Suvarnabhumi International Airport Project

Created by modifying "Suvarnabhumi Airport Control Tower, Bangkok, Thailand"
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Reasons for Taking Up This Project

Thailand's Suvarnabhumi Airport, which was built to accommodate the rapid rise in demand for air travel, was planned to function as an airport at the heart of Thailand's network of domestic flight routes and as an international airport hub in Southeast Asia that would host international and domestic connecting flights. The airport opened its doors in September 2006 and functions as a driver of Thailand's economy that includes the tourist industry, which is one of the country's key industries.

The 4,000-meter and 3,700-meter runways are located in a marshy area approximately 8 kilometers north to south and 4 kilometers east to west. This new gigantic airport, which can welcome 45 million passengers annually as part of phase 1 of the project, is part of Japan's Official Development Assistance (ODA) scheme (providing funds and engineering expertise). In terms of investment, it is the largest project of its kind in the aviation sector.

The reason JSCE decided to include this project in its International Infrastructure Archives is as follows:

1) For this new airport project, which is Thailand's largest piece of infrastructure, a giant government loan of 199.243 billion yen (based on the authorized amount for government loans) was granted to Thailand, and it was a project in which the main facilities such as the runways and passenger terminal building were built.
2) In addition to the financial support that was used to build the airport facilities, it was a project in which JICA's technical assistance scheme was also used. From the planning stage, building stage, preparation for the opening stage, right up to the stage of running the airport after opening, experts were dispatched to the project implementation organization from the Ministry of Land, Infrastructure, Transport and Tourism and Narita International Airport Corporation (NAA) for short and long-term placements, and various ongoing assistance was provided, including from the perspective of how to utilize Japanese technologies.

The following is a more detailed breakdown of the reasons for including this project in the International

Infrastructure Archives:

(1) In the procedures such as those of placing orders for the construction of the airport facility, the stakeholders on the Japanese side provided appropriate advice and ensured the procurement procedures went smoothly.

(2) In building on the marshland, the ground improvement technologies adopted at Haneda Airport in Japan were used.

(3) As preparations to begin welcoming passengers, the stakeholders on the Japanese side assisted in the formulating of an airport civil engineering facility management manual and an environment management manual to be followed by the project implementation organization, and also trained personnel who would be in charge of operations in both of these areas.

(4) After opening the airport, various communication between Airports of Thailand (AOT), which manages and runs the airport, and Narita International Airport Corporation (NAA), which manages and runs Narita Airport, took place.

The Grand Palace
Photo by Tourism Authority of Thailand (TAT)

1 Project Background

The Kingdom of Thailand is about 1.4 times the size of Japan and has a population of about 66 million, which is slightly over half of that of Japan. Japan and Thailand have a history of cultural exchange that dates back 600 years, with both countries traditionally maintaining a good relationship. Based on the close relationship between the imperial family and the royal family of both countries for many years, Japan and Thailand have built a strong relationship in a wide range of areas such as politics, finance, and culture, and there is a large amount of interaction between the people of both countries. The number of Japanese expatriates living in Thailand is slightly more than 81,000 (2020).

Thailand is one of the main industrial and manufacturing hubs in the region of Southeast Asia and is also an economic hub as a country that exports industrial and manufactured goods. In 2019, before the Covid-19 pandemic, the nominal GDP per citizen was about $7,800 a year. Compared to 1999, in which this figure was about $2,010, the nominal GDP has increased 3.9 times over the 20-year period. Thailand has vast tourism resources and many tourists from not only its neighboring countries but all over the world visit the country. The number of inbound tourists in 2019 before the pandemic was about 40 million, which meant Thailand was ranked 13th in the world. Comparing this to the approximate 8.7 million tourists in 1999, we can see that Thailand experienced growth of over 4.5 times in those 20 years (Figure 1). Against this backdrop, there is a very strong demand for air travel between Thailand and the rest of the world. Furthermore, about 8 million of Thailand's population is condensed into the capital of Bangkok, with the city acting as a hub for exchange with foreign countries.

For many years, the role of the gateway airport in Thailand had been fulfilled by Don Mueang International Airport, which is located 20 kilometers to the north of central Bangkok. Don Mueang International Airport was opened as a Thailand military airfield in 1914 and began accepting commercial aircraft in 1924. Improvements were made to the airport with the use of Japanese government loans, but there was little room to increase the scale of the airport and there was also the restriction of sharing it with the military. For both reasons, it was forecast

Photo 1: Positioning of Central Bangkok and the Airport

Photo 2: Don Mueang International Airport
(Photo : Pawarin Prapukdee/AirTeamImages.com)

Figure 1: Change in the Number of International Tourists to Thailand Over Time (Source: Our World in Data [https://ourworldindata.org/grapher/international-tourist-trips?tab=chart&time=1995..2019&country=~THA])

that the airport would not be able to handle an increase in air passengers.

The Government of Thailand had a development plan for the eastern region of Thailand and called on foreign investment to advance facilities such as roads, ports and harbors, and industrial estates.

Against this backdrop, in 1960, the Government of Thailand researched the possibility of forming a project to construct a second international airport in Bangkok, and decide a site of this project, which is named Nong Ngu Hao (meaning wetlands inhabited by cobras) district of Samut Prakan Province, which is located about 30 kilometers east of Bangkok.

2 Project Chronology

2.1 Process to the Opening of the New Airport

After the site for the new airport had been determined at the outset of the 1960s, in 1973, the majority of the airport site was purchased, with an approximately 3,200 hectars site acquired. However, the plan was shelved following a change in the ruling government, and the plan would then rise up and fade away several times afterward.

In the 1990s, the demand at Don Mueang International Airport neared the limit of the airport's capacity, and thus the need for a new airport facility went up a level. The Japanese government would end up assisting the new airport project as ODA, and in 1996, the project took a step forward with the signing of a loan agreement between the Government of Thailand and the Japanese government. Then, in 1996, Second Bangkok International Airport Company Ltd. (SBIA) was established as the project implementation organization, and the project got underway.

However, due to financial circumstances, such as the 1997 Asian financial crisis, and political unrest in Thailand, the opening of the airport, which was initially scheduled for the year 2000, was significantly pushed back. Furthermore, there were various other reasons for the delay. For example, the site development and ground improvement work would take a lot of time and the bidding procedure, resource procurement, and construction work would take a lot of time given that an architectural design that consisted of a large roof structure with a large span using a large amount of glass and steel frames was adopted in a design competition for the passenger terminal building.

When undertaking the project, the Japanese government provided financial and technical support by offering government loans and dispatching experts to the Government of Thailand's project implementation organization for long-term placements. Furthermore, many Japanese companies were involved in each project phase such as planning, design, construction, and construction management, with Japanese airport construction technologies put to use.

As a result of the hard work of the project stakeholders led by those from Thailand and Japan, the new airport was opened on September 28, 2006. The name of the airport was officially named Suvarnabhumi (meaning 'golden land' in Thai) Airport by His Majesty King Rama IX.

The overall cost of the project was ultimately about 380 billion yen. Over half of the overall cost was loaned by the Japanese government.

SBIA, which was set up as the organization to implement this construction project, then changed its name to the New Bangkok International Airport Company Ltd. (NBIA), and then before the airport was opened, it merged with Airports of Thailand (AOT), which runs the major airports in Thailand.

2.2 Airport Facilities and Passenger Data

The airport is run by Airports of Thailand (AOT), which is the company that was established when the state-owned Airports Authority of Thailand (AAT) was made private. The area of 3,200 hectares is made up of two runways and a large Passenger Terminal Building. After the airport opened its doors, the demand for air travel in Thailand dramatically increased and the number of people using the new airport was 65 million annually (ranking 19th in the world in 2019). Meanwhile, the number of people boarding international flights from the airport was 53 million a year (ranking 9th in the world in 2019), making it one of the most prominent airports in Southeast Asia.

Photo 3: Satellite Photo (December 2006)
(Source: ISAS/JAXA [https://www.eorc.jaxa.jp/earthview/2009/tp091118.html])

Main Airport Facilities and Passenger Data

Item	Overview
Airport operator	• Airports of Thailand (AOT) • It was made a public company when Airports Authority of Thailand (AAT), which was a state-owned company at the time, was taken public. • The New Bangkok International Airport (NBIA), which was an organization to implement the construction project, merged with AOT before the airport was opened.
Size	• 3,240 hectars (approximately 8 kilometers from north to south and 4 kilometers from east to west) • Over twice the size of Tokyo International Airport (Haneda Airport), which is 1,522 hectars
Runways	• Two 01R/19L: 4,000 meters in length × 60 meters in width 01L/19R: 3,700 meters in length × 60 meters in width • Open parallel layout (the space between center lines is about 2,200 meters)
Passenger terminal building	• The overall floor space area is 563,000 square meters (at the time the airport was built, it was one of the largest buildings in terms of its overall floor space area). • It was designed by an American architect (Helmut Jahn). • It is a bright and innovative design that uses a large amount of glass. • On the first floor, there is a bus and taxi boarding area, and in the basement, there is the railway station. • In the terminal building, there is a hotel for travelers in transit.
State of Operation (2019)	• It is a hub airport in Asia that is extremely convenient for those boarding connecting flights to countries in East Asia, Europe, or the Middle East. • There are 170 international flight routes (54 countries) and 14 domestic flight routes. • In terms of airlines that use the airport, there are 116 companies for international flights and 4 companies for domestic flights. • The total number of travelers who use the airport was 65,425,879 (53,455,724 international travelers and 11,970,155 domestic travelers). • For the total number of travelers, the airport is ranked 19th in the world, and for the number of international travelers, the airport is ranked 9th in the world. • The amount of cargo handled by the airport is 1,357,986 tons (1,327,125 tons of international cargo and 30,861 tons of domestic cargo). • The number of take-offs and landings is 380,051 (294,969 for international flights and 85,082 for domestic flights).
Access	• Access by car is about 30 kilometers via the expressway from the center of Bangkok. • Access by rail is about 28 kilometers by a direct train from the center of Bangkok and takes approximately 30 minutes.

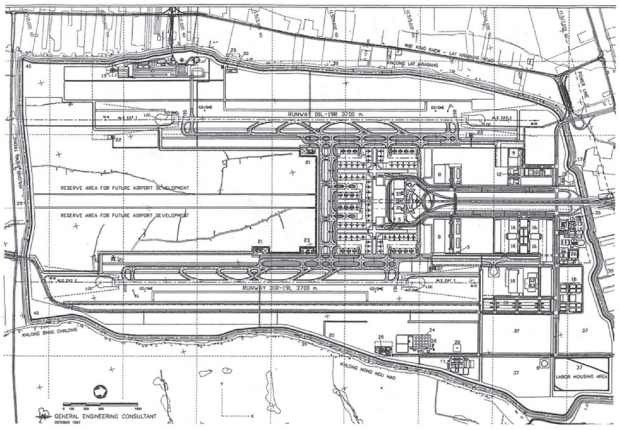

Figure 2: Airport Schematic (Phase 1 of Plan)
(Source: Issue 111 of Airport Review (2000))

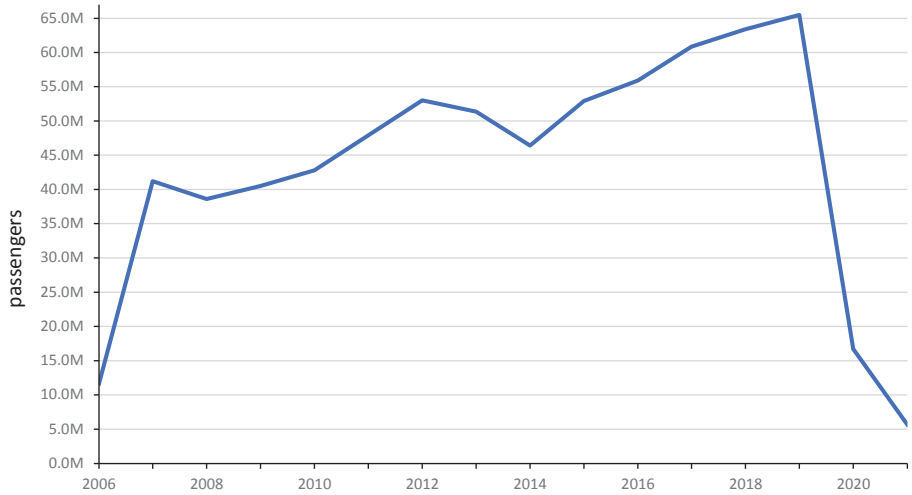

Figure 3: Change in the Number of Passengers That Travel Through Suvarnabhumi Airport (Source: Wikidata [https://www.wikidata.org/wiki/Q194316])

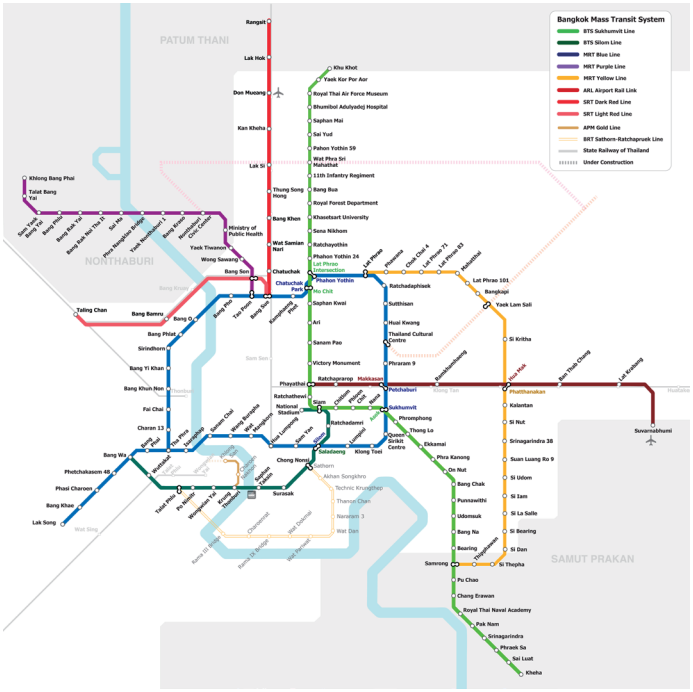

Figure 4: Railway Network for Access to Airport ("2023 Map of Bangkok mass rapid transit" by Zeddlex, CC BY-SA 4.0 / Resized from original, https://commons.wikimedia.org/w/index.php?curid=132493409)

2.3 Confusion After Opening

After Suvarnabhumi Airport opened in September 2006, in addition to cracks and damage to the runways and taxiways and a lack of information boards and toilets, various other problems occurred such as delays to and loss of luggage due to inexperienced staff, and these caused serious disruption to travelers using the new airport. As a result, together with carrying out improvements to the facilities, in March 2007, regular flights at Don Mueang International Airport, which is the

old airport, were resumed. Don Mueang International Airport was scheduled to host in-service charter flights, cargo planes, government planes, and military planes after the new airport had opened, but it assisted the new airport, which was experiencing trouble, and supported the demand for air travel in Thailand. Afterward, with the aforementioned problems more or less resolved, the new airport returned to its regular operations. And, the regular international flights at Don Mueang International Airport would also continue.

2.4 Dividing up the Roles of Airports in Bangkok

Bangkok would become home to two international airports. Today, based on the division of roles with Suvarnabhumi Airport operating as a full-service carrier (FSC) airport mainly for medium and long-distance routes and Don Mueang International Airport operating as a low-cost carrier (LCC) airport with a focus on short-haul routes, the airports continue to support the strong air travel demand and enjoy rapid growth together.

2.5 Expansion Plan

While Suvarnabhumi Airport began operation with two runways and a passenger terminal building, ultimately, the plan is to build four runways, two passenger terminal buildings, and two satellites that link these buildings. Once all the airport facilities have been built, it is anticipated that the number of travelers that the airport can handle will be 150 million a year, which is approximately over three times as many as at the time of opening, and the number of possible landings and take-offs at a maximum of 120 an hour, which is about twice as many as at the time of opening.

A part of the expansion plan got underway, and in September 2016, the construction of the first new satellite was started on the south side of the current passenger terminal building, with it now more or less complete. The plan to build a third runway was determined in April 2019, and in November 2019, a plan was set to build an extra passenger terminal building on the north side of the existing passenger terminal building. As such, efforts to increase the size of the airport were up and running to meet the strong demand for air travel.

3 Project Features

3.1 Putting Core Infrastructure in Place

This project contributes significantly to the development of Thailand and the Southeast Asia region because, for Thailand, which is a major production and export base in Southeast Asia and welcomes a large number of tourists from all over the world, it was a project that construct core infrastructure essential to support the country's strong demand for air travel with the rest of the world. In 2005, a year before

the airport opened, the demand for air travel in Bangkok was about 39 million passengers annually. After the airport opened, this increased dramatically, and in 2019, this figure rose to about 107 million passengers annually in total at the new and old airports. Thus, this was a project that delivered solid results.

3.2 The Project Over the Long Term

This is a large-scale project that was completed after its many stakeholders experienced a journey of ups and downs.

The land that would be used to construct the new airport was decided at the outset of the 1960s, and with the purchasing of land thereafter, in 1973, the majority of the land to be used for the airport was already acquired. And due to the impact of the political and economic situation in Thailand, the project was started in 1996 and it then took 10 years from the outset of the project up until the airport was open.

It was a grand project that span across a long period of time, with it taking 30-plus years from acquiring the land to the opening of the airport and 50-plus years from determining the project site to the opening of the airport.

3.3 Measures Against Weak Ground and Flooding

The project site was a wetland located on low-lying ground, and large-scale ground improvements were carried out before constructing the airport. In undertaking the ground improvements, proven construction methods used in the offshore development project of Haneda Airport in Japan were adopted. Even beyond these ground improvements, many Japanese companies were involved in various stages of this project, with Japanese airport construction technologies playing a major part.

The project site was land with concerns over possible flooding from heavy rain. Consequently, flood measures were essential in the construction of the airport. Around the approximately 24-kilometer circumference of the airport, the following infrastructure was built: an approximately three-meter-tall embankment, a canal around the outside of the embankment, six regulating ponds inside the embankment and drainage channels to the regulating ponds, and four pumps that discharge water from the reservoir to the waterway outside the airport.

Bangkok suffered large-scale flooding in October 2011, and much infrastructure was damaged, including Don Mueang International Airport experiencing flooding and no longer being able to operate properly. However, Suvarnabhumi Airport's measures to prevent water damage at the airport were effective and the airport had been able to avoid flood damage and maintain its infrastructure, which is key to Thailand.

3.4 Wide-Ranging Japanese ODA

During this project, a wide range of financial and technical support was provided by Japan. The Japanese government began granting loans to Thailand in 1996, and from 1997 to the opening of the airport in 2006, dispatched experts to the project

implementation organization of the Government of Thailand on long-term placements as well as many experts for short-term placements even after the airport had opened. In each project stage, such as planning, building, preparation for the opening, and running the airport after it had opened, Japan's broad ODA efforts, which included providing funds and dispatching personnel, offered multifaceted assistance to ensure the success of the project.

3.5 Creating Manuals and Training Staff for Running the Airport

In assisting with this project, not only did Japan help plan and construct the airport, but it also helped preparation of operating of the airport, in the field of maintenance and management of airport civil facilities such as the runways and environmental management of aircraft noise and so on. More specifically, the Japanese stakeholders supported formulation of the airport's civil facilities management plan and the environmental management plan, and also trained the relevant personnel.

In addition to assignment of long-term expert locally in Thailand, seminars and so on were held with invited staff from the Civil Aviation Bureau, Ministry of Land, Infrastructure, Transport and Tourism, Narita International Airport Corporation, and Kansai International Airport Corporation from Japan as short-term experts. And training to educate the relevant AOT personnel in Japan were also conducted to confirm how the work is actually undertaken in Japan.

3.6 Continuous Exchange

Even after the opening of the new airport, Narita International Airport Corporation and Kansai International Airport Corporation, which had helped in the preparations before opening the airport, continued various communication with the project implementation organization, AOT, which is a fellow airport operator. In continuing to communicate, Narita International Airport Corporation and Kansai International Airport Corporation both helped to ensure the efficient running of the airport that had been built with the ODA scheme, such as by sharing information on measures for various issues.

4 Lessons Leaned

4.1 Forming a Project that Meets Needs of Receiving Country

This project was a project to build core infrastructure to support the strong demand for air travel in Thailand, which was a pending matter for many years in the country. The demand for air travel after the opening of the airport grew dramatically, and so this project has without a doubt, been indispensable for Thailand. In

forming an ODA project of this nature, it is important for the country providing aid to fully consider the economic and social situation and urgency within the country on the receiving end, and for both sides to formulate a project that meets the needs of the receiving country through in-depth discussions.

4.2 Proposal of Plan to Build Infrastructure with a Long-Term Vision

In 1973, this project had almost entirely acquired the 3,200 acres or so site land, which is over twice the size of Haneda Airport at present. Although it took a lot of time until the airport was open due to various factors, the land required for the airport was acquired at the outset for its long-term expansion, and in implementing the current expansion plan, no acquisition of new airport land is required. In this way, it is important to formulate a plan established from a long-term perspective that also takes into account efforts to scale up the infrastructure in the future.

4.3 Use of Japanese Airport Construction Technologies

In each phase of this project, such as the planning, design, and building of the airport, many Japanese companies with a wealth of experience in constructing airports were involved, and Japanese airport construction technologies were used to full effect. Among them, construction methods, which have been used in many projects in the past such as the building of Haneda Airport in Japan, were used for taking measures against the weak ground, which is a key point in constructing an airport. With regards to measures against the weak ground, because Japan has a long track record in building airports, including maritime construction work, construction methods can be examined from a broad range of choices, and so there is an advantage in utilizing Japanese technologies.

4.4 Collaboration of Various Japanese ODA Initiatives

With regards to the assistance from Japan, in addition to loans from the Japanese government being granted from 1996, the Japanese stakeholders supported the project by providing more appropriate assistance for various projects phases and issues such as with the dispatching of experts to the project implementation organization of the Government of Thailand on long-term placements from 1997 to the opening of the airport in 2006, as well as the dispatching of many experts for short-term placements also after the airport had opened. The impact of assistance was enhanced by areas of assistance working in close partnership. For example, for the discussions between both countries regarding the lending of government loans, experts on long-term local placements would coordinate by taking part on the Thailand side.

4.5 Implementing ODA Based on the Circumstances in the Receiving Country

It goes without saying that it is important to implement ODA based on the actual situation in the country on the receiving end of the ODA. In this project as well, the experts on long-term placements in Thailand and the project implementation organization on the Thailand side of the project team gained a deeper understanding of each other through work and interactions outside of work, and used this to their advantage when cooperating on the project.

An example that benefited from this is the creation of manuals and the training of personnel for the running of the airport. To run a facility efficiently and well, it is important to create various manuals and train personnel who can use these manuals accurately. In creating the manuals, with cultural and habitual differences between the two countries, it was necessary to hold close discussions with the project implementation organization and have the project implementation organization revise the content into something they can actually use instead of just keeping the manuals that were being used in Japan as they were. It is also necessary to take a similar stance when training personnel.

4.6 Communication Post-ODA

After opening the airport, it is important to provide a follow-up for facilities built with ODA. However, a follow-up as part of the ODA scheme has its limits. Therefore, it is important to build a relationship beforehand that will enable stakeholders in the same position as the project implementation organization (in this project, airport operators Narita International Airport Corporation and Kansai International Airport Corporation) to continue to communicate and address various issues outside of the ODA scheme.

Photo 4: Plaque Installed at the Passenger Terminal Building to Commemorate the Assistance from Japan (Photo by NAA (Narita International Airport Corporation))

Author

Yoshihiro OZAWA

Born in 1956, he graduated from the Faculty of Engineering at Ibaraki University.
In 1978 he joined the New Tokyo International Airport Authority (now Narita International Airport Corporation).
In 1984, he was seconded to the Civil Aviation Bureau.
In 1997, he was dispatched to the Kingdom of Thailand (Second Bangkok International Airport Company Ltd.) as a JICA long-term expert.
In 2016, he left Narita International Airport Corporation (Executive Officer and General Manager of the Engineering Department)
In 2021, he left Airport Intelligent Communications Service Co., Ltd. President & CEO)

Takamitsu ASAWA

Born in 1962, he completed a master's degree at a graduate school of the Tokyo Institute of Technology (majored in Civil Engineering).
In 1987, he joined the Ministry of Transport (now the Ministry of Land, Infrastructure, Transport and Tourism) and was mainly in charge of policy making of ports and airports.
Between 2000-2003, he was dispatched to the Kingdom of Thailand (New Bangkok International Airport Company Ltd.) as a JICA long-term expert.
In 2022, he left the Ministry of Land, Infrastructure, Transport and Tourism (Director-General of the Ports and Harbours Bureau)
Since 2022, he has acted as an advisor for Mitsui Sumitomo Insurance Company, Limited.

Takeshi HASEGAWA

Born in 1960, he graduated from Kumamoto University (Faculty of Engineering, Department of Architecture
In 1984, he joined the Ministry of Transport (now the Ministry of Land, Infrastructure, Transport and Tourism) and mainly worked for the Civil Aviation Bureau.
In 1995, he was seconded to OECF (now JICA). He was in charge of appraisal of Japanese yen loans for the Suvarnabhumi Airport Project.
Between 2003-2006, he was dispatched to the Kingdom of Thailand (New Bangkok International Airport Company Ltd.) as a JICA long-term expert.
In 2020, he left the Ministry of Land, Infrastructure, Transport and Tourism (Principal of Aeronautical Safety College).
In 2020, he joined Airport Facilities Co., Ltd. and is currently Senior Executive Officer (General Manager of the Airport Business Planning Department)

Kiyoshi HOJI

Born in 1955, he completed a master's degree at a graduate school of the University of Osaka (majored in environmental engineering).
In 1982, he joined the Ministry of Transport (now the Ministry of Land, Infrastructure, Transport and Tourism) and was mainly in charge of aviation administration.
In 1993, he was seconded to OECF (now JICA) and was involved in the Suvarnabhumi Airport Project.
In 2014, he left the Ministry of Land, Infrastructure, Transport and Tourism (Manager of Kansai International Airport).
After his time at the Specialists Center Of Port and airport Engineering (SCOPE), etc., he has served as Representative Director and President of Chuokoei Corporation since 2022.