1995 Technical Review
Summary
by Mukhtar Husain

Jakarta Airport Terminal II

Tangerang, Jakarta,
Indonesia
1560.IDA

Architects
Paul Andreu
Aéroport de Paris, Orly, France

Client
Ministry of Communications

Completed
February 1992

Landscaping of Soekarno-Hatta Airport, Cengkareng, Indonesia

Introduction

Until the early 1980s, Jakarta, the capital of Indonesia, was served by two airports: Kemayoran Airport for domestic flights, and Halim Airport for international flights. Rapid growth in air traffic indicated that these two airports would not be able to cope with the situation for long. The government, therefore, acquired 1,800 hectares of land at Tangerang, about 20 kilometres West of Jakarta, for the construction of a new airport to replace Kemayoran and Halim. The first phase of the new airport, including infrastructure development and Passenger Terminal 1, with a capacity of 9 million passengers per year, was completed in 1985. This was the subject of a Technical Review Report for the Award in 1989.

Development of the Indonesian economy, with the consequent growth in air traffic, particularly in the Asia-Pacific region, prompted the Government to embark on Phase 2 in 1986. Work on Terminal 2 began in 1987 and was completed in 1992, raising the total capacity of the airport to 18 million passengers. Terminal 2 is visually very similar to Terminal 1. However, some features were modified at the request of the government. This report essentially reviews Terminal 2, but within the context of the overall master plan, and attempts to compare it with the earlier building from the point of view of its total experiential impact on the arriving or departing passenger.

Jakarta; located in the North-Western part of the island of Java on the coast of the Java sea

Context

Historical background

Jakarta International Airport, officially known as the Jakarta Soekarno - Hatta International Airport, was designed to replace two existing airports: Kemayoran for domestic flights, and Halim, which was also a military base, for international flights. Both these airports had reached saturation point, and could not be further expanded due to their location close to the city. In 1977, the Indonesian government commissioned Aéroports de Paris to produce a Master Plan that could be developed in phases, and would serve the needs of the city into the early part of the next century.

The anticipation of heavy traffic was reflected in the layout of the facilities and buildings. Provision was made for two runways, multiple taxiways, domestic and international passenger terminals, and technical and support buildings for aircraft maintenance, cargo handling and fuel storage.

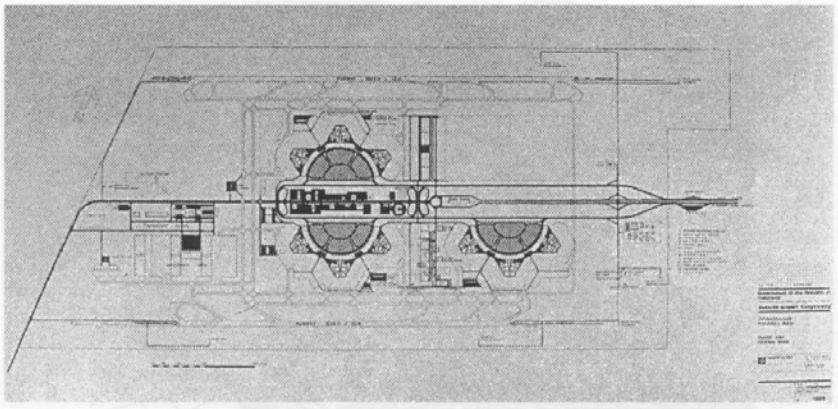
Analysis of passenger traffic indicated that the terminal should be sub-divided so that two-thirds of it could serve domestic traffic, and one-third international traffic. The architect decided to have a one-and-a-half level terminal. Arrivals and departures were at one level on the city side; departures were at the first floor level on the airside, leading to three sub- terminals, with arrivals below.

The boarding lounges were conceived as rooms at the end of passages. Each sub-terminal unit consisted of a central 'spine', with separate passages leading to seven boarding lounges. Each lounge was connected by a bridge to the planes parked on the apron.

Moreover, the architect decided to provide air-conditioning only in those areas where passengers wait, such as, boarding lounges, baggage claim areas and the check-in-halls. The spine and connecting passages are open, overlooking beautifully landscaped courtyards and permitting the fragrant breeze to flow through.

The entire terminal building was designed with sloping roofs in red terra-cotta tiles resembling those used on traditional Javanese houses. Although at its highest point the roof is 17.5 metres, it slopes down to 10 metres at the edges, giving the overall impression of a single floor building with clusters of smaller structures, which hold the boarding lounges facing toward the airside. The roof is supported by an exposed steel pipe structure resembling the bamboo framework of traditional houses.

This not only imparts a noticeably human scale to the entire building, it also gives the Terminal a distinctly tropical Indonesian character. The harmonious relationship between man-made structure and nature, here embodied between the building components and the landscaped courtyards, is characteristic of village buildings in the Jakarta region: small bamboo-frame dwellings, which have tiled roofs, open verandah-like spaces, shady gardens within courtyards that contrast with the openness of the rice-fields, and sheltered walkways that connect separate buildings, and provide protection from the rain and sun. Furthermore, the breaking down of spaces into smaller units makes circulation easier, with little dependence on directional signs.



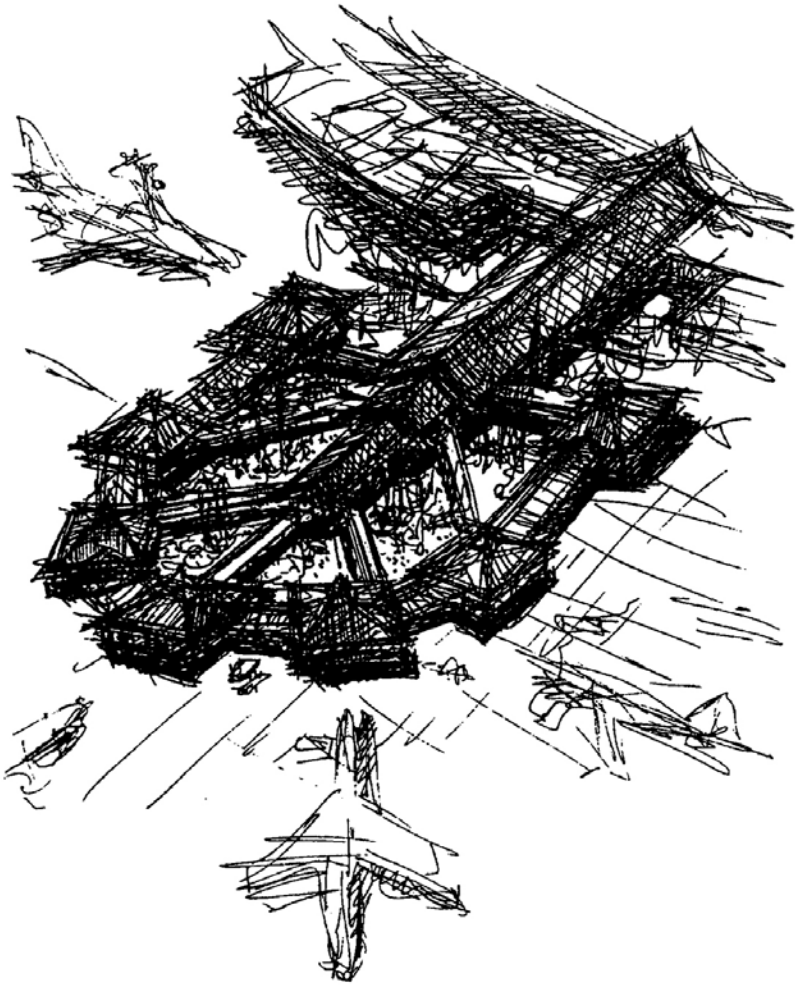
Site plan

The Terminal relates to the Indonesian context, whether seen from the air just before landing, or from the airside, while taxiing towards the building, or while walking through it upon arrival or departure. It was completed in December 1984 and become operational on 1 April 1985.

However, some of the features that distinguish this building, such as open corridors and passages and vast un-air-conditioned areas, were criticised by many users. During tropical rainstorms, water comes through the sides into the corridors, not only drenching passengers but making the floors slippery. At other times many insects enter the building, crawling over the exposed surfaces. Because the sides are open, the space along the edges cannot be optimally utilised. Passengers complained of the heat and humidity in these areas. The concourses on the city side, which are all at ground level and not air-conditioned are generally congested, as the same level handles arrivals and departures. Maintenance personnel has a difficult task keeping the terminal clean and dry.

As air-traffic kept increasing and expansion became imminent, it was decided to construct Terminal 2. The same architects, Aéroports de Paris, were requested to finalise the design in 1986. However, two major changes were requested in the concept:

1. The new terminal was to be a completely two-level facility, with an elevated approach road on the city side for departures at the upper level and arrivals below. This would also reduce the curb-side length of the building, reducing walking distances.



Architects sketch of cluster boarding lounges

2. The new terminal was to be entirely air-conditioned, including the concourses on the city side, and all circulation areas.

The overall character of the building; the passenger flow routes within it and the division into three sub-terminals, each with its cluster of boarding lounges, similar to Terminal1.

Construction of this terminal started in March 1987 and was completed, ahead of schedule, in mid-1991. It became operational in February 1992 and has effectively doubled the handling capacity of the airport.

Local architecture

Traditional architecture is a product of its environment; each regional variant develops in response to the conditions and materials determined by the local climate and vegetation. The archipelago of Indonesia contains a wide variety of sub-cultures and architectural styles. Materials vary from island to island. However, amidst all this variety, the basic system of construction and climatic response of the buildings does not change.

A post and beam system of construction, with very light dividing walls is typical in the region. Traditional houses are renowned for their dramatically inclined roofs, which allow vast amounts of rain water from the tropical monsoon to run swiftly and safely away. The over-hanging eaves shade the windows and protect them from driving rain. Very often the floor of the building is raised on stilts. The buildings usually have one storey.

Also, traditional Indonesian architecture has always had a symbiotic relationship with its surrounding environment. Built with materials collected from the fields and forests and with simple tools, the houses and other public buildings consequently blend harmoniously into their natural habitat.

Climate

The climate in the region is tropical and equatorial, with breezes, high humidity, almost daily showers and uniform diurnal temperatures throughout the year hovering around 28 degrees centigrade. There is also a winter monsoon, which means that precipitation is higher between November and March. The remaining part of the year is relatively dry.

Site

Nearly 1,800 hectares of unbuilt agricultural land was acquired for the development of the first phase of this airport. Because of the high density of population, every part of the country, particularly the island of Java, which houses over 60 per cent of the population of Indonesia, is cultivated. The land selected, was in the midst of paddy fields, in the vicinity of the satellite township of Tangerang. Even today there are scattered houses on the periphery of the airport, which is linked to the city by a new highway.

Immediately surrounding Terminal 2 is the development undertaken according to the Phase 1of the Master Plan. It includes the northern runway; the central fire-station, the fuel farm and area reserved for aircraft maintenance facilities to the

Overall view of the airport, remarking the transition from local architecture, to the car park and the terminal complex

West, the central administrative area, the mosque and control tower within the loop of the access road to the South, and land reserved for cargo facilities and air-shows to the East.

Topography

As mentioned earlier, the topography was paddy field. There fore, it is virtually level land with an imperceptible gradient and no visible geographic features in the vicinity. Its altitude varies between 6 and 11 metres, which is relatively good for drainage purposes. This was one of the decisive factors in the selection of the site.

Programme

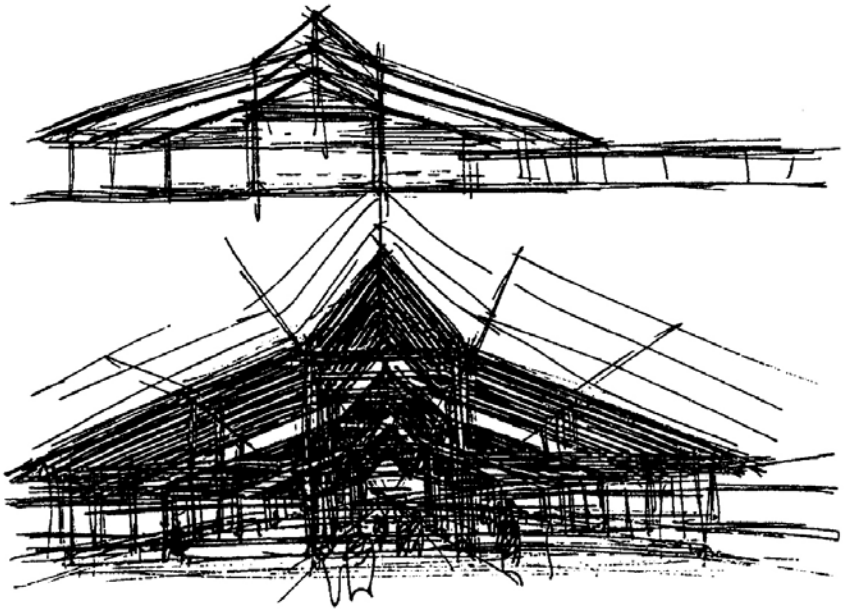
Until 1974, Jakarta was served by Kemayoran airport which was close to saturation. The advent of large commercial airliners required runways of 3 kilometres or more, and those of this airport were barely 2.5 kilometres. Its location in the heart of the city prevented further expansion.

They realised that a new modern airport should be developed on a sufficiently large site outside the city. However, to provide for the 10 year interim period, before the new airport became operational, the government decided to develop the existing military airfield at Halim, 10 kilometres South of Jakarta, as quickly as possible so that it could handle part of Jakarta's civilian air traffic. The runway at Halim was lengthened, a passenger terminal was built and opened in 1974. It was already handling a million passengers by 1976.

Growth in air traffic at Jakarta for the period between 1970 and 1976 was 21 per cent per year for international traffic and 25 per cent for domestic traffic. This was considerably higher than the world average at that time. Faced with the prospect of doubling every four years, no further developments at these two locations could possibly cope with the growth forecast for air traffic at Jakarta in the long term, due to environmental problems and air space congestion. It was, therefore, necessary to build a new airport.

In 1969, an American firm of consulting engineers, Ralph M. Parsons, was commissioned to carry out preliminary surveys. They

East view of terminal 2



Cross section; roof structure of airside corridors

identified the satellite town of Tangerang, West of Jakarta, as the best of several possible sites for the new airport. A preliminary Master Plan was carried out by a consortium of Canadian consultants in 1974.

Based on these studies, Aéroports de Paris, France, carried out a Master Plan review and detailed engineering design. This was submitted to the Indonesian government in 1979. The first phase of the new airport got underway in 1980 and the completed facility, with a terminal that had a capacity of 9 million passengers per year, became operational in 1985. Regular civil aviation operations were moved from Kemayoran and Halim to the new airport, named Jakarta Soekarno-Hatta International Airport. The airfield at Kemayoran was closed. Halim was retained for limited use, including special charters, Hajj flights and state guests.

Traffic forecast figures for the period 1980-2000, based on data available up to 1976, were as follows, in thousands of passengers :

Year	Domestic	International
1980	3,690	1,450
1985	6,481	2,318
1980	10,400	3,531
2000	23,600	7,543

At the time of the opening of the new airport in 1985, actual passenger traffic was lower than forecast, due to a world-wide recession and higher petroleum prices which hit domestic travel rather hard.

However, updated passenger traffic forecasts based on data available up to this time indicated a steady growth which would exceed the capacity of Terminal 1 by 1992.

Traffic Forecast 1985 in Thousands of Passengers :

Year	Domestic	International
1985	3,468	1,286
1986	3,793	1,665
1987	4,049	1,934
1988	4,759	2,132
1989	4,889	2,158
1990	4,967	2,559
1991	5,134	2,284
1992	5,834	3,590
1993	6,475	3,980

The government of Indonesia therefore decided to embark on Phase 2 according to the Master Plan executed by Aéroports de Paris, and develop Terminal 2 with an

Passenger depature gallery, located in Terminal 1

Gardens as seen from the public gallery

additional capacity of 9 million passengers per year. Traffic has increased substantially in the last three years. Although official figures have not been published, it is estimated that the total traffic in 1995 will be about 13 million passengers, two-thirds of which is domestic, and one-third international.

General objectives

The following guidelines were given to Aéroports de Paris for the design of Terminal 2:

1. It should be similar in capacity to Terminal 1, and handle 9 million passengers per year.

2. It should be similar in general character, form and materials to Terminal 1, except that:
- It should be a two-level terminal, with upper level departures on an elevated approach road, and arrivals below.
- It should be fully air-conditioned, including the public concourse on the city side, and all the passages and corridors for passenger movement.
- It should provide an excellent level of service to all passengers, including the elderly and the handicapped. Lifts and escalators should be provided at all changes of level, and moving walkways used to reduce the walking distance to and from aircrafts.

3. It was initially desired by the government that Terminal 2 should be fully international. However, during construction, and in response to the latest traffic forecast data available, it was decided to convert one sub-terminal for domestic use and retain the other two for international traffic.

Functional requirements

The architect and consultant determined the plan after working out space requirements (from the traffic forecast data) for the various activities within the building, as well as in its immediate vicinity. As in every airport, the design is based on the volume and pattern of traffic both domestic and international, transits and transfers, on the peak-hour load and aircraft-mix and usage. Usage includes immigration, customs and security regulations. There are thus a handful of viable alternative concepts. A selection from these alternates may be based on architectural potential, capacity for further expansion, client preference, or cost.

In the case of Terminal 2, the example of Terminal 1 existed, and had been assessed. The changes desired by the client were clearly spelled out. It was therefore mostly a case of fine-tuning and detailed design. Aéroports de Paris, due to their previous involvement with the Master Plan and with the design of Terminal 1, were in an advantageous position to undertake this task.

Description

Building data

It is pertinent to present the data for both Terminals 1 and 2 for comparison.

Total site area of the airport: 1,800 hectares

Runways:
- 2 parallel free runways, 2,400 metres apart
- southern runway is 60 metres x 3,660 metres
- northern runway is 60 metres x 3,050 metres

	Terminal 1 1-1/2 levels	Terminal 2 2 levels
Passenger capacity	9 mi./year	9 mi./year
Area	125,000 m²	151,308 m²
Landscaped area	42,000 m²	45,000 m²
Airside paving	1,200,000 m²	493,000 m²
Land-side parking	2,400 cars	2,700 cars

Landscaping of Soekarno-Hatta Airport, Cengkareng, Indonesia

	Terminal1	Terminal 2
Contact stands	21 aircraft	24 aircraft
Remote stands	8 aircraft	16 aircraft
Avio bridges	21 units	44 units
Baggage belts	15 units	12 units

Use of sub-terminals after Phase 1:
- At Terminal 1: 2 for domestic traffic, 1 for international traffic.

Use of sub-terminals after Phase 2:
- At Terminal 1: 3 for domestic traffic.
- At Terminal 2: 1 for domestic traffic, 2 for international traffic.

Design concept

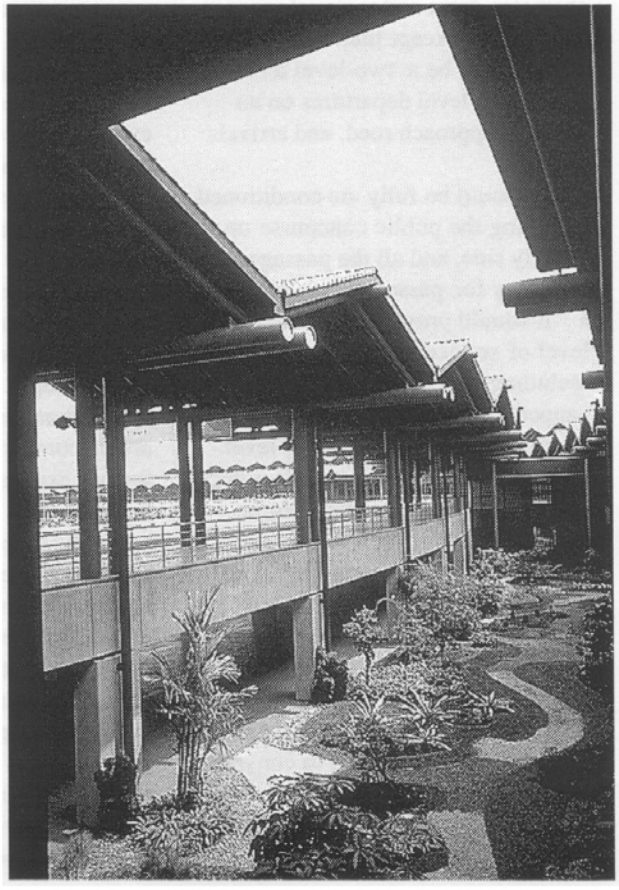
The architectural character of Terminal 1 was based on the premise that, as a gateway into Indonesia, it should reflect the culture, tradition and aspirations of its people. At the same time it should be functional, practical and efficient.

In this case the architect, Paul Andreu, set out to design a simple, low-cost terminal building, which would become a living part of the surrounding environment. As he approached Jakarta on his first ever visit, he had seen, in countless villages, clusters of small red shingled houses scattered among the trees and the broad, flat expanse of rice fields. He set out to design Terminal 1 in this image rather than producing a conventional and characterless monument. He visualised travellers waiting for their flight, sitting, as in a house,among trees, gardens and airplanes. To him, the spirit of the place had to be in harmony with the transition which takes place in the traveller's mind as he or she prepares to journey from one environment to another, leaving the tangible world for the abstract realm of movement and space, and the prospect of another country.

The terminal building, conceived and developed in Phase 1,and then largely repeated for Terminal 2, consisted of three almost identical sub-terminals, each with a capacity of 3 million passengers, connected to form a sweeping semi-circular curb-side building with a car park within it. This concept was a compromise between a completely centralised terminal for 9 million passengers, and three completely decentralised terminals. It created one continuous building, but retained the advantages of small sub-terminals. As a result, walking distances is only 300 metres from the aircraft to the curb-side; baggage handling is simple; and the facility is well utilised.

The most significant aspect of this concept is its human scale. At no time does one feel bewildered by the outlandish concrete mazes associated with airports around the world. Rather, the resulting architectural effect in both Terminals 1 and 2 is intentionally suggestive of the diversity of movement in a garden setting rather than seamless, self-contained perfection.

Separate contracts were given for interior design. This resulted in the installation of ornamental crafts from various parts of the country, including fabric panels, mouldings, chandeliers, and numerous panels in two-dimensional reliefs inside the building; and statues at strategic locations outside. These features, together with the evocation of the West Javanese traditional house for the land-side structure, and the typical traditional roof of Central Java for the boarding lounges, all in steel pipe resembling bamboo construction, are set amidst beautiful sculptured gardens and unite to



Enclosed garden as see from the departure lounge

convey to the arriving passenger the message, "This is Indonesia", and to the departing passenger the impression "Remember Indonesia."

Materials and technology

Materials

Foundations:
20 metre-long driven cast-in-place, reinforced concrete piles for most of the building; strip footings for the galleries.

Main structural elements are:
exposed reinforced concrete for the ground level and upper floor of the main building, and locally produced factory assembled metal pipes, fitted on site for passageways and public lounges.

Infill:
locally produced 15 centimetre hollow blocks and brick facing 11 centimetres thick.

Façade:
10 millimetre clear glass or 10 millimetre clear rolled glass, locally produced with aluminium millwork. Special extruded sections, light bronze in colour, are locally produced.

Floors:
Bandung marble (light brown), solid bricks in passageways alternating with marble (local). Locally produced ceramic tiles are used in toilets.

Ceilings:
Local meranti wood, finished locally in coloured lazur. Armstrong acoustic ceiling tiles are also used. Asbestos cement tiles are used for the toilets and briefing offices.

Roofing:
Varnished matte brown terra cotta tiles, locally produced, over corrugated galvanized steel sheeting.

Other elements are gardens, which are locally designed and created; seating, which is locally produced according to design, or Castelli under local license; and local interior decoration, including steel and copper sculptures, lights, mouldings and relief panels.

Technology

1. Concrete structure, post and beam construction (pre-cast on site). Formwork facing in vertical wooden planks. Prefabricated joists.

2. Steel structure, pipes 406 millimetres and 273 millimetre in diameter, locally manufactured, assembled in factory and mounted, bolted to the concrete structure and welded together on site.

3. Overpass in prestressed concrete, beams 90 centimetres deep, elements of guard-rail in prefabricated concrete with rough formwork facing. Length of overpass (departure level access bridge) 600 metres.

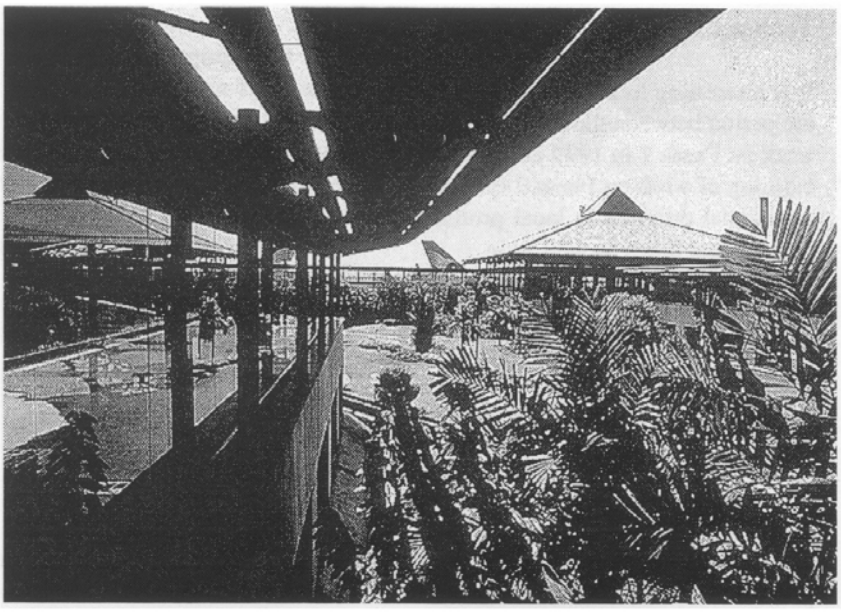
4. Apron Pavement

In Cakar Ayam construction developed by an Indonesian inventor in 1961, the basic idea is to utilise passive soil pressure. Pavement construction in Cakar Ayam (which resembles a chicken foot) consists of:

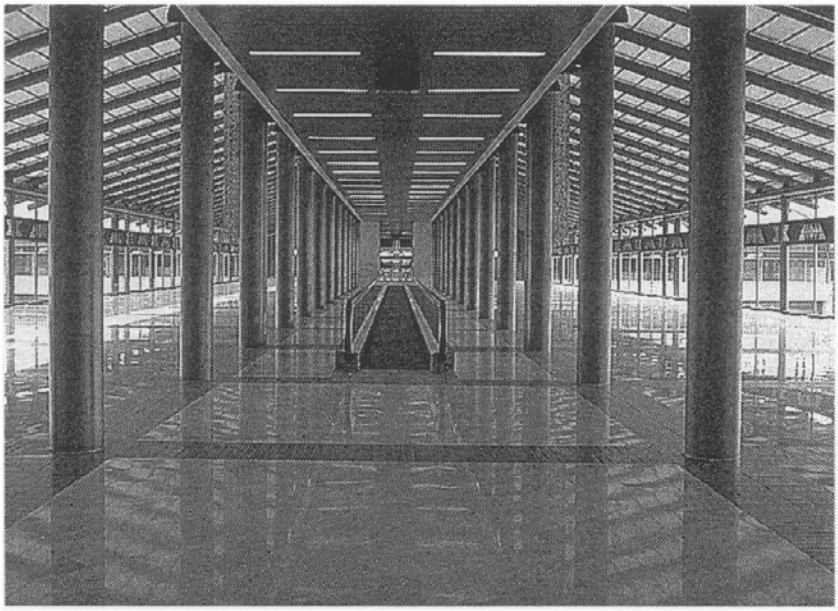
- A reinforced concrete floor slab 10-15 centimetres thick, depending on the loading and the soil conditions.
- Pipes under the slab are monolithically fitted at a regular distance of 2 to 2.5 metres both ways, while the pipe length varies between 1.50 and 3.50 metres.

This same construction technique was used earlier for the runways, taxiways and apron during Phase 1 construction as follows:

- 20 centimetre thick reinforced concrete slab
- 1.20 millimetre pipe diameters
- 0.08 millimetre pipe thickness
- 2.5 millimetre pipe length



The garden as seen from the secondary departure hall



View of the departure gallery located in Terminal 2

The function of the pipes is to maintain slab stiffness and flatness. They are embedded mechanically.

This system is much cheaper than conventional pavement construction as it reduces the slab thickness, and also considerably reduces the depth of sand-fill under the slab.

All infrastructure development was carried out during Phase 1, and basic provisions were made for a total of four terminal buildings,each dealing with 9 to 10 million passengers per year. Terminal 1 was completed as part of Phase 1 development, whereas Terminal 2 has been completed and connected to the various services and utilities networks.

The water supply is provided by the water authority of Tangerang. There are 3 water reservoirs with a capacity of 4,000 cubic metres each. The average consumption of water at Soekarno - Hatta airport is approximately 80,000 - 100,000 cubic metres per month.

Electric power supply to the airport is provided by the government-owned electricity company PLN through its main sub-station, with a capacity of 24 Mega-volt-amperes (MVA). At present, the capacity required by the airport is approximately 10-12 MVA.

For facilities and equipment directly serving flight operations, such as air traffic control facilities and navigational aids, back-up power supply is provided at the main diesel power-house which immediately takes over the load should the PLN power supply fail.

A telephone network of 6,000 channels is provided at the airport and is managed by the government-owned telephone company PERUMTEL.

Origin of

Technology

It is interesting to note that, during the period between the beginning of work on Phase 1 in 1977 and the bigining of work on Phase 2 in 1986, substantial progress in local professional capabilities as well as in manufacturing, fabrication and supply potential was achieved.

Although Aéroports de Paris associated with local consultant PT Konavi during the detailed design stage and during the construction supervision of Phase 1 and Phase 2, the contribution of local consultants during Phase 2 was more significant. Also the construction of Cakar Ayam pavement work was carried out during Phase 2 independent of the French contractor, by PT Cakar Bumi at a much lower rate.

Materials

The building products industry in Indonesia had also progressed, and was able to supply a much higher proportion of materials, finishes and operational equipment. Notable in these categories are the following:

The steel pipes used for supporting the roofs throughout werepreviusly imported from Japan and assembled locally using French handling and fabrication technology. During Phase 2 these pipes were manufactured locally, assembled in the factory and mounted by bolting to the concrete structure and welded together on site.

Ceramic tiles, sanitary facilities 10 millimetre clear rolled glass and extruded aluminium sections used in Phase 2, were locally produced.

Avio-bridges (or telescopic gangways) which connect the terminal building to the aircraft were all imported during Phase 1 but weremanufactured in Indonesia for Phase 2. The Indonesian firm now exports this equipment.

The exact source of various services and products are as follows:

- Foundations and pavement : local.
- Concrete work: local skills under French supervision.
- Steel pipe work: local fabrication and assembly.
- Avio-bridges: local manufacture.
- Miscellaneous building products and fixtures: largely local, or local on-site fabrication.

Labour force

The labour force was 98 per cent local and 2 per cent French, (experts only).

Interior view of of the departure lounge

Professionals

Architectural design and supervision:
French in association with local

Contractors:
French consortium in association with local

Landscape design and execution : local

Interior decoration and artwork:
Local

Construction schedule and costs

History of the project

Master plan by Aéroports de Paris: 1977 - 1979

Start of Phase 1 construction: December, 1980

Completion of Phase 1: March, 1985

Design of Phase 2: August, 1986

Start of Phase 2 construction: March, 1987

Occupancy Completion of Phase 2: June, 1991

Costs and financing

Phase 1
Land acquisition and resettlement US$ 37 million

Cost of buildings US$ 244 million
Cost of interior decorator US$ 0.95 million

Design and supervision fee to AdP US$ 4 million

Total Project Cost US$ 530 million

Terminal 1 cost per square metre US$ 1,110
(This cost was above the average cost for buildings built locally in 1985).

The project was financed wholly through governmental funding of which 40 per cent was from the government of Indonesia, and 60 per cent from international sources.

Note: Because of the steady decline in the value of the Indonesian Rupee against the US dollar over the period under reference, all cost figures are given in US dollars.

1985 US$ 1.00 = Rp 630
1992 US$ 1.00 = Rp 1659
1995 US$ 1.00 = Rp 2195

Cost Analysis Summary

Phase 2
Civil works US$ 110 million

Buildings:

Passenger Terminal 2 US$ 372 million

Apron service buildings US$ 4 million
Power station/ substation US$ 0.2 million
Chlorination & Dilaceration building US$ 0.6 million
Other general buildings US$ 0.4 million
Buildings total cost US$ 377 million
Utilities:
Power supply US$ 8 million
Telephones n/a
Water supply US$ 1 million
Sewage n/a
Fuel supply US$ 11 million
Miscellaneous US$ 3 million
Utilities total cost US$ 23 million
Aeronautical equipment total cost US$ 4 million

Grand total US$ 514 million

Cost Analysis Summary

Passenger Terminal 2

	Total cost	Cost per m²
Sub-structure	US$ 26 mi	160
Super structure	US$ 91 mi	566
Internal finishes	US$ 36 mi	221
Fittings & furnishings	US$ 7 mi	40

Landscaping of Soekarno-Hatta Airport, Cengkareng, Indonesia

Mechanical & Electrical installation

General	US$	94 mi	585
Specific	US$	69 mi	428
Preliminaries	US$	49 mi	293
Grand total	US$	372 mi	2293

Comparative Cost

Because of the unusual nature of the building, which has large spans, which spars large areas exceptional floor heights and a large amount of special equipment, it is not possible to compare the unit cost per square metre with the cost of another building. It may be noted, however, that the unit cost of Terminal 2 completed in 1992 is about twice the unit cost of Terminal 1 completed seven years earlier.

Maintenance Cost

The cost of electricity for running Terminal 1 on its completion was about US$ 635,000 per month. The present total electricity bill for operating the airport, including Terminals 1 and 2 is about US$ 1 million per month.

Technical assessment

An assessment of Terminal 2 cannot be made without comparing it with Terminal 1, and is best made on the following grounds:

1. The overall architectural impact of Terminal 2 is very similar to that of Terminal 1, although the two buildings are somewhat different in basic planning and detail.

2. Terminal 1 was conceived in response to a very tight budget imposed by the client. The Master Plan studies carried out by Canadian consultants in 1974-75 had indicated a cost of US$ 462 million for development of Phase 1 of the project. However, when Aéroports de Paris were asked to review this plan and to prepare a design for the terminal building, they were asked to work within a ceiling of US$ 200 million. Their initial proposal did stay within this limit, although by the time of completion of Phase 1, the cost exceeded this figure for various reasons. Two main features of the design of Terminal 1, the one-and-a-half level concept, and the limited areas with air conditioning, were meant to achieve economies of cost during construction and wher in operation.

At the same time, the architect succeeded in achieving a striking and distinct Indonesian character in his building, both externally and internally. Considering that the building functions quite efficiently as a passenger facility, and is quite attractive and culturally recognizable at the same time, one may call it successful.

3. Although the client was generally quite satisfied with Terminal 1, and commissioned the same architect to undertake Terminal 2, two critical observations by users merited consideration. They are:

- Two have separate levels for arrivals and departures on the land side, to reduce congestion of meeters/greeters, who come in large numbers to receive or say goodbye to passengers in Indonesia.
- The second was to air condition the entire building. This would not only enclose the building, thus preventing rain water and insects from coming into the passenger areas, but would create a more comfortable internal environment, protected from the heat and relatively high prevalent humidity in Jakarta.

These modifications are quite justified. It is normal to have a two level terminal when the passenger traffic exceeds 5 million passengers per year, because it is more compact and better zoned. All activities related to departure are usually at the upper level, and those related to arrival are at the lower level.

Departing passengers who often carry heavy hand-baggage, do not need to change level in such a building. They enter the building from the elevated approach road on the landside, move only horizontally and walk into the plane, all on the same level. Arriving passengers do need to come down once, upon entering the building from the aircraft, then collect their baggage and exit onto the landside usually at the level of the car-park.

The visual impact of the building is rarely missed by the arriving passenger. The tiled roofs, and the juxtaposition of small lounges set against a backdrop of a long, horizontal landside building, make an unmistakable impact, which is very distinct, very un-monumental, and very inviting. Passengers are intrigued to see what is inside. As soon as the passengers enter the building proper from the avio bridge, they are struck by the steel pipe structure supporting the roof which vividly evokes bamboo construction, and soon thereafter by the beautiful landscaping of the gardens on either side on the way to baggage collection. The overall impression is profound and pervasive.

Passengers arriving at Terminal 1 often fail to notice that the sides are open. There may be no breeze, or alternatively there may be a tropical storm, with the rain lashing in sideways.

If they are leaving Jakarta a few days later via Terminal 2 and it happens to be sunny and warm they are grateful that they are in a cool, comfortable interior, with full view of the gardens seen through clear glass. And if it starts to rain, they can still stand at the edge, near the glazing, and enjoy the view.

Meanwhile, in Terminal 1, passengers must leave seats near the railing overlooking the gardens when it starts raining. And the mainte-

nance crew, with mops, takes over.

Terminal 2 has distinctly Indonesian characteristics, as has Terminal 1. The modifications made in the planning and design of Terminal 2 are reasonable and justified, and appreciated by the majority of users. They have made it more efficient and comfortable without compromising or detracting in any way from its traditional or cultural image.

Interior & Artwork:
P.T. Desigras
Mr. Adikarang
Mr. Aligwaga
Mr. Rata Gusti

Mukhtar Husain
May 1995

Users

Jakarta International Airport is used by about 9 million domestic passengers and 4 million foreign tourists and businessmen each year.

Users' response

The client, local people, Indonesian architects, and foreign visitors all feel that the distinctly Indonesian character of the two Terminals provides a pleasant image and experience. Most people with whom the subject was discussed, felt that Terminal 2 was an improvement on Terminal 1.

Project Personnel

Client:
The Government of Indonesia
The Minister of Communications
The Director General of Air Communications

Architectural Design and Supervision:
Aéroports de Paris of France, in association with
P.T. Konavi Local
P.T. Cakar Bumi Local
P.T. Dacrea Avia Local

Landscaping:
P.T. Konavi
P.T. Waskita Karya

Local Report
by Slamet Wirasonjaya

Jakarta Airport Terminal II

Jakarta, Tangerang, Indonesia
1560.IDA

The landscape considered in this report is that which is close to the terminal building, excluding the landscape in the access and airport periphery.

The landscape in Terminal II is not an integral, functioning component of the airport design and use; neither is it successful as a cosmetic device.

1. The landscaping fills only the open spaces resulting from the finger-type design of the terminal. The landscape plan and design do not improve the circulation pattern, or create positive visual or functional impact for the busy travellers.

2. Because it is not easily accessible, travellers are not able to fully appreciate the landscaping and do not become part of the open space. The open space serves as a device for circulation and security. Additional reasons why travellers do not fully benefit from the landscaping are:

a. travellers are preoccupied with their luggage while, at the same time, trying to locate and transit to the right arrival or departure gate; most visitors are in a hurry, and exhausted.

b. the seating arrangement in the waiting rooms does not encourage people to look outside, become aware of the landscape and enjoy it. A study conducted by architecture students shows that most travellers are not aware of the landscape.

3. The design of the landscape surrounding Terminal II cannot be called cosmetic, and does not improve the performance of the building and environment.

In my opinion, there are certain requirements for designing airport landscapes.

1. Plant materials should not attract birds, in order to avoid the problems of their interaction with aircrafts.

2. The design of the landscape should be readily noticeable. It need not be static, such as a Japanese-style garden, as used in some of the courts in the airport. The airport landscape should have attractive focal points, such as fountains and/or flowering plant materials (trees and shrubs).

3. Grass or ground cover should be used as little as possible. The landscaping should require minimum maintenance, and consider possible effects on airport security. Maintenance on a monthly basis would be desirable.

Compared to other open-air projects in Indonesia, with respect to climate and the cost of maintenance, especially from the point of view of design professionals, the performance of the Terminal II landscape does not represent a tropical garden focused upon shade and shadow. In terms of maintenance, it requires weekly - in some cases daily - maintenance, which is costly. There do not seem to be any permanent maintenance facilities in place, such as sprinklers. The exact cost of maintenance for the Terminal II landscaping are not available, but it has been suggested that the cost for landscape maintenance for Terminal I is about $500,000 per year.

The effect of the airport landscaping is mainly visual. Unfortunately, however, only the chauffeurs who drive through the parking area are able to experience optimal enjoyment of the landscaping.

Slamet Wirasonjaya
April 1995