A GLIMPSE OF SOME MAJOR TRANSPORT INFRASTRUCTURE DEVELOPMENT IN MALAYSIA WITHIN A DECADE

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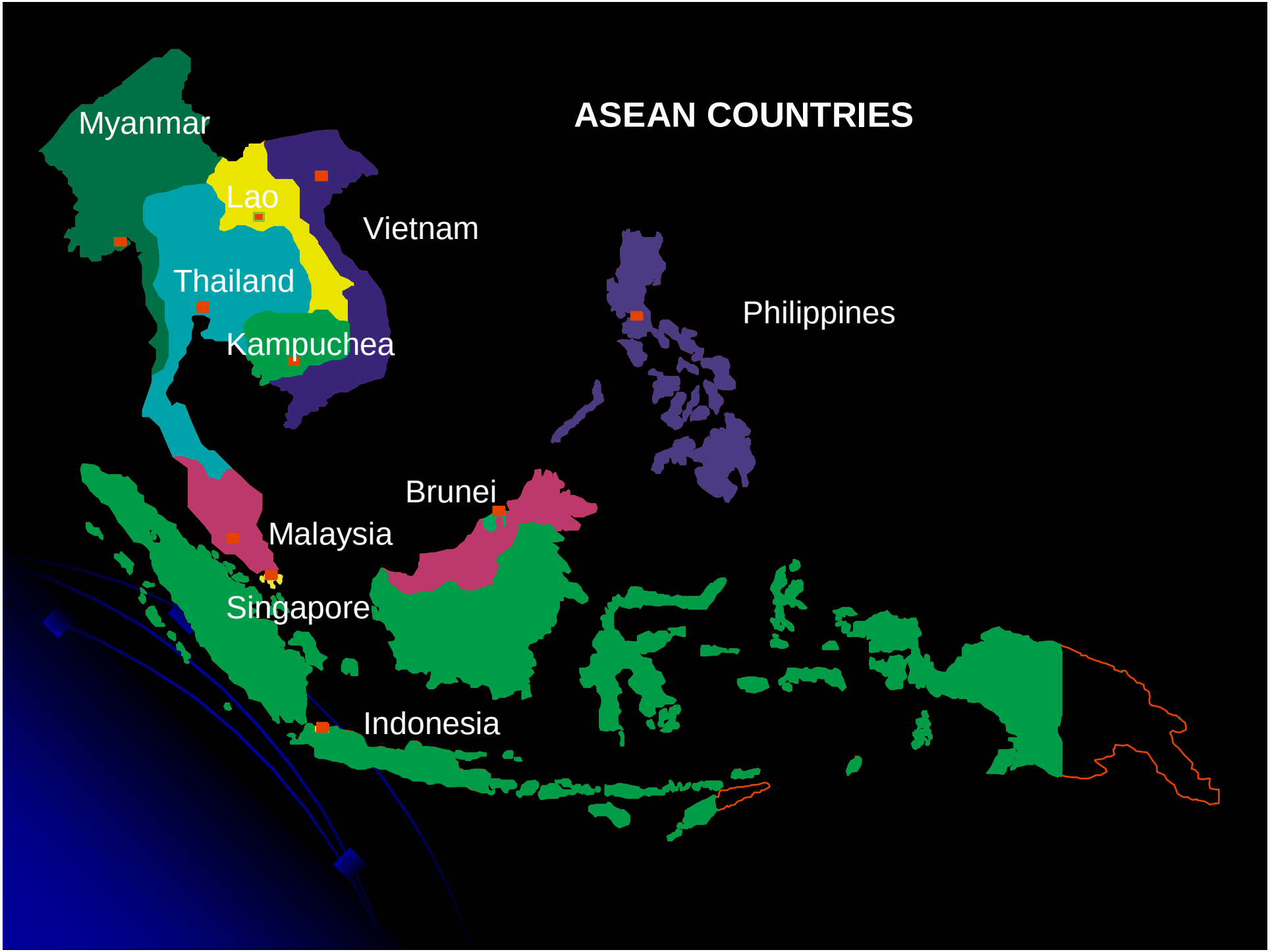

ASEAN COUNTRIES
Myanmar
Lao
Vietnam
Thailand
Kampuchea
Philippines
Brunei
Malaysia
Singapore
Indonesia

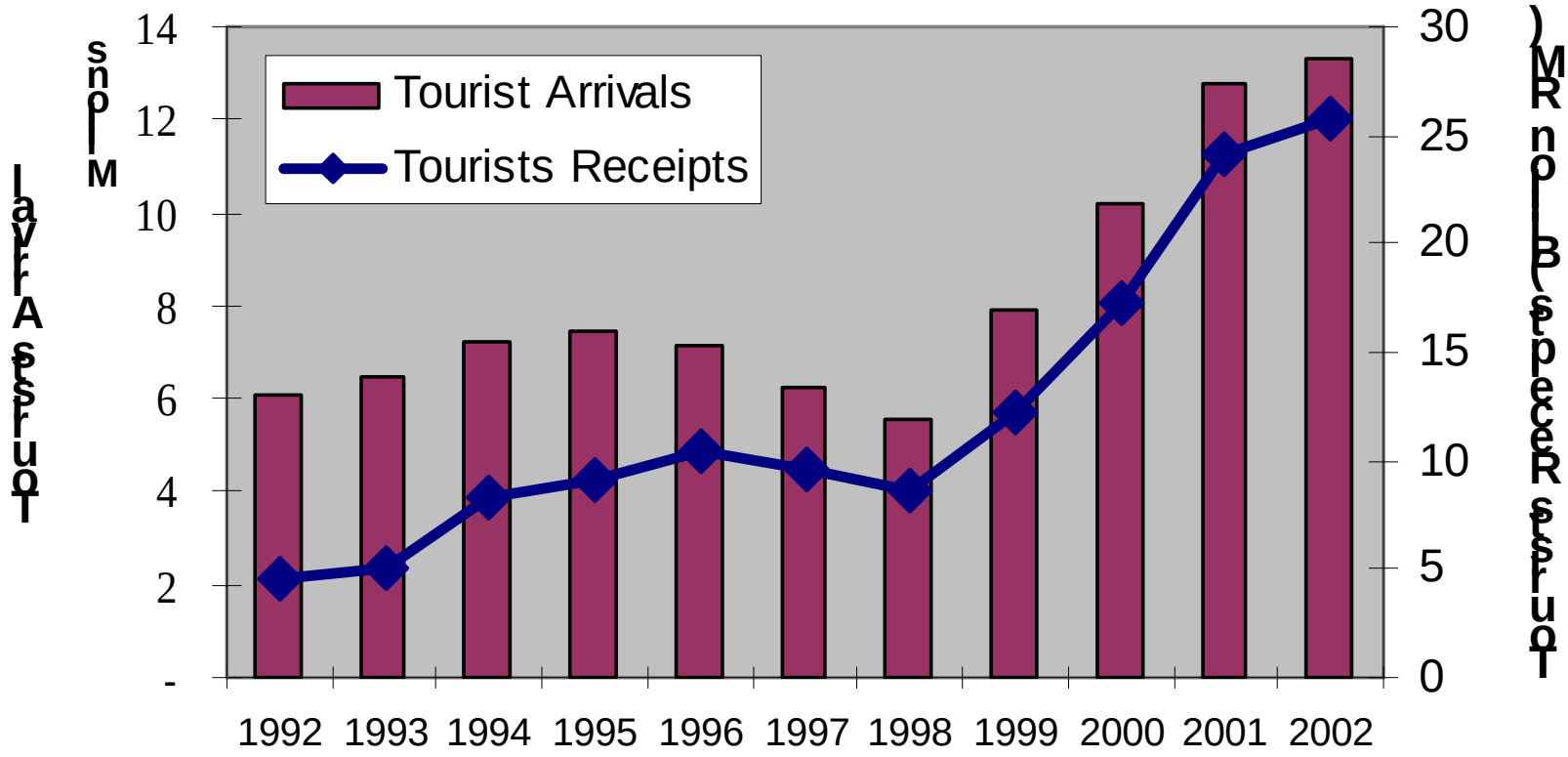
Global Passenger Forecast

Annual Growth Rate (%)	2002	2003	2004	2005	2006	AAGR
TOTAL INTERNATIONAL	-0.3	7.4	5.4	4.6	4.4	4.3
North Atlantic	-6.4	9.2	4.9	4.1	4	3
Trans-Pacific	-6	5.9	3.8	4.3	4	2.3
Europe-Far East	1.2	7.2	6.2	5.3	5.1	5
Europe-Middle East	-4.2	6.8	5.6	4.7	4.9	3.5
Europe-Africa	1.3	9.5	5.9	4.3	4.6	5.2
Far East-South Pacific	-0.9	5.6	5.1	5	4.9	3.9
North America-South America	-5.4	10.7	7.1	5.6	5.3	4.5
Within Europe	0.6	7.5	5.5	4.3	4.2	4.4
Within Far East	5.2	6	5.6	5.4	4.4	5.3
Within South America	-10.6	3.8	4	3.9	3.7	0.8
TOTAL DOMESTIC	-3.5	5.8	4.2	3.9	3.8	2.8
TOTAL	-2.5	6.4	4.6	4.1	4	3.3

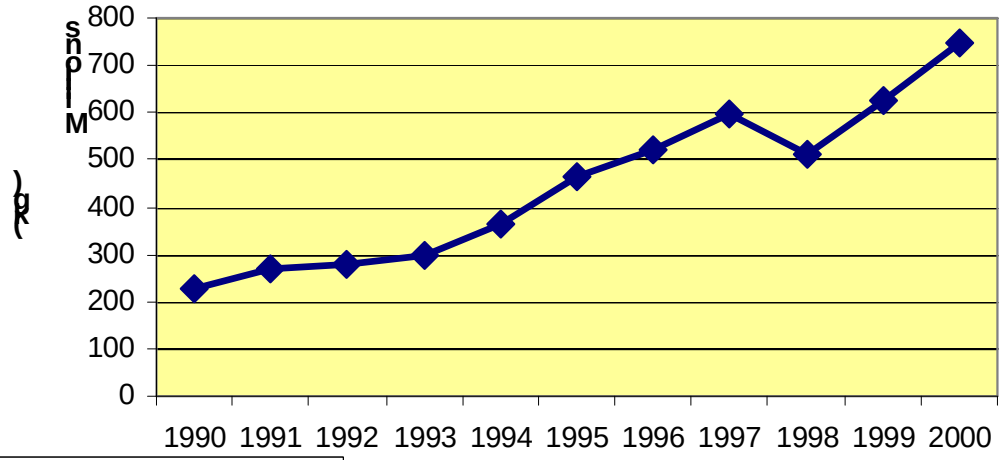
(Source: IATA Global Passenger Forecast)


International Visitor Arrivals in ASEAN 1991-2000*
Arrivals
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
-
20,213,942
21,771,581
23,465,426
25,278,317
29,669,071
30,932,853
31,048,739
29,733,004
33,868,394
37,813,511
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Year

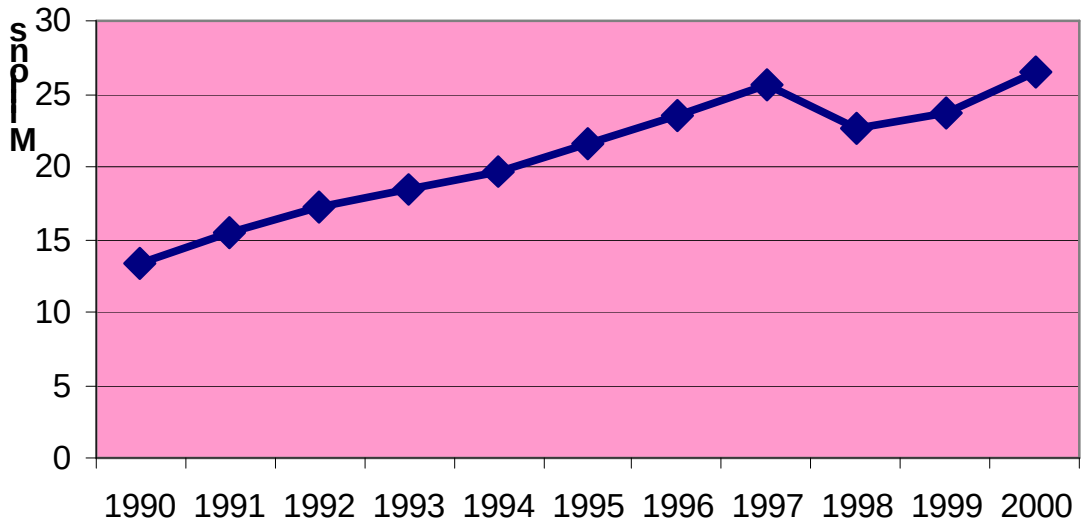
Tourists Arrivals and Receipts in Malaysia



Total Cargo Handled By Malaysian Int. Airports (excluding cargo in transit)



Total Passengers Handled By Malaysian International Airports (excluding in transit)



Malaysian Airports

There are currently 5 international airports operating in the country, namely the Kuala Lumpur International Airport (KLIA), Penang, Kuching, Kota Kinabalu and Langkawi airports. All these airports are able to accommodate the largest commercial aircrafts currently in use.

In addition, there are 17 domestic airports and 15 rural airstrips in the rural areas mainly in Sabah and Sarawak. Although the airports in Malaysia has been privatised and operated by the Malaysia Airports Holdings Berhad (MAHB), the government is still directly involved in the development and financing of the airports.

Objectives:

- International standard
- Domestic mobility
- Liberal, Open-Sky concept
- Domestic demand requirement
- Efficient & safe operations
- KLIA as hub for both passenger & cargo

Domestic Services:

- MAS, Air Asia, Berjaya Air
- Transmile Air

International Context:

- Open sky agreement – USA, NZ, Scandinavia, UAE, Yemen, Austria Taiwan
- 81 agreements with foreign countries
- MAS has 78 destinations, 19 code share

Air Transportation Policy

The availability of a safe and efficient civil air transport system is of utmost importance for the purpose of serving the national interest of the country, including the growth and development of tourism.

The Ministry of Transport through its Aviation Division is responsible for establishing and implementing Malaysia's aviation policy. The present civil aviation policy of Malaysia is adequate in terms of structure and capability to foster and assist in the development of a strong international and domestic tourism sector.

Air Transportation Policy (cont.)

At present Malaysia follows a liberal policy in granting authority to foreign airlines engaged in scheduled air service. In brief, this policy is structured to the effect that any airline desiring to provide service to Malaysia can do so in keeping with the bilateral process.

The Aviation Division is adequately structured and staffed with personnel capable of implementing Malaysia's air policy. The development of air transportation in Malaysia, for all purposes, has occurred pursuant to the provisions of the Civil Aviation Act 1969 and the regulations promulgated there under, including the principles enunciated at the Chicago Convention of 1944 on International Civil Aviation.

Air Transportation Policy (cont.)

In the field of international air transport, Malaysia, like other countries, has employed the bilateral process which permits each nation to take advantage of the traffic potential of the points granted in each country. Usually, each nation advocates the double tracking doctrine and attempts to provide a fair and equal opportunity to share in the market for the air carriers of each of the contracting parties.

Malaysia has used this bilateral process effectively to establish a national airline of international importance, to obtain major international routings for its national airline and to develop international air service to Malaysia by air carriers of other nations. Along with international route development, the finance has been available for the national carrier to expand and continually modernise its fleet of airplanes and there by carry out a continuing programme of expansion.

Current Strategy & Plans

The main strategy and program in the air transport sector is directed on achieving the following objectives (MOT Malaysia, 2002):

- To establish a system and network of international airports that are comprehensive, modern and up to international standards;
- To establish a system and network of domestic airports that will increase mobility and encourage the growth of local economy;
- To adopt a liberal policy on international air transport based on the concept of open sky with other countries;
- To ensure that domestic air travel services are being provided based on local demand to fulfill the needs of the tourism and trade industries as well as to satisfy socio-economic goals;
- To ensure the air traffic control and management services are efficient and safe; and
- To strive to make the Kuala Lumpur International Airport (KLIA) as an aviation hub for both passengers and cargo.

International Air Services

Malaysia has always adopted the liberal open sky policy in negotiations on air services with foreign countries for the purpose of giving the freedom and flexibility for the foreign airlines to operate their services.

The aim is to give incentives for foreign airlines to operate at the international airports in the country. Nevertheless, not all countries adopted the liberal open sky policy.

At the moment, Malaysia has the open sky agreements with the United States, New Zealand, the Scandinavian countries, United Arab Emirates, Yemen, Austria and Taiwan.

Although currently Malaysia has 81 air services agreements with foreign countries only 41 foreign airlines use the right to operate in the country. The national carrier, MAS currently has air services to 78 international destinations, 19 of which are on code-sharing basis.

INTRODUCING THE KLIA

K.L. International Airport (KLIA) at Sepang is designed and built to be an efficient, competitive and world-class hub airport for the Asia-Pacific Region.

It replaces the Sultan Abdul Aziz Shah International Airport at Subang as the main gateway into the nation.

The new mega airport, complete with the latest technology and state-of-the-art facilities, aims at providing maximum passenger safety, comfort and convenience.

It is unique because it has within its boundaries all that is needed for business, entertainment and relaxation. In short, KLIA is a destination in itself.

PLANNING

The planning and development of the new Kuala Lumpur International Airport at Sepang, Malaysia began in early 1990 when it became evident that the existing Sultan Abdul Aziz Shah International Airport (formerly Subang International Airport) has limited expansion capability to meet long term increase in passenger and cargo demand.

The government, therefore, decided to build a new airport at an alternative site to accommodate not only the rapid increase in air transport, but also to meet the growing demand of the tourism and services sector.

The selection of the new airport site was made following site selection studies which required several primary criteria to be met. Requirements included:

- Sufficient land size for expansion
- Potential for access time from Kuala Lumpur within 30 minutes
- Strategic location near major towns in the Klang Valley
- Satisfaction of aeronautical requirements
- Suitability of infrastructure
- Minimal adverse impact on social and environmental issues

Land at the new airport site consisted of oil palm plantations, mixed agriculture and a small Orang Asli settlement of approximately 85 families. These families were relocated to new homes and were provided with their own plots of land to cultivate.

Architecture

In 1998 when the first passengers arrive at the new KLIA, at Sepang, they will have experienced glimpses of a green Malaysia through the unique architecture, enjoy the world renowned Malaysian hospitality and feel the ease of modern hi-tech conveniences that reduce waiting time.

Designed by renowned Japanese architect **Kisho Kurokawa**, the KLIA is a spectacular feat of construction which combines futuristic technology, Malaysian culture and the rich, tropical splendor of its natural resources, and is regarded as one of the most modern and sophisticated airports in the Asia-Pacific region.

It incorporates forms and systems suggesting advancement and modernization while at the same time, support Malaysia's cultural history.

Superlatives & Features

The airport is built on 10,000 hectares (one of the world's largest construction site) or 100 sq. km. of agriculture land once thick with rubber and palm oil plantations which makes it one of the largest airport sites in the world.

KLIA was completed in four and a half years with round-the-clock construction work (making it the fastest airport ever built) undertaken by an international workforce of 25,000 people (largest number of workers for a Malaysian project) at a cost of about **US$3.5bn** and commenced full commercial operations on **June 28, 1998**. The large size of land designated for the airport would allow the airport to expand as needed to meet present and future air traffic demands.

With a rambling roof resembling white Bedouin tents, the five-level KLIA boasts the world's tallest air-traffic control tower, the biggest columnless hangar, the longest baggage conveyor belt system, biggest passenger lounge and the capacity for 25 million people a year. The airport has a Made in Malaysia, RM24 million Olympex flight information display system.

KLIA is the second airport in the world after Munich to have a special chamber to defuse explosives as part of its sophisticated fire-fighting systems. It has two decompression chambers costing RM 3.2 million to dispose of explosive materials. KLIA's fire fighting unit is the most modern in the region. It is the first in the region to secure seven Ultra Large Foam Tender (ULFT) vehicles costing RM 3.8 million each which can be operated in any condition.

Kuala Lumpur International Airport (KLIA)

The KLIA has been designed to be a regional hub with features that allow flexibility for future expansion.

The whole development of the KLIA has been planned to undergo three phases of implementation to cope with the future air traffic demand up to the year 2020 and beyond.

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Kuala Lumpur International Airport (KLIA)

Phase 1 (1993–1998)

Covering 100km² of land, the KLIA was completed in four and a half years with round-the-clock construction work (making it the fastest airport ever built), undertaken by an international workforce of 25,000 people at a cost of about USD$3.5 billion. The facility commenced full commercial operations in June 1998.

Phase 1 required the construction of facilities capable of handling up to 25 million passengers. The major facilities included two 4.0 km parallel runways (4000m x 60m) and a mega terminal building with a satellite and 83 aircraft stands (contact and remote). Sixty contact piers, 20 remote parking bays with 80 aircraft parking positions, one mega terminal, one satellite, two runways and other facilities are available to accommodate the throughput of 25 million passengers per year. The runways are on a staggered configuration 2,535m apart to allow for simultaneous operation. Equipped with category II navigational and lighting aids, they are complemented by a taxiway system for the efficient and expeditious flow of aircraft on the ground.

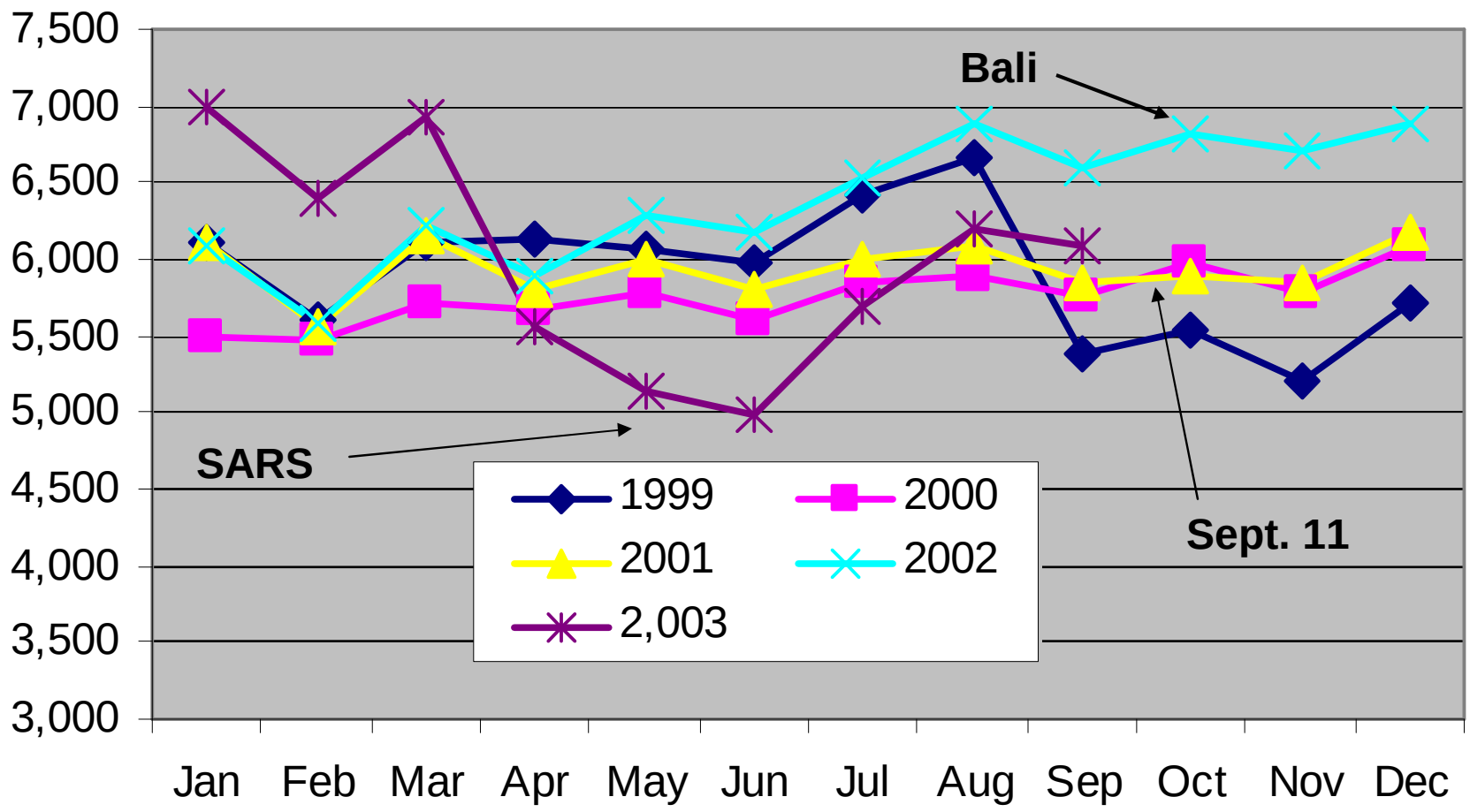
Phase 2 (2003–08) And Phase 3 (2008–Beyond)

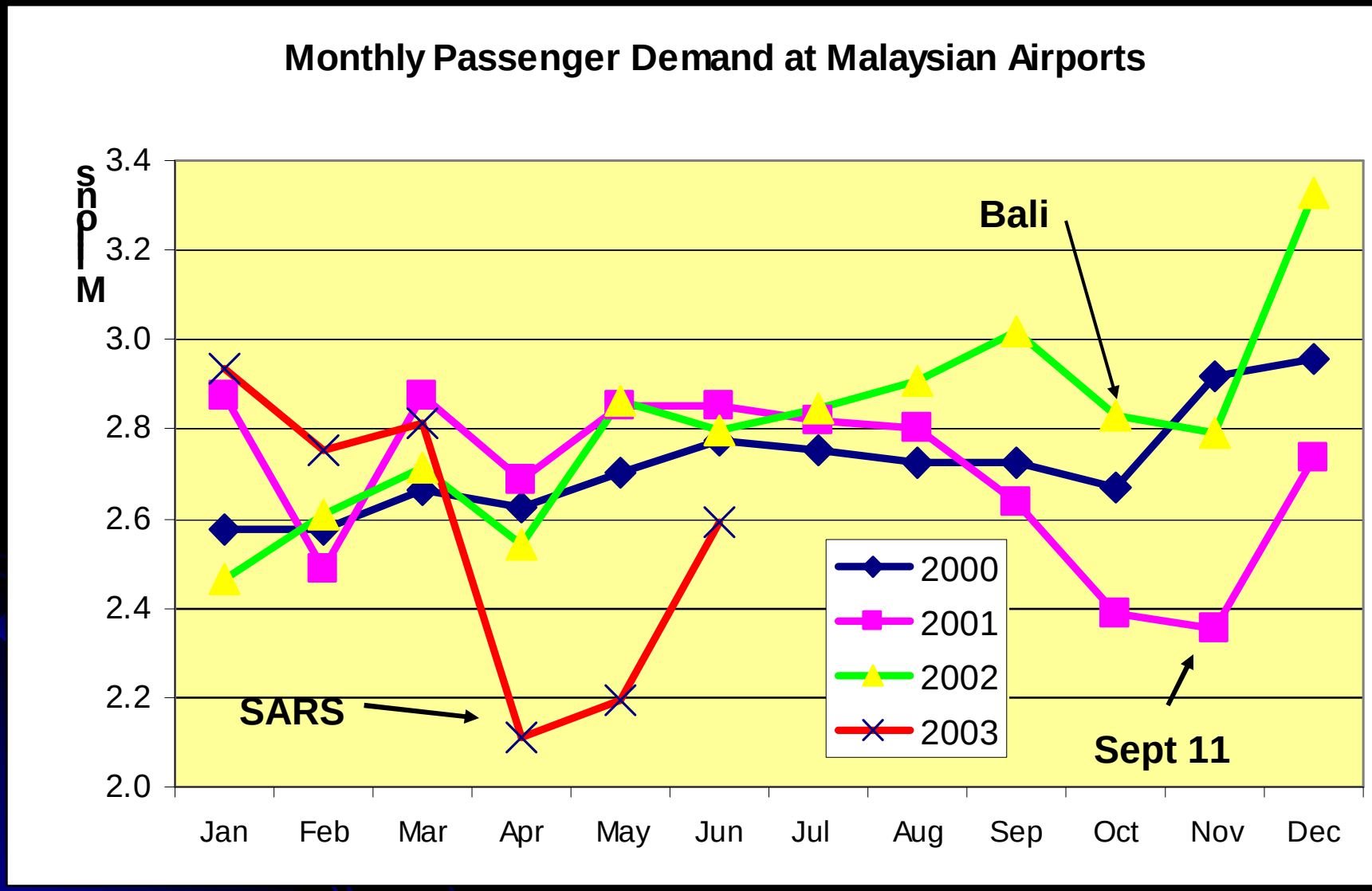
Phase 2 will further expand the facility to be able to handle 35 million passengers per year by 2008. Further planned expansion will enable the airport to handle up to 45 million passengers per year by 2012.

There is sufficient land and capacity to develop facilities to handle up to 100 million passengers per year, including four runways by 2020 and two mega terminals, each with two linked satellite buildings.

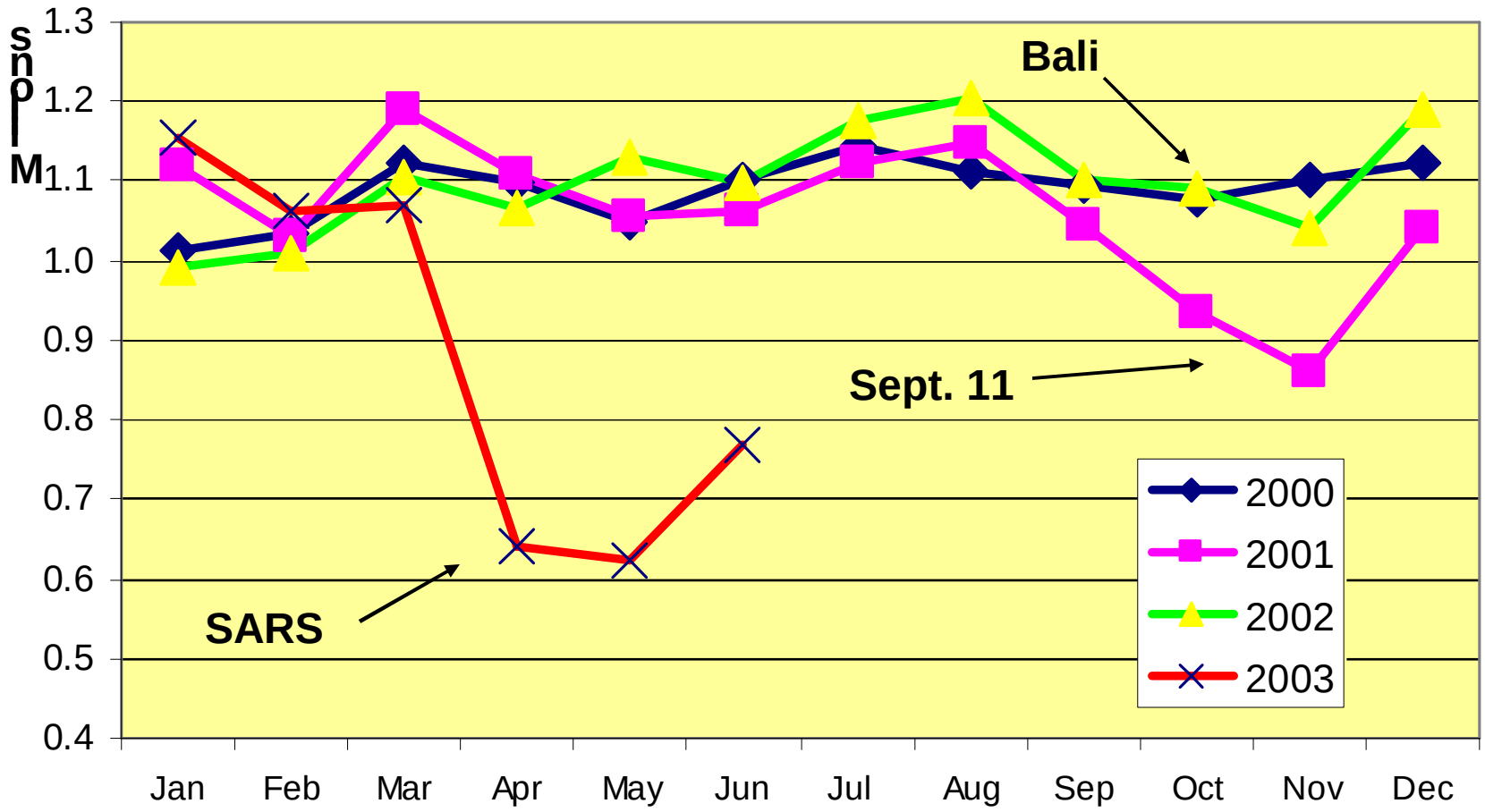
Once all three phases are developed, the airport's surroundings will include hiking trails for jet-lagged travellers, golf courses, a theme park, a shopping centre, hotels, a wetlands nature preserve and a Formula 1 race track that has already hosted the first F1 race in 1999.

KLIA Monthly International Aircraft Movements

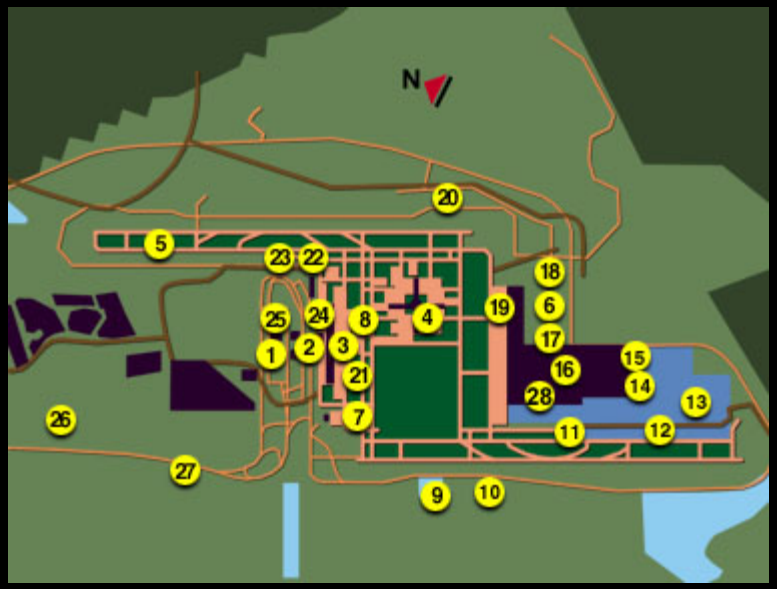



Monthly Passenger Demand at Malaysian Airports
pax M
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Bali
SARS
Sept 11
2000
2001
2002
2003

Monthly International Passenger Demand at Malaysian Airports



1. Air Traffic Control Tower
2. Main Terminal Building
3. Contact Pier
4. Satellite Building
5. Runway / Taxiway
6. Cargo Facilities
7. WTP Building
8. Flight Crew Briefing Centre
9. Waste Water Treatment Facility
10. Meteorological Station
11. Sub Fire Station
12. Centralised Warehouse
13. Fuel Farm
14. KLAS Catering
15. Engineering Complex
16. Southern Common Amenities
17. Customs Complex
18. Airmail and Courier Complex
19. Apron Control Tower
20. Telekom Exchange
21. Administration Building
22. Main Fire Station
23. Electrical Sub Station
24. Landside Hotel
25. Skybridge
26. Police Station
27. Landside Petrol Station
28. MAS Complex



Based on 25mn passengers per annum (ppa) - 1998

The two-armed **Contact Pier** as shown above is attached to the Main Terminal Building This is where all domestic flights and short-haul international flights will depart from. The contact pier is about 900m (3000ft) in length and 95,000 sq meters (1mn sq ft) in size, with 20 fixed passenger bridges for ease of boarding.

BAGGAGE HANDLING SYSTEM

The operational concept is based on a 24-hour daily operation providing check-in service anytime and anywhere. Incorporating automatic bar-code sorting control, 4 level in-line baggage security screening and high speed conveyor belts. BHS operates efficient and safe transportation of inbound and outbound bags between the Main Terminal Building and Satellite Building.

Major Features of the BHS:

- Baggage common check-in at any of the 216 counters on a 24-hour basis
- 8 short-term carpark baggage check-in counters
- 8 bus & train stations baggage check-in counters
- 3 stage baggage security screening system
- Early check-in baggage storage (1,200 bags capacity)
- 12 baggage reclaim carousels
- 33 km total length of conveyor belts
- Part of the belts travel through a 1.1 km tunnel from the Main Terminal Building to the Satellite Building

Air Traffic Control Tower
130m (425ft)

THE AIR TRAFFIC CONTROL TOWER

The **130-metre** (425ft) high tower is the tallest air traffic control tower in the world. Shaped liked a giant Olympic Torch, it will house the air traffic controllers, radar system and high-tech air space computer system. The **Air Traffic Control Office** and other support services are positioned at the base of the tower. It was designed by a local architect.

Apron Control Tower
52m (170ft)

THE VISUAL CONTROL ROOM

From the visual room of the Air Traffic Control Tower, air traffic controllers can easily see the entire length of KLIA's two parallel **runways**. The runways are 4,000 metres long and 60 metres wide. With 10 exit taxiways for each runway, taxiing time for planes range from 2.1 minutes to 10.8 minutes.

AIRCRAFT GATES & STANDS

The KLIA has a total of **106 aircraft stands**. These aircraft stands are located at the Main Terminal Building, Satellite Building and remote bays.

The **Main Terminal Building** will be docking both international as well as domestic flights. It therefore consist of the following:
20 aerobridge stands
23 remote stands next to MTB
1 VVIP remote stand

The **Satellite Building** will only be docking international flights. It consist of:
26 aerobridge stands
15 remote stands next to the STB
Additionally, there will be 21 stands in the remote bay.

RUNWAYS / TAXIWAYS

Two full service parallel runways 2.5km apart from each other (each 4,000m by 60m or 13,000ft by 200ft) are capable of handling up to 120 aircraft movements an hour -- one for landings and the other to serve planes taking off, and the world's tallest control tower at the airport guides the plane right up to one of the 46 aircraft parking gates or one of the 60 remote and multi-aircraft ramp stands. Each runway has one full parallel taxiway (24m or 79ft in width) and also has a second parallel taxiway (2km in length - 6500ft). The ultimate development layout calls for four full service runways.

The KLIA runways are made of flexible bitumen pavement with wearing course of polymer modified binder except for 270m at both ends which are concrete pavement . The runways are covered with a special paint. Both Runway 1 (14L/32R) and Runway 2 (14R/32L) are lit by edge, centreline, touchdown zone, threshold, wingbar, runway end, and PAPI lights.

The Aeronautical Meteorological Station is located near Runway 2. The Meteorological Data Processing System (MDPS) is a state-of-the-art solution to weather data collection, processing, storage and analytical needs.

The MDPS is composed of various meteorological processing components such as radar, workstation, servers, satellite systems and briefing terminals. These various components are located at various points within and outside KLIA. The two primary facilities associated with the MDPS are the Meteorological Data Processing Facility (MDPF) and the Aeronautical Meteorological Station (AMS). The MDPF is located within the first floor of the Administration Building at KLIA and is the heart of the entire Meteorological Sub-System. All data flow into the MDPF and are processed and stored there. All meteorological products are generated and distributed by the MDPF.

Modes of runway operation:

1. Single runway mixed mode (40-45 movements/hour) - Practical capacity 43 movements/hour
2. Two runways segregated mode independent operations - Practical capacity 55 movements/hour
3. Two runways mixed mode independent operations - Practical capacity 70 movements/hour

The runways at KLIA are equipped with Category II landing aids to permit all-weather operations and a full system of twin parallel taxiways and rapid-exit taxiways. This will ensure that runway capacity is maximised. The airport has been designed to accommodate all the latest types of civil aircraft, with built-in safeguards for the future introduction of larger, new generation aircraft.

TAXIWAY System:

- Shortest taxiing time (2.1 minutes)
- Longest taxiing time (10.8 minutes)
- Taxiway (24m/79ft wide)
- 10 exit taxiways for each runway
- Full three cross taxiways and one taxi-lane with provision for a fourth taxiway
- Lit by centreline, edge, and stopbar lights
- Parking apron is lit by high mast flood lights

AIRPORT MAINTENANCE FACILITIES & CARGO FACILITIES

K.L. International Airport will be served by two major Cargo Operators namely Malaysia Airlines (MAS) and Kuala Lumpur Airport Services (KLAS).

MAS will provide a facility to support an initial capacity of **650,000 tons** of cargo per annum, with capabilities to expand to **one million tons of cargo per annum** in near future and beyond as the demand arise.

KLAS will provide a cargo facility with an initial ability to support **300,000 tons** of cargo annually.

MAS Facilities
1 Hangar (200,000 sq ft)
2 Ancillary Hangars (100,000 sq ft)
Can accommodate 2 B747s & 1 B737

KLAS Facilities
1 Hangar (92,400 sq ft)
Can accommodate 1 B747 & 1 B737

AIRPORT FIRE & RESCUE SERVICES

Malaysia Airports Berhad will provide and operate adequate Airport Fire and Rescue Services (AFRS) to cope with aircraft accidents occuring on or in the immediate vicinity of KLIA Sepang.

Fire Station 1

Site Area = 170,000 sq ft
Total Floor Area = 11,400 sq ft
Structure and levels = Steel-framed, 2 levels

Fire Station 2

Floor Area = 60,500 sq ft
Total Floor Area = 12,900 sq ft
Structure and levels = Steel-framed, 2 levels

Vehicles provided

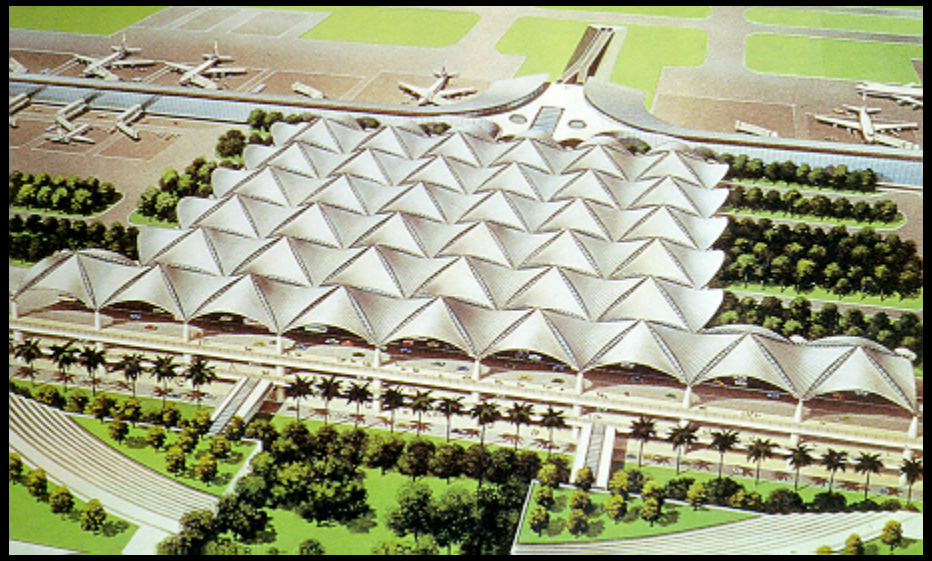
7 Foam tender (0 x 0)
1 Command and control
1 Turntable ladder
1 First-aid vehicle
2 Water tender
1 Office-in-charge vehicle
1 Rescue tender

Main Terminal Building (MTB)

The picture above shows the Main Terminal Building (MTB) in the centre with the two-armed Contact Pier extending outwards at the back. The MTB is flanked by dome-shaped roof covered carpark buildings. In the far left-hand corner is the four-armed Satellite Building.

This large passenger terminal complex, whose facade has a rippling wave-like roof supported by a colonnade of majestic granite-clad conical columns, is designed with an emphasis on natural light, transparency and greenery. The MTB will be of an architecturally distinctive design. The unique stainless steel roof forms of green cladding are designed to imply advanced technologies of flight - wings and aerodynamics using hyperbolic / parabolic shapes. The terminal building complex reflects a Malaysian identity. Abstract geometric floor patterns and wood carving panels will reflect Malaysian cultural design.

Main Terminal Building (MTB)



The 241,000 sq metre (2.6mn sq ft) **MTB** is designed to allow an annual capacity of 25 million passengers from opening day. It houses customs and immigration counters, duty free and retail outlets, and restaurants. The steel, timber-like ceiling is held up by conical pillars and flanked by shiny granite floors, large glass-paned walls and numerous check-in counters (below).

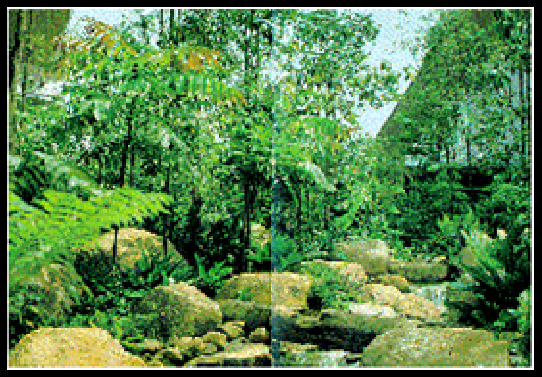
SATELLITE BUILDING

The 143,404 sq metre (1.55mn sq ft) four-armed Satellite Building, where international flights take off, is located some distance away from the Main Terminal Building, and passengers will have to take the Aerotrain (automated track transit system) to catch their international flights from here. International passengers will depart from and arrive at this terminal complex.

"...AIRPORT IN THE FOREST
FOREST IN THE AIRPORT..."

The central hub of the Satellite Building offers travelers a landscaped garden, including forest trees and sculptured waterfall for enjoyment and relaxation. The landscaped circular hub of the Satellite building features a forest in the airport.

The new KLIA is also designed to be an environmentally friendly airport with its central theme of an "airport in the forest" and a "forest in the airport". The airport is perhaps unique in the world for its environmental aspirations. The central theme is carried out through a rain forest arboretum in the center of the international terminal and forested grounds surrounding the facility.



The forested edges of the airport will serve as a buffer to keep the surrounding development in control, while concentric landscape and forest rings are proposed to surround the airport site creating the effect of an "airport in the forest". The courtyard between the Main Terminal Building and Contact Pier, as well as the center courtyard of the Satellite Building will be densely planted to create an image of the Malaysian Rain forest thus portraying the effect of a "forest in the airport"

Strategically located forest areas are proposed within the airport site to act as natural landmarks evoking ideas of a tropical image. Essentially the creation of a tropical image with its accompanying theme of an "airport in the forest" and "forest in the airport" will serve as a counterbalance to the high-tech features of the new airport.

TRACKED TRANSIT SYSTEM

Aerotrain is a complimentary automated people-mover shuttle system (ADtranz CX-100) that shuttles passengers between Main Terminal Building and Satellite Building. It offers the best combination of short journey time, simplicity and fail-safe operation, and resistance against breakdown. The system runs on pneumatic rubber-typed wheels to provide confort.

The **Tracked Transit System** (TTS) connects two stations, one in the node at the centre of the Contact Pier's International Level and one close to the centre of the Satellite building's Departure/Arrival level. The TTS provides transportation for airline passengers over an elevated guideway (1286m or 4219ft) and under the taxiways between the MTB and the Satellite Building.

The Aerotrain operates at three to five minutes intervals for the pier-satellite service. Round trip time takes 5 min 5 sec with the maximum speed being 56km/h (35mp/h).

With two 2-car trains (250-passenger capacity) at opening Phase-I, the system will have the capacity to handle 3870 passenger/hour per direction. Phase-II calls for two 3-car trains (6 in total) capable of handling 5805 passenger/hour per direction. Each car-train has a maximum capacity of 83 passengers. The power supply uses a 3-phase 600 V at 50Hz and the propulsion system uses a 100hp DC Electric Motor.

Automatic train control (ATC) manages the operation of the entire system, controlling vehicle speeds, headways, stops and door openings in stations, and integrating all functions to enhance reliability and performance of the systems.

TOTAL AIRPORT MANAGEMENT SYSTEM (TAMS)

K.L. International Airport is equipped with a sophisticated computerised system called TAMS. TAMS applies advanced Information Technology (IT) concepts and equipment to help make KLIA a primary international transportation hub for South-east Asia. TAMS is a state-of-the-art technology, designed with a high level of sophistication.

This system interfaces and integrates the majority of electronic information within the airport, assuring maximum flow of information for operations and management, and providing unprecedented levels of service, safety and comfort to the travelling public. This, in turn, will help bring more tourists and business to Malaysia.

This integration also supports the business goals of providing an efficient, cost effective operation of KLIA. As both a primary node on the Multimedia Super Corridor and as the precursor to the next generation of airports in Malaysia, KLIA will demonstrate advanced airport technologies and be a model for future IT enterprise solutions for Malaysia and the world.

TAMS encompasses:-

- Centralised databases that expedite information sharing among various airport systems.
- Centralised Management Information System for management of airport human, physical, financial and information assets.
- Centralised Airport operation centres that co-ordinate and expedite airport functions during normal and emergency situations.
- These systems are all connected by a network infrastructure of fiber optics and copper-based telecommunications backbone used by all airport voice, data, and video users. However, each can operate independently in the event of a central control system failure.
- The integration of these primary groups of sub-systems at KLIA brings a new level of functionality and service to international airports and will be the catalyst that will ensure KLIA as a major hub in this region.

There are seventeen sub-systems in TAMS, including the Flight Information Display System, Gate Allocation System, Runway/Taxiway Lighting Control System, Passenger Check-In System, Baggage Handling System, Automated Warehouse System, Facility Management System, Building Management System, Closed Circuit Television, Meteorological System, Air Traffic Management System, Apron Services Management System, Noise Monitoring System, PABX System, Point of Sale System, Card Access System, and Trunked Radio System.

TAMS will provide a proving ground for electronic commerce for other similar enterprises. The Crisis Control Centre (CCC) at KLIA may be expanded to manage national crisis. Or as a minimum, KLIA's CCC will be proving ground for crisis management concepts. Intelligent airport systems will come on line as technologies mature.

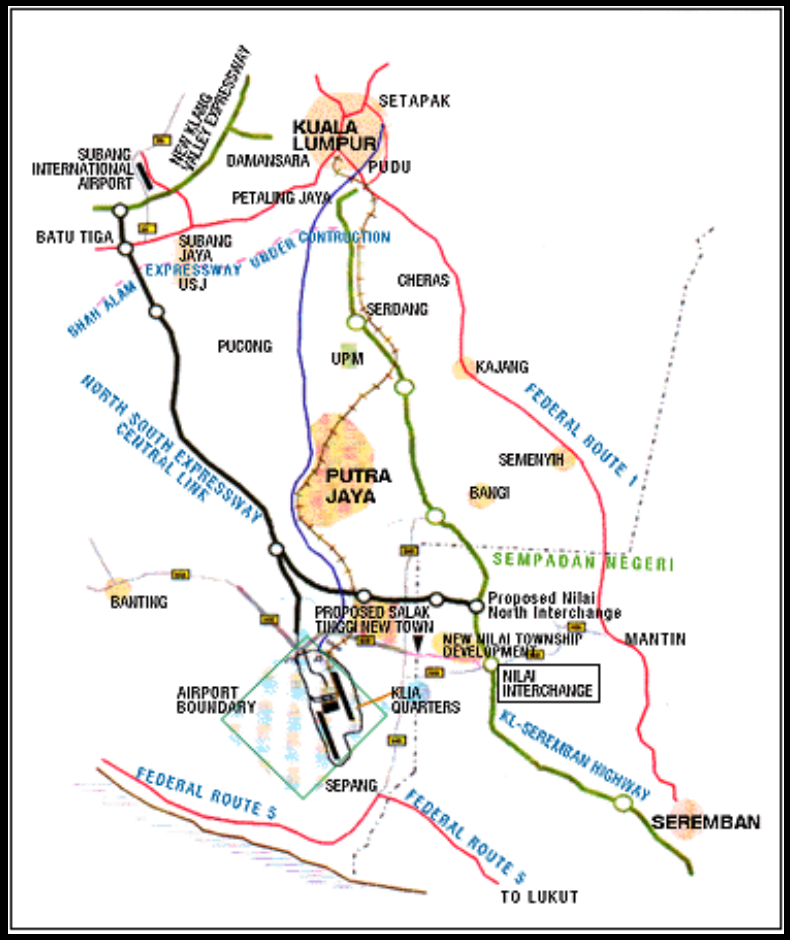
Hotel Accommodation & Facilities

KLIA Location & Accessibility

The KLIA may be accessed by both road and rail transportation.

A network of highways and major roads connect the airport to the city of Kuala Lumpur as well as the new administrative center Putrajaya.

Taxis, limousines, buses and airport coaches are available for those who prefer them.



EXPRESS RAIL LINK (ERL)

A new high-speed rail-based transport mode called the KLIA Ekspres is another option, particularly for those wanting to get to the capital city of Kuala Lumpur in the shortest time possible. It provides direct connection between the KLIA and the KL City Air Terminal (KL CAT) at KL Sentral.

The KL CAT is the extension of the KLIA in the city and is officially recognised by the International Air Transport Association (IATA) as a city destination with the code XKL. The travel time is only 28 minutes and is the fastest way between the airport and the city.

KLIAekspres

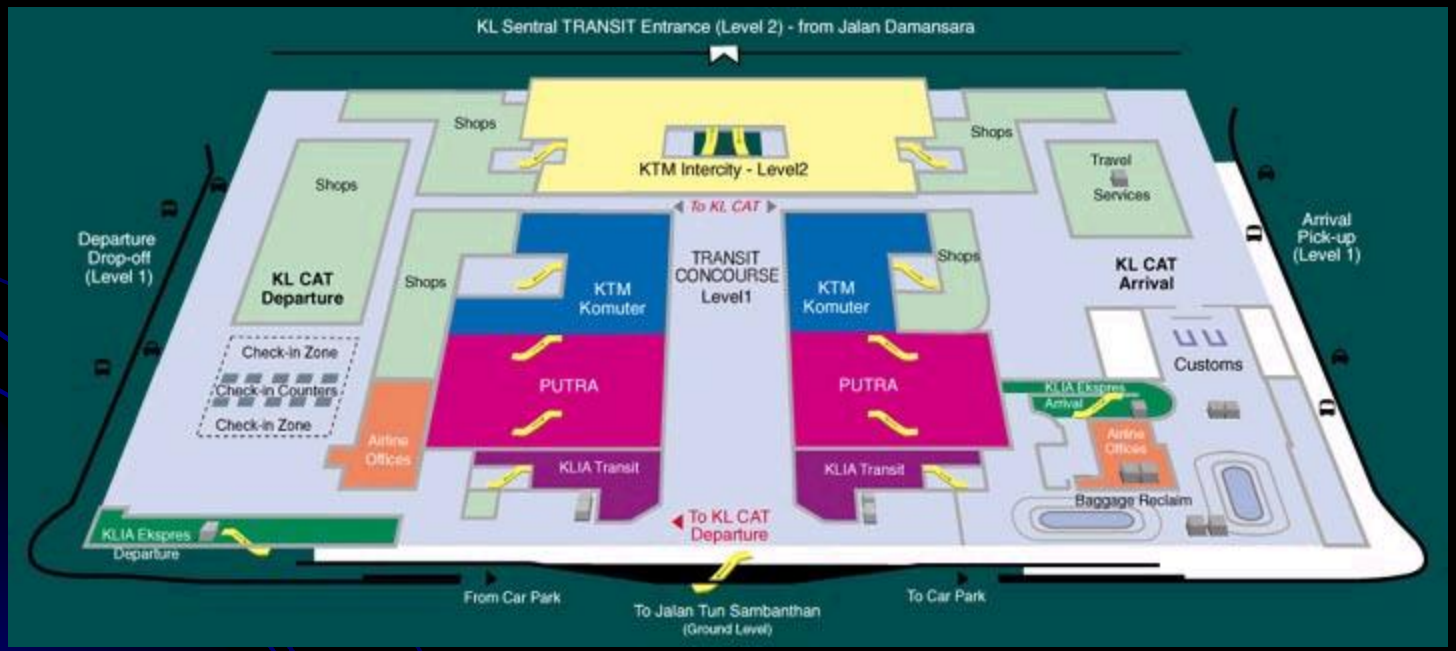
A Member of IARO (International Air Rail Organisation)

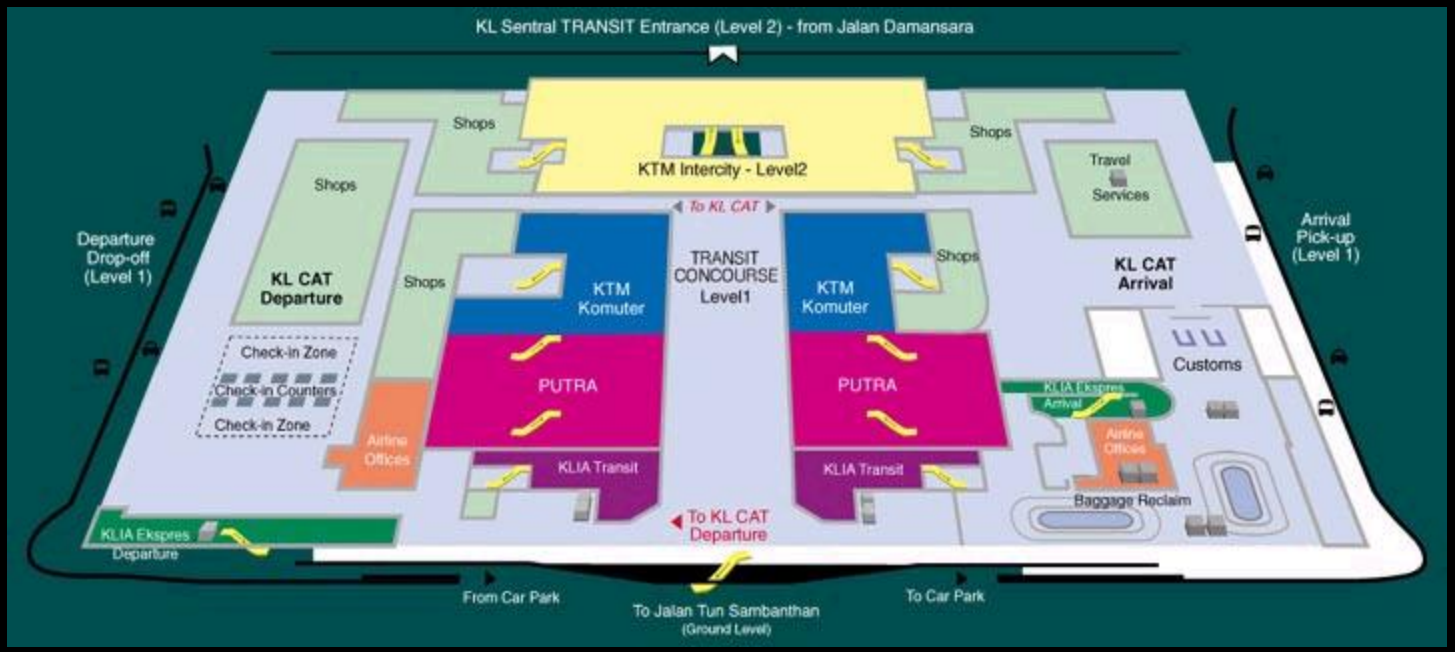
The KLIA Ekspres is a non stop service connecting KL International Airport and the Hub for Kuala Lumpur transportation system, KL Sentral introduced in April 2002. The service is non-stop with a journey time of 28 minutes and frequency of every 15 minutes during peak periods. (Non peak would be at every 20 minutes).

KLIA Ekspres' air-conditioned carriages are equipped with comfortable contoured seats, a washroom, overhead racks for light luggage and tiered racks for large luggage. Special wheelchair seat compartments have been allocated on board for the disabled. Secured containers are used to transport the check-in and check-out luggage.

KL Sentral Station

A state-of-the-art transportation hub for Kuala Lumpur's integrated rail transportation system, offering first class transportation to all residential, commercial and industrial areas. The Sentral Station is truly a gateway to Kuala Lumpur and beyond.





Passengers flying with MAS may check-in their luggage at KL CAT and they will also receive their boarding pass.

MAS offers early check-in for same-day flights and as such one can check in their luggage in the morning for a night flight and enjoy a day of sightseeing and shopping or attend to business without being weighed down.

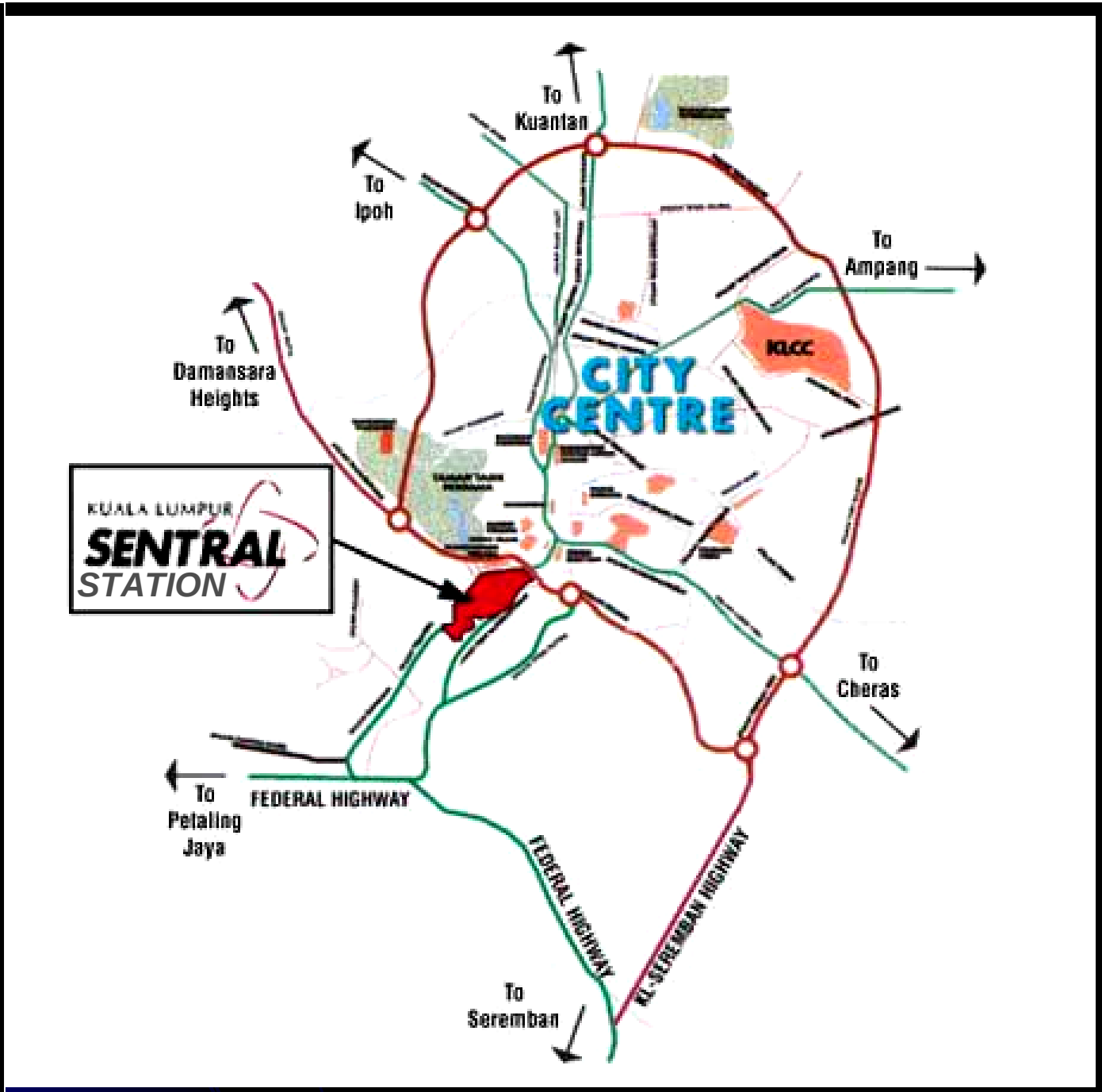
KLSS .....

Seamlessly links together all urban and suburban residential, commercial and industrial areas.

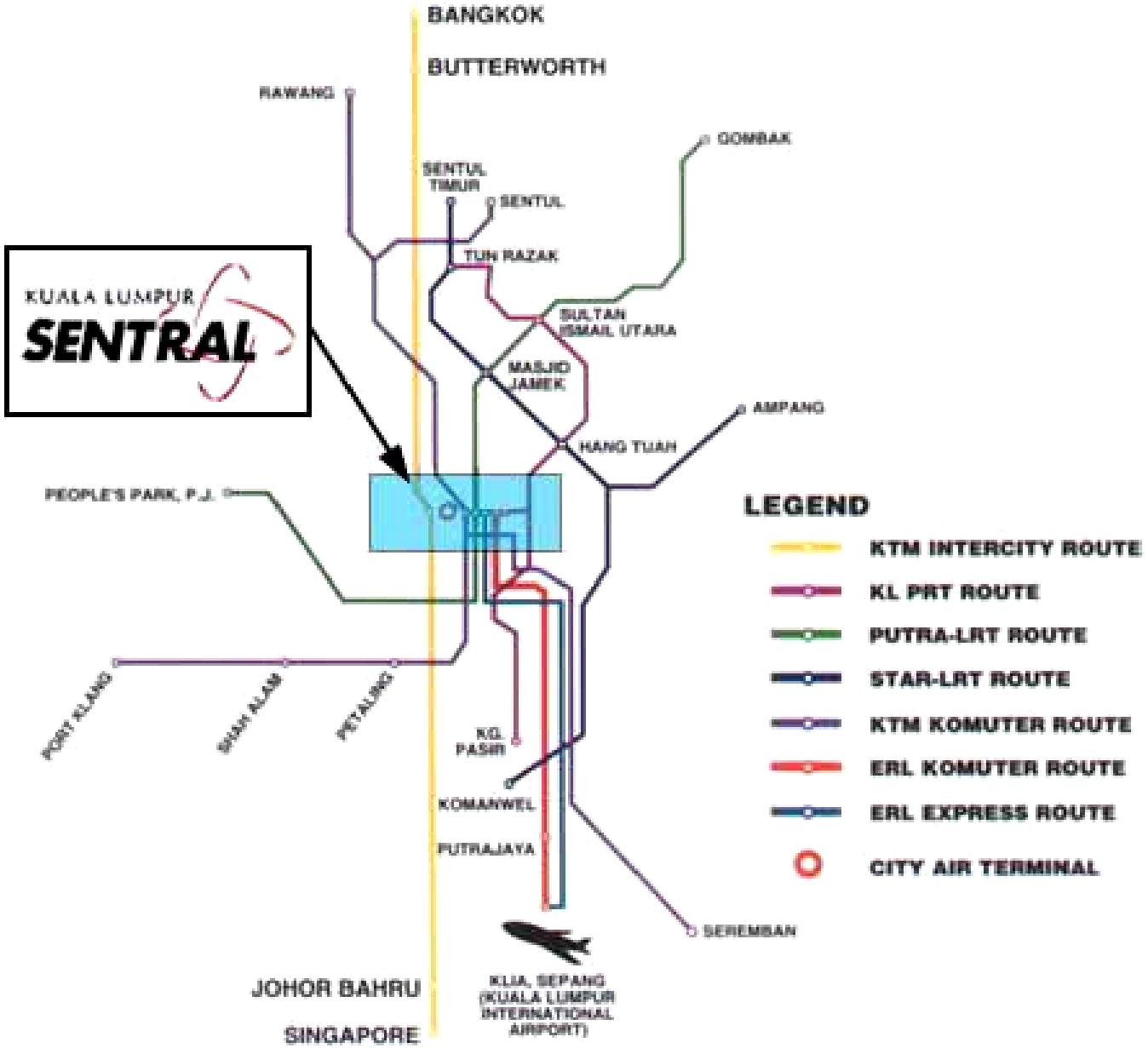
Direct link to Kuala Lumpur International Airport, Putrajaya, new Federal Government Administrative Centre, Cyberjaya and key areas within the Multimedia Super Corridor.

KTM Intercity
PUTRA-LRT
KTM Komuter
KLIA Transit
KLIA Express

Land Area (acres) :9.3
Total Allowable Gross Floor Area (sq. ft.) :966,308
Car Park Spaces :820


To Kuantan
To Ipoh
To Ampang
To Damansara Heights
KLCC
CITY CENTRE
KUALA LUMPUR
SENTRAL
STATION
To Cheras
To Petaling Jaya
FEDERAL HIGHWAY
FEDERAL HIGHWAY
KL-SERI EMBAN HIGHWAY
To Seremban

Kuala Lumpur Sentral. The hub of Kuala Lumpur's integrated rail transportation system



Integrates with **PUTRA LRT** at **KL Sentral** Station

Integrates with **KL Monorail** at **KL Sentral** Station

Integrates with **STAR LRT** at **Masjid Jamik** Station

Integrates with **KTM Komuter** at **KL Sentral** Station

Integrates with **Express Rail Link (ERL)** which is linked to the KL International Airport at **KL Sentral** Station

When it is completed, Kuala Lumpur Sentral will make available 19.1 millions of square feet of world-class working, living and leisure space.

At the heart is a transportation hub (KLSS) that brings together the commuter, intercity and airport express rail networks with Kuala Lumpur's light rail transit system.

Planted in and around this flow of transportation arteries will be a collection of carefully integrated office, hotel, retail and residential developments.

- ***KL Sentral Station (KLSS) is part of the KL Sentral development in Brickfields***
- ***KL Sentral development is being undertaken by KL Sentral Sdn Bhd***
- ***SEMASA SENTRAL Sdn Bhd is the operator of KLSS***

Prohibited Action at the KLSS

- **NO Smoking**
- **NO Bringing Animals**
- **NO Trespassing**
- **NO Bringing in Bicycle**
- **NO Skating**
- **NO Skateboard**
- **NO Vandalism**
- **NO Carrying Hazardous Material**
- **NO Begging**
- **NO Loitering**
- **NO Littering**

The Transport Modes available at KLSS:

- *KTM Komuter Rail*
- *KTM Express Rail*
- *PUTRA LRT*
- *ERL express rail service to KLIA*
- *ERL commuter rail service*
- *Taxis*
- *Buses (Feeder buses, Stage buses, Coaches)*
- *Private cars*

THE PUTRA LRT

The Malaysian capital of Kuala Lumpur has been provided with a state-of-the-art metro system. However, severe financial problems forced a Government takeover in June 2001.

The system is popular and well-used, as the city's roads are hopelessly gridlocked. Linking the city's People's Park and Gombak, the fast, efficient east-west route services some of the most affluent and heavily populated areas and was completed during 1999.

The 29km-long system is the world's second longest fully-automated driverless metro system.

A Bombardier Transportation ART MK 2-vehicle alongside a station platform of the Kuala Lumpur Putra LRT

Each of the 70 air-conditioned, aluminium-bodied vehicles is powered by two linear induction electric motors, which claim to keep noise levels at a minimum.

The design and construction contract was let to Bombardier of North America. They operate in 35 two-car sets initially, but if demand warrants, can be expanded to three- or four-vehicle formations.

Each two-car unit seats 64 passengers, with space for another 350 standing at peak times.

Construction was divided into two:

Section 1, from Subang Depot to Pasar Seni Station, commenced operation in September 1998 and

Section 2, from Pasar Seni Station to Terminal PUTRA, started up in June 1999.

The PUTRA-LRT network has 24 stations along its length, and was constructed in two sections: Lembah Subang to Pasar Seni, and Pasar Seni to Ampang Park and Gombak. The first phase is on elevated single-track bridge sections, which are also used for 8km (4.9 miles) of 14.9km (9.3 miles) of the second phase, avoiding conflict with existing roads. Some 4.3km (2.7 miles) is in tunnel.

The focal point of the system is People's Park, in the west of Kuala Lumpur and journey times to each end of the route are 45 minutes to Gombak and 21 minutes to Pasar Seni. The vast majority of the system is above ground, with 4.3km in tunnel. Five stations are underground, and four stations are designed for park-and-ride expansion.

The average train speed is 40km/h (25mph), with an ultimate capacity of 30,000 passengers per hour in each direction, three times the present figure. The system will operate for 18 hours a day.

Safety is also stressed in the design of the stations, with all platform edges being protected by a barrier, with an intrusion detection system incorporated to prevent passengers getting too close to the moving trains or tracks.

Every platform has emergency buttons and two-way passenger assistance telephones linked to the central control room, which will also monitor fixed CCTV cameras located throughout the system. To ease monitoring, stations are constructed to a standard design, each with the same 68m platform length.

Gradients along the network are slight, with a maximum of 5% (1-in-20). This enables an initial average speed of 38km/h (23.6mph).

Links with other transport systems are an important part of the network. Each station has dedicated feeder bus stops, and interchanges with existing rail lines at Brickfields (KTM line), Jalan Tun Perak (STAR line), and to the route from the city centre to Kuala Lumpur Airport.

The network boasts fully automated signalling to provide a service level of 90 seconds during peak hours and between 5 and 10 minutes in the off-peak.

Two-way communications on board trains allow passengers to speak to the central control room at any time.

Fare-collection is fully automatic, while the busiest stations are designed to a standard formula to include ramps and elevators, specially textured floor surfaces, pre-recorded station announcements, and reserved seats for the elderly and wheelchair-bound.

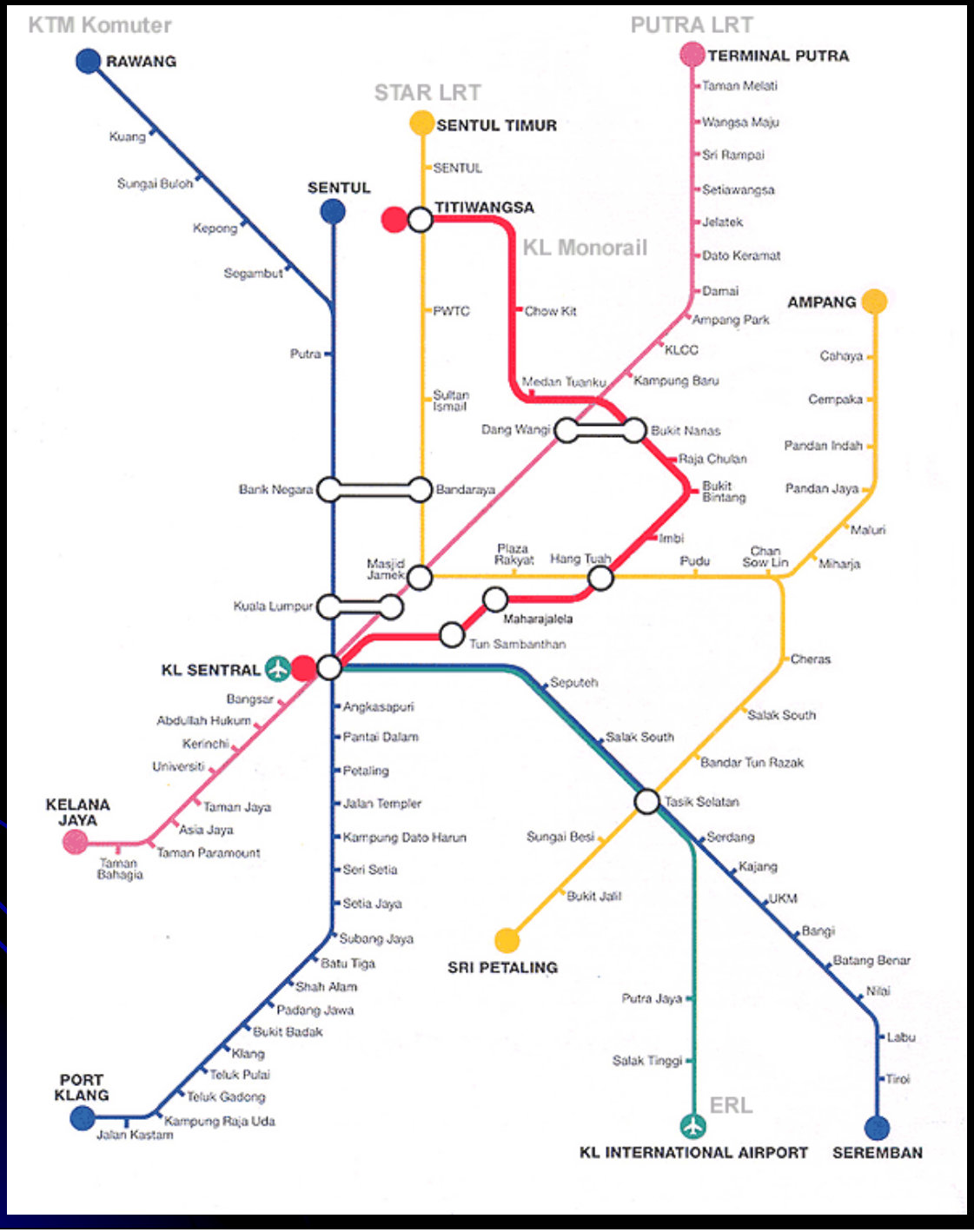
Information systems on board each vehicle allow each station on the system to be illuminated on a map display as the train approaches it.

Despite the high level of automation, the metro still offer substantial employment opportunities in Kuala Lumpur and its environs, with up to 160 operations and 220 maintenance staff employed.

THE STAR LRT

In 1990, Taylor Woodrow and Adtranz formed a Consortium to promote the project. Led by Taylor Woodrow, the Consortium developed the system through to an operational concept and formed the operating company, STAR. In December 1992, the Malaysian government signed a 30-year franchise, authorizing STAR to build, own and operate the system.

The 27 km route begins with Phase 1, linking the central business district with the eastern suburbs. Much of the line follows the route of abandoned State Railway corridors, rising onto an elevated viaduct as it enters the city centre. Phase 2 consists of a southern link to the Commonwealth Games village and a northern extension of the city centre viaduct. Journey times from the outer suburbs to the city centre take less than twenty minutes - and no traffic, except that in view through the window.


KTM Komuter
PUTRA LRT
STAR LRT
KL Monorail
ERL
RAWANG
Kuang
Sungai Buloh
Kepong
Segambut
SENTUL
Putra
SENTUL TIMUR
SENTUL
TITIWANGSA
PWTC
Sultan Ismail
Bank Negara
Bandaraya
Masjid Jamek
Kuala Lumpur
KL SENTRAL
Bangsar
Abdullah Hukum
Kerinchi
Universiti
KELANA JAYA
Taman Jaya
Asia Jaya
Taman Paramount
Taman Bahagia
PORT KLANG
Jalan Kastam
Kampung Raja Uda
Teluk Gadong
Teluk Pulai
Klang
Bukit Badak
Padang Jawa
Shah Alam
Batu Tiga
Subang Jaya
Seri Setia
Setia Jaya
Petaling
Jalan Templer
Kampung Dato Harun
Pantai Dalam
Angkasapuri
Chow Kit
Dang Wangi
Medan Tuanku
Plaza Rakyat
Hang Tuah
Maharajalela
Tun Sambanthan
Seputeh
Salak South
Sungai Besi
Bukit Jalil
SRI PETALING
TERMINAL PUTRA
Taman Melati
Wangsa Maju
Sri Rampai
Setiawangsa
Jelatek
Dato Keramat
Damai
Ampang Park
KLCC
Kampung Baru
Bukit Nanas
Raja Chulan
Bukit Bintang
Imbi
Pudu
AMPANG
Cahaya
Cempaka
Pandan Indah
Pandan Jaya
Maluri
Miharja
Chan Sow Lin
Cheras
Salak South
Bandar Tun Razak
Tasik Selatan
Serdang
Kajang
UKM
Bangi
Batang Benar
Nilai
Labu
Tiroi
SEREMBAN
Putra Jaya
Salak Tinggi
KL INTERNATIONAL AIRPORT

The cost of construction was privately financed through a Build, Own and Operate concession and consisted of 24%equity, 60% commercial loans and 16% government loans.

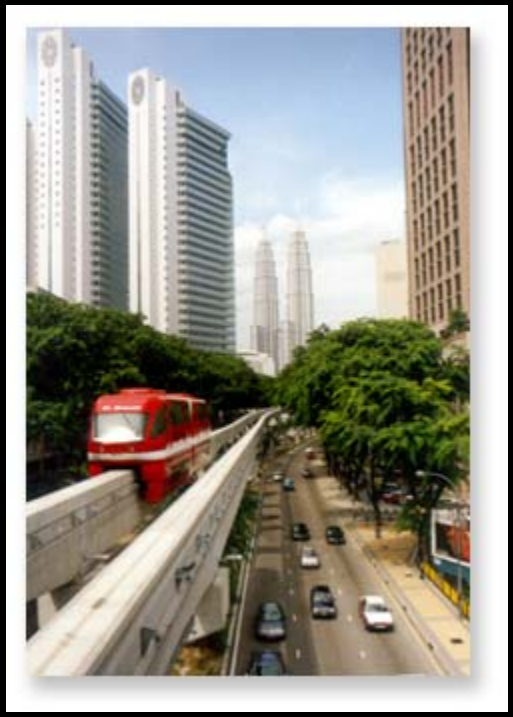
Malaysian companies represent 55% of the investors, with the remainder made up of international companies including a 30% share held by the Consortium.

THE FUTURE

The Government takeover is allowing the city's public transport to be restructured.

A merger of six competing bus services is being considered, as well as an integrated ticketing system covering the city and surrounding areas.

Both PUTRA and STAR have seen their existing concessions and franchises agreements cancelled, and fresh licences with new conditions issued.



KL Monorail Project

The RM1.18 billion KL Monorail privatisation project is an inner-city public transit system that serves the central business, hotel and shopping district of Kuala Lumpur, Malaysia .

The 8.6km long, dual guideway, straddle-beam elevated monorail system will begin from the Pekeliling Bus Terminal in the north, and pass through Kuala Lumpur 's 'Golden Triangle' before reaching KL Sentral in Brickfields.

Fully elevated with 11 stations, the KL Monorail is projected to carry some 85,000 passengers per day. The system uses 12 units of 2-car trains, each capable of handling up to 18,000 passengers per hour per direction if operating at 2 minutes headway between trains.

Work on the project was interrupted by the economic crisis in 1998. Construction resumed in July 1999 and works on stations and tracks are already completed. KL Monorail has started operation on 31 August 2003 .

The KL Monorail Alignment / Route

The KL Monorail is an intra city public transit system that links many key destinations within Kuala Lumpur. It passes major hotels in the city and serves its central commercial, employment and shopping district.

The 8.6km long KL Monorail system will begin from Jalan Tun Razak and terminate at KL Sentral in Brickfields via the central business district of Kuala Lumpur.

Beginning at the present Pekeliling BusTerminal and ending at KL Sentral, the KL Monorail alignment is as shown.

The KL Monorail Station

With a total of 11 fully elevated stations, each between 600 - 1,000 metres apart, the KL Monorail is capable of handling up to 20,000 passengers per hour per direction, operating at up to 2 minutes headway between trains.

Travelling time along the 8.6km route from Titiwangsa station to the KL Sentral station would take about 18 minutes.

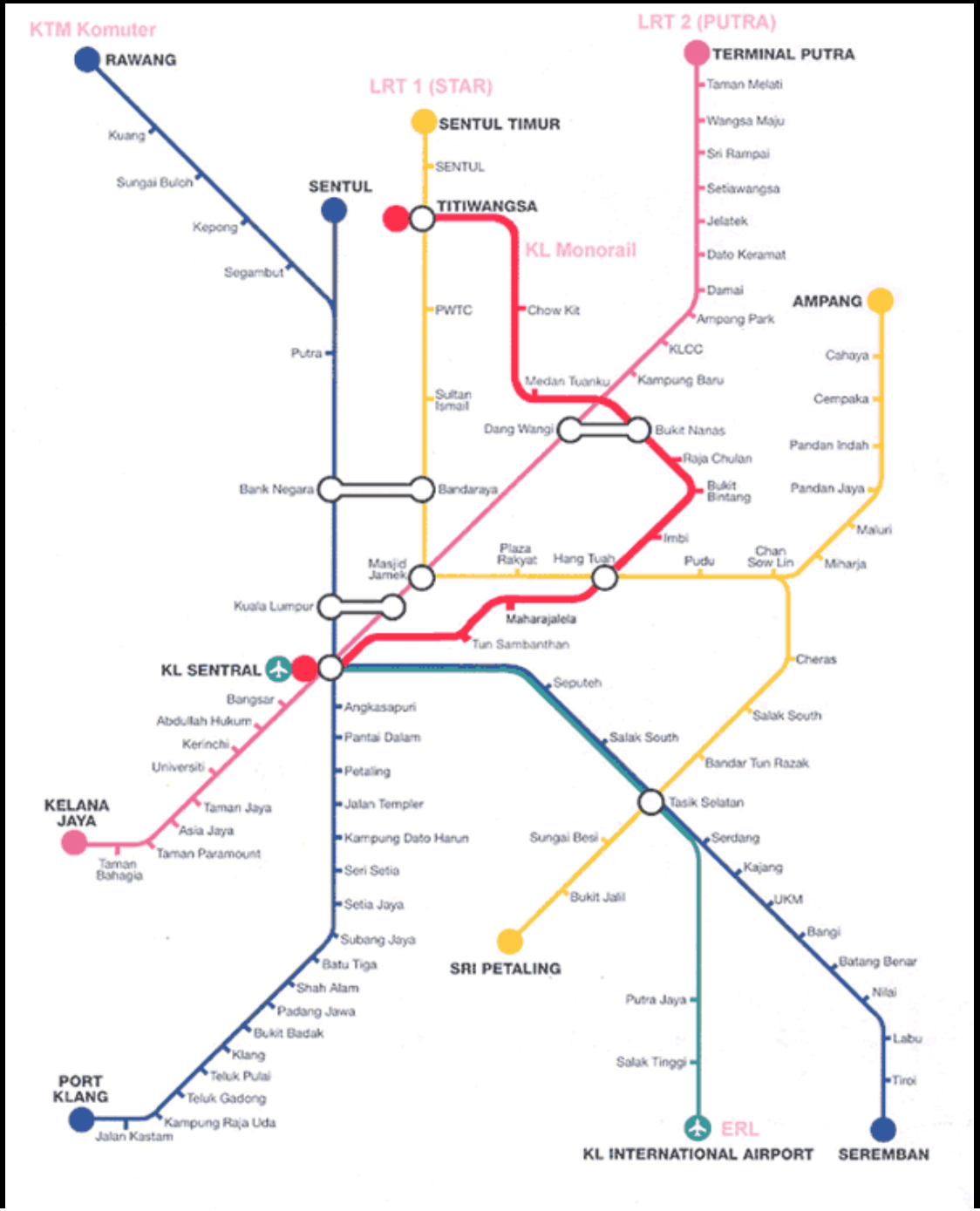
> Operating hour **:** 6.00 am to 12.00 midnight> Maximum train speed **:** 80 km per hour> Average train speed**:** 30 km per hour> Peak hour frequency**:** 2 - 5 minutes> Off peak hour frequency**:** 5 - 10 minutes> From Titiwangsa station to KL Sentral station : 18 minutes

> From Titiwangsa station to Bukit Bintang station : 10 minutes

> From Bukit Bintang station to KL Sentral station: 8 minutes

Systems Integration

The KL Monorail is designed to complement and integrate with Kuala Lumpur's existing and planned urban transportation systems. Transit integration will improve vastly with the implementation of a common ticketing system later. A monorail station within the central station at KL Sentral development is also in the pipeline. The KL Monorail will interface with the other rail systems as follows:



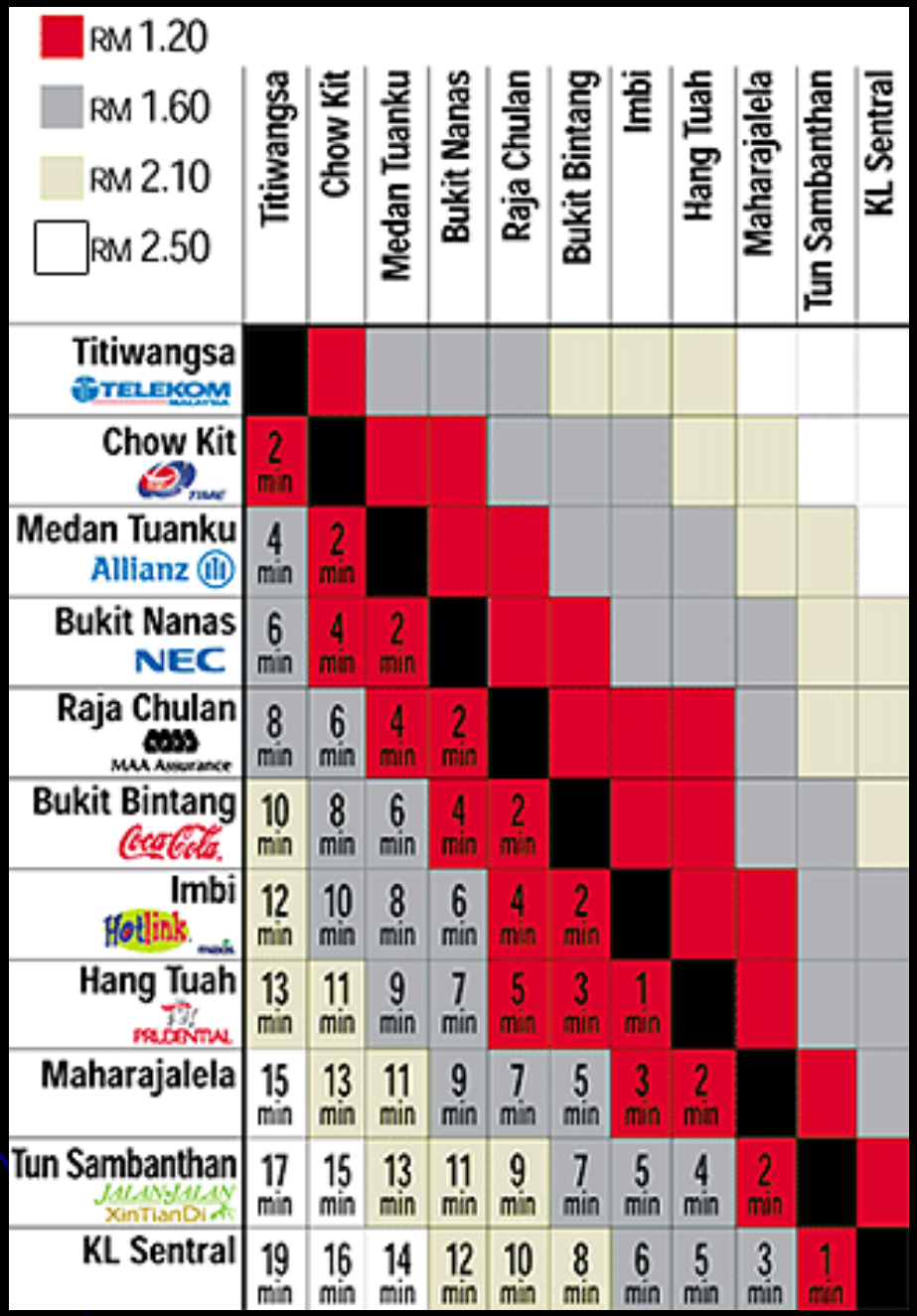
Integrates with **STAR LRT** at **Titiwangsa** Station and **Hang Tuah** Station

Integrates with **PUTRA LRT** at **KL Sentral** Station

Integrates with **KTM Komuter** at **KL Sentral** Station

Integrates with **Express Rail Link (ERL)** which is linked to the KL International Airport at **KL Sentral** Station

Fare Structure



The Construction of KL Monorail

Construction of the KL Monorail began in early 1997 and was later interrupted by the Asian Financial Crisis until June 1999 when work resumed.

The system includes 8.6 kilometres of twin guideway beams, 11 stations, 4 traction power sub-stations and 1 maintenance depot. When completed the KL Monorail will bring transportation convenience within and around the Central Business District linking the existing two LRT systems and giving access to the main urban business centre.

The system is elevated throughout its alignment. The construction of 11 elevated stations in congested urban locations was carried out with minimal disruption to traffic, pedestrian movement and services.

The techniques required for construction of monorail structures are quite different from those used for other forms of light transit structures. The KL Monorail utilises continuous beam construction with span lengths and alignment parameters that have never been achieved elsewhere in the world using precast concrete technology.

Titiwangsa station

Titiwangsa station

Switch deck at Jalan Tun Razak

Portal frame structure at Jalan Tun Razak

Jalan Pahang

Jalan Pahang

'A' series *(Jalan Tun Razak & Jalan Pahang)*

From Titiwangsa station to Jalan Pahang (approx. distance: 552m)

December 2002

Jalan Pahang - in front of KL General Hospital.

Along Jalan Pahang.

Jalan Pahang -In front of Grand Seasons Hotel.

Jalan Pahang - In front of Medical Research Institute.

'B' series *(Jalan Pahang)*

From Jalan Pahang to Chow Kit station (approx. distance: 545m)

December 2002

how Kit station (view from Jalan Pahang)

how Kit station construction (view from Jalan T.A.R.)

Jalan Tuanku Abdul Rahman (at Chow Kit junction)

Jalan Tuanku Abdul Rahman.

Jalan Tuanku Abdul Rahman.

Jalan Tuanku Abdul Rahman.

'C' series *(Jalan Tuanku Abdul Rahman)*

From Chow Kit station to Jalan Tuanku Abdul Rahman (approx. distance: 638m)

December 2002

alan Tuanku Abdul Rahman - in front of Wisma Maran

t the intersection of Jalan T.A.R./ Jalan Sultan Ismail.

'D' series *(Jalan Tuanku Abdul Rahman & Jalan Sultan Ismail)*

From Jalan Tuanku Abdul Rahman to Medan Tuanku station (approx. distance: 441m)

December 2002

Medan Tuanku station.

Jalan Sultan Ismail - in front of Bank Pembangunan.

Jalan Sultan Ismail

'E' series *(Jalan Sultan Ismail)*

From Medan Tuanku station to Bukit Nanas station (approx. distance: 792m)

December 2002

Bukit Nanas station.

Jalan Sultan Ismail - In front of Concorde Hotel.

alan Sultan Ismail/Jalan P Ramlee intersection.

'F' series *(Jalan Sultan Ismail)*

From Bukit Nanas station to Raja Chulan station (approx. distance: 879m)

December 2002

1.The Company

KL MONORAIL SYSTEM SDN BHD, formerly known as KL PRT Sdn Bhd, is the promoter and operator of the KL Monorail project.

KL Monorail Systems Sdn Bhd is a subsidiary of MTrans Holdings Sdn Bhd which also owns Monorail Malaysia Technology Sdn Bhd, the manufacturer and supplier of KL Monorail system.

2.Board of Directors

Dato' Ahmad Bin Sa'adi, Chairman
Bakhtiar Jamilee bin Haji Abdul, Managing Director
Al-Jeffrey bin Ibrahim, Executive Director
Lai Ying Choy, Executive Director
Patrick Wong, Executive Director

3.Scope of the Project

The project involves the development, operation and maintenance of a monorail system that will provide inner-city public transportation to the central business, employment, hotel, shopping and tourism district of Kuala Lumpur.

The KL Monorail project involves the construction of:

> 11 stations and 5 associated power sub-stations
> 1 depot
> 12 monorail trains

4.Concession Period

The concession agreement between the Government of Malaysia and KL Monorail System Sdn Bhd grants the latter to undertake the development, construction, management, operation and maintenance of the KL Monorail system for a period of 40 years.

5.Financial Information

Authorised Capital > RM600 million

Paid Up Capital > RM260 million

Project Cost > RM1.18 billion

Equity	RM260 million
Government Support Loan	RM300million
Infrastructure Loan	RM620 million

Operating hours : 6.00 am to 12.00 midnight daily

Maximum train speed : 80 km per hour

Average train speed: 30 km per hour

Peak hour frequency: 3 - 5 minutes

Off peak hour frequency: 7 - 10 minutes

With a total of 11 fully elevated stations, each between 600 - 1,000 metres apart, the KL Monorail is currently capable of handling up to a maximum 5,000 passengers per hour per direction (PPHPD), operating at 3 minutes headway with 12 numbers of 2-car trains.

Travelling time along the 8.6km route from Titiwangsa station to the KL Sentral station is approximately 19 minutes.

Thank You