



GOVERNMENT OF MALAYSIA

KLANG VALLEY TRANSPORTATION STUDY

FINAL REPORT

MAIN VOLUME

MARCH 1987

JAPAN INTERNATIONAL COOPERATION AGENCY

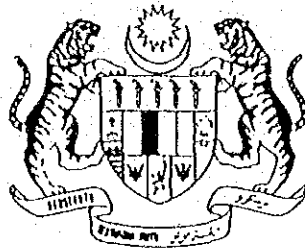
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| 国際協力事業団 | | |
| 受入 月日 | '87. 5. 11 | 1/13 |
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PREFACE

It is with great pleasure that I present this report entitled the Klang Valley Transportation Study to the Government of Malaysia.

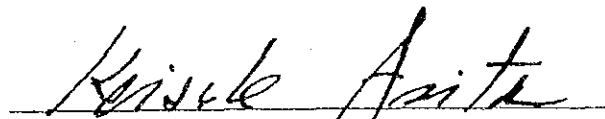
This report embodies the results of a transportation masterplan study which was carried out in the Klang Valley Region from December 1984 to December 1986 by Japanese study team commissioned by the Japan International Cooperation Agency following the request of the Government of Malaysia.

The study team headed by Mr. Toshio Kimura, Fukuyama Consultants International Co., Ltd. and Pacific Consultants International Co., Ltd. had a series of discussions with the officials concerned of the Government of Malaysia, conducted a wide range of field survey and prepared the report.

I hope that this report will be useful as a basic reference for development of the region.

I wish to express my deep appreciation to the officials concerned of the Government of Malaysia for their close cooperation extended to the team.

March, 1987

A handwritten signature in dark ink, reading "Keisuke Arita", is written over a horizontal line.

Keisuke Arita

President

Japan International Cooperation Agency

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INTRODUCTION

Background

In response to the request by the Government of Malaysia for technical cooperation in conducting a Klang Valley Transportation Study (hereinafter referred to as "the Study") the Government of Japan, through the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Study Team to carry out the Study jointly with the Government of Malaysia in preparing a comprehensive Transportation Masterplan for the Klang Valley Region to the year 2005.

The Study commenced on the 19th December, 1984 when the Steering Committee was held and accepted the Inception Report.

During the course of the Study, two (2) progress reports and two (2) interim reports were submitted to the said committee and the Draft Final Report was submitted in December 1986. This Final Report comprises the final proposals for the Transportation Masterplan for Klang Valley to the year 2005.

Objectives

The main objectives of the Study are to formulate a Klang Valley Transportation Masterplan taking into consideration the various development plans, to recommend major transportation policies and to suggest the priority projects in the course of the Study. In more specific terms the objectives of the Study are as follows : —

- (a) Conduct traffic surveys that include Traffic Counting Survey, Public Transport Survey, Home Interview Person Trip Survey (HIS), Lorry Owner Interview Freight Traffic Survey (OIS), Cordon Line and Screen Line surveys.
- (b) Identification of present transport issues and problems and hence set up short term transport policies and the preparation of short term transportation plan to 1990.
- (c) Formulation of Regional Development and Landuse Plans to the year 2005
- (d) Calibration of Landuse and Transport Models based on the results of the traffic surveys conducted
- (e) Forecasting of traffic demands to the year 2005
- (f) Formulation of Long-Term Road Network Plan to the year 2005
- (g) Formulation of Public Transportation System Plan to the year 2005
- (h) Formulation of Freight Transportation System Plan to the year 2005

Study Area

The main study areas are the Federal Territory of Kuala Lumpur and the four (4) districts of Gombak, Hulu Langat, Petaling and Klang in the State of Selangor and the to be established Federal Territory of Bukit Tinggi Twin City in the State of Pahang.

The secondary study areas are the Outer Klang Valley Region which include the other districts of Selangor and the neighbouring regions (Figure (i)).

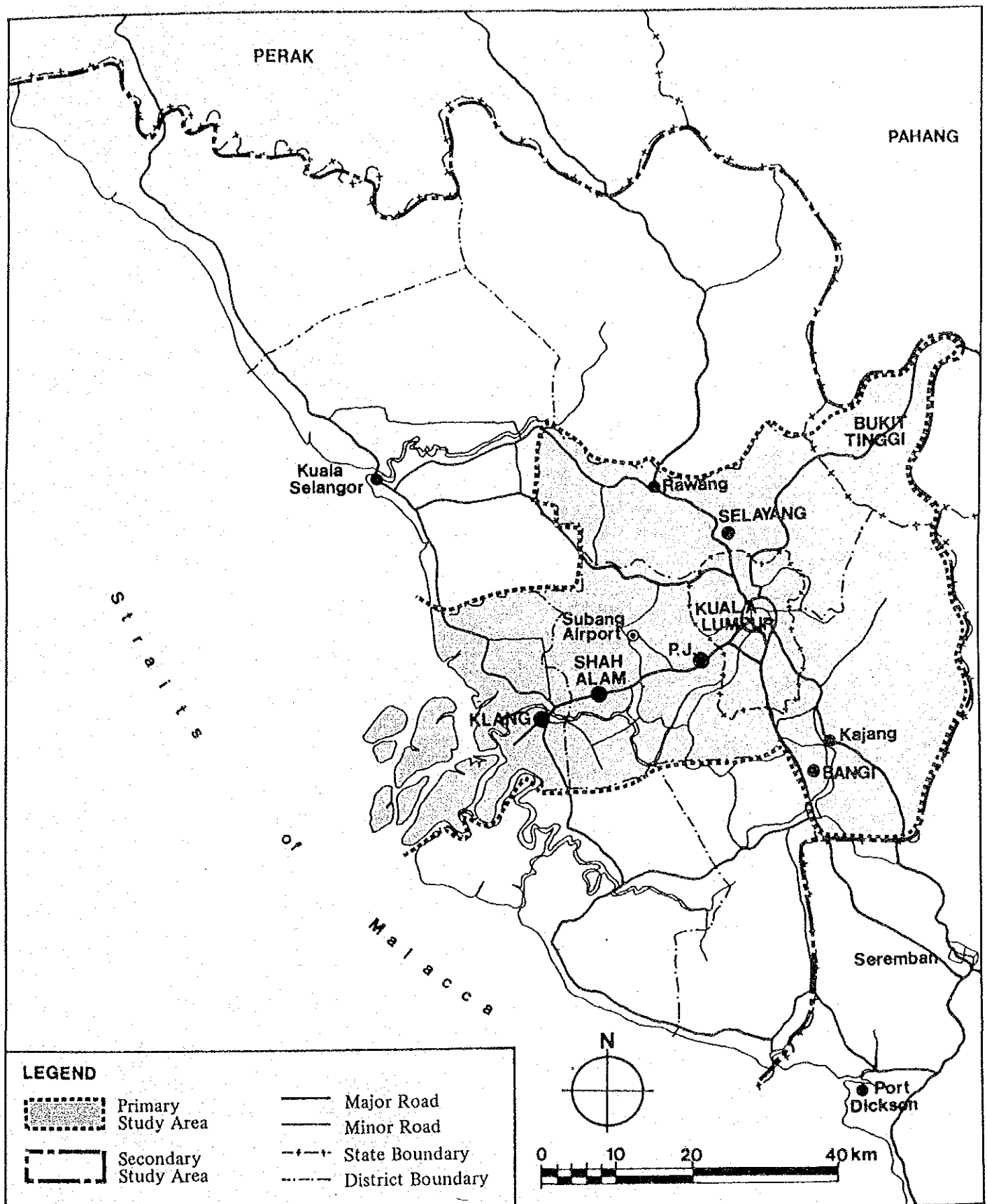


Figure (i) : Study Areas For The Klang Valley Transportation Study

Organization of the Study

The project is being carried out jointly by JICA and the Government of Malaysia in coordination with other related agencies. The organization for the project and the lists of committees members are as follows : —

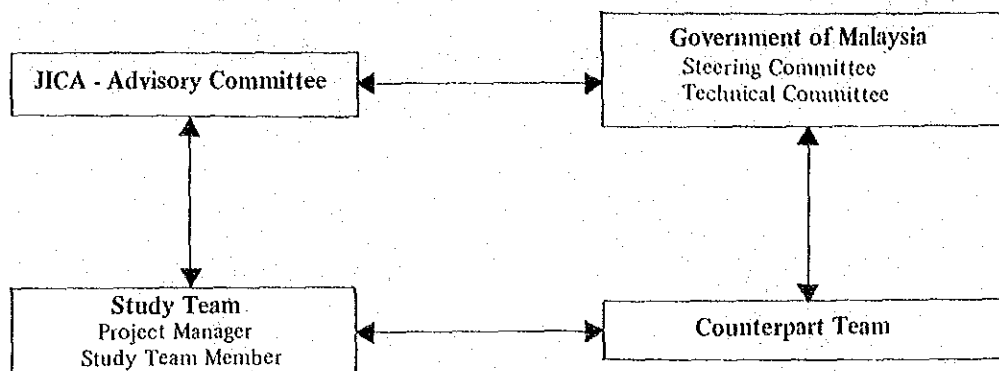


Figure (ii) : Organization Of The Klang Valley Transportation Study

JICA has set up an Advisory Committee to assist the Study Team by providing the latter with advice and suggestions from time to time.

Steering Committee, Government of Malaysia

| | | |
|-----------|-------------------------------|--|
| Chairman | Dr. Mohd. Noor bin Haji Harun | Economic Planning Unit, Prime Minister's Department |
| | Mr. Ismail bin Mohamed | Economic Planning Unit, Prime Minister's Department |
| Secretary | Mr. Annuar bin Khabar | Economic Planning Unit, Prime Minister's Department |
| Secretary | Mrs. Faridatul Akmar Taib | Economic Planning Unit, Prime Minister's Department |
| | Dr. Johari bin Mat | Klang Valley Planning Secretariat, Prime Minister's Department |
| | Mr. Ahmad Kamaruddin | Klang Valley Planning Secretariat, Prime Minister's Department |
| | Mrs. Norasiah Yahya | Klang Valley Planning Secretariat, Prime Minister's Department |
| | Mr. Abdul Karim bin Munisar | Klang Valley Planning Secretariat, Prime Minister's Department |
| | Mr. Alexius Y.A. Loo | Department of Planning and Development Research, Ministry of Works |

Mr. Ong Eng Poe

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Mr. Kamarul Baharim bin
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Mr. Shamsuddin Che' Mat

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Mr. Jabbari bin Ahmad

Development and Planning Unit,
Selangor State

Technical Committee, Government of Malaysia

Chairman Dr. Johari bin Mat

Klang Valley Planning Secretariat,
Prime Minister's Department

Secretary Mr. Shaharuzzaman bin
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Klang Valley Planning Secretariat,
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| Mrs. Hew Kuan Wai | Ministry of Transport |
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| Ms. Hanim bt Ali | Malayan Railway Administration |
| Mr. Selamat Haji Tahir | Malayan Railway Administration |
| Mr. Ahmad Rahimi Jaafar | Malayan Railway Administration |

Advisory Committee, Government of Japan

| | | |
|----------|----------------------|--|
| Chairman | Mr. Kazuo Yoda | Ministry of Construction |
| | Dr. Koji Hasekura | Housing and Urban Development Public Corporation |
| | Mr. Makoto Mizoguchi | Honshu Shikoku Bridge Authority |
| | Mr. Izuo Kishita | Ministry of Construction |
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Japanese Expert

| | | |
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| | Mr. Kokuro Hanawa | Traffic Engineering |
| | Mr. Hironobu Sakai | Urban/Landuse Planning |
| | Mr. Takashi Kadota | Regional Planning |
| | Mr. Takanori Shibata | Land Readjustment Planning |
| | Mr. Naoya Ogawa | Highway Planning |
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Transport Economics

Transport Demand Forecasting/
System Engineering

Transport Survey

Transport Survey

Highway Planning

Highway Planning

Highway Planning

Public Transport Planning

Highway Planning

Urban and Transport Planning

Transport Planning

Study Methodology

A flowchart summarising the Study Methodology is shown in Figure (iii). The Study commenced with establishing the future regional development pattern and forecasting future travel demand under the 'do-nothing' situation. The likely future transport problems under a 'do-nothing' situation is therefore identified at this stage.

Alternative transport solutions are generated and tested through the alternative transport plans. These plans are then compared and assessed from the financial, economic and functional analysis results. This evaluation of alternative plans hence culminated the Study in recommending the Transportation Masterplan for Klang Valley to the year 2005.

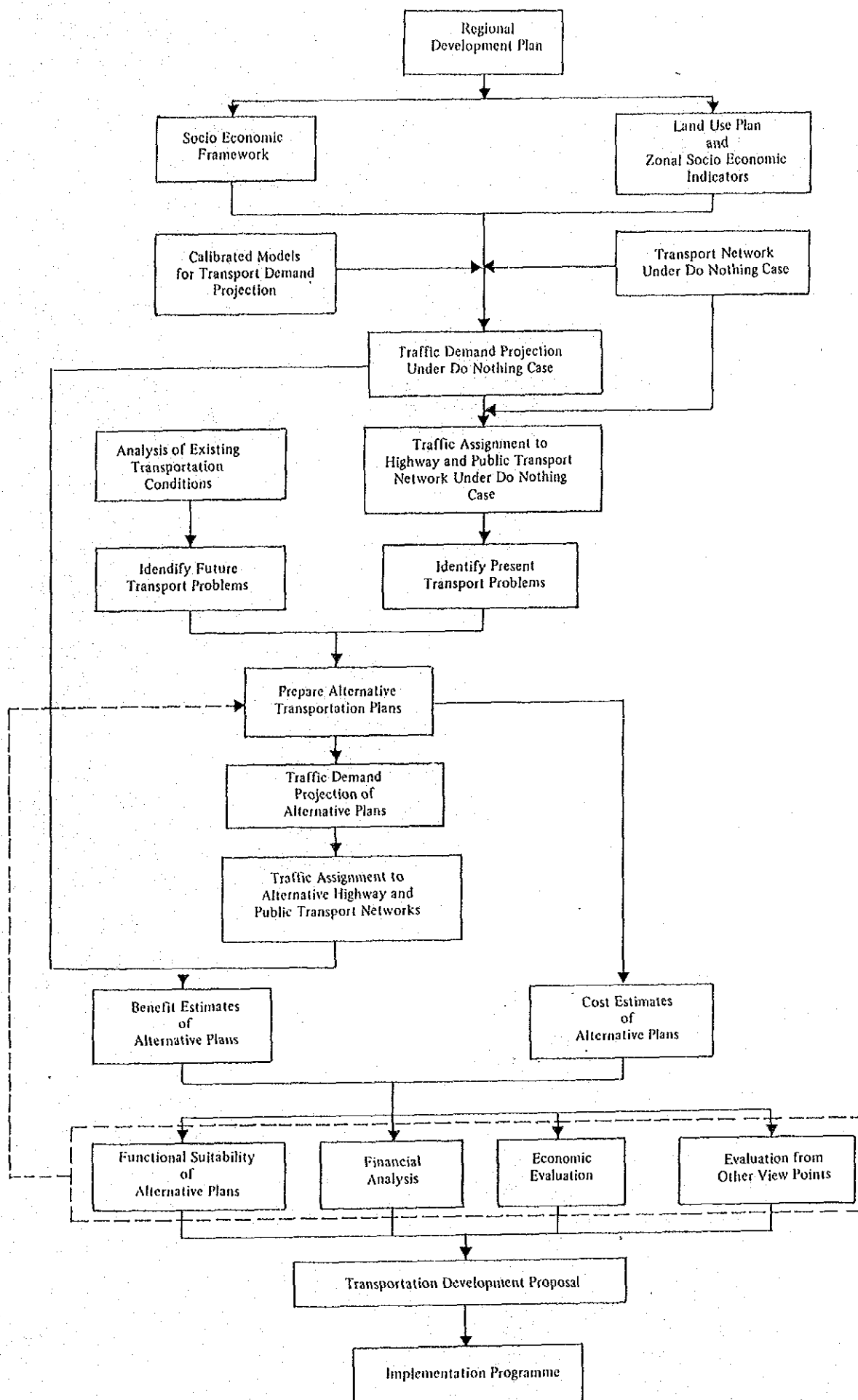
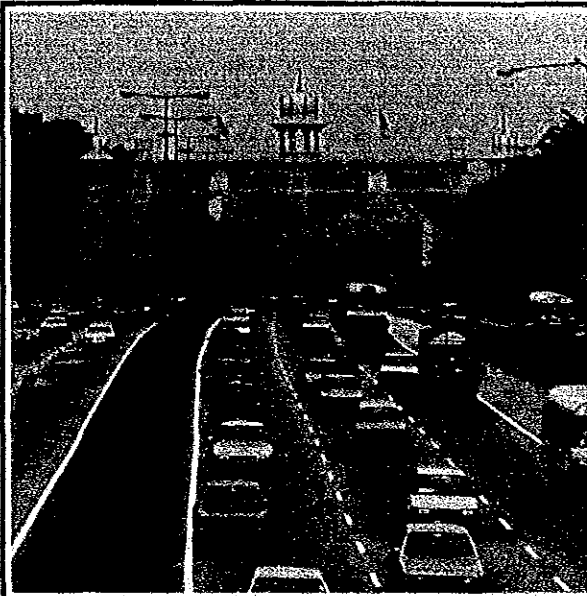


Figure (iii) : Summary Flowchart Of The Study Methodology

MAJOR FINDINGS AND RECOMMENDATIONS



1. SOCIO-ECONOMIC FRAMEWORK AND FUTURE DEVELOPMENT PATTERN

1.1 Socio-Economic Framework

The socio-economic framework for future development in the Klang Valley is based on the expectation that the Klang Valley Region is to play the role of a catalyst for National Economic Development.

The framework proposed in this Study is principally based on the perspective made in the Fifth Malaysia Plan taking into consideration possible economic fluctuations. The socio-economic framework is described below : —

- (1) In the Klang Valley Region, the population is expected to increase from 2.5 million in 1985 to 3.9 million in 1995 and 5.5 million in 2005 with an average annual growth rate of 4.5 percent between 1985 and 1995 and 3.5 percent between 1995 and 2005 (Table 1).

Table 1 : Future Population Framework, Klang Valley, 1985 — 2005

(In '000)

| | 1) 1985 | 2) 1995 | 2) 2005 | Average Annual Growth Rate (%) | |
|--------------------|------------|------------|------------|-----------------------------------|-------------|
| | | | | 1985 — 1995 | 1995 — 2005 |
| Kuala Lumpur | 1,215 | 1,770 | 2,240 | 3.8 | 2.4 |
| Other Klang Valley | 1,319 | 2,170 | 3,210 | 5.1 | 4.0 |
| Bukit Tinggi | — | — | 100 | — | — |
| Klang Valley | 2,534 | 3,940 | 5,550 | 4.5 | 3.5 |

Source : 1) Estimated on the basis of Home Interview Survey, 1985
2) Projected by the Klang Valley Transportation Study

- (2) Considering the economic perspective reported in the Fifth Malaysia Plan, the past trend of economic performance in Malaysia and the likely changes in the world economy, the Study Team predicts the Gross Domestic Product (GDP) using three (3) scenarios, viz. low growth scenario (average annual growth rate of 3% between 1986 and 2005), medium growth scenario (average annual growth rate of 5% for the coming two (2) decades) and high growth scenario (average annual growth rate of 6% for the same period).

Among these, the medium growth scenario which coincides with the target growth rate established in the Fifth Malaysia Plan is adopted and assumed for the transport demand projection.

Based on the estimated Gross Domestic Product, the Gross Regional Product (GRP) is predicted. The GRP in the Klang Valley Region is expected to grow at an average annual growth rate of 5.9 percent from 1985 to 2005. In terms of value, it is estimated that the GRP in the Klang Valley will thereby expand from M\$15,511 million in 1985 to M\$28,274 million in 1995 and M\$48,842 million in 2005 (Table 2).

Table 2 : Gross Domestic Product And Gross Regional Product in Klang Valley, 1985 – 2005

(M\$ million)

| | | 1) | 2) | 2) | Average Annual Growth Rate (%) | |
|---------------------|--------|--------|---------|---------|--------------------------------|-------------|
| | | 1985 | 1995 | 2005 | 1985 – 1995 | 1995 – 2005 |
| GDP in Malaysia | Low | | 72,549 | 97,500 | 2.0 | 3.0 |
| | Medium | 59,544 | 96,665 | 157,457 | 5.0 | 5.0 |
| | High | | 106,276 | 190,324 | 6.0 | 6.0 |
| GRP in Klang Valley | Low | | 21,221 | 30,244 | 3.2 | 3.6 |
| | Medium | 15,511 | 28,275 | 48,842 | 6.2 | 5.6 |
| | High | | 31,086 | 59,037 | 7.2 | 6.6 |

Source : 1) The Fifth Malaysia Plan

2) Projected by Klang Valley Transportation Study

- (3) The number of employments in future is projected based on the future population by age group, participation rate and unemployment rate of the labour force. Consequently, the total employment in the Study Area is expected to grow from 950,000 in 1985 to 1,514,000 in 1995 and 2,190,000 in 2005 at an annual growth rate of 4.8% from 1985 – 1995 and 3.8% from 1995 – 2005.

Employment by industry is broken down using the predicted GRP, the the expected value added by industry and the total employment in the Study Area. Employment in the primary industry is expected to decline slowly whilst employment in the secondary industry is expected to double from 1985 to 2005 and employment in the tertiary industry is also expected to grow to 2.5 times for the same period (Table 3).

Table 3 : Employment By Industry, Klang Valley, 1985 – 2005

| Industry | Employment (In '000) | | | | Average Annual Growth Rate (%) | |
|-----------|----------------------|-------|--------|--------|--------------------------------|-------------|
| | 1) | 2) | 3) | 3) | 1985 – 1995 | 1995 – 2005 |
| | 1980 | 1985 | 1995 | 2005 | | |
| Primary | 56.6 | 46.3 | 45.2 | 38.7 | -0.2 | -1.5 |
| Secondary | 230.2 | 269.3 | 400.6 | 550.5 | 4.1 | 3.2 |
| Tertiary | 473.2 | 634.4 | 1068.2 | 1600.8 | 5.3 | 4.1 |
| Total | 760.0 | 950.0 | 1514.0 | 2190.0 | 4.8 | 3.8 |

Source : 1) Depatement of Statistics

2) Modified from H.I.S. Data

3) Klang Valley Transportation Study

- (4) The average household monthly income in the Klang Valley Region is expected to grow in view of the anticipated economic growth, increasing productivity per employed person and increasing number of employed person per household.

The average monthly household income in the Klang Valley Region will expand from M\$1,383 in 1985 to M\$1,578 in 1995 and M\$1,870 in 2005 (Table 4).

Table 4 : Monthly Income Projection, Klang Valley, 1985 – 2005

(In M\$ at 1985 prices)

| Income | 1) 1985 | 2) 1995 | 2) 2005 | Average Annual Growth Rate (%) | |
|---------------|------------|------------|------------|-----------------------------------|-------------|
| | | | | 1985 – 1995 | 1995 – 2005 |
| Per Employee | 763 | 873 | 1042 | 1.4 | 1.8 |
| Per Capita | 285 | 534 | 410 | 1.6 | 2.1 |
| Per Household | 1,383 | 1,578 | 1,870 | 1.3 | 1.7 |

Source : 1) Results of H.I.S.
2) Klang Valley Transportation Study

- (5) The number of vehicles in Klang Valley is projected to grow by 5.9% annually from 1985 – 1995 and 5.5% from 1995 to 2005. The annual growth rate of motorcar for the period of 1995 – 2005 is projected to be 6.2%, motorcycle 4.7%, taxi 5.5% and lorry 5.1%. (Table 5)

In terms of motor vehicle (including motorcycle) per 1000 households, the Study Team estimated and increase from 1190 in 1985 to 1326 in 1995 and 1493 in 2005. By 2005 there will be 783 cars to every 1000 households in Klang Valley.

Table 5 : Motor Vehicle Projection, Klang Valley, 1985 – 2005

| | No. of Motor Vehicles (In '000) | | | Average Annual Growth Rate (%) | |
|-------------|------------------------------------|--------------------|----------------------|-----------------------------------|--------------|
| | 1) 1985 | 2) 1995 | 2) 2005 | 1985 – 1995 | 1995 – 2005 |
| Motor Cycle | 264.7 | 433.6 | 662.0 | 5.1 | 4.7 |
| Motor Car | 284.5 | 551.2 | 955.3 | 6.8 | 6.2 |
| Taxi | 6.8 | 13.2 | 20.0 | 6.8 | 5.5 |
| Lorries | 67.5 | 111.4 | 184.1 | 5.1 | 5.1 |
| Total * | 623.5 (358.8) | 1,109.4 (675.8) | 1,821.4 (1,159.4) | 5.9 (6.5) | 5.5 (6.0) |

Source : 1) Based on H.I.S. and O.I.S. Data
2) Projected by the Study Team

Note : * Figures in bracket exclude motorcycles

1.2 Regional Development Pattern

(1) Alternative Development Patterns

Three possible alternative scenarios for the future regional development pattern in Klang Valley are considered (Figure 1).

Scenario A : Concentrated Growth in Kuala Lumpur Conurbation Scenario

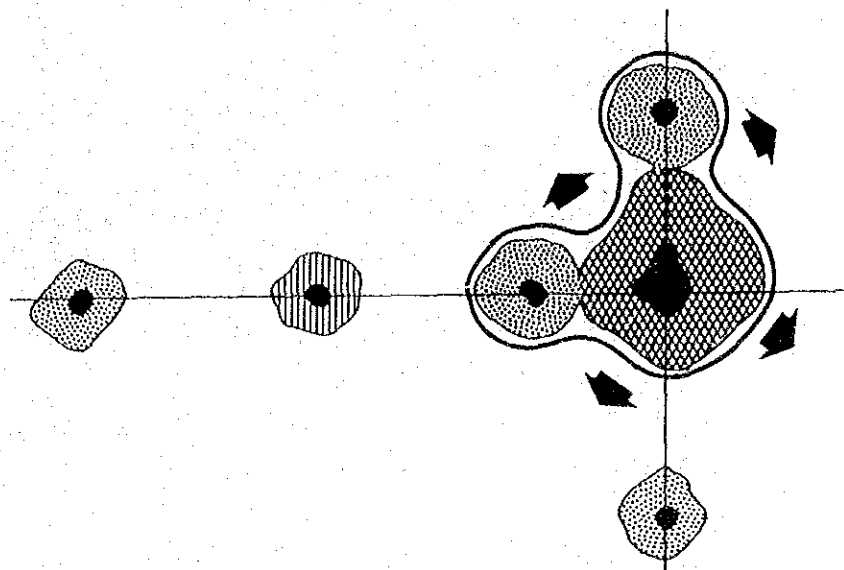
This scenario allows a further attainment of a primacy state where Kuala Lumpur Conurbation becomes a very large metropolitan area commanding the region's economy and employment.

Scenario B : Dispersal to Selected Growth Centres Scenario

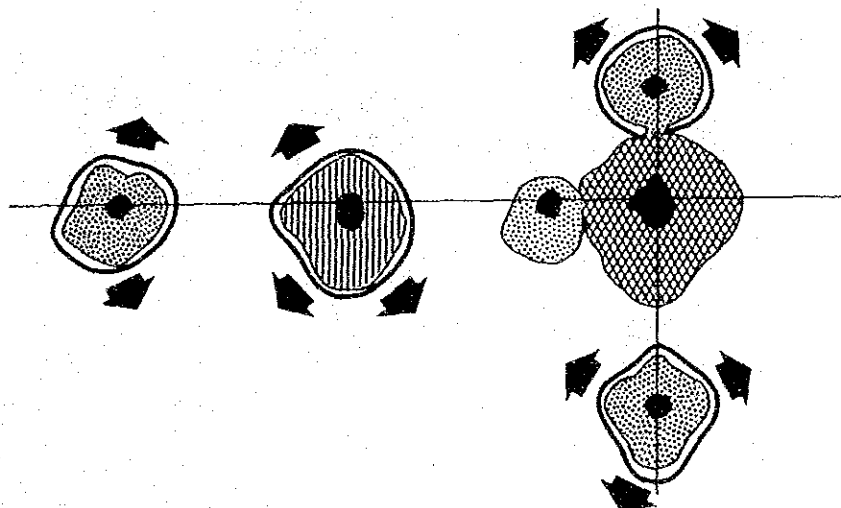
This scenario will produce a balanced urban hierarchy structure with each centre having specific function and providing their own employment so as to achieve more or less individual self-contained urban centre.

Scenario C : Dispersal and Twin City Scenario

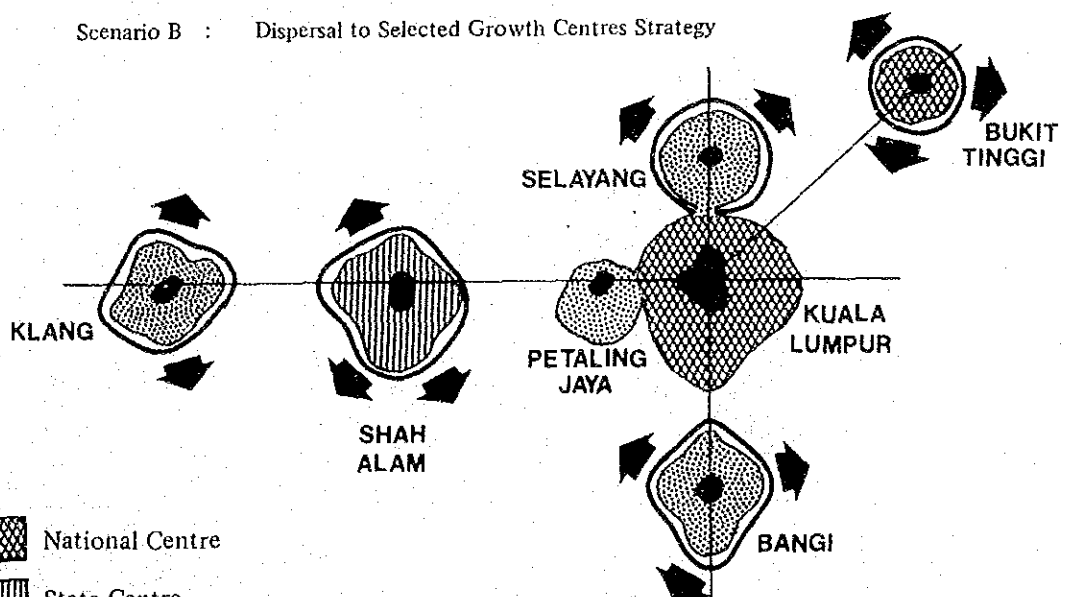
This scenario has the main features of Scenario B. Added to this however is the diversion of some development pressure on Kuala Lumpur to a new town at Bukit Tinggi under a long term planning strategy.






Scenario A : Concentrated Growth in Kuala Lumpur Conurbation Strategy



Scenario B : Dispersal to Selected Growth Centres Strategy




















































-  National Centre
-  State Centre
-  District Centre

Scenario C : Dispersal and Twin City Strategies

Figure 1 : The Three Alternative Regional Development Scenerios

Evaluating these alternative regional development scenarios, Scenario C is taken as the most likely development scenario in future. This is to be in line with the national and regional development policy which suggests that the future development pattern in the Klang Valley will consist of an urban system of six (6) growth centres namely Kuala Lumpur, Shah Alam, Petaling Jaya, Klang, Bangi and Selayang with Bukit Tinggi Twin City, each having its own specific hierarchy of function rather than allowing the urban growth to just sprawl and likely to result in a continuous urban settlement from Klang to Kuala Lumpur.

Figure 2 shows the proposed major functions of each growth centre.

| City | Hierarchy | Population 2005 | Major Functions | | | | | | | Remarks |
|---------------|-----------------|-----------------|---|---|---|---|---|---|---|----------------|
| | | | Adminis- trative | Commercial Trading | Institu- tional | Reside- tial | Heavy Industrial | Light Industrial | Transpor- tation | |
| Kuala Lumpur | National Centre | 2,240,000 |  |  |  * |  |  |  |  Train/Bus | * UM * UTM |
| Shah Alam | State Centre | 430,000 |  |  |  ** |  |  |  |  Air Port | ** ITM |
| Petaling Jaya | District Centre | 427,000 |  |  |  |  |  |  |  | |
| Klang | District Centre | 427,000 |  |  |  |  |  |  |  Port | |
| Bangi | District Centre | 319,000 |  |  |  *** |  |  |  |  | *** UPM UKM |
| Selayang | District Centre | 142,000 |  |  |  |  |  |  |  | |
| Bukit Tinggi | District Centre | 100,000 |  |  |  # |  |  |  |  | # IIU |

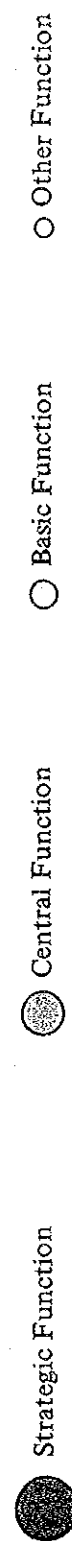


Figure 2: Major Functions of Each Growth Centre

(3) Landuse Requirements and Population Distribution

Based on the selected future development pattern and socio-economic framework, the future landuse requirements are estimated and are shown in Table 6.

The total urbanized area is expected to increase from 33,580 ha in 1985 to 48,280 ha in 1995 and 65,060 ha in 2005. The percent share of urbanized area to the total area is therefore expected to grow from 12% in 1985 to 17% in 1995 and 23% in 2005.

Table 6 : Future Urbanized Area Requirements

| Year | Urbanized Area (ha) | Total Area (ha) | Percent Share to Total Area (%) |
|------|---------------------|-----------------|---------------------------------|
| 1985 | 33,580 | 284,200 | 11.8 |
| 1995 | 48,280 | | 17.0 |
| 2005 | 65,060 | | 22.9 |

Source : Klang Valley Transportation Study

The population and employment distribution are determined using the spatial distribution of landuses and population, employment densities in each area (traffic zones). The resultant population and employment distributions are illustrated in Figures 3 and 4.

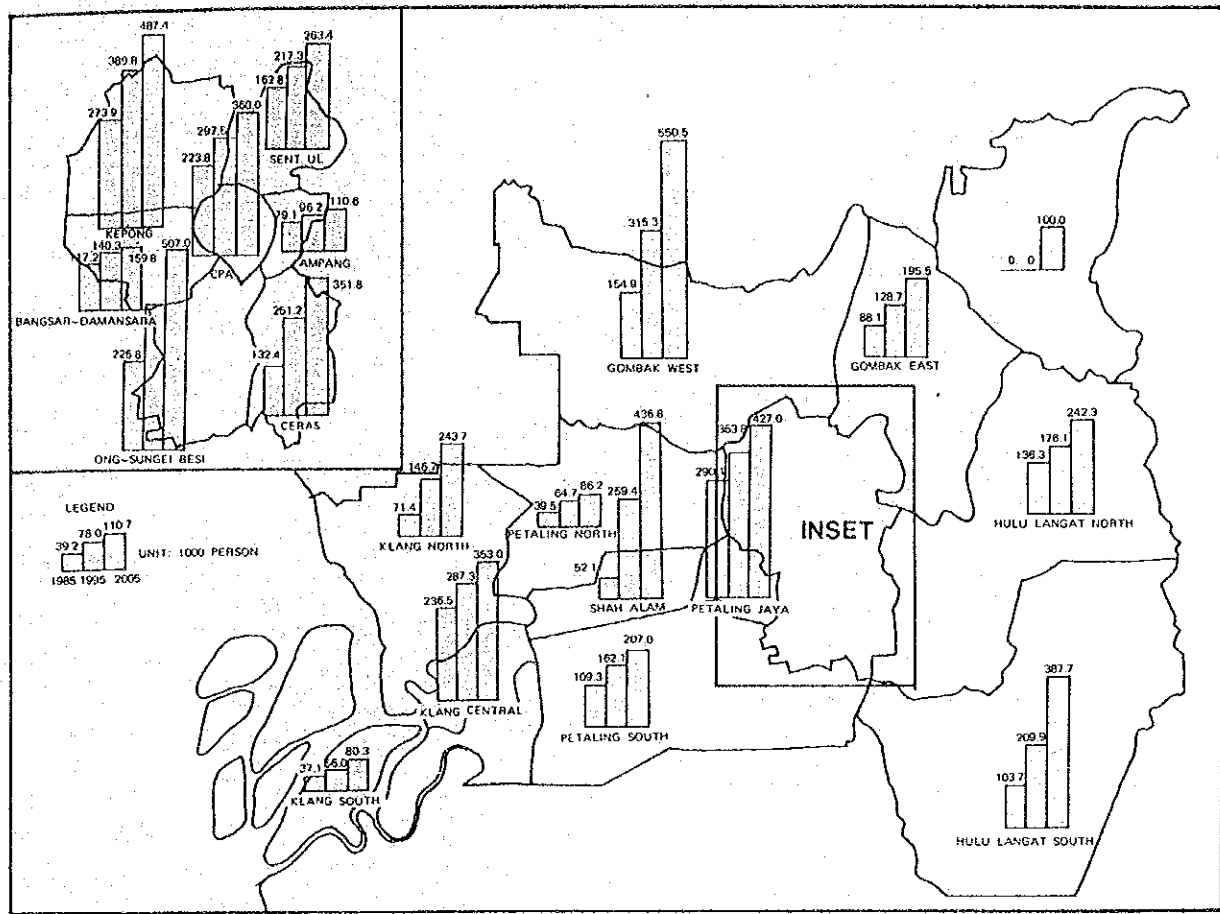


Figure 3: Population Distribution Plan

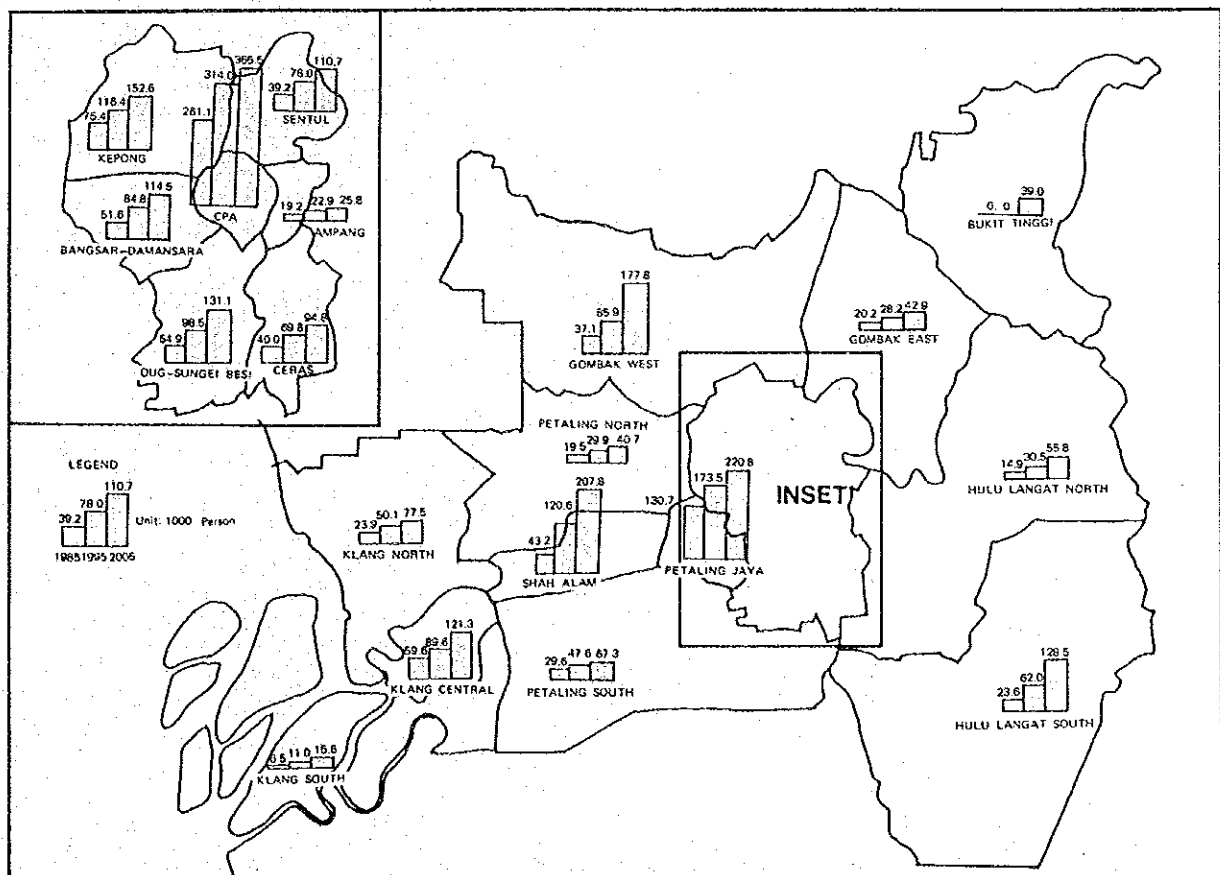
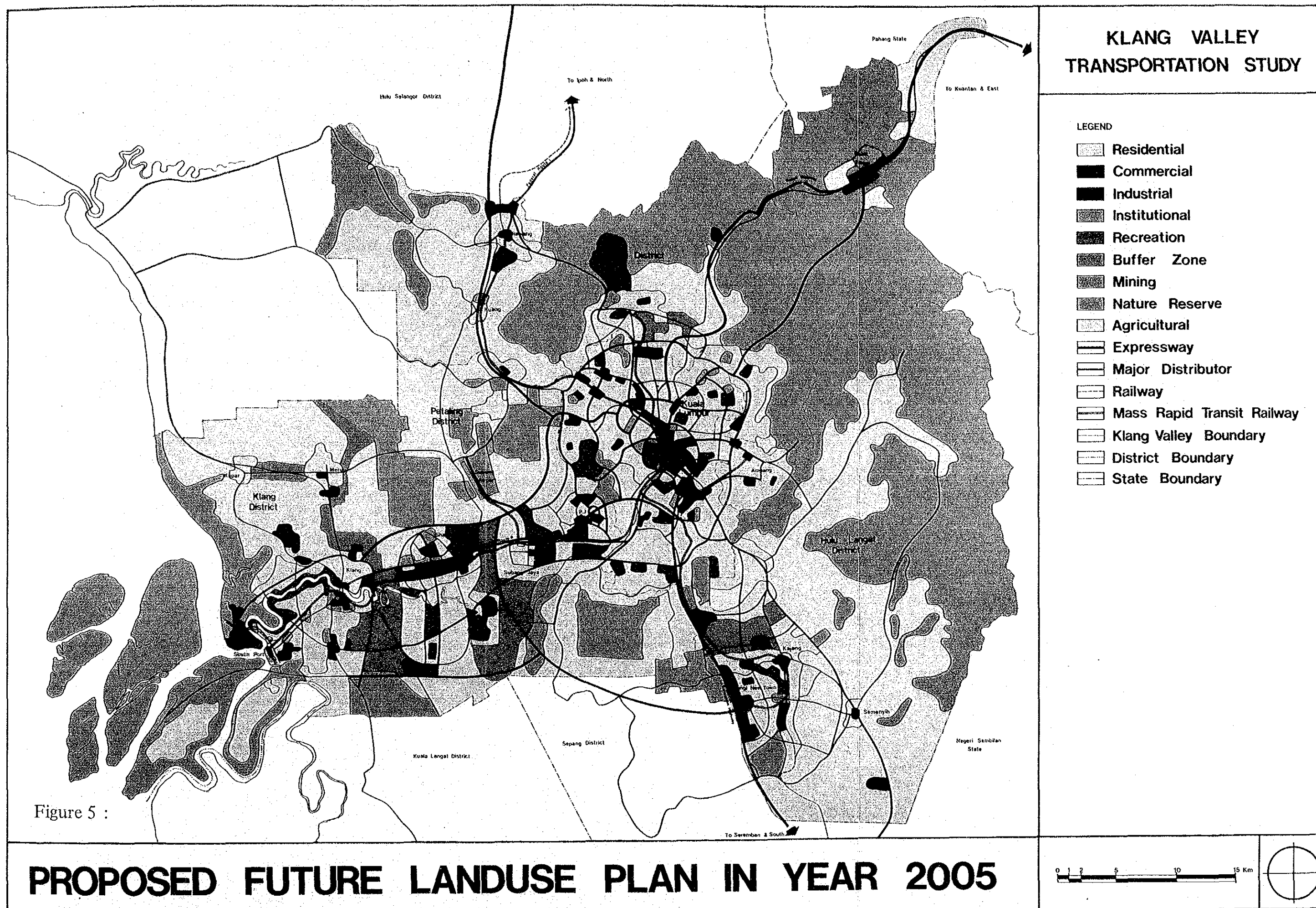


Figure 4: Employment Distribution Plan



2. PRESENT AND FUTURE TRANSPORT PROBLEMS AND ISSUES

2.1 Present Transport Problems

(1) Road Transport

(a) Inadequate Road Network

Delay in the implementation of road network system in the Klang Valley has not been helpful in achieving the targets and growth strategy of the proposed six (6) urban centres structure in the Klang Valley.

(b) Lack of Coordination between Urban and Transport Development

The approvals for housing projects, office buildings and shopping complexes give little consideration to the needs of commuters to and from these developments and the resultant impact on traffic in the surrounding areas. Moreover, direct access to major distributors especially the Ring Roads are not satisfactorily controlled. The latter has resulted in a drop in their traffic capacities which they were planned to carry.

(c) Delay in Travel Time

The high travel demand on the semi-developed existing road network has caused serious traffic congestions during the morning and evening peak hours. This has resulted in the doubling or sometimes tripling of travel times and costs for the road users during these hours.

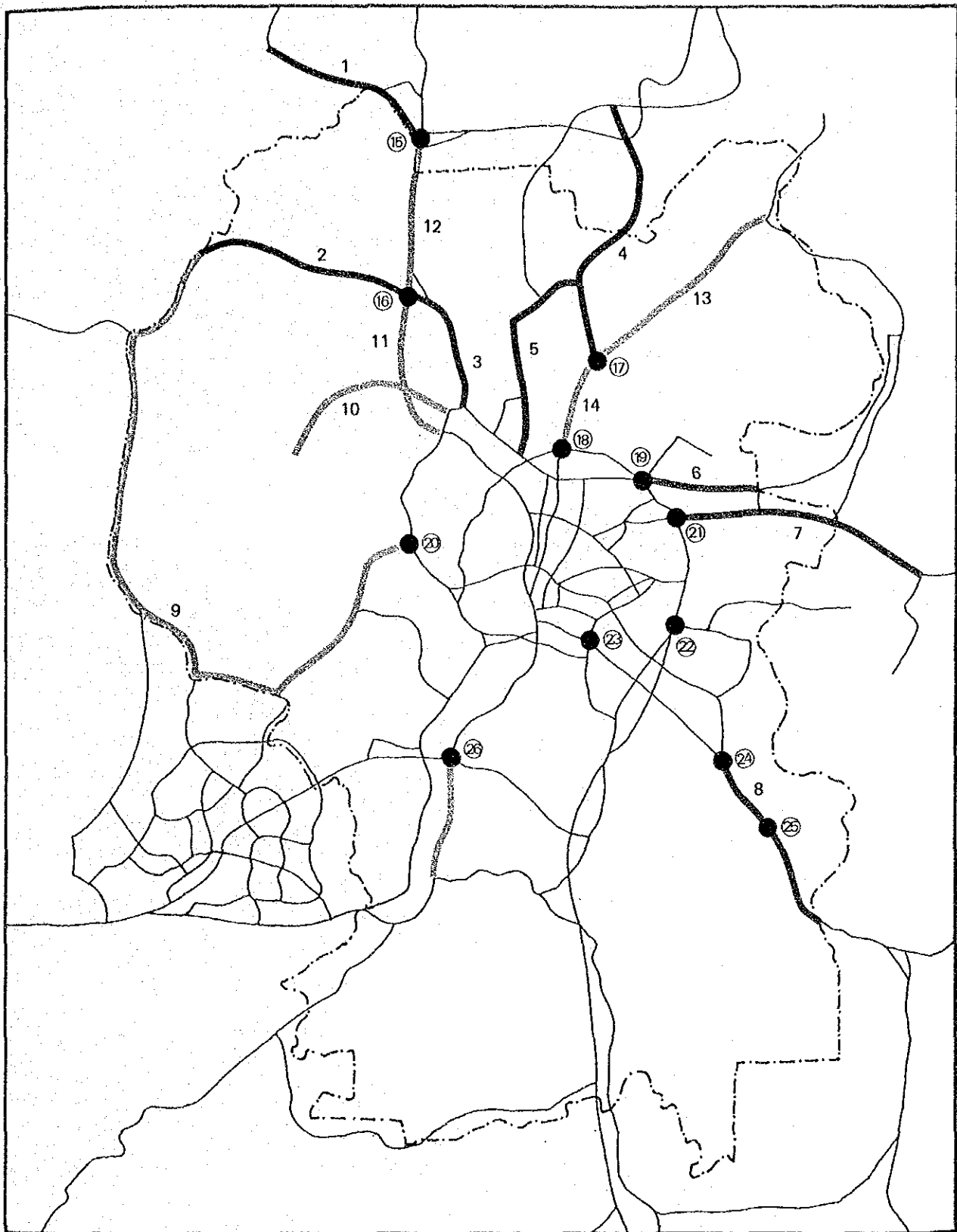
(d) Traffic Bottlenecks and Low Capacity Transport Facility

Incompatible and low capacity intersections such as roundabouts, at-grade intersections along the major roads in Kuala Lumpur Conurbation, in Klang and along the Kuala Lumpur-Klang Corridor; narrow bridges and at-grade rail crossings are traffic flow bottlenecks and causes of traffic congestion. This is particularly conspicuous along Jalan Cheras, Jalan Kepong and Jalan Ipoh.

Traffic congestion in the surrounding areas of Kuala Lumpur Conurbation and the other urban centres occur during the peak and working hours mainly because of under-capacity road conditions and facilities. Major radial roads in Kuala Lumpur like Jalan Ampang and Jalan Pahang have relatively low capacity for their functions.

Table 7 : Existing Traffic Conditions in the Klang Valley

| A) Kuala Lumpur Conurbation (see Figure 6) | | |
|---|-----|---|
| Traffic Conditions | No. | Location |
| Roads with Traffic Congestion Degree 2.0 and above | 1 | Jalan Ipoh (From Batu Caves to Pasar Borong) |
| | 2 | Jalan Kepong |
| | 3 | Jalan Ipoh (Kepong Roundabout to Jalan Duta Junction) |
| | 4 | Jalan Gombak |
| | 5 | Jalan Sentul |
| | 6 | Jalan Datuk Keramat |
| | 7 | Jalan Ampang |
| | 8 | Jalan Cheras |
| Roads with Traffic Congestion Degree 1.5 to 1.9 | 9 | Jalan Damansara |
| | 10 | Jalan Segambut |
| | 11 | Jalan Kuching |
| | 12 | Jalan Ipoh (Kepong Roundabout to Batu Caves Junction) |
| | 13 | Jalan Genting Klang |
| | 14 | Jalan Pahang |
| Congestion Caused by Low Capacity Intersection | 15 | Jalan Batu Caves Junction |
| | 16 | Kepong Roundabout |
| | 17 | Jalan Gombak/Pahang Intersection |
| | 18 | Jalan Pahang Roundabout |
| | 19 | Jalan Gurney Intersection |
| | 20 | Jalan Duta/Semantan Intersection |
| | 21 | Jalan Ampang/Tun Razak Intersection |
| | 22 | Jalan Tun Razak/Jalan Kg. Pandan Intersection |
| | 23 | Edinburgh Roundabout |
| | 24 | 5.5 km Jalan Cheras Roundabout |
| | 25 | 8 km Jalan Cheras Roundabout |
| | 26 | Jalan Klang Lama/Syed Putra Intersection |
| B) Other Klang Valley Area (see Figure 7) | | |
| Roads with Traffic Congestion Degree 2.0 and above | 27 | Federal Highway (From Subang to Shah Alam) |
| | 29 | Jalan Vantoreen |
| Roads with Traffic Congestion Degree 1.5 to 1.9 | 28 | Federal Highway (Klang to Shah Alam) |
| | 30 | Jalan Langat |
| Congestion Caused by Low Capacity Intersection | 31 | Jalan Kim Chuan Intersection |
| | 32 | 7-Legged Roundabout |
| | 33 | Berkely Roundabout |
| | 34 | North Klang Straits Bypass/Federal Highway II I/C |
| | 35 | Batu Tiga Intersection |
| Congestion due to Narrow Bridgeway Area with Large Volume of Through Traffic on poor Condition Street | 36 | Kota Bridge over Klang River |
| | 37 | Kajang |
| | 38 | Rawang |



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

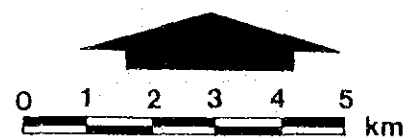
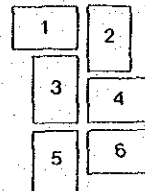
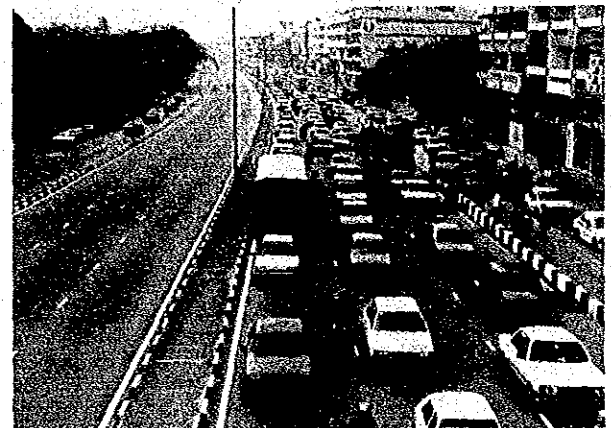
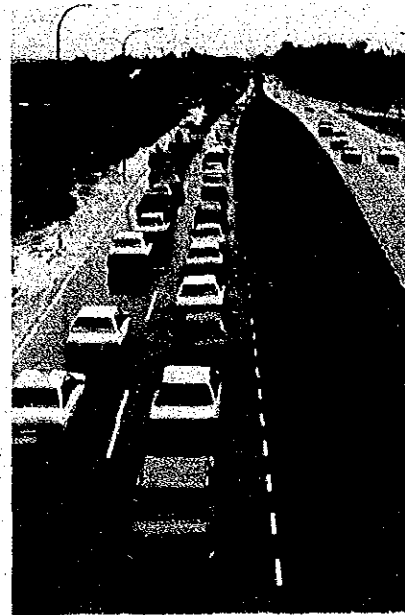
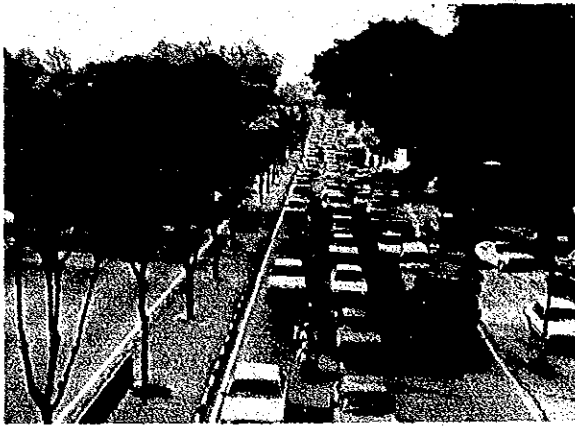
-  ROAD WITH CONGESTION
DEGREE 2.0 & ABOVE
-  ROAD WITH CONGESTION
DEGREE 1.5 - 1.9
-  CONGESTION CAUSED BY LOW
CAPACITY INTERSECTION

Figure 6:
Existing Traffic Conditions
in Kuala Lumpur Conurbation



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1. Heavy traffic congestion on Jalan Cheras during the morning rush hours.
2. Bumper to bumper queue of vehicles on the Federal Highway between Shah Alam and Subang towards Kuala Lumpur in the morning.
3. Traffic standstill on Jalan Tun Razak towards Jalan Pahang in the evening hours.
4. Traffic Congestion on Jalan Loke Yew towards Kuala Lumpur in the morning rush hours.
5. There remains a number of roundabouts like the Edinburgh Circle here which often are the traffic bottlenecks in the city.
6. Another obsolete roundabout at 5 km. Jalan Cheras with vehicles jamming up the roundabout.

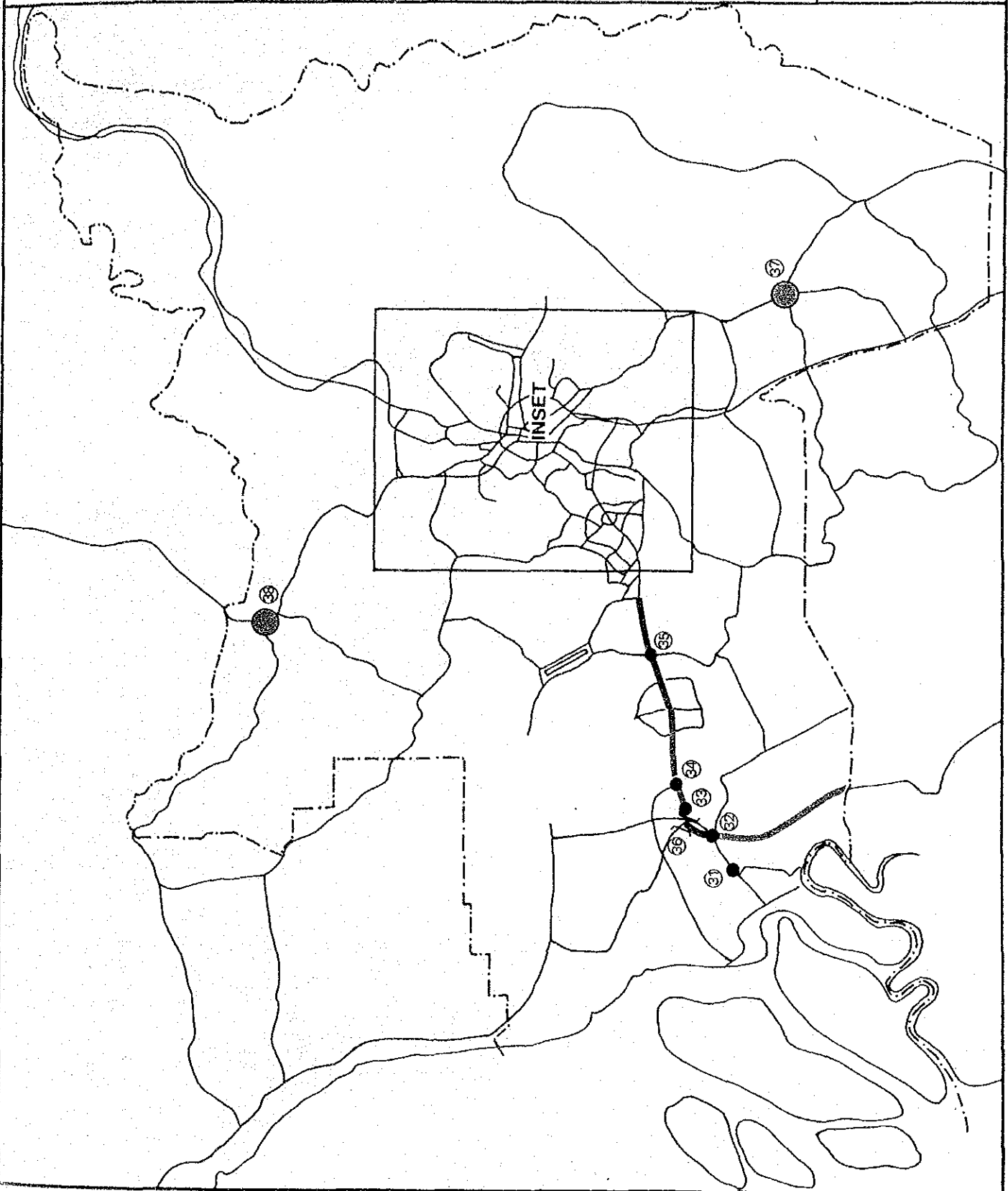
Figure 7:
Existing Traffic
Conditions in the
Other Klang Valley
Area

LEGEND

- ROAD WITH CONGESTION
DEGREE 2.0 & ABOVE
- ROAD WITH CONGESTION
DEGREE 1.5 - 1.9
- CONGESTION CAUSED BY
LOW CAPACITY
INTERSECTION
- CONGESTION DUE TO
NARROW BRIDGEWAY
- AREA WITH LARGE
VOLUME OF THROUGH
TRAFFIC ON POOR
CONDITIONS STREETS



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(2) Public Transport

(a) Inadequate Bus Route Network

There is no town bus service within Shah Alam. The other areas lacking bus services are new residential estates in Petaling Jaya, Ampang-Ulu Langat, Selayang and Setapak-Wangsa Maju areas.

(b) Low Frequency of Bus Services

Bus schedules approved by the authority are seldom followed strictly. Among the bus routes surveyed, 73% were operating below the approved scheduled frequencies.

(c) Long Bus Travel Time

Little priority of road space exists for bus transport. Buses have to compete with other road users and this has resulted in their inefficient service and low travel speed at about 18 kph at peak hour. Other measures like one way street and no right turning have also caused an increase in travel time. Delay in travel time is particularly large along Cheras-Kuala Lumpur corridor, Jalan Sungei Besi and Jalan Pahang/Genting Klang.

(d) Overloading of Passengers in Buses

Passenger traffic on bus transport always exceeds its capacity during peak periods. During the rush hours, the average occupancy on stage bus is about 70 passengers while that of the minibus is about 40 passengers.

(e) Others

The other public transport problems identified are : –

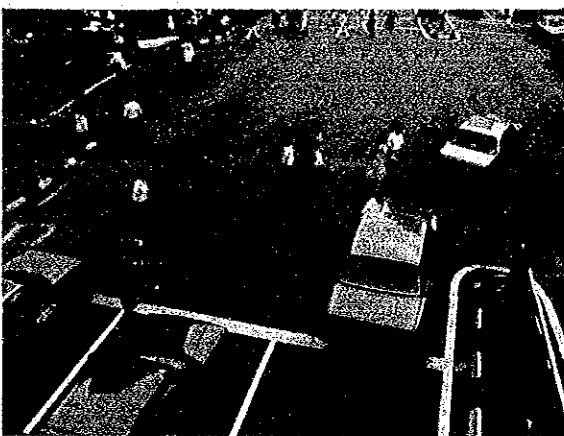
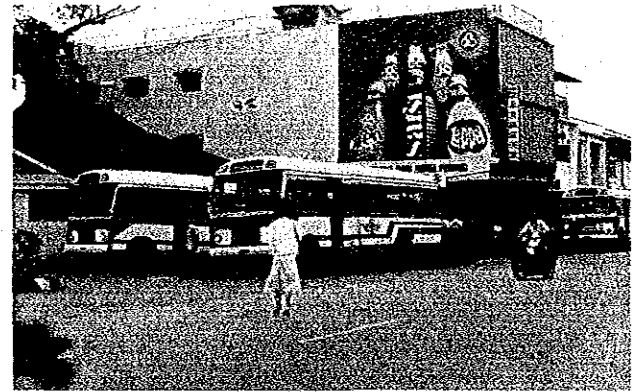
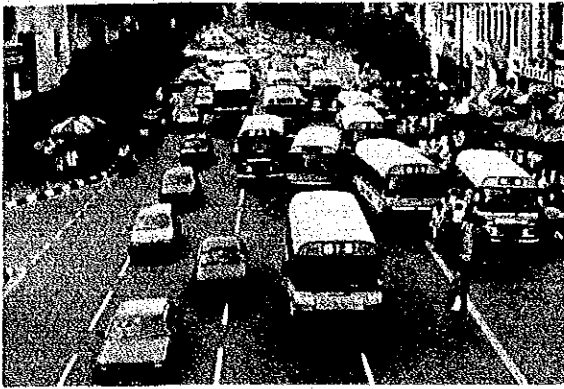
- Poor Terminal Facilities
- Lack of Bus Monitoring Systems
- Lack of Bus Service Information system
- Absence of Rail Commuter Service

(3) Other Transport Facilities

(a) Operation of the Central Area Traffic Control System (ATC) in Kuala Lumpur is not always satisfactory. The cycle lengths of signal changes (Jalan Sultan Ismail, Jalan Klang Lama and Jalan Kepong) are excessive causing unnecessary long delays.

(b) Traffic control devices are outdated, not properly installed or inadequate in the other urban centres like Klang or Shah Alam.

(c) Pedestrian facilities such as side-walks and pedestrian crossings are not sufficient or conducive to use, even in areas like shopping complexes, office buildings and school zones. There is no well defined pedestrian path network in the city centre.



- | | |
|----|----|
| 7 | 8 |
| 9 | |
| 10 | 11 |
| 12 | |
7. Jamming of Mini Buses hindering the flow of traffic at Chowkit Shopping area in the evening.
 8. Overcrowding of passengers in stage buses where passengers have to ride precariously on the steps.
 9. Overcrowding of passengers at bus stop which lack proper shelter and bus information at Lebu Ampang.
 10. Braving the heavy traffic to get to the Pudu bus terminal.
 11. Poor bus terminal facility at Rawang.
 12. Widespread jay walking in central shopping areas due to the lack of proper pedestrian signals and crossing provisions.

- (d) Disorderly parking and on-street parking often cause traffic congestion in the urban areas.

(4) Implementation Authority

The responsibility and authority to plan, implement, license, monitor and manage the operation of transport facilities and systems in Klang Valley rest in the hands of too many agencies which make effective coordination a difficult task.

2.2 Foreseeable Future Transport Problems

With the present population expected to increase by 1.6 times by 1995 and more than double by 2005, employment and vehicle ownerships are also expected to increase proportionally in the coming two decades. Consequently the daily number of person trips in Klang Valley is expected to grow from 6.4 million in 1985 to 10.2 million trips by 1995 and 14.6 million trips by 2005.

Table 8 : Daily Person Trip Production, Klang Valley, 1985 – 2005

| Trip Purpose | 1985 | 1995 | 2005 | Average Annual Growth Rate (%) | |
|--------------|-----------------------|----------------------|----------------------|--------------------------------|-------------|
| | (In Person Trips/Day) | | | 1985 – 1995 | 1995 – 2005 |
| To Work | 936,500 (14.6%) | 1,493,300 (14.7%) | 2,136,400 (14.7%) | 4.8 | 3.6 |
| To School | 678,200 (10.6%) | 1,098,600 (10.8%) | 1,548,900 (10.6%) | 4.9 | 3.5 |
| Business | 402,900 (6.3%) | 676,100 (6.7%) | 1,066,300 (7.3%) | 5.3 | 4.7 |
| Private | 1,701,200 (26.5%) | 2,690,000 (26.5%) | 3,867,000 (26.5%) | 4.7 | 3.7 |
| To Home | 2,706,700 (42.0%) | 4,208,100 (41.3%) | 6,013,100 (40.9%) | 4.5 | 3.6 |
| Total | 6,425,500 (100%) | 10,166,100 (100%) | 14,571,700 (100%) | 4.7 | 3.7 |

The traffic volume between Kuala Lumpur and Shah Alam would increase 3.8 times from 88,000 passenger car unit (PCU) a day in 1985 to 383,000 PCU a day in 2005.

The traffic volume between Kuala Lumpur and Petaling Jaya would have increased by 1.6 times from 226,000 PCU a day in 1985 to 354,000 PCU a day by 2005.

Traffic on the Kuala Lumpur-Gombak corridor will increase by 3.2 times by 2005 and it will be 3.4 times for the Kuala Lumpur-Bangi Corridor, 4.8 times between Shah Alam and Klang (Figure 8).

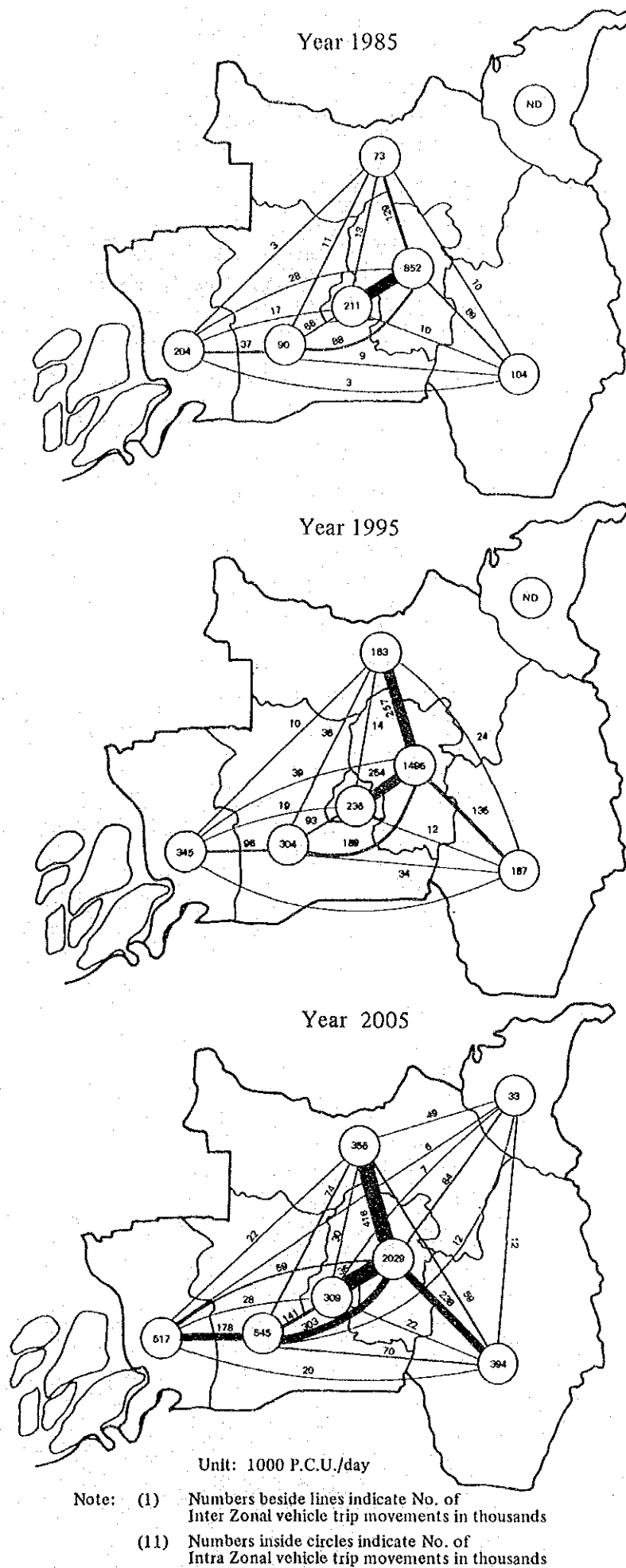
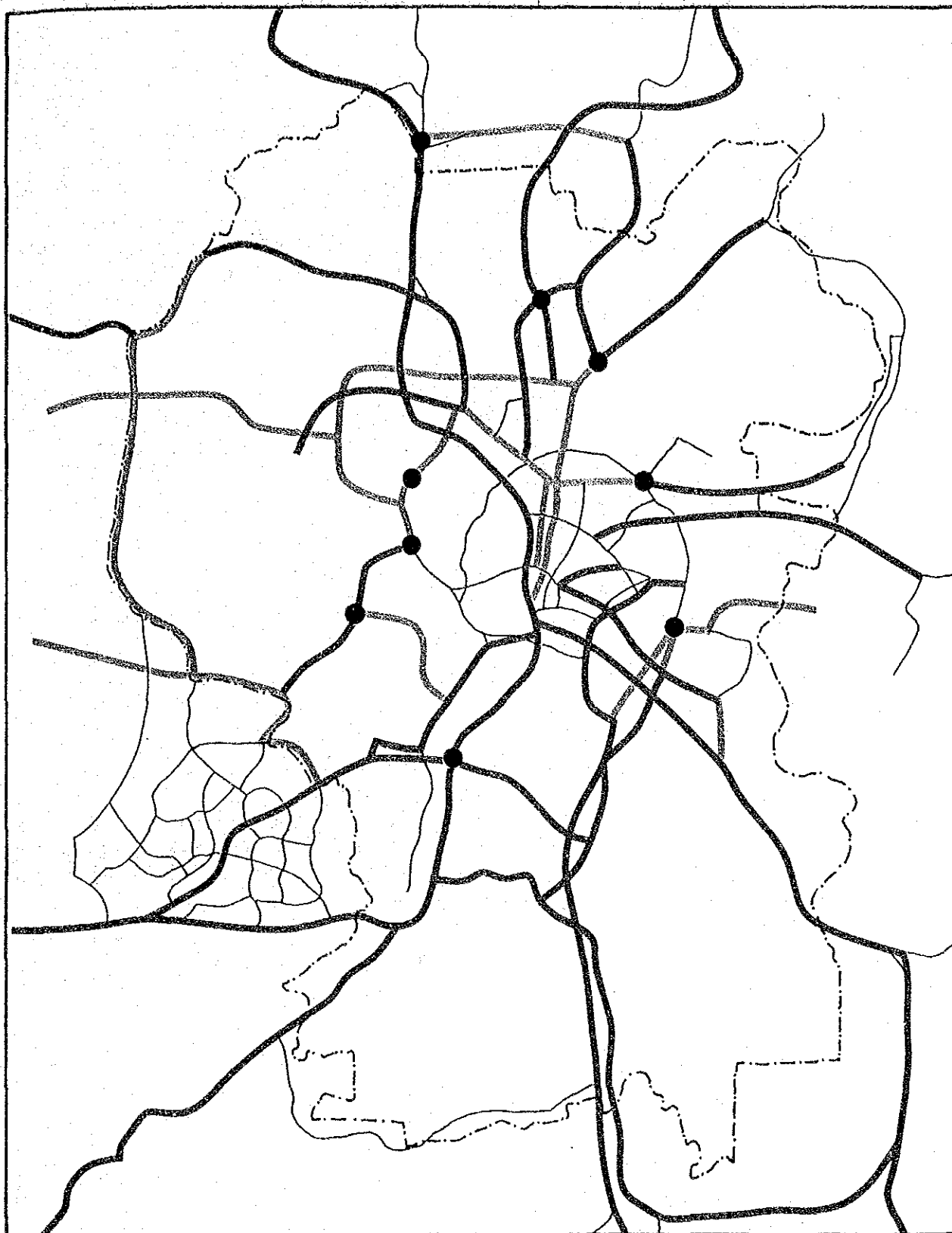


Figure 8: Desire Line of Vehicular Trips by All Purpose, Klang Valley, 1985-2005

(a) Deterioration of Traffic Congestion

In the Klang Valley the amount of road traffic measured by vehicle kilometer is expected to grow from 24.9 million passenger car unit.km (PCU.km) in 1985 to 48.9 million PCU.km in 1995 and 87.0 million PCU.km in 2005. Under the "do-nothing" case this rapid increase in road traffic demand will cause the congestion degree of 0.98 in 1985 to worsen to 1.83 in 1995 and 3.26 in 2005.

In the Federal Territory of Kuala Lumpur, the congestion degree will worsen from the present 1.1 to 2.86 in 2005. The Kepong area, Cheras area and Damansara area will be the regions most severely affected by traffic congestion (Figure 9).



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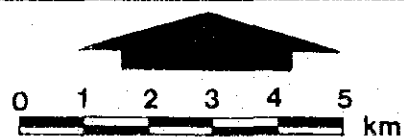
-  ROAD WITH CONGESTION DEGREE 2.0 & ABOVE
-  ROAD WITH CONGESTION DEGREE 1.5 - 1.9
-  CONGESTION CAUSED BY LOW CAPACITY INTERSECTION

Figure 9:
Future Traffic Conditions Under
'Do-Nothing' Case in Kuala Lumpur
Conurbation, 2005



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In the rest of Klang Valley, the present congestion degree of 0.9 will worsen to 3.52 by 2005. In Petaling Jaya, the congestion degree will worsen from 0.8 to 2.0 by 2005. Traffic flow along the Federal Highway II will likely be paralysed by the tremendous demand. Other areas such as Gombak West (Selayang), Klang Central (Klang Old Town and South Port Area) and Petaling Jaya will also be severely affected under the "do-nothing" case (Figure 10).

(b) Worsening of Public Transport Services

The total number of public transportation trip is expected to increase from 1.6 million trips in 1985 to 3.5 million trips by 2005. It is doubtful that under the "do-nothing" situation the expected future public transportation demand can be handled satisfactorily by the existing public transportation system both in terms of service level and transport capacity.

(c) Future Conditions tend to encourage the use of private over public transport

Without any deterrent towards private vehicle usage, the private mode share is expected to form 70% of mode choice for interzonal trips while the public transportation's share will be reduced to 30% by 2005. Lack of any policy to encourage the use of public transportation will cause its mode share to decrease while private vehicles will continue to create massive congestion in the road network system.

(d) Longer Travel Distances

Under the "do-nothing" situation, the average trip length per person trip in Klang Valley is expected to increase from 12.2 km in 1985 to 15.2 km in 2005. It is anticipated that further urbanization of the region in the coming two decades will cause travel distance to increase thereby increasing road traffic demand.

Figure 10:
Future Traffic Conditions
Under 'Do-Nothing' Case
in Other Klang Valley
Area, 2005

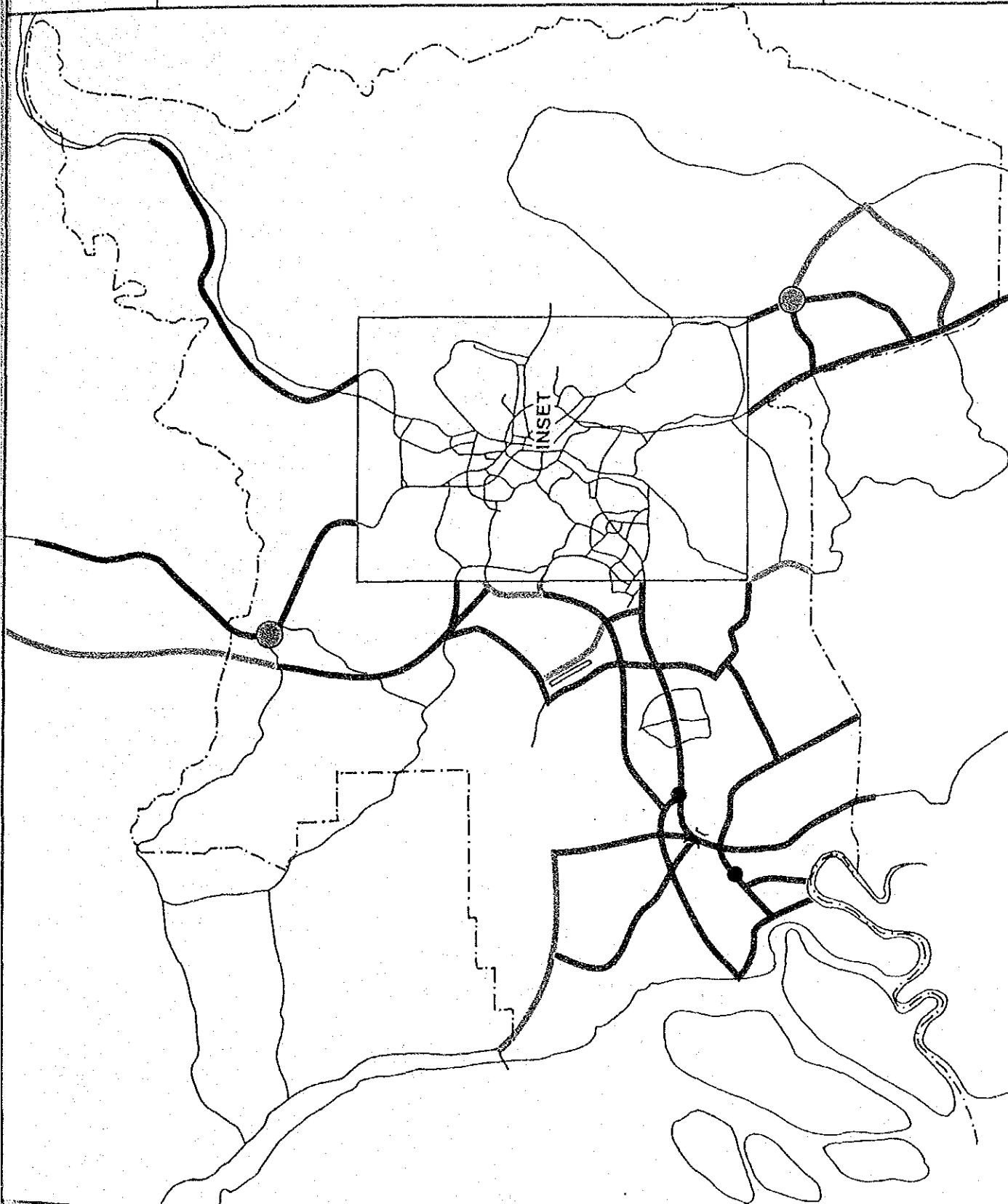
LEGEND

- ROAD WITH CONGESTION
DEGREE 2.0 & ABOVE
- ROAD WITH CONGESTION
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VOLUME OF THROUGH
TRAFFIC ON POOR
CONDITIONS STREETS



0 5 10 15 km

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3. EVALUATION OF ALTERNATIVE PLANS

3.1 Alternative Plans

A total of seven alternative plans were generated by different combinations of the transportation improvement strategies of road improvement/construction, bus system improvement and the introduction of Public Mass Transit System.

- (1) 'Do-Nothing' Case: No further improvement to the existing transportation system is assumed in this case which represents the worst possible outcome in the future. This alternative functions as a control or bench-mark against which the other alternatives are evaluated.
- (2) Alternative Plan 1-1: This alternative comprises of an effective road network proposed for the Klang Valley together with improvement to the existing bus system.
- (3) Alternative Plan 1-2: This alternative is similar to Plan 1-1 except for a lesser road network for the Bangi area while better linkages are planned for the Sg. Buluh area.
- (4) Alternative Plan 2-1: In addition to those proposed in Plan 1-2 this alternative includes an extensive mass transit network consisting of four(4) MRT and seven(7) LRT lines.
- (5) Alternative Plan 2-2: This alternative comprises of Plan 1-2 together with a more realistic transit network of four(4) MRT and three(3) LRT lines.
- (6) Alternative Plan 2-3: In addition to Plan 1-2 this alternative proposes an MRT only transit plan.
- (7) Alternative Plan 2-4: This alternative comprises of Plan 1-2 and LRT only system plan.

At a later stage in the evaluation process, the traffic management measure option of vehicle restraint in the CPA of Kuala Lumpur is applied to these alternatives as Plan 1-1-w, 1-2-w, 2-1-w, 2-2-w, 2-3-w and 2-4-w to measure its added benefits to the overall plans.

3.2 Evaluation Criteria

The evaluation criteria used in the evaluation of alternative transportation plans are:-

- (a) Functional Suitability of Transportation Systems
- (b) Financial Analysis of Private and/or Public Enterprises
- (c) Economic Evaluation

3.3 Functional Suitability

The functional suitability evaluation is done on the alternative plans using the following indicators,

- (a) Volume/Capacity Ratio (Congestion Degree)
- (b) Travel Speed
- (c) Trip Length
- (d) Travel Time
- (e) Balance in Private/Public Mode Share

In terms of the functional suitability, although Plans 1-1 and 1-2 are capable of alleviating the level of traffic congestion that would occur in the case of 'Do-Nothing' alternative, the introduction of transit system to Plans 2-1, 2-2, 2-3 and 2-4 is found to perform better with a further reduction of traffic congestion degree and a more balanced mode share.

Table 9: Comparison of Service Level on Road by Alternative Plan, Klang Valley, 2005

| Indicators | Base Plan (Do-Nothing) | Plan 1-1 | Plan 1-2 | Plan 2-1 | Plan 2-2 | Plan 2-3 | Plan 2-4 |
|--------------------------------|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Total Road Length (km) | 819 | 1,199 | 1,228 | 1,228 | 1,228 | 1,228 | 1,228 |
| Average Travel Speed (Kph) | 11 | 22 | 24 | 27 | 27 | 27 | 26 |
| Average Trip Length (km/trip) | 15.2 | 13.1 | 12.6 | 12.4 | 12.4 | 12.4 | 12.6 |
| Average Travel Time (min/trip) | 79 | 36 | 31 | 27 | 27 | 28 | 29 |
| Congestion Degree | 3.26 | 1.16 | 1.09 | 1.00 | 1.01 | 1.01 | 1.04 |

3.4 Financial Analysis

Financial analysis is carried out on the alternative transit introduction plans with and without the traffic restraint measures in Kuala Lumpur.

The results of the financial analysis are shown in Table 10.

Table 10: Financial Rate of Return for Alternative Mass Transit Introduction Plans

| Alternative Plans | Year of Opening | |
|-------------------|-----------------|------|
| | 1991 | 2005 |
| Plan 2-1 | 5.9 | 9.1 |
| Plan 2-2 | 8.9 | 11.6 |
| Plan 2-3 | 12.3 | 16.7 |
| Plan 2-4 | 1.7 | 4.2 |
| Plan 2-1-W | 6.1 | 9.3 |
| Plan 2-2-W | 9.2 | 11.9 |
| Plan 2-3-W | 12.7 | 17.5 |
| Plan 2-4-W | 2.0 | 4.4 |

The financial rate of return (FRR) for Plan 2-3 is 12.3% (if the MRT is opened in 1991) or 16.7% (if opened in 2000). Plan 2-3-w could increase the FRR by about 0.4% to 0.8%. This plan is found to be the most financially feasible plan among the alternatives.

Furthermore, the FRR of Plan 2-3 is found to increase to 13.9% and Plan 2-3-w to 14.4% if a phasing plan for the proposed MRT system is adopted. A sensitivity analysis conducted on the alternatives shows that even with a 50% reduction of passengers or revenues, the FRR of Plan 2-3 with a phasing plan is able to maintain at 4% (without Cordon pricing) and 4.7% (with cordon pricing) compared to the FRR of Plans 2-1 and 2-4 which fell to 0% and Plan 2-2 to 1.7%.

3.5 Economic Evaluation

The three major strategies of road network proposals, mass transit system network proposals and transport management policy measures are evaluated for their economic feasibility.

Both the alternative road proposals in Plans 1-1 and 1-2 are found to be economically feasible with B/C ratio of 11.6 and 12.2 respectively. Plan 1-2 is therefore more superior than Plan 1-1.

Table 11: Single Year Benefit-Cost Ratio by Road Network Plans in Klang Valley, 2005

| Items | Plan 1-1 | Plan 1-2 |
|-------------------------------------|----------|----------|
| Cost of Roads (M\$million) | 4,080 | 4,330 |
| Annualized Cost at 12% (M\$million) | 546 | 580 |
| Annual Benefit (M\$million) | 6,361 | 7,095 |
| B/C Ratio | 11.6 | 12.2 |

Among the transit introduction plans, Plan 2-3 is found to have the highest B/C ratio of 3.8. With the Cordon Pricing Scheme, the B/C Ratio of this plan is able to increase to 4.1% (Table 12).

Table 12: Single Year Benefit-Cost Ratio by Mass Transit System Introduction Plans With and Without Cordon Pricing in Klang Valley, 2005

| Plans | Project Cost (M\$million) | Annualized Cost (M\$million) | Annual Benefit (M\$million) | B/C Ratio |
|------------|---------------------------|------------------------------|-----------------------------|-----------|
| Plan 2-1 | 3514 | 473 | 751 | 1.6 |
| Plan 2-1-w | 3516 | 470 | 806 | 1.7 |
| Plan 2-2 | 2141 | 287 | 724 | 2.5 |
| Plan 2-2-w | 2143 | 287 | 777 | 2.7 |
| Plan 2-3 | 1384 | 185 | 705 | 3.8 |
| Plan 2-3-w | 1386 | 185 | 761 | 4.1 |
| Plan 2-4 | 1920 | 257 | 581 | 2.3 |
| Plan 2-4-w | 1922 | 257 | 648 | 2.5 |

Note: Annualized Cost is discounted at 12%.

4. PROPOSED TRANSPORTATION MASTERPLAN

4.1 Goals and Objectives for Transportation Development in the Klang Valley Region

The goals and objectives for transportation development in Klang Valley are formulated within the broad framework of the National Development Policy, in particular the New Economic Policy (NEP) and the regional development objectives spelled out in the Klang Valley Perspective Plan.

TG-1 To meet and promote economic and regional development of the Klang Valley

- * Provision of an effective transportation system compatible with the national and regional economic development plan
- * Improvement of access to the six(6) growth centres namely Kuala Lumpur, Shah Alam, Petaling Jaya, Klang, Bangi and Selayang with Bukit Tinggi Twin City and the existing urban and rural development areas
- * Provision of access to the newly developed areas
- * Provision of an economical and efficient transportation system

TG-2 To provide maximum mobility for people and goods

- * Reduction of traffic congestion by increase in traffic capacity, dispersing traffic away from the congested roads and promotion of modal shift
- * Provision of good quality and affordable public transport systems
- * Introduction of alternative route or more efficient mode

TG-3 To provide a safer, pleasant and more efficient transportation system

- * Reduction of the occurrence of traffic accidents
- * Minimization of severity of traffic accidents
- * Provision of safer facilities for pedestrians and motor cyclists

TG-4 To minimize resource consumption of the transportation system

- * Conservation of energy by promoting the use of public mass transport
- * Effective utilization of land space especially in the urbanised area

TG-5 To enhance environmental and community quality

- * Minimization of negative environmental impacts including noise, vibration, emission, etc.
- * Minimization of community disruption and displacement
- * Provision of an adequate transportation system compatible with land-use plan

4.2 Proposed Overall Transport Policies

To achieve the goals and objectives mentioned above, the following overall transport policies are proposed:-

- TP-1 Encouraging the development of mass transit system and improvement of the conventional bus transport system so as to prevent a totally motorized society. Hence the plan describing a balanced transport system is the most preferable.
- TP-2 To attain the future development pattern consisting of an urban system of six(6) growth centres with Bukit Tinggi Twin City with their respective planned targets, an effective regional transportation network consisting of a hierarchial road network system and a mass transit railway system shall be established.
- TP-3 The existing transportation facilities shall be effectively utilized as much as possible so as to obtain maximum effects with minimum social and capital costs.
- TP-4 The transportation development shall meet the varied transport demands both for the movement of people and goods taking into account specific needs to have the transport modes comprised of both innovative and conventional forms.
- TP-5 To achieve efficiency on transport development, both infrastructure augmentation measures and the policy measures such as the traffic limitation programmes shall be considered.
- TP-6 The road network to be provided shall be free from symptoms of the transport diseconomies such as bottleneck and stopshorts.
- TP-7 Efforts should be directed to establish a road system based on functions to carry and accommodate different types of traffic including the provision of cycle path and pedestrian walks in residential zones in ensuring the possibility of maintaining a safe and conducive living environment.
- TP-8 Efforts should be given to monitor traffic and hence reduce the occurrence of traffic accidents by the use of various traffic management methods.

4.3 Proposed Transportation Masterplan to Year 2005

The transportation masterplan which is the most efficient and likely to achieve the identified objectives in line with the identified overall transport policies is proposed and illustrated in Figure 11 and its major components described below:-

(1) Mass Transit Railway System

A Mass Transit Railway System is to be introduced as the major infrastructure of the public transportation system in the major corridors in the Klang Valley and viewed as a strategy for promoting urban and regional development. The proposed Mass Transit Railway Network consists of five(5) lines totalling 137 kilometers in length, i.e.:-

- MR-1 Port Klang Line from Kuala Lumpur to Port Klang
- MR-2 Northern Line from Kuala Lumpur to Rawang
- MR-3 Batu Caves Line from Kuala Lumpur to Selayang
- MR-4 Southern Line from Kuala Lumpur to Bangi New Town
- MR-5 Ampang Line from Kuala Lumpur to Ampang

This system can be accomplished with comparatively lower investment costs by maximizing the utilization of the existing KTM (Malayan Railway) track reserves and facilities.

(2) Road Network Plan

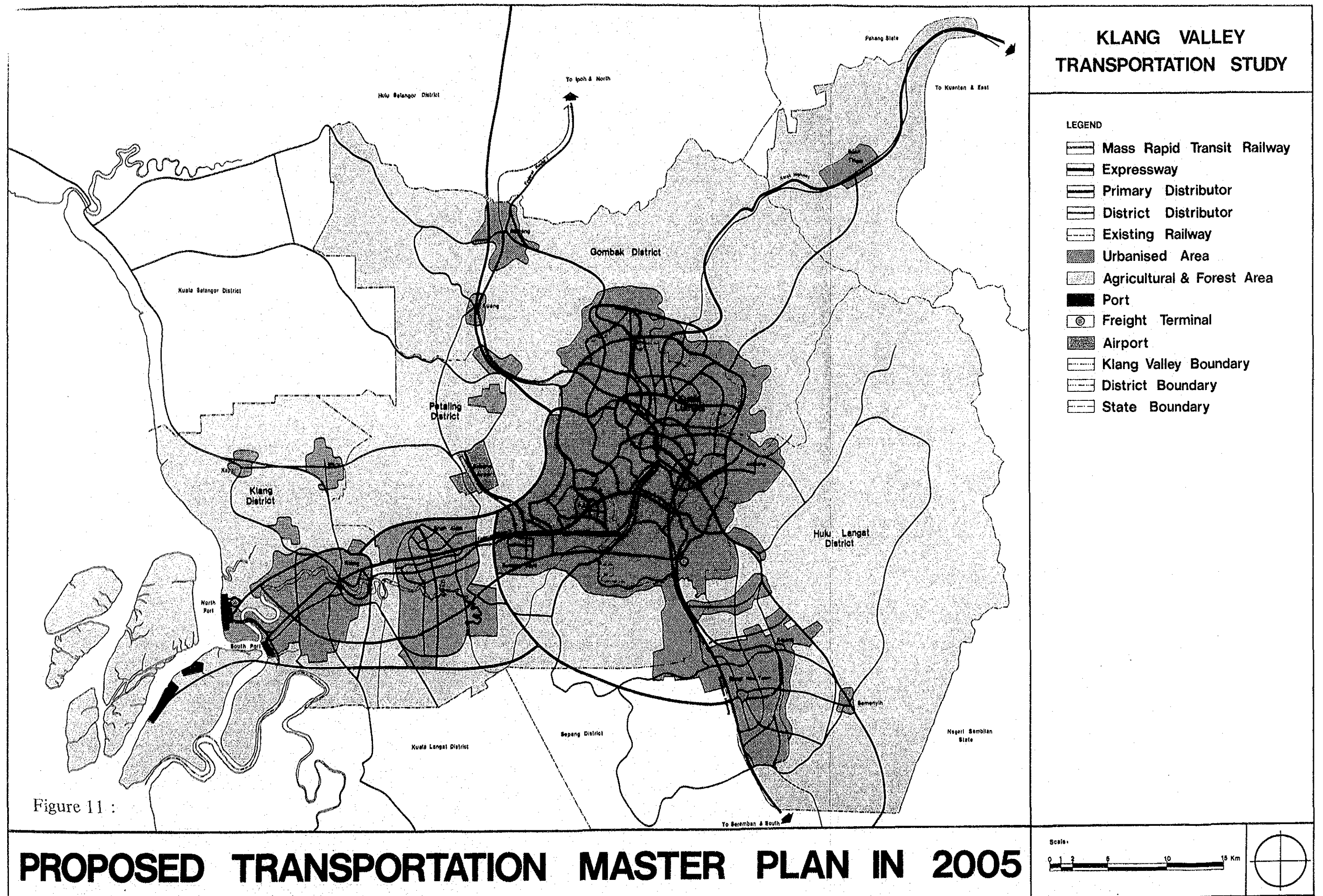
The proposed six(6) urban centres with Bukit Tinggi will be interlinked by expressways and/or primary roads. The road network proposed for the Kuala Lumpur Conurbation shall be fully developed as a radial and circumferential road network in line with the urban development structure of a polycentric city with four(4) sub-centres at Damansara, Wangsa Maju, Bandar Tun Razak and Bukit Jalil.

The road network proposed for the Kuala Lumpur-Klang Corridor shall be developed into a multilinear ladder pattern following the east-west axis urban development concept and that for the other corridors in the Klang Valley shall be developed as a simple or multiple linear ladder pattern.

(3) Monitoring System

The situation of transport demands vary accordingly to the social, economic and landuse conditions. Since the future transport demands are predicted on the basis of assumptions made on the future landuse and socio-economic condition, it follows that the future traffic demands should be carefully monitored in relation to the proposed transportation systems. The Study Team, therefore, proposes:-

- (a) to strengthen the monitoring system on the traffic demands and the transportation systems.
- (b) that the Klang Valley Planning Secretariat in the Prime Minister's Department should constantly monitor and analyse the transport situations in Klang Valley so as to prepare proper countermeasures and coordination whenever any problem should arise in future.
- (c) to review the transport study every five(5) years.



4.4 Public Transportation Plan

4.4.1 Mass Transit Railway Introduction Plan

(1) The System

The proposed System would be the Mass Rapid Transit Railway (MRT) System which can be seen in some major cities in the world. The proposed MRT System would have the following system characteristics.

| | |
|---------------------|-----------------------------------|
| Train Composition : | 2 vehicles to 6 vehicles |
| Vehicle length : | 20 metres |
| Vehicle Capacity : | 250 pass/veh |
| Seated : | 54 pass/veh |
| Standing : | 196 pass/veh |
| Maximum Speed : | 85 km/h |
| Operating Speed : | 40 – 60 km/h |
| Capacity : | 10,000 – 30,000 pass/hr/direction |

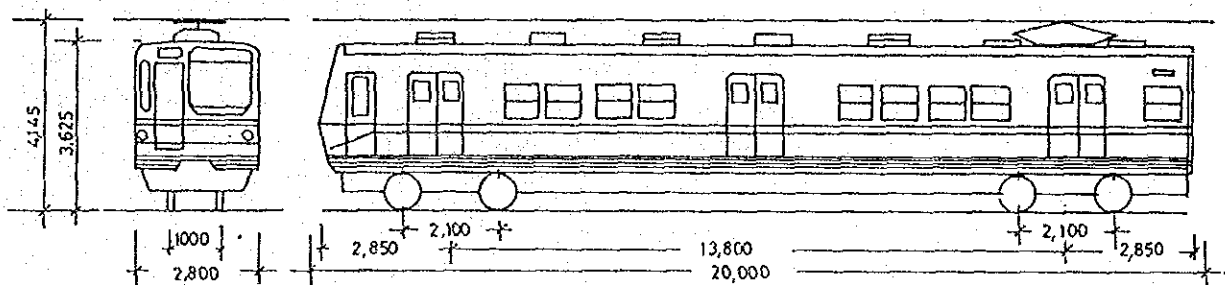


Figure 12 : The Proposed MRT Train

(2) The Network

The proposed MRT Network which make up the five(5) lines, i.e. Port Klang Line including Airport Branch line, Northern Line, Batu Caves Line, Southern Line and Ampang Line has a total length of approximately 137 kilometers (Table 13). The proposed network utilizes mostly the existing KTM (Malayan Railway) track reserves and facilities with the construction of some missing links and some extensions. The whole system is estimated to cost about M\$1384 million.

Table 13: Proposed Mass Rapid Transit (MRT) Railway System for Klang Valley

| Line Name | Origin | Destination | Total Length (km) | Total Project Cost (M\$million) |
|----------------------|--------------|----------------|-------------------|---------------------------------|
| MR-1 Port Klang Line | Kuala Lumpur | Port Klang | 49.3 | 360 |
| MR-2 Northern Line | Kuala Lumpur | Rawang | 31.8 | 288 |
| MR-3 Batu Caves Line | Kuala Lumpur | Selayang | 17.3 | 213 |
| MR-4 Southern Line | Kuala Lumpur | Bangi New Town | 31.6 | 302 |
| MR-5 Ampang Line | Kuala Lumpur | Ampang | 11.4 | 221 |
| Total | | | 141.4* | 1384 |

Note: * Actual track length is only about 137 km because of overlapping of routes.

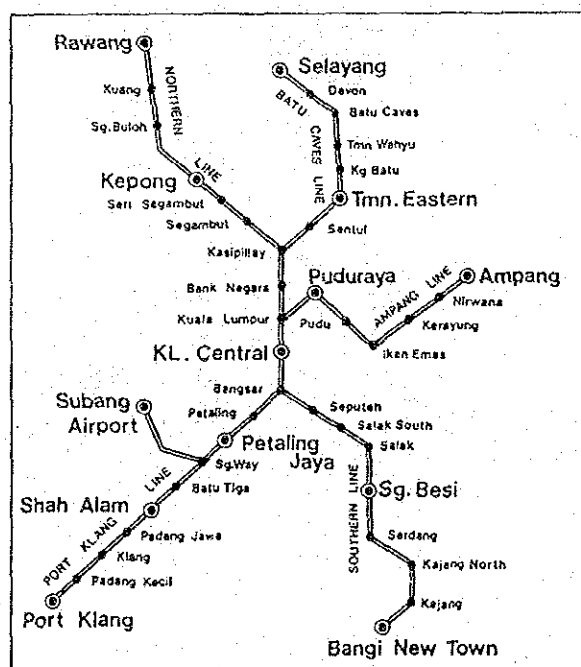


Figure 13 : The Proposed MRT Network in Klang Valley

(3) MRT System Development Plan

The MRT System is proposed to be developed with the following features:-

- Double Tracking and Meter Gauge
- Electrification using the overhead trolley and feeder line system
- Centralized Traffic Control Devices (CTC) and Controlled Automatic Train Stop Devices (ATS)
- Provision of related facilities like bus feeder to the MRT stations, station plaza and landuse control along MRT lines

(e) Phasing of the MRT System

The following phasing plan is proposed.

| Phase | Target Opening Year | Section or line of the MRT System |
|-------|---------------------|--|
| 1 | 1991 | * Taman Eastern - Kuala Lumpur * Kepong - Shah Alam |
| 2 | 1996 | * Kuala Lumpur Central-Ampang * Selayang - Taman Eastern * Shah Alam - Port Klang * Sungei Way - Subang Airport |
| 3 | 2000 | * Kepong - Rawang * Kuala Lumpur Central-Bangi New Town |

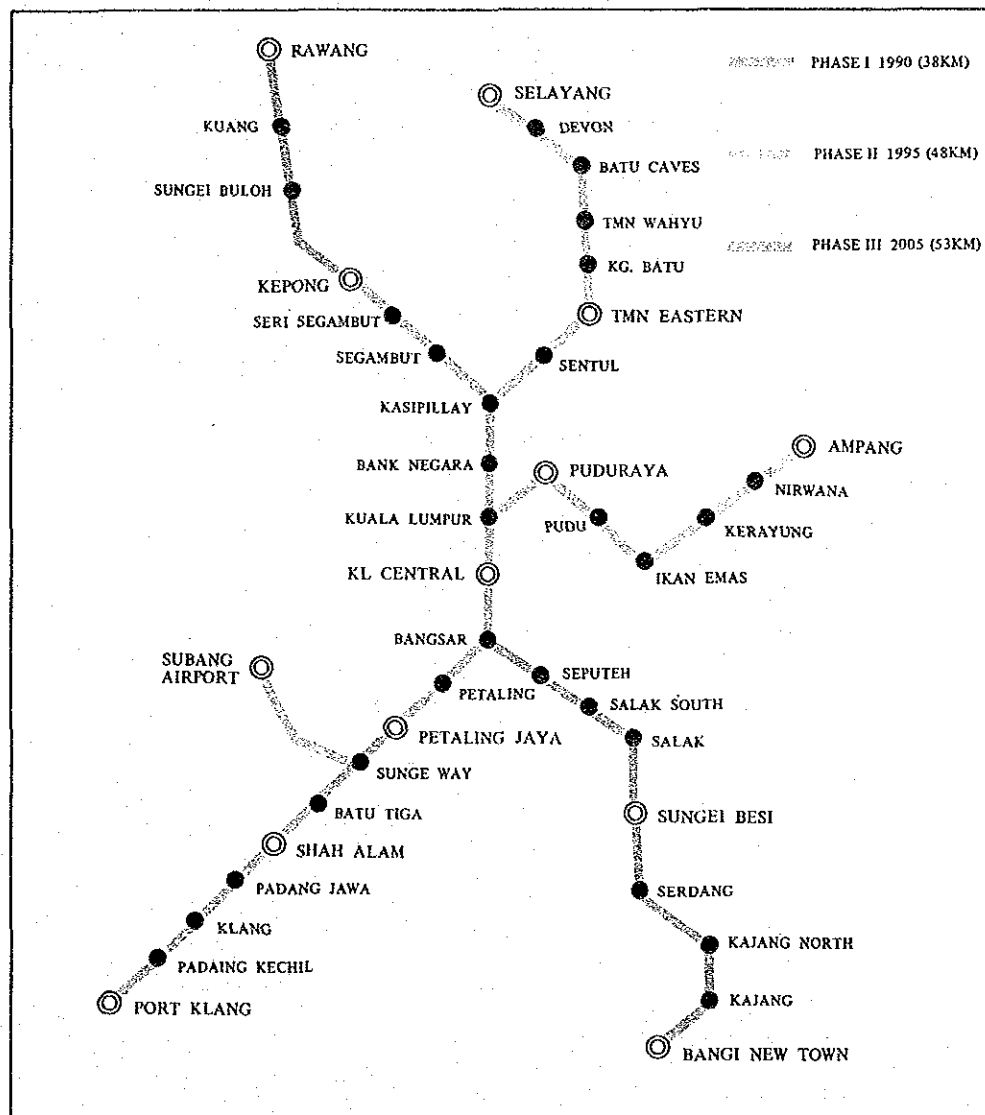


Figure 14: Proposed MRT Phasing Plan