

THE FEASIBILITY STUDY  
ON  
RAIL-BASED COMMUTER SERVICES  
IN  
KLANG VALLEY,  
MALAYSIA

**FINAL REPORT**

FEBRUARY 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

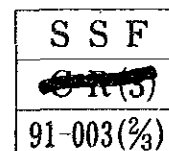
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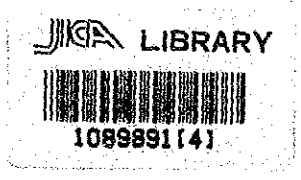
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## PREFACE

In response to a request from the Government of Malaysia, the Japanese Government decided to conduct a feasibility study on Rail-based Commuter Services in Klang Valley and entrusted the Study to the Japan International Cooperation Agency (JICA).

JICA sent to Malaysia a study team headed by Mr. Hotsumi Harada, and composed of members from the Japan Railway Technical Service and Pacific Consultants International Co., Ltd., three times between January 1990 and December 1990.

The team held discussions with the officials concerned of the Government of Malaysia, and conducted field surveys. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

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

February 1991



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Kensuke Yanagiya

President

Japan International Cooperation Agency





Mr. Kensuke Yanagiya  
President  
Japan International Cooperation Agency

Dear Sir,

LETTER OF TRANSMITTAL

We have the pleasure of submitting herewith the final report for the Feasibility Study on "Rail-based Commuter Services in Klang Valley, Malaysia".

We conducted the Study during the period from January 1990 to January 1991, carrying out the field studies three times in Malaysia.

The Study formulated basic plans of the rail-based commuter service system along the Rawang - Kuala Lumpur - Seremban railway corridor, and analysed their techno-economic feasibility.

We hope that this report will serve as a starting point for development of the said Project which we consider is one of the most imminent and significant projects to be materialized by the turn of the century.

We also wish to express our sincere gratitude to the related officials of JICA, Advisory Committee, the Embassy of Japan in Malaysia, as well as to those of Government of Malaysia, for their kind guidance, assistance and cooperation extended to the Study Team.

Very truly yours,



Misao Sugawara

President

Japan Railway Technical Service



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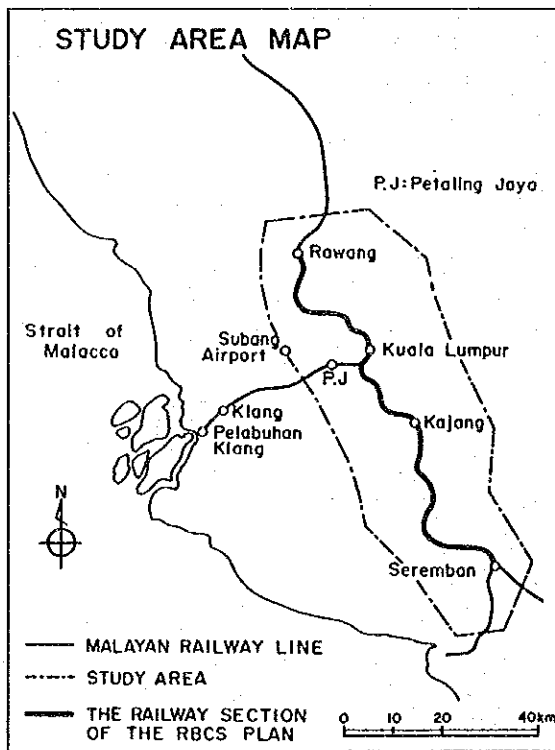
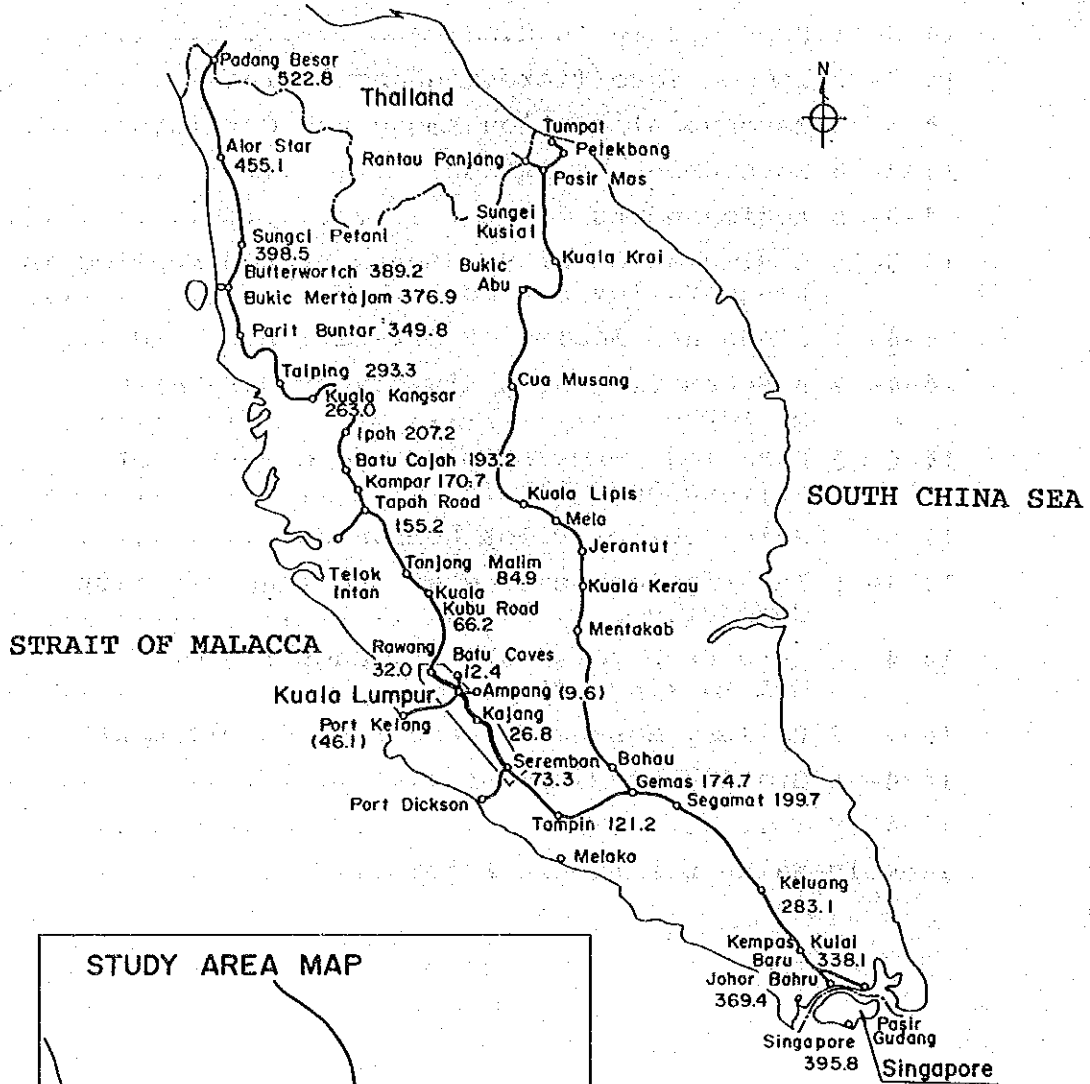
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# MRA Railway Network



## ABBREVIATION

|                  |  |
|------------------|--|
| Corridor         | : Rawang ~ Seremban MRA route  |
| DMU              | : Diesel Multiple Unit   |
| DTP              | : Double Tracking Project  |
| EIRR             | : Economic Internal Rate of Return   |
| EPU              | : Economic Planning Unit   |
| FIRR             | : Financial Internal Rate of Return  |
| HPU              | : Highway Planning Unit  |
| Jct.             | : Junction   |
| JICA             | : Japan International Cooperation Agency   |
| JICA M/P 87      | : Klang Valley Transportation Study<br>(JICA, 1987)  |
| JICA F/S 89      | : Klang Valley Feasibility Study for Trans-<br>portation Facility Projects in Klang Valley<br>(JICA, 1989) |
| JNR              | : Japanese National Railways   |
| JR               | : Japan Railway Group; Successor(s) of JNR   |
| K.L.             | : Kuala Lumpur (area, station)   |
| KVPS             | : Klang Valley Planning Secretariat  |
| LRT              | : Light Rail Transit   |
| MRA              | : Malaysian Railway Administration   |
| OD               | : Origin and Destination   |
| Perspective Plan | : Klang Valley Perspective Plan (KVPS, 1984)   |
| RBCS             | : Rail-Based Commuter Service  |
| Review           | : Review of Klang Valley Perspective Plan<br>(KVPS, 1988)  |
| R/W              | : Right-of-way   |
| S&T              | : Signalling and Telecommunication   |





## **Chapter 1**

### **INTRODUCTION OF THE STUDY**



## Chapter 1 INTRODUCTION OF THE STUDY

### 1-1 Background

The Klang Valley area consists of the Federal Territory of Kuala Lumpur (K.L.) and its several satellite cities. Being the forefront of the political, economic and industrial activities in Malaysia, its population of 2.5 million is going to double by the turn of this Century.

Commuter transportation in the Klang Valley has so far depended on road. Consequently, the sharp growth in population and economic activities of the area has given rise to the chronic road congestion and air pollution as commonly observed in the fast-growing cities in Asia. Alleviating these problems by introducing Rail-Based Commuter Service (RBCS) system is, therefore, an urgent requirement. The Klang Valley Transportation Study, conducted in 1987 by JICA in close collaboration with the Prime Minister's office, formulated a Transportation Master Plan of the Region with the target year of 2005. Among the high-priority-given projects proposed herein, is the introduction of a Mass Rapid Railway System. It proposed to make full use of the currently under-utilized Malayan Railway Administration (MRA) lines in the Valley for the commuter transportation.

Under the circumstances, in order to improve overall railway transport capacity for freight and passenger in the region, the Government of Malaysia has decided to undertake the Double Tracking Project.(DTP). In this project, upgrading the railway infrastructure such as track doubling, improvement of signalling and telecommunication, introduction of diesel multiple unit (DMU) etc. are planned and scheduled to be completed by 1993.

In addition Monorail and LRT projects are going to be materialized by 2005 to mitigate road traffic congestion in the urban/suburban areas of Kuala Lumpur.

Meanwhile, in line with its general policy of privatizing the public enterprises, the Government of Malaysia is going to reform MRA into a self-supporting entity in the near future.

It is under such circumstances that the Government of Malaysia has requested to formulate an RBCS plan covering the Rawang - K.L. - Seremban railway corridor.

The plan must therefore be such that it would guarantee the financial soundness of RBCS management, and operational efficiency, supported by feeder bus service. It must also be such that it would be closely coordinated with the process of the DTP, and the related regional development plans.

## 1-2 Objectives

The objectives of the RBCS Project is to create, by the year 2005, a train-cum-feeder-bus transport system for the urban/suburban commuter traffic in the Klang Valley/Seremban area, preemptively apportioning to the RBCS system a part of the line capacity of the Rawang - K.L. - Seremban railway corridor, which would be remarkably strengthened by the DTP.

The system intends;

- to expedite the related local development project,
- to secure a sufficient mobility for the residents of the area, with well coordinated use of rail and road modes,
- to immune the area from the critical road congestion and the public nuisance arising therefrom.

Study are listed as below;

- (1) Verify the techno-economic feasibility of the optimal alternative selected from among the possible RBCS scenarios, and clarify its social/environmental impacts.
- (2) Formulate its implementation plan, based on the realistic ridership projections on the one hand, and on the other propose necessary measures to encourage it.

### 1-3 Organization of the Study

The study is conducted jointly by JICA and the Government of Malaysia in coordination with other related authorities. The organization of the Study and the lists of the committees members are as follows:

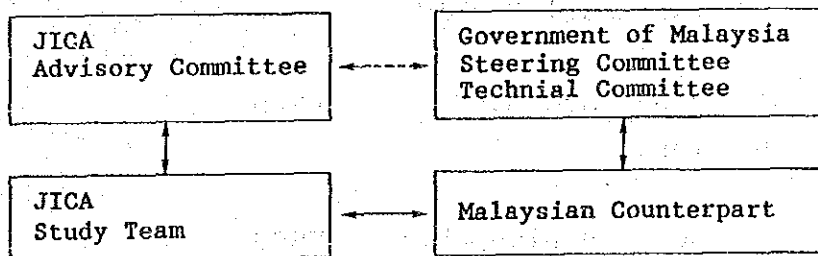


Fig. 1-3-1 Organization of the study

Steering Committee, Government of Malaysia

|          |  |   |
|----------|--|---|
| Chairman | Dr. Gan Khuan Poh                        | Economic Planning Unit<br>(EPU)                     |
|          | Mr. Ismail Mohamed                       | EPU   |
|          | Mr. Isa Kassim                           | EPU   |
|          | Mrs. Wan Norma Wan Daud                  | EPU   |
|          | Mr. Alias Mohd Yassin                    | EPU   |
|          | Mrs. Farida Mohd Ali                     | EPU   |
|          | Datuk Yaacob Abdul Hamid                 | Klang Valley Planning<br>Secretariat (KVPS)         |
|          | Mr. Ahmad Kamaruddin<br>bin Abdul Rashid | KVPS  |
|          | Mr. Mohd Daud Mohd<br>Yusoff             | KVPS  |
|          | Mr. Awangku Hidup bin<br>Awangku Hosain  | KVPS  |
|          | Mrs. Norasiah Hj. Yahya                  | KVPS  |
|          | Mr. Abdul Rahim Osman                    | Malayan Railway<br>Administration (MRA)             |
|          | Mr. Chuah Chow Hee                       | MRA   |
|          | Mr. Chew Swee Hock                       | Ministry of Works<br>Highway Planning Unit<br>(HPU) |

|                                    |   |
|------------------------------------|---|
| Miss Girija Nair                   | Ministry of Transport                           |
| Mr. Zulkifli Othman                | Ministry of Transport                           |
| Mr. Lokman Hashim                  | Federal Territory<br>Development Division       |
| Mr. Prem Kumar                     | ditto   |
| Mr. Mahfix Omar                    | Kuala Lumpur (K.L.)<br>City Hall                |
| Mr. Mohammed Khusrin<br>Hj. Munawi | Selangor State<br>Economic Planning Unit        |
| Mr. Mohamad bin Nafis              | Negeri Sembilan State<br>Economic Planning Unit |
| Mr. Kamaruddin Mohd<br>Taib        | ditto   |

Technical Committee , Government of Malaysia

|             |                          |  |
|-------------|--------------------------|--|
| Chairman    | Datuk Yaacob Abdul Hamid | Klang Valley<br>Planning Secretariat<br>(KVPS) |
| Co-Chairman | Mr. Abdul Rahim Osman    | Malayan Railway<br>Administration (MRA)        |
|             | Mr. Chua Chow Hee        | MRA  |
|             | Mr. Ismail Mohamed       | Economic Planning Unit<br>(EPU)                |

|  |   |
|--|---|
| Mrs. Farida Mohd Ali                     | EPU                                     |
| Mr. Ahmad Kamaruddin<br>bin Abdul Rashid | KVPS                                    |
| Mr. Mohd Daud Mohd<br>Yusoff             | KVPS                                    |
| Mrs. Norasiah Hj. Yahya                  | KVPS                                    |
| Mr. Awangku Hidup bin<br>Awangku Hosain  | KVPS                                    |
| Mr. Shahrel bin Mohd<br>Siang            | Counterpart (KVPS)                      |
| Mr. Selamat Haji Tahir                   | Double Tracking<br>Planning (MRA)       |
| Mr. Rahimi Jaafar                        | Corporate Unit (MRA)                    |
| Mr. Hilmi Mohammad                       | Corporate Unit (MRA)                    |
| Mr. R. Paranthoathi                      | MRA                                     |
| Mr. C. Mahadevan                         | MRA                                     |
| Mr. Ghazali Mamat                        | MRA                                     |
| Mrs. Zainab Hashim                       | MRA                                     |
| Mr. Abdul Kadir<br>Hj. Kamal             | Counterpart (MRA)                       |
| Mr. Mohd Adzali Mohd Ali                 | Counterpart (MRA)                       |
| Mr. M. Subramaniam                       | Ministry of Works<br>Road Planning Unit |



|                                    |   |
|------------------------------------|---|
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| Mr. Nasron Adil Ibrahim            | HPU   |
| Mr. Michihiko Sato                 | HPU   |
| Miss Giriya Nair                   | Ministry of Transport                                       |
| Mr. Zulkifli Othman                | Ministry of Transport                                       |
| Mr. Abdul Razak A. Manaf           | Department of Environ-<br>ment                              |
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| Mr. Mafix Omar                     | ditto   |
| Mr. Mohammed Khusrin<br>Hj. Munawi | Selangor State<br>Economic Planning Unit                    |

|                          |   |
|--------------------------|---|
| Mr. Chin Siek Poi        | Selangor State<br>Urban & Rural Planning<br>Department        |
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| Mr. Mohamad bin Nafis    | Negeri Sembilan State<br>Economic Planning Unit               |
| Mr. Mohd Shukri A.Rahman | ditto   |
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|------------------------------|--------|
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| - Mr. Abdul Kadir Hj. Kamal  | - MRA  |
| - Mr. Mohd Adzali Mohd Ali   | - MRA  |

Contact Officers:

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|                 | - Mr. Abdul Rahim Osman               | - MRA  |
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Development Planner

- Mrs. Norasiah Yahya - KVPS
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- Mr. Madzin b. Majid - MRA

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- Mr. Abd. Mokhti b. Zakaria - MRA

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- Mr. S. Apputhurai - MRA
- Mr. Mohd Zim Yusop - MRA

Advisory Committee, Government of Japan

|                                      |                             |
|--------------------------------------|-----------------------------|
| Satoru Onoyama                       | Chairman                    |
| Takahisa Karasudani<br>(Predecessor) | Transport Plan              |
| Hiroshi Saeki                        | ditto                       |
| Tadashi Shimura<br>(Predecessor)     | Management and<br>Operation |
| Harumoto Ogawa                       | ditto                       |
| Masaru Takimoto<br>(Predecessor)     | Urban Development<br>Plan   |
| Takeo Kai                            | ditto                       |

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|                 |  |
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| Akira Yamaguchi | Acting Leader/Signalling<br>and Telecommunication Plan   |
| Takashi Kadota  | Development Plan/Socio-<br>economic Frame                |

|                    |   |
|--------------------|---|
| Kenji Maeda        | Traffic Demand Forecast/<br>Economic Analysis |
| Makio Kasai        | Railway Transport Plan                        |
| Toru Fukushima     | Station/Structure Plan                        |
| Keizo Yoshikawa    | Rolling Stock Plan                            |
| Hikaru Ishikawa    | Feeder Service Plan                           |
| Ichiro Kawae       | Station Service Plan                          |
| Yoshikazu Kitajima | Signalling/Telecommuni-<br>cation Design      |
| Takuo Nishikawa    | Financial Analysis                            |

#### 1-4 Study Methodology

The general flow-chart of the Study is shown in Fig. 1-4-1.

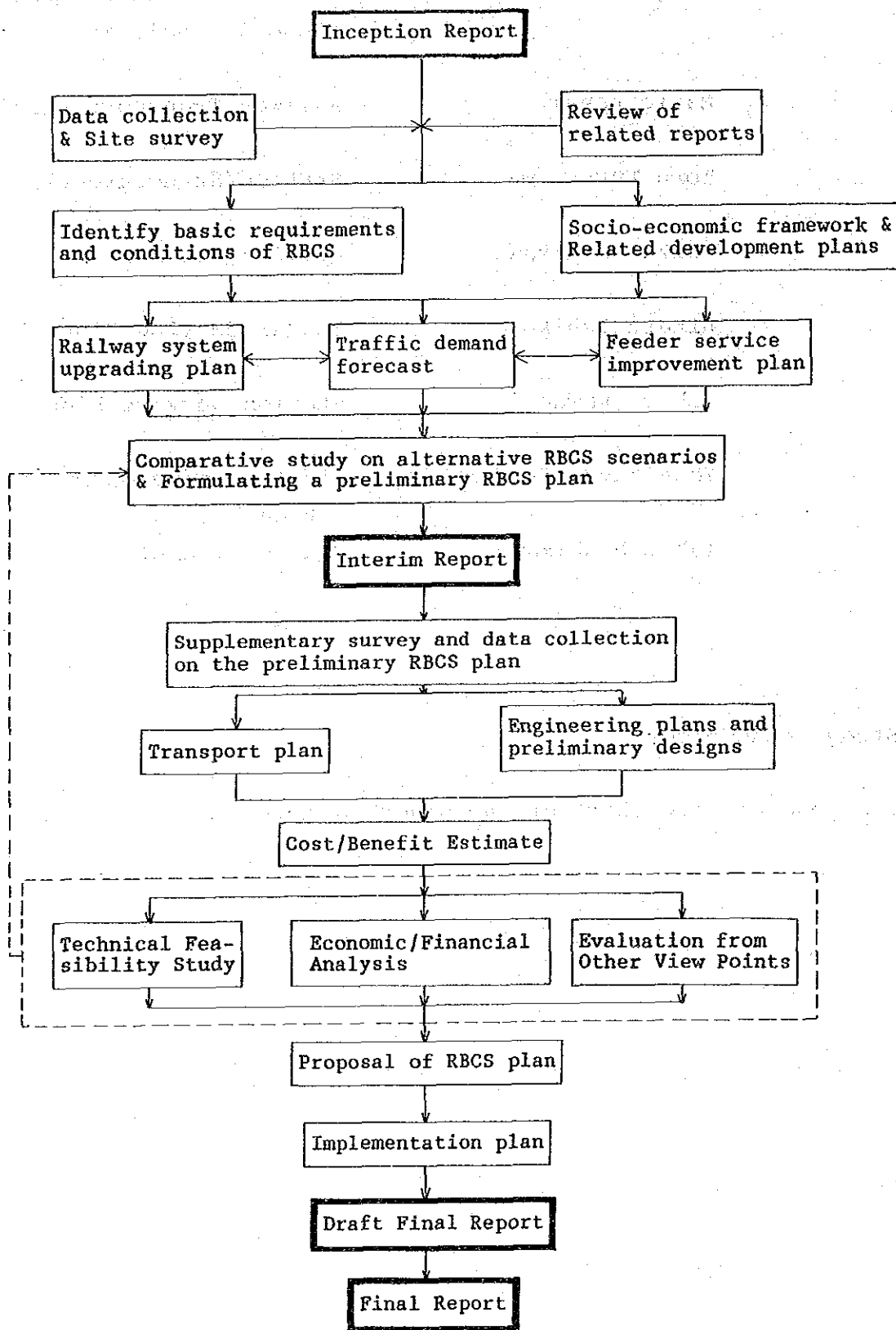


Fig. 1-4-1 General Flow of the Study

## **Chapter 2**

### **PRECONDITIONS AND BASIC APPROACHES OF THE STUDY**





## Chapter 2 PRECONDITIONS AND BASIC APPROACHES OF THE STUDY

### 2-1 Preconditions

#### 2-1-1 The Rail-Based Commuter Service (RBCS) Study

The RBCS system is intended to turn the so-far road-based commuter system to a rail-based, so that the road congestion especially in and around Kuala Lumpur might not be aggravated.

The scope of the present RBCS study is limited, geographically, to be area on and along the MRA's north-south corridor between Rawang and Seremban, and service-wise, to the railway commuter service and the related feeder-bus service.

The RBCS system, therefore, is no more than a sub-system of a greater Integrated RBCS system (Refer to 2-1-2 below). Hence it is necessary to clarify the inter-dependent relationship between the RBCS and the Integrated RBCS system, lest the cost and/or benefit of both systems should be counted in duplicate, or neglected. The same with the operating costs, benefits, revenues etc.

#### 2-1-2 The Integrated RBCS System

Considering the geographical spread of the commuter flows in the K.L./Seremban conurbations, the integrated RBCS system must cover a larger area which consists of the Klang Valley and the Seremban area, including the areas served by the MRA's Port Klang Line and LRT/Monorail network.

The integrated RBCS system would not be viable without being coordinated with the policies for housing, industrial development and/or the road vehicle circulation control.

Hence, the integrated RBCS Project is defined as follows:

(1) Network in 1993

The Integrated RBCS Networks for the year 1993 comprise:

1) The DTP (Double Tracking Project) lines consisting of the Rawang - K.L. - Seremban line, K.L. - Port Klang Line, Subang Jaya - Sri Subang line and Batu Junction line of MRA, and,

2) Monorail lines of Phase-1

(Refer to Fig. 2-1-1)

(2) Network in 2005

The Integrated RBCS networks for the year 2005 comprise:

1) The MRA lines (Including the RBCS line)

2) Monorail lines of Phase 1 and 2

3) The LRT Lines (i.e. People's Park-K.L.-Sentul-Manjalara and K.L.-Taman Connaught), and

4) Two MRA/MetroLink lines (i.e. Ampang-Puduraya and Sentul-Batu Caves).

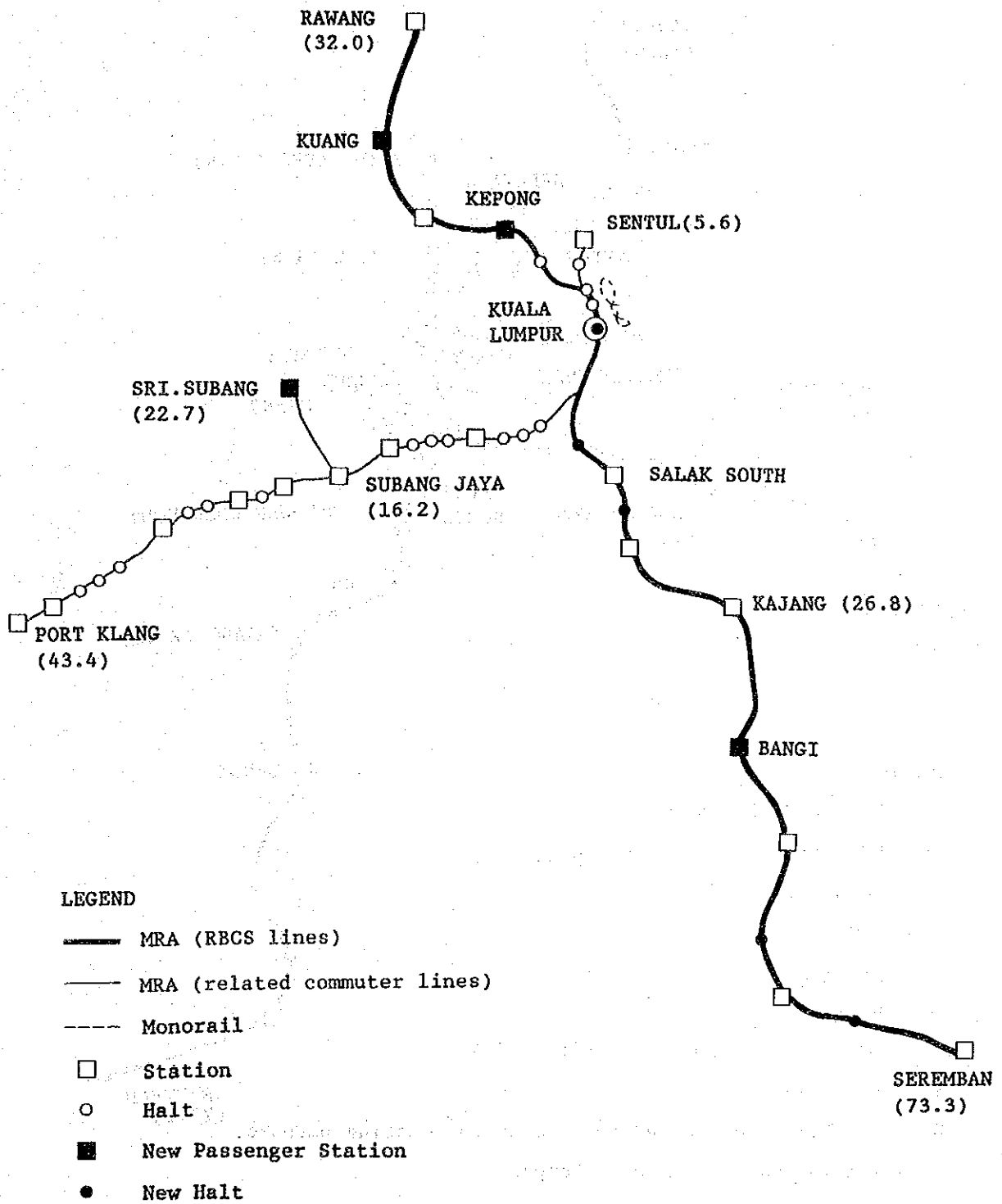


Fig. 2-1-1 Integrated RBCS Network (in 1993)

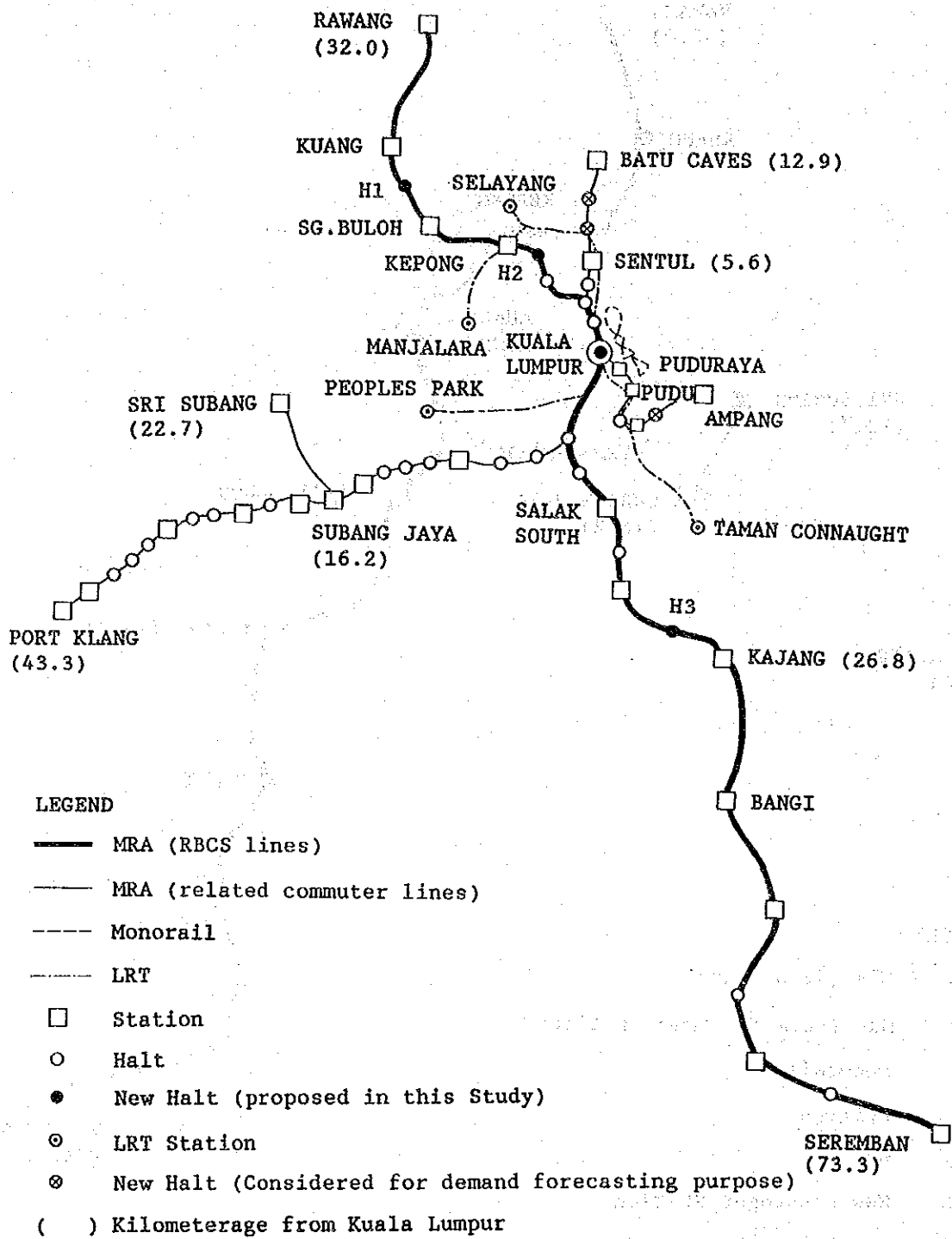


Fig. 2-1-2 Integrated RBCS Network (in 2005)

### 2-1-3 MRA Network

#### (1) Network in 1993

Based on the DTP, the railway network in 1993 is presumed as shown in Fig. 2-1-1.

#### (2) Network in 2005

In view of the regional structure plans, future land use and track conditions, the probable transfers among RBCS modes, etc., the network in 2005 is planned as shown in Fig. 2-1-2.

### 2-1-4 Monorail/LRT

Monorail service will be created by the City Hall in the central part of K.L. in two phases; 8.1 km for Ph-1 line by 1993 and 6.5 km of Ph-2 line by 2005. (Refer to Fig. 2-1-3)

LRT network of 18 km will be constructed by the year 2005. (Refer to Fig. 2-1-4)

Main particulars of the Monorail/LRT plans are given in Table 2-1-1.

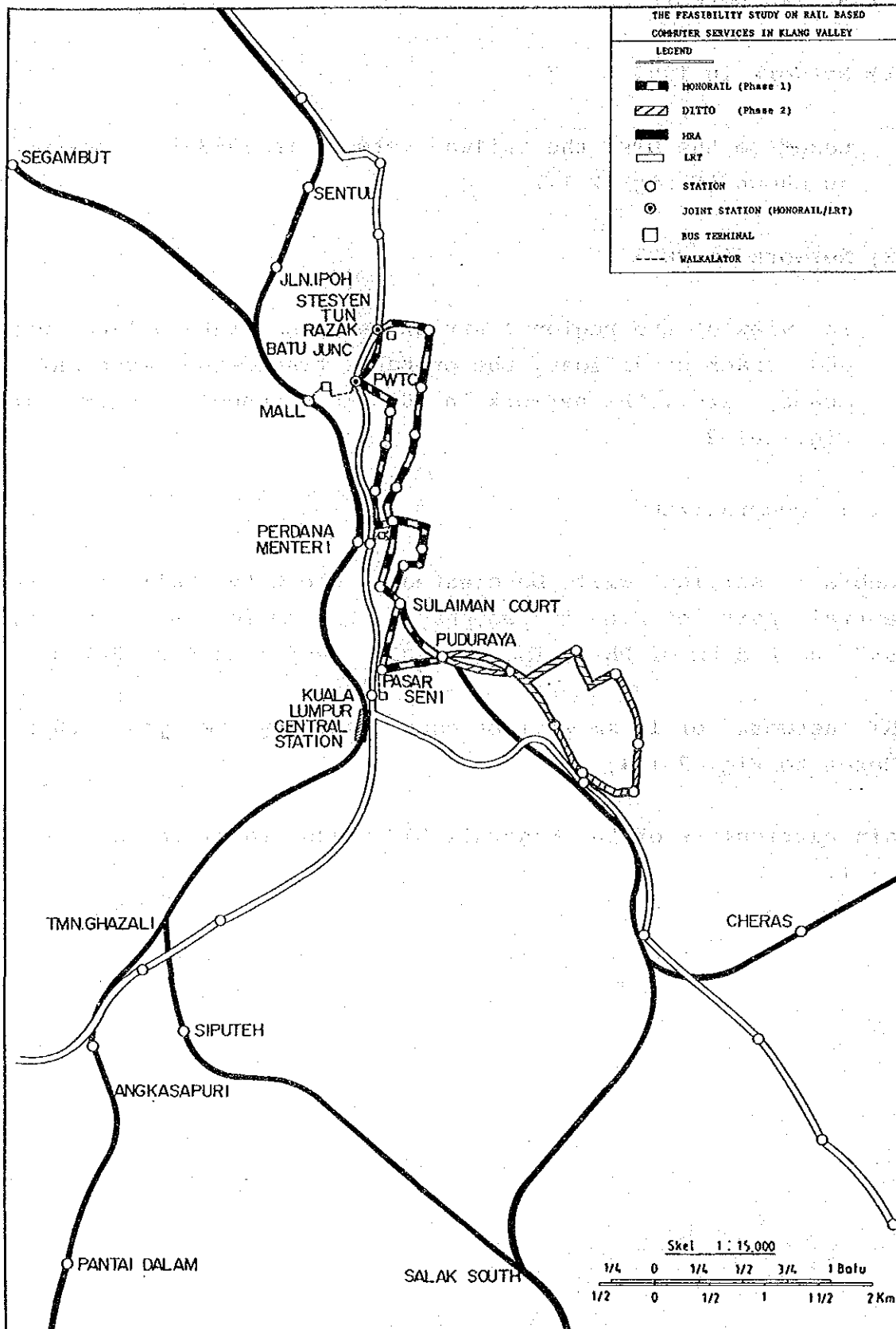


Fig. 2-1-3 Monorail Network (in 2005)

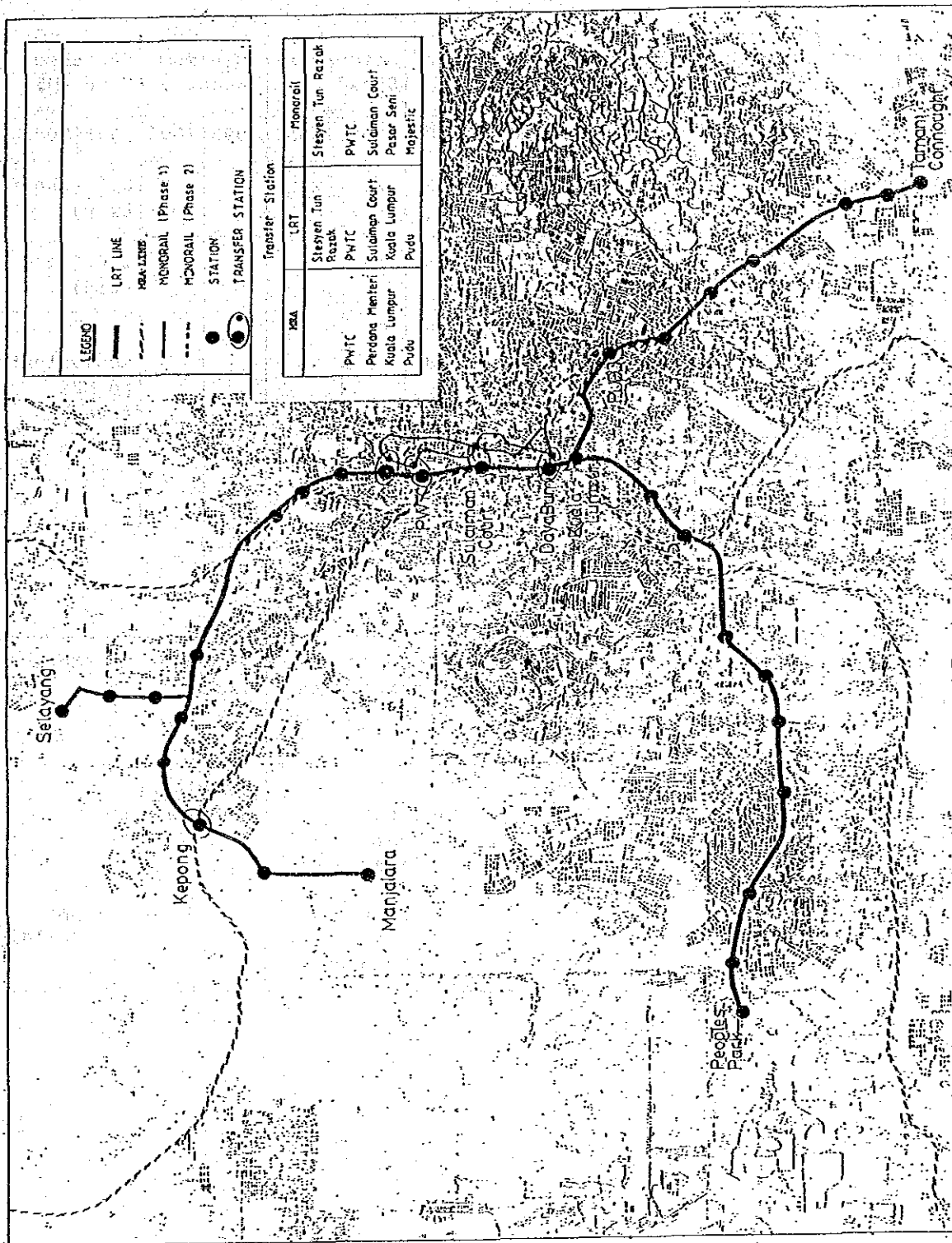


Fig. 2-1-4 LRT Network (in 2005)

Table 2-1-1 Main Particulars of the Monorail LRT Plans

| Transport Mode | Network                                  | Route Length (Km) |      | Number of Stations |      | Commercial Speed |      | Minimum Headway |      | Passenger Fare (M\$)   |      |
|----------------|--|-------------------|------|--------------------|------|------------------|------|-----------------|------|------------------------|------|
|                |  | 1993              | 2005 | 1993               | 2005 | 1993             | 2005 | 1993            | 2005 | 1993                   | 2005 |
| Monorail       | Ph-1                                     | 8.1               | 8.1  | 16                 | 16   | 22               | 22   | 5               | 3    | 0.5 (short trip)       |      |
|                | Ph-2                                     | -                 | 6.5  | -                  | 8    | -                | 24   | -               | 3    | 1.0 (long trip)        |      |
| LRT            | Sentul-KL-<br>People's Park              |                   | 18   | -                  | 18   | -                | 40   | -               | 5    | Equivalent to MRA fare |      |
|                | KL-<br>Kepong-<br>Manjalara<br>KL-Cheras | -                 | 16   | -                  | 16   | -                | 40   | -               | 5    |                        |      |

| Transport mode | Track                            | Carrying capacity per vehicle (person) | Transfer station with MRA                   | Transfer mode      | Note          |
|----------------|----------------------------------|--|---|--------------------|---------------|
| Monorail       | Single (one direction operation) | 100                                    | . PWTC<br>. Perdana Menteri<br>. Pasar Seni | Walklator (3m/sec) |               |
| LRT            | Double (m-gauge)                 | 250                                    | ditto & Kepong*                             | ditto              | * not decided |

(Source: City Hall)



## 2-1-5 The Rawang-Seremban Railway System in 1993

Based on the tentative plans which have been provided by MRA and agreed upon during the discussions between MRA and the Study Team, the railway system as of 1993 is presumed as follows:

### (1) Double Tracking Project

#### 1) Track

- a. Whole single track section will be doubled, however, the current double track section between Batu Junction and the Salak South Junction will not be quadrupled.
- b. Track alignment of the inter-station section will be kept as it is.
- c. Batu Junction (to Batu Caves), Port Klang Junction (Jct.), and Salak South Jct. (to Ampang) will be at grade.
- d. By-pass track for freight train will be constructed at the above three junctions.
- e. Switch points on the new double-tracked section will be upgraded to No. 15 type to allow a higher turnout speed (48 km/h).
- f. Major features of track:
  - rail : 40 kg (80 lb), long welded rails,
  - sleeper : PC (between stations),  
Wooden (in station yards)
  - balast : 250 mm depth
  - maximum axle weight : 20 ton

## 2) Station & structure

- a. New station: Kuang, Kepong and Bangi
- b. New halt: Sungai Besi, Siputeh, Nilai and Tiroi
- c. Conversion from station to halt: Segambut
- d. Effective loop length = 610 m
- e. Platform = 130 m in length  
1050 mm in height (expect at Seremban)
- f. Track layout: In principle, two passing lines without platform and two sidings with platform
- g. New tunnel: one near Seremban

## 3) Signalling & Telecommunication

- a. Intelocking : relay interlocking
- b. Block : tokenless block  
(reversible operation)
- c. Signal : colour light signal (3-aspects)
- d. Level crossing protection : 5 public level crossings  
7 public level crossings will be grade-separated and 8 private level crossings will be closed
- e. Traffic : CTC (Centralized Traffic Control system)
- f. Radio equipment : Train radio (dublex)

- g. Transmission line : Fibre optics (trunk line)  
Buried copper cable(local line)
- h. Telephone exchange : Digital type  
(KL, Seremban)

4) DMU

- a. Maximum speed 120 km/h
- b. Acceleration 165 sec.  
(0 to 100 km/h)
- c. Maximum braking distance 700 m
- d. Fixed train set 3 cars
- e. Driven system Hydraulic or Electrical
- f. Train type Semi-rapid type
- g. Door type One-way-slide type
- h. Number of doors 2 for each side
- i. Floor height 1,054 mm
- j. Door With steps
- k. Passenger Capacity
  - . Seating capacity more than 210/3 cars
  - . Standing capacity more than 90/3 cars
- l. Seat arrangement 2 person bench seat type

(2) Other government projects

- 1) Squatters living in the right-of-way will be removed.
- 2) All level crossings will be either grade-separated or closed within a few years after 1993.
- 3) Running/braking performance of long distance trains will be upgraded by adopting air brakes, automatic coupling, etc.
- 4) Maintenance facilities of DMU introduced by DTP, will be set up at the Sentul Workshop in the 6th Malaysia Plan.

2-2 Basic Approach

2-2-1 Socio-economic Framework

- (1) Formulate a framework for 2005 for the Klang Valley and Seremban District with the following concepts and procedures;

- 1) Set up the regional framework 2005 based on the development scenario in "Review of Klang Valley Perspective Plan", Negeri Sembilan State Master Plan (draft)" and Local Planning Authorities' Structure Plans.
- 2) Break-down the regional frame into each traffic zone based on the above-mentioned current plans and approved development projects.

- (2) Estimate a framework for 1993 with the following procedures ;

- 1) Formulate the regional framework for 1993 based on the development trends (1980-90) studied/estimated by the

above-mentioned Plans and approved development projects.

2) Break-down the regional frame into traffic zones based on the following data:

- the zone-wide population and employment locations for 1985 set up by the "Klang Valley Transportation Study" (JICA M/P 1987)

- the development trends (1980-88) studied by the above-mentioned plans

- the location of development projects approved

## 2-2-2 Traffic Demand Forecast

### (1) Klang Vall Area

#### 1) Trip production

Trip production is adjusted based on the "Klang Valley Transportation Study" (JICA, 1987) (hereinafter referred to as "the JICA M/P") and taking account of the latest information of future socio-economic parameters.

#### 2) Adjustment of public and private mode

Share between public and private mode traffic of the JICA M/P is adjusted by the study result of the "Feasibility Study on Transportation facilities Project in Klang Valley" (JICA, F/S 1989). Intra-zonal traffic is exempted, since it is not considered as commuting traffic.

### 3) Consolidation of traffic zone

Based data prepared by the JICA M/P is consolidated in accordance with the zoning newly set for the Study.

### 4) Estimation of RBCS OD matrix

RBCS OD matrix in Klang Valley is estimated based on the control total of public and private mode.

## (2) Negeri Sembilan Area

### 1) Estimation of trip production

Trip production in Negeri Sembilan area in 1993/2005 is estimated in reference to the trip production rate in Klang Valley.

### 2) Estimation of trip distribution

Trip Distribution is calculated using the parameter of gravity model formulated in the JICA M/P. Trips between Negeri Sembilan and Klang Valley is adjusted by the existing Cordon Line traffic survey data.

## (3) RBCS traffic assignment

### 1) Modal split between rail and bus

Share between rail users and bus is estimated based on a theoretical diversion curve developed by the JICA M/P.

### 2) RBCS link assignment

Based on the rail OD matrix, RBCS traffic assignment between Rawang and Seremban are estimated in terms of the followings:

- Number of cross sectional passengers
- Number of passengers at each station
- Passenger km
- Passenger Hour

### 2-2-3 Commuter Railway System Plan

Improvement plan of the Rawang - Seremban railway section is formulated presuming that the DTP will be completed by 1993.

#### (1) Objectives of the improvement

- 1) Enlargement of commuter transport capacity to cope with the RBCS ridership forecasted for 2005
- 2) Upgrading commuter service level (speed, safety, punctuality, accessibility, etc.)
- 3) Improvement in maintenance and operation
- 4) Minimizing environmental problem

#### (2) Major study items

- 1) Increase train handling capacity of the KL station

Today, four platforms (loops) are fully occupied by long distance passenger/freight trains during the peak hours (6:00 - 8:30 & 16:00 - 19:00). Under such circumstances, DMU operation for commuter service in the peak hours will be impossible even in the year of 1993.

With the increase in RBCS ridership in future, joint operation of long distance passenger/freight trains and DMU during non-peak time zone will also become difficult.

Hence Study is made on possible measures to solve the above problem.

- 2) Maximize the track capacity on the railway section between Batu Caves Junction and Port Klang Junction

After the DTP, since two double tracks meet at the abovementioned junctions the captioned railway section will inevitably become the bottle neck of the overall traffic flow.

Possible countermeasures thereof are examined.

- 3) DMU train transport plan

- a. Set-up DMU train types and their operating sections and times.
- b. Estimate section-wise railway commuter traffic demand by train type in the peak and off-peak hours.
- c. Identify problems and bottlenecks in increasing DMU traffic and determine the section-wise line capacities.
- d. Prepare a standardized DMU train diagram during the morning peak hours.
- e. Plan the number and types of trains operated per day.

- 4) DMU plan

- a. In view of short inter-station distance and many curves, DMU running performance is planned putting more importance on the acceleration/deceleration than on the maximum speed.



- b. Adopt seating and door arrangements to maximize its carrying capacity, and minimize getting on-off time.
- c. Plan engine, powering system, etc. to enable flexible train consists and easy maintenance.
- d. Estimate approximate number of DMUs, and plan their stabling/maintenance facilities.

#### 5) Station/halt and their facilities

- a. Construct new halts at places which are far from the existing stations/halts (including those planned in the DTP) and are expected to induce a considerable number of RBCS commuters in the future.
- b. Modify track/platform layouts of stations to facilitate shuttle operation of DMU trains.
- c. Remodel some stations into the over-the-track type or provide with the rear gates, in order to cope with the increase in railway commuters.
- d. Add or improve passenger facilities such as overtrack passages, ticket windows, wickets and transferring facilities.
- e. Prepare conceptual designs of station buildings and station plazas, taking the spaces for off-rail activities and feeder-bus services into account.

#### 6) Signalling and telecommunications

Although improvements to be implemented in the DTP has not been finalized, signalling and telecommunications (hereinafter referred to as the S & T) for the RBCS will be planned presuming that S & T system stipulated as "optional" in the DTP tender specifications will not

be implemented in the DTP.

- a. Introduce new technologies to improve line capacity, safety, efficiency of DMU operation such as automatic block system, automatic train protection, and yard radio.
- b. Enlarge the number of S & T system adopted in DTP to cope with the increase in DMUs, modification of station track layout, construction of new halts, etc.

#### 7) Environment

Measures to minimize the environmental impacts caused by DMU operation, such as noise, exhausting fumes, waste water are studied.

#### 2-2-4 Feeder-bus Service

- (1) Conduct interview surveys on the rail/bus/stage-bus passengers and car-users to find out their attitudes in selecting transport mode for commuting.
- (2) Identify problems of the existing feeder system, and establish planning criteria for feeder-bus system.
- (3) Formulate feeder-bus routes and bus operation plans.
- (4) Estimate the requirements for the types and number of buses and related facilities.

#### 2-2-5 Cost Estimation and Implementation Plan

- (1) Investment and operating costs for the RBCS Project are estimated for each item and for foreign/local currency portions.

(2) Implementation schedule of the RBCS Project is set with the following target years.

Start of investment : 1993

Inauguration of RBCS : 1997

Stop investment : 2004

End of project life : 2022

## 2-2-6 Economic / Financial Analysis

### (1) General

#### 1) With-the-project case

The Rawang-Seremban railway section and its feeder-bus service are upgraded in accordance with the increase in traffic demand, while the Integrated RBCS network except the Rawang-Seremban section (Port Klang, Batu Caves and Sri Subang railway lines, Monorail, LRT and related feeder-bus system) are presumed to be upgraded by 1993 to the same service level of the said section.

#### 2) Without-the-project case

The service level of the Rawang-Seremban railway section and its feeder-bus are not upgraded after completion of the DTP, while the other Integrated RBCS networks are upgraded to the same level as in the With-The-Project case.

#### 3) Diverted traffic volume from bus to RBCS

Economic and financial analysis are conducted based on the cost and benefit/revenue caused relating to the diverted traffic from stage-bus to RBCS.

#### 4) Project life

30 years (1993 ~ 2022)

### (2) Economic analysis

#### 1) Method of analysis

The feasibility of the RBCS project will be analyzed by calculating the cost and benefit coming from difference of With-the Project and Without-the-Project cases. The project viability is evaluated by Economic Internal Rate of Return (EIRR).

#### 2) Cost

The costs in the With-the-Project case consist of investment and operating costs for DMU and feeder-bus services.

#### 3) Benefit

##### a. Time saving benefit

Time saving benefit related to the following commuter traffics are taken into account;

- . Diverted traffic from stage-bus to railway
- . Mitigated road traffic congestion

##### b. Vehicle saving benefit

Vehicle saving benefit is estimated in terms of savings in fixed and running costs of the followings;

- . Difference between stage-bus cost saving and

railway cost increment related with the diverted traffic from stage-bus to DMU.

Road vehicle cost saving due to mitigated road traffic congestion

### (3) Financial analysis

#### 1) Method of analysis

The feasibility of the RBCS project for the privatized MRA will be analysed based on the difference in RBCS ridership between With-the-Project and Without-the-Project cases. The project viability is evaluated by Financial Rate of Return (FIRR) and Net Cash Flow.

#### 2) Case for analysis

- a. Commuter DMU service
- b. Feeder-Bus service
- c. Commuter DMU and Feeder-Bus service

### 2-2-7 RBCS Management and Off-Rail Business

#### (1) RBCS management

Study the conceivable problems as regards the organizational management with would arise in the implementation / operational stages of RBCS, and propose/suggest appropriate countermeasures.

#### (2) Off-rail business

Study the staged development of off-rail business into which MRA is suggested to venture into ; purpose being set not only to profit from the business itself, but also to increase the railway ridership. Propose/suggest required actions for the development.

## 2-2-8 Integration of Landuse Planning

This study aims to encourage the achievement of the current regional/urban development policies relating to the RBCS Corridor and to promote the RBCS Riderships.

### (1) Review ;

- Review current regional plan setting on Rawang-Seremban Corridor
- Review future development framework and landuse plans relating to the Corridor
- Study regional effects of RBCS introduction

### (2) Study of the impact of RBCS on landuse;

- Select the case study areas
- Set up the concept of station's service/areas
- Study the impact of RBCS in landuse of the selected station-areas

### (3) Proposal of alternative development actions and planning measures based on the results of the above studies.

- Identify the problems for the integration of landuse planning
- Set up the planning/implementation concepts for integration
- Propose the alternative development actions and planning measures for the case study areas

### (4) Reference materials on urban planning policies and strategies relating to commuter train networks in Japan with the following cases;

- Plans and implementation measures of suburban housing development integrated to railway development
- Landuse plans registered by the Japan's City Planning Act

## **Chapter 3**

### **SOCIO-ECONOMIC FRAMEWORK**





## Chapter 3 SOCIO-ECONOMIC FRAMEWORK

### 3-1 Introduction

#### 3-1-1 Study Purpose

The purpose of this chapter is to fix the socio-economic framework which will serve as the pre-conditions for the Railway demand forecast. For this purpose a regional framework of the population and day-time employment of Klang Valley and Seremban District in the year 1993 and 2005 must be determined and their values must be duly allocated to each of the 59 traffic zones.

#### 3-1-2 Study Principle

The framework of the population and day-time employment in 1993 and 2005 was formulated according to the Review of Klang Valley Perspective Plan (1988, Klang Valley Planning Secretariat) and the Structure Plans of the Local Planning Authorities. It was authorized by the Technical Committee of March 21, 1990.

The study team performed the review of the framework formulated by the JICA M/P 87, using the current development plans, in particular, the "Review of Klang Valley Perspective Plan" formulated after the JICA M/P 87, and the various urban development projects newly approved.

For the Rawang - Seremban Railway Corridor the existing land-use, and the current regional/urban development plans, and the approved urban development plans were reviewed in detail, and the results are given in Chapter 13.

## 3-2 Present Socio-economic Conditions

### 3-2-1 Study Area

The Klang Valley Region and the Seremban District of the Negeri Sembilan State were studied for the demand forecast. (Refer to Fig.3-2-1.)

- 1) The Klang Valley Region is one of the important Regional Development Unit as the National Growth Center in the Development Plan of the Malaysian Government. The 2,843 sq km of this region consists of the Federal Territory of Kuala Lumpur, and four districts of Selangor State; Petaling, Klang, Gombak and Hulu Langat.
- 2) Seremban District is one of the districts of Negeri Sembilan State, and consists of the capital city Seremban Municipality and its surrounding rural areas. This 950 sq km area lies south of the Bangi New Town.

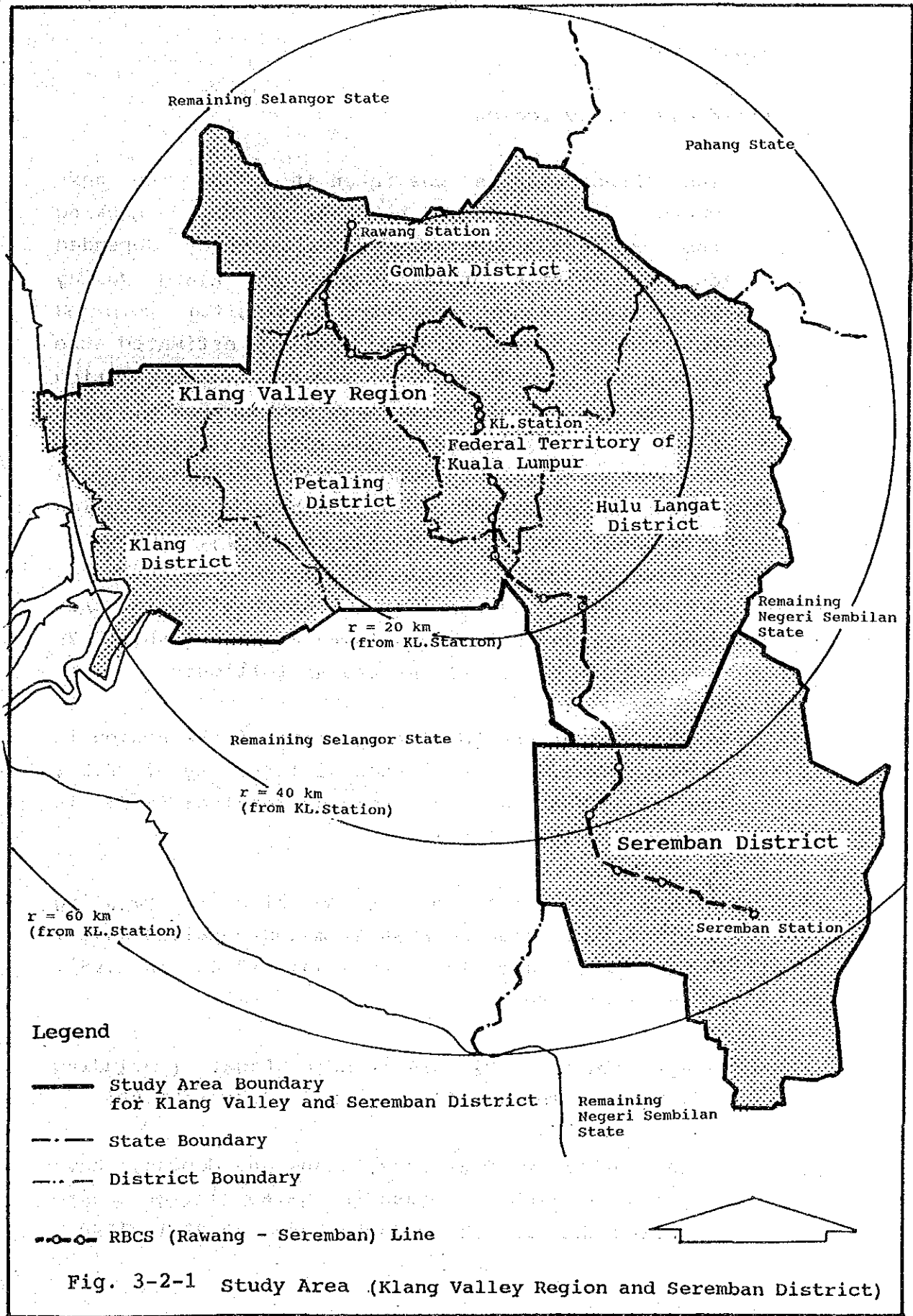


Fig. 3-2-1 Study Area (Klang Valley Region and Seremban District)

### 3-2-2 Population

#### (1) Klang Valley region

The latest Census was taken in 1980; The next Census is scheduled to be taken in 1991. Lacking the original data, therefore, this study depended on the results of the "Review of Klang Valley Perspective Plan (KVPS, 1988, hereinafter referred to as the "Review"). The Review estimated the population in 1985 and 1990. The total population of the Region was, according to the Review, 2.08 million in 1980, and 3.15 million in 1990. The average annual growth rate, 4.25%. Klang Valley is characterized by the rapid growth and concentration of population (Refer to Appendix 3-2-1).

The trend in the population distribution in this region during 1980 - 1990 is as shown in Table 3-2-1 which can be briefly stated as follows:

- One half of the total population of the Region is concentrated in the Federal Territory of K.L.: The percentage is slightly decreasing: 49.9% in 1980, 49.1% in 1990;
- About 20% of the population live in Petaling District (including Shah Alam and Petaling Jaya). The percentage is increasing: 18.4% in 1980. 20.9% in 1990;
- Approximately 9% are in Hulu Lagat (including Bangi New Town). 9.1% in 1980. 9.3% in 1990;
- The other two Districts, Klang and Gombak, have shown a slight decrease in the population share during the decade: 22.7% in 1980. 22.2% in 1990.

According to the "the Review of Klang Valley Perspective Plan" (KVPS, 1988, hereinafter referred to as the "Review"), Major Growth Centers are planned to achieve a balanced development between each other. They are: K.L. (the national capital), Shah Alam (the State's capital of developing Selangor), Petaling Jaya (a town of orderly development), Klang (a port town), Bangi and Selayang (new industrial/residential towns). The population and its growth rates in these towns, as estimated in the Review during 1980 - 1990 are shown in Table 3-2-1(2).

(2) Seremban district

Table 3-2-2 shows the population trends in Negeri Sembilan State and in the Seremban District.

- The annual population growth rate of the whole State during the decade was 2.3%, a rate lower than the Peninsular average. The population of the State was 551,400 in 1980, 645,000 in 1987;
- The City of Seremban was an exception. The growth rate has been stable at 3.3% (1970 - 1980) and 3.4% (1980 - 1987). The population of the City was 144,000 in 1980 and 180,000 in 1987;
- It should be noted that the population has been showing a sharp fall (-5% 1980 - 1987) in the Sub-Districts of Labu and Setur. These areas lie along the RBCS Southern Corridor between Bangi and Seremban (including Batang Benar, Nilai, Labu and Tiroi Stations). The total population of these two Sub-Districts were 31,600 in 1980, and 21,600 in 1987.

### 3-2-3 Economic Basis

#### (1) National economy

Malaysia had enjoyed a good economic growth during the years 1980 - 1984. The average annual GDP growth rate had been +5.5% during this time. However the overall collapse in the prices of primary industry products in the mid-80's strongly affected the economy. The GDP growth rate compared with the preceding years fell down to -1% in 1985, and to 1.2% in 1986;

But with the successful adjustment measures taken thereafter, the Malaysian economy was revitalized. The GDP growth rates recovered +5.2% in 1987, +8.7% in 1988. The Fifth Malaysia Plan (1986 - 1990) had estimated the average annual growth at 5.0%. The Mid-Term Review (1989) noted with expectation that the planned growth rate (1980-90) would be achieved. Also refer to Appendix 3-2-2 GDP Growth 1985 - 88.

#### (2) Gross regional domestic product (GRDP)

According to the Mid-Term Review, the per capita GRDP of the related areas, in relation to the national average, are as follows:

- The domestic economic activities are still concentrated in Kuala Lumpur; but the ratio of per capita GRDP of Kuala Lumpur, as compared to the national average (1.000), declined slightly from 1.754 in 1986 to 1.737 in 1988.
- On the other hand, in both states of Selangor and Negeri Sembilan, the above-mentioned ratios have slightly increased ; in Selangor 1.422 in 1986 to 1.473 in 1988 and in Negeri Sembilan 0.892 in 1986 to 0.898 in 1988.

Table 3-2-3 shows the GRDP and per capita GRDP of Federal Territory, Selangor and Negeri Sembilan in 1986 and 1988.

The population share of the Klang Valley Region is 17.7% of the Peninsular Malaysia, while it constituted 38% of Peninsular's GRDP in 1980.

(Refer to Appendix 3-2-3 for Composition of GRDPs of Federal Territory, Selangor and Negeri Sembilan; and Appendix 3-2-4 for the Mean Monthly Household Income of Federal Territory, Selangor and Negeri Sembilan.)

#### 3-2-4 Day-Time Employment

The total day-time employment of the Klang Valley Region was 1,056,500 in 1985. The annual growth rate during the period 1980 - 1985 was 3.5%. It was 0.6% lower than that of the population. This reveals the influence of the serious recession which the country encountered in the same period.

The Review estimated the total employment of the Region at 1,372,000 for 1990. Compared with the actual employment results in 1985, this gives the annual growth rate of 5.4%. Compared with the actual employment results in 1980, this represents the annual growth rate of 4.4%, or 0.15% higher than that of the population of the same decade.

Table 3-2-4 and 3-2-5 show the employment for Klang Valley (in 1985) and Seremban District (in 1987) by industrial sector. (Refer to Appendix 3-2-5 and 3-2-6 for the employment figure by district by industrial sector.)

Table 3-2-1 Population Trend in Klang Valley (1980-1990)  
by District and Major Growth Center

(1) Population Trend by District

| District                          | Population (x 1000) |                |                | Annual Growth Rate (%) |             |             |
|-----------------------------------|---------------------|----------------|----------------|------------------------|-------------|-------------|
|                                   | 1980                | 1985           | 1990           | 80/85                  | 85/90       | 80/90       |
| Federal Territory of Kuala Lumpur | 1,036.9             | 1,267.7        | 1,550.0        | 4.10                   | 4.10        | 4.10        |
| Pataling                          | 382.3               | 475.3          | 658.9          | 4.45                   | 6.75        | 5.59        |
| Klang                             | 296.1               | 354.5          | 411.9          | 3.66                   | 3.05        | 3.36        |
| Gombak                            | 175.9               | 210.6          | 244.6          | 3.67                   | 3.04        | 3.35        |
| Hulu Langat                       | 188.4               | 235.8          | 289.1          | 4.59                   | 4.16        | 4.38        |
| <b>Klang Valley</b>               | <b>2,079.6</b>      | <b>2,543.9</b> | <b>3,154.5</b> | <b>4.11</b>            | <b>4.40</b> | <b>4.25</b> |

(2) Population Trend by Major Growth Center ,  
Satellite Towns & other Mukims

|                                   | Population (x 1000) |                |                | Annual Growth Rate (%) |             |             |
|-----------------------------------|---------------------|----------------|----------------|------------------------|-------------|-------------|
|                                   | 1980                | 1985           | 1990           | 1980/85                | 1985/90     | 1980/90     |
| Federal Territory of Kuala Lumpur | 1,036.9             | 1,267.7        | 1,550.0        | 4.10                   | 4.10        | 4.10        |
| Pataling Jaya                     | 220.1               | 263.5          | 306.1          | 3.67                   | 3.04        | 3.35        |
| Shah Alam                         | 20.2                | 41.7           | 155.2          | 15.64                  | 30.06       | 22.64       |
| Klang                             | 203.4               | 243.5          | 282.9          | 3.66                   | 3.04        | 3.35        |
| Bangi                             | 33.3                | 50.2           | 73.4           | 8.53                   | 7.89        | 8.21        |
| Selayang                          | 3.5                 | 4.2            | 4.9            | 3.43                   | 3.13        | 3.28        |
| Satellite Towns & Other Mukims    | 562.2               | 673.0          | 782.0          | 3.66                   | 3.05        | 3.36        |
| <b>Klang Valley</b>               | <b>2,079.6</b>      | <b>2,543.8</b> | <b>3,154.5</b> | <b>4.11</b>            | <b>4.40</b> | <b>4.25</b> |

Source : "Review of Klang Valley Perspective Plan", KVPS, 1988



Table 3-2-2 Population Trend in Seremban District (1970-1987)

| Area                  | Population |       |       | Annual Growth Rate (%) |       |
|-----------------------|------------|-------|-------|------------------------|-------|
|                       | 1970       | 1980  | 1987  | 70/80                  | 80/87 |
| a) Seremban District  | 176.4      | 211.8 | 237.4 | 1.85                   | 1.64  |
| Seremban              | 103.0      | 144.1 | 180.6 | 3.41                   | 3.28  |
| Labu                  | 25.3       | 20.6  | 14.1  | -2.03                  | -5.27 |
| Setul                 | 13.8       | 11.0  | 7.5   | -2.24                  | -5.32 |
| Lenggeng              | 9.4        | 8.8   | 6.3   | -0.66                  | -4.66 |
| Ampangan              | 5.6        | 5.7   | 7.0   | 0.18                   | 2.98  |
| Rantau                | 16.7       | 18.6  | 18.8  | 1.08                   | 0.15  |
| Pantai                | 2.6        | 3.0   | 3.1   | 1.44                   | 0.47  |
| b) Other Area         | 305.2      | 339.6 | 407.7 | 1.07                   | 2.65  |
| Negeri Sembilan State | 481.6      | 551.4 | 645.1 | 1.36                   | 2.27  |

Source : Year Book of Statistics 1988; and Negeri Sembilan State Master Plan (draft), 1990

Table 3-2-3 Gross Regional Domestic Product of Federal Territory, Selangor and Negeri Sembilan (1986, 1988)

(in 1978 prices)

| Sector   | Year | Negeri Sembilan  | Selangor          | F.T. K.Lumpur    | MALAYSIA          |
|--|------|------------------|-------------------|------------------|-------------------|
| GDP and GRDP at purchasers' value (\$ million) | 1986 | 2,019.5          | 9,581.1           | 7,468.9          | 57,859.0          |
|  | 1988 | 2,279.5<br>(6.2) | 11,561.0<br>(9.8) | 8,611.4<br>(7.4) | 66,156.0<br>(6.9) |
| Population ('000)                              | 1986 | 637.6            | 1,896.9           | 1,199.4          | 16,294.4          |
|  | 1988 | 657.9<br>(1.6)   | 2,034.6<br>(3.6)  | 1,285.5<br>(3.5) | 17,150.1<br>(2.6) |
| Per capita GDP (\$)                            | 1986 | 3,167.3          | 5,050.9           | 6,227.2          | 3,550.9           |
|  | 1988 | 3,464.8<br>(4.6) | 5,682.2<br>(6.1)  | 6,698.9<br>(3.7) | 3,857.5<br>(4.2)  |
| Ratio to Malaysian average (per capita GDP)    | 1986 | 0.892            | 1.422             | 1.754            | 1.000             |
|  | 1988 | 0.898            | 1.473             | 1.737            | 1.000             |

Note: Figures in parentheses denote the annual growth rate for 1986-88.  
Source: Mid-Term Review of the Fifth Malaysia Plan, 1989

Table 3-2-4 Employment in Klang Valley by District and Sector (1980, 1985 and 1990)

| District     | Sector    | E m p l o y m e n t<br>(x 1000) |         |         | Sectorial Share<br>by District |       | Annual<br>Growth Rate |       |
|--------------|-----------|---------------------------------|---------|---------|--------------------------------|-------|-----------------------|-------|
|              |           | 1980                            | 1985    | 1990*   | 1985                           | 1990  | 80/85                 | 85/90 |
| Klang Valley | Primary   |                                 | 35.3    | 31.3    | 3.3                            | 2.3   | (%)                   | -2.4  |
|              | Secondary |                                 | 324.4   | 446.9   | 30.7                           | 32.6  |                       | 6.6   |
|              | Tertiary  |                                 | 696.8   | 894.0   | 66.0                           | 65.2  |                       | 5.1   |
|              | Total     | 889.0                           | 1,056.5 | 1,372.0 | 100.0                          | 100.0 | 3.5                   | 5.4   |

Source : The Review of Klang Valley Perspective Plan, 1988 KVPS.

Table 3-2-5 Employment in Seremban District by Sector (1987)

| District          | Sector    | Employment | Sectorial         |
|-------------------|-----------|------------|-------------------|
|                   |           | 1987       | Share (%)<br>1987 |
| Seremban District | Primary   | 15,100     | 18.9              |
|                   | Secondary | 21,600     | 27.1              |
|                   | Tertiary  | 43,100     | 54.0              |
|                   | Total     | 79,800     | 100.0             |

Source: Negeri Sembilan State Master Plan (Draft), 1989

### 3-3 Future Socio-economic Framework

#### 3-3-1 Review of Current Regional/Urban Development Plan for Klang Valley

##### (1) Regional planning effects for Klang Valley:

Since the independence of Malaysia in 1957, the Metropolitan Area of Klang Valley has seen various plans for development. A regional development strategy was prepared in the "Klang Valley Plan" by a consultant despatched by the United Nation in 1961. In order to realize this development plan, the Klang Valley Development Committee was formulated. At the same time the Selangor State Development Corporation was established, and the construction of Shah Alam and Petaling Jaya were started.

During the 1970s, the necessity for a comprehensive planning and development study was recognized, and the "Klang Valley Region Planning and Development Study" (Shankland Cox Partnership, 1973) was worked out, sponsored by the World Bank. The gap in the planned development of the Klang Valley and the actual development became evident. The Federal Territory of Kuala Lumpur was created. The above study was made for the "Review of Klang Valley Region Planning and Development in Selangor State and the Federal Territory".

In the 1980s, as one of the development policies of Prime Minister Dr. Mahathir, the Klang Valley development was given a high priority, and in 1981, the Klang Valley Regional Planning Council was established with the Premier as the chairman. Under this council, the Klang Valley Region Working Committee was formed to co-ordinate and formulate

the development policy and planning within the government ministries, and the Klang Valley Perspective Plan was formulated and it was decided to get reviewed every five years by the Klang Valley Planning Secretariat (KVPS) in the Prime Minister's office.

Also co-ordinated with the Perspective plan, the Kuala Lumpur (City Hall), Klang, Shah Alam, and Bangi set up the Structure Plans under the 1976 Town and Country Planning Act, as described later.

(2) Klang Valley perspective plan (2000):

The above-mentioned planning system worked out the Perspective Plan in 1984. It clarified the overall, as well as sectorial policies/strategies for developing the Region up to 2000. It provided the local planning authorities of the Region with the targets and guidelines for making their plans and for controlling their actions for development.

After the economic crisis of Mid-80's, KVPS reviewed the Perspective Plan into "the Review" in 1988. The Review maintained the policies/strategies of the Perspective Plan which follow:

1) Major policies/strategies maintained in the review;

The development of the Klang Valley Region should be such that it would contribute to:

- a. Found the basis of the New Economic Policy, through rapid expansion of Malaysian economy;
- b. Realize the balanced ethnic composition through moderate and controlled migration and

population growth;

- c. Urbanize the Region with the dispersed settlement of people in the Six Growth Centers each having its own specific urban functions and hierarchy.

## 2) Review of perspective plan;

The actual development has not necessarily been satisfactory. The Review identified the major problems as follows. They are to be reconsidered in the subsequent plan-making.

- a. The population growth rate of Klang Valley was lower than planned (4.2% instead of the targetted 5%);

- b. Population growth rates at the new Growth Centers of Shah Alam, Bangi and Selayang were too low compared with plans. On the other hand, population growth rate at K.L. and Petaling Jaya were considerably high. Lack of the countermeasures was marked to cope with the development going on outside the Growth Centers.

## 3) Revised strategies;

Considering the experiences of the economic recession in 1985 - 86, the Review worked out some revised strategies which would recover the delay in achieving the targets for 1990. The strategies and the framework of the Perspective Plan were maintained, but some changes in stress have been observed. Some sectorial strategies were also revised. The new stresses are placed on the following:

a. On the national level:

The role of Klang Valley was emphasized as a catalyst for the national economy. It would serve for preventing/deterring the economic recession of the country:

b. On the Regional level:

- A high economic growth rate for short term planning and a moderate growth rate for long term planning were adopted;

Economic growth rates: 6.0% for 1985 - 1995  
4.3% for 1996 - 2000

Population growth rates: 4.2% for 1985 - 1995  
3.5% for 1996 - 2000

- Moderating the dispersal policy

- Controlling the population growth in the traditional towns, such as Petaling Jaya and Klang, and encouraging the new growth centres of Shah Alam, Bangi and Selayang and the satellite towns of Kuang, Rawang, Sungai Buloh, Meru, Kapar and Semenyih.

4) Reviewed population scenario;

Table 3-3-1 shows the population scenario up to 2000 of the Klang Valley (by District and Growth Centre). The 1980 actual result and the 1990/2000 targeted values in the Perspective Plan and in the Review are compared.

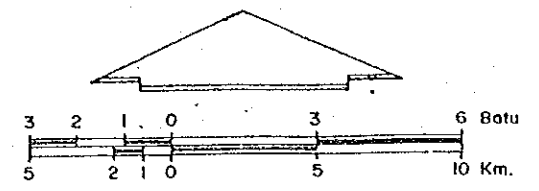
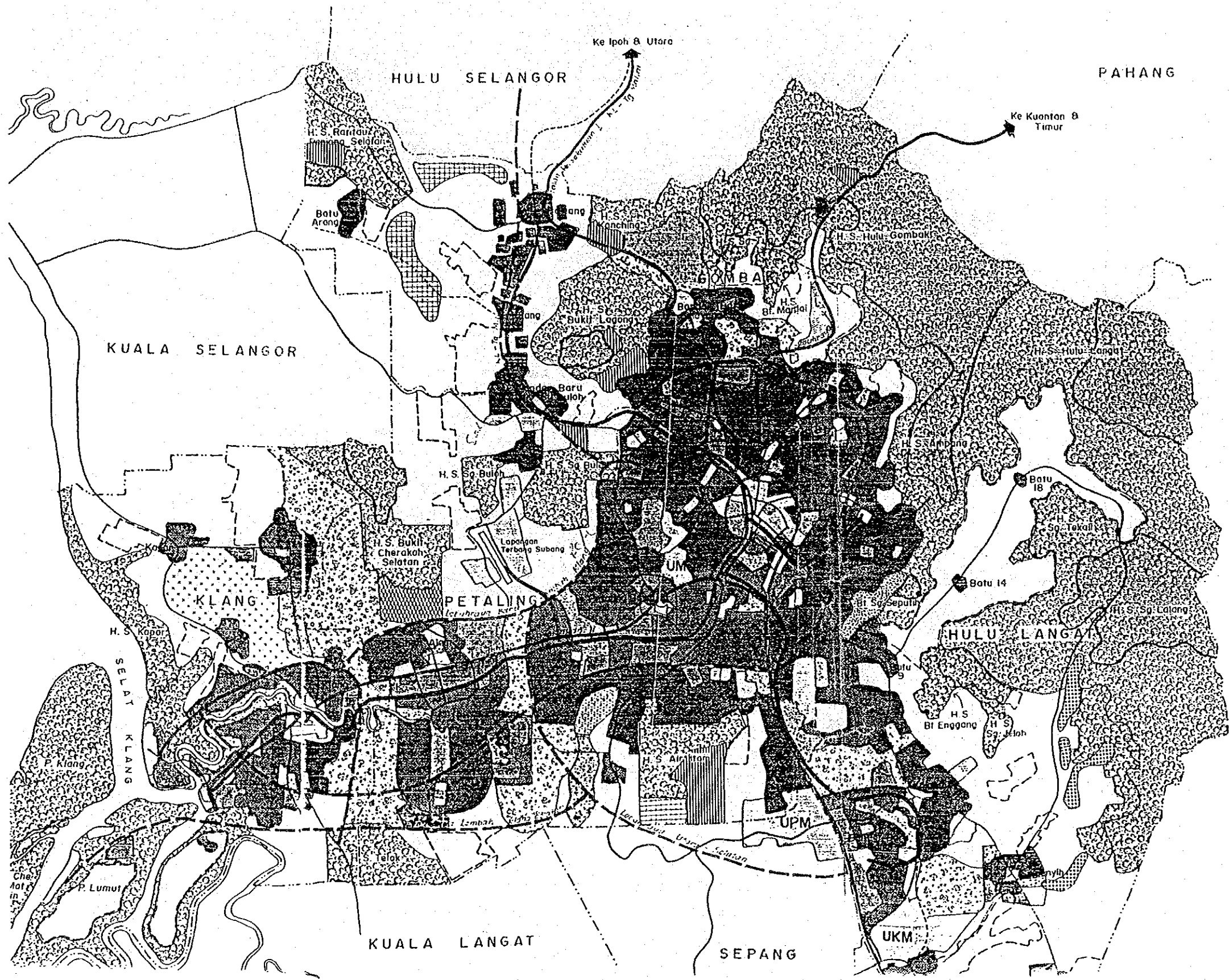
The Valley's 1990 total population in the original Perspective Plan, 3.28 million, was lowered (-0.4%) to 3.15 million in the Review. However the Review maintained the original population frame for 2000. (Refer to Appendix 3-3-1 Review of Population Scenario for Klang Valley.)

Part of the land-use plan was also revised (Fig. 3-3-1). It is to be noted that the area along the Rawang - Sq. Buloh section has been expanded for development in the revised plan.

(3) Structure plans of local planning authorities:

Based on the Town and Country Planning Act of 1976, Local Planning Authority will set up a "Structure Plan" which will decide long-term policies/strategies for developing the area under its jurisdiction. Among those Structure Plans which have been prepared or being prepared in the Klang Valley Region are:

|  | Prepared<br>in       | Target<br>year |
|--|----------------------|----------------|
| - Kuala Lumpur Structure Plan            | 1984                 | 2000           |
| - Klang Structure Plan                   | 1985                 | 2005           |
| - Shah Alam Structure Plan               |                      |                |
| - Bangi Structure Plan                   | 1987                 | 2005           |
| - Petaling District Structure Plan       | Under<br>preparation | 2005           |
| - Hulu Langat District<br>Structure Plan | - Under preparation  | -              |



- LEGEND**
- State Boundary
  - District Boundary
  - Major Road/Street
  - Planned Road
  - Railway
  - Mass Rapid Transit
  - Residential Area
  - Commercial Area
  - Industrial Area
  - Institution
  - Reserved Area for Institute
  - Recreation
  - Buffer Zone
  - Mining
  - Planned Pond
  - Agricultural Land
  - Planned Agricultural Land
  - Forest Reserve
  - Experimental Plantation
  - Protection Area
  - Catchment Area
  - Malay Reserve
  - Controlled Development Area
  - Cherakah Hill Agricultural Park

Fig. 3-3-1 Land Use Plan for 2000  
 - "The Review of Klang Valley Perspective Plan" -





Furthermore the development study for Gombak was prepared in 1986.

Based on the selected development policies/strategies, the Structure Plan provides the land-use diagram of the Local Planning Authority Area (LPAA). The land-use diagram identifies: the future land-use zoning, arterial road network, town centre/sub-centre location, etc. Although it does not give the detailed land use of that part where a new RBCS station would be located, it would serve as a guide-line for determining the general characteristics of the areas along the RBCS railway/bus routes.

### 3-3-2 Review of Current Regional/Urban Development Plans for Seremban District

Negeri Sembilan State is preparing "The Master Plan for Negeri Sembilan State (Draft)" (State Government, 1990, hereinafter referred to as "Negeri Sembilan Draft"). The Negeri Sembilan Draft has prepared the development framework (by District) of population, employment and GRDP, etc. However the State's policies and strategies for the future industrial/housing development for Seremban District are yet to be clarified.

#### (1) Present trend in the Seremban district:

The Seremban District, the most developed district in the Negeri Sembilan State, consists of Seremban Municipality area and the surrounding rural areas. The continuation of urban sprawl extends into the eastern and southern borders of the municipality, such as Ampangan, Rantau and Rantai. But the remaining area consisting of Lenggeng, Labu and Setul, including the RBCS Corridor, are less urbanised areas with declining population. This area is mostly forest and plantations of rubber and oil palm.

(2) Development projects surrounding RBCS corridor:

The Negeri Sembilan Draft reviewed the following industrial/housing development projects within the district. But these are expected to be outside of the RBCS station's influential areas.

- Industrial development projects planned for the Setul and Labu areas
- The Salak Tinggi Project planned by the Selangor State Government

(3) Future development framework:

The Negeri Sembilan Draft estimated the total population of the State at 645,000 in 1987. It will increase to 745,000 in 1995 and to 987,000 in 2005. The State annual growth rates will be 1.98% and 2.72% respectively. The total population of the Seremban District was 237,000 in 1987. It will be 309,000 in 1995, and 445,000 in 2005. The District growth rates will be 3.34% (1987 - 95) and 3.71% (1995 -2005), respectively.

3-3-3 Population and Employment Framework

Based on the established development framework, the population and employment scenarios of the Project area were worked out. Then, the population and the (day-time) employment scenarios thus obtained were broken down into the traffic zones which had been prepared for the demand forecast.

(1) Population scenario for 1993 and 2005:

The Review defines the development scenario up to 2000, while most of the Structure Plans predict the

development framework up to 2005. The Klang Valley Planning Secretariat selected the population scenario up to 2005 by district and major growth centers based on the above-mentioned plans. The total for the region is projected to be 5.778 million in 2005 which is 4.1% larger than that given in the JICA M/P 87.

The population projection of the Seremban District is based on the Negeri Sembilan State Master Plan (Draft).

The population for 1993 is projected by an annual growth rate between 1980 and 1990 for the Klang Valley, and the rate between 1980 and 1987 for the Seremban District.

Table 3-3-1 and 3-3-2 show the population scenario up to 2005 selected for the Klang Valley and the Seremban District.

(2) Day-time employment scenario for 1993 and 2005:

For the Klang Valley the day-time employment scenario up to 2000 projected in the Review is used. The control total of the Klang Valley in 2005 and the total of the districts in 2005 are projected based on the scenario up to 2000. The breakdown by industrial sector for each district is based on the sector's growth trends up to 2000.

For the Seremban District the employment scenario up to 2005 projected in the Sembilan Draft is used.

As to the framework for 1993, it is projected based on the trend 1985 - 1990 for the Klang Valley and 1987 - 1995 for the Seremban District.

Table 3-3-3 and 3-3-4 show the employment scenarios up to 2005 selected for the Klang Valley and the Seremban District. (Refer to Appendix 3-3-2 and 3-3-3 for the employment scenario by district and industrial sector).

(3) Breakdown into traffic zones:

The population/employment scenarios thus selected are broken down into 58 traffic zones in reference to the detailed projection which had been given in each of the relevant Structure Plans. In particular, the population distribution pattern within Kuala Lumpur is adjusted to meet the planned patterns of the four new growth areas. The breakdown of the remaining zones are based on the patterns obtained in the foregoing the JICA M/P 87.

The break down by the Seremban Municipality and the surrounding areas are projected based on the present conditions and the projection in the Seremban Draft.

The result is shown in Appendix 3-3-4.

Table 3-3-1 Population Scenario Selected for Klang Valley up to 2005

| District                             | 1) Population by District<br>(x1000) |   | Selected<br>Projection<br>for 1993 for 2005<br>(x1000) | Annual Growth Rate<br>(%) |         |         |
|--------------------------------------|--------------------------------------|---|--|---------------------------|---------|---------|
|                                      | 1980                                 | Review's<br>Projection Target<br>for 1990 for 2000<br>(x1000) |  | 80-90                     | 90-2000 | 2000-05 |
| Federal Territory<br>of Kuala Lumpur | 1,036.9                              | 1,550.0   | 1,749.0  | 4.1                       | 3.3     | 4.1     |
| Pataaling                            | 382.3                                | 658.9   | 772.0  | 5.4                       | 4.4     | 5.4     |
| Klang                                | 296.1                                | 411.9   | 454.0  | 3.3                       | 3.4     | 3.3     |
| Gombak                               | 175.9                                | 244.6   | 270.0  | 3.3                       | 8.9     | 3.3     |
| Hulu Langat                          | 188.4                                | 289.1   | 328.0  | 4.3                       | 4.5     | 4.3     |
| Klang Valley                         | 2,079.6                              | 3,154.5   | 3,569.0  | 4.2                       | 4.2     | 4.2     |

| Major Growth<br>Center               | 2) Population by Major Growth Center<br>(x1000) |   | Selected<br>Projection<br>for 1993 for 2005<br>(x1000) | Annual Growth Rate<br>(%) |         |         |
|--------------------------------------|---|---|--|---------------------------|---------|---------|
|                                      | 1980  | Review's<br>Projection Target<br>for 1990 for 2000<br>(x1000) |  | 80-90                     | 90-2000 | 2000-05 |
| Federal Territory<br>of Kuala Lumpur | 1,036.9   | 1,550.0   | 1,749.0  | 4.1                       | 3.3     | 4.1     |
| Pataaling Jaya                       | 220.1   | 306.1   | 337.0  | 3.3                       | 2.7     | 3.3     |
| Shah Alam                            | 20.2  | 155.2   | 271.0  | 20.4                      | 9.1     | 20.4    |
| Klang                                | 203.4   | 282.9   | 312.0  | 3.3                       | 4.3     | 3.3     |
| Bangi                                | 33.3  | 73.4  | 92.0   | 7.9                       | 9.4     | 7.9     |
| Selayang                             | 3.5   | 4.9   | 5.0  | 3.3                       | 38.7    | 3.3     |
| Other Centers                        | -   | -   | 428.9  | -                         | -       | -       |
| Satellite Towns                      | 33.9  | 47.2  | 52.0   | 3.3                       | -       | 3.3     |
| Rural Areas                          | -   | 0.0   | -  | -                         | -       | -       |
| Other Mukims                         | 528.2   | 734.8   | 810.0  | 3.3                       | -       | 3.3     |
| Klang Valley                         | 2,079.6   | 3,154.5   | 3,569.0  | 4.2                       | 4.2     | 4.2     |

Source : the Review of Klang Valley Perspective Plan, KVPS, 1988.

Note : \*1 Petaling District Structure Plan (Draft), 1989

\*2 Klang Structure Plan, 1985

\*3 Gombak Study ; \*4 Bangi Structure Plan, 1987

Table 3-3-2 Population Scenario Selected for Seremban District up to 2005

| Area                  | (1) Population (x1000)     |                            |  |  | Selected Population |       |
|-----------------------|----------------------------|----------------------------|--|--|---------------------|-------|
|                       | Population (Existing) 1980 | Population (Existing) 1987 | Population (Planned in Master Plan) 1995 | Population (Planned in Master Plan) 2000 | 1993                | 2005  |
| a) Seremban District  | 211.8                      | 237.4                      | 308.8                                    | 373.5                                    | 261.8               | 444.7 |
| - Seremban City (*)   | 144.1                      | 180.6                      | -  | 334.3                                    | 212.6               | 398.0 |
| - Remained Zones      | 67.7                       | 56.8                       | -  | 39.2                                     | 49.2                | 46.7  |
| b) Other Areas        | 339.6                      | 407.7                      | 445.9                                    | 481.3                                    | 476.2               | 542.0 |
| Negeri Sembilan State | 551.4                      | 645.1                      | 754.7                                    | 854.8                                    | 738.0               | 986.7 |

| Area                  | (2) Annual Growth Rate (%) |       |         |         | Selected for |         |
|-----------------------|----------------------------|-------|---------|---------|--------------|---------|
|                       | 1980/87                    | 87/95 | 95/2000 | 2000/05 | 1987/93      | 2000/05 |
| a) Seremban District  | 1.64                       | 3.34  | 3.88    | 3.55    | 1.64         | 3.55    |
| - Seremban City       | 0.03                       | -     | -       | -       | 2.76         | 3.55    |
| - Remained Zones      | -0.02                      | -     | -       | -       | -2.37        | 3.56    |
| b) Other Areas        | 2.65                       | 1.13  | 1.54    | 2.40    | 2.62         | 1.50    |
| Negeri Sembilan State | 2.27                       | 1.98  | 2.52    | 2.91    | 2.27         | 2.91    |

Source : Negeri Sembilan State Master Plan (Draft), 1989  
 Note : \* Seremban Structure Plan projected the population for 2000 only.

Table 3-3-3

Employment Scenario for Klang Valley up to 2005  
by District and Sector

| District                             | Sector    | Basic Figure     |                  | Projection |         |
|--------------------------------------|-----------|------------------|------------------|------------|---------|
|                                      |           | 1990<br>(Review) | 2000<br>(Target) | 1993       | 2005    |
|                                      |           |                  |                  | (x1000)    |         |
| Federal Territory<br>of Kuala Lumpur | Primary   | 2.7              | 1.5              | 2.2        | 1.1     |
|                                      | Secondary | 164.6            | 228.6            | 179.3      | 260.6   |
|                                      | Tertiary  | 566.4            | 769.7            | 619.0      | 1,005.7 |
|                                      | Total     | 733.7            | 999.8            | 800.5      | 1,267.4 |
| Pataling                             | Primary   | 3.0              | 1.5              | 2.2        | 0.9     |
|                                      | Secondary | 166.9            | 219.5            | 198.7      | 240.7   |
|                                      | Tertiary  | 169.8            | 271.1            | 201.1      | 361.1   |
|                                      | Total     | 339.7            | 492.1            | 402.0      | 602.7   |
| Klang                                | Primary   | 9.5              | 8.5              | 9.1        | 7.7     |
|                                      | Secondary | 53.2             | 80.5             | 61.7       | 95.8    |
|                                      | Tertiary  | 79.2             | 114.8            | 91.4       | 154.4   |
|                                      | Total     | 141.9            | 203.8            | 162.2      | 257.9   |
| Gombak                               | Primary   | 9.2              | 9.8              | 9.7        | 9.2     |
|                                      | Secondary | 46.6             | 97.8             | 58.3       | 135.5   |
|                                      | Tertiary  | 25.3             | 53.0             | 31.6       | 75.5    |
|                                      | Total     | 81.1             | 160.6            | 99.6       | 220.2   |
| Hulu Langat                          | Primary   | 6.7              | 4.7              | 6.4        | 3.3     |
|                                      | Secondary | 15.6             | 31.6             | 20.3       | 58.2    |
|                                      | Tertiary  | 53.3             | 77.6             | 71.7       | 121.5   |
|                                      | Total     | 75.6             | 113.9            | 98.4       | 183.0   |
| Total of<br>Klang Valley             | Primary   | 31.3             | 26.0             | 29.6       | 22.2    |
|                                      | Secondary | 446.9            | 658.0            | 518.3      | 790.8   |
|                                      | Tertiary  | 894.0            | 1,372.2          | 1,014.8    | 1,718.2 |
|                                      | Total     | 1,372.0          | 1,970.2          | 1,562.7    | 2,531.2 |

Source : The Review of Klang Valley Perspective Plan, 1988 KVPS.



Table 3-3-4 Employment Scenario Seremban District up to 2005

| District                | Sector    | (x1000) |                            |       | (x1000)                                 |       |
|-------------------------|-----------|---------|----------------------------|-------|---|-------|
|                         |           | 1987    | (Master Plan)<br>1995 2005 |       | Selected<br>Employment for<br>1993 2005 |       |
| (a) Seremban District   | Primary   | 15.1    | 13.8                       | 12.2  | 14.1                                    | 12.2  |
|                         | Secondary | 21.6    | 36.2                       | 71.0  | 31.8                                    | 71.0  |
|                         | Tertiary  | 43.1    | 55.8                       | 75.3  | 52.7                                    | 75.3  |
|                         | Total     | 79.8    | 105.8                      | 158.6 | 98.6                                    | 158.5 |
| - Seremban Municipality | Primary   |         |                            |       | 9.0                                     | 7.6   |
|                         | Secondary |         |                            |       | 30.2                                    | 66.2  |
|                         | Tertiary  |         |                            |       | 44.8                                    | 66.3  |
|                         | Total     |         |                            |       | 84.0                                    | 140.1 |
| - Other Areas           | Primary   |         |                            |       | 5.1                                     | 4.6   |
|                         | Secondary |         |                            |       | 1.6                                     | 4.8   |
|                         | Tertiary  |         |                            |       | 7.9                                     | 9.0   |
|                         | Total     |         |                            |       | 14.6                                    | 18.4  |
| (b) Remained Area       | Primary   | 79.8    | 74.5                       | 68.8  | 75.8                                    | 68.8  |
|                         | Secondary | 13.3    | 21.1                       | 40.2  | 19.3                                    | 40.2  |
|                         | Tertiary  | 42.6    | 55.6                       | 77.1  | 52.3                                    | 77.1  |
|                         | Total     | 135.7   | 151.2                      | 186.0 | 147.4                                   | 186.1 |
| Negeri Sembilan State   | Primary   | 94.9    | 88.3                       | 81.0  | 89.9                                    | 81.0  |
|                         | Secondary | 34.9    | 57.3                       | 111.2 | 51.1                                    | 111.2 |
|                         | Tertiary  | 85.7    | 111.4                      | 152.4 | 105.0                                   | 152.4 |
|                         | Total     | 215.5   | 257.0                      | 344.6 | 246.0                                   | 344.6 |

Source : The Negeri Sembilan Master Plan (Draft), 1989