(f) Management Organization for MRT System

The MRT System development requires considerable investment costs of M$310 million by 1990, M$788 million by 1995 and M$1384 million by 2005.

Since the MRT System development is aimed at providing the principal public transport system for the mobility of people in the Klang Valley, the Study Team suggests the formation of a management organization for the MRT System as follows:-

(i) To promote the MRT System development, a limited company possibly called the Klang Valley Transit Company Limited (KVTC) be established. KVTC is to have the sole function of developing and operating the MRT System.

(a) Construction of MRT System
(b) Operation of MRT System
(c) Land Development along the MRT Lines
(d) Development and management of amusement centres, shopping centres particularly at train stations

(ii) KVTC will be organized with participation from:-

(a) Selangor State Government or Selangor State Development Corporation (PKNS)
(b) Kuala Lumpur City Hall (DBKL)
(c) Malayan Railway (KTM)
(d) Private Enterprises

4.4.2 Bus Transport Improvement Plan

(a) Deregulation of Government Controls

The control of bus operation through the franchise of routes to companies should be deregularized whenever possible. A double or triple bus operators system should be encouraged to provide healthy competition and to revitalize the existing bus transport industry.

(b) Bus Service Improvement

In order to improve bus services, the following measures should be implemented:-

(i) Expansion of bus services into newly developed areas

(ii) Improvement of services in existing bus routes

(iii) Improvement in attractiveness and reliability of bus operation

(iv) Shorter bus headway time

(v) Introduction of express or limited express services from new town centres to the Central Planning Area of Kuala Lumpur

(c) Bus Fleet Improvement

The bus fleets should be upgraded through the following measures:-

(i) Introduction of some 360 new stage buses to the Klang Valley Region equipped with two(2) doors, low floor and preferably air-conditioned coaches by the year 1990.

(ii) Upgrading the engine capacity or horse power of minibuses.

(iii) Incentives for replacement of old buses.

(iv) Establishment of three(3) common sharing bus depots in the first phase; two(2) out of three(3) bus depots to be located in the Kuala Lumpur Conurbation and one(1) bus depot be in Klang. These depots are to ensure a well maintained bus fleet so as to minimize breakdown and reduce maintenance costs.

(d) Fare and Pricing Policy

The following policies concerning bus fare should be implemented.

(i) The present fare structure is found to be acceptable by the public and should be maintained for as long as possible. Bus companies should be encouraged to channel savings from lower fuel costs to expediate replacement of old age fleet.

(ii) To encourage private vehicle users to use bus transport, premium bus services using air conditioned, comfortable, seating only coaches could be implemented. A premium bus fare structure should then be imposed for such buses only.

(iii) The physically handicapped and elderly persons should be provided with discounted or free fare as a social equity policy.

(iv) In the long term when MRT system has been introduced, a common ticketing system shall be encouraged to ease inter-modal transfer and to encourage a greater usage of public transportation.

(e) Bus Transport Facility Improvement

The following inprovements to bus transport facilities should be implemented:-

(i) Bus priority lanes should be set up on major arterial roads having high bus volume to ensure that buses can maintain their operational speed. Roads for possible implementation of bus priority lanes are:-

* Jalan Pantai - Jalan Bangsar-Jalan Travers
* Jalan Pudu - 7th km Jalan Cheras
* Jalan Pahang/Jalan Genting Klang

(ii) Establishment of bus terminals at all major growth centres in the Klang Valley Region

(iii) Continuous improvement of bus-stands/shelters

(iv) Continuous improvement of pedestrian facilities

(v) Improvement of bus information system

(f) Introduction of Feeder Services to MRT System

When the Mass Transit System is introduced to the Klang Valley in future, competitive bus routes with the MRT System should be rerouted and the feeder bus services to the MRT Stations should be provided.

(g) Modernization of Bus Operating/Management System

Modern management techniques should be practised by bus transport operators to reduce cost of operation while increasing productivity.

(i) Improve the existing cost control methods to identify any operational deficiency

(ii) Improve the existing method of bus service planning and bus/crew schedulling in order to optimise the use of resources

(iii) Introduction of One Man Operation Ticketing System (OTS) to save labour cost

(iv) Introduction of employee training to instill better driving habits, courtesy and good public relations

4.5 Proposed Road Plan

The proposed road plan seeks to fully utilize the existing road network in forming an adequate road network linking all the six growth centres and Bukit Tinggi to meet the future travel demand and capable of alleviating the forecasted future traffic problems.

In Kuala Lumpur, efforts will be required to strengthen the radial and circumferential roads and the construction of new roads linking the proposed new subcentres at Bandar Tun Razak, Wangsa Maju, Damansara and Bukit Jalil (Figure 15).

LEGEND

- Existing Expressway
- Proposed Expressway
- Existing Primary Distributor
- Proposed Primary Distributor
- Existing District Distributor
- Proposed District Distributor

Figure 15: Proposed Road Plan in Kuala Lumpur Conurbation, 2005

0 1 2 3 4 5 km

KLANG VALLEY TRANSPORTATION STUDY

In the Other Klang Valley Area, new roads are required to complete the road network in each respective urban centre with clear hierarchial functions.

The regional expressway network has to be further strengthened such as providing an alternative route along the vital Kuala Lumpur-Klang Corridor and linking up with the North-South National Grid (Figure 16).

The future road network for Klang Valley amounts to 1,226 km of roads excluding local distributors of which 205 km are expressways, 405 km are primary distributors (Table 14). A total of 408 km of new roads are proposed while 487 km of existing roads need to be widened (Table 15).

Table 14: Proposed Road Plan

Road Types	Length (km)	Road Areas (sq·km)
Expressway	205.7	13.2
Primary Distributor	405.1	17.5
District Distributor	615.2	18.5
Total	1226.0	49.2

Table 15: Road Construction and Improvenent Cost Estimates

	Length/Number	Construction Cost (M$million)
New Construction		
6-lane	54.6 km	657.2
4-lane	308.7 km	2,002.6
2-lane	44.8 km	125.8
Sub-total	408.1 km	2,785.6
Widening		
2-lane to 6-lane	34.9 km	106.1
2-lane to 4-lane	326.9 km	595.2
4-lane to 6-lane	116.6 km	297.7
Sub-total	478.4 km	999.0
Upgrading	14.5 km	9.6
Grade-Separation for Intersections and Railway Crossings	41 Nos	517.0
Total	901 km and 41 Nos	4,311.2

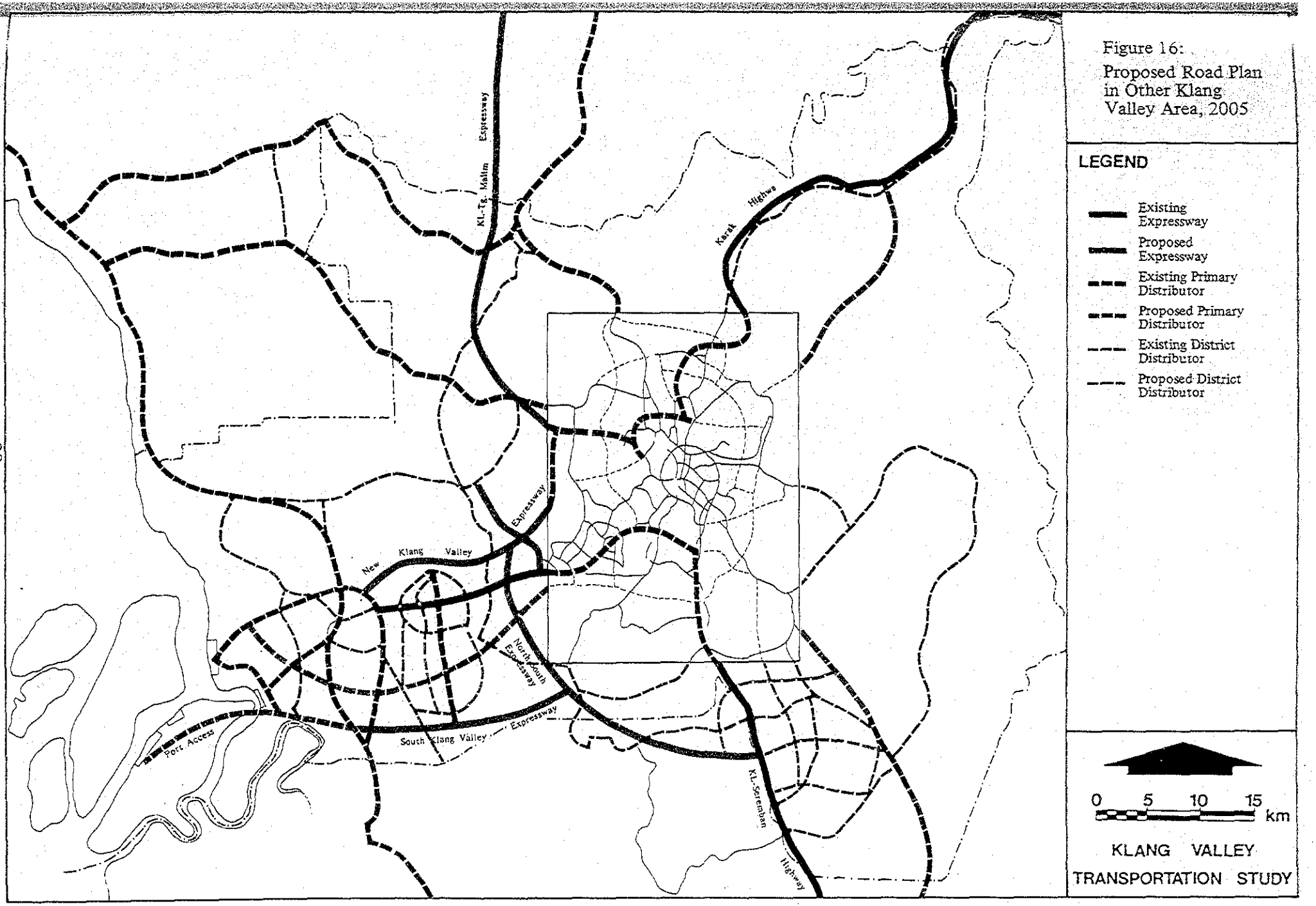


Figure 16:
Proposed Road Plan in Other Klang Valley Area, 2005

4.6 Traffic Management Measures

4.6.1 Traffic Restraint Programme

Urban development featuring multi-storeyed buildings has either been completed or in progress within the Middle Ring Road and especially within the Inner Ring Road. This outcome has resulted in inducing more traffic into the Central Area.

Application of traffic restraint measures to the CPA of Kuala Lumpur has been found to be economically feasible. The Study Team therefore proposes this measure as a possible traffic management option to be implemented if sufficient social and administrative support can be obtained.

This possible option will take the form of:-

* Motor car users with less than 4 persons in the vehicle would be charged for travelling into the Central Area within the Inner Ring Road in the morning peak hours but buses, emergency vehicles and motorcycles would be exempted from the charge. By the introduction of this scheme, traffic congestion on the major roads can be expected to reduce.

* The cordon charge is recommended at two(2) dollars per day or fifty(50) dollars per month levied by means of pre-purchased stickers which would be displayed on the vehicle windscreen.

* This would earn the Government a large amount of revenue with less initial costs.

* As supportive measures to the cordon pricing scheme the following measures are to be implemented simultaneously:-

  - Traffic surveillance and control system especially in the Central Area of Kuala Lumpur
  - Implementation of the MRT System, Phase I
  - Implementation of bus priority lanes in particular:
    - Jalan Pahang and Jalan Genting Klang
    - Jalan Cheras

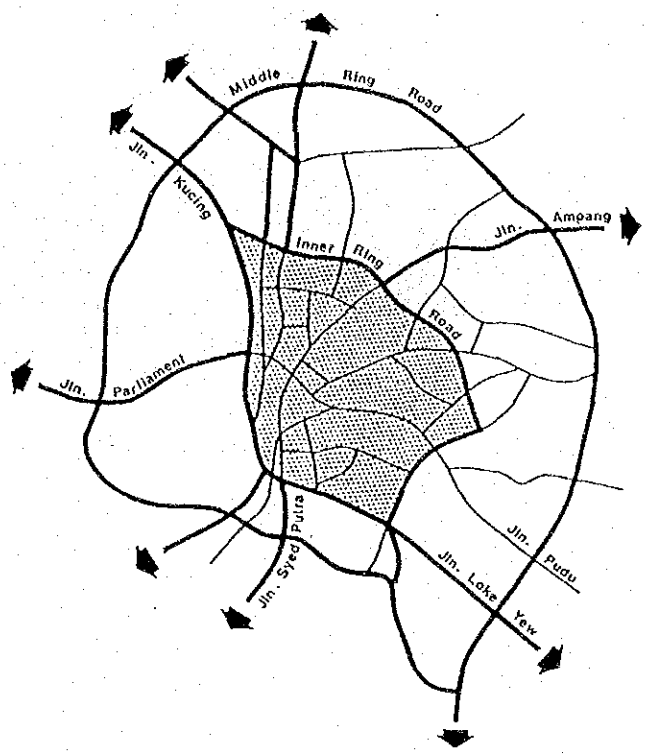


Figure 17 : Proposed Traffic Restraint Zone

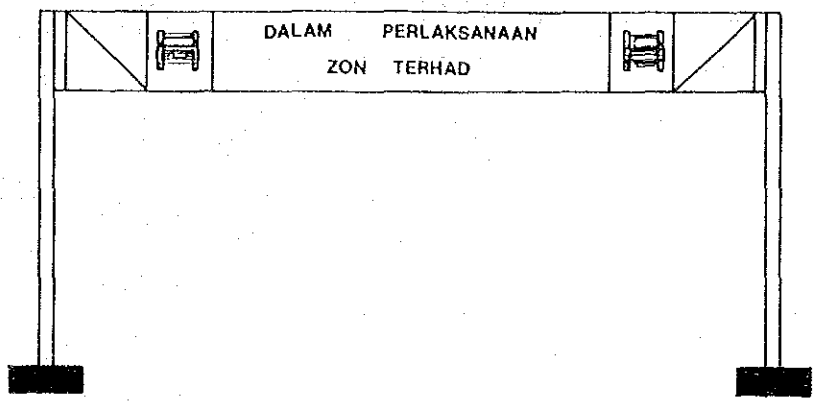


Figure 18 : Example of a Display Gate at Checkpoint to the Traffic Restraint Zone

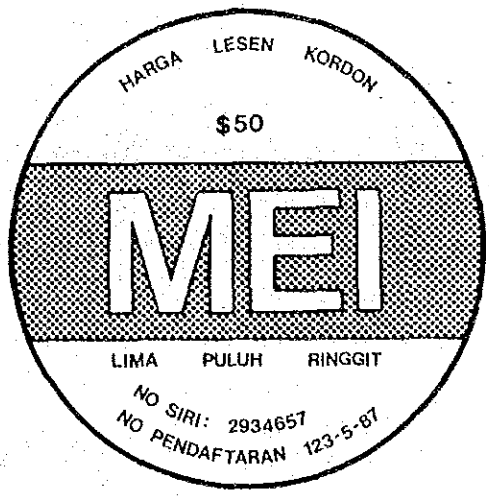


Figure 19 : Example of the Cordon Charge Sticker

4.6.2 Traffic Surveillance and Control System

A traffic surveillance and control system is proposed for the function of:-

(a) Traffic Surveillance for collecting data required in traffic management and monitoring the traffic for prompt first aid counter-measures.

(b) Central control and monitoring of traffic for special enforcement, detour implementations and incident detections.

(c) Traffic control with centrally controlled changeable message signs, radios and traffic signals.

Two systems are proposed, one covering the trunk road network within the Federal Territory and Federal Route II from Kuala Lumpur to Shah Alam and Airport route which is an advanced type of Freeway Surveillance and Control System (Figure 20). The other system covers the Kuala Lumpur Conurbation featuring the innovation of the existing Area Traffic Control System (Figure 21).

4.6.3 Parking Control in the CPA of Kuala Lumpur

Parking supply within the CPA should be strictly controlled and monitored if a more positive mode shift from the private modes to the public modes is to be effected in the future. This is to be in compatible with the traffic limitation measure and the mass transit system introduction proposal.

(1) Control of Parking Supply in the CPA

(2) Parking Charges Control covering Public as well as Private facilities

(3) Removal of On-street Parking along Major streets

(4) Enforcement on illegal parking operators as well as parkers

4.6.4 Pedestrian Facility Improvement

For Kuala Lumpur and the other urban centres in the Klang Valley, continuous effort should be made:

(1) To improve the pedestrian network system consisting of foot-paths, side walks, malls, grade-separated crossings and pedestrian decks; whereby this networks are carefully planned to connect major urban activity areas with transport terminals such as bus, MRT/LRT terminals.

(2) To provide pedestrian paths and network in residential areas or neighbourhoods connecting residential units to local urban centres and public transport terminals or bus-stop.

Locations of Vehicle Detectors

- Mainline detectors at 800 m spacing.
- On and off ramps
- Queue detectors on the off ramps where congestion recurrs

Locations of CCTV Cameras

- Recurrent congestion sites or road sections

Locations of Changeable Message Signs

- Upstream of interchanges where recurrent congestion takes place
- Upstream of accident prone sites
- Upstream of key interchange for route selection

Locations of Detectors

- Federal Route II between Pantai Baru interchange and University interchange

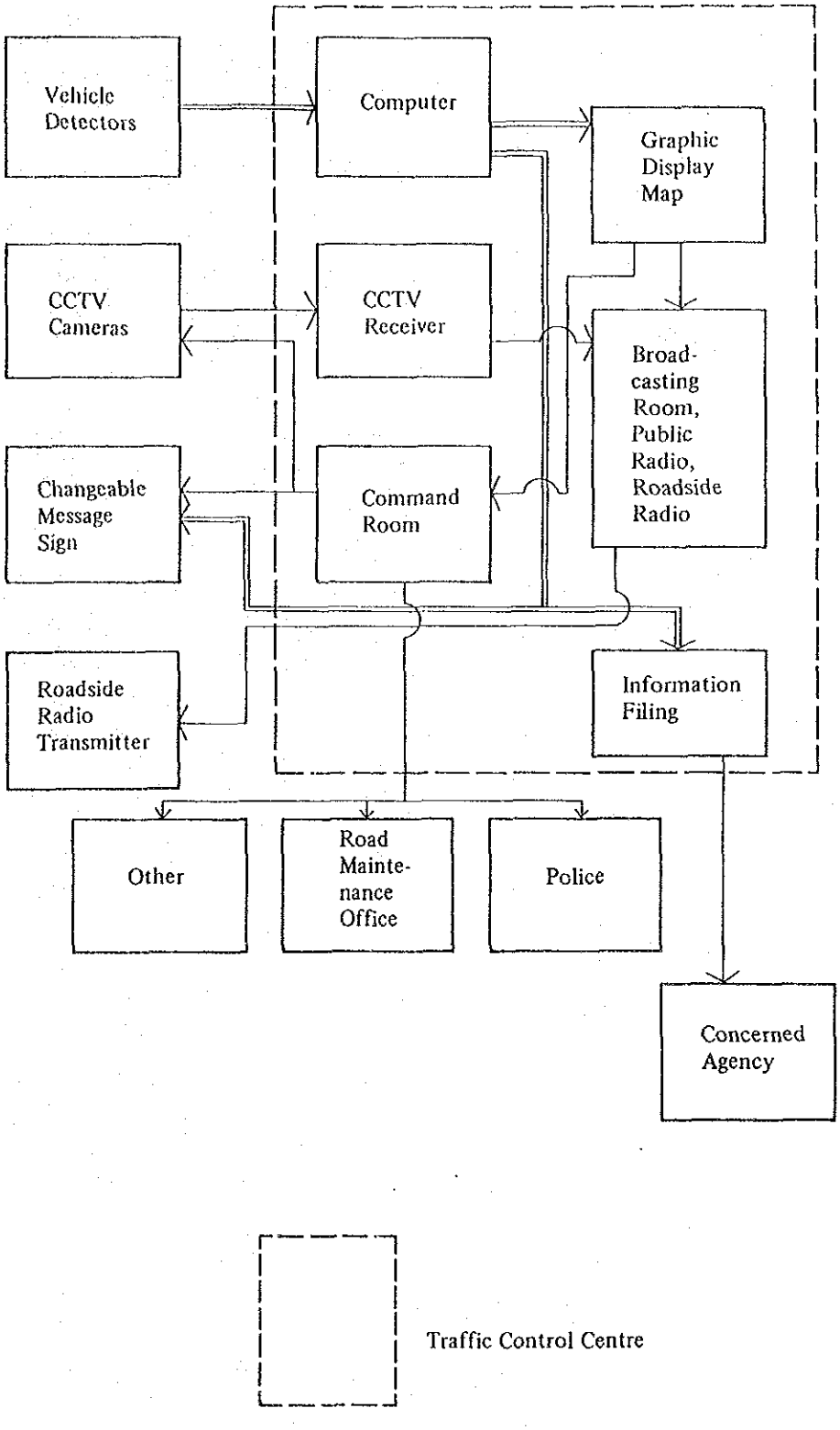


Figure 20 : All Illustration Showing the Flow of Functions and Activities of Expressway Traffic Surveillance and Control System

Locations of Roadside Radio

* Major Arterial Links
* Approaches to critical intersections

Locations of CCTV Cameras

* Critical intersections or sites where congestion recurrs

Locations of Changeable Message Signs

* Before the critical intersections where route selection is possible

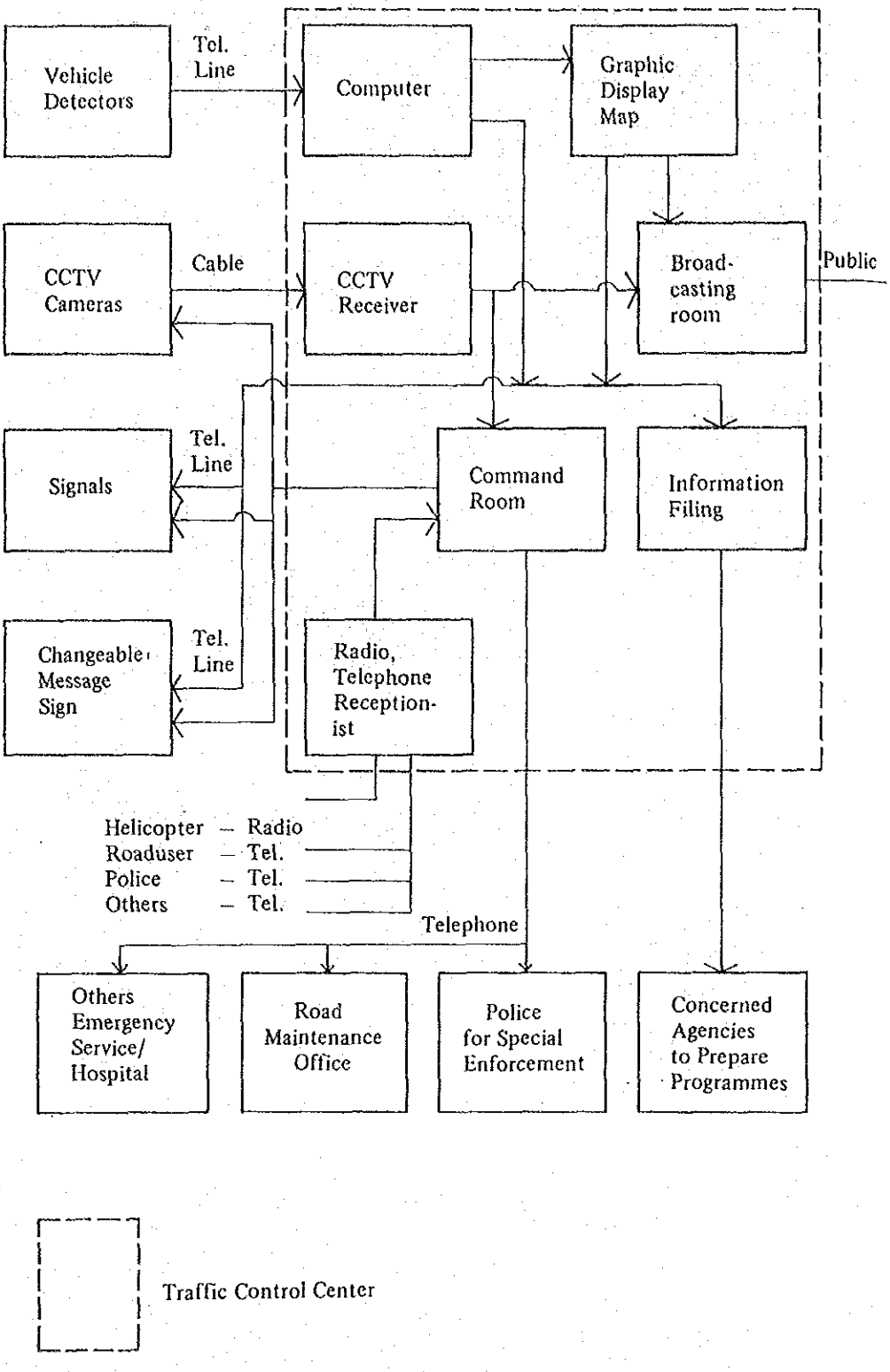


Figure 21 : An Illustration Showing the Flow of Functions and Activities of Kuala Lumpur Traffic Surveillance and Control System

4.7 Transport Terminals

(1) Bus Terminal

(a) Two new inter-state bus terminals be constructed at the fringe areas to the north and south of Kuala Lumpur

* The New North Terminal is to accommodate north and east bound inter-state buses which are to be shifted from the existing Puduraya, Pekeliling and Medan Tuanku Terminals.

* The New South Terminal is to operate south bound inter-state buses which are to be shifted from Puduraya Terminal.

The possible sites are Sentul (an advantageous site with the proposed New Klang Valley Expressway) for the New North Terminal and the Pudu MRT Station proposed in this Study for the New South Terminal (Figure 22).

(b) The existing two terminals at Puduraya and Pekeliling be converted to exclusive intra-state bus use. Congestions in and around the Puduraya Terminal will therefore be mitigated.

(c) Construction of four intra-state bus terminals in providing efficient bus service between the CBD of Kuala Lumpur and the proposed sub-centres district not covered by the MRT service in particular the planned Wangsa Maju New Sub-Centre. Other locations are Bukit Tinggi, Bandar Tun Razak and Bukit Jalil.

(d) Local bus centres be developed at the proposed MRT stations for the effective usage of these two public transport modes. The major MRT stations to be provided with such bus passenger facilities are Petaling Jaya, Shah Alam, Klang, Kepong, Selayang, and Bangi New Town.

(2) Freight Terminals

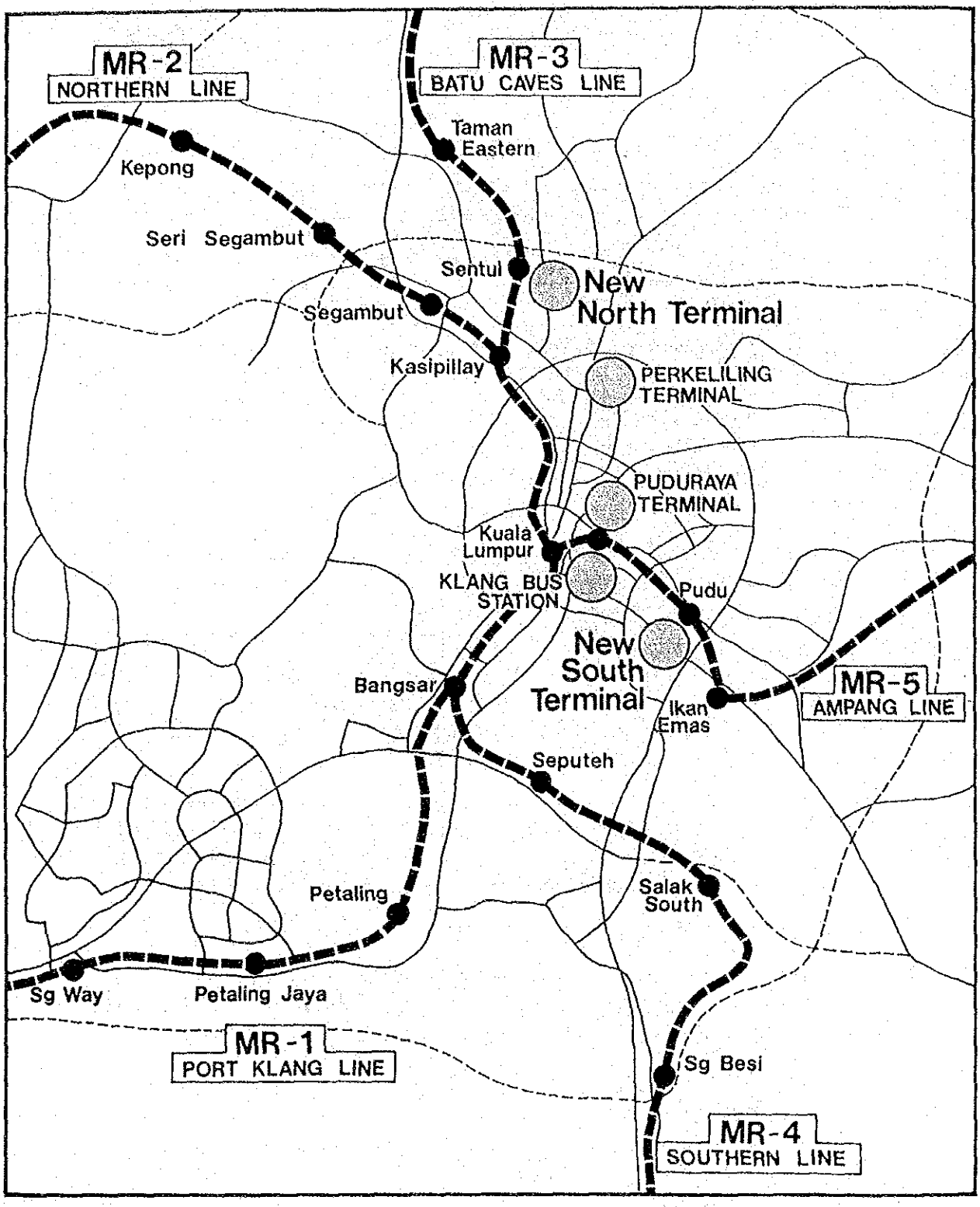
Although there is a container terminal in Sungei Way, a marshalling yard of KTM and some garages of lorry operators in the Klang Valley, these facilities are inadequate to meet the expected demand for goods transport.

(a) Two(2) truck terminals be constructed at the outskirts to the north and south of Kuala Lumpur.

* The site of a disused tin mine along Jalan Ipoh for the North Freight Terminal

* A location in Sungei Besi near the access to Seremban Highway for the South Freight Terminal (Figure 23).

(b) A multi-mode freight terminal be constructed at Port Klang.



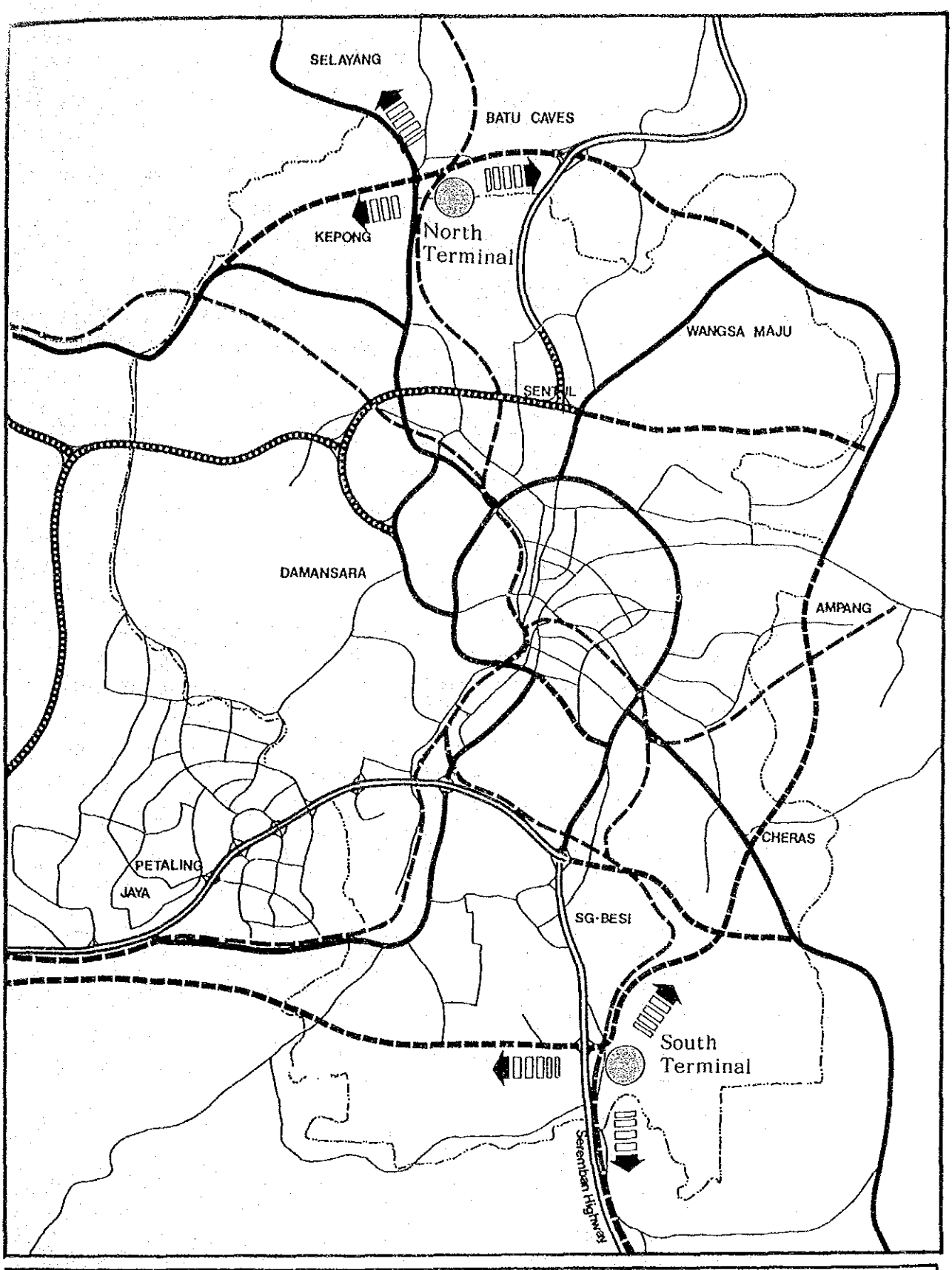
LEGEND

- PROPOSED NEW BUS TERMINAL
- EXISTING BUS TERMINAL
- PROPOSED MRT LINES
- EXISTING ROAD
- PROPOSED HIGHWAY

Figure 22:
Proposed Inter-State Bus Terminals Location in Kuala Lumpur Conurbation

0 1 2 3 4 5 km

KLANG VALLEY TRANSPORTATION STUDY



LEGEND

- Existing Expressway
- Proposed Expressway
- Existing Major Road
- Proposed Major Road
- Railway
- Proposed Freight Terminals

Figure 23: Proposed Location of Freight Terminals in Kuala Lumpur Conurbation

0 1 2 3 4 5 km

KLANG VALLEY TRANSPORTATION STUDY

4.8 Land Readjustment (Kukaku-seri) as an approach for Infrastructure Improvement

The pilot study has indicated that land readjustment technique is a feasible approach for infrastructure development in the Klang Valley.

It is proposed that areas with small individual plots, the Malay Reserve Area that need urban infrastructure improvement especially access roads which fall within the proposed urban areas be examined for the possible application of Kukaku-seiri.

(a) Set up a task force with participation from:-

* Selangor State Planning Unit
* Federal Department of Town and Country Planning
* Planning Unit in City Hall
* Klang Valley Planning Secretariat

with the specific function of:-

* Conduct a detailed feasibility study as a follow up study from the Pilot Study and possibly implement it as a Pilot Project.
* Identifying other possible areas for land readjustment for the improvement of urban infrastructure
* Further promoting the social acceptance of the concept of Kukaku-seiri among policy makers, planners as well as land owners
* Preparing replotting plans
* Implementing the plans

4.9 Follow-Up Studies

The Masterplan Study has recommended the development of various transport facilities in achieving a well balanced transport system for Klang Valley. The Study has accordingly identified some of these recommendations as priority projects on the basis of their urgency.

To ensure continuity and on-schedule implementations, feasibility studies and/or engineering studies should be carried without further delay on:-

(a) Public Transport Projects

(1) Feasibility and Engineering Study on Mass Rapid Transit Railway (MRT) System Introduction Project for Port Klang, Batu Caves and Kepong Lines.

(2) Study on Bus Transport Improvement Project in Kuala Lumpur Conurbation.

(b) Road Projects

(1) Feasibility Study on Middle Ring Road (II) Extension and Shah Alam Highway Project

(2) Feasibility Study on North-South Expressway Link Project

(c) Traffic Management Projects

(1) Study on Traffic Restraint Measure Introduction Project in Central Planning Area of Kuala Lumpur

(2) Feasibility and Engineering Study on Traffic Surveillance and Control System Project

(d) Transport Terminal Projects

(1) Feasibility Study on Freight Terminal Introduction Project

(2) Feasibility Study on Bus Terminal Relocation Project

(e) Urban Development Projects in Relation to Transportation Projects

(1) Study on Land Readjustment (Kukaku-seiri) Project

(2) Study on Urban Development and Landuse near MRT Stations

5. IMPLEMENTATION PROGRAMME AND INVESTMENT REQUIREMENTS

5.1 Total Investment Requirement

The transport projects proposed in the Masterplan are classified into the following:-

(a) Road and Intersection Projects
(b) Public Transport Projects
(c) Traffic Management Projects
(d) Other Transport Facilities Projects

The total investment required for realizing the above proposed projects by the year 2005 is estimated to be approximately M$6,692.0 million as shown in Table 16. Road and intersection projects make up a predominant share of about 65% of the total requirement or M$4,311.2 million.

A higher priority in implementation is given to projects particularly the improvement on radial roads in Kuala Lumpur which are effective in mitigating the existing heavy traffic congestion areas with relatively low cost.

Public transport projects will require an investment of about M$1,862.5 million, 75% of which will be for the development of the proposed Mass Rapid Transit (MRT) System.

The MRT project will commence with developing lines connecting the high population density areas namely the Central Area of Kuala Lumpur, Petaling Jaya, Shah Alam, Sentul and Kepong.

Efforts to improve the bus transport services and facilities will be continuously carried out incorporating with the improvement works on other transport modes, particularly the MRT system.

Traffic management projects preferably to be implemented in short and medium terms require only M$74.0 million in total. It is recommended to start these projects as early as possible, since they are highly effective in reducing traffic in the most congested area and in managing the main traffic flows.

Projects on other transport facilities including transport terminals will require about M$444.3 million, a large portion of which is to be borne by the private sector.

In accordance with the proposed implementation scheduling, the total investment requirement is estimated to be M$790.0 million for Phase I (1988-1990), M$1,892.8 million for Phase II (1991-1995) and M$4,009.2 million for Phase III (1996-2005).

Table 16: Total Transport Investment Requirement in Klang Valley to Year 2005

Projects	Project Cost (M$million)
1. Road Projects	
1.1 Expressways and Primary Roads	2,342.0
1.2 Distributor Roads	1,452.2
1.3 Interchanges and Grade Separation	517.0
Sub-total	4,311.2
2. Public Transport Projects	
2.1 Mass Rapid Transit (MRT)	1,384.0
2.2 Improvement of Bus Facilities	24.9
2.3 Bus Depots	15.0
2.4 Buses and Equipment	438.6
Sub-total	1,862.5
3. Traffic Management Projects	
3.1 Traffic Surveillance and Control System	72.0
3.2 Cordon Pricing	2.0
Sub-total	74.0
4. Other Transport Facilities Projects	
4.1 Bus Terminals	68.6
4.2 Freight Terminals	53.2
4.3 Pedestrian Facilities	104.0
4.4 Parking Facilities	218.5
Sub-total	444.3
TOTAL	6,692.0

5.2 Implementation Programme for Road Projects

Major projects scheduled in Phase I (1988-1990) are:-

(1) Widening of Federal Route I from Kepong to Selayang,

(2) Construction of the eastern part of Middle Ring Road II,

(3) Widening of Jalan Ampang, Genting Klang, Jalan Gombak and part of Jalan Ipoh,

(4) Construction of East-West Link and improvement of Jalan Cheras

and together with the related interchange improvements.

In early 1990's several capital intensive projects will follow:-

(1) Construction of northern part of Middle Ring Road II
(2) Extension of Middle Ring Road II
(3) Shah Alam Highway
(4) North-South Expressway Link and others

(Refer to Figures 24 and 25).

Road projects scheduled for the period beyond 1995 are also shown in Figures 24 and 25.

The investment requirement for road projects is estimated at M$298.0 million for Phase I (1988-1990), M$1,091.1 million for Phase II (1991-1995) and M$2,922.1 million for Phase III (1996-2005).

5.3 Implementation Programme for Public Transport Projects

As for the MRT System, Taman Eastern-Shah Alam line and Kepong-Kuala Lumpur line are recommended to be implemented in Phase I. In Phase II, Ampang Line, Subang Airport Line and the extensions from Shah Alam to Port Klang and from Taman Eastern to Selayang are scheduled.

In accordance with the commencement of MRT system, reorganization of bus routes will be required so as to promote the effective usage of MRT system.

Bus lanes will be introduced for Jalan Genting Klang and Jalan Cheras when their widening projects are completed in Phase I.

The improvement of bus facilities comprising mainly of bus shelters should be implemented continuously throughout the planning period. Construction of two bus depot is scheduled in Phase I and one in Phase II. In addition, replacement for old buses and additional purchase of new buses should also be continuously carried out during the planning period.

The public transport projects will require an investment of M$360.3 million, M$609.8 million and M$892.4 million for the three phases respectively.

5.4 Traffic Management Projects

The proposed traffic Surveillance and Control System is preferably to be implemented in Phase I and the Cordon pricing on private car users entering the area within the Inner Ring Road could be started in Phase I if desirable by the authorities. The installation of traffic control devices is scheduled for Phase II. The investment requirement for traffic management projects is M$38.0 million for Phase I and M$36.0 million for Phase II.

5.5 Other Transport Facilities

The first stage of inter-state bus terminal projects in Kuala Lumpur is to be implemented in Phase II.

LEGEND

- Proposed New Road Construction
- Proposed Road Improvement } (Phase I 1988-1990)
- Proposed New Road Construction
- Proposed Road Improvement } (Phase II 1991-1995)
- Proposed New Road Construction
- Proposed Road Improvement } (Phase III 1996-2005)
- Proposed MRT Phase I
- Proposed MRT Phase II
- Proposed MRT Phase III
- Existing Roads

Figure 24
Proposed Road Construction and Improvement and MRT System by Phase in Kuala Lumpur Conurbation

0 1 2 3 4 5 km

KLANG VALLEY TRANSPORTATION STUDY

The proposed intra-state bus terminals at Wangsa Maju should be constructed in Phase I, followed by the terminals at Bandar Tun Abdul Razak and Bukit Jalil in Phase II and the Bukit Tinggi Terminal in Phase III.

The implementation of freight terminal projects in Kuala Lumpur is to be undertaken in Phase I.

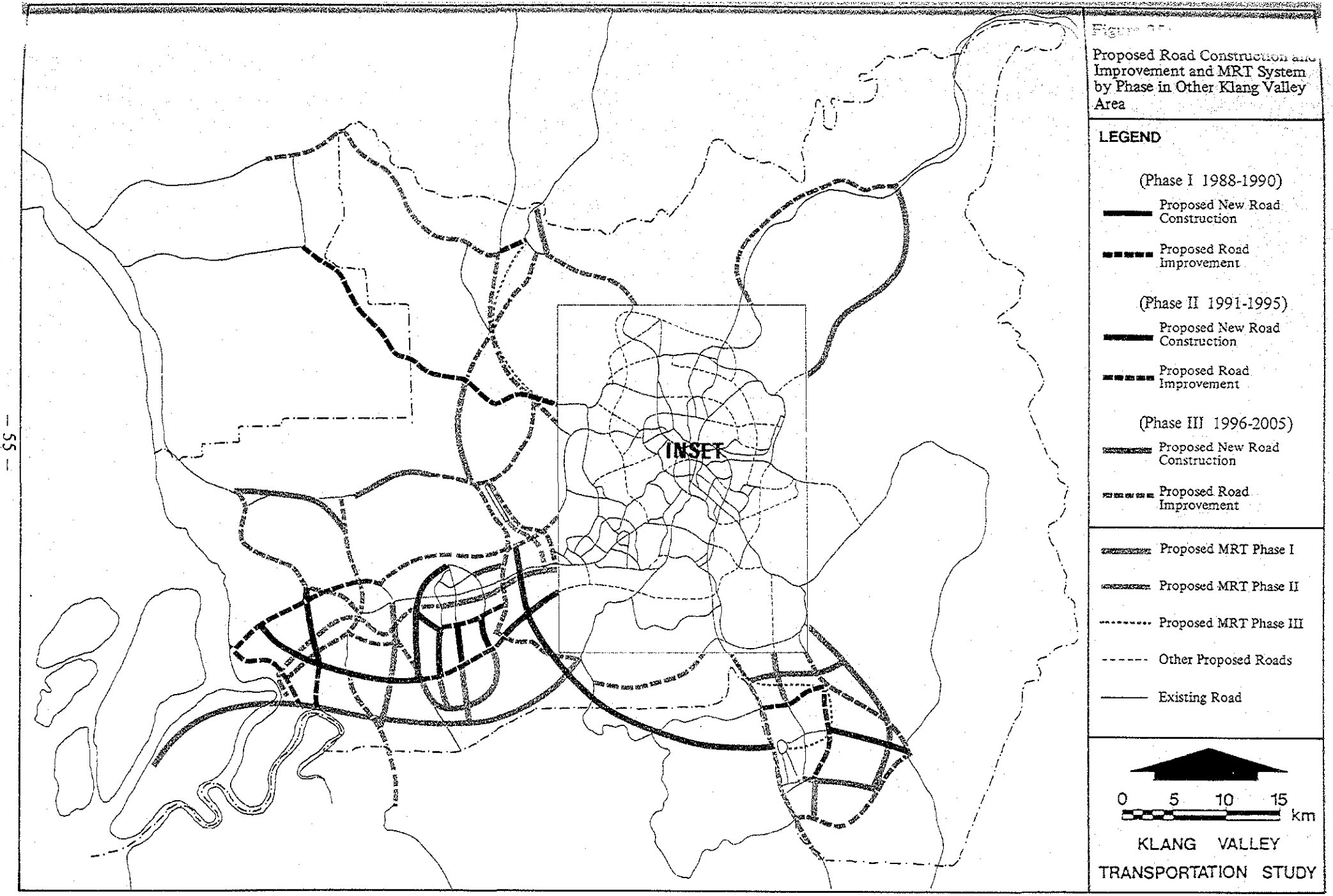
Pedestrian facilities comprising mainly of bridges, foot path and pedestrian mall will be developed steadily and gradually starting with some selected points at the central area of Kuala Lumpur, commercial zones in the sub-centres and major streets where pedestrians are expected to congregate.

Off-street parking facilities will also be developed in the central area of Kuala Lumpur continuously till the year 2005 and in conjunction with the cordon pricing scheme if the latter is implemented.

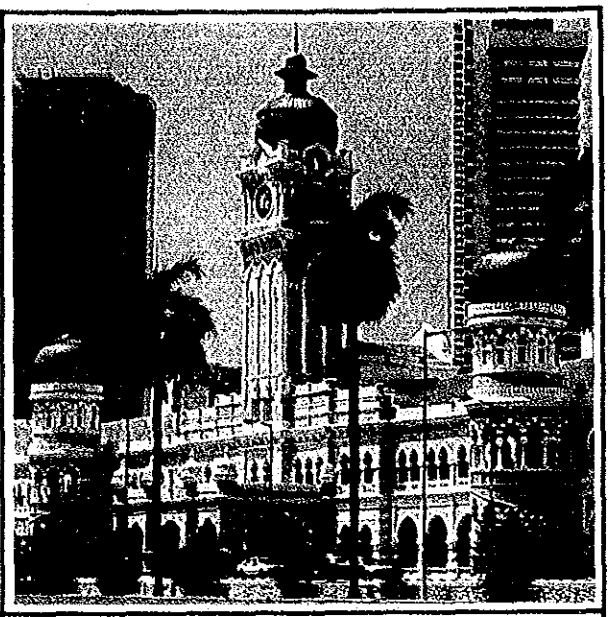
The investment requirement for these transport facilities development is estimated to be M$93.7 million for Phase I, M$155.9 million for Phase II and M$194.7 million for Phase III.

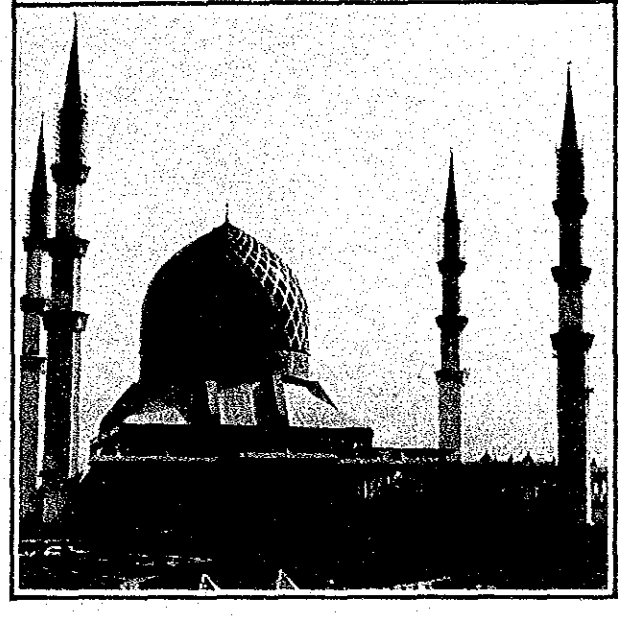
Table 17: Investment Requirement by Phase

Projects	Project Cost (M$million) Phase I 1988-'90	Phase II 1991-'95	Phase III 1996-2005
Road Projects			
1) Expressway and Primary Roads	221.1	786.0	1,334.9
2) Distributor Roads	32.9	166.6	1,252.7
3) Interchanges and Grade-Separation	44.0	138.5	334.5
Sub-total	298.0	1,091.1	2,922.1
Public Transport Projects			
1) Mass Rapid Transit (MRT)	310.0	478.0	596.0
2) Improvement of Bus Facilities	4.2	6.9	13.8
3) Bus Depots	10.0	5.0	–
4) Buses and Equipment	36.1	119.9	282.6
Sub-total	360.3	609.8	892.4
Traffic Management Projects			
1) Cordon Pricing	2.0	–	–
2) Traffic Surveillance and Control System	36.0	36.0	–
Sub-total	38.0	36.0	–
Other Transport Facilities Projects			
1) Inter-State Bus Terminals	–	48.5	7.1
2) Intra-State Bus Terminals	2.9	6.7	3.4
3) Freight Terminals	30.4	–	22.8
4) Pedestrian Facilities	24.0	40.0	40.0
5) Parking Facilities	36.4	60.7	121.4
Sub-total	93.7	155.9	194.7
Total	790.0	1,892.8	4,009.2

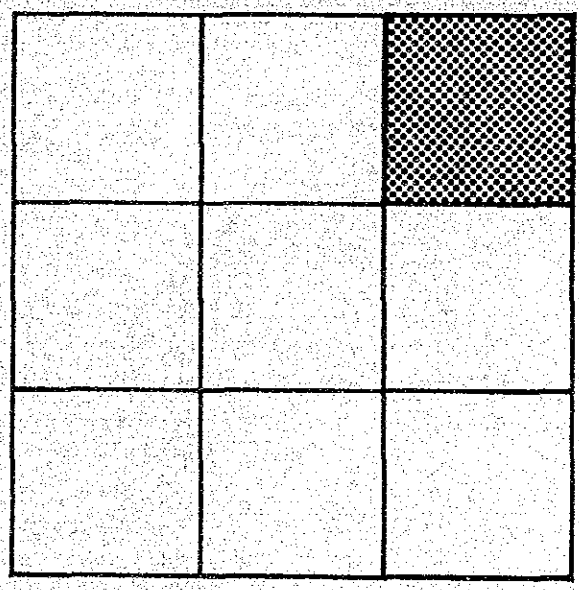


Proposed Road Construction and Improvement and MRT System by Phase in Other Klang Valley Area





MAIN VOLUME



CHAPTER 1 : DEVELOPMENT CONTEXT

1. DEVELOPMENT CONTEXT

1.1 Historical Perspective

The Klang Valley Region, originally a low lying river valley basin of the Klang River in the State of Selangor on the west coast of Peninsular Malaysia first emerged as an important region as far back as 1890 where Kuala Lumpur was made the capital of the Federated Malay States. Tin mining and later rubber plantation industries encouraged the agglomeration of trade, services and labour. The growth in turn supported the development and extension of basic infrastructures especially road and rail transport which fanned out from the capital to link up the other areas and hinterland.

The region that now encompasses the national capital of Kuala Lumpur, the new Selangor State capital of Shah Alam, Petaling Jaya, Port Klang, the new towns of Bangi and Selayang is the hub of the national economy, the focus of modernisation and industrialisation, the seat of political arena, the focal point of transportation and the destination of many rural-urban migrants.

By 1970, all the major roads in the Peninsular converged at Kuala Lumpur. In addition, the region is bestowed with Port Klang which is the largest port in the Peninsular and the Subang International Airport. These transport facilities helped in increasing the region's advantage as a centre for trade, industries and transport.

Urban and population growth in this region is the most rapid in the country. The population in Kuala Lumpur itself has increased from 175,000 in 1947 to 977,000 by 1980. Even the township of Petaling Jaya has a population of some 250,000 by 1980. The whole region is estimated to have a total population of slightly more than 2 million in 1980.

As a centre for trade and the national capital, Kuala Lumpur commands the largest expansion of the tertiary sector in the country. Banking, finance, utilities and other services are important catalysts for investment and industrial development. The closeness to port, airport, rail terminals, administration and the availability of services, infrastructure, land and labour have altogether made the Klang Valley a region ideal for industrial and urban growth. By 1982, 30.7% of the total major manufacturing industries in the country were located in the Klang Valley.

In 1980, the Klang Valley Region alone contributed 38.9% of the GDP in Peninsular Malaysia. Per Capita GDP was $3,648.5, 1.9 times higher than the national Per Capita GDP figure of $1,908.2.

In 1980, 82.4% of the region's total population lived in urban areas. It has an employment level of 889,200 in 1980, representing some 22% to the total employment in Peninsular Malaysia. Out of these 37% were in the service sector and 24% in the manufacturing industry.

The rapid growth of urban population, employment and services have induced a corresponding growth in demand for travel.

Urban traffic volume thus increased many folds and traffic problems became acute year after year especially along the major commuting corridors of Kuala Lumpur-Petaling Jaya, Kuala Lumpur-Selayang, Kuala Lumpur-Ampang and Kuala Lumpur-Cheras. The construction of the two national highways: the Federal Route-1 and Federal Route-2 together with the Kuala Lumpur-Seremban and Karak Highway have further helped in making Kuala Lumpur the focus of north-south and east-west traffic in the Peninsular. Public transport remained poor and confined to only the bus mode while passenger car ownership increased many times over. It was estimated that about 50% of the urban households in 1978 owns at least one car.

1.2 Klang Valley Today

1.2.1 Landuse

Out of the total land area of 284,217 ha in the Klang Valley, 38.8% is still under forest vegetation, 46.4% under agriculture (and unused land), 3% under mining and 11.8% urban land uses.

Table 1.1 shows the breakdown of landuse types in Klang Valley and by districts. In Kuala Lumpur the urban built-up area constitutes 58.5% of the total city area while agriculture still represents 34.1%.

Of the total forest area in Klang Valley, 35% and 34.4% are in Gombak and Hulu Langat Districts respectively. The bulk of the agriculture land is found in Hulu Langat and Klang Districts representing 53.8% of the total agricultural land in Klang Valley. The existing landuse distribution pattern can be seen in Figure 1.1.

Table 1.1 : Existing Landuse Pattern By District In The Klang Valley

District		Forest, Swamp	Agriculture Unused	Mining	Urban/ Built-up	Total Area	Share to Total Klang Valley
Kuala Lumpur	ha	62	8986	1735	13457	24240	8.5
	%	0.2	34.1	6.8	58.9	100.0	
Gombak	ha	38726	21085	1763	3744	65318	23.0
	%	59.3	32.3	2.7	5.7	100.0	
Hulu Langat	ha	37973	39159	1832	3980	82944	29.2
	%	45.8	47.2	2.2	4.8	100.0	
Petaling	ha	14491	31094	3352	7860	56797	20.0
	%	25.5	54.8	5.9	13.8	100.0	
Klang	ha	19011	32184	0	3723	54918	19.3
	%	34.6	58.6	0	6.8	100.0	
Klang Valley	ha	110263	132508	8682	32764	284217	100.0
	%	38.8	46.4	3.0	11.8	100.0	

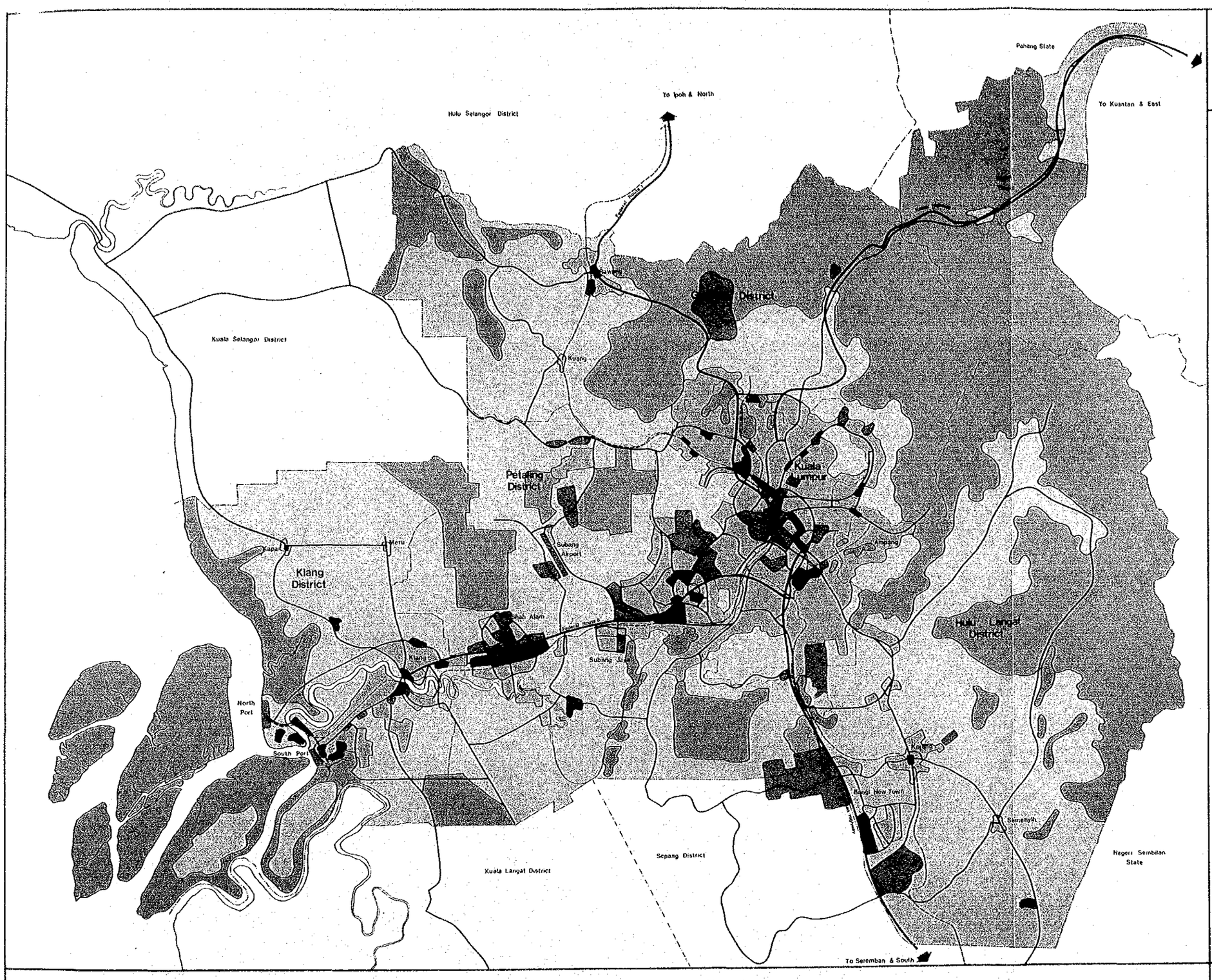
Source : 1. Kuala Lumpur Structure Plan
2. Klang Structure Plan
3. Klang Valley Perspective Plan

1.2.2 Population

There were a total of 2.02 million people residing in Klang Valley in 1980. Using the results of the sampled Home Interview Survey (H.I.S.) conducted in May 1985, the total population in Klang Valley is estimated to have grown to 2.53 million by 1985.

In terms of the distribution in 1985 (see Table 1.2), 47.9% is concentrated in the Federal Territory of Kuala Lumpur and 19.4% in Petaling District. Comparing with 1980, the present distribution shows a slight dispersal from Kuala Lumpur to the other districts. Except for Klang, the other districts recorded an increase in their percentage share of population.

Population in Kuala Lumpur has increased to 1.22 million from 0.98 million in 1980 (See Table 1.3). Petaling Jaya and Klang have increased their population to 260,000 and 247,000 respectively while Shah Alam and Bangi are growing fairly rapidly to achieve the planned target population.



KLANG VALLEY TRANSPORTATION STUDY

LEGEND

- Residential
- Commercial
- Industrial
- Institutional
- Recreation
- Mining
- Nature Reserve
- Agricultural
- Expressway
- Major Distributor
- Railway
- Klang Valley Boundary
- District Boundary
- State Boundary

0 1 2 5 10 15 Km

Figure 1 . 1 **EXISTING LANDUSE IN 1985**

Table 1.2 : Existing Population Distribution Pattern By District In Klang Valley

District	1) 1980	2) 1985
Federal Territory of Kuala Lumpur	997,000 (49.4)	1,215,000 (47.9)
Gombak	176,000 (8.7)	243,000 (9.6)
Hulu Langat	188,000 (9.3)	240,000 (9.5)
Petaling	382,000 (18.9)	491,000 (19.4)
Klang	274,000 (13.7)	345,000 (13.6)
Total Klang Valley	2,020,000 (100.0)	2,534,000 (100.0)

Source : 1) National Census, 1980.
2) H.I.S. 1985

Note : Figures in ( ) are % share to total Klang Valley.

Table 1.3 : Existing Urban Population Distribution By Major Centres In Klang Valley

Urban Centres	1980	1985
Kuala Lumpur	997,000	1,215,000
Petaling Jaya	220,000	260,000
Klang	203,000	247,000
Shah Alam 1)	20,000	52,000
Selayang 2)	14,000	17,000
Bangi 3)	33,000	65,000

Note : 1) Municipal Area of Shah Alam.
2) Includes Selayang Baru and Bandar Baru Selayang.
3) Local Authority Area of Bangi.

Household size in the Klang Valley is found to be 4.8 persons/household in 1985. Comparing with those over the last decade, the household size has become smaller from 5.7 in 1970 and 5.0 in 1980.

By age group, 64.4% of the present Klang Valley population is in the active 15 to 64 age group while 18.5% is in the primary school going age group of 6 to 14. The present Klang Valley age group composition has not changed from that in 1980.

Table 1.4 : Existing Age Group Composition

Age Group	1) 1980	2) 1985
0 – 5	290,000 (14.4%)	363,000 (14.3%)
6 – 14	373,000 (18.5%)	468,000 (64.4%)
15 – 64	1,300,000 (64.3%)	1,632,000 (64.4%)
65 +	57,000 (2.8%)	71,000 (2.8%)

Source : 1) Department of Statistics
2) H.I.S. Survey 1985

The existing Klang Valley population is made up of 45.3% Chinese population, 39.7% Malay population and 15.0% Indian and Others. Comparing with 1980, there is an increase in the percentage share of Malay population while the other groups declined.

Table 1.5 : Existing Ethnic Composition

Ethnic Group	1) 1980	2) 1985
Malay	753,200 (37.3%)	1,005,700 (39.7%)
Chinese	941,400 (46.6%)	1,147,700 (45.3%)
Indian and Others	325,400 (16.1%)	380,600 (15.0%)
Total	2,020,000 (100.0%)	2,534,300 (100.0%)

Source : 1) Klang Valley Perspective Plan
2) H.I.S. Survey 1985

1.2.3 Economic Base

Klang Valley has been the leading growth region in the country particularly in terms of manufacturing output. Though there is no specific data for Klang Valley Region per se, data for the Federal Territory together with those for Selangor State do reflect a large extent the economy structure of Klang Valley.

Out of the total Gross Regional Product (GRP) for Federal Territory and Selangor of M$17,839 million in 1985, 26.5% is contributed by the manufacturing sector followed by 21.0% sales, 12.5% government services, 10.9% finance and business (see Table 1.6). The percentage share of GRP of the region thus reflects the economic importance of manufacturing and the tertiary sector in the region. Manufacturing output for 1985 for example represents 41.6% of the total Malaysia's manufacturing output.

The economic structure for the region has also changed over the last decade with a declining primary sector and growing secondary and tertiary sectors.

Table 1.6 : Percentage Share Of GRP By Sector For Federal Territory And Selangor

Sector	1) 1980	1) 1983	2) 1985
Agriculture, Forestry and Fishing	6.8	6.4	5.6
Mining and Quarrying	2.4	2.2	4.1
Manufacturing	26.5	23.9	26.5
Construction	5.5	6.4	5.7
Utilities	2.7	3.2	1.9
Transport, Storage and Communications	9.4	11.6	8.3
Wholesale and Retail Trade Hotels and Restaurants	20.8	20.2	21.0
Finance, Insurance, Real	9.8	9.3	10.9
Estate and Business Services, Government Services	11.6	12.8	12.5
Other Services	4.3	4.0	3.5
Total	100.0	100.0	100.0

Source : 1) Mid-Term Review of Fifth Malaysia Plan
2) Fifth Malaysia Plan

1.2.4 Employment

Total employment in the Klang Valley in 1985 is estimated at 950,000 based on the H.I.S. survey. This gives an increase of 190,000 from 1980 (Table 1.7).

Table 1.7 : Existing Employment By Industry For Klang Valley

Industry	1) 1980 '000	1980 %	2) 1985 '000	1985 %
Primary	56.6	7.4	46.3	4.9
Secondary	230.2	30.3	269.3	28.3
Tertiary	473.2	62.3	634.4	66.8
Total	760.0	100.0	950.0	100.0

Source : 1) Department of Statistics
2) H.I.S. Survey

By industry, 66.8% of the employment is in the tertiary sector, 28.3% in the secondary sector. Over the last five years, employment for the primary industry has declined both in real number and share.

1.2.5 Income

The 1985 mean monthly household income in Klang Valley is estimated at M$1383 based on the results of the H.I.S. Survey.

Table 1.8 : Mean Monthly Household Income In Klang Valley

Year		Mean Monthly Income	Annual Growth Rate (%)
1970	1)	560	–
1980	2)	1175	7.7
1985	3)	1383	3.3

Source : 1) Klang Valley Review, 1979
2) H.I.S. Survey, 1985

1.3 Regional Planning Efforts and Outcomes

Given the rapid growth and importance of Klang Valley Region, much effort has been shown in the area of regional planning and transportation studies.

The 1973 Klang Valley Regional Development Study (KVS) proposed specific population target for the regional centres advocating a dispersal strategy. By 1979, the strategy was not successfully implemented and this was confirmed by the Klang Valley Review (KVR) in 1979. Population still continued to concentrate at the established centres and the targets set by KVS were far exceeded and it was found mainly due to the lack of effective planning implementation for the Klang Valley. These outcomes have directly led to the establishment of a more autonomous regional planning body for Klang Valley.

Although transportation studies have been conducted for the individual urban centres in Klang Valley notably Kuala Lumpur, there is no regional transport plan for the region.

The Klang Valley Planning Council with its planning unit has since proposed a Klang Valley Regional Perspective Plan in 1984 that outlined the regional policies and strategies to ensure more effective implementation in dispersing and coordinating development in the region. It is with this regional development context that a comprehensive regional transportation masterplan is commissioned. Figure 1.2 shows the summary of the past planning efforts and outcomes for the region.

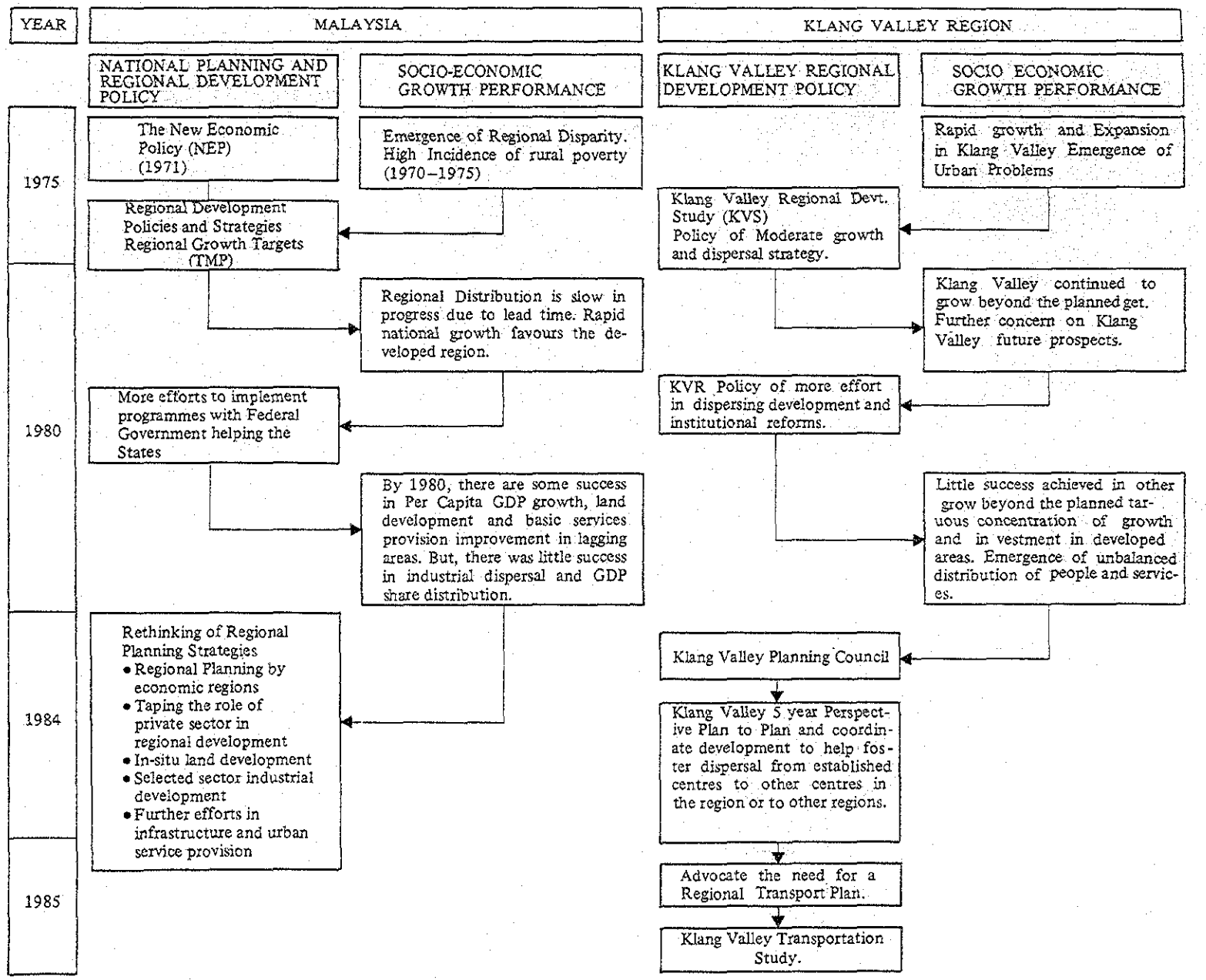
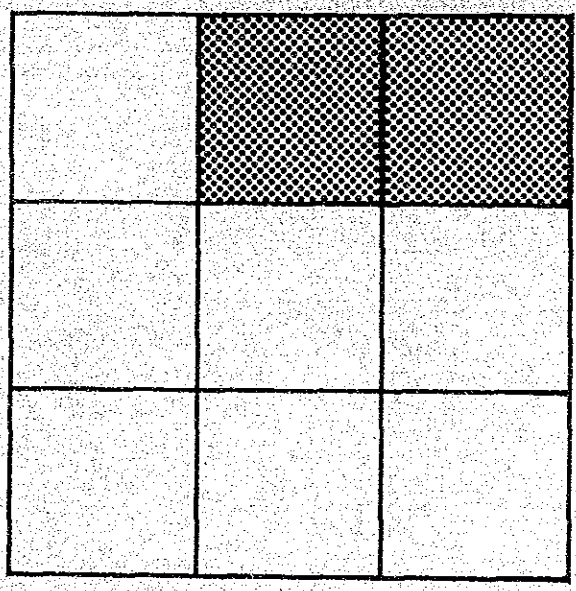


Figure 1.2 : Summary Chart of Regional Development Policy and Progress in Malaysia and Klang Valley



CHAPTER 2 : EXISTING TRANSPORT CHARACTERISTICS

2. EXISTING TRANSPORT CHARACTERISTICS

2.1 Traffic Surveys Conducted

For the purpose of formulating the long term plan, a Home Interview Person Trip Survey (HIS) was conducted for Klang Valley to provide the basic transport data for the analysis of detailed travel pattern as well as the future traffic demand projection.

In addition to the HIS, a Lorry Owner Interview Freight Traffic Survey (OIS) was also conducted for collecting the freight traffic data essential for the freight transport planning and future transport facilities planning.

A Screen Line and Cordon Line Interview Survey was also conducted for collecting cross-sectional traffic data in the Study Area and external to internal traffic volume. Information collected by the interview in the Cordon Line Survey regarding the travellers' origin and destination also served as supplementary data to the HIS. A summary of the various surveys, their scales and durations are shown in Table 2.1.

Table 2.1 : Scale And Duration Of The Various Traffic Surveys

Type of Traffic Surveys	Actual Sample Rate	Actual Sample Size	Period of Survey
Home Interview Person Trip Survey (HIS)	4.8%	25,311 Households	20th March to 4th May, 1985
Lorry Owner Interview Survey (OIS)	10.1%	6,724 Lorry Owners	12th April to 18th May, 1985
Cordon Line Interview Survey (CIS)	20.9%	23,086 Motor Vehicle at 9 Survey Points	1st April to 11th April, 1985
Screen Line Survey (SLS)	–	Traffic Counting at 61 Survey Points	16th January to 28th March, 1985

(1) Home Interview Person Trip Survey (HIS)

The Home Interview Person Trip Survey involved visiting some 25,000 or 5% of the total household in the Klang Valley and recording their household members' (aged 6 years and above) travel movement within a particular working day.

The return rate for the H.I.S. was good. Out of 25,311 households sampled at the beginning of the survey, 24,663 households were interviewed at a rate of 97.0%. The interviewed household is some 4.7% of the total 1985 households estimated for Klang Valley.

(2) Lorry Owner Interview Freight Traffic Survey (OIS)
The Home Interview Person Trip Survey (HIS) was conducted to provide the basic person travel pattern whereas the Lorry Owner Interview Freight Traffic Survey (OIS) was conducted to obtain information for the freight transport planning and future transport facilities planning.

Out of a total of 9,295 lorries/vans sampled at the beginning of the survey, 6,724 samples were interviewed at a rate of 72.0%. The highest rate of 82.0% was obtained for Gombak while the lowest rate of 48.0% was for Klang district.

(3) Cordon Line Interview Survey (CLS)
This road side interview survey was conducted by stopping selected vehicles for a short interview with the driver. The purpose of this survey is to get the origin and destination pattern of the vehicles crossing the Klang Valley boundary which could not be determined from the Home Interview Person Trip Survey.

From the traffic count survey results, seven points with a daily traffic volume above 3,000 vehicles were established for the Cordon Line Interview Survey. In addition, this interview was carried out at two other points located at the access roads to Klang North Port and the Subang International Airport.

(4) Screen Line Traffic Count Survey
The purpose of this survey is to obtain the existing traffic volume on the Screen Lines. The Screen Line data is used to adjust the results of the Home Interview Survey and to analyse the existing traffic conditions.

The traffic counting was carried out at a total of seventy (70) survey points including nine (9) Cordon Line stations. Thirty two of them were located on the Screen Line established in and outside the Federal Territory boundary.

The vehicle occupancy rate was also obtained in this survey by observing and recording the number of passengers on board and the seating capacity of the sample vehicles chosen at random. This information is used to convert vehicular traffic volume into passenger traffic volume.

(5) Bus Transport Survey
Besides the four (4) major traffic surveys described above, supplementary surveys on bus transport were carried out.

A Bus Occupancy Survey was conducted along major bus routes to determine the bus occupancy rates.

A Bus Company Survey was conducted on twelve (12) major stage bus companies and two (2) minibus companies to find out the existing bus operational system, performance and problems.

A Bus User's Survey was also carried out by interviewing about 2,000 bus users at sixteen (16) selected bus stands/terminals to collect information on bus users' trip characteristics and general opinion on bus services.

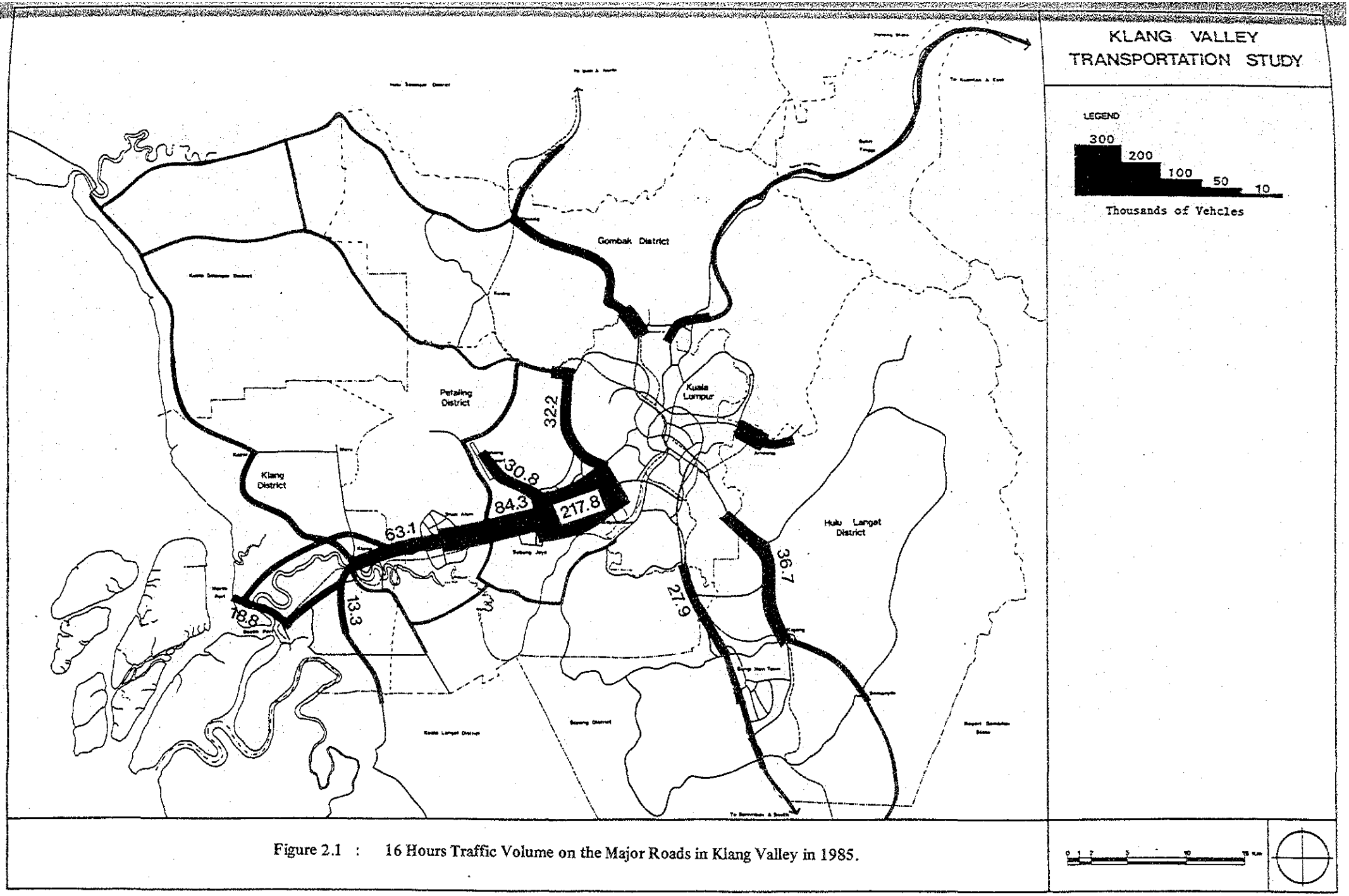


Figure 2.1 : 16 Hours Traffic Volume on the Major Roads in Klang Valley in 1985.

A Bus Ridership Survey was conducted over eight (8) major bus routes to find out the average bus loading pattern and bus travel time/speed. The average bus travel speed was found to be 24.2 kph.

Lastly, a Bus Terminal Survey was conducted from 20th October to 24th October, 1986 covering the survey of Puduraya, Klang and Pekeliling Bus Terminals in Kuala Lumpur. The surveys enumerated the utility rate of the terminals by type of buses and directions and the average berth time. Long distance taxis were also enumerated at these terminals.

(6) Parking and Travel Attitude Surveys

A small scale sample survey on parking in Kuala Lumpur was conducted from 16th June to 5th July, 1986 covering twenty three (23) parking locations in the city. The survey is aimed at collecting data on the existing parking capacity, parking characteristics such as parking duration, parking charges, type of parking vehicles, utilization rate of parking facilities, etc. The survey covers both public and private car parks in buildings, open space as on-street parking.

A Travel Attitude Survey was also conducted in finding out the "attitude" of travellers along the major corridor of Kuala Lumpur-Petaling Jaya-Shah Alam-Klang. A total of 1118 persons were successfully interviewed for their opinion on travel modes, mode shift, etc. The result of this survey was helpful in gauging the extent of mode shift that can be expected in future when for example an innovative mass transit mode or cordon pricing scheme is introduced.

2.2 Transportation System in Klang Valley

Road transport is the major transport means in Klang Valley besides rail transport which is confined only to freight transport in the region.

Public transport in Klang Valley is road-based namely bus and taxi. At present, there is no rail-based public transport for travel within the region.

2.2.1 Road Transport

The road network configuration in the Study Area consists of four (4) major expressways radiating from Kuala Lumpur. The Federal Route I running from north west to south east, the Federal Highway from Klang in the west to Kuala Lumpur, the Karak Highway connecting Kuala Lumpur to the East Coast through north east and the Kuala Lumpur-Seremban Highway to the south.

Road networks within Kuala Lumpur Conurbation and Klang Municipality consist of radial and ring roads while those in Shah Alam and Bangi are grid-pattern roads. The total existing road length (of major roads) in the Klang Valley is about 833 km. Of these, 150 km are expressways, 211 km are primary distributors, 388 km are district distributors with the remaining 84 km as local distributors.

By 1984, the total number of private cars and motorcycles registered in the Federal Territory and Selangor State are 402,000 and 469,900 vehicles respectively. The results of the H.I.S. Survey show that about 48% of the population has access to private cars and 28.3% to motorcycles.

The high vehicular ownership hence produced a very high private vehicle traffic volume. The highest of which is 217,800 vehicles/day on the Federal Highway between Kuala Lumpur and Petaling Jaya. The traffic volumes on the two ring roads in Kuala Lumpur carry as high as 90,000 PCU/day while the major radial roads carry 50,000 to 60,000 PCU/day.

2.2.2 Public Transport

Public transport modes in the Klang Valley consist of bus (stage, express, mini, factory, school, excursion), taxi, hire car, hire and drive car, limousine taxi and railway. Among these modes, the bus is by far the most important existing mode of public transportation.

(1) Bus transport

Currently, in the Klang Valley, 12 stage bus companies operate a total of 1,141 buses along 257 routes totalling 4,567 km. Intraregional express bus service is provided by 5 companies operating 39 buses along 5 routes, while inter-regional express bus service is provided by 58 companies which operate 505 buses along 71 routes. 490 minibuses serve the Kuala Lumpur Conurbation only.

The pattern of all bus services in the Kuala Lumpur Conurbation is radial with downtown Kuala Lumpur as the focal point. Exceptions are downtown linked routes of Sri Jaya Kenderaan Sdn. Bhd. (SJK) and its local services within Petaling Jaya.

The pattern of bus routes making up the public transport system has been built up over time in response to the travel demands from the residents of the expanding urban centres in Klang Valley. The development of the route pattern and area of coverage of the stage bus companies and of the minibus operators has been subject to the regulatory decisions of the Road Transport Licensing Board and the Ministry of Transport.

(a) Stage Bus Services

Stage bus services in Klang Valley are provided by twelve bus companies. Two companies operate local services exclusively in Kuala Lumpur and one company operates local services exclusively in Kajang area. The other nine companies provide both local and inter-urban bus services. The route coverage for stage bus services is shown in Figures 2.3 and 2.4.

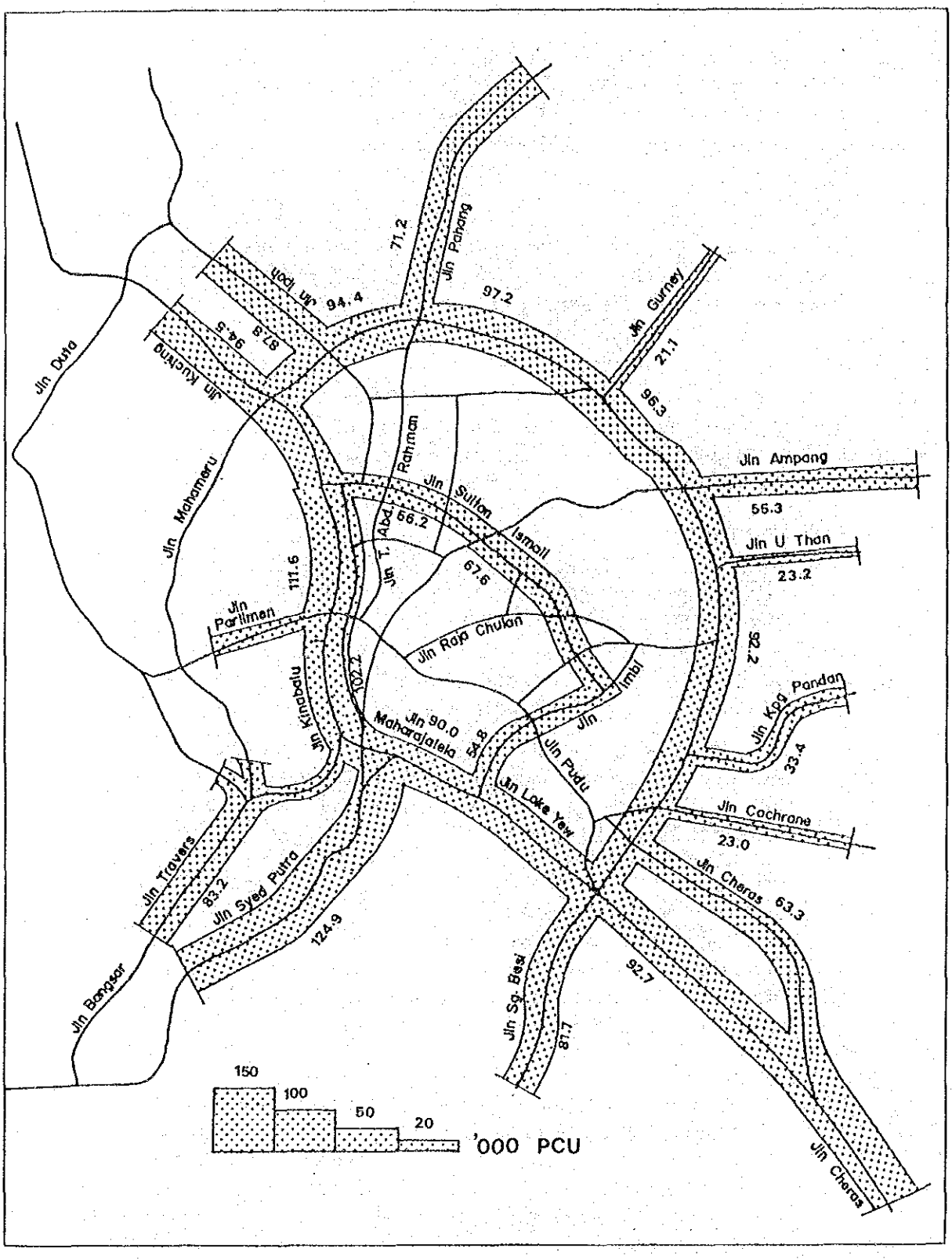


Figure 2.2 : Daily Traffic Volume In PCU In The CPA Area Of Kuala Lumpur

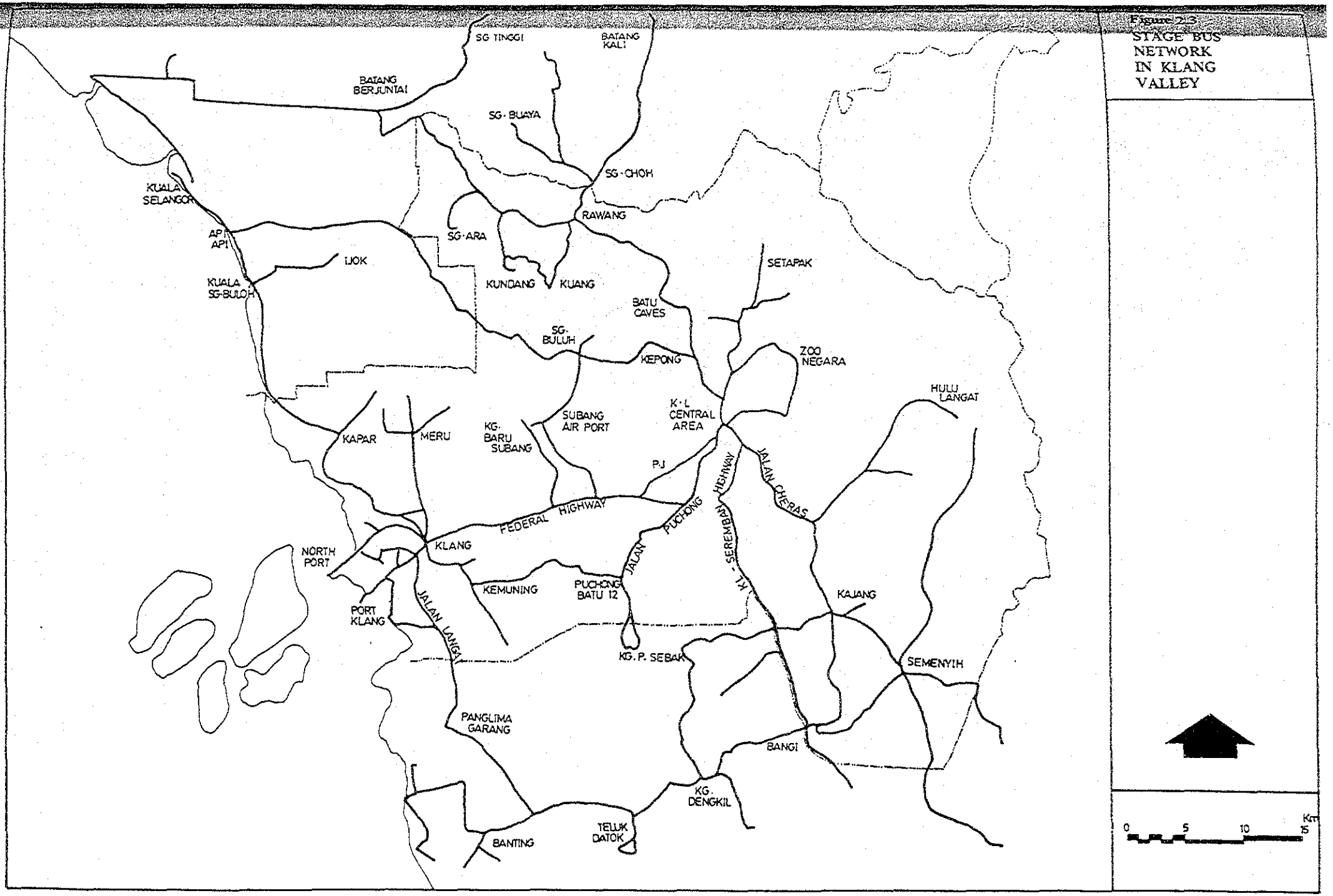


Figure 2.3
STAGE BUS NETWORK IN KLANG VALLEY

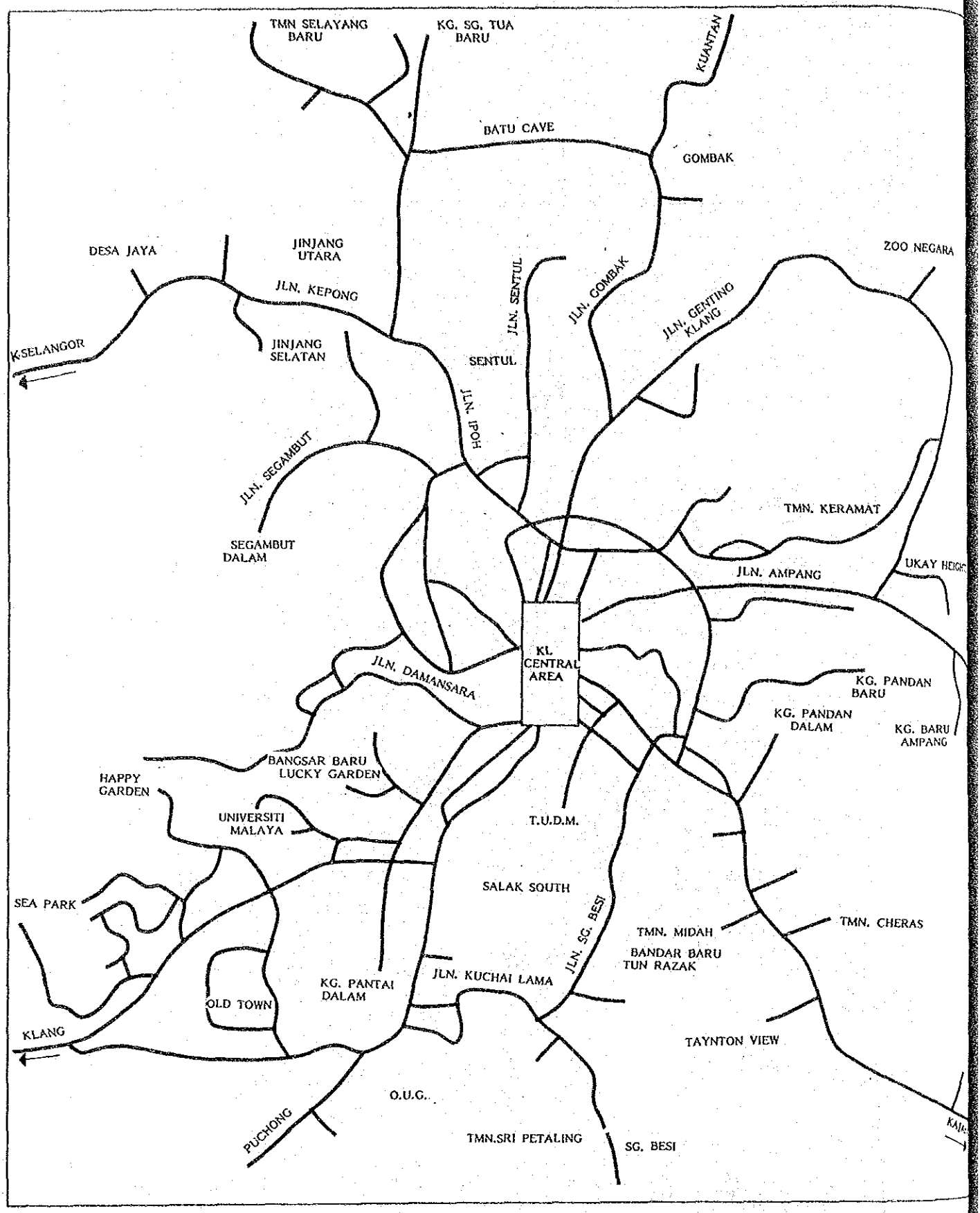


Figure 2.4 : Stage Bus Route Network For Kuala Lumpur And Petaling Jaya

(b) Minibus Services

Minibuses began operation during mid-1975 and by mid-1978 there were 400 minibuses operating in the Kuala Lumpur Conurbation. This total remained the maximum number permitted by the Road Transport Licensing Board until 1984 when 90 new permits were issued. Before 1984, the 400 licenses were held by 167 licence holders, of whom 102 held only one licence, 58 held between 2 and 5 licenses and 7 cooperations held between 7 and 35 minibus licenses, 56 licence holders, most of them holding only one licence.

The original minibus system of Kuala Lumpur was designed as 17 linked-radial routes all passing through downtown. The original concept has been drastically altered. Today, most routes operate on one leg over routes similar to the stage bus network and terminate in the Central Business District. The present minibus route coverage is shown in Figure 2.5.

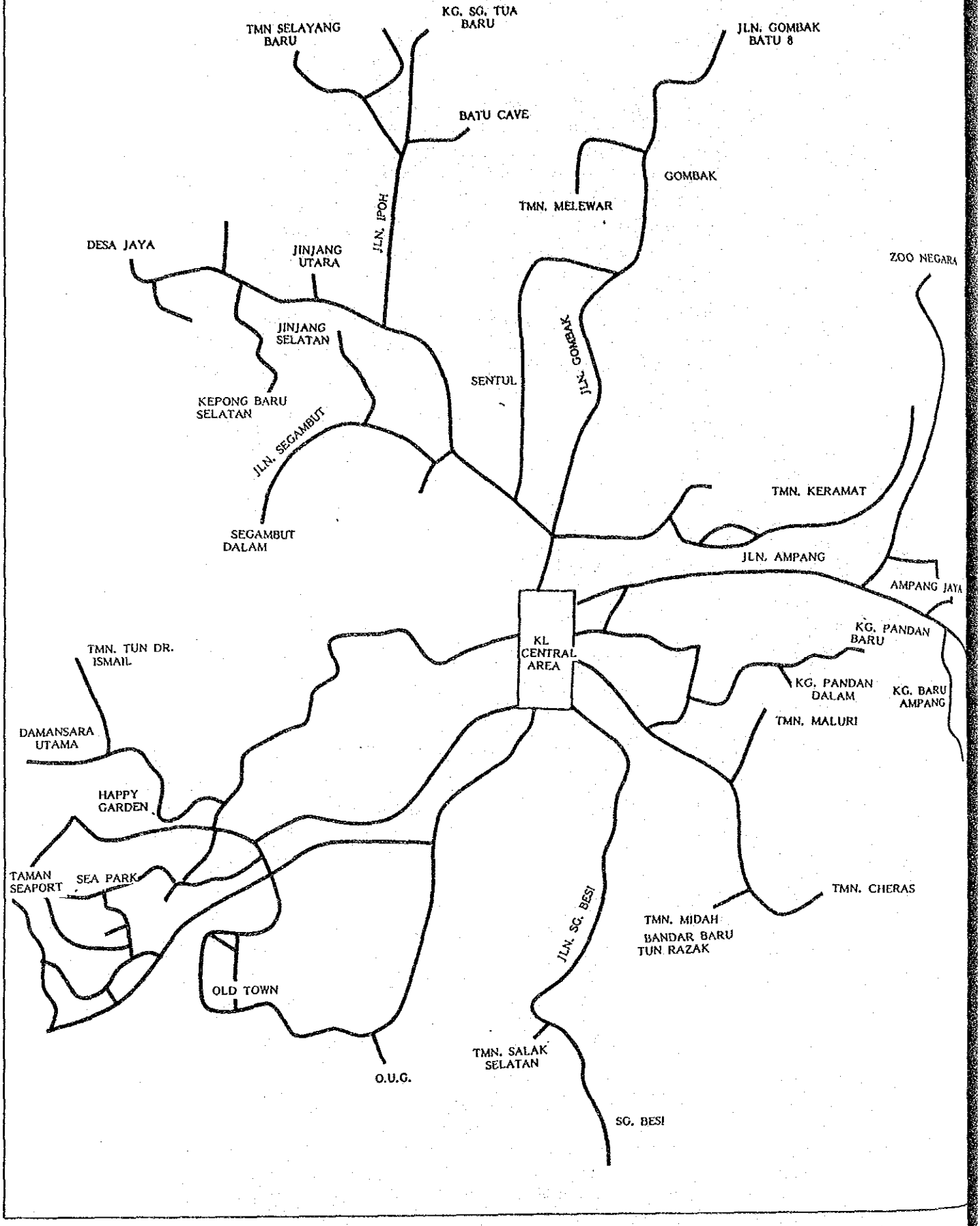


Figure 2.5 : Minibus Route Network In Kuala Lumpur Conurbation

(c) School and Factory Bus Services

As of June 1985, there are a total of 851 school and 152 factory buses registered with the Road Transport Department.

95.5% of the school buses belong to individual owners. Of the total 47.1% operate in Kuala Lumpur, 19.3% in Klang District followed by 16.5% in Petaling District.

For the factory buses, 88.2% are owned by individuals, 9.2% by bus companies and only 2.6% by factories. Of the total, 51.3% operate in the Klang District followed by 18.4% in Petaling District and 13.8% in Kuala Lumpur.

(d) Government Service Bus

A special bus shuttle service to government complexes was started in 1984 to reduce time loss in transfer time by public sector employees. This special service has been popular and in 1984, 32,000 persons were transported daily by this service in the Kuala Lumpur and Petaling Jaya areas.

(2) Taxi and Hire Cars

There are 5,928 taxis registered in Kuala Lumpur, 64 taxis in Gombak District, 480 taxis in Petaling District, 333 hire cars in Klang and 146 hire cars in Hulu Langat, i.e. a total of 6,951 taxis and hire cars operating in the Klang Valley Region in 1984.

By the ratio of taxis per 1,000 population in these districts, Kuala Lumpur head the list with 4.88 taxis/1000 pp, followed by 0.96 in Klang District, 0.9 in Petaling District, 0.63 in Hulu Langat District and 0.26 in Gombak District. Except for Gombak District, all the other districts have favourable taxi service level as compared to Penang State which only has a ratio of 0.58.

(3) Rail Transport

There are 12 passenger trains daily on the north-south line catering mainly for the long distance travellers. An average of 20 cargo trains are operating on the main north-south line; 10 trains on the Kuala Lumpur-Klang line; 16 trains on the Kuala Lumpur-Ampang line and 2 trains on the Kuala Lumpur-Sentul line. Since 1981, the total number of passengers handled at all stations in the Klang Valley has gradually declined by 2.7% annually but the total volume of cargo handled has shown an annual increase of 4.7%.

2.2.3 Other Transport Modes

(1) Air Transport

The traffic volume handled by the Subang International Airport for the period 1974 to 1984 showed an annual growth rate of 20.4% for international passengers, 6.0% for domestic passengers, 15.6% for international mail, 10.7% for domestic mail, 25.5% for international cargo and 5.1% for domestic cargo. The annual throughputs in 1984 consisted of 2.3 million international passengers, 1.8 million domestic passengers, 1.18 million kilo international mail, 4.51 million kilo domestic mail, 51.57 million kilo international cargo and 8.66 million kilo domestic cargo.

(2) Sea Transport

The Klang Port total throughputs in 1984 amounted to 8.8 million tonnes which consisted of 61% imports and 39% exports. During the period 1978 to 1984, both import and export throughputs fluctuated but the overall growth rates had been 8.4% per annum for imports and 2.8% per annum for exports.

The trend towards containerisation is indicated in the sustained rise in container throughput, 2.1 million tonnes (240,682 TEUs) went by containers in 1984 compared to 1.7 million tonnes (193,460 TEUs) in the previous year. The annual growth rate from 1978 to 1984 was 13.6%.

2.3 Transport Demand Characteristics

2.3.1 Passenger Travel Characteristics

(a) Travel Demands

(1) Travel Demands by Purpose

It is estimated from the Home Interview Survey (HIS) that in a typical working weekday in 1985 the total number of person trips made within the Klang Valley is 6,425,500 trips.

Trips to work form 14.6% of the total person trips made. Trips to school form another 10.6% and trips for private purpose and business purpose constitute 21.5% and 6.3% respectively. About 42.0% of the trip made are return to home trips.

Table 2.2 : Travel Demands By Trip Purpose, 1985

Purpose	No. of Person Trips/Day	%
To Work	936,500	14.6
To School	678,200	10.6
Business	402,900	6.3
Private	1,701,200	26.5
To Home	2,706,700	42.0
All Purpose	6,425,500	100.0

(2) Travel Demands by Mode

The mode choice of Klang Valley residents can be categorized into three (3) types of travel mode. The non-motorized mode represented by walk and bicycle contributes to 1,777,500 trips or 27.6% of the total number of person trip made. The private mode consisting of motor cycle, car and taxi contributes to 3,054,200 trips or 47.5% while the public mode serves by mini, stage, factory and school buses contributes to the remaining 24.9% share or 1,595,800 trips.

Table 2.3 : Travel Demands By Mode, 1985

Mode	Sub-Mode	No. of Person Trips/Day	% To Sub-total	% To Total
Non Motorized	Walk/ Bicycle	1,777,500	100.0	27.6
Private	Motor Cycle	884,200	28.9	13.8
	Car	2,060,400	67.5	12.1
	Taxi	109,600	3.6	1.6
	Sub-total	3,054,200	100.0	47.5
Public	Mini/Stage Bus	1,129,900	70.8	17.6
	Factory/ School Bus	465,900	29.2	7.3
	Sub-total	1,595,800	100.0	24.9
Total Person Trip		6,425,500	–	100.0

(3) Travel Demand by Purpose and Mode

Table 2.4 further shows the details of the travel demand by purpose and mode. The non-motorized mode is more commonly used for "private" and "to school" trips. The private mode is widely used for all trip purposes except "to school" trips. On the other hand the public mode is widely used by all trip purposes except for "business" trips.

Table 2.4 : Travel Demand By Purpose And Mode, 1985

Mode	To Work	To School	Business	Private	To Home	All Purpose
Non-motorized	158.5 (16.9%)	257.9 (38.1%)	28.8 (7.2%)	552.1 (32.5%)	778.2 (28.8%)	1775.5 (27.6%)
Private	539.1 (57.6%)	95.1 (14.0%)	348.3 (86.6%)	891.6 (52.4%)	1180.1 (43.6%)	3054.2 (47.5%)
Public	238.9 (25.5%)	325.2 (47.9%)	25.8 (6.2%)	257.5 (15.1%)	748.4 (27.6%)	1595.8 (24.9%)
Total	936.5 (100%)	678.2 (100%)	402.9 (100%)	1701.2 (100%)	2706.7 (100%)	6425.5 (100%)

Unit : 1000 Person Trips/Day
( ) % Composition by Mode

(b) Trip Production Rate

The trip production rate as of 1985 is estimated to be 3.255 trips per day per person of 6 years and above. The average percentage of the population who make at least one trip a day is 88%. The correlationship of trip production rate and socio-economic characteristics of the people such as sex, age, employment status, household income level, vehicle availability for the general population and characteristics such as industry type and scale of establishment for the employed population is shown in Figure 2.6. Trip production rate is found to correlate very well with employment status and vehicle availability.

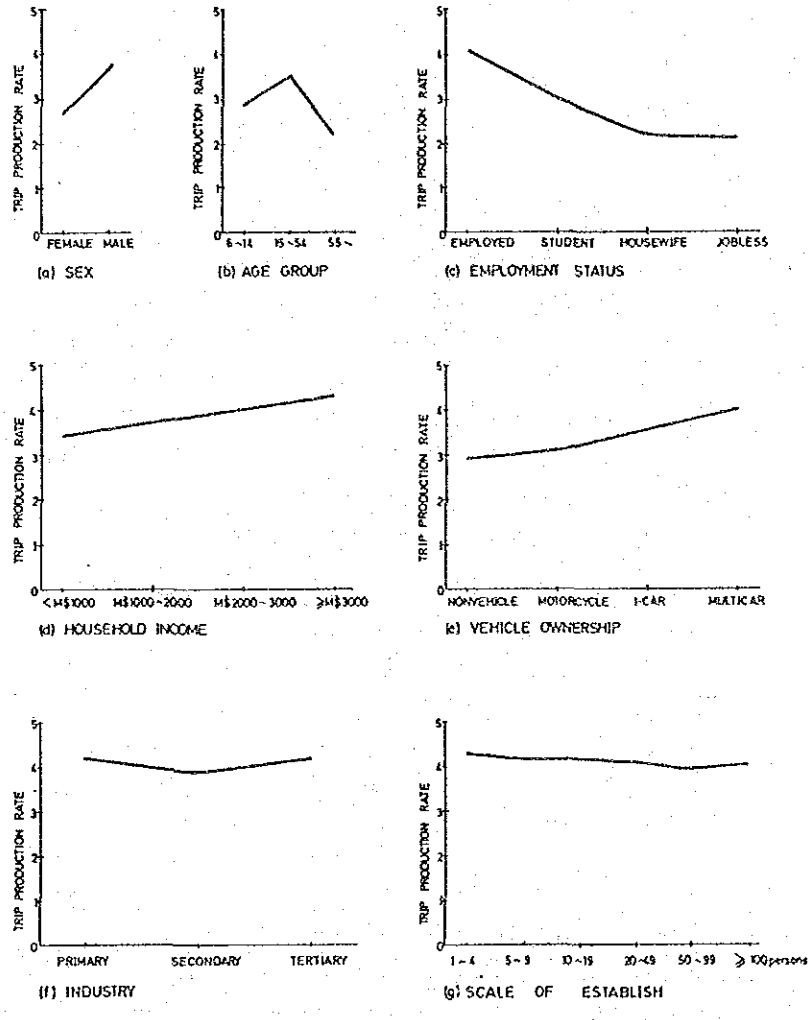


Figure 2.6 : Correlation Of Socio-Economic Characteristics And Trip Production Rate

(c) Temporal Fluctuation Of Traffic Demand

The temporal fluctuation of travel demands in Klang Valley region shows three peaks, i.e. the first or morning peak which occurs during 6.00 a.m. to 8.00 a.m., the second or afternoon peak during 12.00 noon to 2.00 p.m. and the third or evening peak during 4.00 p.m. to 8.00 p.m. The morning peak is mainly due to trips to work and to school. The afternoon peak is mainly due to trips made by the morning session students returning to

home, the afternoon session students going to school and trips for private purposes. The evening peak consists of mainly return to home trips and some trips for private purposes (Figure 2.7).

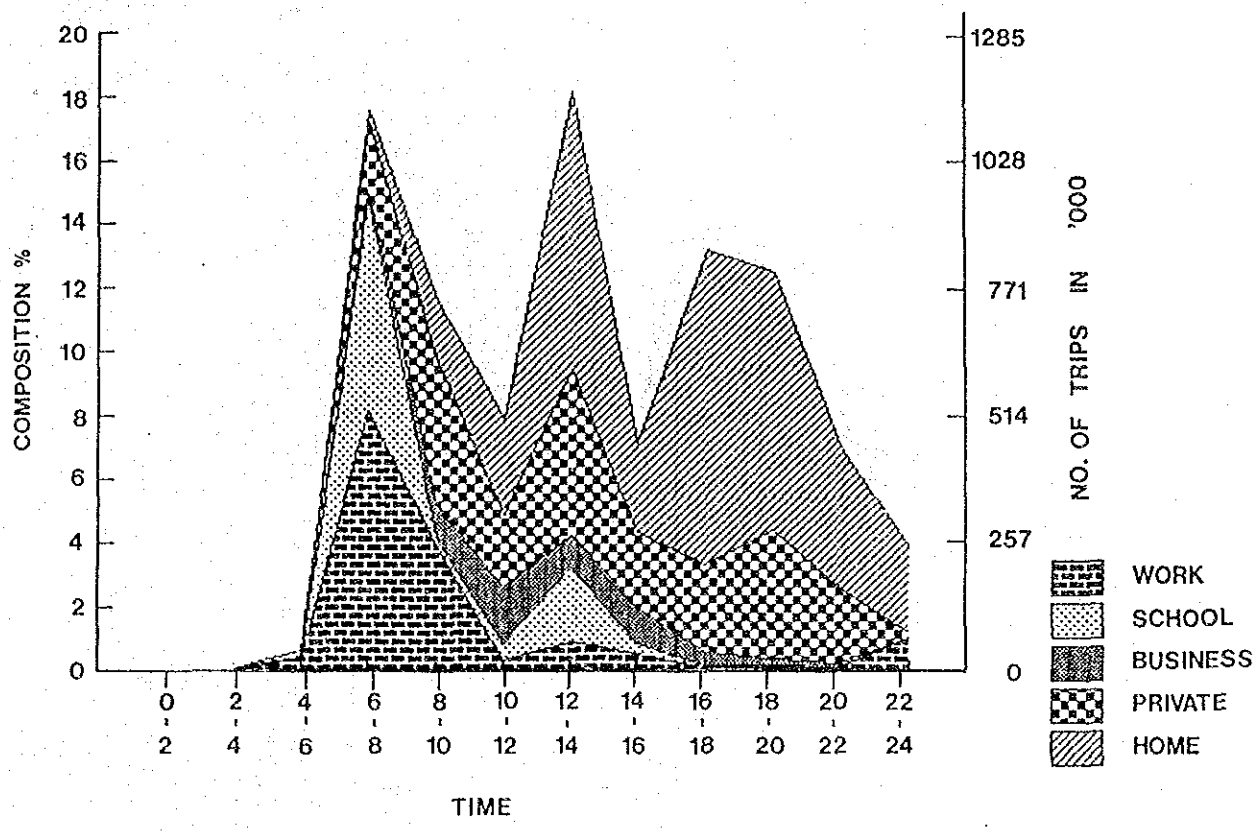


Figure 2.7 : Temporal Fluctuation of Travel Demand By Trip Purpose

Figure 2.8 shows the overlays of the temporal fluctuation of travel demands by provate mode and public mode for each trip purpose. Generally, except for the volume of trips generated, the same pattern of temporal fluctuation of person trips is observed for trips "to work", "to school" and "to home" whether using private or public mode. The number of person trips for "business" using public mode is insignificant compared to the private mode. Trips for "private" purpose using the private mode show two high peaks during 12.00 noon to 2.00 p.m. and 6.00 p.m. to 8.00 p.m. which are mainly due to trips made by car owners for meals, shopping and/or social visits.

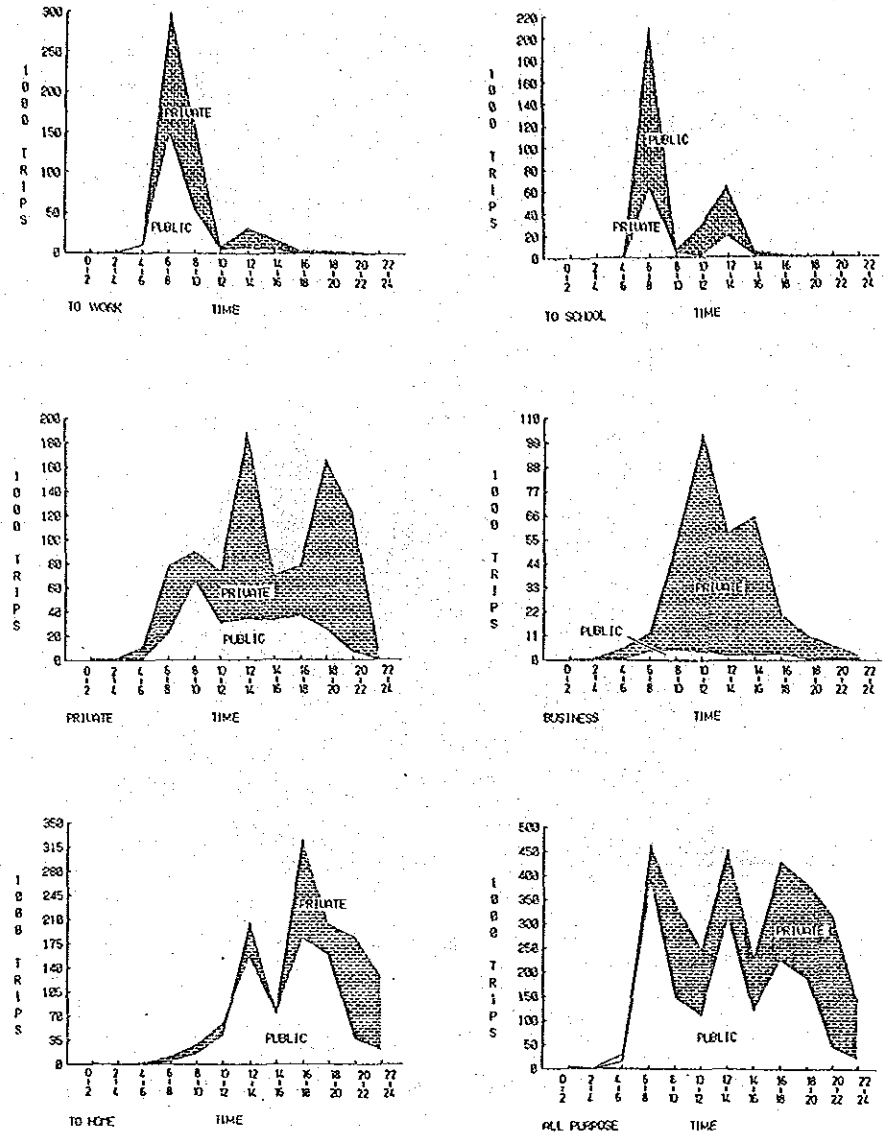


Figure 2.8 : Temporal Fluctuation Of Travel Demands By Trip Purpose By Mode

(d) Trip Length And Travel Time

(1) Trip Length

Trip length is obtained by the simulation of interzonal (C Zones) person trip movement on the existing road network system developed by the Study Team. The average trip length by non-motorized mode is about 3.6 km, by private mode is about 9.0 km and by public mode is about 8.3 km.

The average trip length for business purpose is longest at 10.4 km while the average trip length for trips to school is shortest at 6.2 km. The average person commutes to work at about 9.8 km from home.

(2) Travel Time

The average travel time for all the inter-zonal trips is found to be 15.5 min for no-motorized mode, 33.2 min by private and 30.5 min by public mode.

Average travel time by trip purpose indicates a travel time of 36.2 min to work, 36.7 min to business, 30.8 min to home, 27.2 min for private trips and 24.2 min for school trips.

The travel time as defined here does not include time spent on waiting or transfer but time spent on moving only.

(e) Trip Generation and Attraction

Figure 2.9 shows the trip generation and attraction for trip purpose to work. It is observed that Petaling Jaya generates the largest number of work trips (115,900 trips) followed closely by the Kepong area (101,800 trips). Trip attraction for work trips is largest in the Central Planning Areas (CPA) with 245,300 trips followed by Petaling Jaya (130,000 trips).

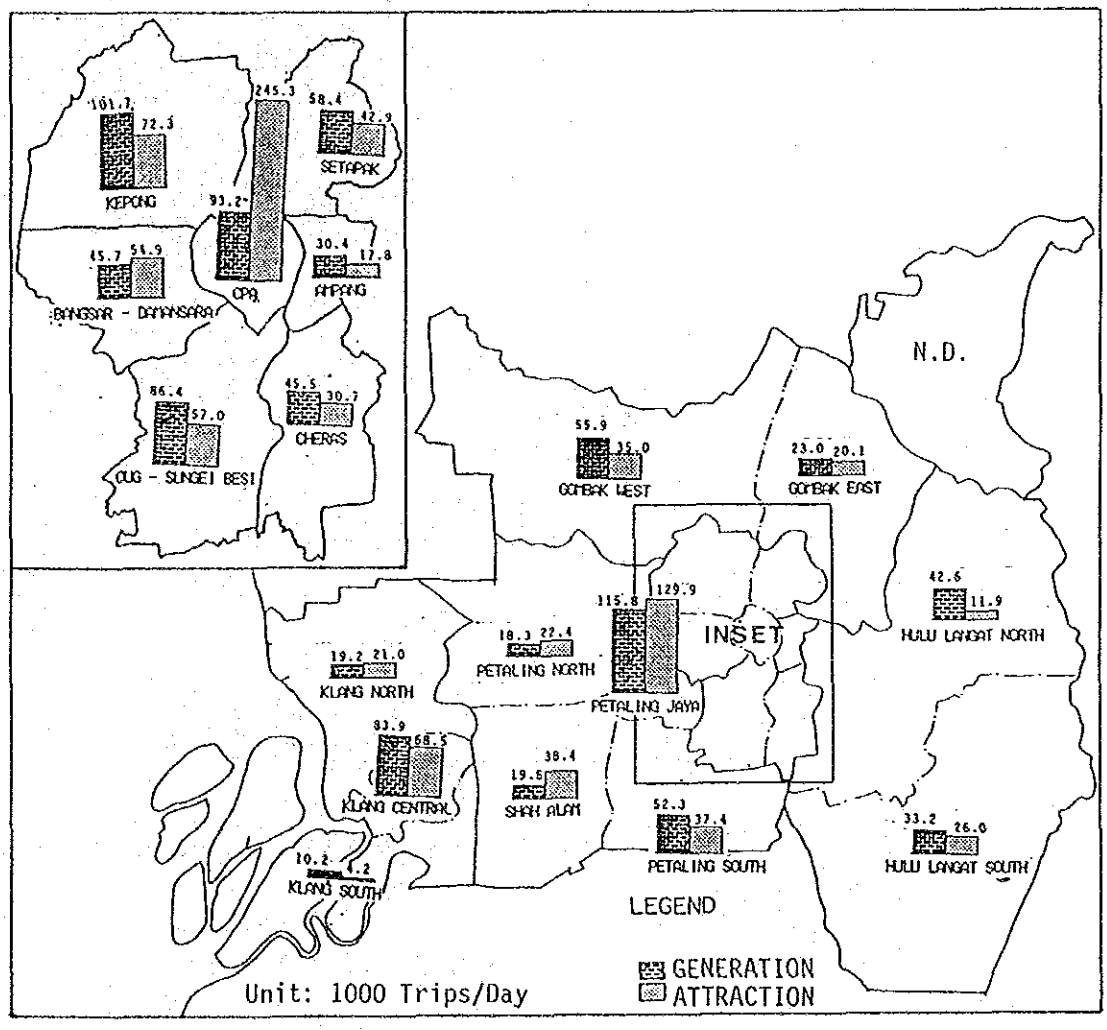


Figure 2.9 : Trip Generation And Attraction For Work Trips, Klang Valley in 1985

Figure 2.10 shows the trip generation and attraction for business purpose trips. The largest generator of business purpose trips come from the CPA (101,200 trips) followed by Petaling Jaya (55,200 trips). The CPA (112,200 trips) and Petaling Jaya (55,100 trips) attract the largest and second largest amount of business trip respectively.

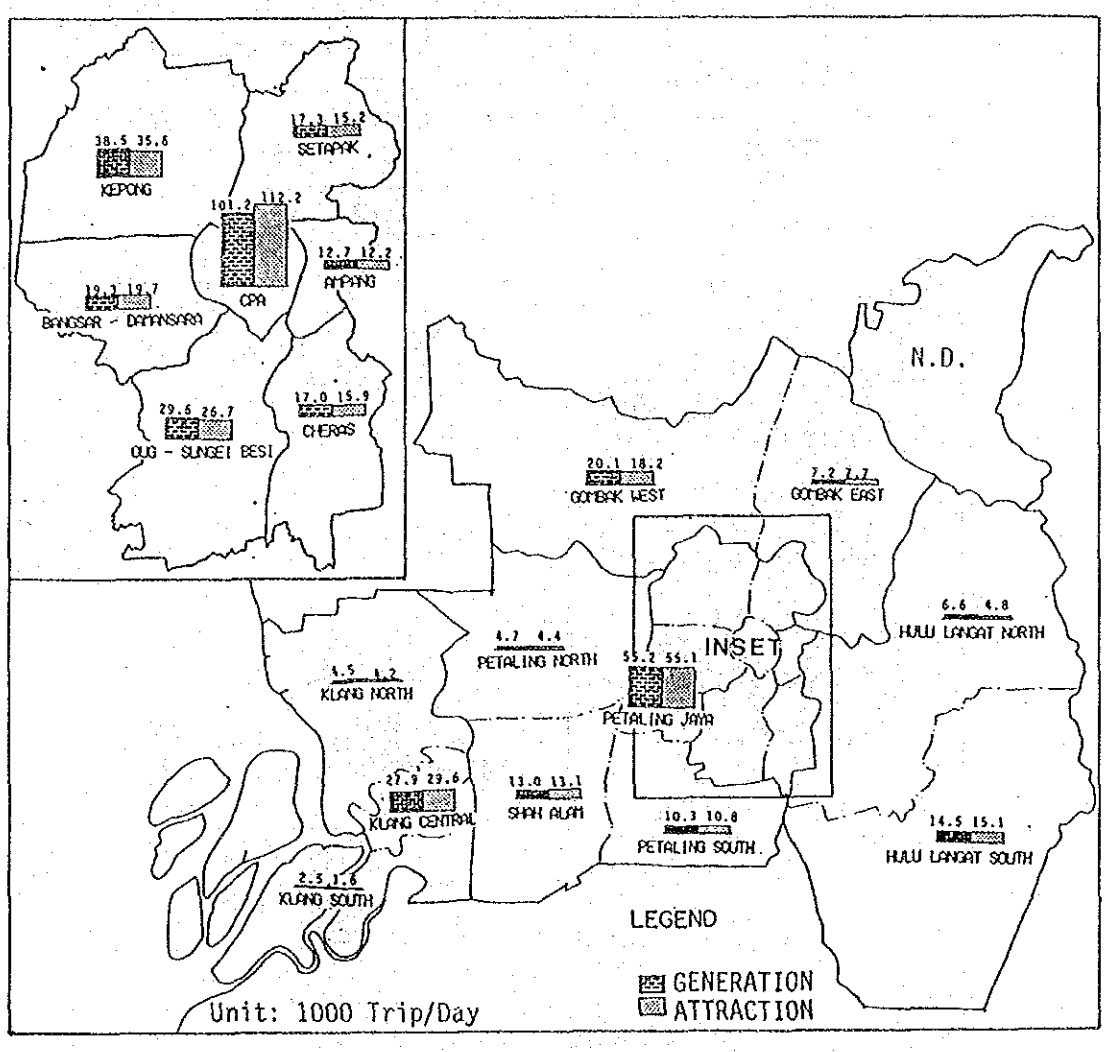


Figure 2.10 : Trip Generation And Attraction For Business Purpose Trips, Klang Valley, 1985

Figure 2.11 shows the trip generation and attraction for private purpose trips. Petaling Jaya (267,400 trips) generates the largest amount of private purpose trips followed closely by the CPA (256,800 trips). However the CPA (415,100 trips) attracts far more private purpose trips than Petaling Jaya (263,100 trips) does. Other areas generating large amount of private trips are Klang Central (182,200 trips), Kepong (161,900 trips) and Kepong (137,800 trips) also attract a fairly large amount of private purpose trips.

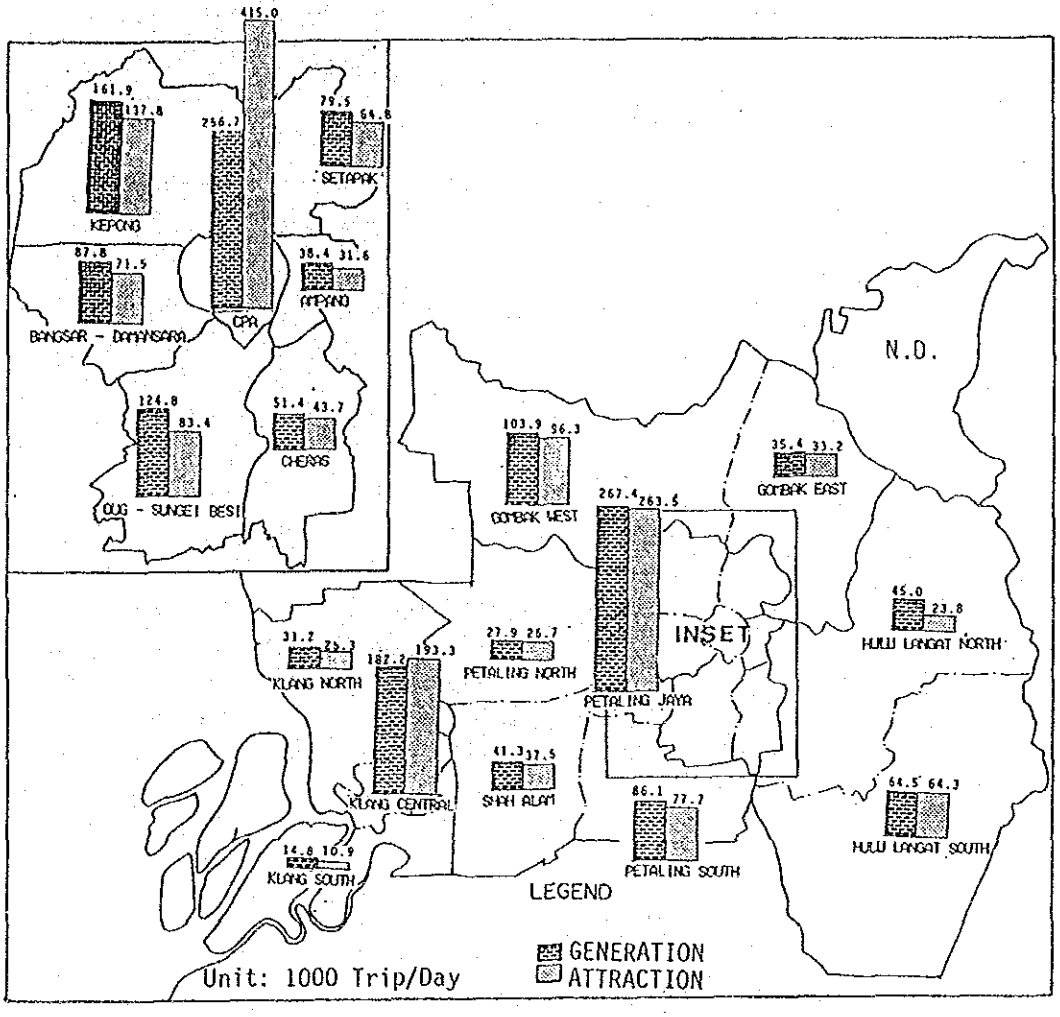


Figure 2.11 : Trip Generation And Attraction For Private Purpose Trips, Klang Valley, 1985

(f) Figures 2.12 and 2.13 show the desire lines of person trips by private mode and public mode respectively. The Kuala Lumpur-Petaling corridor shows the largest amount of person trip movements. The second largest amount of person trip movements is found in the Kuala Lumpur-Gombak corridor followed by the Kuala Lumpur-Hulu Langat corridor.

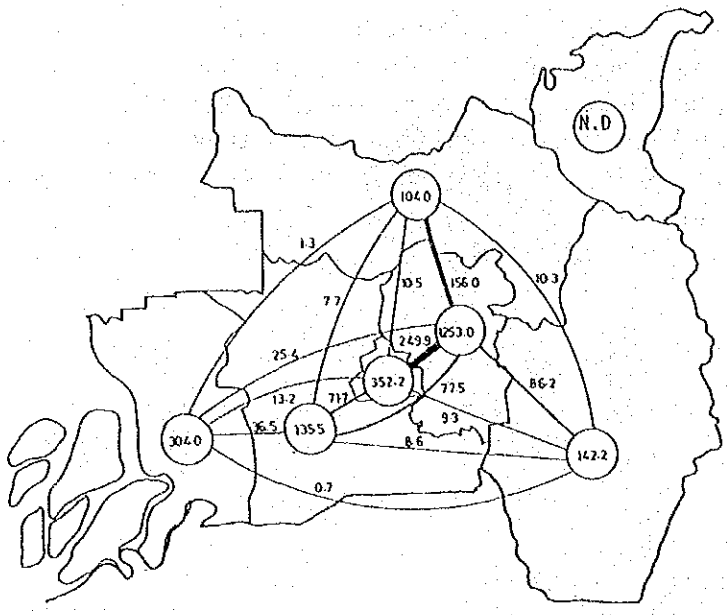


Figure 2.12 : Desire Line of Person Trips by Private Mode, 1985

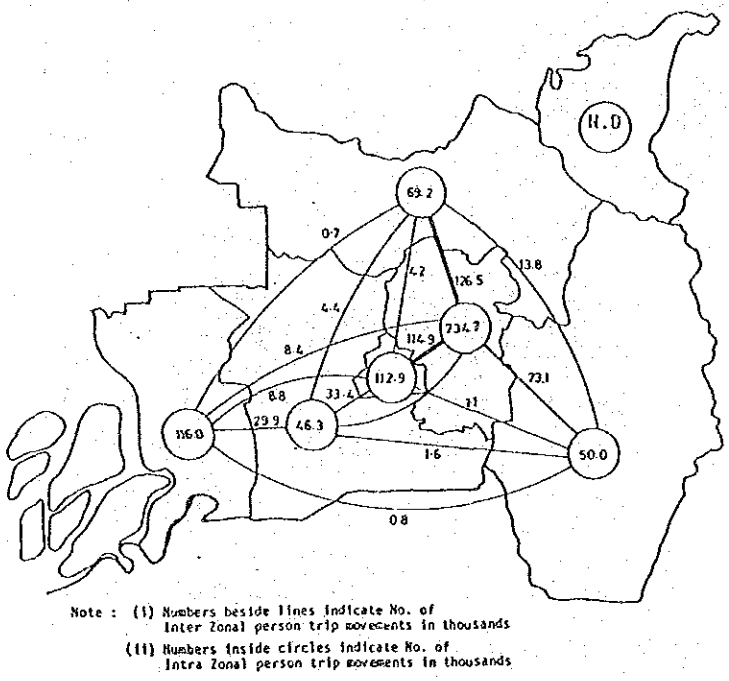


Figure 2.13 : Desire Line of Person Trip by Public Model, 1985

2.3.2 Freight Traffic Characteristics

(a) Freight Traffic Demand

The Lorry Owner Interview Survey (OIS) shows in 1985 the total number of trips per day made by lorries in Klang Valley as 314,078 trips. 21,883 (7%) trips were made by Lorry Type 'A', 91,118 trips (29%) by Lorry Type 'C' and 201,077 (64%) by Lorry Type 'Decontrolled'. The lorry trips breakdown by freight type shows 20% small lorries transported consumer goods, 7% transported metal product while about 38% were unladen trips.

Table 2.5 : Freight Traffic Demand By Lorry Type, OIS, 1985

Freight Type	Type 'A'		Type 'C'		'Decontrolled'		Total	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Agriculture	617	2.0	3,935	4.3	10,946	5.4	15,498	4.9
Mining	71	0.3	61	0.1	20	0.1	152	0.1
Construction	3,965	18.1	14,652	16.1	8,246	4.1	26,863	8.6
Chemical	665	3.0	1,850	2.0	4,022	2.0	6,537	2.1
Metal	951	4.4	3,875	4.3	16,893	8.4	21,719	6.8
Consumer	1,608	7.4	13,081	14.4	46,818	23.2	61,507	19.6
Empties	10,682	48.8	36,726	40.3	70,760	35.2	118,168	37.6
Others	3,324	15.2	16,938	18.5	43,312	21.6	63,634	20.3
Total	21,883	100.0	91,118	100.0	201,077	100.0	314,078	100.0

Note : Lorry Type 'A' – for hire, ladden weight over 2500 kg
Lorry Type 'C' – for own goods only
Lorry Type 'Decontrolled' – commercial vehicle and ladden weight less than 2000 kg and for own goods only

(b) Average Loading by Lorry Type

The total freight traffic in Klang Valley amounts to 240,736 tonne. Lorry Type 'C' handled more than half of it i.e. 128,224 tonnes, although they only made 29% of the total lorry trips. Lorry Type 'A' handled 58,480 tonnes and Lorry Type 'Decontrolled' 54,032 tonnes. The average loading per lorry trip for Lorry Type 'A' is 2.67 tonnes, Lorry Type 'C' 1.4 tonnes and Lorry Type 'Decontrolled' 0.27 tonnes. Since 37.6% of the total trips were empty trips, the average loading per laden lorry trip is 5.22 tonnes for Lorry Type 'A', 2.36 tonnes for Lorry Type 'C' and 0.41 tonnes for Lorry Type 'Decontrolled'.

(c) Lorry Trip Production Rate

The OIS result shows in 1985 the average lorry trip production rate for Klang Valley is 4.65 trips per lorry per day. Lorry Type 'Decontrolled' has the highest trip production rate i.e. 4.73 trips per day, followed by Lorry Type 'C' with 4.68 trips per day and Lorry Type 'A' with 3.94 trips per day (Table 2.6).

Generally, the percentage of lorry which makes at least one trip daily is about 75% for all lorry type.

Table 2.6 : Lorry Trip Production By Permit Types, OIS 1985

Lorry Type	Lorry Trip Production Rate (trips/lorry/day)	% Of Lorry Making Trip to Total No. Of Lorry Registered
'A'	3.94	74.6
'C'	4.68	75.4
'Decontrolled'	4.73	75.3
Total	4.65	75.0

(d) Freight Traffic Generation and Attraction

Figure 2.14 shows the trip generation and attraction of lorry trips in Klang Valley by 'B' Zones. Generally, the number of trip generation in each zone does not vary much from the number of trip attraction. Petaling Jaya generates and attracts the largest amount of lorry trips, followed by Kuala Lumpur Central Planning Area (CPA), Kepong, Klang Central and Gombak West all of which generates and attracts more than 20,000 lorry trips daily.

In terms of lorry type, trip generation and attraction for Lorry Type 'A' is largest in Kepong area, for Lorry Type 'C' is CPA and for Lorry Type 'Decontrolled' is Petaling Jaya.

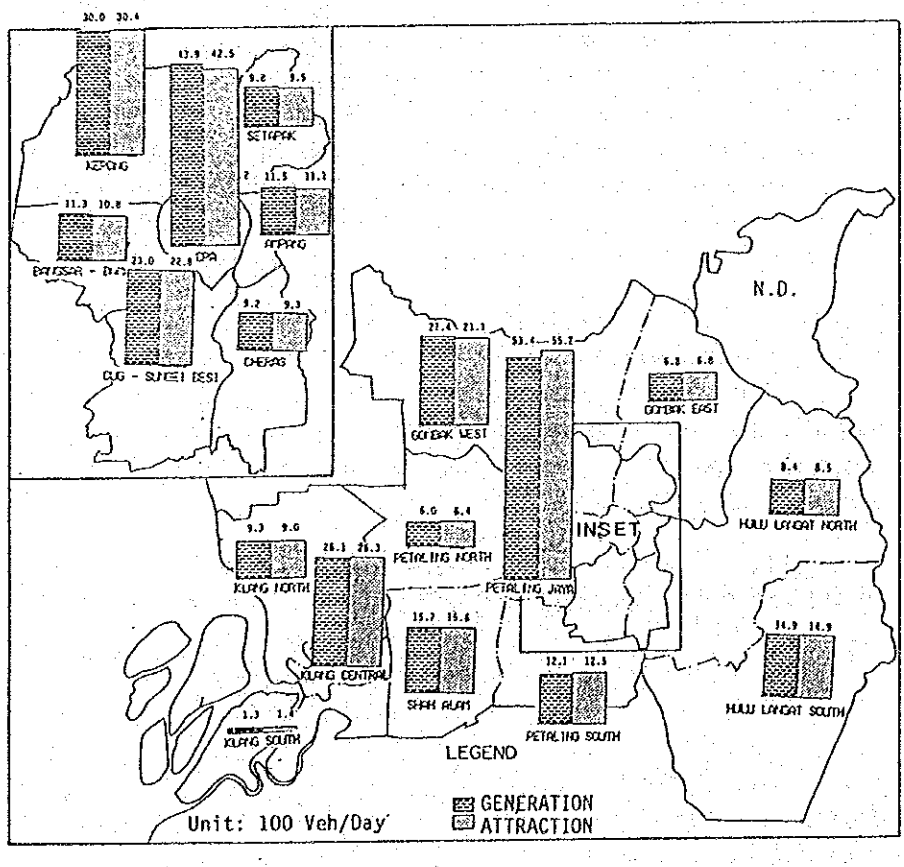


Figure 2.14 : Trip Generation and Attraction Of Lorry Trips, Klang Valley, 1985

(c) Trip Length

The trip length distribution of lorry trips in Klang Valley by lorry type are shown in Figure 2.15. The trip length is obtained by the simulation of interzonal (C Zones) lorry trip movement on the existing road network system developed by the Study Team.

The average trip length of lorry trips is about 13.0 km. Lorry Type 'A' tends to travel further and has an average trip length of 17.8 km. The average trip length for Lorry Type 'C' and Lorry Type 'Decontrolled' are 14.0 km and 11.9 km respectively.

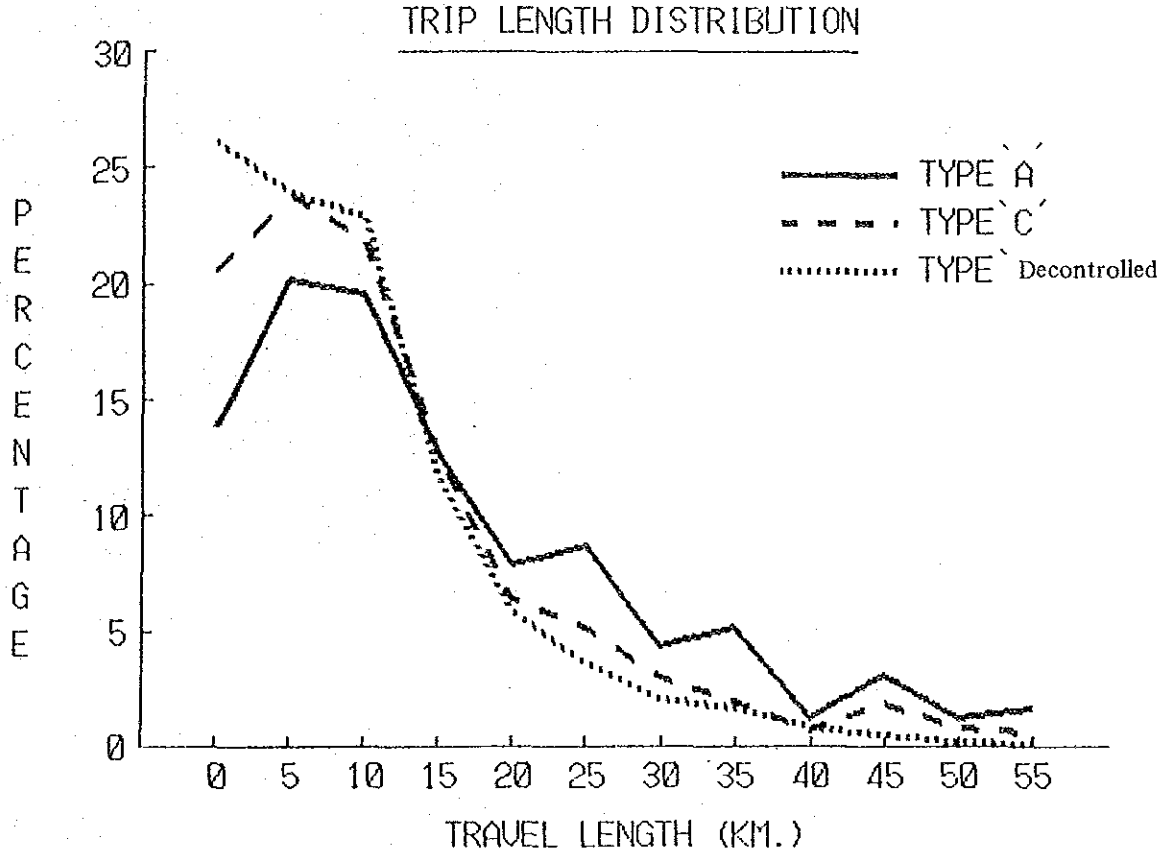
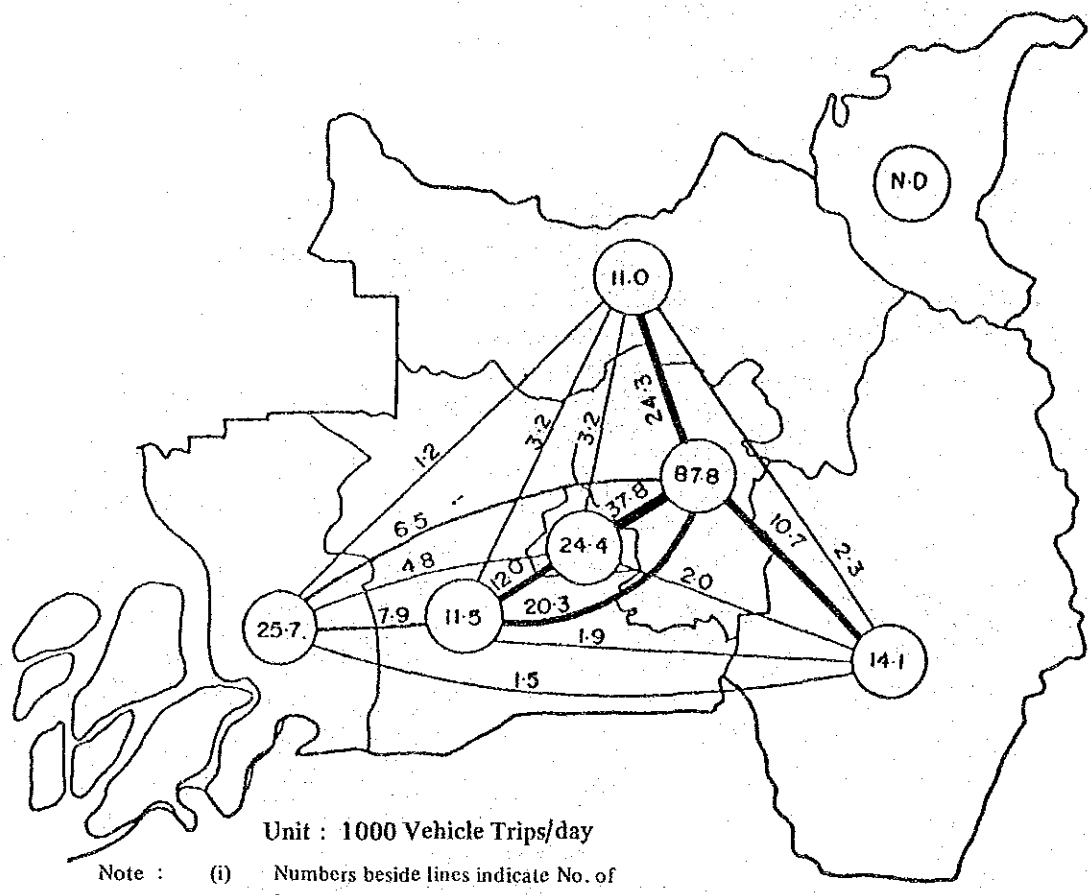


Figure 2.15 : Trip Length Distribution by Lorry Type

(f) OD Distribution Pattern

Figures 2.16 shows the desire lines of commercial vehicle trips in Klang Valley. The main corridors for commercial vehicle trip movement in Klang Valley are between Kuala Lumpur-Petaling Jaya (37,800 trips per day), Kuala Lumpur-Gombak (24,200 trips per day), Kuala Lumpur-Shah Alam (20,300 trips per day).



Unit : 1000 Vehicle Trips/day

Note : (i) Numbers beside lines indicate No. of Inter Zonal vehicle trip movements in thousands

(ii) Numbers inside circles indicate No. of Intra Zonal vehicle trip movements in thousands

Figure 2.16 : Desire Line Of Lorry Trips In Klang Valley, 1985

2.3.3 External Traffic Movement

A summary of the resultant traffic flowing into and out from the Study Area by vehicle type is indicated in Table 2.7. There were 31,500 vehicle flow into and 33,100 vehicle flow out from the Klang Valley. Only 1,878 vehicle or 2.8% of the total vehicle that passed through the Cordon Line were through traffic.

Table 2.7 : Daily Traffic Crossing The Cordon Line By Vehicle Type, 1985

Vehicle Type	Inflow Traffic	Outflow Traffic	Through Traffic	Total	%
Motor cycle	6,287	6,645	237	13,169	19.8
Car	15,239	16,194	980	32,413	48.8
Van	2,491	2,905	109	5,505	8.3
Lorry	6,331	6,164	527	13,022	19.6
Taxi	1,118	1,210	25	2,353	3.5
Total	31,466	33,118	1,878	66,462	100.0

Of the total 66,462 vehicle traffic, 32,413 vehicle trips or 48.8% are by passenger car, 19.8% by motor cycle and 19.6% by lorry.

By area (Figure 3.17), vehicle trips from and to the other districts of Selangor accounted for 45.8%, among which 20.1% is from Kuala Langat, 11.7% from Kuala Selangor. 19,000 vehicle trips or 29.5% are from Seremban and South, 12.8% from Pahang and the East Coast and 11.9% from Perak and North.

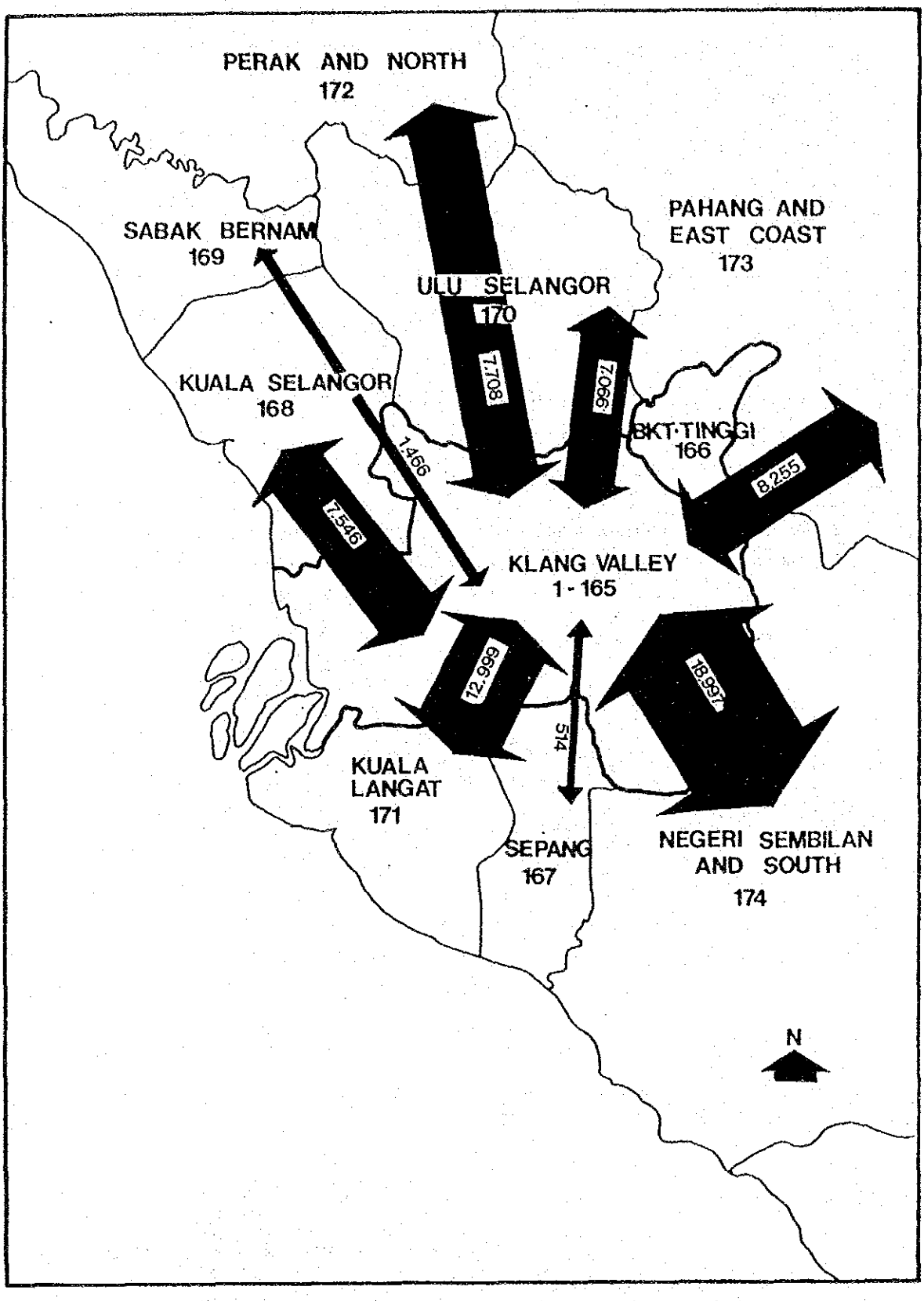


Figure 2.17 : Traffic Volume of the Study Area with External Zones

2.3.4 Existing Parking Supply and Demand in the CPA of Kuala Lumpur

The Study Team conducted a parking survey in the CPA of Kuala Lumpur. The total existing legal parking provisions is found to be about 52,000 parking lots within the CPA.

Table 2.8 : Existing Parking Supply In The CPA in 1985

Type	Total in CPA	Within IRR	Outside IRR
Building	31,638	15,828	15,810
Open Space Parking	13,097	6,829	6,268
On-Street	7,280	2,717	4,563
Total	52,015	25,374	26,641

The parking demand in the CPA is estimated using the results of the HIS conducted in 1985. A total of 49,420 vehicle trips to work, 28,044 for business/sales and 95,854 for private purposes are attracted to the CPA. Besides a total of 27,469 'D Permit' lorry trips are estimated from the OIS that are attracted to the CPA. Using the result of a sample survey on the utility rate of selected parking facilities in the CPA, the turn-over rates of parking by trip purposes are estimated. Using all these information the existing parking demand is estimated as follows: –

Table 2.9 : Existing Parking Demand In The CPA, 1985

Trip Purpose	Vehicle Trips	Turnover Rate	Parking Demand
To Work	49,420	1	49,420
Business *	55,513	6.7	8,286
Private	95,854	10.9	8,794
Total	200,854	–	66,500

* Includes the 'Decontrolled' lorry trips

2.4 Existing Transport Problems

2.4.1 Road Transport

(a) 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) 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) 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) 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 are traffic flow bottlenecks and causes of traffic congestion. This is particularly conspicious along Jalan Cheras, Jalan Kepong and Jalan Ipoh.

(e) 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.

(f) The major radial roads like Jalan Ampang, Jalan Pahang, have relatively low capacity to be able to carry the large volume of traffic from the outskirts into the city.

Some of these transport problems are listed in Table 2.10 and illustrated in Figures 2.18 and 2.19.

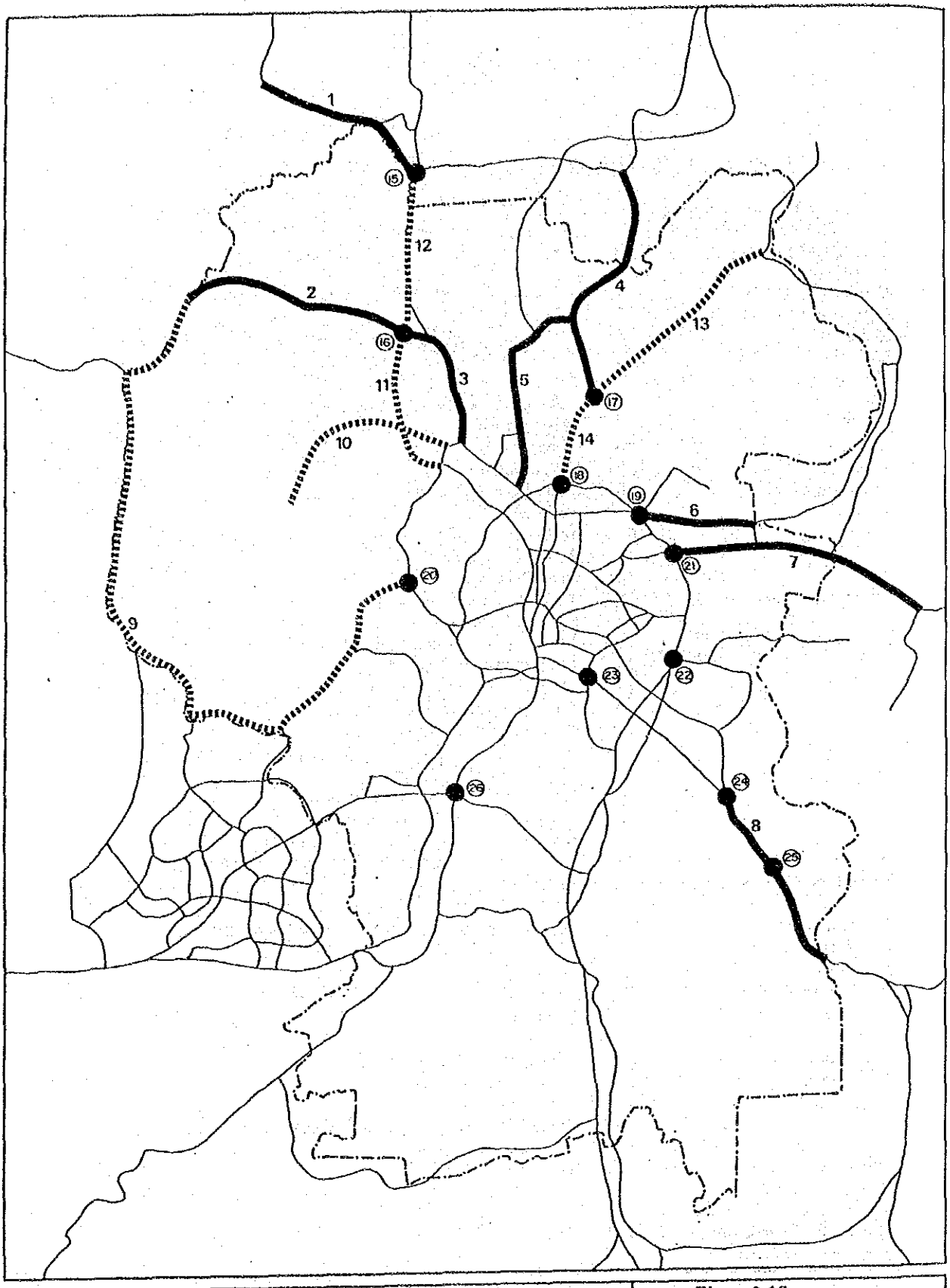
Table 2.10 : Existing Traffic Conditions in the Klang Valley, 1985

A) Kuala Lumpur Conurbation (see Figure 2.18)

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 Ipon (Kepong Roundabout to Batu Cave Junction)
	13	Jalan Genting Klang
	14	Jalan Pahang
Congestion Caused by Low Capacity Intersection	15	Jalan Batu Cave 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 Jaoan Cheras Roundabout
	25	8 km Jalan Cheras Roundabout
	26	Jalan Klang Lama/Syed Putra Intersection

B) Other Klang Valley Area (See Figure 2.19)

Roads with Traffic Congestion Degree 2.0 and above	27	Federal Highway (From Subang to Shah Alam)
	29	Jalan Vantooren
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	36	Kota Bridge over Klang River
Area with Large Volume of Through Traffic on poor condition Street	37	Kajang
	38	Rawang



LEGEND

ROAD WITH CONGESTION DEGREE 2.0 & ABOVE

ROAD WITH CONGESTION DEGREE 1.5 - 1.9

CONGESTION CAUSED BY LOW CAPACITY INTERSECTION

Figure 2.18 : Existing Traffic Conditions in Kuala Lumpur Conurbation

SCALE

0 1 2 3 4 5 KM

KLANG VALLEY TRANSPORTATION STUDY

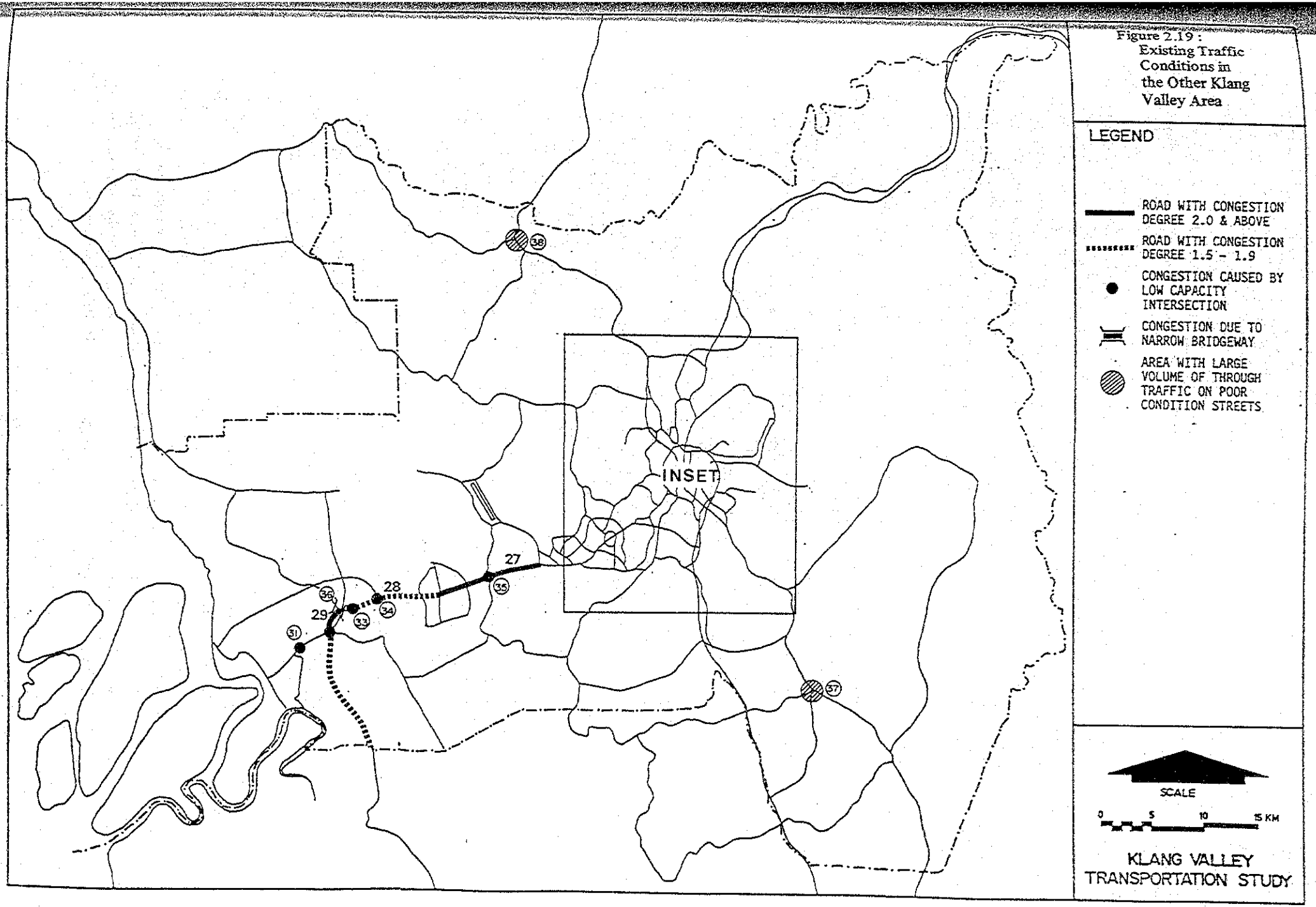


Figure 2.19 :
Existing Traffic Conditions in the Other Klang Valley Area
LEGEND
ROAD WITH CONGESTION DEGREE 2.0 & ABOVE
ROAD WITH CONGESTION DEGREE 1.5 - 1.9
CONGESTION CAUSED BY LOW CAPACITY INTERSECTION
CONGESTION DUE TO NARROW BRIDGEWAY
AREA WITH LARGE VOLUME OF THROUGH TRAFFIC ON POOR CONDITION STREETS
INSET
27
28
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SCALE
0 5 10 15 KM
KLANG VALLEY TRANSPORTATION STUDY