MALAYSIA

URBAN TRANSPORT STUDY

in
Greater Metropolitan Areas
of
George Town, Butterworth and Bukit Mertajam

FINAL REPORT
(Main Volume)

May 1980

JAPAN INTERNATIONAL COOPERATION AGENCY

GOVERNMENT OF MALAYSIA

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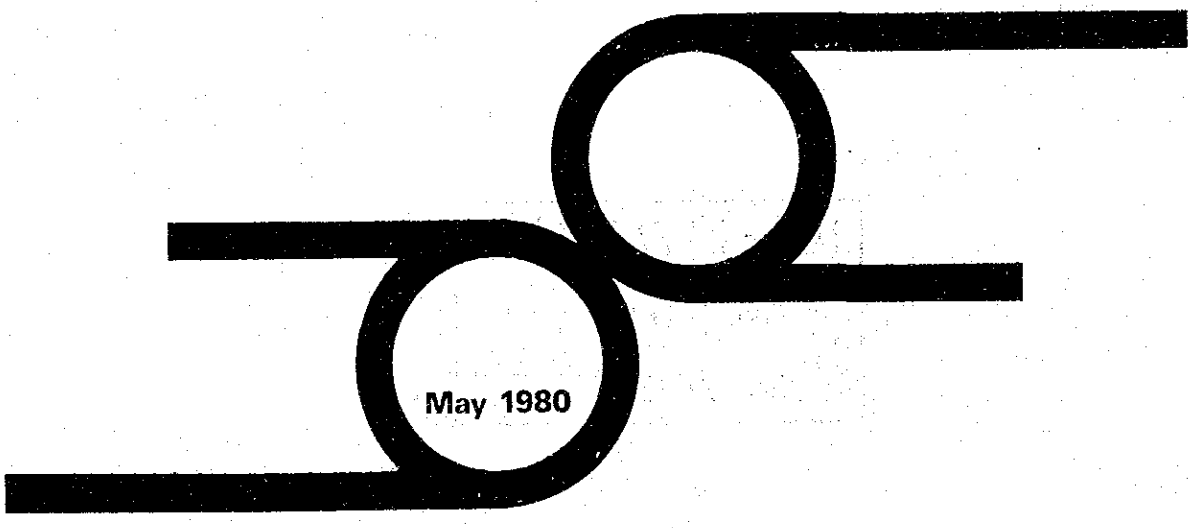

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

It is with the greatest pleasure that I present to the Government of Malaysia this report entitled Urban Transport Study in Greater Metropolitan Areas of George Town, Butterworth and Bukit Mertajam.

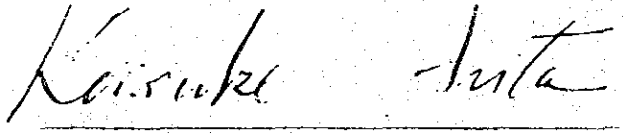
This report embodies the result of the study on urban transport master plan which was carried out in the above mentioned area from March, 1979 to March, 1980 by the Japanese study team commissioned by the Japan International Cooperation Agency following the request made by the Government of Malaysia to the Government of Japan.

The study team, headed by Prof. Takashi Inouye, had a series of discussions with the officials concerned of the Government of Malaysia and conducted a wide scope field survey and data analyses.

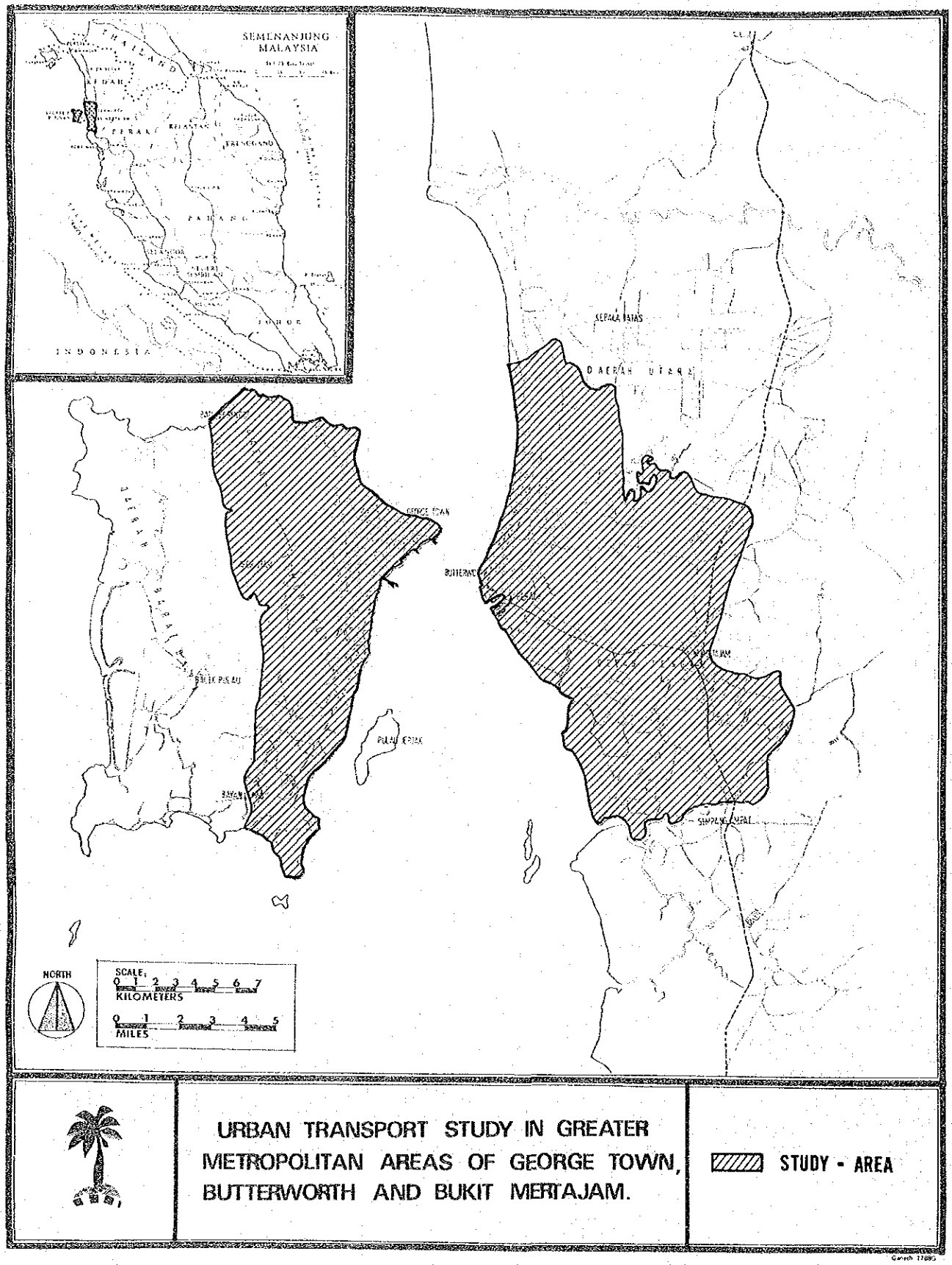
I sincerely hope that this report will be useful as a basic reference for development of the region.

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

May, 1980

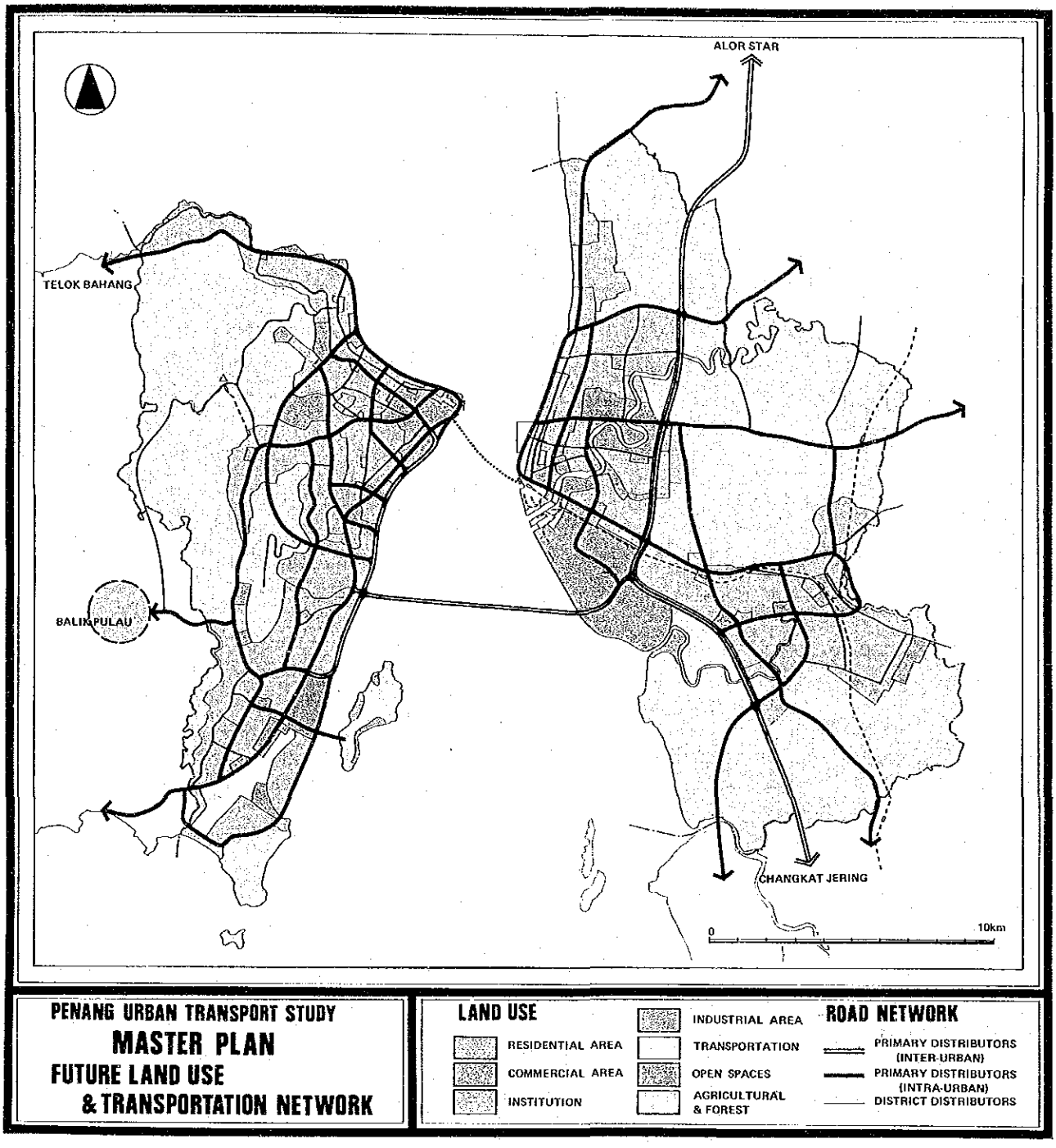


Keisuke Arita
President
Japan International Cooperation Agency



URBAN TRANSPORT STUDY IN GREATER METROPOLITAN AREAS OF GEORGE TOWN, BUTTERWORTH AND BUKIT MERTAJAM.

STUDY - AREA



PENANG URBAN TRANSPORT STUDY

MASTER PLAN
FUTURE LAND USE & TRANSPORTATION NETWORK

LAND USE

- RESIDENTIAL AREA
- COMMERCIAL AREA
- INSTITUTION
- INDUSTRIAL AREA
- TRANSPORTATION
- OPEN SPACES
- AGRICULTURAL & FOREST

ROAD NETWORK

- PRIMARY DISTRIBUTORS (INTER-URBAN)
- PRIMARY DISTRIBUTORS (INTRA-URBAN)
- DISTRICT DISTRIBUTORS

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Summary & Recommendations

SUMMARY AND RECOMMENDATIONS

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1. INTRODUCTION

The Greater Metropolitan Areas of George Town, Butterworth and Bukit Mertajam (referred to as the "Penang Metropolitan Area"), located in northwest Peninsular Malaysia, comprises the second largest metropolitan area in Malaysia.

The metropolis faces serious urban transport problems due to intensive industrial and urban developments as well as a rapid increase in the number of private vehicles. In addition, the Permanent Linkage connecting Penang Island with Province Wellesley (referred to as the "Penang Bridge") is expected to result in drastic changes in the present transport pattern.

In light of these foreseeable changes, it is imperative that improvement of the transport system be urgently carried-out.

The objectives of the study therefore are to formulate a master plan for the Urban Transport System of the Penang Metropolitan Area, to recommend major transport policies and to suggest an order of priority for the undertaking of these projects to be realized by these policies.

To achieve its objective the study makes two (2) types of recommendation of possible solutions to the many problems of transport related matters facing Penang Metropolitan Area:

* A short-term action program
* A long-term program for transport development

2. CONCLUSION AND RECOMMENDATIONS

2.1 Socio-Economic Framework

The socio-economic framework for the Study Area as well as for the State of Penang is based on the premise that in the regional contexts the Penang Metropolitan Area will be the highest developed community center in northwestern Peninsular Malaysia.

1. Within the Study Area, the annual population growth rate is projected to be 2.4 percent from 1979 to the year 2000, with population expected to increase from 720,000 in 1979 to 840,000 in 1985 and to 1.2 million in the year 2000.
2. The annual growth rate of employment in the Study Area is projected at 3.6 percent annually from 1979 to 1985 and 3.4 per

cent from 1985 to the year 2000, with employment expected to increase from 239,000 in 1979 to 296,000 in 1985 and to 488,000 in the year 2000.

3. The Gross Regional Product in the State of Penang is predicted to grow at 8.8 percent annually from 1979 to 1985 and at 8.2 percent annually from 1985 to the year 2000. The Gross Regional Product is expected to expand from M$ 1,977 million in 1979 to M$ 3,280 million in 1985 and to M$ 10,170 million in the year 2000.

4. Average monthly household income in the State of Penang is projected to increase from M$ 516 in 1979 to M$ 642 in 1985 and to M$ 1,060 in the year 2000. The average annual growth rate of real income will thus be 3.5 percent.

5. On the basis of household income projection, the number of vehicles in the Study Area is expected to increase from 175,000 in 1979 to 218,000 in 1985 and to 390,000 in the year 2000.

2.2 Future Traffic Demand

2.2.1 Future Development Pattern

The simultaneous development of Penang Island and Province Wellesley appears the most likely pattern for future development, taking into consideration past trends and existing development plans. This development pattern caters to the regional development potential and the creativity of an appropriate urban community, as well as providing due consideration towards a better urban environment. (Illustrated in Fig. S-1)

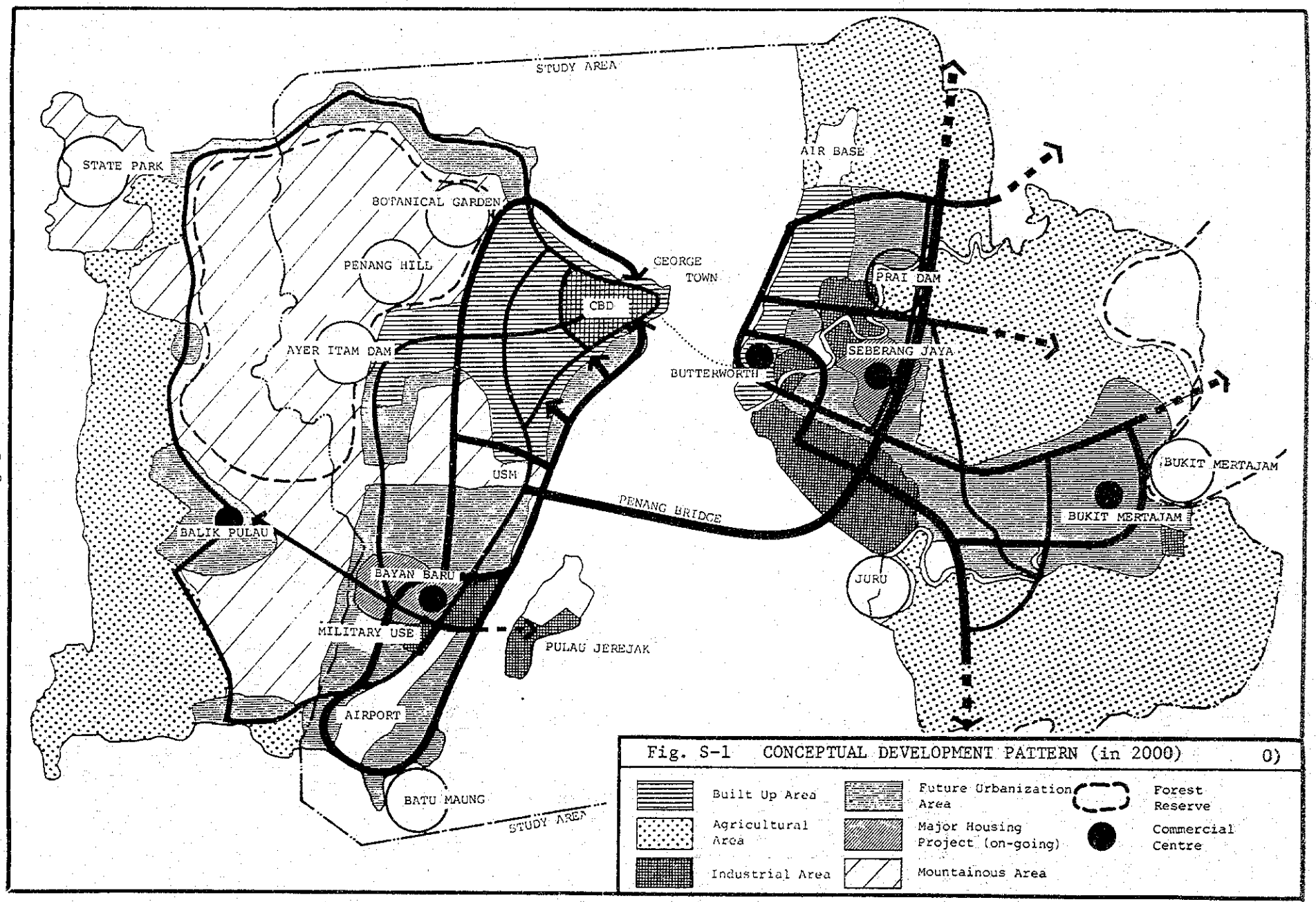

Fig. S-1 CONCEPTUAL DEVELOPMENT PATTERN (in 2000) 0)

2.2.2 Future Traffic Demand

According to the rapid growth of car ownership, the number of trips is increasing year by year with the future total number of trips growing to 782,250 (p.c.u.) and 1,548,150 (p.c.u.) in 1985 and the year 2000 respectively from a base of 609,800 trips (p.c.u.) in 1979.

Table S-1 NUMBER OF TRIPS BY TYPE OF TRAFFIC

(Unit: 1000 trips)

Trip Type	Type of vehicle / Trip purpose / Year	Vehicle: Car: Going to Work	Car: On Business	Car: Private	Car: Going Home	Car: Sub-Total	Lorry	Taxi	Bus	Total	M/C
Internal trip	1979	66.4	33.4	53.1	83.2	236.1	28.4	2.7	19.0	286.2	397.3
	1985	88.1	44.0	70.8	110.1	313.0	43.2	6.1	24.7	387.0	437.7
	2000	200.1	100.1	160.7	249.9	710.8	92.2	24.5	51.5	879.0	449.3
External and through trip	1979	4.3	4.8	6.4	7.5	23.0	9.8	2.1	0.4	35.3	25.1
	1985	6.0	7.2	9.8	10.3	33.3	15.8	3.4	0.6	53.1	27.7
	2000	14.4	21.6	27.3	25.5	88.8	66.4	9.2	1.4	165.8	28.6
Total	1979	70.7	38.2	59.5	90.7	259.1	38.2	4.8	19.4	321.5	422.4
	1985	94.1	51.2	80.6	120.4	346.3	59.0	9.5	25.3	440.1	465.3
	2000	214.5	121.7	188.0	275.4	799.6	158.6	33.6	52.9	1,044.7	477.9

2.3 Recommended Overall Transport Plan

2.3.1 Policy

The objectives and goals of improving transport systems are as follows:

* To provide adequate means of transport for everyone
* To provide a safe traffic environment
* To minimize resource consumption and to ensure effective use of transport facilities
* To preserve and to create a better urban environment

The major difficulties hindering achievement of these objectives

in Penang are that the present transport system cannot afford to meet the rapid increase of transport demand resulting from the intensive economic development of the area and the inevitable great change of traffic conditions which will be brought by the completion of the Penang Bridge and the New Federal Route I.

Taking into consideration these conditions and the results of the overall appraisal of transport strategies, the following policies are recommended.

1. Ensuring the effective use of existing road space.
2. Construction of new roads and improvement of existing ones.
3. Improvement of public transport.
4. Restraint of private vehicle use in congested areas.
5. Construction of transport facilities
6. Preservation and creation of a better urban environment.
7. Monitoring the effectiveness of the implementation

2.3.2 Road Network

Based on the policies and the strategies, the future road network plan is proposed as shown in Fig. S-2.

The conceptual road network planned for George Town is fundamentally a ring and radial road system, while that for the other area is basically a grid pattern.

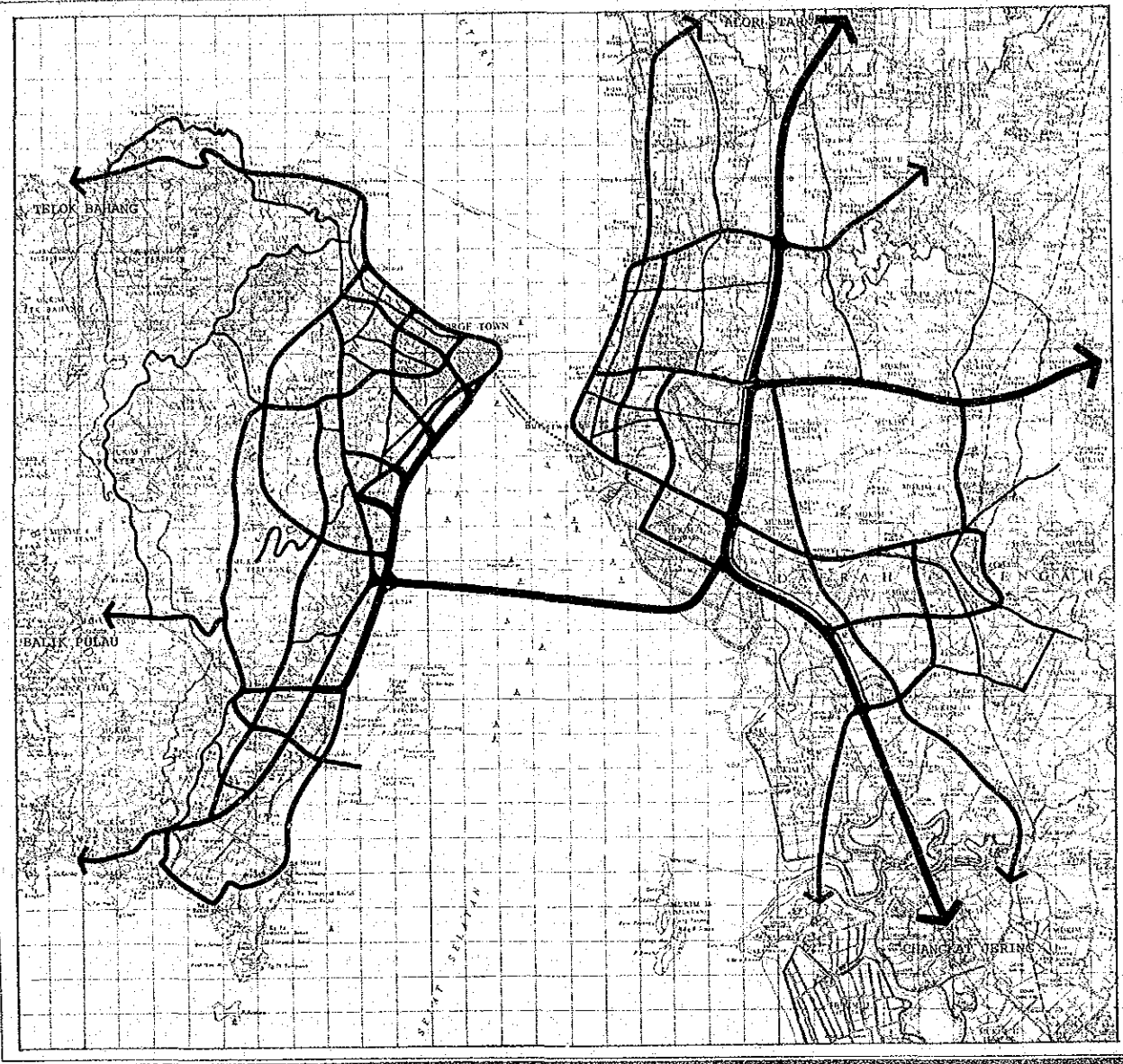

Fig. S-2 Proposed Road Network

NORTH

Primary Distributor (Inter-Urban)

Primary Distributor (Intra-Urban)

District Distributor

PENANG URBAN TRANSPORT STUDY

URBAN TRANSPORT STUDY IN GREATER METROPOLITAN AREAS OF GEORGETOWN, BUTTERWORTH AND BUKIT MERTAJAM

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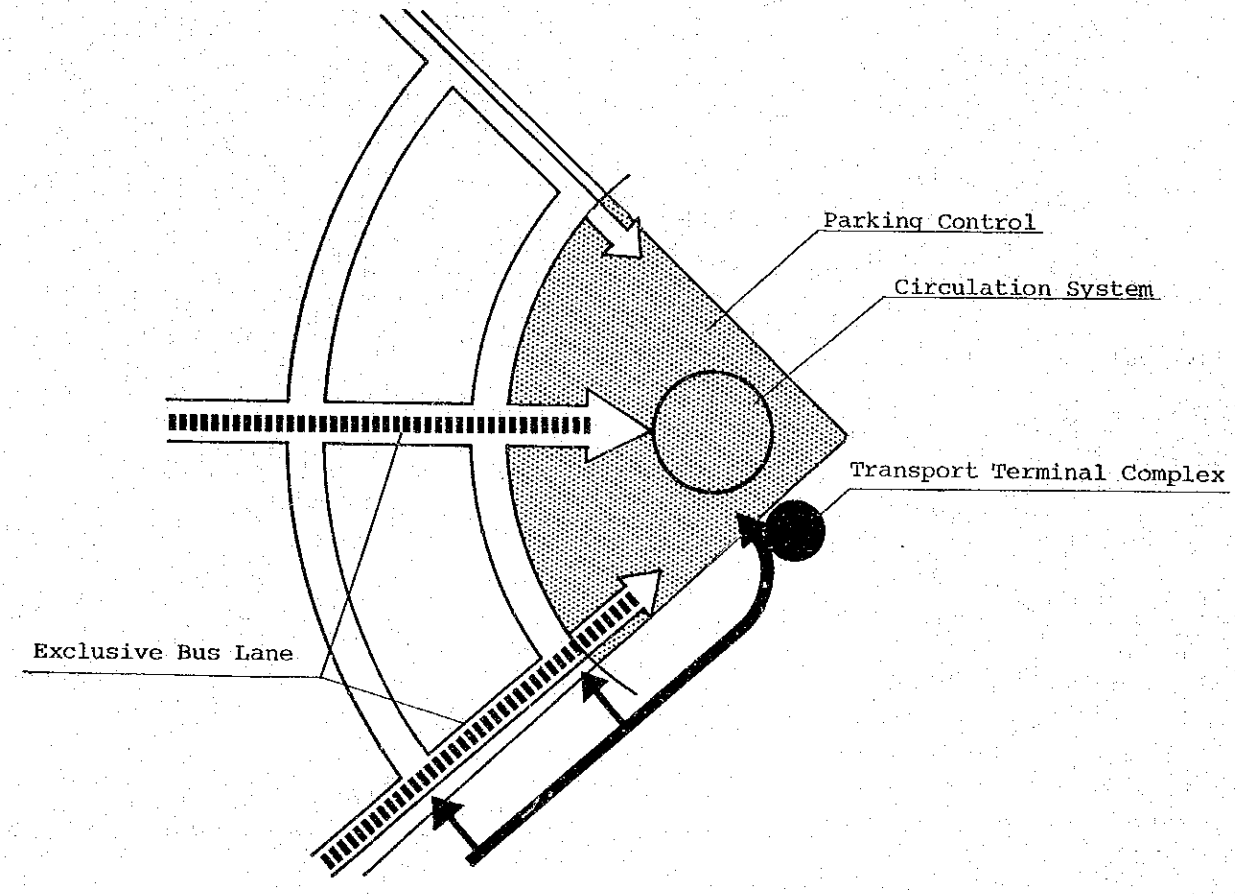
2.3.3 C.B.D. of George Town

Since a great deal of traffic coming from other areas will disturb the traffic flow in the Central Business District (C.B.D.) of George Town, it is necessary to improve roads and public transport, and also to control traffic flow entering the C.B.D. Therefore, a package of strategies, illustrated below, is recommended.

Package of Recommended Traffic Strategies

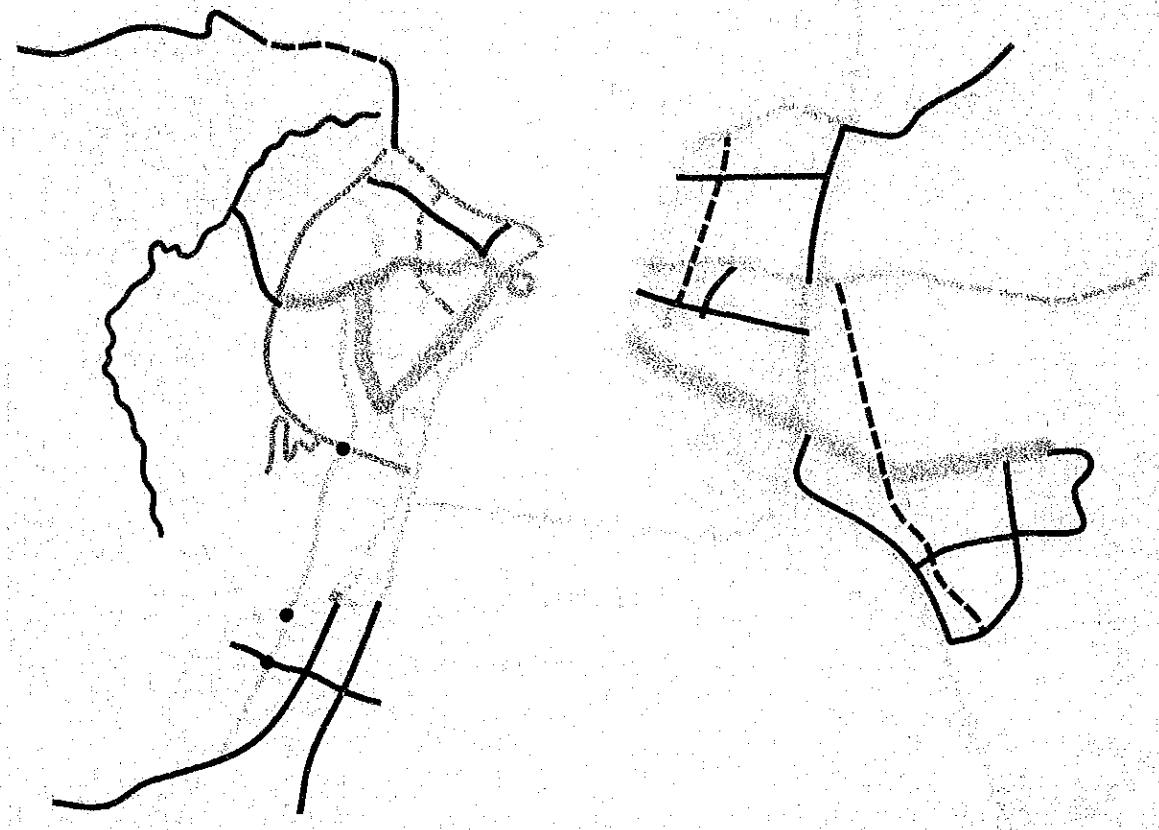


2.4 Long-Term Transport Plans

2.4.1 Construction of New Roads and Road Improvements

The major recommendation for the Study Area is the construction and improvement of roads and grade-separated intersections.

The recommended plan is divided into three (3) phases of construction and improvement, i.e. phase 1 (1981 to 1985), phase 2 (1986 to 1990) and phase 3 (1991 to 2000), as shown in Figs. S-3, S-4 and S-5.



Phase 2 (1986-1990)

Phase 3 (1991-2000)

Fig 5.3

Phase 3 (1991-2000)

Fig.5.3

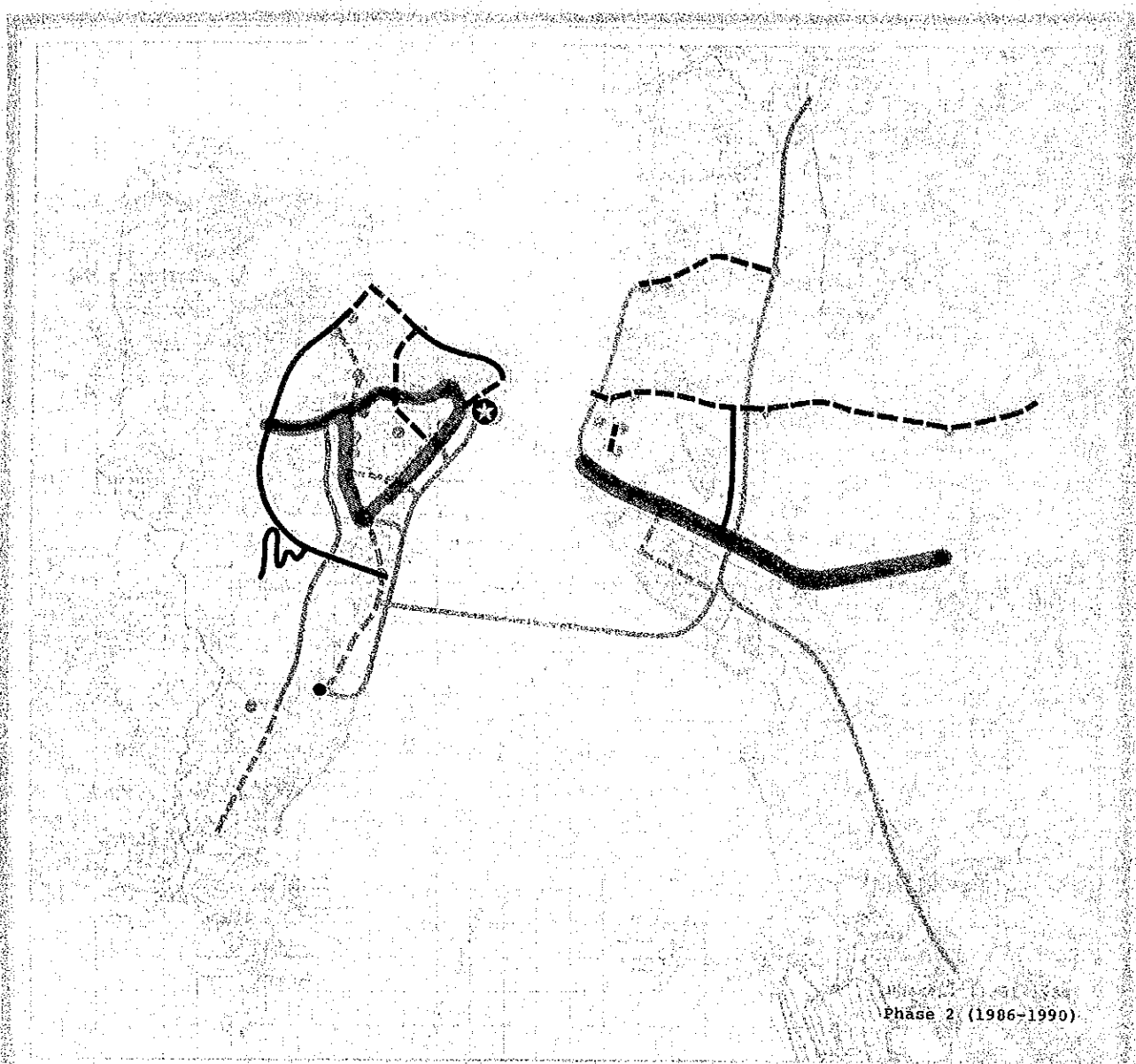


Fig.S.4 Highway Improvement by Phase

Phase 2 (1986–1990)

Phase 3 (1991–1995)

Fig. 5.4:

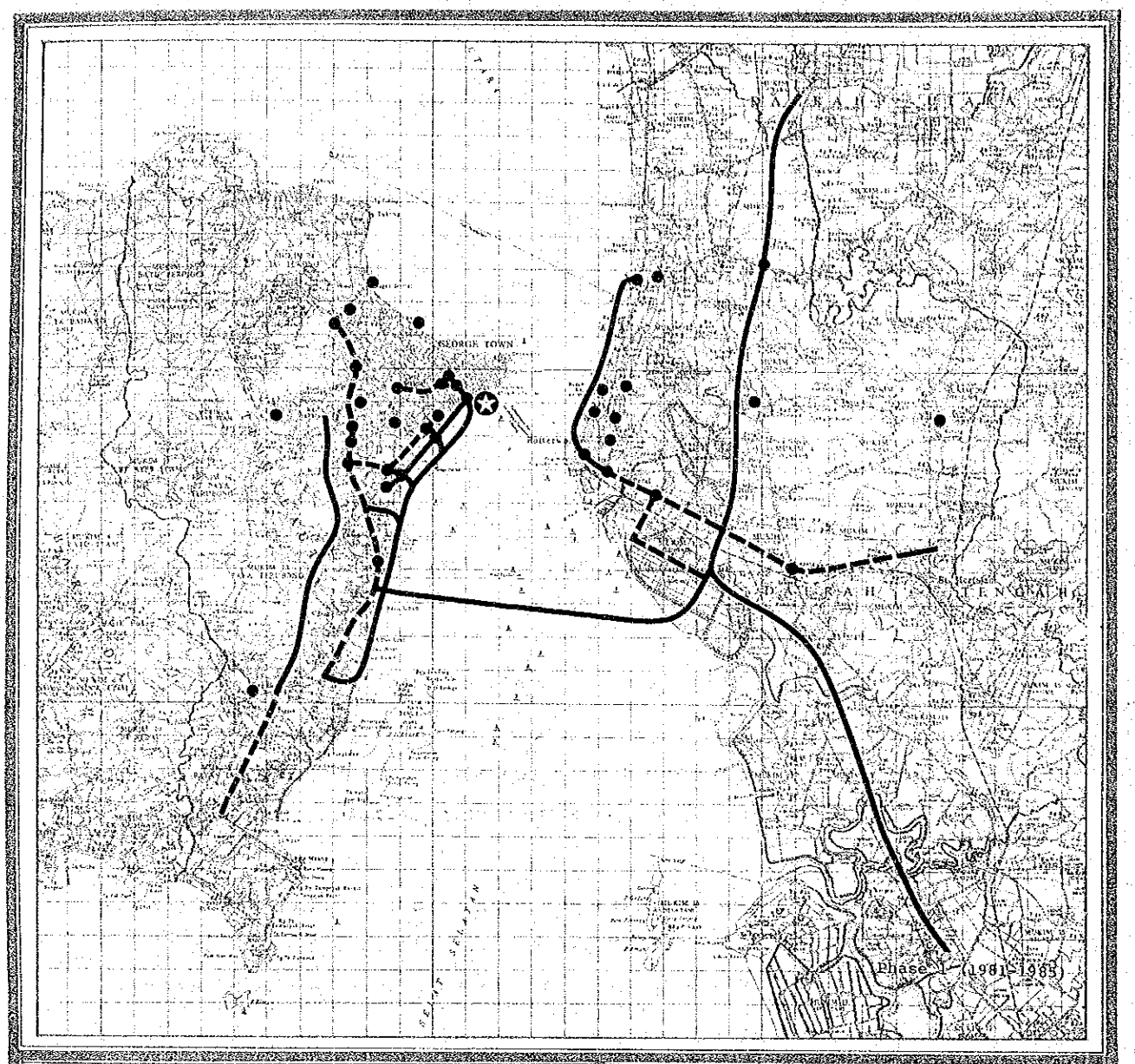


Fig.S.5 Highway Improvement by Phase

NORTH

Construction

Transport Complex

Improvement

Exclusive Bus Lane

Intersection Improvement

PENANG URBAN TRANSPORT STUDY

URBAN TRANSPORT STUDY IN GREATER METROPOLITAN AREAS OF GEORGETOWN, BUTTERWORTH AND BUKIT MERTAJAM

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2.4.2 Improvement of Public Transport

Public transport should be expanded as follows in line with the overall transport strategies.

1. To introduce exclusive bus lanes on the following roads:

   Penang Island : Green Lane
   Ayer Itam Road
   Jalan Dato Keramat
   Jalan Jelutong

   Province Wellesley: Existing Federal Route I

2. To improve bus transport services in the following ways :

   a. Reorganization of routes and schedules
   b. Provision of adequate bus stops and bus terminals
   c. Renovation of bus fleets
   d. Revision of bus fare
   e. Establishment of a bus transport committee.

3. It is recommended not to introduce the mini-bus as a predominant bus system because in terms of quality of service and transport economy, the schedule bus is much more efficient than the mini-bus.

   Therefore, it is suggested that long distance line-haul services should be provided mainly by the scheduled-bus system while the mini-bus is introduced on a selective basis as a feeder system.

4. Introduction of a new transport system

   The introduction of a new transport system will be needed by the year 2000. It is suggested, however, that the new transport system should be re-examined by monitoring the increasing traffic volume on roads after 1990.

2.4.3 Private Vehicle Restraints

The team recommends that management and control system of car parking should be introduced by imposing restrictions against private vehicles before 1990. After 1990, it will be necessary to strengthen further the parking control.

2.4.4 Construction of Transport Terminal Complex

In order to establish efficient and convenient public transport services and to meet the future demand of transport services encouraged by implementation of the Penang Bridge and Bayan Lepas Development, a transport terminal complex capable of handling and coordinating various modes of transport will be necessary.

It is suggested that the transport terminal should be located north of the reclamation area, as the surrounding areas are expected to form a new city center through various urban redevelopment projects like the KOMTAR project. Furthemore, the terminal will make it easier to control traffic flow entering C.B.D. from the Penang Dispersal Road.

In addition, a Traffic Amusement Park is expected to be located in the near area for public education of traffic manners and regulations.

2.4.5 Environmental Preservation

In network planning, consideration is given to the preservation and creation of a better urban environment. When the transport projects as well as the other infrastructure projects are implemented, an environmental assessment of each project should be made from the social and physical view points.

2.4.6 Ferry System

Based on the traffic demand projections, mostly motorcycles and passengers are expected to use the ferry. Therefore, it is suggested that the operation of the present ferry system be continued even after the Penang Bridge is in operation.

2.4.7 Railway

The future demand for railway commuter services will not be sufficient to make the expansion financially viable. However, if any financial relief measures and/or intensive development of the adjacent areas are to be undertaken, it is recommended that a detailed study be conducted to check the viability.

2.5 Short-Term Actions

2.5.1 Traffic Engineering and Management

The short-term actions should focus on the implementation of the following measures which are comparatively inexpensive and easily implemented, and will have substantial effect on the transport system.

1. The circulation road system in George Town should be implemented at the earliest possible time. The implementation of this circulation plan will ensure effective and smooth traffic flow.
2. The following at-grade intersections should be improved:
   a. On Penang Island: Magazine Circus and nineteen (19) other intersections.
   b. In Province Wellesley: Twelve (12) intersections.
3. In order to improve the present disorderly traffic flow which is caused by mixed traffic, the following measures should be undertaken:
   a. Marking of road lane demarcation lines.
   b. Separation of lanes by vehicle type, e.g. one for high-speed vehicles and other/or others for motorcycles & trishaws, as the case may be.
4. A traffic signal system is recommended as the most suitable measure to achieve higher traffic capacity on primary distributor roads in peripheral and suburban areas as well as in the Central Business District of George Town.
5. In order to improve pedestrian facilities, the following should be installed:
   a. Sidewalks
   b. Pedestrian Crossings

   For the improvement of sidewalks, careful consideration should be given to planting roadside trees from the environmental and landscape viewpoints.
6. It is recommended that Campbell Street in George Town and Jalan Pasar in Bukit Mertajam be opened exclusively to pedestrians,

even if only on a part-time basis.

7. The following traffic facilities should be installed, based on standards.

   a. Traffic signs

   b. Lane markings

   c. Traffic signals with improved visibility, with the existing traffic signal system should be reviewed.

8. In order to improve the present and future traffic situation in the congested areas, the implementation of the following traffic regulatory measures are recommended.

   a. Parking prohibition on primary distributor roads.

   b. One-way system in congested areas.

2.5.2 Construction and Improvement of Roads

It is recommended that the following roads should be constructed and improved as short-term actions.

In Penang Island :

a. Gurney Drive Extension*
b. Outer Ring Road from Bagan Jermal to Ayer Itam*
c. Partly Widening of Green Lane**
d. Scotland Road from Ayer Itam Road to Western Road**
e. Western Road from Scotland Road to Gottlieb**
f. Bayan Lepas Road**
g. Jelutong Road**
h. Leboh McNair**
i. Maxwell Road**
j. Dato Keramat-Ayer Itam Road to Ayer Itam Intersection**
k. Paired Road**

In Province Wellesley:

a. S. Dua Road from Kg. Bagan Ajan to S. Dua*
b. West Coastal Road from Kg. Bagan Ajan to New Port*
c. West Coastal Road from New Port to

intersection at Alor Star - Changkat Jering Highway*

d. Federal Route I at Intersection of Alor Star-Changkat Jering Highway and Jalan Methopalaniapa*

e. Prai Road**

f. Permatang Pauh Road**

Note : * Proposed by this study

** Projects currently under planning

2.5.3 Bus Transport

For bus transport, the following measures should be implemented immediately in order to improve the reliability of the system:

1. The bus fleet should be increased in number as well as upgraded through the introduction of more suitable and increased capacity buses such as the standee type.
2. Bus operation in terms of frequency and punctuality should be stabilized.
3. The turn-in and turn-out facilities for buses at stops as well as the bus stop shelters should be improved while the bus schedule should be clearly marked and posted at each stop.

2.5.4 Taxi

As regards taxis, the following measures should be implemented:

1. Taxis should be increased in number.
2. An association or cooperative of taxis should be set up.
3. Taxi stands should be established at strategic locations.

2.5.5 Trishaw

It is suggested that the present government policy of suspending the registration of trishaws should be continnued, while a phase out reduction of trishaws on some of the circulation roads should be enforced.

2.6 Investment Cost

In order to achieve the transport development in the Penang Metropolitan Area, the capital investment required for the next twenty (20) years is estimated at over M$ 1,085 million: Government imvestment is over M$ 686 million (63 percent) and Public Corporation and Private Sector investment is M$ 399 million (37 percent). The investment requirements at each of the phases are shown in Table S-2.

Tables S-2 CAPITAL INVESTMENT BY PHASE

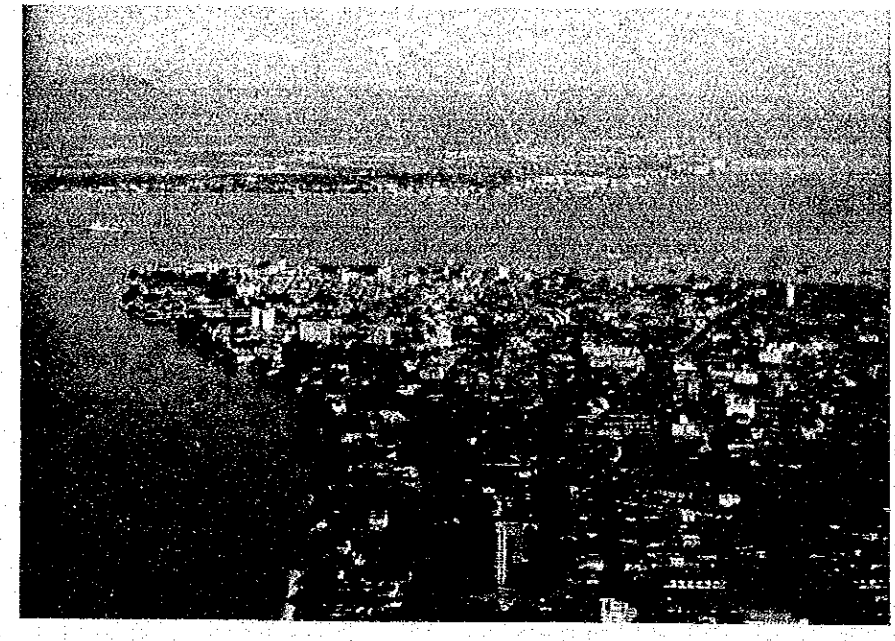
(In thousand Malaysian dollars at 1979 prices)

	Projects / Phase	1-A 1981-mid'83	1-B mid 1983-85	2 1986-'90	3 1991-2000	Total	
Government Investment*	Road Network	99,147	100,378	218,712	189,714	607,951	(56.0)
	Intersection	7,894	30,847	19,755	7,030	65,526	(6.0)
	Traffic Signal	1,337	2,400	679	172	4,588	(0.4)
	Traffic Sign. Marking	637	638			1,275	(0.1)
	Sidewalk	1,356	1,350			2,706	(0.2)
	Bus Facility	1,950	1,990			3,990	(0.4)
	Sub-Total	112,321	137,603	239,196	196,916	686,036	(63.2)
Public Corporation and Private Sector Investment	Penang View Road			21,340		21,340	(2.0)
	Transport Complex**		1,252	13,862	12,445	27,559	(2.5)
	Off-Street Parking***		54,782	27,300	54,600	136,682	(12.6)
	Bus Fleet	21,600	23,040	50,490	118,260	213,390	(19.7)
	Sub-Total	21,600	79,074	112,992	185,305	398,971	(36.8)
	Total	133,921	216,677	352,188	382,221	1,085,007	
	(%)	(12.3)	(20.0)	(32.5)	(35.2)	(100.0)	

Notes: * Including costs of detailed engineering and supervision.

** Including costs of traffic amusement park.

*** Estimated on the assumption that all the off-street parking demand will be supplied by four-storied parking buildings.



Main Volume

MAIN VOLUME

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Chapter 1 INTRODUCTION

1. INTRODUCTION

1.1 Background

The Greater Metropolitan Area of George Town, Butterworth and Bukit Mertajam (Penang Metropolitan Area), located in northwest Peninsular Malaysia comprises the second largest metropolis in Malaysia.

This metropolis has serious urban transport problems due to intensive industrial and other developments undertaken in the area, as well as the rapidly increasing number of private vehicles, particularly within the Central Business Districts (CBD) of George Town and Butterworth.

At present, ferries operated by the Penang Port Commission ply between Penang Island and Province Wellesley. This service is, however, already fully utilized during festive seasons, and will reach maximum capacity by the mid 1980's. In view of this situation, it is the intention of the Government to construct the Penang Bridge connecting Penang Island with Province Wellesley. The opening of the Penang Bridge is expected to result in drastic changes in the present transport pattern.

In this connection, the Government of Malaysia requested the Government of Japan to conduct an Urban Transport Study in the Metropolitan Area in 1978. In response to this request, the Government of Japan, through its implementing body, Japan International Cooperation Agency, has been carrying out this study jointly with the Government of Malaysia since March, 1979.

In light of the expected changes, it is imperative that improvements to the transport system be urgently carried-out. In order to do this most effectively, this overall plan for the urban transport system was formulated to guide appropriate remedial actions in both George Town and Butterworth.

1.2 Objective of the Study

The objectives of the study therefore are to formulate a master plan for the urban transport system of George Town, Butterworth and Bukit Mertajam, taking into consideration the various development projects (such as the Penang Bridge project), to recommend major transport policies and to suggest an order of priority for the undertaking of these policies.

1.3 Study Area

The study area covers the Greater Metropolitan Areas of George Town, Butterworth and Bukit Mertajam and their neighbouring districts. The area for the study has been selected to encompass both the existing developed areas and the surrounding areas where development is most likely to occur in the future.

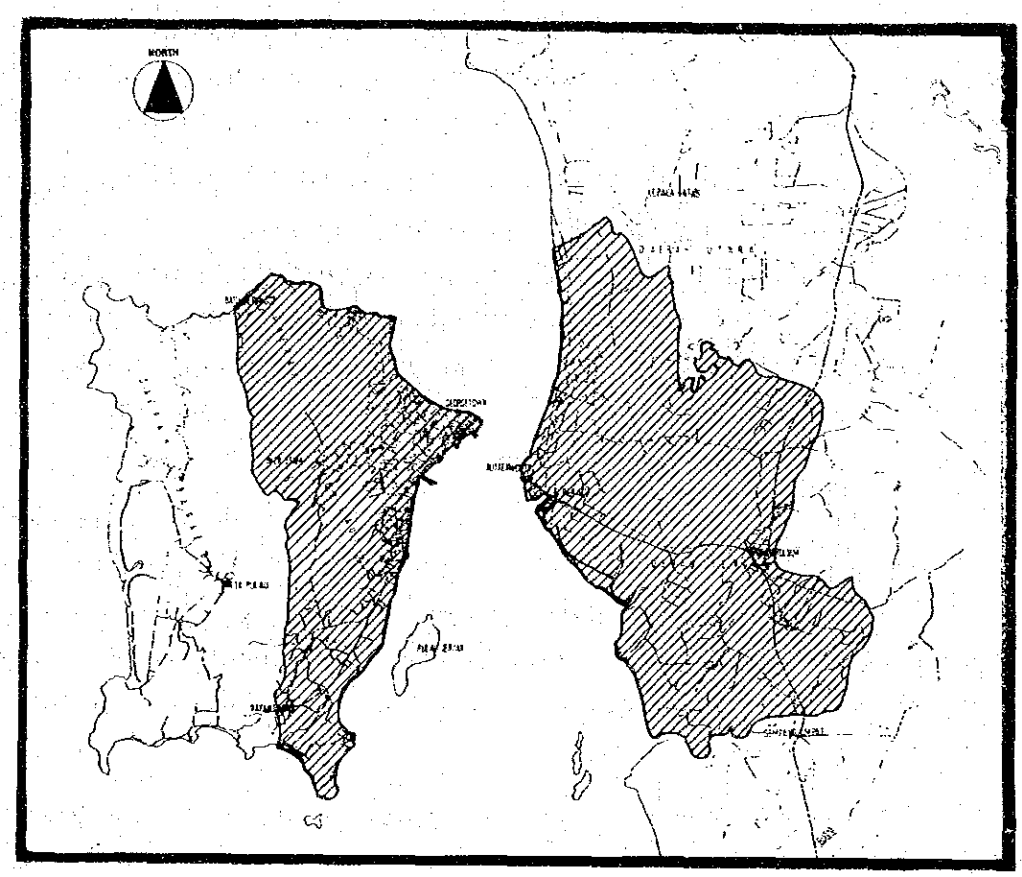

Fig. 1.1 Study Area

1.4 The Study Approach

Alternative solutions were considered for the many problems on transport related matters facing the Greater Metropolitan Area of George Town, Butterworth and Bukit Mertajam. The method of study and general study procedure are outlined in Figs. 1.2 and 1.3 respectively.

Study recommendations are grouped into the following two (2) planning programs:

1. Short term planning
2. Long term transport planning

The essence of the short-term actions is to meet the existing problems and at the same time to face the future problems which will be generated when the Penang Bridge is opened.

The study focuses on three (3) main areas:

1. Traffic Engineering and Management.
2. Construction and Improvement of Roads.
3. Public Transport Operation and Management.

The longer term transport planning is concerned with broad structural planning covering all sectors of transport activity such as carriage on highways, bus transport, and other public transportation including the ferry.

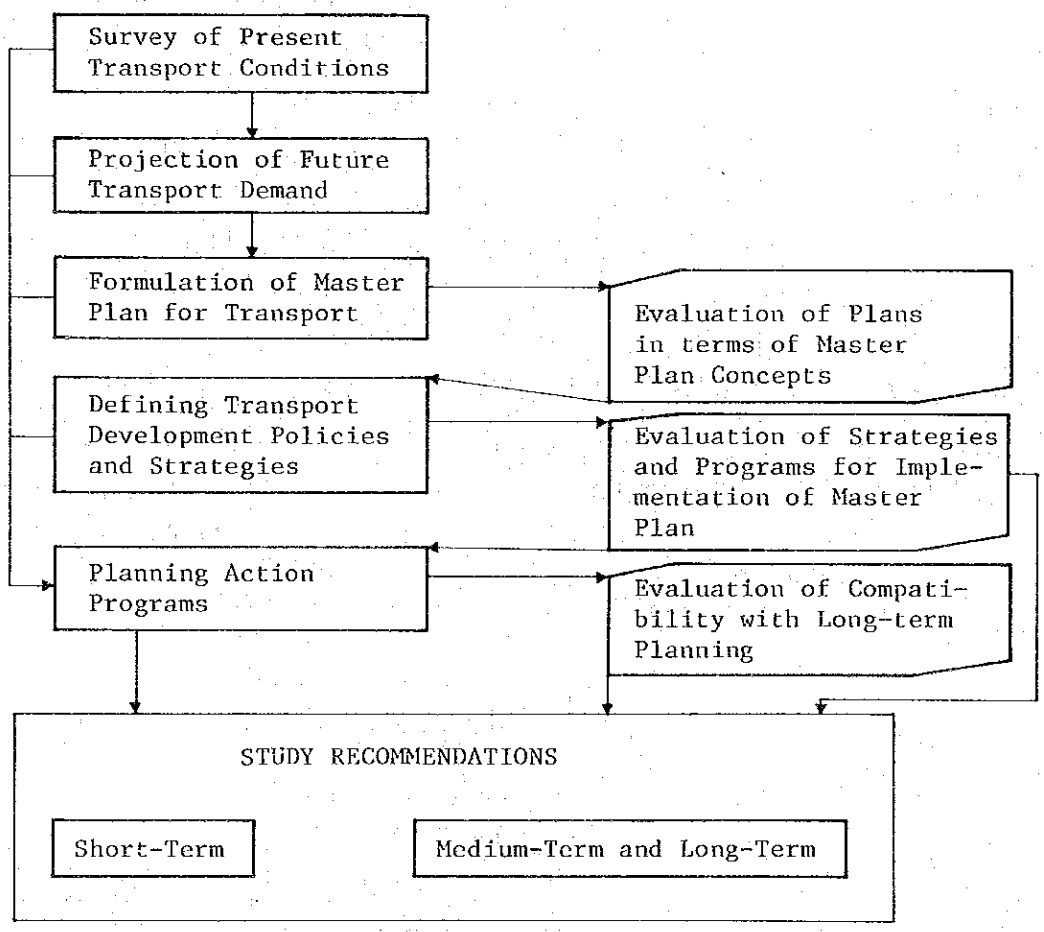

Fig. 1.2 Study Approach

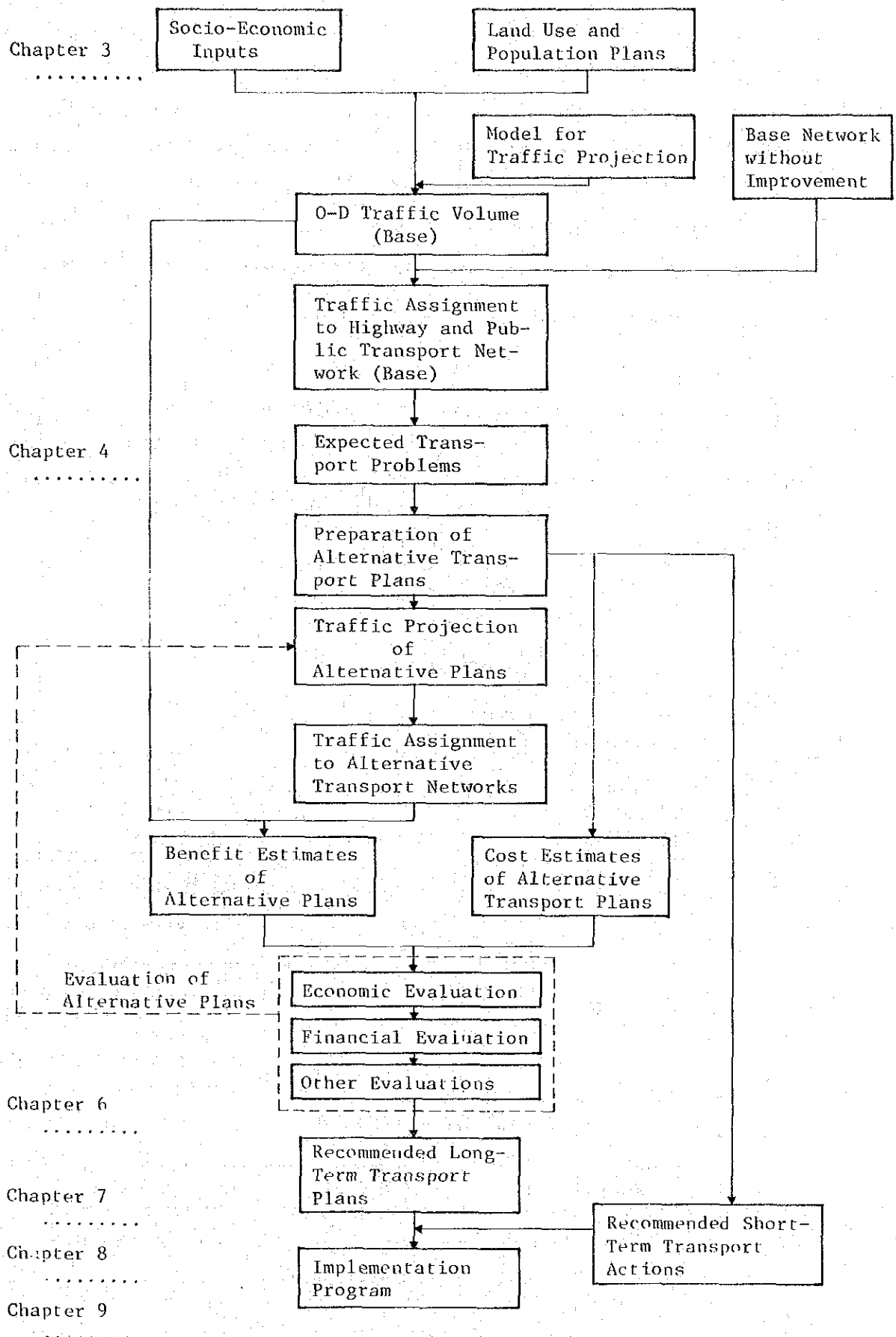

Fig. 1.3 General Procedure of the Study

1.5 Project History

Acting on the request of the Government of Malaysia (G.O.M.), JICA dispatched a preliminary survey mission in November, 1978. The scope of work for conducting the Urban Transport Study in the Greater Metropolitan Areas of George Town, Butterworth and Bukit Mertajam was basically agreed upon by both Governments.

The study formally started on 25th March, 1979 with the arrival of three (3) members of the Supervisory Committee (JICA) headed by Prof. Takashi Inouye and three (3) members of the study team. At the beginning of the study, an Inception Report prepared by JICA was submitted to the G.O.M. and a joint meeting of the steering committee (G.O.M.), the supervisory committee and the study team (JICA) was held in order to formulate a framework for the study.

Three (3) Supervisory Committee members arrived on 29th July, 1979 and a Progress Report was submitted to the G.O.M. On the basis of the Progress Report, a second steering committee meeting was jointly held with the Supervisory Committee and the study team to discuss the progress of the study.

Prof. Takashi Inouye with two (2) members of the Supervisory Committee arrived on 23rd October, 1979, and a third joint meeting was held in order to discuss alternative transport plans and major projects for the feasibility study phase.

The Supervisory Committee members arrived on 29th November, 1979 and an Interim Report was submitted to the G.O.M. On the basis of the Interim Report, a fourth steering committee meeting was held in order to discuss the interim conclusions.

For the purpose of preparing the Draft Final Report, two (2) members of the Supervisory Committee arrived on 7th February, 1980 and discussed the final recommendations for the Master Plan Study.

On 14th March, 1980 a steering committee meeting was held in order to discuss the Draft Final Report submitted. Comments arising from this meeting were considered in preparation of this final report.

1.6 Study Organization

The organization of the study is composed of the following supervisory and working groups:

1.6.1 Steering Committee, Government of Malaysia

Bashah Nordin - (Chairman)
Economic Planning Unit

Zaidan Bin Haji Othman
Highway Planning and Public Transport Unit

Liew Hon Yong
Treasury

Thilagadurai
Ministry of Communication

Hasnan Itam
Ministry of Communication

Juderi Bin Sadinan
Public Works Department Headquarters, Kuala Lumpur

Yoon Shee Leng
Public Works Department Headquarters, Kuala Lumpur

Aw Kheng Huat
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Koh Kok Ee
Public Works Department, Penang

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Ong Chow Meng
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1.6.2 Technical Committee, Government of Malaysia

Zuhuri Bin Saleh - (Chairman)
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Khoo Theam Hooi
Public Works Department, Penang

Khoo Soo Theong
Public Works Department, Penang

Chew Sin Liang
Public Works Department, Penang

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Town & Country Planning Department, Penang.

Chong Kui
Town & Country Planning Department, Penang

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Hua Keng Tong
Municipal Council of Penang Island

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Municipal Council of Seberang Perai

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Idris Bin Muda
Penang Port Commission

Abdul Aziz Bin Ujang
Chief of Penang Traffic Police

Tuffile Nawab Din
Butterworth District Police

Abdul Aziz Bin Navi
Bukit Mertajam District Police

1.6.3 Supervisory Committee, Government of Japan

Takashi Inouye - (Chairman)
Professor, Yokohama National University

Kazuo Yoda
Ministry of Construction

Takeshi Shiina
Ministry of Construction

Takeshi Kurokawa
Associated Professor, University of Tsukuba

Koumei Asano
Ministry of Construction

Yasutaka Tsuruno
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Hiroshi Yamano
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Hirohide Konami
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Road Planning

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City Planning

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Transport Facility Planning

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Shigeru Okutsu
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Kokuro Hanawa
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Junichi Shimada
Planning of Ports and Harbours

Hikaru Nishimura
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