

## 5. IMPLEMENTATION PROGRAMME AND INVESTMENT REQUIREMENT

### 5-1 SUMMARY

Table 7 summarizes the implementation programme for the short-term (1983 – 85), medium-term (1986 – 90) and long-term (1991 – 2000) periods, such as the recommended improvements for roads, public transport system, private vehicle restraints and traffic engineering and management. (See Fig. 36)

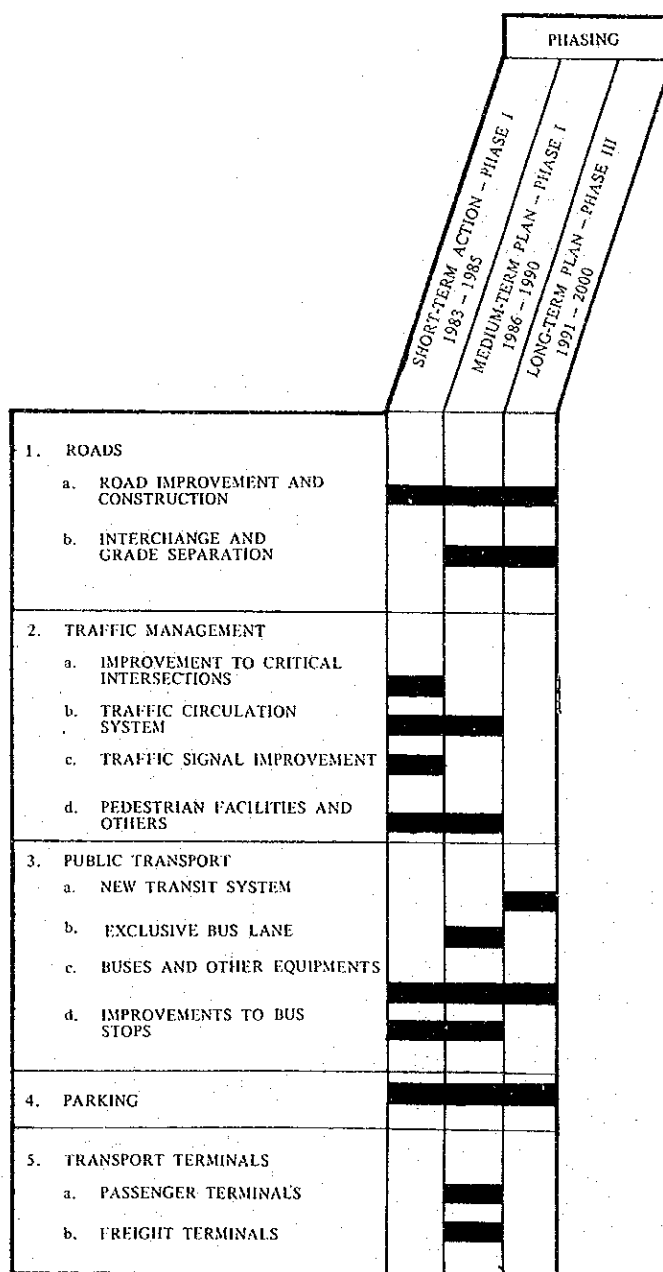


FIG. 36 RECOMMENDED PHASING PLAN

Estimated capital investment in transport facilities and equipment by both the public and private sectors in the years to 2000 is estimated at \$1,437,130. Table 7 shows that new and improved roads will require investment totalling nearly \$981,370. Short and medium term traffic engineering and management improvements will entail a further \$15,600,000. Public transport will require \$395,140,000, about ten (10) per cent of which will be for buses and equipment to be provided by the private sector.

TABLE 7 SUMMARY OF INVESTMENT COST BY TRANSPORT FACILITY

Transport Facility	Capital Cost ('000 \$)
<b>Road</b>	
Improvement of Existing Roads and Construction of New Roads	939,870
Interchanges and Grade Separations	41,500
Sub-Total	981,370
<b>Public Transport</b>	
New Transit System	341,480
Bus Exclusive Lane	670
Buses and Other Equipment	48,500
Improvement of Bus Stops	4,490
Sub-Total	395,140
<b>Traffic Management</b>	
Improvement of Critical Intersections	2,000
Traffic Circulation System in CBD	10,150
Traffic Signal Improvement	1,530
Pedestrian Facilities and Others	1,920
Sub-Total	15,600
<b>Parking</b>	
Off-Street Parking in Central Business Area	20,360
<b>Transport Terminals</b>	
Passenger Terminal Complex/Bus Terminal	17,677
Freight Terminal	9,449
Sub-Total	27,126
<b>Total of all Programmes</b>	<b>1,439,596</b>

TABLE 8 SUMMARY OF INVESTMENT COST FOR THE CONSTRUCTIONS  
AND IMPROVEMENTS OF ROADS BY PHASE

No. of Roads	Name of Roads	Number of Lanes	Total Length (km)	Phase			Project Cost ('000 \$)
				1 1983-1985	2 1986-1990	3 1991-2000	
1	Johor Bahru -- Pasir Gudang Southern Link	4 & 6	14.0				113,720
2	East Coast Road in MPJB	4 & 6	9.7				109,940
3	West Coast Road in MPJB	4 & 6	7.3				32,260
4	Federal Route 1 in MPJB	6	10.8				17,250
5	Jalan Tebrau	6	11.0				49,070
6	West Access to Toll Express Way	2 4	6.2				19,640
7	Inner Ring Road	4	5.1				58,960
8	Lorry Route	2	2.7				16,040
9	Jalan Tampoi	4	7.4				19,050
10	Jalan Yahya Awal	4	3.8				10,690
11	Jalan Kebun Teh and its Extension	4	3.8				13,300
12	Jalan Langkasuka and its Crossing	2 4	6.0				22,610
13	Jalan Stulang Baru	2 4	2.0				6,260
14	Jalan Serampang	4	2.0				4,940
15	Jalan Pasir Pelangi	2 & 4	3.0				12,250
16	Tampoi -- Skudai Road	4	8.5				19,230
17	Pelentong Road	4	10.6				18,720
18	Masai Road	2	14.8				47,980
19	North South Connectors	4	4.0				8,560
20	Road Improvement in Taman Century	2	3.5				1,750
21	Road Improvement in New Development Area	2	5.2				2,600
	JB -- P. Gudan Sub-Total		141.4	50,350	260,196	294,274	604,820

No. of Roads	Name of Roads	Number of Lanes	Total Length (km)	Phase			Project Cost ('000 \$)
				1	2	3	
31	East Coast Federal Road	4	40.0				68,040
32	Federal Route 1	4	13.6				23,500
33	Senai – Pengerang Road	2	44.1				81,070
34	P. Gudang – Kota Tinggi Road	2	24.6				34,550
35	Port Access Extension	4	8.4				44,570
36	Skudai – Pontian Road	2 & 4	13.6				20,000
37	Seelong – Sg. Danga Road	2	27.4				10,960
38	Airport Access Extension	2 & 4	8.2				16,360
	Outer Area Sub-Total		179.9	77,420	23,500	198,130	299,050
S-1	Causeway Improvement Scheme (Medium Term)						
S-2	Second Causeway and its Related Roads						
	Special Project Sub-Total				36,000	(246,650)	36,000 (282,650)
	Total		321.3	127,770	319,696	492,404 (739,054)	939,870 (1,186,520)

5-2 PHASE I (SHORT TERM: 1983 - 1985); IMPLEMENTATION PROGRAMME AND INVESTMENTS

TABLE 9 PHASE I (SHORT TERM: 1983 - 1985); IMPLEMENTATION PROGRAMME AND INVESTMENTS \*1

Programme Category	Action to be Taken	Major Facility Cost ( x 1,000 \$)
1. Traffic Engineering	<ul style="list-style-type: none"> <li>a. Implementation of the interim traffic disposal and circulation plan.</li> <li>b. Improvement of traffic regulatory measures such as marking and traffic signs.</li> <li>c. Improvement of visibility and timing of existing signals extension of signal lights and introduction of pedestrian signals at key locations.</li> <li>d. Installation of pedestrian crossings and sidewalks in CBD including introduction of pedestrian mall on the Jalan Meldrum.</li> <li>e. Implementation of intersection improvements.</li> <li>f. Installation of information boards.</li> <li>g. Covering Sungai Segget.</li> </ul>	
	<b>SUB-TOTAL</b>	<b>4,120</b>
2. Construction and Improvement of Roads	<ul style="list-style-type: none"> <li>a. Widening of Jalan Tebrau.</li> <li>b. Upgrading of two federal roads - Jalan Kota Tinggi and Jalan Pontian.</li> <li>c. Engineering study of the projects for phase 2.</li> <li>d. Construction and improvement of Senai - Ulu Tiram Road.</li> <li>e. Implementation of renovation plan on the causeway.</li> <li>f. Engineering and economic study on the causeway.</li> </ul>	
	<b>SUB-TOTAL</b>	<b>127,770</b>
3. Public Transport System; Bus Transport/Taxi	<ul style="list-style-type: none"> <li>a. Improvement of bus operations to enhance reliability, punctuality and comfort.</li> <li>b. Realignment of bus routes and expansion of bus routes to serve newly developed area.</li> <li>c. Courtesy campaign aimed at bus-users.</li> <li>d. Replacement of over-age buses and addition of new buses; establishment of cooperative work shop for repair and maintenance.</li> <li>e. Review management system of bus company including accounting and reporting procedure.</li> <li>f. Establishment of public transport committee.</li> </ul>	

TABLE 9 (Cont'd)

Programme Category	Action to be Taken	Major Facility Cost ( x 1,000 \$)
	g. Provision of both town taxi and out-of-town taxi stands. h. Elimination of pirate taxis.	
	<b>SUB-TOTAL</b>	<b>8,540</b>
4. Urban Transport Facility	a. Design study for urban transport passenger terminal complex. b. Improvement of Jalan Trus bus terminal. c. Engineering study for bus terminal and freight terminal.	
	<b>SUB-TOTAL</b>	<b>2,466</b>
5. Private Vehicle Restraint	a. Enforcement of control parking. b. Development and adoption of parking provision for building. c. Elimination of on-street parking on primary and district distributors and provision of off-street parking facilities. ▲	
	<b>SUB-TOTAL</b>	<b>4,650</b>
<b>TOTAL</b>		<b>147,546</b>

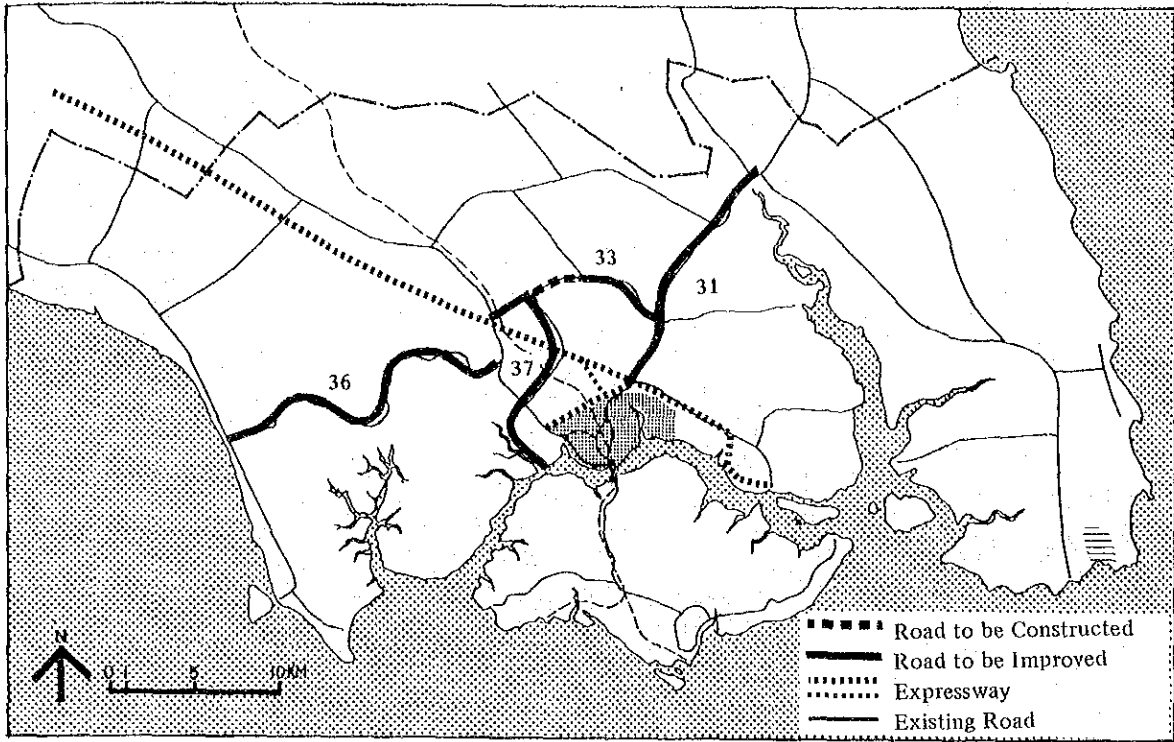


FIG. 37 RECOMMENDED IMPLEMENTATION PLAN PHASE I (1983 – 1985); STUDY AREA

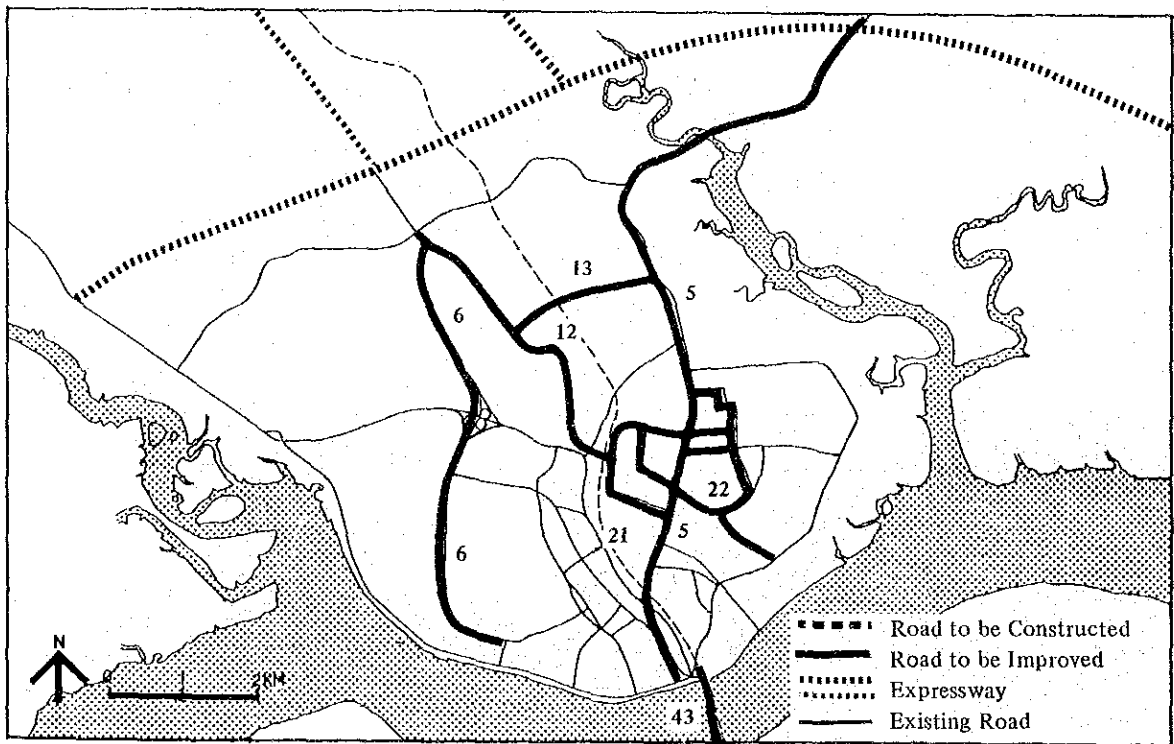


FIG. 38 RECOMMENDED IMPLEMENTATION PLAN PHASE I (1983 – 1985) ; MPJB

5-3 PHASE II (MEDIUM TERM: 1986 - 1990) IMPLEMENTATION PROGRAMME  
& INVESTMENT

TABLE 10 PHASE II (MEDIUM TERM; 1986 - 1990);  
IMPLEMENTATION PROGRAMME AND  
INVESTMENTS

Programme Category	Action to be Taken	Major Facility Cost ( x 1,000 \$)
1. Traffic Engineering and Management	a. Implement the causeway traffic disposal scheme.	
	<b>SUB-TOTAL</b>	<b>11,480</b>
2. Construction and Improvement of Roads	a. Widening of Jalan Tebrau to six-lane.	
	b. Construction and Improvement of Toll Expressway Access Road.	
	c. Construction of Johor Bahru - Pasir Gudang Southern Linkage and Related Roads.	
	d. Construction and improvement of Inner Ring Road/Lorry Route.	
	e. Widening of Federal Route No. 1 from Senai to Kulai.	
	f. Interchanges and Grade Separations	
	<b>SUB-TOTAL</b>	<b>355,196</b>
3. Public Transport System	a. Continued improvement of bus operation.	
	b. Continued route realignments and expansion of bus routings.	
	c. Introduction of exclusive bus lane on Jalan Tebrau and Johor Bahru - Pasir Gudang Southern Linkage.	
	d. Revision of CBD bus routing and introduction of bus lane in CBD.	
	e. Replacement of over-age buses and addition of more buses.	
	f. Study for introduction of public transport system between Johor Bahru and Pasir Gudang.	
	<b>SUB-TOTAL</b>	<b>11,920</b>
4. Urban Transport Facilities	a. Construction of transport passenger terminal complex facility.	
	b. Construction of bus and freight terminals.	
	<b>SUB-TOTAL</b>	<b>24,660</b>
5. Private Vehicle Restraint	a. Continued enforcement of control parking.	
	b. Continued elimination of on-street parking.	
	c. Provision of off-street parking.	<b>5,570</b>
<b>TOTAL</b>		<b>408,826</b>



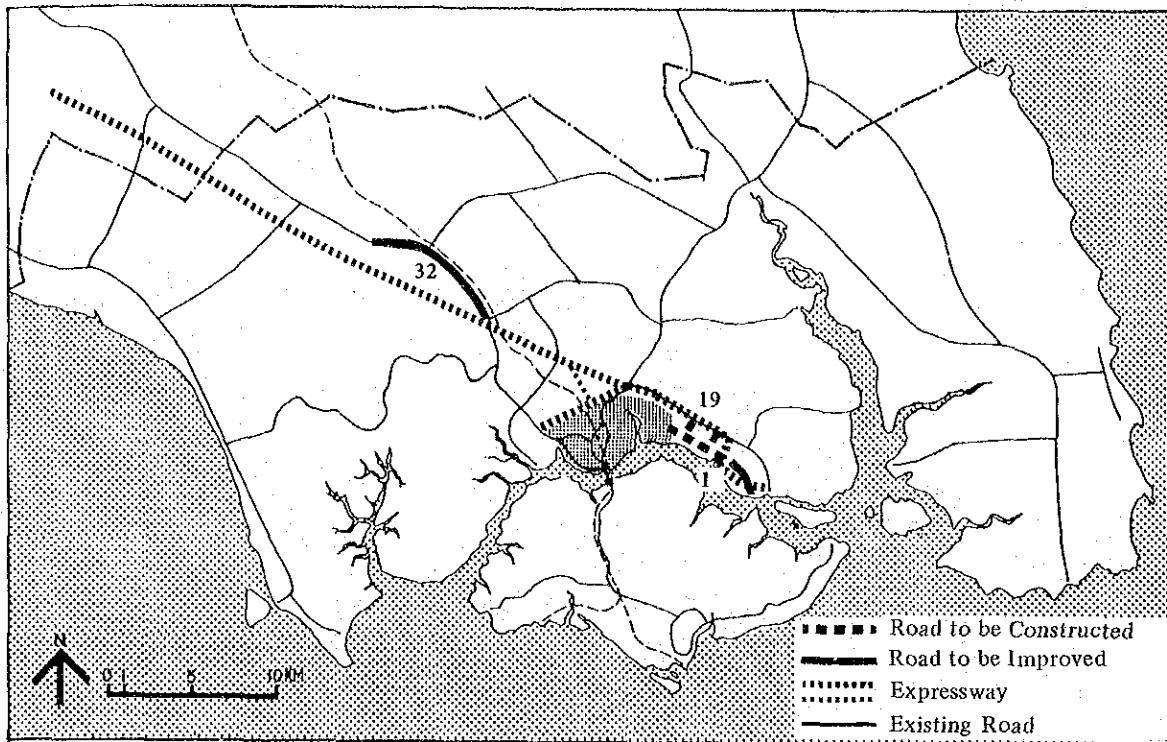


FIG. 39 RECOMMENDED IMPLEMENTATION PLAN PHASE II (1986 – 1990) ; STUDY AREA

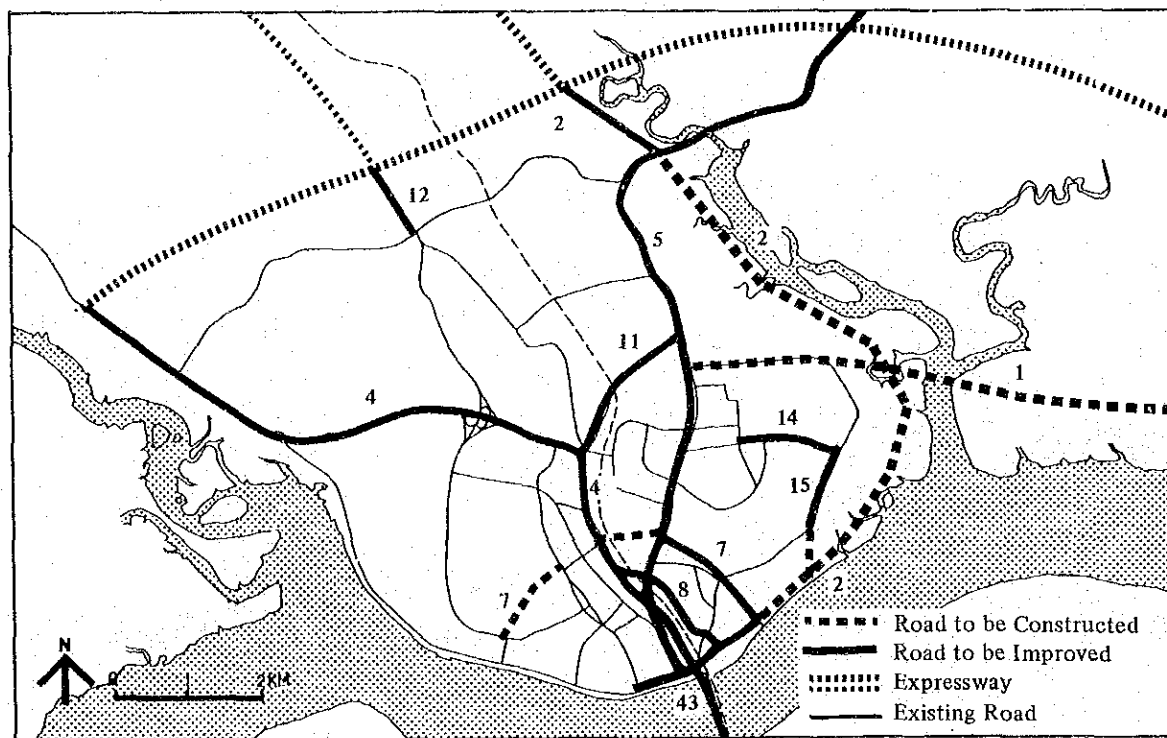


FIG. 40 RECOMMENDED IMPLEMENTATION PLAN PHASE II (1986 – 1990) ; MPJB

5-4 PHASE III (LONG TERM: 1991 - 2000); IMPLEMENTATION PROGRAMME AND INVESTMENTS

TABLE 11 PHASE III (LONG TERM; 1991 - 2000);  
IMPLEMENTATION PROGRAMME AND  
INVESTMENTS

Programme Category	Action to be Taken	Major Facility Cost (x 1,000 \$)
1. Construction and Improvement of Roads	a. Implementation of all phase 3 and 4 road construction and improvement projects.	
	b. Interchanges and grade separations.	
	<b>SUB-TOTAL</b>	<b>498,404</b>
2. Public Transport	a. Continued expansion of bus routing.	
	b. Introduction of new transit system between Johor Bahru and Pasir Gudang.	
	c. Introduction of commuter services for Malayan Railway.	
	d. Replacement of over-age buses and addition of more buses.	
	<b>SUB-TOTAL</b>	<b>374,680</b>
3. Private Vehicle Restraints	a. Continued review and monitoring of traffic operating conditions.	
	b. Examination of possibility of introducing cordon pricing to the CBD.	
	c. Off-street parking in CBD.	
	<b>SUB-TOTAL</b>	<b>10,140</b>
<b>TOTAL</b>		<b>883,224</b>

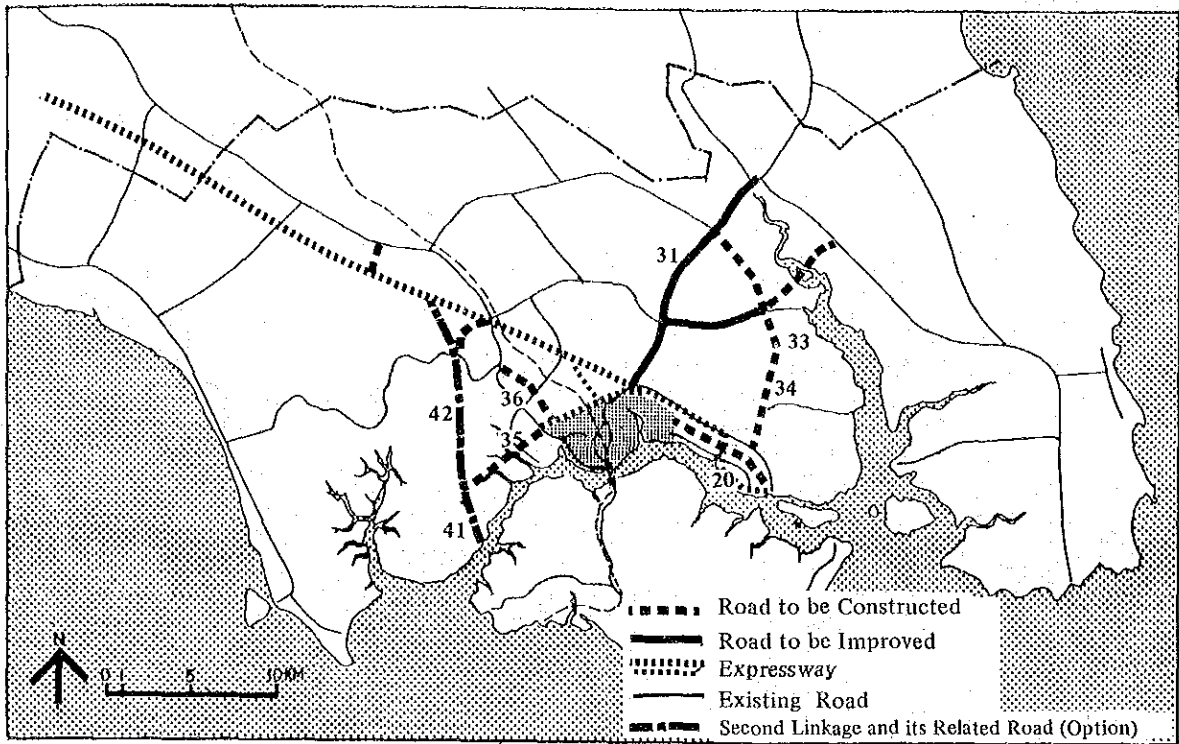


FIG. 41 RECOMMENDED IMPLEMENTATION PLAN PHASE III (1991 – 2000) ; STUDY AREA

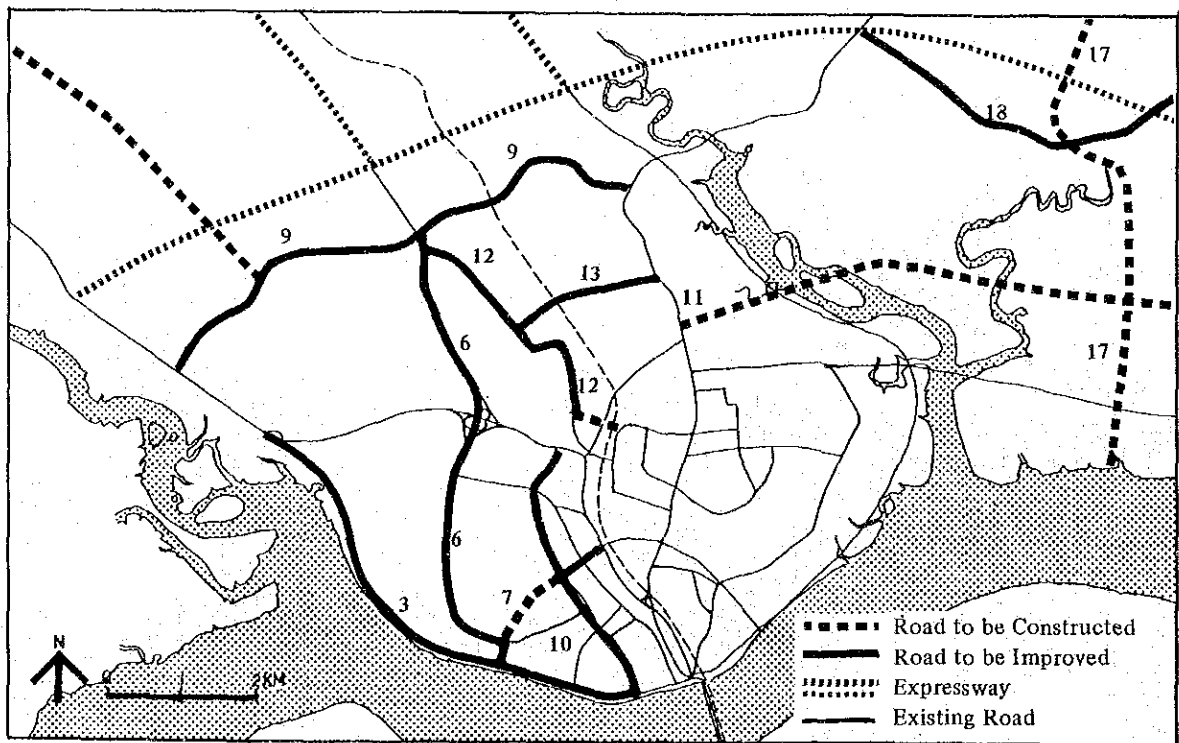


FIG. 42 RECOMMENDED IMPLEMENTATION PLAN PHASE III (1991 – 2000) ; MPJB



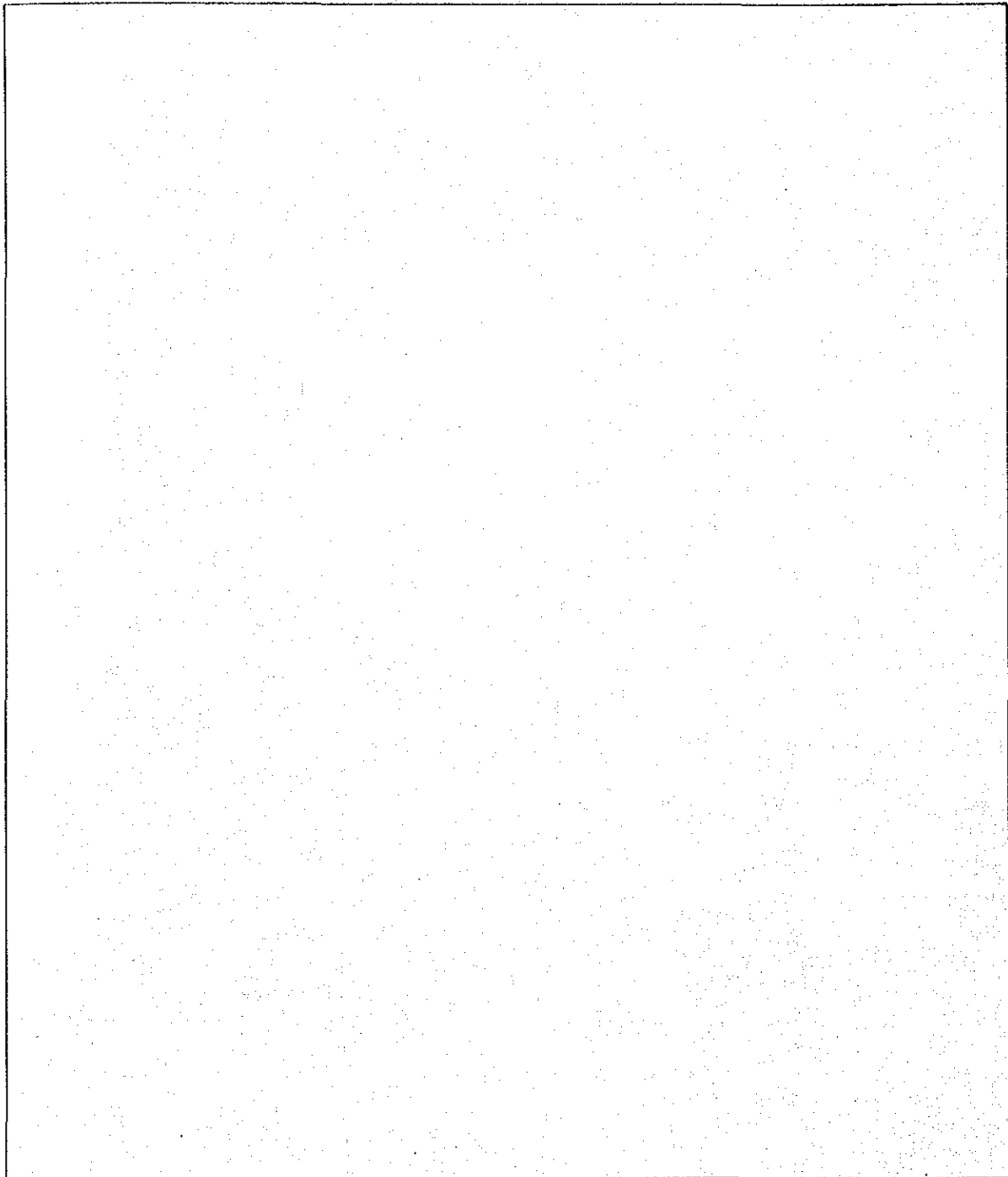
## AFTERWORD

This report shows what implications the New Economic Policy predictions have for urban transport problems, specifically in the Johor Bahru Area.

If economic development and urban population concentration proceed as the policy forecasts, the transport demand generated will be tremendous and the existing urban transport system in Johor Bahru will need to be markedly altered. As can be seen from Japan's past example, the cost-effectiveness of investment in improvements diminishes once the pace of urbanization picks up. Urban improvements must precede development. What is needed for this purpose is a master plan-based, incremental approach which establishes definite priorities through feasibility studies and implements projects in their order of importance. With effort on the part of those concerned, Johor Bahru can develop into an exemplary city.



# MAIN VOLUME

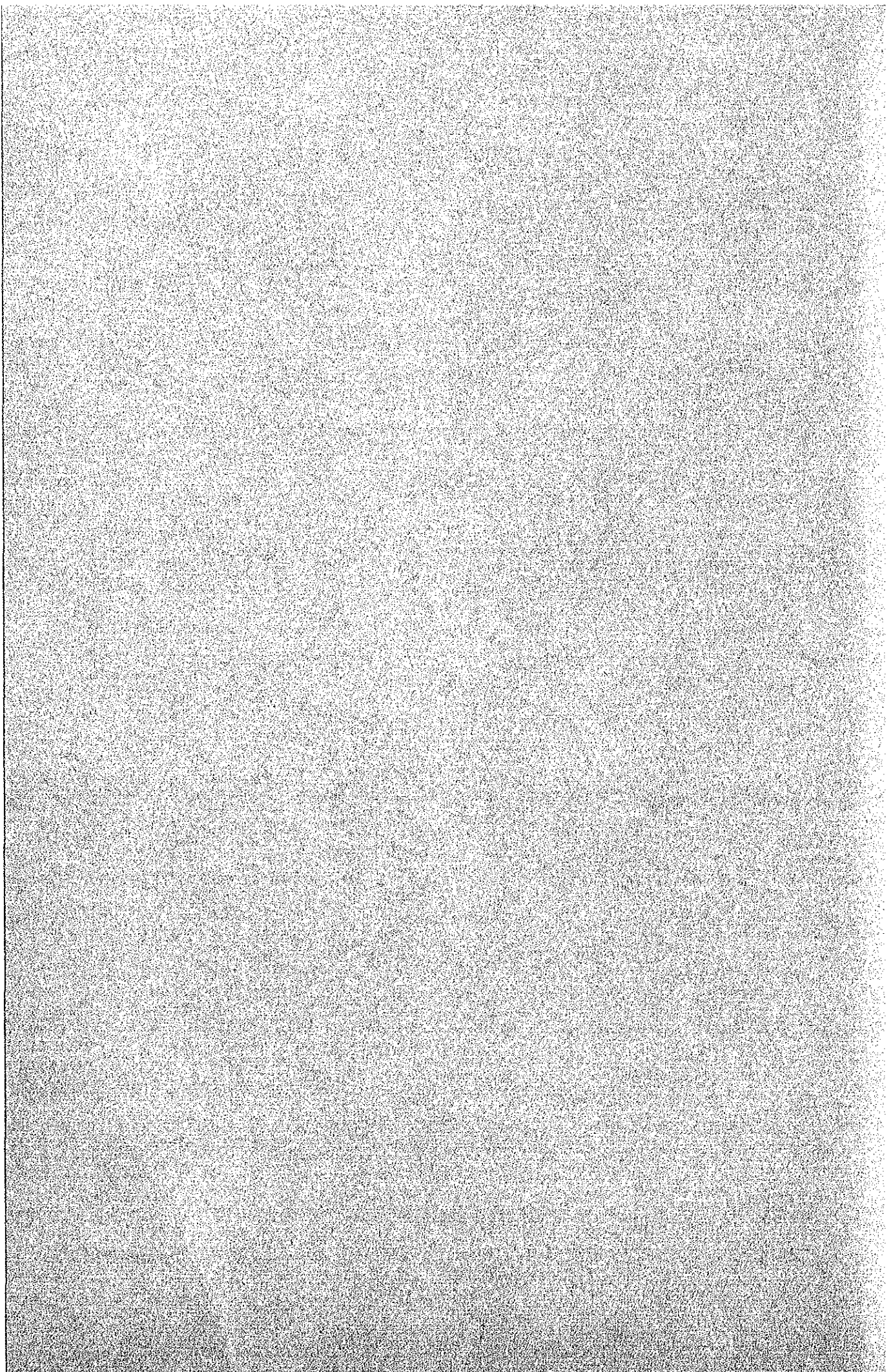






**Chapter 1      URBAN TRANSPORT CONDITIONS**

---



## 1-1 Survey Conducted

### 1 Contents of Survey

In order to formulate an appropriate transport master plan, it is necessary to obtain transport data. Therefore, an "Origin and Destination Survey", with both a Vehicle Owner Interview Survey for car trip and a Home Interview Survey for person trip, was carried out in September and November, 1981. The main contents of the survey are as follows:

- \* Vehicle Owner Interview Survey
- \* Home Interview Survey
- \* Cordonline Interview Survey
- \* Screenline Traffic Count Survey

### 2 Results of the O-D Surveys

The total sample size and sampling rate of the O-D survey were as follows:

#### (1) Owner Interview Survey

The total sample size and sampling rate of the owner interview survey were as follows:-

Table 1.1 Result of Owner Interview Survey

	Motor Car	Motor Cycle	Total
Total Nos. of Vehicle in Study Area	42,441	44,289	86,730
Number of Sample Interviewed	5,443	4,280	9,723
Number of Taxi Interviewed	82	-	82
Total Interviewed	5,525	4,280	9,805
Sample Rate (%)	13.0	9.7	11.3

N.B.: Motorcars include cars, lorries, taxis and buses.

## (2) Home Interview Person Trip Survey

As a supplement to the Owner Interview Survey and as a means of getting information for the model, random members from 2 per cent of the living quarters/households in the Study Area were interviewed and the result of the survey was as shown in Table 1.2.

Table 1.2 Results of Home Interview Survey

	Members of sampled Household above 7 yrs. old		Interviewed		Not Interviewed	
	No.	%	No.	%	No.	%
Male	4,402	100	4,078	92.6	324	7.4
Female	4,194	100	3,928	93.7	266	6.3
Total	8,598	100	8,006	93.2	587	6.8

## (3) Cordon Line and Screen Line Survey

Six (6) survey stations on the Cordon Line and eight (8) survey stations on the screen line were established. On the Cordon Line Survey, more than 6,000 drivers, about 13 per cent of the total traffic volume, were interviewed.

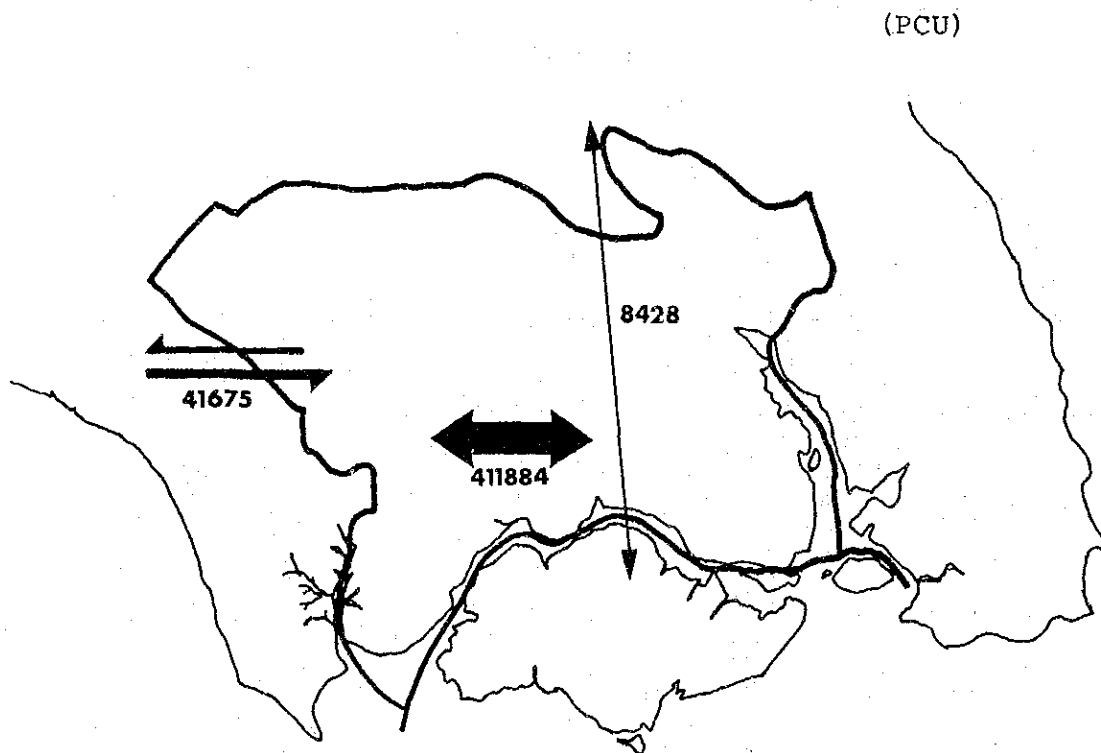
## 1-2 Traffic Characteristics

1. Vehicular O-D in 1981

## (1) Number of trips produced

On the basis of the 1981 O-D surveys, the total number of vehicular trips produced in the Study Area was 462,000 passenger car unit (PCU) per day, of which the number of internal trips was 411,900 PCU per day, while the number of external trips was 41,700 PCU and that of through trips 8,400 PCU. (Refer to Table 3.4.)

Fig. 1.1 General Information of Daily Vehicular Traffic in 1981



Total Number of Trips = 461987

(2) Trip Generation and Attraction

Trip generation and attraction by mukims in the Study Area are shown in Tables 1.5 and 1.6. (Regarding the mukim boundary, refer to Appendix Fig. A.4.).

The largest volume of trips generated and attracted is in MPJB with 557,000 trip ends, (about 69 percent of the total in the Study Area) and the next largest is in Kulai/Senai with 95,000 trip ends (about 12 percent).

(3) Vehicular O-D Pattern

The desired line of the vehicular O-D pattern in 1981 is illustrated in Fig. 1.2.

The vehicular traffic flow between the central and adjacent areas of MPJB is the largest.

1.2.2 Vehicular Traffic on Roads

(1) Traffic flow on Major Roads

The traffic volume on the major roads, based on a traffic volume counting survey conducted in 1981, is illustrated in Figs. 1.3 and 1.4.

From this figure, it can be recognized that the heaviest traffic volume is on Jalan Tun Abdul Razak, Jalan Wong Ah Fook and Jalan Tebrau with about 30,000 PCU per 16 hours.

(2) Vehicle Composition

Fig. 1.5 shows the vehicle composition of traffic volume at selected locations. It can be seen that the composition share of motorcars is bigger than that of any other type of vehicle. It can also be seen that the composition share of lorries is higher on the federal roads than on others.

## (3) Hourly Fluctuation

The hourly fluctuation of traffic flow measured at 5 sites in MPJB is shown in Fig. 1.6. In general, flows tend to build up between 6 to 8 a.m., remain fairly constant throughout the day before approaching another peak between 4 and 8 p.m. after which the volume falls off.

**Table 1.3 Trip Generation by Vehicle Type and Mukims in 1981**

(trip ends/day)

Area	Motorcar	Goods Vehicle	Taxi	Sub Total Vehicle*	Motor-cycle	Total
MPJB	169450	59400	383	229233	49267	278500
Plentong	10125	8065	45	18235	13158	31393
Tg. Kupang Jelutong/Pulai	3225	1917	1	5143	5470	10613
Kulai/Senai	20080	9626	79	29785	17750	47535
Sedenak	1850	1234	18	3102	3565	6667
Tebrau	1586	2739	0	4325	2318	6643
Ulu Sg. Johor K. Tinggi	5665	4726	60	10451	12810	23261
Sg. Tiram	236	78	0	314	736	1050
<b>Total</b>	<b>212217</b>	<b>87785</b>	<b>586</b>	<b>300588</b>	<b>105074</b>	<b>405662</b>

**Table 1.4 Trip Attraction by Vehicle Type and Mukims in 1981**

(trip ends/day)

Area	Motorcar	Goods Vehicle	Taxi	Sub Total Vehicle*	Motor-cycle	Total
MPJB	169441	59470	372	229283	49264	278547
Plentong	10110	8180	51	18341	13138	31479
Tg. Kupang Jelutong/Pulai	3226	1764	1	4991	5434	10425
Kulai/Senai	20091	9538	79	29708	17805	47513
Sedenak	1851	1234	20	3105	3523	6628
Tebrau	1601	2739	0	4340	2350	6690
Ulu Sg. Johor K. Tinggi	5674	4782	63	10519	12823	23342
Sg. Tiram	223	78	0	301	737	1038
<b>Total</b>	<b>212217</b>	<b>87785</b>	<b>586</b>	<b>300588</b>	<b>105074</b>	<b>405662</b>

\* Excluding Buses

Fig. 1.2 Traffic Desire Lines in 1981

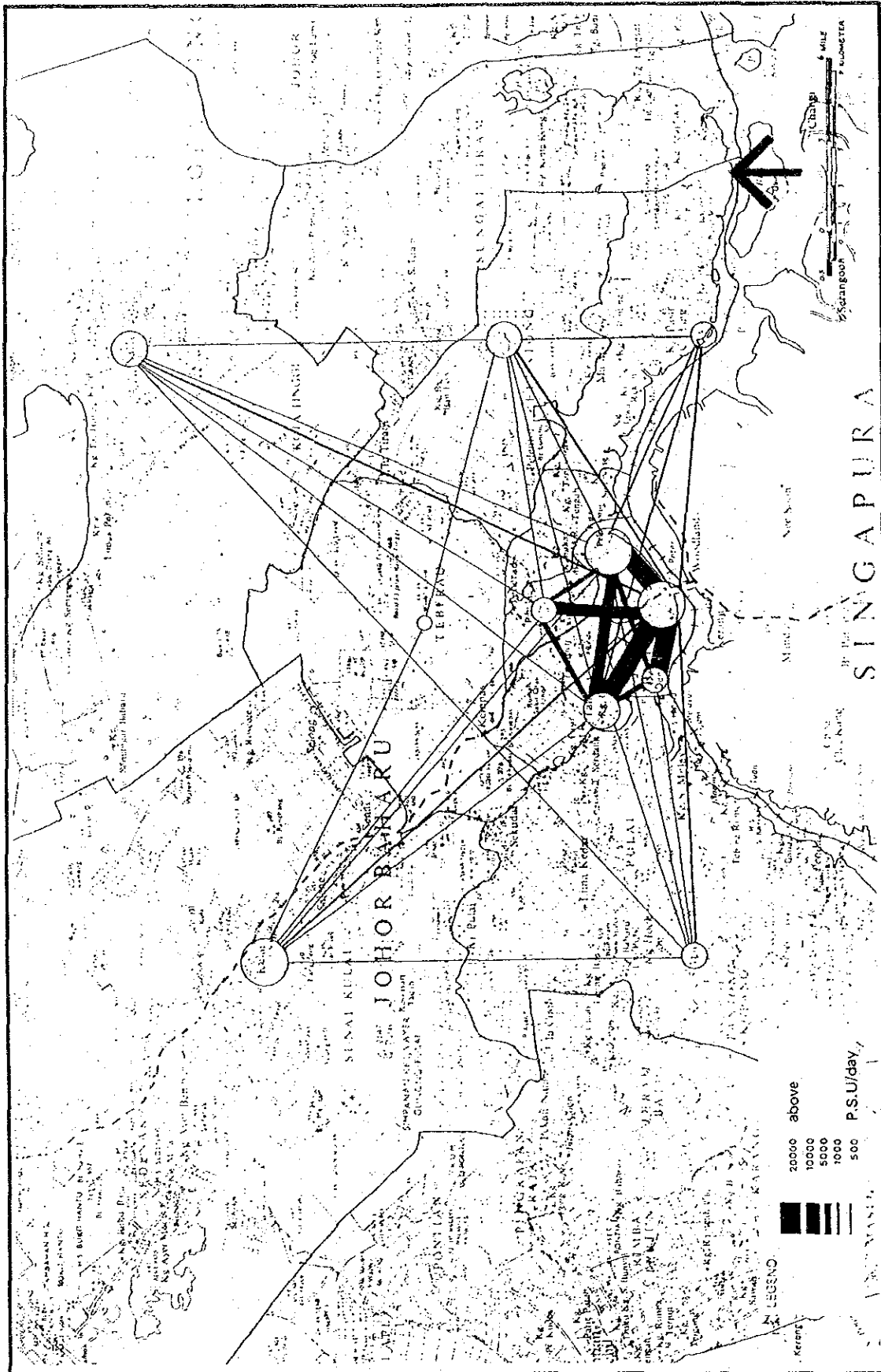




Fig. 1.3 Traffic Volume 1981 (MPJB)

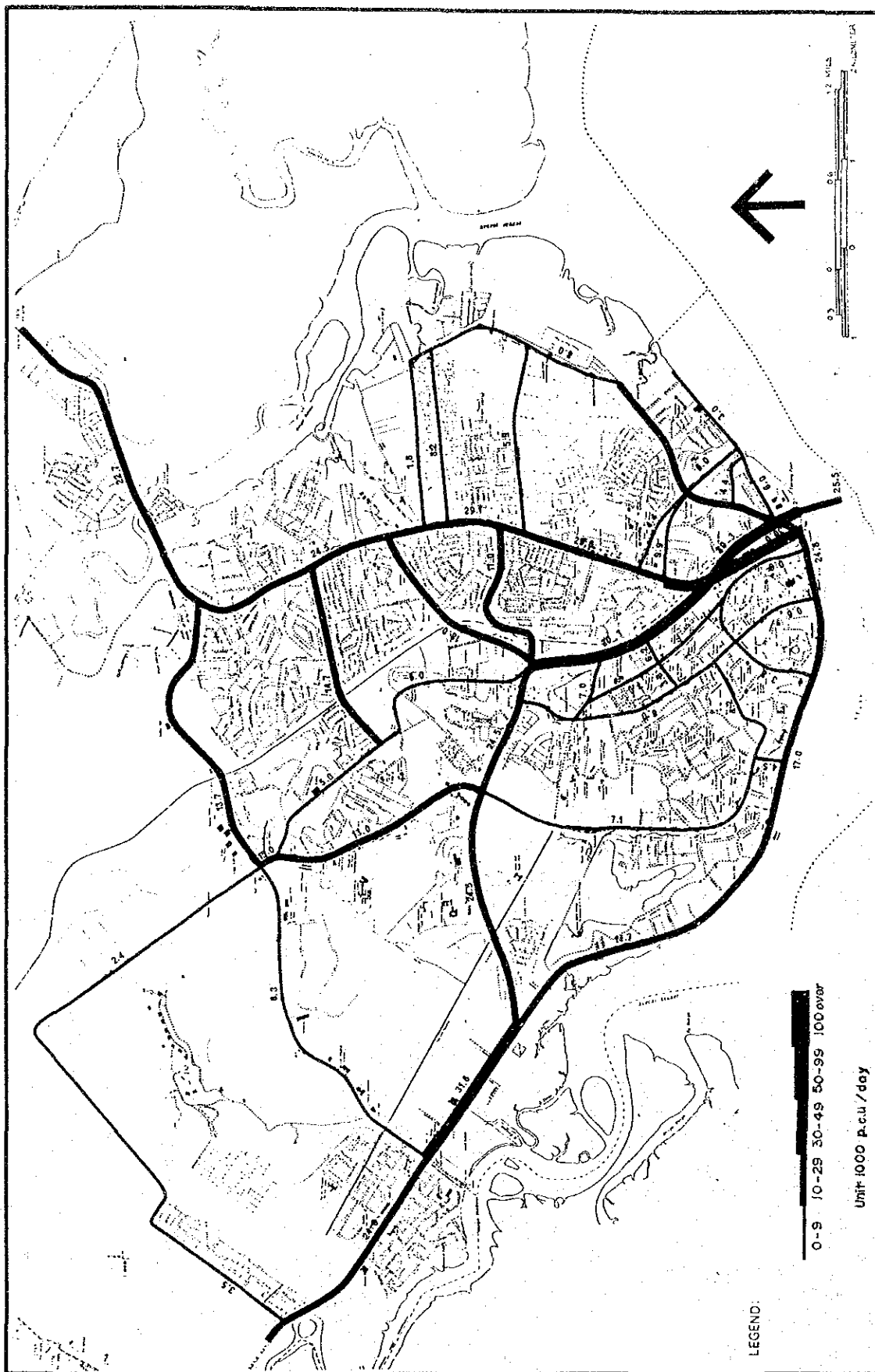


Fig. 1.4 Traffic Volume 1981 (Study Area)

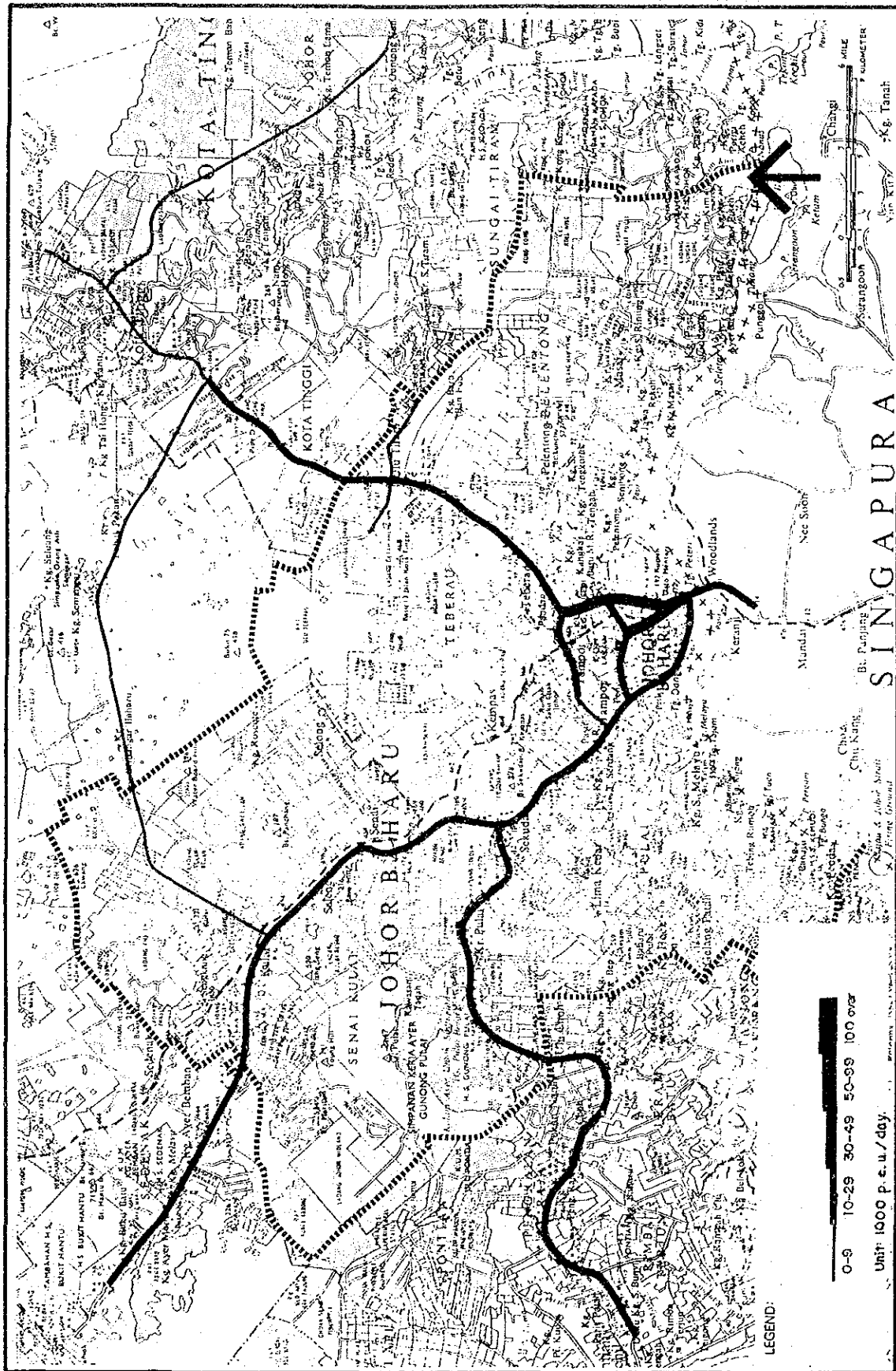


Fig. 1.5 Vehicle Composition on Major Road

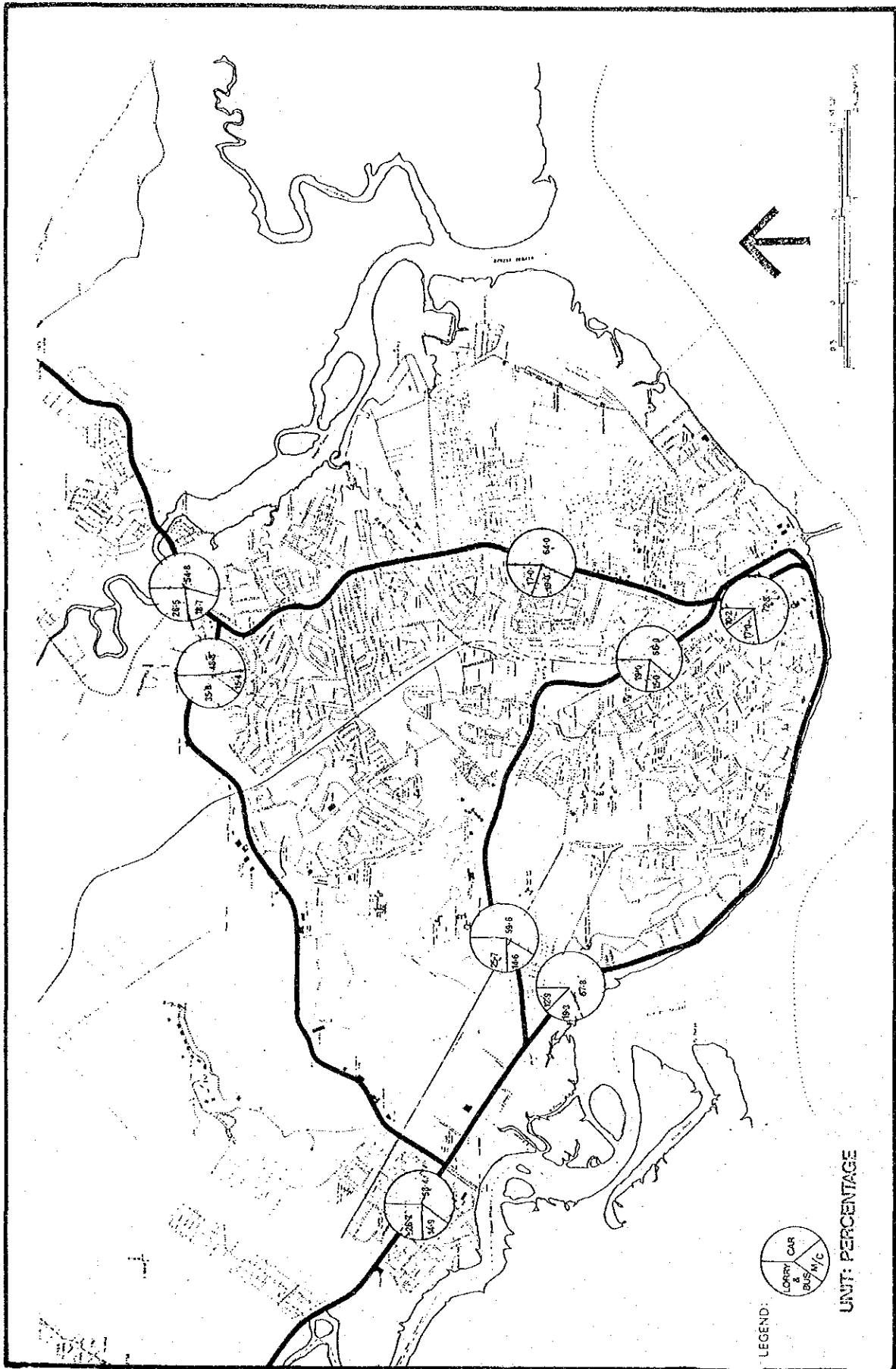
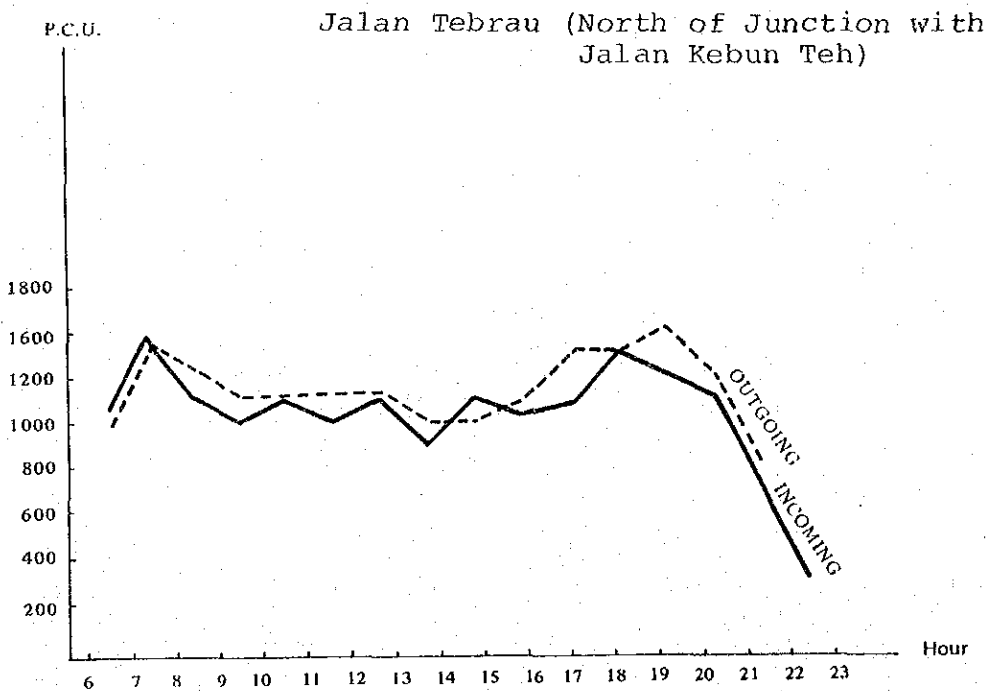
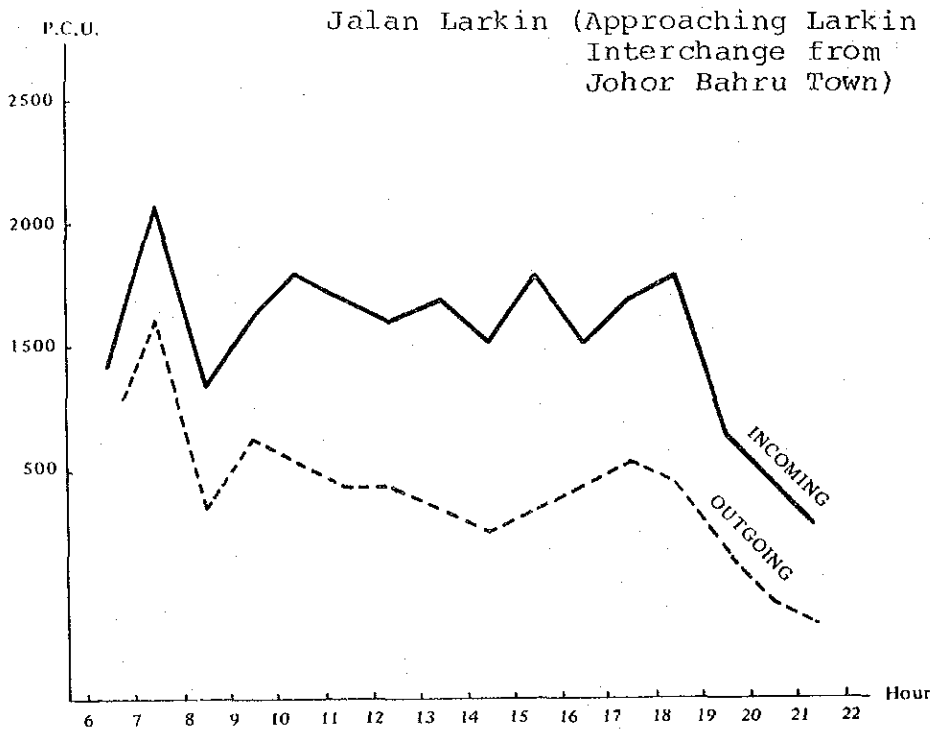


Fig. 1.6 Hourly Fluctuation of Traffic Volume



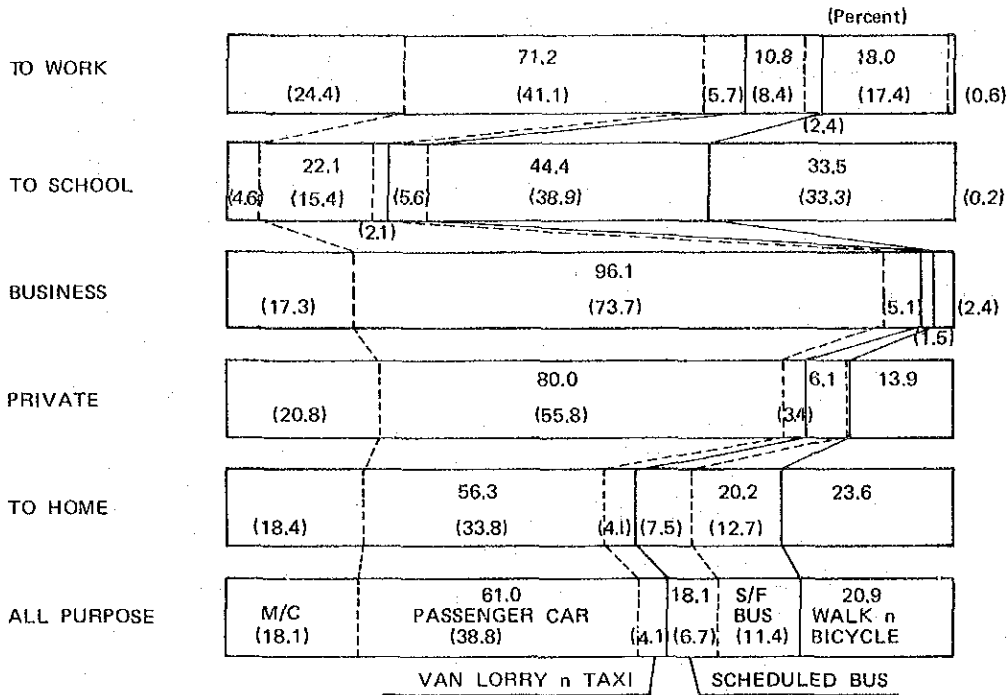
### 3 Person Trip Characteristics

Based on the 1981 Home Interview Person Trip Survey, the total number of person trips produced within the Study Area was 951,000 per day. Therefore, the unit person trip rate per person above 7 years old was about 2.48.

Fig. 1.7 shows the number of person trips by trip purpose. According to this figure, about 320,000 trips or 34 per cent were "to work and school", approximately 170,000 trips or 14 per cent were "private" and only 50,000 trips or 5 per cent were business.

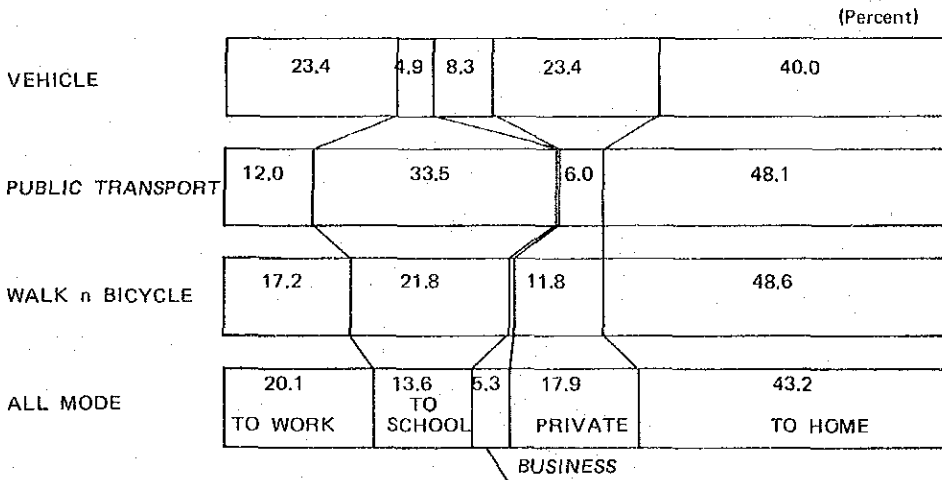
Fig. 1.8 shows the number of person trips by mode and its composition. By this figure, about 61 percent of the total person trip is motor vehicle, 18 percent is bus and 21 percent is non-motor vehicle or walking.

Fig. 1.7 Composition of Mode by Trip Purpose



(Source: Home Interview Person Trip Survey 1981)

Fig. 1.8 Composition of Trip Purpose by Mode



(Source: Home Interview Person Trip Survey 1981)

4 Causeway Traffic

## (1) Traffic Volume

From the owner Interview Survey and Cordon Line Survey carried out by the Study Team, the following causeway traffic volume was found:-

Table 1.5 Origin and Destination of Causeway Traffic

	(P.C.U./day)		
	To Singapore	From Singapore	Total
MPJB	5,577	6,429	12,006
Plentong	520	603	1,123
Tanjung Kupang Jelutong/Pulai	206	208	414
Kulai/Senai	332	458	790
Sedenak	0	27	27
Tebrau	44	47	91
Ulu Sg. Johor Kota Tinggi	238	412	650
Sg. Tiram	34	0	34
Sub Total	6,951	8,184	1,535
Part of Kota Tinggi	34	83	117
Pontian	592	479	1,071
Other Johor District	1,311	1,290	2,601
Other Malaysian State	1,157	2,169	3,326
Singapore	6	6	12
Other Country	0	0	0
Sub Total	3,100	4,027	7,127
Grand Total	10,051	12,211	22,262

(Source: Cordon Line Survey 1981.)

## (2) Traffic Composition

Table 1.6 Traffic Composition of Causeway Traffic

(P.C.U./day)

	Outgoing	Incoming	Total
Motorcar	4,196	6,288	10,484 ( 47%)
Lorry	2,764	4,227	6,991 ( 31%)
Taxi	176	89	265 ( 1%)
Bus	120	120	240 ( 1%)
Motorcycle	2,795	1,487	4,282 ( 20%)
Total	10,051	12,211	22,262 (100%)

Traffic composition using the causeway is as shown in Table 1.6 and it shows that motorcar have the largest share, followed by lorries and motorcycles.

## (3) Purpose of Trips

Table 1.7 Outgoing Traffic on the Causeway

(P.C.U./day)

	Car	Motorcycle	Total
Work	1,021 ( 24.3%)	1,045 ( 37.4%)	2,066 ( 29.6%)
Business	497 ( 11.8%)	26 ( 0.9%)	523 ( 7.5%)
Private	2,174 ( 51.8%)	1,111 ( 39.7%)	3,285 ( 47.0%)
Home	504 ( 12.1%)	613 ( 22.0%)	1,117 ( 15.9%)
Total	4,196 (100%)	2,795 (100%)	6,991 (100%)

Table 1.8 Incoming Traffic on the Causeway

(P.C.U./day)

Vehicle Purpose	Car	Motorcycle	Total
Work	1,000	166	1,166 ( 15%)
Business	519	56	575 ( 7%)
Private	1,421	336	1,757 ( 23%)
Home	3,348	929	4,277 ( 55%)
Total	6,288	1,487	7,775 (100%)



For outgoing trips the main purpose is private. Private trips include trips made for shopping, recreation and social purposes.

For incoming trips, the purpose is mainly to return home. This is the reason for 55% of the total trips made.

#### (4) Traffic Fluctuation

The hourly fluctuation of traffic is as in Fig. 1.9. Most outgoing trips are made between 6 and 8 A.M., and the figure then remains constant throughout the day before it gradually falls off at about 6 P.M. Incoming trips reach their peak between 3 and 6 P.M.

Fig. 19 Hourly Flows by All Vehicles – Johor Bahru to Singapore and Singapore to Johor Bahru



Source: JKR Traffic Census (30th - 5th April, 1981)

## 1-3 Road System

1 General Road Conditions

## (1) Road Length

The roads in the Study Area, measure a total length of approximately 730 kilometers, of which 230 kilometers are primary roads and 500 kilometers are district and local distributors.

Table 1.9 Length of Roads

	Primary Road	District Distributor	Local Distributor	Total
MPJB	41.3	38.0	55.0	134.3
Rest of Primary Study Area	113.7	96.0	34.0	243.7
Pontian	75.0	58.0	83.0	216.0
Tanjung Penggerang	0	107.0	28.0	135.0
Total	230.0	299.0	200.0	729.0

In general, most of the existing roads are in fairly good condition, except several road sections where the vertical or horizontal alignment is not appropriate due to the constraints from geographical conditions and the land use pattern.

## (2) Road Network

The major road network in the Study Area is illustrated in Fig. 1.10 and Fig. 1.11. The existing major road network pattern forms primarily a radial pattern converging on Johor Bahru. However the non-radial links, which tend to be discontinuous, sometimes force traffic to take an undesirable circumferential route.

Most of the existing roads are single carriageway, except for Federal Route 1 and several intra-urban trunk roads.





(3) Road Width

Road width ranges from 5.0 meters to 20.0 meters, but most of the road in MPJB have 6.5 meters carriageway while rural roads have 6.0 meters.

The reserved width for a road is about 15 to 20 meters in the urban areas, and it varies from 10 to 60 meters in the rural areas.

(4) Intersections

There are 20 signalized intersections, one round-about and 3 interchanges in MPJB. Other intersections are at-grade and non-signalized. Sixteen (16) signalized intersections are of the fixed time type and four (4) are of the manual type.

(5) Pedestrian Facilities

There exist four types of pedestrian facilities in the C.B.D. area of Johor Buhru. These are pedestrian bridges of which there are two - the one over Jalan Tun Abdul Razak and the other over Jalan Wong Ah Fook, pedestrian crossings, side walks along roads such as Jalan Wong Ah Fook, Jalan Lumba Kuda, Jalan Selat Tebrau, and five foot ways located within the commercial zone.

Pedestrian facilities are generally insufficient in width as well as in density when considered from the viewpoint of pedestrian safety and environment.

(6) Other Traffic Facilities

The lighting system within MPJB is generally adequate; however outside MPJB, it is insufficient.

Traffic signs are also insufficient, or do not function properly even if they are installed,

because they are incompatible with the revised rules or are inappropriately equipped.

As for road markings, they are generally faint or do not exist at all.

## 2 Parking Spaces

Fig. 1.13 shows the parking spaces in the C.B.D. of Johor Bahru. The existing capacity and the occupancy of parking spaces are summarized in Table 1.10.

The number of occupants is larger than the available parking capacity in the case of on-street parking. This is because the number of occupants includes illegal parking on the roadside.

In the case of off-street parking, the average occupancy rate is about 83%.

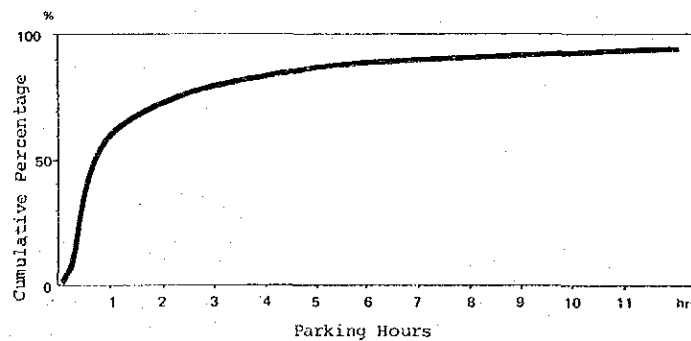
Regarding the duration of parking hours, occupancy of less than 1 hour accounts for more than 60% of the total parked vehicles, as shown in Fig. 1.12.

**Table 1.10 Capacity and Occupancy of Parking Space in C.B.D. of Johor Bahru**

	Capacity			Number of Occupants
	Car	MC	Total	
On-Street Parking Space	749	172	921	1490
Off-Street Parking Space	1113	190	1303	1085
Total	1862	362	2224	2575

(Source: Parking Survey 1981)

**Fig. 1.12 Duration of Parking Hours**



(Source: Parking Survey 1981)



#### 1-4 Public Transport System

At present, public transport available in the Study Area takes the following forms:

1. buses - a) scheduled buses;  
          b) express buses;  
          c) school and factory buses;
2. taxis;
3. rail services;
4. air services.

##### 1 Buses

There are currently 155 buses providing scheduled bus services in the Study Area operated by three private transport companies. All of these buses are of the single-deck type with most of them having seating capacities for 40-50 passengers. The routes of these buses and the catchment areas of bus-stops and bus-stands are shown in Fig. 1.14 and 1.15 respectively. Fare levels which are the same for all bus operators are determined by the Government.

There is also an express bus route within the Study Area between Johor Bahru and Pontian operated by 2 private companies providing a total of 24 runs daily on weekdays and 29 runs on weekends.

The scheduled bus system is supplemented by 2 private bus systems; i.e. factory buses and school buses. These meet the commuting needs of factory workers and school children. The factory buses are particularly needed between 12:00 midnight and 6:00 A.M. when other forms of public transport are not available to workers whose shift ends or begins during that period. Records from RIMV show that there are 88 factory buses and 931 school buses in all registered in the South Johor Region. Factory buses are operated by factories or contracted out to private operators



while school buses are mostly run by private operators. Most factory bus fares are paid for by the factories. The school bus fares, however, are paid individually on a monthly or yearly basis.

Johor Bahru is also connected to the various major towns in peninsular Malaysia and Singapore by inter-regional express bus services. The highest demand is for the service to Singapore with approximately 10,000 passengers transported daily on weekdays and 12,700 during weekends. Northward the main destination is Kuala Lumpur.

## 2 Taxi

There are two types of taxis operating in the Study Area, town taxis and inter-urban taxis. The number of town taxis registered in Johor Bahru, Pontian and Kota Tinggi are 688, 5 and 3 respectively. The number of inter-urban taxis registered in the towns are 304, 212 and 100.

Sixty per cent of the trips made by taxi are external trips i.e. trips made between the Study Area and external areas. 35 per cent are internal trips and the remaining 5 per cent are through trips. For the inter-urban taxis the fare-rates which are determined by the Government vary with the travel distance. The intown taxis are required to use taximeters, their rate being 70 cents for the first mile and 30 cents for each subsequent half mile. However, taxi drivers do not use their meters and the fare charged depends very largely on negotiation with passengers. Another characteristic of these intown taxis is that for a trip starting in the town centre the passenger(s) has to charter the whole taxi while for a trip terminating in the town centre the taxi driver normally picks up additional passengers. Thus the fare per passenger for trips into the town centre is lower.

Fig. 1.14 Bus Routes in Johor Bahru

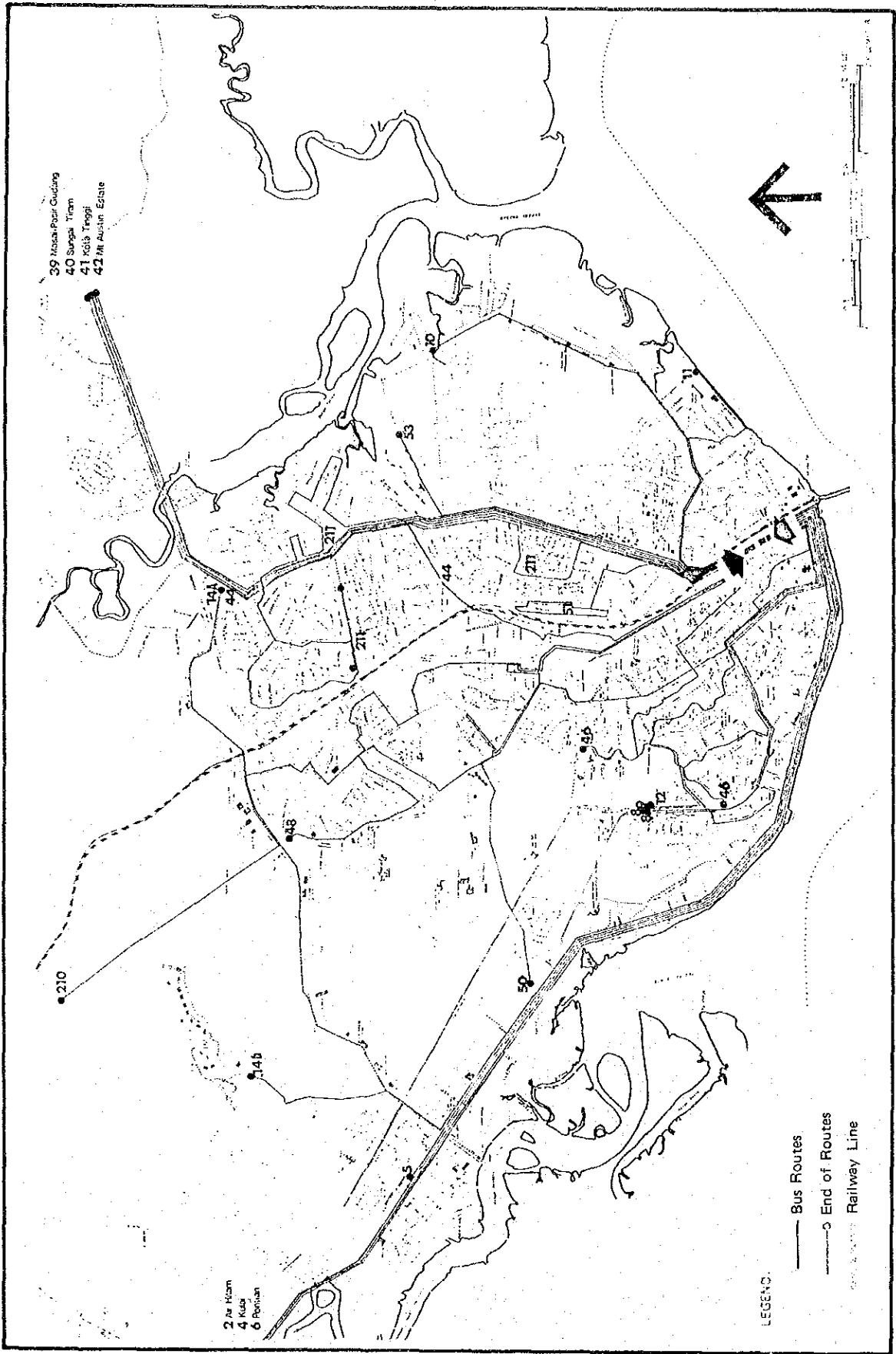
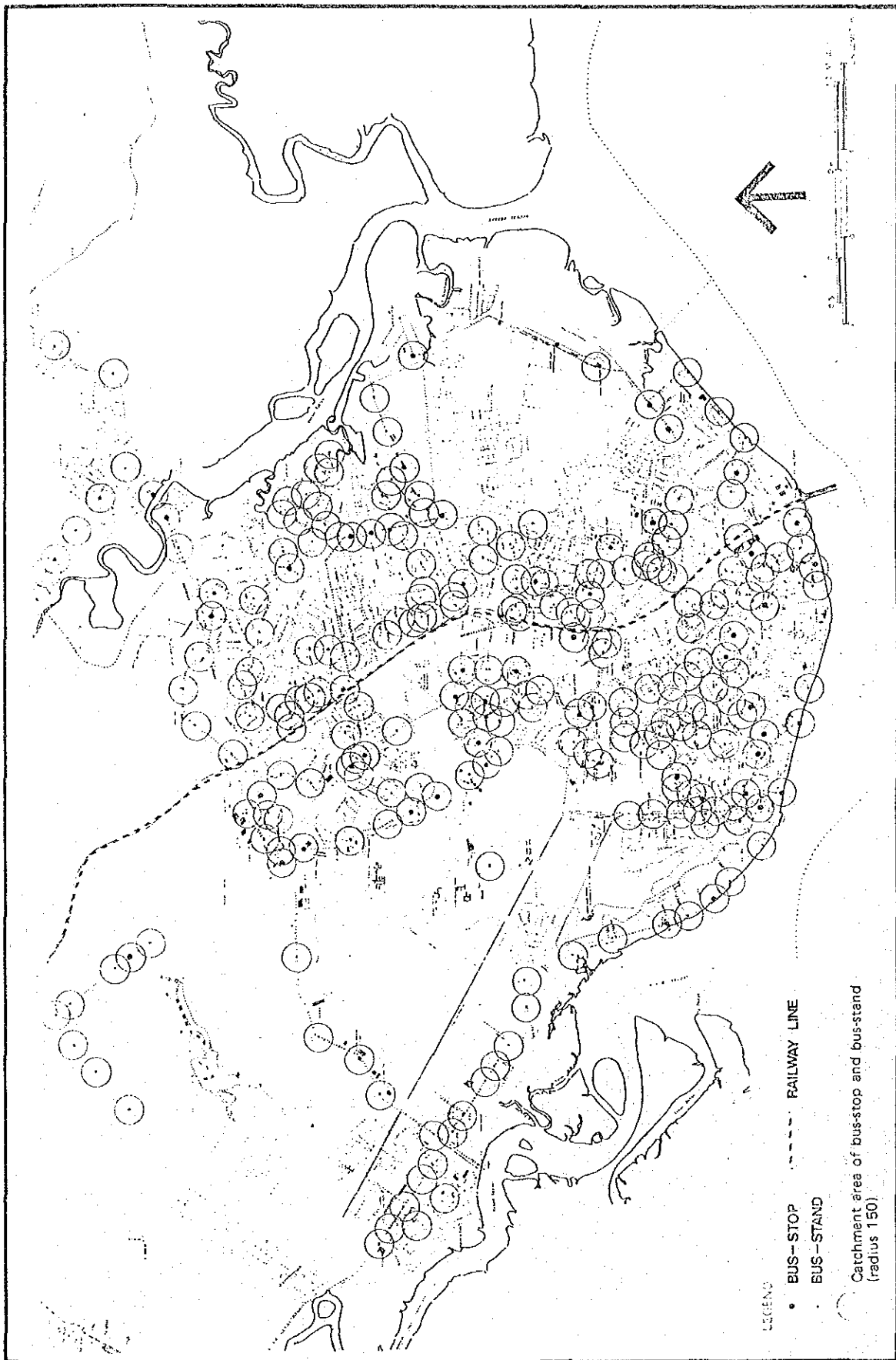


Fig. 1.15 Bus-Stop and Bus-Stand Coverage in MPJB Area



### 3 Railway

The Malayan Railway provides services for the whole of peninsular Malaysia. The main railway network consists of the following routes:

1. Padang Besar - Alor Star - Bukit Mertajam - Ipoh - Kuala Lumpur;
2. Kuala Lumpur - Seremban - Johor Bahru - Singapore;
3. Pasir Mas - Gemas.

The total length of the network is about 1,640 km.

The Study Area is bisected by a single railway line which cuts through the town of Johor Bahru and crosses the causeway into Singapore. Besides the main station at Johor Bahru, there are smaller stations at Sedenak, Kulai, Tampoi and Kempas. There are four express services and one ordinary service operating from Kuala Lumpur to Singapore via Johor Bahru and in the opposite direction daily. There is also one ordinary service operating between Singapore and Gemas everyday. The total number of passengers boarding and alighting at Johor Bahru station in 1980 was 1,084,700 showing a growth of 19.9% from the total in 1979.

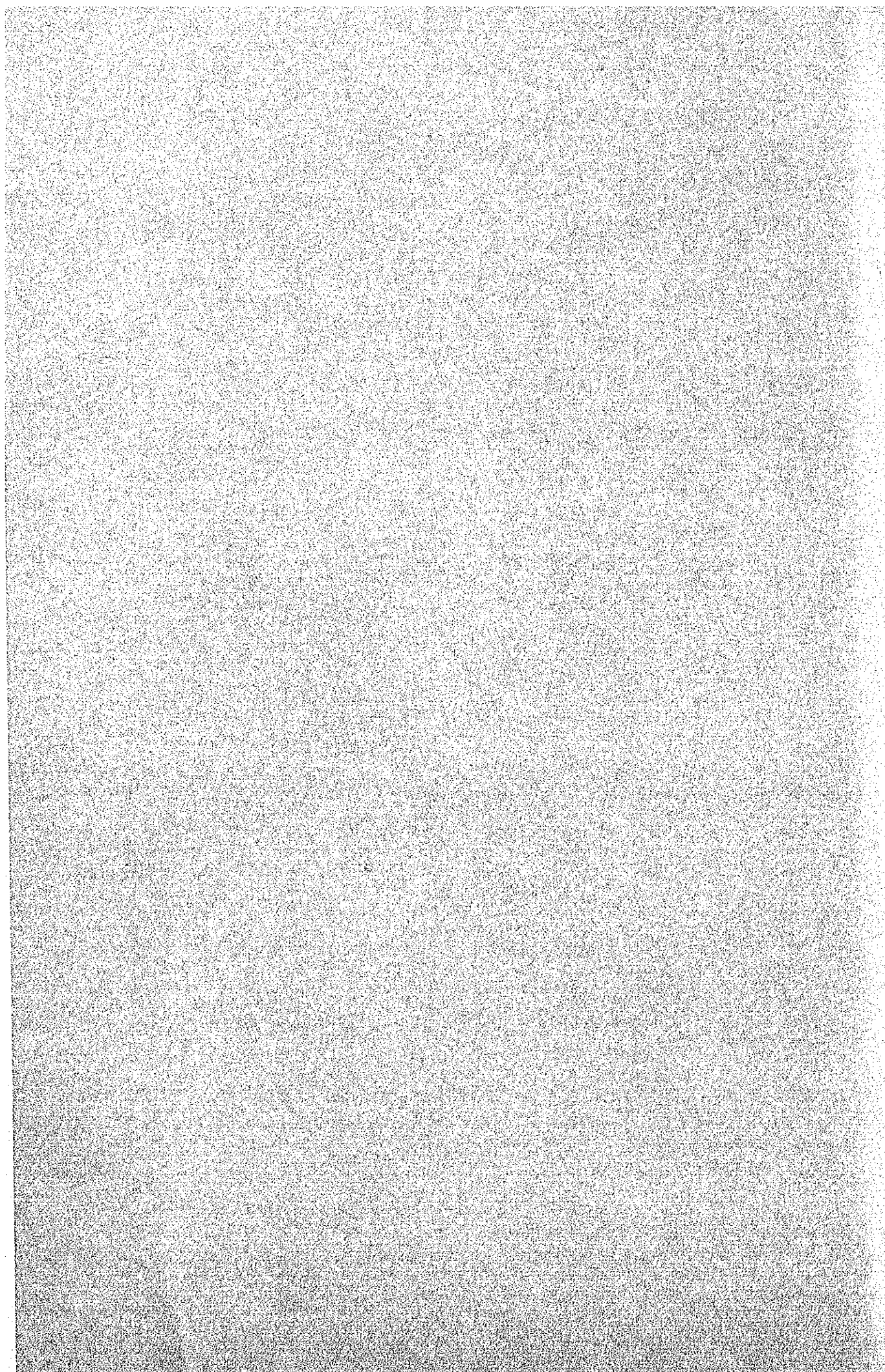
### 4 Air Services

The only airport in the area is located at Senai, 16 miles north of Johor Bahru. It is capable of handling Boeing 737's and started operation in January 1974. It serves domestic flights within the peninsula and those to Sabah and Sarawak. The total number of passengers embarking and disembarking at Senai Airport in 1980 was 103,973. Between 1974 and 1980 the number of departures has increased at an average rate of 35.6% per annum and the number of arrivals by 35.7%. The rise was particularly marked in 1980 when more than a 100% increase was observed.

**Chapter 2**

**SOCIO-ECONOMIC FRAMEWORK  
AND LAND USE PLAN**

---



## 2-1 National and Regional Context

### 1 The National Development Policy

#### Fourth Malaysia Plan and the New Economic Policy

As expressed in the New Economic Policy (NEP) and the Fourth Malaysia Plan (FMP), the two basic objectives of regional development strategy are: first, to develop more fully the resources in the country and second, to bring about a more equitable and balanced growth in the regions and states of Malaysia. In order to achieve a closer integration of regions and states, there is a need in most instances to bring about structural changes in the prevailing economy. New land development schemes such as FELDA, for poor areas and areas that lag behind, are the main strategies of the Government in attempting to correct economic imbalances; very often this involves the selective relocation of the population to new areas or entails the continued reinforcement of existing regional production systems and linkages. The latter approach would include channeling more public investments into poor regions or the strengthening of linkages among cities and towns in the hope that positive spin-off effects will spread to their hinterland. In this respect, to ensure the integration of urban centres and their rural hinterland, there is a need to upgrade and increase facilities (notably urban facilities) in rural areas. Indeed, in cases where resources do not pose serious constraints on development, the preferred primary objective is to reduce polarization in regions by dispersing urban development instead of concentrating it in already highly urbanised centres. In this connection, large urbanised areas, particularly metropolitan regions, should not be permitted to grow uncontrolled as this will produce a diseconomy of scale and give rise to a host of inter-related social and economic problems.

Within this framework of balanced regional development, four major regional growth poles have been selected for high priority development: Georgetown to the north, Kuala Lumpur in the centre, Kuantan to the east and Johor Bahru to the south.

## 2 State and Regional Development

In the regional development framework, Johor Bahru, the state capital of Johor, is expected to play the role of a regional growth centre servicing the southern part of peninsular Malaysia. At the same time, to avoid concentration of development in major urbanised regions and to complement their growth, new towns and service centres will be developed in the state. Ultimately these towns will be linked to their hinterlands as well as to the regional growth centres and form a corridor of urban development. Such is the development anticipated with the establishment of the industrial complex at Pasir Gudang, the airport at Senai, the large-scale development programs of the Johor Barat region and the initiation of land schemes at Johor Tenggara for agriculture and settlement.

### 2-2 **Socio-Economic Framework**

Statistical projections for growth in population, Gross National and Regional Products, employment, household income and vehicle ownership are made in the national and regional contexts.

The framework that emerges is as follows.

#### 1 Population

The proportional demographic trend method as well as the employment-based method of prediction indicate that the likely future population of the Study Area is as shown in Table 2.1. Although different study teams have projected population sizes for the Johor Bahru



District, the estimates are not very different. It is predicted that the Johor Bahru District will probably have a population of about 655,000 by 1990 and 820,000 by the year 2000 and that the entire Study Area will have a population of 929,000 by 1990 and 1,200,000 by the year 2000.

**Table 2.1 Alternative Population Estimates,  
Study Area 1980, 1990 and 2000**

(in thousand)

District	1980	The Likely Population		Target Population
		1990	2000 <sup>1)</sup>	2000 <sup>2)</sup>
Johor Bahru	417	655	850	1,000
Parts of Kota Tinggi	42	53	67	67
Primary Area	459	708	867	1,067
Secondary Area	161	221	283	283
Total Study Area	620	929	1,150	1,350

- Sources:
- 1) Department of statistics, 'Preliminary Fieldcount Summary of 1980 Population Census'.
  - 2) Estimated on the basis of demography (high estimation)
  - 3) Determined by the Technical Committee of the Unit Pelan Struktur Study.

However, as similarly acknowledged in the Unit Pelan Struktur Study, population estimates based on existing, underconstruction and approved developments in the Johor Bahru district alone totalled approximately 984,600 (See Table 2.2). Indeed, this figure due to committed developments far exceeds even the high estimate for the year 2000 of 850,000. For this reason, a planning target population of 1 million by the year 2000 is set for the Johor Bahru district. Given the maximum likely population for the Secondary Area, the entire Study Area can be expected to have a population of approximately 1.36 million by the year 2000.

Table 2.2 Existing and Committed Development,  
Johor Bahru District

(in thousand)

	MPJB	Johor Bahru/ PG. Corridor	Johor Bahru/ Kulai Corridor	Total
Existing	247.0	25.5	54.6	327.1
Under- construction	149.4	225.0	137.2	511.6
Approved	26.2	29.6	90.1	145.9
Sub-Total	422.6	280.1	281.9	984.6
Pending Approval	31.4	415.0	66.2	512.6
Grand Total	454.0	695.1	348.1	1,497.2

## 2 Gross Regional Product (GRP)

On the basis of likely changes in the economy of the state and the country as a whole, the Team anticipates that there will be a further increase in the GRP's share of the total GDP from 11.2 per cent in 1980 to 11.3 per cent in 1985 and 11.6 per cent in the year 2000 (see Table 2.3).

The FMP estimates for the GRP by industry of origin for period 1971 - 1990 are shown in Table 2.4. The GRP projection for the year 2000 is based on the medium estimate.

**Table 2.3 Projected Gross Regional Product<sup>1)</sup>, Johor State 1990 – 2000  
(M.M\$ in 1970 Prices)**

Year	Estimates	Gross Regional Product	Gross Domestic Product	Share of GRP to GDP %
1980 (base year)		2,941	26,188	11.2
1985	High	4,274 4,452 4,286 <sup>2)</sup>	37,824 39,400	11.3 <sup>2)</sup>
1990	Medium Low High	6,471 6,213 6,749 (6,460) <sup>2)</sup>	56,760 54,500 59,200	11.4 <sup>3)</sup>
2000	Medium Low High	13,697 13,154 14,825	118,077 <sup>2)</sup> 113,400 127,800	11.6

- Note: 1) Approved at the Third Technical Committee Meeting.  
 2) Fourth Malaysia Plan Estimates.  
 3) Based on FMP Estimates for GDP and GRP for Malaysia and the State of Johor respectively.

**Table 2.4 Gross Regional Product by Industry of Origin in Johor State  
1971 – 1990**

(Million M\$ in 1970 prices)

	1971	1980	1985	1990	2000 <sup>2)</sup>	Average Annual Growth %			
						'71-80	'80-85	'85-90	'90-2000
Agriculture, Fishing, etc.	625	938	1,042	1,207	1,400	4.6	2.1	3.0	1.5
Mining/Quarrying	32	12	13	12	12	10.3	1.6	-1.6	0
Manufacturing	217	679	1,195	2,045	4,968	13.5	12.0	11.3	9.3
Construction	32	99	160	261	613	13.4	10.1	10.3	8.9
Services <sup>1)</sup>	530	1,129	1,752	2,720	6,618	8.8	9.2	9.2	9.3
Total (GRP)	1,436 (1,476)	2,857 (2,941)	4,162 (4,268)	6,245 (6,460)	13,611 (13,697)	7.9	7.8	8.6	7.8

- Note: 1) Inclusive of utilities, transport, storage and communication and insurance, wholesale and retail trade, banking, public administration and defence, and real estate and other services.  
 2) Urban Transport Study Team Estimates 1981.

Source: Fourth Malaysia Plan.

### 3. Employment

#### (1) Employment Needs in the Study Area

Based on the target population, future employment needs are projected as shown in Table 2.5. During the coming two decades from 1980 to 2000, employment needs are expected to increase at a rate of 4.6% per annum, which is slightly higher than the population growth rate.

Accordingly, employment expected is to increase from 227,100 in 1980 to 541,700 in 2000.

**Table 2.5 Employment Needs in the Study Area**

(IN 1,000)

	1980	1990	2000
(A) Total Population	619.6	928.6	1,350.4
(B) Activity Rate (%)	39.0	40.5	42.0
(C) Labour Force (A) x (B)	241.6	376.1	567.2
(D) Unemployment Rate (%)	6.0	5.0	4.5
(E) Unemployment (C) x (D)	14.5	18.8	25.5
(F) Total Workforce (C) - (E)	227.1	357.3	541.7
(G) Workforce Rate (F)/(A)	36.7%	38.5%	40.1%
(H) Commuter to Singapore	8.3	8.3	8.3
(I) Target Employment	218.8	349.0	533.4

- Note: 1) cf. Metropolitan KL 4.8% in 1979  
(Source: KL Economic Base Study 1980)
- 2) According to the Fourth Malaysia Plan, the workforce rate in peninsular Malaysia is 36% in 1980.  
cf. Metropolitan KL 32.4% in 1970  
37.0% in 1979  
(Source: KL Economic Base Study 1980)
- 3) Cordon Line Interview Survey and Bus Passenger Survey by Study Team.

## (2) Job Opportunity in the Study Area

A further attempt has been made to estimate the overall absorption capacity of future employment from the standpoint of employment opportunity. Detailed analysis of the individual capacities of the various sectors has been carried out mainly on the basis of existing land use as well as future development schemes in the corresponding sector.

The total employment opportunities that would be generated are as shown in Table 2.6.

The comparison of employment needs and job opportunities indicated that job opportunities can be expected to fall short of employment needs. This implies that more development programs to create jobs will be required by 2000.

**Table 2.6 Comparative Analysis of Job Opportunities and Employment Needs 1980 and 2000**

	1980	2000
Employed Population	227.1	541.5
Net Commuter to Singapore	-8.3	-8.3
Employment Needs	218.8	533.2
Job Opportunities	218.8	458.8
Additional Job Requirements	0	74.4

Source: Study Team Estimates.

4 Household Income

Mean monthly household incomes in the state and the peninsula are expected to grow in view of the anticipated economic growth, increasing productivity per employed persons and - despite decreasing household sizes - increasing number of employed persons per household. Previous years' figures for peninsular

Malaysia show a close correlation between mean monthly household income and per capita GDP. Assuming that this correlation continues in the state of Johor, income growing proportionally with the GRP, the per capita income as well as the average household income in the future are predicted as shown in Table 2.7.

## 5 Vehicle Ownership

The future size of vehicle ownership can be estimated by extrapolating the trend of relevant indicators. Estimate for the future obtained by various approaches were compared so as to increase their accuracy. A direct correlation clearly exists between vehicle ownership and household income.

Using the predicted household income distribution as an indicator, the size of motorcycle and car ownership in the future was estimated.

The growth of population in the state of Johor is shown to be closely related to the increased number of buses, taxis and goods vehicles. The future volume of these types of vehicles for the Study Area was obtained by assuming the same relationship to hold true for the Study Area.

Table 2.7 Projected Household Income for Johor State

	1970	1976	1980	1990	2000	Average Annual Rate of Growth (%)		
						'76-'80	'80-'90	'90-2000
GRP=\$mil. (1970 prices)		\$2,219	\$2,941	\$6,461	\$13,697		8.2	7.8
Population ('000)	1,277	1,463	1,602	2,036	2,504	-	-	-
Per Capita GRP		\$1,488	\$1,836	\$3,173	\$5,470	5.4	5.6	5.6
Per Capita Income ('76 prices)	\$64	\$90	\$109	\$179	\$294	4.9	5.1	5.1
Household Size	5.9	5.7	5.5	5.3	5.0	-	-	-
Household Income ('81 prices)	\$608	\$655	\$766	\$1,211	\$1,876	4.0	4.7	4.5

Source: Forth Malaysia Plan 1981 - 1985  
Agricultural Census 1976  
Study Team Survey Data (1981)

The projected volume of the various types of vehicles in the Study Area are given in Table 2.8 and 2.9.

**Table 2.8 Projected Number of Car and Motor Cycle in Primary Study Area**

Type of Vehicles	1981		2000	
	Number of Vehicles	Person/Vehicles	Number of Vehicles	Person/Vehicles
Car	36,645	13.1	145,847	7.3
Motorcycle	43,421	11.0	101,605	10.5

Source: The Study Team Estimate

**Table 2.9 Projected Number of Vehicles in Primary Study Area**

Type of Vehicles	1981	2000
Motorcar	36,645	145,847
Taxi <sup>1)</sup>	745	1,893
Bus	1,000	2,541
Goods Vehicle	5,803	21,065
Motorcycle	43,421	101,605
Total	87,614	272,951

Note: 1) Estimated by assuming that the number of vehicle per population is constant for the whole state of Johor.

Source: Study Team Estimate

## 2-3 Land Use Plan

### 1 Planning Approach

The planning process for the land use study is composed of four major stages.

The first, the analysis on the mid term urbanization pattern, is intended to investigate the opportunity and constraints for development of the study area by 1990. The mid term prospect in future is particularly important in the region. Since so many committed and non-committed development projects are observed.

The second, the analysis on the long term urbanization pattern, forecasts the development prospect during 1990-2000. The analysis involves the examination of development scenarios and development trends by sector.

The third and fourth stages for building basic framework of development pattern and landuse plan based on the result of the development scenarios and trends. Fig. 2.1 displays the framework of landuse study.



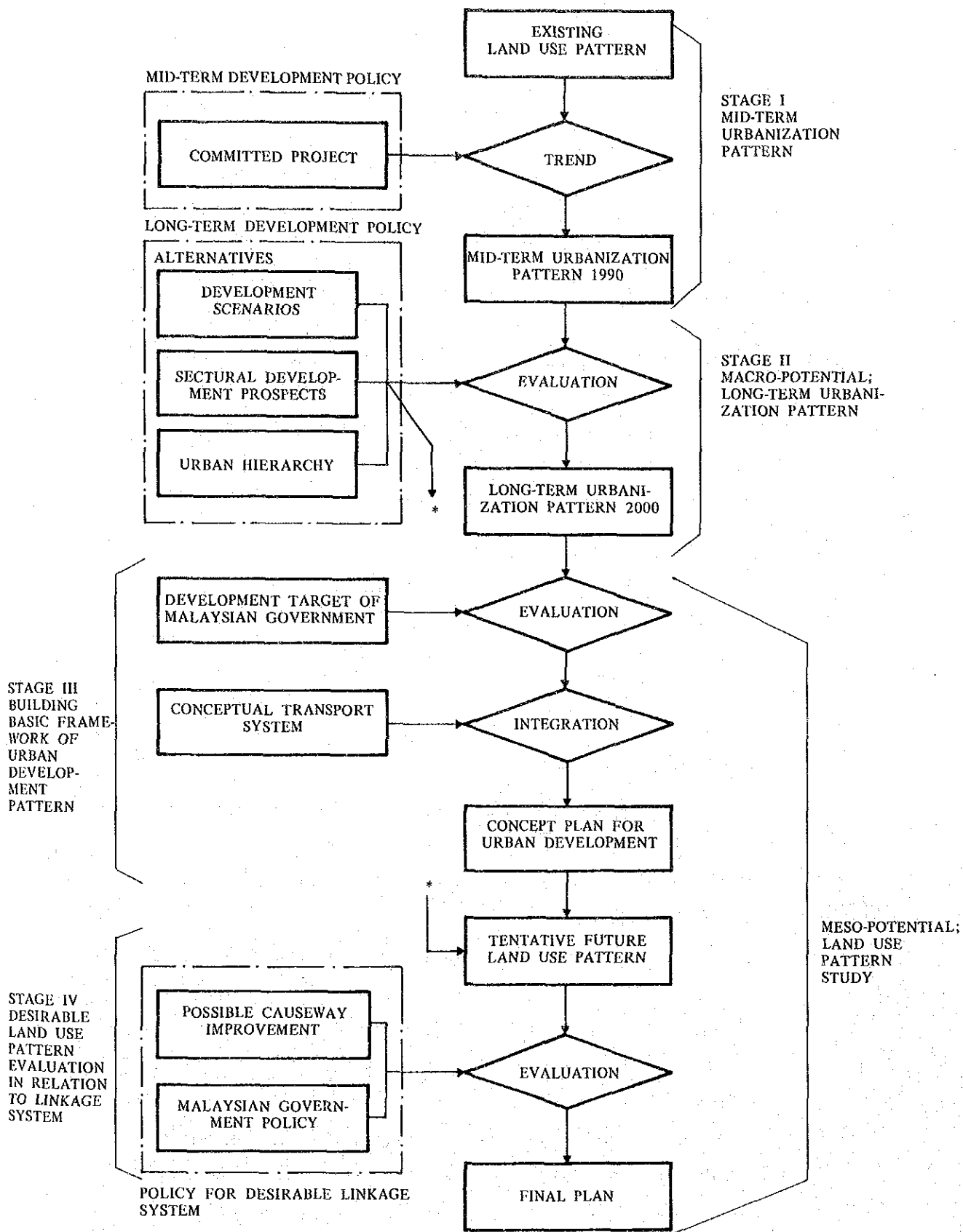


Fig. 2.1 Framework of Land Use Study

## 2 Development Prospect in 2000

### (1) Population Projection

The future population in the Study Area was projected by a combination of macro and the micro approaches whereby the state and the regional levels of population and the proposed projects committed and non-committed were examined.

The total population in the Study Area which was 619,000 in 1980 is expected to be 1,350,000 in 2000. This implies that the population will be more than doubled during the next two decades.

The population in the Johor Bahru District was almost 67% of the total population in 1980, and this share is expected to increase to 74% by 2000.

The share of the rural population is expected to decrease, although the absolute size of the population is expected to increase, supported by the stimulation of government investment in the rural area by 2000.

### (2) Land Use Requirement

The future land requirement was predicted on the basis of the projected population and the future employment opportunities to be provided in the region.

The total urban area is expected to increase from 16,000 ha. in 1980 to 27,000 ha. in 2000; i.e. 1.7 times of existing urban area. The Johor Bahru District will occupy almost 81% of the total urban area in the future.

Agricultural land requirement is expected to increase by 7,000 hectares during the same period, and total agricultural land requirement in 2000 will be 287,000 ha. Future urbanization will

mainly displace agricultural land in the Study Area, so that almost 18,000 ha. of new land will need to be developed for agricultural use by 2000.

In the future urban area, 14,500 ha. or 54.5% of the total is expected to be residential, 2,500 ha. or 9.4% industrial and 900 ha. or 3.5% commercial. The residential area has the highest expected rate of increase. (See Table 2.10 and 2.11).

### 3 Planning Principle

#### (1) Urbanization and Road Network Concept

Various projects for urban and rural development are being proposed or are under construction in the Study Area. Those projects for which commitment has been made or which are under construction will create new opportunities and constraints on the future development concept.

The trend toward urbanization will be bolstered by the growth of the existing urban area and most of the projects for which commitment has been made such as those for major infrastructures (Toll Expressway, Port Access Road, the extension of the Railway to Senai Airport and Pasir Gudang, and Johor Port) and such project as the UTM Campus and many housing developments.

The Toll Express way can reinforce the linkage between Johor Bahru and Kuala Lumpur and the Port Access Road that between Johor Bahru and the Pasir Gudang urban complex.

The new railway linkage will make possible an increased commodity flow along the Senai area - Johor Bahru - Pasir Gudang corridor.

A combination of various road network patterns such as the radial pattern adopted for Johor Bahru Town, the ladder for the Johor Bahru - Pasir Gudang Corridor and the ladder or grid pattern for other areas like the Johor Bahru - Senai/Kulai Corridor forms the major framework for metropolitan Johor Bahru.

The road network pattern is reinforced by the urbanization pattern which will obviously form a metropolis made up of the Senai/Kulai - Johor Bahru and the Johor Bahru - Pasir Gudang corridors.

Table 2.10 Urban and Agricultural Land Requirement in 2000

		Future Urban Area 2000 (ha)	Non-Urban Area (2000)		Total (ha)	Total Land Use Area (ha)	
			Agriculture Area (ha)	Non-Agriculture Area (ha)			
Primary Area	Johor Bahru	MPJB	11,643	0	297	11,940	
		Plentong	5,509	14,170	603	14,773	20,282
		Senai - Kulai	1,676	30,234	11,365	41,599	43,275
		Other Area	2,954	66,210	33,580	99,790	102,744
		Sub Total	21,782	110,614	45,845	156,459	178,241
	Kota Tinggi	Kota Tinggi	904	25,293	12,884	38,177	39,081
		Others	112	19,768	11,212	30,980	31,092
		Sub Total	1,016	45,061	24,096	69,157	70,173
	Total		22,798	155,675	69,941	225,616	248,414
	Secondary Area	Pontian	Pontian Kecil	1,058	9,599	2,114	11,713
Others			1,140	57,224	25,968	83,192	84,332
Sub Total			2,198	66,823	28,082	94,905	97,103
Tanjong Penggerang		1,569	64,911	58,742	123,653	125,242	
Total		3,787	131,734	86,824	218,558	222,345	
Study Area Grand Total		26,585	287,409	155,765	444,174	470,759	

Source: The Study Team Estimate (1981).

Table 2.11 Summary of Land Use Projection

	1980 (km <sup>2</sup> )	1990 (km <sup>2</sup> )	2000 (km <sup>2</sup> )
Residential Land	81.8	113.3	144.9
Industrial Land	8.4	16.7	25.0
Commercial Land	4.1	6.6	9.2
Other Urban Land	61.4	74.5	86.8
Urban Total	155.7	211.1	265.9
Agricultural	2,802.8	2,838.5	2,874.0
Non Agricultural	1,749.1	1,658.0	1,567.7
Non Urban Total	4,551.9	4,496.5	4,441.7
Total Land Use	4,707.6		

Source: Study Team Estimate (1981)

The Tanjong Penggerang region is a focal point of development in the macro level urbanization pattern in the eastern part of the Study Area.

The regional development scheme, Johor Tenggara, creates 8 rural centres and a large tourist and recreational zone along the east coast.

## (2) Conceptual Development Plan

In terms of the macro-level development concept, metropolitan Johor Bahru is expected to be a major growth pole in the southern part of peninsular Malaysia. This implies that Johor Bahru should extend its regional network in radial form, to Batu Pahat, Melaka and Kuala Lumpur, to Kota Tinggi and its extended area, and to the east coast where a large recreational compound is now under construction.

The region is expected to achieve a rural development that is well balanced between the

eastern and western parts, the former being at present less developed than the latter.

Rapid urbanization along the Johor Straits may cause some unexpected environmental problems. The causeway improvement is also urgently needed to solve traffic problems in Johor Bahru.

Fig. 2.2 Conceptual Diagram of the Future Network

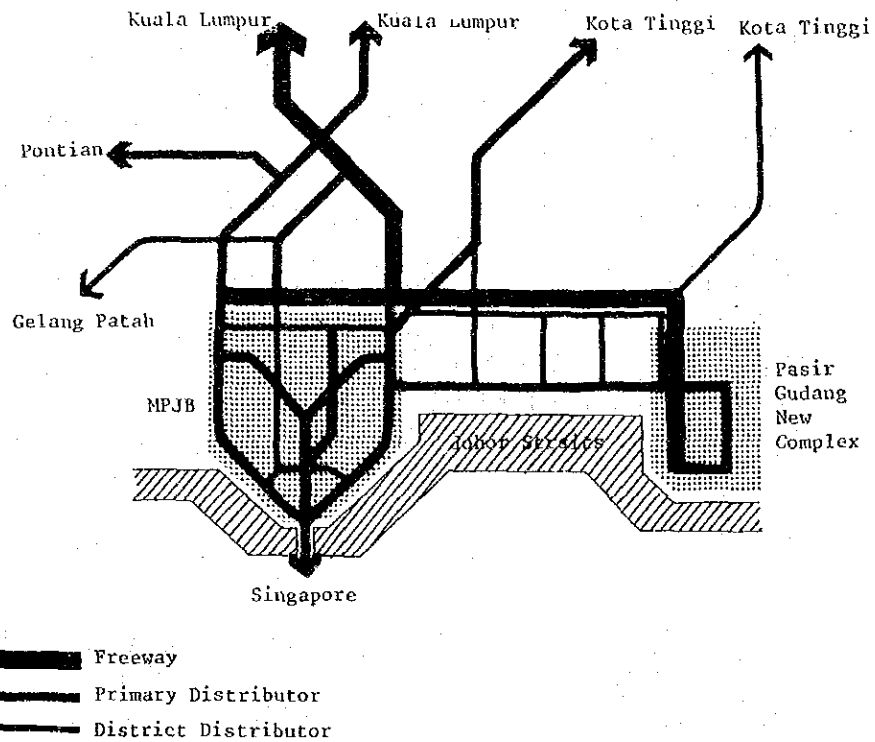
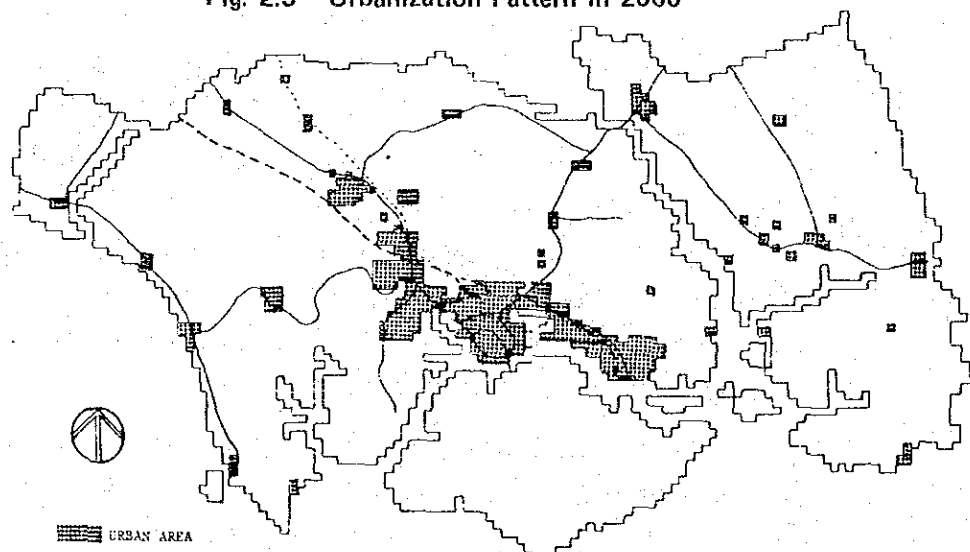


Fig. 2.3 Urbanization Pattern in 2000



From a study of six possible development scenarios the study team proposed three alternative conceptual development patterns for the year 2000.

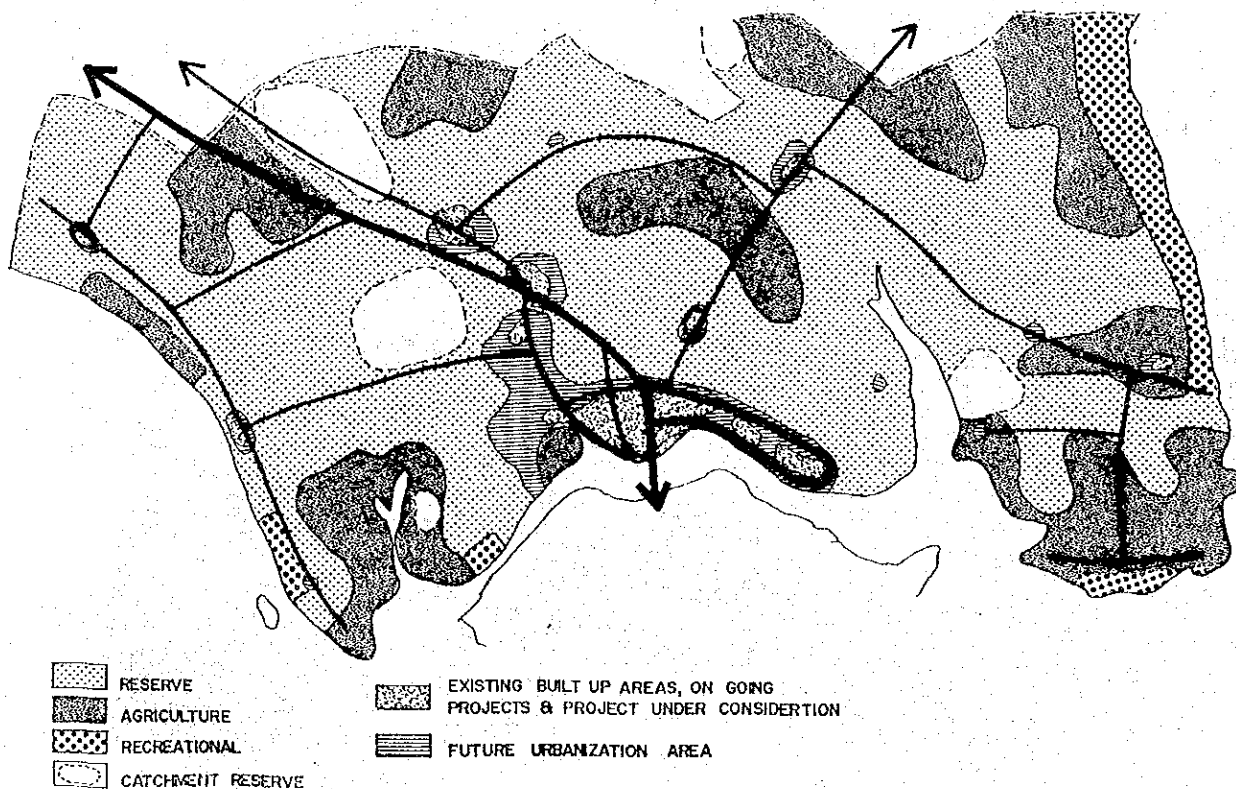
(1) Alternative 1 - West Expansion Pattern

This pattern emphasises the expansion of the west of Johore Bahru town. It is based on two possible development scenerios as follows:-

(Refer to Fig. 2.4)

1. After the SEDC has carried out the Pasir Gudang development their attention can be channelled to the development of the western area.
2. Expansion of Johore Bahru town and the corridor can exert development pressure westwards.

Fig. 2.4 Alternative I

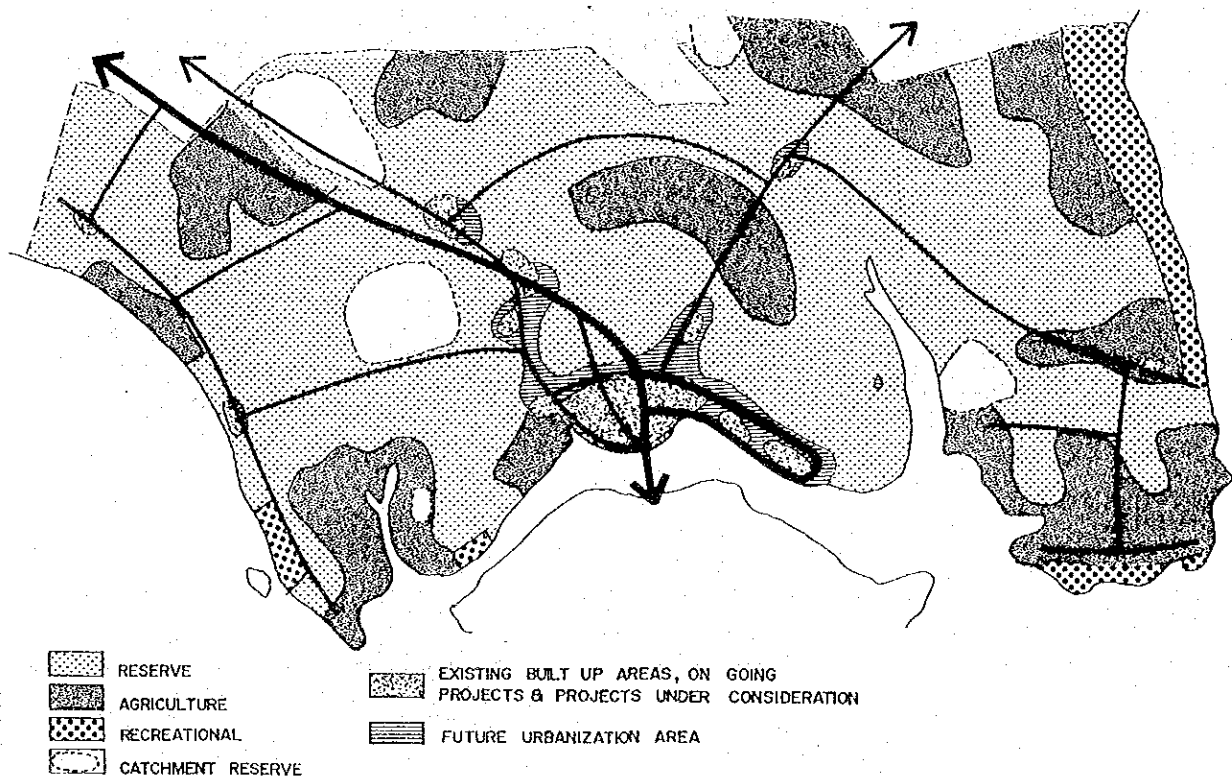


(2) Alternative II - Concentrated Expansion Pattern

This pattern emphasises the further expansion and increase in density of the existing urban area. Growth will therefore be mainly concentrated in Johor Bahru town and along the corridors. It is based on two development scenerios as follows:- (Refer to Fig. 2.5)

1. The construction of major infrastructures along the Johor Bahru - Pasir Gudang Corridor, being combined with large housing projects, will encourage the urbanization concentrated along the corridor.
2. With the increase in employment opportunities and urban amenities in the urban areas, population will be attracted to Johor Bahru from the rural towns and, as a result, the concentrated urban pattern can be appeared.

Fig. 2.5 Alternative II





(3) Alternative III - Dispersed Pattern

Alternative pattern III emphasises more on local town development than the other two alternatives. Major urban areas will continue to grow but the smaller towns can also be expanded; if more inputs will be given. It is based on the combination of two development scenerios as follows:-

1. The government's efforts to promote rural development will be effective to a certain extend rural areas. Major rural towns such as Pontian, Pekan Nenas, Kota Tinggi can be stratigic rural growth poles.
2. The urban corridor area with good employment opportunities and urban amenities, may still continue to attract people from the rural areas. But with reinforcement of the rural-development polices, major rural towns can drive faster for the further growth.

Fig. 2.6 Alternative III

