6.3 Travel Speed Survey

(1) Private Passenger Car Speed Survey

a) Method

Test-car method was applied for observing an average vehicular speed on selected road links. The drivers of test-cars drove the car at the average speed of the general traffic flow.

Running time recorders looked for the check points indicated on the route map and recorded the cumulated time from the starting point using a stopwatch. In addition, the distance was recorded by a trip meter of the test-car.

Stop and slow time recorders measured time during stops and slows. Time for deceleration is not included in slow time. Slow time was recorded only when the test-car moved forward but there was still queues in front. At the same time, reasons for stops and slows were recorded by the surveyor.

b) Survey Routes

Average travel speed was surveyed on the selected 10 routes as shown in Fig. 6.3.1.

c) Survey Period

The test-car departed from the starting points at 6:00, 8:00, 10:00, 14:00, 16:00, and 18:00. The first three runs were surveyed by the surveyors in the shift (1), and the last three runs were surveyed in the shift (2).

(2) Bus Speed Survey

a) Method

Bus operating speed was surveyed on board. The surveyors of the bus speed survey got on buses from the designated place and got off at the designated destination. When the surveyed bus passed the check points, the time passed from the origin place was recorded by the surveyors.

b) Survey Routes

Basically the same routes as those surveyed for general traffic flows were selected for the bus operating speed survey. However, some sections were omitted due to the limitation of the existing bus routes.

c) Survey Period

The bus speed surveyors also departed from the starting point at 6:00, 8:00, 10:00, 14:00, 16:00, and 18:00 for comparison between bus speed and general traffic flows.

(3) Survey Result

The travel speed survey results for the general vehicular speed and the bus operating speed were summarized in Table 6.3.1 and 6.3.2, and presented diagramatically in Figs. 6.3.2 through 6.3.5.

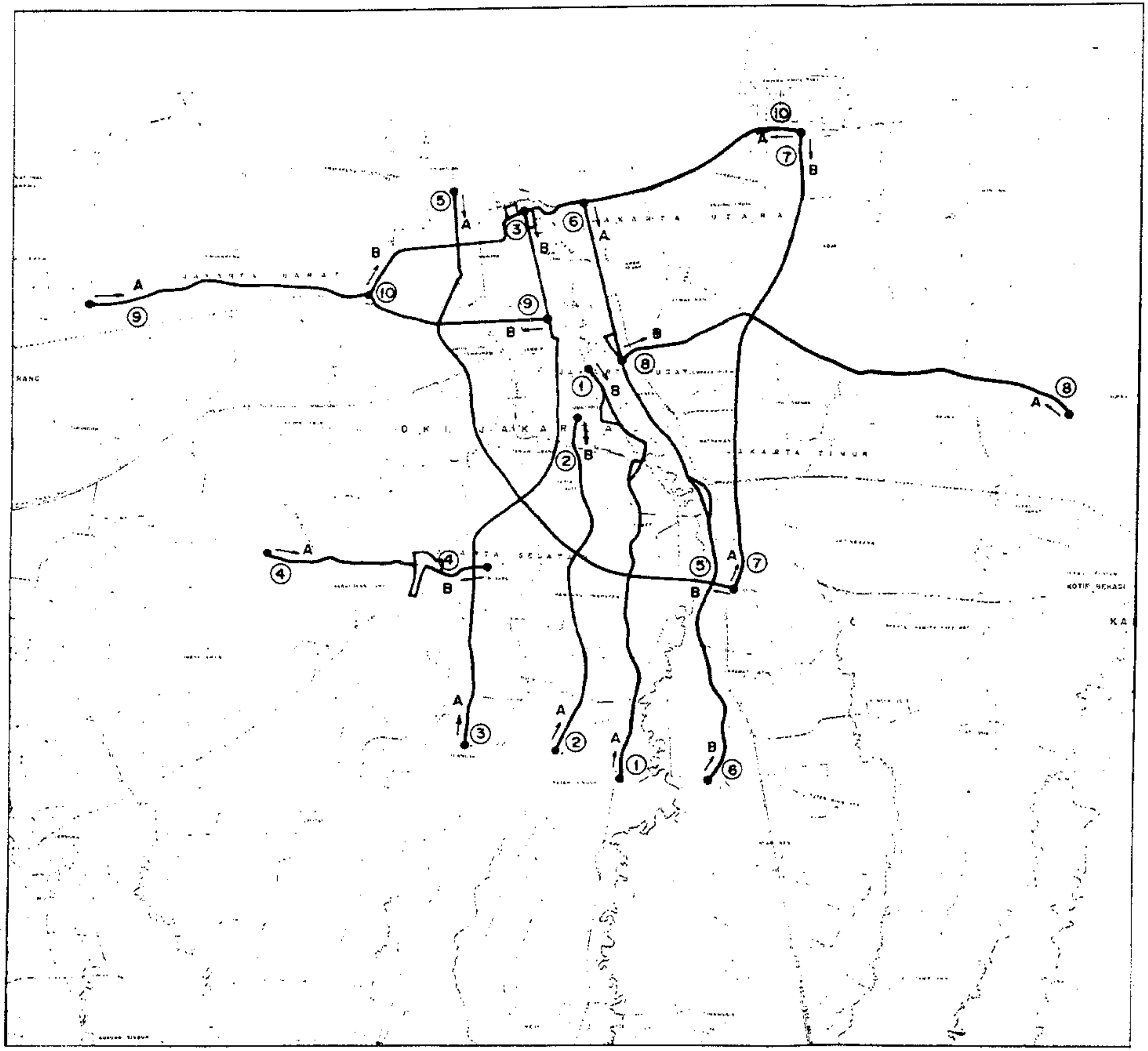


Fig. 6.3.1

TRAVEL SPEED SURVEY
SURVEY ROUTE

1 - 10 : Route No.
A , B : Direction

N

0 1 2 3 4 5 Km

FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM
DEVELOPMENT PROJECT
IN JAKARTA METROPOLITAN AREA

Table 6.3.1 Summary of Travel Speed Survey for General Traffic Flow

Route NO.	Survey Route	Distance	Run No : 1 Start : 6 : 00		Run No : 2 Start : 8 : 00		Run No : 3 Start : 10 : 00		Run No : 4 Start : 14 : 00		Run No : 5 Start : 16 : 00		Run No : 6 Start : 18 : 00	
		(km)	Travel Time (min.)	Average Speed (km/hr)	Travel Time (min.)	Average Speed (km/hr)	Travel Time (min.)	Average Speed (km/hr)	Travel Time (min.)	Average Speed (km/hr)	Travel Time (min.)	Average Speed (km/hr)	Travel Time (min.)	Average Speed (km/hr)
1A	ORR - Perwira	17.15	34.4	29.9	69.9	14.7	45.3	22.7	42.1	24.4	46.0	22.4	48.9	21.0
1B	Perwira - ORR	15.91	36.7	26.0	46.0	20.8	43.2	22.1	47.5	20.1	51.1	18.7	52.8	18.1
2A	ORR - Jl. Wahid Hasyim	12.75	25.5	30.0	-	-	41.3	18.5	37.9	20.2	33.9	22.6	41.1	18.6
2B	Jl. Wahid Hasyim - ORR	12.92	26.0	29.8	45.2	17.2	36.4	21.3	43.9	17.7	37.9	20.5	29.8	26.0
3A	ORR - Jl. Kunir (Kota)	19.15	31.6	36.4	49.1	23.4	59.3	19.4	60.1	19.1	55.4	20.7	42.5	27.0
3B	Jl. Kunir - ORR	20.66	25.1	49.4	52.9	23.4	58.0	21.4	63.0	19.7	59.6	20.8	64.0	19.4
4A	Kreo (Hero) - Jl. Pattimura	7.94	53.8	8.9	46.8	10.2	32.0	14.9	32.9	14.5	31.9	14.9	29.9	15.9
4B	Jl. Pattimura - Kreo (Hero)	9.54	36.6	15.6	29.0	19.7	29.3	19.5	26.4	21.7	38.7	14.8	44.6	12.8
5A	Pluit Raya - Cawang By Pass	19.60	26.2	44.9	62.7	18.8	37.2	31.6	53.1	22.1	55.4	21.2	63.1	18.6
5B	Cawang By Pass - Pluit Raya	19.52	39.8	29.4	58.5	20.0	59.6	19.7	31.2	37.5	54.6	21.5	43.0	27.2
6A	Ancol - Jl. Raya Bogor	21.18	44.6	28.5	63.5	20.0	56.6	22.5	56.3	22.6	59.1	21.5	63.7	19.9
6B	ORR - Ancol	21.49	51.2	25.2	58.3	22.1	56.0	23.0	61.5	21.0	49.1	26.3	49.0	26.3
7A	Cawang By Pass - Jl. Enggano	15.80	26.0	36.5	41.4	22.9	39.9	23.8	32.6	29.1	41.8	22.7	32.3	29.3
7B	Jl. Enggano - Cawang By Pass	14.50	28.4	30.6	30.5	28.5	31.4	27.7	32.4	26.9	33.7	25.8	37.7	23.1
8A	Batas DKI Bekasi - Bundaran Senen	16.26	67.8	14.4	43.1	22.6	37.6	25.9	43.8	22.3	46.2	21.1	39.7	24.6
8B	Bunderan Senen - Batas DKI Bekasi	16.25	29.6	32.9	29.2	33.4	33.2	29.4	31.8	30.7	35.6	27.4	42.7	22.8
9A	Batas Tangerang - Jl. Gajah Mada	15.94	39.2	24.4	56.2	17.0	60.9	15.7	35.0	27.3	35.7	26.8	46.9	20.4
9B	Jl. Gajah Mada - Batas Tangerang	15.94	22.8	41.9	31.5	30.4	35.1	27.2	31.9	30.0	37.1	25.8	37.1	25.8
10A	Jl. Enggano - Jl. Daan Mogot	17.58	38.1	27.7	50.4	20.9	57.3	18.4	68.4	15.4	88.6	11.9	49.1	21.5
10B	Jl. Daan Mogot - Jl. Enggano	19.70	46.9	25.2	68.8	17.2	70.2	16.8	83.4	14.2	88.5	13.4	44.3	26.7

Table 6.3.2 Summary of Travel Speed Survey for Bus Flow

Route NO.	Survey Route	Distance (km)	Run No : 1 Start : 6 : 00		Run No : 2 Start : 8 : 00		Run No : 3 Start : 10 : 00		Run No : 4 Start : 14 : 00		Run No : 5 Start : 16 : 00		Run No : 6 Start : 18 : 00	
			Travel Time (sec)	Average Speed (km/hr)	Travel Time (sec)	Average Speed (km/hr)	Travel Time (sec)	Average Speed (km/hr)	Travel Time (sec)	Average Speed (km/hr)	Travel Time (sec)	Average Speed (km/hr)	Travel Time (sec)	Average Speed (km/hr)
1A	ORR - Terminal Manggarai	11.00	32.3	20.4	66.2	10.0	32.8	20.1	37.0	17.8	51.8	12.7	34.6	19.1
1B	Terminal Manggarai - ORR	13.00	36.3	21.5	40.1	19.5	39.8	19.6	44.7	17.4	41.3	18.9	46.3	16.8
2A	ORR - Jl. Muh. Yamin	11.79	24.1	29.4	57.4	12.3	37.2	19.0	38.9	18.2	35.3	20.0	46.0	15.4
2B	Jl. Muh. Yamin - ORR	11.96	31.3	22.9	34.5	20.8	30.4	23.6	40.4	17.8	26.6	27.0	34.0	21.1
3A	Jl. Trunojoyo - Station Kota	12.70	33.4	22.8	46.2	16.5	53.4	14.3	58.4	13.0	38.1	20.0	61.7	12.4
3B	Jembatan Batu - Jl. Trunojoyo	13.17	46.6	17.0	35.6	22.2	60.9	13.0	48.3	16.4	58.2	13.6	52.0	15.2
3A	ORR - Statiun Kota	19.15	58.2	19.7	51.2	22.4	64.3	17.9	70.8	16.2	66.2	17.4	64.2	17.9
3B	Jl. Kunir - ORR	20.66	52.1	23.8	52.4	23.7	62.5	19.8	69.6	17.8	74.4	16.7	79.9	15.5
4A	Kreo - Jl. Sisingamangaraja	7.49	57.4	7.8	45.9	9.8	31.7	14.2	35.6	12.6	29.1	15.4	22.9	19.6
4B	Jl. Sisingamangaraja - Kreo	9.09	24.5	22.3	21.4	25.5	26.0	21.0	26.8	20.4	33.4	16.3	37.3	14.6
5A	Pluit - Cawang By Pass	19.60	48.4	24.3	42.0	28.0	36.4	32.3	41.9	28.1	39.5	29.8	42.5	27.7
5B	Cawang By Pass - Pluit	19.33	50.5	23.0	62.1	18.7	56.4	20.6	40.9	28.4	48.3	24.0	50.4	23.0
6A	Jl. Kramat Bunder - Jl. Raya Bogor	10.87	23.9	27.3	30.1	21.7	31.2	20.9	28.6	22.8	37.0	17.6	27.9	23.4
6B	ORR - Jl. Kramat Bunder	15.81	43.3	21.9	58.1	16.3	44.9	21.1	25.4	37.3	41.4	22.9	20.4	46.5
7A	Cawang By Pass - Jl. Enggano	15.80	45.0	21.1	53.0	17.9	49.2	19.3	37.3	25.4	43.5	21.8	37.1	25.6
7B	Jl. Enggano - Cawang By Pass	14.51	42.6	20.4	44.4	19.6	39.2	22.2	47.3	18.4	51.4	16.9	44.6	19.5
8A	Batas DKI Bekasi - Bunderan Senen	16.26	72.7	13.4	50.6	19.3	49.4	19.7	39.4	24.8	60.8	16.0	52.0	18.8
8B	Bunderan Senen - Batas DKI Bekasi	16.25	53.5	18.2	42.2	23.1	39.1	24.9	38.2	25.5	41.2	23.7	57.7	16.9
9A	Terminal Kalideres - Jl. Gajah Mada	13.44	43.4	18.6	57.5	14.0	59.8	13.5	38.3	21.1	49.5	16.3	44.5	18.1
9B	Jl. Gajah Mada - Terminal Kalideres	13.44	19.5	41.4	31.3	25.8	43.8	18.4	32.0	25.2	50.5	16.0	43.8	18.4
10A	Terminal Tanjung Priok - Jl. Daan Mogot	16.14	36.2	26.8	40.2	24.1	53.2	18.2	40.3	24.0	57.4	16.9	44.6	21.7
10B	Jl. Daan Mogot - Terminal Tanjung Priok	17.26	37.9	27.3	52.3	19.8	41.9	24.7	69.0	15.0	38.8	26.7	64.6	16.0

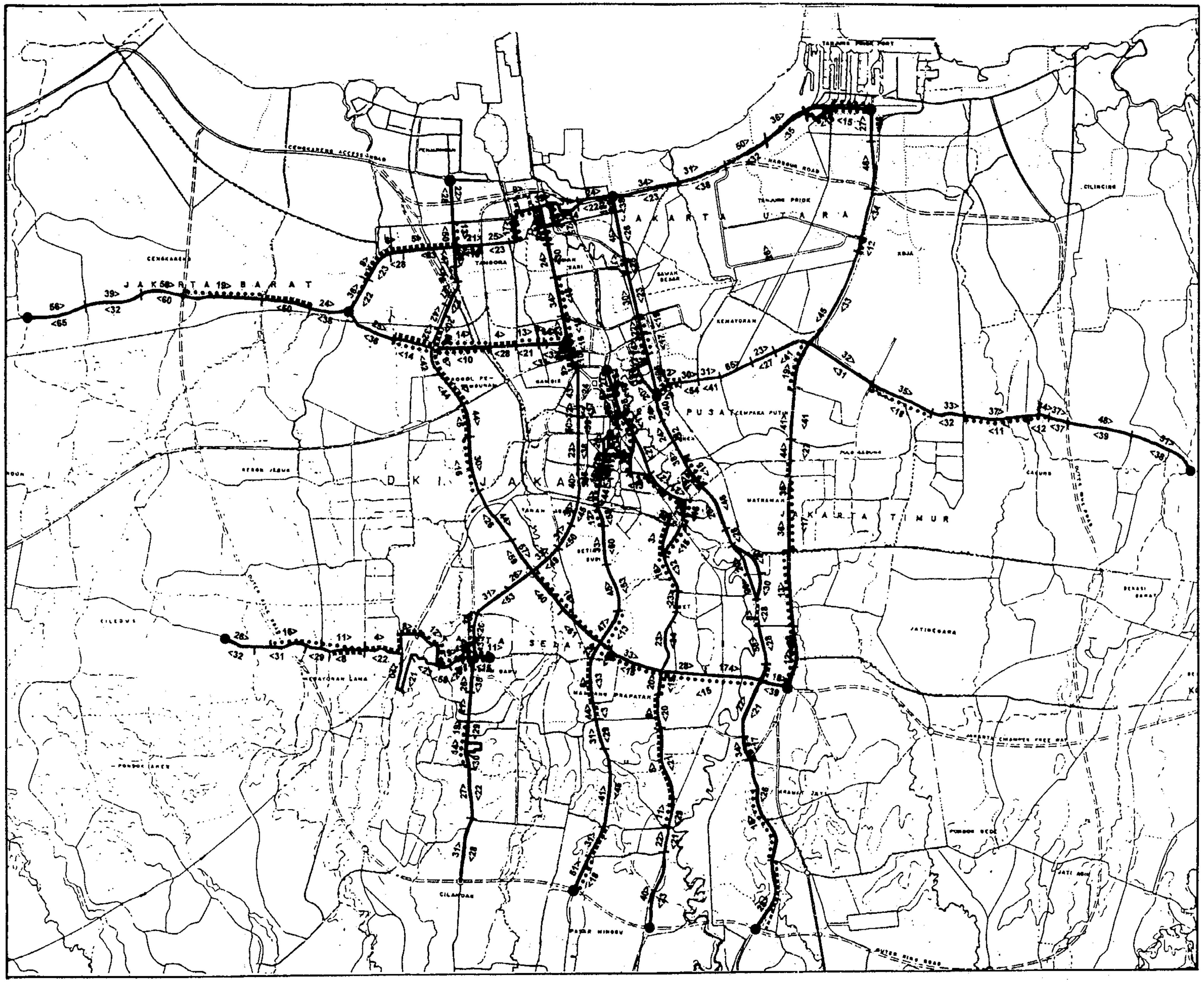


Fig. 6.3.2

AVERAGE TRAVEL SPEED IN THE MORNING PEAK PERIOD

Figures along road sections indicate average travel speed (km/hour)

- - - - - - 0 - 9 km/hr
. . . . . . 10 - 19 km/hr

N 0 1 2 3 4 5 Km

FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA

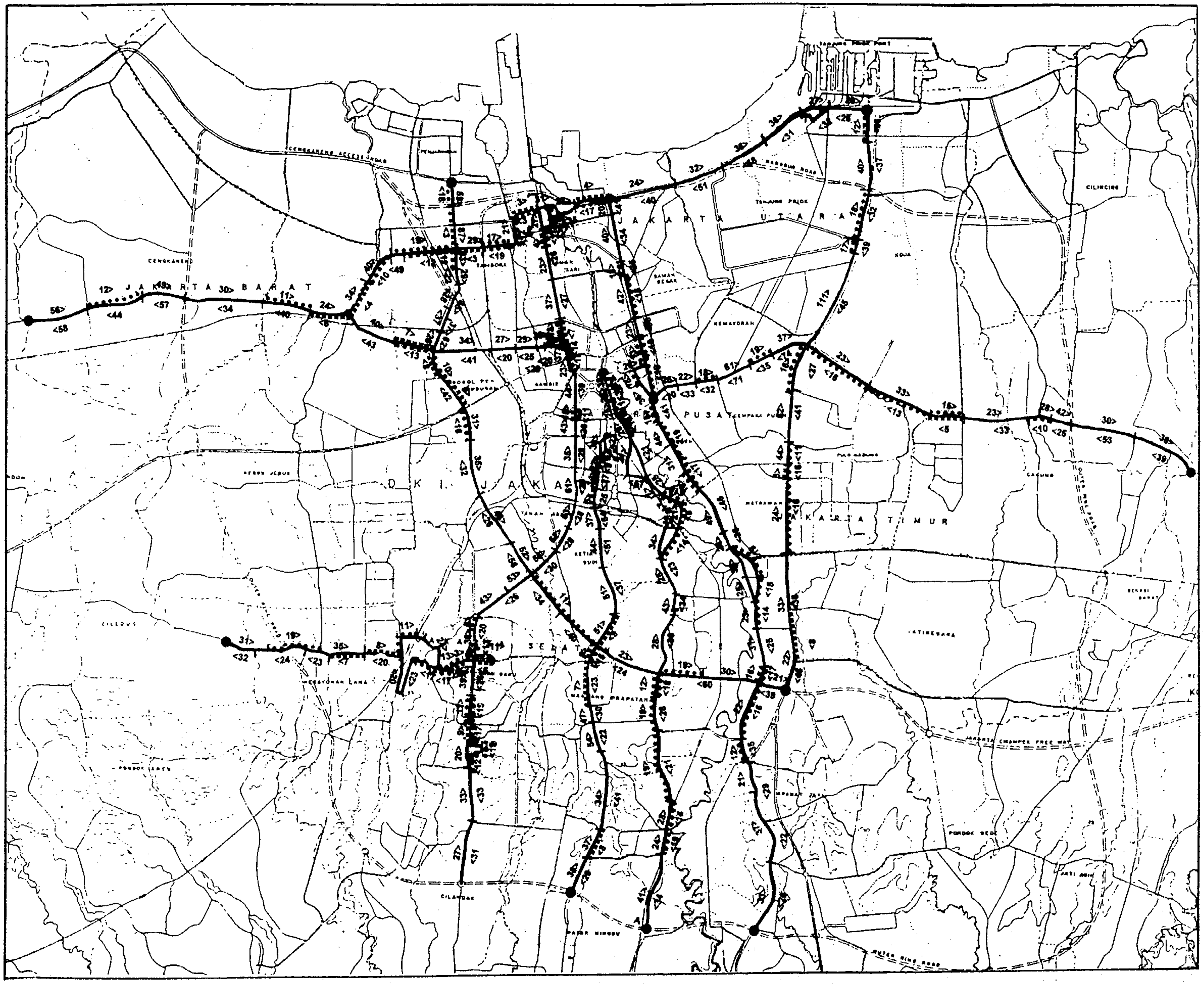


Fig. 6.3.3

AVERAGE TRAVEL SPEED IN THE AFTERNOON PEAK PERIOD

Figures along road sections indicate average travel speed (km/hour)

0 - 9 km/hr
10 - 19 km/hr

0 1 2 3 4 5 Km

FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA

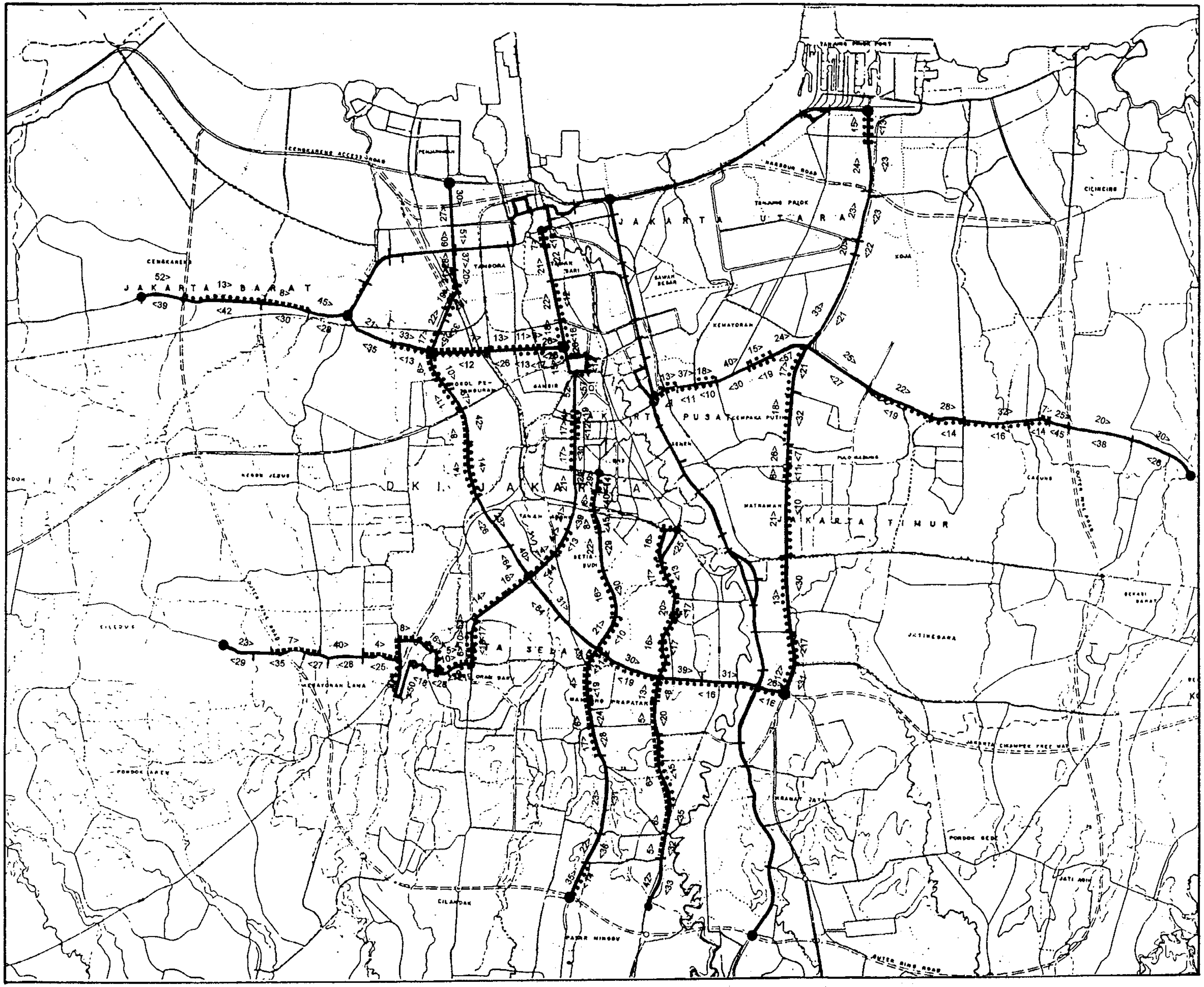


Fig. 6.3.4

BUS OPERATING SPEED IN THE MORNING PEAK PERIOD - Bis Kota / Metro Mini

Figures along road sections indicated average travel speed (km/hour)

0 - 9 km/hr

10 - 19 km/hr

FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA

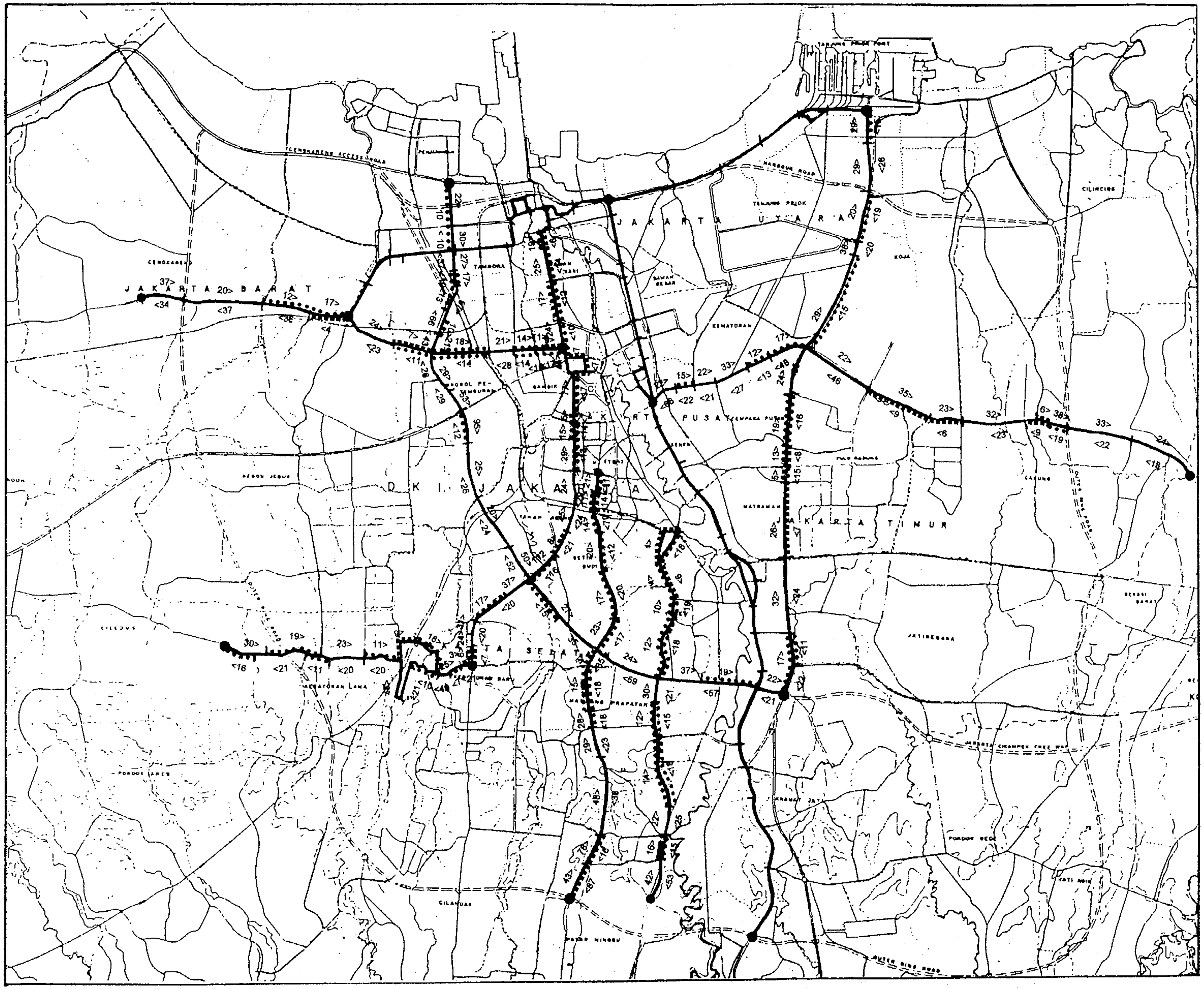


Fig. 6.3.5

BUS OPERATING SPEED IN THE AFTERNOON PEAK PERIOD - Bis Kota / Metro Mini

Figures along road sections indicated average travel speed (km/hour)

0 - 9 km/hr
10 - 19 km/hr

0 1 2 3 4 5 Km

FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA

CHAPTER 7 TRANSPORT MODELING AND DEMAND FORECAST

CHAPTER 7 TRANSPORT MODELING AND DEMAND FORECAST

7.1 Introduction

7.1.1 Basic Concept

This chapter sets forth techniques and methodologies of transport modeling processes employed during the course of this study. The travel demand forecasting model employed in this study has its root in the previous study, the 1985 Arterial Road System Development Study (ARSDS). The 1985 ARSDS transport models were verified in a cascading step as shown in Figure 7.1.1.

In the first place, present travel demand was estimated by applying a series of transportation models developed in ARSDS (1985) with 1993 socio-economic indicators. The estimated travel demand was compared with the observed traffic volume and passenger demand to examine an applicability of the previously developed transportation models for demand forecasting. Accordingly, the estimated mode-wise travel demand in the form of origin-destination matrices were calibrated to the observed traffic volume at the screen lines and cordon lines. Once "base year" network and matrices were set up, future network and matrices may then be developed, and traffic assignment routines performed.

7.1.2 Aggregations and Definitions

In a comprehensive study such as this project, it is necessary to adopt various techniques and terminology. The following descriptions are provided so that a more accurate and complete appreciation of study results and evaluations may be obtained.

- *Data Aggregations*
  It is not possible to predict travel choice (routing and demand) individually for each study area trip. Aggregations of data are therefore necessary and desirable at several levels within the analytical process.

- *Study Area and Zone System*
  The study area is subdivided into analysis zones, the use of which implies that all movement to and from a zone can be adequately represented as starting or ending at a single point in the zone - the centroid. This point represents the zonal center of transport activity.
  Transport modeling is achieved using the Jabotabek transport model, which uses the Jabotabek area as its analytical foundation. Thus, trip demand is generated within and between Jakarta, Tangerang, Bogor and Bekasi. This study area was, to achieve degrees of accuracy, previously subdivided into 131 zones. Within Jakarta (90 zones), subdivisions are typically based on

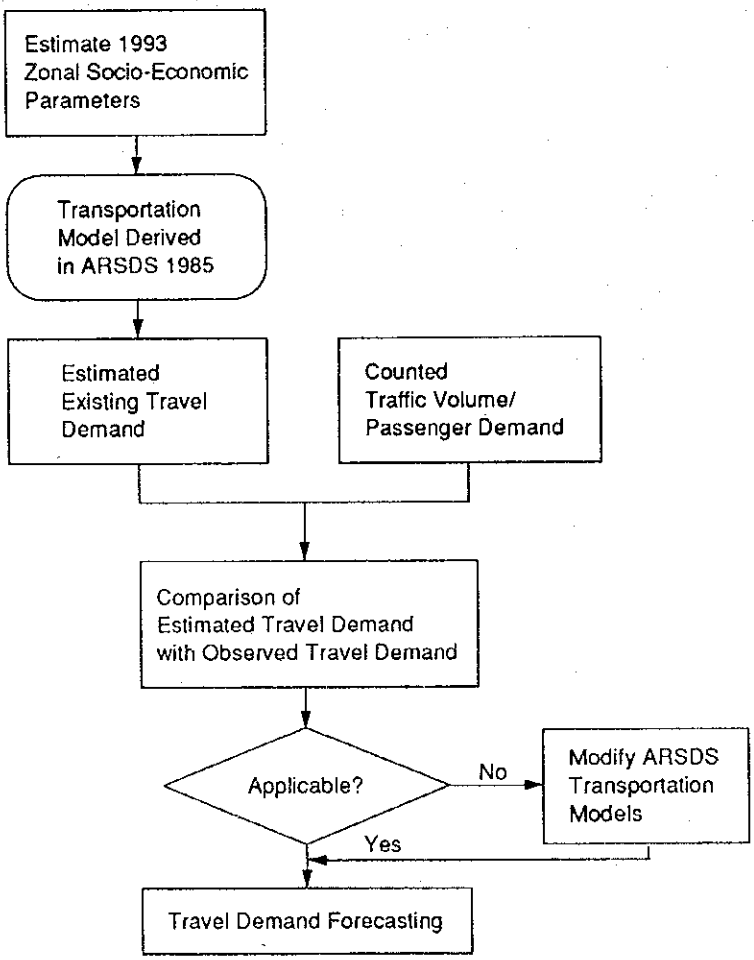


Fig. 7.1.1

Verification of ARSDS Transportation Models

Kelurahan boundaries; within Botabek (23 zones), Kecamatan or Kabupaten boundaries, and outside of Jabotabek (18 zones) Province boundaries. However, during the current study, some major updates were required as to :

- integrate recent changes in Kelurahan designations/naming with the zone system to ensure compatibility with recent data such as results of the 1990 census;

- expand the zone structure within Jakarta to allow for a more detailed traffic analysis;

- restructure zones in Botabek area; and

- designate a special zone to represent movements to/from Soekarno-Hatta airport.

As a result, a revised system of 202 (two hundred two) zones was created. The zone numbers, names and locations are presented in Table 7.1.1 while Figure 7.1.2 shows the 131-zone system (prior to zone division).

- *Vehicle type*
  Feasibility and utilization analyses inherent to this study are based on over-the-road motorized vehicle trips subdivided into four categories, namely motorcycles, sedans (comprising private passenger cars, taxis, pick-ups and vans), buses (comprising small, medium and large-size buses) and trucks (comprising all trucks larger than pick-ups).

- *PCU equivalence*
  A trip is defined as a one-way movement from an origin zone to a final destination zone. The trip may be completed as a vehicular trip (motorized form of transport) or as a "passenger car unit" (PCU). This stratification accepts that vehicle types will excerpt differing impacts upon the traffic stream in which they operate. Motorcycles are defined as being equivalent to 0.33 PCU, sedans to 1.00 PCU, trucks to 2.22 PCU and buses to 1.50 PCU.

- *Tollroad users*
  Potential future users of tollroads are defined as all forms of motorized over-the-road transport whose utilization of the tollway is not precluded on policy or operational grounds. Motorcycles are excluded from the tollway user population, while buses, although some route license prohibit the use of tollway, may use the tollway subject to capacity restraint.

- *Planning Horizon*
  The "base transport condition" is defined as that existing during year 1993. Future year demand is projected in detail for years 2000 and 2010.
  It should, however, be noted that the designation of an ultimate, long-horizon, year represents a somewhat artificial, if necessary, future-year

Table 7.1.1 Zone System

ZONE NAME	ZONE NUMBER	131-ZONE SYSTEM
CIDENG	1	1
PETOJO UTARA	132	
DURI PULA	133	
KEBON KELAPA	134	
GUNUNG SAHARI UTARA	2	2
MANGGA DUA SELATAN	135	
PASAR BARU	3	3
KARTINI	136	
KARANG ANYAR	137	
GUNUNG SAHARI SELATAN	4	4
KEMAYORAN	138	
SENEN	5	5
KRAMAT	6	6
SERDANG	7	7
RAWA SARI	8	8
CEMPAKA PUTIH	9	9
PETOJO SELATAN	10	10
GAMBIR	139	
MENTENG	11	11
KEBON MELATI	12	12
KEBON KACANG	140	
KAMPUNG BALI	141	
GELORA	13	13
BENDUNGAN HILIR	142	
KARET TENGSIN	143	
PETAMBURAN	144	
KAPUK MUARA	14	14
PENJARINGAN	15	15
ANCOL	16	16
PADEMANGAN	17	17
SUNTER AGUNG	18	18
SUNTER JAYA	145	
SUNGAI BAMBU	19	19
LAGOA	20	20
SEMPER	21	21
TANJUNG PRIOK	22	22
KOJA	23	23
KALI BARU	24	24
KELAPA GADING BARAT	25	25
KELAPA GADING TIMUR	146	
PEGANGSAAN DUA	147	
MARUNDA	26	26
SUKAPURA	27	27
SEMANAN	28	28
KALIDERES	148	
KAMAL	29	29
KAPUK	30	30
DURI KOSAMBI	31	31
RAWA BUAYA	149	
KEDANG KALIANGKE	150	
KEMBANGAN	32	32
MARUYA ILIR	33	33
JOGLO	34	34
DURI	35	35
KEDOYA	151	
KEBON JERUK	36	36
KELAPA DUA	37	37
GROGOL	38	38
JELAMBAR	152	
WIJAYA KUSUMA	153	
JELAMBAR BARU	154	
TANJUNG DUREN	39	39
TOMANG	155	
PALMERAH-SP	40	40
SLIPI	156	
KEMANGGISAN-SP	157	
KOTA BAMBU	158	
JATI PULO	159	
PALMERAH-SP	40	40
SLIPI	156	
KEMANGGISAN-SP	157	
KOTA BAMBU	158	
JATI PULO	159	
KALI ANYAR	41	41
JEMBATAN BESI	160	
ANGKE	161	
KRUKUT	42	42
MAPHAR	162	
TAMAN SARI	163	
KEAGUNGAN	164	
GLODOK	165	
MANGGA BESAR	166	
TANGKI	167	
PINANGSIA	168	
DURI SELATAN-Z/M	43	43
TANAH SEREAL	169	
DURI UTARA-Z/M	170	
KRENDANG	171	
TAMBORA	172	
JEMBATAN LIMA	173	
PEKOJAN	174	
ROA MALAKA	175	
KARET KUNINGAN	44	44
KARET	176	
SETIABUDI	177	
GUNTUR	45	45
SEMANGGI	46	46
KUNINGAN TIMUR	47	47
TEBET	48	48
MANGGARAI	49	49
KUNINGAN BARAT	50	50
TEGAL PARANG	51	51
MAMPANG PRAPATAN	178	
PANCORAN	52	52
KALIBATA	53	53
PEJATEN	54	54
BANGKA-Z	55	55
PELA MAMPANG-Z	179	
SENAYAN	56	56
PULO	57	57
PETOGOGAN	180	
MELAWAI	181	
KERAMAT PELA	182	
GUNUNG	183	
SELONG	184	
RAWA BARAT	185	
GANDARI UTARA-M	58	58
CIPETE UTARA-M	186	
GANDARIA SELATAN-M	59	59
CIPETE SELATAN-M	187	
GROGOL SELATAN	60	60
GROGOL UTARA-M	188	
ULUJAMI	61	61
KEBAYORAN LAMA SELATAN-Z/M	62	62
KEBAYORAN LAMA UTARA-Z/M	189	
PONDOK PINANG	63	63
BINTARO	64	64
PASAR MINGGU	65	65
CILANDAK TIMUR	66	66
RAGUNAN-M	190	
JATI PADANG-M	191	
LEBAK BULUS	67	67
PONDOK LABU	192	
CILANDAK BARAT	193	
CIGANJUR	68	68

ZONE NAME	ZONE NUMBER	131-ZONE SYSTEM
SRENGSENG S.	69	69
KEBON MANGGIS	70	70
KAYU MANIS	71	71
KAMPUNG MELAYU	72	72
KAYU PUTIH	73	73
PULOGADUNG	74	74
CIPINANG	75	75
JATINEGARA	76	76
PENGGILINGAN-OK	77	77
PULO GEBANG	194	
PONDOK BAMBU-M	78	78
KLENDER	795	
DUREN SAWIT-M	79	79
PONDOK KELAPA-M	196	
PONDOK KOPI-Z	197	
MALAKA JAYA-Z	198	
MALAKA SARI-Z	199	
CILILITAN	80	80
HALIM	81	81
KRAMAT JATI	82	82
RAWA TERATE	83	83
UJUNG MENTENG	84	84
CAKUNG TIMUR-Z	200	
CAKUNG BARAT-Z	201	
BATU AMPAR	85	85
DUKUH	86	86
LUBANG BUAYA	87	87
SUSUKAN	88	88
CIBUBUR	89	89
PEKAYON	90	90
BATUCEPER	91	91
TANGERANG	92	92
CIPONDOH	93	93
JATIUWUNG	94	94
CURUG	95	95
CILEDUG	96	96
PONDOK AREN	97	97
SERPONG	98	98
CIPUTAT	99	99
SAWANGAN	100	100
GUNUNG SINDUR	101	101
PARUNG	102	102
BEJI	103	103
PANCORAN MAS	104	104
BOJONG GEDE	105	105
CIMANGGIS	106	106
SUKMAJAYA	107	107
CIBINONG	108	108
PONDOK GEDE	109	109
BEKASI BARAT	110	110
BEKASI UTARA	111	111
BEKASI SELATAN	112	112
BEKASI TIMUR	113	113
TAMBUN	114	114
SUKATANI	115	115
CIKARANG	116	116
CIBARUSA II	117	117
CITEUREUP	118	118
JONGGOL	119	119
BOGOR	120	120
CIAWI	121	121
LEUWILIANG	122	122
JASINGA	123	123
CIKUPA	124	124
BALARAJA	125	125
MAUK	126	126
SERANG/MERAK	127	127
SUKABUMI/PELABUHAN RATU	128	128
CIANJUR/BANDUNG	129	129
	130	130
KARAWANG/CIKAMPEK/CIREBON	131	131

FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA	Fig. 7.1.2 (a) TRAFFIC ZONE SYSTEM IN DKI JAKARTA

FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA	Fig. 7.1.2 (b) TRAFFIC ZONE SYSTEM IN BOTABEK

linkage. It is, from a transport perspective, more correct to state that future-year demand projections reflect the achievement of a stated socio-economic condition, which may or may not occur precisely in the postulated year.

7.2 Modeling Procedures

The procedures for transport demand modeling are conveniently illustrated in Figure 7.2.1, and explained accordingly in the following paragraphs.
For the execution of these tasks, the capability of TRANPLAN/NIS[1] software were employed during all steps of the modeling process.

7.2.1 Zonal Planning Parameters

Zonal Residential Population

A zones allocation of residential population in DKI Jakarta and Botabek in 1993 was based on the growth trend derived from the 1980 and 1990 census results of respective traffic zones. The zonal estimates were finally adjusted to the number controlled for the 1993 total population in DKI Jakarta which was independently determined by the regional population growth trend in Jabotabek.

The zonal estimate in 2010 for DKI Jakarta was principally based on the DKI Jakarta Structure Plan. However, revisions were made comparing the planned figure with virtual pattern of population growth in the respective zones. The zones were first categorized into two groups, that is 1) population decreasing zones and 2) population increasing zones.

For the former category, causes that brought about the population decrease were investigated referring to the 1985 land use map (ARSDS results) and a 1990 general land use map prepared by the Bureau of Maps and Survey for DKI Jakarta. Based on the analysis result and a future district plan (RBWK), the population capacity was assumed for these population decrease zones for the future.

---

1) TRANPLAN (Transportation Planning Modeling Software) and NIS (Network Information System, a set of linket proprietary transportation planning programs distributed by The Urban Analysis Group, Danville, California, U.S.A.

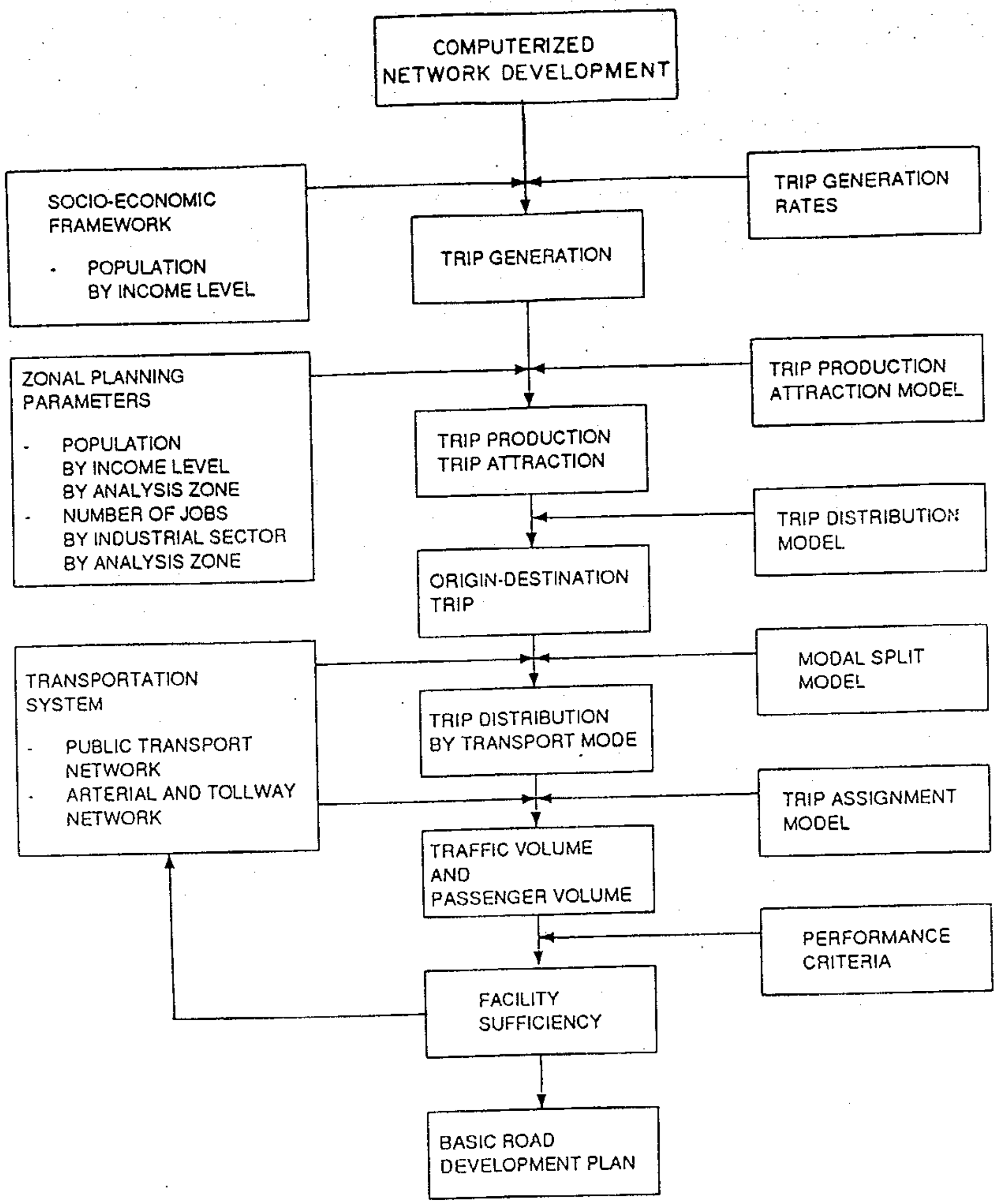


Fig. 7.2.1 Transportation Modelling Process

As for the latter category, the virtual increasing trend, derived from 1971, 1980 and 1990 census results, was compared with the target population set by the Structure Plan, and the category was further divided into the following two sub-groups:

Sub-group (1) : the increasing trend is likely to reach the target population set in the structure plan

Sub-group (2) : the increasing trend is likely to either overestimate or underestimate the target population.

Zones pertaining to the sub-group (1) adopted the derived increasing trend, but those in the sub-group (2) were analyzed to find reasons that brought about differentials between the target figure and the actual figure. The analysis was carried out referring to land use changes between the year 1985 and 1990, and further 2005 of the district plan, in order to determine a revised capacity of settlement in the zones.

Consequently, the total population resulted from the above process was adjusted to conform with the future population determined externally from the regional context by the JMDPR. The derived zonal population is presented in Appendix 4A.

Zonal Distribution of Jobs

The number of zonal jobs is one of important factors to explain the trip attraction to the zone. Compared to the zonal population, basic data concerning to the job distribution are considered most difficult to obtain. The direct data can only be available from the 1986 Census Economy which covered locations and numbers of employees at sampled industrial establishments. However, the census does not include all the type of industrial activities, particularly such facilities without fixed addresses as street venders and road side temporary restaurant and shops.

The indirect data or information which could indicate the job distribution are land use maps. Therefore, these two data sources were utilized to assume the present 1993 job distribution in both DKI Jakarta and Botabek.

The future distribution of jobs in DKI Jakarta was largely based on the district plans prepared for respective Kecamatans for the Year 2005. The zonal estimate for Botabek was undertaken by distributing the fixed total jobs of Botabek components according to the estimated urban/rural population, designated types of urban development such as primary, secondary and local service centers. The derived zonal distribution of jobs is presented in Appendix 4A.

7.2.2 Network Development

The development of base and future year network (both highway and transit) within the study area was performed in three cascading steps :

- analyze DKI Jakarta Public Works road inventory supplemented with field survey as well as any existing road development plans;
- digitize (assign two-dimensional coordinates) to selected links and nodes (generally excludes local roads) contained in the network; and
- develop computer-based networks utilizing capabilities of TRANPLAN/NIS modeling software.

Maps and Inventory Data

Maps and physical descriptive data for road links as well as transit operations were available from the following sources :

- Jakarta base map (digital format, from DKI Mapping Office);
- Jakarta 1993 road atlas (FALK map);
- Jakarta 1993 road inventory (Dinas PU DKI);
- DKI road map 1:20,000 (from former ARSDS study);
- Botabek topographical map 1:25,000 (BAKOSURTANAL);
- Bus operation information (DLLAJR DKI);
- DKI 2005 road development plan;
- Road development plan in Kabupaten Bogor, Tangerang and Bekasi;
- Road improvement implementation plan (Bina Marga & DKI)

These maps and information were observed thoroughly, and unnecessary roads (such as local road in housing area) were excluded from the network, thus leaving only the tollway, arterial, collector and so-called local-plus roads (local roads passed by public transport). Also included were the planned roads categorized as major arterial, minor arterial and major collector in the DKI 2005 plan.

System Digitizing

The road inventory identifiers were transferred to a 1:20,000 map covering the study area. Node and zone centroid numbers were subsequently assigned in line with TRANPLAN requirements. The road network, as well as visual identifiers such as kelurahan and zone boundaries, were then digitized. That is, the capabilities of AUTOCAD software were applied to assign 6-digit X and Y coordinates to each node. Thus, visual system displays are possible under a variety of mediums, including NIS.

Conversion to TRANPLAN format

The TRANPLAN highway network simulation programs require following information for each link :

- A and B node numbers (numeric values which identify the "from" and "to" node of the link),
- Link distance,
- Free flow speed,
- Link capacity,
- Assignment group code, and
- Link group code.

Following paragraphs describe the source/derivation of each of these link data items.

a) A and B node locations are defined by their X and Y coordinates within Jabotabek area. The coordinate locations are obtained from the digitizing process.

b) Link distance defines the length of a link in kilometer.
For simplification, distances are merely straight line distances between the A and B node.

c) Free flow speed is defined as the safe speed at which a vehicle would travel on a link in the absence of other traffic. The average free flow speeds were estimated for each road type.

d) Link capacity is defined in term of assignment capacity, which represents a trip-making threshold for modeling purposes at which alternative route choices (as practical and possible) are likely. This is generally adopted as a Level of Service C/D condition, as defined by the "Highway Capacity Manual, 1985".
Capacities of roads in urban area have been modified in such a way to account for the effect of delay by traffic signals.

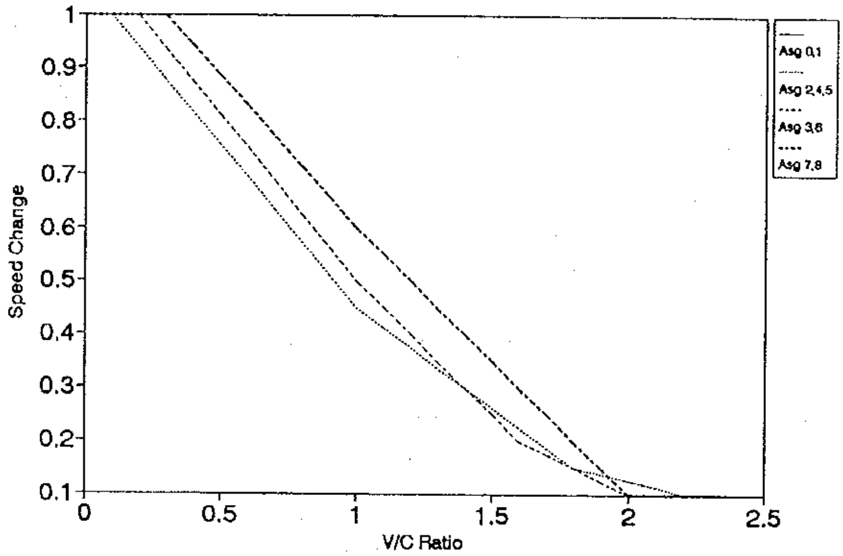
e) Assignment group (ASG) code is used to identify links to which a common capacity restriant function is to be applied; that is, link speed is reduced by a pre-determined function as the link volume to capacity (V/C) ratio increases. For TRANPLAN input, ASG codes were defined as follows (see Table 7.2.1).

Table 7.2.1 Assignment Groups for Jabotabek Trip Assignment

ASG	FACILITY
0	Centroid Connector
1	Ramp
2	Urban 1 or 2 lane
3	Rural 2 lane
4	Urban Multi-lane
5	Urban Multi-lane (high order)
6	Rural Multi-lane
7	Urban Freeway
8	Rural Freeway

The Capacity Restraint Functions (QV curves) are shown in Figure 7.2.2.

Figure 7.2.2 Capacity Restraint Function



f) Link group code is a numeric code to group links with common characteristics for subsequent referencing, updating, and reporting. Link groupings employed in this study address functional class, toll facility, and a special grouping for N/S and E/W Axis Roads.

g) Toll road Impedance
In addition to the above information, another important consideration is tollroad impedance, i.e. a factor via which the transport model routes, or does not route, trips onto the tollroad system. Impedance is determined not only by travel time, but also delays associated with toll transactions, deceleration/acceleration at toll booths and the impact of the toll itself. The latter item is problematic in that impedance is calculated in terms of time, thus, "toll paid" must be converted via a ***"value of time"*** . The derivation

of a time conversion (ie the Rupiah value associated with one hour of travel time for composite tollway users) has always been difficult in Indonesia.

Value of time for different planning years have been calibrated during the course of Jakarta Outer Ring Road Section W1 project conducted by PCI (Pacific Consultants International) in early 90s. The calibration approach adopted within the framework of the ORR-W1 study consists of several steps :

- PCI conducted a traffic count program at locations sited strategically along tollroads, major arterials and the ORR corridor. Volume data were collected over 16-hour periods by direction, by 11 vehicle types and, where appropriate, segregated by tollroad mainline and frontage facilities. These data were supplemented by latest available utilization information for all facilities managed by PT. Jasa Marga.

- Calibrated trip matrices were assigned onto the road system, and modeled traffic volumes compared with observed traffic volumes at 23 locations throughout the tollroad system.

- Assignments were conducted iteratively with value of time modified in subsequent assignments based on comparisons of activity at the 23 tollroad calibration points.

Final results suggest that an acceptable simulation of tollroad activity can be achieved with base year value of time equal to 4750 Rupiah per hour. The future value of time is adjusted in two ways :

- Since the initial toll structure (of the ORR-W1 project) is expressed in terms of 1995 Rupiah, the 1992 impedance is extrapolated to a 1995 impedance in both inflatory (8% p.a.) and real (3% p.a.) terms.

- Post 1995 value of time will, relative to toll structure, change only in real terms (3% p.a. to 2005, 2.5% p.a. thereafter). In other words, an implicit assumption of the modeling process is that the financial "well being" (income) of tollroad users will exceed inflation (Jasa Marga toll rate increases) by some 2.3 to 3 percent p.a.

For the purpose of this Study, the base year value of time is assumed to be the same as that of ORR-W1, whereas the 2010 value of time was estimated via interpolation (see Table 7.2.2).

Table 7.2.2 Value of Time by Planning Years

Year	V.O.T (Rp/hour)	Remarks
1993	4,750	W1
1995	6,300	W1
2000	7,300	W1
2005	8,400	W1
2010	9,500	Interpolated
2015	10,800	W1

7.2.3 Trip Generation Model

Total person trip generation in DKI Jakarta and Botabek was estimated employing trip production rate shown in Table 7.2.3 by income group obtained in the ARSDS with estimated population data by income level.

By including income level as a factor of socio-economic parameters in the estimation process makes, it is possible to reflect an increase of travel demand caused not merely by an increase of population but also by an increase in mobility.

Table 7.2.3 Trip Production Rate

	Income Group			
Trip Purpose	High	U. MIddle	L. Middle	Low
To Work	0.410	0.393	0.366	0.358
To School	0.242	0.252	0.244	0.200
To Home	0.929	0.873	0.799	0.729
Business	0.130	0.104	0.081	0.071
Private Matters	0.379	0.280	0.186	0.141
Shopping	0.119	0.113	0.119	0.121
Total	2.209	2.015	1.795	1.620

Source : ARSDS, 1985

7.2.4 Trip Production/Attraction Models

Trip production/attraction models derived in the ARSDS are classified into two types of forms;

- Attendance rates for "to work", "to school" trips; applied in order to reflect changes of age structure followed by change in labor force and school age population in the future.

Table 7.2.4 Zonal Socio-economic Parameters

Variable Name		Place
POP-HI	Population in high income group	at residence
POP-UM	Population in upper middle income group	at residence
POP-LM	Population in lower middle income group	at residence
POP-LO	Population in low income group	at residence
EMP-HI	Employed population of high income group	at residence
EMP-UM	Employed population of upper middle income group	at residence
EMP-LM	Employed population of lower middle income group	at residence
EMP-LO	Employed population of low income group	at residence
STU-HI	Number of students/pupils of high income group	at residence
STU-UM	Number of students/pupils of upper middle income group	at residence
STU-LM	Number of students/pupils of lower middle income group	at residence
STU-LO	Number of students/pupils of low income group	at residence
JOB-AG	Number of jobs in primary industry	at residence
JOB-MA	Number of jobs in manufacturing industry	at residence
JOB-O2	Number of jobs in other secondary industry	at residence
JOB-CO	Number of jobs in trade and commerce	at residence
JOB-O3	Number of jobs in other tertiary industry	at residence
JOBOCA	Number of jobs in occupation group (A), (B)	at residence
JOBOCB	Number of jobs in occupation group (C)	at residence
JOBOCC	Number of jobs in occupation group (D), (E)	at residence
JOB-HI	Number of jobs of high income group	at residence
JOB-UM	Number of jobs of upper middle income group	at residence
JOB-LM	Number of jobs of lower middle income group	at residence
JOB-LO	Number of jobs of low income group	at residence
SCH-HI	Number of students and pupils of high income group	at school place
SCH-UM	Number of students and pupils of upper middle income group	at school place
SCH-LM	Number of students and pupils of lower middle income group	at school place
SCH-LO	Number of students and pupils of low income group	at school place
DAYPOT	Daytime population	

Table 7.2.5 Trip Production Model

Trip Purpose	Income Group	Trip Production	Formula
To Work	High	TPW HI	EMP HI * 0.9245
	U. Middle	TPW UM	EMP UM * 0.9304
	L. Middle	TPW LM	EMP LM * 0.9053
	Low	TPW LO	EMP LO * 0.8511
To School	High	TPS HI	STU HI * 0.9350
	U. Middle	TPS UM	STU UM * 0.9635
	L. Middle	TPS LM	STU LM * 0.9844
	Low	TPS LO	STU LO * 0.9854
Business		TTBUSI	JOBSEC * 0.1125 + JOBTER * 0.2357 + 1285
Private		TPPRIV	DAY POP * 0.1970-885
Shopping		TPSHOP	POP * 0.1387-832
To Home		TPHOME	DAY POP * 0.9983-7483

Table 7.2.6 Trip Attraction Model

Trip Purpose	Income Group	Trip Production	Formula
To Work	High	TPW HI	EMP HI * 0.9245
	U. Middle	TPW UM	EMP UM * 0.9304
	L. Middle	TPW LM	EMP LM * 0.9053
	Low	TPW LO	EMP LO * 0.8511
To School	High	TPS HI	STU HI * 0.9350
	U. Middle	TPS UM	STU UM * 0.9635
	L. Middle	TPS LM	STU LM * 0.9844
	Low	TPS LO	STU LO * 0.9854
Business		TTBUSI	JOBSEC * 0.1259 + JOBTER * 0.1189 961
Private		TPPRIV	DAY POP * 0.2260-2848
Shopping		TPSHOP	jobcom * 1.0858 + 2166POP * 0.1387-832
To Home		TPHOME	POP * 0.9244-2648

Number of jobs by income group is estimated based on number of jobs by industrial sector (5).

- Multiple regression equations for "to home", "business", "private matters", and "shopping" trips.

The zonal parameters estimated as the variables in the trip production and trip attraction models are shown in Table 7.2.4. The models are summarized in Table 7.2.5 and 7.2.6.

7.2.5 Trip Distribution Model

Trip distribution, that is, the technique by which trips generated by each zone (refer previous section) are linked with all other zones accessible via the roadway network, is accomplished with the use of gravity models. These reflect road network levels of service in the travel deterrence function, and are thus sensitive to changes in trip distribution patterns catalyzed by road system modifications and/or improvements.

The gravity models employed in this study are of the doubly-constrained type with the following formulation :

$$T_{ij} = \frac{P_i A_j F_{t,ij} K_{ij}}{\sum\sum_{ij} P_i Aj F_{t,j} K_{ij}}$$

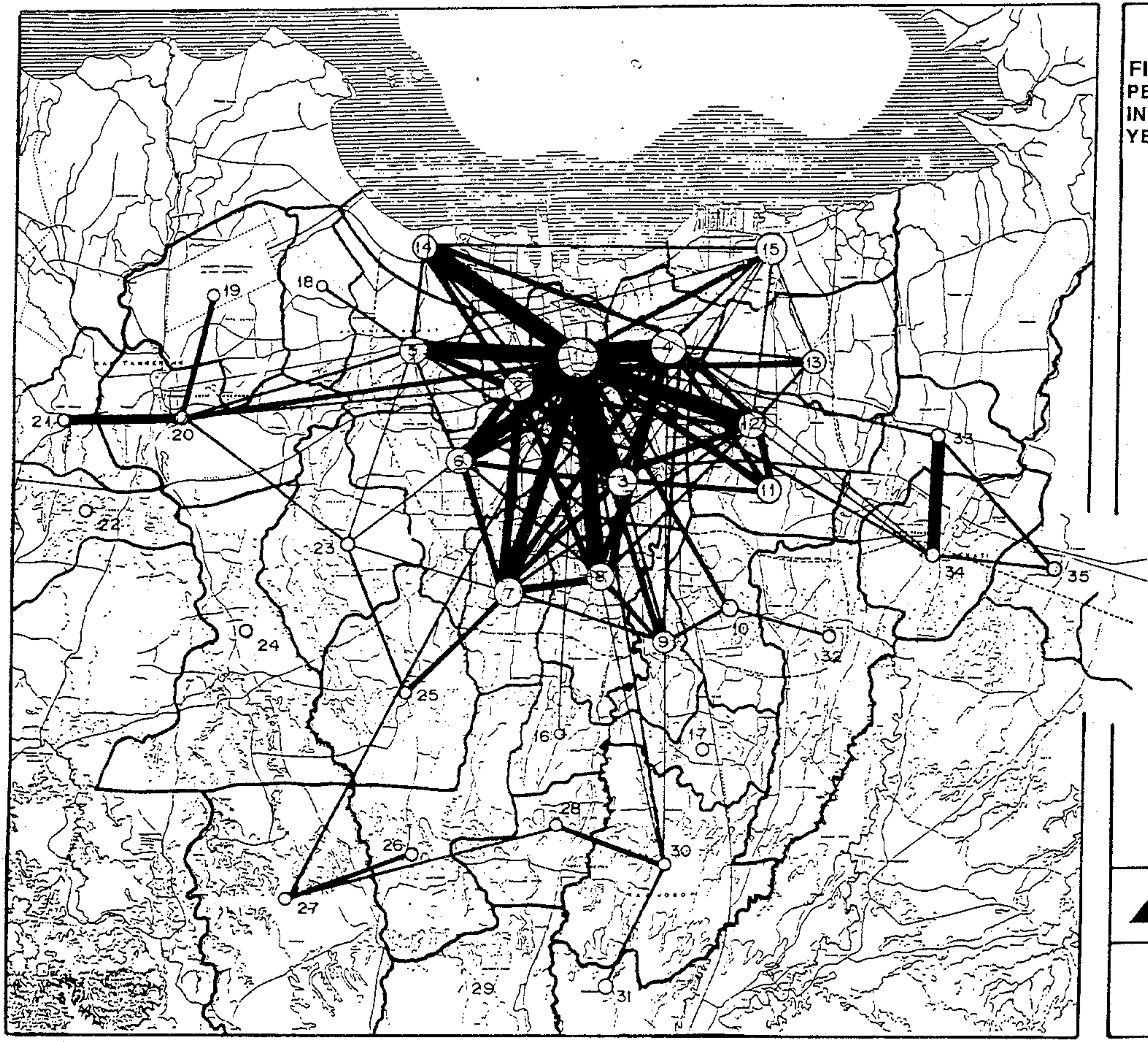
Where T_{ij} = Trips produced in zone i and attracted to zone j
P_i = Trips produced in zone i
A_j = Trips attracted to zone j
$F_{t,ij}$ = Empirically derived travel factor for time t between zones i and j
K_{ij} = Specific zone-zone (or province-province) adjustment factor to allow for the effect of travel linkages not otherwise explained by the gravity model.

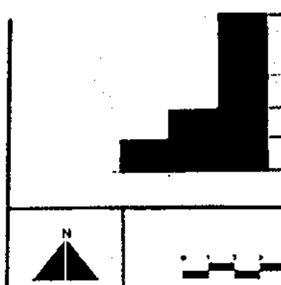
This gravity model formulation constrains balancing of observed trips to modeled trips (as estimated by the trip generation model). Through this process the originally calibrated trip-end patterns are maintained.

Use of the travel deterrence function in this model (F-Factor curves) is preferred to the use of an exponential formulation since it is possible to manually adjust the calibrated F-Factors to more precisely fit the characteristics of the observed OD- data.

The gravity model was calibrated to the available 1985 ARSDS OD Matrix data (person trip, 12 purposes). Due to data incompleteness in some area in Botabek,. only data of DKI area (90 zones) was used in the analysis. It is possible, however, to use the Calibrated Gravity Models to estimate trips in Botabek and between DKI-Botabek.

FIG. 7.2.3
PERSON TRIP FLOWS
IN JAKARTA METROPOLITAN AREA
YEAR 1993





FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM
DEVELOPMENT PROJECT
IN JAKARTA METROPOLITAN AREA

Desire lines of the base year (1993) person trip in Jakarta Metropolitan Arca is shown in Figure 7.2.3.

7.2.6 Modal Split Model

The structure of model is a binary choice model as depicted in Fig. 7.2.4.

The modal split model derived in the ARSDS is rather simple. Merely road distance and ratio of travel time are incorporated in the model.

(1) Non-motorized Transport/Motorized Transport Split Model

Percentage share of non-motorized mode of transport, varies according to distance by trip purpose and income level of trip makers as shown in Fig. 7.2.5.

(2) Public Transport/Private Transport Split Model

Percentage share of public transport depends on the ratio of travel time by public transport to private transport as shown in Fig. 7.2.6.

(3) Sedan/Motorcycle Split Model

After trips are splited into public transport and private transport, trips made by private transport are further devided into trips by private passenger cars and by motorcycles according to trip length. Sedan/Motorcycle split curves are illustrated in Fig. 7.2.7.

After person trips are split into trips by mode of transport according to trip purpose and income level, the estimated trips by trip purpose are combined into all trip purposes. Furthermore, person trips made by private mode of transport are converted into vehicle trips by dividing average occupancies shown in Table 7.2.7. Moreover, these vehicle trips are further converted into P.C.U. (Passenger Car Unit) trip OD matrices by applying passenger car equivalent factors for traffic simulation analyses.

Table 7.2.7 Average Occupancy by Vehicle Type

Area	Sedan	Motorcycle
Within DKI Jakarta	1.96	1.20
DKI Jakarta-Botabek	1.99	1.31

Source : ARSDS Person Trip Survey, 1985

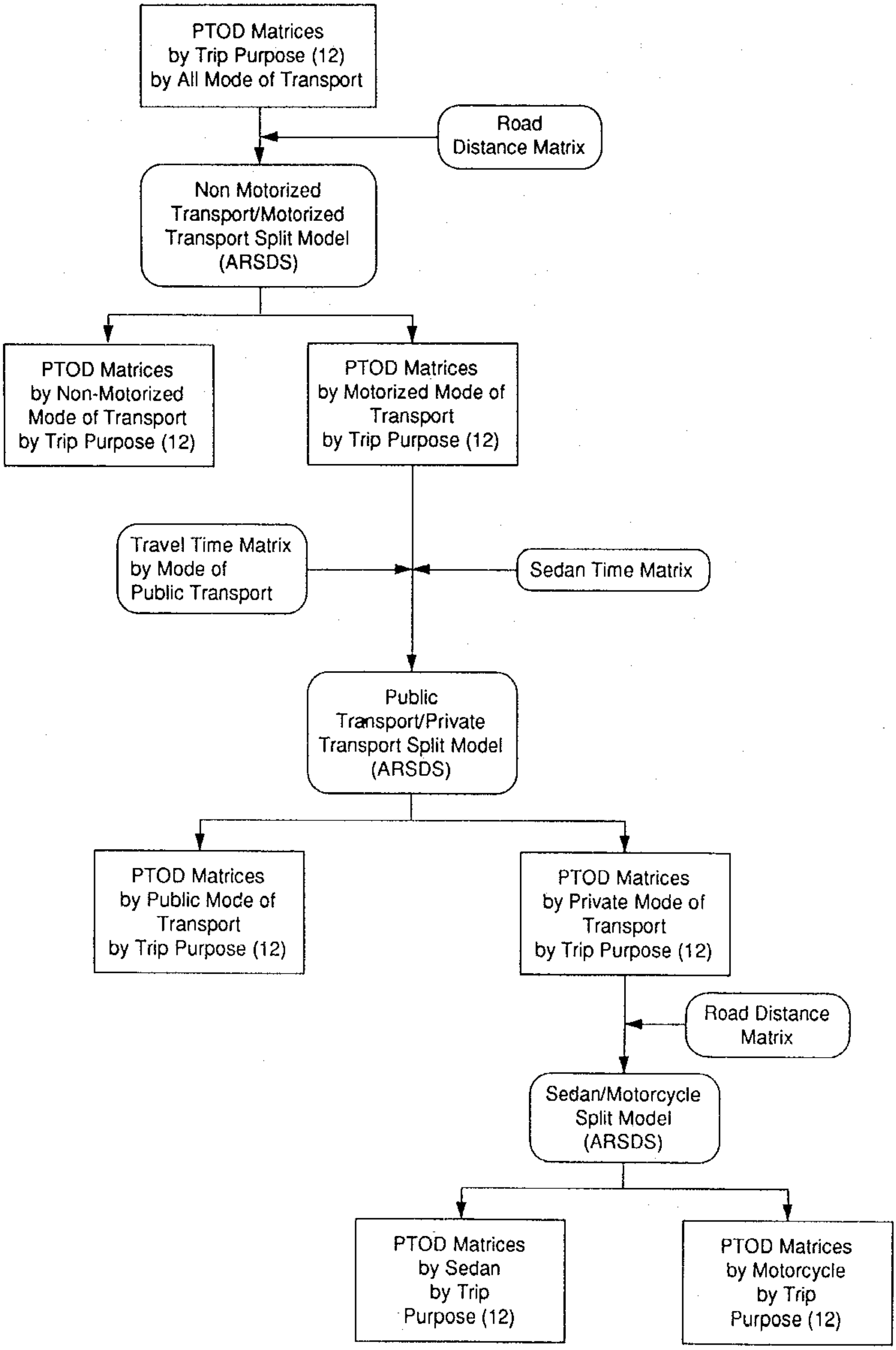


FIG. 7.2.4 Structure of Modal Split Model

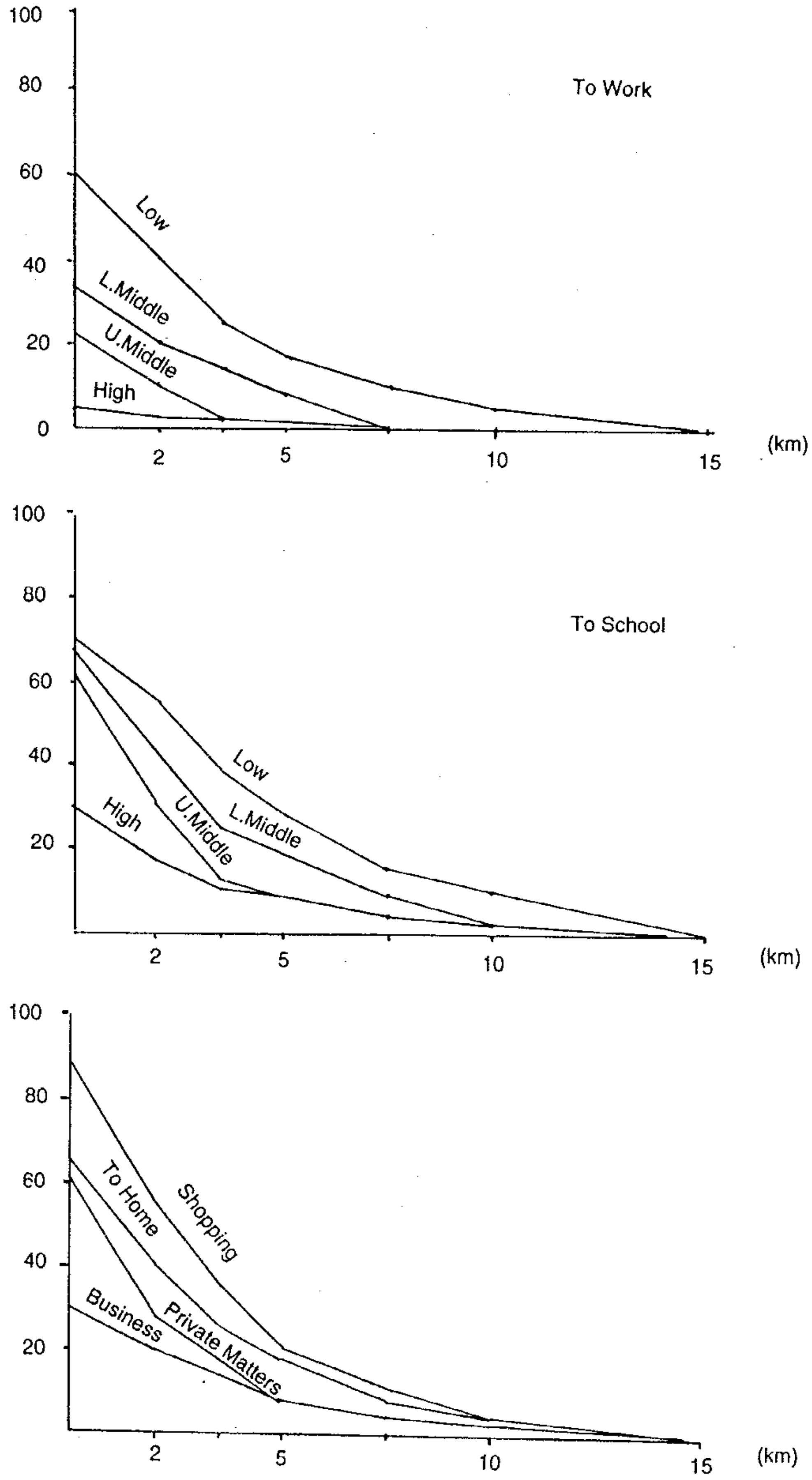


FIG. 7.2.5

FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA	Non-motorized Transport/Motorized Transport Split Model

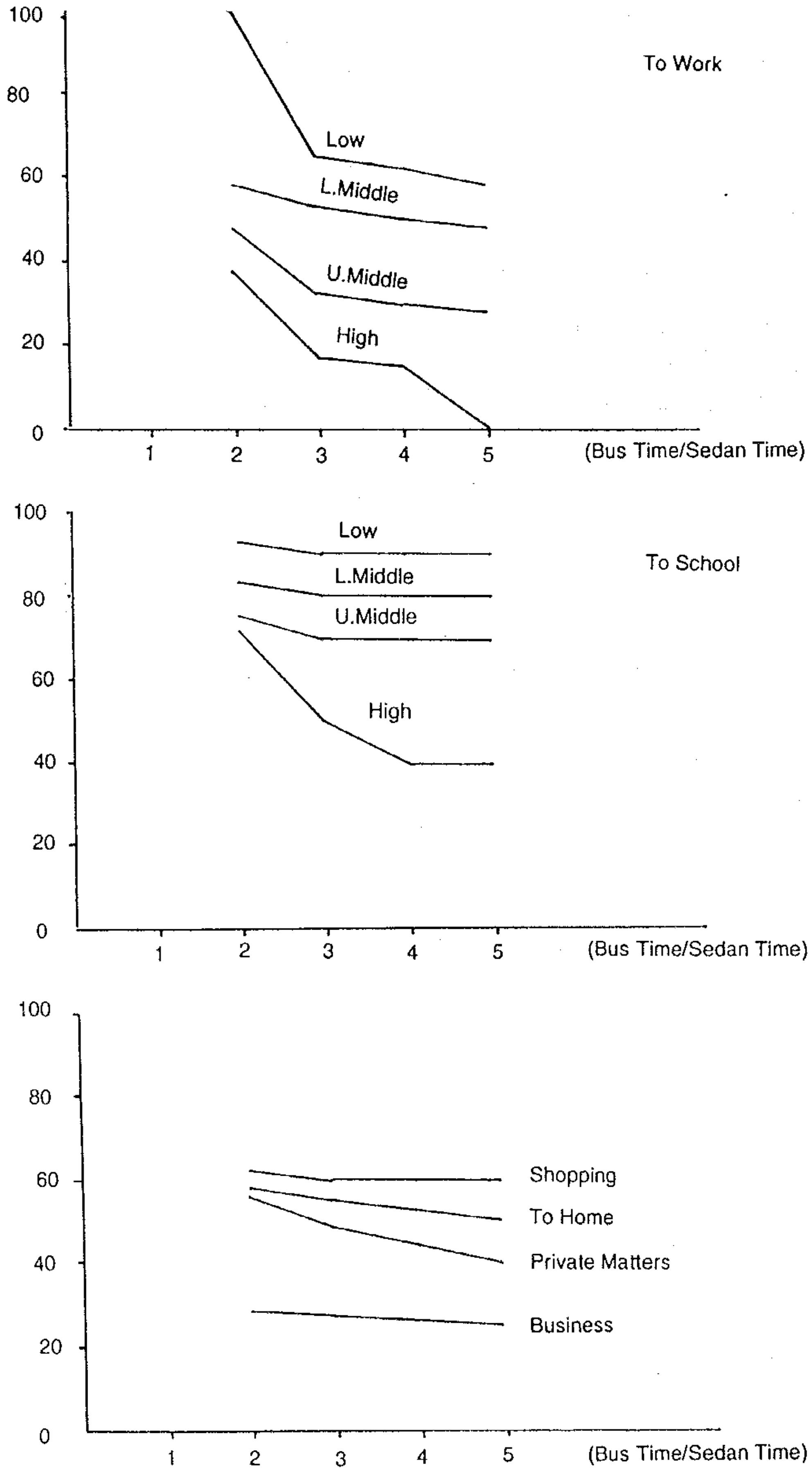
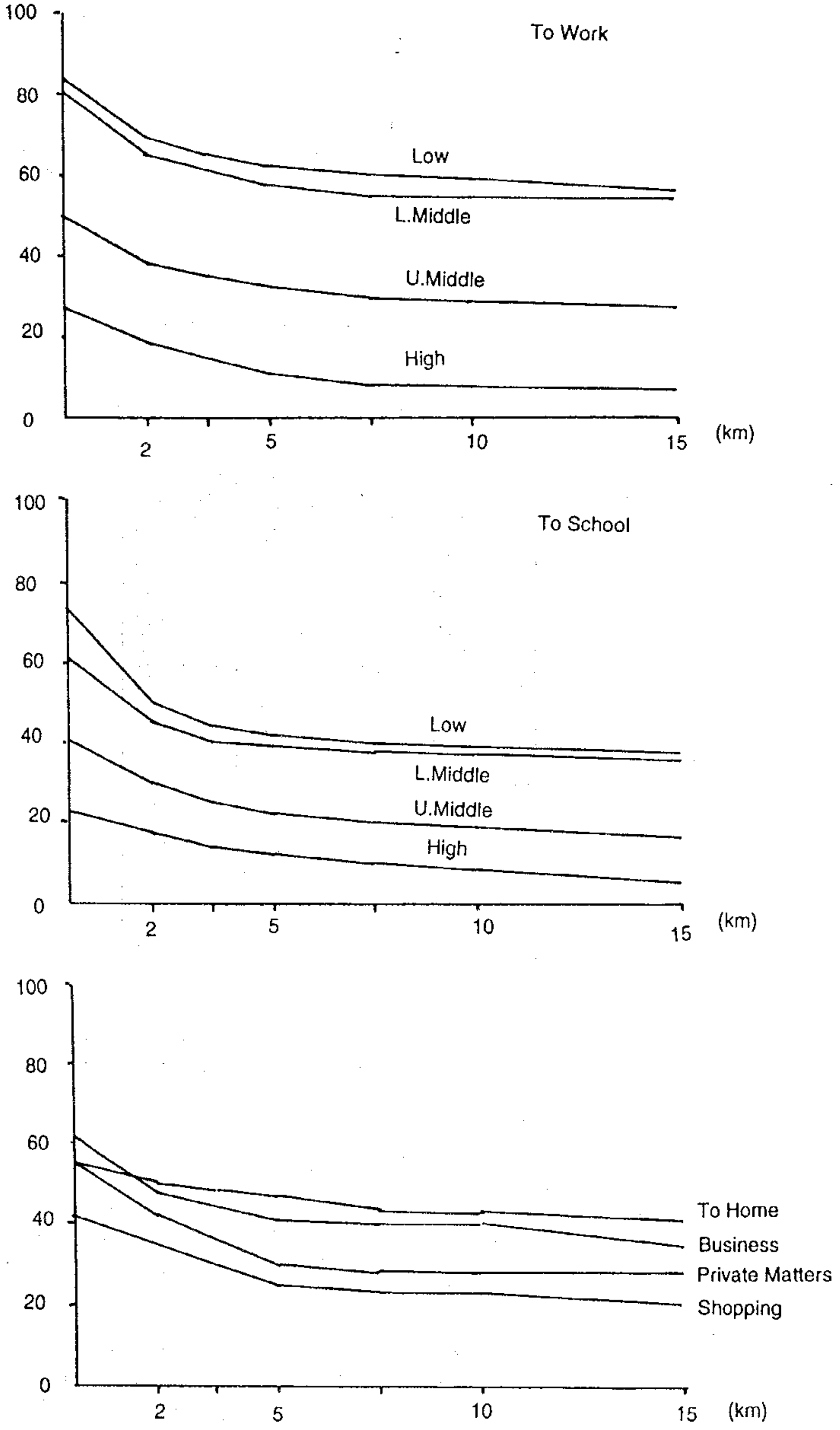


FIG. 7.2.6 Public Transport/Private Transport Split Model



FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA	**FIG. 7.2.7** Sedan/Motorcycle Split Model

7.3 Base Year (1993) Calibration

The primary purpose of base year calibration is to get a reasonably sound base year (1993) OD Matrix that can be used as 'starting point' for subsequent traffic analysis.

7.3.1 Year 1993 Trip Generation

The Trip Generation Total for DKI Jakarta and Botabek is summarized in Table 7.3.1.

Table 7.3.1 Trip Generation of DKI Jakarta and Botabek, 1993

Unit: thousand person trips

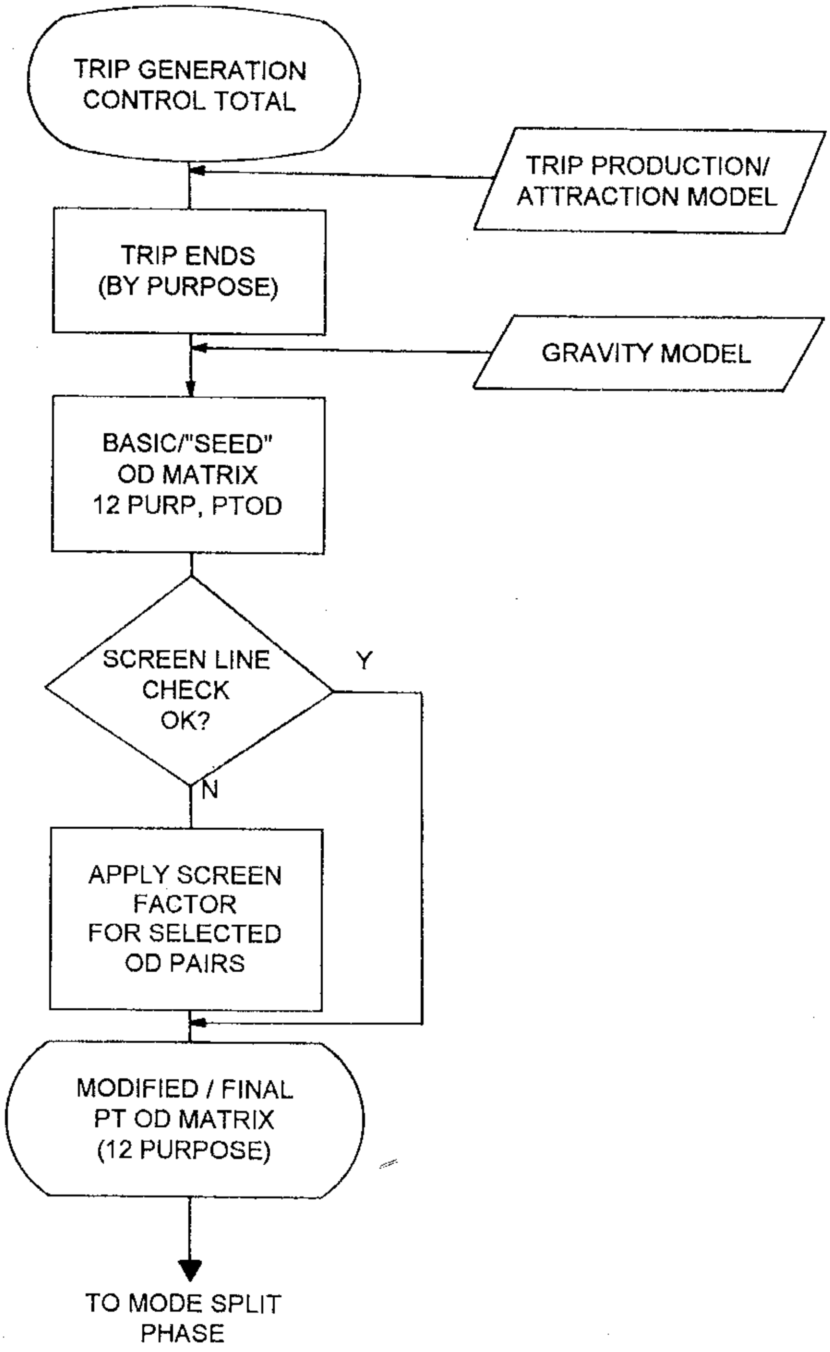
Trip Purpose	Income Level	DKI Jakarta	Botabek
To Work	High	263	38
	U. Middle	620	368
	L. Middle	1,278	1,167
	Low	1,231	1,847
	Sub-total	3,392	3,420
To School	High	155	22
	U. Middle	397	236
	L. Middle	853	778
	Low	688	1,032
	Sub-total	2,092	2,068
To Home	All	7,270	7,213
Business	All	774	734
Private	All	1,819	1,618
Shopping	All	1,086	1,121
Total		16,435	16,175

Constrained by this trip generation, trip production and attraction of each zone can then be estimated using the relationships set forth in Section 3.1.1.

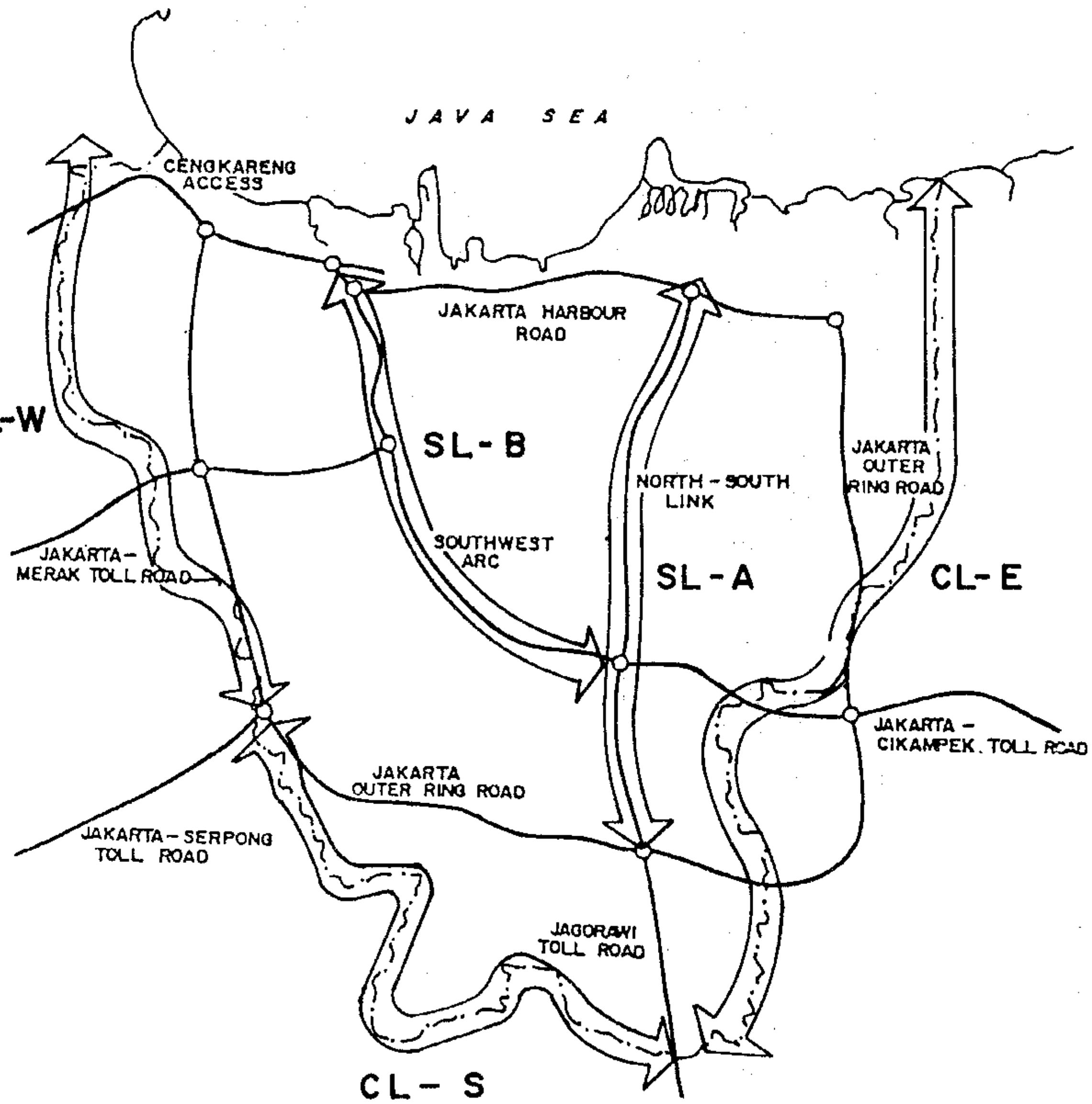
7.3.2 Year 1993 OD Matrix Development and Calibration

First of all, the 1993 inter-zonal OD Matrix was estimated by utilizing the Gravity Model. Intra trips were calculated externally using the relationship employed during 1985 Gravity Model Calibration. These trips were then combined to make a basic 1993 OD Matrix (by trip purpose) for subsequent calibration.

To judge the goodness of the OD matrix in replicating the existing trip-making characteristics, a series of screen lines and cordon lines were determined to check traffic volumes on these crossings. Figure 7.3.1 illustrates the work flow



FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA	Fig. 7.3.1 WORK FLOW OF PTOD CALIBRATION



FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA	Fig. 7.3.2 Screen line Locations

of Person Trip OD Matrix calibration, and Figure 7.3.2 shows the screen line locations.

A preliminary traffic assignment (person trip based) was performed and the result is summarized in Table 7.3.2.

Table 7.3.2 Screen Line Comparison (before adjustment)

Screen Line	Traffic Count (Conv. to person)				Assignment	Ratio Asg/TC
	MC	Sed	Publ (Bus)	Total		
SL-A	170,443	663,432	1,055,593	1,889,468	1,764,896	0.93
SL-B	426,926	1,561,170	1,566,954	3,555,049	2,651,691	0.75
CL-W	82,617	253,244	378,057	713,918	528,828	0.74
Cl-S	73,463	282,616	604,154	960,233	1,133,342	1.18
CL-E	68,461	225,906	526,130	820,497	793,901	0.97

Traffic volumes on Screenline-B, Cordon line W and S are significantly different from the actual condition. Accordingly, adjustment factors were applied only for those trips crossing screen line CL-S, and combination of screen line CL-W and SL-B.

Calibration result in the form of block OD is shown in Table 7.3.3. Average trip length by trip purpose was also calculated and summarized in Table 7.3.4.

7.3.3 Modal Split & Conversion to Vehicle OD Matrices

The modal share of person trips by both motorized and non-motorized mode of transport were estimated by using the modal split model described in the previous section.
In order to calculate Vehicle Trip OD Matrix, the following vehicle occupancy rate was used.

Mode	Area	
	Within DKI	DKI-Botabek
MC	1.20	1.31
Sedan	1.96	1.99
Bus*	18.9	16.8

* based on 1993 survey data.

Vehicle OD Matrices, as converted from Person OD Matrices, are only available for Motorcycle, sedan and bus. No Vehicle OD Matrix for Truck can be estimated from Person OD Matrix. To 'fill-in' this gap, Truck vehicle OD

Table 7.3.3 CALIBRATED PERSON TRIP OD MATRICES, 1993

District 1 = DKI Jakarta
District 2 = Botabek

TRIP PURPOSE : BUSINESS			
DISTRICT	1	2	TOTAL
1	726712	82187	808899
2	99427	669567	768994
TOTAL	826139	751754	1577893

TRIP PURPOSE : PRIVATE			
DISTRICT	1	2	TOTAL
1	6587221	729124	1903352
2	634849	6997496	1631114
TOTAL	7222070	7726620	3534466

TRIP PURPOSE : SHOPPING			
DISTRICT	1	2	TOTAL
1	992985	62967	1055952
2	97379	1115890	1213269
TOTAL	1090364	1178857	2269221

TRIP PURPOSE : TO WORK			
DISTRICT	1	2	TOTAL
1	2939810	192733	3132543
2	478530	2504973	2983503
TOTAL	3418340	2697706	6116046

TRIP PURPOSE : TO SCHOOL			
DISTRICT	1	2	TOTAL
1	2123287	94313	2217600
2	124987	1820553	1945540
TOTAL	2248274	1914866	4163140

ALL PURPOSES			
DISTRICT	1	2	TOTAL
1	15122163	1312528	16434691
2	1605720	14569045	16174765
TOTAL	16727883	15881573	32609456

Table 7.3.4 **YEAR 1993 TRIP LENGTH SUMMARY (KILOMETER)**
TRIPS MADE BY DKI RESIDENTS

PURPOSE : TO WORK

	TOTAL TRIPS	TRIP-KM	AVE. TRIP LENGTH
HIGH INCOME	239596	2541369	10.607
UPP-MID INCOME	612120	635060	10.375
LOW-MID INCOME	1797109	16168279	8.997
LOW INCOME	483718	3773611	7.801
ALL	3132543	28833854	9.205

PURPOSE : TO SCHOOL

	TOTAL TRIPS	TRIP-IMPED	AVE. TRIP LENGTH
HIGH INCOME	186737	1300688	6.965
UPP-MID INCOME	454900	2368060	5.206
LOW-MID INCOME	1267156	5293147	4.177
LOW INCOME	308807	1299579	4.208
ALL	2217600	10261474	4.627

OTHER PURPOSES

	TOTAL TRIPS	TRIP-IMPED	AVE. TRIP LENGTH
BUSINESS	808899	6555211	8.104
TO HOME	7316345	44923016	6.14
PRIVATE	1903352	11791753	6.195
SHOPPING	1055952	4947335	4.685

ALL PURPOSES

	TOTAL TRIPS	TRIP-IMPED	AVE. TRIP LENGTH
ALL PURPOSES	16434691	1.07E+08	6.530

Table 7.3.5 Year 1993 Modal Split (by Purpose of Trip)

TRIPS PRODUCED FROM DKI JAKARTA
(Includes DKI-DKI and DKI-Botabek trips)

MODE	TRIP PURPOSE							
	WORK	SCHOOL	BUSINESS	HOME	PRIVATE	SHOPPING	TOTAL	COMP.
WALKING	491,252	1,374,323	145,858	3,950,303	696,387	824,569	7,482,691	
PUBLIC TRANSPORT	948,983	834,171	139,552	1,932,367	605,669	274,858	4,735,600	52.90%
MOTOR CYCLE	304,115	45,022	95,585	518,129	102,640	30,509	1,096,000	12.24%
PASSENGER CAR	776,516	194,553	286,353	1,326,125	385,455	151,399	3,120,400	34.86%
SUB.TOT MOTORIZED	2,029,614	1,073,746	521,490	3,776,622	1,093,763	456,765	8,952,000	
TOTAL	2,520,865	2,448,069	667,348	7,726,924	1,790,150	1,281,334	16,434,691	
SHARE	15.34%	14.90%	4.06%	47.02%	10.89%	7.80%		

JABOTABEK TRIPS

MODE	TRIP PURPOSE							
	WORK	SCHOOL	BUSINESS	HOME	PRIVATE	SHOPPING	TOTAL	COMP.
WALKING	638,783	1,562,322	175,845	4,370,727	714,696	1,014,459	8,476,832	
PUBLIC TRANSPORT	1,941,853	2,395,352	353,109	5,783,630	1,540,637	907,817	12,922,398	53.55%
MOTOR CYCLE	931,964	89,502	220,831	1,356,838	226,034	85,058	2,910,227	12.06%
PASSENGER CAR	2,101,333	369,434	704,397	3,693,447	945,353	486,036	8,300,000	34.39%
SUB.TOT MOTORIZED	4,975,150	2,854,288	1,278,337	10,833,915	2,712,024	1,478,911	24,132,625	
TOTAL	5,613,933	4,416,610	1,454,182	15,204,642	3,426,720	2,493,370	32,609,457	
SHARE	17.22%	13.54%	4.46%	46.63%	10.51%	7.65%		

Matrix from ORR-W1 Study was used. Modifications were necessary, however, because the zone system is slightly different.

The share of each transport mode is shown in Table 7.3.5.

Once the vehicular OD Matrices are set, it is possible to do a comparison of vehicle movements crossing the screen line. The result is as follows :

Table 7.3.6 Screen Line and Cordon Line Checking (after adjustment)

	Motorcycle (P.C.U./day)		
	Counting Value	Estimated Value	Ratio
Cordon Line - West	20,812	21,256	1.02
Cordon Line - South	18,506	29,683	1.60
Cordon Line - East	17,246	22,281	1.30
Total	56,564		

	Sedan (P.C.U./day)		
	Counting Value	Estimated Value	Ratio
Cordon Line - West	126,622	125,223	0.99
Cordon Line - South	141,308	175,906	1.24
Cordon Line - East	112,953	129,397	1.14
Total	380,883		

	Public Transport (Person trips/day)		
	Counting Value	Estimated Value	Ratio
Cordon Line - West	378,057	358,229	0.95
Cordon Line - South	604,154	534,600	0.88
Cordon Line - East	526,130	390,178	0.74
Total	1,508,341		

	Motorcycle (P.C.U./day)		
	Counting Value	Estimated Value	Ratio
Screen Line (A)	42,936	56,334	1.31
Screen Line (B)	107,546	105,423	0.98
Total	1,508,341		

	Sedan (P.C.U./day)		
	Counting Value	Estimated Value	Ratio
Screen Line (A)	331,716	332,788	1.01
Screen Line (B)	780,585	626,471	0.80
Total	1,112,301		

	Public Transport (Person trips/day)		
	Counting Value	Estimated Value	Ratio
Screen Line (A)	1,055,593	972,303	0.92
Screen Line (B)	1,566,954	1,804,252	1.15
Total	2,622,547		

7.4 Future Traffic Demand Forecast

Future demand forecasting was conducted based on an assumption that the base year calibrated mathematical relationships which represent trip-making characteristics are applicable for the whole planning year. The forecasting process and some findings are summarized in the following section. Year 2010, the ultimate year, was of a focal point in which Person and Vehicular Trip Matrices were thoroughly estimated. The figures for year 2000 were conveniently interpolated from the 1993 and 2010 matrices.

7.4.1 Future Trip Generation

Trip Generation in both DKI Jakarta and Botabek for the year 2010 was estimated and listed in Table 7.4.1. The person travel demand was then broken down into analysis zone using trip production and attraction models described in Section 7.2.3. Trip production in suburban area generally grow more rapidly in future years due to expansion of urbanized area.

Table 7.4.1 Estimated Trip Generation in DKI Jakarta and Botabek, 2010

Unit : Thousand person trips

Trip Purpose	Income Level	DKI Jakarta	Botabek
To Work	High	746	387
	U. Middle	1,385	1,483
	L. Middle	1,474	2,762
	Low	976	2,364
	Sub-total	4,584	6,996
To School	High	116	229
	U. Middle	888	951
	L. Middle	984	1,841
	Low	545	1,320
	Sub-total	2,858	4,341
To Home	All	9,979	15,015
Business	All	1,123	1,595
Private	All	2,808	3,749
Shopping	All	1,425	2,236
Total		22,782	33,932

7.4.2 Year 2010 Person Trip OD Matrices

The 2010 inter-zonal person trip OD matrices were developed using the Gravity Model. Intra trips, as per current procedure, were calculated externally and later combined with inter-zonal trips. The resulting person trip OD matrices, in the form of "block OD", is shown in Table 7.4.2. Compared

Table 7.4.2 PERSON TRIP OD MATRICES, 2010

District 1 = DKI Jakarta
District 2 = Botabek

TRIP PURPOSE : BUSINESS			
DISTRICT	1	2	TOTAL
1	963185	194229	1157414
2	216192	1325874	1542066
TOTAL	1179377	1520103	2699480

TRIP PURPOSE : TO HOME			
DISTRICT	1	2	TOTAL
1	8217668	1642684	9860352
2	1386605	13347675	14734280
TOTAL	9604273	14990359	24594632

TRIP PURPOSE : PRIVATE			
DISTRICT	1	2	TOTAL
1	2529440	377107	2906547
2	432608	3078752	3511360
TOTAL	2962048	3455859	6417907

TRIP PURPOSE : SHOPPING			
DISTRICT	1	2	TOTAL
1	1197055	141767	1338822
2	231829	1993893	2225722
TOTAL	1428884	2135660	3564544

TRIP PURPOSE : TO WORK			
DISTRICT	1	2	TOTAL
1	4160825	655551	4816376
2	1188710	6063837	7252547
TOTAL	5349535	6719388	12068923

TRIP PURPOSE : TO SCHOOL			
DISTRICT	1	2	TOTAL
1	2468922	233721	2702643
2	318561	4347576	4666137
TOTAL	2787483	4581297	7368780

ALL PURPOSES			
DISTRICT	1	2	TOTAL
1	19537095	3245059	22782154
2	3774505	30157607	33932112
TOTAL	23311600	33402666	56714266

with 1993 person trip flows, a significant increase of travel demand would appear in suburban areas. Trips produced and attracted from/to the Central area will also increase due to intense utilization of land in the area. Thus, increase of trip length in addition to increase in number of trips would become heavy burden on transportation network in the study area.

Desire lines of the 2010 person trips in Jakarta Metropolitan Area is shown in Figure 7.3.3.

7.4.3 Modal Split and Conversion to Vehicle OD Matrices

Modal split analysis was done based on modal split model described in the previous section.

Number of person trips by mode of transport projected by the modal split model is shown in Table 7.4.3. This modal share would vary depending on the transportation policy such as a traffic demand constraint policy in CBD.

Following conversion from person trip OD matrices to vehicle OD matrices, the sedan, motorcycle and bus matrices were developed. Again, truck OD matrix was adopted from ORR-W1 study.

During the traffic simulation process, it was deemed necessary to further modify the vehicle OD matrices to achieve a technically reasonable traffic spread throughout the network.

The method adopted is explained below :

- The 2010 vehicle OD matrices developed from person OD matrices was used as 'constraint', in which the trip ends were regarded as control total.
- The 1993 vehicle OD matrices were factored-up to 2010 by a Fratar technique. By this procedure, which is available as a function of TRANPLAN, each trip interchange between zones are iteratively expanded and/or adjusted until the row and column totals replicate the indicated control total.

7.4.4 Future Highway and Transit Network

The transportation network in the transportation analysis is classified into two types of network; highway network and transit network. Highway network consists of arterial road network and tollway system.

In the traffic simulation analysis, the Jakarta-West Java tollway system, which consists of the Intraurban Tollway System, the Outer Ring Road, and Regional Tollway, is assumed to be completed by the year 2000. Arterial road network for future years was coded based on the road development plan in DKI Jakarta,

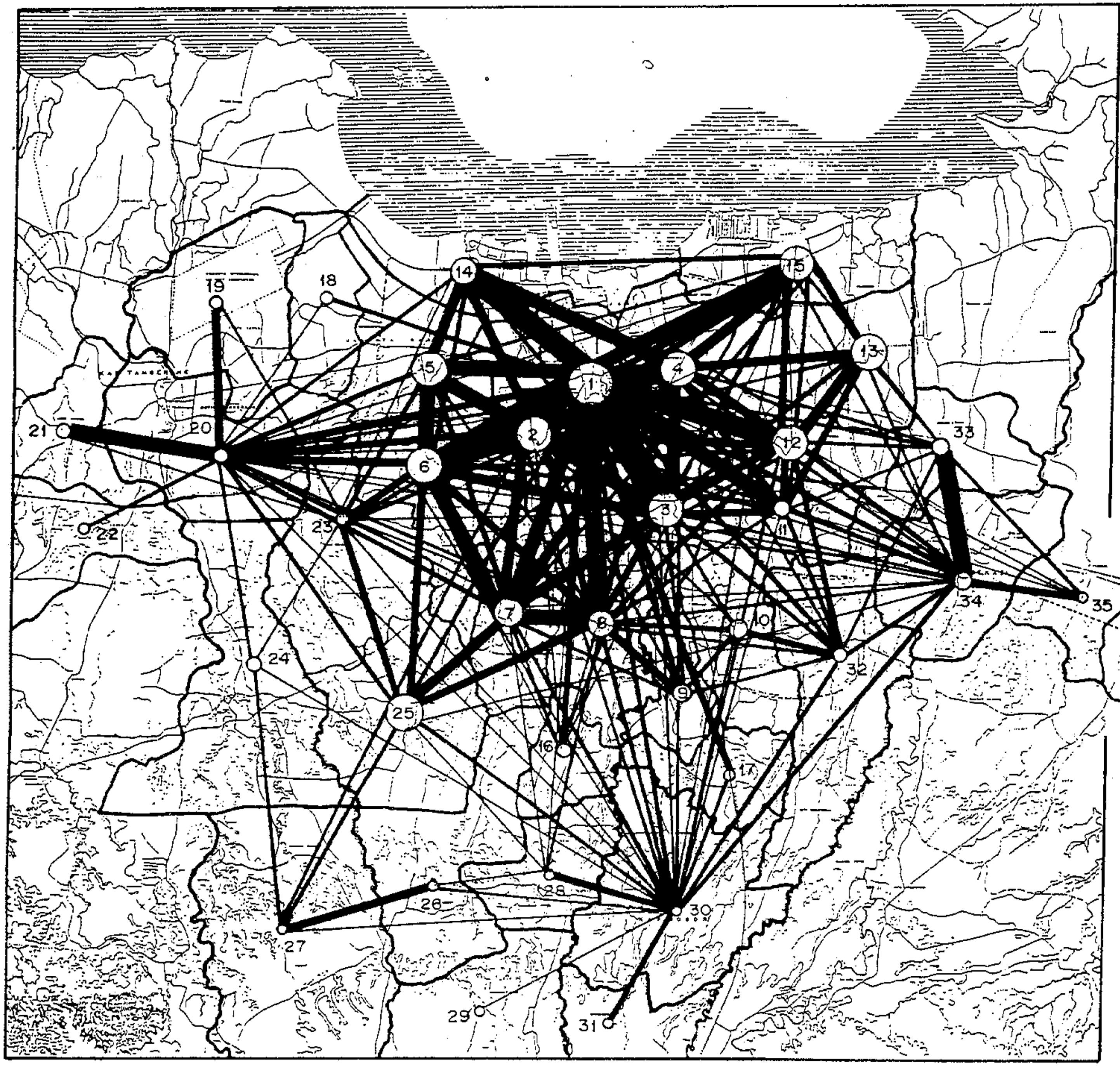


FIG. 7.3.3
PERSON TRIP FLOWS
IN JAKARTA METROPOLITAN AREA
YEAR 2010

PERSON TRIPS/DAY
500,000
200,000
100,000
0

N

FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM
DEVELOPMENT PROJECT
IN JAKARTA METROPOLITAN AREA

Table 7.4.3 Year 2010 Modal Split (by Purpose of Trip)

TRIPS PRODUCED FROM DKI JAKARTA
(Includes DKI-DKI and DKI-Botabek trips)

MODE	TRIP PURPOSE							
	WORK	SCHOOL	BUSINESS	HOME	PRIVATE	SHOPPING	TOTAL	COMP
WALKING	305,098	902,454	138,505	3,399,073	719,831	714,192	6,179,154	
PUBLIC TRANSPORT	1,914,060	1,440,707	273,775	3,568,291	1,258,928	476,639	8,932,400	53.80%
MOTOR CYCLE	482,875	71,954	164,480	876,025	191,955	46,812	1,834,100	11.05%
PASSENGER CAR	1,731,093	390,343	495,332	2,266,850	721,193	231,689	5,836,500	35.15%
SUB.TOT MOTORIZED	4,128,028	1,903,004	933,587	6,711,166	2,172,076	755,140	16,603,000	
TOTAL	4,433,126	2,805,458	1,072,092	10,110,239	2,891,907	1,469,333	22,782,154	
SHARE	19.46%	12.31%	4.71%	44.38%	12.69%	6.45%		

JABOTABEK TRIPS

MODE	TRIP PURPOSE							
	WORK	SCHOOL	BUSINESS	HOME	PRIVATE	SHOPPING	TOTAL	COMP
WALKING	522,752	1,292,277	180,761	4,209,712	795,248	1,015,577	8,016,327	
PUBLIC TRANSPORT	4,725,445	4,978,566	679,105	10,842,759	3,156,252	1,638,012	26,020,139	53.43%
MOTOR CYCLE	1,755,962	198,359	420,730	2,585,026	463,186	152,106	5,575,369	11.45%
PASSENGER CAR	4,774,974	960,989	1,369,702	7,136,760	1,975,814	884,192	17,102,431	35.12%
SUB.TOT MOTORIZED	11,256,381	6,137,914	2,469,537	20,564,545	5,595,252	2,674,310	48,697,939	
TOTAL	11,779,133	7,430,191	2,650,298	24,774,257	6,390,500	3,689,887	56,714,266	
SHARE	20.77%	13.10%	4.67%	43.68%	11.27%	6.51%		

taking the recent progress of road development conducted by the local government into account. The project roads were added on this base road network in 2000 and 2010.
On the other hand, the transit network consists of bus network and railway network, that is, heavy rail network for the current year and new light rail network for the future years. The development schedule of mass rapid transit system follows the on-going study by the inter-department group.

Traffic simulation was executed based on these highway and transit networks.

7.4.5 Future Trip Assignment

Assignment of the respective 2000 and 2010 forecast vehicle (in passenger car unit, pcu) OD matrices was carried out in two batches :

- Batch 1
  First of all, non-tollway vehicles (i.e. motorcycle) were loaded onto arterial roads and exempting them from using the tollway. Assignment were performed in an incremental basis where the network impedance is subsequently adjusted, iteration by iteration, according to the specified capacity restraint function.

- Batch 2
  With the non-tollway vehicles already in the network, other modes were loaded onto both arterial and tollway roads. Assignment were performed using the "equilibrium technique". Equilibrium assignment consists of an iterative series of all-or-nothing traffic assignments with an adjustment of travel times reflecting delays encountered in the associated iterations which is done until no trip can be made by an alternate path without increasing the total travel time of all trips in the network.

Traffic assignments were carried out for several cases including :

- The base case; only commited network improvement, without NS axis tollway nor EW axis road
- With NS axis tollway only
- With EW axis only
- With both NS axis tollway and EW axis road.

Outputs from these assignments (especially those for the year 2010) were used to analyze, among others :

- identification of interchange locations
- profile of tollroad users
- preparation of traffic management measures in congested area
- design of interchanges

The year 2010 traffic volume snapshots on NS axis tollway and EW axis road are presented in Figure 7.4.1 and 7.4.2 respectively. With reference to Figure 7.4.3, the traffic volume incidence in major locations are summarized in Table 7.4.4.

Table 7.4.4 Forecasted Link Load in Year 2010 By Cases of 'Without N-S Axis nor E-W Axis', 'With Only N-S Axis' and N-S Axis and E-W Axis'

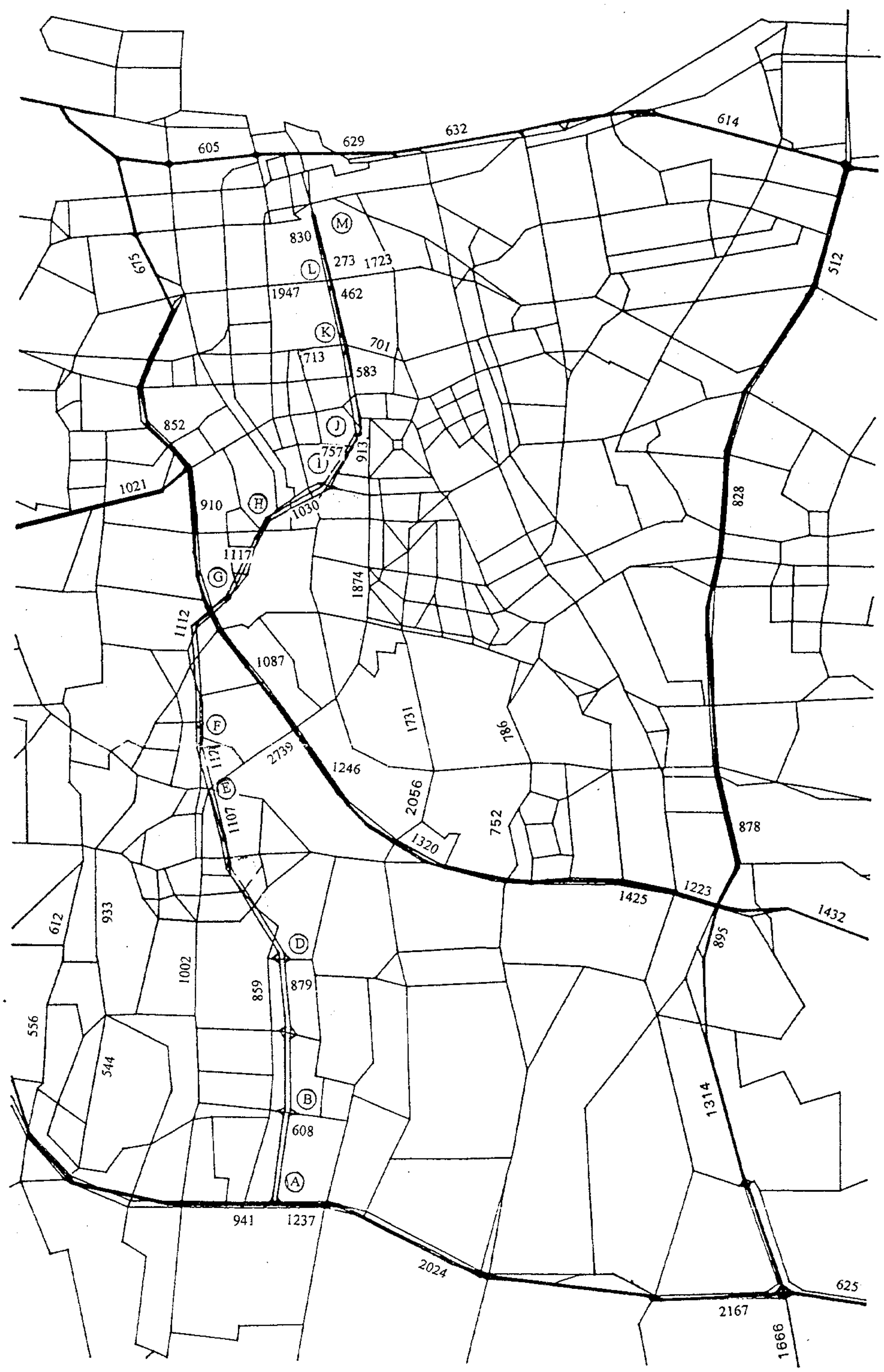
(UNIT : PCU/DAY)

No	Road Section	YEAR 2010			Present Traffic Volume Counted
		Without Project	N-S Axis Only	N-S & E-W Axes	
1.	Northern Location at Jl. Gajah Mada / Hayam Wuruk	91,300 (91,300)	112,000 (83,000)	117,000 (83,000)	117,251
2.	Southern location at Jl.Gajah Mada/Hayam Wuruk	106,000 (106,000)	146,000 (106,000)	155,000 (97,000)	118,303
3.	Jl. Kyai Tapa	95,500	86,500	96,500	106,586
4.	Jl. Tomang Raya	115,000	111,000	105,000	
5.	Jl. Pangeran Tubagus Angke	91,400	85,700	83,400	35,929
6.	Jl. Moch. Mansyur	90,800	88,900	87,000	
7.	Jl. Mangga Dua	121,100	126,400	113,800	39,721
8.	Jl. Gunung Sahari	106,900	100,800	94,900	68,257
9.	Jl. Jembatan Tiga	94,500	95,900	99,800	88,763
10.	Jl. Mangga Besar	81,800	88,800	172,300	43,621
11.	Mangga Besar Extension	98,500	98,600	194,700	--
12.	Jl. Bandengan	54,400	57,600	46,100	46,666
13.	Jl. Medan Merdeka Barat	105,600	88,200	91,300	
14.	Jl. M.H. Thamrin	184,500	183,700	187,400	171,307
15.	Jl. Kebon Sirih	98,300	91,200	82,500	
16.	Jl. Sudirman	300,400	281,200	273,900	185,513

No	Road Section	YEAR 2010 Without Project	N-S Axis Only	N-S & E-W Axes	Present Traffic Volume Counted
17.	Jl. Daan Mogot	134,000	136,500	129,000	
18.	Jakarta - Tangerang Tollway	151,000	146,000	112,000	
19.	Jl. Hang Tuah and Jl. Sisingamangaraja	125,300 78,800	113,800 70,300	115,000 74,400	
20.	Jl. Pangeran Antasari	100,000 (100,000)	163,300 (78,300)	161,700 (73,700)	54,450
21.	Jl. Buncit Raya	95,000	88,400	89,300	(44,207)
22.	Jl. Pasar Minggu Raya	105,500	98,400	96,700	
23.	Jl. Buncit Raya	123,100	112,100	110,400	
24.	Jl. Pasar Minggu Raya	128,500	122,400	124,400	
25.	Jl. H.R. Rasuna Said	205,200	181,800	179,100	89,291
26.	Jl. Dr. Saharjo	85,200	82,100	78,600	51,680
27.	Jl. Tambak	68,000	69,100	69,500	
28.	Jl. Diponegoro	78,700	81,500	74,900	
29.	Jl. Pasar Senen	71,300	70,300	67,600	
30.	Jl. Utan Panjang	73,700	69,100	66,800	
31.	Jl. Landasan Utara/Selatan	73,100	72,800	57,200	
32.	Jl. Gunung Sahari	120,600	114,400	98,600	
33.	Jl. Landasan Utara/Selatan	37,400	36,000	28,400	

Note : 1. For cases with the project, the figures in the parenthesis show the link load on the arterial road at the location.

2. Present traffic volumes, excluding the number of motorcycles were counted in December 1992, June 1993 or December 1993.

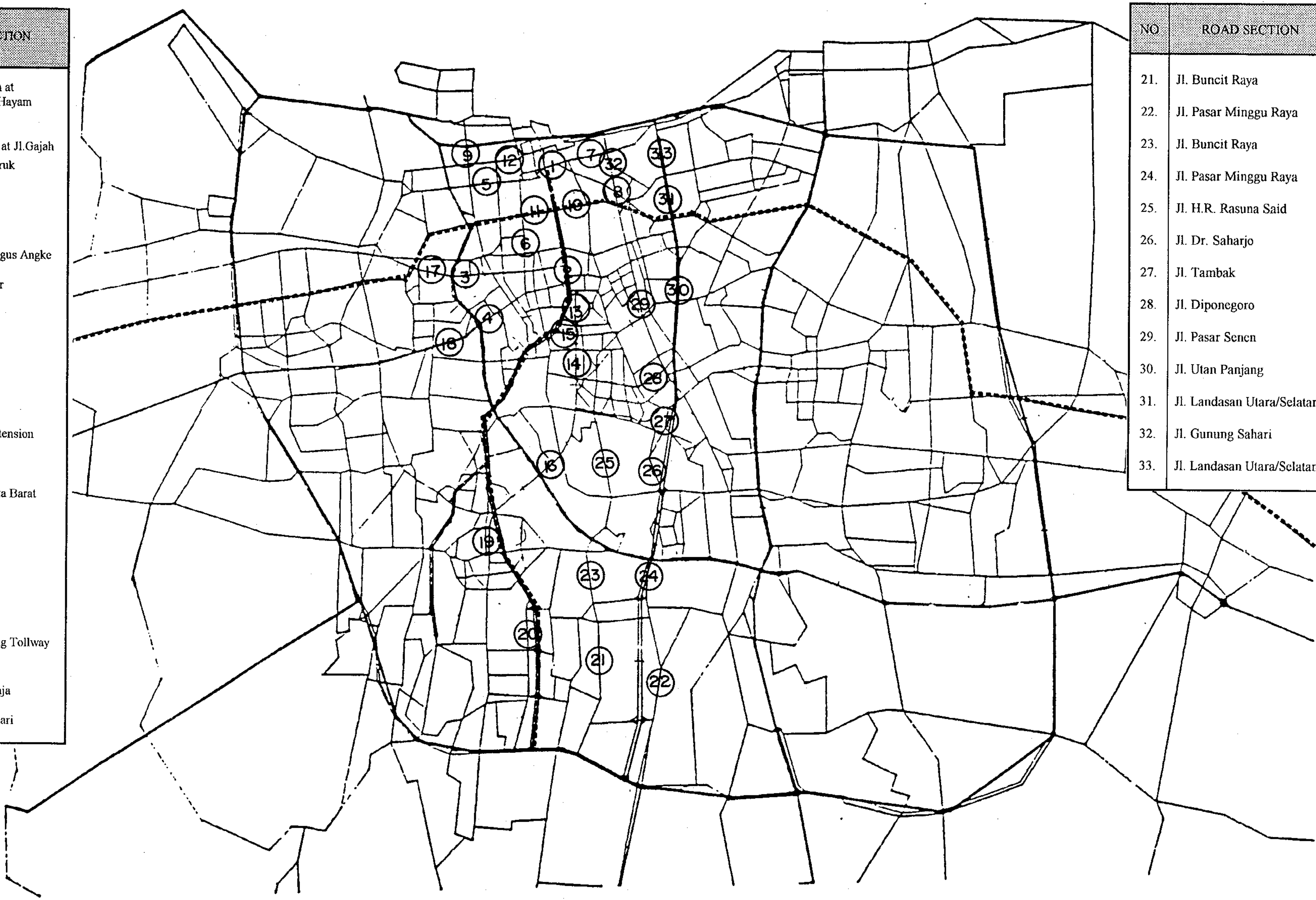


FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT
IN JAKARTA METROPOLITAN AREA

Fig. 7.4.1 FORECASTED TRAFFIC VOLUME ON TOLLWAYS YEAR 2010 (UNIT : 100 PCU/ DAY)

FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT
IN JAKARTA METROPOLITAN AREA

Fig. 7.4.2 Estimated Traffic Volume on East-West Axis in Year 2010
(UNIT : 100 PCU / DAY)



NO	ROAD SECTION
1.	Northern Location at Jl. Gajah Mada / Hayam Wuruk
2.	Southern location at Jl.Gajah Mada/Hayam Wuruk
3.	Jl. Kyai Tapa
4.	Jl. Tomang Raya
5.	Jl. Pangeran Tubagus Angke
6.	Jl. Moch. Mansyur
7.	Jl. Mangga Dua
8.	Jl. Gunung Sahari
9.	Jl. Jembatan Tiga
10.	Jl. Mangga Besar
11.	Mangga Besar Extension
12.	Jl. Bandengan
13.	Jl. Medan Merdeka Barat
14.	Jl. M.H. Thamrin
15.	Jl. Kebon Sirih
16.	Jl. Sudirman
17.	Jl. Daan Mogot
18.	Jakarta - Tangerang Tollway
19.	Jl. Hang Tuah and Jl. Sisingamangaraja
20.	Jl. Pangeran Antasari

NO	ROAD SECTION
21.	Jl. Buncit Raya
22.	Jl. Pasar Minggu Raya
23.	Jl. Buncit Raya
24.	Jl. Pasar Minggu Raya
25.	Jl. H.R. Rasuna Said
26.	Jl. Dr. Saharjo
27.	Jl. Tambak
28.	Jl. Diponegoro
29.	Jl. Pasar Senen
30.	Jl. Utan Panjang
31.	Jl. Landasan Utara/Selatan
32.	Jl. Gunung Sahari
33.	Jl. Landasan Utara/Selatan

Fig. 7.4.3 **LOCATION OF ROAD SECTION FOR FORECASTED LINK LOAD**

The following paragraphs summarize the main findings from the traffic assignment cases.

1) Trip Characteristics

a) North-South Axis

Comparison was made between the trips using North-South Axis (Tollway) and those using the arterial road (Jl. Sudirman)

The average trip lengths of North-South Axis users are 70% longer for passenger car and bus, 20% longer for truck than those of the paralleled arterial road users. This leads that the project tollway is rather functionable to divert the longer trip traffic or the semi regional traffic from the present arterial roads such as Jl. Thamrin and Jl. Sudirman to the proposed North-South Axis Tollway (see Table 7.4.5).

Table 7.4.5 Comparison of Average Trip Length between Jl. Sudirman and N-S Axis

Type of Vehicle	Jl. Sudirman			N.S. Axis		
	Link No. Node-Node	Traffic Volume (P.C.U.)	Agerage Trip Length (Km)	Link No. Node-Node	Traffic Volume (P.C.U.)	Average Trip Length (Km)
Private Passenger Car	2065-2070	98,336	12.5	8060-8066	41,944	21.2
	2070-2065	95,520	12.6	8065-8061	45,579	21.6
	Total	193,856		Total		
Truck	2065-2070	5,899	19.4	8060-8066	3,740	23.9
	2070-2065	6,057	20.6	8065-8061	3,886	25.0
	Total	11,956		Total		
Bus	2065-2070	17,828	12.7	8060-8066	7,690	21.3
	2070-2065	17,389	12.8	8065-8061	8,359	21.7
	Total	35,217		Total		

b) East-West Axis

The comparison of the proposed East-West Axis and parallel arterial roads in the western area, the central area and the eastern area shows the following characteristics (see Table 7.4.6).

- Road users in the western area of Jakarta do not show a remarkable difference in trip length for the proposed road and pertaining arterial roads (Jl. Daan Mogot and Planned DKI road)

Table 7.4.6 (1) Comparison of Average Trip Length between East-West Axis, DKI Road along Tangerang Line, and Jl. Daan Mogot

Type of Vehicle	East-West Axis			Planned DKI Road			Jl. Daan Mogot		
	Link No. Node-Node	Traffic Volume (P.C.U.)	Average Trip Length (km)	Link No. Node-Node	Traffic Volume (P.C.U.)	Average Trip Length (km)	Link No. Node-Node	Traffic Volume (P.C.U.)	Average Trip Length (km)
Private Passenger Car	4155-1020	47,610	16.6	4205-1025	28,021	15.7	4220-1035	44,229	17.7
	1020-4155	56,146	17.1	1025-4205	26,801	15.5	1035-4220	41,871	17.4
	Total	103,756		Total	54,822		Total	86,100	
Truck	4155-1020	6,664	27.7	4205-1025	4,175	29.0	4220-1035	7,464	38.5
	1020-4155	9,126	27.8	1025-4205	3,371	28.0	1035-4220	6,751	40.0
	Total	15,790		Total	7,546		Total	14,215	
Bus	4155-1020	9,248	17.0	4205-1025	5,331	15.5	4220-1035	8,367	17.8
	1020-4155	11,139	17.7	1025-4205	5,070	15.3	1035-4220	7,932	17.6
	Total	20,387		Total	10,401		Total	16,299	
Motor Cycle	4155-1020	7,758	17.5	4205-1025	4,644	15.6	4220-1035	6,543	18.5
	1020-4155	8,457	16.7	1025-4205	4,249	15.0	1035-4220	5,854	19.1
	Total	16,215		Total	8,893		Total	12,397	

Table 7.4.6 (2) Comparison of Average Trip Length between East-West Axis and Jl. Sukarjo Wiryopranoto

Type of Vehicle	East-West Axis			Jl. Sukarjo Wiryopranoto		
	Link No. Node-Node	Traffic Volume (P.C.U.)	Average Trip Length (km)	Link No. Node-Node	Traffic Volume (P.C.U.)	Average Trip Length (km)
Private Passenger Car	2005-2200	56,553	17.5	2010-2220	24,526	11.1
	2200-2005	59,736	17.6	2220-2010	25,055	10.6
	Total	116,289		Total	49,581	
Truck	2005-2200	8,684	30.2	2010-2220	979	21.8
	2200-2005	9,678	29.2	2220-2010	906	21.8
	Total	18,362		Total	1,885	
Bus	2005-2200	10,984	18.1	2010-2220	4,462	11.4
	2200-2005	11,738	18.3	2220-2010	4,472	10.8
	Total	22,722		Total	8,934	
Motor Cycle	2005-2200	7,485	17.0	2010-2220	5,073	10.6
	2200-2005	7,428	16.8	2220-2010	4,663	10.7
	Total	14,913		Total	9,736	

Table 7.4.6 (3) Comparison of Average Trip Length between East-West Axis and Jl. Perintis Kemerdekaan

Type of Vehicle	East-West Axis			Jl. Perintis Kemerdekaan		
	Link No. Node-Node	Traffic Volume (P.C.U.)	Average Trip Length (km)	Link No. Node-Node	Traffic Volume (P.C.U.)	Average Trip Length (km)
Private Passenger Car	3745-6080	52,542	19.1	3760-6100	58,089	13.7
	6080-3745	51,374	16.4	6100-3760	50,574	16.6
	Total	103,916		Total	108,663	
Truck	3745-6080	9,587	34.7	3760-6100	5,912	34.2
	6080-3745	7,482	33.1	6100-3760	7,171	32.2
	Total	17,069		Total	13,083	
Bus	3745-6080	9,687	19.3	3760-6100	11,357	13.5
	6080-3745	9,742	16.3	6100-3760	14,103	16.7
	Total	19,429		Total	25,460	
Motor Cycle	3745-6080	4,581	19.4	3760-6100	9,801	13.5
	6080-3745	6,187	15.6	6100-3760	6,974	16.5
	Total	10,768		Total	16,775	

- Road users in the central area and the eastern area show 30% to 50% longer trips for the proposed East-West Axis, when compared with Jl. Perintis Kemerdekaan and Jl. Sukarjo.

- Truck trips show relatively longer average trip length than other vehicle types.

c) Traffic Management at Kota area

It is predicted that excessively concentrated traffic would take place at the terminus of the North-South Axis in Kota area without any traffic management scheme. Considering present circumstances along Jl. Gajah Mada/Hayam Wuruk, it is rather hard to increase traffic capacity of Jl. Gajah Mada/Hayam Wuruk and its northern extension. Simultaneously, it is unlikely practical to cope with this kind of matter by means of increasing traffic capacity of a few major arterial roads to disperse such concentrated traffic.

On the other hand considerable traffic demand exists in Kota area, particularly built-up eastern block (see Fig. 7.4.4). However, the western block encompassed by Jl. Jembatan Dua and Jl. Pangeran Tubagus Angke will generate and attract enormous traffic in the future, according to the framework in Jakarta 2005. Such big traffic demand surely require well-planned transportation network, in particular functionally classified road network.

Present condition in the western block is designated as poor living environment and to be redeveloped as urban betterment with the first priority.

Accordingly, the concept of traffic management in Kota area is delineated in Fig. 7.4.5.
It is sure that the role and function of the East-West Axis will be enhanced considerably in case of the provision of semi-direct ramps with Jl. Gunung Sahari in the east and Jl. Jembatan Dua in the west as shown in Fig. 7.4.5. It will enable to disperse heavy traffic in Kota by means of circulation in periphery and to avert concentrated traffic load on Jl. Pintu Besar Selatan.

It is one of practical countermeasures that a depressed road which is continuously walled will be constructed on Jl. Pintu Besar Selatan/Utara to connect with Jl. Pakin in the northern block in case that DKI Jakarta intends to penetrate built-up area in the northern part of Kota, preserving present landscape in Kota area comprised by historical and monumental buildings. However, due to low ground water level in Kota area, the underpass structure will require mechanical drain by power pump in a depressed road section.

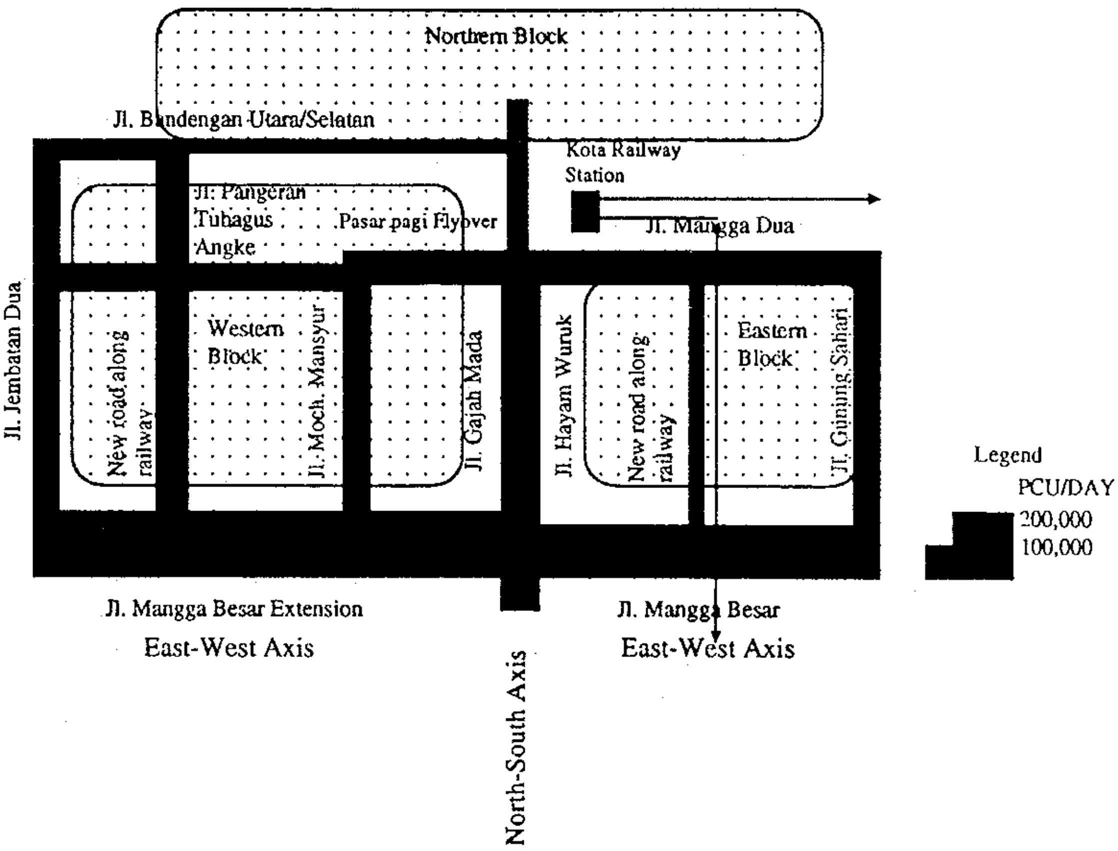


Fig. 7.4.4 TRAFFIC DEMAND FORECAST (YEAR 2010)

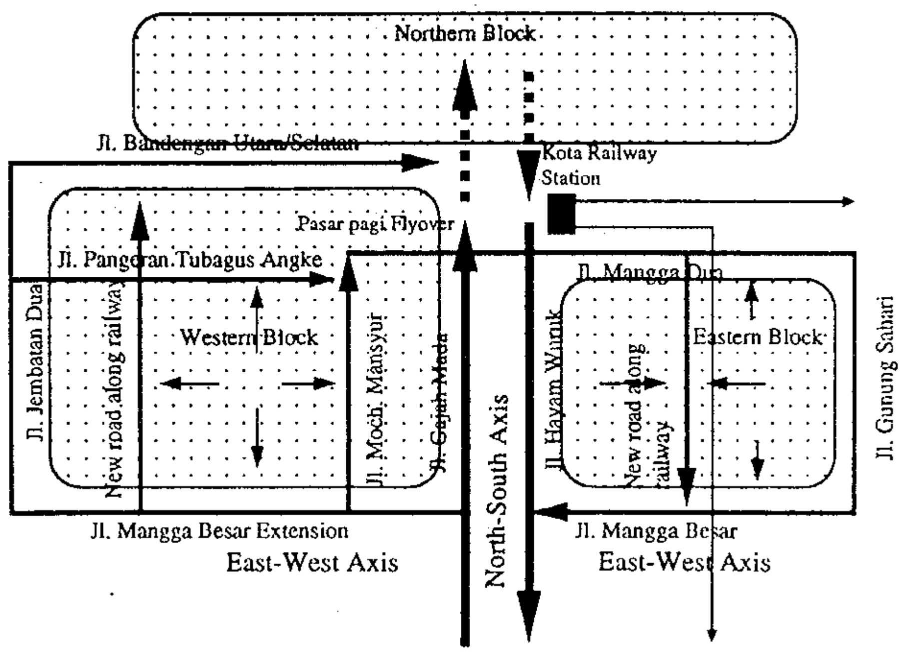


Fig. 7.4.5 CONCEPT OF TRAFFIC MANAGEMENT IN KOTA

2) Tollroad Users

The tollway users for Year 2000 and Year 2010 by toll rate are shown in Table 7.4.7.

The uses are 60,000 PCU/day to 75,000 PCU/day in Year 2000 for toll rates of Rp.5,000 per PCU trip and Rp.2,000 per PCU trip respectively (The toll rate is at 1994 price).

In Year 2010 those are estimated 90,000 PCU/day to 115,000 PCU/day.

Table 7.4.7 Number of Users per Day for North-South Axis (Tollway)

YEAR 2000

Toll Tariff (Gol. I)	Number of Trips (PCU/day)	Average Cross-Sectional Volume (PCU/day)	Average Trip Length on the Tollway (Km/trip)
Rp.2,000 per trip	75,100	44,600	11.9
Rp.3,000 per trip	66,600	40,700	12.2
Rp.4,000 per trip	63,000	39,300	12.5
Rp.5,000 per trip	58,100	38,100	13.1

YEAR 2010

Toll Tariff (Gol. I)	Number of Trips (PCU/day)	Average Cross-Sectional Volume (PCU/day)	Average Trip Length on the Tollway (Km/trip)
Rp.2,000 per trip	114,800	70,000	12.2
Rp.3,000 per trip	107,200	66,500	12.4
Rp.4,000 per trip	100,300	64,000	12.8
Rp.5,000 per trip	90,400	62,000	13.7

3) Traffic Volume at Interchange and Intersections

In a more detailed fashion, traffic volumes on the on-and off-ramps of the NS axis tollway interchanges are shown in Appendix 7A for the Year 2010 and 2000. Summary of those volumes are presented in Table 7.4.8.

The traffic movements on major intersections of EW axis road for the Year 2010 are also shown in Appendix 7A.

Table 7.4.8 Interchange Volumes on NS Tollway

Interchane Name	Interchange Volume (pcu/day)			
	Year 2010		Year 2000	
	On Ramp	Off Ramp	On Ramp	Off Ramp
South JORR	31,700	29,100	20,400	22,500
Pangeran Antasari	17,200	9,800	12,400	8,500
Kemang Raya	8,500	14,300	4,800	6,300
Senayan North	1,600	1,700	500	500
Senayan South	1,600	1,300	600	400
Pal Merah	900	1,100	800	1,000
Kebon Kacang	3,900	3,900	2,500	2,000
Kebon Sirih	12,800	14,500	3,800	4,300
Abdul Muis	8,100	9,300	5,200	3,900
Sukarjo	5,700	6,500	5,300	6,500
Mangga Besar	9,300	9,500	7,300	7,800
Glodok	13,500	13,800	11,500	11,400
Total	114,800	114,800	75,100	75,100

4) Modal Split Results with LRT in North-South Axis Corridor

One of the outputs of the assignment shows rather preferable result for the public transport demand in this North-South Axis corridor.

This would resultantly lead that both the mass rapid transit development and the arterial road development strengthening this corridor are definitely required with parallel development as not only one development but both being developed simultaneously.

The results are shown in the following Tables 7.4.9 and 7.4.10.

Table 7.4.9 Modal Split of Transport Demand in North-South Corridor

Unit : Thousand Passenger/Day
( ) : Percentage

Year 2010

	Grand	Public Transport			Private Vehicle		
	Total	Total	LRT	Bus	Total	Arterial	Tollway
Jl. Gajah Mada	373	223	155	68	150	89	61
	(100)	(60)	42	18	(40)	(24)	(16)
		(100)	(70)	(30)			
Jl. Majapahit	697	390	199	191	307	210	97
	(100)	(56)	29	27	(44)	(30)	(14)
		(100)	(51)	(46)			
Jl. Merdeka Barat	672	308	212	96	364	235	129
	(100)	(46)	32	14	(54)	(35)	(19)
		(100)	(69)	(31)			
Jl. M.H. Thamrin	958	569	249	320	389	260	129
	(100)	(59)	26	33	(41)	(27)	(13)
		(100)	(44)	(56)			
Jl. Sudirman (1)	1,127	627	324	303	500	338	162
	(100)	(56)	29	27	(44)	(30)	(14)
		(100)	(52)	(48)			
Jl. Sudirman (2)	1,151	657	289	368	494	422	72
	(100)	(57)	25	32	(43)	(37)	(6)
		(100)	(44)	(56)			
Jl. Sisingamangaraja	812	630	399	231	182	106	76
	(100)	(78)	49	29	(22)	(13)	(9)
		(100)	(63)	(37)			

Year 2000

	Grand Total	Public Transport			Private Vehicle		
		Total	LRT	Bus	Total	Arterial	Tollway
Jl. Gajah Mada	229 (100)	103 (45)	70	33	126 (55)	96	30
Jl. Majapahit	311) (100)	183 (59)	91	92	128 (41)	61	67
Jl. Merdeka Barat	306 (100)	186 (61)	92	94	120 (39)	53	67
Jl. M.H. Thamrin	485 (100)	165 (34)	82	83	320 (66)	231	89
Jl. Sudirman (1)	527 (100)	99 (19)	50	49	428 (81)	333	95
Jl. Sudirman (2)	520 (100)	48 (9)	25	23	472 (91)	375	97
Jl. Sisingamangaraja	315 (100)	48 (15)	25	23	267 (85)	169	98

Table 7.4.10 LRT User Trip Per Line (Year 2010)

Line	Trip	Trip-Km	Average Trip Length (Km)
1. Blok M-Kota with Casablanca Spur	677	4,736	7.0
2. Tangerang-Bekasi (with Spur)	937	9,067	9.7
3. Blok M-Cileduk	178	921	5.2
4. Kota-Serpong	701	4,602	6.6
5. Loop Line	665	3,280	4.9
Total	3,158	22,606	7.2

Table 7.4.11 Change in Modal Composition (1993 - 2010)

('000 trips)

		Year 1993	Year 2000	Year 2010
1.	Total Generated Person Trip from DKI Jakarta	8,952	14,066	16,603
2.	Modal Split			
	- Public transport	4,730 (52.9%)	7,483 (53.2%)	8,933 (53.8%)
	- Private Transport	4,222 (47.1%)	6,583 (46.8%)	7,670 (46.2%)
3.	Modal Share			
	Rail	242 (3%)	1,685 (12%)	3,819 (23%)
	Road	8,710 (97%)	12,381 (88%)	12,784 (77%)

CHAPTER 8 BASIC ROAD DEVELOPMENT PLAN FORMULATION

[illegible]

[illegible]

CHAPTER 8 BASIC ROAD DEVELOPMENT PLAN FORMULATION

8.1 Basic Arterial Road System

(1) Development Concept

In order to establish a basic arterial road system in Jabotabek, a principal development frame will be provided within the Jabotabek regional master plan and the Jakarta Structure Plan. The project roads are placed in the basic arterial road system and their roles and functions are defined in this system formation shown in Fig. 8.1.1.

As the result of reviewing the development scenarios and strategies for the Jabotabek Development Plan and the Jakarta Structure Plan, metropolitan development goals can be summarized as follows :

<u>Jabotabek Development Context</u>

a) From the regional development concept of West Java Province, Jabotabek is located strategically important location, where primary connections are required in the regional and national development contaxes, to be more in quantity and heavier in quality as shown in Fig. 8.1.1.

b) The Jabotabek Metropolitan Area should be formed adopting the East-West linear city model for the long-term perspective.

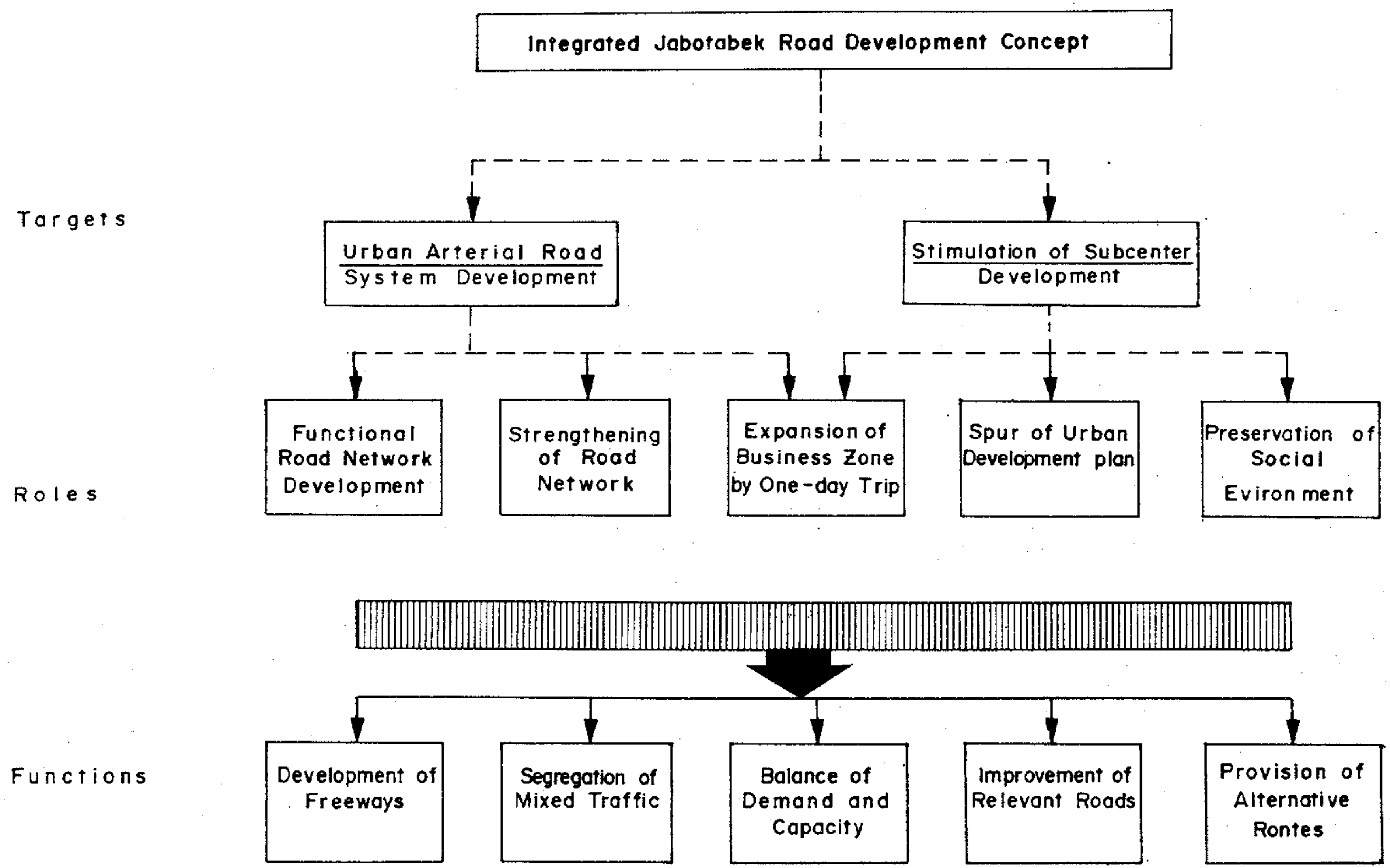
c) The east-west axis and urban fringe areas are basically developed in the early stage by the intensification of present landuse, and the resulting urban concentration will extend about 50 km from east to west, 40 km from north to south, where the development should, however, be directed with priority to confined areas of development consolidation.

d) The linear city concept is spined with a ladder type road structure (based on parallel arterial routes interspersed with cross-link) and there would be less traffic pressure on the urban core area (Jakarta). The ladder road structure will enhance potentials to foster urban centers/sub-centers at those node locations.

e) The land use in the linear city concept is not a homogeneous belt of urban development but a balanced variable mixed use.

f) It is imperative for the urban formation to establish a hierarchy of urban centers (which are categorized in the JMDPR by population size as shown in Fig. 4.1.7).

g) The introduction of green space into the urban structure is essential to secure the future "quality of life" for the descending generation.



FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT
IN JAKARTA METROPOLITAN AREA

Fig. 8.1.1 GENERAL APPROACH TO DEFINING ROLES AND FUNCTIONS OF PROJECT ROADS

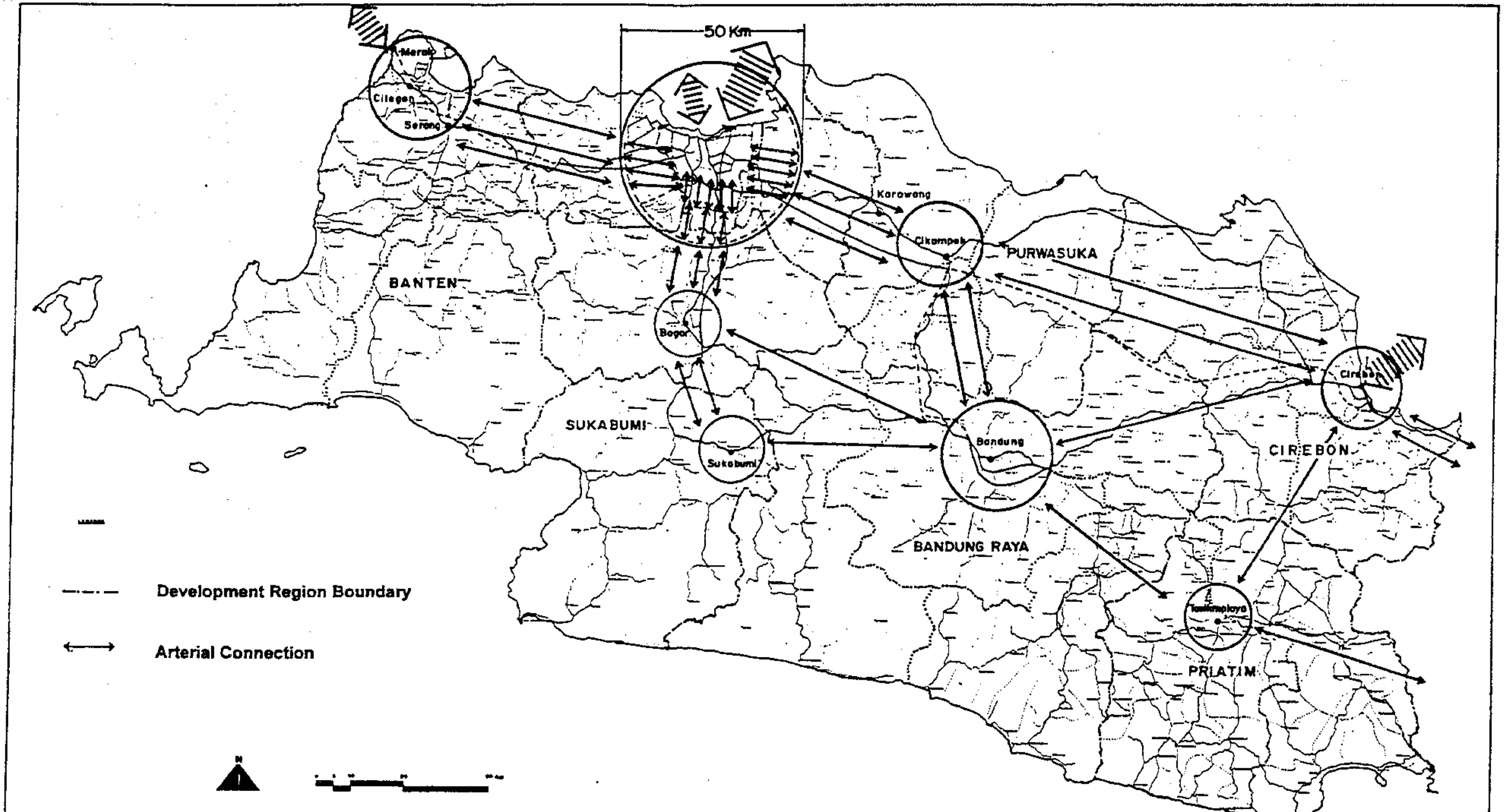


Fig. 8.1.2 SCHEMATIC ARTERIAL CONNECTION (INTER-METROPOLITAN AND INTRA-JAKARTA METROPOLITAN)

Jakarta Development Context

a) Urban development priority should be given to the east-west direction, creating a new primary center development in the east and west.

b) New development, especially in the Northwest and Northeast development regions should be limited at least until the year 2005. The south development region should be designated as the development control area to preserve natural environment and to eliminate as much as possible sources of water contamination for both surface and ground water.

c) The intensity of development of activity centers (large and medium industry, trade center, service and offices) in the North and Central development regions should be limited, which should however be encouraged in the East and West development regions.

d) Multi nucleus center development should be promoted with a proper center hierarchy to disperse the concentration of diversified activities into the central core area.

(2) Basic Arterial Road System Formation

1) Present Traffic Problem in Jakarta Metropolitan Area

Urbanization taken place in DKI Jakarta and its surrounding has naturally increased and continued toward the higher and upstream southern area from geographical reason. Road network in Jakarta Metropolitan area, which is the most fundamental infrastructure to constitute an urban structure, has been developed by several multi-lane arterial roads and its connecting roads. Ribbon development along major arterial roads, therefore, is dominant urbanization pattern. In order to keep mobility of major arterial roads, connecting roads have generally small capacity. Geographical features and urbanization pattern resulted in poor road network development in east-west direction.

On the other hand, public transportation fully depends on road transport. Although railway passengers for commuting are increasing gradually as commuter trains are introduced by official development aids from Japan and other foreign countries, the share of rail-base commuter remains only 3% and bus transport play important roles in public transport sector.

Rapid expansion of social and economic activities stimulates motorization in the urban area and resultingly chronic traffic congestion takes place on major arterial streets in the central business districts as well as on radial roads in the suburbs.

To cope with such traffic situation in Jakarta, the Government of Indonesia has decided to implement the various measures such as the expansion of one way traffic controlled area, increase of intersection with no right turning, application of exclusive bus lane and 3 in 1 regulation in the CBD as a short term scheme. However, it is impossible to solve traffic problems thoroughly by such traffic management scheme and social environment and living standard suffer damages by chronic traffic congestion.

2) Road Development Plans in Jakarta Metropolitan Area

In such circumstances, DKI Jakarta still retains the hub of financial, commercial and administrative activities in Indonesia and will continue to expand her urbanized area toward its surrounding, especially for east and west fringe of the city based on the development policy of Jabotabek Metropolitan.

The Government has medium and long term improvement plans in line with such development concept to construct toll roads and flyovers, to improve the existing railway for commuters and to introduce Light Rail Transit (LRT) system.

In order to propose the basic arterial road system in Jakarta Metropolitan Area, the following criteria/consideration is applied :

a) Pressure and access requirements from further outside metropolitan areas to Jakarta Metropolitan Area.

   - Linkage from the secondary industry area to the tertiary and the administrative area v.v.,

   - Export and import purposes of products,

   - Governmental and social affairs,

b) Most part of Kabupaten and Kotamadya Tangerang and Kabupaten and Kotif Bekasi are forming the Jakarta Metropolitan Area.

   - Free choice of jobs and almost no hazard for commuting and other activities,

   - Linkage of Botabek as the fringe area of DKI Jakarta,

c) In order to synchronize those fringe area with main parts of DKI Jakarta.

   - Circular Arterial Roads including Jabotabek Ring Road
   - East-West Direction of Radial Arterial Roads, and
   - North-South Radial Arterial Roads should form arterial road system to meet both demand from outside of the metropolitan to the central area of DKI Jakarta and interval demand of the metropolitan.

   In the central area, those radial roads would form a grid system road network with road hierarchy.

d) But for the north-south direction radial arterial roads most of them should be limited inside the Jakarta Ring Road and a few radial arterial would be available to outside of the metropolitan area in order to guarantee the sustainable development in the southern region.

e) Within DKI Jakarta, as the city planning road network including the improvement of intersection by flyovers or viaducts is planned and some of them are on-going or already programmed.

In order to realize the above mentioned arterial road network in the Metropolitan Area, at-most efforts should be taken to coordinate with such city planning road network and to make minimum modifications or additional works as those city planning road network has been worked out to meet the zoning plans.

f) Mutual support with the mass rapid transit network are considered.

- Supply easy access to the mass rapid transit network,
- Better and easier operation and management of road traffic are possible with the well-balanced arterial road network,
- Those better operation and management of road traffic would support higher user ratio of public transport including the MRT.

g) In the central business district, the arterial road network is that of grid system with road hierarchy which would make it easier of urban unit development and of traffic management in the area.

Through those application and integrating the Metropolitan development strategies and targeted roles and functions of the project roads, a basic arterial road system was established separately for the Metropolitan area and for Jakarta's central urban area.

Metropolitan Area

a) The east-west axis should be developed with a ladder type road structure with a proper planning of urban centers/sub-centers that could provide transport services with high efficiency.

b) The ladder structure will initially be developed for about 50 kilometers in the east-west direction with about 10 kilometers in width along the belt.

c) Introduction of mass transit system is essential to enable the urban area to expand $\pm$ 50 km in the east-west direction.

d) The east-west axis should be provided with multiple transport corridors to cope with diversified traffic characteristics from the mixed land use planned in the ladder road structure, the traffic demand will include such variation as long, medium and short distance; commuting, shopping, business, school purposes; and large/heavy cargo transport small parcel delivery.

e) Southern Metropolitan area should be provided with some selected transport linkages to control spontaneous urban sprawls.

f) The east-west axis outside the Jakarta Outer Ring Road should be planned as a divided carriageway with frontage facility road to secure the accessibility as well as mobility of the traffic in such developing areas as outside of the Ring Road.

Central Urban Area

a) The road network planned in the Structure Plan 2005 should provide a basis to establish the basic arterial road system.

b) As emphasized in the Structure Plan, the east-west axis development is a priority development policy, so that the axis should facilitate direct access to the CBD from either east or west centers, in order to stimulate these center developments.

c) It is imperative to identify hierarchy of urban centers as well as street network to properly incorporate the project roads into the city planning road system.

d) The east-west axis should be planned as the arterial road in order to improve the present network deficiency and to afford more efficient transport services. The access function of the east-west axis should depend on the adjacent land use and characteristics of traffic demand in different segment of the axis.

e) The north-south axis should be prepared as a tollway to supplement the present Jl. Sudirman/Thamrin, and to eventually alleviate its traffic congestion.

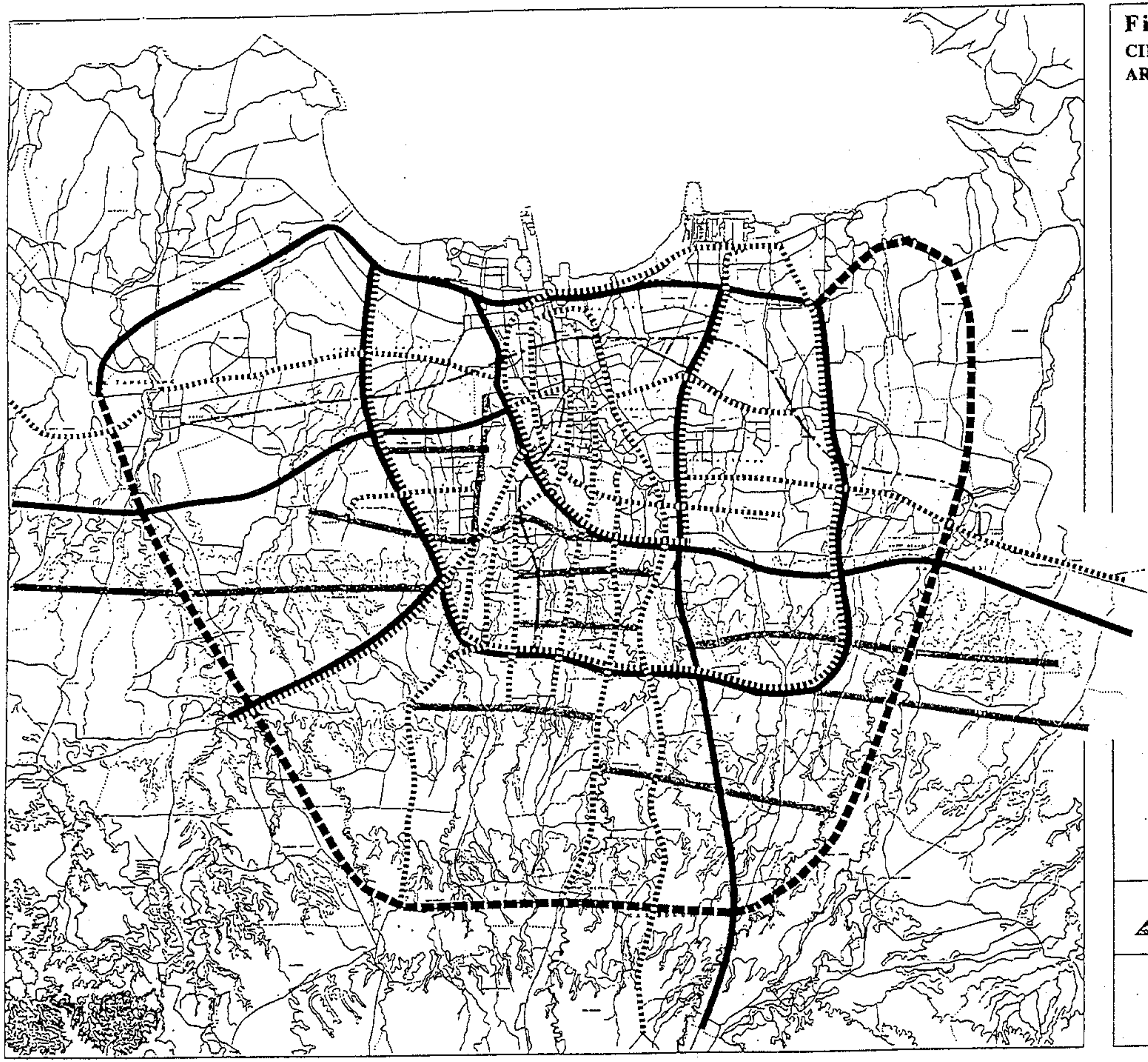
f) The north-south axis will function as an alternative route of the artery Jl. Sudirman/Thamrin, because the traffic demand in this direction is distinctively larger than others.

In accordance with the development concept, road development plan is formulated and implemented by DKI Jakarta and Directorate General of Highways, Ministry of Public Works.

3) Basic Arterial Road System Formation

The project roads are to work as one of links composed arterial road network system with designated roles and functions in Jakarta Metropolitan Area. The arterial road system is to provide mobility and accessibility for considerable traffic demand as a whole. The DKI Jakarta Structure Plan contains the road development masterplan which is officially approved in the study area, while the Jabotabek Metropolitan Development Plan Review (JMDPR) is prepared as the spatial plan to provide the development framework in the study area. The project roads which were proposed by ARSDS basically coincide with the location of city planning roads in the masterplan. However, recent road development and national economic growth stimulate regional economic activities and regional developments induce drastic change of massive demographic movement and commuters. It results in significant change of trip distribution. Accordingly, the review of roles and functions of each link including the project roads is required. The project roads are placed in the basic arterial road system and their roles and functions are defined in this system formation shown in Figs. 8.1.3 through 8.1.5 based on the above-mentioned review.

Fig. 8.1.3
CIRCULAR AND RADIAL ARTERIAL ROAD SYSTEM CONCEPT

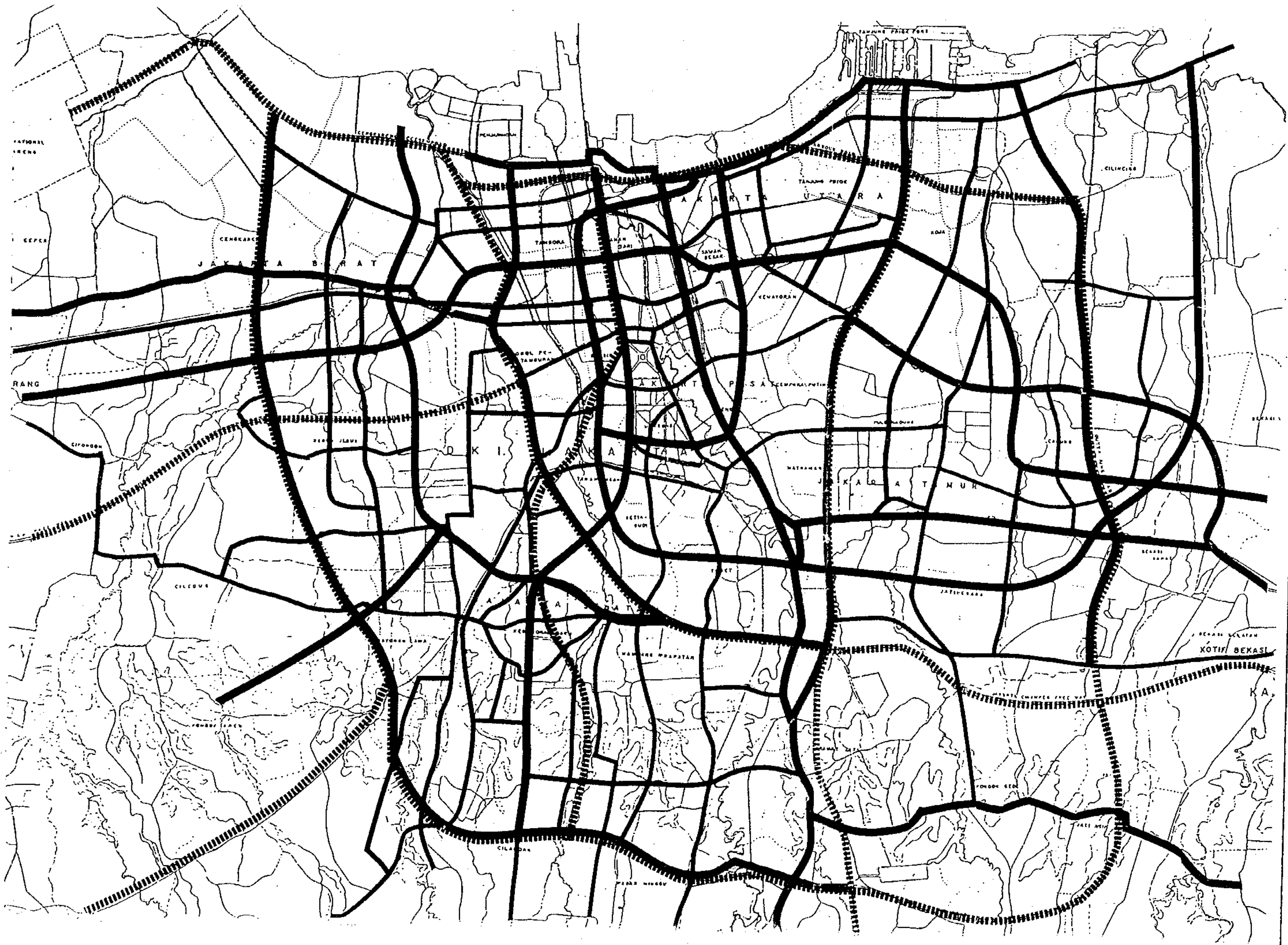


- Tollway System (Circular, Radial)
- Existing Radial Arterial Roads
- Additional Radial Roads Proposed (Improvement, New Construction)
- Proposed N-S Axis and E-W Axis

N

FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM
DEVELOPMENT PROJECT
IN JAKARTA METROPOLITAN AREA

Fig. 8.1.4
BASIC ARTERIAL ROAD SYSTEM IN JAKARTA



LEGEND:

- FREEWAY (TOLL)
- MAJOR ARTERIAL ROAD
- MINOR ARTERIAL ROAD

N

0 1 2 3 4 5 KM

FEASIBILITY ON
URBAN ARTERIAL ROAD SYSTEM
DEVELOPMENT PROJECT
IN JAKARTA METROPOLITAN AREA

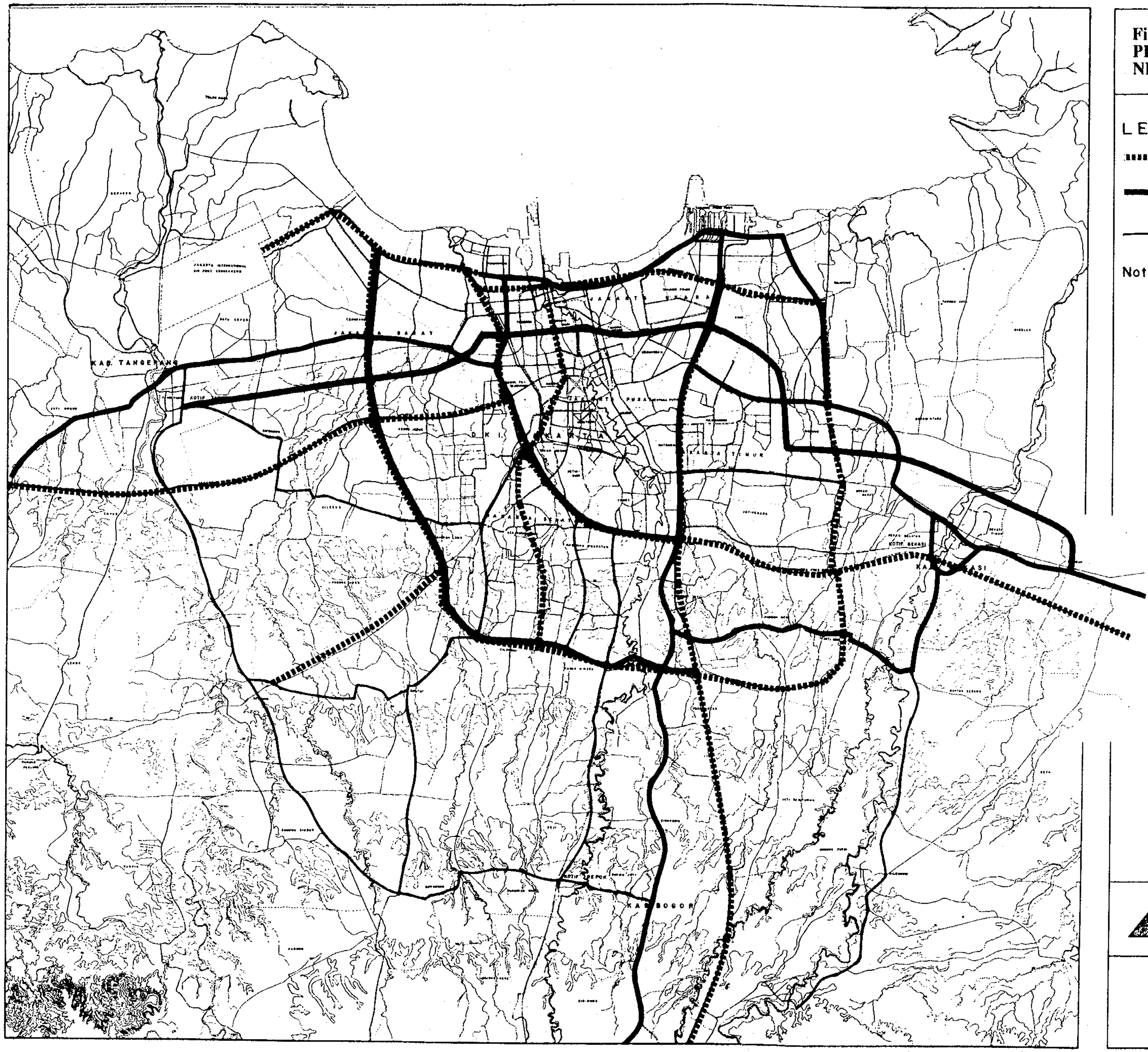


Fig. 8.1.5
PROPOSED PRIMARY ROAD NETWORK IN JABOTABEK

LEGEND:

- FREEWAY (TOLL)
- PRIMARY ARTERIAL ROAD
- PRIMARY COLLECTOR ROAD

Note. Please refer to Proposed Road Network in Jakarta within - Jakarta Intra Urban Tollway.

N

0 1 2 3 4 5 10 KM

FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA

8.2 Roles and Functions of Project Roads

8.2.1 East-West Corridor

A targeted role and function of the East-West corridor will be determined in such a development context of Jakarta Metropolitan Area and Jakarta itself.

1) Metropolitan Development Context

From the metropolitan development view, Tangerang and Bekasi are sub-growth centers, together with Depok, and are planned not only to accommode housing facilities for Jakartans but also to support Jakarta's functions of such various sectors and levels as administrative, economic, social and cultural activities at national, regional and metropolitan levels.

In order to enable these cities to grow as sub-centers to Jakarta, the project corridor should provide higher mobility to stimulate the relocation of urban function from Jakarta, and concurrently raise their own development potentials.

A real estate development has been taking place rapidly in a last decade around the east and west urban fringe area. The population growth in these areas exceeds more than 7% p.a. during 1980-1990. Many of the increased population are Jakartans who have their jobs in Jakarta.

Despite such a dramatic population growth in the urban fringe area, transport facilities remain poorly developed. Accordingly, it is also requested that the East-West corridor should strengthen the road network in the Jakarta urban fringe area.

Thus, the East-West corridor should be planned to further enhance the development potentials of the two cities, and also to accommodate traffic service to newly developed residential areas of east and west periphery of DKI Jakarta.

2) Urban Development Context

In compliance with the development policy of Jabotabek, DKI Jakarta Structure Plan 2005 supports the urban development in the east-west direction, and it plans to develop new primary centers in the east and west as shown in the structure plan Fig. 4.2.2.

A road network in Jakarta has been developed in the north-south direction mainly because of Jakarta's geography. East-west connections, crossing rivers and major north-south arterial roads, are only developed for local traffic services with a relatively narrow width. A long thoroughfare such as Jl. Sudirman/Jl. Thamrin and Jl. Gunung Sahari - Jl. Otista is developed few, particularly in the area enclosed by Intra Urban Tollway.

Besides the center development in the east and west, a housing development in a large scale has been in progress to absorb relatively high income group of Jakarta residents. Local and service road networks are constructed in and around the planned new residential estate but they are concentrating to the existing east-west artery neither expanding the existing capacity nor constructing a new artery.

Therefore, from the urban development context, the East-West corridor should be planned so as to stimulate the development of planned east and west primary centers, to enhance the road capacity in the new housing development area, and to support through traffic in the central urban area.

This east-west axis should primarily play a role of the development inducement with additional and stronger access among several required access routes between Kabupaten/Kotamadya Tangerang and the central business district of DKI Jakarta; and between Kabupaten Bekasi and the central business district; and the port of DKI Jakarta in order to form the Jakarta Metropolitan Area.

Besides above, secondarily the axis take another role as a good arterial access to the central business district from those primary centres under development, e.q. East Primary Centre and from those large scale developments in surrounding area of those primary centers.

8.2.2 North-South Corridor

The north-south corridor is rather confined to the urbanized area of DKI Jakarta, and which already exhibits a large traffic demand along the existing north-south thoroughfare, and its urban structure is considered relatively stable compared to the east-west corridor.

Therefore, a targeted role and function of the north-west corridor can be simply defined as a strengthening of the existing north-south thoroughfare.

The present situation or background is as follows :

- The population in the central business district are decreasing as shown in figures derived from the results of census in 1980 and in 1990.

- Office buildings and multi purpose buildings are realizing in the central business district and along the major arterial roads with large volume and rapid speed. On the other hand, housing developments in the southern area, where is basically a sustainable development area including the southern part of the Jakarta Ring Road are being carried with a large volume and a rapid speed.

- It is likely that bussiness and private purpose trips will marginally increase, as the commuting demand towards the central core area grows from either south or north of Jakarta. Resultantly, the major roads in the north-south direction will be constantly congested during the whole day.

- It is well-known that shortage of traffic capacity causes traffic congestion in the CBD of Jakarta. Imbalance between capacity and demand is brought about mainly by deficient road ratio. Since road transport plays an overwhelmingly important role in the transport industry in Jakarta utmost efforts should be made to improve such situation by means of both increase of road ratio and its efficiency.

- In terms of road ratio, more roads should be constructed as far as feasible; even though it becomes an elevated road on viaduct. In terms of efficiency, on the other hand, functional road network should be established, segregating medium and long distance traffic from local traffic.

- Accordingly, the Jakarta-West Java Tollway System has been developed and being extended as required. Traffic volume on arterial roads in Jakarta demonstrated a sharp growth during these decades. It implies that latent traffic demand is so high that the North-South Axis can be justified as an alternative route to the existing Jl. Thamrin/Sudirman. The simulation of the N-S Axis on the existing road network revealed that total vehicle-kilometers would have the same level but total vehicle-hours would decrease significantly, that is, significant increase in transport efficiency could be achieved.

- From technical viewpoints, the following countermeasures are taken into accounts;

(a) In order to avert exececssive concentration of traffic at On/Off ramps, their locations will be dispersed and intended selection of service directions will be made.

(b) To make full use of existing parallel roads as a frontage road, On/Off ramps are provided apart from connecting cross roads.

(c) The open system, which toll barrier is provided not on On/Off ramps but on the through way, will be proposed. Therefore, traffic congestion would be on a tollway if extraordinary traffic should happen.

8.2.3 Relationship to Mass Transport System

Both project roads are radial arterial roads and are planned not to conflict but to support a mass transportation system through efforts to change the present urban structure to a structure pertaining to the mass transportation system.

Regarding the urban transport in Jakarta and its surrounding, it is proposed to establish a transport system, efficient combination of rail, buses and private vehicles, functioning respectively in their appropriate range of service distance and their purpose of trip.

To cope with such situation and to consider such planning elements as securing of urban functions, maintaining of regional environmental conditions and energy preservation, the low private motorization is urged by public opinions and the Jabotabek Urban Mass Transit System is proposed on the use of a combination of LRT and conventional heavy rail.

Public transportation has two options, namely car-base transport and rail-base transport. The former is represented by bus transport. Many metropolitan cities through the world rely upon urban activities, particularly commuters, by means of bus transport. The main reasons why bus transport is well-advanced, are that it can share road network and rather small investment enables to operate and maintain buses with the flexibility against the fluctuation of demand. On the contrary, rail-base transport has the variety of capacity by type. The common features are that it is necessary for rather big organization to operate and maintain transport system and to accompany with enormous initial investment.

Jakarta has been developed as a road transport oriented city where several thoroughfares sustain urban activities. On the other hand, rail-base transport oriented city has different salient features. Urban development as well as road network have been developed around station square where bus bay, taxi bay and passenger waiting area claim their priority to occupy and they lay aside private car parking in the vicinity. Accordingly, Jakarta will have more public facilities and parking places in the CBD if a new rail-base transport system is introduced.

Generally, such a development scenario can be envisaged that the arterial road network with bus transport will accommodate urban activities in short and medium term and it will foster the circumstances to make rail-base transport viable and it will eventually enable to realize the scheme of low private motorization by means of administrative measures. The administrative measures are to discourage citizens the entry into the CBD by using private vehicle, particularly in peak hours by means of imposing higher transport costs and to encourage citizens to use the public transport system by frequency, comfort, safety, certainly and cheaper cost.

It is noted that the road transport still remains the predominant role in transport industry in Jakarta even if a new transport system has been developed. The tollway network contributes the leveling of the regional developments towards realization of a balanced development between the regions, and evenly distributed results of development. The arterial road network as well as tollway not only complement rail-base traffic but also accommodate services for commuters, business trips and goods and always door-to-door service.