3.2 Present Road Network and Traffic Conditions

3.2.1 Road Administration and Functional Classification

(1) General

Essentially, there are two kinds of road classification, i.e. administrative and functional classification.

Administrative classification denotes the level of government responsibility and the method of financing road facilities.

Functional classification on the other hand, groups roads by their character of service and is very important for transportation planning purposes.

The following three Indonesian law and regulations regarding roads have been issued and remain in force;

i) Law of the Republic of Indonesia Number 13 of the Year 1980 on Roads

ii) Government Regulations of the Republic of Indonesia Number 26 of the Year 1985 on Roads

iii) Government Regulations of the Republic of Indonesia Number 8 of the Year 1990 on Toll Roads.

Definitions of terms and terminology in the law and regulations, which are given in Appendix-1, are referred to this report.

The concept of road network and road classification is derived from these governmental law and regulations in principle. Some supplemental explanation on road functions is referred to "A Policy on Geometric Design of Highways and Streets, 1984" issued by AASHTO.

(2) Road Administration

Road Administration in Indonesia may be further sub-divided into Seven (7) Categories, namely, National Road, Provincial Road, District Road, Provincial City Road, Village Road, Special Road and Toll Road.
Their general application according to the law and regulations are as follows;

(a) National Road

National roads form the inter-province road network linking provincial capitals or roads that assure strategic value in the national interests. These roads are constructed and maintained by the Directorate General of Highways (Bina Marga), Ministry of Public Works.

(b) Provincial Road

Provincial roads are developed for improving communication within province or region to link Provincial Capital to regional or other provincial capitals, or roads that assure strategic value in the provincial interests.
The provincial road developer is the regional government level I, or government agency appointed by the regional government.

(c) District Road

District roads are developed for linking cities to premises or linking cities to other cities within region, or roads that assure strategic value in the regional interests. The district road developer is the regional government level II.

(d) Provincial City Road

Provincial City roads form secondary road network in a medium City. The road developer is the regional government level II.

(e) Village Road

Village roads are constructed to form secondary road network within a village by village/district administration.

(f) Special Road

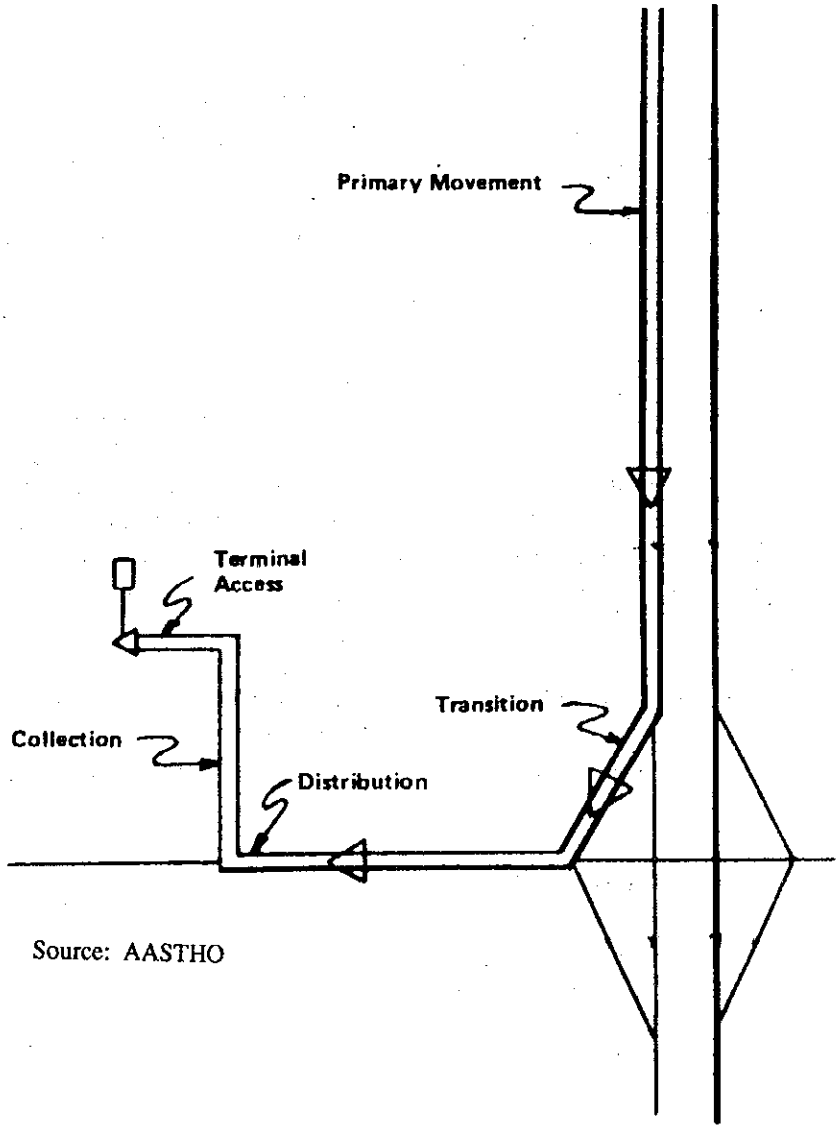
Special roads are constructed and maintained by government agency, legal body, individuals to serve their respective interests.

(g) Toll Road

Toll roads provide inter-urban access to promote the economic growth in the hinterland, which constitutes an important element for realization of the spreading of development and development results. These are constructed and maintained by a state enterprise. A toll road mainly provides an alternative route to an existing public highway.

(3) Functional Classification

A complete functional road system may be seen as a series of distinct travel movement. The travel movement basically includes the following six stages, i.e. primary movement, transition, distribution, collection, access and termination as shown in Figure 3.2.1. Each of these six stages of a typical trip are handled by a separate facility designed specifically for its function.



Source: AASTHO

Fig. 3.2.1 Hierarchy of movement.

Thus functional classification groups primary road network system and secondary road network system according to the character of service they intend to provide. This classification recognizes that individual roads do not serve travel independently. Rather, most travel involve movement through networks of roads and can be categorized relative to such networks in a logical and efficient manner.

Primary road network system at a national level are classified into four (4) Categories, namely, Freeway, Primary Arterial Road, Primary Collector Road and Primary Local Road.
Secondary road network system on city planning, on the other hand, are classified into three (3) categories, namely, Secondary Arterial Road, Secondary Collector Road and Secondary Local Road.

Their general definitions according to the law and regulations are as follows:

(a) Freeway

An Freeway is a divided highway for through traffic with full control of access and always with grade separations at all intersections.

In rural areas, they apply to the inter-province toll road for through traffic and form the high standard road network for fast traveling. They serve long trips and provide higher speed of traveling and comfort. To maintain this, they are fully access-controlled and are designed to the highest standards.

In urban areas, they form the basic framework of road transportation system in urbanized areas for through traffic. They also serve relatively long trips and allow for smooth traffic flow with full access control.

(b) Primary Arterial Roads

They constitute the basic framework of national road transportation as public roads. They usually link up directly with national or provincial capitals and international ports and airports. They serve for long distance traffic with high speed average and partial access control.

(c) Primary Collector Roads

They constitute the major roads forming the basic network of the road transportation system within a province or provinces. They serve medium trip lengths and medium traveling speeds. Smooth traffic flow is provided with partial access control. They usually link provincial capital and regional centers or other major towns.

(d) Primary Local Roads

They form the basic network of the road transportation system within a district. They serve mainly local traffic with short trip lengths and are usually with no access control.

(e) Secondary Arterial Roads

Secondary arterial road is a continuous road with partial access control for through traffic within the urban areas. Basically, it conveys traffic from residential areas to the vicinity of the central business district or from one part of a city to another which does not intend to penetrate the city centre. Smooth traffic flow is essential since it carries large traffic volume.
Arterials usually serve long to medium trips with high to medium traveling speeds.

(f) Secondary Collector Roads

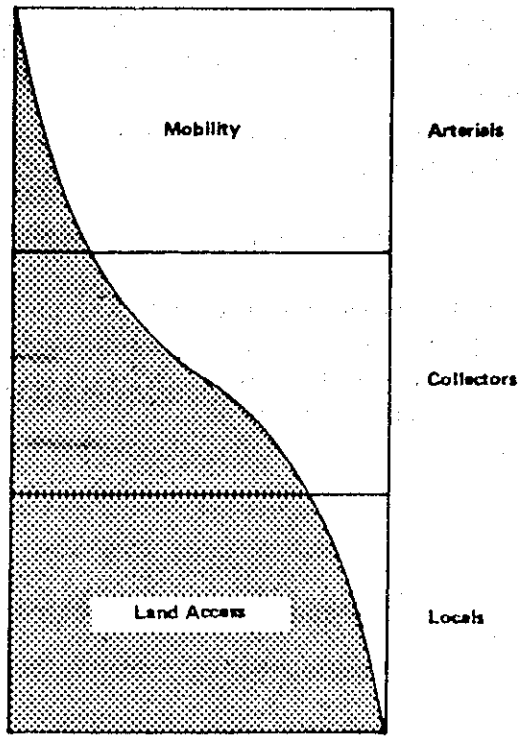
Secondary collector road is a road with partial access control designed to serve on a collector or distributor of traffic between the arterial and the local road systems. Collectors are the major roads which penetrate and serve identifiable neighborhoods, commercial areas and industrial areas.

(g) Secondary Local Roads

Secondary local road is the basic road network within a neighborhood and offer direct access to abutting land. They are linked to the collector road and thus serve short trip lengths. Through traffic should be discouraged.

The two major considerations in classifying road networks functionally are access and mobility as shown in Fig. 3.2.2. The conflict between serving through movement and providing access to the places of trip origin and destination necessitates the differences and gradations in the various functional types. Regulated limitation of access is necessary on freeway and arterial to enhance their primary function of mobility. Conversely, the primary function of local road is to provide access.

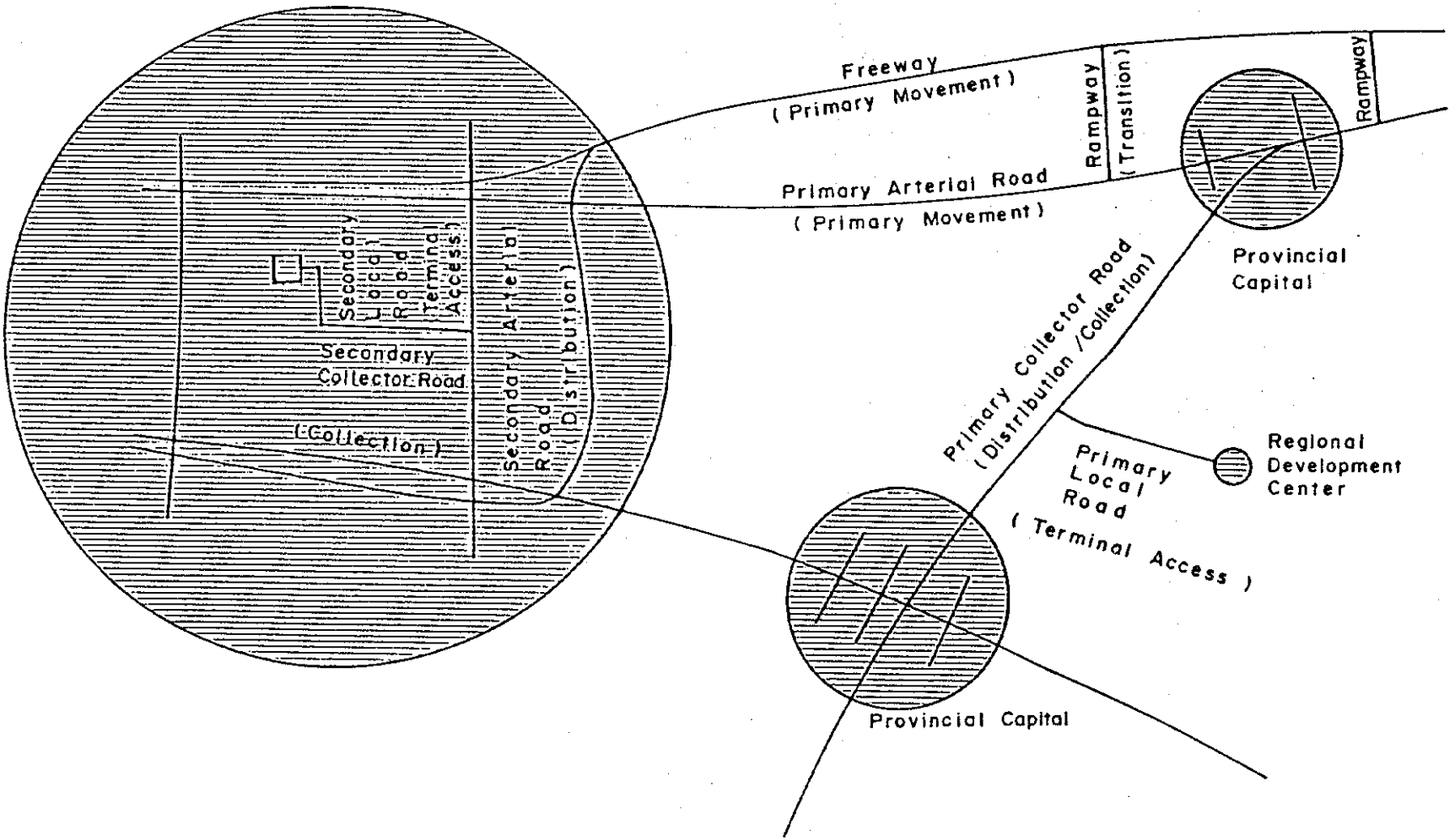
The two major considerations in classifying road networks functionally are access and mobility as shown in Fig. 3.2.2. The conflict between serving through movement and providing access to the places of trip origin and destination necessitates the differences and gradations in the various functional types. Regulated limitation of access is necessary on freeway and arterial to enhance their primary function of mobility. Conversely, the primary function of local road is to provide access.



Source: AASTHO

Figure 3.2.2 Relationship of functionally classified systems in service traffic mobility and land access.

Fig. 3.2.3 schematizes the combination of road classification demonstrated in this section.



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

Fig. 3.2.3 Functional Classification and Hierarchy at Movement

3.2.2 Present Road Network

(1) Public Road Network

Present road network in Jabotabek and Jakarta are presented in Figs. 3.2.4 and 3.2.5 respectively.
The present road network pattern in Jakarta is partially developed radial and circumferential one, while those in its surrounding are a less developed linear ladder pattern. Fig. 3.2.6 shows the existing road network in Jakarta with classification by member of lanes.
Jl. Bekasi Raya and Jakarta-Cikampek Freeway form the main eastward trunk roads, while Jl. Daan Mogot and Jakarta-Merak Freeway are the westward trunk roads. In the southern part of Jabotabek, Jl. Bogor Raya and Jagorawi Freeway are dominant trunk roads, complemented by Jl. Rawa Bambu, Jl. Cinere Raya and Jl. Ciputat Raya.
In Jakarta Bay waterfront area, Jl. Pluit Raya/Jl. R.E. Martadinata and planned Jakarta Harbour Road are coastal trunk roads along northern periphery.

Presently, road ratio of DKI Jakarta is of 5.23%, rather low level compared with 14.8% of Tokyo. DKI Jakarta intends to increase their road ratio up to 8%.

(2) Toll Road Network

The Jakarta-West Java Tollway System which was studied by Bina Marga in 1976 was the original concept of Toll Road network. The system consisted of the Jakarta Intra Urban Tollway, the Jakarta Outer Ring Road and three regional freeways, Jakarta-Bogor-Ciawi (Jagorawi), Jakarta-Merak, and Jakarta-Cikampek.

Progress in realization of the Jakarta-West Java Tollway System has been substantial and dramatic as it was revised from time to time.

Table 3.2.1 presents the summary of opening year and operating length of toll roads as of year 1992.

Fig. 3.2.7 shows the presently operating toll roads and planned toll roads by the year 2005.

Fig. 3.2.4
FUNCTIONAL ROAD NETWORK
IN JABOTABEK

LEGEND :

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

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

N

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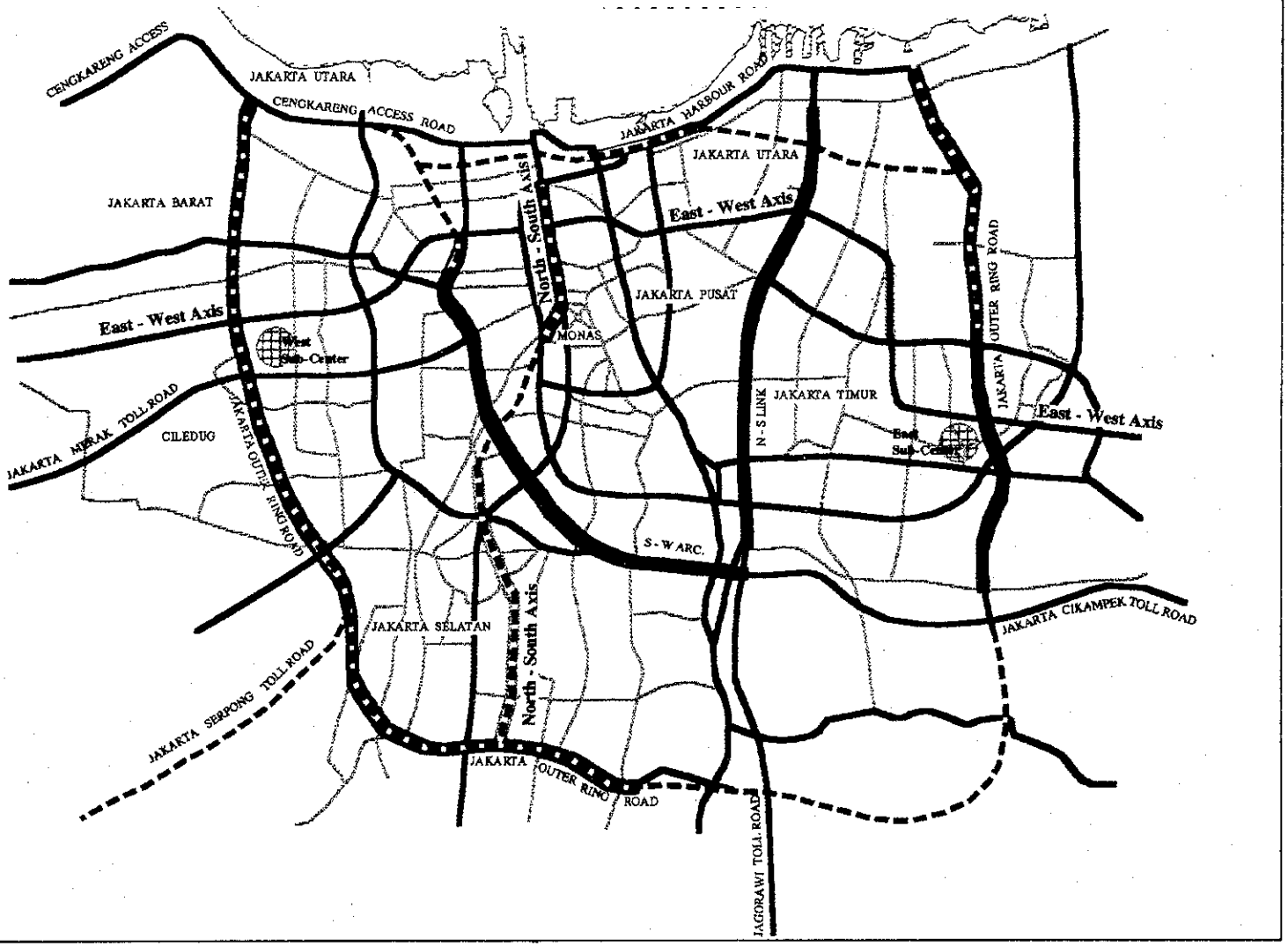

Fig. 3. 2. 5
FUNCTIONAL ROAD NETWORK IN JAKARTA

LEGEND

- TOLL ROAD (Available at Present)
- TOLL ROAD (Planned or Under Construction)
- MAJOR ARTERIAL ROAD
- MINOR ARTERIAL ROAD

N

0 1 2 3 4 5km

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URBAN ARTERIAL ROAD SYSTEM
DEVELOPMENT PROJECT
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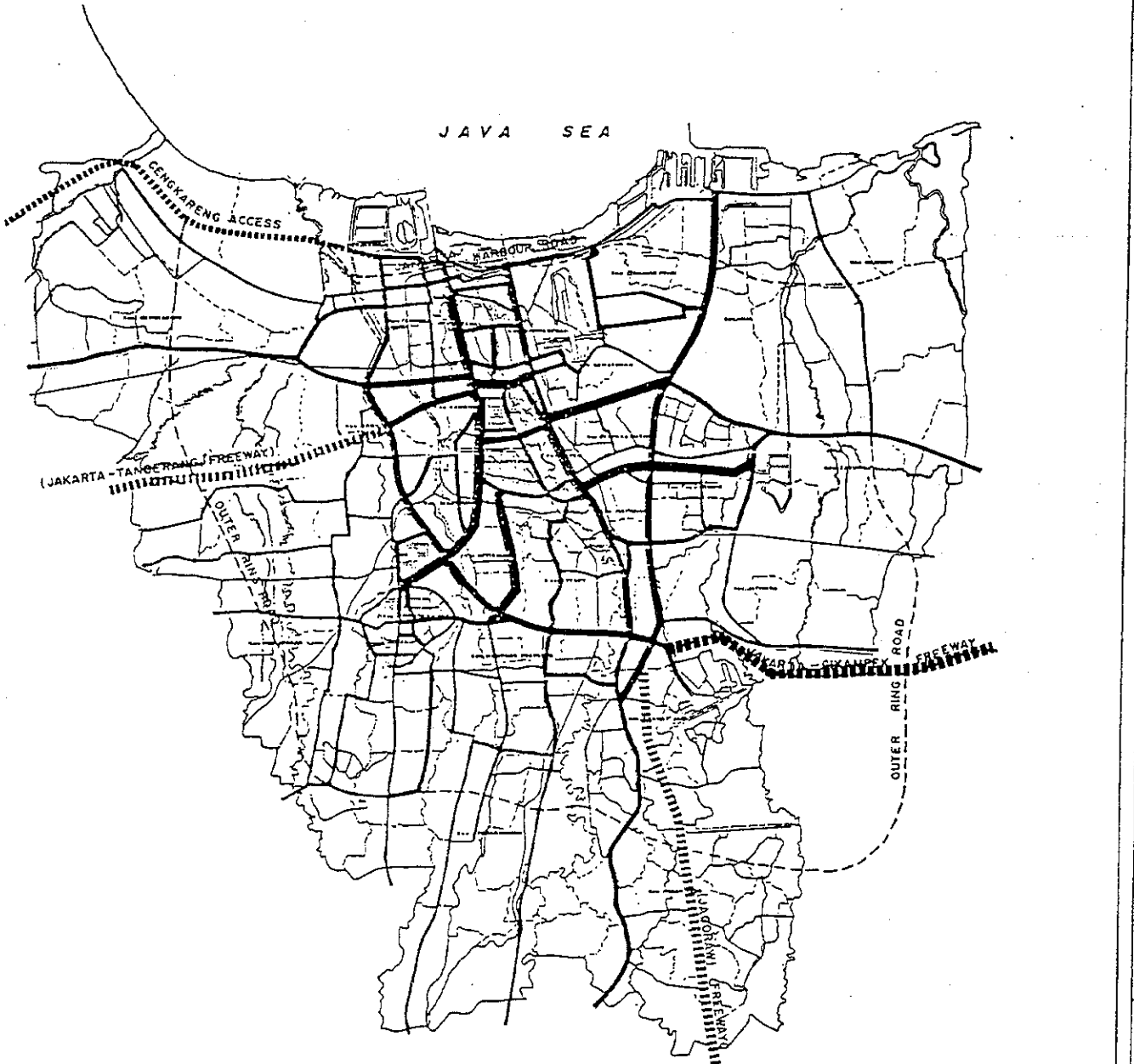

Fig. 3.2.6
EXISTING ROAD NETWORK
IN DKI JAKARTA

LEGEND :

- More than 8 Lanes / More than 6 Through Lanes and 4-Lane Frontage Road
- 6 Lanes / 4 Through Lanes and 4-Lane Frontage Road
- 4 Lanes
- 2 Lanes
- Freeway (4 Lanes)
- Freeway (2 Lanes)

N

0 2 4 6 KM

FEASIBILITY STUDY ON
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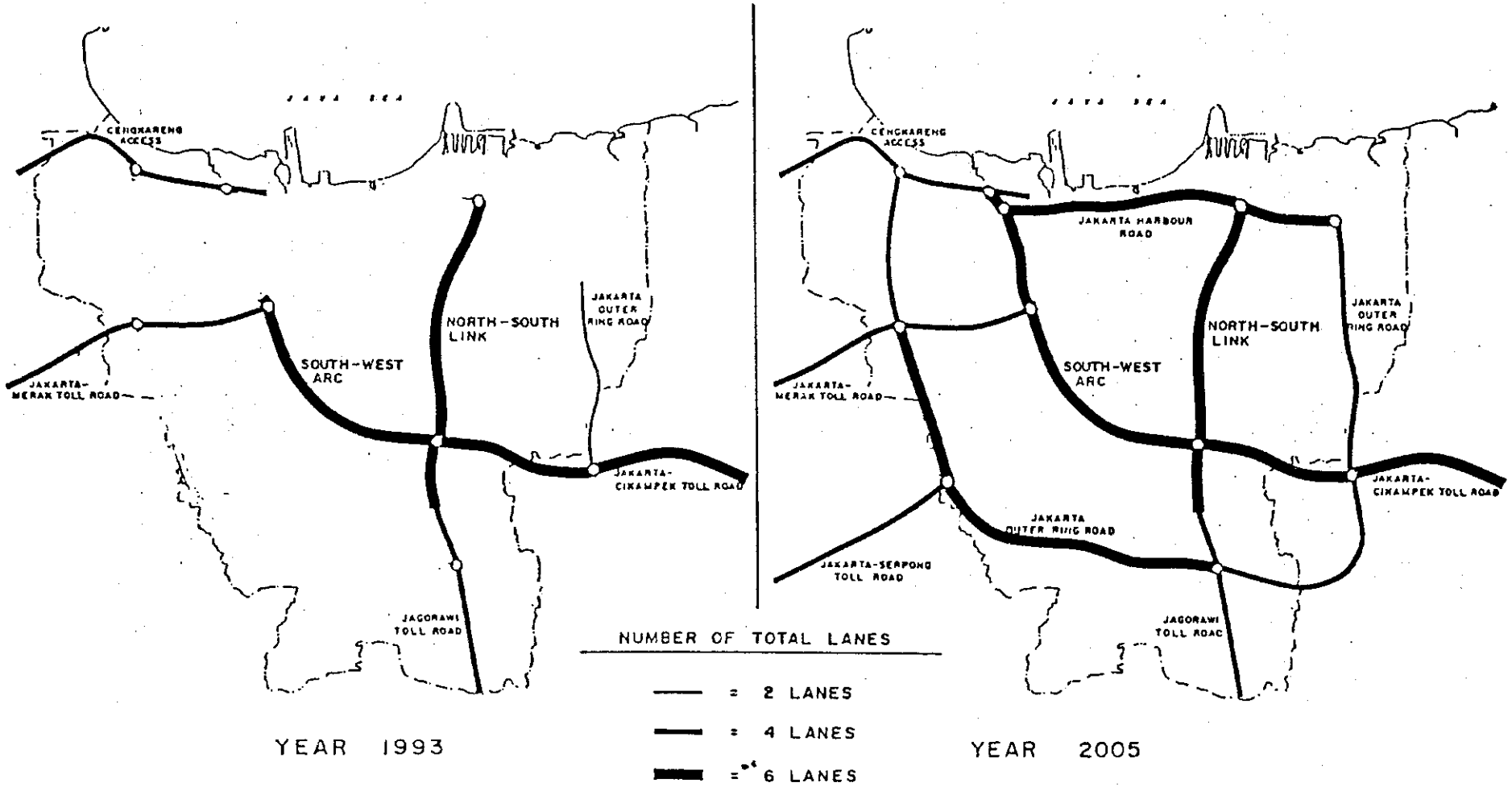
DEVELOPMENT PROJECT
IN JAKARTA METROPOLITAN AREA

Table 3.2.1
SUMMARY OF OPENING YEAR AND OPERATING LENGTH OF TOLL ROADS IN JABOTABEK AREA

Name of Toll Road	Operating Section	Opening Year	Opening Length (km)
Jagorawi Freeway	Jakarta - Bogor-Ciawi	09 Mar. 1978	50.0
Jakarta-Merak Freeway	Jakarta - Tangerang	27 Nov. 1984	26.8
Cengkareng Access	Pluit-Soekarno Hatta International Airport	01 Apr. 1985	13.4
Jakarta-Cikamepk Freeway	Jakarta - Cikampek	21 Sep. 1988	81.5
South-West Arc	Cawang - Grogol	01 No. 1989	14.0
North-South Link	Cawang - Tg. Priok	09 Mar. 1990	17.0



FEASIBILITY STUDY ON
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Fig. 3.2.7 Jakarta - West Java Tollway System

3.2.3 Present Traffic Conditions

(1) Cordon Line Traffic

The cordon line traffic, which crossed the DKI Jakarta boundary, were consolidated with major directions and compared among survey results in 1985, 1988 and 1993 as shown in Table 3.2.2. The average annual growth of the respective directions is summarized in Table 3.2.3.

The counted cordon line traffic in 1985 was 172,474 vehicles (without motorcycles) or 242,829 vehicles (with motorcycles) during 06:00-22:00. The former volume grew to 289,680 in 1988, and 523,313 in 1993. The average annual growth rates were 18.9% p.a. during 198501988, 12.6% p.a. during 1988-1993 and 14.9% p.a. during 1985-1993. The growth rate exceeded that of vehicle registration in DKI Jakarta (7.5% p.a. during 1985-1990).

Viewing the traffic growth by direction, the south cordon line segment during 1985-1988 showed the highest growth of 24.0% p.a., compared to other segments, but it fell down to 7.4% during 1988-1993. The west and east cordon line segments grew faster over the same period at a rate of 16.3% p.a. and 16.0% p.a. respectively. Throughout the 1985-1993 period, the traffic volume on the east and west cordon line segments grew faster than that on the south segment, that is 16.4% p.a., 15.1% p.a. and 13.4% p.a. respectively.

Generally, sedan/van traffic increased rapidly at an average growth rate of 19.1% during 1985-1993, other types of vehicles grew more or less similar pace ranging 9% to 12%, though they are still high compared to the increase in the respective types of vehicles.

(2) Screen Line and Radial Road Traffic

Screen Lines A (East), B1 (West) and B2 (South) are presented in Fig. 3.2.9. Traffic volumes (excluding motorcycles) in a 16-hour (06:00-22:00) were 323,049 on the screen B2 in 1993. The south screen (B2) held the largest traffic volume which overwhelmed about 100,000 vehicles, or 30%-40% higher than the east or west screen volumes.

The east screen traffic volume increased about 80,000 vehicles from 1988 to 1993, but the other two screen volumes underwent little change over the same period. Among the count stations on the east screen (A), a great impact was brought about by the completion of the Jakarta-Cikampek Tollway, which opened to traffic in September 1988. The 1988 traffic count survey was conducted before the tollway opening, so that the impact of the tollway was not reflected in the 1988 traffic volume on the screen (A).

Traffic volumes in a 16-hour period on mayor road sections were exhibited in Fig. 3.2.10. Radial road traffic which 16-hour volumes exceeded 45,000 vehicles (excluding motorcycles) were :

West screen line (B1 - B1)
Jl. Kyai Tapa (86,000 veh.)
Jl. Tomang Raya (72,100 veh.)

South screen line (B2 - B2)
Jl. Sudirman (163,300 veh.)
Jl. Rasunasaid (78,300 veh.)
Jl. Supomo (45,300 veh.)
Jl. Otista (57,700 veh.)
Jl. Panjaitan (77,800 veh.)
Cawang-Cilincing Tollway (60,600 veh.)

East screen line (A - A)
Jl. Pemuda (55,200 veh.)
Jl. Bekasi Timur Raya (63,200 veh.)
Jakarta-Cikampek Tollway (81,600 veh.)

Eastern Railway Line
Jl. Suprapto (76.900 veh.)
Jl. Pramuka (76,100 veh.)
Jl. Bekasi Barat Raya (50,900 veh.)

If the central urban area of Jakarta is defined as an area enclosed with the South-West Arc and the Eastern Railway Line, major radial arteries from the west, south and east are enumerated two (2), four (4) and three (3), respectively.

Jl. Sudirman inter alia has an estimated daily traffic volume of 176,400 veh./day (excluding motorcycles) or 221,400 veh./day (including motorcycles) which is the outstanding volume compared to other radial roads. A peak hour traffic was found during 14:00-15:00 to be 8,500 pcu/hour in the direction from H.I. (Hotel Indonesia) to Semanggi. Since the typical cross section of Jl. Sudirman is a (2-lane frontage + 3-lane main) road/direction, the road capacity is assumed to be 8,000 pcu/hour direction. Hourly fluctuation of the Sudirman traffic is small ranging from 6,500 to 8,500 pcu/hour/direction during 17:00 - 18:00. Therefore, the congestion ratio is constantly maintained over 0.8.

Table 3.2.2 Cordon Line Traffic Volume by Type of Vehicle in 16 Hours, 1985, 1988 and 1993

Year, Direction*	16-Hour Traffic Volumes (06:00-22:00)					
	Motor-cycle	Sedan/ Van	Bus	Truck	Total w/o . MC.	Total With M.C.
Year 1985 :						
West	21,382	19,604	10,414	16,254	46,272	67,654
South	23,483	34,450	14,950	18,380	67,780	91,263
East	25,490	26,468	16,257	15,697	58,422	83,912
Total	70,355	80,522	41,621	50,331	172,474	242,829
Year 1988 :						
West	26,524	26,753	16,662	23,418	66,833	93,357
South	33,293	66,985	25,995	36,147	129,127	162,420
East	45,174	39,154	27,177	27,389	93,720	138,894
Total	104,991	132,892	69,834	86,954	289,680	394,671
Year 1993 :						
West	54,839	85,786	21,504	34,818	142,108	196,947
South	51,418	115,323	41,592	27,833	184,748	236,166
East	60,046	125,562	27,559	43,336	196,457	256,503
Total	166,303	326,671	90,655	105,987	523,313	689,616

Source : Traffic Count Survey results in ARSDS (1985), Outer Ring Road (1988) and this study (1993)

Note * : Please refer to Fig. 3.2.8 for directional segments of the cordon line

Table 3.2.3 Growth of Cordon Line Traffic Volume by Direction

Year, Direction*	Average Annual Growth Rate (% p.a.)					
	Motor-cycle	Sedan/ Van	Bus	Truck	Total w/o . M.C.	Total With M.C.
1985-1988 :						
West	7.4	10.9	17.0	12.9	13.0	11.3
South	12.3	24.8	20.2	25.3	24.0	21.2
East	21.0	13.9	18.7	20.4	17.1	18.3
Total	14.3	18.2	18.8	20.0	18.9	17.6
1988-1993 :						
West	15.6	26.2	5.2	8.3	16.3	16.1
South	9.1	11.5	9.9	-0.5	7.4	7.8
East	5.6	26.2	0.3	9.6	16.0	13.1
Total	9.6	19.7	5.4	4.0	12.6	11.8
1985-1993 :						
West	12.5	20.3	9.5	11.1	15.1	14.3
South	10.3	16.3	13.6	5.3	13.4	12.6
East	11.3	21.5	6.8	13.5	16.4	15.0
Total	11.4	19.1	10.2	9.8	14.9	13.9

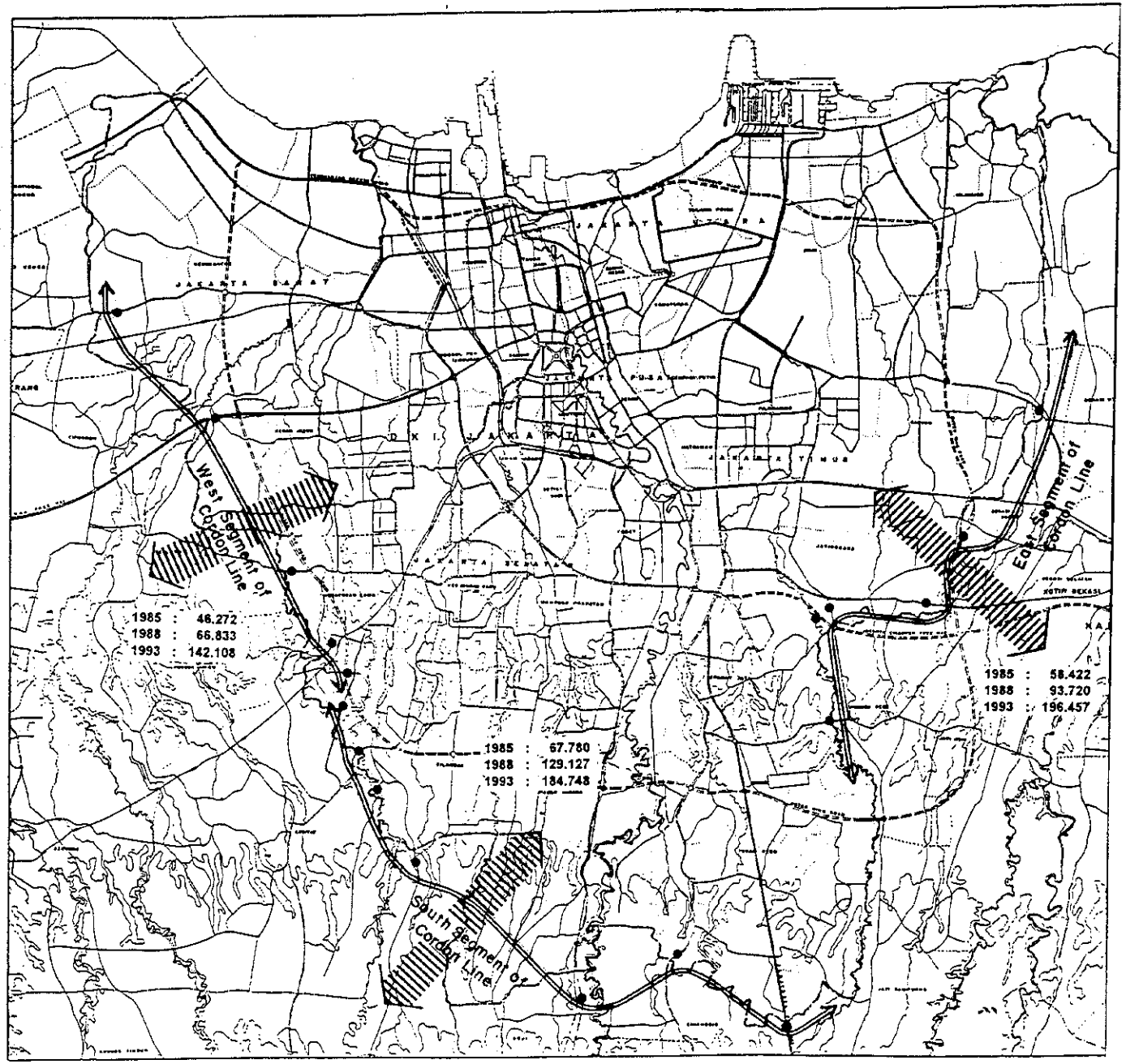

Fig. 3.2.8
DIRECTIONAL SEGMENT
OF CORDON LINE

Legend:

- Traffic Count Station
- Directional Segment of Cordon Line

Year	16-Hour Traffic Volume
1985	Motorcycles are not included

N

0 1 2 3 4 5 Km

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Fig. 3.2.9
SCREEN LINE TRAFFIC VOLUME
IN 1993

Legend:

A ⟺ A Screen Line A

Year	16-Hour Traffic Volumes (Motorcycles are not included)
1988	

N

0 1 2 3 4 5 Km

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Fig. 3.2.10
CROSS SECTIONAL TRAFFIC VOLUME IN 1993 AT MAJOR ROAD SECTIONS

Legend

⟷ Both Direction

No. 16-Hour Traffic Volume (Excluding motorcycles)

Source: Traffic Survey in this Study and "JKT Harbour Road Geometric Design Change", Mar., 1993

FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM
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3.3 Present Bus Operations

3.3.1 Bus Services

(1) Bus Service in DKI Jakarta

Bus services operating in DKI Jakarta can be classified into three types by vehicle size; large, medium and small size buses as follows (refer to Table 3.3.1) :

Table 3.3.1 Existing City Bus Services

Bus Service Name	Vehicle	Sealing Capacity	Bus Route	Bus Stop	Number of Bus Routes	Bus Fare (Rp.)
1) Bis Kota	Articulated	100	Fixed	Fixed	3	250
	Double Decker	85	Fixed	Fixed	6	250
	Large Bus	50	Fixed	Fixed	71	250
2) PATAS	Large Bus	50	Fixed	Fixed	68	550
3) PATAS AC	Large Bus	50	Fixed	Fixed	10	1,300
4) Bis Micro	Medium Bus	30	Fixed	Not Fixed	106	300
5) Mikrolet	Small Bus	9	Fixed	Not Fixed	52	300+
6) KOASI, etc.	Small Bus	9	Fixed	Not Fixes	70	300+

Source : DLLAJR, Peta Trayek Angkutan Umum di DKI Jakarta, April 1993.
Note : 300+ indicates Rp.300 and over. (Bus Fare : as of Oct. 1994)

1) Large size bus

Bis Kota and PATAS mainly operate on arterial roads between city bus terminals in Jakarta using standard buses, double deckers and articulated bus. PATAS serves express buses with few stops. Recently PATAS AC, which is an air-conditioned express city bus, was introduced. Furthermore, since 1992 Articulated type bus has begun its operation for some limited routes.

2) Medium size bus

Bis Mikro not only operates between city bus terminals in Jakarta, but also expands the routes to the suburbs of Jakarta. Bis Mikro serves arteries and collector streets.

3) Small size bus

Mikrolet operates on 52 routes within Jakarta and has the most frequent services with the largest number of vehicles among city buses. Mikrolet is utilized by more passengers with short trip distances, such as trips between bus terminals, than by passengers with long trip distances. KOASI, etc., serve the suburban areas of Jakarta and Botabek using small buses.

Table 3.3.2 shows the average daily passenger carried, total number of buses operated in DKI Jakarta in 1988 and 1991.

Table 3.3.2 Average Daily Bus Passenger and Total Number of Bus Operated in Jakarta (1988 - 1992)

Year	Average Daily Passenger Carried (x 1,000)	Total Number of Bus Operated
1988	1,624	2,606
1991	1,827	2,594
1992	1,851	2,624

Source : Jakarta Dalam Angka 1993
(DLLAJR DKI Jakarta)

(2) Intercity and Rural Bus Services in the BOTABEK Area

Bus services operate between DKI Jakarta and the BOTABEK area. Large bus routes operate to Bekasi, Tangerang and Ciputat from terminals in DKI Jakarta. Other suburban areas in Botabek are served by micro buses and small buses due to the physical constraints of the existing roads.

In the Botabek area local bus services are distributed from the towns (Tangerang, Bekasi, Ciputat, Cileduk, Depok and Bogor) that are directly connected with DKI Jakarta by small buses.

(3) Intercity Bus Services

Inter city buses operate from four inter-city bus terminals in DKI Jakarta with the following coverage areas :

Pulo Gadung Terminal : Eastern part of West Java Province, all of Central Java Province and East Java Province

Kampung Rambutan Terminal : Southern part of West Java Province and some eastern parts of West Java Province

Kalideres Terminal : Western part of West Java Province and Sumatra

Lebak Bulus Terminal : Southwest part of West Java Province

3.3.2 Bus Terminals

There are 18 bus terminals for the city bus operations in DKI Jakarta and 4 of these terminals (Pulo Gadung Kalideres, Lebak Bulus and Kampung Rambutan) are used for both intra-city and inter-city bus operations.

Bus terminals work inefficiently at present in spite of the effort made by related agencies. Bus terminals are used for parking instead of for transit purposes due to the practice of bus crews who wait a long time to collect passengers.

The location of existing bus terminals in the area of DKI Jakarta is shown in Fig. 3.3.1.

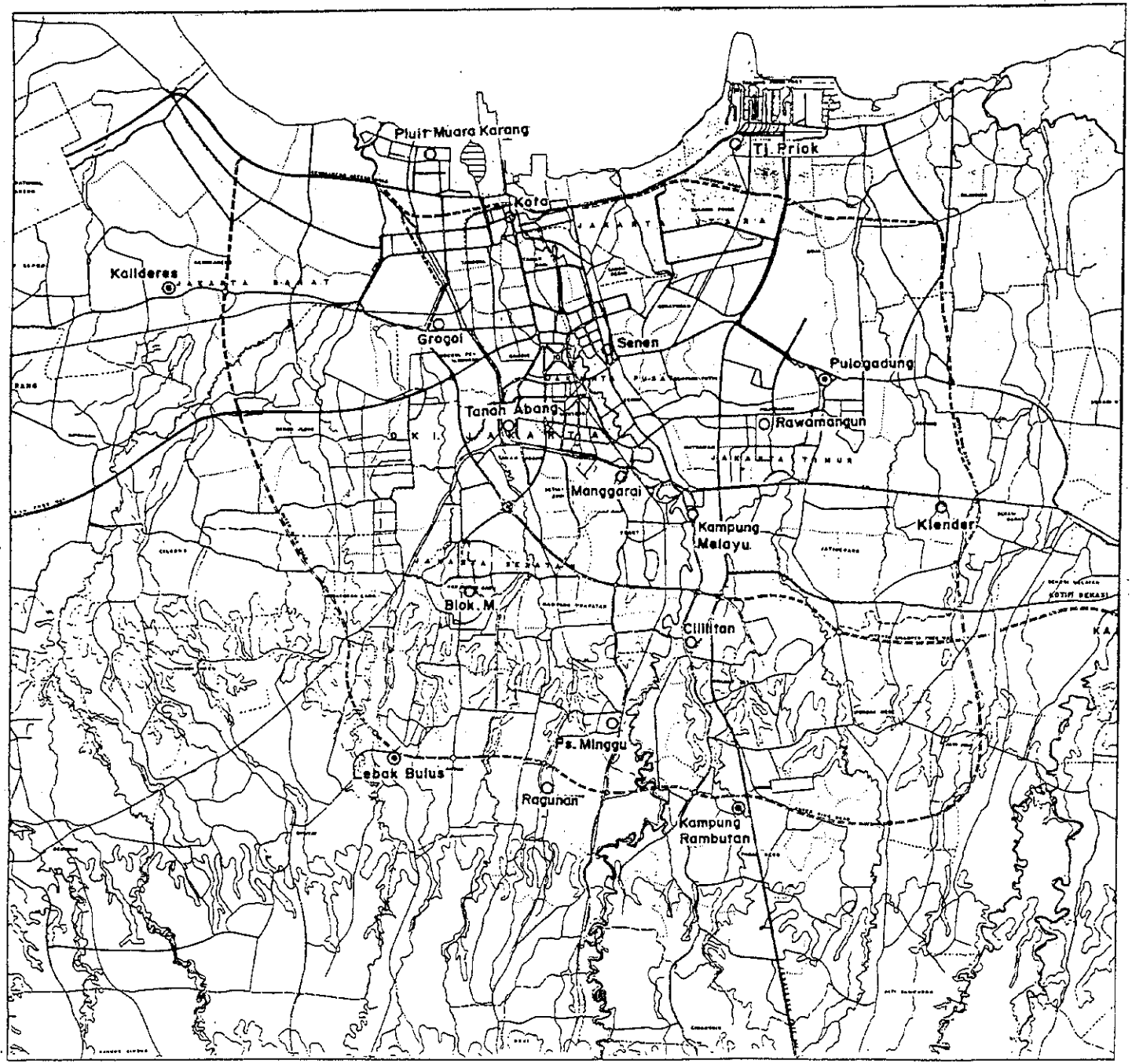

Fig. 3.3.1
LOCATION MAP OF
EXISTING BUS TERMINAL
IN DKI JAKARTA

Legend:

- ◉ Bus Terminal for Inter - City Bus and Intra - City Bus
- ○ Bus Terminal for Intra - City Bus

N

0 1 2 3 4 5 Km

FEASIBILITY STUDY ON
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3.4 Present Railway Operations

3.4.1 Railway Lines

In the Jabotabek area, the railway system is served by 7 rail lines totaling 160 km in length and 55 railway stations. These lines are listed in Table 3.4.1 and outlined in Fig. 3.4.1. The Jabotabek railway system is managed and operated by PERUMKA (Perusahaan Umum Kereta Api, Public Corporation of Railways).

Table 3.4.1 Existing Railway Network

Line	Section	Distance (km)	Single or Double Truck	Electrified (Yes/No)
Eastern Line	JKT Kota - Jatinegara	11.8	Double	Yes
	JKT Kota - Tg. Priok	8.1	Double	Yes
	Tg. Priok - Kemayoran	4.2	Double	Yes
Central Line	JKT Kota - Manggarai	9.7	Double	Yes
Western Line	JKT Kota - Kp. Bandan	2.7	Double	Yes
	Kp. Bandan - Duri - Tanah Abang - Manggarai	14.3	Double	No
	Manggarai - Jatinegara	2.9	Double	Yes
Tangerang Line	Duri - Tangerang	19.3	Single	No
Merak Line	Tanah Abang - Serpong	23.3	Single	No
	Parung Panjang - Rangkasbitung	49.5	Single	No
Bogor Line	Manggarai - Depok	22.2	Double	Yes
	Depok - Bogor	22.7	Single	Yes
Bekasi Line	Jatinegara - Bekasi	14.8		
	Kerawang - Cikampek - Purwakarta	76.2	Double	No

Source : ARSDS Supporting Report No. 3, 1987
Jakarta Mass Transit System Study, 1992

3.4.2 Railway Passengers

Table 3.4.2 shows the actual data of 1993 daily number of railway passengers related to Jabotabek area obtained through field survey conducted by PMS III (Project Management Service) in April 1993.

Table 3.4.2 Surveyed 1993 Daily Number of Railway Passengers of Jabotabek Area

	Kind of Train	Number of Passengers
Getting On	Commuter Train	188,433
	Other Train	29,345
	Total	217,778
Getting Off	Commuter Train	188,433
	Other Train	19,373
	Total	207,806
Getting On/Off	Commuter Train	376,866 (89%)
	Other Train	48,718 (11%)
	Total	425,584 (100%)

Source : PMS III
Note : "Other Train" indicates "Local Train" and "Long/Medium Distance Train".

According to this survey result, about 426 thousand passengers utilize railway daily in Jabotabek area. Of these passenger, 377 thousand passengers accounting for about 89% of the total passenger use commuter train.

The study results of PMS III field survey also shows the breakdown of commuter train passengers by railway line as shown in Table 3.4.3
This breakdown shows that the commuter train passengers are greatly concentrated to the Central Line.

Table 3.4.3 Surveyed 1993 Daily Number of Commuter Train Passengers by Line

Line	Number of Passengers Getting On/Off for Commuter Train	
Central Line (Jakarta-Bogor)	269,553	(71.5%)
Bekasi Line (Jatinegara-Bekasi)	40,034	(10.6%)
Western & Eastern Line (Excluding Tanah Abang-Duri)	29,336	(7.8%)
Serpong Line (Tanah Abang-Serpong)	26,866	(7.1%)
Tangerang Line (Duri- Tanah Abang)	11,077	(3.0%)
Total	376,866	(100%)

Source : PMS III

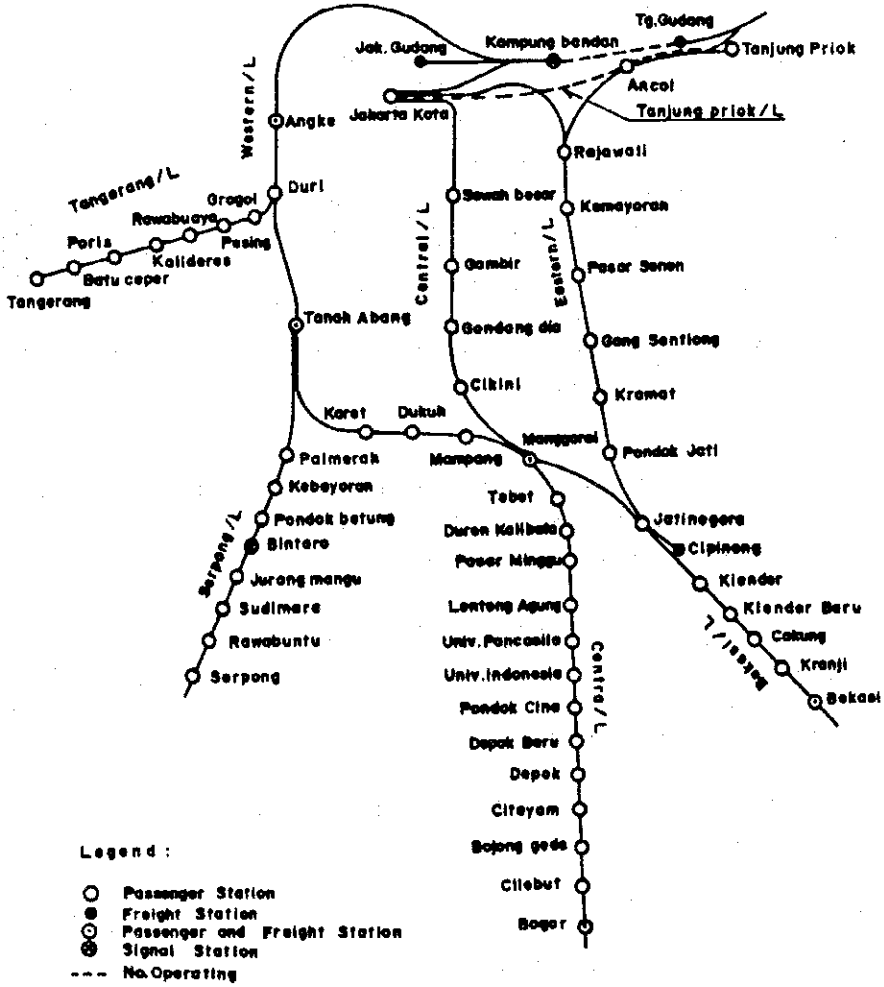


Fig. 3.4.1 EXISTING RAILWAY NETWORK IN JAKARTA METROPOLITAN AREA

3.5 Air and Sea Transport

3.5.1 Air Transport

Air passengers and air cargo to/from Jakarta were, prior to 1985, serviced at Kemayoran and Halim Airports. Soekarno-Hatta International Airport was opened in 1985, at which time the roles of Halim and Kemayoran Airports were significantly downgraded. Halim Airport is now utilized for military functions and limited commercial activity focused on pilgrims, transmigration participants and VIP guests. Kemayoran Airport has been closed and the site is being redeveloped as a new administrative, business and residential area.

Kemayoran Airport served about 3.4 - 3.6 million annual boarding and alighting passengers in the early 1980's. Halim Airport dealt with about 2.1 - 2.2 million annual boarding and alighting passengers for the same period.

In 1991, Soekarno-Hatta Airport accommodated 2.8 million and 5.1 million international and domestic boarding and alighting passengers respectively (Table 3.5.1).

Soekarno-Hatta Airport processed about 69,000 tons and 94,000 tons for domestic cargo and international cargo (163,000 tons in total) in 1991 respectively (Table 3.5.2).

3.5.2 Sea Transport

DKI Jakarta plays a significant role in the nations seaport activity with local ports accounting for 9% and 10% of 1990 Indonesian domestic and international cargo shipments respectively. DKI Jakarta ranks, on a provincial basis, as the fourth most active sea cargo center after East Kalimantan, Riau and Aceh.

The major seaports in Jakarta are Tanjung Priok and Sunda Kelapa Port. Tanjung Priok is located on a 424 hectar site in northeastern Jakarta, accommodating also domestic and international passengers.

Sunda Kelapa Port, located north-central Jakarta, processes domestic (inter-island) cargo and some passenger traffic. Facilities are limited, with a significant component of transactions involving manual loading/unloading of inter-island cargo schooners.

Table 3.5.3 show the annual passengers and cargo activity in Tanjung Priok Port. In 1991, about 680,000 annual boarding plus alighting passengers utilized Tanjung Priok Port. Cargo volume processed at Tanjung Priok Port amounted to about 5 million tons and 13 million tons for domestic and international cargo (18 million tons in total) in 1991, respectively.

Table 3.5.3 Annual Passengers and Cargo Activity in Tanjung Priok Port 1981 - 1991

Year	One-Way Passengers (1,000 persons)			Cargo (1,000 ton)		
	Domestic	International	Total	Domestic	International	Total
1981	189.2	3.1	192.3	2,473.5	6,810.6	9,284.1
1982	153.1	1.6	154.7	2,441.7	6,710.5	9,152.2
1983	169.7	5.8	175.5	2,306.3	6,993.2	9,299.5
1984	186.3	7.2	193.5	NA	NA	-
1985	190.2	6.1	196.3	NA	NA	-
1986	197.3	6.9	204.2	3,096.1	8,012.3	11,108.4
1987	223.9	5.0	228.9	3,034.1	9,010.8	12,044.9
1988	230.6	2.5	233.1	NA	NA	-
1989	256.8	3.7	260.5	NA	NA	-
1990	247.6	5.7	253.3	NA	NA	-
1991	296.6	42.4	339.3	4,985.0	12,986.1	17,971.1

Source : Jakarta Dalam Angka (Jakarta in Figures)
Note : Passengers : Average of boarding plus alighting
Cargo : Total of inbound and outbound
NA : Not available

Table 3.5.1 Annual One-Way Passenger Activity, Jakarta Airports, 1980 - 1991

(Unit : 1,000 passengers)

YEAR	KEMAYORAN			HALIM PERDANAKUSUMA			SOEKARNO - HATTA		
	Domestic	International	Total	Domestic	International	Total	Domestic	International	Total
1980	1,543.86	2.47	1,546.33	190.29	763.85	954.14	-	-	-
1981	1,831.26	1.55	1,832.81	232.04	840.65	1,072.69	-	-	-
1982	1,812.76	0.74	1,813.50	226.30	865.57	1,091.87	-	-	-
1983	1,760.13	0.44	1,760.57	223.22	794.18	1,017.40	-	-	-
1984	1,766.79	0.19	1,766.98	229.58	830.03	1,059.61	-	-	-
1985	409.80	0.00	409.80	188.23	226.95	415.18	1,324.29	642.92	1,967.21
1986	0.00	0.00	0.00	201.03	28.00	229.03	1,896.40	832.38	2,728.78
1987				141.66	27.16	168.82	2,024.34	967.12	3,009.46
1988				142.42	25.17	167.59	2,379.38	1,065.98	3,445.36
1989				216.71	30.58	247.29	2,444.61	1,079.20	3,523.81
1990				269.70	46.86	316.56	2,483.66	1,279.33	3,762.99
1991				297.95	44.90	342.85	2,567.11	1,411.79	3,978.90

Source : Jakarta Dalam Angka (Jakarta in Figures)

Note : Activity based on average of boarding plus slighting passengers

Table 3.5.2 Annual Aircargo Activity, Jakarta Airports, 1980 - 1991

(Unit : ton)

YEAR	KEMAYORAN			HALIM PERDANAKUSUMA			SOEKARNO - HATTA		
	Domestic	International	Total	Domestic	International	Total	Domestic	International	Total
1980	35,325	2,455	37,780	1,899	28,069	29,968	-	-	-
1981	39,197	2,934	42,131	2,247	33,020	35,267	-	-	-
1982	39,528	1,963	41,491	2,508	38,617	41,125	-	-	-
1983	35,761	1,555	37,316	3,075	38,657	41,732	-	-	-
1984	34,403	1,079	35,482	2,488	39,602	42,090	-	-	-
1985	9,001	0	9,001	1,750	10,571	12,321	29,090	21,186	50,276
1986	0	0	0	1,965	0	1,965	42,755	28,241	70,996
1987				2,843	0	2,843	46,028	41,713	87,741
1988				7,201	0	7,201	47,163	61,808	108,971
1989				2,157	0	2,157	57,402	80,271	137,673
1990				2,809	0	2,809	66,730	97,603	164,333
1991				2,090	4	2,094	69,431	94,113	163,544

Source : Jakarta Dalam Angka (Jakarta in Figures)

Note : Activity based on total of inbound plus outbound shipments.

3.6 Present Traffic Problems

There are various aspects of traffic problems which accrue from, for example, lack of facilities, network deficiency or driver's behavior. A traffic problem observed in the study area is not simple but complex to provide an appropriate solution. Therefore, the problem should be tackled from various viewpoints, with best efforts and endurance.

In this section, analysis begins with categorization of traffic problems caused by the following major elements:

- Road network
- Traffic obstacles
- Lack of facilities
- Intersections
- Bus operation
- Driver's behavior

(1) Road Network

- No direct connections between east and west :
  Road links between north and south Jakarta are comparatively good and long in distance, but east-west links are short and staggered.

- Low road density :
  Kembangan, Cengkareng, Sunter, Cakung, Klender, Menteng Atas, Menteng Dalam, Karet, Kuningan are examples of areas with low road density. There is a lack of suitable and sufficient number of roads to meet the traffic needs in these areas. Spontaneous land development in these areas will incur hindrance to the future plan.

- Lack of network concept and road hierarchy :
  This can be seen in many areas throughout Jakarta where local roads connect directly to arterial roads; poor access to activity centers

- Lack of crossing streets with arterial streets :
  Many U-turn openings compensate for right-turn movements due to lack of crossing streets with arterial streets.

- Staggered intersections :
  Many staggered intersections produce additional traffic congestion on the arterial streets being crossed.
- Unbalance and discontinuity of lane numbers in the carriageway :
  Carriageway lane numbers vary over a whole length of the road with no relation to the traffic demand. Traffic congestion occurs at the bottle neck section.

- Unbalance of lanes at intersections :
  The same number of lanes should be provided for the in and out flow of through traffic at intersections.

(2) Traffic Obstacles

Through traffic flow is disturbed by many kinds of obstacles such as the existence of facilities, physical constraint, multipurpose use of road, road user's behavior, etc.

a) Facilities along Arterial Street

Pasars, shopping centers, schools, warehouses, bus stops and terminals are major obstacles. In- and out-flow of the traffic at these facilities, lack of parking space and direct use of access/frontage roads cause traffic congestion on the arterial street. Bus terminals have problems of operation. Those problems are subject to landuse control and individual facility planning.

b) Physical and Engineering Constraints

- Lane reduction by railway bridges :
  Railway bridges over roads reduce the number of lanes :

Ex : Jl. Matraman Raya	10 lanes - 5 lanes
Jl. Gunung Sahari Ancol	6 lanes - 4 lanes
Jl. Tambak	6 m - 5 m plus pedestrian.

- Lane reduction by road bridges :

  Ex : Jl. Gajah Mada, Hayam Wuruk, Kramat Raya, Salemba Raya, etc. These constraints cause not only traffic congestion but also safety problems to the road user.

- Poor interchange ramp service :
  Poor interchange ramp service produces additional traffic on the access road.

- Improper geometric standards at intersections :
  Short sight-distance, steep access gradient, small radius of horizontal curvature, etc.

- Reduction of lateral clearance :
  Reduction of lateral clearance by electric poles, traffic sign boards, etc.

c) Multi Purpose Use of Street

- Increase of street vendors
- Multi row parking and use of road for maneuvering

- Hand carts and street peddlers
- Buses waiting for customers
- Cargo loading and unloading at roadside
- Uncontrolled crossing by pedestrians

A street vendor is one of the most serious causes to generate traffic congestion. They occupy sidewalk, shoulder and carriageway resulting in the deterioration of road function.

(3) Lack of Facilities

Lack of traffic signals, pedestrian sidewalks, guardrails, traffic islands/markings, drainage, traffic signs also cause disorder and disturbance to traffic flows.

(4) Intersections

- Traffic signals not meeting traffic demand
- Excessive number of traffic queues at intersections
- No priority passage such as right turn priority

(5) Bus Operation

- Unscheduled operation with poor service level
- Spontaneous stopping as required or intended
- Stopping of large buses at locations other than fixed bus stops
- Uneffective bus terminal operation
- Lack of discipline as a public transport operator

(6) Drivers' Behavior

- Frequent lane changing by vehicle
- Vehicle running on sidewalk and shoulder
- Traffic jams at intersections due to the absence of police even though there are traffic signals

From the general traffic problems mentioned above, several specific issues can be abstracted to form a development strategy for the project roads, and they are :

1) Preparation of a basic network plan which is well organized with both regional and urban development plans;

2) Establishment of a road and street hierarchy to accord with the basic network plan;

3) Continuous efforts to enhance road density with a standard, not sub-standard, engineering design;

4) Requirement of proper road management and law enforcement to road users.

The first two issues are concerned with the "Road Transport System Development" and the remainders are concerned with "Road and Traffic Management". In this study, the former issue of the Road Transport System Development is a major subject.

CHAPTER 4 DEVELOPMENT PLANS AND SOCIO-ECONOMIC FRAMEWORK

CHAPTER 4 DEVELOPMENT PLANS AND SOCIO-ECONOMIC FRAMEWORK

4.1 Jabotabek Metropolitan Development Plan Review (JMDPR)

4.1.1 Background

The Jabotabek Metropolitan Development Plan (JMDP) was prepared during 1976-1981, and directed a principal mechanism for the coordination of strategic investment in Jabotabek. Since then, some revisions were made in the Jabotabek Development Plan 2005 (1985) regarding such an upgrade of population frame in Serpong for then emerging development plans of Puspitek (Science, Education and Research Center) and a new town development by Bumi Serpong Damai (BSD). However, development strategies proposed in the JMDP have succeeded to the Jabotabek Development Plan 2005.

The main strategies of the JMDP are :

- an integrated growth and investment strategy;

- a more environmentally sound, east-west alignment for future development, in order to avoid further pollution of the important aquifer charge area to the south of the City (Jakarta), and high development costs in the environmentally sensitive wetlands and poor soil in when coastal areas; and

- a major emphasis on water supply, sanitation, kampung improvement and flood protection together with guided land development (GLD) for residential and industrial areas focused on primary infrastructure deficiencies (including roads).

The JMDP has been implemented through short-term subsectoral action programs, complemented by long-term institutional development efforts. Central government agencies and the provinces of DKI Jakarta and West Java, with principal assistance from the World Bank, Asian Development Bank, Government of Japan (OECF and JICA) and the Government of the Netherlands have been trying to maintain the 1981 Jabotabek Metropolitan plan program.

The process of implementation, however, has not been monitored effectively. There is a lack of synthesized information on the scale and location of changes which have taken place since 1983. The population has increased much faster in Botabek, or slower in Jakarta than projected in the JMDP. Furthermore, some designated growth areas show few signs of significant growth, while major developments not foreseen in the JMDP have occurred (e.g. new towns at Bekasi, Serpong and Ciputat), and much development is occurring in environmentally sensitive areas.

The projected JMDPR population in 1990 is compared with the 1990 census result as shown in Table 4.1.1

Table 4.1.1 Comparison of JMDP Population Projection and 1990 Census Result

Region	JMDP	1990 Census	Thousand Difference
DKI Jakarta	8,827	8,200	+ 627
Botabek	6,880	8,900	- 2,020
Jabotabek	15,701	17,100	- 1,399

The difference in population projection will become more significant, when considering the long term view to 2010. Botabek area, in particular, has grown faster than expected. Changes in development scale, nature and locations have to be inrestigated to allow for the revision of the existing JMDP.

4.1.2 Present Urban Structure in Jabotabek

The existing urban structure of Jabotabek is simple, in the sense that it is clearly dominated by DKI Jakarta with the old core of Bogor a smaller but nevertheless important urban center to the South. Tangerang and Bekasi to the West and East are less distinct, less 'urban', but still towns with separate identities.

Compared to a decade ago, the Jakarta's urban continuum to the east, west and south beyond the Jakarta boundary has become distinguishable. In addition to the regional arterial roads, radial freeways have enabled their adjacent land use to be diversified and a large scale housing complex, industrial estate and even a new town development were realized to some extent, or further in progress.

It is certain from the trend of demographic data that the population growth pressure, in Jakarta is urging the people to live in separate, and more in distant from their working places, because of higher land prices in the central urban area on the one hand and better living environment in the suburban area on the other hand.

It is also clear that substantial numbers of middle class consumers are accumulating in real estate type developments, which are vigorously evolving either inside or outside of the Jakarta boundary. Their consuming power represents a latent demand for a range of commercial opportunities which

could catalyze a network of service centers featuring supermarkets, department stores, specialty shopping, sports and recreation, and health centers as well as entertainment service industry and office employment. It is inevitable that this will happen within a time frame of medium-term to the year 2000 as the increasing traffic congestion restricts mobility to the core areas of Jakarta and other existing centers.

The functional urban areas at the present time can be identified with the level of urban population and the status of administrative function. The first level centers of Bogor, Tangerang and Bekasi dominate the urban structure of Botabek with Depok, Ciputat and Pondok Gede representing an emerging second tier of urban areas. These six towns surrounding DKI Jakarta are the basis of the existing metropolitan framework.

Functional urban areas, which are the agglomeration of urban, desas, were ranked by population size in 1990, and they are presented in Table 4.1.2 and Fig. 4.1.1.

Table 4.1.2 Functional Urban Areas[1)] in Botabek by Population size, 1990

	City Size				
	500,000-1,000,000	250,000-500,000	100,000-250,000	50,000-100,000.	10,000-50,000
Bogor	Bogor*	Depok	Cimanggis Cibinong Citeureup	Ciampea Cibatok Cinere	Cileungsi Sawangan G. Putri/ Wanaher Caringin Cipayung Cigombong Cibetung Parung Tugu Cisarua Bj. Gede P. Panjang Leuwiliang Pd. Udik Jonggol
Tangerang	Tangerang	Ciputat	Pd. Aren	Tl. Naga Cikupa Legok/ Curug	Serpong Kresek Sepatan Cisoka Balaraja Mauk
Bekasi	Bekasi	Pd. Gede	Tambun Cikarang Lemah-abang	Babelan	Cibitung Sukadarma Pebayoran

Source : JMDPR Report

Note : * Bogor includes the fringe areas in Kecamatan Ciawi, Ciomas, Semplak and Kedunghalang

1) Urban areas described here include urban desas listed Appendix IV.

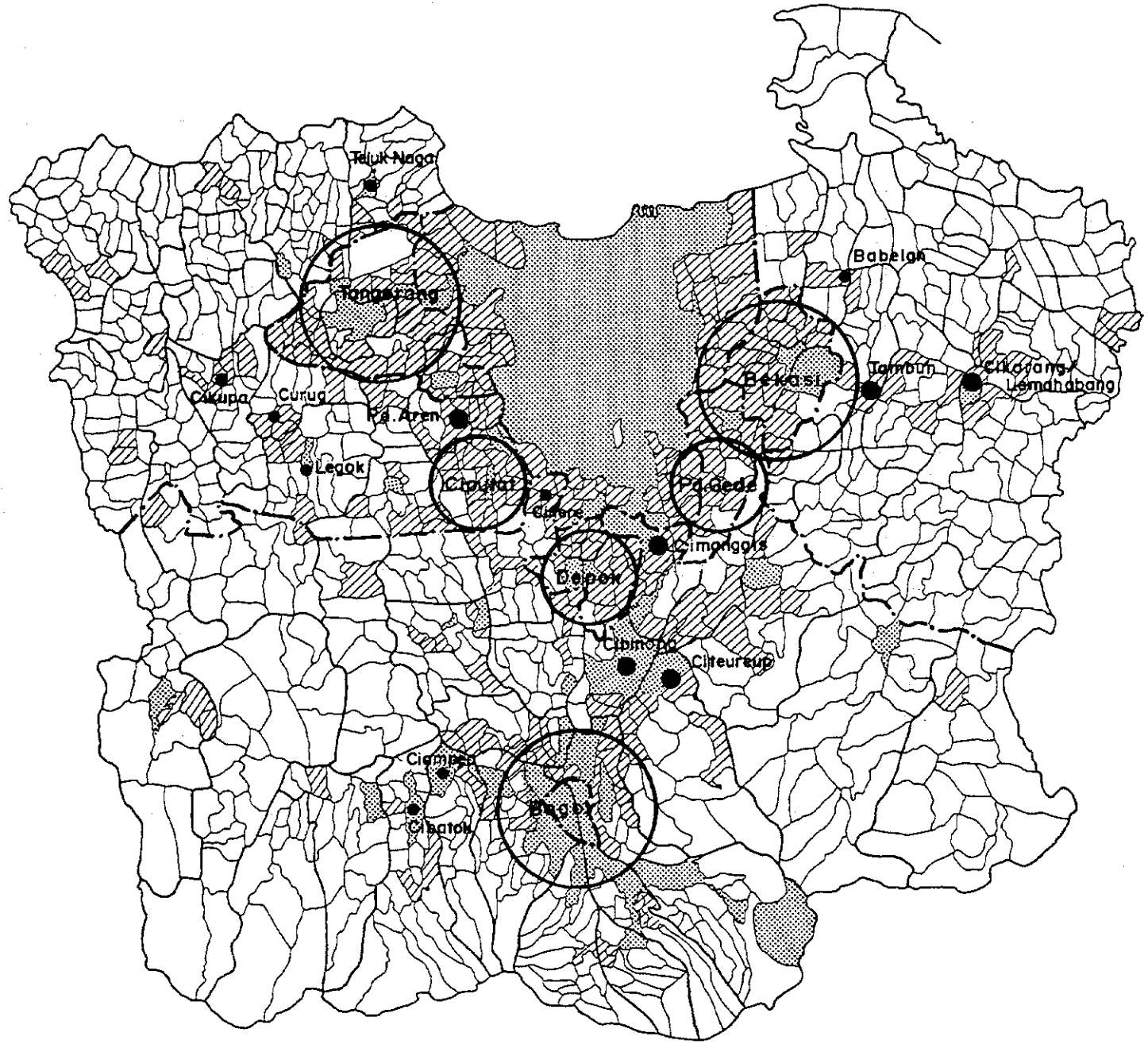


Fig. 4.1.1
URBAN AGGLOMERATION
IN JABOTABEK 1990

Legend — Population Size

- 500.000 – 1.000.000
- 250.000 – 500.000
- 100.000 – 250.000
- 50.000 – 100.000
- Urban Desa 1980
- Increase 1980 – 1990

N

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

4.1.3 Development Potential and Constraint

The JMDPR's Third Planning Report deals with the measurement of development potentials and constraints for every desa/kelurahan in Jabotabek. The selected assessment parameters are "Accessibility", "Environmental and Physical Conditions", "Economic Activities" and "Planning Conditions". The current third Planning Report added another parameter of "Pollution and Water Supply Constraints" to assess the overall potential of the Jabotabek area.

Each of the above parameters consists, as required, of some sub-parameters as shown in Fig. 4.1.2.

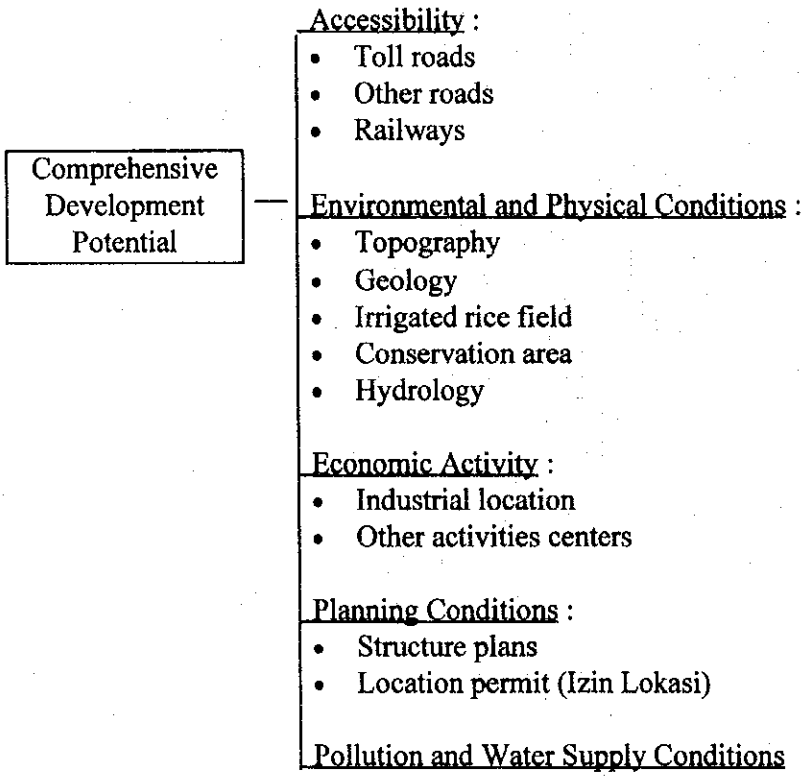
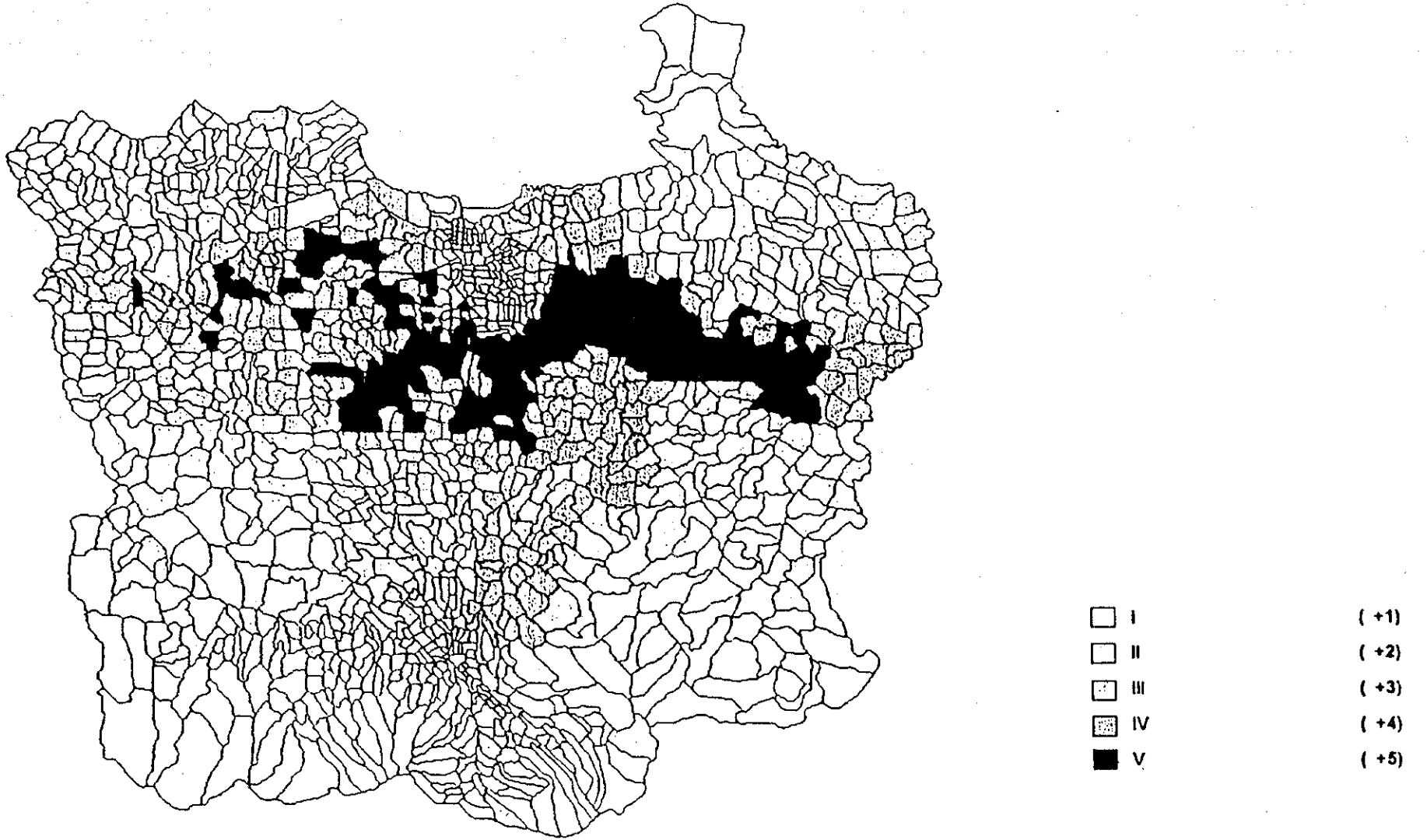


FIG. 4.1.2 ASSESSMENT PARAMETERS OF DEVELOPMENT POTENTIAL AND CONSTRAINT

Consequently, the overall growth potential was assessed every desa/kelurahan in Jabotabek and ranked with I through V, where the development potential becomes higher in ascending order, but adversely the development constraint becomes severer in descending order. The growth potentials were prepared to alter over the planning period as shown in Fig. 4.1.3 through 4.1.5.



FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT
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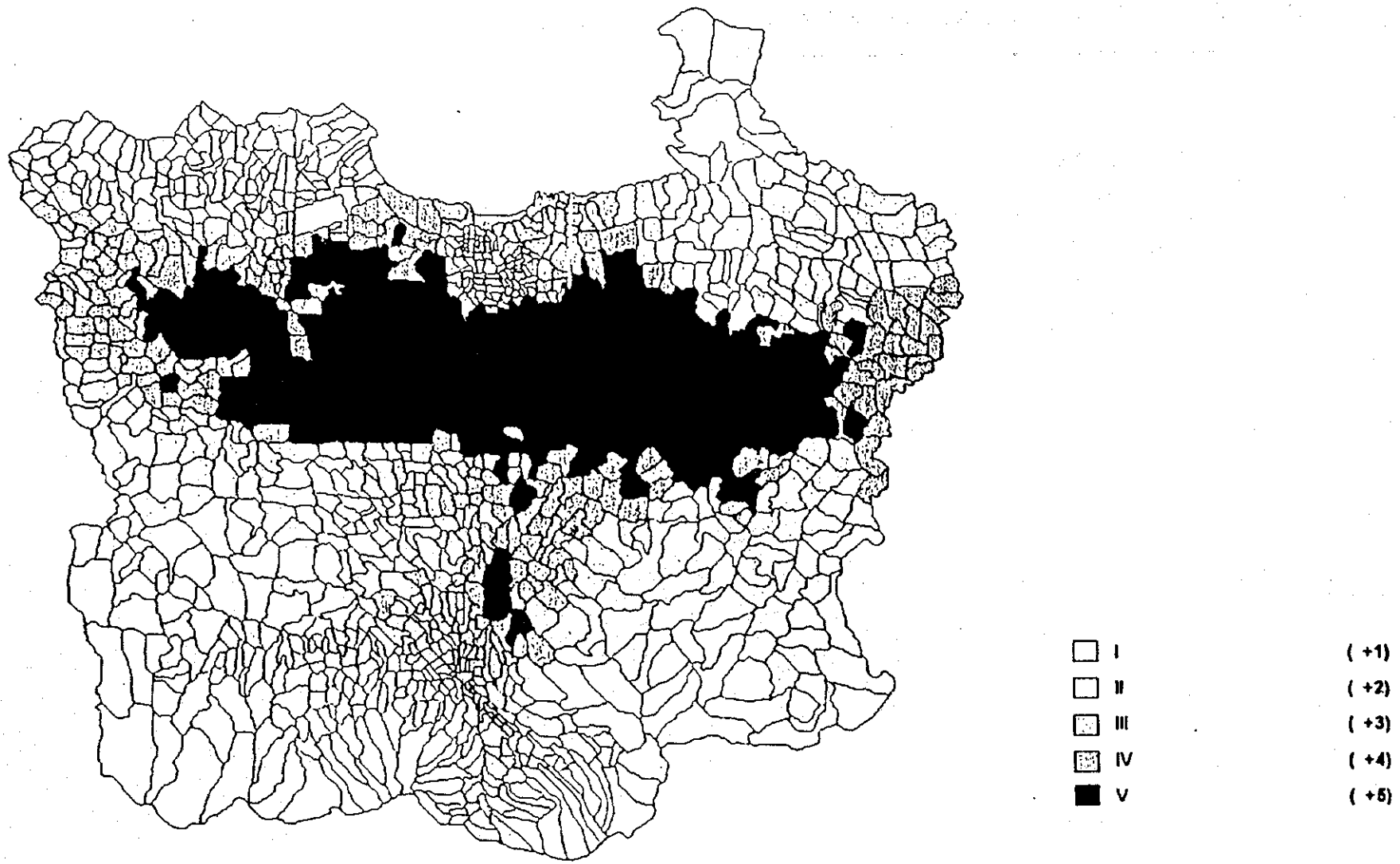
Fig. 4.1.3 GROWTH POTENTIAL INDEX 1990-1995



FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT
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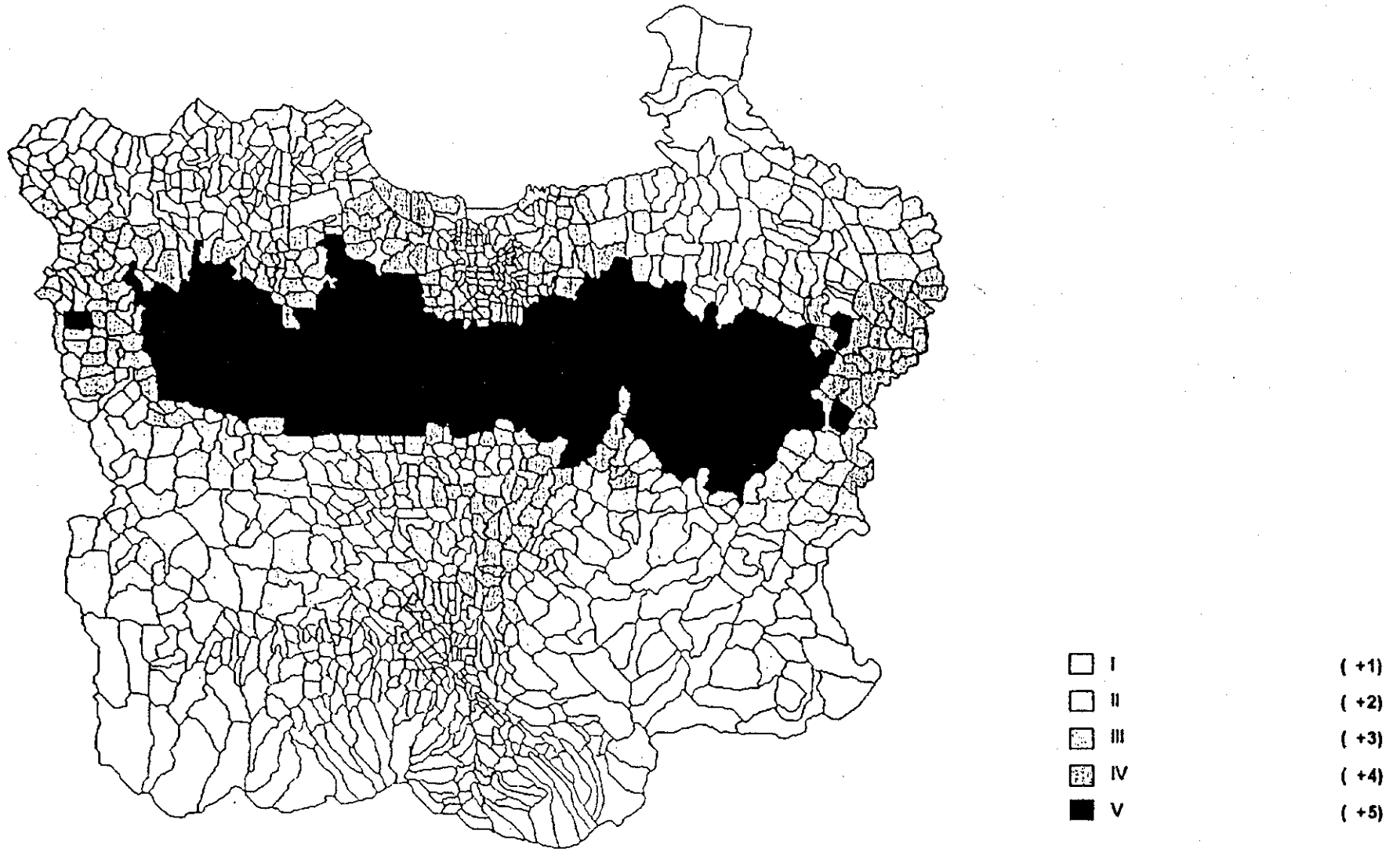
Fig. 4.1.4 GROWTH POTENTIAL INDEX 1995 - 2000



FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT
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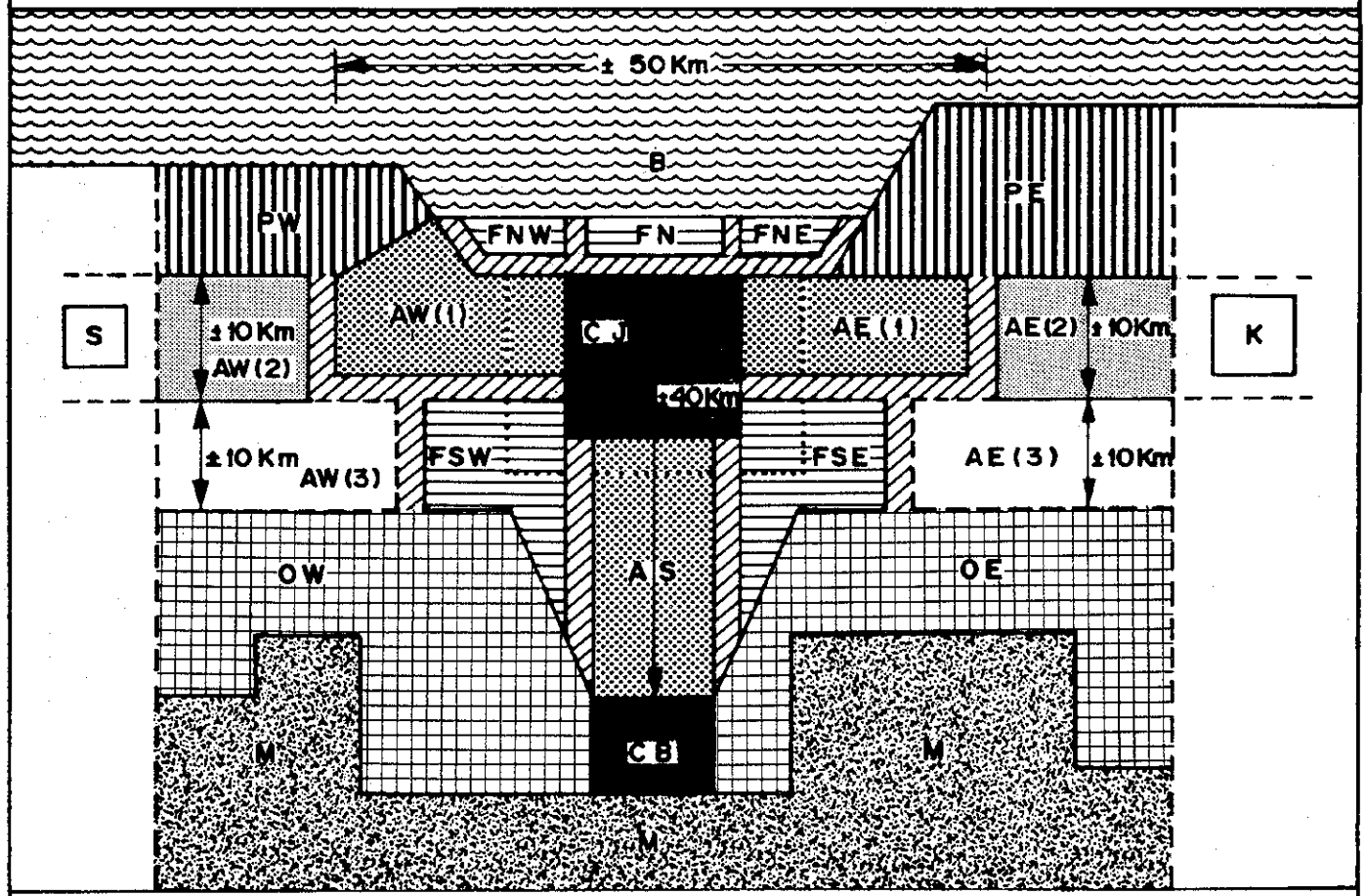
Fig.4.1.5 GROWTH POTENTIAL INDEX 2000-2010

4.1.4 Urban Development Strategy

The basic development scheme is generally in respect to the trend of current changes in the urban structure of Jabotabek, e.g. rapid shifting of population from the central region of DKI Jakarta to the peripheral areas in the south, west and east and outside areas of DKI Jakarta. The analysis, as shown in Fig. 4.1.6 defined urban area components in Jabotabek as follows :

Urban Area Components	Designation
Urban Core Area	Most of DKI Jakarta (CJ) as well as Kotamadya Bogor (CB)
Axis Area	Radiating outwards to the east (AE), to the west (AW) and to the south (AS) where regional arterial roads, freeways and railways support the urban expansion
Urban Fringe Area	Containing urban sprawl with various densities, and mainly residential development relying much upon the existing collector or local roads. This category area is expanding according to four quadrants : urban fringe north-east (FNE), south-east (FSE), south-west (FSW) and north-west (FNW). A unique component of the urban fringe area lies along the coast and includes land reclamation opportunities, urban fringe north (FN). This area is of special interest to the proposed sub-project of the Northern Jakarta Development Project (1st stage 70% funded via JUDP III).

Rural Area Components	Designation
Coastal Plain	Outside the urban fringe areas, coastal plains, mostly technical irrigation areas, lie to the north of the east axis (PE), and to the north of the west axis (PW).
Open Areas	Scarcely developed open areas lie to the south of the east and west axis, designated as open east (OE) and open west (OW).
Java Sea	Jakarta Bay and Thousand Islands area (B) is located to the north of coastal line
Mountain Zone	Mainly restricted zone (M)



Legend :

CJ	Centre	- Jakarta
CB	Centre	- Bogor
AE	Axis	- East
AW	Axis	- West
AS	Axis	- South
FNE	Urban Fringe	- North East
FSE	Urban Fringe	- South East
FSW	Urban Fringe	- South West
FNW	Urban Fringe	- North West
FN	Urban Fringe	- North
PE	Coastal Plain	- East
PW	Coastal Plain	- West
OE	"Open" Area	- East
OW	"Open" Area	- West
B	Jakarta Bay	
M	Puncak Mountains	
K	Karawang Development Zone	
S	Serang Development Zone	
(1)	First Phase	
(2)	Second Phase	
(3)	Third Phase	

Green wedge

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

Fig.4.1.6 BASIC URBAN DEVELOPMENT SCHEME IN JABOTABEK

Outside Jabotabek	Designation
Development Zone	Outside the Jabotabek area, relatively independent development zones are evolving to the east, Karawang/Cikampek (K); and to the west, Serang (S).

The east and west axis and urban fringe areas are basically formed in the early stage by the intensification of present land use, and the resulting urban concentration will extend about 50 km from east to west, 40 km from north to south. This is potentially able to absorb additional 9 million population, which correspond to the estimated 2005 population (26.6 million) in Jabotabek.

As a long-term planning horizon, the JMDPR reserves further extension of the initial east-west axis towards the Jabotabek boundary. The initial east-west axis development is assumed to be some 10 km in width.
However, this urban extension is considered possible only if a heavy rail commuter system, supplemented by a freeder system, is developed to bring passengers within a tolerable commuting time. A light rail system can not effectively serve for such a long distance commuting with frequent stops.

Subsequent to the basic development strategy, which could accommodate 80 to 90% of total capacity required for 2010, the JMDPR compared alternative strategic growth models for the long-term perspective. It was intended through this comparative analysis to justify the basic development strategy, and eventually recommended the "East-West linear city" concept (see Fig. 4.1.6). Other alternative models compared were "Self-sustaining new towns" and "Self-sustaining finger city".

The East-West linear city model for the long-term perspective is quite compatible with the basic development scheme discussed previously. This model concept enables to absorb unlimited population by extending its principal structural elements. Therefore, planning issues to attain the model concept are to complete the following principal elements :

i) urban centers, including New Towns and expansion of existing centers;

ii) transportation system, including tollways, arterial roads, suburban rail and mass rapid options; and

iii) green space/wedges, reserves and low density semi-open space areas.

The linear city concept will be spined with a ladder type road structure (based on parallel arterial routes interspersed with cross-links) and there would be less traffic pressure on the urban core area, and potentially dispersing congestion among a larger number of modes. Thus, the ladder road structure will enhance potentials to foster urban centers/sub-centers at those node locations.

The land use in the linear city concept should not be a homogeneous belt of urban development but a balanced variable mixed use. A large scale, single use developments contradict sustainability criteria, through increased functional commuting and heavy point loads on the environment. It is imperative for the urban formation to establish a hierarchy of urban centers, and the JMDPR categorized the future urban function by population size as shown in Fig. 4.1.7.

The introduction of green space into the urban structure represents a major challenge to the linear city concept. Urbanization pressures will, soon or later, penetrate into the remaining rural agricultural land which will become more essential to "quality of life" to secure urban amenity with substantial green space. The approach, suggested in the JMDPR, is to promote the open space with a function that provide a comparable economic return to "developed land" such as recreational and sports complex development.

4.1.5 Transportation Development Strategy

As a policy to serve the movements of the people and to support the economic activities functional transportation services have to adapt to the need of traffic quality and quantity. Transport is subdivided into short, medium and long distance; public and private; rapid and slow; etc. Goods transport consists of conventional trucks and containers.

To meet such a policy, apart from an overall strategy, five area strategies have been developed in the JMDPR (Third Planning Report) that address the specific needs of locations, being : Central Core = mostly DKI Jakarta, Urban fringe, Urban axis, Bogor and rural areas (see Figure 4.1.8).

Basic Strategy

1. Transportation development is meant to support the urban development strategy. In this case priority for development is directed to the East and West axis, with improvements to the primary road networks, combined with the stimulation of the Mass Rapid Transit system and Light Rail activities within the urban core.

2. Widening and improvement of the economic arteries (national and provincial) to speed up industrial activities and other production of economic goods.

3. Additional toll roads have to be provided to enhance the role of Jabotabek for its hinterland especially in relation with the activities in the East-West axis sub centers. Access to the South will be consolidated in line with the reduced growth of the Southern sub centers.

4. Assessment of the future need of transportation infrastructure is urgently needed. First the long term needs, that would enable to identify problems

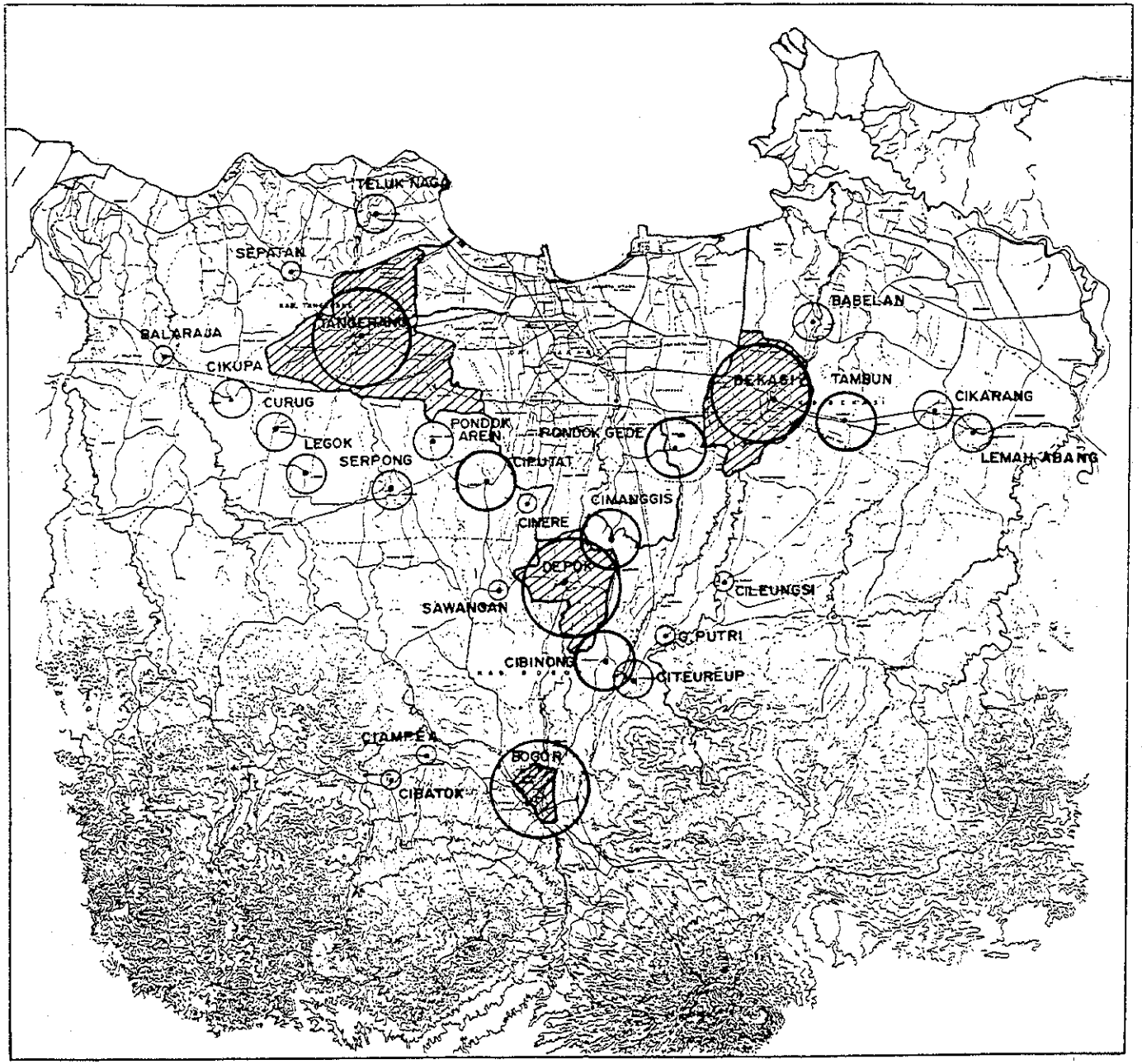


Fig. 4.1.7
FUNCTIONAL URBAN AREAS IN BOTABEK BY POPULATION SIZE, 2010

Legend

Population Size

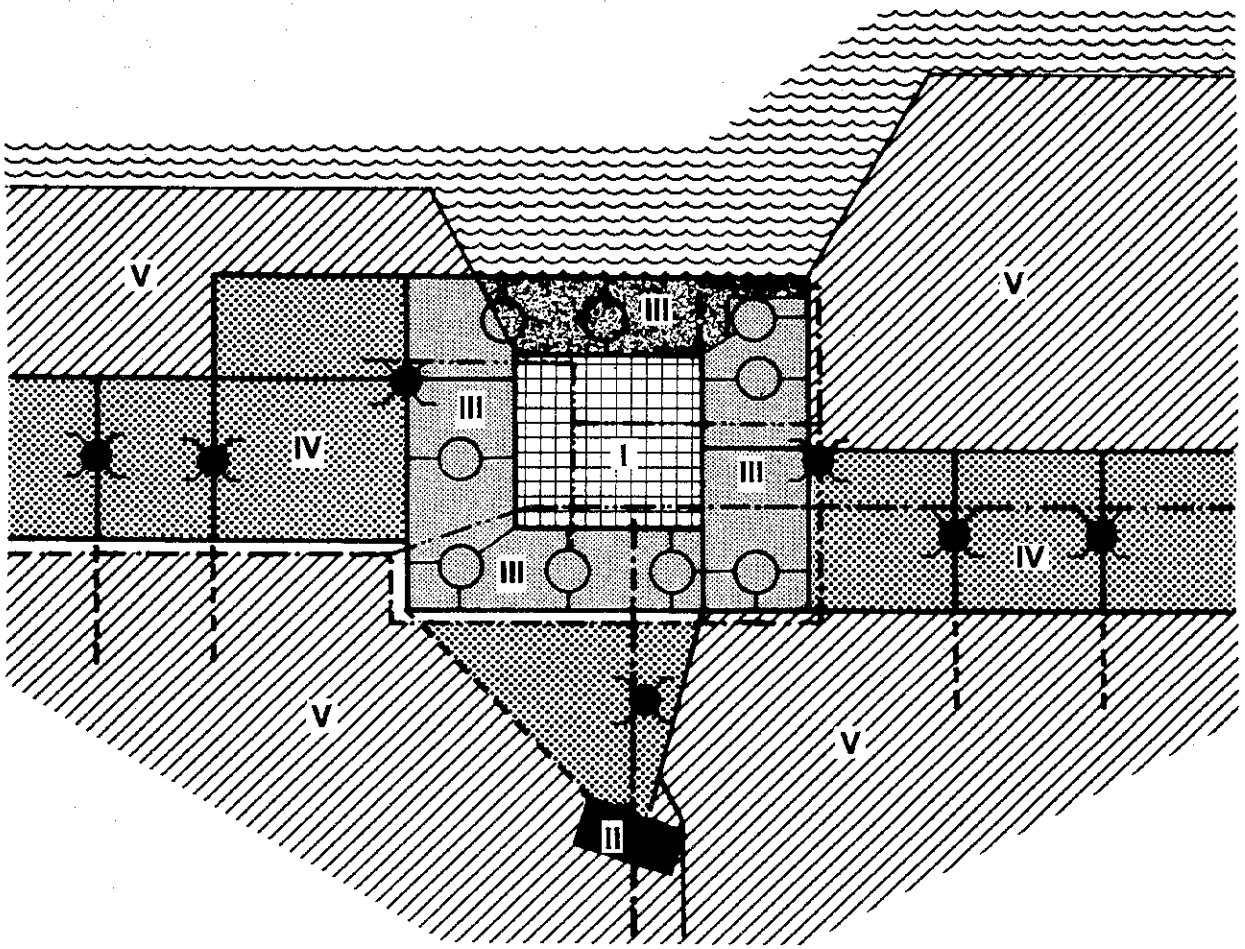
1,000,000 and over

500,000 – 1,000,000

250,000 – 500,000

100,000 – 250,000

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



Legend :

- Heavy Rail
- Light Rail/MRT
- Toll/Arterial Road
- Collector/Secondary Road
- Feeder Road
- Sub (growth) Center
- Urban Fringe Center
- Central Core/DKI
- Central Core / Bogor
- Urban Fringe
- Urban Axis
- Rural Area
- Jakarta Bay
- Waterfront City (reclaimed)

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

Fig. 4.1.8
TRANSPORTATION SYSTEM CONCEPT, JABOTABEK 2010

that need to be addressed on the short term. This will allow the demand to develop alongside developments.

5. The Rapid Mass Transit system has to be developed simultaneous with the development of the bus and rail systems as the three systems are inter-linked and inter-related. It is proposed that these services maintain a 50-60% share of the total passenger transport.

6. The position of rail transport both urban and sub regional needs to be strengthened. The target being that its share will increase from less than 10% (1990) till 30% in 2010. The transport of goods per rail has to be made more efficient to reduce the transportation of goods over the road network.

7. It is urgent to connect the Jabotabek growth and economic centers to the Light Rail and/or to the Mass Rapid Transport networks.

8. Divert transport of goods from busy roads and neighbourhood roads.

9. Construct and develop transit facilities as stations and terminals for passengers and goods to allow for easy shift from local to regional, national and even international travel and transport. Hereto improve the capacity of the harbor Tanjung Priok and the Airport Soekarno-Hatta.

10. Improve role and function of the transport monitoring and coordination body, responsible for the development of Jabotabek's transportation systems. This by improving the directions and the management system Jabotabek's transportation system will be integrated, planned and developed.

Central Core Strategy

1. The growth of private transportation means (cars) in Jabotabek will result increasingly in congestion in the central core as the road network is unable to accommodate all the trips and related traffic flows to the center of the megalopolis. The car ownership is expected to grow with 4.6% per year while the road development capacity is expected to grow with only 2.8%

   It therefore will be necessary to restrict the use of private cars in the central core. Hereto the zone within the inner ring road has to be restricted for private cars, while the adjacent urban quarters have to support systems to push inter regional and inter provincial trips outside the inner core zone (ie. to the middle and outer ring roads).

   Public transport has to be optimalized to provide an adequate alternative for private cars, while the adjacent urban quarters have to support systems to push inter regional and inter provincial trips outside the inner core zone (ie. to the middle and outer ring roads).

Public transport has to be optimalized to provide an adequate alternative for private transport to meet the need for inner core movements. Free lanes and preferential treatment at red lights crossings may result in a greater attraction of the public services. Car parking places have to be provided in or near the core at heavy tariffs, while cheap parking should be provided near nodes in the bus, rail and MRT networks in the axis and fringe.

2. The increase in car ownership is expected to result in some 20 million trips per day, of which 2.0 million will be commuting. When deciding on the distribution of roads the strategy will be to cater for the medium and long trips from the hinterland first. However in such a way that they cannot reach the central core directly but have to use the outer and middle ring road as a distributor road.

   In the long term will the outer ring road serve the residential areas in the fringe and the growth of economic activities in Botabek, while it also will become the artery of goods transport between the harbor, airport and industrial estates.

3. The present operational public transport system is not efficient. It is therefore necessary to develop the public transport services qualitative, quantitative and in service frequency, while it is also necessary to improve the discipline of the staff and the information on the service to the users.

4. Through introduction of Mass Rapid Transit lines the conventional transportation system has to gradually give way for the new system based upon interaction and supporting connections of bus and rail.

5. To develop the public bus transport a system of free lanes has to be created on the arterial and distributor roads. This is linked to feeder systems, serving the adjacent residential areas. Additionally have the bus routes to be changed to avoid round trips as these are less efficient when regular congestion ties up the buses.

6. With the increasing number of commuters arterial and collector roads have to be constructed and/or widened in the East-West Axis to connect the fringe areas with the activity centers in the central core. This however should not be directly, as the middle ring road will act as a distributor road and the inner ring road as a terminal for change to public transport.

7. Commuters preferably use rail services to go to their working places. When taking buses minimal two services are required, meaning transfer from inter regional routes at terminals to area services. Within the outer ring road the railway services should be based on Light Rail principles as the heavy rail transport of goods will be diverted from Serpong via Cibinong upto Tanjung Priok.

8. The handling intensity of goods, especially import and export goods has to be improved and integrated with the cargo terminal, warehouse and harbour system. Hereto the Tanjung Priok harbour has to be enlarged and the Cengkareng airport to be fully operational.

   The use of rail transport for the goods is advocated, as it can serve the ports directly requiring only one handling.

9. Tightening monitoring and active implementation of regulations with regards to the tuning of car motors should reduce exhaust fumes and improve the fumes content.

Urban Axis Strategy

1. Improvement and development of the accessibility between residential centers and commercial, industrial and social activities in the urban area.

2. Improvement of the hierarchical system of roads connecting the urban centers, and preparation of improved management of the dense traffic especially adjacent to the core centers.

3. Improvement and development of feeder roads so as to reduce the intensities on the arterial roads which are provided mainly for through traffic.

4. Improvement and development of access to rural desas as a way to ease mobility of goods and persons.

5. Preparation and improvement of road hierarchy, for those roads connecting to the toll and regional roads.

6. Encouragement of the growth of new centers through increased intensities and further development of the public transport and by providing connecting roads.

7. Promotion of the industrial growth with improvement of industrial access roads and improvement of cargo terminals and dry ports.

8. Expansion and development of passenger terminal facilities in the regional development centers.

Bogor Strategy

1. Development of inter connected road and railway terminal to absorb in-flow of goods and passengers from hinterland, and to allow transfer to intra urban agglomeration communication means.

2. Plan and organise the inner Bogor traffic management with a well inter-connected bus system, supported with free lanes on major arteries.

3. Deviation of goods transport to the Bogor outer ring road and toll road.

Urban Fringe Strategy

1. Improvement and development of hierarchical structure of the feeder roads related with the regional growth.

2. Expansion and development of primary arterial and collector roads that connect with Jakarta's outer and middle ring roads but restrict direct connection to the inner core.

3. Management of long distance and heavy transport that need direct access to the urban centers, channeled via the outer ring road system.

Rural Area Strategy

1. Improvement of desa roads as key links between the agricultural production and the rural market centers, and development of a hierarchical rural road network that allows for easy transport of goods and passengers from these centers to the medium and long distance regional transportation network.

2. Extension of passenger transport networks in the rural area to increase the social and economic mobility of the rural residents.

4.2 DKI Jakarta Structure Plan and District Plan (RBWK)

4.2.1 DKI Jakarta Structure Plan 2005

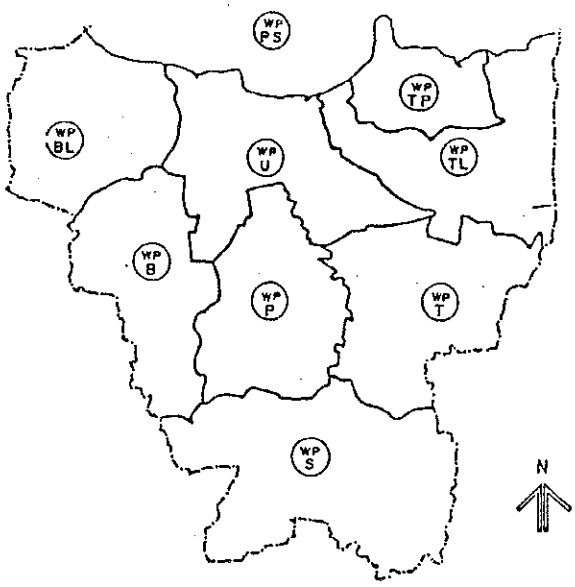
DKI Jakarta Structure plan 2005 was issued in 1984 and revised in 1990 to materialise national and especially Jabotabek development policies at the urban level of DKI Jakarta (Figures 4.2.1 and 4.2.2).

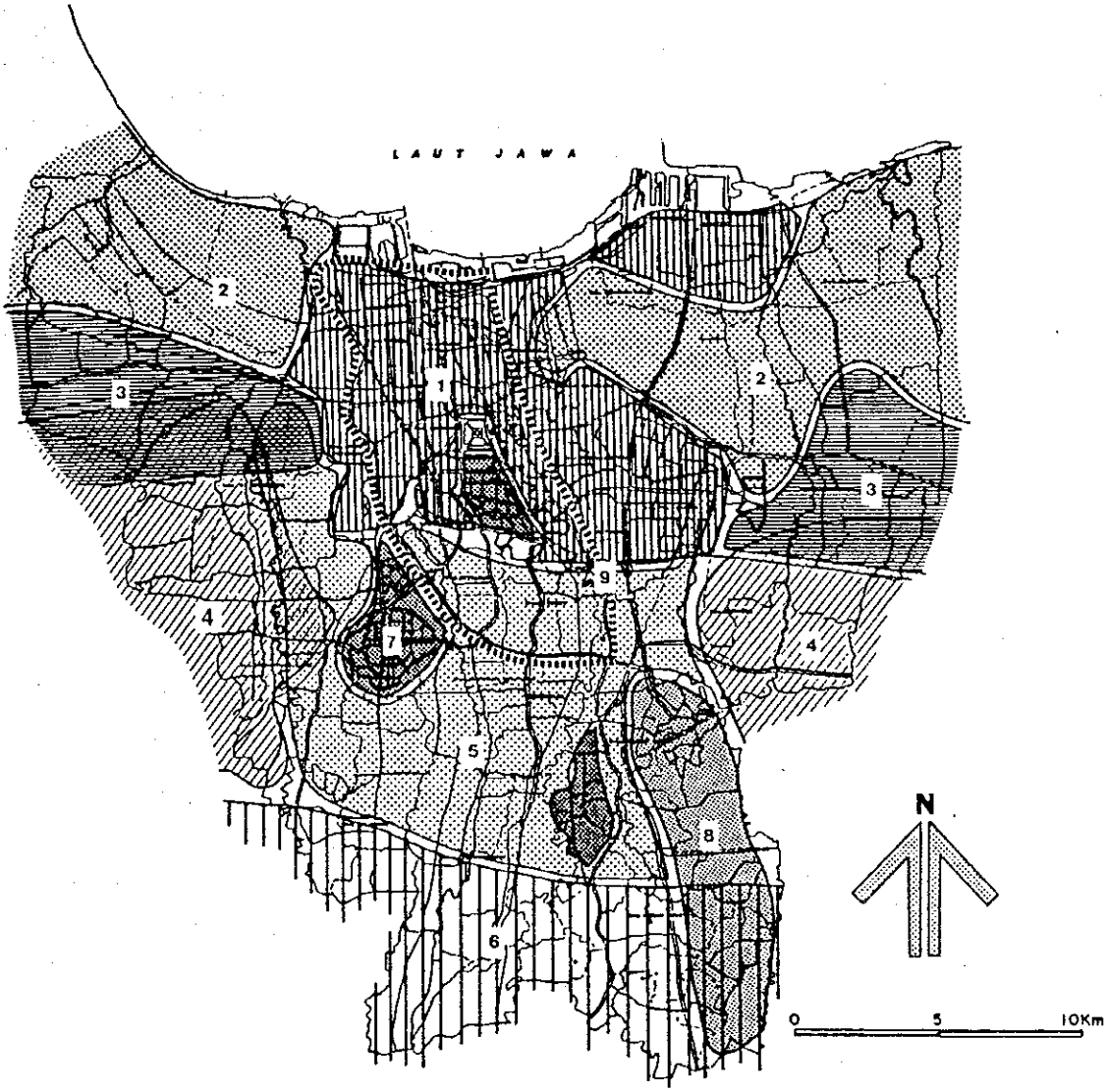
Based on the former DKI Jakarta Master Plan 1965-1985 whose planning was orientated towards rather static landuse aspects, this new structure plan tries to cope with more dynamic changes and activities towards the year 2005.

(1) Development Regions

Based on analyses of the natural and socio-economic conditions and taking into consideration the existing administrative boundaries of Kecamatan and Kelurahan, DKI Jakarta is divided into the following 9 Development Regions (WP):

- Northwest Development Region (WP-BL),
- North Development Region (WP-U),
- Tanjung Priok Development Region (WP-TP),
- Northeast Development Region (WP-TL),
- West Development Region (WP-B),
- Central Development Region (WP-P),
- East Development Region (WP-T),
- South Development Region (WP-S), and
- Thousand Islands Development Region (WP-PS).





LEGEND :

1 Limitation of growth in the short term
2 Postponement of development until completion of the infrastructure
3 Proposed industrial development area
4 Priority for new settlement development
5 Main infill area until the density is 300/400 persons/ha
6 Strictly controlled area for development with low density
7 Limited new development
8 Special zone for the Government
9 Limited traffic zone (▪▪▪▪▪▪▪▪▪▪▪▪▪)

FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA	**Fig. 4.2.1 BASIC DIRECTION FOR DEVELOPMENT**

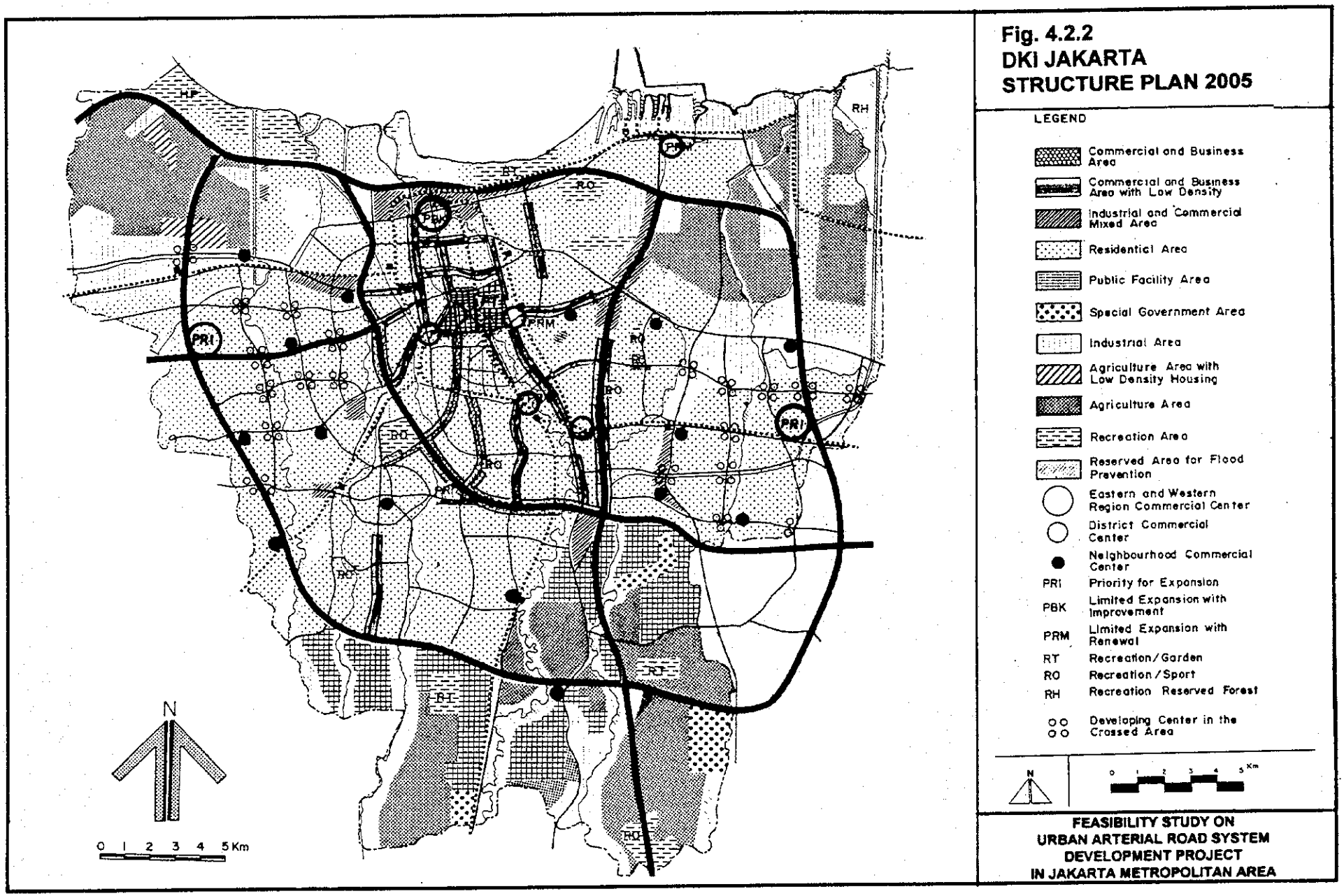


Fig. 4.2.2
DKI JAKARTA
STRUCTURE PLAN 2005
LEGEND
Commercial and Business Area
Commercial and Business Area with Low Density
Industrial and Commercial Mixed Area
Residential Area
Public Facility Area
Special Government Area
Industrial Area
Agriculture Area with Low Density Housing
Agriculture Area
Recreation Area
Reserved Area for Flood Prevention
Eastern and Western Region Commercial Center
District Commercial Center
Neighbourhood Commercial Center
PRI Priority for Expansion
PBK Limited Expansion with Improvement
PRM Limited Expansion with Renewal
RT Recreation/Garden
RO Recreation/Sport
RH Recreation Reserved Forest
Developing Center in the Crossed Area
N
0 1 2 3 4 5 Km
FEASIBILITY STUDY ON
URBAN ARTERIAL ROAD SYSTEM
DEVELOPMENT PROJECT
IN JAKARTA METROPOLITAN AREA

(2) Population Distribution

The planned total population in Jakarta according to Jabotabek Development Plan 2005, 12 million, is distributed into these Development Regions whereby the emphasis is laid on the growth in east-west direction (Table 4.2.1, Figure 4.2.3).

Table 4.2.1 Forecast Population Growth by Development Region

Development Region	Area (ha)	Population		Density (Persons per ha)		Annual Growth Rate (%)
		1980	2005	1980	2005	1980/2005
North West	8,073.4	250,504	689,000	31	85	4.1
North	8,465.8	2,020,419	2,411,000	239	285	0.7
Tanjung Priok	3,337.4	542,442	897,000	163	269	2.0
North East	7,709.6	186,763	644,000	24	84	5.2
Central	7,736.0	1,393,185	2,128,000	180	275	1.7
West	7545.2	485,393	1,937,000	64	257	5.7
East	8,630.8	1,060,082	2,187,000	123	253	2.9
South	12,948.0	529,727	1,075,000	41	83	2.8
DKI Jakarta Total	64,446.2	6,468,515	11,988,000	100	186	2.5

Source : DKI Jakarta Structure Plan 2005.

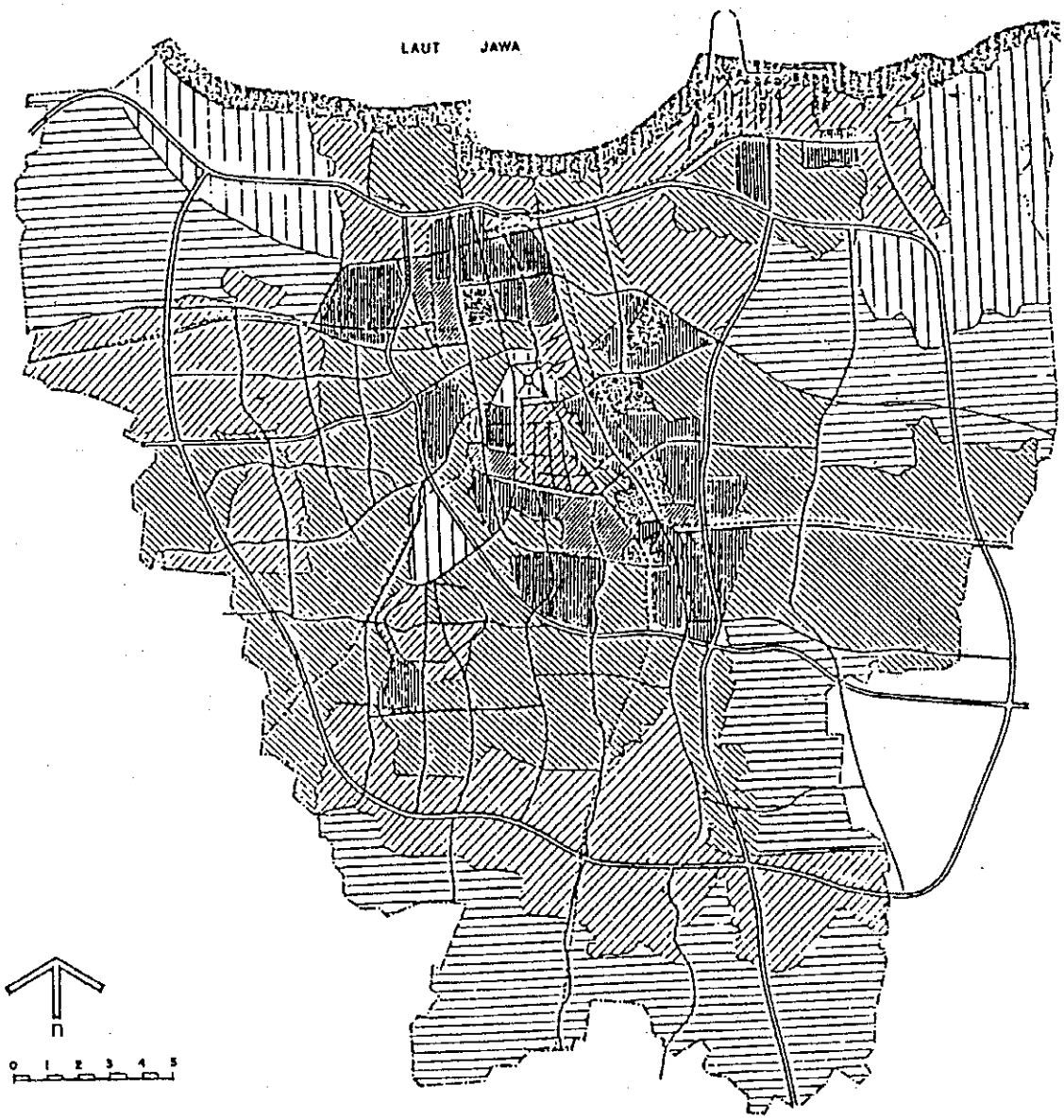
(3) Housing

According to the future population frame of 12 million in the year 2005, the demand for new housing development is estimated to be about 1.6 million units during the period from 1980 to 2005, that is about 64,500 units per year.

This estimate was made on the assumption that 1) the average number of persons per household drops from 5.27 in the year 1980 Census to 4.23 in the year of 2005 due to successful implementation of family planning and 2) each household needs one housing unit.

About three-quarters of this demand is planned to be filled by the development of new housing by Guided Land Development (PPT), Perumnas (National Urban and Housing Development Corporation) and private developers.

The Guided Land Development (GLD) is planned to be implemented in W.P. East and W.P. West as an effort to make land and housing available for low and middle income groups with about 2,000 ha of land for about 139,000 households.



FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA	**Fig. 4.2.3 PROJECTED POPULATION DENSITY IN JAKARTA 2005**

(4) Industry

The main policies of industrial development are summarized as follows :

- Industries with low pollution level, with advanced technology in the production process and with low demand for water and land are to be developed inside DKI Jakarta

- The development of large and medium industries is especially directed towards WP Northwest and WP Northeast.

- Small industries related directly to residents could be located in residential regions within small industrial villages or within activity centres.

- Small industries with activities related to the production process of large and medium industries should be located nearby.

- Industrial locations must be selected to provide ease of communications and availability of infrastructure or locations where this can be easily arranged.

(5) Commerce and Business

The form of commercial and business activities in Jakarta are categorised as follows:

- Primary Centre,
  - Secondary Centre,
  - Tertiary and Local Centre, and
  - Ribbon

Primary Centre

It is expected that the primary centre will take a main role in providing city wide commercial and trading services. Along with the development of West and East Jakarta, new primary centres are to be developed and they are expected to decentralise the activity centres.

There would then be 6 existing and 2 new primary centres in the year 2005.

- Existing Primary Centre;
  Glodok (Kota), Tanjung Priok, Senen, Tanah Abang, Jatinegara, Manggarai.

- New Primary Centres;
  West (Kebon Jeruk), East (Cakung).

Secondary Centre

The secondary centres provide local service with approximately the scope of Kecamatan in Jakarta performing the following activities;

- The formal (officially employed) and informal (casually employed) sectors will be arranged in balance,

- The large formal sectors will be expected to play a sufficient role in these centres, and

- Even small formal sectors should also be able to play a sufficient role.

Tertiary and Local Centre

The services provided by both centres are generally special local services. The tertiary centres serve the inhabitants of Kelurahan, while the local centres serve the neighbourhood.

Ribbon

Development of the location of employment in this form should consider the possibility of the growth of the informal sector.

(6) Transportation

Parallel with the general objectives and targets of transportation development in Jakarta the promotion of public mass transportation is especially emphasised as follows:

- The limitation of motorised private trips in the central area;

- The development of bus transportation networks as the main public transportation mode and the provision of transfer facility with railway, bus terminal, exclusive bus lane, etc; and

- The provision of accessibility to both East and West Primary Centres by public mass transportation system.

For physical distribution the provision of truck terminals is planned near Cengkareng Airport, Tanjung Priok Harbour, Industrial Estate in Pulo Gadung, Warehouses in Pluit and East and West primary centres.

4.2.2 District Plan (RBWK)

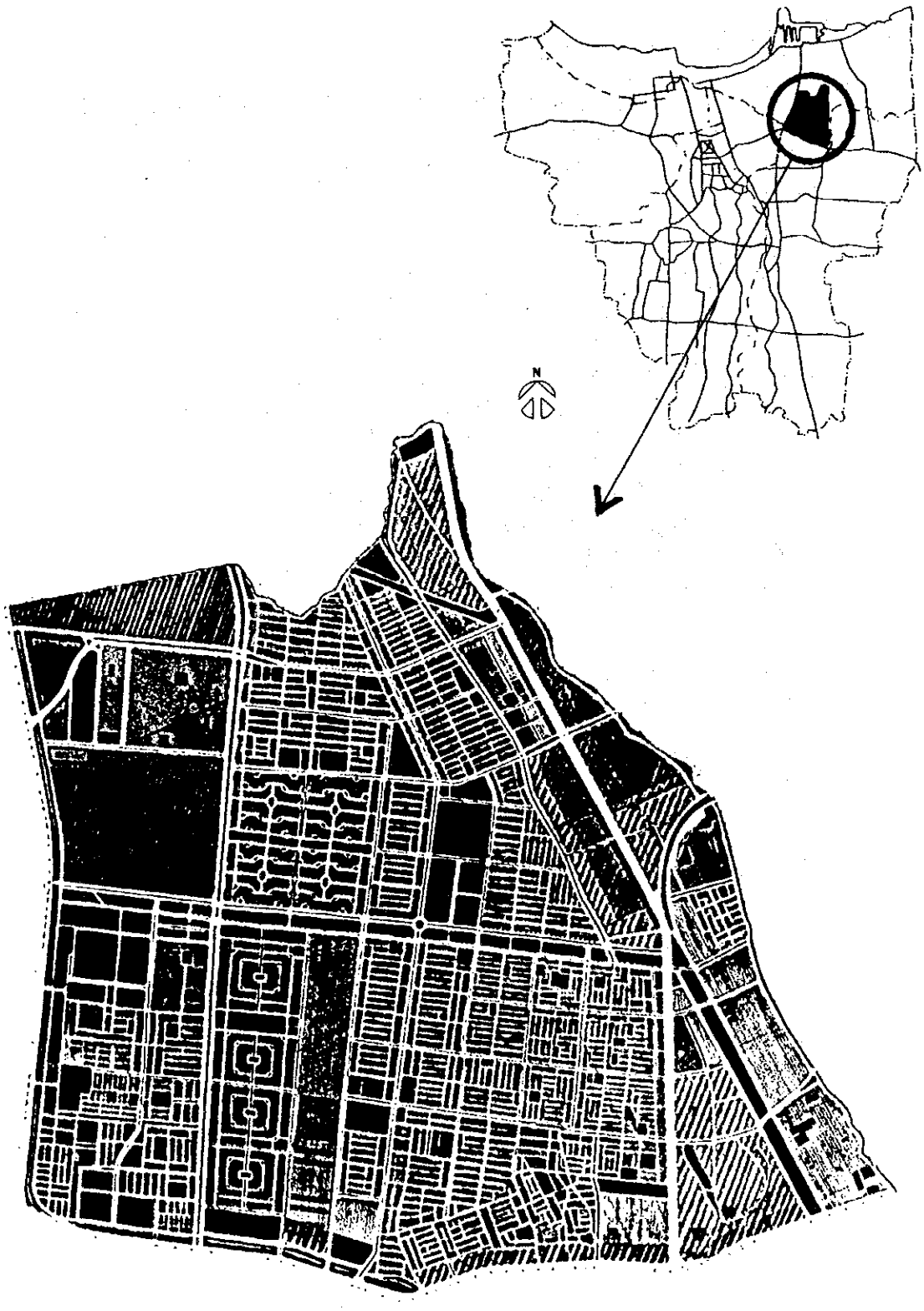
Based on the Structure Plan 2005, DKI Jakarta prepared a district plan of every Kecamatan as the unit planning area in 1987.
This plan is drawn on a map of scale at 1 to 5,000 with the following land use categories :

- Housing
- Public Facilities (Hospital, School, Religious Facility, etc.)
- Government Facilities
- Service/Commerce/Office
- Industry/Warehouse
- Mixed Use of Housing and Public Building (Hotel, Stadium, etc.)
- Mixed Use of Housing and Small-scale Industry
- Mixed Use of Industry and Public Building
- Low Density (Building Coverage Ratio) Public Building
- Low Density (Building Coverage Ratio) Industry/Commerce
- Low Density Housing
- Green and Open Space
- Road
- Railway
- Electric Power Line
- River/Canal/Waterways

The district plan, shown in Fig. 4.2.4 as an example, governs "Detailed Plan (RTK)" which is drawn at a scale of 1 to 1,000. The Detailed Plan is prepared by the authority of Municipal Government (Pemerintah Wilayah) with such planning parameters as population density, building coverage ratio, floor area ratio, right of way for planned road construction/improvement, and so on.

The planned road network in the structure plan 2005 is superimposed upon the detailed plan where the route location and the ultimate right of way requirement are elaborated on a 1 to 1,000 scale-map. This map is utilized to estimate the project implementation cost and budgetary programe.

After the Detailed Plan, the "Cell Plan (RUK)" is prepared at a scale of 1 to 500 for the project execution.



FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA	**Fig. 4.2.4** **DISTRICT PLAN (RBWK)** **- Example:Kecamatan Kelapa Gading (North JKT) -**

4.3 Major Development Plans in Jabotabek

4.3.1 West Java Provincial Structure Plan

Currently, Ministry of Public Works and Ministry of Home Affairs jointly finalized provincial structure plans (RSTRP) for all the 27 provinces in Indonesia. The West Java Provincial Structure Plan is one of those plans which will guide further elaborated planning stage to strategic areas, urban/rural areas and development sectors.

Botabek is defined in the West Java Provincial Structure Plan as the regional development unit, and thus the JMDPR recognizes its importance from not only geographical but also regional planning context.

In the provincial plan, a strategic area with selected priority industrial sector(s) and city ordering system within the province are designated. It is generally considered that the strategic development area is the regional consumption/trading center. The strategic development areas and the city hierarchy in West Java Province are designated as follows :

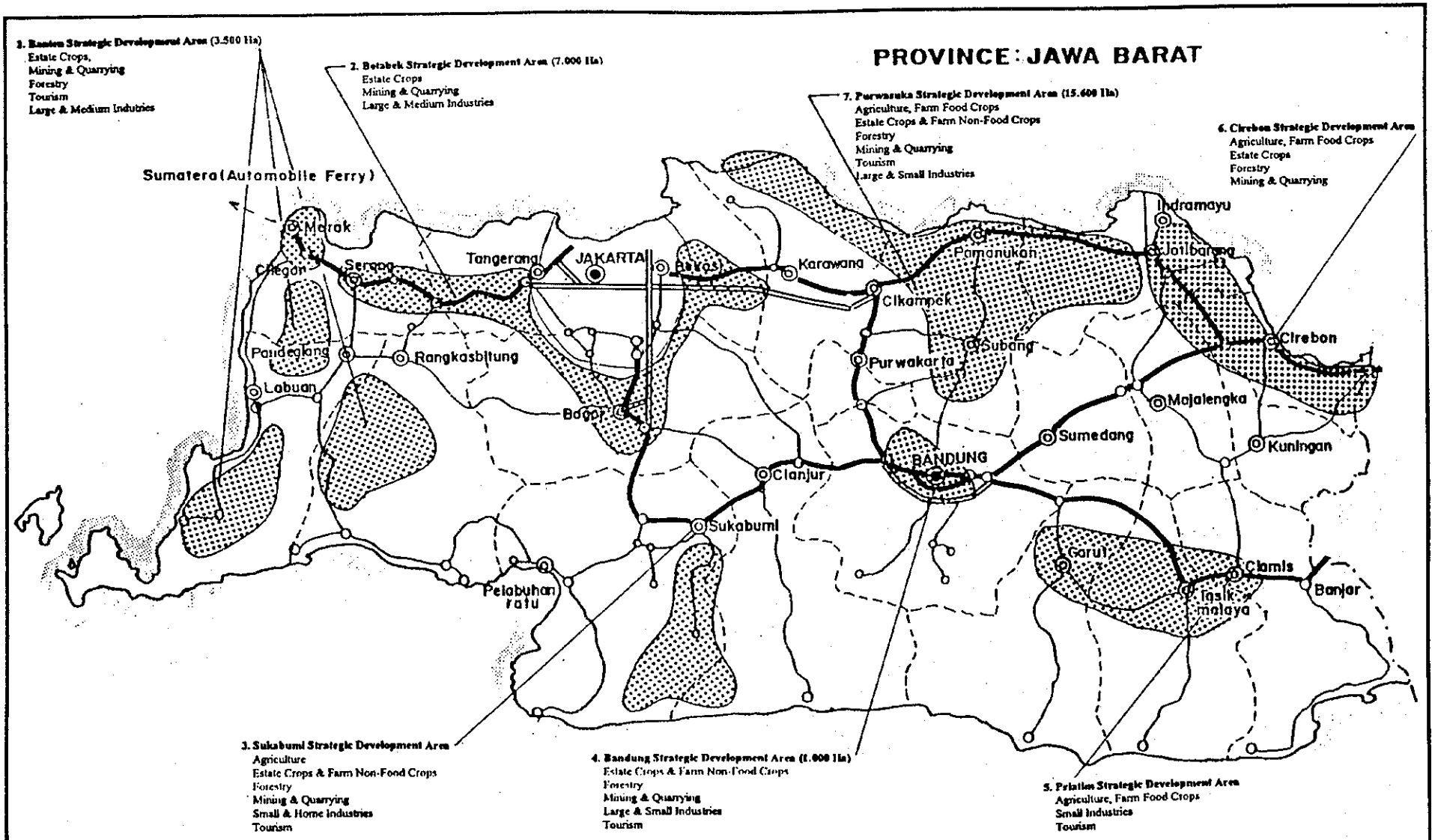
(1) Strategic Development Area (See Fig. 4.3.1)

West Java Strategic Development are :

1. Banten Strategic Area
   Banten has an industrial area of about 3500 Ha located in Cilegon industrial zone.
   Potential :- plantation (rubber plantation and large estates)
   - forestry
   - mining and quarrying
   - industry (large and medium scale manufacturing)
   - tourism

2. Botabek Strategic Area
   Industrial areas in Botabek are located in Bogor (500 Ha), Tangerang (3500 Ha) and Bekasi (3000 Ha)
   Potential :- plantation (large estates)
   - mining and quarrying
   - industry (large and medium scale manufacturing)

3. Sukabumi Strategic Area
   Potential :- agriculture (food crops)
   - plantation
   - forestry
   - mining and quarrying
   - small scale manufacturing and home industry
   - tourism



Source : Laporan Konsolidasi dan Rencana Struktur Tata Ruang Propinsi Jawa Barat 1992

FEASIBILITY STUDY ON URBAN ARTERIAL ROAD SYSTEM DEVELOPMENT PROJECT IN JAKARTA METROPOLITAN AREA	Fig.4.3.1 STRATEGIC DEVELOPMENT AREAS IN WEST JAVA

4. Bandung Raya Strategic Area
   Industrial areas in this region are located in Bandung (600 Ha), Sumedang (400 Ha)
   Potential :- plantation (large estates and public estates)
   - forestry
   - mining and Quarrying
   - tourism

5. Priangan Strategic Area
   Potential :- agriculture (food crops)
   - small scale manufacturing and home industry
   - tourism

6. Cirebon Strategic Area
   Potential :- agriculture (food crops)
   - public estates
   - forestry
   - mining and quarrying

7. Purwasuka Strategic Area
   Potential :- agriculture (food crops)
   - large estates and public estates
   - forestry
   - mining and quarrying
   - tourism
   - large and small scale manufacturing

(2) Future City Hierarchy (See Table 4.3.1)

The city hierarchy within Regional Development Unit ("Satuan Wilayah Pengembangan", SWP) is summarized below :

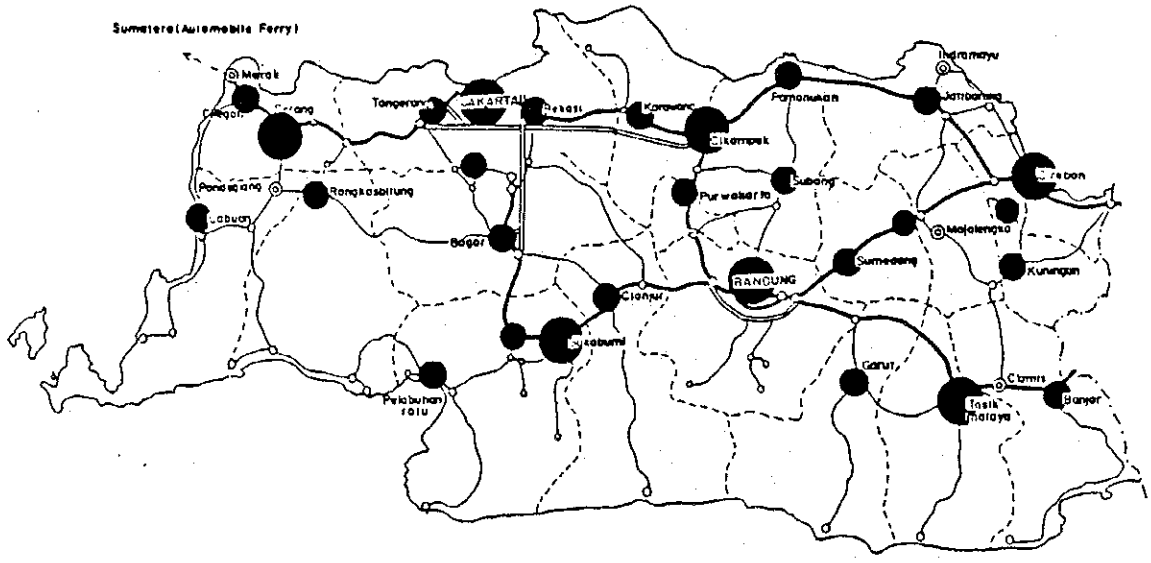
1. SWP Banten
   The main centers of city system are Cilegon and Serang. Serang has a function as government administration center, while Cilegon is the center of trading, services and industry. Cities to support those main cities are Labuhan, Rangkasbitung and Malimping.

2. SWP Botabek
   The function of cities in this region is to support the development of Jakarta metropolitan city, although Jakarta itself is not included in this development area. Under this arrangement Bogor, Tangerang and Bekasi will function as supporting cities.

3. SWP Sukabumi
   The primary center is Kotamadya Sukabumi with Cibadak, Sagaranten and Pelabuhan Ratu as supporting cities.

Table 4.3.1 City Hierarchy in West Java in 2010

Order	City Name	
Order I	1. Jakarta	5. Cirebon
	2. Sukabumi	6. Tasikmalaya
	3. Cikampek	7. Serang
	4. Bandung	
Order II	1. Bogor	13. Garut
	2. Bekasi	14. Sumedang
	3. Tangerang	15. Cianjur
	4. Serpong	16. Sumber
	5. Cibadak	17. Jatibarang
	6. Sagaranten	18. Kadipaten
	7. Pelabuhan Ratu	19. Kuningan
	8. Karawang & Teluk Jambe	20. Banjar
	9. Subang	21. Cilegon
	10. Pamanukan	22. Cikande
	11. Purwakarta	23. Labuhan
	12. Sorcang	24. Rangkasbitung
Order III	1. Leuwiliang	13. Cicalengka
	2. Jonggol	14. Indramayu
	3. Rumpin	15. Jatiwangi
	4. Tigaraksa	16. Majalengka
	5. Cicurug	17. Kalijati
	6. Parung Kuda	18. Ciawi
	7. Jasinga	19. Ciamis
	8. Surade	20. Singaparna
	9. Rengasdengklok	21. Pangandaran
	10. Ciranjang	22. Malingping
	11. Cililin	23. Pandeglang
	12. Cikajang	24. Banjarsari
Order IV	1. Sukaraja	12. Karangampel
	2. Kiara Dua	13. Weru
	3. Sukanegara	14. Klanengan
	4. Sindang Barang	15. Aryawinangun
	5. Cilamaya	16. Cihaurgeulis
	6. Kalijati	17. Kawali
	7. Pagaden	18. Cijulang
	8. Pangalengan	19. Karangnunggal
	9. Ciwidey	20. Cibaliung
	10. Limbangan	21. Bayah
	Bungbulang	Leuwidamar
	Pamcungpeuk	Padarincang
	11. Rancaekek	



LEGEND : ● Order 1 ● Order 2 Other order 2 City : Sagaranten, Cikande