

11 and 12, 1981 to Indonesia - Japan joint steering committee. The direction for preparation of draft final report was agreed among both sides.

- 2) Discussions with and hearings from the authorities concerned (especially, Ministry of Transport and Communications, Directorate General of Land Transport, State Railways and DKI Jakarta).

(5) 5th step: Works in Japan

After submission of the Interim Report, the study team carried out examination and analysis from late November 1981 through February 1982.

- 1) Reexamination of design and computation for determination of railway facilities planning and investment scale by alternatives.
- 2) Economic analysis
- 3) Items to be considered for final selection of alternative.
- 4) Examination of measures to be taken prior to track elevation project
- 5) Preparation of the Draft Final Report

(6) 6th step: Submission and explanation of the Draft Final Report.

In February 18, 23 and 24 1982, the Draft Final Report was submitted and explained to the Indonesia - Japan joint steering committee and was agreed.

4. Basic policy of study

The Master Plan (prepared by JICA in March 1981) of "The Urban/Suburban Railway Transportation in JABOTABEK Area Project" aiming at the year 2,000 proposes execution of continuous grade separation project on the Central Line. When we take into account actual conditions of road and railway transports, trouble connection on east-west road traffic, etc. as well as future traffic system and highly efficient use of land in DKI Jakarta as a city of ten million inhabitants, the Central Line Track Elevation Project should contribute to harmonious development in JABOTABEK Area.

In other words, the project must be reasonable from aspects of investment scale, construction period and railway management.

With a view to improvement of existing railways and in coordination with railway traffic demand forecast, we studied highly efficient use of land after completion of track elevation project, necessity of new stations, conceptional idea of station plazas and electric and signaling/communication facilities for mass rapid transport. Establishing plan of the railway facilities, we carried out computation of investment scale, determination of construction period and economic analysis on each alternative elevated track construction method in order to conclude the feasibility of the project.

5. Organization

The Japanese Supervisory Committee and the study team as well as Indonesian Government Steering Committee and counterparts are as follows.

5.1 JICA Supervisory Committee

- 1) Y. Matsumoto : Chairman
Professor of Engineering Department in Tokyo University
- 2) Y. Fukuda : Member (Management and operation)
Director, Operation and Rolling Stock Division,
Railway Supervision Bureau,
Ministry of Transport
- 3) T. Kuroda : Member (Electrification)
Deputy Director, Civil Engineering and Electricals Division,
Railway Supervision Bureau,
Ministry of Transport
- 4) S. Onoyama : Member (Rolling Stock)
International cooperation officer,
Rolling Stock Industry Division,
Railway Supervision Bureau,
Ministry of Transport
- 5) A. Suzuki : Member (Civil engineering)
Specialist officer, International Division,
Secretariat to the Minister,
Ministry of Transport
- 6) T. Oguni : Member (Civil engineering)
Deputy Director, Planning Division,
Shinkansen Construction Department,
Japanese National Railways

5.2 Indonesian Government Steering Committee

Directorate General of Land Transport and Inland Waterways (PHBD)

- Ir. Giri S. Hadihardjono : Chairman of Steering Committee
Gatot Soedjantoko : Planning Division
Djauhari P. : ditto
Effendy : ditto
Moch Slamet : Traffic and Urban Transport
Arif Salim : Research and Development
Mawardi : ditto
T. Gultom : ditto
S. Subagio : ditto
Sjafei Souib : ditto

Ministry of Transport, Communication & Tourism

Ir. S. Abdulrachman : Director of Planning Bureau
M.O. Soelaiman : Planning Bureau
Maspattela : ditto
Ir. Imam Sudradjad : ditto

PJKA head office (BANDUNG)

Parto Siswojo : Chief of Railway Research and Development Centre
Ch. N. Latief : Director of Traffic Division
Sandjojo : Director of Rolling Stock and Traction Division
Harbani : Planning Centre
Ajeh Karjana : Fixed Installation Division
Abdullah Muchtar : Personnel Division

PJKA West Regional Office (JAKARTA)

Soetarno : Chief of West Regional Office
R. Soehardjo : Traffic Division
Soeradji : Electricity
Abdullah Sapari : Track Maintenance
Abdullah Sani : Rolling Stock & Traction

DKI JAKARTA

Ir. Arifin Jusuf : Planning and Development Board of DKI JAKARTA
Ismail A Pasay : ditto
Aswin : ditto
Budiman : ditto
Herbowo : ditto
Budihardjo : ditto
Yani : ditto
Ir. T.B.M. Rais : ditto
Dodo Yosida : Development Bureau of DKI JAKARTA
Ir. Dimmy Kirbandiman : Highway and Traffic Division of DKI JAKARTA
Hanno Djuanda : ditto
Bambang Soeprabowa : ditto
Kandar Tisnawinata : City Planning Division of DKI JAKARTA
Ediwan : ditto
Soewardi : ditto
M.E. Loenggana : Cooperation Board of Jabotabek
Ruchiat : ditto

National Planning and Development Board (BAPPENAS)

Drs. Darmawan

M. Jusuf

Directorate General of CIPTA KARYA

Ir. Budisantoso

Ir. Yoeliarto

R. Maris

Directorate General of BINA MARGA

Trihardjo

E. Sunarya

Sahat Simorangkir

Appropriate Evaluation and Implimentation of Technology Institution (BPPT)

Sjahedi J.

Margono B

5.3 JICA Study Team

- 1) M. Sudo : Leader
- 2) S. Miyata : Railway civil engineering (Deputy leader)
- 3) N. Koyama : Transport demand forecasting
- 4) K. Nagayama : City and regional planning
- 5) T. Kojin : Train operation
- 6) S. Ito : Geological survey
- 7) I. Mizuno : Environmental planning
- 8) K. Maeda : Railway civil engineering
- 9) I. Kikuta : Construction planning
- 10) T. Matsuda : Construction design
- 11) K. Adachi : Economic analysis

Project coordination

M. Tashiro : Social Development Cooperation Department, JICA

K. Mima : Social Development Cooperation Department, JICA

5.4 Indonesian Counterparts

Project Officer : Harry Prayitno B.A. Directorate of Traffic and Urban
Transportation

Deputy I Project Officer Merangkap Traffic Demand : Wahyuhardjo Indonesian State Railways

Deputy II Project Officer	: Ir. Djauhari P.	Directorate General of Land Transport and Inland Waterways
Administrator	: Drs. Hatmadji P.	Directorate of Traffic and Urban Transportation
Railway Planner	: Tohir Kartabrata	Indonesian State Railways
City Planner	: Ir. Udji Atmono	Directorate of Traffic and Urban Transportation
Civil Engineer	: Ir. Satrio K.	Indonesian State Railways
Economist	: Drs. Abdulrachman	Indonesian State Railways
Economist	: Drs. Taufic	Directorate of Traffic and City Transportation
Civil Engineer	: Ir. Djoko Riyanto	Indonesian State Railways
As. Administrator	: Yunus	Directorate of Traffic and City Transportation

Following members participated in the home study in Japan from January 13 to February 8, 1982.

Mr. Tohir Kartabrata
 Mr. Satrio Karsudjono
 Mr. Eddy Sasongko
 Mr. Madjid Arsjad



**CHAPTER 1. TRAFFIC DEMAND
FORECAST**



CHAPTER 1 TRAFFIC DEMAND FORECAST

1.1 Existing Transportation Network and Traffic Situation

1.1.1 Transportation Network

(1) Railway Network

The existing railway network in DKI Jakarta and its outskirts is as shown in Fig. 1.1.1. The railways in DKI Jakarta can be grouped into a circular route encompassing the central business district (CBD) of DKI Jakarta, and four radial routes extending to the suburban areas: Purwakarta, Bogor, Rangkasbitung and Tangerang. The circular route consists of Central Line (Jakarta Kota – Gambir – Manggarai), Eastern Line (Jakarta Kota – Pasar Senen – Jatinegara) and Western Line (Jakarta Kota – Tanah Abang – Jatinegara). The outline of each railway line is shown in Table 1.1.1.

Electrification of Central Line and Eastern Line was completed but Western Line is to be electrified under the "Intermediate Program" and is not electrified. Train operation of each railway line is shown in Table 1.1.2. Most of the electric cars are operated on Central Line and diesel cars are operated mainly on the other lines. So far, the railway system in Indonesia served principally to inter regional transportation and accordingly operation of long distance train accounted for large portion of the operation of all the trains. This tendency still continues as shown in Table 1.1.2.

There are seven important stations in DKI Jakarta, which serve as terminals for long distance train.

- a. Jakarta Kota Station
for all directions, short and long distance
- b. Gambir Station
for Bandung, Solo, Yogya, Madiun, Surabaya and JOBOTABEK
- c. Pasar Senen Station
for Semarang, Surabaya, Solo, Yogya, Madiun, Kutoarjo and JABOTABEK
- d. Manggarai Station
for Banjar, Sukabumi and JABOTABEK
- e. Tanjung Priok Station
for Semarang, Kutoarjo, Solo, Pekalongan and JABOTABEK
- f. Jatinegara Station
for Kutoarjo, Solo, Semarang and JABOTABEK
- g. Tanah Abang Station
for Merak and JABOTABEK

However, a prominent change developed in the railway transportation as the result of the "JABOTABEK" train being instituted with introduction of new EC and DC by PJKA under the "Intermediate Program" from the year 1976 to the year 1983. Although the number of passengers on JABOTABEK train is not so many if compared with those of the countries of advanced railway utilization, it showed a remarkable increasing tendency in the recent years as shown in Table 1.1.3. These figures are thought to be an evidence of urgent necessity of high speed-frequent railway service. Number of passengers on JABOTABEK train increased from 2,482 thousand passengers in the year 1977 to 8,936 (growth rate 3.6), 12,265 (4.9) and 15,505 (6.2) thousand passengers in the year 1978, 1979 and 1980, respectively.

(2) Bus Network

Buses are the main public transportation means in DKI Jakarta.

In the year 1979, 1,766 city buses were operating everyday and 2.2 million passengers were transported everyday.

There are 13 bus terminals and 114 bus routes in DKI Jakarta, which are shown in Fig. 1.1.2. In addition to the above, there are many inter city bus routes from Terminal Pulo Gadung for the eastern direction, Terminal Cililitan for the southern direction and Terminal Grogol for the western direction.

Bus terminals are located in the neighbourhood of the important railway stations, but the distance between bus terminal and railway station is generally longer than easy access for the passengers.

The existing bus routes connected with stations on Central Line are as shown in Table 1.1.4.

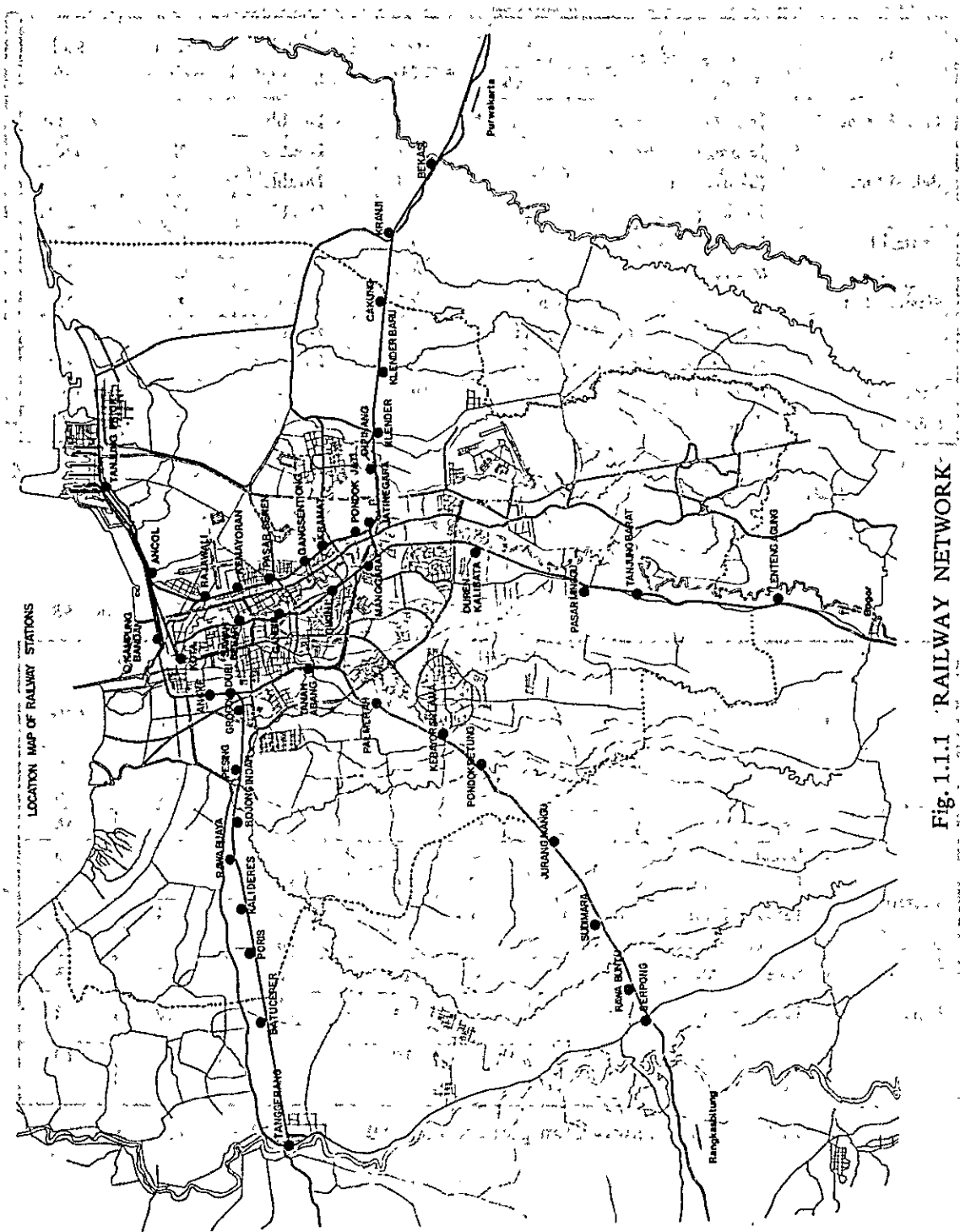


Table 1.1.1 OUTLINE OF EACH RAILWAY LINE

Dec. 1980

Line	Section	Distance (KM)	Single or Double	Electrification	Rail-cars
Eastern Line	Jakarta – Jatinegara	11.8	Double	○	EC, DC
	Jatinegara – Bekasi	14.8	Double	X	DC
Bekasi Line	Jakarta – Tanjung Priok	8.1	Double	○	EC, DC
	Tanjung Priok – Kemayoran	4.2	Double	○	EC, DC
Central Line	Jakarta – Manggarai	9.7	Double	○	EC
	Managgarai – Bogor	44.9	Single	○	EC
Western Line	Jakarta – Kampungbandan	2.7	Single	X	DC
	Kampungbandan – Manggarai	14.3	Double	X	DC
	Manggarai – Jatinegara	2.9	Double	○	DC
Tangerang Line	Duri – Tangerang	19.3	Single	X	DC
Merak Line	Tanah Abang – Serpong	23.3	Single	X	DC

Source: "Urban/Suburban Railway Transportation in JABOTABEK Area", March 1981 by JICA.

Table 1.1.2 TRAIN OPERATION

Jan. 1981

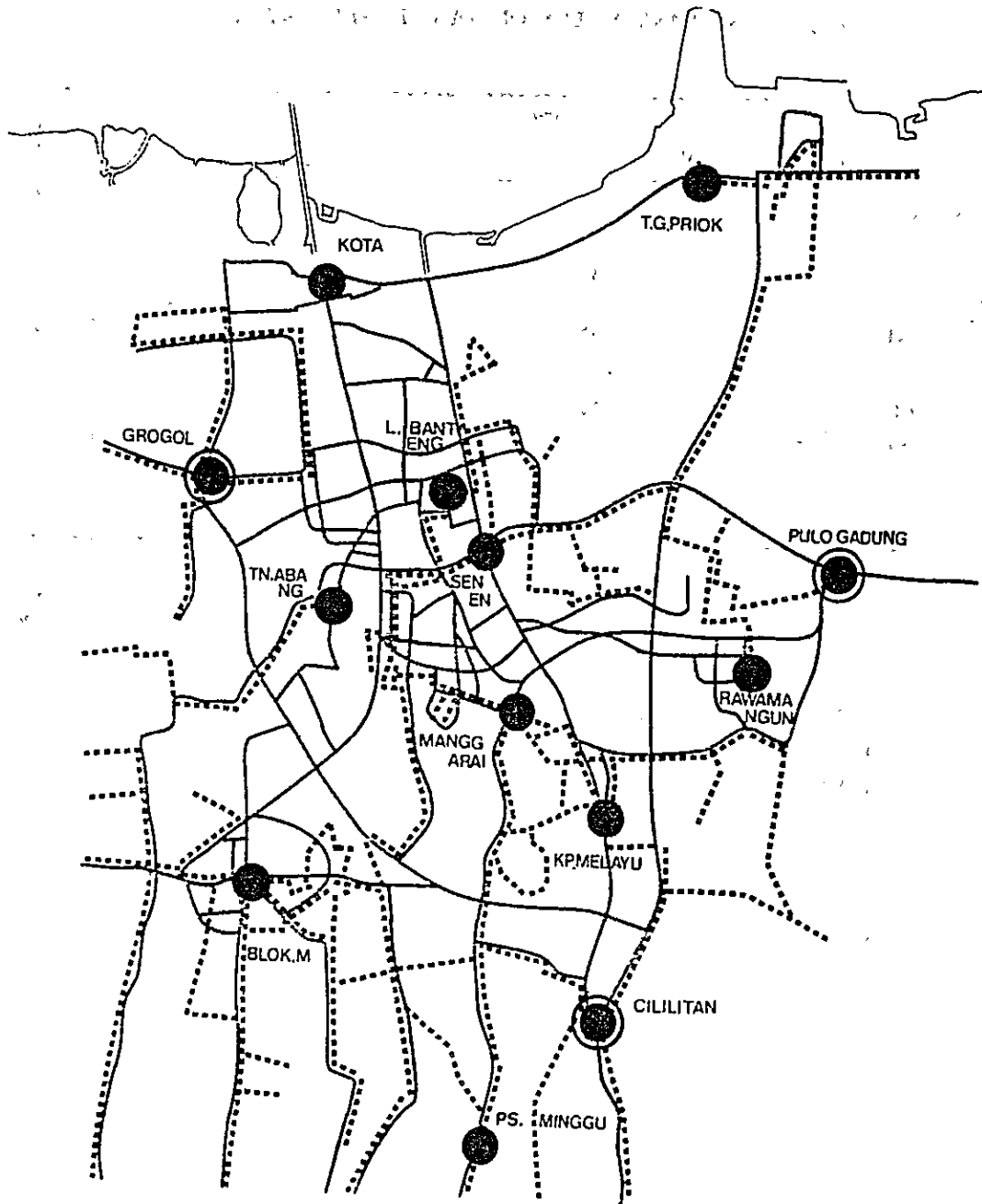
Line	Section	No. of Trains (both directions) per Day				
		EC	DC	Long Distance Train	Freight Train	Total
Central	Jakarta – Manggarai	42	4	24	–	70
	Manggarai – Depok	42	4	(2)	2	50
	Depok – Bogor	38	4	(2)	2	46
	Bogor –	–	6	–	–	6
Eastern	Jakarta – Jatinegara	3	20	16	8	47
	Tanjung Priok – Kemayoran	1	2	2	4	9
Bekasi	Jatinegara – Bekasi	–	16	46	8	70
Western	Jakarta – Manggarai	–	16	2	7	25
Merak	Tanahabang – Serpong	–	4	4 (4)	10	22
Tangerang	Duri – Tangerang	–	10	–	–	10
	Tanjung Priok – Jakarta	7	–	–	–	7

Source: "Urban/Suburban Railway Transportation in JABOTABEK Area", March 1981 by JICA.

Table 1.1.3 PASSENGERS ON JABOTABEK TRAIN

	1977		1978		1979		1980		
	Volume	Growth Rate	Volume	Growth Rate	Volume	Growth Rate	Volume	Growth Rate	
Number of Trains per Day	60	1.0	66	1.1	78	1.3	110	1.8	
Number of Passengers	2,482	1.0	8,936	3.6	12,265	4.9	15,505	6.2	
Line	JAK - PWK	455	1.0	1,838	4.0	2,866	6.3	3,808	8.4
	JAK - BOO	1,664	1.0	5,845	3.5	7,468	4.5	8,793	5.3
	JAK - RK	292	1.0	865	3.0	1,003	3.4	1,077	3.7
	JAK - TNG	71	1.0	388	5.5	496	7.0	645	9.1
	BOO - SI	—	—	—	—	432	1.0	651	1.5
	SI - CJ	—	—	—	—	—	—	531	—

- Notes:
- 1) Source : PJK West Region
 - 2) Unit : Number of Trains per day : trains/day
Number of Passengers : 1,000 passengers/year
 - 3) JAK : Jakarta
PWK : Purwakarta
BOO : Bogor
RK : Rangkasbitung
TNG : Tangerang
SI : Sukabumi
CJ : Cianjur



- Legend:
- Bus Terminals including Inter City Bus
 - Intra City Bus Terminal
 - Bus Route
 - - - - Micro Bus Route

Fig. 1.1.2 BUS NETWORK IN DKI JAKARTA

Table 1.1.4: BUS ROUTES CONNECTED WITH RAILWAY STATIONS ON CENTRAL LINE

1. Jakarta Kota St. 8 Routes	3.4 Lap. Banteng – Ps. Minggu
1.1 Kota – Tg. Priok	3.5 Lap. Banteng – Block M (2)
1.2 Kota – Pulo Gadung	3.6 Lap. Banteng – Pejompongan
1.3 Kota – Lap. Banteng (2)	3.7 Lap. Banteng – Grogol
1.4 Kota – Kp. Melayu	4. Cikini St. 3 Routes
1.5 Kota – Block M	4.1 Lap. Banteng – Rw. Mangan
1.6 Kota – Tn. Abang	4.2 Lap. Banteng – Cililitan
1.7 Kota – Grogol	4.3 Rw. Mangan – Tn. Abang
2. Sawah Besar St. 4 Routes	5. Manggarai St. 13 Routes
2.1 Kota – Kp. Melayu	5.1 Manggarai – Lap. Banteng (5)
2.2 Tg. Priok – Tn. Abang	5.2 Manggarai – Tg. Priok
2.3 Rajawali – Lp. Banteng	5.3 Manggarai – Pulo Gadung (2)
2.4 Ps. Senen – Grogol	5.4 Manggarai – Cililitan
3. Gambir St. 10 Routes	5.5 Manggarai – Ps. Minggu
3.1 Lap. Banteng – Rw. Mangan	5.6 Manggarai – Block M
3.2 Lap. Banteng – Manggarai (3)	5.7 Manggarai – Tn. Abang
3.3 Lap. Banteng – Cililitan	5.8 Manggarai – Grogol

Note: () indicates plural routes in the same origin and destination.

1.1.2 Traffic situations along central line

(1) Traffic Surveys Performed

Traffic survey was performed in order to obtain existing traffic conditions of railway stations and crossing on Central Line (from Jakarta Kota St. to Manggarai St.). The survey was divided into two groups, one was for railway stations and the other was for crossings. Items surveyed in each group are as shown below.

Station Survey

- i) Traffic volume on the front road of railway stations by hour band and by vehicle type.
- ii) Number of buses to and from each station and number of bus passengers on and off at bus stops near each station.
- iii) Number of persons to and from station by hour band and number of vehicles to and from station by hour band and by vehicle type.
- iv) Number of vehicles parking around station by vehicle type at every one hour.

- v) Number of railway passengers boarding and detraining at each station by hour band.
- vi) Trip characteristics of the persons coming to each station by hour band. Trip characteristics contains origin and destination, transportation means to the station and purpose of the trip.

Crossing Survey

- i) Traffic volume on the railway crossing by hour band and by vehicle type.
- ii) Number of vehicles stopped while the crossing is closed.
- iii) Duration of each closed time, from the time traffic barrier is pulled out from its normal position to the time traffic barrier is restored to its original position again.

Traffic survey was carried out on weekdays from July 21, 1981 to August 11, 1981 on seven locations for the station survey and on twenty locations for the Crossing Survey. Survey locations and schedule are as shown in Fig. 1.1.3 ~ 4 and Table 1.1.5, respectively.

<u>Locations for Station Survey</u>	<u>Locations for Crossing Survey</u>
1. Jakarta Kota	101. Jl. Mangga Dua
2. Sawah Besar	102. Jl. Jayakarta
3. Gambir	103. Jl. Mangga Besar
4. Cikini	104. Jl. Lautze
5. Manggarai	105. Jl. Sukarjo Wiryopranoto
6. Pasar Senen	106. Jl. Ceylon
7. Tanah Abang	107. Jl. Pintu Air 2
	108. Jl. Juanda & Jl. Veteran
	109. Jl. Merdeka Utara
	110. Jl. Monas Utara
	111. Jl. Monas Selatan
	112. Jl. Merdeka Selatan
	113. Jl. Kebon Sirih
	114. Jl. Wahid Hasyim
	115. Jl. Johar
	116. Jl. Cut Mutiah
	117. Jl. Gondangdia Lama
	118. Jl. Cikini Raya
	119. Jl. Diponegoro
	120. Jl. Sultan Agung (Grade separated)

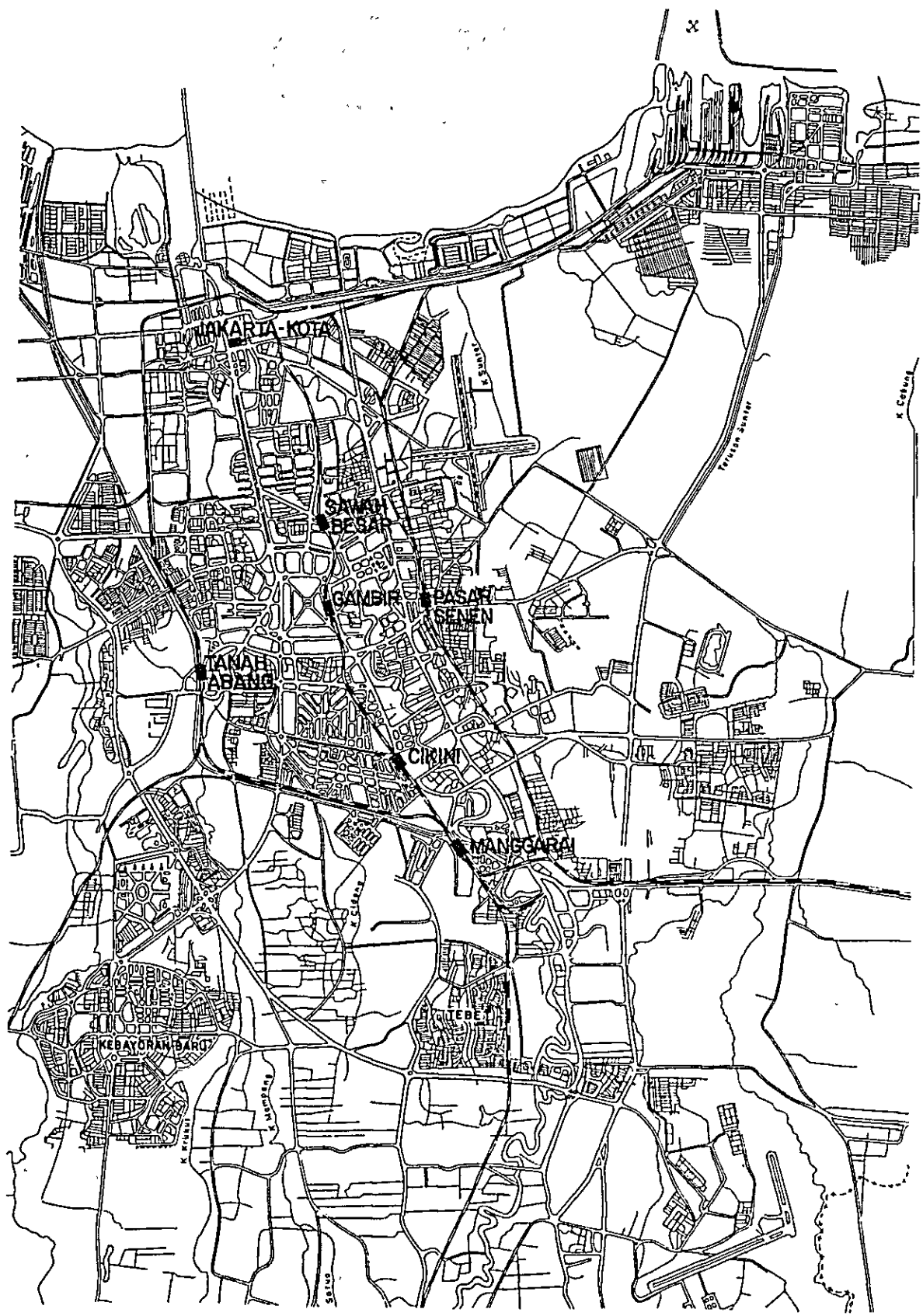


Fig. 1.1.3 SURVEY LOCATION MAP FOR STATION SURVEY

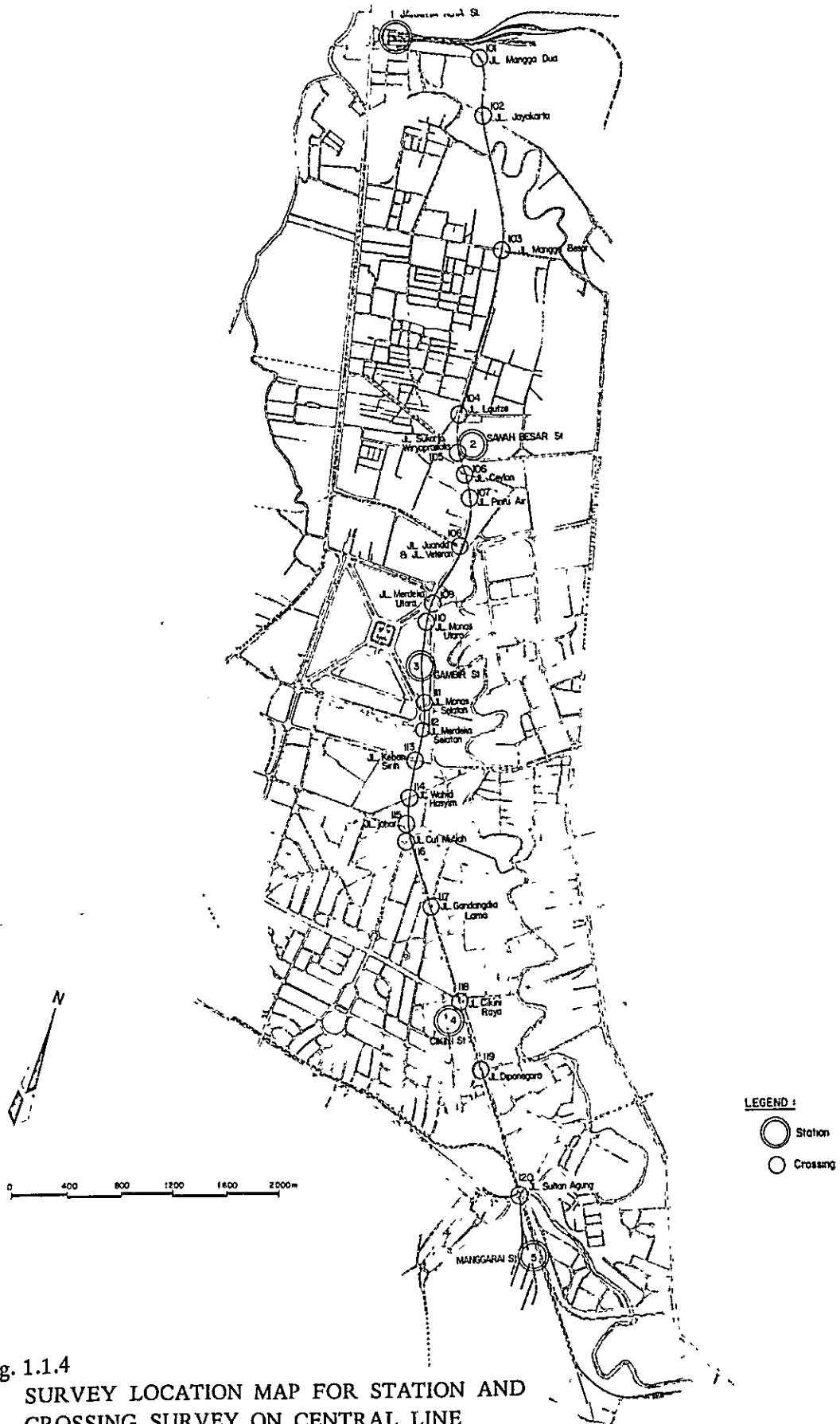


Fig. 1.1.4
 SURVEY LOCATION MAP FOR STATION AND
 CROSSING SURVEY ON CENTRAL LINE

Table 1.1.5 SURVEY SCHEDULE

July, August 1981

Unit: Duration of Survey-Hours

Date	Pos No.	Location	Kind of Survey												
			11	12	13	14	15	16	17	18	21	22	23		
July 20 Mon;	104	J1. Lautze											12	12	12
	105	J1. Sukarjo Wirjopranoto											12	12	12
	106	J1. Ceylon											12	12	12
	107	J1. Pintu Air 2											12	12	12
	109	J1. Merdeka Utara											12	12	12
	110	J1. Monas Utara											12	12	12
	111	J1. Monas Selatan											12	12	12
	112	J1. Merdeka Selatan											12	12	12
21	2	Sawah Besar St.		12	12	12	12	12	12						
Tue.	3	Gambir St.	24	12	12	12	12	12	17						
22 Wed.	4	Cikini St.		12		12	12	12	12						
	5	Manggarai St.	12	12	12	12	12	12	17	17					
23 Thu.	1	Jakarta Kota St.	24	12	12	12	12	12	17	17					
27 Mon.	101	J1. Mangga Dua										12	12	12	
	102	J1. Jayakarta										12	12	12	
	113	J1. Kebon Sirih										12	12	12	
	114	J1. Wahid Hasyim										12	12	12	
	115	J1. Johar										12	12	12	
	117	J1. Gondangdia Lama										12	12	12	
	118	J1. Cikini Raya										12	12	12	
	119	J1. Diponegoro										12	12	12	
28 Tue.	103	J1. Mangga Besar										24	17	17	
	108	J1. Juanda & J1. Veteran										24	17	17	
	116	J1. Cut Mutiah										24	17	17	
August 11 Tue.	6	Pasar-Senen Station							12	12					
	7	Tanah-Abang Station							12	12					

Note: Kind of Survey

11	Vehicle Traffic Count	17	Railway Passengers Boarding and Detraining
12	Bus Passenger	18	Railway Passengers
13	Persons to and from Station	21	Vehicle Traffic Count
14	Vehicles to and from Station	22	Traffic Block
15	Parking	23	Closing Time
16	Interview		

Survey Hours

12 Hours	7:00 ~ 19:00
17 Hours	5:00 ~ 22:00
24 Hours	7:00 ~ 7:00

(2) Passenger Situations of Railway Stations

Number of railway passengers boarding at five stations (Jakarta Kota, Sawah Besar, Gambir, Cikini and Manggarai) in the last six years are shown in Table 1.1.6. In the year 1975, annual passengers of these five stations amounted to 1.8 million passengers, and afterwards showed a continuous upward tendency. In the year 1980 the annual passengers amounted to 5.8 million passengers, that is 3.3 times that of the year 1975. The average daily passengers of the five stations in the year 1980 was estimated to be 15.8 thousand passengers. According to the counting survey of railway passengers boarding and detraining at each station, the sum of boarding passengers at these five stations amounted to 18.2 thousand passengers during 12 hours. The result of this survey is shown in Table 1.1.7. As for Pasar Senen St., there was a big discrepancy between passengers boarding and those detraining because this station was a terminal for long distance trains and the survey date fell a week after the Lebaran holiday.

Table 1.1.8 shows number of samples interviewed by station and by the place (Kecamatan) where those interviewed originated their trips to each station. Jakarta Kota St. Gambir St. Pasar Senen St. and Tanah Abang St. attracted passengers from almost every part of DKI Jakarta on account that these stations are terminals for long distance trains. On the other hand, passengers of Sawah Besar St., Cikini St. and Manggarai St. were attracted from the vicinity of each station.

Table 1.1.6 NUMBER OF RAILWAY PASSENGERS

		1975	1976	1977	1978	1979	1980
Jakarta Kota	Annual Passengers	684	802	988	1,535	1,992	2,672
	(Increase Ratio)	(1.00)	(1.17)	(1.44)	(2.24)	(2.91)	(3.91)
	Daily Passengers	1,874	2,198	2,702	4,207	5,457	7,322
Gambir	Annual Passengers	860	925	1,182	1,403	1,809	2,036
	(Increase Ratio)	(1.00)	(1.08)	(1.37)	(1.63)	(2.10)	(2.37)
	Daily Passengers	2,357	2,533	3,238	3,946	4,956	5,578
Manggarai	Annual Passengers	224	270	512	853	1,005	1,066
	(Increase Ratio)	(1.00)	(1.21)	(2.29)	(3.81)	(4.49)	(4.76)
	Daily Passengers	613	739	1,402	2,338	2,753	2,919
Total	Annual Passengers	1,768	1,997	2,682	3,791	4,806	5,774
	(Increase Ratio)	(1.00)	(1.13)	(1.52)	(2.14)	(2.72)	(3.27)
	Daily Passengers	4,844	5,470	7,347	10,491	13,166	15,819

1) Data from PJKA West Region

2) Passengers counted by ticket Sales

3) Number of passengers at Sawah Besar is included in Jakarta Kota and number of passengers at Cikini is included in Manggarai

4) Unit: Annual Passengers 1,000 persons/year

Daily passenger persons/day

Table 1.1.7 RAILWAY PASSENGERS AT EACH STATION BY HOUR BAND

Hour Band	Jakarta-Kota		Sawah-Besar		Gambir		Cikini		Manggarai		Pasar Senen		Tanah Abang	
	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off
5 - 6	107	0	-	-	71	0	-	-	81	16	-	-	-	-
6 - 7	91	317	-	-	166	461	-	-	136	238	-	-	-	-
7 - 8	348	3197	118	2166	79	1810	154	864	296	177	370	381	194	738
8 - 9	172	1225	96	359	103	1654	94	630	118	101	186	3497	472	112
9 - 10	198	172	31	6	287	1181	79	93	69	67	89	394	258	132
10 - 11	136	284	93	217	226	333	102	124	49	70	14	6	448	646
11 - 12	141	93	124	25	309	58	181	154	81	31	99	409	100	65
12 - 13	99	241	220	209	926	95	221	132	84	67	56	107	60	33
13 - 14	577	375	81	53	272	68	109	37	135	118	186	2838	139	38
14 - 15	808	205	380	81	275	165	183	90	131	337	236	1366	77	350
15 - 16	771	287	254	101	308	214	322	69	140	355	14	136	92	45
16 - 17	2738	413	308	7	803	141	340	120	197	454	1083	64	302	167
17 - 18	459	229	595	134	1152	119	243	98	85	528	1013	40	215	469
18 - 19	162	167	189	59	837	407	128	62	19	90	214	927	46	4
19 - 20	68	29	-	-	183	56	-	-	44	154	-	-	-	-
20 - 21	0	9	-	-	61	49	-	-	15	58	-	-	-	-
21 - 22	0	0	-	-	0	98	-	-	6	0	-	-	-	-
7 ~ 19	6609	6888	2489	3417	5577	6245	2156	2473	1404	2445	3560	10165	2403	2799
7 ~ 9	520	4422	214	2525	182	3464	248	1494	414	278	556	3878	666	850
5 ~ 22	6875	7243	-	-	6058	6909	-	-	1686	2906	-	-	-	-

Note: 1) Passengers/17 hours for Jakarta - Kota, Gambir and Manggarai.
 2) Passengers/12 hours for the other stations.

Table 1.1.8 NUMBER OF SAMPLES INTERVIEWED AT RAILWAY STATIONS

Unit: passengers/12 hours

Origin	Station No.	1	2	3	4	5	6	7	Total
11.	Gambir	11	24	39	6	2	3	2	87
12.	Sawah-Besar	14	102	19	—	—	3	2	140
13.	Kemayoran	4	11	26	1	—	10	2	54
14.	Senen	12	1	25	53	6	22	3	122
15.	Cempaka Putih	4	1	21	3	—	14	1	44
16.	Menteng	13	2	23	213	19	9	3	282
17.	Tanah-Abang	15	—	17	3	5	8	46	94
	Central Jakarta	73	141	170	279	32	69	59	823
21.	Kep. Seribu	—	—	—	—	—	—	—	—
22.	Penjaringan	36	6	19	—	—	5	2	68
23.	Tanjung-Priok	15	3	14	—	—	12	4	48
24.	Koja	7	—	7	—	—	5	6	25
25.	Cilincing	1	—	—	—	—	2	5	8
	North Jakarta	59	9	40	—	—	24	17	149
31.	Cengkareng	3	—	2	—	—	3	2	10
32.	Grogol Petamburan	21	—	21	2	—	14	22	80
33.	Taman Sari	62	31	2	—	—	5	4	104
34.	Tambora	37	—	7	1	2	4	4	55
35.	Kebon Jeruk	3	1	6	—	—	1	4	15
	West Jakarta	126	32	38	3	2	27	36	264
41.	Tebet	11	2	13	1	74	4	5	110
42.	Setiabudi	—	—	16	6	33	3	9	67
43.	Mampang Prapatan	8	—	19	—	—	1	5	33
44.	Pasar Minggu	11	—	16	—	3	—	8	38
45.	Kebayoran Baru	11	—	25	3	6	18	10	73
46.	Kebayoran Lama	3	—	12	—	2	6	3	26
47.	Cilandak	—	—	9	—	—	4	—	13
	South Jakarta	44	2	110	10	118	36	40	360
51.	Matraman	1	1	13	8	26	4	2	55
52.	Pulo Gadung	11	2	9	7	11	14	2	56
53.	Jatinegara	11	1	10	2	3	3	—	30
54.	Kramat-Jati	6	—	15	2	—	10	4	37
55.	Pasar-Rebo	—	—	2	—	1	—	—	3
56.	Cakung	—	—	—	1	—	—	—	1
	East Jakarta	29	4	49	20	41	31	8	182
	TOTAL :	331	188	407	312	193	187	160	1778

Note: Station No.

1. Jakarta Kota St.
4. Cikini St.
6. Pasar Senen St.

2. Sawah Besar St.
5. Manggarai St.
7. Tanah Abang St.

3. Gambir St.

(3) Traffic Situations of Railway Crossings

As shown in Fig. 1.1.4, there are twenty road crossings with Central Line from Jakarta Kota St. to Manggarai St. Out of twenty roads, only one road (No. 120 Jl. Sultan Agung) is grade separated with railway track. There are eight roads of directional control, five roads from west to east and three roads from east to west.

The total number of vehicles going across the Central Line at the level crossings amounted to 793 thousand vehicles in 12 hours, out of which 394 thousand vehicles were motorcycle and bajaj, and 399 thousand vehicles were four wheeled automobiles. Among the nineteen level crossings, J1. Juanda and J1. Veteran showed the largest traffic volume, which amounted to 154 thousand in total vehicles. The traffic volume on J1. Kebon Sirih was the second largest, amounting to 88 thousand in total vehicles. Traffic volume of less than 10 thousand vehicles, was counted on J1. Mangga Dua, J1. Lautze, J1. Ceylon, J1. Pintu Air 2, J1. Monas Selatan and J1. Johar. Except J1. Monas Selatan, these five roads are classified as collecting road. The result of traffic counting survey on the level crossing roads are shown in Table 1.1.9. Duration of closing barriers at each crossing and number of vehicles stopped by barriers are shown in Table 1.1.10. The average closing time accounted for 63 seconds per each closing, variation of which was very large, extending from 19.8 seconds at the minimum to 138.5 seconds at the maximum. The average number of vehicles stopped by the closing in 12 hours amounted 5,384 vehicles.

Table 1.1.9 TRAFFIC VOLUME ON RAILWAY CROSSINGS
12 Hours (7:00 – 19:00)

(Year 1981) Unit: vehicles/12 hours

No.	Name of Road	Condition		Pedes- trian Bicycle Beca	Motor cycle	Bajaj	Automobiles					Total
		Width (M)	Way				Sedan & Jeep	Taxi	Mini Bus	Bus	Truck	
101	J1. Mangga Dua	5.4	2 ways	8,730	2,074	1,513	162	21	42	2	215	442
102	J1. Jayakarta	20.9	2 ways	5,383	19,060	13,620	10,007	1,231	2,960	409	4,395	19,002
103	J1. Mangga Besar	15.7	2 ways	4,197	20,278	16,489	9,683	1,485	3,071	215	16,418	30,872
104	J1. Lautz	4.3	2 ways	5,086	4,595	1,454	380	34	204	—	109	727
105	J1. Sukarjo Wiryopranoto	23.4	2 ways	2,953	23,420	9,626	13,352	3,013	8,255	175	5,031	29,826
106	J1. Ceylon	3.6	2 ways	1,560	840	196	393	33	3	—	86	515
107	J1. Pintu Air 2	9.2	2 ways	1,999	680	188	523	36	326	2	12	899
108	J1. Juanda & J1. Veteran	31.5	2 ways	7,073	43,082	28,743	47,843	8,824	11,921	7,705	6,173	82,466
109	J1. Merdeka Utara	17.3	W → E	2,280	14,818	2,535	20,131	3,066	3,618	465	1,835	29,115
110	J1. Monas Utara	30.6	E → W	1,942	14,647	6,411	12,615	2,900	3,838	353	1,637	21,343
111	J1. Monas Selatan	32.0	W → E	2,388	1,330	1,677	1,294	702	452	172	230	2,850
112	J1. Merdeka Selatan	20.1	E → W	6,614	10,679	7,508	18,476	2,542	3,993	601	504	26,116
113	J1. Kebon Sirih	12.4	W → E	18,486	26,282	24,462	24,356	4,210	5,085	1,294	1,867	36,812
114	J1. Wahid Hasyim	7.8	2 ways	3,659	9,260	8,463	9,190	1,542	1,918	447	624	13,721
115	J1. Johar	8.6	W → E	4,712	1,033	2,826	1,489	200	393	73	37	2,192
116	J1. Cut Mutiah	13.2	2 ways	4,551	12,018	9,792	20,179	3,399	4,049	1,105	1,070	29,802
117	J1. Gondangdia Lama	8.8	W → E	1,646	9,379	10,935	14,097	2,345	1,674	570	641	19,327
118	J1. Cikini Raya	9.1	E → W	7,778	8,767	6,299	11,642	2,024	2,164	579	1,137	17,546
119	J1. Diponegoro	16.8	2 ways	1,785	16,933	2,527	21,804	4,429	4,438	1,564	2,997	35,232
	TOTAL			92,822	239,175	155,264	237,616	42,036	58,404	15,731	45,018	398,805

Table 1.1.10 BARRIER TIME AND TRAFFIC BLOCK AT THE CROSSINGS

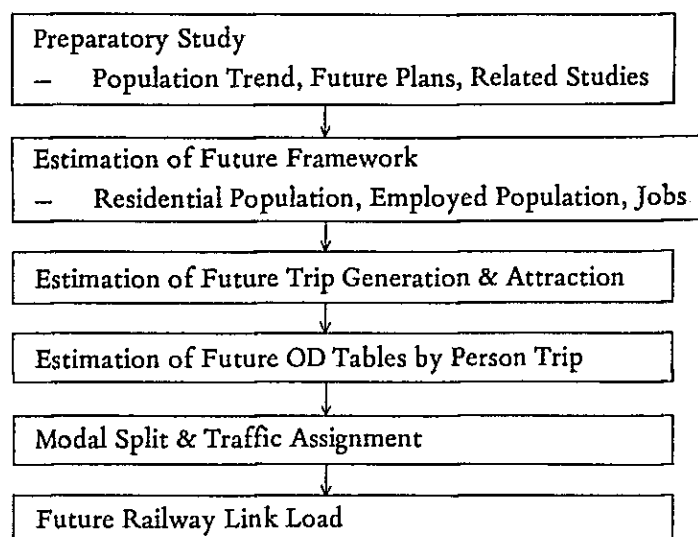
No.	Name of Road	Barrier Time				Traffic Block		
		Fre- quency	Aver. Secs.	Min. Secs.	Max. Secs.	West	East	Total
101	J1. Mangga Dua	59	109	61	248	576	422	998
102	J1. Jayakarta	58	50	10	110	3054	2954	6008
103	J1. Mangga Besar	61	62	19	119	2588	3794	6382
104	J1. Lautze	62	53	11	200	110	534	644
105	J1. Sukarjo Wiryopranoto	62	81	18	142	6017	11268	17285
106	J1. Ceylon	62	52	18	101	79	54	133
107	J1. Pintu Air 2	59	68	12	205	131	79	210
108	J1. Juanda & J1. Veteran	59	78	15	185	11658	7115	18773
109	J1. Merdeka Utara	61	45	25	85	4251	—	4251
110	J1. Monas Utara	61	47	25	95	—	2132	2132
111	J1. Monas Selatan	63	41	11	115	495	—	495
112	J1. Merdeka Selatan	62	33	15	75	—	2765	2765
113	J1. Kebon Sirih	59	41	9	107	10345	—	10345
114	J1. Wahid Hasyim	60	78	10	150	461	323	784
115	J1. Johar	60	97	25	185	842	—	842
116	J1. Cut Mutiah	58	73	25	125	991	8718	9709
117	J1. Gondangdia Lama	60	69	25	150	5316	—	5316
118	J1. Cikini Raya	58	72	32	130	—	5240	5240
119	J1. Diponegoro	61	58	10	105	5345	4652	9998
AVERAGE		60.3	63	19.8	138.5	2750	2634	5384

Note: Unit for Traffic Block: vehicles/12 hours

1.2 Traffic Demand Forecast

1.2.1 Area growth analysis

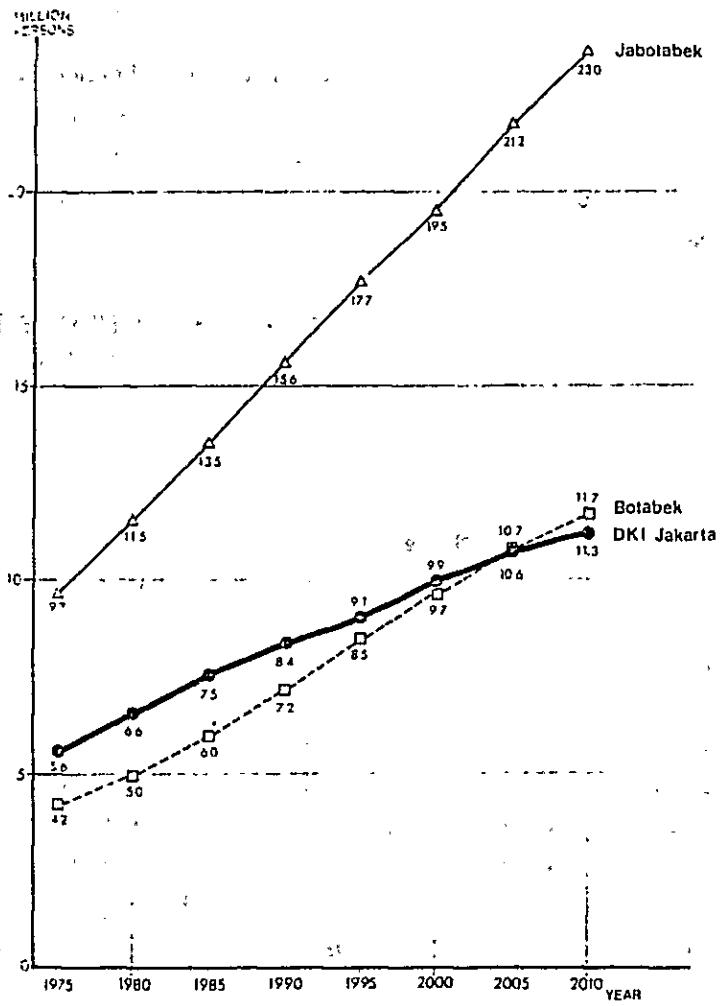
In this chapter, analysis and forecast were performed as for the socio-economic situation and land use in JABOTABEK area, which were later used as a basis of forecasting person trips. "Master Plan of DKI Jakarta" and "JABOTABEK Metropolitan Development Planning" (JMDP) were fully referred to as the framework of this study. The procedure for forecasting future traffic demand is briefly shown as follows:



(1) Growth Analysis of Population

1) Residential Population

Residential Population in DKI Jakarta and BOTABEK area was firstly estimated on the past growth rate of their natural increase and migration. Secondly, the maximum capacity of population absorption by DKI Jakarta was fixed by setting an optimum gross population density. The balance between the former estimation and the latter estimation of DKI Jakarta was considered to be overspill and shifted to BOTABEK area. The optimum population density in the year 2000 was assumed to be 150 persons/ha in consideration of "Master Plan", "JMDP" and "JMATS". The results of population forecast for DKI Jakarta and BOTABEK area are shown in Fig. 1.2.1. The residential population of JABOTABEK area in the year 1980, 1990, 2000 and 2010 amounted to 11,510, 15,620, 19,530 and 22,980 thousand persons respectively.



Source: "Feasibility Study on Jakarta Harbour Road Project" JICA 1981

Fig. 1.2.1 FUTURE POPULATION FORECAST

2) **Employed Population**

The employed population in the residential area was obtained by multiplying the residential population by the rate of employment, which was based on the "JMDP" figures. However, the rate of employment adapted in the "JMDP" for the year 2003 was assumed to be attained in the year 2010 in this study. For the determination of future sectoral composition of employed population, the rate of employment applied for each industrial sector in the "JMDP" was also used for DKI Jakarta and BOTABEK area. The employed population in JABOTABEK area was estimated to be 3,706.2, 5,543.5, 7,563.7 and 9,437.9 thousand persons in the year 1980, 1990, 2000 and 2010 respectively. They are shown in Table 1.2.1.

3) **Number of Jobs**

Number of jobs in DKI Jakarta is the sum of the employed population in DKI Jakarta and the excess inflow of the employed population from outside Jakarta. The excess inflow of the employed population from outside Jakarta to DKI Jakarta had a close relationship with the employed population in BOTABEK area. In this study, number of jobs in DKI Jakarta in future was estimated on the assumption that 10% of the employed population in secondary and tertiary sector in BOTABEK area was the excess inflow to DKI Jakarta. The results are shown in Table 1.2.2. Number of jobs in DKI Jakarta was estimated to be 2,167, 3,100, 4,026 and 4,935 thousand persons in the year 1980, 1990, 2000 and 2010 respectively. Number of jobs in the year 2010 amounted to 2.28 times that of the year 1980. Number of jobs in BOTABEK area was estimated by deducting the excess outflow to DKI Jakarta from the employed population in BOTABEK area.

Table 1.2.1. FUTURE EMPLOYMENT STRUCTURE
IN DKI JAKARTA & BOTABEK

(Unit: 1,000 persons)

		1980	1990	2000	2010	
DKI JAKARTA	Residential Population	6,560.0	8,390.0	9,860.0	11,310.0	
	Rate of Employment (%)	32.09	35.42	38.78	41.07	
	Employed Population	2,105.1	2,972.0	3,823.7	4,645.0	
	Sectoral Composition (%)	I	2.7	1.2	0.4	0.2
		II + III	97.3	98.8	99.6	99.8
	Employed Population by Sector	I	57.1	36.0	15.0	7.0
II + III		2,048.0	2,936.0	3,808.7	4,638.0	
BOTABEK	Residential Population	4,950.0	7,230.0	9,670.0	11,670.0	
	Rate of Employment (%)	32.35	35.57	38.78	41.07	
	Employed Population	1,601.1	2,571.5	3,750.0	4,792.9	
	Sectoral Composition (%)	I	59.6	50.0	42.0	39.5
		II + III	40.4	50.0	58.0	60.5
	Employed Population by Sector	I	953.7	1,287.0	1,576.7	1,891.1
II + III		647.4	1,284.5	2,173.3	1,898.1	
JABOTABEK	Residential Population	11,510.0	15,620.0	19,530.0	22,980.0	
	Rate of Employment (%)	32.20	35.49	38.78	41.07	
	Employed Population	3,706.2	5,543.5	7,563.7	9,437.9	
	Sectoral Composition (%)	I	27.3	23.9	21.0	20.1
		II + III	72.7	76.1	79.0	79.9
	Employed Population by Sector	I	1,010.8	1,323.0	1,581.7	1,898.1
II + III		2,695.4	4,220.5	5,982.0	7,539.8	

Source: "Feasibility Study on Jakarta Harbour Road Project" JICA, 1981

Table 1.2.2 FUTURE JOBS IN JABOTABEK AREA

(Unit: 1,000 persons)

		1980	1990	2000	2010
DKI JAKARTA	I	57.1	36.0	15.0	7.0
	II + III	2,110.4	3,064.5	4,011.0	4,928.2
	TOTAL	2,167.5	3,100.5	4,026.0	4,935.2
BOTABEK	I	953.7	1,287.0	1,576.7	1,831.4
	II + III	585.3	1,156.6	1,957.1	2,672.8
	TOTAL	1,539.0	2,443.6	3,533.8	4,504.2
TOTAL	I	1,010.8	1,323.0	1,591.7	1,838.4
	II + III	2,695.7	4,221.1	5,968.1	7,601.0
	TOTAL	3,706.5	5,544.1	7,559.8	9,439.4

Source: "Feasibility Study on Jakarta Harbour Road Project" JICA, 1981

(2) Land Use in DKI Jakarta

The land-use program of DKI Jakarta was revised successively under the "Master Plan 1965 ~ 1985", and the most up-to-date land-use program is shown in the "Draft Master Plan". The comparison between the current (in 1977) land use and the planned land use (in 2000) is shown in Table 1.2.3. The remarkable trends were that there would be a sharp decrease in agricultural land use, and a large increase in residential and industrial land use in the future.

As for the housing development, there are the Kampung Improvement program, and other housing development programs to be undertaken by the government and private developers. The site areas are Tegal Alur, Prondok Kelapa, Pluit, Ancol & Sunter.

As to the Kampung area, the program calls for the improvement of the existing facilities, so there is no expansion in area. The sites selected for industrial development are Pulogadung, Gandaria & Rawa Buaya. The specific industries are to be located in Marunda, Tahah Kusir, and along the Jakarta By-pass. The improvement and development of port are programmed at Kali Baru, Marunda, Sunda Kelapa and Pasar Ikan. For the airport program, Halim and Kemayoran airports now in use are to be closed and a new airport is to be constructed at Cengkareng.

Table 1.2.3 · DKI JAKARTA LAND USE

LAND USE	1977		2000		2000/1977 %
	Area (ha)	%	Area (ha)	%	
Commercial/Administrative Area	3,494	5.3	5,495	8.4	157.3
Manufacturing Industry	1,543	2.4	8,522	13.0	552.3
Residential Area	19,900	30.4	33,605	51.4	168.9
Outside Kampung	12,062	18.4	25,767	39.4	213.6
Kampung	7,838	12.0	7,838	12.0	100.0
Agriculture	28,102	43.0	4,600	7.0	16.4
Green, etc.	12,367	18.9	13,184	20.0	106.6
TOTAL	65,406	100.0	65,406	100.0	100.0

(3) Zonal Allocation of Population Framework

1) Zone Division

For the following analysis, the study area was divided into zones with the administrative boundary, land use & traffic network taken into account. DKI Jakarta was divided into 47 zones, BOTABEK area into 15 zones, and the other areas into 5 zones, totalling 67 zones as shown in Table 1.2.4 & Figs. 1.2.2 ~ 3.

2) Land Use and Residential Population

The existing and the future land use composition by category and by zone were obtained by measuring the existing land use map and the master plan map in the year 2000 respectively.

The residential population by zone was estimated by multiplying land use area by category and by zone by the population density, which was established by land use category for the present and for the year 2000. For the year 1990, the residential population by zone was estimated by interpolation, and for the year 2010, it was estimated by extrapolation. The total of residential population by zone was then adjusted to the controlled total estimated in section 1.2.1 (1).

The established population densities were as follows:

	Year 1980 persons/ha	Year 2000 persons/ha
Residential Area Kampung	417	488
Outside Kampung	170	200
Industrial Area	60	30
Agricultural Area	5	5
Commercial/Administrative Area	12 m ² /person	

Table 1.2.4 ZONE CODE LIST

No.	Zone Name	No.	Zone Name	No.	Zone Name
	DKI JAKARTA	23	Kali Deres	46	Pasar Rebo
1	Gambir	24	Cengkareng	47	Cakung
2	Cideng	25	Grogol	BOTABEK	
3	Sawah-Besar	26	Palmerah	48	Tangerang
4	Pasar Baru	27	Mangga Besar	49	Cikupa
5	Kemayoran	28	Taman Sari	50	Serpong
6	Senen	29	Tambora	51	Ciputat
7	Kramat	30	Kembangan	52	Depok
8	Cempaka-Putih	31	Kebon Jeruk	53	Cibinong
9	Cikini	32	Tebet	54	Citeureup
10	Menteng	33	Manggarai	55	Bogor
11	Kebon Melati	34	Setiabudi	56	Parung
12	Karet Tengsin	35	Mampang-Prapatan	57	Leuwiliang
13	Geloro	36	Pasar Minggu	58	Pondok Gede
14	Muara	37	Kebayoran Baru	59	Bekasi
15	Pejagalan	38	Kebayoran Lama	60	Cikarang
16	Mangga Dua Utara	39	Cilandak	61	Setu
17	Pedemangan	40	Kebon Manggis	62	Sukatani
18	Sunter	41	Kayu Manis	OUTSIDE JABOTABEK	
19	Tanjung Priok	42	Pulo Gadung	63	West Java 1
20	Pegangsaan-Dua	43	Cipinang-Besar	64	West Java 2
21	Cilincing	44	Kelender	65	West Java 3
22	Semanan	45	Kramat Jati	66	Central & East Java
				67	Sumatera & Others

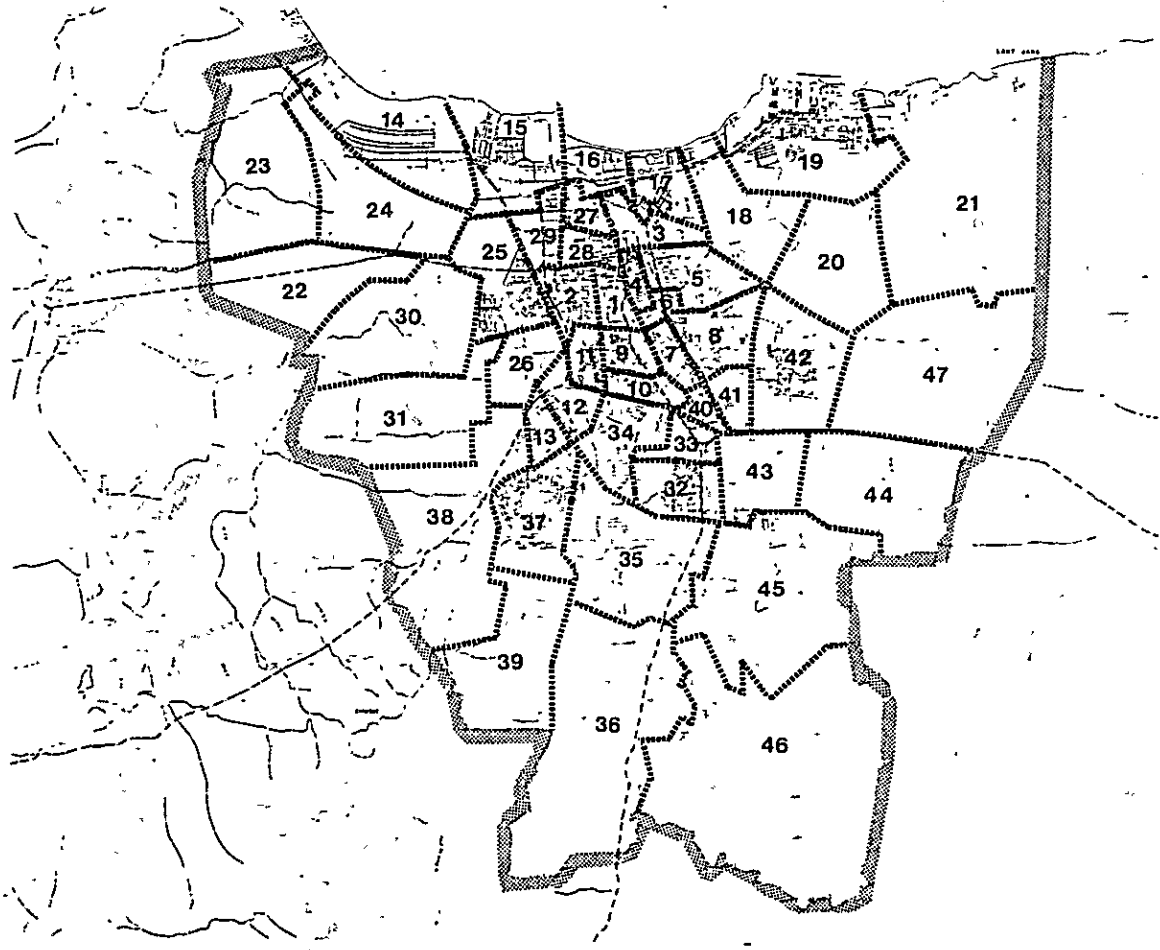


Fig. 1.2.2 ZONE DIVISION IN DKI JAKARTA

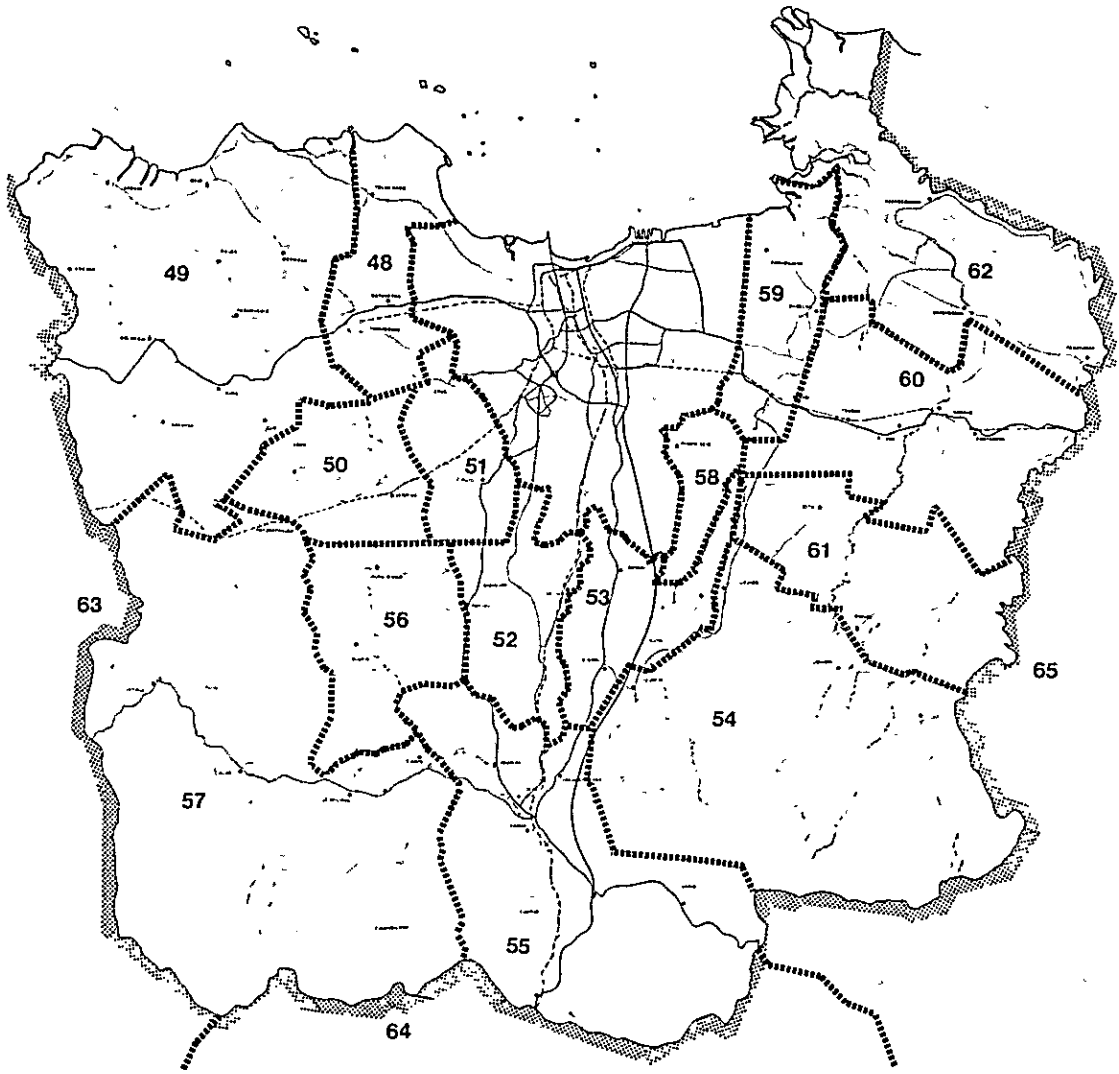


Fig. 1.2.3 ZONE DIVISION IN BOTABEK

As to BOTABEK area, the estimated controlled total of residential population was allocated to each zone by using the regional composition ratio of residential population in Tangerang, Bogor and Bekasi, which was estimated in "JMDP".

3) Employed Population and Number of Jobs

The employed population in residential area by zone was estimated by multiplying the rate of employment by the residential population of each zone. The existing rate of employment differs from zone to zone, but it was assumed that the future rate of employment would be developed and nearly equalized in each zone to the average rate of employment. The employed population of the primary sector by zone was estimated by apportioning the employed population of the primary sector in DKI Jakarta in proportion to the area of agricultural land use in each zone, on the assumption that the employed population in the primary sector would have their work places in their residential zones. The employed population in the secondary and tertiary sector was obtained by deducting the employed population in the primary sector by zone from the employed population by zone.

As to the number of jobs by zone, it was assumed that the number of jobs in the primary sector by zone was equal to the employed population in the primary sector by zone, as they found their jobs in their residential zones. The number of jobs in the secondary sector by zone was estimated as per the following three groups.

a) To be allocated in industrial area

Number of jobs in the secondary sector deducted b) and c) was allocated to each zone in proportion to the industrial land use area by zone.

b) To be allocated in commercial/administrative area

10% of number of jobs in the secondary sector was allocated to each zone in proportion to the commercial/administrative land use area by zone, on the assumption that the present situation would not be changed in the future.

c) To be allocated in proportion to the residential population

As the trend in the past showed that the number of jobs in the secondary sector in the residential area was decreasing, it was assumed that 15.3% of number of jobs in the secondary sector would be in the residential area in the year 2000 as compared with 25% in the year 1980. It was allocated to each zone in proportion to the residential population by zone.

The number of jobs in the tertiary sector was allocated to each zone by two ways, one portion to be allocated to commercial/administrative area and the other to be allocated in proportion to residential population. As for the former, 70% of the number of jobs of the tertiary sector was allocated to each zone in proportion to its commercial/administrative area by zone. As for the latter, 30% was allocated to each zone in proportion to residential population by zone.

Employed population by zone in BOTABEK area was estimated by multiplying residential population by zone by the rate of employment by Kabupaten adapted in the "JMDP". Number of jobs by zone in BOTABEK area was estimated by allocating excess outflow of employed population to DKI Jakarta by Kabupaten to each zone.

Table 1.2.5 shows the estimated residential population, employed population and number of jobs by zone in the year 1980 and 2000.

Table 1.2.5 RESIDENTIAL POPULATION, EMPLOYED POPULATION AND NUMBER OF JOBS BY ZONE

Zone No.	Zone Name	1980			2000		
		Residential Population	Employed Population	Number of Jobs	Residential Population	Employed Population	Number of Jobs
1.	Gambir	34.6	14.5	19.3	33.0	14.9	50.9
2.	Cideng	146.5	61.6	81.5	139.8	63.0	215.5
3.	Sawah	167.4	43.5	48.3	170.0	60.1	88.2
4.	Pasar Baru	30.5	7.9	8.8	30.9	10.9	16.0
5.	Kemayoran	248.7	71.1	74.4	228.8	84.5	94.6
6.	Senen	66.1	18.3	21.9	55.7	20.3	31.9
7.	Kramar	116.6	32.3	38.5	98.1	35.7	56.1
8.	Cempaka-Putih	262.3	68.9	70.3	278.5	98.9	118.7
9.	Cikini	70.8	27.5	36.6	70.8	30.6	65.1
10.	Menteng	92.0	35.8	47.5	92.0	39.8	84.5
11.	Kebon Melati	129.1	45.8	50.2	123.1	50.7	60.7
12.	Karet Tengsin	119.7	42.5	46.5	114.1	47.0	56.2
13.	Gelora	10.9	9.9	10.3	20.4	15.3	30.4
14.	Muara	19.6	5.6	7.0	127.7	48.1	10.2
15.	Pejagalan	129.8	58.5	68.4	258.8	121.5	62.7
16.	Mangga Dua Utara	30.1	14.1	20.2	11.1	5.4	16.8
17.	Pedemangan	102.8	23.7	23.0	94.5	31.7	34.9
18.	Sunter	42.8	17.7	27.6	170.2	76.1	66.5
19.	Tanjung Priok	427.2	109.1	120.2	480.7	167.5	351.1
20.	Pegangsaan-Dua	25.3	11.4	8.6	81.5	38.2	23.4
21.	Cilincing	128.9	29.6	29.2	338.2	110.2	134.1
22.	Semanan	41.2	11.6	12.0	135.3	49.6	38.3
23.	Kali Deres	73.7	15.8	14.6	298.2	96.2	98.3
24.	Cengkareng	119.7	29.3	26.0	263.9	90.7	57.1
25.	Grogol	207.9	111.4	106.6	261.8	137.1	169.5
26.	Palmereah	180.6	88.2	86.2	227.4	112.2	88.9
27.	Mangga Besar	82.6	22.3	25.2	72.9	26.2	35.2
28.	Taman Sari	113.1	30.6	34.4	99.8	35.9	48.3
29.	Tambora	281.1	62.4	63.1	238.4	81.2	83.2
30.	Kembangan	77.9	24.4	24.2	314.9	121.4	39.5
31.	Kebon Jeruk	100.3	27.9	26.5	259.6	94.6	37.1

Zone No.	Zone Name	1980			2000		
		Residential Population	Employed Population	Number of Jobs	Residential Population	Employed Population	Number of Jobs
32.	Tebet	150.9	49.8	42.9	168.2	66.6	43.1
33.	Manggarai	129.6	42.7	36.9	144.4	57.2	37.0
34.	Setiabudi	239.7	72.2	68.6	234.8	88.9	119.7
35.	Mampang-Prapatan	207.8	67.9	74.8	265.2	104.6	93.6
36.	Pasar Minggu	225.3	60.4	54.6	560.8	196.3	109.8
37.	Kebayoran Baru	223.2	103.5	116.0	265.7	126.2	193.2
38.	Kebayoran Lama	285.3	74.4	70.7	600.5	212.5	129.3
39.	Cilandak	105.1	27.2	25.3	210.1	74.1	43.6
40.	Kebon Magsis	26.9	6.3	6.2	27.3	9.5	7.5
41.	Kayu Manis	193.5	45.4	44.5	196.2	68.2	53.8
42.	Pulo Gadung	236.1	102.1	91.4	301.3	138.3	83.9
43.	Cipinang-Besar	279.4	81.5	79.1	304.3	113.5	72.1
44.	Kelender	82.4	37.8	28.5	327.0	154.3	57.5
45.	Kramat Jati	229.1	92.5	86.1	337.4	147.2	139.6
46.	Pasar Rebo	170.7	43.1	40.1	475.8	162.9	151.8
47.	Cakung	95.2	25.1	24.7	250.9	87.9	341.1
DKI Jakarta Total		6,560.0	2,105.1	2,167.5	9,860.0	3,823.7	4,041.0
48.	Tangerang	352.0	113.1	106.7	718.2	277.2	259.2
49.	Cikupa	702.5	225.7	213.0	1,265.8	488.5	456.8
50.	Serpong	140.7	45.2	42.7	328.8	126.9	118.6
51.	Ciputat	192.4	61.8	58.3	487.1	188.0	175.8
52.	Depok	243.1	78.7	75.5	487.2	189.7	181.4
53.	Cibinong	228.7	74.0	71.0	559.1	217.7	208.1
54.	Citeureup	346.4	112.1	107.5	641.0	249.5	238.5
55.	Bogor	971.5	314.4	301.6	1,842.7	717.3	685.7
56.	Parung	180.9	58.5	56.1	320.2	124.6	119.1
57.	Leuwiliang	544.2	176.1	168.9	752.3	292.9	280.0
58.	Pondok Gede	91.6	29.9	28.7	350.3	135.6	125.2
59.	Bekasi	205.2	66.9	64.2	429.2	166.1	153.4
60.	Cikarang	391.0	127.4	122.3	895.6	346.7	320.2
61.	Setu	157.9	51.5	49.4	293.0	113.4	104.7
62.	Sukatani	201.9	65.8	63.1	299.5	115.9	107.1
BOTABEK Total		4,950.0	1,601.1	1,539.0	9,670.0	3,750.0	3,533.8
Grand Total		11,510.0	3,706.2	3,706.5	19,530.0	7,573.7	7,574.8

1.2.2 Forecast of person trips

(1) Present Situation of Person Trips

The present situation of person trips in DKI Jakarta was shown in the OD table established under the "Feasibility Study on Jakarta Harbour Road Project". In the survey conducted under the said project, a postcard was distributed to the vehicles passing through the surveying point. The vehicles distributed postcards were motorcycle, passenger car and truck. Based on the traffic counting survey carried out at the same time, the samples returned were expanded to the actual traffic volume and processed into OD tables by vehicle type. An OD table by bus was estimated by using the traffic volume on Cordon lines and distribution pattern by motorcycle, considering that motorcycle was used as an alternative means of bus and its distribution pattern of trip length was similar to that of bus.

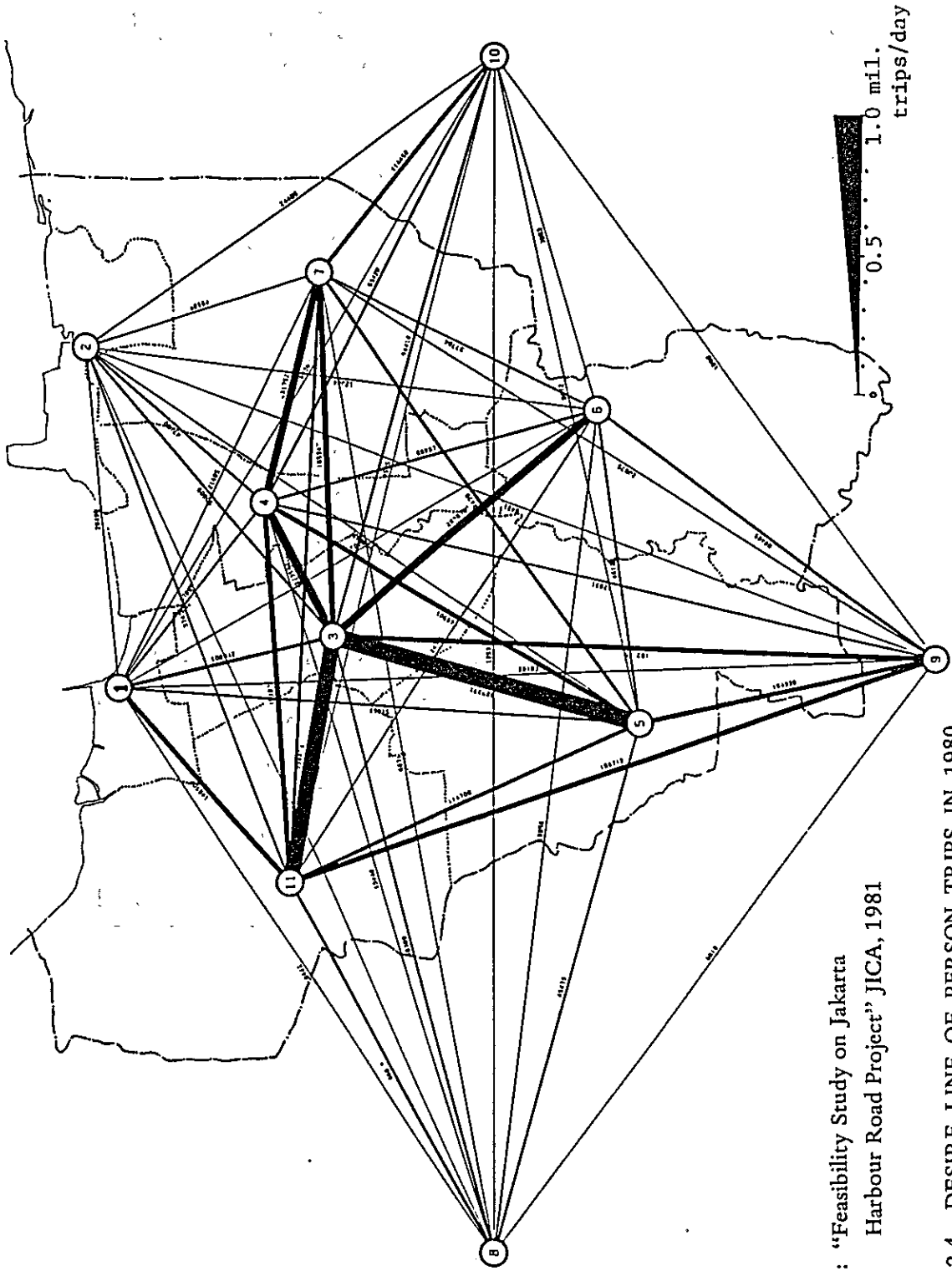
The results of screen line checking were satisfactory. The above OD tables by vehicle base were then converted to OD tables by applying average occupancy rates by vehicle type obtained by the result of the survey. An OD table by railway established on the basis of issued tickets was added to the above OD tables by person trip and OD tables by all transportation means were established. Number of person trips in 24 hours in the year 1980 amounted to 5,145.8 thousand person trips excluding intra zonal trips. The desire line in the year 1980 is shown in Fig. 1.2.4.

(2) Future Person Trip Generation

Person trip generation in the future was estimated on the basis of work trips. The number of employed population in residential area implicates generated work trips on one hand and the number of jobs at work place indicates attracted work trips on the other hand.

An effective working day ratio was established to estimate number of work trips on the basis of employed population and number of jobs. The effective working day ratio in the year 1980 was 0.956 according to the result of the survey. This ratio is considered to show an decreasing trend in future, so it was assumed as shown in Table 1.2.6 taking consideration of the trends of foreign cities.

Generation and attraction of work trips were then converted to those of trips of all purposes in the following procedure. Parameters established were as shown in Table 1.2.6.



Source: "Feasibility Study on Jakarta Harbour Road Project" JICA, 1981

Fig. 1.2.4 DESIRE LINE OF PERSON TRIPS IN 1980 (ALL MODES IN 24 HOURS)

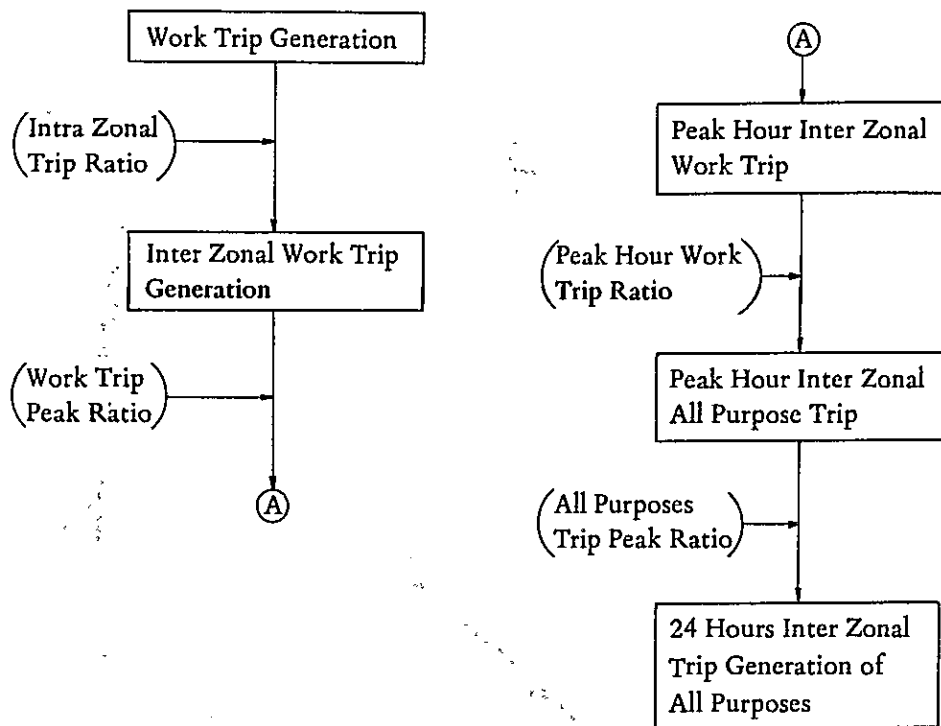


Table 1.2.6 PARAMETERS FOR ESTIMATING PERSON TRIP GENERATION

	1980	1990	2000	2010
Effective Working Day Ratio	0.956	0.93	0.90	0.90
Inter Zonal Work Trip Ratio	0.477	0.55	0.60	0.625
Peak Hour Ratio of Work Trip	0.515	0.55	0.60	0.60
Work Trip Ratio at Peak Hour	0.73	0.75	0.75	0.75
Peak Hour Ratio of All Purposes Trip	0.15	0.18	0.20	0.20

Table 1.2.7 FUTURE PERSON TRIP GENERATION AND ATTRACTION

(Unit: 1,000 Person Trips)

	1980			1990			2000			2010		
	Generated	Attracted	Generated	Attracted	Generated	Attracted	Generated	Attracted	Generated	Attracted	Generated	Attracted
24 Hours All Purposes	DKI JAKARTA	959.4	1,019.0	1,520.2	1,639.7	2,064.8	2,260.4	2,612.8	2,874.0			
	BOTABEK	148.5	89.1	237.7	118.8	351.3	156.7	455.6	195.7			
	OTHERS	5.9	5.6	9.5	8.9	13.8	12.8	17.7	16.4			
	TOTAL	1,113.8	1,113.7	1,767.4	1,767.4	2,429.9	2,429.9	3,086.1	3,086.1			
Peak 2 Hours Work Trips	DKI JAKARTA	494.1	524.8	836.1	901.8	1,238.9	1,356.2	1,567.7	1,724.4			
	BOTABEK	76.4	45.8	142.9	77.5	210.8	93.3	273.5	117.6			
	OTHERS	3.1	3.0	5.2	4.9	8.3	7.7	10.6	9.8			
	TOTAL	573.6	573.6	984.2	984.2	1,457.2	1,457.2	1,851.8	1,851.8			
Peak 2 Hours All Purposes	DKI JAKARTA	685.0	707.5	1,116.8	1,204.4	1,656.7	1,813.1	2,100.0	2,308.8			
	BOTABEK	103.0	79.2	190.4	163.2	281.0	125.4	365.3	157.5			
	OTHERS	5.0	6.3	6.9	6.5	11.1	10.3	14.1	13.1			
	TOTAL	793.0	793.0	1,314.1	1,314.1	1,948.8	1,948.8	2,479.4	2,479.4			
24 Hours All Purposes	DKI JAKARTA	4,528.0	4,528.0	6,459.7	6,459.7	8,702.3	8,702.3	11,075.2	11,075.2			
	BOTABEK	558.6	558.6	1,058.2	1,058.2	1,405.2	1,405.2	1,822.3	1,822.3			
	OTHERS	59.2	59.2	114.2	114.2	151.5	151.5	196.6	196.6			
	TOTAL	5,145.8	5,145.8	7,632.1	7,632.1	10,259.0	10,259.0	13,094.1	13,094.1			

Source: "Feasibility Study on Jakarta Harbour Road Project" JICA, 1981

(3) Generation and Attraction of Person Trips by Zone

Generation and attraction of person trips by zone were estimated on the basis of work trips, too.

Generation of inter zonal work trips by zone was estimated as a balance between the total of employed population by zone and employed population inside its own zone, and attraction of inter zonal work trips by zone was estimated as a balance between the total of number of jobs by zone and number of jobs inside its own zone. The rate of employment inside its own zone by zone was established according to the result of the survey.

The procedure estimating trip generation and attraction by zone on the basis of employed population and number of jobs by zone was just the same as mentioned in section 1.2.2 (2).

Parameters such as peak ratio of work trips, work trip ratio at peak hour and peak ratio of all purposes trips were established by zone on the basis of the result of the survey. The total of the estimated trip generation and attraction by zone was then adjusted to the controlled total estimated in the previous section.

Work trip generation by zone in BOTABEK area was estimated by multiplying work trip generation by zone by the growth rate of employed population by Kabupaten estimated in the "JMDP". As to the area outside JABOTABEK, the growth rate was assumed to be the average of BOTABEK area. Work trip attraction by zone in BOTABEK area was estimated by deducting the excess outflow to DKI Jakarta from the above estimated work trip generation by zone. These work trips were then converted to the trips of all purpose.

The estimated trip generation and attraction of all purposes for peak 2 hours and for 24 hours are shown in Table 1.2.8.

(4) Distribution of Person Trips

In estimating future distribution of person trips, application of a gravity model and a present pattern method was studied. The correlation coefficient obtained from the study of a gravity model was very low. Considering the below mentioned items, future distribution of person trips was estimated on the basis of present pattern method with some modification to the relevant zones.

- Although road network will be developed and improved, road network itself will not be changed.
- Industrial development plan is concentrated in some particular zones. Distribution pattern of these zones are to be modified in consideration of distribution pattern of industrial zones already developed.
- As to the development of ports and the relocation of airport, future distribution pattern of these zones will be modified in consideration of the distribution pattern of the facilities now in use.

Desire line in the year 2000 is shown in Fig. 1.2.5.

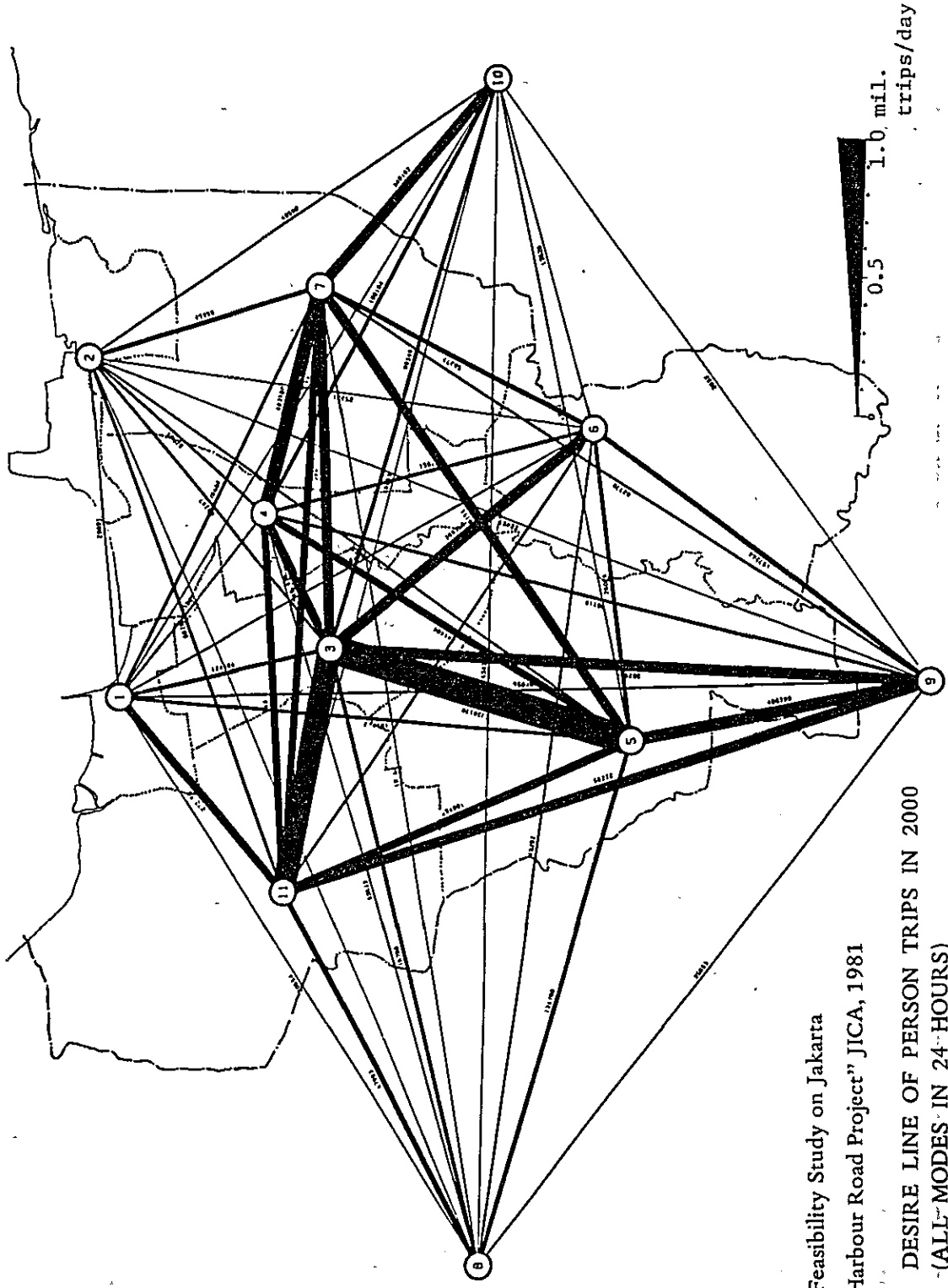
Table 1.2.8 ESTIMATION OF FUTURE PERSON TRIPS BY ZONE

(Unit: 1,000 person trips)

Zone No.	Zone Name	Peak 2 Hours										24 Hours (Generated = Attracted)			
		Generated					Attracted					1980	1990	2000	2010
		1980	1990	2000	2010	1980	1990	2000	2010	1980	1990	2000	2010		
1.	Gambir	5.3	8.5	11.5	14.5	11.7	23.3	37.3	47.9	45.6	71.4	97.9	124.8		
2.	Cideng	22.3	35.9	48.7	61.2	49.6	98.6	158.0	203.1	193.1	301.5	414.7	528.7		
3.	Sawah-Besar	9.4	12.1	14.3	18.2	12.9	21.4	33.7	42.8	80.4	110.5	140.4	182.0		
4.	Pasar Baru	1.7	2.2	2.6	3.3	2.4	3.9	6.1	7.8	14.6	20.1	25.5	33.1		
5.	Kemayoran	16.4	18.8	20.9	25.7	21.8	23.4	30.5	36.2	126.9	135.9	151.1	183.1		
6.	Senen	6.2	7.5	8.2	10.1	7.0	9.5	13.5	16.5	40.6	48.9	56.9	69.5		
7.	Kramat	10.9	12.7	14.6	17.4	12.3	16.8	23.8	29.1	71.5	86.2	100.2	122.4		
8.	Cempaka-Putih	17.1	22.2	26.8	33.5	29.6	44.4	68.6	88.3	114.5	153.2	196.5	250.1		
9.	Cikini	8.0	8.1	9.1	11.3	16.2	25.2	35.2	43.2	83.3	102.8	123.3	152.1		
10.	Menteng	10.4	10.5	11.8	14.7	21.0	32.7	45.8	56.1	108.1	133.6	160.2	197.5		
11.	Kebon Melati	19.0	19.4	21.7	25.9	12.3	14.3	16.9	19.7	118.5	112.1	119.7	141.5		
12.	Karet Tengsin	17.6	18.0	20.1	24.0	11.4	13.3	15.7	18.3	109.9	103.9	110.9	131.1		
13.	Gelora	1.3	1.4	2.0	2.4	8.4	18.1	28.2	36.2	32.7	50.6	71.2	90.0		
14.	Muara	1.1	4.4	9.1	11.7	3.7	4.8	6.3	7.6	11.1	35.6	69.0	88.3		
15.	Pejagalan	28.7	55.9	78.7	99.3	32.5	31.3	31.5	34.3	187.3	235.7	303.6	372.6		
16.	Mangga Dua Utara	4.3	6.9	9.3	11.7	11.1	22.1	35.4	45.5	47.9	73.0	100.1	127.7		
17.	Pedemangan	5.6	6.1	6.5	7.5	2.1	2.9	3.9	5.1	27.2	41.9	32.2	39.9		
18.	Sunter	4.5	7.3	9.9	12.5	16.0	31.7	50.9	65.3	60.5	92.3	126.5	161.3		
19.	Tanjung Priok	18.3	29.5	40.0	50.3	38.4	76.5	122.6	157.5	177.5	270.3	367.5	473.1		
20.	Pegangsaan-Dua	3.7	5.4	13.9	18.0	2.7	5.1	8.0	10.5	27.5	43.0	73.2	95.8		
21.	Cilincing	3.5	10.1	28.3	36.0	7.4	16.1	26.9	35.9	36.4	71.9	142.9	185.8		

Zone No.	Zone Name	Peak 2 Hours										24 Hours (Generated = Attracted)				
		Generated					Attracted					1980	1990	2000	2010	
		1980	1990	2000	2010	1980	1990	2000	2010							
22.	Semanan	5.4	14.8	32.1	41.9	1.7	3.8	6.3	8.4	18.5	42.7	77.2	102.3			
23.	Kali Deres	4.5	17.8	38.5	57.2	2.4	19.9	33.4	54.7	13.1	82.9	151.6	251.8			
24.	Cengkarang	12.6	35.8	64.5	82.6	3.3	5.9	9.2	12.6	44.8	93.2	149.1	196.1			
25.	Grogol	42.5	42.7	51.2	62.5	53.3	76.0	99.9	121.4	337.8	380.6	449.2	544.0			
26.	Palmereah	23.8	25.9	33.2	40.1	28.2	28.8	30.8	34.7	218.5	216.0	237.1	279.3			
27.	Mangga Besar	4.9	6.3	6.3	7.9	7.8	9.1	14.1	16.9	44.9	51.2	59.4	73.0			
28.	Taman Sari	6.8	8.6	8.6	10.8	10.6	12.5	19.3	23.2	61.5	70.1	81.4	100.0			
29.	Tambora	21.4	34.4	46.8	58.7	11.6	23.1	37.0	47.6	90.4	137.8	188.9	240.9			
30.	Kembangan	13.0	50.9	111.8	145.3	1.8	2.4	3.2	4.0	44.7	110.7	207.5	268.0			
31.	Kebon Jeruk	12.7	40.8	79.6	100.4	2.0	2.6	3.2	4.0	40.5	85.0	141.0	178.3			
32.	Tebet	19.3	27.0	32.9	39.0	6.8	7.2	7.8	9.0	91.3	99.9	108.5	128.1			
33.	Manggarai	16.5	23.2	28.2	33.5	5.9	6.2	6.7	7.7	78.4	85.8	93.2	110.0			
34.	Setiabudi	25.4	30.5	33.1	41.5	26.0	42.9	69.0	86.3	131.7	159.1	200.0	251.0			
35.	Mampang-Prapatan	17.3	25.0	32.5	41.1	24.7	28.4	33.6	39.8	144.2	176.8	205.7	254.5			
36.	Pasar Minggu	16.4	46.3	89.1	116.8	9.4	12.6	16.6	21.0	89.1	171.1	277.2	366.0			
37.	Kebayoran Baru	24.2	39.1	53.0	66.6	67.0	133.2	213.4	274.3	285.4	463.7	635.1	808.7			
38.	Kebayoran Lama	24.9	65.1	115.4	147.4	6.0	9.2	13.1	17.2	99.0	193.4	298.2	385.0			
39.	Cilandak	8.1	21.3	37.0	46.8	4.2	6.2	8.6	11.2	39.0	76.4	115.1	151.5			
40.	Kebon Manggis	2.0	3.2	4.3	5.4	0.7	1.4	2.2	2.8	9.5	14.5	19.8	25.3			
41.	Kayu Manis	14.2	22.9	31.1	39.1	5.0	9.9	15.9	20.4	68.3	104.2	142.8	182.1			
42.	Pulo Gadung	42.0	52.3	68.1	85.7	33.9	33.1	33.7	37.1	266.7	263.3	291.5	352.0			
43.	Cipinang-Besar	30.3	53.2	62.0	75.5	12.7	12.7	13.1	14.7	153.6	197.8	206.5	246.5			
44.	Kelender	20.6	33.3	45.2	56.8	5.2	10.3	16.4	21.1	87.5	133.5	182.9	233.3			
45.	Kramat Jati	41.0	48.5	58.2	74.9	34.6	53.6	76.8	93.8	227.8	277.9	344.0	430.1			

Zone No.	Zone Name	Peak 2 Hours										24 Hours (Generated = Attracted)				
		Generated					Attracted					1980	1990	2000	2010	
		1980	1990	2000	2010	1980	1990	2000	2010							
46.	Pasar Rebo	13.3	30.5	58.3	77.5	6.6	19.2	34.2	48.2	62.0	145.7	251.2	341.3			
47.	Cakung	6.8	14.8	26.3	35.8	5.7	98.8	197.0	269.6	41.1	333.8	604.8	826.3			
	DKI Jakarta Total	685.0	1116.8	1656.7	2100.0	707.5	1204.3	1813.1	2308.8	4528.8	6459.7	8702.3	11075.2			
48.	Tangerang	13.8	32.4	45.6	63.1	8.4	11.3	14.3	20.3	81.7	173.2	218.6	302.3			
49.	Cikupa	4.8	11.3	15.7	21.9	6.8	9.2	11.5	16.5	16.1	34.3	43.2	59.8			
50.	Serpong	0.5	1.1	1.6	2.2	0.6	0.9	1.1	1.6	3.1	6.5	8.2	11.4			
51.	Ciputat	13.9	32.8	45.9	63.7	18.6	24.9	31.4	44.7	102.5	217.1	274.0	379.0			
52.	Depok	18.0	30.4	45.5	54.3	3.6	5.2	6.5	6.7	72.5	119.4	160.5	191.4			
53.	Cibinong	14.9	25.0	37.6	44.9	7.6	10.8	13.4	13.8	94.9	157.8	211.8	252.8			
54.	Citeureup	0.9	1.5	2.1	2.6	5.8	8.3	10.4	10.7	10.9	18.1	24.4	29.1			
55.	Bogor	8.2	14.0	20.8	24.8	10.6	15.1	18.9	19.4	54.3	90.2	121.2	144.6			
56.	Parung	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	1.5	2.5	3.4	4.0			
57.	Leuwiliang	0.1	0.2	0.2	0.3	0.0	0.0	0.0	0.0	4.6	7.6	10.2	12.1			
58.	Pondok Gede	16.5	24.5	38.9	51.5	6.4	6.6	6.7	9.0	61.7	104.6	149.0	196.8			
59.	Bekasi	8.8	13.1	20.7	27.2	8.7	8.8	9.1	12.0	52.8	89.6	127.6	168.7			
60.	Cikarang	2.7	3.9	6.2	8.4	1.7	1.8	1.8	2.5	16.3	27.7	39.4	52.1			
61.	Seru	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	5.7	9.7	13.8	18.2			
62.	Sukatani	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2			
	BOTABEK Total	103.0	190.4	281.0	365.3	79.2	103.2	125.4	157.5	558.6	1058.2	1405.2	1822.3			
63.	West Java 1	0.5	0.7	1.1	1.4	0.9	0.9	1.4	1.8	13.3	24.4	32.4	42.0			
64.	West Java 2	3.7	5.1	8.1	10.4	1.3	1.4	2.2	2.7	27.7	50.8	67.5	87.5			
65.	West Java 3	0.3	0.4	0.7	0.9	3.8	3.8	6.2	7.8	16.2	29.7	39.3	51.1			
66.	Sentral & East Java	0.5	0.7	1.2	1.5	0.3	0.4	0.5	0.8	4.5	8.2	10.9	14.1			
67.	Sumatera & Others	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.1	1.5	1.9			
	Outside JABOTABEK Total	5.0	6.9	11.1	14.1	6.3	6.5	10.3	13.1	59.2	114.2	151.5	196.6			
	Grand Total	793.0	1314.0	1948.8	2479.4	793.0	1314.0	1948.8	2479.4	5145.8	7632.1	10259.0	13094.1			



Source: "Feasibility Study on Jakarta Harbour Road Project" JICA, 1981
 Fig. 1.2.5 DESIRE LINE OF PERSON TRIPS IN 2000 (ALL-MODES IN 24-HOURS)

1.2.3 Forecast of railway passengers

(1) Modal Split

1) Modal Split between Mass Transit and Individual Transit

The modal split in 1980 obtained from the results of OD survey is as shown in Table 1.2.9.

Table 1.2.9 MODAL SPLIT IN THE YEAR 1980

(Unit: thousand trips)

	Peak time		Off-peak		24 Hours	
	Trip	Ratio	Trip	Ratio	Trip	Ratio
Motorcycle	86.9	11.0	418.7	9.6	505.6	9.8
Sedan	181.4	22.9	1,138.0	26.2	1,319.4	25.6
Truck	87.5	11.0	523.0	12.0	610.5	11.9
Bus	429.1	54.1	2,237.4	51.4	2,666.6	51.8
Railways	8.1	1.0	35.7	0.8	43.7	0.9
Total	793.0	100.0	4,352.8	100.0	5,145.8	100.0

Share of mass transit and individual transit at peak hours accounted for 55.1% and 44.9% respectively and 52.7% and 47.3% respectively for 24 hours. Of mass transit, buses accounted for 54.1% at peak hours and 51.8% for 24 hours. The railways account for 1.0% and 0.9% respectively. In estimating the future modal split, the sharing of traffic demands between mass transit and individual transit was firstly determined, after which sharing between motorcycles and passenger cars, and sharing between railways and buses were performed. Future share of mass transit was estimated as shown in Table 1.2.10 considering the following situations:

- Present share of mass transit is relatively low compared with that of foreign cities.
- Present share of motorcycle is relatively high, but it is estimated that there will be considerable shift from motorcycle to mass transit as mass transportation system will be improved in future.
- Railway improvement plan is now in process under the Intermediate Program and Master Plan.

Generation and attraction of person trips by mass transit was calculated by multiplying the estimated generation and attraction of person trips by the above established share of mass transit.

Table 1.2.10 FRAMEWORK OF FUTURE SHARE OF MASS TRANSIT

(Unit: Percent)

		1980	1990	2000	2010
All Day	Jakarta	51.6	55	60	65
	Outside JKT	60.9	65	70	75
Peak 2 hours	Jakarta	54.3	60	65	70
	Outside JKT	60.4	65	70	75

Source: "Feasibility Study on Jakarta Harbour Road Project" JICA, 1981

Table 1.2.11 PASSENGERS ESTIMATED FOR MASS TRANSIT

(Unit: Thouand Passengers)

		1990		2000		2010	
		Generated	Attracted	Generated	Attracted	Generated	Attracted
Peak Hours	DKI	668.9	721.4	1,073.7	1,175.4	1,463.2	1,609.4
	Others	128.3	75.8	204.5	102.8	284.7	138.5
	Total	797.2	797.2	1,278.2	1,278.2	1,747.9	1,747.9
Off Peak Hours	DKI	2,871.3	2,818.8	4,116.6	4,014.9	5,669.8	5,523.6
	Others	633.9	686.4	885.5	987.2	1,229.6	1,375.8
	Total	3,505.2	3,505.2	5,002.1	5,002.1	6,899.4	6,899.4
All Day	DKI	3,540.2	3,540.2	5,190.3	5,190.3	7,133.0	7,133.0
	Others	762.2	762.2	1,090.0	1,090.0	1,514.3	1,514.3
	Total	4,302.4	4,302.4	6,280.3	6,280.3	8,647.3	8,647.3

Source: "Feasibility Study on Jakarta Harbour Road Project" JICA, 1981

The results of calculation are as shown in Table 1.2.11 with 2,710.3 thousand trips (24 hours) in 1980, 4,302.4 thousand trips in 1980 (growth rate from 1980 = 1.53), 6,280.3 thousand trips in 2000 (2.32), and 8,647.3 thousand trips in 2010 (3.19). The total person trips by year was distributed to zones by multiplying firstly present share of mass transit of each zone by the generation and attraction of person trips by zone, and thereby obtaining the theoretical generation and attraction of person trips by zone shared by mass transit. The thus obtained figures were adjusted to the controlled totals estimated. The distribution of person trips by mass transit was estimated on the present pattern. The distribution of person trips by individual transit was calculated as the balance between the total person trips and the person trips by mass transit.

2) Modal Split between Railway and Bus

Modal split between railway and bus depends mostly upon time and cost factors. Cost factor will be varied largely by what kind of fare system will be adopted. In this study, therefore, time factor was selected as a determining factor for modal split between railway and bus.

It was very difficult to estimate a diversion curve between railway and bus as the share of railway was very low at present. In this study, diversion curve was assumed as follows:

$$\frac{BT_{ij}}{RT_{ij}} = kBS_{ij}^a - kBS_{ij}^\beta$$

BS_{ij}: Share of bus between zone i and zone j

BT_{ij}: Travel time by bus between zone i and zone j

RT_{ij}: Travel time by railway between zone i and zone j

k, a, β: Parameters (k = 4, a = 2, β = 1)

i) Travel Time by Railway

Travel time between zones by railway was calculated as follows:

$$RT_{ij} = RS_{mn} + RA_{im} + RA_{nj} + RW + RC$$

RT_{ij}: Travel Time between zone i and zone j by railway.

RS_{mn}: Time required to travel between station m nearest to zone i and station n nearest to zone j.

= Distance between m ~ n/scheduled speed.

	Scheduled speed	Peak hours	Off-peak hours
1980		30 km/h	30 km/h
1990		35	35
2000		35	35
2010		35	35

RAim: Access time from zone i to station m
 = Distance between i and m/Travel speed by transportation means + Time required to change transportation means

Travel speed by transportation means

$0^m < \text{Distance } i \sim m \leq 1000^m$ 4 km/h by walk

$1000^m < \text{Distance } i \sim m$ 25 km/h by bus

Time required to change transportation means

5 min. for bus

RAnj: Access time from station n to zone j

– Calculation formula is same with RAim.

RW: Waiting time for train

Waiting time	Peak hours	Off-peak hours
1980	15 min.	20 min.
1990	10	15
2000	5	10
2010	5	10

RC: Time required to change trains at railway terminal

Zone Group 1 (zones inside and including the loop line)

Zone Group 2 (zones outside the loop line)

– No change of trains among zone group 1.

– One change of trains among zones other than the above.

	Peak hours	Off-peak hours
1980	10 min.	20 min.
1990	5	10
2000	5	10
2010	5	10

ii) Travel Time by Bus

Travel time between zones by bus was calculated as follows:

$BT_{ij} = BR_{ij} + BA_i + BA_j + BW + BC$

BTij: Travel time between zone i and zone j by bus

BRij: Running time by bus between zone i and zone j

= Road Distance between i and j/Scheduled speed

Scheduled speed	Peak hours	Off-peak hours
1980	30 km/h	35 km/h
1990	25	35
2000	25	30
2010	25	30

BAi: Time required to travel from zone i to a bus stop
 Zone Group 1 (zones inside and including bus terminals
 in DKI Jakarta)

Zone Group 2 (zones other than zone group 1)

– 5 min. or zone group 1

– 10 min. for zone group 2

BAj: Time required to travel from a bus stop to zone j.

– same as BAI

BW: Waiting time for bus

Waiting time	Peak hours	Off-peak hours
1980	10 min.	20 min.
1990	10	20
2000	5	15
2010	5	15

BC: Time required to change buses at bus terminal

– No change of buses among zone group 1

– One change of buses among zones other than the
 above.

Peak hours	Off-peak hours
5 min.	10 min.

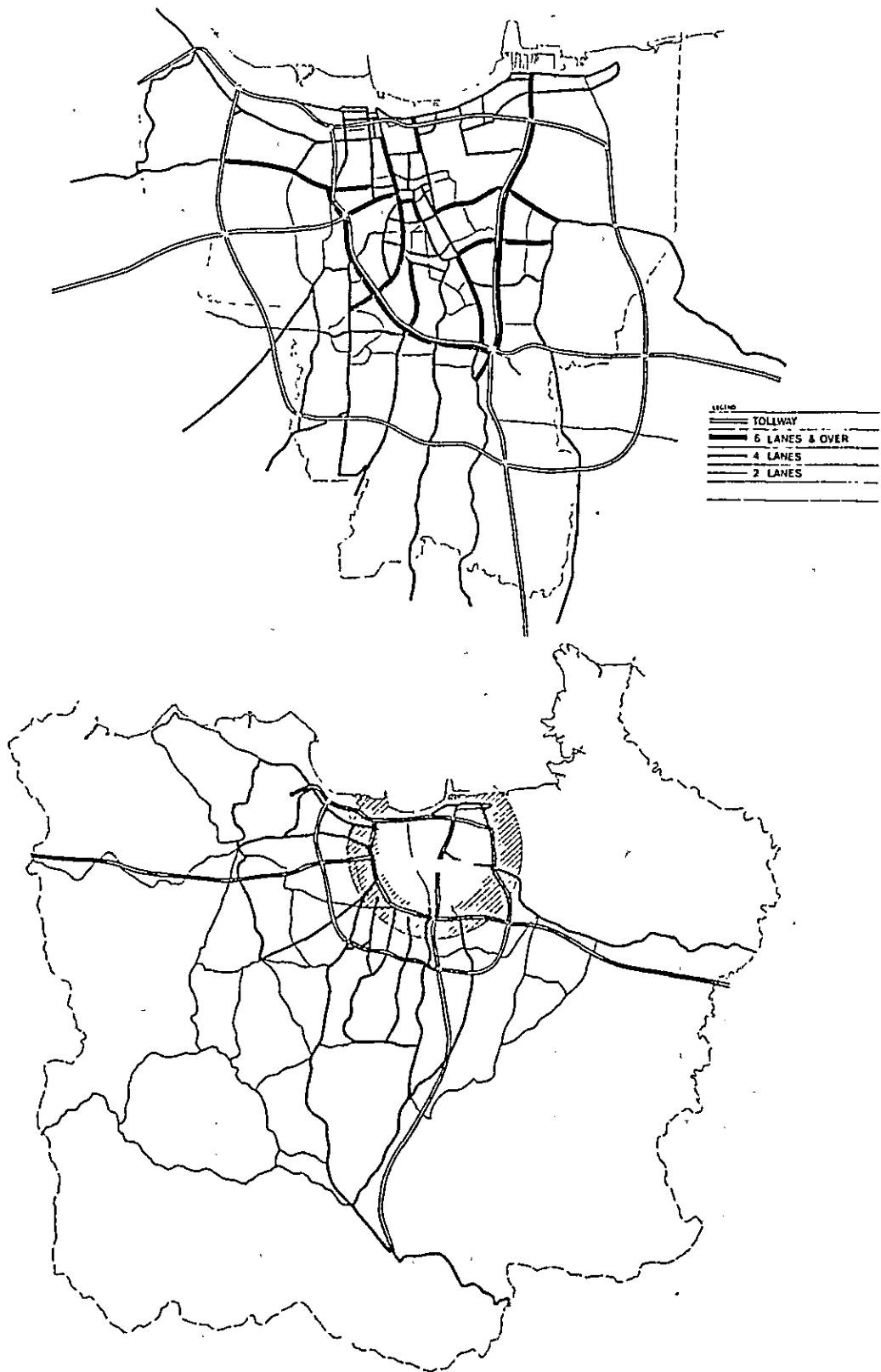
Inter stational distance was measured on railway network by
 “Master Plan” and inter zonal distance was measured on road
 network by “Feasibility Study on Jakarta Harbour Road Project”.
 The road network in the year 2000 is as shown in Fig. 1.2.6.

(2) OD Tables by Railway

After modal split between railway and bus, future OD tables by railway was established. The total number of person trips by railway, mass transit and all transportation means are shown in Table 1.2.12.

Person trips by railway in 24 hours will be increased from 43.7 thousand trips in the year 1980 to 523.3 (rate of growth 12.0) 1,478.6 (33.8) and 2,195.3 (50.2) thousand trips in the year 1990, 2000 and 2010 respectively. Railway share in mass transit will be increased from 1.6 percent in the year 1980 to 12.2, 23.5 and 25.4 percent in the year 1990, 2000 and 2010, respectively.

Estimated OD tables by railway are as shown in Table 1.2.13 ~ 14.



Source: "Feasibility Study on Jakarta Harbour Road Project" JICA, 1981

Fig. 1.2.6 ROAD NETWORK IN THE YEAR 2000

Table 1.2.12 ESTIMATION OF PERSON TRIPS BY RAILWAY AND MASS TRANSIT

(Unit: 1,000 person trips)

		1980	1990	2000	2010
Peak 2 Hours	Railway	8.1	105.6	288.8	425.9
	Mass Transit	437.2	797.2	1,278.2	1,747.9
	Total Person Trips	793.0	1,314.1	1,948.8	2,479.4
24 Hours	Railway	43.7	523.3	1,478.6	2,195.3
	Mass Transit	2,710.3	4,302.4	6,280.3	8,647.3
	Total Person Trips	5,145.8	7,632.8	10,259.0	13,094.1

Table 1.2.13 PERSON TRIP OD TABLE BY RAILWAY – PEAK 2 HOURS

(Unit: 1,000 person trips/peak 2 hours)

Origin \ Destination		DKI JAKARTA		BOTABEK		OTHERS		TOTAL	
		Trips	Growth Rate	Trips	Growth Rate	Trips	Growth Rate	Trips	Growth Rate
DKI JAKARTA	1980	5.4	1.0	1.2	1.0	0.0		6.7	1.0
	1990	62.8	11.5	15.7	12.7	0.2		78.8	11.8
	2000	173.1	31.8	37.9	30.6	0.6		211.6	31.6
	2010	254.6	46.8	53.2	43.0	0.9		308.8	46.2
BOTABEK	1980	1.4	1.0	0.0		0.0		1.4	1.0
	1990	26.2	18.6	0.0		0.0		26.2	18.7
	2000	75.3	53.6	0.1		0.0		75.4	53.7
	2010	114.1	81.2	0.2		0.0		114.2	81.3
OTHERS	1980	0.0		0.0		0.0		0.0	
	1990	0.7		0.0		0.0		0.7	
	2000	2.7		0.0		0.0		2.0	
	2010	2.9		0.0		0.0		2.9	
TOTAL	1980	6.9	1.0	1.2	1.0	0.0		8.1	1.0
	1990	89.7	13.0	15.8	12.8	0.2		105.7	13.0
	2000	250.3	36.3	38.0	30.7	0.6		288.9	35.5
	2010	371.6	53.9	53.4	43.2	0.9		425.9	52.4

Table 1.2.14 PERSON TRIP OD TABLE BY RAILWAY - 24 HOURS

(Unit: 1,000 person trip ends/day)

	DKI JAKARTA		BOTABEK		OTHERS		TOTAL	
	Trip Ends	Growth Rate	Trip Ends	Growth Rate	Trip Ends	Growth Rate	Trip Ends	Growth Rate
DKI JAKARTA								
1980	63.1	1.0	11.5	1.0	0.6	1.0	75.2	1.0
1990	570.9	9.0	216.8	18.9	11.9	18.2	799.7	10.6
2000	1,539.0	24.4	641.4	55.8	39.6	60.6	2,220.0	29.5
2010	2,255.9	35.8	967.9	84.2	59.7	91.4	3,283.4	43.7
BOTABEK								
1980	-		0.0		0.0		11.5	1.0
1990	-		18.0		0.1		234.9	20.4
2000	-		55.0		0.6		697.0	60.6
2010	-		77.7		0.9		1,046.5	100.0
OTHERS								
1980	-		-		0.0		0.6	1.0
1990	-		-		0.0		12.0	18.4
2000	-		-		0.0		40.2	61.6
2010	-		-		0.0		60.7	92.9
								(Trips)
					TOTAL		87.4	1.0
							1,046.6	12.0
							2,957.2	33.8
							4,390.6	50.2
								43.7
								523.3
								1,478.6
								2,195.3

(3) Railway Link Load

The estimated inter zonal OD tables by railway were then distributed on railway network. On converting the inter zonal OD tables to the inter stational OD table, a zone was corresponded to several stations inside or near the zone in consideration of the result of the Interview Survey at railway stations and bus routes. The inter stational OD tables thus established were distributed on railway network.

The maximum link load on each section is shown in Fig. 1.2.7 ~ 10, and the transition of the maximum link load between Jakarta Kota St. and Manggarai St. is also shown in Fig. 1.2.11.

The maximum link load between Gambir St. and Manggarai St. in 24 hours was estimated at 3.1, 38.9 (growth rate 12.7), 110.9 (36.3) and 164.7 (53.9) thousand passengers in the year 1980, 1990, 2000 and 2010, respectively.

Peak 2 hours ratio of this section amounted to 33.6 percent in the year 2000.

The maximum link load between Jakarta Kota St. and Gambir St. was estimated at 1.7, 25.8 (growth rate 15.0), 74.1 (43.2) and 110.6 (64.5) thousand passengers in the year 1980, 1990, 2000 and 2010, respectively.

The maximum link load on this section was approximately two thirds of that on Gambir St.–Manggarai St. Peak 2 hours ratio of this section amounted to 25.5 percent in the year 2000. This ratio was comparatively lower than that of Gambir St.–Manggarai St., but it was relatively higher than that of the whole network. This means that Central Line between Jakarta Kota St. and Manggarai St. plays an important role in transporting commuters who have their jobs in the CBD of DKI Jakarta.

(4) Timing of New Station Opening

In order to give railway users easy access to the Central Line, four new stations were planned between Jakarta Kota St. and Manggarai St. as described in detail in the later chapters. They were Jayakarta St., Mangga Besar St., Juanda St. and Gondangdia St.

It is recommended that these new stations will be opened simultaneously at the completion of track elevation because railway stations have great impact on area development which in turn generates and attracts railway passengers.

The estimated result of passengers at each station is shown in Table 1.2.15.

At the completion of track elevation around the year 1990, existing stations (Gambir St., Sawah Besar St. and Cikini St.) are to be opened simultaneously.

At this time, passengers at new stations were estimated to be less sufficient than those of Sawah Besar St. and Cikini St. There will therefore be another alternative for deciding the timing of new station opening, that is, the timing should be decided on the number of passengers at new stations.

If the standard of number of passengers at new station opening is assumed at 3,000 passengers in peak 2 hours and 15,000 passengers in 24 hours in consideration of the average of Sawah Besar St. and Cikini St., it is recommended that four of the new stations will be opened by the year 1995 at the latest.

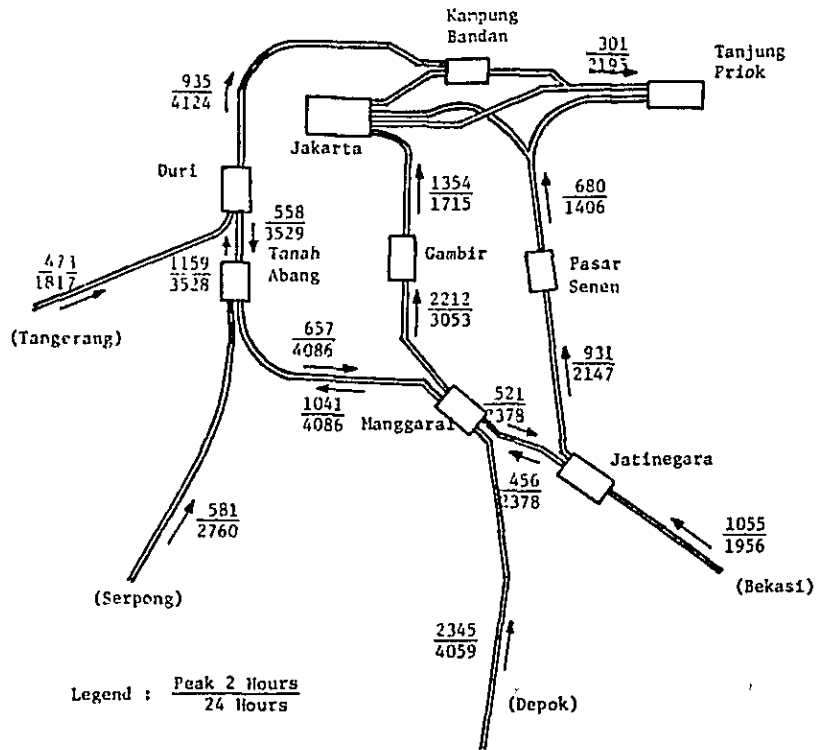


Fig. 1.2.7 RAILWAY LINK LOAD (Year 1980)

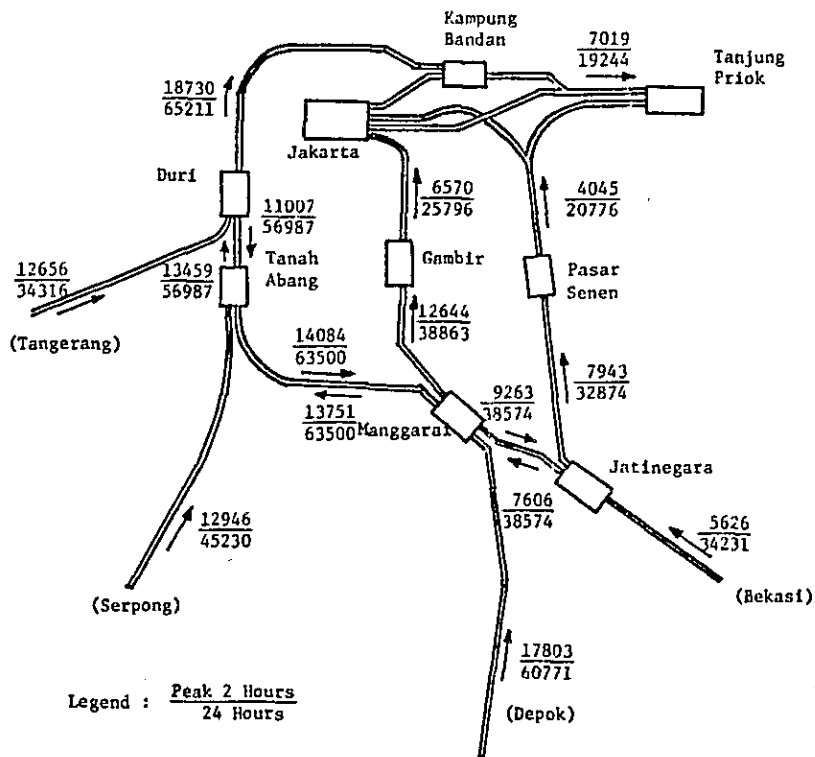


Fig. 1.2.8 RAILWAY LINK LOAD (Year 1990)

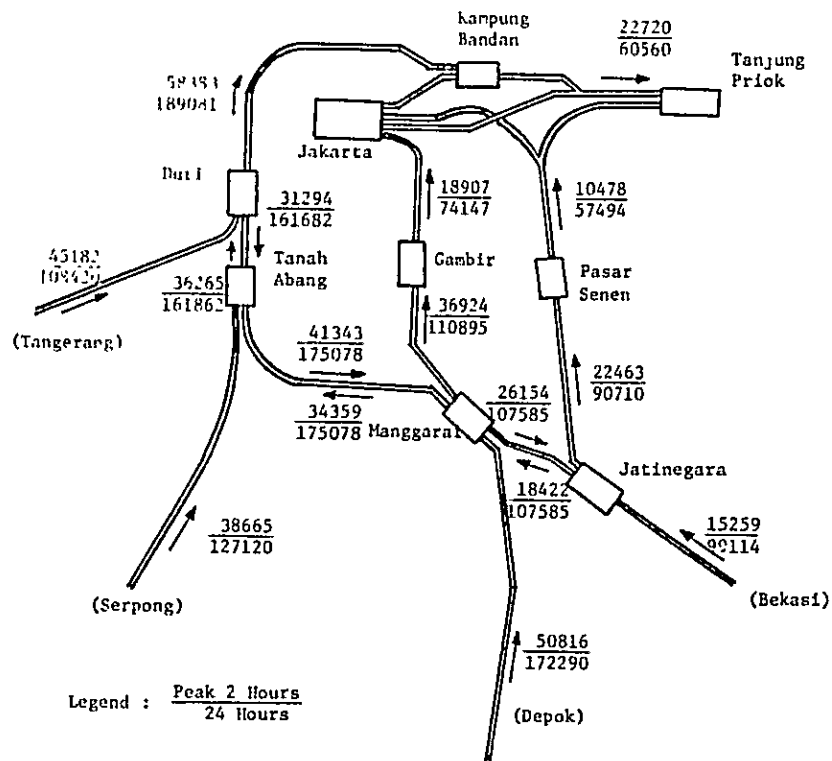


Fig. 1.2.9 RAILWAY LINK LOAD (Year 2000)

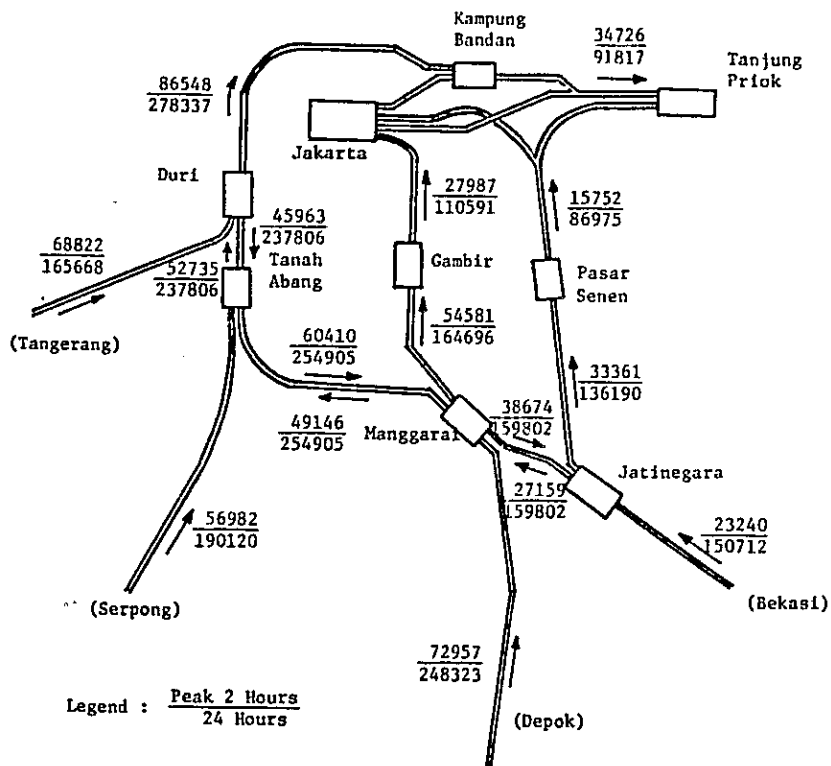


Fig. 1.2.10 RAILWAY LINK LOAD (Year 2010)

Jakarta Kota - Gambir

Gambir - Manggarai

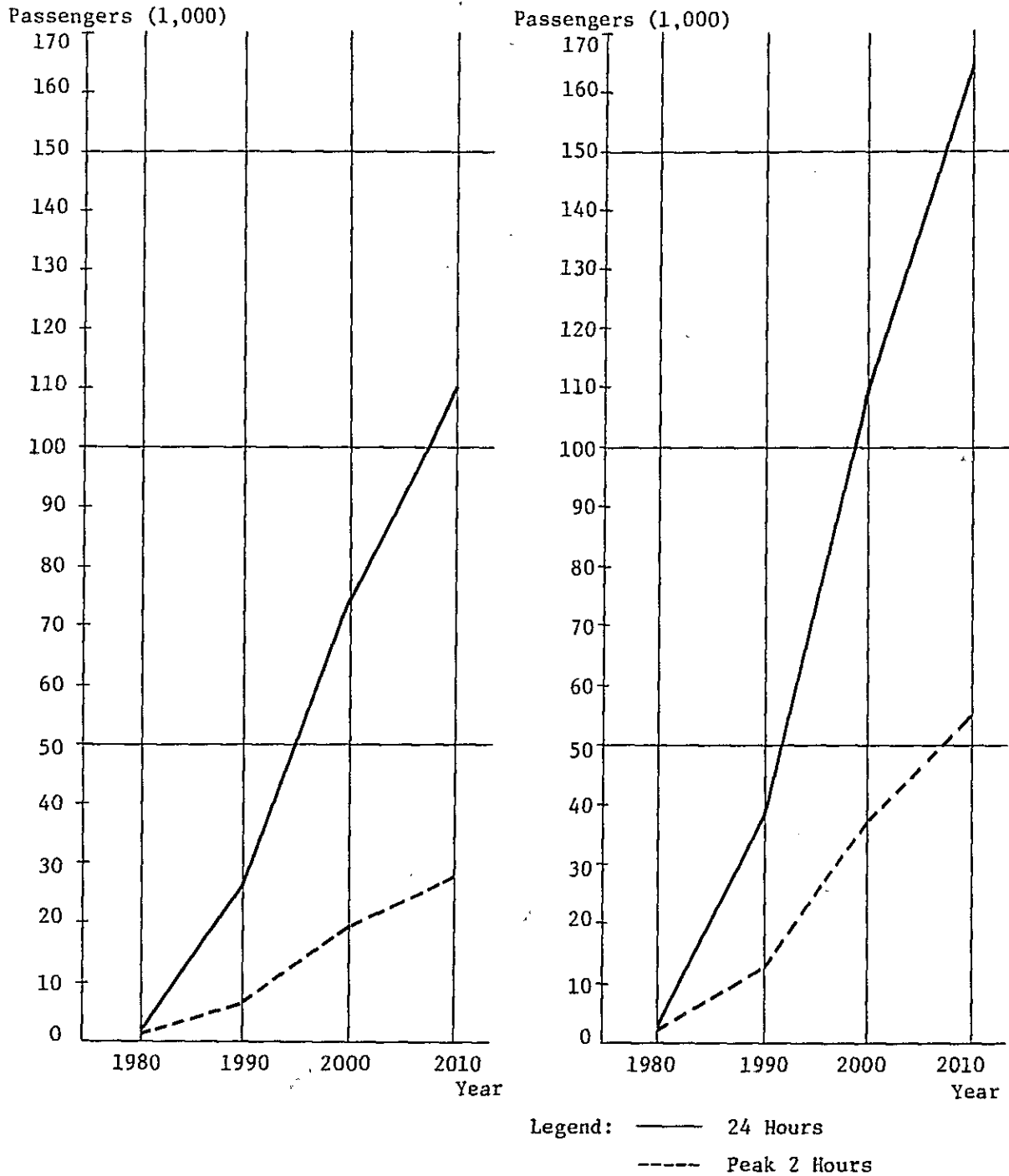


Fig. 1.2.11 MAXIMUM LINK LOAD ON CENTRAL LINE

Table 1.2.15 PASSENGERS ON RAILWAY STATIONS

(Unit: 100 Persons)

No.	Name of Station	Peak 2 Hours			24 Hours		
		1990	2000	2010	1990	2000	2010
6	Gambir	75.5	224.5	340.9	294.5	873.1	1331.8
4	Sawah Besar	29.8	79.9	118.5	158.7	429.7	645.1
8	Cikini	32.0	82.5	120.1	144.9	380.8	561.3
2	Jayakarta	16.4	44.0	64.9	82.8	225.1	336.7
3	Mangga Besar	15.2	41.2	61.2	84.8	233.6	352.5
5	Juanda	13.4	36.0	53.1	67.8	184.2	275.5
7	Gondangdia	14.7	38.8	56.8	65.8	175.7	259.8
2~ 7	Total	59.7	160.0	236.0	301.2	818.6	1224.5

- Note: 1) Number of Passengers in Peak 2 Hours means Passengers detraining at the Station.
 2) Number of Passengers in 24 Hours means Passengers getting on or detraining at the station.

1.2.4 Forecast of Traffic Volume on Railway Crossings

(1) Traffic Volume on Railway Crossings

Traffic count survey on the railway crossings between Jakarta Kota St. and Manggarai St. was carried out in July 1981. The result of the survey on nineteen crossings was shown in Table 1.1.9.

The biggest traffic volume was counted on J1. Juanda & J1. Veteran, traffic volume of which amounted to 82.5 thousand vehicles excluding motorcycle and bajaj. The second biggest was counted on J1. Kebon Sirih and J1.

Diponegoro, traffic volume of which amounted to about 35 thousand vehicles. Traffic volume on J1. Mangga Besar, J1. Sukarjo Wiryopranoto, J1. Merdeka Utara and J1. Cut Mutiah amounted to about 30 thousand vehicles. These roads function as arterial roads for the east-west traffic in the center of DKI Jakarta.

In order to estimate future traffic volume on the nineteen crossings, it is necessary to estimate the future trend of traffic volume on road network in DKI Jakarta. In this study, the growth rates of traffic volume estimated in "Feasibility Study on Jakarta Harbour Road Project" were adopted for the year 1990, 2000 and 2010 by each type of vehicles. As for the transportation means such as pedestrian, bicycle, beca and bajaj, the growth rate of person trips in DKI Jakarta was adopted. The growth rates used for future estimation

were shown in Table 1.2.16 and the estimated traffic volume by transportation means on the nineteen crossings were as shown in Table 1.2.17 ~ 19.

The total traffic volume excluding motorcycle and bajaj on the nineteen crossings is estimated to be 605.8 (growth rate 1.52), 842.2 (2.11) and 1,020.7 (2.56) thousand vehicles in the year 1990, 2000 and 2010, respectively.

In the year 2000, traffic volume on J1. Juanda & J1. Veteran will amount to 170.9 thousand vehicles, and traffic volume on J1. Kebon Sirih and J1. Diponegoro will amount to 79.0 and 74.9 thousand vehicles, respectively. Traffic volume on the other arterial roads will amount approximately to 63 thousand vehicles.

(2) Considerations on Flyover Construction

The objective of this study is to investigate the technical and economic feasibility of track elevation of Central Line. It is very important from the view point of economic evaluation what kind of situation will be established as a case without project.

It will be a way of thinking that the case without project represents the situation in which track elevation will not be realized and level crossings will be left as they are. Considering the following situations, this case however will be concluded to be unrealistic:

- Central line runs across the CBD of DKI Jakarta and has many level crossings with arterial roads.
- Traffic volume on these arterial roads are estimated to increase year by year and will be doubled by the year 2000.
- Improvement of JABOTABEK Railway is now under way for the purpose of energy saving and easing traffic congestion.
- This improvement will produce frequent service of railway, which will cause more waiting time on the vehicles crossing Central Line.

As a result of the above considerations, the case without project was assumed to represent the situation in which flyovers would be constructed for several arterial roads, and the case with project – Track Elevation – will be evaluated in comparison with the case without project as assumed.

The procedure of selecting roads for constructing flyovers is as follows:

- a) To give the nineteen roads crossing with Central Line ranking of four classifications obtained by the road map of DKI Jakarta.
- b) To identify the connecting road of each nineteen road and give the above-mentioned ranking to each connecting road.
- c) To mention specific constraints obtained by an interview of DKI office if any on the nineteen roads.
- d) To select preliminary proposed roads for flyover construction based on the following criteria.

- For a) and b) above, road selected should be the first and the second rank, and
- For c) above, there should be no specific constraints.
- e) To fix the roads of all first rank as the final proposed road for flyover construction.
- f) To select the remaining final proposed roads in consideration of the distance between each preliminary proposed road, road improvement plan and existing and future traffic volume.

According to the above analysis, five roads were selected for flyover construction, namely, J1. Mangga Besar, J1. Sukarjo Wiryopranoto, J1. Juanda & Veteran, J1. Cut Mutiah and J1. Diponegoro, as shown in Table 1.2.20. Timing of flyover construction for each proposed road was estimated by calculating stopped vehicle time at each railway crossing. 10,000 stopped vehicle time was adopted as a standard for deciding this timing.

	Year open to traffic
J1. Mangga Besar	1990
J1. Sukarjo Wiryopranoto	1993
J1. Juanda & Veteran	1987 *1
J1. Cut Mutiah	1992
J1. Diponegoro	1992
*1 Timing of J1. Juanda & Veteran was put off to make accord with construction schedule of the track elevation of Central Line.	

Table 1.2.16 ESTIMATING PARAMETER FOR ROAD TRAFFIC

Transportation Modes	1980	1990	2000	2010
Pedestrian, Bicycle, Beca	1.000	1.320	1.780	2.256
Motorcycle	1.000	1.117	1.180	1.235
Bajaj	1.000	1.320	1.780	2.256
Sedan & Jeep	1.000	1.667	2.423	2.881
Taxi	1.000	1.320	1.780	2.256
Mini Bus	1.000	1.188	1.378	1.747
Bus	1.000	1.188	1.378	1.747
Truck	1.000	1.470	1.988	2.482

Table 1.2.17 TRAFFIC VOLUME ON RAILWAY CROSSING
12 Hours (7:00 – 19:00)

(Year 1990)

No.	Name of Road	Pedestrian Bicycle Beca	Motor cycle	Bajaj	Automobiles						Total
					Sedan & Jeep	Taxi	Mini Bus	Bus	Truck		
101	Jl. Mangga Dua	11,524	2,317	1,997	270	28	50	2	316	666	
102	Jl. Jayakarta	7,106	21,290	17,978	16,682	1,625	3,516	486	6,461	28,770	
103	Jl. Mangga Besar	5,540	22,651	21,765	16,142	1,960	3,648	255	24,134	46,139	
104	Jl. Lurze	6,714	5,133	1,919	633	45	242	—	160	1,080	
105	Jl. Sukarjo Wiryopranoto	3,898	26,160	12,706	22,258	3,977	9,807	208	7,396	43,646	
106	Jl. Ceylon	2,059	938	259	655	44	4	—	126	829	
107	Jl. Pintu Air 2	2,639	760	248	872	48	387	2	18	1,327	
108	Jl. Juanda & Jl. Veteran	9,336	48,123	37,941	79,754	11,648	14,162	9,154	9,074	123,792	
109	Jl. Merdeka Utara	3,010	16,552	3,346	33,558	4,047	4,298	552	2,697	45,152	
110	Jl. Monas Utara	2,563	16,361	8,463	21,029	3,828	4,560	419	2,406	32,242	
111	Jl. Monas Selatan	3,152	1,486	2,214	2,157	927	537	204	338	4,163	
112	Jl. Merdeka Selatan	8,730	11,928	9,911	30,799	3,355	4,744	714	740	40,352	
113	Jl. Kebon Sirih	24,402	29,357	32,290	40,601	5,557	6,041	1,537	2,744	56,480	
114	Jl. Wahid Hasyim	4,830	10,343	11,171	15,320	2,035	2,279	531	917	21,082	
115	Jl. Johar	6,220	1,154	3,730	2,482	264	467	87	54	3,354	
116	Jl. Cut Mutiah	6,007	13,424	12,925	33,638	4,487	4,810	1,313	1,573	45,821	
117	Jl. Gondangdia Lama	2,173	10,476	14,434	23,500	3,095	1,989	677	942	30,203	
118	Jl. Cikini Raya	10,267	9,793	8,315	19,407	2,672	2,571	688	1,671	27,009	
119	Jl. Diponegoro	2,356	18,914	3,336	36,347	5,846	5,272	1,858	4,406	53,729	
	TOTAL	122,526	267,158	204,948	396,106	55,488	69,384	18,687	66,173	605,839	

Table 1.2.18 TRAFFIC VOLUME ON RAILWAY CROSSING
12 Hours (7:00 – 19:00)

(Year 2000)

No.	Name of Road	Pedestrian Bicycle Beca	Motor cycle	Bajaj	Automobiles						Total
					Sedan & Jeep	Taxi	Mini Bus	Bus	Truck		
101	Jl. Mangga Dua	15,539	2,447	2,693	393	37	58	3	427	918	
102	Jl. Jayakarta	9,582	22,491	24,244	24,247	2,191	4,079	564	8,737	39,818	
103	Jl. Mangga Besar	7,471	23,928	29,350	23,462	2,643	4,232	296	32,639	63,272	
104	Jl. Lautze	9,053	5,422	2,588	921	61	281	—	217	1,480	
105	Jl. Sukarjo Wiryopranoto	5,256	27,636	17,134	32,352	5,363	11,375	241	10,002	59,333	
106	Jl. Ceylon	2,777	991	349	952	59	4	—	171	1,186	
107	Jl. Pintu Air 2	3,558	802	335	1,267	64	449	3	24	1,807	
108	Jl. Juanda & Jl. Veteran	12,590	50,837	51,163	115,924	15,707	16,427	10,617	12,272	170,947	
109	Jl. Merdeka Utara	4,058	17,485	4,513	48,777	5,457	4,986	641	3,648	63,509	
110	Jl. Monas Utara	3,457	17,283	11,412	30,566	5,162	5,289	486	3,254	44,757	
111	Jl. Monas Selatan	4,251	1,569	2,985	3,135	1,250	623	237	457	5,702	
112	Jl. Merdeka Selatan	11,773	12,601	13,364	44,767	4,525	5,502	828	1,002	56,624	
113	Jl. Kebon Sirih	32,905	31,013	43,542	59,015	7,494	7,007	1,783	3,712	79,011	
114	Jl. Wahid Hasyim	6,513	10,927	15,064	22,267	2,745	2,643	616	1,241	29,512	
115	Jl. Johar	8,387	1,219	5,030	3,608	356	542	101	74	4,681	
116	Jl. Cut Muñah	8,101	14,181	17,430	48,894	6,050	5,580	1,523	2,127	64,174	
117	Jl. Gondangdia Lama	2,930	11,067	19,464	34,157	4,174	2,307	785	1,274	42,697	
118	Jl. Cikini Raya	13,845	10,345	11,212	28,209	3,603	2,982	798	2,260	37,852	
119	Jl. Diponegoro	3,177	19,981	4,498	52,831	7,884	6,116	2,155	5,958	74,944	
	TOTAL	165,223	282,225	276,369	575,744	74,825	80,482	21,677	89,496	842,224	

Table 1.2.19 TRAFFIC VOLUME ON RAILWAY CROSSING
12 Hours (7:00 – 19:00)

(Year 2010)

No.	Name of Road	Pedestrian Bicycle Beca	Motor cycle	Bajaj	Automobiles						Total
					Sedan & Jeep	Taxi	Mini Bus	Bus	Truck		
101	Jl. Mangga Dua	19,695	2,561	3,413	467	47	73	3	534	1,124	
102	Jl. Jayakarta	12,144	23,539	30,727	28,830	2,777	5,171	715	10,908	48,401	
103	Jl. Mangga Besar	9,468	25,043	37,199	27,897	3,350	5,365	376	40,749	77,737	
104	Jl. Lautze	11,474	5,675	3,280	1,095	77	356	--	271	1,799	
105	Jl. Sukarjo Wiryopranoto	6,662	28,924	21,716	38,467	6,797	14,421	306	12,487	72,478	
106	Jl. Ceylon	3,519	1,037	442	1,132	74	5	--	213	1,424	
107	Jl. Pintu Air 2	4,510	840	424	1,507	81	570	3	30	2,191	
108	Jl. Juanda & Jl. Veteran	15,957	53,206	64,844	137,836	19,907	20,826	13,461	15,321	207,351	
109	Jl. Merdeka Utara	5,144	18,300	5,719	57,997	6,917	6,321	812	4,554	76,601	
110	Jl. Monas Utara	4,381	18,089	14,463	36,344	6,542	6,705	617	4,063	54,271	
111	Jl. Monas Selatan	5,387	1,643	3,783	3,728	1,584	790	300	571	6,973	
112	Jl. Merdeka Selatan	14,921	13,189	16,938	53,229	5,735	6,976	1,050	1,251	68,241	
113	Jl. Kebon Sirih	41,704	32,458	55,186	70,170	9,498	8,883	2,261	4,634	95,446	
114	Jl. Wahid Hasyim	8,255	11,436	19,093	26,476	3,479	3,351	781	1,549	35,636	
115	Jl. Johar	10,630	1,276	6,375	4,290	451	687	128	92	5,648	
116	Jl. Cut mutiah	10,267	14,842	22,091	58,136	7,668	7,074	1,930	2,656	77,464	
117	Jl. Gondangdia Lama	3,713	11,583	24,669	40,613	5,290	2,924	996	1,591	51,414	
118	Jl. Cikini Raya	17,547	10,827	14,211	33,541	4,566	3,781	1,012	2,822	45,722	
119	Jl. Diponegoro	4,027	20,912	5,701	62,817	9,992	7,753	2,732	7,439	90,733	
TOTAL		209,405	295,380	350,274	684,572	94,832	102,032	27,483	111,735	1,020,654	

Table 1.2.20 SELECTION OF ROADS FOR FLYOVER CONSTRUCTION

No.	Road	Conditions of Road				Connected Road				Constraints	Preliminary		Final	
		Rank	Existing Width	Planning Width	Traffic in 1981	Traffic in 2000	Rank	Westside	Rank		Eastside	Road	Distance	Road
101	Jl. Mangga Dua	4	5.4 ^M		440	920	2	Jl. Jembatan Bati	1	Jl. Gn. Sahari Ancol	-			
102	Jl. Jayakarta	2	11.3	33.0 ^M	19,000	39,820	1	Jl. Pintu Besar	1	Jl. Gn. Sahari Ancol	0	1,029 ^M	-	
103	Jl. Mangga Besar	2	15.7	47.0	30,870	63,270	1	Jl. Hayam Wuruk	1	Jl. Gn. Sahari Ancol	0		0	
104	Jl. Lantze	4	4.3		730	1,480	3	Jl. Taman Sari	4	Jl. Kartini	-	1,548	-	1,548 ^M
105	Jl. Sukarjo Wiryopranoto	2	23.4	47.0	29,830	59,330	1	Jl. Hayam Wuruk	1	Jl. Gn. Sahari	0		0	
106	Jl. Ceylon	4	3.6		520	1,190	4	Jl. Juanda 4	3	Jl. Pasar Baru	-	709	-	709
107	Jl. Pintu Air 2	4	4.2		900	1,810	3	Jl. Peconongan	4	Jl. Pintu Air	-		-	
108	Jl. Juanda & Veteran	1	31.5		82,470	170,950	1	Jl. Hayam Wuruk	1	Jl. Gn. Sahari	0		0	
109	Jl. Merdeka Utara	1	17.3		29,120	63,510	1	Jl. Merdeka Barat	1	Jl. Merdeka Timur	-		-	
110	Jl. Monas Utara	2	30.6		21,340	44,760		Monas	1	Jl. Merdeka Timur	-		-	
111	Jl. Monas Selatan	2	32.0		2,850	5,700		Monas	1	Jl. Merdeka Timur	-		-	
112	Jl. Merdeka Selatan	2	20.1		26,120	56,420	1	Jl. M.H. Thamrin	1	Jl. Merdeka Timur	-	2,230	-	2,230
113	Jl. Kebon Sirih	3	12.4		36,810	79,010	1	Jl. M.H. Thamrin	1	Jl. Menteng Raya	-		-	
114	Jl. Wahid Hasyim	3	7.8		13,720	29,510	1	Jl. M.H. Thamrin	1	Jl. Menteng Raya	-		-	
115	Jl. Johar	4	8.6		2,190	4,680	3	Jl. Wahid Hasim	1	Jl. Menteng Raya	-		-	
116	Jl. Cut Muftah	2	13.2		29,800	64,170	2	Jl. Hos. Cokroaminoto	1	Jl. Cikini Raya	0		0	
117	Jl. Gondangdia Loma	3	8.8		19,330	42,700	2	Jl. Sutan Syahrir	1	Jl. Cikini Raya	-	1,250	-	1,804
118	Jl. Cikini Raya	1	9.1		17,550	37,850	2	Jl. Sutan Syahrir	2	Jl. Mohamad Yamin	0		0	
119	Jl. Diponegoro	1	15.8		35,230	74,940	1	Jl. Jend. Sudirman	1	Jl. Salemba Raya	0	554	0	

The following table shows the results of the experiment. The first column is the number of trials, the second column is the number of correct responses, and the third column is the percentage of correct responses. The data shows that the percentage of correct responses increases as the number of trials increases, indicating that the subject is learning the task.

Number of Trials	Number of Correct Responses	Percentage of Correct Responses
10	6	60%
20	12	60%
30	18	60%
40	24	60%
50	30	60%
60	36	60%
70	42	60%
80	48	60%
90	54	60%
100	60	60%

The results of the experiment show that the subject is able to learn the task and maintain a constant level of performance. This suggests that the task is relatively simple and that the subject has sufficient cognitive resources to learn it.

CHAPTER 2. LAND USE



CHAPTER 2 LAND USE

2.1 Existing Land Use in Wayside Area

2.1.1 Characteristics of existing land use

The observation survey of the land use in wayside areas was performed not only to understand the state and characteristics of Central Line, but also to establish any problems to be considered from an urban planning point of view.

The relevant informations gained from this survey has been arranged into 4 sections, to cover Jakarta–Kota Station to Manggarai Station as illustrated on Fig. 2.1.1 – Fig. 2.1.4 respectively.

As shown in the remarks on these figures, there appears to be some significant problems to be taken into account when executing this project.

Some important considerations for the characteristics of land use are summarized as follows:

Firstly, many low-income houses of a tenement type, similar to barracks, have occupied part of the Central Line, right of way.

This is very noticeable in the area between J1. Mangga Dua and J1. Mangga Besar (refer to Fig. 2.1.1), and the number of households living in such conditions in this area was estimated as approximately 370.

The quality of these houses, which are made of crude materials is very poor, and the average area of dwelling space per family was observed to be less than 20 square metres housing 5–6 persons, and the residents have utilized the railway land for their approach paths, front gardens, keeping of live-stocks, and as play-grounds for children.

Besides the area between J1. Mangga Dua and J1. Mangga Besar, other areas which have similar characteristics are;

- the north and the south area of Sawah Besar Station (Refer to Fig. 2.1.1 and Fig. 2.1.2).
- Some parts of the area between J1. Diponegoro and Manggarai Station (Refer to Fig. 2.1.4).

The removing of these structures and clearing of the areas is a major problem.

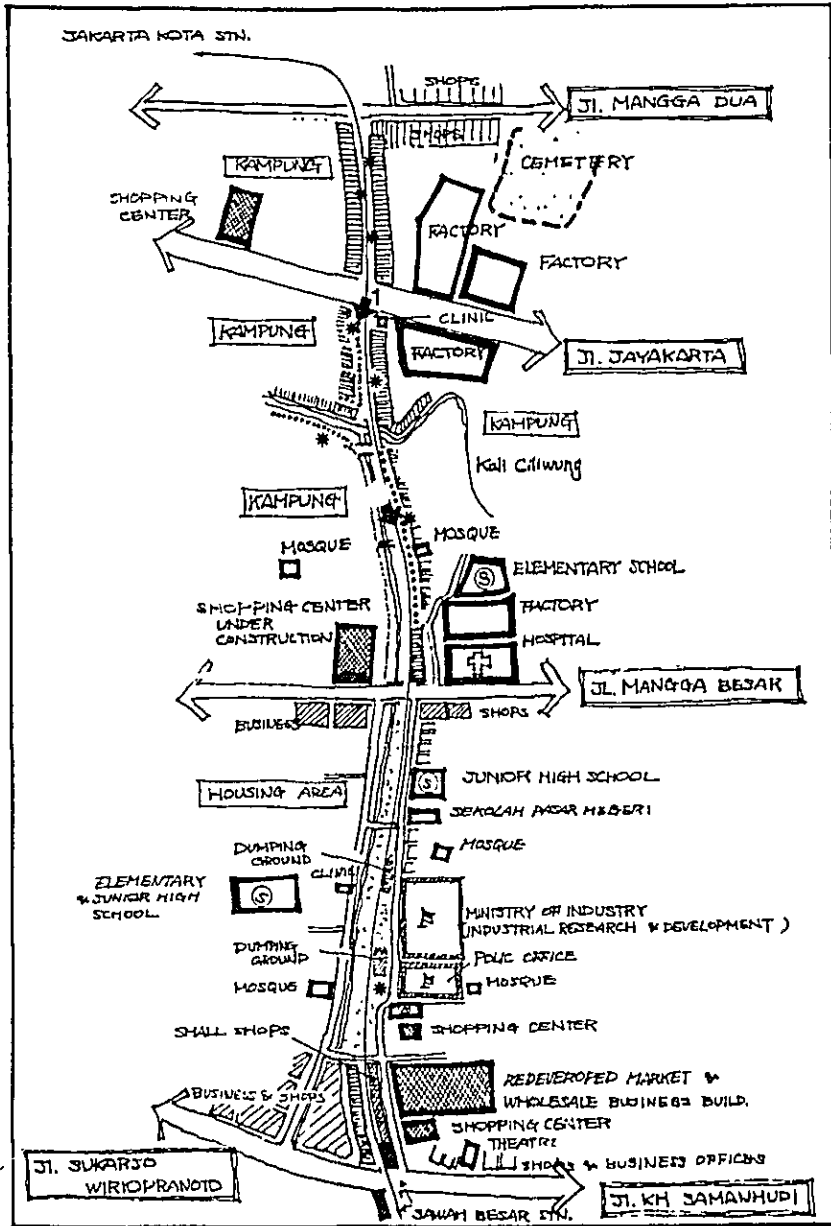
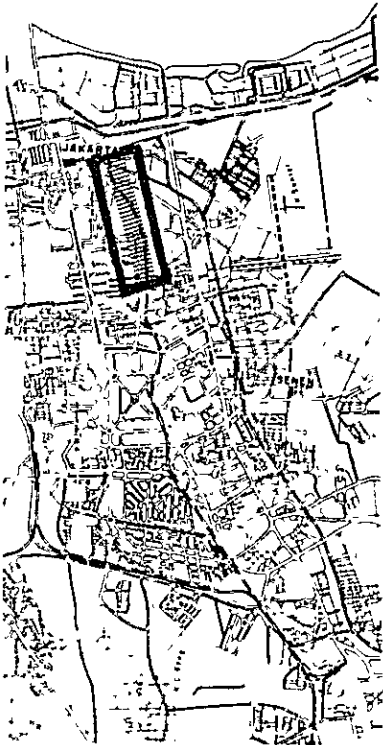
Next, it can be assumed that the land use of wayside areas with roads running parallel with the railway is likely to be formed orderly, but in areas without such roads a more disorderly land use can be presumed. For instance, the way side areas between J1. Mangga Besar and J1. Lautze (refer to Fig. 2.1.1) and between Cikini Station and J1. Diponegoro (refer to Fig. 2.1.4), where the railway lies between two parallel roads, have orderly, desirable town formations and there are no occupied houses inside the railway land.

In such areas the railway has been able to function as an established urban transportation method because any obstruction doesn't lie in the way.

Moreover, distribution of robust buildings was also checked in parallel with the study of existing land use. What requires particular attention during planning of construction of the railway is that Mesjid Istiqial, which is an important religeous building, is located face to the railway.

SECTION-1

Jl. MANGGA DUA
~ SAWAN BESAR STN.



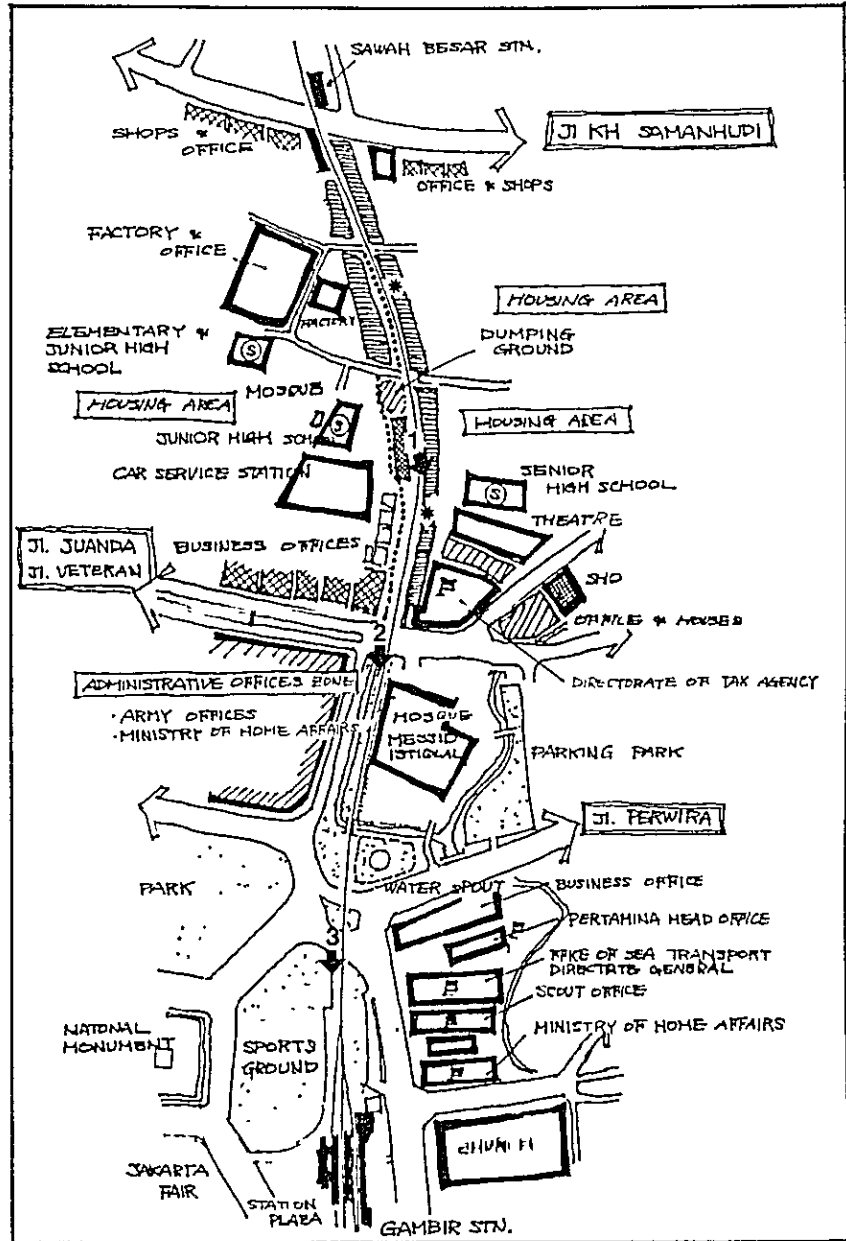
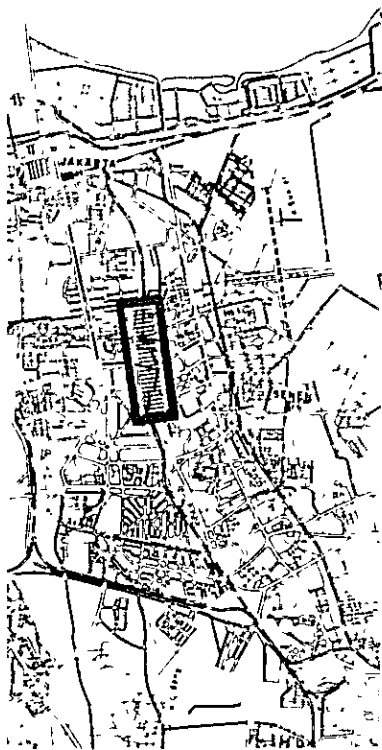
NOTES; [hatching symbol] : LOW INCOME HOUSES OCCUPIED IN RIGHT-OF-WAY

* : WELL



Fig. 2.1.1 CHARACTERISTICS OF EXISTING LAND USE IN WAYSIDE AREA (SECTION-1)

SECTION-2
 SAWAH BESAR STN.
 ~ GAMBIR STN.



NOTES; [hatched rectangle], LOW INCOME HOUSES OCCUPIED IN RIBHT-OF-WAY

* : WELL

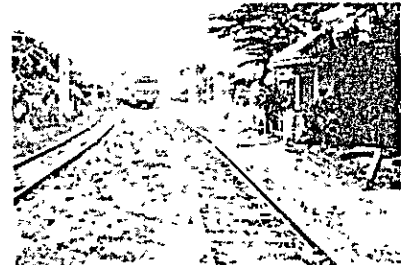
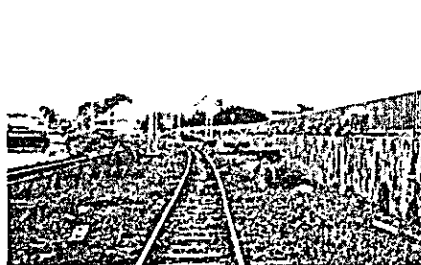
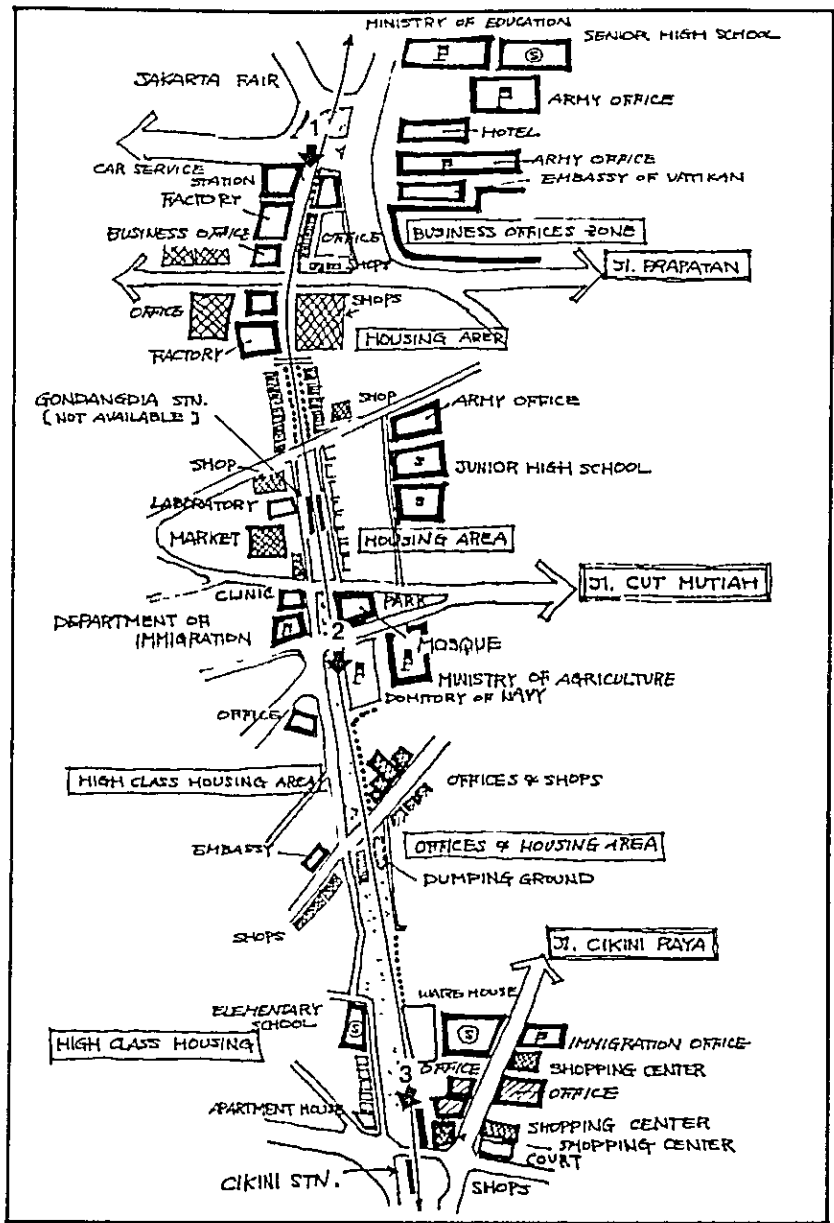
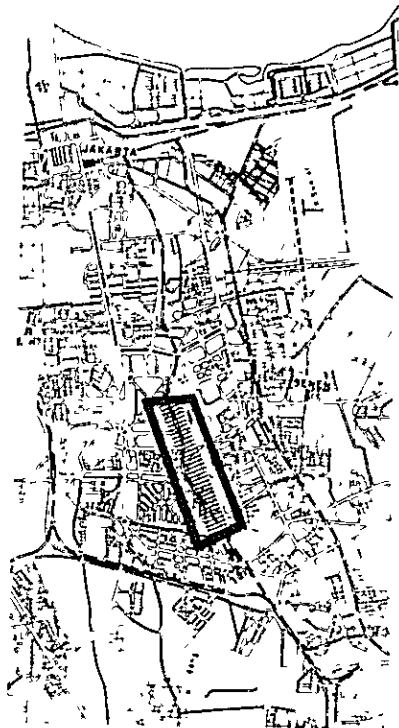


Fig. 2.1.2 CHARACTERISTICS OF EXISTING LAND USE IN WAYSIDE AREA (SECTION-2)

SECTION-3
 GAMBIR STN.
 ~ CIKINI STN.



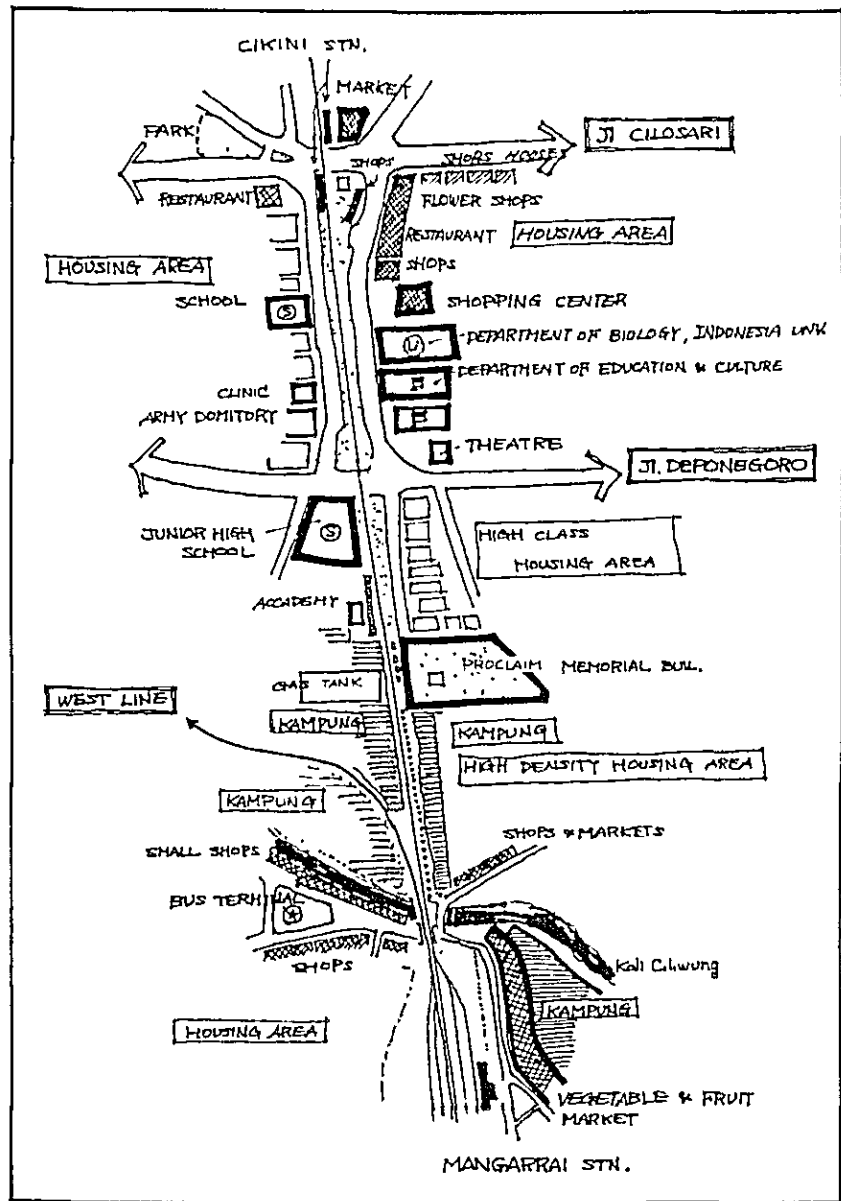
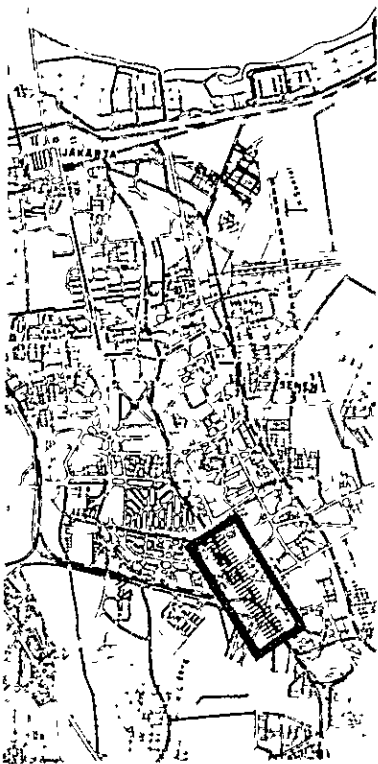
NOTES; LOW INCOME HOUSES OCCUPIED IN RIGHT-OF-WAY

* WELL



Fig. 2.1.3 CHARACTERISTICS OF EXISTING LAND USE IN WAYSIDE AREA (SECTION-3)

SECTION-4
 CIKINI STN.
 ~ MANGGARAI STN.



NOTE; [Hatched Pattern] LOW INCOME HOUSES OCCUPIED IN RIGHT-OF-WAY



Fig. 2.1.4 CHARACTERISTICS OF EXISTING LAND USE IN WAYSIDE AREA
 (SECTION-4)

2.1.2 Land use composition in wayside area

The result of existing land use along Central Line area shown in Table 2.1.1 was obtained from the study of land use in way-side area. The state of land use is arranged in this table with the studied area classified into the section of within 100 m zone, 100 – 300 m zone and 300 – 500 m zone.

The landuse characteristics classified by these three zones on each side, that is, six zones in total, are as shown in Fig. 2.1.5.

The area shown in table 2.1.1 was defined to be the limit bounded between Jakarta–Kota Station and Manggarai Station, the distance of which is about 9.9 km, and the area of 500 meters from the Central Line. According to Table 2.1.1, for the east-side land use the residential use occupies approximately 42% of total land use, and 14% for commercial use, 3% for industrial use, 40% for the others of public, infrastructure, etc. respectively within the area of 500 meters from Central Line; while, for the west-side area, the residential use is shared most of total land use. That share is approximately 47% which is 5% more than that of the east-side area. Moreover, compared with the composition of the east-side area, the commercial use and the infrastructure use occupies a greater share than in the east-side area.

Next, the composition of land use in six divisions between Jakarta–Kota Station and Manggarai Station can be arranged as illustrated on Fig. 2.1.5. According to this figure, it is the section between Jakarta–Kota Station and Jl. Mangga Besar that the commercial land use occupies the major share, while the section occupied by the most residential land use share is between Cikini Station and Manggarai Station.

It is remarkable that the section 1 between Jakarta–Kota Station and Jl. Mangga Besar has a comparatively large share or industrial land use.

Such characteristics of land use as above must be taken into account not only when planning the station allocation and the station front area, but also on analyzing the influenced area of the station from an economic point of view.

Table 2.1.1 Existing Land Use along Central Line Area

Classification of Land Use	Hectares				Composition (%)			
	Within 100 m Zone	100 ~ 300 m Zone	300 ~ 500 m Zone	TOTAL	Within 100 m Zone	100 ~ 300 m Zone	300 ~ 500 m Zone	TOTAL
Area	82.4	163.0	149.7	395.1	100.0	100.0	100.0	100.0
Residential Land Use	30.4	71.9	64.4	166.7	36.9	44.1	43.0	42.2
Commercial Land Use	12.8	23.0	19.1	54.9	15.5	14.1	12.8	13.9
Industrial Land Use	2.1	7.4	2.6	12.1	2.5	4.5	1.7	3.1
Public Land Use*	18.4	38.2	27.4	84.0	22.3	23.4	18.3	21.2
Infrastructure**	18.7	22.5	36.2	77.4	22.7	13.8	24.2	19.6
Others								
Area	88.4	171.4	155.4	415.2	100.0	100.0	100.0	100.0
Residential Land Use	37.5	83.6	73.6	194.7	42.4	48.8	47.4	46.9
Commercial Land Use	15.1	25.7	21.0	61.8	17.1	15.0	13.5	14.9
Industrial Land Use	1.9	2.2	0.5	4.6	2.1	1.3	0.3	1.1
Public Land Use*	6.5	20.1	21.4	48.0	7.4	11.7	13.8	11.6
Infrastructure**	27.4	39.8	38.9	106.1	31.0	23.2	25.0	22.5
Others								

Note: * Including school, mosque, hospital, administrative office, post office and some urban installations.

** Including road, canal, park, etc.

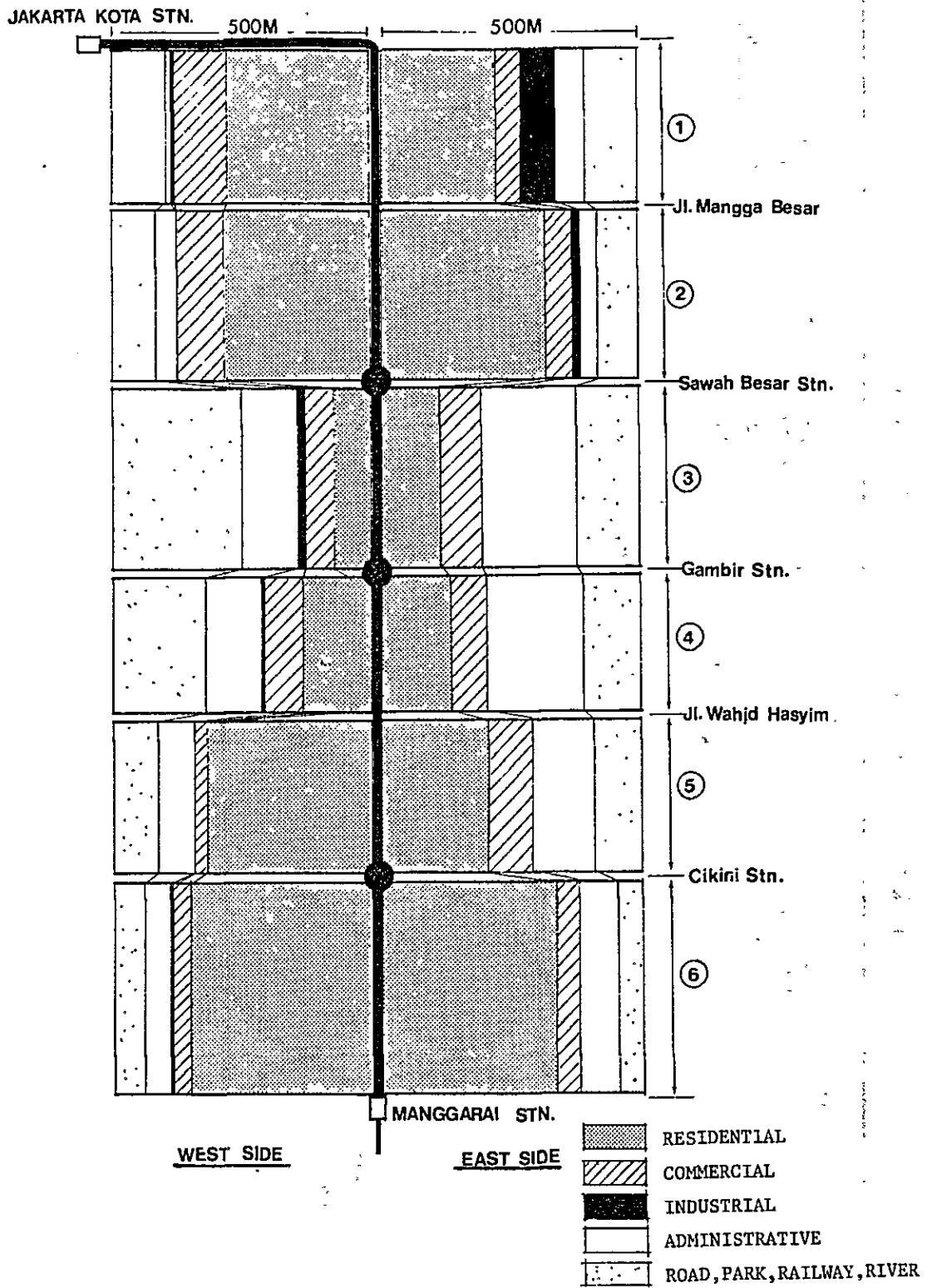


Fig. 2.1.5 LAND USE COMPOSITION IN WAYSIDE AREA