(5) Summary of problems of bus operation

Bus network in Jakarta metropolitan area is extensively developed by mixing public and private operators and small to large buses, and managed to maintain reasonable average operating speed throughout the urban area. However, quality of service may not be satisfactory. The following points summarizes the existing problems of bus operation in the area.

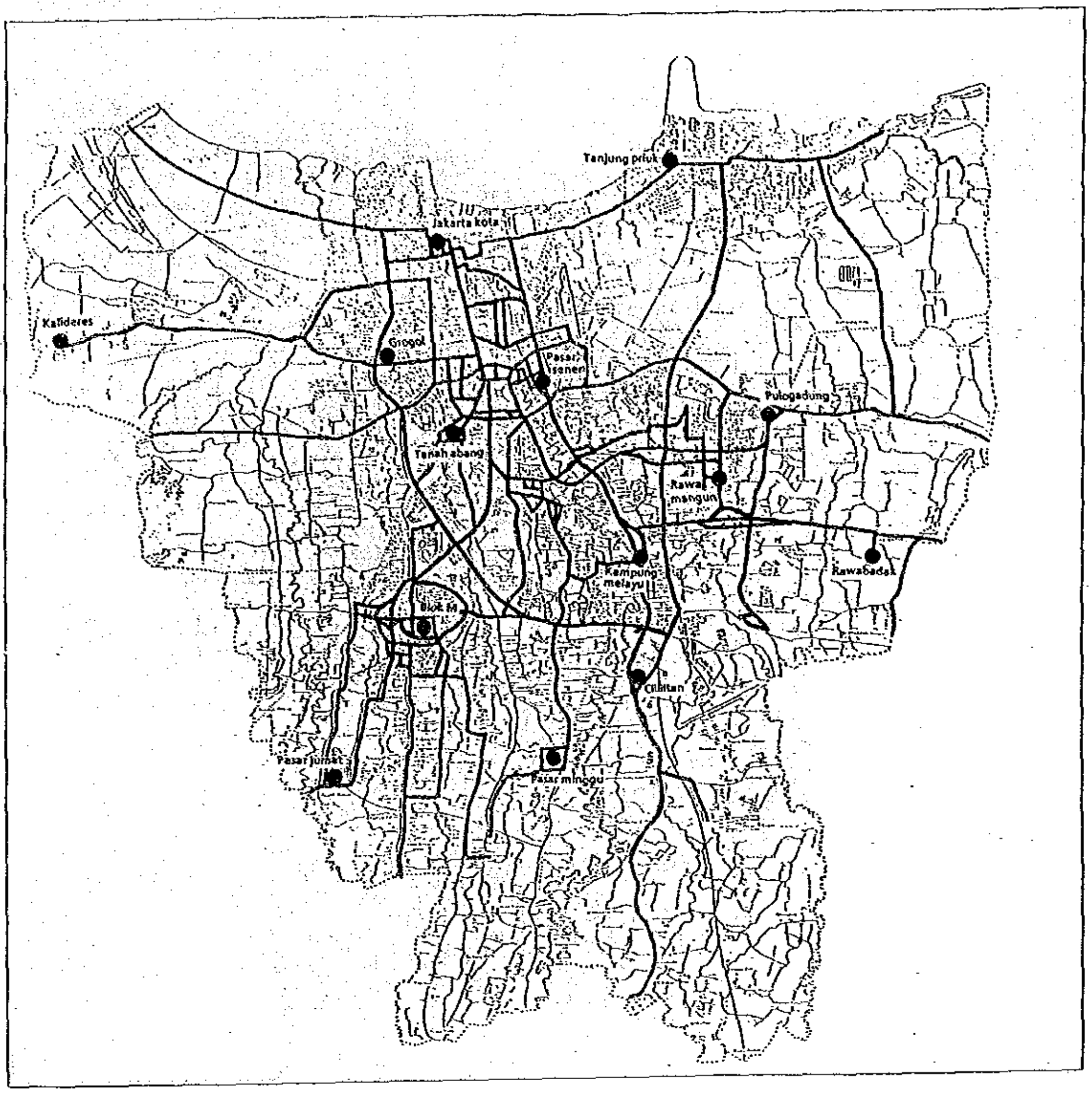
- Buses operate without schedule, therefore, bus users do not know how long they have to wait for a particular bus to arrive.

- Bus rides are becoming increasingly unreliable due to traffic congestion resulting from recent growth of motorvehicle ownership.

- Some users complain that buses are unsafe because of the ruthless driving practice. Buses do not stop completely to unload and pickup passengers.

- Rational route allocation policy and method is required to keep the healthy development of bus business to both public and private operators. This should also help ease traffic congestion.

- Many of the bus routes are competing with railway but if an integrated Rail-bus system to be promoted re-organization of bus routes and better transfer facilities are required.

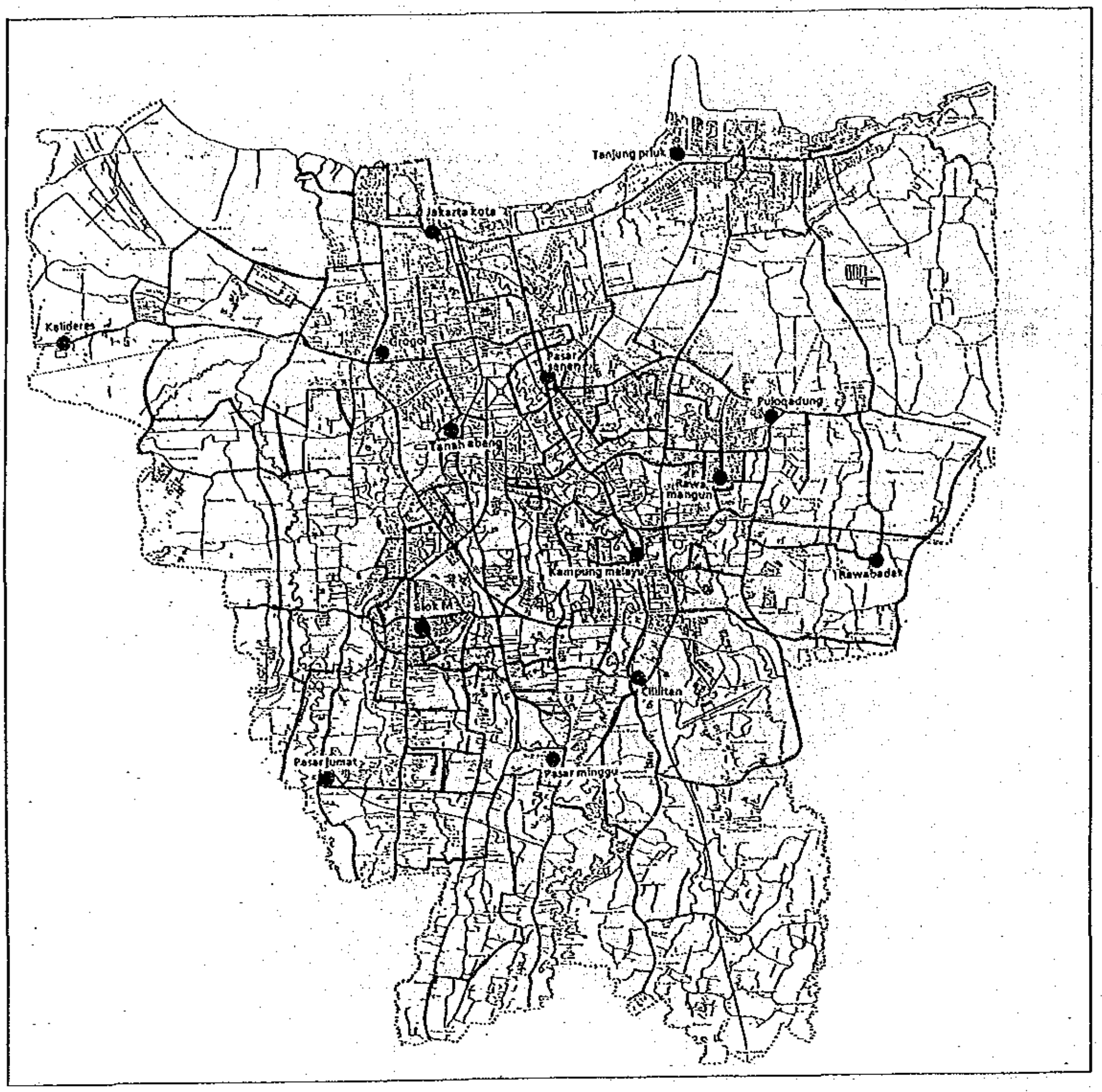


Legend:

—— Large Bus Route

● Bus Terminal

Fig. 3.3.1.1 Large Bus Network (Bis Kota, Patas)

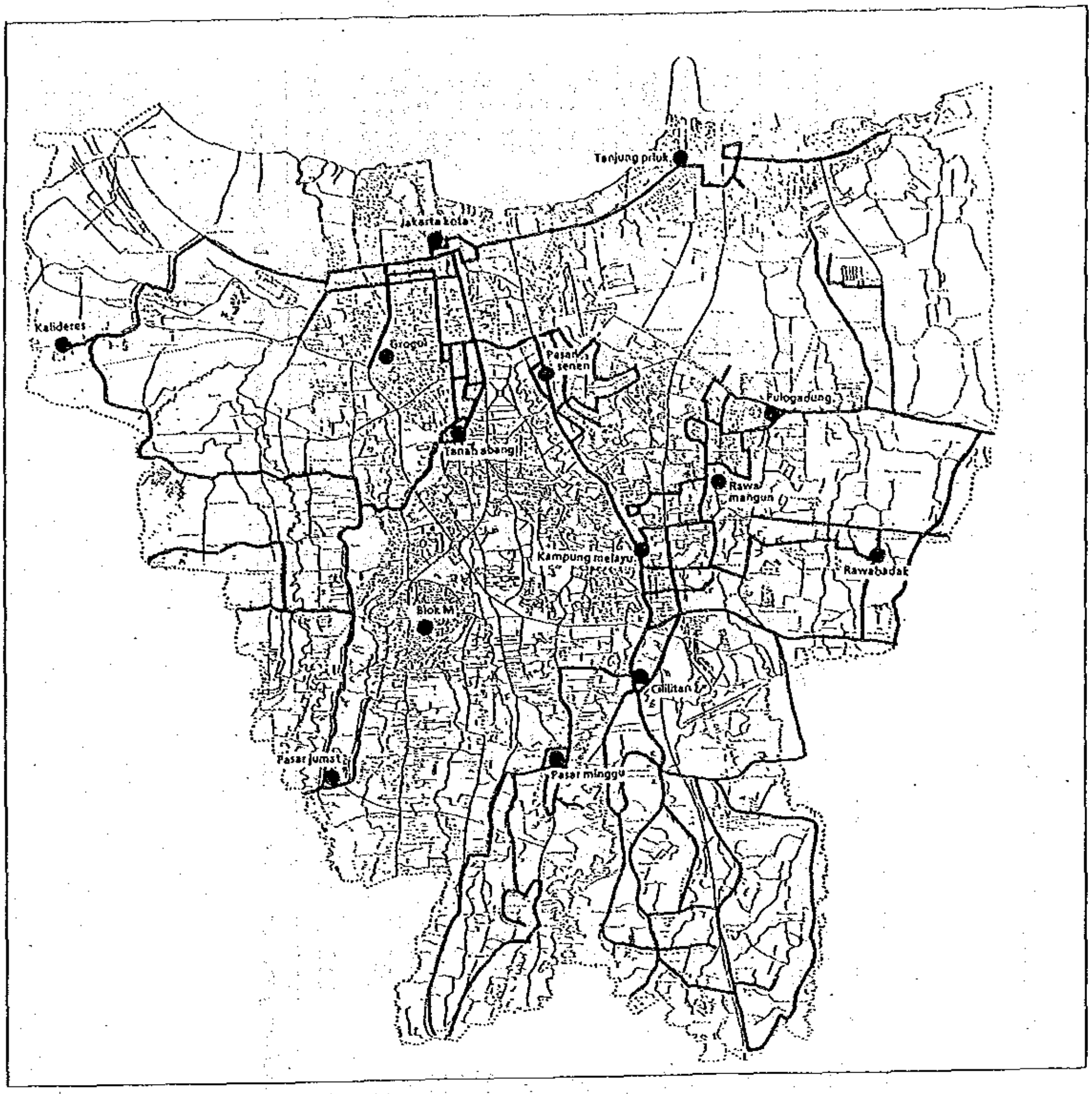


Legend:

—— Medium Bus Route

● Bus Terminal

Fig. 3.3.1.2 Medium Bus Network (Metro Mini Kopaja)



Legend:

—— Small Bus Route

● Bus Terminal

Fig. 3.3.1.3 Small Bus Network (Microlet, APK)

Table 3.3.1.7 Scale of Bus Operation at Bus Terminals (City Service Only)

Terminal	Number of Buses				Number of Routes				Number of Passengers			
	Large	Medium	Small	Total	Large	Medium	Small	Total	Large	Medium	Small	Total
Senen	224	251	-	475	4	11	-	15	10,440	17,760	-	28,200
Tg.Priok	130	90	210	430	14	5	6	25	65,000	45,000	8,500	118,500
Grogol	155	138	-	293	19	6	-	25	29,718	17,390	-	47,108
Jakarta Kota	83	110	689	882	11	4	5	20	6,745	5,135	34,551	46,431
Kali Deres	135	98	90	323	10	5	2	17	40,006	12,090	6,480	58,576
Blok M	230	721	-	951	21	29	-	50	71,200	86,520	-	157,720
Lebak Bulus	12	35	22	69	2	2	2	6	3,360	5,712	3,920	12,992
Pasar Minggu	-	91	86	177	-	19	8	27	-	16,000	8,256	24,256
Manggarai	37	153	-	190	5	7	-	12	18,000	44,200	-	62,200
Rw.Mangun	128	-	-	128	17	-	-	17	6,400	-	-	6,400
Klender	32	54	70	156	44	2	3	49	1,600	1,080	1,000	3,680
Cililitan	533	109	-	642	32	7	-	39	26,650	2,180	-	28,830
Kp.Melayu	73	180	765	1,018	6	15	10	31	1,460	3,600	9,180	14,240
Pulo Gadung	304	306	231	841	27	11	2	40	15,200	5,424	2,592	23,216
Total	2,076	2,336	2,163	6,575	212	123	38	373	295,779	262,091	74,479	632,349

Note: Number of buses, routes and passengers are for city services and do not include intercity services.
Souce: DLLAJR, DKI Jakarta

Table 3.3.1.8 Agencies Responsible for Planning, Construction, Operation and Maintenance of Bus Related Facilities Jakarta

Facility	Planning	Construction	Operation	Maintenance
Bus Terminal	Bappeda,DKI	D P U	DLLAJR	DLLAJR
Bus Shelters	DLLAJR D.Tatakota	DLLAJR	DLLAJR	DLLAJR
Bus Bays	DLLAJR	D P U	-	D P U
Bus Lanes	DLLAJR	D P U	-	DLLAJR
Traffic Signs & Marking	DLLAJR	DLLAJR	-	DLLAJR
Signals	DLLAJR	DLLAJR	DLLAJR Police	DLLAJR
Pedestrian Bridge	DLLAJR	D P U	-	DLLAJR

Legend:
DLLAJR - Dinas LLAJR
D P U - Dinas PU
D.Tatakota - Dinas Tatakota

Table 3.3.1.9 Fixed Route Bus Operators in DKI Jakarta, 1988

Name of Operator	Type of Organization	Number of Owners	Number of Vehicles	Number of Routes	Type of Service	Area of Operation
Perum PPD	State Enterprize	1 1)	1881	105	Bis Kota D/D, S/D, Patas, Patas AC 2)	DKI Jakarta
PT. Mayasari Bhakti	Private Company	1	725	44	Bis Kota S/D, Patas, Patas AC	DKI Jakarta
PT.Metro Mini	Private Company	1735	2876	70	Bis Mini	DKI Jakarta
Kopaja	Cooperatives	626	993	35	Bis Mini	DKI Jakarta
Koantas Bima	Private Company	13	76	4	Bis Mini	DKI Jakarta
Kopami Jaya	Private Company	98	98	2	Bis Mini	DKI Jakarta
Mikrolet	Individual (Association)	4077	4449	32	Mikrolet	DKI Jakarta
Angkutan Pinggir Kota	Individual (Association)	Not known	2176 3)	49 4)	Mikrolet	DKI Jakarta + boader area

Note:
1) Under Supervision of LLAJR, DJPD.
2) Air conditioned Patas is first introduced in November 1988 by PPD. Mayasari Bhakti introduced them in January 1989.
3) This number includes 749 Mikrolet type vehicles and 831 Covered pick-up tracks. The remaining 596 vehicles registered outside DKI Jakarta.
4) The number is for those registered in DKI Jakarta.

Source: DLLAJR, DKI Jakarta and bus operators.

Table 3.3.1.10 Efficiency Indices of Bus Companies

Item	DAMRI Bandung 1)	PPD(11/85) Jakarta 1)	PPD(12/88) Jakarta 2)	Mayasari Jakarta 3)	Metromini Jakarta 4)	Kopaja Jakarta 5)
Personnel:						
Total personnel	1,054	16,663	14,694	3,642	9,579	4,477
Crew (driver & conductor)	800	10,511	9,265	2,946	9,480	4,172
Non crew (adm, mech and other)	254	6,152	5,429	696	99	305
Fleet:						
Total (in regular use)	194	1,942	1,690	706	2,978	1,245
Buses in operation (average day)	146	1,149	1,136	552	2,370	1,050
Regular buses	138	1,040	932	152	2,370	1,050
Express or air conditioned	8	109	204	400	0	0
Fare level (per passenger trip):						
Regular buses (Rp)	100	150	200	200	200	200
Express or AC (Rp)	200	200	350	350	-	-
Total passenger (average day)	151,300	704,200	653,634	319,121	1,040,800	609,424
Total fare revenue (average day in Rp 1000)	15,045.6	104,345.0	136,472.0	* 90,233.4	189,600.0	57,365.0
Total vehicle kilometer (average day/bus)	2308.5	13,697	24,646	13,696	31,794	7,812
Efficiency Indice:						
Percent buses in operation (%)	75.3	59.2	67.2	78.2	79.6	84.3
Personnel/bus operating	7.2	14.5	12.9	6.6	4.0	4.3
Crew/bus operating	5.5	9.1	8.2	5.3	4.0	4.0
Non crew/bus operating	1.74	5.35	4.78	1.26	0.04	0.29
Passengers/bus/day	1,036	613	575	578	439	580
Passengers/crew/day	189	67	71	108	110	146
Passengers/personnel/day	144	42	44	88	109	136
Revenue/km (Rp)	6,517	7,618	5,537	6,588	5,963	7,343
Revenue/bus/day (Rp)	103,052	90,814	120,134	163,466	80,000	54,633
Revenue/crew/day (Rp)	18,807	9,927	14,730	30,629	20,000	13,750
Revenue/personnel/day (Rp)	14,275	6,262	9,288	24,776	19,793	12,813

Note: * Total average day fare revenue is extimated based on the company's report on the number of passenger carried in average day. Fifteen percent of the Bis Kota passengers are assumed to be student with 50% discount fare.

Source: 1) Directret LLAJR, DJPD: 2) Perum PPD, Annual Report 1988
3) P.T. Mayasari Bhakti, January 1989: 4) P.T. Metro Mini, December 1988
5) Kopaja (Kooperasi Angkutan Jaya), January 1989.

3-3-2 Projects and Plans for System Improvements

(1) Introduction

This section reviews existing projects and plans in JABOTABEK Area with particular emphasis on road based transportation systems, namely: road network, bus service, traffic management and mass transit systems. An effort is made to clarify the ongoing and committed projects and future plans in JABOTABEK Area for 1992 and 2005.

Reviewed reports are listed below but several informal contacts are also made to the relevant government agencies to confirm the current status of projects and plans mentioned on those documents:

Reviewed reports:

- Traffic Management and Road Network Development Study, Final Report, May 1983
- Fixed Route Public Transportation - Problem Ranking and Scheme Identification, Technical Paper No. 5 (No date)
- Traffic Restraint and Parking Policy Studies, May 1987
- Public Transport Policy Recommendations Review and Action Program (No date)
- A 5 Year Indicative Programme for Traffic Engineering and Management in Dinas LLAJR DKI, Draft (No date)
- Arterial Road Systems Development Study in Jakarta Metropolitan Area, Final Report, Main Report, September, 1987
- The Consulting Engineering Services for Jakarta Outer Ring Road: Phase I Report, Volume 1: Text, Draft, October 1988
- Jakarta 2005 (DKI Master Plan), 1987

Agencies contacted:

- Directorate General Bina Marga (Highways), MPW
- Bappeda, DKI-Jakarta (City Planning Department, Jakarta Special Capital Province)
- Dinas Tata Kota, DKI (Urban Planning Department, DKI Jakarta)
- Dinas LLAJR, DKI (Traffic and Highway Transportation Department, DKI-Jakarta)
- JUPCO (JABOTABEK Urban Project Coordination Office)

Although the aim of this section is considered as the review of existing projects and plans, some of the less firmly established plans, such as the location of mass transit corridor has been considered, and are elaborated to provide the basis for the demand forecasting.

(2) Road network development

The road network prepared for the demand forecasting purpose is composed of primary and secondary roads in JABOTABEK area.
Majority of local and community roads are not included in the network, therefore the review of existing projects and plans is concentrated on the improvements of these classes of roads.

Projects to be Completed by 1992

Currently, DKI and Bina Marga are executing the JUDP-1 (JABOTABEK Urban Development Project - Phase I) road development plans for the period 1988/89 - 1993/94 and the improvement plans up to 1992/93 are well summarized there. Some toll road sections, either by Jasa Marga or by private investment, are also scheduled to be constructed by 1992/93. Table 3.3.2.1 summarizes the road development projects to be completed by 1992.

Table 3.3.2.1 Road Development Projects to be completed by 1992

Code	Projects
A	JUDP-1
1	Outer Ring Rd. west, frontage
2	Outer Ring Rd. south, frontage
3	Buncit-Lingkar
4	Pinang-Pejompongan
5	Minggu-Depok
6	Pasar Pagi viaduct
7	Tembus Jatinegara-Sudirman
8	Tembus Pejompongan-Matraman
9-12	Flyover, Harmoni etc.
13-15	Land Dev. Rds., east
16-20	Land Dev. Rds., west
--	Land Dev. Rds., Kemayoran
21-25	Corridor Dev.
26	Bus Prio. Gun.Sari-Jatinegara
27	Bus Prio. Kyai T.-H.Asyhari
28	Bus Prio. K.Bender-Suprapto
B	Toll Road (Intra Ur., West, G1)
C	Toll Road (Intra Ur., N-S)
D	Toll Road (ORR east, Jl. Bekasi Raya - Jak. - Cikampek Toll way) half roadway will open in 1989.

Source: A) DG, Land Transport Dept. (JUDP-1)
B), C) ARSDS (JICA, 1987) and D) from JDRRP study

Plans for 2005

The road network development plans for the year 2005 are determined by studying the DKI Master Plan, plans by Bina Marga, Jasa Marga and the ARSDS Study. The main characteristics may be summarized as follows:

Inside the Intra-Urban Ring Roads: A few sections will be improved since large scale works are difficult due to the high cost of land and compensations. Minor works and traffic management works are expected in this area.

Inside the Outer Ring Road: DKI Master Plan for 2005 are examined. Road plans surrounding the east and west urban centers and a corridor extension both to Tangerang and Bekasi are emphasized. Considering the magnitude of the current JUDP-1, part of the DKI's road plan are assumed to be postponed to the years beyond 2005.

Outside the Outer Ring Road: A long-range road improvement plan is yet prepared by Bina Marga. However, they suggested that widening of the existing road is a realistic approach in the JABOTABEK Area. Major radial roads will be improved. ARSDS recommended mass transit corridors to east/west, however a part of the recommendation is taken for 2005 since the scale of improvement by ARSDS seemed too costly to implement within the planning period.

Table 3.3.2.2 summarizes the planned road development for 2005. The location of the plans in 1992 and 2005 are shown in Fig. 3.3.2.1.

(3) Bus service improvements

Bus Lanes and Busways

A bus lane is separated from general traffic by means of markings and signs. Basically, general traffic is prohibited to run along the bus lane but permitted to cross it in the case of access to the frontage activities.

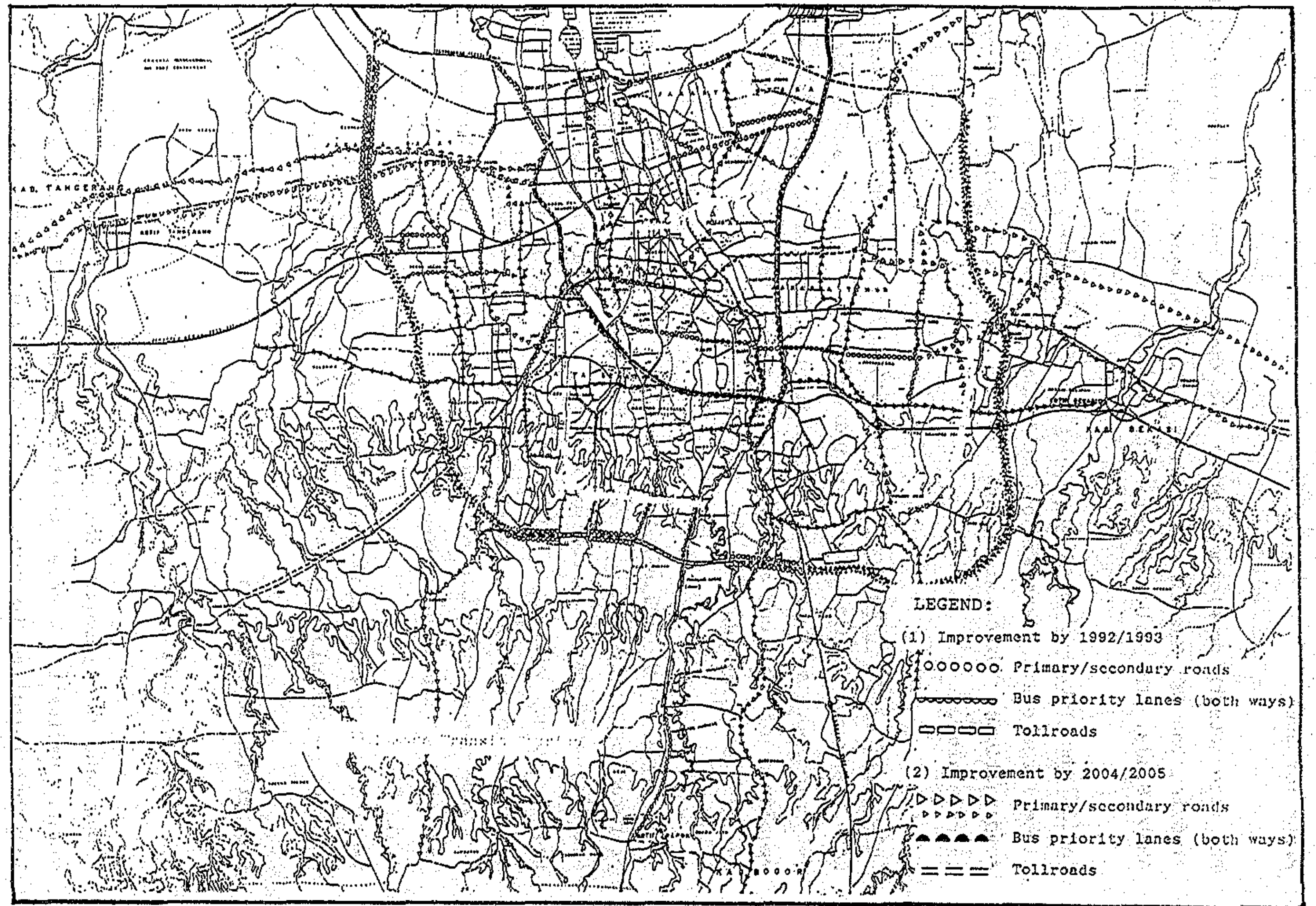


Fig. 3.3.2.1 The Location of Road Improvement Project

Table 3.3.2.2 Road Development Plan for 2005

Source	Projects	Length	Lanes
A	Primary and Secondary Roads		
1	Fatmawati	5.4	2 --) 6
2	Prapanca R.	4.6	4 --) 6
3			
	- Pejompongan	3.4	N 4/6
	- Pejompongan		N 4/6
	- Matraman	2.0	I 4
5	K. jeruk	5.4	2 --) 4
6	Flyovers		
7	Otto Iskandar - R. Bogor	27.5	2/4 --) 6
8	Pejaten R. -	4.7	2 --) 4
9	Duren Tiga -	8.0	2 --) 4
10	Kyai Maja	3.1	2 --) 4
	- Tangerang	18.1	2 --) 4
11	Simpruk	4.4	N 6
	N-S st., inside the West ORR	9.4	N,I, 4
12	To/from Tangerang	26.7	I 6
13	South-West	19.9	N 6
14	Daan Mogot	24.8	4 --) 6
15	Mas Mansur	10.4	2/4 --) 6/8
16	Kemayoran	8.0	2/4 --) 6
17	Cip Baru	4.0	2/4 --) 4
18	Pahlawan Revol.	26.0	2/4 --) 4
19	Ext. of EE	3.8	N 6
20	Inside ORR east	19.1	2,N --) 4
21	Perintis - Bekasi	23.4	I --) 4/8
22	Bekasi BP	16.5	N 4
23	Pulogadung east	9.8	N 4
24	CC/FF n-east	5.1	N 4
25	CC/FF east	4.4	N 4
26	Jatinegara east	13.1	2/4 --) 8
40	S-W, Blok M road	18.5	2 --) 4
B.	Tollways		
	S.W Arc		
	Northern Ex.	4.3	4
	Harbour Rd.	19.0	4
	ORR	59	4 x 4
	Serpong Toll Rd.	14.0	4

Source: A means ARSD Study (JICA 1987)

B means JUDP-1 Project List.

This type of bus lane terminates in the approaches to intersections to allow general traffic to make left turn movements or queue up at the intersection, which minimizes the reduction of intersection delays to general traffic while improving the service level of the bus running speed. The bus lane should be restricted to large buses with fixed route/stop and possibly to certain medium buses. Small buses without fixed stops, that also slow down to seek passengers and pick up and unload them wherever possible, are not suited for bus priority lanes. Bus lanes are aimed at improving service levels of higher capacity buses so that bus users can shorten their travel time.

This arrangement however may adversely affect the private car users but the precious urban road space is more efficiently used because the number of passengers carried by the cross section can be significantly increased if the scheme is successfully implemented and attract more bus users diverted from the use of private cars.

The bus lane arrangement can be enforced continuously for 24 hours only for peak hours but the enforcement hour will be clearly marked on the bus lanes and signs.

According to the report 'A 5 Year Indicative Program for Traffic Engineering and Management in DLLAJR, DKI' total of 84.8 km was proposed over 5 years starting 1987.

Busways are the roads which are specially build for buses. They are physically segregated from general-purpose roads but may be expensive to build. They provide a higher level of service than bus lanes. Buses can be operated on a guided-busway on which buses are automatically controlled by computer controlled guiding wheels. They operate more like trains but in suburban areas they can be separated as traditional buses. This system adds flexibility, and an extra reliability and a high level of service in congested area and provides flexibility in the outer area.

A further study on the possible introduction of guided-busway system is recommended by one of the J.U.T.P studies (Jakarta Mass Transit Options Study), but no definite program exist for its construction in the immediate future.

Bus Terminals and Bus Shelters

Two types of improvements have been proposed to change the situation: terminal improvements proposed by 'Traffic Management and Road Network Development Study, 1983' and new terminal construction (or relocation of old terminal) proposed by DKI Master plan, 1987.

The terminal improvement measures concern the revised layouts and modifications to access/egress arrangements as well as internal circulation systems. The Study proposed the following six terminals to be improved:

- Cililitan
- Grogol
- Pulo Gadung
- Kampung Melayu
- Tanah Abang
- Blok M

Between the financial year 1982/1983 - 1986/1987, DLLAJR, DKI spent total of 685 Million Rupiah to the rehabilitation of bus terminals and bus shelters and the most of the recommended improvements have been implemented. Similar improvements are also planned for Bogor and Bekasi.

DJJAJR, DKI currently committed to the construction of four new bus terminals along the planned Outer Ring Road (Fig. 3.3.2.2).

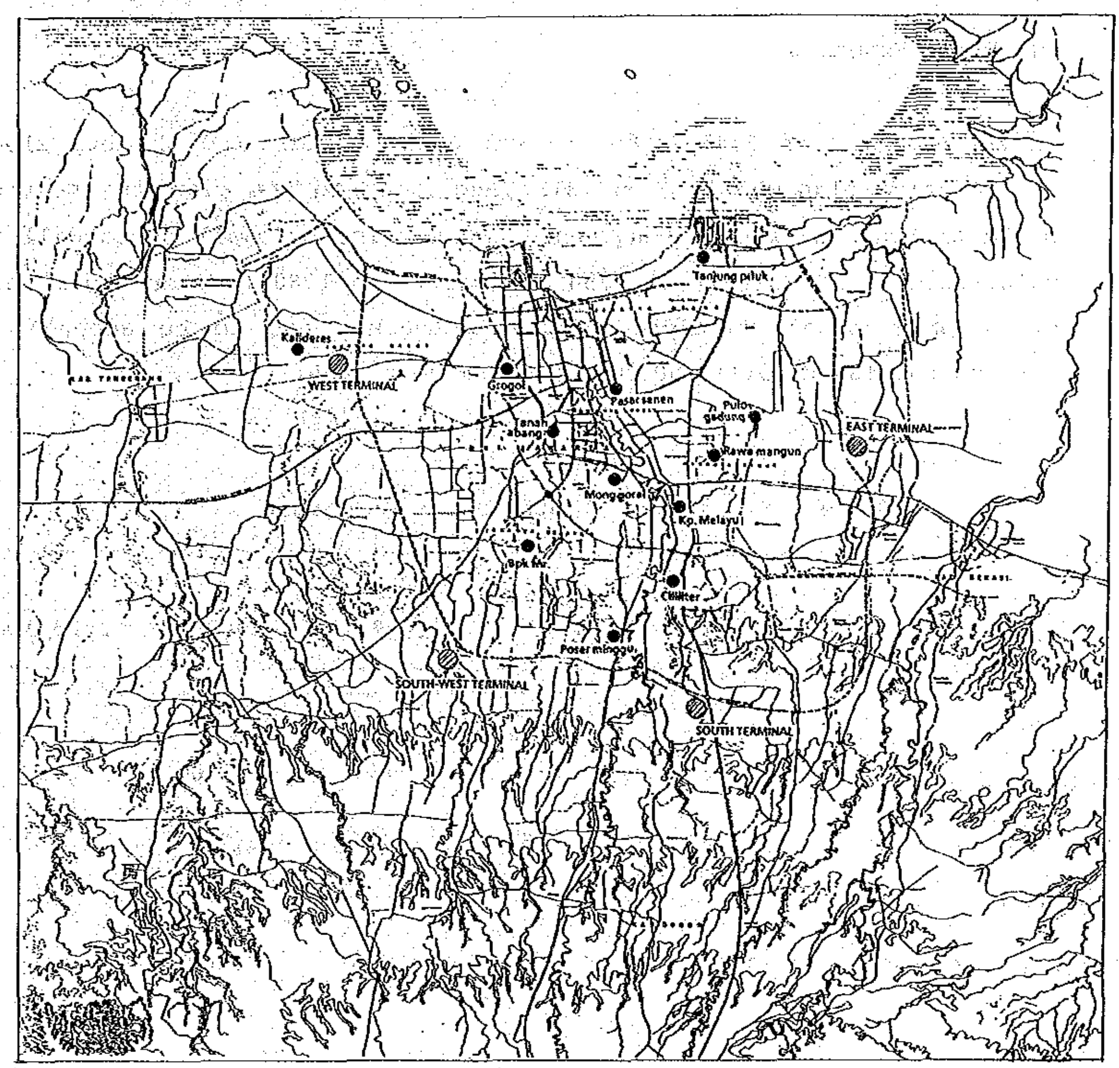
These bus terminals are referred here as the East, South, Southwest and West Terminals and the each terminal is explained individually in the following sections.

The East Bus Terminal is to be sited east of planned Outer Ring Road near Cakung South interchange in Pulo Gadung. The site covers a minimum of 15 hectors. The terminal will serve long-distance buses to/from the eastern part of West Java, Central Java and East Java province. Routing will follow both Jl. Perintis Kemerdekaan and Jakarta-Cikampek Toll Road.

The South Bus Terminal is to be sited in the Southwest quadrant of tollway-to-tollway interchange of the Ring Road with Jagorawi Toll Road in Kampung Rambutan. The site covers 20 hectors. The site is fixed and land clearing is expected to commence in 1989. The terminal will serve long-distance buses to/from the southern and southeastern part of West Java Province. Routing will follow both Jl. Raya Bogor and the Jagorawi Toll Road.

The Southwest Bus Terminal is to be sited Southwest of the Pondok Pinang East interchange near the existing Lebak Bulus terminal. The site covers 3 hectors. The terminal will serve long-medium distance buses to/from Serpong and the Southwestern part of West Java Province. Routing will follow both the Jl. Raya Bogor and Jakarta-Serpong Toll Road (after construction).

The West Bus Terminal is sited west of the Ring Road between Jl. Daan Mogot and the Jakarta-Merak Toll Road. Long-distance inter-city and some intra-city services will shift from Kalideres Terminal to the site (10 hectors) near Rawa Buaya in the near future. Land clearing for the site is expected to commence in 1989. The inter-city component of the West Bus Terminal will serve long-distance buses to/from the western part of West Java Province and Sumatra. Routing will follow both Jl. Daan Mogot and Jakarta-Merak Toll Road.



● Existing Bus Terminal

▨ New Bus Terminal

(Construction will be completed by 1992)

Fig. 3.3.2.2 Site of New Bus Terminals

Bus Fleet Expansion

In the Master Plan 2005 (1989) by DKI Jakarta indicated the bus fleet installation plan (Table 3.3.2.3). According to the plan the service by large buses will be strengthened and service by small buses will be maintained at 1982 level of 1750 vehicles. In 1988 however there were 6,624 small buses therefore a drastic measure has to be adopted to achieve the target of 1,750 buses in the year 2005.

Table 3.3.2.3 Bus Fleets Expansion Target

Type of Bus	1982 1)	1988 2)	1992 3)	2005 1)	2005/1988
Large Bus					
(Double Decker)	74	438	732	1,250	2.85
(Bis Kota/Patas)	1,381	2,276	2,976	5,250	2.31
Micro Bus					
(Metro Mini/Kopaja)	1,872	3,918	3,820	3,500	0.89
Small Bus					
(Microlet, etc.)	1,756	6,624	5,479	1,750	0.26

Source: 1) DKI Jakarta Master Plan 2005, issued 1987.
2) DLLAJR, DKI, number of registered fleets.
3) Interpolation between 1988 - 2005.

The rationale behind the DKI policy on the desirable bus fleet composition is that the use of larger buses could reduce bus traffic and increase bus corridor capacity. When combined with bus lane schemes and other traffic management measures to give priority to bus operation system, substantial saving in travel time and operating cost is expected. (Jakarta Mass Transit Options Study, 1986).

Reorganization of Bus Routes

The existing bus routes do not necessarily present an optimal service to the demand pattern in terms of minimizing transfers as well as maximizing the efficiency of the use of limited urban road space. The existing bus service pattern is licensed by Dinas LLAJR in the absence of clear policy and procedure, but the most likely goals of the rationalization of bus routes are to:

- provide an efficient bus service to meet the demand pattern subject to constraint of limited urban road space and public expenditure.
- provide direct bus service to employment area from residential area so as to minimize changes at terminals.
- increase large capacity buses in major bus corridor and limit lower capacity buses to attain maximum capacity and higher level of service.

With the implementation of such bus-route rationalization scheme the overall level of bus service in JABOTABEK region is expected to be improved.

(4) Traffic management schemes

Parking Controls

Central area parking controls are proposed by JUTP (Jakarta Urban Transportation Project -- Traffic Restraint and Parking Policy Studies, Final Report, May 1989) as a part of the traffic restraint package for the central area of Jakarta.

It is recommended that a stricter street parking restriction should be imposed together with an introduction of a tighter control on those included within new developments. It is also recommended that an increase of parking charges and modification to the revenue collection procedure including a peak and off-peak differentiation and stricter enforcement of hourly charges with respect to time actually parked. It is also proposed that new parking areas be provided in the vicinity of some of the railway stations in the suburbs to provide park-and-ride facilities so that some of the car users may attract to use the improved railway facilities to complete their journeys to the central area.

Area Licensing

The Central Area Licensing Scheme will require all private cars to display a license to operate within the designated area, but cars with four or more occupants would be allowed free entry to the area. This scheme is recommended as final stage of a series of traffic restraint proposals and institutional improvements.

The proposed restraint cordon covers an area of less than 4 square kilometers and includes a minimum residential population and a maximum number of office and commercial establishments. There are 15 entry points to this area and the remaining 11 minor roads are closed to achieve a 'water-tight' cordon. The initial period of enforcement is recommended to be between 0600 - 1000 hours with subsequent extensions throughout the day. Cars with four or more occupants would be allowed free entry to the area.

Traffic Light

Many critical junctions in Jakarta are controlled by traffic signals, but most of their settings are outdated to cope with the current level of 'overloaded' traffic. Traffic computer system called Urban Traffic Control (UTC) have been installed on junctions in Jakarta but full benefits have not been gained due to lack of a system to observe the latest traffic volume of approaches and set appropriate timings for the UTC computer.

Proposals are made however to improve the situation, and in certain cases to replace older UTC computer to new equipments. Dinas LLAJR, DKI has spent 3927.8 Million Rupiah over 1982-1986 for rehabilitation of existing equipment and new installations. Installation of more traffic lights and traffic computer equipments are expected in the future but no definite plan exist at the moment.

Current status and the implementation prospects of the improvement measures described in the previous sections are summarized in Table 3.3.2.4, and their expected impacts are shown in Table 3.3.2.5.

Table 3.3.2.4 Summary of Status and Completion Prospects of Bus Improvement Measures and Traffic Management Schemes

Improvement Measures	Status in Early 1989	Prospect of Completion	
		by 1992	by 2005
Bus lanes	17 Kilometers Committed, remaining 69 kilometers under study.	Approximately 30 kilometers will be constructed.	All of the remaining sites will be completed
Busways	Proposed by JUTP. (No commitment)	Not completed (Detailed Study will begin, TNPR)	May be Completed
New Bus Terminals	The location of 4 sites are determined.	Not completed (Detail Design finalized)	Completed
New Bus Fleets	Jakarta Master Plan recommends an increase of large buses and reduction of small buses.	Bus companies will follow the recommendation and take a first step to purchase appropriate fleets.	Bus companies attain the target number of fleets.
Bus Route Reorganization	World Bank Study is scheduled (TNPR).	World Bank study produces a reorganization plan but the buses start to use buslanes completed by this year.	Major Reorganization will be completed.
Parking Control	Proposed by JUTP (No commitment)	Not completed (Detail Study will be conducted).	Completed
Area Licensing	Proposed by JUTP (No commitment).	Not completed (Detail Study will commence but slower progress than the parking control measure).	Completed
Traffic Lights	JUTP proposed improvements.	Not certain	Not certain
Institutional Improvements	JUTP proposed PPD, Damri action plans.	Partially completed	Completed

(Based on hearing at DLLAJR, DKI Jakarta)

Table 3.3.2.5 Expected Impacts of Bus Service Improvements and Traffic Improvement Measures

Improvement Measures	Expected Impact	Remark
Bus Lanes	Bus service level will improve due to speed increase of buses on bus lanes. JUDP study predicts the current 15 km/h average speed to become 25-30 km/h that will be faster than general traffic	General Traffic will slow down but not significantly because of the set back arragngement of bus lanes.
Busways	If a complete segregation of general traffic is attained by constructing physically separated busways and intersection over-passes, the speed and reliability of bus services will become equivalent to fixed truck systems.	Costly to build bus lanes but cheaper than fixed route system such as LRT or heavy rail. The system may be de-signed as a 'guided busway system' in which automatic operation is possible.
New Bus Terminals	Inter-city bus service will become convenient due to improved traffic condition around the terminals which results in shortened travel time to bus users and improved image of bus services.	General traffic around the old bus terminals will be greatly bene-fited by removal of 'bus congestion' to outer areas.
New Bus Fleets	Increased frequency will shorten travel time. Higher speed to carry the same number of passengers if combined with bus lanes because the introduction of larger buses and reduction of smaller buses reduces the traffic congestion.	Some influence if modal shift occurs from private cars to buses.
Bus Route Reorganiz-ation	Shorter journery time due to better connections among buses and higher running speed on trunk bus routes with high capacity buses.	
Parking Control	Improved running speed for both buses and general traffic due to reduced traffic within the control area.	
Area Licensing	Same as parking control but the higher level of traffic congestions may occur close to the restricted area because unlike parking control, area licensing will affect through traffic as well.	Parking control and area licensing measures are expected to force some private car users to public transporta-tion
Traffic Lights	Improve running speed of all traffic.	

3-4 Transportation Interchange and Railway Feeder Systems

3-4-1 Inter-Modal Dependency and User Behaviour

(1) Access modes to railway

Railway access is performed by a variety of modes such as on foot, by bicycle, motorcycle, buses, private cars and taxies. (Unless it is specified railway access is defined here as the travel to and from railway stations or stops.) Table 3.4.1.1 shows the composition of access modes of JABOTABEK railway passengers found in an interview survey conducted by study team in December 1988.

Table 3.4.1.1 Access Mode Composition to/from JABOTABEK Railway

Access Mode	To Railway	%	From Railway	%
On Foot	766	40.5%	719	38.0%
Bicycle	18	1.0%	8	0.4%
Motorcycle	72	3.8%	50	2.6%
Motor Car	130	6.9%	105	5.5%
Small/Medium Bus	633	33.5%	703	37.2%
Large Bus	135	7.1%	136	7.2%
Becak	54	2.9%	86	4.5%
Taxi/Bajaj	52	2.7%	35	1.8%
Others	32	1.7%	50	2.6%
Total	1,892	100.0%	1,892	100.0%

Source: Railway passenger survey conducted by the study team in December 1988.

As it can be seen in the table walking and bus ride dominate the means to reach the railway. The composition of the methods to arrive at the final destinations from railway are more or less the same. Bicycles and motorcycles are playing a relatively minor role.

The compositions of access modes to different railway stations, however, vary reflecting their diverse locational characteristics. Table 3.4.1.2 shows the access mode composition of major railway stations in JABOTABEK Area. The following observations can be noted:

a) High proportion of taxi/bajaj use is observed at the long-distance railway stations (Kota, Gambir, Senen and Jatinegara).

b) Relatively higher proportion of 'from railway trips' are made on foot as compared to 'to railway trips' which may imply the existence of different preference over the two types of access modes; shorter trips on foot may be favoured at the end of trips by public transportation compared to the beginning of the trips.

c) Large buses are well used at major stations within DKI-Jakarta but small buses play a significant role at suburban/rural stations where more than 50% of access trips are made by using small buses.

(2) Bus-rail interchange behaviour

It was pointed out in the previous section that a large portion of railway access trips are made by buses of different sizes and railway passengers come by or transfer to buses at the stations with better connections to bus services.

Fig. 3.4.1.1 shows the distribution of railway stations over the two dimensional space of railway service level and bus accessibility index. Railway service level is measured by number of train operation per day and bus accessibility index is denoted by the number of bus routes within 350 m radius of the stations. The distance represents an assumed 80 percentile walk trips between buses and trains.

Table 3.4.1.2 Modal Composition of Access Transportation Modes Railway Stations

Station Name	Number of Passengers Boarding	Access mode percentage by Station									
		On foot	Bicycle M.Cycle	Becak Ojek	Large Bus	Medium Bus	Small Bus	Taxi Bajaj	Private Passengers Car	Others Unknown	Total
(To Station Trips)											
Kota	11,733	28.9	0.4	2.9	14.9	8.7	20.4	16.5	6.4	0.9	100.0
Gambir	8,916	18.0	1.2	0.2	24.6	1.9	5.3	29.3	17.0	2.5	100.0
Manggarai	4,985	51.8	1.4	2.2	6.8	15.7	8.4	9.7	2.2	1.8	100.0
Tanjung Priok	434	37.8	0.0	12.7	8.1	13.8	19.6	1.2	0.0	6.8	100.0
Senen	3,302	10.9	1.9	4.0	26.0	7.7	7.3	32.0	8.4	1.8	100.0
Jatinegara	3,944	12.0	2.0	4.5	15.5	18.1	20.6	19.0	6.8	1.5	100.0
Tanah Abang	3,111	24.0	0.3	17.4	23.3	8.5	14.8	9.7	1.5	0.5	100.0
Pasar Minggu	5,991	23.0	0.6	0.5	13.8	43.4	16.1	0.4	1.1	1.1	100.0
Depok Baru	3,614	18.2	3.9	3.5	3.0	8.9	60.1	0.0	1.7	0.7	100.0
Depok	4,291	42.1	0.9	2.5	1.4	3.3	48.6	0.0	0.4	0.8	100.0
Bogor	8,855	12.2	1.3	6.6	2.7	1.6	73.4	0.2	0.9	1.1	100.0
Bekasi	1,035	17.3	4.5	6.0	11.7	3.8	54.2	0.6	1.7	0.2	100.0
Tangerang	724	22.0	1.5	11.4	0.0	5.4	58.7	0.0	0.0	1.0	100.0
Serpong	1,045	33.4	1.1	1.6	7.8	0.6	51.0	2.5	0.4	1.6	100.0
(From Station Trips)											
Kota	9,913	43.4	0.3	2.4	10.5	7.1	21.3	12.1	1.3	1.6	100.0
Gambir	10,575	24.5	0.0	0.3	28.9	3.3	7.2	29.0	6.0	0.8	100.0
Manggarai	4,289	50.1	0.1	3.7	8.3	16.9	8.1	10.4	1.5	0.9	100.0
Tanjung Priok	184	20.1	0.0	41.3	13.6	0.0	20.1	0.0	0.0	4.9	100.0
Senen	3,661	13.3	0.0	2.9	31.8	6.6	13.8	29.0	2.0	0.6	100.0
Jatinegara	5,361	12.7	0.0	3.2	19.1	11.5	16.9	30.4	4.7	1.5	100.0
Tanah Abang	2,323	32.9	0.0	4.0	27.6	10.1	17.7	7.0	0.0	0.7	100.0
Pasar Minggu	5,221	30.6	0.1	1.8	6.8	37.4	22.0	0.7	0.1	0.5	100.0
Depok Baru	2,970	21.5	4.0	10.1	2.5	3.7	57.4	0.0	0.0	0.8	100.0
Depok	6,764	36.8	0.6	5.7	2.3	5.0	47.8	0.1	0.8	0.9	100.0
Bogor	8,712	18.7	0.9	5.8	5.7	2.8	63.2	0.5	1.2	1.2	100.0
Bekasi	1,235	18.7	3.2	8.6	7.0	6.6	53.8	0.0	0.0	2.1	100.0
Tangerang	1,085	30.8	0.0	11.7	2.7	1.3	51.6	0.7	0.7	0.5	100.0
Serpong	440	43.6	0.2	8.4	4.8	7.3	35.7	0.0	0.0	0.0	100.0

Source: ARSDS Railway Survey, 1986

The stations close to the upper right hand corner represent desirable rail-bus integration (Gambir, Jakarta Kota, Senen) but lower left hand corner need to be improved both in train operation and bus services. An opportunity to increase rail patronage exists in the ranges between the two extremes by gradually upgrading bus services and railway services.

Field inspection of railway stations in the study area revealed that many of the stations lack access roads on which buses may be operated. The construction of better road and provision of interchange space in front of railway stations should be an important element of the rail feeder planning.

Majority of transit users do not possess private vehicles (Table 3.4.1.3) which means that the rail users require feeder services that is also public transportation.

Table 3.4.1.3 Carownership of Bus and Rail Users

Vehicles Owned	Bus User		Rail Users	
Private Car	156	11.5%	135	7.2%
Motorcycle	234	17.3%	256	13.7%
None	962	71.2%	1479	79.1%
Total	1352	100.0%	1870	100.0%

Source: Transit passenger interview survey conducted by the study team.

On Rail Catchment Area

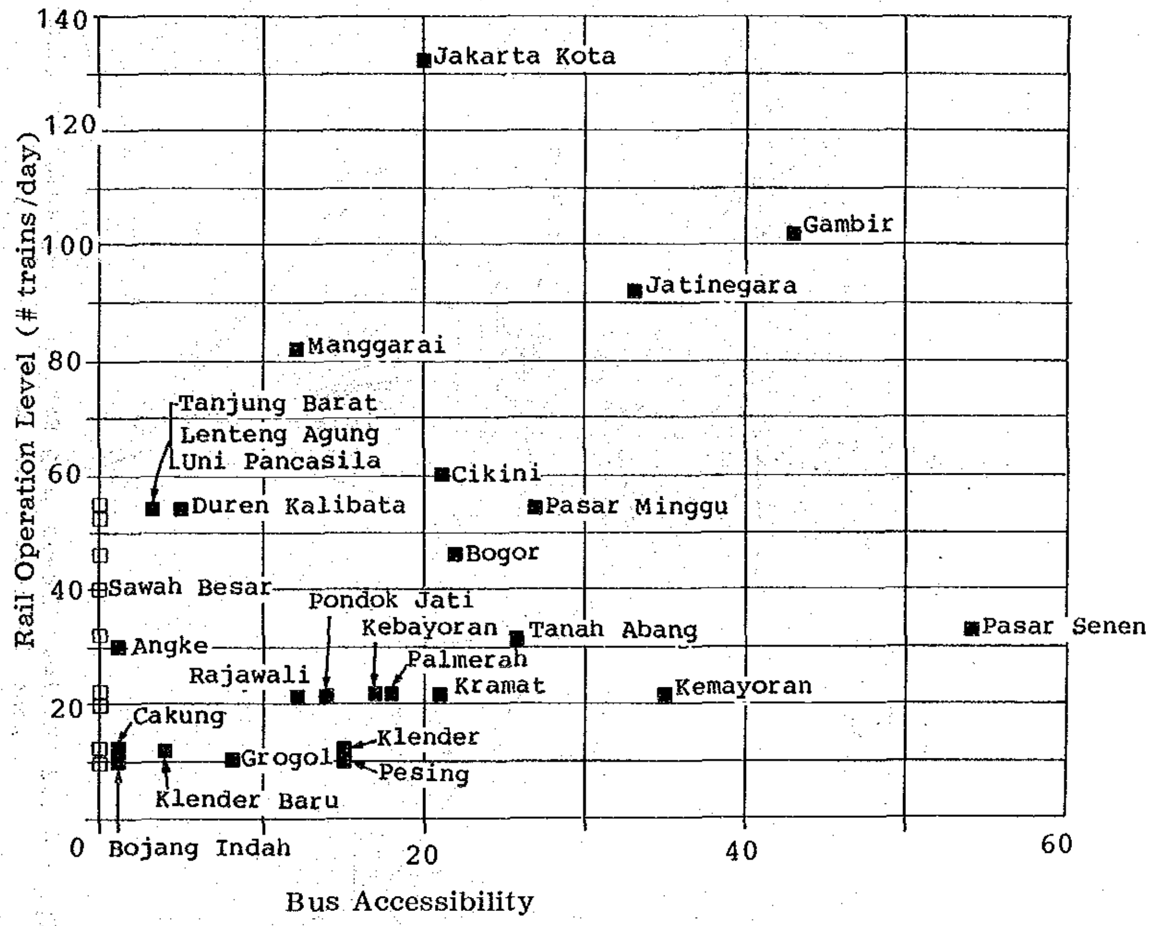
Railway passenger interviews mentioned before also revealed the average walking duration to/from railway (about 10 minutes) and the duration by buses (about 20, 25 and 30 minutes for small, medium and large buses respectively). By assuming an average walking speed of 4 km/h and the bus running speed of 25 km/h, the access trip lengths can be estimated (Table 3.4.1.4).

Table 3.4.1.4 Estimated Railway Access Trip Length on Foot and by Buses

Access Mode	Average Duration (min)	Assumed Speed (km/h)	Estimated Trip Length (km)
On Foot	10	4	0.7
Small Bus	20	25	8.3
Medium Bus	25	25	10.4
Large Bus	30	25	12.5

Source: Railway passenger interview survey.

Fig. 3.4.1.2 shows the spatial distribution of access trips expressed as the lines connecting zone centroid/railway station pairs. The stations with better bus access (such as Kota, Gambir, Passar Minggu) have remarkably long access trips -- the fact implies that the improvement of bus services around railway would increase the catchment area.



Note: Bus Accessibility (No. of Bus routes within 350 m radius of each railway station)

Railway Service Level (No. of trains operated/day)

Fig. 3.4.1.1 Bus-Rail Integration at JABOTABEK Railway Stations

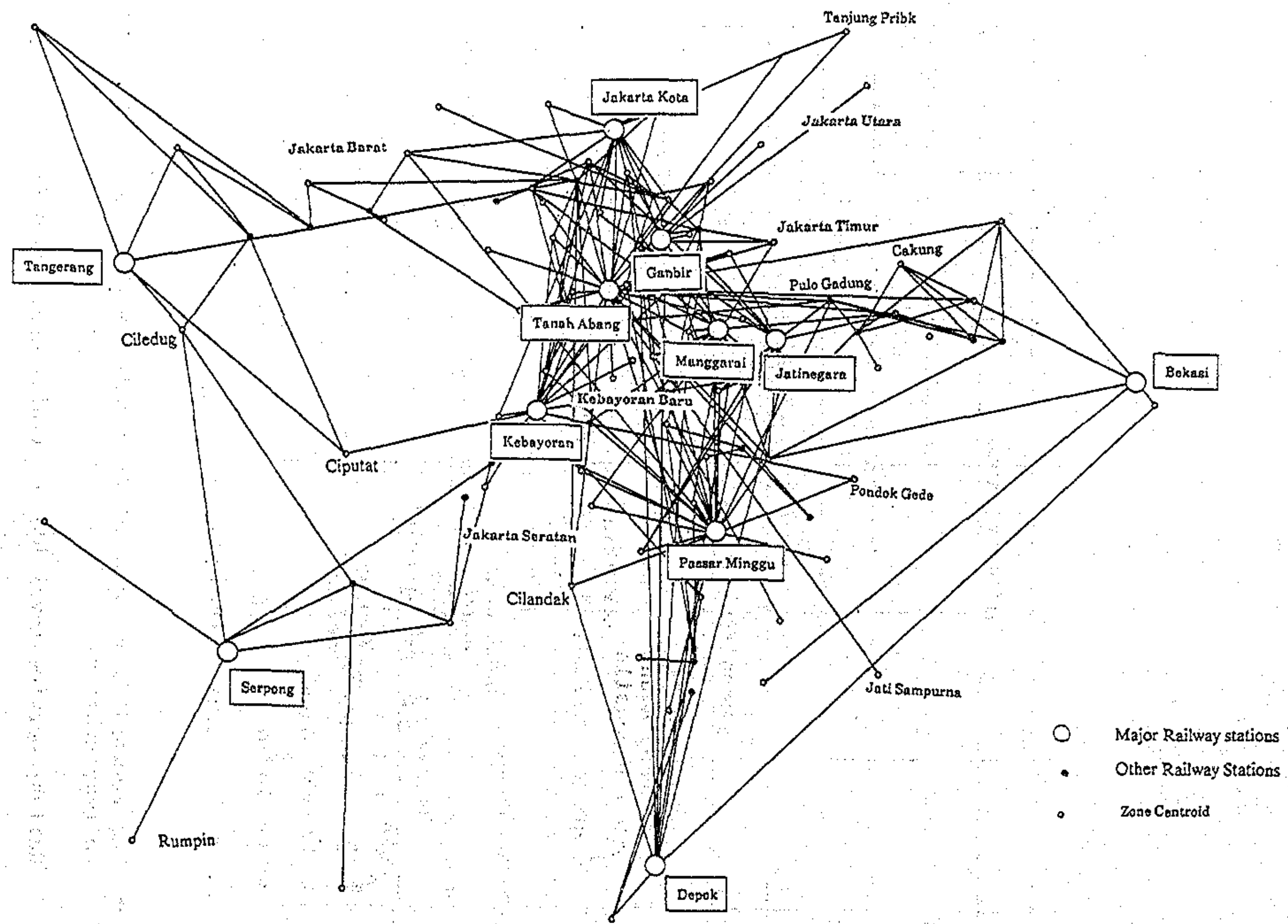


Fig. 3.4.1.2 Railway Access Trip Patterns (Expressed as lines between zone Centroid & Stations)

(3) User attitudes to bus and rail service

Although the rail and bus services should be integrated into a mutually dependent system and indeed many passengers transfers one mode to the other, the level of present system integration is not satisfactory. Bus users complain about the rail service and rail users have reasons for not using buses. Table 3.4.1.5 shows the result of transit user interviews which indicate existing shortcomings of each services and some directions of the way each system can be improved.

Table 3.4.1.5 Public Transportation Passengers' Reasons for Not Using Bus or Rail Services

Bus Users Reasons For Not Using Rail	(%)		(%)	Rail Users' Reasons For Not Using Buses
Railway is not available	53.1	<-->	10.0	Bus is not available
Railway is not frequent enough	3.7	<-->	4.0	Bus is not frequent enough
Railway is time consuming	17.1	<-->	32.0	Bus is time consuming
Railway is expensive	3.0	<-->	34.3	Bus is expensive
Railway is unreliable	3.3	<-->	3.0	Bus is unreliable
Railway is not comfortable	4.5	<-->	5.7	Bus is not comfortable
Railway is not safe nor secure	4.6	<-->	4.2	Bus is not safe nor secure
With some other reasons	10.8	<-->	6.8	With some other reasons
Total	100.0		100.0	Total
(Total Samples)	(1338)		(1891)	(Total Samples)

Source: Study Team interview survey.

The table also indicates the different emphasis placed on the different aspects of transit services. Bus users concern the service availability (53% bus users point out the absence of rail services) and rail users weigh the time element (32% of rail users complains that buses are time consuming) and the level of fares (34% point out bus ride is expensive).

Bus users and rail users are also critical about the systems they accustomed to use. Table 3.4.1.6 and 3.4.1.7 summarize the free style answers obtained during the interview survey.

Many rail users insists that trains should keep schedule and improve service frequency particularly during peak hours. They also point out the necessity of improving safety and comfort of rail system but some of them can be attained merely by influencing changing moral of the passengers.

Bus users also complain about frequency and scheduled operations but noticeably higher proportion of users point our traffic congestion and need of better road systems. Some bus users go further to say that the railway system is more practical than the bus system and more railway lines should be constructed. The fact underlining these comments is that these bus users are experiencing frustrating congestions during the peak hours.

The argument of public transportation improvement is, however, not the selection of one system out of two but the method of integrating the two systems into a mutually reinforcing system to alleviate urban transportation problems arising from the concentration of urban activities in the city center and surrounding suburban areas.

Table 3.4.1.6 Railway Users Comments on Railway Services

Concerns	Comments	Count (persons)	
Scheduled Operation	- Trains should keep schedule	130	19.5%
Frequency	- More frequent commuter trains are desired particularly during peak hours	96	14.4%
	- Improved schedule is necessary	6	0.9%
Safety, confort and security	- Vendors are nuisance (separate coach is desired)	52	7.8%
	- Cleaner coach (inside) and stations desired	44	6.6%
	- Improve security (prevent pick pocket)	36	5.4%
	- Need for improving passenger moral (not to litter)	16	2.4%
	- Increase the number of seats	8	1.2%
	- Toilet is dirty	8	1.2%
	- Electric fan is always out of order	8	1.2%
	- Dustbin should be provided	3	0.5%
	- Do not like beggers on boad	2	0.3%
	- Seat is not comfortable	1	0.2%
	- Separate coaches for passenger and freight	1	0.2%
New Lines	- New suburban lines should be constructed	33	5.0%
	- Every line should be double tracked	2	0.3%
Travel Time	- Too frequent stops between stations	6	0.9%
Fares	- Stricter control over free riders	20	3.0%
	- Cheaper fare is desired	17	2.6%
	- Prevent black marketing of tickets	7	1.1%
Public Relation	- Staff do not take care passengers well	39	5.9%
	- Ticket seller is sometimes absent regardless of long queue	14	2.1%
	- Passengers should be better informed	2	0.3%
Satisfactions	- Satisfied with current condition	86	12.9%
	- Very convenient	15	2.3%
	- Fare is at reasonable level	14	2.1%
TOTAL NUMBER OF RESPONDENT WITH COMMENTS		666	100.0%

Note: All comments are obtained in free style answers.
Total of 1892 railway passengers were interviewed on board the train.
Source: Railway passenger survey conducted by Study Team in December 1988.

Table 3.4.1.7 Bus Users' Comments on Bus (and Railway) Services

Concerns	Comments	Count persons	(%)
Frequency	- More frequent bus service is required during peak hours	79	35.3%
Scheduled Operation	- Buses should operate according to schedule	22	9.8%
Safety, Comfort and Security	- Safety and comfort should be improved	17	7.6%
	- Police should be on boad to prevent pick pocketing	1	0.4%
	- Dangerous to leave doors open	1	0.4%
	- Too much competition among buses	1	0.4%
Bus Routing	- More bus routes are desired	20	8.9%
	- School bus should be provided	1	0.4%
Travel Time	- Effective measures are needed to avert traffic congestion	8	3.6%
	- Increase the number of traffic police	2	0.9%
	- Buses wait too long at bus terminals	7	3.1%
	- Better organize bus terminals	1	0.4%
	- Better road system is necessary	17	7.6%
Fares	- Too expensive	1	0.4%
	- Prevent free riders	1	0.4%
Satisfaction	- Satisfied with current service	12	5.4%
On Railway	- More railway lines should be constructed	18	8.0%
	- Railway is more practical than buses	11	4.9%
	- Safety should be improved	4	1.8%
TOTAL NUMBER OF RESPONDENTS WITH COMMENTS		224	100.0%

Note: All comments are obtained by free style answers.
Total of 1352 bus users were interviewed.
Source: Bus passenger interview survey was conducted by Study Team in December 1988.

3-4-2 Insufficient Condition of Feeder Facilities

The JICA Study team carried out a field survey on feeder facilities, including approach roads to railway stations, intermodal transportation facilities, station front plazas, etc. Fifty two operating stations were surveyed.

The results of the survey are summarized as follows:

- Approach roads to railway stations are poor
- Transfer facilities are not in good condition
- Safety facilities for pedestrians are poor
- Small size of station front plaza
- Illegal occupation by squatters

(1) Approach roads to railway stations

As a result of the survey, 52 station are classified into three groups in accordance with the distance from a major road.

Group 1. Stations which face a major road:
Jakarta Kota, Sawar Besar, Gambir, Pasar Senen, Pasar Minggu, Univ. Pancasila, Univ. Indonesia, Jatinegara, Bekasi, Tanah Abang, and Dukuh

11 stations

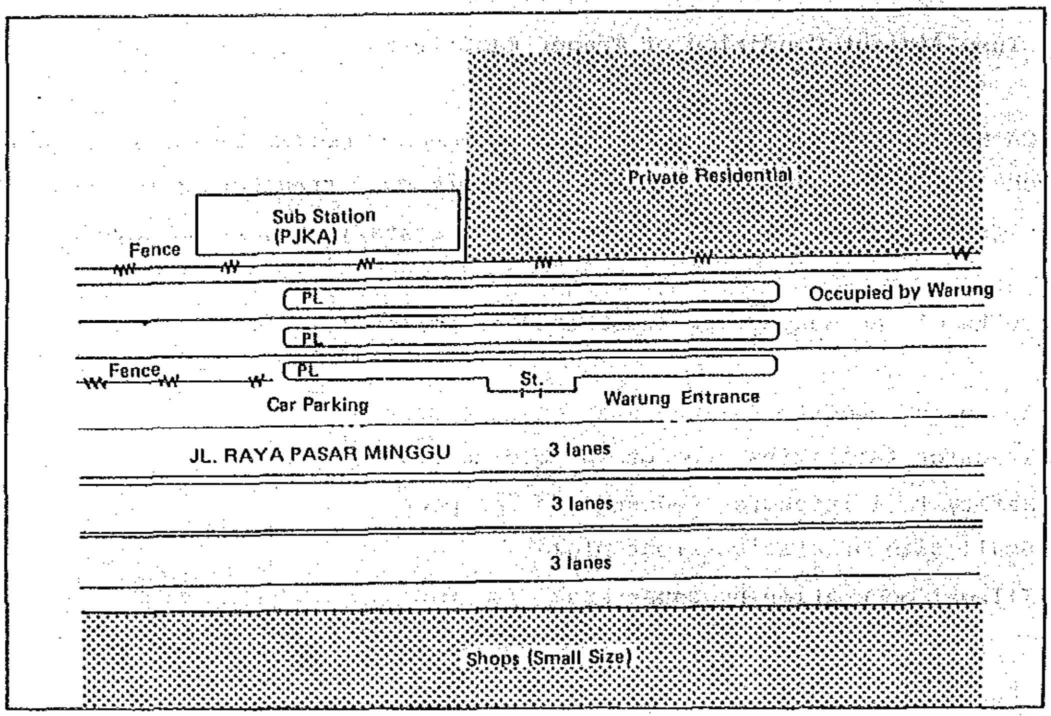


Fig. 3.4.2.1 Pasar Minggu General Layout

Group 2. Stations linked to major road by less than 50 m access roads:
Bogor, Citayam, Klender, Klender Baru,
Lenteng Agung, Duri and Tangerang

7 stations

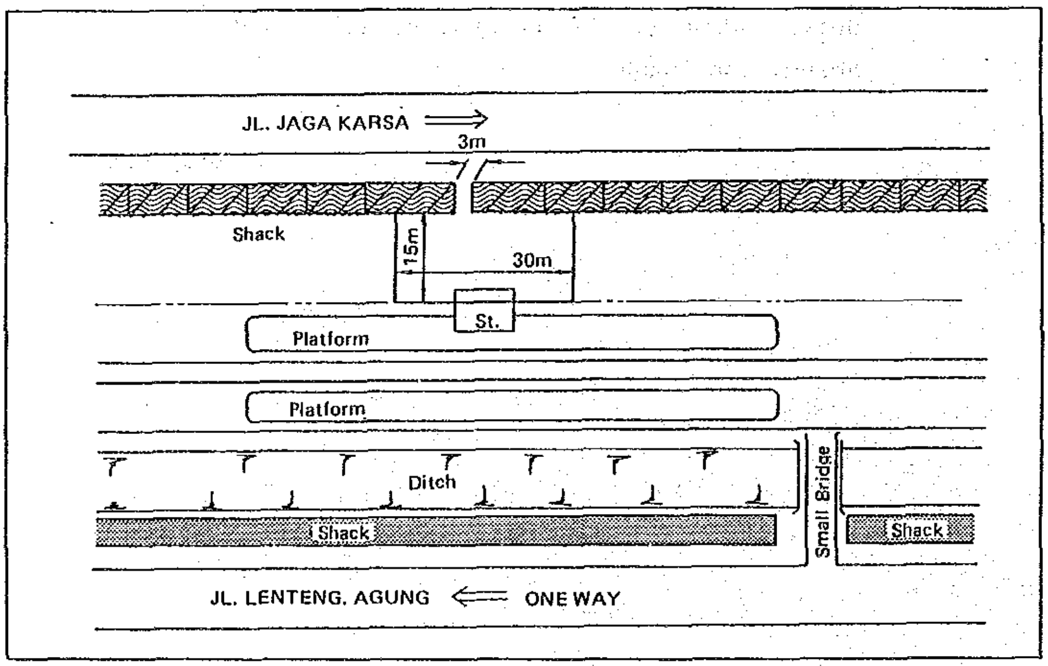


Fig. 3.4.2.2 Lenteng Agung General Layout

In a case of Group 2, the access to the station is not better than in Group 1. As a matter of fact, most of the access roads are in insufficient condition, because of narrow and poor road pavement.

For example, the access road length to Citayan station is around 10 m, the width is 5 m without pavement, however automobiles can not enter the station, because of the ditch along Jl. Bojongedeh which obstructs traffic flow. Jl. Bojongede Raya, 7 m wide, is occupied by mini-buses waiting for passengers at the station.

In Klender Station, the length and width of the access road is 5 m and 4 m respectively.

At Duri Station, there is a 12 m wide creek which runs alongside the station. The station front plaza is connected by a small bridge 2 m wide.

Bogor and Tangerang Station are rather good condition in comparison with the above mentioned stations.

In the case of Tangerang Station, the access road is about 30 m long, and 9 m wide, enough to keep smooth traffic flow on the road, however public transportation does not come to the station front because of insufficient facilities.

Group 3. Stations linked to major roads by more than 50 m access road: Manggarai, Tebet, Duren Kalibata, Pondok Cina, Depok Baru, Depok, Cikini, Bojonggedeh, Cilebut, Rajawari, Kemayoran, Gang Sentiong, Kramat, Pondok Jati, Cakung, Kranji, Palmerah, Kebayoran, Pondok Bitung, Bintaro, Jurangmangu, Sidimara, Rawabunt, Serpong, Grogol, Pesing, Bojong Indah, Kalideres, Rawabuaya, Poris, Batu Cepar, Karet, Mampang and Angke

34 stations

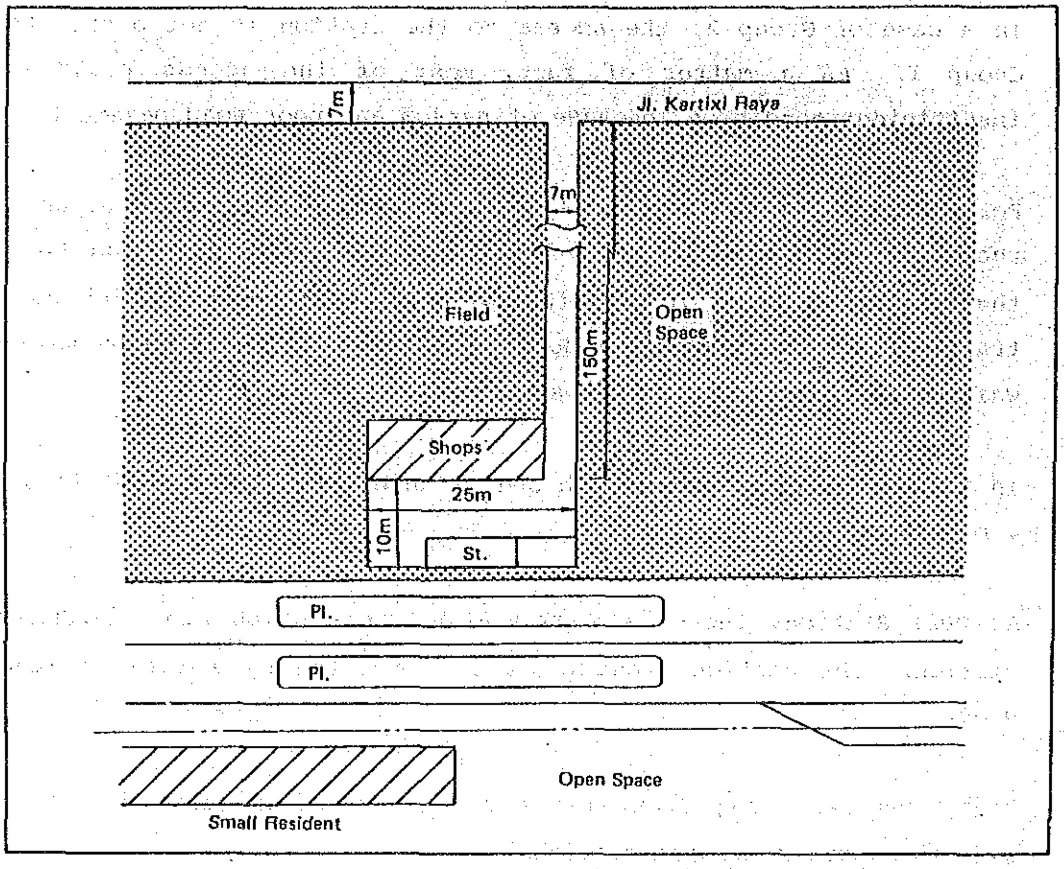


Fig. 3.4.2.3 Depok General Layout

(2) Intermodal transportation facilities

During the survey, intermodal transportation facilities such as bus bays, sidewalks, signalling, and pedestrian crossings, were investigated. To keep smooth traffic flow, right turns are prohibited on most roads. Therefore, it is often difficult for cars running on the opposite side of the street to enter the station front plaza. In such a case, passengers who transfer between rail and bus are forced to cross road on foot, because there are no safety facilities to protect them from accidents.

On the Central Line, although a track elevation project is now under progress and new bus bays along the roads adjacent to the station were proposed, safety facilities are not proposed for pedestrian crossing. Fig. 3.4.2.4 shows the Juanda Station general layout plan. In the plan, new bus bays along Jl.M Juanda some 20 m wide will be constructed. But connection facilities from the opposite side of the railway station were not recommended.

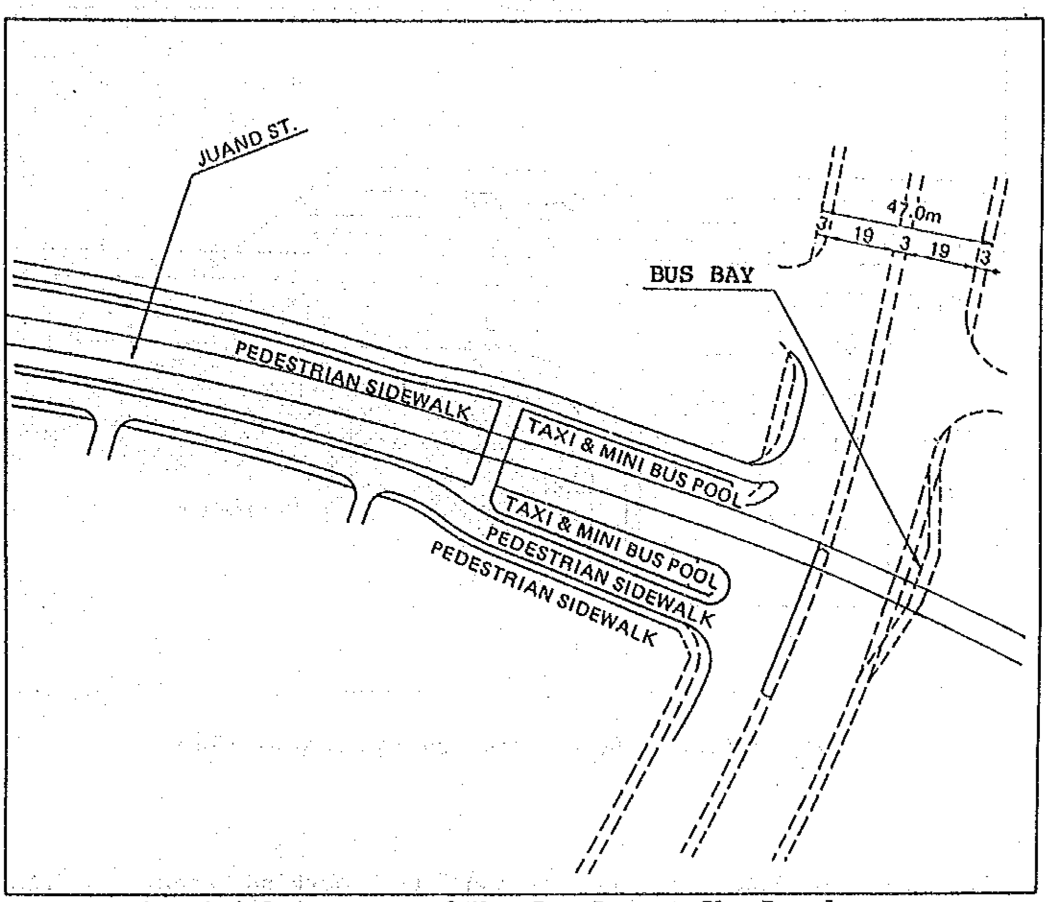


Fig. 3.4.2.4 Proposed New Bus Bay on Jl. Juanda

In the cases of Pasar Minggu and Jatinegara Station, the trunk roads facing the station yard have a width of 9 lanes and 6 lanes respectively which run with heavy traffic volume. Traffic safety facilities are not installed.

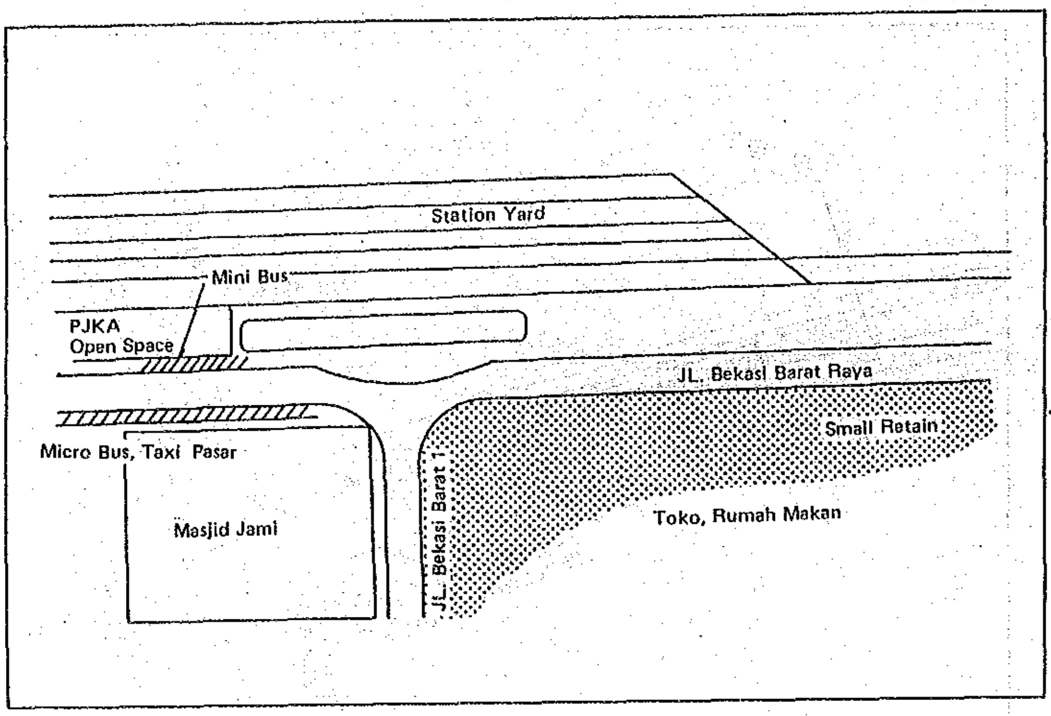


Fig. 3.4.2.5 Jatinegara General Layout Plan

In case of Pasar Minggu station, the parking space is too small compared with the number of access buses. Access buses to the station which stop in front of the station entrance causes traffic jams on Jl. Pasar Minggu Raya. In addition, the sidewalk along the road is not separated from the road, causing traffic jams by passengers.

(3) Station Front plaza

According to the ARSDS railway station inventory survey performed July 1985, among 54 station surveyed only 6 station such as Gambir, Depok, Depok Baru, Bogor, Kemayoran, Pasar Senen, and Serpong have more than 1000 s.m for station front space. However, these spaces are insufficient in for the transportation interchange. The minimum required space to keep smooth traffic flow without parking area is indicated as shown in Fig. 3.4.2.6.

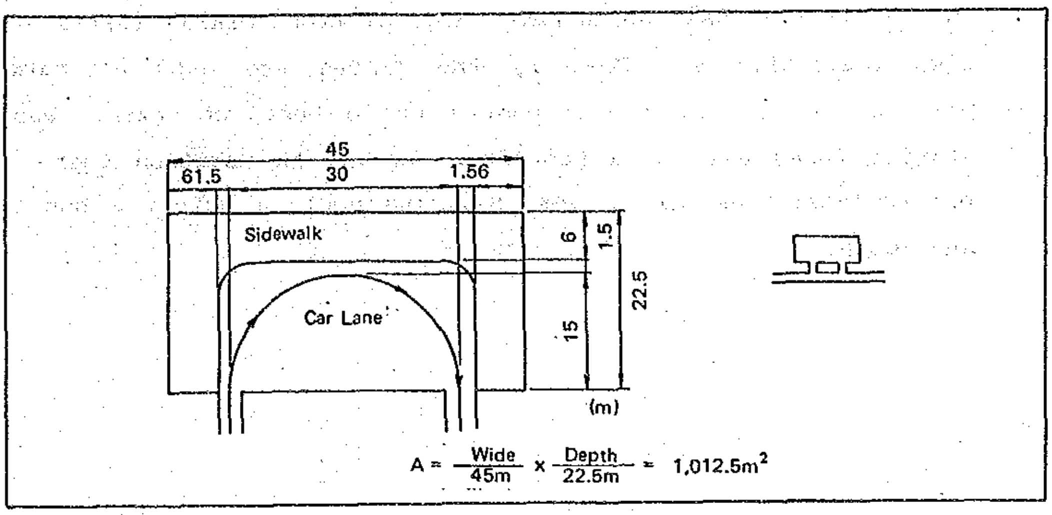


Fig. 3.4.2.6 Minimum Required Area for Station Plaza

Almost all station plazas are too small to accomodate a sufficient number of buses and private cars. Additionally, they are occupied by illegally parked cars and squatters.

On the contrary Depok Baru station has enough space in the front plaza, utilized by mini size buses. However, the large size buses which are operated on Jl. Marugu must locate some 100 m from the station entrance.

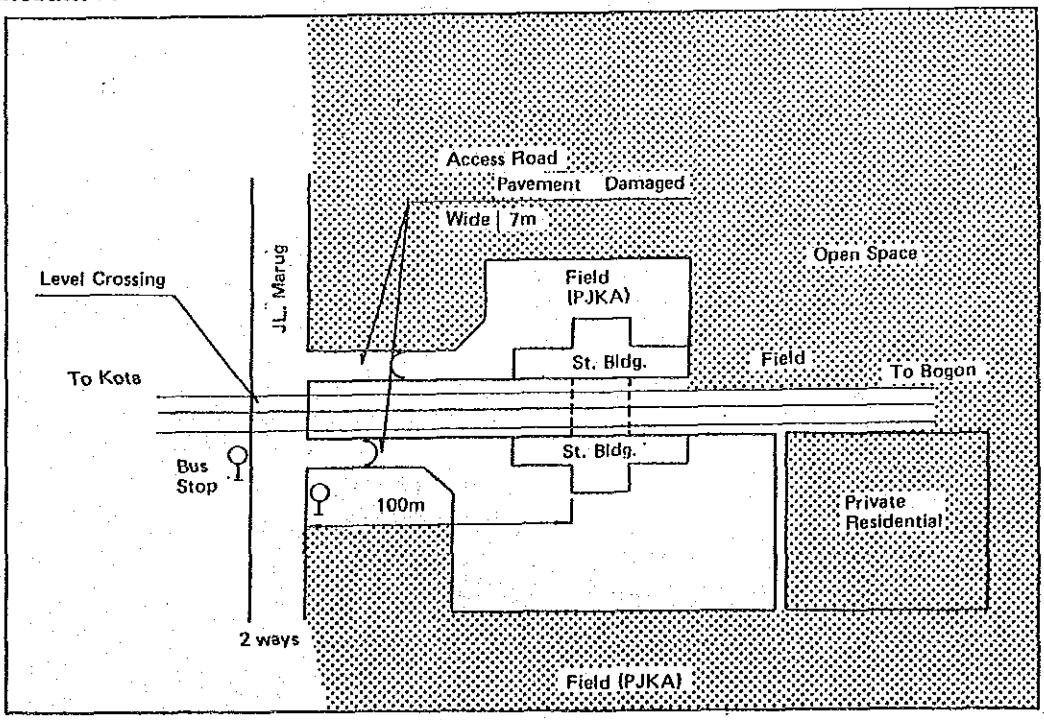


Fig. 3.4.2.7 Depok Baru Station Layout

The Gambir and Pasar Senen have large of front plazas (5,725 s.m, 6,250 s.m. respectively). However, the plazas are used as parking for private use cars instead of public use of buses or taxis. Pasar Senen Station faces Jl. Jend Suprapto. Around the station there are many public facilities such as DKI Swimming Pool, a Hotel, a bus terminal, and so on.

CHAPTER 4 APPROACH TO FORMULATING A MASTER PLAN

CHAPTER 4 Approach to Formulating a Master Plan

4-1 Basic Standpoint
- Role of the Railway in the JABOTABEK Area -

4-1-1 Urban Transportation Problem

In many large cities throughout various countries of the world, a concentration of the population and intensification in both quality and quantity of urban functions can now be seen. It has therefore become more and more necessary that in these metropolitan area efficient and well balanced political, economic and cultural activities are to be developed and at the same time a civilized and comfortable living environment should be created.

Transportation in a large city plays an important role in supporting various urban activities. In the absence of a good transportation system, development of urban activities will not occur.

The large cities in the developing countries of the world are generally dependent for their urban transportation on road traffic, including buses, taxis and other public transportation and motor-bicycles, motor cars and other private means. Very few utilize guided MRT systems for urban transportation.

The large cities which depend mainly on road transportation are experiencing social and economic difficulty resulting from the increased population and an increase in the use of motor cars. There have been, for example, increases in travel time and frequent traffic accidents due to chronic road congestion, as well as environmental problems such as noise, vibration and air pollution, and increased energy consumption. These problems will only get aggravated further with increasing urban transportation demand so long as the urban transportation continues to rely solely on road transportation.

4-1-2 Role of Railways (Guided Transportation System) in Urban Transportation

There is very little chance that the problems mentioned will be resolved using only road transportation. Therefore it would seem essential that a guided transportation system such as railway be introduced. As shown in Table 4.1.2.1, many large cities in the world have guided transportation systems, and further, Singapore, Cairo and Los Angeles, although not included in the table, are introducing guided transportation systems. Shanghai, Istanbul, Taipei and Bangkok are also either constructing, or planning, their introduction. The features and roles of guided transportation systems in urban transportation are presented below.

(1) Transportation capacity

One of the principal features of guided transportation systems is a large transportation capacity. It is possible to transport 30,000 to 80,000 passengers an hour in one direction as described in Chapter 5. (Table 5.4.5.2). On the other hand, bus transportation capacities vary greatly depending on the running environment. According to World Bank data, if an exclusive lane is provided, transportation of up to 30,000 passengers an hour one way is possible by bus, but the transportation capacity of the whole bus system is limited by the passenger processing capacity at bus stops and at the midtown bus terminal area, where traffic demands converge. Taking these factors into account, transportation of 20,000 passengers an hour one way is in many cases considered to be the limit practically.

(2) Construction and operating expenses

The railway and other guided transportation systems have a large transportation capacity. However, the construction and operation expenses in terms of cost per passengerare are equivalent roughly to those of a bus system as shown in Table 4.1.2.2 and 4.1.2.3. In Table 4.1.2.2 where a subway being to high construction cost is compared with bus, construction cost per passenger at peak hours is not much different from that of a bus system with an exclusive lane.

Table 4.1.2.1 Traffic Share by Transportation Mode in Major Cities of the World

No.	Name of City	Population (10,000) [1980]
1	Mexico	1,506
2	San Paulo	1,280
3	Calcutta	950
4	Rio Dejaneiro	920
5	Paris	880
6	Bombay	850
7	Soeul	837
8	Tokyo	835
9	New York	709
10	London	685
11	Jakarta	670
12	Karachi	520
13	Hong Kong	507
14	Ankara	190
15	Tunis	123
16	Wellington	13

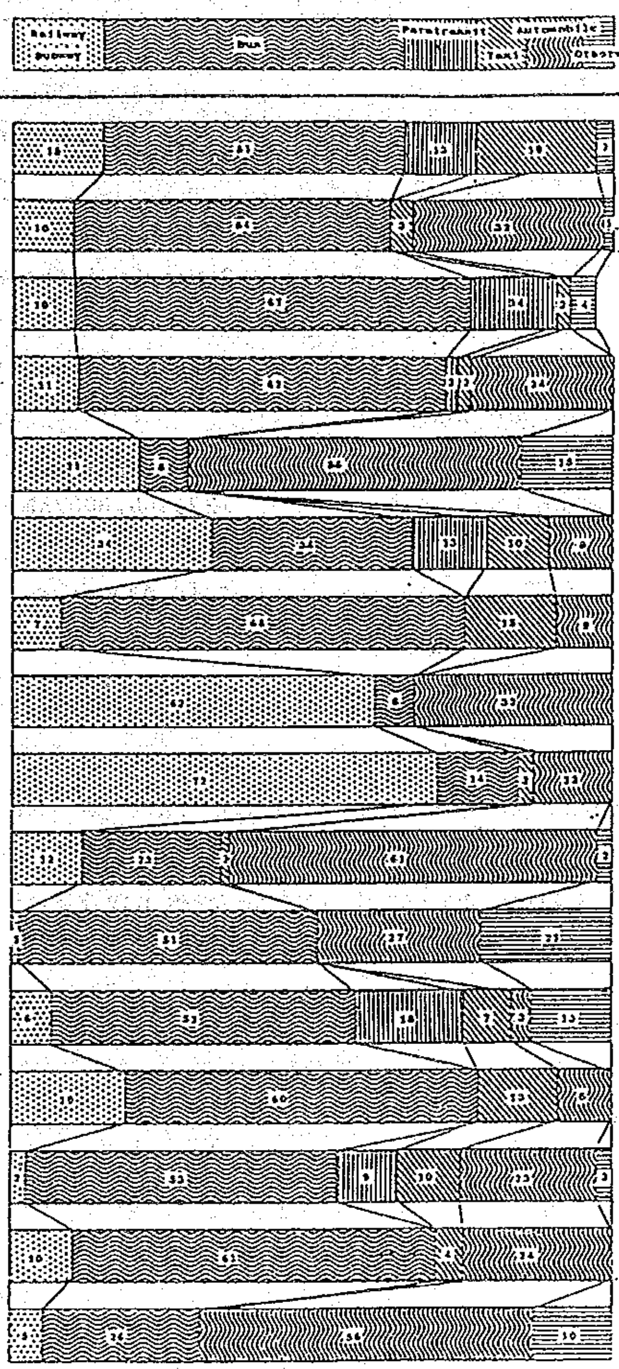


Table 4.1.2.2 Efficiency of Subway Versus Bus

Item \ Systems	Rapid railways Occupancy 200%	Bus (regular bus lane provided) Occupancy 150%
Transport conditions	10 vehicles per train 2-Minute intervals	Capacity 80-person bus 0.3-Minute interval
Maximum transport capacity per one way per hour	84,000 passengers	21,600 passengers
Construction cost	$22,400,000/km	$5,000,000/km
Construction cost per peak transport capacity	$260,000/passenger	$230,000/passenger

Note: Construction cost of the rail is the mean of the Yurakucho Line, Hanzomon Line, Shinjuku Line and Sendai Subway, and that of the road is estimated from the construction cost per km of the urban express way under the 9th road development five-year program.

Table 4.1.2.3 Operation Cost of Rapid Railways Versus Buses

Item \ Systems	Rapid railways		
	Public rapid railways	Teito rapid transit	Public buses of 6 large cities
Service kilometers	234	210.5	3,149.9
Passenger transportation per day (1,000 passengers)	5,672	5,111	3,154
Cost per day (¥1,000,000)			
Running cost	511	401	420
Depreciation	206	90	27
Interests payable	498	139	28
Total	1,215	630	475
Running cost per passenger (¥/passenger)	90	78	133
Total cost per passenger (¥/passenger)	214	123	150

Note: Public rapid rail was represented by the total of the 8 cities of Tokyo, Sapporo, Yokohama, Nagoya, Kyoto, Osaka, Kobe and Fukuoka. Public buses of 6 large cities are of Tokyo, Yokohama, Nagoya, Kyoto, Osaka and Kobe.

Source: Annual Report of Commercial Railway Statistics (1985) and Annual Report of Local Public Enterprises (1985).

If the rapid transit with the elevated structure is considered, the construction is about 1/2 - 1/3 the cost of constructing a subway, thus making constructing a railway far more advantageous than constructing roads in terms of construction cost per passenger of peak hours. As for operation or running cost, the railway is far cheaper than buses as shown in Table 4.1.2.3. With the depreciation and interest included, a railway system is nearly the same cost as a bus system.

(3) *National economic evaluation*

The transportation means is a basic urban facility, and so not only a mere financial evaluation but a national economic evaluation are required. A guided transportation system has the following national economic benefits over road transportation.

1) Time savings

On roads in Jakarta City, traffic congestion is considerable not only during morning and evening rush hours but throughout the day at various locations, resulting in a great deal of time loss (Fig. 4.1.2.1).

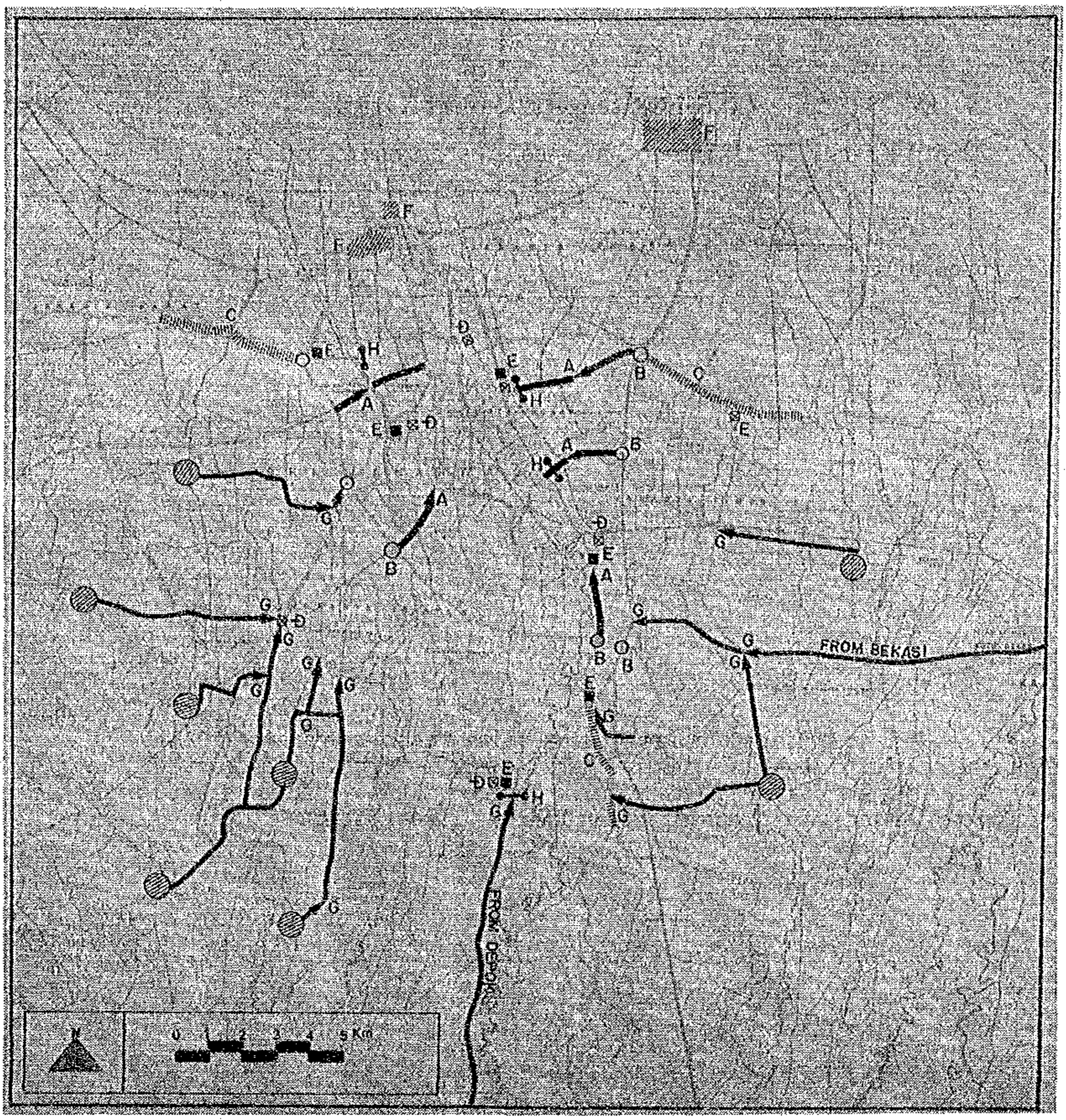
Railway and other guided transportation systems have exclusive tracks, allowing high speed and regular operation. They are, therefore, the transportation system with the highest reliability.

2) Energy economy

Comparing the energy consumption per unit transportation volume, a railway is 60% of a bus and 1/6 of a private automobile.
(Fig. 4.1.2.2)

3) Safety

The guided transportation system has a better safety record than road transportation. Table 4.1.2.4 shows the number of fatal accidents by transportation means in Japan. As seen, the railway is the safest transportation means, when one compares the number of passengers killed per billion passenger kilometer.



LEGEND

CONGESTION TYPE AND REASON

A : CONGESTED RADIAL ARTERIAL STREETS TOWARD CBD

B : CONGESTED INTERSECTIONS BETWEEN THE RADIAL ARTERIAL STREETS TOWARD CBD AND THE S-W BY-PASS AND N-S BY-PASS

C : CONGESTION ON REGIONAL ROADS

D : CONGESTION CAUSED BY PASARS, SHOPPING CENTERS AND SCHOOLS ALONG ARTERIAL STREETS

E : CONGESTION CAUSED BY BUS TERMINALS LOCATED AT MAJOR INTERSECTIONS

F : CONGESTION AROUND PORT AND WAREHOUSE AREA

G : CONGESTION AT SUBURBAN INTERSECTIONS DUE TO SPRAWL OF THE RESIDENTIAL AREA AND DELAY OF RELATED ROAD IMPROVEMENT

H : CONGESTION AT RAILWAY CROSSING

Fig. 4.1.2.1 Location Map of Traffic Congestion Problems

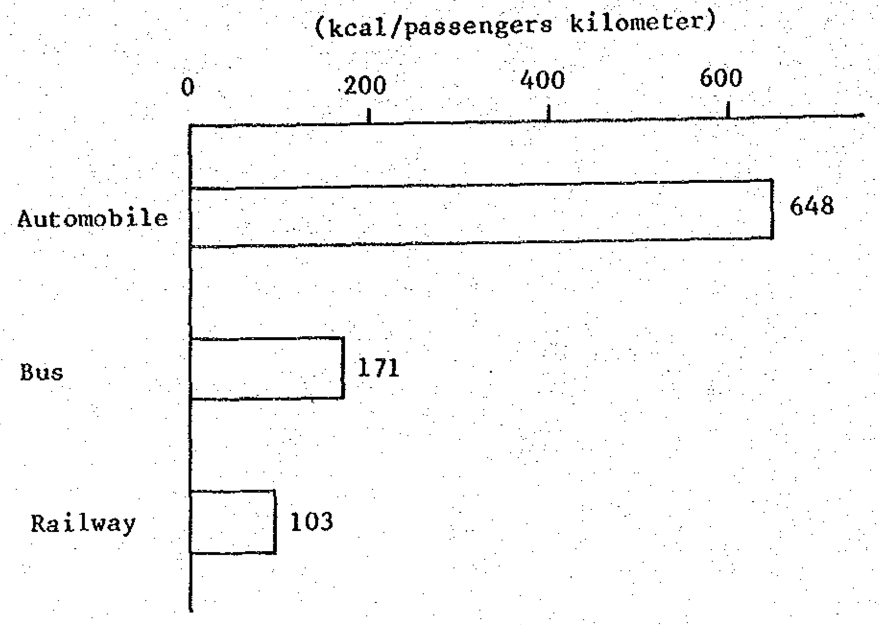


Fig. 4.1.2.2 Energy Consumptions by Major Transit Systems (1985)

Source: Manual of Transportation Energy, 1987 Edition.

Table 4.1.2.4 Number of People Killed in Accidents by Mode of Transportation in Japan

(per 1,000 million passenger-kilometers)

Year	Railways			Automobiles			Aircrafts		
	Number of people killed (A)	Passenger-kilometer (1,000 million) (B)	Rate of killed (A/B)	Number of people killed (A)	Passenger-kilometer (1,000 million) (B)	Rate of killed (A/B)	Number of people killed (A)	Passenger-kilometer (1,000 million) (B)	Rate of killed (A/B)
1975	620	161.9	3.230	10,792	360.3	29.947	11	19.1	0.574
1980	410	151.3	2.709	8,760	431.6	20.293	11	29.6	0.371
1985	280	142.0	1.971	9,261	489.2	18.929	530	33.1	16.008

Source: Traffic Safety White Book(1982)

4) Air pollution

The railway and other guided transportation system are free from the problem of air pollution. The automobile, by comparison, makes significant contributions to air pollution.

(4) Financial resources

There are people who remain passive when it comes to introducing a guided transportation system in large city. They maintain that the railway and other guided transportation system require a large investment and a long period to recover the investment. They feel, therefore, that before considering the development of a guided transportation system, measures to control road traffic should be taken because they involve less investment and a shorter recovery period. The transportation needs of a large city, where information functions are concentrated and high mobility is required, can not be satisfied by road transportation alone. This has been demonstrated in the cities of the advanced countries as discussed earlier. An urban transportation system assumes a public mission as it contributes to the development of the economic structure of the city. At the same time it has to deal with extreme fluctuations in transportation demand so that its profitability is generally low. Therefore, profitability should not be the only factor taken into consideration when deciding what type of transportation system to adopt for urban transportation means. Public fund should be invested with consideration of the social benefits produced. This has been true in cities in Europe and U.S.A. In the most recent cases of construction, funds equivalent to 60 - 100% of the initial investments were supplied without compensation (Table 4.1.2.5). Various measures are now being used by foreign governments to obtain the necessary funding for the construction of guided transportation systems, as is shown in Table 4.1.2.6.

Another financial resource now being discussed for use in the construction of a guided system is the future development benefit. A method for collecting this benefit beforehand and incorporating it into the funding is shown in Table 4.1.2.7.

Table 4.1.2.5 Grant for Urban Transportation in North America and Canada

Line \ Item	Construction Cost	Operation Cost
Vancouver Sky Train	66% { State Government ------------------ 40%; Cities Along the Route, Gas Tax, etc. 26%	
Toronto SLRT	100% { State Government ---75%; Toronto City ------ 25%	32% { State Government; City Government
Washington Subway	100% { Federal Government 80%; Local Government---20%	60% Local Government

Table 4.1.2.6 Financial Resources Used in Constructing Guided Transportation Systems in Various Cities of the World

Countries	Measures
France	Benefit tax for public transportation system
West Germany	Increase in the mineral oil tax for use in public transportation
USA	Federal funds appropriated to subsidize operational cost of urban transportation
Japan	Fund reserve system for specified urban railway improvement established in 1986 (Part of construction expense reserved in advance using fares paid)
	Securing a certain proportion of local tax, or designating an increased portion of taxes as a special fund

Table 4.1.2.7 Recycling of Development Benefits

Countries	Measures
Japan	Infrastructural part of the railway in a new town included in land development expenses
USA	Case of burden on beneficiaries applied to San Francisco Bay Area Rapid Transit (BART)
Hong Kong subway	Authorizing acquisition of the necessary land around station locations and along the line at appraised prices before construction plan, and having the land jointly developed by commercial developers through bidding, then appropriating revenue from the sale of the land for the construction fund
Singapore subway	Part of the revenue from the sale of reclaimed land appropriated for the construction fund

Such a kind of improvement of a guided transportation system as elevation, grade separation from the road, removal of level crossings, and construction of a station plaza, may benefit both the railway and the road management authority, thus a sharing of the construction costs between the railway and the road management authority should be considered in such cases.

In summarizing the above discussion, the introduction of a guided transportation system in a metropolitan area should be planned not only from a financial view point but in due consideration of the national economic benefits, with the financial support of the central or local government, when required.

4-1-3 Resolution of the Urban Transportation Problems in the JABOTABEK Area

The present condition of urban transportation in JABOTABEK Area is described in Chapter 3. The railway is not functioning properly, and JABOTABEK Area is almost completely dependent on roads for transportation, which causes various problems including traffic congestion, air pollution and energy loss. The population is increasing, along with the mobility of the citizens which results from the increasing and improved standard of living. If JABOTABEK Area continues to completely rely on road transportation, city functions will eventually be paralyzed by the increasing number of automobiles. In considering the future of urban transportation in JABOTABEK Area, it is imperative that guided transportation systems including a railway be utilized. Fortunately, a railway network can be advantageously located in the JABOTABEK Area, which should be fully utilized and linked with the existing road network, thus ensuring that urban functions in JABOTABEK Area will operate smoothly and efficiently from now on. The basic guidelines used in formulating a solution to the urban transportation problem in JABOTABEK Area are set forth below. The master plan will be formulated using these guidelines as well as the basic principle described in "1-3."

(1) When investing in urban transportation in JABOTABEK Area, both the railway and the road system should be considered, and in each system, realistic levels of investment should be provided. After deciding the most efficient balance of investment for railway and road, improvement of the railway and other guided transportation means should be examined.

(2) Based on the forecasted demand, the existing railway facilities should be improved and modernized so that they will be fully utilized, and when required, expansions in function should be examined.

(3) The railway feeder services should be improved so that there is satisfactory linkage with road transportation. Thus an integrated transportation system which utilizes both the railway and the road system should be established.

(4) For the main corridors not covered by the railway network, introduction of a mass rapid guided transit system should be planned, when required.

4-2 Basic Methodology

In considering integrated transportation in the Jakarta metropolitan area, it is important to plan the transportation so that the railway and road transportation, whether by bus or other means, are in harmony with each other and are adapted in a way, such that maximum function is exhibited.

For such purpose, there should be an optimum combination of railway equipment capacity and network and the road vehicle and network enabling each transportation system exhibit its maximum capacity respectively.

Present railway projects include those recommended by the Report on Urban/Suburban Railway Transportation in the JABOTABEK Area made by JICA in 1981, and the Final Report on Execution of Review of Feasibility Study by JARTS in 1985 with 2005 as the target year of completion. Based on these recommendation, construction works are now being carried out. These projects do not always take road transportation into consideration sufficiently, but are the ones with the greatest emphasis on railway transportation.

As for a road plan, the Arterial Road System Development Study for the Jakarta Metropolitan Area (ARSDS) was formulated by JICA in 1987, and has been partially implemented by the Indonesian Government. This project was developed mainly from a road system point of view and is not always satisfactory with respect to harmony with the railway, thus its review is required. In addition to the above mentioned, the JUDP-1 Plan is being promoted by the World Bank with 1993/1994 as the targeted date of completion.

In this context, drawing up a master plan for an integrated transportation system in the JABOTABEK Area with due consideration for the various existing studies is very important.

In preparing a Master Plan for an integrated urban transportation system in the JABOTABEK Area, the Study Team will try first to establish the optimum balance of investment in the railway and road respectively. The reason for this follows.

It should be recalled that two studies, i.e., ARSDS and Railway Master Program outputted different railway traffic shares for 2005. One of the major reasons for this difference was that the combination of investment levels for the railway and road were different in each of the studies. Higher levels of investment in railways and lower levels of investment on roads will provide for a higher traffic share for railways, while lower levels of investment in railways and higher levels of investment on roads will provide for a lower railway traffic share. To avoid getting different results, the Study Team adopted the following methodology. First, set up various conceivable and realistic combinations of railway and road investment in the JABOTABEK Area. Second, select the most optimum combination. For this optimum combination, the optimal railway traffic share will be produced. With regard to this, the Study Team, in consultation with the Counterpart Team, has set up two road development levels and three railway development levels, examined the six resulting combinations (alternative patterns) of railway and road investment and selected the most desirable combination for JABOTABEK. In order to selected the most appropriate combination or alternative pattern, annual generalized cost for each alternative pattern has been calculated. Then, using this as one of the indices for reference, along with the comprehensive decision of the group of experts who compose the Steering Committee, the most desirable combination of railway and road investment (alternative pattern) will be obtained.

The six combinations of alternative patterns are illustrated in Fig. 4.2.1.1.

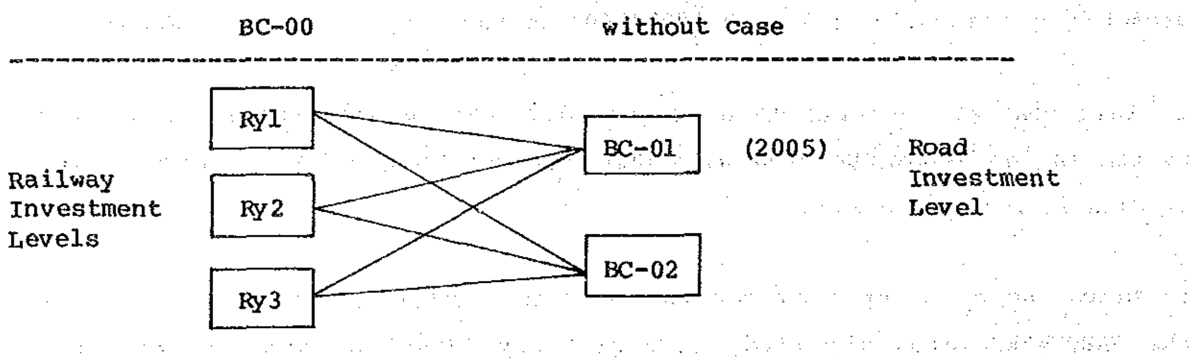


Fig. 4.2.1.1 Alternative Pattern Formed by Combination

Ry1 represents a minimum level of investment in the railway, Ry2, a medium investment level and Ry3, a high investment level. BC01 represents medium road investment levels and BC02, high investment levels. BC00 signifies the without cases.

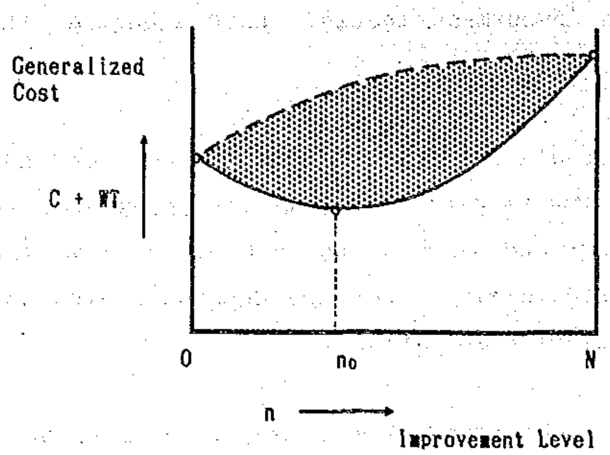
As mentioned above, these investment levels for the railway and the road has been set up in consultation with the Counterpart Team and are considered to represent a realistic range of railway and road investment levels for the JABOTABEK Area. Therefore the optimal combination for the JABOTABEK Area can be selected from these six investment level combinations.

After the optimal pattern is obtained, the Study Team attempts to draw up a Master plan for an Integrated Transportation System in the JABOTABEK Area which improves the railway system and its feeder services.

The relationship between investment levels and annual generalized costs for each alternative pattern is explained below.

When the investment is made in all of the generally conceived items necessary for development and improvement of the railway and the road, time cost will be small. There will, however, be excessive investment, and the annual generalized cost will be very great.

If investment is not made in any of the improvement items, the investment will be zero. There will, however, be an increase in the time cost due to train delays and road congestion as well as higher operating costs due to increased bus operation, resulting in a very high generalized cost. By examing various combinations of levels of investment in the railway and road, and the resulting improvements, an optimum level can be found as is illustrated in Fig. 4.2.1.2.



Where,

C: Construction cost + operation cost

W: Time value

T: Trip time

C + WT = generalized cost

Fig. 4.2.1.2 Improvement Level and Generalized Cost

As mentioned before, the selected pattern will be examined by the experts of the Indonesian Steering Committee generally from the aspects of urban development, environment, regional characteristics and finance before it is determined.

4-3 Outline of Alternative Patterns

Railway cases Ry1, Ry2 and Ry3 mentioned in Fig. 4.2.1.1 are represented in Table 4.3.1.1 Railway Improvement Cases.

Ry1: Minimum Development Case

Complete the minimum facilities necessary for achieving a 6-minutes interval on the C/L, 10-minutes interval on the Extended Loop Line, 15 minutes on the Serpong Line and 20 minutes on the Tangerang Line.

(a) On-going and committed projects.
(b) Projects for Rationalized Execution Plan

Ry1 is the minimum case scenario for maintaining up until 2005 the service level contemplated in the Rationalized Execution Plan.

Ry2: Medium Development Case

In addition to the facilities for Ry1, complete the necessary facilities for achieving the following intervals: 3-minutes on the C/L, 6-minutes on the Extended Loop Line, 10 minutes on the Serpong Line, and 15-minutes on the Tangerang Line.

Ry3: High Development Case

Maintain the same levels of service as Ry2 for an increased passenger. In addition to the facilities for Ry2, complete the Cibinong Line, and provide the necessary rolling stock.

Road cases mentioned in Fig. 4.2.1.1 are represented by BC-00, BC-01 and BC-02, and are shown in the Table 4.3.1.2.

BC-00 contains without cases and includes Ry0 projects that will be completed in 1992. A new mass transit system is also being considered for the mass transit corridor between Sudirman, Thamrin, and Kota.

BC-00: Without case (1992)

1. Ry0; "a" or "b" Option selected after evaluation (Table 4.3.1.1)
2. Completion of the traffic management program and parking policy implementation project, as well as an improved level of service in the bus transportation system
3. Completion of the on-going and committed road construction project within the JABOTABEK Region (JUTP, JUDP-1 and Toll roads), and the development of a mass transit system on the Blok M -Sudirman-Thamrin-Kota corridor.

BC-01: Medium Development Case (2005)

BC-00 with the following additional improvements:

1. Completion of the urban free-way network, i.e. the Inner Ring Road, Outer Ring Road and Harbour Road.

2. Further traffic management improvements within the Outer Ring Road, including the extension of the licensing scheme.

Table 4.3.1.1 Railway Improvement Cases

Improvement case	Project Item	Remarks
Ry0 (to be included in BC-00)	(a) or (b) items to be taken up from the below	
Ry1 Complete the minimum facilities necessary for achieving the service of 6 minutes interval on C/L, 10 minutes interval on Extended Loop Line, 15 minutes or Serpong Line and 20 minutes on Tangerang Line. (b) items 1–17; (a) items 1–11	1. Track elevation and Automatic signalling of C/L (Kota-Mri) 2. Automatic signalling on E/L. 3. Automatic signalling on W/L. 4. Electrification and Automatic signalling on Serpong Line. (including Srp.Sub-Depot) 5. Electrification and Automatic signalling on Bekasi Line. (including Bks.Sub-Depot) 6. Double tracking. Electrification and Automatic Signalling on C/L. (Mri-Dp) 7. Automatic signalling for single track on C/L (Mri-Boo) 8. Improvement of Kampung Bandan Station. 9. Improvement of feeder service (Station plaza included in no. 1.5.6) 10. Establishment of Train operating system. 11. Rolling stock (EC, 44 cars) 12. Grade separation at Manggarai Station. 13. Automatic signalling on Tangerang Line. (including Tng.Sub-Depot) 14. Improvement of passenger handling facilities, such as platform elevation and widening. (Jng, Pse, Thb) 15. Investment of on Manggarai workshop. (2nd step) 16. Construction of Depok Depot. 17. Increase of necessary number of rolling stock. 18. Double tracking. Electrification and Automatic Signalling on C/L (Dp-Boo) 19. Improvement of feeder service (station plaza, bus bay, approach roads, etc.) 20. Increase of necessary number of rolling stock.	(a) On-going and committed projects (b) Projects for Rationalized Execution Plan
Ry2 Complete the necessary facilities for achieving the service level of 3 minutes interval on C/L, 6 minutes on Extended Loop Line, 10 minutes on Serpong Lone, 15 minutes on Tangerang Line.	In addition to the completion of the facilities of Ry1, the following facilities will be completed. 1. Relocation of Kota-Station. 2. Construction of car-depot in relation to Kota-Station. 3. Track elevation of E/L (Kota-Gangsentiong) 4. Flyover on W/L. 5. Improvement of passenger handling facilities. 6. Construction of new station. 7. Improvement of feeder service (station plaza, bus bay, approach road, etc.) 8. Electrification on Tangerang Line. 9. Double Tracking of Serpong Line. 10. Increase of necessary number of rolling stock.	
Ry3 Maintain the same levels of service as Ry2 for increased Passenger.	In addition to the completion of the facilities of Ry2, the following will be completed. 1. Improvement of other facilities such as small stations. 2. Construction of Cibinong Line. 3. Increase of necessary number of rolling stock.	

Table 4.3.1.2 Base Cases

BC-00 (1992)

1. RyO
2. Completion of the traffic management program and parking policy implementation project, and improved level of service for the bus transport system.
3. Completion of the on-going and committed road construction project within JABOTABEM Region (JUTP, JUDP-1 and Toll roads), and the development of mass transit system on Blok M -Sudirman-Thamrin-Kota corridor.

BC-01 (2005)

BC-00 with the additional improvements:

1. Completion of the urban free-way network, i.e. the Inner Ring Road, Outer Ring Road and Harbour Road.
2. Further traffic management improvements within the Outer Ring Road, including extension of area licensing scheme.
3. Construction of East/West Mass. Transit Corridor from Kebon Jeruk, via Tanah Abang, Gambir, Pasar Senen and Pulo Gadung to new interchange with railway between Klender Baru and Cakung.
4. Urgrading of Blok M -Sudirman-Thamrin-Kota Mass transit Corridor, and an extension from Blok M to Pasar Minggu.
5. Development of street system within the East/West Jakarta and within the Tangerang/Bekasi Core-Cities.

BC-02 (2005)

BC-01 with the additional improvements:

1. Extension of Mass Transit Corridor from Kebon-Jeruk to North Serpong from new station near Cakung to Pondok Gede,
2. Provision of the road/street system within the southeast/southwest suburbs.

3. Construction of East/West Mass Transit Corridor from Kebon Jeruk, via Tanah Abang. Gambir, Pasar Senen and Pulo Gadung to new interchange with railway between Klender Baru and Cakung.

4. Upgrading of Blok M-Sudirman-Thamrin-Kota Mass Transit Corridor, and extension from Blok M to Pasar Minggu.

5. Development of street system within East/West Jakarta and within the Tangerang/Bekasi Core-Cities.

BC-02: High Development Case

BC-01 with the additional improvements:

1. Extension of Mass Transit Corridor from Kebon Jeruk to North Serpong from new station near Cakung to Pondok Gede.

2. Provision of the road/street system within the southeast/southwest suburbs.

4-4 Feeder Service

4-4-1 Integration of Public Transportation Network

Public transportation in JABOTABEK Area is mainly dependent on bus operations. The bus operation system is organized with trunk and feeder routes, and bus terminals are provided space for transportation interchange for them.

However, punctual bus operation is hindered by the serious traffic congestion on operation route and bus terminal in recent years.

The existing JABOTABEK railway line which consists of a loop line in Jakarta city and radial lines serving to BOTABEK Area will be utilized for public transportation under the numerous improvement programs. The first stage improvement of railway development will be accomplished in 1992 and second stage in 2005.

It is desired that public transportation by railway and bus in JOBOTABEK Area will be organized as primary routes, and will be provided an integrated network with medium or small buses used for feeder service.

The basic pattern of integrated public transportation network is shown in Fig. 4.4.1.1.

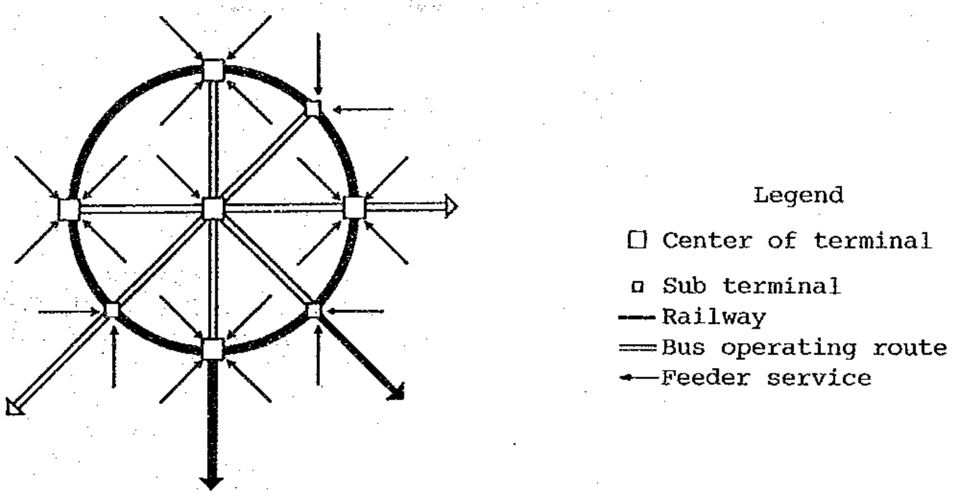


Fig. 4.4.1.1 Public Transportation Network

4-4-2 Provision of Feeder Service to Railway Station

The World Bank financed Transportation Network Planning and Regulation Study (TNPR) will be studied an analysis of the existing bus betwork, and will be proposed the effective bus operation network.

Therefore, this study report will concentrate for feeder service to railway station.

(1) Selection of feeder mode

The basic pattern of access and egress to railway stations is indicated in Fig. 4.4.2.1 the existing mode to and from railway stations is by bus, taxi, bajaj, motorcycle and by foot. The result of the interview survey by this study team, the access and egress mode to railway station is 40 percent of on foot, 40 percent by bus, and 20 percent by other modes.

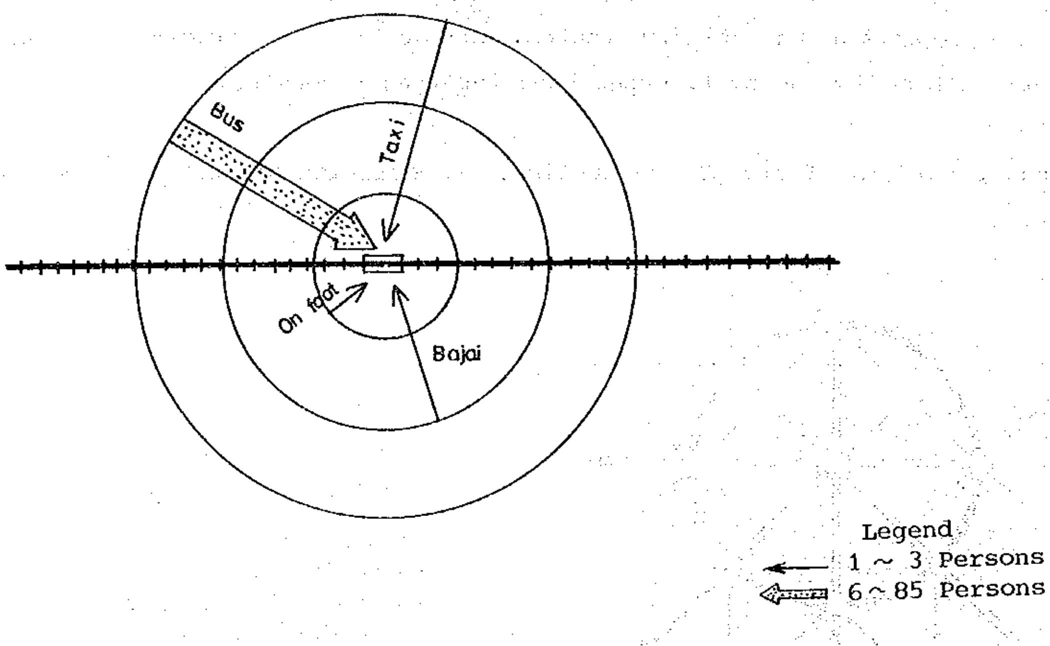


Fig. 4.4.2.1 Access and Egress Modes to Railway Station

The object of feeder service planning will be mainly focus on bus transportation as for public transportation service, due to the efficiency transportation volume in serving a wide service area for each railway station.

(2) Type of buses along side of railway line

The type of buses which serve railway lines in existing are distinguished by their area of coverage as shown in Fig. 4.4.2.2

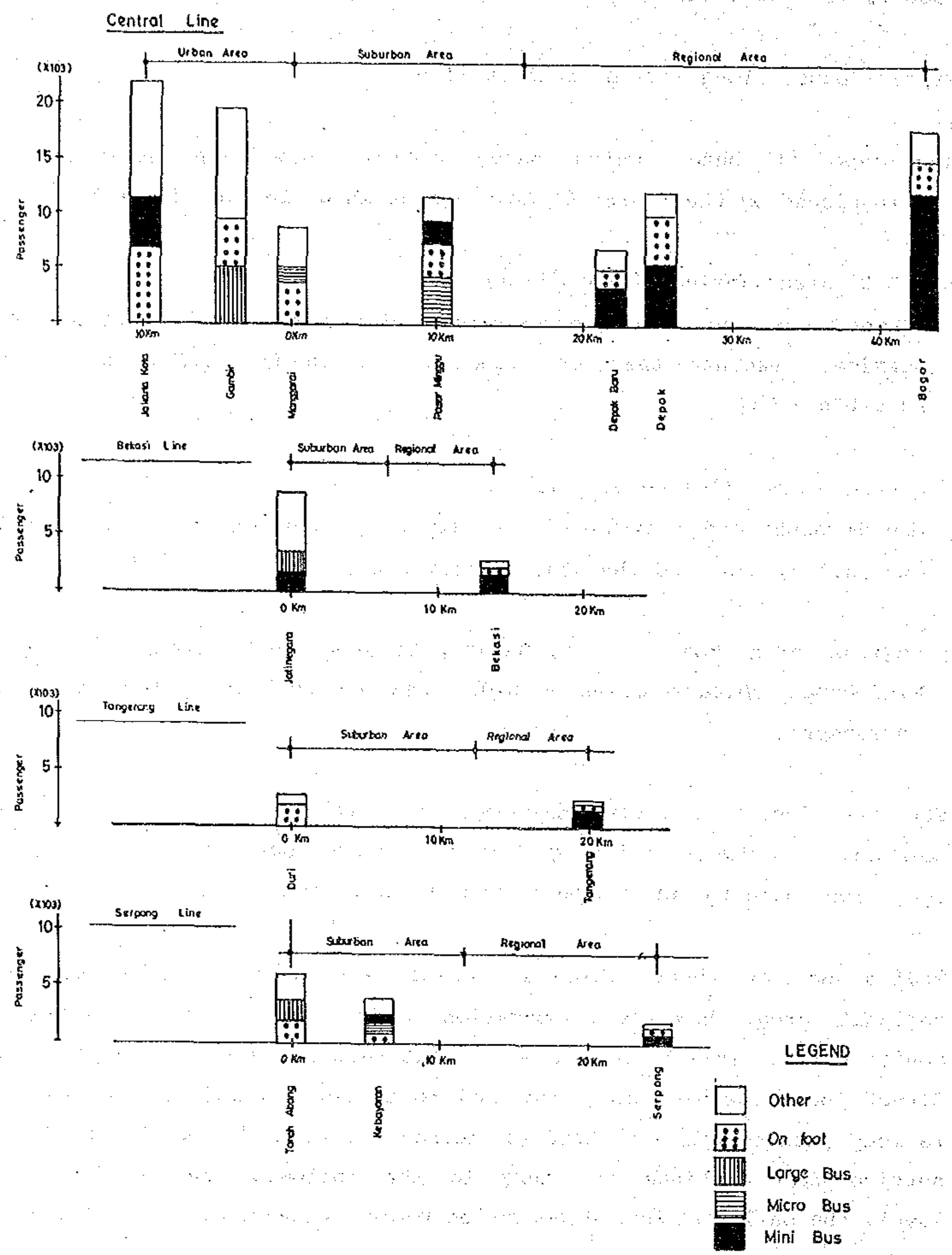
- C.B.D. area (Inside of Loop Line)
  Large buses and medium buses are mostly used for the urban area service. Because they are concentrated in the C.B.D. area from suburban area.

- Suburban area (Inside of DKI)
  Medium buses and mini-buses are mainly operated on roads adjacent to the railway line and the station served area.

- Regional area (Bogor, Depok, Bekasi, Tangerang and Serpong)
  Mini-buses operate cover a wide area to collect a few scattered passengers.

For the feeder service planning, it will require well balanced combination between existing bus operation route and new proposed operation route for provision of passenger service.

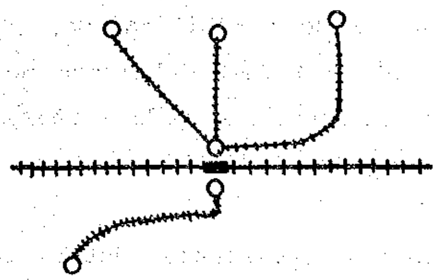
Medium and mini buses, which are mostly served for suburban area and regional area, have transportation characteristic as para-transit vehicles with flexible operation. These vehicles will introduce in the direct feeder service (new proposed route between railway station and railway passenger's generated or attractive area). The direct feeder service will continue to study in the following Feasibility Study level, the basic pattern of operation route is shown in Fig. 4.4.2.3.



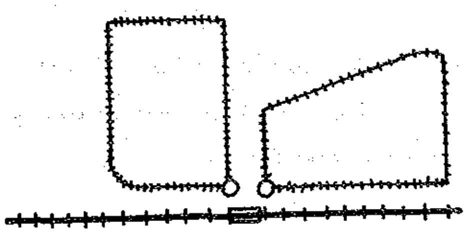
Note: Data is based on ARSDS Report ('86 JICA)

Fig. 4.4.2.2 Existing Transportation Mode for Main Station

a) Radial type



b) Zone bus type



c) Rudder type

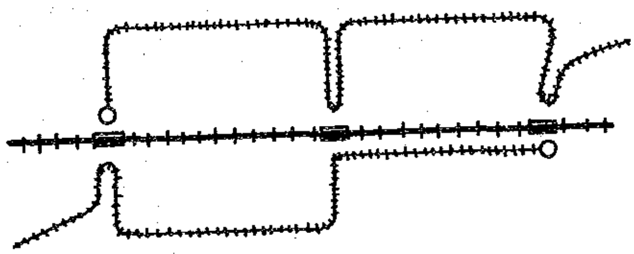


Fig. 4.4.2.3 Basic Pattern of Direct Feeder System

4-4-3 Reduction of Transfer Resistance Factors

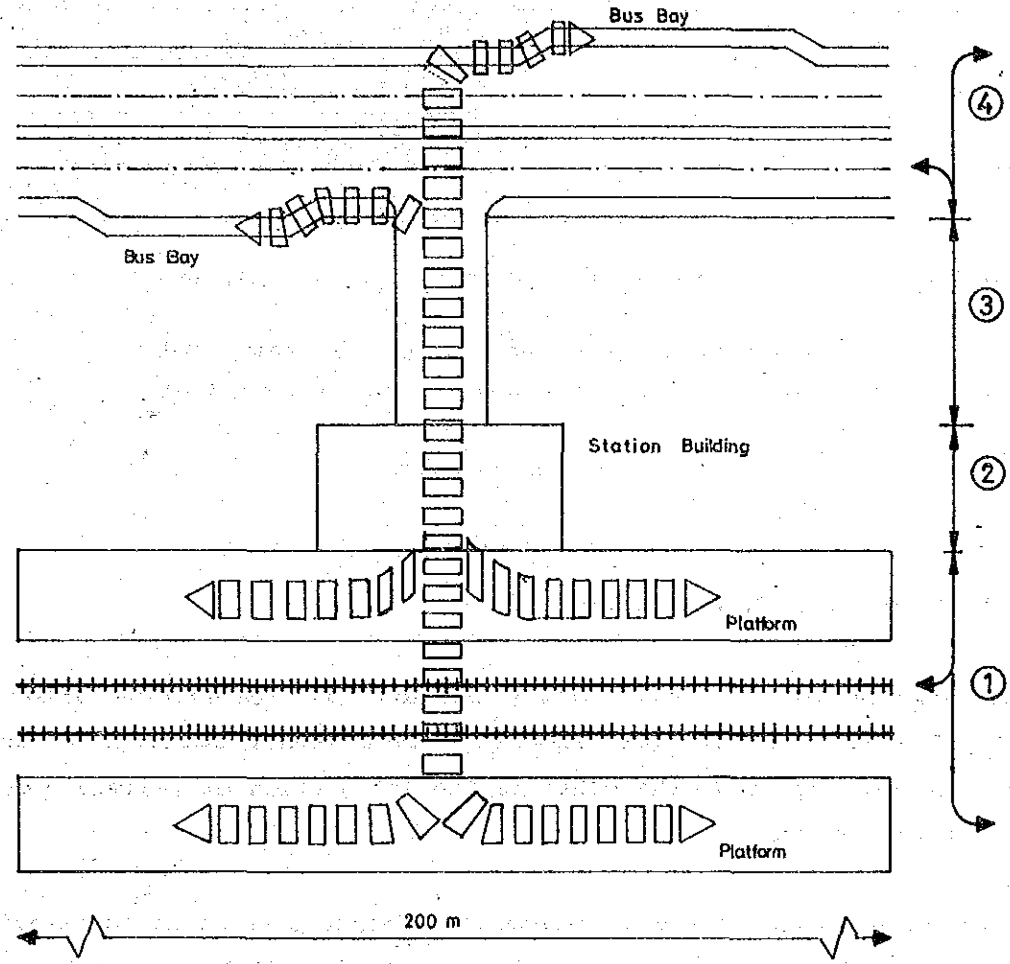
Although automobil serves door to door mobilization, public transportation such as railway necessarily involves transfer between modes, and route in a single mode. Therefore, it is important to reduce these transfer resistance factors by providing efficient transfer facilities.

The transfer facilities for reducing resistance factors at railway station in this study is proposed as follows.

- Improvement and construction of access road.
- Station front plaza and parking areas
- Provision of bus bays with facilities protection from traffic accident.

Transfer time between bus and rail modes consists of wait time and walk time. The wait time is primary a function of the operation of the rail and bus system and discuss elsewhere is this document.

The walk time can be shortened through the provision of pedestrian facilities at the railway station and by minimizing walking distance. A graphic representation of these facilities is shown in Fig. 4.4.3.1. And estimation of transfer time by the provision of transfer facilities is shown in Table 4.4.3.1.



①	Time for Platform to Wicket	2.5 min
②	Time for Wicket to Exit	0.5 min
③	Time for Approach Road	
	~ 50m	1.0 min
	50 m ~ 100m	2.0 min
	100m ~ 200m	3.0 min
	200m ~	4.0 min
④	Time for Approach Road to Bus Stop (more than 4 Line Road)	5.0 min

Fig. 4.4.3.1 Composition of Transfer Factors

Table 4.4.3.1 Required Transfer Time in Future

Unit: minute

	Road Section (A)		Approach Section (B)		Station Section (C)	
	Pedestrian Signal	Pedestrian Bridge	Facing to New Road	Station Front Plaza	Over Head Foot Bridge	Over-Track Station
Cross walk more than 4 Lane Road	3'	1'				
Approach Road			0' - 1'	1'		
Station Building					2'	2'

Note: 1. Transfer time will be calculated by the combination of (A), (B), and (C).

2. In the case of connection of pedestrian bridge (on road) and over-track station, cross over time is included in the required time for station building.

3. 3' is only required in the case of station front plaza.

4-4-4 Basic Approach of Feeder Service

The feeder service to and from railway station will categorize into two conception. The first is the provision of direct feeder route (new route) into population density area, the other is the integration of railway service with existing bus routes.

A more efficient approach to the development of feeder service is to alleviate existing congested bus operation routes by connection with bus terminal. The integration of bus terminal and station front plaza is desirable at Jakarta kota station, Pasar Senen Station, Pasar Minggu Station, etc. And the relocation of an intercity bus terminal has been undertaken to solve the traffic congestion of the existing terminal. Some traffic jam at intercity bus terminals is caused by buses from BOTABEK area. If new intercity bus terminal relocated near the railway station, this will offer passengers two alternate modes of transportation, thus leading to a reduction in road traffic congestion. The recommendable connection by shuttle service between new intercity bus terminal and railway station are shown in Fig. 4.4.4.1

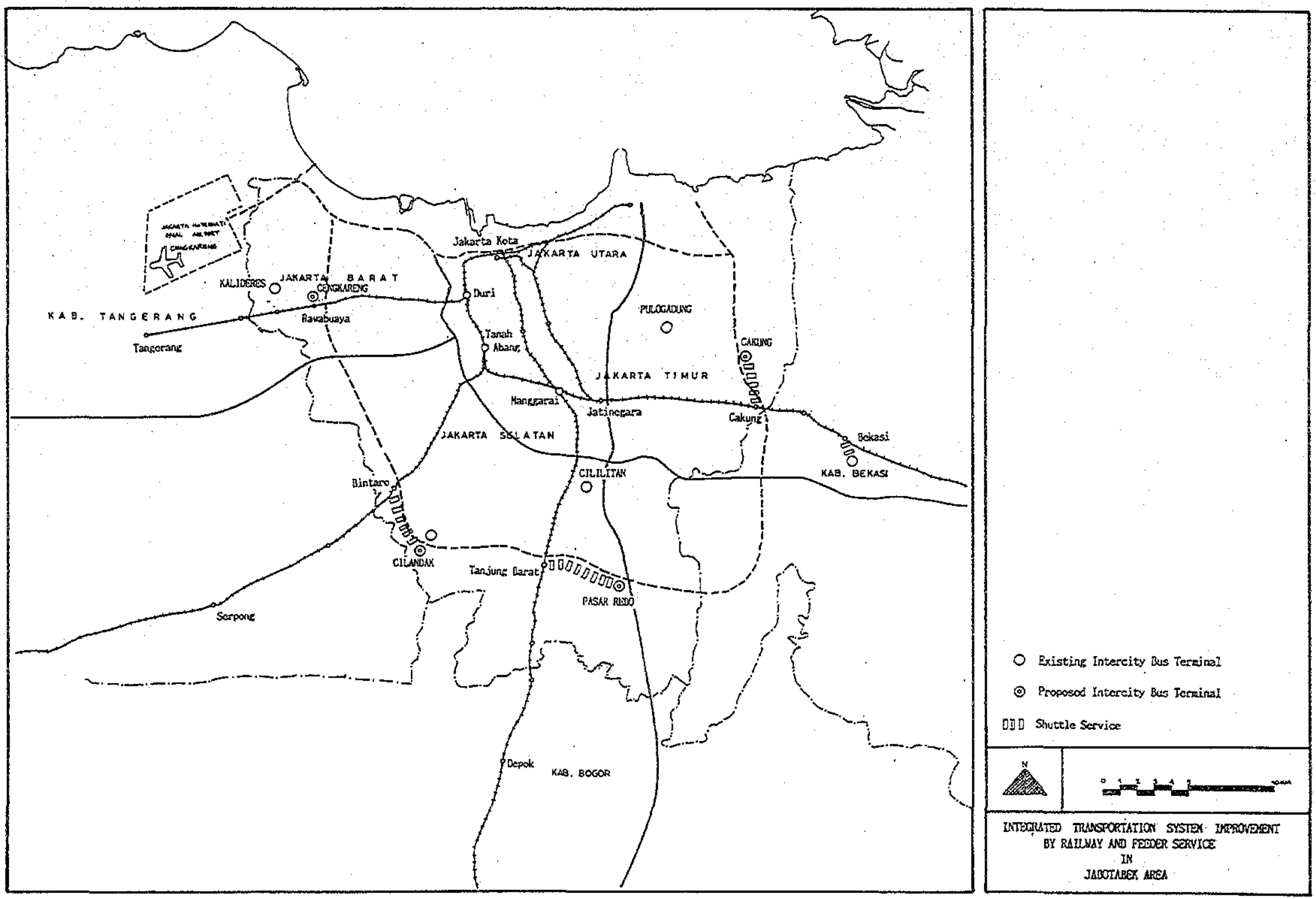


Fig. 4.4.4.1 Shuttle Service Plan between Railway Station and Bus Terminal

CHAPTER 5 DETAILS OF ALTERNATIVE PATTERNS

Chapter 5 Details of Alternative Patterns

5-1 Introduction

In Jakarta, road congestion is getting worse every year. In order to improvement the situation, the railway must bear a greater share of transportation.

At present, a railway network exists in Jakarta, and if this network is utilized, it will be possible to improve the railway's transportation share for more easily than by constructing a new network.

The low transportation capacity of the existing railway can be mainly attributed to longer headways, inadequate feeder services caused by poor access, a lack of punctuality, and poor reliability and comfort. For improving the transportation capacity, various projects have been proposed in the Master Plan and Feasibility Study.

At the same time, Indonesia is in a difficult financial position conditions as a result of low oil prices and other factors. For this reason the most efficient use of funding for improvement is desired. As discussed in Chapter 4, the alternative patterns for a railway are Ry1, Ry2 and Ry3, and for a road BC-00, BC-01 and BC-02.

5-2 Projects to be Accomplished by 1992 (Option "a" and "b")

These projects are included in Ry1 and their aim is to limit headways, for example, to 6 minutes on the Central Line and to 10 minutes on the Extended Loop Line.

At present, the track elevation and installation of automatic signalling on the Central Line has been underway since 1987. In order for the effect of investment in this project to be fully realized, it will be necessary to simultaneously improve the lines running into the Central Line through electrification, and the installation of automatic signalling.