c) The existing diesel engine shop will be rearranged into a DC incidental inspection area.

d) Some machines, tools, and testing devices will be installed.

(3) Basic workshop layout plan

The existing Manggarai Workshop layout is shown in Fig. 3.6.2.1, and an example of an improved workshop layout is shown in Fig. 3.6.2.2. After the improvement work, both the EC and PC work flow will be much smoother, as shown in Fig. 3.6.2.3 and Fig. 3.6.2.4.

An example of the daily EC overhaul work schedule based on the above layout and flow is shown in Fig. 3.6.2.5. This improvement work will be comprehensively effective (see Table 3.6.2.1).

For PC maintenance facilities, the layout will have to be reviewed in the future and capacity expanded if necessary.

(4) Relocation of workshops in Java

The work volume and types of rolling stock to be assigned at each workshop in the future should be based on a railway plan for all of Indonesia. However, the characteristics of Manggarai Workshop, as one of the workshops in Java, have to be clarified for the workshop improvement plan to be drawn up. Therefore, an example of a relocation plan for the workshops in Java is assumed to be as shown in Table 3.6.2.2.

Table 3.6.2.1 Effects Expected from Improvement Work

Item	EC facilities	PC facilities	Existing condition
Flexibility for expanding maintenance capacity	○	○	○
Distance required for conveying car parts	○	△	×
Work flow	○	○	×
Working environment	○	○	△

Notes : ○ = Good △ = Not so good × = Bad

Table 3.6.2.2 Future Relocation of Workshops in Java (tentative plan)

Location of workshop	At present	In future
Manggarai	EC + PC	(ditto)
Yogyakarta	DL + DC	(ditto)
(Cipinang or someplace)	(FC yard)	EL + (PC/EL depot)
Madiun	(Knockdown)	(ditto)
Surabaya	FC	(ditto)
Tegal	FC	(ditto)
Semarang	Parts	(ditto)

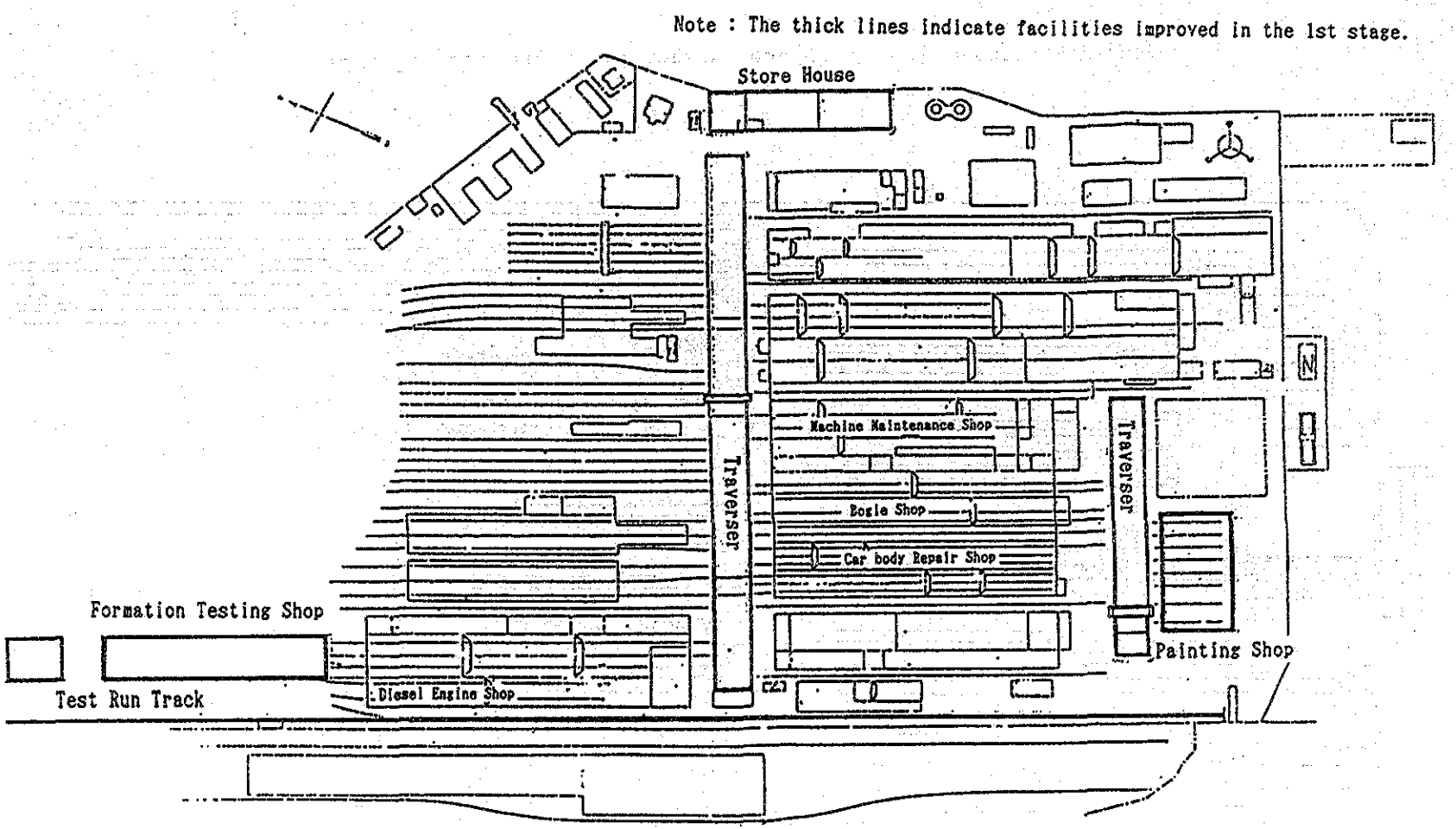


Fig. 3.6.2.1 Layout of Existing Manggarai Workshop

Note : The thick lines indicate the facilities to be improved in the 2nd stage.

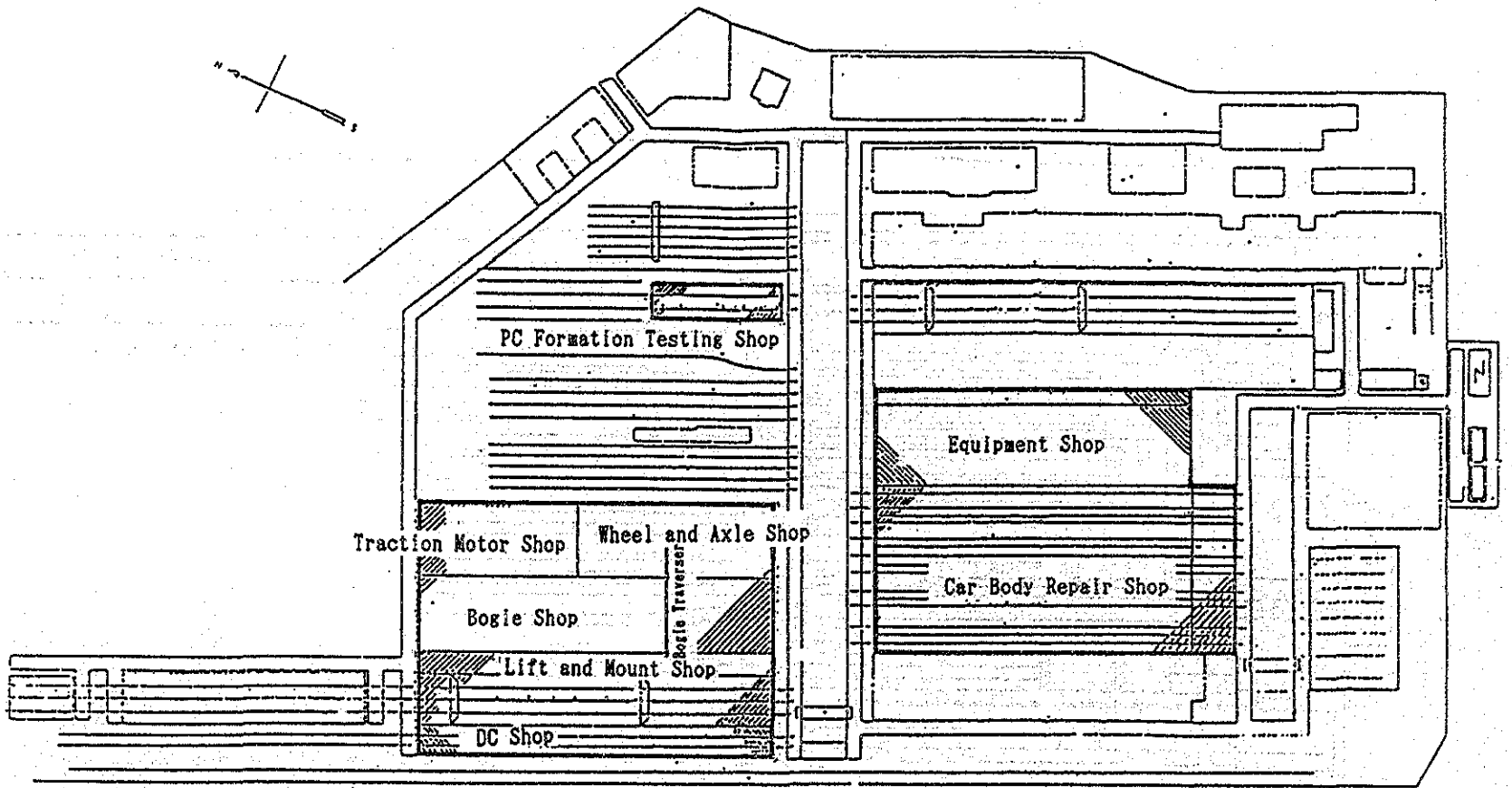


Fig. 3.6.2.2 Layout of Improvement Plan for Manggarai Workshop

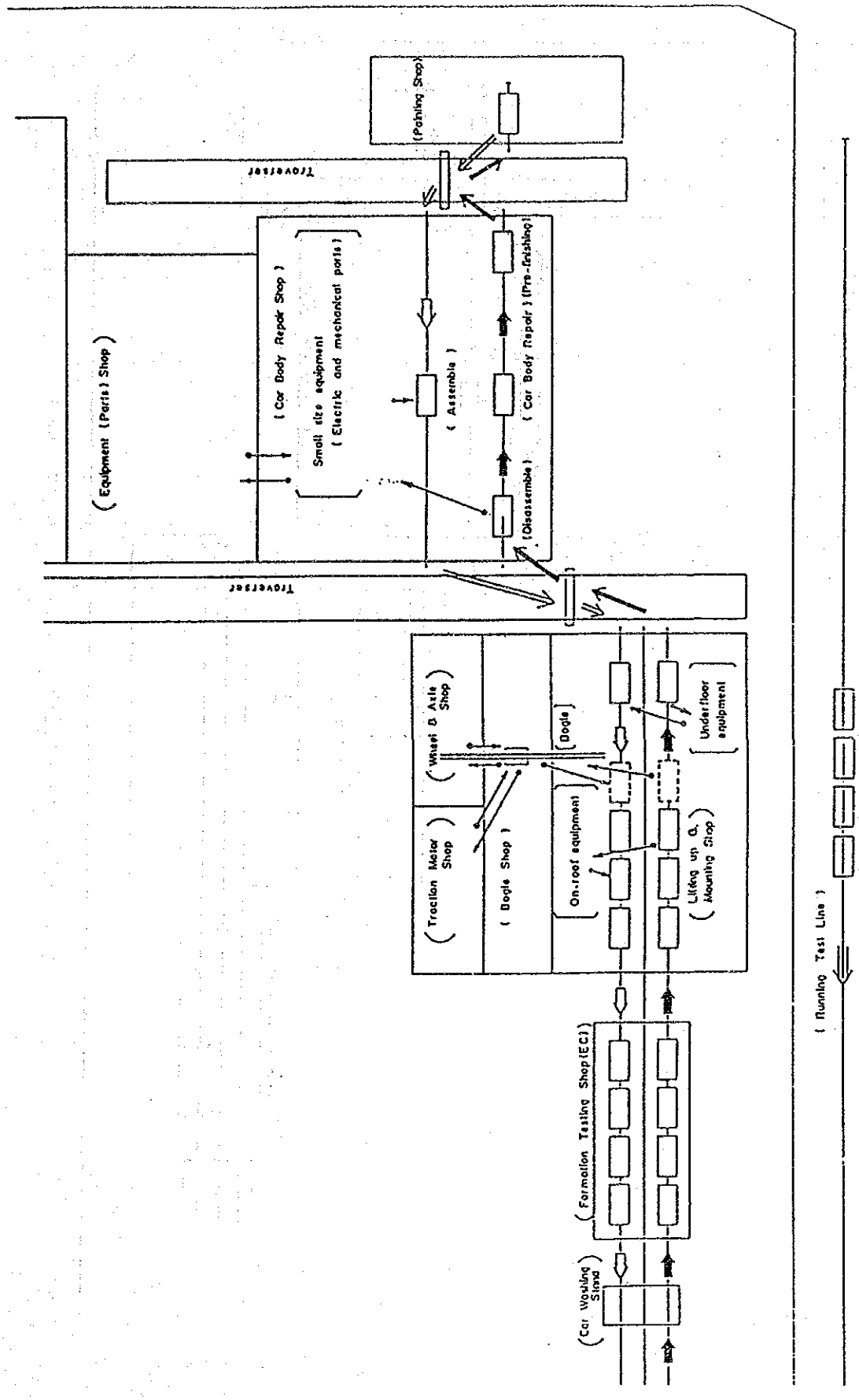


Fig. 3.6.2.3 Total Work Flow of Electric Railcar

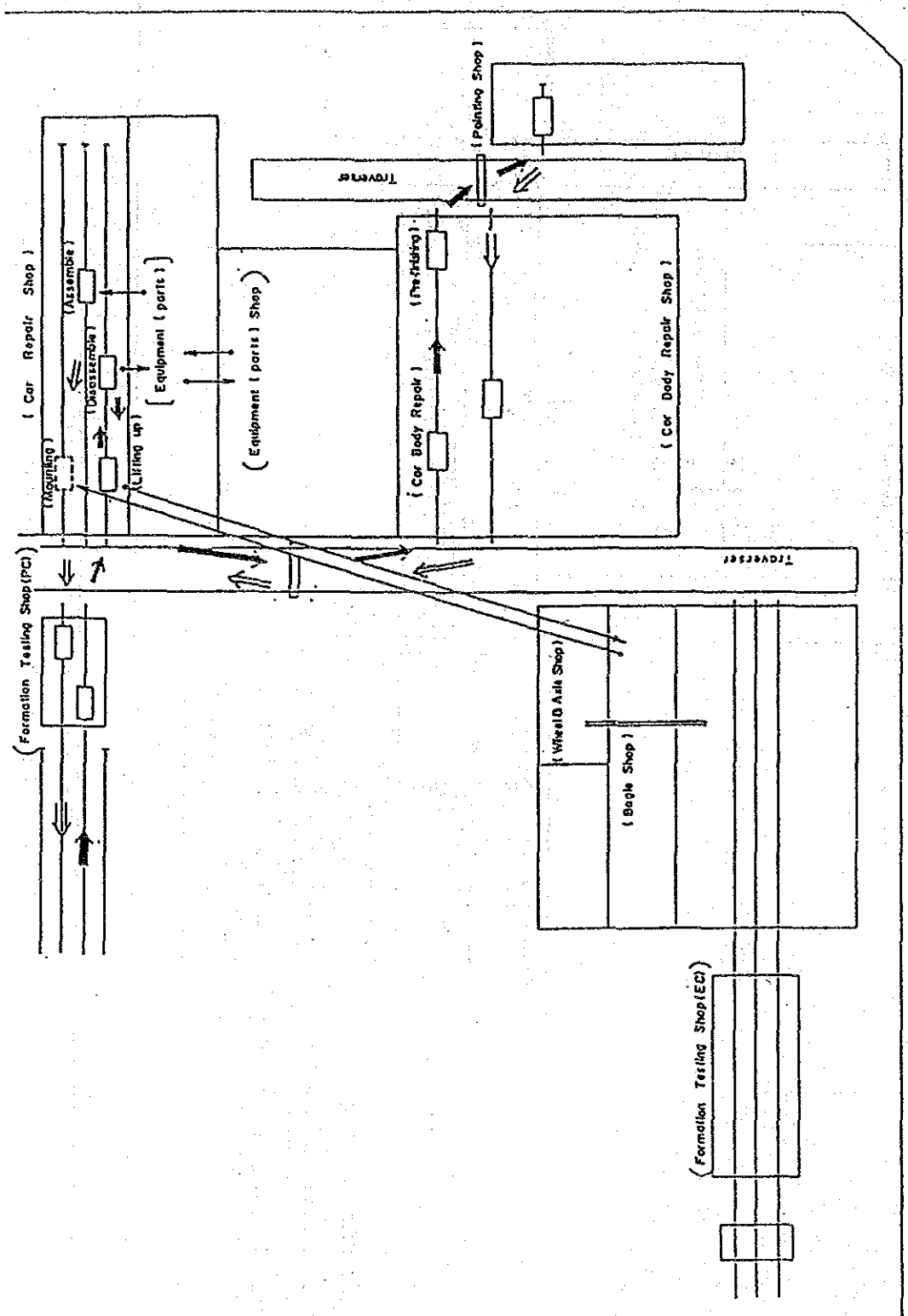


Fig. 3.6.2.4 Total Work Flow of Passenger Coach

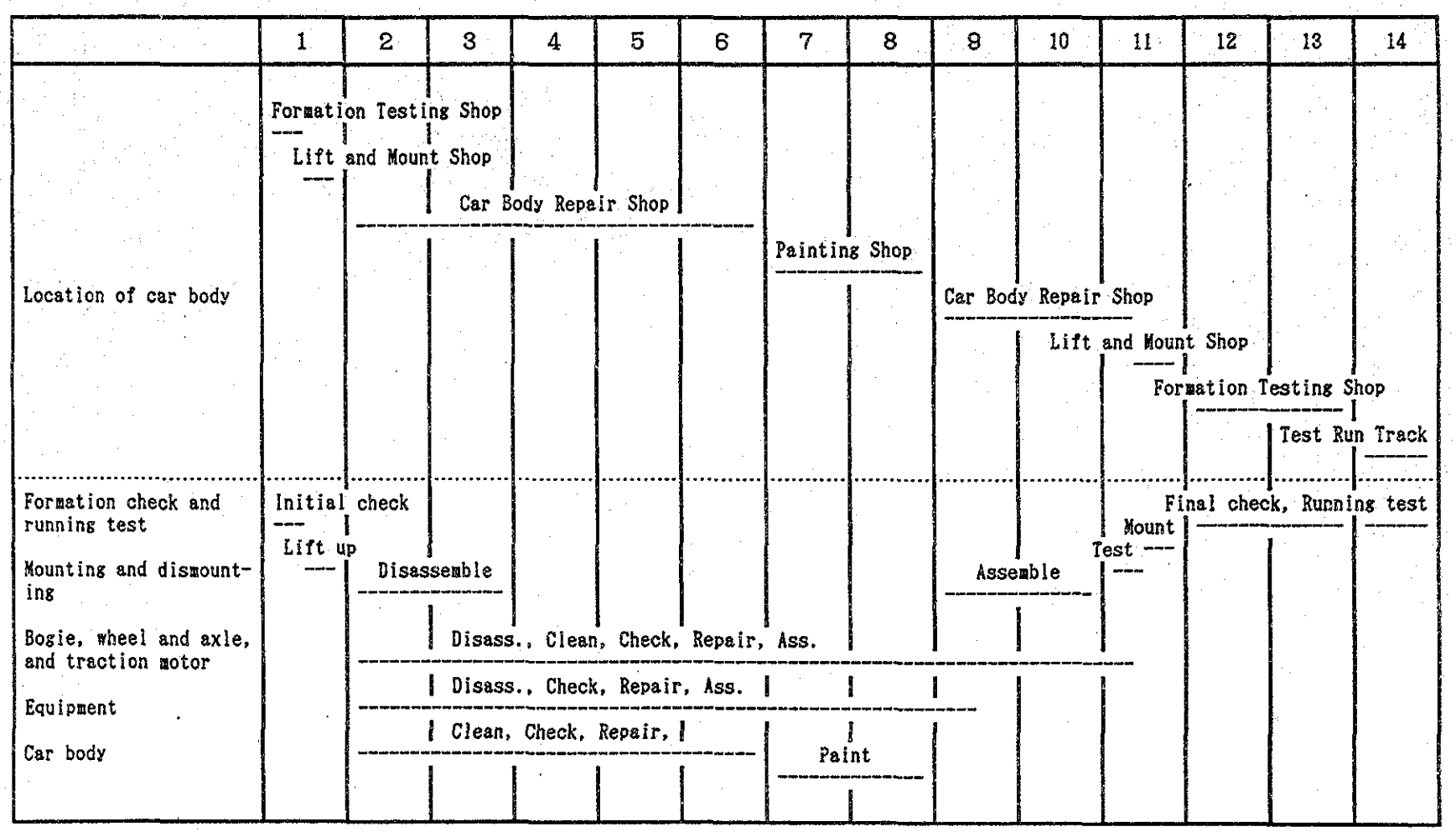


Fig. 3.6.2.5 An Example of EC's Daily Schedule

CHAPTER 4 FEEDER SERVICE AND STATION IMPROVEMENTS

CHAPTER 4 Feeder Service and Station Improvements

4-1 Feeder Service Improvement Policies

4-1-1 Introduction

Bus is the principal mode of public transportation in the JABOTABEK area. However, the reliability of bus operations is hindered by serious traffic conditions on the routes and in the areas surrounding bus terminals. Under these conditions, the planned railway improvement projects (options "a" and "b") were designed to improve passenger service and increase the capacity of rail public transportation by 1992. However, most of the railway stations in the JABOTABEK region are located outside of the region's urbanized area. The stations only serve as relief facilities for long-distance train operations.

Analysis of the bus-rail interchange indicated that 40 - 50 percent of the trips to and from the main station were served by buses, with the highest bus share (75%) in Pasar Minggu. However, the intermodal facilities at present are insufficient to facilitate easy transfers between both modes. Thus the provision of intermodal facilities will generate a variety of benefits, including reduced passenger travel times, increased railway profits due to an increase in passengers, and reduced investment by city governments in traffic control. To improve intermodal facilities between bus and rail, this study considered the following issues:

- Level of rail development to be reached in 1992;
- Investment planning up to 2005;
- Utilization of existing bus routes; and
- Urban facilities considerations.

4-1-2 Feeder Development Policies

(1) Basic development policies

The intermediate railway development program for urban commuter

service will be completed in 1992. However, the JABOTABEK area developed principally along arterial corridors, and most railway stations are located outside of these corridors. As stated above, most stations in the region were designed as relief facilities for long-distance train operations.

If the railway is to serve as a mode of public transportation, it is necessary to link the railway stations with the urbanized areas by bus. Currently, bus operations are provided in all urbanized areas in the region. Large buses are operated on routes connecting the main bus terminals, while small and medium buses provide local service and connect to main bus terminals.

If bus-rail intermodal facilities are not provided, the level of railway service will remain low. Although the capacity of the railway system to serve demand may be increased, the demand will not likely materialize. Therefore, if the railway is to serve effectively as a means of public transportation in the JABOTABEK region, it is necessary to provide intermodal facilities that will assure passengers an easy transfer between modes.

(2) A phased program for the improvement of feeder services

To promote the efficiency of the transport system, feeder services must be consolidated with station facilities and rail services. Although the existing bus and rail networks are independent, if the railway service area is to be expanded it is essential that buses deliver passengers directly to the stations. However, it is difficult to expand existing bus services because the level of railway service is still quite low at present.

Fig. 4.1.2.1 presents a phased plan for the improvement of feeder services. As shown in the figure, the goal is to provide feeder services at each stage at a level consistent with the development of railway services. Ultimately, the target in Phase III is to create a railway transport corridor in which railway transport will have a large impact on land use in the vicinity of the station.

Table 4.1.2.1 presents, a list of transport modes and facilities for various kinds of stations, for example, a main terminal station in an urban area would be served by all modes except bicycle and motorcycle, and all types of major facilities would be located near the station except for bicycle/motorcycle parking.

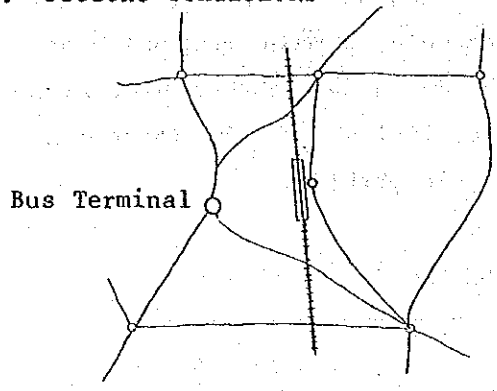
Table 4.1.2.1 Station Topology and Feeder System

Location of Station	1.	2.	3.	4.	5.
A. Transportation Mode Connection					
- Trunk railway line	X	-	-	-	-
- Inter-city railway line	X	-	X	-	-
- Inter-city bus	X	X	X	X	-
- Suburban railway line	X	X	X	X	X
- Suburban bus	X	X	X	X	
- City bus	X	X	X	X	X
- Taxi	X	X	X	X	X
- Personal car	X	X	X	X	X
- Bicycle/Motorcycle	-	-	X	X	X
- Walking	X	X	X	X	X
B. Major Facilities Near the Station					
- Bus transfer facilities	X	X	X	X	-
- Taxi bays	X	X	X	X	X
- Car parking	X	X	X	X	X
- Bicycle/Motorcycle parking	-	-	X	X	X
- Pedestrian plaza	X	X	X	X	X
- Amenity plaza	X	X	X	X	-
- Information center	X	X	X	X	-
- Stores or shops	X	X	X	X	X
- Hotels	X	X	X	X	-

Note: Location of station

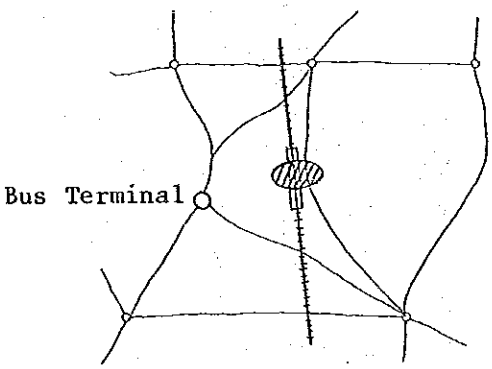
1. Main terminal station in urban area
2. Subterminal station in urban area
3. Main terminal station in regional area
4. Subterminal station in regional area
5. Main station in suburban area

1. Present Conditions



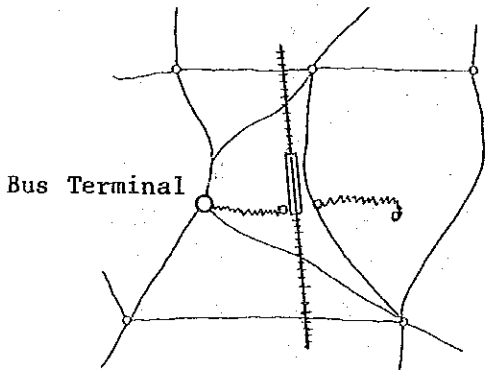
There are no intermodal facilities and services linking railway and bus operations.

2. Phase I: Initial Provision of Intermodal Facilities and Services



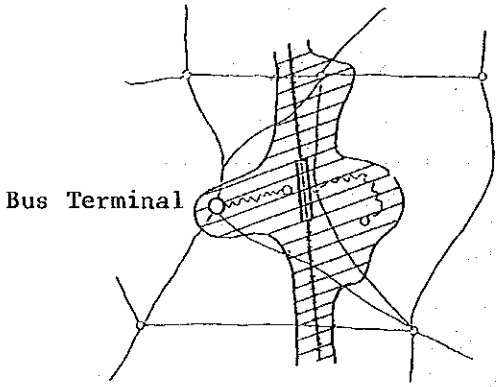
Transfers between modes become less onerous.

3. Phase II: Provision of New Zonal and Shuttle Services



The service area of the station will expand.

4. Phase III: Creation of a Railway Transport Corridor



Railway transport will have a large impact on land use in the vicinity of the station.

Fig. 4.1.2.1 A Phased Plan for the Improvement of Feeder Services

4-1-3 Design Guidelines and Standards

The design guidelines and standards described in this section was used to prepare improvement plans for interchange facilities improvements in Section 4-4 and 4-5. These guidelines and standards were originally adopted from Japanese standards as well as Indonesian standards for certain cases. Some of these standards are listed below:

- DGH, (1989) "Standard Specifications for Geometric Design of Urban Roads".
- Doro Kyokai (1983), "Doro Kouzorei to Sono Ohyoh", (Standard Specification of Roads) in Japanese.

(1) Station building

As a rail transport facility and as a point of contact with passengers, the station building must necessarily form a space allowing passengers to move smoothly from the plaza in front of the station to the platforms, as well as permit the smooth operation of station business.

The station building is divided generally into four sections: the circulation section, the passenger section, the passenger reception section and the station offices.

1) Circulation facilities: concourse, plaza, passageway, wickets

2) Passenger facilities : waiting room, washrooms, shops, dining hall

3) Passenger reception facilities: ticket window, fare-adjustment office, information counter

4) Station office facilities : stationmaster's office, general office, various subordinate offices

Of these, 1) and 2) can be classified as passenger-oriented sections, and 3) and 4) as station business-oriented sections.

These facilities should be arranged under criteria that organize the passenger facilities and passenger reception facilities around the central circulation facilities. (Fig. 4.1.3.1)

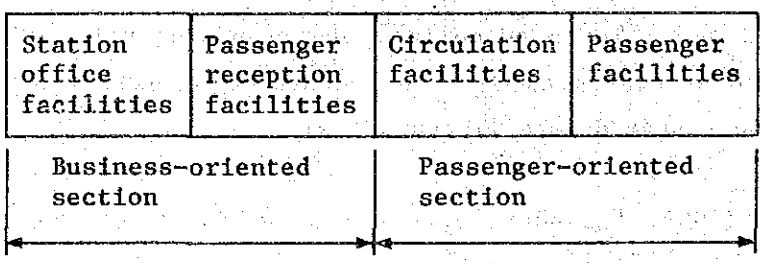


Fig. 4.1.3.1 Basis for Arrangement of Facilities in the Station Building

The Plan to Organize Facilities in the Station Building takes into account the following:

1) it is a short way from the plaza in front of the station to the platforms;
2) the route the passengers follow should be simple and easy to understand and should keep passengers out of each other's paths;
3) at stations where long-distance trains stop, the paths of long-distance passengers and commuters should be kept separate;
4) equipment in the passenger facilities and the passenger reception facilities should be easy for the passengers to understand.

Stations can be broadly divided, according to the sites where they are built, into ground-level stations, stations on bridges, elevated stations and underground stations. It is not necessary to prepare land for stations on bridges. Furthermore, the function of a station is after all mainly to provide passenger services and so urban planning approaches to the station environs are useful, as are the nodules of the feeder system in improving station facilities.

When designing over track stations, nodules of the feeder facilities are planned from the point of view of passenger paths on the basis of the situation of the free passageway as shown in Table 4.1.3.1. The scale of the station is determined by estimates of passenger turnover in 2005.

Table 4.1.3.1 Characteristics of over Track Station

Item	Strong Point	Weak Point
Relevant aspects of urban planning	. There is freedom of movement from front to rear, and it is possible to plan for centralization of the city.	
Effective use of land with related business	. The remaining land can be used effectively. . It is useful in the case of the limited ground space. . Open space above the tracks can be used efficiently. . When construction is undertaken with related businesses, it will be possible to use effectively the first and second floors for these related businesses.	
Maintenance and operation		. Maintenance work will be difficult on the platforms, above the live tracks. . The maintenance area will increase greatly.
Construction cost		. Great expense compared to ground-level stations.
Passenger routes	. Pedestrian and automobile flow can be set apart by combining them with pedestrian decks.	. The stairs will be an obstacle for handicapped people.
Other		. Alterations and improvements in the structure will be difficult in the future.

(2) Station front plaza

The station front plaza is the facility that connects the railway with the surrounding area and roads and so will have the functions described in Table 4.1.3.2.

Table 4.1.3.2 Functions of the Station Front Plaza

Function	Specifies
Transport terminal	. Connecting the railway with other transport modes . Getting on or off secondary transport modes, and transferring modes . Parking for buses, taxis and private cars . Carrying hand luggage in and out
Urban activity	. Dispersal of citizens to and their collection from surrounding shops and offices . Place for citizens to meet and communicate . Commercial space
Consolidation of the environment	. Mediation between town transport and railway transport. . Presentation of a sophisticated atmosphere befitting the city's front door . Space for tree-planting fountains, and other environmental improvements . Monuments and flower clocks
Disaster relief	. Emergency refuge in the event of earthquakes or fires . Storage for emergency transport goods

The important functions of the station front plaza are as a thoroughfare for passengers and the general populace and as a parking lot for buses, taxis and private cars. Organic unity of the station building with the surrounding area and roads will be the basis of the plan for the station front plaza.

The scale of the station front plaza will be determined by the estimated passenger turnover in 2005, and with consideration for land-use planning and development of the area around the station.

(3) Bus bays/platforms

The followings are the adopted guidelines for the design of bus bays and platforms.

- Secure the safety of passengers by segregating passenger and vehicular traffic.

- If construction of the station plaza is not feasible due to various constraints of land use around the station, bus bays along bus routes close to the railway station should be constructed so as to secure convenience to the transferring passengers.

- Determine the length of bus bays by considering the frequency of buses operating along these roads.

- The clearance between bus platforms is determined as follows to allow for overtaking buses within the bay. (Fig. 4.1.3.2)

3.5 m (over taking) + 3.0 m = 6.5 m (clearance width)

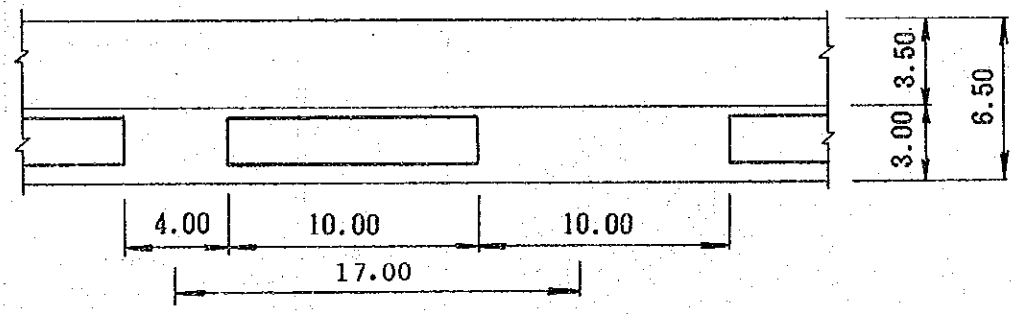


Fig. 4.1.3.2 Clearance Width of Bus bays (Large Bus)

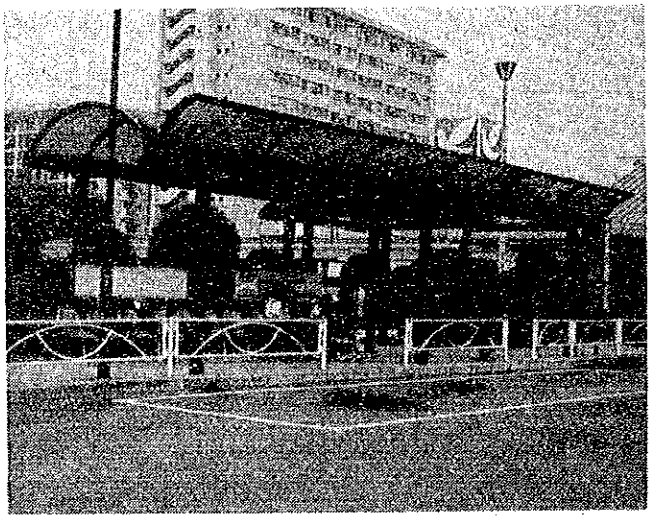
- The distance between buses within the bays and platforms is set as follows for large buses and medium/small buses.

	Large Buses	Medium/Small Buses
Length of vehicle	10 m	5 m
Distance	7 m	5 m
Total	17 m	10 m

- Provide an appropriate information system for bus passengers and vehicular traffic.

- If it is possible, large and small buses should be segregated to secure smooth flow of traffic.

- For the comfort of passengers provide the shelters at bus bays for at least a half the length of bus bays and platforms. Provide also bench, lighting, plants and dustbins (Fig. 4.1.3.3).



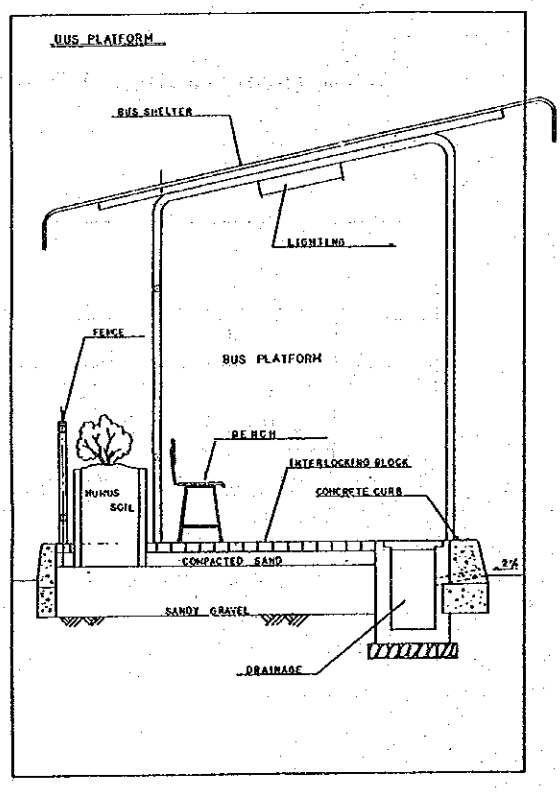


Fig. 4.1.3.3 An Example of Equipments at Bus Bay

- The minimum width of the platforms should be 2 m.

- Provide an information panel such as shown in Fig. 4.1.3.3 to indicate the name of bus stop, route numbers and approximate frequencies.

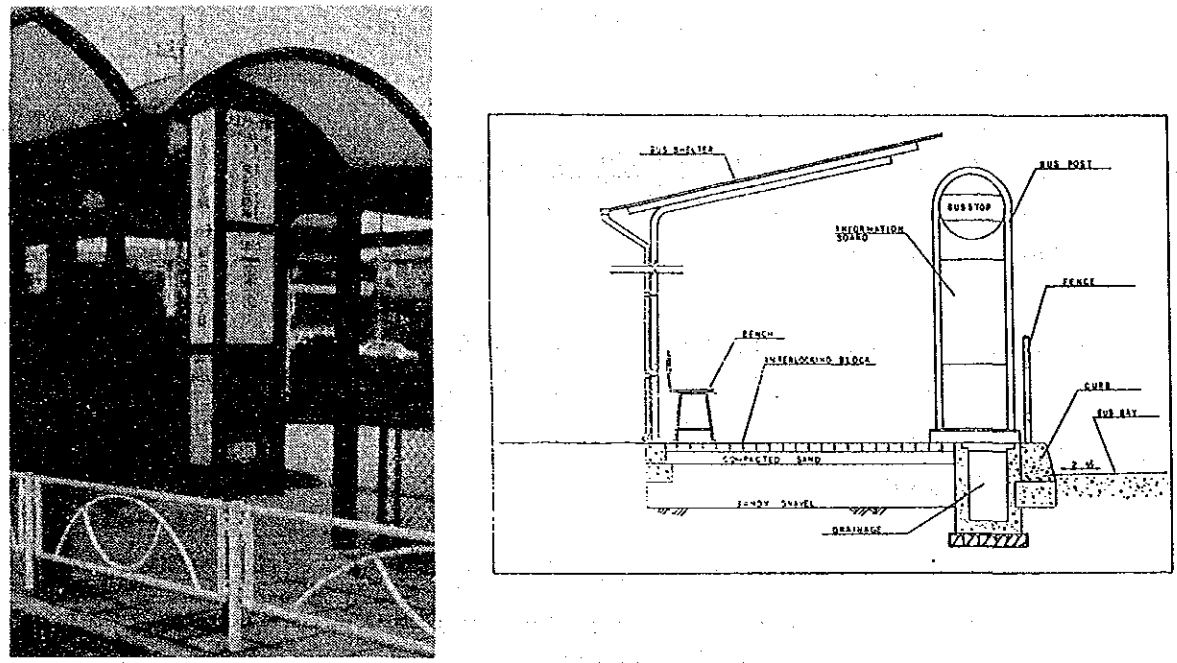


Fig. 4.1.3.4 An Example of an Information Panel at Bus Bay

(4) Traffic safety measures

Pedestrian Facilities

- Zebra crossing should be built to conform pedestrian movements. Pedestrians prefer to walk a shorter distance between any two points.

- Selection of the location for a pedestrian bridge should follow the similar policy as zebra crossing but with an additional consideration to the traffic volume, land availability on sidewalks. The width of the bridge is determined by the volume of pedestrian traf-

fic but the minimum width is set to 3 m. The stair part is 2 m (dual stair type). The height of the bridge (between the road surface and the bottom of the bridge) is set to 5.1 m.

- The design of the bridge should conform to the surrounding scenery and be provided with the roof and appropriate lighting system.

Traffic Signal

- Traffic signals with a right-turn indication should be provided where the volume of main traffic is heavy and the right turn of buses is difficult.

- It is recommended to build a pedestrian signal at zebra crossing where traffic volume on main street is relatively light.

Lane Marking

- Exclusive right-turn lane for buses should be provided where the volume on main traffic is heavy and the right-turn movement of buses is likely to destruct main traffic.

4-2 Investment Priorities and the Selection of Projects for Urgent Implementation

This section describes the selection of priority stations for the provision of intermodal facilities. Section 4-2-1 identifies the group of advantageous stations from the viewpoint of urban development, as the general bases for the selection. Section 4-2-2 selects the priority stations based on an analysis of transport factors, particularly those relating to the railway; the selected stations are included by the advantageous stations above-mentioned.

4-2-1 Identification of Advantageous Stations in Urban Circumstances

This section identifies advantageous stations in potential demand; these station can be regarded as "strategic station" because these will offer large potential of making better use of Jabotabek Railway

(1) Types of stations having advantage of potential demand

An advantage station having large potential demand of the railway-and -feeder commuter service will be located at a strategic position that neighbors on or is connected with commuters' destinations or origins such as urban activity centers or commuter towns.

Four types of advantageous stations identified are:

Type 1: A TERMINAL STATION within the central Jakarta. Its VICINITY, where is within walkable distance or short bus-riding from the station, includes the urban activity center/sub-center. This type of station can also work as a junction station for other centers because it has well-developed bus services.

Type 2: A JUNCTION STATION within or around the central Jakarta. Its HINTERLAND, where is within about 2 km radius or can be reached by bus within 10 to 20 minutes, includes urban activity centers/sub-centers.

Type 3: A JUNCTION STATION. Its hinterland/vicinity includes industrial developments, university, amusement center and so on.

Type 4 A MAJOR CENTER COMMUTER STATION. It is located outside of the central Jakarta; its Hinterland includes large-scale housing developments.

Furthermore, stations that are related to road development projects on-going/committed have advantage of improving the access conditions by coordinating with the project's implementation.

(2) Identified advantageous stations in relation to urban activities and road projects

Approximately 35 advantageous stations were identified in relation to future urban activity centers. Further more 12 stations were identified in relation to road development projects; nine stations out of twelve were placed at the above-mentioned 35 stations.

The identified stations by type are as follows:

Type 1: TERMINAL STATION for major urban activity centers

(Present &Future)	(Future)
Jakarta-Kota	Manggarai
Gambir	Tanjung Priok
Pasar Senen	Cakung
Jatinegara	
Tanah Abang	

Terminal for Sub-Centers

(Present & Future)	(Future)
Cikini	(Dukuh)
Sawah Besar	
Pasar Minggu	

Type 2: JUNCTION STATION for urban activity centers/sub-centers

(Present & Future)	(Future)
Angke(for Kota-Glodok)	Jayakarta(for Kota)
New Kampuang Bandang(for Kota)	Juanda (for Gambir, Pasra Baru)
Dukuh(for Jl.J.Sudirman	Gondandia(for Gambir)
Palmerah(for Jl.Jnd.Gatot Subroto)	
Kebayoran(for Blok M)	
Duren Kalibata(for Jl. Jnd. Gatot Subroto)	
(Pasar Minggu (for Blok M etc.))	

Type 3: JUNCTION STATION for Industrial developments and so on

(Present &Future)	(Future)
Klender Baru, Klender (for Puro Gadung Industrial Development)	Stations on Tangerang Line

Type 4: MAJOR COMMUTER STATION

(Present & Future)	(Future)
Klender Baru (Bekasi Line)	Serpong, Rawabuntu, New Station and Sudimara (Serpong Line)
Depok Baru (Central Line)	Cakung, Kranji and Bekasi (Bekasi Line)
	Tangerang and Poris (Tangerang Line)

Furthermore the stations related to road development projects on-going/committed are:

- Dukuh (Bus-lanes and bus-stops in front of station will be improved.)
- Kebayoran (Construction of a long flyover, crossing the railway, will affect the access for the station.)
- Tanjungbarat and Rawabuaya (Outer-Ring-Road's frontage road developments will improve the access for the stations.)
- Tebet (Jatinegara-Sudirman road development will improve the access for the station.)
- Dukuh, Mampang and Manggarai (Pejompongan-Matraman road development will improve the access for the station.)
- Klender Baru (Road development by Urban Land Consolidation Projects will give a chance to improve the access for the station.)

- Tanah Abang and Gondangdia ("Corridor Development" Projects will give a chance to improve the access for the stations.)

- Jatinegara and Pasar Senen (Bus-priority Lane Projects will affect the access for the stations .)

4-2-2 Identification of High-Priority Stations Based on an Analysis of Transport Factors

(1) Passenger demand forecasting

Passenger demand forecasts for 1992 and 2005 were prepared by the study team based on an analysis of proposed road and railway improvements, as well as on the basis of urban development factors. The forecasts are presented in Table 4.2.2.1. In the BC 01 Ry 02 case, demand in 1992 would be nine times greater than the 1985 total (1,678,000 trips per day compared to 186,890 trips per day), and demand in 2005 would be more than 20 times greater (3,879,000 trips per day).

It was assumed that the railway development program would include an increased number of trains, increased train speed, modernized railway facilities and intermodal facilities promoting bus-rail transfers. If and when these programs are implemented, the rail share of trips by public transport modes will increase to approximately 25% by 2005.

(2) Railway facilities improvement program

The selection of stations urgently requiring intermodal facilities must also take into consideration the overall railway improvement program. Fig. 4.2.2.1 presents the railway facilities development program for 1992 under Options "a" and "b". Modernized facilities

Table 4.2.2.1 Potential Passenger Demand Used in Station Facilities Design

Station	Zone	1985 (ARSDS)	1992 B	2005 (Case= 052)
Pasar Senen	4	6963	162900 *1	297956 *1
Klender	74	2422	119937	237881
Jatinegara	71	9305	107646 *15	290359 *15
Duren Kalibata	53	2522	77124	127490
Tanjungpriok	22	618	73909	122669 *5
Dukuh	45	-	66458 *9	234097 *9
Pasar Minggu	54	11212	61033 *11	116240 *11
Cikini	11	5771	58717 *2	70363 *2
Gambir	10	19491	56994	77512
Kemayoran	4	1410	52031	150354
Kebayoran	60	3349	48748	43813 *12
Jakarta	16	21646	44964 *4	153342 *4
Klenderbaru	76	649	43850 *16	176138
Manggarai	49	9274	43166	99975
Bekasi	108	2270	38358 *22	89180 *22
Angke	43	2325	38004 *8	44672 *8
Bogor	91	17567	37040 *17	32143 *17
New Kampungband	16	-	36789 *4	38335 *4
Pesing	38	185	36623	80360
Gondangdia	11	-	28921 *2	46909 *2
Cawang	48	-	26667 *10	83971 *10
Tanah Abang	12	5434	23865 *3	132571 *3
Mampung	45	-	22153 *9	41311 *9
Sawa Besar	42	5026	21688 *7	43560 *7
Tanjung Barat	65	-	20732 *14	84478 *14
Duri	43	2302	20463 *8	39088 *8
Depokbaru	98	6584	19040 *18	26275 *18
Palmerah	13	1998	16728	2503
Kramat	6	656	15154 *1	27717 *1
Depok	98	11685	15001 *18	19905 *18
Rajawali	2	779	14973	34790
Grogol	38	210	14773	47395
Tebet	48	5251	14359 *10	35987 *10
Bintaro	64	-	13921 *13	20573 *13
Pondok Bitung	64	-	13921 *13	20573 *13
Lenteng Agung	69	5089	13822 *14	56318 *14
Gg.Sentiong	6	446	11365 *1	20788 *1
Juanda	42	-	10844 *7	21780 *7
Manggabesar	42	-	10844 *7	21780 *7
Jayakarta	42	-	10844 *7	21780 *7
Sudimara	103	2181	10355	12827 *21
Bojonggedeh	98	4900	9808 *18	11943 *18
Pondok Jati	71	771	9360 *15	25249 *15
Citeyang	98	4975	9231 *18	11943 *18
Tangerang	100	1809	8165 *19	22789 *19
Kalideres	28	649	7930 *6	20737 *6
North Minggu	54	-	6781 *11	29060 *11
Kranji	108	409	6769 *22	15738 *22
Uni.Pancasila	69	-	6482	14742
Rawabuaya	31	525	6344 *6	45425
Cilebut	91	2844	6030 *17	6429 *17
Poris	101	411	4956 *6	15553 *6
Cakung/New St.	77	1001	4872 *16	108924
Serpong	102	1845	4642 *20	15606 *20
Karet	12	0	4212 *3	28408 *3
Uni.Indonesia	98	-	2308 *18	3185 *18
Podok Cina	98	1165	2308 *18	3185 *18
Batucepur	100	400	1792 *19	4883 *19
Rawabuntu	102	474	1160 *20	4802 *20
Bojongindah	31	56	595 *6	7776 *6
Pondokterong	98	-	-	1592 *18
New Stn.	98	-	-	1592 *18
New Stn.	31	-	-	7776 *6
New Stn.	103	-	-	1603 *21
Jurangmangu	103	0	-	1603 *21
New Stn.	102	-	-	3601 *20
New Stn.	100	-	-	4883 *19
New Stn.	91	-	-	3214 *17
Kebon Pedes	91	-	-	22500 *17
New Stn.	60	-	-	10953 *12
New Stn.	43	-	-	27920 *8
Ancol	18	-	-	21647 *5
New Stn.	12	-	-	28408
Total of Jabotabek Railway's Stations			1678467	3879427
Stations excluded in Jabotabek Railway			57231	109998
Total of Jabotabek Area's Stations			1735698	3989425

Note: *n and *n are included within a same traffic-zone.

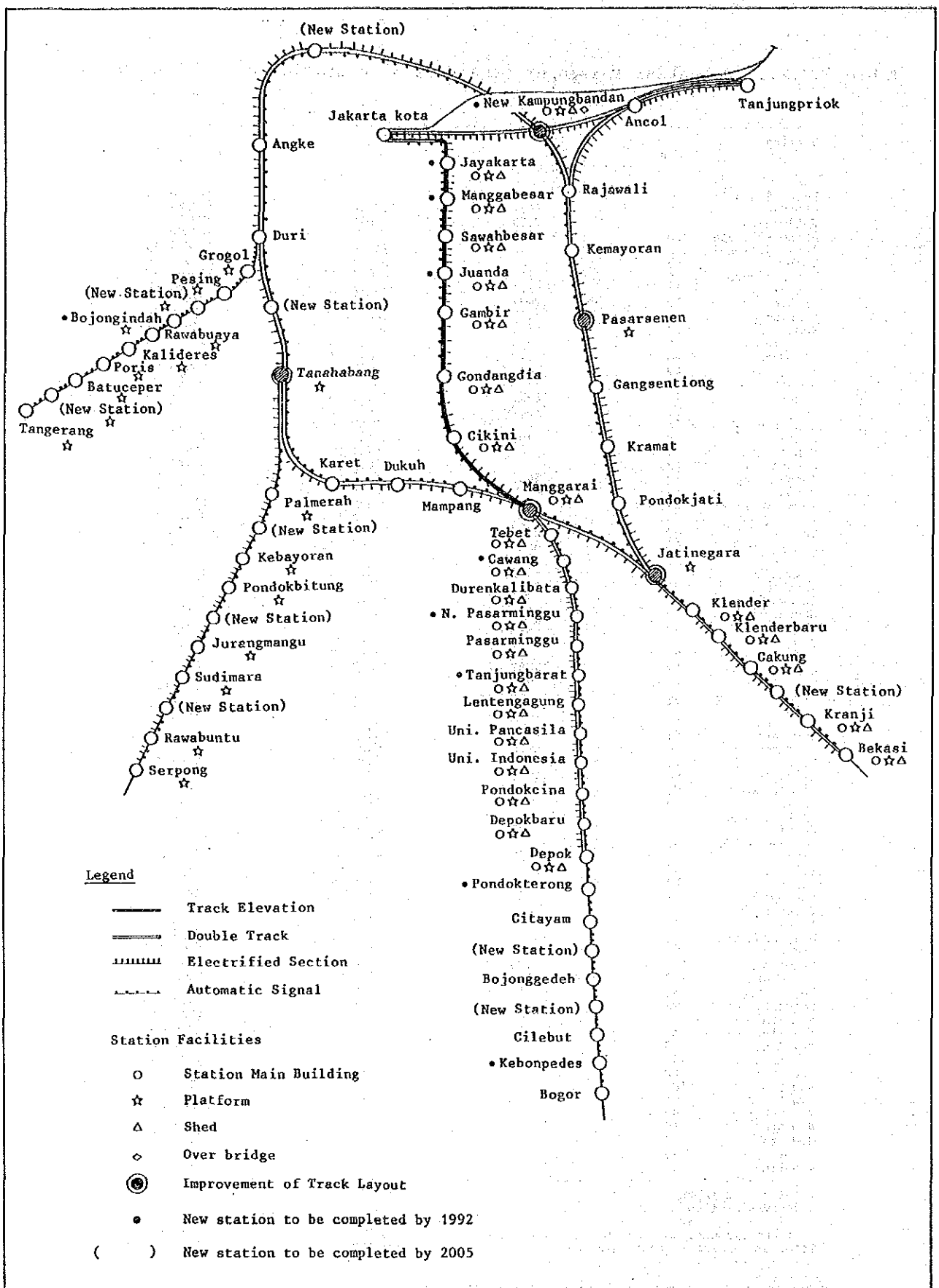


Fig. 4.2.2.1 Railway Facilities Development Program for 1992

to serve commuters will be provided on the Central Line (from Jakarta Kota to Depok), the Bekasi Line (from Jatinegara to Bekasi), and the Loop Line (from Jatinegara to Tanah Abang to Duri to New Kampung Bandan to Pasar Senen to Jatinegara).

(3) Train operation program

Although the train operation program is closely related to demand forecasts and the program to improve railway facilities, the selection of stations urgently requiring improved intermodal facilities must consider the density of train operations. Fig. 4.2.2.2 presents a graphic display of planned train operation density in the region in 1992. As shown, the sections with the highest density of train operations will include the sections mentioned in part (2) above as sections that will be modernized.

(4) Selection of stations urgently requiring improved intermodal facilities

There are currently 53 stations in the JABOTABEK area and 10 new ones are to be completed by 1992. However, it is necessary to rank the stations in terms of their need for intermodal transfer facilities since it is not economically feasible to make such improvements immediately at every station. Thus, to establish a cost-effective investment program, four selection criteria were adopted by the study team:

Criterion 1: Does the station have a peak hour service level of 30 trains per 2 hours?

Criterion 2: Does the station currently have 1,000 passengers per day and is the level that is forecast for 1992 at least 15,000 passengers per day?

Criterion 3: Is there a bus route within 350 m of the station?

Note: Above figure is shown the number of operation in 1992.

No.of Train Operation and Train Operation Frequency

Name of line	Operating section	1988		1992	2005
Central line	Jak ~Dp	16(23')		122(8.5')	294(3.5')
	Dp ~Boo	6(60')		34(30')	52(20')
Loop line &	Du ~Jak ~Jag	12(30')		122(12')	122(12')
Bekasi line	Du ~Bks	15(12')	*	148(10')	246(6')
Tangerang line	Du ~Tng	12(30')		42(24')	89(17')
Serpong line	Thb ~Srp	6(60')		58(18')	58(25')
Tanjung Priok line	Jak ~Tjp	———		50(30')	98(15')

* Middle-distance trains are also counted

( ) Train operation freqency in all day

Fig. 4.2.2.2 Train Operation Density

Criterion 4: Are there connections with a bus terminal? Is traffic interchange important? Is there a covered pedestrian area?

The work procedure for the selection of stations urgently requiring intermodal facilities based on transport factors is set forth in Fig. 4.2.2.3. The results of the process are presented in Table 4.2.2.2; twenty-one stations were selected.

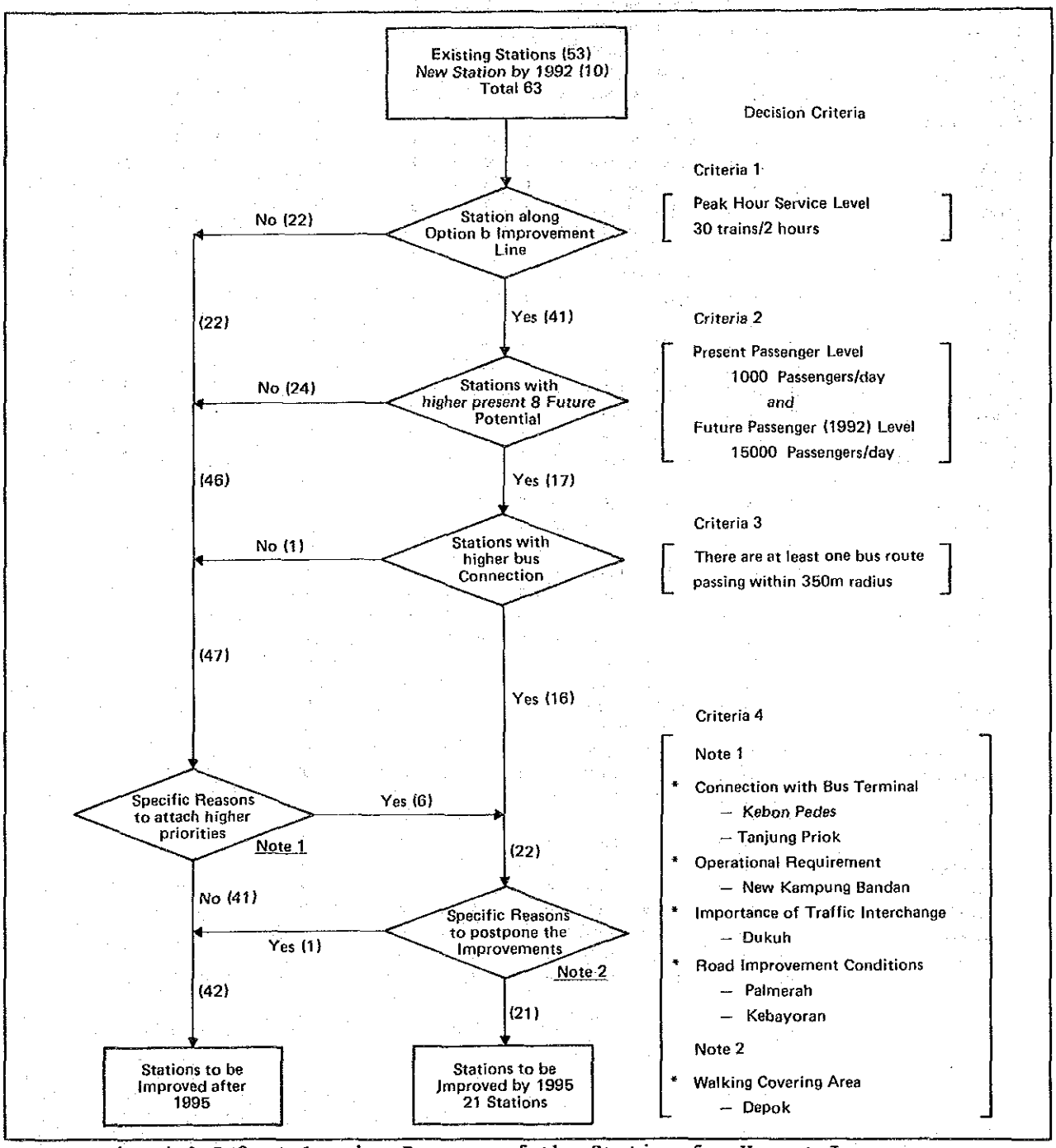


Fig. 4.2.2.3 Selection Process of the Station for Urgent Improvements

Table 4.2.2.2 Selection of Station for Urgent Improvement

Station Name	Criterion 1 (Operation)			Criterion 2 (Passenger)		Criterion 3 (Bus Connectio					Criterion 4 Specific Condition		Land Use Density				Integration Type
	Line	Peak H service		1985	1992								1988	200 500	2000	Center	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Angke	L1	30	1	2,330	38,000	1	1	1	1	1		1			1		D
Bekasi	L2	36	1	2,270	38,000	1	1	-	1	1		1	1				C
Cikini	C1	42	1	5,770	59,000	1	1	21	1	1		1			1		D
Depok Baru	C1	42	1	6,580	19,000	1	1	-	1	1	1	1					A
Dukuh	L2	36	1	-	66,000	0	0	-	1	0	1	1		1	1		D
Duren Kalibata	C1	42	1	2,520	77,000	1	1	5	1	1		1					D
Gambir	C1	42	1	19,490	57,000	1	1	43	1	1		1	1	1	1		D
Jakarta Kota	C1	42	1	21,650	45,000	1	1	20	1	1		1	1	1		1	D
Jatinegara	L2	36	1	9,310	108,000	1	1	33	1	1		1	1			1	D
Kebayoran	S	20	0	3,350	49,000	1	0	17	1	0	1	1			1		
Kebon Pades	C2	12	0	-	18,000	0	0	-	1	0	1	1					A
Kemayoran	L1	30	1	1,410	52,000	1	1	35	1	1		1			1		D
Klender	L2	36	1	2,420	120,000	1	1	15	1	1		1					D
Manggarai	C1	42	1	9,270	43,000	1	1	12	1	1		1	1			1	A
New Kampung Bandan	L1	30	1	-	37,000	0	0	-	1	0	1	1			1		C
Palmerah	S	20	0	2,000	17,000	1	0	18	1	0	1	1					
Pasar Minggu	C1	42	1	11,210	61,000	1	1	19	1	1	1	1		1			B
Pasar Senen	L1	30	1	6,960	163,000	1	1	54	1	1	1	1	1	1	1	1	A
Sawah besar	C1	42	1	5,030	22,000	1	1	-	1	1		1			1		D
Tanah Abang	L2	36	1	5,430	24,000	1	1	26	1	1		1	1	1	1	1	D
Tanjung Priok	TP	24	0	620	74,000	0	0	5	1	0	1	1	1			1	B
Batuceper	T	15	0	400	2,000	0	0	0	0	0		0					
Bintaro	S	20	0	-	14,000	0	0	-	1	0		0					
Bogor	C2	12	0	17,570	19,000	1	0	-	1	0		0	1				
Bojong Gedeh	C2	12	0	4,900	10,000	0	0	-	1	0		0					
Bojong Indah	T	15	0	60	1,000	0	0	1	1	0		0					
Cakung	L2	36	1	1,000	2,500	0	0	1	1	0		0				1	
Cawang	C1	42	1	-	27,000	0	0	0	0	0		0					
Cilebut	C2	12	0	2,840	6,000	0	0	-	1	0		0					
Citayam	C2	12	0	4,980	9,000	0	0	-	1	0		0					
Depok	C1	42	1	11,690	15,000	1	1	-	1	1	-1	0					
Duri	L2	36	1	2,300	20,000	1	1	0	0	0		0					
Gang Santiong	L1	30	1	450	11,000	0	0	-	1	0		0					
Gondangdia	C1	42	1	-	29,000	0	0	-	1	0		0	1	1	1		
Grogol	T	15	0	210	15,000	0	0	8	1	0		0					
Jayakarta	C1	42	1	-	11,000	0	0	-	1	0		0					
Juanda	C1	42	1	-	11,000	0	0	-	1	0		0					
Kalideres	T	15	0	650	8,000	0	0	-	1	0		0					
Karet	L2	36	1	-	4,000	0	0	-	1	0		0					
Klender Baru	L2	36	1	650	44,000	0	0	4	1	0		0	1		1		
Kramat	L1	30	1	660	15,000	0	0	21	1	0		0					
Kranji	L2	36	1	410	7,000	0	0	2	1	0		0					
Lenteng Agung	C1	42	1	5,090	14,000	0	0	3	1	0		0					

← Proposed Urgent Improvement Station →

Mampang	L2	36	1	-	22,000	0	0	-	1	0	0	1			
Manggabesar	C1	42	1	-	11,000	0	0	-	1	0	0				
North Pasar Minggu	C1	42	1	-	7,000	0	0	-	1	0	0				
Pesing	T	15	0	190	37,000	0	0	15	1	0	0				
Pondok Bitung	S	20	0	-	14,000	0		-	1	0	0				
Pondok Cina	C1	42	1	1,170	2,000	0	0	-	1	0	0				
Pondok Jati	L1	30	1	770	9,000	0	0	14	1	0	0				
Poris	T	15	0	410	5,000	0	0	0	0	0	0				
Rajawali	L1	30	1	780	15,000	0	0	12	1	0	0				
Rawa Buaya	T	15	0	530	6,000	0	0	-	1	0	0				
Rawa Buntu	S	20	0	470	1,000	0	0	0	0	0	0				
Rawabebek	L2	36	1	-	2,500	0	0	-	1	0	0				
Serpong	S	20	0	1,850	5,000	0	0	-	1	0	0				
Sudimara	S	20	0	2,180	10,000	0	0	-	1	0	0				
Tangerang	T	15	0	1,810	9,000	0	0	-	1	0	0	1		1	
Tanjung Barat	C1	42	1	-	21,000	0	0	3	1	0	0				
Tebet	C1	42	1	5,250	14,000	0	0	5	1	0	0				
Univ.Indonesia	C1	42	1	-	2,000	0	0	-	1	0	0	1			
Univ.Pancasila	C1	42	1	-	6,000	0	0	3	1	0	0				
TOTAL		41				20	17	57	16		21	14	7	13	7

Notes: 1. L1: Loop Line (Duri-M.Kasp-Pse-Jatinegara)
L2: Loop Line (Duri-Tanahabang-Jatl)
C1: Central (Kota-Mang-Depok)
C2: Central (Depok-Bogor)
TP: Tanjung Prick Line
T: Tangeran Line
S: Serpong Line

2. Peak hour service level (trains/hour)

3. 1: If more than or equal to 30
0: If less than 30

4. 1985 level of passengers (ARSDS)

5. 1992 potential number of passengers (estimation by this study)

6. 1: If 1985 >=1000 and 1992>=16000
0: otherwise

7. 1: if criteria 1 and 2 are both true
0: otherwise

8. Number of bus routes within 350 m radius.
(mark '__' indicates that no exact data are available)

9. 1: if the number of routes in colum 8 is greater than 1
0: otherwise

10. 1: if criteria 1, 2, and 3 are all true
0: otherwise

11. Specific reasons exist for including or excluding these stations
1: include
2: exclude

12. 1: if criteria 1, 2 and 3 are all true or criterion 4 is true.

13. High-density development exists within a 500 m radius (1988)

14. High-density development is expected within a 500 m radius (2005)

15. High-density development is expected within a 2000 m radius (2005)

17. Characterized as urban centers

18. Station improvement policy (Type of integration b/w bus-rail)

4-3 Existing Conditions and Improvement Strategies for Urgent Improvement Stations

4-3-1 Review of Urban Circumstances Around Stations

(1) Urban factors related to feeder service planning

1) Introduction

Urban factors around the station that will reflect upon the characteristics of railway users' activities are:

a) Station's location in the metropolitan area;
b) Land use pattern
c) Road network; and
d) Planned development projects.

These factors influence average access time to the station, major access modes, the extent of a station's service area, and the principal direction that commuters access/egrees to/from a station in peak hours.

2) Access activity pattern

The following observations regarding station access are apparent when comparing Japan's metropolitan areas to Jabotabek:

- One factor to consider is the average travel time between a station and the destination or origins of railway users. A study in the Osaka Metropolitan Area found that the average access time is 10 to 15 minutes; the access time in the central area was found less than in the suburbs. However, the average access time in Jabotabek is probably longer than in Osaka.

- Another factor is the mode used to reach the station. A typical terminal in the center of Tokyo is used by 200,000 passengers a day, 94% of whom walk to/from the station. A typical suburban station is used by 80,000 passengers a day, 23% of whom use buses to travel to/from the station and 58% of whom walk (See Table 4.3.1.1). The

relatively high portion of passengers walking to/from the station in Tokyo is a consequence of the relatively short walking distance to stations (usually less than 1km), which in turn reflects the large number of stations in the metropolitan area and high density of development within the station's vicinity.

In contrast, in Jabotabek area the passengers generally use buses to reach the main terminals in both the central area (e.g., Jakarta Kota, Pasar Senen, Jatinegara, Tanah Abang) and suburbs (e.g., Depok Baru). However access by walking is significant in the case of stations used by is less than 2,500 passengers per day. According to the ARSDS survey, approximately 40% of all rail passenger within Jabotabek travel to/ from the station on foot.

- A third important factor is the extent of station catchment area (or station's service area), which is determined by the average access time and the major access mode(s). A station could have a catchment area measured by the maximum walkable distance and/or the longest distance that passengers travel to the station by bus. In central Tokyo, the catchment area can be measured by the maximum walkable distance since most passengers walk to the station. In contrast, for most large stations in Jabotabek, the catchment areas should be measured by the longest distance that passengers travel to the station by bus since bus is a principal access mode.

- Another factor is the principal direction that railway users access/egrees to/from the station in peak hours. Thus, for example, during morning peak the principal movement at a suburban commuter station is from outside of station into the station; but the one at a terminal station around urban center is from station to outside. In addition, the railway user's concentration ratio of peak hours against all the day is different between terminal station, junction station and commuter station.

Table 4.3.1.1 Urban Circumstance and Railway Utilization by 'Type of Station'
-- based on Analysis of 126 Terminal Stations in Tokyo Metropolitan Area (1975/78)

Type of Station	No.of Station	Urban Circumstances of Station's Vicinity: Location	Population per HA	Workers per HA	Railway Utilization: Daily Passengers	Access to/from Station by: Walking %	Bus %	Bicycle %
I	18	City Center	73	1,169	206,000	94.4	4.1	0.2
II	22	City Center's Vicinity (within 5-km radius)	112	356	134,000	87.6	9.0	0.6
III	34	Area within 20-km radius (5 - 20 km)	203	108	82,000	77.5	16.8	3.6
IV	52	Area out of 20-km radius	80	43	52,000	58.0	23.5	7.7

Source: Z.Ootsuka, Y.Kawakami, N.Fujikura, M.Tsuji, "Analysis on Urban Conditions and the Growth on Station's Neighborhoods", PAPERS OF THE JAPAN SOCIETY OF CIVIL ENGINEERS, 1983

(Note) 'Types of Station' were abstracted by the factor-analysis on the urban and transportation Conditions of 126 Terminal Stations.
Table shows the averages on the urban/transportation conditions of the types of station

Date on Passengers: Person Trip Survey within Tokyo Metropolitan Area (1978)
Data on Population: Population Census (1975)
Data on Workers: Census on Working Places (1975)

3) Urban factors reviewed

As the result of review on 21 stations, the following type of urban factors were found:

Location within the Jabotabek Area

Location within Jabotabek was considered, with each station placed into one of four categories:

- Central Area: area inside the Inner-Ring Road;
- Intermediate Area: area inside the Outer-Ring Road but outside the Central Area;
- Suburban Area 1: area within 30 km of the city center but outside the Central and Intermediate Area;
- Suburban Area 2: areas more than 30 km from the city (center).

Note that all the Jakarta Metropolitan Area including the suburban cities/towns (e.g., Tangerang, Serpong, Depok and Bekasi) are within 30 km of the center of the city (Monas).

Extent of a Station's Catchment Area

Two measures of a station's catchment area were found:

- The Station's Vicinity: The area within about 500 meters of the station (the area that can be reached in 10 minutes on foot);
- The Station's Hinterland: The area within 1.5 - 2 km of the station in the central area, or 2 - 3 km in other areas (the area that can be reached by bus in about 10 - 20 minutes).

Land Use and Road Newtwork

The main categories of land use found were;

- Commercial/business/service center of sub-center:
- Administrative Center;
- Industrial Districts;
- Housing, commercial or industrial mixed area;
- Densely populated area;
- Developing area in the surburbs; and
- University, amusement complex, or similar development.

The road network patterns identified were:

- The "Grid Type" well-developed or not;
- The "Parallel Road Type", where the main access is by one or two road running parallel to the railway;
- The "One Access Road Type", where one road crossing railway is used for access; and
- The case of there being no access road available for bus use, (large-bus or medium-bus).

Development Projects and Planned Development Directions

Development projects, on-going or committed, and the long-range development directions affecting the 21 high-priority stations were reviewed, taking into consideration the DKI Jakarta District Plan (RBWK).

(2) Analysis of the impact of urban development factors on the 21 high-priority stations

1) Stations within the Central Area

Urban Center Terminal

The following stations, located around a present or future urban center, are or will be the largest stations in Jakarta. They already serve, or will serve, as Urban Center Terminals as well as junction due to present or future existence of a well-developed bus network. They are included in the Type 1 group of strategic stations, as discussed in Section 4-2-1.

- Jakarta Kota. Kota-Glodok is far the largest center of commercial/business activities in Jakarta; the ARSDS survey revealed that the total floor area utilized for commercial/business purposes is more 60 ha or twice that of Senen or Blok M. According to Current Development Strategy of Jakarta, the future growth of Kota-Glodok should be controlled. The old financial and trading districts near the station are being developed into the modern business districts. Other old trading area is also planned to be new commercial and housing mixed area. The relocation of station will remain the large-scale redevelopment sites. The road network is well-developed grid type.

- Pasar Senen. A large-scale commercial redevelopment is under way at the station's vicinity. Senen is one of the largest urban centers of Jakarta; it is also planned as a primary commercial/service center out of eight ones. The eastern half of the station area is a densely populated area. The road network is well-developed.

- Jatinegara is located at the periphery of a commercial and buses center. There is a densely populated area in back of the station, where RBWK plans to construct a road parallel to the station. Commercial activities will be stimulated, and PD. Sarina Jaya (a DKI-owned development company) may develop a project in the area. The road network in the vicinity of the station is well-developed, but provides no direct access to the station from the back.

- Jakarta's central administrative district provides the catchment area for Gambir Station. RBWK plans to develop the area, which should increase employment. Monas Park lies to the west of the station. The road network in the area is well-developed.

- In front of Tananh Abang Station is a busy commercial and business center, which should be developed further in the future. Part of the city's central administrative district lies to the east of the station's hinterland, and populated area is located to the west. The road network in the area is well-developed.

- There are physical barriers north, east and south of Manggarai Station (e.g., a canal, a large-scale railway workshop). To the east lies the central area and a local commercial area, but the station does not face in that direction. DKI plans to make Manggarai a primary center for new east-west road to connect the area with two arterials (Jl. Jend Sudirman and Jl. Salemba Raya) will be constructed. The existing road network in the area needs to be improved.

- The station at Tanjung Priok is located at the peripherry of a local commercial center. There is a harbor district to the north and populated areas to the south. DKI has designed the area a primary center, and the road network is already well-developed.

Junction Station for Urban Centers/Sub-centers

Because the following stations principally serve or will serve as junction for urban centers/sub-centers, they are included in the Type 2, as discussed in Section 4-2-1.

- Sawah Besar Station is located in a busy modern commercial district. The elevation of the Central Line and the Kemayoran Complex Development will stimulate commercial development along Jl. Sukarjo Wiryo Pranto. The road network in the area is already well-developed.

- Cikini Station is located near a commercial sub-center in the neighboring Menteng area. The station provides access to the Jakarta's City Center and the road network is well-developed.

- Dukuh Station was opened at 1987 in a strategic location on Jl. Jend Sudirman. The current five-year road development plan will improve the transfer between the station and the buses. Redevelopment is under way and concentration of commercial activity in the area should be higher as a consequence. The local road network in the area will also be improved.

- Kemayoran Station is located near the Kemayoran Complex Development, a large on-going project that includes the International Trading Center and the Jakarta Fair, as well as related business and housing developments, and a Perumnas's housing development for low-/middle-class income groups, as mentioned later. It is proposed to relocate the station to a site that would provide direct access for the kemayoran Complex Development. Jl. Angkasa would then serve as a special commercial street connecting Kemayoran with the new development project as well as with Sawah Besar Station and the Pasar Baru commercial center. The road network in the vicinity of Kemayoran Station includes several arterial roads.

- Angke Station is located at the periphery of Kota-Glodok in an older crowded with industrial, commercial and housing uses. The Pasar Pagi Flyover, an on-going project, will improve access to the Kota-

Glodok from the station. The station's eastern hinterland includes undergoing commercial/business redevelopment projects of Pasar Pagi and the Financial Triangle District. Until the development of New Kota Station, Angke will be an important junction station on the Tangerang and Serpong Lines serving Kota-Glodok. The road network in the area is based on an old grid-pattern.

- New Kampung Bandan Station is included in Option "b". Located on the Eastern/Western Lines, it will serve as an important junction for Kota-Glodok. The area around the station is being developed as an urban sub-centers.

2) Stations within intermediate area

The following stations, located within the "intermediate area" (inside the Outer Ring Road but outside the Inner Ring Road), currently serve or will serve as junction for urban centers/sub-centers or industrial districts because of their advantageous location and the existing road network in the areas. Most, but not all of these stations, have been classified as type 2 strategic stations.

- Duren Kalibata offers the possibility of access to the concentrations of commercial activities along the Inner Ring Road, North-South Ring, Jl. O. Iskandardinata and other major streets. Currently the area around Duren Kalibata Station is principally residential, but activity there is likely to increase.

- Pasar Minggu is a local commercial area in which business activity will be promoted in the future. At present, this station serve as a main junction connecting the Inner Ring area, Blok M and other area in the southern Jakarta with the Central Line Corridor (e.g., Depok and Bogor). However, Duren Kalibata may replace the Pasar Minggu's role in the future. The road running parallel to Pasar Minggu Station will be widened but it will probably still remain congested. The local road network has not yet developed, and there is no access for areas to the east that are located across a river.

- The hinterland of Klender Station includes populated residential area, part of the Purogadung Industrial Development and developing housing areas. The station offers access to other urban centers via the Loop Line. Arterial roads crossing the area have developed but the local road network is only partially developed.

- The area around Palmerah Station includes Senayan Sport Center; the station's hinterland includes the ribon-developed business districts along Jl. Jend. Sudirman and the Inner Ring Road and so on.

- Kebayoran Station is located near a busy local commercial center, Kebayoran Lama, which will be developed further in the future. The station's hinterland includes the large-scale public facilities and commercial/business districts of Kebayoran Baru. A long flyover that will pass over the station will be constructed in the current five-year road development plan; this project and the new north-south road will make Kebayoran Station an important junction in south-west Jakarta.

3) Stations within suburban area 1

Depok Baru and Bekasi stations are located within 25 km of Monas and within 20 km of stations that permit transfer to the Loop Line (e.g., Manggarai, Jatinegara). Depoku Baru and Bekasi were classified as Type 4 strategic stations (ie. Main Commuter Station).

- Various housing developments (e.g., that of PERMNAS) are located at the east and west of Depok Baru Station. The current regional development strategy, which designates the Kabupatan Bogor as an area where development is controlled, names Depok and other certain areas (e.g., Cibinong) as "action areas". The structure plan for Depok designates the vicinity of the station as commercial/service areas. The road network will be improved, but a problem remains in connecting the residential areas to the east with the station because of a lake.

- The hinterland of Bekasi Station includes completed, on-going and committed housing developments. The area to the south is part of

Tollway Corridor. The Structure plan for Bekasi designates the area near the station as a local governmental district.

4) Station within suburban area 2

Kebon Pedes was the only station selected as urgently requiring improvements in Suburban Area 2, i.e., in areas more than 30 km from the Jakarta's city center. Located in the periphery of Bogor City, it can serve the city as a junction because of a new bus terminal. With the distance to Jakarta approximately 50 km, the railway will serve as a major mode of transportation for this trip.

4-3-2 Existing Conditions and Improvement Strategies

(1) Jakarta Kota

Existing Conditions/Problems

There is a bus stop on Jl. Pos Kota about 60 meters away from Kota Station, but smaller buses and bajaj stop just in front of the station, with a consequent impact on traffic. Since the Jl. Jambatan Baru side of the station is occupied by venders, pedestrians have to walk between the venders and the heavy traffic on the street. The station is used by both long-distance and commuter passengers. Currently this station serves all JABOTABEK railway lines, but after the completion of the Option "b" plan, trains on the Western and Eastern Lines will be diverted through New Kampung Bandan Station.

Improvement Guidelines

- Improvements in the safety of those walking between bus stops and the station building are necessary.

- Improvements in passenger information services and ticket sales are also important.

(2) Sawah Besar

Existing Conditions/Problems

Sawah Besar Station is located off Jl. Saman Hudi and the railway passengers reach the platform by first walking along the railway track, which they enter from this street. A project to elevate the Central Line track is under way and the Sawah Besar station building will be rebuilt above ground. Passenger safety would still be insufficient in the station area as long as no arrangement exists for bus passengers to transfer safely to rail.

Improvement Guidelines

- Improvements in passenger safety should be made by providing bus bays and a pedestrian bridge connecting the station building and the bus loading/unloading points.

(3) Gambir

Existing Conditions/Problems

The Jl. Medan Merdeka Timur side of Gambir Station has a small plaza in front but only taxis and private cars can enter. The bus users descend from the buses and walk to the station through the station plaza which, at peak hours, is very busy with taxis and private cars. No pedestrian footpath exists. The Monas side of the station building has a relatively large bus terminal used by Damri for the airport shuttle service. Currently, for political reasons, no other buses are allowed to enter, which makes the transfer from bus to train inconvenient. The project to elevate the track of the Central Line is under way and the Gambir station building will be rebuilt above ground, but passenger safety would still be insufficient in the station area.

Improvement Guidelines

- Passenger safety facilities should be improved and bus bays

should be constructed along Jl. Medan Merdeka Timur. Reconstruction of the station plaza is proposed in Option "a".

(4) Cikini

Existing Conditions/Problems

A relatively large number of passengers use this station, but the platform is too narrow to accommodate them. Bus users on Jl. Pegangsan Timur have easy access to the station, whereas passenger access from Jl. Diponegoro have to cross through heavy traffic to get to the station. Many passengers reach the station by first walking along the railway track, which they enter from Jl. Diponegoro. The Cikini station building will also be rebuilt above ground as part of the project to elevate the Central Line track. However, passenger safety would still be insufficient in the station area.

Improvement Guidelines

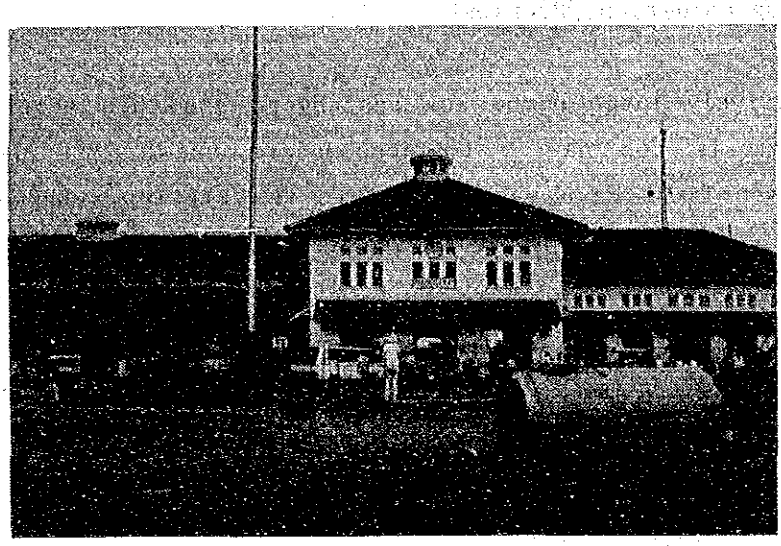
- Passenger safety facilities should be improved and bus bays constructed along Jl. Pegangsan Timur and Jl. Diponegoro.

(5) Manggarai

Existing Conditions/Problems

The front of Manggarai Station directly faces Jl. Stasiun Manggarai which, at present, has a relatively low traffic volume. Medium-sized buses are operated along the street and stop just in front the station, as do taxis. However, the loading and unloading of passengers on this street will cause traffic congestion in the near future. There is no access road to the back side of the station. Many train passengers walk along the railway track to get to the main street. Constant congestion exists on Jl. Sultan Agung at the narrow underpass, thereby obstructing the smooth operation of buses at this point. There is no sidewalk or crosswalk in front of

the station. The platforms in Manggarai Station are too narrow, and the lower-level platform obstructs the loading/unloading of train passengers during peak hours. The Western Line and Central Line cross at this station, but these lines would be grade separated if Option "b" is implemented.



Improvement Guidelines

- Jl. Sultan Agung should be widened to alleviate the existing bottleneck.

- Manggarai Bus Terminal should be integrated with a planned station- plaza expansion project.

(6) Duren Kalibata

Existing Conditions/Problems

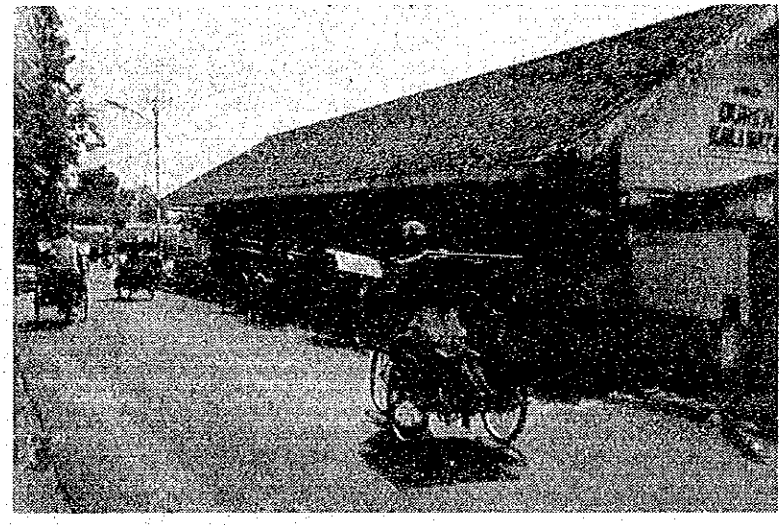
Only one bus route passes in front of the Duren Kalibata Station. Since the other buses do not come close to the station, some passengers use becak to/from Jl. Raya Kalibata, which is located 50 m from the station. Different types of buses are operated along Jl. Raya Kalibata, but most passengers have to walk at least 50 m to reach Duren Kalibata Station. There is no sidewalk along the access road to the station, and there is no road from the back side of the sta-

tion. Therefore, many train passengers walk along the railway track to reach the main street. Option "a" includes the construction of a new station building, but the capacity of the planned building is insufficient to accomodate the expected future demand. Bus bays are required for the safety of passengers and the smooth flow of traffic.

Improvement Guidelines

- Passenger safety facilities should be improved and bus bays should be constructed along Jl. Raya Kalibata.

- The proposed construction of a ticket box for passengers entering the station building from the back should proceed.

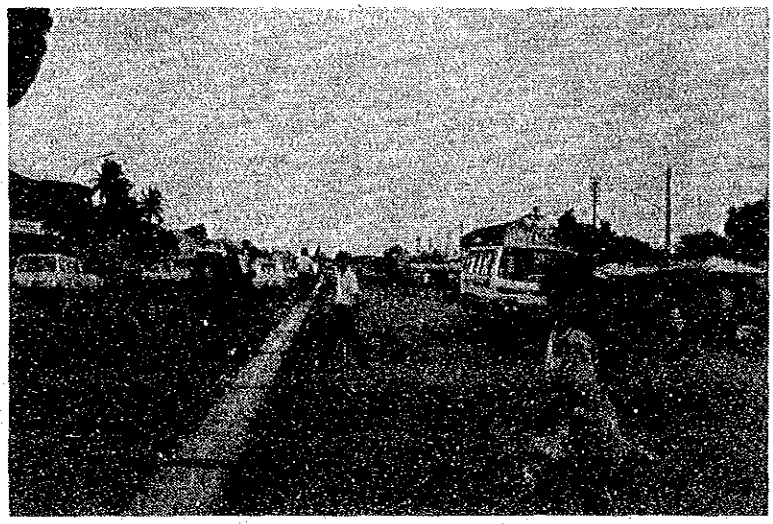


(7) Pasar Minggu

Existing Conditions/Problems

Venders occupy the space in front of Pasar Minggu Station and buses load/unload passengers close to these venders, thereby creating conflicts between shoppers and the transit passengers. Buses slow down near the station, resulting in congestion that affects the main traffic on Jl. Pasar Minggu. Mikrolets (minibuses) wait for

passengers at the exit of the new bus terminal, opposite the station, and therefore other buses cannot exit the terminal easily. Many bus passengers are endangered when crossing Jl. Raya Pasar Minggu. The entrance to the new bus terminal is crowded with street venders. Many train passengers have to walk along the rail tracks because there is no access road to the back of the station. Passenger service facilities such as ticket counters and concourses are not large enough to meet the demand. A private-sector project will construct a pedestrian bridge connecting the new bus terminal and Pasar Minggu Station. This pedestrian bridge, however, will not provide the maximum possible benefit unless it is implemented in coordination with the new station building included in Option "a". Ground-level station buildings would be constructed at both ends of the platforms, which would hinder direct access to the railway platform from the bus terminal.



Improvement Guidelines

- The Option "a" plan should be modified to include the construction of a station building over the track to directly connect the planned pedestrian bridge between the bus terminal and the station building.

- Bus bays should be constructed along Jl. Pasar Minggu and the planned new road in back of the station.

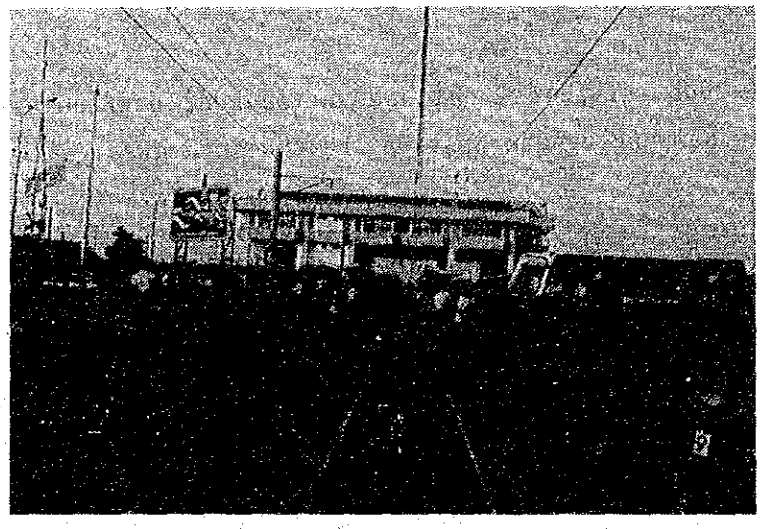
(8) Depok Baru

Existing Conditions/Problems

There are large areas of PJKA land around Depok Baru Station but few buses use this area because the operators (mostly private) do not seem to want to divert. Most of the buses load/unload passengers on Jl. Comodo near the railway crossing. The area in front of the station is occupied with venders and standing becaks. The over-track structure of Depok Baru Station is not functioning properly to serve passengers. The passengers still have to cross the rail tracks to change platforms and the area for crossing is too narrow. Also, the medium-height platforms are too low for passengers to get on and off the trains. A new bus terminal is to be constructed near the planned station plaza, but there is not yet a concrete plan to integrate the terminal and the plaza.

Improvement Guidelines

- The plan for the development of a station plaza should be integrated with the bus terminal.
- Some of the buses using the new bus terminal should be directed to the planned station plaza to load/unload railway passengers.
- The pedestrian environment inside and outside the station building should be improved.



(9) Kebon Pedes

Existing Conditions/Problems

A new inter-city bus terminal is to be constructed near the planned Kebon Pedes Station. Much of the terminal activity currently at Bogor Station will be transferred to Kebon Pedes. Although a new railway station and a new bus terminal will be constructed side by side, no action has been taken to coordinate the two facilities to increase the convenience of bus/rail users.

Improvement Guidelines

- The planned bus terminal and station facilities should be coordinated both in terms of design and operation.

(10) New Kampung Bandan

Existing Conditions/Problems

New station is planned in Option "a" to merge the East and West Lines. In addition, a part of the function currently performed by Kota Station will be transferred to this station. The planned station site is away from the main streets (e.g., Jl. Mangga Dua) and difficult to approach. Therefore, construct the new station should improve the approach road as well.

Improvement Guidelines

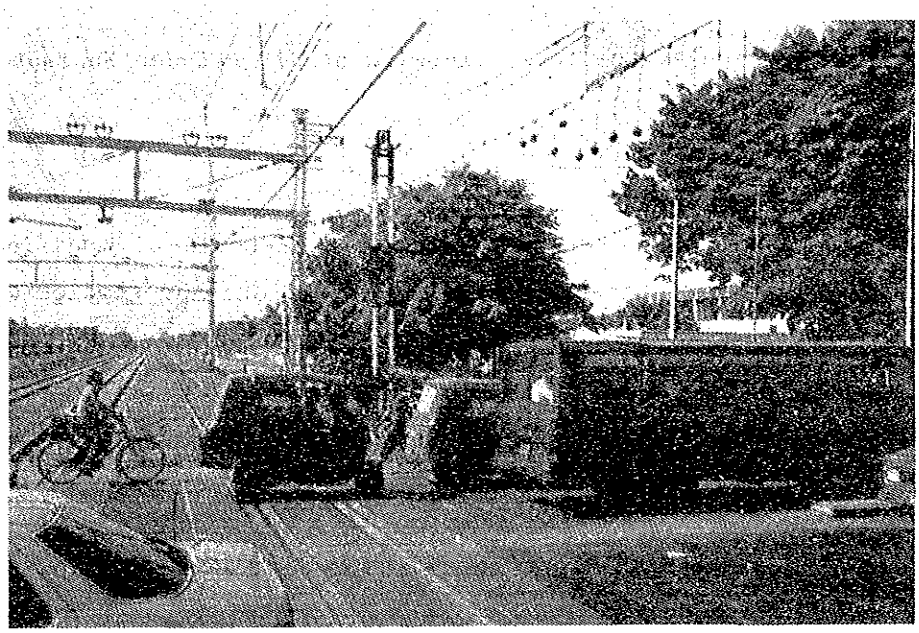
- New bus services should be introduced, particularly between the new Kampung Bandan Station and the Kota area.

(11) Kemayoran

Existing Conditions/Problems

The space in front of Kemayoran Station is not effectively used as an interchange facility. A few private cars and taxis use the area

but no buses enter. Passenger access to the Jl. Garuda side is along the railway track. Therefore, a better approach road is required. Some passengers walk from bus stops on Jl. Bungur Besar Raya (40 m away) and Jl. Gunung Sahari (90 m away). Since Kemayoran Station is situated in an environment that has the potential to develop as a quiet residential area, it is expected that most passengers will arrive at the station on foot. A new station building will be considered as part of a grade separation project near Jl. Angkasa, which is 200 m towards Kota.



Improvement Guidelines

- The design of a new station should account for the Kemayoran redevelopment project, and an appropriate feeder service such as a "zone bus system" should be provided for this area.

(12) Pasar Senen

Existing Conditions/Problems

The space in front of Pasar Senen Station is not well designed for bus passengers who want to use trains. These passengers have to cross Jl. Stasiun Senen. Large buses (Bis Kota) run along Jl.

Gunung Sahari, which is about 500 m from the station entrance, a rather long distance for many transferring passengers. Also, there is no easy access to the station from the back. Senen Bus Terminal is located near the station, but buses using this terminal do not enter the area in front of the station due to a lack of coordination. The station plaza is currently used for car parking; only a limited number of vehicles come into this area. Passengers have to stand in a queue in a narrow waiting room to buy tickets (mostly for long-distance trains). The station yard and platform would be relocated 190 m toward Kota in Option "b" to ease traffic congestion at the level crossing at Jl. Let Jen Suprapto.

Improvement Guidelines

- Some of the existing bus routes should be modified to make the transfer between the bus terminal and the station easier.

- Traffic safety facilities should be provided, and a pedestrian mall connecting the station plaza with the triangle development area should be constructed.

- The station plaza should be consolidated. The station yard and platform would be relocated in Option "a". However, after the completion of the grade separation project under consideration, the station could then be reconstructed at the original location.

(13) Angke

Existing Conditions/Problems

The approach road to Angke Station (on Jl. Stasiun Angke) is filled with rotten vegetables and fruit. Fruit wholesalers and venders occupy the narrow street and entry by vehicle is nearly impossible. There are one or two bus routes on Jl. Tubagus Angke, which is 60 m away from the station entrance. Many passengers enter the railway track and ultimately the station from this street since this is less unpleasant than walking down the access street. A station plaza of 320 sq. m. exists but is not paved. Venders occupy this area, and only pedestrians can enter. The station building is showing signs of deterioration.

Improvement Guidelines

- Bus bays should be provided along Jl. Tubagus Angke.

- The venders should be removed from the station plaza area and along Jl. Stasiun Angke.

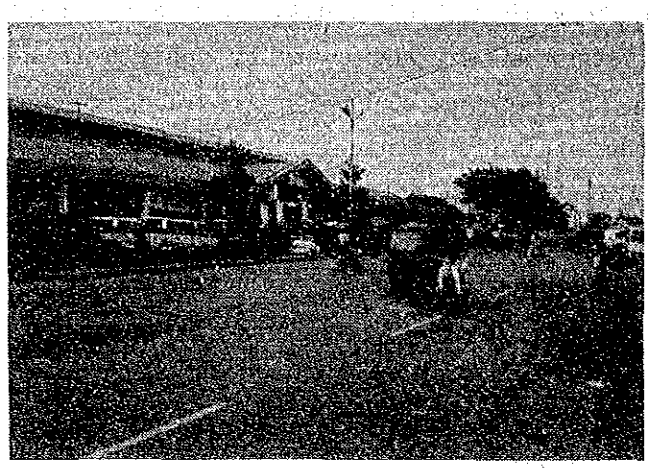
- A passenger bridge for railway passengers should be constructed and the track layout should be rearranged.

(14) Tanah Abang

Existing Conditions/Problems

The station faces Jl. Jati Baru, on which a number of buses run. During the morning peak, the buses bunch together as they unload and load passengers, thereby aggravating the congestion problem in the area. The small station plaza is currently used for parking by railway staff. Improvement of access to the station through the back is difficult because there is a waterway, and the bridge across it is 80 m away from the station. Rearrangement of the track-layout and

construction of new platforms is planned in option "b", but the present station building is too small to accomodate the expected increase in passengers.



Improvement Guidelines

- Bus bays should be constructed on Jl. Jati Baru to alleviate traffic congestion and to improve pedestrian safety.

- A station should be constructed over the track along with overpasses connecting Jl. Jati Baru and the back side of the station.

(15) Dukuh

Existing Conditions/Problems

There is no convenient path for reaching Dukuh Station from Jl. Sudirman, where a high level of bus service is available. There is no bus service available on Jl. Kendal Pasar, which runs along the station. A relatively new station built over the tracks would not be very convenient for passengers who have to climb up the stairs to purchase tickets.

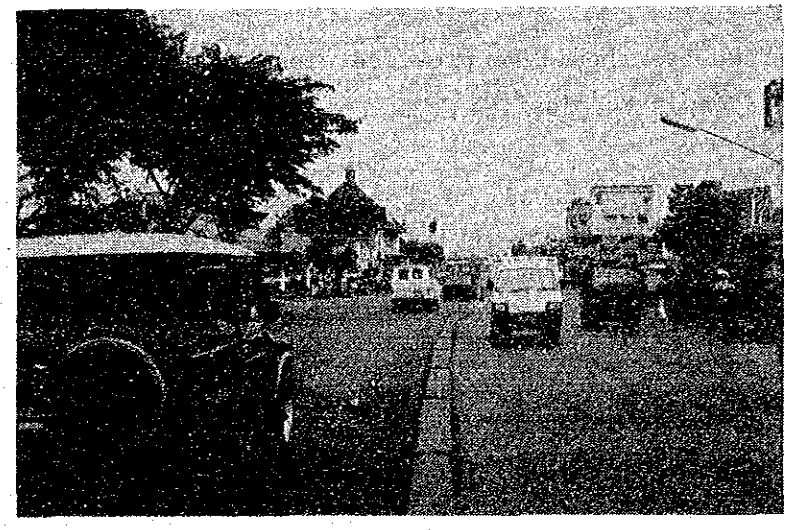
Improvement Guidelines

Hanging pedestrian decks should be constructed along Jl. Sudirman to provide direct transfers between bus and rail. Improvement of passenger information services and ticket sales counters is also required.

(16) Jatinegara

Existing Conditions/Problems

Many bus passengers must make a hazardous crossing of Jl. Bekasi Barat Raya. Traffic lights have been installed but they flash only, which is insufficient for controlling the heavy traffic on this road. People living in back (north) of the station have to detour a long way to reach the main entrance. Venders occupy the sidewalk, forcing pedestrians to walk in the street. There is not enough space for train passengers to transfer to taxis and buses. Currently, the narrow sidewalk outside the station serves as the interchange point. The station concourse is too narrow, and the platform level is too low for efficient loading/unloading.



Improvement Guidelines

- Bus bays should be constructed on Jl. Bekasi Barat to improve passenger safety and the flow of traffic.

- A station should be constructed over the track along with bridges connecting platforms. Preferably, these bridges would themselves be connected to maximize passenger convenience.

- A station plaza should be constructed in back of the station, and small bus routes established to provide feeder services.

(17) Klender

Existing Conditions/Problems

Klender Station is just off Jl. Bekasi Timur Raya and Jl. Pahlawan Revolusi, and has conditions similar to those found at the other small stations. Many passengers reach the station via the street along the railway tracks. Bus access is relatively easy but passenger safety is jeopardized. The railway line and station building are isolated by parallel roads.

- Bus bays should be provided along Jl. Bekasi Timur Raya and Jl. Pahcawan Revolusi.

- A station should be constructed over the track along with overpasses connecting the roads running in front and back of the station.

(18) Bekasi

Existing Conditions/Problems

Bekasi Station is located off Jl. Ir. H. Juanda, on which various types of buses are operated. Currently, buses and taxis load/unload passengers on Jl. Ir. H. Juanda. The space in front of Bekasi Station is divided into two areas. Facing the station, the left side

is designated as a car park but is occupied by venders; the right side is not used by buses but a fence prevents vehicular and pedestrian access. A station building and parking area would be constructed in Option "a" on the opposite side of Jl. Ir. H. Juanda. Coordination among related agencies is required to improve the safety of passengers crossing this street.

Improvement Guidelines

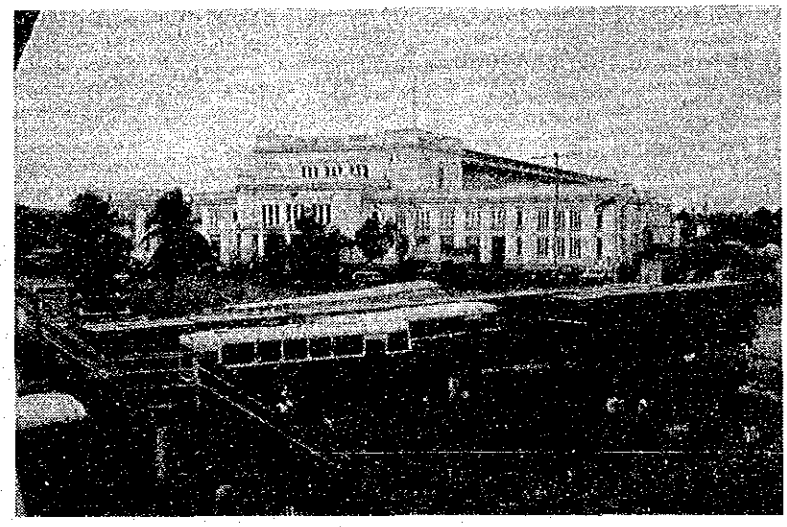
- The Option "a" plan for a new station building and station plaza to promote efficient transfers should be reviewed.

- The rail authorities should encourage the bus operators to modify their routes to bring buses into the station plaza and thereby facilitate intermodal transfers.

(19) Tanjung Priok

Existing Conditions/Problems

The Tanjung Priok city bus terminal is located outside the station building, just across Jl. Enggano, but bus users cannot use trains due to a suspension of passenger train services at this station. The station building is closed, although trespassers enter through side entrances. The pedestrian environment is very poor, similar to all other JABOTABEK railway stations studied.



Improvement Guidelines

- A pedestrian bridge should be constructed to connect the bus terminal with the station plaza.

- Passenger train services should be resumed; passenger information services and ticket sales counters should be provided.

(20) Palmerah

Existing Conditions/Problems

The front of Palmerah Station is occupied by squatters. Since buses on Jl. Palmerah Utara pass about 30 m away from the station entrance, direct access is only possible on foot. In back of the station, minibuses run on a new road and some passengers reach the station through a fence.

Improvement Guidelines

- Bus bays should be provided along a new road.

- The passenger access road from Jl. Palmerah Utara to the station building and movement within the station building should be improved.

- A ticket sales box should be provided on the side of the station facing the new road.

(21) Kebayoran

Existing Conditions/Problems

The access road (Jl. Pasar) is too narrow for vehicular traffic, and it is dirty. The station entrance is about 150 m away from the main bus route on Jl. Kebayoran Baru. The platform and the station yard are

being renovated by another project, but double tracking construction is not scheduled. A new road parallel to the railway line is under construction.

Improvement Guidelines

- Bus bays should be provided along the new road. The passenger access path from Jl. Kebayoran Baru to the station building should be improved and movement within the station should be facilitated.

- A ticket sales box should be provided on the side of the station facing the new road under construction.

4-4 Improvement Plans for Representative Stations

4-4-1 Classification of Representative Stations

(1) Selection of stations

Stations for subsequent feasibility studies were selected from among those urgently requiring improvement. Project viability was confirmed and an implementation program proposed.

(2) Classification of transfer patterns

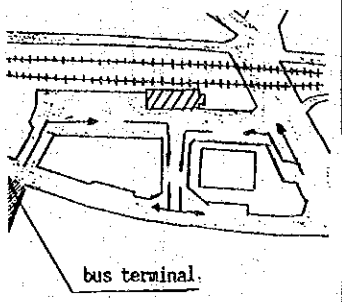
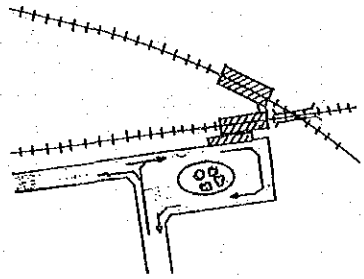
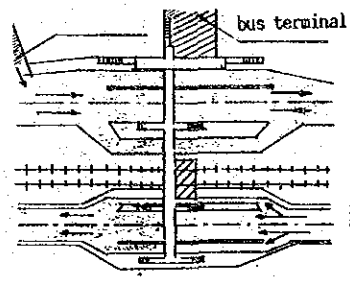
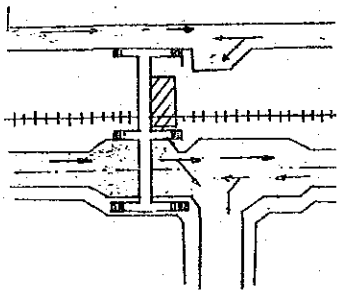
Four typical patterns of transfer between bus and rail were identified, as shown in Fig. 4.4.1.1. The 21 stations urgently requiring improvement were classified into one of the four patterns shown in the figure.

(3) Selection of stations for detailed study

Three stations were selected for detailed study. One criterion for selection was that the stations represent different types of transfer patterns, based on the typology set forth in Fig. 4.4.1.1. Another criterion was that the stations represent different patterns

of passenger demand. In the figure, the candidate stations were assigned priorities based on actual (1985) and projected (1992) passenger volumes, with Group I the highest and Group IV the lowest.

Table 4.4.1.1 and Fig. 4.4.1.2 summarize the selection process. The stations chosen for detailed feasibility studies were Pasar Senen, a Group I station with a Type A transfer pattern; Kemayoran, a Group IV station with a Type C transfer pattern; and Jatinegara, a Group II station with a Type D transfer pattern.

Typology of Traffic Interchange	Connection with Bus Terminal	Connection with Bus Route
Provision of Station Front Plaza	Type A 	Type C 
Insufficient Space for Station Front Plaza	Type B 	Type D 

Type A	Type B	Type C	Type D
- Pasar Senen	- Pasar Minggu	- Bekasi	- Jakarta Kota
- Manggarai	- Tanjung Priok	- Kemayoran	- Gambir
- Depok Baru		- New Kampung Bandan	- Jatinegara
- Kebon Pedes			- Klender
			- Cikini
			- Duren Kalibata
			- Sawah Besar
			- Tanah Abang
			- Angke
			- Dukuh
			- Palmerah
			- Kebayoran

Fig. 4.4.1.1 Classification of Transfer Patterns

Table 4.4.1.1 Selection of Stations for Detailed Study

Transfer Type	Name of Station	Traffic Class	Development Program	Selection
A	Pasar Senen	Group I	- Relocation of track and platform is included in Option "b" to reduce traffic congestion on Jl. Kramat Bundar.	o
A	Manggarai	Group III	- Rail-rail grade separation included in Option "b".	-
A	Depok Baru	Group IV	- Construction of a station plaza and modification of track layout is part of Option "a".	-
A	Kebon Pedes	Group IV	- A study of the location of the proposed station is required, taking the new bus terminal into consideration.	-
B	Pasar Minggu	Group II	- Option "a" includes a new ground-level station building and modification of the track layout.	-
B	Tanjung Priok	Group IV	- Passenger service will be improved, for example, by provision of an improved ticket sales system and passenger information.	-
C	Bekasi	Group IV	- Option "a" includes a new station building and modification of the track layout.	-
C	Kemayoran	Group IV	- Completion of a new station building.	o
C	New kampung	Group IV	- A new station and station plaza is included in Option "a".	-
D	Jakarta Kota	Group I	- The ticket sales and passenger information system will be improved.	
D	Gambir	Group I	- The track will be elevated as part of Option "a".	-
D	Jatinegara	Group II	- Option "b" includes modification of the track layout and platforms.	o
D	Klender	Group II	- Option "a" includes a ground-level station building and construction of a new platform.	-
D	Cikini	Group III	- Track elevation is included in Option "a".	-
D	Duren Klibata	Group III	- Option "a" includes a new station building and track layout.	-
D	Tanah Abang	Group IV	- Adjustment of the track layout and construction of new platforms is included in Option "b".	-
D	Sawah Besar	Group IV	- Track elevation is underway as part of Option "a".	
D	Kebayoran	Group IV	- Track layout and platform improvements are part of Option "a".	
D	Angke	Group IV	- The station building and track layout will be upgraded.	
D	Dukuh	Group IV	- Passenger service facilities will be improved.	-
D	Palmerah	Group IV	- Option "a" includes improvement of the track layout and platforms.	

Note: o denotes selection

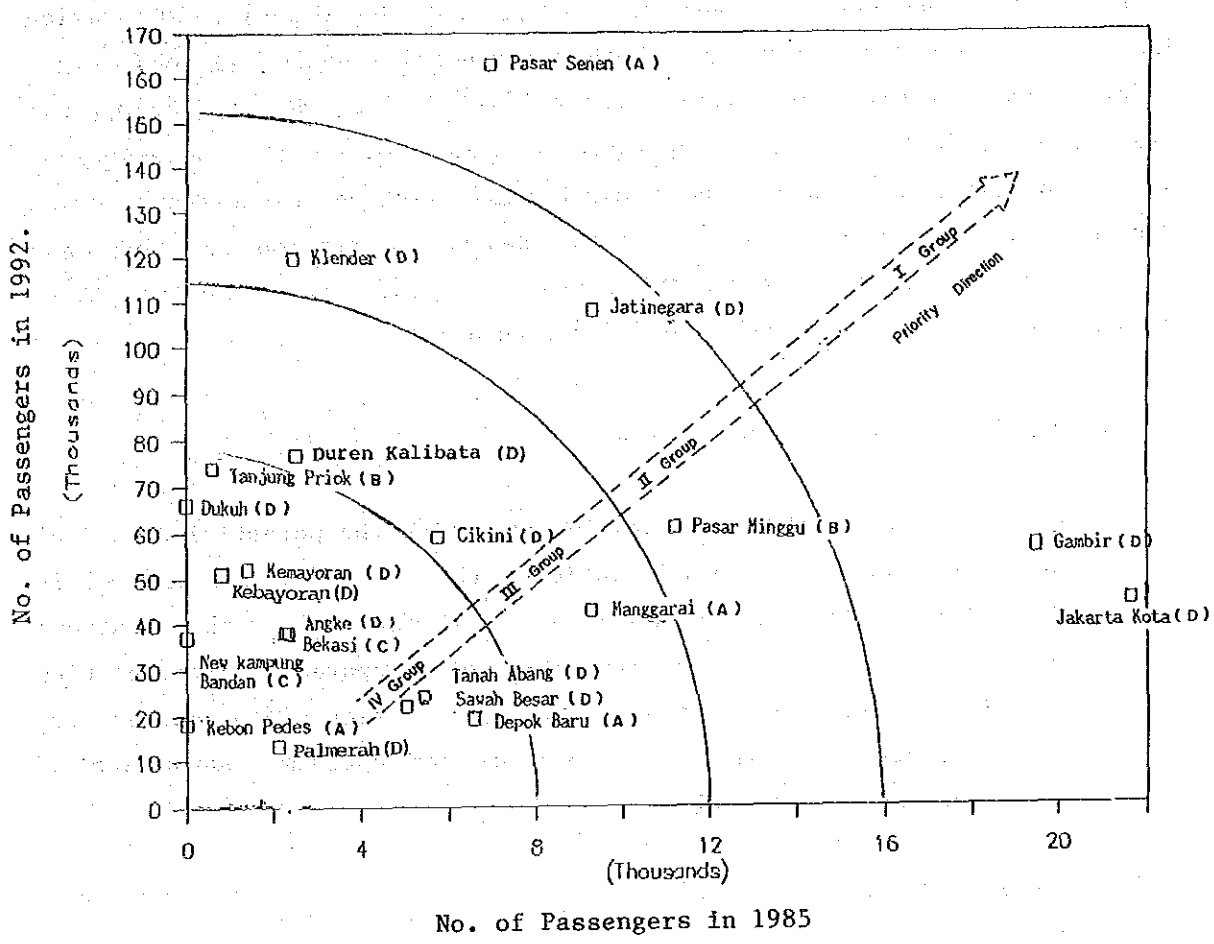


Fig. 4.4.1.2 Priority Setting for Selection of Stations for detailed Study

4-4-2 Design Framework

Although the concepts of level of service and the capacity of station facilities are not as critical as other engineering design factors (e.g., safety), basic figures are required to calculate, for example, the optimal area of a station plaza or the approximate number of bus bays necessary to handle the expected number of passengers. This section summarizes the time horizon and the framework used for the design of station buildings and station plazas and their component parts (e.g., bus bays) for the three "representative stations" selected in section 4-4-1.

(1) Target year and potential demand

A target year of 1995 was used in estimating the potential demand of passengers using the study stations; the figures are presented in Table 4.4.2.1 together with the potential demand for other stations in the JABOTABEK area. The estimates were prepared by interpolating demand forecasts developed during the preparation of the master plan of the region. Ry2-BC01 was used as the optimum combination of transport investment options.

(2) Model shares of access trips

Four types of access modes were considered to account for present and future modal shares, as shown in Table 4.4.2.1.

Changes in modal shares were calculated by assuming present and future proportions of trip ends originating/terminating within a predetermined radius of zone bands. At the same time, a shorter access time for walk trips and a longer journey for trips on mechanized modes was assumed.

Table 4.4.2.1 Present and Future Modal Shares Used in the Assessment of Time Savings from Improvements

Station	Bus	Walk	Taxi	Private	Total
PRESENT MODAL SHARES[1]					
Pasar Senen	46.9%	16.8%	30.4%	5.9%	100.0%
Jatinegara	50.4%	17.6%	25.6%	6.4%	100.0%
Kemayoran	26.5%	64.4%	8.2%	0.9%	100.0%
ASSUMED CHANGE IN MODAL SHARE[2]					
Pasar Senen	2.9%	-4.2%	1.1%	0.1%	0%
Jatinegara	-2.9%	4.4%	-1.2%	-0.3%	0%
Kemayoran	11.1%	-16.6%	4.5%	1.1%	0%
FUTURE MODAL SHARES					
Pasar Senen	49.8%	12.6%	31.5%	6.1%	100.0%
Jatinegara	47.5%	22.0%	24.4%	6.1%	100.0%
Kemayoran	37.6%	47.8%	12.7%	2.0%	100.0%

1) Originally adopted from ARSDS, 1985
2) Assumed in this study.

(3) Peak hour concentration rate

Most trains in the JABOTABEK area are planned to carry only 10% of the daily traffic during the peak-hour. Also, field counts conducted by the study team indicated peak-hour concentration rates on major streets of only 6 to 7%. However, a conservative approach was adopted in the design framework, with a concentration rate of 20% used to account for the increasing density of urban activities around railway stations in the future.

4-4-3 Development Trends and Planned Future Directions

(1) Pasar Senen

The hinterland of Pasar Senen Station is completely built-up. A part of the city center, including Senen and Gambir, is located to the west; populated areas are located to the east. The station is

situated within the main sphere of influence of the Senen commercial district.

1) Development trends

Since the 1960's, the government has promoted the large-scale commercial redevelopment of Pasar Senen. A public facilities complex and a large-scale commercial complex in front of the station have already been completed.

In addition, the Senen Triangle Business District Redevelopment is under construction. It will include 165 shops and housing on 2.5 hectares, a 1.5-hectare shopping center, and a 258-room hotel (including an underground car park) on 1.0 hectares. An additional 1.5 hectares has been allocated to expand the Senen Flyover. The work is scheduled for completion by mid-1992. The northern block (4.5 hectares) has also been planned for redevelopment purposes. Although large-scale parking facilities are included in the Senen Triangle project, many of those who work or visit the development would likely consider using the railway. Therefore, it is recommended that pedestrian improvements be made around the station to promote railway use.

2) Planned future development directions

The DKI District Plan (RBWK) regulates land use, plot ratios, floor area ratios, and building height at the block level. However, the future development directions called for by the plan are generally consistent with current development trends and land use paterns. For example, the area to the east of the station is planned principally for housing and mixed uses.

Considering the railway and feeder service improvements, the District Plan surrounding the station should be reviewed. Medium- to long-range planning issues are likely to include the following:

- The block fronting the station (including the public facilities complex) may provide a long-range alternative to developing a station plaza; this concept was proposed by the ARSDS.

- The northern block, which includes a bus terminal, may provide a suitable site for commercial redevelopment.

- It may be worthwhile to study alternatives for providing a "transporation square" in coordination with a redevelopment project; for example, incentives such as bonus floors or subsidies could be provided.

- Commercial activity may increase in the back of the station, especially if the connection with the Kemayoran Complex Redevelopment is strengthened by improvements to Jl. Tanah Tinggi Barat.

(2) Kemayoran (New Location)

The site proposed for a new Kemayoran Station is on Jl. Angkasa; the neighborhoods includes the Kemayoran Complex Development area and the Pasar Baru commercial center.

1) Development trends

The redevelopment of the former Kemayoran Airport site is the most important factor to be considered. The Kemayoran redevelopment project will include three principal elements: the Jakarta International Trade Fair (JITF) and related business complexes on 44 hectares, several housing complexes including a Perumnas development, and a forest park. The land use plan for the site has already been prepared (Aug. 1989). The project is under the control of the central government, which has acted in coordination with DKI's city planning division (Tata Kota DKI) and DKI's public works division (DPU DKI).

Car is expected to be the main access mode for the northern half of the project, which includes the trade fair and some high-rise housing blocks for upper- and middle-income households. An east-west central road, to connect with Kota-Glodok or eastern Jakarta, is planned as a freeway with a grade-separation at the Eastern Line crossing. The railway and other public transport modes will serve the southern half of the site, including a business district and low-income housing complex. The new Kemayoran Station will be within one km of the business area and the within 2 km of the low-income housing (as well as the trade fair).

2) Planned future development directions

According to RBWK and the Kemayoran Complex Development Special District Plan, both the front and back of the new station are planned to be housing area. The site planned for the station is available because an airplane company will soon relocate its facilities away from the area.

Commercial potentiality in the strip along Jl. Angkasa will increase in relation to Pasar Baru and the Kemayoran Complex. The DKI district plan calls for the widening of Jl. Angkasa, it should be coordinated with redeveloping the area.

(3) Jatinegara

Jatinegara Station is located at the periphery of the Jatinegara urban sub-center. The area in back of the station includes housing.

1) Development trends

The most active areas in the vicinity of Jatinegara Station are approximately 500 m away. However, a shopping center has been developed in front of the station. In addition, an interchange that will connect the North-South Ring Road with the frontage street of the station (Jl. Bekasi Barat Jaya), is under construction.

2) Planned futuer development directions

RBWK has directed that the area in front of Jatinegara Station should be developed as a commercial area; and the area in back of the station would be housing. A new road parallel to the station is planned; it will connect with the station's frontage road at a point east of the station. PD. Sarinah Jaya, a DKI-owned company, has a proposal to redevelop an area in front of the station. As stated earlier, the possibility of providing the private sector with incentives to construct such a project should be studied.

4-4-4 Improvement Plans

(1) Pasar Senen Station (Fig. 4.4.4.2)

1) Feeder facilities

a) Crossing facilities

- For the convenience and safety of pedestrians in the station area, there will be a pedestrian crossing and a crossing signal at Jl. Kramat Bunder.

- A pedestrian mall will be built from the station building exit to Jl. Stasiun Senen, as well as a pedestrian bridge of the same width as the mall, at Jl. Stasiun Senen.

b) Pedestrian mall

- Zones will be set off on both sides of the mall to separate cars and people.

- Fences will be built in the open spaces, separating buses and bus passengers.

c) Left-turn lane

A left-turn lane will be installed for cars entering the station front plaza from Jl. Kramat Bunder so they do not get in the way of other traffic.

d) Bus bay

A bus bay will be built to make connection with the bus lines in tha back of the station more efficient.

e) Traffic signals to guide buses on their entry routes

So that entering and exiting the bus routes from Pasar Senen bus terminal to the station front plaza will be easier, a traffic signal will be installed and the traffic flow of other cars will be controlled.

2) Station facilities

a) Station building

a. Passenger-handling facilities

The aim of the first stage of the connection between the station building and the bus bay at back of the station, will be only to construct the passageway and to install ticket-vending machines, so that the work will not interfere with the future station plan.

b. Use of the current ground-level station

b) Station front plaza

a. Traffic flow plan

Aside from installing bus stops to handle the bus transportation nodules, parking space for taxis and private cars, car lanes and sidewalks will be provided in the station front plaza.

The space available for the station front plaza is 30 m by 250m area now used as a parking lot in front of the station building.

The width generally required for a station front plaza is at least 40 m so that cars have room to turn about in it. Transport route within the station front plaza is planned on the basis of such passage.

The two roads impinging on the station front plaza are Jl. Stasiun Senen and Jl. Suprapto. The problems presented by these roads and their tie-in with transportation within the station front plaza are the following: (Fig. 4.4.4.1 (1) (2)).

- route complications within the station front plaza;

- decrease in the area available for transit facilities; and

- interference of Jl. Let Jen Supraptos traffic.

For these reasons bus and taxi traffic is completely separated from that of private cars, and it is wise to avoid a situation wherein bus traffic would cross Jl. Letjen Suprapto traffic. (Fig. 4.4.4.1 (3) (4)).

Furthermore, in order to minimize crossing traffic which goes in and out the station front plaza and traffic on the road, the former will be limited to one way.

The followings are planned using Fig. 4.4.4.1.

- remove the fountain located in front of the station building, install a pedestrian crossing to connect the business district with the station building, and install separately bus stops and parking spaces for taxis and private cars with this in the center;

- install an entrance/exist for buses along Jl. Stasiun Senen, taking into consideration access to the bus terminal;

- install the entrance for taxis and private cars along Jl. Letjen Suprapto and their exit along Jl. Stasiun, making these one-way.

- To make an exit for cars leaving the station front plaza, the open space for pedestrian use located in between the swimming pool and the athletic gym will be removed and two one-way lanes installed, one for buses and one for taxis and private cars.

- On the Jl. Stasiun side, bus stops will be installed near the swimming pool located in front of the exist of the bus terminal for large and medium-sized buses.

b. Bus stops

A shelter will be installed at the bus platform, as well as lighting fixtures, benches and route maps.

c. Boarding for taxis and private cars

- The station front plaza facing Jl. Kramat Bunder will be used for the departure and arrival of taxis and private cars, and as a parking lot. Taxis and private cars will enter the staion front plaza from the Jl. Kramat Bunder side and exit along the oneway lane into Jl. Stasiun Senen as the buses do.

c) Other

Considerable care has been taken to plan the facilities so that there will be plenty of greenery and open space, so that the facilities will harmonize with the scenery and so that it will be

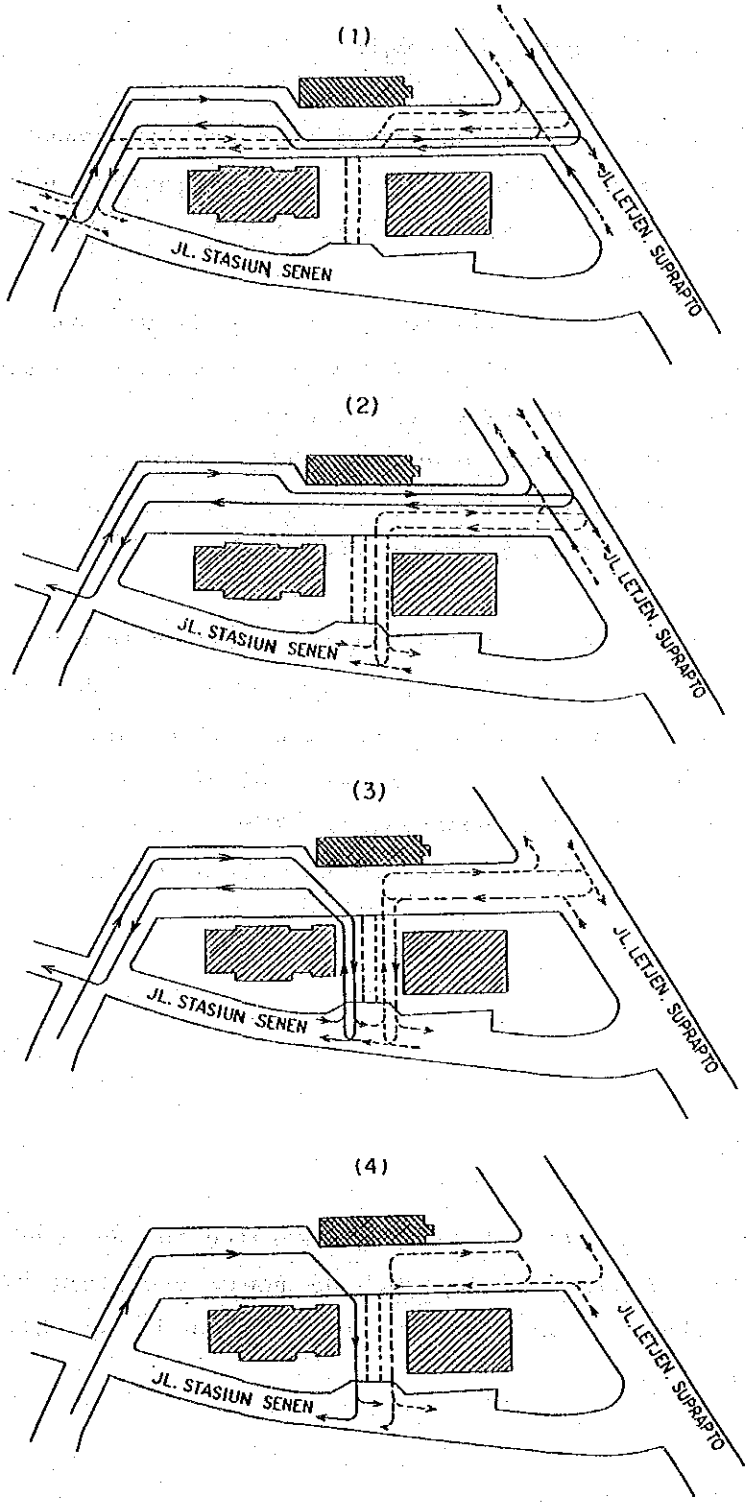


Fig. 4.4.4.1 Comparative Traffic Circulations in Pasar Senen Station Front Plaza

a place where people can relax. Lighting will be substantial, thus offering a high degree of safety from crime.

d) Second stage of construction (Fig. 4.4.4.3)

a. Plan for the pedestrian mall

A large-scale business district is growing around the station; a great concentration of business is planned in the triangular redevelopment area, and a part of this consolidation has in fact been accomplished.
It is expected, therefore, that in future the flow of people will concentrate in the corridor connecting the station with the shopping and the business districts.
As an improvement plan for the station front plaza and the feeder system, therefore, the second stage of construction will consolidate this corridor into a mall.

b. Considering estimates of future passenger turnover and developmental conditions in the area in order to estimate the station's role in east-west communications, a free passageway will be built, with the main building on the bridge running along this free passageway. Given the estimates of future passenger turnover, the station will be on the scale of 2700 m^2.

(2) Kemayoran station (Fig. 4.4.4.4)

1) Feeder facilities

a) Bus bay

- In order to conduct passenger service to the development area of former Kemayoran airport, the newly organized "Zone bus" will use the station front plaza to be built by this project as a terminal.

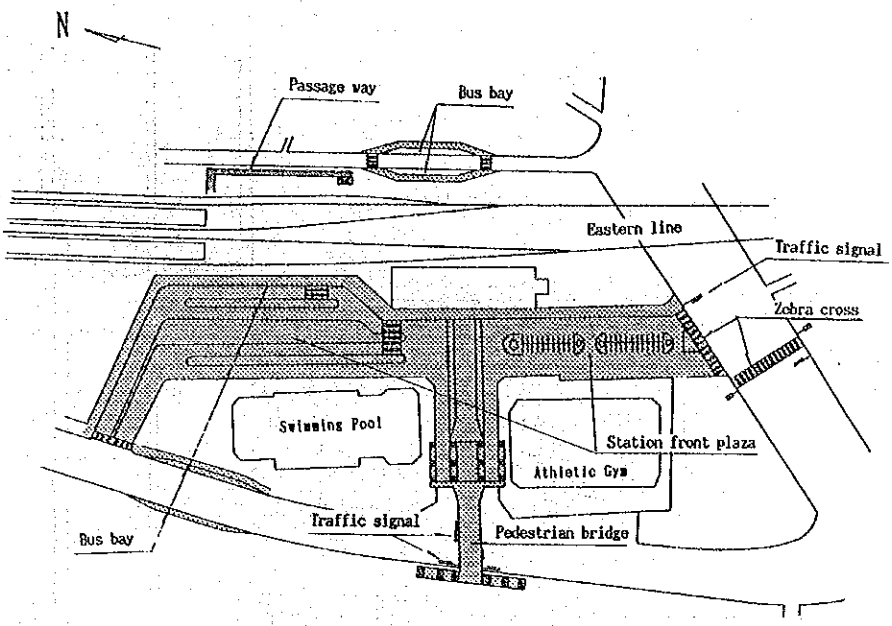


Fig. 4.4.4.2 Pasar Senen Improvement Plan

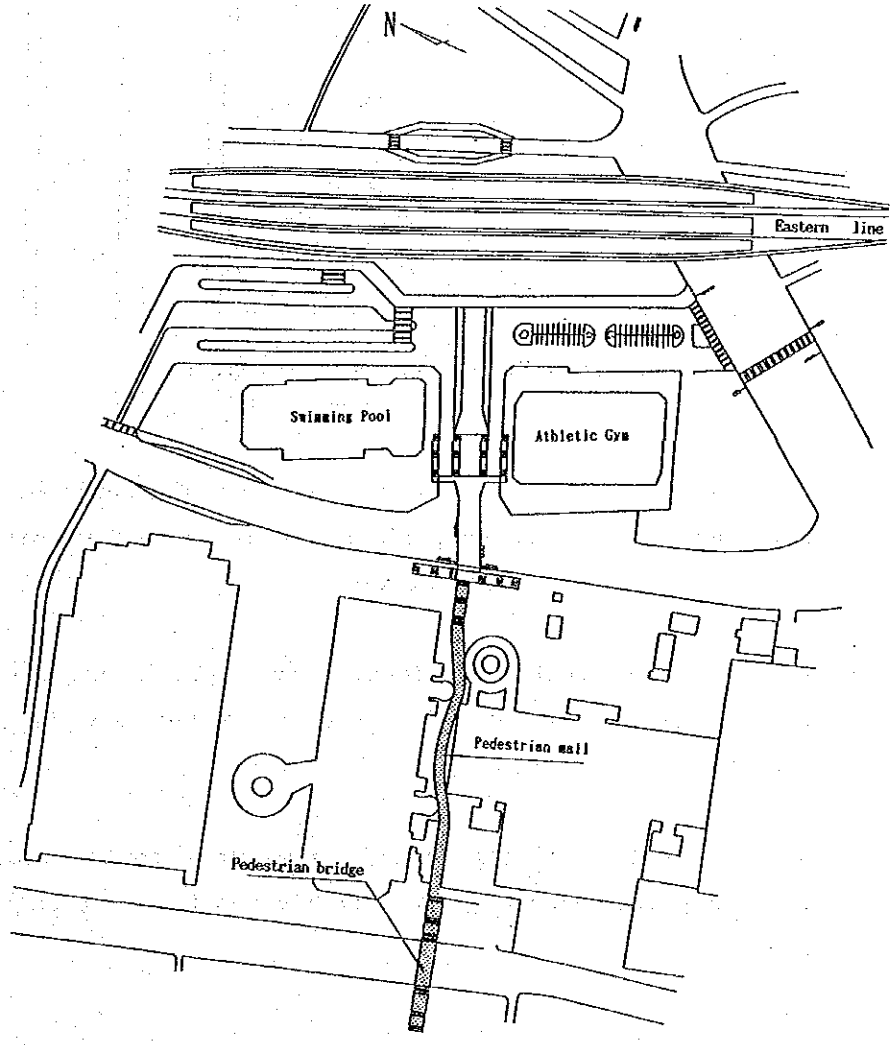


Fig. 4.4.4.3 Pasar Senen Improvement Plan (Second Stage)

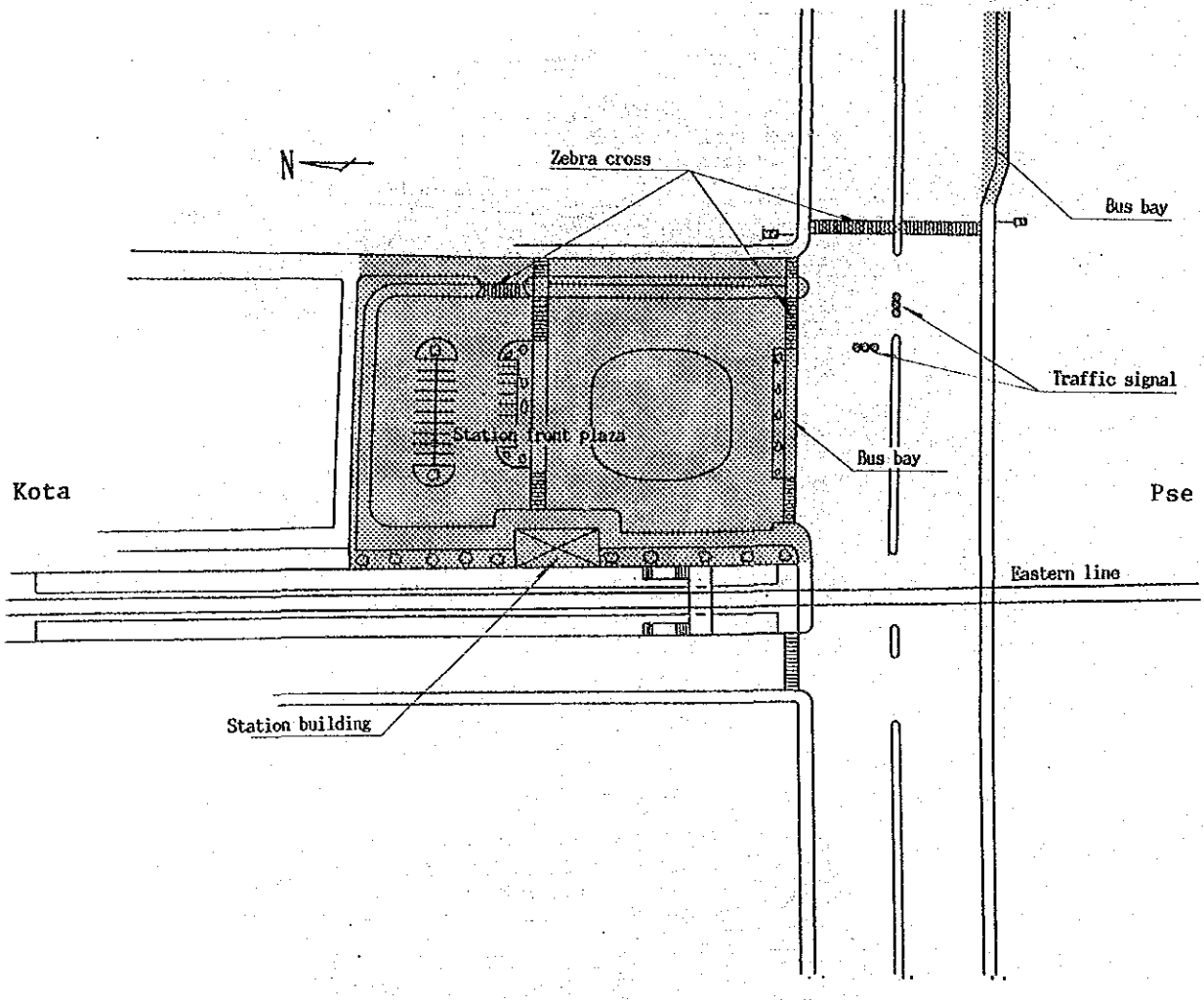


Fig. 4.4.4.4 Kemayoran Improvement Plan

- Zone bus term used in contrast to line-haul bus services providing services to specific areas or "zones" within a certain fixed distance of railway stations.

- To derive greatest efficiency from the intersection of the mainline bus route and the station, a bus bay is planned in front of the station.

- In consideration of the traffic jams that could occur when the crossing gates are down, the bus bay has been set back from them somewhat.

b) Concerning the right lane and right-lane traffic signals

The zone bus travelling to and from the redevelopment area must not enter the station front plaza against oncoming traffic. Left- and right-hand lane traffic signals will therefore be installed for safety and to prevent traffic jams.

2) Station facilities

a) Station front plaza

Bus stops and parking space for "Zone bus" which will be connected with the development area of the former KEMAYORAN airport, parking space for taxis and private cars, as well as car lanes and sidewalks will be provided in the station front plaza.

The station front plaza will be located along JL. ANGKASA which has high traffic volume. Therefore the traffic flow around the station front plaza was planned in order to minimize interference with JL. ANGKASA's traffic, as is described below.

- install an entrance/exit for "Zone bus" east of the station front plaza, away from the railroad crossing

- install a rotary space for "Zone bus" to change a bus'es direction smoothly and allow for easy entrance and exit.

- divided parking space for taxis and private cars which stop for a long time in the rotary area.

b) Station building

Because of the large-scale development plan which used the site of the ex-airport, it will move 200m towards Kota. Because passenger turnover will reach 150,000 according to the development plan, the station building will be expanded from its present 200m^2 to 500m^2.

(3) Jatinegara station (Fig. 4.4.4.5)

1) Feeder facilities

a) Bus bay

- The bus bay on the station's side of Jl. Bekasi Barat is to be established in the site of the present station after the new station building is constructed on the bridge.

- In front of Jatinegara station, where Jl. Bekasi Barat and Jl. Bekasi Barat 1 form a T, the bus bay will be located in front of Pasar. As the land intended for the bus bay now comprises a parking lot and a police box, construction will proceed after one of these is removed.

2) Station facilities

The station will be built on a bridge in order to allow for the easy passage of east-west traffic and commuter passenger turnover, and for the departure and arrival of medium- and long-distance trains.

3) Second stage of construction (Fig. 4.4.4.6)

a) Plan for construction of a pedestrian bridge

A large-scale urban development plan is under way in front of Jatinegara station. Parallel to the execution of this plan, expansion will take place for the sake of the traffic nodule in front of the station.

b) Plan for consolidation of the bus bay and the parking lot

Accompanying the coming redevelopment in the Jatinegara district is a possible shortage of traffic nodules. A parking lot for taxis and cars in general will thus be established on the public land in front of the station, with space left open for greenery.

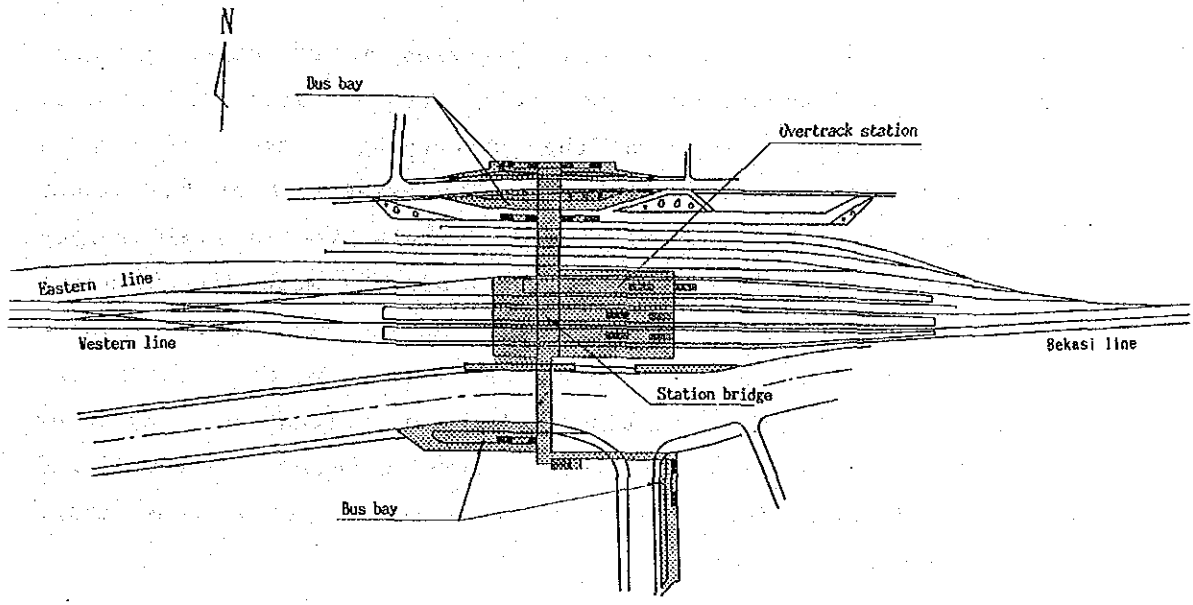


Fig. 4.4.4.5 Jatinegara Development Plan

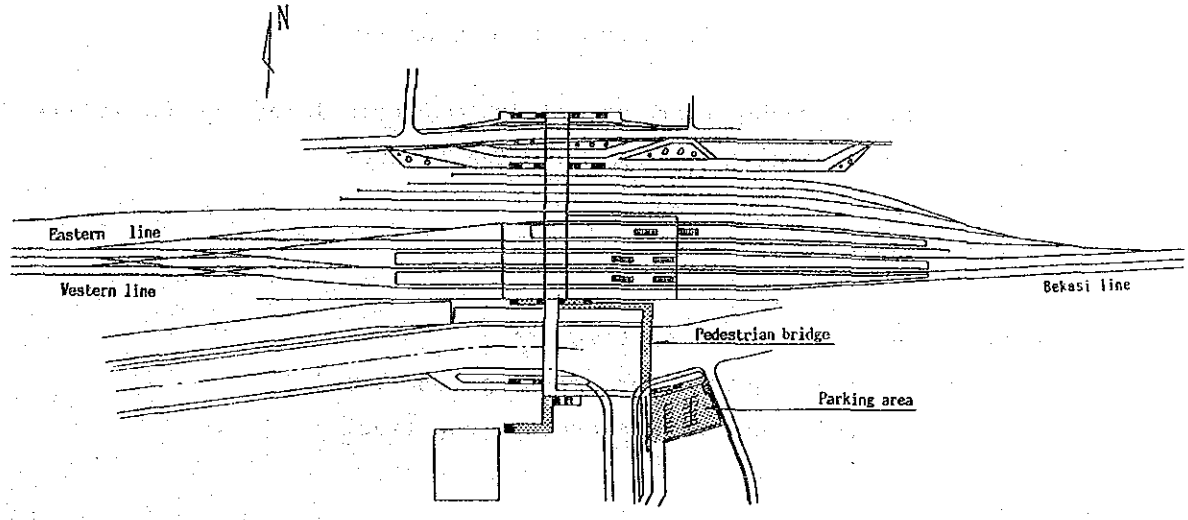


Fig. 4.4.4.6 Jatinegara Development Plan (Second Stage)

4-4-5 Assessment of Improvements to Decrease Transfer Time

(1) Methodology

The most important benefit to passengers using improved intermodal transfer facilities is the time saved compared to the situation before the improvements. In this analysis, two components of time savings were identified: time savings outside the station building and time savings inside the building.

Basically, in both cases, several patterns of passenger movement were assumed and an average time saving was calculated and used as the access time saving in the succeeding stages of demand forecasting and economic evaluation. The assessment of the impact outside the station building, however, necessitated a field survey including passenger interviews to elucidate the main direction and modes of approaching the railway stations in question. It also demanded modal shares of access and egress trips to/from the stations for both the existing and future situation. Existing data bases such as the ARSDS (1986) interview surveys were utilized for the estimation; future modal shares were assumed by considering land use development trends.

1) Calculation of time savings outside the station building

Four types of access modes were considered to account for present and future modal shares, as shown in Section 4-4-2.

Waiting time at pedestrian crossings was calculated by using the following formula, derived from queueing theory:

$$W = \frac{e^{-LT} - 1}{L} - T$$

where, W = Average waiting time (sec);
T = Time required for crossing (sec); and
L = Reciprocal of the average gap (sec).