

ANNEX

ANNEX

A PRELIMINARY STUDY ON THE CONTINUOUS TRACK ELEVATION PROJECTS OF THE CENTRAL LINE AND THE EASTERN LINE

1. Scope of the Study

Consideration is focussed on,

- i) primarily, possible construction timing, and
- ii) the economic viability of the investment plans

for the continuous track elevation of both the Central and Eastern Lines referred to in Chapter 5.2.3. "Grade Separation Plans of the City Lines."

However, the study on economic viability of these projects is no more than a preliminary estimation and further detailed examination will be necessary before they are implemented.

The sections of the two lines to be elevated are:

- 1) Central Line: 7.8 km length between Jakarta-Kota Station and Manggarai Station (station areas at both ends excluded)
- 2) Eastern Line: 6.5 km length between Jakarta-Kota Station and the crossing at Pasar Senen Station (Jakarta-Kota Station area excluded), including the approach of approximately 300m at the Rajawali Station from Ancol direction.

2. Method of Evaluation

Based on the description in Chapter 5, two separate construction periods for each project are set for comparison purpose. Calculation of internal rates of return (IRR) is made for both periods for each project to determine the timing of construction. For each period, the two projects are assumed to be completed in the same year. Altogether, four cases are considered as follows:

	Early construction	Late construction
Central Line:		
(i) construction period	1985-1989	1990-1994
(ii) cost (Rp. mio)	52,365	62,838
Eastern Line:		
(i) construction period	1986-1989	1991-1994
(ii) cost (Rp. mio)	50,723	60,868

The construction cost is considered higher in case of "late construction" because extra expenses are expected to be incurred for safety measures against a sharp increase in train frequency. Installation of automatic crossing gates and renovation of certain station facilities required before 1990 and removal of these facilities at the time of track elevation is taken into consideration. Maintenance cost of the elevated track is also estimated.

The estimation of benefits and costs is based on two possibilities:

- i) this project is implemented, and
- ii) this project is not implemented.

The benefits of track elevation, which generally is considered gained more by the road than the railway, are elaborated below:

- 1) Time saving benefit: Time interrupted at crossings and detour time for pedestrians, who could previously cross at crossings, is estimated as the time saved. The time value is assumed to reflect productivity of people that increases every year. GDP growth rate of 5.6% per annum* in Indonesia (constant price basis) is used in this study as no other appropriate data were available.

* An average rate of 19 years (1960-1978) in 1975 prices.
Data from IMF International Financial Statistics (Oct. 1980)
- 2) Saving of fuel consumed by road vehicles for acceleration at crossings. A shadow price of US\$ 0.966/gallon (US\$ 0.255/litre*) is used as a unit price of fuel.

* Export price of diesel oil quoted by Shell Eastern Petroleum Ltd., Singapore.
- 3) Land use benefit: Utilization of land after removing the existing track (which will become a free land) and of the space under the elevated track is considered benefit of the project. We assumed that the free land after removing the track can be sold immediately after completion of the project and that the space under the elevated track can be rented.
- 4) Benefit from avoidance of crossing accidents is estimated.
We assumed that accident rate is high immediately after the installation of automatic crossing gates due to unfamiliarity felt by road traffic.
However, we supposed that accidents will decrease in ten-year time (1984-1993) as people become familiar with the facility and as road traffic discipline prevails.
- 5) Saving of costs of the operators at crossings.
- 6) Cost of installing and removing automatic crossing gates are measured as the cost saving benefit of the "early construction."
These automatic gates need to be installed due to increase of train frequency at the early stage of the Plan, even knowing that they eventually will have to be removed by 1994.

3 Result of the Evaluation

The IRR were estimated for four cases of investment.

	Early Construction	Late Construction
Central Line	(1985 – 1989) 9.1%	(1990 – 1994) 8.1%
Eastern Line	(1986 – 1989) 6.6%	(1990 – 1994) 5.3%

The result indicates that the Central Line, which has more crossings (19 as against 9 for the Eastern Line) and a larger crossing traffic volume, has higher IRRs. The IRR is the highest in case of the early construction of the Central Line and it is recommended for further study for implementation.

The viability of the Eastern Line Project, whether it is the “early” or the “late” construction, may be in doubt due to the low rates of return resulting from fewer crossings and lower traffic volume involved. However, in estimating the IRRs of the Eastern Line project, the development plan for the east part of Jakarta City was not taken into consideration. The development of the economic activity in that part of Jakarta and the consequent increase of the land use along the line and of the east-west traffic flow will be the important determinates that influence the project viability. In view of the foregoing, the track elevation project of the Eastern Line should be reviewed later at an appropriate time in the light of this development plan.

As examined above, we consider the two cases, namely, the “early construction” for the Central Line and the “late construction” for the Eastern Line can be selected as the projects possible for further contemplation.

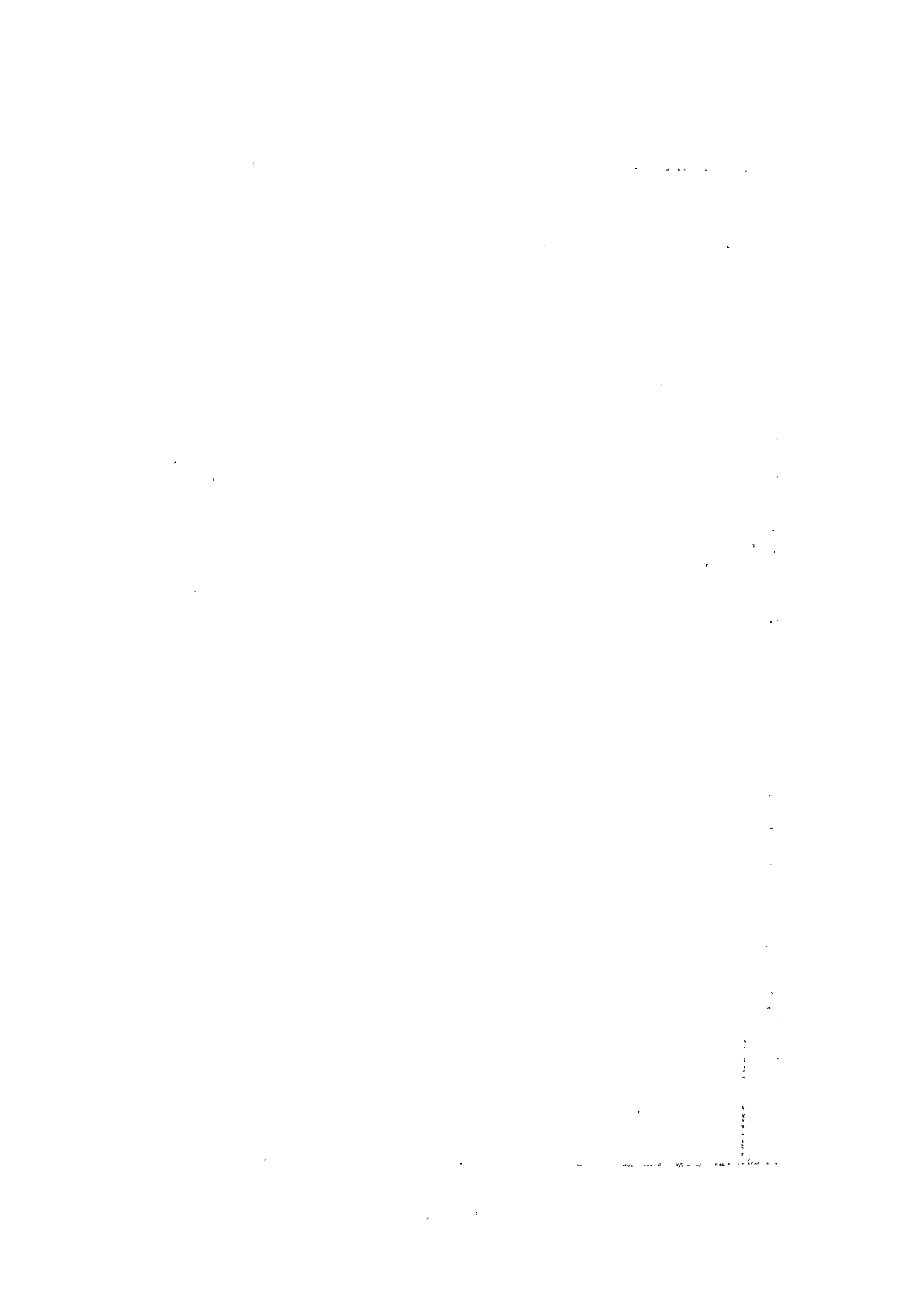
The cost/benefit tables of the two cases showing respective IRR are given in the following Tables.

Table A.3.1 Track Elevation Project of Central Line (Work commencement in first term 1985)

	Investment/ Maint. Cost	Benefits							Benefit-Cost Diff.	Net Present Value (Dis- count rate 9.1%)	Cumulative Net PV
		Time Saving	Fuel Saving	Space Utilization	Crossing Accidents	Investment Saving	Maint. Cost Saving	Total Benefit			
1984	-	-	-	-	-	-	-	1969	31	2001	2001
85	6864	-	-	-	-	-	-	1922	57	1979	-4478
86	12482	-	-	-	-	-	-	1490	76	1566	-10915
87	13128	-	-	-	-	-	-	-	76	76	-13052
88	13006	-	-	-	-	-	-	-	76	76	-12930
89	6885	-	-	-	-	-	-	-	76	76	-6809
90	622	2091	172	4613	774	773	65	773	65	8487	4671
91	622	2281	178	133	587	151	65	151	65	3397	1510
92	622	2486	184	133	395	167	65	167	65	3430	1402
93	622	2707	190	133	200	121	65	121	65	3416	1279
94	622	2946	196	133	202	103	65	103	65	3645	1268
95	622	3204	202	133	204	-	65	-	65	3808	1226
96	622	3588	211	133	214	-	65	-	65	4211	1266
97	622	4011	221	133	224	-	65	-	65	4654	1304
98	622	4477	230	133	235	-	65	-	65	5140	1340
99	622	4989	240	133	246	-	65	-	65	5672	1373
2000	622	5372	239	133	253	-	65	-	65	6063	1356
1	622	5673	239	133	253	-	65	-	65	6364	1312
2	622	5991	239	133	253	-	65	-	65	6681	1269
3	622	6327	239	133	253	-	65	-	65	7071	1228
4	622	6681	239	133	253	-	65	-	65	7371	1188
5	622	7055	239	133	253	-	65	-	65	7745	1150
6	1067	7450	239	133	253	-	65	-	65	8140	1047
7	2038	7867	239	133	253	-	65	-	65	8558	885
8	1321	8308	239	133	253	-	65	-	65	8998	955
9	1084	8773	239	133	253	-	65	-	65	9463	956
10	622	9264	239	133	253	-	65	-	65	9955	976
11	622	9783	239	133	253	-	65	-	65	10473	944
12	622	10331	239	133	253	-	65	-	65	11021	913
13	-43503	10909	239	133	253	-	65	-	65	11600	4440
											0

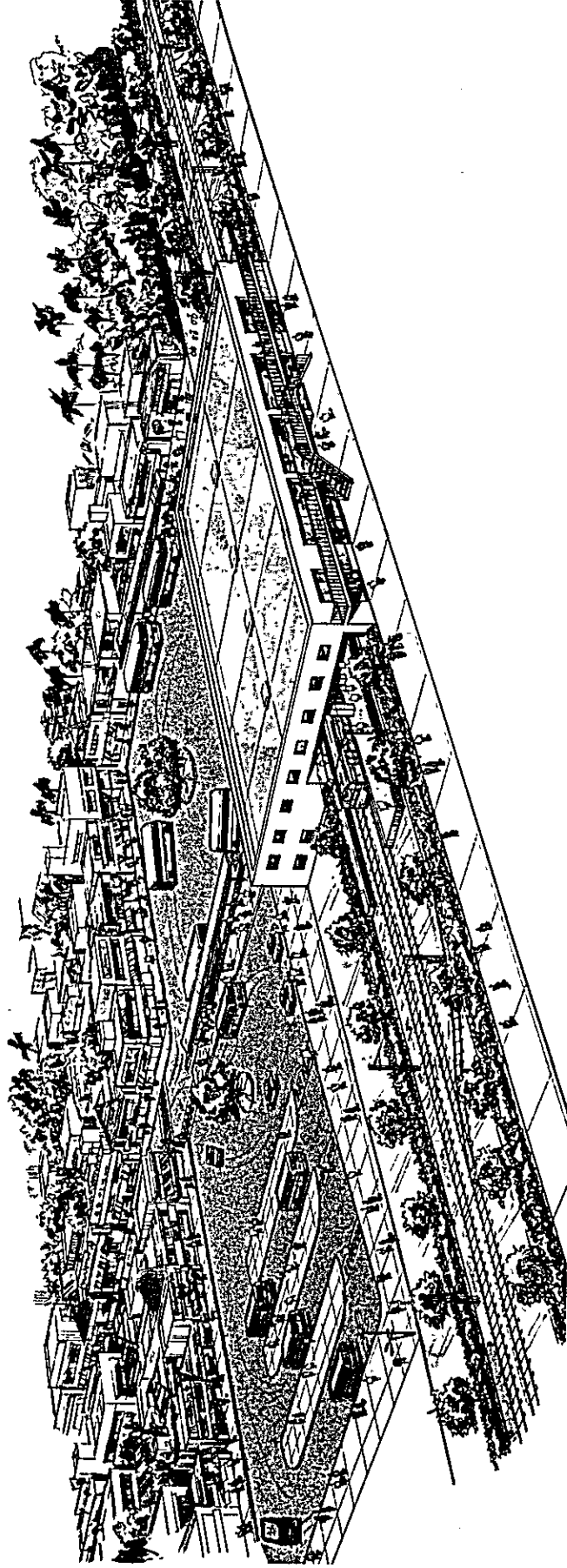
Table A.3.2 Track Elevation Project of Eastern Line (Work commencement in first term 1991)

	Investment / Maint. Cost	Benefits					Benefit/Cost Diff.	Net Present Value (Dis- count rate 5.3%)	Cumulative Net PV
		Time Saving	Fuel Saving	Space Utilization	Crossing Accidents	Maint. Cost Saving			
1984	-	-	-	-	-	-	-	-	-
85	-	-	-	-	-	-	-	-	-
86	-	-	-	-	-	-	-	-	-
87	-	-	-	-	-	-	-	-	-
88	-	-	-	-	-	-	-	-	-
89	-	-	-	-	-	-	-	-	-
90	-	-	-	-	-	-	-	-	-
91	7691	-	-	-	-	-	-7691	-5375	-5375
92	17556	-	-	-	-	-	-17556	-11658	-17034
93	21228	-	-	-	-	-	-21228	-13393	-30427
94	14393	-	-	-	-	-	-14392	-8628	-39055
95	603	2087	110	3642	86	27	5349	3046	-36009
96	603	2293	115	122	87	27	2645	1105	-34904
97	603	2517	120	122	87	27	2874	1167	-33737
98	603	2758	125	122	88	27	3121	1230	-32507
99	603	3018	131	122	89	27	3387	1292	-31215
2000	603	3299	136	122	90	27	3674	1354	-29860
1	603	3484	136	122	90	27	3859	1364	-28496
2	603	3679	136	122	90	27	4054	1374	-27123
3	603	3885	136	122	90	27	4260	1383	-25740
4	603	4103	136	122	90	27	4477	1392	-24348
5	603	4332	136	122	90	27	4707	1401	-22946
6	603	4575	136	122	90	27	4950	1410	-21536
7	603	4831	136	122	90	27	5206	1419	-20118
8	603	5102	136	122	90	27	5476	1427	-18691
9	603	5387	136	122	90	27	5762	1435	-17255
10	603	5689	136	122	90	27	6064	1444	-15812
11	603	6008	136	122	90	27	6382	1452	-14397
12	2242	6344	136	122	90	27	6719	1068	-13292
13	-51547	6699	136	122	90	27	7074	56620	0

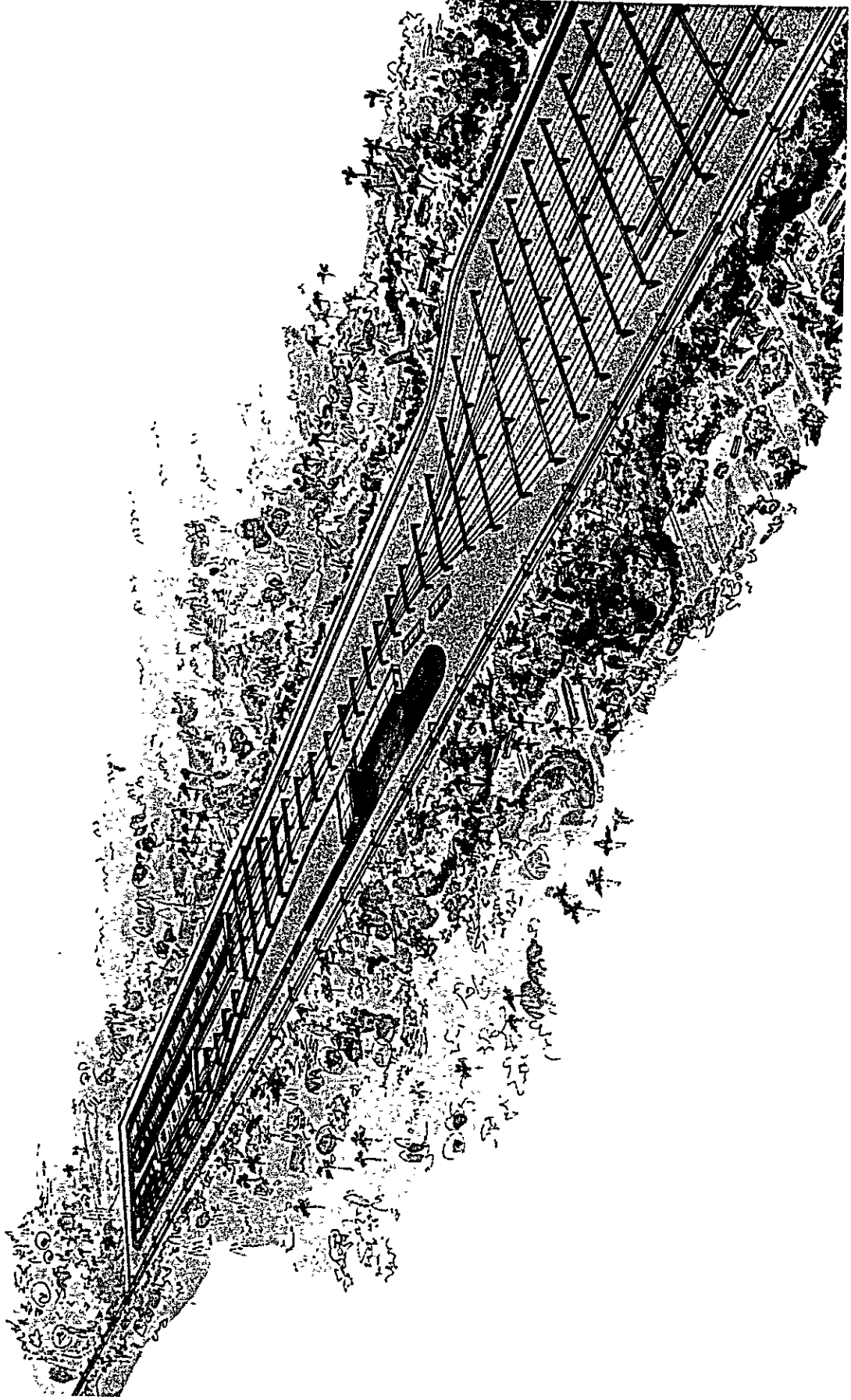


FEASIBILITY STUDY



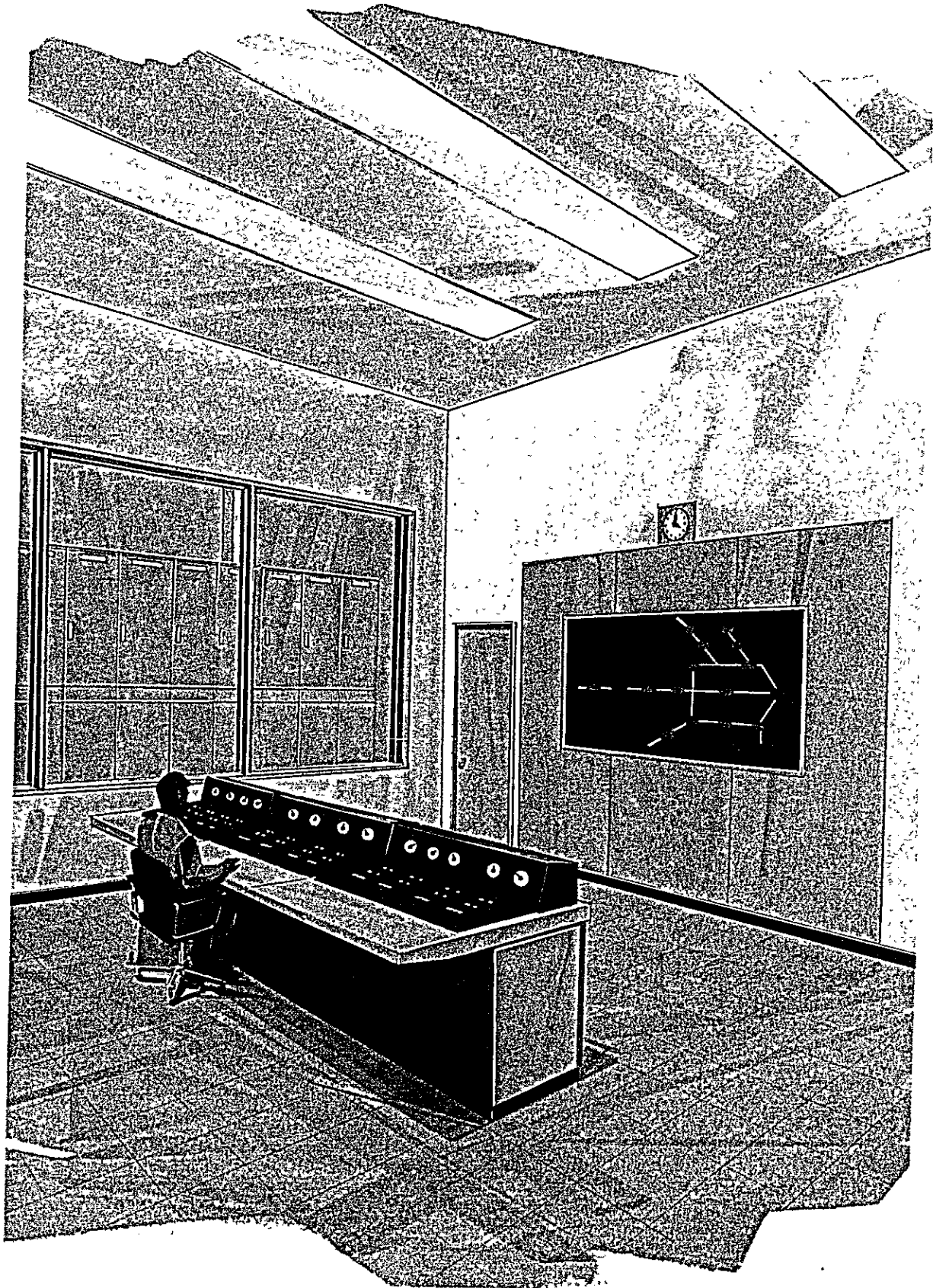


Depok Station and Front Area



New Depot at Depok





Power Dispatching Office

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SUMMARY AND CONCLUSION

SUMMARY AND CONCLUSION

1. Forecast of Railway Demand

1.1 Socio-Economy and Land Use

Housing development in the form of new towns is being planned in the entire BOTABEK Area such as Bogor, Depok, Cikarang, Bekasi, Serpong, Ciptat and Tangerang as the large scale development in JABOTABEK Area up to year 2000.

In addition, industrial development is being planned in Jonggol, Cikarang and Tangerang including development of cement industry in Cibinong. New airport in Cenkareng belongs to a development of large scale among other developments, and it is scheduled that this airport will be open in 1984 at the latest.

1.2 Estimation of Generated Demand

The generated demand for railway transport from the BOTABEK Area to D.K.I. was calculated from employment ratio, commuting ratio, commuting ratio to Jakarta and so forth based on the population in the influence area of each station. As for the generated demands in peak two hours, it will be 13,500 persons along Central Line, 6,200 persons along Bekasi Line, 6,400 persons along Merak Line and 2,800 persons along Tangerang Line, 28,900 persons in total, in 1987.

The generated demand for railways in D.K.I. was calculated from numbers of commuters and school attendants all modes in the influence area of each station, railway selectivity ratio and commuting ratio. According to the result of this calculation, the generated demand for railway in 1987 will be 13,000 persons along Central Line, 6,600 persons along Bekasi Line, 10,600 persons along Merak Line, 11,300 persons along Tangerang Line, 8,100 persons along Tanjung Priuk Line, 5,400 persons inside of City line, 55,000 persons in total in peak two hours.

That is, the total generated demand for railway inside and outside of D.K.I. will be 83,900 persons in peak two hours in 1987. This generated demand will be distributed to the stations in the central part of D.K.I. of each line.

1.3 Sectional Traffic Load in 1987 Classified by Line and its Growth Rate

When the demand distributed to stations is observed in sectional traffic load, the following matters can be pointed out. That is, the section between Tanahabang and Duri of Western Line indicates the largest sectional traffic load, which will be 11,270 persons (peak 2 hours) in 1987. Angke, Duri and Tanahabang are growing to become the center of commerce, therefore reinforcement of Western Line is important. Furthermore, the section between Depok and Manggarai of Central Line indicates the largest traffic load bound for D.K.I., and the traffic loads in the sections between Bekasi and Jatinegara, between Serpong and Tanahabang and between Tangerang and Duri will also make a great stride.

The sectional traffic loads indicate a rapid growth after 1985. When the figures in 1987 are observed, they are 7 to 8 times along Central Line, 33 times along Bekasi Line, 33 times along Merak Line, 69 times along Tangerang Line and 42 times along Western Line compared to the figures in 1978.

2. Train Operation Program

Status of ground facilities, which becomes the basis of train operation program toward the end of 1987 in which track addition between Manggarai and Depok of Central Line, electrification of Bekasi Line and so forth will be completed as shown in the following table.

Line	Section	Track			Electrification		Signal and Blocking	
		Double	Single	Max. Running speed	Electrified	Non Electrified	Auto-matic	Non Auto-matic
Central Line	Jakarta ~ Manggarai	o		60km/h	o			o
	Manggarai ~ Depok	o		100 "	o		o	
	Depok ~ Bogor		o	100 "	o			o
Eastern & Bekasi Line	Jakarta ~ Jatinegara	o		60 "	o			o
	Jatinegara ~ Bekasi	o		100 "	o		o	
Western Line	Jakarta ~ Jatinegara	o		60 "	o			o
Merak Line	Tanahabang ~ Serpong		o	100 "				o
Tangerang Line	Duri ~ Tangerang		o	100 "				o

2.1 Train Operation Routes

Transition to train operation routes on Alternative D proposed in the Master Plan will be made 1990 in which the works of various facilities and equipment required for it will be completed. The train operation routes in 1987 is based on the present train operation routes. As track addition between Manggarai and Depok of Central Line will be completed, train operation will be stepped between Depok and Jakarta to meet the increased traffic demand.

2.2 Running Time

The running time between main stations is as shown in the following Table. The time shown in this Table is the schedule running time in the case where each train stops at all stations, and practical arrival time will be shorter than the time shown in this Table because some of the stations are passed in the train operation program as matched with boarding and alighting passengers. The stopping time is assumed as 2 minutes at a large station and 1 minute at a small station, but it will be possible to shorten them with elevation of platforms and habituation of passengers.

Line	Section	Schedule Running Time	
		Out-Bound	In-Bound
Central Line	Jakarta – Manggarai	23'	22' 33"
	Jakarta – Depok	61'	60'
	Jakarta – Bogor	93'	90' 30"
Eastern & Bekasi Line	Jakarta – Jatinegara	27' 30"	27' 30"
	Jakarta – Bekasi	52' 30"	52'

2.3 Running Speed

The schedule running speed and average running speed in main sections are as shown in the following Table. These speeds will also be increased because of the reason stated in Item 2.2 above.

Line	Section	Average Running Speed		Scheduled Running Speed	
		Out-Bound	In-Bound	Out-Bound	In-Bound
Central Line	Jakarta – Manggarai	34.4 km/h	35.5 km/h	25.4 km/h	26.0 km/h
	Jakarta – Depok	43.4 "	44.4 "	32.0 "	32.5 "
	Jakarta – Bogor	46.9 "	48.6 "	35.3 "	36.2 "
Eastern & Bekasi Line	Jakarta – Jatinegara	36.6 "	36.6 "	27.2 "	27.2 "
	Jakarta – Bekasi	42.5 "	43.1 "	31.2 "	31.5 "

2.4 Train Operation Diagram

Examination of the train operation diagram is made based on the morning rush two hours, the maximum number of railcars for one train-set is eight for both electric train and diesel train and average passenger efficiency is 200 per cent. The required number of trains and the average operation headway in the rush hour zone in 1988, that is, after completion of electrification of Bekasi Line, are indicated below as an example.

Line	Section	Required No. of Train Sets	Average Operation Headway (min.)
Central Line	Manggarai ~ Depok	10	12
	Depok ~ Bogor	5	24
Bekasi Line	Jatinegara ~ Bekasi	8	15
Western Line	Duri ~ Tanahabang	6	20
Merak Line	Tanahabang ~ Serpong	5	24
Tangerang Line	Duri ~ Tangerang	3	40

The diagram is drawn up assuming the train operation starting time as 4 : 00 or later and the train operation headway in the day time is about two time of that in the rush hour zone. Operation diagram is shown in the Appendix.

Although the operation schedule of long-distance passenger trains remains unchanged in this train operation diagram from the present diagram (established on July 21, 1979), operation schedule of other trains is partly changed. In addition, shortening of arrival time to be accomplished through reinforcement of tracks and improvement of crossing facilities is taken into account for the trains of Merak Line and Tangerang Line. At Tangerang Line, in particular, it is necessary to hasten reinforcement of tracks because it is desirable that train operation of eight railcar train-set and 40 minute headway is performed as shown in the diagram of the Appendix beginning in 1986.

2.5 Railcar Operation Program and Required Number of Railcars

The railcar operation program is drawn up based on the train operation diagram indicated earlier and with the turning-back time at a terminal station assumed as five minutes or longer. The required number of railcars based on this railcar operation program is as shown in the following Table. It suggests that increase of 116 electric railcars and 36 diesel railcars is required up to the end of 1987.

Type	No. of railcars at the end of fiscal year	Year				
		1983 *	1984	1985	1986	1987
EC	No. of railcars in useing	88	100	116	132	192
	No. of spare railcars	12	12	12	20	24
	Total	100	112	128	152	216
DC	No. of railcars in useing	44	56	68	76	64
	No. of spare railcars	12	12	16	16	16
	Total	56	68	84	92	80

*After completion of the Intermediate Program

3. Expansion of Transport Capacity

3.1 Track Facilities

1) Type and Time-elapse of Rails

The following Table indicates the type and time-elapse (used since) of the rails used today. All of these rails have been deteriorated, and it is wanted that tracks of Tangerang Line in particular are renewed in an early stage.

Line and Section	Type of Rail	Used Since
1. Central Line		
Manggarai ~ Pasarminggu	R-14 (41.52 kg/m)	1960
Pasarminggu ~ Bogor	R-14 (41.52 kg/m)	1963
2. Bekasi Line		
Jatinegara ~ Bekasi	R-14 (41.52 kg/m)	1960
3. Tangerang Line		
Duri ~ Tangerang	R-2 (25.75 kg/m)	1899

2) Track Facilities

The track components in the sections, which are the object of track renewal, are shown in the following Table.

	Linear Section	Curved Section (curve radius less than 800 m)	Rail Joint
Rail	R14A Rail 85m long, end hardened rail	R14A Rail 85m long, end hardened rail	R14A Rail 85m long, end hardened rail
Sleeper	Oil treated wooden sleeper 1,600 pcs. per kilo- meter (62.5cm)	Oil treated wooden sleeper 1,680 pcs. per kilo- meter (59.5cm)	Oil treated large wooden sleeper Supported joint width 350mm
Fastening	Double elastic fastening for ordinary F type	Double elastic fastening for ordinary F type	Double elastic fastening F type for rail joint
Ballast	Crushed stone depth 250mm	Crushed stone depth 250mm	Crushed stone depth 250mm

3) Renewal of track classified by line

Track reinforcement of single track sections will be made between Duri and Tangerang of Tangerang Line and between Depok and Bogor of Central Line. Because of the fact that these lines are scheduled to be double tracked in the future, it was decided to carry out track renewal in station yards having switching facilities at the time when double tracking is materialized, and to limit the work to be executed this time to replacement of sleepers and input of ballast. Track renewal of double track sections is carried out of track addition in the

sections between Manggarai and Depok of Central Line and between Jatinegara and Bekasi of Bekasi Line, which has already been double tracked.

For track addition between Manggarai and Depok of Central Line, it was decided to make parallel track addition at the position that is apart from the existing track by 3.9 m with economy taken into account, and the position of track addition is determined so that the existing overhead wire posts for the existing track can be used as much as possible. In the sectional plan, the added track will be of the gradient same as that of the existing track.

For track renewal between Jatinegara and Bekasi of Bekasi Line, the station yard track program will be followed in the station improvement project, and in the sections between stations, existing R-14 rails will be replaced with R-14A rails and ballast will be input for securing ballast thickness of 25 cm.

3.2 Station Facilities

Improvement of station facilities is often executed on the occasion of improvement of other facilities, and it is desirable from the standpoints of economy and execution of construction work that it executed in parallel with improvement of other related facilities.

Consequently, improvement of facilities of stations which are directly related to track addition between Manggarai and Depok of Central Line and electrification of Bekasi Line will be executed in this project. The outline of improvement of the facilities is as follows.

- 1) Elevation and width expansion of platforms
($H = 18 \text{ cm or } 45 \text{ cm} \rightarrow H = 95 \text{ cm}$)
- 2) Construction of new platform sheds
- 3) Construction of new overbridges
- 4) Reconstruction of station main buildings
($1,000 \text{ m}^2$ at a large station, 500 m^2 at a small station)
- 5) Expansion or new construction of station front area ($10,000 \text{ m}^2$ at a large station, $5,000 \text{ m}^2$ at a small station)

3.3 Crossing Facilities

- 1) Scope of improvement of crossings

The scope of improvement of crossings is the crossings which are presently equipped with crossing equipment. The following Table indicates the number of crossings to be improved as classified by line.

Line and Section	Present No. of crossings	No. of crossings improved by I.P.	No. of crossings to be improved
- Central Line			
Jakarta Kota ~ Manggarai	19	19	0
Manggarai ~ Depok	17	9	8
Depok ~ Bogor	8	3	5
- Eastern & Bekasi Line			
Tanjungpriuk ~ Kemayoran	1	-	1
Jakarta Kota ~ Jatinegara	14	7	7
Jatinegara ~ Bekasi	8	-	8
- Western Line			
Jatinegara ~ Bekasi	10	4	6
- Tangerang Line			
Jakarta Kota ~ Manggarai	11	-	11
- Merak Line	14	-	14
Total	102	42	60

2) Crossing facilities

i) Crossing alarms

Crossing alarm will be installed on the left hand side of roads as a rule.

ii) Automatic crossing barriers

Automatic crossing barriers of the type that is same as those used in the Intermediate Program will be installed. In addition, X-mark crossing signal units for notifying the train crew of barrier operation will be provided.

iii) Control of alarms

Control of each alarm will be made in such a manner that approach of a train to the crossing is detected with the track circuit and an alarm is issued.

Because control with track circuits require sleepers to provide electrical insulation such as that of wood sleepers, it is necessary to replace iron sleepers, if used, with wood sleepers.

iv) Reconditioning of crossing roads

Reconditioning of crossing roads will be made for allowing smooth running of motor vehicles.

For this purpose, crossing roads will be of such a structure that pavement surfaces and rail surfaces are protected using guard rails and spacers.

The present crossing roads are partly responsible for traffic congestion. But reconditioning of crossing roads will not be a drastic measure for solving traffic congestion. The following improvements are additionally required for solving the problem of traffic congestion.

a. Bus, oplet and bajai stops

It is necessary to provide a bus bay or to space the bus stop apart from the crossing.

b. Mixed traffic

It is necessary to establish a regulation to assign different lanes to vehicles of different kinds.

c. Improvement of traffic moral

It is necessary to provide a median strip and to provide guidance to improve traffic moral of drivers.

3.4 Electrification

Although the electrification facilities of Central Line and Eastern Line are over 50 years old, main equipment of substations, contact wire and so forth have been well maintained with replacement and repair suitably made.

However, they require more minute maintenance and care to cope with renewal of tracks and operation of additional electric trains. High voltage power distributing equipment will be installed at substations, and high voltage distributing wires will be laid along overhead contact wires system accompanying automation of signals.

Reinforcement of equipment of substations and addition of overhead equipments will be made at the occasion of track addition between Manggarai and Depok of Central Line, and in addition, renewal of existing overhead contact wires, reinforcement of feeders and so forth will be executed.

An electrical dispatch system will be introduced at this time in preparation for the future of electric railways. This dispatch system will have the initiative on the operation of electric power, and will make unitary management of electric power. It will also be very useful for assurance of safety of train operation and for shortening the recovery time on occurrence of accidents.

If electrification of Bekasi Line, which has already been double tracked, is executed simultaneously with installation of automatic signals, it will be possible to drastically increase the transport capacity. In order to accomplish such an increase of the transport capacity, however, works of stations, crossing, fences and so forth should be executed in coordination.

Bekasi Line has a mission as the most important line in the future. Therefore, it is necessary to examine the electrification program of the sections beyond Bekasi as early as possible.

3.5 Signals and Telecommunication

(1) Signal equipment

Signal equipment are very important for safely, speedily and correctly operating trains. Therefore, operation security equipment which enable high speed and high density operation are selected and the equipment plan is established so that the handling is single, failure rate is minor and maintenance is also easy.

The method of blocking is automatic blocking system with which approach of a train is automatically detected with a track circuit and the train is protected with colored lamp signals. Signals and turnouts in a station yard are collectively controlled with a relay interlocking device and the course of each train is secured.

For the track circuit, AC track circuit of commercial frequency, which is the

simplest, highly reliable and is economical, is adopted.

(2) Telecommunication equipment

Renewal of telecommunication equipment are in progress on many items including dispatch telephone system, train wireless communication system, PCM carriage and use of cables for transmission circuits in the Intermediate Program and so forth. In this project, therefore, telecommunication equipment for yard workers will be provided accompanying employment of relay interlocking devices.

3.6 Railcars and Workshops

The number of railcars for JABOTABEK train to be inspected and repaired at Manggarai Workshop is assumed as about 660 electric railcars and about 110 diesel railcars in year 2000. The main work of the Manggarai Workshop is inspection and repair of passenger cars at the present time, but it is necessary to convert this workshop in quality and quantity into a maintenance workshop capable of inspecting and repairing electric and diesel railcars of a large number.

Under the prospect stated above, the basic thought on the scope of work, scale and railcar inspection and repair system at Manggarai Workshop is clarified, and concrete contents of improvement of equipment (Stage 1) to be urgently executed are proposed in this Report.

It is necessary that the equipment improvement program is executed step by step in a long run in correspondence to increase the number of railcars. The contents of these steps of improvement should simultaneously satisfy two requirements, which conflicting to each other in appearance, that is, they should maintain mutual continuity and they should be capable of coping to a certain extent with changes in conditions such as major change in the number of railcars and change in assignment of a certain kind of railcars.

For designing the program of the Stage 1, therefore, a number of forecastable changes in conditions are picked up, and four Alternatives are drawn up based on them regarding how the workshop should be in year 2000.

The contents which are adopted as the object of the Feasibility Study are the Stage 1 of the Alternative (A), which is considered to be the most desirable out of these four Alternatives, and they form a solution to the following propositions.

- 1) How maintenance of electric and diesel railcars to be additionally input by the time of completion of the Intermediate Program should be carried out?
- 2) What should be done for some time for establishing the inspection and repair system at the workshop?

The main contents of the improvement program in the Stage 1 are as follows:

- 1) Construction of a new shed for final inspection and adjustment of electric and diesel railcars .
- 2) Expansion of body repair shop
- 3) Rehabilitation of test run track in the workshop
- 4) Introduction of electric railcar inspection equipment to be the main equipment of the workshop
- 5) Construction of new body-painting shop

3.7 Railcar Depot

The railcar depot in Bukitduri is of small scale and its equipment have been deteriorated. In addition, its capacity will be exceeded by the time of completion of the Intermediate Program. Expansion of this depot, however, is very difficult because it is located in a town area. The required number of electric railcars will over 200 in 1988 after completion of electrification of Bekasi Line as already described. Consequently, a new railcar depot will be constructed in Depok until 1988 for carrying out inspection and repair as well as storage of electric railcars, and the depot in Bukitduri will be used as a depot for diesel railcars.

Although construction of the new depot will be commenced as soon as the project starts a long period of time will be required for construction. Consequently, for coping with increase of railcars until the time when the new depot is completed and also for improving the operation efficiency of electric railcars, the passenger car depot in Jakarta Kota will be reinforced including introduction of equipment for preoperational inspection and cleaning of electric railcars and construction of new storage lines.

The new depot in Depok will be constructed in three Stages toward the final scale of the capacity to cope with 700 railcars in order to cope with increase of railcars after year 2000 to a certain extent.

As the first stage, equipment necessary to cope with the increased railcars up to year 1994, in which the works of the second stage will be commenced, such as equipment for trip inspection and cleaning, equipment for regular inspection and bogie inspection and storage lines will be constructed.

It is also necessary to make examination to sequentially add storage lines sequentially as matched with the railcar increasing program. In the Stage 2 and subsequent, introduction of wheel grinding machine and automatic washing machine and increase of bogie inspection equipment (introduction of bogie replacement system) and so forth will be made together with addition of storage lines, for improving the working efficiency.

4. Improvement Program Classified by Line

4.1 Purpose of Improvement Program

The purpose of the projects on which this Feasibility Study is conducted can be generally divided into the following three items.

- 1) Improvement of existing lines
To improve all the railways in the JABOTABEK Area to the equal level by track renewal improvement of crossings and fences of suburban lines, which are not included in the Intermediate Program.
- 2) Expansion of transport capacity
To expand the transport capacity through improvement in quality for coping

with the increasing traffic demand.

To make track addition between Manggarai and Depok of Central Line and electrification between Jatinegara and Bekasi of Bekasi Line as the projects of urgent requirement. Improvement of station facilities, establishment of station front areas and installation of automatic signals will be made together with these works for increasing the transport capacity, for improving passenger services and improvement of degree of operation security, in order to modernize the railways.

3) Improvement of back-up facilities

To improve a workshop and a railcar depot for backing up expansion of the transport capacity.

Electric railcar inspection and repair equipment of the Manggarai Workshop and Jakarta Kota Passenger Car Depot will be improved.

This improvement should be urgently made because it will not be executed in the Intermediate Program. Furthermore, storage lines for electric railcars will be added in the Jakarta Kota Passenger Car Depot and an electric railcar depot will be newly constructed in Depok as the depot for storage of electric railcars accompanying electrification of Bekasi Line.

4.2 Contents of Improvement of Ground Facilities

(1) Method of execution of improvement

Coordination of the lines was taken into account, and in addition, consideration was made not to involve duplicate efforts of works for execution of improvement.

Consequently, improvement of all of the existing lines will be made simultaneously for increasing the train running speed (up to 60 km/h for city lines and up to 100 km/h for suburban lines) and for increasing safety of crossings within the range in which the existing facilities are not changed. If tracks and turnouts in station yards are replaced, duplicate efforts will occur in the future at the occasion of track addition, electrification, elevation of platforms, construction of overbridges and installation of automatic signals. The works in the station yards will be executed together with the works of track addition, electrification and so forth.

Improvement of station facilities, establishment of station front areas and installation of automatic signals will be made together with the works of track addition and electrification.

(2) Contents of improvement classified by line

1) Central Line

The track addition work between Manggarai and Depok (22.8 km) of Central Line will be completed in 1987. The tracks of existing section will be replaced at the occasion of track addition work, and in addition, renewal of tracks and turnouts in station yards in this section will be made. Renewal of tracks, installation of fences and improvement of crossings between Manggarai and Bogor of Central Line will be completed by 1985. At eight stations from Tebet Station to Depok Station, elevation of platforms, construction of overbridges and construction or expansion of platform sheds and station main buildings will be made.

The scales of station main buildings of Pasarminggu Station and of Depok Station will be made large with future increase of number of passengers taken into account. The station front areas of these eight stations will also be established at the same time. Addition of silicon rectifiers to substations and addition of feeders will be made accompanying electrification, to cope with shortage of capacity. Signals between Manggarai and Depok will be automated and relay interlocking devices will be installed at two stations, that is, Pasaeminggu and Depok Stations.

2) Eastern Line and Bekasi Line

Although tracks and fences of Eastern Line (Jakarta ~ Jatinegara) will be renewed or installed in the Intermediate Program, crossings will remain unimproved. Therefore, improvement of eight crossings will be made by 1985.

Electrification between Jatinegara and Bekasi (14.8 km) of Bekasi Line will be completed in 1987. Renewal of tracks, installation of fences and improvement of crossings in this section will be completed in 1985 prior to completion of electrification.

Renewal of tracks and turnouts in station yards, improvement of station facilities and station front areas and installation of automatic signals will be made simultaneously with electrification work.

Improvement of station facilities and station front areas will be made at six stations from Jatinegara Station through Bekasi Station.

The scales of station main buildings are large at Jatinegara and Bekasi Stations and the scales of station front areas are large at Jatinegara and Klender Stations. A sub-station will be newly constructed near Bekasi Station accompanying electrification. Relay interlocking devices will be newly installed at three stations, that is, Jatinegara, Cipinang and Bekasi Stations.

3) Western Line

Electrification and renewal of tracks, installation of fences and improvement of some (4 places) of crossings of Western Line will be executed in the Intermediate Program. Therefore, improvement of the remaining six crossings will be made by 1985.

4) Merak Line

Renewal of tracks, improvement of crossings and installation of fences between Tanahabang and Serpong of Merak Line will be executed by 1986.

5) Tangerang Line

Renewal of tracks, improvement of crossings and installation of fences between Duri and Tangerang of Tangerang Line will be executed by 1985.

4.3 Points of Consideration until Commencement of Works

It is usual that a period of about three to four years is required including engineering service in general until commencement of works after termination of the Feasibility Study.

It is important, therefore, to permit commencement of works so that the works will be completed by the time when they are required, by quickly performing the study, clerical processing and so forth.

The following items are of the works of the character identical to those which are under

execution in the Intermediate Program and are the items which require urgent completion. It is strongly needed that planning is promoted with early commencement of works around 1982 as a criterion through simplification of engineering service.

- 1) Renewal of tracks and improvement of crossings
 - a. Between Depok and Bogor of Central Line
 - b. Between Jatinegara and Bekasi of Bekasi Line
 - c. Between Tanahabang and Serpong of Merak Line
 - d. Between Duri and Tangerang of Tangerang Line
- 2) Improvement of crossings
 - a. Eastern Line
 - Some crossings between Jakarta and Jatinegara
 - Some crossings between Tanjung priuk and Kemayoran
 - b. Western Line
 - Some crossings between Jakarta and Jatinegara
- 3) Improvement of inspection and repair facilities of Manggarai Workshop
- 4) Introduction of inspection and repair equipment of Jakarta Kota Depot
- 5) Partial increase of railcars (EC, DC)

5. Scale and Schedule of Investment

The object of this Feasibility Study is the following items to be commenced subsequent to the Intermediate Program, that is, in or after 1984, and to be completed by 1987.

- 1) Improvement of tracks and crossings of lines
- 2) Improvement of Manggarai Workshop (Stage 1)
- 3) Improvement of Jakarta Kota Depot
- 4) Track addition between Manggarai and Depok of Central Line
- 5) Construction of new electric railcar depot in Depok (Stage 1)
- 6) Electrification between Jatinegara and Bekasi of Bekasi Line

In the study made up to the present time it is desirable that Feasibility Study for continuous track elevation between Jakarta and Manggarai of Central Line should be executed and to commence its work beginning in 1985 based on the result of the Feasibility Study.

The scale of investment and the schedule of investment obtained as a result of this Feasibility Study are as shown in the following tables, and the total investment of approximately Rp 155.6 x 10⁹ is required.

Item	Investment Cost (Rp × 10 ⁶)		
	Total	Foreign Currency	Local Currency
– Improvement between Depok and Bogor of Central Line	4,178	2,463	1,715
– Improvement of Bekasi Line	4,000	2,495	1,505
– Improvement of Merak Line	1,916	1,231	685
– Improvement of Tangerang Line	3,840	2,314	1,526
– Improvement of Manggarai Workshop (Stage 1)	7,810	4,882	2,928
– Improvement of Jakarta Kota Depot	4,870	3,388	1,482
– Improvement of crossings of Eastern and Western Lines	570	436	134
– Increase of railcars	33,177	32,182	995
– Track addition between Manggarai and Depok	33,955	25,034	8,921
– Electrification of Bekasi Line	42,074	33,987	8,087
– Construction of new depot in Depok (Stage 1)	19,196	10,831	8,365
Total	155, 586	119, 243	36,343

Note: The expenses for track addition between Manggarai and Depok and electrification of Bakasi Line include related railcar expenses.

Project Item	81	82	83	84	85	86	87
– Improvement of Existing Lines							
o Improvement between Depok and Bogor							
o Improvement of Bekasi Line							
o Improvement of Merak Line							
o Improvement of Tangerang Line							
o Improvement of Manggarai Workshop (Stage 1)							
o Improvement of Jakarta Kota Depot							
o Improvement of crossings of Eastern and Western Lines							
o Increase of railcars							
– Expansion of Transport Capacity							
o Track addition between Manggarai and Depok							
o Electrification of Bekasi Line							
o Construction of new depot in Depok (Stage 1)							

6. Personnel Program

6.1 Design of Personnel Program

It is extremely important to secure personnel of required number and to upbringing capable personnel in order to smoothly accomplish railway transportation with modernized facilities and increased railcars.

Consequently, required personnel should be secured and education and training should be executed as matched with the time of completion of works, time of input of railcars and other factors, with the length of time required for education and training taken into account.

It is necessary, therefore, to draw up a personnel demand and supply long-term program classified by year and to establish the personnel education and training program based on this long-term program.

6.2 Number of Personnel Classified by Work System

When the required number of personnel at the beginning of year 1988 in which all of the projects, which are the object of this Feasibility Study, are completed and start operation is trially calculated, the total of crew (operators and conductors), station men and maintenance personnel for railcars, tracks, electricals, signal and telecommunication, that is, the number of personnel of work-site operation organs in the JABOTABEK Area, is larger by about 790 persons than the number in 1980. The number of increased personnel at main office of Inspection 1 is 80 persons, and is about 550 persons at Manggarai Workshop. (See Table 7.2.1 in the Report.)

Together with security of necessary number of personnel based on the personnel program classified by year and through execution of the education and training program, it is necessary to make entire innovation of work structures such as mechanization of maintenance works, reorganization of maintenance work structure, improvement of station equipment, mechanization of ticketing and wicket works and review of duty operation and duty standard for train crew and also to promote various measures such as promotion of use of season tickets.

6.3 Reinforcement of Education and Training Structure

It is necessary to establish an education and training institution in the JABOTABEK Area because it is necessary to upbringing personnel of a large number within a short period of time and also because of the present situation of training at Bandung and Yogyakarta. It is necessary to temporarily secure classrooms in the main office of Inspection 1, West Java Region or Manggarai Workshop to make early purchase of training equipment and materials and to upbringing lecturers by dispatching them to overseas training institutes, acceptance railway experts from foreign country and to then start education and training of personnel as early as possible.

The following matters in particular should be taken into account for upbringing of personnel. That is, practical training of electric train operators in the field and practice of conductors along practical lines should be made. Because entirely new equipment will be introduced for signal and telecommunication, retraining of all of the existing personnel is

required in addition to training of newly employed personnel.

7. Structure for Promotion of Railway Transportation Development Program

7.1 Necessity of Structure for Promotion

In order to allow efficient execution of a Railway Transport Development Program, it is essential to energetically cope with the following problems and to promote execution of the program with opinions adjusted with related organs and with various problems solved, with a special organization, that has sufficient authority and capability for management and operation of the project from the all-round standpoint, suitably organized.

- 1) This Program is a large scale long-term program which requires investment of a huge amount, and therefore, special consideration by the Government of Indonesia is required regarding security of the financial source and special measures in the budget.
- 2) Positive guidance and cooperation of the Government of Indonesia as well as of concerned organs and also the understanding and cooperation of local resident are essential in the aspect of security of right of way for implementation of the Program.
- 3) It is necessary to smoothen accounting works and clerical works related to management of materials and to clarify location of the responsibility by introducing classified accounting with provision of special accounts and special accounting audit system.
- 4) It is necessary to establish an execution structure regarding draw-up of work execution programs, selection of constructors, supervision and audit of works and so forth. Furthermore, because of the fact that the works of this Project will be executed while existing railways are kept operated, it is necessary to make minute deliberation, adjustment and thorough communication with concerned organs.
- 5) The items required for implementation of the Project and Program are diversified and are mutually related to each other in complexity. Therefore, it is most important to advance of the works while maintaining harmony of all items, and an all-round adjusting function is really essential in order to materialize it.

7.2 Provision of Promoting Organization

It is not possible to smoothly promote the Railway Transport Development Program merely by strengthening of reforming the structure of PJKA as described above. Consequently, it is desirable that "JABOTABEK Area Railway Transport Development Program Promoting Committee" (tentative name), which is organized by representatives of concerned organs and by representatives of PJKA with the Minister for Transport, Communications and

Tourism as the chairman, is organized and this committee makes all-round adjustment and advices regarding the specific items, so that a guidance and cooperation structure for implementation of the Program will be established.

7.3 Provision of Executing Organization

Directorate General of Land Transport and Inland Waterways (PHBD) and PJKA head office and PJKA West Java Region can be considered as the place where the organization for concrete execution and promotion of the program, but it is considered suitable that this organization is established in PJKA West Java Region because of the following reasons:

- 1) This program is a Railway Transport Improvement Program, and is to be executed subsequent to the Intermediate Program, which is being executed.
- 2) Management and operation of what will be completed with this Program will be made by PJKA West Java Region and Inspection 1 after their completion.
- 3) Construction works should be executed while keeping the existing railways operating.
- 4) It is desirable that the executing organization is located in a place that is closest to the places of execution of works because it is necessary to always seize the extent of advancement of works and to make all-round adjustment regarding concrete problems occurring in execution of works.

As already described in Item 7.1, transfer of authority and clarification of responsibility structure would be required within the range that does not cause problems to implementation of the Program regarding execution of budget and so forth.

As a concrete organization, "JABOTABEK Area Railway Transport Development Chamber" (tentative name) having the Chief of PJKA West Java Region as the manager, for example, may be organized with some staff members from each one of work systems.

8. Economic Evaluation

8.1 General

The basic idea, methodology and assumption for assessing the economic benefits and costs of the proposed Phase I Program are essentially the same as that of the Master Plan (the Plan). However, the basic differences are that the priority projects in the Plan which are recommended for early implementation are selected for the study and that the more accurate data are used for the economic evaluation.

8.2 Methodology

Based on the "With or Without" principle, only incremental benefits and costs due to implementation of the Phase I Program were considered in estimating the Economic Internal

Rate of Return (EIRR). The factors for estimating costs and benefits are shown in the following Table.

		Cost Estimate		Estimate of EIRR	
		Investment Items	Operation/Maintenance Costs	Costs	Benefits
With	(1) Railway facilities (2) Rolling stock (EC, DC)	Maint./replacement personnel and energy costs	Difference in investment	(1) Cost saving benefit	
Without	(1) Road construction (2) Road vehicles (Buses, cars)	Maint./replacement, personnel and fuel costs		(1) Time saving benefit	

8.3 Estimation of Passenger Volume

The passenger volume, which comprising normal, attracted and generated demands, was estimated in passenger-km at each railway line and at different time periods (peak hours and non-peak hours).

The passenger volume estimated for the proposed Program accounts for 50% of that of the Plan while the investment share accounts for only 30%. This facts indicates the priority of the Projects selected for the immediate investment.

8.4 Traffic Volume and Travel Speed of Road Vehicles ("Without Project")

In this report, the investment on construction of required roads and road vehicles were determined by such factors as the traffic congestion on roads and travel time of the vehicles. The operation/maintenance costs were estimated by using the factor of travel speed of buses and passenger motor vehicles.

The shares of passengers using buses and motor car were used as Key Para-Meters for this analysis.

8.5 Economic Evaluation

According to the available data, the shares of passengers allocated to buses motor car passenger ratio was 70%: 30% in 1977. However, considering the general tendency of the Government pursuing every saving policy, it will be more appropriate to estimate the shares of passenger cars at lower figures. In view of the foregoing, two cases were assumed in the study and EIRRs were estimated, as indicated below.

	Base Case	Case I
Shares of passengers using bus/passenger car ratio	90% : 10%	100% : 0%
EIRR	28.9%	14.7%

The cost saving effect of "With Project (Base Case)" as against "Without Project" can be estimated as follows:

- a. Operating/maintenance costs of "Without" is 5.3 times as much, and
- b. In particular, the energy costs of "Without" is 16.2 times of that of "With"
- c. Sensibility analysis

The passenger volume and the amount of investment were considered for the analysis.

Cases	1	2	3
Factors			
Passenger volume	-20%	-30%	-
Investment Amount	+10%	-	+20%
EIRR	17.5%	16.8%	21.1%

Considering the result of evaluation in items (a), (b) and (c) based on the parameter of passenger shares using bus/passenger car "90%: 10%", which may be considered as relatively severe condition, a fairly reasonable EIRR was estimated. Even considering an extreme case of the shares "100%: 0%", EIRR of 14.7% was obtained. It is, therefore, considered that the Program is economically feasible and recommended for further processing for implementation.

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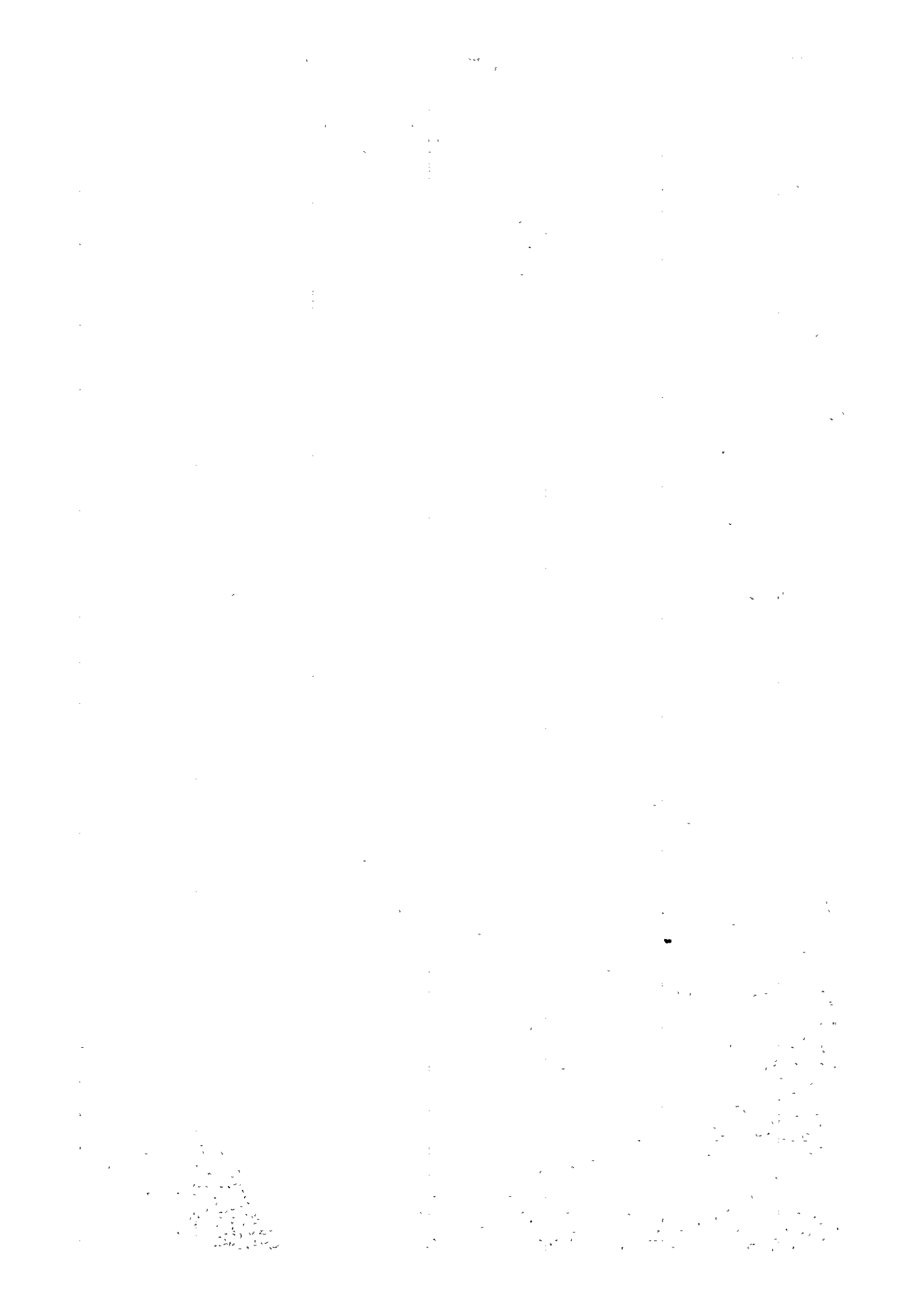
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CHAPTER 1. INTRODUCTION



CHAPTER 1 INTRODUCTION

1.1 Background of the Study

The JABOTABEK Area, which is composed of D.K.I. Jakarta, Bogor, Tangerang, Bekasi and Serpong, is of the total area of 550,000 ha., and its population was 10.6 million in 1978. Of which the population of D.K.I. Jakarta is 6.08 million, which is approximately 58 per cent of all. The growth rate of the population of D.K.I. Jakarta has been four per cent per annum since 1971. Urbanization of Depok and Bogor in the south, Tangerang and Serpong in the west and Klender and Bekasi in the east has been rapidly in progress accompanying increasing liveliness of industrial and economic activities in D.K.I. Jakarta.

The transportation in JBOTABEK Area has been dependent mainly on roads. Although railways are located along favorable routes, they are not yet exhibiting their full functions because of deteriorated facilities, lack of transport capacity, congestion at crossings, lack of linkage between railways and roads and other reasons. Consequently, jamming of road traffic is excessive, causing large social problems such as frequent occurrence of traffic accidents. In order to solve the problem of congestion of road traffic and to cope with future increase of traffic demand, it is necessary to modernize railways and to cause railways to exhibit the functions as means of mass and high speed transportation.

The Government of Indonesia is currently executing the Intermediate Program under cooperation of the Government of Japan, and this Program is achieving success, as railway passengers are rapidly increasing. This Intermediate Program, however, is a short-term and tentative measures, and is scheduled to be completed in 1983.

Railway improvement programs to be executed after the Intermediate Program has not yet been designed. The Government of Japan decided to carry out this Feasibility Study based on the request of the Government of Indonesia regarding draw-up of an all-round modernization program for railways based on a long-term vision. The Japan International Cooperation Agency (JICA), which is an executing organ of the Government of Japan, dispatched a prestudy team led by leader Mr. Fumikatsu Tachibana to Indonesia in February, 1980.

The prestudy team visited concerned government agencies of Indonesia, and reached an agreement with the Government of Indonesia regarding the scope of work of this study and the tentative study period based on necessary information and materials.

This Feasibility Study was conducted based on this agreement.

1.2 Purpose of Study

The purpose of this study is to design a short-term railway improvement program Phase I for the JABOTABEK Area with the project to be commenced with 1985 as the target in outline as the object, based on priority ranking of projects included in the Master Plan established toward the target of year 2000. Consequently, its object is the project which should be executed subsequent to completion of the Intermediate Program, that is, improvement of foundation of the

existing lines, which could not be executed in the Intermediate Program, and transport capacity expansion project of urgent requirement are the objects of this study.

1.3 Outline and Schedule of Study

The study schedule can be generally divided into two stages as indicated below.

1) First Stage; Work in Indonesia

The following works, which are required for the Feasibility Study to be conducted in Japan, were conducted during the work in Indonesia, in parallel with various works regarding designing of the Master Plan.

- i) Discussion with concerned Government agencies and hearing of their will and opinions.
- ii) Collection of materials and information.
- iii) Survey and analysis of present situations of facilities, organization, management and administration of existing railways.
- iv) Supplementary survey of traffic loads (numbers of boarding and alighting passengers classified by station, degree of jamming of crossings).
- v) Fundamental study related to economic analysis.
- vi) Establishment of general conception regarding selection of the project to be the object of the Feasibility Study and also regarding the method of study. It was agreed upon at the preliminaries of the Joint Supervisory Committee between Indonesia and Japan held toward the end of September, 1980 to select the following projects as the objects of this Feasibility Study by March, 1981.

As a result of reexamination of grade separated crossing plan of urban lines during the work in Japan for designing the Master Plan, it was requested to continue the study even in April, 1981 and subsequent if addition of the object project is required.

- a. Rehabilitation of Tracks, Workshop and Depot
- b. Installation of Automatic Signal in City Line
- c. Improvement of Station Passenger Facilities.
- d. Establishment of New Electric Railcar Depot at Depok
- e. Electrification of Bekasi Line
- f. Additional Track for Central Line (Manggarai ~ Depok)
- g. Establishment of Station Front Area
- h. Additional Supply of Rolling Stocks.

2) Second Stage; Work in Japan

The work in Japan was conducted in the period of October, 1980 through March, 1981. The main contents of this study are as follows.

- i) Orientation of short-term improvement program
- ii) Design of itemized plans of short-term improvement program
- iii) Examination classified by item and field.
 - a. Design of conception of reinforcement of facilities classified by field

- and additional introduction railcars.
- b. Examination of management and organization .
- c. Examination of education and training.
- iv) General design and calculation of construction expenses.
- v) Design of investment scale and investment schedule.
- vi) Economic analysis .
- vii) Finalization of short-term railway improvement program.

1.4 Fundamental Policy on the Study

The objects of the short-term railway improvement program are the Projects to be subsequently executed after completion of the Intermediate Program. All of these Projects will be commenced in 1985 in general and will be completed by 1987. The purpose of the Intermediate Program is improvement of ground facilities and additional supply of railcars in the urban lines in Jakarta City, and suburban lines are excluded from the objects of the Intermediate Program. As the next stage that follows the Intermediate Program, therefore, it is necessary to strengthen the entire lines in the JABOTABEK Area to the equal level through improvement of the suburban lines. This improvement of foundation of existing lines is not to innovate the present railway system, but it is an emergency measure that causes survival of deteriorated facilities.

Together with improvement of transport facilities, the facilities for backing up transport such as workshops and railcar depots, which are not improved in the Intermediate Program, will be made.

The stage that follows improvement of foundation of existing lines is execution of the transport capacity reinforcing projects through modernization of railway system.

Many projects are included in this category as described in the Master Plan. But it was decided to execute track addition between Manggarai and Depok of Central Line, electrification between Jatinegara and Bekasi and construction of a new railcar depot in Depok as the projects which are particularly urgently required. As works such as betterment of station facilities and of station front areas, automatic signalling and so forth will be executed together with track addition and electrification, passenger services and security of operation will be improved together with increase of transport capacity, and as a result, the existing railways will be reborn to modern railways.

Grade separated crossing of urban lines will be examined in the Master Plan. But the time of execution of the work is considered based on further deepened study, and whether continuous feasibility study is required or not was discussed.

1.5 Organization

The members of the supervisory committee and of the study team as well as of their counterparts in Indonesia are as follows:

1.5.1 JICA Supervisory Committee

Dr. Y. Matsumoto (Chairman)	- Professor Civil Engineering Department, Tokyo University
Mr. Y. Fukuda (Deputy Chairman)	- Director Rolling Stock & Operation Division Railway Supervision Bureau Ministry of Transportation (MOT)
Mr. N. Kodera	- Deputy Director Civil Engineering & Electricity Division Railway Supervision Bureau, MOT
Mr. S. Onoyama	- International Cooperation Officer Rolling Stock Industry Division Railway Supervision Bureau, MOT
Mr. T. Kuroda	- Deputy Director Division of Safety Operation Railway Supervision Bureau, MOT
Mr. A. Otake	- Deputy Director International Secretariat, MOT
Mr. T. Oguni	- Deputy Director Planning Division Shinkansen Construction Department Japanese National Railways
Coordinator: Mr. H. Kawaguchi Mr. K. Mima	Social Development Cooperation Department, Japan International Cooperation Agency (JICA)

1.5.2 Indonesian Government Steering Committee

Ir. Giri S. Hadihardjono (Chairman)	- Directorate General of Land Transport and Inland Waterways (PHBD)
Mr. Gatot Soedjantoko	- Directorate General of Land Transport and Inland Waterways (PHBD)
Drs. Mochtarudin Siregar	- National Planning and Development Board (BAPPENAS)
Ir. Abdulrachman	- Ministry of Transport, Communications and Tourism
Ir. Wijoto Wijono	- Directorate General of Highways (BM)
Mr. Sugiarto Sumobrote	- Directorate General of Budget
Ir. Ruslan Diwirjo	- Directorate General of Cipta Karya
Ir. F. Soewarto MSc.	- Highways and Traffic Agency, Jakarta Capital City Government (DLAJR-D.K.I.)

Ir. Soetijanto	- Indonesian State Railways Headquarters (PJKA)
Ir. Sriwiranto	
Ir. Soetarno	- Western Regional Office of PJKA
Drs. R. Soekotjo	- Directorate General of Land Transport and Inland Waterways (PHBD)
Drs. Tb. M. Rais	- City Planning Bureau of D.K.I. Jakarta
Mr. Kandar S	- City Planning Bureau of D.K.I. Jakarta
Mr. Moch Slamet	- Directorate General of Land Transport and Inland Waterways (PHBD)

1.5.3 JICA Study Team

Mr. Mikio Sudo	- Team Leader Executive Vice-President, Japan Railway Technical Service (JARTS)
Mr. Nobuwaka Yamakawa	- Member (Transport Demand Forecasting) Adviser to JARTS
Mr. Naoshi Kawabata	- Member (Transport demand forecasting) Adviser to JARTS
Mr. Yoshikazu Itoh	- Member (City and Regional Planning) Adviser to JARTS
Mr. Masaki Tamura	- Member (Transport Economy) Adviser to JARTS
Mr. Takamatsu Sakai	- Member (Railway Management) Assistant to the Director Corporate Planning Dept., Japan National Railways (JNR)
Mr. Masao Taniwaki	- Member (Train-Operation Planning) Assistant to the Director, International Dept., JNR
Mr. Ikujiro Kikuta	- Member (Line and Structures Planning) Senior Engineer, JARTS
Mr. Kenji Maeda	- Member (Track and Crossing Planning) Adviser to JARTS
Mr. Toshiaki Miyuki	- Member (Station and Yard Planning) Assistant to the Director, Research & Planning Section, Tokyo 3rd Construction Div., JNR
Mr. Ichiro Nomura	- Member (Rolling Stock and Workshop Planning)

Mr. Masanobu Niwa	Senior Engineer, JARTS - Member (Electrification Planning) Adviser to JARTS
Mr. Kazuei Asada	- Member (Signal and Telecommunication Planning) Assistant to the Director, International Dept., JNR
Mr. Tomohiro Ishiguro	- Member (Financial and Economic Analysis) Adviser to JARTS

1.5.4 Indonesian Counterpart Experts

Project Officer	Ir. Ajeh Karyana	Chief of Sub Directorate of Development, PJKA
Deputy Project Officer/Mechanical Administrator	Mr. Hardi Drs. Hatmadji P	Staff Chief of Sub Directorate of Rolling Stock, PJKA Chief of Sub Division of Planning & Programing (PHBD)
Electrification	Mr. Tugiman	Supervisor of Rolling Stock, PJKA
Signal & Telecommunication	Mr. Suradji	Chief of Division of Signal & Telecommunication West Regional Office, PJKA
Civil Engineer	Ir. Satriyo K	Staff of Directorate Way and Work, PJKA
Railway Planner	Mr. Tohir Kartabrata	Vice of Manager of Traffic and Commerce West Regional Office, PJKA
Transport Planner	Ir. Udji Atmono	Staff of Planning Division (PHBD)
Economist	Mr. Wahjuhardjo	Staff Chief of Sub Directorate of Marketing, PJKA
Ass. Administrator	Mr. Yunus	Staff of Planning Division (PHBD)