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THE STUDY ON THE MASTER PLAN OF CONTAINER CARGO HANDOLING PORTS, DRY PORTS AND CONNECTING RAILWAYS IN THE REPUBLIC OF INDONESIA

FINAL REPORT

VOL.4 FEASIBILITY STUDY OF CONTAINER CARGO HANDLING FACILITIES OF GEDEBAGE DRY PORT AND CONNECTING RAILWAYS

JULY 1995

…OF JAPAN (OCDI)

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IN THE REPUBLIC OF INDONESIA

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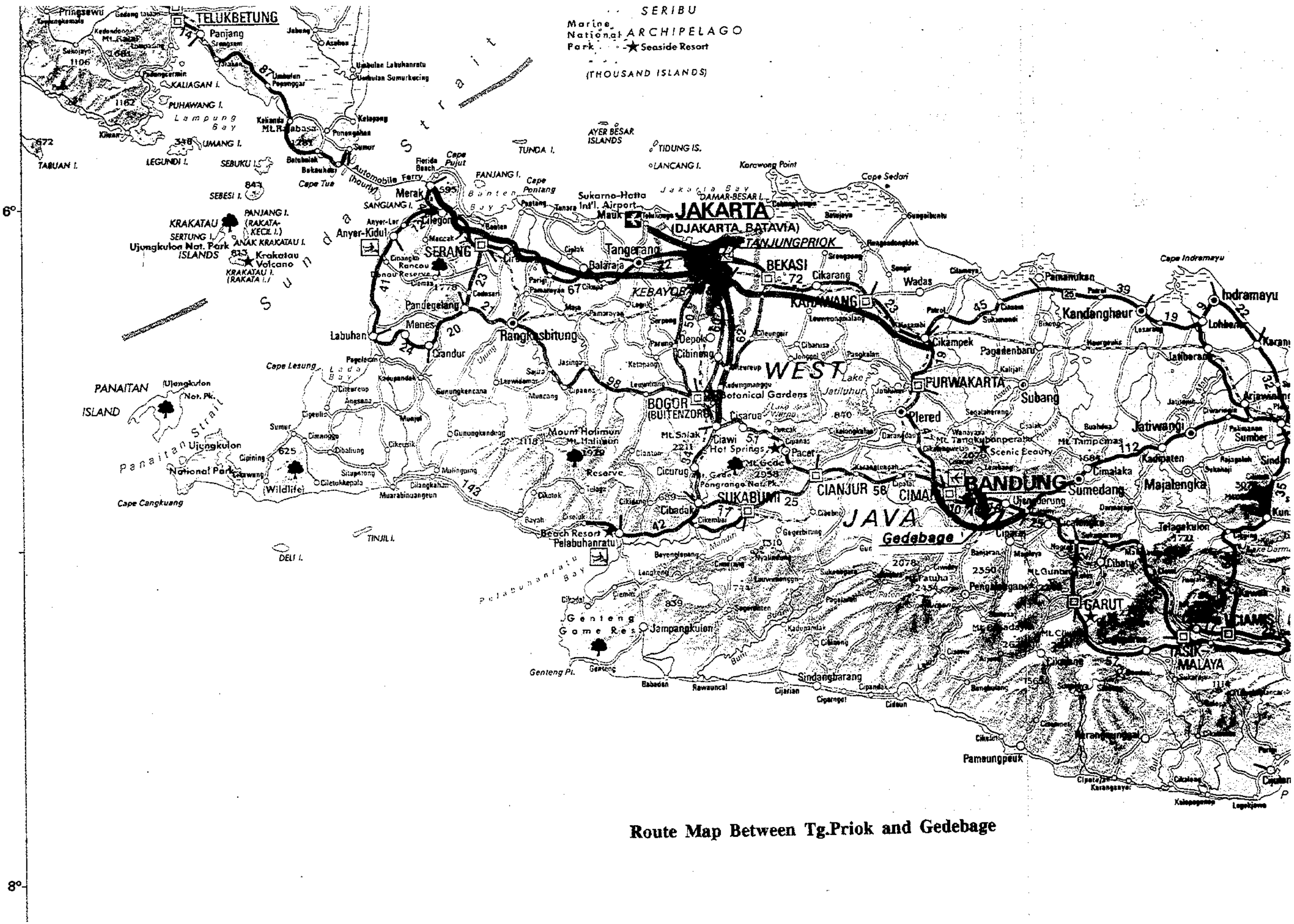
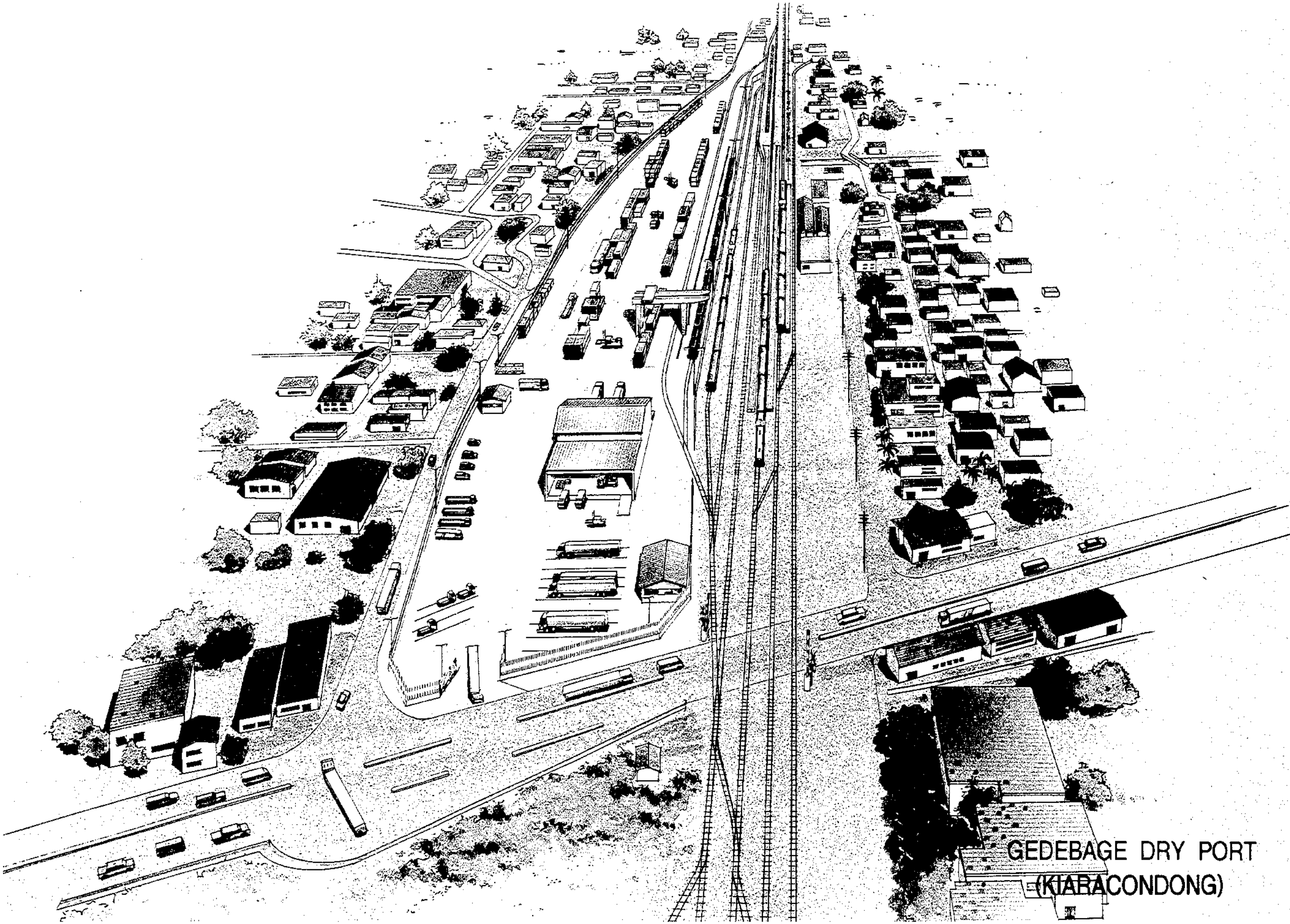
JULY, 1995

The Overseas Coastal Area Development Institute of Japan (OCDI)
Japan Railway Technical Service (JARTS)
Pacific Consultants International (PCI)



Route Map Between Tg.Priok and Gedebage



GEDEBAGE DRY PORT
(KIARACONDONG)

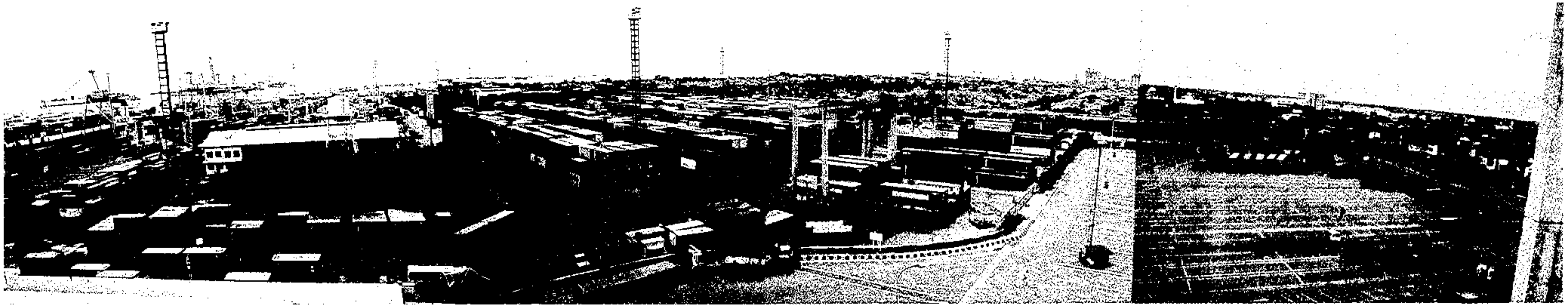


Photo. taken: April. 1994

Container Yard of Container Terminal I (CTI), Port of Tanjung Priok, Jakarta

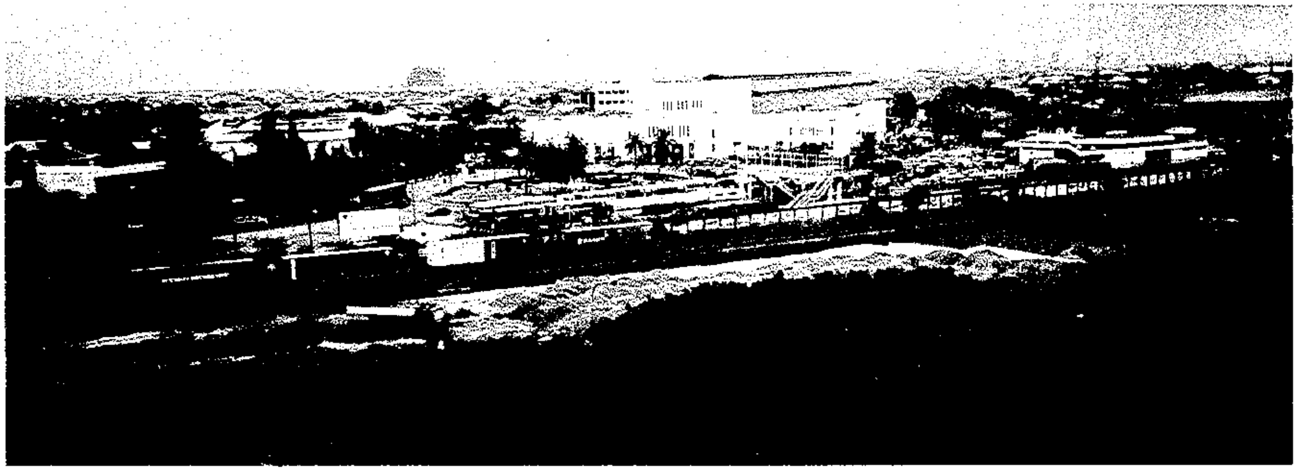


Photo. taken: May. 1994

Note:
All Photographs
are taken by
JICA Study Team

Pasoso Terminal and Tanjung Priok Station, Jakarta

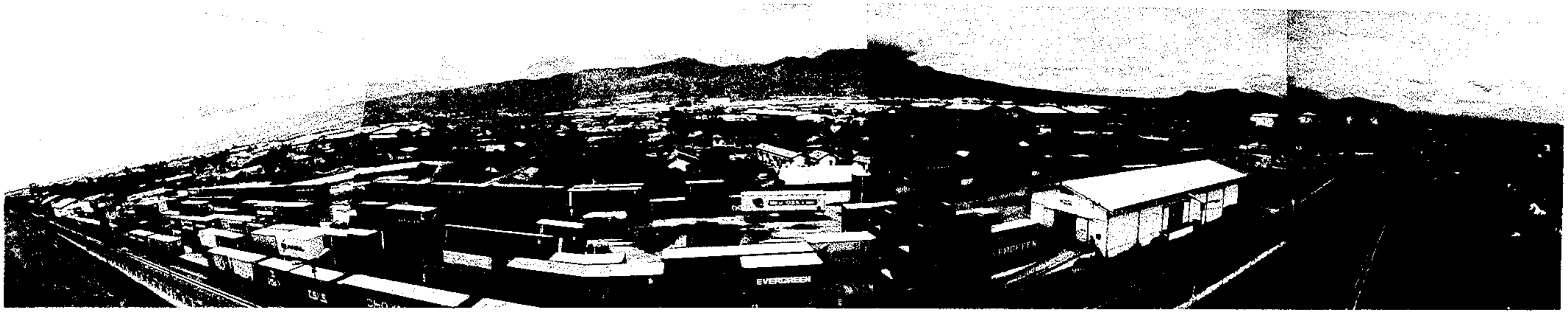


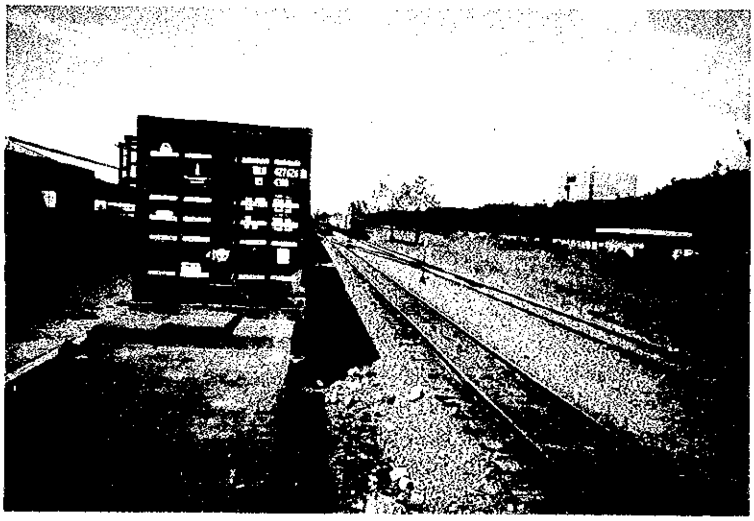
Photo. taken: April, 1994

Gedebage Dry Port, Bandung, West Java

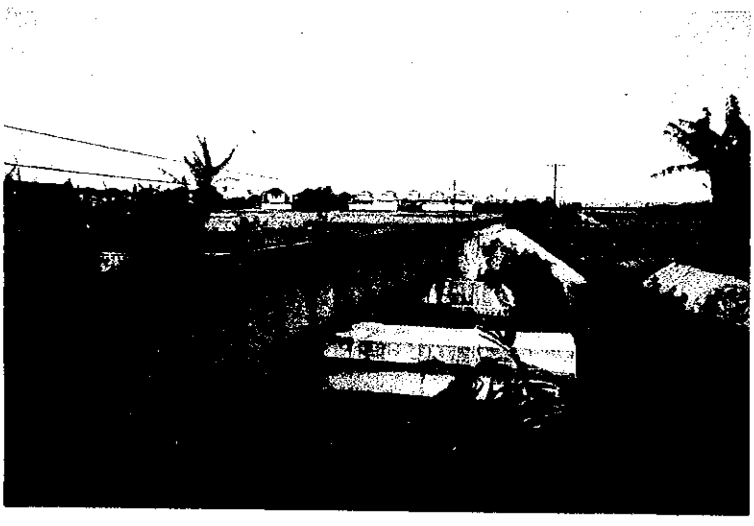
Photo. taken: April, 1994

Kiaracondong, Bandung

Land space expected for arrival and departure tracks at Gedebage



Land space expected for tracks at Pasoso container terminal



The bridge on the doubling track section between Gedebage and Kiaracondong

ABBREVIATION

1. General

CFS	:	Container Freight Station
CIF	:	Cost, Insurance and Freight
C.T.	:	Container Terminal
C.Y.	:	Container Yard
DGLT	:	Directorate General of Land Transport and Inland Waterways
GDP	:	Gross Domestic Products
GRDP	:	Gross Regional Domestic Products
F/S	:	Feasibility Study
ICD	:	Inland Container Depot
ISO	:	International Organization for Standardization
ITC	:	Inland Container Terminal
JR	:	Japanese Railways
MOC	:	Ministry of Communications
M/P	:	Master Plan
O/D	:	Origin Destination (survey)
PERUMKA	:	Indonesia Railway Public Corporation (PERUSAHAAN UMUM KERETA API)
St.	:	Station
S/W	:	Scope of Work
TCT	:	Tanjung Priok Container Terminal

2. Railway Station Name Code

Bd	:	Bandung
Bks	:	Bekasi
Ckp	:	Cikampek
Gdb	:	Gedebage
Jak	:	Jakarta Kota
Jng	:	Jatinegara
Kac	:	Kiaracondong
Kpb	:	Kampung bandan
Mri	:	Manggarai

Pdl	:	Padalarang
Pwk	:	Purwakarta
Thb	:	Tanahabang
Tpk	:	Tanjung Priok
Tg. Priok	:	Tanjung Priok
Prp	:	Parung Panjang

THE STUDY ON THE MASTER PLAN OF CONTAINER CARGO HANDLING PORTS, DRY PORTS AND CONNECTING RAILWAYS IN THE REPUBLIC OF INDONESIA
Vol.4

Table of Contents

Vol. 4: Feasibility Study on Gedebage Dry Port and Its Connecting Railway

List of Tables

List of Figures

Preface

The team selected Gedebage Dry Port and its connecting railway for a feasibility study (F/S) from among four existing routes contained in the Master Plan (M/P), and reported on the first half of the construction (till 1999) in the F/S as the Urgent Implementation Plan (Vol.2 : Chapter 8).

This F/S report (Vol.4) includes not only the investment until 2003, but additional improvements executed during the project's life span, which are necessary for both the economic and financial analysis.

The basic policy for F/S work is based on the M/P : Item 7.2.3 (Vol.2).
It should be noted that the following three stages have been carried out respectively, and they are based on different demand forecasts and are chronological in the order given below.

(1) Urgent Implementation Plan
(2) Master Plan
(3) Feasibility Study

The study going on with the above is proceeded based on the following issues.

i) As the premises, the necessary doubling of track and automatic signalization between Ckp and Pdl is completed by another Project.
ii) F/S includes urgent implementation plan and objectifies only additional number of handling containers and the additional investment from 1995, based on the container traffic demand.
iii) F/S studies whether the present transportation route can be responsible for the forecasted demand at Gedebage in 2003 year and for the set up of TCT-III expected by 2000 year or not.
iv) Major facilities to be improved are as follows. (**Fig.2-2(9)**)
    a) New additional Container terminal at Gdb.
       The study of the way of using concerning Gdb.
    b) Improvement of Tpk and Pasoso corresponding to the above and the Tg. Priok pork port improvement action plan.
    c) Improvement of car depot, if necessary.
    d) Doubling track between Gdb and Kac and the automatic signalization between them.

1. TRANSPORTATION PLAN

1.1 CONTAINER TRANSPORTATION DEMAND FORECAST

(1) Gedebage dry port

1. The Gedebage dry port is located on the outskirts of east side of Bandung city and is 187 km from Tanjung Priok Port. It started operation in 1987. Container handling statistics are shown below: (refer to Appendix 1-1(1)).

Table 1-1(1) Transported Result

Year	Container Volume (TEU)
1987	2,595
1988	8,887
1989	14,807
1990	23,065
1991	35,836
1992	52,008
1993	60,918
1994	56,603

(2) Hinterland

2. The hinterland of Gedebage dry port extends along the railway and major hinterland is Bandung city. Population of the hinterland is estimated at 2.2 million in 1993 (population of Bandung is 1.8 million) and it will reach 2.77 million in 2003, assuming an annual increase rate at 2.33%. The major export container cargo of the hinterland consists of light industrial products and agricultural products.

(3) Actual throughput of hinterland and the dry port

3. There are no data of container cargo throughput of the hinterland: Padalarang and Lembang. Container traffic survey was conducted from 8th of December to 10th of December in 1994 and during the same period, a container traffic survey was conducted at Gedebage dry port and Tanjung Priok Port.

4. Based on these surveys, approximately 100,000 TEUs containers are transported by trailer and 60,000 TEUs containers are transported by train from the hinterland, Padalarang and Lembang. Within above volume, from 80,000 to 100,000 TEUs containers is assumed to be generated from the hinterland of Gedebade dry port. Other containers are assumed to be generated from the west side of Bandung city that is better to transport directly to the port, because it's hard to cross the Bandung city to the Gedebade dry port for trailer.

5. According to interviews with Caban Dinas Llajr Kabupaten DT II Subang and the companies which use container and container traffic survey for trailer, 76% of export container and 78% of import container include empty containers are transported by train from the hinterland.

6. Based on the above, container volume of the hinterland is assumed as approximately 77,000 TEUs in 1993 and 80,000 TEUs in 1994 and estimated container cargo volume from the year 1987 is listed in Table 1-1(1).

7. Major containerized export cargo handled at the dry port is light industrial products such as textile, garment, yarn, shoes and furniture and agricultural products such as tea, woods and chocolate. Major containerized imported cargo is raw materials and machinery for industrial and empty containers.

8. The following trends are assumed based on the above.

1) The container cargo increase rate at Gedebage and in its hinterland has been decreasing, and it will get stable.

2) Ten percent of the container cargo traffic generated in the hinterland have to be transported by trailer because train cannot accommodate jumbo-size container such as

45 foot container or customer's request.

(4) Socioeconomic frame work of the hinterland

1) Population

9. The population at hinterland of Gedebage dry port is estimated at approximately 2.2 million in 1993 (population of Bandung is 1.8 million) and it is forecasted to reach 2.77 million in 2003 (by BAPEDA), annual increase rate will be 2.33% That is higher than the average growth rate of Indonesia.

2) Economy

10. Regional economic forecast is under planning, therefore future economy frame is estimated using the following procedure. According to the 25 year long-term development plan (PJP II), the growth rate of the industrial sector GDP is estimated to decrease while the GDP growth rate will increase. The GRDP of the West Jawa industrial sector is estimated by adopting the above trend based on REPELITA VI. The major container cargo commodities through the dry port are light industrial products, and therefore the growth rate of the industrial GRDP of the hinterland is assumed to be 75% of the growth rate of GRDP of industrial sector at West Jawa. The agricultural GRDP of the hinterland is estimated in the same manner as above. The results are shown below;

Table 1-1(2) Growth Rate of GRP and GRDP

(Unit: %)

REPELITA	VI	VII	VIII	IX	X
GDP growth rate	* 6.2	* 6.6	* 7.1	* 7.8	* 8.7
Industrial GDP growth rate	* 10.3	* 10.2	* 10.0	* 9.5	* 9.0
Agricultural GDP growth rate	* 3.4	* 3.5	* 3.5	* 3.5	* 3.5
GRDP growth rate of West Jawa industrial sector	** 9.2	9.1	8.9	8.5	8.0
Industrial GRDP growth rate of the Hinterland	6.9	6.8	6.7	6.4	6.0
GRDP growth rate of West Jawa Agricultural sector	** 2.0	2.5	2.5	2.5	2.5
Agricultural GRDP growth rate of the hinterland	2.0	2.5	2.5	2.5	2.5

Source : *PJP II, **REPELITA VI, Estimated by The Study Team

(5) Container transportation demand forecast through Gedebage dry port in 2003

1) Estimation of container cargo potential of the hinterland

11. Based on the above socioeconomic frame, containerized cargo volume generated from the hinterland is estimated by each commodity. The results of which are shown in Appendix 1-1(2) and summarized below. (Table 1-1(3)).

Table 1-1(3) Potential Transportation Demand

(Unit: TEU)

	1993	1998	2003	2010
Potential of Hinterland	77,000	102,000	139,000	214,000

2) Estimation of container cargo potential of the dry port and connecting railway

12. Around 10% of container cargo potential of the hinterland cannot be transported by railway because these containers are jumbo size or customers request transport by trailer. Based on above, if container transportation of the dry port and connecting railway had enough capacity for the demand, the container cargo potential of Gedebage dry port and connecting railway is assumed to be 90% of the hinterland. Container cargo potential of the dry port and connecting railway is estimated as below.

Table 1-1(4) Container Cargo Potential of The Dry Port

(Unit: TEU)

	1993	1998	2003	2010
Potential of Dry port and Railway	70,000	92,000	124,000	190,000

3) Estimation of volume of loaded container and empty container

13. Future empty container ratio is assumed the same as present ratio.

Table 1-1(5) Volume of Loaded and Empty Container of The Dry Port

(Unit: TEU)

	1993	1998	2003	2010
Loaded Export	32,000	42,000	57,000	88,000
Empty Export	3,000	4,000	5,000	7,000
Loaded Import	10,000	15,000	20,000	30,000
Empty Import	25,000	31,000	42,000	65,000

4) Estimation of volume of 20 foot container and 40 foot container

14. In 1993, 20 foot container occupied ratio was 45% and it is assumed to decrease 33% in future, it means that number of each size container will be equal.

Table 1-1(6) Volume of 20 Foot and 40 Foot Container of The Dry Port

(Unit: TEU)

	1993	1998	2003	2010
20 foot	27,096	38,000	47,000	63,000
40 foot	33,822	54,000	77,000	127,000

1.2 FREIGHT VOLUME AT CONTAINER STATIONS AND TRAIN OPERATION

1.2.1 Freight volume processed at container stations

15. The maximum processing capacity of the Gdb container handling platform at peak time is estimated only at five trains (87,000 TEUs/year) and is restricted by the narrow yard area even after the urgent implementation (On detail, refer to Item 2.2.2). According to the transportation demand forecast in Section 1.1, transportation demand for railway containers in the year 2003 is 124,000 TEUs.

(1) Owing to unloading work starting in 1998 for arriving empty containers at Kac Sub Dry Port, the freight volume processed at each station has been calculated as follows Gdb = 82,000 TEUs, Kac = 42,000 TEUs, Pasoso =124,000 TEUs in 2003 (see Table 1-2(1)).

(2) To supplement freight processing capacity at Gdb, all arrivals are handled at Kac in and after 2004 year, in order to keep freight processing volume at Gdb in 1997 at 87,000 TEUs or less.

(3) Based on the above, the annual volume of freight processed at each station is as shown in Table 1-2(1).

Table 1-2(1) Freight Volume Processed at Container Stations (unit: TEU)

	Gedebage	Kiaracondong	Pasoso	Remarks
1993	60,918		60,918	Result
1994	72,000		72,000	Forecast,
1995	77,000		77,000	here in after
1996	82,000		82,000	the same
1997	87,000		87,000	
1998	61,000	31,000	92,000	*
1999	65,000	33,000	98,000	
2000	69,500	35,500	105,000	
2001	73,000	37,500	111,000	
2002	78,000	40,000	118,000	
2003	82,000	42,000	124,000	
2004	88,000	45,000	133,000	
	66,500	66,500	133,000	**
2010	95,000	95,000	190,000	

* Unloading of arriving empty containers only at Kac St.
** Unloading of all arriving containers at Kac St.
Details are shown in Appendix 1-2(1).

1.2.2 Container transportation demand and the required supply of trains

16. Current container trains have a capacity of 34 TEUs and are aided by an auxiliary locomotive between Gdb and Pwk.
The operational pattern of container trains corresponds to Sundays and Mondays, other weekdays, and annual peak time, under consideration of weekly deviations. The team assumes that the same pattern of deviation will continue hereafter, and calculated the necessary supply of trains for yearly transportation demand based on this pattern.
The results are as shown in Table 1-2(2).

Table 1-2(2) Operational Pattern for Container Trains

i) Number of days in a year

* Sundays and Mondays	104 days
* Weekdays	201 days
* No, of peak days in a year	60 days

ii) Number of trains

	Pattern	Number of trains/year				average
	S W P	S	W	P	Total	per direction/day
Present	2 - 3 - 4	416	1,206	480	2,102	2.9
	3 - 4 - 5	624	1,608	600	2,832	3.9
	4 - 5 - 6	832	2,010	720	3,562	4.9
2003	5 - 6 - 7	1,040	2,412	840	4,292	5.9
	6 - 7 - 8	1,248	2,814	960	5,022	6.9
	7 - 8 - 9	1,456	3,261	1,080	5,752	8
	8 - 9 -10	1,664	3,618	1,200	6,482	9

Note : S = Sunday and Monday, W = Weekday P = Peak day

17. According to the transportation demand forecast, transportation demand for railway containers in 2003 is 124,000 TEUs. Since the transportation capacity per train is 34 TEUs, the number of trains required in the year 2003 is 3,647, or 6 trains per day per direction on average.

124,000 TEUs / 34 TEUs = 3,647 trains / year

To provide a margin of safety an operating efficiency of 90% was adopted, resulting in the annual number of trains being as follows:

3,647 / 0.9= 4,052 trains / year

Based on this, a 5-6-7 pattern is desirable for the year 2003, which means that an operating efficiency of 0.85 is sufficient.

3,647 / 4,292=0.85

Annual changes in the train operation pattern are as shown in Table 1-2(3).

Table 1-2(3) Transportation Demand and Required Number of Trains between Tanjung Priok and Gedebage

Year	Transpor -tation demand TEU	Number of trains /year	B/365 /day	Round-trips /day	Opera -tion pattern /day	Number of trains /year	Average number of train one round trip/day	Transpor -tation capacity TEU/year	Train operation rate B/F%
	A	B	C	D	E	F	G	H	I
1990	23,065	678	1.9	1.0					
1991	35,836	1,054	2.9	1.5					
1992	52,008	1,530	4.2	2.1					
1993	60,918	1,792	4.9	2.5	2- 3- 4	2,102	2.9	71,469	85.3
1994	72,000	2,118	5.8	2.9	3- 4- 5	2,832	3.9	96,288	74.8
1995	77,000	2,265	6.2	3.1					80.0
1996	82,000	2,412	6.6	3.4					85.2
1997	87,000	2,559	7.0	3.5					90.4
1998	92,000	2,706	7.4	3.7	4- 5- 6	3,562	4.9	121,108	76.0
1999	98,000	2,882	7.9	4.0					80.9
2000	105,000	3,088	8.4	4.2					86.7
2001	111,000	3,265	8.9	4.5	5- 6- 7	4,292	5.9	145,928	76.1
2002	118,000	3,471	9.5	4.8					80.9
2003	124,000	3,647	10.0	5.0					85.0
2004	133,000	3,912	10.7	5.4	6- 7- 8	5,022	6.9	170,748	77.9
2005	143,000	4,206	11.5	5.8					83.8
2006	152,000	4,471	12.2	6.1					89.0
2007	162,000	4,765	13.1	6.6	7- 8- 9	5,752	7.9	195,568	82.8
2008	171,000	5,029	13.7	6.9					87.4
2009	181,000	5,324	14.6	7.3	8- 9-10	6,482	8.9	220,388	82.1
2010	190,000	5,588	15.3	7.7					86.2

Note : 1. Transportation demand is based on 1990 - 1993 traffic results.

2. The transportation capacity of a train is 34TEUs.

3. Operation pattern : Sundays and Mondays - other weekday - peak days.

1.3 INVESTMENT IN RELEVANT FACILITIES

18. As the facilities investment relevant to F/S the following plans are considered surcharged on "Vol 2, Item 2.7.3(3) C ongoing and proposed development plans" in M/P.

1.3.1 Tg. Priok Port TCT III

19. The freight track at TCT III is shown in plans only, which indicate the location of sidings for loading and unloading and show the track branching off from the PERUTAMINA freight track. Any other details are still unknown.
Land acquisition for TCT III is now proceeding rapidly, so the railway extension to TCT III should be materialized.

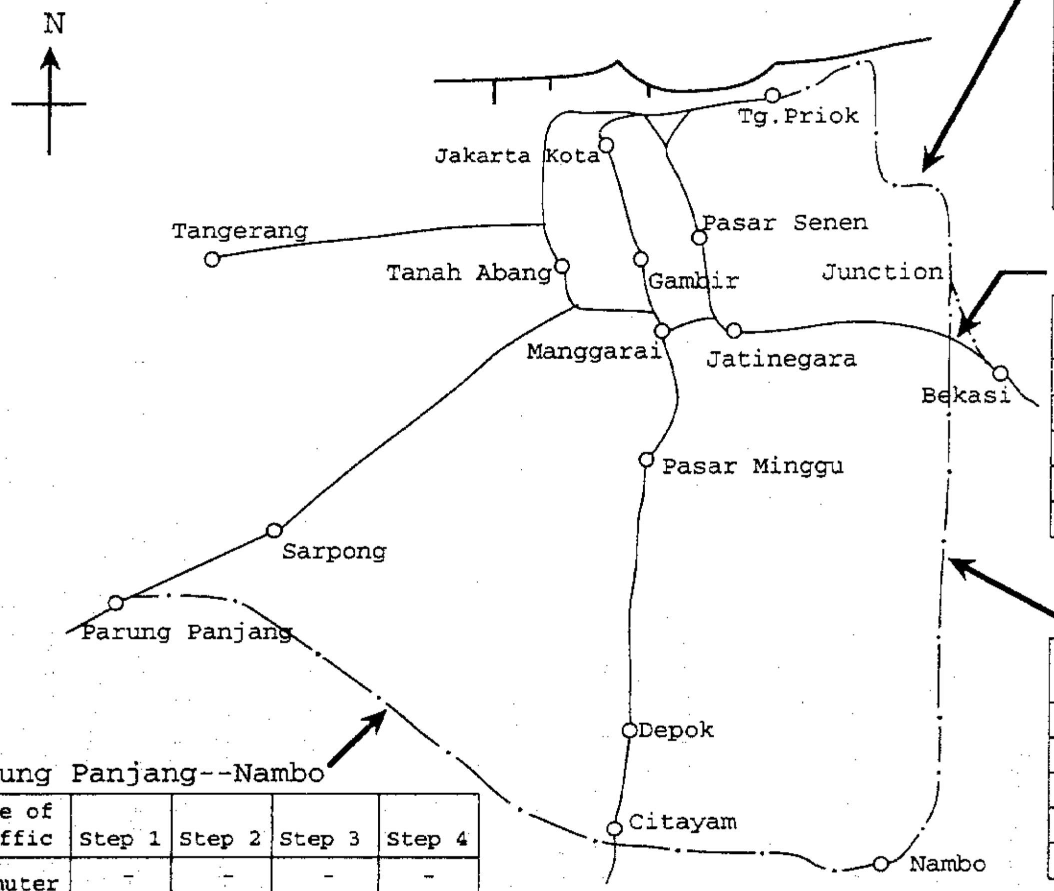
1.3.2 Railway

(1) Background on Bekasi Route

20. Bekasi Route is shown in Fig. 1-3(1), and the purpose of its construction is explained below.
Coal from Sumatra is unloaded at Parung Panjang (Prp) and transported to Kujang Cement Factory near Nambo, which produces cement products to be transported by the new line and then shipped from Tg. Priok Port.
Presently, coal bound for Nambo is carried from Prp to Bks via Mangarai (Mri) using coal freight trains. The wagons of these trains carry 30- t coal containers, which are then transferred to trailers at Bks St. and forwarded to the cement factory near Nambo.

(2) North Trunk Line

21. This is a multi-purpose line and serves intercity, commuter, and freight traffic. In particular, the section between Jng and Bks, which also serves commuters, will reach its capacity in the near future.
The following route plan is therefore needed.
Intercity transportation on the existing route to get to Jakarta Kota(Jak) is shifted to the Bekasi Line at Tpk St., joined with the North Trunk Line at Bks.
The number of trains forecasted for the future is shown in Fig. 1-3(1).
Step 1. Planned number of trains before the new line is set up.
Step 2. The planned number of trains when the new line is set up.



Tg.Priok--Junction

Type of Traffic	Step 1	Step 2	Step 3	Step 4
Commuter	-	-	-	-
Middle P.	-	0	0	0
Long P.	-	35	39	44
Freight	-	26	28	33
Total	-	61	67	77

Junction--Bekasi

Type of Traffic	Step 1	Step 2	Step 3	Step 4
Commuter	41	51	67	77
Middle P.	32	40	49	53
Long P.	30	36	41	47
Freight	21	27	28	30
Total	124	154	185	207

Nambo--Junction

Type of Traffic	Step 1	Step 2	Step 3	Step 4
Commuter	-	-	-	-
Middle P.	-	-	-	-
Long P.	-	-	-	-
Freight	-	15	18	21
Total	-	15	18	21

Parung Panjang--Nambo

Type of Traffic	Step 1	Step 2	Step 3	Step 4
Commuter	-	-	-	-
Middle P.	0	0	0	0
Long P.	0	0	0	0
Freight	11	19	22	23
Total	11	19	22	23

*Per direction per day

*The Above does not include container trains.

Fig. 1-3(1) Stepwise Train Operation Plan for the New Line

1.4 SELECTION OF CONTAINER TRANSPORTATION ROUTE AND PURPOSE OF DRY PORTS

1.4.1 Selection of transportation route

22. There exists the request for changing the present container transportation route that is due to the inability of the section between Jatinegara (Jng) and Bekasi (Bks) to handle increases in transportation demand.
As for countermeasures, the team must not only consider doubling the double track on this section, but also construction of the abovementioned new line (New Bekasi Line).
The problems with doubling the double track on the Jng - Bks Section are as follows:

i) The complex track layout at Jng would restrict transportation capacity on direction operation system.
ii) Only trains running from the east link on line operation system can use the increased line (Fig. 1-4(1)), which is favorable as a container route.

A decision on the New Bekasi Line is pending.

23. Duplicated investment to supplement transportation capacity on the Jak - Mri Section would be wasteful.
Accordingly, though a decision on whether to double the existing double track or to implement the second step of the New Bekasi Line is pending, the team must considers the setting up of TCT III by the year 2000. Therefore, at present, the team must uses the Pasoso - Tpk - Bks - Gdb route as it is until a decision is made.
This existing route will have no problems in the near future according to the traffic demand for 2003 (6 - 7 trains one way), as long as there are not large increases in commuter traffic (Fig. 1-3(1)). This is because freight and passenger traffic use the railway at different time range.

24. Though Tg. Priok Port will become the mother port as already stated, it will only regulate the facilities and the use of the platform at Pasoso and TCT III, but it matters little with the transportation capacity problem.
Since the route to Tpk. St. on the New Bekasi Line will pass through a highly populated area, it will be constructed as an elevated structure, utilizing land on the south side of Pasoso St. where there were sidings. This will permit the installation of a new branch line at Pasoso St. (Fig. 1-4(2)).
Therefore, it is desirable that there be a shift in transportation to the new line, accompanied with the construction of a new branch line.

25. Changing the above-mentioned container route and intercity passenger route will not only reduce the pressure on transportation capacity among Jak, Mri and Bks, but also cut in half the 32 km distance between Pasoso and Bekasi, which will result in the New Bekasi Line being profitable.
Early construction of the new line is therefore warranted.

1.4.2 Purpose of dry ports

26. The team has decided in the Urgent Implementation Plan that Kac St. handles only unloaded imported empty containers.
It seems very effective countermeasure, because of small scale of the initial investment, although there will be an increase in handling costs owing to out-of-service chassis being sent from Gdb St. to Kac St.

27. However, an increase up to eight trains or more (one way) results in the need for not only arrival and departure tracks at Gdb St, but also requires a gantry crane, a sub-main track and repavement for container yard at Kac St.
In this case the potential handling capacity is estimated at ten round trips.
Based on the above, the following argument would arise; improvements at Gdb St. should be kept within the Urgent Implementation Plan, thereafter Gdb and Kac should become an integrated dry port, by unifying the former handling loading and the latter unloading.
Gdb St. and Kac St. can then correspond to Pasoso and TCT III platform individually.
On the other hand, Gdb St. can only handle a maximum of five trains (one way) at peak time (four trains on average), because the present container yard space at Gdb St. can be enlarged only a little bit more, and three stacks have already occurred below the crane at a max of four trains operation stage.

28. Furthermore, for Kac St. to handle remained these five trains (one way) at peak time, it must install storage sidings and one lead track, which will require land acquisition on the Gdb St. side and expensive earth works for a hill full of houses. In addition, tractive locomotives must be exchanged, which will disturb the grade crossing on the Bd side and increase the closing time of the gate. (Fig. 1-4(3))

29. In conclusion, the team will continue with the separate loading and unloading system in and after 2004.

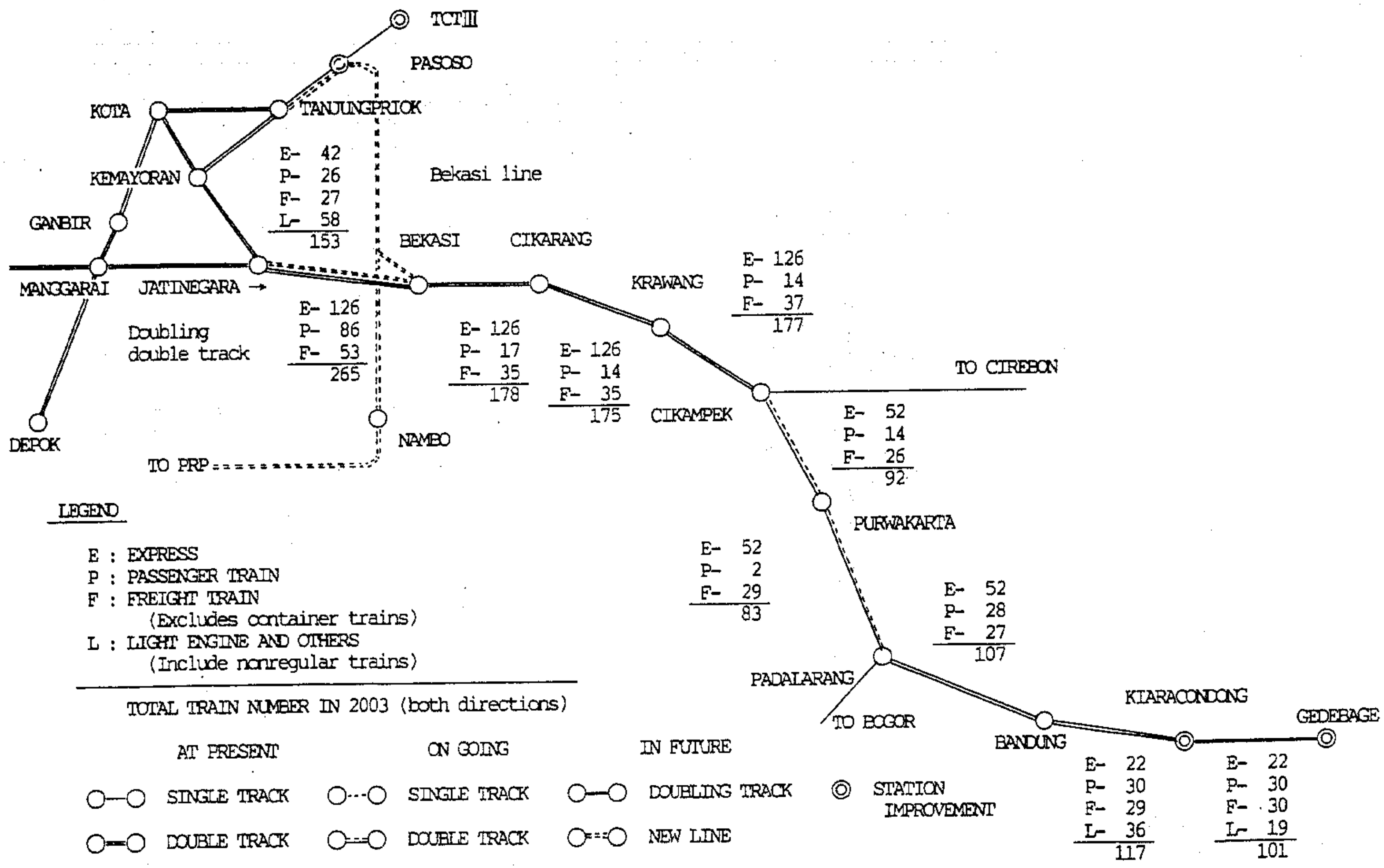


Fig. 1-4(1) Main Improvements for Container Transportation

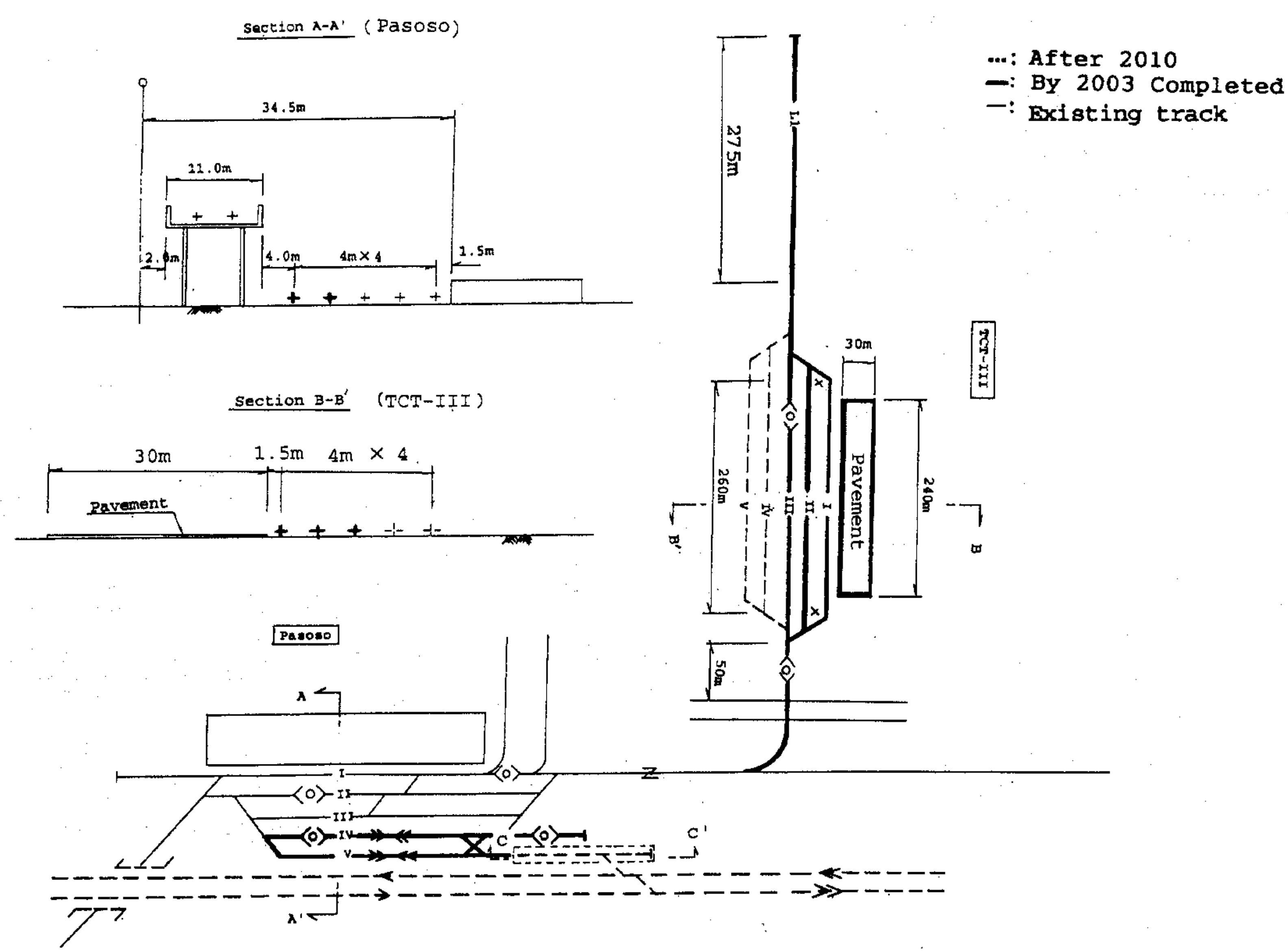
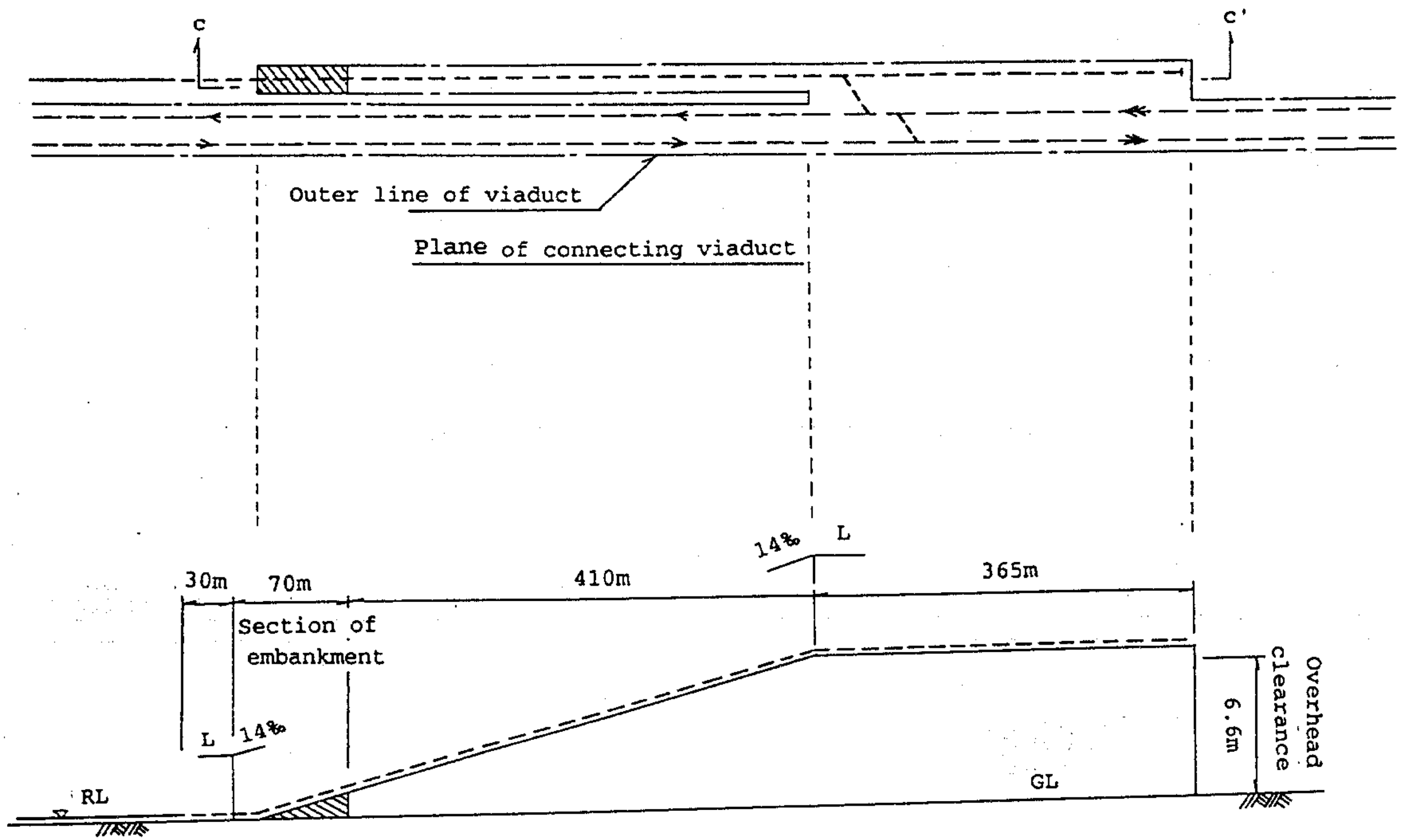


Fig. 1-4(2) Track Layout at Tg. Priok (Pasoso, TCT - III)


c
c'
Outer line of viaduct
Plane of connecting viaduct
14‰
L
30m
70m
410m
365m
Section of
embankment
L
14‰
RL
GL
6.6m
Overhead
clearance

Profile c-c′

K I A R A C O N D O N G

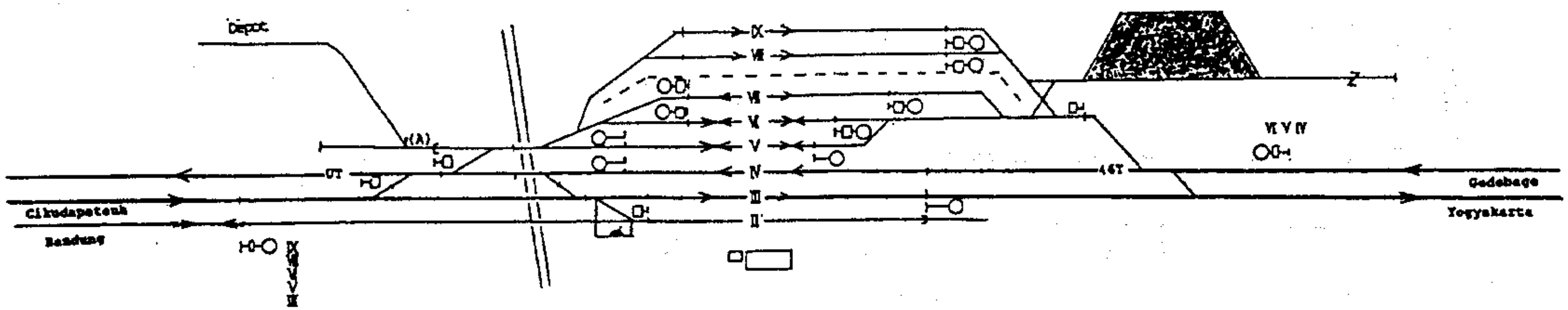


Fig. 1-4(3) Kiaracondong with Non-separated Functional System

2. CONSTRUCTION PLAN

1. The Urgent Implementation Plan is for the first half of the period that the F/S covers and is to resolve existing bottlenecks.
Improvements in the second half of the period are executed step by step in accordance with annual traffic demand increases.

2.1 CONSTRUCTION STANDARDS

(1) Railway Facilities and Dry Port

2. Track construction shall conform to Indonesia National Rail Track Construction Standards, established by the Governance of the National Railroad Edict of April 2,1986.
Dry port Standards shall be designed by referring to "The standards of Port and Harbor of Facilities" the Japan Port and Harbor Association.

a. Construction standards for railway facilities
i) Classification
Track capacity, maximum speed, axle load and other items for each class of track are listed in the following Table 2-1(1).
ii) Construction gauge
The construction gauge is the clearance area for a running train and must always be free of any foreign material that may disturb the train running.

3. The measurements for construction gauge on single and double track, not only on straight track but on curved track as well, are shown in Fig. 2-1(1), Fig. 2-1(2), Fig. 2-1(3) and Fig. 2-1(4).
The above measurements are also applicable to container wagons/box containers (standard ISO type). (Fig. 2-1(5)).
Construction gauge on curved track is measured from the rail center at a height of between 1m and 3.55m from the rail head.

※ At free traffic
From 2.35m to 2.53m on the left-hand and right-hand sides of the center line.
※ At stations
From 1.95m to 2.35m on the left-hand and right-hand sides of the center line.

※ At bridges

2.15m on the left-hand and right-hand side of the center line.

iii) Effective length at a station

Effective length of main track at a station is 320m (including the Northern Trunk Line). The effective length of shunting track (L1, L2) at Gdb St. is to be improved to 275m (260m+15m).

However, for sub-main track only for container trains with an auxiliary loco, the effective length is 290m for both Gdb and Kac stations.

iv) Number of utilized turnout

Siding track ---- 8#
Departure track ---- 10#
Arrival track---- 12#

v) Grade in stations

The grade at relevant stations is set from 0‰ to 5‰.

vi) Width of formation level and track interval

The minimum distance between two tracks shall be 4m, and formation level width will be as shown in Fig. 2-1(6) and Fig. 2-1(7).

vii) Sub-grade

※ Composition of Sub-grade

Sub-grade will consist of a continuous layer of natural soil or crushed stone 30cm in thickness.

Composition will be decided by considering a track's importance, economical track load, etc.

In addition, material sufficient to bear forecasted loads and to remain stable during vibration and/or mud-pumping will be selected (Fig. 2-1(8)).

※ Degree of Composition

Sub-grade shall be compacted at more than 11kg/m^3 as the K-30 value of the ground coefficient to protect pavement.

It is important to carry out compaction sufficiently in order to keep rainwater from easily permeating Sub-grade.

The thickness of the surface layer on the top of the Sub-grade shall be more than 30cm, and satisfy the necessary CBR.

4. The method of substituting a K-30 value with an in-situ CBR is calculated below.
   * Conversion of in-situ CBR to a laboratory CBR.
   Laboratory CBR = 2/3 * in-situ CBR (see Fig. 2-1(9))

* Conversion of a laboratory CBR to a K-30 value.
  The relationship between K-30 values laboratory CBR is as follows:
  K-30 value =(log of laboratory CBR + 0.192)/0.115.
  (The CBR value is less than 30%, see Fig. 2-1(10))

b. Dry port design standards (pavement)

i) Design load

It is natural that the static and live loads vary in terms of the loading system, and also that there is some difference in terms of the types of machines.

It is necessary to carry out design work based on not only the types of handling machines at Kiaracondong and Pasoso, such as transfer cranes or forklifts, but also on the location of fixed facilities such as the CFS, the management office, etc. Container dimensions shall be based on the 20ft and 40ft types to be handled, whose maximum weights are 20.3t and 30.5t respectively.

In the case of stacks (a stack of three is at the max.), the static load is calculated as below.

* In the case of stack of three 40ft containers.
  (30.5t × 3 containers) ÷ 4 = 22.9t
  The pavement has to bear 23t as one dot load.

ii) Classification of pavement

It shall be classified on the basis of the loading system and the facility arrangement plan.

In the case of the dry ports at KIARACONDONG and PASOSO, they shall adopt asphalt pavement in consideration of the container storage, wagon passage, the handling machines, drainage, etc. (see Fig. 2-1(11)).

5. The characteristics of asphalt pavement are explained below.

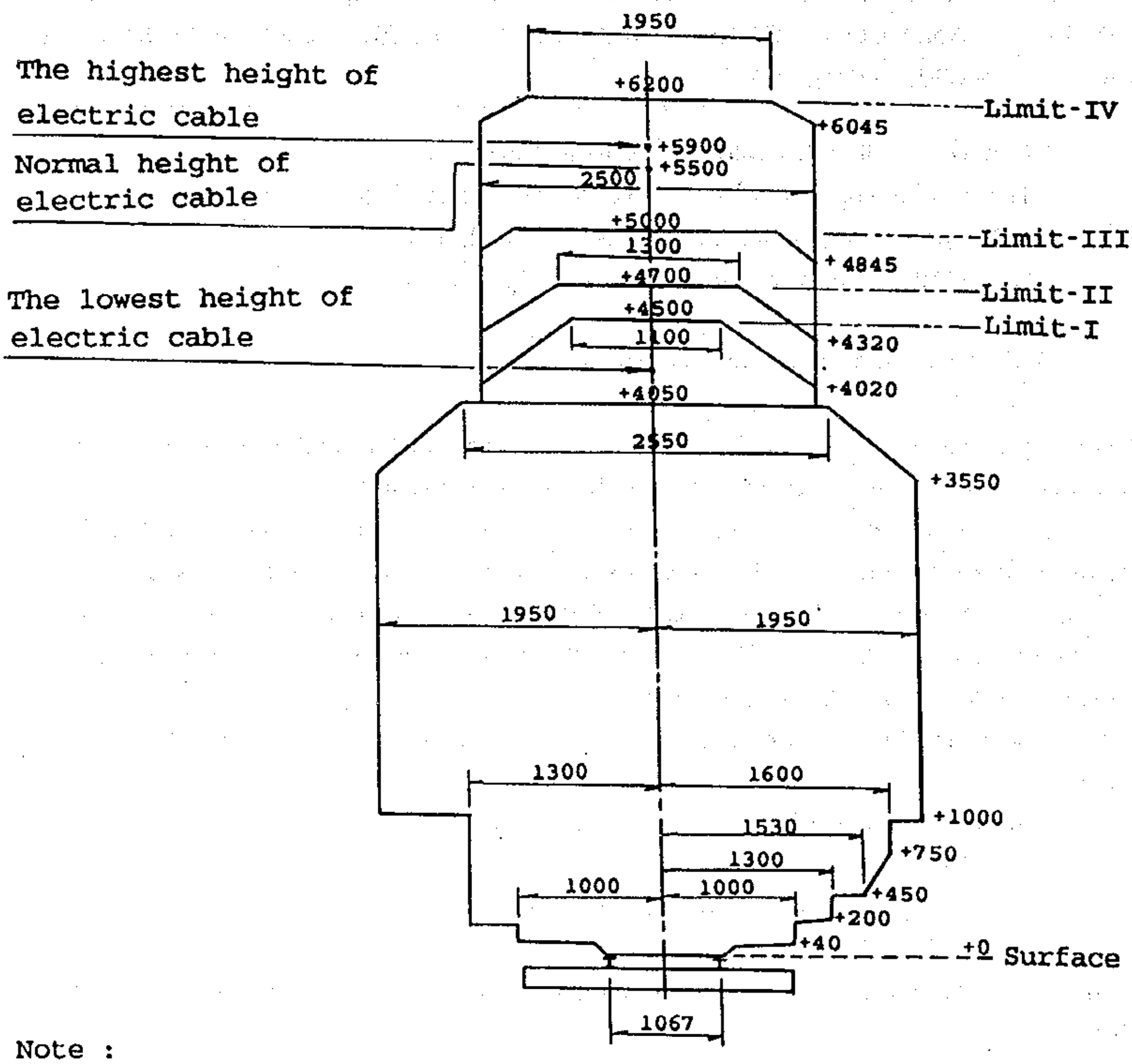
Advantages

* It is easy to construct step by step.
* It can adapt to some extent to differential settlement under a sub-grade.
* It can be used earlier because curing time after execution is short.
* It is easy to repair.

Disadvantages

* The life span of asphalt concrete is relatively short.
* It is weak against a static load with heavy contact surface pressure, against repeated loads, and against dents and ruts easily.

Topographical maps used for the planning are shown in Appendix 9-1 - 9-7.



Note :

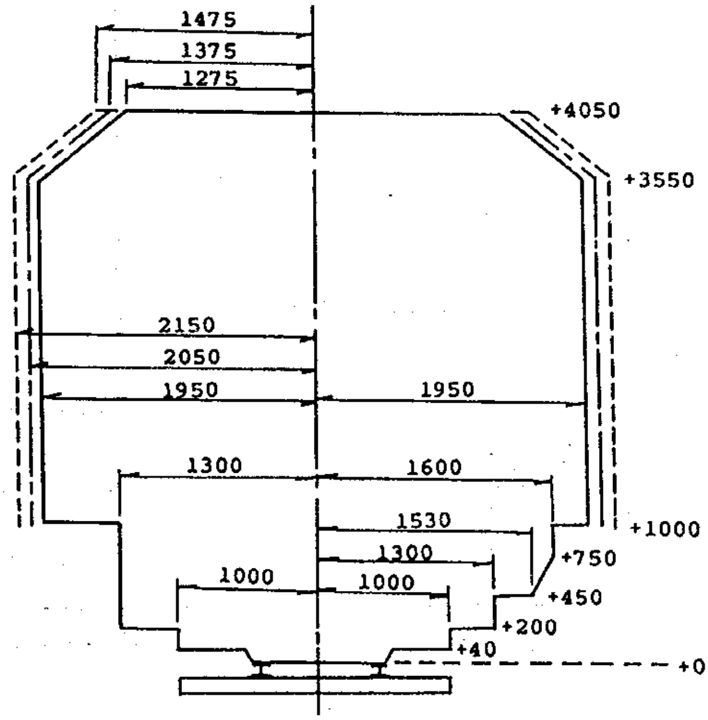
Limit-I For bridges with train speeds up to 60 km/h

Limit-II For viaducts and tunnels with train speeds up to 60 km/h and for bridges without a speed limit

Limit-III For new viaducts and old buildings, excluding tunnels and bridges

Limit-IV For electric train traffic

Fig. 2-1(1) Construction Gauge on Straight Track



Note :

——— Construction gauge on straight track and on curved track with a radius of 3000m

—·— Construction gauge with a radius from 300m up to 3000m

-------- Constuction gauge with a radius of 300m

Fig. 2-1(2) Construction Gauge on Curved Track

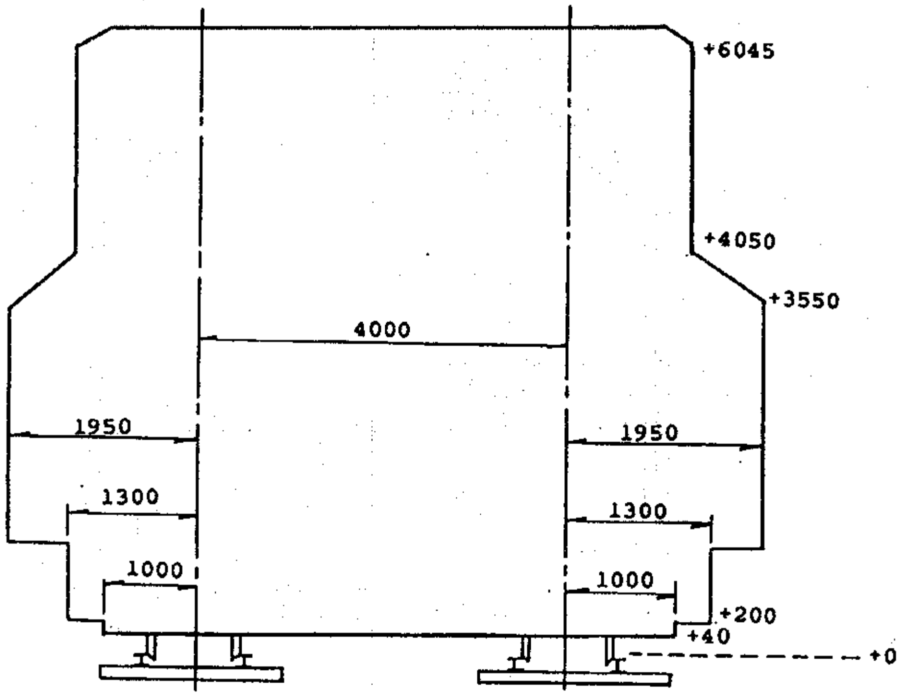


Fig. 2-1(3) Construction Gauge on Straight Double Track

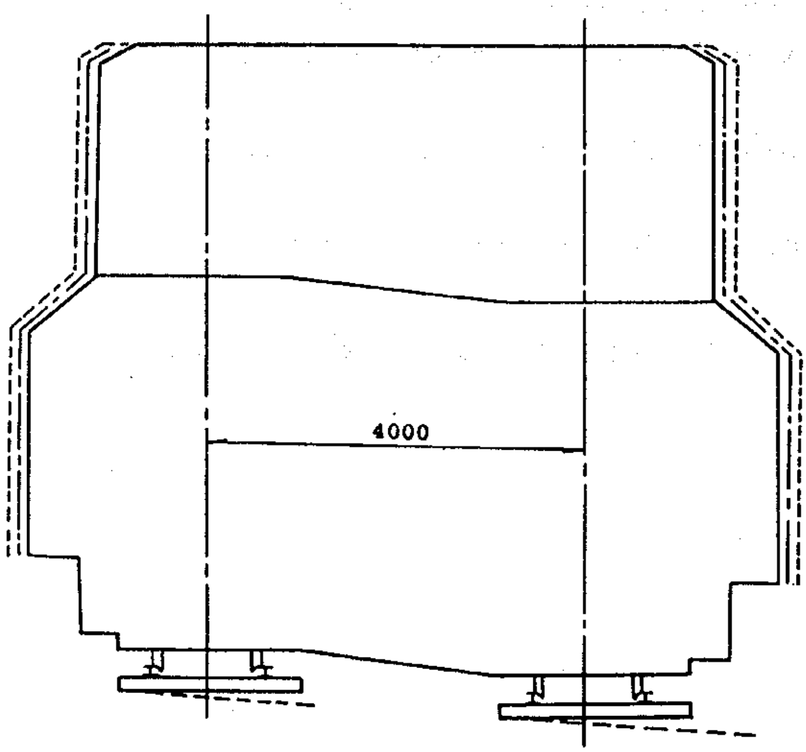


Fig. 2-1(4) Construction Gauge on Curved Double Track

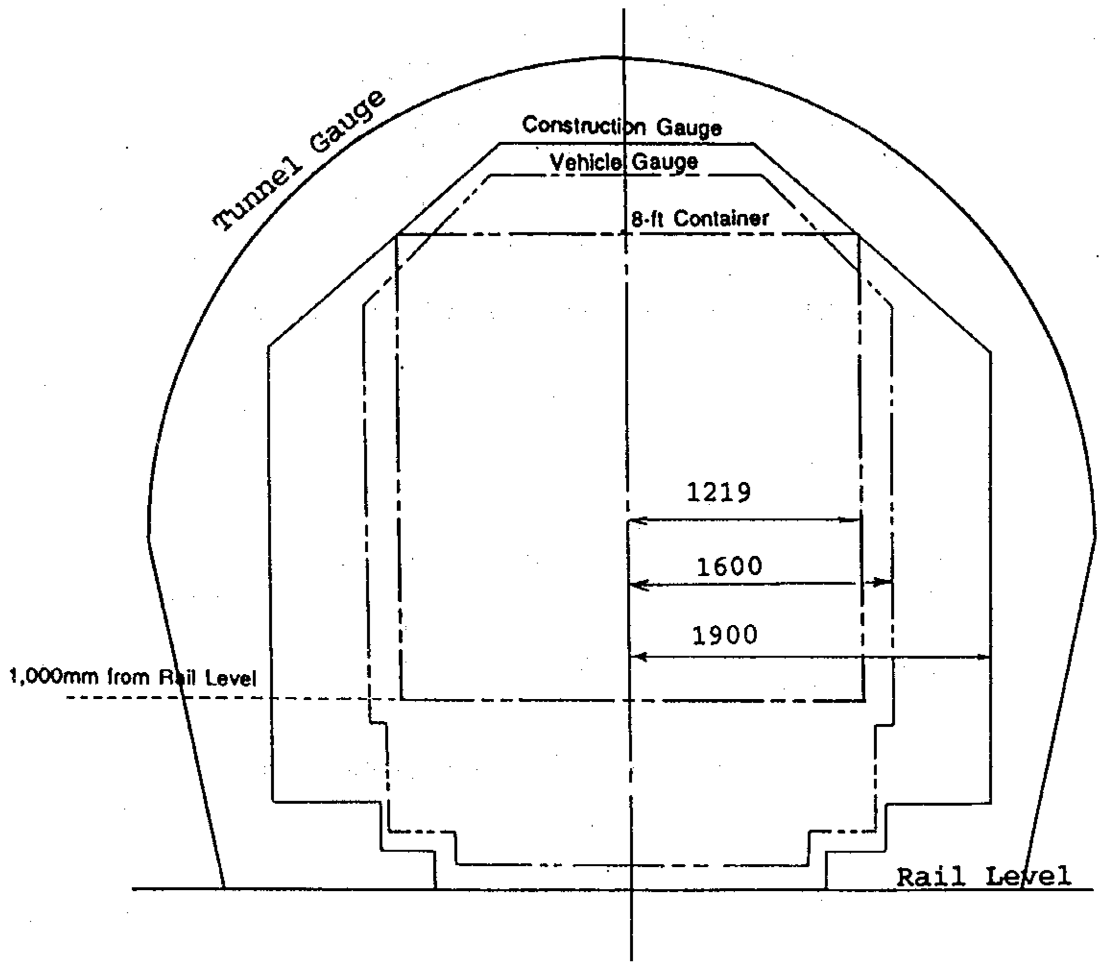


Fig. 2-1(5) PERUMKA Gauge and the Measurements for a Standard Container

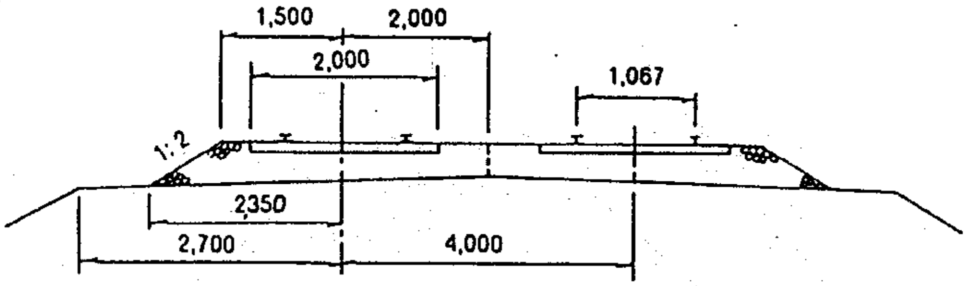


Fig. 2-1(6) Cross section of Straight Double Track

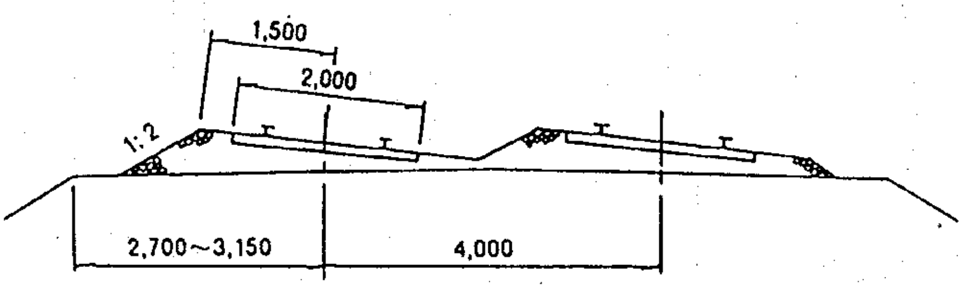


Fig. 2-1(7) Cross section of Curved Double Track

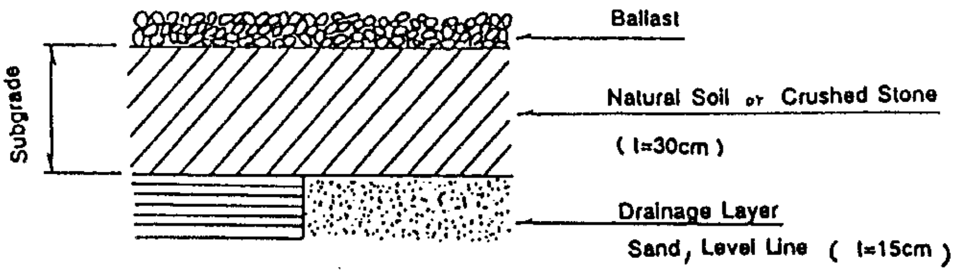


Fig. 2-1(8) Composition of Subgrade

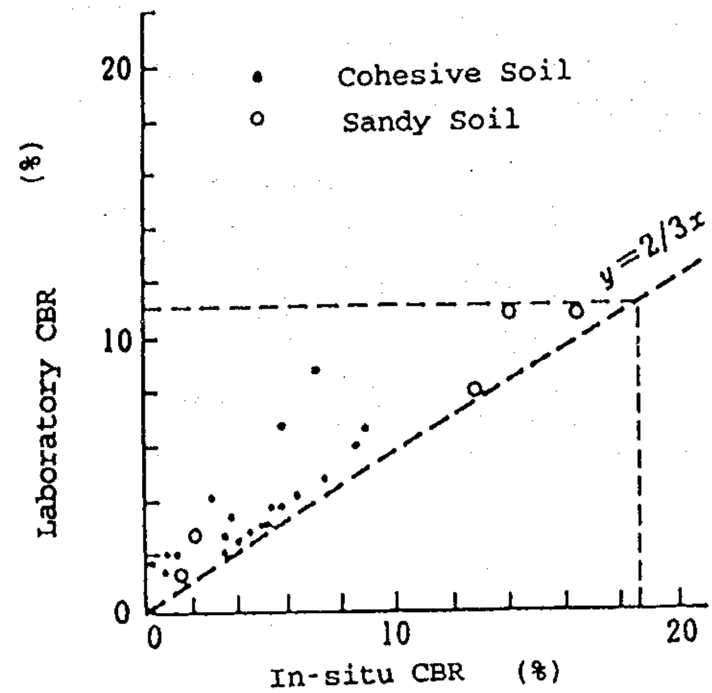


Fig. 2-1(9) In-Situ and Laboratory CBR

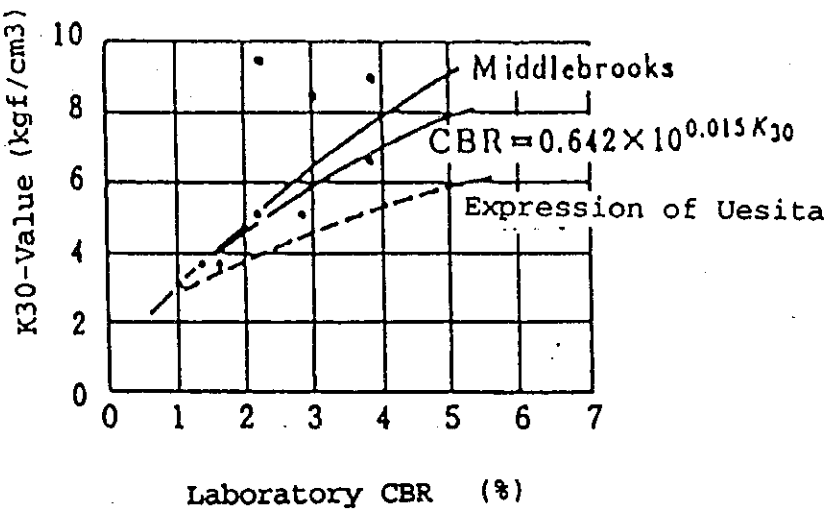


Fig. 2-1(10) K30-Value and Laboratory CBR

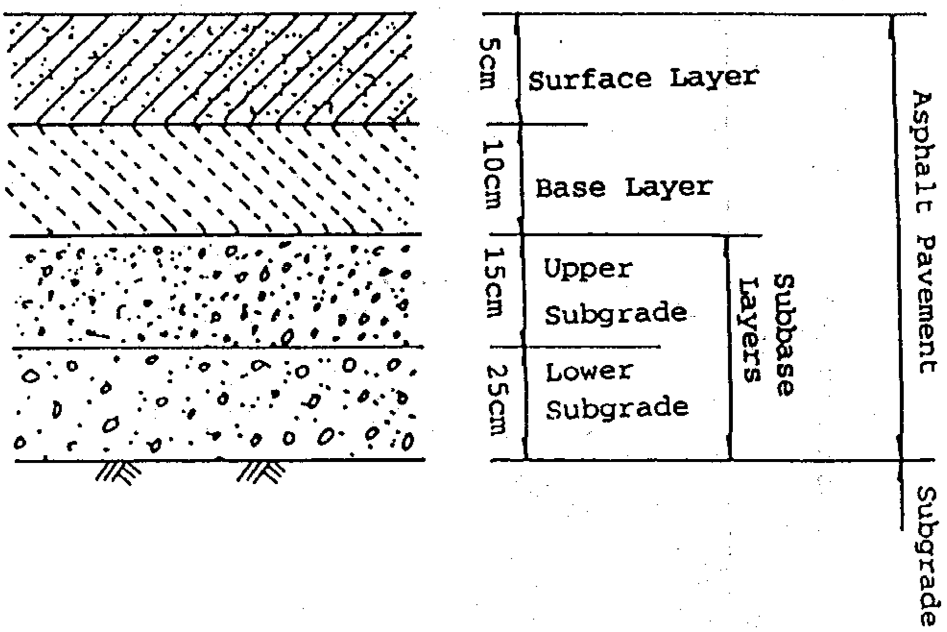


Fig. 2-1(11) Composition of Asphalt Pavement

Table 2-1(1) Classification of Track

Track Class	II	III
Traffic Carrying Capacity (t/year)	(10.1~20.1) × 1,000,000	(5.1~10.1) × 1,000,000
V :Max(km/hr)	110	110
P :Max axle load (t)	18	18
Rail type	R54/R50	R54/R50/42
Sleeper type	Concrete/Timber	Concrete/Timber/ steel
Sleeper space	600mm	600mm
Upper ballast thickness	30cm	30cm
Width of ballast shoulder	50cm	40cm
* Applicable section	Tg.Priok-- --Padalarang	Padalarang-- --Gedebage

(2) Signalling and telecommunication

6. The standards to be adopted result not only in an increase on track capacity but in the following as well:

* Improvement in operational safety
* Ease in handing
* Improvement in equipment reliability and maintenance
* Response for high speed and high density operation

a. Block system

A Morse-code signalling system is used at present, but this will be changed to automatic block system to promote operational safety and quick block setting.
The automatic block system (single track) has the following advantages:

i) Handling advantages

* The contents of required communication (e.g., train direction) between adjacent stations are simplified.
* Direction setting work is easy and quick.
* Train route setting can be changed easily by combining the block system with electronic (relay) interlocking devices.
* Track capacity is substantially increased by shortening route setting time.

ii) Safety advantages

* This system reduces accidents because it simplifies required communications between adjacent stations.
* A dangerous accident does not occur even if a communication error arises.

iii) Operation advantages

* This system increases the work efficiency because of simpler communication.

b. Interlocking devices

At any station where an automatic signalling system is to be installed, the mechanical interlocking devices will be replaced with electronic interlocking devices. (In 1989, the Minister of Transport & Communications issued an ordinance that interlocking devices must be electronic.)
A starting signal for a non-automatic section normally indicates red.
Whenever a train wants to start, the signal lever has to be reversed every time to obtain green signal.
This is called reset indication (and is equivalent to a signal resetting machine for a

mechanical signal.)

7. Electronic interlocking devices, although more advanced, have been developed based on the theory of existing relay interlocking devices.
Compared with mechanical interlocking devices, they have the following advantages:

i) Handling advantages
 * Since switch levers need not be operated in advance, the frequency of lever handling is small.
 * Levers are small and easy to handle.
 * Since a lever need not be operated by a fixed procedure, human error is infrequent.
 * When instructions for route formation are transmitted, the centrally controlled related switches indicate their status automatically with signals. Therefore, handling time is shortened.
 * Various indication lamps enable the confirmation of handling results.

ii) Safety advantages
 * Since the equipment has no mechanical interlocking part, no failure due to wearor friction occurs.
 * No serious accident due to an error in lever handling occurs because of the electric locking.
 * Since the system is ordinarily handled by one person, errors due to communication are infrequent.

iii) Operational advantages
 * Since route lever setting and block setting can be performed on the same control panel, communications between neighboring control offices are unnecessary.
 * Operation is easy and efficient.
 * Maintenance is easy because not many mechanical parts are used.
 * Improvements required for high density train operation are easy.

iv) Compared with relay interlocking devices, electronic interlocking devices have the following functional advantages:
 * Higher safety due to train tracking, etc.
 * Equipment standardization (hardware, main program)
 * Better man-machine interface
 * Satisfaction of user needs

c. Signal devices

The currently used semaphore signals will be replaced by color light signals. As a result, failures of mechanical parts composed of levers and steel ropes can be eliminated, maintenance can be reduced, and signal visibility distance at night can be extended.

* Shunting signals will be installed to facilitate shunting work.
* A distant signal will be installed at places where a minimum visible distance of 600m from a home signal is not secured.
* If tracks share a home signal, route indicators will be installed.
* A calling-on signal will be installed so that a tractive locomotive sent from a depot can be directly connected with a container wagon formation at arrival and departure tracks.

d. Point switch movements

Motor driven electric switch machines will be installed.
Electric switch machines bring about various advantages. For example, switching time can be shortened. Since the switching and locking state of switches can be electrically indicated, trains and routes can be easily related to each other. As a result, extremely high levels of safety can be assured.
Locally operated mechanical switch machines connected with interlocking devices will be installed for infrequently used shunting switches.

e. Track circuits

i) Track circuits are electric circuits used for detecting trains. Rails are a part of an electric circuit. The presence of a train is detected by short-circuiting the section between two rails with the axles of a vehicle's wheels.
Track circuits bring about the following advantages:

* The presence or absence of a train can be continuously detected.
* The cost is small because rails are used as part of a circuit and no cables need to be installed.
* This system is fail-safe because damage to a rail results in the presence of a train being detected.

ii) AC track circuits will be installed.

Since DC electrification is approved in Indonesia, the commercial frequency track circuit method, which is the most general, reliable, and economical method, will be used.

iii) In forming a track circuit in a station yard, the following should be done:

* Iron sleepers should be replaced by wooden sleepers.

* Twin girders should be insulated.
* Flooding should be prevented by constructing drain ditches.

iv) One track circuit will be formed between two adjacent stations.

2.2 LAYOUT OF REQUIRED FACILITIES AND THEIR USE AT STATIONS

8. As for the F/S, station improvement after finishing the Urgent Implementation Plan is described below.
Use of facilities for daily work is shown in Section 4.1.

2.2.1 The premises at track layout plan

(1) Even if TCT III is set up by the year 2000 and can cope with the traffic demand in 2003, Tg. Priok Port will be used as a feeder port for a while and then will be changed to a mother port.

(2) The construction of TCT III will result in an increase in the number of trains, so Kac St. will only handle unloading and Gdb St. will only handle loading in the future.

(3) The transportation route is kept as it is for a while, in spite of the above, and shunting work is conducted by a shunting locomotive at Tpk St. and as well by a shunting locomotive at Gdb and Pasoso stations.
The Bandung Depot will be used for daily inspection and fuelling

(4) Transportation facilities between Ckp and Bd will be improved by another project. The influence of building a new dry port along the transportation route is taken into consideration in this F/S.

(5) Doubling track between Gdb and Kac stations is carried out. These tracks are not used as two parallel single track, but as inbound and outbound track since a plan to the double track on the Banjar side has already been considered.

2.2.2 Gedebage St.

9. Maximum processing capacity at Gdb St. is estimated at five trains for loading and unloading work. This is because containers in stacks of three even now (four trains at peak time) and the area for containers is small.

a. The case of Tg. Priok Port becoming a mother port after 2000 is considered.

In this case, export containers departing from Gdb St. have to be classified by two destinations: Pasoso and TCT III.
It is reasonable to conduct this work at Gdb St., because container trains are kept there waiting for a long time in order to depart.
Shunting and storage is carried out at the storage sidings on the Banjar side.
Accordingly, four arrival and departure track will be added to the Kac side and the existing arrival and departure track (3#) converted to the track to turn back tractive locos and provide passage for wagon formations.
The lead track L1 is extended for easy shunting.
Below, the use of this track is described. (Both land acquisition and construction is executed simultaneously together with doubling track. Fig. 2-2(1)).
A train arrives at A1 or A2 and the tractive loco. moves to 3# and switches back to the Bd Car Depot.
A shunting loco. leads a wagon formation at 4# to S1 (or S2), after keeping it on the storage sidings. The loco moves the wagon formation waiting at A1# or A2# to 4# and then the loading work for that starts. (Fig. 2-2(3)).

10. The destination classification for both Pasoso and TCT III is conducted on the loading platform with the top-lifters and the gantry crane, by utilizing this area as a marshalling yard as shown in Fig. 2-2(2).
The arrangement of the coupling order is conducted only at the storage sidings.
The wagon formation parked either at S2 or S4 is moved to D1, or D2 via 3# to wait for departure. This formation starts as a train, after it is coupled with a tractive loco sent from the car depot.
Container yard space is desirable to accommodate handling volume all day for containers not stacked more than two high.
The area is narrow even after enlarging pavement, but it is possible to accommodate the containers of eight trains for loading only as shown in Fig. 2-2(1).
The maximum number of trains that can be handled is at most ten round trips (nine on average), taking into consideration both container yard space and the capacity of the track layout.

b. Doubling track and installing arrival and departure track is accompanied by a change in the track layout of the station yard, such as shifting the lead track L2#.

c. The extension of lead track L1# to 275 m is available for the work of classifying

wagons by their destinations.
It is necessary that the main track be shifted 2 m to secure the formation width for the lead track extension due to submergence.
If drainage work can resolve the bottleneck at the stream crossing the existing line by 2003, extension work would be easy and not expensive.

d. An additional office is to be built in accordance with increased demand

e. The possible number of wagon formations that can be stored is seven in all as shown in Fig. 2-2(3) and 2-2(8); this corresponds to ten round trips.

2.2.3 Kiaracondong St. (Fig. 2-2(4))

11. To accept all imported containers, the following work is to be executed by 2003.

a. One arrival and departure track is added to accommodate more trains in and after 2004. Accordingly, one gantry crane that can span two tracks is installed.

b. The existing fence securing the bonded area is moved 4 m further out from the container yard.

c. Heavily paved surfaces are used when handling all imported containers.

d. The activities of facilities are explained in section 4.1.

e. The approach problem for the grade crossing will be alleviated by adopting the following countermeasures.

i) A system that separates entering and exiting independently will be used, and a waiting place for quick shunting of trailers is established as shown in Fig. 2-2(5).
ii) As stated in Urgent Implementation Plan (Vol 2. Item 8.1.4.1), the existing dead head handling side track (9#) is converted to a sub-main track with through type. These can eliminate wasteful shunting of container wagons that disturb traffic flow near the grade crossing.

f. The container handling layout in Kac Yard is as shown in Fig. 2-2(6).
Storage and delivery at the container yard has to be conducted smoothly.

The layout of the container yard is planned to accommodate the daily arrival of ten trains a day, taking into consideration of container volume, delivery storage, and the working areas for the vehicles and handling machines.
The container freight station (CFS) will handle less container loads (LCL), which account for 5% of all full containers. Floor height is about 1.3 m or the same as a truck (Fig. 2-2(6)).
There is to be an open space of more than 10 m in front of the maintenance shop building.

2.2.4 Tg. Priok Port

12. The purpose of the container transfer yard at TCT III in Fig. 1-4(2) is the loading and unloading with top-lifters as well as at Pasoso. Destination classification is all conducted at the port's marshalling yard.
The max. number of wagon formations that can be stored in the F/S is six, because eight trains (single direction) at peak time will be operated during 2004 - 2006. (Refer to Table 1-2(3))

(1) TCT III (Fig. 1-4(2))

13. A loading and unloading track (1#), a storage track (2#), a locomotive run-round track (3#) and a lead track (L1#) are installed in TCT III, respectively.
The track layout is sufficient for a shunting loco. to shunt at the entrance of the loading and unloading track, which will permit the loco. to avoid traffic congestion on the street. The track space denoted by the dotted line is secured in case either there is an increase in the number of trains or a new container yard between Ckp and Bd is realized in the future.
A train that started from Gdb St. arrives at 3# track in TCT III via Tpk and Pasoso. The shunting loco. moves the starting wagon formation to the loading and unloading track (1#), to the storage track (2#), and then shifts the arrived wagon formation from 3# to 1#. Afterwards, wagons are moved to Pasoso after coupling at 2#.
The loading and unloading work for containers is conducted by using top-lifters and chassis, available for other work when free.

(2) Pasoso (Fig. 1-4(2)

14. A storage track and a locomotive run-round track are installed taking the future of the Bekasi Route into consideration.
This storage track will be converted to an arrival and departure track after setting up the New Bekasi Line. This will bring not use of storage track at Tpk St., since the utilization between Tpk and Pasoso changes unnecessary.

(3) Train storage capacity

15. Storage tracks capable of handling a max. of six wagon formations for eight train operations during 2004 - 2006, as well as seven wagon formations for ten train operations during 2009 - 2010, are sufficient as below.

Pasoso	6 wagon formations	
TCT III	2	ditto

2.2.5 Relationship between facilities capacity and transportation capacity

16. The relationship between the necessary annual supply of trains (based on the demand forecast) and investment in facilities is summarized based on the above items 2.2.1 to 2.2.4. The results of it are as shown in Table. 2-2(1)), where the max, number of wagon formations to be stored is calculated by interpolating the existing train diagram in order to justify the above-mentioned plan (Fig. 2-2(7), (8)).

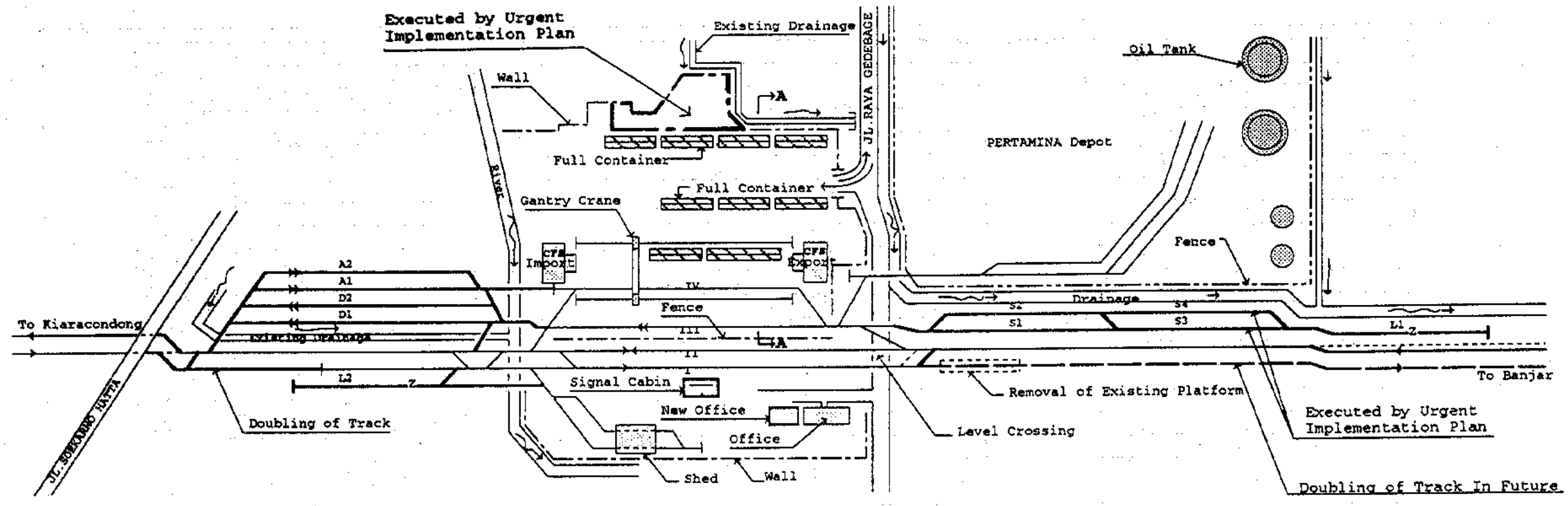


Fig. 2-2(1) Track Layout at Gedebage

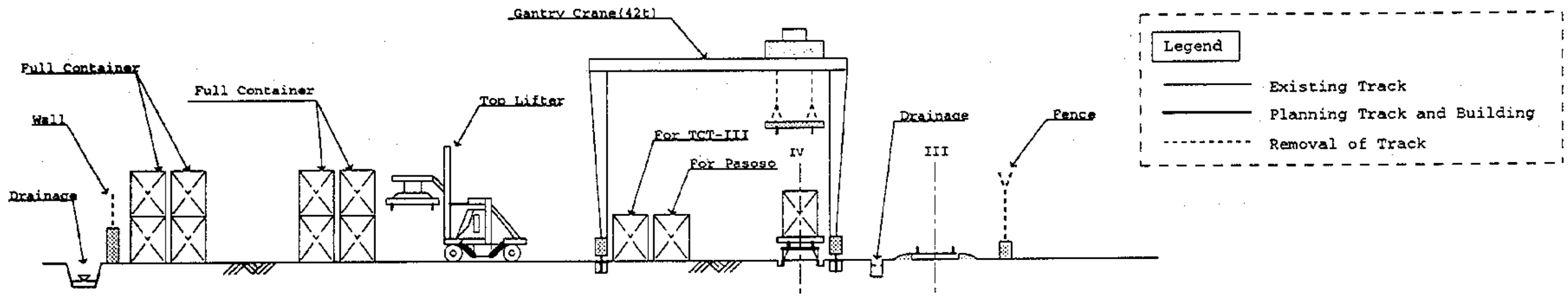
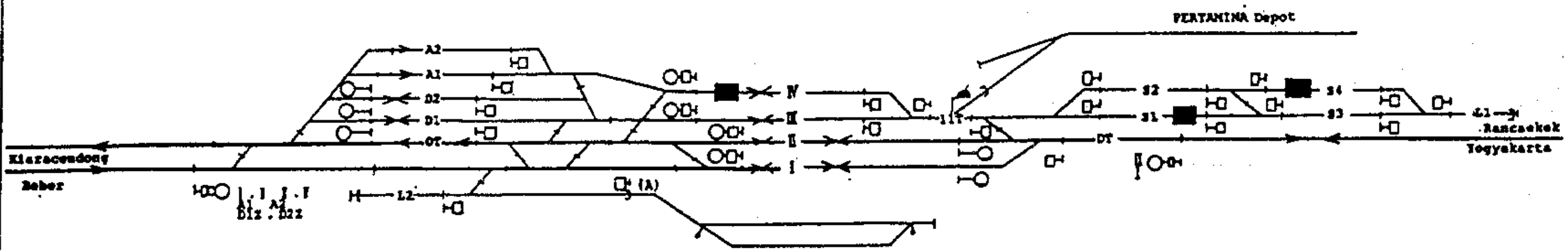


Fig. 2-2(2) Classification Work for Two Directions at Gedebage (Section A-A)

GEDEBAGE



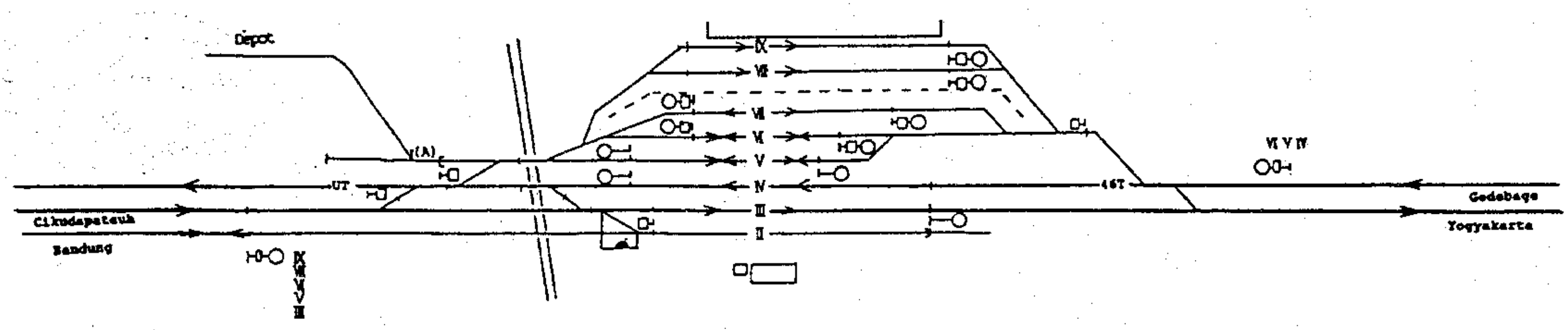
Signal	Route	Remarks
Home Signal	Kiaracondong - I	
	〃 - II	
	〃 - III	
	〃 - IV	
	〃 - A1	
	〃 - A2	
First Starting Signal	IV - OT	
	III - 〃	
	II - 〃	
	I - 〃	
Starting Signal	D2 - Kiaracondong	
	D1 - 〃	
Second Starting Signal	OT - 〃	
Starting Signal	I - Rancaekek	
	II - 〃	
Home Signal	Rancaekek - II	
	〃 - I	
Calling on Signa	Kiaracondong - D1	
	〃 - D2	

Signal	Route	Remarks
Shunting Signal	L2 - (A)	
	〃 - I	
	〃 - II	
	〃 - IV	
	D1 - III	
	D2 - 〃	
	A1 - 〃	
	〃 - IV	
	A2 - III	
	〃 - IV	
	IV - A2	
	〃 - A1	
	〃 - L2	
	III - A2	
	〃 - A1	
	〃 - D2	
	〃 - D1	
	II - L2	
	I - 〃	
	(A) - 〃	
	L1 - S4	
	〃 - S3	

Signal	Route	Remarks
Shunting Signal	S4 - S2	
	S3 - 〃	
	〃 - S1	
	S2 - IV	
	〃 - III	
	〃 - 11T	
	S1 - IV	
	〃 - III	
	〃 - 11T	
	DT - II	
	〃 - I	
	III - DT	
	〃 - S1	
	〃 - S2	
	IV - DT	
	〃 - S1	
	〃 - S2	
	11T - DT	
	S1 - S3	
	S2 - 〃	
	〃 - S4	
	S3 - L1	
	S4 - 〃	

Fig. 2-2(3) Track Layout Sketch

K I A R A C O N D O N G



Signal	Route	Remark	Signal	Route	Remark	Signal	Route	Remark
Home Signal	Cikudapateuh - III		Home Signal	Gedebage - VI		Shunting Signal	46T - IX	
	〃 - V			〃 - V			〃 - VIII	
	〃 - VI			〃 - IV			〃 - VII	
	〃 - VIII						〃 - VI	
	〃 - IX						〃 - V	
			Shunting Signal	UT - II			IX - 46T	
				〃 - V			VIII - 〃	
Starting Signal	VII -Cikudapateuh			〃 - VI			VII - 〃	
	VI - 〃			〃 - VII			VI - 〃	
	V - 〃			(A) - V				
	IV - 〃			〃 - VI				
	III - Gedebage			〃 - VII				
	V - 〃			VII - UT				
	VI - 〃			〃 - (A)				
	VII - 〃			VI - UT				
	VIII - 〃			〃 - (A)				
	IX - 〃			II - UT				

Fig. 2-2(4) Track Layout Sketch

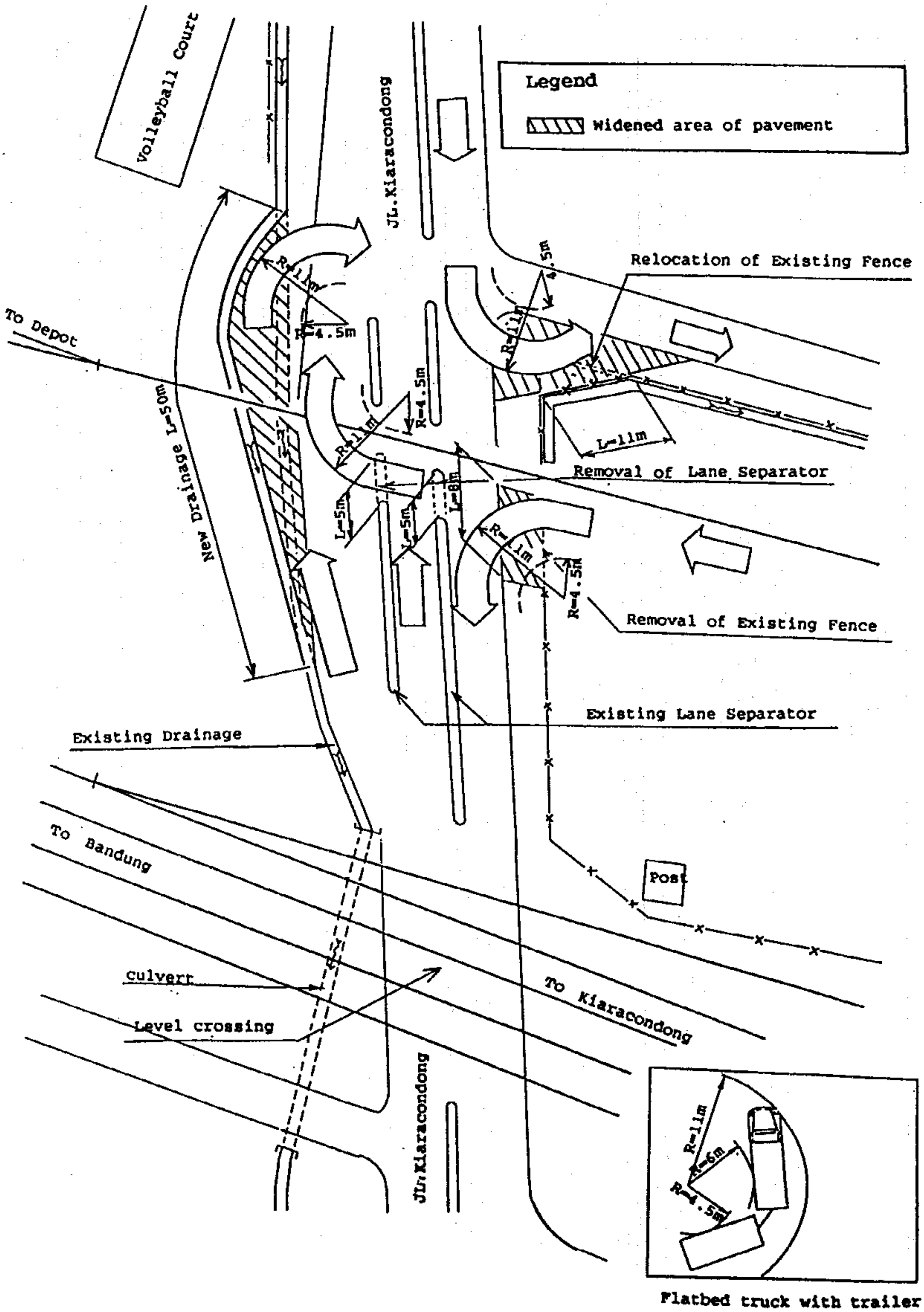


Fig. 2-2(5) Flow Treatment Sketch at the Entrance and Exit of Kiaracondong

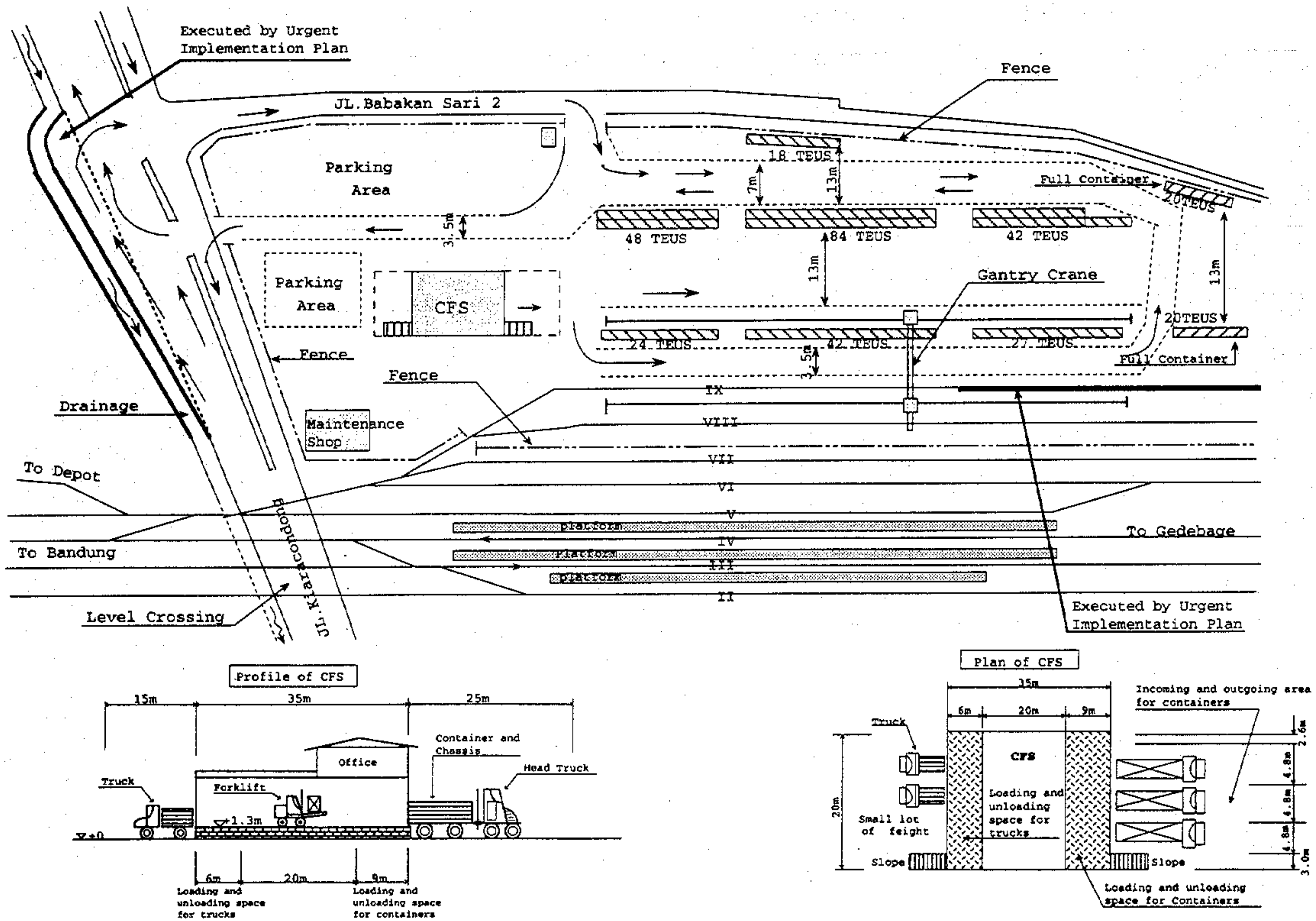


Fig. 2-2(6) Layout of Facilities at Kac

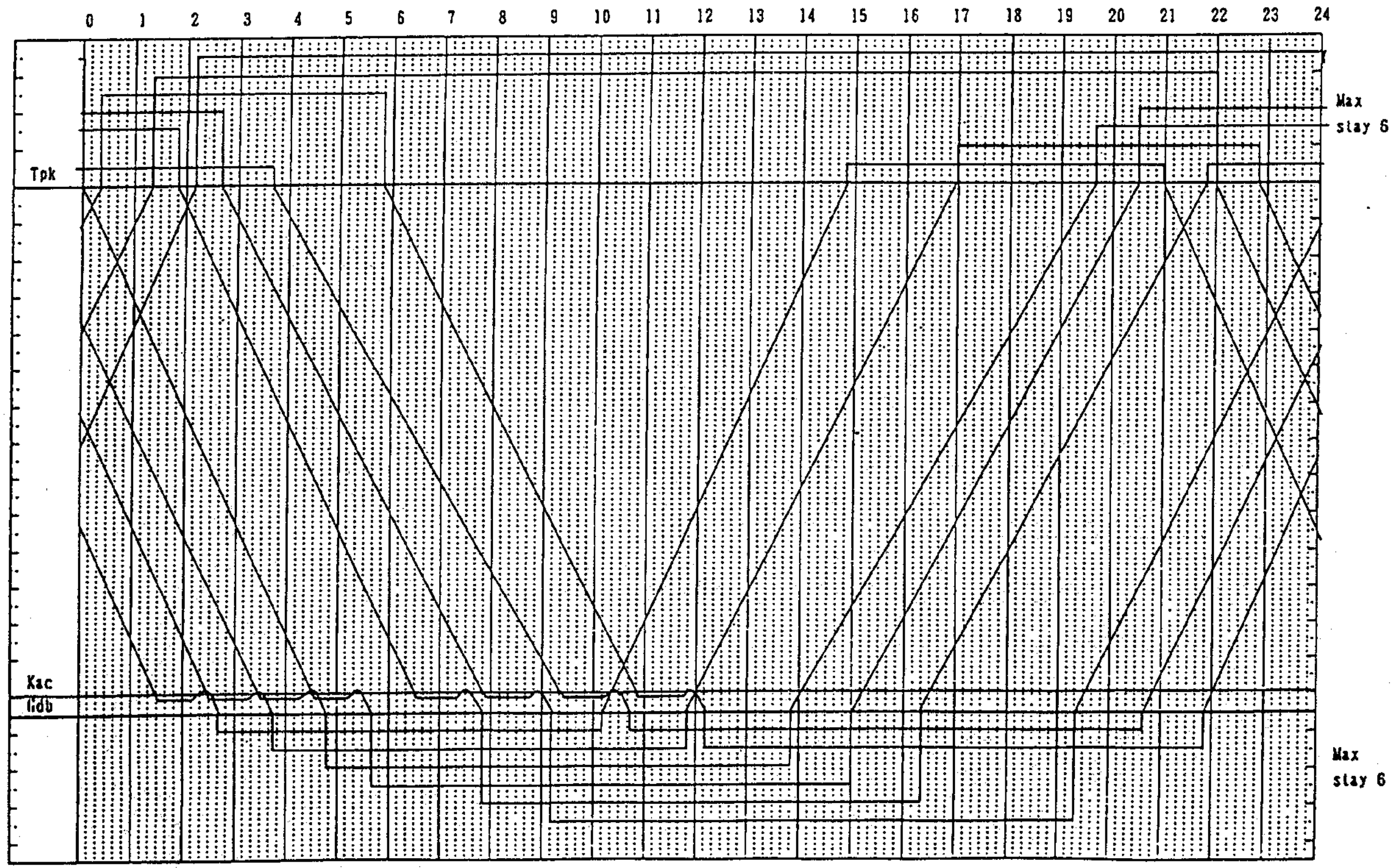


Fig. 2-2(7) Wagon Formation Storage Diagram at Tanjung Priok and Gedebage (eight trains)

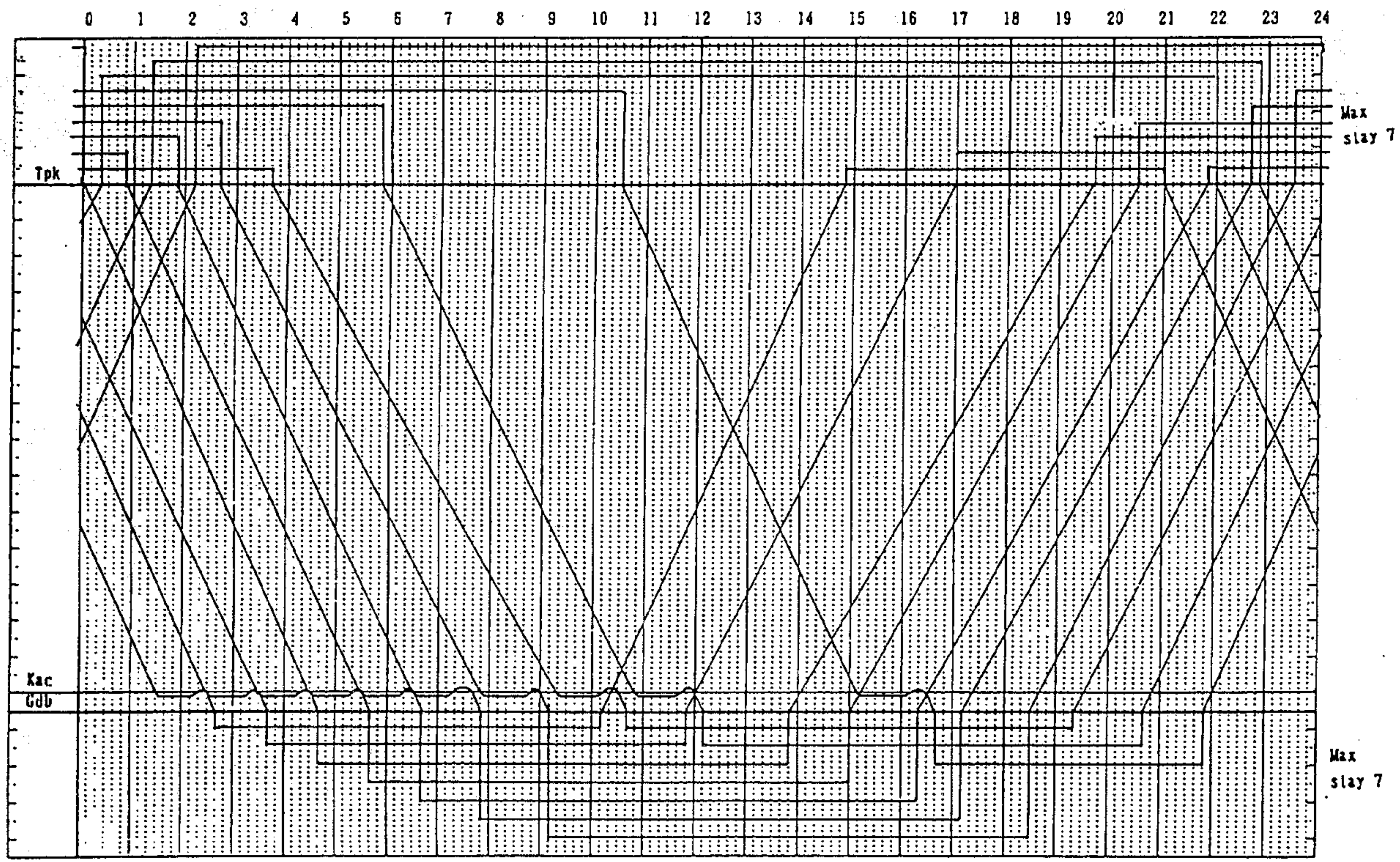


Fig. 2-2(8) Wagon Formation Storage Diagram at Tanjung Priok and Gedebage (ten trains)

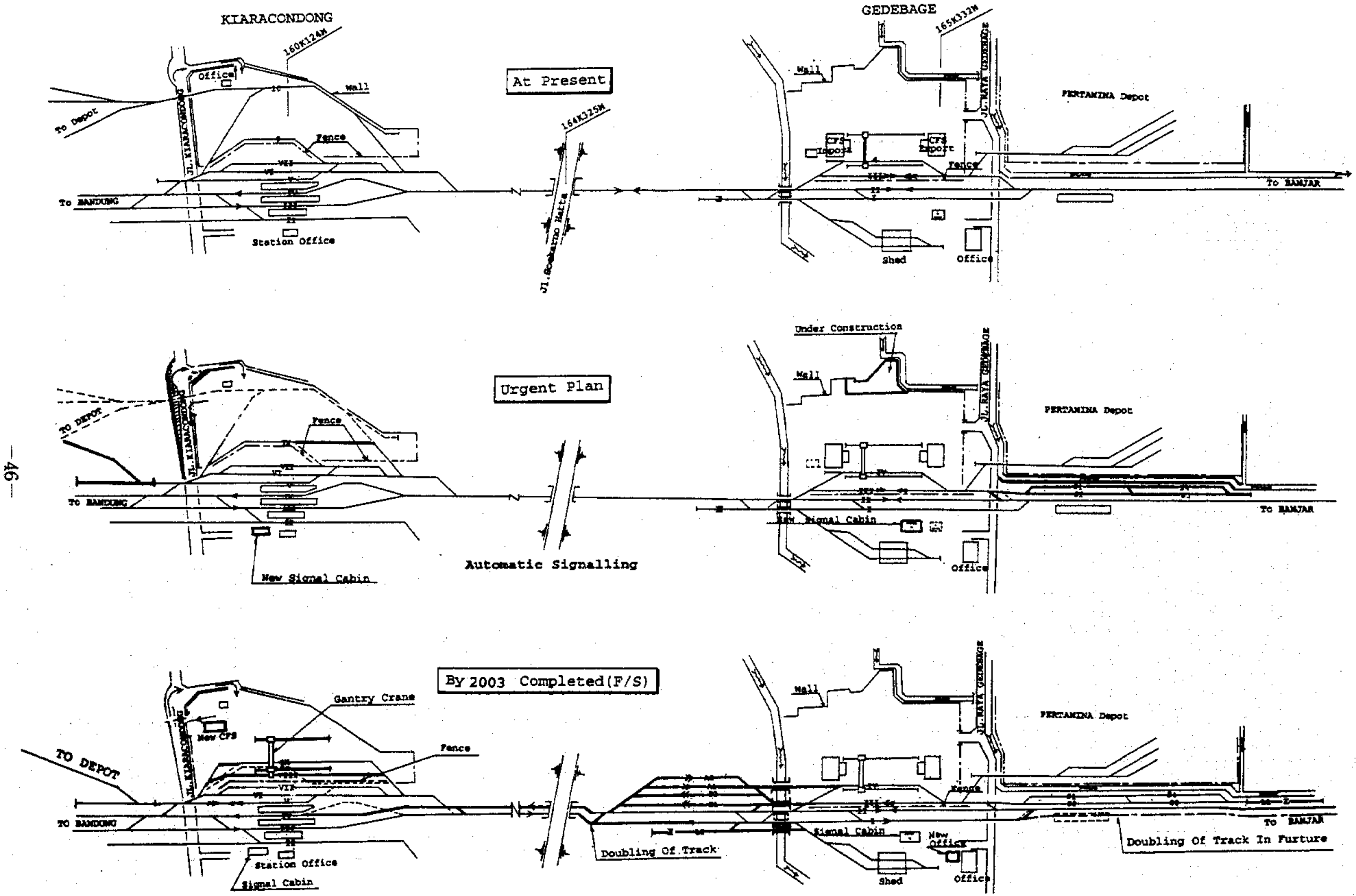


Fig. 2-2(9) The change of track layout at each step

Table 2-2(1) Handling Capacity at Container Stations (at peak time)

Item		Present	Urgent Impl. Plan		2004 ～2006	2007 ～2010	After 2011
			1997	1998～2003			
Round-trip		4	5	6 - 7	8	9 - 10	
Gdb	A	4	7	7	10	10	
	F H	Max. storage of 4 (1 formation stays on main track)	· Increase of storage track. staying : 4	· Separate unloading of arriving empty containers. (1998) staying : 5	· Increase no. of arrival and departure track. · Separate unloading of arriving full containers. (2004) staying : 6	staying : 7	
Kac	F H			· Convert a siding to a arrival and departure track. · Start unloading of arriving empty containers. (1998) staying : 1	· Increase No. of arrival and departure track. · Install a Gantry crane. · Start unloading arriving all containers. (2004) staying : 2	staying : 2	
New C.T	A						2
Tpk & Pasoso	A	7	7	7	11	11	12
	F H	staying 4	staying : 4	staying : 5	· Increase no. of arrival and departure track at Pasoso. (2004) · TCT Ⅲ open staying : 6	staying : 7	· New Bekasi Line opens. · TCT Ⅲ improved
synthetic judgment		4	5	7	10	10	
facilities capacity /year		71,500TEUs	87,000TEUs	145,900TEUs	220,400TEUs	220,400TEUs	

Notes : 1. A : Possible no. of train round-trips.
2. F H : Improved facilities and max staying.
3. Transportation ability : 34TEUs/train.

2.3 Doubling of Track between Gedebage and Kiaracondong

2.3.1 On-site status

17. The length of the doubling section is 5.2 km and almost straight with a moderate down slope (i = 2.1‰ from Kac up to Gdb).
The space for doubling the track has already been secured on the north side of the existing line, except the place where many houses near Kac St. must be removed.
The proposed site is situated in a zone with rice fields and seven rivers whose span is longer than 3 m, so the site is moist.
An additional track will be built on a low embankment and bridges, which poses no difficult problems except for the removal of houses and changing track layout at both end stations owing to the doubling of track.

2.3.2 Adoption of automatic signalling prior to doubling of track

18. In general, increasing transportation capacity on a single-track line is done by doubling track or automatic signalling.
In Japan, automatic signalling is adopted first and then doubling track is carried out. The reasons for this are as follows:

i) The construction cost of doubling of track is very expensive.
ii) Automatic signalling is effective for modernization, such as securing safety and reducing manual power.

19. However, personnel costs in Indonesia are not the same as Japan so the team considers the followings:

i) Automatic signalling means here that the renovation of the electronic interlocking apparatus at both stations accounts for most of the costs.
Savings due to reductions in personnel expenses are small owing to the new adopted apparatus.
ii) However, the cost of doubling of track (19 billion Rp) is more expensive than net automatic signalling, excluding yard facilities which is common with the cost of doubling track (12 Billion Rp).
The cost of doubling of track at this rice field zone is so expensive as the costs of the low embankment, bridges, and house compensation are included (refer to Section 5.2).

20. Therefore, the team adopted automatic signalling to keep down the costs and to modernize, as well as for the following reasons.

i) Doubling of track requires a long period of time from land acquisition to track installation, so it is inappropriate for urgent action.

ii) Automatic signalling requires foreign currency, so timeliness is important. This is different from doubling of track, which uses domestic currency.

iii) Duplicated costs due to prior automatic signalling are estimated to be very small (80 million Rp).

21. However, PERUMKA prefers doubling track for various reasons.
Therefore, both plans are kept in the F/S in parallel hereafter.

2.3.3 Double track facilities

22. The double track facilities are shown in Fig. 2-3(1).

(1) Compensation

23. There are many private homes (approx.230 houses or 5,600 m^2) on the north side of the main track near Kac St. between 160K580M and 161K700M (L=1,120m), which will hinder the doubling of track.
However, all of this land is owned by PERUMKA, which is renting the land to the present inhabitants.
Therefore, compensation for relocation of these private houses is necessary.

(2) Doubling of track plan at station

24. Doubling of track at the yard of Kac St. is extended in a straight line on the north side of the existing line.
So, the main work for this section is as follows.

	(See Fig.2-3(3))
Installation of railway	L=410 m
Removal of railway	L=250 m
Removal of turnout	1 set
Relocation of turnout	1 set
Installation of turnout	1 set

Retaining wall	L=220 m
Cutting and embankment	1 Ls

25. Doubling of track at Gdb St. is executed by extending the existing lead track (164k 630M).
Therefore, new lead track (L-2) is shifted to the south side of the down-track. (Fig.2-3(4))
Doubling of track must be executed at the same time as the installation of arrival and departure track.

(3) Doubling of track plan for intermediate section

26. The profile of the embankment for the intermediate part is shown in Fig.2-3(2). Land acquisition is not necessary, because some prepared land already exists.
The soil for the embankment is used borrow material, and it is not necessary to take measures to strengthen the sub-grade because of the embankment's low height (mean height H=1.5m).
It is necessary to construct a retaining wall and drainage (width=1 m) on the north side between 161k 200M and 164K 000M (L=2,800 m). (See Fig.2-3(2))

(4) Main structure of track

27. The outline of the main structure is as follows:

i)	The embankment	V=27,700 m3
ii)	Bridges	
	Long-span bridges (L=3m--10m)	7 structures
iii)	Installation of track	L= 3,935m
iv)	Retaining wall (mean height H=1.5m)	L=2,800m
v)	Compensation	230 houses
vi)	Drainage (width=1m)	L=3,430m
vii)	Fence(at Kac St.)	L=1,100m

Main road (JL.SOEKARNO-HATTA) at 165K332M flied over with the width of B =12.5 m to make double track possible by using the north of existing line. (Photo 2-2(4)).

2.3.4 Attributed signalling and telecommunication

28. Doubling of track accompanies signal and telecommunication improvement after

the urgent implementation program.

(1) Automatic signalling preceding

a. Improvement at Gdb and Kac

i) Increased routes necessitate the improvement of software about the electronic interlocking apparatus.
Additional signals, track circuits and electric points are needed for the arrival and departure tracks at Gdb and Kac.
ii) Talk-backs are equipped for the new shunting signals.
iii) Light facilities are equipped for arrival and departure tracks at Gdb for night operation.

b. Doubling track between Kac and Gdb

i) New intermediate track section needs a track circuit.
ii) Public telephone wires along the existing track are removed after using new equipped communication cable (50P).

(2) Doubling of track preceding

The difference from (1) is as follows.
At the Urgent implementation program stage,
i) Existing mechanical interlocking apparatus is used as it is.
Therefore, new installed points are handled on site.
ii) Two communication cables are equipped along the line for PERUMKA and public phone at first.
Detailed track layouts are shown in Appendix 2.3(1) ~ (12)

2.3.5 Completion time for doubling of track

29. The time required to finish the doubling of track is as follows.

a. In the case of automatic signalling preceding

30. According to Table 2-3(1), the number of trains using the Kac-Gdb section a-

lready exceeds the track capacity of 81, automatic signalling in 1997 will make possible to drive 117 trains for both directions. On the other hand, even increases in container trains only will come relatively close to reaching this new upper limit in track capacity by 2009.

Table 2 - 3(1) No. of Trains by Year (includes sent-on locos)

	At present	2003	2009	Remarks
Container	20(5*4)	28(7*4)	40(10*4)	*
Others	69	69	69	
Total	89	97	109	**
Track capacity	81	117	117	

* ( ) shows sent-on loco again
** Includes irregular train running

31. Accordingly, even if the increasing rate of passenger trains is unknown, it is necessary to complete the doubling of track by 2008 at the latest.

b. In the case of doubling of track preceding

32. Track capacity in the case of the doubling of track having an existing mechanical blocking system will be 200 trains both ways even if the one-block one-intersection system is used.
The team can say that additional automatic signalling is not needed during the project life as long as the argument is limited to the intermediate section.
However, an increase in container trains requires arrival and departure track at Gdb St. and the installation of mechanical interlocking apparatus. This results in the complex situation of there being two mechanical signal cabins at Gdb St., and adversely affects safety.
So electronic interlocking should be completed at the same time when arrival and departure tracks are installed (completed in 2003).

33. Doubling of track will be completed in 1998 on the basis of construction schedule

to be implemented now.

Therefore, the situation where track capacity is exceeded will continue one year longer than automatic signalling preceding.

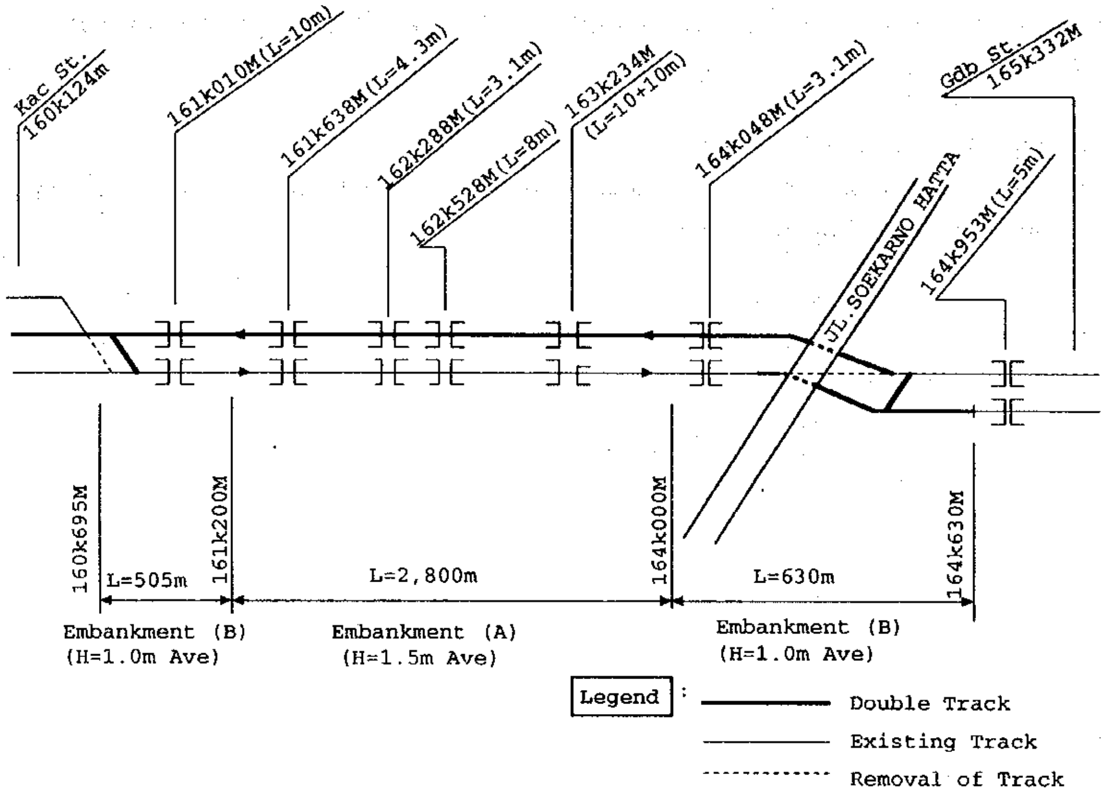


Figure 2-3(1) Layout of Double Track

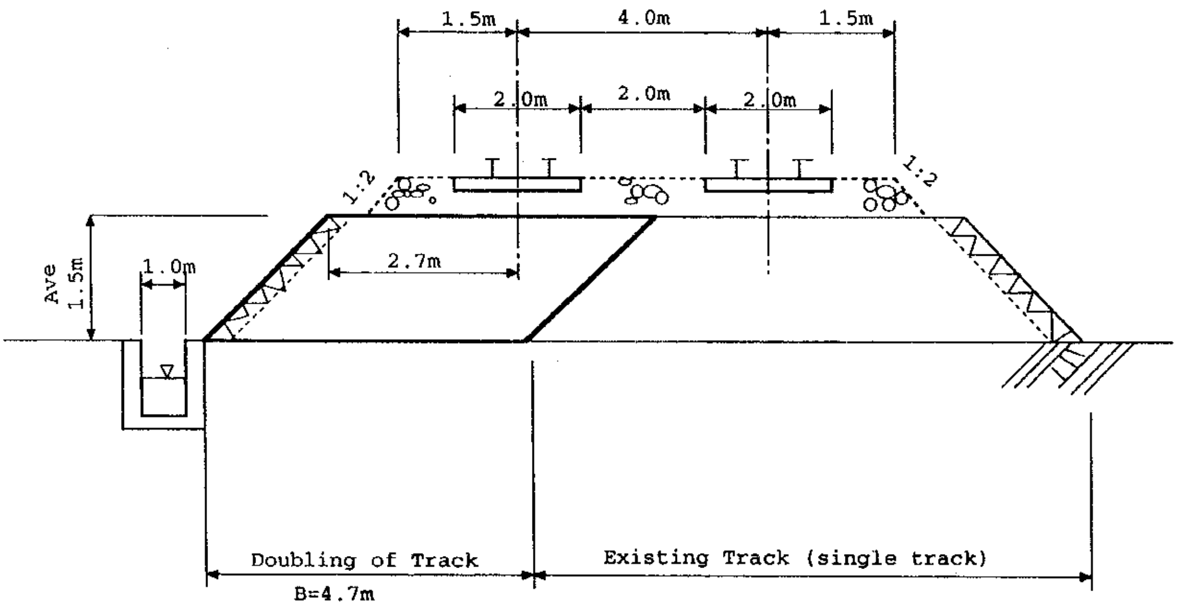


Figure 2-3(2) Profile of Embankment (A)

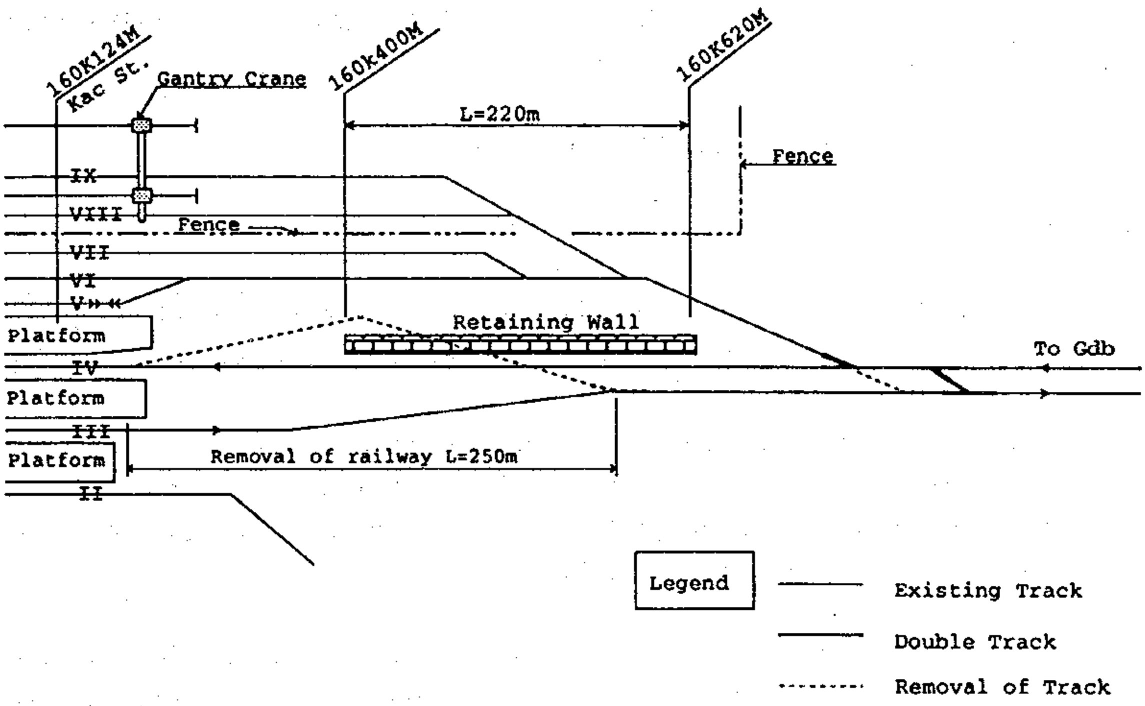


Figure 2-3(3) Layout of Double Track at Kac St.

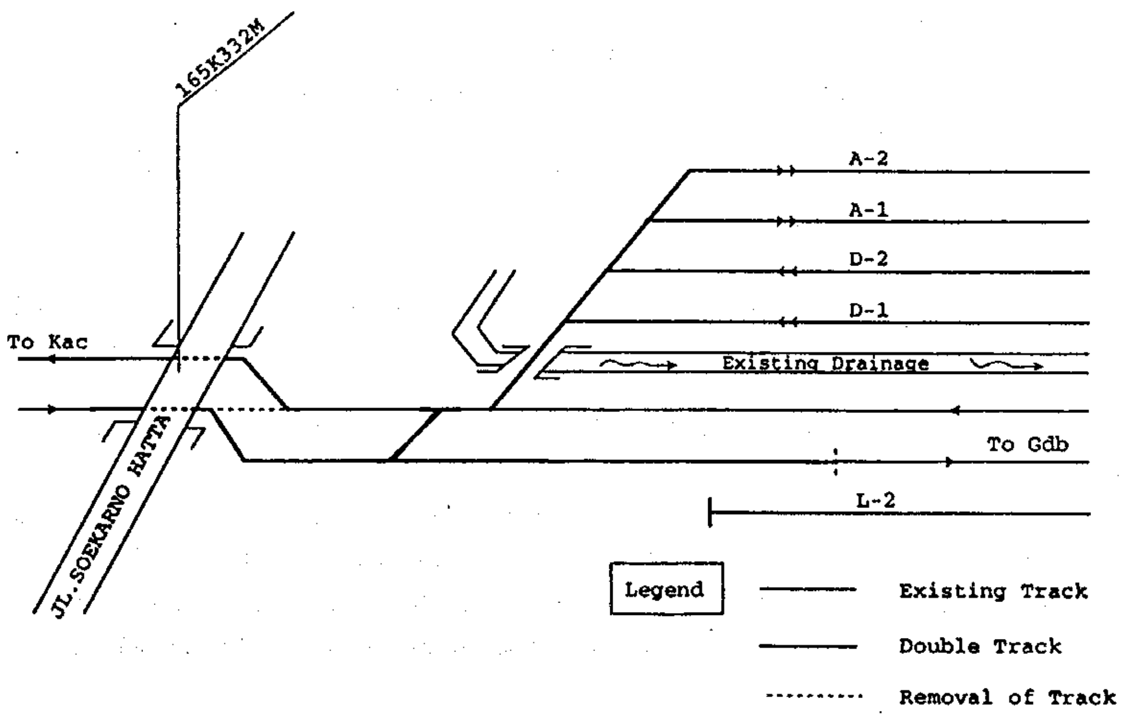


Figure 2-3(4) Layout of Double Track at Gdb St.

2.4 PASOSO AND EXTENSION TO TCT III

(1) Present situation

a. The completion of TCT III by 2000 increases 2.4 times present handling capacity by as much as, which means 2.4 million TEUs per year in all. This will have following consequences:

i) Handling capacity at Pasoso will be insufficient in the future.

ii) Transportation distance is extended by 500 m from TCT III to Pasoso. Therefore, a new handling platform for the railway is necessary near the container marshalling yard at TCT III.

b. The Port Authorities have been promoting land acquisition, and have secured yard space near the barriers between TCT I and III. However, land acquisition for the approaching track branches off from the existing PERTAMINA exclusive track is now pending.

(2) The original plan and its problems

34. The original plan is shown in Fig. 2-4(1).
The location is near the barrier line between TCT I and TCT III, and the forwarding distance is a minimum for both.
It is the most recommendable location, which is the same for the Port Authorities.
However, it has the following problems:

a. The track layout of the approach crosses two large streets, which would result in traffic congestion.

b. It was said till now, that land acquisition for approach track and the construction was executed by PERUMKA.
It is said the land acquisition cost will be very expensive, owing to the demands of the owners for the land and for sales compensation (2 million Rp / m^2).
Therefore, if PERUMKA is forced to bear land acquisition and construction costs with only the revenue receiving from container transportation, it might be damaged as an organization.
However, this is situation can be solved as described below.

(3) The principle of burden sharing for the extension to TCT III

35. Concerning TCT III's transfer yard construction, cost allocation is expected to be as follows.

a. Land acquisition

The Port Authorities will purchase all the necessary land, including the land for the approach track for the extension to TCT III.

b. Construction

i) PERUMKA will bear the costs for the new track extension work, including the new grade crossing.
ii) The Port Authorities will bear the construction costs for the TCT III platform and its relevant facilities.

c. Operation

Additional shunting and depreciation costs will be recouped from the fare to be paid by users.

(4) Countermeasures plan

36. If the TCT III transfer yard is not constructed, the following countermeasures should be considered.

a. Revised plan I (Fig. 2-4(2))

37. If PERUMKA gives up building new track and use the Pasoso St. platform to the limits of its handling capacity, there would be a shortage in storage capacity for wagon formations.
As for countermeasures, PERUMKA could restore supplemental storage sidings and arrival and departure track at Tg. Priok Gudang, and change the present transportation route via Kampung Bandan, which is not used now. Otherwise, multiple switch back shunting at Tg. Priok could be adopted.
The first change will resolve the problems of shunting at Tg. Priok St. and expensive

land acquisition. The second change utilizes the new route Pasoso-Kpb-Thb-Mri-Bks, which is a detour.

38. The ultimate handling capacity at the Pasoso platform is estimated as follows. The necessary loading and unloading time per train is two hours, including shunting time. Total potential handling capacity is 10 trains a day, after considering worker shifts and meals. However, storage capacity can only cope with eight trains, even if two tracks are added as in Fig. 2-4(2).
Though capacity can be supplemented, the time loss in forwarding and the traffic congestion caused by the forwarded trailers is adverse. On the other hand, changing the transportation route results in a detour and requires expensive track and signal restoration.
The loss is remarkable in view of the national transportation economy.
Furthermore, alleviating the pressure on transportation capacity between Jng and Bks via the New Bekasi Line is neglected in this revised plan.

b. Revised plan II (Fig. 2-4(3))

39. Instead of revised plan I, the team considers increasing storage capacity by installing additional track only at Pasoso.
This will enable eight trains to be operated in 2004, whereas the max. number of wagon formations to be stored is six.
This plan means that the TCT III platform is not constructed in the F/S stage, but done in the M/P stage. This is due to the M/P shifting container trains from the existing route to a new route, in order to reduce the transportation volume burden on the Jng-Bks Section.
The only countermeasure here is to utilize the New Bekasi Line by joining the branch line from Pasoso (Fig. 1-3(1)).
However, the construction of this branch line results in the decrease of storage sidings at Pasoso, so new sidings at TCT III are necessary as substitutes.

(5) Burden sharing on container handling volume

40. The completion of the TCT III platform will reduce all forwarding distance to Pasoso, and make forwarding more convenient for TCT III and TCT I.
It is necessary that the users of TCT III pay the same handling charges as the users of

TCT I for equal utilization of the port facilities.
It is desirable that the TCT III platform and Pasoso be in charge of the same amount of freight volume.
The reductions in cost due to the decrease in forwarding distance (1400m) for TCT III construction, is used to depreciation of the track construction cost.

* Container transportation cost per trailer km is estimated at 1,100 Rp / TEU.

(6) Evaluation

a. The platform should be set up after waiting for the time when the handling volume requires it.
This means the final stage of TCT III construction, which is almost equal to the time reached full capacity at Pasoso anticipated in the year 2004.

b. Traffic congestion at the two intersections is inevitable, even if the streets(five trains would be shunted in 2010 for TCT III) are crossed at midnight ten times.

c. The TCT III platform is available for both TCT I and TCT III, so burden sharing is adjusted by designated destinations between Pasoso St. and the TCT III platform.

(7) Countermeasure

41. In conclusion, land acquisition for approach track will soon be resolved by a decision of DGLT, together with the approach problem for trailer transportation passing through almost the same place, based on the principles stated in (3).

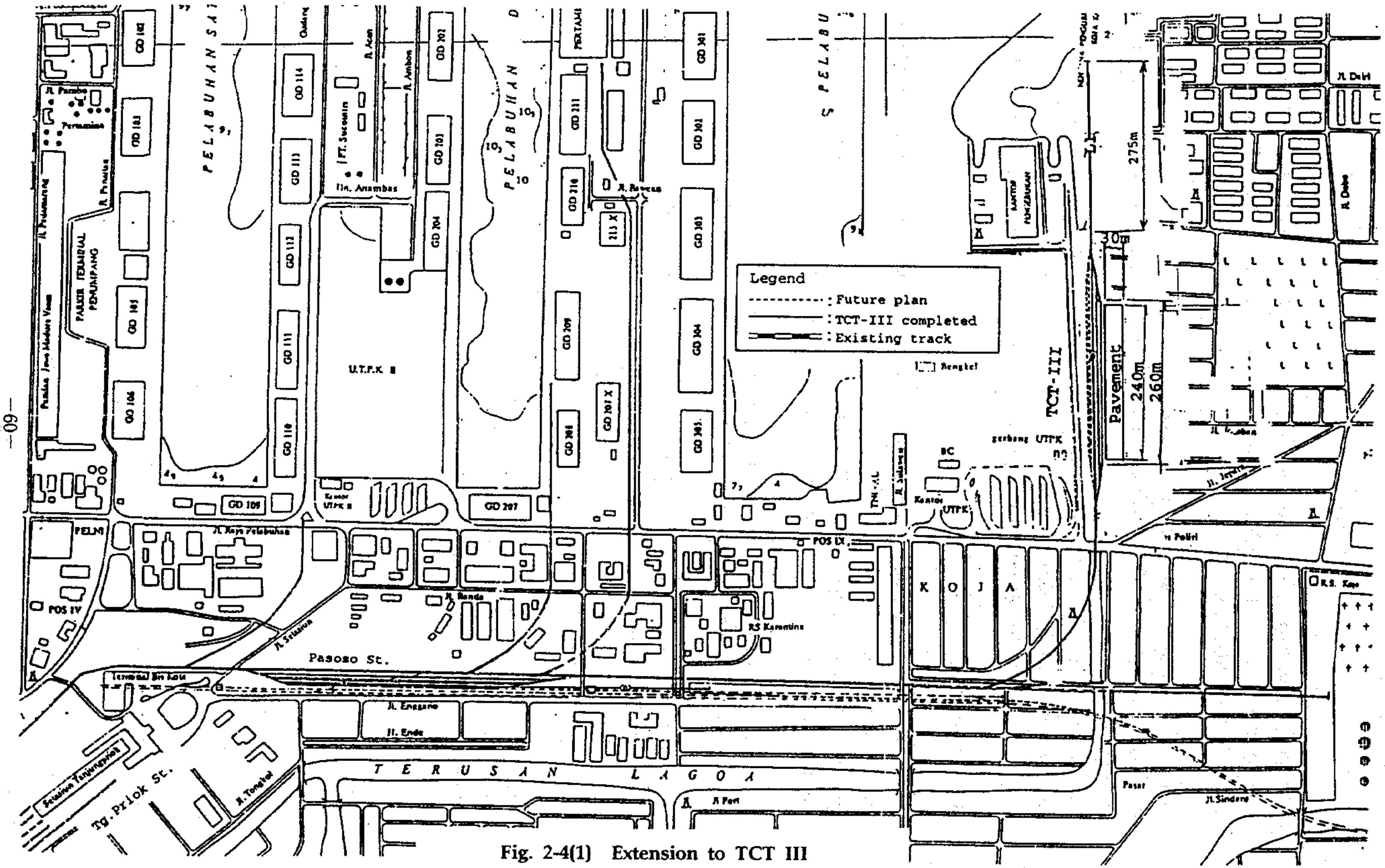


Fig. 2-4(1) Extension to TCT III

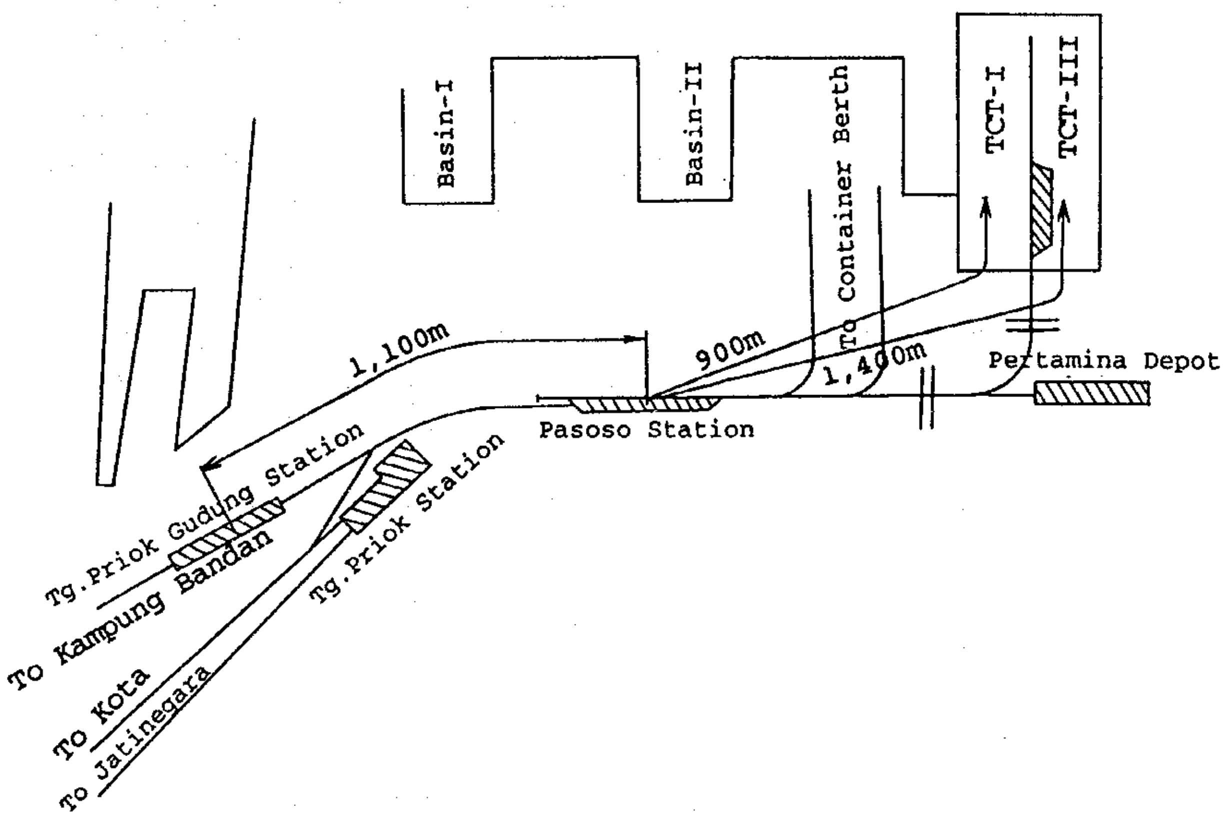


Fig. 2-4(2) Network around Tg. Priok (Pasoso)

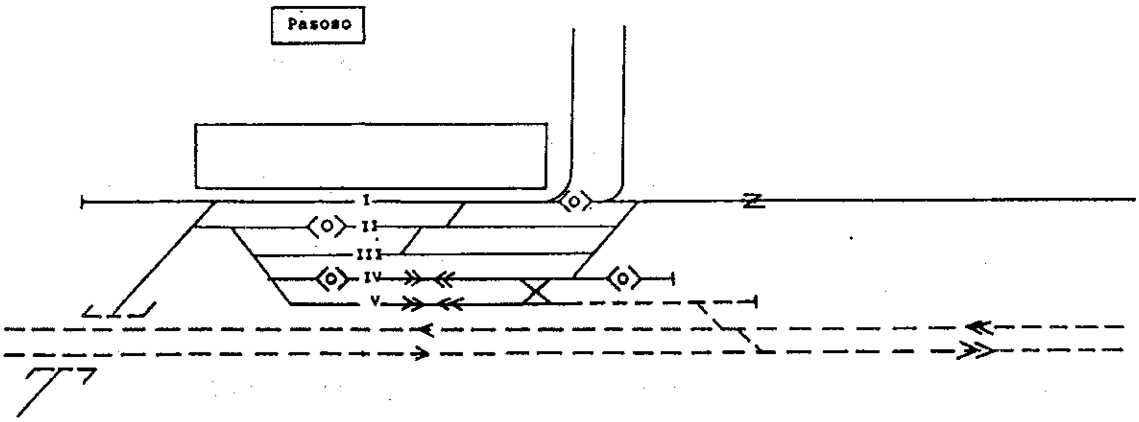


Fig. 2-4(3) Track Layout at Tg. Priok (Pasoso)

2.5 NECESSARY ROLLING STOCK AND CAR DEPOT IMPROVEMENT

2.5.1 Necessary rolling stock

42. At present, five trains per day (one way) can operate in the peak period.
The required number of trains per day (one way) in the peak period estimated by the rolling stock operation plan up to 2010 are as follows(refer to Table 1-2(2)).

At present (1994)	: 5 trains (Present train diagram)
1998	: 6 trains
2001	: 7 trains
2004	: 8 trains
2007	: 9 trains
2009	:10 trains

43. After considering the mean daily locomotive running distance, the number of required rolling stock is estimated (including auxiliary locomotives between Gab and Pwk).
In addition, spare rolling stock for inspection, repair requirements and standby is estimated as 15% of the total operating rolling stock.
Required locos are shown in Table 2-5(1).

Table 2-5(1) Required Number of Locomotives

	At present (1994)	1998	2001	2004	2007	2009	Total
No. of running trains per day in peak period	5	6	7	8	9	10	-
Necessary no. of running loco. in peak period	7	8	9	10	11	13	-
Auxiliary loco.	4	4	5	6	7	7	-
Sub total	11	12	14	16	18	20	-
Numbers of Loco. to be increased	-	1	1	2	1	2	7
For spares	-	1	-	-	-	-	1
New loco. to be purchased	-	(2)	(1)	2	1	2	8

Note : ( ) for Urgent Implementation Plan.

44. The above table shows that eight new locomotives (including 3 locos for the Urgent Implementation Plan) are to be purchased by 2009.
The number of required wagons is shown in Table 2-5(2). At present, there are 190 wagons.

Table 2-5(2) Required Number of Wagons

	At present (1994)	1998	2001	2004	2007	2009	Total
No. of running trains per day in peak period	5	6	7	8	9	10	-
Required running numbers (units)	7	8	9	10	11	13	-
(numbers)	119	136	153	170	187	221	-
Necessary no. of wagons (including spare wagons)				196	215	254	-
Holding numbers	190	190	190	190	207	224	-
Shortage numbers	-	-	-	6	8	30	-
Total number to be purchased (including spare wagons)				17	17	34	68

45. The above table shows that the required number of wagons is 68.
As for the type of wagons, PKPKW type is recommendable.

46. Domestic manufacturing of rolling stock is considered for the purchase.

2.5.2 Bandung Depot

47. The team studied whether the present handling capacity can bear an increase of 8 vehicles in Table 2-5(1) or not.

(1) Activity

a. Outline

48. Bandung Depot is used to inspect and maintain not only tractive locomotives and diesel cars for passenger trains utilizing Bandung Station as a terminal, but also for tractive locomotives for container trains and shunting locomotives.
Bandung Depot has enough maintenance capacity owing to the improvement in 1992. At present, its washing facilities for locomotives, fuel storage facilities, machines and tools (grinding machine, welding machine, etc.) are being increased. Furthermore, a new office building will be constructed near the shop.
The depot's layout is shown in Fig. 2-5(1).

b. Number of vehicles

CC201 (Main line loco.) in total	: 34
Ready for operation	: 30
In workshop (Jogya)	: 4 (normal: 1M, 1: more than 1year)
Diesel car	: 19
6	: used as Diesel car
Others	: used as ordinary passenger car
D300 & 301 (shunting loco.)	: 14
Total	: 67 (Loco: 48 Nos)

c. Organization and personnel

The organization consists of following four departments.

Administration, and Planning	: 43 (including planning)
Maintenance	: 37
Operation	:187 (drivers:92, co-drivers:95)
Total	:267

d. Inspection and maintenance cycle of locomotives

	Maintenance hr.	Maintenance M · H
Daily	1 or 2 hr	11
Monthly *	1 day	122
Trimonthly	3 days	239
Biannually	3 days (max.1w.)	313
Yearly	3 days	561

e. Facilities for inspection & maintenance are sufficient at present.

f. Issues at depot

The capacity for inspection and maintenance is sufficient now, but there is a lack of drivers.

g. Misc.

Fuelling : daily, about 900 liters
Fuel consumption : 2.4 l/km (standard)
actual 2.5 - 2.7 l / km
Operation distance / day
for Parahyangan Loco : 177 Km * 2
for reference in other Depot;
for express night Train Loco : 750 Km
from Jakarta to Surabaya
Oiling : changed trimonthly for old loco. (16 Locos) and
biannually for new loco. (18 Locos);
volume : 980 l / each time

(2) Examination of inspection and maintenance capacity

49. The depot now services 34 CC201-type locomotives and 14 shunting locomotives, as a total of 48 locomotives, which will increase to 56 for the purpose of securing transport capacity in the year 2009. The table 2-5(3) lists the estimates of the inspection and maintenance capacity of the locomotive depot.

(3) The team cannot grasp the number of locomotives stored in the peak hour. However, according to the locomotive operation schedule for Parahyangan, the max. number of locomotives stored accounts about only 40% of all locomotives for Parahyangan use.

Table 2-5(3) Locomotive Inspection Cycle and Capacity

Kind of inspect.	Period of inspect.	Required time for inspect.	Annual			Remarks
			Inspect. No/Loco	Inspect. time Total	Inspect. capacity	
Daily	every day	1.5 hr	344	1.5hr*344 *53units =27,348 hr	2 lines *2 units *24 hrs *365days =35,040hr	27,348 <35,040 OK
Monthly	every M	1 day	8	1*8+3*2+ 3*1+3*0.5 =18.5 days 18.5 days *53 units =981 days	3 lines *2 units *(365-69) =1,776days	981 <1,776 OK
Tri	every 3M	3 days	2			
Biannual	every 6M	3 days	1			
Yearly	every Y	3 days	0.5			

Note :* The number of locomotives to be inspected and repaired excludes the number of vehicles to be overhauled. Thus, 56 vehicles * 0.95 = 53 vehicles.

* Average annual holiday : 69 days (=52+12+30/6)
* Daily inspection line : 2 lines
* Monthly & yearly inspection line : 3 lines

(4) Evaluation

50. The above table shows that the existing facilities have sufficient capacity for inspection and maintenance for an increase of not only three vehicles necessary for container transportation in 2003 but for 8 vehicles as well (see Table. 2-5(1)). Locomotive storage capacity is sufficient for the present track layout and has room for future improvement.

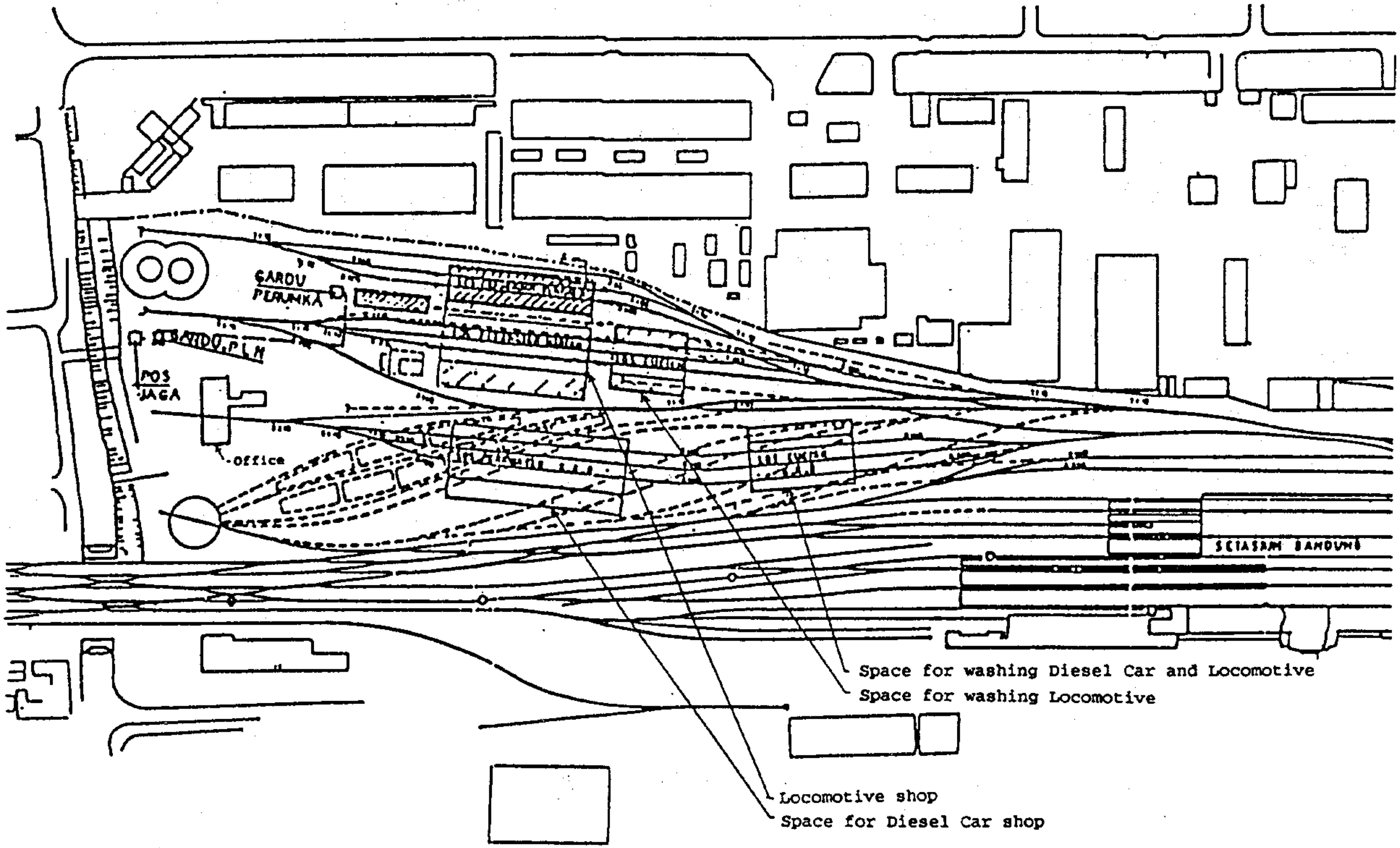


Fig. 2-5(1) Layout of Bandung Depot

3. ENVIRONMENTAL IMPACT STUDY

1. An environmental assessment of the railway is conducted at three places : Gedebage including the doubled track section, Kiaracondong, and the approach to TCT III. The evaluation of those three places is below the standard levels in the ANDAL STUDY.
The team has only to submit the study results for each place to the AMDAL Committee.

2. The team conducted the required site survey in accordance with Indonesian environmental regulations. The survey is composed of three parts: physical-chemical, biological and social environment. The method of the environmental assessment is as follows. Based on the above-mentioned site survey existing data, and Indonesian environmental regulations, the team makes an examination, whenever an extraordinary value is found, check the range, and draw up necessary countermeasures if the value can be attributed to construction or its completion of construction at a site.

3. The results and countermeasures are as follows.

Impact level A: Heavy impact is supposed C: Uncertain
B: A little impact is supposed D: Impact is negligible

a. Gedebage Dry Port and Doubled track area
i) During construction
Physical-chemical environment

Items	Influence on environment	Level	countermeasure
Air	Increase of dust caused by construction	D	Check method of execution
Water quality	Water pollution caused by bridge work	D	Check method of execution

Biological environment

Aquatic living thing	Water pollution. Increase plankton.	D	Check method of execution

ii) After construction

Physical-chemical environment

Noise	Arrival and departure of trains	D	Low level, no need for countermeasures
Vibration	Ditto	D	Ditto

b. Kiaracondong

i) Prior to construction

Social environment

Items	Influence on environment	Level	Countermeasure
Removal of inhabitants	Land compensation for doubling of track	B	Environmental countermeasure for surrounding area

ii) During construction

Construction is executed in the container yard, so the influence on the environment is negligible.

iii) After construction

Social environment

Traffic	Traffic congestion near the grade crossing	B	Check entrance and exit at the yard

c. Approach to TCT III

i) Prior to construction

Social environment

Removal of inhabitants	Land acquisition for approaching track	B	Environmental countermeasures for surrounding area

ii) After construction

Physical-chemical environment

Noise	Sent for trains	C	Decrease of Rail joint.
Vibration	ditto	C	Wide side path along the track

Details of the survey result are contained in Appendix 3-1.

4. OPERATION AND MANAGEMENT PLAN

4.1 BASIC DAILY WORK PATTERN AND ORGANIZATION

(1) The team made an examination from the viewpoint that Gdb and Kac are a single unified dry port and that the handling facilities at Gdb are located partially at Kac.(Fig. 4-1(1)).

(2) The main office of the dry port is located at Gdb and the sub-office at Kac. The main office has the function of regulating container deliveries, being a reception counter, and being handling work shop.

(3) The sub-office is a container depot that handles only unloading and delivers containers to customers, in other words, confirming arriving containers, operating and maintaining handling machines, delivering containers to customers or forwarders at Kac. Therefore, Kac St. manages only train operation and station activity in general excluding container handling.

(4) Use of the Kac branch is classified into two stages (Fig. 4-1(2), (3)).

a. Until 2003, Kac will only handle empty containers. It is in charge of unloading and delivering empty containers and should alleviate congestion of C.T at Gdb St.
Empty container transportation needs neither import letters nor export letters, so shifting this business to forwarders is simple.
Accordingly, it is sufficient to have only regular telecommunications devices (such as telephones and facsimiles) and a container information data terminal necessary for empty container work if necessary.
Eight trains one way will be operated in 2004. The system will ensure that Gdb St. has enough handling capacity to solve the problems in the F/S.

b. In and after 2004, Kac St. will have to handle all arriving containers, since the handling capacity of Gdb St. will reach its limit, or 87,000 TEUs (Table 1-2(1)).
All field work for unloading containers is carried out here there after.
The office work for imported full containers will be conducted at Gdb St.
Importing procedures are completed by both the notice of arrival to consignees and the payment of various duties at Gdb St.

Customs inspection for arriving full containers is conducted at Kac St. in parallel with office work at Gdb St.
The main office at Gdb St. gives Kac St. permission to take full containers away from the depot below a crane after importing procedures are finished.
The sub-office at Kac then transfers the containers onto a forwarders chassis after receiving the permission. The forwarder then carries them away from the C.T, and the work of handing over the containers to the customer is finished.
De-stuffing at CFS in Kac hands over goods to customers according to a directive from the main office.
For this purpose, the main office gives operational orders about container handling to the sub-office by using a facsimile, etc.
The sub-office then submits a finished report on the handling to the main office via facsimile, after finishing a series of the procedure.

(5) For the above activities the cooperation of the same forwarder is necessary at both stations.
The system that realizes (1)-(5) not only promotes effective delivery and service, but - alleviates traffic congestion near Gdb Dry Port.

(6) The owner, maintenance, and operation at Kac is the same as the Gdb Dry Port.

a. The handling machines at Kac are owned, operated, and maintained by PERUMKA, except the gantry crane.

(Machine)	(Owner)	(Operation)	(Maintenance)
Gantry crane	PERUMKA	private company	Private company
Top lifter	PERUMKA	PERUMKA	PERUMKA
Forklift	PERUMKA	PERUMKA	PERUMKA

b. The trailer head and chassis for the movement of containers to CFS are owned by PERUMKA.
Those for delivery to customers are owned by the forwarders.
Payment for the operation and maintenance of the gantry crane is the same as for Gdb St.

Based on the above items, the established organization at Kac is as shown in Fig. 4-1(1).

The explanation is as follows.

(1) Kac Sub-Dry Port is established and supervised by the chief of the dry port.

(2) The machinery sub-section belongs to the sub dry port, where an operation chief and machine operators are stationed. The operation chief is in charge of unloading and delivery directed from the Gdb main office.

(3) All imports are handled in and after 2004, owing to the increase of imported full containers, and import section is established.

(4) The operation and maintenance of an additional gantry crane at Kac in and after 2004 is entrusted to a specified forwarder as well as to Gdb Dry Port.

(5) Maintenance sub-section is added to handle the increase in machinery.

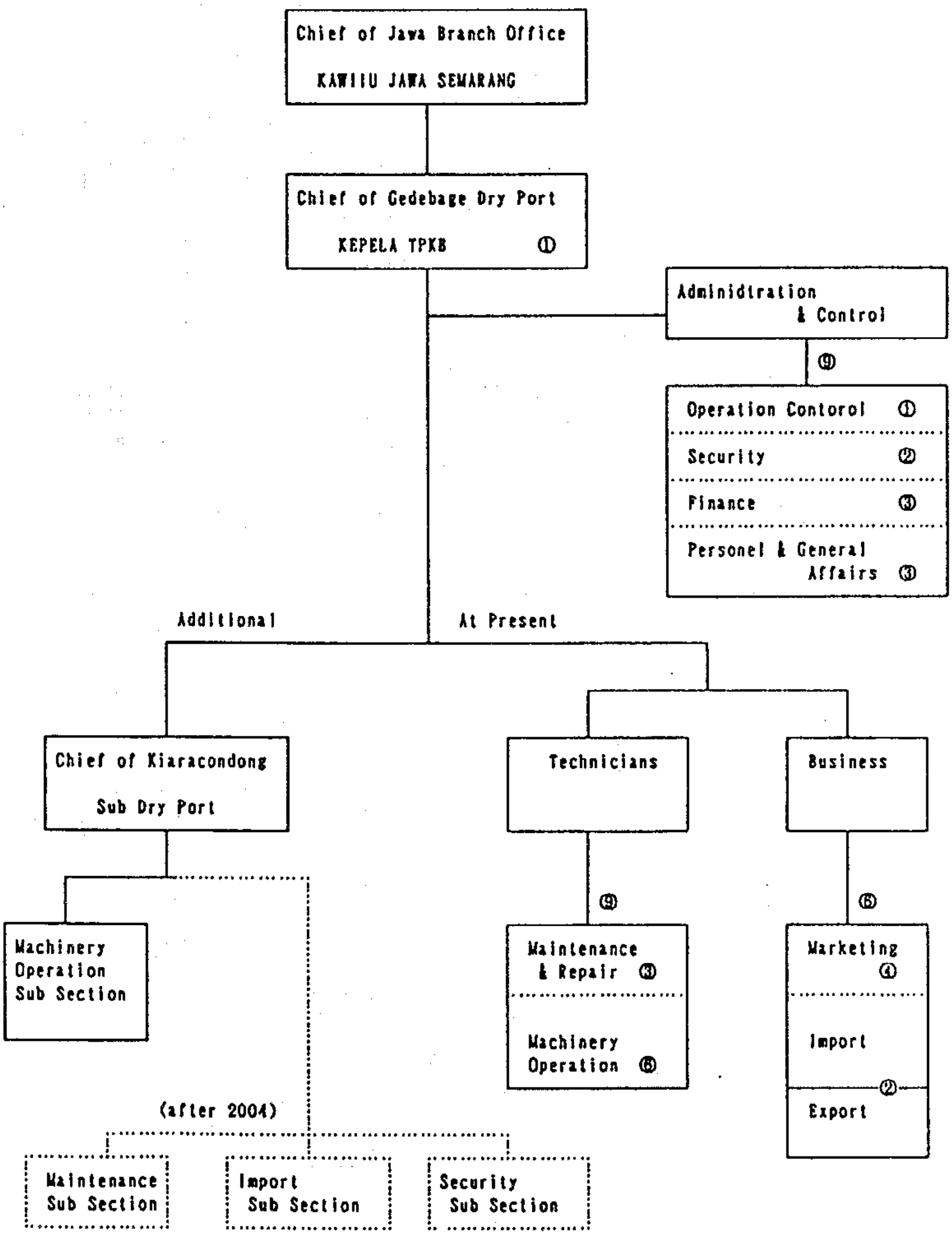


Fig. 4-1(1) Organization at Gedebage Dry Port

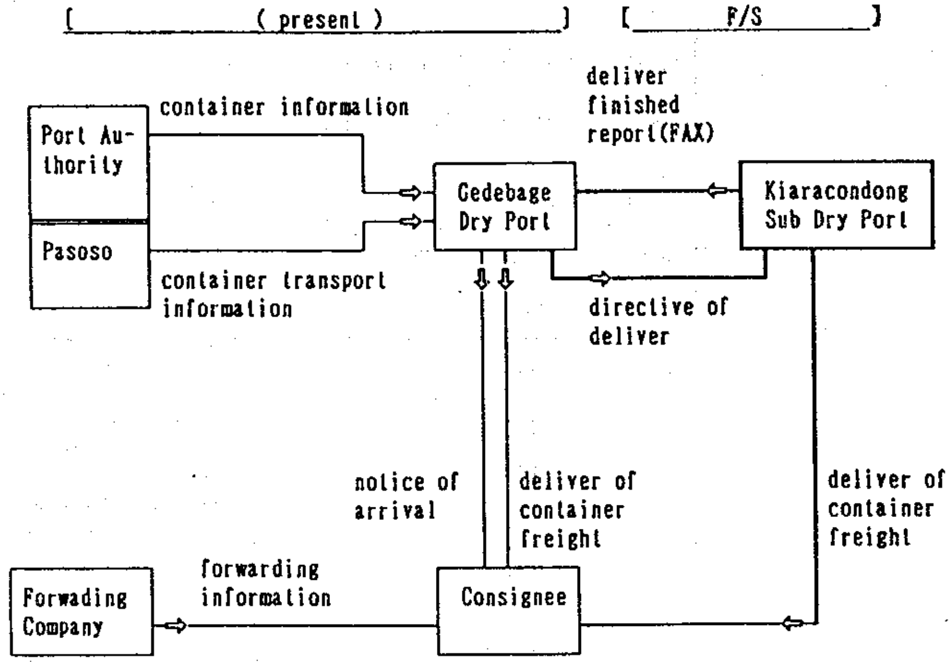


Fig. 4-1(2) The Flow of Arriving Containers and the Communications System

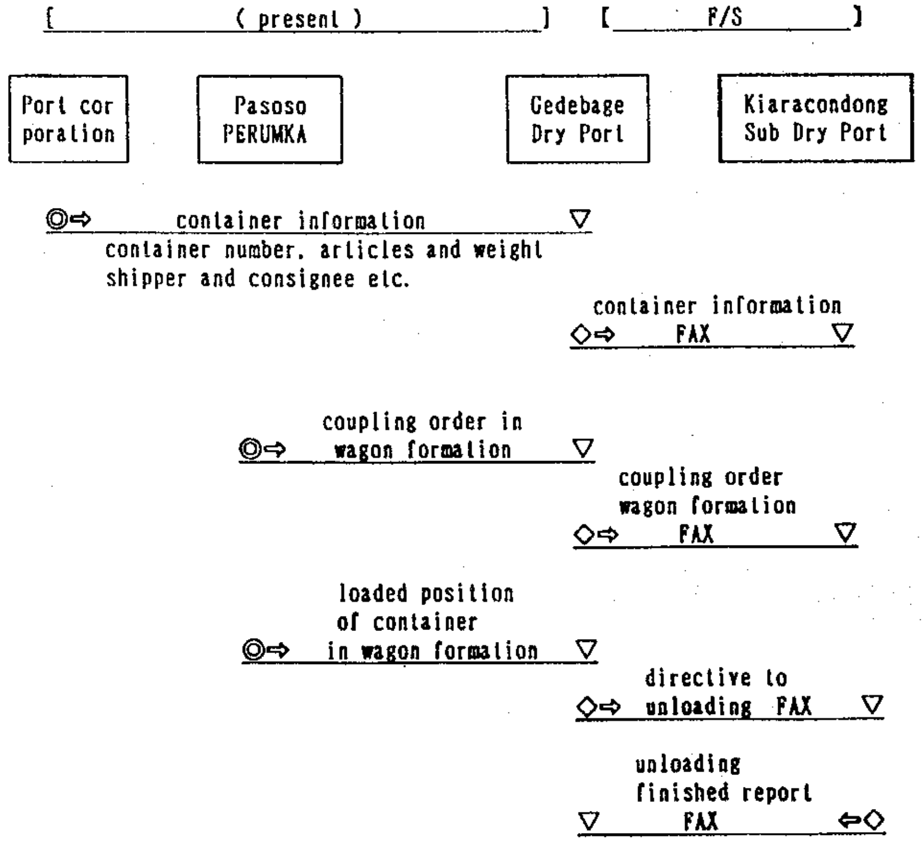


Fig. 4-1(3) Communication Contents

4.2 SUPPLY OF PERSONNEL AND EQUIPMENT

(1) Train crew

a. Every container train has the following crew.

Section	Engine driver	Assistant driver	Conductor	Army patrol	Total
*Gdb-Pwk (with an assistant loco)	2	2	1	2	7
*Pwk-Tpk (without an assistant loco)	1	1	1	2	5

b. Necessary personnel

The annual increases in personnel in accordance with transportation demand are shown in Table 4-2(1).

(2) Dry port officials and equipment
The number of dry port officials and handling machines is increased in accordance with the yearly progress, whose details are shown in Table 4-2(2),(3).

(3) Education and training for engine drivers
This is necessary to meet increases in demand.

Table 4-2(1) Increases in Numbers of Locomotive Drivers and Conductors

	1996	1997	1998	1999	2000	2001	2002	2003	Sub total
Loc. driver	4		6			8			18
Conductor	1		2			2			5
Total	5		8			10			23

	2004	2005	2006	2007	2008	2009	2010	Sub total	Total
Loc. driver	9			7	6			22	40
Conductor	4			2	2			8	13
Total	13			9	8			30	53

Note : Loc. driver means locomotive driver and co-driver.

Table 4-2(2) Plan for Handling Equipment

	Gedebage Dry Port	Kiaracondong Sub Dry Port		
	1994 present	1998 open	2004 increase	2004 total
Crane 42ton	1	-	+ 1	1
Toplifter 35ton	1	-	+ 1	1
Fork lift 10ton	1	+ 1	-	1
Fork lift 3.5ton	1	-	+ 1	1
Fork lift 2.5ton	4	-	+ 2	2
Hand Palette 2.5ton	2	-	+ 1	1
Head truck	2	+ 2		2
Chassi	4	+ 2	+ 2	4

Note : 1. Until 2003 at Kac., unloading empty containers will be done only with a 10t forklift.

2. In and after 2004 at Kac., full containers will be handled and the CFS. opened.

Table 4-2(3) Yearly Growth in Dry Port Personnel

	Present 1994	1997	1998	2001	After 2004	2010	Total increase	Total in 2010
Gedebage Dry Port								
Chief of Dry Port	1							1
Administration & Control								
Operation Control	1							1
Security	2	+ 1			+ 2		+ 3	5
Finance	3			+ 1			+ 1	4
Personnel & General Affairs	3							3
Business								
Marketing	4			+ 1			+ 1	5
Export・Import	2			+ 1			+ 1	3
Technical								
Maintenance	3		+ 1				+ 1	4
Forklift operator	8		+ 2	+ 3	+ 1		+ 6	14
Subtotal	27	+ 1	+ 3	+ 6	+ 3		+13	40
Kiaracondong Sub Dry Port								
Management			+ 1				+ 1	1
Security					+ 2		+ 2	2
Import					+ 1		+ 1	1
Maintenance					+ 3		+ 3	3
Forklift operator			+ 6		+ 3		+ 9	9
Subtotal			+ 7		+ 9		+16	16
Pasoso & TCTⅢ	7				+ 7		+ 7	14
Total	34	+ 1	+10	+ 6	+19		+36	70

Note : 1. Gedebage Dry Port in 1994 includes spare Forklift operators (2 persons).

2. Yearly increase of facilities and operation

1997	Gdb	Increase of storage track.
1998	Kac	Sub Dry Port established.
2001	Gdb	Increase of business volume and container trains.
2004年	Gdb	Increase of arrival and departure track.
	Kac	All arriving containers are unloaded.
	TCTⅢ	Set up.

4.3 DAILY REVENUE AND EAXPENSES

(1) Daily railway revenue from containers consists of tariff and handling charge at Gdb St.
Table 4-3(1) shows the tariff and handling charge at the dry ports.

(2) Daily expenses consist of variable costs concerning trains, their fixed costs and container handling costs at Gdb St. The cost estimate is based on the operation cost table per train submitted by PERUMKA referring to handling on sites and other submitted data, and is arranged as a daily expense table per round trip train (Table 4-3 (2), refer to Appendix 4-3(2)).
The handling charge paid by customers is shared with the contractor of the gantry crane handling payment according to the following rule.

	Contractor	:	PERUMKA
Until 2000 TEU/month	45	:	55
More than 2000 TEU/month	40	:	60

The above revenue of PERUMKA should be for the handling work under the direct management of PERUMKA, but the work cost is already appropriated in the item named stations and yards of Table 4-3(2).

(3) Annual increase of expenditure later than 1995 is shown in Table 4-3(3) in accordance with increased train operation.

Detailed calculation process of crane handling income and expenditure is shown in Appendix 4-3(4).

Table 4-3(1) Container Tariff and Handling Charge between Gdb and Tg. Priok

(Lift off/on ; include tax 10%) (Rp.) 11. Nov. 1994

Item	Gedebage and Pasoso						Gedebage and UTPK Tg. Priok							
	20feet			40feet			20feet				40feet			
	Loaded		Empty	Loaded		Empty	UTPK- I + II		Oermaga - 207		UTPK- I + II		Oermaga - 207	
	Full	Stuffed		Full	Stuffed		Full	Stuffed	Full	Stuffed	Full	Stuffed	Full	Stuffed
Lift off	17,500	9,700	0	25,700	15,000	0	17,500	9,700	17,500	9,700	25,700	15,000	25,700	15,000
Lift on	17,500	17,500	9,700	25,700	25,700	15,000	17,500	17,500	17,500	17,500	25,700	25,700	25,700	25,700
Stacking	4,000	4,000	1,750	7,750	7,750	3,500	4,000	4,000	4,000	4,000	7,750	7,750	7,750	7,750
Stuffing	0	27,500	0	0	41,050	0	0	27,500	0	27,500	0	41,050	0	41,050
Revenue at Gdb	39,000	58,700	11,450	59,150	89,500	18,500	39,000	58,700	49,000	58,700	59,150	89,500	59,150	89,500
Tariff	124,000	124,000	80,650	223,599	223,500	145,750	124,000	124,000	124,000	124,000	223,500	223,500	223,500	223,500
Security	8,000	8,000	0	8,000	8,000	0	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Total	132,000	132,000	80,650	231,500	231,500	145,750	132,000	132,000	132,000	132,000	231,500	231,500	231,500	231,500
Lift off	21,000	21,000	10,500	31,500	31,500	16,000	21,000	21,000	21,000	21,000	31,500	31,500	31,500	31,500
Lift on	21,000	21,000	10,500	31,500	31,500	16,000	21,000	21,000	21,000	21,000	31,500	31,500	31,500	31,500
Stacking	5,000	5,000	2,500	10,000	10,000	5,000	5,000	5,000	5,000	5,000	10,000	10,000	10,000	10,000
Revenue at Pasoso	47,000	47,000	23,500	73,000	73,000	37,000	47,000	47,000	47,000	47,000	73,000	73,000	73,000	73,000
Truck forwardly	0	0	0	0	0	0	32,500	32,500	0	0	52,500	52,500	0	0
Railway forwardly	0	0	0	0	0	0	0	0	32,500	32,500	0	0	52,500	52,500
Lift off/on	0	0	0	0	0	0	21,000	21,000	21,000	21,000	31,500	31,500	31,500	31,500
Imp. and Exp. issue	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Revenue at Tg. Priok	0	0	0	0	0	0	53,500	53,500	21,000	21,000	84,000	84,000	31,500	31,500
Port authorities	47,000	47,000	23,500	73,000	73,000	37,000	100,500	100,500	68,000	68,000	157,000	157,000	104,500	104,500
PERUMKA	171,000	190,700	92,100	290,650	321,000	164,250	171,000	190,700	203,500	223,200	290,650	321,000	343,150	373,500
Tariff all in	218,000	237,700	115,600	363,650	394,000	201,250	271,500	291,200	271,500	291,200	447,650	478,000	447,650	478,000

Original is shwon in Appendix 4-3 (1)

Table 4-3(2) Expenditure per Container Train

(Unit : Rp.)

Items of expenditure	From Gdb to Pasoso per train A	From Psoso to Gdb per train B	One-round trip per train A+B=C	Notes
Variable expenses				
Maintenance of Loc.	757,356	757,356	1,514,712	Gdb-Pwk:2 CC201 Pwk-Tpk:1 CC201
Maintenance of wagon	483,312	483,312	966,624	17wagon/train
Station and yard	104,831	104,831	209,662	
Maintenance track	171,451	130,507	301,958	
Rehabilitation for derailment	5,191	5,191	10,382	
Subtotal A	1,522,141	1,481,197	3,003,338	
Personnel expenses B	77,568	78,821	156,389	Driver, co-driver, conductor, army
Fuel C	420,117	327,967	748,084	
Total Variable expenses A+B+C=D	2,019,826	1,887,985	3,907,811	
Fixed expenses E	1,114,829	1,067,626	2,182,455	Not include compensation and interest
Total expenses D+E=F	3,134,655	2,955,611	6,090,266	

Notes : 1. Locomotive between Gdb and Pwk means 2 CC 201
〃 〃 Pwk and Tpk means 1 CC 201

2. PERUMKA crew between Gdb and Pwk consists of 2 drivers, 2 co-drivers, 1 conductor.
〃 〃 between Pwk and Tpk consists of 1 driver, 1 co-driver, 1 conductor.

3. Security between Gdb and Tpk consists of 2 Army soldiers (non PERUMKA personnel)

4. Include, personnel expenses and non-personnel expenses.

Table 4-3(3) Annual Increased Operation Cost from 1995 Basis

(unit : 10^3Rp.)

Year	1996	1997	1998	1999	2000
Increase in train operation expenses	287,224	287,224	287,224	343,887	402,504
Increase in crane handling & maintenance expenses	41,033	40,285	73,198	51,072	55,307
Total increase in expenses	328,257	327,509	360,422	394,959	457,811
Cumulative increase in expenses	656,514	984,023	1,344,445	1,739,404	2,197,215

Year	2001	2002	2003	2004	2005
Increase in train operation expenses	343,887	402,504	343,887	517,785	574,448
Increase in crane handling & maintenance expenses	50,899	54,573	50,523	72,501	84,119
Total increase in expenses	394,786	457,077	394,410	590,286	658,567
Cumulative increase in expenses	2,592,001	3,049,078	3,443,488	4,033,774	4,692,341

Year	2006	2007	2008	2009	2010
Increase in train operation expenses	517,785	574,448	517,785	574,448	517,785
Increase in crane handling & maintenance expenses	71,872	83,364	71,426	82,521	67,371
Total increase in expenses	589,657	657,812	589,211	656,969	585,156
Cumulative increase in expenses	5,281,998	5,939,810	6,529,021	7,185,990	7,771,146

Details are referred to
Apendex 4-3 (3) Containers expenses of container train operation cost between Gedebage and Tg.Priok.

5. COST ESTIMATE AND CONSTRUCTION SCHEDULE

5.1 FACILITIES AND EQUIPMENT AND THEIR RELATION WITH THE CONSTRUCTION SCHEDULE

(1) In the F/S, a gantry crane will be installed at Kac St. by 2004 when train arrivals will need two arrival and departure tracks to handle the container trains that cannot stop closed to the unloading platform.
Accordingly, the CFS and heavy pavement have only to be completed by 2004 as well when full container handling is required at Kac St.

(2) The handling volume at Gdb and Kac together in 2010 will be three times greater than present.
The present office will become inadequate with the increase in counter business and the reinforcement of container handling.
An addition onto the main office building will be executed at the same time as crane installation (2003) at Kac St.

(3) At Kac St. reinforcement of the telecommunications system is necessary to direct crane operation.
The workshops for machine operators, mechanics, CFS administrators, customs agents and inspection agents at Kac St. are added onto the CFS.

(4) Otherwise, a whole on-line information system might be necessary, in accordance with the plan that Tg. Priok Port functionally changes to a mother port and the full container handling is carried out at Gdb and Kac St.

These are reflected in the following below.

5.2 INVESTMENT COST ESTIMATE AND CONSTRUCTION SCHEDULE

5.2.1 Necessary investment amount

1. The premises of the cost estimate and investment unit cost of the F/S is the same as the Urgent Implementation Program (Vol. 2, Chapter 8).
The investment amount till 2003 which is the term of the F/S and that of the project life term are shown in Table 5-2(1).

(1) In the case of Automatic signalling preceding
The necessary total construction cost of the project life term is 120.4 billion Rp (73.7 billion Rp as foreign currency).
Meanwhile, that of the term of the F/S, i.e., till 2003, is 62.5 billion Rp (43.1 billion Rp as foreign currency).

(2) In the case of Doubling of track preceding
The necessary total construction cost of the project life term is 119.5 billion Rp (72.5 billion Rp as foreign currency).
Meanwhile, that of the term of the F/S, i.e., till 2003, is 83.3 billion Rp (55.7 billion Rp as foreign currency).

Accordingly, the construction cost till 2003 is cheaper in the case of Automatic signalling preceding than Doubling of track preceding.

Table 5-2(1) Required Investment Amount

(1) In the Case of Automatic Signalling Preceding

Unit : Billion Rp

Investment Stage / Costruction Items	Until 2003			Later than 2003			Grand Total		
	Total	F/C	D/C	Total	F/C	D/C	Total	F/C	D/C
a. Doubling of Track									
Compensation	0	0	0	5.3	0	5.3	5.3	0	5.3
Civil works and buildings	0	0	0	7.4	5.7	1.7	7.4	5.7	1.7
Track	0	0	0	4.9	4.3	0.6	4.9	4.3	0.6
b. Yard Improvement									
Land acqusition and compensation	4.3	0	4.3	0	0	0	4.3	0	4.3
Civil works and buildings	8.7	5.4	3.3	0	0	0	8.7	5.4	3.3
Tracks	17.7	15.1	2.6	0	0	0	17.7	15.1	2.6
c. Signalling and Telecommunication									
Automatic signalling including electrionic interlocking apparatus	11.3	10	1.3	0	0	0	11.3	10	1.3
Yard Facilities	4.8	4.3	0.5	2	1.7	0.3	6.8	6	0.8
d. Machines									
Rolling stock	9.8	4.9	4.9	25.8	8.1	17.7	35.6	13	22.6
Handling machines	0.3	0.3	0	7.2	7.2	0	7.5	7.5	0
e. Management	5.6	4	1.6	5.3	2.7	2.6	10.9	6.7	4.2
Grand Total	62.5	44	18.5	57.9	29.7	28.2	120.4	73.7	46.7

(2) In the Case of Doubling of Track Preceding

Investment Stage / Costruction Items	Until 2003			Later than 2003			Grand Total		
	Total	F/C	D/C	Total	F/C	D/C	Total	F/C	D/C
a. Doubling of Track									
Compensation	5.3	0	5.3	0	0	0	5.3	0	5.3
Civil works and buildings	7.4	5.7	1.7	0	0	0	7.4	5.7	1.7
Tracks	4.9	4.3	0.6	0	0	0	4.9	4.3	0.6
b. Yard Improvement									
Land acqusition and compensation	4.3	0	4.3	0	0	0	4.3	0	4.3
Civil works and buildings	8.7	5.4	3.3	0	0	0	8.7	5.4	3.3
Tracks	17.7	15.1	2.6	0	0	0	17.7	15.1	2.6
c. Signalling and Telecommunication									
Mechanical equipment required by doubling of track	1	0.6	0.4	0	0	0	1	0.6	0.4
Automatic signalling including electronic interlocking apparatus	16.3	14.3	2	0	0	0	16.3	14.3	2
d. Machines									
Rolling stock	9.8	4.9	4.9	25.8	8.1	17.7	35.6	13	22.6
Handling machines	0.3	0.3	0	7.2	7.2	0	7.5	7.5	0
e. Management	7.6	5.1	2.5	3.2	1.5	1.7	10.8	6.6	4.2
Grand Total	83.3	55.7	27.6	36.2	16.8	19.4	120	72.5	47

*Notes : The items in c and d are different from the other items in that they can be made accurate relatively so physical contingencies were not considered.

*F/C shows foreign currency.

*D/C shows domestic currency.

5.2.2 Construction schedule

2. The necessary completion time of each construction item, based on Chapter one to three, is as shown in Table 5-2(2).

Based on the above table, the construction schedule and annual investment per item is as shown in Table 5-2(3).

Furthermore, the team considers the case of a 10% decrease in transportation as sensitivity analysis in both economic and financial analysis, owing to the construction of an expressway expected to be finished in 1997.

This means a two-year delay in the forecasts in and after 1998 in Table 1-2(2), so completion time may be delayed by two years in Table 5-2(2).

Table 5-2(2) Required Completion Time for Facilities

Stage	Present	Urgent		F/S	M/P	Reference
Operation round trip	4	5	6 ~ 7	8	9 ~ 10	
Gedebage		2 storage tracks Pavement 2920 m² 1996	Electronic interlocking 1997 →	4 sub-main tracks 2003 (Electronic interlocking 2003)		( )←, →( ) when doubling of track preceding as first alternative
Kiaracondong			1 sub-main tracking 1997 Electronic interlocking 1997 →	Increase of a sub-main track 2003 Pavement 23350m² CFS 700m² 2003 (Electronic interlocking 2003)		
Tanjung Priok & Pasoso				2 storage tracks 2003		Sub-main tracking (1) will be necessary for Bekasi New Line after 2010.
New C.T				Platform 7200 m² 2003		Additional storage tracks (2) will be necessary for TCT III after 2010.
Doubling of track			(1998) →	3935 m	2008	
Rolling stock		Loco : 2 1997	Loco : 1 2001	Loco : 2 2004 Wagon : 17 2004	Loco : 1 2007 Wagon : 17 2007 Loco : 2 2009 Wagon : 34 2009	
Operational year		1997	–2003	–2006	–2010	

Table 5-2(3) Annual Investment and Construction Schedule

(1)In the Case of Automatic Signalling Preceding

Unit : Million Rp

Construction Stage	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	after2010	Total
(a) Urgent Plan at Kac																		
(1)Civil, Building		595	0															595
(2)Track		0	546															546
(3)Electric		2,340	3,332															5,672
(4)Folklift		0	300															300
(5)Management Cost		294	418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	712
Total	0	3,229	4,596	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,825
(b) Urgent Plan at Gdb																		
(1)Civil, Building	505	2,720	0															3,225
(2)Track		83	2,794															2,877
(3)Electric		3,220	3,878															7,098
(4)Locomotive		0	6,520			0	0											6,520
(5)Management Cost	50	602	1,319	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,971
Total	555	6,625	14,511	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21,691
(c) Improvement Plan at Kac																		
(1)Civil, Building									1,917									1,917
(2)Track									2,690									2,690
(3)Electric									882									882
(4)Handling Machine									0	7,150								7,150
(5)Management Cost	0	0	0	0	0	0	0	0	549	715	0	0	0	0	0	0	0	1,264
Total	0	0	0	0	0	0	0	0	6,038	7,865	0	0	0	0	0	0	0	13,903
(d) Improvement Plan at Gdb																		
(1)Land Acquisition							1,285	2,998										4,283
(2)Civil, Building									2,388									2,388
(3)Track									5,937									5,937
(4)Electric									2,483									2,483
(5)Locomotive and Wagon							3,260		0	8,900			5,640		11,280			29,080
(6)Management Cost	0	0	0	0	0	0	455	300	1,081	890	0	0	564	0	1,128	0	0	4,418
Total	0	0	0	0	0	0	5,000	3,298	11,889	9,790	0	0	6,204	0	12,408	0	0	48,589
Sub Total (a)+(b)+(c)+(d)	555	9,854	19,107	0	0	0	5,000	3,298	17,927	17,655	0	0	6,204	0	12,408	0	0	92,008

Table 5-2(3) Annual Investment and Construction Schedule

(1)In the Case of Automatic Signalling Preceding

Unit : Million Rp

Construction Stage	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	after2010	Total
(e) Doubling of Track																		
(1)Compensation												5,313						5,313
(2)Civil, Bridge													5,427	1,948				7,375
(3)Track													0	4,928				4,928
(4)Electric													0	1,959				1,959
(5)Management Cost		0	0	0	0	0	0	0	0	0	0	531	543	883	0	0	0	1,957
Total	0	0	0	0	0	0	0	0	0	0	0	5,844	5,970	9,718	0	0	0	21,532
(f) Improvement at Pasoso																		
(1)Civil									0									0
(2)Track									2,497									2,497
(3)Management Cost		0	0	0	0	0	0	0	250	0	0	0	0	0	0	0	0	250
Total	0	0	0	0	0	0	0	0	2,747	0	0	0	0	0	0	0	0	2,747
(g) Improvement at TCT-III																		
(1)Civil									594									594
(2)Track									3,112									3,112
(3)Management Cost		0	0	0	0	0	0	0	371	0	0	0	0	0	0	0	0	371
Total	0	0	0	0	0	0	0	0	4,077	0	0	0	0	0	0	0	0	4,077
																	0	
																	0	
																	0	
																	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																	0	
																	0	
																	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub Total (e)+(f)+(g)	0	0	0	0	0	0	0	0	6,824	0	0	5,844	5,970	9,718	0	0	0	28,356
Grand Total	555	9,854	19,107	0	0	0	5,000	3,298	24,751	17,655	0	5,844	12,174	9,718	12,408	0	0	120,364

Table 5-2(3) Annual Investment and Construction Schedule

(2)In the Case of Doubling of Track Preceding

Unit : Million Rp

Construction Stage	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	after2010	Total
(a) Urgent Plan at Kac																		
(1)Civil, Building		595	0															595
(2)Track		0	546															546
(3)Electric		0	0															0
(4)Folklift		0	300															300
(5)Management Cost		60	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144
Total	0	655	930	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,585
(b) Urgent Plan at Gdb																		
(1)Civil, Building	505	2,720	0															3,225
(2)Track		83	2,794															2,877
(3)Electric		0	185															185
(4)Locomotive		0	6,520			0	0											6,520
(5)Management Cost	50	280	950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,280
Total	555	3,083	10,449	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,087
(c) Improvement Plan at Kac																		
(1)Civil, Building									1,917									1,917
(2)Track									2,690									2,690
(3)Electric									6,649									6,649
(4)Handling Machine									0	7,150								7,150
(5)Management Cost	0	0	0	0	0	0	0	0	1,126	715	0	0	0	0	0	0	0	1,841
Total	0	0	0	0	0	0	0	0	12,382	7,865	0	0	0	0	0	0	0	20,247
(d) Improvement Plan at Gdb																		
(1)Land Acquisition							1,285	2,998										4,283
(2)Civil, Building									2,388									2,388
(3)Track									5,937									5,937
(4)Electric									9,481									9,481
(5)Locomotive and Wagon							3,260		0	8,900			5,640		11,280			29,080
(6)Management Cost	0	0	0	0	0	0	455	300	1,781	890	0	0	564	0	1,128	0	0	5,118
Total	0	0	0	0	0	0	5,000	3,298	19,587	9,790	0	0	6,204	0	12,408	0	0	56,287
Sub Total (a)+(b)+(c)+(d)	555	3,738	11,379	0	0	0	5,000	3,298	31,969	17,655	0	0	6,204	0	12,408	0	0	92,206

Table 5-2(3) Annual Investment and Construction Schedule

(2)In the Case of Doubling of Track Preceding

Unit : Million Rp

Construction Stage	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	after2010	Total
(e) Doubling of Track																		
(1)Compensation		5,313																5,313
(2)Civil, Bridge			5,427	1,948														7,375
(3)Track			0	4,928														4,928
(4)Electric			0	1,001														1,001
(5)Management Cost		531	542	787	0	0	0	0	0	0	0	0	0	0	0	0	0	1,860
Total	0	5,844	5,969	8,664	0	0	0	0	0	0	0	0	0	0	0	0	0	20,477
(f) Improvement at Pasoso																		
(1)Civil									0									0
(2)Track									2,497									2,497
(3)Management Cost		0	0	0	0	0	0	0	250	0	0	0	0	0	0	0	0	250
Total	0	0	0	0	0	0	0	0	2,747	0	0	0	0	0	0	0	0	2,747
(g) Improvement at TCT-III																		
(1)Civil									594									594
(2)Track									3,112									3,112
(3)Management Cost		0	0	0	0	0	0	0	371	0	0	0	0	0	0	0	0	371
Total	0	0	0	0	0	0	0	0	4,077	0	0	0	0	0	0	0	0	4,077
																	0	
																	0	
																	0	
																	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																	0	
																	0	
																	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub Total (e)+(f)+(g)	0	5,844	5,969	8,664	0	0	0	0	6,824	0	0	0	0	0	0	0	0	27,301
Grand Total	555	9,582	17,348	8,664	0	0	5,000	3,298	38,793	17,655	0	0	6,204	0	12,408	0	0	119,507

6. ECONOMIC ANALYSIS

6.1 PURPOSE OF ECONOMIC ANALYSIS

1. The purpose of the economic analysis is to appraise the economic feasibility of the Short-term Development Plan for the dry port and connecting rail way from the viewpoint of the national economy.

6.2 METHODOLOGY OF ECONOMIC ANALYSIS

2. Economic analysis will be carried out according to the following method. Short-term development plan will be defined and it will be compared with the "Without" case. All benefits and costs of it in market prices will be converted to economic prices. All benefits and costs are evaluated using economic prices in the economic analysis based on the border price concept. There are various methods to evaluate the feasibility of this type of development project. Here, the economic internal rate of return (EIRR) based on a cost-benefit analysis is used to appraise the feasibility of this project. The EIRR is a discount rate that makes the costs and the benefits of the project during the project life equal, and it is calculated using the following formula:

$$\sum_{i=0}^{n} \frac{Bi-Ci}{(1+r)^i} = 0$$

Where,
- Bi : Benefits in the i-th year
- Ci : Cost in the i-th year
- r : Discount rate
- n : Period of project life

6.3 "WITHOUT" CASE AND "WITH" CASE

3. In the cost-benefit analysis, the benefits and the project costs are defined as the difference between the "Without" the project and the "With" the project cases. Therefore, it is very important to define the difference between the "Without" case and "With" case in the economic analysis in order to evaluate the feasibility of the development project. In this study, the following conditions are adopted as the "Without case" considering the existing situation.

6.3.1 "Without" case

4. In the "Without" case, it is assumed that no additional investment will be made to enlarge the existing dry port and connecting rail way facilities, but the required funds will be provided to maintain the existing facilities at their current level of services. Thus the level of capacities of the dry port and connecting railway, that show the efficiency of transportation, loading and unloading and so on, are not improved. The conditions of "Without" case are assumed as follows.

5. The maximum transportation capacity by railway via the dry port for the container cargo is estimated as follows:

71,500 TEU / year

6.3.2 "With" case

6. In the "With" case, it is assumed that Short Term Development plan for the dry port and connecting railway will be conducted and the capacity levels will be improved. The conditions of "With" case are assumed as follows.

7. The maximum transportation capacity of the dry port and connecting railway for the container cargo is calculated as follows :

Table 6-3(1) Transportation Capacities of the "With" case

Year	Maximum Capacity
1995 - 1996	71,500 TEU
1997	87,000 TEU
1998 - 2003	145,900 TEU
2004 - 2006	220,400 TEU
2007 - 2010	220,400 TEU
2010 -	220,400 TEU

Estimated by The Study Team

6.3.3 Cargo handling volume

8. According to the demand forecast at Gedebage Dry Port, future container cargo volume is estimated as follows:

Table 6-3(2) Estimated Container Cargo Volume

(Unit: TEU)

Cargo	1993	1998	2003	2010
Container Cargo	60,918	92,000	124,000	190,000

6.3.4 Container cargo flow under the "Without" case

9. Under the "Without" case, the estimated cargo volume will be handled without the purchasing of new container transportation equipment, construction of Kiaracondong container dry port, automatic signalization and double tracking. The transportation capacity will be limited by the container handling capacity of railway at the dry port utilizing the existing facilities and the current level of services. Under the "Without" case, estimated container cargo volume will be over the container handling capacity of the dry port and connecting railway. The overflow container will be transported by trailer.

6.4 PREREQUISITES OF ECONOMIC ANALYSIS

10. In order to estimate the costs and benefits under the "With" and "Without" cases, the following prerequisites are assumed for the analysis.

6.4.1 Base year

11. The "Base Year" here means the starting year of the economic analysis. Taking into consideration the construction and installation schedule, 1995 is set as the "Base Year" for this Study.

6.4.2 Project life

12. Taking into consideration the depreciation period of the main facilities mentioned in the chapter of Financial Analysis and construction period of four years, the period of calculation ("project life") in the economic analysis is assumed to be thirty years from the beginning of construction. It is from 1995 to 2024.

6.4.3 Foreign exchange rate

13. The exchange rate adopted for this analysis is as below, that is, the same rate as used in the cost estimation.

US$ 1.00 = Rp. 2,134
US$ 1.00 = JP¥ 105.85
JP¥ 1.00 = Rp. 20.16

6.4.4 Others

14. Under the "With" case, the short-term plan that includes the urgent plan for the dry port and connecting railway development will be carried out from the year 1995 and the capacity of the dry port and connecting railway will be improved after the year 1997.

6.5 ECONOMIC PRICES

6.5.1 Method for converting to economic prices from market prices

15. For the economic analysis, prices are expressed in economic prices rather than prices based on the border price concept. In general, after exclusion of transfer items, such as taxes, subsidies etc, all the costs and benefits are divided into three categories : labor, tradable goods and non-tradable goods. Labor is further classified into skilled labor and unskilled labor. As for skilled labor, the economic price is determined by multiplying the market wage by the conversion factor for consumption (CFC). On the other hand, the economic price of unskilled labor is determined by multiplying the nominal wage by the shadow wage rate and the conversion factor for labor (CFL). The prices of tradable goods are expressed in CIF and FOB value for import goods and export goods respectively. The non-tradable goods are calculated by multiplying the market prices by the standard conversion factor (SCF) directly.

6.5.2 Conversion factors

16. Conversion factors for goods and labor are determined as follows:

(1) Standard Conversion Factor (SCF)

17. In this study, the standard conversion factor is adopted as 0.951.

(2) Conversion Factor for Consumer Goods (CFC)

18. In this study, the conversion factor for consumer goods is estimated as 0.925.

(3) Conversion Factor for Labor (CFL)

19. The cost of skilled labor is converted into border prices by multiplying the market wages by the conversion factor for consumption goods.

20. The conversion factor for unskilled labor is calculated as 0.578.