c) Hatta quay will be exclusively used for container terminal and the on-going plan should be basically followed by the Study.

64. The capacity of the new container terminal to be completed in 1997 is estimated at 145,000 TEU(116,000 Box)/Year and will be saturated in 1999 - 2002. The saturation will come from the shortage of container yard area as well as handling equipment. Thus, an additional container yard including CFS area should be provided outside the Port as an inland depot prior to the saturation, because there is no available space near the container terminal or at any place inside the Port.

65. The site next to the existing ship yard at Kel Tallo north of the Port is proposed for the location of the inland container terminal. Equipment for handling containers is also proposed for procurement together with the development of additional access channels and terminal facilities. Development of access roads are further proposed to keep smooth connection with the regular and toll roads around the inland terminal.

66. Cost estimation is carried out based on the preliminary design of the major facilities and the implementation program. Total construction cost including infrastructure, superstructure, and equipment of both the port and inland terminals amounts to 190,112 million Rp.

5.1.3 Sort-Term Development Plan

67. On the basis of the Master Plan and cargo forecast for the years 2003 and 2010, the following facilities and equipment will be required for accepting container ships and handling containers.

		Master Plan (M/P)	Short-Term Development Plan
1.New Hatta Quay	-Power supply	: 1 set	-same as M/P
	-Terminal building	: 600 m^2	-same as M/P
	-Yard fence	: 270 m	-same as M/P
	-Information and control system		-same as M/P
2.Inland Container Terminal	-Yard reclamation	: 15.5 ha	-: 8.5 ha
	-CFS sheds	: 15,750 m^2	-: 9,000 m^2
	-Open yard storage	: 6.6 ha	-: 2.7 ha
	-Office building	: 1 bld.	-same as M/P
	-Work shop	: 1 bld.	-same as M/P
	-Utilities	: 1 set	-: 1 set
3.Access Entrance	-Road embankment and pavement		-same as M/P
	-Gate		-same as M/P
	-Bridge(Box culvert)		-same as M/P
	-Utilities		
4.Connecting Toll Road	-Road embankment and pavement		-part of M/P
	-Fence and utilities		-same as M/P
5.Access Channel	-Navigation aids		-same as M/P
	-Dredging and disposal	:685,000m^3	-:438,000 m^3
6.Equipment and Information System	-Quay gantry crane	: 3 units	-: 3 units
	-Rubber tired gantry crane	: 14 units	-: 9 units
	-Forklift(7 ton)	: 14 units	-: 7 units
	-(3.5 ton)	: 12 units	-: 9 units
	-Reachstacker(45ton)	: 6 units	-: 2 units
	-Tractor head	: 54 units	-:27 units
	-Chassis	:108 units	-:54 units
	-Generator(150KVA)	: 2 units	-: 1 units
	- (400KVA)	: 2 units	-: 2 units
	-Computer & software	: 11 units	-:10 units

68. Preparation for project implementation, such as basic /detail design will continue until the end of 1997. Following this period, the beginning of the construction works and installation of the container handling equipment will begin as required till 2003.

69. Project cost is estimated based on the basic design of the major facilities and handling equipment. Total construction cost including infrastructure, superstructure, and equipment of both the port and inland terminals amounts to 129,125 million Rp.(Foreign portion: 106,412 million Rp., Local portion: 22,713 million Rp.) including physical contingency and engineering fee.

70. Environmental impact assessment(EIA) was carried out for the two works as follows:

a)Dredging and dumping in access channel of Uj. Pandang Port
b)Construction of inland container terminal for Uj. Pandang Port

According to the assessment, both portions are expected to cause impacts to some environmental components around the project site to some extent. Therefore careful countermeasure to avoid significant impacts should be employed for the project implementation and operation.

71. Evaluation of the short-term development plan for the container terminal at Uj. Pandang Port was executed by the internal rate of return(IRR) though cost/benefit analysis. Economic benefit is mainly accrued from the saving in ships' port staying cost and interest of cargo cost, etc. Calculated IRR for the container terminal including the inland terminal is 15.6 % under a 30 year project life. This figure exceeds the national and international bench-mark and the project can be considered to be economically feasible.

72. In order to confirm the viability of the project, Financial Internal Rate of Return(FIRR) is calculated for the proposed project together with related alternative schemes. If the project is executed through low-interest fund, not only this project but also the total project including the on-going project will become financially feasible. Even if the equipment in the terminal is financed and operated by a private company, it will be difficult for the company to refund the capital cost under the current market interest rate. Accordingly, the project should be executed by low-interest rate source, and operated and managed, together with the on-going project as one body, by the public sector.

5.2 RECOMMENDATIONS

73. In order to compensate for the shortage of container yard space including CFS area, an additional inland terminal should be developed outside the Port to coordinate operation with the port terminal. In view of the limited CFS area inside the Port, it is recommended that an additional CFS be installed in the inland terminal in 1997 when the container terminal is inaugurated.

74. The Team suggests that the on-going terminal plan partially implemented should be modified to some extent taking into consideration the linkage between the new inland terminal and the on-going plan. The planned construction works related to the proposed modification should be soon postponed and then implemented based on the short-term development plan which is to be proposed in Part 2.

75. The on-going project excludes the procurement of handling equipment for containers, but it is clear that the container cargo loaded/unloaded in 1997 when the terminal is completed will not be able to be handled without installation of container gantry cranes, judging from the efficiency of ship gears for container handling. Therefore it is recommended that two gantry cranes with other related equipment be provided upon completion of the proposed container terminal.

76. To raise efficiency in terminal operation and service, it is preferable to introduce computerization when the gantry cranes are installed in the terminal. Further, the computer systems should be expanded to the inland terminal to operate the container terminal including the inland terminal as one body when it is used as a container yard other than CFS area.

77. Since Sulawesi has no railway facilities, road is the major arterial transport facility. In line with the progress of the container terminal, Uj. Pandang port, highways under planning to connect the Port and Uj. Pandang city with its hinterland should be developed without delay.

78. The inland terminal should be smoothly connected to the toll road in each directions. According to the original development plan of the toll road, it is unlikely that the connecting road from the terminal will easily join the proposed toll road southward because of the steep slope of the planned toll road. Therefore it is suggested that

coordination should be made to connect both roads with other for smooth joining between port and road sides.

79. In line with increase of international container ship calls, it is suggested that a new berth allocation system like 'window system' instead of 'first come, first served' system, be studied to keep container ship sailing on schedule.

80. It is suggested that the establishment of a new sub division should be examined to operate the specialized container terminal including the inland terminal, in order to raise efficiency and high quality service in terminal operation.

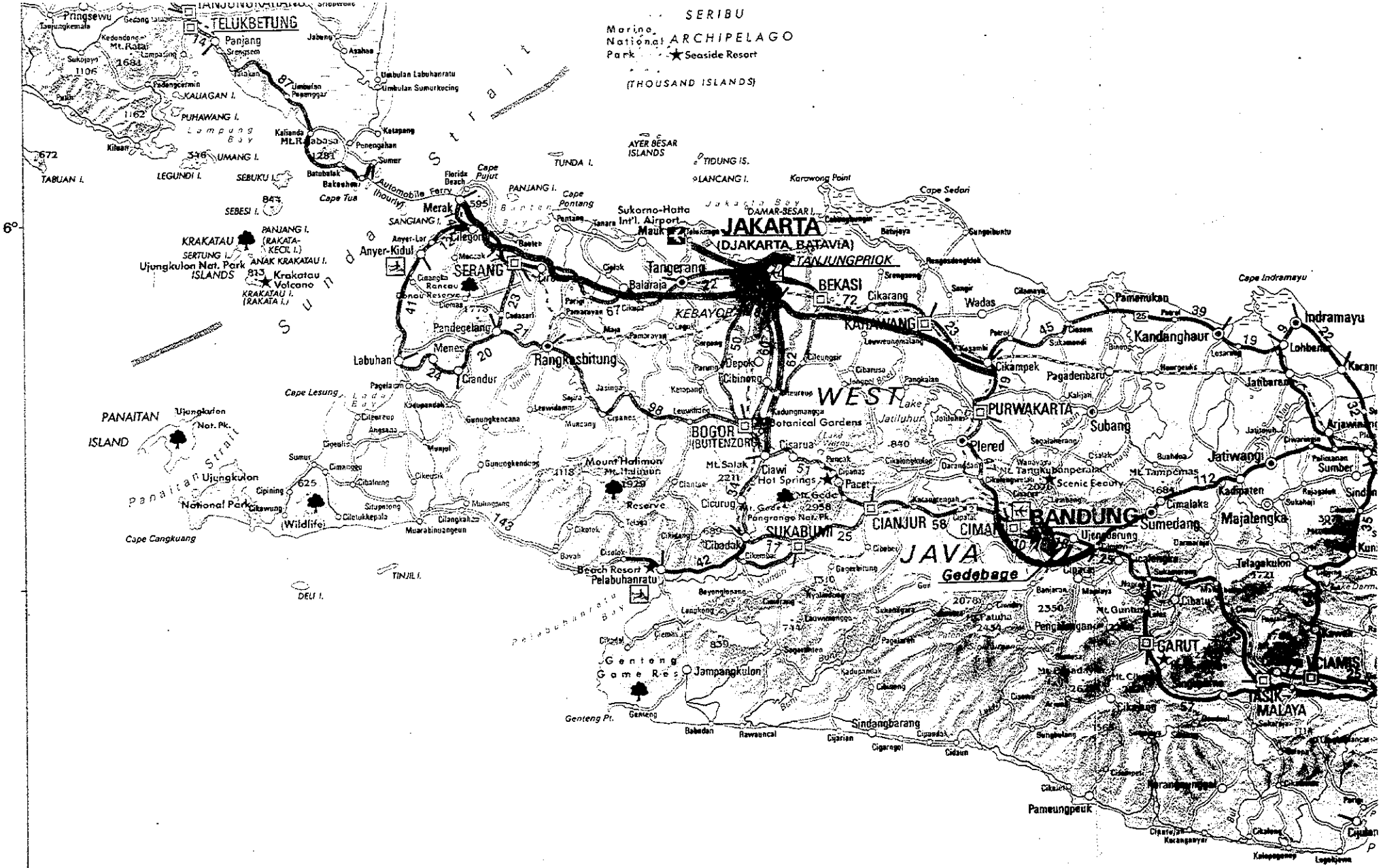
81. To obtain more safety of navigation around the port water area, special navigation traffic rules should be examined with the development of the new entrance channel and tanker docking facilities of PERTAMINA.

82. When dredging the access channel is carried out, a dredging fleet consisted of grab dredger along with barges with bottom doors should be selected instead of cutter suction dredger or drug suction dredger. Further, reclamation works should be started after revetments are completed.

83. The container terminal at Uj. Pandang port will be still in the cradle stage in 2003 and it is expected that the project should be executed by low-interest rate source, and operated and managed, together with the on-going project as one body, by the public sector (PELABINDO IV).

Part 3

Feasibility Study of Container Cargo Handling Facilities of Gedebage Dry Port and Connecting Railway



Route Map Between Tg.Priok and Gedebage

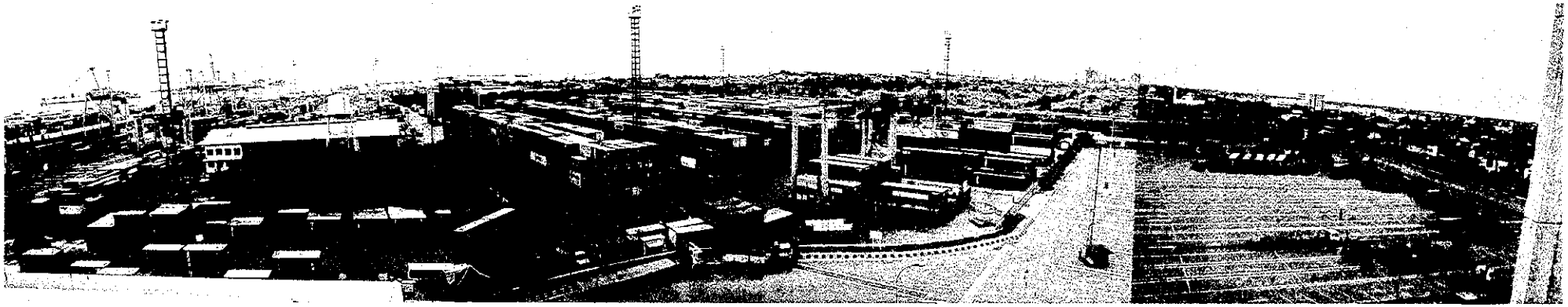
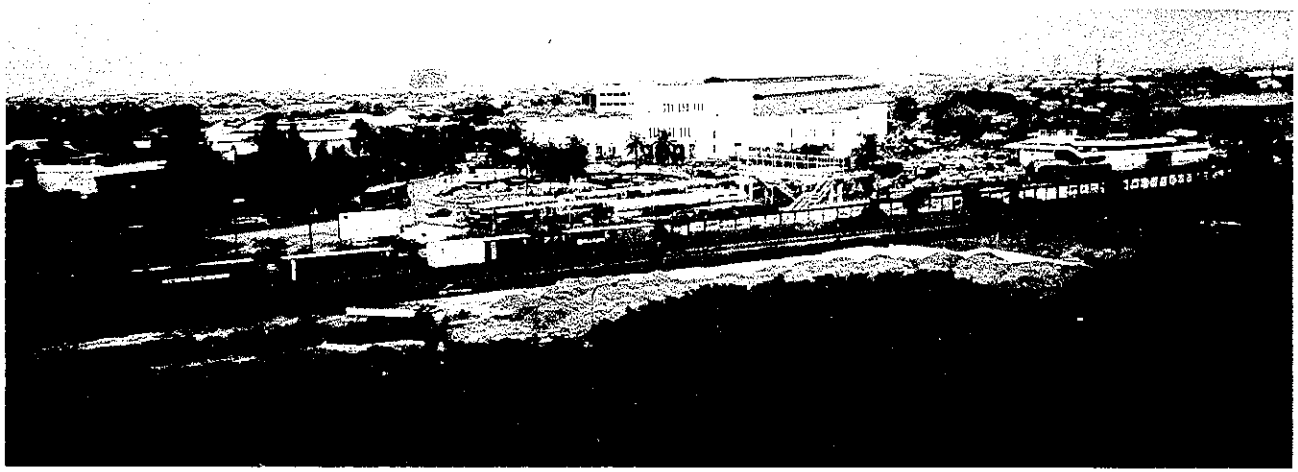


Photo. taken: April. 1994

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



Note:

All Photographs are taken by JICA Study Team

Photo. taken: May. 1994

Pasoso Terminal and Tanjung Priok Station, Jakarta

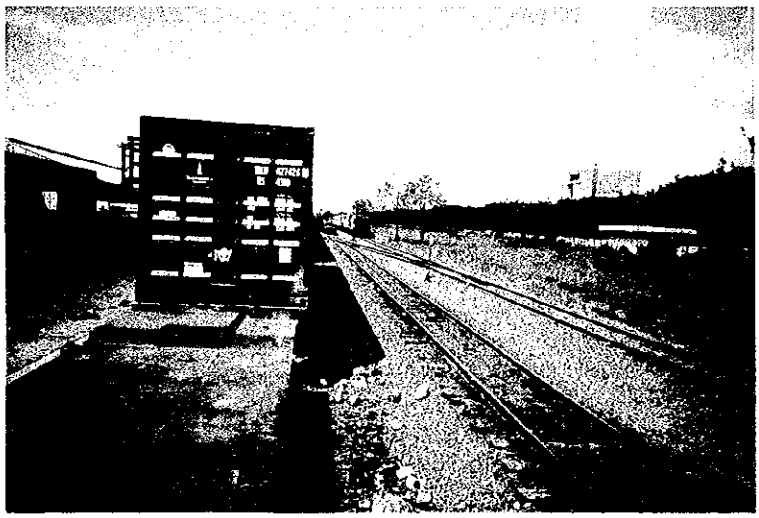
Photo. taken: April, 1994

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

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

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

i) The object of F/S is Gedebage Dry Port and the relevant facilities.
ii) As the premises, the necessary doubling of track and automatic signalization between Ckp and Pdl is completed by another project.
iii) F/S includes urgent implementation plan and objectives only additional number of handling containers and the additional investment from 1995, based on the container traffic demand.
iv) 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.
v) Major facilities to be improved are as follows. **(Fig. 19)**
   a) New additional Container terminal at Gdb.
      The study of the way of using concerning Gdb. and Kac.
   b) Improvement of Tpk and Pasoso corresponding to the above and the Tg. Priok port improvement action plan.
   c) Improvement of car depot, if necessary.
   d) Doubling track between Gdb and Kac and the automatic signalization between them.

The present situation of the subject is described in **Appendix 1.**

1. TRANSPORTATION PLAN

1.1 CONTAINER CARGO DEMAND FORECAST AT GEDEBAGE DRY PORT

1. Container cargo exported from Gdb consists of light industry products such as textiles.
Therefore, the economic growth rate is forecasted for the hinterland as 75% of that of the West Jawa industrial zone.
Based on the above growth rate, all container cargo demand originating from the hinterland is forecasted by summing up each product in the future classified by textile, other light industry products and agricultural products. **(Table 47)**

Table 47 Container Cargo Demand Forecast in the Hinterland of Gedebage

(TEU)

Year	1993	1994	1998	2003	2010
Container cargo	77,000	80,000	102,000	139,000	214,000

2. About 10% of the above demand ignores the railway due to high cube type containers or client requests.
Therefore, potential demand for railway is calculated as 90% of total demand forecast as follows.

Table 48 Container Cargo Demand Forecast at Gedebage Dry Port

(TEU)

Year	1993	1994	1998	2003	2010
Container cargo	70,000	72,000	92,000	124,000	190,000

3. The present annual ratio for full and empty container is adopted as follows.

Table 49 Container Cargo Demand Forecast for Full and Empty Container

(TEU)

Year	1993	1994	1998	2003	2010
Exported full	32,000	34,000	42,000	57,000	88,000
Exported empty	3,000	2,000	4,000	5,000	7,000
Imported full	10,000	10,000	15,000	20,000	30,000
Imported empty	25,000	26,000	31,000	42,000	65,000

4. The handling volume ratio between 20' and 40' containers is 44:56 in terms TEUs. The ratio of 40' containers has been increasing, so a fifty: fifty ratio is adopted for the future as follows.

Table 50 Container Cargo Demand Forecast for 20' and 40' Container

(TEU)

Year	1993	1994	1998	2003	2010
20 feet	27,100	31,500	37,900	47,000	63,000
40 feet	33,800	40,500	54,100	77,000	127,000

1.2 FREIGHT VOLUME AT CONTAINER STATION AND TRAIN OPERATION

(1) The maximum processing capacity of the Gdb container yard is estimated only at five trains at peak time (87,000 TEUs / year), due to the small platform space even after urgent implementation.
Concerning handling at other stations, unloading of empty containers at Gdb is shifted to Kac St in 1998, as a result of the completion of the Urgent Implementation Plan in 1997.

5. This will result in the handling volume at Gdb decreasing remarkably from 92,000 TEUs to 61,000 TEUs. However volume will exceed 87,000 TEUs again in 2004, and it will be necessary to move all unloading work to Kac St.
Based on the above, the annual handling volume at each station is as shown in **Table 51.**

Table 51 Freight Volume Processed at Container Stations (unit :TEU)

Year	Gedebage	Kiaracondong	Pasoso	Remarks
1993	60,918		60,918	Result
1994	72,000		72,000	Forecast
1995	77,000		77,000	hereinafter
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.

(2) The capacity of a container train is 34 TEUs, and requires an auxiliary locomotive between Gdb and Pwk.

The operational pattern of container trains is planned in accordance with weekly deviation classified by Sundays and Mondays, other weekdays, and annual peak time. The change in annual transportation demand and the necessary supply of trains is as shown in **Table 52.**

Table 52 Transportation Demand and Required Number of Trains between Tanjung Priok and Gedebage

Year	Transpor-tation demand	Number of trains			Train operation plan				Train operation rate
	TEU	/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	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 SELECTION OF CONTAINER TRANSPORTATION ROUTE AND PURPOSE OF DRY PORT

(1) The selection of transportation route **(Fig. 32)**

6. There exists the request for changing the present container transportation route which is due to the inability of the Jatinegara (Jng) - Bekasi (Bks) section to handle increases in transportation demand.
As for countermeasures, the team must consider doubling the double track or constructing new Bekasi line, whose construction schedule is pending.
Both duplicated investment at the same time is wasteful.
The existing transportation route will have no problems in the near future based on the traffic demand for 2003 (6 - 7 trains one way), as long as there are not large increases in commuter. This is because that freight and passenger traffic utilizes the section at different time zone each other.

7. Since the new Bekasi Line will pass through highly populated area, and be constructed as an elevated structure, utilizing available land from the removal of sidings on the south side of the Pasoso St. so land acquisition is not necessary.
This will permit the installation of a new branch line at Pasoso St.
Shifting the container and intercity routes will not only alleviate transportation capacity between Jak, Mri and Bks, but also cut in half the 32 km distance between Pasoso and Bekasi. This will improve the chances of profitability for the New Bekasi Line and result in the disappearance of a train crossing in front of Tpk station square.
Early construction of the new line is therefore warranted.

(2) Purpose of dry ports

8. In the Urgent Implementation plan, Kac St. handles only the unloading of empty containers.
This is an effective countermeasure, because it requires only small scale initial investment, in spite of the increase in handling costs owing to empty chassis being sent to Kac St.
However, an increase of eight round-trips or more demands the installation of arrival and departure track at Gdb St. and the installation of a gantry crane and sub-main track together with heavy pavement for the container yard, at Kac St. In this case the

potential handling capacity is estimated at ten round trips (see details in Vol.4 Section 2.2).
Based on the above, the following argument would arise; improvements at Gdb St. should be restricted to the Urgent Implementation plan stage and Gdb and Kac should be in charge of both loading and unloading to deal with Pasoso and TCT III individually.

9. 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 maximum of four trains operation stage.
Furthermore, for Kac St. to handle these remained five trains (one way) at peak time, it must install three 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. 2 -1(2))**
In conclusion, PERUMKA will continue the separate loading and unloading system on and after 2004.

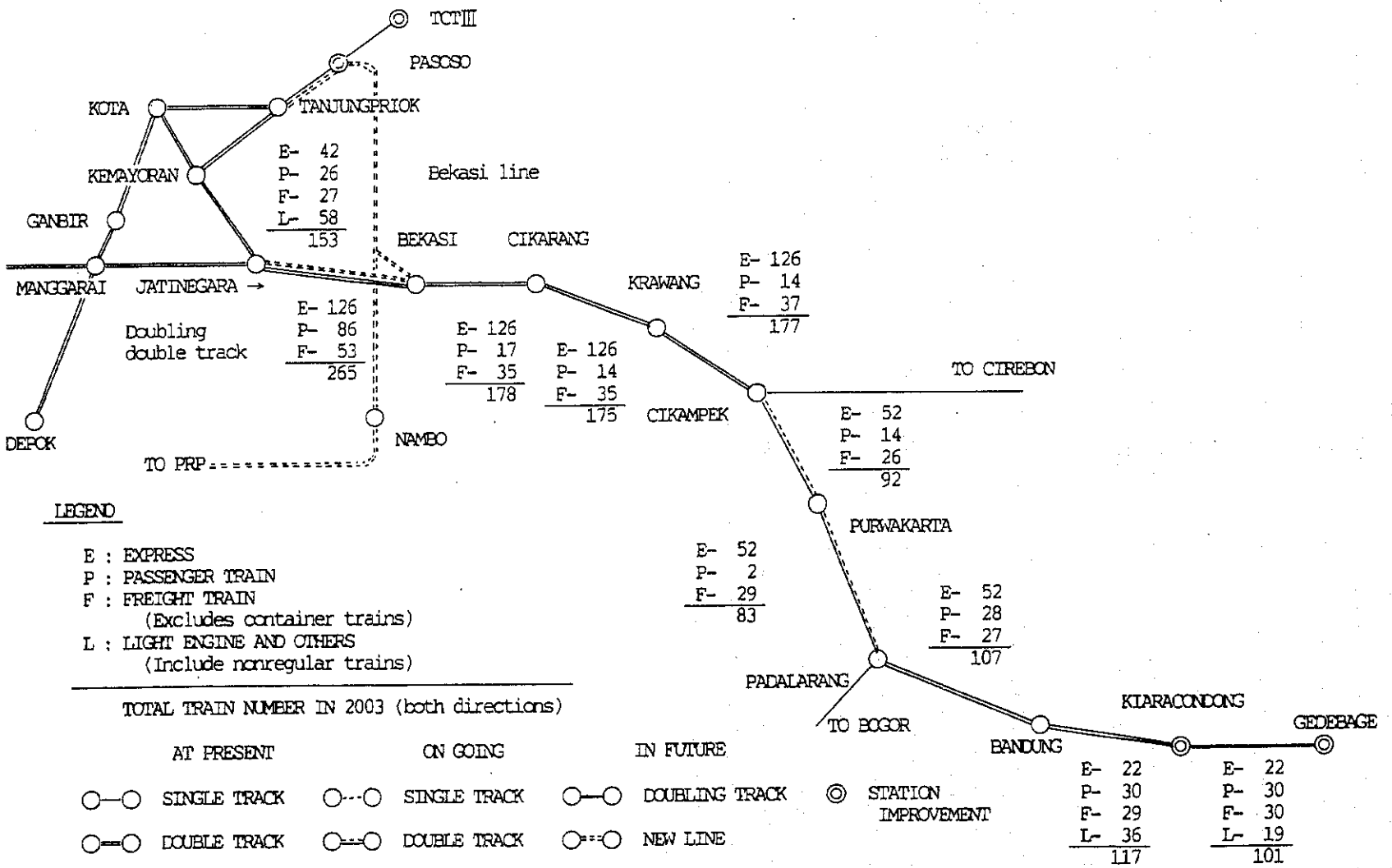


Fig. 32 Main Improvements for Container Transportation

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 Layout of Required Facilities at Each Station

2. The premises for track layout are as follows.
a. Whenever TCT III is set up by 2000 and has a traffic demand corresponding to the year 2003, Tg. Priok Port will become a mother port, after being used as a feeder port for a while.
b. The establishment of TCT III will result in an increase in the number of trains, so Kac St. will handle unloading only and Gdb will handle loading only in the future.
c. 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.
Bandung Depot is used for daily inspection and fuelling.
d. Transportation facilities between Ckp and Bd will be improved by another project. The influence of the installation of a new dry port along the transportation route is taken into consideration in this F/S.

(1) Gedebage St. (**Fig. 33, Fig. 36**)

a. Four arrival and departure tracks are added on the Kac side, and the existing arrival and departure track (3#) is converted to the track to turn back tractive locos and to provide passage for wagon formations. The lead track L1 is extended for easy shunting.
The installation of arrival and departure tracks is executed at the same time as doubling track.
An additional office is built in accordance with increased demand.
b. Eight trains are operated and the max. storage for wagon formations is six during 2004~2006.
The maximum number of trains that can be handled is estimated at ten round trips (nine on average), considering both container yard space and the storage capacity of the

track layout.

(2) Kiaracondong St. (**Fig. 34, Fig. 36**)

3. 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 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. 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.

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

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

a. A system that separates entering and exiting independently will be used, and a waiting place for quick shunting of trailers is established.

b. 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.

This can eliminate wasteful shunting of container wagons that disturb traffic flow near the grade crossing.

(3) Tg. Priok Port (**Fig. 35**)

The purpose of the container transfer yard at TCT III 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** 53).

a. TCT III transfer yard

5. 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.

6. Concerning TCT III transfer yard construction, the cost allocation is expected as follows.
i) Land acquisition
The Port Authorities will secure all the necessary land, including land for the approach track for the extension to TCT III.
ii) Construction
* PERUMKA will bear the cost for track extension work, including the new grade crossing.
* The Port Authorities will bear the construction costs of the TCT III platform and its relevant facilities.
iii) Operation
Additional shunting and depreciation costs are to be recouped via user tariffs or fares.

b. Pasoso (**Fig.** 35)
A storage track and a locomotive run-round track are installed taking the New Bekasi Line into consideration.
This storage track will convert to an arrival and departure track after the New Bekasi Line is laid. This situation will bring no use of the storage tracks at Tpk St., because the operation between Tpk and Pasoso changes unnecessary.

c. Train storage capacity
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 operation during 2009 - 2010, are sufficient as below.

Pasoso	6 wagon formations
TCT III	2 ditto

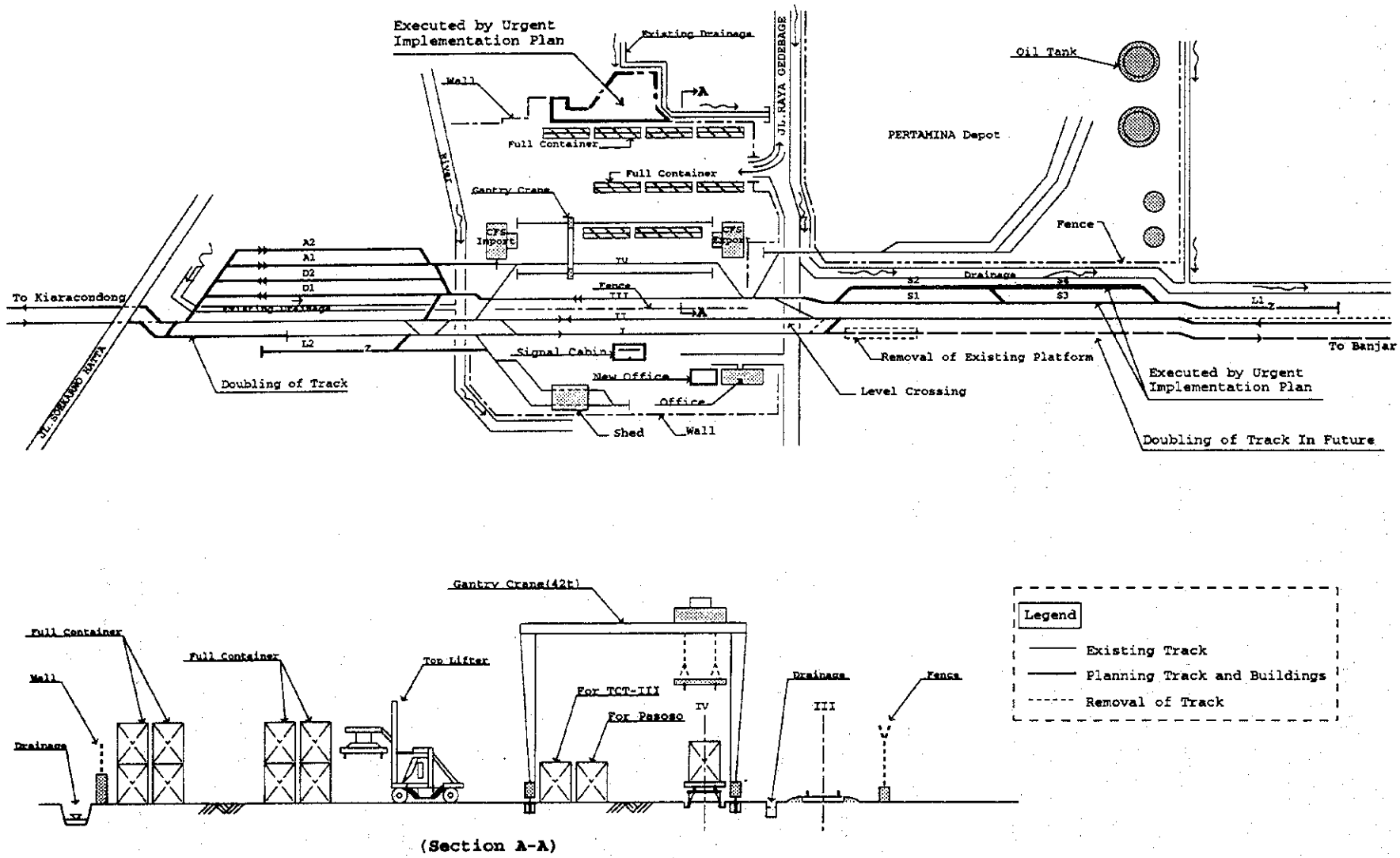


Fig. 33 Track Layout at Gedebage

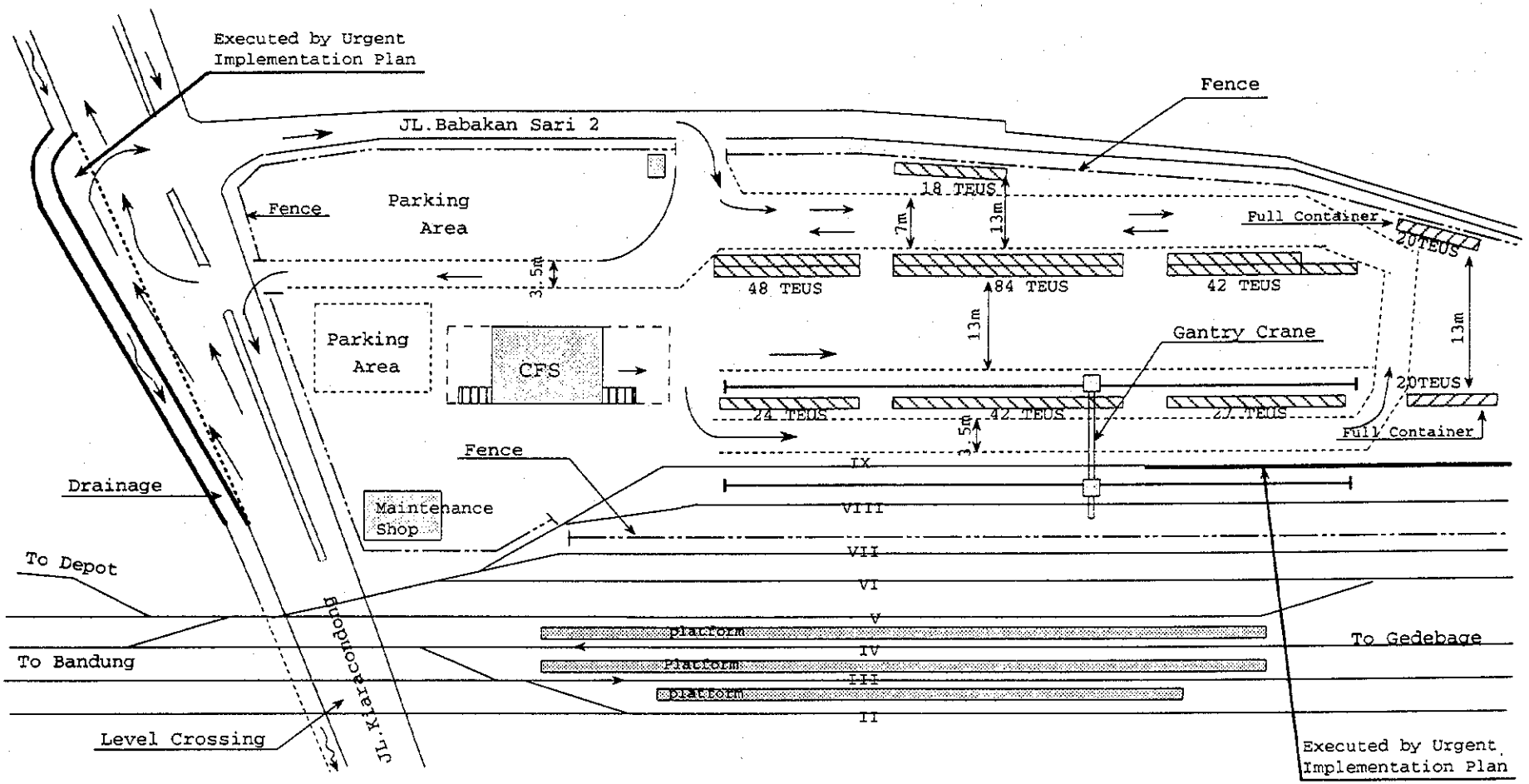


Fig. 34 Layout of Facilities at Kac

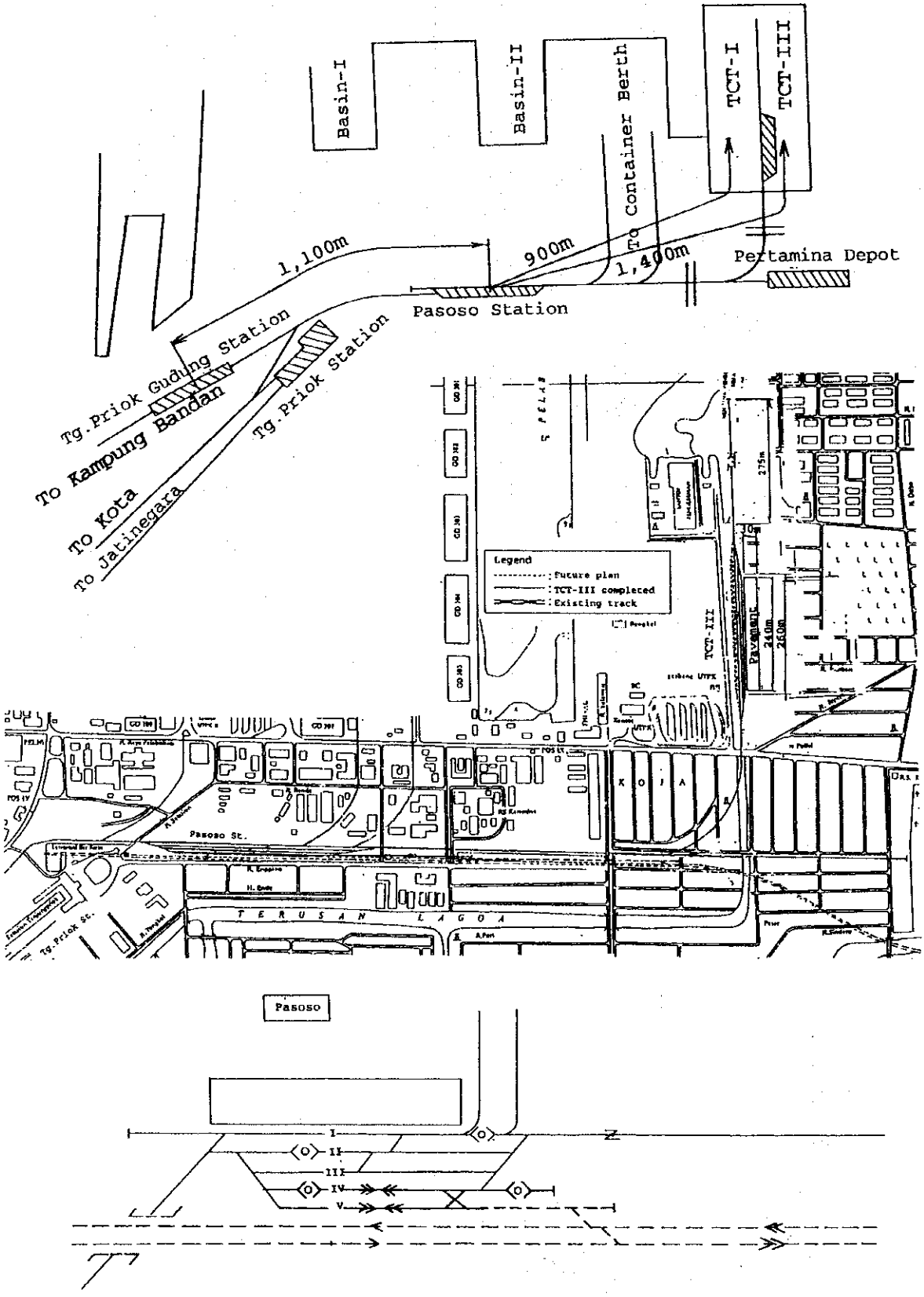


Fig. 35 Network around Tg. Priok (Pasoso)

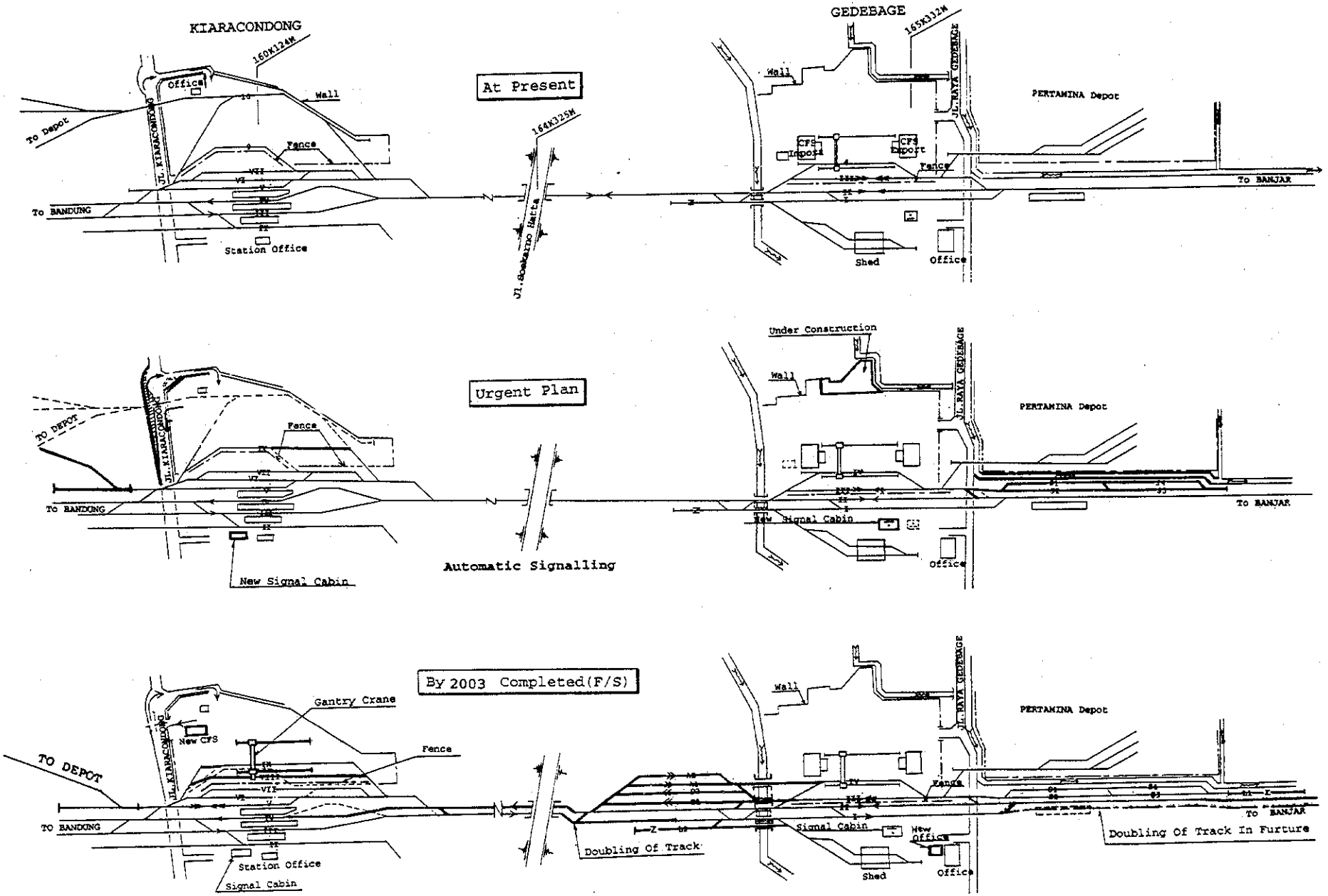


Fig. 36 The change of track layout at each step

Table 53 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.

(4) Relationship between facility capacity and transportation capacity.

7. 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. The results of it are as shown in **Table 53**, 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.

2.2 Doubling of Track plan

(1) It is about 5.2 km from Kac to Gdb on the double track section. (**Fig. 37**)
Track alignment between both stations is on an embankment (L = 3.9 km H = 0.5~1.5 m) and is situated in a paddy field zone and forms a straight line.
There are hardly any houses, except near Kac. St along the line.
As for structures, there are seven bridges with a span of 3 m or more, and two level crossings whose width and traffic volume are also small.
The main road (near mile marker 164 km 325 m) crosses the line and is a fly over, so new track can pass through the north side of the span.

8. Doubled track is extended from the existing lead track at Gdb, but executed on the north side parallel with existing track on the intermediate section.
Land acquisition is not necessary because the land has already been secured.
Private houses (about 230) are crowded on the north side near Kac St. and will prevent the doubling of track.
However, the used land is owned by PERUMKA, and is leased to the inhabitants.
Therefore, it is necessary to compensate for the relocation of private houses.
As for embankment soil material, borrow material is used and there is no need to take special measures to strengthen subgrade because of the embankment's low height. (**Fig. 38**)
Main road (JL.SOEKARNO-HATTA) is flied over with the width B = 12.15 m to make double track possible by using the north of existing line.

(2) Generally speaking, there are two ways to increase track capacity on a single track section: doubling of track or automatic signalling.
The team gives priority to automatic signalling in the Urgent Implementation Program for the following reasons.

a. The lower cost estimates for automatic signalling (12 billion RP) compared with doubling of track(19 Billion RP).
b. The necessary execution period for automatic signalling is shorter.
c. The timeliness of automatic signalling, which needs foreign currency for investment.
d. Modernization

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

(3) The team considers the completion time of the doubling of track as follows.

a. In the case of automatic signalling preceding

According to **Table 54**, the number of trains using the Kac-Gdb section already 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 54 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 runs

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

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.

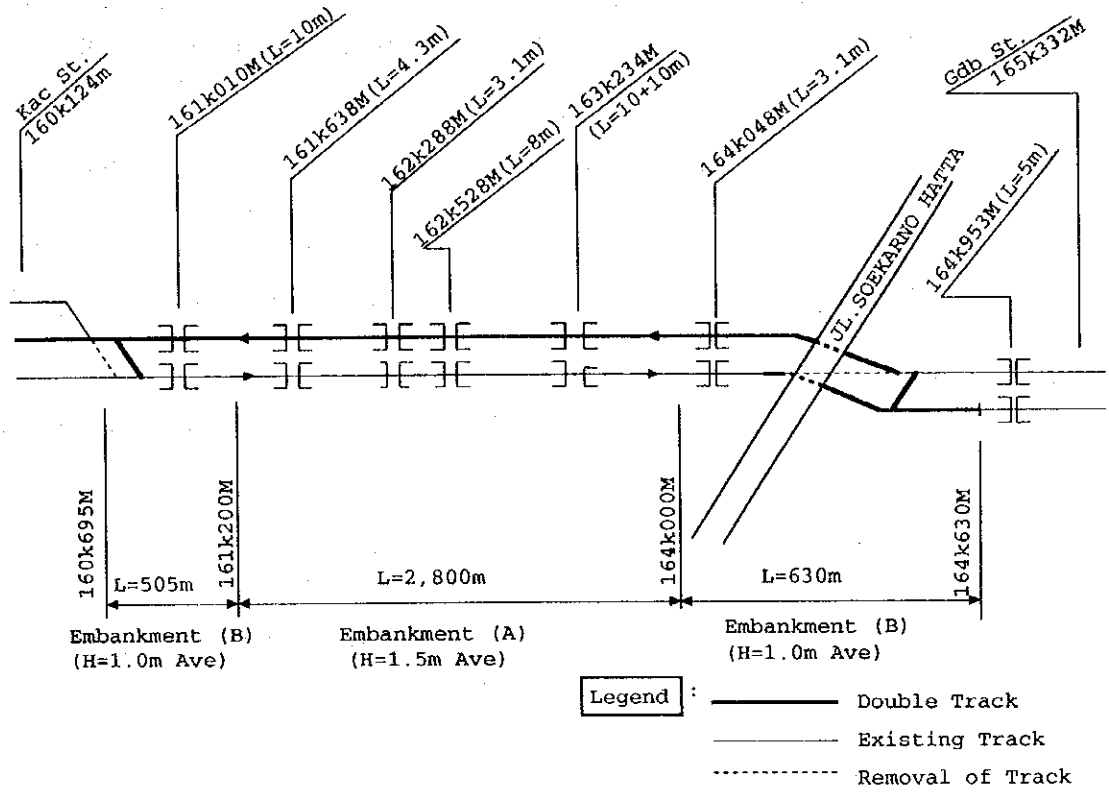


Fig. 37 Layout of Double Track

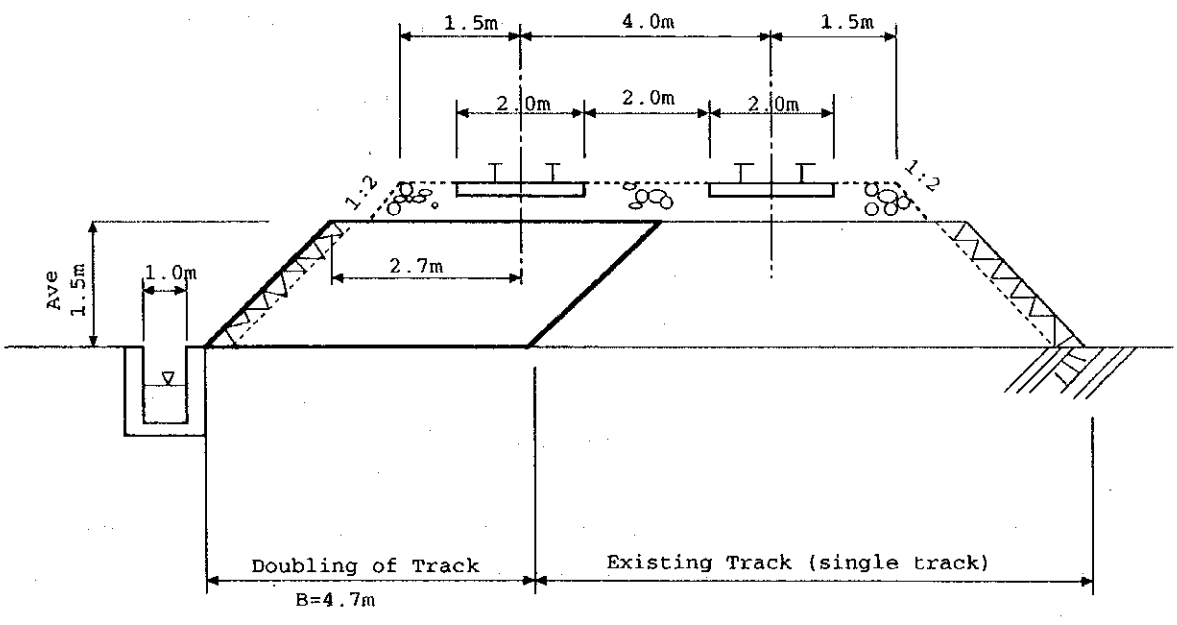


Fig. 38 Profile of Embankment (A)

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).

9. Doubling of track will be completed in 1998 on the basis of construction schedule to be implemented from now.
Therefore, the situation where track capacity is exceeded will continue one year longer than automatic signalling preceding.

2.3 Necessary Rolling Stock and Car Depot Improvement

(1) Necessary rolling stock

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-52).

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

10. 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 are estimated as 15% of the total operating rolling stock.
Required locos are shown in **Table 55.**

Table 55 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. running loco. in peak period	7	8	9	10	11	13	-
Auxiliary loco.	4	4	5	6	7	7	-
Subtotal	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.

11. 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 56**. At present, there are 190 wagons.

Table 56 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 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	
Total numbers to be purchased (including spare wagons)				17	17	34	68

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

(2) Bandung Car Depot

All locomotives used for container trains belong to the Bandung Car Depot.
The depot is in charge of 48 locomotives at present : 34 tractive locos and 14 shunting locos.
Maintenance facilities were improved in 1992, so the capacity for intermediate inspections and repairs is more than 90% capable.
There is no problem for an increase of eight locos as shown in **Table 55.**

2.4 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 the draw up necessary countermeasures if the value can be attributed to construction or the 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(Vol.4).

3. OPERATION AND MANAGEMENT PLAN

3.1 Basic Idea

(1) The team makes 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.

(2) The sub-office is placed at the container depot, and handles only unloading and delivers containers to customers.

(3) Accordingly, regular telecommunications devices (such as telephones and facsimiles) are sufficient if only equipped.

(4) The main office gives operational orders about container handling to the sub-office 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 procedures.

(5) For the above activities, the cooperation of the same forwarders is necessary at both stations.

(6) Facilities, equipment, and work allocation are as follows as well as Gedebage Dry Port.
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.

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

3.2 Daily Revenue and Expenses

(1) Daily railway revenue from containers consists of tariff and handling charge at Gdb St.
Table-57 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 hearing on sites and other submitted data, and is arranged as a daily expense table per round trip train (**Table 58**).

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 paved 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 58**.

Table 57 Container 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

Table 58 Expense 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 expensses				
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	2,955,621	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.

4. INVESTMENT COST ESTIMATE AND CONSTRUCTION SCHEDULE

4.1 Necessary Investment Amount

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 59**.

(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.

4.2 Construction Schedule

The necessary completion time of each construction item, based on Chapter one to three, is as shown in **Table 60**.
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 finish in 1997.
This means a two-year delay in the forecasts in and after 1998 in **Table 52**, so completion time may be delayed by two years in **Table 60**.

Table 59 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.

Table 60 Required Completion Times 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	

5. ECONOMIC ANALYSIS AND FINANCIAL ANALYSIS

5.1 Economic Analysis

(1) Premises

To carry out an economic analysis, the WITH / WITHOUT project cases are taken up using the demand forecast in **Table 50.**

a. WITH case : Investment is executed based on the F/S
WITHOUT case : Investment is not executed based on the F/S, and transportation volume more than 71,500 TEUs moves to highway.

b. The project life is thirty years (1995 to 2024).

c. The economic analysis is executed on the following two cases.

i) When automatic signalling precedes.

ii) When doubling of track precedes.

d. Sensitive analysis is conducted for the above cases for a 10% decrease in transportation volume and a 10% increase in investment.

e. Economic analysis is done under the assumption that the project costs concerning automatic signalling and doubling of track will be allocated in proportion to the ratio of container trains versus the number of other trains at present (20 / 69). (See **Table 54**).

(2) Results of analysis

The EIRR is calculated on the basis of the premises mentioned above, and is summarized in **Table 61.** The lowest EIRR is 17.2%.
Note, that calculations are only based on countable measures, so we can expect more indirect merit.
According to the analysis, the EIRR in the case of doubling of track preceding is the highest. It is said that the opportunity cost of capital in Indonesia is 10 to 15%. All the cases are economically feasible for executing the project.

Table 61 Results of Sensitivity Analyses EIRR (%)

Case	CASE-1	CASE-2
Base Case	29.66	32.33
Case A	23.18	24.91
Case B	22.56	24.21
Case C	17.22	18.36

Case A : Increase in construction cost by 10%
Case B : Decrease in forecasted benefits by 10%
Case C : Increase in construction cost by 10% and decrease in benefits by 10%
CASE-1 : When automatic signalling precedes
CASE-2 : When doubling of track precedes

5.2 Financial Analysis

(1) Premises

a. The financial analysis is carried out from the stand point of PERUMKA being the executing entity of the project.
All investment costs for the dry ports and connecting railway are to be borne by PERUMKA initially.

b. The project life is thirty years (1995 to 2024).

c. As for the dry ports and connecting railway, the financial analysis is to be made only for the portion under the control of PERUMKA.

d. The financial analysis will only cover increases in container freight transportation revenues brought about by the execution of the project.
In this case, the project cost concerning automatic signalling and doubling of track should be allocated in proportion to the ratio of the number of container trains versus other trains at present (20 : 69). (See **Table 54**).

e. The financial analysis is executed for the following two cases.

i) When automatic signalling precedes.

ii) When doubling of track precedes.

f. Sensitivity analysis is conducted for the above cases and for both a 10% decrease in transportation volume and a 10% increase in investment.
Beside the team tries to confine construction to the Urgent Implementation Plan stage.

(2) Results of analysis

The FIRR is calculated on the basis of the cash flow gained from the premises mentioned above, and is summarized in **Table 62.**
According to this, the FIRR in the case when automatic signalling precedes, and investment is up till the Urgent Implementation Plan stage, is highest.

Although the FIRR of this project is not high, taking the present interest rate in Indonesia into account (e.g., the interest for a public corporation's borrowing from the Indonesian state bank is 13.5% p.a., the interest of the Indonesian private bank for a corporate or individual finance is 17%-22% p.a.), all the cases may become financially feasible for the executing entity of the project (PERUMKA), as long as PERUMKA can obtain soft loans, such as government to government borrowing for the foreign currency portion and government grants for the local currency portion.

Table 62 Results of Sensitivity Analysis

	FIRR (%)			
	a) Base Case	b) Revenue 10% down	c) Investment 10% up	d) b) + c)
Case A				
Case 1	5.1	3.9	4.0	3.0
Case 2	5.4	4.2	4.3	3.2
Case B				
Case 1	10.9	9.6	9.7	8.5
Case 2	10.8	9.5	9.7	8.4

Case A : Short-term Development Plan stage
Case B : Urgent Implementation Plan stage
Case 1 : When automatic signalling precedes.
Case 2 : When doubling of track precedes.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

(1) The decreases in container transportation after a raise in fares in resolving the existing facilities bottleneck, so the execution of the Urgent Implementation Plan has some leeway.
The team can say that the growing seeped in demand hereafter depends on the recovery of textile industry and new investment in other growth industries.

(2) The Urgent Implementation Plan was a facilities investment plan for a traffic demand forecast until 1999.
However, this F/S shows the plan is applicable even for demand until 2003.
The reason for this is that the former is based on another report assuming high economic growth and the latter is framed on the present economic situation.

(3) As a result of the economic analysis, it can be said that the opportunity cost of capital in Indonesia is 10 to 15%, which means the EIRR is feasible from the view point of the national economy.

(4) The result of the financial analysis proves the project is feasible in all cases corresponding to demand until 2010.
As the profitability of the basis plan (Case I), when doubling of track is carried out first is a little better than when automatic signalling is executed first, but the difference is so negligible that the investment order between them is irrelevant.
The team tried a sensitivity analysis when there is a 10% decrease in traffic demand, and found that the FIRR index is greater than the expected financed interest rate in any cases.

(5) Base on Table-61, successive investment for the existing dry ports later than 2003, makes the feasibility inferior but profitable.
Investment later than 2003 should be reviewed, by examining the demand in Bd District at the beginning of the 21 st century. The team can then select suitable places needing only low investment cost, such as the following:

i) Eager sponsors (local government or private sector) are wanting investment.
ii) Huge investment is not needed (such as doubling track)

iii) No need for land acquisition
iv) Utilization of existing facilities (tracks and signals)
v) Auxiliary locomotives are not needed.

Pwk seems to be satisfied with the above conditions as long as the demand exists.

6.2 Recommendations

(1) Urgent implementation plan which is the front half of F/S, should be carried out as soon as possible, because both the storage capacity for container wagons at Gdb and track capacity between Gdb and Kac are in shortage even now.
Concerning the rear half of F/S additional execution will be examined again at the head of 2000, whether it is necessary or not, by considering demand forecast at that time, because violent economic deviation is anticipated in near future.

Further more,

(2) Normalization of train operation and bringing up of forwarders

On the 2 nd site survey, some customers were doubtful of the railway, since its arrival time is inaccurate.
High economic development required accurate and quick service, as well as cost effectiveness, not only for the railway but for all means of transportation
In Japan, regular conventional freight trains were slow and unpunctual, which resulted in their falling into disuse.
Unpunctual trains will lose the trust of customers and they will go elsewhere.

Locomotive break down occupies near half of the cause of the delay.
The above is already known and Bd Depot has been also improved. The study and carrying out of the cause and checking system on spare parts supply, personnel training etc., under the decision that the break down should be exclude, is desirable.
However, it would be sure that the almost delay of arrival time caused by railway operation is less than 30 minutes.
The complaint by customers on the big delay seems to be caused in the shortage of equipment such as trailer head and chassis owned by forwarder.
The foster of resourceful forwarders is also desirable as one of the resolutions on the subject.

(3) Improvement of delivery capability

Due to transportation costs rising by 15%, the volume of containers handled in July of last year decreased by about 15% as well, and container stocks in container terminals greatly decreased.
It was said that the excessive container stocks were caused by customers accepting their goods, but waiting theory teaches us that the more likely causes is in shortage of distributive capability.
Therefore, it is necessary for forwarder to have sufficient distributive capability (trailer truck head, chassis, and working force) when transportation demand for containers revives. Otherwise, even if the storage capacity of the tracks is enough, it will reproduce huge excess of container stock once again.

(4) Co-operation between railway construction and urban planning

In relation with the above improvement, the New Transportation Line will be constructed, new urban railway has a large influence on urban development and urban structure, so it is necessary to coordinate railway construction planning with urban planning.
If a new line is constructed without such coordination, buildings would be built on the predetermined line before the start of the construction project, or land prices would rise remarkably. This would then force a reexamination of land utilization and the public facilities related to it.
The team therefore recommends holding discussions with relevant government and private organizations concerning these problems, and drawing up countermeasures such as simultaneous execution with urban development and land use regulations.
By the way, Bekasi new line is not only effective for commuter service between Jng and Bks, but it has various merits, so we expect the promotion for the earlier construction.

(5) Promotion of submergence countermeasure at Gdb District

The submergence problem is not only for Gdb St, but for all Gdb District.
The arrangement of relevant drainage facilities should be executed by the public works.
The team expects the negotiation for the early execution between relevant governmental organizations.

APPENDIX 1

The Present Situation of Gedebage Dry Port and Connecting Railway

Appendix 1 The Present Situation of Gedebage Dry Port and Connecting Railway

(1) Gedebage Dry Port

a. Activity

Gedebage dry port is located in the suburbs of Bandung city with the population of 1.8 million people. It is 187 Km apart from South East of Tg. Priok Port. (App. Fig. 1 - 1) The transportation has started in 1987 for the sake of alleviation of highway transport and the annual increase has been remarkable as follows.

year	annual transportation volume	daily actual no. of running trains
1987	2,595 TEUS	one train / single way
1988	8,887 TEUS	ditto
1990	23,065 TEUS	two train / single way
1993	60,918 TEUS	three train / single way

The contents are as follows, where empty containers are imported and goods to be exported are stuffed to them.

	full	empty	
import	30%	70%	: industrial materials, machines
export	92%	8%	: Textile goods, tea, shoes

The main destination for export is japan.
Container size and the used ratio are as follows on Box substitute. (Result in 1993)

20 ft	(8 * 8 * 20)	61%
40 ft	(8 * 8 * 40)	39%

Average transportation weight of a full container is as follows.

	20 ft	40 ft
export	8 - 14 t	18 - 24 t
import	10 t	22 - 30 t

The share of Railway transportation in Bandung district occuppies about 80% in

Bandung district, but it deserves of only 6% of containers handling volume in Tg. Priok Port.

b. Facilities at Gedebage dry port

i) general remarks

The track layout of Gedebage St. is shown as App. Fig. 1 - 2.
The outline of the facilities is as follows.

ii) Infrastructure

*	land area 3.5 ha (after spreading) 2.6 ha (at present) loading and unloading space for transtainer 3000 m2, container yard 1.5 ha and 6000 m2 under construction	
*	loading and unloading side track	1 * 240 m
*	passing tracks	2 * 240 m
*	CFS for export and import	2 buildings
*	warehouse	20 m * 15 m * 5 m
*	wagon checking tracks	2
*	private siding track to oil terminal (stopped the use at present)	1

iii) Equipment

*	Transtainer	for 42 t	1
*	Toploader	for 35 t	1
*	Forklift	for 10 t	1
*	ditto	for 2.5 t	4
*	ditto	for 3.5 t	1
*	Hand pallet	for 2.5 t	2
*	Head truck		2
*	Chassis		4

iv) Rolling stock

PERUMKA prepares 190 marine container wagons including spare ones as follows, for this route operation.

Two axle bogies with four wheels : PPCW 150 wagons

l = 13 m (1 * 40 ft or 2 * 20 ft use)
Three axle bogies with six wheels : PKPKW 40 wagons
l = 17.6 m (more than 30 t use)

Total : 190 wagons

Besides, one shunting locomotive is dispatched at Gdb all day long.

c. Management

This dry port is not one of the regular stations, but independent organization under PERUMKA Semarang Branch. It is the only real dry port in Indonesia, and arranges all functions necessary for a dry port.
The following bloc units are established in it for the export procedure.
The shipping procedure by customers can finish here.
Chief of dry port is the representative of all organization in this terminal as follows.

PERUMKA	25	Others	148
		* Port authority	48
		Customs	32
		* Guarantine	3
		* BNI bank	2
		Praghan Indonesia (Handling company)	60
		Export inspector	3

* sign is in the PERUMKA office

Valid time for the reception for business document
7:30 - 14:00
Valid time for the carrying in containers
8:00 - 22:00

d. Outline of Kiaracondong

Kac St. is next to Gdb St. on Bandung direction, the track layout is shown as App.Fig.1-2. All the container trains for Gdb St.can stop here on the way where a dead end siding possible to unloading is located in the land space with about 2.6 ha parallel to the station.

(2) Tanjung Priok St. and the belonging station.

The network around Tpk St. is shown as App. Fig. 1 - 3.
The Pasoso St. is located next to TCT Berth, the industrial railway track branched from Tpk St. reaches PERTAMINA oil base, where Pasoso St. is located intermediary one km apart from Tpk St.

a. Pasoso St.

The industrial railway track branched from Tpk St. where track is owned by PERUMKA and the other facilities are owned by the Port Authorities.
Seven of PERUMKA staff are working here for contact business with the port.
The track layout is shown as App. Fig. 1 - 4.

We can find three side tracks including locomotive run-around siding, PERTAMINA route which is in no use, is utilized as a lead track, and signals and safety facilities are not installed.
The length of present elevated platform was 300 m where two top-lifters were operating by Port side operators, it has finished extension works for securing 600 m after completion.
After that, two container wagon formations become possible to be handled at the same time, though the shunting is complicated a little.

The width is 49 m enough to handle containers with top lifters.
There is a warehouse (107 m * 40 m) seemed to be CFS on the platform but it seems to be little used.

b. Tanjung Priok

Tpk St. is a terminal, and the track layout is shown as App. Fig. 1 - 3.
There are two double track routes, one is for Jakarta kota, another is for Jatinegara. The former is not used now.
It is not enough used in spite of being a big station.
Sepur Labuhan route connects pasoso St. with Tpk St. Accordingly, a train going for Pasoso has to receive double switch back shunting at Tpk.

c. Operation

i) Imported containers are carried to Pasoso by a yard truck one hour later after unloading from a ship. Exported ones are carried into marshalling yard in TCT, one or two hours before shipping at latest.

ii) Shunting is conducted by a shunting locomotive, and the wagon formations waiting for departure are stored at Tpk St. or Pasoso St.

iii) Arrival trains are admitted even on the locomotive run-around track used for shunting, owing to excess empty wagons.

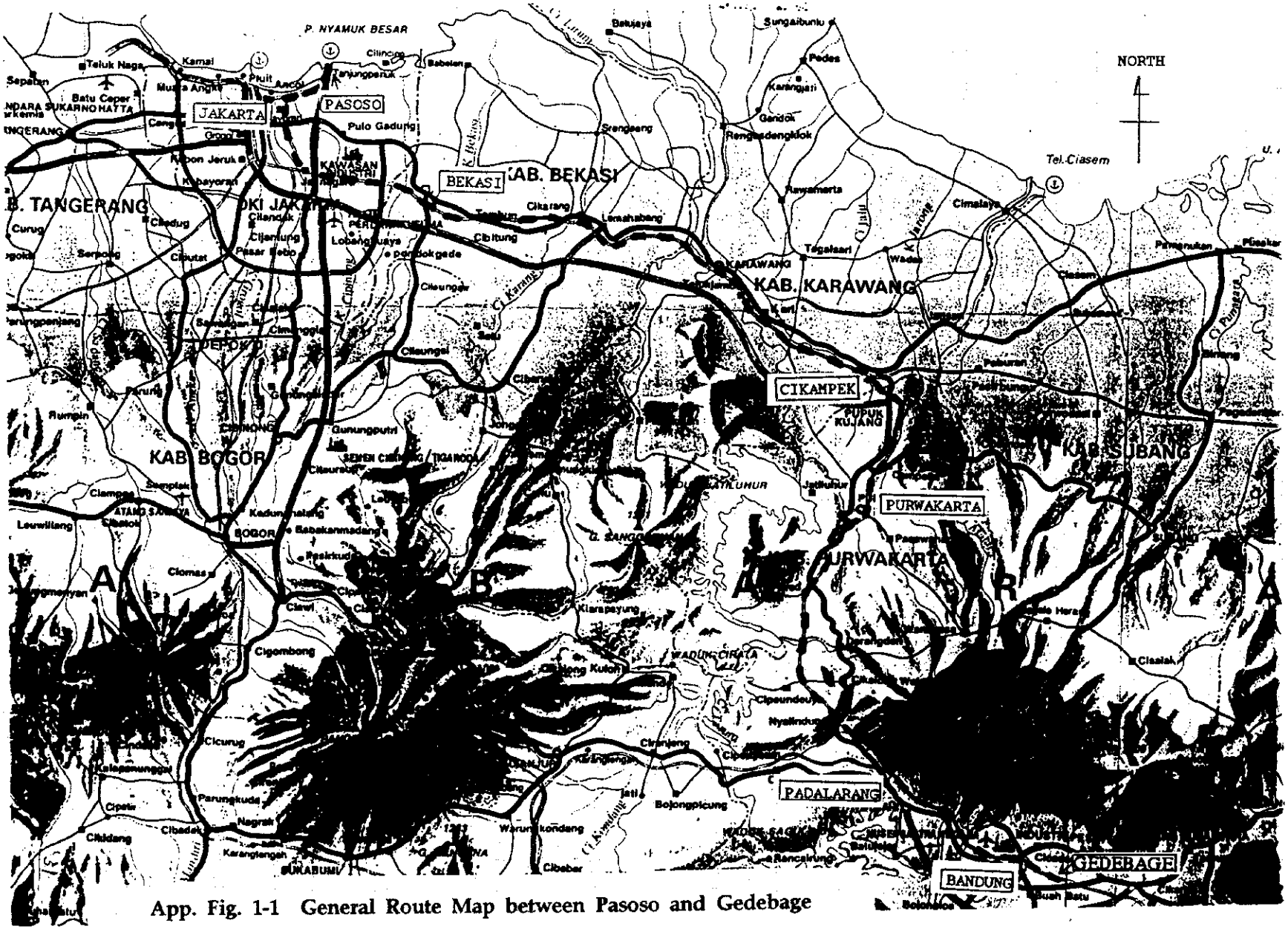
iv) The tractive locomotives successively arriving at Tpk St. from Gdb St. at mid-night start from Tpk St, soon after exchanging wagon formation, at the same midnight. Therefore the staying time of the locomotives is not so long.

(3) Facilities of connecting railway

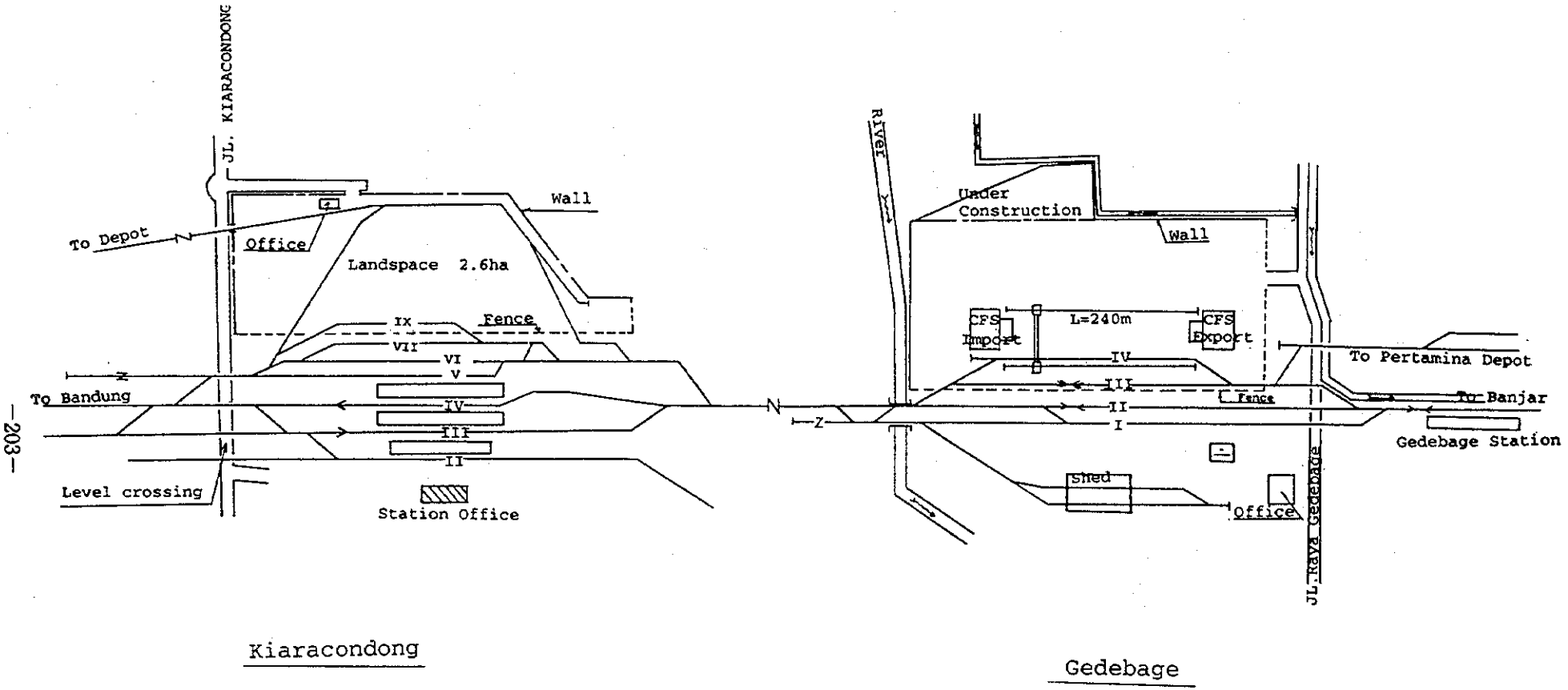
This route consists of both double track section and single track section; the former is Jabtabek Eastern Line (Tpk-Jng) that is one of the urban railways in Java island and the Northern Trunk Line (Jng-Ckp); the latter is Southern Trunk Line (Ckp-Gdb) Which has partial double track section (Pdl-Kac).
The track layout of the every station on this route is shown in App. Fig. 1 - 5.

In the Southern Trunk Line, the section between Cikampek and Padalarang (approximately 75km) is the single track line, with sharp-curved alignment (minimum R=150m) and steep gradient (i=7.6-16.6/1000) on the mountainous terrain, the effective length of main track is 300m in the Northern Trunk Line, but in the Southern Trunk Lines limited to 239m owing to the difficulty of extension.

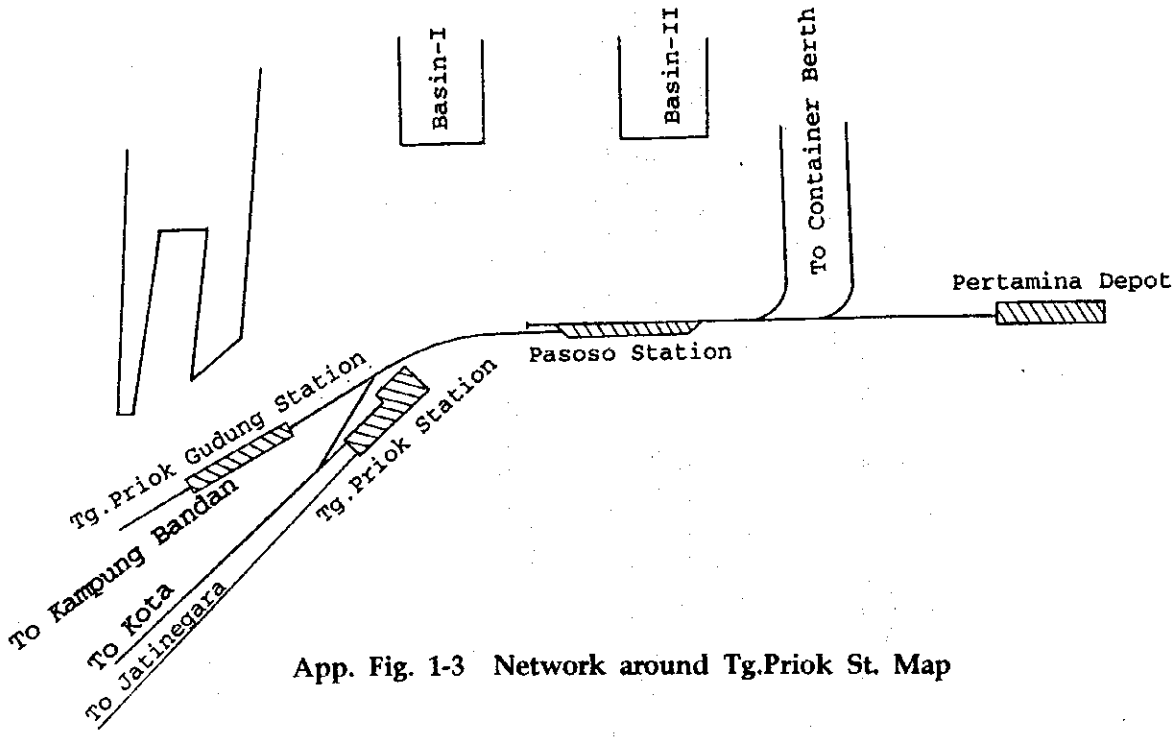
The blocking system on this route is one block between every two adjacent stations, and every station is equipped with mechanical signal and interlocking.
The locomotive and coach depot is located in Bandung and Jatinegara, and the locomotives for container trains belong to Bandung depot.



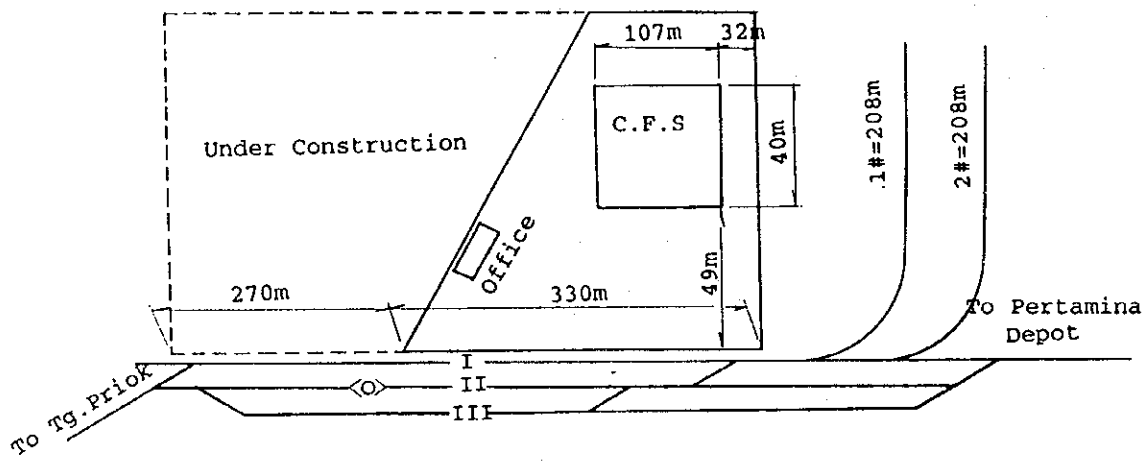
App. Fig. 1-1 General Route Map between Pasoso and Gedebage



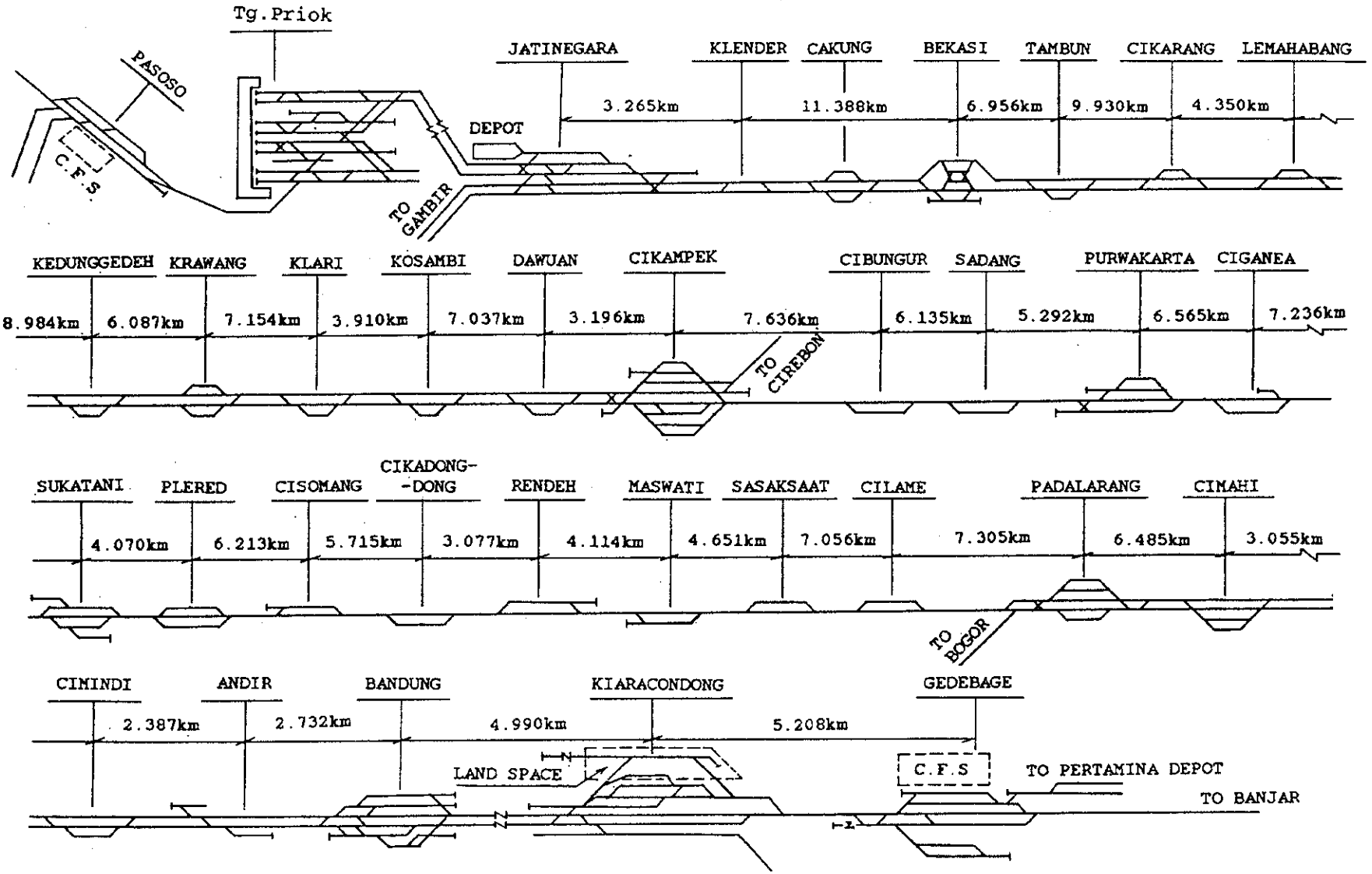
App. Fig. 1-2 Track Layout at present



App. Fig. 1-3 Network around Tg.Priok St. Map



App. Fig. 1-4 Track Layout at Pasoso



App. Fig. 1-5 Track Layout Between Pasoso and Gedebage