(3) Dry Ports and Connecting Railways

a. General

131. In order to resolve the bottle necks at present container transportation, it is recommended that the urgent implementation program for the route between Gedebage and Tg. Priok proposed in the Study be implemented as early as possible.

132. It is said that considerable amount of freight is traveling along the northern Java Island from Jakarta to Surabaya (726 km). A market survey is probably necessary to organize a nation-wide container network and to find potential demand.

b. Regarding Master Plan

i) Transport system

133. As seen in **Chapter 2 of Vol. 2**, the railway transportation of marine containers is still popular in the continent of North America and Europe with large inland regions. However, this cannot always become a good example for Indonesia, an archipelagic country, that has entirely different topographic condition.

ii) Developing domestic container transport

134. It seems that the efforts to modernize the domestic freight transport system by using small size container transport to compete with trucks have been neglected. Large-scale boxes such as marine containers are impractical for domestic transport of general merchandise.

135. Strictly speaking, Japanese freight transport by railway would not be profitable. However, container transport is considered to be more advantageous than any other types of freight transport from the perspective of carriage occupancy rates. Furthermore, when the total volume of freight transport dropped from 200 million tons to 60 million tons, these annual decreases have not affected on container transportation even under the remarkable transfer to vehicles.

136. The cities are located along the Northern trunk line from Jakarta to Surabaya (726

km), and we are informed that considerable amount of freight is traveling between these two points. Market survey is probably necessary to organize a nationwide container network and to discover potential demand.

iii) Dry ports

137. New construction or improvement of railway facilities is too costly, on the other hand, a small increase of transport cannot reach payable.
Nevertheless, the transport industry is under perfect free competition, and freight is vulnerable to economy fluctuation. It would be inevitable for low-volume freight to be supported by truck transport for the time being, and to persuade customers to convert to railway transport when its demand has sufficiently grown up. Thus, the installation of new dry port might be difficult without premises either there exist strong requests by customers group or powerful forwarders are fostered.

iv) Revising development plans

138. It is difficult to predict circumstances in the year 2010, since freight transport is sensitive to economic changes and its conditions. Therefore, the development is forced to rely on medium range treatment.
Continual revision of the existing future plans is necessary, in particular, soon after the construction based on this F/S has been completed.

v) Infrastructure facilities

139. Current marine container boxes do not exceed construction gauge limits, but they exceed car gauge limits.
It is uncertain whether this is because containers are ensured enough to avoid clearance limit violations, owing to small jolting or because Indonesia is currently experiencing a transitional period for developing a special low-bed freight car and the car clearance excess is specifically allowed in some sections. In any cases, safety concerns still are remained.

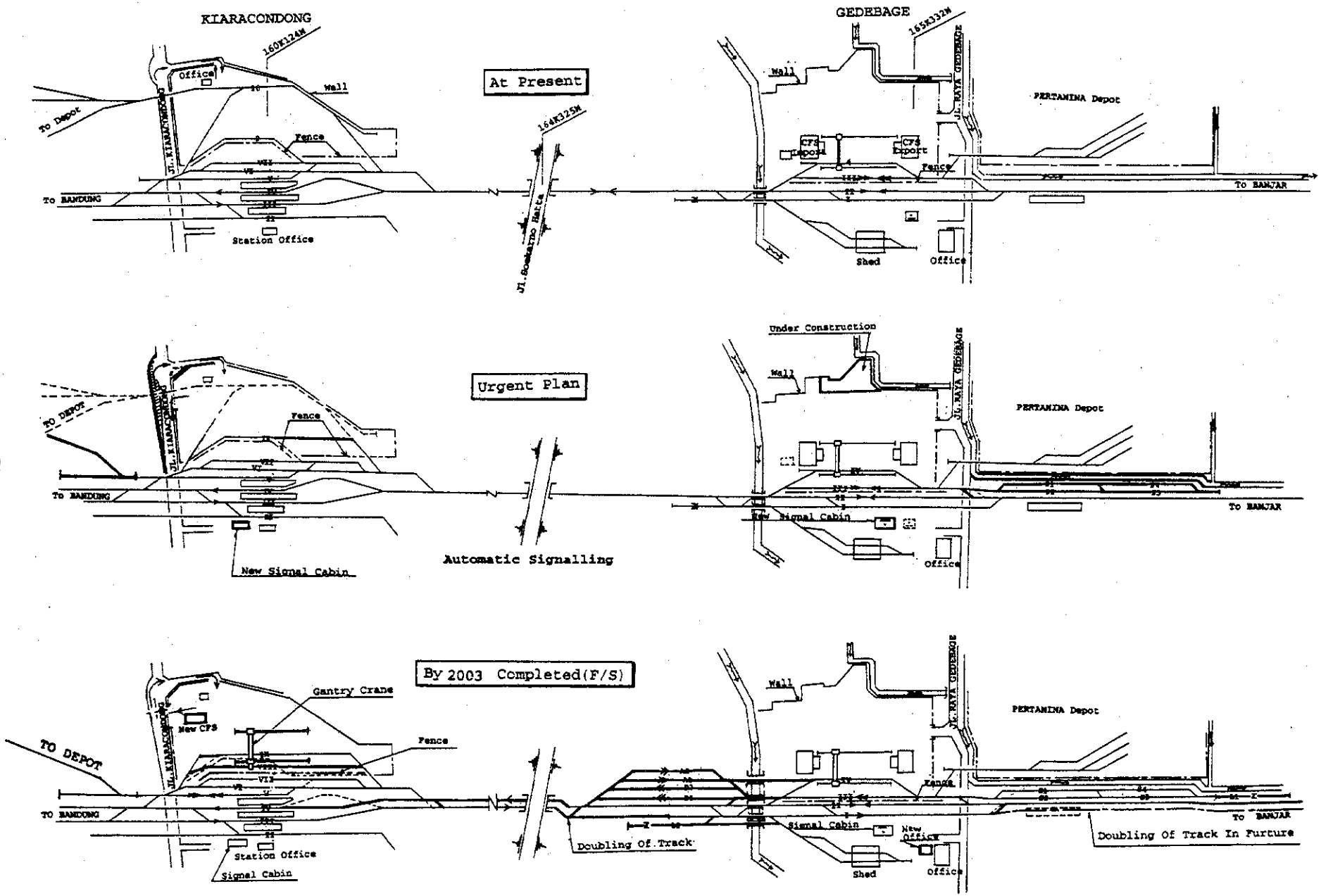


Fig. 19 The change of track layout at each step

5. URGENT IMPLEMENTAION PROGRAM OF DRY PORTS AND CONNECTING RAILWAYS

141. Urgent implementation plan for the capacity improvement of Dry Port and connecting railway

(1) Objectives

142. The team was asked to make an urgent implementation plan, and the railway team selected Gedebage - Tg. Priok route for container transportation as well as F/S. The urgent implementation plan (until 1999) forms the front half of the execution of works in the F/S (until 2003) of Tg. Priok - Gedebage route.
Urgent implementation plan is to increase both the handling capacity at Gdb, where is handling space at the platform and storage sidings, and the track capacity between Gdb and Kac, they are in shortage even now.
Still more, the necessary doubling track and automatic signalling between Ckp and Pdl are on the finance stage at present, they form the premises for the study of this plan.

(2) Scope of Work for Urgent Implementation Plan

143. The plan is made on the focus that seven container trains at the maximum are operated by 1999, based on gradual increase from four train operations at present busy time. The demand forecast is quoted from another project report.
("Modernization/Capacity Study Corridor Jakarta-Bandung" Final Report Jan. 1994)

a. At Gedebage (**Fig. 19, 20**)

144. Gedebage Dry Port handles exported and imported full containers.

i) Multiplication of storage sidings
Install two storage sidings only a little possible for five wagon formation staying at Banjar side corresponding to both the present and 1999 year situation.

ii) Completion of spreading the suspended container depot.

iii) Submergence countermeasure for the existing main tracks

b. At Kiaracondong (**Fig. 19, 21**)

145. Karacondong sub dry port handles only imported empty containers.

i) The improvement of the side track (9#) to sub-main track possible for arrival empty container handling by means of extending the effective track length (290 m).

ii) The arrangement of carrying path in and around the yard for the avoidance traffic congestion.

iii) The purchase of a fork-lift (10 t).

c. Automatic signalization between Gdb and Kac

146. The improvement is to form one block system between them with color light signals and electronic interlocking device at both end stations.

d. The purchase of three locomotives

147. Including the use as an assistant locomotive between Gdb and Pwk.

e. Pasoso

148. Six (6) wagon formation stayings will occur, but the countermeasure is unnecessary.

149. Five train operations at peak time described in the present train diagram is impossible owing to the present facilities at Gdb. Exact execution of urgent implementation program is necessary.
The countermeasure for seven train operations at busy time at both Gdb and Pasoso is not necessarily enough, early additional execution of F/S is desirable.

(3) Project cost

Table 36 Project cost of the Urgent Implementation

Unit : million rp.

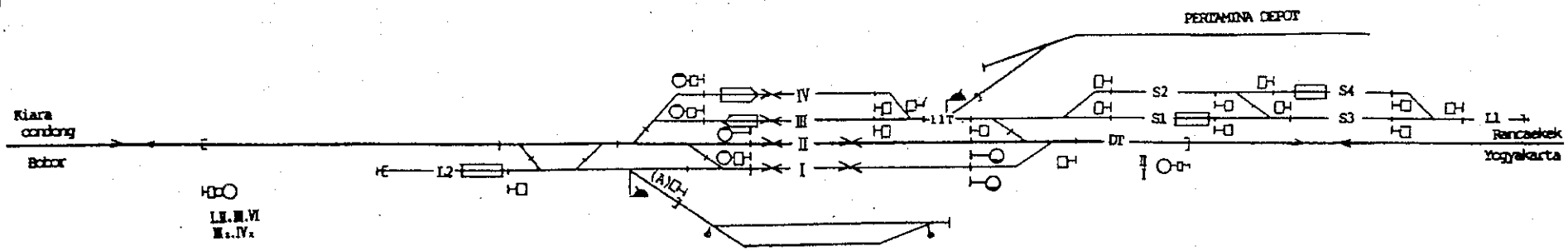
	Foreign	Domestic	Total
a. At Gedebage			
i) Storage siding track	3,935	1,496	5,431
ii) Spreading container depot	0	505	505
iii)Submergence countermeasure	0	165	165
Sub-total	3,935	2,166	6,101
b. At Kiaracondong			
i) Civil and Track work	765	331	1,096
ii) Widening road	0	45	45
iii)Forklift	300	0	300
Sub-total	1,065	376	1,441
c. Signalling, Electric Power and Telecommunication	11,225	1,544	12,769
d. Locomotives	4,890	4,890	9,780
Management cost and Contingency	2,111	898	3,009
Total	23,226	9,874	33,100

Yearly investment and schedule are shown in **Table 37** and 38.

G E D E B A G E

(U R G E N T P R O G R A M)

and Staying Situation



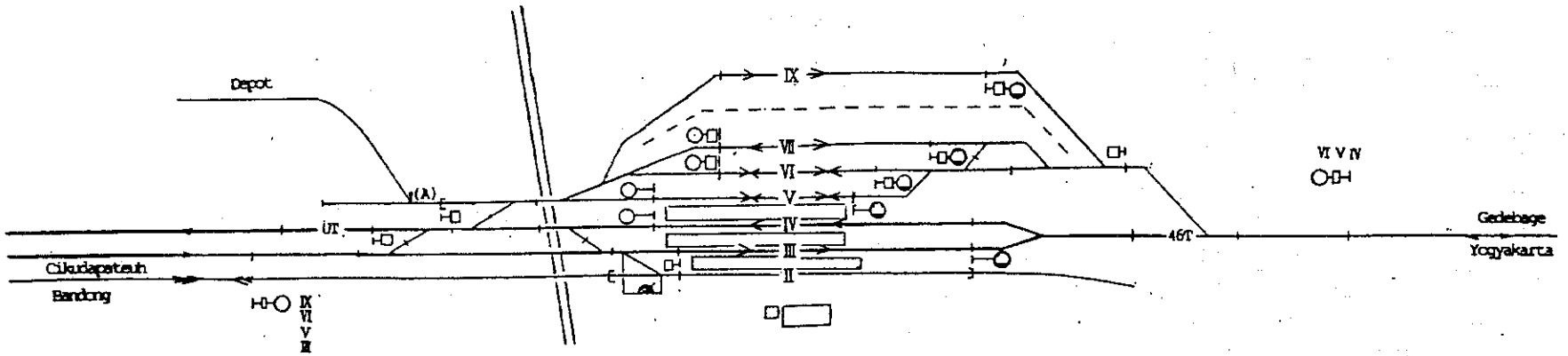
Signal	Route	Remarks
Home Signal	Kiaracondong – I	
	〃 – II	
	〃 – III	
	〃 – IV	
Starting Signal	IV – Kiaracondong	
	III – 〃	
	II – 〃	
	I – 〃	
	I – Rancaekek	
	II – 〃	
Home Signal	Rancaekek – II	
	〃 – I	
Calling on Signal	Kiaracondong – III	
	〃 – IV	

Signal	Route	Remarks
Shunting Signal	L2 – (A)	
	〃 – I	
	〃 – II	
	〃 – IV	
	IV – L2	
	III – 〃	
	I – 〃	
	(A) – 〃	
	L1 – S4	
	〃 – S3	
	S4 – S2	
	S3 – 〃	
	〃 – S1	
	S2 – IV	
	〃 – III	
	〃 – 11T	
	S1 – IV	
	〃 – III	
	〃 – 11T	
	DT – II	
	〃 – I	

Signal	Route	Remarks
Shunting Signal	III – DT	
	〃 – S1	
	〃 – S2	
	IV – DT	
	〃 – S1	
	〃 – S2	
	11T – DT	
	S1 – S3	
	S2 – 〃	
	〃 – S4	
	S3 – L1	
	S4 – 〃	

Fig. 20 GEDEBAGE Route Table

KIARACONDONG
(URGENT PROGRAM)



Signal	Route	Remarks
Home Signal	Cikudapateuh – III	
	〃 – V	
	〃 – VI	
	〃 – IX	
Starting Signal	VII – Cikudapateuh	
	VI – 〃	
	V – 〃	
	IV – 〃	
	III – Gedebage	
	V – 〃	
	VI – 〃	
	VII – 〃	
	IX – 〃	

Signal	Route	Remarks
Home Signal	Gedebage – VI	
	〃 – V	
	〃 – IV	
Shunting Signal	UT – II	
	〃 – V	
	〃 – VI	
	〃 – VII	
	(A) – V	
	〃 – VI	
	〃 – VII	
	VII – UT	
	〃 – (A)	
	VI – UT	
	〃 – (A)	

Signal	Route	Remarks
Shunting Signal	II – UT	
	46T – IX	
	〃 – VII	
	〃 – VI	
	IX – 46T	
	VII – 〃	
	VI – 〃	

Fig. 21 KIARACONDONG Route Table

Table 37 The investment amount and the schedule

Unit : Million Rp

Item	Currency	URGENT PLAN								Subtotal	Total
		1995		1996		1997		1998--2001			
		Kac	Gdb	Kac	Gdb	Kac	Gdb	Kac	Gdb		Foreign+Domestic
(1)Land Acquisition	Foreign										
	Domestic										0.00
(2)Civil	Foreign			24.89	969.22					994.11	
<40 years>	Domestic		458.90	16.21	503.60					978.71	1,972.82
(3)Building	Foreign			275.00	440.00					715.00	
<40 years>	Domestic			225.00	560.00					785.00	1,500.00
(4)Track	Foreign					395.20	2,168.26			2,563.46	
<20 years>	Domestic				75.00	100.55	372.14			547.69	3,111.15
(5)Contingency 10%	Foreign		0.00	29.99	140.92	39.52	216.83	0.00	0.00	427.26	
(1)~(4)*10%	Domestic		45.89	24.12	113.86	10.06	37.21	0.00	0.00	231.14	658.40
(6)Sub Total	Foreign		0.00	329.88	1,550.14	434.72	2,385.09	0.00	0.00	4,699.83	
(1)~(5)	Domestic		504.79	265.33	1,252.46	110.61	409.35	0.00	0.00	2,542.54	7,242.37
(7)Signalling	Foreign			2,320.00	3,240.00	1,399.04	1,627.27			8,586.31	
<30 years>	Domestic			0.00	0.00	568.43	675.64			1,244.07	9,830.38
(8)Electric Power	Foreign			0.00	0.00	851.70	853.06			1,704.76	
<20years>	Domestic			0.00	0.00	78.30	76.94			155.24	1,860.00
(9)Telecommunication	Foreign			0.00	0.00	364.60	568.94			933.54	
<20 years>	Domestic			0.00	0.00	69.77	75.43			145.20	1,078.74
(10)Locomotive	Foreign				0.00		3,260.00		1,630.00	4,890.00	
<25 years>	Domestic				0.00		3,260.00		1,630.00	4,890.00	9,780.00
(11)Forklift (10t)	Foreign					300.00				300.00	
<8 years>	Domestic					0.00				0.00	300.00
(12)Sub Total	Foreign		0.00	2,649.88	4,790.14	3,350.06	8,694.36	0.00	1,630.00	21,114.44	
(6)+(7)+(8)+(9)+(10)+(11)	Domestic		504.79	265.33	1,252.46	827.11	4,497.36	0.00	1,630.00	8,977.05	30,091.49
(13)Management Cost	Foreign		0.00	264.99	479.01	335.01	869.44	0.00	163.00	2,111.45	
(12)*10%	Domestic		50.48	26.53	125.25	82.71	449.74	0.00	163.00	897.71	3,009.16
(14)Grand Total	Foreign		0.00	2,914.87	5,269.15	3,685.07	9,563.80	0.00	1,793.00	23,225.89	
(12)+(13)	Domestic		555.27	291.86	1,377.71	909.82	4,947.10	0.00	1,793.00	9,874.76	33,100.65

* < >shows depreciation period.

Table 38 Schedule of Urgent Implementation Plan

Unit : Million Rp

Item	1995	1996	1997	1998--2001	Remarks
At Gedebage					
(1) Storage siding Track		Civil 2,992	Track 2,983		4,937*1.21=5,974
(2) Spreading container depot	555				459*1.21=555
(3) Submergence countermeasure		91	91		150*1.21=182
At Kiaracondong					
(1) Civil and track work		605	Track 600		996*1.21=1,205
(2) Widening road		50			41*1.21=50
(3) Forklift (10t)			330		300*1.1=330
Signalling		6,116	4,697		9,830*1.1=10,813
Electric power			2,046		1,860*1.1=2,046
Telecommunication			1,187		1,079*1.1=1,187
Locomotive			<2> 7,172	<1> 3,586	9,780*1.1=10,758
Grand Total	555	9,853	19,106	3,586	33,100

Legend ----: Preparation
————: Execution

APPENDIX A

EXISTING SITUATION OF CONTAINER CARGO HANDLING FACILITIES PORT, DRY PORTS AND CONNECTING RAILWAYS

(1) Belawan Port and Tebing Tinggi Dry Port

(2) Panjang Port and Kertapati Dry Port

(3) Tanjung Priok Port and Gedebage Dry Port

(4) Tanjung Emas Port and Solo Jebres Dry Port

(5) Tanjung Perak Port and Rambipuji Dry Port

(6) Ujung Pandang Port

(1) Port of Belawan and Tebing Tinggi Dry Port

a. Port of Belawan

1 The berthing facilities are lined up on the right bank of the mouth of Belawan River: these port facilities are grouped into four bases, namely from up to down stream, "Belawan Rama", "Ujung Baru Base", "Cita Base" and "Gabion Base". Gabion Base is consists of 500 m full-container wharf equipped with a pair of gantry cranes and 350 m multi-purpose wharf. International containers are presently handled at the full container wharf. In addition to the wharf, there several container terminal operated by private sector near the wharf.

The railroad, mainly utilized for the petroleum transportation at present, is terminated at Ujung Baru Base, and its extension to Gabion Base for container transportation is still in planning stage.

Container cargo handling volume in the Belawan Port in 1993 is 152,514 TEUs and is on the third as the domestic rank. Average growth rate per year for past 4 years shows the high growth rate of 24.6 %.
At present, direct connection with the Gabion Port and railway is not formed yet and relayed by road transportation of about 2 km.

2 For the development of Port of Belawan, studies have been conducted three times. The latest study is the Review Master Plan of the Port of Belawan completed in 1992, which proposed the development plan for the year 2000 and 2018.

b. Tebing Tinggi Dry Port and Connecting Railway

3 The Tebing Tinggi Dry Port in Tebing Tinggi (Population 120,000) is situated 81 Km apart in direction of South East from Medan (Population 1,730,000) that is the state capital of the North Sumatra State, and connected by railway via Medan to the Belawan Port where is situated 23 Km apart in direction of North from Medan.
Tebing Tinggi District where the dry port exists, is the primary industrial zone whose products are rubber, furniture, tapioca, etc.

4 The short transport distance of 104 Km has invited the neglect of container transportation by railway on the opportunity for tariff boast of 15 % since the head of 1994 year.

5 The facilities at Tebing Tinggi Dry Port consists of the following items:

Area of container yard	1000 m^2
Loading and unloading track	160 m x 1 lane
Handling facilities	A light forklift only, no heavy loading macchine

Planed capacity	21,000 TEUS/year
Access	Directly approach from a public road
Dry Port function	Not provided
Transportation distance	104 Km
Transportation article	Rubber only
Actual transportation result	Max. 1392 TEUs/year, mean 1.91 TEUs/day.one way
Present condition	Transportation has stopped since Jan. 1994 (due to expensive tariff)

6 The utilized track is superannuated, and allowable axle load is limited to 11 t. Therefore, container transportation is used with only one 20' container per wagon, and 40' container can not be transported. A number of locomotives are in lack.

(2) Port of Panjang and Kertapati Dry Port

a. Port of Panjang

7 Port of Panjang is located on the east coast of the cove of Lampung Bay. It is located south east part of Bandar Lampung City and serves as the gate way of the Lampung Province. It also used to serve as out let of the Southern Sumatra with the railways connecting to Palembang. However, the container transportation by railway terminated when Palembang Port was renovated.

8 The Panjang port area is well protected by coral reef from waves caused by West Monsoon (Musim Barat). The reef also protect the port basin from sedimentation and the port is said to be free from maintenance dredge, while many other ports of Indonesia are experiencing siltation problems. The port has conventional wharves, namely A through C and Multipurpose wharf D-I through D-III, where containers are handled. There is about 10 ha container yard as well as CFS.

9 The latest study on master plan of the Port of Panjang was completed in Dec. 1992. The study forecasted the cargo traffic by various methods up to the year 2012 and concluded that the container traffic would be expected to increase to 78,000 TEUs in 1996, 104,000 TEUs in 2002 and to 157,000 in 2012. On the basis of their forecast, the study concluded that a new 300 m container wharf having a water depth 12 m would need to operate by 1996 and that the back up container yard should be completed by 2002. For long-term plan, it recommended to expand the container wharf by 150 m beyond 2012. The long-term plan also proposed new railway alignment as well as a depot next to the container terminal. The construction of the container wharf is on-going and scheduled to complete in 1995.

b. Kertapati Dry Port and Connecting Railway

10 Kertapati St. is situated on the upper opposite side of Palembang container yard located along the Musi River. Kertapati dry port belonging to that station, has not been in activity since Nov. 1991, but in usage as a barge wharf for coal transport now.

11 The dry port has ever sent general cargo produced in Palembang City to Panjang 400 Km apart from there by using 30 flat cars and 50 container boxes before.

12 The preceding container transport route was formed by detour as Kertapati – Panjang – Tanjung Priok – Singapore but now the direct container route to Singapore has been established, and former route had to be abolished. The South Sumatra has been developing in the main core of primary and row material industries. Accordingly, the occurrence of freight goods adaptable to container will not be found in the inland zone for a while.

(3) Port of Tanjung Priok and Gedebage Dry Port

a. Tanjung Priok Port

13 Port of Tanjung Priok locates at northern coast of Java Island on the northeastern part of DKI Jakarta. The port extends approximately 6 km from east to west. It consists of six (6) major basins and six (6) finger piers, breakwaters and navigation channels. The port has two entrance, i.e., West and East. The west approach channel, which is 3 km long, 200 m wide and 11 m deep below Low Water Sea Level (LWS), is used for oceangoing vessels. On the other hand the east approach channel is left undredged and there are some portions shallow than – 5 m, thus it cannot serve for large sizes ocean-going vessels. The maintenance dredge is performed annually in the west approach channel and basins as well, and the total volume of the dredge is in the range of 230,000 to 300,000 cubic meters for the past four years.

14 Port of Tanjung Priok started container handling in 1973, and in 1978, the Container Terminal I (CT-I) was inaugurated at Basin III to meet the tremendously increasing container traffic there. In 1991, the Container Terminal II (CT-II) started operation at the Basin II, and the Pasoso Container Terminal at the behind the CT-II also started operation for the container service to Bandung by railway.

15 So far various studies on the development plans of Tanjung Priok have been carried out. On the basis of and with up-dating of these study results, the PELABINDO II completed "Master Plan 1993" and "Contingency Plan, March, 1993". A new Terminal, which is located next to the existing CT-I and is called the Container Terminal III (CT-III), is given a priority for the development. The construction started in 1994. When CT-III is completed three new berths (-12m) will be operational by the year 2000. Even with the CT-III, the study pointed out that five additional container

berths will be needed by the year 2010 to accommodate the projected container traffic.

16 In accordance with the study of the development plan of the Tanjung Priok Port, a plan to develop Bojonegara Port, an entirely new port in the west of the West Java, has been studied. The Master Plan and the feasibility study was completed in April, 1994. The development of the Bojonegara Port aims to start operation in 1997 and to ease the heavily congested situation on Tanjung Priok Port by shouldering the hinterland of the latter. In addition, the port is planned to be expanded to a deep sea port in West Java for full container carriers of third or fourth generation in the year 2020.

b. Gedebage Dry Port and Connecting Railway

17 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 (see **Fig. A-1**). The transportation of container cargoes by railway started in 1987 with an aim at easing heavy traffic along the highway. Thus, the railway achieved remarkable increase in its container transportation from 2,595 Tues with one TRCT per day in 1987 to 60,918 TEUs with three TRCTs per day in 1993. The share of railway container transportation occupies about 80 % of the total container cargo traffic to and from Bandung District, but this volume amounts to only six(6) % of container throughput at Tg. Priok Port(see **Table 3** of SUMMARY, Part1 Chapter II).

18 The track layout of Gedebage St. is shown in **Fig. A-2**. The Dry Port has an area of 2.6 ha with two CFS. It has also various handling equipments: one transtainer having load capacity 42 t, one toploader with a load capacity of 35 t, six forklifts with load capacity ranging from 2.5 t to 10 t and one hand pallet having load capacity 2.5 t. In addition two head trucks and four chassis are presently operational.

19 For container transportation, 190 marine container wagons including spare ones: 150 units of two-axle bogie with four wheels (PPCW wagon) having a length of 13 m which can accommodate either one 40 ft container or two 20 ft containers, and 40 units of three axle bogie with six wheels (PKPKW wagon) having a length of 17.6 m which can accommodate heavy containers over 30 ton. For shunting operation, one locomotive is dispatched at Gedebage all day long.

20 This dry port is not one of the regular station, but independent organization under PERUMKA Semarang Branch. It is the sole Dry Port practically in operation in Indonesia, and provides all the functions necessary for a Dry Port such as Port Administration, Customs, Quarantine, BNI Bank, Praghan Indonesia (Handling company) and Export Inspector.
With these units, the export procedure and the shipping procedure can be completed at the Dry Port. The business documents are accepted from 07:30 through 14:00 and

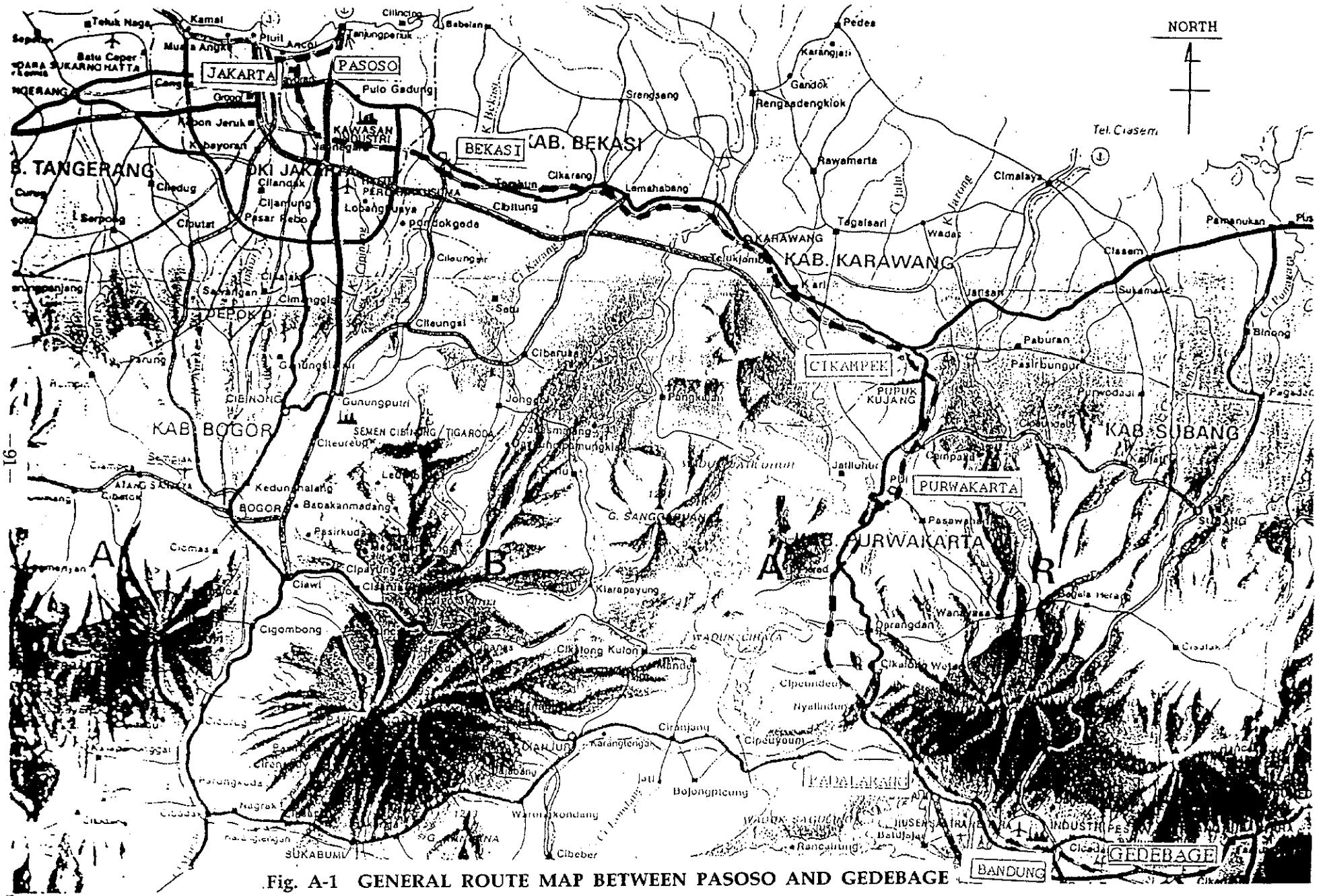


Fig. A-1 GENERAL ROUTE MAP BETWEEN PASOSO AND GEDEBAGE

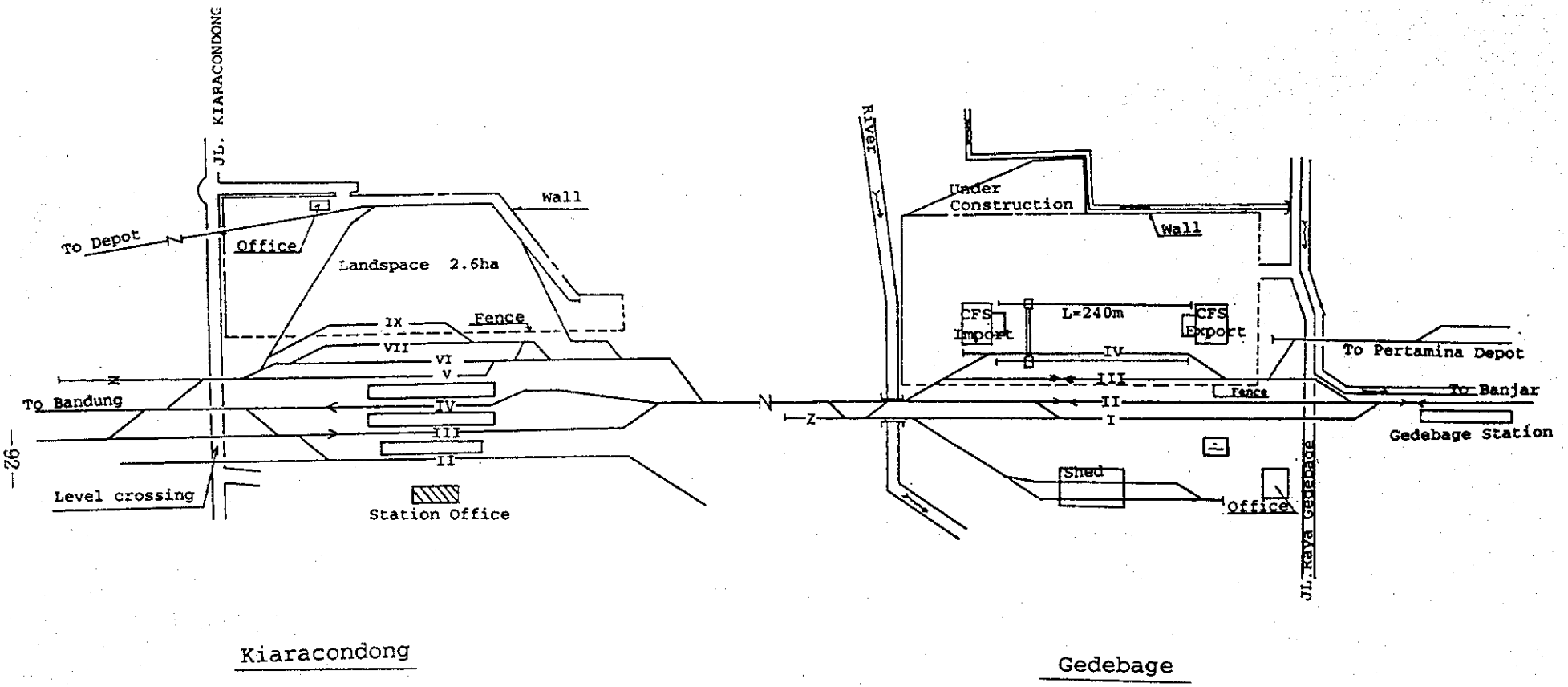


Fig. A-2 Track Layout at present

the acceptance and releasing of containers are done from 08:00 trough 22:00.

21 The rail track network around Tanjung Priok Station (Tpk St.) is shown in Fig. **A-3.** Pasoso Station is located next to CT-II. A private rail track, which is for exclusive use for the port, branches at Tpk St. to PERTAMINA Oil Base, where Pasoso St. is located intermediary one km apart from Tpk St.

22 The above mentioned private track is owned by PERUMKA and the other facilities for container handling at Pasoso St. are owned by PELABINDO II. Seven of PERUMKA staff are working here for contact business with the staff of PELABINDO. The track layout is shown in Fig. **A-4.** It is seen that three side tracks including locomotive run-around siding, PERTAMINA route which is in no use, is utilized as lead track, signals and safety facilities are not installed.

23 An elevated platform, an extension work of which has been completed recently, has a length of 600 m and a width of 49 m where two top-lifters are operated by the operators of the Port Corporation. Since the extended the platform can accommodate two trough container trains alongside, loading and unloading services can be performed for the two trains at the same time. Thus, the handling efficiency at Pasoso St. can be improved, even though such operation would make the shunting a little bit more complicated.

c. Tanjung Priok Station (Tpk St.)

24 Tpk St. is a terminal, and the track layout is shown as **Fig. A-3.**
There are two double-track routes, one is bound for Jakarta Kota, another is bound for Jatinegara. The former is not used now. Thus, Tpk St. is not fully used at present in spite of its large size. The Sepur Labuhan route connects Pasoso St. with Tpk St. Accordingly, a train going to Pasoso have to receive double switch back shunting at Tpk St.

25 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 C.T. one or two hours before shipping at the latest.
ii) Shunting is conducted by a shunting locomotive, 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 midnight start from Tpk St, soon after exchanging wagon formation, at the same midnight. Therefore the staying time of the locomotives is not so long.

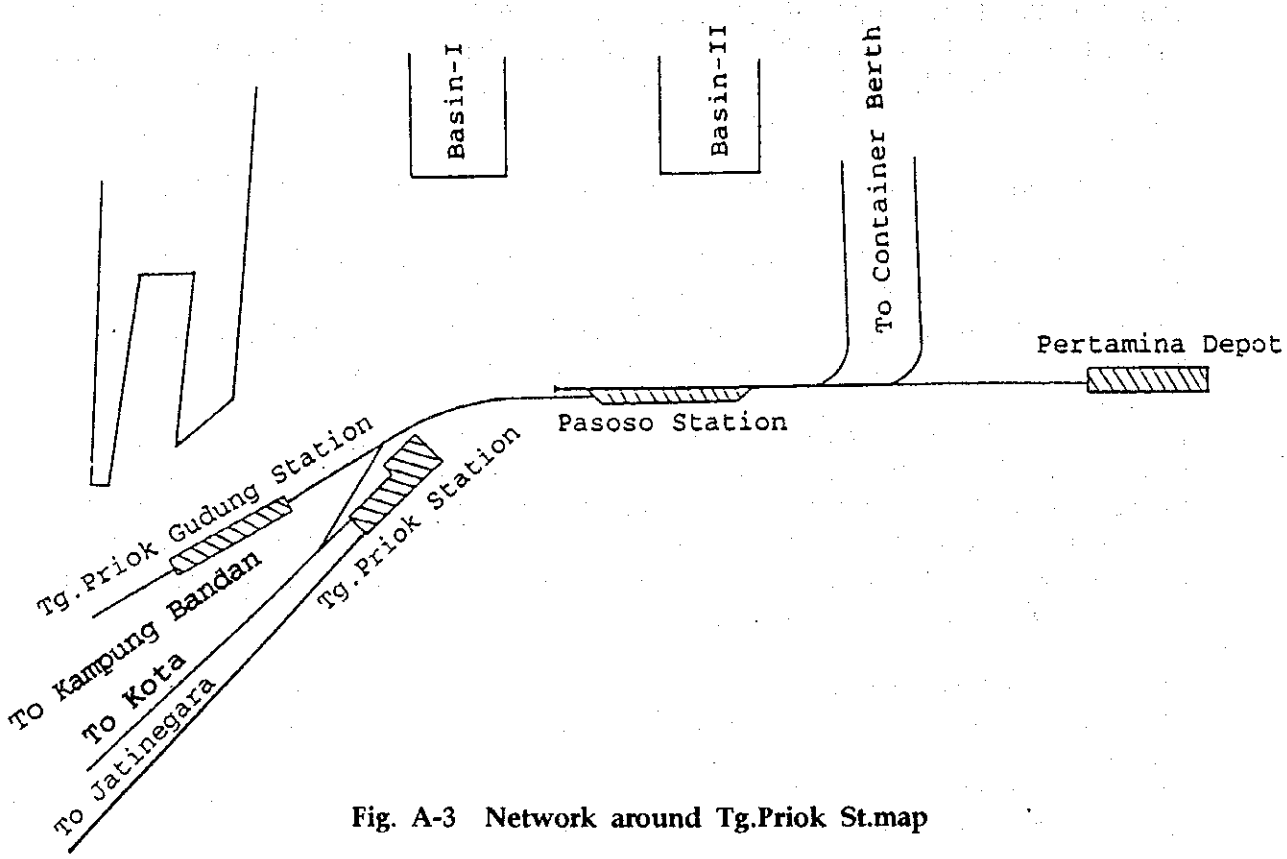


Fig. A-3 Network around Tg.Priok St.map

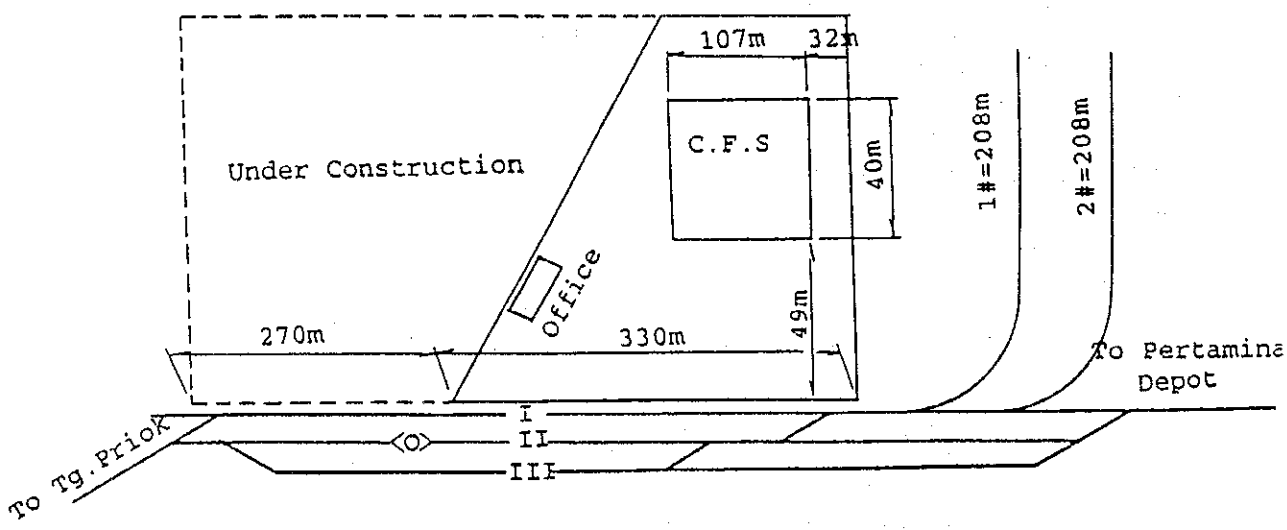


Fig. A-4 Track layout of Pasoso

26 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 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 **Fig. A-5.**

27 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.

28 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, the locomotives for container trains belong to Bandung depot.

(4) Tanjung Emas Port and Solo Jebres Dry Port

a. Tanjung Emas Port

29 Port of Tanjung Emas is located at north coast of Central Java, and it is within Semarang City. The slope of sea bed is mild, and it has 5.7 km approach channel having a width of 150 m and a depth of – 9 m. Because of the siltation, maintenance dredge is needed in the approach channel and inside port every year. The volume of the annual maintenance dredge is approximately 500 to 600 cubic meters. The port has three breakwaters, West and North Breakwaters and East Groin, for the protection of the port area from northwest monsoon.

30 The berthing facilities are grouped into three sections:

i) Samudera Wharf; – 9 m deep and 605 m long multi purpose wharf for oceangoing vessels including container carriers. The railway terminal has been completed nest to the container yard.

ii) Coaster Wharf; – 4.5 deep and 320 m long general cargo wharf for domestic vessels

iii) Old Port; Consists of Inner Harbor and Kali Baru, used for coastal boats

31 The port is presently suffering serious settlement of ground. Especially, the Inner Harbor is submerged during high tide.

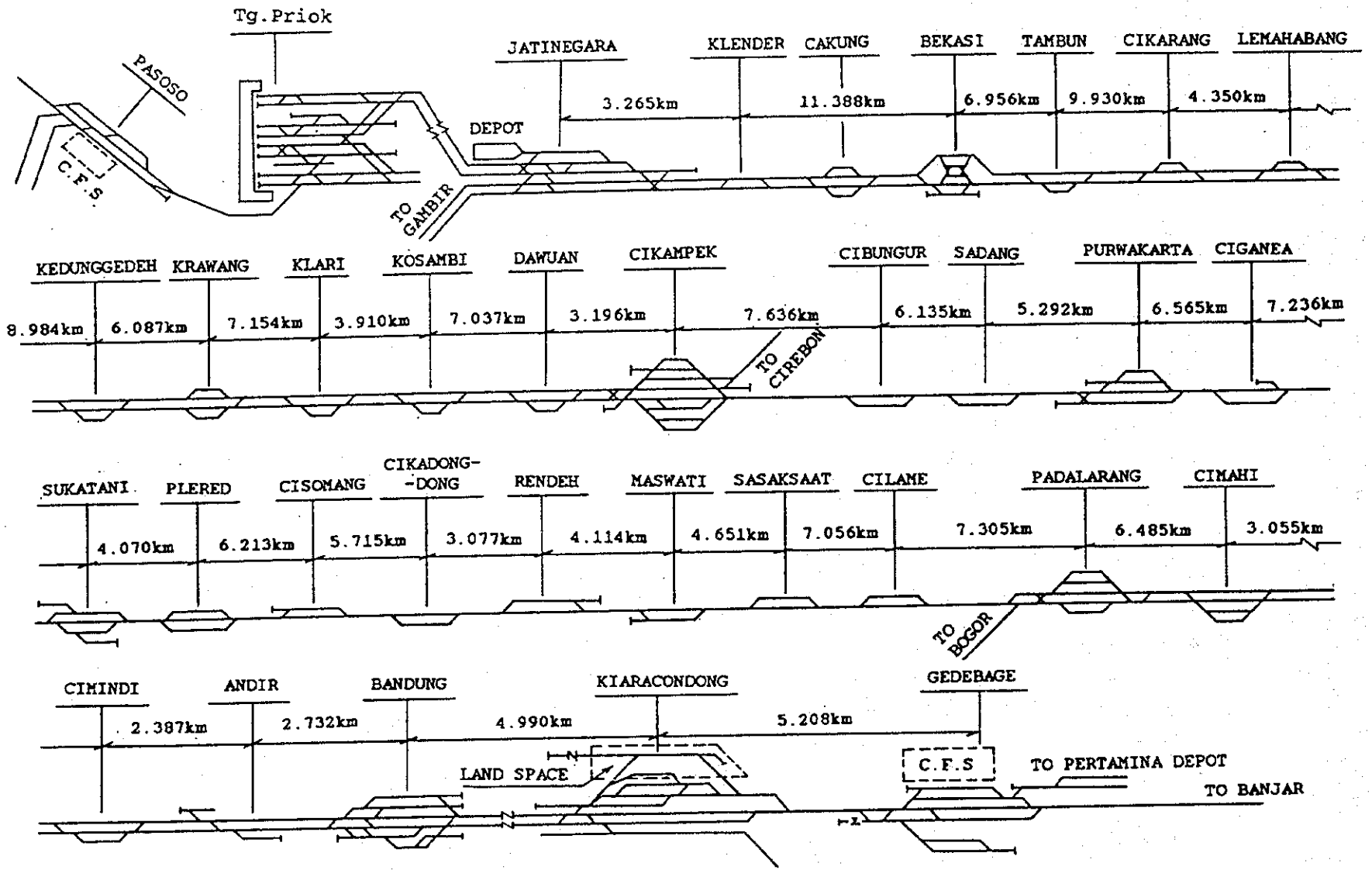


Fig. A-5 Track Layout Between Pasoso and Gedebage

31 The port is presently suffering serious settlement of ground. Especially, the Inner Harbor is submerged during high tide.

32 The master plan and the feasibility studies were completed in 1978. The master plan aimed at the port development up to the year 2000 with the short-term plan up to 1980. The study proposed the existing multi-purpose berths in West Wharf as the Urgent Implementation Plan (Phase I Project). The wharf having 3 berths and - 9.0 m quay started operation in 1985.

33 The original Master Plan has been reviewed by Indonesia Government and another study has been conducted and the final report was submitted in June 1986, which proposed i) Urgent development plan for 1990, ii) Short-term development plan for 1995, and iii) Long-term development plan for 2005.

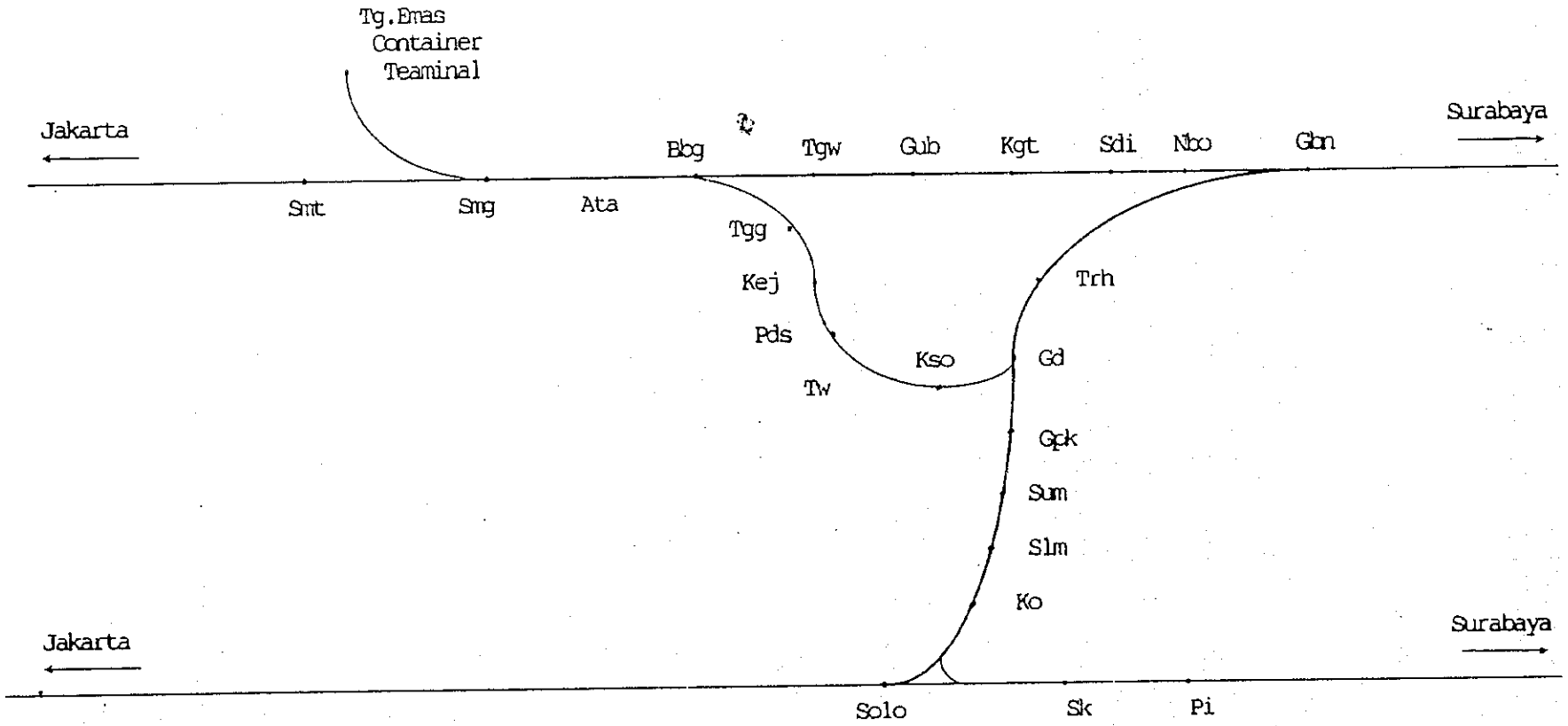
34 The total container cargo volume forecasted for the year 1995 (390,000 tons) was reached in 1990. Thus, the Urgent development plan II (Stage I: Civil work and building in 1991, Stage II: Procurement of cargo handling equipment and computer hardware in 1992). The engineering services for the Urgent Development plan was started on July 16, 1992 (Stage I) Phase II-Stage II is under proceeding. With this Urgent Development Plan, a full container wharf having 345 m berth and -10m quay, which is an extension of the existing Multi-purpose wharf, will be completed in February 1997.

35 In spite of the revised development plan, updating of the plan was urged because of the rapid growth of the container cargo traffic in recent years. A preliminary study has been conducted. This study forecast the container cargo traffic up to the year 2005(408,000 TEUs for optimistic scenario, and 362,000 TEUs for conservative scenario). On the basis of updated container traffic forecast, the study concluded that an additional wharf having a berth 345 m and - 12 (initial depth -10 m) will be required. In addition, it also recommended the concept of the future development of the port and concluded that the central wharf is optimum site for the future development of container wharf. This study thus covers demand forecast and layout plan and the feasibility study is desired for the future plan. Figure 2.6.4 shows the existing facilities and container terminal presently constructed.

b. Solojebres Dry Port and Connecting Railway

36 The City of Surakarta where Solojebres Dry Port is located, has the population of 520 thousand people and the main industry is light industry. Although Surakarta has a tendency of decreasing population, the area around the city keeps developing under the city development and industrial complex plan.

37 The main line with approximately 112 km in length, connecting between Solo and Semarang is used as the container route (see **Fig. A-6).**



Smt	Semarangtawang	Smg	Semaranggudang	Ata	Alastua	Bbg	Brumbung	Tgw	Tegowanu
Gub	Gubug	Kgt	Karangjati	Sdi	Sedadi	Nbo	Ngrombo	Gbn	Gambringan
Trh	Torch	Gd	Gundih	Tgg	Tanggung	Kej	Kedungjati	Pds	Padas
Tw	Telawa	Kso	Karangsono	Gpk	Goprak	Sum	Sumberlawang	Slm	Salem
Ko	Kalioso	Slo	Solobalapan	Sk	Solojebres	Pl	Palur		

Fig. A-6 Solo Jebres - Smaragng Port Railway Connection

container wagons are connected together with other ordinary freight cars to a conventional freight train and operated via Gambringan. Since this decreases the punctuality and stability of transportation, the train always arrives 1 to 2 hours later than the schedule.

39 The railway facilities to the container wharf of Tanjung Emas Port, which is located 1.7 km away from Semarang Gudang Station (Sgm.), were completed in March 1993, but they are not used at present. For this reason, containers carried from Solo are unloaded at Semarang Gudang Station and carried to the container wharf by trailer, if the railway service to the container wharf is started, it will bring about various merits. For example, the transportation cost can be reduced. Therefore, such a railway service should be started in an early stage.

40 Textile is the main export commodity carried by the railway from Surakarta to Semarang, which accounts for about 60% of the export cargo and the principal import commodity is polypropylene, which accounts for 60 to 100% of railway cargoes from Semarang to Surakarta.

41 The volume of container traffic has increased rapidly between 1989 and 1991, but slowly since 1992 due to the decreasing import cargo traffic. However, it has increased during the first 4 months of 1994.

42 In Solo district, the volume of full containers were about 700 TEUs (export 400 TEUs, import 300 TEUs). Containers carried by the railway were 90 TEUs/month, accounting for only 13 % of the total. The railway accounts for only 3% of imported containers.
Since only one train is operated every day, it takes three days to carry goods from a factory to a ship by railway transportation.

43 However, it takes only one day by road transportation. For this reason, customers use a truck in spite of relatively high cost whenever they need quick transportation. They use the railway whenever they have enough time, since 75,000 Rupia can be saved in total by selecting railway transportation comparing with 346,000 Rupia by Road transportation, the railway has been able to secure some demand.

44 Solojebres Dry Port belongs to Solojebres Station. Although a chief is appointed for the dry port, it has no specified organization.
The dry port has not the customs clearance, import/export inspection, and bank functions, but all the import and export formalities can be completed in Surakarta (Solo).

45 Circumstances at Solojebres Dry Port are as follows:
i) Facilities designed for mass transportation expected in future are used for

handling a small number of containers at present.The Dry Port has only one 3.5 ton fork lift and one 2 ton fork lift.

ii) Since heavy handling machines are not used, containers are left on container cars during cargo stuffing and unstuffing. Heavy cargo is handled by fork lifts.

iii) For handling heavy cargo, steel plate is spanned between the lengthwise platform in front of a warehouse and a container car, instead of a bridge a fork lift is used for cargo handling. Every container car must be shunted after handling the container. Since Solojebres has no shunting locomotive, every container car must be shunted by the fork lift bound with ropes and stored in the staying sidings. Therefore, loading and unloading takes a long time.

(5) Tanjung Perak Port and Rambipuji Dry Port

a. Tanjung Perak Port

46 Tanjung Perak port is located in Madula Strait between Java Island and Madula Island. Oceangoing vessels utilize 46 km long West Channel in the strait. The 16 km entrance channel of the strait need to be dredged periodically, because of siltation there. At present the width and the depth of the navigation channel are 100 m and -9 m respectively.

47 The port consists of two part: Old port and International Container Terminal. International containers are handled at both International Container Terminal and the Container Terminal I (CT-I) at Berlian Wharf which is one of the wharves in Old Port. The former has - 10.5 m deep and 500 m long pier equipped with three gantry cranes, while the latter used 9.5 m deep and 700 m long berths without gantry crane.

48 Total yard areas are 150,000 and 32,000 square meters at the International Container Terminal and CT-I, respectively. The railway terminal has been completed just out side of the container yard of the International Container Terminal.

49 To fulfill the increasing container traffic, the expansion of international container wharf and the construction of a new domestic container terminal are proposed. Presently a study on the long-term and short-term development plan is being conducted by the ADB loan. The study aims at the year 2010 for the long-term plan and the year 2000 for the short-term development plan, and scheduled to be completed in 1994.

b. Rambipuji Dry Port and Connecting Railway

50 Activity at Dry port

Rambipuji Dry Port is situated 194 km (in railway distance) away from the southwest of Surabaya. It is located in the inland area and connected with Tanjung Perak (Tg. Perak) in Surabaya. The Dry Port was established on September 8, 1989.

51 The chief official of dry port belonging to PERUMKA is posted at Rambipuji St. (**Fig. A-7**). The offices with various functions necessary for export and import procedures are not concentrated at Rambipuji St. However, customers can finish export and import procedures at the relevant offices scattered in Jember City without going to the port authorities office.

52 Primary industries, such as agriculture and stone material processing, are the main industries in the Jember district where Rambipuji Dry Port is located. The population of this area including Jember City is about 2 million. The major containerized commodities shipped from Rambipuji Dry Port are tobacco and stone materials (Teppei stone) used for construction. In 1993, the volume of outgoing containers were 1,258 TEUS and that of arriving containers were 1,258 TEUs, making the total of 2,516 TEUs. All of the arriving containers were empty ones.

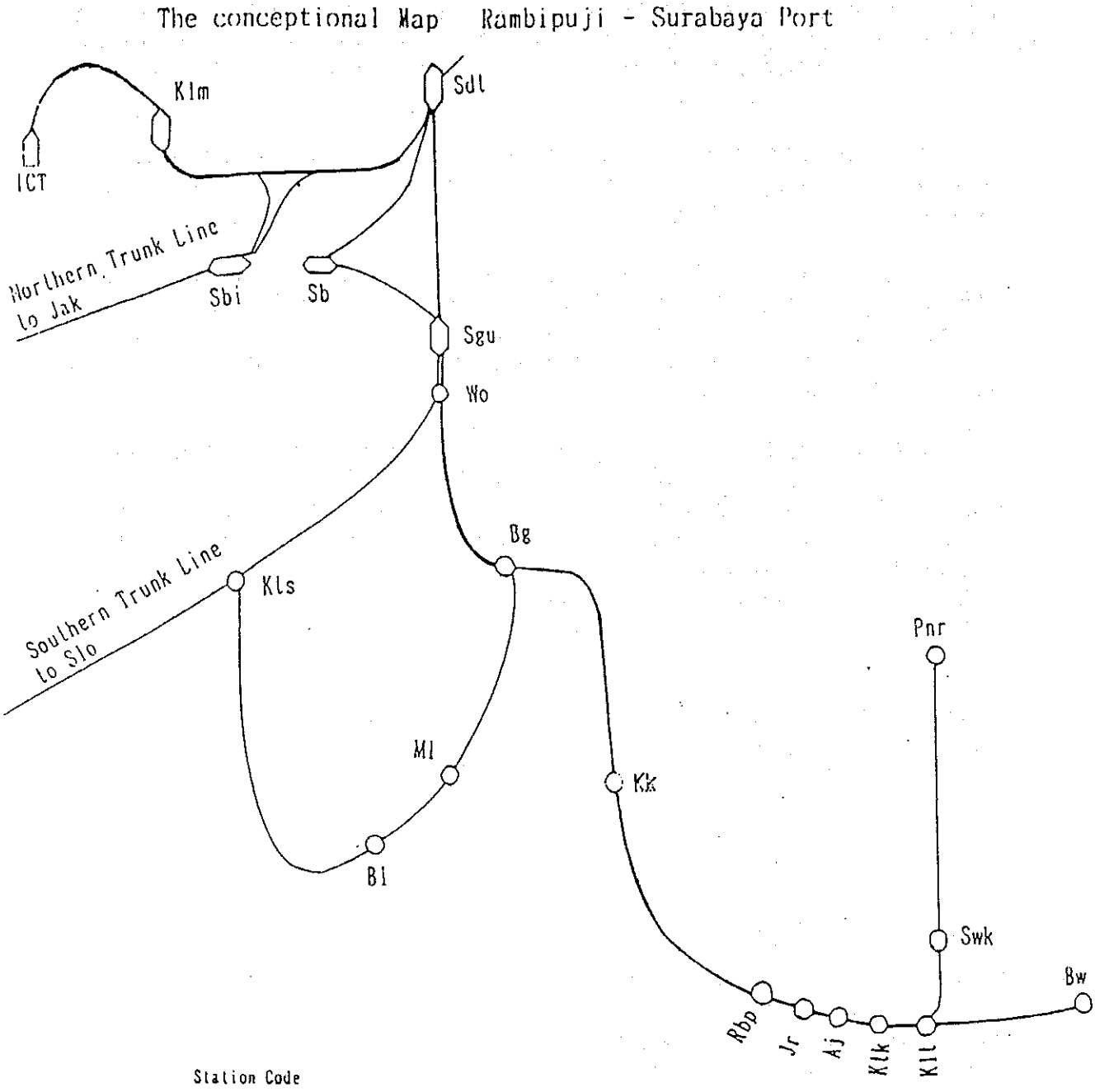
53 One round trip of a non-regular container freight train is scheduled between Rambipuji and Kalimas. Container wagons, however, are connected with a conventional rapid service freight train because Jember district had very small demand for container transportation, e.g., 3.4 TEUs (2 cars) daily on the average in 1993.

(6) Ujung Pandang Port

a. Port facilities

54 Ujung Pandang Port is located at west coast of South Silawesi, and is in the City of Ujung Pandang. The port consists of several facilities, Ship repair Yard, Paotere Port (for traditional sailing boats), Naval Base, PERTAMINA Oil Base, Bogasari Flour Terminal and Port of Makassr. Port of Makassar is the largest among these facilities where both oceangoing and inter-island vessels are berthed. The Port of Makassar consists of three sections: Soekarno Quay which is only wharf presently operational for the cargo ships and passenger ships, Hasanuddin Basin for tug boats and patrol boats, and Hatta Quay which is presently the construction site of new container wharf. Soekarno Quay was originally built in 1920, and has 1,360 long and -6 to -8 m deep wharf. At present one berth is used for container service, however, no handling facilities except a few forklifts are equipped.

55 The Hatta Quay is presently rehabilitated. The on-going project covers the construction of i) 670 m long and -12 m deep new Hatta Quay, ii) 154 m small vessel quay,
iii) dredging and reclamation (1.4 million cubic meters), iv) Transit shed(4,000 sq. m) and CFS(4,000 sq. m), v) Administration building(455 sq. m), and Vi)a maintenance



Station Code

code	Station name	code	Station name	code	Station name
ICT	Perak International Container Terminal	Wo	Wonokromo	Klt	Kalisat
		Bg	Bangil	Bw	Banyuwangi baru
Klm	Kalimas	Kk	Klakah	Skw	Sukowono
Sdl	Sidotopo	Rb	Rambipuji	Pnr	Panarukan
Sbi	Surabaya pasarturi	Jr	Jember	Ml	Malang
Sb	Surabaya kota	Aj	Arjoso	Bl	Blitar
Sgu	Surabaya gubeng	Kt	Kotok	Kls	Kertosono

Fig. A-7 The conceptional Map Rumbipuji and Surabaya Port

shop(755 sq. m).

b. Dry Port and Connecting Railway

56 At present, there are no railway facliilities have been constructed in South Sulawesi. However, an inlander container terminal was established by city government. It is locate about four (4) km away from the port. The access road to the port is under construction at present and, thus, trailers are restricted tp pass the city roads. The terminal is not fully utilized.

APPENDIX B

FACILITY LAYOUT PLANS

(1) Belawan Port

(2) Panjang Port

(3) Tanjung Priok Port

Tg. Priok Port Alternative I – IV

Bojonegara Port Alternative III and IV

(4) Tanjung Emas Port

(5) Tanjung Perak Port

(6) Ujung Pandang Port

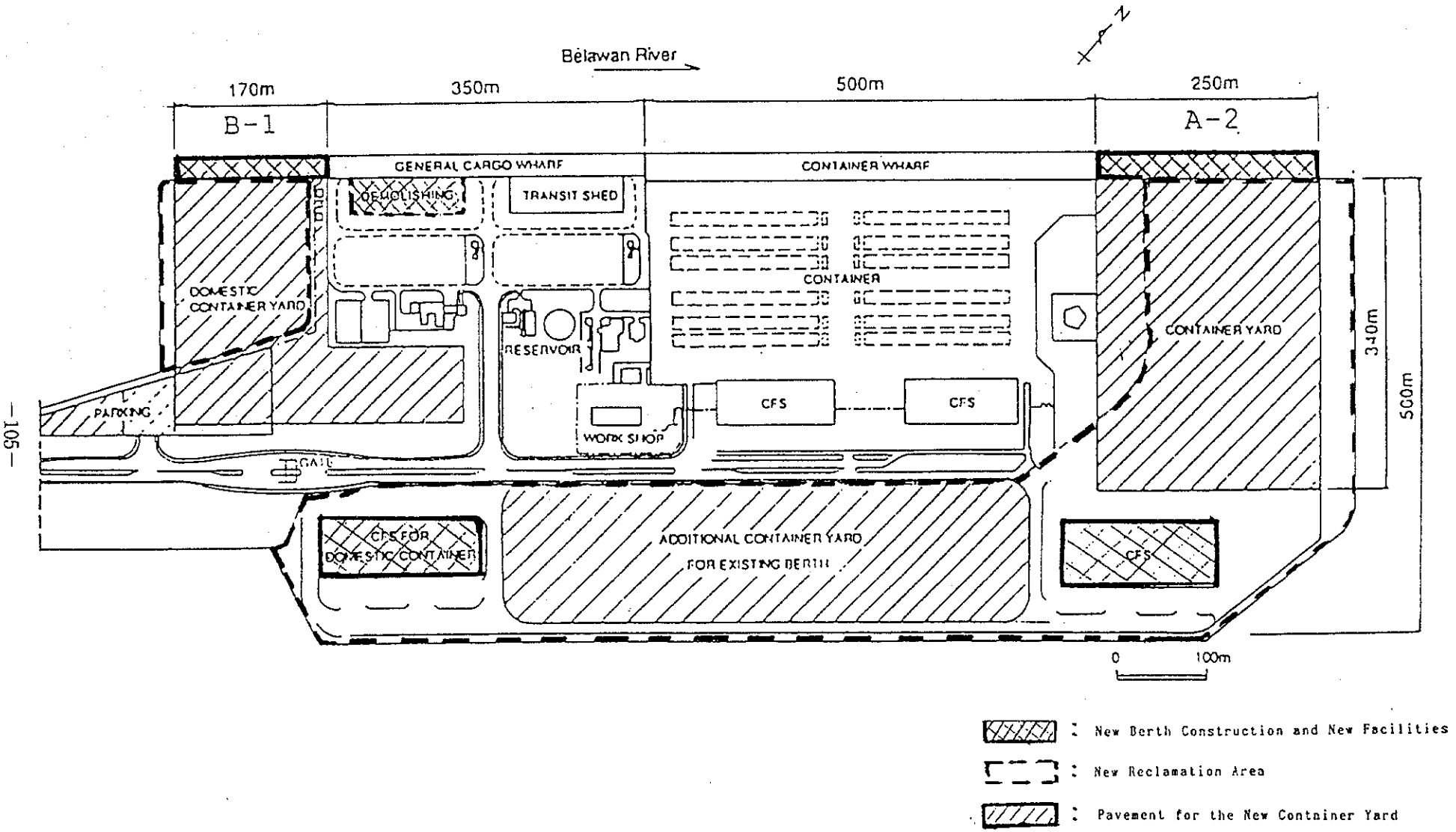
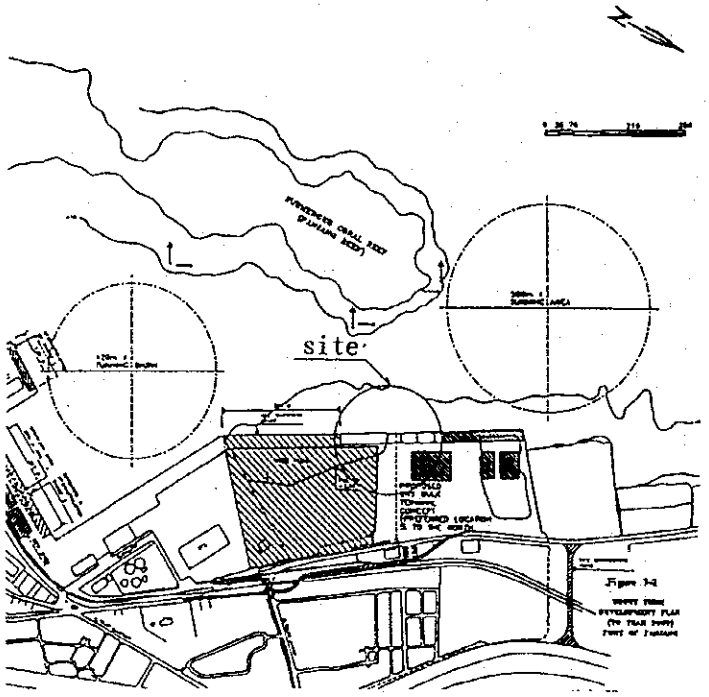


Fig. B-1 Layout of Master Plan of Belawan Port



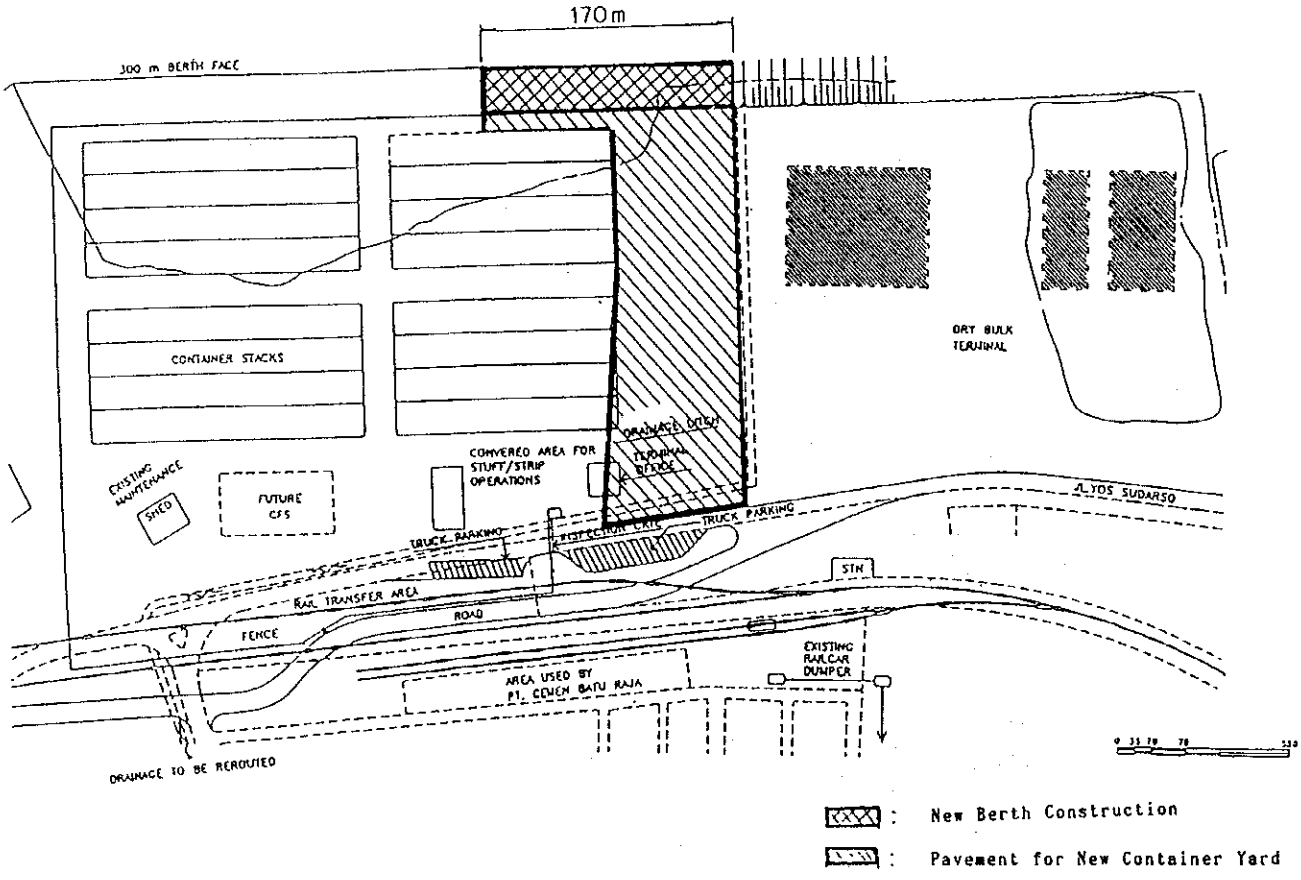


Fig. B-2 Layout of Panjaug Port

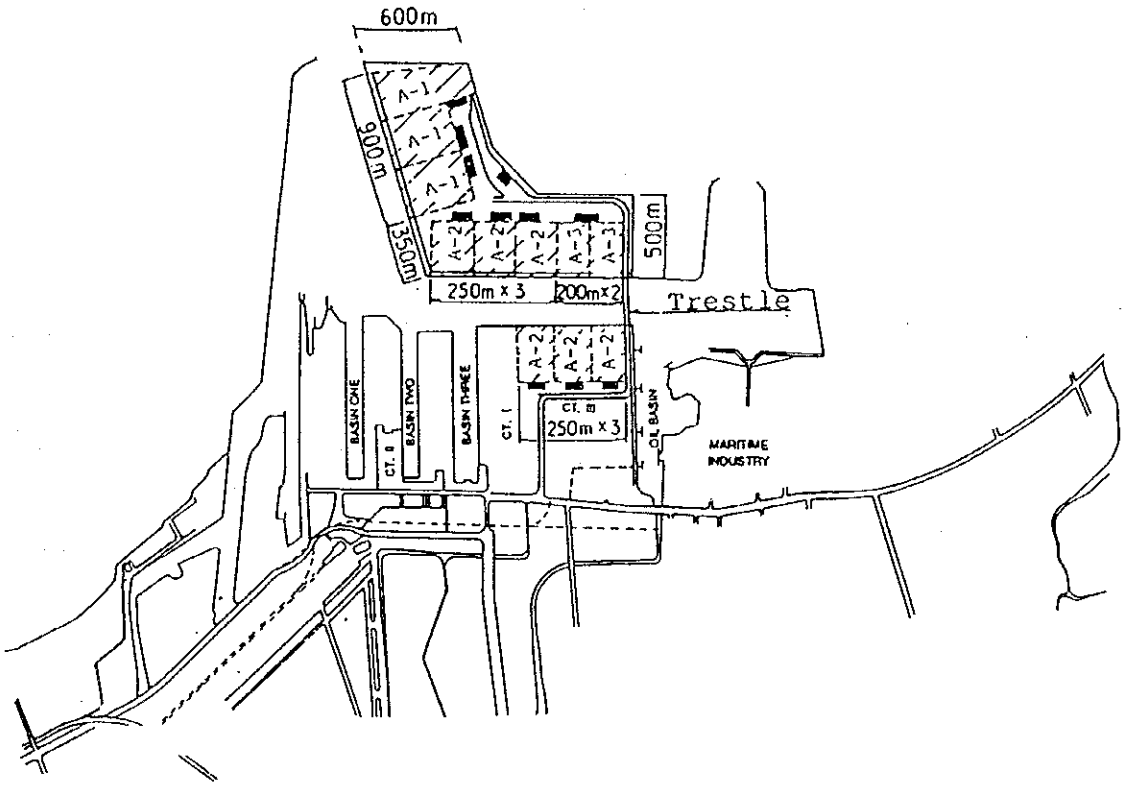


Fig. B-3 Layout of Tanjung Priok Port (Alternative I)

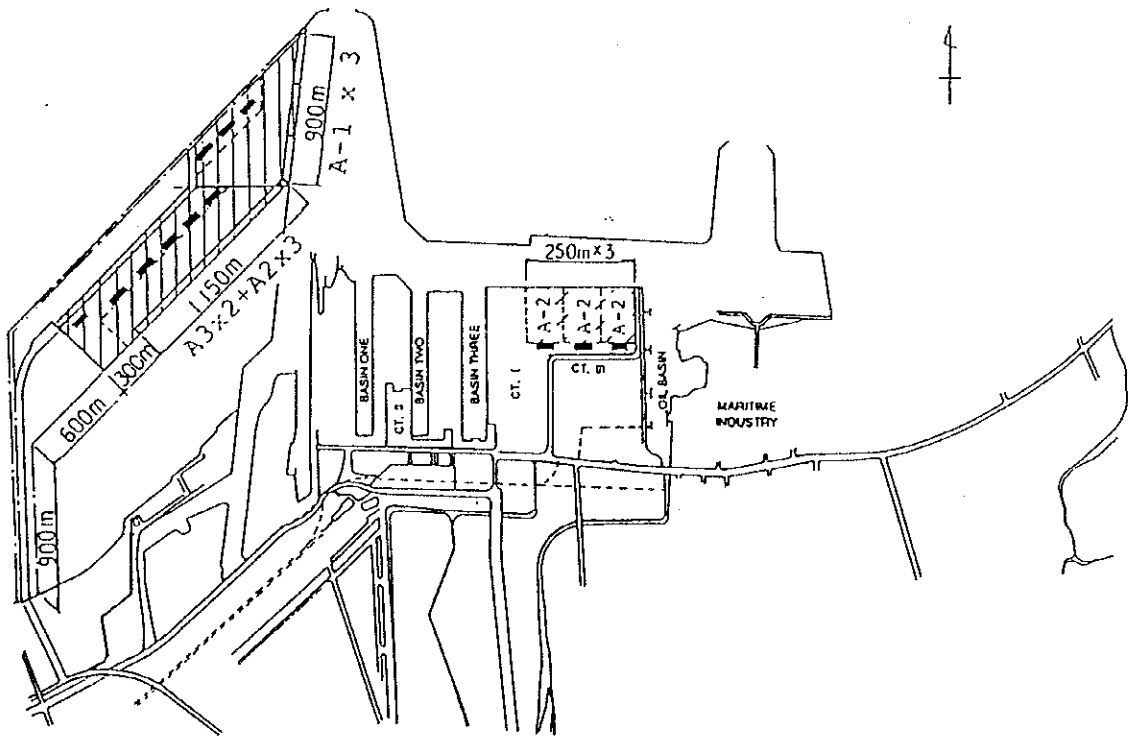


Fig. B-4 Layout of Tanjung Priok Port (Alternative II)

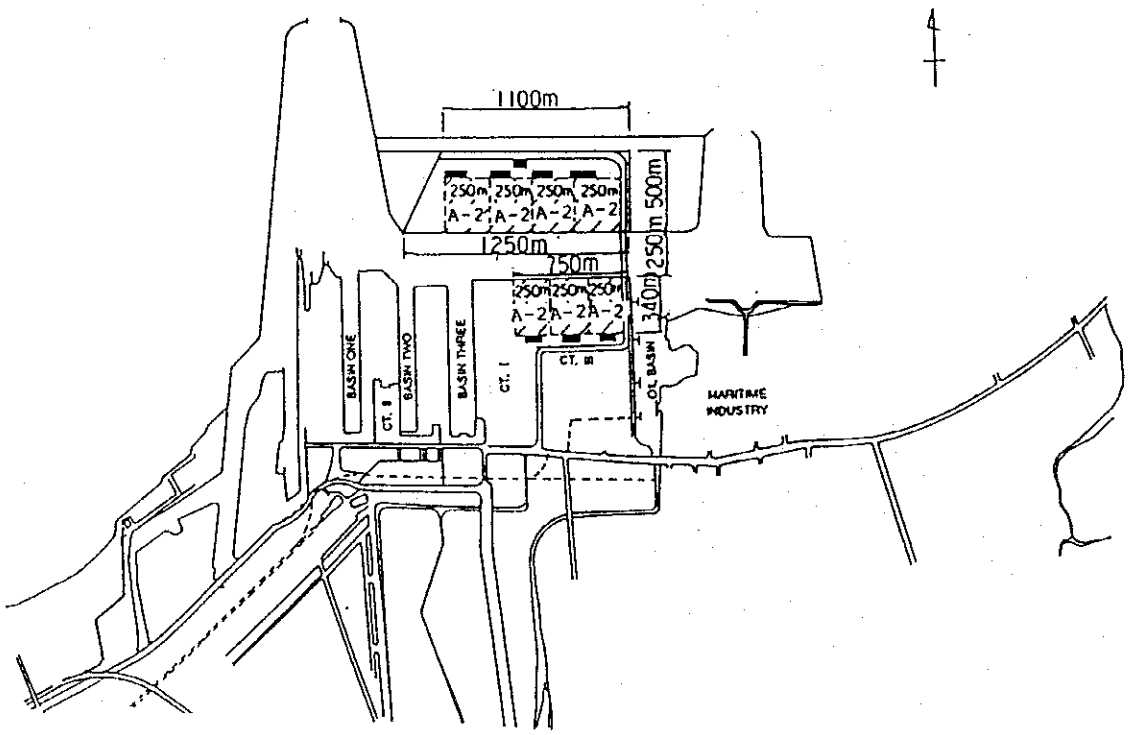


Fig. B-5 Layout of Tanjung Priok Port (Alternative III)

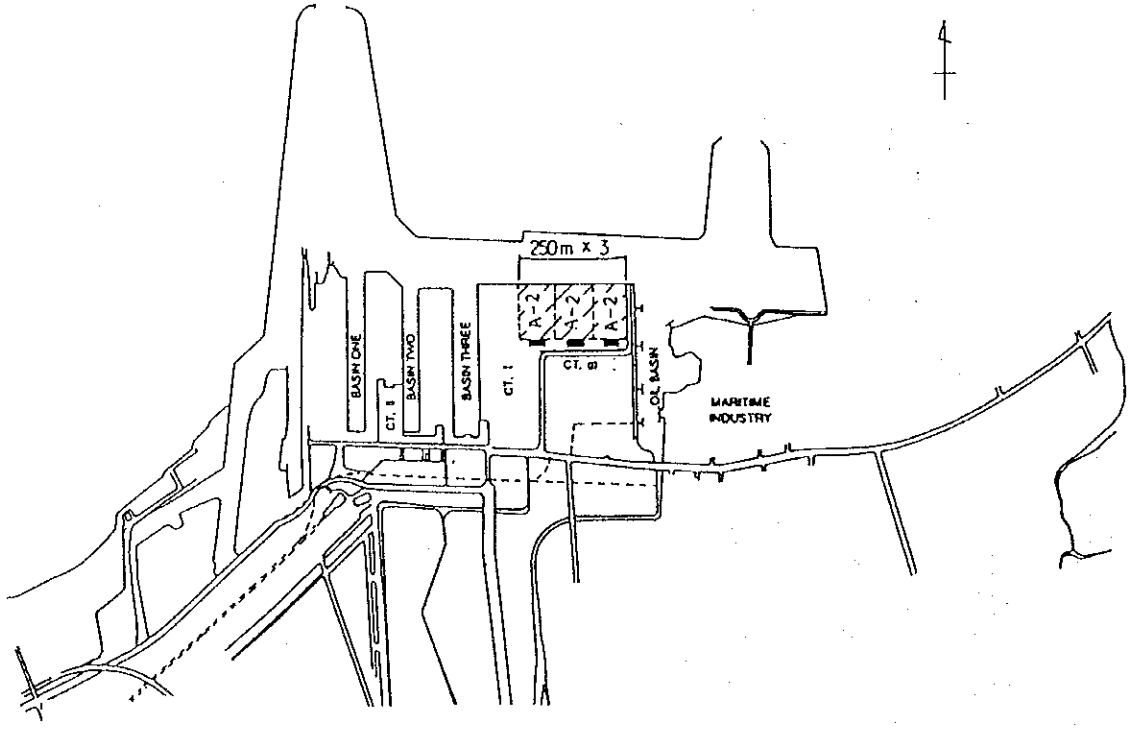
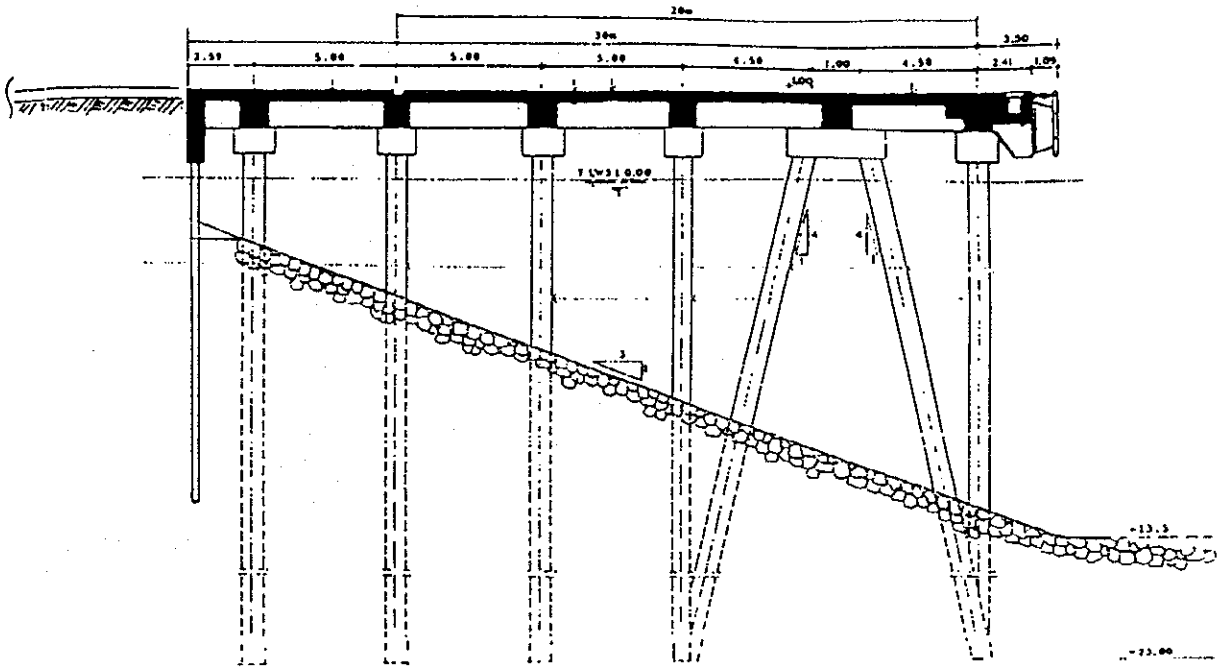


Fig. B-6 Layout of Tanjung Priok Port (Alternative IV)



A-1 Berth

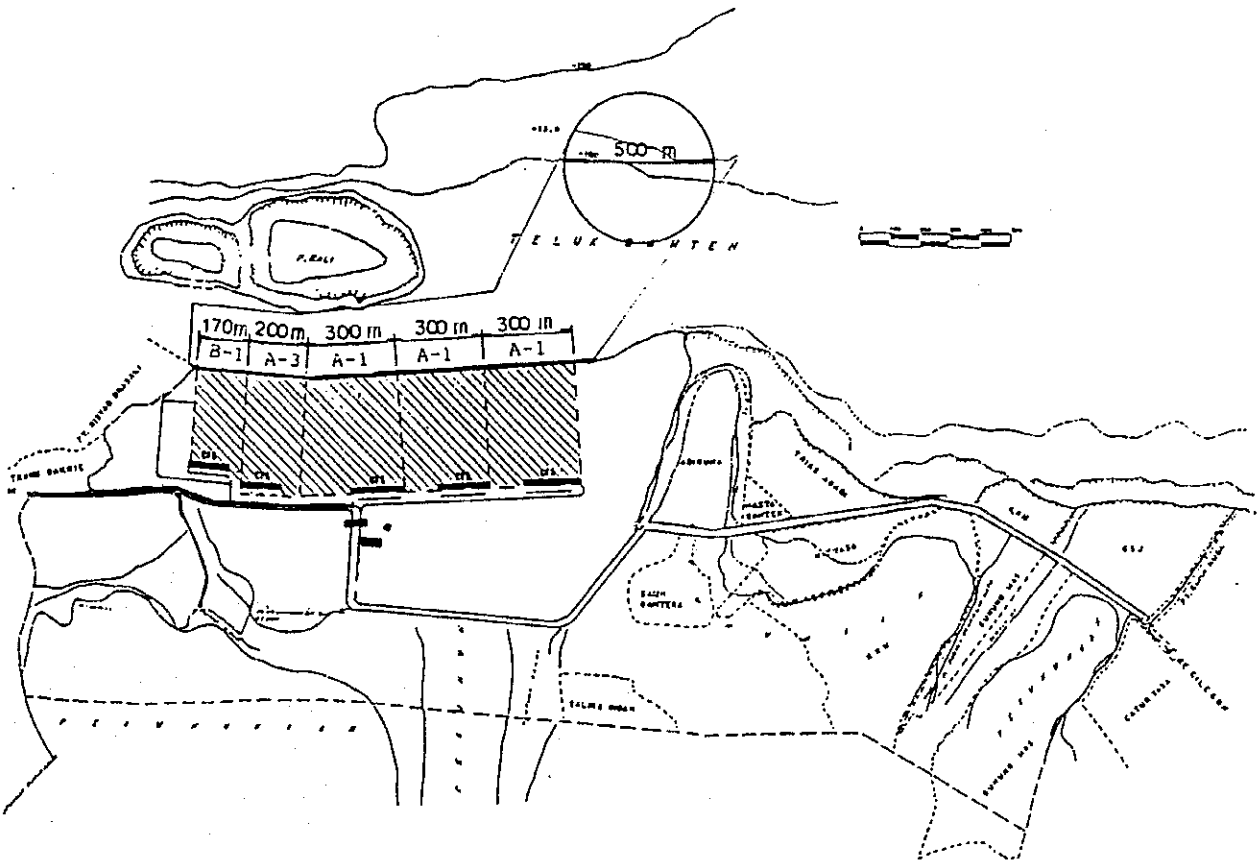
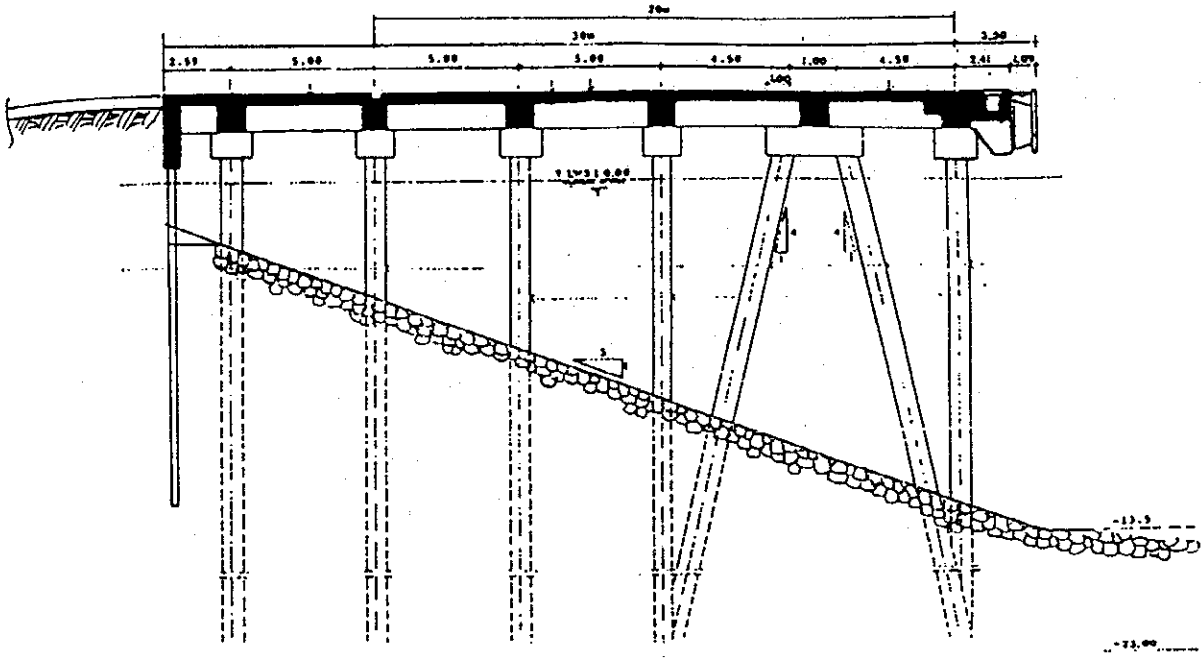


Fig. B-7 Bojonegara Port (Alternative III)



A-1 Berth

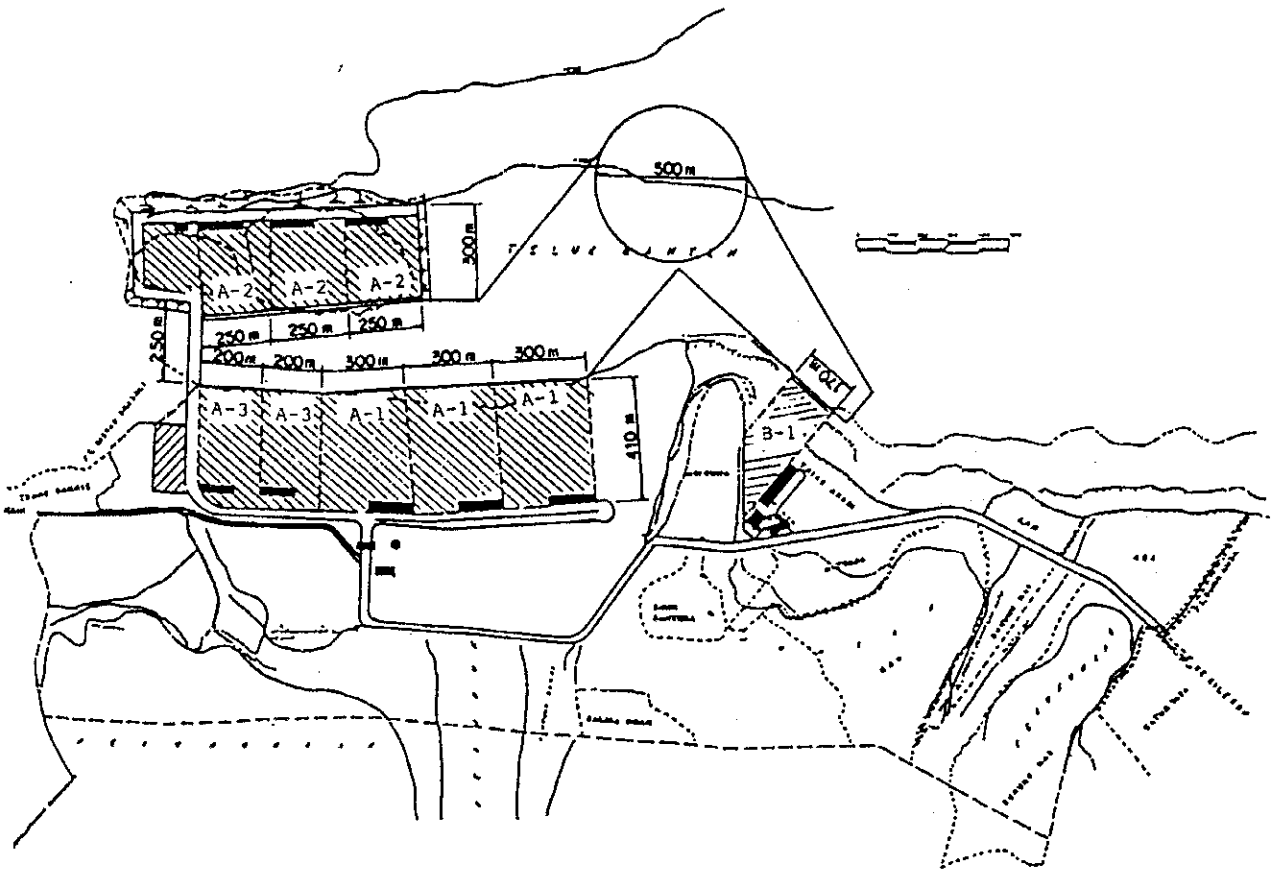


Fig. B-8 Bojonegara Port (Alternative IV)

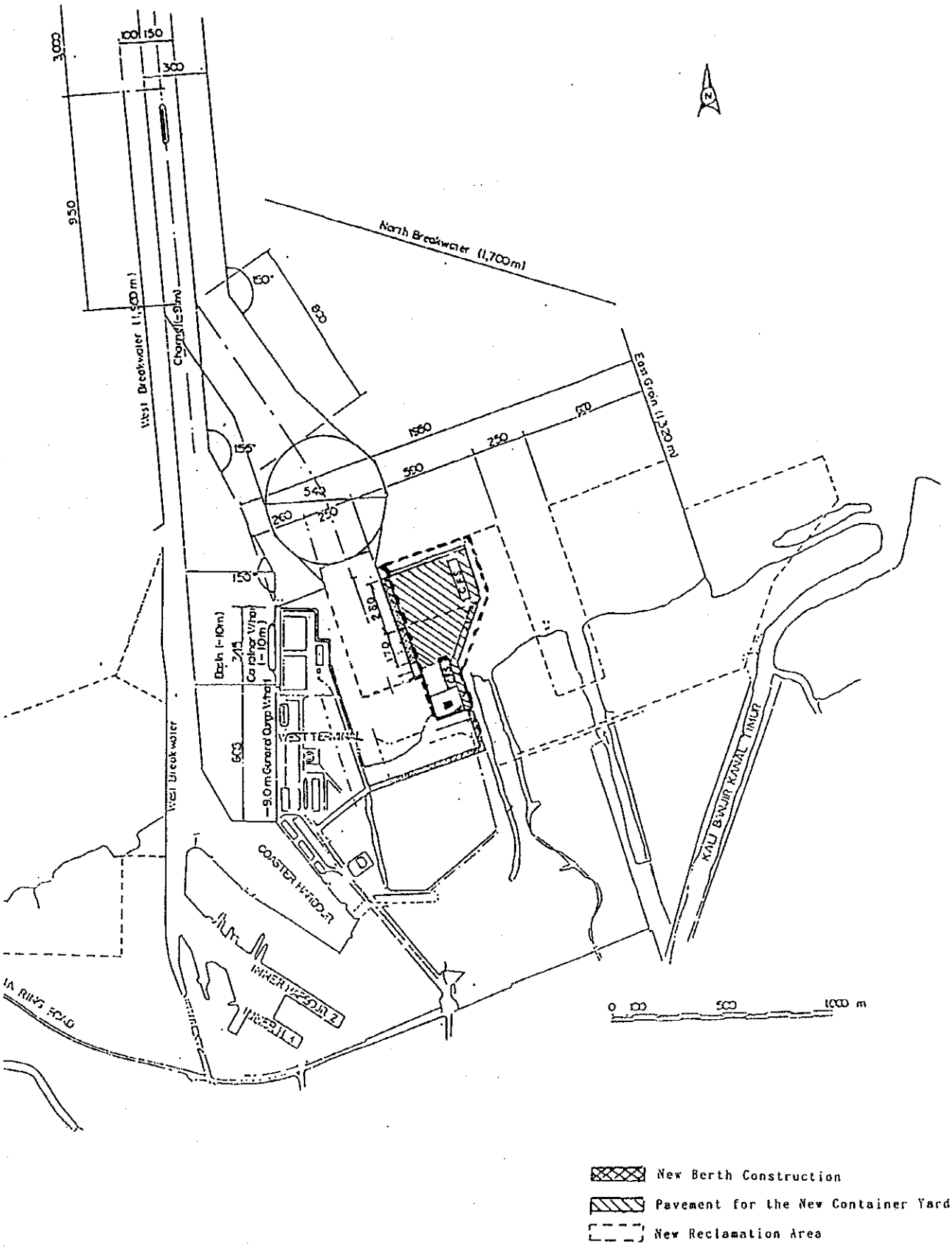


Fig. B-9 Layout of Tanjung Emas Port

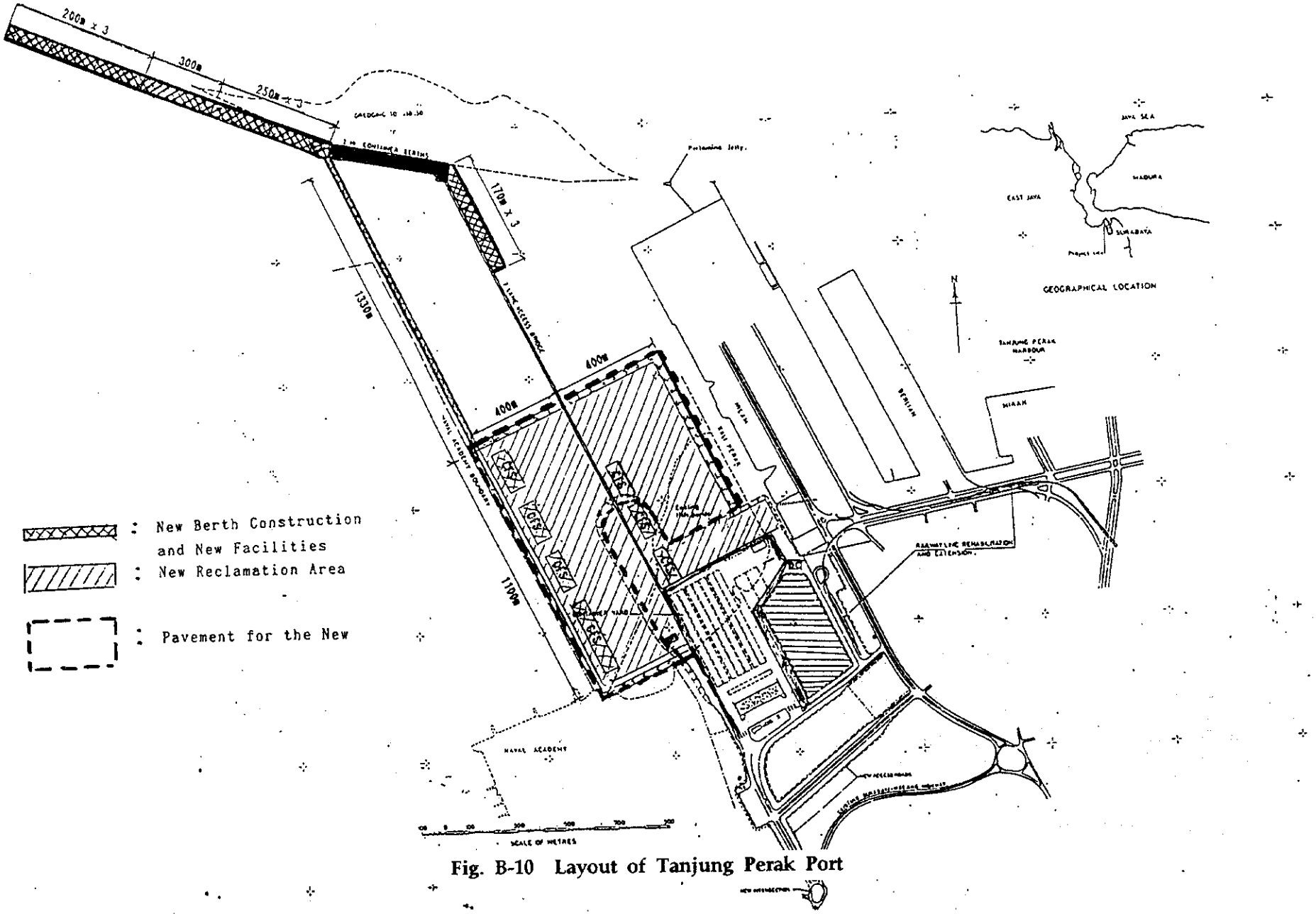


Fig. B-10 Layout of Tanjung Perak Port

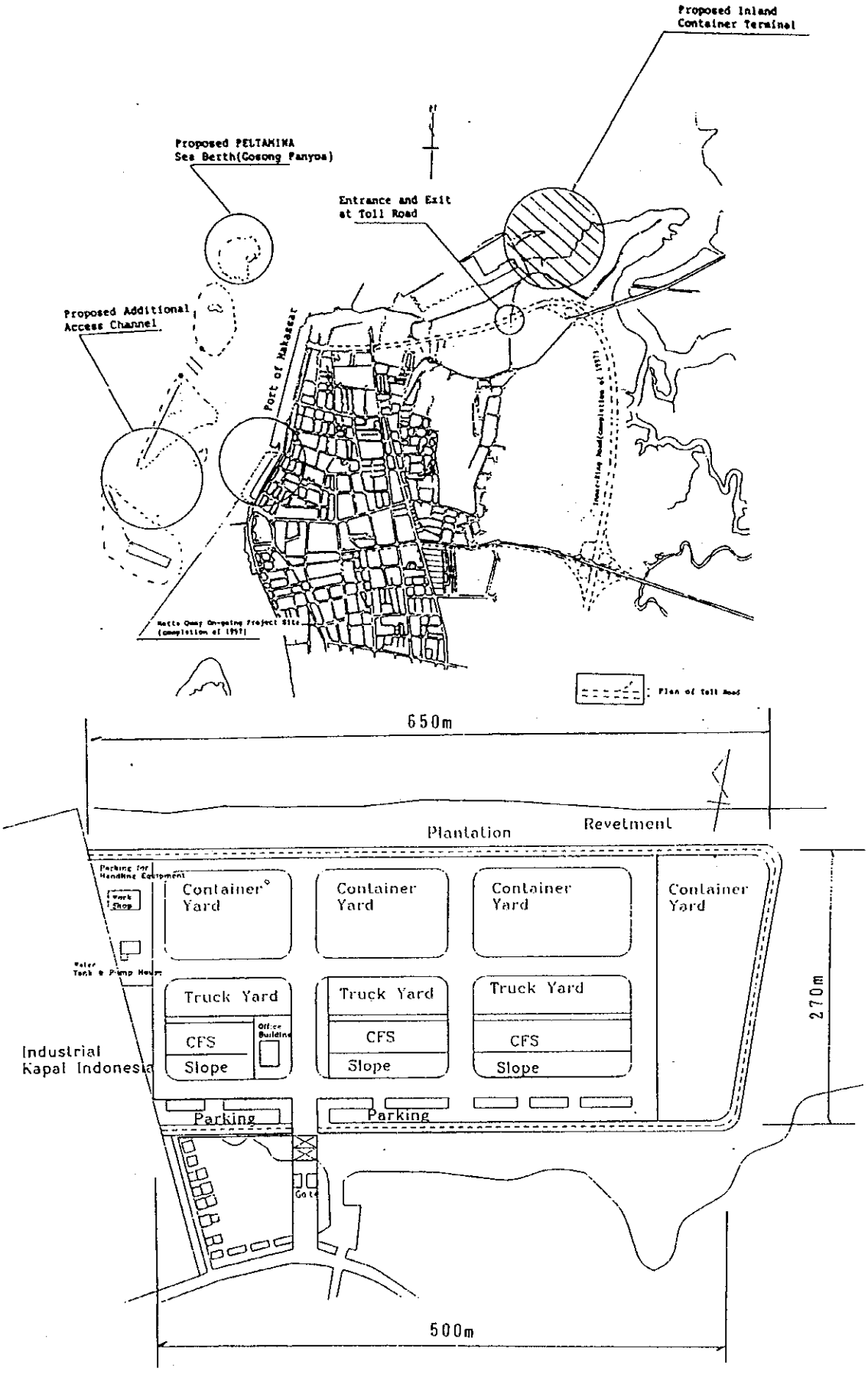
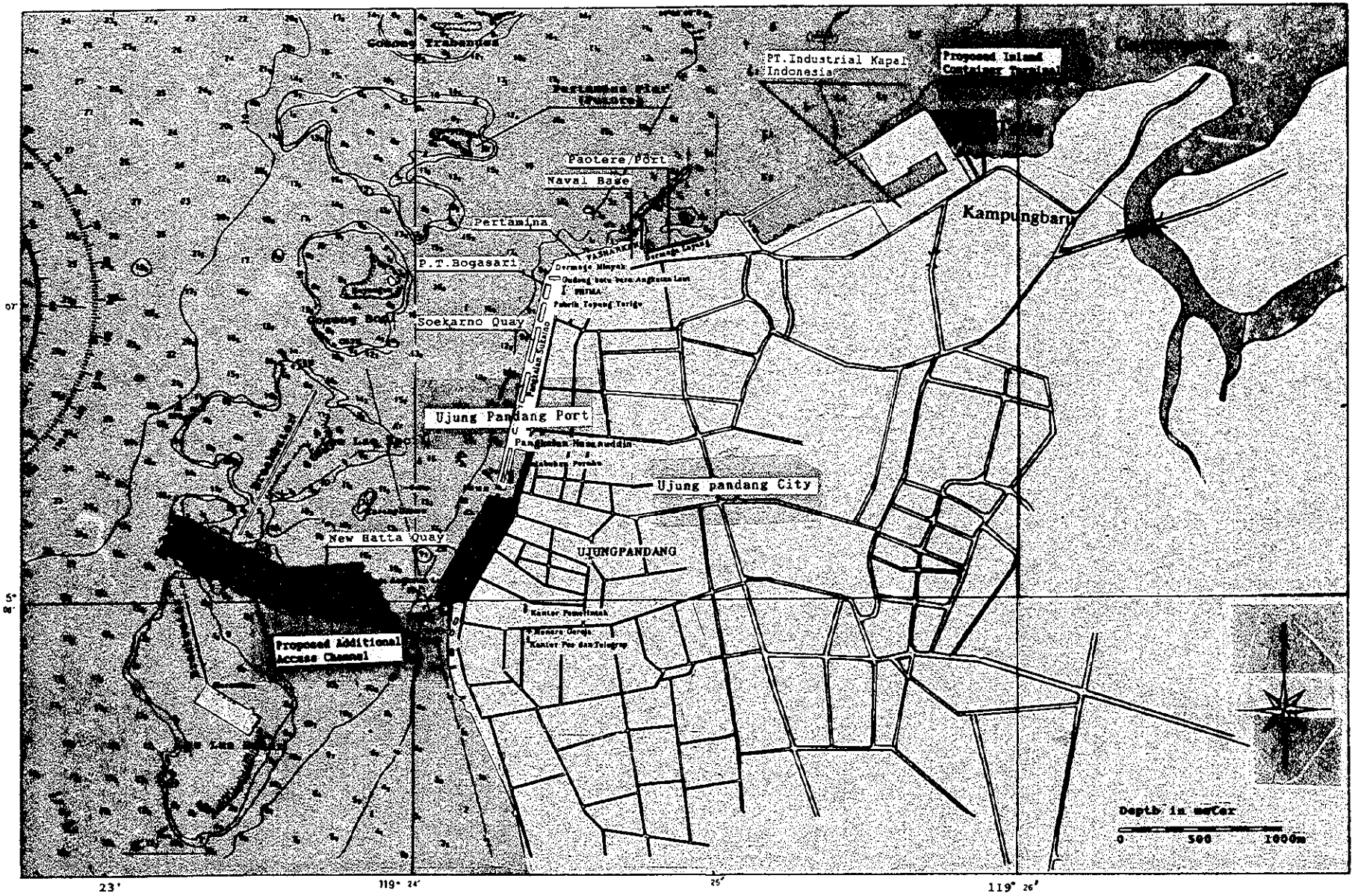


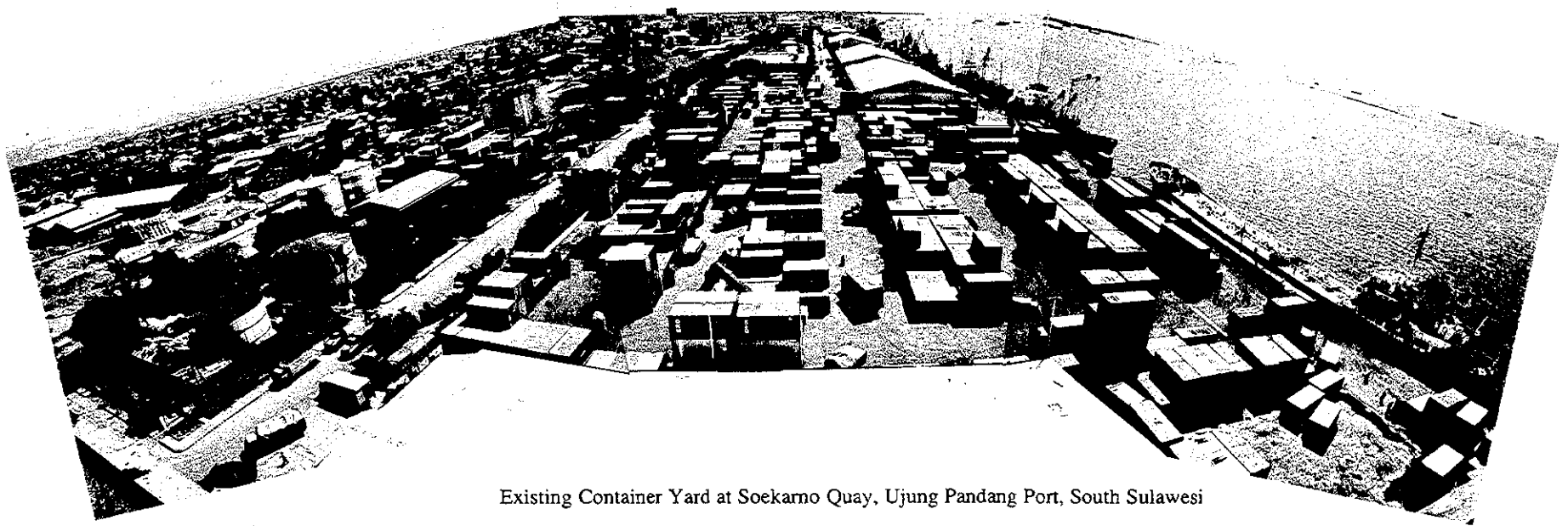
Fig. B-11 Layout of Inland Container Terminal for Ujung Pandang Port

Part 2

Feasibility Study of Container Cargo Handling Facilities of Ujung Pandang Port

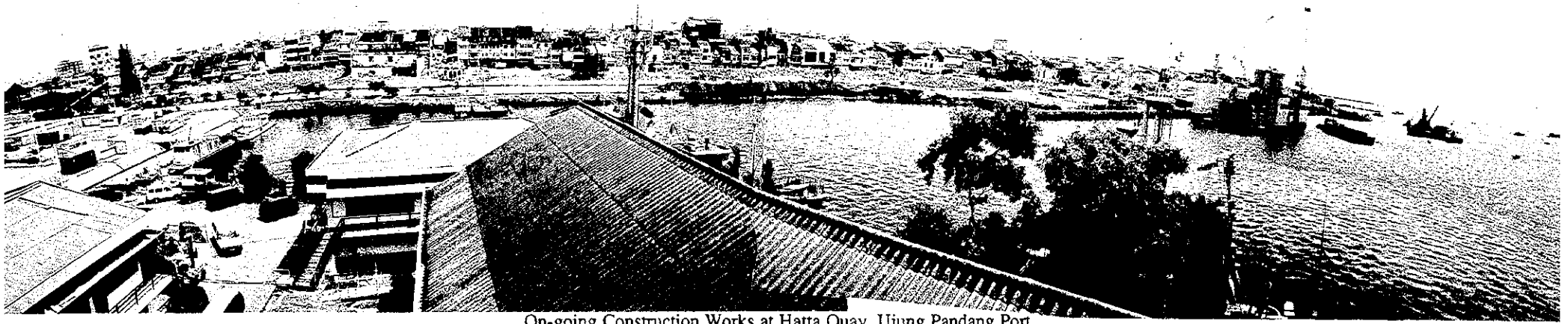


Map of Ujung Pandang



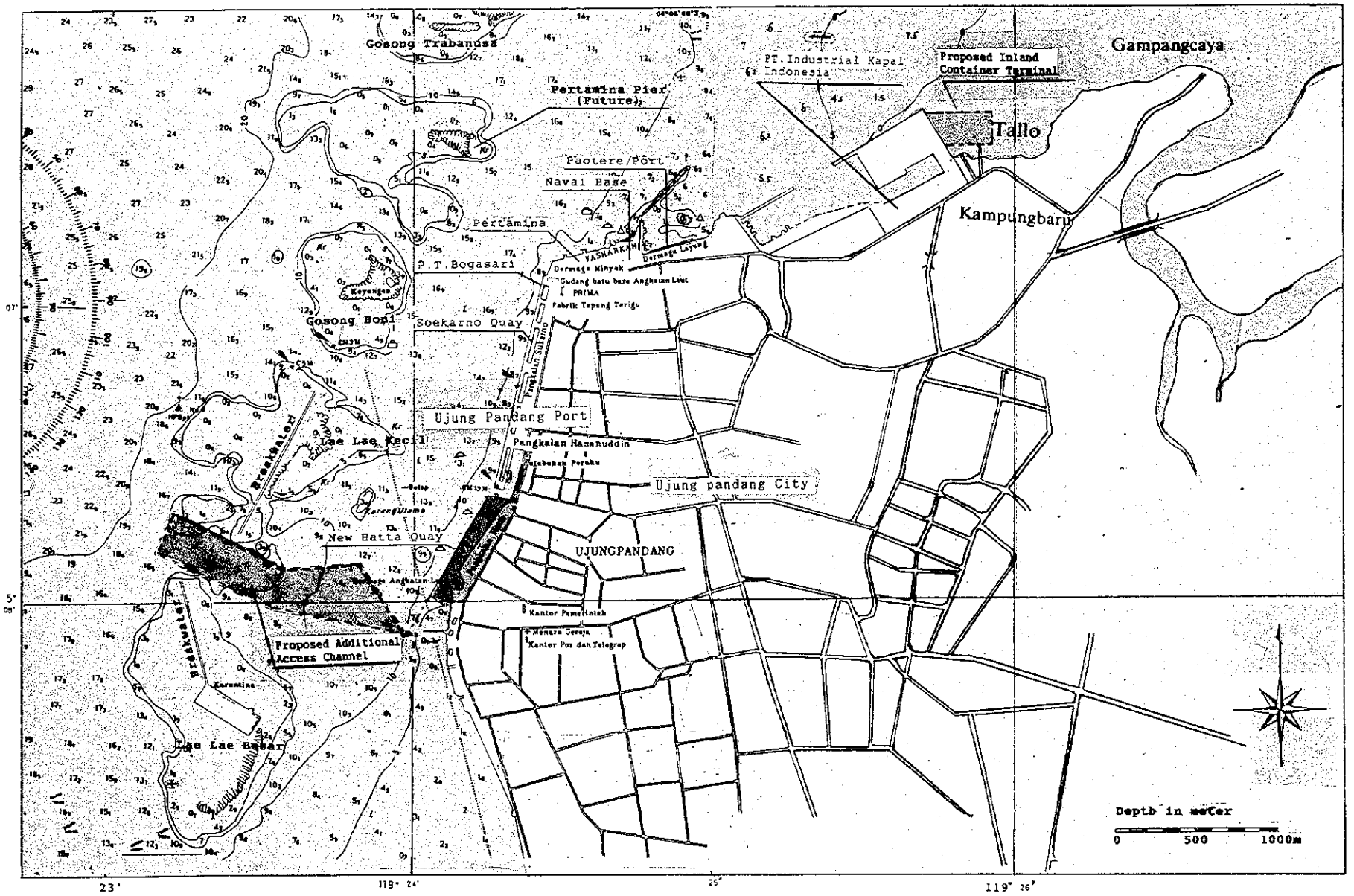
Existing Container Yard at Soekarno Quay, Ujung Pandang Port, South Sulawesi

Photo. taken: Dec., 1994

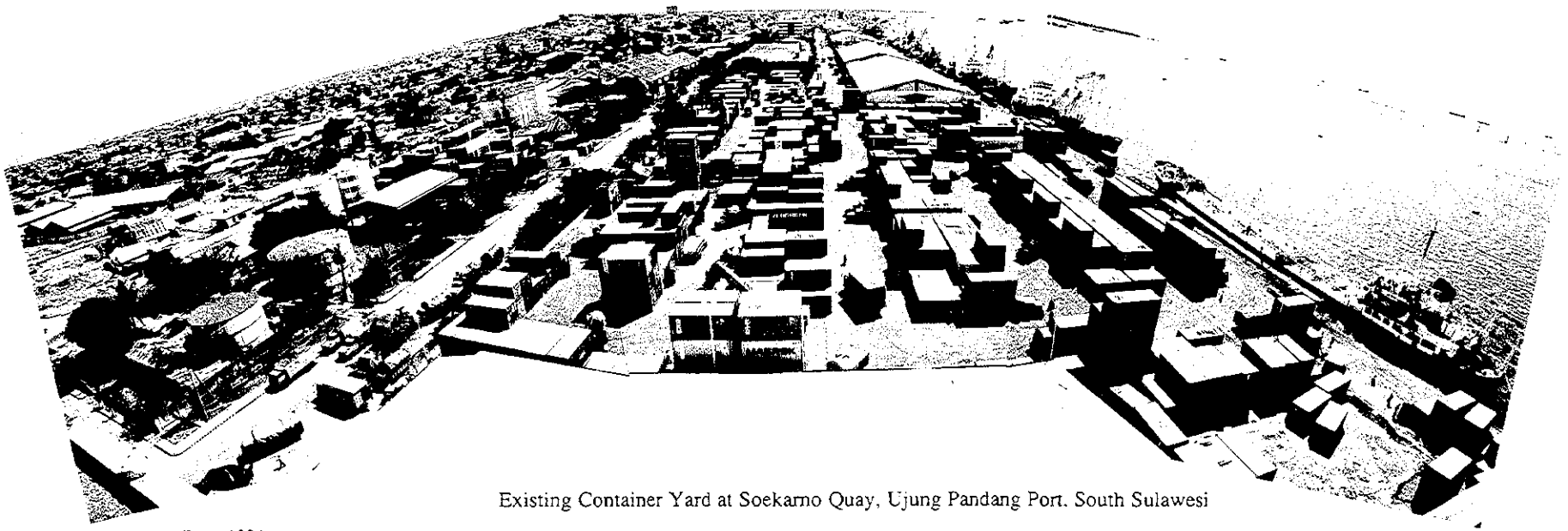


On-going Construction Works at Hatta Quay, Ujung Pandang Port

Photo. taken: Dec., 1994

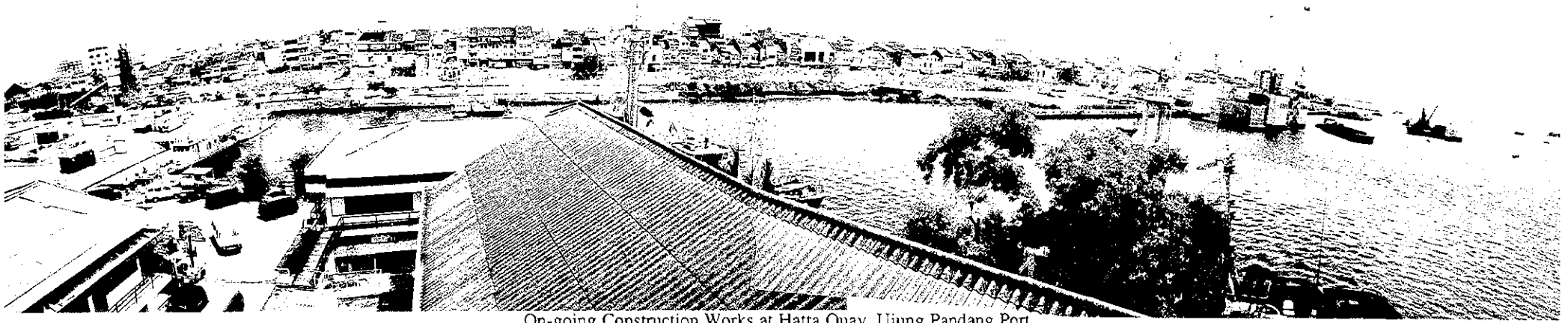


Map of Ujung Pandang



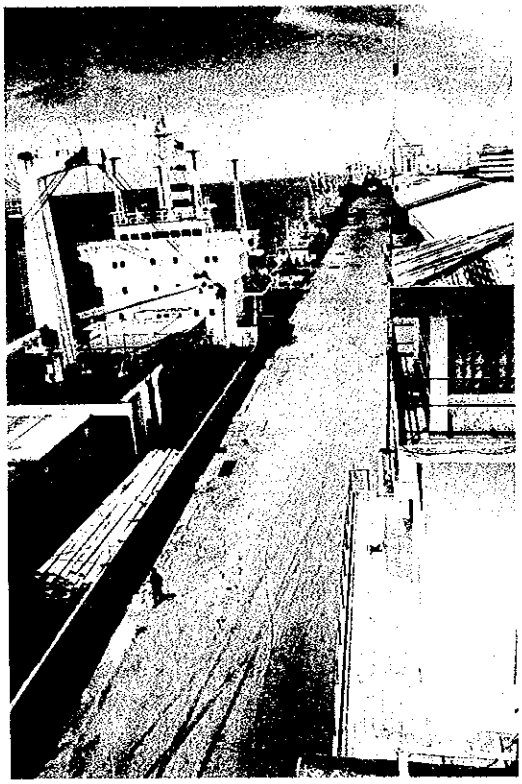
Existing Container Yard at Soekarno Quay, Ujung Pandang Port, South Sulawesi

Photo. taken: Dec., 1994



On-going Construction Works at Hatta Quay, Ujung Pandang Port

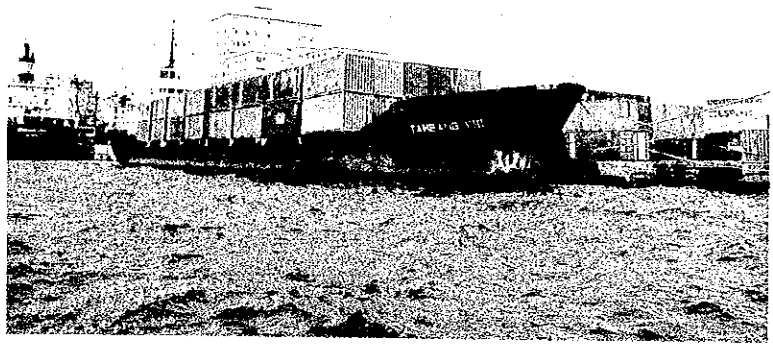
Photo. taken: Dec., 1994



Sockarno Quay of
Ujung Pandang Port,
South Sulawesi

Devanning at Sockarno Quay,
Uj. Pandang Port

Container Ship
along Sockarno Quay,
Uj. Pandang Port



Note: Photos. 29 to 32
were taken in Dec., 1994

Proposed Inland Container
Terminal Site, Kel. Tallo,
Ujung Pandang City

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Part 2: Feasibility Study of Container Cargo Handling Facilities of Ujung Pandang Port

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Part 2

1. INTRODUCTION

1. As the conclusion of the Master Plan of the current study, Uj. Pandang Port is identified the port which needs further expansion after the completion of on-going project of New Hatta Quay in 1997, which is being undertaken under the project title "Urgent Rehabilitation Project of Makassar Port". Thus, of the three ports, Ujung Pandang Port was chosen to be the first priority project site of which short-term development plan should be conducted in the current study together with Gedebage Dry Port and Connecting Railways.

2. The study was conducted dividing two stages: the Master Plan Study and the Feasibility Study.

(1) Master Plan

Target year : 2010

Objectives : i)Zoning of the port areas of the facilities for container cargo, general cargo, dry bulk and passengers
ii)Layout plan, implementation plan, basic design and cost estimate of the container cargo handling facilities, necessary for the target year, and
iii)Proposal of the future development plan beyond 2010

(2) Feasibility Study

Target year : 2003

Objectives : Container cargo handling facilities including layout plan of the wharf and inland terminal, handling equipment, operation system and management, and examination of new access channel

2. BACKGROUND

2.1 Socioeconomic Profile of South Sulawesi

3. South Sulawesi, one of four provinces in Sulawesi, is located in the south-west of Sulawesi Island, and had a population of 7.0 million in 1990. The GRDP per capita was Rp. 434,000, which was 102 % of the Sulawesi average and 66 % of the national average in 1991, and its annual growth rate from 1983 to 1991 was 5.7 % while the

Sulawesi average showed 5.3 % and the national average 5.1 % during the same period. Thus, South Sulawesi was on a average development level compared to other Sulawesi provinces but one of the economically stagnated areas in Indonesia. However the growth rate of per capita GDRP in Sulawesi was a little higher than that of all Indonesia during the period from 1983 to 1991.

4. Agriculture was the single most important sub-sector in South Sulawesi, and had a 41.0 % share of the provincial GRDP in 1993. Several sub-sectors in the tertiary sector also played important roles in the provincial economies. On the other hand, contribution of manufacturing industry sub-sector to the provincial economy was minimal, having only a 6.3 % share in 1988.

2.2 Potential for Development

5. This area has the largest population concentration in the Eastern Indonesia. Ujung Pandang port and Ujung Pandang city are located in this region. The area has comparatively well developed infrastructure including deep water port, air port, water supply, and human resources. Roads are also developed in the vicinity of Ujung Pandang but less developed inland, especially in the north.**(Fig. 22)**

6. The port of Ujung Pandang is located on the west coast of South Sulawesi along the coast of Makassar strait, an international sea lane. Thus, the location of Ujung Pandang is quite advantageous to serve Eastern Indonesia including Kalimantan. However the shipping route is not much different in distance and time of sailing to Surabaya from Eastern Indonesia, so that Surabaya partly plays a role of distribution center for Eastern Indonesia. Therefore, the role of Ujung Pandang is currently limited to serve for Central and South Sulawesi and a part of East Kalimantan.**(Fig.23)**

7. The temperature of this area ranges between 20(C°) and 35(C°) and the rainfall range 2.0 - 3.0 mm/month from July - August and 350 - 400 mm/month from December - January. The predominant wind blows from the south-west at an average speed of 1 - 5 knots all the year round except for the monsoon season.

8. The tidal level of Ujung Pandang Port were observed as 0.00 cm(L.W.S.), +87.87 cm(M.S.L.) and 175.74 cm(H.W.S.). According to the current survey conducted during this study at the entrance of the port, the maximum velocity was a moderate 0.8 knots

with main direction of north bound.

9. The construction of a six (6) km toll road between Ujung Pandang Airport(Hasanudin Airport) and the Uj. Pandang Port is on-going, and scheduled to be completed in 1997.

10. The municipal government completed an inland cargo terminal located near the toll road under construction and 6 km away from the Uj. Pandang Port in 1991. However the terminal is not functioning well because the container trailers are restricted to run on the ordinary highways.

11. Kawasan Industrial Makassar(KIMA), a state owned enterprise and established in 1988, started its operation with 203 ha and its expansion plan up to 703 ha has been conducted since 1992. In 1993, an Export Processing Zone, which is a bonded zone having 34 ha was established in KIMA.

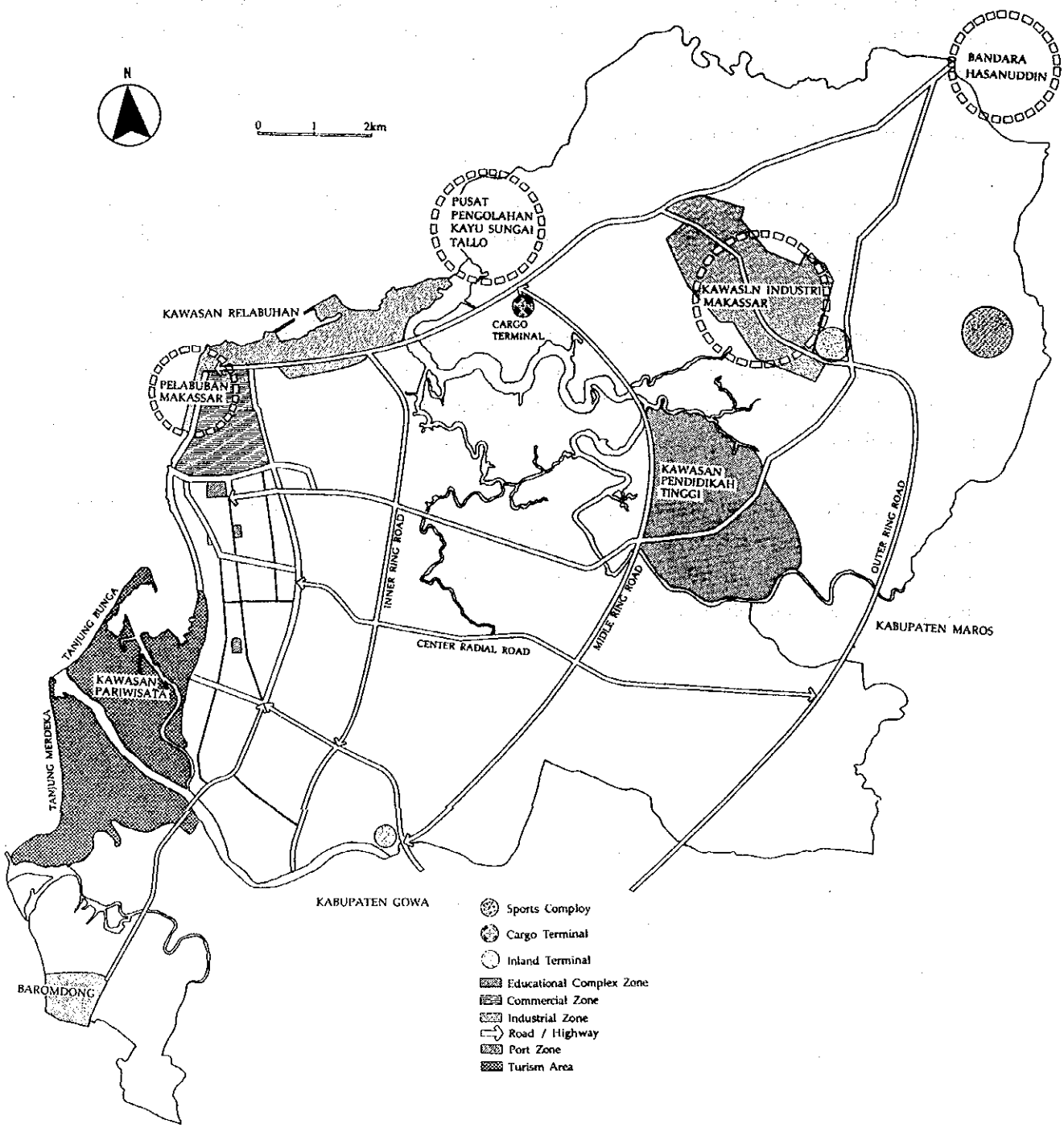


Fig. 22 Map of Uj.Pandang City

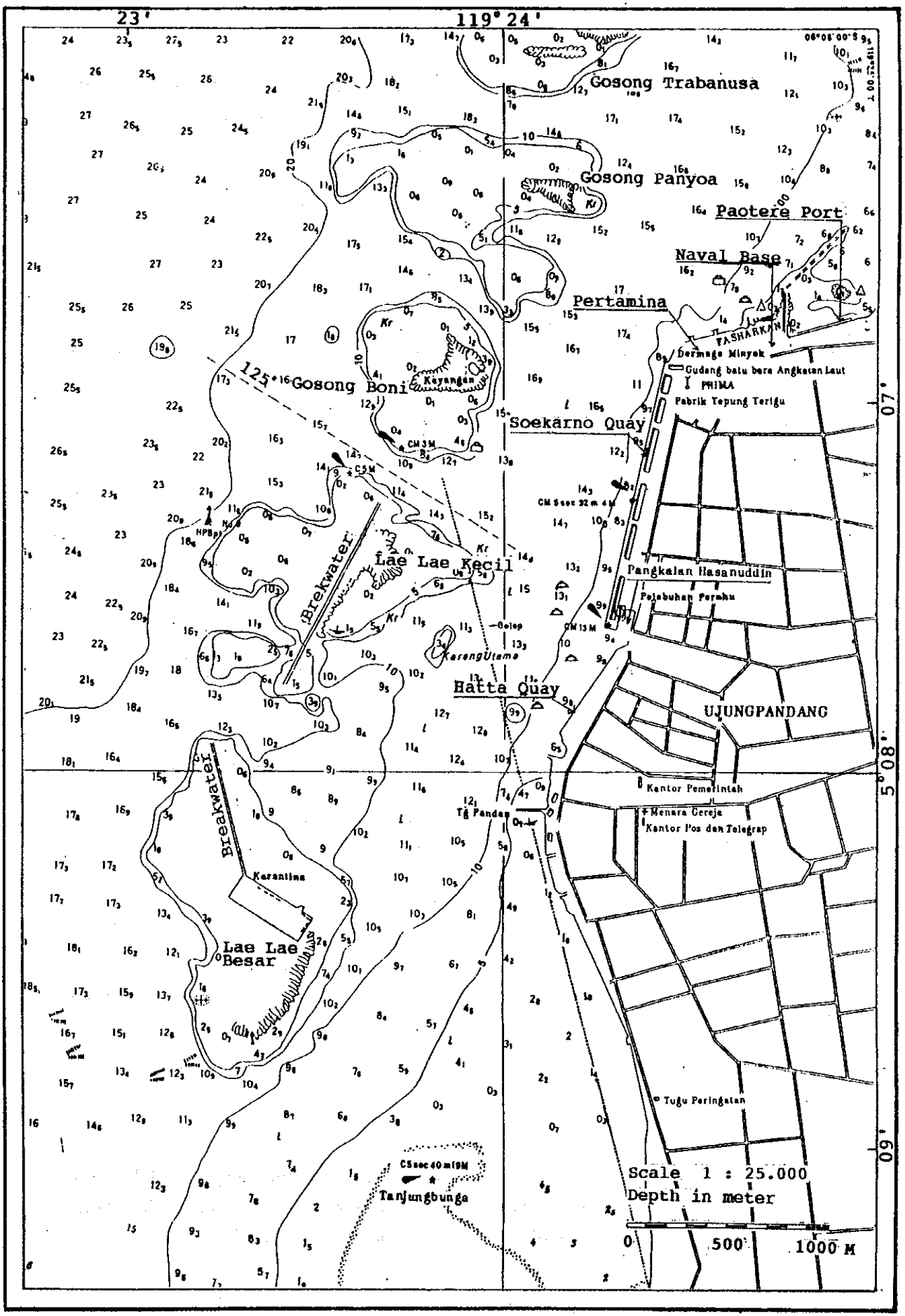


Fig. 23 Location Plan of Ujun Pandang Port

2.3 Port of Uj. Pandang

2.3.1 Port Organization

12. Public port facilities at Ujung Pandang Port are managed by the branch office which ranks in the highest level within managing areas of Port Corporation IV. PAO office under direct control of MOC supervises the navigation safety and ship allocation of berths as governmental coordinator.

2.3.2 Cargo Traffic

13. The Port accommodated 4.1 million tons of cargo and 0.8 millions passengers in 1993. Regarding the cargo movement, increase rate between 5 years was 118 % and average annual increase rate was 3.4 %. In 1993, 20 % of total cargo volume was imported or exported and the remaining 80 % was domestic cargo.

14. The export cargo volume has been gradually increasing since 1990 and reached 441,000 tons in 1993. The import cargo volume, however, has been leveling off at around 350,000 tons. Major export commodities are cocoa, animal food, plywood, molasses and tapioca, while major import commodities are wheat and fertilizer.**(Table 39)**

Table 39 International cargo traffic

	In 1988 1,000 tons	In 1993 1,000 tons	Increase Rate	Annual Increase Rate
Import	349	351	101%	0.1%
Export	286	441	155%	9.1%
Total	634	792	125%	4.5%

Source : PTPI IV

15. The domestic cargo increased to 2.3 millions tons of unloading and 1.0 millions tons of loading in 1993. Major unloading commodities were fuel, fertilizer, vehicle and logs, while major loading commodities fuel, rice and flour.**(Table 40)**

Table 40 Domestic cargo traffic

	In 1988 1,000 tons	In 1993 1,000 tons	Increase Rate	Annual Increase Rate
Unloading	1,811	2,250	120%	3.6%
Loading	931	1,036	111%	2.2%
Total	2,812	3,286	117%	3.2%

Source : PTPI IV

16. Container handling at the Port has been rapidly increasing since 1988 and reached 405,000 tons(47,325 TEU) in 1993. The container traffic increased to 23 times over the 1988 figure during the period from 1988 to 1993 and is expected to keep its high growth rate even in future.**(Table 41 and 42)**

Table 41 Cargo volume by cargo form

	In 1988 1,000 tons	In 1993 1,000 tons	Increase Rate	Annual Increase Rate
Container	18	405	2295%	187.1%
General	1,040	671	65%	-8.4%
Bagged	717	912	127%	4.9%
Liquid Bulk	1,117	1,335	119%	3.6%
Dry Bulk	476	581	122%	4.1%
Others	77	175	224%	17.5%
Total	3,446	4,078	118%	3.4%

Table 42 Growth of container volume by TEU

	In 1992 TEU	In 1993 TEU	Increase Rate	Annual Increase Rate
Unload (Full)	12,189	12,415	102%	1.9%
Empty	849	760	90%	-10.5%
Loading(Full)	7,208	10,297	143%	42.9%
Empty	4,639	13,128	283%	183.0%
Total	24,885	47,352	190%	90.3%

*Remarks: (Full) includes L.C.L containers

2.3.3 Port Facilities

17. The major existing port facilities along the coast line are, from north to south:

1. Ship repair yard
2. Paotere Port(for traditional sailing boats)
3. Naval base
4. Pertamina oil base
5. Port of Ujung Pandang
   - i) Seokarno Quay
   - ii) Hasanuddin Basin
   - iii) Hatta Quay

18. Income/outgoing ships uses only a channel between Gosong Boni and Laelae Kecil.**(Fig. 24)**

19. Berthing facilities at the port of Ujung Pandang are summarized below:

Name of Quay	Length	Water Depth Nominal	Water Depth Actual	Usage
	m	m	m	
Seokarno Quay	1,360	6 to 8	8.1 to 8.9	Ocean Vessel Inter insular Passenger Boat
Hatta Quay	550	6 to 8	7.9 to 9.1	Inter insular
Hasanuddin Basin	70	3 to 6	2.0 to 7.0	Pilot Boat
Paotere Port	820	3 to 6		

2.3.4 On-going Project

20. In order to meet the future demand of the year 1997, the rehabilitation of the Old Hatta Quay was decided and implementation was started in 1994 as "Ujung Pandang Port Urgent Rehabilitation Project" under the assistance of OECF Loan. The major scope of the project is listed below:

a)Demolition of the existing Hatta Quay and other related facilities,
b)Construction of 670 m long new Hatta Quay including a passenger terminal,
c)Dredging of 1.4 million m3 and reclamation of 1.85 million m3,
d)Building covering transit shed, container freight station(CFS), administration building and others,
e)Road/Pavement of about 125,000 m2.

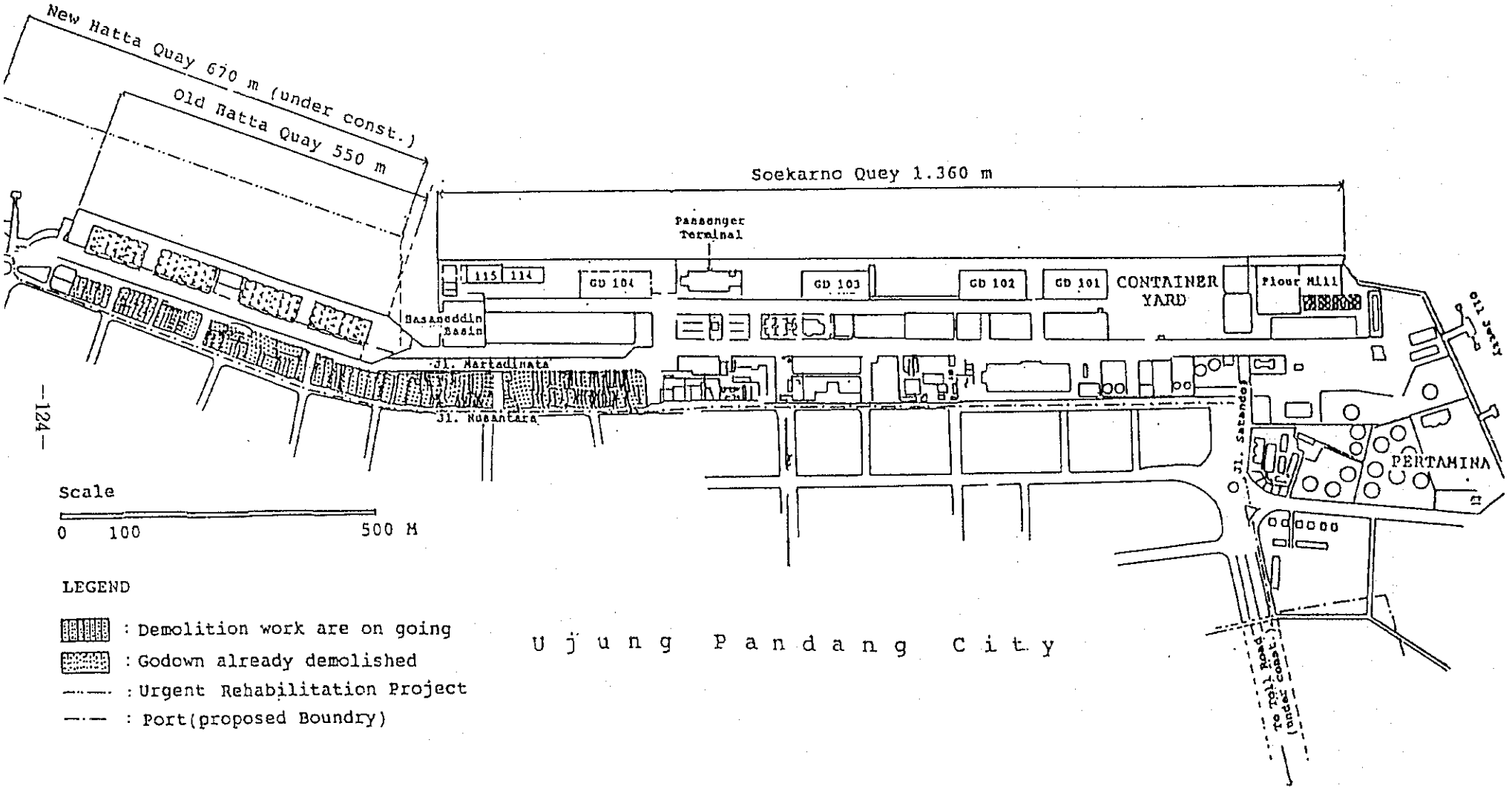


Fig. 24 General layout of Ujun Pandang Port

3. MASTER PLAN OF UJUNG PANDANG PORT

3.1 Traffic Projection

21. The total cargo throughput at the year 2010 is estimated at 10.9 million ton(2.7 times over the 1993 figure) including 3.1 million tons of container cargo(7.7 times over the 1993 figure). While the traffic volumes of bagged cargoes, dry bulk and liquid bulk cargoes increase about 2.3 to 2.6 times, that of general cargoes decrease to a level of 82 % of the 1993 volume as a result of the cargo shift from general cargo to container cargo.

22. The container cargo throughput at the year 2003 is estimated at 239,000 TEU (5.6 times over the 1993 figure), among which international container cargo amounts to 72,000 TEU and domestic container cargo 167,000 TEU.**(Table 43)**

Table 43 Estimation of Total Cargo Volume at Ujung Pandang Port

(Unit : 1,000 tons)

	1993	1998	2003	2010
Bagged Cargo	930	1,101	1,429	2,289
With Cement		1,701	2,029	2,889
Dry Bulk Cargo	633	792	1,014	1,468
With Cement	1,233	1,392	1,614	2,068
Liquid Bulk	1,296	1,678	2,222	3,318
General Cargo	815	532	438	667
Container Cargo	405	1,049	1,849	3,126
Total Cargo	4,078	5,152	6,953	10,866
With cement		6,352	8,153	12,066
Container (TEU)	47,352	165,000	239,000	364,000

Source : Estimated by The Study Team

3.2 Master Plan

3.2.1 Zoning of Port Area

23. Based on the cargo traffic estimation and cargo handling capacity of the existing facilities, zoning of the utilization of port area is examined for the target year of 2010. Soekarno quay will be mainly used for general cargo terminals and the north of the quay will be used for dry bulk and liquid bulk terminals. Hatta quay, now under construction, will be exclusively used as container and passenger terminals. The south of the Hatta quay should be preserved as it is as an urban leisure water-front of Uj. Pandang City.**(Fig. 25)**

3.2.2 Long-term Development Plan

24. Long-term development plan of container terminal for Uj. Pandang Port has been examined. The following development policies are set:

a)Uj. Pandang Port will be developed as one of the major container ports in Indonesia, designated in "The Development Strategy for National Container Port Network of Indonesia" proposed in the Master Plan of Container Handling Ports, Dry Ports and Connecting Railways (Part 1).

b)The Port will achieve not only the role of gateway for South Sulawesi but also the distribution function of containers for East Indonesia including East Kalimantan.

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

25. 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.

26. First, in order to perform the efficient operation and usage of limited New Hatta Quay container yard, following modifications on the plan of the New Hatta Quay were recommended:**(Fig. 26)**

a. The yard behind the New Hatta Quay should be utilized only for container yard.
b. The CFS was transferred to Soekarno Quay and transit shed was canceled.

27. As the handling system for the container terminal, the Team selected the transfer crane system compared to four basic handling system, such as chassis system, forklift system, straddle carrier system and transfer crane system.

28. Concerning the inland container terminal, a comparison study on the proposed site of INCT was made on the view points of construction cost, operation body and etc. among following four alternative sites.**(Fig. 27)**

Location 1 Kel Tallo area
Location 2 Kawasan Industrial Makassar(KIMA)
Location 3 Area along existing toll-way
Location 4 Existing city cargo terminal

29. 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. They are summarized as follows:

1)Inland Container Terminal**(Fig. 28)**

-Project site	:	Kel Tallo
-Dimensions	:	Terminal area 15.5 ha
-Reclamation	:	375,000m^3
-Main facilities	:	
Container yard	;	66,000 m^2
CFS	;	15,750 m^2
Work shop	;	600 m^2
Terminal office	;	400 m^2
Fence	;	3,080 m
-Road	:	Access road for inland terminal
		Connecting road to toll road

2)New Hatta Quay(Additional Facilities)

-Control building	;	600 m^2
-Power supply	;	L.S
-Fence	;	270 m
-Communication system	;	1 unit
-Reefer outlet	;	40 set

3)Additional Navigation Channel**(Fig. 29)**

-Dimensions	;	Width 200 m Depth -12 m
-Dredging	;	685,000 m^3
-Light beacon	;	2 sets
-Light buoy	;	2 sets

4)Equipment Procurement

-Rail mounted gantry crane(35ton)	;	3 units
-Rubber tired gantry crane(6+1)	;	14 units
-Fork-lift & side-lifter(7ton)	;	14 units
-Reach stacker(45ton)	;	6 units
-Tractor head	;	54 units
-Chassis	;	108 units
-Folk-lift(3.5ton)	;	12 units
-Computer(Terminal)	;	11 units
-Pakage soft-ware	;	1 units

5)Land Acquisition and Others

-Access road	;	4,960 m^2
-Connecting road	;	-
-Compensation	;	L.S.

3.2.3 Cost Estimates

30. 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 terminal amounts to 190,112 million Rp.**(Table 44)**

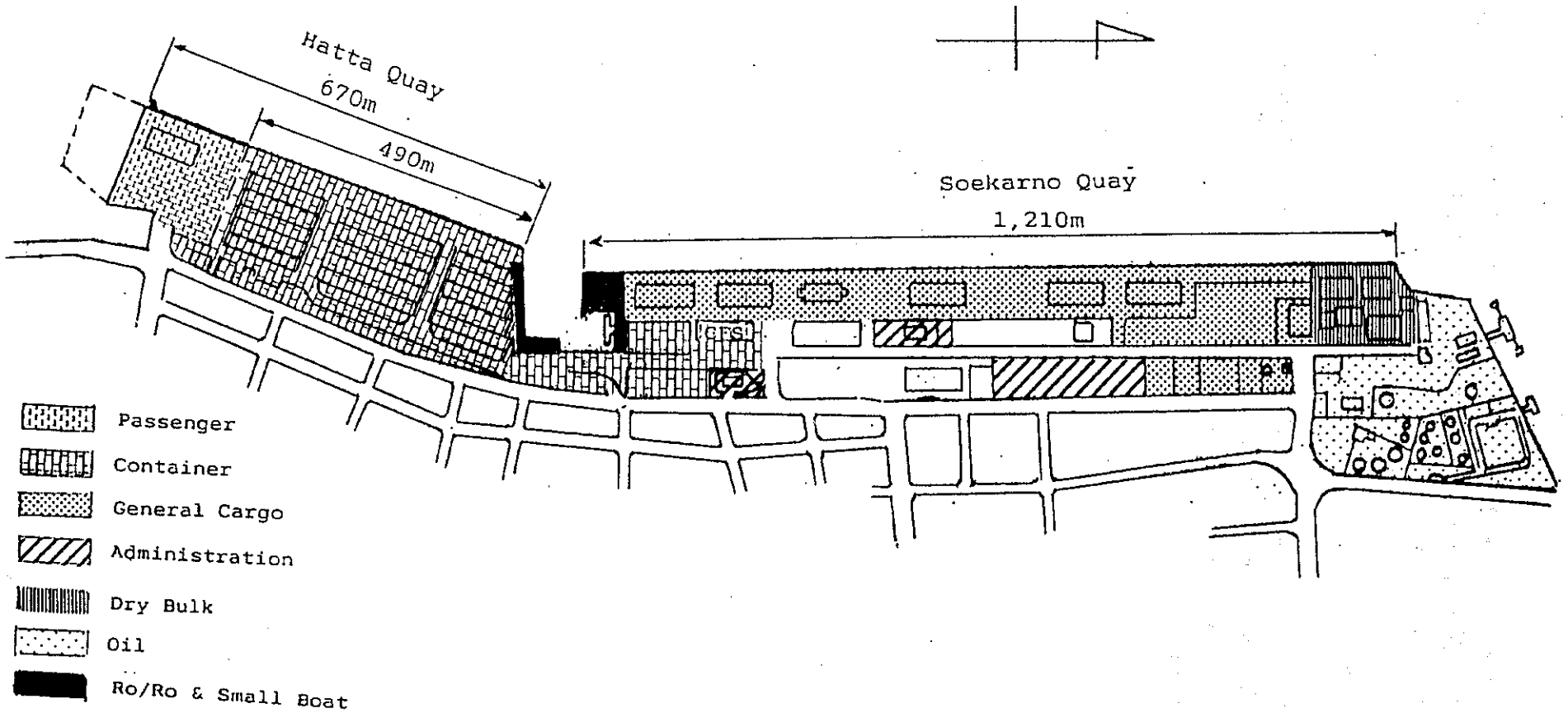


Fig. 25 Zoning Plan of Ujun Pandan Port (2010)

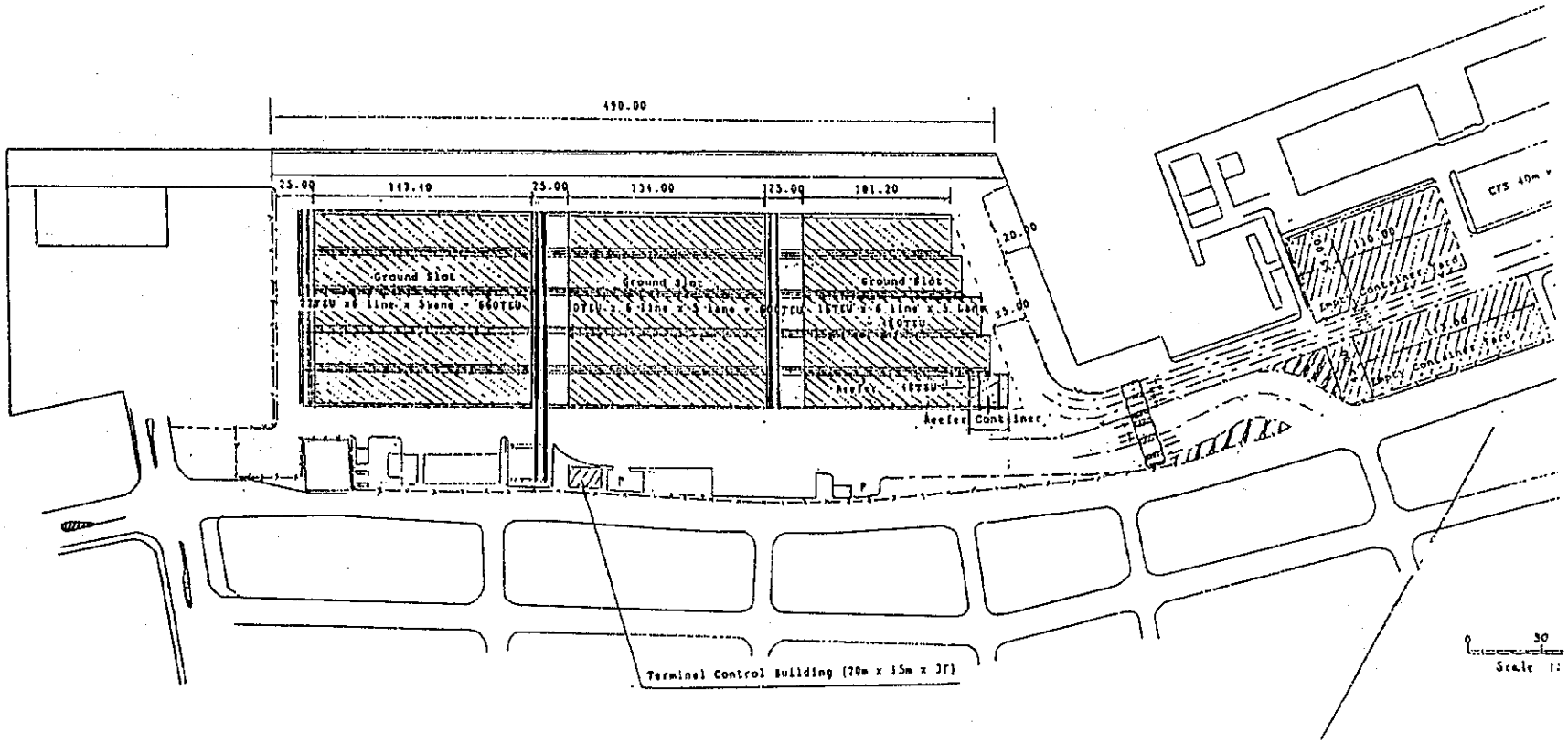


Fig. 26 General layout of Proposed Container Terminal

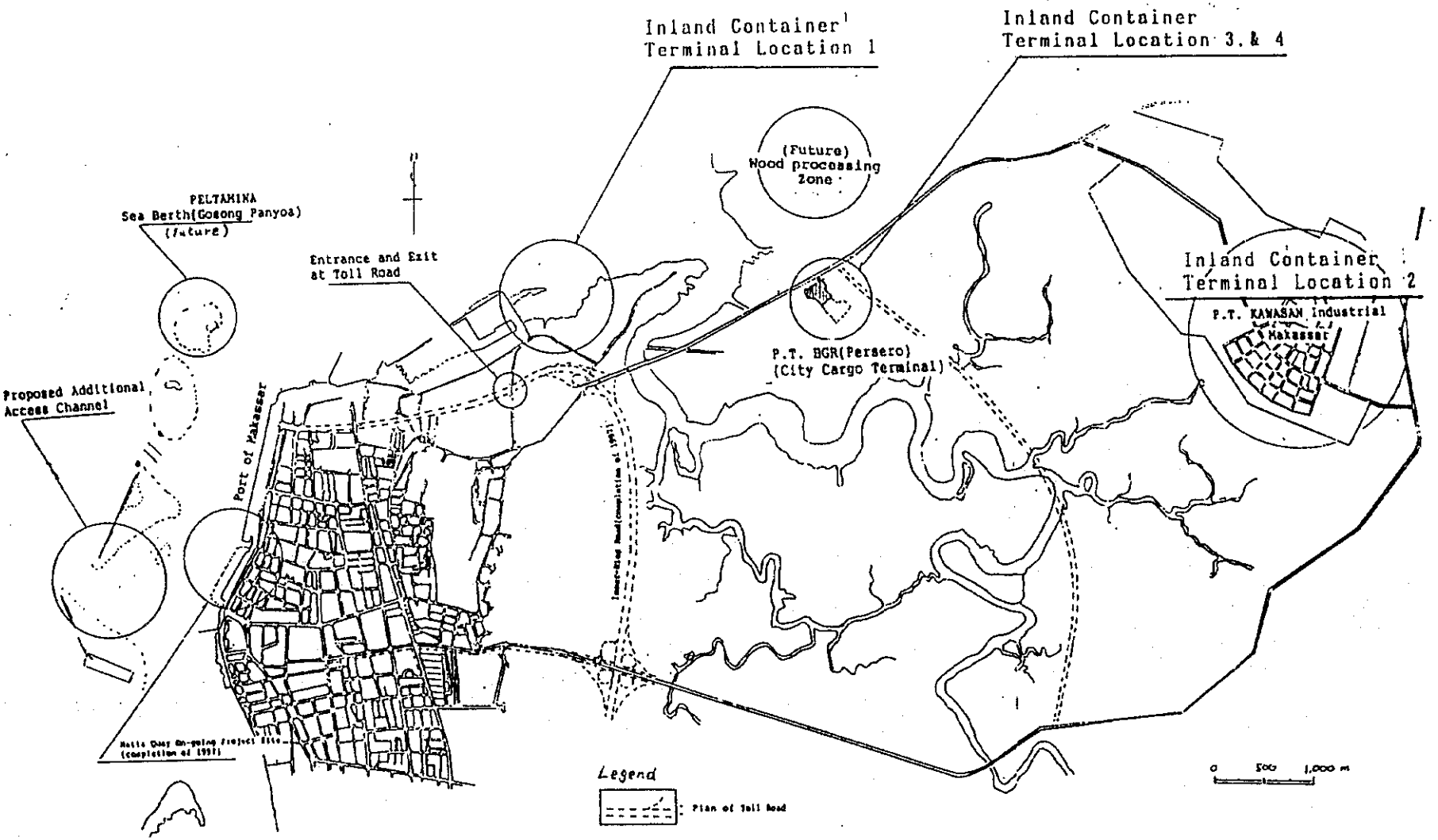


Fig. 27 Location Plan of Inland Container Terminal

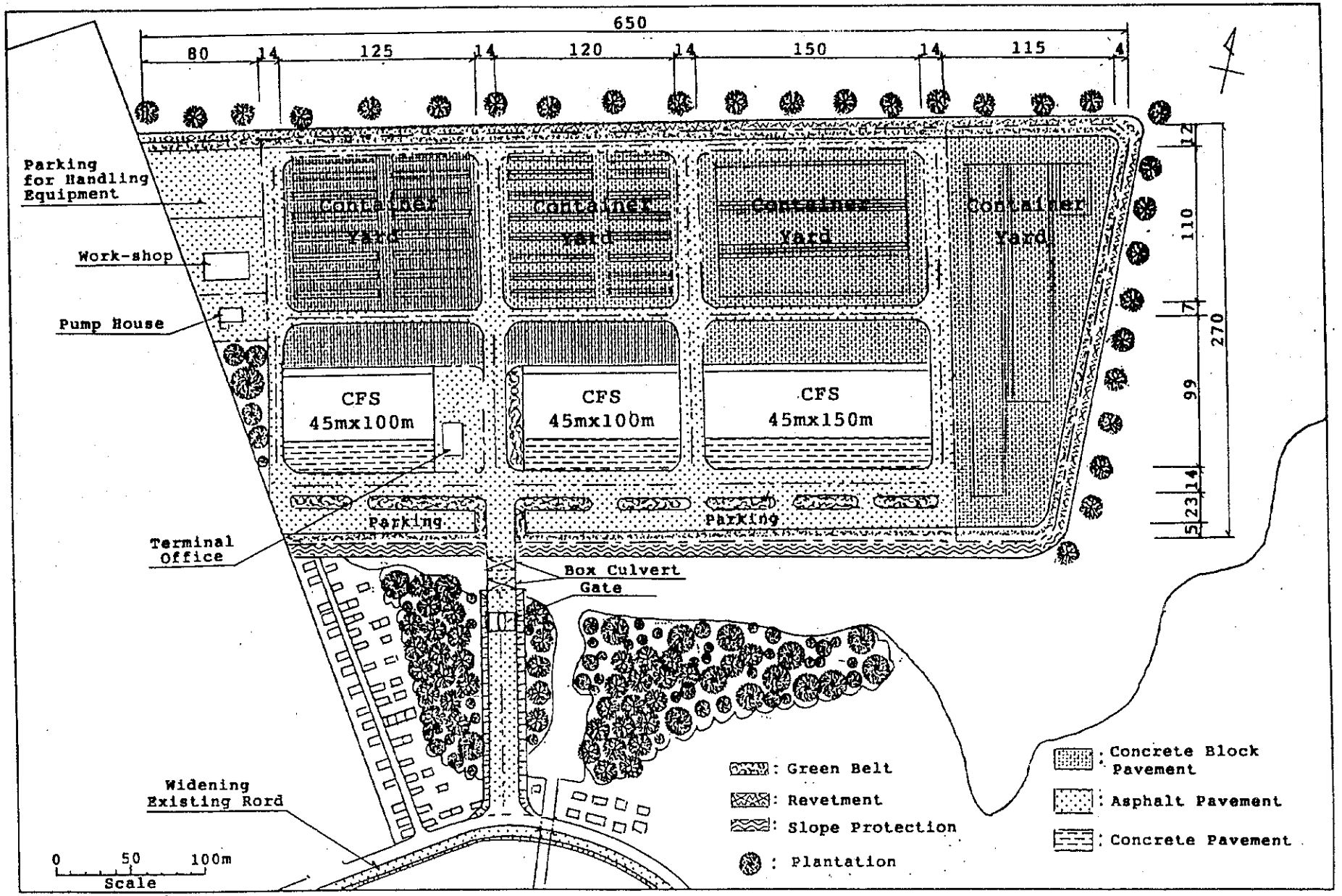
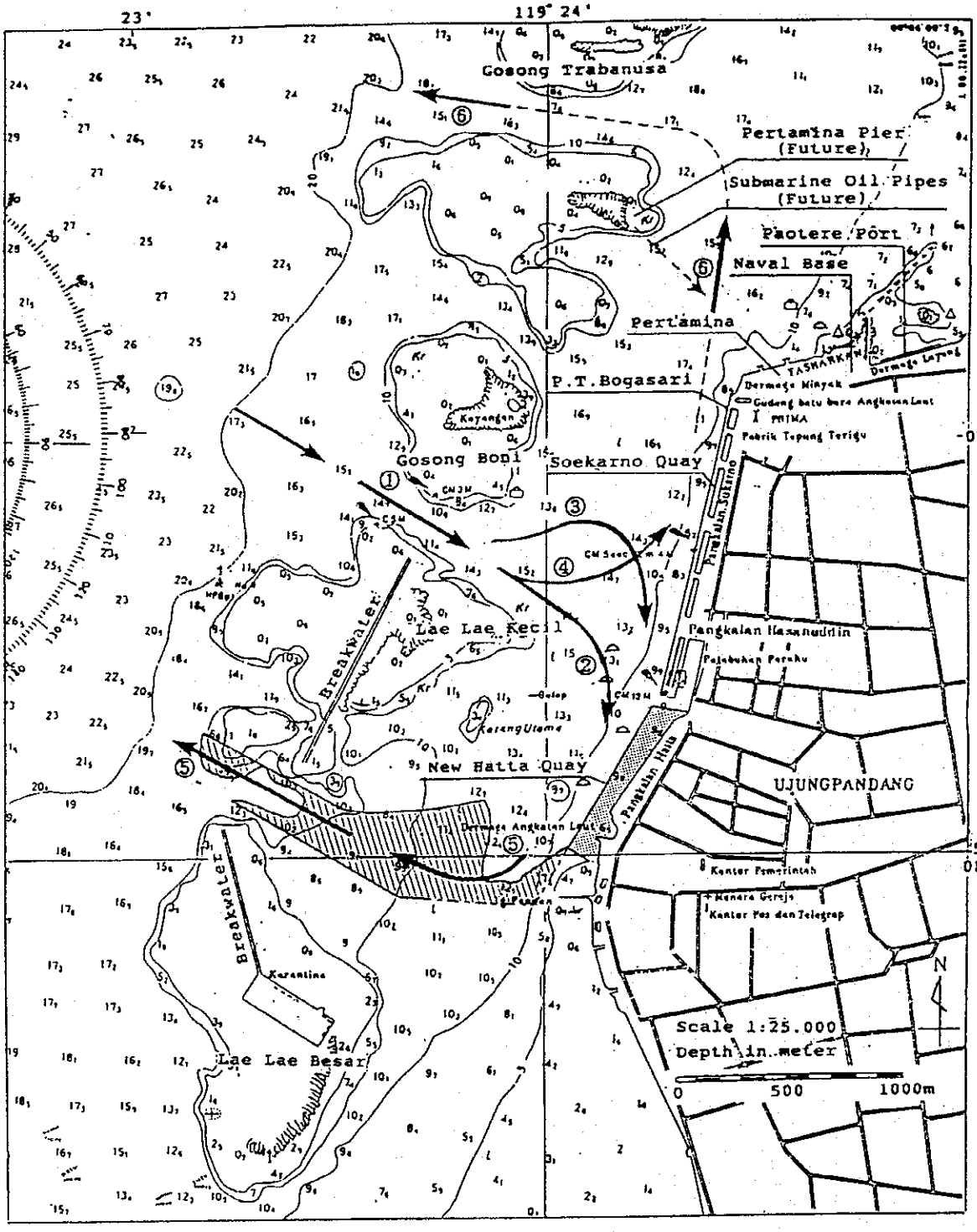


Fig. 28 General Layout of Inland Container Terminal (2010)



LEGEND

→ :Proposed Flow of Navigation

① Existing center channel by two ways navigation, proposed to be one way navigation as the entrance of Ujung Pandang Port

② South bound channel for container and passanger ships

③ To south bound channel for general cargo ships

④ To north bound channel for general cargo ships naval ships and bulk carriers

⑤ Proposed south channel (by Project)

⑥ Alternative north and north bound channel (by others)

▨ :Proposed channel dredging ▨ : New Hatta Quay (under construction)

Fig. 29 Navigation Channel of Ujun Pandang Port

Table 44 Cost Estimation of the Master Plan

	Project Cost for Ujung Pandang Port				
No	Description	Unit	Quantities	Unit Price	Cost
1	Inland Container Terminal (Yard Construction)				Million Rp
	Reclamation	m3	375,000	23,000	8,625
	Compaction	m3	375,000	3,000	1,125
	Concrete Block Pavement	m2	81,500	60,000	4,890
	Asphalt Concrete Pavement	m2	31,500	50,000	1,575
	Concrete Pavement	m2	7,000	60,000	420
	Revetment and Slope Protection	L.S	1		1,407
	Utilities	L.S	1		3,700
	Fence	m	3,080	170,000	524
	Green Belt and Plant Mangrove	L.S	1		300
	Sub-Total				22,566
2	Inland Container Terminal (Building Construction)				
	CFS Construction	m2	15,750	550,000	8,663
	Work shop Construction	m2	600	600,000	360
	Terminal Office Building	m2	400	600,000	240
	Terminal Gate	L.S	1	80,000,000	80
	Utilities	L.S	1		300
	Sub-Total				9,643
3	Access Road Construction for Inland Terminal				
	Terminal Access Reclamation	m3	7,600	26,000	198
	Asphalt Concrete Pavement	m2	2,100	50,000	105
	Walk way Pavement	m2	420	20,000	8
	Slope Protection	m2	2,000	8,000	16
	Box Culvert	set	2	50,000,000	100
	Utilities	L.S	1		40
	Sub-Total				467
4	Connecting Toll Road for Inland Terminal				
	Road Embankment	m3	14,600	26,000	380
	Road Pavement	m2	6,660	50,000	333
	Slope Protection	m2	5,300	8,000	42
	Utilities	L.S	1		250
	Boundary Fence	m	300	170,000	51
	Sub-Total				1,056
5	Additional Access Channel				
	Navigation Light Beacon	set	2	140,000,000	280
	Navigation Light Buoy	set	2	85,000,000	170
	Dredging Depth-11.0m and Disposal	m3	685,000	11,000	7,535
	Sub-Total				7,985
6	Hatta Quay Additional Facilities				
	Terminal Control Building	m2	600	600,000	360
	Additional Power Supply System	L.S	1		1,000
	Additional Fence	m	270	170,000	46
	Yard Control Communication System	L.S	1		200
	Reefer Container Outlet	set	40	750,000	30
	Sub-Total				1,636
	Total Cost				43,352
	Physical Contingency	%	10		4,335
	Engineering Fee	%	10		4,335
	VAT	%	10		5,202
	Total Construction Cost				57,224

No	Description	Unit	Quantities	Unit Price	Cost
1	Procurement				
	Rail Mounted Gantry Crane(35ton)	No	3	11,500,000,000	34,500
	Rubber Tired Gantry Crane(5+1)	No	14	3,800,000,000	53,200
	Fork-Lift and Side Lifter(7ton)	No	14	141,000,000	1,974
	Reach Stacker 45t	No	6	1,250,000,000	7,500
	Tractor Head	No	54	200,000,000	10,800
	Chassis	No	108	50,000,000	5,400
	Fork-Lift (3.5t)	No	12	90,000,000	1,080
	Generator(150KVA)	No	2	110,000,000	220
	Generator (800KVA)	No	2	400,000,000	800
	Computer (Terminal)	No	11	20,000,000	220
	Package Soft-ware	set	1	1,450,000,000	1,450
	Sub-Total				117,144
	Physical Contingency	%	0		0
	Engineering Fee	%	3		3,514
	VAT	%	10		12,066
	Procurement Cost Total				132,724
1	Land Acquisition and Others				
		m2	0	0	0
	Access Road Land Acquisition	m2	4,960	20,000	99
	Connecting Road Land Acquisition	m2	0	50,000	0
	Compensation Expense	L.S	1		50
	Other Expense		0	0	0
	Sub-Total				149
	VAT	%	10		15
	Land Acquisition Total				164
	Total Project Cost				190,112

4. SHORT-TERM DEVELOPMENT PLAN

4.1 Objectives

31. The Short-term Development Plan examines facilities and equipment provided for both Hatta quay and the inland container terminal as well as their management and operation for the target year of 2003.

4.2 Project Scope

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

	Short-Term Development Plan
1.New Hatta Quay	-Power supply -Terminal control building -Yard fence -Information and control system
2.Inland Container Terminal(**Fig. 30**)	-Yard reclamation : 8.5 ha -CFS sheds : 9,000 m^2 -Open yard storage : 2.7 ha -Office building : 1 bld. -Work shop : 1 bld. -Utilities : 1 set
3.Access Entrance	-Road embankment and pavement -Gate -Bridge(Box culvert) -Utilities
4.Connecting Toll Road	-Road embankment and pavement -Fence and utilities

5.Access Channel	-Navigation aids	
	-Dredging and disposal	
6.Equipment and Information System	-Quay gantry crane	: 3 units
	-Rubber t'd gantry crane	: 9 units
	-Forklift(7 ton)	: 7 units
	-Ditto(3.5 ton)	: 9 units
	-Reachstacker(45ton)	: 2 units
	-Tractor head	:27 units
	-Chassis	:54 units
	-Generator(150KVA)	: 1 units
	-Ditto(400KVA)	: 2 units
	-Computer & software	:10 units

4.3 Cost Estimates

33. 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.**(Table 45)**

4.4 Project Implementation

34. Preparations for project implementation, such as basic/detail design will continue until 1997. Following this period, construction works and installation of the container handling equipment will begin as required till 2003.**(Fig. 31)**

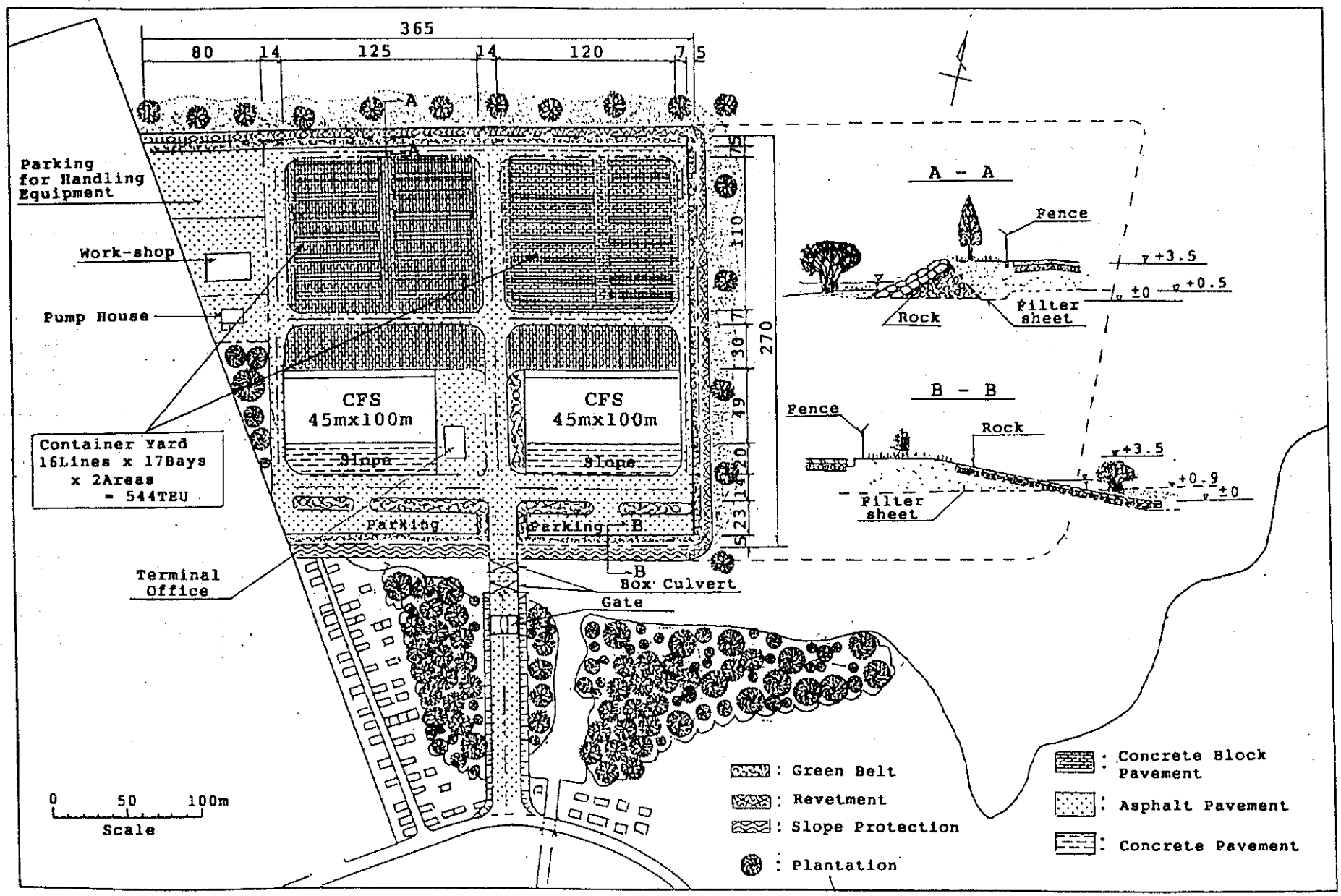
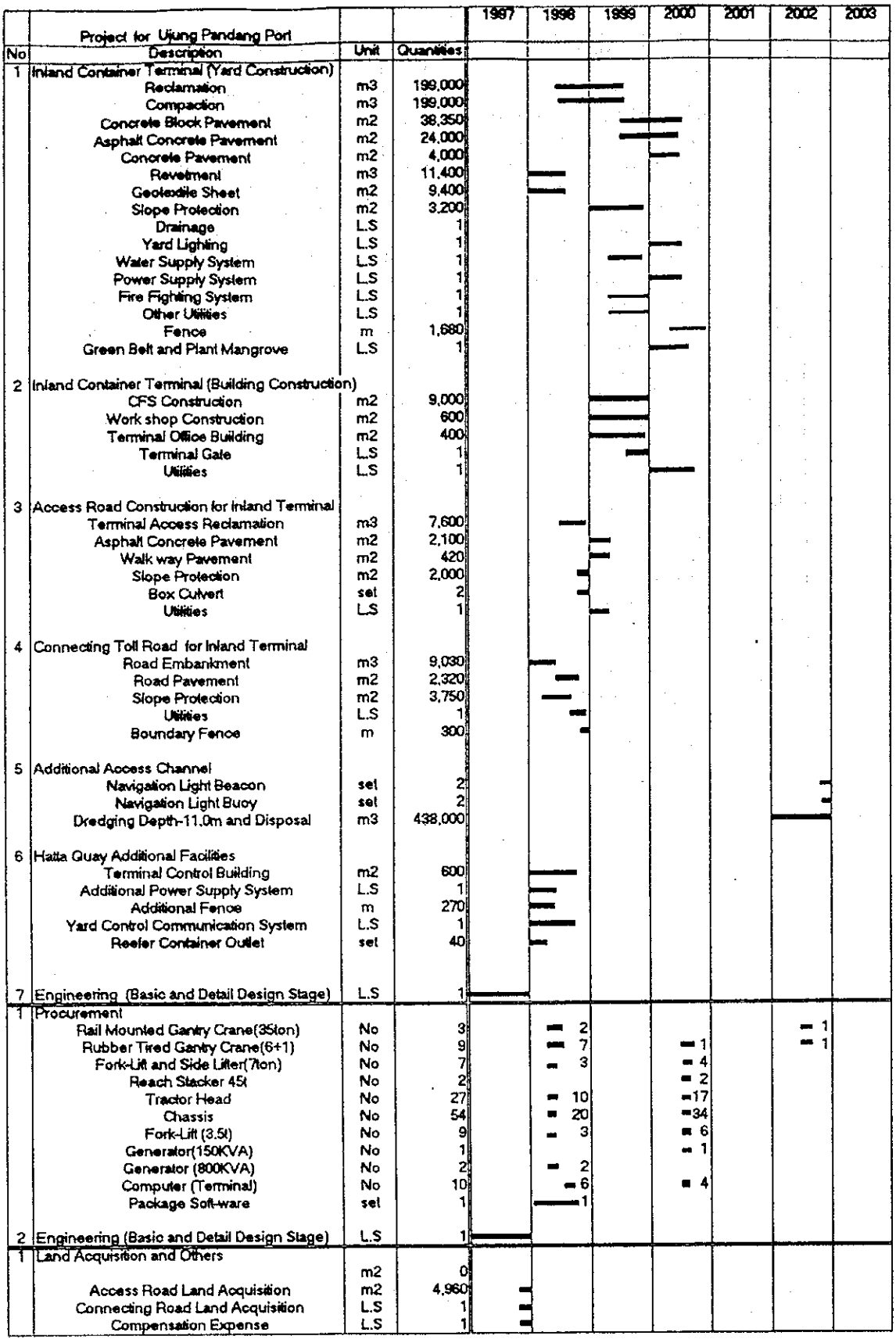


Fig. 30 Layout Plan of Inland Container Terminal (2003)

Table 45 Cost Estimation for The Short-Term Plan

No	Project Cost for Ujung Pandang Port Description	Unit	Quantities	Unit Price	Cost
					Million Rp
1	Inland Container Terminal (Yard Construction)				
	Reclamation	m3	199,000	23,000	4,577
	Compaction	m3	199,000	3,000	597
	Concrete Block Pavement	m2	38,350	60,000	2,301
	Asphalt Concrete Pavement	m2	24,000	50,000	1,200
	Concrete Pavement	m2	4,000	60,000	240
	Revetment	m3	11,400	45,000	513
	Geotextile Sheet	m2	9,400	6,000	56
	Slope Protection	m2	3,200	53,000	170
	Drainage	L.S	1		430
	Yard Lighting	L.S	1		850
	Water Supply System	L.S	1		50
	Power Supply System	L.S	1		300
	Fire Fighting System	L.S	1		200
	Other Utilities	L.S	1		140
	Fence	m	1,680	170,000	286
	Green Belt and Plant Mangrove	L.S	1		150
	Sub-Total				12,060
2	Inland Container Terminal (Building Construction)				
	CFS Construction	m2	9,000	550,000	4,950
	Work shop Construction	m2	600	600,000	360
	Terminal Office Building	m2	400	600,000	240
	Terminal Gate	L.S	1	80,000,000	80
	Utilities	L.S	1		250
	Sub-Total				5,880
3	Access Road Construction for Inland Terminal				
	Terminal Access Reclamation	m3	7,600	26,000	198
	Asphalt Concrete Pavement	m2	2,100	50,000	105
	Walk way Pavement	m2	420	20,000	8
	Slope Protection	m2	2,000	8,000	16
	Box Culvert	set	2	50,000,000	100
	Utilities	L.S	1		40
	Sub-Total				467
4	Connecting Toll Road for Inland Terminal				
	Road Embankment	m3	9,030	26,000	235
	Road Pavement	m2	2,320	50,000	116
	Slope Protection	m2	3,750	8,000	30
	Utilities	L.S	1		150
	Boundary Fence	m	300	170,000	51
	Sub-Total				582
5	Additional Access Channel				
	Navigation Light Beacon	set	2	140,000,000	280
	Navigation Light Buoy	set	2	85,000,000	170
	Dredging Depth-11.0m and Disposal	m3	438,000	11,000	4,818
	Sub-Total				5,268
6	Hatta Quay Additional Facilities				
	Terminal Control Building	m2	600	600,000	360
	Additional Power Supply System	L.S	1		1,000
	Additional Fence	m	270	170,000	46
	Yard Control Communication System	L.S	1		200
	Reefer Container Outlet	set	40	750,000	30
	Sub-Total				1,636
	Total Cost				25,892
	Physical Contingency	%	10		2,589
	Engineering Fee	%	10		2,589
	VAT	%	10		3,107
	Total Construction Cost				34,177

No	Description	Unit	Quantities	Unit Price	Cost
1	Procurement				
	Rail Mounted Gantry Crane(35ton)	No	3	11,500,000,000	34,500
	Rubber Tired Gantry Crane(6+1)	No	9	3,800,000,000	34,200
	Fork-Lift and Side Lifter(7ton)	No	7	141,000,000	987
	Reach Stacker 45t	No	2	1,250,000,000	2,500
	Tractor Head	No	27	200,000,000	5,400
	Chassis	No	54	50,000,000	2,700
	Fork-Lift (3.5t)	No	9	90,000,000	810
	Generator(150KVA)	No	1	110,000,000	110
	Generator (800KVA)	No	2	400,000,000	800
	Computer (Terminal)	No	10	20,000,000	200
	Package Soft-ware	set	1	1,450,000,000	1,450
	Sub-Total				83,657
	Physical Contingency	%	0		0
	Engineering Fee	%	3		2,510
	VAT	%	10		8,617
	Procurement Cost Total				94,783
1	Land Acquisition and Others				
		m2	0	0	0
	Access Road Land Acquisition	m2	4,960	20,000	99
	Connecting Road Land Acquisition	m2	0	50,000	0
	Compensation Expense	L.S	1		50
	Other Expense		0	0	0
	Sub-Total				149
	VAT	%	10		15
	Land Acquisition Total				164
	Total Project Cost				129,125



No	Description	Unit	Quantities
1	Inland Container Terminal (Yard Construction)		
	Reclamation	m3	199,000
	Compaction	m3	199,000
	Concrete Block Pavement	m2	38,350
	Asphalt Concrete Pavement	m2	24,000
	Concrete Pavement	m2	4,000
	Revetment	m3	11,400
	Geotextile Sheet	m2	9,400
	Slope Protection	m2	3,200
	Drainage	L.S	1
	Yard Lighting	L.S	1
	Water Supply System	L.S	1
	Power Supply System	L.S	1
	Fire Fighting System	L.S	1
	Other Utilities	L.S	1
	Fence	m	1,680
	Green Belt and Plant Mangrove	L.S	1
2	Inland Container Terminal (Building Construction)		
	CFS Construction	m2	9,000
	Work shop Construction	m2	600
	Terminal Office Building	m2	400
	Terminal Gate	L.S	1
	Utilities	L.S	1
3	Access Road Construction for Inland Terminal		
	Terminal Access Reclamation	m3	7,600
	Asphalt Concrete Pavement	m2	2,100
	Walk way Pavement	m2	420
	Slope Protection	m2	2,000
	Box Culvert	set	2
	Utilities	L.S	1
4	Connecting Toll Road for Inland Terminal		
	Road Embankment	m3	9,030
	Road Pavement	m2	2,320
	Slope Protection	m2	3,750
	Utilities	L.S	1
	Boundary Fence	m	300
5	Additional Access Channel		
	Navigation Light Beacon	set	2
	Navigation Light Buoy	set	2
	Dredging Depth-11.0m and Disposal	m3	438,000
6	Hatta Quay Additional Facilities		
	Terminal Control Building	m2	600
	Additional Power Supply System	L.S	1
	Additional Fence	m	270
	Yard Control Communication System	L.S	1
	Reefer Container Outlet	set	40
7	Engineering (Basic and Detail Design Stage)	L.S	1
1	Procurement		
	Rail Mounted Gantry Crane(35ton)	No	3
	Rubber Tired Gantry Crane(6+1)	No	9
	Fork-Lift and Side Lifter(7ton)	No	7
	Reach Stacker 45t	No	2
	Tractor Head	No	27
	Chassis	No	54
	Fork-Lift (3.5t)	No	9
	Generator(150KVA)	No	1
	Generator (800KVA)	No	2
	Computer (Terminal)	No	10
	Package Soft-ware	set	1
2	Engineering (Basic and Detail Design Stage)	L.S	1
1	Land Acquisition and Others		
		m2	0
	Access Road Land Acquisition	m2	4,960
	Connecting Road Land Acquisition	L.S	1
	Compensation Expense	L.S	1

Fig. 31 Project Implementation Schedule

4.5 Port Management and Operation

4.5.1 Port Management

(1) Appropriateness of the direct management system

35. Container terminals at other ports have been operated by the Port Corporations since before privatization. Port Corporation IV was born out of privatization. Container terminals represent a high-profit business that is expected to remain central to the corporation. In light of these factors, it seems most appropriate for Port Corporation IV to continue managing and operating the terminals directly for the time being.

(2) Adequate management and operation of port area

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

37. Considering the development of the new entrance channel and tanker docking facilities of PERTAMINA, it will be necessary to obtain more safety navigation around the port area. The special navigation traffic rules should be set up immediately.

(3) Possibility of phased privatization

38. In consideration of the efficiency of container terminals, Ujung Pandang Port should be privatized in a move led by the public sector on a long-term basis. For container terminals for internal trade, there is a particular need to investigate at an early stage the joint handling of cargos with private operators, and the commissioning of terminal management and operation duties to private parties on a limited scale on a contractual basis.

4.5.2 Computerization of Terminal Operation

(1) The necessity and advantage

39. A container handling volume of 60,000 TEU per year is generally considered the

upper limit for manual labor. The introduction of computers is indispensable at container terminals where the handling volume has surpassed this limit. Computers are necessary for improving efficiency in operational planning, management, and document processing even when the actual loading is manually performed.

(2) Model plans of computer systems

40. In order to introduce computers to handle container terminal duties. The three model systems should be built up for three different duties as follows.

a. Terminal management system
This system consists of two programs which are listed below.
-Program for managing marshalling yard.
-Program for managing gates

b. Terminal planning system
This systems consists of following three programs.
-Program for planning loading containers
-Program for planning unloading containers
-Program for operating equipment

c. Terminal document processing system
This system puts together data processed by the management and planning system.

(3) Model plan of computer instruments

41. In terms of processing capacity, personal computers can cope with the aforementioned container-handling volume. However, in view of the duplex system to be adopted and the terminals to be used, adoption of a mini computer that satisfies the following minimal standards will also be necessary.

i) Number of main computers: 1
Binary digit (bit): 16 bits
Data memory capacity: 10 - 20 MB

ii) Number of terminals: 10

42. It is preferable to introduce computerization just when the gantry cranes are installed on the terminal to raise efficiency in terminal operation and service. Further, the computer system should be expanded to the Inland Terminal to operate the new Container Terminal including the Inland Terminal as one body when it is used as a container yard other than CFS area.

4.5.3 Organization

43. In view of the anticipated handling volume and required work force in 1998 when Container Terminals at Ujung Pandang Port are completed as full-scale container terminals, it will be desirable to establish a container terminal division within the Ujung Pandang Port branch, and to let this section manage and operate the terminals. However, in 2003, the target year for this feasibility study, it is suggested that a new branch which will manage and operate to Container Terminals exclusively be established

4.6 Economic Evaluation

44. Evaluation of the short-term development plan for container terminal at Uj. Pandang Port was executed by the internal rate of return(IRR) through cost/benefit analysis.

4.6.1 Premise of Economic Analysis

45. The following premises are made for economic analysis.
1)The project life is assumed to be 30 years.
2)The exchange rate adopted is US$ 1.00 = Rp. 2,258
3)With case:The short-term development project of Uj. Pandang Port including the inland terminal
4)Without case:No additional investment will be made to enlarge the existing port facilities but the required funds will be provided to maintain the existing facilities at their current level of service.

4.6.2 Benefit

46. The following economic benefits are considered to be generated from the short-term development plan of Uj. Pandang Port including the inland terminal.

1)Saving in ships' staying cost
2)Saving in interest of cargo cost
3)Saving in cargo handling labor cost
4)Saving in investment cost of minimum transportation facilities
5)Saving in investment cost of additional inland container yard
6)Saving in investment cost of additional transportation facilities
7)Saving in investment cost of additional extension of berth

4.6.3 Costs

47. Following costs are employed for the calculation:

1)Construction cost
2)Maintenance cost
3)Operation cost
4)Replacement cost for handling equipment

4.6.4 Economic Evaluation

48. Calculated IRR for the container terminal including the inland terminal is 15.6 % and it exceeds the national and international bench-mark(10 - 15%) which is generally adopted to assess the economic justiciability of a project. Accordingly this project can be economically feasible. In the sensitivity analysis, the project is judged feasible even when costs increase by 10% and benefits decrease by 10%.

Case	EIRR(%)
Base Case	15.58
Case - A	12.95
Case - B	12.69
Case - C	10.38

Case-A:The construction costs increase by 10%
Case-B:The forecast benefits decreases by 10%
Case-C:Case-A and Case-B

4.7 Financial Evaluation

4.7.1 Purpose and Methodology of the Financial Analysis

49. The purpose of the financial analysis is to appraise the financial feasibility of the port facility development plan. The analysis focuses on the viability of the project itself and the influence on the soundness of the port management body during the project life.

50. The viability of the project is analyzed using the Discount Cash Flow Method and appraised by the FIRR (financial internal rate of return). Also the influence on the financial soundness of the port management body is appraised based on projected financial statements regarding the project.

4.7.2 Fund raising

51. The Study Team assumes that the foreign funds necessary for the implementation of the project will be raised as follows:

Loan period: 30 years, including a grace period of 10 years
Interest rate: 2.6% per annum
Repayment: fixed amount repayment of principal

4.7.3 Analyzed pattern for FIRR appraisal

52. To appraise the profitability of the projects and to study the possibility of participation of private sector, the following cases are studied to calculate FIRR and analyzed financially.

(1) Base Case
Short-term development plan project

(2) Case 1
General project: Short-term development plan project (Base Case) + On-going project (Case 2)

(3) Case 2
On-going project (the part of civil construction and building by the OECF loan)

(4) Case 3
Base Case is executed by the private sector

(5) Case 4
Equipment such as gantry crane is procured and operated by the private sector

4.7.4 Sensitivity analysis

53. Sensitivity analysis is conducted to examine the impact of unexpected future changes. The following three cases are envisioned:

Case (1): The revenue decreases by 10%
Case (2): The project cost increases by 10%
Case (3): The revenue decreases by 10 % and the project cost increases by 10%

4.7.5 Results of the FIRR calculation

54. The results are shown in Table 46. If the FIRR exceeds the interest rate of the foreign funds, we can judge the case to be financially feasible.

55. We can judge Base Case and Case 1 to be financially feasible, because the FIRR of both cases exceeds the interest rate of foreign funds.
Financially, it is difficult for the private sector to execute the project as the FIRR of Case 3 and Case 4 is less than the interest rate of city bank loans.

4.7.6 Financial soundness

56. Base Case also appraised from the viewpoint of financial soundness of the implementation body. According to the results of financial statement analysis, working ratio keeps below 50% after the year 2000 and operating ratio keeps around 50% after 2010, thus the financial indicators keep preferable levels.

Table 46 Result of the FIRR calculation

Base Case (Short-term development plan project)		
Calculation Case	FIRR	Remarks
Original	8.57	
Sensitivity Analysis(1)	6.89	Revenue 10%Down
Sensitivity Analysis(2)	7.05	Cost 10%Up
Sensitivity Analysis(3)	5.41	Revenue 10%Down, Cost 10%Up
Case 1 (General project)		
Calculation Case	FIRR	Remarks
Original	7.79	
Sensitivity Analysis(1)	6.14	Revenue 10%Down
Sensitivity Analysis(2)	6.30	Cost 10%Up
Sensitivity Analysis(3)	4.70	Revenue 10%Down, Cost 10%Up
Case 2 (On-going project)		
Calculation Case	FIRR	Remarks
Original	6.33	
Sensitivity Analysis(1)	4.71	Revenue 10%Down
Sensitivity Analysis(2)	4.86	Cost 10%Up
Sensitivity Analysis(3)	3.29	Revenue 10%Down, Cost 10%Up
Case 3 (Execution of Base Case by Private sector)		
Calculation Case	FIRR	Remarks
Original	9.95	
Sensitivity Analysis(1)	7.28	Revenue 10%Down
Sensitivity Analysis(2)	7.53	Cost 10%Up
Sensitivity Analysis(3)	5.02	Revenue 10%Down, Cost 10%Up
Case 4 (Procurement and Operation of Equipment by Private sector)		
Calculation Case	FIRR	Remarks
Original	13.62	
Sensitivity Analysis(1)	10.24	Revenue 10%Down
Sensitivity Analysis(2)	10.55	Cost 10%Up
Sensitivity Analysis(3)	7.37	Revenue 10%Down, Cost 10%Up

4.8 Environmental Evaluation

57. In order to know the impact of project activities on environment, and to identify the environmental components and to grasp the level of impact, an environmental impact study was conducted on the following two locations:
(1)Navigation channel and dumping site of dredging materials
(2)Proposed Inland Container Terminal (INCT) area.
The study was made based on the previous study data, and investigation data newly collected at site are as shown below:

Test/survey items	Dredging channel	Dumping site	INCT
Water quality test	2 points	2 points	2 points
Sediment test	2 points	2 points	3 points
Air quality test	2 points	-	2 points
Water biotha survey	2 points	1 point	1 point
Interview of local habitant	1 lot	-	1 lot

Coral survey	Dayang-dayangan Is.	17 km southwestward of dump site
by diver	Samalona Is.	18 km northeastward of dump site
	Kudinggareng Is.	13 km northward of dump site
	others	

Note:The area located at 15 km southeast ward of Ujung Pandang Port with a water depth of -30 m was proposed as a dumping site.

58. The major results of survey are summarized hereunder:

(1) Sea water quality
(1-1)at dredging area: Suspended solid, COD, nickel, phenol, oil-grease, lead, selenium and cadmium were exceeding allowable limit.
(1-2)at dumping area: Better than that of dredging area, however, COD, oil-grease, lead, and phenol were exceeding allowable limit.

(1) For the dredging and dumping activities, following mitigation were proposed:
i)To minimize the turbidity of sea water, a combination of grab dredger and hopper barges should be utilized in stead of suction pump type dredger.
ii)Dredging area should be selected at the area deeper than -30 m where coral and benthos are relatively less, and the area should be clearly marked with buoy(s) to limit irregular dumping.
iii)Inspectors should be deployed to control the dredging and dumping works.
iv)Dredging works should be interrupted at fast current period during spring tide.
v)Silt curtain should be prepared at the ready position.
vi)Waste oil treatment procedure should be prepared by dredging contractor.
vii)The source of high level heavy metal should be detected and be controlled as soon as possible.

(2)For INCT, following mitigation were proposed:
i)Trucks should be covered to avoid the reclamation materials spill along the route.
ii)Trucks should be washed and kept clean.
iii)Vehicles speed should be limited to minimize noise.
iv)Reclamation was recommended to be by dry fill materials to minimize turbid water.
v)Reclamation area should be protected by revetment to avoid soil spill during and after the completion of construction works.
vi)Planting in and surrounding area of INCT should be made.
vii)Proper traffic control should be performed by cooperation with local government to avoid traffic congestion.
viii)In order to settle the evacuation of local habitants proper information and compensation should be made.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

5.1.1 Forecast of Container Cargo

60. The total cargo throughput in the year 2010 is estimated at 10.9 million ton(2.7 times over the 1993 figure) including 3.1 million tons of container cargo (7.7 times over the 1993 figure). While the traffic volumes of bagged cargoes, dry bulk and liquid bulk cargoes increase about 2.3 to 2.6 times, that of general cargoes decrease to a level of 82 % of the 1993 volume as a result of the cargo shift from general cargo to container cargo.

61. The container cargo throughput in the year 2003 is estimated at 239,000 TEU (5.6 times over the 1993 figure), among which international container cargo amounts to 72,000 TEU and domestic container cargo 167,000 TEU.

5.1.2 Master Plan of Uj. Pandang Port

62. Based on the cargo traffic estimation and cargo handling capacity of the existing facilities, zoning of the utilization of port area is examined for the target year of 2010. Soekarno quay will be mainly used for general cargo terminals and the north of the quay will be used for dry bulk and liquid bulk terminals. Hatta quay, now under construction, will be exclusively used as container and passenger terminals. The south of the Hatta quay should be preserved as it is as an urban leisure water-front of Uj. Pandang City.

63. Long-term development plan of container terminal for Uj. Pandang Port has been examined. The following development policies are set:

a) Uj. Pandang Port will be developed as one of the major container ports in Indonesia, designated in "The Development Strategy for National Container Port Network of Indonesia" proposed in the Master Plan of Container Handling Ports, Dry Ports and Connecting Railways(Part 1).

b) The Port will achieve not only the role of gateway for South Sulawesi but also the distribution function of containers for East Indonesia including East Kalimantan.