CHAPTER-8. CAPACITY AND DEVELOPMENT POTENTIAL OF THE PORTS

8-A. PORT CAPACITY

8-A-1 Off Shore Capacity (Navigational Capacity) of Tanjung Priok

193. As described in the previous chapter, the ship navigational/maneuvering water area is very limited within the port area. Main channel is just for one-way traffic and is overlapped with the ship's turning basin. Each mooring basin is too narrow to secure safe and smooth berthing. Moreover, the port itself has only one entrance gate. Ship traffic has become severely congested recently and the port's capacity to accommodate increasing ship calls and larger-seized vessels seems to be limited.

194. Therefore, it is important to determine the port capacity from the navigational point of view. In other words, how many ships are able to enter the port with the existing water area condition? In some cases, the port entrance capacity is more critical than the quay side capacity.

195. The study team estimates navigational capacity (ship calls) by exploring two methods, one is an estimate from the possible interval time of in/out movements and the other is a computer simulation. Although details are shown in the Main Report II, the results are almost the same in both methods, that is, around 16,000 ~ 16,500 would be the limit of ship calls for cargo vessels which excludes non-cargo vessels such as passenger ships, vessels for the purpose of docking etc. Therefore, it is assumed here that **16,500 calls** is the maximum capacity for cargo vessels at the existing Tanjung Priok as shown in Table 8-A-1. It is also assumed that there will be no limit on the number of ship calls provided that navigational conditions are improved.

Table 8-A-1 Estimated Off-Shore Capacity of the Existing Tanjung Priok

		All cargo handling ships	JICT & Koja	MTI	Other Terminals
Capacity (A)	Annual	16,500	3,048	657	12,795
	per day	45.2	8.4	1.8	35.1
2001 * (B)	Annual	13,568	2,257	499	10,812
	per day	37.2	6.2	1.4	29.6
Increase Ratio (A/B)		1.22	1.35	1.32	1.18

* 2001 figure forr all cargo handling ships is estimated subtracting 3,500 calls of non-cargo vessels from total calls (17,068 calls).

8-A-2 On-shore Capacity (Quay Side & Yard Side Capacity) of Tanjung Priok

196. On-shore capacities which are determined by critical capacity between quay side capacity and yard side capacity are estimated as below.

Container Cargo

197. Capacity and demand for import/export containers and domestic containers is compared in Table 8-A-2, Figure 8-A-1 and Figure 8-A-2. It is assumed that the former containers are handled in JICT and Koja while the latter are handled in MTI and conventional berths.

Table 8-A-2 Capacity and Demand (Container, Tanjung Priok)

	Capacity (000'TEU)			Demand (000'TEU) - Basic Case -			
	Existing Facilities (One-way Channel)	Future Facility (One-way Channel)	Future Facility (Two-way Channel)		2,000	2012	2025
JICT&Koja	2,567	2,927	3,643	Im/Export	2,073	4,177	6,530
MTI&Conv.	458	458	485	Domestic	237	754	1,709
(Quay side)	710	710	939				

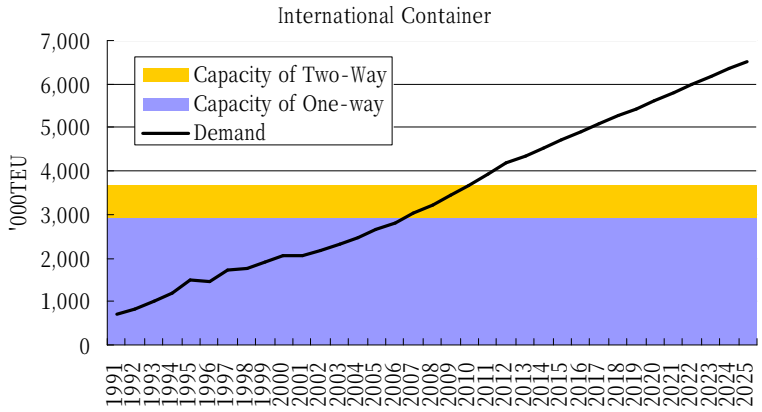


Figure 8-A-1 Quay Side Capacity and Demand (International Container, Tanjung Priok)

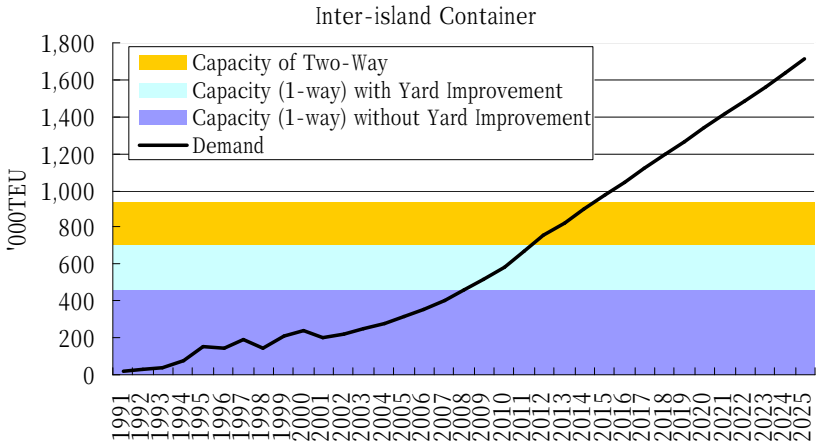


Figure 8-A-2 Quay Side Capacity and Demand (Inter-island Container, Tanjung Priok)

198. In 2012, demand is beyond the capacity for both import/export and domestic container cargo. This means that new container handling facilities are needed at least by 2012 even if operating under maximum capacity.

199. It is also noted that establishment of dedicated domestic container terminals with sufficient yard area is necessary by reorganizing existing conventional wharves. Lack of sufficient yard area behind conventional berths would make it very difficult to increase the capacity of domestic container handling. The capacity of MTI should be also improved by widening the current narrow access channel as well as by improving yard productivity.

Conventional Cargo

200. Table 8-A-3 and Figure 8-A-3 ~ Figure 8-A-5 shows a comparison between capacity and demand based on the demand analysis.

Table 8-A-3 Capacity and Demand (Conventional Cargo, Tanjung Priok)

	Quay Side Capacity (000'ton)		Demand (000'ton)		
	Without Navigation Improvement	With Navigation Improvement	2001	2012	2025
General & Bag	13,940	17,758	13,190	16,246	20,389
Dry B.	10,641	13,554	7,268	11,004	20,129
Public	7,126	9,077	4,482	6,563	10,720
Special	3,515	4,477	2,786	4,441	9,409
Liquid B.	12,515	15,942	10,094	11,644	14,046
Public	2,435	3,102	1,490	2,386	3,480
Special	10,080	12,840	8,604	9,258	10,566
Total	37,096	47,254	30,552	38,894	54,564

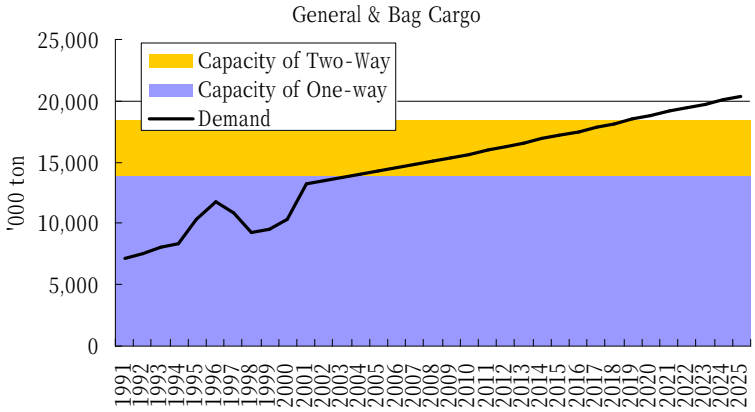


Figure 8-A-3 Quay Side Capacity and Demand (General and Bag Cargo)

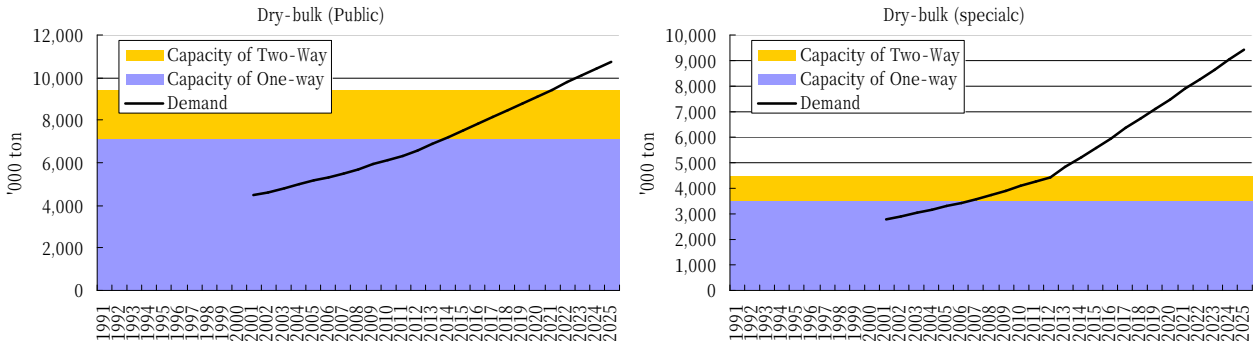


Figure 8-A-4 Quay Side Capacity and Demand (Dry-Bulk Cargo)

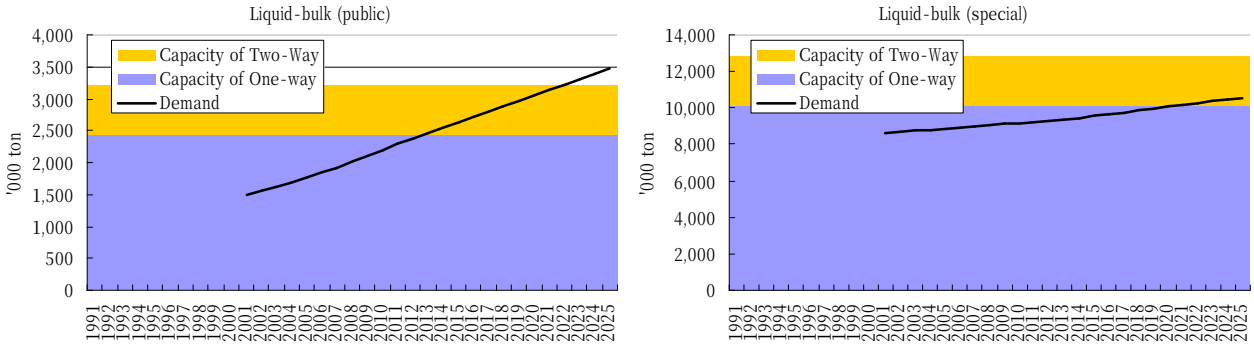


Figure 8-A-5 Quay Side Capacity and Demand (Liquid-Bulk Cargo)

201. As for public cargo, the demand in 2012 and 2025 is far beyond the quay side capacity for general and bag cargo while liquid and dry bulk cargo have allowance. More facilities for general and bag cargo should be developed by re-organizing conventional wharves and/or constructing additional wharves. At the same time, increasing navigational capacity by improving channels is also indispensable to cope with the increase of ship calls in future.

202. Land side capacities and yard/warehouse capacities at public wharf are calculated as in Table 8-A-4. In the calculation, only yard/warehouse areas located behind and/or belonging to quays are counted.

Table 8-A-4 Yard/Warehouse Capacity

	Yard Side		Actual (2001) ('000ton)		Passage Ration (Assumption)		
	Area (m2)	Capacity ('000ton)	Cargo Volume (GC, Bag & Dry-B (Public))	Necessary Capacity	GC	Bag	Dry-B
Yard	94,700	5,455	17,672	4,596	25%	0%	50%
Warehouse	185,000	5,920	17,672	4,240	25%	50%	0%

203. There will soon be a shortage of yard area, while there is a surplus of warehouse capacity. This means that some warehouses are not utilized fully and can be demolished. Furthermore, a shortage of yard area means that there are lots of direct unloading/loading cargo without being stored in the yard and this would generate increased road traffic. To maximize berth productivity, some dedicated dry bulk berths with sufficient yard area as well as enhancement of use of storage facilities would be necessary.

Relation between Navigational Capacity and Handling Productivity

204. According to the above capacity examination, solving navigational constraints is critical to increase the quay side capacity for both container and conventional cargo. Constraint of navigational capacity compels ships to wait outside of the port and/or quay side which leads to an increase of waiting time and/or non-operating time. Under this kind of situation, there seems to be no incentive for stevedoring companies to increase the handling productivity. Thus, priority should be put on the improvement of navigation as well as handling productivity.

8-B. LAND TRANSPORT CAPACITY OF TANJUNG PRIOK

8-B-1 Daily Traffic Volume (DTV) from 3 Directions around the Port

205. The traffic survey was carried out from July 14 to 16 2002 at 6 gates of Tanjung Priok port and 2 intersections. The conceptual traffic flows around the Tanjung Priok Port area are summarized in the diagram below.

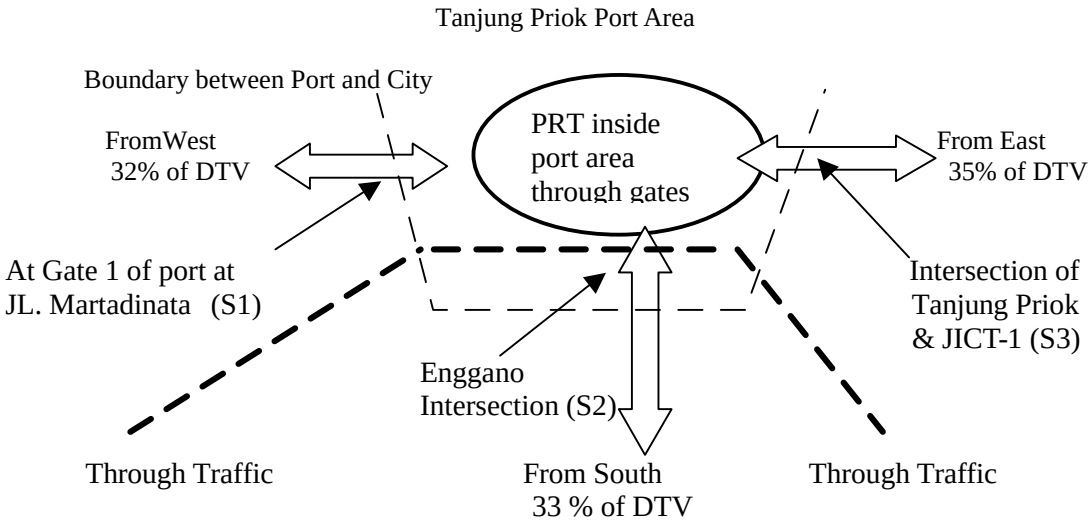
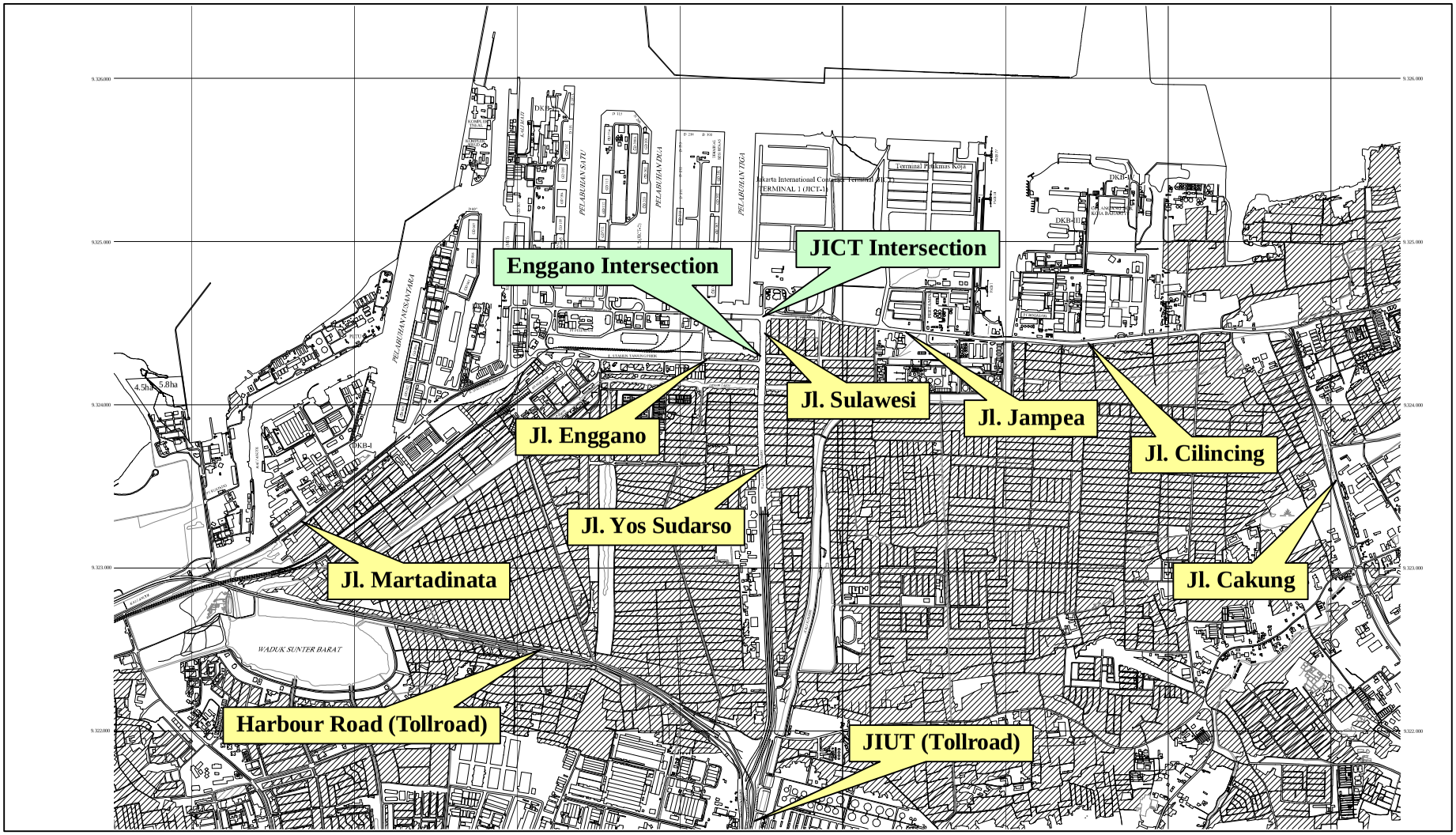


Figure 8-B-1 Traffic Flow Diagram around Tanjung Priok Port Area

Figure 8-B-2 Road Network around Tanjung Priok Port



206. The sectional road traffic of S1, S2 and S3 was counted as the total daily traffic volume around the Port area.

Table 8-B-1 Sectional Road Traffic Volume (veh/day)

Type of Vehicle	From East	From West	From South	Total
Sedan	16,747	14,204	19,281	50,232
Van	4,917	3,339	2,500	10,756
Small (Mini) Bus	7,276	6,887	2,164	16,327
Medium/Large Bus	5,550	1,721	3,992	11,263
Pick up	3,200	2,311	2,016	7,527
Medium Truck	2,868	3,762	2,827	9,457
Large Truck	5,397	11,646	9,887	26,930
Total	45,955	43,870	42,667	132,492
Ratio	34.7%	33.1%	32.2%	100.0%

8-B-2 Port Related Traffic (PRT) and Through Traffic Volume (TTV)

207. The traffic moving in and out of the port at the 6 gates is considered as the port related traffic. The total traffic volume through the gates per day was 40,815 units, equivalent to 31% of the daily traffic volume.

Table 8-B-2 Traffic Volume Through gates of Tanjung Priok Port

	Gate 1	Gate 3	Gate 8	Gate 9	JICT 1	JICT 2	Total
Passenger car	4,881	2,880	1,848	7,840	301	104	17,854
Sedan	2,795	2,215	1,627	6,742	263	73	13,715
Van	2,086	665	221	1,098	38	31	4,139
Small Bus	25	22	1	30	0	0	78
Medium/Large Bus	44	20	14	81	24	11	194
Pick up	632	336	280	1,062	6	47	2,363
Medium Truck (Truck 2Ax)	883	262	294	1,590	0	11	3,040
Large Truck	2,283	221	796	8,700	4,373	913	17,286
Truck 3Ax	908	133	409	1,584	0	2	3,036
Truck with Trailer	5	2	9	67	28	0	111
Trailer	1,370	86	378	7,049	4,345	911	14,139
Total	8,748	3,741	3,233	19,303	4,704	1,086	40,815

208. The through traffic from/to the port area unrelated to port activities is estimated from the balance between the total daily traffic around the port and port related traffic through the gates as follow.

Table 8-B-3 Daily Traffic Volume of Port Related and Through Traffic in 2002

Type of Vehiale	Port Related Traffic(PRT)	Through Traffic Volume around the Port (TTV)	Total
Passenger Car	17,854	43,134	60,988
Sedan	13,715	36,517	50,232
Van	4,139	6,617	10,756
Mini (small) Bus	78	16,249	16,327
Medium/large Bus	194	11,069	11,263
Pick up	2,363	5,164	7,527
Medium Truck	3,040	6,417	9,457
Large Truck	17,286	9,644	26,930
Total	40,815	91,677	132,492
Ratio	30.8%	69.2%	100.0%

8-B-3 Forecast of the Daily Traffic Volume (DTV) around the port

Port Related Traffic

209. The daily traffic volume of port vehicles in 2012 and 2025 is estimated based on the actual traffic counting data and forecast of cargo throughput by applying the unit factor of vehicle cargo ton and passengers. The results are summarized in the following table.

Table 8-B-4 Summary of Forecast of Port Related Traffic by vehicle type

Vehicle Type	Daily Traffic Volume		
	2002	2012	2025
Passenger Cars	17,854	29,780	40,456
Sedan	13,715	22,538	30,665
Van	4,139	7,242	9,791
Small Bus	78	148	198
Medium/ Large Bus	194	469	615
Trucks for Cargo			
Pick up	2,363	2,490	3,634
Truck 2 Axles (Medium Truck)	3,040	3,374	4,615
Large Truck	17,286	26,516	33,580
Truck 3 Axles	3,036	3,055	4,216
Truck with trailer	111	1,115	2,006
Trailer Truck	14,139	22,345	27,358
Total	40,815	62,777	83,098

Through Traffic

210. The growth in the number of registered vehicles has been correlated with the growth of GDRP, and population growth of the region/province. In this study, the vehicle growth rate those used for the “Heavy Loaded Road Improvement Project, Master Plan Review” financed by JBIC in 2001 is adopted. The estimated vehicle growth rate by vehicle type is summarized below.

Table 8-B-5 Growth Rate of Vehicle Type 2010 and 2025

Vehicle Type	Vehicle Growth Rate (%)			
	2010	2015	2020	2025
Passenger Car	3.68	4.67	4.17	4.00
Small Bus	5.60	6.19	4.86	4.50
Medium/Large Bus	5.53	6.13	4.87	4.50
Pick Up	2.41	3.11	2.65	2.50
Medium Truck	2.77	3.51	2.95	2.50
Large Truck	3.06	4.04	3.30	3.00

211. The above growth factors by vehicle type are applied to the existing through traffic volumes to obtain the forecast traffic volume through the port area for years of 2012, and 2025. The result of calculation is shown in the table below. The estimated traffic volume would represent the volume of traffic which would use the existing arterial roads.

Table 8-B-6 Forecast of Through Traffic Volume (veh/day)

Vehicle Type	Traffic Volume (veh/day)								
	2002			2012			2025		
	PRT	TTV	Total	PRT	TTV	Total	PRT	TTV	Total
Passenger Car	17,854	43,134	60,988	29,780	63,099	92,880	40,456	107,987	148,443
Small Bus	78	16,249	16,327	148	28,334	28,482	198	53,603	53,801
Medium/Large Bus	194	11,069	11,263	469	19,178	19,646	615	36,236	36,851
Pick Up	2,363	5,164	7,527	2,490	6,642	9,132	3,634	9,390	13,023
Medium Truck	3,040	6,417	9,457	3,374	8,555	11,929	4,615	12,938	17,553
Large Truck	17,286	9,644	26,930	26,516	13,286	39,801	33,580	21,413	54,993
Total	40,815	91,677	132,492	62,777	139,094	201,870	83,098	241,566	324,664
PRT: Port Related Traffic Volume (veh/day)									
TTV: Through Traffic Volume around the Port area (veh/day)									

Traffic Forecast by Passenger Car Equivalent

212. Based on the PCU factors of Indonesian Highway Capacity Manual, 1997, the traffic volumes of 2012 and 2025 are expressed in PCU as follow: These figures present the daily traffic volume which would be handled on the existing arterial roads around the port if the toll way were not developed.

Table 8-B-7 Forecast of Daily Traffic Volume by PCU

Vehicle Type	2002		2012		2025	
	DTV	PCU	DTV	PCU	DTV	PCU
Passenger Cars	60,988	60,988	92,880	92,880	148,443	148,443
Small Bus	16,327	16,327	28,482	28,482	53,801	53,801
Medium/ Large Bus	11,263	16,895	19,646	29,470	36,851	55,276
Trucks for Cargo						
Pick up	7,527	7,527	9,132	9,132	13,023	13,023
Medium Truck	9,457	21,751	11,929	27,436	17,553	40,371
Large Truck	26,930	107,720	39,801	159,204	54,993	219,971
Total (veh/day)	132,492	231,208	201,870	346,604	324,664	530,885
DTV: Daily Traffic Volume derived from port related traffic and through traffic volume around port area						
PHV: Peak Hour Volume						

8-B-4 Lane Capacity of the Road

Estimation of Lane Capacity of the Existing Road

213. The lane capacity or design service flow rate represents the maximum hourly flow rate that a highway can accommodate without congestion falling below a prescribed level. The lane capacities for the arterial roads were determined in accordance with IHCM and the following formula

$$C = C_0 \times Fcw \times Fcsp \times Fcsf \times Fcs \text{ (pcu/hr)}$$

Where:
- C = Capacity (pcu/hr)
- C_0 = Base capacity (pcu/hr)
- Fcw = Adjustment for carriageway width
- Fcsp = Adjustment for directional split
- Fcsf = Adjustment for side friction
- Fcs = Adjustment for city size

214. The design hourly flow of the existing roads to the east, west and south direction for Tanjung Priok port are estimated as follows:

Table 8-B-8 Capacity of Existing Road by Direction

Description	Road Conditions & Capacity		
	To East	To West	To South
Lane width (m)	3.5	3.5	3.5
Number of lane in one direction	2	2	3
Base Capacity per lane (Co)	1,650	1,650	1,650
Width adjustment factor (Fcw)	1.0	1.0	1.0
Directional split (Fcsp)	0.94	0.97	1.00
Adjustment factor for side friction (Fcsf)	0.84	0.84	0.872
City size factor (Fcs)	1.04	1.04	1.04
Capacity (pcu/hr/lane) (C)	1,355	1,398	1,496
Existing Traffic volume (veh/day)	45,955	43,870	42,667
Existing Traffic volume (pcu/day)	80,195	76,556	74,457
Design Hour Factor (K)	0.10	0.10	0.10
Peak Hour Traffic (pcu/hr/lane) (T)	2,005	1,914	1,241
Ratio (T/C)	1.48	1.37	0.83

Note) Existing traffic volume is vehicle per day in one direction based on the actual traffic counting survey results.

215. The existing daily traffic volume (ADT) of each direction is converted to the design hourly flow and is found that the existing traffic volume of East and West is about 148% to 137%whereas about 83%of South which are over to the saturated condition to East and West and are close to the saturated condition to South to the capacity.

8-B-5 Railway Access

216. Considering the improvement program of the eastern line, central line and Bogor lines connecting Tanjung Priok and Bandung through Bekasi, Karawang as parts of the Jabotabek rail way network, the management body of the railway (PT. KAI) should make its best efforts to utilize the existing available railway facilities for encouraging the increasing freight transport of containers

217. IPC2 should work with PT. KAI to study the possibility of enhancing railway transport from the inland container depot to the Pasoso terminal by improving its service level of frequency and/or capacity.

8-C. ENVIRONMENTAL FACTORS

218. The JICA Study Team examined the environmental conditions of major ports in West Java area. Environmental factors in the ports including Bojonegara where proposed site for a new port development are summarized in Table 8-C-1.

Table 8-C-1 Environmental Factors in Tanjung Priok, Cirebon, Banten/Ciwandan and Bojonegara

Name of Port	Natural Environment	Social Environment
Tanjung Priok	✓ Tanjung Priok Port faces serious water pollution, air pollution and noise disturbance, which are caused by heavy traffic congestion and domestic pollution from hinterland. ✓ Impact from the hinterland also aggravates sediment condition, especially serious heavy metal contamination occurs near the river mouth. ✓ Protected/Rare or Endangered species do not exist. Fishery activity is not commercial. ✓ Poor management system of water supply, wastewater/drainage and waste/garbage adversely affect health and sanitary conditions.	✓ High density of population gives stress to the residents. ✓ Residents expect increased job opportunities and business chance by the port development. ✓ There are various types of people in the residential zone, so they are easy to welcome outsiders. However, they are concerned about increasing criminal acts. ✓ Traffic congestion is a serious problem on the lives of residents. ✓ It is required to improve the road condition with the development of port.
Cirebon	✓ Discharged water from the hinterland aggravates seawater condition, however, water quality here is better than other ports. ✓ Bottom condition is basically silt layer especially distributing in the shallow water area.	✓ Residents expect increased job opportunities and business chance by the port development. ✓ Historic buildings exist around the port. ✓ Residential zone and industrial zone are close to the hinterland so there is little space to expand port area.
Banten/Ciwandan	✓ Water pollution caused by domestic water from the hinterland affects the water quality in the port area. ✓ Impact from the hinterland also aggravates sediment condition, especially serious heavy metal contamination occurs near the river mouth.	✓ Residents expect to increase job opportunity and business chance by port development. ✓ Residents complain about dust pollution by coal terminal and traffic congestion. ✓ Traffic congestion by heavy vehicles for transportation between the port and industrial zone impacts the lives of residents.
Bojonegara	✓ Seawater quality around the project site is still good condition. ✓ Small coral reef and mangrove forest exist around P. Kali and coastal area. ✓ Several factories exist near the project area, residents complain of bad odor (no relation with port activity).	✓ Basically, residents agree with the port development as they expect increased job opportunities and business chance. ✓ Outline of the port development project has already informed to residents and they are proceeding to change their life and work style. ✓ Residents are concerned about air pollution and noise disturbance by port activities.

8-D. NATURAL CONDITION

219. The natural condition of each potential development site is summarized as in Table 8-D-1.

Table 8-D-1 Port Development Potential Viewing from Natural Conditions

Name of Port	Tanjung Pirok Port	Bojonegara	Banten/Ciwandan	Banten/Merakmas	Cirebon
Province/location	DKI Jakarta/Tanjung Priok Port	Banten/Bojonegara	Banten/Ciwandan	Banten/Merakmas	West Jawa/Cirebon
Distance from Jakarta Pusat	10 km	130 km	110 km	120 km	260 km
Distance from Bandung	180 km	310 km	290 km	300 km	130 km
Topography	Swampy lowland facing shallow water of Jawa Sea	Narrow band of low-lying coastal flat, deep-water beach facing Banten Bay	Rock, reef line coast, steep slope and deep water beach facing Sunda Strait	Rock, reef line coast, steep slope and deep water beach facing Sunda Strait	Swampy lowland facing shallow water of Java Sea
Sub-soil condition/foundation layer	Sand or sandy clay layer in the depth from -19 m to -30 m with N-value of 40 to more than 60	Volcanic rock in the depth from -6.5 m to -15 m	Hard sandy clay in the depth from -15 m to -25 m	Hard sandy clay in the depth from -15 m to -25 m	Sandy clay or silty sand layer in the depth more than -30 m with N-value about 23
Tide/Tide range	Diurnal type Z = 60 cm	Mixed dominant semidiurnal type/Z = 60 cm	Mixed dominant semidiurnal type/Z0 = 62.3 cm	No data. However, it is presumed same as Banten/Ciwandan.	Mixed dominant semidiurnal type Z0 = 60 cm
Wave	Cumulative frequency of wave height less than 0.5 m is about 87 %, maximum 2.5 m ～3.0 m	Cumulative frequency of wave height less than 0.5 m is about 87 %, maximum 2.5 m～3.0 m	Generally less than 1 m Maximum 2.5 m～3.0 m	Generally less than 1 m Maximum 2.5 m～3.0 m	Generally less than 1.5 m, Maximum 2.5 m～3.0 m
Siltation/Maintenance dredging	0.4～1.2 m/year 400,000m^3/year	Less than 0.2 m/year No dredging data	Negligible	Negligible	1.2～1.4 m/year 200,000～250,000m^3/year

8-E. HINTERLAND SITUATION

Hinterland Characteristics

220. Distribution of container cargo volume in West Java area is estimated in Table 8-E-1 based on the OD traffic survey carried out by the Study team in August 2002, interviews with container terminal companies, shipping companies and other data such as GRDP.

Table 8-E-1 Distribution of Container Cargo Volume

	Estimated	OD Survey		Shipping Line		Terminal Company		(GRDP)		(Population)
		Traffic	%	Import	Export	A	B	Total	Manufacturing	
Jakarta	**34.8%**	3,963	34.8%	29.0%	23.0%	59.4%	72.0%	46.5%	37.1%	16.1%
South JKT	**1.3%**	143	1.3%		1.0%			8.5%		3.5%
East JKT	**15.6%**	1,778	15.6%	7.1%	2.0%			9.0%		4.5%
Central JKT	**2.6%**	294	2.6%		6.0%	57.4%		11.4%		1.7%
West JKT	**8.0%**	907	8.0%	9.5%		0.1%		7.4%		3.7%
North JKT	**7.4%**	842	7.4%	12.4%	14.0%	1.9%	72.0%	10.3%		2.8%
Tangerang	**12.2%**	1,389	12.2%	14.9%	28.0%	2.0%	11.5%	7.9%	62.9%	7.8%
Serang	**7.9%**	897	7.9%	7.9%	2.0%			3.9%		3.7%
Bogor	**8.5%**	970	8.5%	18.1%	3.0%	1.1%		5.2%		8.1%
Bandung	**9.0%**	1,073	9.4%	3.0%	9.0%	1.1%		9.7%		12.1%
Cirebon	**3.0%**				10.0%	0.1%		2.2%		4.2%
Purwakarta	**3.0%**			7.5%	3.0%	0.2%	3.4%	0.7%		1.3%
Karawang	**3.0%**			3.3%	11.0%			2.0%		3.4%
Bekasi	**16.2%**	2,824	24.8%	16.3%	11.0%	2.5%	13.1%	6.7%		6.4%
Other Area	**2.5%**	285	2.5%			33.6%		15.1%		36.8%
Total	**100.0%**	11,402	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

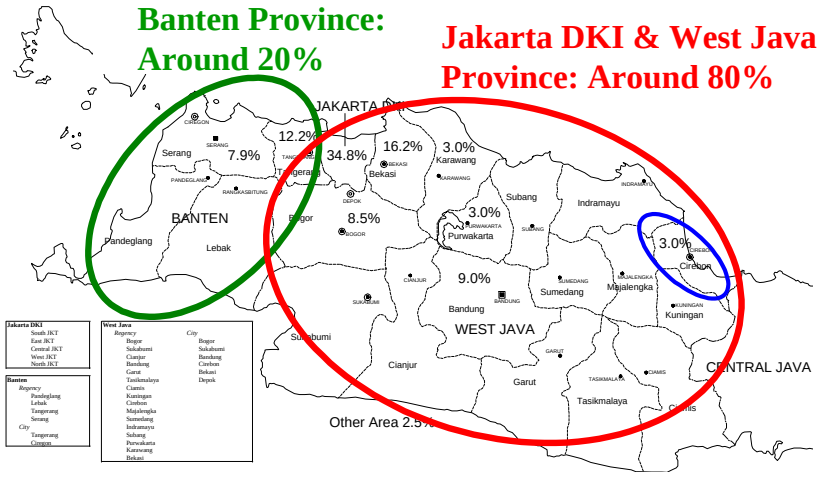


Figure 8-E-1 Current Cargo Distribution

Road Network Development

221. Ministry of Settlements and Regional Development Infrastructure is proceeding with its future development plan. Future road network is shown in Figure 8-E-2 and Table 8-E-2.

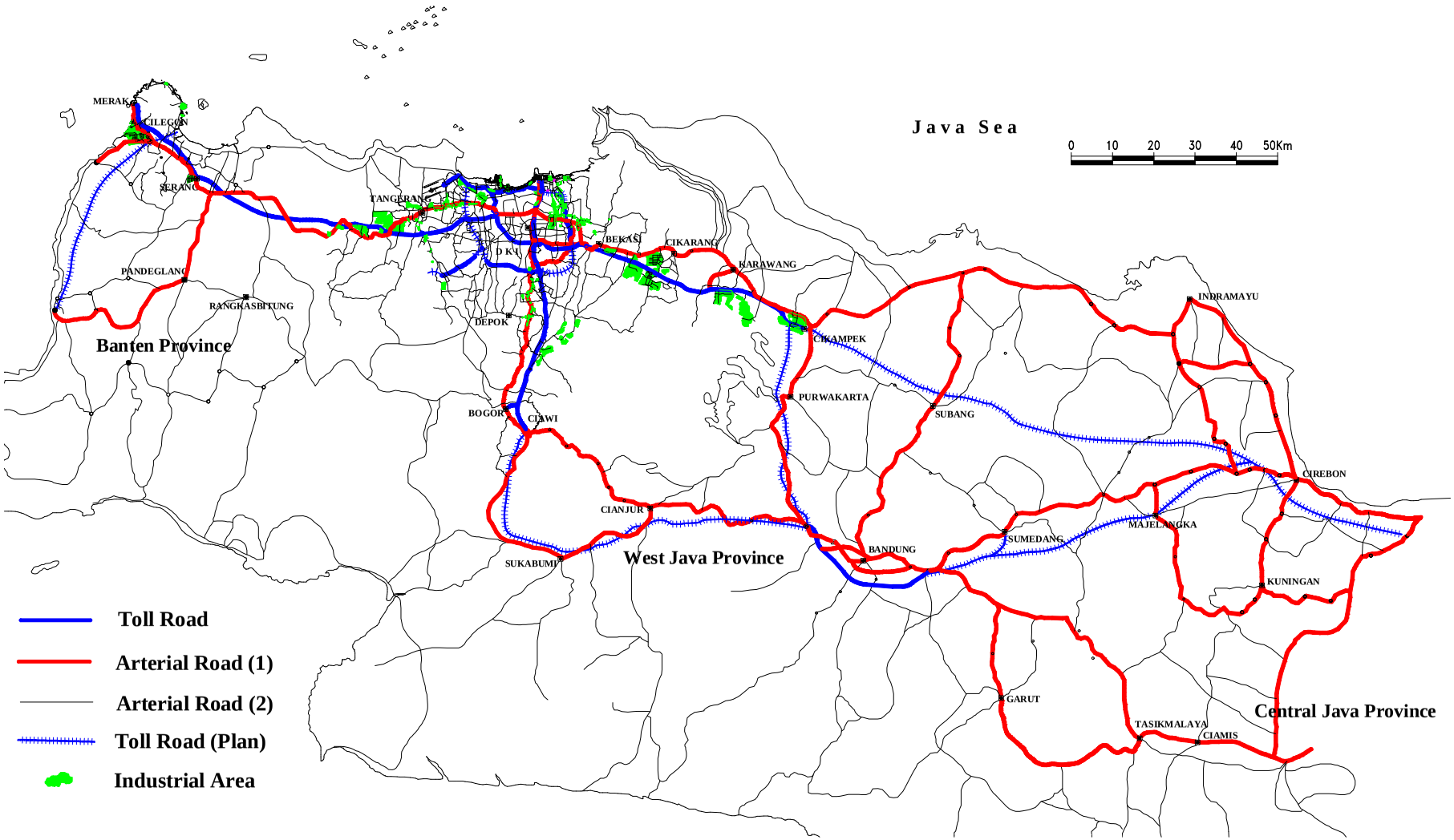


Figure 8-E-2 Road Network in Future (Western Java Area)

Table 8-E-2 Future Development for Toll Road

	2010	2020
Jakarta – Bandung Corridor	◆ Cikampek – Padalarang ◆ Cikampek – Jakarta (3 lanes)	◆ Cikampek/Sadang – Jakarta ◆ Capacity on Cikampek – Padalarang
Surabaya Corridor	◆ Gempol – Malang Toll Road ◆ Western by pass Toll Road	◆ Gempol – Pasuruan
Central Java		◆ Cirebon – Semarang – Demak ◆ Semarang – Solo - Yogyakarta

222. Other programs for improvement of road capacity are as follows:

- Additional toll road capacity in corridors leading to Jakarta/Jabotabek
- Significant toll road capacity leading to and around Surabaya
- Toll roads on heavy-use sections of Main Trunk Network, particularly on the North Java Coast and between Semarang – Solo/Yogyakarta
- Four-lanes for the remainder of Main Trunk Network, Merak – Jakarta and Probolinggo – Banyuwangi
- Four-lanes for approach road to major urban areas and other developments

223. Aside from the nationwide development plan, the government, MoSRD (Ministry of Settlement and Regional Development) has taken up the project of the Jakarta Outer Ring Road (JORR) between Cengkareng airport through the southern parts of Pasar Minggu to Tanjung Priok area to connect with the existing Jakarta harbor Toll-way road. The key objectives are as follows:

- To reduce existing traffic congestion of city traffic and to improve heavily congested situation of traffic to the port
- To improve access to and from international air port/industrial estates in Jabotabek region to Tanjung Priok port
- To promote the efficient development of Jabotabek as a metropolitan region.

224. JORR has a total length of about 70 km and was divided into seven sections for implementation by private investors. Two sections between Cilandak to Jagorawi toll way were constructed and operated till 1997 but the construction of the remaining parts was suspended due to the 1997 economic crisis and has not yet started since then. This JORR is located on the fringe of DKI Jakarta and strategically serve both Jakarta and surrounding conurbations of Bogor, Tangerang, and Bekasi regions, making it an essential components of the Jakarta-West Java toll way system.

225. JORR Northern Extension to provide direct access to the port from the existing toll way road as an alternative route was studied as part of the JORR development project, since the planned toll way road from the Jakarta Harbor Road to Cilincing was indefinitely suspended due to the heavy land acquisition cost and social environmental issues. Therefore the proposed northern extension road is 7 km in length and follows the alignment of Cilincing Access Road, which is classified as a primary arterial road. The existing road carries high volumes of heavy container trucks to and from the port and container depots located in surrounding areas of the port.

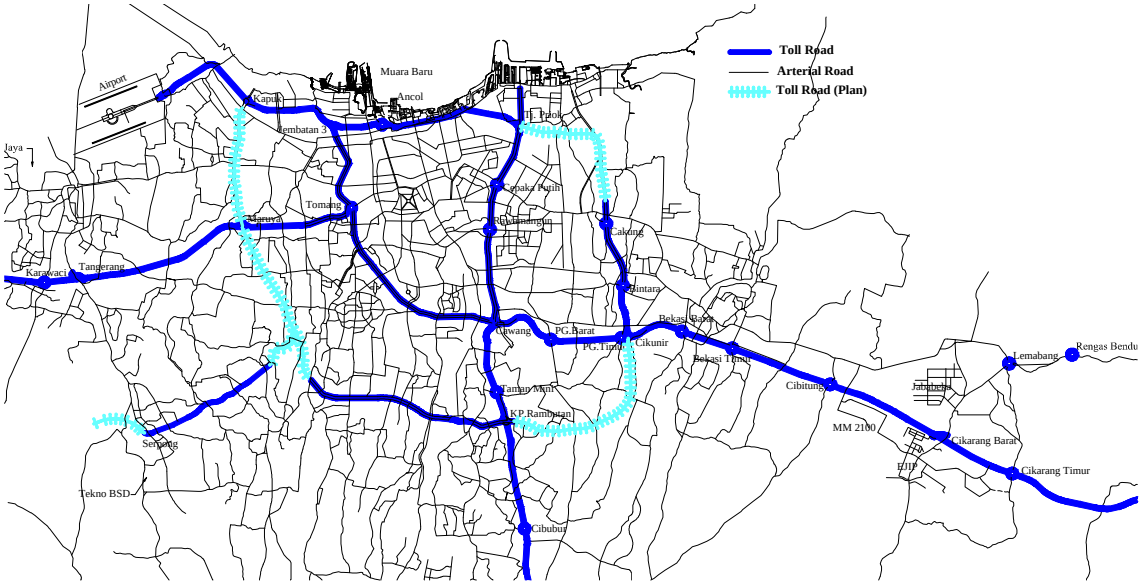


Figure 8-E-3 Road Network in Future (DKI Area)

CHAPTER-9. PORT DEVELOPMENT STRATEGY

9-A. EXISTING PROBLEMS

226. With its substantial share of GDP and population (30% and 25% respectively), Western Java area consisting of Jakarta DKI, West Java province and Banten province is vital to the socio-economic development of Indonesia. To stimulate economic growth in Indonesia, more investment in this area is needed.

227. One of the most important factors in good investment climate is a smooth cargo logistic network for industry. Especially in Indonesia as an archipelago, ports are key infrastructures for cargo distribution system and port service level has a great influence on economic and industrial activities.

228. Tanjung Priok port now functions as the largest trading port in the Western Java area. However, its physical figure is almost the same as it was in the Dutch colonial era and the port productivity has been gradually deteriorated compared to major ASEAN ports. This will let the port's function paralyzed in near future, and which will surely depress the investment climate especially for foreign investors. As a result, global companies will likely withdraw from this area and Indonesian products will lose competitiveness in the international market, especially in the ASEAN market.

229. One of the most urgent issues of the port, for example, is providing appropriate service for car products export, which is expected to increase in volume under ASEAN Free Trade Agreement (AFTA). In fact, several car manufacturing companies in Indonesia intend to export their products to ASEAN countries and they strongly desire a dedicated car terminal to be prepared at least by 2005 to accommodate their handling. However, proper space can hardly be found under the present situation of Tanjung Priok.

230. The critical issue now facing the existing Tanjung Priok port are as follows, which are summarized in "being unable to meet the port users' needs":

- Lack of speedy and credible cargo transit through the port
- Lack of safe and secure cargo handling
- Lack of available port facilities and space to accommodate the cargo demand
- Lack of fair and transparent dues and charge

231. Causes of this unfavorable situation are found in the following points:

- Capacity constraints from the viewpoints of ship navigation, land space and inland transport
- Low efficiency/productivity for cargo handling stemming from capacity constraints and disorderly land use
- Institutional defectiveness in trade facilitation such as inefficient customs clearance, inefficient and inflexible terminal operating system, ineffective EDI system etc.

232. In particular, with regard to the first point, the narrow channel, which can only support one-way traffic, will place a limitation on the number of calling vessels viewing from the safe navigation. It is foreseen that the demand will exceed the estimated capacity in near future.

Two-way channel has been already standard for modern ports in the world. Moreover, there are many narrow pier-type wharves and berths in the end of basins are not accessible and land space is also insufficient. And being surrounded by the long breakwaters, it is hard to expand the land and water space within the port.

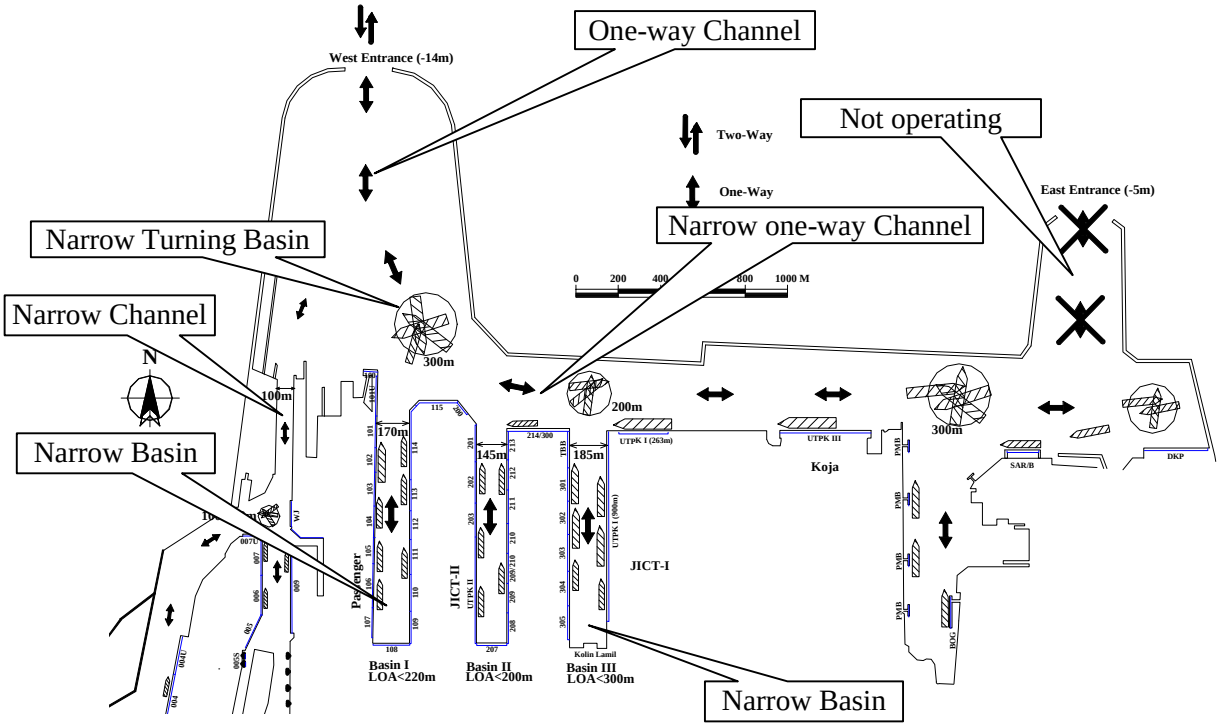


Figure 9-A-1 Current Situation of Ship Navigation

233. The environment is another problem that needs to be addressed. Provision of good amenities and conservation of the environment are musts for a metropolitan port. The port of Tanjung Priok needs to make efforts to better coexist with its surroundings tackling the current problems such as deteriorated water quality, chronicle traffic congestion and drainage problems. At present, sufficient amenities are not provided for passengers and workers in the port.

234. In addition, it is necessary to harmonize port functions with the surrounding city function. In this connection, the current disorderly land use in/around the port becomes an obstacle for beautification of the city.

9-B. COMPARISON WITH OTHER ASIAN PORTS

235. Compared to other Asian ports, especially those of ASEAN countries, Tanjung Priok is inferior in terms of port facility level and logistic cost. Examples are given below.

Main Channels in Other Asian Ports

236. The channels of main ASEAN ports are around 250m in minimum width and allow for two-way traffic. (Although the main channel of Port of Tanjung Pelepas is 250m in width, there is a 600m wide turning basin in front of the quay.) In contrast, Tanjung Priok's single lane and 125m wide channel clearly falls short of international standards.

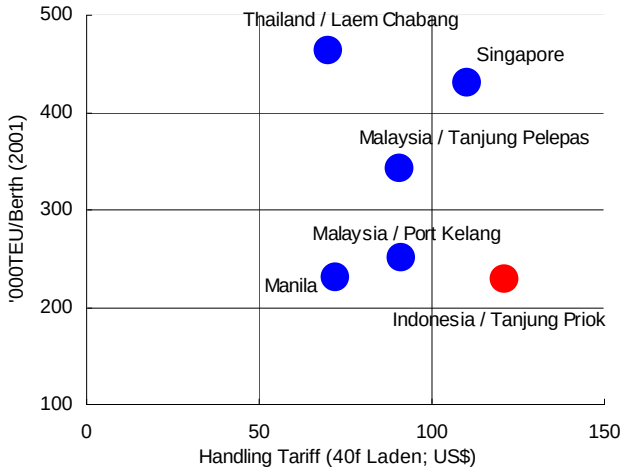
Table 9-B-1 Channel Characteristics of Main ASEAN Ports

Port	Manila	Laem Chabang	Port Klang	Tanjung Pelepas	Sai Gon	Hai Phong	Tg.Priok
Nation	Philippines	Thailand	Malaysia	Malaysia	Vietnam	Vietnam	Indonesia
Handling Volume in 2000 (000'TEU)	2,868	2,195	3,207	2,010	237	219	2,476
Calling Ships	32,294	4,713	12,416	-	1,811	1,593	17,058
Number of Container Berth	15	5	15	6	3	2	11
Largest Vessel	-	50,000DW	-	-	30,000DW	15,000DW	
Fairway Width	250m	325m	366m	250m	(River port located around 20 miles from the oceans)		125m
Fairway Depth	-15m	-14m	-15m	-15m	-9.7m		-14m
Traffic	Two-way	Two-way	Two-way	Two-way	One-way (Two-way traffic is planned)		One-way

*Source: Containerization International Yearbook 2002
Guide of Port Entry 2001/2002
Lloyd's List Ports of the World 2002

Comparison of Handling Productivity and Charge/Tariff for Container Handling

237. The following graphs indicate berth productivity and tariff for container handling at major ASEAN ports.



Note) Handling Tariff:
US$ per FEU (40f FCL Container)
Loading/Discharging plus moving to/from CT yard
10% discount from official tariff as for Singapore and Malaysian ports
Source: JICA Study survey

Figure 9-B-1 Berth Productivity and Handling Tariff –40f Laden–

Comparison of Port Facilities and Handling Cost for Automobile Products

238. Currently, Tanjung Priok has no appropriate terminal facility to load/unload automobile products. Figure 9-B-2 shows the current situation of automobile terminal in Laem Chabang Port.

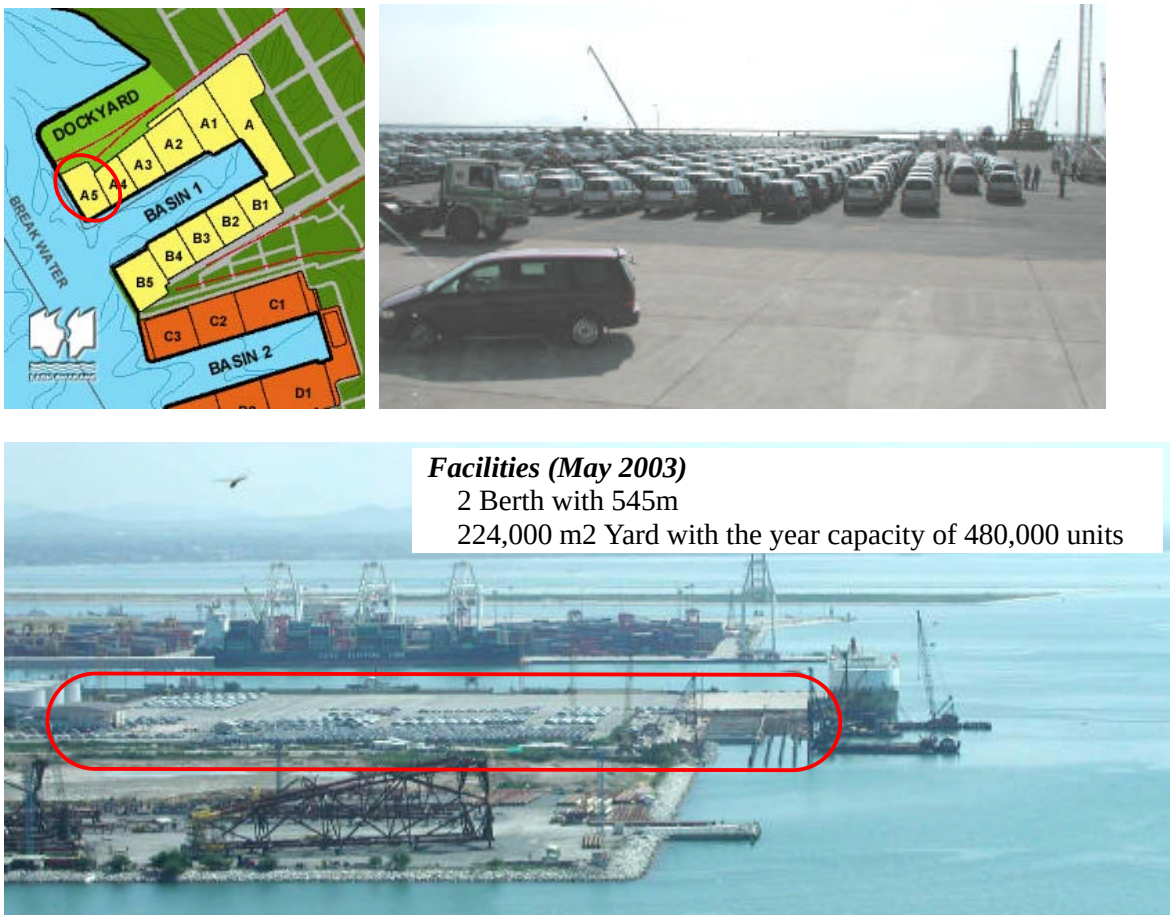


Figure 9-B-2 Automobile Terminal in Laem Chabang port (Thailand)

239. For export/import automobiles, tariff has not yet been set. When comparing real handling and storage cost offered by stevedoring in Tanjung Priok, there is a great difference with other ASEAN ports such as Laem Chabang of Thailand. For example, a difference of US$30 per unit will translates into a difference of US$1.5 million per year assuming annual trade of 50,000 units.

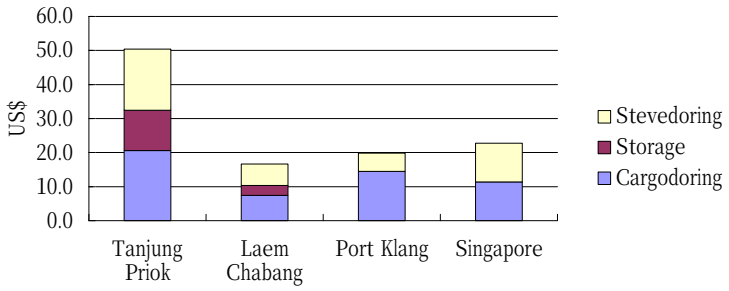


Figure 9-B-3 Charge for Automobile Export (per 1 Unit (12 tonne), with 5 days of Storage)

9-C. DEVELOPMENT TARGETS AND FOCUS

240. In order to overcome hardship of economy and to achieve sustainable economic growth, one of the most important tasks is to establish an effective and efficient cargo logistics with reliable transportation services. The Study Team proposes development targets of Jakarta Metropolitan ports as follows:

- To make the Greater Jakarta Metropolitan port function as a **"Logistic Center" in ASEAN regions** in order to maintain and enhance the competitiveness of Indonesian industry in the regions by providing an attractive business /investment environment.
- To make the Greater Jakarta Metropolitan port function as a "**Regional Hub Port"** not only attracting international trunk line but also linking them to domestic/inter-island lines

241. In order to achieve the above development targets, the following points should be focused:

Best Use of the Existing Facilities

To increase and maximize the capacity/productivity of the existing port facilities in a comprehensive manner by means of:

- Rehabilitation and re-organization of the port facilities and land-use, including channels, basins, quays, yards, warehouses, roads etc.
- Good maintenance of the port facilities and proper regulation of land-use

Port User Friendliness

To encourage existing trading industry as well as new industrial location/investment by achieving the best use of the existing facilities and providing good services, i.e. speediness and credibility of cargo transit through the port by means of:

- Improving the productivity of cargo handling at the wharves
- Securing easy-access and flexible use of the port facilities and spaces
- Securing smooth traffic flow in/around the port
- Ensuring the safety of sea/land transport as well as the security of cargo
- Developing an integrated information system achieving single-window procedure

Strategic Manners of Port Development and Management

- To meet the future demand properly and to secure good communication with port users as well as establishing feed back system of their needs through better management and operation
- To clarify the sales points of each port and to carry out port sales promotion activity to its potential users
- To make a good coordination with regional development, especially industrial location
- To secure transparency of price setting and to provide reasonable and competitive price with a proper tariff system

Environment Friendliness

- To make the Greater Jakarta Metropolitan port function as a environmental friendly port

9-D. DEVELOPMENT SCENARIO

242. To overcome capacity constraints, increase productivity and better serve its potential hinterland and users, urgent rehabilitation of Tanjung Priok is strongly recommended. For export/import container, which will rapidly increase in future, if there is no rehabilitation of the port including improvement of navigational condition, the capacity of international container handling at Tanjung Priok will reach its limits at **around 2007** even after completion of some new berths. This will cause significant damage to the trade activity in Indonesia since Tanjung Priok is now functioning as the sole international container port in the West Java area. To cope with this situation, navigational condition should be improved, which will increase the international container handling capacity of the port up to **3.6~3.8 million TEUs**.

243. The urgent rehabilitation of Tanjung Priok is recommended for the following reasons:

- Urgent needs of potential users of Tanjung Priok.

  Around 80% of total container cargoes are generated in the hinterland of Tanjung Priok. For these potential users of Tanjung Priok, viewing from existing capacity limits of Tanjung Priok, urgent improvement of Tanjung Priok is strongly desired, otherwise, economic activity as well as investment climate will be surely depressed. Car manufacturing sector is a typical example. Furthermore, the rehabilitation of Tanjung Priok Port is necessary and urgent not only for international container but also for increasing the capacity and productivity of conventional wharves including inter-island container handling, together with alleviating the traffic congestion in/around the port.

- Time of realization of Bojonegara new port

  The rehabilitation of Tanjung Priok Port is necessary and urgent even if the development of a new port (here we assume it will be Bojonegara new port) will be developed, since operation of the new port would not commence until around 2008~9, considering the preparation and port construction period as well as the development of a new access road which requires land acquisition. A scenario, which envisages that a new container terminal of Bojonegara will be in operation by 2007, is risky and unrealistic.

- Investment efficiency

  It is better to optimize and make the best use of the existing port facilities in Tanjung Priok. When comparing the investment cost for increasing the container handling capacity of Tanjung Priok to that of Bojonegara, Tanjung Priok rehabilitation is more cost-effective being able to increase container handling capacity by 600,000 TEU at a cost of 1,100 billion Rp, while the development of Bojonegara new port with the capacity of 700,000 TEU requires investment of 1,600 billion Rp.

244. However, in terms of export/import container, Tanjung Priok will reach its capacity limit again around 2010. Considering the following points, a new port as a complementary international container handling port is recommended to be developed by the time when the demand of international container will reach the capacity of Tanjung Priok again. The Study team proposes that a **new port should be developed and operated by 2010 in Bojonegara** for the following reasons:

- Spatial constraints for new development in the existing Tanjung Priok port and huge cost for new development outside Tanjung Priok port
- Avoiding intensive concentration of cargo traffic especially large container trailers on

the roads of the metropolitan area.

245. The relation between the demand of international container and the capacity is shown below:

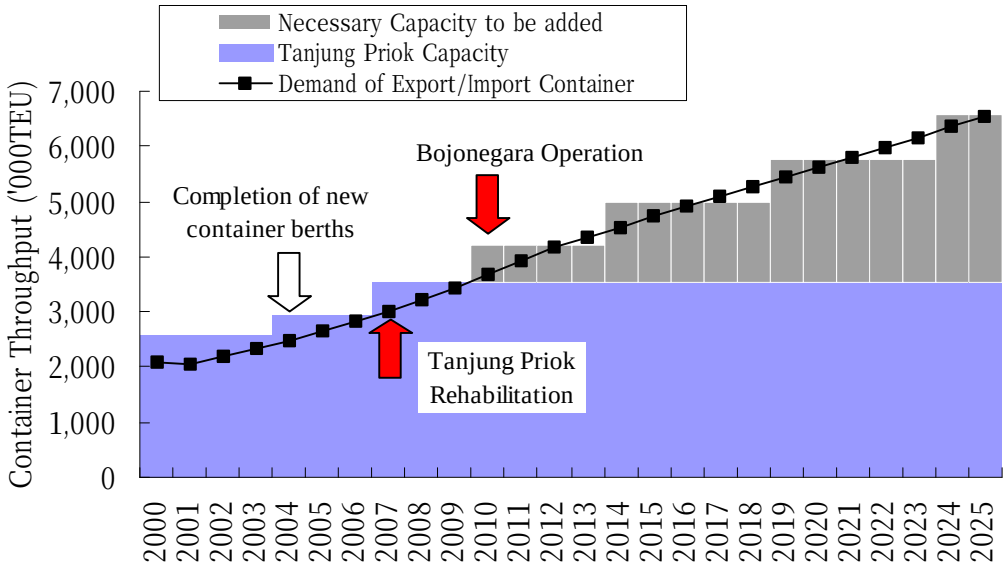


Figure 9-D-1 Demand and Capacity (International Container)

9-E. FUNCTIONAL ALLOTMENT

9-E-1 Principle of Functional Allotment of Bojonegara

246. The strength and the weakness of Tanjung Priok and Bojonegara can be summarized as shown below.

Tanjung Priok

Strength	Economic potential of cargo hinterland (Located at the center of Western Java area)
	Big assets of port facilities (Breakwater, deep channels, basins and quays)
Weakness	Narrow space of land area as well as ship navigational area inside the port
	Mixed land-use and heavy congestion inside the port
	Highly urbanized and congested area around the port
	Many vested interests related to the port

Bojonegara

Strength	Blessed with deep sea (Easy to develop a port with deep draft)
	No vested interest
Weakness	Limited cargo hinterland (Located far west in Western Java area, long way from one of most major industrial area of eastern Jakarta)
	Narrow land space behind the port

247. Based on the above characteristics and in accordance with the development targets, the basic functions of Tanjung Priok and Bojonegara are set as follows:

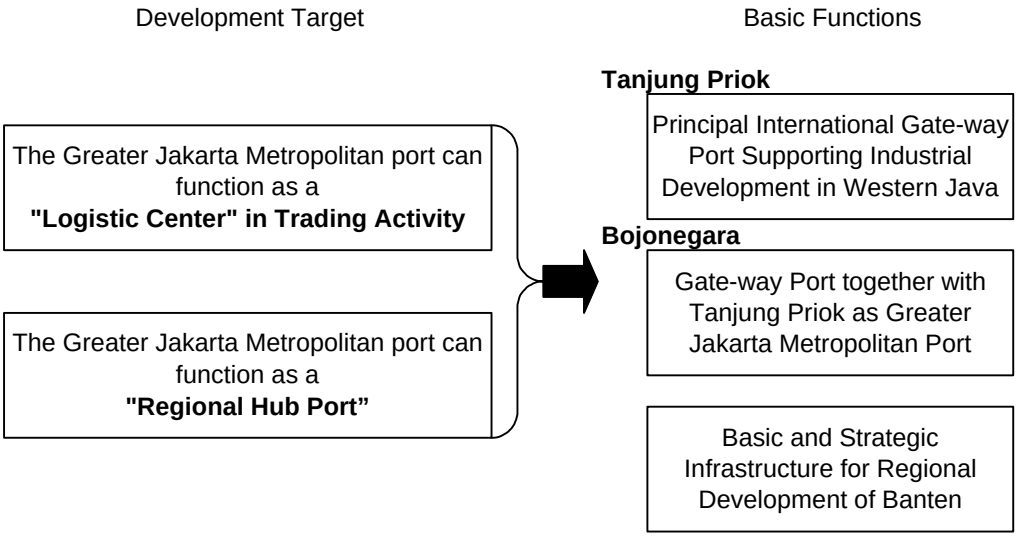


Figure 9-E-1 Basic Function of the Ports

9-E-2 International Container

248. The hinterland of Bojonegara new port is assumed to be extended only to Banten province viewing from transportation time. However, if the road network around Jakarta DKI including JORR will be developed and if the new port can provide better services than Tanjung Priok, the new port can attract more customers who are reluctant to use the congested roads within Jakarta and in this case, there is a potential for the hinterland to expand to the west and south of Jakarta and Bogor regency.

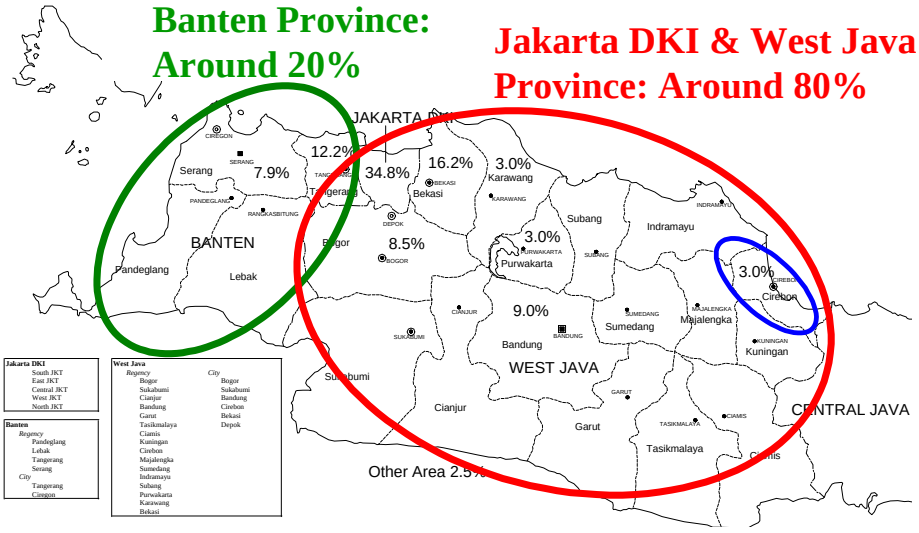


Figure 9-E-2 Current Container Cargo Distribution

249. Thus, the Study team assumes that the hinterland of Bojonegara will be Banten province at the time of initial stage of operation, and will gradually expand to West Jakarta, South Jakarta

and Bogor regency as shown in Figure 9-E-3 in accordance with road network development and by efforts of port sales of Bojonegara providing good service and price.

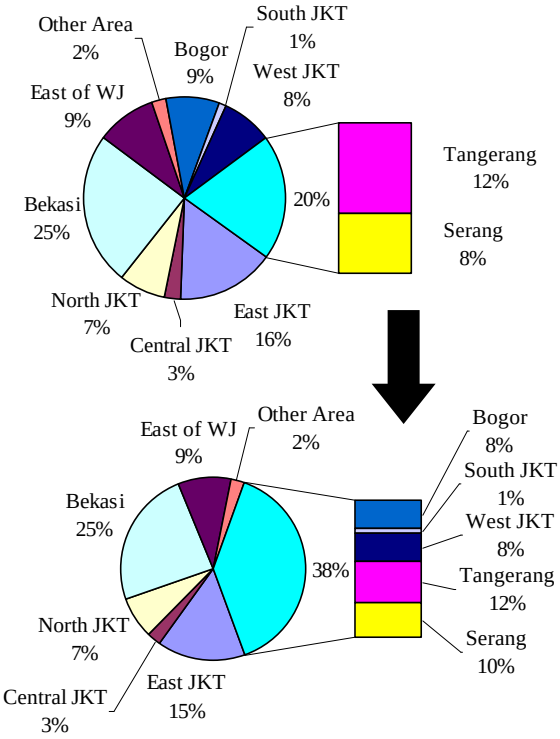


Figure 9-E-3 Bojonegara Hinterland (Current Situation and Future)

250. Demand analysis of export/import containers and hinterland analysis of Tanjung Priok and Bojonegara results in the following demand curve for each port.

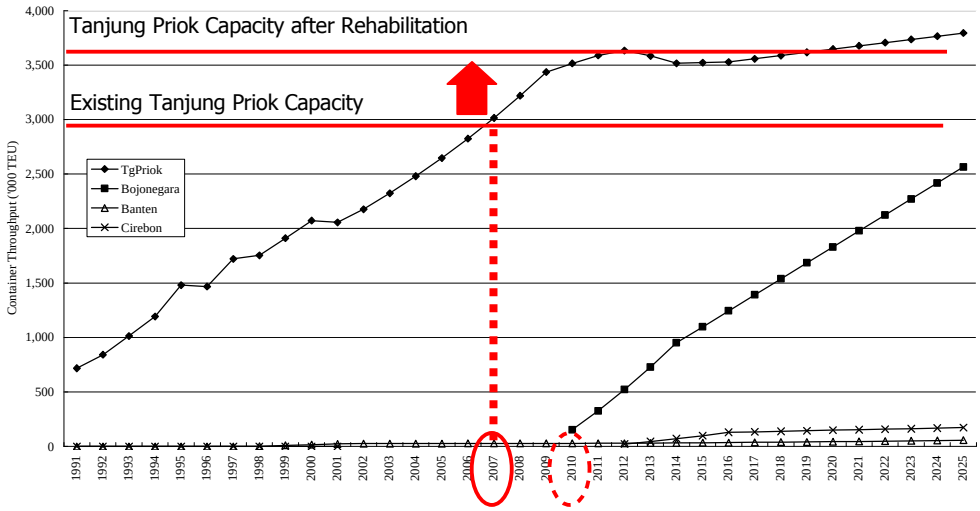


Figure 9-E-4 Demand of International Container Cargo for Each Port

9-E-3 Inter-island Container and General & Bag Cargo

251. Figure 9-E-5 and Figure 9-E-6 are examples showing the result of cargo volume allotment for inter-island containers and general & bag cargo.

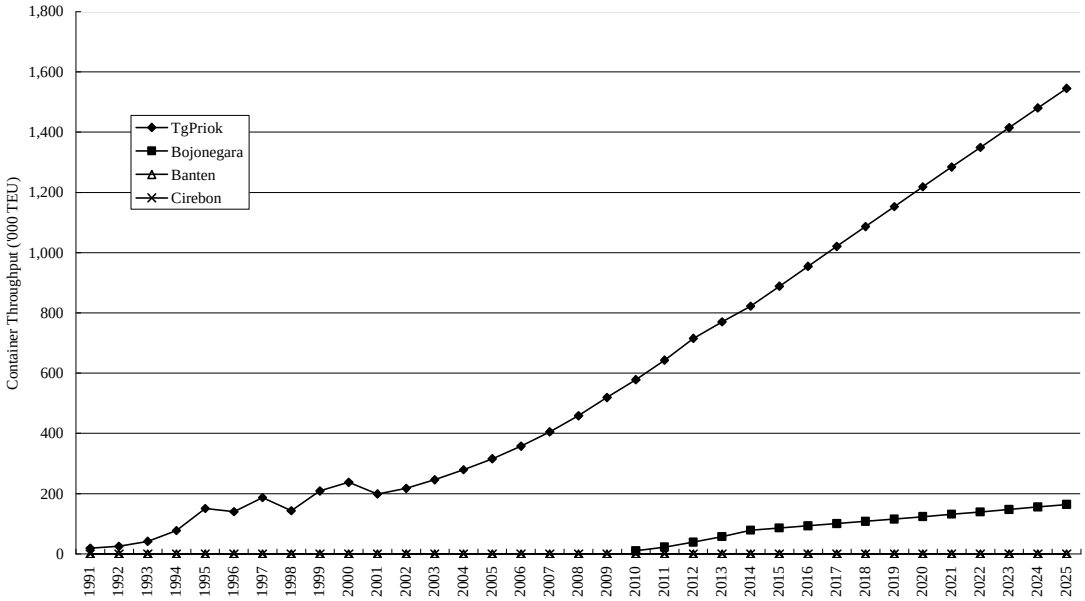


Figure 9-E-5 Functional Allotment of Inter-island Container

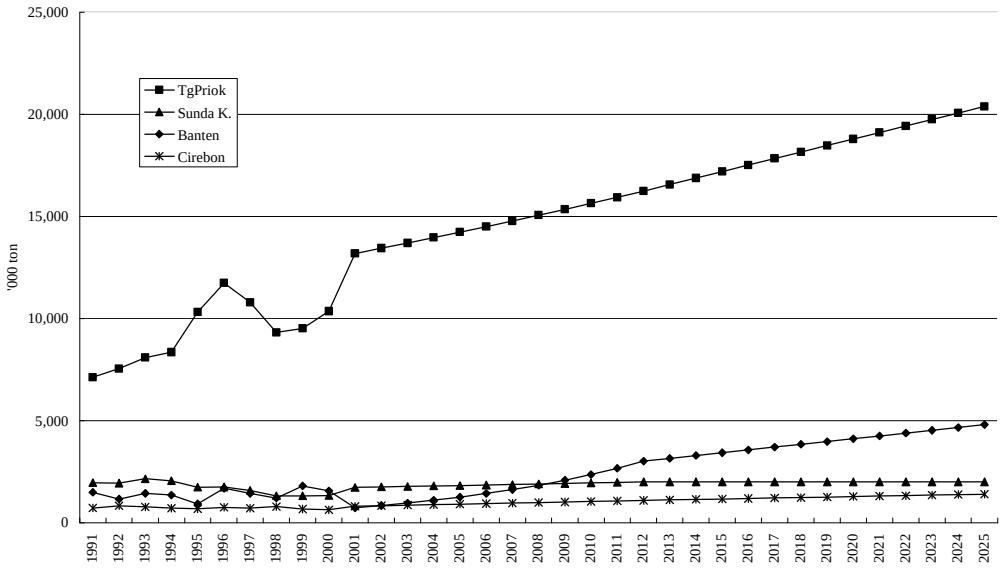


Figure 9-E-6 Functional Allotment of General and Bag Cargo

9-E-4 Automobile Products

252. Considering that major car assembling factories are located just behind and on the east side of Tanjung Priok along the Jakarta – Cikampek toll road, it is natural that the automobiles should be handled at Tanjung Priok.

253. The Study team initially examined the following four alternatives as an automobile terminal development site. It is considered that the location at Tanjung Priok should come first viewing from its hinterland, however, Bojonegara has been included among the alternatives for comparison. Other sites at the exiting piers of Tanjung Priok would not be suitable for a car dedicated terminal due to the limits of yard.

- Alternative-1: Establish a car terminal in Ancol reclamation project area
- Alternative-2: Converted DKB-IV's unused area into a car terminal
- Alternative-3: Dedicated use of JICT-2 for a car terminal
- Alternative-4: Establish a car terminal in the Bojonegara new port

254. Each alternative is evaluated from Accessibility, Logistic cost, Project cost and Project period (Time of realization). Based on the evaluation as shown Table 9-E-1, Alternative-2 could be the best choice among the alternatives both time-wise and cost-wise. Alternative-1 is difficult to choose at the moment because of the long period required to realize it. Alternative-3 is not realistic because it would be almost impossible to convert half of a container terminal to a car terminal because container handling is more profitable than automobile handling. Alternative-4 is also difficult to choose at the moment in terms of accessibility as well as the time of realization.

Table 9-E-1 Preliminary Comparison for Developing an Automobile Terminal

	Alternative-1	**Alternative-2**	**Alternative-3**	**Alternative-4**
	Tanjung Priok			Bojonegara
	Ancol	DKB-IV	JICT-2	
Accessibility from Karawang	Turn around time = around 3hr	Turn around time = around 3hr	Turn around time = around 3hr	Turn around time = around 7hr (need to develop an access road)
Logistic Cost	Not High	Not High	Not High	High
	The location in Bojonegara makes the transportation cost almost double against Tanjung Priok. The difference will amount to 5-10 billion Rp for 50,000 units, which will be significant value considering the company's ROE. (Assuming transportation cost from Karawang to Tanjung Priok is around 100,000 ~ 150,000Rp per unit)			
Project Cost	High	Not high (But need to pay some compensation to DKB)	Low (But high in compensation for the profit of container terminal use)	High
Environment	Nothing remarked because of offshore location.	Located in a busy area in the port. Mixed transport with other bulk cargo.	Isolated area located in the special cargo zone and less congestion. Need to check the influence from the DKB activity.	Nothing remarked because of being located thinly-populated area. Need to check the influence from neighboring steel and chemical industry.
Project Period	Long	Short	Expected to be long. (Difficult to coordinate with JICT until demand of 2 berths is elicited. Unfavorable operation of 1 berth for container handling.)	Long
Coordination with the existing use and plan	Need coordination and modification on the existing reclamation project.	Need coordination with DKB, however, the business is not active and some part of the land has not been utilized. The land itself is owned by IPC-II, and leased to DKB free of charge. Also need to coordinate with IBRA because DKB is now under the control of IBRA.	Need coordination with existing use of container handling. Depending on JICT's agreement on conversion and/or handover of container terminal.	Nothing remarked.
Evaluation	**Poor** (Time required for realization is too long given the urgent need of the terminal.)	**Best** (Better than other alternatives both time-wise and cost-wise.	**Not realistic** (Almost impossible to convert a half of existing container terminal to a car terminal from profit view.)	**Poor** (The weakness of this alternative is its location. Time required for of realization is also too long given the urgent need of the terminal.)

9-E-5 Summary

255. Based on the above examinations as well as functional allotment of other cargoes, the results are summarized in Table 9-E-2 and Table 9-E-3.

Table 9-E-2 Summary of Functional Allotment among the Port in Western Java Area

	Tanjung Priok	Bojonegara	Ciwandan	Merakmas	Cirebon	(Merak)
Export/Import Container	+++	+++	+	+	+	-
Domestic Container	+++	+	-	-	-	-
Transshipment Container	++	++	-	-	-	-
Conventional Cargo	+++	+++	+++	+	+++	-
Passenger	+++	-	-	-	+	-
Ro-Ro Cargo	++	++	-	-	-	+++
Car Cargo	+++	+	-	-	-	-

+++: indicates principal ports
++: indicates ports which may become principal ports in future
+: indicates ports which may handle a small portion of cargo in future
-: indicates that cargo will not be handled

Table 9-E-3 Summary of Cargo Volume Allotment among the Port in Western Java Area

Unit: 000'ton/TEU

	Tanjung Priok		Banten*		Bojonegara		Cirebon		Sunda K		Total	
	2012	2025	2012	2025	2012	2025	2012	2025	2012	2025	2012	2025
Container (TEU)												
Import/Export	3,631	3,776	54	100	525	2,581	22	173			4,232	6,630
Domestic Container	715	1,545			39	164					754	1,709
Conventinal Cargo (ton)	38,894	54,564	43,801	83,284	753	1,601	3,402	5,980	4,000	4,000	90,850	149,429
General & Bag Cargo	16,246	20,389	2,258	3,202	753	1,601	1,092	1,397	2,000	2,000	22,349	28,589
Dry Bulk Cargo	11,004	20,129	20,288	33,908			2,160	4,433			33,452	58,470
(Public)	6,563	10,720									6,563	10,720
(Special)	4,441	9,409									4,441	9,409
Liquid Bulk Cargo	11,644	14,046	21,255	46,174			150	150			33,049	60,370
(Public)	2,386	3,480									2,386	3,480
(Special)	9,258	10,566									9,258	10,566
Others									2,000	2,000	2,000	2,000
Newly Emerged Cargo												
Pure Cars (000'cars)	207	391									207	391

*) Banten includes Ciwandan, Merakmas and other special wharves.

9-F. PROPOSED DEVELOPMENT SCENARIO

256. Based on the functional allotment described in the previous section, proposed development scenario of the ports in Western Java area is as follows:

Proposed Development Scenario

			Short Term	Long Term
Tanjung Priok	Container	Import/Export	• Start the operation of new berths (675m, -14m) in JICT & Koja. • Increase the capacity of quay by improving navigational condition and handling productivity in order to cope with the demand until operation at Bojonegara container terminal begin.	(Nothing special development)
		Domestic	• Increase the capacity of quay by improving navigational condition and handling productivity • Convert some warehouses to container yard. • Start the operation of a new dedicated domestic container terminal	• Expand the terminal according to the demand
	Automobile Products		• Start the operation of a new dedicated automobile terminal	• Expand the terminal according to the demand
	Conventional Cargo		• Increase the quay side capacity by improving navigational condition and handling productivity. • Increase the yard capacity by demolishing some warehouses • Re-organize cargo handling zones by cargo type.	• Develop wharves in a new area according to the demand.
	Passenger		• Start the operation of a new passenger terminal at a newly developed port area.	• Expand the terminal according to the demand
Bojonegara	Container (Import/Export)		• Start the operation of a newly established container terminal	• Expand the terminal according to the demand
	Conventional Cargo		• Start the operation of a new Multi Purpose terminal for regional development in Bojonegara.	• Expand the terminal according to the demand of regional development in Bojonegara.
	Ro-Ro Cargo		Start the operation of a new Ro-Ro cargo terminal	
Banten/Ciwandan	Container (Import/Export)		• Cope with the demand overflowing from Tanjung Priok until operation at Bojonegara container terminal begin.	(Nothing special development)
	Conventional Cargo		• Develop wharves according to the demand of Banten province.	• Expand wharves according to the demand of Banten province and some part of West Java.
Banten/Merakmas	Container (Import/Export)		• Cope with the demand overflowing from Tanjung Priok until operation at Bojonegara container terminal begin.	(Nothing special development)
	Conventional Cargo		• Cope with the demand of Banten province.	(Nothing special development)
Cirebon	Container (Import/Export)		Utilize the multi-purpose terminal and realize feeder services for the demand of Cirebon area. Need to introduce gantry cranes.	
	Conventional Cargo		• Develop wharves according to the demand of Cirebon area.	• Develop wharves according to the demand of Cirebon area and some part of West Java.