The Republic of Indonesia
Directorate General of Sea Transportation
Ministry of Transportation

Final Report on Project for Master Plan Study on Port Development and Logistics in Greater Jakarta Metropolitan Area in The Republic of Indonesia

Summary

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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

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ABBREVIATIONS

ADPEL	Administrator Pelabuhan (Port Administrator)
AFTA	ASEAN Free Trade Area
ALOS	Advanced Land Observation Satellite; an observation satellite launched by JAXA (Japan Aerospace Exploration Agency) on 24 January 2006.
AMDAL	Analisis Mengenai Dampak Lingkungan (Environmental Impact Assessment)
ANDAL	Analisis Dampak Lingkungan (Environmental Impact Analysis)
APEC	Asia-Pacific Economic Cooperation
ASEAN	The Association of Southeast Asian Nations
ASTM	American Society for Testing and Materials
Aus-AID	Australian Agency for International Development
BAKOSURTANAL	Badan Koordinasi Survei dan Pemetaan Nasional; a governmental agency of Indonesia for land survey and mapping
BAPEDAL	Badan Pengendalian Dampak Lingkungan (Environmental Control Agency)
BAPPENAS	Badan Perencanaan Pembangunan Nasional (National Development Planning Agency)
BMKG	Badan Meteorologi Klimatologi dam Geofisika (Meteoroligical, Climatological and Geophysical Agency)
BPJT	Badan Pengatur Jalan Tol (Indonesian Toll Road Authority)
BPS	Badan Pusat Statistik (Indonesian Statistic Agency)
CBU	Completely Built-Up
CCTV	Closed Circuit Television
CDL	Chart Datum Level
CEPT	Common Effective Preferental Tariffs
CFC	Conversion Factor for Consumption
CFS	Container Freight Station
CFSL	Conversion Factor for Skilled Labor
CFUL	Conversion Factor for Unskilled Labor
CGI	Consultative Group on Indonesia
CIF	Cost, Insurance and Freight
CKR	Cikarang
CLM	Cilamaya
CMEA	Coordinating Ministry of Economic Affairs
CPO	Crude Palm Oil
CBU	Complete-Built-Unit
DAOP	Daerah Operasi (Operational Area)
DEL	Diesel Electric Locomotives
DENR	Department of Environment and Natural Resources
DGLC	Directorate General of Land Communications
DGPS	Differential Global Positioning System
DGR	Directorate General of Railways
DGR	Directorate General of Railways
DGST	Directorate General of Sea Transportation
DKI	Special Capital City District
DKP	Departemen Kelautan dan Perikanan (Ministry of Marine Affairs and Fisheries)
DL	Datum Level
DLT	Design Low Tide Level
DNIT	National Department of Transport Infrastructures

DTV	Daily Traffic Volume
DWT	Dead Weight Tons
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
FAO	Food and Agriculture Organization
FIRR	Financial Internal Rate of Return
FOB	Free On Board
GAIKINDO	Gabungan Industri Kendaraan Bermotor Indonesia (Association of Indonesian Automotive Industries)
GDB	Gedebage
GDP	Gross Domestic Product
GEA	Governmental Environmental Authority
GEIP	GHG (Greenhouse Gas)
GOI	Government of Indonesia
GOJ	Government of Japan
GPS	Global Positioning System
GRDP	Gross Regional Domestic Product
HHWL	Highest High Water Level
HWL	High Water Level
IBA	Important Bird Areas
ICB	Interlocking Concrete Block
ICD	Inland Container Depot
IPC II	Indonesia Port Corporation II
IEE	Initial Environmental Examination
IMF	International Monetary Fund
IMO	Infrastructure Maintenance and Operation
IRR	Internal Rate of Return
ISPS	International Ship and Port Facility Security
ITB	Institut Teknologi Bandung (Bandung Institute of Technology)
JBIC	Japan Bank for International Cooperation
JCT	Jakarta Container Terminal
JICA	Japan International Cooperation Agency
JICT	Jakarta International Container Terminal
JIS	Japan Industrial Standard
JIT	Jakarta Container Terminal
JIUT	Jakarta InterUrban Toll Road
JKABODETABEK	Greater Jakarta covering Jakarta, Bogor, Depok, Tangerang and Bekasi
JKABODETABEKPUNJUR	Greater Jakarta covering Jakarta, Bogor, Depok, Tangerang, Bekasi, Puncak and Cianjur
JORR	Jakarta Outer Ring Road
JORR2	second Jakarta Outer Ring Road
KA-ANDAL	Kerangka Acuan Analisis Dampak Lingkungan (Term of Referrence for Environmental Impact Analysis
KfW	Kreditanstalt fur Wiederaufbau
KKPPI	Komite Kebijakan Percepatan Penyediaan Infrastruktur (National Committee on Acceleration of Infrastructure Provision)
KN	Kilo Newton
KOJA	one of Container Terminal Companies in Jakarta
LA	Loan Agreement
LCP	Laem Chabang Port
LL	Liquid Limit
LLWL	Lowest Low Water Level
LOA	Length Overall

MAL	Mustica Alam Lestari
MSL	Mean Sea Level
MT	Metric Ton
MTI	Multi Terminal Indonesia
MW	Megawatt
NKB	North Kalibaru area
NSW	National Single Window
O&M	Operation and Maintenance
O&M	Operation and Maintenance
OCR	Over Consolidated Ratio
OD	Origin and Destination
ODA	Official Development Assistance
ONWJ	Off Shore North West Jawa
PABX	Private Automatic Branch Exchange
PBI	Indonesian Standard
Pc	Pre-consolidation stress
PC	Prestressed Concrete
PCU	Passenger Car Unit
Pelindo	Indonesian Port Corporation
PIANC	Permanent International Association of Navigation Congress
PL	Plastic Limit
PLN	National Electric Corporation
PLTGU	Pembangkit Listrik Tenaga Gas Uap (Indonesian: Integrated Gasification Combined Cycle Plants)
POO	Pasoso
PPP	Public Private Partnership
RPJMN	Rencana Pembangunan Jangka Menengah Nasional (National Medium-term Development Plan)
RPJPN	Rencana Pembangunan Jangka Panjang Nasional (National Long-term Development Plan)
PRT	Port Related Traffic Volume
PSO	Public Service Obligation
PT. KAI	PT. Kereta Api Indonesia (Persero), Indonesian Railways Corporation
PVD	Plastic Vertical Drain
QGC	Quay Gantry Crane
R.p	Rupiah
RBD	Refined, Bleached and Deodorized
RBDPO	Refined, Bleached and Deodorized Palm Oil
RC	Reinforced Concrete
RKL	Rencana Pengelolaan Lingkungan (Environmental Management Plan)
RMCIP	Risk Management Committee on Infrastructure Provision
RMU	Risk Management Unit
ROE	Return on Equity
ROI	Returen on Investment
ROW	Right of Way
RPL	Rencana Pemantauan Lingkungan (Environmental Monitoring Plan)
RTG	Rubber Tired Gantry crane
RTRW	National, Provincial and Regional/Municipal Spatial Plan
SCF	Standard Conversion Factor
SE	South-East
SEA	Strategic Environmental Assessment
SEZ	Special Economic Zone

SOE	State Owned Enterprises
SPM	Suspended Particulate Matter
SPP	Steel Pipe Pile
SPT	Standard Penetration Test
SRT	State Railway of Thailand
SSP	Steel Sheet Pile
STEP	Special Terms for Economic Partnership
SUPAS	Intercensal Population Survey
TAC	Track Access Charge
TEU	Twenty-foot Equivalent Unit
TgPA	Tanjung Priok Access Road
TIC	Tangerang International City
TJTR	Trans Java Toll Road
TPK	Terminal Petikemas (Container Terminal)
TSHD	Trailing Suction Hopper Dredger
TSP	Total Suspended Solids
TSS	Traffic Surveillance System
TTV	Through Traffic Volume
UKL/UPL	Upaya Pengelolaan Lingkungan - Upaya Pemantauan Lingkungan (Environmental Management Efforts - Environmental Monitoring Efforts)
ULCS	Ultra-Large Container Ships
UNDP	United Nations Development Program
UNPF	United Nations Population Fund
URTP	Urgent Rehabilitation Project of Tanjung Priok Port
VAT	Value Added Tax
VCR	Vehicle Capacity Ratio
VLCC	Very Large Crude Carrier

CONTENTS

Page

EXECUTIVE SUMMARY

1. Background

Tanjung Priok Terminal under Tanjung Priok Port is the sole principal terminal which can provide transport services for international container in the western Java Area as well as for domestic containers, and has been playing important and indispensable roles in supporting the national economy, particularly in the Jakarta Greater Metropolitan Area. The volume of container cargo of the port has been ever increasing since the introduction of container transport and may exceed her physical container handling capacity within several years. Hence, a new container terminal needs to be developed as soon as possible through taking account of the following issues.

- There is no space for the new container terminal in the existing port area of Tanjung Priok Port.
- Although several alternatives for the new container terminal have been proposed already by various organizations, precise evaluation to prioritize these alternatives has not been conducted yet.
- Available data/information on project sites including topographic, geologic and environmental data of these development alternatives is limited
- Accessibility, road/railway to/from the new container terminal has to be taken into consideration.
- Public Private Partnership (PPP) scheme based on the new Shipping Law (No.17, 2008) and Government Regulation (No.61, 2009) has to be taken into consideration.

Besides the issue of container handling capacity, Tanjung Priok Terminal has another problem concerning port logistics, namely, traffic congestion in the Greater Jakarta Metropolitan Area. This traffic congestion has adversely affected not only port logistics but also total economic activities in the region. Since improvement of rail accessibility to the port could be one of the solutions to ease the traffic situation, the improvement plan of railway access connecting Tanjung Priok Port should be examined.

Under such situation, in response to the official request of the government of the Republic of Indonesia (hereinafter referred to as "GOI), the Government of Japan (hereinafter referred to as "GOJ) decided to conduct "the Project for Master Plan Study on Port development and Logistics in Greater Jakarta Metropolitan Area" (hereinafter referred to as "the Study")

Accordingly, the Japan International Cooperation Agency (hereinafter referred as "JICA") the official agency responsible for the implementation of the technical cooperation programs of GOJ, has undertaken the Study in close cooperation with the authorities concerned of GOI.

2. Objectives of the Survey

The objectives of the Study are:

To evaluate and prioritize development alternatives for a new container terminal

To formulate the master plan for port development together with access infrastructure development/improvement in/around the Greater Jakarta Metropolitan Area

To transfer technology to Indonesian counterparts

3. Outline of the Study

3.1 Master Plan and Phased Implementation Plans of Tanjung Priok Port

The projected cargo volumes, facility plans and construction costs of the port expansion plans are outlined in the table below

Table 1 Master Plan and its Phased Plans of Tanjung Priok Port

Items of Plans			Master Plan	First Phase	Second	Third Phase
1. Target year			2030	mid 2010's	2020	2030
2. Forecast cargo volume	International containers (million		13.4	5.7	7.3	13.4
	Domestic containers (million TEUs)		4.4	1.5	2.3	4.4
	Conventional cargoes (million MTs)		49	35	39	49
3. Facility components of Infrastructures						
North Kalibaru	Access Channel	Bottom width (m)	310	310	-	-
		Water depth (m)	15.5	15.5	-	-
	Breakwater	Length (m)	1,020	1,020	-	-
	Seawalls	Length (m)	2,420	2,420	-	-
	Revetment	Length (m)	360	360	-	-
	International Container Terminal	Berth length (m)	1,200	1,200	-	-
		Water depth (m)	15.5	15.5	-	-
		Terminal area (ha)	77	77	-	-
		Capacity (million TEUs per annum)	1.9	1.9	-	-
	Petroleum Terminal	Berth length (m)	1,080	-	-	1,080
		Water depth (m)	15.5	-	-	15.5
		Terminal area (ha)	109	-	-	109
	Dry Bulk Terminal	Berth length (m)	915	-	-	915
		Water depth (m)	15.5	-	-	15.5
		Terminal area (ha)	18	-	-	18
	Land area(ha)		214	87	-	127
	Access bridge	Length (m)	1,100	1,100	-	-
	Land road	Length (m)	950	950	-	-
Cilamaya	Access Channel	Bottom width (m)	310	-	310	-
		Water depth (m)	15.5	-	15.5	-
	Breakwater	Length (m)	2,120	-	2,120	-
	Seawalls	Length (m)	4,680	-	4,680	-
	Revetment	Length (m)	1,630	-	1,090	540
	International Container Terminal	Berth length (m)	4,320	-	2,160	2,160
		Water depth (m)	12.5~15.5		12.5~15.5	12.5~15.5
		Terminal area (ha)	173	-	87	86
		Capacity (million TEUs per annum)	7.5	-	3.2	4.3
	Multi- purpose Terminal	Berth length (m)	590	-	-	590
		Water depth (m)	9	-	-	9
		Open yard (ha)	15	-	-	15
	Port service boats basin	Berth length (m)	1000	-	-	1000
		Water depth (m)	4	-	-	4
	Land area(ha)		290	-	130	160
	Access bridge	Length (m)	950	-	800	150
	Access road	Length (m)	30,600		30,600	-
4. Construction costs (billion Rp.)			37,292	8,744	15,736	12,811

Source: JICA Study Team

Note: In addition to infrastructures, super structures and equipment are included in the above estimated costs.

4. Measures for Improvement of Railway Access to Tanjung Priok Terminal for Container Transport (Phases I and II)

So as to contribute to the alleviation of current serious road congestion in terms of time-value-oriented container transport from/to Tanjung Priok Terminal through the improvement of the railway access, the following measures have been proposed:

- To expand traffic capacity of railways as much as possible under the practical restriction of the track usage together with commuter and passenger trains. In this standpoint, it is advisable to introduce high performance locomotive so that freight trains will not obstruct commuter train or passenger trains and consequently increase the line capacity and reduce the travelling time.
- To realize so-called Inland Clearance Depots (ICDs) at Cikarang and Gedebage Dry Ports with the stationing of customs officers, which is essential to promote railway transport for containers,
- To install sufficient railway sidings at New Tanjung Priok Railway Terminal to be constructed so as to reduce uneconomic traffic of railway wagons without transporting any container boxes through its terminal gate
- To develop Pasoso Terminal as an intermodal node between road and railway transport by taking account of the preferable linkage with the New Tanjung Priok Railway Terminal providing diverse services for customers' including CFS's function at Pasoso.
- Needless to say, to accelerate land purchase for tracks between Pasoso and Tanjung Priok Terminal as planned.

The phased implementation plans for railways are shown in Table 2.

Table 2 Phased Plans of Railway Access to Tanjung Priok Terminal

Items of Plan		First stage	Second stage
Target Year		mid 2010's	2020
2.Target of Allocated Railway Traffic for containers (TEUs)	Tanjung Priok - Gedebage	23,360	35,040
	Tanjung Priok - Cikarang	233,360	350,400
	Total	256,960	385,440
3.Facility components of railway investment			
Infrastructures	Tanjung Priok Terminal Facility	1 set	-
	Pasoso Stabling Track	1 set	-
	Tanjung Priok Stabling Yard	-	1 set
	Cikarang Dry Port Access Track	1 set	-
Rolling Stock	Locomotives	12	3
	Wagons	302	50
4. Investment cost (billion Rp)		982	56.3
5.Financial returns (FIRR)	Return on Investment (ROI)	3.59%	
	Return on equity (ROE)	55.76%	

5. SEA for the Master Plan

In accordance with Law No.32/2009, Strategic Environmental Assessment (SEA) was conducted to integrate environmental and social consideration into the master plan.

In the SEA study, two series of evaluations were conducted to provide environmental aspects on formulating the master plan for the new international container terminal. In the first step of the evaluation, the nine potential candidate sites have been narrowed down into the three alternative sites for the new terminal through the screening by various factors by taking account of environmental and social considerations. Then in the second step, the three alternative development options at the selected sites have been compared based on the degree of the environmental impacts that may be caused by each of the selected alternative options.

Considering the results of the evaluation, new terminals have been planned in North Kalibaru and Cilamaya in the master plan. Towards implementation of the developmental plans, necessary study for EIA and mitigation measures have been extracted and recommended to be conducted in the next stages as well as developing resettlement plans.

6. Economic Appraisal of the Proposed Key Projects

6.1 Construction Project of North Kalibaru Container Terminal (Phase I)

A comparison between the “Without-the-project” case and the “With-the-project” case has been carried out to evaluate the economic feasibility of the construction project of North Kalibaru Container Terminal. The resulting economic internal rate of return (EIRR) for the above mentioned project has been estimated at 53.0% which exceeds the general criterion to assess the economic feasibility.

6.2 Construction Project of Cilamaya Container Terminal (Phases II and III)

Economic analysis was conducted to appraise the feasibility of the project from the viewpoint of the national economy. Two-step methodology for the economic feasibility was adopted in this study. For the first step Cost Minimization method was applied for ranking the project options. By comparing the combined cost of construction cost and land transportation cost, Option 2 (Cilamaya Terminal) was selected as being the lowest cost option through this process. As the second step, EIRR method was applied to the selected option, i.e., Option 2, to determine the viability of the project. The resulting EIRR of the Option 2 was 46.2%.

7. Financial Appraisal and Recommended PPP Scheme

7.1 Construction Project of North Kalibaru Container Terminal (Phase I)

There are many presumptions in the financial appraisal of the project including “concession term and fee”, “revenue and expenditure of port authority and terminal operator” and “financial source”. Financial analysis was conducted in many cases and various FIRRs were obtained. Among them, the most preferable and financially viable FIRR for port authority and terminal operator are shown in the table below;

Account	FIRR
Port Authority	4.27 %
Terminal Operator	17.2 %

These FIRRs are obtained by introducing the following PPP scheme.

Organization	Responsibility
Port Authority	Breakwaters, Channels and basins, Seawalls, Reclamation, Soil Improvement, Port Inner Road, Utility Facilities including X-ray Inspection Facilities, Drainage, Lighting and Power Supply. Port Authority should obtain soft loan.
Terminal Operator	Quay Walls, Yard Pavement, Passage Pavement, Buildings for Operation, Container Handling Equipment and Operation System, Terminal Gate Debt/Equity=60/40

7.2 Construction Project of Cilamaya Container Terminal (Phases II and III)

Financial analysis was conducted based on simplified premises. The most preferable and financially viable FIRR for port authority and terminal operator are shown on the table below;

Account	FIRR
Port Authority	2.94 %
Terminal Operator	14.3 %

These FIRR are obtained by introducing the following PPP scheme.

Organization	Responsibility
Port Authority	Breakwaters, Channels and basins, Seawalls, Reclamation, Soil Improvement, Port Inner Road, Utility Facilities including X-ray Inspection Facilities, Drainage, Lighting and Power Supply. Port Authority should obtain soft loan.
Terminal Operator	Quay Walls, Yard Pavement, Passage Pavement, Buildings for Operation, Container Handling Equipment and Operation System, Terminal Gate

8. Road Map for the Implementation of the Master Plan

8.1 Port

Presidential regulation No.13/2010 which amends Presidential Regulation No.67/2005 and National Development Planning Agency Regulation No.4/2010 which provides general guidance for the performance of PPP were issued last year. Taking these new regulations and other policies and regulatory framework for Port PPP into consideration, necessary procedures could be classified into the following categories.

- Approval and notification of Port Master Plan stipulated by the New Shipping Law
- Identification of PPP projects which are parts of the Port Master Plan by the Ministry of Transport
- Approval and necessary coordination among the government
- Procurement of business entities
- Implementation and Management of PPP project

Besides them, procurement of funding source, particularly soft loan, is another issue to be tackled. Required procedures and activities taken by public and private sectors are described in the main report more in detail.

8.2 Access Road

(1) For North Kalibaru (Phase I)

The access road is planned to utilize the existing road for minimizing resettlement and to install a signalized intersection for connecting with the existing arterial road (Jl Cilincing Raya).

For implementing the proposed project, the existing road of which land is managed by PELIND 2 is required to be widened for smooth and safe running of container trucks. DGST through the Ministry of Transportation (MOT) shall request the Ministry of the State Owned Companies (MOSOC) to compensate residents occupying the area along the road.

(2) For Cilamaya Terminal (Phase II)

For implementation of the new container terminal development at Cilamaya the following measures will be taken.

Step	Agencies concerned	Actions to be taken
1st step	Provincial Government of West Java and DGST	Decide to implement the development of a new container terminal at Cilamaya and ratify through the provincial legislature with the assistance of DGST
	Provincial government West Java, Council meeting by three ministries. Ministry of Public Works Ministry of Agriculture Ministry of Environment	1. West Java provincial government asks to open the council meeting by three ministries' representatives and to discuss the necessity, feasibility, assessment of reasonableness of land acquisition, environmental compensation for development of a new container terminal at Cilamaya together with the construction of toll road dedicated for access to terminal. 2. Upon the approval of the council, the provincial government of West Java shall start the land acquisition needed for road construction.
2nd step	Provincial government West Java, Directorate General of Highway, Ministry of Public Works	The provincial government shall request DGH for approval of the road development project as toll road dedicated to access to terminal and to conduct the engineering study including EIA for implementation of road construction works.
	Directorate General of Highway, Ministry of Public Works	1. Upon the agreement between DGH and provincial government, DGH will conduct engineering study including field surveys, basic design of a dedicated toll road, the route of the road construction, the scope of land acquisition, project cost estimates and feasibility of the road construction. 2. Based on the findings, DGH will call public tender for construction of the proposed road by concession scheme.

CONCLUSIONS

1. Necessity of the Development of Tanjung Priok Port

Tanjung Priok Port is managed by its Port Authority and geographically situated along the northern coast extending from Banten Province to DKI Jakarta and West Java Province.

The volume of cargoes passing through Tanjung Priok Terminal has been steadily increasing year by year, reaching around 3.8 million TEUs of containers (2.7 million TEUs in international containers and 1.1 million TEUs in domestic containers) and 27.2 million tons in 2009, showing respective annual average growth rates of 7.6% and 2.7% during the past 15 years..

The port is connected with the hinterland covering Banten Province, DKI Jakarta and West Java Province by land, and with the foreland of both the worldwide trade partners of Indonesia and the islands of Indonesia by sea.

A lot of industrial estates in which manufacturing industries including those of vehicles, electrical appliances and fine chemicals are in operations are located within the port hinterland and along the toll roads radiating in various directions from the centre of Jakarta,. The port is serving for these industries through handling of containers at its marine terminals

The port is also serving heavy industries such as cement and steel manufactures, as well as food industries such as four mills and crude palm oil plants by handling their port-related cargoes at its marine terminals connected with the islands of Indonesia through intra-Indonesia sea routes.

In addition, the port is also serving the provision of consumer goods for the Jakarta Metropolis by handling mainly containers at its marine terminals.

Thus, the port is greatly contributing to economic activities as a principal port in the Jakarta Metropolitan Area.

The port, however, has the following bottlenecks and disadvantages that need to be overcome with a view to meeting the above-mentioned expectations.

- Shortage of the port facilities including the number of berths, yard space and cargo-handling equipment, especially in container handling both for international and domestic containers,
- Insufficient water depth and space of turning basins especially for large international container ships and petroleum products tankers,
- Excessive congestion on port access roads that cause delays for international container transport
- Environmental burden on urban areas in the vicinity of the existing Tanjung Priok Terminal by port activities such as the scattering of dust cargoes including coal and sand

Thus, to meet the ever increasing demand for the future through resolving current problems and disadvantages mentioned above, it is necessary to implement a comprehensive development of Tanjung Priok Port covering both handling of containers and conventional cargoes in the framework of its Master Plan on long-term basis made by taking account of limited and valuable spaces in both waters and land.

In the Master Plan, special attention needs to be paid on the development of international container terminals because of its direct linkage with competitiveness of Indonesian export-oriented industries within the global market as well as an improvement in the standard of living through imports of consumer goods in the port hinterland.

Moreover, another special attention needs to be paid on the current serious road congestion that is predicted to further deteriorate for the future and is clearly a critical condition to justify intermodal transport of containers connecting road as link and port as node.

2. Master Plan (Target Year: 2030)

(1) Construction of New International Container Terminals

In the target year of the Master Plan, 2030, the volume of international containers to be handled at Tanjung Priok Terminal Port has been forecast at 13.4 million TEUs, 4.9 times as much as the volume in 2009, due to the anticipated economic growth of Indonesia for the future.

The maximum container-handling capacity of the existing international container terminals, Jakarta Container Terminal (JCT) and KOJA at Tanjung Priok Terminal, is estimated as 4.0 million TEUs per annum under the condition of the conversion of usage of JICT II and MTI terminals from international containers to domestic containers, and hence new container terminals with the capacity of 9.4 million TEUs per annum in total corresponding to an excess capacity of to JCT and KOJA need to be prepared. The entire excess capacity of containers is planned to be split into the two portions, 1.9 million TEUs and 7.5 million TEUs, respectively.

To handle 1.9 million TEUs, and 7.5 million TEUs, construction of new terminal at off-North Kalibaru and at off-Cilamaya Coast is proposed respectively..

1) Construction of the Container Terminal at off North Kalibaru

It is proposed to construct a new container terminal at off North Kalibaru with continuous berths and container yards installed with container-handling equipment including container gantry cranes (see Figure 1).

Together with the construction of the container terminal, the construction of an access bridge has been proposed to connect the off-shore container terminal and the existing land.

2) Construction of the New Cilamaya Terminal off Karawan Coast

It has been proposed to construct the new Cilamaya Terminal off Karawan Coast with 19 berths and container yards installed with container handling equipment including container gantry cranes. In addition, a new access channel has been proposed to be constructed

Together with the construction of the container terminal, the construction of an access bridge is proposed to connect the off shore container terminal and the existing land (see Figure 2).

(2) Construction of a New Road having an Access to the Cilamaya Terminal

Corresponding to the establishment of the new Cilamaya Terminal, it is proposed to construct a new access toll road to connect the new terminal and the Jakarta-Cikampec toll road through Karawan industrial estates (see Figure 3).

(3) Project Cost of the New International Container Terminal

The total project cost of the new international container terminals composed of North Kalibaru Container Terminal and Cilamaya Container Terminal including the access road to the Cilamaya Container Terminal has been roughly estimated at 37.3 trillion Rp.

(4) Construction of a New Petroleum Terminal

New petroleum terminal is proposed to move existing petroleum terminal and for other newly required petroleum firms to make apart from the densely populated areas.(see Figure 1).

(5) Construction of a New Dry Bulk Terminal

A new dry bulk terminal for dust bearing cargoes such as clinker, gypsum, coal and sand to move from the existing conventional wharves at off North Kalibaru with a view to decreasing mal-effects on densely-populated urban areas (see Figure 1).

(6) Redevelopment of the Existing Third Wharf of the Tanjung Priok Terminal Specialized for Domestic Containers

In the target year of the Master Plan, 2030, the volume of domestic containers to be handled at Tanjung Priok Terminal is forecast at 4.4 million TEUs, 4.0 times as much as the volume in 2009, due to the expected economic growth of Indonesia in the future.

To handle 4.4 million TEUs of domestic containers, it is proposed to convert JICT II and MTI terminals currently used for international container terminals into terminals for solely domestic containers. In addition, it is proposed to redevelop the Third Wharf of the Tanjung Priok Terminal as the wharf specialized for domestic containers with the introduction of container gantry cranes except for MAL Terminal (see Figure 1).

(7) Expansion of the Existing Car Terminal of the Tanjung Priok Terminal

In the target year of the Master Plan, 2030, the volume of vehicles as imports and exports to be handled at the Car Terminal within Tanjung Priok Terminal is forecast at 499,000 units, 3.3 times as much as the volume in 2009 (see Figure 1).

To handle 499,000 units of vehicles, it is proposed to expand the existing Car Terminal by the extension of the berth length and the expansion of car storage behind the berth.

(8) Port-related Waters Area Use Plans

As a part of the Master Plan of Tanjung Priok Port, port-related waters area use plans of Tanjung Priok Port is drafted in Jakarta Bay and off Carawan Coast in the vicinity of the project site at Cilamaya (see Figure 4 and Figure 5).

(9) Measures for Improvement of Railway Access to Tanjung Priok Terminal for Container Transport

Lack of capacity of road as well as large number of small inland container depots (ICD) scattering in the vicinity of the Tanjung Priok Terminal are causing enormous traffic jam in the vicinity of Tanjung Priok and along the expressway of Jakarta.

In this context, various plans for the improvement of the railway access to Tanjung Priok Terminal have been proposed under the assumption of future concentration of container terminals to Tanjung Priok Terminal.

It is, however, difficult to overcome the problem of traffic congestion only by improvement of railway access under the assumption of concentration to Tanjung Priok Terminal considering the operational restriction of mixed use both of passenger and cargo transport by railway.

In order to use existing railway system for transport of container cargo more effectively and to contribute to ease the traffic jam around Tanjung Priok Terminal as much as possible, following measures are proposed:

- extension of tracks from Pasoso station to the JICT yard to avoid the ineffective transport by trucks from Pasoso station to JICT
- to increase traffic capacity of railways under current operational restriction of mixed use for cargo train and passenger train, introduction of high performance locomotives is recommended to increase line capacity and to decrease travel

time

- to realize Inland Clearance Depots (ICDs) at Cikarang and Gedebage Dry Ports by stationing customs officers to promote railway transport for containerized cargo
- to install sufficient railway sidings at New Tanjung Priok Railway Terminal to be constructed in order to reduce uneconomical transport of railway wagons without transporting any container boxes through its terminal gate
- to develop Pasoso Terminal as inter-modal node between road and railway transport by providing diverse services for customers including CFS function at Pasoso
- to progress planed land acquisition for tracks between Pasoso and Tanjung Priok Terminal as fast as possible

(10) Railway Access to Cilamaya Terminal

Railway access to Cilamaya Terminal is not financially viable based on the resulting Return on Investment estimated by railway transportation cost per unit container including initial investment cost. Operation cost is much higher than road transport cost assuming that the geographical location of industries will remain unchanged.

Current industries have been located based on the cargo transport network formed with road network connecting to Tanjung Priok Terminal and with negligible role of railway transport.

In this context, there is some technical limitation in evaluation of feasibility of railway access to Cilamaya Terminal within the framework of this study on the assumption of the current locations of industries.

Railway transport for cargo is generally said to have advantage over road transport for the distance beyond several hundred km and distance from current location of industries to Cilamaya Terminal is less than 100 km.

In order to analyze the feasibility of railway access to Cilamaya Terminal, it is necessary to make more comprehensive analysis on the operational scheme of railway such as mixed operation both of cargo and passenger transport as well as analysis on possible change in the location of industries and residence as the source of demand on railway transport.

Railway access to Cilamaya Terminal is planned in the master plan with the hope of the viability in future considering the environmental constraints on the road transport, mixed use with passenger transport, and change of the location in the industries.

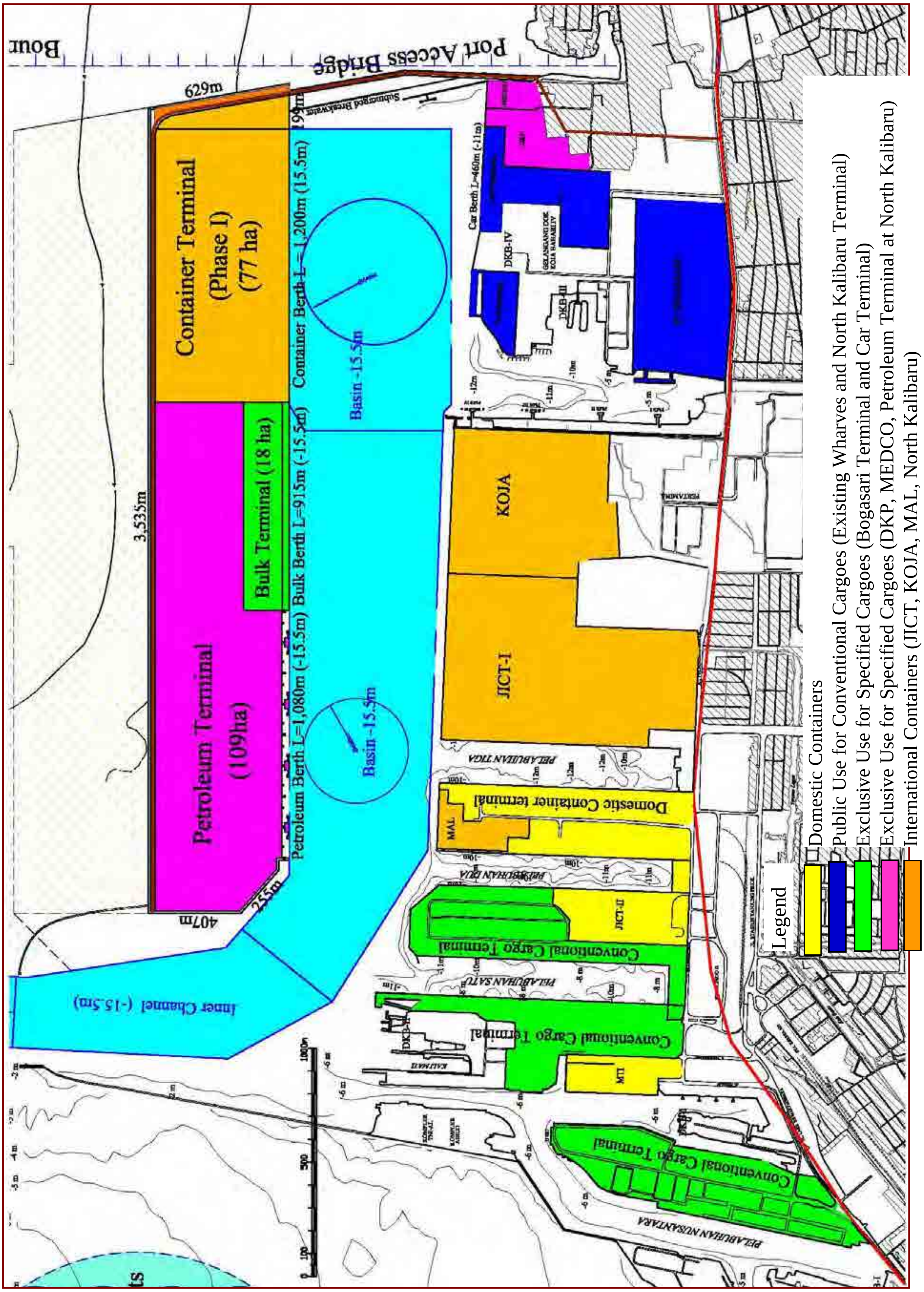
There are a lot of factors influencing on the modal split between road and railway such as change in fuel cost, wage and volume of transport demand etc and hence it is necessary to conduct feasibility analysis prior to the implementation of the railway access project.

(11) Strategic Environmental Assessment (SEA)

In accordance with Law No.32/2009, Strategic Environmental Assessment (SEA) was conducted to integrate environmental and social consideration into the master plan.

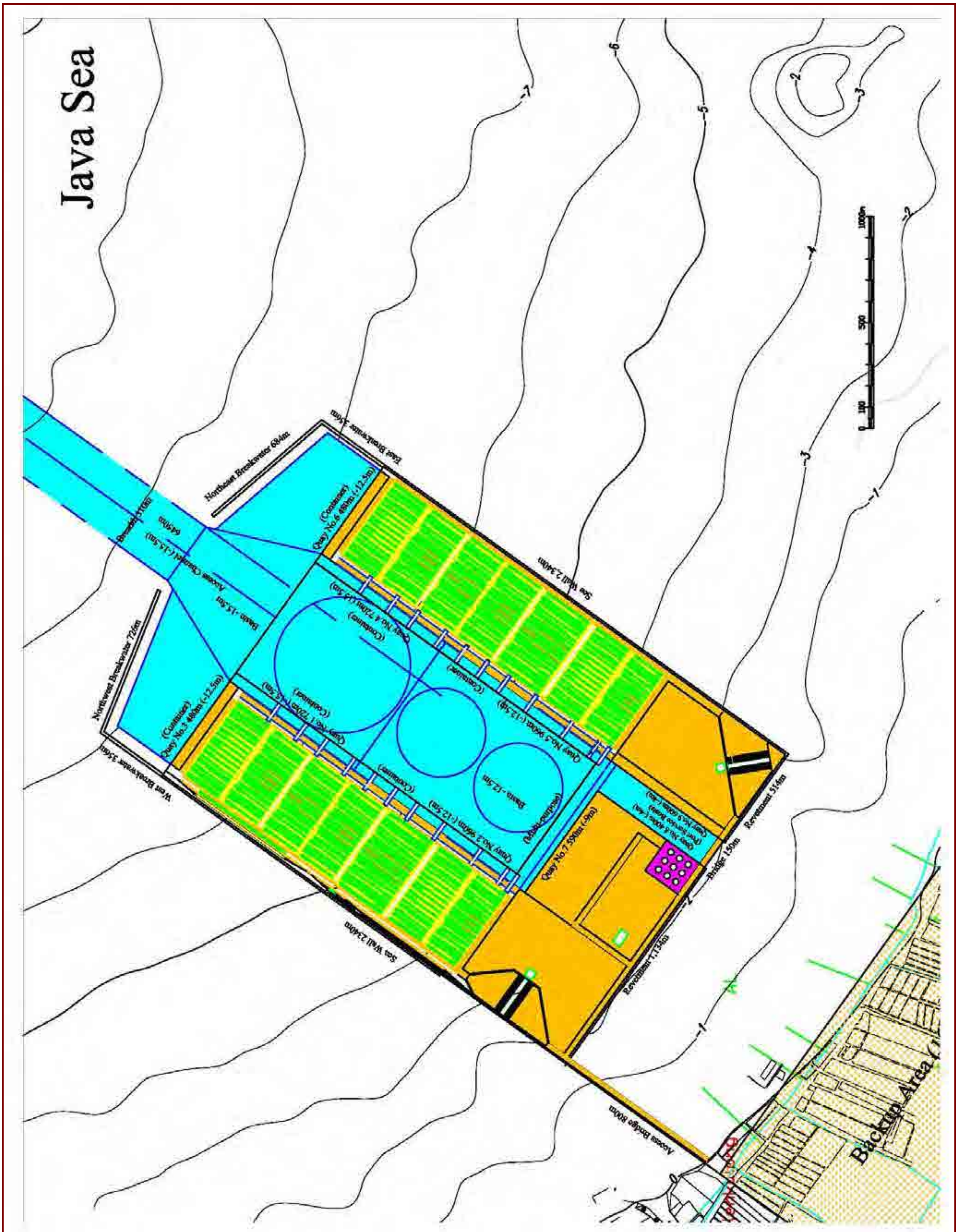
In the SEA study, two series of evaluation were conducted to provide environmental aspects on formulating the master plan for the new international container terminal. In the first step of the evaluation, the nine potential candidate sites are screened and three alternative sites are remained as the candidates for next screening taking environmental and social factors into consideration. Then in the second step, the three alternative development options at the selected sites are compared based on the degree of the environmental impacts that may be caused by each of the selected alternative options.

Considering the results of the evaluation, new terminals are planned in North Kalibaru and Cilamaya in the master plan. Towards implementation of the developmental plans, necessary study for EIA and mitigation measures have been extracted and recommended to be conducted in the next stages as well as developing resettlement plans.



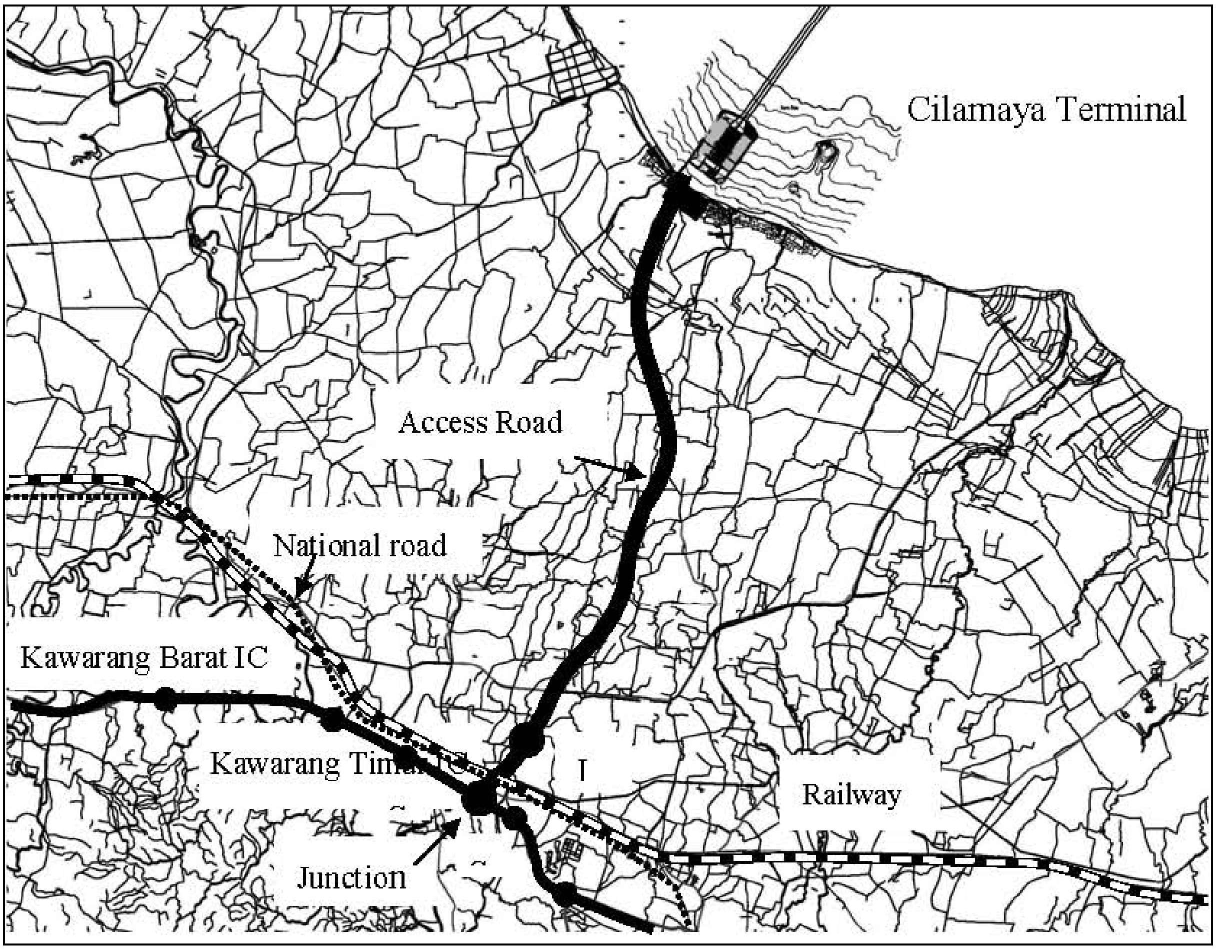
Source: Made by the Study Team

Figure 1 Facility Layout Plan of Tanjung Priok Terminal in the Stage of Master Plan (2030)



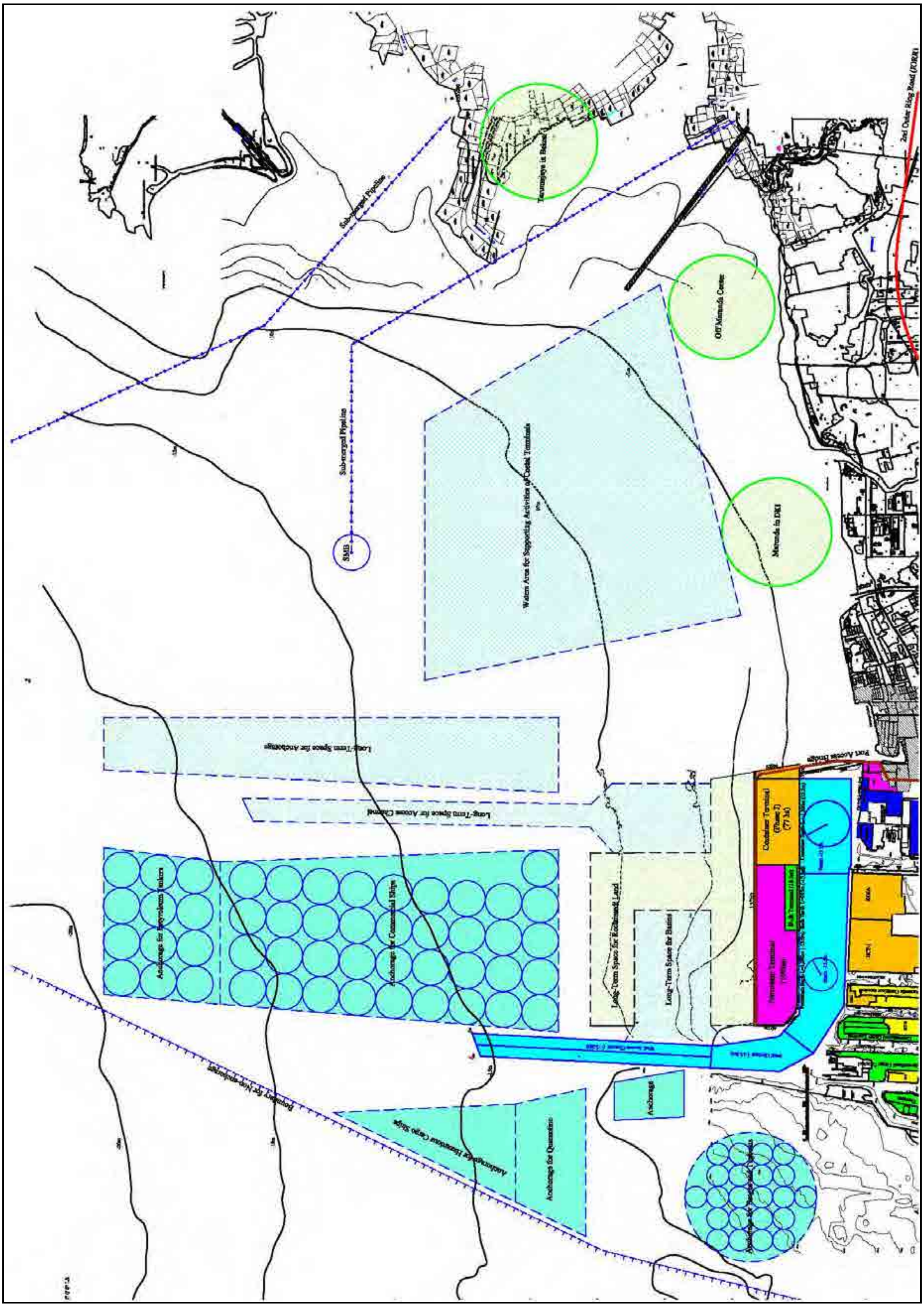
Source: Made by the Study Team

Figure 2 Facility Layout Plan of a New Container Terminal at Cilamaya in Master Plan (2030)



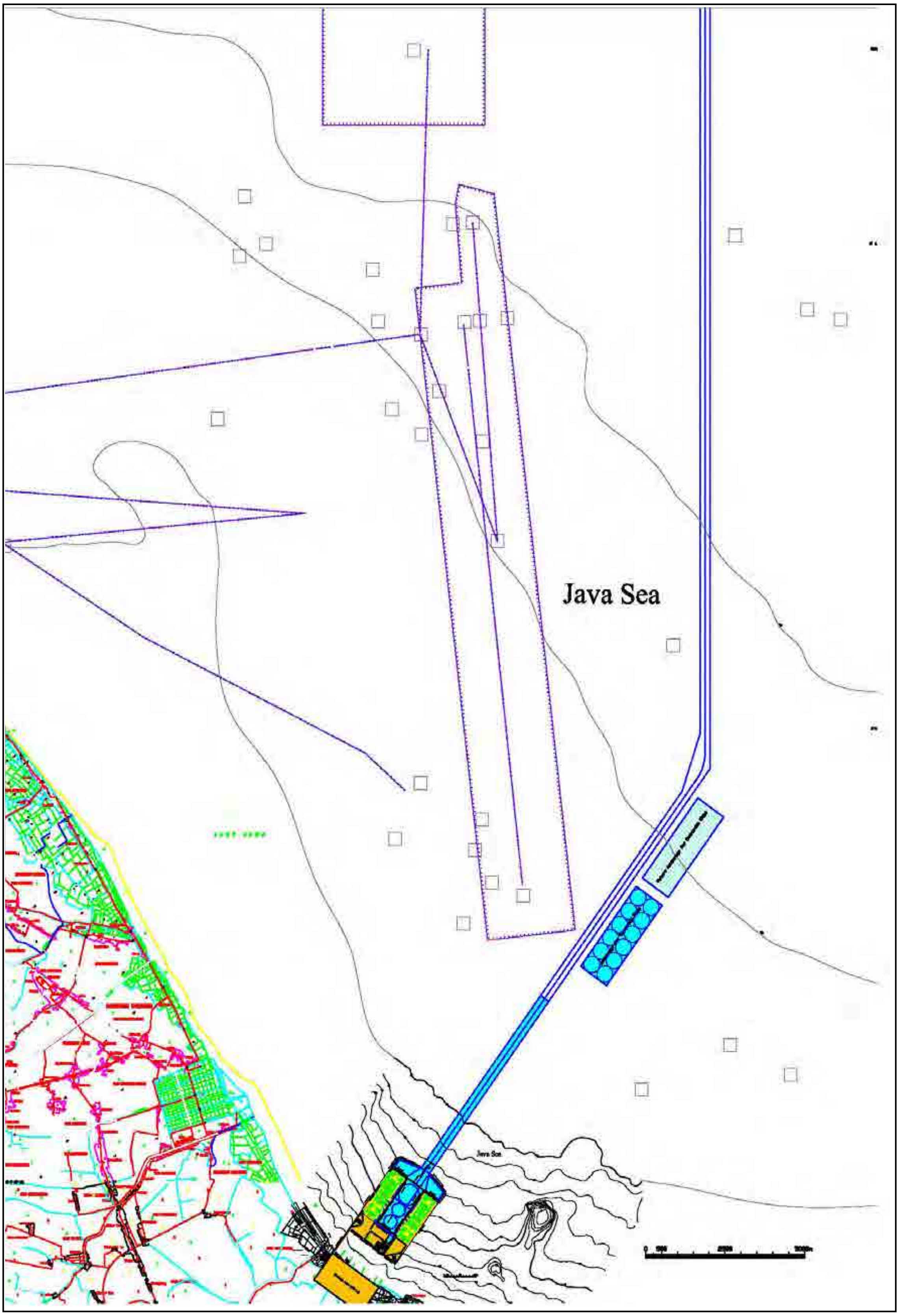
Source: Made by the Study Team

Figure 3 Access Road to a New Container Terminal at Cilamaya



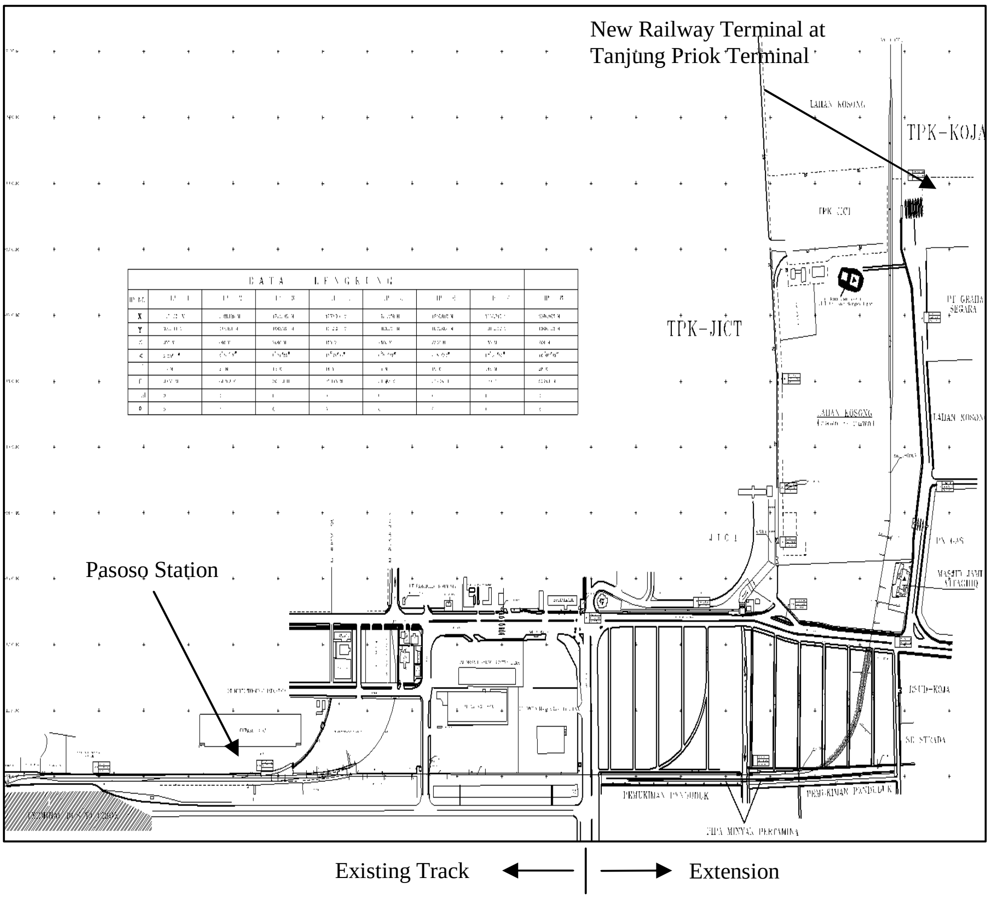
Source: Made by the Study Team

Figure 4 Port-Related Waters Area Use Plan in Jakarta Bay



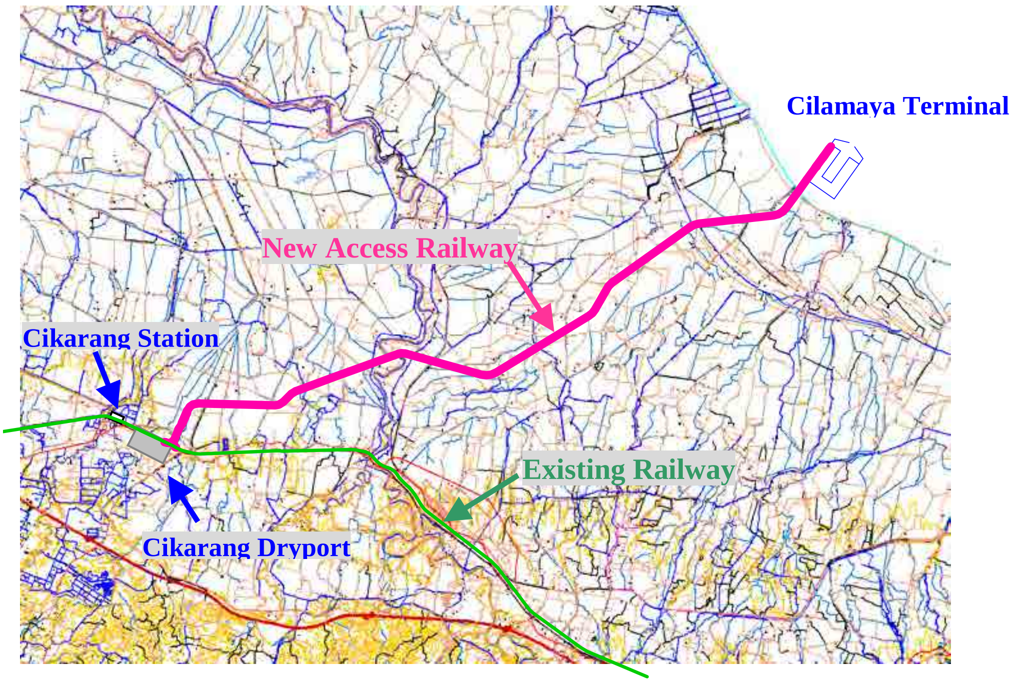
Source: Made by the Study Team

Figure 5 Port-Related Waters Area Use Plan in Karawan



Source: DGR

Figure 6 Railway Extension Plan at Tanjung Priok



Made by the Study Team

Figure 7 Access Railway to a New Container Terminal at Cilamaya

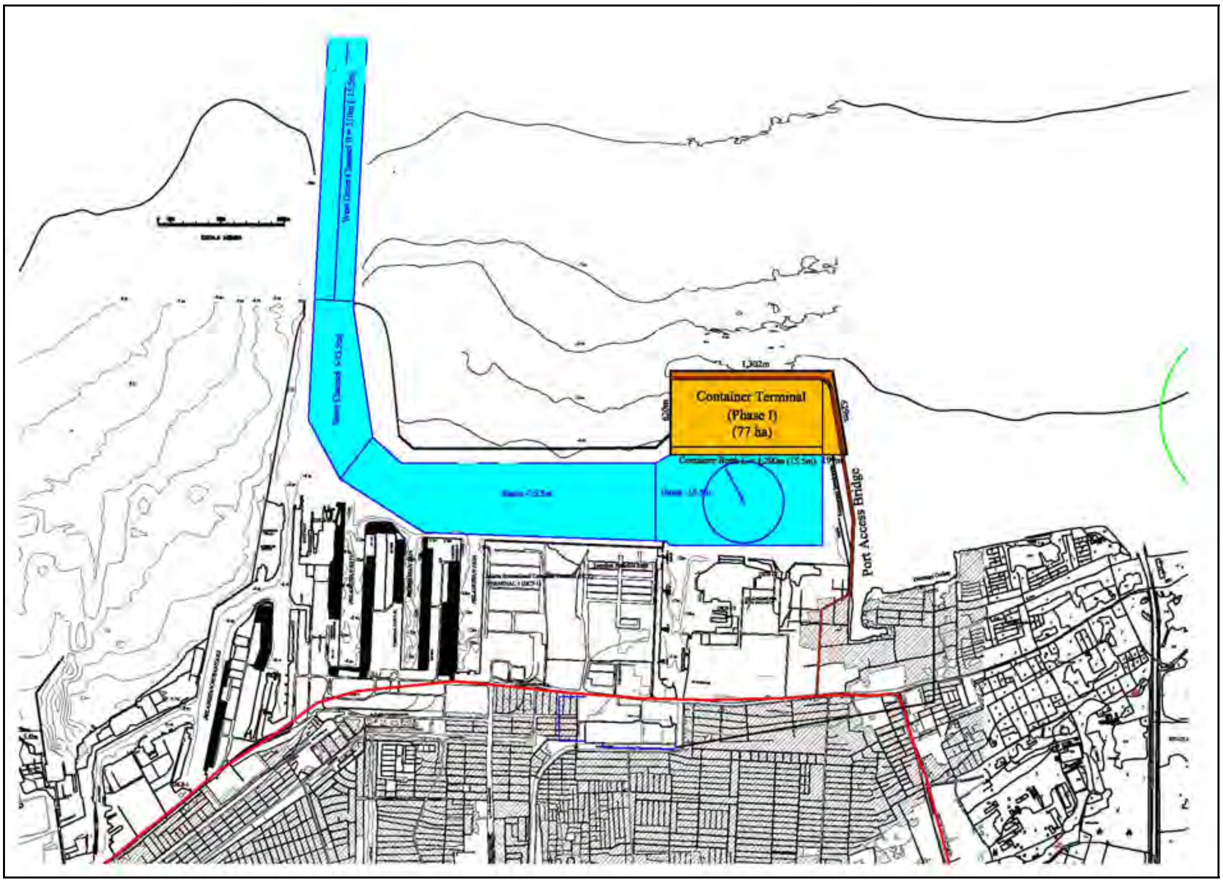
3. The First Phased Implementation Plan (Target Year: mid 2010's)

(1) Construction of the New International Container Terminal off North Kalibaru

In mid 2010's, the volume of international containers to be handled at Tanjung Priok Terminal is expected to reach the container-handling capacity of the existing terminals (JCT) at Tanjung Priok Terminal estimated as 4.9 million TEUs per annum before conversion of JICT II and MTI terminals mentioned above.

Thus to handle containers to be overflowed from JCT, it is proposed to implement the construction project of the new international container terminal off North Kalibaru (North Kalibaru Container Terminal) at the timing of the saturation of JICT, viz. in mid 2010's.

The cargo-handling capacity of Container Terminal off North Kalibaru (hereinafter named as North Kalibaru Container Terminal) is planned as 1.9 million TEUs per annum by taking account of the possible starting year of operations of the second phase (Cilamaya Terminal) projected as around 2020 (see Figure 8).



Source: Made by the Study Team

Figure 8 Facility Layout Plan of North Kalibaru Container Terminal

(2) Project Cost of North Kalibaru Container Terminal

The total project cost of North Kalibaru Container Terminal is estimated at 8.8 trillion Rp.

(3) Economic Appraisal of the North Kalibaru Container Terminal project

A comparison between the “Without-the-project” case and the “With-the-project” case is carried out to evaluate the economic feasibility of the construction project of North Kalibaru Container Terminal.

The resulting economic internal rate of return (EIRR) for the above mentioned project is estimated at 53.0% which exceeds the general criterion to assess the economic feasibility.

(4) Financial Appraisal and Recommended PPP Scheme

There are many presumptions in financial appraisal of the project including “concession term and fee”, “revenue and expenditure of port authority and terminal operator” and “financial source”. Financial analysis was conducted in many cases and various FIRR were obtained. Among them, the most preferable and financially viable FIRR for port authority and terminal operator are shown on the table below;

Account	FIRR
Port Authority	4.27 %
Terminal Operator	17.2 %

These FIRR are obtained by introducing the following PPP scheme.

Organization	Responsibility
Port Authority	Breakwaters, Channels and basins, Seawalls, Reclamation, Soil Improvement, Port Inner Road, Utility Facilities including X-ray Inspection Facilities, Drainage, Lighting and Power Supply. Access road construction Port Authority should obtain soft loan.
Terminal Operator	Quay Walls, Yard Pavement, Passage Pavement, Buildings for Operation, Container Handling Equipment and Operation System, Terminal Gate Debt/Equity Ratio is 60/40

4. The Second Phased Implementation Plan (Target Year: 2020)

(1) Construction of Cilamaya Terminal Phase II

The construction of Cilamaya Terminal is required to implement as early as possible so as to contribute to alleviation of serious road congestion within JABODETABEK area which is getting worse year by year. As mentioned above, the possible earliest starting year of operations of Cilamaya Terminal is expected to be around 2020 by taking account of the supposed construction schedule.

The second phase implementation plan of Cilamaya Terminal with eight berths and container yards installed with container-handling equipment together with a new access channel has been proposed (see Figure 9).

(2) Construction of a New Road having Access to the Cilamaya Terminal

Corresponding to the establishment of Cilamaya Container Terminal, it is proposed to construct a new access toll road to connect the new terminal and the Jakarta-Cikampec toll road through Karawan industrial estates (see Figure 3).

(3) Project Cost of the Cilamaya Container Terminal Phase II

The total project cost of North Kalibaru Container Terminal including the new access road is estimated at 15.7 trillion Rp.

(4) Economic Appraisal of the Cilamaya Container Terminal Construction Project

Comparison between the "Without-the-project" case and the "With-the-project" case is carried out to evaluate the economic feasibility of the entire construction project of Cilamaya Container Terminal composed of marine terminals of Phases II and III and the new access road from Karawan to the terminal.

The resulting economic internal rate of return (EIRR) for the above mentioned project is estimated at 46.2% which exceeds the general criterion to assess the economic feasibility.

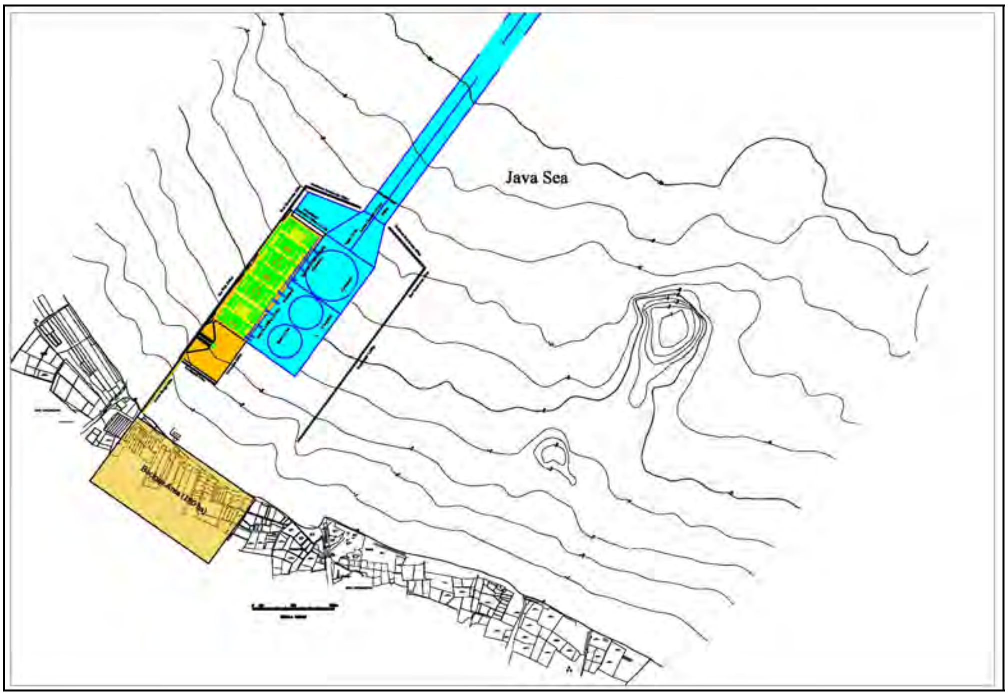
(5) Financial Appraisal and Recommended PPP Scheme of Cilamaya Container Terminal Construction Project

Financial analysis of the entire construction project of Cilamaya Container Terminal composed of marine terminals of Phases II and III is conducted based on simplified premises. The most preferable and financially viable FIRR for port authority and terminal operator are shown on the table below;

Account	FIRR
Port Authority	2.94 %
Terminal Operator	14.3 %

These FIRRs are obtained by introducing the following PPP scheme.

Organization	Responsibility
Port Authority	Breakwaters, Channels and basins, Seawalls, Reclamation, Soil Improvement, Port Inner Road, Utility Facilities including X-ray Inspection Facilities, Drainage, Lighting and Power Supply. Port Authority should obtain soft loan.
Terminal Operator	Quay Walls, Yard Pavement, Passage Pavement, Buildings for Operation, Container Handling Equipment and Operation System, Terminal Gate



Source: Made by the Study Team

Figure 9 Facility Layout Plan of Cilamaya Container Terminal in Phase II (2020)

(6) Redevelopment of the Existing Third Wharf of the Tanjung Priok Terminal Specialized for Domestic Containers

In around 2020, the volume of domestic containers to be handled at Tanjung Priok Terminal is expected to reach the container-handling capacity of the existing conventional wharves estimated as 2.1 million TEUs per annum in the condition of the mixture use with conventional cargoes, which means the simultaneous saturation in conventional cargo-handling.

At that timing, so as to cope with the saturation of domestic containers, it is proposed to convert JICT II and MTI terminals into ones for domestic containers. In addition to the above conversion, it is proposed to redevelop the Third Wharf specialized for domestic containers (see Figure 1).

(7) Expansion of the Existing Car Terminal of the Tanjung Priok Terminal

In around 2020, the volume of vehicles to be handled at Car Terminal is expected to reach the capacity of the existing one berth estimated as 300,000 units per annum. At that timing, it is proposed to expand the existing Car Terminal with the extension of the berth length up to two berths and the expansion of car storage behind the berth.

5. The Third Phased Implementation Plan (Target Year: 2030)

(1) Construction of Cilamaya Container Terminal Phase III

The third phased implementation plan of Cilamaya Terminal with 11 berths and a container yard equipped with container-handling machines towards the year 2030 has been proposed (see Figure 2).

(2) Construction of a New Petroleum Terminal

New petroleum terminal is proposed to move existing petroleum terminal and for other newly required petroleum firms to make apart from the densely populated areas. (see Figure 1).

(3) Construction of a New Dry Bulk Terminal

Anew dry bulk terminal for dust bearing cargoes such as clinker, gypsum, coal and sand to move from the existing conventional wharves at off North Kalibaru with a view to decreasing mal effects on densely-populated urban areas (see Figure 1) towards the year 2030.

(4) Project Cost of Phase III

The total project costs of Cilamaya Terminal and Bulk Terminals have been estimated at 12.8 trillion Rp. and 6.3 trillion Rp. respectively.

RECOMMENDATIONS

In accordance with the Study, it is recommended that the Government of the Republic of Indonesia implements the key projects of Tanjung Priok Port extracted from the Master Plan Proposed by the Study so as to contribute to the economies of Greater Jakarta Metropolitan Area and Indonesia and to improve port-related logistics. The key projects are divided into two phases with the respective target years of mid 2010's and 2030.

1. The First Phased Project

The main components of infrastructures of the first phased project are summarized as follows:

1.1 Construction of North Kalibaru Container Terminal

(1)	Access Channel	
	Bottom width	310m
	Water depth	15.5m
(2)	Breakwater	1,020 m
(3)	Basin	
	Water depth	15.5 m
	Maximum diameter of turning basin	640 m
(4)	Container berth (Continuous berth)	
	Length	1,200 m
	Water depth	15.5 m
(5)	Inner Road	
	Length	1,840 m
	Number of lanes	4
(6)	Land area	
	Container terminal	77 ha
	Other area including that for utilities	10 ha
	Total land area	87 ha
(7)	Access bridge	
	Length	1,100 m
	Number of lanes	2
(8)	Access land road	
	Length	950 m
	Number of lanes	2

1.2 Implementation of the First Phased Project

It is recommended that the following measures be taken to advance the project:

(1) To determine the scope of the project components by public and private sectors and to arrange the project finance of implementing the respective parts of the project components.

(2) To conduct the engineering study of detailed design of the terminal facilities to be financed by public sector including detailed soil investigation and environmental basic survey for preparation of EIA and to obtain the approval of EIA of the project by MOE.

(3) To prepare the necessary documents by DGST for inviting the private investors/concessionaire to participate in the development and operation of a new terminal development.

1.3 Recommended PPP Scheme

Considering the stipulation of Government Regulation No.61 year 2009 and results of financial analysis, following scheme is recommended to be applied to the development of Kalibaru Phase I urgent project.

Financial condition applying investment by EXIM bank is the most favorable condition, but it seems to be rather difficult to meet the requirement of EXIM bank to get endorsement by the Government of Indonesia in case of Kalibaru Phase I project.

In many case of concession, concessionaire is often obligated to maintain debt/equity ratio of 60/40 for the terminal operation in order to avoid serious financial risk to continue to operate the public use terminal.

Further more, it is reasonable to reserve the proprietorship of terminal land by the public sector considering the concession condition set forth in ② of Article 71 of Government Regulation No. 61.

In order to make balance of profitability between TOC and PA and considering the rather unfavorable demand in the initial years of operation, variable portion of concession fee is better to be set as 10% for the first 5years and 15% thereafter.

Summarizing above, recommended PPP scheme is as follows:

- Investment Demarcation: PA invests on breakwater, channel and basin, inner road, security and utility facilities and reclamation.

  TOC invest on quay wall and equipment.
- Financial Scheme: PA requests soft loan.
  TOC prepare 40% by its own equity and 60% from commercial bank.
- Concession Period: 30 years after commencement of operation with fixed fee of about $5.4mil/year and variable fee of 10% of revenue for the first 5 years and 15% of revenue thereafter.

1.4 Environmental and Social Considerations

It is recommended that the following measures be taken in the implementation stage of the first phase project in view of environmental and social considerations that need to be duly given.

- To implement EIA study properly to assess the impacts and develop necessary measures for mitigation and management.
- To carefully plan and carry out the appropriate measures for the involuntary resettlement.

2. The Second Phased Project

The main components of infrastructures of the second phase project are summarized as follows.

2.1 Construction of Cilamaya Terminal Phase II

(1)	Access Channel	
	Bottom width	310m
	Water depth	15.5m
(2)	Breakwater	2,120 m
(3)	Basin	

	Water depth	4 ~ 15.5 m
	Maximum diameter of turning basin	640 m
(4)	Container berth (8 berth)	
	Length	2,160m
	Water depth	12.5 ~ 15.5 m
(7)	Inner road	
	Length	130 m
	Number of lanes	4
(8)	Land area	
	Container terminal	87 ha
	Other area including that for utilities	43 ha
	Total land area	130 ha
(9)	Access bridge	
	Length	800 m
	Number of lanes	2

2.2 Construction of Cilamaya Access Road

Length:	30.6 km
Route:	Karawan ~ Cilamaya Terminal
Type:	Express way (Toll road)
Number of lanes:	4

2.3 Implementation of the Second Phased Project

It is recommended that the following measures be taken to implement the project:

1) To conduct a feasibility study for development of a new container terminal at Cilamaya at the same time as progress of the engineering study of North Kalibaru Terminal.
2) To open the council meeting by representatives of three ministries (Ministry of Public Works, Ministry of Agriculture, Ministry of Environment) and to discuss the necessity, feasibility, assessment of reasonableness of land acquisition, environmental compensation by development of Cilamaya Terminal together with the construction of the toll access road. Upon the conclusion of the council meetings, the provincial government of West Java shall start the land acquisition needed for road construction and also ask DGH and Ministry of Public Works to conduct an engineering study for construction of the access road.

2.4 Recommended PPP Scheme

It is recommended that the following measures be taken to promote PPP Scheme in the implementation of the second phased project.

1) Public sector should play a significant role in the procurement of infrastructure. For example. public sector should basically procures major facilities and conducts major works including breakwater, seawalls, channel/water basin, land reclamation, soil improvement, direct access road/bridge to port, power/water supply, drainage, lighting and basic facilities for safety/security.
2) Public sector should avail low interest finance including foreign assistance as much as possible.
3) Private sector should increase port investment drastically when the proposed master plan will be implemented.

2.5 Environmental and Social Considerations

It is recommended that the following measures be taken in the implementation stage of the second phased project in view of environmental and social considerations.

1) To implement EIA study properly to assess the impacts and develop necessary measures for mitigation and management.
2) To carefully plan and carry out the appropriate measures for the involuntary resettlement.

3. The Third Phased Project

The main components of infrastructures of the second phase project are summarized as follows.

3.1 Construction of Cilamaya Terminal Phase III

(1)	Basin	
	Water depth	4 ~ 9 m
(2)	Container berth (8 berth)	
	Length	2,160 m
	Water depth	12.5 ~ 15.5 m
(3)	Multi-purpose berth (3 berth)	
	Length	590 m
	Water depth	9m
(4)	Berth for port service boats	
	Length	1,000m
	Water depth	4 m
(5)	Inner road	
	Length	2,100 m
	Number of lanes	4
(6)	Land area	
	Container terminal	86 ha
	Multi-purpose terminal	15 ha
	Other area including that for utilities	59 ha
	Total land area	160 ha
(7)	Access bridge	
	Length	150 m
	Number of lanes	4

SUMMARY

1. INTRODUCTION

1.1 Background of the Study

Tanjung Priok Terminal under Tanjung Priok Port is the sole principal terminal which can provide transport services for international container in the western Java Area as well as for domestic containers, and has been playing important and indispensable roles in supporting the national economy, particularly in the Jakarta Greater Metropolitan Area. The volume of container cargo of the port has been ever increasing since the introduction of container transport and may exceed her physical container handling capacity within several years. Hence, a new container terminal needs to be developed as soon as possible through taking account of the following issues.

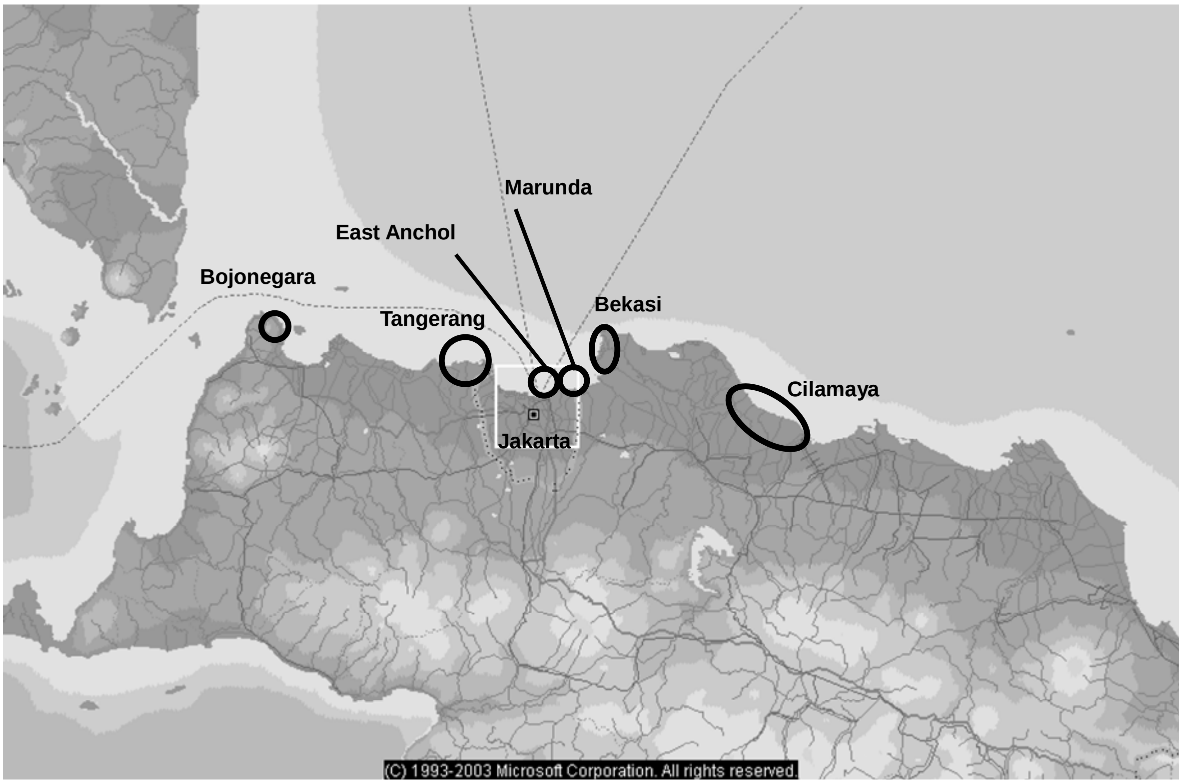
- There is no space for the new container terminal in the existing port area of Tanjung Priok Port.
- Although several alternatives for the new container terminal have been proposed already by various organizations, precise evaluation to prioritize these alternatives has not been conducted yet.
- Available data/information on project sites including topographic, geologic and environmental data
  of these development alternatives is limited
- Accessibility, road/railway to/from the new container terminal has to be taken into consideration.
- Public Private Partnership (PPP) scheme based on the new Shipping Law (No.17, 2008) and Government Regulation (No.61, 2009) has to be taken into consideration.

Besides the issue of container-handling capacity, Tanjung Priok Terminal has another problem concerning port logistics, namely, traffic congestion in the Greater Jakarta Metropolitan Area. This traffic congestion has adversely affected not only port logistics but also total economic activities in the region. Since improvement of rail accessibility to the port could be one of the solutions to ease the traffic situation, the improvement plan of railway access connecting Tanjung Priok Port should be examined.

Under such situation, in response to the official request of the government of the Republic of Indonesia (hereinafter referred to as “GOI), the Government of Japan (hereinafter referred to as “GOJ) decided to conduct “the Project for Master Plan Study on Port development and Logistics in Greater Jakarta Metropolitan Area” (hereinafter referred to as “the Study”)

Accordingly, the Japan International Cooperation Agency (hereinafter referred as “JICA”) the official agency responsible for the implementation of the technical cooperation programs of GOJ, has undertaken the Study in close cooperation with the authorities concerned of GOI.

1.2 Study Area



Source: JICA Study Team

Figure 1.2-1 Study Area

1.3 Objectives of the Study

The objectives of the Study are:

- To evaluate and prioritize development alternatives for a new container terminal
- To formulate the master plan for port development together with access infrastructure development/improvement in/around the Greater Jakarta Metropolitan Area
- To transfer technology to Indonesian counterparts

2. ANALYSES OF CURRENT SITUATION OF PORT LOGISTICS IN THE STUDY AREA

2.1 Review of Port Development Strategies/Policies in Port Sector

(1) National Logistics Blueprint

To resolve the current problems in terms of national logistics including those related to port cargo transport and to meet ever increasing demand for the future in logistics, the Government intends to develop a "National Logistics Blueprint" based on "Presidential Directive Number 5 Year 2008" to cover vision, mission, goals, strategies, directions, policies, implementation phases and action plans through coordinating the Ministry of Economy and involving the ministries concerned. The blueprint is expected to serve as a reference and guidelines for relevant sectors in establishing their policies and to be able to a means of building national competitiveness and achieve social welfare.

(2) New Maritime Law (Law Number 17 Year 2008)

In 2008, The Government of Indonesia enacted the so-called New Maritime Law (Law Number 17 Year 2008) and in compliance of the maritime law proclaimed the Port Regulation (Government Regulation of the Republic of Indonesia Number 61 Year 2009). The main clauses provided by the port regulation are listed as follows:

- No. 3 Clause (National Port System)
- Nos. 72~77 Clauses (Port Principal Plan)
- Nos. 79~88 Clauses (Port management Body)
- Nos. 96~99 Clauses (Port Development and Management)

2.2 Review of Port Development Plans Proposed by Relevant Organizations

The study area extends from West Java Province through DKI (Daerah Khusus Ibukota: Special Capital Territory) Jakarta to Banten. The existing port development plans in the area are introduced below.

(1) DKI Jakarta

1) North Kalibaru off Tanjung Priok Port

Pelindo II (Indonesian Port Corporation II) has a port expansion plan towards North Kalibaru (see Figure 2.2-1). As shown in the figure, the new terminal is composed of two terminals: container terminal and oil & gas terminal. The development of container terminal is phased into three phases: the first phase, the second phase and third phase.

Figure 2.2-1 Development of Container Terminal in North Kalibaru Tanjung Priok

2) Off Marunda Area between the existing Kalibaru Terminal and the border to Regent Bekesi

KBN Company founded by the investment of DKI Jakarta Municipality and the Central Government aims to develop SEZ (Special Economic Zone). It is said that along with the development of SEZ, KBN intends to establish a new container port adjacent to SEZ (see Figure 2.2-2).

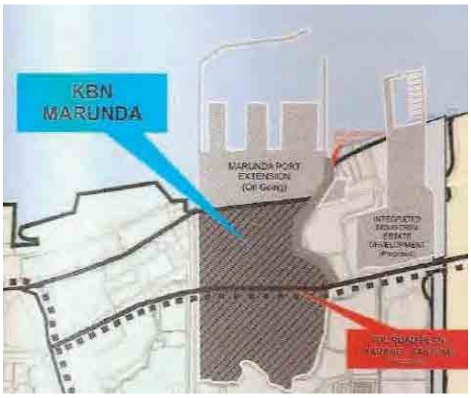


Figure 2.2-2 Marunda Port Development Plan (KBN)

(2) West Java Province

1) Off Marunda Center in Regent Bekesi (Kabupaten Bekesi)

Pelindo II has a plan to develop a new marine terminal off the Marunda Centre Industrial Estate (see Figure 2.2-3). It is called by Pelindo II as a shallow port, and the water depth of the access channel at the entrance of the port seems to be less than 5 meter. The port is planned for handling mainly coal, CPO (crude palm oil) together with presumably general cargoes and domestic containers in the similar way at present Sunda Kelapa Port. Full-scale container terminal for international containers is not planned.

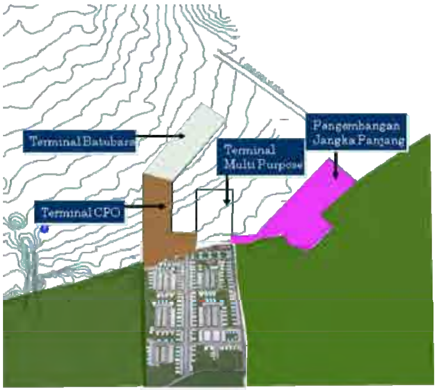
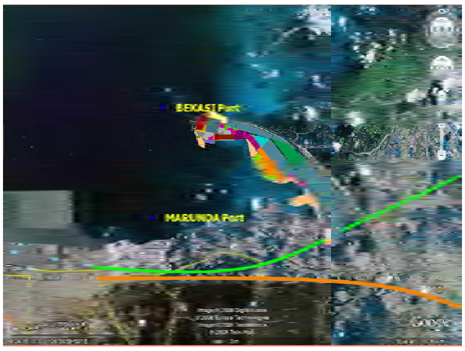


Figure 2.2-3 Marunda Centre Terminal Development Plan

2) Left Bank of Karang River (Ci Karang) in Regent Bekesi (Kabupaten Bekesi)

Regent Bekesi (Kabupaten Bekesi) has a plan to develop a Feeder Port at the left bank of the Karang River. There are two types of port facility configurations: jetty type without breakwaters and marginal type enclosed by two breakwaters (see Figure 2.2-4 and Figure 2.2-5). The latter one is planned to receive international containers though its port status in the New Maritime Law is "Feeder Port".



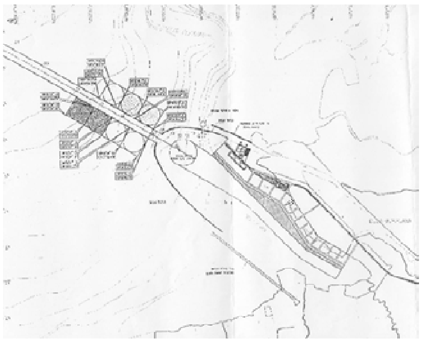


Figure 2.2-4 Tarmajaya Port in Regent Bekesi Development Plan (Jetty Type)(Left)

Figure 2.2-5 Tarmajaya Port in Regent Bekesi Development Plan (Marginal Type)(Right)

3) Muara Gembong Coast in Regent Bekesi (Kabupaten Bekesi)

Some private developer has a plan to develop a new container terminal in the northernmost part of Regent Bekesi with a further distance of over 10 km from the river mouth of Karang River mentioned in the above clause 2. It is said that its scale is much smaller than the full-scale international container terminal to be required to receive excess containers from the existing Tanjung Priok Terminal in the long-term basis (see Figure 2.2-6).

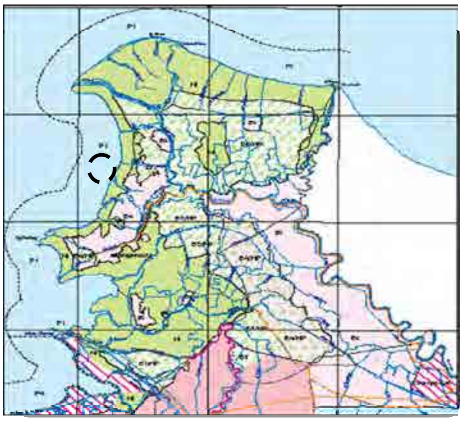


Figure 2.2-6 Terminal Site Plan on Muara Gembong Coast in Regent Bekesi

4) Cilamaya Coast (1) in Regent Karawan (Kabupaten Karawan)

West Java Province has a plan to develop a Container Terminal at the left bank of the Ciparage River. Type of port facility configuration is partly reclamation type with breakwaters (see Figure 2.2-7 and Figure 2.2-8).

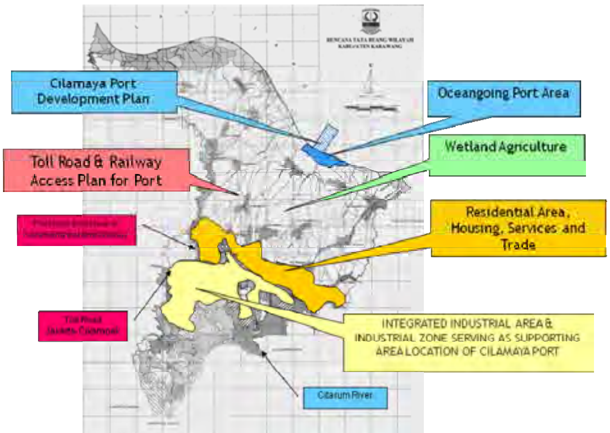


Figure 2.2-7 Cilamaya Terminal Development Plan (1) (Left)

Figure 2.2-8 Supporting Area for Cilamaya Terminal (Right)

5) Cilamaya Coast (2) in Regent Karawan (Kabupaten Karawan)

Pelindo II has a plan to develop a Container Terminal at the left bank of the Ciparage River. Type of port facility configuration is excavated type with breakwaters (see Figure 2.2-9). The site is considered to be almost the same as that planned by the West Java Province.

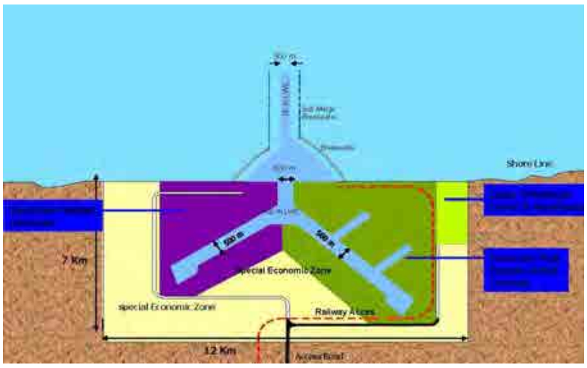


Figure 2.2-9 Cilamaya Terminal Development Plan (2)

6) Ciasem Bay in Regent Subong (Kabupaten Subong)

Some private developer has a plan to develop a new terminal with one container berth and one car berth on Ciasem bay in Regent Subong. (see Fig. 2.2-10).

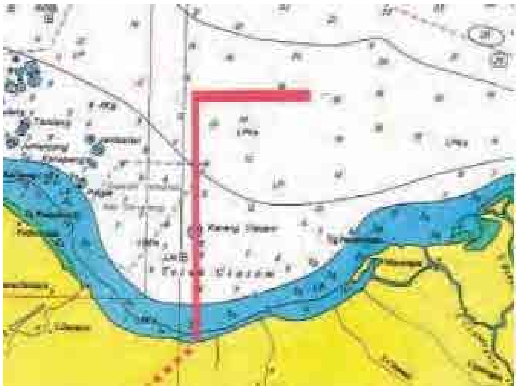


Figure 2.2-10 Terminal Plan on Ciasem Bay

(3) Banten Province

1) Tangeran Coast in Regent Tangeran (Kabupaten Tangeran)

Private Developer has a plan to develop a TIC (Tangeran International City) Port off Tangeran Coast. Type of port facility configuration is reclamation type with breakwaters (see Figure 2.2-11).

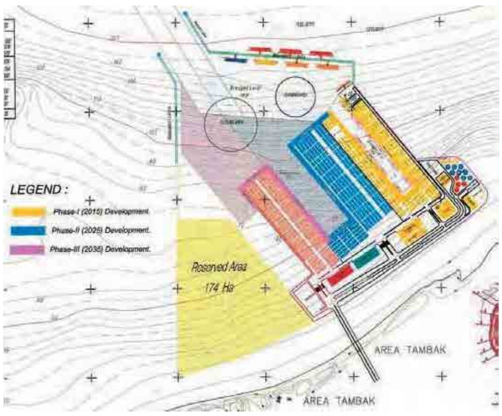


Figure 2.2-11 TIC Port Plan on Tangerang Coast

2) Bojonegara Port (Kabupaten Serang)

Pelindo II which owns and operates Bojonegara Port intends to convert the port originally designed as a container port into a petroleum port. A petroleum refinery is planned to be set up behind the port (see Figure 2.2-12).

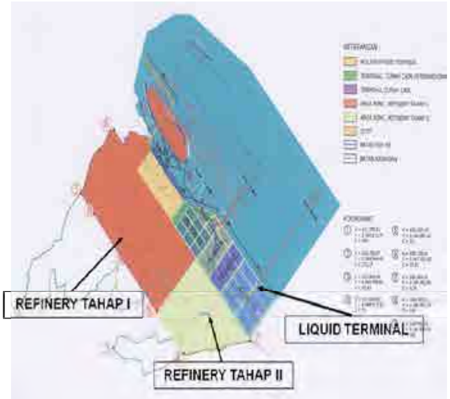


Figure 2.2-12 Bojonegara Port Facility Layout Plan for Petroleum Terminal

2.3 Review of Spatial Plans and Related Regulations Established by Local Governments

(1) General

Indonesia established the first Spatial Planning Law (No.24/1992) in 1992 to regulate structures and land uses in its territory. Spatial planning was defined in this law as the plan-making process, plan implementation and development control. This law provides the guidelines on the plan-making process, implementation and development control for national and local levels. Central government was responsible for spatial plans which cover two or more provincial areas in this law. The organization responsible for drafting the plan has been the National Spatial Planning Coordination Board, which has been chaired by the Coordinating Minister for the Economy. The board's office was set up in the National Development Planning Agency (BAPPENAS). The Directorate General of Spatial Planning of the Ministry of Public Works has been charged with handling the practical implementation of the board's plan.

Indonesia established a new Spatial Planning Law (Law No.26/2007) to replace the previous law in 2007. This new law contains some provisions which are not included in the previous law and stipulates explicitly the authority of local governments in spatial planning. Central government is no longer authorized to coordinate spatial plans which cover two or more provincial areas. The plan includes guidelines for effective and efficient planning processes to achieve the stated objectives of the plan.

A major national planning system related to the spatial plan is the socio-economic development planning system, which consists of a 20-year long-term national development plan and a five-year development plan. The latter comprises a national medium-term development plan and yearly implementation plan. The development plans fall under the authority of the National Development Planning Agency (BAPPENAS). Duration of the current national long-term development plan (Law No.17/2007) is from 2005 to 2025 and that of the medium-term development plan (Presidential Regulation No.5/2010) is from 2010 to 2014.

Local governments have the authority to draft socio-economic development plans and spatial plans based on the National Development Planning System (Law No.25/2004) and Spatial Planning Law (No.26/2007). Development in Indonesia centers on these plans.

(2) National Development Plan

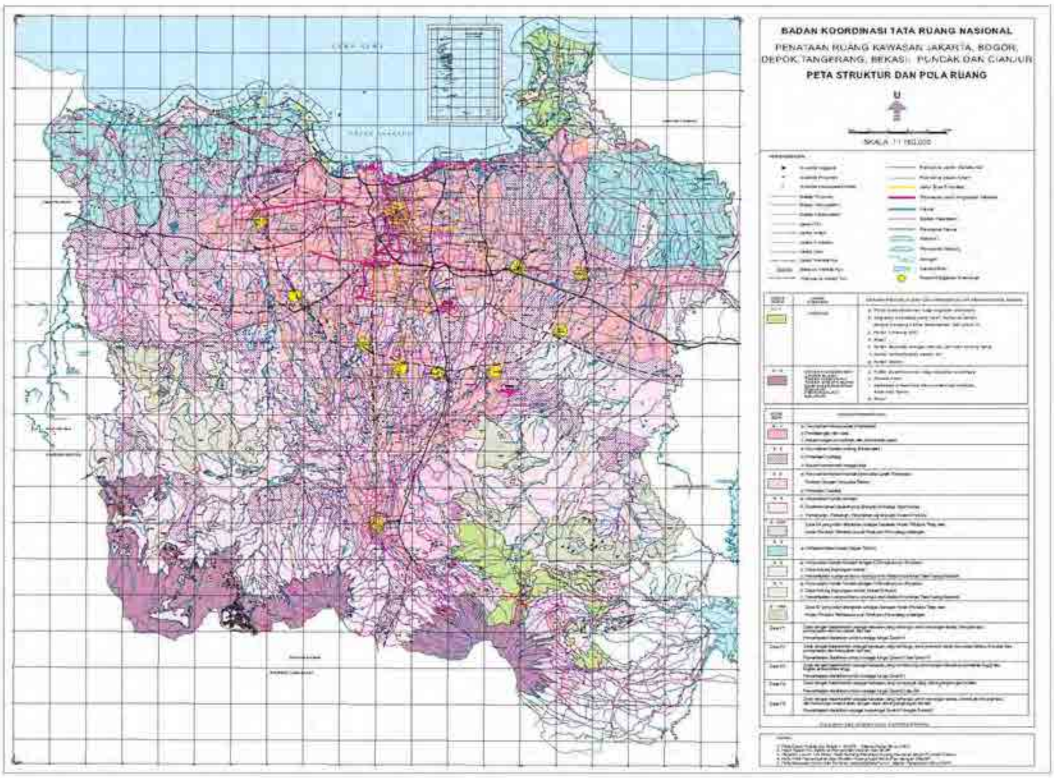
National long-term Development Plans and National Medium-term Development Plans are reviewed. Major Characteristics of these plans are analyzed.

(3) Spatial Plan

National Spatial Plans and many regional Spatial Plans are reviewed. Major Characteristics of these plans are analyzed. Figure 2.3-1 shows the current national spatial plan. Figure 2.3-2 show the current regional spatial plan of JABODETADEK for reference.

Source: BAKOSURTANAL

Figure 2.3-1 Current National Spatial Plan



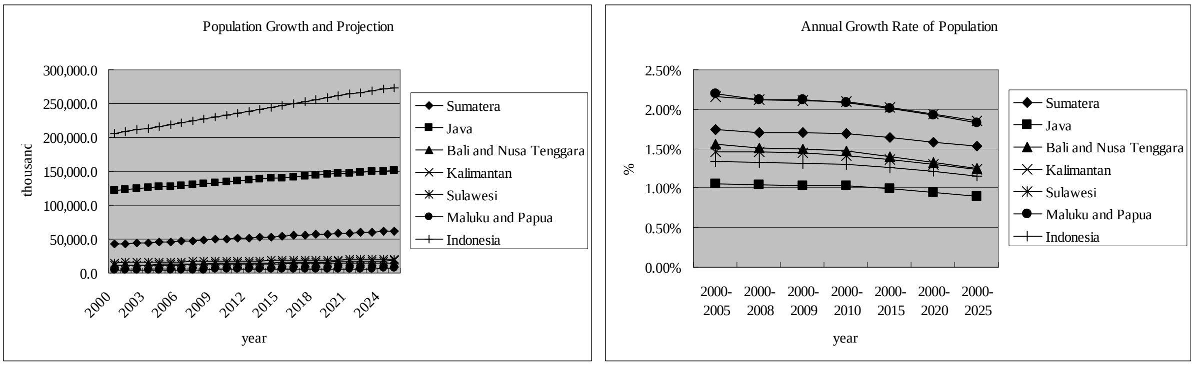
Source: Ministry of Public Works Web-site

Figure 2.3-2 Current Regional Spatial Plan (JABODETADEK)

2.4 Analysis of Socio-economic Situation

(1) Population

Population and annual growth rate of population are shown in Figure 2.4-1.

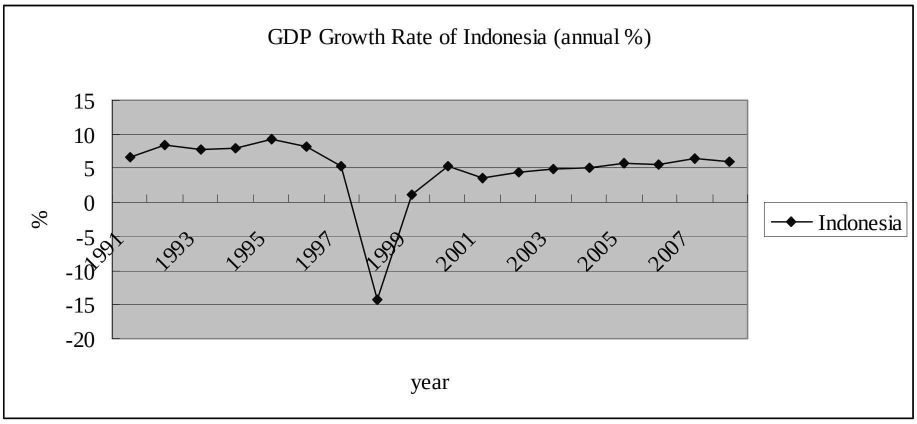


Source: Statistical Year Book of Indonesia 2009

Figure 2.4-1 Population and Annual Growth Rate of population

(2) GDP (Gross Domestic Product)

The Indonesian economy suffered from the Asian economic crisis, and its GDP growth rate sharply dropped to -13.1 % in 1998 and registered only 0.79 % in 1999. Indonesian economy, however, got back on track in 2000 with a healthy growth rate of 4.9 %. Since then, the national economy has showed steady growth with annual growth rates of about 5 %; in 2007 it registered 6.32 % as shown in Figure 2.4-2.



Source: International Monetary Fund, World Economic Outlook Database, April 2010,JICA Study 2009

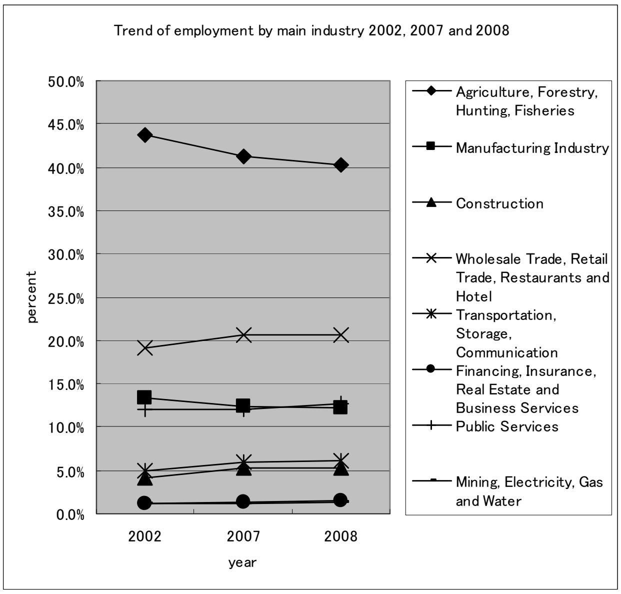
Figure 2.4-2 Historical Trend of GDP Growth Rate of Indonesia

Among the 33 provinces in Indonesia, DKI Jakarta has the highest GRDP value in terms of GRDP without oil & gas at constant 2000 market price. DKI Jakarta accounts for 18.23% of the national total GDP, followed by West Java Province, producing 14.59% of the national total. Combined share of the two provinces accounts for one third of Indonesian total GDP.

(3) Employment

Trend of employment by industry is shown in Figure 2.4-3. The sector of wholesale trade has been increasing while the industrial groups of agriculture, forestry, hunting and fisheries have been decreasing. Other remarkable trends are the increase of persons employed in the construction and transportation sector and the decline in employment in the manufacturing industry.

According to the employment statistics, Manufacturing Industry sector is heavily concentrated in Java Island.

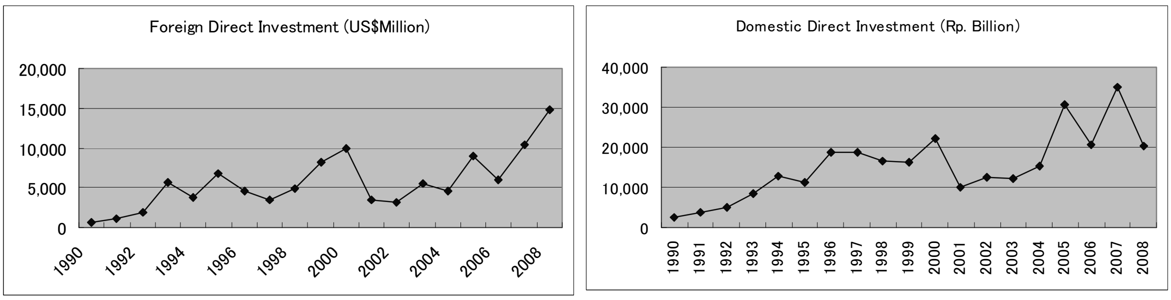


Source: Statistical Year Book of Indonesia 2009, JICA Study 2009

Figure 2.4-3 Trend of Employment by main Industry

(4) Investment

Figure 2.4-4 shows new domestic and foreign direct investments which have been realized since 1990. Value of realized projects was Rp. 2,399 Billion for domestic and US$ 706 Million for foreign investment in 1990, and since then it has continued to increase, reaching Rp. 22,038 Billion for domestic and US$ 9,877 Million for foreign projects in 2000.



Source: Statistics of Direct Investment, BKPL, December 2008 (JICA Study 2009), Realized Domestic and Foreign Direct Investment

Figure 2.4-4 Foreign and Domestic Investment

Ranking of realized direct investment by location in 2008 is shown in Table 2.4-1. In terms of domestic investment, west Java takes first place followed by East Timur, Banten, Riau and DKI Jakarta. West Java is definitely the core investment area with a share is 21.1% of the total while East Timur follows with 13.6%.

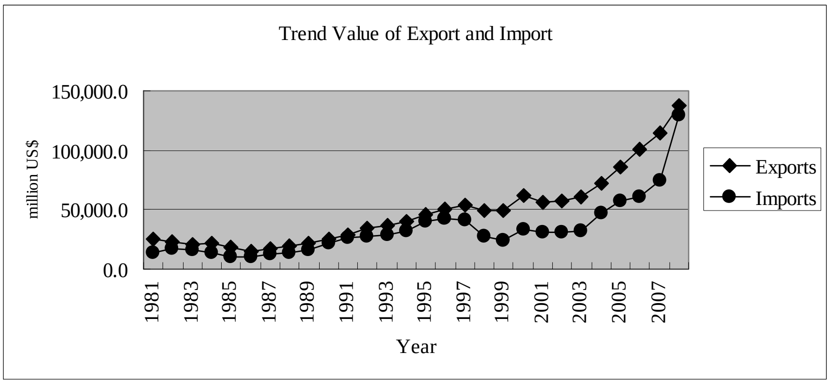
Table 2.4-1 Ranking of Realized Direct Investment by Location, 2008

	Domestic Direct Investment				Foreign Direct Investment			
	Location	Project	Value (Rp. Billion)	%	Location	Project	Value (Rp. Billion)	%
1	Jawa Barat	64	4,289.5	21.1%	DKI Jakarta	434	9,927.8	66.8%
2	Jawa Timur	40	2,778.3	13.6%	Jawa Barat	293	2,552.1	17.2%
3	Banten	31	1,989.1	9.8%	Banten	99	477.8	3.2%
4	Riau	8	1,966.8	9.7%	Riau	8	460.9	3.1%
5	DKI Jakarta	34	1,837.3	9.0%	Jawa Timur	73	457.3	3.1%
National Total		239	20,363.2	100.0%		1,138	14,871.5	100.0%

Source: Statistical Year Book of Indonesia 2009

(5) Trade

Figure 2.4-5 shows historical development of Indonesian Foreign Trade without oil and gas trade, both export and import, in monetary terms. Remarkable feature worth mentioning is the fact that the export value has been exceeding the import value, and the difference has been widening since the economic crisis. However, it has been drastically reduced in 2008 to less than US$ 8 billion while it was US$ 40 billion in the previous year.



Source: Statistical Year Book of Indonesia 2009

Figure 2.4-5 Trend Value of Export and Import

(6) Main Trading Partners

As for exports, Japan is the most significant partner in terms of both volume and value from 2004 - 2008. While the volume of Japan remains almost at the same level, China’s volume has increased more than 4 times since 2004. The difference between the two in 2008 is only 11.7 million tons while it was 45 million tons in 2004.

(7) Administration System

As of April 2010, there are 33 provinces (Propinsi), 2 special regions (Aceh and Yogyakarta) and 1 special capital city district i.e. Jakarta (Daerah Khusus Ibukota). It is noted that the province of West Java and Irian Jaya have been divided into two new provinces, i.e. Papua and West Papua, Banten and West Java respectively, under the recent decentralization movement. Each province has its own capital city and there are regencies/cities (Kabupaten/Kota) under the province, which are thought to become the key administrative units in the decentralization.

Administration of the Case Study area is as follows: DKI Jakarta consists of 5 districts. The capital of Banten province is Serang city and consists of 4 regencies and 2 municipalities including the capital city. West Java province consists of 16 regencies and 9 municipalities including Bundong, the capital city.

In addition to various policy implementations regarding decentralization of the administrative system, the Indonesian Government tackled another national strategy on Public Private Partnership. Presidential Regulation No.67/2005 was put in force to set out the platform for the national PPP scheme. The Presidential Regulation, coupled with the Ministry of Finance Regulation No.38/2006, provide government support for the undertakings of infrastructure development by the private sector.

Three government organizations were newly established to promote the national PPP scheme. These are the "National Committee on Acceleration of Infrastructure Provision" (KKPPI), "Risk Management Committee on Infrastructure Provision" (RMCIP) and "Risk Management Unit" (RMU).

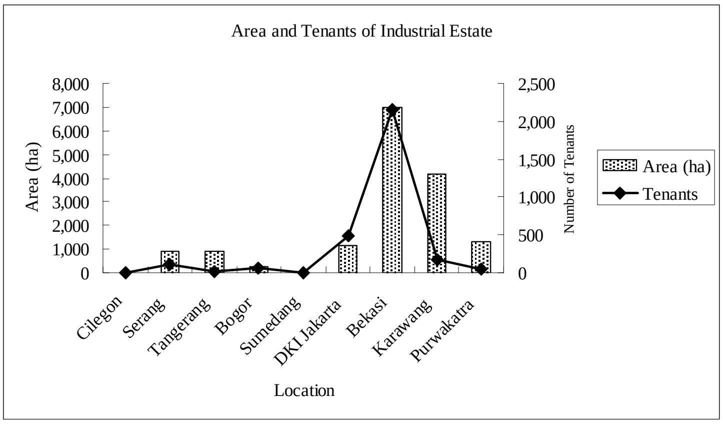
KKPPI was established by the Presidential Regulation No.42/2005 and possess the core function for the promotion of infrastructure development under the PPP scheme. Coordinating Ministry of Economic Affairs (CMEA) acts as a Chairman of the committee and the Director General of the National Development Planning Agency (BAPPENAS) sits as an Executive Chairman. The members of the committee are the Minister of Finance, Minister of Internal Affairs, Minister of Public Works, Minister of Energy and Mining, Minster of Transportation, Minister of Communication, Minster of State Own Companies and Minister of Cabinet.

(8) Current situation of Industrial Estate

According to the directory, numbers of estate are 9 in Banten, 3 in DKI Jakarta and 22 in West Java.

The directory says Krakatau Industrial Estate in Cilegon is located inside Krakatau Steel complex and targeting heavy manufacturing, ranging from steel to chemical, petrochemical industries.

Area and number of tenants of industrial estate excluding those under construction and Krakatau industrial estate which basically has few container cargoes is shown in Figure 2.4-6. It is clearly shown that potential industrial estates for container traffic are gathered in West Java province.



Source Indonesia Industrial Estate Directory 2006, HKI

Figure 2.4-6 Area and Tenants of Industrial Estate in DKI, Banten and West Java

At industrial estates in Karawang, number of tenants is smaller than the area because of characteristics of their industry type and expandable lot. Representative examples of tenant are vehicle (2 & 4 wheel), rubber products, electronic products, textile, glass products and non-ferrous metal which need comparatively wide lot as one company.

2.5 Analysis of Cargo Trends of the Existing Ports

Four public ports are situated in the Greater Jakarta Metropolitan Area: Tanjung Priok port, Banten port, Sunda Kelapa port, and Cirebon port.

(1) Container Throughput (TEU)

A total of 3.8 million TEU of containers are handled at the public ports in the Study area in 2009, which was a 4.4% decrease from 2008 (see Table 2.5-1). Among the four ports, the Cirebon port has practically handled no containers for the last two decades. At Sunda Kelapa port about ten thousand TEUs containers are loaded/unloaded, and all of them are interisland traffic.

Banten port is composed of two port districts: Ciwandan port district and Merakmas port district; the former is a public port and the latter is a special port. Banten port handled a total of 14,072 TEUs in 2009, and almost all of the containers handled at the Banten port were throughput of Merakmas port district, which is managed by a paper company. Container throughput at Banten port reached more than 50,000 TEUs in 2002 and 2003, however it has been gradually decreasing since then.

Table 2.5-1 Container Throughput By Port

(Unit: '000 TEU)

Year	Tg. Priok	Banten	Sunda Kelapa	Cirebon	Total	Share of Tg. Priok
1991	736	0	0	0	736	99.9%
1992	866	0	0	0	866	100.0%
1993	1,078	0	0	0	1,078	100.0%
1994	1,270	0	0	0	1,270	100.0%
1995	1,501	0	0	0	1,501	100.0%
1996	1,604	0	0	0	1,604	100.0%
1997	1,869	0	0	0	1,869	100.0%
1998	1,900	1	0	0	1,901	99.9%
1999	2,112	10	0	0	2,122	99.5%
2000	2,431	16	0	0	2,447	99.3%
2001	2,192	25	0	0	2,217	98.9%
2002	2,624	54	0	0	2,678	98.0%
2003	2,758	53	0	0	2,811	98.1%
2004	3,179	47	1	0	3,226	98.5%
2005	3,330	25	2	0	3,357	99.2%
2006	3,424	30	5	0	3,459	99.0%
2007	3,692	19	11	0	3,722	99.2%
2008	3,984	16	5	0	4,005	99.5%
2009	3,804	14	9	0	3,827	99.4%

(Source: Indonesia Port Corporation II)

Tanjung Priok port is the gateway oft he whole of Indonesia, and it can be said that in effect all of the containers handled in the greater Jakarta metropolitan area have been handled at the Tanjung Priok port because the share of the Tanjung Priok port has been exceeding more than 99% of the total (see Table 2.5.1).

(2) Non-Container Cargo

A total of 41.3 million tons of non-container cargoes were loaded or unloaded at the four public ports in the greater metropolitan area. Tanjung Priok port handled a total of 29 million tons of non-container cargoes in 2009, which was 71 percent of the total. Banten port followed Tanjung Priok port, handling 5.4 million tons of non-container cargo. Coal is the principal commodity handled at this port. Ciirebon port and Sunda Kelapa port each handled about three million tons of non-container cargo in 2009. Total non-container cargo tonnage at the four ports have shown an increasing tendency from around 35 million tons in 2003 to around 43 million tons in 2008 (see Table 2.5-2).

Table 2.5-2 Non-Container Cargo Throughput by Package Type at Study Ports (1991-2009)

(Unit: '000 ton)

Year	2002	2003	2004	2005	2006	2007	2008	2009
Banten	5,667	3,278	4,083	4,756	3,825	4,651	4,571	5,426
Sunda Kelapa	3,667	3,712	4,325	4,500	3,532	3,321	3,532	3,155
Cirebon	1,730	1,730	2,459	2,982	3,270	3,819	3,827	3,584
Tg. Priok	29,982	25,920	26,682	26,469	28,381	31,489	30,940	29,097
Total Metropolitan Ports	41,046	34,640	37,548	38,707	39,008	43,280	42,871	41,263

(Source: Indonesia Port Corporation II)

(3) Non-container Cargo Throughput by Package Type

Throughput by package type is shown in the following Table 2.5-3**.** Total non-container cargo throughput has shown stable or rather increasing tendency since 2003, but throughput levels of bag cargo and liquid bulk cargo have shown decreasing tendencies.

Meanwhile, throughput of dry bulk cargo has been expanding remarkably since 2003, and compound annual growth rate of this cargo type has registered at 11.9%. A considerable portion of this throughput expansion has been attributed to coal, clinker and sand.

Table 2.5-3 Non-Container Cargo Throughput by Package Type at Study Ports

(Unit: '000 ton)

Year	2002	2003	2004	2005	2006	2007	2008	2009
Total Non-Container	41,046	34,640	37,548	38,707	39,008	43,280	42,871	41,263
General Cargo	11,131	7,430	5,653	7,535	9,102	9,271	10,537	9,665
Bag Cargo	4,151	3,642	2,771	3,294	2,531	3,158	2,856	2,981
Liquid Bulk Cargo	14,836	12,615	13,720	11,912	10,812	10,892	10,056	9,494
Dry Bulk Cargo	9,850	9,717	14,183	14,899	16,116	19,703	18,975	19,066
Others	1,079	1,236	1,222	1,067	447	256	447	56

(Source: Indonesia Port Corporation II)

2.6 Analysis of Operational Situation of Tanjung Priok Terminal

(1) Allocation of the Existing Port Facilities

The Wharf Area of Tanjung Priok Terminal to handle commercial goods is divided into seven areas as follows (see Figure 2.6-1):

- Japat River Wharf
- Island Wharf
- First Wharf
- Second Wharf
- Third Wharf
- International Container Terminal Area (JICT and KOJA)
- Bulk Cargo Area (Petroleum, Grains)

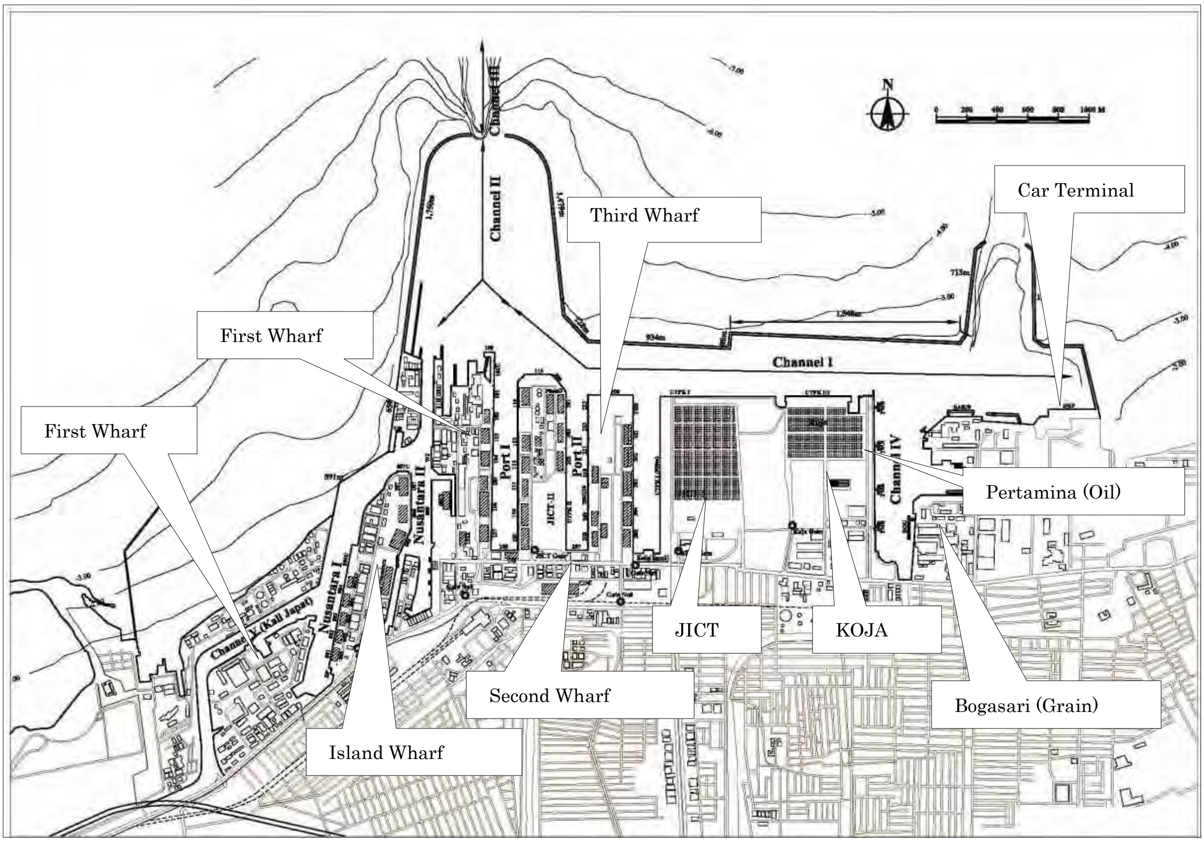


Figure 2.6-1 The Existing Facility Layout of Tanjung Priok Terminal

(2) Cargo-Handling Activities

1) Containers

In 2009, around 3 million boxes of containers were handled at Tanjung Priok Port. Out of that amount, around 1.9 million boxes were international containers. The remaining 1.1 million boxes were domestic containers.

Almost all international containers were handled at Jakarta Container Terminal (JCT) containing Jakarta International Container Terminal (JICT), KOJA Terminal, MTI (Multi-Terminal Indonesia), and Mustica Alam Lestari (MAL). International containers were transhipped at JCT in the same year, though the amount was small (1.8 % of the total at JCT).

On the other hand, domestic containers were handled at conventional berths. Those domestic containers are supposed to be pure domestic containers judging from the results of interviews to Intra-Indonesia shipping lines and site observations. At those berths, conventional cargoes were also handled.

2) Conventional (Non-container) Cargoes

Conventional cargoes handled at Tanjung Priok Terminal are shown inTable 2.6-1. Petroleum products, coal, iron & steel products, cement, wheat, sand, vegetable oil (CPO) and clinker were major commodities.

Table 2.6-1 Conventional Cargoes Handled at Tanjung Priok Terminal in 2009

Cargo Item	Units	Import and Domestic Unloading			Export and Domestic Loading			Total	
		International	Domestic	Sub-total	International	Intra-Indonesia	Sub-total		
Vehicle	units	90,348	14,553	104,901	62,632	102,881	165,513	270,414	
Cattle	Heads	370,847		370,847			-	370,847	
Wheat	MT	1,941,612	395	1,942,007		12,796	12,796	1,954,803	7.3%
flour	MT			-	61,242		61,242	61,242	
rice	MT	74,758	3,300	78,058			-	78,058	
rice bran	MT			-	226,300	9,000	235,300	235,300	
Sand	MT	80,961	1,774,600	1,855,561			-	1,855,561	7.0%
Construction material	MT			-	4,552		4,552	4,552	
Lumber	MT	4,017		4,017			-	4,017	
Cement	MT	2,044	823,316	825,360	541,572	1,440,538	1,982,110	2,807,470	10.5%
Clinker	MT			-	1,357,900	1,950	1,359,850	1,359,850	5.1%
Gypsum	MT	549,586	62,541	612,127			-	612,127	2.3%
Sulfur	MT	185,115		185,115			-	185,115	
Coal	MT		3,219,781	3,219,781			-	3,219,781	12.1%
Mineral	MT	16,822	112,552	129,374			-	129,374	
Quartz sand	MT	119,500		119,500			-	119,500	
Slag	MT	47,686		47,686			-	47,686	
Salt	MT	44,100		44,100			-	44,100	
Fertilizer	MT	23,955	1,000	24,955	6,900	32,952	39,852	64,807	
Maize	MT	16,500		16,500			-	16,500	
Petroleum products	MT	2,293,437	1,959,439	4,252,876	57,130	73,329	130,459	4,383,335	16.5%
LPG	MT	786,677		786,677			-	786,677	3.0%
Lubricant oil	MT	183,262		183,262			-	183,262	
Chemical product	MT	611,418	199,999	811,417			-	811,417	3.0%
Vegetable oil	MT	5,010	1,584,302	1,589,312	35,760		35,760	1,625,072	6.1%
Vegetable fats	MT	10,402		10,402	18,251	29,950	48,201	58,603	
Bo-diesel	MT	41,097		41,097			-	41,097	
Iron and steel product	MT	2,441,264	5,759	2,447,023	225,555	143,838	369,393	2,816,416	10.6%
Aluminium	MT	42,738	65,626	108,364			-	108,364	
Scrap	MT	255,795	6,725	262,520			-	262,520	
Pulp	MT	202,410	667,560	869,970			-	869,970	3.3%
GC	MT	114,161	66,404	180,565	83,774	416,637	500,411	680,976	2.6%
GC + CNT	MT	176,468	72,610	249,078	85,692	228,318	314,010	563,088	2.1%
GC + cement	MT			-	84,126		84,126	84,126	
Project material	MT			-	2,638	12,397	15,035	15,035	
Machinery and equipment	MT	51,653	34,403	86,056	8,124	90,375	98,499	184,555	
Parts and components	MT			-	2,887	5,586	8,473	8,473	
Plywood and particleboard	MT	11,076	122,569	133,645			-	133,645	
Textile	MT			-	62,200		62,200	62,200	
miscellaneous	MT	24,082	107,347	131,429	2,200	8,861	11,061	142,490	
Frozen fish	MT	941		941			-	941	
Total excluding non-MT units	MT	10,358,547	10,890,228	21,248,775	2,866,803	2,506,527	5,373,330	26,622,104	91.5%

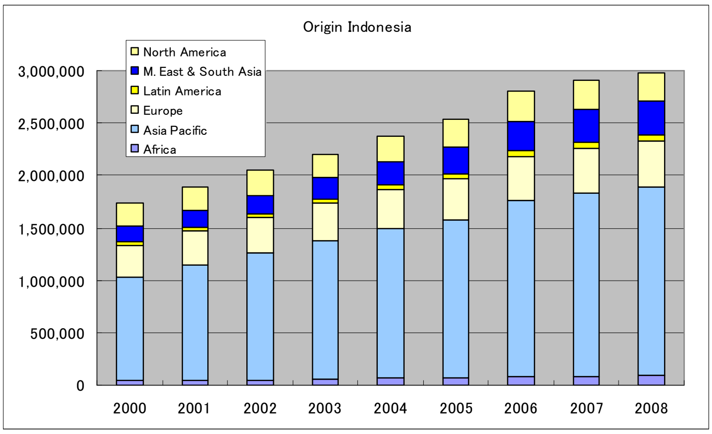
Note: Containers: Intra-Indonesian Islands
Soure: Vessel Berting Records probided by Pelindo 2

2.7 Analysis of Trends of International Maritime Transport including Container Transshipment Centering on Indonesia

(1) Cargo Origin / Destination

There are two types of figures regarding container volume: “Actual Container Figure” and “Container Throughput Figure.” The concept of “Throughput” is widely used at container terminals site and most of the container statistics is “throughput basis”, while “Actual Container” is used mostly in official statistics based on the custom documents.

Figure 2.7-1 shows historical trend of the distribution of origin of international containers destined to Indonesia, based on "Actual Container Figure". The diagram clearly shows the domination of Intra-ASEAN trade in the Indonesian economy. The share of the Intra-ASEAN trade has been constantly increasing since 2000, while the other origin region such as North America, Europe, and Latin America has remained at more or less the same level. The share of the Middle East and South Asia is increasing substantially. In the container system, export and import are prone to have similar trends.



Source: Seabury, OCDI

Figure 2.7-1 Annual Change in Origin Countries to Indonesia (2000/2008,TEU)

(2) Shipping Lines Serving Indonesia

1) International Feeder Services via Singapore

Several major ocean going shipping lines are serving Jakarta (Container Terminals: JICT, KOJA, T100, T300, JICT & KOJA) basically with feeder vessels (ship size varies from 1,000 TEU to 1,500 TEU). Presently about 10 major shipping lines are serving to/from Jakarta, thus, as far as container ships are concerned, there are roughly 28,000 callings to Jakarta port per year.

2) International Direct Calling Services

Major shipping lines are offering international direct calling services to and from Indonesian major ports such as Jakarta, Surabaya and some others ports. Six lines (one is a joint venture) are maintaining international direct calling services as summarized in Table 2.7-1.

Table 2.7-1 Shipping Lines serving Indonesia by Direct Calling Services

Line	Route	Frequency	Deployed VSL type
OOCL	Japan Taiwan South China	Weekly	2,700 ～4,600TEU
	Newzealand/ Jakarta	Monthly	3,000 TEU
	Singapore/ Semarang, Surabaya	3 sailings/ week	1,000 TEU
	Malaysia /Jakarta /Merak/ Singapore	Weekly	1,500 TEU
	Malaysia (Pasir Gudang)/ Jakarta	Weekly	1,500 TEU
TSK	Japan / Southeast Asia Jakarta	Weekly	1,500 TEU
	Thailand/Malaysia/Indonesia	Weekly	2,500 TEU
YSC	Korea / Taiwan / SE Asia Jakarta, Bintulu	Weekly	1,500 TEU, 1,700 TEU 1,300 TEU
TSK/ KL	Japan / Southeast Asia Jakarta	Weekly	2,500 TEU

Source: Telephone Interviews to 6 shipping lines key person(as of End June, 2010)

3) International Feeder Service between Singapore and the major Indonesian ports by Indonesian Shipping Lines

Two middle sized shipping lines (ACT and Samudera) are operating a shuttle feeder carrier between Singapore and some major Indonesia ports. These two lines are dominant in the field of the international/domestic feeder service centering on Singapore.

As far as the big two lines' feeder vessels calling Jakarta port are concerned, about 3,000 calls are counted for one year total for both export and import.

2.8 Review of the Situation and Development Plans of Toll Road Network

(1) Current Situation of Toll Road Network

1) Jakarta Metropolitan Area

Indonesia opened the first toll road, Jagorawi toll road, in 1972 and to date, 28 developed toll roads, 741.92km in length have been operated. 2 ring roads, Jakarta inter urban toll road (JIUT) with the Jakarta Harbour Road and Jakarta outer ring road (JORR), are presently traversed around Jakarta Metropolitan Area. JIUT is fully in operation with about 50km, while the length of JORR will reach 58km after the completion of current missing link, W2 section, between Kebon Jeruk and Ulujami.

2) Jakarta Inter-Urban Toll Road (JIUT)

Becoming fully operationa in 1996, this toll road consists of a 23.5 km-long Cawang-Tomang-Pluit concession operated by Jasa Marga, and 11.5km of Harbour Road and 15.5km of Ir. Wiyoto Wiyono concession operated by Citra Marga Nusaphala Persada. The toll road with 6 lanes connecting Cawang-Pluit, has 3 interchanges, 8 flyovers, 10 pedestrian bridges and 19 toll gates operated with open transaction system.

3) Jakarta Outer Ring Road (JORR)

The sections of JORR which are now being operated are Ulujami-Cilincing toll road that spreads from the east, southeast and south of Jakarta covering a length of 45 km and W1 North (Kebon Jeruk-penjaringan) with a length of 9.7 km. The W2 (Ulujami-Kebon Jeruk) section that connects Ulujami with Prof. Dr. Ir. Sedyatmo Toll Road is under construction. When the toll road becomes fully operational, the toll road users will not have to traverse the center of Jakarta to go to the international airport. This JORR connects the radial toll roads which are now is being operated such as Jakarta-Cikampek, Jagorawi, Pondok Aren-Serpong and Jakarta-Merek toll road.

4) West Java Area

In West Java Area, 5 radial toll roads spread from the center of Jakarta to the east, south and west and link to JORR. Jasa Marga has operated all roads except Tangerang-Merek and Serpong-Pondok Aren Toll Road. The Jakarta-Cikampek toll road was extended to Bandung in 2004, which shortened the travel time from Jakarta to Bandung to about 2 to 3 hours by vehicle. The existing toll road network in West Java Area is shown in Figure 2.8-1. The length and operator of each toll road are described in Table 2.8-1.

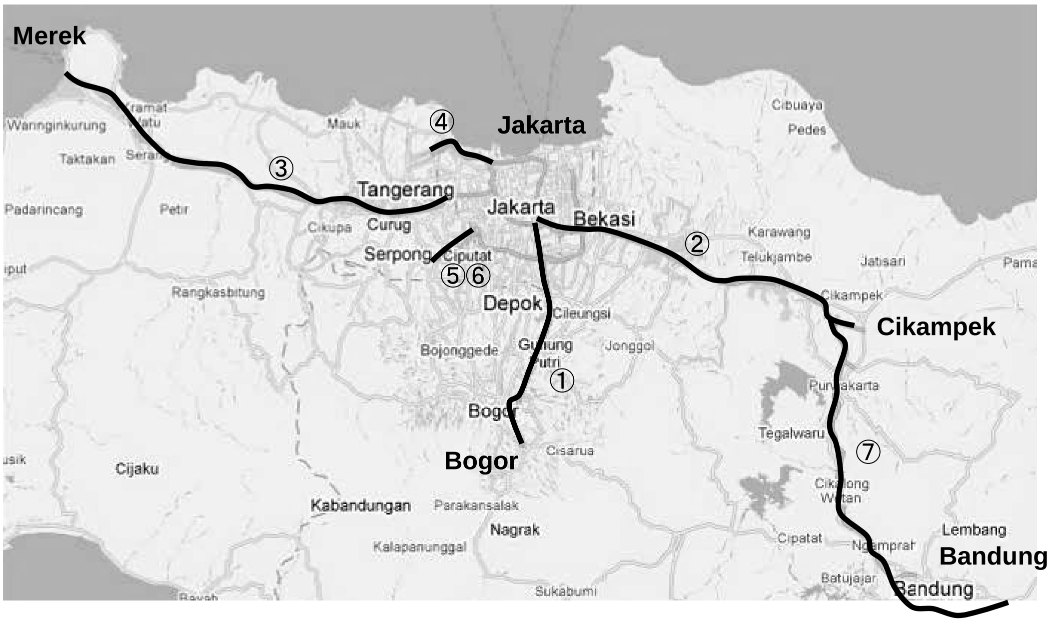


Figure 2.8-1 Toll road network in West Java Area

Table 2.8-1 Length and operator of toll road

	Name of Toll Road	Length (km)	Name of Operator	Start Operation
1	Jagorawi Toll Road	59.0	PT. Jasa Marga	1978
2	Jakarta - Cikampek Toll Road	72.0	PT. Jasa Marga	1985
3	Jakarta - Merak Toll Road - Jakarta - Tangerang - Tangerang – Merak	106.0 33.0 73.0	 PT. Jasa Marga PT. Marga Mandala Sakti	 1998 1996
4	Prof. Dr. Ir. Sedyatmo Toll Road (Cengkareng Airport Access)	14.3	PT. Jasa Marga	1986
5	Ulujami-Pondok Aren Toll Road	5.5	PT. Jasa Marga	2001
6	Serpong-Pondok Aren Toll Road	7.3	PT. Bintaro Serpong Damai	1999
7	Cipularang Toll Road	58.5	PT. Jasa Marga	2004

Source: Badan Pengatur Jalan Tol (BPJT)

Detail of radial roads which is operated by Jasa Marga is as follows.

Jagorawi Toll Road (West Java Province)

With a length of 59 km, the toll road that links Jakarta- Bogor-Ciawi was Indonesia's first toll road.

Jakarta-Cikampek Toll Road (West Java Province)

Jakarta-Cikampek Toll Road became fully operational in 1988. The toll road, 72 km in length, consists of 10 interchanges, 27 flyovers and 16 pedestrian bridges with most of its toll gates utilizing a closed transaction system. The toll road is connected with Cipularang Toll Road and Jakarta Outer Ring Road, and is a part of Trans Java Toll Road.

Jakarta-Tangerang Toll Road (Banten Province)

Fully operated in 1984, Jakarta-Tangerang Toll Road is 33.0 km long, with 6 lanes connecting Jakarta-Tangerang and has closed transaction system..

Prof. Dr. Ir. Sedyatmo Toll Road (Banten Province)

Fully operated in 1984, Jakarta-Tangerang Toll Road is 33.0 km long, with 6 lanes connecting Jakarta-Tangerang and has a closed transaction system.

Ulujami-Pondok Aren Toll Road (Banten Province)

The toll road is a part of Serpong-Ulujami Toll Road that connects Jakarta and southern Tangerang via Bintaro and Pesanggrahan over a distance of 5.5km.

Cipularang Toll Road (West Java Province)

Spreading 58.5 km from Cikampek-Purwakarta to Padalarang, this toll road is part of Purbaleunyi Toll Road. This toll road consists of 3 interchanges, 37 flyovers, 8 pedestrian bridges and 3 toll gates which are operated with a closed transaction system..

(2) Development Plan

Although the Indonesian government's budget and foreign loan were invested for the toll road construction when the toll road development started around 1980s, currently the construction and operation of toll road are mainly conducted by the private investors. Badan Pengatur Jalan Tol (BPJP) was established as the implementation body to manage the toll road under Ministry of Public Works, based on "Law No.38 of 2004 concerning Road". Toll road development progress as of March 2010 released from BPJT is shown as Table 2.8-2.

Table 2.8-2 Toll road development progress in Indonesia

Setates	Number of Link	Length (km)	Estimate investment Cost (Billion Rp.)
In operation	28	741.92	-
Concession Agreement Signed	21	768.65	66,751.95
Concession Agreement Preparation	4	154.24	10,267.17
Built by Government	4	78.01	8,068.08
Tender Preparation	30	1,345.01	142,842,15

Source: Toll Road Investment Opportunities in Indonesia 2010 by BPJT

1) Jakarta Metropolitan Area

In order to mitigate the traffic congestion around Jakarta Metropolitan area and strengthen the toll road network, Bina Marga, Directorate General of Highways, has plans to develop the second Jakarta Outer Ring Road (JORR 2), which is located outside of JORR.

Table 2.8-3 Toll road of JORR and JORR2

	Name of Toll Road		Length (km)	Name of Operator	Condition
1	JORR	W1	9.7	PT. Jalan Tol Lingkar Barat 1	In operation
2		W2,U	7.0	PT. Jasa Marga	Land acquisition
3		W2,S	2.5	PT. Jasa Marga	In operation
4		S	13.2	PT Jalan Tol Lingkar Luar	In operation
5		E1 S.1+2	4.5	PT. Jasa Marga	In operation
6		E1 S.3	4.4	PT. Jasa Marga	In operation
7		E1 S.4	4.0	PT. Jasa Marga	In operation
8		E2	9.0	PT. Jasa Marga	In operation
9		E3	3.8	PT. Jasa Marga	In operation
10		Tanjung Priok Access	12.1		Land acquisition
11	JORR2	Cibitung-Cilinging	33.9	MTD Capital (Malaysia)	Land acquisition
12		Cimanggis-Cibitung	25.4	Bakri Group + Plus	Land acquisition
13		Cinere-Jagorawi	14.6	PT. Trans Lingkar Kita Jaya	Land acquisition
14		Depok-Antasari	22.8	PT. Citra Waspphitowa	Land acquisition
15		Serpong-Cinene	10.1	Theiss	Negotiation
16		Kunciran-Serepong	11.2	PT. Marga Trans Nusantara	Land acquisition
17		Cengkareng-Kunciran	15.2	PT. Marga Kunciran Cengkareng	Land acquisition

Source: Badan Pengatur Jalan Tol (BPJT) and Jasa Marga

2) Inner Toll Road in Jakarta City

In addition to JORR2, the plan of Inner Toll Road consisting of 6 routes in Jakarta city is proposed to solve the serious traffic congestion. This project also depends on land acquisition.

Table 2.8-4 Length and estimated investment cost of Inner Toll Road

	Section	Length (km)	Estimate investment Cost *including Land Acquisition cost
1	Kemayoran – Kampung Melayu	9.65	6,953.56 Billion Rp.
2	Sunter - Rawa Buaya – Batu Ceper	22.92	9,760.67 Billion Rp.
3	Ulujami – Tanah Abang	8.27	4,255.27 Billion Rp.
4	Pasar Minggu – Casablanca	9.56	5,719.87 Billion Rp.
5	Suntar - Pur Genbag	25.73	7,377.98 Billion Rp.
6	Duri Puro – Tomang – Kp Melayu	11.38	5,960.05 Billion Rp.

Source: Toll Road Investment Opportunities in Indonesia 2010 by BPJT

3) Tanjung Priok Access Road

Tanjung Priok Access Road (TgPA) was originally planned to connect the JORR to the Tanjung Priok International Port, however it is now planned to be part of the JORR to replace the N Section that has been set aside due to land acquisition and resettlement issues.

TgPA is a six-lane toll road stretching 10.3 km connecting the northeastern section of JORR and JIUT through in front of Tanjung Priok Port. In the design stage, TgPA consisted of 5 sections, E1, E2, W1, W2 and NS. However, W1 and W2 sections were once removed from the project scope due to budget constraints.

The construction work of E1 section is almost completed with the operation expected to commence within this year. E2 and NS section is now under the stage of tender evaluation for contractor. The construction schedule of the TgPA is listed in Table 2.8-5.

Table 2.8-5 Construction schedule of Tanjung Priok Access Road

Section	Length (km)	Construction Schedule	Construction Period
E1	3.4	Completion of construction at July, 2010	
E2	2.7	Commencement of construction Nov, 2010	28 month
NS	2.2	Commencement of construction Jan, 2011	18 month
E2A	2.0	Commencement of construction Mar, 2011	31 month

4) West Java Area

Jasa Marga has a plan to increase the number of lanes of the existing toll roads as listed in Table 2.8-6. The increased road capacity will contribute to alleviate the traffic condition especially on Jakarta-Cikampek toll road where serious traffic congestion occurs due to cargo traffic generated from the development of industrial areas in Cibitung, Cikarang and Karawang.

Table 2.8-6 Widening plan on toll road

Road name	Location	length (km)	Number of lanes	Schedule
Jakarta - Cikampek	Cibitung – Cikarang Timur	13.7	6 to 8	Apr 2010 - Sep 2010
	IC Dawuan – Cikampek	6.5	4 to 6	Jun 2010 - Feb 2011
Jagorawi	TMII - Cibubur	9.1	6 to 8	Dec 2010 - Sep 2011
	Cibubur – Cibinong	13.7	6 to 8	Dec 2010 - Sep 2011
Jakarta - Tangerang	Tomang – Tangerang Barat	26.0	6 to 8	Sep 2010 - Aug 2011

In addition, Trans Java Toll Road (TJTR) is proposed to link most major manufacturing centers of Java by the Ministry of Public Works. As part of this network, 7 of 10 sections of the toll road from Cikampek to Surabaya already have concessionaires and some of them have begun construction.

2.9 Review of the Situation and Development Plans of Railway Network

(1) Overview of regional railway network

1) Railway Network in Project Area

The existing freight transportation in Java island is composed of coal, bulk and container transport between Banteng, Jakarta DKI District areas and West Java area. Among 9 operational regions (Daerah Operasi/DAOP)[1] in whole Java Island, DAOP I (Jakarta) and DAOP II (Bandung) are laid in the project area of this study.

2) Freight Transportation in Java Island

The total freight traffic volume in Indonesia is approximately 17 million tons annually, and has maintained an almost constant level for the last couple of years. Although freight traffic is starting to attract interest from the coal production market in Sumatra and Kalimantan Islands, passenger trains play a much more important role than freight trains in Java Island at present.

However, consistent with the government policy of saving fuel consumption, freight railway transport is expected to play a significant role in the nation's logistic growth.

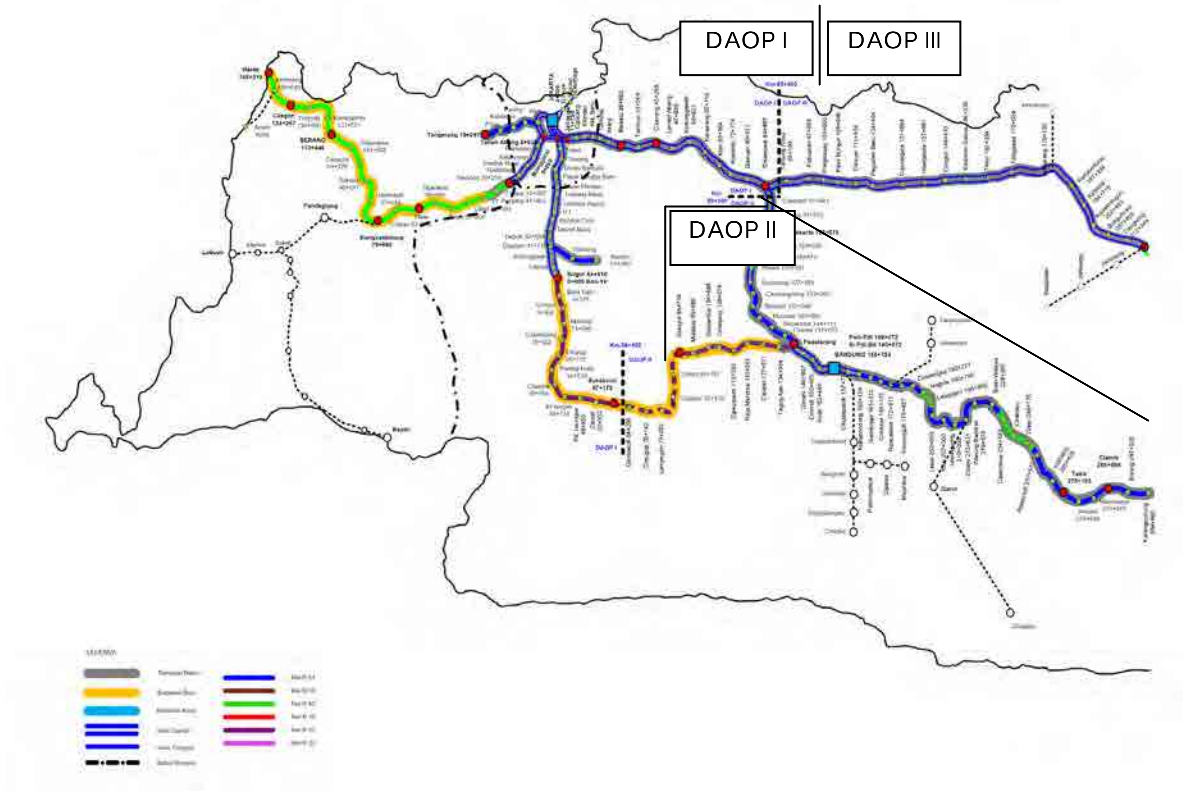
3) Freight Transportation Routes and Volumes

- Freight traffics across project area are generated mostly in Pasoso, Jakarta Gudan, Sungai, Cigading (DAOP I), Gedebage (DAOP II), and Central / East Java Provinces (Semarang, Surabaya).
- Freight traffic in DAOP I shows a 39% increase for the last 5 years, while the traffic in DAOP II shows a 27% decrease for the same period.
- Majority of the traffic in DAOP I is coal transport from Cigadin to Bekasi, which reaches around 40% of all the freight transport handled in this region. Total container traffic handled between North Jakarta and Gedebage or between North Jakarta and East Java accounts for around 20%.
- Freight traffic in DAOP II is less than 20% of that in DAOP I. More than half of all the traffic in this region is the containers from Gedebage to Tg. Priok.

4) Railway Facilities

Rail, sleeper, and number of tracks in Project Area are summarized in the following figure.

[1] (Daop I) - Jakarta, (Daop II) - Bandung, (Daop III) - Cirebon, (Daop IV) - Semarang, (Daop V) - Purwokerto, (Daop VI) - Yogyakarta, (Daop VII) - Madiun, (Daop VIII) - Surabaya, (Daop IX) - Jember



	Concrete Sleeper		54 kg/m rail
	Steel Sleeper		50 kg/m rail
	Wood Sleeper		42 kg/m rail
	Double Track		38 kg/m rail
	Single Track		33 kg/m rail
	Provincial Boundary		25 kg/m rail

Figure 2.9-1 Types of Track Structures in Project Area

Railway facilities of Jabodetabek Railways and other provincial regions show significant differences. Most sections in Jabodetabek Railways are now double tracked and electrified to 1500V DC (except the Serpong and the Tangelang Line which applies 1,800V DC), while other regions are still operated under diesel technology. Automated electric block signaling is used on all lines except the Tg. Priok Line in Jabodetabek Railways and vicinities, whereas mechanical interlocking is still used in some provincial areas.

DAOP I of PT KA owns 51 locomotives, 1 diesel railcar, 195 electric railcars that are ready for operation as of 2007. All the freight trains are currently hauled by diesel locomotives. These diesel locomotives are maintained at Jatinegara in DAOP I and Bandung in DAOP II.

According to DAOP I, the performance of the existing locomotives is generally good. There are 3 types of existing locomotive owned by PT. KA, C201, C203 and C204. C201 is a type of locomotive dedicated for freight transport.

(2) The existing railway transportation network between Tanjung Priok Port (Pasoso station) and Gedebage ICD

1) Tanjung Priok Port (Pasoso station)

Location

Tanjung Priok Port has the most populated hinterland: West Java province and Metropolitan Jakarta, where the scale of economic activities is the largest in the country. Tanjung Priok Port serves as the outlet for this hinterland.

The Pasoso Station is located next to C.T. Berth. The industrial railway track branched from Tanjung Priok Station reaches PERTAMINA oil base. Pasoso Station is located one km from Tanjung Priok Station. It was converted to a container freight station from a marshalling yard due to the improvement of general cargo berths.

Outline **of** container loading/unloading installation

Existing yard facility in Pasoso Station consists of stabling and operating trucks. One track reaches general cargo berth which is now used only for transporting heavy machines or locomotives, while another track goes to the empty container depot which is not in use.

The length of the existing platform was originally 300m, but extended to 600m where two toplifters are operated by Port side operators. The width of the platform is 49m, which is sufficient to handle containers with toplifters. Also, the Station has a warehouse (100m x 40m) suitable for CFS on the platform. Although two container wagon formations are possible at the same time, the actual handling these days seems far below the maximum capacity.

Transportation volume from/ to Tanjung Priok Port (Pasoso station)

Transportation volume from/to Tanjung Priok Port, including Pasoso (dealing with container transport) and Jakarta Gudang (dealing with bulk transport) has shown a steady increase since 2004 with an average growth rate of 18%, even though several disadvantages over road transport were reported. This is probably because of the overall development in logistic industry associated with the nation's rapid economic growth.

When it comes to railway container transport, Tanjung Priok – Gedebage freight corridor plays a dominant role in the project area. It was especially true when garment industries in Bandung enjoyed rapid growth in the 1990's. However, container transportation between Tanjung Priok (Pasoso) and Gedegbage dry port was decreased for the last decade[2], as transportation time and tariff are unable to compete with truck transportation. This is largely due to the highway between Jakarta and Bandung, which started operation in 2004, and to chronic traffic congestion between Tanjung Priok Port and Pasoso Station, which makes the total travel time of freight transportation much longer.

As a result, only trains of twice/day were scheduled in the published timetable, but regular operation is actually limited to only once/day because of the lack of transport demand.

Problem of container transportation time on road between Port and Pasoso railway station

At present, it takes 6 hours and half for the operation of freight trains from Tg. Priok to Gedebage Dryport (4 hours for travelling from Pasoso to Gedebage plus 2 hours and half for loading and unloading from/to freight trains to/from trailer trucks). The latter is becoming even worse as the total container handling volume in Tanjung Priok Port increases year by year, resulting in a loss of competitiveness in time against road transport.

[2] It is noted that freight transport volume in 2009 shows remarkable growth (+37%) over the last year. The reason is yet to be identified.

2) Gedegbage inland container depot

Location

Gedebage Dryport is located 187 km away from the port of Tanjung Priok and around 10 km east from Bandung Station. Kiaracondon station yard, located 5 km west of Gedebage, was once used as an unloading facility due to the constraint of available space in Gedebage Dryport, but the facility was cleared after significant decrease in handling volume.

Outline of container loading/unloading installation

The following infrastructure and equipment are provided in Gedebage inland container depot:

Table 2.9-1 Infrastructures and Facilities of Gedebage Dryport

Infrastructure/Facility	Dimension/Quantity
Land area	3.5 ha
Loading and unloading side track	1 x 240m
CFS for export and import	2 buildings
Warehouse	20m x 15m x 5m
Tractor head	3
Top loader	11
Transtainer	1
Forklift	5

Source: Study Team

Cost Comparison between railway transportation and road transportation

The transportation cost per km of loaded containers by railway is in general calculated based on the following unit costs.

- Per Km transportation cost of loaded container by railway
- Per Km transportation cost of empty container by railway
- Average container transportation cost by railway
- Commodity stuffing cost
- Loaded container loading and unloading cost at dry port
- Empty container loading and unloading cost at dry port
- Transportation cost within port
- Container lift-on or lift-off cost at port

The Team cannot present these unit costs in this report, as the information was not provided by relevant authorities. Some reference data is available in the previous JICA Study on Container Transportations (1995), which indicates a transportation unit cost of Rp. 1,125/km for 40-foot container and Rp. 643/km for 20-feet container operated in Pasoso – Gedebage corridor.

Also, unit cost of Rp. 100,000/km per trainset is currently used as a benchmark by a private freight forwarder, which equals Rp. 2,500/km for a 20-feet container provided that one trainset hauls 20 wagons.

These unit costs suggest that the freight transportation cost has become few times more costly over the last 15 years. However, it was also suggested by the private forwarder that freight railway operation still has a slight cost advantage over road transport in general. Freight transport of Tanjung Priok – Gedebage corridor may be able to restore the high potency once the direct access to Tanjung Priok Port is materialized.

Other Constraints

Only one stabling track is provided in Gedebage Dryport, mainly due to the land constraint. Taking the travel time and loading/unloading time into account, maximum number of round-trips is estimated to be 5 times per day.

For the main line, single track section from Kiaracondon to Gedebage will face a serious line capacity problem once the corridor serves more traffic. Either double tracking or electric interlocking will be required to increase line capacity.

In addition, Tanjung Priok – Gedebage corridor has a serious constraint in effective length at several locations for overtaking, especially at mountainous areas around Bandung. With existing effective length of 240m, train length cannot be expanded more than 17 freight wagons, i.e. 34 TEUs. It seems unable to extend the effective length due to the limited land space.

(3) Development plan of railway network

1) Improvement project of direct lead-in railway track to Tanjung Priok quay

Direct rail access from Pasoso to JICT & KOJA quay is programmed by DGR for early implementation. However, budget for the project in fiscal year 2010 was cancelled due to the slow progress of land acquisition. Some illegal dwellers still remains on site even now. Taking the strong need for timely completion into account, it is now anticipated to resume the project next year with Indonesian Government budget.

Another problem of the rail access to container terminal is land subsidence. The area from Pasoso to Tg. Priok faced a serious waterlogging problem associated with a heavy flood on Feb 2007. It seems that no particular provisions were made even after the flooding. Given the significant land subsidence problem in north Jakarta and frequent cancellation of train operations in flood season, it is essential to make necessary provisions in its facility plan.

2) Reinforcement of railway facilities

Several reinforcement projects are planned to improve railway facilities and rolling stocks for better passenger and freight train operation. Such projects include:

- Electrification and double-double tracking of Java Main Line to address the operational bottleneck in Manggarai and improve line capacity in Bekasi Line of Jabodetabek Railway and between Bekasi and Cikarang (on-going project by JICA funding)
- Step-by-step electrification and double tracking of the railroads in the vicinity of Bandung area (on-going project by Indonesian Government funding)
- Procurement of diesel locomotives to promote freight train operation in entire Java Island (study is in progress)
- Rehabilitation of Nambe Line to cater for cement transportation from south Jakarta
- Rehabilitation of Bogor – Sukabumi – Cianjur – Padalarang Corridor as an alternative route from Jakarta to Bandung

2.10 Results of Traffic Survey including OD (Origin-Destination) Survey

Traffic survey including OD survey was carried out from May 18 to June 12, 2010 at 5 gates of Tanjung Priok port, 2 intersections and 2 cross sections. The schedule and location of gates and intersections in the survey are shown in Figure 2.10-1

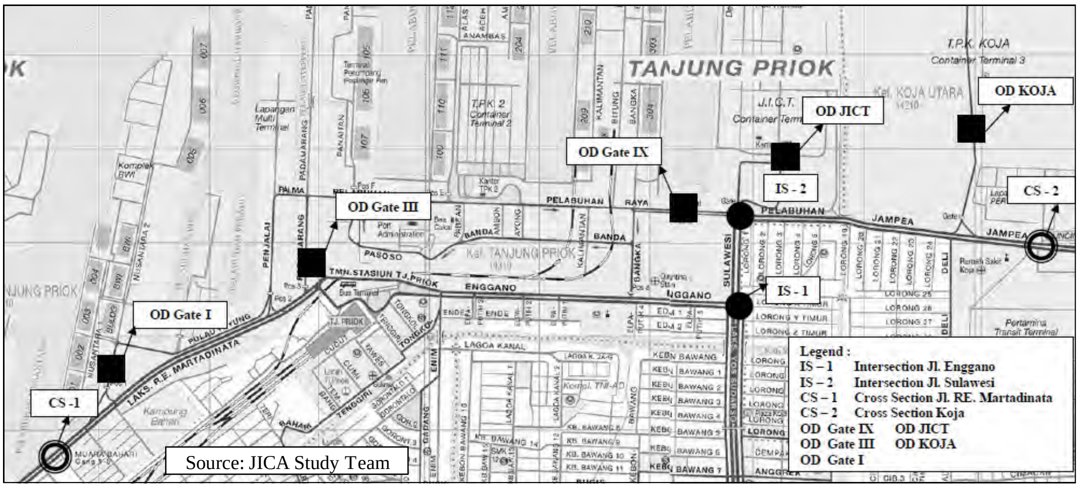


Figure 2.10-1 Location of Gates and Intersection of Survey

(1) Vehicle Counting Survey

Based on the results of the counting survey, the directional traffic flows of survey days at five gates, two cross sections are shown in Table 2.10-1.

Table 2.10-1 Traffic Flow at Gates and Cross Sections

Location	Direction	Tuesday	Wednesday	Thursday	Saturday	Total	Average
JICT Gate	In	3,418	2,937	4,211	4,144	14,710	3,678
	Out	3,175	3,293	3,609	3,234	13,311	3,328
	Total	6,593	6,230	7,820	7,378	28,021	7,005
KOJA Terminal Gate	In	1,360	1,606	1,606	1,661	6,233	1,558
	Out	1,318	1,585	1,631	1,468	6,002	1,501
	Total	2,678	3,191	3,237	3,129	12,235	3,059
Gate I Tanjung Priok Port	In	3,475	3,339	3,664	2,190	12,668	3,167
	Out	4,331	4,386	4,771	2,745	16,233	4,058
	Total	7,806	7,725	8,435	4,935	28,901	7,225
Gtae III Tanjung Priok Port	In	2,660	2,372	2,945	1,514	9,491	2,373
	Out	2,231	2,137	2,526	1,285	8,179	2,045
	Total	4,891	4,509	5,471	2,799	17,670	4,418
Gate IX Tanjung Priok Port	In	12,818	12,262	13,938	9,958	48,976	12,244
	Out	10,543	9,527	9,619	8,302	37,991	9,498
	Total	23,361	21,789	23,557	18,260	86,967	21,742
Cross Section Jl. RE. Martadinata	Ancol - Tanjung Priok	9,049	9,010	9,738	8,705	36,502	9,126
	Tanjung Priok- Ancol	11,887	11,817	12,189	10,227	46,120	11,530
	Total	20,936	20,827	21,927	18,932	82,622	20,656
Cross Section Jl. Jampea	Cilincing - Tanjung Priok	23,408	22,944	22,647	19,909	88,908	22,227
	Tanjung Priok - Cilincing	20,586	20,836	20,717	17,252	79,391	19,848
	Total	43,994	43,780	43,364	37,161	168,299	42,075

Note; without Motorcycle veh/day
Source: JICA Study Team

2.11 Results of Interview Survey with Major Consignees/Consignors

Interview survey with major consignees and consignors was conducted by JICA Study Team during their visit to Indonesia. Selected opinions and comments are as follows

(1) Issues on land transportation

Because of heavy road congestion, it sometimes takes 5~7 hours to transport import containers from the Tg. Priok port to our factory in Cibitun.

- Road congestions cannot be solved easily. Therefore, larger volume of storage is required to keep the operation of our factory.
- Only one round trip can be made between Tangerang and the Tg. Priok port (30 km) while two round trips can be done between Merak to Tangerang (100 km).
- We have not been greatly affected by traffic jams although sometimes we become 1～2 hours behind the schedule.
- When congested, six hours are needed to come to Tg. Priok port from Bekasi; it usually takes only one hour.

(2) Issues on port transportation

- Containers were moved out from the terminal to an unknown place without our consent.
- Port space is lacking for tracking, and existing container handling capacity cannot meet the demand.
- Pure car terminal does not have enough area for loading operation. Therefore, additional cost is generated for export activities.
- Cargo handling equipment for heavy cargo has not been sufficiently provided at the port terminal. Therefore, we are obliged to wait for a long time.

(3) Logistics in general

- 14-day stock has been stored at main warehouses because sometimes container cargoes cannot be cleared from the port. (Food industry)
- It is necessary for the management to take into account the traffic congestion in DKI, and inventory management has to be done taking into consideration the delay of ship arrival and departure due to port congestion.

(4) Location of a new port

- It is desirable that a new container port should be located as near as possible to Jakarta.
- Location of a new port should be selected from the view point that the new port shall contribute to the diversion of land traffic.
- Many automobile related industries are located near Bekasi and Karawan. If a container terminal is built at the eastern side of DKI, road congestion between Bekasi and the Tg. Priok would be reduced.

(5) Prospect for Indonesian economy and others

- Shortages of both power supply and road capacity have been bottlenecks for the Indonesian economic growth, and this is expected to continue in future.
- Higher economic growth rates can be expected for a long period in Indonesia.

Many foreign investors have been rushing to Indonesia recently.

2.12 Review of Laws and Regulations for Environmental and Social Considerations

(1) Fundamental Law for Environment

Fundamental law for environment in Indonesia was recently revised and enacted as Law No.32/2009 concerning Environmental Protection and Management.

The Law No.32/2009 requires environmental protection and management plan to utilize natural resources, control of pollution and damage on environment, environmental reservation, management of hazardous and toxic materials/waste and environmental information systems as well as strengthening regulations on environmental permission, supervision and penalties. In light of environmental and social consideration on developmental projects, Law No.32/2009 has stipulated to conduct Strategic Environmental Assessment (SEA) in addition to Environmental Impact Assessment (EIA) to realize sustainable development.

(2) Strategic Environmental Assessment (SEA)

According to the Law No.32/2009, central/local government has to conduct SEA for following policy, plan and program.

- Long-term development plan (RPJP),
- Medium-term development plan (RPJM),
- National, provincial and regional/municipal spatial plan (RTRW), and
- Policy, plan and/or program that may cause impacts and/or risks to the environment.

The screening criteria for policy, plan and program that may cause impacts and/or risks to the environment will be described in government regulations in the future.

SEA is treated as a sort of self-assessment for government agencies to adapt their policy into wise decision-making. This means SEA is not the process aiming to acquire administrative approval.

The law requires involvement of communities and stakeholders into SEA study although the specific procedure has not been stipulated in the law. Further provision on procedures for executing SEA will be regulated in a government regulation in the future.

(3) Environmental Impact Assessment (EIA)

EIA in Indonesia is called AMDAL (Analisis Mengenai Dampak Lingkungan), which is stipulated by Law No.32/2009. The specific criteria of the project type and scale which require AMDAL are described in Decree of the Ministry of Environment No.11/2006.

Details of the AMDAL process are described in Government Regulation No.27/1999 on Analysis of Environmental Impacts and Decree of the Ministry of Environment No.8/2006 on Guidelines for AMDAL as well as Decree of Head of BAPEDAL (Environmental Agency) No.8/2000 which stipulates the public involvement and information disclosure on AMDAL. Project proponent shall prepare following documents in the AMDAL process to be approved by AMDAL Commission.

- KA-ANDAL (Kerangka Acuan Analisis Dampak Lingkungan): terms of reference for ANDAL
- ANDAL (Analisis Dampak Lingkungan): environmental impact assessment report
- RKL (Rencana Pengelolaan Lingkungan):environmental management plan

- RPL (Rencana Pemantauan Linkungan): environmental monitoring plan

2.13 Identification of Critical Issues in Port Logistics

(1) General

Indonesian economy has been expanding steadily and accordingly international/domestic cargoes handled in Indonesian ports have been increasing rapidly. Total numbers of laden containers handled in Indonesia was 2.7 million TEU in 2000 and 4.9 million TEU in 2008. The annual growth rate of container cargo is approximately 7.8 %, while annual growth rate of GDP at constant price during the same period is approximately 5 %. Most of these containers are handled in ports in the Greater Jakarta Metropolitan Area, which is the Study Area. Previous sections of this chapter describe the background and current situation of port logistics in the study area. These analyses and related sections of other chapters reveal existing critical issues on port logistics in this area.

(2) Critical Issues facing Ports

1) Limited Container Handling Capacity

Since container throughput has been increasing rapidly, container volume will exceed the capacity in several years. According to the demand forecast, total throughput will reach the capacity limit in 2014.

2) Limited Dimensions/Scales of Container Facilities

Deeper quay-walls, water channels and basins shall be required to meet the current enlargement of container ships in international maritime transport. Capacity analysis of container terminals in Chapter 4 reveals that existing total number of ground slots for container storage is inadequate.

3) Insufficient Port Facilities

Besides the container related issues, consignees/consigners point out several issues in port facilities.

4) Inefficient Cargo Handling

Above mentioned issues comprehensively result in inefficient cargo handling and damage the international competitiveness of Indonesian industries.

5) Insufficient Utilization of IT Technology in Port Procedures

Many consignees/consigners suggest that port entry and CIQ procedures should be simplified and conducted promptly by introducing more IT technologies.

(3) Critical Issues around Port

1) Poor Road Access to/from Port

Almost all consignees/consigners claim that traffic congestion in the study area should be eased as soon as possible to rationalize and boost their business activities in Indonesia.

2) Insufficient Utilization of Container Transport by Rail

From the viewpoint of energy consumption and environmental aspects, container transport by rail should be promoted.

3. NATURAL CONDITIONS IN AND AROUND POTENTIAL SITES FOR A NEW CONTAINER TERMINAL

3.1 Meteorological Conditions

The region of the study area is located northern part of Java Island facing Java Sea. The area is categorized tropical monsoon climate zone.

Air Temperature

Seasonal variations of temperature are small and the mean daily temperature varies between 23ºC to 33ºC.

Precipitation

Annual total rainfall is about 1,800 mm in the Jakarta area. Rainy season in the West Java region is from November to March, and the dry season is from June to September. Monthly rainfall during the rainy season is about more than five times during dry season. January shows the highest monthly rainfall among the year at 381 mm.

Wind

In general, May to September is the season of Southeast (SE) monsoon and November to March is the season of Northwest (NW) monsoon.

3.2 Oceanographic Conditions

(1) Tide

According to the harmonic analysis based on the tide observation records obtained during the bathymetric survey carried out in May and June 2010, the Z0, tide type and tidal range at each survey site can be summarized in the table below. The Mixed diurnal tide is dominant in the coastal area except at East Ancol (Tanjung Priok). Tidal ranges are relatively narrow, within 1.0 to 1.2m.

Table 3.2-1Tidal Conditions at Candidate Sites of Terminal Development

Site	East Ancol (Tanjung Priok)	Marunda/ Bekasi	Cilamaya	Ciasem	Tangerang
Z0 (cm)	60	63	55	55	59
Tide Type	Diurnal	Mixed, Dominant Diurnal	Mixed, Dominant Diurnal	Mixed, Dominant Diurnal	Mixed, Dominant Diurnal
Tidal Range (m)	1.0	1.2	1.1	1.1	1.2

Source: JICA Study Team

(2) Surface Current

In the open Java Sea, the direction of the predominant surface current generally sets in the same direction to which the monsoon wind is blowing. From November to March the currents set ESE in Java Sea with an average rate of between 0.75 to 1.25 knots (0.4 to 0.6 m/sec).

Between May and September the direction of the current is reversed with a WNW set in Java Sea with an average rate of about 0.75 knots. Maximum rates are usually less than 2 knots but on relatively rare occasions, during either monsoon, rates of 3 knots have been recorded. During April and late October to November, the months of transition between the NW and SE monsoons, the currents are usually variable.

(3) Wave Climate

Deepwater Waves off Tanjung Priok (Base Data)

In Java Sea, waves are generated locally by the wind and can be very variable in direction, especially in the transitional months (April and late October to November) between NW monsoon (from November to March) and SE monsoon (between May and September). Throughout the year, heights of the sea waves are less than 1 meter.

Since the candidate sites of the new container terminal development are facing the north coast of the Java Island, wave conditions are heavy mostly during the NW monsoon season. And the waves from between N and NW are most frequent in January.

Setting the waves to be used for planning and designing in this study, wave occurrence rate at each candidate site and parameters of design waves are estimated by the statistical processing and by analyzing wave transformations. Wave data for this analysis are hindcasted in the previous JICA Study (2002 – 2003) using SMB method using wind data from 1997 to 2001 observed at Cengkareng Meteorological Station of BMKG (Badan Meteorologi Klimatologi dan Geofisika).

Wave Height and Wave Directions

Since the range of wave generation driven by the sea wind and wave development is relatively small in Java Sea, large waves rarely occur. Table 3.2-2 and Figure 3.2-2 show combined occurrence of wave heights and its directions based on the wave hindcast data (JICA Study, 2002 – 2003).

The most dominant direction of wave is West direction and its occurrence rate is 10.5% while the rates of other directions waves are small, varying from 1.6 to 4.1%. The area is relatively calm since the occurrence percentage of calm wave amounts to 68.5%, and the cumulative percentages of wave height less than 0.5m and 1.0m show 86.6% and 96.9% respectively.

Wave Period and Wave Directions

Wave periods of deepwater waves (hindcast) distribute in a narrow range from 1 to 5 seconds as shown in Table 3.2-3. Wave periods less than 3 seconds account for more than 90% of the total occurrence.

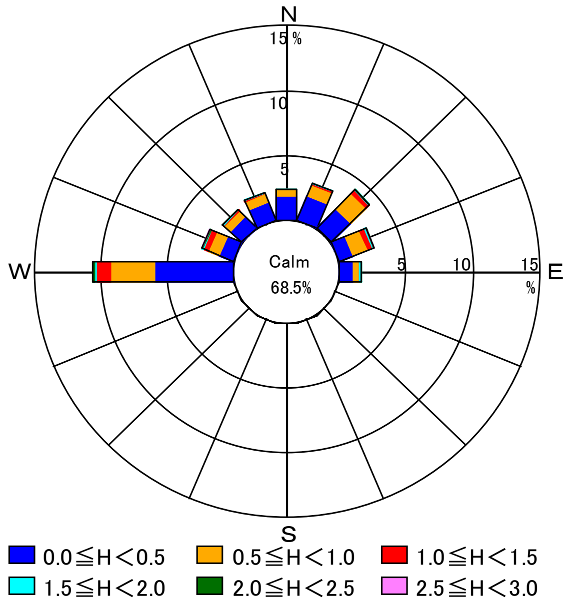
The weighted average of wave period is worked out at each rank of wave height in the Table 3.2-3, and the relations between wave height and wave period are as shown in Figure 3.2-2. For waves with a height less than 1.0m, the wave periods are shorter than 3 seconds, however, if the wave height increases more than 1.5m, the corresponding wave periods are about 4 seconds.

Table 3.2-2 Combined Occurrence of Wave Heights and Wave Directions

(Deepwater Waves Off Tanjung Priok)

Dir \ $H_{1/3}$	W	WNW	NW	NNW	N	NNE	NE	ENE	E	Calm	total	Cumu-lative
0.00≦ H < 0.25	1.011	153	146	182	252	256	218	133	173	32.259	34.783	73.9%
0.25≦ H < 0.50	1,785	415	432	540	614	699	786	401	303		5,975	86.6%
0.50≦ H < 0.75	976	223	211	241	200	336	523	379	157		3,246	93.5%
0.75≦ H < 1.00	620	187	73	62	44	115	238	205	70		1,614	96.9%
1.00≦ H < 1.25	316	96	41	21	11	45	113	95	38		776	98.6%
1.25≦ H < 1.50	136	74	11	7	7	16	38	56	13		358	99.3%
1.50≦ H < 1.75	61	39	6	8	2	5	18	23	6		168	99.7%
1.75≦ H < 2.00	29	9	3	4	1	4	14	18	2		84	99.9%
2.0≦ H < 2.5	17	23	3				1	9	2		55	100.0%
2.5≦ H < 3.0		4						1			5	100.0%
3.0≦ H < 3.5											0	100.0%
3.5≦ H < 4.0											0	100.0%
4.0≦ H											0	100.0%
total	4,951	1,223	926	1,065	1,131	1,476	1,949	1,320	764	32,259	47,064	100%
	10.5%	2.6%	2.0%	2.3%	2.4%	3.1%	4.1%	2.8%	1.6%	68.5%	100%	100%

Source: JICA Study Team



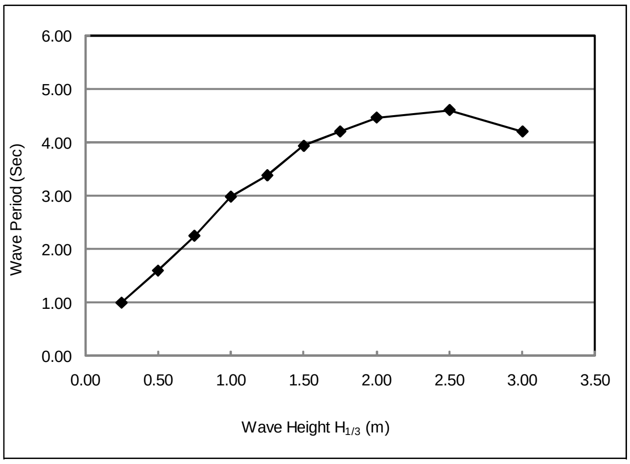
(Deepwater Waves Off Tanjung Priok)

Figure 3.2-1　Combined Occurrence of Wave Heights and Wave Directions

Table 3.2-3　Combined Occurrence of Wave Height and Wave Period

(Deepwater Wave Off Tanjung Priok)

$H_{1/3}$ (m) \ $T_{1/3}$ (sec)	1	2	3	4	5	6	7	8	9	Calm	Total	Rate		weighted average
												Individual	Comulative	
0.00 ≦H＜ 0.25	2,524									32,259	34,783	73.91%	73.91%	1.00
0.25 ≦H＜ 0.50	2,382	3,593									5,975	12.70%	86.60%	1.60
0.50 ≦H＜ 0.75		2,442	804								3,246	6.90%	93.50%	2.25
0.75 ≦H＜ 1.00		62	1,528	24							1,614	3.43%	96.93%	2.98
1.00 ≦H＜ 1.25			480	296							776	1.65%	98.58%	3.38
1.25 ≦H＜ 1.50			38	308	12						358	0.76%	99.34%	3.93
1.50 ≦H＜ 1.75				134	34						168	0.36%	99.69%	4.20
1.75 ≦H＜ 2.00				45	39						84	0.18%	99.87%	4.46
2.00 ≦H＜ 2.50				22	33						55	0.12%	99.99%	4.60
2.50 ≦H＜ 3.00				4	1						5	0.01%	100.00%	4.20
3.00 ≦H＜ 3.50											0	0.00%	100.00%	
3.50 ≦H＜ 4.00											0	0.00%	100.00%	
4.00 ≦H											0	0.00%	100.00%	
Total	4,906	6,097	2,850	833	119	0	0	0	0	32,259	47,064	100.00%	100.00%	
Rate	10.42%	12.95%	6.06%	1.77%	0.25%	0.00%	0.00%	0.00%	0.00%	68.54%	100.00%			
Coumlative Rate	10.42%	23.38%	29.43%	31.20%	31.46%	31.46%	31.46%	31.46%	31.46%	100.00%				



Source: JICA Study Team

(Deepwater Wave Off Tanjung Priok)

Figure 3.2-2 Relations between Wave Height and Wave Period

Wave Conditions at Candidate Terminal Sites

For discussions of (i) harbor calmness, (ii) net operational rate of cargo handling at the berth and number of operational days, (iii) energy of incident waves and others for port planning at each candidate site, wave conditions were studied such as wave height and period, dominant directions, probability of wave occurrence and non-exceeding wave height.

Wave transformation of the deepwater waves (hindcasted at off Tanjung Priok) to the waves at each candidate site of container terminal development was studied considering mainly wave refraction due to coastal bathymetry of the water area.

Wave height ratios at the designated points in front of the candidate site at the water depths -10 m and -15 m are calculated per directions against deepwater wave heights off Jakarta. By using the wave height ratios, probability of wave occurrence and non-exceeding wave height can be estimated for port planning purposes.

Wave Height Ratio

Calculation results of wave height ratios are summarized as shown in Table 3.2-4. In this table, ratio of wave heights at interested points divided by deepwater wave per directions is given. Wave conditions and characteristics are discussed based on the wave height ratio and the incident wave directions as presented in the following sub-section.

Table 3.2-4 Wave Height Ratio

Site	Depth	Wave Directions								
		W	WNW	NW	NNW	N	NNE	NE	ENE	E
East Ancol	10m	0.420	0.585	0.750	0.890	0.890	0.820	0.635	0.450	0.285
	15m	0.480	0.645	0.800	0.910	0.920	0.870	0.715	0.535	0.360
Marunda/Bekasi	10m	0.500	0.660	0.790	0.890	0.775	0.615	0.385	0.230	0.110
	15m	0.540	0.710	0.850	0.960	0.910	0.810	0.625	0.435	0.270
Cilamaya	10m	0.410	0.580	0.740	0.890	0.950	0.980	0.970	0.930	0.860
	15m	0.500	0.670	0.820	0.945	0.980	1.000	0.980	0.950	0.890
Ciasem	10m	0.435	0.610	0.775	0.920	0.970	0.990	0.950	0.875	0.760
	15m	0.490	0.665	0.820	0.940	0.980	0.995	0.980	0.935	0.860
Tangerang	10m	0.465	0.585	0.680	0.730	0.735	0.765	0.705	0.650	0.525
	15m	0.525	0.665	0.760	0.755	0.688	0.675	0.655	0.655	0.565

Source: JICA Study Team

(4) Wave Conditions at Each Candidate Site

1) East Ancol

Estimated points of the wave height at -10 m and -15 m water depths are as shown in Figure 3.2-3. Wave height ratios show the lower values (0.3 – 0.5) for the waves from West and East, while the around twice higher values (0.8 – 0.9) are estimated for the North waves.

Incident waves coming from the West and East directions are sheltered by the coastal topography such as Tanjung Pasir and Tanjung Karawang respectively. However, some incident waves from North directions can reach East Ancol site directly.

2) Marunda and Bekasi

Estimated points of the wave height at -10m and -15m water depths are as shown in Figure 3.2-4. Wave height ratios show very low values (0.1 – 0.3) for the waves from the East, while values are three times higher (0.8 – 0.9) for the North waves.

Western waves approach the site after refraction and the lower wave height ratio (0.5 - 0.7) are given.

Marunda/Bekasi is sheltered from incident waves from the East direction by Tanjung Karawang, however waves coming from north direction can reach to the Marunda/Bekasi site directly.

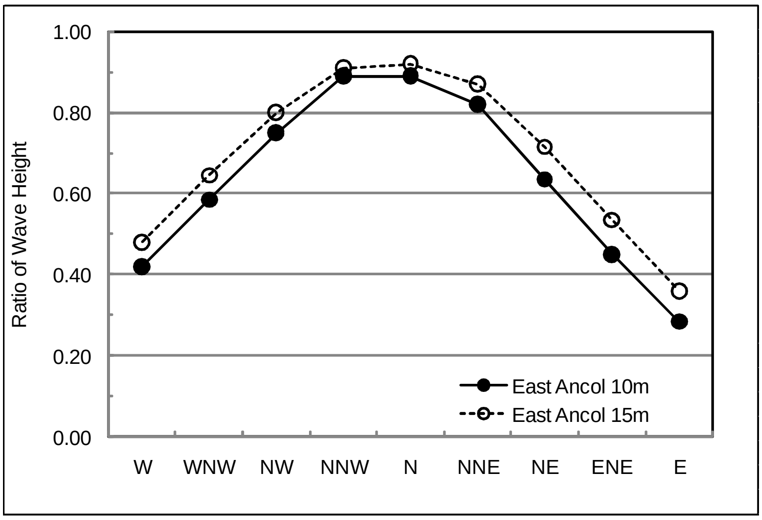


Figure 3.2-3 Wave Height Ratio at Designated Points (East Ancol)

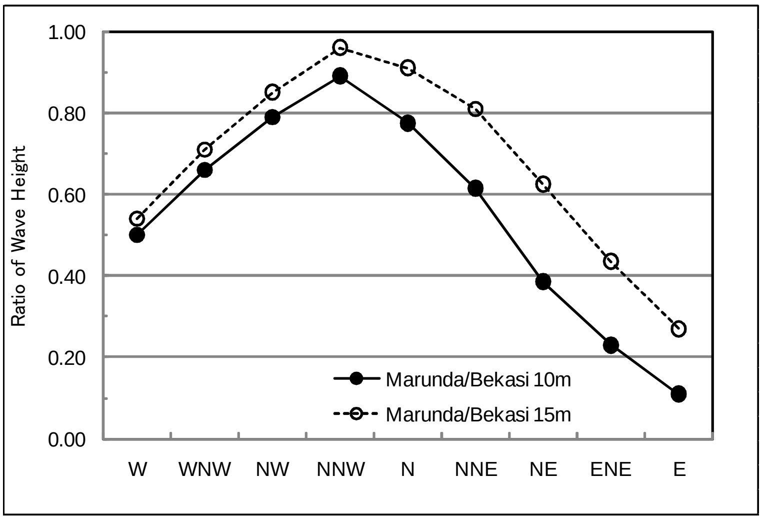


Figure 3.2-4 Wave Height Ratio at Designated Points (Bekasi / Marunda)

3) Cilamaya

Estimated points of the wave height at -10m and -15m water depths are as shown in Figure 3.2-5.

The coast of Cilamaya is topographically sheltered from incident waves from West directions, while the coast is directly exposed to the waves from North to Northeast directions.

Higher wave height ratios (0.95 – 1.0) are estimated for the waves ranging from N to NE directions. Eastern waves approaches to the site after refraction but still higher wave height ratios (0.85 - 0.9) are given.

The Cilamaya coast is sheltered by the land area which is protruding toward the seaside east of Tanjung Karawang; accordingly a lower wave height ratio (0.4 – 0.5) is estimated.

4) Ciasem

Estimated points of the wave height at -10m and -15m water depths are as shown in Figure 3.2-6.

Characteristics of the coast of Ciasem are almost similar with that of Cilamaya; the coast is topographically sheltered from incident waves from West directions, while the coast is directly exposed to the waves from North to Northeast directions.

Higher wave height ratios (0.95 – 1.0) are estimated for the waves ranging from N to NE directions. Eastern waves approaches to the site after refraction but still higher wave height ratios (0.75 - 0.9) are given.

The Ciasem coast is sheltered by the land area which is protruding toward the seaside east of Tanjung Karawang; accordingly, a lower wave height ratio (0.4 – 0.5) is estimated.

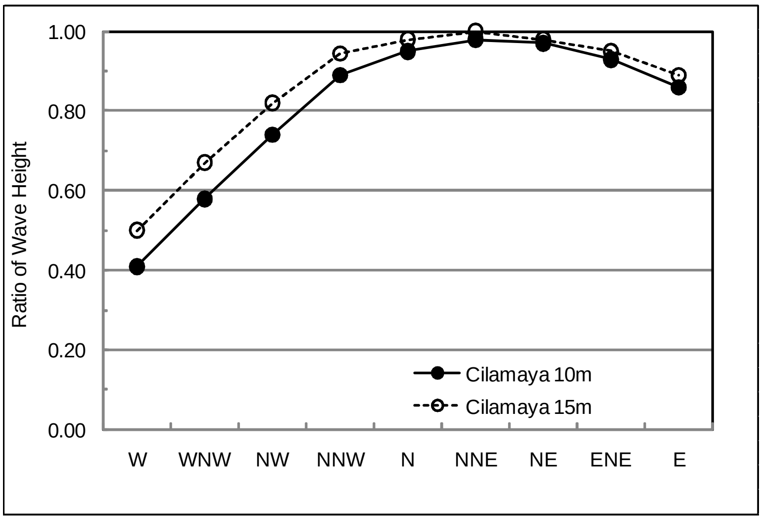


Figure 3.2-5 Wave Height Ratio at Designated Points (Cilamaya)

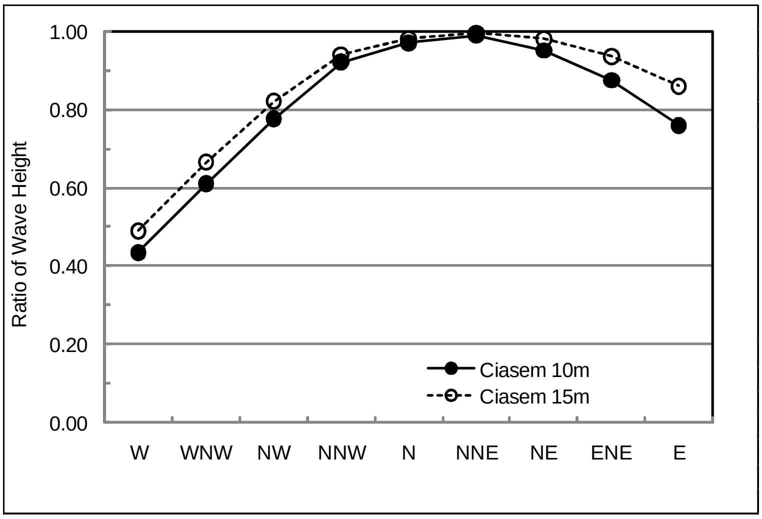


Figure 3.2-6 Wave Height Ratio at Designated Points (Ciasem)

5) Tangerang

Estimated points of the wave height at -10m and -15m water depths are as shown in Figure 3.2-7.

The designated development site is located at the coast middle of Tanjung Pasir and Tanjung Kait facing the open sea. There are many small islands in front of the Tangerang site and the bathymetry of the sea area has complicated features.

The coast of Tangerang is exposed to almost all the wave directions from the West, North and East. The wave height ratios estimated by wave transformation study ranges from 0.45 to 0.75. The reason for these lower values is thought to be that the waves approach the coast after refraction due to the coastal bathymetry and also because of the wave diffraction effect due to the thousand of small islands in front of the coast.

As for waves incident from North to Northeast, wave height ratio at water depth -15 m is larger than the ratio at water depth -10 m; this is likely due to the diffraction effect by the shallow area near scattered islands off the coast.

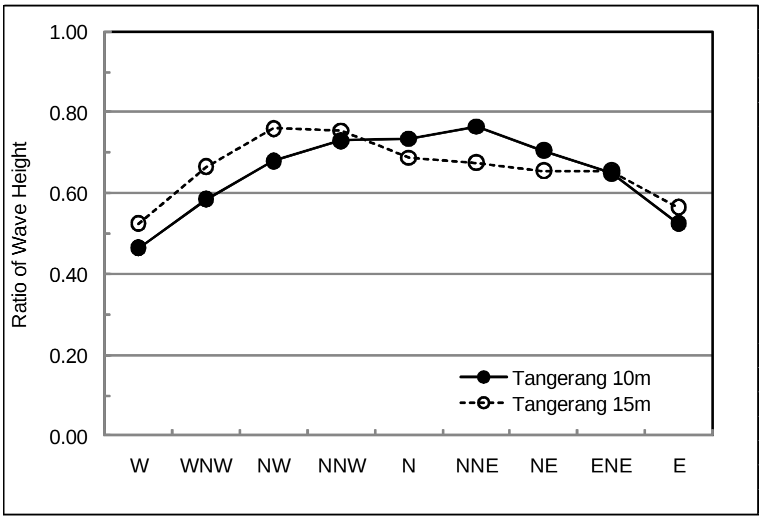


Figure 3.2-7 Wave Height Ratio at Designated Points (Tangerang)

(5) Probability of wave occurrence and non-exceeding wave height

Based on the wave transformation study on each candidate development site and the analysis mentioned above, probability table of wave height occurrence is given in Table 3.2-5 for each candidate site.

Table 3.2-5 Probability of Wave Height Occurrence

Site / $H_{1/3}$ (m)	East Ancol		Marunda/Bekasi		Cilamaya		Ciasem		Tangerang	
	10m	15m	10m	15m	10m	15m	10m	15m	10m	15m
0.00 ≦H< 0.25	90.0%	89.0%	89.8%	87.9%	88.7%	85.1%	88.7%	88.7%	88.7%	86.6%
0.25 ≦H< 0.50	7.3%	7.6%	7.7%	8.3%	7.2%	9.0%	7.2%	7.2%	7.8%	9.7%
0.50 ≦H< 0.75	1.9%	2.3%	1.7%	2.6%	2.6%	3.7%	2.3%	2.3%	2.6%	2.5%
0.75 ≦H< 1.00	0.6%	0.8%	0.7%	0.8%	0.8%	1.3%	1.2%	1.1%	0.6%	1.0%
1.00 ≦H< 1.25	0.2%	0.2%	0.1%	0.3%	0.4%	0.5%	0.4%	0.3%	0.2%	0.2%
1.25 ≦H< 1.50	0.0%	0.1%	0.1%	0.1%	0.2%	0.2%	0.1%	0.2%	0.1%	0.1%
1.50 ≦H< 1.75	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%
1.75 ≦H< 2.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2.00 ≦H	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: JICA Study Team

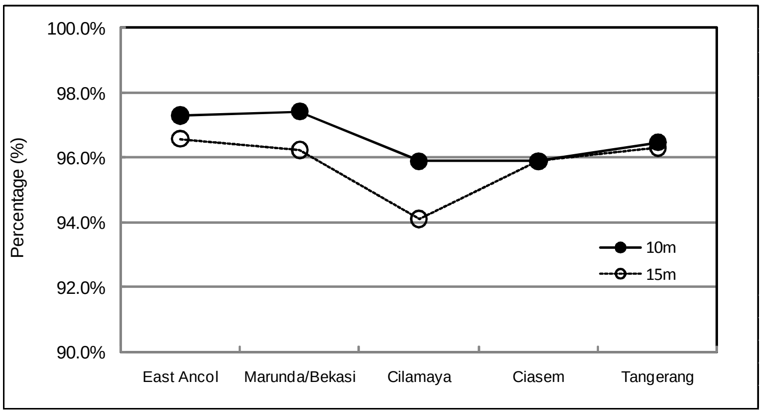
(6) Threshold Wave Height for Cargo Handling

Considering that vessel size ranges from 500 GT to 50,000 GT (medium- and large sized vessels), threshold wave height: 0.5 meter is chosen. Based on the 0.5 m wave height, the non-exceeding wave heights at each site are summarized in Table 3.2-6 below.

Table 3.2-6 Probability Percentage of Non-exceeding Wave Height

(Threshold Wave Height: 0.5 m)

Water Depth / Site	-10 m	-15 m
East Ancol	97.3%	96.6%
Marunda / Bekasi	97.4%	96.2%
Cilamaya	95.9%	94.1%
Ciasem	95.9%	95.9%
Tangerang	96.5%	96.3%



Source: JICA Study Team

The following recommendations for port planning are made based on the wave transformation analysis at the candidate sites.

East Ancol

Non-exceeding percentage of 0.5 m wave height at this site is evaluated at 97.3% (at water depth -10 m) and 96.6% (– 15 m) respectively. The percentages at -10 m and at -15 m depth give the highest at East Ancol and Marunda/Bekasi as well among the candidate sites. It means that the waves are well sheltered by coastal topography at those sites.

Marunda and Bekasi

Non-exceeding percentage of 0.5 m wave height at this site is evaluated as 97.4% (at water depth -10 m) and 96.2% (at -15 m) respectively.

The percentages at -10 m and at -15 m depth give the highest at East Ancol and Marunda/Bekasi as well among the candidate sites. It means that the waves are well sheltered by coastal topography at those sites.

Cilamaya

Non-exceeding percentage of 0.5 m wave height at this site is evaluated as 95.9% (at water depth -10 m) and 94.1% (at -15 m) respectively.

Since the waves incident from North, Northeast and East directions can reach directly to the shore, percentage of non-exceeding waves is relatively low compared with the other candidate sites.

Ciasem

Non-exceeding percentage of 0.5 m wave height at this site is evaluated as 95.9% both at water depth -10 m and at -15 m. The directional wave conditions are similar with those of Cilamaya.

Tangerang

Non-exceeding percentage of 0.5 m wave height at this site is evaluated as 96.5% (at water depth -10 m) and 96.3% (at -15 m) respectively.

3.3 Topographical Conditions

(1) Topography and Bathymetry

1) East Ancol

The location is the north side of Ancol Timur and the area is reclaimed on the shallow water (-4m ~ -5m area) west side of Tanjung Priok Port in recent years. Wharves are constructed along the east side of the reclaimed area; warehouses and open storage area are located behind the wharves. West side of the reclaimed area is a naturally formed shore that developed due to sand accumulation by wave and costal current after the reclamation.

Distance from shoreline to -10m and -15m depth are about 5 km and 7 km respectively. The seabed slope is 1/500 and very gentle slope.

2) Marunda / Bekasi

The objective area is the coast of Jakarta Bay including the east side of Cakun Drain, east side of Kali Baru Port, to Tanjung Karawang through Muaragembong. The north side of Muaragembong along to Tanjung Karawang is a conservation forest area.

Along the coast between the estuary of Cakun Drain and Kali Blencong is a flat area mostly occupied by a factory and houses. Marunda port lies near the estuary of Kali Blencong. Between Kali Blencong and Sungai Tawar, there is a man-made flood control canal, Banjir Kanal Timur. On the west side of the Canal, there are factories, rice field and wasted/reserved area, and on the east side of the Canal, there are also wasted/reserved area and rice fields. The Muara Tawar Power Station is on the east side of Sungai Tawar. In front of the Station, there is water intake for the power plant with a dyke about 2.8 km off the coast in the north-west directions. An inlet of Jakarta Bay has formed on the west side of the water intake and the coast consists of a marshy land with some fairly high trees.

Coast line of the west side of Sungai Tawar to Muara Gembong is intricate. On the coast, there are several medium to large rivers flowing into Jakarta Bay such as K. CBL, S. Gabah, K. Blancan and Ci Tarum. The area is generally flat, low and marshy. Some areas are wooded.

The planned site for the new terminal is located at the mouth of Muala Peach River, which is about 5 km west from the River Teruson Blubuk, branch of Ci Tarum. Mangroves are found on both sides of the mouth of the Muala Peach River and this area is designated as a preserved forest by the Ministry of Forest. A number of fish catching nets are observed along this coast.

3) Cilamaya

The area is generally flat and low, and there is a river called Ci Bulan-Bulan at almost middle part of the candidate site. Both side of the river, fish ponds run down close to the beach, and mostly behind the fish ponds, rice fields are spread over the area. There are several villages along the shore, which is developed by sand accretion. About 3km west side along the coast of the Ci Bulan-Bulan, Ci Delewek flow into the sea and further about 5 km from Ci Delewek, one another river flow into the sea. East side of the Ci Bulan-Bulan, fish ponds and rice fields run down close to the beach. This coastal area is designated as Part Development Area by Bappeda of Karawang Regency.

The seabed is very gentle slope and the contour lines are mostly parallel to the beach. Distances from shoreline to -10 m and -15 m depth are about 5 km and 10 km respectively. Seabed slope is about 1/500 up to about -10 m depth contour line, and between -10 m to -15 m, seabed slope is 1/1000. The area is muddy beach and seabed deposits are mud and fine particles.

4) Ciasem

The area is generally flat and low, and there is a river called Ci Bulan-Bulan near the middle of the candidate site. Fish ponds run down close to the beach on both sides of the river, and rice fields are spread over the area. There are several villages along the shore, which has developed by sand accretion. About 3km west side along the coast of the Ci Bulan-Bulan, Ci Delewek flows into the sea and 5km further another rivers flow into the sea. On the east side of the Ci Bulan-Bulan, fish ponds and rice fields run down close to the beach. This coastal area is designated as Part Development Area by Bappeda of Karawang Regency.

The seabed is very gentle slope and the contour lines are mostly parallel to the beach. Distances from shoreline to -10 m and -15 m depth are about 5 km and 10 km respectively. Seabed slope is about 1/500 up to about -10 m depth contour line, and between -10 m to -15 m, seabed slope is 1/1000. The area is muddy beach and seabed deposits are mud and fine particles.

Distance from shoreline to -10m depth is about 4~5 km and -15m depth is about 7~8 km. Seabed slope from shore to about -15m water depth is about 1/500. Mud sediment are observed along the shoreline about 500 m to 1,000 m toward the off-shore.

5) Tangerang

The site is low and flat area with muddy beach. There are many fishing grounds off the coast. The area of the candidate site is the coast between Tanjung Kait and Tanjung Burung. Between these two capes, rivers such as Ci Rarab and Ci Tuis and S. Apuran flow into the sea. Sugai Cisadane is the largest and its estuary is Tanjung Burung and Tanjung Pepuloa. The area is mostly flat and between Tanjung Kait to Ci Rarab, some villages are developed close to the coast and between Ci Rarab to Tanjung Burung, marshy and fish ponds are found close to the beach. There are fairly high trees near the coast and some areas along the coast.

Distance from shoreline to -10 m and -15 m water depths are 4 km and 6 km respectively. The shore is generally gentle with its slope as 1/400. However, scattered islands exist and the contour lines are rather complicatedly formed off the coast of Tangerang.

(2) Shoreline Changes in the Study Area

Tracing analysis of the shoreline changes using ALOS satellite images and archived topographic maps was conducted along the coast of the Study Area (from Tangerang to Ciasem) from the 1940s to the present.

For this purpose, the archived old topographic maps (1940) in the Dutch ruling era, present published maps (1993, BAKOSURTANAL), and the latest satellite images (2009, ALOS satellite) are traced and analyzed covering the northern coast of Java Island including the target candidate sites of the new container terminal development, Tangerang, Tanjung Priok (Ancol Timur), Bekasi/Marunda, Cilamaya and Ciasem.

Alongshore distributions of shoreline changes are extracted and presented in Figure 3.3-1, Figure 3.3-2, Figure 3.3-3 and Figure 3.3-4. Major features of the shoreline changes at each target area are extracted as follows.

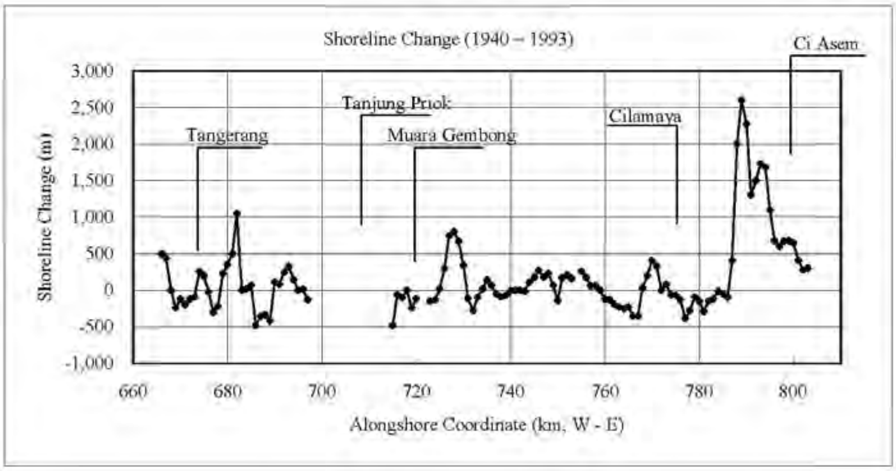


Figure 3.3-1 Shoreline Changes along the Coast from Tangerang to Ci Asem: 1940 – 1993

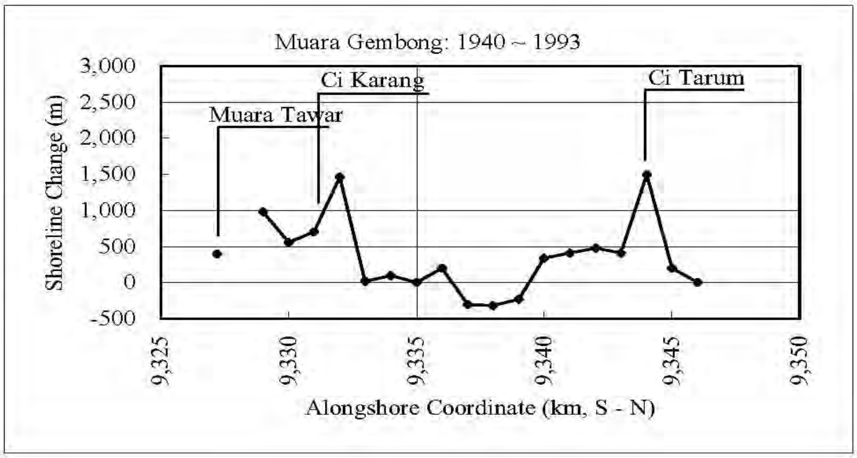


Figure 3.3-2 Shoreline Changes along the Coast of Muara Gembong Area: 1940 – 1993

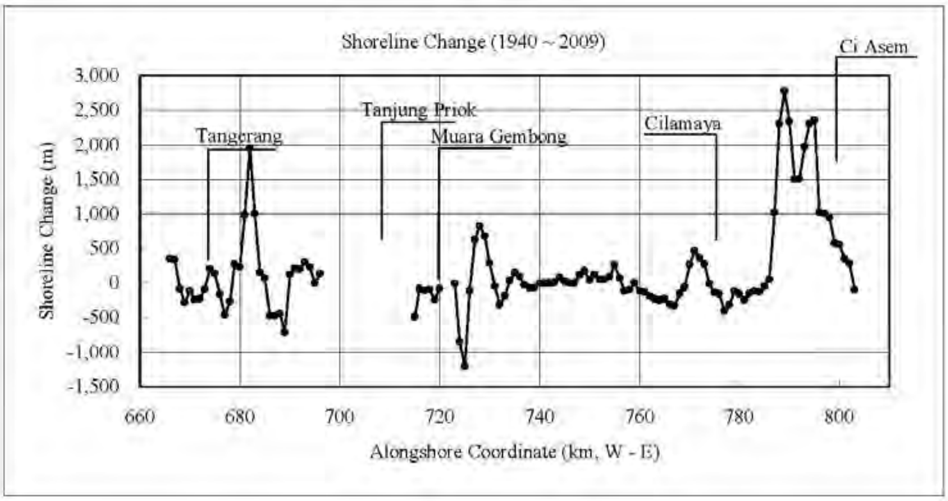


Figure 3.3-3 Shoreline Changes along the Coast from Tangerang to Ci Asem: 1940 – 2009

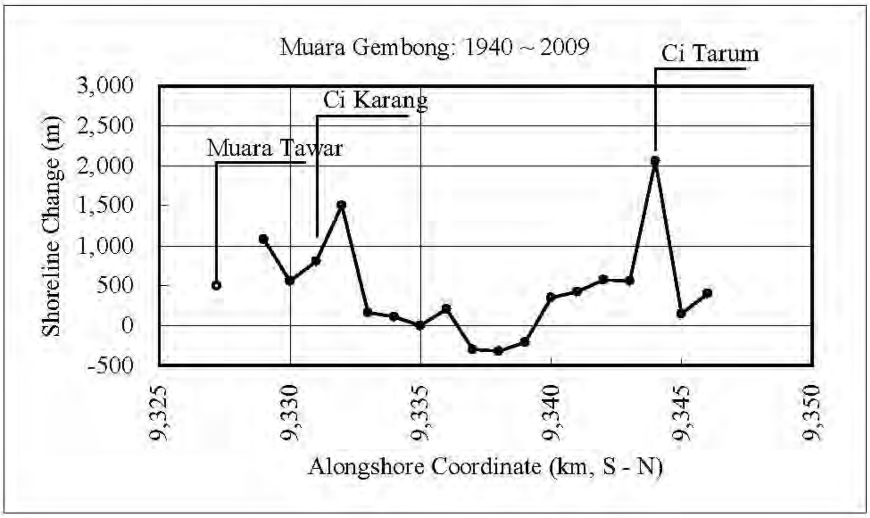


Figure 3.3-4 Shoreline Changes along the Coast of Muara Gembong Area: 1940 – 2009

1) Tanjung Priok and the surrounding Area

The coastal areas from Muara Baru, Tanjung Priok to Marunda are covered by artificial facilities such as port and harbor, fishing harbors, waterfront recreation facilities. Hence, artifact effects on the shoreline change must be taken into consideration in this area

Shoreline change can be discerned in the district of Kali Baru (around 1 km east of Tanjung Priok Port). And backward shoreline change of 200 - 500 m is seen in the period of 1940 – 1993 (4 ~ 9 m/year) in this area. This is considered to be affected by the coastal facilities as longshore sediment transport was blocked off by the breakwaters and/or sediment supply was taken away to offshore by maintenance dredging of the harbors.

According to the old archived map of Batavia in 1940, a characteristic shoreline change can be seen in the areas of Muara Baru and Sunda Kelapa, that is, the forward shoreline change at the west side of the training jetty and the backward shoreline change at the east side. It is estimated that the predominant direction of the sediment transport is from west to east in this coastal area.

2) Bekasi and Muara Gembong Area

The coastal area of Bekasi and Muara Gembong is located in the river-mouth area of Ci Tarum, the river system which has the largest catchment area in West Java Province. This area which borders the eastern end of Jakarta Bay is called Tanjung Karawang (Cape of Karawang). This projecting coast line is evolving and advancing seaward due to clay and silt being carried by the river Ci Tarum. This coastal area shows the significant tendency of forwarding shoreline change.

According to the readings from the Shoreline Change Map, the coastline of this coastal area shows an abnormal forwarding shoreline changes as follows.

River-mouth Area	1940 ~ 1993 (53 years)	1993 ~ 2009 (16 years)
Ci Karang	1,000 m (19 m/year)	2,000 m (125 m/year)
Ci Tarum	1,700 m (32 m/year)	500 m (31 m/year)

Dredged soil from Tanjung Priok Port was dumped in front of the Muara Gembong area (refer to Sub-section 5.1.6) until recent years. This is another source of sediment which expedites the big and significant shoreline changes in this coastal area. The shoreline in this area is still advancing seaward. Accretion and silting up in the water area will continue.

3) Cilamaya Area

As for the northwest portion of the Cilamaya district, significant shoreline changes are seen in the river-mouth area of Ci Wadas (1940 ~ 1993: 200 ~ 400 m; 1940 ~ 2009: 250 ~ 450 m). The yearly rate of shoreline change is estimated at 4 ~ 7 m/year.

As for the southeastern portion of Muara Ciparage, an obvious backward shoreline change is seen in this area (1940 ~ 1993: -130 ~ -380 m). The yearly rate of shoreline change is estimated at -3 ~ -7 m/year. Shore protection works can be seen on the coast of this area. There was no significant erosion seen in this area for the period 1993 ~ 2009.

Although the districts of Cilamaya and Ci Wadas are included in the large catchment area of the Ci Tarum river system, it is limited to small rivers that have river-mouths in this coastal area. Hence, shoreline change is rather moderate in this area and the coast is relatively stable.

According to the shoreline change around the small jetty in the Fish Landing Site at Muara Ciparage, it is estimated that the predominant direction of the sediment transport is from west to east in this coastal area.

4) Ci Asem Area

Many large and small rivers and drainage canals flow into the shore of Ci Asem, and three rivers with relatively large catchment area (Kali Bawah, Ci Lamaya, and Ci Asem) have their river-mouths. According to the readings from Shoreline Change Map of this area, the coastlines around the river-mouths show big forwarding shoreline changes as follows. It is an unstable coast where forwarding and backward shoreline changes co-exist in this area.

River-mouth Area	1940 ~ 1993 (53 years)	1993 ~ 2009 (16 years)
Kali Bawah	2,600 m (49 m/year)	170 m (11 m/year)
Ci Lamaya	1,730 m (33 m/year)	240 m (15 m/year)
Ci Asem	670 m (13 m/year)	280 m (17 m/year)

5) Tangerang Area

A protruding shoreline change is seen in this coast around the river-mouth area of Ci Sadane (1940 ~ 1993: 500 ~ 1,050 m; 1993 ~ 2009: 480 ~900 m). The yearly rate of shoreline change is estimated to be10 ~ 20 m/year from 1940 -1993 and 30 – 56 m/year from 1993 ~ 2009. The shoreline change is still bigger in recent years.

In addition to the abnormally big and forwarding shoreline changes observed around the river-mouth area mentioned above, backward shoreline changes are seen on the coast of several 10 km. The change width was 200 to 300 m in the 50 to 60-year period, and the yearly rate of shoreline change is estimated to be 4 m/year.

It is an unstable coast where abnormally big forwarding shoreline around the river-mouth area and relatively moderate backward shorelines co-exist.

(3) Littoral Sediment Transport

1) Sediment Property of in Jakarta Bay Area

The following table gives the information on the sediment properties in the Jakarta Bay area surrounding Tanjung Priok Port. The sediment samples were obtained using grab samplers in the river mouth area of Ci Tarum, Bekasi Regency. The minimum, maximum and average properties are presented based on total 24 samples of seabed sediment.

According to the table, median (d50) of article size distribution ranges from 1 – 62 μm, and its average is obtained around 5μm. The main component of the sediment is evaluated as Clay (59 %) with Silt (33 %) on average, while sand portion accounts for only 7 %.

The source origin of the seabed sediment is the river systems which flow into the seashore and make many river mouths along the north coast of Java Island. Sedimentation at seabed is called Siltation. In the siltation process, flocculation of fine materials of clay and silt occurs in the estuary by mixing of river water and seawater.

Table 3.3-1 Size Properties of Seabed Sediment (Bekasi Area)

	d_{50} (μm)	d_{90} (μm)	Clay (%)	Silt (%)	Sand (%)
Minimum	0.9	19.1	16.6	25.1	1.4
Maximum	61.9	158.9	69.9	52.0	43.1
Average	4.9	48.9	59.2	33.1	7.7

Source: Poerbandono, R. Nurdany Magetsari; Identification of Representative Erosion and Accretion Patterns across North Java Coasts on the Basis of Analytical Study of Current and Seabed Interaction, November 2007, Hydrographic Science and Engineering Research Division, Institute of Technology Bandung, ITB Research Program

2) Dimension of River Systems as Source Origin of Sediment

Large and small rivers have their river mouths on the north coast of Banten and West Java regions in the Study Area.

The major river systems which have river mouths on the coast of Banten and West Java regions are presented in Figure 3.3-5 with the distribution of their catchment areas. Table 3.3-2 gives an abstract of the major river systems on the coast in the Study Area and in relation to the shoreline changes analysis in the previous sub-section.

Muara Gembong and Tanjung Karawang

The river system Ci Tarum is the largest with its catchment area (690, 572 ha) among the rivers in the West Java region. Ci Tarum transports a massive volume of suspended solids (silt and clay) to the shore causing sedimentation on the coast. The protruding coastline in the areas of Tanjung Karawang and Muara Gembong is the coastal topography developed by the sediment from the river mouth of Ci Tarum.

Cilamaya

As for the coast of Cilamaya, the shoreline change is evaluated rather moderate in this area. It is understood, as seen in Table 3.3-2, that the catchment areas of the rivers which have their river mouths in the Cilamaya coast are small or minor in their dimension.

Ciasem

In contrast to Cilamaya, the neighboring coast of Ciasem shows an unstable shoreline change. Two medium sized river systems (Ci Lamaya and Ci Asem) have river mouths on the coast of Ciasem.

Advancing shoreline changes are seen at the river mouths of Ci Lamaya and Ci Asem, and a large scale shoreline change has taken place on the shore between the two river mouths.

Tangerang

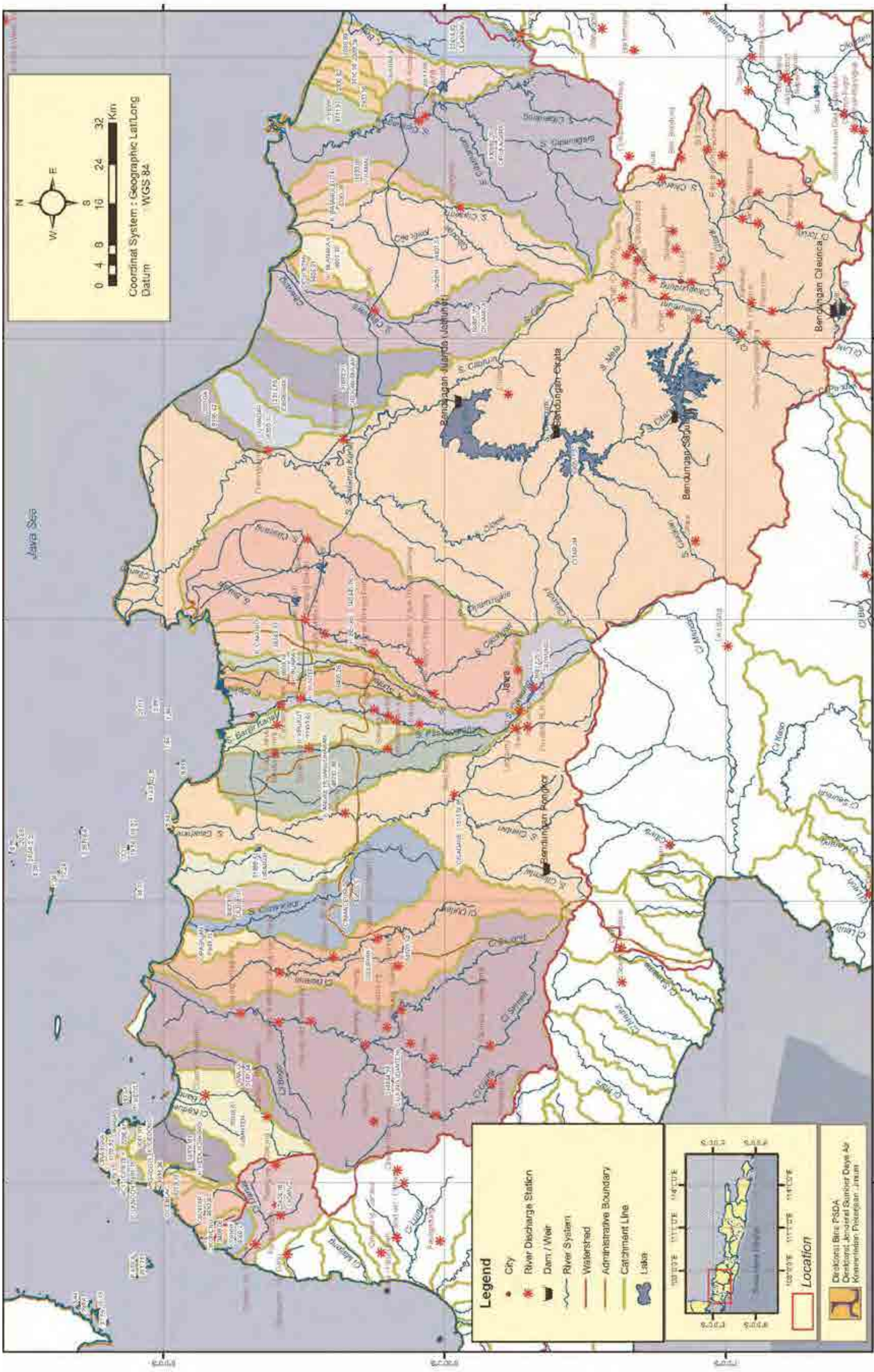
The river Ci Sadane has the second largest catchment area among the river systems in the Banten province next to the river Ci Ujung (or the 3rd largest in the Banten and West Java regions). A protruding shoreline change is seen in this coast around the river mouth of Ci Sadane. The yearly rate of shoreline change is estimated to be 10 ~ 20 m/year from 1940 ~ 1993 and 30 ~ 56 m/year from 1993 ~ 2009. The shoreline change is still bigger in recent years.

As seen in the studies and analysis mentioned above, the shoreline changes are proportional to the dimension of the river systems which have their river mouths in the coast. It is understood that the large scale shoreline changes or unstable shoreline changes took place at the river mouth areas of the large or medium scale river systems on the north coast of West Java.

The coasts of the Jakarta Bay area around Tanjung Priok Port and Cilamaya show rather moderate scale of shoreline changes, and are evaluated as stable and acceptable for port development.

Table 3.3-2 Major River Systems on the Coast in the Study Area

Location of River Mouth	Name of River System	Catchment Area (ha)
Jakarta (Tanjung Priok)	Kali Sunter	18,406
	Ci Liwung	38,610
	Kali Angke Pesanggrahan	48,732
Kabupaten Bekasi (Muara Gembong)	Kali Bekasi (Ci Karang)	140,846
	Ci Tarum	690,572
Kabupaten Karawang (Cilamaya)	Ci Soga	8,296
	Ci Wadas	16,350
	Ci Derewak	12,313
	Ci Bulan-Bulan	31,849
Kabupaten Subang (Ciasem)	Ci Lamaya	66,496
	Ci Asem	74,408
Kabupaten Tangerang	Ci Sadane	151,577
	Ci Rarab	21,999
	Ci Durain	84,503



Source: Diretorate of Water Resources Management, Ministry of Public Works

Figure 3.3-5 Major River Systems in the Banten and West Java Regions

3.4 Subsoil Conditions

(1) Subsoil Condition at Candidate Terminal Site

The subsoil condition survey was conducted to get the actual subsoil conditions at on- and off-shore of each candidate site planned to be developed in Marunda-Bekasi, Cilamaya, Ciasem and Tangerang. After those surveys, in response to the request for further examination with regard to the expansion of Tanjung Priok Port, an additional subsoil survey was implemented at offshore Tanjung Priok Port in North Kalibaru.

In this study, the past soil investigation records and the results of newly executed subsoil investigations in this study are comprehensively examined and summarized.

1) Tanjung Priok Port

Outline of subsoil condition

In the past, many subsoil condition surveys have been carried out in Tanjung Priok Port by JICA and/ or other study teams, e.g. "The Study for Development of Greater Jakarta Metropolitan Ports (JICA study in 2002)".

According to these past results, it seems that subsoil conditions are classified into mainly three layers as follows;

- The top layer is a soft layer with thickness approximately in the 5 to 13 m range, and N-value is approximately 0.
- The second layer is a deposited stratum consisting of volcanic ash in the elevation approximately Mean Sea Level (MSL) -10 to -25 m range with N-value approximately 6.
- The third layer is a deposited stratum consisting of volcanic ash, sand and silts in the elevation approximately MSL -20 to -25 m range with N-value approximately 50 or over.

In this study, the records from the newly executed subsoil investigations and the some of the previous records are examined comprehensively.

2) Marunda-Bekasi

Existing borehole data

A private investor for the new development at Marunda (Marunda Center) had carried out subsoil conditions surveys in the past. According to their results, the very soft layer (N-value 0 to 3), which is assumed to be accumulated in Alluvium era, spreads over the seabed surface. Medium stiff clayey silt, which is likely to be Pleistocene Sediment (N-value 5 to 12), is laid below the surface. Stiffed hard clayey silt appears below the second layer with N-value 40 or over.

Outline of boring logs

Two onshore borings and three offshore borings are carried out in Marunda-Bekasi in this study. According to the results, the thickness of soft layer (N-value 4 or less) varies in the 12 to 21m range, and the relatively hard layer (N-value 30 or over) appears from MSL -23.8m at BH02 and -34.9m at BH01 dominated with clayey silt, or silty clay with sand. In the case of BH03, it is comprised silty sand.

Laboratory test

Both disturbed samples and undisturbed samples of thin-wall sampling were subjected to physical testing in laboratory to gain the information of physical characteristics of the soils. The results of physical tests are shown in Table 3.4-1 and Table 3.4-2

Water content of Ac layer tends to be close to Liquid Limit (L.L) while the one of Dc and Tc tend to be in the middle between L.L. and Plastic Limit (P.L.). Ac and Dc are mostly composed of Silt and Clay.

The strengths of unconfined compression test (qu) are 0.25 to 0.56 kg/cm2. OCR calculated from Pre-consolidation stress (Pc) and Effective Pressures at a sampling depth (Pe) vary from 0.31 to 2.13. However, Pc of BH02 is not obvious enough to be identified according to e-logP curve, so OCR should be considered as 0.68 to 2.13.

Table 3.4-1 Summary of Average for Each Layer (Physical test)

Layer	Specific Gravity (g/cm3)	Water Content (%)	Atterberg Limit (%)		Grain Size Distribution (%)			
			Liquid Limit	Plastic Limit	Gravel	Sand	Silt	Clay
Ac	2.608	86.76	98.48	36.65	0	5.47	36.12	58.42
Dc	2.605	53.03	79.44	34.70	0	4.06	35.76	60.18
Tc	2.615	50.04	79.60	34.75	0	23.68	30.75	45.57

Abbreviation: Ac: Alluvial clay, Dc: Diluvium clay, Tc: Tertiary clay
Source: JICA Study Team

Table 3.4-2 Summary of Average for Each Layer (Mechanical test)

Item		BH01	BH02	BH03	BH04	BH05
Unit Weight	γ_t (g/cm^3)	1.517	1.504	1.474	1.489	1.484
Unconfined Compression Test	q_u (kg/cm^2)	0.41	0.56	0.25	0.45	0.37
Consolidation Test	C_v (cm^2/sec)	5.272 $\times 10^{-4}$	5.022 $\times 10^{-4}$	2.260 $\times 10^{-4}$	3.453 $\times 10^{-4}$	4.262 $\times 10^{-4}$
	C_c	0.58	0.36	2.24	1.47	0.92
	P_c (kg/cm^2)	1.5	1.5	0.68	0.765	0.76
Effective Pressure at Sampling depth	P_e (kg/cm^2)	0.84	4.90	0.92	0.36	1.11
Over Consolidated Ratio	OCR	1.79	0.31	0.74	2.13	0.68

Source: JICA Study Team

3) Cilamaya

Existing borehole data

In 2005, soil investigations were carried out in the west side of the candidate study area by a local consultant ("Soil Investigation Report- Kegiatan Feasibility Study Pelabuhan Cilamaya-2005" by PT. Rayasurverindo Tirtasarana). According to their results, the thickness of soft layer gradually becomes thinner towards the east. Also, the hard layer (N-value 30 or over) appearance is from -11m at the shallowest point.

Outline of boring logs

According to our survey results, the thickness of soft layer (N-value 4 or less) varies in the 0 to 12m range, and it tends to be thinner in off-shore area than on-shore area.

The relatively hard layer (N-value 30 or over) appears from about MSL -18m at BH03 and BH04, and from -31m at BH02. In the case of BH01, it appears from much deeper than others, -57.59m. It is assumed that the reason for this deeper appearance at BH01 is originated in its location, which is next to the Ciparage River, that is, it has roots in the past river erosion which probably occurred in the glacial era.

Laboratory test

Both disturbed and undisturbed samples extracted from thin-wall sampling were subjected to physical and mechanical testing to obtain the soil characteristics. The results of physical and mechanical tests are shown in Table 3.4-3 and Table 3.4-4.

Water content of Ac layer tends to be close to Liquid Limit (L.L.) while the one of Dc and Tc tend to be in the middle between L.L. and Plastic Limit (P.L.) or closer to P.L. Ac and Dc are mostly occupied by silt and clay. The strengths of unconfined compression test (qu) are in the range 0.08 - 0.13 kg/cm2. OCR varies 1.67 to 10.8. However, Pc calculated from BH02 is not obvious enough according to e-log ~P curve, therefore OCR should be considered in the 1.67 to 2.73 range.

Table 3.4-3 Summary of Average for Each Layer (Physical test)

Layer	Specific Gravity	Water Content (%)	Atterberg Limit (%)		Grain Size Distribution (%)			
			Liquid Limit	Plastic Limit	Gravel	Sand	Silt	Clay
Ac	2.579	93.04	101.64	36.09	0	5.27	36.66	58.07
Dc	2.619	42.26	73.20	33.94	0	11.16	35.61	53.99
Tc	2.650	32.81	77.83	34.51	0	20.43	33.03	46.58

Abbreviation: Ac: Alluvial clay, Dc: Diluvium clay, Tc: Tertiary clay
Source: JICA Study Team

Table 3.4-4 Summary of Average for Each Layer (Mechanical test)

Item		BH01	BH02	BH03
Unit Weight	γ_t (g/cm^3)	1.229	1.354	1.39
Unconfined Compression Test	q_u (kg/cm^2)	0.08	0.1	0.13
Consolidation Test	C_v (cm^2/sec)	4.251×10^{-4}	4.021×10^{-4}	3.027×10^{-4}
	C_c	1.9	0.81	0.5
	P_c (kg/cm^2)	0.5	2.6	1.39
Effective Pressure at Sampling depth	P_e (kg/cm^2)	0.30	0.24	0.51
Over Consolidated Ratio	OCR	1.67	10.8	2.73

Source: JICA Study Team

4) Ciasem

Outline of boring logs

According to the results, the thickness of soft layer (N-value 4 or less) is thin and in the 2 to 5 m range.

The relative hard layer (N-Value 30 or over) appears from MSL -21.4m at BH01 and -31m at BH02.

Laboratory test

Both disturbed and undisturbed sample of thin-wall sampling were subjected to physical and mechanical testing to obtain the physical characteristics of the soils. The results of physical and mechanical tests are show in Table 3.4-5 - Table 3.4-6.

Average water content of Ac layer is beyond Liquid Limit (L.L.) while the one of Dc and Tc tend to be in the middle between L.L. and Plastic Limit (P.L.). All the layers are mostly occupied by silt and clay. The strengths of unconfined compression test (qu) are in the range 0.17 - 0.2 kg/cm2. OCR varies in the 1.61 to 1.73 range.

Table 3.4-5 Summary of Average for Each Layer (Physical test)

Layer	Specific Gravity	Water Content (%)	Atterberg Limit (%)		Grain Size Distribution (%)			
			Liquid Limit	Plastic Limit	Gravel	Sand	Silt	Clay
Ac	2.522	71.29	62.10	31.37	0	4.91	38.59	56.50
Dc	2.611	45.67	63.55	31.76	0	3.90	42.78	53.33
Tc	2.618	43.90	65.06	32.17	0	3.69	48.56	47.75

Abbreviation: Ac: Alluvial clay, Dc: Diluvium clay, Tc: Tertiary clay
Source: JICA Study Team

Table 3.4-6 Summary of Average for Each Layer (Mechanical test)

Item		BH01	BH04
Unit Weight	γ_t (g/cm^3)	1.518	1.618
Unconfined Compression Test	q_u (kg/cm^2)	0.2	0.17
Consolidation Test	C_v (cm^2/sec)	4.134×10^{-4}	3.622×10^{-4}
	C_c	1.08	0.29
	P_c (kg/cm^2)	0.52	1.4
Effective Pressure at Sampling depth	P_e (kg/cm^2)	0.30	0.87
Over Consolidated Ratio	OCR	1.73	1.61

Source: JICA Study Team

5) Tangerang

Outline of boring logs

According to the results, the thickness of soft layer (N-value 4 or less) varies in the 5 to 17m range.

The relatively hard layer (N-value 30 or over) appears from MSL -39.5m at BH03, -32.5m at BH01, -32.4m at BH04, and -15.2m at BH02 as shallowest.

Based on the results, it is generally inclinable that the soft layer thickness in the west side of the site is thicker than east side and hard layer appearance in the west side is deeper than east side.

Laboratory test

Both disturbed samples and undisturbed samples of thin-wall sampling were subjected to physical testing in laboratory to obtain information on the physical characteristics of the soils. The results of physical tests are presented in Table 3.4-7 and Table 3.4-8.

Water content of Ac layer is close to Liquid Limit (L.L) while the one of Dc is in the middle between L.L. and Plastic Limit (P.L.). Water content of Tc is close to P.L. relatively. Ac and Dc are mostly occupied by Silt and Clay.

The strengths of unconfined compression test (qu) are 0.16 to 0.33 kg/cm^2. OCR calculated from Pre-consolidation stress (Pc) and Effective Pressure at a sampling depth (Pe) vary from 0.88 to 1.36.

Table 3.4-7 Summary of Average for Each Layer (Physical test)

Layer	Specific Gravity	Water Content (%)	Atterberg Limit (%)		Grain Size Distribution (%)			
			Liquid Limit	Plastic Limit	Gravel	Sand	Silt	Clay
Ac	2.566	79.41	95.69	36.57	0	4.58	34.22	61.31
Ds	2.601	51.94	80.83	34.27	0	14.84	28.16	57.00
Dc	2.610	37.45	65.30	32.22	0	2.60	37.15	60.25
Tc	2.675	28.02	68.30	34.56	0	19.34	43.02	37.67

Abbreviation: Ac: Alluvial clay, Dc: Diluvium clay, Ts: Tertiary sand, Tc: Tertiary clay
Source: JICA Study Team

Table 3.4-8 Summary of Average for Each Layer (Mechanical test)

Item		BH01	BH02	BH03	BH04
Unit Weight	γ_t (g/cm^3)	1.621	1.608	1.445	1.481
Unconfined Compression Test	q_u (kg/cm^2)	0.31	0.33	0.16	0.21
Consolidation Test	C_v (cm^2/sec)	6.442×10^{-4}	7.856×10^{-4}	3.963×10^{-4}	5.781×10^{-4}
	C_c	0.67	0.22	1.56	0.92
	P_c (kg/cm^2)	1.5	0.9	1.16	0.82
Effective Pressure at Sampling depth	P_e (kg/cm^2)	1.10	0.94	1.32	0.62
Over Consolidated Ratio	OCR	1.36	0.96	0.88	1.32

Source: JICA Study Team

6) North Kalibaru

Outline of boring logs

Three offshore borings were carried out in North Kalibaru additionally after the studies in Tangerang, Marunda-Bekasi, Cilamaya and Ciasem. According to the results, the thickness of soft layer (N-value 4 or less) varies in the 6 to 9 m range.

The relatively hard layer (N-value 30 or over) appears from the seabed -10m at BH01 and BH02, and from the seabed -18m at BH03.

Laboratory test

Both disturbed and undisturbed samples extracted from thin-wall sampling were subjected to physical and mechanical testing to ascertain the soil characteristics. The results of physical and mechanical tests are shown in Table 3.4-9 and Table 3.4-10.

According to the test results, unconfined compression strengths (qu) are in the range 0.20 - 0.94 kg/cm2. OCRs are in the 0.82 to 1.67 range.

Table 3.4-9 Summary of Average at BH01 (Physical test)

Layer	Specific Gravity	Plastic Index (%)	Atterberg Limit (%)		Grain Size Distribution (%)			
			Liquid Limit	Plastic Limit	Gravel	Sand	Silt	Clay
Ac	2.66	14.74	50.72	38.65	0.00	5.70	90.82	0.00
Dc	2.41	12.29	54.71	36.92	0.00	19.21	80.79	0.00
Ts	2.55	7.47	50.53	43.06	0.00	54.30	45.32	0.39
Tc	2.45	12.85	50.89	41.46	0.00	14.16	85.01	0.83

Abbreviation: Ac: Alluvial clay, Dc: Diluvium clay, Ts: Tertiary sand, Tc: Tertiary clay
Source: JICA Study Team

Table 3.4-10 Summary of Average (Mechanical test)

Item		BH01	BH02	BH03
Unit Weight	γ_t (g/cm^3)	1.69	1.77	1.53
Unconfined Compression Test	q_u (kg/cm^2)	0.94	0.39	0.20
Consolidation Test	C_v (cm^2/sec)	7.35×10^{-4}	5.24×10^{-4}	6.18×10^{-4}
	C_c	0.52	0.32	0.72
	P_c (kg/cm^2)	0.40	0.65	0.95
Effective Pressure at Sampling depth	P_e (kg/cm^2)	0.49	0.39	0.60
Over Consolidated Ratio	OCR	0.82	1.67	1.58

Source: JICA Study Team

(2) Summary of Subsoil Conditions

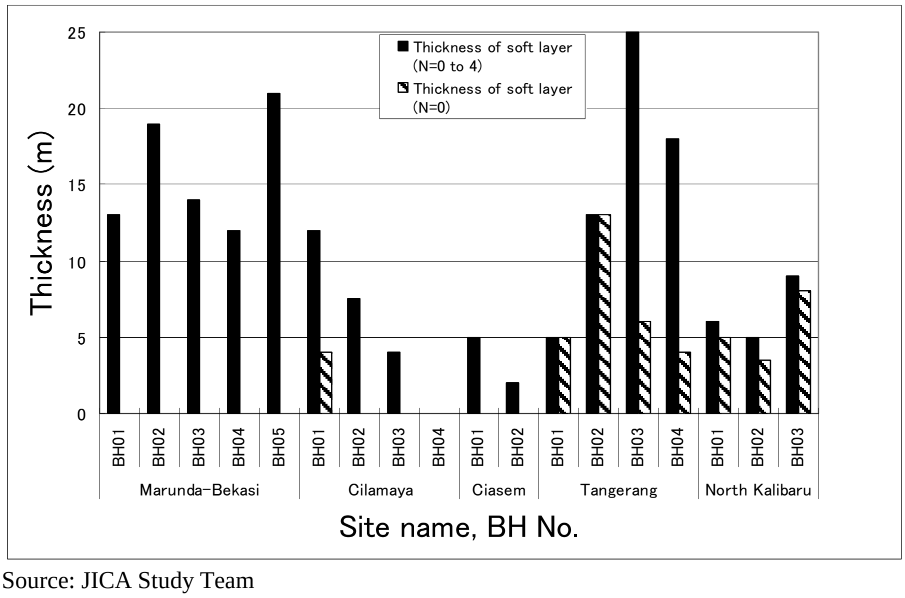
1) Soft Layer Thickness

The thicknesses of soft layers at each site are shown in Figure 3.4-1. Mainly, the soft layer in Marunda-Bekasi, Cilamaya, Ciasem and Tangerang consists of silty clay or clayey silt while it is mainly silty clay or sandy silt in North Kalibaru.

The thickness of soft layer in Cilamaya is 6 m on average and in Tangerang and Marunda are respectively 15m and 16m on average. On the other hand, in Cilamaya at BH04, the soft layer is very thin, less than 50cm in thickness, and in Ciasem is relatively thinner, 5m or less. In North Kalibaru, the average thickness of soft layer is 7 m.

From the viewpoint of thickness variation, the soft layer accumulated in the west side of Tangerang site (BH03 and 04) is thicker than the east side (BH01 &02). It can be said that the range of soft layer thickness in Marunda varies relatively smaller than the other sites. In North Kalibaru at BH03, where is located closer to the landside, is thicker than other two locations at BH01 and BH02.

The consolidation test results show that the soft layer in all of the sites seems to be normally-consolidated (OCR□1) or slightly over-consolidated clay (OCR<2) except some samples, which are assumed to be disturbed before the test. Therefore, in case that reclamation work is applied to the sites, it is assumed that final settlement by reclamation would be small if the effective overburden stress including reclamation work dose not exceed Pc.



Source: JICA Study Team

Figure 3.4-1 Soft Layer thickness at each site

2) Examination of Countermeasure to Soft Foundation

In off-shore Cilamaya, Soil Replacement method is applicable because the soft layer thickness is less than 5 m. However, other sites have more than 5m, therefore the method seems to be not applicable. From the view point of acceleration consolidation, Preloading method with/ without vertical Drain method seems to be effective in on-shore Cilamaya, Marunda-Bekasi, North Kalibaru and especially in Tangerang.

For the construction of breakwater and revetment, Sand Compaction Pile method or Deep Soil Mixing method should be examined. In case of applying Sand Compaction method, a huge amount of fine sand is required. However, considering environmental aspect and the surroundings in/ around the candidate sites, it might be difficult to acquire such huge volume of sand of that quality. In case of Deep Soil Mixing method, cement can be easily procured and work quality will be relatively stable. However, it must be noted that the cost of the method is higher and such advanced method has never been applied before in the Republic of the Indonesia.

As another option, Compaction/ Jet Grouting method can be considered to increase the rate of consolidation and reduce total amount of settlement.

In terms of reuse of dredged soft material as reclamation material, Pipe Mixing method seems to be effective.

It is important that the most effective soil improvement method be decided not only based on the examination of existing soil properties but also considering structural scale, construction time schedule, procurement condition and construction cost comprehensively.

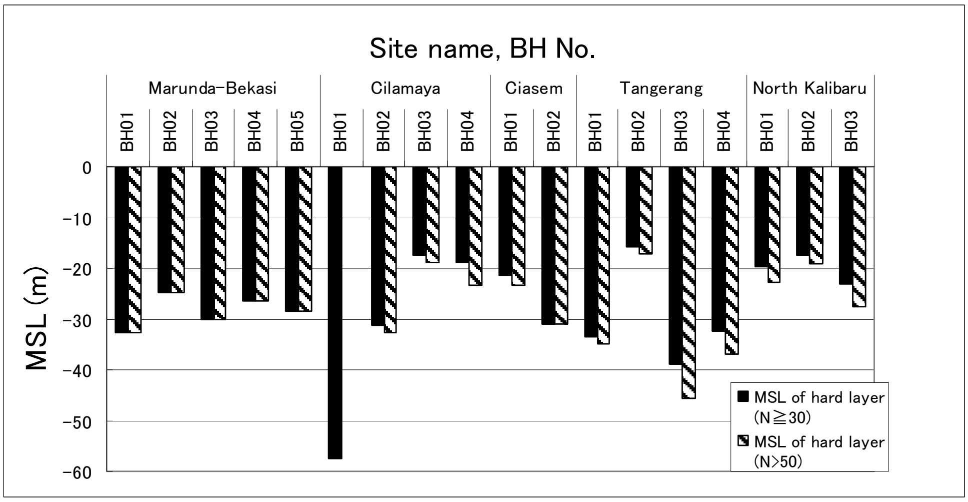
3) Elevation of Hard Layer Encountered at Each Site

The encountering of relatively hard layer (N-value 30 or over) and hard layer (N-value 50 or over) at each site is shown in Figure 3.4-2. The average elevation of relatively hard layer encountering (N-value 30 or over) is at -29m in Marunda-Bekasi and -30m in Tangerang. At BH01 in Cilamaya, it appears from -57.6m, which is the lowest compared to other sites. It is assumed that the reason for this deep appearance is that it originated in the past river erosion.

As for the components of hard layer, most of all consists of clay or silt, sometimes accompanied by fine sand. However, in the case of BH02 in Tangerang and BH03 in Marunda-Bekashi, it is comprised of sand only.

In Cilamaya and Tangerang, the hard layer (N-value 50 or over) appears from 1.5 to 6.5 m below the relatively hard layer (N-value 30 or over). In Marunda-Bekashi, both layers appear at almost the same elevation. In North Kalibaru, the hard layer (N-value 50 or over) is encountered from 2.0 to 5.0 m below the relatively hard layer (N-value 30 or over). Comparing with results in North Kalibaru to others, the appearance of hard layer in North Kalibaru is shallower than at the other four sites.

Generally, the relatively hard layer (N-value 30 or over) can be considered as a bearing layer for shallow footing and it would normally be suitable for friction piling. The hard layer (N-value 50 or over) is recommended as a bearing layer for piling foundation having upper heavy structure.



Source: JICA Study Team

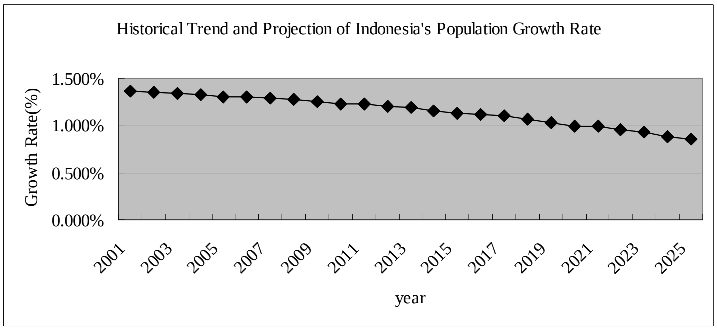
Figure 3.4-2　Hard Layer thickness at each site

4. MASTER PLAN FOR PORT DEVELOPMENT AND LOGISTICS IN AND AROUND GREATER JAKARTA METROPOLITAN AREA

4.1 Socio-economic Framework

(1) Population

According to the projection, the population of Indonesia during the next twenty-five years increased from 205.1 million in 2000 to 273.2 million in 2025. Average growth per year over the period 2000-2025 shows a tendency to decline continuously. In the decade 1990-2000, the population of Indonesia increased at the rate of 1.49 percent per year, then between the periods 2000-2005 and 2020-2025 fell to 1.34 percent and 0.92 percent per year (See Figure 4.1-1)



Source: Indonesia Population Projection, BPS, 2005

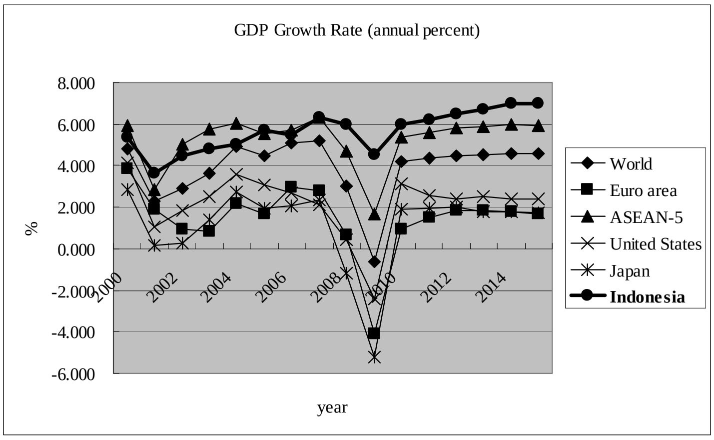
Figure 4.1-1 Historical Trend and Projection of Indonesia's Population Growth Rate

(2) GDP

Indonesia's recent GDP growth rates are still less than the 7.2 % average GDP growth the country experienced during the period of 1990-1996, however, during 2nd quarter of 2010, economists as well as the Indonesian Government expressed that such positive economic may continuously grow steadily ranging 6.0% to 7.0%. Furthermore, the Indonesian Government announced growth rate of 7.7% at 2014 as the Governments Policy Target.

GDP growth rates of major trading partners after 1990 are shown in Figure 4.1-2. Economies of East Asia and Pacific region had shown the highest growth rates of more than 8 % before the year 1997 when the region's economic prosperity collapsed due to the financial crisis.

United States has shown steady economic growth for the last decade, with growth rates in the range of 2 – 4 %. On the contrary, Japan as well as Euro area has been in an economic slump since 1998, and annual growth rates have been around 1 or 2 % recently.



Source: IMF World Economic Outlook Database April 2010

Figure 4.1-2 Growth Rate in Major Trade Partners

Future GDP growth rates of the trade partners were taken and extrapolated from the International Monetary Fund (IMF), World Economic Outlook Database April 2010 and official announcement of the Indonesian Government.

The 2010 – 2014 National Medium-Term Development Plan (RPJMN 2010-2014) is the second phase of implementation of the 2005-2025 National Long-Term Development Plan promulgated through Law 17/2007. The RPJMN 2010-2014 contains the national development strategy, general policies, programs of ministries/agencies and cross-ministries/agencies, regional and cross-regional programs, as well as the macroeconomic framework.

RPJMN 2010-2014 describes that a sustainable macroeconomic position will be maintained in 2010-2014 period. Indonesian economy is expected to gradually grow from 5.5-5.6% in 2010 to 7.0-7.7% in 2014, at the average growth rate of 6.3-6.8% per year over the next five years (See Table 4.1-1).

Table 4.1-1 Estimated Economic Growth 2010-2014 (%)

	2010	2011	2012	2013	2014	average 2010-2014
Economic Growth	5.5 - 5.6	6.0 - 6.3	6.4 - 6.9	6.7 - 7.4	7.0 - 7.7	6.3 - 6.8
Expenditure Side						
Private Consumption	5.2 - 5.2	5.2 - 5.3	5.3 - 5.4	5.3 - 5.4	5.3 - 5.4	5.3 - 5.4
Governement Consumption	10.8 - 10.9	10.9 - 11.2	12.9 - 13.2	10.2 - 13.5	8.1 - 9.8	10.6 - 11.7
Investment	7.2 - 7.3	7.9 - 10.9	8.4 - 11.5	10.2 - 12.0	11.7 - 12.1	9.1 - 10.8
Exports of Goods and Services	6.4 - 6.5	9.7 - 10.6	11.4 - 12.0	12.3 - 13.4	13.5 - 15.6	10.7 - 11.6
Imports of Goods and Services	9.2 - 9.3	12.7 - 15.2	14.3 - 15.9	15.0 - 16.5	16.0 - 17.4	13.4 - 14.9
Production Side						
Agriculture, Plantation, Livestock, Forestry, and Fisheries	3.3 - 3.4	3.4 - 3.5	3.5 - 3.7	3.6 - 3.8	3.7 - 3.9	3.6 - 3.7
Mining and Quarrying	2.0 - 2.1	2.1 - 2.3	2.3 - 2.4	2.4 - 2.5	2.5 - 2.6	2.2 - 2.4
Manufacturing Industry	4.2 - 4.3	5.0 - 5.4	5.7 - 6.5	6. 2 - 6.8	6.5 - 7.3	5.5 - 6.0
Non-Oil and Gas Industry	4.8 - 4.9	5.6 - 6.1	6.3 - 7.0	6.8 - 7.5	7.1 - 7.8	6.1 - 6.7
Electricity, Gas and Water	13.4 - 13.5	13.7 - 13.8	13.8 - 13.9	13.9 - 14.0	14.1 - 14.2	13.8 - 13.9
Construction	7.1 - 7.2	8.4 - 8.5	8.8 - 9.3	8.9 - 10.1	9.1 - 11.1	8.4 - 9.2
Trade, Hotels, and Restaurants	4.0 - 4.1	4.2 - 4.8	4.4 - 5.2	4.5 - 6.4	4.6 - 6.6	4.3 - 5.4
Transaportatio and Telecommunication	14.3 - 14.8	14.5 - 15.2	14.7 - 15.4	14.9 - 15.6	15.1 - 16.1	14.7 - 15.4
Finance, Real Estates, and Corporate Services	6.5 - 6.6	6.6 - 6.7	6.8 - 7.0	6.9 - 7.0	7.2 - 7.3	6.8 - 6.9
Services	6.7 - 6.9	6.9 - 7.0	7.0 - 7.1	7.1 - 7.2	7.2 - 7.4	6.9 - 7.1

Source: The 2010 – 2014 National Medium-Term Development Plan

IMF regularly updates "The World Economic Outlook" and its latest version as of April 2010 estimates global economy until 2015 and the report describes about the world economy as follows:

The global recovery has evolved better than expected, with activity recovering at varying speeds— tepidly in many advanced economies but solidly in most emerging and developing economies.

The world economy is poised for further recovery but at varying speeds across and within regions. Global growth is projected to reach 4¼ percent in 2010 and 2011. Advanced economies are now the impact to the economies and reveals the updated GDP growth rates of each economy up to 2010. It is true that future economic framework is quite uncertain, but released outlook by IMF is the most reliable one so far. The outlook for activity remains unusually uncertain, even though a variety of risks have receded.

The growth rates of the high case are set at 0.5 percentage point higher, and those of the low case are 0.5 percentage point lower, than those of the basic case, respectively as same manner as JICA Study Team executed in 2002.

As for base case, each growth rate is based on the following:

2000 - 2009: the IMF World Economic Outllook April 2010,

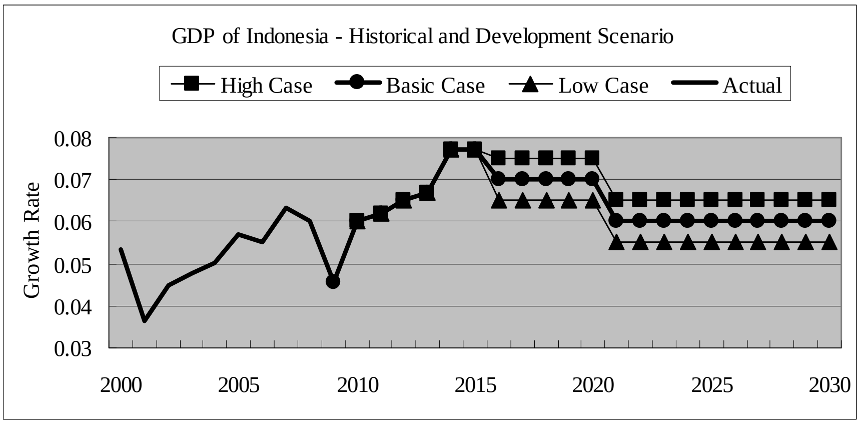
2010 - 2013: ditto

2014 - 2015: The Indonesian Government Policy Target, April 2010,

2016 - 2020: Assumed 7.0%

2021 - 2030: Assumed 6.0%

Figure 4.1-3 shows historical and development scenario of Indonesia's GDP in conformity with conditions as above mentioned



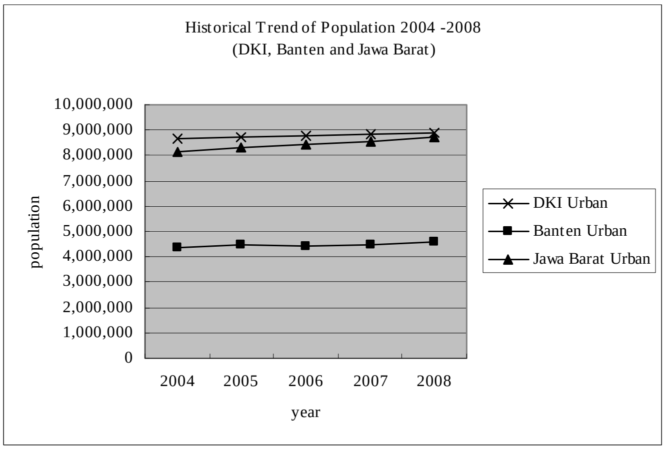
Source: IMF World Economic Outlook Update on April 2010, JICA Study Team

Figure 4.1-3 Development Scenario and Historical Growth Rates of GDP

(3) Regional Socio-economic framework

Population

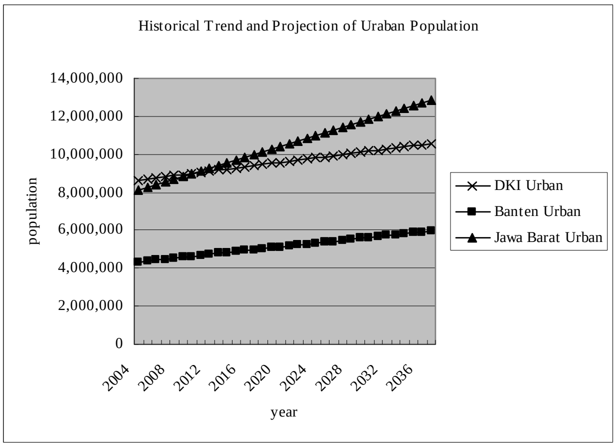
historical trend of population of Population (2004 – 2008) of DKI, Banten and West Java are shown is shown in Figure 4.1-4.



Source: Statistical Yearbook of Indonesia 2009, Jawa Barat in Figure2009, Banten in Figures in 2009

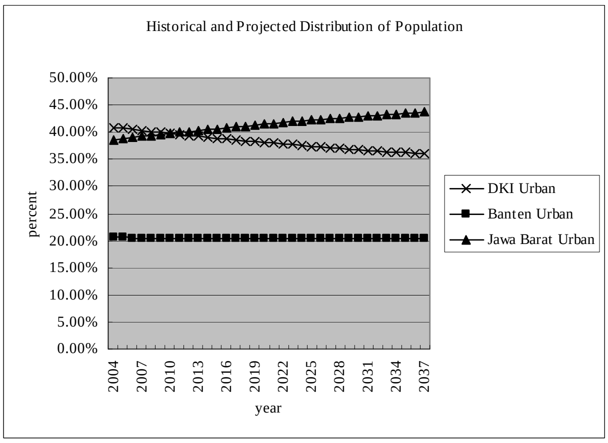
Figure 4.1-4 Historical Trend of Urban Population 2004 – 2008 (DKI, Banten and West Java)

The method of the projection is based on the approximation formula. Projection of population is shown in Figure 4.1-5 and distribution trend of population is shown in Figure 4.1-6.



Source: Statistical Yearbook of Indonesia 2009, Jawa Barat in Figure2009, Banten in Figures in 2009

Figure 4.1-5 Historical Trend and Projection of Population in DKI, Banten and West Java



Source: Statistical Yearbook of Indonesia 2009, Jawa Barat in Figure2009, Banten in Figures in 2009

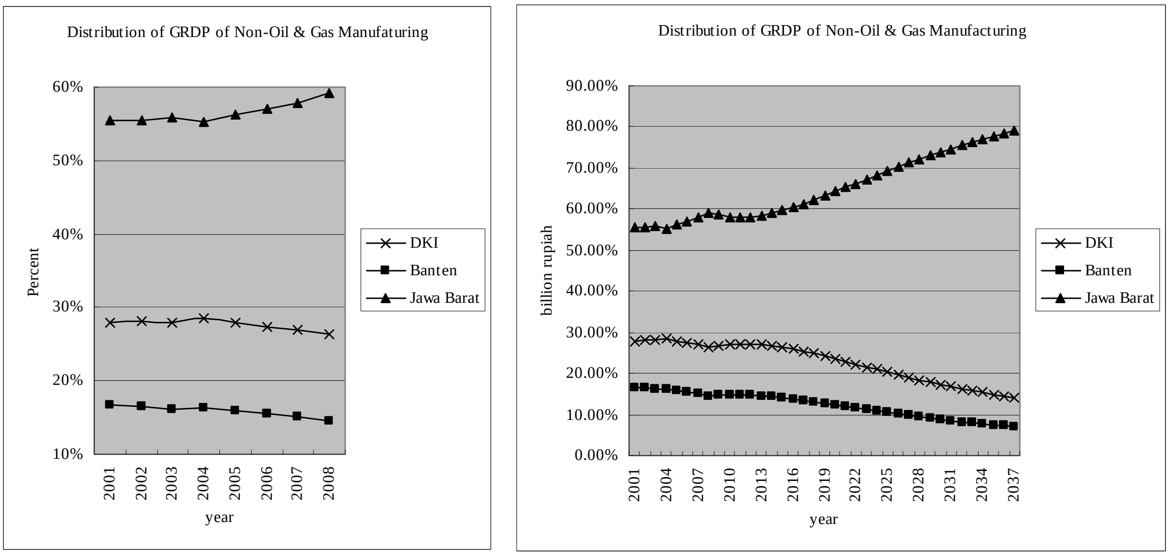
Figure 4.1-6 Historical Trend and Projection of Population Distribution in DKI, Banten and West Java

In the area of DKI, Banten and West Java, trend of distribution of population in urban areas clearly shows West Java constantly increase while DKI decrease. Suburban area in West Java may become densely populated area.

GRDP of Manufacturing

Distribution of the Manufacturing GRDP in the area shows obvious trend which West Java has been constantly increased since 2004 until 2008 while the remaining two has been decreased especially DKI (See Figure 4.1-7).

Further to this data, it also may be said that this trend will continue for the next decades according to the results of Interview Survey with Major Consignees/Consignors as well as Shipping Companies. One of the reasons of the tendency is investment of manufacturing companies to West Java Province rather than the others.



Source: BPS, Gross Regional Domestic Product of Provinces in Indonesia by Industrial Origin 2004 – 2008, and Raw data prepared by BPS

Figure 4.1-7 Current Share and Projection of GRDP of Non Oil & Gas Manufacturing

4.2 Cargo Demand Forecast

(1) International Container

A Total of 28.6 million tons of international cargo were handled at Tanjung Priok Port in 2009 in the form of containers, which was equivalent to 2.74 million TEU. There used to be three dedicated container terminals: JICT I & II and KOJA terminal while JICT II is not operational at present because of customs practice reasons. These dedicated container terminals handle international containers. Conventional berths are also used for handling international containers, which account for 14.2% of the total international containers at the port in 2009.

A regression model was developed and applied to forecast future port demand taking the correlation ship between cargo volume (ton) and magnitude of economic activities in the hinterland into consideration.

$Y = a + bX$

Where, X: Independent Variable

Y: Dependent Variable

a, b: Constants

Firstly, future cargo tonnage transported by containers was forecast using the regression model. This work is implemented for export and import cargo individually. Trade partners' weighted GDP was applied as an independent variable for export cargo, and GRDP of the hinterland of Tanjung Priok Port for import cargo. Correlation coefficient (R) of the model is 0.984 for export and 0.932 for import cargo.

Secondly, the number of containers is estimated as follows;

$$N = V/W \times 1/(1 - E)$$

where N : Number of containers (TEUs/year)

V : Cargo tonnage in containers (tons/year)

W : Cargo weight per loaded 20 ft container (tons/TEU)

E : Percentage of empty container

The average cargo weight per loaded 20 ft container (W) is set at 10.5 ton for export containers and 11.0 ton for import containers based on the actual past records at JICT. Although average tonnages per loaded TEU are quite similar for both import container and export one, a total cargo tonnage of imported containers is larger than that of exported. Therefore, import container cargoes need a larger number of laden container boxes (TEUs) than export container cargoes. Percentage of empty container among import container is set at 5 %, taking the actual records of JICT and prospect of container operation into consideration.

Considering the fact that a highway network system in Java Island is under development, and that Tanjung Priok Port is by far the largest container port in Indonesia, it is reasonable to assume that the number of exported containers is same as those of imported containers in the long run. The difference between the number of imported container and that of exported containers calculated from the cargo tonnage will be the number of exported empty containers.

Under the three socioeconomic frameworks, container throughputs were forecast. Total tonnage and the number of containers of international trade in the target years for the basic case are calculated at 61.2 million tons, 7.3 million TEU in 2020, and 106.2 million tons and 13.4 million TEU in 2030. Resulting TEU in the high case is 7.5% higher and that in the low case is 7.1% lower than the basic case in 2030, as shown Table 4.2-1.

Table 4.2-1 Forecast of International Container Throughput at Tanjung Priok by Case

High Case

	Import		Export		Total	
	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)
2009	15,616	1,445	12,980	1,291	28,596	2,736
2015	26,341	2,661	18,345	2,661	44,685	5,321
2020	38,860	3,719	24,140	3,719	63,000	7,437
2025	54,129	5,180	31,274	5,180	85,403	10,360
2030	75,050	7,182	40,130	7,182	115,180	14,364

Basic Case

	Import		Export		Total	
	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)
2009	15,616	1,445	12,980	1,291	28,596	2,736
2015	26,341	2,661	18,345	2,661	44,685	5,321
2020	37,909	3,628	23,244	3,628	61,153	7,255
2025	51,543	4,932	29,169	4,932	80,711	9,865
2030	69,787	6,678	36,396	6,678	106,183	13,356

Low Case

	Import		Export		Total	
	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)
2009	15,616	1,445	12,980	1,291	28,596	2,736
2015	26,341	2,661	18,345	2,661	44,685	5,321
2020	36,976	3,538	22,365	3,538	59,342	7,077
2025	49,063	4,695	27,153	4,695	76,216	9,390
2030	64,860	6,207	32,906	6,207	97,765	12,413

(Source: Forecast by JICA Study Team)

(2) Domestic Container

A total of 7.7 million tons or 1.07 million TEU of domestic containers were handled at Tanjung Priok Port in 2009. These domestic containers are loaded and unloaded at conventional berths. Although dedicated container terminals such as JICT are also used for loading/unloading containers coming from/going to remote islands, the volume is minimal.

Future demand for domestic containers is also forecast basically in the same manner as the international containers. However, a Multiple Regression analysis with a Dummy variable is employed in stead of a single regression analysis.

Multiple Regression analysis is an extension of simple regression, to take account of more than one independent variable. It is obviously the appropriate technique when we want to examine the effect on Y of several X variables simultaneously.

Now we introduce Dummy Variable (D) into the Multiple Regression Model in the following form;

$$Y = a + bX + cD$$

D is a 0-1 variable that clearly distinguishes between the two groups.

It is assumed that observed data of a dependent variable can be classified into two groups; initial stage on containerization in the interisland shipping (D=0), and after 2002 (D=1). Then relative to the reference line where D=0, the line where D= 1 is parallel and c units higher.

Coefficient of determination (R2) of the Multiple Regression model with a dummy variable was turned out 0.947 for unloading case and 0.962 for loading case.

The average cargo weight per laden 20 ft container is set at 12.0 tons for both loading and unloading containers taking the actual working records at conventional wharves into consideration. Percentage of empty container is set at 5% for loading containers based on the actual records and future prospects.

Resulting volumes of inter-island containers handled at Tanjung Priok Port are estimated at about 18.5 million tons or 2.3 million TEU in 2020, and about 34.7 million tons or 4.4 million TEU in 2030. Future demands under the different economic frameworks are also forecast. Resulting volumes in the target years are summarized in Table 4.2-2. Estimated demands (TEU) of the high case and low case are 7.9 % larger or 7.4% less respectively than that of the basic case in 2030.

Table 4.2-2 Forecast of Domestic Container Throughput at Tanjung Priok by Case

High Case

	Unloading		Loading		Total	
	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)
2009	2,417	524	5,244	544	7,662	1,068
2015	3,868	761	8,824	761	12,692	1,523
2020	5,430	1,173	13,599	1,173	19,030	2,347
2025	7,335	1,676	19,424	1,676	26,759	3,352
2030	9,945	2,364	27,404	2,364	37,349	4,728

Basic Case

	Unloading		Loading		Total	
	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)
2009	2,417	524	5,244	544	7,662	1,068
2015	3,868	761	8,824	761	12,692	1,523
2020	5,312	1,142	13,237	1,142	18,549	2,284
2025	7,013	1,591	18,437	1,591	25,450	3,181
2030	9,289	2,191	25,396	2,191	34,685	4,382

Low Case

	Unloading		Loading		Total	
	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)
2009	2,417	524	5,244	544	7,662	1,068
2015	3,868	761	8,824	761	12,692	1,523
2020	5,195	1,111	12,881	1,111	18,076	2,223
2025	6,703	1,509	17,491	1,509	24,194	3,018
2030	8,674	2,029	23,517	2,029	32,191	4,058

(Source: Forecast by JICA Study Team)

(3) Transshipment Container

According to container throughput statistics, a total of 90,221 TEU of containers (unloading / loading total) were transshipped at JICT in 2008. This volume was equivalent to 4.52% of the total throughput at JICT. On the other hand, it is reported that transshipped volume at KOJA was 7,680 TEU in 2008, which corresponded to 1.09% only of the total throughput at the terminal. Presently transshipment ratio at Tg. Priok Port is not significant from the view point of terminal throughput level and volume of transshipment containers is included in the international container throughput in this study.

(4) Demand Elasticity

Container throughput elasticity with respect to GDP is examined. This analysis aims at whether throughput elasticity to GDP will decline as per capita GDP grows. Resulting elasticities of selected countries including both developing and developed countries are shown in Table 4.2-3. Contrary to the prediction, what is found is that nations with high per capita GDP have higher elasticity; Japan, USA and Netherlands are among this class. Elasticity of ports in Indonesia including the Tg. Priok port has not been necessarily high, but Indonesian ports belong to a class of rather low elasticity. In other words, Indonesian ports have good potential to increase container volume elasticity with respect to GDP in coming years.

Table 4.2-3 Throughput Elasticity to GDP

	Elasticity (2000～2007)	Per Capita GDP (2008)		Elasticity (2000～2007)	Per Capita GDP (2008)
Japan	3.57	40,455	Jawaharlal Nehru	2.28	718
Tokyo	3.42	40,455	Vietnam	2.20	647
Korea	2.04	15,447	Pakistan	2.68	650
China	1.28	1,965	Indonesia	1.52	1,087
Thailand	1.86	2,640	Tg. Priok	1.28	1,087
Laem Chabang	2.36	2,640	USA	3.03	37,867
India	2.05	718	Rotterdam	3.38	27,307

(Source: JICA Study Team)

(5) Summary of Container Throughput

Total container throughputs at Tanjung Priok Port are summarized in Table 4.2-4.

Table 4.2-4 Total Container Throughput at Tanjung Priok

High Case

	International Total		Domestic Total		Grand Total	
	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)
2009	28,596	2,736	7,662	1,068	36,258	3,804
2015	44,685	5,321	12,692	1,523	57,377	6,844
2020	63,000	7,437	19,030	2,347	82,029	9,784
2025	85,403	10,360	26,759	3,352	112,162	13,711
2030	115,180	14,364	37,349	4,728	152,529	19,092

Basic Case

	International Total		Domestic Total		Grand Total	
	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)
2009	28,596	2,736	7,662	1,068	36,258	3,804
2015	44,685	5,321	12,692	1,523	57,378	6,844
2020	61,153	7,255	18,549	2,284	79,702	9,539
2025	80,711	9,865	25,450	3,181	106,161	13,046
2030	106,183	13,356	34,685	4,382	140,868	17,738

Low Case

	International Total		Domestic Total		Grand Total	
	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)	Ton ('000)	TEU ('000)
2009	28,596	2,736	7,662	1,068	36,258	3,804
2015	44,685	5,321	12,692	1,523	57,377	6,844
2020	59,342	7,077	18,076	2,223	77,418	9,299
2025	76,216	9,390	24,194	3,018	100,411	12,408
2030	97,765	12,413	32,191	4,058	129,956	16,471

(Source: Forecast by JICA Study Team)

(6) Major Non-container Cargoes

According to the commodity-wise cargo tonnage statistics in 2009, commodities with more than one million tons can be listed in the Table 4.2-5. Petroleum Product, Iron and Steel, and Coal are among the largest commodity group at Tg. Priok Port.

Table 4.2-5 Commodities with more than one million tons

(Unit: ton)

No.	Commodity Category	Unit	Import	Export	Unloading	Loading	Total
2	Cement and Clinker	Ton	14,643	1,943,484	722,102	352,767	3,032,996
3	Wheat	Ton	1,814,400	22,500	104,721	0	1,941,621
4	Crude Palm Oil		15,895	26,150	1,465,354	18,989	1,526,388
5	Iron & Steel	Ton	2,670,899	396,583	78,997	125,864	3,272,343
6	Coal	Ton	133,638	0	2,946,000	8,745	3,088,383
7	Sand	Ton	124,300	4,000	1,883,309	39,984	2,051,593
8	Forest Product	Ton	214,561	771	769,591	81,734	1,066,657
9	Petroleum Product	Ton	3,205,411	58,073	1,912,028	10,848	5,186,360

Source: Tg. Priok Port Office, Pelindo II

Volume of cargos listed in Table 4.2-5 covers more than ninety percent of the non-container cargo handled at the Tg. Priok port.

Methodologies applied for demand forecasting are summarized in Table 4.2-6, varying according to the commodity type. Statistical data sources for forecasting have not been limited to Indonesian sources but databases of international institutions such as the World Bank, IMF, and FAO have been reviewed for reference. Outcomes of the future demands are also cross checked with Asian and international standpoints.

Results of demand forecast for Non-container major cargoes, which correspond to the basic case, are summarized in Table 4.2-7.

Table 4.2-6 Methodology Employed for Commodity-wise Demand Forecasting

Commodity	Methodology
Cement and Clinker	Domestic sales up to 2015 is based on Indonesia Cement Association's forecast. For 2016-2-30, regressed against construction sector's GDP and Dummy variable. Cement production capacity projection is based on Indonesia Cement Association's forecast. Export of cement/clinker is assumed at 5% of the production capacity. Tg Priok Port will handle 50% of national export. Inter-island trade is forecast in cosideration of actual ratio against the volume of domestic sales.
Wheat	Indonesian wheat import volume is regressed against total population in Indonesia. It is set that total wheat tonnage handled at the Tanjung Priok Port is equal to 50 % of the Indonesian import of wheat.
Crude Palm Oil	Regressed against hinterland population. 10% of Im/Unloading will be Ex/Loading volume.
Iron and Steel	Time series analysis until 2015, and assume the throughput remains unchanged at the 2015 level afterwards.
Coal	Coals fired at cement industries in the hinterland are expected to grow at 3.1% per year.
Sand	Regressed against Hinterland GRDP.
Forest Product	Largest volume in the past
Petroleum Product	Tonnage has been decreasing since 2004. Five million tons will be at most.
CBU (Car)	CBU import is set at 10% of Indonesia automotive market volume, which is regressed by domestic GDP. Growth rate of CBU export is same as that of World's GDP.

(Source: JICA Study Team)

Table 4.2-7 Summary of Demand Forecast by Major Commodity

(Unit: ' 000 Ton)

Commodity	Trade Type	2009	2015	2020	2025	2030
Cement & Clinker	Im/Unloading Total	795	983	1,304	1,716	2,266
	Ex/Loading Total	3,215	3,602	4,541	5,713	7,218
	Grand Total	4,009	4,584	5,845	7,428	9,484
Wheat	Im/Unloading Total	1,919	2,756	3,058	3,333	3,589
	Ex/Loading Total	23	0	0	0	0
	Grand Total	1,942	2,756	3,058	3,333	3,589
Crude Palm Oil	Im/Unloading Total	1,481	1,713	1,877	2,032	2,176
	Ex/Loading Total	45	171	188	203	218
	Grand Total	1,526	1,884	2,065	2,235	2,393
Iron and Steel	Im/Unloading Total	3,272	4,291	4,291	4,291	4,291
	Ex/Loading Total	522	644	644	644	644
	Grand Total	3,795	4,935	4,935	4,935	4,935
Coal	Im/Unloading Total	3,080	3,700	4,311	5,023	5,853
	Ex/Loading Total	9	0	0	0	0
	Grand Total	3,088	3,700	4,311	5,023	5,853
Sand	Im/Unloading Total	2,008	3,351	4,700	6,290	8,417
	Ex/Loading Total	44	0	0	0	0
	Grand Total	2,052	3,351	4,700	6,290	8,417
Forest Product	Im/Unloading Total	984	1,300	1,300	1,300	1,300
	Ex/Loading Total	83	200	200	200	200
	Grand Total	1,067	1,500	1,500	1,500	1,500
Petroleum Product	Im/Unloading Total	5,117	5,000	5,000	5,000	5,000
	Ex/Loading Total	69	0	0	0	0
	Grand Total	5,186	5,000	5,000	5,000	5,000
CBU (Car)	CBU Import (Unit)	32,678	100,000	159,000	235,000	314,000
	CBU Export (Unit)	56,669	103,908	130,000	155,000	185,000
	Grand Total	89,347	203,908	289,000	390,000	499,000

(Source: JICA Study Team)

4.3 Estimate of Cargo-Handling Capacity of Tanjung Priok Port

(1) General

The capacity of the existing port facilities for container-handling at Tanjung Priok Port has been estimated so as to make a plan of new container terminal to receive excess containers from the port after the port will reach saturation.

The estimation has been divided into two steps. Firstly, the capacity for handling international containers at JCT has been estimated. Then, the capacity for handling domestic containers at conventional wharf areas containing the island wharf, the first wharf, the second wharf and the third wharf has been estimated.

In this estimation, according to Pelindo II plan, it is assumed that JICT II and MTI will be converted from international container terminals into domestic container terminals.

(2) International Containers

1) Berthing Capacity

JCT comprising JICT I-North, JICT I-West, KOJA and MAL has 9 berths in total. According to the berthing records in 2009, the following conditions have been assumed:

JICT I-North, KOJA and MAL (6B)

Gross container handling productivity	63 boxes/hr/vessel
Average lot per vessel	1,270 boxes/vessel
Average berthing time	20 hr/vessel
Weekly service	5 services/week
Total Capacity	2,971,000 TEUs/year

JICT I-West (3B)

Gross container handling productivity	42 boxes/hr/vessel
Average lot per vessel	840 boxes/vessel
Average berthing time	20 hr/vessel
Weekly service	5 services/week
Total Capacity	983,000 TEUs/year

From the above, their total capacity has been estimated as 4 million TEUs per annum.

In addition, the capacity of JICT II and MTI has been estimated as 900,000 TEUs in total before the conversion from international containers to domestic container terminals. Thus total capacity has been estimated as 4.9 million According to the demand forecast, this volume is forecast to reach in 2014.

2) Storage Capacity

Container dwelling conditions of JCT has been revealed using a computer simulation model assuming that the above-mentioned 4 million TEU containers are handled in a year and supposed weekly services are provided.

According to the result of the simulation, the total container storage capacity corresponding 4 million TEUs handled in a year are as follows:

- Import containers: 18,000 TEUs

- Export containers: 12,000 TEUs
- Empty containers: 4,000 TEUs

Thus, required storage capacity has been estimated as 34,000 TEUs.

On the hand, the ground slots of the existing container yards including the yard under expansion are as follows:

- JICT: 10,000 ground slots
- KOJA: 6,200 ground slots
- MAL: 1,000 ground slots

Thus, the total ground slots of JCT are 17,200. Assuming 4 high stacking and operational factor of 0.75, the total storage capacity has been estimated as 52,000 TEUs, and exceeds the required capacity mentioned above. Hence, the required capacity has been determined by the berthing capacity.

(3) Domestic Containers

Domestic containers are handled at the conventional berths where conventional cargoes such as cement, CPO and steel products are also handled. Hence, the analysis of seaside capacity for handling both domestic containers and conventional cargoes at the existing Tanjung Priok Port has been conducted by using a computer simulation model. The seaside capacity is determined by the combination of the capacities of access channel and berths themselves. An auspice of saturation in the seaside capacity is found in a sharp increase in the number of ships waiting offshore. The shortage of capacity in specified berths with high berth occupancy rate causes offshore ship waiting for specified ships using the berths. Additionally, the shortage of access channel capacity also causes offshore waiting of every calling ship. The resulting figures of the simulation reveal causes of seaside saturation.

As to the seaside capacity covering simultaneously both access channel and berths, there are two categories. One is adequate capacity to keep a service level for a calling vessel at a port (hereinafter referred to as “the adequate seaside capacity”). The service level is expressed the percentage of an offshore waiting time to the turnaround time from arrival to departure of a vessel at a port excluding ship off-shore waiting time. The figure of around 10% is generally used as the adequate service level, and in this study the figure has been used as a criterion to determine the adequate seaside capacity.

The other is the capacity that enables the number of vessels receivable at berths to maximize during a certain period (one year), in which offshore ship waiting is on the verge of unstable conditions indicating an auspice of a sharp increase in waiting times (hereinafter referred to as “the absolute seaside capacity”).

According to the results of the simulation, in 2019 the service level will be 20% with an average off-shore waiting of 8 hours per vessel with satisfying the adequate service level. Then in the next year, 2020, the service level will jump to 113% with an average off-shore waiting of 45 hours per vessel without satisfying the adequate service level.

Hence, it has been judged that the saturation year will be 2019 and consequently the adequate capacity has been estimated as the volume in 2019, viz. 2.1 million TEUs of containers.

4.4 Estimate of Traffic Capacities of the Existing Roads Related to Port Cargo Traffic

(1) Traffic Condition and Capacity of Toll Road

1) Current condition

Jakarta Metropolitan Area

The transportation system in Jakarta Metropolitan Area is facing the serious traffic congestion problem. Despite being 6 lanes on JIUT and JORR, the rate for volume/capacity as of April 2010 is beyond 0.8 in the most of sections. In addition, there are bottleneck points that the queue from the on and off ramp block off the smooth traffic flow on the main carriageway.

The rate of volume/capacity of each section on toll road is as follows.

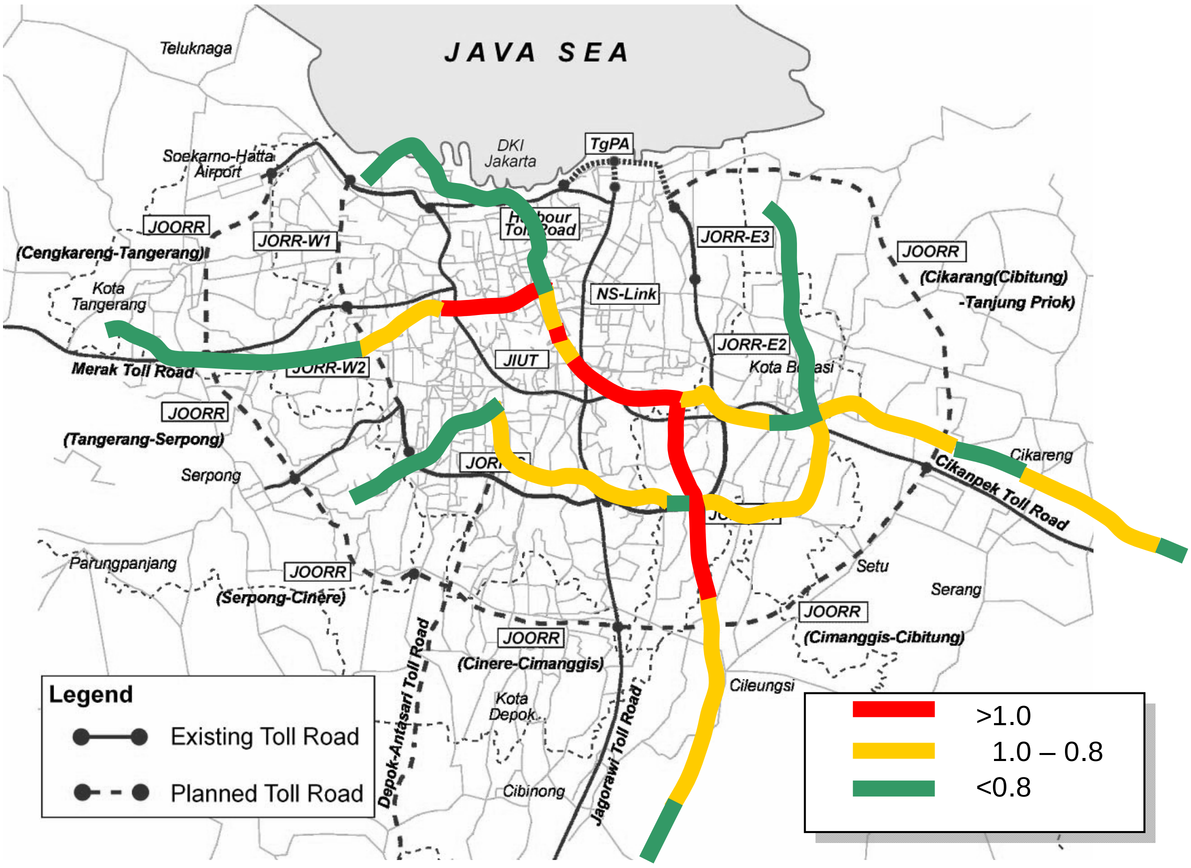


Figure 4.4-1 V/C ratio on toll road in April 2010

West Java Area

Jakarta-Cikampek Road

The industrial area has been developed around Cibitung and Cikarang, the east outskirt of Jakarta due to the congestion in urban area and the restriction of land use. According to this movement, the traffic especially cargo between Tanjung Priok Port and industry area has increased which caused substantial traffic congestion on Jakarta – Cikampek Toll Road.

The Jasa Marga prepared the annual average daily traffic volume on Jakarta – Cikampek Toll Road in 2009. According to the drawing it indicates that the traffic volume around Bekasi is over 200,000 vehicle/day on main road, which is beyond the capacity of 126,000 vehicle/day for 6 lanes.

Besides, the traffic on the ramp toward Jakarta on Cibitung and Cikaran IC accounts for over 20,000 vehicle/day.

Jagorawi Road

The traffic volume for both directions between Cawang and Citeureup on Jagorawi Road exceed 100,000 vehicle/day. Especially around Cawang, the traffic volume only for one direction account for over 100,000.

2) Future forecast of traffic demands in Jakarta Metropolitan Area

The future traffic volume around JABODETABEK area in 2011 and 2020 was forecasted in THE STUDY ON INTEGRATED TRANSPORTATION MASTER PLAN FOR JABODETABEK (PHASEII) in 2004 and reviewed and updated it in the project for Tanjung Priok Access Road conducted in 2007.

According to the result, by the opening of JORR and JORR2, the traffic volume is expected to decrease temporarily on Jagowawi, Jakarta-Cikampek and JIUT in 2011. However, it will exceed the capacity and be overflowed in 2020.

It is obvious that the traffic volume will be overflowed in the near future by not only the cargo but also ordinary vehicles, so reducing the traffic is the one of most important issues in JABODETABEK.

Based on the traffic forecast of cargo by terminals in Tanjung Priok of Jakarta Metropolitan Area towards 2030, the daily traffic volume to the road is worked out.

Daily traffic volume from/to port terminals at Tanjung Priok Port and the so-called a new terminal in Jakarta Metropolitan Port has been estimated based on cargo allocation.

Daily truck traffic volume by area as origin and destinations of port cargoes has been estimated based on estimated daily traffic from/to port terminal with the following assumption.

- Daily trucks volume for transporting annual International containers volume (TEU) is worked out by dividing demands cargo volume by 365 days and 1.5 considering combined number of containers 40 ft and 20 ft containers by one truck.
- On the other hand, daily trucks volume of domestic container is also worked out in the similar manner as divided by 365 days per year and 1.25 considering combined number of containers 40 ft and 20 ft.
- The regional share of trucks volume (veh/day) by commodities in 2030 based on the cargo demands is estimated considering regional socio-economic indicators such as regional GDP (GRDP), regional population, and consumption level (see Section 4.1),
- OD survey (see section 2.10). The result of regional share of trucks traffic volume is shown in Table 4.4-1.

In case required magnitude of new terminal facilities are developed at respective candidate sites, the volume of trucks (veh/day) using toll ways within JABODETABEK area for transporting port cargo are estimated and shown in matrix format of OD (Origin and Destination) traffic related to port cargoes based on the estimated annual truck traffic by terminals and regional truck traffic forecast.

Table 4.4-1 Truck Traffic by area as origins and destinations of port cargoes

Unit: vehicle per day

Type of cargo transported by truck	Banten Province		DKI Jakarta		North east area of West Java Province		South West area of West Java Province		Total Traffic	
Consumer goods	4,076	20.3%	7,376	36.8%	6,886	34.3%	1,712	8.5%	20,050	100%
Cargoes related to manufacturing industries	1,409	8.8%	2,777	17.3%	9,975	62.1%	1,886	11.8%	16,050	100%
Total	5,485		10,153		16,861		3,598		36,100	

Source: The Study Team

Table 4.4-2 shows the findings of truck traffic distribution by OD in the matrix format by using the toll roads within JABODETABEK area.

The truck traffic volume in the Table 4.4-2 is indicated by unit of veh/day. The figures are converted to pcu (passenger car unit) for assessing the balance of demands and capacity of the planned lanes of the toll ways and by calculating percentage of trucks traffic occupancy in the toll ways. The veh/day of trucks traffic is converted to PCU by multiplying PCU factor of ICHM.

According to the past traffic survey by JICA Study in 2002, the percentage of truck for transporting port cargo to the total traffic volume including passenger cars, buses etc without converting pcu basis was around 20% on the roads around Tanjung Priok Port, equivalent to 50 % in term of pcu unit. In the case of traffic counting survey by Directorate General of Highways Ministry of Public Works in 2009, the ratio of trucks traffic in the toll ways on some section of Jakarta – Cikampec Toll Road has been around 10%, equivalent to 30% in term of pcu unit.

It is considered that this ratio of occupancy of trucks in the city traffic indicates the saturated capacity of the arterial city road. Beyond this ratio of truck traffic occupancy will get heavy congested situation and road service level will get down.

According to the results of the estimation of the occupancy ratio of port-related truck traffics to road capacities on toll roads on the basis of PCU in 2030 as shown in Table 4.4-2. Note that PCU factor for the heavy truck is “3” according to the design standard in Indonesia.

Table 4.4-2 Truck volume related to port cargo and truck occupancy

	Route	Nos. of Lane	Capacity (pcu/day)	Tanjung Priok		Cilamaya		Tangerang	
				Truck Volume (veh/day)	Truck occup -ancy	Truck Volume (veh/day)	Truck occup -ancy	Truck Volume (veh/day)	Truck occup -ancy
A	JKT~Merek	3	60,000	5,485	27%	5,485	27%	-	0%
B	JKT~Bogor	3	60,000	3,598	18%	3,598	18%	3,598	18%
C	2nd JORR（NE）	3	60,000	16,861	84%	8,003	40%	13,488	67%
D	2nd JORR（SE）	3	60,000	-	0%	3,598	18%	3,373	17%
E	2nd JORR（NW）	3	60,000	5,485	27%	5,485	27%	6,970	35%
F	2nd JORR（SW）	3	60,000	-	0%	-	0%	6,970	35%
G	JKT~Cikampek	4	80,000	16,861	63%	4,405	17%	16,861	63%
H	JIUT (NS)	3	60,000	13,751	69%	10,153	51%	10,153	51%

Source: JICA Study Team

In the case of fully concentration to Tanjung Priok Port, the truck occupancy on 2nd Outer Ring Road (NE), Jakarta Cikampek Toll Road and the JIUT (NS) show extraordinary high ratios, viz.

84%, 63% and 69%, which are far exceeding the above mentioned figures of 30 ~ 50% level obtained from the actual traffic survey data. This is implied the fact that the fully concentration of a new terminal to Tanjung Priok Port clearly contributes to overcapacity of those accessible toll roads.

Alternatively in the case of developing a new terminal at Cilamaya area, the occupancy ratio of truck traffic through the toll roads concerned to a new terminal will be less than 50 % in the most of the section, which will relieve the heavy traffic congestion in the metropolitan area and maintain the required service level of toll ways. While the cases of developing a new terminal at Tangerang revealed by and large the similar high burden percentages by truck traffic occupancy in the accessible toll roads, which anticipate acceleration to over capacities by port related cargo traffic.

(2) Estimate of Traffic Capacities of the Existing Railway Related to Port Cargo Traffic

1) Existing Railway transportation line capacity between Tanjung Priok – Jatinegara – Bekasi – Cikarang – Cikampek

The line capacity of the existing railway facilities between Tanjung Priok and Bekasi stations is 288 lines per day and the eastern line and Bekasi line is more than 200 lines per day.

As referring to the said table, the busiest section is between Jatinegara and Bekasi with more than 80% of its capacity, as passenger and freight trains run on the same tracks. Additional electric rail car operation on this line is planned to extend to Cikarang station once the Electrification and Double-double Tracking of Java Main Line Project is completed.

In this connection, room for additional freight car operation from/to Tanjung Priok/East Jakarta and Gedebage Dryport through Bekasi line will be extremely limited. It is anticipated that freight volume by railway on this line cannot be increased, even if freight volume in Tanjung Priok Port shows remarkable growth. Identifying the new container terminal and freight corridor is essential to promote modal shift from road to railway.

This problem is not applicable only in case new port and freight terminal is located in Cilamaya area. Unlike other alternatives, railway approaching and connection to the existing line in the vicinity of Klari station will not interfere with passenger train operations between Jakarta and Bekasi area.

The present line traffic between between Bekasi and Cikampek is about 65% of the line capacity, which will be enough to add freight cars operation. Existing Railway transportation line capacity between Cikampek – Purwakarta – Padalaran – Bandung – Gedebage

Within whole Bandung line, line capacity is still enough space for additional freight cars operation, except the short distance of single line between Kiaracondon and Gedebage. To secure the operational efficiency, not only capacity increase in this short section, but also bottlenecks of railway infrastructure such as gradient, curve, and effective length in station yard shall be improved.

2) Physical Conditions of Railway Transportation Infrastructures between Tanjung Priok and Gedebage

Physical conditions causing limited capacity of railway infrastructure in Tanjung Priok - Gedebage Corridor are summarized below:

- Maximum gradient: 16‰ (Between Purwakarta and Padalarang)
- Minimum curve 150 meter (Between Puwakarta and Cisomang)
- Minimffective length 168 meter (Cikadondong)
  Minimum Line Capacitum ey 96 (Between Purwakarta and Padalarang)

Other constrains,

- Transportation time and tariff are unable to compete with truck transportation. This is largely due to highway road between Jakarta and Bandung and to chronic traffic jam between Tanjung Priok Port and Pasoso Station.

4.5 Basic Concept of Port Development Plan in Greater Jakarta Metropolitan Area

The purpose of the Master Plan for the port development in Greater Jakarta Metropolitan Area (target year 2030) is to serve as a target and guideline for phase plans including the Phase I Project urgently required.

The Master Plan for the port development in Greater Jakarta Metropolitan Area has been made according to the following principles:

- To propose a new terminal so as to receive increasing international containers to be overflowed from JCT at Tanjung Priok Terminal with a target year of 2030
- To propose redevelopment plan of the existing conventional wharves at Tanjung Priok Terminal so as to receive both increasing domestic containers and conventional cargoes
- To propose a transfer of the existing petroleum jetties and the tank farms connected with them to a new location off the existing facilities so as to ensure safety in urban areas adjacent to the existing petroleum terminal
- To propose a transfer of the current handling of dust cargoes to new location so as to reduce scattering of dust cargoes to urban areas adjacent to the existing berths handling them
- To propose a port access road having the linkage with a road network in the port hinterland so as to enable smooth distribution of port cargoes to/from consignors/consignees of port cargoes and simultaneously alleviate further burden by port traffic to city traffic within JABODETABEK area
- To propose recommendations on the improvement of railway access to Tanjung Priok Terminal for port cargoes traffic for the purpose of converting the traffic from by excessively congested road to by railway
- To pay due attention to environmental issues through conducting SEA (Strategic Environmental Assessment) when prior to finalizing the Master Plan, especially focusing on the harmonization with the spatial plans of the central, provincial and regent governments and other related activities at a planned port location
- To take consideration of potential shallow sea terminals extending off from Marunda to Tarumajaya by pursuing possible linkage with Tanjung Priok Terminal as a deep-sea terminal through barge transport
- To propose adequate functional allotment among the existing and potential terminals which are under the umbrella of Tanjung Priok Port aiming at making the most of limited resources including waters, land and funds

4.6 Screening of Potential Candidate Sites for a New International Container Terminal

(1) Listing of Potential Candidate Sites

As shown in Section 2.2, there are the following nine conceptual port development plans proposed by various organizations including West Java Provincial Government, DKI Jakarta, Bekesi Regent, Tangeran Regent, Pelindo II and private developers. The sites of their plans have been listed as potential candidate sites for a new container terminal in this Study.

DKI Jakarta

- North Kalibaru
- Off Marunda Area between the existing Kalibaru Port and the border to Regent Bekesi

West Java Province

- Off Marunda Center in Regent Bekesi (Kabupaten Bekesi)
- Left Bank of Karang River (Ci Karang) in Regent Bekesi (Kabupaten Bekesi)
- Muara Gembong Area in Regent Bekesi (Kabupaten Bekesi)
- Cilamaya Coast in Regent Karawan (Kabupaten Karawan)
- Ciasem Bay Coast in Regent Subong (Kabupaten Subong)

Banten Province

- Tangeran Coast in Regent Tangeran (Kabupaten Tangeran)
- Bojonegara Port

(2) Criteria for Screening Potential Candidate Sites

In this study, in the first step, those nine plans have been reviewed as potential candidate sites. Then, in the second step, screening has been done to select candidate sites for the new container terminals out of those potential candidate sites. When screening, the following criteria have been applied:

- Designation of protected forest (Hutan Lindun) by the Ministry of Forestry
- Obedience to the Spatial Plan of the Provincial Governments
- Obedience to the Spatial Plan of the Regent Governments (Kabupaten)
- Ecological importance
- Coastal line changes
- JAPODETABEK traffic congestion
- Distance from the major consumption area (Jakarta) in view of economical land traffic
- Distance from the major industrial areas (area along Jakarta – Cikampec Toll Road) in view of economical land traffic
- Sustainable maintenance dredging along deepwater access channel

(3) Result of the Screening

According to the basic concept of the New Container Terminal mentioned in Section 4.5 and the criteria mentioned in Clause “(2)", screening of the above nine potential sites has been conducted and has been narrowed down into the three sites, viz. North Kalibaru, Cilamaya and Tangerang. The remaining six potential sites have been ruled out due to having fatal negative factors for the construction of a deep sea marine terminal for international containers as summarized in Table 4.6-1 (see Figure 4.6-1)

Table 4.6-1 Screening of Potential Sites for a New Container Terminal

	Place	Regulated Forest Area (Hutan Lindung)			Ecological Importance	Coastal Line Changes	JABODETABEK traffic congestion	Land Transport Distances (km) to a new terminal		Maintenance dredging
		The Ministery of Forestry	Provincial Government	Government of Regent				Major industrial areas	Major consump-tion area	
1	North Kalibaru						Accelaration	60	7	
2	Marunda (Jakarta)						Accelaration	57	10	Infeasible
3	Marunda Center						Accelaration	55	12	Infeasible
4	Tarumajaya (Bekesi)	Disobedience				Excessive	Accelaration	53	32	Infeasible
5	Muara Gembong (Bekesi)	Disobedience	Disobedience	Disobedience	Important	Unstable	Accelaration	60	40	
6	Cilamaya						Alleviation	30	80	
7	Ciasem	Disobedience	Disobedience	Disobedience			Alleviation	55	100	
8	Tangerang						Accelaration	100	50	
9	Bojonegara						Accelaration	180 > 100	120 > 100	

Note: (shaded) Negative factor

Source: Study Team

Source: Made by the Study Team

Figure 4.6-1 Potential Candidate Sites for International Container Terminal in the Jakarta Metropolitan Area

The following three options for the development of international container terminals have been drafted at the three candidate sites of North Kalibaru, Cilamaya and Tangerang which passed the screening mentioned above.

Option 1:	Fully concentration to Tanjung Priok Terminal		
	JCT:	4.0	
	North Kalibaru Phase I:	1.9	million TEUs
	North Kalibaru Phases II~ III:	7.5	million TEUs
	Total:	13.4	million TEUs
Option 2:	Split to Tanjung Priok Terminal and Cilamaya		
	JCT:	4.0	
	North Kalibaru Phase I:	1.9	million TEUs
	Cilamaya Phases II~III:	7.5	million TEUs
	Total:	13.4	million TEUs
Option 3	Split to Tanjung Priok Terminal and Tangerang		
	JCT:	4.0	
	North Kalibaru Phase I:	1.9	
	North Kalibaru Phases II~ III:	5.5	million TEUs
	Tangerang:	2.0	million TEUs
	Total:	13.4	million TEUs