23. INITIAL ENVIRONMENTAL EXAMINATION (IEE)

23.1 General

(1) Objectives of Initial Environmental Examination

Initial Environmental Examination (IEE) has the following two objectives:

1) To evaluate whether Environmental Impact Assessment (EIA) is necessary for the project and, if so, to define its scope.
2) To examine, from an environmental viewpoint, measures to mitigate the impact of the project which requires environmental consideration but not a full-scale Environmental Impact Assessment.

(2) EIA Criteria of port development project in Indonesia

EIA is required for a development projects larger than a certain scale by the environmental laws of Indonesia and the method and regulations are stipulated in EIA Guideline of Indonesia (1999) shown in Table 23.1.1.

Table 23.1.1 Criteria of EIA for Port Development Project

Project type	Project description	Criteria of development project requires EIA
Port development project	Berthing facility	Facility more than 200m in length or 6,000m^2 in area
	Breakwater	More than length 200m in length
	Development are	More than 5 ha in area
	Mooring buoy	More than 10,000DWT
Dredging	Initial dredging	Dredged soil volume more than 250,000m^3
	Maintenance dredging	Dredged soil volume more than 500,000m^3
Reclamation		More than 25 ha in area or soil volume 500,000m^3*
Soil dumping		Dumped soil volume more than 250,000m^3

Source: Revised Environmental Impact Assessment Procedure in Indonesia

(3) Method of IEE

The IEE procedure has two steps as follows:

1) Screening: To evaluate whether it is necessary to include the environmental consideration in a development project or not.

2) Scoping: To identify the important environmental impacts by the implementation of a development project, and to define the survey items for EIA based on the findings.

23.2 Components of the Development Plan

Main components of the development plan are shown in Table 23.2.1 for Talang Duku Terminal and Table 23.2.2 for Muara Sabak Terminal.

Table 23.2.1 Development plan for Talang Duku

Facility	Dimension	Environmental aspect
Berths	2 pontoons: 125 m	Total length of 2 pontoons 250m is longer than the EIA criteria, 200m.
Container terminal Total Terminal area Ground slots CFS General cargo terminal Shed Open storage	 3 ha 540 TEU 1,600 m^2 1,350 m^2 2,500 m^2	Smaller scale than the criteria 5ha
Container handling equipment capacity	80,000 TEU/year	

Table 23.2.2 Development plan for Muara Sabak

Facility	Dimension		Environmental Aspect
	Base case	High public case	
Berths	3 x125m/berth, Design depth 6 m	4 x 125 m/berth, Design depth 6 m	Total length of the berths is longer than the EIA criteria 200m.
Container terminal Total terminal area Ground slots CFS	 7.5 ha 753TEU 2,880 m^2	 10 ha 1,152 TEU 4,480 m^2	Larger than the EIA criteria scale 5ha in area.
Container handling capacity	128,000TEU/year	224,000TEU/year	
General cargo berth	1: 125 m		
General cargo terminal Mobile crane Forklift Shed Open storage	 3 10 3,600 m^2 6,600 m^2		
Dredging Initial dredging Maintenance dredging	 5,300,000m^3 1,200,000m^3/year		Initial and maintenance dredging volumes are more than EIA Criteria.
Soil dumping Initial dredging Maintenance dredging	 5.300,000 m^3 1,200,000 m^3/year		Dumping soil volumes are more than EIA Criteria

Examination of the project plan with the EIA criteria showed necessity of EIA for the projects.

23.3 Environmental Scoping of Development Sites

Scoping of environmental impact was carried out by using scooping checklist as shown in Tables 23.3.1 and 23.3.2.

Table 23.3.1 Environmental Scoping for Development Plan (Talang Duku)

No.	Environmental Items	Evaluation	Description
Social Environment			
1	Resettlement	D	Land area of both project sites is owned by IPC2.
2	Economic Activities	B	Positive impact is expected by construction work increase.
3	Traffic/Public Facilities	B	The number of coal transport trucks may increase with the new coal terminal operation in Talang Duku.
4	Split of Communities	D	No impact is expected.
5	Cultural Property	D	No cultural property is seen around the development sites.
6	Water Right and Right of Common	C	Unknown (further examination is needed in next phase)
7	Public Health Condition	D	No impact is expected.
8	Waste	B	Industrial waste generated from the construction work and is expected in the construction phase.
9	Hazards (Risk)	D	No impact is expected.
Natural Environment			
10	Topography and Geology	D	No impact is expected.
11	Soil Erosion	D	No impact is expected.
12	Groundwater	C	Unknown (further examination is needed in next phase)
13	Hydrological Situation	D	No impact is expected.
14	Coastal Zone	D	No impact is expected.
15	Fauna and Flora	B	Some impact is expected to aquatic biology during the construction and operational phase.
16	Meteorology	D	No impact is expected.
17	Landscape	D	No impact is expected.
Pollution			
18	Air Pollution	B	The exhaust gas generated by the vehicles and heavy equipments in the construction and operation phase is expected since the traffic volume may increase by port development.
19	Water Pollution	B	The water pollution is expected in the construction phase. Decrease of water quality by domestic waste and shipping activities is expected in the operation phase.
20	Soil Contamination	B	The soil contamination by oil, grease, and other materials is expected in the construction phase. Ship operation activities may generate heavy metals that may accumulate in sediment.
21	Noise and Vibration	B	The noise and vibration are expected by operation of various construction equipments during the construction phase. Also traffic increase in operation phase may cause traffic noise.
22	Land Subsidence	C	Unknown (further examination is needed in next phase)
23	Offensive Odor	D	No impact is expected.

Note : Evaluation categories : A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown.
(Examination is needed. Impact may become clear as study progress).
D: No impact is expected. IEE/EIA is not required.

Table 23.3.2 Environmental Scoping for Development Plan (Muara Sabak)

No.	Environmental Items	Evaluation	Description
Social Environment			
1	Resettlement	D	Land area of both project sites is owned by IPC2.
2	Economic Activities	B	Positive impact is expected by construction work increase.
3	Traffic/Public Facilities	B	Road Traffic volume may increase with the new port development in Muara Sabak.
4	Split of Communities	D	No serious impact is expected.
5	Cultural Property	D	No cultural property is seen around the development sites.
6	Water Right and Right of Common	D	No serious impact is expected.
7	Public Health Condition	D	No serious impact is expected.
8	Waste	B	Industrial waste generated from the construction work and operation phase is expected in the construction phase.
9	Hazards (Risk)	D	No serious impact is expected.
Natural Environment			
10	Topography and Geology	D	No serious impact is expected.
11	Soil Erosion	D	No serious impact is expected.
12	Groundwater	C	Unknown (further examination is needed in next phase)
13	Hydrological Situation	D	No serious impact is expected.
14	Coastal Zone	D	No serious impact is expected.
15	Fauna and Flora	B	Some impact is expected to aquatic biology during the construction and operational phase.
16	Meteorology	D	No serious impact is expected.
17	Landscape	B	Tall cargo handling equipments may not be in harmony with the landscape around.
Pollution			
18	Air Pollution	B	The exhaust gas generated by the vehicles and heavy equipments in the construction and operation phase is expected since the traffic volume may increase by port development.
19	Water Pollution	B	Decrease of water quality by domestic waste and shipping activities is expected in the operation phase.
20	Soil Contamination	B	The soil contamination by oil, grease, and other materials is expected in the construction phase. Ship operation activities may generate heavy metals that may accumulate in sediment.
21	Noise and Vibration	B	The noise and vibration are expected by operation of various construction equipments during the construction phase. Also traffic increase in operation phase may cause traffic noise.
22	Land Subsidence	C	Unknown (further examination is needed in next phase)
23	Offensive Odor	D	No serious impact is expected.

Note : Evaluation categories : A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown.
(Examination is needed. Impact may become clear as study progress).
D: No impact is expected. IEE/EIA is not required.

23.4 Results of the IEE

The Environmental Impact Assessment (EIA) is required for the development activities of Talang Duku and Muara Sabak.

The reasons for the requirement of EIA are as follows:

1) Total length of the new berths is longer than the EIA criteria 200m.
2) The construction area of Muara Sabak terminal 7.5 ha in base case and 10ha in high public case exceed the EIA requirement criteria of 5 ha.
3) The dredging soil volume (initial dredging volume 5.3 million m^3, maintenance dredging volume 1.2 million m^3) in Batanghari river exceeds the EIA requirement criteria (initial dredging volume 0.25 million m^3, maintenance dredging volume 0.5 million m^3). Also, dumping soil volumes exceed the EIA criteria.
4) The number of vehicles in traffic volume is anticipated to increase on the access roads of both Talang Duku and Muara Sabak.
5) Water pollution generated from the coal terminal in Talang Duku is anticipated. Soil erosion, air pollution, soil contamination, noise and vibration are expected in construction and operation phases.

Regarding “Resettlement” at Talang Duku and Muara Sabak, since the proposed project sites are owned by IPC2, no negative environmental impact of the resettlement of people is expected.

Environmental impacts expected particularly in the construction phase (such as “air pollution”, “water pollution”, “noise and vibration”) can be handled by adopting proper construction methods. Such environmental conscious work methods are considered not to need additional construction cost.

Category “B” and “C” items will be further clarified as to their impacts and magnitude in the next stage of the study and survey.

The Environmental Management Plan (RKL) and the Environmental Monitoring Plan (RPL) will be formulated as one of the procedures of Environmental Impact Assessment (EIA). The appropriate environmental management, implementation of continuous observation and monitoring of the environmental change will be recommended by RKL and RPL (refer to Supporting Report: Parts I and J).

23.5 Environmental Consideration for the Development Sites

23.5.1 Environmental conservation for the river basin of Batanghari

Jambi Province has developed along Batanghari River. By 1932, people were settled along most of the river and its tributaries. The large coastal and freshwater swamp areas around Muara Sabak, Kuala Tungkal, and right side of Batanghari river mouth were developed during the 15 years from 1982 to 1996.

Forest exploitation was especially dramatic during the 15-year period with massive commercial logging and conversion from forest to cultivated areas, especially to oil palm plantations.

Soil erosion is one severe damage caused by forest exploitation. By removing the vegetation ground cover from the forest floor, rainfall carries surface soil to rivers and the river transports the soils to the riverbed, estuary, and offshore.

Ground cover with grasses and trees is a well-known prevention method against soil erosion. To prevent soil erosion, the bare land should be covered with vegetation. When farmers develop and cultivate oil palm plantations, they first remove the surface soil layer and then plant oil palm seedlings. The bare areas between the seedlings should be covered with grass in order to prevent soil erosion.

23.5.2 Environmental consideration for a coal terminal in Talang Duku

A water treatment facility should be prepared specifically for the pollution from coal dust and the contaminated water generated from the coal terminals (see Figure 23.5.1).

Table 23.5.1 Water treatment facility for the coal terminal

Facility	Capacity	Note
Coal stock yard	20 ha for 1.0 million ton/yr.	
Settling basin	1 ha x 2m depth	1/20 for stock yard area
Water treatment basin	Filter facility	Filtration system
Drainage system		Drainage network in stock yard

Source : PT.Indonesia Power, Sularaya Power Plant

23.5.3 Measures against traffic accident along the access roads to port areas

The number of vehicles is anticipated to increase during construction and operation phases, especially carrier vehicles like container trailers, coal transport trucks. This indicates the risk of traffic accident for the people living along the access roads for both Talang Duku and Muara Sabak. Following countermeasures are suggested to avoid the risks.

1) Public meetings should be held for safety enlightening education by IPC. The meetings will be held for the peoples living along the access roads by community

basis.

2) Some publication for doing safety manners in the roads, like a brochure issued by IPC.
3) The traffic enforcers or the helpers should be arranged for the pedestrians crossing the roads at the public facilities like schools and hospitals.

Measures for Other Environmental Parameters are described in the section of Environmental Management Plan (refer to Supporting Report: Part I).

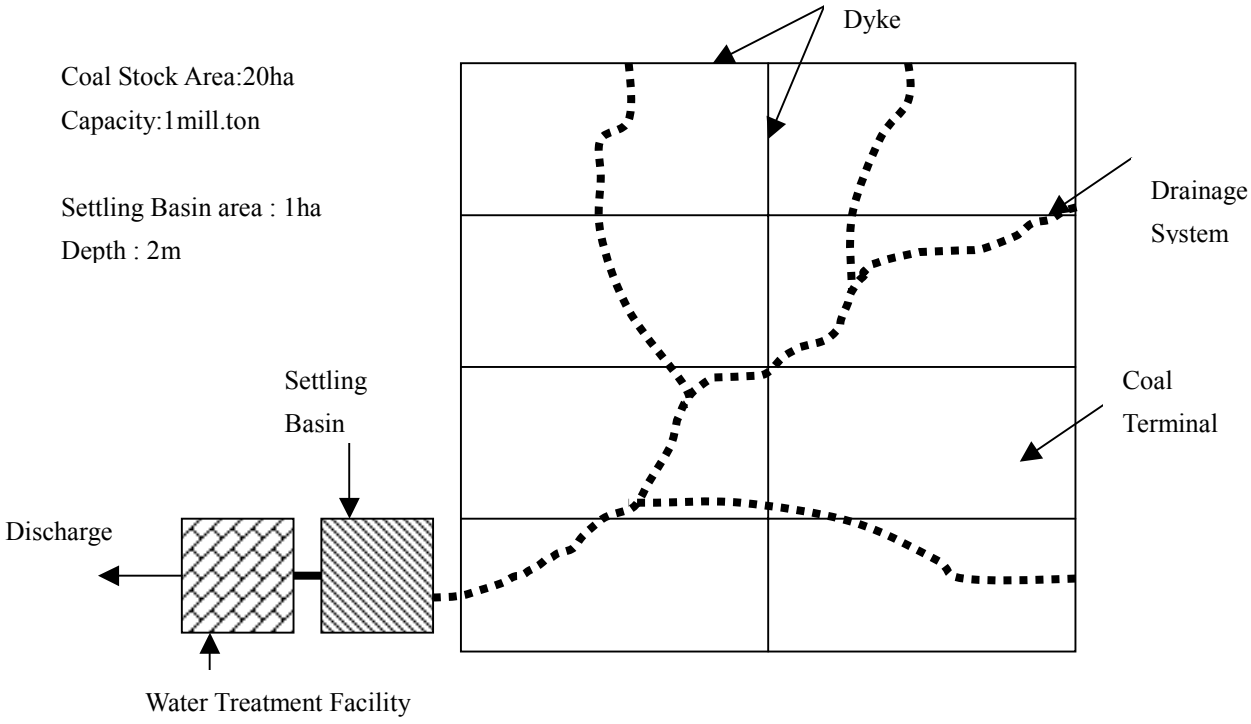


Figure 23.5.1 Schematic diagram of water treatment system for coal terminal

24. SHORT-TERM PLAN OF JAMBI

24.1 Project Description

The Study Team identified a short-term plan based on the master plan (See section 22.8) and its phasing plan (See section 22.11). This short-term plan is made up of the projects urgently needed in Port of Jambi in response to the needs of the regional economy. The master plan proposes that a major part of the port activity be transferred from Talang Duku to Muara Sabak after Muara Sabak becomes fully operational. Accordingly, urgent projects are proposed only in Muara Sabak.

(1) Project Profiles

The layout plan for the short-term plan is shown in Figure 24.1.1. Main components of the plan are shown in Table 24.1.1.One berth for container and another berth for general cargo need to be created. The next phase of development will become necessary in 2012-2015. Muara Sabak will start the operation with the access channel of 4.5m draft. The time of deepening the channel to 6m will be determined taking account of the development of the private industries around Muara Sabak.

Table 24.1.1 Short-term Plan for Muara Sabak (2007)

Facility	Base Case	High Public Case
Additional Container Berths	1: 125m/Berth, Draft 6m,	
Container Terminal		
Total Terminal Area	2.5 ha	2.5 ha
Ground Slots	257 TEU	371 TEU
CFS	320 m^2	640 m^2
Container Handling Equipment		
Gantry Crane	1	1
RTG	2	2
Yard Tractor	4	4
Reach Stacker	1	1
Container Handling Capacity	47,000 TEU/year	
Additional General Cargo Berths	1	
General Cargo Terminal		
Mobile Crane	3	
Forklift	10	
Shed	1,200 m^2	
Open Storage	2,200 m^2	
Access Channel	Width = 80m, Depth = 4.5m	
Total Cost	Rp. 242 billion	

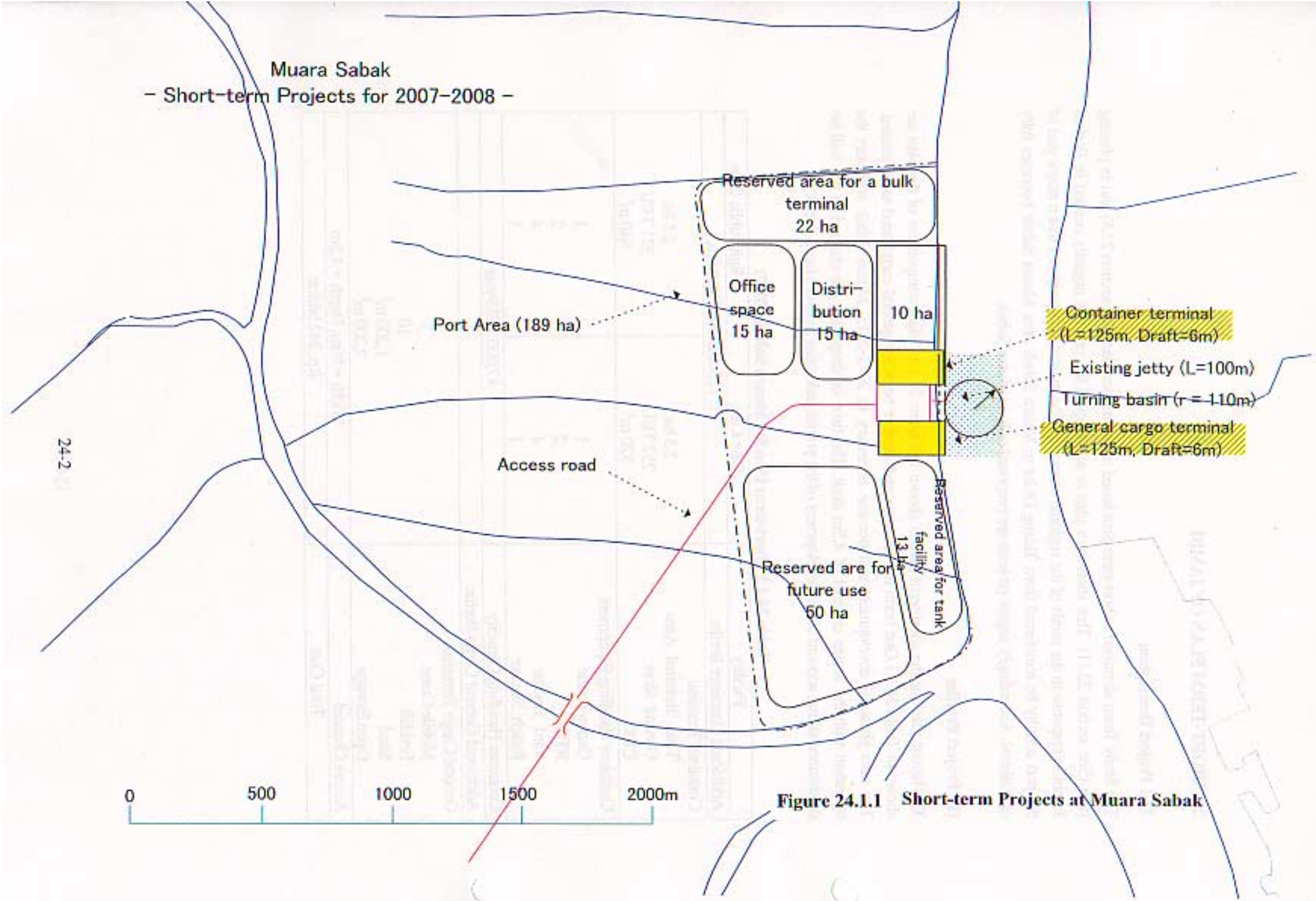


Figure 24.1.1 Short-term Projects at Muara Sabak

(2) Milestone

Table 24.1.2 Milestone for Base Case

Year	Milestone	Procurement	Construction
2007		1 Gantry, 2 RTG, 4 yard Tractors, 2 Mobile Cranes, 5 Forklifts	1 Container Wharf, CFS
2008	1 Container Wharf becomes operational, The Existing Jetty dedicated to General Cargo	1 Mobile Cranes, 5 Forklifts	1 General Cargo Wharf, Shed
2009	1 General Cargo Wharf becomes operational		

Table 24.1.3 Milestone for High Public Case

Year	Milestone	Procurement	Construction
2006		1 Gantry, 2 RTG, 4 Tractors, 2 Mobile Cranes, 5 Forklifts	1 Container Wharf, CFS
2007	1 Container Wharf becomes operational, The Existing Jetty dedicated to General Cargo		
2008		1 Mobile Cranes, 5 Forklifts	1 General Cargo Wharf, Shed
2009	1 General Cargo Wharf becomes operational		

(2) Container Terminal

1) Design vessel

Design vessel for the short-term plan is the same as the master plan, 6m of draft and 110m of LOA. Hence, the proposed quay length is 125m as is the case with the master plan.

2)Terminal

The area for the proposed container terminals can be estimated with the following formulas.

Container Terminal Area = (Container yard area) / (Yard area ratio)
= 1.6 ha (Base case), 2.3 ha (High public case)

Container Yard Area = (Ground slots) / (Land use ratio)
= 1 ha (Base case) 1.4 ha (High public case)

Ground Slots = (Container volume) x (Dwelling time) / (Yard operation ratio) / 365 /

(Stacking height)
= 257 TEUs (Base case), 351 TEUs (High public case)

where:
Yard area ratio: 0.6 (CFS within the terminal)
Land use ratio: 260 TEU / ha (RTG system)
Dwelling time: 5 days
Yard operation ratio: 0.6
Stacking height: 4
Container volume: 18,000 TEU/year (Base case), 26,000 TEU/year (High public case)

However, a terminal with a RTG system needs to have a depth of at least 200m. Accordingly, the Team proposes a terminal area of 2.5ha for both cases.

3)CFS

Some portion of import/export container will be LCL requiring CFS. The area for the proposed container terminals can be estimated with the following formulas. In order to efficiently carry out the stuffing and stripping of containers, CFS should be located on dock.

$S = (W \times D \times p) / (w \times r \times T)$
where:
W: cargo volume for CFS (ton) = (container cargo volume) x (CFS cargo ratio)
D: average dwelling time (days)
p: peak ratio
w: average stacking weight in CFS (ton/m^2)
r = effective use ratio of floor area in CFS
T: annual operating days (days/year)
These parameters are assumed as follows:
W = 9,000t (Base case in 2007), 13,000t (High public case in 2007)
D = 5 days, p = 1.5, w=1.0, r = 0.6, T = 300 days, CFS cargo ratio = 0.05
On the above assumptions, S is calculated as follows:
S = 380 m^2 (Base case in 2007), 540 m^2 (High public case in 2007)

Assuming the depth of CFS as 40m and the width of a bay as 8m, the actual area will be as follows:

S = 320 m^2 (Base case in 2007), 640 m^2 (High public case in 2007)

4)Handling Equipment

Taking into account the following factors, a RTG system is recommended for the yard operation.

a. Large available area
b. Reliability of equipment
c. The terminal will be open to multiple users
d. The terminal requires high stowing capacity to maximize the operational income

In order to provide a quay-side productivity of 20 TEU/hour/berth, the berth needs to have a gantry crane. A gantry requires two RTG and four yard tractors.

5) Gate

The Study Team carried out a simplified calculation with the following formula to identify traffic volume of container cargo:

(Traffic volume) = (Annual cargo handling volume) x (20ft container + 40 ft container)/ (20ft container + 2 x 40ft container) x β/12 x γ/30 x σ/12

= 6 vehicles/hour/each way (Base case), 9 vehicles/hour/each way (High public case)

where:

(Annual cargo handling volume)=18,000 TEU (Base case), 26,000 TEU(High public case)

(20ft container + 40 ft container)/ (20ft container + 2 x 40ft container) = 2/3

β : Monthly variation = (cargo volume in the peak month) / (average monthly cargo volume)
= 1.2

γ : Daily variation = (cargo volume in the peak day) / (average daily cargo volume) = 1.5

σ : Hourly variation = (vehicle traffic volume during the peak hour) / (daily traffic volume)
= 1.2

(In-gate capacity) = 60 minutes / (gate processing time) x (working ratio) = 21.6 vehicle / hour

where:

(gate processing time) = 2.5 minutes / vehicle

(working ratio) = 0.9

(Out-gate capacity) = 60 minutes / (gate processing time) x (working ratio) = 43.2 vehicle / hour

where:

(gate processing time) = 1.25 minutes / vehicle

(working ratio) = 0.9

According to the above scenario, the gate to have one lane for each way.

(3) General Cargo Terminal

Assuming that a quarter of the cargo will go through sheds and another quarter will use open storage area, the following storage facilities are needed in the long-term.

Shed area = (cargo volume) x (stored cargo ratio) x (dwelling time) / 365 days / (cargo volume per unit area) / (shed occupancy ratio) / (net area ratio)= 76,000 x 0.25 x 14 / 365 / 2 / 0.5 / 0.6 = 1,200 m^2

Open Storage Area = (cargo volume) x (stored cargo ratio) x (dwelling time) / 365 days / (cargo volume per unit area) / (yard occupancy ratio) = 76,000 x 0.25 x 30 / 365 / 1 / 0.7 = 2,200 m^2

In order to cater for the cargo with four gangs, the general cargo terminal requires the following handling equipment:

3 Mobile Cranes

10 Forklifts

(4) Access Channel

Since the number of calling vessels at Muara Sabak will be relatively small at an early stage, the Team proposes the following provisional design condition of the access channel:

Width: 80m
Depth: 4.5m

The Study Team examined the economic impacts of different types of vessels on the transportation costs. Assuming the ship costs given in Section 22.5 and the project costs, shallow draft vessels requiring the depth of 6m turned out the most economical alternative for the short-term (Table 24.1.4).

Table 24.1.4 Economic Implication of Ship Types

	Ordinary Vessel requiring 6m Draft	Ordinary Vessel requiring 4.5m Draft	Shallow Draft Vessel requiring 4.5m Draft
Per TEU Transportation Cost (1,000 Rp.)	1,306	2,100	1,677
Container Throughput in 2007 (Base Case) (TEU)	18,000	18,000	18,000
Container Throughput in 2007 (High Case) (TEU)	26,000	26,000	26,000
Total Transportation Cost in 2007 (Base Case)	23,508,000	37,800,000	30,186,000
Total Transportation Cost in 2007 (High Case)	33,956,000	54,600,000	43,602,000
Annual Maintenance Dredging Cost (1,000 Rp.)	14,300,000	5,005,000	5,005,000
Total Annual Cost (Base Case)	37,808,000	42,805,000	35,191,000
Total Annual Cost (High Case)	48,256,000	59,605,000	48,607,000
Annual Benefits over the Scenario developing Ordinary Vessels requiring 4.5m Depth			
Base Case (1,000 Rp./year)	4,997,000	0	7,614,000
High Case 1,000 Rp./year)	11,349,000	0	10,998,000
Annual Benefits over the Scenario developing Ordinary Vessels requiring 4.5m Depth			
Base Case (1,000 Rp./TEU)	278	0	423
High Case (1,000 Rp./TEU)	437	0	423

24.2 Engineering Design and Cost Estimate for Short-term Plan of Jambi

24.2.1 Design Conditions

(1) Proposed Vessel

The proposed maximum capacity of the vessel is determined to have following dimensions:

Container Ship: 5,000DWT, Length Overall: 110m
Breadth of Ship: 15.7m, Full loaded Draft: 5.5m
Required depth of the berth: 6.0m

(2) Design Codes and Standard

The design criteria of the marine and civil works are based on the following design standards and references:

- Standard Design Criteria for Ports in Indonesia, 1984
- Technical Standards for Port and Harbour Facilities in Japan, 1999

(3) Design Criteria

The particulars of major design criteria for Short Term Development Plan are summarized in Table 24.2.1

Table 24.2.1 General Design Criteria

Description	Muara Sabak	
	Container Berth	General Cargo Berth
Seismic coefficient	0.05	0.05
Load on berth	3t/m^2	3t/m^2
Load on yard	4t/m^2	4t/m^2
Truck	T-20	T-20
RTG on yard	Max.32t/wheel	-
Gantry Crane on berth	Max 45t/wheel	-
Berth top elevation	+5.6	+5.6
Berthing velocity of ship	15cm/sec	15cm/sec
Subsoil condition	Sandy silt	Sandy silt
Assuming depth of hard strata	-20m	-20m

(4) Tide Condition

The change of the water surface level due to astronomical tide and water quantity of the river is determined as follows:

Muara Sabak: HWL = +3.8m, LWL = +0.2m

24.2.2 Layout of Short Term Development Plan

The new container berth and general cargo terminal are planned to be developed at both sides of the existing concrete pier in Muara Sabak. This development is divided into two scenarios: Base case and High public case.

In the short term development plan, one (1) container berth and one (1) general cargo berth having 125m length respectively with these related facilities are constructed in the

both scenarios.

Since the difference of the water level between HWL and LWL is approximately 4.0m, these berths are planned to be constructed at about 50m detached from riverbank and two access bridges connecting the berth and yard are also planned.

The container berth is planned to have 28m width in order to secure 12 m rail span of the gantry crane with additional space for the hatch covers of container ship at the back of the gantry crane. For the general cargo berth, a 17 m width berth is determined as sufficient space for the general cargo handling operation on the berth.

The container yard and the general cargo yard are determined to be almost the same length of the berth with width 200 m to secure the required space for the related facilities with open space.

The general layout of the short development plan for Jambi is shown in Figure 24.2.1.

24.2.3 Design of Port Facilities

(1) Berthing Facilities

The container berth and the general cargo berth are planned with detached pier type RC deck structure supported by the steel pipe piles. Based on the soil investigations for the site, a sand stone layer (N value >50) is encountered at about DL –20m. Thus, the steel pipe piles are to be driven into DL –20m to secure the bearing force.

For the horizontal force of the berth such as vessel berthing, mooring force and seismic force of the berth, the coupled batter piles are to be used at the line of second pile alignment from the berth face. Based on the alignment of the piles and load on the berth, the adopted diameters of the piles are 600 mm for the container berth, 500mm for general cargo berth and 500mm for access bridges. All of the piles are planned to be protected against the corrosion loss due to brackish water for the area under the deck to D.L –1.0m.

The RC deck for the berth is consists of RC pile cap, RC beam on the piles and RC slab. The scale of the RC deck structure for general cargo berth is generally smaller than the container berth. However, the heavy truck crane is planned to operate on the general cargo berth in this project. Therefore, the basic scale of the deck structure (except beams under the gantry crane rail) is planned to be the same as the container berth.

Based on the design vessel size, berth accessories such as bollard and fender are determined. The capacity of the accessories are planned 35 ton bollard for both berth, cellular type 800 H fenders for the container berth and V type 600 H fenders for the general cargo berth. These accessories installed on the quay face are planned at 10 m intervals for the general cargo berth and 12 m intervals for the container berth.

The typical section is shown in Figure 24.2.2 for the general cargo terminal and Figure 24.2.3 for the Container Terminal.

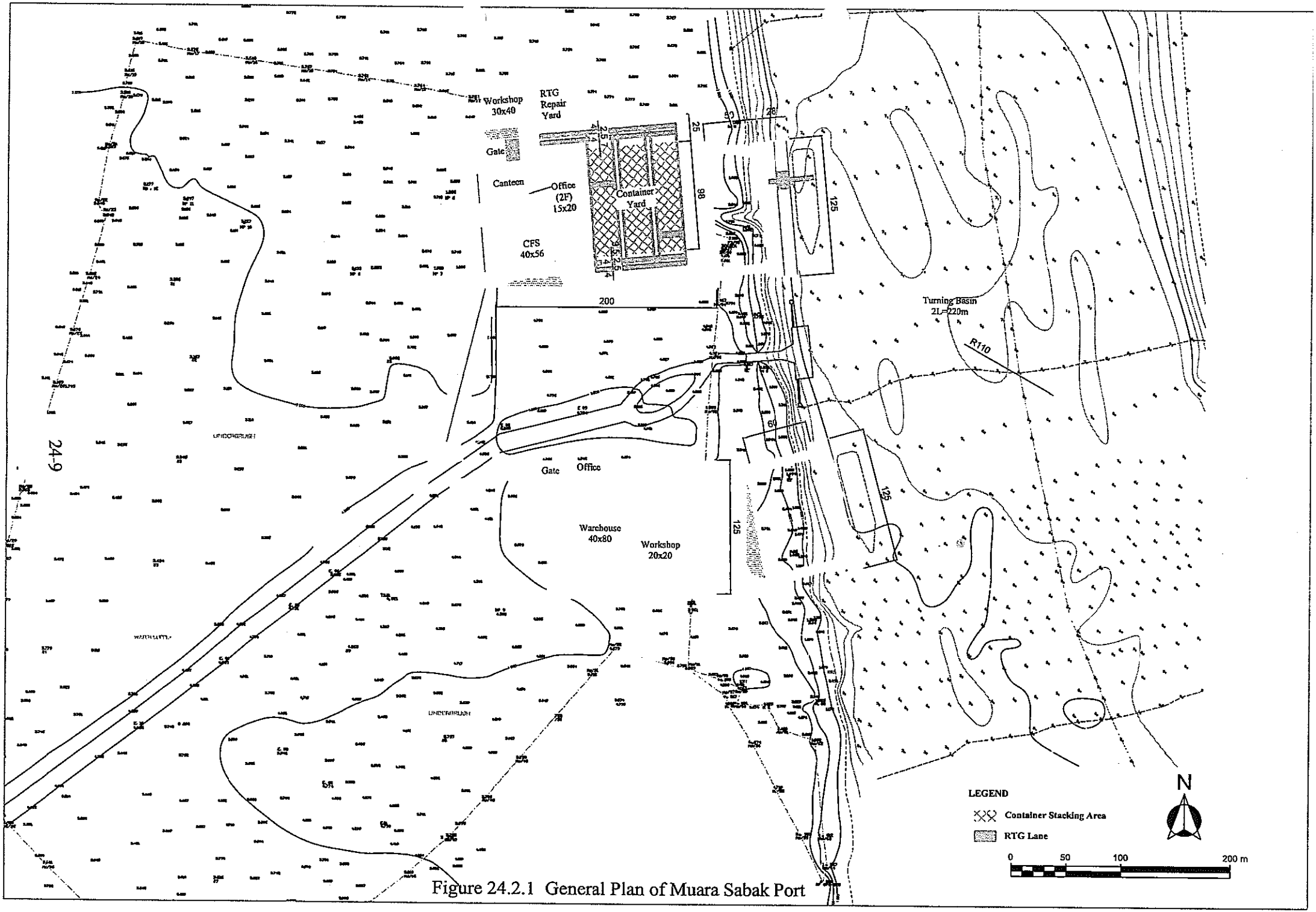


Figure 24.2.1 General Plan of Muara Sabak Port

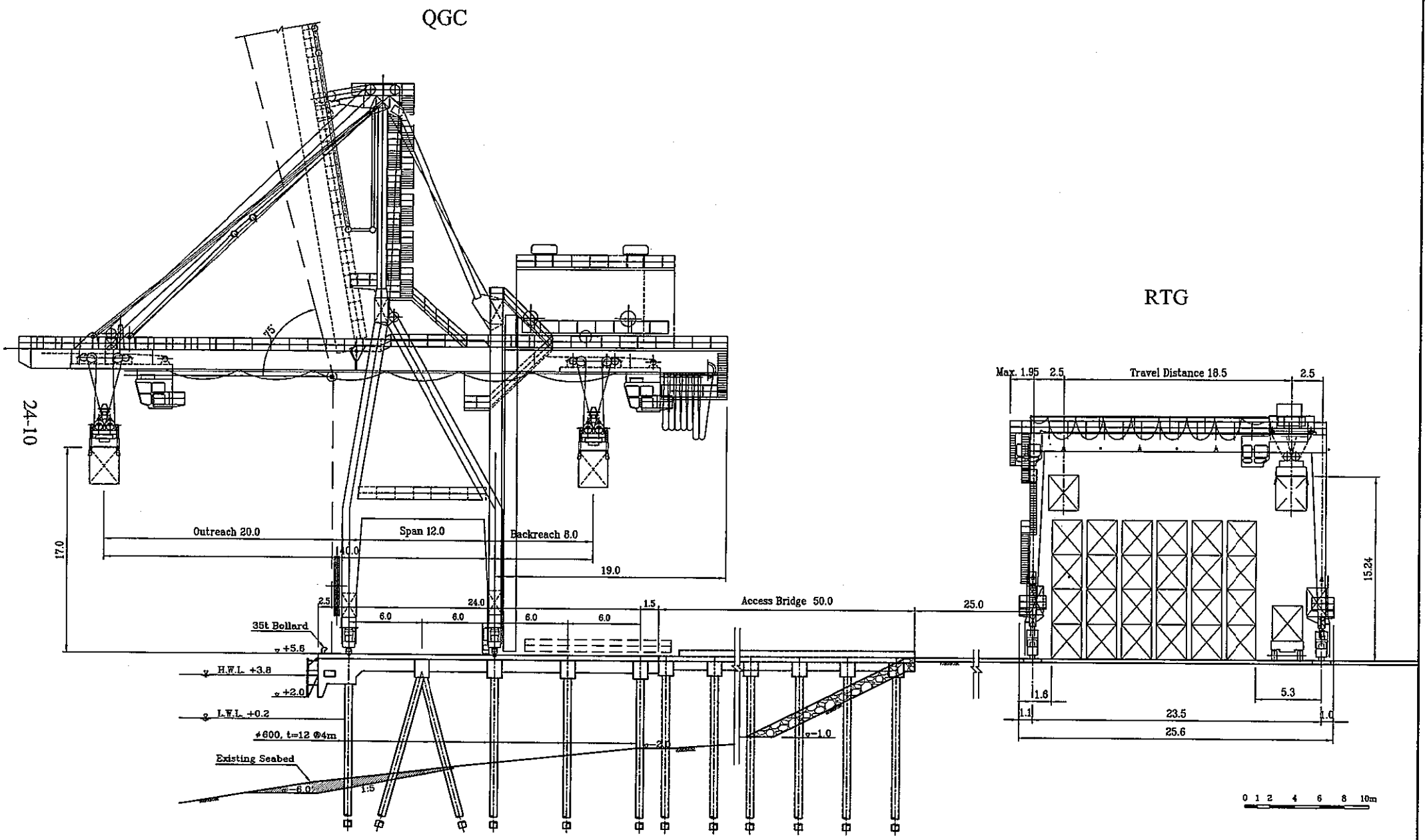
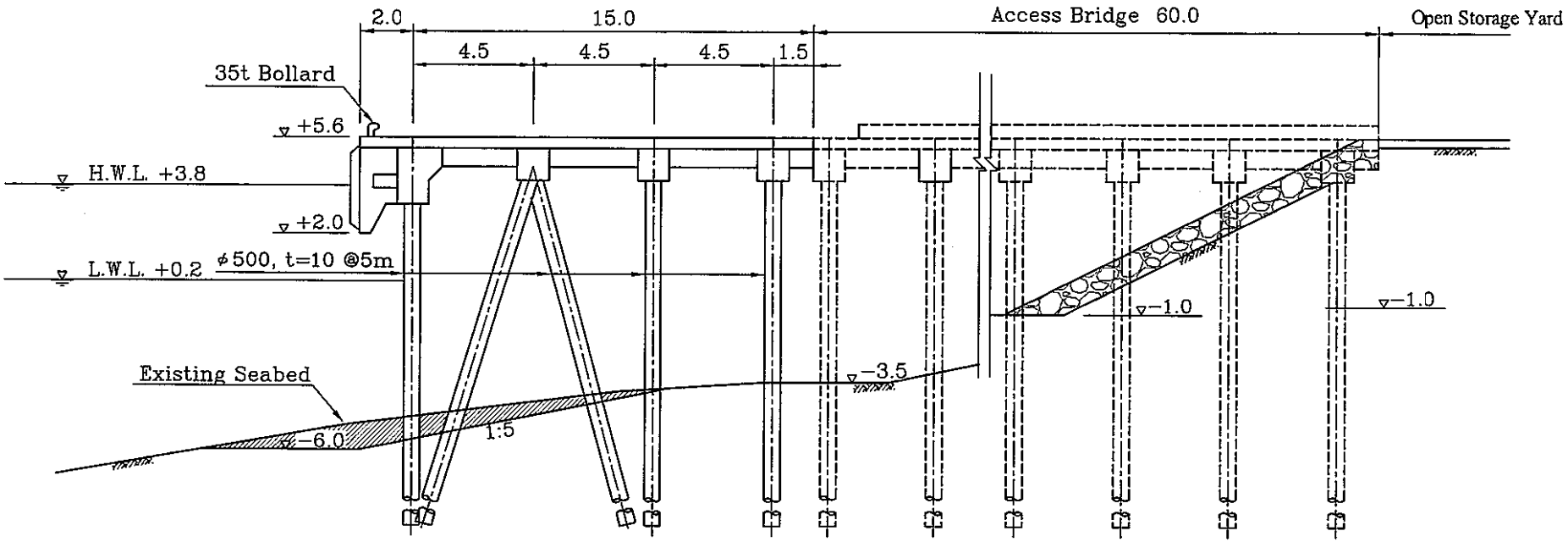
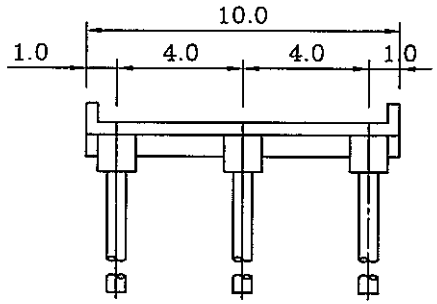


Figure 24.2.2 Typical Section of Container Terminal



Muara Sabak General Cargo Berth



Muara Sabak Access Bridge

Figure 24.2.3 Typical Section of General Cargo Terminal

(2) Dredging and Reclamation

Structural dredging work will be done by using clamshell buckets on barges up to DL –6.0 m along the berth line where precise dredging work is required, and different from those for turning basin and navigation channel. The dredging for the basin and the channel is explained as Channel Dredging Scheme.

This dredging work is a rather small quantity (about 100m^3), mainly leveling work for the riverbed along the quay line. The reclamation work is adopted to fill the terminal yard up to DL +5.6 m (same elevation of the berth). The existing grand surface covered by the organic materials will be removed and filled up to required elevation by the suitable materials from quarry near the site.

Based on the soil data, it was revealed that the soil consolidation is rather moderate at around 20 to 25 cm for 7-year duration with 2 tons/m^2 additional load. An additional reclamation fill will enable adjustment of the yard settlement.

(3) Shore Protection and Stone Bank

The riverbank of the terminal and the shore area underneath of the access bridges are planned to be protected with a stone layer from shoulder of the yard to DL –1.0 m. After filling work, the yard boundary of the river shall be made with slope 1:2, then the armor stones will be installed on the filter sheet with filter stone. The other perimeter face of the yard is planned to be protected by clay topsoil installation.

(4) Pavement (Road, Container yard and General cargo open storage)

Roads and paved areas are identified by their types, as follows:

1) Container storage areas and general cargo open storage
2) RTG runway beam (RTG Lane)
3) Container Sleeper
4) Roads and other areas of Container Terminal

The following pavement types will be considered:

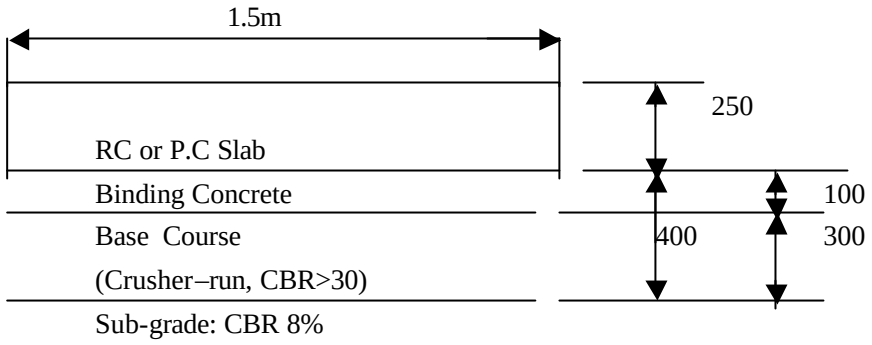
1) Container storage areas and general cargo open storage

The structure of the pavement for the container storage area except for the RTG lanes and the container sleepers is planned and recommended as follows.

Interlocking Concrete Block	80 mm
Sand and bedding	50 mm
Cement Stabilized base course (30kgf/cm^2, 7days)	200 mm
Crushed –run sub-base course (CBR > 30)	300 mm
Sub-grade (CBR > 8%)	

2) RTG Runway Beams

Rubber Tired Gantry Crane (RTG) is required the long span passage with 1.5 m width in order to stand a loading force of more than 38 tons per wheel. The lanes are generally required to be made of reinforcing concrete slab (RC slab) or PC slab. Section of the recommended structure is as follows:



3) Container Sleeper

The basement sitting for the containers is planned to be the heavy structure Container Sleeper having 1.5 m width and the same structure as RTG lane. The containers should be stacked and arranged at fixed positions in the yard for identification of the container.

4) Roads and other areas of Container Terminal

The vehicle traffic lanes adjacent and parallel to the container stacking areas and access road to the terminal are planned and recommended in the following section.

Portland Cement Concrete Surface	250 mm
Base Course (20kgf/cm^3)	300 mm
(Crashed stone for mechanical stabilization)	
Sub-grade (CBR > 8%)	

(5) Buildings

The basic design concept of architecture zoning will be adopted to ensure efficient space utilization of the buildings. Design for the buildings and structures shall consider the future port development. The proposed buildings to be established in this project are summarized in Table 24.2.2.

1) Terminal Office Building

The building is planned as two stories having 15 m width and 20 m length supported by RC pile foundation. The horizontal zoning concept is that each floor is broadly divided into two parts with a common area, which is allocated at the middle of the building, staircase and void space, in order to provide each area with natural ventilation. The space for this building is vertically and horizontally divided into two

floor zones to be utilized by different divisions and common spaces

2) CFS

One container freight station (CFS) in the terminal is recommended. CFS shed has dimension of 40 m width and 56 m length, with 6m deep canopy on the both sides, supported by RC pile foundation. The shed has 300 m^2 for damaged cargo storage and 150 m^2 for operator's room. One side of the CFS shed has a platform which is 3 m width, 1.3 m height from the ground elevation in order to facilitate cargo handling from/to container on chassis and the other side of the CFS shed has a slope way for in-coming and out-going containers directly from trucks.

The building will be designed to utilize natural environment resources for lighting and ventilation. Thus, the building will be provided with skylight at the top of the roof and movable high-side windows.

3) Maintenance Shop

The building is planned to have 15 m width and 20 m length supported by RC pile foundation. The routine works of this facility are inspections and repair works for the container handling equipment. Annual and monthly inspections required for vehicles, RTG and other handling equipment utilized in the container terminal are expected to be performed.

One overhead hoist crane shall be installed inside for the aid of repair works. The building will also be provided with skylight at the top of the roof and movable high-side windows.

4) Main Gate

Three lanes for incoming, two lanes for outgoing and one oversize lane for both traffics are planned at the main gate. The gatehouse is designated to process and inspect vehicle and container as they leave or enter the terminal. The checking booths with computer communication lines in the gatehouse are installed at side of the lanes respectively. The gate is a one roof structure having 20 m width and 26 m length supported RC columns. Columns are installed at both sides of the checking booths located between the lanes.

In addition, one track scale with 40 tons capacity will be installed at incoming lanes in the gatehouse in order to check the weight of container.

Table 24.2.2 Summary of Buildings

Building	Floor Area (m2)	Number of Peoples	Foundation Structure	Column Structure	Stories	Remarks
Office Building	600	50	R.C Piles	R.C	2	
Maintenance Shop	1200	40	R.C Piles	R.C	1	
Main Gate House	6–Lanes	10	R.C Base	R.C	1	
CFS	2240	10	R.C Piles	R.C	1	
Warehouse	3600	10	R.C Piles	R.C	1	
Canteen & Workers Room	150	30	R.C Base	R.C	1	

(6) Utilities

1) Drainage System

The drainage system (storm water drainage) is based on rainfall intensity and catchment area. The catchment area of the storm water is the only new reclamation area, since the reclamation area is an independent area in the site connected to the existing access road. The main drainage lines are designed to divide into two main drainage lines with underground RC pipes. Storm water is collected into main drainage lines by the concrete trenches installed in the area of the terminal.

2) Power Supply System

Since, there is no available electricity power supply by PLN (National Electric Company) at Muara Sabak site, the power shall be provided by generators installed at site. To meet the electrical demand, it is required to supply about 600 kVA for a gantry crane and 300 kVA for other related facilities in the terminal.

In addition to the electrical demand for normal operation, emergency power supply is considered for the site. Thus, one 1000 kVA generator and one 600 kVA generator is planned to be installed for the power sources. The lighting system for the facilities such as yard, buildings and road for container and general cargo terminal and electrical power for equipment are provided from main generator through sub-power stations.

3) Water Supply

Since fresh water for the terminal operation is not available through existing public services, the fresh water will be provided by deep wells. However, it is difficult to take the fresh water from deep wells around the site due to seawater mixed into the well water. Thus, the water source is assumed to be located minimum 10 km from the site. A pipeline for water provided 15 km from the reservoir tank at the deep well site to the general cargo terminal is planned.

The water supply system is arranged for the buildings, berth for supplying ship, green belt and fire hydrant system. The main water pipeline (6") from the deep well and distribution pipe (4") in terminal are to be installed underground. The water demands are assumed 35 tons/day for the buildings and 80 tons/day for ships.

4) Sewerage System and Other Utilities

Waste water from buildings, canteen, and those toilets are to be discharged to a septic-tank and treated naturally. Therefore, septic-tanks are to be installed for individual facilities around the buildings. Other utilities such as communication system and navigation aids will be provided in this project.

24.2.4 Scope of Works

The scope of works for the general cargo terminal and the container terminal is summarized in Table 24.2.3.

Table 24.2.3 Scope of Works for Short Term Development in Jambi

General Cargo Terminal Construction				Unit	Quantity
(1)	Mobilization and Demobilization			L.S	1
(2)	Dredging & Reclamation				
	1)	Dredging		m3	400
	2)	Reclamation		m3	55,000
(3)	Berth Construction				
	1)	Steel Pipe Piling Work (D=500)		m	3,125
	2)	Concrete Deck			
		Concrete Placing		m3	1,490
		Re-bar Work		ton	164
	3)	Trestle (2set)			
		Steel Pipe Piling Work (D=500)		m	2,050
		Concrete Deck		m3	840
		Re-bar Work		m3	92
	4)	Retaining Stone Bank		m3	2,540
	5)	Wharf Fittings			
		Fender & Bollard		set	13
	6)	Corrosion Protection		m2	1,495
(4)	Yard Pavement				
	1)	Block Paving		m2	21,600
(5)	Access Road				
	1)	Filling & Grading		m3	480
	2)	Concrete Paving		m2	480
	3)	Utilities		L.S	1
(6)	Buildings				
	1)	Warehouse (1 Units)		m2	3,600
	2)	Gate		m2	80
	3)	Terminal Office Building		m2	400
	4)	Work Shop		m2	400
	5)	Canteen		m2	150
(7)	Yard Fence			m	325
(8)	Drainage System			L.S	1
(9)	Power Supply & Yard Lighting			L.S	1
(10)	Water Supply System			L.S	1
(11)	Sewerage System			L.S	1
(12)	Water Resources			L.S	1
(13)	Other Utilities			L.S	1
Equipment					
	1)	Mobile Crane (25t)			1
	2)	Forklift (3t)			5

Container Terminal Construction				Unit	Quantity
(1)	Mobilization and Demobilization			L.S	1
(2)	Dredging & Reclamation				
	1)	Dredging		m3	500
	2)	Reclamation		m3	50,000
(3)	Berth Construction				
	1)	Steel Pipe Piling Work (D=600)		m	4,800
	2)	Concrete Deck			
		Concrete Placing		m3	2,625
		Re-bar Work		ton	289
	3)	Trestle (2set)			
		Steel Pipe Piling Work (D=500)		m	1,750
		Concrete Deck		m3	800
		Re-bar Work		ton	88
	4)	Retaining Stone Bank		m3	2,000
	5)	Wharf Fittings			
		Fender & Bollard		set	11
		Crane Rail Fittings		m	250
	6)	Corrosion Protection		m2	1,800
(4)	Yard Pavement				
	1)	Block Paving		m2	3,350
	2)	RTG Lane		m2	1,200
	3)	Container Sleeper		m2	1,150
	4)	Concrete Paving		m2	19,300
(5)	Access Road				
	1)	Filling & Grading		m3	14,285
	2)	Concrete Paving		m2	2,800
	3)	Utilities		L.S	1
(6)	Buildings				
	1)	CFS (1 Units)		m2	2,240
	2)	Gate		m2	300
	3)	Terminal Office Building		m2	600
	4)	Work Shop		m2	1,200
	5)	Canteen		m2	150
(7)	Yard Fence			m	325
(8)	Drainage System			L.S	1
(9)	Power Supply & Yard Lighting			L.S	1
(10)	Water Supply System			L.S	1
(11)	Sewerage System			L.S	1
(12)	Other Utilities			L.S	1
Equipment					
	1)	Gantry Crane			1
	2)	RTG			2
	3)	Tractor & Trailer			4
	4)	Mobile Crane (25t)			2
	5)	Reach Stacker			1
	6)	Forklift (3t)			5

24.2.5 Cost Estimate

The project cost for the short term development in Jambi is estimated based on the following basic assumptions.

(1) Unit Cost and Exchange Rate

The project cost are estimated based on the unit price as of 2001 and the foreign currency exchange rate of US$ 1 = 9,500 Rupiah (Rp) = 118 Yen.

(2) Construction Cost

The direct construction cost is estimated based on the results of the quantities and the unit price for the construction works. The unit price was obtained by accumulating labor cost with income tax and indirect expense, materials cost and construction equipment cost for operation of the work. In addition to the direct construction works, 8% of the direct

construction cost for the common temporary works, 15% of the direct construction cost for site expenses and 8% of the direct construction cost for overhead are added for the construction cost.

These percentages are based on reference to other similar projects in Indonesia.

(3) Procurement Cost

The procurement unit price are determined based on the imported CIF Jakarta price including installation costs of the individual unit price of items and costs of spare parts for two years.

(4) Initial Dredging for Channel and Basin

Initial dredging for the approach channel and basin in Batanghari River is required. The incremental volume of the initial dredging is estimated about 570,000 m^3, its initial cost is as follows.

Dredging Inner Channel: 570,000 m^3 x Rp 25,000/m^3 = Rp 14,250 million
(B= 80m, Depth = -4.5m)

Engineering Fee: 2.5% of dredging fee = Rp 356 million
VAT : 10% of dredging fee and Engineering fee = Rp 1,461 million

(5) Currency Component

The each unit price was split into foreign currency and local currency portions, both indicated in Rupiah, estimated in the following classifications.

1) The foreign currency component consists of :
   - Imported Construction materials
   - Foreign components of depreciation and operation/maintenance cost for construction equipment and plant
   - Foreign component of domestic materials
   - Salaries and costs of foreign personnel
2) The local currency component consists of :
   - Local construction materials
   - Local components of depreciation and operation /maintenance cost for construction equipment and plant
   - Salaries and costs of local personnel
   - Import duty on imported materials
   - Indonesian taxes

(6) Depreciation Period

For the economic analysis, the depreciation period of the constructed facilities and the procured equipment are determined as shown in Table 24.2.4.

Table 24.2.4 Depreciation Period of the Facilities and Equipment

Facility	Depreciation Period	Remarks
Berth , Retaining Wall	50 years	
Warehouse, CFS	50 years	
Yard Pavement	35 years	
Road Pavement	35 years	
Buildings	40 years	
Equipment	Depreciation Period	Remarks
Quay gantry Crane	25 years	
RTG	20 years	
Mobile Crane	15 years	
Reach Stacker	15 years	
Tractor & Chassis	10 years	
Forklift	10 years	

(7) Maintenance Cost (Facility, Equipment, Dredging)

The maintenance cost for facilities is set out as 2% of the construction cost of the facility based on the annual maintenance fee of the facilities. Also, the maintenance cost for the equipment is adopted as 3% of the equipment cost. The maintenance dredging cost is determined as annual maintenance dredging cost of the river done by RUKINDO.

Maintenance dredging cost = Rp13,000/m^3.

The incremental maintenance dredging volume is estimated as 160,000m^3/year. Thus the cost of maintenance dredging is as follows.

Maintenance Dredging : 160,000m^3/yr x Rp 13,000/m^3 = Rp 2,080 million

Engineering Fee : None

VAT : 10% of dredging fee = Rp 208 million

(8) Project Cost

In addition to the construction cost, equipment cost, and the initial dredging cost, the engineering fee of 12% for the construction and 3% for the equipment, the physical contingency of 8% for the construction and VAT of 10% for the whole cost are considered in the project cost.

The project cost for the short term development in Jambi is shown in Table 24.2.5. The equipment cost for Jambi is shown in Table 24.2.6. The construction cost for Jambi is shown in Table 24.2.7 for the container terminal and Table 24.2.8 for the general cargo terminal.

Table 24.2.5 Project Cost for the Short Term Development in Jambi

(Unit in Million Rp.)

	Civil Work		Equipment		Total		
	Foreign	Local	Foreign	Local	Foreign	Local	Total
Muara Sabak - Base Case	93,194	51,375	72,109	9,070	165,303	60,445	225,748
Muara Sabak - High Case	93,194	51,375	72,109	9,070	165,303	60,445	225,748
Initial Dredging	9,494	6,573			9,494	6,573	16,067
Total - Base Case	102,686	57,948	72,109	9,070	174,795	67,018	241,813
Total - High Case	102,686	57,948	72,109	9,070	174,795	67,018	241,813

Table 24.2.6 Equipment Cost for Jambi

Phase		Description	Quantity	Unit Price (Million	Amount (Million
I	1	Gantry Crane	1	32,000	32,000
Container	2	RTG	2	11,200	22,400
Berth	3	Tractor & Trailer	4	1,100	4,400
	4	Mobile Crane (25t)	2	1,900	3,800
	5	Reach Stacker	1	3,650	3,650
	6	Forklift (3T)	5	350	1,750
	7	Engineering Fee	3%		2,040
	8	VAT	10%		7,004
			Total		**77,044**
II	1	Mobile Crane (25t)	1	1,900	1,900
General Cargo	2	Forklift (3T)	5	350	1,750
Berth		Engineering Fee	3%		110
		VAT	10%		376
					4,135

Table 24.2.7 Construction Cost of Container Terminal for Jambi (Phase I)

			Description	Unit	Quantity	Unit Price (Rp)	Amount (Million Rp)
1	Direct Construction Cost						
	(1)		Mobilization and Demobilization	L.S	1	16,000,000,000	4,000
	(2)		Dredging & Reclamation				
		1)	Dredging	m^3	500	63,000	32
		2)	Reclamation	m^3	50,000	32,200	1,610
	(3)		Berth Construction				
		1)	Steel Pipe Piling Work (D=600)	m	4,800	1,899,052	9,115
		2)	Concrete Deck				
			Concrete Placing	m^3	2,625	601,900	1,580
			Re-bar Work	ton	289	5,099,050	1,472
		3)	Trestle				(2 sets)
			Steel Pipe Piling Work (D=500)	m	1,750	1,198,546	2,097
			Concrete Deck	m^3	800	601,900	482
			Re-bar Work	ton	88	5,099,050	449
		4)	Retaining Stone Bank	m^3	2,000	205,967	412
		5)	Wharf Fittings				
			Fender & Bollard	set	11	144,000,000	1,584
			Crane Rail Fittings	m	250	1,315,000	329
		6)	Corrosion Protection	m^2	1,800	1,280,000	2,304
	(4)		Yard Pavement				
		1)	Block Paving	m^2	3,350	162,727	545
		2)	RTG Lane	m^2	1,200	446,052	535
		3)	Container Sleeper	m^2	1,150	391,770	451
		4)	Concrete Paving	m^2	19,300	171,370	3,307
	(5)		Access Road				
		1)	Filling & Grading	m^3	14,285	32,200	460
		2)	Concrete Paving	m^2	2,800	171,370	480
		3)	Utilities	L.S	1	250,000,000	100
	(6)		Buildings				
		1)	CFS (1 Units)	m^2	2,240	1,420,000	3,195
		2)	Gate	m^2	300	2,150,000	645
		3)	Terminal Office Building	m^2	600	2,150,000	1,290
		4)	Work Shop	m^2	1,200	1,420,000	1,704
		5)	Canteen	m^2	150	1,420,000	213
	(7)		Yard Fence	m	325	456,000	148
	(8)		Drainage System	L.S	1	2,536,800,000	906
	(9)		Power Supply & Yard Lighting	L.S	1	7,583,333,333	3,250
	(10)		Water Supply System	L.S	1	3,700,000,000	1,850
	(11)		Sewerage System	L.S	1	1,487,500,000	850
	(12)		Other Utilities	L.S	1	600,000,000	200
	Total Direct Cost						**45,596**
3	Indirect Construction Cost						
	(1)		Common Temporary Work	%	8	D.C	3,648
	(2)		Site Expenses	%	15	D.C	6,839
	(3)		Overhead	%	8	D.C	3,648
	Total Indirect Cost						14,135
Total Construction Cost							**59,730**
			Physical Contingency	%	8	T.C	4,778
			Engineering Fee	%	12	T.C	7,168
			VAT	%	10	T.C, P.C, E.F	7,168
Total Project Cost							**78,844**

Table 24.2.8 Construction Cost of General Cargo Terminal in Jambi

				Description	Unit	Quantity	Unit Price(Rp)	Amount (Million Rp) (Phase II)
1	Direct Construction Cost for General Cargo Terminal							
	(1)			Mobilization and Demobilization	L.S	1	3,800,000,000	3,800
	(2)			Dredging & Reclamation				
		1)		Dredging	m3	400	63,000	25
		2)		Reclamation	m3	55,000	32,200	1,771
	(3)			Berth Construction				
		1)		Steel Pipe Piling Work (D=500)	m	3,125	1,198,546	3,745
		2)		Concrete Deck				
				Concrete Placing	m3	1,490	601,900	897
				Re-bar Work	ton	164	5,099,050	836
		3)		Trestle				(2 sets)
				Steel Pipe Piling Work (D=500)	m	2,050	1,198,546	2,457
				Concrete Deck	m3	840	601,900	506
				Re-bar Work	m3	92	5,099,050	469
		4)		Retaining Stone Bank	m3	2,540	205,967	523
		5)		Wharf Fittings				
				Fender & Bollard	set	13	144,000,000	1,872
		6)		Corrosion Protection	m2	1,495	1,280,000	2,220
	(4)			Yard Pavement				
		1)		Block Paving	m2	21,600	162,727	3,515
	(5)			Access Road				
		1)		Filling & Grading	m3	480	32,200	15
		2)		Concrete Paving	m2	480	171,370	82
		3)		Utilities	L.S	1	100,000,000	100
	(6)			Buildings				
		2)		Warehouse (1 Units)	m2	3,600	1,420,000	5,112
		3)		Gate	m2	80	2,150,000	172
		4)		Terminal Office Building	m2	400	2,150,000	860
		5)		Work Shop	m2	400	1,420,000	568
		6)		Canteen	m2	150	1,420,000	213
	(7)			Yard Fence	m	325	456,000	148
	(8)			Drainage System	L.S	1	706,000,000	706
	(9)			Power Supply & Yard Lighting	L.S	1	1,250,000,000	1,250
	(10)			Water Supply System	L.S	1	1,850,000,000	1,850
	(11)			Sewerage System	L.S	1	450,000,000	450
	(12)			Other Utilities	L.S	1	100,000,000	100
	(13)			Water Resources	L.S	1	3,432,000,000	3,432
	Total Direct Cost							**37,695**
3	Indirect Construction Cost							
	(1)			Common Temporary Work	%	8	D.C	3,016
	(2)			Site Expenses	%	15	D.C	5,654
	(3)			Overhead	%	8	D.C	3,016
	Total Indirect Cost							11,686
Total Construction Cost								**49,381**
				Physical Contingency	%	8	T.C	3,950
				Engineering Fee	%	13	T.C	6,419
				VAT	%	10	T.C,P.C,E.F	5,975
Total Project Cost								**65,726**

24.3 Implementation Plan for Short-term Development of Jambi

24.3.1 Construction Presumption

(1) Working days for construction

The working days considered in the construction schedule are basically every day except Sunday, National holidays and heavy rain days. The number of working days per month is determined as follows

Civil Works: 23 days/month

Building Works: 25 days/month

(2) Productivity of the Works

The following productivities of the works are applied for the construction schedule.

Fabrication and Transportation of Steel Piles: 3 months from order

Structural Dredging: 300 m^3/day (Clam-shell mounted on barge)

Reclamation: 300 m^3/day (reclaimed by dump truck & bulldozer)

Driving of Steel Pipe Pile: 2 piles/day x parties

Concrete Work: 25 m^3/day

Pavement (Concrete Block): 120 m^2/day

Pavement (Concrete): 170 m^2/day

Building Construction (RC Office): 10 m^2/day

Building Construction (RC Shed): 20 m^2/day

24.3.2 Project Implementation Schedule

The project implementation schedule includes consulting services for detailed design stage, tendering stage and construction supervision and construction stage of the project. The consulting services before construction are assumed to be for one year. Based on these assumptions for construction, the prospective implementation schedule is prepared as shown in Table 24.3.1 for the Container Terminal and Table 24.3.2 for the General Cargo Terminal.

Table 24.3.1 Implementation Schedule for Container Terminal

Description	Unit	Quantity	2006 1 2 3 4 5 6 7 8 9 10 11 12	2007 1 2 3 4 5 6 7 8 9 10 11 12	2008 1 2 3 4 5 6 7 8 9 10 11 12	
Consulting Services						
(1) Detail Design (D/D)	LS	1				
(2) Assist to Tender	LS	1				
(3) Contract & Suprevision (S.V)	LS	1				
General Cargo Terminal Construction						
(1) Mobilization and Demobilization	LS	1				
(2) Dredging & Reclamation						
1) Dredging	m3	400				
2) Reclamation	m3	55000				300m3/day x 2 parties
(3) Berth Construction						
1) Steel Pipe Piling Work (D=500)	m	3125				125 Pieces (2/day)
2) Concrete Deck						
Concrete Placing	m3	1490				25m3/day
Re-bar Work	ton	164				
3) Trestle (2set)						
Steel Pipe Piling Work (D=500)	m	2050				82 Pieces (2/day)
Concrete Deck	m3	840				25m3/day
Re-bar Work	m3	92				
4) Retaining Stone Bank	m3	2540				
5) Wharf Fittings						
Fender & Bollard	set	13				
6) Corrosion Protection	m2	1495				207pieces (4/day)
(4) Yard Pavement						
1) Block Paving	m2	21600				
(5) Access Road						
1) Filling & Grading	m3	480				
2) Concrete Paving	m2	480				
3) Utilities	LS	1				
(6) Buildings						
2) Warehouse (1 Units)	m2	3600				20m2/day
3) Gate	m2	80				
4) Terminal Office Building	m2	400				
5) Work Shop	m2	400				
6) Canteen	m2	150				
(7) Yard Fence	m	325				
(8) Drainage System	LS	1				
(9) Power Supply & Yard Lighting	LS	1				
(10) Water Supply System	LS	1				
(11) Sewerage System	LS	1				
(12) Water Resources	LS	1				Assumed 8 months
(13) Other Utilities	LS	1				
Equipment						
(1) Consulting Services (D/D, Tender, S.V)		1				
(2) General Cargo Terminal						
1) Mobile Crane (25t)		1				
2) Forklift (3t)		5				

Table 24.3.2 Implementation Schedule for Gene ral Cargo Terminal

Description	Unit	Quantity	2005 *(2004)* 1 2 3 4 5 6 7 8 9 10 11 12	2006 *(2005)* 1 2 3 4 5 6 7 8 9 10 11 12	2007 *(2006)* 1 2 3 4 5 6 7 8 9 10 11 12	Remarks
Consulting Services						
(1) Detail Design (D/D)	LS	1				
(2) Assist to Tender	LS	1				
(3) Contract & Suprevision (S.V)	LS	1				
Container Terminal Construction						
(1) Mobilization and Demobilization	L.S	1				
(2) Dredging & Reclamation						
1) Dredging	m3	500				
2) Reclamation	m3	50,000				300m3/day x 2parties
(3) Berth Construction						
1) Steel Pipe Piling Work (D=600)	m	4,800				192 Pieces (2/day)
2) Concrete Deck						
Concrete Placing	m3	2,625				25m3/day
Re-bar Work	ton	289				
3) Trestle (2set)						
Steel Pipe Piling Work (D=500)	m	1,750				70 Pieces (2/day)
Concrete Deck	m3	800				25m3/day
Re-bar Work	ton	88				
4) Retaining Stone Bank	m3	2,000				
5) Wharf Fittings						
Fender & Bollard	set	11				
Crane Rail Fittings	m	250				
6) Corrosion Protection	m2	1,800				262 Pieces (3/day)
(4) Yard Pavement						
1) Block Paving	m2	3,350				120m2/day
2) RTG Lane	m2	1,200				
3) Container Sleeper	m2	1,150				
4) Concrete Paving	m2	19,300				170m2/day
(5) Access Road						
1) Filling & Grading	m3	14,285				300m3/day
2) Concrete Paving	m2	2,800				
3) Utilities	L.S	1				
(6) Buildings						
1) CFS (1 Units)	m2	4,500				20m2/day
2) Gate	m2	300				
3) Terminal Office Building	m2	600				10m2/day
4) Work Shop	m2	1,200				20m2/day
5) Canteen	m2	150				
(7) Yard Fence	m	325				
(8) Drainage System	L.S	1				
(9) Power Supply & Yard Lighting	L.S	1				
(10) Water Supply System	L.S	1				
(11) Sewerage System	L.S	1				
(12) Other Utilities	L.S	1				
Equipment						
(1) Consulting Services (D/D, Tender, S.V)		1				
(2) Container Terminal						
1) Gantry Crane		1				
2) RTG		2				
3) Tractor & Trailer		4				
4) Mobile Crane (25t)		2				
5) Reach Stacker		1				
6) Forklift (3t)		5				

24.4 Operation and Management Scheme

In the short-term plan for 2007, following measures are needed.

(1) Development of Port Facilities

Port facilities have not sufficiently developed due to a lack of funds. Development of port facilities in Muara Sabak is needed in the short-term. Jambi ADPEL and the other port-related offices are still operating in the old Jambi port. They need to be relocated to Talang Duku to better coordinate with the IPC II Jambi branch office.

(2) Review of Port Working Area and Port Interest Area

It is necessary to review Port Working Area (land area and water area) and Port Interest Area (water area) of Jambi Port. They should be reviewed in accordance with the new port regulation (Government Regulation No.69/2001). The cost-sharing scheme of the maintenance dredging should be taken into account in reviewing those areas.

(3) Simplification of Port Procedures

IPC II Jambi branch office provides various port services such as ship service, cargo service and terminal service as a port authority. On the other hand, Jambi ADPEL is managing port and channel navigation safety as a harbor master in Jambi Port.

It takes a long time for port users to receive permission from the port office, particularly for port entry and berth assignment. Port-related procedures need to be simplified by introducing an EDI system. They should be processed in a fair and prompt manner. Introduction of a processing manual, unification of the application forms, delegation of the authority to local offices and application of standard processing time are among the measures to be considered.

(4) Maintenance Dredging

Maintenance dredging of the access channel is carried out by Ministry of Communications and IPC II. They make an agreement on this matter every year. The provincial government of Jambi is expected to bear a part of the cost after decentralization. Therefore, it is necessary to establish a cost-sharing scheme, which is acceptable for the parties concerned.

(5) Improvement of Navigational Safety

Jambi ADPEL is responsible for the navigation safety in the Jambi port and Batang Hari River, while Kuala Tungkal ADPEL is responsible for that in Tungkal River. It is necessary to increase light buoys to secure safety for night navigation.

24.5 Economic Analysis of Short-term Port Development at Jambi

24.5.1 General Introduction to Economic Evaluation

The purpose of economic evaluation is to provide a view of the feasibility of investment from the national, resource viewpoint. It differs from financial analysis, which provides information on the direct financial implications of investment including profitability.

Economic evaluation, therefore, considers only resource costs and excludes transfers such as taxes. It also takes into account the price of local (non-traded) inputs which may be overpriced or underpriced relative to market conditions. Minimum wages may overprice labour relative to its market value and subsidies, say for fuel or water, may underprice inputs. Shadow pricing is the mechanism to overcome these market defects.

Economic evaluation also differs from financial analysis as it is based on 'with' and 'without' project scenarios and the costs and benefits quantified are the incremental costs and benefits (i.e., the difference between the two scenarios).

In this project, the 'without' scenario is defined as the existing port at Jambi having minimal development and very little change occurring in infrastructure, equipment and operational procedures.

In this project, under the 'without' case, the existing port facilities will be used to their maximum capacity with an increasing degree of congestion and delay at the berths and in the terminals. This would result in increased waiting time, lower port efficiency and increased transport costs. Container traffic would also be handled at the existing general cargo berths at lower handling rates than would be anticipated at specialized berths.

Ultimately, traffic would be increasingly diverted to other ports such as Palembang and this is already happening and sometimes to ports even further distant.

Under the 'with' project scenario the specialized and additional facilities will enable cargo to be handled more efficiently and cost effectively with ships experiencing less queuing and faster on berth turnaround times.

24.5.2 Methodology

(1) General

Economic analysis is carried out by means of well-developed techniques and the EIRR (Economic Internal Rate of Return) and NPV (Net Present Value) are the two most often used. Both use discounting or discount rates (i.e., money has a time value and the same amount of money is worth more today than in any future year).

EIRR calculates the discount rate internally, hence its name and is the most widely used for the reason that one does not need to input a discount rate. The rate estimated within this procedure provides a proxy for the economic return on investment and is then

compared to the target discount rate (15 % in Indonesia). To calculate the NPV of a project, the discount rate is input and a discounted project value i.e. the value of the project in today's values is the output. If the output is greater than zero, the project is economically feasible.

In Indonesia, in recent years, the minimum rate required for projects has been 15 percent for non-social projects and 12 percent for social projects such as housing.

In undertaking the economic analysis, the project period is determined, and the costs and benefits of the investment, in each year of disbursement or receipt, are calculated.

Both local costs and all benefits are shadow priced. The foreign portion is regarded as already at market prices so no adjustment is made for imported (traded) inputs.

All costs and benefits are expressed in real terms (i.e., there is no allowance for inflation although costs and benefits may be increased if there is expected to be an increase in real terms i.e. above the general level of inflation). Costs and benefits are expressed in real or constant values in the base year of study which for this project is 2001.

The exchange rate used throughout is US$1.0=Rp.9,500.

Clearly, economic analysis depends on quantification of costs and benefits. All projects have clearly quantifiable elements but also elements that are difficult or impossible to quantify.

(2) Specific Aspects of Jambi Development

At this stage of the project, the ToR specify that the Master Plan as a whole is to be evaluated i.e. the total costs and benefits of all the Jambi port sub-projects are to be compared together to assess in broad terms the feasibility of the Master Plan.

This section relates to the economic evaluation of the Master Plan. The short term project, which forms the first set of sub-projects, for implementation within the master plan framework, is evaluated in section 31.5.

This section deals with both the 'Base' and 'High' development scenarios as defined above.

Usually, the principal quantified benefits of each such project are reduction in ship time in port and/or queuing and avoided land transport and /or transshipment costs between the without and with scenarios. In this case, one existing small port and a proposed port are both complementary and competitive. Unlike Samarinda, the existing port is very small and is not handling many containers per year.

24.5.3 Project Period

As with the Master Plan, thirty years has been chosen for short-term evaluation.

However, discounting means that costs and benefits after about 20 years usually have relatively small impacts on the economic feasibility.

24.5.4 Project Costs

For the short-term plan, the project represents the first package for implementation. However, the determination of costs is the same as for the Master Plan but only for the first period, together with all replacement of equipment needed over the project lifetime.

Costs for each short term scenario are divided into capital costs and annual costs. Capital costs are incurred both for the initial investment, and any subsequent, phase and for replacement of fully depreciated assets within the 30 year period (usually equipment has an economic life of less than 30 years).

Dredging at Jambi will be required on capital and annual basis.

The economic costs of implementing the projects have been estimated based on the financial cost including physical contingency. Price contingency, interest during construction and taxes and duties are then all excluded from the financial cost.

In order to shadow price the projects costs and benefits, a standard conversion factor (SCF) of 0.924 has been generally applied to non-traded (local portion) costs and benefits and a specific factor of 0.75 has been applied to unskilled labour. These factors are currently being applied in other Indonesian project evaluations.

Annual costs (i.e., operating and maintenance costs) are assumed to have a reasonably high local content and a SCF of 0.9 has been applied.

All traded costs (foreign portion) have been valued at their border price (i.e., the SCF is assumed as 1.0).

1) Capital Costs and Maintenance Costs

These have been specified by year in section 22.10 and the assumptions made detailed therein. The without scenario envisages minimal development and so the capital and maintenance costs are the incremental costs, but only related to the short-term investment. Current maintenance expenditure is minimal.

2) Operating Costs

These have been projected originally for the Jambi port branch based on 1999 and 2000 data and then converted to incremental costs for the project, based on incremental cargo volumes for each scenario.

These have been projected originally for the branch based on 1999 and 2000 data and then converted to incremental costs based on incremental cargo volumes for each scenario. The estimates involve a two-stage process. First a realistic assessment of the base year data is needed to establish the reliability of the data and then the future year costs must be

estimated taking into account that some costs will directly vary with cargo growth and other costs are fixed or semi-fixed.

Base year costs were reviewed in relation to other Indonesian ports including on an IPC-wide basis for the 4 IPCs. Secondly, cost data was disaggregated and an estimate made of the likely proportion of fixed sub-costs and variable sub-costs. Based upon a weighted average of these two, an estimate could be made of the link between cargo growth and operating cost growth.

In the feasibility study, operating costs are kept constant from the year short term capacity is reached as indicated in Section 24.1.

Table 22.13.1 shows the incremental operating costs.

3) Dredging Costs

Dredging costs are subsidised in the RUKINDO contracts and a substantially increased price has been allowed. However, it is unclear whether any subsidy still remains in our estimates. Hence, dredging costs are not shadow priced.

24.5.5 Benefits-Quantifiable

(1) Ship Queuing and Savings to Ships

Ship waiting time with and without the project are estimated with a simulation model and this was described in Section 20.11. The resulting time savings are then costed by applying the daily cost of the average vessel in key years. Vessel cost per day was established by surveys with ship operators and charterers. These costs are increased in real terms in line with the increased size of vessel projected over time.

There is considerable competition in shipping rates at present with the economic recession in Indonesia and elsewhere, but the possible increase in real costs is difficult to estimate.

The three types of vessels handled at Jambi public port are container, general cargo and bulk/CPO vessels. Passenger vessels are not handled at Talang Duku nor proposed at Muara Sabak.

Table 24.5.1 Ship Costs per day interpolated between 2007 and 2025

Type of Vessel	GRT, Tonne (t) or TEU	Year	Cost per Day (Million Rp.)
Container	75 teu	In 2007	8.0
	125 teu	By 2025	19.0
General Cargo	300 t	In 2007	6.7
	650 t	By 2025	10.9
Bulk CPO Cargo	927 grt	In 2007	8.8
	1210 grt	By 2025	10.3

Notes: Conversion of tonnes to GRT or v.v. based on Indonesian fleet data and load factors

Sources: Research in Indonesia with shipping companies and charterers.

(2) Ship Service Time on Berth and Savings to Ships

Benefits are also generated by faster turnaround of vessels. The simulation model gives time on berth with and without project and annual savings are calculated and costed as in a) above.

Other benefits, albeit small in total, are generated because ships can save up to 36 hours per round trip by calling at Muara Sabak rather than Talang Duku. The saved time is valued as in (2) above.

(3) Avoided Transport Costs

At the point at which the 'without' project capacity is reached, overflow cargo is assumed to be handled elsewhere. In accordance with the likely situation, it is assumed 100% will be handled at Palembang about 265 km from Jambi. The avoided costs (benefits) are based on the economic cost of truck transport based on data used in Indonesia for highway planning. While these rates could vary from actual freight rates they represent a more realistic resource cost.

Road transport costs are based on cost models currently in use in Indonesia. These models are based on the World Bank Highway Development Manual and adapted over many years to Indonesian conditions. The main inputs are vehicle type, speed and road surface. It is assumed that these conditions will not be as favourable as in East Kalimantan (a new road or toll road is planned to link Samarinda the capital with Balikpapan the oil centre) and therefore, truck costs are somewhat more expensive in Sumatra than Kalimantan.

Heavy truck costs are estimated to amount to Rp 3,688 per truck/km assuming that each truck will carry 10 tonnes payload. As traffic will be imbalanced a load factor of 80% is assumed within that figure bearing in mind probable overloads.

It is quite possible that in a regional port study, there would be justification of including some additional capital costs for 'overflow' ports and other infrastructure. In this study, since a specific Master Plan is being assessed, the regional infrastructure requirements are not considered in detail.

Therefore, as this benefit is quite substantial and there could be justification for assessing the impact of not including all of this benefit assessed in the sensitivity analysis.

(4) Transport Disbenefits

Muara Sabak is about 105 km from the existing Jambi port and there will be some disbenefit from the additional distance. However, companies are likely to move in the longer term nearer the port and industrial development areas are already planned in the Muara Sabak area at Parit Culum. Further, Jambi city will become increasingly congested and impose penalties on port users.

The disbenefit is assumed to be on the same cost basis as the avoided costs above.

However, for the reasons above, it is assumed that in year 1 of operation the disbenefit will be 100 % of the maximum. By 2025 this percentage is assumed to fall to 10 % with relocation of businesses.

(5) Benefit Cut-Off

Just as costs are kept constant once the capacity year is reached, so benefits are capped in the same way.

Further, as the short term project at Jambi relates only to Muara Sabak, so benefits related to Talang Duku are excluded.

(6) Shadow Pricing of Benefits

The net benefits are shadow priced at a SCF of 0.923. Conventionally, only benefits to Indonesian shippers and other Indonesian parties are included. In Jambi, as in most river ports, this is made complex by the fact that say plywood is exported from Indonesia in foreign ships but is barged to the sea in Indonesian vessels. Container exports often travel in Indonesian ships to the export port where they are exported in foreign ships.

This is further complicated by the fact that Indonesia is taking steps to carry more goods in Indonesian ships so that by 2025 the situation could be different.

In this case, unlike Samarinda, therefore, it is assumed no benefits accrue directly to foreign entities.

24.5.6 Unquantified Costs and Benefits

Environmental and social impacts are usually impossible or very difficult to quantify in monetary terms. The loss of mangrove areas and the destruction of landscapes and cultures cannot be measured in these terms. Project screening at an early stage attempts to sieve out the most sensitive areas.

Similarly, the generation of employment and employment opportunities, development of the economy and the facilitation of agriculture, trade and industry are all aspects which this project will help develop in a very important manner.

However, their quantification is rarely attempted. This is because either no data exists to help quantify the impact of improved transport and even where some data does exist, its further translation into monetary terms depends on often-speculative assumptions.

However, this is not to say that the economic development aspects are not important. On the contrary, while benefits are attempted to be quantified through cost savings, the goal is expansion of the regional economy, more and better quality employment opportunities and economic and social development in its wider sense.

The basis of the provincial economy and its maritime transport constraints were discussed in Chapter 9, on demand forecasts.

However, it is worth emphasizing again, albeit briefly, that Jambi province is poorly served by river/sea transport with Talang Duku a long way upstream and providing public services through only small vessels on a semi-scheduled basis. The current difficulties and limitations of the existing services are described above.

Conversely, as described in sections 8 and 9, Jambi province is resource rich and, while possibly not on the same level as Riau or East Kalimantan, requires improved river/sea transport to provide much needed support to exploit these resources.

The Jambi Port Master plan sets out to significantly support economic development through the phased implementation of infrastructure and equipment, together with associated operational and related improvements. The short term plan is the first step along the route to the implementation of the Master Plan.

24.5.7 Residual Values

Land values have not been included as no expenditure has been made on land in the cost estimates.

Infrastructure implemented after 2020 has been valued at 50 percent of its initial cost and all equipment is assumed fully depreciated by 2036. After 30 years the impact of residual values is very small.

24.5.8 Results of the Economic Evaluation

The EIRR for the proposed Master Plan was estimated as shown in Table 24.5.2 which also shows the sensitivity analysis.

Table 24.5.2 EIRR Analysis for Jambi Short-Term Plan-Base Option

JAMBI Port Short-Term Plan	Base Scenario	Cost Plus 10%	Benefits Minus 10%	Combining (2) and (3)
	(1)	(2)	(3)	(4)
EIRR (%)	19.8	18.3	18.5	17.1

The EIRR analysis shows that the Short Term Plan is economically viable at nearly 20 percent. If either benefits or costs change by 10 percent, the EIRR remains around 18 percent. With two unfavourable factors combined the EIRR remains above 17 percent.

At 15 % discount rate, the Net Present Value (NPV) is Rp. 80,638 million. Any positive value of NPV means the project is viable.

Table 24.5.3 EIRR Analysis for Jambi Port Short Term Plan-High Scenario

JAMBI Port Short-Term Plan	High Scenario	Cost Plus 10%	Benefits Minus 10%	Combining (2) and (3)
	(1)	(2)	(3)	(4)
EIRR (%)	18.2	16.9	17.0	15.8

The EIRR analysis shows that the Short Term Plan is economically viable. If either costs or benefits change, the EIRR remains about 17 percent. With two unfavourable factors combined the EIRR remains viable at over15 percent.

At 15 % discount rate, the Net Present Value (NPV) is Rp. 53,243 million. Any positive value of NPV means the project is viable.

Table 24.5.4 Results of the Economic Evaluation of Jambi Ports

Short Term Plan / /Base Scenario

Year	NET BENEFIT	Capital Costs	Maintenance incl dredging	NET COST BENEFITS
2004	0	0	0	-
2005		-3,447	0	(3,447)
2006		-35,635	0	(35,635)
2007	9,566	-141,605	0	(132,039)
2008	17,364	-32,447	-3,837	(18,920)
2009	23,806	0	-6,852	16,954
2010	28,120	0	-7,023	21,097
2011	33,129	0	-7,215	25,914
2012	38,626	0	-7,416	31,211
2013	44,603	0	-7,623	36,980
2014	51,084	0	-7,839	43,245
2015	58,086	0	-8,063	50,023
2016	65,615	0	-8,297	57,318
2017	73,758	-6,070	-8,297	59,391
2018	82,651	-1,727	-8,794	72,129
2019	92,258	0	-9,059	83,200
2020	102,616	0	-9,334	93,281
2021	113,778	0	-9,622	104,155
2022	125,812	-7,354	-9,923	108,535
2023	138,755	-1,875	-10,237	126,642
2024	152,738	0	-10,566	142,172
2025	167,796	0	-10,909	156,887
2026	167,796	0	-10,909	156,887
2027	167,796	-28,181	-10,909	128,706
2028	167,796	-1,727	-10,909	155,160
2029	167,796	0	-10,909	156,887
2030	167,796	0	-10,909	156,887
2031	167,796	0	-10,909	156,887
2032	167,796	-31,586	-10,909	125,301
2033	167,796	0	-10,909	156,887
2034	167,796	0	-10,909	156,887
2035	167,796	0	-10,909	156,887
2036	167,796	0	-10,909	156,887
2037	167,796	-13,424	-10,909	185,537
	3,433,713	-586,893		42,074
				Residual Value
				Land
				Infrastructure
				84,147
				42,074

EIRR=	19.8%

NPV=	80,638

Total costs=	586,893	Million Rp

Table 24.5.5 Results of the Economic Evaluation of Jambi Ports

Short Term Plan / High Scenario

	NET BENEFIT	Capital Costs	Maintenance incl dredging	NET COST BENEFITS
2004		-3,454	0	(3,454)
2005		-34,091	0	(34,091)
2006		-102,598	0	(102,598)
2007	10,287	-41,580	-5,564	(36,857)
2008	18,205	-31,418	-5,959	(19,172)
2009	24,910	0	-7,414	17,497
2010	29,508	0	-7,631	21,877
2011	34,825	0	-7,872	26,953
2012	40,657	0	-8,125	32,532
2013	46,477	0	-8,388	38,089
2014	52,787	0	-8,663	44,124
2015	59,604	0	-8,950	50,654
2016	66,932	-6,070	-9,250	51,612
2017	74,815	0	-9,565	65,250
2018	83,248	-1,727	-9,894	71,627
2019	92,449	0	-10,238	82,210
2020	102,806	0	-10,599	92,207
2021	113,968	-7,354	-10,978	95,637
2022	126,002	0	-11,374	114,628
2023	138,945	-1,875	-11,790	125,280
2024	152,928	0	-12,226	140,702
2025	167,987	0	-12,684	155,303
2026	167,987	-28,181	-12,684	127,122
2027	167,987	0	-12,684	155,303
2028	167,987	-1,727	-12,684	153,575
2029	167,987	0	-12,684	155,303
2030	167,987	0	-12,684	155,303
2031	167,987	-31,586	-12,684	123,217
2032	167,987	0	-12,684	155,303
2033	167,987	0	-12,684	155,303
2034	167,987	0	-12,684	155,303
2035	167,987	0	-12,684	155,303
2036	167,987	-13,424	-12,684	183,952
	3,285,192	-621,773		42,074
				Residual Value
			Land	0
			Bought	-
			Balance in 2036	-
			Infrastructure	
			Spent after 2020	84,147
			Remaining Value	42,074

EIRR=	18.2%
NPV=	53,243
Total Costs =	621,773 Million Rp

24.6 Financial Analysis

24.6.1 Methodology

(1) Viability of the Project

The viability of the project is analyzed using the Discount Cash Flow Method and appraised by the Financial Internal Rate of Return (FIRR). The FIRR is the discount rate that makes the discounted costs and revenues over the project life equal, i.e., the rate "r" that satisfies the following formula:

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

Where, n : Project life,
Bi : Revenue in the i-th year : the first year is the base year,
Ci : Cost in the i-th year
r : Discount rate.

The revenues and costs which are taken into account for the FIRR calculation are summarized in Table 24.6.1. The revenue and cost items excluded from the FIRR calculation are also summarized in Table 24.6.2. When the calculated FIRR exceeds the weighted average interest rate of the total funds for the investments of the project, that project is regarded as financially feasible.

Table 24.6.1 Revenues and Costs Employed in the FIRR Calculation

Revenues	Costs
1) Operating Revenues by the Project	1) Investment for the Project (including reinvestment for the project, installation of handling equipment and replacement/overhaul of equipment) 2) Operating Expenses such as Maintenance, Repair, Rental, Personnel and Administration Costs

Table 24.6.2 Revenues and Costs Exempted from the FIRR Calculation

Revenues	Costs
1) Fund Management Income	1) Depreciation Cost 2) Repayment of the Loan Principal 3) Interest on Loans

(2) Financial Soundness of the Executing Agency

The financial soundness of the executing agency of the project is appraised based on its projected financial statements (Profit and Loss Statement, Cash Flow Statement and Balance Sheet). The appraisal is generally made from the viewpoint of profitability, loan repayment capacity and operational efficiency,

using the following formula:

1) Profitability

Rate of Return on Net Fixed Asset :

$$\frac{\textbf{Net Operating Income}}{\textbf{Total Fixed Assets}}$$

This indicator shows the profitability of the investments in terms of Net Fixed Assets. It is necessary to keep the rate higher than the average interest rate of various funds for investments, which have different interest rates.

2) Loan Repayment Capacity

Debt Service Coverage Ratio:

$$\frac{\textbf{Net Operating Income + Depreciation Cost}}{\textbf{Repayment and Interest on Long-term Loans}}$$

This indicator shows whether the operating income can cover the repayment of both the principal and the interest on long-term loans. The ratio should be higher than 1.0 and is desirable to be higher than 1.75 (World Bank recommendation).

3) Operating Efficiency

(i) Operating Ratio :

$$\frac{\textbf{Operating Expenses}}{\textbf{Operating revenues}}$$

(ii) Working Ratio :

$$\frac{\textbf{Operating Expenses} - \textbf{Depreciation Expenses}}{\textbf{Operating Revenues}}$$

The Operating Ratio shows the operational efficiency of the organization as an enterprise, while the Working Ratio shows the efficiency of the routine operations. When the Operating Ratio is less than 70 - 75% and the Working Ratio is less than 50 - 60%, the operation of the organization is assessed to be efficient.

24.6.2 Assumption for Financial Analysis

(1) Scope of Analysis

The viability of the project is assessed using the revenues and costs related to the project. It is also assumed that IPC2 Jambi Branch Office will construct the new terminal at Muara Sabak and that it

will operate and manage the terminal. Thus, the investment by IPC2 will be confined to the following:

- All infrastructure construction work of the new terminal.
- Procurement of cargo handling equipment for the new terminal..

(2) Base Year

Price as of year 2001 is used in this financial analysis. Price escalation due to inflation for the future is not considered.

(3) Project Life

Taking account of conditions of the long-term loans and service lives of port facilities, the project life for the financial analysis is determined as 33 years including 3-year design and construction period.

(4) Cargo Handling Volume

To estimate the revenues to be generated from cargo handling and marine charge relative to the new terminal, cargo volume was assumed as shown in Table 24.6.3.

(5) Revenues and Port Tariff

The Study Team took the following assumptions for the container wharves of Jambi Port.

1) Talang Duku will remain a conventional terminal throughout the study period.
2) Talang Duku will raise the tariff by 20 % in 2005 to become on a par with other conventional terminals. The tariff in Talang Duku will be raised in 2018 again to pay for the new investment.
3) Muara Sabak will be declared as a container terminal in 2007/2008. Most of the containers handled at Muara Sabak will be destined for Singapore. Accordingly, Muara Sabak will charge the tariffs for general cargo handling and marine charge, the existing tariff will be applied.
4) As for ECT,
5) To avoid a drastic increase of the container tariff, an exchange rate of US$1= Rp.6,000 is applied (This rate of convenience is adopted at Palembang).

Table 31.6.3 Cargo Projection

	Talang Duku container (000TEU)	Talang Duku general cargo (000t)	Muara Sabak container (000TEU)	Muara Sabak general cargo (000t)	Talang Duku container ship call	Talang Duku General cargo ship call	Muara Sabak container ship call	Muara Sabak general cargo ship call
2000	13	86	0	0	138	861	0	0
2001	16	85	0	0	170	851	0	0
2002	17	83	0	0	180	831	0	0
2003	21	78	0	0	223	781	0	0
2004	23	109	0	0	244	1,091	0	0
2005	29	101	0	0	308	1,011	0	0
2006	32	90	0	0	340	901	0	0
2007	9	41	27	76	73	60	200	85
2008	10	10	30	18	85	63	207	83
2009	11	77	34	142	97	67	214	81
2010	13	79	38	146	109	70	220	79
2011	14	83	42	153	120	73	227	77
2012	16	84	47	162	132	77	234	75
2013	18	84	47	172	144	80	241	73
2014	20	84	47	182	156	83	247	71
2015	20	84	47	192	168	87	254	69
2016	20	84	47	200	286	90	322	67
2017	20	84	47	209	286	93	322	64
2018	20	84	47	210	286	97	322	62
2019	20	84	47	210	286	100	322	60
2020	20	84	47	210	286	103	322	58
2021	20	84	47	210	286	107	322	56
2022	20	84	47	210	286	110	322	54
2023	20	84	47	210	286	113	322	52
2024	20	84	47	210	286	117	322	50
2025	20	84	47	210	286	120	322	48
2026	20	84	47	210	286	120	322	48
2027	20	84	47	210	286	120	322	48
2028	20	84	47	210	286	120	322	48
2029	20	84	47	210	286	120	322	48
2030	20	84	47	210	286	120	322	48
2031	20	84	47	210	286	120	322	48
2032	20	84	47	210	286	120	322	48
2033	20	84	47	210	286	120	322	48
2034	20	84	47	210	286	120	322	48
2035	20	84	47	210	286	120	322	48
2036	20	84	47	210	286	120	322	48

Table 24.6.4 Future Container Tariff at Jambi Port

Terminal	Type of a container	-2004	2005-2017	2018-
Talang Duku	FCL	Rp.94,800 (20') Rp.142,200 (40')	Rp.120,000 (20') Rp.180,000 (40')	Rp.200,000 (20') Rp.300,000 (40')
	LCL	Rp.195,600 (20') Rp.293,400 (40')	Rp.240,000 (20') Rp.360,000 (40')	Rp.400,000 (20') Rp.600,000 (40')
	Empty	Rp.85,320 (20') Rp.127,980 (40')	Rp.110,000 (20') Rp.165,000 (40')	Rp.180,000 (20') Rp.270,000 (40')
Muara Sabak	FCL	-	US$ 81 (20') US$121 (40')	US$ 81 (20') US$121 (40')
	LCL	-	US$135 (20') US$ 203 (40')	US$135 (20') US$ 203 (40')
	Empty	-	US$ 73 (20') US$109 (40')	US$ 73 (20') US$109 (40')

(6) Fund Raising

It is assumed that 85 % of the total project cost is financed by foreign funds. The remaining 15 % of the total cost is assumed to be raised by domestic funds. The following conditions are employed for each fund in this financial analysis.

1) Foreign Fund

The foreign loan conditions are assumed as follows:

- Loan period : 30 years
- Grace period : 10 years
- Interest rate : 1.0 % per annum
- Repayment : Fixed amount repayment of principal
- Ratio of investment : Less than 85 % of the project cost

2) Domestic Fund

The domestic loan conditions are assumed as follows:

- Loan period : 10 years
- Interest rate : 18.05 % per annum
  (The real interest rate excluding inflation rate)
- Repayment : Fixed amount repayment of principal

3) Weighted Average Interest Rate

The weighted average interest rate of the funds for investments is 3.55 % per annum under the loan conditions stated above. (1.0 x 0.85 + 18.0 x 0.15 = 3.55)

(7) Expenditure

Table 24.6.5 Jambi Short-term Projects FIRR (Base Case)

Year	Expenditure						Revenue	Balance
	Capital cost	MS Facility Maintenance	MS Equipment	Maintenance Dredging	Incremental operation	Total		
2004	0					0		0
2005	4,672					4,672		-4,672
2006	40,712					40,712		-40,712
2007	144,096	0	0			144,096	0	-144,096
2008	36,997	1,823	2,040	2,288	571	43,719	13,550	-30,169
2009	0	2,357	2,150	2,288	1,138	7,933	15,397	7,465
2010	0	2,357	2,150	2,288	1,409	8,204	18,207	10,003
2011	0	2,357	2,150	2,288	1,714	8,509	20,473	11,964
2012	0	2,357	2,150	2,288	2,032	8,827	23,286	14,459
2013	0	2,357	2,150	2,288	2,361	9,156	26,646	17,490
2014	0	2,357	2,150	2,288	2,703	9,498	29,599	20,100
2015	0	2,357	2,150	2,288	3,060	9,855	33,031	23,176
2016	0	2,357	2,150	2,288	3,060	9,855	33,732	23,877
2017	6,765	2,357	2,150	2,288	3,060	16,620	33,806	17,186
2018	1,925	2,357	2,150	2,288	3,060	11,780	36,472	24,693
2019	0	2,357	2,150	2,288	3,060	9,855	36,540	26,685
2020	0	2,357	2,150	2,288	3,060	9,855	36,607	26,753
2021	0	2,357	2,150	2,288	3,060	9,855	36,675	26,820
2022	8,195	2,357	2,150	2,288	3,060	18,050	36,743	18,693
2023	2,090	2,357	2,150	2,288	3,060	11,945	36,810	24,865
2024	0	2,357	2,150	2,288	3,060	9,855	36,878	27,023
2025	0	2,357	2,150	2,288	3,060	9,855	36,945	27,090
2026	0	2,357	2,150	2,288	3,060	9,855	36,945	27,090
2027	31,405	2,357	2,150	2,288	3,060	41,260	36,945	-4,315
2028	1,925	2,357	2,150	2,288	3,060	11,780	36,945	25,165
2029	0	2,357	2,150	2,288	3,060	9,855	36,945	27,090
2030	0	2,357	2,150	2,288	3,060	9,855	36,945	27,090
2031	0	2,357	2,150	2,288	3,060	9,855	36,945	27,090
2032	35,200	2,357	2,150	2,288	3,060	45,055	36,945	-8,110
2033	0	2,357	2,150	2,288	3,060	9,855	36,945	27,090
2034	0	2,357	2,150	2,288	3,060	9,855	36,945	27,090
2035	0	2,357	2,150	2,288	3,060	9,855	36,945	27,090
2036	0	2,357	2,150	2,288	3,060	9,855	36,945	27,090

Exchange rate for the dollar base tariff

US1$= Rp.	6,000

FIRR	6.8%

Table 24.6.6 Jambi Short-term Projects FIRR (High Case)

	Expenditure							
	Capital cost	MS Facility Maintenance	MS Equipment	Maintenance Dredging	Incremental operation costs	Total	Revenue	Balance
2004	4,672					4,672		-4,672
2005	40,712					40,712		-40,712
2006	144,096	0	0			144,096		-144,096
2007	36,997	1,823	2,040	2,288	721	43,869	15,455	-28,414
2008	0	2,357	2,150	2,288	1,307	8,102	17,842	9,740
2009	0	2,357	2,150	2,288	1,893	8,688	21,031	12,343
2010	0	2,357	2,150	2,288	2,215	9,010	24,087	15,077
2011	0	2,357	2,150	2,288	2,573	9,368	27,750	18,382
2012	0	2,357	2,150	2,288	2,947	9,742	32,013	22,272
2013	0	2,357	2,150	2,288	3,336	10,131	32,266	22,135
2014	0	2,357	2,150	2,288	3,336	10,131	32,752	22,621
2015	0	2,357	2,150	2,288	3,336	10,131	32,802	22,671
2016	6,765	2,357	2,150	2,288	3,336	16,896	33,229	16,332
2017	1,925	2,357	2,150	2,288	3,336	12,056	33,235	21,179
2018	0	2,357	2,150	2,288	3,336	10,131	35,796	25,665
2019	0	2,357	2,150	2,288	3,336	10,131	35,797	25,665
2020	0	2,357	2,150	2,288	3,336	10,131	35,797	25,666
2021	8,195	2,357	2,150	2,288	3,336	18,326	35,797	17,471
2022	2,090	2,357	2,150	2,288	3,336	12,221	35,798	23,576
2023	0	2,357	2,150	2,288	3,336	10,131	35,798	25,667
2024	0	2,357	2,150	2,288	3,336	10,131	35,798	25,667
2025	0	2,357	2,150	2,288	3,336	10,131	35,799	25,667
2026	31,405	2,357	2,150	2,288	3,336	41,536	35,799	-5,738
2027	1,925	2,357	2,150	2,288	3,336	12,056	35,799	23,742
2028	0	2,357	2,150	2,288	3,336	10,131	35,799	25,667
2029	0	2,357	2,150	2,288	3,336	10,131	35,799	25,667
2030	0	2,357	2,150	2,288	3,336	10,131	35,799	25,667
2031	35,200	2,357	2,150	2,288	3,336	45,331	35,799	-9,533
2032	0	2,357	2,150	2,288	3,336	10,131	35,799	25,667
2033	0	2,357	2,150	2,288	3,336	10,131	35,799	25,667
2034	0	2,357	2,150	2,288	3,336	10,131	35,799	25,667
2035	0	2,357	2,150	2,288	3,336	10,131	35,799	25,667
2036	0	2,357	2,150	2,288	3,336	10,131	35,799	25,667

Exchange rate for the dollar base tariff

US1$=Rp	6,000

FIRR	7.1%

Capital cost and annual cost for the project are summarized in Table 24.6.5 and Table 24.6.6. Capital dredging costs were divided to two parts, inside the river and outside the river. Since IPC2 is responsible for the dredging inside the river, the capital dredging cost for the channel inside the river was counted as the project cost. The Study Team also assumed IPC2 would pay a half of the maintenance dredging costs outside the river mouth. The dredging costs born by IPC 2 are included in the financial analysis.

Table 24.6.7 Proposed Dredging Cost Sharing

Area	Capital Dredging	Maintenance Dredging
Inside the River Mouth	IPC 2	IPC 2
Outside the River Mouth	Central Government	Central Government (50%) IPC2 (50%)

1) Investment

Initial investment cost for the infrastructure and superstructure developed by IPC2 are estimated. Since the durable years of infrastructure facilities are longer than the project life, re-investment costs for these facilities are not counted in this analysis.

2) Maintenance Cost

Annual maintenance cost for infrastructure facilities are calculated as 1.6% of the initial construction cost. Annual maintenance cost for superstructure facilities are calculated as 2.60% of the original procurement cost. In addition, the replacement cost is counted in 2017, 2022, 2027, and 2032.

3) Depreciation Cost

Annual depreciation cost for both infrastructure and superstructure facilities is calculated by the straight-line method, based on their durable years. Residual value after all depreciation is estimated as being zero.

4) Tax

Taxes to be levied for profit are income tax and deemed dividend tax.

24.6.3 Evaluation of Project

(1) Viability

FIRR of the project is shown in Table 24.6.5 and Table 24.6.6. FIRR of each project is exceeding the weighted average interest rate of loan of 3.55 %.

(2) Sensitivity Analysis

Sensitivity analysis is carried out to examine the impact of unexpected future changes such as cargo volume, construction cost, inflation or exchange rate. The following cases are examined.

Case 1 Investment costs increase by 10 %.

Case 2 Revenues decrease by 10 %.

Case 3 Investment costs increase by 10 %, and revenues decrease by 10 %.

Case 4 All the dredging costs are born by the government and thus exempted from the financial analysis

Results of the sensitivity analysis is shown in Table 24.6.8. I all cases, FIRR exceeds the weighted average interest rate of loan (3.55% per annum). FIRR will significantly improve if IPC is exempted from the entire dredging costs (See Case 4).

Table 24.6.8 FIRR Sensitivity Analysis

(Exchange rate of convenience at US1$=Rp6,000)

Case	Jambi Base Case	Jambi High Public Case
Original case	6.8%	7.1%
Case 1	5.9%	6.2%
Case 2	5.3%	5.6%
Case 3	4.5%	4.7%
Case 4	8.5 %	8.9 %

(3) Financial Soundness of Executing Agency

Together with the above-mentioned financial analysis, overall financial soundness of IPC2 was assessed to confirm the feasibility of the project. In the assessment, current financial statement, loan repayment programs and income prospects for the future were evaluated. Projected financial statements and financial indicators for IPC2 are shown in Table 24.6.9 and Table 24.6.10.

1) Profitability

The rate of return on net fixed assets exceeds the weighted average interest rate of the funds in each case.

2) Loan Repayment Capacity

The debt service coverage ratio exceeds 1.75 (World Bank Standard) during the project life.

3) Operational Efficiency

The operating ratio keeps below 70% (World Bank Standard) and working ratio also keeps below 50% (World Bank Standard). This means that the operation at port will be efficient.

24.6.4 Conclusion

Judging from the above analysis, the project can be regarded as financially feasible. And the financial soundness of executing agency, namely IPC2 is considered to be sound. However, the new terminal management entity should make efforts to heighten the quality of the service, to improve cargo handling efficiency, to secure the forecast cargo volume, and to reduce operating expenses.

Table 24.6.9 Financial Statement for Feasibility Study (Base case)

Income Statement (Unit:USD)

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Operating Revenue	0	0	0	0	13,550	15,197	18,207	20,473	23,286	26,646	29,598	33,031	33,732	33,806	36,472	36,548	36,607	36,679
Operating Expenses	0	0	0	0	12,661	13,872	14,143	14,448	14,766	15,095	15,457	15,794	15,794	15,794	15,794	15,794	15,794	15,794
Personnel & Administration	0	0	0	0	571	1,138	1,409	1,714	2,052	2,361	2,703	3,060	3,060	3,060	3,060	3,060	3,060	3,060
Maintenance	0	0	0	0	6,151	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795
Depreciation	0	0	0	0	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939
Net Operating Income	0	0	0	0	889	1,325	4,064	6,025	8,520	11,551	14,162	17,237	17,938	18,012	20,678	20,746	20,813	20,881
Interest on Long-term Loans	0	0	39	1,485	2,736	2,626	2,516	2,406	2,296	2,187	2,077	1,910	1,742	1,557	1,482	1,407	1,332	1,257
Net Surplus	0	0	-39	-1,485	-1,847	-1,102	1,547	3,618	6,223	9,364	12,085	15,327	16,196	16,455	19,196	19,339	19,481	19,624
Corporation Income Tax					-462	-275	387	905	1,556	2,341	3,021	3,832	4,049	4,114	4,799	4,835	4,870	4,906
Accumulated Earnings	0	0	-39	-1,524	-2,910	-3,736	-2,575	138	4,806	11,829	20,893	32,388	44,535	56,876	71,273	85,778	100,389	115,107

Cash Flow

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Cash Beginning	0	7,355	128,074	266,265	104,006	70,952	75,455	81,944	89,986	99,982	112,334	121,054	132,026	142,002	152,783	165,620	178,564	191,614
Cash Inflow	7,355	124,661	178,942	0	6,828	7,464	10,003	11,964	14,459	17,490	20,101	23,176	23,477	23,951	26,617	26,695	26,732	26,820
Net Operating Income	0	0	0	0	889	1,325	4,064	6,025	8,520	11,551	14,162	17,237	17,938	18,012	20,678	20,746	20,813	20,881
Depreciation	0	0	0	0	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939
Long-term Loans	7,355	124,661	178,942	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Outflow	0	3,942	40,751	162,258	40,344	3,237	3,127	3,017	2,907	2,797	8,380	8,172	9,852	9,056	8,981	8,906	8,831	8,756
Investment	0	3,942	40,712	160,163	36,993	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment of principal	0	0	0	611	613	611	611	611	611	611	6,283	6,462	8,110	7,499	7,499	7,499	7,499	7,499
Interest on Long-term Loans	0	0	39	1,485	2,736	2,626	2,516	2,406	2,296	2,187	2,077	1,910	1,742	1,557	1,482	1,407	1,332	1,257
Corporation Income Tax				0	-462	-275	387	905	1,556	2,341	3,021	3,832	4,049	4,114	4,799	4,835	4,870	4,906
Cash Balance	7,355	120,719	138,191	-162,258	-33,054	4,502	6,489	8,042	9,998	12,352	8,720	10,972	9,976	10,781	12,817	12,944	13,051	13,158
Cash Ending	7,355	128,074	266,265	104,006	70,952	75,455	81,944	89,986	99,982	112,334	121,054	132,026	142,002	152,783	165,620	178,564	191,614	204,772

Balance Sheet

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Current Assets	0	0	0	0	0	75,455	81,944	89,986	99,982	112,334	121,054	132,026	142,002	152,783	165,620	178,564	191,614	204,772
Cash & Deposit	0	0	0	0	0	75,455	81,944	89,986	99,982	112,334	121,054	132,026	142,002	152,783	165,620	178,564	191,614	204,772
Fixed Assets	0	3,942	44,654	204,817	235,875	229,935	223,996	218,057	212,118	206,178	200,239	194,300	188,361	182,421	176,482	170,543	164,604	158,664
Total Assets	0	3,942	44,654	204,817	235,875	305,390	305,940	308,043	312,100	318,512	321,293	326,325	330,362	335,204	342,102	349,107	356,218	363,437
Liabilities	0	3,942	44,693	206,341	309,737	309,126	308,515	307,905	307,294	306,683	300,400	293,938	285,827	278,328	270,828	263,329	255,829	248,330
Short-term Loans	-7,355	-128,074	-266,265	-104,006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-term Loans	7,355	132,016	310,958	310,347	309,737	309,126	308,515	307,905	307,294	306,683	300,400	293,938	285,827	278,328	270,828	263,329	255,829	248,330
Net Worth	0	0	-39	-1,524	-2,910	-3,736	-2,575	138	4,806	11,829	20,893	32,388	44,535	56,876	71,273	85,778	100,389	115,107
Total Liabilities & Net Worth	0	3,942	44,654	204,817	306,827	305,390	305,940	308,043	312,100	318,512	321,293	326,325	330,362	335,204	342,102	349,107	356,218	363,437

Financial Indicators

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Rate of Return Fixed Assets					0.4%	0.7%	1.8%	2.8%	4.0%	5.6%	7.1%	8.9%	9.5%	9.9%	11.7%	12.2%	12.6%	13.2%
Debt Service Coverage Ratio					2.04	2.31	3.20	3.97	4.97	6.25	2.40	2.77	2.42	2.64	2.96	3.00	3.03	3.06
Operating Ratio					93.4%	90.1%	77.7%	70.6%	63.4%	56.7%	52.2%	47.8%	46.8%	46.7%	43.3%	43.2%	43.1%	43.1%
Working Ratio					49.6%	51.5%	45.1%	41.6%	37.9%	34.4%	32.1%	29.8%	29.2%	29.2%	27.0%	27.0%	26.9%	26.9%

Income Statement

(Unit:USD)

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Operating Revenue	36,793	36,810	36,878	36,945	36,945	36,945	36,945	36,945	36,945	36,945	36,945	36,945	36,945	36,945	36,945
Operating Expenses	15,794	15,794	15,794	15,794	15,794	15,794	15,794	15,794	15,794	15,794	15,794	15,794	15,794	15,794	15,794
Personnel & Administration	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060
Maintenance	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795
Depreciation	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939
Net Operating Income	20,949	21,016	21,084	21,151	21,151	21,151	21,151	21,151	21,151	21,151	21,151	21,151	21,151	21,151	21,151
Interest on Long-term Loans	1,182	1,107	1,032	957	882	807	732	657	582	507	432	357	282	207	132
Net Surplus	19,767	19,909	20,052	20,194	20,269	20,344	20,419	20,494	20,569	20,644	20,719	20,794	20,869	20,944	21,019
Corporation Income Tax	0	0	5,013	5,049	5,067	5,086	5,105	5,124	5,142	5,161	5,180	5,199	5,217	5,236	5,255
Accumulated Earnings	134,874	154,783	169,822	184,967	200,169	215,427	230,742	246,112	261,539	277,022	292,561	308,157	323,809	339,517	355,281

Cash Flow

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Cash Beginning	204,772	222,979	241,328	254,807	268,392	282,034	295,731	309,485	323,296	337,162	351,085	365,064	379,099	393,191	407,339
Cash Inflow	26,838	26,955	27,023	27,090	27,091	27,090	27,090	27,090	27,090	27,090	27,090	27,090	27,090	27,090	27,090
Net Operating Income	20,949	21,016	21,084	21,151	21,151	21,151	21,151	21,151	21,151	21,151	21,151	21,151	21,151	21,151	21,151
Depreciation	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939
Long-term Loans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Outflow	8,631	8,606	8,531	8,456	8,381	8,306	8,231	8,156	8,081	8,006	7,931	7,856	7,781	7,706	7,631
Investment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment of principal	7,499	7,499	7,499	7,499	7,499	7,499	7,499	7,499	7,499	7,499	7,499	7,499	7,499	7,499	7,499
Interest on Long-term Loans	1,182	1,107	1,032	957	882	807	732	657	582	507	432	357	282	207	132
Corporation Income Tax	0	0	5,013	5,049	5,067	5,086	5,105	5,124	5,142	5,161	5,180	5,199	5,217	5,236	5,255
Cash Balance	18,207	18,349	13,479	13,585	13,642	13,696	11,754	13,810	13,867	13,923	13,979	14,035	14,092	14,148	14,204
Cash Ending	222,979	241,328	254,807	268,392	282,034	295,731	309,485	323,296	337,162	351,085	365,064	379,099	393,191	407,339	421,543

Balance Sheet

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Current Assets	222,979	241,328	254,807	268,392	282,034	295,731	309,485	323,296	337,162	351,085	365,064	379,099	393,191	407,339	421,543
Cash & Deposit	222,979	241,328	254,807	268,392	282,034	295,731	309,485	323,296	337,162	351,085	365,064	379,099	393,191	407,339	421,543
Fixed Assets	152,725	146,786	140,847	134,907	128,968	123,029	117,090	111,150	105,211	99,272	93,332	87,393	81,454	75,515	69,575
Total Assets	375,704	388,114	395,653	403,299	411,002	418,760	426,575	434,446	442,373	450,357	458,397	466,493	474,645	482,854	491,118
Liabilities	240,830	233,331	225,831	218,332	210,832	203,333	195,833	188,334	180,834	173,335	165,835	158,336	150,836	143,337	135,837
Short-term Loans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-term Loans	240,830	233,331	225,831	218,332	210,832	203,333	195,833	188,334	180,834	173,335	165,835	158,336	150,836	143,337	135,837
Net Worth	134,874	154,783	169,822	184,967	200,169	215,427	230,742	246,112	261,539	277,022	292,561	308,157	323,809	339,517	355,281
Total Liabilities & Net Worth	375,704	388,114	395,653	403,299	411,002	418,760	426,575	434,446	442,373	450,357	458,397	466,493	474,645	482,854	491,118

Financial Indicators

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Rate of Return Fixed Assets	13.7%	14.3%	15.0%	15.7%	16.4%	17.2%	18.1%	19.0%	20.1%	21.3%	22.7%	24.2%	26.0%	28.0%	30.4%
Debt Service Coverage Ratio	3.10	3.13	3.17	3.20	3.23	3.26	3.29	3.32	3.35	3.38	3.42	3.45	3.48	3.52	3.55
Operating Ratio	43.0%	42.9%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%
Working Ratio	26.8%	26.8%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%

Table 24.6.10 Financial Statement for Feasibility Study (High case)

(Unit:USD)

Income Statement

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Operating Revenue	0	0	0	15,455	17,842	21,051	24,687	27,750	32,013	32,266	32,753	32,902	33,229	33,235	35,396	35,397	35,397	35,397
Operating Expenses	0	0	0	6,339	12,864	14,627	14,949	15,307	15,681	16,070	16,070	16,070	16,070	16,070	16,070	16,070	16,070	16,070
Personnel & Administration	0	0	0	321	1,307	1,893	2,215	2,515	2,947	3,336	3,336	3,336	3,336	3,336	3,336	3,336	3,336	3,336
Maintenance	0	0	0	5,618	5,618	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795
Depreciation	0	0	0	0	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939
Net Operating Income	0	0	0	9,116	4,978	6,404	9,138	12,443	16,332	16,196	16,682	16,732	17,159	17,165	19,726	19,727	19,727	19,727
Interest on Long-term Loans	0	39	429	6,188	5,987	5,516	5,045	4,575	4,104	3,633	3,163	2,679	2,178	1,627	1,546	1,465	1,384	1,304
Net Surplus	0	-39	-429	2,928	-1,009	888	4,092	7,868	12,228	12,562	13,519	14,052	14,981	15,538	18,180	18,262	18,342	18,423
Corporation Income Tax					-252	222	1,023	1,967	3,057	3,141	3,380	3,513	3,745	3,885	4,545	4,565	4,586	4,606
Accumulated Earnings	0	-39	-468	2,460	1,203	2,369	5,438	11,339	20,510	29,932	40,071	50,610	61,846	73,499	87,134	100,830	114,587	128,405

Cash Flow

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Cash Beginning	0	3,413	89,088	136,181	104,808	71,556	75,547	81,941	91,166	103,662	116,408	128,578	139,378	145,862	155,377	166,875	178,433	190,052
Cash Inflow	7,355	124,661	178,942	9,116	10,917	12,343	15,077	18,382	22,271	22,135	22,621	22,671	23,098	23,104	25,665	25,666	25,666	25,666
Net Operating Income	0	0	0	9,116	4,978	6,404	9,138	12,443	16,332	16,196	16,682	16,732	17,159	17,165	19,726	19,727	19,727	19,727
Depreciation	0	0	0	0	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939
Long-term Loans	7,355	124,661	178,942	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Outflow	3,942	38,986	131,849	40,489	44,421	8,331	7,660	7,189	6,119	6,248	7,071	8,358	12,870	9,704	9,623	9,542	9,461	9,381
Investment	3,942	38,947	131,420	31,686	35,820	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment of principal	0	0	0	2,615	2,615	2,615	2,615	2,615	2,615	2,615	3,908	5,679	10,692	8,077	8,077	8,077	8,077	8,077
Interest on Long-term Loans	0	39	429	6,188	5,987	5,516	5,045	4,575	4,104	3,633	3,163	2,679	2,178	1,627	1,546	1,465	1,384	1,304
Corporation Income Tax				0	-252	222	1,023	1,967	3,057	3,141	3,380	3,513	3,745	3,885	4,545	4,565	4,586	4,606
Cash Balance	3,413	85,675	47,093	-31,373	-33,252	3,990	6,394	9,226	12,495	12,546	12,170	10,800	6,493	9,516	11,493	11,559	11,619	11,680
Cash Ending	3,413	89,088	136,181	104,808	71,556	75,547	81,941	91,166	103,662	116,408	128,578	139,378	145,862	155,377	166,875	178,433	190,052	201,732

Balance Sheet

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Current Assets	0	0	0	0	0	75,547	81,941	91,166	103,662	116,408	128,578	139,378	145,862	155,377	166,875	178,433	190,052	201,732
Cash & Deposit	0	0	0	0	0	75,547	81,941	91,166	103,662	116,408	128,578	139,378	145,862	155,377	166,875	178,433	190,052	201,732
Fixed Assets	3,942	42,889	174,309	205,995	235,876	229,936	223,997	218,058	212,119	206,179	200,240	194,301	188,362	182,422	176,483	170,544	164,605	158,665
Total Assets	3,942	42,889	174,309	205,995	235,876	305,483	305,938	309,224	315,780	322,587	328,818	333,679	334,223	337,800	343,358	348,977	354,657	360,397
Liabilities	3,942	42,928	174,777	206,535	305,129	303,114	300,500	297,885	295,270	292,656	288,748	283,069	272,378	264,301	256,224	248,147	240,070	231,993
Short-term Loans	-3,413	-39,068	-136,131	-101,908	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-term Loans	7,355	132,016	310,958	308,343	305,128	303,114	300,500	297,885	295,270	292,656	288,748	283,069	272,378	264,301	256,224	248,147	240,070	231,993
Net Worth	0	-39	-468	2,460	1,203	2,369	5,438	11,339	20,510	29,932	40,071	50,610	61,846	73,499	87,134	100,830	114,587	128,405
Total Liabilities & Net Worth	3,942	42,889	174,309	205,995	307,432	305,483	305,938	309,224	315,780	322,587	328,818	333,679	334,223	337,800	343,358	348,977	354,657	360,397

Financial Indicators

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Rate of Return Fixed Assets					2.1%	2.8%	4.1%	5.7%	7.7%	7.9%	8.3%	8.6%	9.1%	9.4%	11.2%	11.6%	12.0%	12.4%
Debt Service Coverage Ratio					1.27	1.52	1.97	2.56	3.31	3.54	3.20	2.71	1.79	2.38	2.63	2.69	2.71	2.74
Operating Ratio					72.1%	69.6%	62.1%	55.2%	49.0%	49.8%	49.1%	49.0%	48.4%	48.4%	44.9%	44.9%	44.9%	44.9%
Working Ratio					38.8%	41.3%	33.4%	33.8%	30.4%	31.4%	30.9%	30.9%	30.5%	30.5%	28.3%	28.3%	28.3%	28.3%

Income Statement (Unit:USD)

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Operating Revenue	35,798	35,798	35,798	35,799	35,799	35,799	35,799	35,799	35,799	35,799	35,799	35,799	35,799	35,799	35,799
Operating Expenses	16,070	16,070	16,070	16,070	16,070	16,070	16,070	16,070	16,070	16,070	16,070	16,070	16,070	16,070	16,070
Personnel & Administration	3,336	3,336	3,336	3,336	3,336	3,336	3,336	3,336	3,336	3,336	3,336	3,336	3,336	3,336	3,336
Maintenance	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795	6,795
Depreciation	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939
Net Operating Income	19,728	19,728	19,728	19,729	19,729	19,729	19,729	19,729	19,729	19,729	19,729	19,729	19,729	19,729	19,729
Interest on Long-term Loans	1,223	1,142	1,061	980	900	819	738	657	577	496	415	334	254	173	92
Net Surplus	18,505	18,586	18,667	18,748	18,829	18,910	18,991	19,071	19,152	19,233	19,314	19,394	19,475	19,556	19,637
Corporation Income Tax	0	0	4,667	4,687	4,707	4,727	4,748	4,768	4,788	4,808	4,828	4,849	4,869	4,889	4,909
Accumulated Earnings	146,910	165,495	179,495	193,557	207,678	221,861	236,104	250,407	264,771	279,196	293,681	308,227	322,833	337,500	352,228

Cash Flow

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Cash Beginning	201,732	218,099	234,547	246,410	258,333	270,317	282,362	294,467	306,633	318,859	331,146	343,494	355,902	368,371	380,900
Cash Inflow	25,667	25,667	25,667	25,668	25,668	25,668	25,668	25,668	25,668	25,668	25,668	25,668	25,668	25,668	25,668
Net Operating Income	19,728	19,728	19,728	19,729	19,729	19,729	19,729	19,729	19,729	19,729	19,729	19,729	19,729	19,729	19,729
Depreciation	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939	5,939
Long-term Loans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Outflow	9,300	9,219	9,138	9,057	8,977	8,896	8,815	8,734	8,654	8,573	8,492	8,411	8,330	8,250	8,169
Investment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment of principal	8,077	8,077	8,077	8,077	8,077	8,077	8,077	8,077	8,077	8,077	8,077	8,077	8,077	8,077	8,077
Interest on Long-term Loans	1,223	1,142	1,061	980	900	819	738	657	577	496	415	334	254	173	92
Corporation Income Tax	0	0	4,667	4,687	4,707	4,727	4,748	4,768	4,788	4,808	4,828	4,849	4,869	4,889	4,909
Cash Balance	16,367	16,448	11,862	11,924	11,984	12,045	12,105	12,166	12,226	12,287	12,348	12,408	12,469	12,529	12,590
Cash Ending	218,099	234,547	246,410	258,333	270,317	282,362	294,467	306,633	318,859	331,146	343,494	355,902	368,371	380,900	393,490

Balance Sheet

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Current Assets	218,099	234,547	246,410	258,333	270,317	282,362	294,467	306,633	318,859	331,146	343,494	355,902	368,371	380,900	393,490
Cash & Deposit	218,099	234,547	246,410	258,333	270,317	282,362	294,467	306,633	318,859	331,146	343,494	355,902	368,371	380,900	393,490
Fixed Assets	152,726	146,787	140,848	134,908	128,969	123,030	117,091	111,151	105,212	99,273	93,333	87,394	81,455	75,516	69,576
Total Assets	370,825	381,334	387,257	393,241	399,286	405,392	411,558	417,784	424,071	430,419	436,827	443,296	449,826	456,416	463,066
Liabilities	223,916	215,839	207,762	199,685	191,608	183,531	175,454	167,377	159,300	151,223	143,146	135,069	126,992	118,915	110,838
Short-term Loans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-term Loans	223,916	215,839	207,762	199,685	191,608	183,531	175,454	167,377	159,300	151,223	143,146	135,069	126,992	118,915	110,838
Net Worth	146,910	165,495	179,495	193,557	207,678	221,861	236,104	250,407	264,771	279,196	293,681	308,227	322,833	337,500	352,228
Total Liabilities & Net Worth	370,825	381,334	387,257	393,241	399,286	405,392	411,558	417,784	424,071	430,419	436,827	443,296	449,826	456,416	463,066

Financial Indicators

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Rate of Return Fixed Assets	12.9%	13.4%	14.0%	14.6%	15.3%	16.0%	16.8%	17.7%	18.8%	19.9%	21.1%	22.6%	24.2%	26.1%	28.4%
Debt Service Coverage Ratio	2.76	2.78	2.81	2.83	2.86	2.89	2.91	2.94	2.97	2.99	3.02	3.05	3.08	3.11	3.14
Operating Ratio	44.9%	44.9%	44.9%	44.9%	44.9%	44.9%	44.9%	44.9%	44.9%	44.9%	44.9%	44.9%	44.9%	44.9%	44.9%
Working Ratio	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%

24.7 Environmental Impact Assessment (EIA) for Jambi Port Development

The Environmental Impact Assessment for Jambi Port Development Project consists of three portions, 1) Environmental Condition in Chapter 20 gives existing condition of Natural and Social Environmental, 2) Initial Environmental Examination (IEE) in Chapter 23 gives initial examination of possible environmental impacts, and 3) this Section gives Environmental Management and Mitigation Measures.

This section describes the Environmental Management Plan (EMaP) for the proposed Talang Duku and Muara Sabak terminals development plan. It contains specific measures that will enhance potential positive impacts for the purpose of maximizing the beneficial impacts of the proposed project. Likewise, this section contains mitigation measures to minimize and lessen adverse effects at different stages of project implementation.

24.7.1 Identification of the Environmental Impacts

Based on the Initial Environmental Examination presented in Chapter 23. Environmental Impacts have been evaluated with following 4 grades (A – D):

A: Serious impact is expected
B: Some impact is expected
C: Extent of impact is unknown (further examination is needed, impact may become clear as study progress)
D: No impact is expected

From the result of IEE in Chapter 23, important environmental parameters affected by the project items are listed up as follows (refer to Tables 23.3.1 and 23.3.2).

24.7.2 Environmental Management and Mitigation Measures

Based on the analyses and forecasts of possible environmental impacts, it is recommended that the following environmental parameters should be considered as items for environmental management plan of this project:

- Economic Activities
- Traffic/Public Facilities
- Waste
- Fauna and Flora
- Air Pollution
- Water Pollution
- Soil Contamination
- Noise and Vibration

(1) Economic Activities

1) Description

In construction phase, the construction works of the terminal will provide job opportunities and absorb employee that comes from local people. They can get the new job from this project and indirectly in other new job occupation such as restaurants, boarding houses, car workshops and car rental, etc. In operational phase, business opportunities will open surrounding the terminal to support directly or indirectly the activities of the terminal operation.

2) Mitigation Measures

- Deserve high priority for employment of local people.
- Opportunity of job training should be provided.
- Executive organizations are IPC.

(2) Traffic/Public Facilities

1) Description

The number of coal transport trucks may increase with a new coal terminal to be operated in Talang Duku and road Traffic volume may increase with a new port development in Muara Sabak. As a result of the traffic volume survey by JICA Study team, 2,032/day vehicles (excluding motorcycles) is the current total traffic volume at the intersection of the entrance of Talang Duku terminal.

When the coal terminal is in operation in Talang Duku port, 400 vehicles/day dump trucks traffic is expected for coal transport to the terminal, which is 20 percent increase in daily traffic. The traffic accidents, degradation of the roads, resuspended dust are expected as environmental impacts.

While the traffic volume survey results indicate 161 vehicles/day (excluding motorcycles) at Muara Sabak, increase of traffic volume in Muara Sabak is also expected. However, absolute volume is still small compared to the road widths, and affected communities along the access roads are few.

2) Mitigation Measures

a. <u>Traffic Accidents</u>

The number of vehicles is anticipated to increase in construction and operation phases, especially carrier vehicles like container trailers. This involves increased risks of traffic accidents for the people living along the access roads to Talang Duku terminal development area. Following countermeasures are recommended to reduce the risks. Executing organizations are IPC, Jambi city, and Jambi Provincial Government.

- Public meetings should be held for safety education by IPC, Jambi city, and Jambi

Province. The meetings will be held for the people living along access roads, on community by community basis.

- Some publication for safety manners on the roads, like the brochures issued by IPC.
- The traffic enforcers or the helpers should be arranged for pedestrians crossing roads at the public facilities like schools and hospitals. They also contribute to solve the split of communities.

b. Degradation of the access roads and re-suspended dust

- Constant monitoring of pits and cracks on the roads pavement, rapid repaving should be required. Good control of pavement will make traffic flow smooth and contribute to higher transport speed.
- IPC and Jambi city government should sprinkle the roads with water.

(3) Waste

1) Description

Industrial Waste generated by the construction work is expected especially in construction phase such as frame, concrete, used oil and so on. And also waste will be generated in operational phase.

2) Mitigation Measures

- Some dumping sites should be prepared for the industrial waste from the port development activities.
- Some kind of materials can be recycled as construction material.
- Executing organization is IPC.

(4) Fauna and Flora

1) Description

Some water pollution is expected in construction and operation phases. Oil and grease, heavy metals, coal dust, and soil may flow into the river frequently, when they wash the heavy equipments, containers and some tools. These pollutants may disturb aquatic biology.

2) Mitigation Measures

- Sedimentation tank or other measures of sufficient capacity to trap silt laden water before discharge into the river should be provided.
- Optimum water treatment facility should be prepared, which gather drainage in the port area and introduce it to sedimentation pit, treatment facility, and then discharge to river. The sedimentation pit catches soil, dust, and coal dust physically. The treatment facility catches chemical contents.
- Discharge water should not exceed the environmental standards.

- Executive organization is IPC.

(5) Air Pollution

1) Description

The exhaust gas generated by construction vehicles and heavy equipment in the construction and operation phase is expected, and the traffic volume may increase by port facility construction. Re-suspended dust will be generated during construction and operation phases especially in dry season.

2) Mitigation Measures

- The heavy equipment must be converted from diesel engine to electric machinery, and if diesel equipment is used, they should be inspected to maintain good condition, especially for preventing carbon exhaust.
- For the re-suspended dust, sprinkling of water in the port area is recommended especially in dry season.
- Executing organization is IPC.

(6) Water Pollution

1) Description

The water pollution is expected in particular in construction and operation phases. Oil and grease, heavy metals, coal dust, and soil will fall into the river frequently, when they wash the heavy equipments, containers and some tools.

2) Mitigation Measures

- Sedimentation tank or other measures of sufficient capacity to trap silt laden water before discharge into the river should be provided.
- Optimum water treatment facility should be prepared, which gather drainage in the port area and introduces it to a sedimentation pit, treatment facility, and then discharges it to the river. The sedimentation pit catches soil, dust, and coal dust physically. The treatment facility catches chemical contents.
- Discharge water should not exceed the environmental standards.
- Executive organization is IPC.

(7) Soil Contamination

1) Description

Soil contamination by oil, grease, and other materials is expected in the construction phase. And ship operation may cause heavy metal accumulation to the bottom sediment.

2) Mitigation Measures

- Spill and dump prevention and control plan shall be prepared for prevention of soil and sediment contamination.
- Executiing organization is IPC.

(8) Noise and Vibration

1) Description

The noise and vibration are expected by operation of various construction equipments during the construction phase. Also traffic increase in operation phase may increase traffic noise.

2) Mitigation Measures

- Scheduling truck loading, unloading, and hauling operations so as to minimize noise and vibration impact.
- Utilization of stationary equipment so as to minimize noise impact.
- Scheduling work to avoid simultaneous activities that both generate high noise of vibration levels.
- Executing organization is IPC.

(9) Environmental Impacts caused by Closing Dyke studied in Dredging Chapter

1) Description

Closing Dyke is studied at the former navigation entrance of Batanghari River in the dredging Chapter in this Report. It was examined whether it is effective to reduce the volume of dredging in the navigation channel. It also seriously affects river current.

2) Mitigation Measures

- Since the water level down river goes down exceedingly after closing the river with a dyke, seawater will influence directly downstream of the Dyke. The salinity of the river will be changed from up and downstream of the dyke. However the brackish environment has high plastic features, so biota below and above the dyke may easily change to adapt to each environment.
- Socio-environmental impacts are expected rather than biota. When the Dyke closes a river that is a former navigation channel, not only fishing boats cannot go through this channel, but also small troopships.