30. MASTER PLAN

30.1 Channel Capacity

30.1.1 Number of Calling Vessels and Navigation Conditions

The number of calling vessels in the year 2000, 2007 and 2025 according to the traffic forecast for each type of vessel is shown in Table 30.1.1. The purpose of this chapter is to calculate the vessel waiting time in the access channel taking into account the navigation conditions. If the simulation yields an excessive waiting time, some measures will need to be taken.

The navigation conditions of the Mahakam River are shown in Table 30.1.2.

A numerical simulation model "WITNESS 2000" was employed to evaluate the above. The detailed explanation of the simulation model is given in section 30.12.

Table 30.1.1 Number of Calling Vessels

Berth	Vessel Type	2000 (nos./year)	2007 (nos./year)	2025 (nos./year)
Public Berth	General Cargo	2,152	1,276	1,185
	Container	303	542	985
	Passenger	50	70	79
Private Berth	Coal	2,210	2,315	4,761
	Timber & Log	2,530	2,357	1,491
	Others	3,070	4,863	3,661

Source : IPC IV Samarinda Office & JICA Study Team

Table 30.1.2 Navigation Conditions of Mahakam River

No.	Navigation Condition		Remarks
1.	Maximum Vessel Size	LOA = 153.0m, Draft = 6.80 m	
2.	Vessel Speed	less than 12 knots/hour	
3.	Navigation Activity	24 hours	
4.	Traffic	2 ways (except at narrow points)	One-way traffic at 6 points

Source: IPC IV Samarinda Office

30.1.2 Vessel Waiting Time in Mahakam River Channel

Two scenarios have been drawn up for the Short Term Plan (target year 2007) and Master Plan (target year 2025) of Samarinda: "Case 1 (Four-Berth Scenario)" and "Case 2 (Six-Berth Scenario)". Further explanation of each scenario is given in section 30.8.

The simulation results over a span of one year are shown below. The average channel waiting time for each case is given in Table 30.1.3.

Table 30.1.3 Average Vessel Waiting Time in River Channel

Scenario / Vessel Type	Case 1 (4-Berth Scenario)		Case 2 (6-Berth Scenario)	
	2007	2025	2007	2025
General Cargo	2.1 min.	2.1 min.	2.2 min.	2.2 min.
Container	2.2 min.	2.1 min.	2.1 min.	2.4 min.
Passenger	2.0 min.	2.2 min.	2.0 min.	2.2 min.
Coal	1.9 min.	2.1 min.	1.9 min.	2.1 min.
Timber & Log	2.0 min.	2.1 min.	2.0 min.	2.0 min.
Others	2.0 min.	2.1 min.	2.0 min.	2.1 min.

Source: by "WITNESS 2000" Simulation Result

According to the simulation results, the channel waiting time is minimal in both cases, just a few minutes. Therefore, there is no need to increase the depth and the width of the Mahakam River during the study period.

However, maintenance dredging will continue to be needed to keep a suitable channel depth.

30.2 Channel Sedimentation

30.2.1 Maintenance Dredging

A very large-scale delta 40 km in longitude and 60 km in latitude is formed at the river mouth of Sungai Mahakam. The main navigation channel to Samarinda has 65 km extension from the south entrance of the delta, and a 29 km portion of the navigation channel is maintained by dredging (see Figure 30.2.1).

This 29 km portion has nine divisions from south to north as follows.

1) Area Ia,	2) Area Ib Selatan,	3) Area Ib Utara,
4) Area II,	5) Area III Tenggara,	6) Area III Timur,
7) Area IV,	8) Area V Selatan,	9) Area V Utara

Although the original design section of the navigation channel had the following dimensions: bottom width: 80 m, depth: LWS-6.0 m and side slope: 1:6.0; the dimension of the channel has been changed in accordance with the limitation of the budget for the maintenance dredging (refer to Table 30.2.1).

The average yearly volume of the dredging in the navigation channel of Samarinda Port is about 1,600,000 m^3. The dredging work is carried out by hopper dredger and the dredged material, mainly sand and silt, is disposed of at two dumping areas located at 25 km offshore south of the delta and also along the river at the center of the delta (refer to Figure 30.2.1).

Table 30.2.1 Record of Maintenance Dredging in the Channel of Samarinda Port

Fiscal Year	Width of Channel	Depth of Channel	Dredging Volume (m^3)	Unit Price (Rp./m^3)	Expense (Rp.)
1990/91	70 m	6.0 m	2,000,000	980.00	1,960,000,000
1991/92	60 m	6.0 m	2,149,800	1,195.55	2,578,800,000
1992/93	70 m	6.0 m	2,100,000	1,800.00	3,780,040,000
1993/94	70 m	6.0 m	2,067,270	1,800.00	3,721,086,000
1994/95	70 m	6.0 m	1,617,467	2,550.00	4,124,540,850
1995/96	80 m	6.0 m	1,296,034	2,550.00	3,304,886,700
1996/97	70 m	6.0 m	1,333,333	2,550.00	3,400,000,000
1997/98	70 m	6.0 m	1,350,000	2,900.00	3,915,000,000
1998/99	80 m	6.0 m	1,351,724	2,900.00	3,920,000,000
99/2000	60 m	5.7 m	1,217,783	3,880.00	4,725,000,000
2000	60 m	5.7 m	1,175,288	3,880.00	4,560,117,000

Source: IPC4

Maintenance dredging of the fiscal year 2000 was executed by RUKINDO as follows.

Work Period: 150 days from the middle of August – 15 December 2000

Dredger: "Kalimantan II" for the channel division of Area I – Area III
(Trailing Suction Hopper Dredger, hopper capacity 4,000 m^3)
"Seram" for the channel division of Area IV and Area V
(Trailing Suction Hopper Dredger, hopper capacity 3,000 m^3)

The dredging work in 2001 is planned as 930,740 m^3 for the channel with dimensions of width: 70 m and depth: LWS-5.0 m. The budget is estimated as 5.58 billion Rupiah. The expense is shared by the following public organizations:

DGSC:	670,238 m^3	(72.0 %;	Area Ia, Ib)
IPC4:	70,504 m^3	(7.6 %;	Area II, III, IV, V Utara)
PERTAMINA	189,998 m^3	(20.4 %;	Area V Selatan)

The soundings (bathymetric surveys) and the maintenance dredging of the navigation channels in the Mahakam River were carried out at the times shown in the following table.

Table 30.2.2 Sounding and Dredging at Navigation Channel of Mahakam River

	year	1998												1999												2000											
Samarinda	month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Area Ia							S		D	D	D	D	D		S						D	D	D	D	D		S				S		D	D	D	S	D
Area Ib Selatan							S		D	D	D	D	D		S						D	D	D	D	D		S				S		D	D	D	S	D
Area Ib Utara							S		D	D	D	D	D			S					D	D	D	D	D			S			S		D	D	D	S	D
Area II							S		D	D	D	D	D			S					D	D	D	D	D			S			S		D	D	D	S	D
Area III Tenggara							S		D	D	D	D	D		S						D	D	D	D	D			S			S		D	D	D	S	D
Area III Timur							S		D	D	D	D	D		S						D	D	D	D	D			S			S		D	D	D	S	D
Area IV							S		D	D	D	D	D		S						D	D	D	D	D		S			S			D	D	D	S	D
Area V Selatan							S		D	D	D	D	D		S						D	D	D	D	D			S			S						
Area V Utara							S		D	D	D	D	D		S						D	D	D	D	D			S		S			D	D	D	S	D

S: Sounding D: Dredging

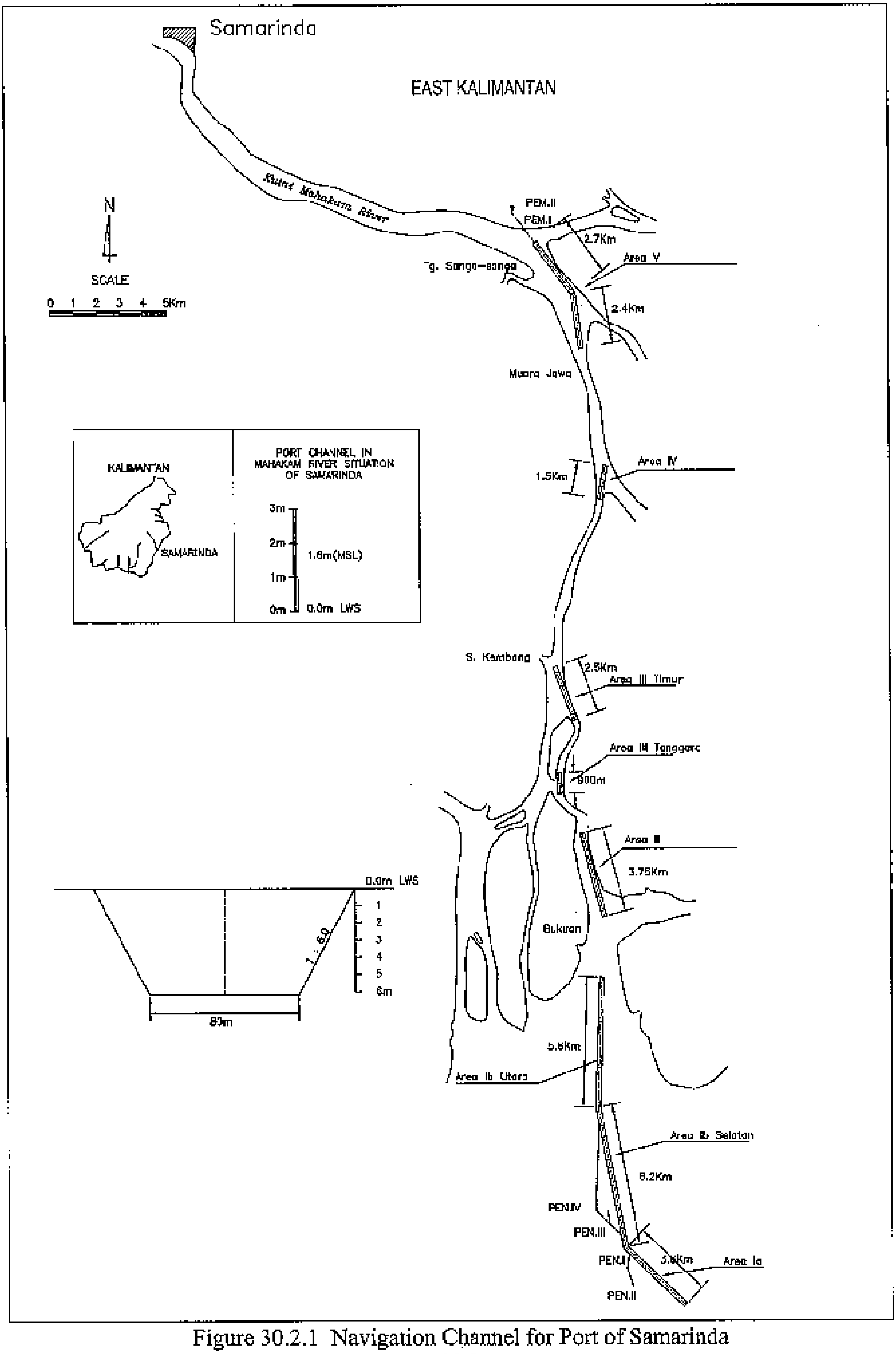


Figure 30.2.1 Navigation Channel for Port of Samarinda

30.2.2 Sedimentation and Riverbed Changes

A study on the notable features of the navigation channels and riverbed changes was carried out using channel sounding data (refer to Table 20.2.2). The names of the divisions of the navigation channels and the locations of the cross sections along the channel are shown in Figure 30.2.2.

(1) Longitudinal Profile of Riverbed Changes

a. <u>Area Ia - Ib</u>

The biggest riverbed changes are seen in this portion of the navigation channel approaching Samarinda Port. The depth of the changes exceeds one m/year as seen in the profiles (see Figure 30.2.3).

The profiles of February 1999 and February 2000 show the riverbed (one or two month after the dredging) with the bottom of the design section (LWS -5.7 m or –6 m).

The profile of June 2000 (a half-year after the dredging) shows big riverbed changes where the elevation of the channel bottom rose by 0.4 m to 1.0 m, and, in some portion, by 1.6 m. The riverbed changes are particularly big in Area Ib Utara.

A drop in elevation of the riverbed to about LWS-7 m is seen in the offshore portion of Outer Bar, which judging from the location, must have been caused by strong longshore tidal current that flushed sediment away.

b. <u>Area II - III</u>

There are several deep-water portions with LWS-8 to -10 m along the river channel that runs through Mahakam Delta (see Figure 30.2.4). Those portions are the contraction of the curved channel where the flow velocity increases and three-dimensional complicated flow takes place.

The profile of March 2000 shows the riverbed (right after the dredging) and the bottom of the design section (LWS -5.7 m or –6 m). The profile of June 2000 (a half-year after the dredging) shows big riverbed changes where the elevation of the channel bottom rose by 0.4 m to 0.6 m.

It is believed that the bottom elevation of the navigation channel won't become shallower than LWS -5 m in this division.

c. <u>Area IV - V</u>

The riverbed change in this division (see Figure 30.2.5) show its complicated aspect and wide range from LWS-4 m to –8 m.

The depth of changes in Area IV and Area V Utara is 0.2 to 0.3 m/year and is relatively small, while Area V Selatan shows the biggest riverbed changes among this portion of the channel ranging from 0.3 to 1.0 m/year.

(2) Cross Section Profile of Channel Area Ia - Ib

The profiles (see Figure 30.2.6) of February 1999 and February 2000 show the riverbed (right after the dredging) and the bottom of the design section. The profile of June 2000 (a half-year after the dredging) shows big riverbed changes where the elevation of the channel bottom rose by 1.0 m to 1.5 m.

The profile is flattened at Spot 0 which is located the farthest offshore of the navigation channel. It is assumed that the longshore tidal current offshore must have flushed sediment away.

The cross sections of this division show that the main part of the sedimentation takes place in the dredged and deepened part of the channel. It is assumed that in the process of sedimentation, the sediment is trapped in the deepened trench of the channel and deposited at the bottom.

(3) Cross Section Profile of Channel Area II - III

The riverbed in this division (see Figure 30.2.7) changes in the range from LWS -5 m to -6 m mainly at the center of the channel. The depth of the change is about 0.4 to 0.6 m.

Although the riverbed change is dynamically stable between the balance of deposition and erosion and the effect of the current, dredging of the channel is required to maintain the design depth and design width of the channel.

(4) Cross Section Profile of Channel Area IV - V

The riverbed in this division (see Figure 30.2.8) changes in the range from LWS -5 m to -7 m. The depth of the change is seen very big in the cross sections.

Four pipelines for oil and petroleum gas have been installed about 2 meters below the riverbed (approximately LWS -9 m) in the vicinity of Spot 1800 (Area V Selatan). The alignment of the navigation channel is off center to the right-hand side (west side) where the channel is shallower and also the riverbed change appears bigger than left-hand side.

The company that installed the pipelines insists that the alignment of the navigation channel should be rotated clockwise by 2° (to be shifted about 100 m to the left-hand side) so that maintenance dredging of Area V Selatan could become unnecessary. However, it will still be necessary to conduct follow-up surveys to capture the complicated aspects of the riverbed changes in the division.

Although the riverbed change in Area V Utara is dynamically stable between the balance of deposition and erosion and the effect of the current, the dredging of the channel is required to maintain the design depth and design width of the channel.

Figure 30.2.2 Location Map of Cross Section of Channel

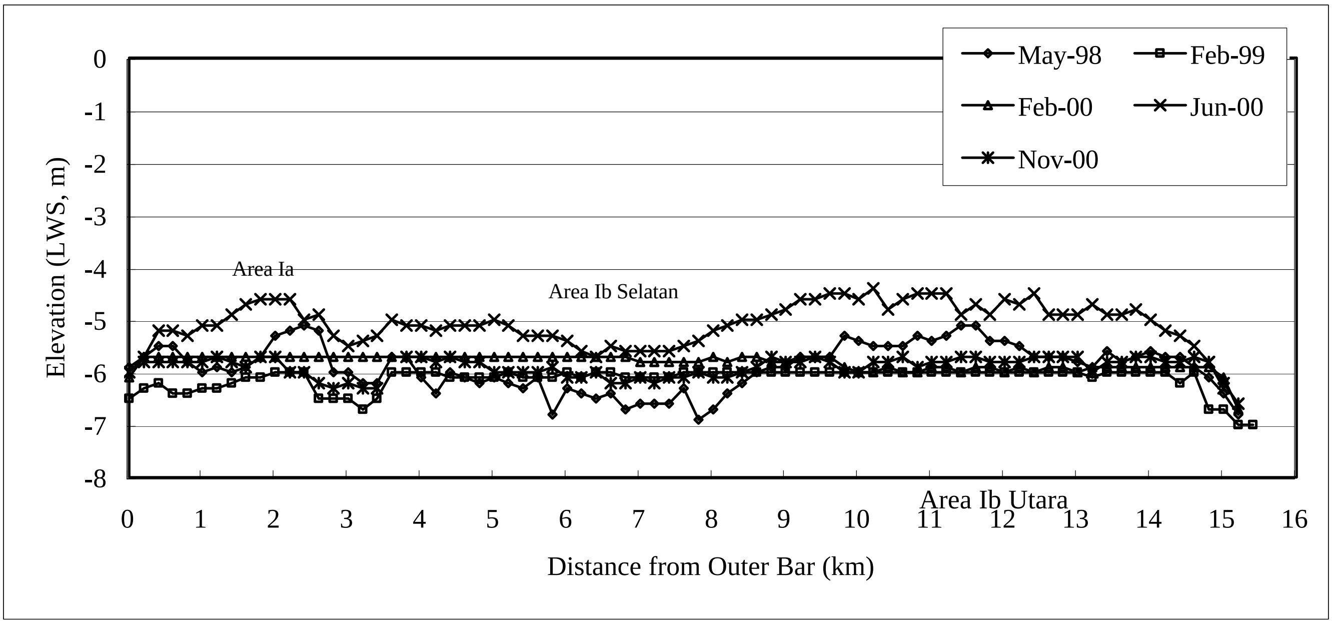


Figure 30.2.3 LongitudinalProfile of Riverbed Changes (Mahakam River; Area I)

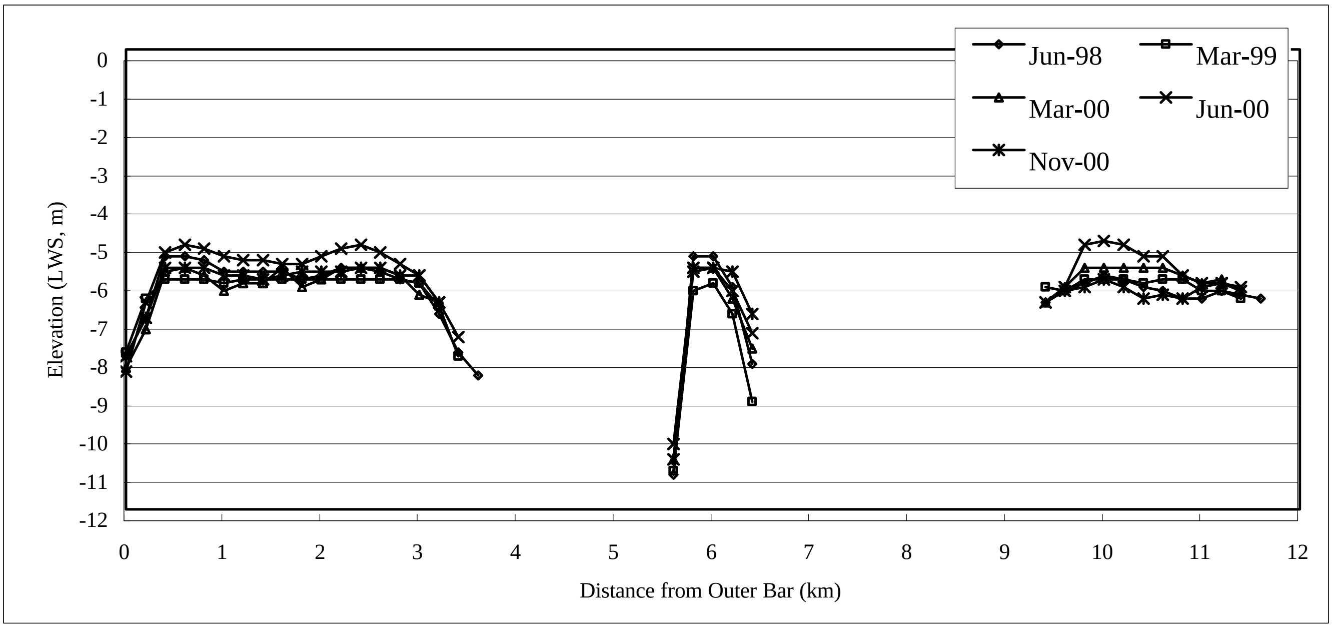


Figure 30.2.4 LongitudinalProfile of Riverbed Changes (Mahakam River; Area II - III)

Figure 30.2.5 LongitudinalProfile of Riverbed Changes (Mahakam River; Area IV - V)

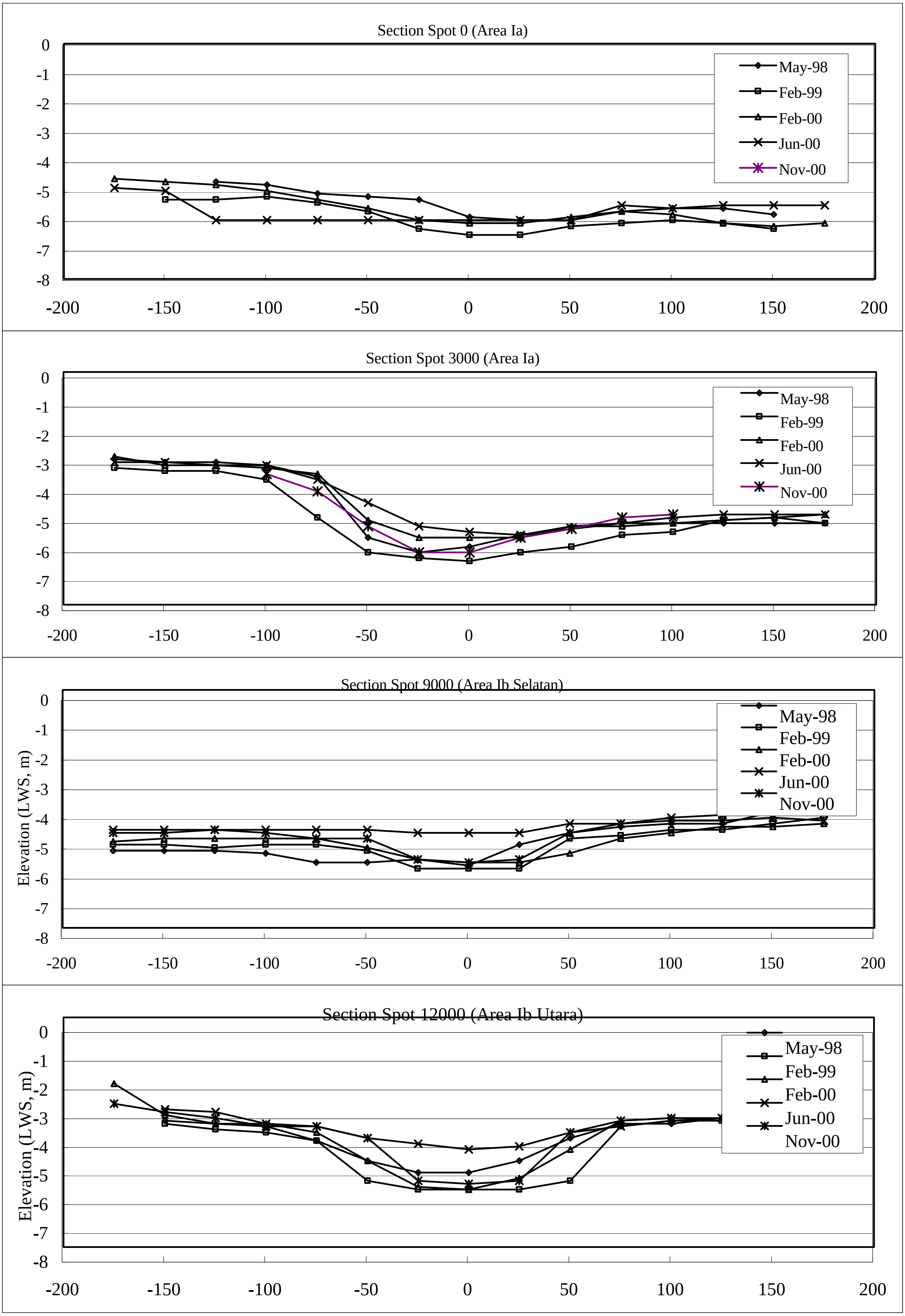


Figure 30.2.6 Cross Section of Navigation Channel (Area Ia - Ib)

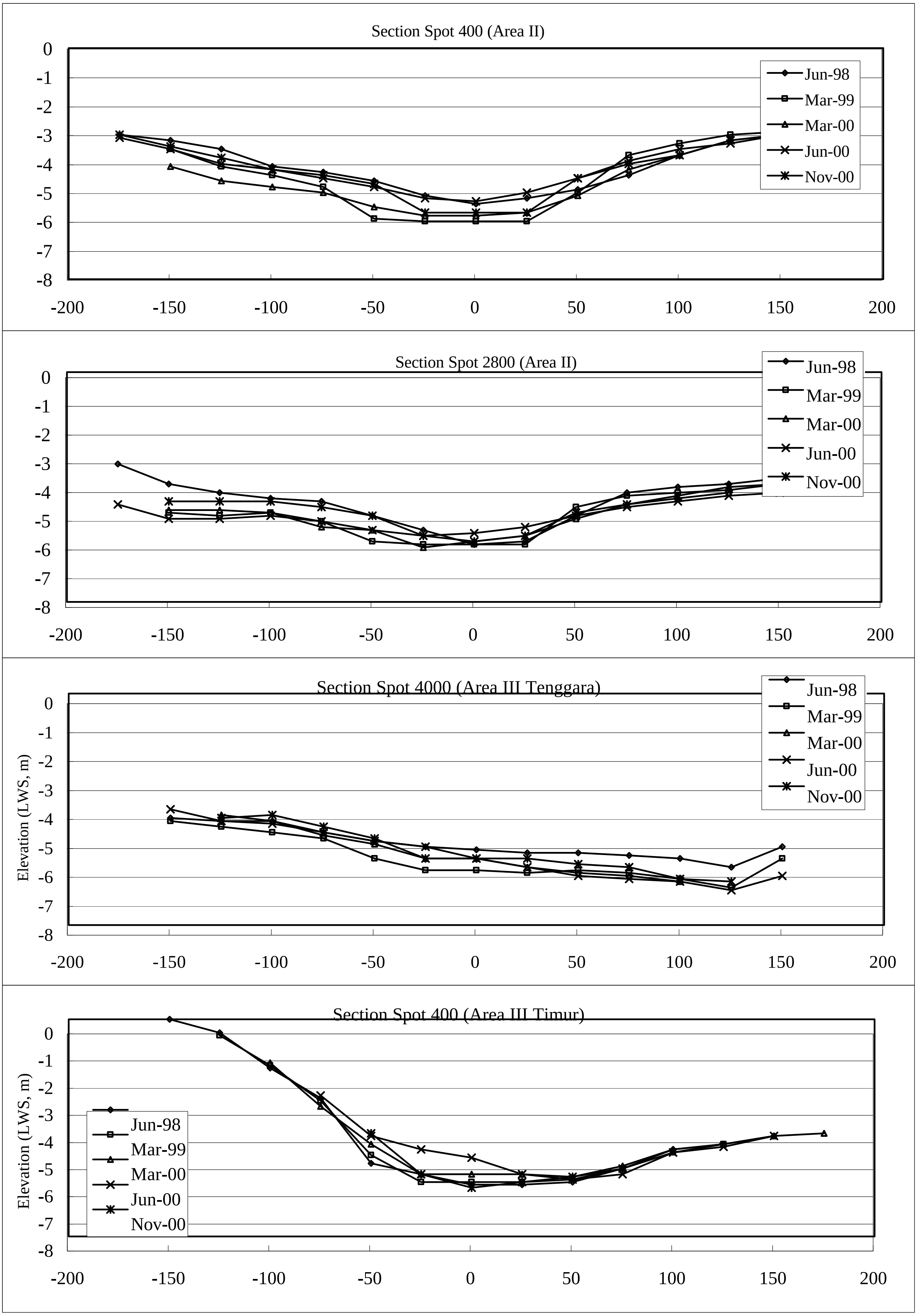


Figure 30.2.7 Cross Section of Navigation Channel (Area II - III)

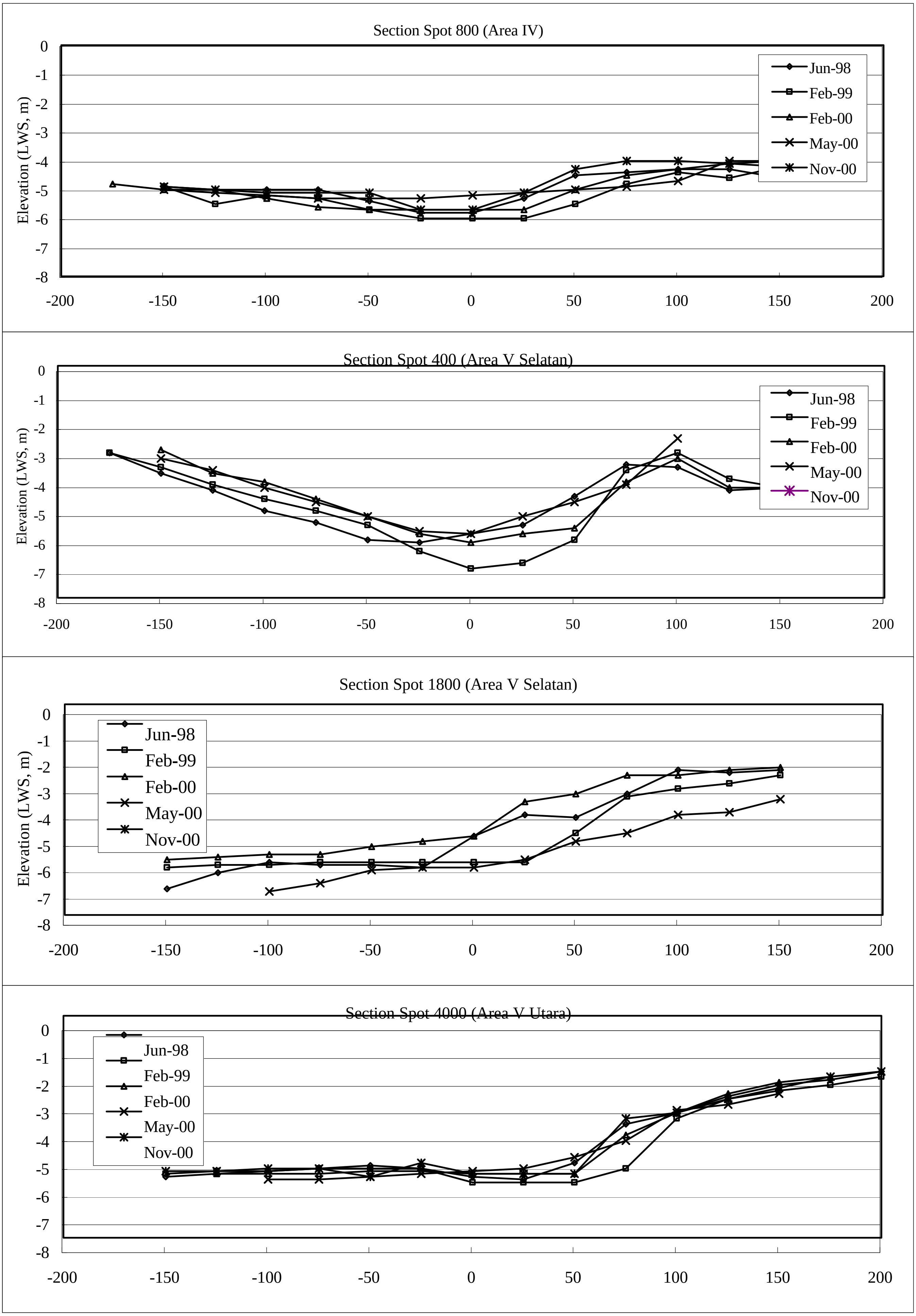


Figure 30.2.8 Cross Section of Navigation Channel (Area IV - V)

30.2.3 Dredging and Channel Management

(1) Necessity of Bathymetric Survey of River Channel

The riverbed changes have very complicated aspects in the river channel in the delta of Mahakam River mouth.

There are some portions of the channel where the alignment of the navigation channel appears off center to one side (the shallower side) of the river channel. In addition, pipelines have been installed only two meters below the bottom of navigation channel in the division of Area V Selatan.

Large shoreline change and riverbank erosion along Mahakam River are taking place in Mangkupalas and Palaran.

It is recommended, therefore, that bathymetric surveys should be conducted periodically in the river channel from the river mouth up to Samarinda and the characteristics of the riverbed changes should be captured.

(2) Improvement in Dredging Work

The cross sections in Figures 20.2.7 – 20.2.9 show that there are several portions of the navigation channel where dredging was carried out in excess of the design section and/or with deviation from the centerline. These are problems related to the positioning of the dredger vessels at work.

In order to improve the accuracy of the positioning and efficiency, the introduction of the global positioning system (GPS) to dredging work is recommended. Already, GPS has been introduced the newly equipped dredgers in Rukindo.

A sharp reduction of the working period is expected with GPS for maintenance dredging in the navigation channel of Samarinda Port from the five months (150 days) currently.

30.3 Optimum Dredging Plan and Countermeasures

30.3.1 Technical evaluation of dredging method

(1) Trailing Suction Hopper Dredger

The dredging method employed by the ports is the trailing suction hopper dredger. The trailing suction hopper dredger (TSHD; see Figure 22.3.1) is a self-propelled vessel with suction pipes suspended from one or from both sides. The dredged material is delivered through the suction pipes to the hopper. When the hopper is full, the vessel proceeds to the dumping site remote from the work site.

This type of dredger is widely used in the maintenance of channels, where its ability to maneuver as a ship is a distinct advantage. It is effective in silts, sands, clays and relatively loose materials as would be found in maintenance dredging.

In addition, since they are self-propelled, they can work in congested areas with minimum disruption to shipping traffic. It can work in sheltered and unsheltered waters such as channel entrances or far out to sea and under most weather and sea conditions.

Therefore, employing TSHD for maintenance dredging of the river channels is reasonable and appropriate. The problem area is the dimensions of TSHD.

Since the water depth in both Batanghari River and Mahakam River is shallow and limited, small – medium size dredger vessels are generally employed (hopper capacity: 2,000 - 4,000 m^3, loaded draught: 4 - 7 m).

Since the dredger has to go up and down between the work site and the dumping site frequently if the hopper capacity is small and limited, the Hopper capacity is closely related to the productivity of the dredging work. The performance of TSHD used in maintenance dredging of the river channels is 6,500 - 9,600 m^3/day. Although this productivity may seem rather small, there are limitations to adopting larger dredger vessels.

(2) Riverbed material

According to Figure 26.4.1, the riverbed materials distributed from the Samarinda Port up to the estuary area of Mahakam River range from clay or silt, fine sand to medium sand.

Fine and medium sand are distributed at the sampling points along the comparatively narrow channel (GS-01 to GS-05, GS-10, 12, 15) while, silty clay and/or silty fine sand are distributed on Outer Bar (GS-17～GS-21) and the divergent point of the channel (GS-06, GS-11, GS-16). These features suggest that the riverbed materials are well sorted by the current in the channel.

Density-in-situ is estimated from the results of the physical test of the riverbed materials and has range from 1.40 to 1.81 g/cm^3 (1.6 g/cm^3 on average; water content: 65 %).

(3) Dumping Area of dredged Soil

According to government guidelines, the dumping area of dredged soil is to be established at a location with over twenty meters in water depth or over three nautical miles from the dredging work site. Also, the current pattern in the sea area is taken into consideration to prevent the returning of dumped soil to the dredging work area.

In the case of Samarinda, the dumping area of the dredged soil is located at two sites (see Figure 30.3.1). The dumping area established south offshore of the Mahakam Delta is used as the site for the dredged soil from Area I, II and III. The location is about 6 miles from the south end of Area Ia and is over 30 m in depth.

The dredged soil from Area IV and V is carried and dumped at a dumping area along the river channel in the middle of Mahakam Delta. The location is 6 – 8 miles from the working sites in the channel. These dumping areas are established at appropriate locations.

(4) Modification of Channel Alignment

There is a part in the river channel of Mahakam River where the navigation channel runs through the shallower side of the river. Oil and gas pipelines have been installed several meters beneath the navigation channel of Area V Selatan.

Pertamina would like to avoid dredging in this area to protect the pipelines and has proposed to shift the channel alignment about 100 m to the left side of the river channel in this area so that the navigation channel runs through deeper portion of the river channel than –6 m (design depth).

It is technically possible to modify the channel alignment, and in fact, the maintenance dredging volume will be reduced if the navigation channel runs through the deeper side of the river.

However, the discharge from river has a large fluctuation and follow the same pattern every year. The riverbed changes caused by the sediment transport and siltation will not be steady or constant. Hence, it is considered necessary to confirm the stability and fluctuation of the riverbed changes based on the results of channel surveys conducted over the whole area of the management channel for several years on a regular basis.

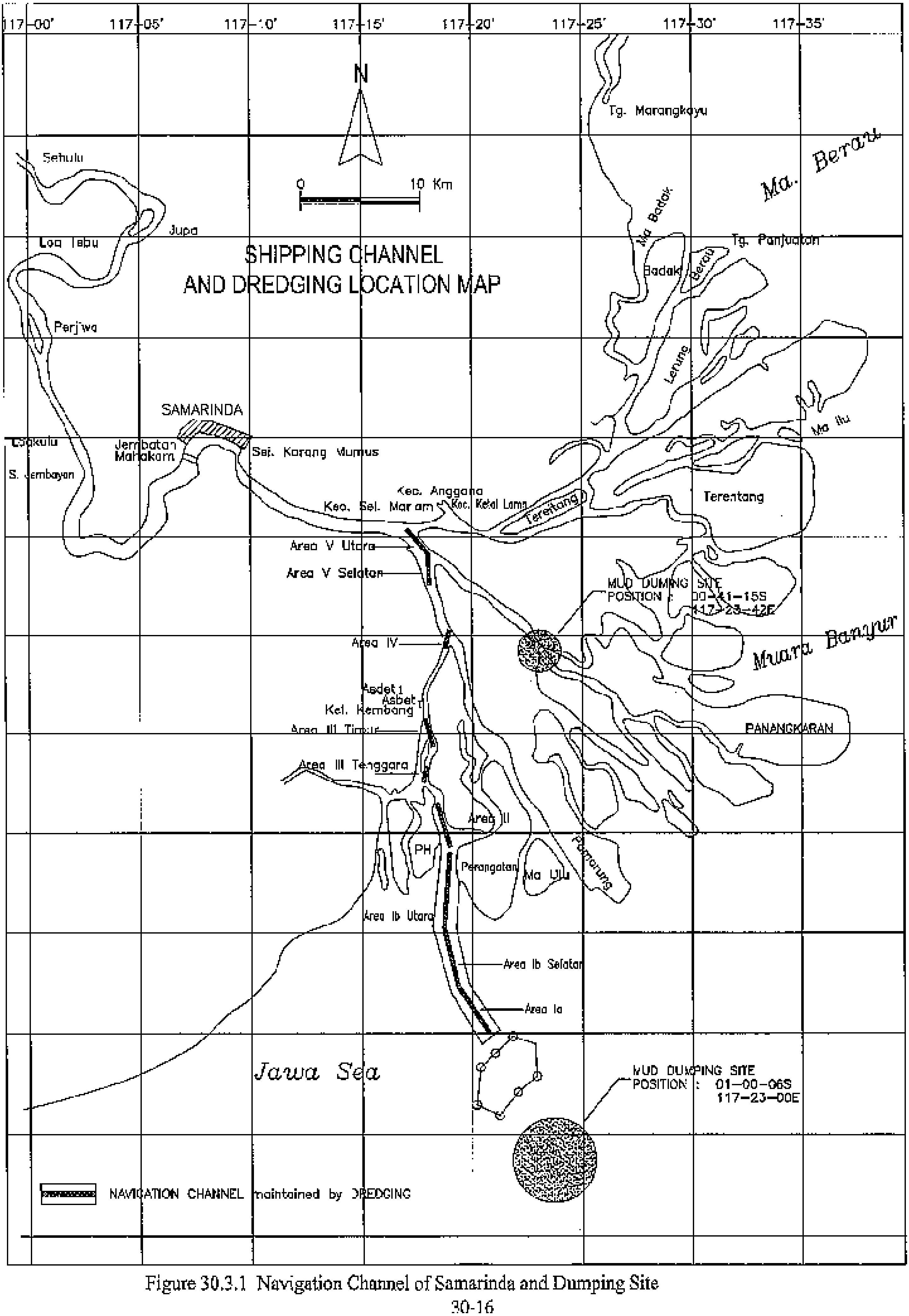


Figure 30.3.1 Navigation Channel of Samarinda and Dumping Site

30.3.2 Maintenance dredging for port development

(1) Maintenance dredging for port development

The volume of maintenance dredging in the Mahakam River channel was about 1,000,000 m^3/year in 2001 (up to –5 m of channel depth). In the case the design depth of the navigation channel is secured up to –6 m accompanying the port development at Palaran, the incremental volume is estimated as 600,000 m^3/year.

(2) Effect of structural countermeasure

The effect of the river structures to decrease the dredging volume is studied based on the actual riverbed changes and also using numerical simulation of siltation.

The river channel in the Tanjung Sanga-sanga area has two major branches (refer to Figure 30.2.1), which lose its flow and speed along the channel at the branches. Hence, significant deposition is taking place in those parts of the navigation channel (Area V Selatan and Utara; see Figure 30.2.5).

To block the branches of channel with Closing Dykes is considered in order to concentrate the river flow into the main stream of the channel and to decrease the volume of deposition. The location and cross section of the Closing Dyke are assumed as shown in Figure 30.3.2. The extension of construction is assumed 900 m in length (400 m at the Selatan channel and 500 m at the Utara channel; construction cost: 9.0 million USD).

The effects of river structures to decrease the dredging volume are very limited. The reduction of the maintenance dredging volume by the Closing Dykes is estimated as 250,000 m^3/year（about 0.35 million USD/year）. The construction cost of the Closing Dyke is equivalent to the maintenance dredging cost over 26 years.

An economic analysis of this case shows that the present values of the cost and benefit balance after 45 years of the construction under the condition of the discount rate: 1 %, while the balance is gained after 51 years under the discount rate 1.5 %.

The merit from the siltation prevention measures with river structures is very limited and small considering the restriction to the use of the river channel and the miscellaneous environmental risks.

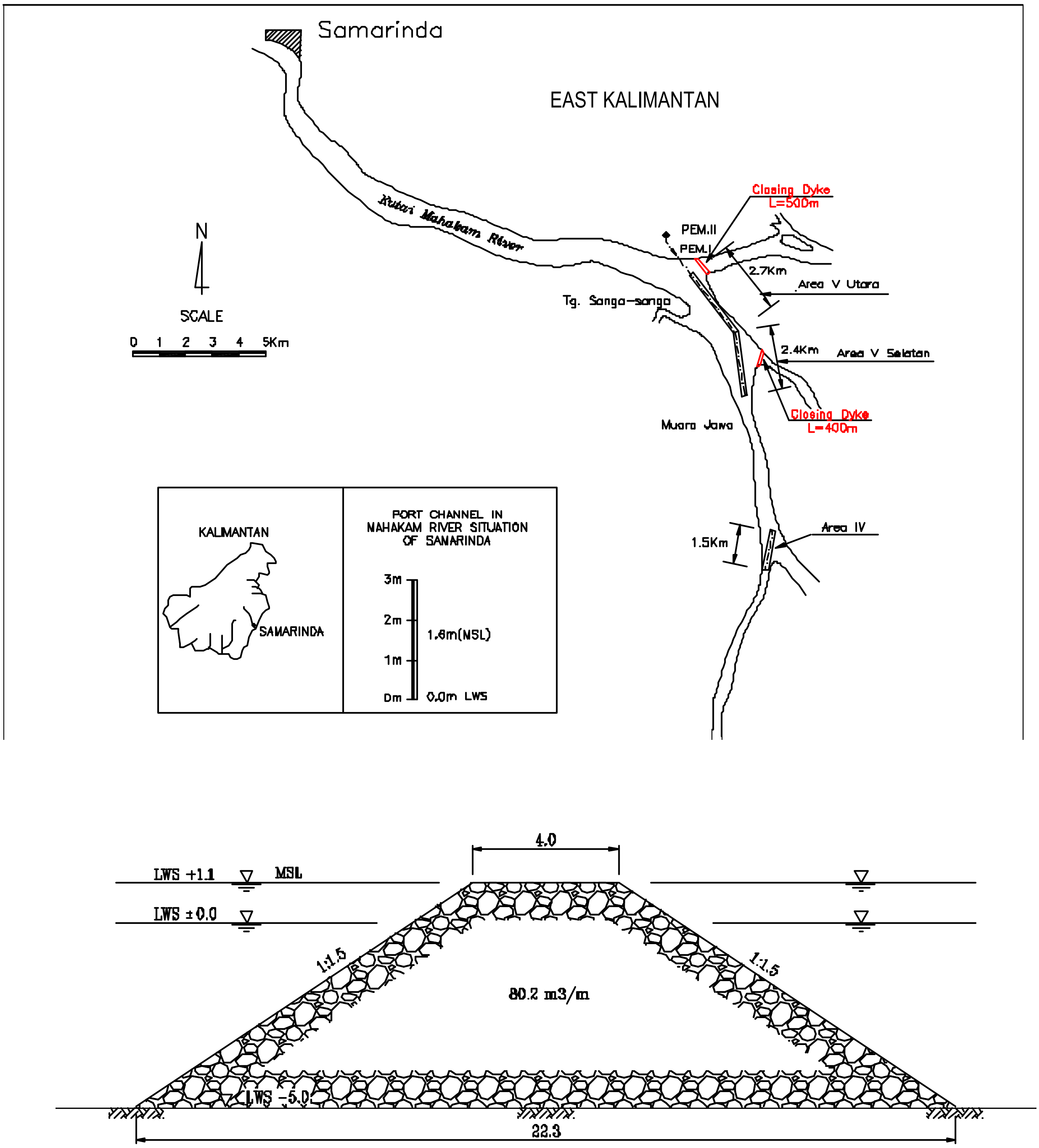


Figure 30.3.2 Location and Cross section of the assumed Closing Dyke in Mahakam River

30.4 Channel Dredging Scheme

30.4.1 Channel Management

IPC IV Samarinda branch office serves as the port authority and manages the Samarinda port. On the other hand, Samarinda ADPEL is responsible for the safe navigation along the Mahakam River. The port working area and the port interest area in this river and around its river mouth, should be reviewed not only to realize the best sharing scheme of dredging costs among the concerned parties but also to respond to the principles of the new port regulation (Government Regulation No.69/2001).

30.4.2 Cost Sharing for Maintenance Dredging

Judging from the past records, maintenance dredging of 1,600,000 m3 will be required every year. Accordingly, if a unit price is set at Rp.13,000/m3, about Rp.20,800 million is required for dredging per year. However the Samarinda branch office earns only Rp.13,979 million per year. Consequently, the Samarinda branch office will have to spend 1.5 times its income for dredging if the central government discontinues its subsidy. In this case, there will be no funds left for port development.

As the decentralization process progresses, the local governments and the private sectors are expected to play a greater role in realizing regional development.

The Study Team proposes a new cost-sharing scheme for maintenance dredging (Table 30.4.1) (Table 30.4.2). It is necessary to review the port working area and the port interest area in Samarinda port in line with the scheme.

The central government entrusts the port authority with the management of the "outer channel".

In this scenario, the port authority (IPC IV) manages the port interest area including the "outer channel" and “anchoring area”. A similar practice is undertaken in Japan. The Japanese government constructs major port facilities and entrust the port authority with their management.

The port working area will be limited inside the river reaching as far as the river mouth. IPC IV manages the "river channel" where dredging cost is comparatively small. In addition, IPC IV will get the port charge for the "outer channel" and anchoring area. The central government and IPC IV share the dredging cost of the “outer channel” through negotiation. It is also necessary to examine whether the existing port charges on special wharves should be revised.

Table 30.4.1 Distribution of the Responsibility for Maintenance Dredging

Channel	Owner	Management	Revenue	Dredging Cost
River Channel	IPC IV	IPC IV	IPC IV	IPC IV
Outer Channel	Central Government	IPC IV (entrusted by the Central Government)	IPC IV	IPC IV and Central Government

Table 30.4.2 Conceptual Dredging Cost Sharing Scheme for Samarinda Port Master Plan

Parties concerned	Current Scheme (until 1998)	Provisional Scheme (1999-2001)	Future Scheme (Draft)				Note (unit : million Rp)
			Maintenance Dredging 13,000m3/Rp		Initial Dredging		
			River Channel 400,000m3	Outer Channel (15.6 km) 1,200,000m3	River Channel	Outer Channel (15.6km)	
River Channels							
Central Government	50-100 %	50-90 %					
Port Authority I PC IV	0-50 %	10-50 %	2,600 (50%)				
Local Government	0 %	0 %	2,080 (40%) *-2		*-4		*-1
Related Business Circles (beneficiaries)	0 %	0 %	260 (5%) *-2		*-5		Beneficiary charge *-3
Calling vessels (greater than 150 GRT)	0 %	0%	260 (5%) *-2		*-5		Channel use charge *-3
Sub-total	100%	100%	5,200 (100%)				
Outer channel							
Central Government	50-100 %	50-90 %		7,800 (50%)			
Port Authority I PC IV	0-50 %	10-50 %		7,800 (50%)			
Sub-total	100%	100%		15,600 (100%)			

Note: *-1 Subsidy (within the budgetary limitation) from Province and Municipality

: *-2 Share is conceptual. Thorough review is needed after the available amount of the balancing fund is determined.

: *-3 Beneficiaries include the owners of special ports and vessels larger than 150t.

: *-4 IPC IV may ask for financial support after the available amount of the balancing fund is determined.

: *-5 IPC IV may ask for financial support after private industries start operation around Samarind

30.5 Vessels for Samarinda and their Cost for Container Transport

In the same way as for Jambi, the relationships between L_{OA} and draft for Indonesian fleet, and L_{OA} - draft relations for the study port regulated by the Navigation Rules are studied for Samarinda Port and navigation channels (refer to Figures 22.5.1, 22.5.2 and 22.5.3).

(1) Conceptual design of vessels for Samarinda route

The conceptual design for three feeder service container vessels has been carried out. Particulars of these vessels are shown in Table 30.5.1.

1) Ordinary type vessel, for water depth 6m
2) Ordinary type vessel, for water depth 5m
3) Shallow draft vessel, for water depth 5m

Table 30.5.1 Conceptual Design of Feeder Vessels and their Particulars

		Ordinary vessel water depth, 6m	Ordinary Vessel water depth, 5m	Shallow draft vessel water depth, 5m
Carrying capacity	(TEU)	350	180	290
Annual carry. cap.	(TEU)	45,150	23,220	37,410
L_{OA}	(m)	149.0	110.0	149.0
Breadth	(m)	18.0	15.5	18.0
Draft	(m)	5.5	4.5	4.5
GRT		5,700	2,600	4,200
DWT	(t)	6,300	3,200	5,200
Main engine	(HP)	4,600	2,700	4,400
Speed	(knot)	13.5	13.5	13.5

Conceptual design plans of general arrangement and midship section for Types 1) and 3) vessels are attached (refer to Figure 30.5.1 and Figure 30.5.2).

Type 2) vessel container in hold 4 rows, 2 tiered and 10 bays
on deck 6 rows, 2 tiered and 10 bays

(2) Estimation of transport cost

The cost of the container transport for the following route has been analyzed. Cost of the container transport is shown in Table 30.5.2.

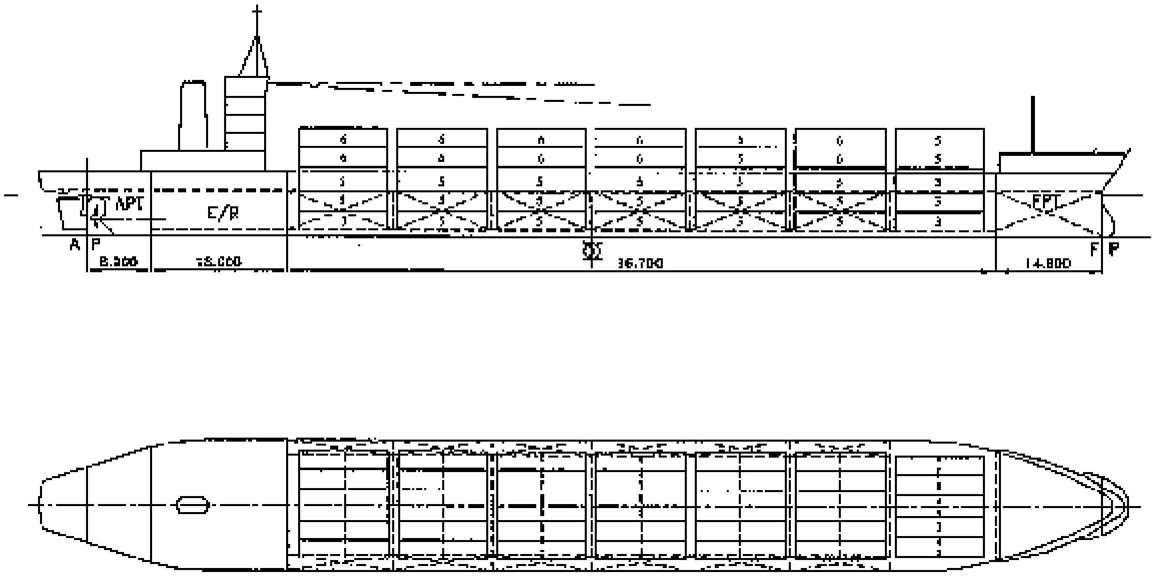
Samarinda ～ Surabaya ～ Samarinda (566 nautical miles, 64.5 round / year)

1) The cost of transporting one TEU container using shallow draft vessel (water depth 5m) is higher than that of transporting by ordinary type vessel (water depth 6m) by about 7%. It is necessary to compare this transporting cost with the dredging cost of the channel from 5m to 6m.
2) In ordinary type vessel, the cost of transporting one TEU container using vessel of 5m water depth is higher than that of 6m water depth vessel by more than 30%.
3) If the vessel can not load fully(for example 70% load), the cost of transporting one TEU container is higher than that of fully loaded vessel by more than 20%.

Table 30.5.2 Cost Estimate for the Container Transport (Samarinda Route)

		Ordinary type vessel, water depth, 6m	Shallow-draft vessel, water depth, 6m	Ordinary type vessel, water depth, 5m	Shallow-draft vessel, water depth, 5m
Carrying capacity	(TEU)	350	460	180	290
Annual carry. cap.	(TEU)	45,150	59,340	23,220	37,410
L_{OA}	(m)	149.0	153.0	110.0	149.0
Breadth	(m)	18.0	22.0	15.5	18.0
draft	(m)	5.5	5.5	4.5	4.5
GRT		5,700	7,200	2,600	4,200
DWT	(t)	6,300	8,100	3,200	5,200
Main engine	(HP)	4,600	5,100	2,700	4,400
Speed	(knot)	13.5	13.5	13.5	13.5
Ship price	(million Rp)	72,800	93,100	33,600	56,000
Depreciation	(million Rp/year)	4,368	5,586	2,016	3,360
Interest	(million Rp/year)	3,185	4,071	1,470	2,450
Administration	(million Rp/year)	1,477	1,484	1,463	1,470
Insurance	(million Rp/year)	294	378	147	245
Manning	(million Rp/year)	11,375	11,375	11,375	11,375
Repair & Maint.	(million Rp/year)	917	1,057	518	847
Lubricant oil	(million Rp/year)	182	200	105	175
Store	(million Rp/year)	609	614	595	609
Tax	(million Rp/year)	49	58	21	35
Bunker	(million Rp/year)	3,619	3,899	2,583	3,507
Port cost	(million Rp/year)	8,806	8,806	8,806	8,806
Terminal cost	(million Rp/year)	33,278	43,743	17,115	27,573
Total cost	(million Rp/year)	68,159	81,271	46,214	60,452
Cost / TEU	(‘000 Rp)	1,510	1,370	1,990	1,616

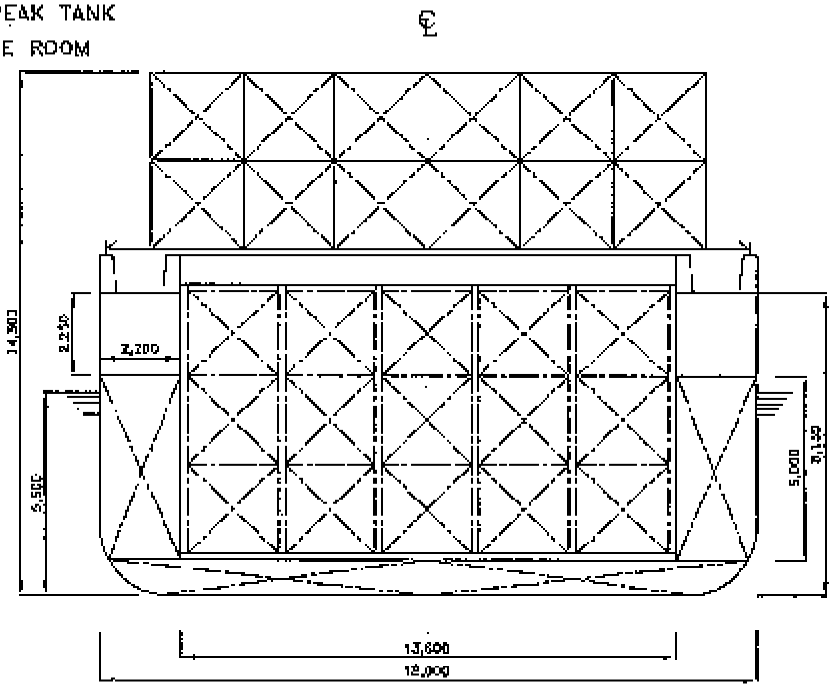
Reference : “Strategy and Profitability in Global Container Shipping” Drewry 1991
“Global Container Markets” Drewry 1996 , etc.



350 TEU CONTAINER SHIP GENERAL ARRANGEMENT
SCALE 1:1,000

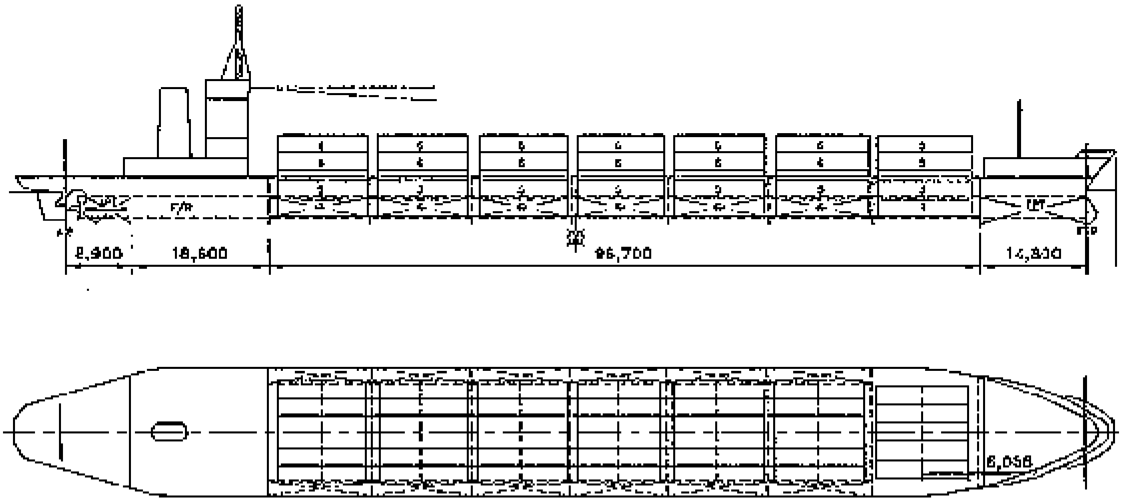
LEGEND:

FP : FORE PERPENDICULAR
AP : AFT PERPENDICULAR
⊠ : MIDSHIP
FPT : FORE PEAK TANK
APT : AFT PEAK TANK
E/R : ENGINE ROOM



MIDSHIP SECTION
SCALE 1:200

Figure 30.5.1 General Arrangement and Midship Section for ordinary type vessel
(water depth: 6m)



290TEU CONTAINER SHIP GENERAL ARRANGEMENT

SCALE 1:1,000

LEGEND:

FP : FORE PERPENDICULAR

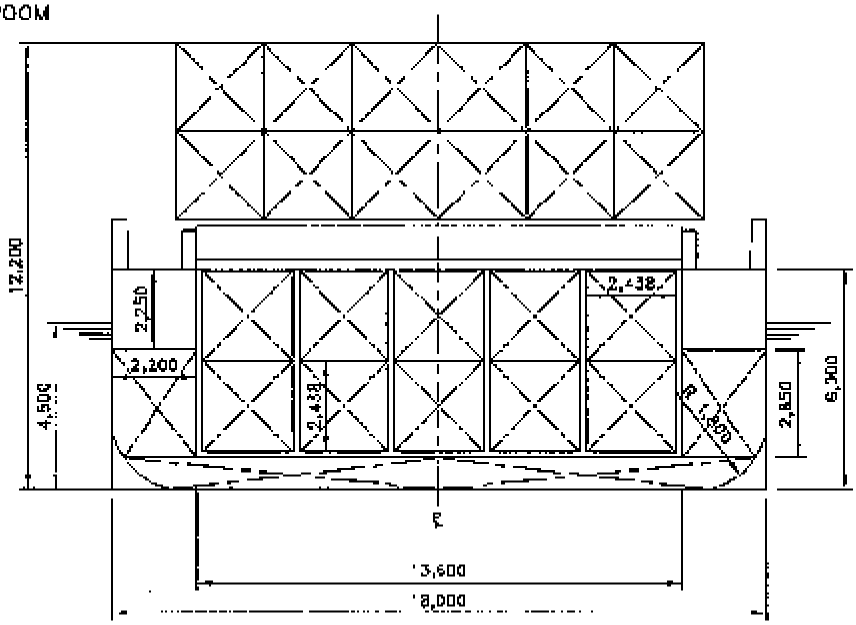
AP : AFT PERPENDICULAR

⊠ : MIDSHIP

FPT : FORE PEAK TANK

APT : AFT PEAK TANK

E/R : ENGINE ROOM



MIDSHIP SECTION

SCALE 1:200

Figure 30.5.2 General Arrangement and Midship Section for shallow draft vessel
(water depth: 5m)

30.6 Capacity Requirements

30.6.1 Assumptions

In order to estimate the capacity requirements of the public ports, the Study Team assumed the following:

1) Traffic Projection (Summarized in Table 30.6.1)
2) Distribution of the port functions between the existing terminal and Palaran
3) Baseline Productivity (Table 26.1.1)
4) Capacity of the existing port (Chapter 26.1.2)

Table 30.6.1 Traffic Projection Summary

(General Cargoes in Million Tons, Containers in TEU)

Cargoes	2000	2007	2025	Annual Growth Rate 2000-2025 (Average)
International Cargo	5.2	8.4	18.3	5.2 %
Domestic Cargo	3.1	4.4	7.8	3.8 %
All Cargo	8.4	12.8	26.0	4.7 %
of which:				
Containers (TEU)	37,000	79,000	406,000	10.0 %
Coal	4.5	0.6	2.0	6.9 %
Logs and Timber Products	2.5	2.7	2.9	<1.0 %
Public Cargo	1.2	2.3	6.3	6.7%
of which:				
Containers (TEU)	69,000	160,000	399,000	5.2%(2007-2025)
General Cargo	344	455	1,065	
Passengers	197,000	277,000	472,000	3.6 %

Source: JICA Team

Table 30.6.2 Container Traffic (TEU)

Container & Cargo	2000	2007	2025	Annual Growth Rate (2000-2025)
Total Containers in the Catchment Area	70,000	175,000	500,000	8.2 %
Assumed diversion to Balikpapan	-	20 %	20 %	
Containers to be handled at Samarinda	13,000	160,000	399,000	5.2 % (2007-2025)
Remaining General Cargo (ton)	344,000	455,000	1,065,000	4.8 %

Source: JICA Team

30.6.2 Berth Requirements

(1) Palaran Container Terminal

1) 6-Berth Scenario

6-berth scenario is examined in case necessary waterfront for future container handling can be acquired in Palaran. This scenario assumes 18-hour operation and 20 TEU productivity of the terminal with one container crane. RTG system is also introduced in the terminal to carry out container handling operation at yard.

Demand is estimated at 160,000 TEU/year in 2007 and 399,000 TEU/year in 2025.
Capacity requirement = (Demand) – (Existing capacity)

Short-term

Since the existing wharves will be dedicated to general cargo, new container terminals need to be constructed to respond to the demand.

Capacity with 3 berths with a gantry = 3 berths x 365 days x 18 hours/day x 0.8 x 20 TEU/crane x 0.55 (three-berth group) = 173,000 TEU

Hence, 3 new berths with a gantry are needed in the short-term.

Ground slots = 160,000 TEU x 5 days (dwelling time) / 0.6 (yard operation ratio) / 365 days / 4 tiers(RTG) = 913 TEU
Container terminal area = 913 TEU / 260 TEU/ha (land use ratio) / 0.6 (yard area ratio) = 5.9 ha

Long-term

Capacity with 6 berths with a gantry = 6 berths x 365 days x 18 hours/day x 0.8 x 20 TEU/crane x 0.7 (six-berth group) = 441,504 TEU

Hence, 6 new berths with a gantry will be needed for the long-term.

Ground slots = 399,000 TEU x 5 days (dwelling time) / 0.6 (yard operation ratio) / 365 days / 4 tiers (RTG) = 2,277 TEU
Container terminal area = 2,277 TEU / 260 TEU/ha (land use ratio) / 0.6 (yard area ratio) = 15 ha

2) 4-Berth Scenario

4-berth scenario is examined just in case large land area cannot be acquired. This scenario assumes 24-hour operation and higher productivity of the terminal in order to make up for the shorter quay length. Number of the handling equipment and depth of the terminal differ depending on the scenario. Other than that, the project profiles are the same as those of the 6-berth scenario.

As stated above, demand is estimated at 160,000 TEU/year in 2007 and 399,000 TEU/year in 2025.

Capacity requirement = (Demand) – (Existing capacity)

Short-term

Capacity with 2 berths with a gantry = 2berths x 365 days x 24 hours/day x 0.8 x 24 TEU/crane x 0.5 (two-berth group) = 168,000 TEU

Hence, 2 new berths with two gantries are needed in the short-term.

Ground slots = 160,000 TEU x 5 days (dwelling time) / 0.6 (yard operation ratio) / 365 days / 4 tiers (RTG) = 913 TEU
Container terminal area = 913 TEU / 260 TEU/ha (land use ratio) / 0.6 (yard area ratio) = 5.9 ha

Long-term

Capacity with 4 berths with a gantry = 4 berths x 365 day x 24 hours/day x 0.8 x 24 TEU/crane x 0.6 (four-berth group) = 404,000 TEU

Hence, 4 new berths with four gantries will be needed in the long-term.

Ground slots = 399,000 TEU x 5 days (dwelling time) / 0.6 (yard operation ratio) / 365 days / 4 tiers (RTG) = 2,277 TEU
Container terminal area = 2,277 TEU / 260 TEU/ha (land use ratio) / 0.6 (yard area ratio) = 15 ha

(2) Existing Terminal for General Cargo

Demand is estimated at 455,000 t/year in 2007 and 1,065,000 t/year in 2025.

Capacity requirement = (Demand) – (Existing capacity)

Short-term

Capacity of 4 berths = 4berths x 365 days x 16 hours x 0.8 (work time ratio) x 20 t/hour/gang x 2gangs x 0.6(berth occupancy ratio, 4-berth group) = 448,512 t/year

Since this is almost equivalent to the estimated demand, 4 berths will be sufficient in the short-term. Consequently, the remaining part of the existing terminal will be ready for rehabilitation after container operation moves to Palaran.

Long-term

Capacity of 9 berths = 9 berths x 365 days x 16 hours x 0.8 (work time ratio) x 20 t/hour/gang x 2gangs x 0.7 (berth occupancy ratio) = 1,177,344 t/year

Hence, 9 berths will be needed in the long-term. Since this will require more than the existing quay length in the terminal, creation of wharves will be needed to make the entire waterfront of the terminal available for general cargo handling in the long-term. In relation to this, the existing passenger terminal also needs to be relocated to make room for general cargo.

(3) Passenger Terminal

Demand is estimated at 277,000 passengers/year in 2007 and 472,000 passengers/year in 2025

Capacity requirement = (Demand) – (Existing capacity)

Short-term

Capacity of 1 berth

The existing capacity is greater than the demand for 2007 and thus sufficient for the short-term

Long-term

New passenger terminal will be created out of the existing terminal.

30.6.3 Summary

Table 30.6.3 Capacity Requirements Summary

Terminal Location	Facility	Required Berths	
		2007 (Short-term)	2025 (Long-term)
Palaran	New Container Terminal	3 (2)	6 (4)
Existing	General Cargo Terminal	4	9
Selili	New Passenger Terminal	0 (1 at Samarinda)	1

Note: Number in a parenthesis corresponds with the 4-berth scenario.

30.7 Alternative Layout

30.7.1 Palaran Container Terminal Plan

As stated in the previous chapter, Palaran is the most recommendable project site for a new container terminal. The area of Palaran is 77 ha, quite large. However, the waterfront is 500 m. According to cargo demand forecast at Samarinda, at least 6 container berths need to be operational in the target year 2025. Taking calling vessel size into account, total berth length should be 750 m (125 m x 6 = 750 m). Palaran's 500 m waterfront is able to provide 4 container berths for a new terminal, but not able to afford 6 berths there. This means that the project site at Palaran is sufficient in terms of space, but not sufficient in terms of waterfront length. Further waterfront acquisition is needed in order to realize a modern container terminal at Palaran in the target year 2025.

On the other hand, there is another candidate project site at Mangku Palas, just on the opposite bank of the Mahakam River to the existing port. 7 ha space and some 400 m waterfront at Mangku Palas are able to provide 2 container berths for a new terminal, but not able to afford 6 berths there. There is an alternative that a new container terminal may be divided into two terminals, that is, 4 berths at Palaran and 2 berths at Mangku Palas. This scenario will be one of answers for coping with rapidly increasing container cargo in future. However, cargo handling, in particular, container cargo handling requires stretch and continuous wharves to mobilize a set of modern equipments as efficiently as possible. Thus, two-terminal scenario will turn out to reduce the cargo handling efficiency to a significant extent.
All these taken into account, the Study Team proposes that the project site at Palaran should be developed in the short run, and that the site Palaran should be extended along the riverside by means of further waterfront acquisition in the long run.

30.7.2 Selili Passenger Terminal

As stated in the previous chapter, Selili is the most recommendable project site for a new passenger terminal. The area at Selili is sufficient, and distance from the city center is only 1 km, nearest among five alternative project sites. A new passenger terminal requires 1 ha land and 120 m long passenger wharf. Therefore, the project site should be located at the riverside, first of all. And then, the site should be also near the access road from the city center in order to secure the convenience for passengers. Needless to say, the actual project site will be depending on land acquisition process in future. The true project site will be identified by the result of land acquisition at that time. However, when land acquisition is initiated, the project site should be determined on the basis of securing the convenience for passengers, that is, at the riverside, nearest to the city and nearest to the access road.

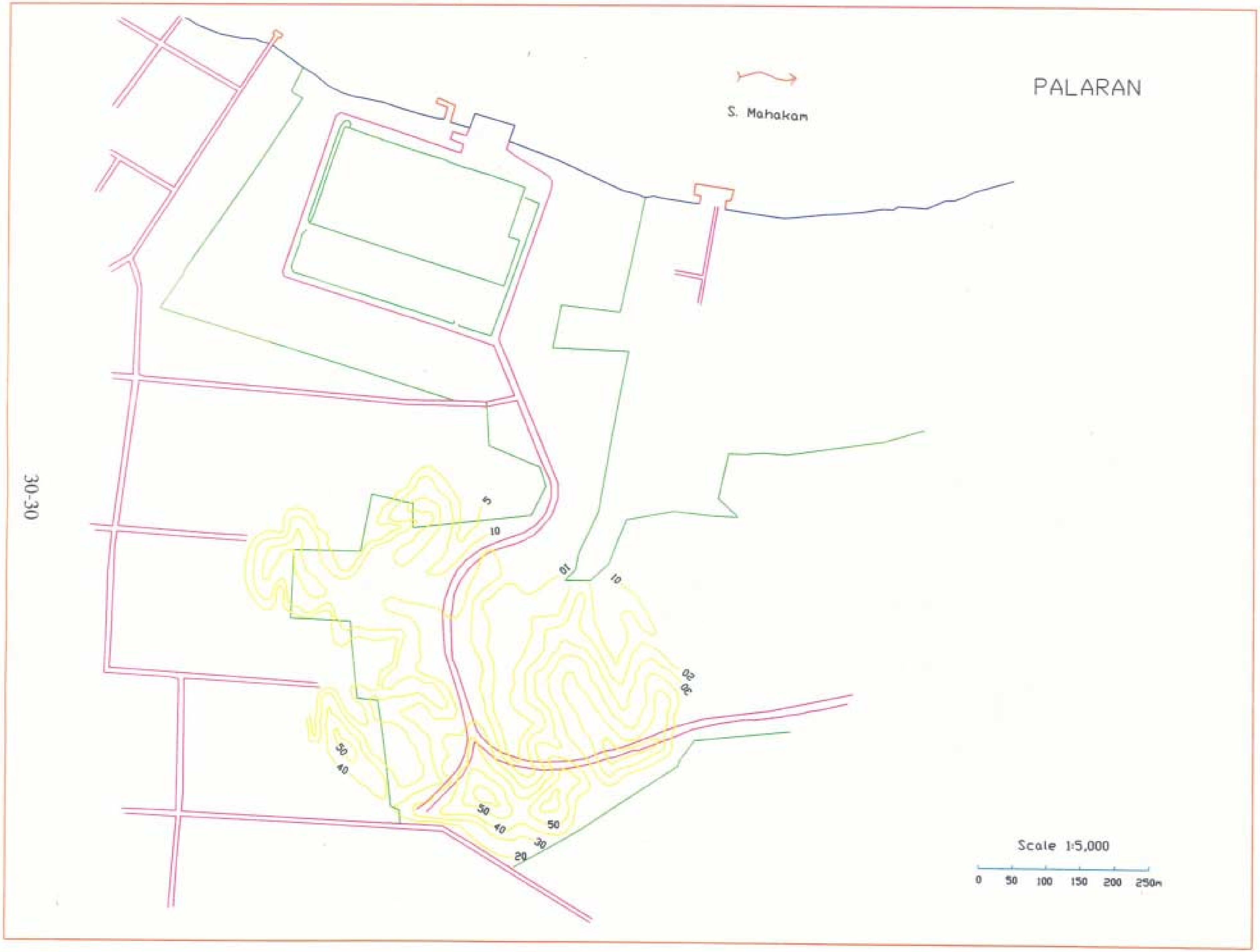


Figure 30.7.1 Project Site at Palaran

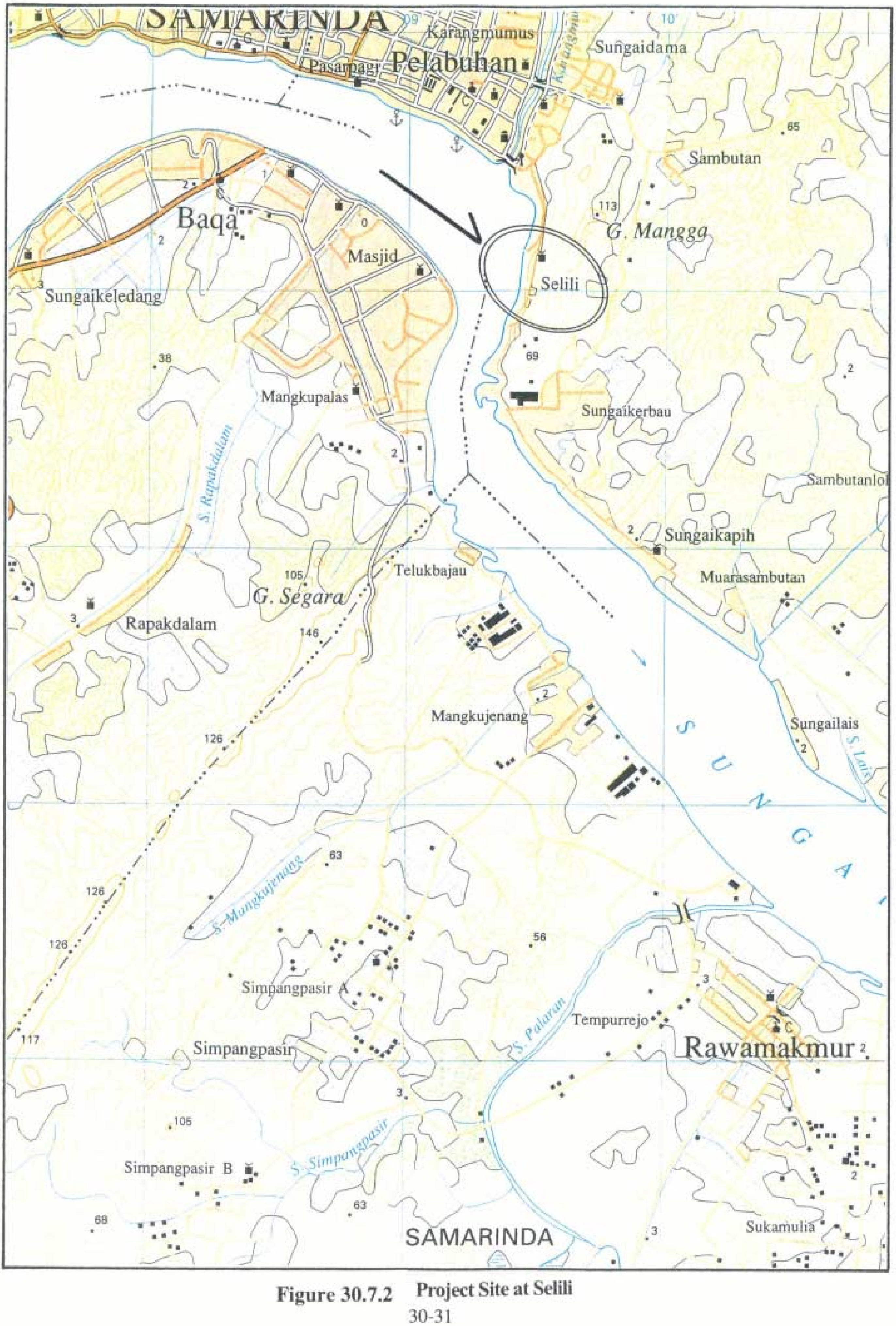


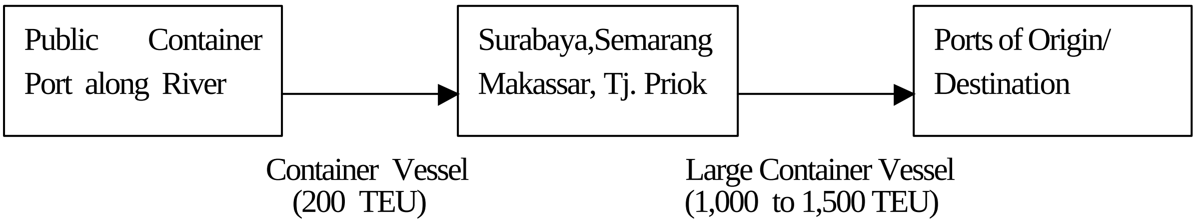
Figure 30.7.2 Project Site at Selili

30.8 Master Plan for 2025

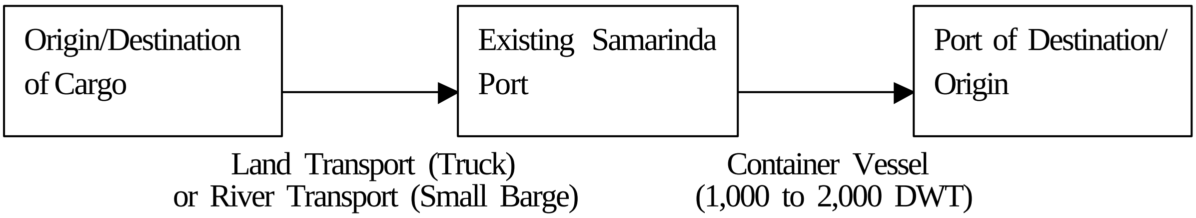
30.8.1 Vessel Calling Pattern

In order to define the roles of the development sites, the Study Team assumed the following vessel calling patterns for major cargo items. These assumptions are based on the topographical features of the Mahakam River, evolution of the maritime environments and interviews with port users. Since the approach channel to the Samarinda Port is shallow (5.0 m to 6.0 m), barge transportation will continue to be prevalent for a large volume of bulk cargo like coal and log, which is loaded/unloaded to its mother vessel at the anchorage area of the open sea. On the other hand, general cargo vessels and container cargo vessels to/from Surabaya and Makassar, tend to be deployed for the existing Samarinda Port to respond to frequent service demand with a comparatively small amount of cargo.

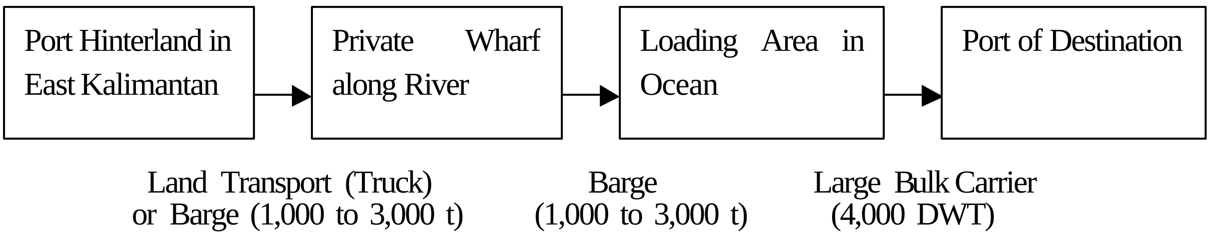
(1) Container



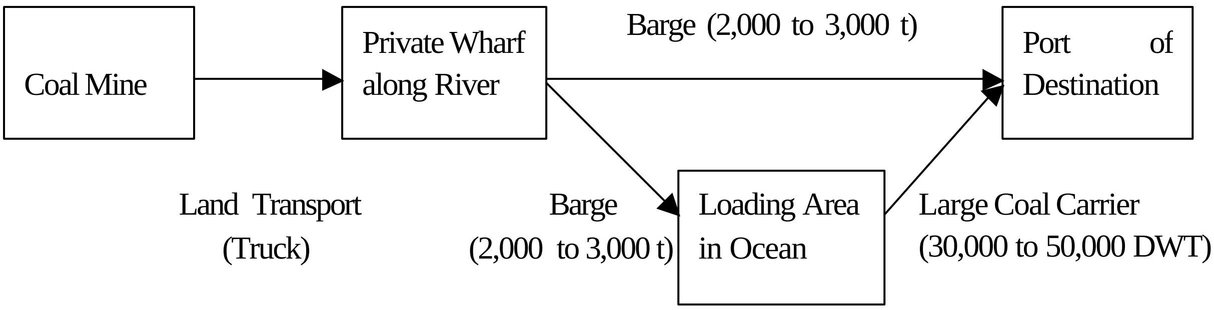
(2) General Cargo



(3) Timber Products



(4) Coal



30.8.2 Master Plan

(1) 6-Berth Scenario

1) Project Profiles

The layout plan for 2025 is shown in Figure 30.8.2. Main components of the plan are shown in Table 30.8.1. The Study Team proposes to create a new modern container terminal at Palaran. This requires land acquisition by the relevant organizations.

Table 30.8.1 Master Plan for Samarinda (2025)

Facility	Dimensions
Container Berth	6 Berths: 125m/berth, Draft 6m
Container Terminal Total Terminal Area Ground Slots CFS	 19 ha 2,304 TEU 8,320 m^2
Container Handling Equipment Gantry Crane RTG Yard Tractors	 6 12 24
Container Handling Capacity	442,000 TEU/year
General Cargo Berth	9 Berths, Draft 6m
General Cargo Terminal Shed Open Storage	 6,800 m^2 31,300 m^2
General Cargo Handling Equipment	14 Mobile Cranes 45 Folk Lifts
Passenger Terminal Terminal Area	1 Berth: 120m, Draft 3.7m 1 ha
Total Cost	Rp.931 billion

2) Container Terminals

a. Design Vessel

The Study Team proposes a container vessel with the capacity of 200 TEU as the design vessel as this vessel size is common in the container shipping calling at river ports in Indonesia. The proposed ship draft does not require a large amount of capital dredging either.

Table 30.8.2 Design Vessel for Container

Vessel	DWT	Loading Capacity (TEU)	LOA (m)	Beam (m)	Full Draft (m)
Vessels Calling at Full Draft	3,000	200	100	15.5	5.5
Vessels Calling at Half Draft	5,000	300	110	17.5	6

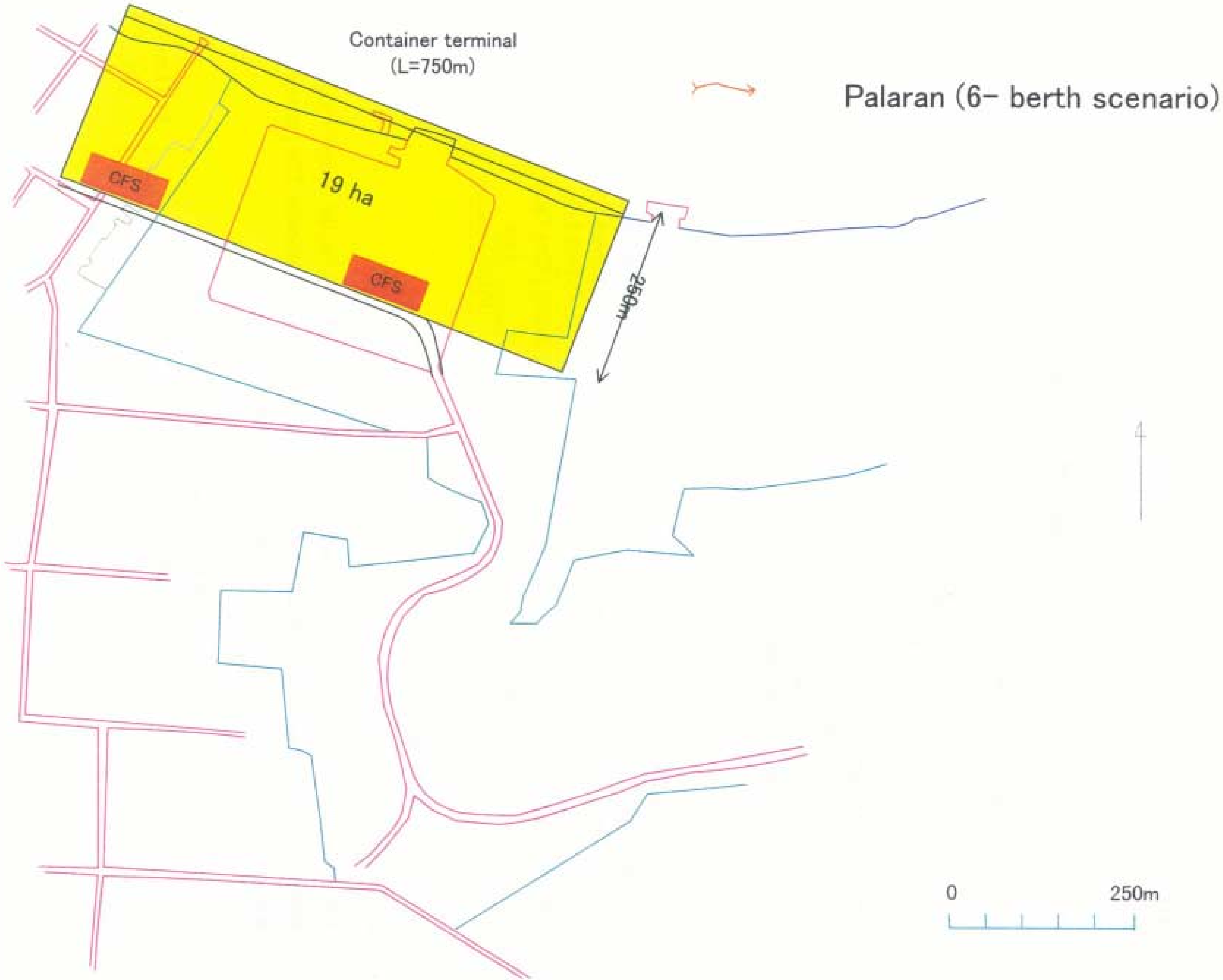
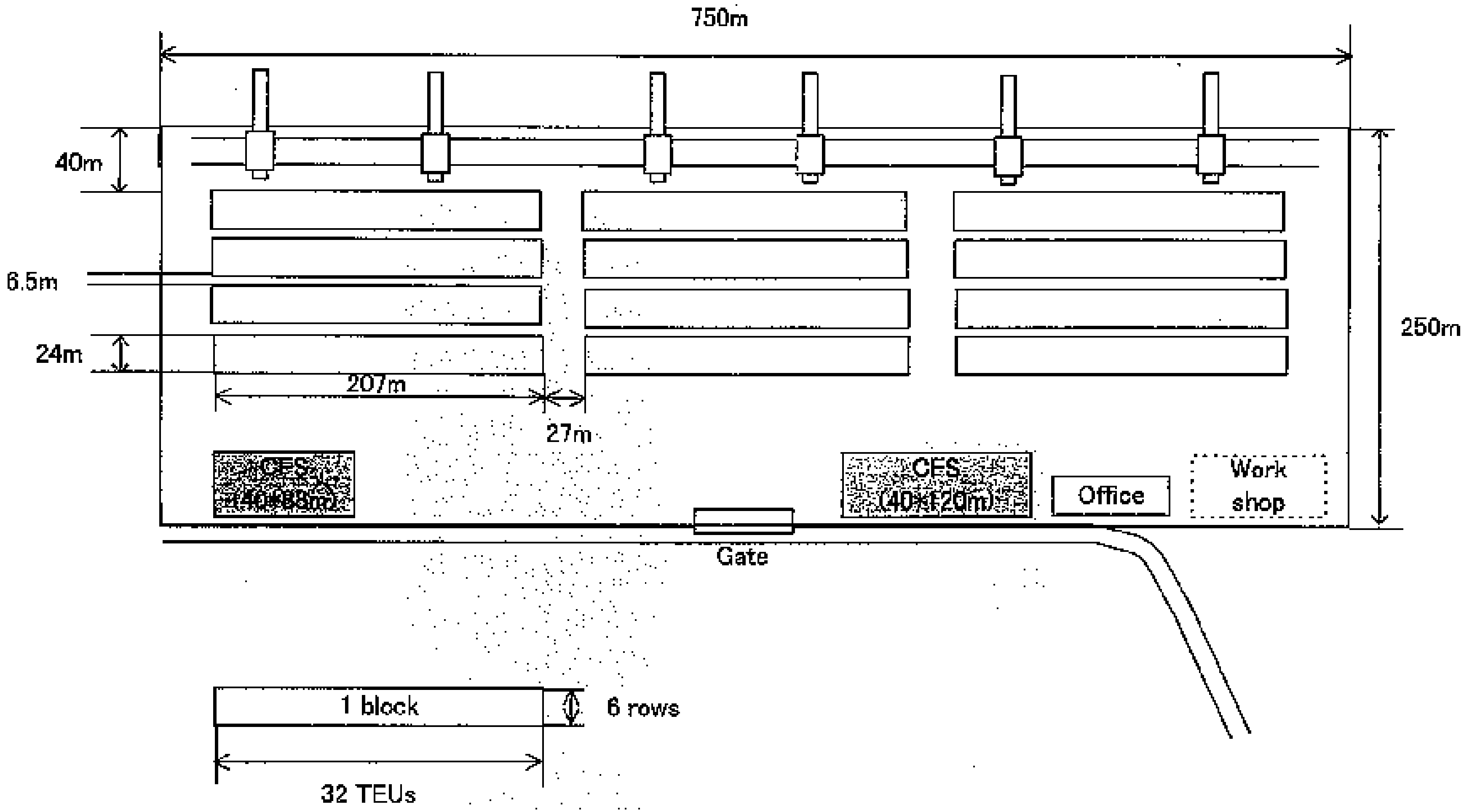


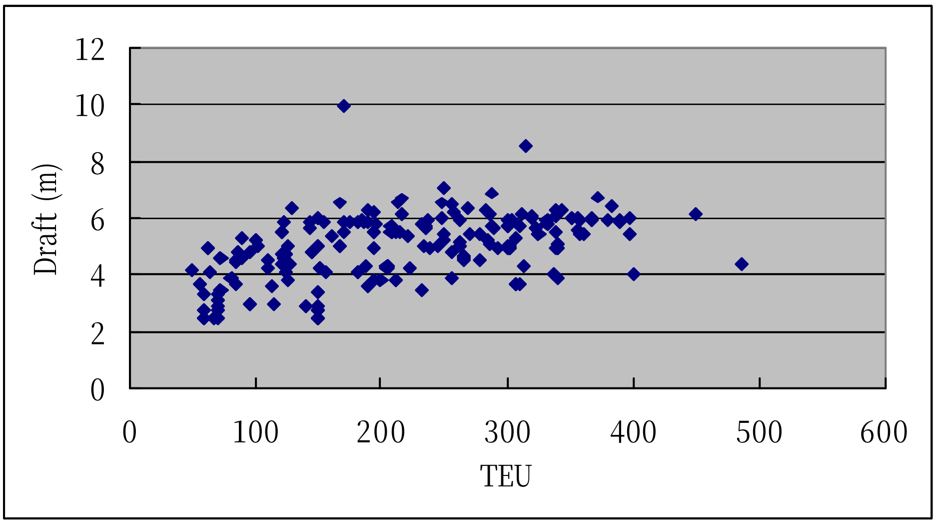
Figure 30 ^ 1 Palaran Container Terminal in 2025 (6-be ' scenario)



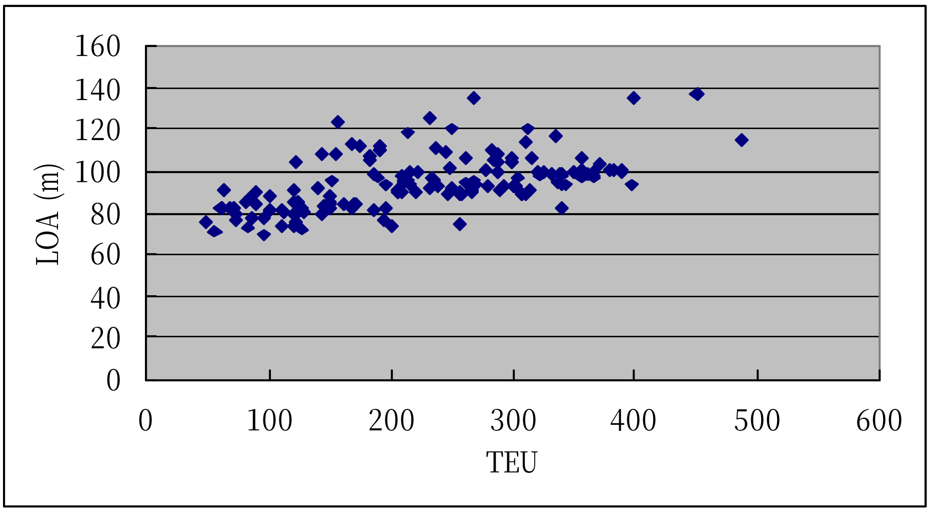
Palaran container terminal (6-berth scenario)
Gantry crane: 6 units
RTG: 12 units (1 over 4 operation)
Yard tractor: 24 units
Ground slots: 2,304 TEUs (192 TEUs/block)

Figure 30.8.2 Layout Plan of Palaran Container Terminal in 2025 (6-berth scenario)

The Study Team analyzed the relationship between draft and load capacity of container vessels smaller than 5,000DWT (Figure 30.8.3). Correlation between the two factors turned out weak but most vessels with a capacity of 200 TEU have a draft of 4-6m. As for 300 TEU vessels, they have a draft of 5-6.5m. Dimensions of the design vessel were determined based on this analysis (Table 30.8.2). Quay length per berth is 125m, the sum of the LOA and 1.7 times the beam.



Source: Fairplay **Figure 30.8.3 Relationship between Draft and Load Capacity**



Source: Fairplay **Figure 30.8.4 Relationship between LOA and Load Capacity**

b. Terminal

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

Container terminal area = (Container yard area) / (Yard area ratio)

= 5.8 ha (2007), 14.7 ha (2025)

Container yard area = (Ground slots) / (Land use ratio)

= 3.5 ha (2007), 8.8 ha (2025)

Ground slots = (Container volume) x (Dwelling time) / (Yard operation ratio) / 365 / (Stacking height)

= 913 TEUs (2,007), 2,277 TEUs (2025)

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: 160,000 TEU/year (2007), 399,000 TEU/year (2025)

Depth of the terminal = (Terminal area) / (Quay length)

= 155m (2007), 196m (2025)

Considering the layout of container terminal facilities, the Team proposes 250m (including the apron of the wharf) as the depth of the terminal area (in 2025). Consequently, the container terminal area turns out to be 19 ha.

c. CFS

Some portion of import/export container will be LCL and thus requires 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 x D x p) / (w x r x T)

where:

S : Required floor area of CFS (m2)
W: cargo volume for CFS (ton) = (container cargo volume) x (LCL 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 = 80,000t (2007), 199,500t (2025)
D = 5 days, p = 1.5, w=1.2, r = 0.6, T = 365 days, LCL cargo ratio = 0.05

On the above assumptions, S is calculated as follows:
S = 3,336 m^2 (2007), 8,319 m^2 (2025)

Assuming the depth of CFS as 40m and the width of a bay as 8m, the actual area will be 3,520m^2 (2007) and 8,320 m^2 (2025).

d. Handling Equipment

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

- Linear quay alignment
- Reliability of equipment
- The terminal will be open to multiple users
- The terminal requires high stowing capacity to maximize the operational income

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

e. 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

= 53 vehicles/hour/each way (2007), 133 vehicles/hour/each way (2025)

where:

(Annual cargo handling volume)=160,000 TEU (2007), 399,000 TEU (2025)

(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 needs 6 in-lanes and 3 out-lanes in 2025.

3) General Cargo Terminal

Assuming that 10 % of the cargo will go through sheds and another 25 % 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) = 1,065,000 x 0.1 x 14 / 365 / 2 / 0.5 / 0.6 = 6,808 m^2

Open storage area = (cargo volume) x (stored cargo ratio) x (dwelling time) / 365 days / (cargo volume per unit area) / (yard occupancy ratio) = 1,065,000 x 0.25 x 30 / 365 / 1 / 0.7 = 31,300 m^2

In order to cater for the cargo in 2025 with 18 gangs, the general cargo terminal requires the following handling equipment:

- 14 Mobile Cranes and 45 Forklifts

4) Passenger Terminal

In order not only to make room for increasing general cargo, but also to renovate the existing terminal, the passenger terminal should be removed in 2019. A new passenger terminal will be created downstream of the existing terminal.
Taking into account the number of passenger vessels calling at Samarinda in 2025 (79 vessels/year), 1 passenger berth with the terminal area of 9,000 m2 will be enough for the long term.

a. Design Vessel

The Study Team proposes a passenger vessel with capacity of 3,000 passengers as the design vessel. The proposed vessel draft does not require a large amount of capital dredging in the channel either.

Table 30.8.3 Design Vessel for Passenger

Vessel Name	GRT	Loading Capacity	LOA (m)	Beam (m)	Full Draft (m)
Iyo Maru	3,074 ton	Passenger: 2,350 Wagon/Trucks: 27	89. 4	15.8	3.7
Awa Maru	3,081 ton	Passenger: 2,350 Wagon/Trucks: 27	89.4	15.8	3.7

b. Quay Length and Draft

Quay length (L) = LOA + (B x 1.19 to 1.73)
= 89.4 + (15.8 x 1.5)
= 120 m

Quay draft (D) = (Vessel Draft) x 1.10 = 4.5 m

c. Passenger Terminal House

The necessary area of a passenger terminal house is calculated by using the following formula.

A = a x n x N x r x q

Where A : Nessary area of passenger terminal (m2)
a : Nessary area per passenger (1.2 m2 per person)
n : Loading capacity (3,000 passengers)

N : Number of vessels departing at the same time (1.0)
r : Peak ratio (all day : 1.0)
q : Seasonal ratio (1.0)

A = 1.2 x 3,000 x 1.0 x 1.0 x 1.0 = 3,600 m2

d. Parking Area

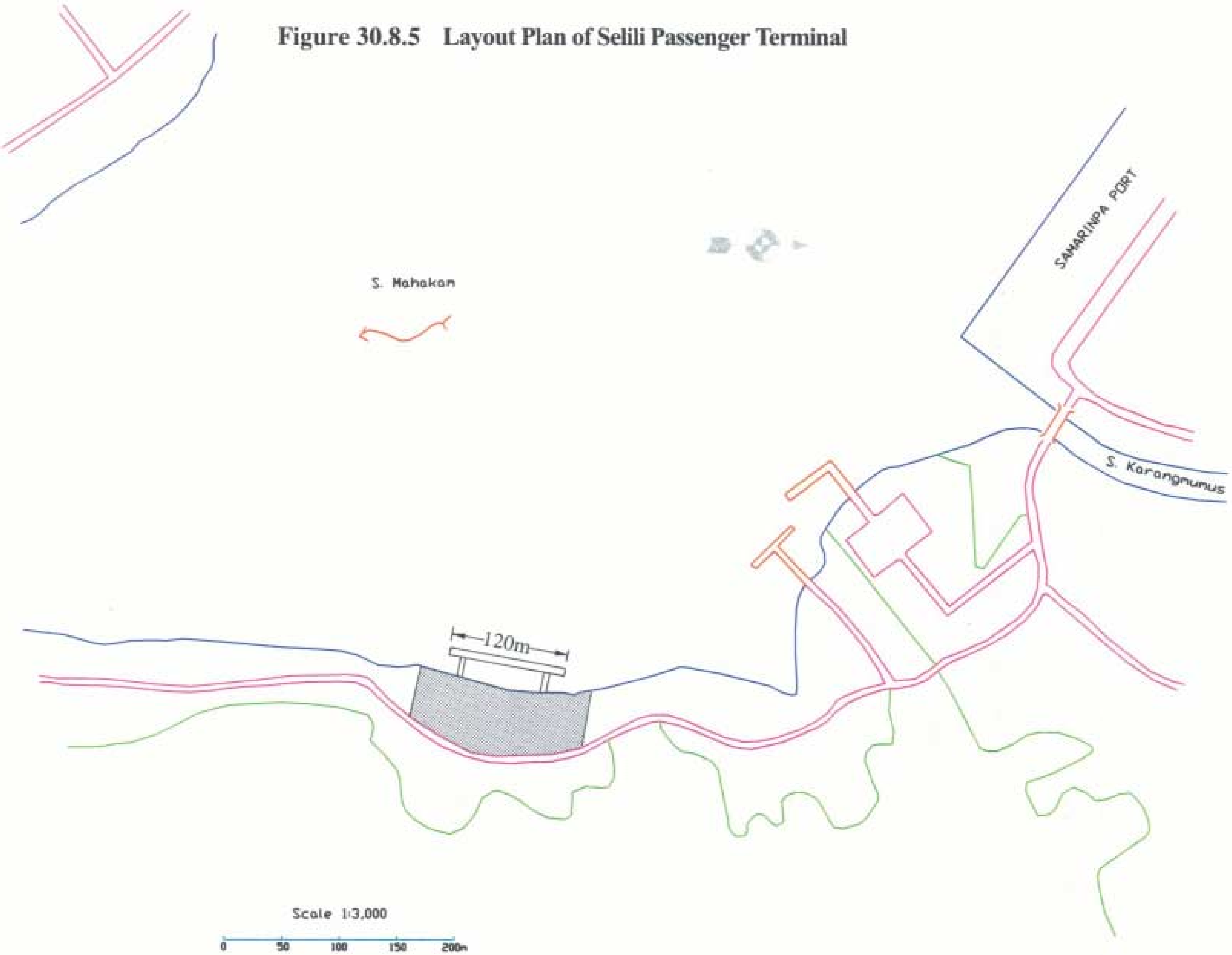
Among 3,000 passengers (embarkation or disembarkation), 30 % will use private cars or taxis, 70 % will use busses.

3 ,000 x 0.3 = 900 passengers (by private car or taxi)
3,000 x 0.7 = 2,100 passengers (by bus)

Area occupied by vehicles:
Private cars or taxis : 2 m x 4 m = 8 m2 (2 passengers per vehicle)
Busses : 3.5 x 10 m = 35 m2 (50 passengers per bus)

Area for cars / taxis : 8 x 900 / 2 = 3,600 m2
Area for buses : 35 x 2,100 / 50 = 1,470 m2
Parking area : 3,600 + 1,470 = 5,000 m2

Figure 30.8.5 Layout Plan of Selili Passenger Terminal



(2) 4-Berth Scenario

1) Project Profiles

The layout plan for 2025 is shown in Figure 30.8.7 Main components of the plan are shown in Table 30.8.4. The Study Team proposes to create a new modern container terminal at Palaran. This requires land acquisition by the relevant organizations. 4-berth scenario is examined just in case large land area cannot be acquired. This scenario assumes 24-hour operation and higher productivity of the terminal in order to make up for the shorter quay length. Number of the handling equipment and depth of the terminal differ depending on the scenario. Other than that, the project profiles are the same as those of the 6-berth scenario.

Table 30.8.4 Master Plan for Samarinda (4-Berth Scenario)

Facility	Dimensions
Container Berth	4 Berths: 125m/berth, Draft 6m
Container Terminal Total Terminal Area Ground Slot CFS	 15 ha 2,304 TEU 8,320 m^2
Container Handling Equipment Gantry Crane RTG Yard Tractor	 4 8 16
Container Handling Capacity	404,000 TEU/year
General Cargo Berth	9 Berths, Draft 6m
General Cargo Terminal Shed Open Storage	 6,800 m^2 31,300 m^2
General Cargo Handling Equipment	14 Mobile Cranes 45 Folk Lifts
Passenger Terminal Terminal Area	1 Berth: 120m, Draft 3.7m 1 ha
Total Cost	Rp.705 billion

1) Container Terminals

a. Terminal

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

Container terminal area = (Container yard area) / (Yard area ratio)
= 5.8 ha (2007), 14.7 ha (2025)

Container yard area = (Ground slots) / (Land use ratio)
= 3.5 ha (2007), 8.8 ha (2025)

Ground slots = (Container volume) x (Dwelling time) / (Yard operation ratio) / 365 / (Stacking height)
= 913 TEUs (2,007), 2,277 TEUs (2025)

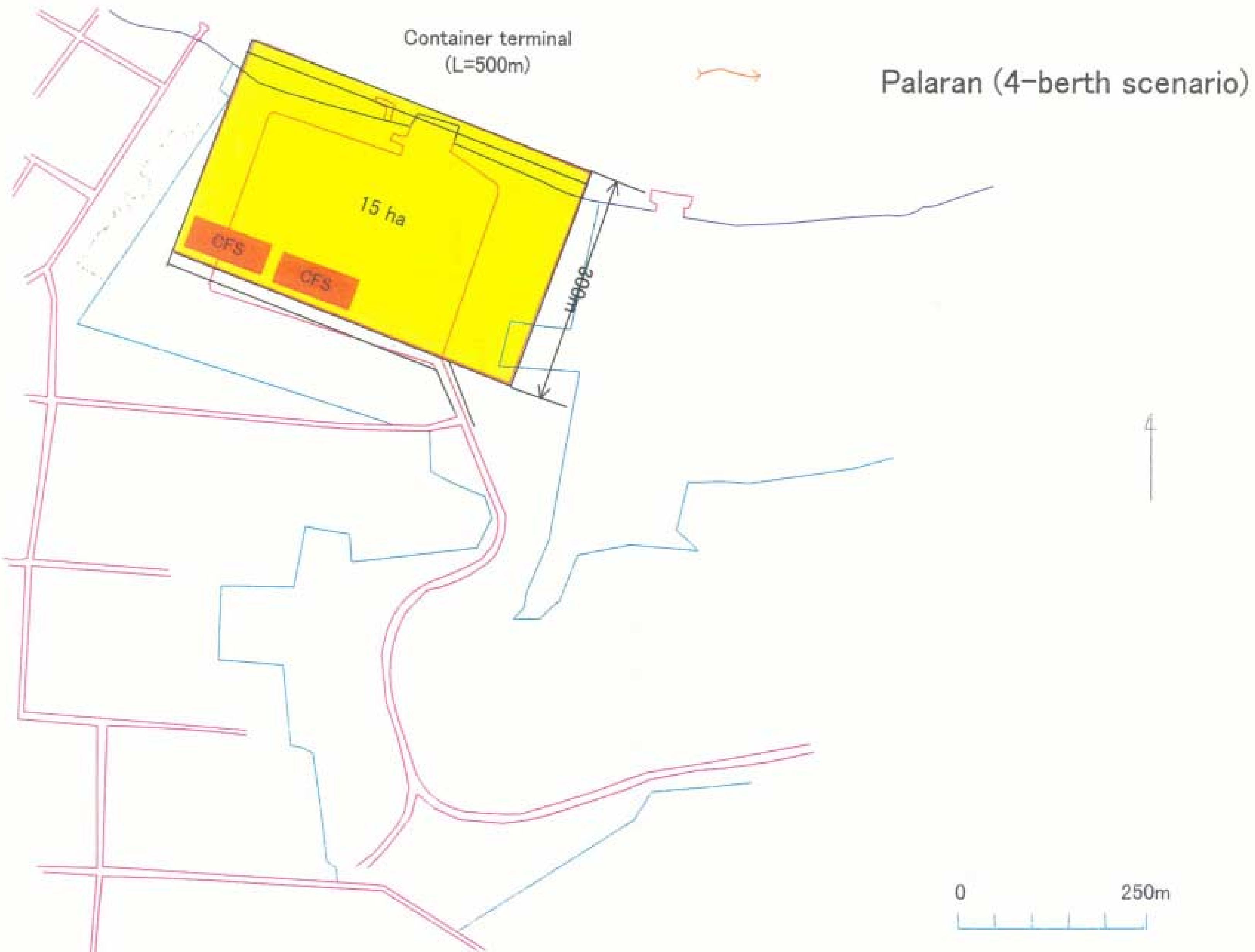
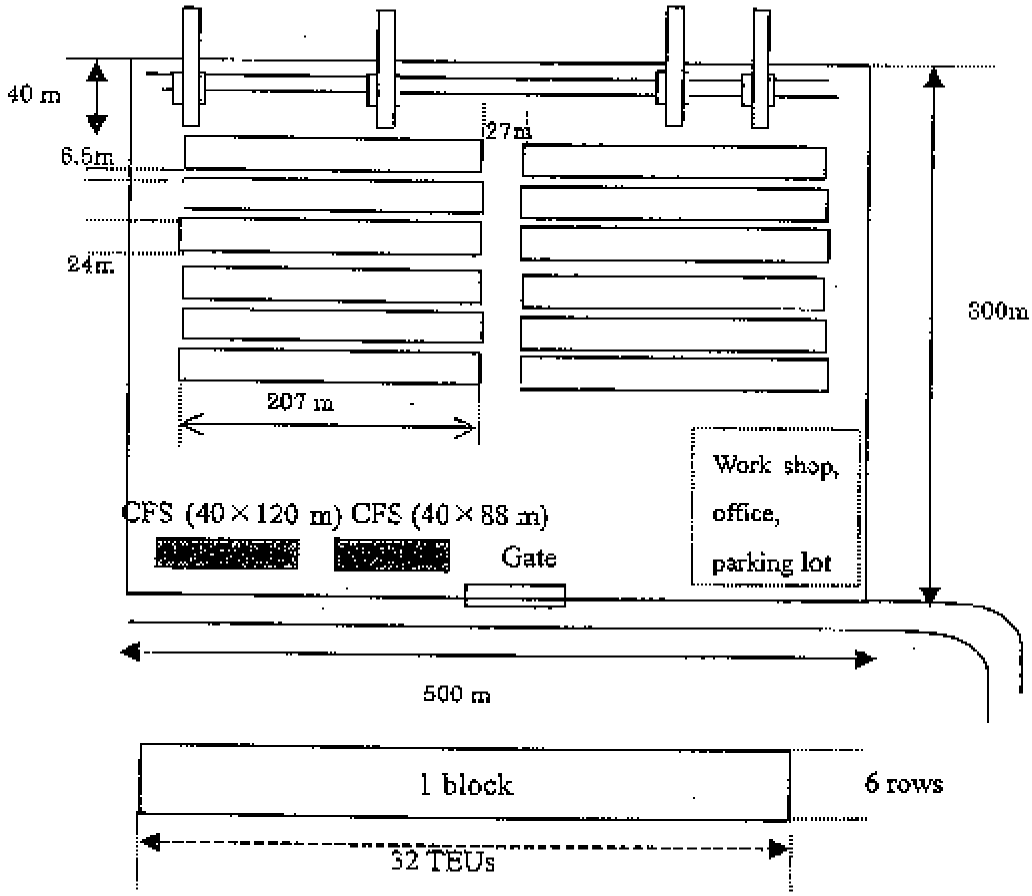


Figure 30.8.6 Palaran Container Terminal in 2025 (4-berth scenario)

Figure 30.8.7 Layout Plan of Palaran Container Terminal in 2025 (4-berth scenario)



<u>Palaran container terminal</u>

Gantry cranes: 4 units

RTG: 8 units (1 over 4 operation)

Yard tractors: 16 units

Ground slots: 2,304 TEUs (192 TEUs/block)

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: 160,000 TEU/year (2007), 399,000 TEU/year (2025)

Depth of the terminal = (Terminal area) / (Quay length)
= 232m (2007), 294m (2025)

Considering the layout of container terminal facilities, the Team proposes 300m (including the apron of the wharf) as the depth of the terminal area (in 2025). Consequently, the container terminal area turns out to be 15 ha (500m x 300m).

30.9 Administrative Framework

30.9.1 Outline of Samarinda Port

Samarinda port is located in the East Kalimantan province that has a population of about 2.3 million. It takes about 2 hours and 30 minutes from the Balikpapan airport to Samarinda Port by car. There is also an airport in Samarinda but it can only accommodate small planes.

IPC IV Samarinda branch office is located just outside the port working area. A passenger terminal and port related offices are located inside the narrow port working area, reducing the space available for cargo handling. Within the provincial government, BAPPEDA and DINAS are responsible for port development projects. DINAS used to be a part of the Ministry of Communications, but it merged with the local government in January 2001.

IPC IV Samarinda branch office serves as the port authority and manages the port. The main exports of Samarinda port are logs and lumbers. Samarinda port also serves as a base of tourism in East Kalimantan. It is an ideal place to start a sightseeing tour of the upper Mahakam River. The number of tourists has been increasing: 161,619 person in 1998, 186,592 person in 1999 and 197,172 person in 2000.

Samarinda port is classified as Class 3. Samarinda ADPEL office is responsible for navigational safety and it is under the control of DGSC, Ministry of Communications. The channel buoy administrative office takes care of buoys and the lighthouse.

30.9.2 Port Management in Samarinda

(1) IPC IV and IPC IV Samarinda Branch Office

The organization chart and the composition of the staff are as follows:

Figure 30.9.1 shows the organization chart of IPC IV.
Figure 30.9.2 shows the organization chart of IPC IV Samarinda branch office.
Table 30.9.1 shows the number of staff of IPC IV and Samarinda branch office.

(2) Workforce of Samarinda Branch Office in 2007 and in 2025

1) Workforce of Staff for the Cargo Handling

Currently, Samarinda Port is the main public cargo terminal in Samarinda. Palaran has not started operation. The staff of IPC IV Samarinda branch office should be strengthened responding to the container port development at Palaran proposed by the master plan (Table 30.9.2.). This table assumes that the IPC IV Samarinda branch office will carry out all cargo handling. Consequently, the size of the staff can be reduced if a part of the handling operation in privatized. As for general cargo handling, private companies will provide additional workers in response to the cargo increase. Therefore expansion of the IPC IV Samarinda branch office staff is not proposed for general cargo handling.

Table 30.9.1 The Number of Staff at IPC IV's Branch Office in 2001

NO	BRANCH OFFICE	GM	PERSONAL & GENERAL ADM. DIVISION				VARIOUS BUSINESS AND CARGO SERVICE DIVISION				CONTAINER SERVICE DIVISION				SHIP SERVICE DIVISION				TECHNICAL DIVISION				FINANCIAL DIVISION				PILOTING DIVISION				HEALTHY UNIT				AREA				TOTAL
			Manager	supervisor	Implementor	operator	Manager	supervisor	Implementor	operator	Manager	supervisor	implementor	operator	Manager	supervisor	implementor	operator	Manager	supervisor	Implementor	operator	Manager	supervisor	Implementor	operator	Manager	supervisor	Implementor	operator	Manager	supervisor	Implementor	operator	Manager	supervisor	Implementor	operator	
1	MAKASAR	1	6	1	21	7	3	3	58	5	3	2	36	47					3	2	25	7	4	1	21	3	3		15	41					1		10	2	329
2	BALIKPAPAN	1	5	1	16		3	2	32	8					5		29	40	3	1	11	1	3		13	2									2				178
3	SAMARINDA	1	5		9	1	3		28	3					3		27	21	5		10		2		11	1							3						133
4	BITUNG	1	4		14	2	3		26	4					3		11	17	3	3	11	1	3		12	1							8		1	1	8	-	139
5	AMBON	1	4		11	2	3		25	5					2		8	4	2	1	9	1	2	1	6	1													86
6	SORONG	1	4		4		3		15						3		7	8	3		1		3		2	1													55
7	JAYAPURA	1	3	1	1	1	1	1	10	2					1		2	1	1	1	3		1		3	1													35
8	TARAKAN	1	1	1	2		1	2	11	2					1		5	2	1		4		1	1	6	1									1	1	6	3	64
9	PANTOLOAN	1	1	1	4		1	2	8						1		6	3	1	1	2		1	2	3	1									2		8		49
10	TERNATE	1	1	1	2		1	2	6						1		3	6	1		5		1	1	4	1													39
11	KENDARI	2	1		6		1	1	8	3									1	1	3	3	1	1	3	2													37
12	PARE-PARE	1	1	1	7		1	3	10	3									1		4	1	1	1	6	1													42
13	BIAK	1	1	1	1		1		14	2										2	1		1	1	1	1													28
14	MERAUKE	1	1	1			1		5	1									1		4		1	1	1	1													19
15	MANOKWARI	1	1	1		1	1		7	1									1		1		1		5														19
16	FAK-FAK	1	1		1										2		6	2					1			1													15
17	GORONTALO	1			3		1	1	1											1	5		1		1	1													16
	TOTAL	18	40	10	102	14	28	17	262	39	3	2	36	47	22	0	102	106	27	13	99	14	28	10	96	20	3	0	15	41	0	0	11	0	7	2	32	6	1272

Table 30.9.2 Organization Chart of the new Samarinda Branch Office in 2007 and in 2025

Port District Name	Current in 2000		Short-term Plan in 2007		Long-term Plan in 2025	
	Size of Staff	Public Cargo Volume	Size of Staff	Public Cargo Volume	Size of Staff	Public Cargo Volume
Samarinda Branch Office	133 persons		226 persons		259 persons	
General cargo Container cargo		General Cargo 344,000 t Containers 69,000 TEU Passengers 197,000 9 Mobile Crane 21 Forklift 2 Super Stacker 7 Trailer 1 Floating Crane		General Cargo 455,000 t Containers 160,000 TEU Passengers 277,000 3 Mobile Crane 10 Forklift		General Cargo 1,065,000 t Containers 399,000 TEU Passengers 472,000 3 Mobile Crane 10 Forklift
of which Palaran Office	0		93 persons		126 persons	
General Cargo		0		0		0
Container Cargo		0		160,000 TEU 3 Berth (-6m) 3 Gantry Crane 3 Mobile Crane 6 RTG 12 Yard Tractor 1 Reach Stacker		399,000 TEU 6 Births(-6m) 6 Gantry Crane 6 Mobile Crane 12 RTG 24 Yard Tractor 2 Reach Stacker

The Study Team estimated the number of the required workers of Samarinda Branch Office in 2007 and in 2025 taking into account common practices of port cargo handling.

a. Palaran Container Terminal in 2007

Administration Section

6 persons ×1 shift =6 persons (Senior 3, Junior 3)

Operation Section

Gantry Carne 3 Unit ×1.5 persons/Unit × 2 shift = 9 persons (Junior 9)

Transfer Carne 6 Unit ×1.5 persons/Unit ×2 shift = 18 persons (Junior 18)

Tractor &Trailer 12 Unit ×1 person/Unit ×2 shift = 24 persons (Junior 24)

Yard Control Section

3 persons ×2 shift = 6 persons (Senior 3, Junior 3)

Gate Operation Section

2 gates (in and out)×2 line ×1 person/ line ×2 shift = 8 persons (Junior 8)

Documentation Section

2 persons ×2 (Import/Export)=4 persons (Senior 4)

Maintenance Section

Electrical 3 persons ×2 shift = 6 persons (Senior 3, Junior 3)

Refrigeration 3 persons ×2 shift = 6 persons (Senior 3, Junior 3)

Vehicle 3 persons × 2 shift = 6 persons (Senior 3, Junior 3)

Total 93 persons (Senior Staff 19 persons, Junior Staff 74 persons)

b. Palaran Container Terminal in 2025

Administration Section

6 persons ×1 shift =6 persons (Senior 3, Junior 3)

Operation Section

Gantry Carne 6 Unit ×1.5 persons/Unit ×2 shift = 18 persons (Junior 18)

Transfer Carne 12 Unit ×1.5 persons/Unit ×2 shift = 36 persons (Junior 36)

Tractor &Trailer 12 Unit ×1 person/Unit × 2 shift = 24 persons (Junior 24)

Yard Control Section

6 persons × 2 shift =12 persons (Senior 6, Junior 6)

Gate Operation Section

2 gates (in and out)×2 line ×1 person/ line ×2 shift =8 persons (Junior 8)

Documentation Section

2 persons ×2 (Import/Export)= 4 persons (Senior 4)

Maintenance Section

Electrical 3 persons ×2 shift = 6 persons (Senior 3, Junior 3)

Refrigeration 3 persons ×2 shift = 6 persons (Senior 3, Junior 3)

Vehicle 3 persons ×2 shift = 6 persons (Senior 3, Junior 3)

Total 126 persons (Senior Staff 22 persons, Junior Staff 104 persons)

2) Mandatory Pilotage for Calling Vessel

Vessels of 150 GRT or larger should be accompanied by a pilot in Samarinda Port. The number of pilots of IPC IV Samarinda branch office should be increased to cope with the increase in calling vessels (Table 30.9.3).

Table 30.9.3 Number of Calling Vessel and Pilots in Samarinda Port

Berth	Cargo Type	Vessel Calls in 2000	Vessel Calls in 2007	Vessel Calls in 2025
Samarinda				
Public	General Cargo	2,152	1,276	1,185
	Container	303	0	0
	Passenger	50	70	79
Palaran				
Public	Container	0	542	985
Other Area of Samarinda				
Private	Coal	2,210	2,315	4,761
	Timber & Log	2,530	2,357	1,491
	Others	3,070	4,863	3,661
Total		10,315	11,423	12,162
Increase Ratio		100 %	111 %	118 %
Proposed Number of Pilots		12 pilots	13 pilots	14 pilots

(3) Staff Training by I PC IV

1) Education and training programs are arranged every year for the existing working units.

Education and training programs consist of:

a. An initiation program for prospective employees:
b. Technical programs tailored to the needs of each working unit:
c. A certificate upgrading program especially for the employees whom will proceed to a higher level of study:
d. A program for managers
e. A program on general port affairs

2) The main target of the training and education programs is to respond to the needs of the following divisions:

a. Commercial Division
b. Technical Division
c. Finance Division
d. Personnel and General Affairs Division
e. Planning and Development Division
f. Supervising Division and
g. Working Quality Division

3) Training and education programs are organized in two ways:

a. Self-management (internal); or
b. Cooperation with training and education institutes either within the country or outside the country

4) Participants of the training and education programs are decided by the IPC IV Head Office after consultation with the head of the branch office.

(4) Revenue and Expenditure of IPC IV and Samarinda Branch Office

1) Port Development Budget of IPC IV

The national budget for port development is allocated not only to non-commercial ports but also to commercial ports. In 1996, non-commercial ports received 30% of the budget, with the remainder taken up by commercial ports. The central government is responsible for channel dredging and navigational safety.
Depending on the financial situation of IPC, the government also subsidizes the development of basins, wharves and roads. Financial sources of IPC IV are operational revenue, government subsidy, and foreign loans. Private sector participation is also encouraged.

IPC IV was established in April 1983, based on Government Regulation No.17 of 1983. In 1992, IPC became a corporation (PELINDO). However, the government still holds its entire equity. The head office of IPC IV is located in Ujung Pandang (Makassar). It covers 24 commercial ports in 7 provinces, East Kalimantan, South Sulawesi, Central Sulawesi, Southeast Sulawesi, and North Sulawesi, Maruk and Irian Jaya.

The budget of IPC IV is smaller than that of other IPC (I, II & III) and IPC IV is dependent on the subsidy from the central government. Since January 2001, the fiscal year of Indonesia coincides with the calendar year.

Table 30.9.4 shows the consolidated Balance Sheets of IPC IV in 1,998 - 2,000.

2) Income Statement of I PC IV Samarinda Branch Office

The income statement of Samarinda branch office is as follows (Table 30.9.5).

(5) Simplification of Port-related Procedures

IPC IV Samarinda Branch Office provides various port services, such as ship service, cargo service, terminal service and building service. Official procedures relative to those services should be transparent, fair and rapid. The flow of the port service procedure in Samarinda Port is shown in Figure 30.9.3.

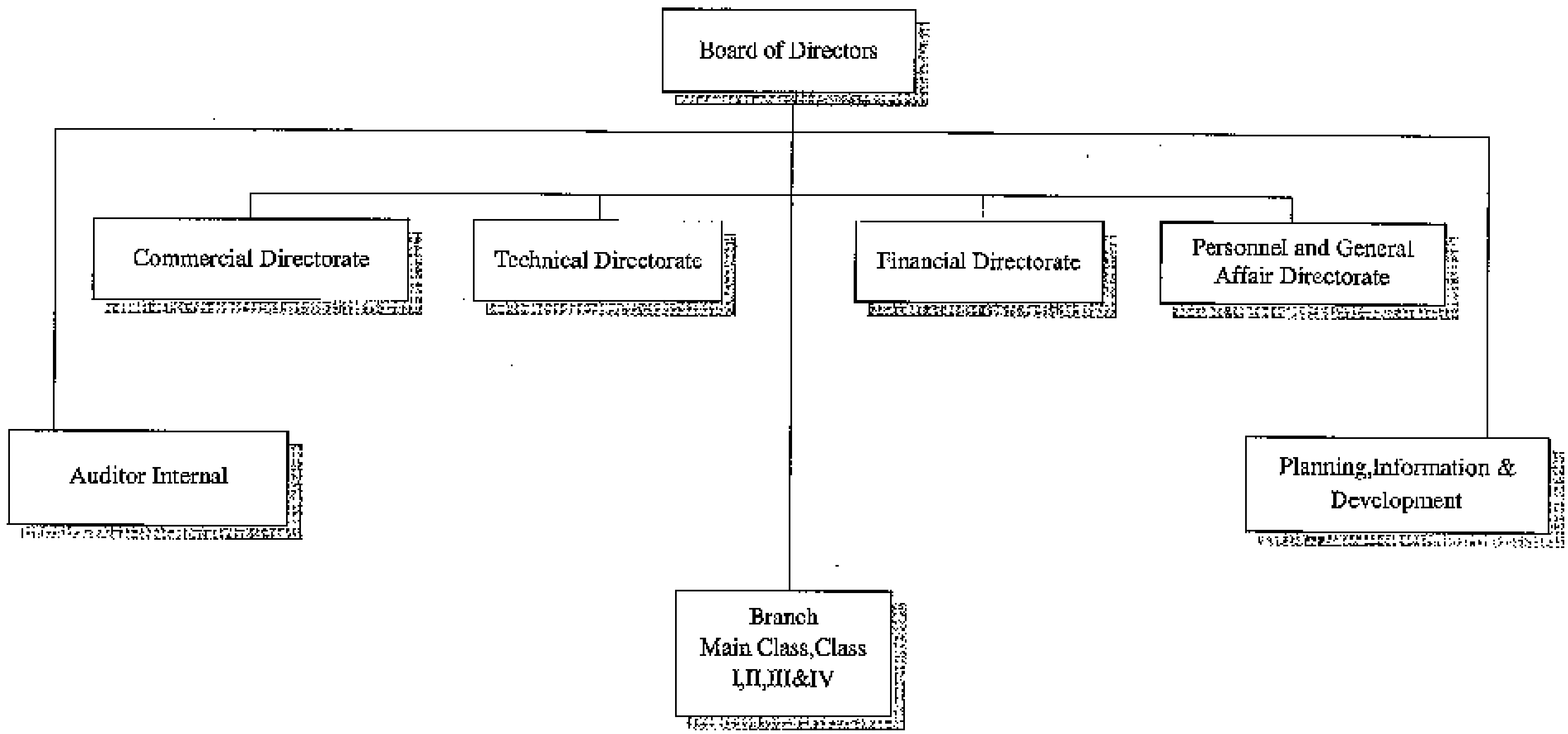


Figure 30.9.1 Organization Chart of IPC IV Head Office

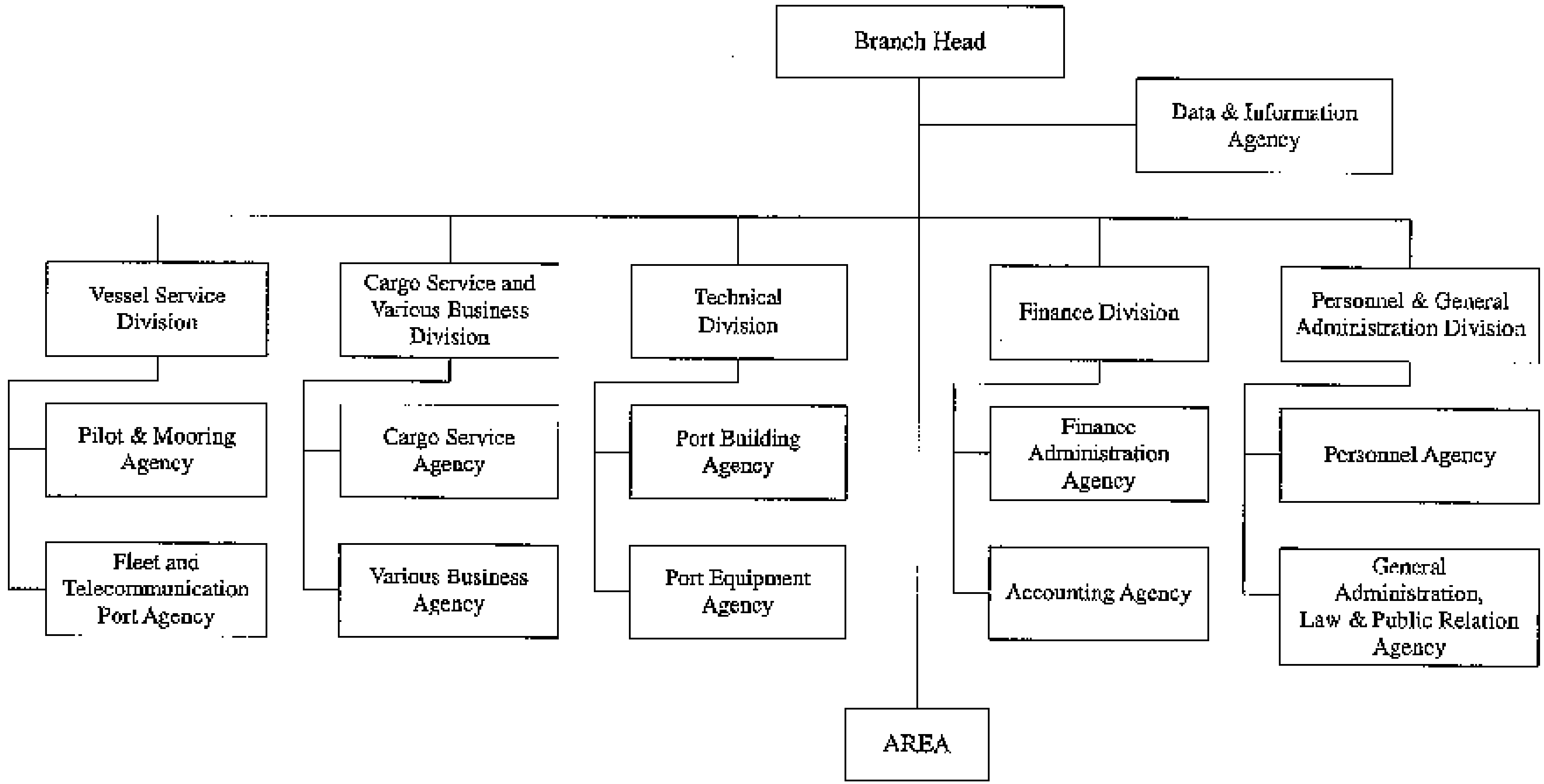


Figure 30.9.2 Organization Chart of IPC IV Samarinda Branch Office

Table 30.9.4 Consolidated Balance Sheets of IPC IV in 1998-2000

Indonesia Port Corporation IV

As of December 31,2000,1999 and 1998 (in Million Rupiah)

Description	2,000	1,999	1,998
ASSETS			
Current Asset	115,906	92,051	99,684
Long Term Investment	1,050	1,050	1,050
Fixed Assets	422,778	352,575	335,064
Intangible Assets	3,872	4,103	3,550
Other Assets	153,945	111,681	87,731
TOTAL ASSETS	697,551	561,460	527,079
LIABILITIES			
Current Liabilities	41,460	28,984	29,457
Long Term Debts	229,786	145,675	112,604
Undecided-status Government Assistances	579	97,695	92,791
Capital and Reserve	384,270	239,933	238,885
Earning	41,456	49,173	53,342
Total Liabilities	697,551	561,460	527,079

Table 30.9.5 Income Statement of IPC IV Samarinda Branch Office in 1 999 - 2.000

unit : 1000 Rp

No.		Description	1,999	2,000
I		OPERATING REVENUES		
	1	Vessel Services	6,201,051	6,977,222
	2	Piling Facilities	1,714,625	2,257,269
	3	<pendapatans Pengusahaan Alat-alat	73,536	86,750
	4	Terminal Services	171,897	200,976
	5	Container Terminal Services	0	0
	6	Land, Building, Water and Electricity Services	195,448	196,457
	7	Joint Operation	1,326,798	1,466,734
	8	Port Hospital	419	292
	9	Special Port/Berth Services	1,587,426	1,847,603
	10	Other Business Services	478,537	716,881
		Gross Operating Revenue	11,749,737	13,750,184
		Revenue Reduction	250,157	486,086
		Net Oprating Revenue	11,499,580	13,264,098
		<pendapatan diluar usaha>	53,560	715,021
		Total Net Operating Revenue	11,553,140	13,979,119
II		OPERATING EXPENSES		
	1	Personnel	1,843,722	2,236,284
	2	Material	551,291	548,782
	3	Maintenance	972,524	1,212,224
	4	Depreciation and Amortization	1,103,363	1,106,789
	5	Insurance	22,393	25,895
	6	Rent	13,543	13,267
	7	General Administration	209,247	202,870
	8	Overhead	1,340,310	1,608,139
III		Total Operating Expenses	6,056,393	6,954,250
IV		Loss Before Extraordinary Items	5,496,748	7,024,870
V		extraordinary items		
VI		profit/loss before extraordinary items	5,496,748	7,024,870

PORT SERVICE CHANNEL
(STANDING OPERATION PROCEDURE)

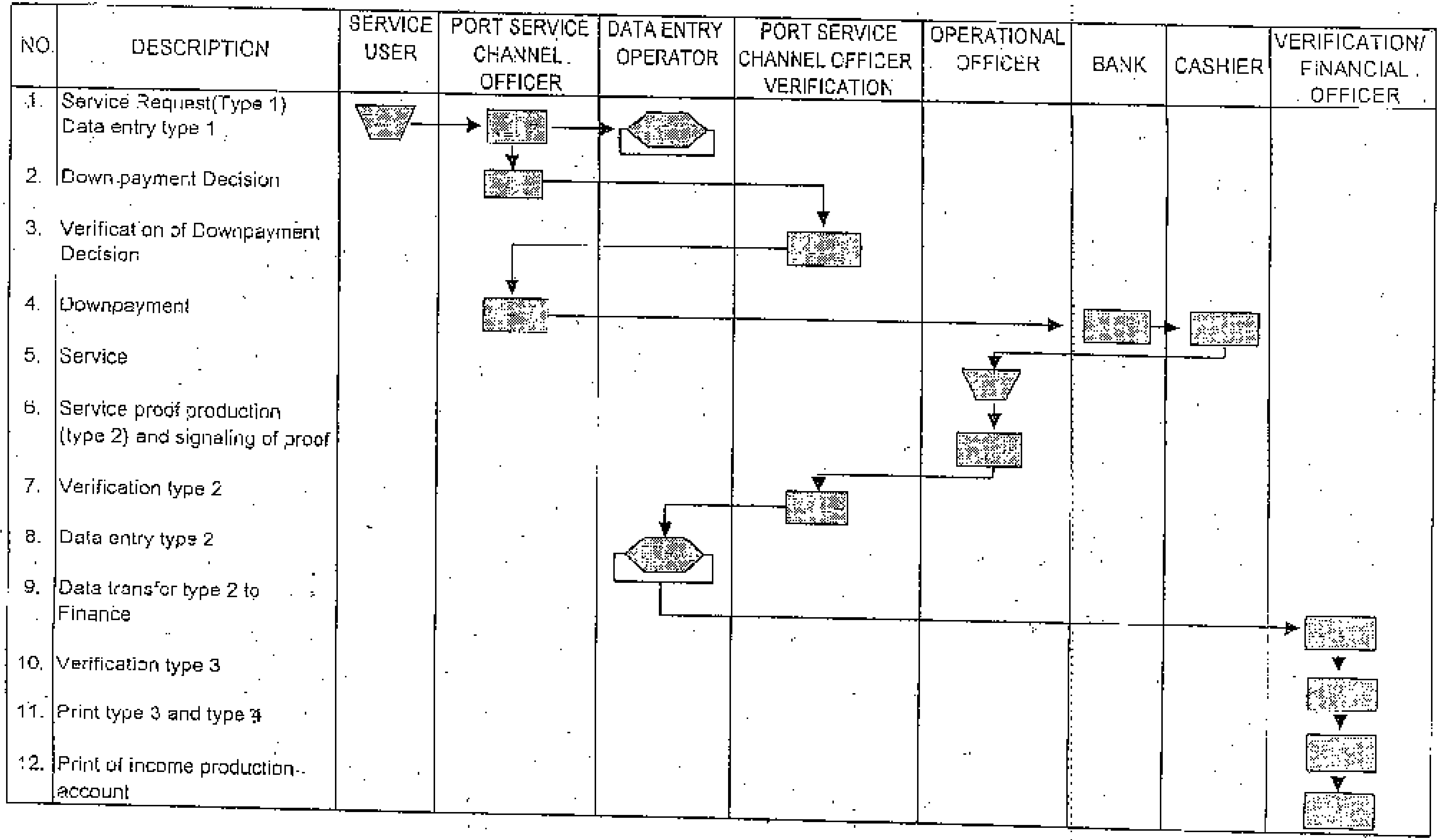


Figure 30.9.3 Port Service Channel

30.9.3 Channel Management in Samarinda

(1) Samarinda ADPEL Office

Samarinda ADPEL is responsible for the channel management in Mahakam River. Samarinda ADPEL is now controlled by DGSC, though it used to be under the guidance of KANWIL. Port users are required to obtain permission from ADPEL for various matters. These permissions must be given quickly and fairly.

The Study Team learned that a considerable period of time elapses before permission is granted.

(2) Outline of Access Channel and River Channel

1) General

The access channel is made up of the estuary channel and the river channel. The total length of the access channel is 37 nautical miles. The channel is 60 - 70m in width and 6m in draft. Tidal range is 1.5m at the Samarinda Port and almost the same at the estuary. 24 km of the total channel length requires maintenance dredging every year, the volume of which has averaged 1.4 million m3 per year over the last eight years. This is equivalent to 15.6 % of the nation's total dredging volume.

2) Navigation Rules

Samarinda ADPEL is responsible for the administration of the access channel in the river and the sea. Pilot is required for the vessel over 150 GRT. The Vessels smaller than 153 m in length (LOA) and 6.8m in draft, are allowed to enter the channel by taking advantage of high tide. Night navigation is allowed and vessel traffic is two ways throughout the channel.

3) Navigational Aids

In total, 38 navigational aids are placed throughout the access channel (Table 30.9.6).

Table 30.9.6 Navigational Aids in the Access Channel of Samarinda
(from the Estuary of Kutai River to the Port of Samarinda)

No.	ILL NR	Location	Latitude/ Longitude	Range	Remarks
1	4735	Ma.Pegah	00 51 37.5 S 117 18 55.7 E	24 NM	Lighthouse
2	4741	Kutai River (Ma.Pegah)	00 58 44.0 S 117 18 57.0 E	9 NM	Leading Light (Front I)
3	4742	Chute River (Ma.Pegah)	00 59 15.8 S 117 19 02.0 E	12 NM	Leading Light (Rear I)
4	4743	Kutai River (Ma.Pegah)	00 57 40.6 S 117 18 27.0 E	10 NM	Leading Light (Front II)
5	4744	Kutai River (Ma.Pegah)	00 57 24.1 S 117 18 10.5 E	12 NM	Leading Light (Rear II)
6	4745	Kutai River (Ma.Pegah)	00 56 22.8 S 117 18 12.1 E	12 NM	Leading Light (Front II. A)
7	4746	Kutai River (Ma.Kerbau)	00 47 20.0 S 117 16 54.0 E	8 NM	Leading Light (Front III)
8	4747	Kutai River (Ma.Kerbau)	240 m from NR 4746	10 NM	Leading Light (Front III)
9	4748	Kutai River (Tg.Nibung)	00 48 30.1 S 117 17 50.6 E	9 NM	Leading Light (Front)
10	4749	Kutai River (Tg.Nibung)	00 48 06.4 S 117 17 44.5 E	7 NM	Leading Light (Rear)
11	4760	Kutai River (North of Tg.Ulu)	00 39 38.0 S 117 18 23.0 E	8 NM	Leading Light (Front)
12	4761	Kutai River (North of Tg. Ulu)	00 39 20.0 S 117 18 25.0 E	10 NM	Leading Light (Rear)
13	4762	Kutai River	00 34 54.5 S 117 16 36.1 E	9 NM	Leading Light (Front)
14	4763	Kutai River	00 34 20.0 S 117 16 20.1 E	11 NM	Leading Light (Rear)
15	4768	Ma.Berau (Mahakam River)	00 20 15.0 S 117 29 42.0 E	11 NM	Light Beacon
16	4770	Merolu River (750 WNTg.Merolu)	00 51 50.6 S 117 18 39.2 E	10 NM	Light Beacon
17	4780	Kutai River (Across Tg. Sanga-Sanga)	00 35 53.1 S 117 17 14.0 E	8 NM	Leading Light (Front)
18	4790	Kutai River (Across Tg. Sanga-Sanga)	00 36 00.0 S 117 17 30.0 E	10 NM	Leading Light (Rear)
19	4781	Kutai River	00 35 59.0 S 117 17 30.0 E	4 NM	Light Beacon
20	4782	Kutai River	00 36 11.0 S 117 17 51.0 E	4 NM	Light Beacon
21	4783	Kutai River	00 34 49.0 S 117 17 31.0	4 NM	Light Beacon
22	4784	Kutai River (Tg. Sanga-Sanga)	00 35 16.0 S 117 16 32.0 E	4 NM	Light Beacon
23	4785	Kutai River	00 34 36.0 S	4 NM	Light Beacon

		(Mariam River)	117 16 40.0 E		
24	4750	Kutai River	00 52 54.0 S	4 NM	Light Buoy
		(Ma.Pegah)	117 17 06.0 E		
25	4751	Kutai River	00 59 51.0 S	4 NM	Light Buoy Nr.0
		(Ma.Pegah)	117 20 37.0 E		
26	4752	Kutai River	00 59 10.0 S	6 NM	Light Buoy Nr.1
		(Ma.Pegah)	117 20 20.2 E		
27	4753	Kutai River	00 50 52.0 S	5 NM	Light Buoy Nr.2
		(Ma.Pegah)	117 18 17.0 E		
28	4754	Kutai River	00 58 03.0 S	4 NM	Light Buoy Nr.3
		(Ma.Pegah)	117 19 10.0 E		
29	4755	Kutai River	00 37 06.0 S	4 NM	Light Buoy Nr.8
		(Sanga-sanga)	117 17 38.0 E		
30	4756	Kutai River	00 54 28.9 S	4 NM	Light Buoy Nr.7
		(Ma.Pegah)	117 18 19.7 E		
31	4757	Kutai River	00 36 10.0 S	4 NM	Light Buoy Nr.10
		(Sanga-sanga)	117 17 36.0 E		
32	4758	Kutai River	00 51 10.0 S	4 NM	Light Buoy Nr.11
		(Ma.Pegah)	117 18 18.3 E		
33	4759	Kutai River	00 34 49.0 S	5NM	Light Buoy Nr. 12
		(Mariam River)	117 16 38.0 E		
34	4764	Kutai River	00 47 39.0 S	6NM	Light Buoy Nr.9
		(Kerbau Island)	117 17 21.0 E		
35	4765	Kutai River	00 45 13.0 S	4 NM	Light Buoy Nr.19
		(Ma.Kembang)	117 17 27.0 E		
36	4766	Kutai River	00 40 25.0 S	4 NM	Light Buoy Nr.21
		(Tg. Ulu)	117 17 24.0 E		
37	4767	Kerbau Island	00 47 02.0 S	4 NM	Light Buoy
		Kutai River	117 17 29.1 E		
38	4769	(Ma.Kembang)	00 44 45.0 S	3NM	Light Buoy Nr.6
			117 17 13.0 E		

30.9.4 Proposed Port Management Scheme

(1) Port Management Scheme

The Team proposed a management scheme for Samarinda port as shown in Table 30.9.7.

Table 30.9.7 Port Development Scheme (Common-user Wharves) in Samarinda Port

Development and Management of Facility	Central Government	I PC IV (Port Authority)	Local Government (Province/ Municipality)	Private Sector
Port Management				
Commercial Activities		○		
Navigational Safety	○			
Development of the Facilities				
Navigational Aids	○			
Basins		○	△	
Wharf		○	△	P
Maintenance Dredging ※	○	○	△	■
Initial Dredging ※	○	○	△	■
Storage/Marshalling Yard		○	△	P
Handling Equipment		○	△	P
Port Road (inside Port Area)		○	△	
Access Road (outside Port Area)	○		○	P
Industrial Estate and Related Infrastructure			○	P

Note: ○ Principal responsible party
△ Secondary responsible party (providing subsidy or sharing costs)
■ Special charge for port users requiring a deep draft
P Private sector participation
※ Maintenance dredging and Initial dredging include outer channel and river channel

(2) Port Working Area and Port Interest Area in Samarinda Port

The Study Team proposes the new port working area and port interest area as shown in Figure 30.9.5.

The new port waters working area covers the entire river channel and it is managed by IPC IV. On the other hand, the revised port interest area covers the anchorage basin and the access channel in the outer bar and it is administered by the central government.

Figure. 30.9.4 shows the port working area in Samarinda Port (current).
Figure. 30.9.5 shows the port working area and port interest area in Samarinda Port (proposal).

The port working area and port interest area in Samarinda Port will be designated as follows:

1) Port Waters Working Area

The border of Port Waters Working Area of Samarinda Port starts from point P6 (*-1) which is located in the bank of Dundang River then goes along riverside to the North until point P7 which is located in Muara Ulu at coordinates: 00°- 39'-14.35" South Latitude / 117°-18'- 03.87" East Longitude then goes along riverside to the North West until point P8 at coordinates: 00°-30'-58.69" South Latitude / 117°-09'-01.93" East Longitude then goes along to the West then turn to the North until point P9 at coordinates: 00°-25'-32.61" South Latitude / 116°- 59'- 34.19" East Longitude then goes along to the North turns to the East and the North until point P10 which is located in the bank of Sebulu River at coordinates: 00°- 17'- 23.48 South Latitude / 116°-59'-34.19" East Longitude then goes to the North crossing Sebulu River 11 at point at coordinates: 00°-16'-57.39" South Latitude / 116°- 59'- 21.29" East Longitude then goes along riverside to the South at point P12 which is located in Loa Sadu at coordinates: 00°-30'-45.65" South Latitude / 117°- 01'-43.22" East Longitude then goes along to the South and turns to the North East until point P13 at coordinates: 01°-31'-11.74 South Latitude / 117°-05'- 22.58" East Longitude and goes along to the East until point P14 which is located in Kutai Lama Area at coordinates: 00°-34'-14.35" South Latitude / 117°- 18'- 23.22" East Longitude then goes along riverside to point P15(*-2) and goes back to point P6.

Note: Points *-1 and *-2 are located at the outer bar.

Figure 30.9.6 shows the port waters working area in Samarinda Port.

2) Port Land Working Area

a. Border of Samarinda Port Land Working Area

Samarinda Port Land Working Area is 44,297 m^2 in area. Its border starts from point A which is located at the border fence between the land of Public Corporation of River, Lake, and Ferry Transportation and Samarinda Port at coordinates: 00°-30'-17.32" South Latitude / 117°- 08'- 51.56" East Longitude then goes along Yos Sudarso Street to the East until point B which is located in Gate VI of the Port at coordinates: 00°- 30'-25.10" South Latitude / 117°- 09'-12.73" East Longitude then to point C which is located at the bend of Yos Sudarso Street and Maritim Street at coordinates: 00°-30'-31.89" South Latitude / 117°-09'-12.73" East Longitude then turns to the North to the bend of Maritim Street and Gurami Street until point D at coordinates: 00°-30'-30.98" South Latitude / 117°- 09'-22.21" East Longitude then goes to the South East until point E which is located at the edge of bridge I at coordinate: 00°-30'-31.50" South Latitude / 117°-09'-22.86" East Longitude then goes along to the South to point F which is located in Muara Sei Karang Mumus at coordinates: 00°-30'-33.33" South Latitude /117°- 09'- 20.84 East Longitude then turns to the West into Passenger Special Wharf of Turap Kayu until the edge of the West side of the Concrete Wharf at point G at coordinates: 00°-30'-18.95" South Latitude / 117°- 08'- 51.56" East Longitude then goes along to the edge of land the border fence between Public Corporation of River, Lake, and Ferry Transportation and Samarinda Port and goes back to point A.

Figure 30.9.7 shows the port land working area in Samarinda Port.

b. Palaran Port Land Working Area

Palaran Port Land Working Area is 187,500m2 in area and is shown in Figure 30.9.8

3) Port Interest Area (Waters)

a. Border of Samarinda Port Interest Area –1

The border of Samarinda Port Interest Area-1 starts from Point A at coordinates: 01° 02'15'' S /117°06''30 E then goes to the East until Point B at coordinates: 01°08'30'' S / 117°25' 00'' E then goes to the North until Point C and then goes back to Point A along the coast.

b.Border of Samarinda Port Interest Area-2

The border of Samarinda Port Interest Area-2 starts from Point D at coordinates: 00° 28'00''S /117° 36'00'' E, then goes to the East until Point E at coordinates: 00°28' 00'' S / 117° 45' 00'' E, then goes to the North until Point F at coordinates: 00°10' 00'' S / 117° 45' 00'' E, then goes to the West until Point G at coordinates: 00°10' 00'' S / 117° 27' 00'' E, and then goes back to Point D along the coast.

Figure. 30.9.6 shows port interest area in Samarinda Port.

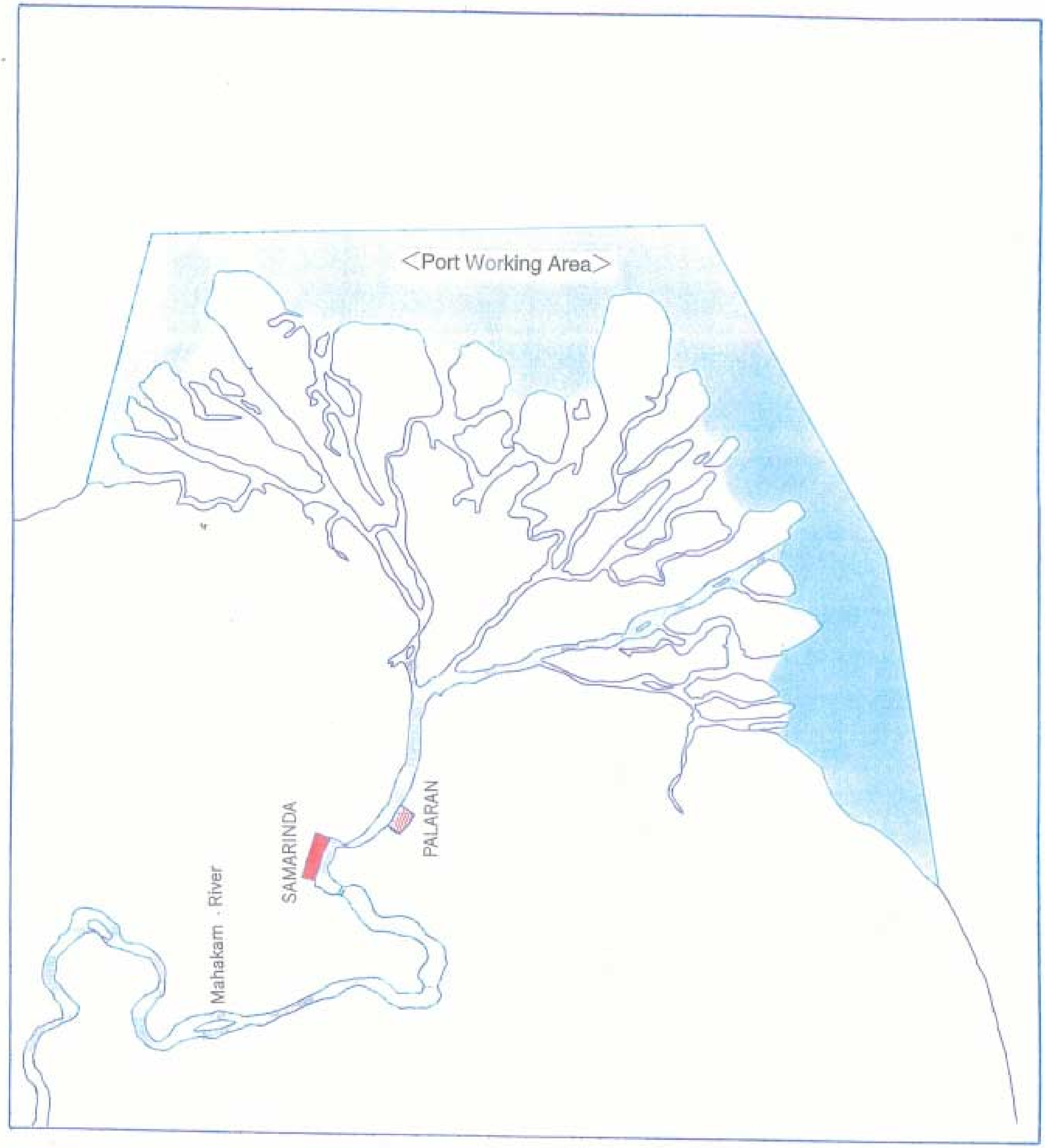


Figure 30.9.4 Port Working Area (DLKR) and Port Interest Area (DLKP) along the Mahakam River (Current)

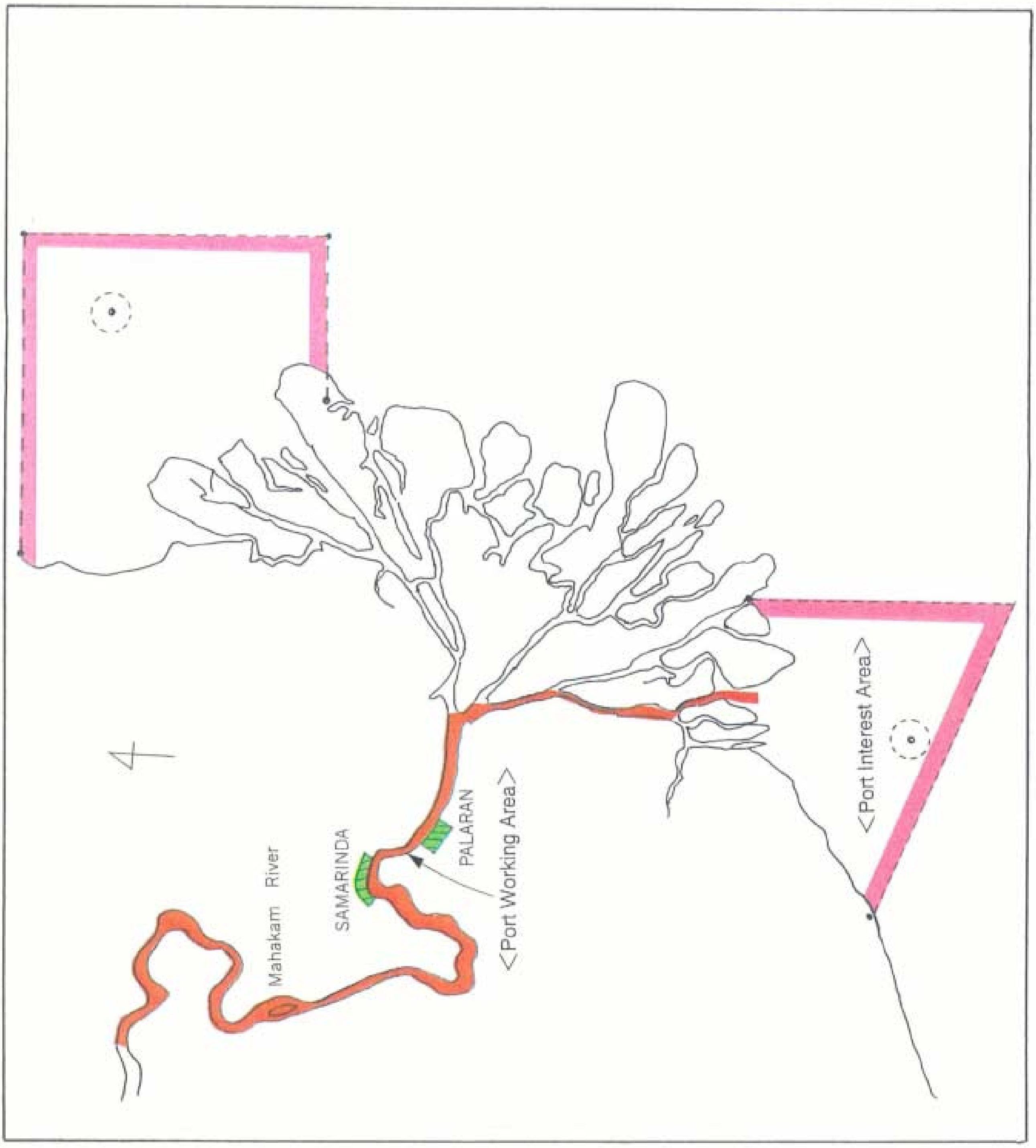
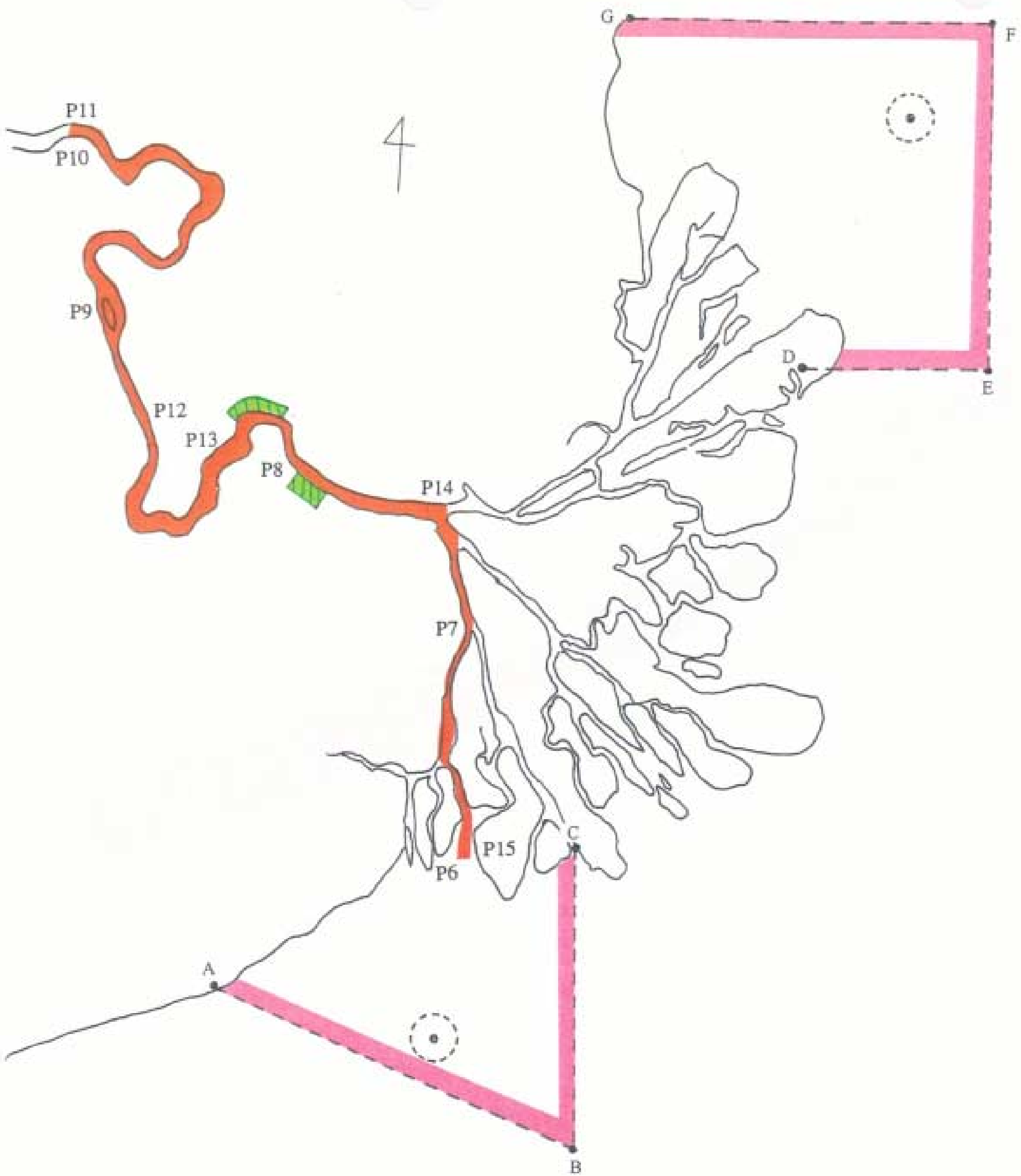


Figure 30.9.5 Port Working Area (DLKR) and Port Interest Area (DLKP) along the Mahakam River (PLAN)



REMARKS
MUARA PEGAH RIVERS

ANCHOR POSITION

01° 03'00" S / 117° 18'00" E

PILOT ON BOARD

01° 05'00" S / 117° 15'00" E

POINTS COORDINATE

A 01° 02'15" S / 117° 06'30" E

B 01° 08'30" S / 117° 25'00" E

C 00° 52'30" S / 117° 25'00" E

MUARA BEAURIVERS
ANCHOR POSITION

00° 15'00" S / 117° 36'30" T

PILOT ON BOARD

00° 15'00" S / 117° 45'00" E

POINTS COORDINATE

D 00° 28'00" S / 117° 36'00" E

E 00° 28'30" S / 117° 45'00" E

F 00° 10'00" S / 117° 45'00" E

G 00° 10'00" S / 117° 27'00" E

Figure 30.9.6 Port Waters Working Area – and Port Interest Area (Waters) in Samarinda Port

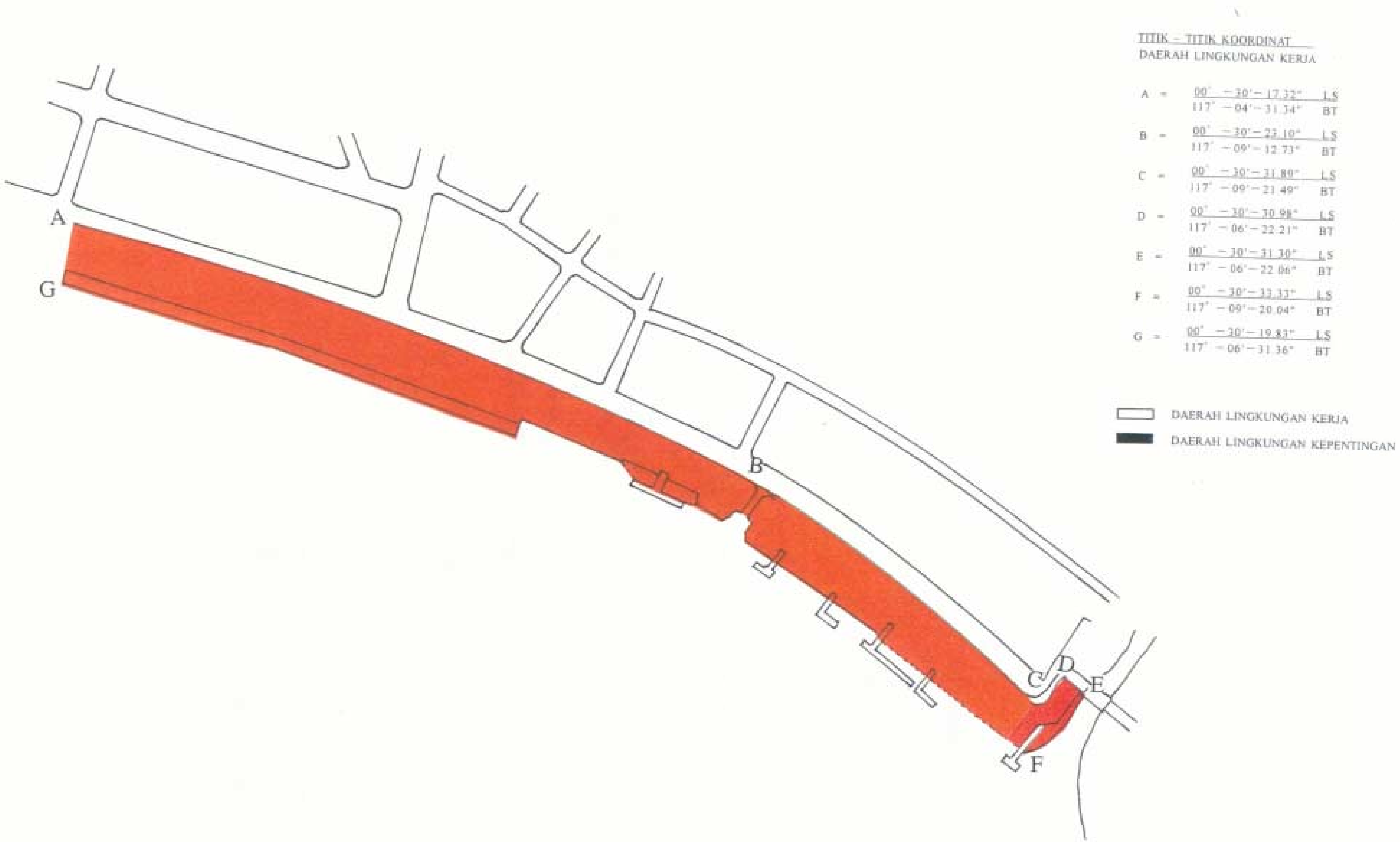


Figure 30.9.7 Port Land Working Area in Samarinda Port

Figure 30.9.8 Palaran Port Working Area