5.3 Access Road Development

5.3.1 Introduction

The accessibility is one of the most significant factors to prioritize the terminal development. In order to make use of the new terminal, it is necessary to provide a proper access road which can connect the new terminal with the urban area or industrial zone and accommodate the future cargo demand. In this section the concept, design, project cost and implementation schedule of the access road are described for each candidate terminal (North Kalibaru, Cilamaya, Tangerang) which were selected based on the future traffic demand and topography and geography around the proposed sites and the characteristics of the roads.

The design period is 2030 for all 3 terminals. However, for North Kalibaru the access road for Phase 1 is deemed to be an "Urgent project" and therefore, the design period for that road only is 2014. Pre-feasibility study for access road in “Urgent project” is described in Chapter 9.

The access road to the candidate port terminal is studied and evaluated based on the following criteria.

1) Accessibility

The alignment and scale of access road should be determined in accordance with the traffic flow related to port traffic. The access road should connect with the existing or planned road network.

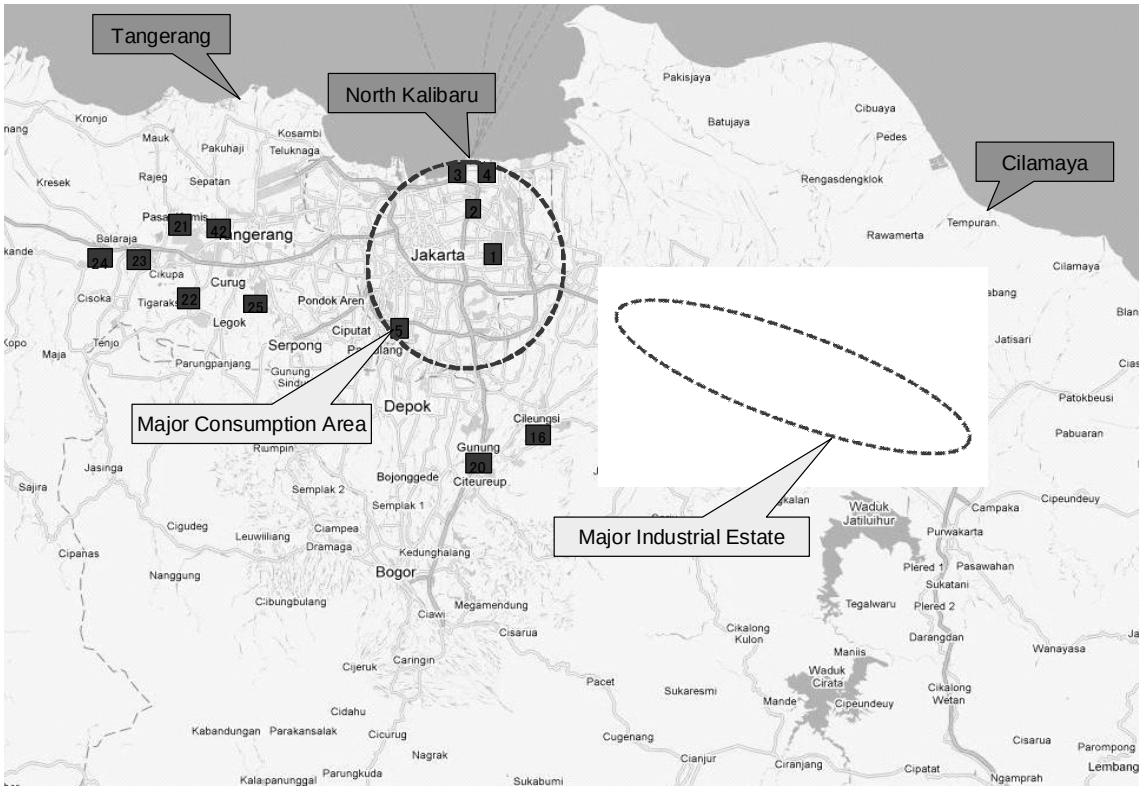
2) Project cost

The project cost mainly depends on the road length and road structure. To minimize the project cost, it is preferable to shorten the road length and apply the embankment type as much as possible. In addition, the alignment should be set up to reduce the length of structure section which largely affects the project cost.

3) Land acquisition

Land acquisition is always a significant issue for road projects. In Indonesia, many projects have been suspended delayed, revised and cancelled because an agreement with residents and land owners could not be reached. The route of the access road should affect as few houses and buildings as possible.

The location of the candidate terminals is shown in Figure 5.3-1.



Source: JICA Study Team

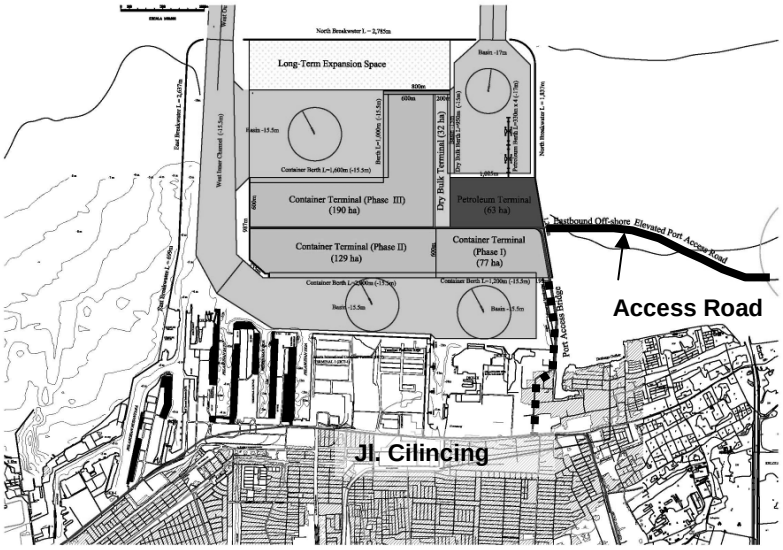
Figure 5.3-1 Location of candidate new terminals

5.3.2 Access Road Development for the Master Plan at North Kalibaru

(1) Summary of access road

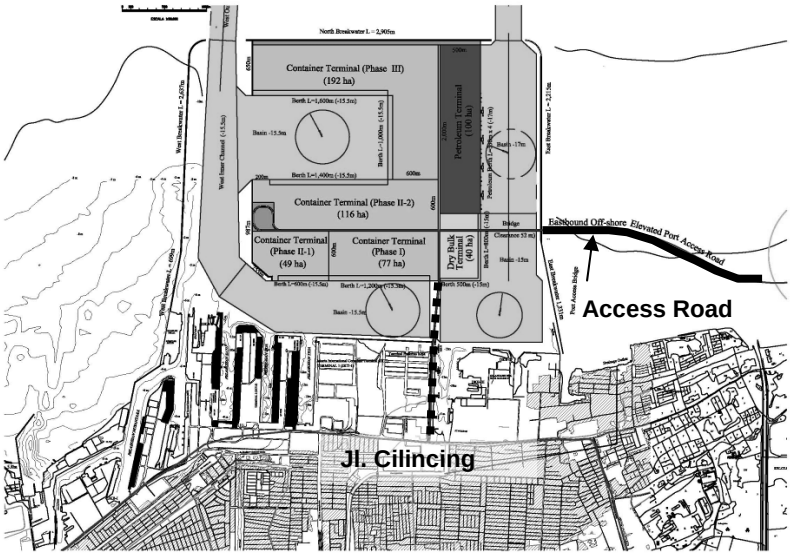
The project of North Kalibaru is the expansion of the existing Tanjung Priok Terminal. The proposed terminal will be constructed on the land reclamation area off shore of Jakarta bay.

Two alternatives for the layout of the new terminal of North Kalibaru are proposed by the Study Team. Consequently, an access road is also designed for each layout. In order for traffic on the new access road to avoid the currently congested road network in Jakarta Metropolitan Area, the access road will be planned to connect from the new terminal to East Metropolitan Region through the off shore area. Two alternative terminal layouts are shown in Figure 5.3-2 and Figure 5.3-3.



Source: JICA Study Team

Figure 5.3-2 Terminal layout for North Kalibaru (Alternative 1)



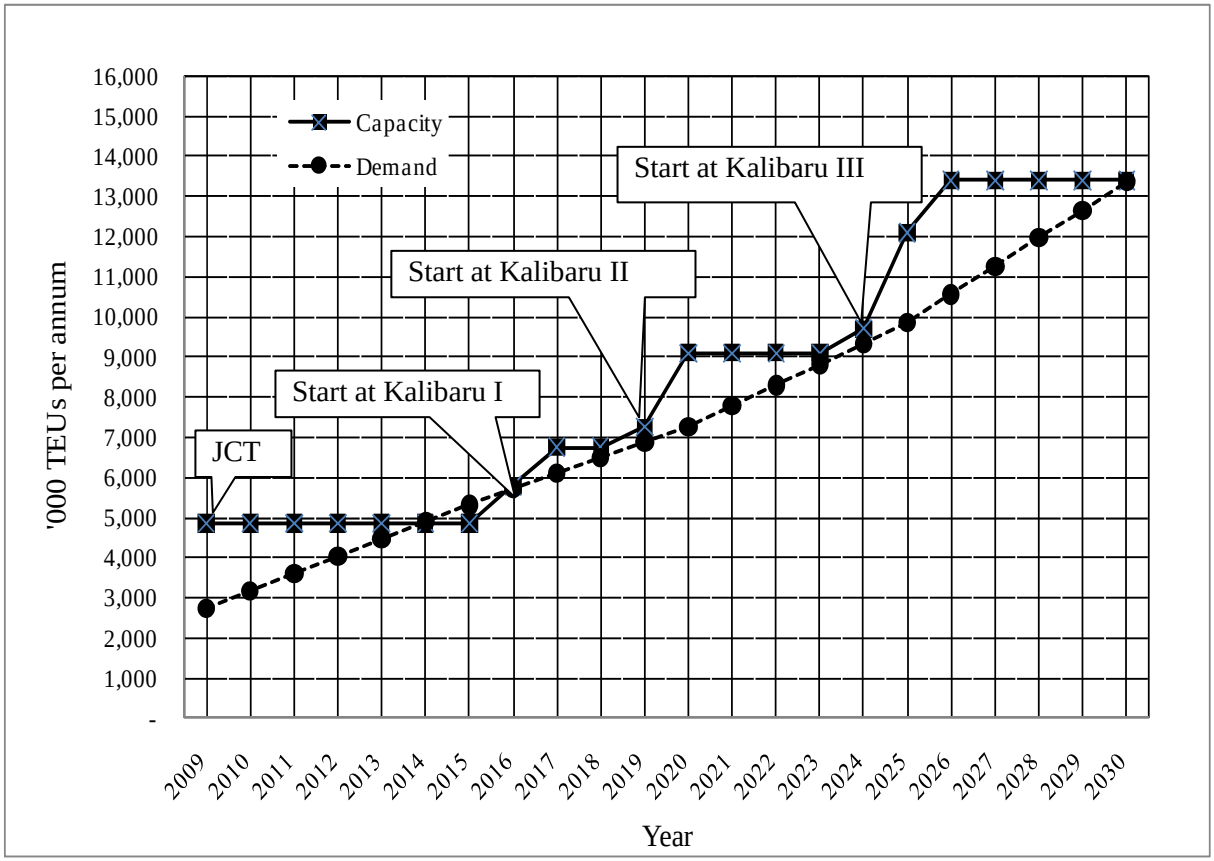
Source: JICA Study Team

Figure 5.3-3 Terminal layout for North Kalibaru (Alternative 2)

(2) Traffic demand forecast

The development of North Kalibaru is divided into three phases based on future cargo demand and construction schedule. The targeted annual capacity of North Kalibaru will reach 1.9 million TEU in Phase 1, 3.2 million TEU in Phase 2 and 4.3 million TEU in Phase 3. The total cargo capacity of North Kalibaru will reach 9.4 million TEU. Total cargo handing capacity of Tanjung Priok Terminal will reach 13.4 million TEU including the existing capacity of 4.0 million TEU.

Based on the above forecasts, generated traffic from/to the new terminal of North Kalibaru is estimated for each phase.



Source: JICA Study Team

Figure 5.3-4 Phased Development of New Container Terminal for North Kalibaru

1) Phase 1

Phase 1 of North Kalibaru terminal will start operation with a handling capacity of 1.9 million TEU. The number of containers is converted into the amount of traffic based on the following assumptions:

- Maximum cargo volume is 1.9 million TEU.
- 20 foot trailer and 40 foot trailer ratio is 1:1.
- All trailers shall be fully loaded from/to North Kalibaru.
- The proportion of other traffic compared to the containers is assumed to be 10% for passenger cars and 80% for medium trucks, based on the result of a traffic survey at Tanjung Priok Port and the condition of surrounding area.
- Passenger Car Units (PCU) for heavy trucks, medium trucks and passengers is 3.0, 2.0 and 1.0 respectively. (According to Design standards in Indonesia)

Therefore, estimated traffic volume for Phase 1 is as follows:

Table 5.3.2-1 Estimated traffic volume for Phase 1 of North Kalibaru

Vehicle type	Traffic volume (Nos/year)	Traffic volume (PCU/day)
Heavy trucks (20 foot containers)	633,000	5,203
Heavy trucks (40 foot containers)	633,000	5,203
Medium Trucks	1,013,000	5,551
Passenger cars	127,000	347
Total		**16,304**

Source: JICA Study Team

2) Phases 2 and 3

The terminal of North Kalibaru will be expanded in 2019 for Phase 2 and in 2024 for Phase 3. Planned additional handling capacity of North Kalibaru Phase 2 is 3.2 million TEU and 4.3 million TEU for Phase 3. Total capacity of North Kalibaru will reach 9.4 million TEU including that for Phase 1.

The traffic volume at the period of opening Phases 2 and 3 shall be estimated based on the following assumptions:

- Maximum cargo volume is 5.1 million TEU for Phase 2 and 9.4 million TEU for Phase 3.
- 20 foot trailer and 40 foot trailer ratio is 1:1.
- All trailers shall be fully loaded from/to North Kalibaru.
- The proportion of other traffic compared to the container is assumed to be 10% for passenger cars and 80% for medium trucks, based on the result of a traffic survey at Tanjung Priok Port and the condition of surrounding area.
- Passenger Car Units (PCU) for heavy trucks, medium trucks and passengers is 3.0, 2.0 and 1.0 respectively. (According to Indonesian Design standards)

Table 5.3.2-2 Estimated traffic volume for Phase 2 of North Kalibaru

Vehicle type	Traffic volume (Nos/year)	Traffic volume (PCU/day)
Heavy trucks (20 foot containers)	1,700,000	13,972
Heavy trucks (40 foot containers)	1,700,000	13,972
Medium Trucks	2,720,000	14,904
Passenger cars	340,000	932
Total		**43,780**

Source: JICA Study Team

Table 5.3.2-3 Estimated traffic volume for Phase 3 of North Kalibaru

Vehicle type	Traffic volume (Nos/year)	Traffic volume (PCU/day)
Heavy trucks (20 foot containers)	3,133,000	25,750
Heavy trucks (40 foot containers)	3,133,000	25,750
Medium Trucks	5,012,000	27,463
Passenger cars	627,000	1,717
Total		**80,680**

Source: JICA Study Team

After opening Phase 2 for North Kalibaru, there are two access roads available, one is the arterial road in the south direction and the other is the dedicated road in the east direction.

According to the result of the traffic survey, 65% of traffic shall pass through the dedicated access road (to East) and 35% of traffic shall pass through the arterial road (to South and West). The estimated traffic volume in 2030 is 52,442 PCU/day on the dedicated road and 28,238 PCU/day on the arterial road.

(3) Preliminary design of access road

1) Design standards

"Ketentuan Teknik, Tata Cara Pembanguan Dan Pemeligaraan Jalan Tol (Technical provision, method of development and maintenance for toll roads)" issued by the Directorate General of Highways of the Ministry of Public Works in June 2001 is used as the main design standards for the design of access roads. However, some items are modified so as to be in accordance with the characteristics of the designed road and consistent with similar roads recently designed in Indonesia.

The geometric design standards of the access road for North Kalibaru are shown in Table 5.3.2-4.

Table 5.3.2-4 Geometric design standards for North Kalibaru

No.	Item	Unit	Design Standard
1.	Design speed	km/h	80
2.	Cross Section Element		
	-Lane Width	m	3.60
	-Left Shoulder Width	m	3.00
	-Right Shoulder Width	m	1.00
	-Median Width	m	3.00
	-Cross Fall	%	2
	-Maximum Super elevation	%	8
	-Cross Fall at left shoulder	%	4
	-Minimum Clearence Height	m	5.10
	-Minimum Clearence Height above Railway	m	6.50
3.	Minimum Stopping Sight Distance	m	110
4.	Horizontal Alignment		
	-Minimum Radius	m	400(280)
	-Minimum Radius Without Transition Curve	m	2000
	-Minimum Radius at Normal Crossfall	m	3500
	-Minimum Curve Length	m	140 or 1000/θ 200
	-Minimum Transition Curve length	m	70
5.	Vertical Alignment		
	-Maximum Grade	%	4
	-Critical Vertical Curve Length 6 % grade	m	500
	-Vertical Curve		
	Minimum Crest Radius	m	4500
	Minimum Sag Radius	m	3000
	Minimum Curve Length	m	70

Source: Standard specifications for geometric design of urban roads, Bina Marga

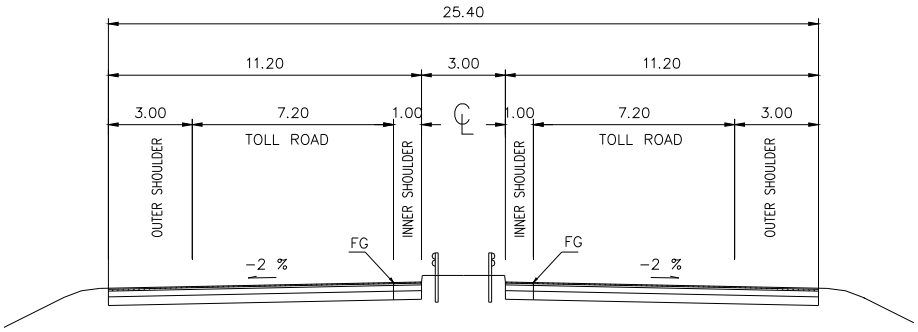
2) Cross section

As described in the section of the traffic demand forecast, estimated traffic volume for the access road in 2030 is 52,442 PCU/day. According to the design standards in Indonesia, a lane capacity is 20,000 PCU/day. Therefore, a four-lane road is sufficient for the access road to North Kalibaru.

Cement concrete pavement is to be applied, which is commonly used for roads recently constructed in Indonesia.

The width of left shoulder is reduced to 2.5m for bridge section to lower the construction cost.

The typical cross section of the access road is as shown in Figure 5.3-5. For details refer to the drawings attached at the end of this chapter.



Source: JICA Study Team

Figure 5.3-5 Typical cross section of access road for North Kalibaru

3) Plan and Profile

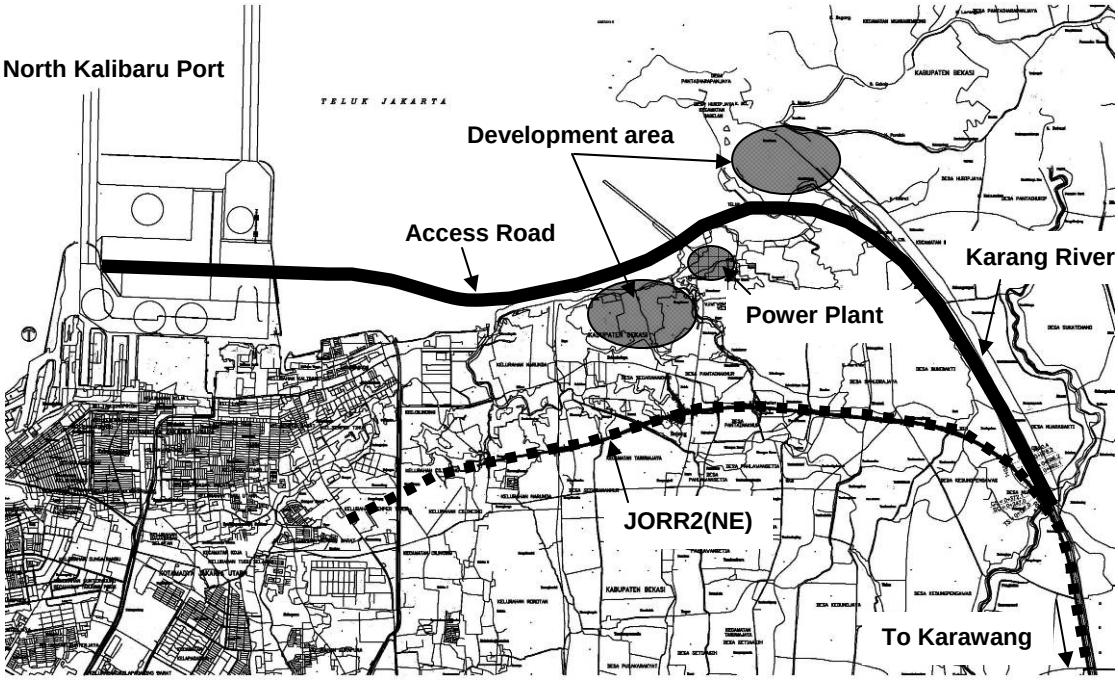
a) Horizontal alignment

The access road connects the new terminal facility with JORR2, passing through the coastal area in front of the development area of Marunda and Bekasi. The total length of the access road is 19.3 km, consisting of 9.0 km inland and 10.2 km on the coast.

The control points to determine the horizontal alignment of the access road are as follows.

- To smoothly connect with the terminal internal road
- To pass through near the development area for Marunda and Bekasi and over 300m away from the coast line
- To avoid the existing power plant and major facilities in Marunda
- To connect the planned alignment of JORR2 with a Junction
- To utilize the land along Karang River

For details of the horizontal alignment refer to the drawings attached at the end of this chapter.



Source: JICA Study Team

Figure 5.3-6 Plan for access road for North Kalibaru

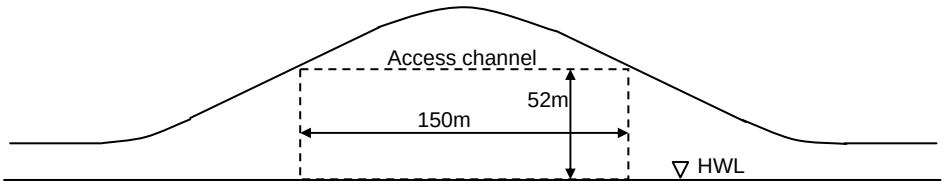
b) Vertical alignment

While the road level on the inland section is almost the same as the ground level, a certain vertical clearance must be secured in the coastal section. In addition, it is necessary to secure a certain horizontal and vertical clearance for the car carrying vessel plying the east access channel of North Kalibaru for alternative 2.

The vertical alignment is determined based on the following conditions.

- Ground level of terminal: 3.0m above M.S.L.
- Vertical clearance on coastal: 5m above H.W.L.
- Vertical clearance on the coast for the barge route: 10m above H.W.L.
- Vertical clearance on the sea for the car carrying vessel : 52m above H.W.L. (Alt2)
- Required fairway width for the car carrying vessel: 150m (Alternative 2)

For details of the vertical alignment refer to the drawings attached at the end of this chapter.



Source: JICA Study Team

Figure 5.3-7 Clearance for access channel of North Kalibaru

4) Structure

a) Standard span bridge

The major bridges and their lengths on the access road for North Kalibaru are listed in Table 5.3.2-5.

Table 5.3.2-5 Bridge sections on access road for North Kalibaru

Station	Length	Remarks
Sta. 1+050	80m	Junction ramp with JORR2
Sta. 6+800	50m	Road for power plant
Sta. 8+900 – 19+220	10,320m	Port access bridge

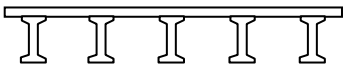
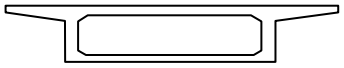
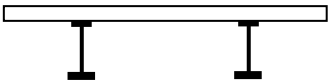
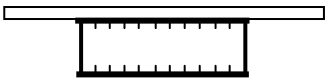
Source: JICA Study Team

Each bridge component will be selected in consideration of the economic aspect, construction period and durability.

Superstructure

PC-I Girder is most suitable from the viewpoint of construction period, cost and durability. The features of the typical girder types are shown in Figure 5.3-7.

Table 5.3.2-6 Typical girder type

Girder Type	Feature	Span	
PC Hollow Slab 	• Typical short span bridge • Span limitation and center pier is not applicable	- 20	×
PC-I Girder 	• Most popular conventional bridge type	25-35	○
PC-Box Girder 	• Economical for middle span bridges • Need longer construction period at site	45-65	△
Steel-I Girder 	• Popular for middle span bridges • Shorter construction period at site • Light weight • Application of anti-corrosion steel	35-50	×
Steel-Box Girder 	• Applied for middle to longer span bridges • Shorter construction period at site • Light weight • Application of anti-corrosion steel	40-80	×

Source: JICA Study Team

Piers

Concrete piers have been selected because of the advantages in the aspects of cost, durability and ease of maintenance.

Table 5.3.2-7 Typical pier type

Pier Type	Concrete pier	Steel pier		
Shape	T-shape 	T-shape 	Reverse-L 	Frame 
Flexibility of pier position	Almost fixed at center	Very flexible and adjustable to the limitations of site conditions		
Construction time	Long (in-situ)	Very short because of Pre-fabrication of steel structures		
Cost	Low	High		
Maintenance	No need	Re-painting		

Source: JICA Study Team

Span

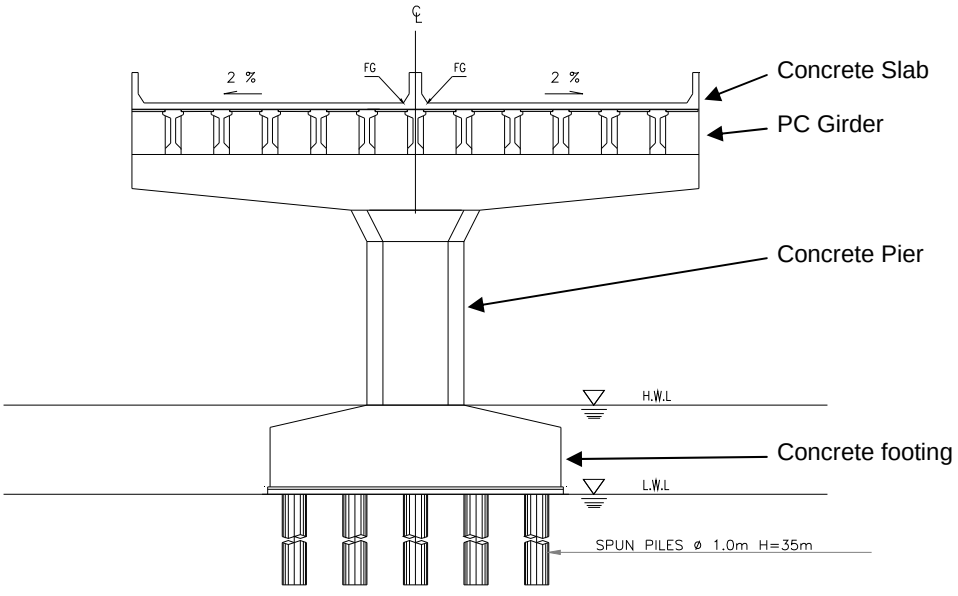
The optimum span length for PC-I Girder is 25-35m. Based on the common practice in Indonesia, the standard span length shall be 35m (pier to pier) for the bridge on the access road for North Kalibaru.

Foundations and piles

As the bridge is located over water and above a soft ground layer, steel piles and concrete footings shall be selected for the common foundation. Referring to the result of the geotechnical survey for off shore of Tanjung Priok port, it is assumed that average length of the steel piles will be 35m.

Bridge type

The typical type for standard span bridge is as shown in Figure 5.3-8. This type of bridge is applied for all bridges except the long span bridge in the terminal.



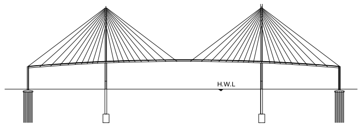
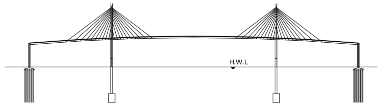
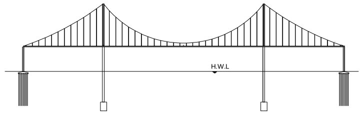
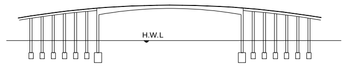
Source: JICA Study Team

Figure 5.3-8 Typical type for standard span bridge

b) Long span bridge

For alternative 2 of North Kalibaru, it is required to ensure a certain fairway width and vertical clearance for the car carrying vessel plying the east access channel in North Kalibaru. Considering the scale of the bridge, construction period, cost and aesthetic view as a monument of Kalibaru terminal, the Extra-dosed bridge is selected. The features of representative long-span bridges are shown in Table 5.3.2-8.

Table 5.3.2-8 Comparison table for the long span bridge of North Kalibaru

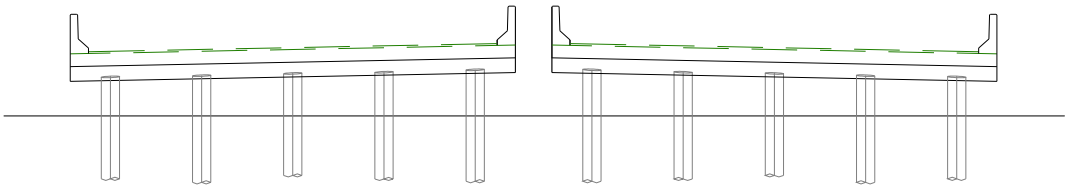
Bridge type	No-1		No-2		No-3		No-4	
Bridge type (Main Bridge)	**Composite Cable Stayed Bridge** **(Concrete Pylon+2-Steel I girder +RC deck slab)**		**Extra-dosed bridge** **(PC-box girder)**		**Self Anchored Suspension Bridge** **(Concrete Pylon+Steel BOX with orthotropic steel deck)**		**PC-Box bridge**	
Span arrangement	**80m+180m+80m=340m**		**80m+180m+80m=340m**		**80m+180m+80m=340m**		**180m**	
Figure of main Bridge								
Requirement								
1) Aviation control	No special limitation for height of pylon							
2) Navigation control	L:150.0m×H:52.0m×1 way							
3) Fairway obstruction	According to Navigation control							
4) Cross section	Motorized lane: 2 sides×2 lines×3.60m=14.4m、Shoulder along left handrail=3.00m, Median=3.0m. Handrail in both sides=2×0.5m=1.0m、Total=24.40m.							
5) Foundation Type	Caisson Foundation		Pile Foundation		Caisson Foundation		Pile Foundation	
6) Maximum Gradient	3%							
Evaluation		Rating		Rating		Rating		Rating
1) Bridge Construction cost	**116%**	Δ	**112%**	Δ	**129%**	x	**100%**	O
2) Construction period (exclude contractor detailed design)	**35 months**	Δ	**33 months**	O	**35 months**	Δ	**41 months**	x
3) Navigation control (Operating stage)	Enough navigation width can be secured.	O	Required navigation width can be secured. However, protection measurement for piers against vessel must be arranged.	Δ	Enough navigation width can be secured.	O	Required navigation width can be secured. However, protection measurement for piers against vessel must be arranged.	x
3) Navigation control (Construction Stage)	Temporary changing of navigation route and width will not be necessary.	O	Temporary changing of navigation route and width may be necessary during construction term of pier in the sea.	Δ	Temporary changing of navigation route and width will be necessary during launching erection term of steel box girder.	x	Temporary changing of navigation route and width may be necessary during construction term of pier in the sea.	Δ
4) Appearances	Very good (Symbolic landmark, harmonize with landscape)	O	Good (Harmonize with landscape)	O	Very good (Symbolic landmark, harmonize with landscape)	O	Fair	Δ
5) Bridge Maintenance	Main checking points at periodical maintenance term will be as follows. *) Stay cable and anchorage points *) Painting for steel structure *) Crack of concrete structure *) Pavement *) Electrical works *) Expansion joint and bearing	x	Main checking points at periodical maintenance term are as follows. *) Outer PC cables and anchorage points *) Crack of concrete structure *) Pavement *) Electrical works *) Expansion joint and bearing	O	Main checking points at periodical maintenance term will be as follows. *) Suspension and hunger cables, anchoring and connection parts *) Painting for steel structure *) Crack of concrete structure *) Pavement *) Electrical works *) Expansion joint and bearing	x	Main checking points at periodical maintenance term are as follows. *) Crack of concrete structure *) Pavement *) Electrical works *) Expansion joint and bearing	O
6) Workability	Few experience in Indonesia	O	No experience in Indonesia	Δ	No experience in Indonesia	x	Many experience in Indonesia	O
Summary								
	By the reason of lightest weight superstructure compared with other plans, this bridge type can minimize the construction Q'ty of foundation, which may influences most on construction schedule. Therefore, this type can minimize the risk of construction schedule delay. Merits *) Medium construction schedule *) Safety navigation traffic on fairway *) Good appearance Demerits *) More expensive than PC box girder bridge The same type of bridge has been constructed in Sulabaya.		Span arrangement as well as construction cost is the close to the cable stayed and PC box girder bridge. Merits *) Lower construction cost *) Good appearance *) Shortest construction period Demerits *) Guard block against vessel collision shall be required for center piers. This type of bridge so far does not exist in Indonesia. Considering to the Life Cycle Cost (LCC), Construction Term and Esthetic View point, this type of bridge is recommendable for the project		Self-anchored type suspension bridge can eliminate anchorage work on ground which often require big construction volume and cost. Merits *) Good appearance. *) Medium construction term. *) Safety navigation traffic on fairway during operating term. *) Effectiveness of technical transfer. Demerits *) It costs much higher than other alternatives. This type of bridge so far dose not exist in Indonesia.		This type of bridge is common in Indonesia. Merits *) Lowest construction cost Demerits *) No good appearance with big girder depth. *) This bridge have more risk of construction delay caused by cast-in-place superstructure fabrication.	
Rank	**2**		**1**		**4**		**3**	

Source: JICA Study Team

c) Other structures

Pile slabs

Pile slabs are applied on the section where the soft ground strata exists as the countermeasure against subsidence. The pile slab road is commonly and widely used in Indonesia at soft ground areas. The length of section for the pile slabs is about 8.5km from the junction with JORR2.



Source: JICA Study Team

Figure 5.3-9 Cross section of pile slab

Overpass bridge

To avoid the segmentation of the local road and the residential area, the overpass bridge for the local road is to be installed where it is split by the access road. The overpass bridge is composed of the PC-I girder section and a retaining wall. Concrete footings and PC piles are to be used for the substructure the same as the standard span bridge. Two overpass bridges are applied on the access road for North Kalibaru.

Table 5.3.2-9 Location of overpass bridge on access road for North Kalibaru

Station	Name of local road
Sta. 2+250	Jl. Pendayakan
Sta. 4+150	Jl. Bunibakti

Source: JICA Study Team

(4) Implementation schedule

1) Alternative 1

The construction of the access road of the urgently required terminal for Alternative 1 will require three years. The access road planning should be started earlier to complete construction by 2019.

Access Road Development of North Kalibaru for Alt1

Road:	4-lane, L=9.0km, 2 bridge as listed in Table 5.3.2-5
Interchange:	1 place
Overpass bridge:	2 places
Port Access Bridge:	4-lane, L=10.3km
Utility Facilities	

The construction schedule of North Kalibaru project is shown in Table 5.3.2-10.

Table 5.3.2-10 Implementation schedule of access road North Kalibaru (Alternative1)

Description	1st year				2nd year				3rd year				4th year			
1. Administration																
Survey/Detail Design	■	■														
Tender Process			■	■												
2.Construction																
Road Construction					■	■	■	■								
Interchange											■	■	■	■		
Flyovers													■	■		
Access Bridge						■	■	■	■	■	■	■	■			
Utility Facilities														■	■	■

Source: JICA Study Team

2) Alternative 2

The construction of the access road of the urgent required terminal for Alternative 2 will require four years. The access road planning should be started earlier to complete construction by 2019.

Access Road Development of North Kalibaru for Alt 2

Road:	4-lane, L=9.0km, 2 bridges as listed in Table 5.3.2-5 and long span bridge
Interchange:	1 place
Overpass bridge:	2 places
Approach from Extra dosed bridge to harbor facilities:	4-lane, L=0.5km
Port Access Bridge:	4-lane, L=13.3km
Extra dosed bridge:	4-lane, L=0.3km
Utility Facilities	

The construction schedule of North Kalibaru project is shown in Table 5.3.2-11.

Table 5.3.2-11 Implementation schedule of access road of North Kalibaru (Alternative 2)

Description	1st year				2nd year				3rd year				4th year				5th year			
1. Administration																				
Survey/Detail Design	■	■																		
Tender Process			■	■																
2.Construction																				
Road					■	■	■	■	■	■										
Interchange															■	■	■	■		
Flyovers																	■	■		
Bridge						■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Utility Facilities																		■	■	■

Source: JICA Study Team

(5) Preliminary Cost Estimate

1) Alternative 1

The construction cost of Alternative 1 “Access Road” was estimated at Rp 11,940,860 million as shown in Table 5.3.2-12.

Table 5.3.2-12 Construction cost of access road for North Kalibaru (Alternative 1)

Description	Unit	Quantity	Total Cost Estimate(million Rp)			Remarks
			Local Portion	Foreign Portion	Summation	
1 GENERAL	l.s	1	**1,160,533**	**23,684**	**1,184,218**	15% of Direct Construction Cost
2 Direct Construction Cost						
a: Road	m2	190,400	569,772	29,988	599,760	
b: Interchange	l.s	1	216,000	54,000	270,000	
c: Flyover	m2	8,960	36,772	1,935	38,707	
d: Bridge	m2	241,020	2,603,016	650,754	3,253,770	
e: Facilities	l.s	1	199,440	49,860	249,300	
f: Road along JORR2	m2	12,600	2,786,598	696,649	3,483,247	
Total			**6,411,597**	**1,483,187**	**7,894,784**	
3 Contingency	l.s	1	**641,159**	**148,318**	**789,478**	10% of Direct Construction Cost
Construction Cost	l.s		**8,213,290**	**1,655,189**	**9,868,480**	Total of (1+2+3)
4 Engineering Service	l.s	1	**621,991**	**180,642**	**986,848**	10% of Construction Cost
Project Cost	l.s		**8,835,281**	**1,835,830**	**10,855,328**	
5 VAT			**883,528**	**183,583**	**1,085,532**	10% of Project Cost
Total Project Cost	l.s		**9,718,809**	**2,019,413**	**11,940,860**	

Source: JICA Study Team

2) Alternative 2

The construction cost of Alternative 2 “Access Road” was estimated at Rp 14,124,850 million as shown in Table 5.3.2-13.

Table 5.3.2-13 Construction cost of access road for North Kalibaru (Alternative 2)

Description	Unit	Quantity	Total Cost Estimate(million Rp)			Remarks
			Local Portion	Foreign Portion	Summation	
1 GENERAL	l.s	1	**1,372,795**	**28,016**	**1,400,812**	15% of Direct Construction Cost
2 Direct Construction Cost						
a: Road	m2	201,600	603,288	31,752	635,040	
b: Interchange	l.s	1	216,000	54,000	270,000	
c: Flyover	m2	8,960	36,772	1,935	38,707	
d: Bridge (PC Slab)	m2	269,100	2,906,280	726,570	3,632,850	
e: Bridge (Cable)	m2	7,020	758,160	189,540	947,700	
f: Facilities	l.s	1	264,960	66,240	331,200	
g: Road along JORR2	m2	12,600	2,786,598	696,649	3,483,247	
Total			**7,572,057**	**1,766,687**	**9,338,744**	
3 Contingency	l.s	1	**757,205**	**176,668**	**933,874**	10% of Direct Construction Cost
Construction Cost	l.s		**9,702,058**	**1,971,371**	**11,673,430**	Total of (1+2+3)
4 Engineering Service	l.s	1	**723,255**	**206,850**	**1,167,343**	10% of Construction Cost
Project Cost	l.s		**10,425,313**	**2,178,221**	**12,840,773**	
5 VAT			**1,042,531**	**217,822**	**1,284,077**	10% of Project Cost
Total Project Cost	l.s		**11,467,844**	**2,396,043**	**14,124,850**	

Source: JICA Study Team

5.3.3 Access Road Development for the Master Plan at Cilamaya

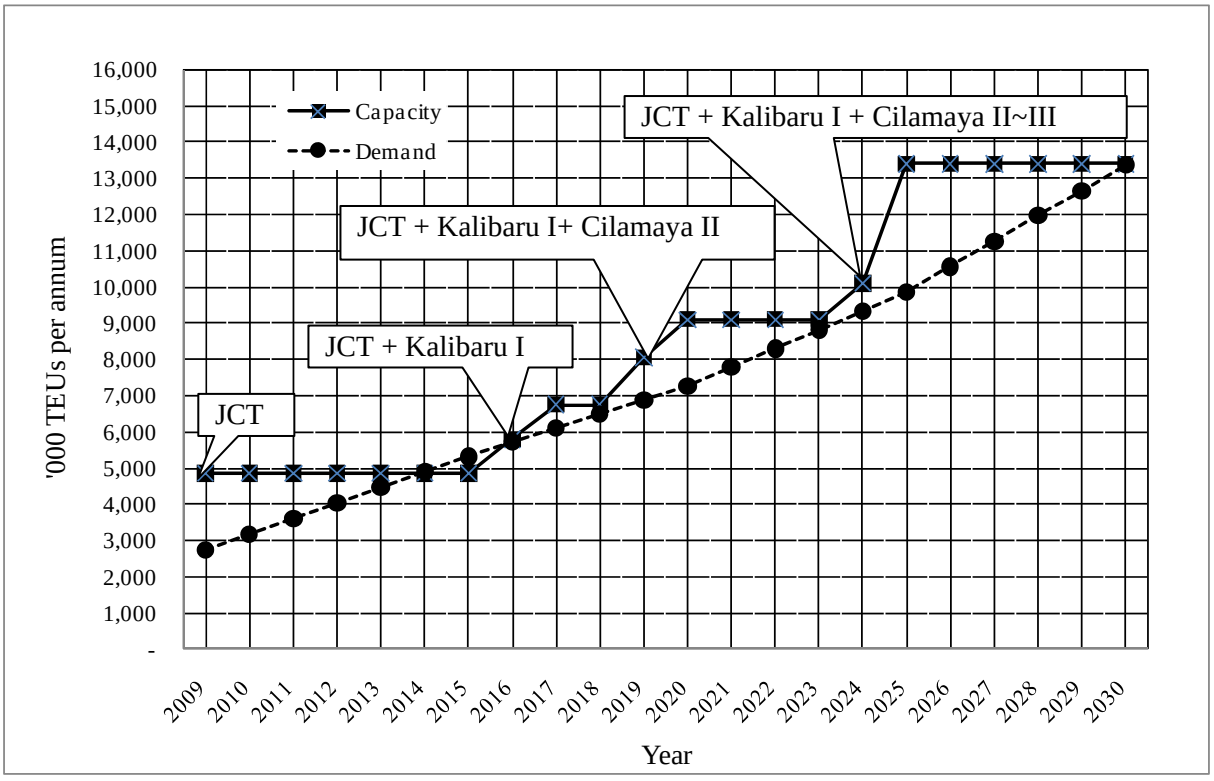
(1) Summary of access road

The candidate terminal of Cilamaya is located about 80km from Tanjung Priok Port to the east along the coast. The surrounding area is largely covered by rice fields and most of the local roads in this area are very narrow with many houses and buildings on the roadsides.

The access road is planned as a dedicated road to connect the new terminal with the Cikampek Toll Road by the shortest route. In addition, frontage roads should be provided along the access road on both sides to secure the accessibility to the surrounding areas.

(2) Traffic demand forecast

Cilamaya terminal is planned to open in 2019 after the saturation of North Kalibaru and will be developed in two phases. The targeted annual capacity of Cilamaya will reach 3.2 million TEU in Phase 2 and 4.3 million TEU in Phase 3. The total cargo capacity of Cilamaya will reach 7.5 million TEU.



Source: JICA Study Team

Figure 5.3-10 Phased Development of the New Container Terminal for Cilamaya

Based on the above forecast, generated traffic from/to the new terminal of Cilamaya for the access road is estimated for each phase.

The traffic volume at the period of opening Phase 2 and 3 shall be estimated based on the following assumptions:

- Maximum cargo volume is 3.2 million TEU for Phase 2 and 7.5 million TEU for Phase 3.
- 20 foot trailer and 40 foot trailer ratio is 1:1.
- All trailers shall be fully loaded from/to Cilimaya.

- The proportion of other traffic compared with the containers is assumed to be 10% for passenger cars and 80% for medium trucks, based on the result of a traffic survey at Tanjung Priok Port and the condition of the surrounding area.
- Passenger Car Units (PCU) for heavy trucks, medium trucks and passengers are 3.0, 2.0 and 1.0 respectively. (According to Indonesian Design standards)

Table 5.3.3-1 Estimated traffic volume for Phase 2 of Cilamaya

Vehicle type	Traffic volume (Nos/year)	Traffic volume (PCU/day)
Heavy trucks (20 foot containers)	1,067,000	8,770
Heavy trucks (40 foot containers)	1,067,000	8,770
Medium Trucks	1,707,000	9,353
Passenger cars	213,000	584
Total		**27,477**

Source: JICA Study Team

Table 5.3.3-2 Estimated traffic volume for Phase 3 of Cilamaya

Vehicle type	Traffic volume (Nos/year)	Traffic volume (PCU/day)
Heavy trucks (20 foot containers)	2,500,000	20,548
Heavy trucks (40 foot containers)	2,500,000	20,548
Medium Trucks	4,000,000	21,918
Passenger cars	500,000	1,370
Total		**64,384**

Source: JICA Study Team

(3) Preliminary design of access road

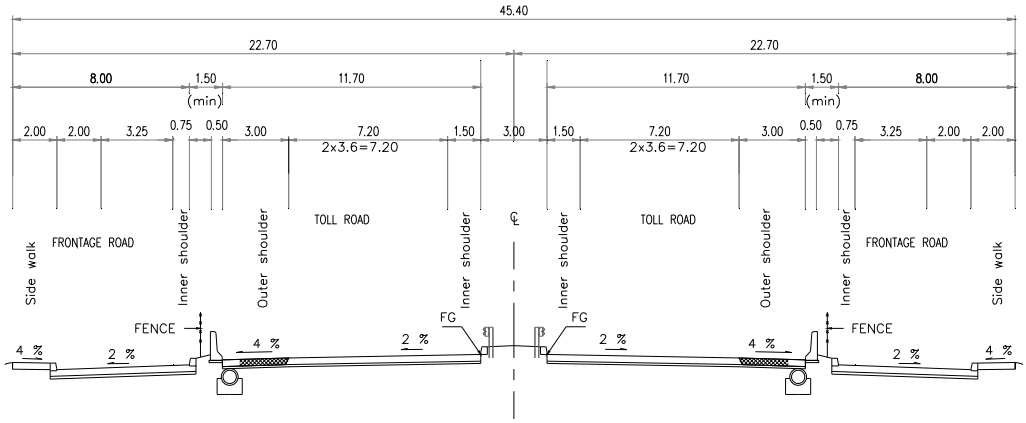
1) Design standards

Refer to 5.3.2 (3) 1) for the design standards for the access road of Cilamaya.

2) Cross section

As described in the traffic demand forecast section, estimated traffic volume for the access road is 64,384 PCU/day in 2030. According to the design standards in Indonesian, a lane capacity is 20,000 PCU/day. Therefore, a four-lane road is sufficient for the access road to Cilamaya. Cement concrete pavement is applied, which is commonly used for roads recently constructed in Indonesia.

The typical cross section of the access road with frontage roads is as shown in Figure 5.3-11. For details refer to the drawings attached at the end of this chapter.



Source: JICA Study Team

Figure 5.3-11 Typical cross section of access road for Cilamaya

3) Plan and Profile

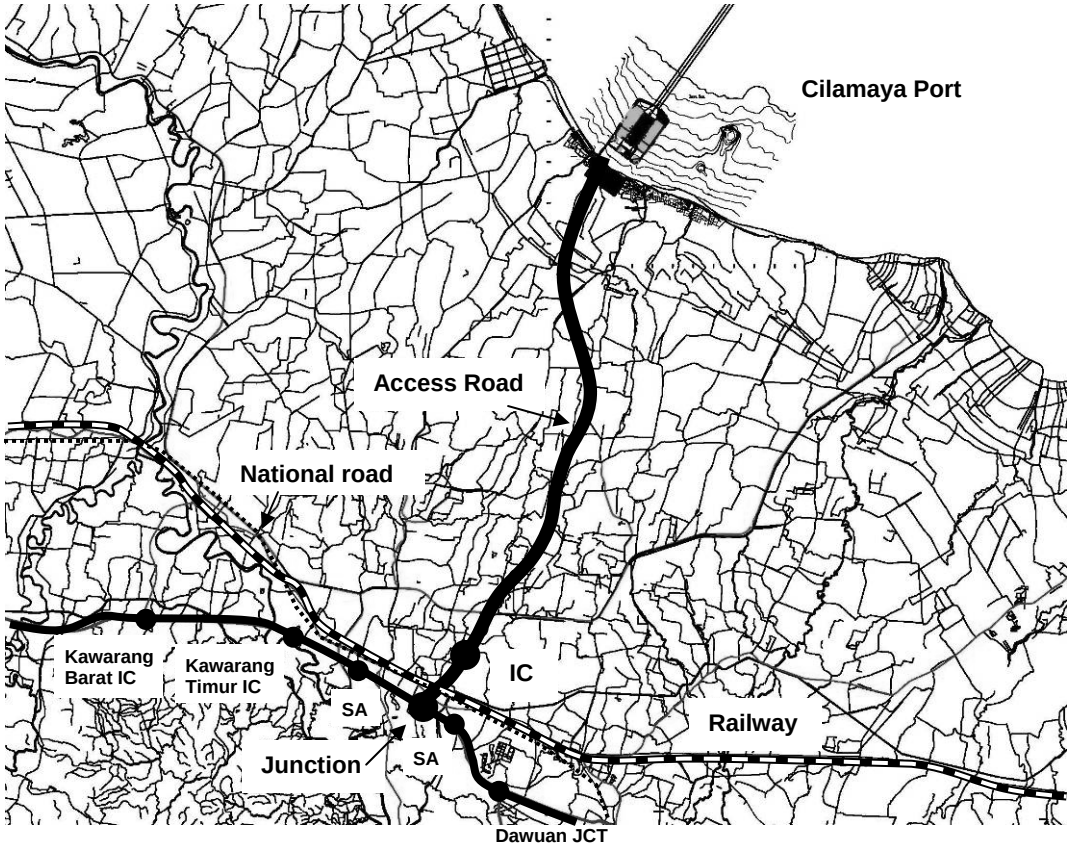
a) Horizontal alignment

The horizontal alignment of the access road is determined based on the following conditions.

- To choose the shortest route between the new terminal and Cikampek Toll Road
- To pass through the rice fields to minimize the resettlement
- To apply a Trumpet-type junction with Cikampek Toll Road

The total length of the access road is 30.6 km. The dedicated road finishes and links up with the frontage road about 1 km before the terminal. An interchange is to be installed at the beginning of the access road.

The horizontal alignment details are shown in the drawings attached at end of this chapter.



Source: JICA Study Team

Figure 5.3-12 Plan for access road for Cilamaya

b) Vertical alignment

The topography in the area of the proposed road is low and flat while the ground elevation is 30 to 40m around the area of the interchange and railway. The road height should be basically almost the same as the existing ground level. The vertical alignment is raised at the following points.

- Junction with Cikampek Toll Road
- National road
- Railway
- Major arterial road
- Canal

For the approach bridge to the terminal, the vertical clearance is 5.0m from HWL. The vertical alignment details are shown in the drawings attached at the end of this chapter.

4) Structure

a) Bridges

The major bridges and their lengths on the access road for Cilamaya are listed in Table 5.3.3-3. The same type of standard span bridge as North Kalibaru is applied.

Table 5.3.3-3 Bridge sections on the access road for Cilamaya

Location	Length	Remarks
Sta. 0+300	50m	Ramp at JCT with Cikampek Toll Road
Sta. 1+120	50m	National road
Sta. 1+570	80m	Railway and canal
Sta. 5+730	80m	Irrigation canal and road
Sta. 12+500	30m	Arterial road
Sta. 24+800	30m	Arterial road
Sta. 29+100 – 29+900	800m	Port access bridge

Source: JICA Study Team

b) Other structures

Pile slabs

Pile slab are to be applied on the sections where the soft ground strata exists for the countermeasure against subsidence. Pile slab roads are commonly and widely used in Indonesia in soft ground areas. The length of the pile slab section is about 0.5 km long from the port access bridge.

Overpass bridge

To avoid the segmentation of the local road and the residential area, an overpass bridge for the local road is to be installed where it is split by the access road. The type of overpass bridge is composed of a PC-I girder section and a retaining wall. Concrete footings and PC piles are to be used for the substructure the as same as the standard span bridge. An overpass bridge is to be applied on the access road for Cilamaya.

Table 5.3.3-4 Location of overpass bridge on access road for Cilamaya

Station	Name of local road
Sta. 9+250	Jl. Babakan Berenuk

Source: JICA Study Team

(4) Implementation schedule

Project implementation period will be 48 months including project preparation and 36 months of construction works.

Access Road Development of Cilamaya

Road:	4-lane, L=29.8km, 6 bridges as listed in Table 5.3.3-3.
Interchange:	1 place
Overpass bridge:	1 place
Access Bridge:	4-lane, L=0.8km
Utility Facilities	

The construction schedule of Cilamaya project is shown in Table 5.3.3-5.

Table 5.3.3-5 Implementation schedule of access road for Cilamaya

Description	1st year				2nd year				3rd year				4th year			
1. Administration																
Survey/Detail Design																
Tender Process																
2.Construction																
Road Construction																
Interchange																
Flyovers																
Access Bridge																
Utility Facilities																

Source: JICA Study Team

(5) Preliminary Cost Estimate

The construction cost of Cilamaya Access Road Development was estimated at Rp 2,663,586 million as shown in Table 5.3.3-6.

Table 5.3.3-6 Construction cost of access road for Cilamaya

Description	Unit	Quantity	Total Cost Estimate(million Rp)			Remarks
			Local Portion	Foreign Portion	Summation	
1 GENERAL	l.s	1	**258,874**	**5,283**	**264,157**	**15% of Direct Construction Cost**
2 Direct Construction Cost						
a: Road	m2	1,083,500	975,150	0	975,150	
b: Pile slab	m2	19,700	58,952	3,103	62,055	
c: Interchange	l.s	1	216,000	54,000	270,000	
d: Flyover	m2	23,640	97,019	5,106	102,125	
e: Bridge	m2	18,720	202,176	50,544	252,720	
f: Facilities	l.s	1	79,200	19,800	99,000	
Total			**1,628,497**	**132,553**	**1,761,050**	
3 Contingency	l.s	1	**162,849**	**13,255**	**176,104**	**10% of Direct Construction Cost**
Construction Cost	l.s		**2,050,220**	**151,091**	**2,201,311**	**Total of (1+2+3)**
4 Engineering Service	l.s	1	**146,537**	**30,564**	**220,131**	**10% of Construction Cost**
Project Cost	l.s		**2,196,758**	**181,655**	**2,421,442**	
5 VAT			**219,675**	**18,165**	**242,144**	**10% of Project Cost**
Total Project Cost	l.s		**2,416,433**	**199,820**	**2,663,586**	

Source: JICA Study Team

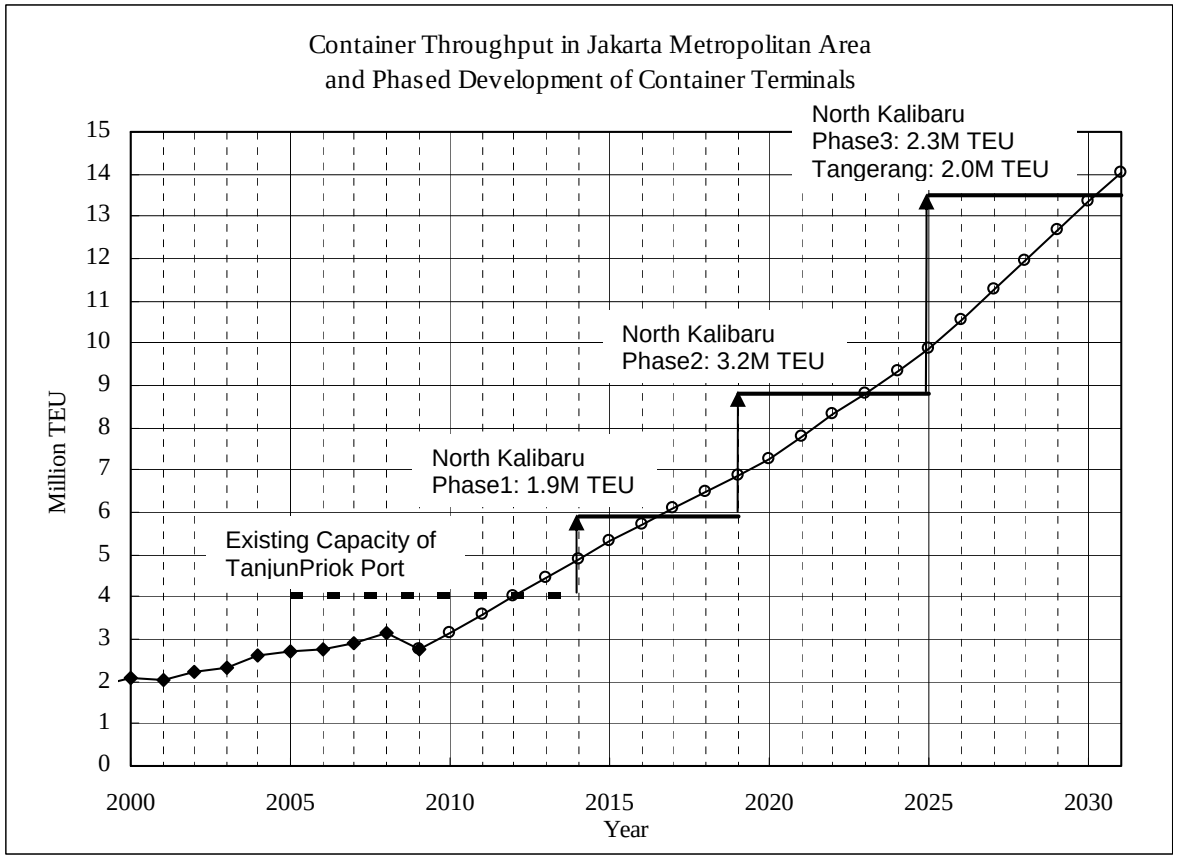
5.3.4 Access Road Development for the Master Plan at Tangerang

(1) Summary of access road

Tangerang terminal is planed about 30km west along the coast from Tanjung Priok Port. The access road shall be the arterial road as the estimated traffic volume is low at the time of terminal opening. The access road shall connect the terminal with JORR2 through the interchange which is planned by Bina Marga.

(2) Traffic demand forecast

Tangerang terminal is planned to open in 2025. The targeted capacity of Tangerang will reach 2.0 million TEU. The generated traffic for the access road from/to the new terminal of Tangerang is estimated based on the above forecast.



Source: JICA Study Team

Figure 5.3-13 Phased Development of the New Container Terminal for Tangerang

The traffic volume at the period of opening of Tangerang shall be estimated based on the following assumptions:

- Maximum cargo volume is 2.0 million TEU
- 20 foot trailer and 40 foot trailer ratio is 1:1
- All trailers shall be fully loaded from/to Tangerang
- The proportion of other traffic compared with the containers is assumed to be 10% for passenger cars and 80% for medium trucks, based on the result of the traffic survey at Tanjung Priok Port and the condition of the surrounding area
- Passenger Car Units (PCU) for heavy trucks, medium trucks and passengers is 3.0, 2.0 and 1.0 respectively. (According to Indonesian Design standards)

Table 5.3.4-1 Estimated traffic volume for Phase 3 of Tangerang

Vehicle type	Traffic volume (Nos/year)	Traffic volume (PCU/day)
Heavy trucks (20 foot containers)	667,000	5,482
Heavy trucks (40 foot containers)	667,000	5,482
Medium Trucks	1,067,000	5,846
Passenger cars	133,000	364
Total		**17,894**

Source: JICA Study Team

(3) Preliminary design of access road

1) Design standards

"Standard Specifications for geometric design of urban roads" published by the Directorate General of Highways of the Ministry of Public Works in March 1992 is used as the main design standards for the design of the access road.

The geometric design standards of the access road for Tangerang are shown in Table 5.3.4-2.

Table 5.3.4-2 Geometric design standards for Tangerang

No.	Item	Unit	Design Standard
1.	Design speed	km/h	60
2.	Cross Section Element		
	-Lane Width	m	3.50
	-Left Shoulder Width	m	2.00
	-Right Shoulder Width	m	1.00
	-Median Width	m	2.50
	-Cross Fall	%	2
	-Maximum Super elevation	%	8
	-Cross Fall at left shoulder	%	4
	-Minimum Clearence Height	m	5.10
	-Minimum Clearence Height above Railway	m	6.50
3.	Minimum Stopping Sight Distance	m	75
4.	Horizontal Alignment		
	-Minimum Radius	m	400(120)
	-Minimum Radius Without Transition Curve	m	600
	-Minimum Radius at Normal Crossfall	m	2,000
	-Minimum Curve Length	m	100 or 700/θ
	-Minimum Transition Curve length	m	50
5.	Vertical Alignment		
	-Maximum Grade	%	5
	-Critical Vertical Curve Length 6% grade	m	500
	-Vertical Curve		
	Minimum Crest Radius	m	2,000(1,400)
	Minimum Sag Radius	m	1,500(1,000)
	Minimum Curve Length	m	50

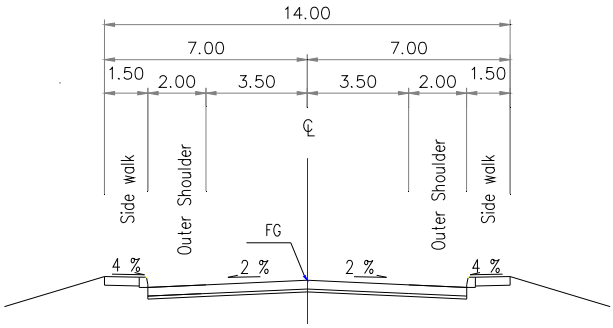
Source: Standard specifications for geometric design of urban roads, Bina Marga

2) Cross section

As described in the section on traffic demand forecast, estimated traffic volume for the access road is 17,894 PCU/day in 2030. According to design standards in Indonesian, a lane capacity is 20,000 PCU/day. Therefore, a two-lane road is sufficient for the access road of Tangerang.

Cement concrete pavement is applied, which is commonly used for roads recently constructed in Indonesia.

The typical cross section of the main road is as shown in Figure 5.3-14. For details refer to the drawings attached at the end of this chapter.



Source: JICA Study Team

Figure 5.3-14 Typical cross section of access road for Tangerang

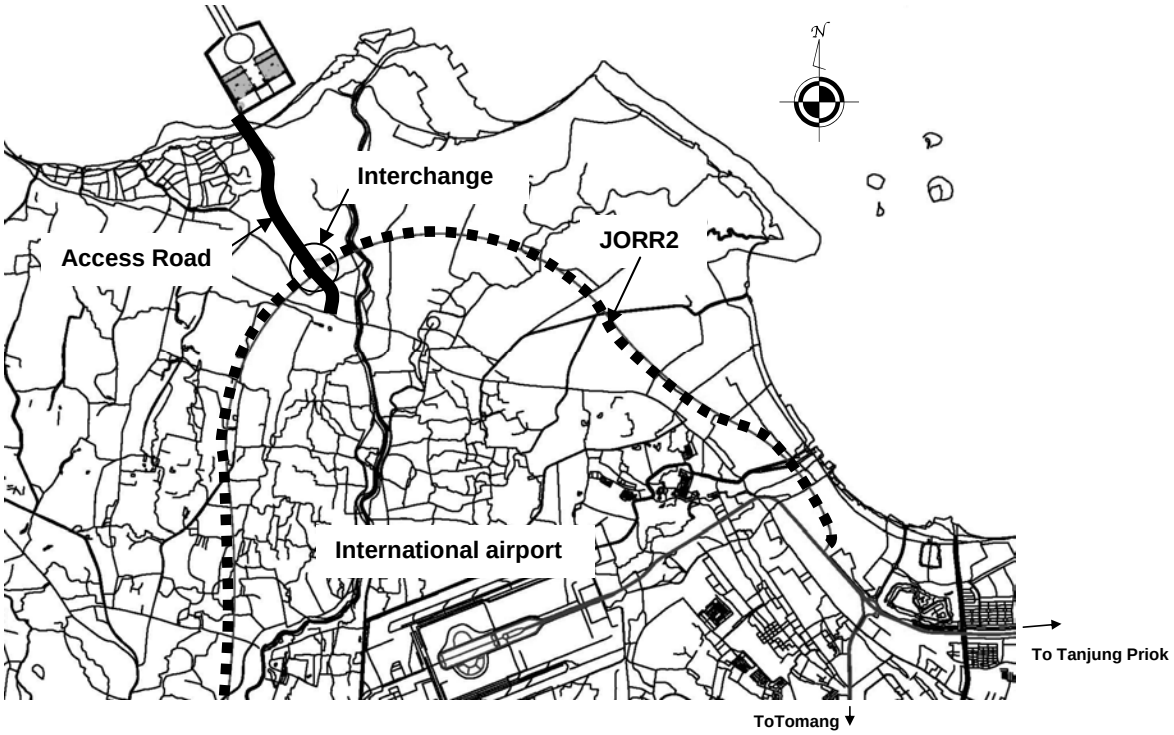
3) Plan and Profile

a) Horizontal alignment

The horizontal alignment is determined based on the following conditions.

- To choose the shortest route to the existing arterial road
- To pass through the rice fields to minimize resettlement
- To connect with JORR2 by the interchange

The total length of the access road is 5.0 km. The horizontal alignment details are shown in the drawings attached at the end of this chapter.



Source: JICA Study Team

Figure 5.3-15 Plan for access road for Tangerang

b) Vertical alignment

The area around the access road is low and flat. The road height should be basically almost the same as the existing ground level. The vertical alignment is raised only for the crossing with JORR2. For the bridge to the terminal, the vertical clearance is 5.0 m from HWL.

The vertical alignment details are shown in the drawings attached at the end of this chapter.

4) Structure

a) Bridge

The major bridge sections and their lengths for the access road for Tangerang are listed in Table 5.3.4-3. The same type of standard span bridge as North Kalibaru is applied.

Table 5.3.4-3 Bridge section on access road for Tangerang

Location	Length	Remarks
Sta. 1+000	50m	JORR2
Sta. 4+400 – 4+870	470m	Terminal approach

Source: JICA Study Team

b) Other structures

Pile slabs

Pile slabs are applied on the sections where soft ground strata exist as the countermeasure against subsidence. The pile slab road is commonly and widely used in Indonesia in soft ground areas. The length of sections for the pile slabs account is about 0.5 km from the port access bridge.

(4) Implementation Schedule

Project implementation period will be 30 months including project preparation and 18 months of construction works.

Access Road Development of Tangerang:

Road:	2-lane, L=4.5km, 1 bridge as listed in Table 5.3.4-3
Interchange:	1 place
Port Access Bridge:	2-lane, L=0.5km
Utility Facilities	

The construction schedule of Tangerang project is shown in Table 5.3.4-4.

Table 5.3.4-4 Implementation schedule of access road for Tangerang

Description	1st year				2nd year				3rd year			
1. Administration												
Survey/Detail Design	■	■										
Tender Process			■	■								
2.Construction												
Road					■	■	■					
Interchange								■	■			
Flyovers								■	■			
Bridge							■	■	■	■		
Utility Facilities										■		

Source: JICA Study Team

(5) Preliminary Cost Estimate

The construction cost of Tangerang Access Road Development was estimated at Rp 404,071 million as shown in Table 5.3.4-5.

Table 5.3.4-5 Construction cost of access road for Tangerang

Description	Unit	Quantity	Total Cost Estimate(million Rp)			Remarks
			Local Portion	Foreign Portion	Summation	
1 GENERAL	l.s	1	39,272	801	40,073	15% of Direct Construction Cost
2 Direct Construction Cost						
a: Road	m2	42,900	38,610	0	38,610	
b: Pile slab	m2	7,000	20,948	1,103	22,050	
c: Interchange	l.s	1	85,500	4,500	90,000	
d: Flyover	m2	2,800	11,491	605	12,096	
e: Bridge	m2	7,000	75,600	18,900	94,500	
f: Facilities	l.s	1	7,920	1,980	9,900	
Total			240,069	27,087	267,156	
3 Contingency	l.s	1	24,006	2,708	26,715	10% of Direct Construction Cost
Construction Cost	l.s		303,347	30,596	333,944	Total of (1+2+3)
4 Engineering Service	l.s	1	24,820	8,574	33,394	10% of Construction Cost
Project Cost	l.s		328,166	39,171	367,338	
5 VAT			32,816	3,917	36,733	10% of Project Cost
Total Project Cost	l.s		360,982	43,088	404,071	

Source: JICA Study Team

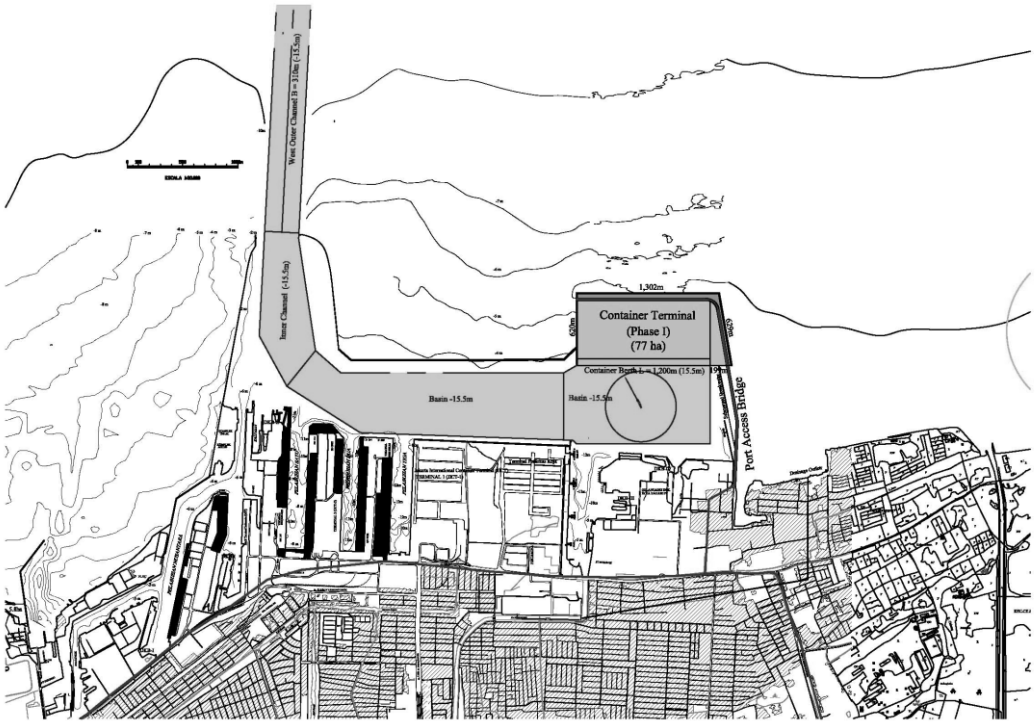
5.3.5 Access Road Development for Urgently Required Terminal at North Kalibaru

(1) Summary of access road

As described in 5.3.2, the development of North Kalibaru consists of 3 phases (Phase-I, II, III). The access road connecting the new terminal with the existing road needs to be provided for phase 1, which is a so called “Urgent Project”. The concept of the access road is as follows.

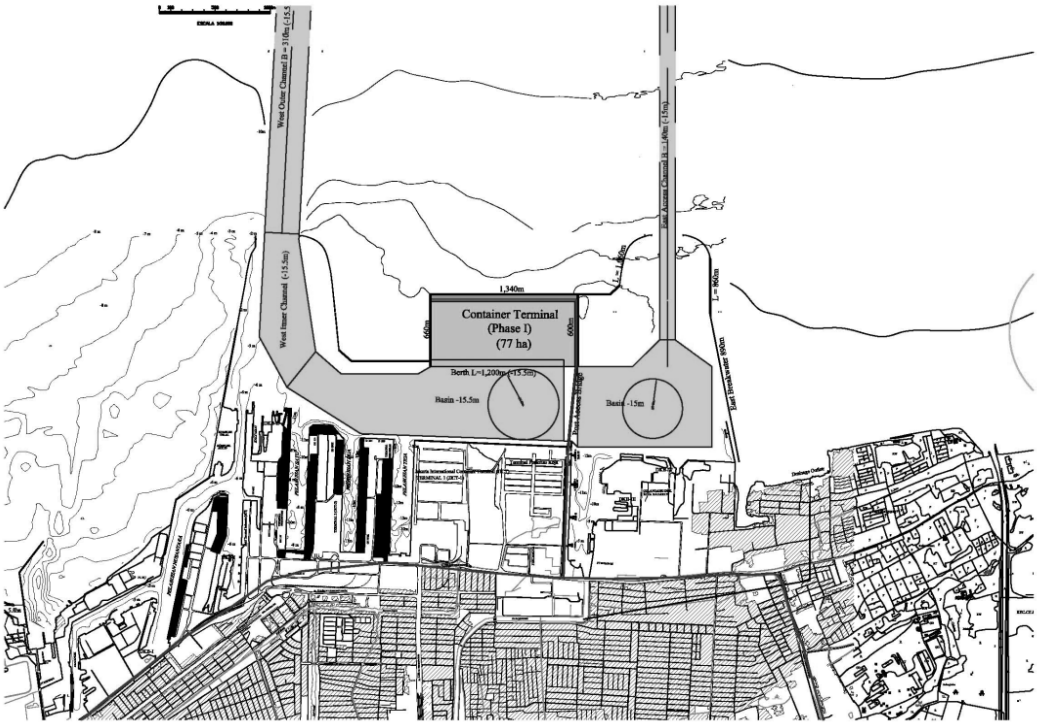
- To be the arterial road due to the need for prompt construction
- To utilize the existing road to minimize resettlement
- To construct the bridge between the land and terminal
- To install a signalized intersection for connecting with the existing road

The same as the future plan, the access roads are designed for both alternative 1 and 2.



Source: JICA Study Team

Figure 5.3-16 Terminal layout for North Kalibaru (Alternative 1)



Source: JICA Study Team

Figure 5.3-17 Terminal layout for North Kalibaru (Alternative 2)

(2) Traffic demand forecast

Refer to 5.3.2 (2) 1) for the traffic demand forecast for phase 1 of North Kalibaru.

(3) Preliminary design of access road

1) Design standards

"Standard Specifications for geometric design of urban roads" published by the Directorate General of Highways of the Ministry of Public Works in March 1992 are used as the main design standards for the design of the access road.

The geometric design standards for the access road are shown in Table 5.3.5-1.

Table 5.3.5-1 Geometric design standards for phase 1 of North Kalibaru

No.	Item	Unit	Design Standard
1.	Design speed	km/h	50
2.	Cross Section Element		
	-Lane Width	m	3.50
	-Left Shoulder Width	m	0.50
	-Right Shoulder Width	m	0.50
	-Median Width	m	2.00
	-Cross Fall	%	2
	-Maximum Super elevation	%	8
	-Cross Fall at left shoulder	%	4
	-Minimum Clearance Height	m	5.10
	-Minimum Clearance Height above Railway	m	6.50
3.	Minimum Stopping Sight Distance	m	40
4.	Horizontal Alignment		
	-Minimum Radius	m	100(60)
	-Minimum Radius Without Transition Curve	m	250
	-Minimum Radius at Normal Crossfall	m	800
	-Minimum Curve Length	m	70 or 500/θ
	-Minimum Transition Curve length	m	35
5.	Vertical Alignment		
	-Maximum Grade	%	3.5
	-Critical Vertical Curve Length 3.5% grade	m	400
	-Vertical Curve		
	Minimum Crest Radius	m	800
	Minimum Sag Radius	m	700
	Minimum Curve Length	m	60

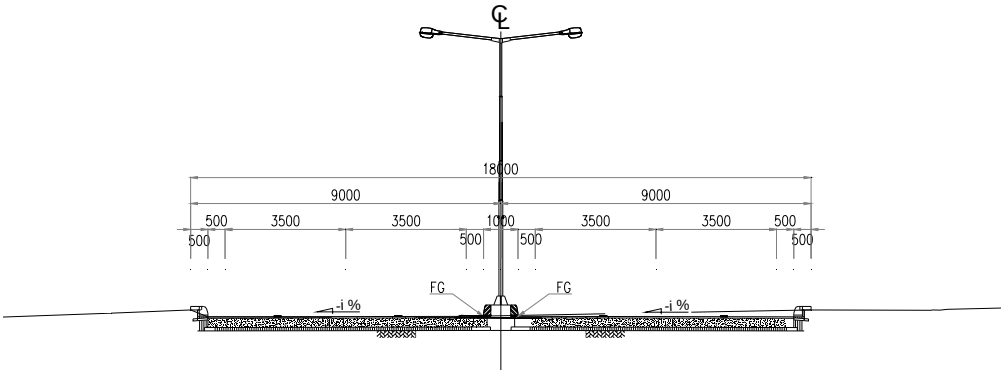
Source: Standard specifications for geometric design of urban roads, Bina Marga

2) Cross section

As described in 5.3.2, estimated traffic volume for the access road is 28,238 PCU/day in 2030. According to the design standards in Indonesia, a lane has a capacity of 18,000 PCU/day. Therefore, at least two lanes are necessary for the access road. Considering the future development, the lane number

should be 4 lanes for Alternative-2 according to the discussion with DGST. Cement concrete pavement is applied, which is commonly used for roads recently constructed in Indonesia.

The typical cross section of the access road is as shown in Figure 5.3-18.



Source: JICA Study Team

Figure 5.3-18 Typical cross section for phase 1 of North Kalibaru

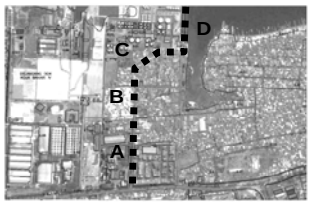
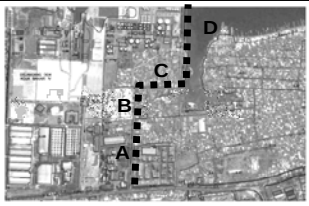
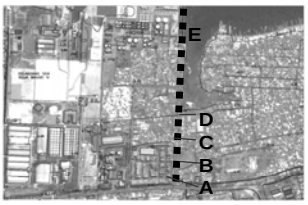
3) Plan and Profile

a) Horizontal alignment

Three routes were examined for the horizontal alignment of the access road on the land section for alternative 1. Although the land around the proposed area is owned by PERINDO 2, the area is already occupied by many houses, shops, warehouses and a market. Hence, the social aspect is one of the most significant issues to select the alignment of the access road. As a result of an evaluation of each route and discussion with DGST, “Route 1” is selected.

The comparison of access roads for alternative 1 is shown in Table 5.3.5-2.

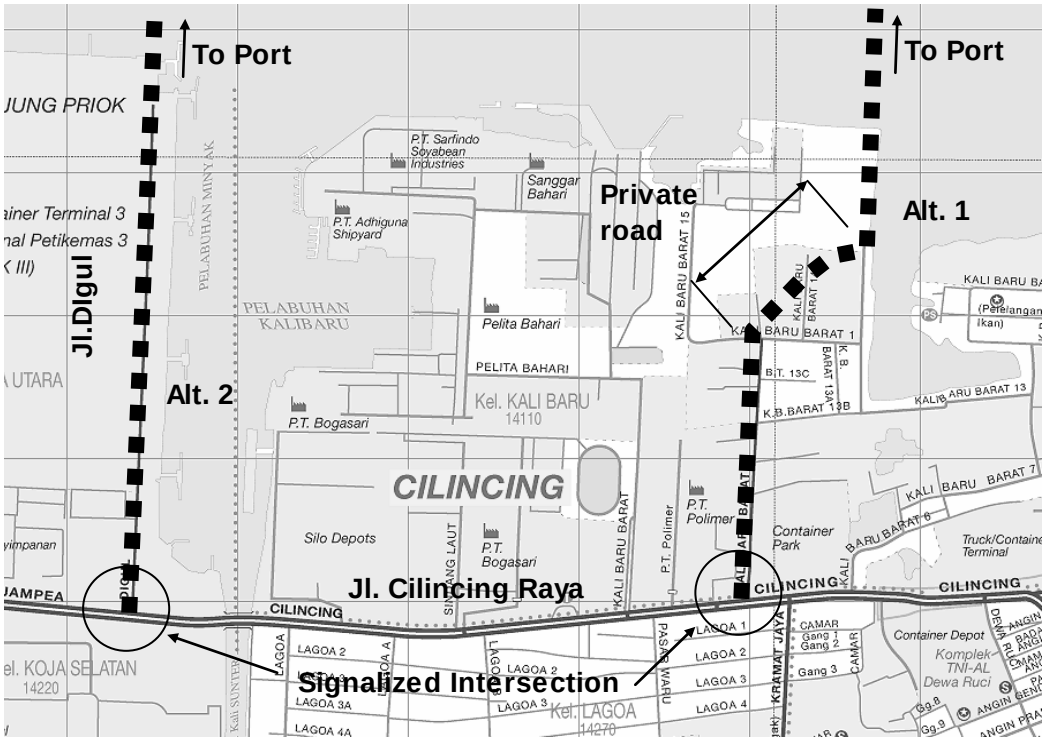
Table 5.3.5-2 Comparison table of access roads for Alternative 1

	Route 1	Route 2	Route 3
Layout			
Concept	Use the existing private road to timber wharf	Use the existing road to timber wharf	Straight to timber wharf
Alteration of land use	**A: Venders**(1850m2) B: Parking for car terminal (3500m2) **C: Houses** (2800m2, **ca. 50 houses along the existing private road**) D: Timber yard(120m2)	**A: Venders**(1850m2) B: Parking for car terminal (750m2) **C: Houses and shops** (2200m2, **ca.30 houses along the existing road**) D: Timber yard(3800m2)	**A: Houses**(380m2, **ca.10 houses along the existing road**) B: Truck parking(1500m2) **C: Houses**(1800m2, **ca.40 houses for the new road**) **D: Warehouse**(1200m2) E: Timber yard(5700m2)
Nos of corner	1 (+2 small curve (R=55m))	2	0
Intersection	Signalized	Signalized	Signalized
Observation	- The traffic flow is not smooth due to a corner and small curve	- The traffic flow is not smooth due to two corners	- The smooth traffic flow is secured

Source: JICA Study Team

For alternative 2, the existing road east of KOJA terminal, Jl. Digul, is used and expanded for the access road.

The routes of the access road for alternatives 1 and 2 are shown in Figure 5.3-19. The total length of the access road is 2.1 km for both alternative 1 and alternative 2.



Source: JICA Study Team

Figure 5.3-19 Plan for the access road for phase 1 of North Kalibaru

b) Vertical alignment

The road height should be almost the same as the ground level, about 1.5 to 3.0 m above M.S.L. For the bridge section, the road is raised to secure the vertical clearance of 16.0m above HHWL for tugboats passing under the bridge for Alternative-2.

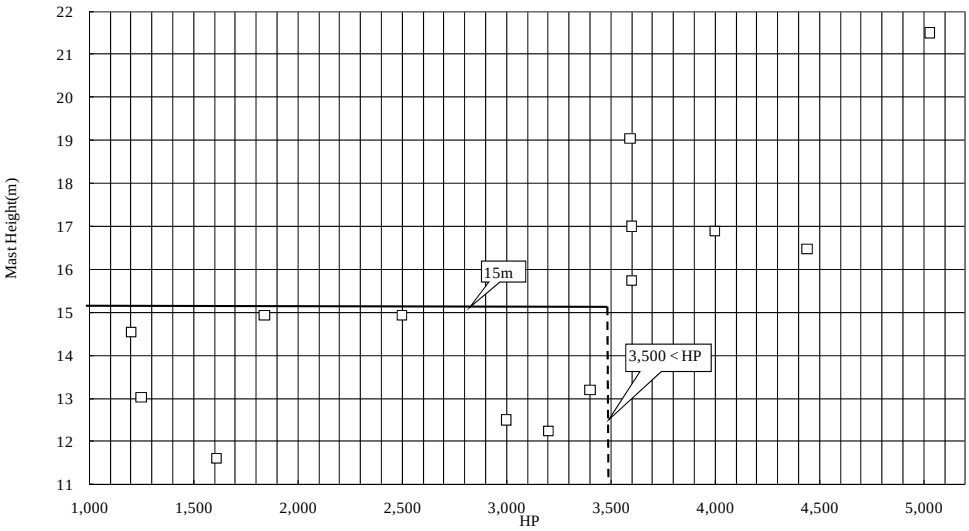


Figure 5.3-20 Correlation between Main Engine HP – Mast Height in Tugboats

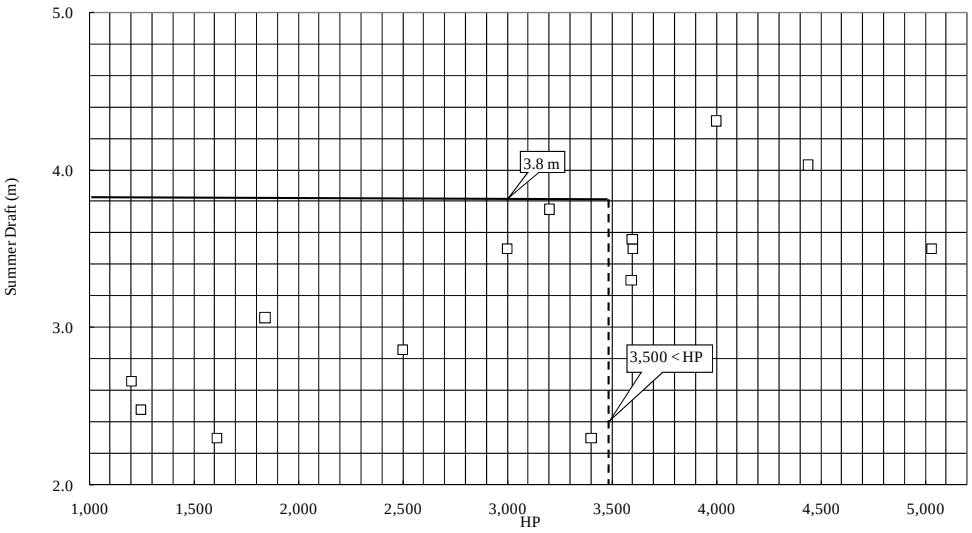


Figure 5.3-21 Correlation between Main Engine HP – Summer Draft in Tugboats

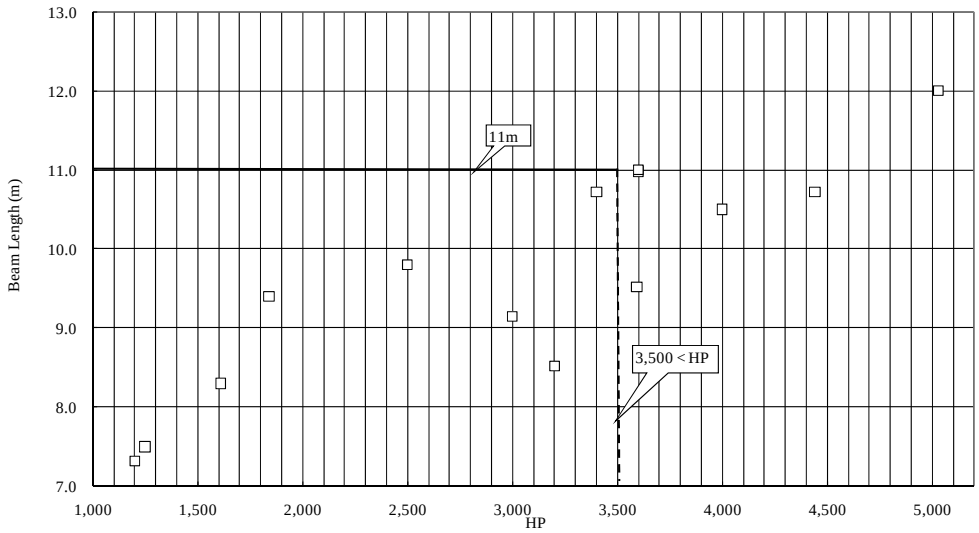


Figure 5.3-22 Correlation between Main Engine HP – Beam Length in Tugboats

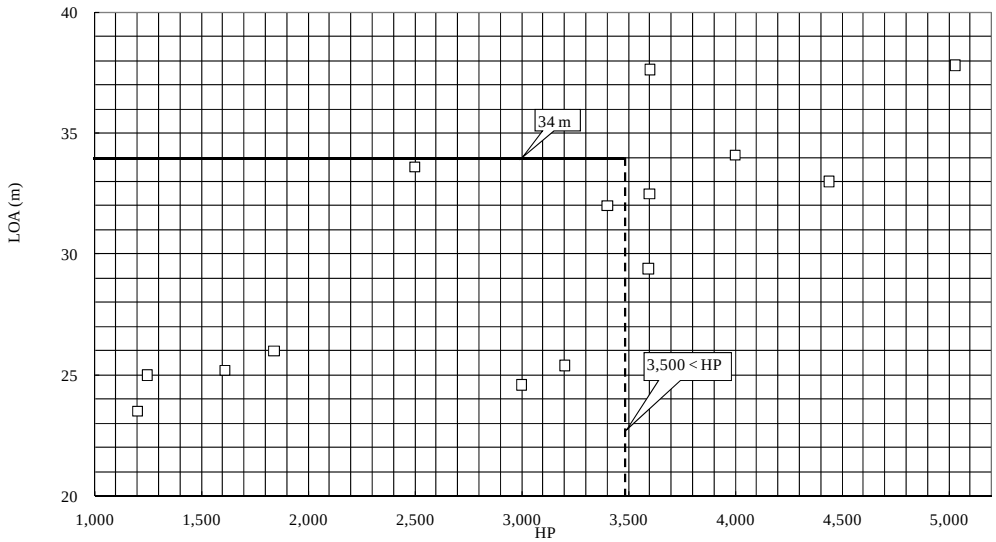


Figure 5.3-23 Correlation between Main Engine HP – LOA in Tugboats

Basic requirements for low clearance bridge are as follows:

1) Channel width (one-way): 34m
2) Span pier to pier 40m
3) Mast height of (vertical height of mast from HWL): 15m
4) Air clearance: 1m
5) Vertical clearance from HWL: 16m

4) Structure

A PC girders (PC-I, PC-U) bridge with 35-40 m span, which is the same type of standard span bridge as North Kalibaru, is applied for the access bridge.

(4) Construction method of bridge

The main bridge portion has number of piers in the sea. Therefore steel pile with 1.0m diameter is used for the foundation of the piers in the sea.

For the excavation of the riverbed material (sand and gravel), the hammer grab excavation and the reverse circulation method can be considered. However, for the rock excavation under the riverbed material, only the reverse circulation method with rock roller bit is applicable.

The bridge pile driving will be done from the deck of a temporary jetty constructed out to the pile locations in the sea.

After completion of the pier structure, the superstructure will be started from land side according to the contractor's instructions.

(5) Implementation schedule

1) Construction Length of Alternative-1&2

a) Alternative-1

Road	: 2-lane, L=0.90 km
Port Access Bridge on land	: 2-lane, L=0.47 km
Port Access Bridge in the sea	: 2-lane, L=0.73 km
Total	: 2-lane, L=2.10 km

b) Alternative-2

Road	: 4-lane, L=0.33 km
Port Access Bridge on land	: 4-lane, L=1.04 km
Port Access Bridge in the sea	: 4-lane, L=0.73 km
Total	: 4-lane, L=2.10 km

For both Alternative-1 and -2, the project implementation period will be 2.5 years including project preparation 1.0 year and 1.5 years of construction works. The construction schedule of North Kalibaru Phase 1 project is shown in Table 5.3.5-3.

Table 5.3.5-3 Implementation schedule of access road for North Kalibaru Phase 1

Description	1st year				2nd year				3rd year			
1. Administration												
Survey/Detail Design	■	■										
Tender Process			■	■								
2.Construction												
Road					■	■	■					
Bridge							■	■	■	■		
Utility Facilities									■	■		

Source: JICA Study Team

(6) Preliminary Cost Estimate

1) Alternative-1

The total project cost of Alternative-1 is estimated as 514 billion including VAT of 10% as shown in Table 5.3.5-4.

2) Alternative-2

The total project cost of Alternative-2 is estimated at 1,045 billion with including VAT of 10% as shown in Table 5.3.5-5.

Table 5.3.5-4 Construction cost of access road for North Kalibaru Phase 1 (Alternative 1)

Description	Unit	Unit Cost (Thousand RP.)	Quantity	Total Cost Estimate(million Rp)			Remarks
				Local Portion	Foreign Portion	Summation	
1 Civil Works							**W=13.5m**
a:Road	m2						**L=900m**
Earthwork	m3	60	5,000	300		300	
Pavement	m2	1,000	12,000	12,000		12,000	
Drainage	m	1,200	463	556		556	
PC Sheet Pile	m	800	11,000	8,800		8,800	
Sub total				21,656		21,656	
Excavation	l.s	10.0%	1	2,166		2,166	10% of Sub total
Miscellaneous	l.s	10.0%	1	2,166		2,166	10% of Sub total
Total a.				**25,987**	**0**	**25,987**	
b-1:Sea-Main Bridge	m2						**L=0m**
Pavement	m2		7,200	0	0	0	
Slab	m2		7,200	0	0	0	
Girder	m2		7,200	0	0	0	
Pier	m2		7,200	0	0	0	
Foundation	m2		7,200	0	0	0	
Pile	m2		7,200	0	0	0	
Sub total				0	0	0	
Erection	l.s	15.0%	1	0	0	0	15% of Sub total
Miscellaneous	l.s	5.0%	1	0	0	0	5% of Sub total
Total b-1				**0**	**0**	**0**	
b-2:Sea-Sub Bridge	m2						**L=730m**
Pavement	m2	1,000	9,855	8,870	986	9,855	
Slab	m2	2,000	9,855	17,739	1,971	19,710	
Girder	m2	5,000	9,855	44,348	4,928	49,275	
Pier	m2	6,000	9,855	53,217	5,913	59,130	
Foundation	m2	3,000	9,855	26,609	2,957	29,565	
Pile	m2	3,000	9,855	26,609	2,957	29,565	
Sub total				177,390	19,710	197,100	
Erection	l.s	15.0%	1	26,609	2,957	29,565	15% of Sub total
Miscellaneous	l.s	5.0%	1	8,870	986	9,855	5% of Sub total
Total b-2				**212,868**	**23,652**	**236,520**	
b-3:Ground Bridge	m2						**L=470m**
Pavement	m2	1,000	6,345	5,711	635	6,345	
Slab	m2	2,000	6,345	11,421	1,269	12,690	
Girder	m2	3,500	6,345	19,987	2,221	22,208	
Pier	m2	2,000	6,345	11,421	1,269	12,690	
Foundation	m2	1,000	6,345	5,711	635	6,345	
Pile	m2	1,000	6,345	5,711	635	6,345	
Sub total				59,960	6,662	66,623	
Erection	l.s	15.0%	1	8,994	999	9,993	15% of Sub total
Miscellaneous	l.s	5.0%	1	2,998	333	3,331	5% of Sub total
Total b-3				**71,952**	**7,995**	**79,947**	
Total a+b				**310,807**	**31,647**	**342,454**	
c: General cost	l.s	15.0%	1	46,621	4,747	51,368	15% of Total a+b
Total 1				**357,428**	**36,394**	**393,822**	
2 Project Related Expensise							
a: Contingency	l.s	10.0%	1	35,743	3,639	39,382	10% of Total 1
b: Supervision Cost	l.s	3.0%	1	11,795	1,201	12,996	3% of Total 1+2-a
c: Land Acquition	l.s	30.0%	1	7,796		7,796	30% of Total 1-a for road
d: Administration Cost	l.s	3.0%	1	11,795	1,201	12,996	3% of Total 1+2
Total 1+2				**424,558**	**42,435**	**466,993**	
3 Other Cost							
a: VAT	l.s	10.0%	1	46,699		46,699	10% of Total 1+2
4 Total Project Cost				**471,257**	**42,435**	**513,692**	

Source: JICA Study Team

Table 5.3.5-5 Construction cost of access road for North Kalibaru Phase 1(Alternative 2)

Description	Unit	Unit Cost (Thousand RP.)	Quantity	Total Cost Estimate(million Rp)			Remarks
				Local Portion	Foreign Portion	Summation	
1 Civil Works							**W=18m**
a:Road	m2						**L=330m**
Earthwork	m3	60	4,500	270		270	
Pavement	m2	1,000	5,940	5,940		5,940	
Drainage	m	1,200	400	480		480	
PC Sheet Pile	m	800	10,000	8,000		8,000	
Sub total				14,690		14,690	
Excavation	l.s	10.0%	1	1,469		1,469	10% of Sub total
Miscellaneous	l.s	10.0%	1	1,469		1,469	10% of Sub total
Total a.				**17,628**	**0**	**17,628**	
b-1:Sea-Main Bridge	m2						**L=400m**
Pavement	m2	1,000	7,200	6,480	720	7,200	
Slab	m2	2,500	7,200	16,200	1,800	18,000	
Girder	m2	10,000	7,200	64,800	7,200	72,000	
Pier	m2	8,000	7,200	51,840	5,760	57,600	
Foundation	m2	4,000	7,200	25,920	2,880	28,800	
Pile	m2	4,000	7,200	25,920	2,880	28,800	
Sub total				191,160	21,240	212,400	
Erection	l.s	15.0%	1	28,674	3,186	31,860	15% of Sub total
Miscellaneous	l.s	5.0%	1	9,558	1,062	10,620	5% of Sub total
Total b-1				**229,392**	**25,488**	**254,880**	
b-2:Sea-Sub Bridge	m2						**L=330m**
Pavement	m2	1,000	5,940	5,346	594	5,940	
Slab	m2	2,500	5,940	13,365	1,485	14,850	
Girder	m2	8,000	5,940	42,768	4,752	47,520	
Pier	m2	8,000	5,940	42,768	4,752	47,520	
Foundation	m2	4,000	5,940	21,384	2,376	23,760	
Pile	m2	4,000	5,940	21,384	2,376	23,760	
Sub total				147,015	16,335	163,350	
Erection	l.s	15.0%	1	22,052	2,450	24,503	15% of Sub total
Miscellaneous	l.s	5.0%	1	7,351	817	8,168	5% of Sub total
Total b-2				**176,418**	**19,602**	**196,020**	
b-3:Ground Bridge	m2						**L=1040m**
Pavement	m2	1,000	18,720	16,848	1,872	18,720	
Slab	m2	2,000	18,720	33,696	3,744	37,440	
Girder	m2	3,500	18,720	58,968	6,552	65,520	
Pier	m2	2,000	18,720	33,696	3,744	37,440	
Foundation	m2	1,000	18,720	16,848	1,872	18,720	
Pile	m2	1,000	18,720	16,848	1,872	18,720	
Sub total				176,904	19,656	196,560	
Erection	l.s	15.0%	1	26,536	2,948	29,484	15% of Sub total
Miscellaneous	l.s	5.0%	1	8,845	983	9,828	5% of Sub total
Total b-3				**212,285**	**23,587**	**235,872**	
Total a+b				**635,723**	**68,677**	**704,400**	
c: General cost	l.s	15.0%	1	95,358	10,302	105,660	15% of Total a+b
Total 1				**731,081**	**78,979**	**810,060**	
2 Project Related Expensise							
a: Contingency	l.s	10.0%	1	73,108	7,898	81,006	10% of Total 1
b: Supervision Cost	l.s	3.0%	1	24,126	2,606	26,732	3% of Total 1+2-a
c: Land Acquition	l.s	30.0%	1	5,288		5,288	30% of Total 1-a for road
d: Administration Cost	l.s	3.0%	1	24,126	2,606	26,732	3% of Total 1+2
Total 1+2				**857,729**	**92,089**	**949,818**	
3 Other Cost							
a: VAT	l.s	10.0%	1	94,982		94,982	10% of Total 1+2
4 Total Project Cost				**952,711**	**92,089**	**1,044,800**	

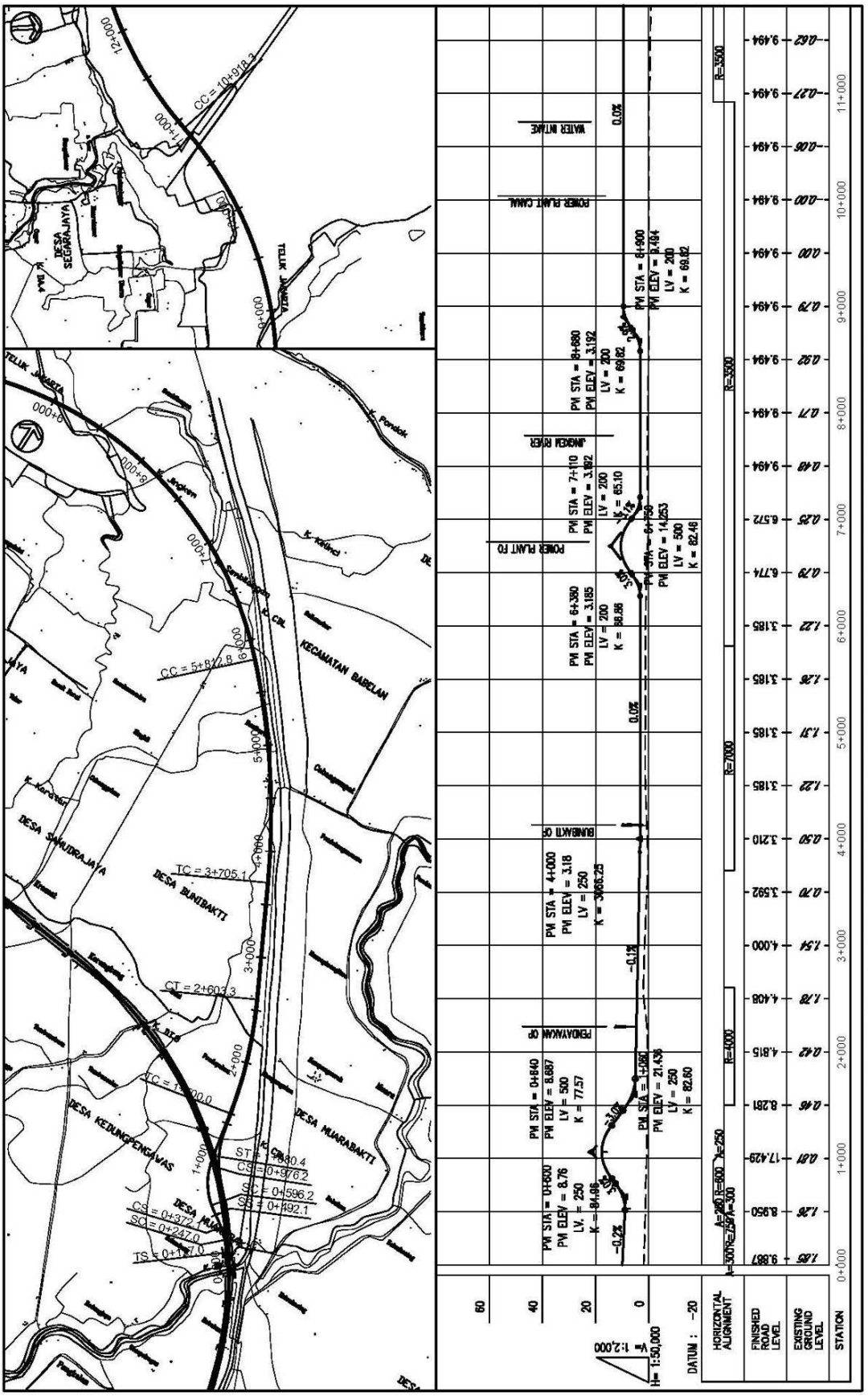
Source: JICA Study Team

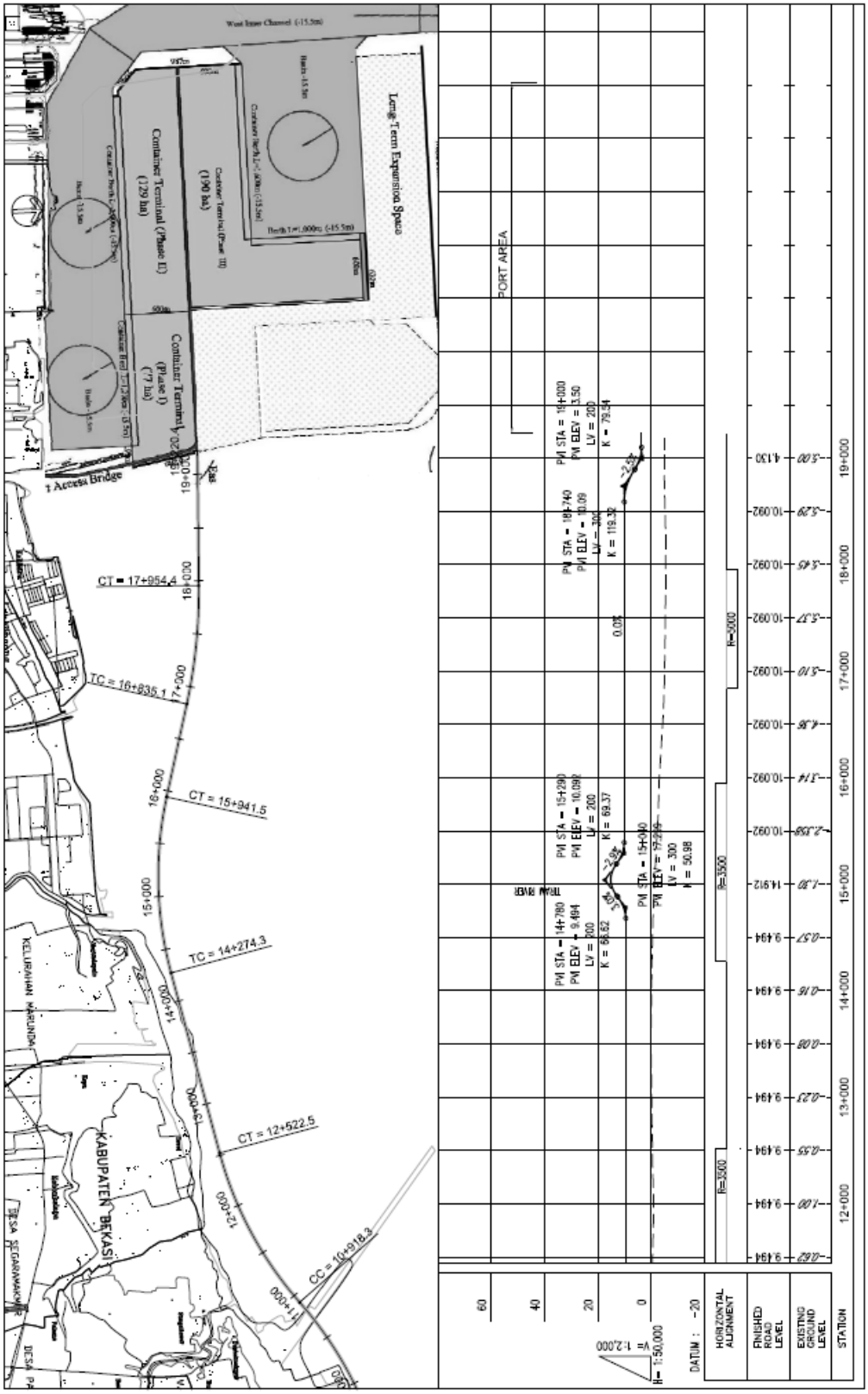
5.3.6 Drawings for Access Road Development

The drawings for access road development of each candidate port are attached as shown in Table 5.3.6-1.

Table 5.3.6-1 Contents of drawings

Access road	Contents
North Kalibaru	Plan and Profile (Alt 1) Sta. 0+000 – Sta. 11+500
	Plan and Profile (Alt 1) Sta. 11+500 – Sta. 19+360
	Plan and Profile (Alt 2) Sta. 0+000 – Sta. 11+500
	Plan and Profile (Alt 2) Sta. 11+500 – Sta. 22+000
	Typical cross section (At grade section)
	Typical cross section (Bridge section)
Cilamaya	Plan and Profile Sta. 0+000 – Sta. 11+500
	Plan and Profile Sta. 11+500 – Sta. 23+000
	Plan and Profile Sta. 23+000 – Sta. 31+380
	Typical cross section (At grade section)
	Typical cross section (Bridge section)
Tangerang	Plan and Profile Sta. 0+000 – Sta. 5+000
	Typical cross section (At grade section)
	Typical cross section (Bridge section)
North Kalibaru (Phase1)	Plan and Profile (Alt 1) Sta. 0+000 – Sta. 1+100
	Plan and Profile (Alt 1) Sta. 1+100 – Sta. 2+200
	Plan and Profile (Alt 1) Sta. 2+200 – Sta. 2+428
	Plan and Profile (Alt 2) Sta. 0+000 – Sta. 1+100
	Plan and Profile (Alt 2) Sta. 1+100 – Sta. 2+200
	Plan and Profile (Alt 2) Sta. 2+200 – Sta. 3+400
	Typical cross section (At grade section)
	Typical cross section (Bridge section)
	General view (Standard span bridge)


THE PROJECT OF MASTER PLAN STUDY ON PORT DEVELOPMENT AND LOGISTICS IN GREATER JAKARTA METROPOLITAN AREA
NORTH KALIBARU ACCESS ROAD - PLAN AND PROFILE (Alternative 1)
STA. 0+000 ~ STA. 11+500
DESA SEGARAJAYA
DESA SUKAMULYA
DESA BUNIBAKTI
DESA KEDUNGPENCANAS
DESA MUARABAKTI
KECAMATAN BABELAN
TELUK JAKARTA
HORIZONTAL ALIGNMENT
FINISHED ROAD LEVEL
EXISTING GROUND LEVEL
STATION
DATUM : -20
0+000
1+000
2+000
3+000
4+000
5+000
6+000
7+000
8+000
9+000
10+000
11+000


THE PROJECT OF MASTER PLAN STUDY ON PORT DEVELOPMENT AND LOGISTICS IN GREATER JAKARTA METROPOLITAN AREA
NORTH KALIBARU ACCESS ROAD - PLAN AND PROFILE (Alternative 1, Option-1, Phases II and III)
STA. 11+500 ~ STA. 19+220.4
PORT AREA
Long Term Expansion Space
Container Terminal (Phase II) (190 ha)
Container Terminal (Phase I) (77 ha)
Container Terminal (Phase II) (129 ha)
Access Bridge
CT = 17+954.4
TC = 16+835.1
CT = 15+941.5
TC = 14+274.3
CT = 12+522.5
CC = 10+918.3
KABUPATEN BEKASI
KELURAHAN MARGUNDA
DESA SEGARAMAKMUR
TRAVA RIVER
PVI STA = 14+780
PVI ELEV = 9.494
LV = 100
K = 66.62
PVI STA = 15+290
PVI ELEV = 10.098
LV = 200
K = 69.37
PVI STA = 15+740
PVI ELEV = 10.09
LV = 300
K = 119.32
PVI STA = 16+000
PVI ELEV = 13.50
LV = 200
K = 79.54
R=3500
R=3500
R=3500
0.0%
-2.5%
2.5%
-2.5%
H= 1:50,000
V= 1:2,000
DATUM : -20
HORIZONTAL ALIGNMENT
FINISHED ROAD LEVEL
EXISTING GROUND LEVEL
STATION
12+000
13+000
14+000
15+000
16+000
17+000
18+000
19+000