Chapter 5

Review of JORR Engineering Aspects

5. Review of JORR Engineering Aspects

5.1 Outline of the Project

5.1.1 General

The Jakarta Outer Ring Road (JORR) is a trunk toll road which runs at a 10~13km radius from the center of the City (Monas Independent Square), encircling the west, south and east sides of the Metropolitan area. JORR is a part of the West Java Tollway Network, being the second ring road located outside of the Jakarta Intra Urban Tollway (JIUT or Inner ring road). These 2 ring roads are connected by the Jakarta Harbor Road as 2 rings at the north of the City.

JORR has a length of approximately 65 km and it is divided into 7 sections. These 7 sections are connected to the tollways of the West Java Tollway Network by 7 junctions and also to crossing arterial streets and frontage roads by 20 interchanges.

Table 5.1.1 Location and Length of Sections

Section	Extent	Length (km)
W1	Prof. Dr. Sediyatmo Tollway – Jakarta Merak Tollway	7.4
W2	Jakarta Merak Tollway – Jl Ciptat Raya	12.2
S	Jl. Ciptat Raya – Jagorawi Tollway	12.9
E1	Jagorawi Tollway – Jakarta Cikampek Tollway	12.5
E2	Jakarta Cikampek Tollway – Jl Bekasi Raya	9.5
E3	Jl. Bekasi Raya – Section N	4.8
N	Section E3 – Jakarta Harbor Road	5.2
	Total	**64.4**

Source: JICA Study Team compilation

5.1.2 Present Situation

In accordance with the Government's policy, construction had commenced under BOT schemes from the year 1994.The concessions for the 7 sections above were awarded to 4 private companies and the concessionaires employed consultants for the design and supervision and contractors for the construction. All contractors were selected by direct appointment, and in case of one concessionaire the contract amount was fixed as a lump sum based on the definitive plan. The 3 other concessionaires signed contracts with the contractors based on the detailed design while the contractor contracted by the definitive plan had to prepare the detailed design before the commencement of the construction (Design Built Contract). All detailed design was approved by Bina Marga, which was responsible for supervising the design of JORR including the detailed design of the design built contracts. The Right of Way (ROW) was purchased basically by Jasa Marga, but in some of the concessionaire sections, ROW acquisition was made by the concessionaire under an extended concession period arrangement.

PT. Marga Nurindo Bhakti, Sections S and E1, and PT. Citra Mataram Satriamarga Persada, Section W2, have concessions with a 45-year and 35-year concession period, and they were responsible for the purchasing of ROW.

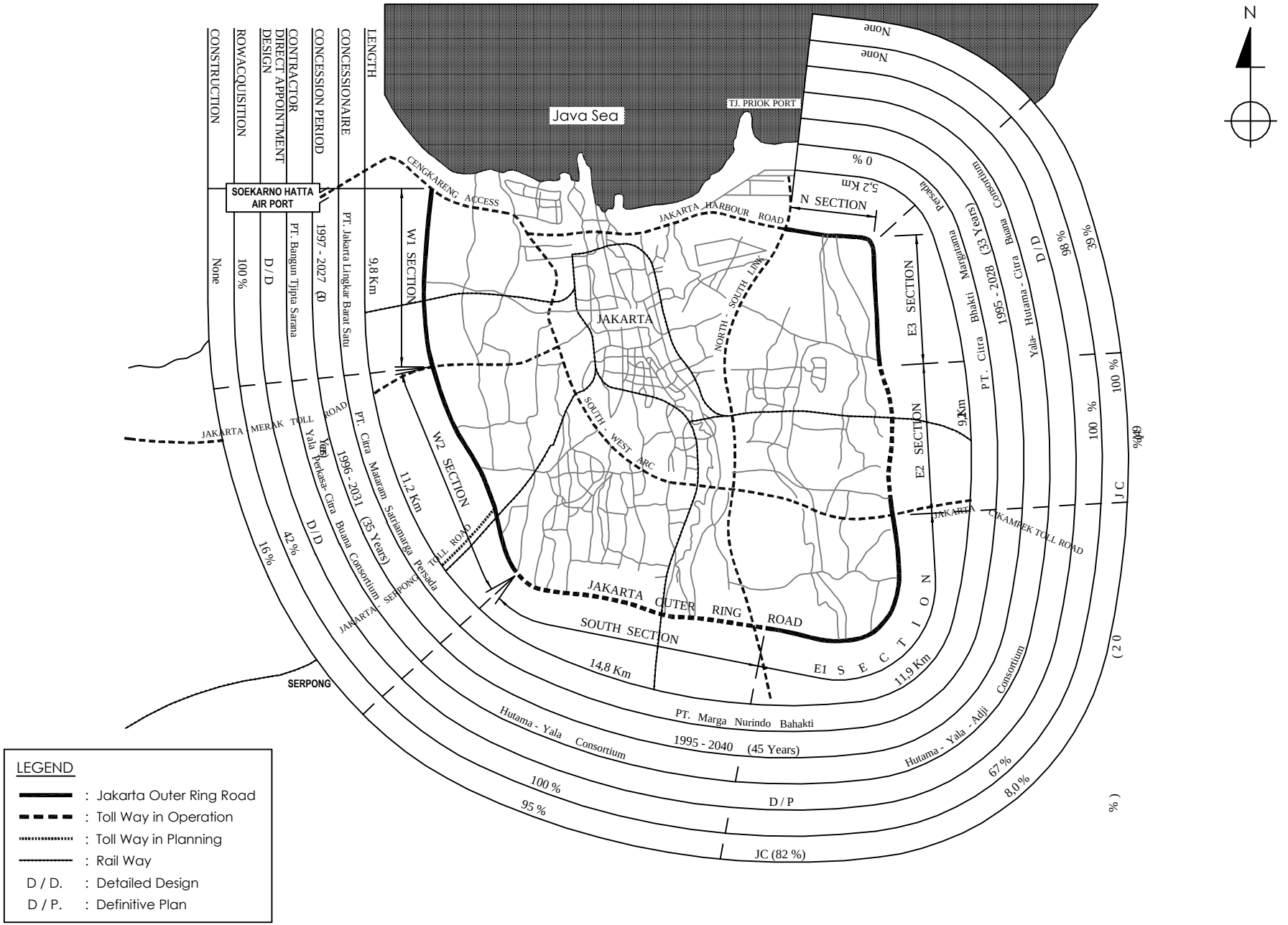


Figure 5.1.1 Jakarta Outer Ring Road Project Present Situation

The progress so far in ROW acquisition for Sections W1, S, E2 and E3 is almost 100% while that of Sections W2 and E1 are at 42 percent and 67 percent, respectively.

Construction work has stopped except at Sections S and E1, and the Sections W2, E1 and E3 are under construction. Construction has not started at Sections W1 and N.

Figure 5.1.1 explains the present status of the projected tollway, such as the name of concessionaires, concession period, the name of contractors and progress of ROW acquisition and construction.

5.1.3 General Description of the Projected Road

The Jakarta Outer Ring Road (JORR) is developing at the outer fringe of DKI Jakarta and is assigned to be an important distributor of people and goods between the Botabek area and DKI Jakarta. To realize this important role of JORR, the Government had started construction with the participation of the private sector using the BOT scheme. However, the economic crisis of 1997 has brought the progress of the projects to a standstill. No work has taken place except at Sections S and E2, which was able to complete the project before the crisis and open for traffic.

Time, which is a very important factor in such the circumstances, such as this was taken into consideration when the project configuration was reviewed. As the tollway construction plan has not yet been communicated to the people in the area, Section N has been excluded from the current project configuration, but it is still an important segment of the JORR system. Therefore, once the circumstances surrounding this section has matured, it should be implemented as a part of the JORR. In the meantime, instead of Section N, Jl. Cakung Cilincing Raya, Jl. Ampea/ Jl. Cilincing and Jl. Sulawesi are upgraded for better accessibility between Tanjung Priok International Port and JORR.

Table 5.1.2 explains the section length in accordance with the implementation schedule.

Table 5.1.2 Location and Length of Sections

Section	Extent	Length (Km)
W1	Sta. 0+000 to Sta. 7+350 = 7,350m	7.4
W2	Sta. 7+350 to Sta. 19+555 = 12,205m	12.2
S	Sta. 19+555 to Sta. 32+450 = 12,895m	12.9
E1	Sta. 32+450 to Sta. 44+950 = 12,500m	12.5
E2	Sta. 9+200 (44+950) to Sta. 18+700 = 9,500m	9.5
E3	Sta. 18+700 to Sta. 23+450 = 4,750m	4.8
	Sub-Total	59.3
	Jl. Cakung Cilincing Raya L=3.7km Jl. Jampea/Cilincing L=3.3km Jl. Sulawesi L=0.3km	

Source: JICA Study Team compilation

The location of the junctions and interchanges, and their names in accordance with the implementation scheme are presented in Figure 5.1.2 and Table 5.1.3. Due to the tentative arrangement under which Section N is excluded, the 2 junctions relating to the said section have not been listed and 1 terminal interchange has been added at the end of Section E3.

Table 5.1.3 Junctions and Interchanges

Junction

No.	Name	Connecting Road	Type of Junction	Section
JC1	Penjaringan JC	Cengkareng Access	Modified Cloverleaf	W1
JC2	Kebon Jeruk JC	JKT Merak Tollway	Modified Cloverleaf	W2
JC3	Kebayoran Lama JC	JKT Serpong Tollway	Trumpet	W2
JC4	Taman Mini JC	Jagorawi Tollway	Modified Cloverleaf	E1
JC5	Cikunir JC	JKT Cikampek Tollway	Modified Cloverleaf	E2

Interchange

No.	Name	Connecting Road	Type of Interchange	Section
IC1	Kayu Besar IC	Jl. Kayu Besar Raya	Half Diamond	W1
IC2	Daan Mogot IC	Jl. Daan Mogot	Diamond	W1
IC3	Meruya IC	DKI Planned Road	Diamond	W2
IC4	Joglo IC	Jl. Joglo Raya	Diamond	W2
IC5	Petukangan IC	Jl. Cileduk Raya	Diamond	W2
IC6	Veteran IC	Jl. Veteran	Diamond	W2
IC7	Ciputat Raya IC	Jl. Ciputat Raya	Half Diamond	W2
IC8	Pondok Pinang West	Jl. Ciputat Raya	Half Diamond	S
IC9	Pondok Pinang East IC	Jl. Metro Pondok Indah	Half Diamond	S
IC10	Fatmawati IC	Jl. R. S. Fatmawati	Diamond	S
IC11	Ampera IC	Jl. Ampera Raya	Diamond	S
IC12	Lenteng Agung IC	Jl. Lenteng Agung	Diamond	S
IC13	Gedong IC	Jl. Raya Bogor	Diamond	S
IC14	Bambu Apus IC	DKI Road	Half Diamond	E1
IC15	Setu IC	DKI Road	Half Diamond	E1
IC16	Jatiwarna IC	Jl. Hankam	Diamond	E1
IC17	Jati Asih IC	Jl. Jati Asih	Single Trumpet	E2
IC18	Kalimalang IC	Jl. Kalimalang	Diamond	E2
IC19	Bintara IC	DKI Road	Single Trumpet	E2
IC20	Cakung IC	Jl. Bekasi Raya	Single Trumpet	E2
IC21	Cilincing IC	Jl. Cakung Cilincing Raya	Half Diamond	E3

Source: JICA Study Team compilation

The tollway is 3 lanes in one direction and the design speed was planned at 100 Km/h for all sections under the original scheme. However, difficulty in purchasing land, for Sections S and E1, has resulted in a lower design speed lower of 80 Km/h. On the other hand, Section E2 has adopted a higher design speed of 120 Km/h. The cross sectional dimensions of this section are wider compared to the other sections, which has enabled it to have a higher design speed. The design speed of each section was approved by Bina Marga and the relevant Regional Governments during the definitive plan stage. The design standard and cross sectional dimensions are presented in Table 5.1.4.

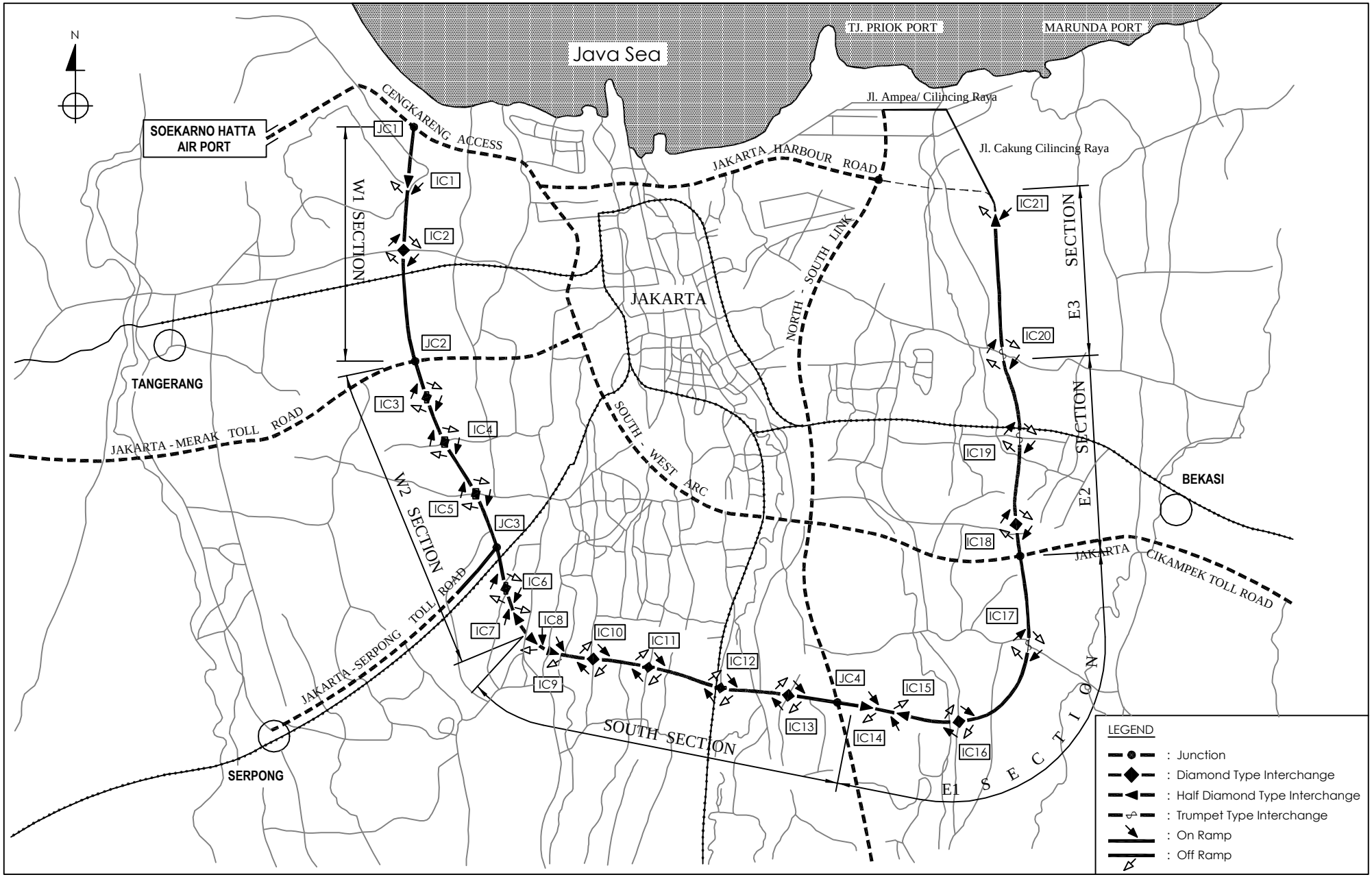


Figure 5.1.2 Location of Junctions and Interchanges

Table 5.1.4 Geometric Design Standard for Tollway

Item	Unit	Design Standard			
Design Classification			Type I / Class I		Type II/Class II
Design Speed	Km/hr	(120)	100	80	60
Cross-sectional Elements					
Lane Width	m	(3.60)	3.50	3.50	3.25
Left Shoulder Width	m	(2.50)	2.25	2.25	2.00
Right Should Width	m	(0.75)	0.50	0.50	0.50
Median Width	m	(2.80)	2.50	2.50	2.00
Marginal Strip Width	m	(0.75)	0.75	0.75	0.75
Cross fall of Traveled Way	%		2	2	2
Outer Shoulder	%		4	4	4
Vertical Clearance Road	m		5.10	5.10	5.10
Railway	m		6.50	6.50	6.50
Min. Stopping Sight Distance	m		160	110	70
Horizontal Alignment					
Minimum Radius					
Absolute Min.	m		380	230	120
Desirable	m		700	400	200
Without Super-elevation	m		5,000	3,500	2,000
Minimum Curve Length	m		1,200/a	1,000/a	700/a
Max. Super-elevation	%		8	6	6
Min. Transition Curve Length	m		85	70	50
Min. Radius w/o Transition Curve	m		1,500	1,000	600
Super-elevation Runoff Rate			1/250	1/200	1/175
Vertical Alignment					
Max. Grade					
Standard	%		3	4	5
Absolute Max.	%		4	5	6
Min. Vertical Curve Radius					
Crest Standard	m		6,500	3,000	1,400
Crest Desirable	m		10,000	4,500	2,000
Sag Standard	m		3,000	2,000	1,000
Sag Desirable	m		4,500	3,000	1,500
Min. Vertical Curve Length	m		85	70	50

Source: JICA Study Team compilation

The basic concept of JORR is that of a tollway accompanied by frontage roads at the both sides. In several sections, the National Government has constructed the frontage roads and provided space for the tollway inside the 2 frontage roads. W1, S, E2 and E3 are the sections which have frontage roads. Nonetheless, the frontage roads of the sections W2 and E1 have not been constructed yet. The present designs of the 2 sections do not include frontage roads except compensating an existing road network disturbed by the tollway.

In Section W2, the Right of Way line (ROW - Land Acquisition Line) is set by assuming the existence of a frontage road. Since frontage road construction might be regarded as being out of the scope of the tollway operator, the National Government or the Provincial Government, depending on the degree of autonomy, may be requested to provide funds for the construction of frontage roads

For Section E1, some of the compensation roads are part of the current design plans but frontage road and ROW for frontage roads have not been planned for approximately half of the section length.

Since the construction work for the Sections have been forced to stop at various stages, special care must be paid when resuming work at the sites. The cost for extra work is assigned to each section depending on the magnitude and progress of the section. This covers the cost for restarting the site, inspections to judge the soundness of the existing structures in order to determine if they could be incorporated into the permanent works, rectification of the structures if necessary, and certification of the structures for their soundness as permanent works. The

contract documents shall state the final responsibility of the successful contractor regarding the structures that will be overlaid on the existing structures.

5.1.4 Design Feature of Each Section

(1) Section W1 (Sta. 0+000 to Sta. 7+350 L= 7,350m)

- This section starts at the cross point with the Prof. Dr. Sediyatmo Tollway. Panjaringan Junction, JC 1, has been constructed and is open to traffic. The ramp ways for the Soekarno-Hatta Airport and for central Jakarta are connected to the crossing road, Jl. Raya Kayu Besar. A bridge is planned to cross over Jl. Raya Kayu Besar and the approach road is connected to the rampways. This arrangement has been made to allow JORR to connect directly to the Prof. Dr. Sediyatmo Tollway. A terminal barrier gate is planned for the end of this section.
- Since parallel roads at grade had been constructed at the location of frontage roads of JORR, small revisions were made in the original design of JORR's alignment. This section has frontage roads for entire stretch.
- The major structures in this section are Viaducts, Small Bridges and Piled Slabs. There are small sections of embankments. The embankment section, in accordance with typical cross sections, provides a vertical cardboard drain. Piled slab may be used as a countermeasure against soft soil in the previous design. However, piled slab structure was substituted by embankment structure at the southern part of Jl. Daan Mogot where the sub-soil condition is not as soft compared to the northern part of the street.
- JC 2, Kebon Juruk Junction was a section boundary between W1 and W2 in the original design. Section boundary was shifted from the center of the junction, the crossing point with Jakarta Merak Tollway, to the north side, and, as a result, all junction works now belong to the section W2.

(2) Section W2 (Sta. 7+350 to Sta.19+555 L= 12,205m)

- The scope of the tollway construction for W2 may not include frontage roads construction in accordance with plan and profile drawings. The ramp ways under the present system always connect to crossing roads and the system can function without frontage roads, although ROW may be reserved for frontage roads.
- If frontage road is to be constructed by an agency other than the tollway construction agency, separate funds may be necessary.
- Vertical alignment from Sta. 13 + 900 may be revised from the original design, which is outlined in the following.

a) Republic of Indonesia PT. Mataram Citra Binangun & Group
Jakarta Outer Ring Road Project Section – W2 volume III Drawings
February 1995 by PT. Buana Archicon & PT. Ingenium Consultant

b) PT. Citra Mataram Satriamarga Persada
Review Design Vertical Alignment (JORR W2 – Phase 1A)
Date is unknown.

Revised design is adapted from the Sta. 13+900 to the end of this W2 section.

The end point of the section is the crossing point with Jl. Ciputat Raya.

(3) Section S (Sta. 19+ 555 to Sta. 32+450 L= 12,895m)

- This section is almost completed and is open to traffic. The unfinished section is the connection with Section W2. The scope of the works includes this part as the section S. The overlay of the main through way is included in the Scope of Works and its cost is included in the budget of extra works.

(4) Section E1 (Sta. 32+450 to Sta. 44+950 L= 12,500m)

- The Taman Mini Junction is in the scope of work for this section. Approximately 85 percent of the junction is completed and the remaining works of this junction are included in the Section E1 together with adjacent E1 section.
- There are no continuous frontage roads at either side of the tollway. However, to compensate for the function of existing road network, some new service roads are planned at locations where the tollway disturbs the existing network by passing through the area.
- The northern section from the Jati Ashi Interchange in particular, has no space reserved for frontage roads beside the tollway.

(5) Section E2 (Sta. 9+200 (Sta. 44+950) to Sta. 18+700 L= 9,500m)

- This section starts from improvement of the Cikunir Junction which has been operated as a junction for the Cikunir Cakung Toll Road and the section also operates as a 6-lane tollway.
- The major work remaining in this section are the construction of the new Kali Malang Interchange which has 2 on-ramps and 2 off-ramps and of the frontage roads to compensate for the disturbance of the existing road networks.
- The frontage roads in this section were partly constructed before the start of the improvement project, and the central area between the frontage roads was reserved for the tollway. However these frontage roads are not always paved and remain as earth surface.

(6) Section E3 (Sta. 18+700 to Sta. 23+450 L= 4,750m)

- The whole stretch consists of bridges, elevated slabs and piled slab and no earth works is planned.
- There are frontage roads at the both sides of the future tollway.
- No on and off ramps are planned for this section except at the end of the section.
- Since the construction of Section N will be delayed for some time, the north end of this section will temporarily be the end of the tollway. Barrier gates are planned on the main road at the end of the section.
- There are several structures already constructed but left alone.

(7) Section Jl. Cilincing

- This section consists of the improvement of Jl. Cakung Cilincing Raya (L=3.7Km), Jl. Jampea/ Jl. Cilincing (L= 3.3Km) and Jl. Sulawesi (L=0.3Km).

- A 4.0m section (3.5m+0.5m) of 1 lane is widened at the inside of the existing 2-lane road of Jl. Cakung Cilincing Raya by applying rigid pavement. The existing space between the roads is empty.
- An overlay of asphalt pavement is applied to the existing roads of Jl. Jampea/ Jl. Cilincing and Jl. Sulawesi.

5.2 Design Standards

5.2.1 Highway Design Standard

"Standard Specification for Geometric Design of Urban Road" proposed by Bina Marga in January 1988 was applied to the highway design and supplemented by the Japanese Standard and /or AASHTO Standard for the present design.

In accordance with the Standard, Type I road is designated as an access control road which is applicable to a tollway. Type I is further divided to 2 categories, Primary and Secondary roads. Primary roads are generally in rural areas and secondary roads are urban roads. Primary Arterial road is applied to the tollway and the class of this category is 1. Class 1 of Type I is the classification for a tollway. Design speed is either 100 Km/h or 80 Km/h.

Frontage roads are classified as being Type II Class 1(Primary Arterial) and the Design speed is 60Km/h. The major values of the Standard are presented in Table 5.1.4 and typical cross-sections are presented in Figures 5.2.1 and 5.2.2.

5.2.2 Bridge Design Standard

The loading specifications and standards applied to bridge design follow the following specifications;

1) Loading Specification for Highway Bridge Design, February 1988 by Bina Marga,

2) General Explanation and Interim Guide for using Loading Specification No.12/1970 by Bina Marga,

3) Explanation and Supplement Specification of Loading Standard for Highway Bridges, February 1997 by Bina Marga,

4) Revision to Loading Specifications, 1980 by Bina Marga, and

5) Bridge Design Code (draft) Volume I, May 1992 Bina Marga.

Japanese or AASHTO Specifications for Highway Bridges and Pedestrian Bridges were adopted for the design of requirements not covered by the standards and specifications mentioned above.

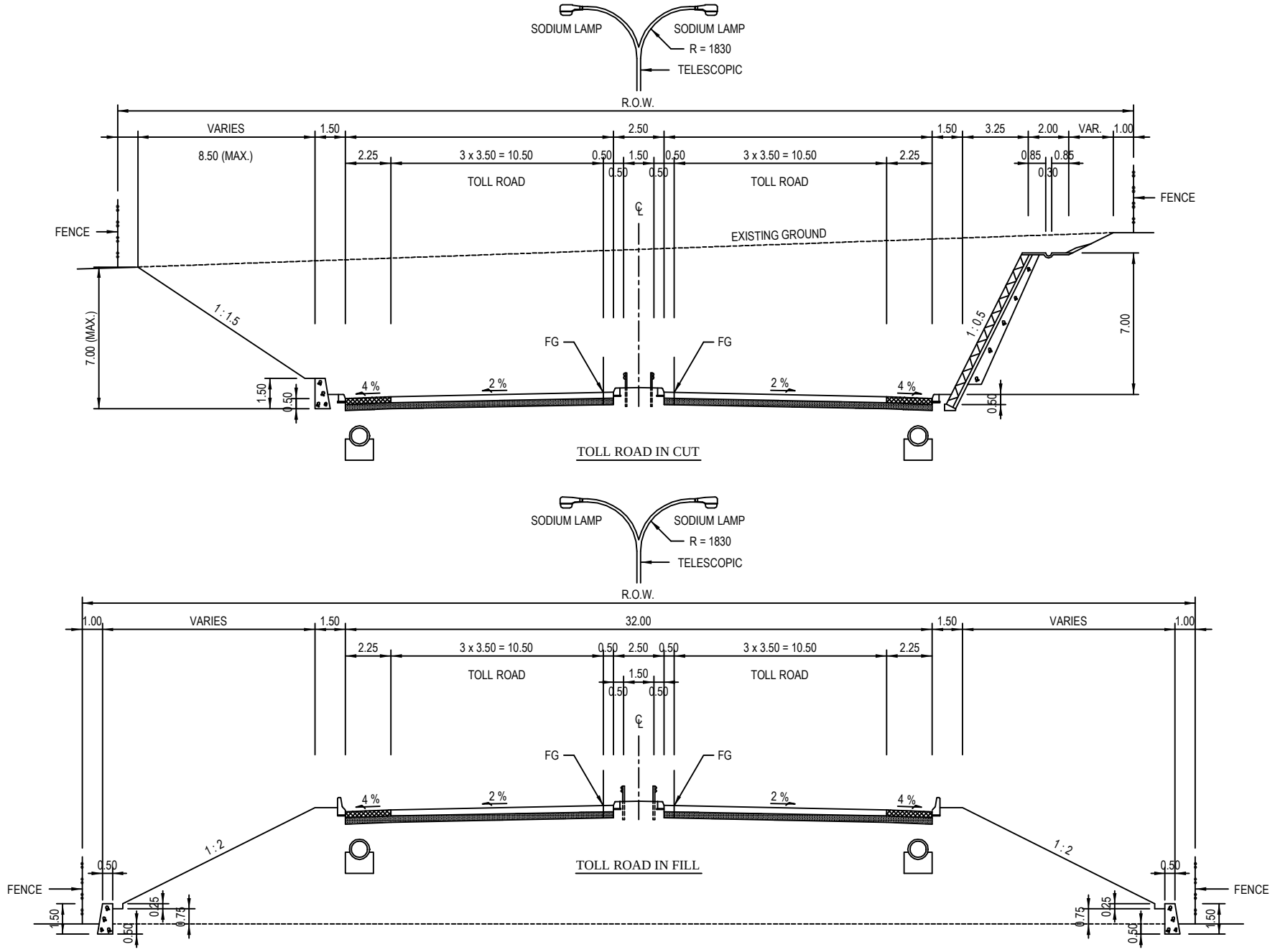
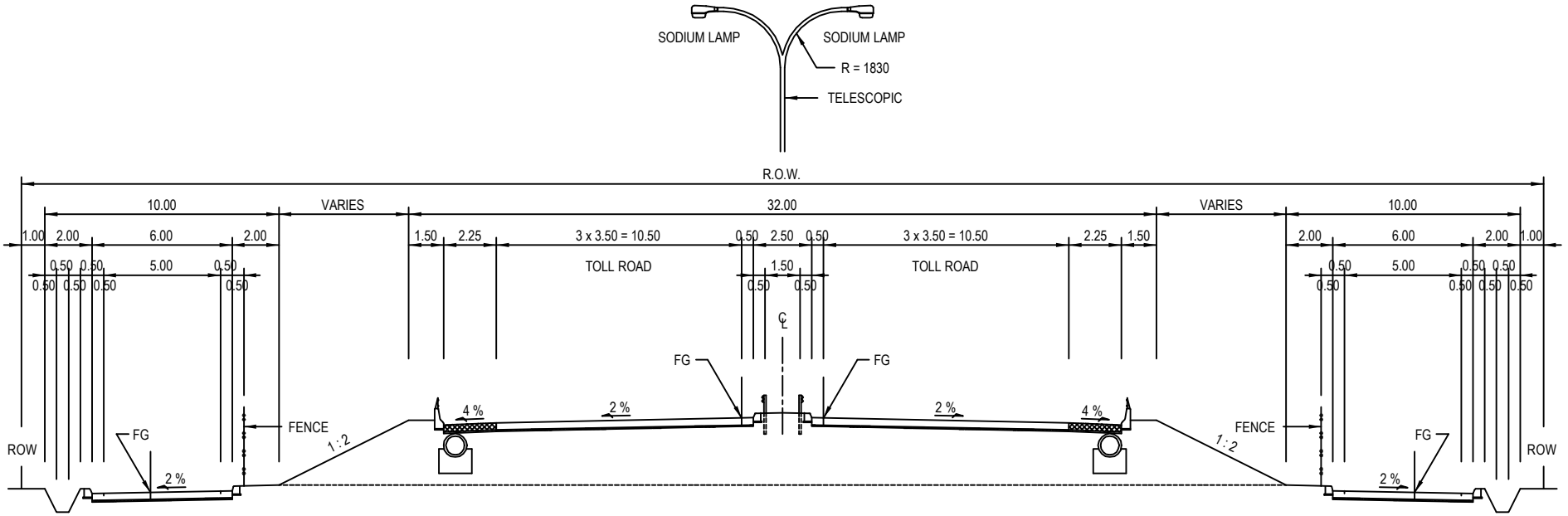


Figure 5.2.1 Typical Cross Section (1)



TOLL ROAD WITH ACCESS ROADS

Figure 5.2.2 Typical Cross Section (2)

5.3 Project Description

5.3.1 Project Objectives

The project has two main objectives.

The first objective of the project is to complete the unfinished works of the JORR's 6 sections, sections W1, W2, S, E1, E2 and E3, and to improve the access streets between Tanjung Priok International Port and JORR.

The second objective is to introduce computer aided toll collecting and transmission systems as well as traffic information system into the JORR. These systems are fundamental tools for modern tollway operation.

5.3.2 Toll Collecting System

(1) Functions of JORR

The functions of a ring road are, generally speaking, to guide city development expanding towards outside and to take the traffic concentrating within the city center and distribute it to other roads.

Due to the recent rapid urbanization, the area adjacent to the JORR corridor which used to be green fields during the JORR planning stage is now under development as residential or commercial areas. The City Administration is considering this corridor as a candidate for developing traffic facilities such as inter city bus terminals. The east Jakarta Urban Center in Pulo Gebang and the west Jakarta Urban Center in Kembangan have been developed along this corridor. Future commercial and business sub-center developments are expected along this corridor utilizing the JORR as a traffic infrastructure. Hence the JORR is now expected to play the role of an urban tollway. The average distance between junctions and interchanges is approximately 2 km on the west of Section E1 and 3 km on the east.

In the present network, 3 radial tollways, Jakarta Cikampek Tollway, Jagorawi Tollway and Jakarta Merak Tollway, are connected directly to the JIUT system, Inner Ring Road, and as a result, traffic congestion is a daily phenomenon at the Cawang Junction and Tomang Junction. Especially in the Cawang Junction which intersects 2 rural tollways and 2 urban tollways, traffic congestion exceeds the level of tolerance.

JORR is expected, therefore, to distribute inflow traffic from the radial roads into other tollway routes or trunk streets and reduce the burden of the inner ring road network.

Tanjung Priok International Seaport and Soekarno-Hatta International Airport have smooth access to the JORR and goods and passengers originating from these infrastructures can be delivered to their destinations without passing the CBD of DKI Jakarta.

A toll collecting system, whether closed or open system, can heavily govern the behavior of drivers in their selection of routes. In the case of toll roads, the major factors influencing drivers in the selection of a route at a turning point are time and monetary factors and they are inter-related to each other.

The former is governed initially by the distance and running speed of the route but in reality, Volume/Capacity ratios have a greater influence on the running speed and subsequently on the destination arrival time. Drivers, who are supplied with traffic condition information before they arrive at the turning point may be able to select the better route.

But this selection does not become a final decision in case the latter is involved. Monetary factor is sometimes a very strong motive and reduces drivers' elasticity in their selection of routes.

(2) Present Toll Collecting System

The toll collecting systems currently used by the Jabotabek Tollways are Open System - flat tariff, and Closed System – distance proportion tariff, as illustrated in Figure 5.3.1.

(1) Intra Urban Tollway (SW arc, NS Link and Harbor Road)	Operated by Jasa Marga & Private Companies	Open System
(2) Access Cengkareng	Operated by Jasa Marga	Closed System
(3) JKT Merak Tollway	Operated by Jasa Marga	Closed System
(4) Jagorawi Tollway	Operated by Jasa Marga	Closed System
(5) JKT Cikampek Tollway	Operated by Jasa Marga	Closed System
(6) JORR South	Operated by Private Company	Closed System
(7) JORR E2	Operated by Private Company	Closed System

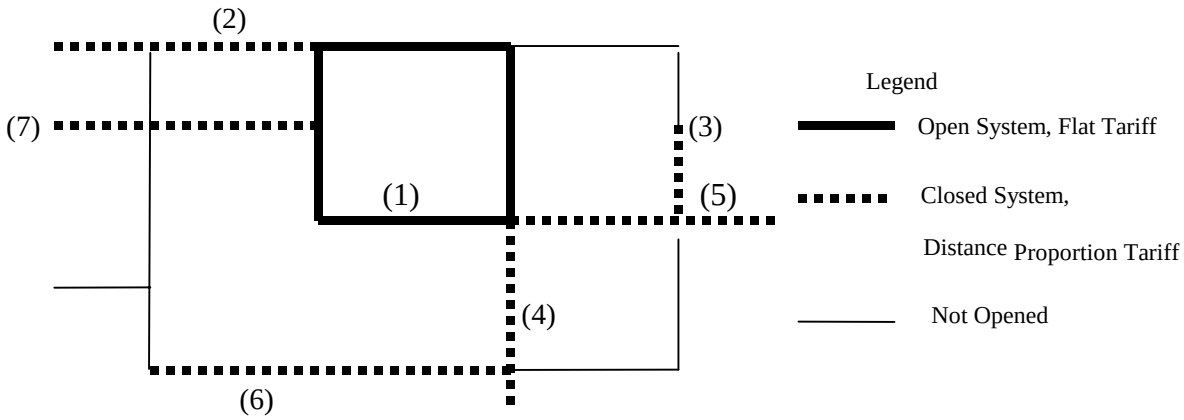


Figure 5.3.1 Present Toll Collecting System

(3) Proposed Toll Collecting System

There are 2 possible systems for the Jabotabek Tollway Network in the future. Both systems do not basically change the system of the existing Jakarta Intra Urban Tollway, Cengkareng Access Tollway and the 3 radial tollways as explained in the item b) of this section.

1) Comprehensive Closed System

A closed system is applied to JORR. This system has tollgates at the entrance and exit and therefore it is a closed space in between the gates. Drivers receive a ticket at the entrance on which the name of the entrance is printed and pay a toll levy at the exit in accordance with the distance covered. This system is known as the Distance Proportion System and it is viewed as being fair to drivers who only pay for the distance covered. Since tollway users are always recorded at the entrance and exit, tollway operators can collect detailed operation data by compiling the records on the computer system. To enjoy these merits of the system, higher initial investment for the installation of toll gates and equipment and running cost for toll collectors is required, roughly double that of a open system which has only entrance gates. Between 2 different systems, such as the open system of JIUT / Cengkareng Access Tollway and JORR/ radial tollways, barrier gates will be necessary on the through roads outside of the JIUT and Cengkareng Access Tollway.

Figure 5.3.2 illustrates the concept of a Comprehensive Closed System.

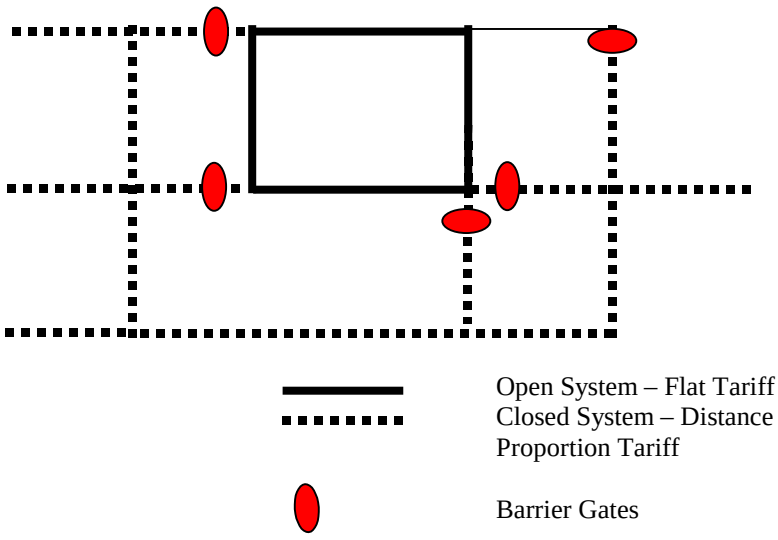


Figure 5.3.2 Concept of a Comprehensive Closed System

2) Double Flat Tariff System

The inner ring road is currently operating under a flat tariff system. Application of a flat tariff system to the Outer Ring Road will result in a Double Flat Tariff System.

An open system has only one gate at the entrance of a tollway and drivers are requested to pay a toll levy at the gate. The toll is a flat tariff in this case.

The initial and running costs are lower compared to a closed system but tollway operators cannot collect data on O and D of tollway users.

If one were to apply an open system on the JORR, several barrier gates on through roads will become necessary in order to divide the tollway. The difference between the toll collecting systems is shown in the illustration below.

Tollway users pay a constant toll levy no matter how far they travel and therefore, the driver who travels over a short distance may view this levy as being unfair.

Figure 5.3.3 illustrates the concept of a Double Flat Tariff System.

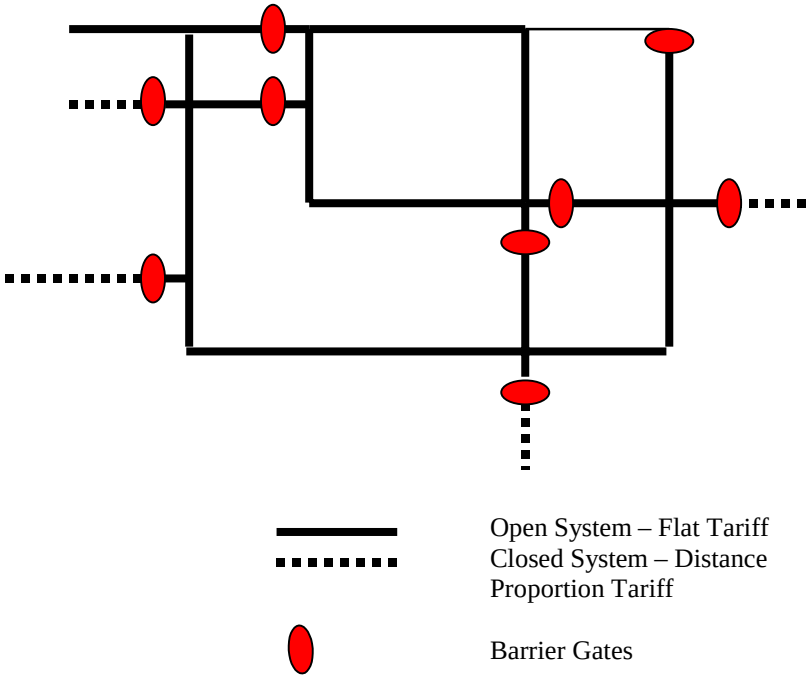


Figure 5.3.3 Toll Collecting System – Double Flat Tariff System

(4) Factors for Selecting a Toll Collecting System

To achieve the desired objectives of the JORR, it is necessary to take not only toll collecting systems but also toll rates into consideration.

In the case of a closed system, the majority of drivers at a turning point may be motivated by monetary factors and select the cheapest route to arrive at the inner ring road. Going straight on the radial tollway may be the cheapest option compared to the JORR and the other radial tollway for the inner ring road. This behavior would not change the present problems of traffic concentrating at junctions of the inner ring road. In order to ease this situation with a closed

system, one solution would be to charge a comparatively low toll levy with distance proportion tariff. This solution may increase the users' elasticity in route selection but may possibly require diversion funds from the road and radial tollways as a form of cross subsidy in lieu of the comparatively low toll levy.

In an open system, users would select a route purely by time factor as long as they are able to receive accurate and current information before the turning point. The majority of vehicles may opt for the JORR if they knew of the heavy traffic congestion at the inner ring road junction.

The application of a constant toll levy on the entire stretch of JORR, approximately 60 Km, may reduce tollway users traveling short distances. These users would feel that the flat tariff is unfair and avoid using the JORR for short distance. However, this can be solved if a comparatively low toll levy is applied under a cross subsidy policy as discussed earlier for the closed system in the previous section.

Since detailed and actual data cannot be collected by this system, in case the JORR which would be operated by more than one entity, toll levy sharing must be made by mutual agreement among the operating entities same as in the case of the inner ring road. A constant toll levy of Rp.3,000 is being applied for the inner ring road, which is 40 km in length.

(5) Selected Toll Collection System for Economic and Financial Analysis

The JOOR sections presently operational, i.e. S and E2, adopts the closes system and P.T Jasa Marga plans to apply the same system to remaining sections of the JORR.

Changing the existing toll collections system and/or toll rates is deeply concerned with the tollway development policy, traffic control and management policies on a comprehensive tollway network in Jabotabek.

As discussed in section 4.2, development policies on the Jabotabek tollway network should be elaborated from views of master planning, involving such issues as the amortization policy on the tollway loan project, private sector participation, toll rate adjustment mechanism, the revenue pooling and cross subsidy system.

Consequently, the closed toll collection system was selected as the basis proceeding to the review of economic and financial feasibility of the JOOR.

5.3.3 Traffic Information System

(1) Introduction of Traffic Information System

Toll roads are closed spaces where access is controlled and communication method with the outside world is very limited. As such, an incident on the toll road could lead to a disaster if inadequately handled. Continuous surveillance of traffic condition on the toll roads is, therefore, essential for the early detection of incidents and the prompt implementation of countermeasures. In this way, human lives can be saved and negative consequence of incidents such as prolonged congestion or secondary accident can be minimized, if not totally avoided. Drivers could be informed of an incident before they enter the toll roads

or at an upstream section so that they can take a detour and not to waste their time or fuel being caught in a queue.

Recurrent congestion, which occurs due to excess demand even without any incident, is already a daily event at some locations on the toll roads in Jabotabek area particularly on the Jakarta Intra Urban Tollway (JIUT). Construction work and maintenance work are frequently carried out to improve or maintain the toll roads. Even if there is no severe incident, the provision of information regarding these minor disturbances to the road users can contribute greatly towards the safety and convenience of toll roads.

This traffic information system as well as the transmission system are proposed as fundamental equipment for operating toll road in order to obtain users' satisfaction. The transmission system consists of an optical fiber cable installation together with the operating equipment and it is a basic infrastructure for traffic information and toll collecting systems.

Figure 5.3.4 illustrates a schematic concept of the Traffic Information and Transmission Systems.

(2) System Function

Traffic Surveillance, Incident Detection, Information Dissemination, Countermeasure Implementation and Data Logging are the five basic system functions of a traffic information system.

- Traffic surveillance is carried out by the toll road operator at the control center via a closed circuit television system and the wall map. Detectors installed at each section of toll road collect and send traffic data to the control center where the data is automatically processed. The results are graphically displayed on the wall map to indicate the various degrees of congestion or free flow condition of the toll road. By operating the CCTV cameras from the control center, the toll road operator can visually inspect the traffic situation on the toll roads. Emergency telephones along the toll roads allow road users to report incidents to the control center.
- Incident detection is basically made by observing the processed detected data displayed on the wall map at each section of the toll roads. If there is a sudden change in the level or traffic flow parameters, it is highly likely that an incident has occurred and the smooth flow has been disturbed. The video image from the CCTV camera also assists in the manual or automatic detection of incidents. Video image processing technology has made it possible to automatically detect an incident with reasonable accuracy.
- Information dissemination is to supply information gathered at the control center through various methods to the road users via a number of facilities. One of the effective ways is through variable message signs and graphic display panels installed at strategic locations both on the through lane and toll roads' entry points. Roadside radio can provide traffic information in an audible way and convey more messages than a signboard.
- Once an incident occurs, countermeasures must be taken. To control and manage the incident, patrol cars must be instructed through radio to go to the site to rescue the vehicle or an ambulance must be dispatched without delay depending on the situation via the quick incident disposal system

established in the control center. Another countermeasure is to inform the road user of the incident through information dissemination. The road users are informed of the existence of abnormal conditions such as toll road closure, lane closure, congestion, or speed limit control and advised of the action to take.

- Traffic data gathered by vehicle detectors are automatically processed and stored in a suitable format for future use. Such data is a valuable reference in the planning of improvement work or new toll roads. Operation log including malfunction data of other facilities such as the variable message sign is also automatically recorded.

Figure 5.3.4 illustrates a concept image of a Traffic Information System as well as of a transmission system. The system function is introduced is more detail in the working paper W H-10.

(3) System Selection and Future Expansion

Since the traffic information system consists of information in-put facilities and out-put facilities, users cannot enjoy the benefits if there are no in-put facility at the places of users' destination. In order to achieve the function of the system, the information regarding the inner ring road is essential for the users heading to the CBD. This report therefore suggests the development of this system to cover the JIUT, Cengkareng Access, JORR and a part of 3 radial tollways.

However, the cost estimated for confirming financial feasibility includes only the cost required for JORR, since it is considered rationale that cost which originates outside of the scope of JOOR be shared by the respective tollways.

It must be noted that the system introduced in this project is a basic system and has much room for up-grading to supply more accurate and real time information. This upgrading can be achieved by increasing the number of roadside facilities.

This system is introduced as a basic infrastructure of traffic operation and will be a source of future expansion to further sophisticated instrument. It is recommended that the government and the operating entity should establish a long-term concept for the development of this system including a toll collecting policy. Expanding the project sites and up grading the system accuracy is the 2 directions of development.

Expanding the project sites is;

JORR - JIUT - Radial Tollways - Trunk Road Network other than tollway

Upgrading the accuracy is;

Upgrade the accuracy of the present system - Upgrade to the next generation system ITS

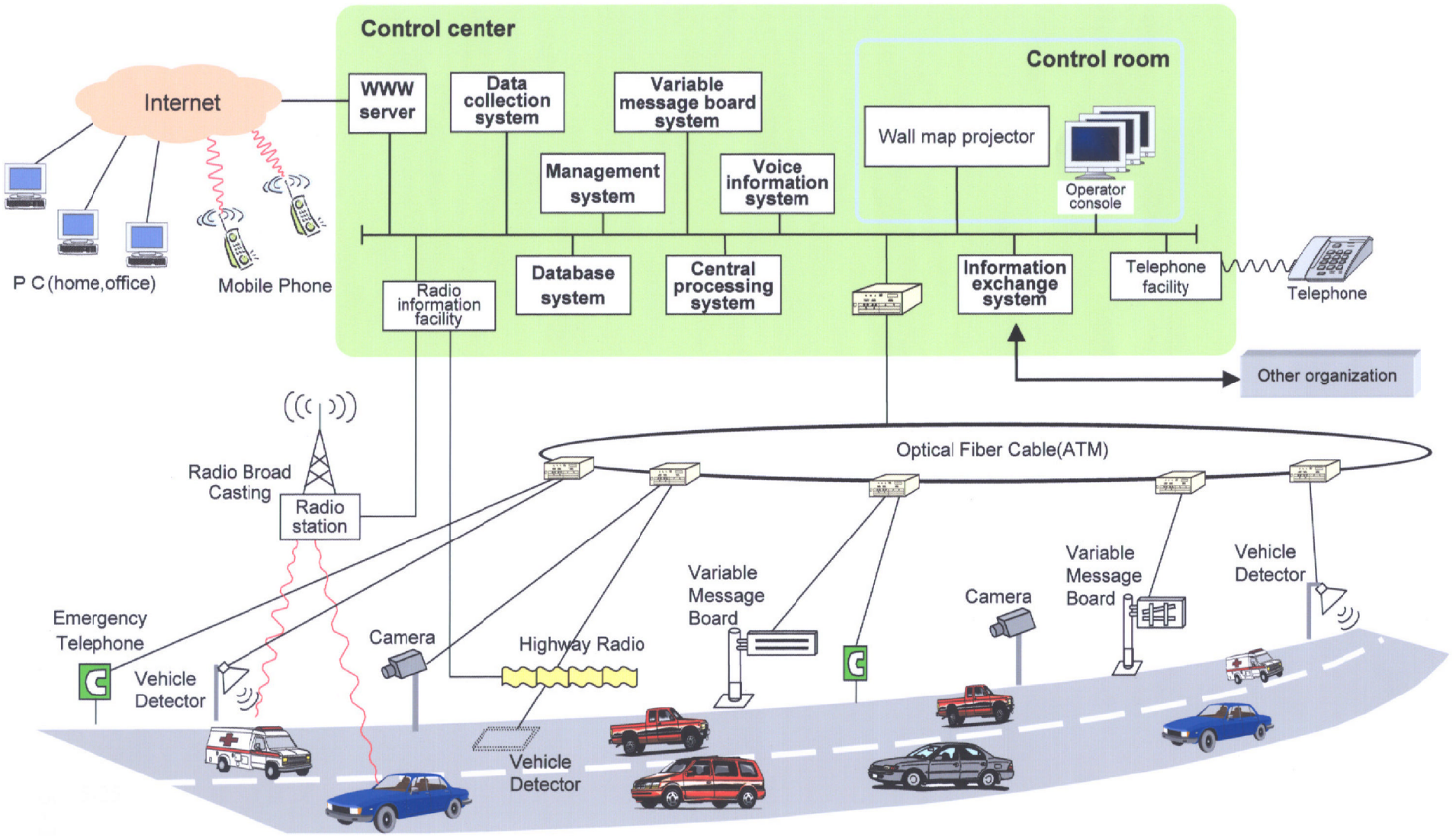


Figure 5.3.4 Schematic Concept of Traffic Information and Transmission System

5.3.4 Design and Tender Preparation

A Definitive plan (basic design) and detailed design were prepared by the consultants directly appointed by each concessionaire and these 2 stages of designs were approved by the authorized agencies, Bina Marga and the pertinent local governments, except for the detailed designs of sections W1 and N. The consultants, which were contracted for the design works are listed in the name of the main consultants as below.

- W1 C. Lotti & Associati SpA
- W2 PT. Vuana Archicon
- S and E1 Pacific Consultants International
- E2, E3 and N Biec International.

It is impractical to use these designs for the construction of the remaining works, because these designs had been developed under the BOT scheme. It is desirable for an independent consultant to review the previous designs and establish a new definitive plan for the remaining sections, in order to maintain design uniformity under the present circumstances.

A design built type of contract, based on the definitive plan, may be proper under such conditions.

Time factor is taken into consideration for proposing the design built type of contract. Priority may be placed to prepare integrated concepts applicable to all sections in the stage of a definitive plan. Once an integrated plan is approved by the relevant authorities, preparation of detailed designs can proceed parallel to the mobilization of contractors.

Structures constructed by the previous contractors exist at the site and the new contractor is requested to take responsibility for its structures which will be overlaid on the present structures. The new contractor can propose a construction method after inspecting the site and conducting site tests to ensure the safety of the new structures.

Provisions for testing and inspection of previous works and responsibilities regarding the results of the inspection must be included in the Contract Documents.

5.4 Cost Estimates

5.4.1 Basic Assumptions

Project base cost comprises 2 categories, namely engineering base cost and the GOI contribution.

Engineering Base Cost

- Construction cost
- Physical contingency, and
- Consulting engineering and supervisory service cost.

GOI Contribution

- Land acquisition and compensation cost

- Administration cost and utility relocation cost, and
- Duties and Levies on Imports, as well value-added tax (Ppn).

(1) Engineering Base Cost

Construction cost is estimated section by section and summed up to the total. Since the contracts for the construction of the tollway and the purchase and installation of equipment for the traffic control system, such as the toll collecting, traffic information and transmission systems, are of different nature, the costs of these two works as well as the engineering service cost are estimated independently.

It is assumed that all tollway construction works will be executed by qualified general contractors to be employed by the authorized government agency or, should such a case materialize at all, by the private investors that are to be selected by an international competitive tender based on the definitive plan prepared by the managing agency/agencies (Design Built). It is assumed that the tender for the purchase and installation of the traffic control system will also follow a similar process with qualified equipment suppliers to that of the tollway construction works.

Construction Cost ┬ Tollway Construction Cost
└ Purchase and Installation Cost of Traffic Control System

Physical Contingency (10% of tollway construction & 5% of the Traffic Control System)

Engineering Service Cost ┬ Tollway Construction
└ Purchase & Installation of Traffic Control System

Construction costs were estimated on the following basis:

- The unit prices of work items are based on September 2000 prices,
- The exchange rates between the Rupiah, the Yen and the U.S. dollar are the weighted average rates from the period January to June 2000, namely one U.S. dollar equals Rp.7,950 equals Y106. In other words Rupiah75 equals Y1.0
- The rates of price escalation for construction works are:

  F/C 1.0% p.a. and L/C 5.0% p.a.

The cost is split into foreign and local currency components.

The foreign component consists of

- Salaries, and wages of foreign personnel,
- Overhead and profit of foreign firms,
- Depreciation of construction equipment and plants,
- Steel products, except reinforcing bars,
- Joint fillars and water stop, and
- Material for road supporting facilities.

The local component consists of

- Salaries and wages of local personnel,
- Overhead and profit of local firms,
- Domestic materials and supplies such as fuel, cement, asphalt, reinforcing bars, plywood, timber and other materials/supplies all of which the country is a net exporter, and
- Taxes.
- 10 % of the tollway construction cost and 5 % of the purchase and installation cost of the traffic control systems are estimated as physical contingency cost.
- Consulting engineering services includes the preparation of definitive plans for construction of civil works and tender documents. Supervisory services consists of site supervision and approval of detailed designs to be prepared by the contractors of each section. The purchase and installation of equipment for the toll collecting and traffic information and transmission systems are implemented by different consulting engineering services. This service also covers engineering and supervisory services.

(2) GOI Contribution

The GOI contribution is estimated to be as follows:

- Land acquisition cost is estimated based on the market price of the land that has not yet been acquired in the scope of the present implementation.
- A 5 % import duty and levy has been assumed on all imported F/C components.
- A 10 % value-added tax (Ppn) has been assumed on all business transactions.

5.4.2 Construction Costs

The costs were obtained by reviewing the following report as the latest reports available at the time of writing this report.

- Valuation Study of Jakarta Outer Ring Road; May 2000.

This report includes;

- Evaluation of performed works (fair cost) and comparison with the concessionaire's report (historical cost)
- Estimation of remaining works of each section on a U.S. dollar by base without dividing the cost into F/C and L/C components.

Rearrangement of the costs of the remaining works of the report, due to:

- Change of construction limit,
- Structure change,
- Toll gates arrangement,
- Addition of the cost for extra works,
- Addition of the costs for traffic control systems, such as a toll collecting, a traffic information and a transmission systems,

- Addition of Jl. Cilincing sections, and
- Inflation between March 2000 to September 2000

  F/C 2.5% p.a. and L/C 5.0% p.a.

5.4.3 F/C and L/C Rates

The GOI has requested officially for this project the application of a Special Yen Loan (SYL). The specific terms & conditions for the SYL, i.e. that the project must incorporate more than 50% of the materials and services of Japanese origin, was taken into account. However, no special arrangement was made for increasing the Japanese content.

The toll collecting, traffic information and transmission systems which are currently available in the current international market are highly sophisticated. However, an advanced system is not recommended, but only very basic traffic information and control equipment that is deemed fundamental for the tollway facilities and its users.

The inclusion of Japanese contents is one of the conditions of the SYL and distribution of the cost over the foreign currency (F/C) and local currency portions (L/C) was studied and concluded as discussed below:

- There are many kinds of Japanese products available in the local market, but, as far as construction materials are concerned, almost all materials are local products. There are few local material suppliers that receive financial support from Japanese companies.
- However, construction equipment is mainly imported from Japan and other countries and this equipment is available on the local lease market.
- Generally speaking, the Indonesian market can supply any locally made construction material.
- The share of construction equipment obtained from the local lease market may not be large enough to meet the requirement of the SYL condition.
- A basic assumption was made that this project will become a Japanese ODA project, since the GOI had already requested officially SYL assistance.
- Japanese contractors may, in the case of a Japanese ODA project, purchase major equipment on the Japanese market and import them to Indonesia with enjoying import tax exemption.
- Construction cost consists of components of construction equipment, fuel, labor and material costs.
- These components have naturally different F/C to L/C ratios, depending on the construction categories, such as earth works, pavement and structure works.
- These ratios and further F/C and L/C rates in the components were estimated from the experience of on-going ODA highway projects in Jakarta.
- Labor and material costs have a low F/C component rate and the major source of the F/C component is depreciation cost of construction equipment.
- As a result, the F/C component rate of construction civil works of this project was approximately 38%.

The direct cost includes equipment installation. Toll collecting, traffic information and transmission equipment are the necessary equipment. This equipment has a higher F/C component rate and as a result of incorporating the equipment cost, the project's F/C component rate of the engineering base cost increased. The F/C and L/C component rates are presented in the summary tables of each case, introduced in the following section.

5.4.4 Engineering Base Cost

Three alternative engineering base costs were estimated, of which difference lies in the area that is covered by the traffic information system.

Engineering base cost case "A": the traffic information system covers the JORR only

Engineering base cost case "B": the traffic information system covers JORR, JIUT and 3 Radial Tollways, and

Engineering base cost case "C": a traffic information system is not introduced at all at this point in time.

Table 5.4.1 presents the summary results of the three engineering base cost estimates.

Table 5.4.1 Summary of Three Engineering Base Cost Estimates

September 2000 Price

Alternative Engineering Base Cost Cases	Sub-option 1 Closed System			
	F/C	L/C	Total	
	Mil. Yen	Mil. Rp.	Mil. Yen	Mil. Rp.
Case "A"	35,531	2,435,855	68,009	5,100,675
(F/C & L/C Ratio)	(0.522)	(0.478)		
Case "B"	42,583	2,487,974	75,727	5,679,525
(F/C & L/C Ratio)	(0.562)	(0.438)		
Case "C"	28,152	2,384,685	59,904	4,492,800
(F/C & L/C Ratio)	(0.470)	(0.530)		

Source: JICA Study Team computations

Notes; 1) Coverage area of the Traffic Information System
Case A ; JORR only
Case B ; JORR+ JIUT+ 3 Radial Tollways
Case C ; No information System
2) Conversion Rates Yen 106 = US$ 1.0 = Rupiah 7,950 Yen 1.0 = Rupiah 75

A break down of the engineering base costs is presented in Appendix Table AP 5.1 of the report.

Table 5.4.1 includes the ratios of the F/C and L/C cost components for all cases. The table indicates that the engineering base cost cases "A" and "B" meet the requirement for a Special Yen Loan Project, i.e. a F/C component that exceeds 50% of the engineering base cost. The engineering base cost case "C", though the lowest in terms of engineering base cost, is to be dismissed, since its F/C component is below the 50% requirement. Case "A" is selected, because its total engineering base cost is lower than Case "B".

5.4.5 Project Base Cost for the Selected Case "A"

The project base cost was obtained by adding to the engineering base cost the GOI contribution. Table 5.4.2 presents the summary of the project base cost of the engineering base cost Case "A", and this is the base case that is used for further project evaluation.

Table 5.4.2 Summary of Project Base Cost for Engineering Base Cost Case "A"

No.	Items	F/C	L/C	Total	
		Mil. Yen	Mil. Rupiah	Mil. Yen	Mil. Rupiah
1	Construction Civil Works	17,056	2,094,619	44,984	3,373,800
2	Equipment Installation	13,194	78,918	14,246	1,068,450
3	Physical Contingency	2,365	213,408	5,211	390,825
4	Consulting Engineering Services for Civil Works	2,006	40,617	2,548	191,100
5	Consulting Engineering Services for Equipment Installation	900	8,293	1,021	76,575
6	Sub-Total of Engineering Base Cost	35,531	2,435,855	68,009	5,100,675
	F/C & L/C Rates	0.522	0.478		
7	Land Acquisition; Compensation; Administration& Utility Relocation	0	464,600	6,195	464,600
	Add: 10% of Physical Contingency	0	46,500	620	46,500
8	Duty and Levies on Imports	0	113,400	1,512	113,400
9	Ppn (VAT)	0	290,000	3,876	290,000
10	Sub-Total of GOI Contribution		914,500	12,193	914,500
11	Grand-total of Project Base Cost	35,531	3,350,355	80,202	6,015,175

	F/C,L/C Rates	F/C	L/C
1	Construction Civil Works	0.379	0.621
2	Equipment Installation	0.926	0.074
2	Physical Contingency	0.454	0.546
3	Consulting Engineering Services for Civil Works	0.787	0.213
4	Consulting Engineering Services for Traffic Managing Systems	0.892	0.108

Source:
JICA Study Team computations

Notes:
1) Construction Works consists of Civil Works and Equipment Installation Works
2) Contingency is 10% of the Civil Works and 5% of the Equipment Installation Works
3) Conversion Rates
   Yen 106 = US$ 1.0 = Rupiah 7,950
   Yen 1.0 = Rupiah 75

Chapter 6

Review of JORR Environmental Aspects

6. Review of JORR Environmental Aspects

6.1 Result of Previous EIA Study

Based on the environmental basic law as stipulated in Act No.4 of 1982: Basic Provision for the Management of the Living Environment, an environmental impact assessment in Indonesia (AMDAL: Analisis Mengenai Dampak Lingkungan) has to be established that meets the requirements stated in this Act. The process of AMDAL is prescribed in Government Regulation No.51 of 1993 and the type of business/ activities in which AMDAL is required, are defined in the State Ministry of Environment Decree No.KEP-39/MENLH/8/1988 (this Decree was recently renewed to the Decree No.KEP-39/MENLH/8/1996). AMDAL Guidelines have been prepared and they are enforced by the Ministry of Public Works through its Decree No.506/KPTS/1992. As stated in No.51 of 1993, AMDAL is composed of an Environmental Impact Statement (ANDAL: Analisis Dampak Lingkungan), Environmental Management Plan (RKL: Rencana Pengelolaan Lingkungan) and Environmental Monitoring Plan (RPL: Rencana Pemantauan Lingkungan).

In accordance with the laws mentioned above and other relevant environmental laws/ regulations, an environmental impact assessment (AMDAL) was carried out in full scale for each JORR Section and they were approved by the Central AMDAL Commission organized by the Ministry of Public Works up to the year 1997, in the following manner.

1. AMDAL (ANDAL, RKL & RPL) study on the development plan of JORR Section W1 (Penjaringan – Kebon Jeruk), prepared by PT. Bangun Cipta Sarana, has been stipulated based on the approval letter of: KL.03-03-MN/466, 25 October 1996.

2. AMDAL (ANDAL, RKL & RPL) study on the development plan of JORR Section W2 (Kebon Jeruk – Pondok Pinang), prepared by PT. Mataram Citra Binangum, has been stipulated based on the approval letter of: KL.03-02-MN/334, 29 August 1997.

3. AMDAL (ANDAL, RKL & RPL) study on the development plan of JORR Section S/ E1 (Pondok Pinang – Jagorawi/ “S” and Jagorawi – Cikunir/ “E1”), prepared by PT. Marga Nurindo Bhakti, has been stipulated based on the approval letter of: KL.03-02-MN/259, 19 July 1995.

4. AMDAL (ANDAL, RKL & RPL) study on the development plan of JORR Section E2/ E3/ N (Cikunir - Cakung/ “E2”, Cakung – Cilincing/ “E3” and Cilincing – Tanjung Priok/ “N”), prepared by PT. Citra Bhakti Margatama Persada, has been stipulated based on the approval letter of: KL.03-02-MN/372, 21 August 1996.

Each AMDAL study described the contents of the project, project activities, environmental settings/ conditions of the project sites and surroundings including social aspects, prediction and evaluation of the impacts related to each activity and environmental management & monitoring plan for each project stage of pre-construction, construction and post-construction stages.

Table 6.1.1 shows the environmental impacts, on which special attention was paid in each AMDAL Study. Table 6.1.2, 6.1.3, 6.1.4 and 6.1.5 show the environmental impact matrices of each AMDAL Study which described the environmental impacts related to the project activities.

Table 6.1.1 Environmental Impacts Considered in Each AMDAL Study

JORR Section	Project Stages	Important impacts to be considered in AMDAL study
W1 Penjaringan – Kebon Juruk	Pre-construction	---
	Construction	• Decline in air quality and noise impact • Erosion and land subsidence • Traffic congestion and accident
	Post-construction	• Increase of surface water run-off • Decline in air quality and noise impact • Traffic disturbance/congestion • Land-use change in the surroundings • Traffic accident
W2 Kebon Jeruk-Pondok Pinang	Pre-construction	• Social unrest due to land acquisition
	Construction	• Increase in local employment/economic activities • Traffic congestion and accident • Decline in air quality and noise impact • Change of land form and environmental aesthetics • Disturbance to drainage/surface water flow pattern • Disturbance to infrastructures and/or public utilities
	Post-construction	• Change in traffic flow pattern • Traffic speed increase • Change of land use and land appropriation • Air pollution and noise impact • Increase of economic activities in the region • Change of life patter in the community
S/E1 Pondok Pinang – Jagorawi - Cikunir	Pre-construction	• Social unrest due to site investigation • Social unrest due to land acquisition
	Construction	• Decline in air quality and noise impact • Soil erosion and land subsidence • Disturbance due to piling work • Disturbance to infrastructures and/or public utilities • Traffic congestion and accident
	Post-construction	• Air pollution and noise impact • Change of land use • Disturbance of traditional values • Traffic congestion
E2/E3/N Cikunir – Cakung – Cilincing – Tanjung Priok	Pre-construction	• Social unrest due to site investigation • Social unrest due to land acquisition
	Construction	• Decline in air quality and noise impact • Soil erosion, sedimentation and water inundation • Increase of weeds/tramps population • Traffic congestion and disturbance to mobility
	Post-construction	• Air pollution, noise and dust • Change of land-use (increase of building coverage) • Increase of weeds/tramps population • Increase of economic activities in the community • Community split

Source: Environmental Impact Assessment for JORR, Summary, May 1999)

Table 6.1.2 Environmental Impact Matrix (Section W1)

Project Stages	Pre-Const	Construction											Post Const.		
Project Activities	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
I. Geo-Physical/Chemical															
1. Air quality		◆	○	◆										○	
2. Noise		○	◆	○										◆	
3. Water quality					○		○								
4. Hydrology					○		○								
5. Land-use/utilization													○		
II. Biology															
1. Flora															
2. Fauna															
III. Socio-Economic															
1. Social economic															
2. Community's relatives										◆		○			
3. People's perception		○	○	○		○									
4. Public health															
IV. Traffic															
1. Traffic congestion at arterial road		○	◆	◆			◆								
2. Traffic congestion at toll road														◆	
3. Traffic congestion at toll gate														◆	
4. Traffic accidents on arterial road		○	◆	◆			◆								
5. Traffic accidents on the toll road														◆	
V. Public Infrastructure															
1. Kalideres Bus Terminal								○							
2. Jakarta- Merak railway track								○							

(Source: Analisis Dampak Lingkungan, Proyek Pembangnang Jalan TOL Lingkan Luar Kebon Jeruk-Penjaringan, September 1996 and Environmental Impact Assessment for JORR, Summary, May 1999)
Remark: *) Land acquisition had been carried out in 1986 and there was no residual impact.
Legend;
◆ : Important impact (requires special effort in management)
○ : Less important impact (requires anticipation)

Project Activities;

1. Land acquisition
2. Mobilization of heavy equipment
3. Operation of heavy equipment
4. Transportation of materials
5. Earthworks
6. Piling of foundation
7. Development of drainage canal
8. Construction of flyover and bridge
9. Base camp activities
10. Construction of the toll road
11. Associated works
12. Toll road existence
13. Toll road operation
14. Maintenance of the toll road

Table 6.1.3 Environmental Impact Matrix (Section W2)

No.	Activities important impacts	Environmental component	Indication of impact	Impact
A.	**Pre-construction Stage**			
1.	Survey activity and field measurement	- Social economic and social-culture	- Increase in land price	P
2.	Land and building acquisition	- Social-economic and social-culture	- Change in land and building ownership. - Social unrest	P
B.	**Construction Stage**			
1.	Mobilization of labor	- Social-economic and social-culture	- Increased economic activities	P
2.	Operation of base-camp, workshop and AMP	- Air quality and noise	- Increased air pollution and noise	P
3.	Transportation of quarry and building materials	- Air quality and noise	- Increased air pollution and noise.	P
4.	Land opening, land clearing and compaction	- Air quality and noise	- Increased air pollution and noise	P
		- Physio-graphy	- Change of land form and environmental aesthetics	TP
		- Hydrology	- Surface water pollution - Occurrence of water inundation	P
		- Public infrastructure	- Disturbance to its function	P
5.	Construction of the road prism and pavement	- Air quality and noise. - Traffic condition	- Increased air pollution and noise - Disturbance to the traffic	P
6.	Development of the bridge, guardrail and associated structures	- Air quality and noise - Traffic condition	- Increased air pollution and noise - Disturbance to the traffic	P
C.	**Post-Construction Stage**			
1.	Operation and maintenance of the toll road	- Traffic condition	- Change of traffic flow pattern - -Increased traffic speed	P P
		- Spatial structure and land0-use	- Change of land-use in the study area	P
		- Air quality and noise	- Increased air pollution and noise	P
		- Social economic and social culture	- Increase economic activities in the community - Change of life pattern in the community - Positive perception in the community	P P P

Source: Analisis Dampak Lingkungan Proyek Pembangunan Jalan TOL, Lingkan Luar Jakarta Seksi W2 Kebon Jeruk-Pondok Pinang, July 1996 and Environmental Impact Assessment for JORR, Summary, May 1999

Legend:
P: Important impact
TP: Unimportant impact

Table 6.1.4 Environmental Impact Matrix (Section S/E1)

Environmental Activities		Construction										Post-construction			
	Component of Activities	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Social Economic Culture	Social unrest	O													
	Disturbance to relative system		Δ										Δ		
	Disturbance to habits		Δ									Δ	Δ		
	Disturbance to the population's rice field						Δ								
	Disturbance to house structure								O						
	Disturbance to public facilities and utilities							O							
	Disturbance to population transportation lane	O											Δ		
Physical-Chemical	Disturbance due to noise				X	X					Δ				
	Disturbance due to exhaust emissions				X	X					Δ				
	Erosion and subsidence road						X								
Traffic	Traffic congestion on arterial roads			X	O	O	O			Δ					
	Traffic congestion on toll road													X	Δ
	Traffic congestion around toll gate											Δ			
	Traffic accident on arterial road			X	X	Δ	Δ			X					
	Traffic accident on toll road													X	X
	Decrease of level of service (LOS) on toll road														O
	Change of land use pattern										X		X		O

Source: Proyek Pembangunan Jalan Tol Lingkar Luar Pondok Pinang-Jagorawi-Cikunir, May 1995 and Environmental Impact Assessment for JORR Summary, May 1999

Remarks:
Legend:
X Less important (KP) Not essential to overcome because technical prevention can be implemented
Δ Sufficiently important (CP) requires intensive effort to limit impact so that it will not cause a greater impact later
O Important (P) requires an intensive effort to overcome

Activities:
1. Land acquisition
2. Fencing the border of project
3. Temporary structure and lay down area
4. Mobilization of heavy equipment
5. Transportation of equipment/materials
6. Cut, fill and compaction of the road
7. Relocation of public facilities/utilities
8. Foundation pilling
9. Concrete placing
10. Toll road operation
11. Tollgate operation
12. Existing toll road
13. Maintenance and improvements
14. Over activities of the toll road

Table 6.1.5 Environmental Impact Matrix (Section E2/E3/N)

No.	Activities causing important impact	Environmental component	Indication of important impact
A. Pre-construction Phase			
1.	Field Survey	Social	Appearance of social unrest (Section N)
2.	Land acquisition	Social	Increased social unrest as the result of inadequate compensation & change of livelihood
		Biology	Decline of flora density as a result of land acquisition
B. Construction Phase			
1.	Mobility of equipment	Geo-physic (air quality)	Increased gas emission from heavy equipment, noise and dust
		Transportation	Disturbance of traffic flow
2.	Mobilization of labor	Demography	Increased population mobility Increased population density Opening of employment opportunities
		Social-economic culture	Increased community economic activities
		Public health	Increase health service Greater building density Better attitude about hygiene
3.	Cut and fill	Geo-physic	
		a. Air quality b. Hydrology c. Geo-technique	Increased dust pollution Increased of soil erosion, sedimentation and wide spread of water inundation. Increased of plasticity index
		Biology	Increased weeds population
4.	Transportation of materials	Geo-physic (air quality)	Increased of dust pollution
5.	Piling (for elevated construction and bridge)	Geo-physic a. Air quality/noise b. Geo-technique	 Increased of dust pollution, noise Increased of subsidence
6.	Compaction of the body of road	Geo-physic (air quality)	Increased of air pollution, noise and sound of heavy equipment
		Transportation a. Road capacity b. Accessibility	 Decline of road capacity up to the occurrence of disturbance on the trip. Delay in mobility of the road users.
7.	Development of complementary structure and crossing facilities	Transportation (Accessibility)	Delay in population mobility around the toll road.
8.	Construction of guardrail at the toll road	Social	Increased conflicts regarding border of land ownership
C. Post-construction Phase			
1.	Too road operation	Geo-physic (air quality)	Increased air pollution, noise, dust
		Biology	Increase in weeds population
		Transportation a. Road capacity b. Accessibility	 Increased in the traffic speed/safety Increasing of access road capacity
		Spatial structure	Change of land appropriation Increasing of building coverage
		Economic-social/culture	Increase of economic activities Community split
2.	Maintenance of the toll road	Transportation (road capacity)	Decline of road capacity so that the traffic speed was disturbed

Source: Laporan Akhir Analisis Dampak Lingkungan (ANDAL) Pembangunan Jalan TOL Tanjung Priok-Cilincing-Cakung-Cikunir, July 1997 and Environmental Impact Assessment for JORR, Summary, May 1999

6.2 Pending Key Issues on Environment

6.2.1 Key Issues

The pending key issues for the implementation of the remaining parts of the JORR from an environmental viewpoint are land acquisition/ compensation and social unrest which may result from it. This is especially true for the JORR Sections W2, E1 and N, in which some and/or most parts of the Section still remaining to be acquired.

Special attention will have to be paid to Section N, because land acquisition and physical construction have not been carried out yet. It is mentioned in the report of "Implementation Program for the Jakarta Outer Ring Road (Special Yen Loan), Ministry of Public Works, July 1999" that Section N will be outside the framework of the current Special Yen Loan application. Instead, the upgrading of existing urban non-toll roads, Jl. Jampea Cilincing and Jl. Cakung Cilincing Raya shall be included to enhance the linkage between the JORR and Jakarta Harbor Road.

Generally, social unrest might occur, because land is needed for the project, and thus may result in people losing out in their living and economic foundations, and suffering anxiety that they may not receive fair market value in compensation for their land and buildings. (The legal process of land acquisition in Indonesia, based on the Presidential Decree No.55 of 1993 and Ministry of Agrarian Affaires/ Head of National Land Agency (BPN) Regulation No.1 of 1994, is described in Article 3.1.2, Chapter 3, Volume I of this Interim Report.)

6.2.2 Land Acquisition Progress

The number of families to be resettled, the area remaining and its ratio (%) to the total area required for the implementation of the remainder of JORR Sections W2, E1, E2 and N are shown in Table 6.2.1.

Table 6.2.1 Present Situation of Land Acquisition and Resettlement for JORR

JORR Section	Total Area (m2)	Acquitted Area (m2)	Remaining Land		No. of Families
			(m2)	(%)	
W2	1,068,690	451,080	617,610	58	1,333 *1)
E1	944,710	663,060	281,650	30	650 *1)
E2	714,660	699,540	15,120	2	--
N	279,400	0	279,400	100	580 *2)

Source: System Zoning, PT. Jasa Marga, 2000, JORR Project Definitive Plan of Section-N
Note: *1) Source of data is a letter from PT. Jasa Marga No. BC. 297, May 30 2000
*2) The number was counted based on the Definitive Plan of Section-N

The present situation of land acquisition for each JORR Section divided into each Kelurahan is shown in Table 6.2.2. Detailed information about the land status and present land-use categories of each Section and each Kelurahan is shown in Table 6.2.3 (for W2), Table 6.2.4 (for E1) and Table 6.2.5 (for N/ E2), respectively.

Based on "Report for the Construction Control and Land Acquisition of Toll Road, PT. Jasa Marga, 1998" and "System Zoning of Toll Road, PT. Jasa Marga,

2000", present condition/ procedure of the land acquisition for each Section of JORR is summarized as follows.

1) Section W2: Approximately 61.8 hectare of land (equivalent to 58 percent of the total area) remains to be acquitted. Community consultation has been held three times at Kelurahan Pondok Pinang, Ulujami, Petukangan Utara and Petukangan Selatan and one time at Kelurahan Joglo, Meruya Udik and Meruya Ilir. However, due to the funding problem of the Government resulting from the recent monetary crisis, the process of land acquisition has been interrupted.

2) Section E1: Approximately 28.2 hectare of land (equivalent to 30 percent of the total area) remains to be acquitted. 10.6 hectare is located at DKI Jakarta and 17.6 hectare is at Kabupaten Bekasi. 34 households in Jakarta Timur area (Kelurahan Cegar, Bambu Apus and Setu) are ready to receive compensation. However, the process was terminated because of the funding problems of the investor due to the monetary crisis. Land acquisition in Kabupaten Bekasi area (Kelurahan Jatiwarna, Jatiasih, Jatimekar and Jakamulya) has progressed based on Keppres No.55/1993 without any complaint/ refused letter from the communities. However, it was stopped in 1998 for the same reasons as above.

3) Section E2: Approximately 1.5 hectare of land (equivalent to 2 percent of the total area) remains. The E2 Section has already been constructed and it is fully operational at present. However, some land located at Kelurahan Bintaro Jaya and Jakasampurna remains. This remaining area will be used for the construction of the Cikunir Interchange, in order to connect the JORR with the Jakarta-Cikampek Toll-way.

4) Section N: 100 percent of the required land (approximately 27.9 hectare) for Section N located at Kelurahan Rawabadak Selatan, Tugu Selatan, Semper Barat and Sukapura remains to be acquitted. An inventory survey for land acquisition has already been carried out for 70m of ROW (Right of Way). However, because of the difficulty in land acquisition in this region (Section N is the most densely populated region, 212 person/hectare on average), the ROW of 70m has been reduced to 40m. This ROW revision process has already been finalized and approved by the Mayor and Governor. However, no further progress in of the land acquisition has been advised yet.

Table 6.2.2 Remaining Area for Land Acquisition in JORR

Section	No	Kelurahan	Total Area (m^2)	Acquitted Land (m^2)	Remaining Land	
					(m^2)	(%)
W2	1	Pondok Pinang	34,920	-	34,920	100%
	2	Bintaro	241,300	211,890	29,410	12%
	3	Pesanggrahan	48,590	33,280	15,310	32%
	4	Ulujami	18,740	-	18,740	100%
	5	Petukangan Utara	113,540	-	113,540	100%
	6	Petukangan Selatan	156,530	-	156,530	100%
	7	Joglo	99,110	-	99,110	100%
	8	Meruya Udik	92,200	-	92,200	100%
	9	Meruya Ilir	57,850	-	57,850	100%
	10	Kebon Jeruk	205,910	205,910	-	-
	Total (DKI)		1,068,690	451,080	617,610	58%
E1	1	Cegar	48,440	34,000	14,440	30%
	2	Bambu Apus	132,520	93,020	39,500	30%
	3	Setu	173,960	122,090	51,870	30%
		Sub-total (DKI)	354,920	249,110	105,810	30%
	4	Jatiwarna	122,070	85,680	36,390	30%
	5	Jatiasih	83,830	58,830	25,000	30%
	6	Jatimekar	176,050	123,560	52,490	30%
	7	Jakamulya	207,840	145,880	61,960	30%
		Sub-total (bekasi)	589,790	413,950	175,840	30%
	Total (DKI+Bekasi)		944,710	663,060	281,650	30%
E2	1	Bintaro Jaya	358,630	349,690	8,940	2%
	2	Jakasampurna	356,030	349,850	6,180	2%
	Total (Bekasi)		714,660	699,540	15,120	2%
E3	(APBN)		362,250	362,250	-	0%
N	1	Rawabadak Selatan	89,740	-	89,740	100%
	2	Tugu Selatan	95,860	-	95,860	100%
	3	Semper Barat	76,360	-	76,360	100%
	4	Sukapura	17,440	-	17,440	100%
	Total (DKI)		279,400	-	279,400	100%

Source: Sistem Zoning, PT.Jasa Marga, 2000

Table 6.2.3 Remaining Area for land Acquisition by Status in JORR (Section W2)

(Unit: m^2)

Section	Kelurahan	Land Status	Zone I	Zone II	Zone III	Total
W 2	Pondok Pinang	Sertifikat	6,990	8,730	1750	17,470
		Girik	4190	5240	1050	10,480
		HGB	1400	1750	350	3,500
		HP	700	870	170	1,740
		Garap	700	870	170	1,740
		Total	13,980	17,460	3,490	34,930
	Bintaro	Sertifikat	21,180	5,880	0	27,060
		Girik	2,350	0	0	2,350
		HGB	0	0	0	0
		HP	0	0	0	0
		Garap	0	0	0	0
		Total	23,530	5,880	0	29,410
	Pesanggrahan	Sertifikat	11,030	3060	0	14,090
		Girik	1,230	0	0	1,230
		HGB	0	0	0	0
		HP	0	0	0	0
		Garap	0	0	0	0
		Total	12,260	3,060	0	15,320
	Ulujami	Sertifikat	5,620	4,500	750	10,870
		Girik	2,340	1,500	500	4,340
		HGB	940	750	470	2,160
		HP	0	0	0	0
		Garap	470	750	150	1,370
		Total	9,370	7,500	1,870	18,740
	Petukangan Utara	Sertifikat	20,440	28,390	11360	60,190
		Girik	11,920	22,710	11360	45,990
		HGB	1700	2840	0	4,540
		HP	0	0	0	0
		Garap	0	2,840	0	2,840
		Total	34,060	56,780	22,720	113,560
	Petukangan Selatan	Sertifikat	37,570	35,220	11740	84,530
		Girik	21,910	28,180	11740	61,830
		HGB	3130	3520	0	6,650
		HP	0	0	0	0
		Garap	0	3520	0	3,520
		Total	62,610	70,440	23,480	156,530
	Joglo	Sertifikat	14,870	26,760	14870	56,500
		Girik	7,430	13,380	7430	28,240
		HGB	2970	2,230	1240	6,440
		HP	0	0	0	0
		Garap	4,460	2,230	1240	7,930
		Total	29,730	44,600	24,780	99,110
	Meruya Udik	Sertifikat	13,830	24,890	13,830	52,550
		Girik	6,920	12,450	6,920	26,290
		HGB	2,770	2,070	1,150	5,990
		HP	0	0	0	0
		Garap	4,150	2,070	1150	7,370
		Total	27,670	41,480	23,050	92,200
	Meruya Ilir	Sertifikat	8,680	15,620	8,680	32,980
		Girik	4,340	7,810	4,340	16,490
		HGB	1,740	1,300	720	3,760
		HP	0	0	0	0
		Garap	2,600	1,300	720	4,620
		Total	17,360	26,030	14,460	57,850
	Kebon Jeruk	Sertifikat	-	-	-	-
		Girik	-	-	-	-
		HGB	-	-	-	-
		HP	0	0	0	0
		Garap	0	0	0	0
		Total	0	0	0	0
Grand Total			230,570	273,230	113,850	617,650

Note, Sertifikat : Ownership with certificate from Land Agency
Girik : Ownership without land certificate
HGB : Right for using building property only
HP : Right for using land
Garap : Right to cultivative land

(Source : System Zoning, PT. Jasa Marga, 2000)

Zone I : High land-use area
Zone II : Medium land-use area
Zone III : Low land-use area

Table 6.2.4 Remaining Area for Land Acquisition by Status in JORR (Section E1)

(Unit: m2)

Section	Kelurahan	Land Status	Zone I	Zone II	Zone III	Total
E1	Ceger (DKI Jakarta)	Sertifikat	3,900	9,100	-	13,000
		Girik	430	510	-	940
		HGB	-	-	-	-
		HP	-	-	-	-
		Garap	-	510	-	510
		Total	4,330	10,120	-	14,450
	Bambu Apus (DKI Jakarta)	Sertifikat	15,800	18,760	-	34,560
		Girik	2,960	-	-	2,960
		HGB	-	-	-	-
		HP	-	-	-	-
		Garap	990	990	-	1,980
		Total	19,750	19,750	-	39,500
	Setu (DKI Jakarta)	Sertifikat	35,010	520	-	35,530
		Girik	7,000	3,110	-	10,110
		HGB	2,330	-	-	2,330
		HP	-	-	-	-
		Garap	2,330	1,560	-	3,890
		Total	46,670	5,190	-	51,860
	Jatiwarna (Bekasi)	Sertifikat	20,470	5,460	-	25,930
		Girik	5,460	2,280	-	7,740
		HGB	1,360	910	-	2,270
		HP	-	460	-	460
		Garap	-	-	-	-
		Total	27,290	9,110	-	36,400
	Jatiasih (Bekasi)	Sertifikat	7,500	6,250	-	13,750
		Girik	3,130	2,500	-	5,630
		-	630	-	-	630
		-	-	3,130	-	3,130
		-	1,250	630	-	1,880
		Total	12,510	12,510	-	25,020
	Jatimekar (Bekasi)	Sertifikat	42,520	4,730	-	47,250
		Girik	4,720	530	-	5,250
		HGB	-	-	-	-
		HP	-	-	-	-
		Garap	-	-	-	-
		Total	47,240	5,260	-	52,500
	Jakmulya (Bekasi)	Sertifikat	24,780	18,590	-	43,370
		Girik	4,650	6,200	-	10,850
		HGB	-	4,650	-	4,650
		HP	-	-	-	0
		Garap	1,550	1,550	-	3,100
		Total	30,980	30,990	-	61,970
	Grand Total		188,770	92,930		281,700

(Source: System Zoning, PT.Jasa Marga, 2000)

Note, Sertifikat : Ownership with legal certificate from Land Agency
Girik : Ownership without formal land certificate
HGB : Right for using building property only
HP : Right for using land
Garap : Right to cultivate land

Zone I : Highly land-use area (Area along existing road, housing, etc)
Zone II : Medium land-use area (Highly cultivated area, housing, etc)
Zone III : Low land-use area (Cultivated area, vacant land, etc)

Table 6.2.5 Remaining Area for Land Acquisition by Status in JORR (Section N/E2)

(Unit: m^2)

Section	Kelurahan	Land Status	Zone I	Zone II	Zone III	Total
N	Rawabadak Selatan (DKI Jakarta)	Sertifikat	24,230	56,540	-	80,770
		Girik	2,690	3,140	-	5,830
		HGB	-	-	-	0
		HP	-	-	-	0
		Garap	-	3,140	-	3,140
		Total	26,920	62,820	-	89,740
	Tugu Selatan (DKI Jakarta)	Sertifikat	38,340	45,530	-	83,870
		Girik	7,190	-	-	7,190
		HGB	-	-	-	0
		HP	-	-	-	0
		Garap	2,400	2,400	-	4,800
		Total	47,930	47,930	-	95,860
	Semper Barat (DKI Jakarta)	Sertifikat	6,870	760	-	7,630
		Girik	41,230	4,580	-	45,810
		HGB	-	-	-	0
		HP	6,870	-	-	6,870
		Garap	13,740	2,290	-	16,030
		Total	68,720	7,640	-	76,360
	Sukapura (DKI Jakarta)	Sertifikat	7,850	2,620	-	10,470
		Girik	3,270	1,090	-	4,360
		HGB	1,310	440	-	1,750
		HP	650	220	-	870
		Garap	-	-	-	0
		Total	13,080	4,360	-	17,440
	Lorotan (DKI Jakarta)	Sertifikat	-	-	-	0
		Girik	-	-	-	0
		HGB	-	-	-	0
		HP	-	-	-	0
		Garap	-	-	-	0
		Total	-	-	-	0
	Grand Total		129,160	119,690	-	248,850
E2	Bintara Jaya (Bekasi)	Sertifikat	2,680	2,240	-	4,920
		Girik	1,120	890	-	2,010
		HGB	220	-	-	220
		HP	-	1,120	-	1,120
		Garap	450	220	-	670
		Total	4,470	4,470	-	8,940
	Jakasampurna (Bekasi)	Sertifikat	5,000	560	-	5,560
		Girik	560	60	-	620
		HGB	-	-	-	0
		HP	-	-	-	0
		Garap	-	-	-	0
		Total	5,560	620	-	6,180
	Grand Total		10,030	5,090	-	15,120

(Source : System Zoning, PT. Jasa Marga, 2000)

Note, Sertifikat : Ownership with legal certificate from Land Agency
Girik : Ownership without formal land certificate
HGB : Right for using building property only
HP : Right for using land
Garap : Right to cultivate land

Zone I : Highly land-use area (Area along existing road, housing, etc)
Zone II : Medium land-use area (Highly cultivated area, housing, etc)
Zone III : Low land-use area (Cultivated area, vacant land, etc)

6.2.3 Issues on Land Acquisition

Two regulations provide guidance on land acquisition in Indonesia: i.e. "Presidential Decree No.55/ 1993: Acquisition of Land for Development in the Public Interest" and "State Minister of Agrarian Affaires/Head of National Land Agency (BPN) Regulation No.1 of 1994: Operational Directive of Land Acquisition for Development in the Public Interest".

An outline of land acquisition in Indonesia and issues pertaining to it are prescribed in the following articles.

(1) Process of Land Acquisition

As stated in Presidential Decree No.55/ 1993, land acquisition shall be carried out under the coordination/ assistance of the Land Acquisition Committee (Committee Nine/ Panitia Sembilan) established by the Governor/ Head of Provincial Government. The procedure/ steps for land acquisition are summarized as follows.

1) The implementation Agency (Government agency) would submit a request for a development location (lokasi pembangunan) to Mayor/Bupati (Head of Kabupaten) or Governor through BPN (National Land Agency) office.

2) The mayor/ Bupati or Governor would appoint BPN to coordinate the related agencies to carry out a joint study on the appropriateness of the project with respect to the Regional Spatial Plan (Rencana Tata Ruang Wilayah) or an existing regional plan.

3) Approval by Mayor/Bupati or Governor of the development location should be in the public interest.

4) A land acquisition committee appointed by Mayor/Bupati or Governor will be established, in order to handle/ settle land acquisition.

5) The land acquisition committee, implementation agency and local government would hold briefing/meeting with the affected people and/or the community in order to provide the information (penyuluhan) on the project.

6) The land acquisition committee, implementation agency and local government would carry out a detailed inventory of the land, buildings and other properties (including a preparation of trace map) that would be affected by the project. The result of a detailed inventory shall be announced officially by putting it on the bulletin board for one month.

7) The land acquisition committee, implementation agency, local government and affected people would hold consultations based on the result of the detailed inventory. The affected people would have an opportunity to comment on the inventory, and if there are any objections to the inventory (and proved to be true), the inventory would be revised accordingly.

8) The land acquisition committee, implementation agency, local government and the affected people (or representatives) would carry out a community

consultation (musyawarah) on the form and/or amount of compensation for the land, building and other properties/ assets. The musyawarah would be carried out until all parties agree with the form/ price of the compensation.

9) If an agreement cannot be reached, the issue will be transferred from Governor/ Bupati/ Mayor to Minister of Agrarian Affaires/ Head of BPN, consulted by Ministry of Home Affaires, Minister responsible for the Agency requiring the land and Ministry of Justice.

10) In case the required land area for the development is less than one hectare, land acquisition would be executed directly between an implementation agency and affected people on the basis of mutual agreement. If agreement is not reached or the form/price of compensation, the same process stipulated in the above i) – ix) shall be carried out.

(2) Compensation Set-up

The amount of compensation will be set-up/ calculated by the Land Acquisition Committee taking into account the value of land and buildings/ crops and so on, existing on the land.

1. Value of Land (Hak Bawah)

Land value (Hak Bawah) is basically evaluated based on the land location, latest sales value (market price) of the land, tax rate and the legal status of the land. Categories of legal status of land and its compensation ratio stated in Article 17, Section 3 of Regulation No.1 of 1994 is as follows.

(a) Hak Milik (Right of land ownership)

- with certificate: 100%
- without certificate: 90%

(b) Hak Guna Usaha (Right of land exploitation, usually for agricultural use)

- still valid/ well cultivated: 80%
- already expired/ well cultivated: 60%

(c) Hak Guna Bangunan (Right to use the land for building)

- still valid: 80%
- already expired: 60%

(d) Hak Pakai (Right to use the land)

- unlimited period of valid/ used for certain purpose: 100%
- utilization right is up to 10 years: 70%

(e) Wakaf (Property donated for religious/ community use)

- 100%: compensation shall be given in a form of land, building and facilities needed

2. Value of Buildings, Plants and so on, existing on the land (Hak Atas)

Ministry of Settlement and Regional Development (former Ministry of Public Works/ PU) has a standard price for the buildings and other items on the land for compensation. The Hak Atas is the rights to the buildings, fences, plants on the land. The compensation for these structures and plants is determined by the standard price. They also use a formula for depreciation of a house which is 2% per year and thus a ten year old house would have the value depreciation by 20% of the standard price. (Source: JUDP I, World Bank in 1993)

(3) Issues on Land Acquisition

Taking into account the recent democratic waves in Indonesia, the following issues on land acquisition are clarified.

1. Transparency

Land acquisition process carried out by the Government is not clear from the community/ land owners/ affected people side and some necessary steps are never considered. Formerly, a community consultation (musyawarah) is conducted insufficiently and the Government poorly handles the claim from community side.

In some cases, *musyawarah* is conducted only between the Government officers and community representatives such as Camat, Lurah and/or RT/RW. Land owners/ affected people are often neglected from it. Also, sometimes only the cooperate people from the land owners/ affected people side are invited for it.

A land acquisition tends to be carried out by "top down" way, especially for the low-income people: i.e. Government sometimes takes forcible measures (*korban penggusuran*) for the affected people to achieve an agreement on land prices/ compensation.

Project is not transparent both in the planning process and the land acquisition process. It sometimes leads an intervention of brokers and land speculators and causes a social unrest among the affected local community.

2. Land tenure

The land tenure documents of the people are not clear and thus it is difficult to determine the status of the land. In some cases, a lot of land owned by more than one party may found and each of them has legal document/ certificate of the land, or the owner of the land is unknown.

Preparation of a trace map usually takes long time because of the unclearness of the land status, and it leads the process of land acquisition delay.

In general, the time period between the determination of the ROW (right of way) and the land acquisition may take long time. Therefore, even for once acquitted land by the Government, illegal occupancy by the people; i.e. construction of semi-permanent and/or permanent structures and performance of some economic activities on it, may happen.

The renter and the owner of the land may disagree on the sharing of the compensation.

3. Compensation price

In musyawarah process, the amount of compensation for the land/ buildings/ crops settled by the Government is not reached to the agreement because a local society (land owners and/or affected people) tends to require a higher price than the price set by the Government.

Brokers/ speculators may take part in the land acquisition process. They sometimes generate a social unrest to the local community regarding to the land/ building values and require unreasonable price for the compensation.

In general, the time period between the determination of the compensation and the payment may takes long time (a year or two). During this period, developers often come in and buy the land behind the ROW that may greatly increase the land values due to the development effect. However, a compensation price settled by the Government remains at much lower rate. Thus, people who already agreed on the compensation with the Government feel unfairness and a social unrest occurs among the local community.

Chapter 7

Economic and Financial Project Analysis

7. Economic and Financial Project Analysis

7.1 General Introduction

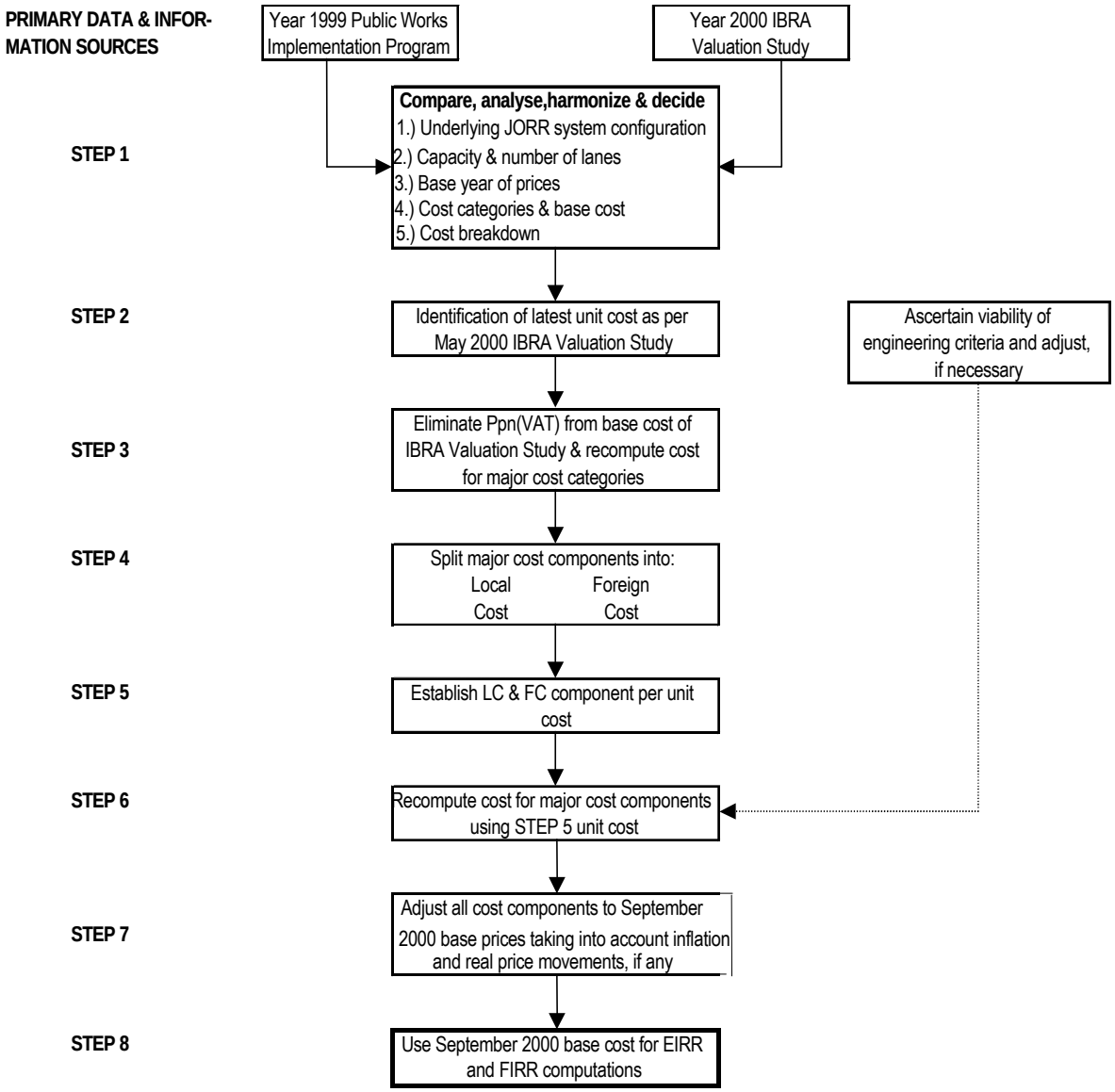
The overall objective of the economic and financial analysis in general terms is to assess in quantitative terms the effect of the JORR on Indonesia's economic well being and to estimate the project's expected internal rate of return (simple IRR or return on investment [ROI])) and its economic and financial rates of return (EIRR and FIRR) on the resources invested. This appraisal follows the conventional discounted cash flow methodology in computing the ROI (or simple IRR), the net present value, the economic internal rate of return, the benefit cost ratio and the FIRR in current prices. These measures are to establish the overall viability of the proposed JORR project and they are to test the sensitivity of the project's viability to possible changes in project related costs and benefits.

The computations follow a strict procedural approach, in order to ensure adequacy of methodology and transparency of the computed results. The JORR project proposal is more complicated than the ordinary case and a careful step-by-step approach as illustrated in Figure 7.1.1 was therefore adopted. The complications derive from the following facts:

1) The two primary data and information sources for the JORR assessment exercise, i.e. the 1999 Ministry of Public Works Implementation Program and the May 2000 IBRA Valuation Study were undertaken with two completely different objectives in mind: the 1999 Implementation Plan was the supporting document for the GOI's official SYL request and the system configuration was tailored to meet SYL requirements, whereas the Valuation Study's purpose was to assess the value of the already completed and to be completed works and structures within a "historic" versus "fair" cost approach. Hence, the underlying JORR system configurations, base year prices, cost breakdowns and base cost computations are incompatible (please refer to Appendix 7 for a discussion of this subject) and had to be adjusted to a common denominator, in order to allow for compatibility between the two studies and their results
2) An additional and uncommon cost component covering the already existing works and structures (costs for checking the design, testing and possibly needed repair or replacement costs) had to be introduced into the project definition[1] and decision had to made on how to treat, in a reasonable manner, the investment already realized by the previous concessionaires (value of existing assets) in the JORR project's cost streams, and
3) Margins, such as for "physical contingencies" and base cost definitions, had to be harmonized, since both primary data source studies use different margins and different base cost definitions.

[1]) See Section 3.2 in Chapter 3.

The following sections introduce the basic cost-structure, the financial or market and economic project cost, the vehicle operating cost and value of time computations. The economic benefits are subsequently defined and the quantified project cost and benefits are set against each other, in order to determine the incremental project benefits, which form the basis for assessing the JORR's economic viability.



Source: JICA Study Team.
Note: LC= Local cost component
FC= Foreign cost component

Figure 7.1.1 Step by Step Assessment Approach for JORR

7.2 Total Project Cost

7.2.1 Cost Structure, Its Major Components and Margins

For cost estimation purposes, the JORR toll way project, as defined in Chapter 3 comprises the six sections W1, W2, S, E1, E2, and E3. Also, two feeder roads (replacing Section N) are to be included into the assessment, as well as a cost-block "extra works" for testing, repair and/or replacement of existing works and structures already completed and in-place by the previous concessionaires. In addition to the construction of the toll way itself and the feeder roads, the JORR project comprises per definition:

1) Hardware for a toll collection system (either an "open" or "closed" toll system)
2) Hardware for a traffic information and control system
3) Hardware for an appropriate communications system, and
4) Engineering and supervisory services for design and construction of the JORR sections as well as the establishment, testing and handing-over of the toll collection system, the traffic information and control system and the communications system.

The cost structure that was employed for computing the engineering and total project base cost is discussed and attached in Appendix Figure AP 7.1. This Appendix identifies the major cost blocks, major cost components and margins that were applied for September 2000 base cost computing purposes.

7.2.2 Construction Method

There are, in principle, two approaches, namely the "conventional procurement method - [CPM]" and the "fast track procurement method - [FTPM]". It is estimated that a CPM approach, which in essence is sequential (approved plan (AP), then basic design (BD), then detailed design (DD), then approval (A) and then tendering for construction (TC)), would result in a roughly thirty percent longer implementation schedule for the project and, hence, increased capital needs, due to higher interest during construction cost. Given the fact that the detailed designs for the sections were already approved under the old concessionaire agreements by the relevant authorities and certain works and structures are already in-place, it was assumed that a FTPM approach would be more appropriate for the situation in terms of shorter implementation time, lowest interest during construction and, therefore, capital needs.

Therefore the assumption of the implementation schedule and draw down of capital costs is the selection of a fast track procurement method under which detailed design and construction is realized in parallel.

7.2.3 Assumptions for Project Cost Estimate

Project cost was estimated employing the following assumptions:

1) The construction cost was estimated using the detailed design drawings of the concessionaires and individual items identified in the year 2000 IBRA Valuation Study
2) The unit cost analysis was conducted first by the economic conditions prevailing in March 2000 and then adjusted to September 2000 economic price condition
3) The foreign currency component of each unit price was, in general, based on the following classification of basic cost elements:
   - Wages of foreign personnel
   - Overheads and profits of foreign firms
   - Depreciation of construction equipment
   - Steel products except reinforcing bars
   - Bituminous materials
   - Joint fillers, and
   - Equipment and materials for road supporting facilities (toll collection system, traffic information and control equipment and communications equipment)
4) The local currency component of each unit price was, in general, based on the following classification of basic cost elements:
   - Domestic materials and supplies, such as fuel, cement, reinforcing bars, plywood and timber
   - Wages of local personnel
   - Overhead and profit of local firms
   - Managing and maintenance cost of equipment, and
   - Taxes and levies
5) Indonesian taxes and duties on imported equipment and materials were not included in the engineering base cost estimate, but identified separately under the GOI project contribution
6) Tax was imposed on the overheads and profit on both local and foreign currency components
7) Land acquisition and compensation costs include land acquisition, property compensation and compensation for the relocation of public utilities, which were estimated from data obtained from P.T. Jasa Marga and other relevant agencies as well as from site inspections carried out by this study
8) Physical contingency was assumed at 10 percent of the total construction cost and at 5 percent for the total equipment component. Physical contingency for land acquisition was calculated taking into account historical data, if there

was any difference between "estimated or budgeted cost" and "actually paid cost"

9) The cost of consulting supervisory services is estimated at 5 percent of the foreign cost component and 2 percent of the local component of construction cost

10) Final engineering services were based on the actual contract amount

11) The exchange rate between the Indonesian Rupiah, the US dollar and the Japanese ¥ was obtained by using the average of January to June 2000 exchange rates.

7.2.4 Land Acquisition, Compensation and Utility Relocation Cost

The land acquisition cost includes the cost for actual land acquisition, compensation for buildings, agricultural use land and other physical assets; cost for utility relocation and administrative overhead. Compensation for existing assets has been estimated by the relevant Indonesian authority as being between 20 to 30 percent of land acquisition cost, utility relocation at four (4.0) percent and administrative overhead at one and half (1.5) percent of the land acquisition cost. There is for some cases a considerable difference between the budgeted land acquisition resources and the actually paid cost. This is quite normal, since the actual amounts to be paid depend to a large extent on the outcome of the negotiations between the GOI and the asset owners. For such cases, the financial resources needed were estimated by obtaining the historical per ha price and multiplying that unit price with the area, which still needs to be acquired by the GOI. Table 7.2.1 summarizes by JORR section and by cost category the estimated remaining land acquisition and related compensation costs.

Table 7.2.1 Remaining JORR Land Acquisition & Compensation Cost

(Unit: million Rp./US$)

JORR Section	Remaining Land Acquisition Cost	Compensation Cost	Utility Relocation Cost	Administrative Overhead	Total	
					million Rupiah	million US $
W1	nil	nil	nil	nil	nil	nil
W2	261,077	82,835	11,045	5,222	360,179	45.306
S	nil	nil	nil	nil	nil	nil
E1	56,904	14,925	3,731	1,138	76,698	9.648
E2	115	18,426	9,213	2.3	27,756	3.491
E3	nil	nil	nil	nil	nil	nil
2 feeder roads	nil	nil	nil	nil	nil	nil
Total	**318,096**	**116,186**	**23,989**	**6,362**	**464,633**	**58.445**

Source: JICA Study Team from P.T. Jasa Marga documents.

Notes: 1.) Ref. W2. 61.76 ha, equivalent to 57.8% of the total have not yet been acquired.
2.) Ref. E1. All previous purchase was over budget. 29.8 % still need to be acquired. A historic acquisition cost of 2,020.7 million/ha has been applied.
3.) Ref E2. 1.5 ha remains to be acquired. It has been assessed at 5,500 million Rp./ha historic cost.
4.) The underlying exchange rate is Rp. 7,950, which is the average for the period January to June 2000.

7.2.5 Equipment Installation Cost Options

Chapter 5 introduced and discussed three different cases that were prepared from a pure engineering perspective. Those three cases imply different equipment installation options. The preparation of alternative cases is somewhat useful, since it was necessary in view of the different perceptions among various Indonesian stakeholders.

The results of the base case selection procedure are summarized as:

1) **Engineering base cost case "A" collection system.**

   Case "A" takes into account the introduction of a basic traffic information and control system that covers only JORR and the need to minimize base cost. This case just meets SYL criteria.

2) **Engineering base cost case "B"**

   Case "B" takes into account the introduction of a basic traffic information and control system. It was assumed here that such system would cover JORR, the inner ring road and three radial toll ways. Such coverage area would address best toll way users needs. However, engineering base cost are the highest among all three cases. Case "B" meets SYL requirements, but cost had to be reduced with a view to minimize engineering base cost. Hence, case "B" was dismissed in consequence.

3) **Engineering base cost case "C"**

   Case "C" assumed that a traffic information and control system would not be introduced, at this point in time. Hence, the engineering base cost for this case is in absolute terms the lowest among all three cases. However, first the Study Team is of the considered opinion that a basic traffic information and control system is really needed, at this point in time. Secondly, the GOI request for SYL assistance comprises a traffic information and control system equipment component and that JORR project element could not be simply disregarded arbitrarily by the Study Team. And, thirdly, the engineering base cost for case "C" do not meet the 50 percent F/C component requirement for SYL assistance. Case "C" had to be dismissed in consequence.

7.2.6 Review Result of Construction & Equipment Cost of IP

In comparison to the 1999 Implementation Program (IP), the reviewed cost estimate as reflected in the selected base case "A" for a closed toll collection system, despite including Section S and a price escalation to September 2000 price levels, reflects savings in terms of construction and equipment cost (but excluding physical contingencies) in the range of 7 to 30 percent, depending on the exchange rate applied and the cost components compared.

7.2.7 Maintenance Equipment and Operation & Maintenance Cost

The operation and maintenance cost (O&M) is comprised of all pay items needed to preserve and keep each type of roadway, roadside structure and facility as near

as possible in its newly as constructed or subsequently improved condition. The O&M cost is required to maintain the operation of the toll way facilities and services in order to provide safe and satisfactory transportation services.

The O&M cost is comprised of three major cost categories which have different functions, namely:

1) Routine maintenance
2) Periodic maintenance, and
3) Replacement cost for equipment and facilities.

Routine maintenance comprises the following pay items:

1) Maintenance cost comprising electricity and cleaning cost. Electricity cost includes the electricity cost for lightening and other facilities and services. Cleaning cost covers the cost for cleaning the road surface, drainage facilities, guardrails, regulatory signs and other services
2) Routine repair cost covers the pay items for routine road surface repairs, overlays, painting of bridges and guardrails, inspection of structures, and inspection and repair of electric and traffic control facilities
3) Other routine maintenance cost covers indirect cost items, such as the salaries of staff in toll booths, operational offices and maintenance offices as well as other personnel related expenditures.

Periodic maintenance addresses the need for toll way resurfacing, which is assumed here to be a ten years cycle.

Replacement and spare parts cost for equipment and facilities are difficult to estimate, since a considerable amount of such parts are often purchased at the time of initial investment (sometimes of up to 20 percent of the initial investment amount). However, an annual requirement at a rate of 1.75 percent of the original investment has been assumed here for practical reasons.

The requirement for maintenance equipment is based on previous estimations for similar toll road projects, the bill-of-quantities for which are available in 1997 prices. The bills-of-quantities were checked for adequacy and the local and foreign cost components were advanced to September 2000 price levels using the same escalation factors as used for all other cost components. The cost for the purchase of this equipment has been added in the third quarter of 2006 to the total project base cost.

A summary overview of the maintenance equipment costs and the operations and maintenance cost estimations is provided in Table 7.2.2.

Table 7.2.2 Operation & Maintenance (O&M) Cost Estimations for JOOR Project (September 2000 constant price base)

O&M Cost Estimations	Remarks & Observations
A. Maintenance Equipment Comprising: 4 units sedan; 5 units station wagon; 4 units pick-up; 3 units ambulance; 3 units dump truck [6 ton]; 3 units light truck [4 ton with 2.5 ton crane]; water tank truck [6,000 liter]; 3 units vibratory compactor [100gr]; 3 units tamper [100 kg]; 3 units air compressor [2.5m3/min]; 3 units concrete cutter [45 cm blade]; 3 units concrete breaker [30 kg]; 5 units moving equipment; and 3 generator sets [50 KVA]. Total cost estimation in 1997 prices = 1,772 million Rp., equivalent to 0.711 million US dollar.	**A. Maintenance Equipment** 1.) The maintenance equipment is to be included in the project base cost. Estimated purchase date is the year 2006. 2.) After adjustment for exchange rate movements and real price increases; the maintenance equipment costs in September 2000 prices are estimated at: **8,860.0 million Rupiah, or** **1.11 million US dollar at Rp.7950 to 1 US$.**
B. Operations Expenditures Estimated by a 1997 toll road F/S at Rp. 86 million/booth/year and Rp. 170 million/ Km/year in 1997 prices.	**B. Operations Expenditures** After adjustment for mainly labor cost increases of about 25% the estimations are: Rp. 108 million/booth/year, and Rp. 213 million/km/year, equivalent to: **Rp. 20,602 million for 59.2 km JORR.**
C. Routine Maintenance Expenditures Were estimated by the same F/S referred to above as being Rp. 5 million/km/year.	**C. Routine Maintenance Expenditures** After adjustment for mainly labor cost increases (25%) and equipment cost increases (40%) the September 2000 estimation is: Rp. 12.86 million/km/year, equivalent to **Rp.761.1 million for 59.2 km JORR**
D. Periodic Maintenance Expenditures Were estimated by the same F/S referred to above as Rp. 159.2 million/km/5years.	**D. Periodic Maintenance Expenditures** After adjustment for mainly labor cost increases (25%) and equipment & material cost increases (40%) the September 2000 estimation is: Rp.409.4 million/km/5 years, equivalent to **Rp. 24,234 million for 59.2 km JORR/5 years**
E. Overlay Expenditures Actual overlay expenditures by P.T. Jasa Marga for Jakarta Cikampek, Jakarta Tangerang and Cawang-Tomang-Cengkareng toll roads amounted in 1998 to Rp. 122.1 million/km, Rp. 242.5 million/km and Rp. 126.3 million/km; respectively.	**E. Overlay Expenditures** After adjustment to September 2000 prices overlay expenditures are estimated at : Rp. 163.6 million Rupiah, equivalent to **Rp. 9,687 million/JORR/5 years**
F. Maintenance and Spare Parts for Traffic Information & Control & Communication Systems No previous source	**F. Maintenance and Spare Parts for Traffic Information & Control & Communication Systems** Are estimated at 1.75% of initial investment cost, equivalent to **Rp.19,348 million per year**

Source: JICA Study Team.

Notes: 1.) For the cases with the lowest base cost, that is those without a sophisticated traffic information and control system, the cost block "F Maintenance and Spare Parts for Traffic Information & Control & Communications Systems" was reduced by Rupiah 9,248 million per year, equivalent to about 47.8 percent of the total annual requirement.

2.) The actual 1998 overlay expenditures by P.T. Jasa Marga imply that they were in adequate. However, in view of the lack of any better and more recent data, they were used here as a proxy.

7.3 Economic Profit Analysis

7.3.1 Unit Vehicle Operating Cost and Vehicle Time Costs

All cost components of the unit vehicle operating cost, i.e. unit prices of the representative vehicles, tires, fuel & oil and so on were obtained from information collected from GAIKINDO, dealers and motor vehicles makers in Jakarta. The following vehicle types and parameter were used in the estimations.

1) **Representative vehicles**. A major factor in determining the vehicle operating cost is the type and the cost of the vehicles and there is the necessity to first identify the representative vehicles for vehicle categories in the traffic assignment. Based on the sales and market share data obtained from the marketing research department of a major car manufacturer, the following representative vehicles were established: passenger car; van (private use); pick-up (private use); minibus (public use); medium bus; large bus; small truck, medium truck and large truck.

2) **Unit prices of operating cost components**. The financial unit prices prevailing in the year 2000 of the major cost components were collected in Jakarta by the Study Team. The tariff, levies and tax structures utilized in determining the economic unit prices are discussed item by item below.

   a) **Vehicles.** It was assumed here that all complete knocked down (CKD) parts imported by the major vehicle manufacturers of the representative vehicles were imported from production facilities within AFTA, in order to keep total cost of sales as low as possible. The import content of sedan was assumed at 25% and that of commercial vehicles at 35% of the retail price value, on which a 10% tariff is levied. After adjustment for import tariff, income tax and value added tax (VAT), the tax ratio for passenger cars and commercial vehicles has been established at 38.092 percent (Table 7.3.1 refers).

   b) **Tires.** The local market price of tires for the various representative vehicle types was obtained from retail dealers in Jakarta. It was assumed here that a local tubeless brand would be used. Hence tire prices consist of the price for the tires to which the price of the tubes was added. The total tax ratio was determined at 32.66 percent of the actual retail price for the purpose of determining the economic unit price.

   c) **Fuels & lubricants.** There is a subsidy on gasoline and diesel and implicitly also on lubricants. However, in view of a lack of reliable data[2] on the actual and implicit subsidy content in the retail price of fuels and lubricants, only the retailer margin and the VAT have been used to determine the economic price of fuels and lubricants. The estimated transfer content is 18.18 percent.

[2]) The total budget for fuel subsidies is available. However, total sales data for premium gasoline, diesel and related engine and gear oils are not available. It is, therefore, not possible to estimate the actual subsidy amount per liter sold.

Table 7.3.1 Tax Components of Market Sales Price of vehicles

Item	Parameter	Costs	Taxes
1	CIF price of CKD parts	1.0000	
2	Import tariff [10% on 1]		0.1000
3	Local assembly and manufacturing cost	0.7000	
4	PPH (Income tax) [1+2+3] x 35%	0.5950	0.5950
5	VAT [1+2+3] x 10%	0.1700	0.1700
6	Distributor price [1 to 5]	2.4650	
7	Dealer Commission [6] x 10%	0.2465	
8	Retail price [6+7]	2.7115	
9	Registration Fee [8] x 10%	0.2712	0.2712
10	Total Price	2.9827	1.1362
	Tax Ratio	**38.0920**	

Source: JICA Study Team.

d) **Wage rates.** The wage rates were obtained from BPS and compared with the actual wage data for maintenance personnel, bus drivers, bus conductors and assistants and truck drivers and their assistants. The income tax free threshold for salary and wage receivers is Rupiah 8,640,000 for a family with three children. Hence, the bus drivers are theoretically tax subjects. However, in view of the existing tax collection system, it was assumed that no income taxes are paid and the financial and economic rates are identical.

e) **Interest cost.** A rate of 16.5% per annum has been assumed. It was further assumed that representative vehicle owners would pay for 50 percent of the vehicles in cash and finance the remaining 50 percent of the vehicle cost are financed at the above mentioned rate.

f) **Insurance cost.** The average insurance premiums assumed in previous similar studies were reviewed and incorporated into the assumptions as 3.5 percent of the vehicle price for passenger car and pick-up, 4.0 percent for buses and 6.0 percent for trucks. It was further assumed that about 50 percent of the vehicle fleet is actually insured.

g) **Wages costs of crews**. The average crew size was obtained from survey results as being one driver and 0.5 conductors for public minibus: one driver and one conductor/assistant for medium bus; one driver and one conductor/assistant for large bus; one driver and one assistant for small and medium truck; and one driver and two assistants for large truck. Their wage costs were derived from their traveling hours equated by the average running speed.

h) **Overhead costs**. The overhead costs of commercial vehicles were assumed as being 10 percent of the total of the other cost items.

i) **Cost equations of VOC**. The cost at different levels of speed on a level tangent road was calculated by using standard equations for each individual cost component.

Appendix 7 comprises relevant tables on which the vehicle operation and time costs are based. That is Table AP.7.2 summarizes the representative vehicle types and their major features, and Table AP 7.3 identifies the financial and economic cost of the major components for VOC calculations. Table AP 7.4 identifies the vehicle operating cost VOC (in economic prices) individually for motorcycle, sedan, van, pick-up, small, medium and large bus, and small/medium and large truck and the table shows also the weighted VOC for the vehicle categories used in the VOC saving estimations. Table AP 7.5 identifies the conversion factors that were used to convert financial into economic prices in the relevant tables. Table AP 7.6 summarizes the value of time by mode and trip purpose.

7.3.2 Economic Cost and Benefit Analysis

The quantified direct economic benefit in terms of travel costs, comprising vehicle operating costs (VOC) and time costs (TC), is defined as savings in economic travel costs achieved through a comparison of the "with" with the "without" project conditions. The total daily economic vehicle operating cost was calculated by taking the daily section volume PCU-kilometers at average operating speeds and multiplying these by the respective vehicle category operating costs by speed and surface condition. The daily costs were converted to total annual costs by multiplying with factor 365. The economic benefits in VOC were obtained for the "with" and "without" cases and the difference taken as the VOC savings.

The economic benefits in TC savings were estimated by applying the total vehicle-hours in the "with" and" without" project conditions directly to the value of time. The daily values were converted to yearly costs and the difference represented in the TC savings.

The following other benefits that would be realized have not been taken into account in this analysis:

- Reduction in accident costs resulting from improved travel conditions and increased comfort in travel
- Indirect development benefits along the direct influence area of the JORR
- Short term employment opportunities arising from the JORR project.

The evaluation uses a conventional discounted cash flow methodology, in order to determine the net present value (NPV), the economic rate of return (EIRR) and the benefit cost ratio. The fundamental assumptions for the economic evaluation are:

Base year:	2000
Analysis period:	Life cycle of the project, i.e. 2000 to 2031, or 31 years
Prices:	Constant 2000 price base, and
Residual value:	None.

Table 7.3.2 summarizes the results of the economic cost benefit analysis. The table illustrates that the JORR project is with an EIRR of about 28.9 percent highly viable from an economic perspective. The NPV is still positive even at a discount rate of 16.5 percent. The project's B/C ratio is about 1.9.

The sensitivity test, the results of which are summarized in Table 7.3.3, shows that under a worse-case scenario (underestimation of cost by 20 percent and overestimation of benefits by 20 percent) the JORR project still maintains an EIRR of about 22.5 percent, a positive NPV, but a B/C ratio of only 1.1.

Table 7.3.2 Economic Costs and Benefits (Constant 2000 prices) 2000 to 2031

(Unit: billion Rupiah)

		ECONOMIC COSTS										TOTAL ECONOMIC	
Year	Life Cycle Year	Land Acquisition	Civil Works	Engineering Consulting Services	Equipment Component	Physical Contingency	Administrative Overhead	Levies & Duty	Taxes	O&M Costs	TOTAL	SAVINGS	NET ECONOMIC BENEFITS
2000	-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	-5	146.19	0.00	1.74	0.00	14.58	0.00	0.00	0.00	0.00	162.51	0.00	-162.51
2002	-4	199.71	0.00	84.82	0.00	19.98	0.00	0.00	0.00	0.00	304.51	0.00	-304.51
2003	-3	45.77	257.62	98.57	0.00	43.79	0.00	0.00	0.00	0.00	445.75	0.00	-445.75
2004	-2	0.00	1,028.74	27.72	215.29	113.63	0.00	0.00	0.00	0.00	1,385.38	0.00	-1,385.38
2005	-1	0.00	873.54	27.72	438.82	109.27	0.00	0.00	0.00	17.51	1,466.86	235.14	-1,231.72
2006	0	0.00	488.54	19.48	199.13	58.80	0.00	0.00	0.00	35.01	800.96	794.18	-6.78
2007	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	1,188.79	1,153.78
2008	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	1,331.21	1,296.20
2009	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	1,487.24	1,452.23
2010	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	1,658.09	1,623.08
2011	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.18	64.18	1,845.02	1,780.84
2012	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	2,049.43	2,014.42
2013	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	2,272.82	2,237.81
2014	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	2,516.80	2,481.79
2015	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	2,780.02	2,745.01
2016	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.18	64.18	3,070.59	3,006.41
2017	11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	3,387.47	3,352.46
2018	12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	3,732.88	3,697.87
2019	13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	4,109.21	4,074.20
2020	14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	4,519.07	4,484.06
2021	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.18	64.18	4,965.25	4,901.07
2022	16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	5,450.79	5,415.78
2023	17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	5,450.79	5,415.78
2024	18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	5,450.79	5,415.78
2025	19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	5,450.79	5,415.78
2026	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.18	64.18	5,450.79	5,386.61
2027	21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	5,450.79	5,415.78
2028	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	5,450.79	5,415.78
2029	23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	5,450.79	5,415.78
2030	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.01	35.01	5,450.79	5,415.78
2031	25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.18	64.18	5,450.79	5,386.61
Accumulated		**391.67**	**2,648.44**	**260.05**	**853.24**	**360.05**	**0.00**	**0.00**	**0.00**	**1,073.62**	**5,587.07**		
												EIRR	**28.86%**
												NPV at 5%	29,582.38
												NPV at 10%	10,622
												NPV at 16.5%	2,983

Source: JICA Study Team.

Notes: 1.) Section W2' is excluded upon the request of the GOI.

2.) The economic benefits are capped as of 2022 when practical capacity level has been reached at major subsections of the JORR.

3.) The economic benefits derived from reductions in accidents have been disregarded here.

Table 7.3.3 JORR Results of Sensitivity Analysis EIRR

	NET BENEFITS									
COSTS	Minus 20%		Minus 10%		No Change from Base Case		Plus 10%		Plus 20%	
Minus 20%	EIRR	28.89%	EIRR	31.02%	EIRR	33.09%	EIRR	35.06%	EIRR	36.96%
	NPV	8,546	NPV	9,855	NPV	11,213	NPV	12,570	NPV	13,928
	B/C	1.91	B/C	2.20	B/C	2.51	B/C	2.81	B/C	3.12
Minus 10%	EIRR	26.87%	EIRR	28.86%	EIRR	30.79%	EIRR	32.63%	EIRR	34.41%
	NPV	8,251	NPV	9,560	NPV	10,918	NPV	12,275	NPV	13,633
	B/C	1.64	B/C	1.90	B/C	2.17	B/C	2.44	B/C	2.71
No Change from Base Case	EIRR	25.17%	EIRR	27.04%	**EIRR**	**28.86%**	EIRR	30.60%	EIRR	32.27%
	NPV	7,956	NPV	9,265	**NPV**	**10,622**	NPV	11,980	NPV	13,337
	B/C	1.42	B/C	1.66	**B/C**	**1.90**	B/C	2.14	B/C	2.39
Plus 10%	EIRR	23.72%	EIRR	25.49%	EIRR	27.21%	EIRR	28.86%	EIRR	30.44%
	NPV	7,661	NPV	8,970	NPV	10,327	NPV	11,685	NPV	13,042
	B/C	1.25	B/C	1.46	B/C	1.68	B/C	1.90	B/C	2.12
Plus 20%	EIRR	22.45%	EIRR	24.14%	EIRR	25.78%	EIRR	27.35%	EIRR	28.86%
	NPV	7,365	NPV	8,675	NPV	10,032	NPV	11,389	NPV	12,747
	B/C	1.10	B/C	1.29	B/C	1.50	B/C	1.70	B/C	1.90

Source: JICA Study Team.

Note: The NPV is in billion Rupiah at a discount rate of 10%.

7.4 Project Financial Analysis

7.4.1 Potential ROI Cases and Financial Base Case Selection

In order to decide on a proper and viable project structure[3], it is imperative to determine from a purely financial point of view the project's "financial base case", i.e. the most likely return on investment (ROI) or simple project internal rate of return (IRR)[4]. This requires a realistic project implementation schedule and, based on such schedule, a realistic annual drawdown estimation of funds required. The project implementation schedule, which assumes a fast track procurement method, is based on the engineering schedule. Table 7.4.1 presents the annual drawdown schedule for all project cost components, i.e. including the indirect cost of GOI project contribution for the selected engineering base cost case "A" with a basic traffic information and control system.

The total project base cost, covering all resources expressed in constant September 2000 prices for the engineering base cost case "A" with a fundamental traffic information and control system component, would amount to about 6,015 billion Rupiah.

[3]) The project structure is defined as the debt to equity ratio; the equity structure and the debt structure.

[4]) This is sometimes referred to as the project's financial rate of return. However, such reference may lead to confusion. It is therefore better to indicate clearly that ROI is for IRR in constant prices, and simple the financial internal rate of return or FIRR is for the computations in current prices only, allowing for price escalations on the cost and revenue stream sides of the equation.

Table 7.4.1 Project Base Cost all Resources & All Cost Components (No Traffic Information and Control System)

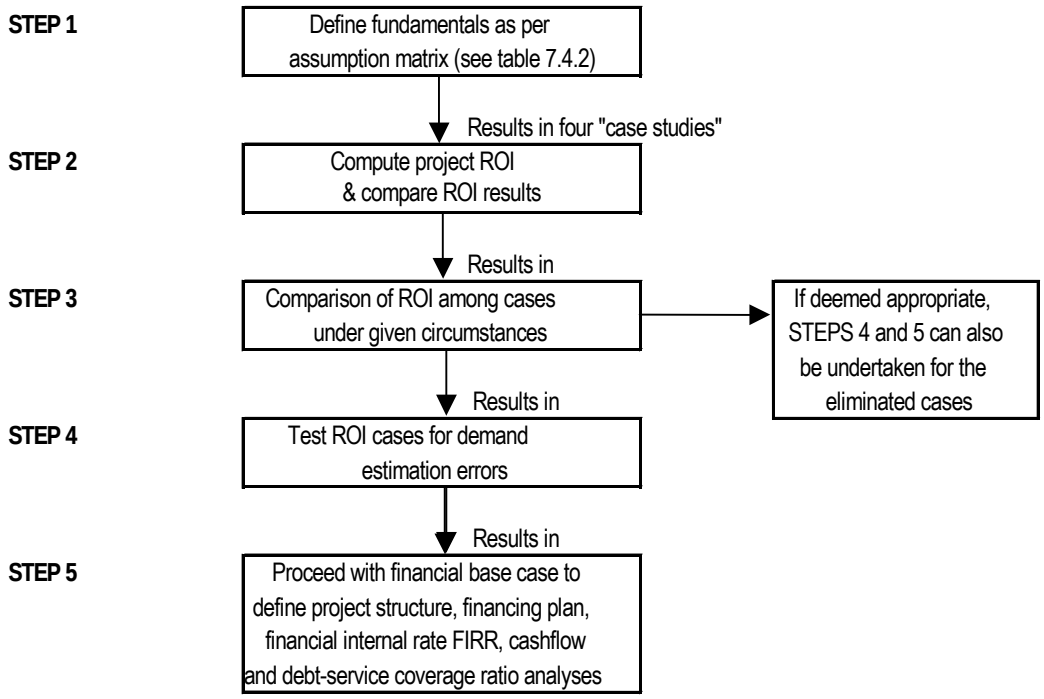
(September 2000 constant price base) (Unit: Billion Rupiah)

Major Cost Category	2001			2002			2003			2004			2005			2006			Total			[in percent]		
	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total
1. Construction Civil Works	0.0	0.0	0.0	0.0	0.0	0.0	305.6	169.0	474.6	773.7	473.6	1,247.3	665.6	393.0	1,058.6	349.8	243.6	593.3	2,094.6	1,279.2	3,373.8	**62.52**	**48.00**	**56.09**
2. Toll Collection, Traffic Information & Control & Communications Equip.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.1	249.5	269.7	40.9	508.6	549.6	17.9	231.5	249.3	78.9	989.6	1,068.5	**2.36**	**37.13**	**17.76**
3. Physical Contingency	0.0	0.0	0.0	0.0	0.0	0.0	30.6	16.9	47.5	78.4	59.8	138.2	68.6	64.7	133.3	35.9	35.9	71.8	213.4	177.4	390.8	**6.37**	**6.66**	**6.50**
4. Consulting Engineering Services for Civil Works	0.4	1.4	1.7	15.2	56.2	71.4	16.0	59.4	75.4	3.4	12.7	16.1	3.4	12.7	16.1	2.1	8.3	10.4	40.6	150.5	191.1	**1.21**	**5.65**	**3.18**
5. Consulting Engineering Services for 2. Above	0.0	0.0	0.0	1.9	14.2	16.0	2.0	24.0	26.0	1.6	10.8	12.5	1.6	10.8	12.5	1.2	8.4	9.7	8.3	68.3	76.6	**0.25**	**2.56**	**1.27**
6. Engineering Base Cost Sub-total	0.4	1.4	1.7	17.1	70.4	87.4	354.2	269.3	623.5	877.3	806.5	1,683.7	780.2	989.9	1,770.0	406.8	527.7	934.5	2,435.8	2,665.0	5,100.9	**72.70**	**100.00**	**84.80**
7. Land Acquisition; Compensation; Administration & Utility Relocation	173.4	0.0	173.4	236.9	0.0	236.9	54.3	0.0	54.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	464.6	0.0	464.6	**13.87**	**0.00**	**7.72**
8 add: 10% physical contingency	17.3	0.0	17.3	23.7	0.0	23.7	5.4	0.0	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.5	0.0	46.5	**1.39**	**0.00**	**0.77**
9. Duty & Levies on Imports	0.0	0.0	0.0	0.0	0.0	0.0	8.5	0.0	8.5	36.2	0.0	36.2	45.1	0.0	45.1	23.8	0.0	23.8	113.4	0.0	113.4	**3.39**	**0.00**	**1.89**
10. Ppn (VAT)	17.4	0.0	17.4	25.4	0.0	25.4	40.8	0.0	40.8	87.7	0.0	87.7	78.0	0.0	78.0	40.7	0.0	40.7	290.0	0.0	290.0	**8.66**	**0.00**	**4.82**
11. GOI Contribution Sub-total	208.1	0.0	208.1	286.0	0.0	286.0	109.0	0.0	109.0	123.9	0.0	123.9	123.1	0.0	123.1	64.4	0.0	64.4	914.6	0.0	914.6	**27.30**	**0.00**	**15.20**
12. Project Base Cost (All resources)	208.5	1.4	209.9	303.1	70.4	373.5	463.1	269.3	732.4	1,001.1	806.5	1,807.6	903.3	989.9	1,893.1	471.3	527.7	998.9	3,350.4	2,665.0	6,015.4	**100.00**	**100.00**	**100.00**

As has been discussed and indicated earlier in Chapter 5, the engineering base cost case "C", though the lowest in absolute engineering base cost terms, is not considered for the reasons already stated in Section 7.2.5. However, that case is given consideration here from a financial perspective, in view of the strong interest of some Indonesian stakeholders in this theoretical alternative. The main objective of this exercise though is only to investigate whether case "C" would result in a fundamentally different return on investment than the selected engineering base case "A" for a closed toll collection system with basic traffic information and control system.

Figure 7.4.1 illustrates the step-by-step procedure for the comparison of the two approaches and Table 7.4.2 summarizes the assumptions and criteria that were used in said comparison. The major differences in assumptions are:

- **Traffic information and control system.** As indicated above, savings that are achievable through the exclusion of the basic traffic information and control system component are in the order of 10.5 percent of total project base cost (all resources)
- **Treatment of O&M cost and revenue streams Sections S and E2**. Two cases can be differentiated, namely that the implementing entity and therefore the project will either be or not be a direct beneficiary of the revenue streams of Sections S and E2 and that the entity will either have or have not responsibility for the O&M costs during the construction period of the JORR.



Source: JICA Study Team.

Figure 7.4.1 Procedure for Comparing Alternative Financial (ROI/IRR) Cases

Table 7.4.2 Assumption Matrix for ROI Financial Cases Comparison

(Unit: figures are in constant 2000 prices)

Parameter	Base Cost	Treatment of elements in project IRR		SYL Conditionality	Treatment of existing JORR assets and liabilities	Treatment of cost components for W2' and feeder roads
		O&M Cost for Sections S and E2	Existing Revenue Streams for Sections S and E2			
Case Study 1	6,532,671 million Rupiah	Are included into the cost stream	Are included into the revenue stream	Meets SYL conditionality	So far excluded from consideration	To be treated as a loan extended by the "implementing entity" in financing plan
Case Study 2	6,532,671 million Rupiah	Are excluded from the cost stream	Are excluded from the revenue stream	Meets SYL conditionality	So far excluded from consideration	To be treated as a loan extended by the "implementing entity" in financing plan
Case Study 3	5,805,160 million Rupiah	Are included into the cost stream	Are included into the revenue stream	Does not meet SYL conditionality	So far excluded from consideration	To be treated as a loan extended by the "implementing entity" in financing plan
Case Study 4	5,805,160 million Rupiah	Are excluded from the cost stream	Are excluded from the revenue stream	Does not meet SYL conditionality	So far excluded from consideration	To be treated as a loan extended by the "implementing entity" in financing plan

Source: JICA Study Team.

- **Treatment of the existing JORR assets and liabilities**. Any JORR implementing entity will have to address, in one way or another, issues pertaining to the existing JORR assets and related liabilities. However, such considerations have so far been left out, since these issues will have a profound impact on financing needs and the balance sheet of the implementing entity. Furthermore, the project ROI should be computed on an as pure as possible basis.
- **Treatment of cost components for feeder roads**. Three feeder roads are part of the project definition[6] though it is unlikely that they will come under the jurisdiction of the JORR implementing entity in the future. However, since the loan will be used to finance these elements, they are treated later as a loan extended from the implementing entity to the entity that will eventually have jurisdiction over the feeder roads.
- **SYL conditionality**. As has been explained already in Section 2, the existing official request from the GOI to the GOJ is for financial assistance under the SYL scheme. It is therefore obvious that (a) SYL conditionality must be met and (b) that the base case selection must automatically eliminate all cases that do not meet SYL criteria[7].

The results of the ROI computation and comparison for the four financial case studies under consideration is tabulated in Table 7.4.3 and summarized as:

- Financial Case Study 1 and 2, which reflect a basic traffic information and control system component (engineering base cost case "A"), result in a project ROI of 6.55 and 5.63 percent, respectively. Since the project ROI for Financial Case Study 2, which implies the implementing entity is neither beneficiary of the revenues streams from Sections S and E2 and has no O&M expenditures for these two sections, is lower than that of Financial Case Study 1, Financial Case Study 2 is to be disregarded from here on
- Financial Case Study 3 and 4, which reflect a project with no traffic information and control component (engineering base cost case "C", see Appendix Table 7.7 for annual project base cost), have a higher ROI of 7.66 percent for Financial Case Study 3 and 6.54 percent for Financial Case Study 4. However, it should further be highlighted here that the comparison indicates also very clearly that the exclusion of the basic traffic information and control system from the project's total base cost does not result in a significantly better ROI performance of the JORR project.
- Financial Case Study 1, including its underlying assumptions, is therefore selected as the JORR project's financial base case with which to proceed.

[6]) See Chapter 3.
[7]) Such elimination is, of course, on pure "technical grounds".

Table 7.4.3 Results of Project ROI for Financial Case Studies 1 to 4
(September 2000 constant price base)

(Unit: million Rupiah)

Calendar Year	Cycle Year	FINANCIAL CASE STUDY 1 Base Cost	O&M Cost	Revenue	Net Revenue	FINANCIAL CASE STUDY 2 Base Cost	O&M Cost	Revenue	Net Revenue	FINANCIAL CASE STUDY 3 Base Cost	O&M Cost	Revenue	Net Revenue	FINANCIAL CASE STUDY 4 Base Cost	O&M Cost	Revenue	Net Revenue
2000	-6	0	(8,083)	103,630	95,547	0	0	0	0	0	(8,083)	103,630	95,547	0	0	0	0
2001	-5	(209,900)	(8,083)	109,300	(108,683)	(209,900)	0	0	(209,900)	(209,900)	(8,083)	109,300	(108,683)	(209,900)	0	0	(209,900)
2002	-4	(373,500)	(8,083)	117,500	(264,083)	(373,500)	0	0	(373,500)	(367,000)	(8,083)	117,500	(257,583)	(367,000)	0	0	(367,000)
2003	-3	(732,400)	(8,083)	123,190	(617,293)	(732,400)	0	0	(732,400)	(721,500)	(8,083)	123,190	(606,393)	(721,500)	0	0	(721,500)
2004	-2	(1,807,600)	(8,083)	124,090	(1,691,593)	(1,807,600)	0	0	(1,807,600)	(1,625,700)	(8,083)	124,090	(1,509,693)	(1,625,700)	0	0	(1,625,700)
2005	-1	(1,893,100)	(8,083)	304,000	(1,597,183)	(1,893,100)	(8,083)	304,000	(1,597,183)	(1,607,400)	(8,083)	304,000	(1,311,483)	(1,607,400)	(8,083)	304,000	(1,311,483)
2006	0	(998,900)	(20,356)	317,832	(701,424)	(998,900)	(20,356)	317,832	(701,424)	(849,100)	(20,356)	317,832	(551,624)	(849,100)	(20,356)	317,832	(551,624)
2007	1	0	(40,711)	332,293	291,582	0	(40,711)	332,293	291,582	0	(40,711)	332,293	291,582	0	(40,711)	332,293	291,582
2008	2	0	(40,711)	347,413	306,702	0	(40,711)	347,413	306,702	0	(40,711)	347,413	306,702	0	(40,711)	347,413	306,702
2009	3	0	(40,711)	363,220	322,509	0	(40,711)	363,220	322,509	0	(40,711)	363,220	322,509	0	(40,711)	363,220	322,509
2010	4	0	(40,711)	379,746	339,035	0	(40,711)	379,746	339,035	0	(40,711)	379,746	339,035	0	(40,711)	379,746	339,035
2011	5	0	(74,632)	397,025	322,393	0	(74,632)	397,025	322,393	0	(74,632)	397,025	322,393	0	(74,632)	397,025	322,393
2012	6	0	(40,711)	415,090	374,379	0	(40,711)	415,090	374,379	0	(40,711)	415,090	374,379	0	(40,711)	415,090	374,379
2013	7	0	(40,711)	433,976	393,265	0	(40,711)	433,976	393,265	0	(40,711)	433,976	393,265	0	(40,711)	433,976	393,265
2014	8	0	(40,711)	453,722	413,011	0	(40,711)	453,722	413,011	0	(40,711)	453,722	413,011	0	(40,711)	453,722	413,011
2015	9	0	(40,711)	474,400	433,689	0	(40,711)	474,400	433,689	0	(40,711)	474,400	433,689	0	(40,711)	474,400	433,689
2016	10	0	(74,632)	523,700	449,068	0	(74,632)	523,700	449,068	0	(74,632)	523,700	449,068	0	(74,632)	523,700	449,068
2017	11	0	(40,711)	544,800	504,089	0	(40,711)	544,800	504,089	0	(40,711)	544,800	504,089	0	(40,711)	544,800	504,089
2018	12	0	(40,711)	567,300	526,589	0	(40,711)	567,300	526,589	0	(40,711)	567,300	526,589	0	(40,711)	567,300	526,589
2019	13	0	(40,711)	589,000	548,289	0	(40,711)	589,000	548,289	0	(40,711)	589,000	548,289	0	(40,711)	589,000	548,289
2020	14	0	(40,711)	611,500	570,789	0	(40,711)	611,500	570,789	0	(40,711)	611,500	570,789	0	(40,711)	611,500	570,789
2021	15	*0*	(74,632)	*633,100*	558,468	*0*	(74,632)	*633,100*	558,468	*0*	(74,632)	*633,100*	558,468	*0*	(74,632)	*633,100*	558,468
2022	16	*0*	(40,711)	*656,200*	615,489	*0*	(40,711)	*656,200*	615,489	*0*	(40,711)	*656,200*	615,489	*0*	(40,711)	*656,200*	615,489
2023	17	*0*	(40,711)	*668,400*	627,689	*0*	(40,711)	*668,400*	627,689	*0*	(40,711)	*668,400*	627,689	*0*	(40,711)	*668,400*	627,689
2024	18	*0*	(40,711)	*680,100*	639,389	*0*	(40,711)	*680,100*	639,389	*0*	(40,711)	*680,100*	639,389	*0*	(40,711)	*680,100*	639,389
2025	19	*0*	(40,711)	*692,500*	651,789	*0*	(40,711)	*692,500*	651,789	*0*	(40,711)	*692,500*	651,789	*0*	(40,711)	*692,500*	651,789
2026	20	*0*	(74,632)	*704,100*	629,468	*0*	(74,632)	*704,100*	629,468	*0*	(74,632)	*704,100*	629,468	*0*	(74,632)	*704,100*	629,468
2027	21	*0*	(40,711)	*716,600*	675,889	*0*	(40,711)	*716,600*	675,889	*0*	(40,711)	*716,600*	675,889	*0*	(40,711)	*716,600*	675,889
2028	22	*0*	(40,711)	*726,000*	685,289	*0*	(40,711)	*726,000*	685,289	*0*	(40,711)	*726,000*	685,289	*0*	(40,711)	*726,000*	685,289
2029	23	*0*	(40,711)	*729,600*	688,889	*0*	(40,711)	*729,600*	688,889	*0*	(40,711)	*729,600*	688,889	*0*	(40,711)	*729,600*	688,889
2030	24	*0*	(40,711)	*733,300*	692,589	*0*	(40,711)	*733,300*	692,589	*0*	(40,711)	*733,300*	692,589	*0*	(40,711)	*733,300*	692,589
2031	25	*0*	(74,632)	*737,200*	662,568	*0*	(74,632)	*737,200*	662,568	*0*	(74,632)	*737,200*	662,568	*0*	(74,632)	*737,200*	662,568
Accumulated		*(6,015,400)*	*(1,256,234)*	*15,309,827*	*8,038,193*	*(6,015,400)*	*(1,215,819)*	*14,732,117*	*7,500,898*	*(5,380,600)*	*(1,256,234)*	*15,309,827*	*8,672,993*	*(5,380,600)*	*(1,215,819)*	*14,732,117*	*8,135,698*
Simple IRR					***6.73%***				***5.80%***				***7.82%***				***6.71%***

Source: JICA Study Team.

Note: It is assumed that Sections E1 and E3 will be opened for traffic in the third quarter of 2005, Section E1 in the first quarter of 2006 and Sections W1 and W2 in the third quarter of 2006.

7.4.2 Sensitivity Test

It is essential, before proceeding to the estimation of investment requirements, project structure and so on, to test the JORR project ROI result of the selected financial base case against error margins in the demand estimation. The commonly accepted error margin in demand modeling is plus minus 25 percent. Hence, the ROI of the selected Financial Case Study 1 was tested for 20 cases, namely plus/minus 10 percent demand estimation error and plus/minus 20 percent. The ROI sensitivity results for the selected financial base case are summarized as:

- For the case that demand from modeling underestimated future actual demand within accepted standard error margins, the project ROI would be 8.69 percent at the highest error margin of 20 percent.
- For the case that demand from modeling overestimated future actual demand within accepted standard error margins, the project ROI/IRR would be 4.27 percent for the highest negative error margin of minus 20 percent.
- However, for further financial viability computation the financial standard base case with a project ROI of 6.55 percent is accepted for conversion into current prices, investment requirement estimations, and so on. The final sensitivity test that combines demand over- or underestimation with the total project base cost over- or underestimation was undertaken and its results are illustrated in Table 7.4.4 and summarized as:

Table 7.4.4 Project IRR Sensitivity to Demand and Cost Under-/Overestimation

(in 2000 constant prices)

	TRAFFIC DEMAND/ NET REVENUES				
BASECOST	Minus 20%	Minus 10%	Unchanged Base Case	Plus 10%	Plus 20%
Minus 20%	6.31%	7.66%	8.98%	10.27%	11.57%
Minus 10%	5.20%	6.45%	7.65%	8.82%	9.97%
Unchanged Base Case	4.27%	5.44%	6.55%	7.63%	8.69%
Plus 10%	3.47%	4.58%	5.63%	6.64%	7.62%
Plus 20%	2.78%	3.84%	4.84%	5.79%	6.71%

Source: JICA Study Team.

Notes:
1. Changes in net-revenue streams are the result of traffic demand over- or underestimation measured in million PCU-km-per year.
2. Changes in costs cover project base costs only.
3. Financing cost is excluded.

- If demand modeling overestimated future actual demand by 20 percent and the JORR project's total project base cost were underestimated by 20 percent, in this case the project ROI/IRR would be 2.78 percent.
- If demand modeling underestimated future actual demand by 20 percent and the JORR project's total project base cost were overestimated by 20 percent, in this case the project ROI/IRR would be 11.57 percent.
- In summary, under the most optimistic assumption the JORR project will generate a return on investment in the order of magnitude of 11.6 percent, which is well below the current Indonesian lending rate of around 16.5 percent. It is self-evident that such ROI cannot meet commercial financing terms & conditions.

7.4.3 Capital or Investment Requirements

The price escalation factor summarized in Table 7.4.5 were used to convert the base cost (all resources) of Financial Case Study 1 into current prices, in order to proceed finally to the identification of capital or investment requirements. The footnotes in Table 7.4.5 explain the assumptions underlying the individual price escalation factors, the most important of which are:

- Individual cost item inflation rates are identical with the general inflation rate after the year 2010
- Individual item inflation rates for the project cost components were differentiated for obvious reasons into the domestic and foreign cost components
- It was assumed that there will be no increase in duties and taxes up to the year 2010.

Table 7.4.5 Price Escalation Factors to Convert into Current Prices

(Unit: percent per year)

Parameter	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CAPITAL COSTS										
1.) Land	4.0	4.0	5.0	5.0	5.0	7.0	8.0	10.0	10.0	10.0
2.) Compensation	5.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
3.) Civil works (LC)	5.0	6.0	7.0	7.0	7.0	8.5	8.5	8.5	8.5	8.5
Civil works (FC)	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0
4.) Equip. & spares (LC)	5.0	6.0	7.0	7.0	7.0	8.5	8.5	8.5	8.5	8.5
Equip. & Spares (FC)	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0
5.) Engineering serv. (LC)	5.0	6.0	7.0	7.0	7.0	8.5	8.5	8.5	8.5	8.5
Engineering serv. (FC)	0.0	0.0	0.0	1.5	1.5	2.0	2.0	2.0	2.0	2.0
6.) Physical conting. (LC)	5.0	6.0	7.0	7.0	7.0	8.5	8.5	8.5	8.5	8.5
Physical conting. (FC)	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0
6.) Duties	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.) Taxes (Ppn)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST OF SERVICES SOLD										
a.) Salaries & wages	7.5	7.5	7.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
b.) Repair & maintenance	7.5	7.5	7.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
c.) Power and Fuel	15.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0
d.) Stores & spares	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0
e.) Miscellaneous	5.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
General Inflation Rate	5.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0

Source: JICA Study Team.

Notes:
1.) It is assumed that individual inflation rates are identical with general inflation rates after the year 2010.
2.) It is assumed that land price increases will remain below general inflation up to 2006 and that thereafter land prices will increase in real terms due to higher economic growth.
3.) It is assumed that compensation cost increases will remain below or around general inflation levels.
4.) Cost increases for civil works will remain below or around inflation up to 2006. After that there will be real price increases of 1.5% p.a. caused by higher economic growth.
5.) Equipment & spares are imported and reflect Yen-based prices increase only.
6.) Engineering services are dominated by expatriate services reflecting modest cost increases after 2003 only.
7.) It is assumed that there will be no increases in duties and taxes.
8.) Cost of services sold refers to the O&M cost component. It is assumed that salaries & wages and repair & maintenance cost will increase slightly above the general inflation rate. Increases in power & fuel cost reflect Government policy to adjust fuel prices. Cost for stores & spares reflect price increases in Yen terms only. Miscellaneous costs increase parallel with the general inflation rate.

Table 7.4.6 summarizes the project base cost for the selected Financial Case Study 1 expressed in current prices and before financing. Total project base cost (all resources) in current prices are estimated at Rupiah 7,133.2 billion.

It is necessary, in order to estimate interest during construction and subsequent investment or capital requirements, to define a project structure. The following major assumptions, which are summarized in Table 7.4.7, were made:

- **Equity to debt structure**. The low project ROI of 6.55 percent suggests a limited capacity of the project to service long-term debt. Hence, an equity portion of about 43.3 percent which is higher than usual, was assumed. This is equivalent to a debt equity ratio of about factor 1.31.
- **Equity structure**. It was assumed that the equity portion of the implementing entity would be contributed partly in cash and partly in kind. The equity in kind contribution refers to the treatment of the existing JORR assets. (completed works and structures)
- **Debt structure**. The low project ROI indicates already fairly clearly without detailed computations that high interest borrowing by the implementing entity is likely to result in a long-term debt coverage ratio below 1. This would imply that the implementing entity would have to borrow already early short-term money, in order to cover long-term debt payments. Such a course of action can, for obvious reasons, not be recommended. It was, therefore, proper and prudent to assume that long-term financing would be under a sovereign guaranteed loan with SYL conditions, i.e. an interest rate of 0.75 percent and a repayment period of 40 years with a grace period on principal of 10 years. It was furthermore assumed that on-lending condition to the implementing entity would also be for 40 years with ten years grace on the principal and an on-lending rate of 5 percent p.a. Again, an on-lending rate higher than the project ROI of about 6 percent is unrealistic and cannot be recommended.

Interest-during-construction (IDC) computations were based on the project structure identified above. The individual components are summarized in Table 7.4.8. It is assumed that during the first two years of project implementation, i.e. 2001 to 2002, total financing needed (without the cost of financing) will be covered from equity contributions in cash and kind.

Table 7.4.6 Project Base Cost All Resources & All Cost Components
(Traffic Information and Control system Covering JORR Configuration Only)
(Converted into current price base)

(Unit: Billion Rupiah)

Major Cost Category	2001			2002			2003			2004			2005			2006			Total			Total [in percent]		
	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total
1. Construction Civil Works	0.0	0.0	0.0	0.0	0.0	0.0	363.9	175.6	539.5	985.9	502.7	1,488.6	907.5	423.4	1,330.9	517.5	267.7	785.2	2,774.8	1,369.4	4,144.2	64.84	47.99	58.10
2. Toll Collection, Traffic Information & Control & Communications Equip.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.6	262.5	288.1	55.8	547.9	603.7	26.5	262.7	289.2	107.9	1,073.1	1,181.0	2.52	37.60	16.56
3. Physical Contingency	0.0	0.0	0.0	0.0	0.0	0.0	36.4	17.6	54.0	99.9	63.4	163.3	93.5	69.7	163.3	53.1	39.9	93.0	282.9	190.6	473.5	6.61	6.68	6.64
4. Consulting Engineering Services for Civil Works	0.4	1.4	1.7	15.2	56.2	71.4	19.1	59.4	78.5	4.3	12.9	17.2	4.6	13.1	17.7	3.1	8.7	11.8	46.6	151.6	198.3	1.09	5.31	2.78
5. Consulting Engineering Services for 2. Above	0.0	0.0	0.0	1.9	14.2	16.0	2.4	24.0	26.4	2.0	11.0	13.0	2.2	11.1	13.3	1.8	8.8	10.6	10.3	69.1	79.3	0.24	2.42	1.11
6. Engineering Base Cost Sub-total	0.4	1.4	1.7	17.1	70.4	87.4	421.8	276.5	698.3	1,117.7	852.5	1,970.2	1,063.6	1,065.2	2,128.9	601.9	587.8	1,189.7	3,222.4	2,853.8	6,076.2	75.30	100.00	85.18
7. Land Acquisition; Compensation; Administration & Utility Relocation	182.1	0.0	182.1	263.7	0.0	263.7	64.7	0.0	64.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	510.5	0.0	510.5	11.93	0.00	7.16
8 add: 10% physical contingency	18.2	0.0	18.2	26.4	0.0	26.4	6.5	0.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.1	0.0	51.1	1.19	0.00	0.72
9. Duty & Levies on Imports	0.0	0.0	0.0	0.0	0.0	0.0	8.8	0.0	8.8	38.3	0.0	38.3	48.6	0.0	48.6	26.5	0.0	26.5	122.1	0.0	122.1	2.85	0.00	1.71
10. Ppn (VAT)	18.2	0.0	18.2	28.1	0.0	28.1	48.6	0.0	48.6	111.8	0.0	111.8	106.4	0.0	106.4	60.2	0.0	60.2	373.3	0.0	373.3	8.72	0.00	5.23
11. GOI Contribution Sub-total	218.6	0.0	218.6	318.1	0.0	318.1	128.6	0.0	128.6	150.0	0.0	150.0	154.9	0.0	154.9	86.7	0.0	86.7	1,057.0	0.0	1,057.0	24.70	0.00	14.82
12. Project Base Cost (All resources)	218.9	1.4	220.3	335.2	70.4	405.6	550.4	276.5	826.9	1,267.7	852.5	2,120.2	1,218.6	1,065.2	2,283.8	688.6	587.8	1,276.4	4,279.4	2,853.8	7,133.2	100.00	100.00	100.00

Source: JICA Study Team.

Notes:
1. All figures are based on the respective quarterly drawdown schedule. Minor differences to other tables are due to rounding.
2. Physical contingency is assumed at 10% for the civil works & land acquisition, and 5% for the equipment component. Physical contingencies are calculated without duty and Ppn.
3. A 5% import duty and levy has been assumed on all FC component imports.
4. A 10% Ppn has been assumed on all business transactions of the local cost component.
5. The cost for the "Maintenance Equipment" component is reflected in the FC component in 2006.
6. LC = Local cost component.
7. FC = Foreign cost component.
8. The W2' Section, though part of the original GOI request for SYL assistance, is now excluded upon the request of the GOI.
9. The following exchange rates apply: 1US$ = Rp 7,950 = ¥106 reflecting the average exchange rates over the period January to June 2000.

Table 7.4.7 Definition of Project Structure for Implementing Entity

(Unit: all figures are in current prices)

Parameter	Structure	Comments
Equity to Debt Structure	**43.3% : 56.7%**	1.) Cashflow to indicate whether this structure allows for high enough debt coverage ratio. If not, equity portion will need to be increased. 2.) It appears to be best to target an as high as possible equity share with a view to reduce the interest during construction load.
Equity Structure	**43.3% = 3,088.2 billion Rp.** **of which:** 1.) 830.8 billion Rp. in kind for existing JORR assets. 2.) 2,257.4 billion Rp. in cash.	1.) "Equity in kind" in form of a debt for equity swatch. However, this is cash flow neutral. 2.) However, the debt-for-equity swatch does not address the issue of outstanding liabilities of the old concessionaires.
Debt Structure	**56.7% = 4,045.1 billion Rp.** To be financed from long-term concessinal ODA loan with: **Terms & conditions of lender to GOI:** n = 40 years (10 years grace) i = 0.75% p.a. **On-lending terms to implementing entity:** n = 40 years (10 years grace) i = 5.0% p.a.	Depending on the results of the FIRR and the cashflow, on-lending terms may have to be adjusted, in order to minimize the need for short-term bridging financing and in order to optimize the net cashflow after long-term financing.
	HOWEVER: Liabilities tied to the D/E swatch will have to be covered somehow.	Amount and terms for covering such liabilities need to be established.
	Short-term working capital for 2006 will have to be added	Not included in long-term loan. Financing to be secured from operational income.

Source: JICA Study Team.
Note: Please consult with Chapter 8, Table 8.2, on the question of outstanding liabilities of the old concessionaires.

Table 7.4.8 Interest During Construction (IDC) Computations

(Unit: billion current Rupiah)

Parameter	2001	2002	2003	2004	2005	2006	Total
1.) Total Financing Needed	220.3	405.6	826.9	2,120.2	2,283.8	1,276.4	7,133.2
2.) Of which: Equity in kind	168.9	200.0	261.9	200.0	0.0	0.0	830.8
3.) Of which: Equity in cash	49.3	196.8	563.9	560.0	546.9	340.5	2,257.4
4.) Total Equity	218.2	396.8	825.8	760.0	546.9	340.5	3,088.2
5.) Loan disbursement required	2.1	8.8	1.1	1,360.2	1,736.9	935.9	4,045.1
6.) Loan disbursed (current year)	2.1	8.8	1.1	1,360.2	1,736.9	935.9	n.a.
7.) Interest on loan (item 6.)	0.1	0.4	0.1	68.0	86.8	46.8	n.a.
8.) Total loan balance (current year end)	2.2	9.3	1.2	1,428.2	1,823.7	982.7	n.a.
9.) Interest on previous years loan balance	0.0	0.0	0.0	0.1	71.7	91.2	n.a.
10.) Interest on loan balance 2006 (year end)						49.4	n.a.
Total interest expense incurred during year	**0.0**	**0.0**	**0.1**	**68.3**	**158.5**	**187.7**	**414.6**

Source: JICA Study Team.

Notes: 1.) Total financing needed is taken from project base cost in current prices. Interest costs are excluded.
2.) Equity in kind through a debt for equity swatch.
3.) Equity in cash by GOI.
4.) The interest for the loan balance outstand year end 2006 is capitalized at year end 2006.
5.) On-lending terms by the GOI to the implementing entity are assumed at 5% p.a.
6.) n.a. = not applicable.

Such an approach is recommendable, in order to keep IDC as low as possible. Total IDC is estimated at Rupiah 414.6 billion accruing in the implementation years 2003,2004, 2005 and 2006.

The total investment or capital cost estimation (all resources) is summarized in Table 7.4.9 and 7.4.10, respectively. Key features are:

- The total capital requirement for JORR implementation under the given project structure are estimated at about Rupiah 7,547 billion, out of which Rupiah 414.6 billion represent IDC, equivalent to about 5.5 percent of total capital requirements. The total estimated capital requirement is as indicated in the summary table 7.4.9 equivalent to about US dollar 949 million and/or about 101 billion Japanese yen.
- The total financing needed during project implementation years 2001, 2002 and 2003 is, if possible, to be financed through equity contributions, in order to keep IDC as low as possible.
- The debt to equity ratio should be in the order of 1 to 1.3.

Table 7.4.9 Summary of Total Capital or Investment Cost Requirements

(in current prices)

(Unit: as indicated)

Major Cost Component	Unit	Basic Traffic Information and Control System Covering JORR Configuration Only		
		LC	FC	Total
1. Construction Civil Works	Billion Rupiah	2,774.8	1,369.4	4,144.2
	Million US $	349.0	172.3	521.3
	Million ¥	36,997.3	18,258.7	55,256.0
2. Toll Collection, Traffic Information & Control & Communications Equipment	Billion Rupiah	107.9	1,073.1	1,181.0
	Million US $	13.6	135.0	148.6
	Million ¥	1,438.7	14,308.0	15,746.7
3. Physical Contingency	Billion Rupiah	282.9	190.6	473.5
	Million US $	35.6	24.0	59.6
	Million ¥	3,772.0	2,541.3	6,313.3
4. Consulting Engineering Services for Civil Works	Billion Rupiah	46.5	151.6	198.1
	Million US $	5.9	19.1	24.9
	Million ¥	621.3	2,021.3	2,642.7
5. Consulting Engineering Services for 2. Above	Billion Rupiah	10.3	69.1	79.4
	Million US $	1.3	8.7	10.0
	Million ¥	137.3	921.3	1,058.7
6. Engineering Base Cost	Billion Rupiah	3,222.4	2,853.8	6,076.2
	Million US $	405.3	359.0	764.3
	Million US ¥	42,966.7	38,050.7	81,017.3
7. GOI Contribution	Billion Rupiah	1,057.0	0.0	1,057.0
	Million US $	133.0	0.0	133.0
	Million US ¥	14,093.3	0.0	14,093.3
8. Project Base Cost (all resources)	Billion Rupiah	4,279.4	2,853.8	7,133.2
	Million US $	538.3	359.0	897.3
	Million US ¥	57,060.0	38,050.7	95,110.6
9. Working Capital Requirements	Billion Rupiah	0.0	0.0	0.0
	Million US $	0.0	0.0	0.0
	Million ¥	0.0	0.0	0.0
10. Interest During Construction	Billion Rupiah	414.6	0.0	414.6
	Million US $	52.2	0.0	52.2
	Million ¥	5,528.0	0.0	5,528.0
11. TOTAL CAPITAL COST ESTIMATE	Billion Rupiah	4,694.0	2,853.8	7,547.8
	Million US $	590.4	359.0	949.4
	Million ¥	62,588.0	38,050.7	100,638.6

Source: JICA Study Team.

Notes: 1.) All figures are based on the schedule presented in Table 8.5.1.
2.) All conversions are based on the average January to June exchange rate of rate of 1 US $ = 7,950 Rp. = ¥ 106.

Table 7.4.10 Total Annual Investment/Capital Cost Requirement
(Traffic Information and Control system Covering JORR Configuration Only)
(Current price base)

(Unit: Billion Rupiah)

Major Cost Category	2001			2002			2003			2004			2005			2006			Total			Total [in percent]		
	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total	LC	FC	Total
1. Construction Civil Works	0.0	0.0	0.0	0.0	0.0	0.0	363.9	175.6	539.5	985.9	502.7	1,488.6	907.5	423.4	1,330.9	517.5	267.7	785.2	2,774.8	1,369.4	4,144.2	**64.84**	**47.99**	**58.10**
2. Toll Collection, Traffic Information & Control & Communications Equip.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.6	262.5	288.1	55.8	547.9	603.7	26.5	262.7	289.2	107.9	1,073.1	1,181.0	**2.52**	**37.60**	**16.56**
3. Physical Contingency	0.0	0.0	0.0	0.0	0.0	0.0	36.4	17.6	54.0	99.9	63.4	163.3	93.5	69.7	163.3	53.1	39.9	93.0	282.9	190.6	473.5	**6.61**	**6.68**	**6.64**
4. Consulting Engineering Services for Civil Works	0.4	1.4	1.7	15.2	56.2	71.4	19.1	59.4	78.5	4.3	12.9	17.2	4.6	13.1	17.7	3.1	8.7	11.8	46.6	151.6	198.3	**1.09**	**5.31**	**2.78**
5. Consulting Engineering Services for 2. Above	0.0	0.0	0.0	1.9	14.2	16.0	2.4	24.0	26.4	2.0	11.0	13.0	2.2	11.1	13.3	1.8	8.8	10.6	10.3	69.1	79.3	**0.24**	**2.42**	**1.11**
6. Engineering Base Cost Sub-total	0.4	1.4	1.7	17.1	70.4	87.4	421.8	276.5	698.3	1,117.7	852.5	1,970.2	1,063.6	1,065.2	2,128.9	601.9	587.8	1,189.7	3,222.4	2,853.8	6,076.2	**75.30**	**100.00**	**85.18**
7. Land Acquisition; Compensation; Administration & Utility Relocation	182.1	0.0	182.1	263.7	0.0	263.7	64.7	0.0	64.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	510.5	0.0	510.5	**11.93**	**0.00**	**7.16**
8 add: 10% physical contingency	18.2	0.0	18.2	26.4	0.0	26.4	6.5	0.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.1	0.0	51.1	**1.19**	**0.00**	**0.72**
9. Duty & Levies on Imports	0.0	0.0	0.0	0.0	0.0	0.0	8.8	0.0	8.8	38.3	0.0	38.3	48.6	0.0	48.6	26.5	0.0	26.5	122.1	0.0	122.1	**2.85**	**0.00**	**1.71**
10. Ppn (VAT)	18.2	0.0	18.2	28.1	0.0	28.1	48.6	0.0	48.6	111.8	0.0	111.8	106.4	0.0	106.4	60.2	0.0	60.2	373.3	0.0	373.3	**8.72**	**0.00**	**5.23**
11. GOI Contribution Sub-total	218.6	0.0	218.6	318.1	0.0	318.1	128.6	0.0	128.6	150.0	0.0	150.0	154.9	0.0	154.9	86.7	0.0	86.7	1,057.0	0.0	1,057.0	**24.70**	**0.00**	**14.82**
12. Project Base Cost (All resources)	218.9	1.4	220.3	335.2	70.4	405.6	550.4	276.5	826.9	1,267.7	852.5	2,120.2	1,218.6	1,065.2	2,283.8	688.6	587.8	1,276.4	4,279.4	2,853.8	7,133.2	**100.00**	**100.00**	**100.00**
13. Working Capital Requirements	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
14. Interest During Construction (IDC)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	68.3	0.0	68.3	158.5	0.0	158.5	187.7	0.0	187.7	414.6	0.0	414.6			
15. Total Capital Cost Estimate	**218.9**	**1.4**	220.3	**335.2**	**70.4**	405.6	**550.5**	**276.5**	827.0	**1,336.0**	**852.5**	2,188.5	**1,377.1**	**1,065.2**	2,442.3	**876.3**	**587.8**	1,464.1	**4,694.0**	**2,853.8**	**7,547.8**			

Source: JICA Study Team.

Notes: 1. All figures are based on the respective quarterly drawdown schedule. Minor differences to other tables are due to rounding.
2. The working capital requirements for 2006 will be financed by the implementing entity from operational revenues.
3. The interest rate for IDC is assumed at 5% concessional terms from the Central Government of Indonesia to the implementing entity.

7.4.4 Financial Cash Flow and Debt Service Analysis

(1) Financing Structure & Plan for Selected Option

The total loan financing need according to the project structure identified in the previous Table 7.4.7 would amount to Rupiah 4,045.1 billion, excluding IDC of about Rupiah 414.6 billion. The following assumptions were used in determining the financing structure and long-term debt service requirements:

- There will be only one long-term loan covering the total above amount. The loan will be obtained under sovereign guarantee conditions and on-lend to the implementing entity.
- On-lending terms & conditions by the central Government to the implementing entity will be: repayment duration n = 40 years; interest rate i = 5% per year; a ten year grace period on principal repayment.
- Interest during construction is capitalized.
- Repayment is in Rupiah to the central Government.
- Repayment calculation is in accordance with the declining balance method, and
- Repayment is at period end, here year end.

(2) Loan Requirements and Repayment Schedules

The repayment schedule identifying the annual debt service schedule over the total repayment period, i.e. up to the year 2041, is identified in Table 7.4.11.

Key features of the long-term debt are:

- The total debt service over the 40 years repayment period amounts to a total of Rupiah 9,474.2 billion.
- This total reflects Rupiah 4,458.5 billion principal repayments and Rupiah 5,015.7 billion in interest payments under the terms & conditions defined before. In other words, about 47.1 percent of total debt service are for servicing the principal payments and the balance of about 52.9 percent are to service interest payments.
- The highest debt service payments are to start with the life cycle year 16 (calendar year 2016) when the first repayment of principal occurs.

Table 7.4.11 Long-term Debt Service Requirements

(Unit: Billion Rupiah)

Calendar Year	Loan Year	Disbursement Schedule	Interest on Disbursed Loan	Interest on Outstanding Loan Balance	Total IDC	Outstanding Loan Balance	Repayment Principal	Interest due on Balance	Total Debt Service
2001	**1**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	**2**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	**3**	1.10	0.11	0.00	1.20	0.00	0.00	0.00	0.00
2004	**4**	1,360.20	68.26	0.06	68.32	1,433.52	0.00	0.00	0.00
2005	**5**	1,736.90	86.85	71.67	158.52	3,328.94	0.00	0.00	0.00
2006	**6**	941.80	47.09	91.19	187.68	4,458.42	0.00	222.92	222.92
2007	**7**	0.00	0.00	49.40	0.00	4,458.42	0.00	222.92	222.92
2008	**8**	0.00	0.00	0.00	0.00	4,458.42	0.00	222.92	222.92
2009	**9**	0.00	0.00	0.00	0.00	4,458.42	0.00	222.92	222.92
2010	**10**	0.00	0.00	0.00	0.00	4,458.42	0.00	222.92	222.92
2011	**11**	0.00				4,458.42	0.00	222.92	222.92
2012	**12**	0.00				4,458.42	0.00	222.92	222.92
2013	**13**	0.00				4,458.42	0.00	222.92	222.92
2014	**14**	0.00				4,458.42	0.00	222.92	222.92
2015	**15**	0.00				4,458.42	0.00	222.92	222.92
2016	**16**	0.00				4,286.94	171.48	214.35	385.83
2017	**17**	0.00				4,115.46	171.48	205.77	377.25
2018	**18**	0.00				3,943.98	171.48	197.20	368.68
2019	**19**	0.00				3,772.50	171.48	188.63	360.11
2020	**20**	0.00				3,601.02	171.48	180.05	351.53
2021	**21**	0.00				3,429.54	171.48	171.48	342.96
2022	**22**	0.00				3,258.06	171.48	162.90	334.38
2023	**23**	0.00				3,086.58	171.48	154.33	325.81
2024	**24**	0.00				2,915.10	171.48	145.76	317.24
2025	**25**	0.00				2,743.62	171.48	137.18	308.66
2026	**26**	0.00				2,572.14	171.48	128.61	300.09
2027	**27**	0.00				2,400.66	171.48	120.03	291.51
2028	**28**	0.00				2,229.18	171.48	111.46	282.94
2029	**29**	0.00				2,057.70	171.48	102.89	274.37
2030	**30**	0.00				1,886.22	171.48	94.31	265.79
2031	**31**	0.00				1,714.74	171.48	85.74	257.22
2032	**32**	0.00				1,543.26	171.48	77.16	248.64
2033	**33**	0.00				1,371.78	171.48	68.59	240.07
2034	**34**	0.00				1,200.30	171.48	60.02	231.50
2035	**35**	0.00				1,028.82	171.48	51.44	222.92
2036	**36**	0.00				857.34	171.48	42.87	214.35
2037	**37**	0.00				685.86	171.48	34.29	205.77
2038	**38**	0.00				514.38	171.48	25.72	197.20
2039	**39**	0.00				342.90	171.48	17.15	188.63
2040	**40**	0.00				171.42	171.48	8.57	180.05
2041	**41**	0.00				0	171.50	0.00	171.50
Accumulated Total		**4,045.00**	**202.3**	**212.3**	**414.6**	**n.a.**	**4,458.5**	**5,015.7**	**9,474.2**

Source: JICA Study Team.

Note: Interest on the outstanding loan balance year-end 2006 in the amount of 54.10 billion Rupiah has been capitalized at 2006 year end.

(3) Estimated Revenues

Revenues were estimated based on projections in sectional PCU-km-day from the demand model[8] and the following assumptions and/or modeling results were used in estimating revenues first in constant 2000 prices:

- Traffic volume was estimated in PCU/km/day for the three toll rate categories GOL I, GOL IIA and GOL IIB
- A distance proportional toll rate of Rupiah 330/km[9] was assumed and the existing multipliers were taken to convert into GOL IIA rate of Rupiah 495 (factor 1.5) and GOL IIB of Rupiah 660. (factor 2)
- The split among the toll rate categories from the model were applied.
- The sectional travel distance was applied
- The annual PCU-km was computed and based on the toll category split, toll revenues over the life span of the JORR project was obtained in constant 2000 prices.

(4) Results of Basic Debt Service Analysis

The results of the debt service capability of the JORR project in constant 2000 prices are presented in Table 7.4.12 and summarized as:

- The implementing entity shows a positive net cash flow after long-term financing already in the project implementation period 2000 to 2005. This is due to the fact that the implementing entity, while covering O&M expenditures for the existing JORR Sections S and E2 is also the direct beneficiary of revenues generated by Sections S and E2.
- Total accumulated net cash flow in the year 2005 after long-term financing is around Rupiah 821.3 billion.
- It is not necessary, because of this situation, to include in 2006 a financing component for working capital into the capital costs, since it can be assumed that such working capital will be financed from the accumulated net cash flow.
- The net cash flow after opening to traffic of the full JORR in 2006 is in all projects life cycle years positive. Hence, no short-term bridging financing will be needed.

[8]) See Chapter 4.
[9]) The implications for assuming either a different toll rate and/or an open or closed toll collection system for the project are discussed in the following Chapter 8.

Table 7.4.12 Projected Cashflow JORR Project Excluding Debt for Equity Swap for existing Assets (Traffic Information and Control System JORR Configuration Only)

(Unit: million Rupiah)

Year	Project Cycle	Cashinflow	CASH OUTFLOW				Net Cashflow	FINANCING INFLOW					FINANCE OUTFLOW				Net Cashflow	Cumulative	Corporate	Net Cashflow	Balance
		Total System Revenues	Capital Cost	O&M Cost	ROE	Total Outflow	Before Financing	Equity	Foreign LT Loan	Other LT Loan	Total Inflow	Cumulative Inflow	Foreign LT Repayment	Other LT Repayment	Total Debt Service	Net Financing	after LT Financing	Net Cashflow after LTF	Tax Payments	after Tax	after ST Financing
2000	-6	103,630	0	-8,083	0	-8,083	95,547	0	0	0	0	0	0	0	0	0	95,547	95,547	0	0	0
2001	-5	109,300	-220,300	-8,083	0	-228,383	-119,083	218,200	0	0	218,200	218,200	0	0	0	218,200	99,117	194,664	0	0	0
2002	-4	117,500	-405,600	-8,083	0	-413,683	-296,183	396,800	0	0	396,800	615,000	0	0	0	396,800	100,617	295,281	0	0	0
2003	-3	123,190	-827,400	-8,083	0	-835,483	-712,293	825,800	24	0	825,824	1,440,824	0	0	0	825,824	113,531	408,812	0	0	0
2004	-2	124,090	-2,188,300	-8,083	0	-2,196,383	-2,072,293	760,000	1,428,870	0	2,188,870	3,629,694	0	0	0	2,188,870	116,577	525,389	0	0	0
2005	-1	304,000	-2,442,100	-8,083	0	-2,450,183	-2,146,183	546,900	1,895,160	0	2,442,060	6,071,754	0	0	0	2,442,060	295,877	821,266	0	0	0
2006	0	317,832	-1,463,500	-20,356	0	-1,483,856	-1,166,024	340,500	1,123,020	0	1,463,520	7,535,274	-222,920	0	-222,920	1,240,600	74,576	895,842	0	0	0
2007	1	332,293	0	-40,711	0	-40,711	291,582	0	0	0	0		-222,920	0	-222,920	-222,920	68,662	964,504	0	0	0
2008	2	347,413	0	-40,711	0	-40,711	306,702	0	0	0	0		-222,920	0	-222,920	-222,920	83,782	1,048,286	0	0	0
2009	3	363,220	0	-40,711	0	-40,711	322,509	0	0	0	0		-222,920	0	-222,920	-222,920	99,589	1,147,875	0	0	0
2010	4	379,746	0	-40,711	0	-40,711	339,035	0	0	0	0		-222,920	0	-222,920	-222,920	116,115	1,263,990	0	0	0
2011	5	397,025	0	-74,632	0	-74,632	322,393	0	0	0	0		-222,920	0	-222,920	-222,920	99,473	1,363,463	0	0	0
2012	6	415,090	0	-40,711	0	-40,711	374,379	0	0	0	0		-222,920	0	-222,920	-222,920	151,459	1,514,922	0	0	0
2013	7	433,976	0	-40,711	0	-40,711	393,265	0	0	0	0		-222,920	0	-222,920	-222,920	170,345	1,685,267	0	0	0
2014	8	453,722	0	-40,711	0	-40,711	413,011	0	0	0	0		-222,920	0	-222,920	-222,920	190,091	1,875,358	0	0	0
2015	9	474,400	0	-40,711	0	-40,711	433,689	0	0	0	0		-222,920	0	-222,920	-222,920	210,769	2,086,127	0	0	0
2016	10	523,700	0	-74,632	0	-74,632	449,068	0	0	0	0		-385,830	0	-385,830	-385,830	63,238	2,149,365	0	0	0
2017	11	544,800	0	-40,711	0	-40,711	504,089	0	0	0	0		-377,250	0	-377,250	-377,250	126,839	2,276,204	0	0	0
2018	12	567,300	0	-40,711	0	-40,711	526,589	0	0	0	0		-368,680	0	-368,680	-368,680	157,909	2,434,113	0	0	0
2019	13	589,000	0	-40,711	0	-40,711	548,289	0	0	0	0		-360,110	0	-360,110	-360,110	188,179	2,622,292	0	0	0
2020	14	611,500	0	-40,711	0	-40,711	570,789	0	0	0	0		-351,530	0	-351,530	-351,530	219,259	2,841,551	0	0	0
2021	15	*633,100*	0	-74,632	0	-74,632	558,468	0	0	0	0		-342,960	0	-342,960	-342,960	215,508	3,057,059	0	0	0
2022	16	*656,200*	0	-40,711	0	-40,711	615,489	0	0	0	0		-334,380	0	-334,380	-334,380	281,109	3,338,168	0	0	0
2023	17	*656,200*	0	-40,711	0	-40,711	615,489	0	0	0	0		-325,810	0	-325,810	-325,810	289,679	3,627,847	0	0	0
2024	18	*656,200*	0	-40,711	0	-40,711	615,489	0	0	0	0		-317,240	0	-317,240	-317,240	298,249	3,926,096	0	0	0
2025	19	*656,200*	0	-40,711	0	-40,711	615,489	0	0	0	0		-308,660	0	-308,660	-308,660	306,829	4,232,925	0	0	0
2026	20	*656,200*	0	-74,632	0	-74,632	581,568	0	0	0	0		-300,090	0	-300,090	-300,090	281,478	4,514,403	0	0	0
2027	21	*656,200*	0	-40,711	0	-40,711	615,489	0	0	0	0		-291,510	0	-291,510	-291,510	323,979	4,838,382	0	0	0
2028	22	*656,200*	0	-40,711	0	-40,711	615,489	0	0	0	0		-282,940	0	-282,940	-282,940	332,549	5,170,931	0	0	0
2029	23	*656,200*	0	-40,711	0	-40,711	615,489	0	0	0	0		-274,370	0	-274,370	-274,370	341,119	5,512,050	0	0	0
2030	24	*656,200*	0	-40,711	0	-40,711	615,489	0	0	0	0		-265,790	0	-265,790	-265,790	349,699	5,861,749	0	0	0
2031	25	*656,200*	0	-74,632	0	-74,632	581,568	0	0	0	0		-257,220	0	-257,220	-257,220	324,348	6,186,097	0	0	0
Accumulated Values		**14,827,827**	**-7,547,200**	**-1,256,234**	**0**	**-8,803,434**	**6,024,393**	**3,088,200**	**4,447,074**	**0**	**7,535,274**	**n.a.**	**-7,373,570**	**0**	**-7,373,570**	**161,704**	**6,186,097**	**n.a.**			

Source: JICA Study Team.

Notes: 1.) The computation allows for 5% return on equity (ROE) during the first five operational years and 20% in the years thereafter (before tax). No ROE will be paid during the construction period.

2.) The capital cost exclude the equity portion of Rp. 830,800 million for the existing assets due to the assumed debt for equity swap, which is cashflow neutral.

3.) ROE = return on equity. Computation is based on net cashflow after long-term financing.

4.) n.a. = not applicable.

Chapter 8

Strategic Realization Scenario & Suggested Realization Plan

8. Strategic Realization Scenarios & Suggested Realization Plan

8.1 Toll Road Policy Direction

8.1.1 General

The realization of the JORR project should also be viewed, scrutinized and judged from a broader perspective of future long-term toll road development in West Java and Indonesia in general.

The JORR toll way is not going to be the last toll road that is ever going to be built in Indonesia and it is, therefore, useful and necessary in the context of this project specific assessment exercise to also look briefly at the JORR project with a birds-eye view from the following perspectives:

- Medium to long-term road and toll road development policy (covering all roads, i.e. across the road hierarchy and also toll road operations and maintenance)
- Adequacy, transparency and fairness to the transport sector consumer, including toll roads, pricing policy, and
- Overall adequacy of the regulatory framework.

The development of transport sector means[1] and adequacy in transport sector pricing plays a crucial role in connecting spatially dispersed production with consumption centers, and vice versa. Adequate transport sector development is a prerequisite for supporting accelerated economic growth, conversely inadequate transport sector development will be an obstacle to advanced economic growth performance. In fact, the insufficient levels of investment in the past and delays in the implementation of previously programmed road and toll road projects may now hinder economic recovery.

8.1.2 Road/Toll Road Development Policy

Policy formulation and policy implementation is and must remain a government function. Indonesia with her vast diversity should have a long-term, say ten to 15 year, road and toll road development policy, in which the identification of individual road/toll road projects is based on clearly established needs, of which demand is one of the important indicators. The same holds obviously true for the Jabotabek region. The hierarchy level of the road project in question determines the rest of close cooperation and coordination between central and local Government levels.

Project identification, formulation and project prioritization is and must also remain a government function that should not be substituted for by unsolicited private sector project proposals. The major policy objective should, inter alia, be

[1]) In the physical sense, that is air, inland water, road, rail infrastructure, transport vehicles, public transport sector means and so on.

to ensure system integration among transport modes, public and private use, as well as system integration within a single mode, for example the road system. The prioritization among individual road/toll road projects should be based on clear and transparent criteria, in principle the project, economic and financial viability. Economic and financial viability considerations, the most important of which is reflected in a project's IRR/ROI computations, should only be acceptable to decision takers, if & when such computations follow internationally accepted standards, such as those used by international financial assistance organizations. The professional integrity of the numerical framework is a standard that must be ensured by all means.

As is the case in many other countries, public funds for road/toll road development, especially in urban and mega-urban centers, are insufficient to meet investment needs in such roads and the gap between investment needs and investment means available from public funds is likely to continue in future. This is the reason for the strong calls in recent years for a wider and broader private sector participation in toll road construction and their operations and management.

However, it must be kept in mind that toll road development projects are in themselves relatively high-risk undertakings. This is so because of the complexities involved in traffic flows and, therefore, the difficulties associated with obtaining low error margin demand forecasts for a particular project within a given system configuration. Private sector capital, on the other hand, needs predictability and, therefore, low risk. This is the reason why many concessionaire toll road contracts in reality end up with "guaranteed return on equity" clauses in favor of the private investor, thus insuring the private investor against project inherent risks. It must be stressed that such guarantee clauses imply an implicit subsidy to private capital. Needless to say such policy, which is against public interest, should be avoided.

As regards public roads, many countries are now pursuing the establishment of "road maintenance funds", since established public funds are insufficient to sustain proper maintenance level of the roads already built with public funds.

There are many possible approaches toward construction, operations and maintenance of toll roads and the GOI should establish a clear policy in that area of concern, which is based on experience gained so far and on case-by-case or project-by-project evidence. Principal modus operandi are:

- Concessionaire or pure private sector approach. The private concessionaire finances, builds, operates and maintains (O&M) the toll road (Indonesia's past practice) under various schemes, such as "build-operate-transfer" BOT, "build-own-operate-transfer" BOOT, "design-build-operate-transfer" (DBOT), and so on
- Basically public sector approach. The public sector provides the financing for the toll road project itself as a public sector endeavor. If O&M remains also a public function, then this would be the "classical" public sector function approach
- Public-Private-Partnership (PPP). The PPP approach has many forms. For example, the public sector provides the financing for the toll road project itself as a public sector endeavor. However, the operations and maintenance

function are leased out to a private sector party over a specified time frame, which does not necessarily have to be identical with the life span of the project. Or, the private sector participates in equity, while the O&M function remains in the public domain. Or, the private sector partner is an equity partner and at the same time assumes the O&M function. However, which of these options is the most realistic and therefore feasible depends on many factors, the most important of which are the individual project related risk expressed by its ROI/IRR, the legally binding toll rate adjustment mechanism and the overall regulatory framework.

8.2 Strategic Scenarios for Implementing the JORR Project

8.2.1 Alternative Strategic Scenarios

It has to be highlighted clearly from the onset that JORR project implementation can only be realized within the prevailing existing Indonesian legal framework and that framework delegates the authority to implement toll roads, including O&M operations, to P.T. Jasa Marga[2]. The existing regulatory framework allows P.T. Jasa Marga to do so in collaboration with "third parties". In fact, P.T. Jasa Marga operates a number of toll roads with private sector investors usually under toll road revenue sharing agreements.

There are, in principle, four strategic scenarios on how to proceed with JORR project realization. In addition to the project specific EIRR and ROI performance indicators presented in Chapter 7, the Study Team employed a set of assessment factors, in order to arrive at a considered opinion on the level of realism and/or merits and demerits of each of these scenarios. The assessment factors are:

- Time factor, or time needed to complete the JORR
- Impact on JORR configuration
- Impact on "implementing entity"
- Impact on outstanding legal issues with old concessionaires
- Impact on financing terms & conditions
- Impact on toll way development policy, and
- Impact on the domestic economy.

The basic approach under each of the strategic scenarios is in brief:

- **Strategic scenario 1.** This option entails that P.T. Jasa Marga implements the JORR project out of its own resources and merit
- **Strategic scenario 2.** This entails that P.T. Jasa Marga teams up with a domestic private sector partner under a new concessionaire agreement.

[2]) The GOI discusses currently a new road law, which may change certain factors in the overall enabling environment. However, any assumption would be speculative until the date such new law is passed. Consult with Annex 3-1 for details.

- **Strategic scenario 3.** This entails that P.T. Jasa Marga teams up with on overseas private sector strategic partner under a new concessionaire agreement. (of course, a combination of scenarios 2 and 3 is also possible), and
- **Strategic scenario 4.** This entails that P.T. Jasa Marga implements the JORR project with the assistance of a long-term sovereign guaranteed ODA loan that is extended under "best available" terms & conditions.

8.2.2 Assessment of Alternative Strategic Scenarios

The assessment alternative strategic scenario were assessed as follow:

(1) **Strategic Scenario 2 and 3**

The JICA Study Team is of the considered opinion that the quick realization of this approach is highly unlikely for the following reasons. The JORR is a very capital-intensive project with a relatively modest project specific ROI of only 6.55 percent (constant price base), or in other words the return on investment for one US dollar is only 6.55 cents per annum (or 11.6 percent under the best of circumstances, namely an underestimation of demand by 20 percent and on overestimation of base cost by also 20 percent). It is very difficult to imagine how either domestic and/or overseas private capital could come up with the necessary financing, either on a cash and/or loan basis.

There is no long-term capital market in Indonesia[3] from commercial banks, which are anyway under restructuring. Financing the JORR at around 16 percent interest per year is, under the given ROI, unrealistic. The situation for overseas private sector capital is even more complicated. Unless such partner can come up with the needed capital in cash (in itself an unlikely scenario, because of the amounts involved), such partner would have to borrow on the overseas capital market, most likely in US dollars. Such borrowing would have to be collateralized by the overseas borrower with overseas assets, since it is highly unlikely that an overseas bank would accept Rupiah based revenues as security. In addition, overseas borrowing by a private entity would be based on the formula: LIBOR[4] plus margin for country risk, plus margin for project risk. The LIBOR rate for US dollars is currently around 6.7 percent. Adding country and project risk could result in a lending rate (if the loan can be properly collateralized) of over ten percent per year in US dollar terms. The JORR project can simply not carry such a dollar based debt burden, even if the Rupiah exchange rate would be less volatile.

That leaves the possibility of private capital as portfolio investor. However, this, too, appears to be unlikely, because the implementing entity would have to guarantee a certain return, most likely also US dollar dominated. Such guaranteed returns in similar projects can range anywhere between 15 to 20 percent per year on the private sector equity portion (US dollar base). The Study Team sees no merit in such approach, which would amount to a risk free private capital subsidy. Even if one assumes that either domestic and/or overseas private

[3]) The longest-term money is for certain Government bonds at 9 years and an interest rate of 16.5 percent.
[4]) London Interbank Offering Rate.

sector capital can be identified quickly and that no guaranteed return on equity (ROE) would be involved, financial closure of such project could not proceed.

This is so because (a) there is no standardized "authorization agreement" yet, on which P.T. Jasa Marga could base its negotiations, and (b) there is no new legal mechanism yet in Indonesia that regulates toll rate adjustments. However, such a mechanism is a prerequisite for the authorization agreement to become bankable.

In short, the Study Team considers these two options have too many demerits and real obstacles to be viable over the short term and under prevailing circumstances. Some numerical considerations are presented and discussed later in this Chapter with a view to support this assessment

(2) **Strategic Scenario 1**

This option is indeed a possibility. However, it has also strong demerits, which cannot be dismissed easily. First, the JORR capital requirements are much too large for P.T. Jasa Marga to be shouldered alone. Hence, it is likely that P.T. Jasa Marga would have to implement the JORR section by section, in order to minimize risk and reduce strongly capital requirements through phasing over time. Since there is no long-term capital market in Indonesia, P.T. Jasa Marga would have to finance the sections at market rates of around 16 percent per year with term money that does not match the life cycle of the project. It is likely that such approach would render the individual sections not viable from a financial point of view. In short, the Study Team considers this option possible, but not representing an optimal approach to the question at hand

(3) **Strategic Scenario 4**

The Study Team considers this option has the most merits and the most viable one. This is so because lending terms could be matched to the life cycle of the project at the lowest possible interest rate for both, the GOI and the implementing entity, since the on-lending rate is determined by the GOI and could be determined flexibly, reflecting project risk conditions. In addition, the JORR could be implemented in the shortest time possible and in one piece. The project risk could be hedged against through proper risk distribution among the stakeholders and the issues pertaining to the existing JORR assets and related liabilities of the old concessionaires could be addressed to a certain degree.

There are other advantages, such as toll road system integration. The JORR is not going to be the last toll road to be realized in Indonesia. System integration considerations (in physical and toll rate level terms) will become more pressing in future. In short, the Study Team considers this option has the highest level of merits.

The factors of assessment for the strategic scenarios are summarized in Table 8.2.1.

Table 8.2.1 Strategic Scenarios for Implementing the JORR Project

Factors of Assessment	Strategic Scenario 1 P.T. Jasa Marga "on its own"	Strategic Scenario 2 P.T. Jasa Marga with a domestic private sector strategic partner	Strategic Scenario 3 P.T. Jasa Marga with an overseas private sector strategic partner	Strategic Scenario 4 P.T. Jasa Marga with long-term concessional ODA financing
Time needed for JORR realization	Overall negative: JORR realization in sequence and section-wise, due to huge capital needs exceeding PT Jasa Marga's capital raising capacity.	Somewhat negative, because of difficulty to control & supervise private concessi-onaire. Case is unlikley, due to huge capital needs and lack of "bankable" AA.	Same as "Strategic Option 2".	Overall positive, since JORR could be completed in "one piece". Risk of all parties can be hedged through proper risk distribution.
Impact on JORR confi-guration	Negative, because of fragmentation	Neutral, if capital-strong partner can be identified	Neutral, if capital-strong partner can be identified	Positive, since unfragmented realization possible
Impact on "implementing entity"	Project size is too large for PT Jasa Marga. New legal entity will have to be established to hedge against project risk. Alternatively, implement section by section in a sequential manner.	New legal entity will be established by strategic partner, in which PT Jasa Marga will be equity holder. However, highly likely that there will have to be a guaranteed ROE for private sector partner.	New legal entity will be established by strategic partner, in which PT Jasa Marga will be equity holder. However, highly likely that there will have to be a guaranteed ROE for private sector partner.	New legal entity will have to be estab-lished to hedge against project risk. Risk control depends on risk distribution between central Government, PT Jasa Marga and "implementing entity".
Impact on outstanding legal issues with old concessionaires	PT Jasa Marga will have to assume ownership of "assets" and "liabilities" with impact on debt-service and cash flow	Unclear, since private partner is unlikly to burden himself with old "liabilities". If so, some form of risk guarantee by the GOI will be required. (Implicit subsidy)	Unclear, since private partner is unlikly to burden himself with old "liabilities". If so, some form of risk guarantee by the GOI will be required. (Implicit subsidy)	PT Jasa Marga will have to assume ownership of "assets" and "liabilities" with impact on debt-service and cash flow. However, risk can be hedged through proper risk distribution
Impact on financing terms & conditions	No long-term financial market. Hence, financing terms cannot meet life-cycle of project. High domestic interest rates, which project may not be capable of servicing	No long-term financial market. Hence, financing terms cannot meet life-cycle of project. High domestic interest rates, which project may not be capable of servicing. Private partner will insist on risk guarantees.	If financing is obtained off-shore in foreign currency, project can not shoulder debt-service. This is only possible, if the GOI inherently gurantees against all project risks, including foreign exchange risks	Financing would be perfect in matching life cycle with lending terms at lowest possible interest rate. Risk for "implemen-ting entity" depends on on-lending rate provided by GOI
On toll way development policy	System integration possible	System integration not possible	System integration not possible	System integration possible
Impact on domestic economy	Fragmented & distributed over longer period of time	Depends on strategic partner	Depends on strategic partner	Roughly 48% of project cost over the coming five to six years

Source: JICA Study Team

Note : 1.) AA means "Authorization Agreement", which is the agreement between PT Jasa Marga and any private sector concessionaire. This agreement is presently not bankable, due to a lack of a new toll rate

8.3 JORR Project Financial Viability Constraints to Private Sector Approach

8.3.1 General

Chapter 7 has already established the JORR project's limited return on investment performance of 6.55 percent for the financial base case. However, in view of the strong interest of some Indonesian stakeholders in a pure private or PPP approach to JORR project realization, the Study Team has investigated to the extent necessary to make the point two additional questions. They are:

1) What is the order of magnitude of the JORR project's financial internal rate of return (FIRR, in current prices) if reasonable price escalation assumptions are introduced into the IRR equation on the project cost and project revenue stream sides, and
2) Would the implementing entity be in a position to service in the initial operating years of the JORR long-term debt service, if capital is raised at say prevailing Indonesian capital market conditions.

8.3.2 FIRR in Current Prices

The key points of the above mentioned two issues are discussed below. The project ROI is calculated based on constant prices and it reflects, therefore, the project's fundamental viability and capacity to generate a return which is then used to repay debts, generate any return on equity (ROE), pay taxes and generate gross/net profit for the implementing entity. However, in reality the financial internal rate of return (FIRR based on current prices) may differ depending on price escalation assumptions employed for adjusting:

- Project cost over the implementation cycle of the project,
- O&M cost over the life span of the project, and
- Projected revenues, which are a direct function not only of traffic demand in terms of PCU/km per year, but also toll levels and the magnitude and sequence of toll rate adjustments over the life span of the project.

The following fundamental assumptions were made, in order to determine the ranges of the current price base FIRR:

1) **Capital Requirements**. The total capital requirement for JORR project implementation remains the same, i.e. about Rupiah 7,547 billion, equivalent to about US dollar 949.3 million or Japanese ¥ 100,631 million[5].
2) **Debt to Equity Structure.** Remains the same as for the financial base case, i.e. equity portion of 43.3% and debt portion of 56.7%.
3) **Equity Structure.** It is assumed here that the private sector partner will want to be minority shareholder with say 49% of equity, equivalent to about Rupiah 1,420.6 billion (equivalent to roughly US dollar 178.7 million at the

[5]) See Table 7.3.12 in Chapter 7.

exchange rate applied throughout this Study). It is further assumed for the sake of simplicity that the private sector partner is a pure portfolio investor that is interested in a reasonable return on equity (ROE), but not in the O&M of the JORR project[6]. The remaining 51% of equity are to be provided by P.T. Jasa Marga and other interested public stakeholders. An important point to be highlighted in this context is the fact that an equity "in kind" contribution by the GOI in the form of a debt for equity swatch (as is the case for the financial base case considerations) worth some Rupiah 830.8 billion representing the value of the existing JORR assets is, for obvious reasons, highly unlikely. Hence, that amount will have to be financed somehow.

4) **Debt Structure.** It is assumed that private sector partner raises Rupiah 4,045.1 billion on the Indonesian domestic market. It is further assumed that this long-term loan is collateralized with overseas assets, since future toll way revenues cannot be used for that purpose yet, due to lack of a proper legal toll rate adjustment mechanism. The terms & conditions for the Rupiah-based loan are: repayment period "n" is 10 years, the interest rate "i" is 20% payable at the beginning of the period (year-start), repayment terms is declining balance and no grace period is granted.

5) **Revenue and O&M Streams of the Existing Sections "S" and "E2".** It is assumed that the implementing entity with private sector portfolio participation will also be the beneficiary of the revenue streams generated during construction by Sections "S" and "E2", since the majority shareholder of the implementing entity remains the GOI or its representative. It is also assumed that O&M expenditures for both existing sections will be covered by the implementing entity.

6) **Traffic Demand & Toll System**. The same traffic demand and the same toll collection system (i.e. distance proportional) as for the financial base case 1 is assumed.

7) **Toll Rate and Toll Rate Adjustment Mechanism.** Though there is no legal basis for such a mechanism yet, it was assumed that the GOI would pass legislation that allows for adjusting toll rates in line with both inflation and real per capita increases estimated in the 5 percent range. It is assumed that toll rates are adjusted annually, but that adjustment realization is allowed only in every three years.

8) **O&M Costs.** They are price increased with the price escalation assumptions outlined in Chapter 7.

9) **Capital Costs.** They are price increased with the price escalation assumptions outlined in Chapter 7**.**

Table 8.3.1 summarizes the FIRR equation that can be obtained when employing the assumptions as outlined above. The result is a financial internal rate of return of about 16.7 percent on all resources invested. It has to be stressed, however, that such calculation is speculative only, since the underlying toll rate adjustment mechanism, which in itself is very optimistic, simply does not or not yet exist in Indonesia. Furthermore, it can also be concluded already that a 16.7 percent

[6]) Whether such assumption would meet the requirements of the GOI is not considered here.

financial internal rate, which is the overall financial return generated by all invested resources, can hardly be enough to cover long-term debt service at a 20 percent interest rate, generate a reasonable ROE for all implementing entity stakeholders and generate a reasonable gross profit margin for the implementing entity itself. If the toll rate is assumed to increase at CPI (7% p.a.) the resulting FIRR reaches only 10.9% as presented in Table 8.3.2.

This likely reality is illustrated further in the implementing entities capability to service in the initial years of operations long-term debt service and other related changes in key parameter resulting from private capital market financing. They are summarized as:

1) The total capital requirements for the JORR project increase to Rupiah 8,720.5 billion (equivalent to about US dollar 1,096.9 million) due to the high interest-during-construction cost caused by the commercial terms & conditions of the loan, of which an estimated Rupiah 1,587.3 billion (equivalent to about US dollar 199.7 million) alone are IDC.
2) The total ten years commercial loan would therefore amount to roughly Rupiah 5,632 billion.
3) Total loan repayment over ten years under assumed terms & conditions would amount to Rupiah 11,828 billion (roughly equivalent to US dollar 1,487.8 million), out of which some 52 percent or Rupiah 6,196 billion are interest payments alone.
4) The implementing entity's accumulated cash inflow from system revenues (including toll rate adjustments) over the period 2000 to 2010 would amount to about Rupiah 5,851 billion.
5) The implementing entity's total O&M expenditures would amount over the same period to about Rupiah 282 billion.
6) In other words, this approach has little chance to survive the first ten years of operations, since total cash inflow from system revenues in the amount of Rupiah 5,851 billion is insufficient to finance a total cash outflow over the same period of Rupiah 11,828 billion for long-term debt service and Rupiah 282 billion for O&M related cash outflow
7) The computation assumes already that the equity portion of the private sector portfolio investor will be financed from retained earnings, or in other words no additional loan and financing cost are involved.

Table 8.3.1 JORR Project Financial Internal Rate of Return

(current price base)

(Unit: million Rupiah)

Implementing Entity with Private Sector Participation

Calendar Year	Cycle Year	Base Cost	O&M Cost	Revenue	Net Revenue
2000	-6	0	(8,083)	103,630	95,547
2001	-5	(220,300)	(8,689)	109,300	(119,689)
2002	-4	(405,600)	(9,341)	159,800	(255,141)
2003	-3	(826,900)	(10,041)	167,538	(669,403)
2004	-2	(2,120,200)	(10,895)	168,762	(1,962,333)
2005	-1	(2,283,800)	(11,821)	522,880	(1,772,741)
2006	0	(1,276,400)	(22,086)	546,671	(751,815)
2007	1	0	(44,171)	571,544	527,373
2008	2	0	(47,926)	755,498	707,572
2009	3	0	(52,000)	789,871	737,871
2010	4	0	(56,420)	968,741	912,321
2011	5	0	(80,976)	1,162,252	1,081,276
2012	6	0	(66,419)	1,215,133	1,148,714
2013	7	0	(72,065)	1,433,762	1,361,697
2014	8	0	(78,191)	1,499,104	1,420,913
2015	9	0	(84,837)	1,654,892	1,570,055
2016	10	0	(121,760)	1,917,696	1,795,936
2017	11	0	(99,872)	1,996,896	1,897,024
2018	12	0	(108,361)	2,073,280	1,964,919
2019	13	0	(117,572)	2,372,620	2,255,048
2020	14	0	(127,566)	2,456,428	2,328,862
2021	15	*0*	(183,085)	2,456,428	2,273,343
2022	16	*0*	(150,174)	2,456,428	2,306,254
2023	17	*0*	(162,939)	2,456,428	2,293,489
2024	18	*0*	(176,788)	2,456,428	2,279,640
2025	19	*0*	(191,815)	2,456,428	2,264,613
2026	20	*0*	(275,297)	2,456,428	2,181,131
2027	21	*0*	(225,809)	2,456,428	2,230,619
2028	22	*0*	(245,003)	2,456,428	2,211,425
2029	23	*0*	(265,828)	2,456,428	2,190,600
2030	24	*0*	(288,424)	2,456,428	2,168,004
2031	25	*0*	(413,952)	2,456,428	2,042,476
Accumulated		*(7,133,200)*	*(3,818,206)*	*49,667,006*	*38,715,600*
FIRR					***16.66%***

Source: JICA Study Team.

Notes: 1.) Capital cost streams on a "before financing" basis.
2.) O&M cost price escalated as per factors in Table 7.3.8.
3.) Revenue increases as per outlined toll rate adjustment assumptions.

Table 8.3.2 JORR Project Financial Internal Rate Of Return (Toll Rates are adjusted by inflation only)

(current price base)

(Unit: million Rupiah)

Implementing Entity with Private Sector Participation

Calendar Year	Cycle Year	Base Cost	O&M Cost	Revenue	Net Revenue
2000	-6	0	(8,083)	103,630	95,547
2001	-5	(220,300)	(8,689)	109,300	(119,689)
2002	-4	(405,600)	(9,341)	138,650	(276,291)
2003	-3	(826,900)	(10,041)	145,364	(691,577)
2004	-2	(2,120,200)	(10,895)	146,426	(1,984,669)
2005	-1	(2,283,800)	(11,821)	422,560	(1,873,061)
2006	0	(1,276,400)	(22,086)	441,786	(856,700)
2007	1	0	(44,171)	461,887	417,716
2008	2	0	(47,926)	482,904	434,978
2009	3	0	(52,000)	581,152	529,152
2010	4	0	(56,420)	607,594	551,174
2011	5	0	(80,976)	635,240	554,264
2012	6	0	(66,419)	751,313	684,894
2013	7	0	(72,065)	785,497	713,432
2014	8	0	(78,191)	821,237	743,046
2015	9	0	(84,837)	958,288	873,451
2016	10	0	(121,760)	1,057,874	936,114
2017	11	0	(99,872)	1,100,496	1,000,624
2018	12	0	(108,361)	1,265,079	1,156,718
2019	13	0	(117,572)	1,313,470	1,195,898
2020	14	0	(127,566)	1,363,645	1,236,079
2021	15	*0*	(183,085)	1,544,764	1,361,679
2022	16	*0*	(150,174)	1,544,764	1,394,590
2023	17	*0*	(162,939)	1,544,764	1,381,825
2024	18	*0*	(176,788)	1,544,764	1,367,976
2025	19	*0*	(191,815)	1,544,764	1,352,949
2026	20	*0*	(275,297)	1,544,764	1,269,467
2027	21	*0*	(225,809)	1,544,764	1,318,955
2028	22	*0*	(245,003)	1,544,764	1,299,761
2029	23	*0*	(265,828)	1,544,764	1,278,936
2030	24	*0*	(288,424)	1,544,764	1,256,340
2031	25	*0*	(413,952)	1,544,764	1,130,812
Accumulated		*(7,133,200)*	*(3,818,206)*	*30,685,796*	*19,734,390*
FIRR					***10.87%***

Source: JICA Study Team.

Notes: 1.) Capital cost streams on a "before financing" basis.
2.) O&M cost price escalated as per factors in Table 7.3.8.
3.) Revenue increases as per outlined toll rate adjustment assumptions.

8.4 Toll Rate Level and Regulatory Framework

8.4.1 Toll Rate Level and Pricing Policy

The generally accepted economic principle is that toll rates must be within, or must not exceed user benefit levels. This principle, in combination with "willingness-to-pay" criteria leads usually to the definition of a certain threshold at which the toll rate will be defined (say a maximum of 70 percent of user benefit).

The first distance proportional toll rate was established in Indonesia in 1978 at Rupiah 120/km. The present distance proportional rate is Rp.330/km for the existing section 'S' of JORR. A time span of some 22 years has passed between the two rates and it seems obvious that toll rate levels in real prices cannot have kept pace with real price increases in the economy. In other words, passenger car users, which represent a higher income group of Indonesian society and which form and will continue to form the majority of toll road users, not only enjoy a considerable subsidy on fuel for their cars, but also an unintended, nevertheless real, decline in real toll road transport prices.

Toll rate increases (levels and frequency) under the still prevailing legislation, which is currently under review, is delegated to the President of the Republic. There is an urgent need for the GOI:

- To establish a fair and transparent toll rate increase mechanism,
- To make such a mechanism legally binding, and
- To establish a formula under such a mechanism, which is based on hard economic facts and figures.

The establishment of a legally binding toll rate increase mechanism would render any "authorization agreement" between P.T. Jasa Marga and any private sector party (regardless of the JORR project) bankable, which is a prerequisite for future private sector participation. Furthermore, many countries adopt an approach under which toll rate increase is linked to the CPI or in other words inflation. However, such an approach ensures that nominal toll rates keep pace with only inflation and toll rates in real prices would decrease as other real price of goods and services increase over time. The GOI may wish to consider adding real per capita increase to that equation. A toll rate increase, which is linked to inflation and real per capita growth would ensure that the portion of disposable income spent by toll road user would remain the same. Much more work needs to be done on the economic side of the adequacy of toll rate levels and their increase mechanism.

8.4.2 Regulatory Framework

It may not be a bad idea for the GOI to investigate the need to establish an independent transport authority. The principal function of such an authority would be to monitor prices and costs, and to establish fair policy guidelines for transport sector pricing policy.

Table 8.4.1 summarizes a general action agenda for the GOI under the above context.

Table 8.4.1 General Action Agenda for the GOI & Local Governments

Agenda Item	Conclusions	Policy Action Required	Target of Policy Action	Time Frame
Institutional Framework	Needs review and streamlining. There may be a need for a "transport authority".	Yes By central Government	Establish economic fundamentals for transport/road pricing policies	Over the medium-term
Toll rate policy & formulation	There is a need to establish toll rates based on economic fundamentals. Also, to ensure the across country fair rates.	Yes By central Government	Establish transparency & economically sound toll rates	Over the short- to medium term
Toll rate increase mechanism	There is a need to establish a legally binding & fair mechanism	Yes By central Government	Needed to reflect economic fundamentals. Needed to support economic toll road operations	Over the short-term
Authorization Agreement	Must be standardized to ensure level playing field among different investors	Yes By central Government	Needed to ensure openess, fairness and market competition	As soon as possible
Concession Agreement	Must be standardized to ensure level playing field among different investors	Yes By central Government	Needed to ensure openess, fairness and market competition	As soon as possible
Other vital items	There is a need for: 1.) traffic and model data 2.) system integration	Yes By central & local Governments	Needed to support the planning, monitoring and evaluation functions	Over the short-term

Source: JICA Study Team.

8.4.3 Institutional Set-up

It has already been observed above that P.T. Jasa Marga has, under the given regulatory framework, the mandate to implement toll roads. However, it is recommended, in order to hedge against any risk, that a separate new legal entity be established that assumes legal responsibility for the JORR project execution.

There are, in fact, indications that there has already been a request for such a new entity to be formed by P.T. Jasa Marga and another important temporary Indonesian institution. It could not yet be confirmed by the Study Team, as to whether such a request has been approved by the central Government or not.

Be that as it may, the following observations and comments are called for in this context:

- Any entity, whether public, private or a PPP, will have to address the issue of the value of the already existing JORR assets,
- Any entity, whether public, private or a PPP, will have to address the issue of related liabilities, and
- Any entity, whether public, private or a PPP, will have to finance in one way or another the purchase of the existing JORR assets.

The current scheme that seems to be pursued suggests a debt for equity swap between the new implementing entity and the partner for P.T. Jasa Marga. Such a swap would be cash flow neutral and no financing would therefore be needed. Depending on which approach is adopted for the valuation of the assets[7], one can come up with different numbers. The JICA Study Team assesses the value of the existing assets at roughly Rupiah 830.8 billion as indicated in the relevant previous tabulation tables.

One major point of contention is likely to be how to handle IDC during the construction and, in particular, accrued interest over the default period. These amounts are considerable especially for section S and E1.

Table 8.4.2 identifies the concessionaires by JORR section, the position of P.T. Jasa Marga in terms of share capital in the defaulted companies, the estimated value of the existing assets and the outstanding loan positions as of June 1999.

It is recommended that:

- The new implementing entity not be burdened with the interest accrued over the default period.

This is justified, since the JORR project cannot generate enough return to also assume this liability burden and, secondly, the implementing entity should only pay for the value of the existing JORR assets which it will come to own.

Table 8.4.2 Assessment of Value of Existing JORR Assets and Liabilities of Concessionaires

(Unit: as indicated)

P.T. Jakarta Lingkar Barat Satu	P.T. Citra Mataram Satriamarga Persada	P.T. Marga Nurindo Bhakti	P.T. Citra Bhakti Margatama Persada
Section: W1	**Section: W2**	**Sections: S & E1**	**Sections E2, E3 & N**
Five (5) shareholders [P.T. Jasa Marga no equity shareholder]	**Four (4) shareholders: P.T. Jasa Marga equity share: 11.50%**	**Six (6) shareholders: P.T. Jasa Marga equity share: 10.00%**	**Five (5) shareholders: P.T. Jasa Marga equity share: 34.80%**
Share capital: n.a.	**Share capital: 41,131 million Rp. of which PT Jasa Marga: 4.73 million Rp.**	**Share capital: 110,000 million Rp. of which PT Jasa Marga: 11.00 million Rp.**	**Share capital: 99,672 million Rp. of which PT Jasa Marga: 34.686 million Rp.**
Total assets: n.a.	**Total assets: 279,506 million Rp. of which toll road value: 211,900 million Rp.**	**Total assets: 1,098,259 million Rp. of which toll road value: 946,000 million Rp.**	**Total assets: 593,171 million Rp. of which toll road value: 411,000 million Rp.**
Outstanding loan position: (million Rupiah)	**Outstanding loan position: (million Rupiah)**	**Outstanding loan position: (million Rupiah)**	**Outstanding loan position: (million Rupiah)**
Principal: n.a.	Principal: 134,209	Principal: 721,149	Principal: 299,239
IDC: n.a.	IDC: 170,243	IDC: 196,604	IDC: 312,650
Accrued interest: n.a.	Accrued interest: 0	Accrued interest: 582,456	Accrued interest: 53,631
TOTAL n.a.	**TOTAL 304,452**	**TOTAL 1,500,209**	**TOTAL 665,520**

Source: JICA Study Team based on the results of company audits undertaken by PT "ERNST & YOUNG" Consulting for IBRA, April 2000.

Note: 1.) All financial information as per "ERNST & YOUNG" audit.
2.) The outstanding loan positions are as of 30 June 1999.
3.) The above quoted outstanding loan positions do not take into account other non-loan liabilities. The total liabilities are: MNB 1,578,674 million Rp.; CBMP 693,096 million Rp.; CMSP 331,761 million Rp. amounting to a total of 2,603,531 million Rp. As of 30 June 1999.

[7]) This refers in particular to the exchange rate to be applied. Fair versus historic cost have already been established by the 2000 IBRA study.

8.5 Final Recommendation & JORR Project Time Schedule

The JORR project realization time schedule assumes that:

- The JORR project will be implemented as a public sector project and in "one piece"
- The JORR project will be implemented under the fast track procurement approach
- The JORR project will be financed through a sovereign guaranteed loan, the terms and conditions of which will at least match the life span of the project (31 years)
- The on-lending rate of the GOI to the implementing entity will be well below the projects ROI (6.55%)
- During the construction period the implementing entity will be the beneficiary of revenue stream already generated by existing Sections
- The implementing entity will assume O&M cost responsibility for these sections, and
- The GOI will assume the exchange rate risk.

Figure 8.5.1 illustrates the JORR implementation time schedule that can be achieved under the conditions outlined above. This schedule is identical to the implementation schedule underlying the JORR project's economic and financial viability calculations.

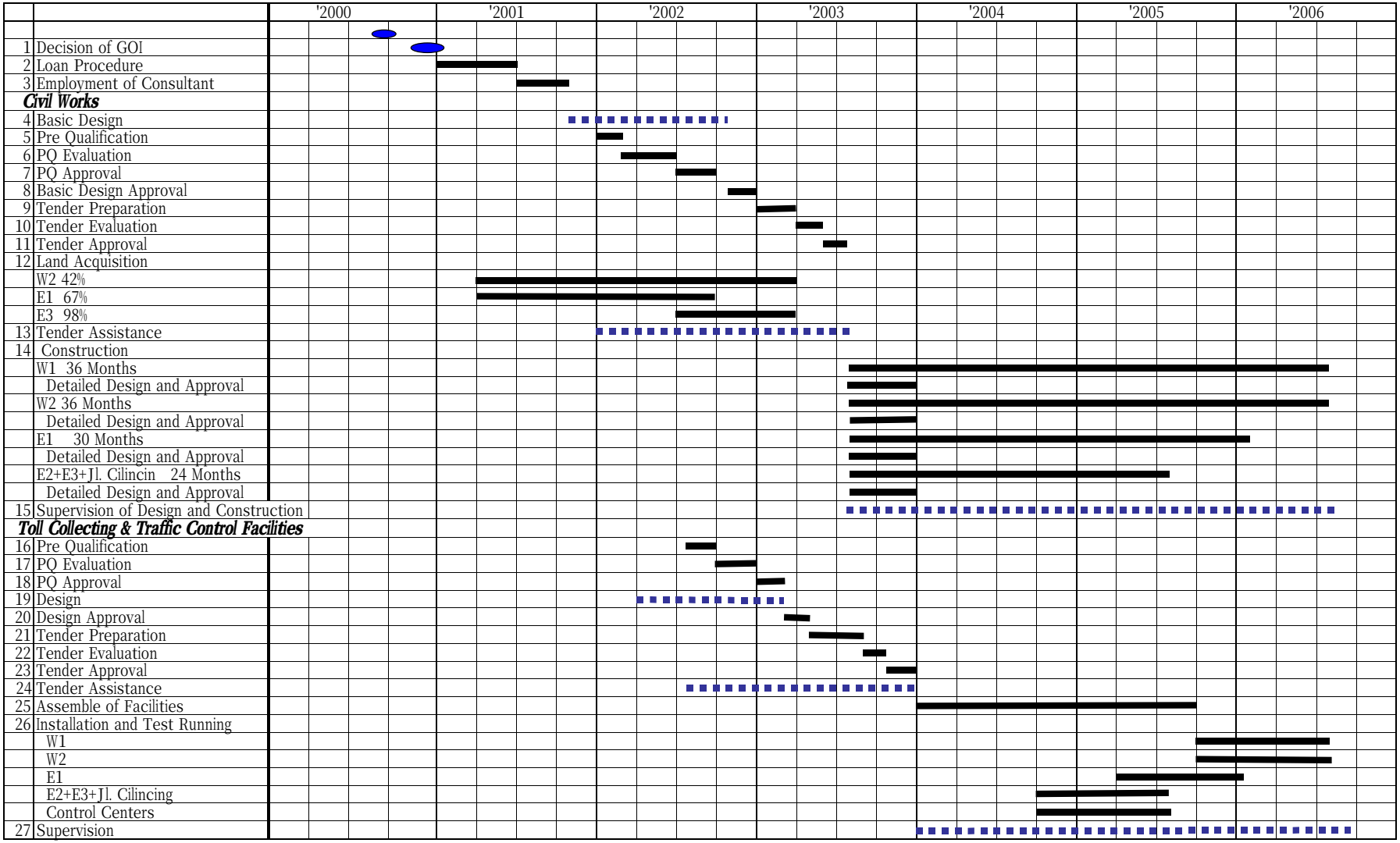


Figure 8.5.1 Proposed JORR Project Realization Timetable