## 13.3 Implementation Plan for the East - West Axis

### 13.3.1 Executing Body of the Project

The East - West Axis is split into following four (4) construction sections, considering development pressure, present road network and development impacts;

1) Section - 1 : Sta. 0+500 (West JORR IC) to Sta. 9+200 (Latumeten IC)
2) Section - 2 : Sta. 9+200 (Latumeten IC) to Sta. 11+700 (Mangga Besar IC)
3) Section - 3 : Sta. 11+700 (Mangga Besar IC) to Sta. 20+150 (Sunter IC)
4) Section - 4 : Sta. 20+150 (Sunter IC) to Sta. 31+250 (East JORR IC)

The salient features of each section and its recommended executing body is summarized in as follows :

**Section - 1 : Sta. 0+500 (West JORR IC) to Sta. 9+200 (Latumeten IC)**

1. Road Configuration
   The proposed ROW is 70 m wide and at-grade 10-lane arterial road will be constructed mainly on embankment. At major intersections and railway crossings, grade separation structures for throughway are designed.

2. Landuse
   The western section is remained undeveloped but high potential for residential development can be seen. After crossing Tangerang railway line, dense old housing areas are widely spread, in which it is very necessary to create public spaces by applying a land readjustment techniques in Kecamatan Grogol Petamburan.

3. Physical Constraints
   Major physical constrains are as follows;

   1) Location of West JORR IC
   2) Extension of Taman Permata Buana Housing Complex
   3) LRT Development Plan of Tangrang Railway Line
   4) Redevelopment of Kecamatan Grogol Petamburan

4. Recommended Executing Body
   DKI Jakarta is to be responsible for the execution of the construction of Section - 1 because probable Land Subdivision Development Method will enable to acquire required ROW in the nick of time when private sector submits an application for an urban area development project and

is controlled by its approval. The redevelopment of Kecamatan Grogol Petamburan will be implemented in conjunction with the redevelopment of Kecamatan Tambora in Section -2.

**Section - 2 : Sta. 9+200 (Latumeten IC) to Sta. 11+700 (Mangga Besar IC)**

1. Road Configuration
   The proposed ROW is 70 m wide and at-grade 10-lane arterial road will be constructed mainly on embankment. At major intersections and railway crossing, grade separation structures for throughway are designed. Latumeten IC has three level structure to overpass the elevated Northern Extension of South - West Arc.

2. Landuse
   Densely populated areas exist in Kecamatan Tambora, where the District Plan claims public space and facilities, commerce and office buildings so much that it is very necessary to create such land area by certain land readjustment techniques.

3. Physical Constraints
   Major physical constrains are as follows;

   1) Redevelopment of Kecamatan Tambora
   2) LRT Development Plan of the Western Railway Line
   3) Location of Latumeten IC

4. Recommended Executing Body
   DKI Jakarta is to be responsible for the execution of the construction of Section -2 because Urban Betterment by certain land readjustment techniques will enable to acquire required ROW. The redevelopment of Kecamatan Tambora will be implemented in conjunction with the redevelopment of Kecamatan Grogol Petamburan in Section -1.

**Section - 3 : Sta. 11+700 (Mangga Besar IC) to Sta. 20+150 (Sunter IC)**

1. Road Configuration
   4-lane elevated throughway on viaduct and at-grade 6-lane frontage road will be constructed mainly on existing arterial road within the proposed ROW of 40 m wide. Mangga Besar IC will connect the East - West Axis with the North - South Axis.

2. Landuse
   Densely developed commerce and business landuse along existing arterial roads exist in the western section, while new residential areas are spread in the eastern section. Ex-Kemayoran Airport is designated

the special area to be developed as an intensive sub-center of commerce and housing complex.

3. Physical Constraints
Major physical constrains are as follows;

1) Location of Mangga Besar IC
2) Redevelopment of Ex-Kemayoran Airport
3) Location of Sunter IC

4. Recommended Executing Body
Bina Marga is to be responsible for the execution of the construction of Section -3 because this section includes a full access controlled road to connect the North - South Axis with Jakarta Harbour Road through the main road in Ex-Kemayoran Airport. This connection is deemed a specific road that assures strategic value in the national interest.

**Section - 4 : Sta. 20+150 (Sunter IC) to Sta. 31+250 (East JORR IC)**

1. Road Configuration
The proposed ROW is 70 m wide and at-grade 10-lane arterial road will be constructed mainly on embankment except the stretch of elevated throughway in Kelapa Gading Housing Complex. At major intersections, grade separation structures for throughway are designed.

2. Landuse
The western section is located in industrial area and the area in the eastern section still remains undeveloped. However, many housing estates are being developed along existing roads.

3. Physical Constraints
Major physical constrains are as follows;

1) Kelapa Gading Housing Complex
2) Pelogadung Industrial Estate and other industrial complex
3) High Voltage Power Transmission Lines and its Pylons
4) Location of East JORR IC

4. Recommended Executing Body
DKI Jakarta is to be responsible for the execution of the construction of Section - 4 because in the eastern section probable Land Subdivision Development Method will enable to acquire required ROW in the nick of time when private sector submits an application for an urban area development project and is controlled by its approval. In Kelapa Gading Housing Complex, DKI Jakarta is also responsible for the execution of the construction of viaduct to secure the role and function of this section in conjunction with the above-mentioned road section in the undeveloped area.

**Table 13.3.1** Annual Required Funds for the Development of the East - West Axis

| Name of Link | Section | Activity | Cost (M.Rp) | YEAR | | | | | | | | | | Total (M. Rp) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| | | | | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | |
| E-W AXIS | SEC-1 | Engineering Services | 6,332 | | 3,166 | 3,166 | | | | | | | | 6,332 |
| | | ROW Acquisition | 94,118 | | | 47,059 | 47,059 | | | | | | | 94,118 |
| | | Construction | 232,157 | | | | | 116,079 | 116,079 | | | | | 232,157 |
| | | Supervisory Services | 8,442 | | | | | 4,221 | 4,221 | | | | | 8,442 |
| | SEC-2 | Engineering Services | 2,149 | | | | | | 1,397 | 752 | | | | 2,149 |
| | | ROW Acquisition | 35,000 | | | | | | | 17,500 | 17,500 | | | 35,000 |
| | | Construction | 78,807 | | | | | | | | | 47,284 | 31,523 | 78,807 |
| | | Supervisory Services | 2,866 | | | | | | | | | 1,720 | 1,146 | 2,866 |
| | SEC-3 | Engineering Services | 7,621 | | 3,811 | 3,811 | | | | | | | | 7,621 |
| | | ROW Acquisition | 30,120 | | | 15,060 | 15,060 | | | | | | | 30,120 |
| | | Construction | 279,451 | | | | | 111,780 | 111,780 | 55,890 | | | | 279,451 |
| | | Supervisory Services | 10,162 | | | | | 4,065 | 4,065 | 2,032 | | | | 10,162 |
| | SEC-4 | Engineering Services | 6,592 | | | | 3,296 | 3,296 | | | | | | 6,592 |
| | | ROW Acquisition | 65,280 | | | | | 32,640 | 32,640 | | | | | 65,280 |
| | | Construction | 241,713 | | | | | | | 120,857 | 120,857 | | | 241,713 |
| | | Supervisory Services | 8,790 | | | | | | | 4,395 | 4,395 | | | 8,790 |
| Total | | | 1,109,600 | 0 | 6,977 | 69,096 | 65,415 | 272,081 | 270,182 | 201,426 | 142,752 | 49,004 | 32,669 | 1,109,600 |

### 13.3.2 Implementation Time Schedule for the East - West Axis

The ideal implementation time schedule of the East - West Axis is proposed for the purpose of economic evaluation as discussed in Chapter 10 : Construction Planning. Based on the implementation time schedule, annual required funds are tabulated in Table 13.3.1.

## 13.4 Overall Implementation Plan

The implementation plan of the North-South Axis and the East-West Axis is proposed as shown in Fig**13.4.1** based on the construction time requirements studied in Chapter 10 : Construction Planning and required costs studied in Chapter 14 : Project Cost Estimates.

Considering present budgetary constraints of the governmental agencies, one of practical options is presented in Fig. 13.4.2 as an alternative overall implementation plan on the assumption that the ceiling of budget for the East-West Axis would be made 150 billion Rp./Year. According to this overall implementation plan, annual required funds for the project roads are tabulated in Table 13.4.1.

**Fig. 13.4.1** OVERALL IMPLEMENTATION PROGRAM

| Name of Link | Section | Activity | Cost (M.Rp) | YEAR 1 (1995) | 2 (1996) | 3 (1997) | 4 (1998) | 5 (1999) | 6 (2000) | 7 (2001) | 8 (2002) | 9 (2003) | 10 (2004) | Recommended Executing Body |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-S AXIS | | Engineering Services | 27,232 | | | | | | | | | | | BOT |
| | | ROW Acquisition | 79,400 | | | | | | | | | | | |
| | | Construction | 998,516 | | | | | | | | | | | |
| | | Supervisory Services | 36,310 | | | | | | | | | | | |
| E-W AXIS | SEC-1 | Engineering Services | 6,332 | | | | | | | | | | | GOI |
| | | ROW Acquisition | 94,118 | | | | | | | | | | | |
| | | Construction | 232,157 | | | | | | | | | | | |
| | | Supervisory Services | 8,442 | | | | | | | | | | | |
| | SEC-2 | Engineering Services | 2,149 | | | | | | | | | | | GOI |
| | | ROW Acquisition | 35,000 | | | | | | | | | | | |
| | | Construction | 78,807 | | | | | | | | | | | |
| | | Supervisory Services | 2,866 | | | | | | | | | | | |
| | SEC-3 | Engineering Services | 7,621 | | | | | | | | | | | GOI |
| | | ROW Acquisition | 30,120 | | | | | | | | | | | |
| | | Construction | 279,451 | | | | | | | | | | | |
| | | Supervisory Services | 10,162 | | | | | | | | | | | |
| | SEC-4 | Engineering Services | 6,592 | | | | | | | | | | | GOI |
| | | ROW Acquisition | 65,280 | | | | | | | | | | | |
| | | Construction | 241,713 | | | | | | | | | | | |
| | | Supervisory Services | 8,790 | | | | | | | | | | | |

## Fig. 13.4.2 ALTERNATIVE OVERALL IMPLEMENTATION PROGRAM

| Name of Link | Section | Activity | Cost (M.Rp) | FISCAL YEAR | | | | | | | | | | | | | | Recommended Executing Body |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PELITA VI | | | | PELITA VII | | | | | PELITA VIII | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | |
| | | | | 1995/96 | 1996/97 | 1997/98 | 1998/99 | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | |
| N-S AXIS | | Engineering Services | 27,232 | | | | | | | | | | | | | | | BOT |
| | | ROW Acquisition | 79,400 | | | | | | | | | | | | | | | |
| | | Construction | 998,516 | | | | | | | | | | | | | | | |
| | | Supervisory Services | 36,310 | | | | | | | | | | | | | | | |
| E-W AXIS | SEC-1 | Engineering Services | 6,332 | | | | | | | | | | | | | | | GOI |
| | | ROW Acquisition | 94,118 | | | | | | | | | | | | | | | |
| | | Construction | 232,157 | | | | | | | | | | | | | | | |
| | | Supervisory Services | 8,442 | | | | | | | | | | | | | | | |
| | SEC-2 | Engineering Services | 2,149 | | | | | | | | | | | | | | | GOI |
| | | ROW Acquisition | 35,000 | | | | | | | | | | | | | | | |
| | | Construction | 78,807 | | | | | | | | | | | | | | | |
| | | Supervisory Services | 2,866 | | | | | | | | | | | | | | | |
| | SEC-3 | Engineering Services | 7,621 | | | | | | | | | | | | | | | GOI |
| | | ROW Acquisition | 30,120 | | | | | | | | | | | | | | | |
| | | Construction | 279,451 | | | | | | | | | | | | | | | |
| | | Supervisory Services | 10,162 | | | | | | | | | | | | | | | |
| | SEC-4 | Engineering Services | 6,592 | | | | | | | | | | | | | | | GOI |
| | | ROW Acquisition | 65,280 | | | | | | | | | | | | | | | |
| | | Construction | 241,713 | | | | | | | | | | | | | | | |
| | | Supervisory Services | 8,790 | | | | | | | | | | | | | | | |

**Table 13.4.1** Annual Required Funds for the Development of the Project Roads

| Name of Link | Section | Activity | Cost (M.Rp) | FISCAL YEAR | | | | | | | | | | | | | | Sub-total (M.Rp) | Total (M.Rp) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PELITA VI | | | | PELITA VII | | | | | PELITA VIII | | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | | |
| | | | | 1995/96 | 1996/97 | 1997/98 | 1998/99 | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | | |
| N-S AXIS | | Engineering Services | 27,232 | 13,616 | 13,616 | | | | | | | | | | | | | 27,232 | |
| | | ROW Acquisition | 79,400 | 31,760 | 47,640 | | | | | | | | | | | | | 79,400 | |
| | | Construction | 998,516 | | | 299,555 | 399,406 | 299,555 | | | | | | | | | | 998,516 | |
| | | Supervisory Services | 36,310 | | | 10,893 | 14,524 | 10,893 | | | | | | | | | | 36,310 | 1,141,458 |
| E-W AXIS | SEC-1 | Engineering Services | 6,332 | | 3,166 | 3,166 | | | | | | | | | | | | 6,332 | |
| | | ROW Acquisition | 94,118 | | | 47,059 | 47,059 | | | | | | | | | | | 94,118 | |
| | | Construction | 232,157 | | | | | 116,079 | 116,079 | | | | | | | | | 232,157 | |
| | | Supervisory Services | 8,442 | | | | | 4,221 | 4,221 | | | | | | | | | 8,442 | 341,049 |
| | SEC-2 | Engineering Services | 2,149 | | | | | | | | | | 645 | 1,504 | | | | 2,149 | |
| | | ROW Acquisition | 35,000 | | | | | | | | | | | 17,500 | 17,500 | | | 35,000 | |
| | | Construction | 78,807 | | | | | | | | | | | | | 47,284 | 31,523 | 78,807 | |
| | | Supervisory Services | 2,866 | | | | | | | | | | | | | 1,720 | 1,146 | 2,866 | 118,822 |
| | SEC-3 | Engineering Services | 7,621 | | | | 1,905 | 3,811 | 1,905 | | | | | | | | | 7,621 | |
| | | ROW Acquisition | 30,120 | | | | | 7,530 | 15,060 | 7,530 | | | | | | | | 30,120 | |
| | | Construction | 279,451 | | | | | | | 55,890 | 111,780 | 111,780 | | | | | | 279,451 | |
| | | Supervisory Services | 10,162 | | | | | | | 2,032 | 4,065 | 4,065 | | | | | | 10,162 | 327,354 |
| | SEC-4 | Engineering Services | 6,592 | | | | | | | 3,296 | 3,296 | | | | | | | 6,592 | |
| | | ROW Acquisition | 65,280 | | | | | | | | 32,640 | 32,640 | | | | | | 65,280 | |
| | | Construction | 241,713 | | | | | | | | | | 120,857 | 120,857 | | | | 241,713 | |
| | | Supervisory Services | 8,790 | | | | | | | | | | 4,395 | 4,395 | | | | 8,790 | 322,375 |
| | | BOT Sub-total | 1,141,458 | 45,376 | 61,256 | 310,448 | 413,930 | 310,448 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,141,458 | |
| | | GOI Sub-total | 1,109,600 | 0 | 3,166 | 50,225 | 48,964 | 131,640 | 137,265 | 68,749 | 151,781 | 148,485 | 125,896 | 144,256 | 17,500 | 49,004 | 32,669 | 1,109,600 | |
| | | Total | 2,251,058 | 45,376 | 64,422 | 360,673 | 462,895 | 442,088 | 137,265 | 68,749 | 151,781 | 148,485 | 125,896 | 144,256 | 17,500 | 49,004 | 32,669 | 2,251,058 | |

# CHAPTER 14 OPERATION AND MAINTENANCE PLAN

# CHAPTER 14 OPERATION AND MAINTENANCE PLAN

## 14.1 North-South Axis

### 14.1.1 Scope of Operation and Maintenance Works

The scope of operation and maintenance works for the North-South Axis is broadly divided into the following three major components :

- Toll Road Maintenance
- Traffic Management
- Toll Collection

(1) Toll Road Maintenance

Toll road maintenance together with traffic management has the three basic goals of securing traffic safety, smooth traffic flow and user comfort. The maintenance function can be divided into routine maintenance, periodic maintenance and incidental maintenance as described below.

Routine maintenance is based on routine (daily) inspection of the condition of pavement, cut and fill slopes, drainage, bridges and other structures and facilities to monitory any defects and damage. The results of routine inspection will be promptly reported to the operation office for follow-up maintenance works as required.

Periodic maintenance is based on detailed inspection to be performed at certain time intervals such as weekly, monthly or yearly depending on the type and kind of facilities, including checking and testing the conditions of various structures and facilities. Defects and damages will be reported for repairs or remedies. Periodic maintenance also covers such works as cleaning of pavement, guardrail and sign board, mowing and maintenance of landscape plantation, repainting of steel structures, and road marking and painting.

Incidental maintenance is basically the work to be carried out to restore the toll road and the related facilities to their normal operating conditions after they are damaged by road accidents or natural causes.

Maintenance works except for inspections are usually executed by contractors under the supervision of the operation office, and will include:

- Clearing of pavement
- Mowing and maintenance of plantations
- Clearing of ditches and culverts
- Pavement repair such as patching and resurfacing

- Repair of sealants and expansion joints of bridges and viaducts
- Repair of damaged paintwork on steel bridges and repainting as necessay
- Repair and maintenance of traffic control devices, including signs and traffic signals
- Repair and maintenance of CCTV monitoring system
- Repair and maintenance of lighting
- Repair of cut and fill slopes
- Repair of damage to road facilities caused by traffic accidents
- Improvement and maintenance works including pavement markings, pavement overlay, widening, etc.

(2) Traffic Management

Traffic management includes traffic control, removal of disabled cars which have been involved in accidents, and furnishing users with expressway and traffic information.

Highway patrols will be conducted to identify damage to road facilities, traffic accidents, illegal parking, disabled cars and other extraordinary conditions which affect traffic safety. Information and reports will be dispatched to the operation office through radio communication equipment on the patrol cars.

Services such as emergency rescue, emergency treatment of those injured in traffic accidents, and towing of disabled cars will be provided.

Traffic control includes general control for speed and overloading, and control of traffic and emergency lane use under unusual conditions such as traffic accidents, adverse weather and operation of maintenance works. Control of speed and prohibition of illegally overloaded trucks will be conducted in cooperation with traffic police. Axle load meters will be installed at entry ramps for weighing.

Traffic surveillance including information collection and dissemination is also an important part of traffic management especially when the traffic volume is approaching the toll road capacity. Installation of a CCTV monitoring system is proposed and allowance for future installation of other facilities such as radio broadcasts, variable message signs and emergency telephones will also be made.

(3) Toll Collection

As described in Chapter 9 the North-South Axis will operate under a closed toll system with On-Ramp toll collection. Totalling and auditing of collected tolls and recording of traffic data will also be carried out. The necessity for extension of toll booths will be reviewed based on traffic data collected after the opening.

Data collected will be forwarded to Jasa Marga for coordination of the overall toll road system.

### 14.1.2 Organization for Operation and Maintenance

For the assumed private investor participation in the North-South Axis Toll Road, the organization for operation and maintenance should be self-sufficient and separate from that of Jasa Marga by himself and the other Jakarta Toll Roads. Toll collection and maintenance will generally be carried out independently of Jasa Marga while traffic control functions will be integrated with Jasa Marga. The basic organization will consist of a Head Office and an Operation Office as described below.

(1) Head Office

The Head Office will be directed by a board of directors of the joint venture company. It will be responsible for overall management of the organization including decision making related to the activities of operation and maintenance of the toll road, budgetary control, etc. It is proposed that the Head Office should have four main departments; technical, administration, operation, and finance, as shown in Fig. 14.1.1. The director of the operation department will be the representative from P.T. Jasa Marga in the Head Office organization. The Head Office will be located in Jakarta to ensure smooth and easy access to the related governmental agencies, financial institutions and business opportunities.

(2) Operation Office

An Operation Office will be established and will be responsible for execution of operation and maintenance works for the toll road, including traffic management. Since the total length of the toll road is only 17.6 km, the establishment of one office is sufficient. It is recommended that the office should be located near the South JORR Interchange.

The organization of the Operation Office headed by an Office Manager will generally have 5 sections; administration/employment, finance, supervision of toll collection, maintenance and monitoring/traffic services, as shown in Fig. 14.1.2. Traffic management and control functions should be fully integrated with Jasa Marga and the Traffic Police. Police from the Arterial Road Traffic and Transportation Bureau (DLLAJR) will be stationed in the office to cooperate in this role.

The Operation Office will be responsible for administering toll transactions, issuance of tickets and collection of toll at entry ramps. The office will manage the operation and staffing of toll booths. Toll collectors will work in 3 shifts.

As stated in Section 14.1.1.(1) above, the maintenance works will be performed mostly by contractors under the supervision of the Operation Office. The office will be equipped with the following limited kinds of equipment for operation and maintenance works under such a system:

- Communication cars, patrol cars and maintenance vehicles for highway patrol, inspection and supervision of maintenance works being carried out by the contractors
- Trucks (tow trucks, dump trucks), small crane vehicles, small rollers and tampers, air compressors, breakers, asphalt cutters, etc. for emergency repair works on occasions of accident and disaster.
- Water tankers, grass cutters, etc.

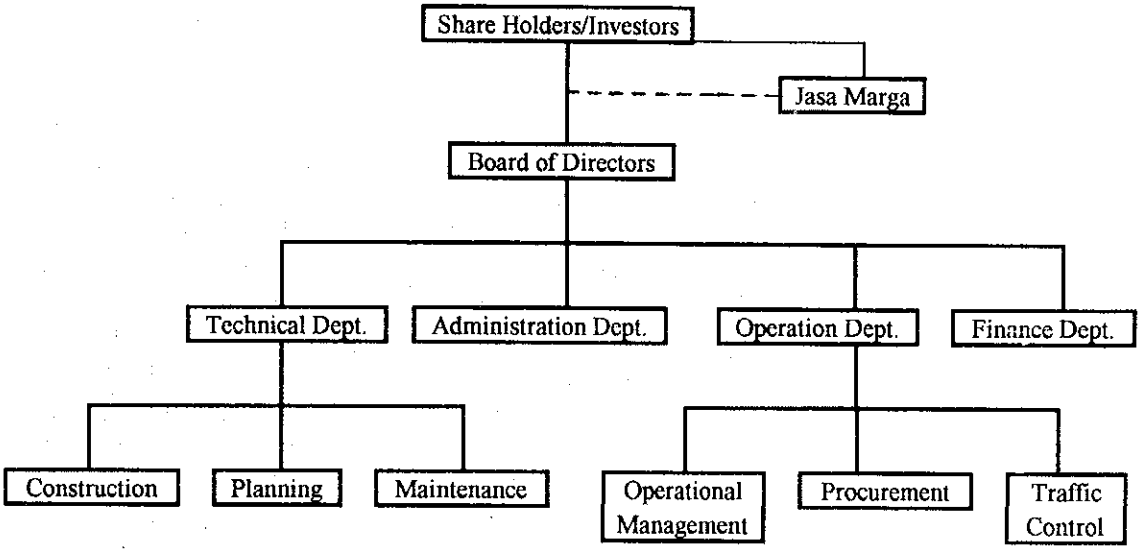


**Fig.14.1.1 Organization of Head Office**

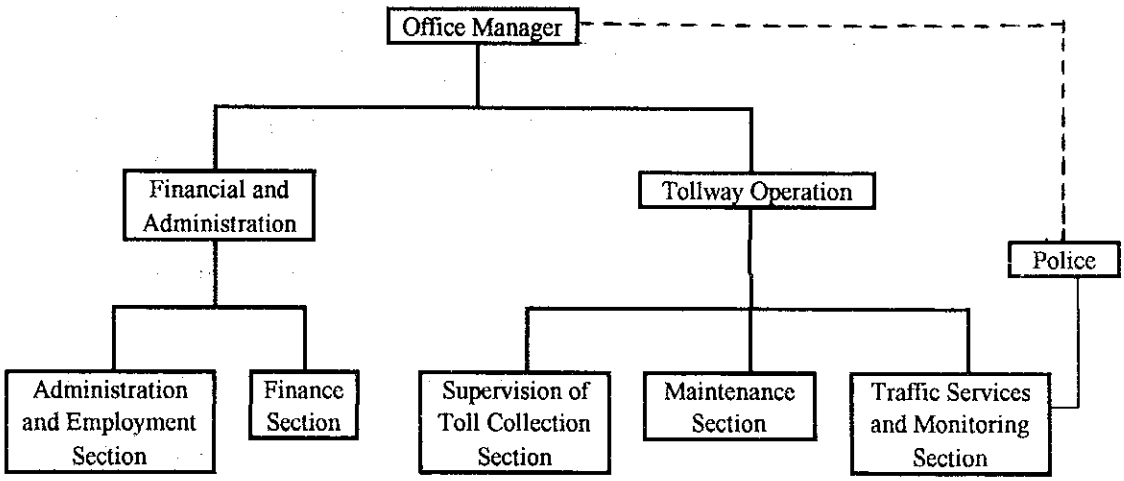


**Fig.14.1.2 Organization of Operation Office**

14.1.3 Operation and Maintenance Costs

The operation and maintenance costs (O & M costs) of the North-South Axis Toll Road were estimated based on JASA MARGA's forecasts for O & M costs in 1993 on other toll roads.

The forecast 1993 O & M costs are presented in Table 14.1.1. O & M costs are likely to be a function of both the number of toll booths and the length of the toll road. In order to check this and to estimate annual costs per booth and per kilometre, the forecast O & M costs were broken down into two components as shown in Table 14.1.2. The first component (Item No.44) is the O & M cost directly related to the toll booths while all other O & M costs are included in "Other O & M Costs" (Item No.45). In Table 14.1.3 the O & M costs per booth and per km have been estimated for each existing expressway. Despite the different conditions applying to each toll road an approximately linear relationship was found between total toll booth O & M costs and number of toll booths and also between other O & M costs and the length of the toll road. For the 1993 forecasts, the average annual O & M costs were Rp.65.34 million/toll booth plus Rp.104.57 million /km. The most significant variation from the linearity is the O & M cost per km for the Tg. Priok-Cawang-Tomang-Cengkarang Toll Road (North-South Link, South-West Arc and Cengkareng Access), which was well above average at Rp.142.32 million per km. The reason for the higher cost per km is at least partly due to the toll road width; as it is the only 6-lane toll road. For estimating purposes it is assumed that O & M costs per km are about 25% higher for a 6-lane toll road than for a 4-lane toll road.

To increase costs to 1994 levels a 5% allowance is added, making say Rp.70 million/toll booth, plus Rp.110 million/km for a 4-lane toll road or Rp. 140 million/km for a 6-lane toll road.

The estimated O& M costs for the North-South Axis are shown in Table 14.1.4.

**Table 14.1.4 Annual Operation and Maintenance Costs for North-South Axis**

(Rp.million)

| Item | NS-1 | NS-2 | Total NS |
|---|---|---|---|
| Booth Related O & M Costs (per booth) | | | |
| No. of Booths | 12 | 31 | 43 |
| Estimated O & M Cost per Booth | 70 | 70 | 70 |
| Total Booth Related O & M Cost | 840.0 | 2,170.0 | 3,010.0 |
| Other O & M Costs (per km) | | | |
| Length in km | 4.79 | 12.84 | 17.63 |
| Number of lanes | 4 | 6 | |
| Estimated O & M Cost per km | 110 | 140 | |
| Total Other O & M Costs | 526.9 | 1,797.6 | 2,324.5 |
| Grand Total Estimated O & M Cost | 1,366.9 | 3,967.6 | 5,334.5 |

TABLE 14.1.1 FORECAST OPERATION AND MANAGEMENT COSTS OF EXISTING TOLLWAYS FOR 1993

(RUPIAH 1,000)

| NO | ITEM | JAGORAWI | | JAKARTA - MERAK | | SURABAYA-GEMPOL | | JAKARTA-CIKAMPEK | | PADALARANG-CIL. | | PRIOCK-CAW-TOM-CENG. | | SEMARANG | | BELMERA | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Forecast '93 | % of Total | Forecast '93 | % of Total | Forecast '93 | % of Total | Forecast '93 | % of Total | Forecast '93 | % of Total | Forecast '93 | % of Total | Forecast '93 | % of Total | Forecast '93 | % of Total | Forecast '93 | % of Total |
| ** | SALARY/WAGE | | | | | | | | | | | | | | | | | | |
| 11 | Wage/Payment for Service/Insurance Cost | 4,981,225 | 46.64% | 4,188,658 | 50.06% | 4,284,693 | 47.83% | 5,123,537 | 42.06% | 3,009,171 | 39.90% | 4,416,178 | 39.38% | 1,073,782 | 49.17% | 1,829,684 | 44.71% | 28,906,929 | 44.32% |
| 12 | Employment Health Cost | 224,500 | 2.10% | 176,000 | 2.10% | 164,000 | 1.83% | 241,000 | 1.98% | 136,000 | 1.80% | 153,000 | 1.36% | 50,400 | 2.31% | 114,900 | 2.81% | 1259800 | 1.93% |
| 13 | Training & Seminar Cost | 48,800 | 0.46% | 35,850 | 0.43% | 47,000 | 0.52% | 49,950 | 0.41% | 31,550 | 0.42% | 45,850 | 0.41% | 23,050 | 1.06% | 23,050 | 0.56% | 305100 | 0.47% |
| 14 | Sports,Music, Art for Staff of JASA MARGA | 27,000 | 0.25% | 18,500 | 0.22% | 17,500 | 0.20% | 21,500 | 0.18% | 16,500 | 0.22% | 21,500 | 0.19% | 9,500 | 0.43% | 11,500 | 0.28% | 143500 | 0.22% |
| | SUB TOTAL | 5,281,525 | 49.45% | 4,419,008 | 52.81% | 4,513,193 | 50.38% | 5,435,987 | 44.63% | 3,193,221 | 42.34% | 4,636,528 | 41.35% | 1,156,732 | 52.96% | 1,979,134 | 48.36% | 30615328.5 | 46.94% |
| ** | FUEL/MAINTENANCE COST | | | | | | | | | | | | | | | | | | |
| 15 | Fuel Cost for Heavy Equipment | 35,443 | 0.33% | 13,676 | 0.16% | 24,295 | 0.27% | 37,058 | 0.30% | 26,039 | 0.35% | 37,136 | 0.33% | 9,672 | 0.44% | 5,747 | 0.14% | 189066.26 | 0.29% |
| 16 | Fuel Cost for Vehicles | 292,839 | 2.74% | 230,183 | 2.75% | 280,650 | 3.13% | 384,115 | 3.15% | 249,559 | 3.31% | 323,330 | 2.88% | 90,805 | 4.16% | 118,373 | 2.89% | 1969853.97 | 3.02% |
| 17 | Fuel Cost for Generator | 7,620 | 0.07% | 34,106 | 0.41% | 16,258 | 0.18% | 30,708 | 0.25% | 6,486 | 0.09% | 14,310 | 0.13% | 1,394 | 0.06% | 3,527 | 0.09% | 114409.52 | 0.18% |
| 18 | Maintenance for Heavy Equipment | 69,450 | 0.65% | 38,380 | 0.46% | 58,529 | 0.65% | 48,727 | 0.40% | 28,702 | 0.38% | 47,492 | 0.42% | 15,295 | 0.70% | 14,614 | 0.36% | 321189 | 0.49% |
| 19 | Maintenance for Vehicle | 59,085 | 0.55% | 32,356 | 0.39% | 96,812 | 1.08% | 63,712 | 0.52% | 23,477 | 0.31% | 99,898 | 0.89% | 37,995 | 1.74% | 50,000 | 1.22% | 463335 | 0.71% |
| 20 | Maintenance for Generator | 6,000 | 0.06% | 36,500 | 0.44% | 30,500 | 0.34% | 0.00 | 0.00% | 7,100 | 0.09% | 32,500 | 0.29% | 3,000 | 0.14% | 34,000 | 0.83% | 148600 | 0.23% |
| | SUB TOTAL | 470,437 | 4.40% | 385,202 | 4.60% | 507,044 | 5.66% | 564,320 | 4.63% | 341,362 | 4.53% | 554,667 | 4.95% | 158,161 | 7.24% | 226,261 | 5.53% | 3207453.75 | 4.92% |
| ** | MAINTENANCE COST | | | | | | | | | | | | | | | | | | |
| 21 | Maintenance Cost for Roadway | 156,689 | 1.47% | 149,205 | 1.78% | 211,220 | 2.36% | 303,365 | 2.49% | 163,251 | 2.16% | 420,013 | 3.75% | 23,688 | 1.08% | 182,430 | 4.46% | 1609860.5 | 2.47% |
| 22 | Maintenance Cost for Office/Building/Residence | 34,255 | 0.32% | 25,800 | 0.31% | 19,500 | 0.22% | 18,100 | 0.15% | 15,250 | 0.20% | 15,450 | 0.14% | 5,800 | 0.27% | 34,100 | 0.83% | 168255 | 0.26% |
| 23 | Maintenance Cost for Traffic Control Sign | 147,751 | 1.38% | 125,535 | 1.50% | 176,662 | 1.97% | 141,110 | 1.16% | 144,979 | 1.92% | 260,333 | 2.32% | 49,274 | 2.26% | 39,957 | 0.98% | 1085601 | 1.66% |
| 24 | Maintenance Cost for Toll Gate Facilities | 957,252 | 8.96% | 620,476 | 7.42% | 801,187 | 8.94% | 1,278,427 | 10.50% | 996,035 | 13.21% | 1,578,268 | 14.07% | 151,063 | 6.92% | 408,602 | 9.98% | 6791310 | 10.41% |
| | SUB TOTAL | 1,295,947 | 12.13% | 921,016 | 11.01% | 1,208,569 | 13.49% | 1,741,002 | 14.29% | 1,319,515 | 17.50% | 2,274,064 | 20.28% | 229,825 | 10.52% | 665,089 | 16.25% | 9655026.5 | 14.80% |
| ** | ADMINISTRATION | | | | | | | | | | | | | | | | | | |
| 25 | Printing Machine for Toll Operation | 599,994 | 5.62% | 623,596 | 7.45% | 524,974 | 5.86% | 638,030 | 5.24% | 224,835 | 2.98% | 615,013 | 5.48% | 61,583 | 2.82% | 115,711 | 2.83% | 3403735.05 | 5.22% |
| 26 | Land & Property Tax | 2,025,733 | 18.97% | 802,795 | 9.59% | 900,383 | 10.05% | 2,402,875 | 19.73% | 1,223,994 | 16.23% | 1,741,034 | 15.53% | 151,591 | 6.94% | 604,308 | 14.77% | 9852712.5 | 15.11% |
| 27 | Electricity & Telephone for Office | 112,600 | 1.05% | 252,867 | 3.02% | 243,400 | 2.72% | 382,000 | 3.14% | 183,200 | 2.43% | 126,516 | 1.13% | 43,800 | 2.01% | 156,000 | 3.81% | 1500383 | 2.30% |
| 28 | Others | 259,910 | 2.43% | 200,764 | 2.40% | 279,419 | 3.12% | 334,420 | 2.75% | 246,084 | 3.26% | 316,948 | 2.83% | 62,413 | 2.86% | 151,600 | 3.70% | 1851557.7 | 2.84% |
| | SUB TOTAL | 2,998,236 | 28.07% | 1,880,022 | 22.47% | 1,948,176 | 21.75% | 3,757,325 | 30.85% | 1,878,113 | 24.90% | 2,799,511 | 24.97% | 319,387 | 14.62% | 1,027,619 | 25.11% | 16508388.3 | 25.47% |
| ** | GENERAL | | | | | | | | | | | | | | | | | | |
| 29 | Lighting | 0 | 0.00% | 249,840 | 2.99% | 219,600 | 2.45% | 9,600 | 0.08% | 141,600 | 1.88% | 498,000 | 4.44% | 14,400 | 0.66% | 43,200 | 1.06% | 1176240 | 1.80% |
| 30 | Costs for Safety | 127,182 | 1.19% | 99,540 | 1.19% | 95,787 | 1.07% | 193,002 | 1.58% | 89,109 | 1.18% | 117,468 | 1.05% | 50,349 | 2.31% | 69,567 | 1.70% | 842004 | 1.29% |
| 31 | Duty Travel Instruction | 21,500 | 0.20% | 19,000 | 0.23% | 76,000 | 0.85% | 25,500 | 0.21% | 25,100 | 0.33% | 15,200 | 0.14% | 40,500 | 1.85% | 70,300 | 1.72% | 293100 | 0.45% |
| 32 | Rent Fee of Vehicles | 448,200 | 4.20% | 359,560 | 4.30% | 333,440 | 3.72% | 397,038 | 3.26% | 462,118 | 6.13% | 270,054 | 2.41% | 198,840 | 9.10% | 0 | 0.00% | 2469250 | 3.79% |
| 33 | Rent Fee of Other Assets | 20,000 | 0.19% | 17,000 | 0.20% | 39,500 | 0.44% | 39,500 | 0.32% | 25,000 | 0.33% | 16,000 | 0.14% | 7,800 | 0.36% | 0 | 0.00% | 164800 | 0.25% |
| 34 | General | 17,000 | 0.16% | 17,000 | 0.20% | 17,000 | 0.19% | 17,000 | 0.14% | 67,000 | 0.89% | 32,000 | 0.29% | 8,000 | 0.37% | 11,000 | 0.27% | 186000 | 0.29% |
| 35 | Other | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% |
| | SUB TOTAL | 633,882 | 5.94% | 761,940 | 9.11% | 781,327 | 8.72% | 681,640 | 5.60% | 809,927 | 10.74% | 948,722 | 8.46% | 319,889 | 14.65% | 194,067 | 4.74% | 5131394 | 7.87% |
| ** | TOTAL O & M Cost | 10,680,027 | 100.00% | 8,367,187 | 100.00% | 8,958,309 | 100.00% | 12,180,273 | 100.00% | 7,542,138 | 100.00% | 11,213,492 | 100.00% | 2,183,994 | 100.00% | 4,092,171 | 100.00% | 65217591 | 100.00% |

TABLE 14.1.2 BREAKDOWN OF O & M COSTS INTO TOLL BOOTH RELATED COSTS AND OTHER COSTS

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TOLL ROAD INFORMATION | | | | | | | | | | | | | | | | | | |
| 36 | Length of Tollway (Km) | 54.80 | | 69.30 | | 46.5 | | 81.50 | | 43.00 | | 42.40 | | 14.80 | | 37.05 | | 389.36 | |
| 37 | No. of Toll Gates | 10 | | 9 | | 12 | | 13 | | 8 | | 25 | | 2 | | 6 | | 85 | |
| | No. of Toll Booths | | | | | | | | | | | | | | | | | | |
| 38 | - in use | 58 | 78.38% | 56 | 90.32% | 53 | 85.48% | 65 | 73.86% | 39 | 69.64% | 71 | 88.75% | 10 | 62.50% | 23 | 52.27% | 375 | 77.80% |
| 39 | - total available | 74 | 100.00% | 62 | 100.00% | 62 | 100.00% | 88 | 100.00% | 56 | 100.00% | 80 | 100.00% | 16 | 100.00% | 44 | 100.00% | 482 | 100.00% |
| | REVIEW OF STAFFING | | | | | | | | | | | | | | | | | | |
| 40 | Total Staff on Payroll (Note 1) | 611 | | 511 | | 522 | | 629 | | 370 | | 537 | | 134 | | 229 | | 3543.4408 | |
| 41 | Staff required for Toll Booth Operation (Note 2) | 204 | | 195 | | 195 | | 234 | | 141 | | 288 | | 36 | | 87 | | 1380 | |
| 42 | Total Staff required for Toll Booth Operation (Note 3) | 245 | | 234 | | 234 | | 281 | | 169 | | 346 | | 43 | | 104 | | 1,656 | |
| 43 | % of staff related to toll booths | 40.05% | | 45.75% | | 44.80% | | 44.63% | | 45.78% | | 64.40% | | 32.27% | | 45.58% | | 46.73% | |
| | ASSUMED BREAKDOWN OF O&M COSTS | | | | | | | | | | | | | | | | | | |
| 44 | Toll Booth Related O&M Costs (Note 4) | 3,672,318 | 34.38% | 3,265,832 | 39.03% | 3,347,921 | 37.37% | 4,342,569 | 35.65% | 2,682,758 | 35.57% | 5,179,265 | 46.19% | 585,894 | 26.83% | 1,426,329 | 34.86% | 24,502,885 | 37.57% |
| 45 | Other O&M Costs | 7,007,709 | 65.62% | 5,101,355 | 60.97% | 5,610,388 | 62.63% | 7,837,705 | 64.35% | 4,859,380 | 64.43% | 6,034,226 | 53.81% | 1,598,101 | 73.17% | 2,665,841 | 65.14% | 40,714,706 | 62.43% |
| 46 | Total O&M | 10,680,027 | 100.00% | 8,367,187 | 100.00% | 8,958,309 | 100.00% | 12,180,273 | 100.00% | 7,542,138 | 100.00% | 11,213,492 | 100.00% | 2,183,994 | 100.00% | 4,092,171 | 100.00% | 65,217,591 | 100.00% |

Note 1. Estimated from Salary/Wage costs assuming an average monthly salary of Rp.400,000 per month.
Note 2. Estimated assuming each toll booth in use requires 1 operator /8 hours with 3 shifts a day. In addition, 1 supervisor /8 hours with 3 shifts a day for each toll gate is also assumed.
Note 3. An allowance of 20% has been added to Item 41 for backup staff, etc. collection.
Note 4. The toll booth related O&M costs have been estimated by multiplying the total Salary/Wage cost by the percentage in Item 43. Items 24 and 25 will also be closely related to the number of toll booths and have been added as well.

TABLE 14.1.3 ESTIMATED O&M COST PER TOLL BOOTH AND PER KM (ADAPTED FROM FORECAST 1993 O&M COSTS)

| ITEM | TOLLWAY | | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| | JAGORAWI | JAKARTA - MERAK | URABAYA GEMPOL | JAKARTA-CIKAMPEK | DALARAN CILEUNYI | PRIOCK-CAW.-TOM.-CENGK. | EMARAN | BELMERA | |
| Toll Booths in use (No.) | 58 | 56 | 53 | 65 | 39 | 71 | 10 | 23 | 375 |
| Toll Booth Related O&M Costs (Rp.millio | 3,672 | 3,266 | 3,348 | 4,343 | 2,683 | 5,179 | 586 | 1,426 | 24,503 |
| Cost/Booth (Rp.million/booth) | 63.32 | 58.32 | 63.17 | 66.81 | 68.79 | 72.95 | 58.59 | 62.01 | 65.34 |
| PLUS | | | | | | | | | |
| Length of Tollway (Km) | 54.8 | 69.3 | 46.5 | 81.5 | 43 | 42.4 | 14.8 | 37.06 | 389.36 |
| Other O&M Costs (excl. toll booth relate | 7,008 | 5,101 | 5,610 | 7,838 | 4,859 | 6,034 | 1,598 | 2,666 | 40,715 |
| Cost/Km (Rp.million/Km) | 127.88 | 73.61 | 120.65 | 96.17 | 113.01 | 142.32 | 107.98 | 71.93 | 104.57 |

The cost of the overlay required after 12 years has been measured separately as described in Section 14.2.1.(1) and is estimated (at 1994 prices) in Table 14.1.5 below.

**Table 14.1.5 NS Axis Pavement Overlay Cost**

| DESCRIPTION | LENGTH (Km) | AREA OF SURFACING | | | TONS OF ASPH.SURF (ton) | UNIT RATE (Rp/t) | OVERLA COST (Rp.mill) |
|---|---|---|---|---|---|---|---|
| | | THR'WAY (m2) | RAMPWA (m2) | TOTAL (m2) | | | |
| North-South Axis | | | | | | | |
| Section NS-1 | 4.79 | 2,523 | 1,454 | 3,977 | 1,122 | 95,000 | 106.6 |
| Section NS-2 | 12.84 | 5,886 | 8,509 | 14,395 | 4,060 | 95,000 | 385.7 |
| TOTAL N-S | 17.63 | 8,409 | 9,963 | 18,372 | 5,181 | 95,000 | 492.2 |

## 14.2 East-West Axis

### 14.2.1 Scope of Maintenance Works

For the East-West Axis it is assumed that DKI Jakarta and Bina Marga will be responsible for operation aspects and only maintenance works are considered in this section. Required maintenance works for the East-West Axis will be similar to that previously described for the North-South Axis but to a standard appropriate for an arterial road rather than a toll road.

Maintenance works except for inspections are usually executed by contractors under the supervision of DKI Jakarta and Bina Marga, and should include:

- Clearing of pavement
- Mowing and maintenance of plantations
- Clearing of ditches and culverts
- Pavement repair such as patching and resurfacing
- Repair of sealants and expansion joints of bridges and viaducts
- Repair of damaged paintwork on steel bridges and repainting as necessary
- Repair and maintenance of traffic control devices, including signs and traffic signals
- Repair and maintenance of sidewalks and other pedestrian facilities
- Repair and maintenance of lighting
- Repair of cut and fill slopes
- Repair of damage to road facilities caused by traffic accidents
- Improvement and maintenance works including pavement markings, pavement overlay, widening, etc.

According to the flexible pavement design, an overlay is required after 12 years to extend the pavement life to the 20 year design life. The cost of the overlay is substantial and will therefore be estimated separately from other O & M costs. The thickness of the overlay is a 7 cm binder course plus a 5 cm surface course and for costing purposes is assumed to apply to the throughway and rampways only.

### 14.2.2 Organization for Maintenance

The East-West Axis should be designated as a major arterial road in Jakarta and as such, maintenance will be the responsibility of DKI Jakarta and Bina Marga. For example, Bina Marga's Kampung Rambutan Maintenance Office which is in the sub-directorate of Metropolitan under the Directorate of Urban Road Development (BINKOT) currently carries out maintenance of National Roads in Jakarta.

The total office staff at present is sixteen (16) for the 134.9 km of National Roads in Jakarta. The office has no maintenance equipment or facilities other than three (3) vehicles for inspections.

No detailed information about maintenance offices of DKI Jakarta was made available.

### 14.2.3 Maintenance Costs

The annual budget for this financial year amounts to Rp. 3,400 million against a requested Rp. 10,200 million, excluding personnel expenses and office running costs. Under the available budget there are no funds for pavement overlays or for vegetation control.

The existing annual budget corresponds to Rp. 25.2 million per km while the requested budget corresponds to Rp. 75.6 million per km. Considering the estimated Rp. 110 million per km excluding toll booth related costs which was derived for a 4-lane tollway in section 14.1.3 above, the requested budget of say Rp. 75 million per km seems reasonable and has been adopted to estimate the annual budget for maintenance for the East-West Axis.

The estimated costs are shown in Table 14.2.1. The costs shown cover maintenance costs only and do not include DKI Jakarta and Bina Marga's salary/wage expenses for inspections and management of maintenance contractors, provision of an office, or office running costs.

**Table 14.2.1 Annual Maintenance Costs for East-West Axis**

(Rp.million)

| Item | EW-1 | EW-2 | EW-3 | EW-4 | Total EW |
|---|---|---|---|---|---|
| Length in km | 8.70 | 2.50 | 8.45 | 11.10 | 30.75 |
| Estimated Maintenance Cost/km | 75 | 75 | 75 | 75 | 75 |
| Total Maintenance Cost | 652.5 | 187.5 | 633.8 | 832.5 | 2306.3 |

The cost of the overlay required after 12 years has been measured separately as described in Section 14.2.1.(1) and is estimated (at 1994 prices) in Table 14.2.2 below.

## Table 14.2.2 EW Axis Pavement Overlay Cost

| DESCRIPTION | LENGTH | AREA OF SURFACING | | | TONS OF | UNIT | OVERLA |
|---|---|---|---|---|---|---|---|
| | | THR'WAY | RAMPWAY | TOTAL | ASPH.SURF | RATE | COST |
| | (Km) | (m2) | (m2) | (m2) | (t) | (Rp/t) | (Rp.mill) |
| East West Axis | | | | | | | |
| Section EW-1 | 8.70 | 183,845 | 3,764 | 187,609 | 52,906 | 95,000 | 5,026.0 |
| Section EW-2 | 2.50 | 22,710 | 1,136 | 23,846 | 6,725 | 95,000 | 638.8 |
| Section EW-3 | 8.45 | 7,101 | 6,860 | 13,961 | 3,937 | 95,000 | 374.0 |
| Section EW-4 | 11.10 | 155,982 | 1,455 | 157,437 | 44,397 | 95,000 | 4,217.7 |
| TOTAL FOR EW | 17.63 | 8,409 | 9,963 | 18,372 | 107,964 | 95,000 | 10,256.6 |

# CHAPTER 15 PROJECT COST ESTIMATES

# CHAPTER 15 PROJECT COST ESTIMATES

## 15.1 General

The estimate of the project cost is based on the results of preliminary engineering design and a subsequent quantity take-off of the main work items. About seventy-five (75) work items associated with construction of the project roads are defined and unit costs for each work item have been estimated. The estimate takes into consideration the prevailing market conditions and construction practices in Jakarta, the study on construction methods, the duration of the construction period, and the study on operation and maintenance of the toll road as described in the preceding chapters.

The project cost discussed in this chapter consists of the following cost items:

- Construction cost including utility relocation cost
- Value added tax of 10% (PPN)
- Physical Contingency (10%)
- Land acquisition and compensation cost
- Engineering cost

Operation and maintenance cost of the project is discussed separately in Chapter 14.

The basic premises in estimating the project cost are as follows :

1) It is assumed that all construction works will be executed by general contractors to be employed by the private investor or Bina Marga, with contractors being selected by international competitive bidding (ICB).

2) The unit price of each cost component is determined based on the economic conditions prevailing in August 1994.

3) For the construction works, Indonesian taxes and duties on imported equipment and materials (tax percentage depending on type/kind of equipment and materials) is included in the estimates.

4) Indonesian value added tax (PPN) of 10% is not included in the unit cost of each work item, but is calculated separately and added in the summary of construction cost for each road section.

5) The unit price of each work item includes the labour cost, equipment cost, material cost and the contractor's overhead and profit (15%).

6) The consulting engineering services cost is assumed to be 7% of the construction cost, consisting of 3% for detailed design and 4% for construction supervision.

7) A physical contingency of 10% of the construction cost has been added.

8) The cost is split into foreign currency and local currency portions, both indicated in Rupiah. Foreign currency and local currency components of the unit cost of each work item are estimated based on the following classifications:

a) The foreign currency component includes but is not limited to the following costs:

- Salaries and costs of foreign personnel;
- Overhead and profit of foreign firms;
- Foreign component of depreciation and operating/maintenance costs of construction equipment;
- Bituminous materials;
- Steel sheet pile, steel H-beam and steel forms;
- Structural steel, including steel for box girders, I-girders, etc.
- Prestressing strand, wire and bars;
- Sheaths and anchorages for prestressing;
- Rubber water stops and joint fillers;
- Metal bearing shoes;
- Rubber bearing pads;
- Forty percent (40%) of fuel costs;
- Traffic sign boards; and
- Foreign component of domestic materials.

b) The local currency component includes but is not limited to the following costs:

- Salaries and cost of local personnel;
- Overhead and profit of local firms;
- Local component of depreciation and operating/maintenance costs of construction equipment;
- Sixty percent (60%) of fuel costs
- Import duty on imported materials; and
- Local component of domestic materials.

9) Foreign and local cost components are quoted in Rupiah. Foreign costs may be converted into foreign currency using exchange rates applicable in August 1994: US$1.00 = Yen 100 = Rp. 2150.

Construction costs have been estimated separately for each of the contract packages as follows:

| Section | Description | Station From | Station To | Length (km) |
|---|---|---|---|---|
| North-South Axis | | | | |
| Section NS-1 | Mangga Dua IC - Kebon Sirih IC | 0+770 | 5+560 | 4.79 |
| Section NS-2 | Kebon Sirih IC - South JORR IC | 5+560 | 18+400 | 12.84 |
| TOTAL FOR NS | Mangga Dua IC - South JORR IC | 0+770 | 18+400 | 17.63 |
| East-West Axis | | | | |
| Section EW-1 | West JORR IC -Latumeten IC | 0+500 | 9+200 | 8.70 |
| Section EW-2 | Latumeten IC - Mangga Besar IC | 9+200 | 11+700 | 2.50 |
| Section EW-3 | Mangga Besar IC - Sunter IC | 11+700 | 20+150 | 8.45 |
| Section EW-4 | Sunter IC - East JORR IC | 20+150 | 31+250 | 11.10 |
| TOTAL FOR EW | West JORR IC - East JORR IC | 0+500 | 31+250 | 30.75 |
| TOTAL FOR NS PLUS EW | | | | 48.38 |

## 15.2 Construction Cost

### 15.2.1 Unit Costs of Construction Work Items

The unit costs for construction works are estimated considering labor cost, materials cost, equipment cost and overhead and profit for major work items. The analyzed unit prices have been compared with recent similar bid prices and adjusted as required to obtain realistic prices consistent with the proposed construction method and the duration of the construction period.

(1) Unit Cost of Labor

Table 15.2.1 shows the unit costs of labor applicable to the construction cost estimates. The rates include an allowance for items such as social benefits, insurance, etc., and are based on 7 hours of working time per day. No allowance is included in the rates for any tax liability related to salary/wage payments.

The unit labour costs were set after referring to "Daftar Harga Satuan Bahan Bangunan DKI Jakarta", "Patokan Harga Satuan Pekerjaan Bidang Pemborongan Pemerintah DKI Jakarta", and labour rates from major contracts in the Jakarta area.

**Table 15.2.1 Unit Cost of Labour**

(Rupiah/day)

| Classification | Component | | Total. |
|---|---|---|---|
| | Foreign | Local | |
| Superintendent | 0 | 40,000 | 40,000 |
| Foreman, General | 0 | 24,000 | 24,000 |
| Plant Operator | 0 | 12,000 | 12,000 |
| Electrician | 0 | 7,000 | 7,000 |
| Driver | 0 | 12,000 | 12,000 |
| Mechanic | 0 | 6,500 | 6,500 |
| Carpenter | 0 | 7,000 | 7,000 |
| Painter | 0 | 6,000 | 6,000 |
| Mason | 0 | 7,000 | 7,000 |
| Skilled Labourer | 0 | 8,000 | 8,000 |
| Heavy Labourer | 0 | 4,500 | 4,500 |
| Common Labourer | 0 | 3,750 | 3,750 |

(2) Unit Cost of Materials

Table 15.2.2 shows the unit costs of major construction materials applicable to the construction cost estimates. The contractor's overhead and profit are not included.

The unit costs of local materials are based on market prices in the Jakarta area and are set after referring to "Patokan Harga Satuan Pekerjaan Bidang Pemborongan Pemerintah DKI Jakarta" and material costs from major contracts in the Jakarta area.

The unit costs of imported materials are based on the CIF Jakarta price including port handling and clearance costs, estimated by reference to the "Data Book for Cost Estimates in Japan". Import duty on imported materials is also included after reference to "Tarip Bea Masuk (Custom Tariff), Republic of Indonesia".

## Table 15.2.2 Unit Costs of Major Materials

(Rupiah)

| MATERIAL | UNIT | UNIT COST | | |
|---|---|---|---|---|
| | | FOREIGN COMP. | LOCAL COMP. | TOTAL |
| Gasoline (Bensin Premium) | litre | 280 | 420 | 700 |
| Diesel Fuel (Minyak Solar) | litre | 152 | 228 | 380 |
| Lubricant Oil | litre | 1,600 | 2,400 | 4,000 |
| Cutback Asphalt MC-70/RC-250 *** | kg | 692 | 208 | 900 |
| Asphalt Cement *** | ton | 326,923 | 98,077 | 425,000 |
| Mineral Filler | ton | 68,960 | 14,735 | 83,695 |
| Portland Cement | kg | 89 | 91 | 180 |
| Timber Plank | m3 | 0 | 250,000 | 250,000 |
| Plywood (12.5mm) | m2 | 0 | 15,000 | 15,000 |
| Reinforcing Steel SD 30 | ton | 720 | 180 | 900 |
| Rolled Structural Steel (SM 50 YB) *** | ton | 1,067,147 | 320,144 | 1,387,291 |
| PC Strand (12T12.7) *** | kg | 3,544 | 1,063 | 4,607 |
| Course Aggregate | m3 | 23,810 | 7,347 | 31,157 |
| Fine Aggregate | m3 | 23,032 | 7,055 | 30,087 |
| PC Pile D=60cm | m | 82,600 | 35,400 | 118,000 |
| RC Pipe D=60cm | each | 40,602 | 27,068 | 67,670 |
| RC Pipe D=120cm | each | 284,493 | 189,662 | 474,155 |

Notes:
1. Unit Costs of imported goods (marked ***) are based on CIF Jakarta price, ie. including port handling and clearance costs, plus Indonesian tax and duty.
2. Indonesian value added tax (PPN) is not included.

(3) Unit Cost of Equipment

To assist in determining appropriate unit costs for work items an assessment of hourly costs was made for major plant and equipment which are likely to be used in the construction of the project roads. The hourly costs comprised depreciation cost, operation and maintenance cost (fuel, lubricants, spare parts, etc.) and management cost. The design life of the equipment and usable hours per year were adjusted to reflect local conditions.

(4) Overhead and Profit

An allowance of 15% for the contractor's overhead and profit is included in the unit rates for work items.

(5) Unit Prices of Construction Works

The unit prices by work item estimated as described above are shown in the cost estimation tables for each section. The foreign and local cost

components for each work item have been estimated based on the assumptions described in Section 15.1. 8) and are also shown in the tables.

15.2.2 Estimated Construction Costs

Using the unit rates derived as described above, the construction costs for each section of the North-South Axis and the East-West Axis have been estimated and are shown below. The costs represent the estimated construction cost at August 1994 prices. Indonesian value added tax of 10% (PPN) has been added to the total construction cost as a separate item. The costs shown refer to initial construction costs only, they do not include items such as operation and maintenance costs, costs of overlay after 12 years, consulting engineering services, land acquisition and compensation, or physical contingency which are added later.

(1) North-South Axis

The estimated construction cost, work item by work item, for the North-South Axis is shown in Table 15.2.3-(a). The cost of Traffic Control Equipment for the North-South Axis is included. Refer to Table 10.10.3 for a breakdown of these costs.

The total estimated construction costs for each bill section are further summarised in Table 15.2.4-(a). For each section the bridge/viaduct construction cost represents about 80% of the total construction cost.

(2) East-West Axis

The estimated construction cost, work item by work item, for Sections EW-1, EW-2, EW-3 and EW-4 are shown in Table 15.2.3-(b) to Table 15.2.3-(c) respectively.

The total estimated construction costs for each bill section are further summarised in Table 15.2.4-(a). The bridge/viaduct construction cost as a percentage of the cost averages about 60% but varies from about 45% (EW-1) to about 75% (EW-3).

The total construction costs for the North-South Axis and the East-West Axis are shown in Table 15.2.5-(b)

## TABLE 15.2.4 (c) CONSTRUCTION COST FOR SECTION EW-2

NAME OF LINK NORTH-SOUTH AXIS
NAME OF SEGMENT TOTAL NS
STATION STA. +770 - STA. 18+400

| ITEM NO. AND DESCRIPTION | | UNIT | QUANTITY | | | | | UNIT COST (Rp.) | | | COST (Rp.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THROUGHWAY | RAMPWAY | FRONTAGE | OTHERS | TOTAL | FOREIGN | LOCAL | TOTAL | FOREIGN | LOCAL | TOTAL |
| 1. GENERAL | | ITEM | | | | | | 5.00% | 2.00% | 7.00% | 36,917,438,673 | 14,766,975,469 | 51,684,414,142 |
| 2. SITE CLEARING | | M2 | 437,200 | 129,450 | 292,400 | 0 | 859,050 | 1,509 | 411 | 1,920 | 1,296,027,470 | 353,348,530 | 1,649,376,000 |
| 3. DEMOLITION OF MASONRY/CONC. STRUCT. | | M3 | 2,241 | 0 | 0 | 0 | 2,241 | 35,658 | 14,342 | 50,000 | 79,894,644 | 32,135,356 | 112,030,000 |
| 4. ROAD EARTHWORKS | | | | | | | | | | | | | |
| 4.01 | BORROW MATERIAL | M3 | 19,500 | 2,200 | 365,500 | 0 | 387,200 | 12,937 | 5,063 | 18,000 | 5,009,205,269 | 1,960,394,731 | 6,969,600,000 |
| 4.02 | FREE-DRAINING MATERIAL | M3 | 12,500 | 0 | 0 | 0 | 12,500 | 24,485 | 7,515 | 32,000 | 306,056,942 | 93,943,058 | 400,000,000 |
| 4.03 | PERMEABLE BACKFILL | M3 | 957 | 3,137 | 0 | 0 | 4,094 | 28,329 | 9,671 | 38,000 | 115,973,569 | 39,590,831 | 155,564,400 |
| | SUB-TOTAL | | | | | | | | | | 5,431,235,780 | 2,093,928,620 | 7,525,164,400 |
| 5. STRUCTURE EXCAVATION | | | | | | | | | | | | | |
| 5.01 | STRUCTURE EXCAVATION UP TO 2m | M3 | 163,228 | 43,820 | 0 | 0 | 207,048 | 7,120 | 2,880 | 10,000 | 1,474,264,170 | 596,213,830 | 2,070,478,000 |
| 5.02 | STRUCTURE EXCAVATION OVER 2m | M3 | 226,057 | 34,154 | 0 | 0 | 260,211 | 35,616 | 9,384 | 45,000 | 9,267,537,872 | 2,441,943,628 | 11,709,481,500 |
| | SUB-TOTAL | | | | | | | | | | 10,741,802,042 | 3,038,157,458 | 13,779,959,500 |
| 6. DRAINAGE | | | | | | | | | | | | | |
| 6.01 | R.C. PIPE D=60cm | M | 800 | 1,096 | 19,298 | 0 | 21,194 | 162,917 | 99,583 | 262,500 | 3,452,922,651 | 2,110,607,349 | 5,563,530,000 |
| 6.02 | R.C. PIPE D=120cm | M | 0 | 0 | 8,918 | 0 | 8,918 | 343,255 | 213,245 | 556,500 | 3,061,214,722 | 1,901,763,578 | 4,962,978,300 |
| 6.03 | U-DITCH, 0.3 x 0.6m (DS-2) | M | 0 | 0 | 33,041 | 0 | 33,041 | 72,832 | 57,168 | 130,000 | 2,406,460,235 | 1,888,895,765 | 4,295,356,000 |
| 6.04 | U-DITCH, 1.0 x (0.6-2.0)m (DS-4) | M | 0 | 0 | 29,240 | 0 | 29,240 | 85,991 | 64,009 | 150,000 | 2,514,379,543 | 1,871,620,457 | 4,386,000,000 |
| 6.05 | CATCHBASIN INLET TYPE-A (DC-A-2) | EACH | 53 | 70 | 801 | 0 | 924 | 553,363 | 296,637 | 850,000 | 511,306,952 | 274,093,048 | 785,400,000 |
| 6.06 | CATCHBASIN INLET TYPE-B (DC-A-4) | EACH | 0 | 0 | 367 | 0 | 367 | 765,980 | 434,020 | 1,200,000 | 281,114,630 | 159,285,370 | 440,400,000 |
| 6.07 | MORTARED RUBBLE WATERWAY (DW-1-3) | M2 | 15,500 | 0 | 0 | 0 | 15,500 | 37,802 | 22,198 | 60,000 | 585,931,582 | 344,068,418 | 930,000,000 |
| 6.08 | RIVER REVETMENT | M | 0 | 400 | 0 | 0 | 400 | 1,240,985 | 959,015 | 2,200,000 | 496,394,090 | 383,605,910 | 880,000,000 |
| | SUB-TOTAL | | | | | | | | | | 13,309,724,404 | 8,933,939,896 | 22,243,664,300 |
| 7. SUBGRADE PREPARATION | | M2 | 11,100 | 13,700 | 365,500 | 0 | 390,300 | 608 | 192 | 800 | 237,327,581 | 74,912,419 | 312,240,000 |
| 8. BASE AND SUBBASE | | | | | | | | | | | | | |
| 8.01 | GRANULAR SUBBASE | M3 | 3,050 | 3,425 | 100,878 | 0 | 107,353 | 30,598 | 9,402 | 40,000 | 3,284,822,605 | 1,009,297,395 | 4,294,120,000 |
| 8.02 | GRADED GRANULAR BASE | M3 | 1,850 | 2,192 | 64,328 | 0 | 68,370 | 42,073 | 12,927 | 55,000 | 2,876,510,829 | 883,839,171 | 3,760,350,000 |
| | SUB-TOTAL | | | | | | | | | | 6,161,333,434 | 1,893,136,566 | 8,054,470,000 |
| 9. PAVEMENT SURFACING | | | | | | | | | | | | | |
| 9.01 | BITUMINOUS PRIME COAT/TACK COAT | KG | 461,982 | 146,746 | 752,930 | 0 | 1,361,658 | 842 | 258 | 1,100 | 1,146,666,910 | 351,156,340 | 1,497,823,250 |
| 9.02 | ASPHALT TREATED BASE(incl. Asph.Cement) | TON | 3,200 | 3,562 | 105,264 | 1,294 | 113,320 | 67,178 | 16,822 | 84,000 | 7,612,625,173 | 1,906,233,827 | 9,518,859,000 |
| 9.03 | ASPHALT CONCRETE SURFACE(incl. A.Cem.) | TON | 58,234 | 17,514 | 71,638 | 881 | 148,267 | 77,263 | 17,737 | 95,000 | 11,455,485,416 | 2,629,855,834 | 14,085,341,250 |
| 9.04 | CONCRETE PAVEMENT (t=28cm with mesh) | M2 | 1,000 | 8,000 | 0 | 0 | 9,000 | 44,780 | 25,220 | 70,000 | 403,019,372 | 226,980,628 | 630,000,000 |
| | SUB-TOTAL | | | | | | | | | | 20,617,796,871 | 5,114,226,629 | 25,732,023,500 |
| 10. CONCRETE STRUCTURES | | | | | | | | | | | | | |
| 10.01 | STR. CONC. CLASS B-1-1(Deck Slab/Diaphragm | M3 | 120,873 | 23,935 | 0 | 0 | 144,808 | 119,630 | 100,370 | 220,000 | 17,323,412,718 | 14,534,285,682 | 31,857,698,400 |
| 10.02 | STR. CONC. CLASS B-1-2 (Piers) | M3 | 132,301 | 33,330 | 0 | 0 | 165,632 | 156,945 | 63,055 | 220,000 | 25,994,977,975 | 10,443,978,425 | 36,438,956,400 |
| 10.03 | STR. CONC. CLASS C-1 (Abutments) | M3 | 121,836 | 17,285 | 0 | 0 | 139,122 | 109,092 | 60,908 | 170,000 | 15,177,028,966 | 8,473,632,834 | 23,650,661,800 |
| 10.04 | STR. CONC. CLASS C-2 (Box Culverts) | M3 | 5,524 | 0 | 0 | 0 | 5,524 | 102,135 | 67,865 | 170,000 | 564,180,293 | 374,875,907 | 939,056,200 |
| 10.05 | STR. CONC. CLASS C-3 (Curbs) | M3 | 19,332 | 4,544 | 0 | 0 | 23,875 | 100,625 | 69,375 | 170,000 | 2,402,460,954 | 1,656,353,646 | 4,058,814,600 |
| 10.06 | STR. CONC. CLASS C-4 (Ped. Bridge Stairs) | M3 | 0 | 0 | 0 | 0 | 0 | 145,004 | 104,996 | 250,000 | 0 | 0 | 0 |
| 10.07 | STR. CONC. CLASS C-5 (Ped. Bridge Piers) | M3 | 0 | 0 | 0 | 0 | 0 | 124,931 | 75,069 | 200,000 | 0 | 0 | 0 |
| 10.08 | STRUCTURE CONCRETE CLASS D | M3 | 0 | 6,038 | 0 | 0 | 6,038 | 110,824 | 59,176 | 170,000 | 669,179,082 | 357,321,718 | 1,026,500,800 |
| 10.09 | REINFORCING STEEL | TON | 40,378 | 8,233 | 0 | 0 | 48,611 | 722,004 | 327,996 | 1,050,000 | 35,096,986,444 | 15,944,059,556 | 51,041,046,000 |
| 10.10 | PC-I GIRDER SPAN 30m | EACH | 1,455 | 344 | 0 | 0 | 1,799 | 15,970,489 | 6,029,511 | 22,000,000 | 28,730,909,116 | 10,847,090,884 | 39,578,000,000 |
| 10.11 | PC-U GIRDER SPAN 30m | EACH | 1,395 | 243 | 0 | 0 | 1,638 | 27,585,390 | 10,414,610 | 38,000,000 | 45,184,868,034 | 17,059,131,966 | 62,244,000,000 |
| 10.12 | PC-I GIRDER PEDESTRIAN SPAN 24m | EACH | 0 | 0 | 0 | 0 | 0 | 17,482,207 | 6,567,793 | 24,050,000 | 0 | 0 | 0 |
| 10.13 | PC CABLE TYPE A (12T12.7) | KG | 502,988 | 0 | 0 | 0 | 502,988 | 3,423 | 1,077 | 4,500 | 1,721,859,624 | 541,586,376 | 2,263,446,000 |
| 10.14 | PC CABLE TYPE E (1T19.3) | KG | 93,856 | 17,898 | 0 | 0 | 111,754 | 4,375 | 1,625 | 6,000 | 488,948,077 | 181,575,923 | 670,524,000 |
| 10.15 | FURN.& DRIVE PC PILE 45x45cm | M | 10,573 | 1,922 | 0 | 0 | 12,496 | 62,049 | 47,951 | 110,000 | 775,342,749 | 599,173,251 | 1,374,516,000 |
| 10.16 | FURN.& DRIVE PC PILE D=60cm | M | 158,590 | 25,177 | 0 | 0 | 183,767 | 89,461 | 35,539 | 125,000 | 16,439,888,768 | 6,530,948,732 | 22,970,837,500 |
| 10.17 | FURN. & BORE PC PILE D= 60cm | M | 152,924 | 31,539 | 0 | 0 | 184,463 | 118,088 | 46,912 | 165,000 | 21,782,925,126 | 8,653,535,874 | 30,436,461,000 |
| 10.18 | CAST-IN-PLACE CONCRETE PILE D=100cm | M | 17,819 | 4,098 | 0 | 0 | 21,917 | 504,662 | 295,338 | 800,000 | 11,060,731,525 | 6,472,948,475 | 17,533,680,000 |
| 10.19 | EXPANSION JOINT TYPE A | M | 10,251 | 1,824 | 0 | 0 | 12,075 | 571,013 | 78,987 | 650,000 | 6,894,757,203 | 953,732,797 | 7,848,490,000 |
| 10.20 | EXPANSION JOINT TYPE B | M | 10,251 | 1,824 | 0 | 0 | 12,075 | 585,518 | 64,482 | 650,000 | 7,069,900,868 | 778,589,132 | 7,848,490,000 |
| 10.21 | METAL BEARING SHOE TYPE A (125t) | EACH | 2,147 | 144 | 0 | 0 | 2,291 | 3,273,391 | 1,000,109 | 4,273,500 | 7,499,339,923 | 2,291,248,577 | 9,790,588,500 |
| 10.22 | METAL BEARING SHOE TYPE D (275t) | EACH | 16 | 20 | 0 | 0 | 36 | 7,892,200 | 2,412,800 | 10,305,000 | 284,119,210 | 86,860,790 | 370,980,000 |
| 10.23 | METAL BEARING SHOE TYPE E (450t) | EACH | 0 | 14 | 0 | 0 | 14 | 16,110,839 | 4,878,661 | 20,989,500 | 225,551,745 | 68,301,255 | 293,853,000 |
| 10.24 | METAL BEARING SHOE TYPE N (1200t) | EACH | 8 | 20 | 0 | 0 | 28 | 45,242,294 | 13,700,206 | 58,942,500 | 1,266,784,223 | 383,605,777 | 1,650,390,000 |
| 10.25 | BEARING PAD TYPE H (40x40x4.0cm) | EACH | 2,910 | 782 | 0 | 0 | 3,692 | 341,331 | 106,669 | 448,000 | 1,260,195,061 | 393,820,939 | 1,654,016,000 |
| 10.26 | BEARING PAD TYPE K (60x40x4.0cm) | EACH | 2,810 | 446 | 0 | 0 | 3,256 | 511,997 | 160,003 | 672,000 | 1,667,061,939 | 520,970,061 | 2,188,032,000 |
| 10.27 | DRAIN PIPE D=20cm | M | 24,332 | 12,367 | 0 | 0 | 36,699 | 34,049 | 61,951 | 96,000 | 1,249,570,186 | 2,273,539,574 | 3,523,109,760 |
| | SUB-TOTAL | | | | | | | | | | 250,830,979,809 | 110,421,168,151 | 361,252,147,960 |
| 11. STEEL STRUCTURES | | | | | | | | | | | | | |
| 11.01 | STEEL STRUCTURES: BOX GIRDERS | TON | 2,374 | 3,748 | 0 | 0 | 6,121 | 4,727,452 | 272,548 | 5,000,000 | 28,938,058,768 | 1,668,341,232 | 30,606,400,000 |
| 11.02 | STEEL STRUCTURES: I-GIRDERS | TON | 39,415 | 1,656 | 0 | 0 | 41,072 | 4,254,707 | 245,293 | 4,500,000 | 174,747,666,745 | 10,074,578,255 | 184,822,245,000 |
| 11.03 | STEEL STRUCTURES: PIERS | TON | 10,826 | 0 | 0 | 0 | 10,826 | 4,299,558 | 200,442 | 4,500,000 | 46,546,282,697 | 2,169,952,303 | 48,716,235,000 |
| | SUB-TOTAL | | | | | | | | | | 250,232,008,210 | 13,912,871,790 | 264,144,880,000 |
| 12. MISCELLANEOUS | | | | | | | | | | | | | |
| 12.01 | SOLID SODDING | M2 | 0 | 0 | 0 | 0 | 0 | 304 | 2,496 | 2,800 | 0 | 0 | 0 |
| 12.02 | GUARDRAIL | M | 2,000 | 2,740 | 29,240 | 0 | 33,980 | 108,796 | 31,204 | 140,000 | 3,696,903,579 | 1,060,296,421 | 4,757,200,000 |
| 12.03 | SEPARATOR FENCE | M | 0 | 1,100 | 0 | 0 | 1,100 | 21,889 | 8,111 | 30,000 | 24,078,034 | 8,921,966 | 33,000,000 |
| 12.04 | DRY RIPRAP SLOPE PROTECTION (SP-C) | M2 | 300 | 0 | 0 | 0 | 300 | 22,548 | 7,452 | 30,000 | 6,764,409 | 2,235,591 | 9,000,000 |
| 12.05 | REGULATORY & WARNING SIGN | EACH | 525 | 384 | 584 | 0 | 1,493 | 156,312 | 83,688 | 240,000 | 233,373,546 | 124,946,454 | 358,320,000 |
| 12.06 | GUIDE SIGN | EACH | 84 | 125 | 56 | 0 | 265 | 4,599,619 | 2,275,381 | 6,875,000 | 1,218,899,092 | 602,975,908 | 1,821,875,000 |
| 12.07 | ROAD MARKING | M2 | 37,199 | 30,809 | 28,070 | 0 | 96,079 | 8,687 | 7,313 | 16,000 | 834,656,369 | 702,604,431 | 1,537,260,800 |
| 12.08 | CONCRETE CURB | M | 0 | 1,100 | 84,796 | 0 | 85,896 | 9,002 | 6,998 | 16,000 | 773,276,584 | 601,059,416 | 1,374,336,000 |
| 12.09 | INTERLOCKING CONCRETE PAVING | M2 | 0 | 0 | 78,948 | 0 | 78,948 | 6,883 | 5,117 | 12,000 | 543,414,577 | 403,961,423 | 947,376,000 |
| 12.10 | CONCRETE BARRIER | M | 0 | 0 | 0 | 0 | 0 | 68,805 | 35,195 | 104,000 | 0 | 0 | 0 |
| 12.11 | BUS STOP SHELTER | EACH | 0 | 0 | 0 | 0 | 0 | 3,680,342 | 1,319,658 | 5,000,000 | 0 | 0 | 0 |
| 12.12 | STREET TREE | EACH | 0 | 0 | 0 | 0 | 0 | 0 | 20,000 | 20,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 7,331,366,189 | 3,507,001,611 | 10,838,367,800 |
| 13. STREET LIGHTING AND TRAFFIC SIGNALS | | | | | | | | | | | | | |
| 13.01 | STREET LIGHTING UNIT | EACH | 1,174 | 201 | 362 | 0 | 1,737 | 2,976,039 | 1,223,961 | 4,200,000 | 5,169,379,831 | 2,126,020,169 | 7,295,400,000 |
| 13.02 | STREET LIGHTING CONTROL PANEL | EACH | 49 | 29 | 39 | 0 | 117 | 2,467,853 | 682,147 | 3,150,000 | 288,738,846 | 79,811,154 | 368,550,000 |
| 13.03 | TRAFFIC SIGNAL UNIT | EACH | 0 | 0 | 140 | 0 | 140 | 1,928,897 | 591,103 | 2,520,000 | 270,045,630 | 82,754,370 | 352,800,000 |
| 13.04 | TRAFFIC SIGNAL CONTROL PANEL | EACH | 0 | 0 | 7 | 0 | 7 | 41,764,856 | 12,835,144 | 54,600,000 | 292,353,989 | 89,846,011 | 382,200,000 |
| 13.05 | FLASHING LIGHT UNIT | EACH | 0 | 20 | 0 | 0 | 20 | 2,759,885 | 915,115 | 3,675,000 | 55,197,706 | 18,302,294 | 73,500,000 |
| | SUB-TOTAL | | | | | | | | | | 6,075,716,002 | 2,396,733,998 | 8,472,450,000 |
| 14. TOLL OFFICE AND FACILITIES | | | | | | | | | | | | | |
| 14.01 | TOLL GATE | EACH | 4 | 32 | 0 | 0 | 36 | 62,540,043 | 32,459,957 | 95,000,000 | 2,251,441,562 | 1,168,558,438 | 3,420,000,000 |
| 14.02 | TOLL OFFICE | EACH | 1 | 0 | 0 | 0 | 1 | 658,316,246 | 341,683,754 | 1,000,000,000 | 658,316,246 | 341,683,754 | 1,000,000,000 |
| | SUB-TOTAL | | | | | | | | | | 2,909,757,808 | 1,510,242,192 | 4,420,000,000 |
| 15. UTILITY DIVERSIONS | | M | 17,630 | | | | 17,630 | 331,578 | 224,973 | 556,551 | 5,845,723,274 | 3,966,276,726 | 9,812,000,000 |
| 16. TRAFFIC CONTROL EQUIPMENT | | ITEM | | | | | | | | | 29,791,905,000 | 5,394,565,000 | 35,186,470,000 |
| TOTAL | | | | | | | | | | | 647,810,037,193 | 177,409,620,410 | 825,219,657,602 |
| VALUE ADDED TAX (PPN 10%) | | | | | | | | | | | 0 | 82,521,965,760 | 82,521,965,760 |
| GRAND TOTAL | | | | | | | | | | | 647,810,037,193 | 259,931,586,170 | 907,741,623,362 |

## TABLE 15.2.3 (a) CONSTRUCTION COST FOR NS AXIS (TOTAL)

| | NORTH-SOUTH AXIS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | THROUGHWAY/RAMP | | | FRONTAGE ROAD/OTHERS | | | TOTAL | | |
| | FOREIGN | LOCAL | TOTAL | FOREIGN | LOCAL | TOTAL | FOREIGN | LOCAL | TOTAL |
| 1. GENERAL | 35,970,677,444 | 14,115,688,622 | 50,086,366,066 | 946,761,229 | 651,286,847 | 1,598,048,076 | 36,917,438,673 | 14,766,975,469 | 51,684,414,142 |
| 2. SITE CLEARING | 854,890,828 | 233,077,172 | 1,087,968,000 | 441,136,642 | 120,271,358 | 561,408,000 | 1,296,027,470 | 353,348,530 | 1,649,376,000 |
| 3. DEMOLITION OF MASONRY/CONC. STRUCT. | 79,894,644 | 32,135,356 | 112,030,000 | 0 | 0 | 0 | 79,894,644 | 32,135,356 | 112,030,000 |
| 4. ROAD EARTHWORKS | 702,763,348 | 243,401,052 | 946,164,400 | 4,728,472,432 | 1,850,527,568 | 6,579,000,000 | 5,431,235,780 | 2,093,928,620 | 7,525,164,400 |
| 5. STRUCTURE EXCAVATION | 10,741,802,042 | 3,038,157,458 | 13,779,959,500 | 0 | 0 | 0 | 10,741,802,042 | 3,038,157,458 | 13,779,959,500 |
| 6. DRAINAGE | 1,459,279,407 | 952,970,593 | 2,412,250,000 | 11,850,444,997 | 7,980,969,303 | 19,831,414,300 | 13,309,724,404 | 8,933,939,896 | 22,243,664,300 |
| 7. SUBGRADE PREPARATION | 15,080,000 | 4,760,000 | 19,840,000 | 222,247,582 | 70,152,419 | 292,400,001 | 237,327,582 | 74,912,419 | 312,240,001 |
| 8. BASE AND SUBBASE | 368,182,065 | 113,127,935 | 481,310,000 | 5,793,151,369 | 1,780,008,631 | 7,573,160,000 | 6,161,333,434 | 1,893,136,566 | 8,054,470,000 |
| 9. PAVEMENT SURFACING | 7,222,349,369 | 1,841,271,381 | 9,063,620,750 | 13,395,447,501 | 3,272,955,249 | 16,668,402,750 | 20,617,796,870 | 5,114,226,630 | 25,732,023,500 |
| 10. CONCRETE STRUCTURES | 250,830,979,809 | 110,421,168,151 | 361,252,147,960 | 0 | 0 | 0 | 250,830,979,809 | 110,421,168,151 | 361,252,147,960 |
| 11. STEEL STRUCTURES | 250,232,008,210 | 13,912,871,790 | 264,144,880,000 | 0 | 0 | 0 | 250,232,008,210 | 13,912,871,790 | 264,144,880,000 |
| 12. MISCELLANEOUS | 2,250,651,236 | 1,215,718,164 | 3,466,369,400 | 5,080,714,953 | 2,291,283,447 | 7,371,998,400 | 7,331,366,189 | 3,507,001,611 | 10,838,367,800 |
| 13. STREET LIGHTING AND TRAFFIC SIGNALS | 4,339,743,964 | 1,754,456,036 | 6,094,200,000 | 1,735,972,038 | 642,277,962 | 2,378,250,000 | 6,075,716,002 | 2,396,733,998 | 8,472,450,000 |
| 14. TOLL OFFICE AND FACILITIES | 2,909,757,808 | 1,510,242,192 | 4,420,000,000 | 0 | 0 | 0 | 2,909,757,808 | 1,510,242,192 | 4,420,000,000 |
| 15. UTILITY DIVERSIONS | 5,845,723,274 | 3,966,276,726 | 9,812,000,000 | 0 | 0 | 0 | 5,845,723,274 | 3,966,276,726 | 9,812,000,000 |
| 16. TRAFFIC CONTROL EQUIPMENT | 29,791,905,000 | 5,394,565,000 | 35,186,470,000 | 0 | 0 | 0 | 29,791,905,000 | 5,394,565,000 | 35,186,470,000 |
| TOTAL | 603,615,688,449 | 158,749,887,627 | 762,365,576,076 | 44,194,348,744 | 18,659,732,783 | 62,854,081,526 | 647,810,037,193 | 177,409,620,410 | 825,219,657,602 |
| VALUE ADDED TAX (PPN 10%) | 0 | 76,236,557,608 | 76,236,557,608 | 0 | 6,285,408,153 | 6,285,408,153 | 0 | 82,521,965,760 | 82,521,965,760 |
| GRAND TOTAL | 603,615,688,449 | 234,986,445,234 | 838,602,133,684 | 44,194,348,744 | 24,945,140,935 | 69,139,489,679 | 647,810,037,193 | 259,931,586,170 | 907,741,623,362 |

## TABLE 15.2.4 (d) CONSTRUCTION COST FOR SECTION EW-3

NAME OF LINK: EAST - WEST AXIS
NAME OF SECTION: SEC-1 : WEST JORR IC - LATUMETEN IC (EW-1)
STATION: STA. 0+500 - STA. 9+200

| ITEM NO. | AND DESCRIPTION | UNIT | QUANTITY | | | | | UNIT COST (Rp.) | | | COST (Rp.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THROUGHWAY | RAMPWAY | FRONTAGE | OTHERS | TOTAL | FOREIGN | LOCAL | TOTAL | FOREIGN | LOCAL | TOTAL |
| 1. | GENERAL | ITEM | | | | | | 5.00% | 2.00% | 7.00% | 8,965,630,935 | 3,586,252,374 | 12,551,883,309 |
| 2. | SITE CLEARING | M2 | 435,000 | 7,500 | 179,000 | 0 | 621,500 | 1,509 | 411 | 1,920 | 937,641,665 | 255,638,335 | 1,193,280,000 |
| 3. | DEMOLITION OF MASONRY/CONC. STRUCT. | M3 | 0 | 0 | 0 | | 0 | 35,658 | 14,342 | 50,000 | 0 | 0 | 0 |
| 4. | ROAD EARTHWORKS | | | | | | | | | | | | |
| 4.01 | BORROW MATERIAL | M3 | 362,048 | 28,000 | 185,094 | 453,600 | 1,028,742 | 12,937 | 5,063 | 18,000 | 13,308,825,781 | 5,208,521,219 | 18,517,347,000 |
| 4.02 | FREE-DRAINING MATERIAL | M3 | 32,063 | 0 | 14,648 | 9,000 | 55,710 | 24,485 | 7,515 | 32,000 | 1,364,034,578 | 418,685,422 | 1,782,720,000 |
| 4.03 | PERMEABLE BACKFILL | M3 | 12,065 | 6,119 | 7,709 | | 25,893 | 28,329 | 9,671 | 38,000 | 733,530,416 | 250,411,184 | 983,941,600 |
| | SUB-TOTAL | | | | | | | | | | 15,406,390,775 | 5,877,617,825 | 21,284,008,600 |
| 5. | STRUCTURE EXCAVATION | | | | | | | | | | | | |
| 5.01 | STRUCTURE EXCAVATION UP TO 2m | M3 | 41,025 | 8,654 | 68,637 | | 118,316 | 7,120 | 2,880 | 10,000 | 842,454,266 | 340,700,734 | 1,183,155,000 |
| 5.02 | STRUCTURE EXCAVATION OVER 2m | M3 | 20,019 | 2,909 | 4,710 | | 27,639 | 35,616 | 9,384 | 45,000 | 984,359,388 | 259,373,112 | 1,243,732,500 |
| | SUB-TOTAL | | | | | | | | | | 1,826,813,654 | 600,073,846 | 2,426,887,500 |
| 6. | DRAINAGE | | | | | | | | | | | | |
| 6.01 | R.C. PIPE D=60cm | M | 6,227 | 460 | 3,085 | 5,400 | 15,172 | 162,917 | 99,583 | 262,500 | 2,471,821,724 | 1,510,907,026 | 3,982,728,750 |
| 6.02 | R.C. PIPE D=120cm | M | 2,440 | 0 | 2,027 | 1,470 | 5,937 | 343,255 | 213,245 | 556,500 | 2,037,841,805 | 1,265,998,525 | 3,303,840,330 |
| 6.03 | U-DITCH, 0.3 x 0.6m (DS-2) | M | 7,897 | 0 | 19,920 | 0 | 27,816 | 72,832 | 57,168 | 130,000 | 2,025,915,386 | 1,590,195,814 | 3,616,111,200 |
| 6.04 | U-DITCH, 1.0 x (0.6-2.0)m (DS-4) | M | 3,467 | 0 | 17,628 | 0 | 21,095 | 85,991 | 64,009 | 150,000 | 1,813,964,897 | 1,350,255,103 | 3,164,220,000 |
| 6.05 | CATCHBASIN INLET TYPE-A (DC-A-2) | EACH | 255 | 19 | 122 | 225 | 621 | 553,363 | 296,637 | 850,000 | 343,638,114 | 184,211,886 | 527,850,000 |
| 6.06 | CATCHBASIN INLET TYPE-B (DC-A-4) | EACH | 94 | 0 | 78 | 0 | 172 | 765,980 | 434,020 | 1,200,000 | 131,748,546 | 74,651,454 | 206,400,000 |
| 6.07 | MORTARED RUBBLE WATERWAY (DW-1-3) | M2 | 0 | 0 | 0 | 0 | 0 | 37,802 | 22,198 | 60,000 | 0 | 0 | 0 |
| 6.08 | RIVER REVETMENT | M | 0 | 0 | 0 | 0 | 0 | 1,240,985 | 959,015 | 2,200,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 8,824,930,471 | 5,976,219,809 | 14,801,150,280 |
| 7. | SUBGRADE PREPARATION | M2 | 231,120 | 6,900 | 158,652 | 81,000 | 477,672 | 608 | 192 | 800 | 290,455,394 | 91,682,206 | 382,137,600 |
| 8. | BASE AND SUBBASE | | | | | | | | | | | | |
| 8.01 | GRANULAR SUBBASE | M3 | 63,558 | 1,150 | 44,070 | 15,120 | 123,898 | 30,598 | 9,402 | 40,000 | 3,791,071,988 | 1,164,848,012 | 4,955,920,000 |
| 8.02 | GRADED GRANULAR BASE | M3 | 40,446 | 828 | 28,205 | 9,720 | 79,199 | 42,073 | 12,927 | 55,000 | 3,332,107,735 | 1,023,826,265 | 4,355,934,000 |
| | SUB-TOTAL | | | | | | | | | | 7,123,179,723 | 2,188,674,277 | 9,311,854,000 |
| 9. | PAVEMENT SURFACING | | | | | | | | | | | | |
| 9.01 | BITUMINOUS PRIME COAT/TACK COAT | KG | 586,782 | 10,044 | 327,211 | 125,172 | 1,049,209 | 842 | 258 | 1,100 | 883,550,725 | 270,579,395 | 1,154,130,120 |
| 9.02 | ASPHALT TREATED BASE(incl. Asph.Cement) | TON | 66,768 | 1,334 | 45,833 | 15,660 | 129,595 | 67,178 | 16,822 | 84,000 | 8,705,954,935 | 2,180,008,265 | 10,885,963,200 |
| 9.03 | ASPHALT CONCRETE SURFACE(incl. A.Cem.) | TON | 59,946 | 980 | 31,203 | 44,820 | 136,949 | 77,263 | 17,737 | 95,000 | 10,581,014,894 | 2,429,102,106 | 13,010,117,000 |
| 9.04 | CONCRETE PAVEMENT (t=28cm with mesh) | M2 | 0 | 0 | 4,371 | 0 | 4,371 | 44,780 | 25,220 | 70,000 | 195,733,075 | 110,236,925 | 305,970,000 |
| | SUB-TOTAL | | | | | | | | | | 20,366,253,629 | 4,989,926,691 | 25,356,180,320 |
| 10. | CONCRETE STRUCTURES | | | | | | | | | | | | |
| 10.01 | STR. CONC. CLASS B-1-1(Deck Slab/Diaphragm) | M3 | 31,502 | 2,243 | 2,496 | | 36,241 | 119,630 | 100,370 | 220,000 | 4,335,540,301 | 3,637,503,899 | 7,973,044,200 |
| 10.02 | STR. CONC. CLASS B-1-2 (Piers) | M3 | 18,451 | 2,838 | 10,080 | | 31,369 | 156,945 | 63,055 | 220,000 | 4,923,213,596 | 1,977,995,004 | 6,901,208,600 |
| 10.03 | STR. CONC. CLASS C-1 (Abutments) | M3 | 25,931 | 5,314 | 42,884 | | 74,129 | 109,092 | 60,908 | 170,000 | 8,086,816,691 | 4,515,028,309 | 12,601,845,000 |
| 10.04 | STR. CONC. CLASS C-2 (Box Culverts) | M3 | 0 | 0 | 0 | | 0 | 102,135 | 67,865 | 170,000 | 0 | 0 | 0 |
| 10.05 | STR. CONC. CLASS C-3 (Curbs) | M3 | 3,039 | 633 | 2,743 | | 6,415 | 100,625 | 69,375 | 170,000 | 645,549,851 | 445,068,149 | 1,090,618,000 |
| 10.06 | STR. CONC. CLASS C-4 (Ped. Bridge Stairs) | M3 | 133 | 0 | 927 | | 1,060 | 145,004 | 104,996 | 250,000 | 153,696,013 | 111,288,987 | 264,985,000 |
| 10.07 | STR. CONC. CLASS C-5 (Ped. Bridge Piers) | M3 | 45 | 0 | 447 | | 491 | 124,931 | 75,069 | 200,000 | 61,401,151 | 36,894,849 | 98,296,000 |
| 10.08 | STRUCTURE CONCRETE CLASS D | M3 | 787 | 0 | 3,936 | | 4,723 | 110,824 | 59,176 | 170,000 | 523,441,705 | 279,502,295 | 802,944,000 |
| 10.09 | REINFORCING STEEL | TON | 7,902 | 977 | 4,177 | | 13,057 | 722,004 | 327,996 | 1,050,000 | 9,427,060,904 | 4,282,579,096 | 13,709,640,000 |
| 10.10 | PC-I GIRDER SPAN 30m | EACH | 701 | 107 | 85 | | 893 | 15,970,489 | 6,029,511 | 22,000,000 | 14,261,646,382 | 5,384,353,618 | 19,646,000,000 |
| 10.11 | PC-U GIRDER SPAN 30m | EACH | 0 | 0 | 0 | | 0 | 27,585,390 | 10,414,610 | 38,000,000 | 0 | 0 | 0 |
| 10.12 | PC-I GIRDER PEDESTRIAN SPAN 24m | EACH | 3 | 0 | 30 | | 33 | 17,482,207 | 6,567,793 | 24,050,000 | 576,912,846 | 216,737,154 | 793,650,000 |
| 10.13 | PC CABLE TYPE A (12T12.7) | KG | 0 | 0 | 0 | | 0 | 3,423 | 1,077 | 4,500 | 0 | 0 | 0 |
| 10.14 | PC CABLE TYPE E (1T19.3) | KG | 19,271 | 2,937 | 2,406 | | 24,614 | 4,375 | 1,625 | 6,000 | 107,691,608 | 39,992,392 | 147,684,000 |
| 10.15 | FURN.& DRIVE PC PILE 45x45cm | M | 67,959 | 8,010 | 42,992 | | 118,961 | 62,049 | 47,951 | 110,000 | 7,381,435,960 | 5,704,263,040 | 13,085,699,000 |
| 10.16 | FURN.& DRIVE PC PILE D=60cm | M | 41,379 | 3,523 | 13,176 | | 58,078 | 89,461 | 35,539 | 125,000 | 5,195,659,953 | 2,064,040,047 | 7,259,700,000 |
| 10.17 | FURN. & BORE PC PILE D= 60cm | M | 0 | 0 | 0 | | 0 | 118,088 | 46,912 | 165,000 | 0 | 0 | 0 |
| 10.18 | CAST-IN-PLACE CONCRETE PILE D=100cm | M | 0 | 0 | 0 | | 0 | 504,662 | 295,338 | 800,000 | 0 | 0 | 0 |
| 10.19 | EXPANSION JOINT TYPE A | M | 1,491 | 246 | 270 | | 2,007 | 571,013 | 78,987 | 650,000 | 1,146,023,695 | 158,526,305 | 1,304,550,000 |
| 10.20 | EXPANSION JOINT TYPE B | M | 1,511 | 246 | 370 | | 2,127 | 585,518 | 64,482 | 650,000 | 1,245,397,706 | 137,152,294 | 1,382,550,000 |
| 10.21 | METAL BEARING SHOE TYPE A (125t) | EACH | 0 | 0 | 0 | | 0 | 3,273,391 | 1,000,109 | 4,273,500 | 0 | 0 | 0 |
| 10.22 | METAL BEARING SHOE TYPE D (275t) | EACH | 0 | 0 | 0 | | 0 | 7,892,200 | 2,412,800 | 10,305,000 | 0 | 0 | 0 |
| 10.23 | METAL BEARING SHOE TYPE E (450t) | EACH | 0 | 0 | 0 | | 0 | 16,110,839 | 4,878,661 | 20,989,500 | 0 | 0 | 0 |
| 10.24 | METAL BEARING SHOE TYPE N (1200t) | EACH | 0 | 0 | 0 | | 0 | 45,242,294 | 13,700,206 | 58,942,500 | 0 | 0 | 0 |
| 10.25 | BEARING PAD TYPE H (40x40x4.0cm) | EACH | 1,402 | 214 | 170 | | 1,786 | 341,331 | 106,669 | 448,000 | 609,617,654 | 190,510,346 | 800,128,000 |
| 10.26 | BEARING PAD TYPE K (60x40x4.0cm) | EACH | 0 | 0 | 0 | | 0 | 511,997 | 160,003 | 672,000 | 0 | 0 | 0 |
| 10.27 | DRAIN PIPE D=20cm | M | 3,618 | 512 | 540 | | 4,670 | 34,049 | 61,951 | 96,000 | 159,009,325 | 289,310,675 | 448,320,000 |
| | SUB-TOTAL | | | | | | | | | | 58,840,115,341 | 29,470,746,459 | 88,310,861,800 |
| 11. | STEEL STRUCTURES | | | | | | | | | | | | |
| 11.01 | STEEL STRUCTURES: BOX GIRDERS | TON | 0 | 0 | 0 | 0 | 0 | 4,727,452 | 272,548 | 5,000,000 | 0 | 0 | 0 |
| 11.02 | STEEL STRUCTURES: I-GIRDERS | TON | 0 | 0 | 0 | 0 | 0 | 4,254,707 | 245,293 | 4,500,000 | 0 | 0 | 0 |
| 11.03 | STEEL STRUCTURES: PIERS | TON | 0 | 0 | 0 | 0 | 0 | 4,299,558 | 200,442 | 4,500,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 0 | 0 | 0 |
| 12. | MISCELLANEOUS | | | | | | | | | | | | |
| 12.01 | SOLID SODDING | M2 | 89,880 | 0 | 0 | 0 | 89,880 | 304 | 2,496 | 2,800 | 27,343,775 | 224,320,225 | 251,664,000 |
| 12.02 | GUARDRAIL | M | 25,680 | 920 | 0 | 0 | 26,600 | 108,796 | 31,204 | 140,000 | 2,893,985,733 | 830,014,267 | 3,724,000,000 |
| 12.03 | SEPARATOR FENCE | M | 12,840 | 920 | 0 | 0 | 13,760 | 21,889 | 8,111 | 30,000 | 301,194,310 | 111,605,690 | 412,800,000 |
| 12.04 | DRY RIPRAP SLOPE PROTECTION (SP-C) | M2 | 0 | 0 | 0 | 0 | 0 | 22,548 | 7,452 | 30,000 | 0 | 0 | 0 |
| 12.05 | REGULATORY & WARNING SIGN | EACH | 258 | 15 | 358 | 18 | 649 | 156,312 | 83,688 | 240,000 | 101,446,370 | 54,313,630 | 155,760,000 |
| 12.06 | GUIDE SIGN | EACH | 41 | 5 | 56 | 9 | 111 | 4,599,619 | 2,275,381 | 6,875,000 | 510,557,733 | 252,567,267 | 763,125,000 |
| 12.07 | ROAD MARKING | M2 | 18,357 | 1,190 | 17,184 | 15,422 | 52,153 | 8,687 | 7,313 | 16,000 | 453,067,352 | 381,387,048 | 834,454,400 |
| 12.08 | CONCRETE CURB | M | 34,026 | 920 | 51,121 | 0 | 86,067 | 9,002 | 6,998 | 16,000 | 774,817,807 | 602,257,393 | 1,377,075,200 |
| 12.09 | INTERLOCKING CONCRETE PAVING | M2 | 0 | 0 | 48,330 | 0 | 48,330 | 6,883 | 5,117 | 12,000 | 332,664,874 | 247,295,126 | 579,960,000 |
| 12.10 | CONCRETE BARRIER | M | 0 | 50 | 0 | 900 | 950 | 68,805 | 35,195 | 104,000 | 65,364,421 | 33,435,579 | 98,800,000 |
| 12.11 | BUS STOP SHELTER | EACH | 0 | 0 | 31 | 0 | 31 | 3,680,342 | 1,319,658 | 5,000,000 | 114,090,606 | 40,909,394 | 155,000,000 |
| 12.12 | STREET TREE | EACH | 10,696 | 0 | 0 | 0 | 10,696 | 0 | 20,000 | 20,000 | 0 | 213,920,000 | 213,920,000 |
| | SUB-TOTAL | | | | | | | | | | 5,574,532,982 | 2,992,025,618 | 8,566,558,600 |
| 13. | STREET LIGHTING AND TRAFFIC SIGNALS | | | | | | | | | | | | |
| 13.01 | STREET LIGHTING UNIT | EACH | 577 | 16 | 444 | 216 | 1,253 | 2,976,039 | 1,223,961 | 4,200,000 | 3,728,976,931 | 1,533,623,069 | 5,262,600,000 |
| 13.02 | STREET LIGHTING CONTROL PANEL | EACH | 21 | 2 | 21 | 0 | 44 | 2,467,853 | 682,147 | 3,150,000 | 108,585,549 | 30,014,451 | 138,600,000 |
| 13.03 | TRAFFIC SIGNAL UNIT | EACH | 0 | 0 | 140 | 0 | 140 | 1,928,897 | 591,103 | 2,520,000 | 270,045,630 | 82,754,370 | 352,800,000 |
| 13.04 | TRAFFIC SIGNAL CONTROL PANEL | EACH | 0 | 0 | 7 | 0 | 7 | 41,764,856 | 12,835,144 | 54,600,000 | 292,353,989 | 89,846,011 | 382,200,000 |
| 13.05 | FLASHING LIGHT UNIT | EACH | 0 | 2 | 0 | 18 | 20 | 2,759,885 | 915,115 | 3,675,000 | 55,197,706 | 18,302,294 | 73,500,000 |
| | SUB-TOTAL | | | | | | | | | | 4,455,159,805 | 1,754,540,195 | 6,209,700,000 |
| 14. | TOLL OFFICE AND FACILITIES | | | | | | | | | | | | |
| 14.01 | TOLL GATE | EACH | 0 | 0 | 0 | 0 | 0 | 62,540,043 | 32,459,957 | 95,000,000 | 0 | 0 | 0 |
| 14.02 | TOLL OFFICE | EACH | 0 | 0 | 0 | 0 | 0 | 658,316,246 | 341,683,754 | 1,000,000,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 0 | 0 | 0 |
| 15. | UTILITY DIVERSIONS | M | 8,700 | 0 | 0 | 0 | 8,700 | 100,665 | 68,300 | 168,966 | 875,786,503 | 594,213,497 | 1,470,000,000 |
| TOTAL | | | | | | | | | | | 133,486,890,878 | 58,377,611,131 | 191,864,502,009 |
| VALUE ADDED TAX (PPN 10%) | | | | | | | | | | | 0 | 19,186,450,201 | 19,186,450,201 |
| GRAND TOTAL | | | | | | | | | | | 133,486,890,878 | 77,564,061,332 | 211,050,952,210 |

## TABLE 15.2.4 (e) CONSTRUCTION COST FOR SECTION EW-4

NAME OF LINK: EAST - WEST AXIS
NAME OF SECTION: SEC-2 : LATUMETEN IC - MANGGA BESAR IC (EW-2)
STATION: STA. 9+200 - STA.11+700

| ITEM NO. AND DESCRIPTION | | UNIT | QUANTITY | | | | | UNIT COST (Rp.) | | | COST (Rp.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THROUGHWAY | RAMPWAY | FRONTAGE | OTHERS | TOTAL | FOREIGN | LOCAL | TOTAL | FOREIGN | LOCAL | TOTAL |
| 1. GENERAL | | ITEM | | | | | | 5.00% | 2.00% | 7.00% | 3,043,472,349 | 1,217,388,940 | 4,260,861,288 |
| 2. SITE CLEARING | | M2 | 125,000 | 13,650 | 50,000 | 0 | 188,650 | 1,509 | 411 | 1,920 | 284,611,585 | 77,596,415 | 362,208,000 |
| 3. DEMOLITION OF MASONRY/CONC. STRUCT. | | M3 | 0 | 0 | 0 | | 0 | 35,658 | 14,342 | 50,000 | 0 | 0 | 0 |
| 4. ROAD EARTHWORKS | | | | | | | | | | | | | |
| 4.01 | BORROW MATERIAL | M3 | 19,875 | 3,360 | 50,610 | 0 | 73,845 | 12,937 | 5,063 | 18,000 | 955,332,549 | 373,877,451 | 1,329,210,000 |
| 4.02 | FREE-DRAINING MATERIAL | M3 | 9,913 | 521 | 12,653 | 0 | 23,086 | 24,485 | 7,515 | 32,000 | 565,256,566 | 173,503,434 | 738,760,000 |
| 4.03 | PERMEABLE BACKFILL | M3 | 4,992 | 609 | 1,024 | | 6,625 | 28,329 | 9,671 | 38,000 | 187,691,456 | 64,073,744 | 251,765,200 |
| | SUB-TOTAL | | | | | | | | | | 1,708,280,572 | 611,454,628 | 2,319,735,200 |
| 5. STRUCTURE EXCAVATION | | | | | | | | | | | | | |
| 5.01 | STRUCTURE EXCAVATION UP TO 2m | M3 | 18,278 | 3,466 | 1,638 | | 23,381 | 7,120 | 2,880 | 10,000 | 166,483,611 | 67,328,389 | 233,812,000 |
| 5.02 | STRUCTURE EXCAVATION OVER 2m | M3 | 16,769 | 2,176 | 392 | | 19,337 | 35,616 | 9,384 | 45,000 | 688,700,759 | 181,468,741 | 870,169,500 |
| | SUB-TOTAL | | | | | | | | | | 855,184,370 | 248,797,130 | 1,103,981,500 |
| 6. DRAINAGE | | | | | | | | | | | | | |
| 6.01 | R.C. PIPE D=60cm | M | 769 | 139 | 844 | 0 | 1,752 | 162,917 | 99,583 | 262,500 | 285,382,891 | 174,440,984 | 459,823,875 |
| 6.02 | R.C. PIPE D=120cm | M | 301 | 0 | 554 | 70 | 926 | 343,255 | 213,245 | 556,500 | 317,730,349 | 197,388,311 | 515,118,660 |
| 6.03 | U-DITCH, 0.3 x 0.6m (DS-2) | M | 975 | 0 | 5,447 | 0 | 6,422 | 72,832 | 57,168 | 130,000 | 467,727,067 | 367,131,633 | 834,858,700 |
| 6.04 | U-DITCH, 1.0 x (0.6-2.0)m (DS-4) | M | 428 | 0 | 4,820 | 0 | 5,248 | 85,991 | 64,009 | 150,000 | 451,300,171 | 335,932,829 | 787,233,000 |
| 6.05 | CATCHBASIN INLET TYPE-A (DC-A-2) | EACH | 31 | 5 | 35 | 0 | 71 | 553,363 | 296,637 | 850,000 | 39,288,738 | 21,061,262 | 60,350,000 |
| 6.06 | CATCHBASIN INLET TYPE-B (DC-A-4) | EACH | 12 | 0 | 22 | 0 | 34 | 765,980 | 434,020 | 1,200,000 | 26,043,317 | 14,756,683 | 40,800,000 |
| 6.07 | MORTARED RUBBLE WATERWAY (DW-1-3) | M2 | 0 | 0 | 0 | 0 | 0 | 37,802 | 22,198 | 60,000 | 0 | 0 | 0 |
| 6.08 | RIVER REVETMENT | M | 0 | 0 | 0 | 0 | 0 | 1,240,985 | 959,015 | 2,200,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 1,587,472,532 | 1,110,711,703 | 2,698,184,235 |
| 7. SUBGRADE PREPARATION | | M2 | 28,548 | 2,085 | 43,380 | 0 | 74,013 | 608 | 192 | 800 | 45,004,679 | 14,205,721 | 59,210,400 |
| 8. BASE AND SUBBASE | | | | | | | | | | | | | |
| 8.01 | GRANULAR SUBBASE | M3 | 7,851 | 348 | 12,050 | 0 | 20,248 | 30,598 | 9,402 | 40,000 | 619,561,121 | 190,366,879 | 809,928,000 |
| 8.02 | GRADED GRANULAR BASE | M3 | 4,996 | 250 | 7,712 | 0 | 12,958 | 42,073 | 12,927 | 55,000 | 545,182,316 | 167,513,184 | 712,695,500 |
| | SUB-TOTAL | | | | | | | | | | 1,164,743,438 | 357,880,062 | 1,522,623,500 |
| 9. PAVEMENT SURFACING | | | | | | | | | | | | | |
| 9.01 | BITUMINOUS PRIME COAT/TACK COAT | KG | 144,318 | 12,066 | 90,578 | 0 | 246,962 | 842 | 258 | 1,100 | 207,969,781 | 63,688,859 | 271,658,640 |
| 9.02 | ASPHALT TREATED BASE(incl. Asph.Cement) | TON | 8,247 | 403 | 12,532 | 0 | 21,182 | 67,178 | 16,822 | 84,000 | 1,422,990,345 | 356,322,855 | 1,779,313,200 |
| 9.03 | ASPHALT CONCRETE SURFACE(incl. A.Cem.) | TON | 16,384 | 1,435 | 8,669 | 0 | 26,488 | 77,263 | 17,737 | 95,000 | 2,046,525,955 | 469,824,545 | 2,516,350,500 |
| 9.04 | CONCRETE PAVEMENT (t=28cm with mesh) | M2 | 0 | 0 | 1,269 | 0 | 1,269 | 44,780 | 25,220 | 70,000 | 56,825,731 | 32,004,269 | 88,830,000 |
| | SUB-TOTAL | | | | | | | | | | 3,734,311,813 | 921,840,527 | 4,656,152,340 |
| 10. CONCRETE STRUCTURES | | | | | | | | | | | | | |
| 10.01 | STR. CONC. CLASS B-1-1(Deck Slab/Diaphragm) | M3 | 14,029 | 1,935 | 657 | 0 | 16,622 | 119,630 | 100,370 | 220,000 | 1,988,457,863 | 1,668,309,537 | 3,656,767,400 |
| 10.02 | STR. CONC. CLASS B-1-2 (Piers) | M3 | 15,350 | 2,610 | 482 | | 18,442 | 156,945 | 63,055 | 220,000 | 2,894,435,505 | 1,162,894,695 | 4,057,330,200 |
| 10.03 | STR. CONC. CLASS C-1 (Abutments) | M3 | 13,068 | 1,069 | 753 | | 14,891 | 109,092 | 60,908 | 170,000 | 1,624,464,128 | 906,970,172 | 2,531,434,300 |
| 10.04 | STR. CONC. CLASS C-2 (Box Culverts) | M3 | 0 | 0 | 0 | | 0 | 102,135 | 67,865 | 170,000 | 0 | 0 | 0 |
| 10.05 | STR. CONC. CLASS C-3 (Curbs) | M3 | 1,933 | 405 | 95 | | 2,433 | 100,625 | 69,375 | 170,000 | 244,825,742 | 168,792,758 | 413,618,500 |
| 10.06 | STR. CONC. CLASS C-4 (Ped. Bridge Stairs) | M3 | 0 | 0 | 106 | | 106 | 145,004 | 104,996 | 250,000 | 15,353,071 | 11,116,929 | 26,470,000 |
| 10.07 | STR. CONC. CLASS C-5 (Ped. Bridge Piers) | M3 | 0 | 0 | 89 | | 89 | 124,931 | 75,069 | 200,000 | 11,163,846 | 6,708,154 | 17,872,000 |
| 10.08 | STRUCTURE CONCRETE CLASS D | M3 | 0 | 734 | 0 | | 734 | 110,824 | 59,176 | 170,000 | 81,375,503 | 43,452,097 | 124,827,600 |
| 10.09 | REINFORCING STEEL | TON | 4,314 | 640 | 213 | | 5,167 | 722,004 | 327,996 | 1,050,000 | 3,730,558,202 | 1,694,739,298 | 5,425,297,500 |
| 10.10 | PC-I GIRDER SPAN 30m | EACH | 261 | 66 | 23 | | 350 | 15,970,489 | 6,029,511 | 22,000,000 | 5,589,671,034 | 2,110,328,966 | 7,700,000,000 |
| 10.11 | PC-U GIRDER SPAN 30m | EACH | 135 | 0 | 0 | | 135 | 27,585,390 | 10,414,610 | 38,000,000 | 3,724,027,585 | 1,405,972,415 | 5,130,000,000 |
| 10.12 | PC-I GIRDER PEDESTRIAN SPAN 24m | EACH | 0 | 0 | 6 | | 6 | 17,482,207 | 6,567,793 | 24,050,000 | 104,893,245 | 39,406,755 | 144,300,000 |
| 10.13 | PC CABLE TYPE A (12T12.7) | KG | 209,200 | 0 | 0 | | 209,200 | 3,423 | 1,077 | 4,500 | 716,146,376 | 225,253,624 | 941,400,000 |
| 10.14 | PC CABLE TYPE E (1T19.3) | KG | 12,690 | 1,873 | 666 | | 15,229 | 4,375 | 1,625 | 6,000 | 66,630,190 | 24,743,810 | 91,374,000 |
| 10.15 | FURN.& DRIVE PC PILE 45x45cm | M | 6,403 | 0 | 728 | | 7,131 | 62,049 | 47,951 | 110,000 | 442,498,102 | 341,955,898 | 784,454,000 |
| 10.16 | FURN.& DRIVE PC PILE D=60cm | M | 15,350 | 4,335 | 2,372 | | 22,057 | 89,461 | 35,539 | 125,000 | 1,973,233,598 | 783,891,402 | 2,757,125,000 |
| 10.17 | FURN. & BORE PC PILE D= 60cm | M | 17,465 | 0 | 0 | | 17,465 | 118,088 | 46,912 | 165,000 | 2,062,443,402 | 819,331,098 | 2,881,774,500 |
| 10.18 | CAST-IN-PLACE CONCRETE PILE D=100cm | M | 0 | 0 | 0 | | 0 | 504,662 | 295,338 | 800,000 | 0 | 0 | 0 |
| 10.19 | EXPANSION JOINT TYPE A | M | 1,046 | 176 | 84 | | 1,305 | 571,013 | 78,987 | 650,000 | 745,172,358 | 103,077,642 | 848,250,000 |
| 10.20 | EXPANSION JOINT TYPE B | M | 1,046 | 162 | 84 | | 1,291 | 585,518 | 64,482 | 650,000 | 755,904,297 | 83,245,703 | 839,150,000 |
| 10.21 | METAL BEARING SHOE TYPE A (125t) | EACH | 20 | 4 | 0 | | 24 | 3,273,391 | 1,000,109 | 4,273,500 | 78,561,396 | 24,002,604 | 102,564,000 |
| 10.22 | METAL BEARING SHOE TYPE D (275t) | EACH | 0 | 0 | 0 | | 0 | 7,892,200 | 2,412,800 | 10,305,000 | 0 | 0 | 0 |
| 10.23 | METAL BEARING SHOE TYPE E (450t) | EACH | 0 | 4 | 0 | | 4 | 16,110,839 | 4,878,661 | 20,989,500 | 64,443,356 | 19,514,644 | 83,958,000 |
| 10.24 | METAL BEARING SHOE TYPE N (1200t) | EACH | 0 | 0 | 0 | | 0 | 45,242,294 | 13,700,206 | 58,942,500 | 0 | 0 | 0 |
| 10.25 | BEARING PAD TYPE H (40x40x4.0cm) | EACH | 522 | 132 | 36 | | 690 | 341,331 | 106,669 | 448,000 | 235,518,579 | 73,601,421 | 309,120,000 |
| 10.26 | BEARING PAD TYPE K (60x40x4.0cm) | EACH | 206 | 0 | 0 | | 206 | 511,997 | 160,003 | 672,000 | 105,471,363 | 32,960,637 | 138,432,000 |
| 10.27 | DRAIN PIPE D=20cm | M | 2,147 | 630 | 40 | | 2,817 | 34,049 | 61,951 | 96,000 | 95,916,332 | 174,515,668 | 270,432,000 |
| | SUB-TOTAL | | | | | | | | | | 27,351,165,071 | 11,924,785,929 | 39,275,951,000 |
| 11. STEEL STRUCTURES | | | | | | | | | | | | | |
| 11.01 | STEEL STRUCTURES: BOX GIRDERS | TON | 0 | 715 | 0 | 0 | 715 | 4,727,452 | 272,548 | 5,000,000 | 3,381,452,029 | 194,947,971 | 3,576,400,000 |
| 11.02 | STEEL STRUCTURES: I-GIRDERS | TON | 0 | 383 | 0 | 0 | 383 | 4,254,707 | 245,293 | 4,500,000 | 1,627,425,429 | 93,824,571 | 1,721,250,000 |
| 11.03 | STEEL STRUCTURES: PIERS | TON | 0 | 0 | 0 | 0 | 0 | 4,299,558 | 200,442 | 4,500,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 5,008,877,458 | 288,772,542 | 5,297,650,000 |
| 12. MISCELLANEOUS | | | | | | | | | | | | | |
| 12.01 | SOLID SODDING | M2 | 11,102 | 0 | 0 | 0 | 11,102 | 304 | 2,496 | 2,800 | 3,377,510 | 27,708,090 | 31,085,600 |
| 12.02 | GUARDRAIL | M | 3,172 | 278 | 0 | 0 | 3,450 | 108,796 | 31,204 | 140,000 | 375,347,774 | 107,652,226 | 483,000,000 |
| 12.03 | SEPARATOR FENCE | M | 1,586 | 278 | 0 | 0 | 1,864 | 21,889 | 8,111 | 30,000 | 40,801,322 | 15,118,678 | 55,920,000 |
| 12.04 | DRY RIPRAP SLOPE PROTECTION (SP-C) | M2 | 0 | 0 | 0 | 0 | 0 | 22,548 | 7,452 | 30,000 | 0 | 0 | 0 |
| 12.05 | REGULATORY & WARNING SIGN | EACH | 75 | 27 | 100 | 0 | 202 | 156,312 | 83,688 | 240,000 | 31,574,987 | 16,905,013 | 48,480,000 |
| 12.06 | GUIDE SIGN | EACH | 12 | 9 | 24 | 0 | 45 | 4,599,619 | 2,275,381 | 6,875,000 | 206,982,865 | 102,392,135 | 309,375,000 |
| 12.07 | ROAD MARKING | M2 | 5,275 | 2,166 | 4,800 | 0 | 12,241 | 8,687 | 7,313 | 16,000 | 106,338,357 | 89,514,443 | 195,852,800 |
| 12.08 | CONCRETE CURB | M | 4,203 | 278 | 13,978 | 0 | 18,459 | 9,002 | 6,998 | 16,000 | 166,175,784 | 129,166,616 | 295,342,400 |
| 12.09 | INTERLOCKING CONCRETE PAVING | M2 | 0 | 0 | 13,500 | 0 | 13,500 | 6,883 | 5,117 | 12,000 | 92,923,149 | 69,076,851 | 162,000,000 |
| 12.10 | CONCRETE BARRIER | M | 0 | 25 | 0 | 0 | 25 | 68,805 | 35,195 | 104,000 | 1,720,116 | 879,884 | 2,600,000 |
| 12.11 | BUS STOP SHELTER | EACH | 0 | 0 | 9 | 0 | 9 | 3,680,342 | 1,319,658 | 5,000,000 | 33,123,079 | 11,876,921 | 45,000,000 |
| 12.12 | STREET TREE | EACH | 1,321 | 0 | 0 | 0 | 1,321 | 0 | 20,000 | 20,000 | 0 | 26,420,000 | 26,420,000 |
| | SUB-TOTAL | | | | | | | | | | 1,058,364,943 | 596,710,857 | 1,655,075,800 |
| 13. STREET LIGHTING AND TRAFFIC SIGNALS | | | | | | | | | | | | | |
| 13.01 | STREET LIGHTING UNIT | EACH | 166 | 0 | 125 | 0 | 291 | 2,976,039 | 1,223,961 | 4,200,000 | 866,027,364 | 356,172,636 | 1,222,200,000 |
| 13.02 | STREET LIGHTING CONTROL PANEL | EACH | 6 | 0 | 6 | 0 | 12 | 2,467,853 | 682,147 | 3,150,000 | 29,614,241 | 8,185,759 | 37,800,000 |
| 13.03 | TRAFFIC SIGNAL UNIT | EACH | 0 | 0 | 60 | 0 | 60 | 1,928,897 | 591,103 | 2,520,000 | 115,733,842 | 35,466,158 | 151,200,000 |
| 13.04 | TRAFFIC SIGNAL CONTROL PANEL | EACH | 0 | 0 | 3 | 0 | 3 | 41,764,856 | 12,835,144 | 54,600,000 | 125,294,567 | 38,505,433 | 163,800,000 |
| 13.05 | FLASHING LIGHT UNIT | EACH | 0 | 1 | 0 | 0 | 1 | 2,759,885 | 915,115 | 3,675,000 | 2,759,885 | 915,115 | 3,675,000 |
| | SUB-TOTAL | | | | | | | | | | 1,139,429,898 | 439,245,102 | 1,578,675,000 |
| 14. TOLL OFFICE AND FACILITIES | | | | | | | | | | | | | |
| 14.01 | TOLL GATE | EACH | 0 | 0 | 0 | 0 | 0 | 62,540,043 | 32,459,957 | 95,000,000 | 0 | 0 | 0 |
| 14.02 | TOLL OFFICE | EACH | 0 | 0 | 0 | 0 | 0 | 658,316,246 | 341,683,754 | 1,000,000,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 0 | 0 | 0 |
| 15. UTILITY DIVERSIONS | | M | 2,500 | 0 | 0 | 0 | 2,500 | 81,025 | 54,975 | 136,000 | 202,562,865 | 137,437,135 | 340,000,000 |
| TOTAL | | | | | | | | | | | 47,183,481,573 | 17,946,826,691 | 65,130,308,263 |
| VALUE ADDED TAX (PPN 10%) | | | | | | | | | | | 0 | 6,513,030,826 | 6,513,030,826 |
| GRAND TOTAL | | | | | | | | | | | 47,183,481,573 | 24,459,857,517 | 71,643,339,090 |

## TABLE 15.2.5 (b) EAST-WEST AXIS CONSTRUCTION COST SUMMARY (RUPIAHS)

NAME OF LINK: EAST - WEST AXIS
NAME OF SECTION: SEC-3 : MANGGA BESAR IC - SUNTER IC (EW-3)
STATION: STA.11+700 - STA. 20+150

| ITEM NO. AND DESCRIPTION | | UNIT | QUANTITY | | | | | UNIT COST (Rp.) | | | COST (Rp.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THROUGHWAY | RAMPWAY | FRONTAGE | OTHERS | TOTAL | FOREIGN | LOCAL | TOTAL | FOREIGN | LOCAL | TOTAL |
| 1. GENERAL | | ITEM | | | | | | 5.00% | 2.00% | 7.00% | 10,792,097,952 | 4,316,839,181 | 15,108,937,133 |
| 2. SITE CLEARING | | M2 | 120,000 | 25,050 | 123,700 | 0 | 268,750 | 1,509 | 411 | 1,920 | 405,456,472 | 110,543,528 | 516,000,000 |
| 3. DEMOLITION OF MASONRY/CONC. STRUCT. | | M3 | 0 | 0 | 0 | 0 | 0 | 35,658 | 14,342 | 50,000 | 0 | 0 | 0 |
| 4. ROAD EARTHWORKS | | | | | | | | | | | | | |
| 4.01 | BORROW MATERIAL | M3 | 5,694 | 20,115 | 123,700 | 0 | 149,509 | 12,937 | 5,063 | 18,000 | 1,934,197,496 | 756,964,504 | 2,691,162,000 |
| 4.02 | FREE-DRAINING MATERIAL | M3 | 0 | 0 | 20,138 | 0 | 20,138 | 24,485 | 7,515 | 32,000 | 493,057,733 | 151,342,267 | 644,400,000 |
| 4.03 | PERMEABLE BACKFILL | M3 | 2,578 | 1,755 | 2,561 | 0 | 6,895 | 28,329 | 9,671 | 38,000 | 195,317,644 | 66,677,156 | 261,994,800 |
| | SUB-TOTAL | | | | | | | | | | 2,622,572,873 | 974,983,927 | 3,597,556,800 |
| 5. STRUCTURE EXCAVATION | | | | | | | | | | | | | |
| 5.01 | STRUCTURE EXCAVATION UP TO 2m | M3 | 59,901 | 22,982 | 1,832 | 0 | 84,715 | 7,120 | 2,880 | 10,000 | 603,203,677 | 243,944,323 | 847,148,000 |
| 5.02 | STRUCTURE EXCAVATION OVER 2m | M3 | 69,405 | 16,377 | 0 | 0 | 85,782 | 35,616 | 9,384 | 45,000 | 3,055,162,913 | 805,018,087 | 3,860,181,000 |
| | SUB-TOTAL | | | | | | | | | | 3,658,366,590 | 1,048,962,410 | 4,707,329,000 |
| 6. DRAINAGE | | | | | | | | | | | | | |
| 6.01 | R.C. PIPE D=60cm | M | 241 | 905 | 2,388 | 0 | 3,533 | 162,917 | 99,583 | 262,500 | 575,597,892 | 351,835,608 | 927,433,500 |
| 6.02 | R.C. PIPE D=120cm | M | 94 | 0 | 1,395 | 0 | 1,489 | 343,255 | 213,245 | 556,500 | 511,161,279 | 317,556,261 | 828,717,540 |
| 6.03 | U-DITCH, 0.3 x 0.6m (DS-2) | M | 305 | 0 | 11,182 | 0 | 11,488 | 72,832 | 57,168 | 130,000 | 836,660,293 | 656,717,307 | 1,493,377,600 |
| 6.04 | U-DITCH, 1.0 x (0.6-2.0)m (DS-4) | M | 134 | 0 | 9,896 | 0 | 10,030 | 85,991 | 64,009 | 150,000 | 862,483,778 | 642,004,222 | 1,504,488,000 |
| 6.05 | CATCHBASIN INLET TYPE-A (DC-A-2) | EACH | 9 | 36 | 96 | 0 | 141 | 553,363 | 296,637 | 850,000 | 78,024,113 | 41,825,887 | 119,850,000 |
| 6.06 | CATCHBASIN INLET TYPE-B (DC-A-4) | EACH | 3 | 0 | 55 | 0 | 58 | 765,980 | 434,020 | 1,200,000 | 44,426,835 | 25,173,165 | 69,600,000 |
| 6.07 | MORTARED RUBBLE WATERWAY (DW-1-3) | M2 | 0 | 0 | 0 | 0 | 0 | 37,802 | 22,198 | 60,000 | 0 | 0 | 0 |
| 6.08 | RIVER REVETMENT | M | 0 | 0 | 0 | 0 | 0 | 1,240,985 | 959,015 | 2,200,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 2,908,354,190 | 2,035,112,450 | 4,943,466,640 |
| 7. SUBGRADE PREPARATION | | M2 | 8,928 | 9,050 | 93,796 | 0 | 111,774 | 608 | 192 | 800 | 67,965,803 | 21,453,397 | 89,419,200 |
| 8. BASE AND SUBBASE | | | | | | | 0 | | | | | | |
| 8.01 | GRANULAR SUBBASE | M3 | 2,455 | 2,263 | 34,141 | 0 | 38,859 | 30,598 | 9,402 | 40,000 | 1,189,017,476 | 365,338,524 | 1,554,356,000 |
| 8.02 | GRADED GRANULAR BASE | M3 | 1,562 | 1,509 | 16,645 | 0 | 19,716 | 42,073 | 12,927 | 55,000 | 829,513,863 | 254,877,137 | 1,084,391,000 |
| | SUB-TOTAL | | | | | | | | | | 2,018,531,339 | 620,215,661 | 2,638,747,000 |
| 9. PAVEMENT SURFACING | | | | | | | | | | | | | |
| 9.01 | BITUMINOUS PRIME COAT/TACK COAT | KG | 256,931 | 63,902 | 259,879 | 0 | 580,712 | 842 | 258 | 1,100 | 489,023,691 | 149,759,069 | 638,782,760 |
| 9.02 | ASPHALT TREATED BASE(incl. Asph.Cement) | TON | 2,579 | 2,353 | 27,082 | 0 | 32,014 | 67,178 | 16,822 | 84,000 | 2,150,631,816 | 538,527,384 | 2,689,159,200 |
| 9.03 | ASPHALT CONCRETE SURFACE(incl. A.Cem.) | TON | 32,180 | 7,479 | 24,652 | 0 | 64,311 | 77,263 | 17,737 | 95,000 | 4,968,855,213 | 1,140,708,787 | 6,109,564,000 |
| 9.04 | CONCRETE PAVEMENT (t=28cm with mesh) | M2 | 0 | 0 | 4,230 | 0 | 4,230 | 44,780 | 25,220 | 70,000 | 189,419,105 | 106,680,895 | 296,100,000 |
| | SUB-TOTAL | | | | | | | | | | 7,797,929,825 | 1,935,676,135 | 9,733,605,960 |
| 10. CONCRETE STRUCTURES | | | | | | | | | | | | | |
| 10.01 | STR. CONC. CLASS B-1-1(Deck Slab/Diaphragm) | M3 | 46,160 | 12,256 | 839 | 0 | 59,255 | 119,630 | 100,370 | 220,000 | 7,088,735,816 | 5,947,425,784 | 13,036,161,600 |
| 10.02 | STR. CONC. CLASS B-1-2 (Piers) | M3 | 66,342 | 19,391 | 0 | 0 | 85,733 | 156,945 | 63,055 | 220,000 | 13,455,326,022 | 5,405,933,978 | 18,861,260,000 |
| 10.03 | STR. CONC. CLASS C-1 (Abutments) | M3 | 38,645 | 8,025 | 1,123 | 0 | 47,792 | 109,092 | 60,908 | 170,000 | 5,213,729,564 | 2,910,927,436 | 8,124,657,000 |
| 10.04 | STR. CONC. CLASS C-2 (Box Culverts) | M3 | 0 | 0 | 0 | 0 | 0 | 102,135 | 67,865 | 170,000 | 0 | 0 | 0 |
| 10.05 | STR. CONC. CLASS C-3 (Curbs) | M3 | 9,315 | 2,025 | 137 | 0 | 11,477 | 100,625 | 69,375 | 170,000 | 1,154,855,417 | 796,203,983 | 1,951,059,400 |
| 10.06 | STR. CONC. CLASS C-4 (Ped. Bridge Stairs) | M3 | 0 | 0 | 53 | 0 | 53 | 145,004 | 104,996 | 250,000 | 7,676,535 | 5,558,465 | 13,235,000 |
| 10.07 | STR. CONC. CLASS C-5 (Ped. Bridge Piers) | M3 | 0 | 0 | 45 | 0 | 45 | 124,931 | 75,069 | 200,000 | 5,581,923 | 3,354,077 | 8,936,000 |
| 10.08 | STRUCTURE CONCRETE CLASS D | M3 | 0 | 5,140 | 0 | 0 | 5,140 | 110,824 | 59,176 | 170,000 | 569,628,520 | 304,164,680 | 873,793,200 |
| 10.09 | REINFORCING STEEL | TON | 16,436 | 4,381 | 209 | 0 | 21,025 | 722,004 | 327,996 | 1,050,000 | 15,180,370,874 | 6,896,225,626 | 22,076,596,500 |
| 10.10 | PC-I GIRDER SPAN 30m | EACH | 910 | 104 | 34 | 0 | 1,048 | 15,970,489 | 6,029,511 | 22,000,000 | 16,737,072,126 | 6,318,927,874 | 23,056,000,000 |
| 10.11 | PC-U GIRDER SPAN 30m | EACH | 651 | 207 | 0 | 0 | 858 | 27,585,390 | 10,414,610 | 38,000,000 | 23,668,264,208 | 8,935,735,792 | 32,604,000,000 |
| 10.12 | PC-I GIRDER PEDESTRIAN SPAN 24m | EACH | 0 | 0 | 3 | 0 | 3 | 17,482,207 | 6,567,793 | 24,050,000 | 52,446,622 | 19,703,378 | 72,150,000 |
| 10.13 | PC CABLE TYPE A (12T12.7) | KG | 764,742 | 0 | 0 | 0 | 764,742 | 3,423 | 1,077 | 4,500 | 2,617,912,102 | 823,426,898 | 3,441,339,000 |
| 10.14 | PC CABLE TYPE E (1T19.3) | KG | 50,833 | 10,105 | 950 | 0 | 61,888 | 4,375 | 1,625 | 6,000 | 270,773,472 | 100,554,528 | 371,328,000 |
| 10.15 | FURN.& DRIVE PC PILE 45x45cm | M | 3,352 | 0 | 364 | 0 | 3,716 | 62,049 | 47,951 | 110,000 | 230,593,670 | 178,199,330 | 408,793,000 |
| 10.16 | FURN.& DRIVE PC PILE D=60cm | M | 32,580 | 4,261 | 448 | 0 | 37,289 | 89,461 | 35,539 | 125,000 | 3,335,889,300 | 1,325,223,200 | 4,661,112,500 |
| 10.17 | FURN. & BORE PC PILE D= 60cm | M | 56,000 | 17,825 | 3,200 | 0 | 77,025 | 118,088 | 46,912 | 165,000 | 9,095,756,472 | 3,613,401,528 | 12,709,158,000 |
| 10.18 | CAST-IN-PLACE CONCRETE PILE D=100cm | M | 13,634 | 4,843 | 0 | 0 | 18,477 | 504,662 | 295,338 | 800,000 | 9,324,491,752 | 5,456,868,248 | 14,781,360,000 |
| 10.19 | EXPANSION JOINT TYPE A | M | 4,001 | 749 | 105 | 0 | 4,855 | 571,013 | 78,987 | 650,000 | 2,772,343,807 | 383,490,693 | 3,155,834,500 |
| 10.20 | EXPANSION JOINT TYPE B | M | 3,964 | 693 | 105 | 0 | 4,762 | 585,518 | 64,482 | 650,000 | 2,788,314,894 | 307,069,606 | 3,095,384,500 |
| 10.21 | METAL BEARING SHOE TYPE A (125t) | EACH | 8 | 16 | 0 | 0 | 24 | 3,273,391 | 1,000,109 | 4,273,500 | 78,561,396 | 24,002,604 | 102,564,000 |
| 10.22 | METAL BEARING SHOE TYPE D (275t) | EACH | 0 | 0 | 0 | 0 | 0 | 7,892,200 | 2,412,800 | 10,305,000 | 0 | 0 | 0 |
| 10.23 | METAL BEARING SHOE TYPE E (450t) | EACH | 8 | 12 | 0 | 0 | 20 | 16,110,839 | 4,878,661 | 20,989,500 | 322,216,779 | 97,573,221 | 419,790,000 |
| 10.24 | METAL BEARING SHOE TYPE N (1200t) | EACH | 0 | 0 | 0 | 0 | 0 | 45,242,294 | 13,700,206 | 58,942,500 | 0 | 0 | 0 |
| 10.25 | BEARING PAD TYPE H (40x40x4.0cm) | EACH | 1,820 | 208 | 34 | 0 | 2,062 | 341,331 | 106,669 | 448,000 | 703,825,086 | 219,950,914 | 923,776,000 |
| 10.26 | BEARING PAD TYPE K (60x40x4.0cm) | EACH | 1,302 | 414 | 34 | 0 | 1,750 | 511,997 | 160,003 | 672,000 | 895,994,593 | 280,005,407 | 1,176,000,000 |
| 10.27 | DRAIN PIPE D=20cm | M | 7,350 | 3,210 | 50 | 0 | 10,610 | 34,049 | 61,951 | 96,000 | 361,277,699 | 657,329,341 | 1,018,607,040 |
| | SUB-TOTAL | | | | | | | | | | 115,931,638,648 | 51,011,256,592 | 166,942,895,240 |
| 11. STEEL STRUCTURES | | | | | | | | | | | | | |
| 11.01 | STEEL STRUCTURES: BOX GIRDERS | TON | 958 | 959 | 0 | 0 | 1,918 | 4,727,452 | 272,548 | 5,000,000 | 9,066,969,724 | 522,730,276 | 9,589,700,000 |
| 11.02 | STEEL STRUCTURES: I-GIRDERS | TON | 0 | 0 | 0 | 0 | 0 | 4,254,707 | 245,293 | 4,500,000 | 0 | 0 | 0 |
| 11.03 | STEEL STRUCTURES: PIERS | TON | 0 | 0 | 0 | 0 | 0 | 4,299,558 | 200,442 | 4,500,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 9,066,969,724 | 522,730,276 | 9,589,700,000 |
| 12. MISCELLANEOUS | | | | | | | | | | | | | |
| 12.01 | SOLID SODDING | M2 | 3,472 | 0 | 0 | 0 | 3,472 | 304 | 2,496 | 2,800 | 1,056,270 | 8,665,330 | 9,721,600 |
| 12.02 | GUARDRAIL | M | 992 | 1,810 | 9,896 | 0 | 12,698 | 108,796 | 31,204 | 140,000 | 1,381,497,400 | 396,222,600 | 1,777,720,000 |
| 12.03 | SEPARATOR FENCE | M | 496 | 610 | 0 | 0 | 1,106 | 21,889 | 8,111 | 30,000 | 24,209,368 | 8,970,632 | 33,180,000 |
| 12.04 | DRY RIPRAP SLOPE PROTECTION (SP-C) | M2 | 0 | 0 | 0 | 0 | 0 | 22,548 | 7,452 | 30,000 | 0 | 0 | 0 |
| 12.05 | REGULATORY & WARNING SIGN | EACH | 239 | 161 | 320 | 0 | 720 | 156,312 | 83,688 | 240,000 | 112,544,510 | 60,255,490 | 172,800,000 |
| 12.06 | GUIDE SIGN | EACH | 38 | 53 | 40 | 0 | 131 | 4,599,619 | 2,275,381 | 6,875,000 | 602,550,117 | 298,074,883 | 900,625,000 |
| 12.07 | ROAD MARKING | M2 | 16,880 | 12,864 | 15,360 | 0 | 45,104 | 8,687 | 7,313 | 16,000 | 391,826,890 | 329,835,510 | 721,662,400 |
| 12.08 | CONCRETE CURB | M | 1,314 | 610 | 28,698 | 0 | 30,623 | 9,002 | 6,998 | 16,000 | 275,680,988 | 214,283,812 | 489,964,800 |
| 12.09 | INTERLOCKING CONCRETE PAVING | M2 | 0 | 0 | 26,719 | 0 | 26,719 | 6,883 | 5,117 | 12,000 | 183,913,497 | 136,716,903 | 320,630,400 |
| 12.10 | CONCRETE BARRIER | M | 0 | 375 | 0 | 0 | 375 | 68,805 | 35,195 | 104,000 | 25,801,745 | 13,198,255 | 39,000,000 |
| 12.11 | BUS STOP SHELTER | EACH | 0 | 0 | 30 | 0 | 30 | 3,680,342 | 1,319,658 | 5,000,000 | 110,410,264 | 39,589,736 | 150,000,000 |
| 12.12 | STREET TREE | EACH | 413 | 0 | 0 | 0 | 413 | 0 | 20,000 | 20,000 | 0 | 8,260,000 | 8,260,000 |
| | SUB-TOTAL | | | | | | | | | | 3,109,491,050 | 1,514,073,150 | 4,623,564,200 |
| 13. STREET LIGHTING AND TRAFFIC SIGNALS | | | | | | | | | | | | | |
| 13.01 | STREET LIGHTING UNIT | EACH | 532 | 108 | 313 | 0 | 953 | 2,976,039 | 1,223,961 | 4,200,000 | 2,836,165,215 | 1,166,434,785 | 4,002,600,000 |
| 13.02 | STREET LIGHTING CONTROL PANEL | EACH | 22 | 15 | 16 | 0 | 53 | 2,467,853 | 682,147 | 3,150,000 | 130,796,229 | 36,153,771 | 166,950,000 |
| 13.03 | TRAFFIC SIGNAL UNIT | EACH | 0 | 0 | 100 | 0 | 100 | 1,928,897 | 591,103 | 2,520,000 | 192,889,736 | 59,110,264 | 252,000,000 |
| 13.04 | TRAFFIC SIGNAL CONTROL PANEL | EACH | 0 | 0 | 5 | 0 | 5 | 41,764,856 | 12,835,144 | 54,600,000 | 208,824,278 | 64,175,722 | 273,000,000 |
| 13.05 | FLASHING LIGHT UNIT | EACH | 0 | 15 | 0 | 0 | 15 | 2,759,885 | 915,115 | 3,675,000 | 41,398,279 | 13,726,721 | 55,125,000 |
| | SUB-TOTAL | | | | | | | | | | 3,410,073,738 | 1,339,601,262 | 4,749,675,000 |
| 14. TOLL OFFICE AND FACILITIES | | | | | | | | | | | | | |
| 14.01 | TOLL GATE | EACH | 0 | 6 | 0 | 0 | 6 | 62,540,043 | 32,459,957 | 95,000,000 | 375,240,260 | 194,759,740 | 570,000,000 |
| 14.02 | TOLL OFFICE | EACH | 0 | 0 | 0 | 0 | 0 | 658,316,246 | 341,683,754 | 1,000,000,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 375,240,260 | 194,759,740 | 570,000,000 |
| 15. UTILITY DIVERSIONS | | M | 8,450 | 0 | 0 | 0 | 8,450 | 221,388 | 150,210 | 371,598 | 1,870,727,633 | 1,269,272,367 | 3,140,000,000 |
| TOTAL | | | | | | | | | | | 164,035,416,098 | 66,915,480,075 | 230,950,896,173 |
| VALUE ADDED TAX (PPN 10%) | | | | | | | | | | | 0 | 23,095,089,617 | 23,095,089,617 |
| GRAND TOTAL | | | | | | | | | | | 164,035,416,098 | 90,010,569,692 | 254,045,985,790 |

## TABLE 15.2.5 (c) CONSTRUCTION COST SUMMARY FOR EAST-WEST AXIS AND NORTH-SOUTH AXIS (RUPIAHS)

NAME OF LINK: EAST - WEST AXIS
NAME OF SECTION: SEC-4 : SUNTER IC - EAST JORR IC (EW-4)
STATION: STA. 20+150 - STA. 31+250

| ITEM NO. AND DESCRIPTION | | UNIT | QUANTITY | | | | | UNIT COST (Rp.) | | | COST (Rp.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THROUGHWAY | RAMPWAY | FRONTAGE | OTHERS | TOTAL | FOREIGN | LOCAL | TOTAL | FOREIGN | LOCAL | TOTAL |
| 1. GENERAL | | ITEM | | | | | | 5.00% | 2.00% | 7.00% | 9,334,717,748 | 3,733,887,099 | 13,068,604,847 |
| 2. SITE CLEARING | | M2 | 423,750 | 2,000 | 155,540 | 0 | 581,290 | 1,509 | 411 | 1,920 | 876,977,834 | 239,098,966 | 1,116,076,800 |
| 3. DEMOLITION OF MASONRY/CONC. STRUCT. | | M3 | 0 | 0 | 0 | | 0 | 35,658 | 14,342 | 50,000 | 0 | 0 | 0 |
| 4. ROAD EARTHWORKS | | | | | | | | | | | | | |
| 4.01 | BORROW MATERIAL | M3 | 247,398 | 3,600 | 162,562 | 151,200 | 564,760 | 12,937 | 5,063 | 18,000 | 7,306,292,002 | 2,859,378,998 | 10,165,671,000 |
| 4.02 | FREE-DRAINING MATERIAL | M3 | 26,400 | 0 | 14,553 | 0 | 40,953 | 24,485 | 7,515 | 32,000 | 1,002,715,995 | 307,780,005 | 1,310,496,000 |
| 4.03 | PERMEABLE BACKFILL | M3 | 15,988 | 471 | 4,625 | | 21,085 | 28,329 | 9,671 | 38,000 | 597,312,890 | 203,909,510 | 801,222,400 |
| | SUB-TOTAL | | | | | | | | | | 8,906,320,887 | 3,371,068,513 | 12,277,389,400 |
| 5. STRUCTURE EXCAVATION | | | | | | | | | | | | | |
| 5.01 | STRUCTURE EXCAVATION UP TO 2m | M3 | 56,965 | 5,380 | 46,170 | | 108,516 | 7,120 | 2,880 | 10,000 | 772,675,722 | 312,481,278 | 1,085,157,000 |
| 5.02 | STRUCTURE EXCAVATION OVER 2m | M3 | 45,392 | 3,063 | 8,583 | | 57,038 | 35,616 | 9,384 | 45,000 | 2,031,434,135 | 535,271,365 | 2,566,705,500 |
| | SUB-TOTAL | | | | | | | | | | 2,804,109,858 | 847,752,642 | 3,651,862,500 |
| 6. DRAINAGE | | | | | | | | | | | | | |
| 6.01 | R.C. PIPE D=60cm | M | 5,284 | 200 | 3,076 | 1,800 | 10,359 | 162,917 | 99,583 | 262,500 | 1,687,674,107 | 1,031,594,893 | 2,719,269,000 |
| 6.02 | R.C. PIPE D=120cm | M | 2,070 | 0 | 1,913 | 1,190 | 5,173 | 343,255 | 213,245 | 556,500 | 1,775,677,539 | 1,103,130,351 | 2,878,807,890 |
| 6.03 | U-DITCH, 0.3 x 0.6m (DS-2) | M | 6,700 | 0 | 17,235 | 0 | 23,935 | 72,832 | 57,168 | 130,000 | 1,743,205,178 | 1,368,288,922 | 3,111,494,100 |
| 6.04 | U-DITCH, 1.0 x (0.6-2.0)m (DS-4) | M | 2,941 | 0 | 15,252 | 0 | 18,193 | 85,991 | 64,009 | 150,000 | 1,564,468,621 | 1,164,538,379 | 2,729,007,000 |
| 6.05 | CATCHBASIN INLET TYPE-A (DC-A-2) | EACH | 217 | 8 | 124 | 75 | 424 | 553,363 | 296,637 | 850,000 | 234,625,701 | 125,774,299 | 360,400,000 |
| 6.06 | CATCHBASIN INLET TYPE-B (DC-A-4) | EACH | 84 | 0 | 76 | 0 | 160 | 765,980 | 434,020 | 1,200,000 | 122,556,787 | 69,443,213 | 192,000,000 |
| 6.07 | MORTARED RUBBLE WATERWAY (DW-1-3) | M2 | 0 | 0 | 0 | 0 | 0 | 37,802 | 22,198 | 60,000 | 0 | 0 | 0 |
| 6.08 | RIVER REVETMENT | M | 0 | 0 | 0 | 0 | 0 | 1,240,985 | 959,015 | 2,200,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 7,128,207,934 | 4,862,770,056 | 11,990,977,990 |
| 7. SUBGRADE PREPARATION | | M2 | 196,092 | 2,000 | 140,201 | 27,000 | 365,293 | 608 | 192 | 800 | 222,121,711 | 70,112,689 | 292,234,400 |
| 8. BASE AND SUBBASE | | | | | | | | | | | | | |
| 8.01 | GRANULAR SUBBASE | M3 | 53,925 | 500 | 39,278 | 5,040 | 98,743 | 30,598 | 9,402 | 40,000 | 3,021,367,917 | 928,348,083 | 3,949,716,000 |
| 8.02 | GRADED GRANULAR BASE | M3 | 34,316 | 320 | 24,906 | 3,240 | 62,782 | 42,073 | 12,927 | 55,000 | 2,641,412,762 | 811,602,738 | 3,453,015,500 |
| | SUB-TOTAL | | | | | | | | | | 5,662,780,679 | 1,739,950,821 | 7,402,731,500 |
| 9. PAVEMENT SURFACING | | | | | | | | | | | | | |
| 9.01 | BITUMINOUS PRIME COAT/TACK COAT | KG | 616,666 | 14,180 | 296,706 | 41,724 | 969,276 | 842 | 258 | 1,100 | 816,237,837 | 249,965,433 | 1,066,203,270 |
| 9.02 | ASPHALT TREATED BASE(incl. Asph.Cement) | TON | 56,649 | 520 | 40,493 | 5,220 | 102,882 | 67,178 | 16,822 | 84,000 | 6,911,435,147 | 1,730,652,853 | 8,642,088,000 |
| 9.03 | ASPHALT CONCRETE SURFACE(incl. A.Cem.) | TON | 65,888 | 1,660 | 30,779 | 14,940 | 113,267 | 77,263 | 17,737 | 95,000 | 8,751,288,000 | 2,009,048,500 | 10,760,336,500 |
| 9.04 | CONCRETE PAVEMENT (t=28cm with mesh) | M2 | 0 | 0 | 5,640 | 0 | 5,640 | 44,780 | 25,220 | 70,000 | 252,558,806 | 142,241,194 | 394,800,000 |
| | SUB-TOTAL | | | | | | | | | | 16,731,519,790 | 4,131,907,980 | 20,863,427,770 |
| 10. CONCRETE STRUCTURES | | | | | | | | | | | | | |
| 10.01 | STR. CONC. CLASS B-1-1(Deck Slab/Diaphragm) | M3 | 34,012 | 2,545 | 1,246 | | 37,803 | 119,630 | 100,370 | 220,000 | 4,522,395,886 | 3,794,275,114 | 8,316,671,000 |
| 10.02 | STR. CONC. CLASS B-1-2 (Piers) | M3 | 49,594 | 3,765 | 5,525 | | 58,885 | 156,945 | 63,055 | 220,000 | 9,241,715,180 | 3,713,035,420 | 12,954,750,600 |
| 10.03 | STR. CONC. CLASS C-1 (Abutments) | M3 | 34,976 | 1,438 | 25,637 | | 62,051 | 109,092 | 60,908 | 170,000 | 6,769,301,085 | 3,779,433,515 | 10,548,734,600 |
| 10.04 | STR. CONC. CLASS C-2 (Box Culverts) | M3 | 0 | 0 | 3,192 | | 3,192 | 102,135 | 67,865 | 170,000 | 326,015,412 | 216,624,588 | 542,640,000 |
| 10.05 | STR. CONC. CLASS C-3 (Curbs) | M3 | 7,220 | 431 | 1,591 | | 9,242 | 100,625 | 69,375 | 170,000 | 929,995,695 | 641,176,605 | 1,571,172,300 |
| 10.06 | STR. CONC. CLASS C-4 (Ped. Bridge Stairs) | M3 | 0 | 0 | 609 | | 609 | 145,004 | 104,996 | 250,000 | 88,362,810 | 63,982,190 | 152,345,000 |
| 10.07 | STR. CONC. CLASS C-5 (Ped. Bridge Piers) | M3 | 0 | 0 | 313 | | 313 | 124,931 | 75,069 | 200,000 | 39,073,460 | 23,478,540 | 62,552,000 |
| 10.08 | STRUCTURE CONCRETE CLASS D | M3 | 0 | 1,469 | 2,362 | | 3,830 | 110,824 | 59,176 | 170,000 | 424,471,858 | 226,655,342 | 651,127,200 |
| 10.09 | REINFORCING STEEL | TON | 12,593 | 870 | 2,760 | | 16,224 | 722,004 | 327,996 | 1,050,000 | 11,713,517,387 | 5,321,283,613 | 17,034,801,000 |
| 10.10 | PC-I GIRDER SPAN 30m | EACH | 1,526 | 104 | 37 | | 1,667 | 15,970,489 | 6,029,511 | 22,000,000 | 26,622,804,612 | 10,051,195,388 | 36,674,000,000 |
| 10.11 | PC-U GIRDER SPAN 30m | EACH | 0 | 0 | 0 | | 0 | 27,585,390 | 10,414,610 | 38,000,000 | 0 | 0 | 0 |
| 10.12 | PC-I GIRDER PEDESTRIAN SPAN 24m | EACH | 0 | 0 | 21 | | 21 | 17,482,207 | 6,567,793 | 24,050,000 | 367,126,357 | 137,923,643 | 505,050,000 |
| 10.13 | PC CABLE TYPE A (12T12.7) | KG | 477,663 | 0 | 0 | | 477,663 | 3,423 | 1,077 | 4,500 | 1,635,165,518 | 514,317,982 | 2,149,483,500 |
| 10.14 | PC CABLE TYPE E (1T19.3) | KG | 43,767 | 2,720 | 1,061 | | 47,548 | 4,375 | 1,625 | 6,000 | 208,032,850 | 77,255,150 | 285,288,000 |
| 10.15 | FURN.& DRIVE PC PILE 45x45cm | M | 11,499 | 0 | 15,890 | | 27,389 | 62,049 | 47,951 | 110,000 | 1,699,454,806 | 1,313,313,194 | 3,012,768,000 |
| 10.16 | FURN.& DRIVE PC PILE D=60cm | M | 49,398 | 4,498 | 4,004 | | 57,900 | 89,461 | 35,539 | 125,000 | 5,179,735,957 | 2,057,714,043 | 7,237,450,000 |
| 10.17 | FURN. & BORE PC PILE D= 60cm | M | 0 | 0 | 256 | | 256 | 118,088 | 46,912 | 165,000 | 30,230,543 | 12,009,457 | 42,240,000 |
| 10.18 | CAST-IN-PLACE CONCRETE PILE D=100cm | M | 0 | 0 | 0 | | 0 | 504,662 | 295,338 | 800,000 | 0 | 0 | 0 |
| 10.19 | EXPANSION JOINT TYPE A | M | 3,226 | 168 | 99 | | 3,493 | 571,013 | 78,987 | 650,000 | 1,994,549,460 | 275,900,540 | 2,270,450,000 |
| 10.20 | EXPANSION JOINT TYPE B | M | 3,226 | 168 | 159 | | 3,553 | 585,518 | 64,482 | 650,000 | 2,080,346,991 | 229,103,009 | 2,309,450,000 |
| 10.21 | METAL BEARING SHOE TYPE A (125t) | EACH | 0 | 0 | 0 | | 0 | 3,273,391 | 1,000,109 | 4,273,500 | 0 | 0 | 0 |
| 10.22 | METAL BEARING SHOE TYPE D (275t) | EACH | 0 | 0 | 0 | | 0 | 7,892,200 | 2,412,800 | 10,305,000 | 0 | 0 | 0 |
| 10.23 | METAL BEARING SHOE TYPE E (450t) | EACH | 0 | 0 | 0 | | 0 | 16,110,839 | 4,878,661 | 20,989,500 | 0 | 0 | 0 |
| 10.24 | METAL BEARING SHOE TYPE N (1200t) | EACH | 0 | 0 | 0 | | 0 | 45,242,294 | 13,700,206 | 58,942,500 | 0 | 0 | 0 |
| 10.25 | BEARING PAD TYPE H (40x40x4.0cm) | EACH | 3,052 | 208 | 74 | | 3,334 | 341,331 | 106,669 | 448,000 | 1,137,998,465 | 355,633,535 | 1,493,632,000 |
| 10.26 | BEARING PAD TYPE K (60x40x4.0cm) | EACH | 0 | 720 | 0 | | 720 | 511,997 | 160,003 | 672,000 | 368,637,775 | 115,202,225 | 483,840,000 |
| 10.27 | DRAIN PIPE D=20cm | M | 6,526 | 0 | 294 | | 6,820 | 34,049 | 61,951 | 96,000 | 232,214,903 | 422,505,097 | 654,720,000 |
| | SUB-TOTAL | | | | | | | | | | 75,611,147,011 | 33,342,018,189 | 108,953,165,200 |
| 11. STEEL STRUCTURES | | | | | | | | | | | | | |
| 11.01 | STEEL STRUCTURES: BOX GIRDERS | TON | 0 | 0 | 0 | 0 | 0 | 4,727,452 | 272,548 | 5,000,000 | 0 | 0 | 0 |
| 11.02 | STEEL STRUCTURES: I-GIRDERS | TON | 0 | 0 | 0 | 0 | 0 | 4,254,707 | 245,293 | 4,500,000 | 0 | 0 | 0 |
| 11.03 | STEEL STRUCTURES: PIERS | TON | 0 | 0 | 0 | 0 | 0 | 4,299,558 | 200,442 | 4,500,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 0 | 0 | 0 |
| 12. MISCELLANEOUS | | | | | | | | | | | | | |
| 12.01 | SOLID SODDING | M2 | 76,258 | 0 | 0 | 0 | 76,258 | 304 | 2,496 | 2,800 | 23,199,617 | 190,322,783 | 213,522,400 |
| 12.02 | GUARDRAIL | M | 21,788 | 400 | 15,252 | 0 | 37,440 | 108,796 | 31,204 | 140,000 | 4,073,339,317 | 1,168,260,683 | 5,241,600,000 |
| 12.03 | SEPARATOR FENCE | M | 9,474 | 0 | 0 | 0 | 9,474 | 21,889 | 8,111 | 30,000 | 207,377,536 | 76,842,464 | 284,220,000 |
| 12.04 | DRY RIPRAP SLOPE PROTECTION (SP-C) | M2 | 0 | 0 | 0 | 0 | 0 | 22,548 | 7,452 | 30,000 | 0 | 0 | 0 |
| 12.05 | REGULATORY & WARNING SIGN | EACH | 331 | 36 | 444 | 6 | 817 | 156,312 | 83,688 | 240,000 | 127,706,756 | 68,373,244 | 196,080,000 |
| 12.06 | GUIDE SIGN | EACH | 54 | 12 | 48 | 3 | 117 | 4,599,619 | 2,275,381 | 6,875,000 | 538,155,448 | 266,219,552 | 804,375,000 |
| 12.07 | ROAD MARKING | M2 | 23,421 | 2,856 | 21,312 | 5,141 | 52,730 | 8,687 | 7,313 | 16,000 | 458,074,658 | 385,602,142 | 843,676,800 |
| 12.08 | CONCRETE CURB | M | 25,106 | 0 | 44,231 | 0 | 69,337 | 9,002 | 6,998 | 16,000 | 624,203,702 | 485,186,698 | 1,109,390,400 |
| 12.09 | INTERLOCKING CONCRETE PAVING | M2 | 0 | 0 | 41,180 | 0 | 41,180 | 6,883 | 5,117 | 12,000 | 283,452,774 | 210,712,026 | 494,164,800 |
| 12.10 | CONCRETE BARRIER | M | 0 | 100 | 0 | 300 | 400 | 68,805 | 35,195 | 104,000 | 27,521,861 | 14,078,139 | 41,600,000 |
| 12.11 | BUS STOP SHELTER | EACH | 0 | 0 | 40 | 0 | 40 | 3,680,342 | 1,319,658 | 5,000,000 | 147,213,685 | 52,786,315 | 200,000,000 |
| 12.12 | STREET TREE | EACH | 7,893 | 0 | 0 | 0 | 7,893 | 0 | 20,000 | 20,000 | 0 | 157,860,000 | 157,860,000 |
| | SUB-TOTAL | | | | | | | | | | 6,510,245,355 | 3,076,244,045 | 9,586,489,400 |
| 13. STREET LIGHTING AND TRAFFIC SIGNALS | | | | | | | | | | | | | |
| 13.01 | STREET LIGHTING UNIT | EACH | 738 | 20 | 420 | 72 | 1,250 | 2,976,039 | 1,223,961 | 4,200,000 | 3,720,048,813 | 1,529,951,187 | 5,250,000,000 |
| 13.02 | STREET LIGHTING CONTROL PANEL | EACH | 30 | 3 | 22 | 0 | 55 | 2,467,853 | 682,147 | 3,150,000 | 135,731,936 | 37,518,064 | 173,250,000 |
| 13.03 | TRAFFIC SIGNAL UNIT | EACH | 0 | 0 | 120 | 0 | 120 | 1,928,897 | 591,103 | 2,520,000 | 231,467,683 | 70,932,317 | 302,400,000 |
| 13.04 | TRAFFIC SIGNAL CONTROL PANEL | EACH | 0 | 0 | 6 | 0 | 6 | 41,764,856 | 12,835,144 | 54,600,000 | 250,589,134 | 77,010,866 | 327,600,000 |
| 13.05 | FLASHING LIGHT UNIT | EACH | 0 | 4 | 0 | 6 | 10 | 2,759,885 | 915,115 | 3,675,000 | 27,598,853 | 9,151,147 | 36,750,000 |
| | SUB-TOTAL | | | | | | | | | | 4,365,436,419 | 1,724,563,581 | 6,090,000,000 |
| 14. TOLL OFFICE AND FACILITIES | | | | | | | | | | | | | |
| 14.01 | TOLL GATE ISLANDS | EACH | 0 | 0 | 0 | 0 | 0 | 62,540,043 | 32,459,957 | 95,000,000 | 0 | 0 | 0 |
| 14.02 | TOLL OFFICE | EACH | 0 | 0 | 0 | 0 | 0 | 658,316,246 | 341,683,754 | 1,000,000,000 | 0 | 0 | 0 |
| | SUB-TOTAL | | | | | | | | | | 0 | 0 | 0 |
| 15. UTILITY DIVERSIONS | | M | 11,100 | 0 | 0 | 0 | 11,100 | 239,919 | 162,783 | 402,703 | 2,663,105,897 | 1,806,894,103 | 4,470,000,000 |
| TOTAL | | | | | | | | | | | 140,816,691,122 | 58,946,268,685 | 199,762,959,807 |
| VALUE ADDED TAX (PPN 10%) | | | | | | | | | | | 0 | 19,976,295,981 | 19,976,295,981 |
| GRAND TOTAL | | | | | | | | | | | 140,816,691,122 | 78,922,564,665 | 219,739,255,788 |

## TABLE 15.2.4 (a) NORTH-SOUTH AXIS CONSTRUCTION COST SUMMARY (RUPIAHS)

| | EAST-WEST AXIS | | | | | |
|---|---|---|---|---|---|---|
| | EW-1 | | | EW-2 | | |
| | FOREIGN | LOCAL | TOTAL | FOREIGN | LOCAL | TOTAL |
| 1. GENERAL | 8,965,630,935 | 3,586,252,374 | 12,551,883,309 | 3,043,472,349 | 1,217,388,940 | 4,260,861,288 |
| 2. SITE CLEARING | 937,641,665 | 255,638,335 | 1,193,280,000 | 284,611,585 | 77,596,415 | 362,208,000 |
| 3. DEMOLITION OF MASONRY/CONC. STRUCT. | 0 | 0 | 0 | 0 | 0 | 0 |
| 4. ROAD EARTHWORKS | 15,406,390,775 | 5,877,617,825 | 21,284,008,600 | 1,708,280,572 | 611,454,628 | 2,319,735,200 |
| 5. STRUCTURE EXCAVATION | 1,826,813,654 | 600,073,846 | 2,426,887,500 | 855,184,370 | 248,797,130 | 1,103,981,500 |
| 6. DRAINAGE | 8,824,930,471 | 5,976,219,809 | 14,801,150,280 | 1,587,472,532 | 1,110,711,703 | 2,698,184,235 |
| 7. SUBGRADE PREPARATION | 290,455,394 | 91,682,206 | 382,137,600 | 45,004,679 | 14,205,721 | 59,210,400 |
| 8. BASE AND SUBBASE | 7,123,179,723 | 2,188,674,277 | 9,311,854,000 | 1,164,743,438 | 357,880,062 | 1,522,623,500 |
| 9. PAVEMENT SURFACING | 20,366,253,629 | 4,989,926,691 | 25,356,180,320 | 3,734,311,813 | 921,840,527 | 4,656,152,340 |
| 10. CONCRETE STRUCTURES | 58,840,115,341 | 29,470,746,459 | 88,310,861,800 | 27,351,165,071 | 11,924,785,929 | 39,275,951,000 |
| 11. STEEL STRUCTURES | 0 | 0 | 0 | 5,008,877,458 | 288,772,542 | 5,297,650,000 |
| 12. MISCELLANEOUS | 5,574,532,982 | 2,992,025,618 | 8,566,558,600 | 1,058,364,943 | 596,710,857 | 1,655,075,800 |
| 13. STREET LIGHTING AND TRAFFIC SIGNALS | 4,455,159,805 | 1,754,540,195 | 6,209,700,000 | 1,139,429,898 | 439,245,102 | 1,578,675,000 |
| 14. TOLL OFFICE AND FACILITIES | 0 | 0 | 0 | 0 | 0 | 0 |
| 15. UTILITY DIVERSIONS | 875,786,503 | 594,213,497 | 1,470,000,000 | 202,562,865 | 137,437,135 | 340,000,000 |
| TOTAL | 133,486,890,878 | 58,377,611,131 | 191,864,502,009 | 47,183,481,573 | 17,946,826,691 | 65,130,308,263 |
| VALUE ADDED TAX (PPN 10%) | 0 | 19,186,450,201 | 19,186,450,201 | 0 | 6,513,030,826 | 6,513,030,826 |
| GRAND TOTAL | 133,486,890,878 | 77,564,061,332 | 211,050,952,210 | 47,183,481,573 | 24,459,857,517 | 71,643,339,090 |

| | EAST-WEST AXIS | | | | | |
|---|---|---|---|---|---|---|
| | EW-3 | | | EW-4 | | |
| | FOREIGN | LOCAL | TOTAL | FOREIGN | LOCAL | TOTAL |
| 1. GENERAL | 10,792,097,952 | 4,316,839,181 | 15,108,937,133 | 9,334,717,748 | 3,733,887,099 | 13,068,604,847 |
| 2. SITE CLEARING | 405,456,472 | 110,543,528 | 516,000,000 | 876,977,834 | 239,098,966 | 1,116,076,800 |
| 3. DEMOLITION OF MASONRY/CONC. STRUCT. | 0 | 0 | 0 | 0 | 0 | 0 |
| 4. ROAD EARTHWORKS | 2,622,572,873 | 974,983,927 | 3,597,556,800 | 8,906,320,887 | 3,371,068,513 | 12,277,389,400 |
| 5. STRUCTURE EXCAVATION | 3,658,366,590 | 1,048,962,410 | 4,707,329,000 | 2,804,109,858 | 847,752,642 | 3,651,862,500 |
| 6. DRAINAGE | 2,908,354,190 | 2,035,112,450 | 4,943,466,640 | 7,128,207,934 | 4,862,770,056 | 11,990,977,990 |
| 7. SUBGRADE PREPARATION | 67,965,803 | 21,453,397 | 89,419,200 | 222,121,711 | 70,112,689 | 292,234,400 |
| 8. BASE AND SUBBASE | 2,018,531,339 | 620,215,661 | 2,638,747,000 | 5,662,780,679 | 1,739,950,821 | 7,402,731,500 |
| 9. PAVEMENT SURFACING | 7,797,929,825 | 1,935,676,135 | 9,733,605,960 | 16,731,519,790 | 4,131,907,980 | 20,863,427,770 |
| 10. CONCRETE STRUCTURES | 115,931,638,648 | 51,011,256,592 | 166,942,895,240 | 75,611,147,011 | 33,342,018,189 | 108,953,165,200 |
| 11. STEEL STRUCTURES | 9,066,969,724 | 522,730,276 | 9,589,700,000 | 0 | 0 | 0 |
| 12. MISCELLANEOUS | 3,109,491,050 | 1,514,073,150 | 4,623,564,200 | 6,510,245,355 | 3,076,244,045 | 9,586,489,400 |
| 13. STREET LIGHTING AND TRAFFIC SIGNALS | 3,410,073,738 | 1,339,601,262 | 4,749,675,000 | 4,365,436,419 | 1,724,563,581 | 6,090,000,000 |
| 14. TOLL OFFICE AND FACILITIES | 375,240,260 | 194,759,740 | 570,000,000 | 0 | 0 | 0 |
| 15. UTILITY DIVERSIONS | 1,870,727,633 | 1,269,272,367 | 3,140,000,000 | 2,663,105,897 | 1,806,894,103 | 4,470,000,000 |
| TOTAL | 164,035,416,098 | 66,915,480,075 | 230,950,896,173 | 140,816,691,122 | 58,946,268,685 | 199,762,959,807 |
| VALUE ADDED TAX (PPN 10%) | 0 | 23,095,089,617 | 23,095,089,617 | 0 | 19,976,295,981 | 19,976,295,981 |
| GRAND TOTAL | 164,035,416,098 | 90,010,569,692 | 254,045,985,790 | 140,816,691,122 | 78,922,564,665 | 219,739,255,788 |

## TABLE 15.2.4 (b) CONSTRUCTION COST FOR SECTION EW-1

| | EAST-WEST AXIS | | | NORTH-SOUTH AXIS | | |
|---|---|---|---|---|---|---|
| | TOTAL EW | | | TOTAL NS | | |
| | FOREIGN | LOCAL | TOTAL | FOREIGN | LOCAL | TOTAL |
| 1. GENERAL | 32,135,918,984 | 12,854,367,594 | 44,990,286,577 | 36,917,438,673 | 14,766,975,469 | 51,684,414,142 |
| 2. SITE CLEARING | 2,504,687,557 | 682,877,243 | 3,187,564,800 | 1,296,027,470 | 353,348,530 | 1,649,376,000 |
| 3. DEMOLITION OF MASONRY/CONC. STRUCT. | 0 | 0 | 0 | 79,894,644 | 32,135,356 | 112,030,000 |
| 4. ROAD EARTHWORKS | 28,643,565,107 | 10,835,124,893 | 39,478,690,000 | 5,431,235,780 | 2,093,928,620 | 7,525,164,400 |
| 5. STRUCTURE EXCAVATION | 9,144,474,472 | 2,745,586,028 | 11,890,060,500 | 10,741,802,042 | 3,038,157,458 | 13,779,959,500 |
| 6. DRAINAGE | 20,448,965,127 | 13,984,814,018 | 34,433,779,145 | 13,309,724,404 | 8,933,939,896 | 22,243,664,300 |
| 7. SUBGRADE PREPARATION | 625,547,587 | 197,454,013 | 823,001,600 | 237,327,582 | 74,912,419 | 312,240,001 |
| 8. BASE AND SUBBASE | 15,969,235,179 | 4,906,720,821 | 20,875,956,000 | 6,161,333,434 | 1,893,136,566 | 8,054,470,000 |
| 9. PAVEMENT SURFACING | 48,630,015,057 | 11,979,351,333 | 60,609,366,390 | 20,617,796,870 | 5,114,226,630 | 25,732,023,500 |
| 10. CONCRETE STRUCTURES | 277,734,066,071 | 125,748,807,169 | 403,482,873,240 | 250,830,979,809 | 110,421,168,151 | 361,252,147,960 |
| 11. STEEL STRUCTURES | 14,075,847,182 | 811,502,818 | 14,887,350,000 | 250,232,008,210 | 13,912,871,790 | 264,144,880,000 |
| 12. MISCELLANEOUS | 16,252,634,329 | 8,179,053,671 | 24,431,688,000 | 7,331,366,189 | 3,507,001,611 | 10,838,367,800 |
| 13. STREET LIGHTING AND TRAFFIC SIGNALS | 13,370,099,860 | 5,257,950,140 | 18,628,050,000 | 6,075,716,002 | 2,396,733,998 | 8,472,450,000 |
| 14. TOLL OFFICE AND FACILITIES | 375,240,260 | 194,759,740 | 570,000,000 | 2,909,757,808 | 1,510,242,192 | 4,420,000,000 |
| 15. UTILITY DIVERSIONS | 5,612,182,898 | 3,807,817,102 | 9,420,000,000 | 5,845,723,274 | 3,966,276,726 | 9,812,000,000 |
| 16. TRAFFIC CONTROL EQUIPMENT | 0 | 0 | 0 | 29,791,905,000 | 5,394,565,000 | 35,186,470,000 |
| TOTAL | 485,522,479,671 | 202,186,186,582 | 687,708,666,252 | 647,810,037,191 | 177,409,620,412 | 825,219,657,603 |
| VALUE ADDED TAX (PPN 10%) | 0 | 68,770,866,625 | 68,770,866,625 | 0 | 82,521,965,760 | 82,521,965,760 |
| GRAND TOTAL | 485,522,479,671 | 270,957,053,207 | 756,479,532,877 | 647,810,037,191 | 259,931,586,172 | 907,741,623,363 |

| | NORTH-SOUTH AXIS PLUS EAST-WEST AXIS | | |
|---|---|---|---|
| | TOTAL NS PLUS EW | | |
| | FOREIGN | LOCAL | TOTAL |
| 1. GENERAL | 69,053,357,657 | 27,621,343,063 | 96,674,700,719 |
| 2. SITE CLEARING | 3,800,715,027 | 1,036,225,773 | 4,836,940,800 |
| 3. DEMOLITION OF MASONRY/CONC. STRUCT. | 79,894,644 | 32,135,356 | 112,030,000 |
| 4. ROAD EARTHWORKS | 34,074,800,887 | 12,929,053,513 | 47,003,854,400 |
| 5. STRUCTURE EXCAVATION | 19,886,276,514 | 5,783,743,486 | 25,670,020,000 |
| 6. DRAINAGE | 33,758,689,531 | 22,918,753,914 | 56,677,443,445 |
| 7. SUBGRADE PREPARATION | 862,875,169 | 272,366,432 | 1,135,241,601 |
| 8. BASE AND SUBBASE | 22,130,568,613 | 6,799,857,387 | 28,930,426,000 |
| 9. PAVEMENT SURFACING | 69,247,811,927 | 17,093,577,963 | 86,341,389,890 |
| 10. CONCRETE STRUCTURES | 528,565,045,880 | 236,169,975,320 | 764,735,021,200 |
| 11. STEEL STRUCTURES | 264,307,855,392 | 14,724,374,608 | 279,032,230,000 |
| 12. MISCELLANEOUS | 23,584,000,518 | 11,686,055,282 | 35,270,055,800 |
| 13. STREET LIGHTING AND TRAFFIC SIGNALS | 19,445,815,862 | 7,654,684,138 | 27,100,500,000 |
| 14. TOLL OFFICE AND FACILITIES | 3,284,998,068 | 1,705,001,932 | 4,990,000,000 |
| 15. UTILITY DIVERSIONS | 11,457,906,172 | 7,774,093,828 | 19,232,000,000 |
| 16. TRAFFIC CONTROL EQUIPMENT | 29,791,905,000 | 5,394,565,000 | 35,186,470,000 |
| TOTAL | 1,133,332,516,862 | 379,595,806,994 | 1,512,928,323,855 |
| VALUE ADDED TAX (PPN 10%) | 0 | 151,292,832,386 | 151,292,832,386 |
| GRAND TOTAL | 1,133,332,516,862 | 530,888,639,379 | 1,664,221,156,241 |

## 15.3 Land Acquisition and Compensation Cost

Land acquisition and compensation cost is based on the area of required land acquisition estimated in the preliminary engineering design and the unit costs of land acquisition and compensation have been obtained from Public Works Bureau (DPU), DKI Jakarta.

Land acquisition requirements and cost estimates for each section of the North-South Axis and East-West Axis are summarised in the following Table 15.3.1.

**Table 15.3.1 Land Acquisition and Compensation Cost Estimates**

| Name of Link | Section | Area (Sq.m) | Cost (M.Rp) |
|---|---|---|---|
| N-S Axis | | 277,270 | 79,400 |
| E-W Axis | Section-1 | 723,600 | 94,118 |
| | Section-2 | 175,000 | 35,000 |
| | Section-3 | 153,600 | 30,120 |
| | Section-4 | 403,000 | 65,280 |
| Sub-total | | 1,455,200 | 224,518 |
| Total | | 1,732,470 | 303,918 |

The integrated unit costs as shown in Table 15.3.2 are established to estimate land acquisition and property compensation excluding utility relocation, taking into account categories and types of tenure in land, and density and kinds of properties.

**Table 15.3.2 Unit Costs of Land Acquisition and Compensation**

| Name of Link | Type of Area | | Integrated Unit Cost |
|---|---|---|---|
| | Land | Property Density | (Rp/sq.m) |
| N-S Axis | developed | high | 310,000 |
| | developed | medium | 250,000 |
| | developed | low | 190,000 |
| E-W Axis | developed | high | 310,000 |
| | developed | medium | 200,000 |
| | developed | low | 150,000 |
| | undeveloped | medium | 165,000 |
| | undeveloped | low | 74,000 |
| | undeveloped | scattered | 60,000 |

## 15.4 Utility Relocation Costs

It has not been possible to carry out a detailed survey to identify all public utilities which will be affected by the project roads. It has been confirmed however that there are no existing major public utilities such as HV cables which must be relocated. An allowance has been included in the cost estimate for the relocation and protection of existing utilities identified during detail design or construction.

An all-inclusive allowance for utility relocation/protection per metre of throughway has been estimated after referring to unit relocation costs from the relevant agencies and also referring to costs from other recent road projects in the Jakarta area. The estimated costs are given in Table 15.4.1 below.

**Table 15.4.1 Allowance for Utility Relocation Costs**

| Degree of difficulty of Expected Diversions | Grade Allocated | Unit Cost (Rp/m) |
|---|---|---|
| Difficult | 1 | 1,000,000 |
| Moderate | 2 | 700,000 |
| Simple | 3 | 400,000 |
| No existing road | 4 | 100,000 |

Utilities are often located under the road side and "difficult" or "moderate" ratings have been applied where pier footings or other major works are located at the roadside. The assigned ratings and the resulting estimated utility diversion costs are shown in Table 15.4.2-(a) and 15.4.2-(b) for the North-South Axis and East-West Axis respectively.

## 15.5 Consulting Services Cost

The consulting engineering services cost is assumed to be 7% of the construction cost, consisting of 3% for engineering services and 4% for supervisory services.

## 15.6 Summary of Estimated Project Cost

The total project costs for each section including value added tax (PPN), land acquisition and compensation, physical contingency and consulting services are shown in Table 15.6.1 for the North-South Axis and East-West Axis. Also shown in Table 15.6.2 are average costs per kilometre. These appear reasonable when compared to other recent and ongoing major road projects in Jakarta.

## TABLE 15.4.2 (a) UTILITY RELOCATION COSTS FOR NORTH-SOUTH AXIS

| No. | LOCATION/SECTION | | LOCATION OF MAJOR WORKS | GRADE | LENGTH | UNIT COST | COST |
|---|---|---|---|---|---|---|---|
| | START | FINISH | | | (m) | (Rp) | (Rp) |
| 1 | Sta. 0+770 | Sta. 3+400 | Sidewalk along the eastern side of the Kali Ciliwung | 3 | 2,630 | 400,000 | 1,052,000,000 |
| 2 | Sta. 3+400 | Sta. 3+850 | Median on Jl. Maja Pahid | 2 | 450 | 700,000 | 315,000,000 |
| 3 | Sta. 3+850 | Sta. 5+100 | Road side of Jl. Abdul Muis | 1 | 1,250 | 1,000,000 | 1,250,000,000 |
| 4 | Sta. 5+100 | Sta. 5+500 | No existing road | 4 | 400 | 100,000 | 40,000,000 |
| 5 | Sta. 5+500 | Sta. 5+560 | Road side of Jl.Jati Baru | 1 | 60 | 1,000,000 | 60,000,000 |
| NS-1 | Sta. 0+770 | Sta. 5+560 | | | 4,790 | 567,223 | 2,717,000,000 |
| 6 | Sta. 5+560 | Sta. 6+350 | Road side of Jl.Jati Baru | 1 | 790 | 1,000,000 | 790,000,000 |
| 7 | Sta. 6+350 | Sta. 8+600 | No existing road | 4 | 2,250 | 100,000 | 225,000,000 |
| 8 | Sta. 8+600 | Sta. 9+400 | Road side of Jl. Gelora 1 | 1 | 800 | 1,000,000 | 800,000,000 |
| 9 | Sta. 9+400 | Sta. 10+100 | Median on Jl. Gelora | 2 | 700 | 700,000 | 490,000,000 |
| 10 | Sta. 10+100 | Sta. 11+650 | Median on Jl. Asia Afrika | 2 | 1,550 | 700,000 | 1,085,000,000 |
| 11 | Sta. 11+650 | Sta. 11+900 | No existing road | 4 | 250 | 100,000 | 25,000,000 |
| 12 | Sta. 11+900 | Sta. 14+100 | Median on Jl. Pattimura/Prapanca | 2 | 2,200 | 700,000 | 1,540,000,000 |
| 13 | Sta. 14+100 | Sta. 14+550 | No existing road | 4 | 450 | 100,000 | 45,000,000 |
| 14 | Sta. 14+550 | Sta. 17+400 | Median on Jl. Pangeran Antasari | 2 | 2,850 | 700,000 | 1,995,000,000 |
| 15 | Sta. 17+400 | Sta. 18+400 | No existing road | 4 | 1,000 | 100,000 | 100,000,000 |
| NS-2 | Sta. 5+560 | Sta. 18+400 | | | 12,840 | 552,570 | 7,095,000,000 |
| Total | Sta. 0+770 | Sta. 18+400 | | | 17,630 | 556,551 | 9,812,000,000 |

## TABLE 15.4.2 (b) UTILITY RELOCATION COSTS FOR EAST-WEST AXIS

| No. | LOCATION/SECTION | | LOCATION OF MAJOR WORKS | GRADE | LENGTH | UNIT COST | COST |
|---|---|---|---|---|---|---|---|
| | START | FINISH | | | (m) | (Rp) | (Rp) |
| 1 | Sta. 0+500 | Sta. 7+200 | No existing road | 4 | 6,700 | 100,000 | 670,000,000 |
| 2 | Sta. 7+200 | Sta. 9+200 | Along Jl. Utama Sakti & Jl. Jelambar Utama/Selatan | 3 | 2,000 | 400,000 | 800,000,000 |
| EW-1 | Sta. 0+500 | Sta. 9+200 | | | 8,700 | 168,966 | 1,470,000,000 |
| 3 | Sta. 9+200 | Sta. 9+500 | Along Jl. Utama Sakti & Jl. Jelambar Utama/Selatan | 3 | 300 | 400,000 | 120,000,000 |
| 4 | Sta. 9+500 | Sta. 11+700 | No existing road | 4 | 2,200 | 100,000 | 220,000,000 |
| EW-2 | Sta. 9+200 | Sta. 11+700 | | | 2,500 | 136,000 | 340,000,000 |
| 5 | Sta. 11+700 | Sta. 12+300 | No existing road | 4 | 600 | 100,000 | 60,000,000 |
| 6 | Sta. 12+300 | Sta. 14+200 | Median on Jl Mangga Besar | 2 | 1,900 | 700,000 | 1,330,000,000 |
| 7 | Sta. 14+200 | Sta. 14+700 | No existing road | 4 | 500 | 100,000 | 50,000,000 |
| 8 | Sta. 14+700 | Sta. 15+500 | Along Jl. Industri | 1 | 800 | 1,000,000 | 800,000,000 |
| 9 | Sta. 15+500 | Sta. 18+700 | No existing road | 4 | 3,200 | 100,000 | 320,000,000 |
| 10 | Sta. 18+700 | Sta.20+150 | Along Jl. Taman Sunter Indah | 3 | 1,450 | 400,000 | 580,000,000 |
| EW-3 | Sta. 11+700 | Sta.20+150 | | | 8,450 | 371,598 | 3,140,000,000 |
| 11 | Sta. 20+150 | Sta. 20+700 | No existing road | 4 | 550 | 100,000 | 55,000,000 |
| 12 | Sta. 20+700 | Sta. 23+900 | Median along Jl. Raya Barat/Timur Boulevard | 2 | 3,200 | 700,000 | 2,240,000,000 |
| 13 | Sta. 23+900 | Sta. 24+300 | No existing road | 4 | 400 | 100,000 | 40,000,000 |
| 14 | Sta. 24+300 | Sta. 25+900 | Along Jl. Pegangsaan Dua | 1 | 1,600 | 1,000,000 | 1,600,000,000 |
| 15 | Sta. 25+900 | Sta. 31+250 | No existing road | 4 | 5,350 | 100,000 | 535,000,000 |
| EW-4 | Sta. 20+150 | Sta. 31+250 | | | 11,100 | 402,703 | 4,470,000,000 |
| Total | Sta. 0+500 | Sta. 31+250 | | | 30,750 | 306,341 | 9,420,000,000 |

## Table 15.6.1 ESTIMATED PROJECT COSTS

Unit : Million Rp

| Item No. | Description | Name of Link/Section | | | | | |
|---|---|---|---|---|---|---|---|
| | | N-S AXIS | E-W AXIS | | | | |
| | | | SEC-1 | SEC-2 | SEC-3 | SEC-4 | TOTAL |
| 1 | Direct Construction Cost | 825,220 | 191,865 | 65,130 | 230,951 | 199,763 | 687,709 |
| 2 | PPN (10% of 1) | 82,522 | 19,187 | 6,513 | 23,095 | 19,976 | 68,771 |
| 3 | Sub-total of 1 and 2 | 907,742 | 211,052 | 71,643 | 254,046 | 219,739 | 756,480 |
| 4 | Physical Contigency (10% of 3) | 90,774 | 21,105 | 7,164 | 25,405 | 21,974 | 75,648 |
| 5 | Sub-total of 3 and 4 | 998,516 | 232,157 | 78,807 | 279,451 | 241,713 | 832,128 |
| 6 | Land Acquisition | 79,400 | 94,118 | 35,000 | 30,120 | 65,280 | 224,518 |
| 7 | Engineering Services (3% of 3) | 27,232 | 6,332 | 2,149 | 7,621 | 6,592 | 22,694 |
| 8 | Supervisory Services (4% of 3) | 36,310 | 8,442 | 2,866 | 10,162 | 8,790 | 30,259 |
| 9 | Sub-total of 7 and 8 | 63,542 | 14,774 | 5,015 | 17,783 | 15,382 | 52,954 |
| 10 | Total | 1,141,458 | 341,048 | 118,822 | 327,354 | 322,375 | 1,109,599 |

**Table 15.6.2 Comparison of Unit Cost by Other Projects**

| Project Name | No. of Lane | Unit Cost | unit : M.Rp | Remarks |
|---|---|---|---|---|
| | | in Road Length | in Bridge Area | |
| N-S Axis | 4 | 34.8 | 1.95 | with steel structure |
| | 6 | 48.5 | 1.95 | ditto |
| E-W Axis | 10 (total) | 22,400 | 1.41 | |
| | 10 (Sec-1) | 22,100 | 1.41 | |
| | 10 (Sec-2) | 26,100 | 1.41 | |
| | 10 (Sec-3) | 27,300 | 1.41 | |
| | 10 (Sec-4) | 18,000 | 1.41 | |
| Jakarta Outer Ring Road | 6 | 16,500 | 1.00 | concrete structure |
| Northern Extension | 6 | 29,800 | 1.57 | ditto |
| Pasar Pagi F/O | 4 | | 1.24 | PC Box |
| Sudirman F/O | 4 | | 4.96 | PC with ILM method |
| Grogol F/O-2 | 3 | | 1.10 | PC Box |

Note. ILM : Incremental Launching Method

## 15.7 Operation and Maintenance Costs

Operation and maintenance costs were estimated in Chapter 14 and are summarised in the following Table 15.7.1. For the East-West Axis which will operate as an arterial road rather than a toll road, operation costs are not included.

**Table 15.7.1 Annual Operation and Maintenance Costs**

(Rp.million)

| NS-1 | NS-2 | Total NS | EW-1 | EW-2 | EW-3 | EW-4 | Total EW |
|---|---|---|---|---|---|---|---|
| 1,156.9 | 3,687.6 | 4,844.5 | 652.5 | 187.5 | 633.8 | 832.5 | 2306.3 |

The cost of the overlay required after 12 years has been measured separately as described in Section 14.2.1.(1) and is estimated (at 1994 prices) in Table 14.7.2 below.

**Table 15.7.2 Pavement Overlay Cost**

| DESCRIPTION | LENGTH (Km) | TONS OF ASPH.SURF (ton) | UNIT RATE (Rp/ton) | OVERLAY COST (Rp.mill) |
|---|---|---|---|---|
| North-South Axis | | | | |
| Section NS-1 | 4.79 | 1,122 | 95,000 | 106.6 |
| Section NS-2 | 12.84 | 4,060 | 95,000 | 385.7 |
| TOTAL NS | 17.63 | 5,181 | 95,000 | 492.2 |
| East West Axis | | | | |
| Section EW-1 | 8.70 | 52,906 | 95,000 | 5,026.0 |
| Section EW-2 | 2.50 | 6,725 | 95,000 | 638.8 |
| Section EW-3 | 8.45 | 3,937 | 95,000 | 374.0 |
| Section EW-4 | 11.10 | 44,397 | 95,000 | 4,217.7 |
| TOTAL EW | 30.75 | 107,964 | 95,000 | 10,256.6 |

# CHAPTER 16 ECONOMIC AND FINANCIAL ANALYSES

# CHAPTER 16 ECONOMIC AND FINANCIAL ANALYSES

## 16.1 Economic Analysis

The main aim of the economic project analysis is to show the effect of the "Urban Arterial Road System Development Project in Jakarta Metropolitan Area" from the nation's economic well-being viewpoint and to estimate the expected economic internal rate of return of the resources invested. The evaluation is an assessment of the economic viability of the proposed arterial road system.

For the evaluation purpose, the net present value (NPV) and the benefit-cost ratio under certain discount rates are computed, as well the economic internal rate of return (EIRR).

## 16.2 Economic Benefits

Benefits are classified into two types, one is the direct benefit and the other is the indirect or intangible benefit.

1) Direct Benefits

The direct benefits which would be realized from implementation of the Project are defined as the savings in travel costs, composed of vehicle operating cost and vehicle time cost, when comparing the "With" and "Without" Project conditions.

The benefit of vehicle operating costs is estimated as a difference of vehicle operating costs between the "With" Project Case and the "Without" Project Case. The vehicle operating cost is derived from the computed daily vehicle-kilometers for each operating speed and the unit vehicle operating cost for each speed by vehicle type.

The benefit of vehicle time cost is estimated as a difference of vehicle time costs between the "With" Project Case and the "Without" Project Case. The vehicle time cost is derived from the computed daily vehicle-hours and the unit vehicle time cost for each vehicle type.

The promotion of traffic safety and the savings in accident costs are not counted as benefits in this case.

As mentioned above, the savings are calculated as the savings of the whole network to examine the effects of the projects.

The direct benefits are :

1) Vehicle Operation Cost Savings in the whole network, and
2) Vehicle Time Cost Savings in the whole network.

The cases calculated are :

1) When only the North-South Axis is constructed;
2) When only the East-West Axis is constructed;
3) When both the East-West Axis and the North-South Axis are constructed.

The calculations are made for Year 2000 and Year 2010.

For the North-South Axis, the direct benefit to the tollway user is computed in order to examine the toll rate level of the North-South Axis Tollway.

2) Indirect Benefits

There would be many possible intangible benefits of the project, e.g. additional employment, multiprier effects, etc. In this chapter, only the following are to be computed as the indirect benefit for the East-West Axis only.

The realization of the East-West Axis will lead not only better and easier access to the central business district, but it will also induce new or renewal development along the corridor with added values.

These added values will be calculated quantitatively for the indirect benefits.

### 15.2.1 Computation of Direct Benefits

The quantified economic benefits in travel costs are defined as the savings in economic travel costs when comparing the "with" and "without" project situations. Travel costs are divided into vehicle operating cost and time cost.

The "with" project situation is the "with" project traffic assignment in vehicle-kilometers and vehicle-hours on vehicles' travel routes between origin and destination, including the proposed road. The "without" project condition is the traffic assignment on vehicles' travel routes "without" the proposed road.

The total daily economic vehicle operating costs, in both the "with" and "without" conditions, are calculated by taking the daily vehicle-kilometers of the traffic assignment computed under Q-V conditions of road links and multiplying them by the respective unit vehicle operating costs by speed. These daily costs are then converted to total annual costs by multiplying by 320 days.

The economic benefit in operating costs is then taken as the savings in operating costs when comparing the total "with" and "without" project vehicle operating costs.

A similar method is followed in estimating the economic benefits in time costs where the total vehicle-hours are applied directly to the time costs per hour in the "with" and "without" project conditions. After converting from total daily time costs to yearly time costs the costs are netted out to arrive at the savings in time costs.

1. Unit Vehicle Operating Cost

(1) General

The estimation of vehicle operating cost is based on the method used in previous similar studies on toll road projects in Indonesia. All cost components (i.e. unit prices of vehicle, tyre, fuel/oil and etc.) were up-dated according to the latest informations collected in Jakarta for this study.

(2) Representative Vehicles

Since a major factor of vehicle operating costs is the cost and type of vehicles, it is necessary to establish representative vehicles for the vehicle categories.

The vehicle categories (vehicles with over 4-wheels) are assumed to be passenger car, pick-up, bus and truck, which respectively consist of sedan, and van; pick-up; minibus (public), medium bus and large bus; and small truck, medium truck and large truck.

The representative vehicles for each category are summarized below.

| | | |
|---|---|---|
| 1) Passenger Car | : | Toyota Corolla 1300 C.C. |
| 2) Pick-up | : | Toyota Kijang |
| 3) Bus | : | (Minibus) Toyota Kijang Minibus |
| | | (Medium bus) Mitsubishi Colt FE 114 |
| | | (Large bus) Mercedes Benz OH 308 |
| 4) Truck | : | (Small Truck) Mitsubishi Colt FE 114 |
| | | (Large Truck) Mitsubishi Fuso FM 517H |
| | | (3 Axles or more) Mitsubishi Fuso FN 517 KRM |

(3) Unit Prices of Operating Cost Components

The financial and economic unit prices of the major cost components were calculated with 1994 prices collected in Jakarta for this study. The tax and duties structures utilized in estimating the economic unit prices incorporate the factor of luxury taxes. The details are shown in the Appendix.

1) Vehicles

The current 1994 market prices for vehicles were obtained through interview surveys with the major car distributors/dealers in Jakarta.

In Indonesia, a 100% import duty on the CIF (cost, insurance and freight) value of CKD (complete knocked down) parts is imposed on passenger car, while not applied for commercial vehicles.

After adjusting for transfer payments such as the PPN tax and value added tax (VAT), the tax ratios on the market prices of vehicle on roads were estimated at 56% and 23% for passenger car and commercial vehicles respectively.

2) Tyres

The market prices of tyres for the various vehicle types were up-dated to 1994 prices and a total tax ratio was assumed at 19.4% of the actual market sales prices for determining the economic unit prices.

3) Fuels

For this economic analysis, it is assumed that a fuel subsidy is not applied for the gasoline and diesel fuels. Therefore, by adjusting for a 10% value added tax, the economic prices of gasoline and diesel fuel were obtained.

4) Wage Rates

The 1991 wage rates of transport workers, i.e. drivers, assistant drivers, conductors and mechanics in Jakarta were obtained from the Central Bureau of Statistic (Upah Buruh Menurut Jenis Pekerjaan). The estimated annual average growth rate of consumer price index in Jakarta for the period 1991 to 1994 (about 7% per annum) was adopted to estimate the wage rates in 1994. Considering the wage levels of transport workers, their wages are assumed not to be subject to any income taxes. Therefore, the economic values are estimated to be equivalent to their market wage rates

5) Interest Costs

A rate of 15% per annum was used. The interest costs in relation to speed were calculated from the annual running speed.

6) Insurance Costs

The average insurance premiums from the previous study and other studies were reviewed and incorporated into this analysis as below:

| | | |
|---|---|---|
| Passenger Car and Pick-up | : | 3.5% of vehicle price |
| Bus | : | 4.0% of vehicle price |
| Truck | : | 6.0% of vehicle price |

The average insured vehicle rate was assumed at 50%, and insurance costs were equated in consideration of the annual running distance by speed.

7) Wages Costs of Crew and Overhead Costs

The average crew size by vehicle type was obtained from field survey result, and their wage costs were derived from their traveling hours equated by average running speed. The overhead costs of commercial vehicles were assumed at 10% of the total of other cost items.

8) Cost Equation of Vehicle Operation Costs

The various operating elements discussed above were individually expressed in terms of a vehicle average running speed, in order that costs at different speeds on a level tangent road could be derived. The equation with a speed variable used in this study are based on those applied in previous similar studies in Indonesia. The equation for vehicle operating costs are shown in the Appendix.

(4) Unit Vehicle Operating Cost by Vehicle Type

Based on the cost components and the equations of vehicle operating cost, unit vehicle operating costs by speed, by vehicle type in terms of financial and economic prices were calculated. Table 16.2.2 shows the unit vehicle operating costs in both financial and economic prices.

The above unit vehicle operating costs were calculated for the eight representative vehicle types described earlier. The costs were then combined into the four vehicle categories based upon the vehicle composition rate shown in Table 16.2.1.

**Table 16.2.1 Vehicle Composition Rate**

| Vehicle Category | Vehicle Type | Composition Rate (%) |
|---|---|---|
| Passenger Car | Sedan | 86.4 |
| | Van | 13.6 |
| Pick-up | Pick-up | 100.0 |
| Bus | Minibus | 32.1 |
| | Medium Bus | 36.6 |
| | Large Bus | 31.3 |
| Truck | Small/Medium Truck | 84.2 |
| | Large Truck | 15.8 |

Source : Based on the traffic survey results at the several selected locations conducted by the Study Team in June 1993.

As a result, the weighted average of the unit vehicle operating costs by speed, by vehicle category in financial and economic prices were obtained as shown in Table 16.2.3.

**Table 16.2.2 1994 Unit Vehicle Operating Costs**

Financial Vehicle Operating Costs (Rp./Km)

| | Passenger Car | | Pick-up | B us | | | Truck | |
|---|---|---|---|---|---|---|---|---|
| Speed (Km/ Hour) | Sedan | Van | | Minibus | Medium Bus | Large Bus | Small/ Medium Truck | Large Truck |
| 10 | 1,667 | 838 | 641 | 655 | 858 | 1,567 | 1,064 | 1,728 |
| 15 | 1,253 | 639 | 492 | 529 | 697 | 1,293 | 843 | 1,375 |
| 20 | 1,033 | 531 | 410 | 457 | 615 | 1,156 | 730 | 1,194 |
| 25 | 893 | 461 | 356 | 410 | 567 | 1,075 | 662 | 1,085 |
| 30 | 794 | 412 | 318 | 376 | 536 | 1,026 | 617 | 1,015 |
| 35 | 720 | 375 | 289 | 351 | 517 | 996 | 587 | 969 |
| 40 | 663 | 346 | 267 | 333 | 505 | 980 | 567 | 939 |
| 45 | 618 | 324 | 250 | 320 | 499 | 974 | 554 | 922 |
| 50 | 582 | 307 | 237 | 312 | 498 | 977 | 548 | 914 |
| 55 | 553 | 294 | 227 | 308 | 501 | 987 | 545 | 914 |
| 60 | 530 | 284 | 220 | 309 | 507 | 1,002 | 547 | 920 |
| 65 | 512 | 278 | 216 | 312 | 516 | 1,023 | 552 | 933 |
| 70 | 498 | 274 | 213 | 319 | 527 | 1,049 | 560 | 950 |
| 75 | 488 | 272 | 214 | 330 | 541 | 1,079 | 571 | 972 |
| 80 | 481 | 273 | 216 | 344 | 558 | 1,114 | 584 | 999 |
| 85 | 477 | 276 | 220 | 360 | 576 | 1,152 | 600 | 1,029 |
| 90 | 475 | 281 | 225 | 380 | 597 | 1,195 | 618 | 1,064 |
| 95 | 477 | 288 | 233 | 403 | 620 | 1,241 | 638 | 1,102 |
| 100 | 480 | 296 | 242 | 429 | 645 | 1,291 | 660 | 1,144 |

Economic Vehicle Operating Costs (Rp./Km)

| Speed (Km/ Hour) | Passenger Car | | Pick-up | B us | | | Truck | |
|---|---|---|---|---|---|---|---|---|
| | Sedan | Van | | Minibus | Medium Bus | Large Bus | Small/ Medium Truck | Large Truck |
| 10 | 782 | 660 | 508 | 583 | 735 | 1,307 | 894 | 1,440 |
| 15 | 595 | 505 | 391 | 467 | 590 | 1,070 | 704 | 1,138 |
| 20 | 494 | 420 | 327 | 401 | 516 | 949 | 606 | 983 |
| 25 | 429 | 365 | 284 | 356 | 472 | 878 | 546 | 889 |
| 30 | 383 | 326 | 254 | 325 | 444 | 833 | 507 | 828 |
| 35 | 348 | 297 | 231 | 302 | 426 | 806 | 481 | 788 |
| 40 | 321 | 274 | 213 | 284 | 414 | 790 | 463 | 761 |
| 45 | 300 | 257 | 199 | 272 | 408 | 783 | 452 | 745 |
| 50 | 284 | 243 | 189 | 264 | 405 | 783 | 445 | 738 |
| 55 | 272 | 233 | 181 | 260 | 406 | 790 | 442 | 736 |
| 60 | 262 | 226 | 176 | 260 | 410 | 801 | 443 | 741 |
| 65 | 256 | 221 | 173 | 262 | 417 | 818 | 447 | 751 |
| 70 | 252 | 218 | 172 | 268 | 426 | 838 | 453 | 765 |
| 75 | 250 | 218 | 173 | 277 | 437 | 863 | 462 | 783 |
| 80 | 251 | 219 | 175 | 289 | 450 | 891 | 473 | 805 |
| 85 | 253 | 223 | 179 | 303 | 466 | 923 | 486 | 831 |
| 90 | 257 | 228 | 185 | 320 | 483 | 958 | 501 | 860 |
| 95 | 263 | 234 | 192 | 341 | 502 | 997 | 518 | 892 |
| 100 | 271 | 243 | 201 | 363 | 522 | 1,038 | 537 | 927 |

**Table 16.2.3 1994 Composite Unit Vehicle Operating Costs**

Financial Vehicle Operating Costs (Rp./Km)

| Speed (Km/ Hour | Passenger Car | Pick-up | B u s | Truck |
|---|---|---|---|---|
| 10 | 1,554 | 641 | 1,015 | 1,169 |
| 15 | 1,169 | 492 | 830 | 927 |
| 20 | 965 | 410 | 734 | 803 |
| 25 | 834 | 356 | 676 | 729 |
| 30 | 742 | 318 | 638 | 680 |
| 35 | 673 | 289 | 614 | 647 |
| 40 | 620 | 267 | 598 | 626 |
| 45 | 578 | 250 | 590 | 612 |
| 50 | 545 | 237 | 588 | 606 |
| 55 | 518 | 227 | 591 | 603 |
| 60 | 497 | 220 | 598 | 606 |
| 65 | 480 | 216 | 609 | 612 |
| 70 | 468 | 213 | 624 | 622 |
| 75 | 459 | 214 | 642 | 634 |
| 80 | 453 | 216 | 663 | 650 |
| 85 | 450 | 220 | 687 | 668 |
| 90 | 449 | 225 | 715 | 688 |
| 95 | 451 | 233 | 745 | 711 |
| 100 | 455 | 242 | 778 | 736 |

Economic Vehicle Operating Costs (Rp./Km)

| Speed (Km/ Hour | Passenger Car | Pick-up | B u s | Truck |
|---|---|---|---|---|
| 10 | 765 | 508 | 865 | 980 |
| 15 | 583 | 391 | 701 | 773 |
| 20 | 484 | 327 | 615 | 666 |
| 25 | 420 | 284 | 562 | 600 |
| 30 | 375 | 254 | 528 | 558 |
| 35 | 341 | 231 | 505 | 530 |
| 40 | 315 | 213 | 490 | 510 |
| 45 | 294 | 199 | 482 | 498 |
| 50 | 278 | 189 | 478 | 491 |
| 55 | 267 | 181 | 479 | 488 |
| 60 | 257 | 176 | 484 | 490 |
| 65 | 251 | 173 | 493 | 495 |
| 70 | 247 | 172 | 504 | 502 |
| 75 | 246 | 173 | 519 | 513 |
| 80 | 247 | 175 | 536 | 525 |
| 85 | 249 | 179 | 557 | 541 |
| 90 | 253 | 185 | 579 | 558 |
| 95 | 259 | 192 | 605 | 577 |
| 100 | 267 | 201 | 632 | 599 |

2. Unit Vehicle Time Cost

(1) General

The estimation method of unit vehicle time cost of passenger car and bus applied for this study is based on an income approach. The unit vehicle time cost of pick-up and truck is estimated based on the time cost of commodities loaded and crews.

(2) Time Value of Passenger Car

For passenger car, an income approach to estimate car owner's time value was adopted.

According to the study results of "Jabotabek Metropolitan Development Plan Review (JMDPR), Third Planning Report, July 1993 (Draft)", Table 16.2.4 shows the estimated distribution of existing household income in DKI Jakarta in 1993.

**Table 16.2.4 Estimated Household Income Distribution in Jakarta in 1993**

| Household Income Group (in 1993 Rupiah) | Decile Group | Average Household Income Per Month (Rp.1,000) in 1993 | Percent of Total Household Income | Cumulative Percent | |
|---|---|---|---|---|---|
| | | | | Household | Income |
| 0-170,000 | 1st & Lowest | 140 | 2.3% | 10.0% | 2.3% |
| 170,001-224,000 | 2nd | 185 | 3.1% | 20.0% | 5.4% |
| 224,001-272,000 | 3rd | 230 | 3.8% | 30.0% | 9.2% |
| 272,001-327,000 | 4th | 290 | 4.8% | 40.0% | 14.0% |
| 327,001-388,000 | 5th | 340 | 5.7% | 50.0% | 19.7% |
| 388,001-442,000 | 6th | 400 | 6.7% | 60.0% | 26.4% |
| 442,001-544,000 | 7th | 500 | 8.3% | 70.0% | 34.7% |
| 544,001-697,000 | 8th | 640 | 10.7% | 80.0% | 45.4% |
| 697,001-986,000 | 9th | 930 | 15.5% | 90.0% | 60.9% |
| Over 986,000 | 10th & Highest | 2,350 | 39.1% | 100.0% | 100.0% |
| | | | 100.0% | | |

Source : Jabotabek Metropolitan Development Plan Review (JMDPR), Third Planning Report, July 1993, (Draft)

On the other hand, according to the statistical data of the 1990 population census in DKI Jakarta (Penduduk DKI Jakarta, Hasil Sensus Penduduk 1990, Central Bureau of Statistics) the ownership ratio of "car and motorboat" by household in DKI Jakarta in 1990 is represented to be about 14%. It can be estimated that the present ownership ratio by household in 1993 is higher than the level of 14%.

Considering the above it is assumed that the household group of "car ownership" corresponds to the household group of the high-ranking two decile groups in the income distribution in DKI Jakarta. Consequently, the time value of passenger car is assumed to be equivalent to the average income of two decile groups of "9th" and "10th". Assuming the working hours per month to be 170 hours, the time value of passenger car in terms of household is estimated to be Rp.9,647 per hour. The trip purpose composition for passenger car is given by the results of traffic O/D survey conducted in the Arterial Road System Development Study in Jakarta Metropolitan Area in 1987. The coefficient factors for time value in the trip purposes are assumed 100% for "business" (14.7%) and "work" (24.1%) and 0% for other purposes. The effective number of person related to "business and work" per household is assumed to be 1.5. The average number of passenger for passenger car is assumed to be 2.5. As a result, the unit time value for passenger car is estimated to be Rp.6,238 per hour in 1993 financial price.

According to the statistical data of the recent trend of the consumer price index of DKI Jakarta, the estimated inflation rate during 1993-1994 (Jan.-July) is 7.08%, and the average annual growth rate during 1990-1994 is estimated to be 7.59%. Therefore, the escalation factor during 1993-1994 to be applied for adjustment of 1993 price is roughly assumed to be 7%.

Thus, the 1994 financial price of unit time value for passenger car is estimated to be Rp.6,675 per hour. The economic price unit time value for passenger car is estimated to be Rp.5,006 per hour, by assuming a conversion factor of 0.75 considering the component of taxes.

(3) Time Value of Bus

For bus, an income approach to estimated non-car owners was adopted.

The estimation of unit vehicle time cost of bus were made according to the following process :

1) The 1994 per capita GRDP (gross regional domestic product) at current price in DKI Jakarta is estimated approximately to be Rp.4,651,200.
2) Assuming the annual working hours to be 2,040 hours (170 hours per month x 12), the per capita GRDP for one hour is estimated as Rp.2,280.
3) The trip purpose composition for bus is given by the results of traffic O/D survey in the Arterial Road System Development Study in Jakarta Metropolitan Area in 1987. The coefficient factors for time value in the trip purposes are assumed 100% for "business" and " work" and 0% for other purposes.
4) The average number of bus passengers is estimated based on the traffic count survey results by the Study Team in June 1993.
5) As a result, the unit time value for bus is estimated to be Rp.15,580 per hour in 1994 financial price. The 1994 economic price of the unit time value is estimated to be Rp.14,022, by assuming a conversion factor of 0.90 considering the component of taxes.

The estimation process is given in Appendix.

(4) Time Value of Pick-up and Truck

The unit vehicle time cost of pick-up and truck comprise the component of the time cost of commodities loaded and the time cost of crews.

1) Time cost of commodities loaded

The hourly time cost of commodities loaded is estimated as below:

Average weighted price of commodities loaded
x Average weight of commodities loaded
x Interest rate per hour (Interest rate per annum/(365x7) )

Average weighted price of commodities loaded per ton was estimated based on the study results of the 1990/1991 Indonesia National O/D Survey. According to the survey results, the information of composition rate of commodities by type of commodity group and by type of vehicle type of "pick-up, small and medium truck" and "large truck" were obtained. The 1994 wholesale prices for each commodity group in the area of DKI Jakarta/West Java province are estimated based on the statistical data (Statistik Harga Perdagangan Besar, Oct. 1993) applying the estimated growth factor, and the weighted average price of commodity per ton were estimated to be Rp.2,890,000 and Rp.2,503,000 for "pick-up and small/medium truck" and "large truck" respectively.

The average weight of commodities loaded were also obtained from the results of this survey. (0.76 ton and 5.32 ton for "pick-up and small/medium truck" and "large truck" respectively. The interest rate is assumed to be 18% per annum.

As a result, hourly costs of commodity loaded were estimated to be Rp.154 and Rp.938 per hour for "pick-up and small/medium truck" and "large truck" respectively.

2) Time costs of crew

The unit personnel costs per hour were estimated based on the statistical data of wage rates of transport workers. The number of crew are assumed as shown in Table 16.2.5.

As a result, the 1994 economic unit time costs of truck vehicles were estimated to be Rp.1,328 and Rp.2,462 per hour for pick-up and truck respectively, by applying the vehicle composition rate of small/medium/ large trucks. (See Table 16.2.5)

**Table 16.2.5 Estimation of Time Cost of Truck Vehicle**

| | | Pick-up | Small/ Medium Truck | Large Truck | Average of Truck |
|---|---|---|---|---|---|
| (a) | Commodity Price (Rp./hour) | 154 | 154 | 938 | |
| (b) | Crew Cost (Assumed Number of Crew) | | | | |
| | (Driver) | 1 | 1 | 1 | |
| | (Assistant) | 0 | 1 | 2 | |
| | (Unit Cost (Rp./hour) ) | | | | |
| | (Driver) | 1,322 | 1,322 | 1,322 | |
| | (Assistant) | 980 | 980 | 980 | |
| | (Crew Cost (Rp./hour) ) | | | | |
| | (Driver) | 1,322 | 1,322 | 1,322 | |
| | (Assistant) | 0 | 980 | 1,960 | |
| | (Total) | 1,322 | 2,302 | 3,282 | |
| (c) | Total | 1,476 | 2,456 | 4,220 | |
| (d) | Vehicle Composition Rate | 100.0% | 84.2% | 15.8% | 100.0% |
| (e) | Weighted Average (Rp./hour) (Financial Price) | 1,476 | 2,068 | 667 | 2,735 |
| (f) | Weighted Average (Rp./hour) (Economic Price) Factor = 0.9 | 1,328 | | | 2,462 |

Note : Vehicle composition rate is based on the traffic survey results by the Study Team in June 1993.

The results on the vehicle time costs are summarized in the following Table 16.2.6.

**Table 16.2.6 Vehicle Time Cost in 1994 Price by Vehicle Category**

(Rp./Veh-Hr.)

| | Financial Price | Economic Price |
|---|---|---|
| Passenger Car | 6,675 | 5,006 |
| Pick-up | 1,476 | 1,328 |
| Truck | 2,735 | 2,462 |
| B u s | 15,580 | 14,022 |

3. Computation of Direct Benefits

(1) Vehicle operating costs and their savings by case

As results of traffic assignment simulation, vehicle-kilometers by road categories and by average travel speed are computed for each vehicle categories.

The vehicle operating costs by vehicle category of the whole network by case for years 2000 and 2010 in the economic cost are shown in Table 16.2.7.

The annual savings of vehicle operating costs are computed as shown in Table 16.2.8.

**Table 16.2.7 Annual Vehicle Operating Costs of the Network in Economic Costs**

(Million Rp./Year)

| | Passenger Car | Pick-up | Truck | Bus | Total |
|---|---|---|---|---|---|
| 1) Without Case | | | | | |
| Year 2000 | 9,200,960 | 837,820 | 373,570 | 1,700,830 | 12,113,180 |
| Year 2010 | 14,723,390 | 1,345,220 | 828,260 | 2,884,030 | 19,780,900 |
| 2) North-South Axis only | | | | | |
| Year 2000 | 9,097,580 | 831,170 | 370,450 | 1,699,620 | 11,998,820 |
| Year 2010 | 14,568,380 | 1,331,300 | 819,710 | 2,869,890 | 19,589,280 |
| 3) East-West Axis only | | | | | |
| Year 2000 | 9,069,380 | 825,060 | 370,360 | 1,715,340 | 11,980,140 |
| Year 2010 | 14,474,020 | 1,322,750 | 804,800 | 2,868,960 | 19,470,530 |
| 4) North-South Axis and East-West Axis | | | | | |
| Year 2000 | 8,997,570 | 820,030 | 393,790 | 1,709,150 | 11,920,540 |
| Year 2010 | 14,445,920 | 1,320,160 | 803,260 | 2,866,370 | 19,435,710 |

**Table 16.2.8 Annual Economic Vehicle Operating Costs Saving in 1994 Prices**

(Million Rp.)

| | Year 2000 | Year 2010 |
|---|---|---|
| 1) North-South Axis only | 114,360 | 191,620 |
| 2) East-West Axis only | 133,040 | 310,370 |
| 3) North-South Axis and East-West Axis | 192,640 | 345,190 |

(2) Vehicle-hours by case and their savings.

As with vehicle-kilometers, vehicle-hours by vehicle categories are computed by case as shown in Table 16.2.9, and the daily savings are shown in Table 16.2.10..

The annual savings of vehicle time cost are computed as shown in Table 16.2.11.

**Table 16.2.9 Daily Vehicle Hours of the Network by Vehicle Category**

(Veh-Hours/Day)

| | Passenger Car | Pick-up | Truck | Bus | Total |
|---|---|---|---|---|---|
| 1) Without Case : | | | | | |
| Year 2000 | 8,127,715 | 1,108,325 | 153,573 | 1,131,268 | 10,520,881 |
| Year 2010 | 10,606,355 | 1,446,321 | 186,726 | 1,497,497 | 13,736,899 |
| 2) North-South Axis only | | | | | |
| Year 2000 | 8,013,459 | 1,098,390 | 150,032 | 1,113,555 | 10,375,436 |
| Year 2010 | 10,521,384 | 1,434,734 | 181,016 | 1,483,769 | 13,620,904 |
| 3) East-West Axis only | | | | | |
| Year 2000 | 7,851,544 | 1,059,589 | 147,671 | 1,090,515 | 10,149,319 |
| Year 2010 | 10,335,555 | 1,409,394 | 176,809 | 1,463,550 | 13,385,308 |
| 4) North-South Axis and East-West Axis | | | | | |
| Year 2000 | 7,746,863 | 1,056,390 | 146,195 | 1,086,960 | 10,036,408 |
| Year 2010 | 10,313,610 | 1,406,401 | 174,370 | 1,462,027 | 13,356,408 |

**Table 16.2.10 Daily Vehicle Hours Savings**

| | N-S only | E-W only | N/S and E/W |
|---|---|---|---|
| Year 2000 | | | |
| Passenger Car | 114,256 | 276,171 | 380,852 |
| Pick-up | 9,935 | 48,736 | 51,935 |
| Truck | 3,541 | 5,902 | 7,378 |
| Bus | 17,713 | 40,753 | 44,308 |
| TOTAL | 145,445 | 371,562 | 484,473 |
| Year 2010 | | | |
| Passenger Car | 88,832 | 261,569 | 292,745 |
| Pick-up | 7,725 | 46,159 | 39,920 |
| Truck | 5,710 | 9,917 | 12,356 |
| Bus | 13,727 | 33,947 | 35,470 |
| TOTAL | 115,994 | 351,592 | 380,491 |

**Table 16.2.11 Annual Economic Vehicle Time Cost Saving**

| Cases | Vehicle-Hours Saving (Million Hours) | | Time Cost Saving (Billion Rp.) | |
|---|---|---|---|---|
| | Year 2000 | Year 2010 | Year 2000 | Year 2010 |
| 1) North-South Axis only | 46.5 | 37.1 | 268.9 | 227.2 |
| 2) East-West Axis only | 118.9 | 112.5 | 649.6 | 643.7 |
| 3) North-South Axis and East-West Axis | 155.0 | 121.8 | 835.5 | 703.7 |

(3) Direct benefit by case

By the above mentioned process, the direct benefits by case and by year of the project are shown in Table 16.2.12.

**Table 16.2.12 Annual Economic Benefit in 1994 Prices**

(Billion Rp.)

| Case/Year | VOC Saving | Time Cost Saving | Total |
|---|---|---|---|
| 1) North-South Axis only | | | |
| Year 2000 | 114.4 | 268.9 | 383.3 |
| Year 2010 | 191.3 | 227.2 | 418.5 |
| 2) East-West Axis only | | | |
| Year 2000 | 133.0 | 649.6 | 782.6 |
| Year 2010 | 310.4 | 563.7 | 954.1 |
| 3) East-West Axis and North-South Axis | | | |
| Year 2000 | 192.7 | 835.5 | 1,028.2 |
| Year 2010 | 345.2 | 703.7 | 1,048.9 |

(4) Direct Benefits of the North-South Axis Tollway User

Limited to users of the tollway, the savings of the vehicle operating costs and the vehicle time costs from the 'without the tollway' case are calculated as the users' benefits.

The results for Year 2000 and for Year 2010 are as follows :

**Table 16.2.13 Tollway User's Benefit in 1994 Prices**

(Rp./PCU-Trip)

| | VOC Saving | Time Cost Saving | Total |
|---|---|---|---|
| Year 2000 | | | |
| Financial | 4,851 | 2,043 | 6,894 |
| Economic | 2,035 | 1,532 | 3,567 |
| Year 2010 | | | |
| Financial | 4,974 | 2,094 | 7,068 |
| Economic | 2,232 | 1,571 | 3,803 |

16.2.2 Computation of Indirect Benefits of East-West Axis

This kind of high standard arterial road realization would impact the direct area of influence or the corridor, with rapid changes in land use toward higher potential use or higher productivity in the land use.

Examining the corridor development, the following points are considered important. The changes in development along the East-West Axis, when compared with the whole development of the Jakarta Metropolitan area, are expected to :

1) Speed-up the expected change of landuse,

2) Induce and complement development in the whole area, and

3) Have the role of promoting balanced development, as opposed to one-core development.

For the computation of this added value development, the detail and precise forecast of landuse change or floor area increase by sector are rather complicated and difficult.

So, by analyzing the relation between the land price and its productivities, rough forecast of land prices in the future are made, followed by productivity estimates.
The results are shown in the following Table 16.2.14.

The details are shown in the Appendix.

**Table 16.2.14 Calculated Annual Indirect Benefit by Section of East-west Axis**

(Rp. Million)

| Year | Sec. 1 | Sec. 2 | Sec. 3 | Sec. 4 | Total |
|---|---|---|---|---|---|
| 2000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2001 | 26,190.0 | 0.0 | 0.0 | 0.0 | 26,190.0 |
| 2002 | 52,380.0 | 0.0 | 5,175.0 | 0.0 | 57,555.0 |
| 2003 | 87,300.0 | 0.0 | 10,350.0 | 14,231.3 | 111,881.3 |
| 2004 | 87,300.0 | 0.0 | 17,250.0 | 28,462.5 | 133,012.5 |
| 2005 | 87,300.0 | 21,960.0 | 17,250.0 | 47,437.5 | 173,947.5 |
| 2006 | 87,300.0 | 43,920.0 | 17,250.0 | 47,437.5 | 195,907.5 |
| 2007 | 87,300.0 | 73,200.0 | 17,250.0 | 47,437.5 | 225,187.5 |
| 2008 | 87,300.0 | 73,200.0 | 17,250.0 | 47,437.5 | 225,187.5 |
| 2009 | 87,300.0 | 73,200.0 | 17,250.0 | 47,437.5 | 225,187.5 |
| 2010 | 87,300.0 | 73,200.0 | 17,250.0 | 47,437.5 | 225,187.5 |

## 16.3 Economic Evaluation of the Project

### 16.3.1 Project Costs

1. Economic Investment Cost

The initial investment costs for engineering services, construction and land acquisition costs of the project North-South Axis Tollway and East-West Axis are estimated in constant 1994 prices as follows (details are in Chapter 15).

**Table 16.3.1 Initial Investment Costs in 1994 Prices**

(Billion Rp.)

| | Financial Costs | Economic Costs |
|---|---|---|
| N-S Axis (including toll facilities) | 1,141.5 | 828.0 |
| E-W Axis (4 Sections) | 1,109.6 | 800.9 |
| Total | 2,251.1 | 1,628.9 |

The economic cost for economic analysis are obtained by subtracting the portion of transfer payment such as taxes and duties from financial costs. The financial and economic investment costs (initial investment) are summarized in Table 16.3.1. The implementation schedule was discussed in Chapter 13. The economic investment costs in constant 1994 prices are phased according to the implementation schedule as shown in Fig. 13.1, and the annually allocated costs are shown in Table 16.3.2.

**Table 16.3.2 Initial Investment Costs by Year in 1994 Prices**

(Million Rp.)

| Year | Financial Costs | | | Economic Costs | | |
|---|---|---|---|---|---|---|
| | N-S Axis | E-W Axis | Total | N-S Axis | E-W Axis | Total |
| 1995 | 13,600 | - | 13,600 | 9,891 | - | 9,891 |
| 1996 | 66,532 | 6,932 | 135,553 | 46,944 | 5,042 | 51,986 |
| 1997 | 233,500 | 69,021 | 302,521 | 169,095 | 48,506 | 217,601 |
| 1998 | 310,500 | 65,538 | 376,038 | 225,818 | 45,967 | 271,785 |
| 1999 | 310,500 | 272,092 | 582,592 | 225,818 | 196,996 | 422,814 |
| 2000 | 206,826 | 270,279 | 477,105 | 150,419 | 195,675 | 346,094 |
| 2001 | | 201,362 | 201,362 | | 145,968 | 145,968 |
| 2002 | | 142,703 | 142,703 | | 103,307 | 103,307 |
| 2003 | | 49,000 | 49,000 | | 35,636 | 35,636 |
| 2004 | | 32,673 | 32,673 | | 23,762 | 23,762 |
| Total | 1,141,458 | 1,109,600 | 2,251,058 | 827,985 | 800,859 | 1,628,844 |

The annual operation and maintenance costs are shown in Table 16.3.3.

**Table 16.3.3 Annual Operation and Maintenance Costs By Year in 1994 Prices**

(Million Rp.)

| Year | Financial Costs | | | Economic Costs | | |
|---|---|---|---|---|---|---|
| | N-S Axis | E-W Axis | Total | N-S Axis | E-W Axis | Total |
| 2000 | 2,422 | - | 2,422 | 1,768 | - | 1,768 |
| 2001 | 4,845 | 969 | 5,814 | 3,537 | 707 | 4,244 |
| 2002 | 4,845 | 1,283 | 6,128 | 3,537 | 936 | 4,473 |
| 2003 | 4,845 | 2,116 | 6,961 | 3,537 | 1,545 | 5,082 |
| 2004 | 4,845 | 2,116 | 6,961 | 3,537 | 1,545 | 5,082 |
| 2005 | 4,845 | 2,306 | 7,151 | 3,537 | 1,683 | 5,220 |
| 2006 | 4,845 | 2,306 | 7,151 | 3,537 | 1,683 | 5,220 |
| 2007 | 4,845 | 2,306 | 7,151 | 3,537 | 1,683 | 5,220 |
| 2008 | 4,845 | 2,306 | 7,151 | 3,537 | 1,683 | 5,220 |
| 2009 | 4,845 | 2,306 | 7,151 | 3,537 | 1,683 | 5,220 |
| 2010 | 4,845 | 2,306 | 7,151 | 3,537 | 1,683 | 5,220 |
| 2011 | 4,845 | 2,306 | 7,151 | 3,537 | 1,683 | 5,220 |
| 2012 | 5,337 | 2,306 | 7,643 | 3,896 | 1,683 | 5,579 |
| 2013 | 4,845 | 7,142 | 11,987 | 3,537 | 5,214 | 8,751 |
| 2014 | 4,845 | 2,490 | 7,335 | 3,537 | 1,818 | 5,355 |
| 2015 | 4,845 | 6,334 | 11,179 | 3,537 | 4,624 | 8,161 |
| 2016 | 4,845 | 2,306 | 7,151 | 3,537 | 1,683 | 5,220 |
| 2017 | 4,845 | 2,755 | 7,600 | 3,537 | 2,011 | 5,548 |
| 2018 | 4,845 | 2,306 | 7,151 | 3,537 | 1,683 | 5,220 |

16.3.2 Economic Evaluation of the Projects

1) Project Costs in Economic Costs

For the economic evaluation purpose; the initial investment costs (project costs) and the maintenance and operation costs are computed into the economic costs.

Those results of the 1994 present value of economic project costs with the discount rates of 12% p.a. and 15% p.a. are shown in the following Table.

**Table 16.3.4 Year 1994 Present Value of Economic Project Costs**

(Million Rp.)

| | | Discount Rate | |
|---|---|---|---|
| | | 12% P.A. | 15% P.A. |
| 1. | North-South Axis | | |
| | 1) Initial Investment Costs | 459,345 | 401,473 |
| | 2) Maintenance & Operation costs | 13,343 | 9,265 |
| | Total | 472,688 | 410,738 |
| 2. | East-West Axis | | |
| | 1) Initial Investment Costs | 363,328 | 303,630 |
| | 2) Maintenance & Operation costs | 6,003 | 3,920 |
| | Total | 369,331 | 307,550 |
| 3. | TOTAL (N-S Axis and E-W Axis) | | |
| | 1) Initial Investment Costs | 822,674 | 705,103 |
| | 2) Maintenance & Operation costs | 19,679 | 13,320 |
| | Total | 842,352 | 718,424 |

2) Economic Evaluation

The opportunity cost of capital is the return on investments foregone elsewhere by committing capital on the project under consideration. To determine the benefit cost ratio of a project it is necessary to choose a rate for discounting the costs and benefits of the project. Unfortunately, there is no universal agreement, in principle, concerning the rate to choose. The theoretical discussions and debates on this issue will continue. However, in practice, the discount rate is usually a policy variable, that is, it is set by the government. In Indonesia, it is standard practice to use a range of rates, most commonly on large infrastructure projects, 12% and 15%. For other projects, such as public work housing developments, a rate of 10% may be

used. The selected rate(s) is commonly decided in discussions with the appropriate government officials

For the project appraisal, the Government of Indonesia has been utilizing a 1.50 benefit-cost ratio at a 12% p.a. discount rate as the preliminary checking rate against project proposals for in Java. As the project roads of the North-South Axis and East-West Axis are proposed in DKI Jakarta, the discount rate of 15% p.a. is applied for this projects evaluation.

The benefit-cost ratio (B/C), the net present value (NPV) and the economic internal rate of return (EIRR) are computed for 25 years of project life span by cash-flow methodology.

The results are shown in Table 16.3.5

**Table 16.3.5 Evaluation Results at Discount Rate of 15% P.A.**

| | North-South Axis only | East-West Axis only | N-S Axis and E-W Axis |
|---|---|---|---|
| B/C ratio | 2.5 | 4.3 | 3.4 |
| Net Present Value (NPV) (Billion Rp) | 627.6 | 1,022.7 | 1,692.2 |
| Economic Internal Rate of Return (EIRR) | 31.9% | 33.2% | 40.2% |

The results of sensitivity analysis are shown in Table 16.3.6.

**Table 16.3.6 Results of Sensitivity Analysis**

| | Base Case | Costs +20% | Benefits -20% | Costs +20% and Benefits -20% | Costs -20% | Benefits +20% | Costs -20% and Benefits +20% |
|---|---|---|---|---|---|---|---|
| **North-South Axis** | | | | | | | |
| B/C Ratio | 2.5 | 2.1 | 2.0 | 1.7 | 3.2 | 3.0 | 3.8 |
| Net Present Value (15%) Billion Rupiah | 627.6 | 545.4 | 419.9 | 337.8 | 709.8 | 835.3 | 917.4 |
| Economic Internal Rate of Return (%) | 31.9% | 27.8% | 27.0% | 23.4% | 37.3% | 36.3% | 42.3% |
| **East-West Axis** | | | | | | | |
| B/C Ratio | 4.3 | 3.6 | 3.5 | 2.9 | 5.4 | 5.2 | 6.5 |
| Net Present Value (15%) Billion Rupiah | 1,022.7 | 961.2 | 756.7 | 695.1 | 1,084.2 | 1,288.8 | 1,350.3 |
| Economic Internal Rate of Return (%) | 33.2% | 30.5% | 29.9% | 27.4% | 36.7% | 36.0% | 39.6% |
| **North-South Axis and East-West Axis** | | | | | | | |
| B/C Ratio | 3.4 | 2.8 | 2.7 | 2.2 | 4.2 | 4.0 | 5.0 |
| Net Present Value (15%) Billion Rupiah | 1,692.3 | 1,548.6 | 1,210.2 | 1,066.5 | 1,836.0 | 2,174.5 | 2,318.2 |
| Economic Internal Rate of Return (%) | 40.2% | 35.2% | 34.1% | 29.7% | 47.0% | 45.7% | 53.2% |

## 16.4 Financial Evaluation of the North-South Axis Tollway

### 16.4.1 General

The main objective of the financial project analysis is to evaluate the financial viability of the implementation of the construction and operation of the North-South Axis Tollway.

This analysis was performed based on the estimations of revenue and construction and operation/maintenance costs. Additionally, financial conditions of required funds were examined and assumed.

Based on the said estimations and assumptions, the profit/loss statement and the cash flow were tabulated, and the first year of continuous annual surplus and continuous accumulated surplus were examined. As the evaluation indicators of financial viability, the financial internal rate of return (FIRR), and net present value (NPV) were calculated, according to the discounted cash flow methodology.

1) Toll Rate and Revenue

In the previous section, the financial direct benefits to the tollway users' are estimated as follows in Rupiah per PCU trip :

(Rp./pcu-Trip)

| | VOC Saving | Time Saving | Total |
|---|---|---|---|
| Year 2000 | 4,851 | 2,043 | 6,894 |
| Year 2010 | 4,974 | 2,094 | 7,068 |

Within this benefit amount, the flat toll rates of Rp.2,000 per PCU trip, Rp.3,000, Rp.4,000 and Rp.5,000, were examined against this tollway with a length of 17.6 kilometers.

The results of the traffic demand forecast in Chapter 7 were used to calculate the revenue.

**Table 16.4.1 Toll Rates and Revenue**

**YEAR 2000**

| Toll Tariff ( Gol. I ) | Toll Rates per KM | Average Trip Length on the Tollway (Km/trip) | Toll Rates per trip-Km | Revenue (Billion Rp/Year) |
|---|---|---|---|---|
| Rp.2,000 per trip | Rp.114 | 11.9 | Rp.168 | 54.8 |
| Rp.3,000 per trip | Rp.170 | 12.2 | Rp.246 | 72.9 |
| Rp.4,000 per trip | Rp.227 | 12.5 | Rp.320 | 92.0 |
| Rp.5,000 per trip | Rp.284 | 13.1 | Rp.382 | 106.0 |

**YEAR 2010**

| Toll Tariff ( Gol. I ) | Toll Rates per KM | Average Trip Length on the Tollway (Km/trip) | Toll Rates per trip-Km | Revenue (Billion Rp/Year) |
|---|---|---|---|---|
| Rp.2,000 per trip | Rp.114 | 12.2 | Rp.164 | 83,8 |
| Rp.3,000 per trip | Rp.170 | 12.4 | Rp.242 | 117,3 |
| Rp.4,000 per trip | Rp.227 | 12.8 | Rp.313 | 146,4 |
| Rp.5,000 per trip | Rp.284 | 13.7 | Rp.365 | 165,0 |

For comparison, toll rates of tollways operated in Indonesia are shown in Table 16.4.2. The Jakarta Intra Urban Tollway is Rp.170/trip-Km and the Cengkareng Airport Access is Rp.300/trip-Km, while the North-South Axis Tollway is approximately Rp.240/trip-Km for the case of Rp.3,000 per trip by flat tariff.

**Table 16.4.2 Toll Rate of Tollway Operated**

| Tollway | Length | Toll Fee For Sedan | Toll Rate per Km | Remarks |
|---|---|---|---|---|
| 1) Closed System Tollway | | | | |
| Jagorawi Tollway | 50.0 Km | Rp.4,000 | Rp. 80/Km | JM |
| Cawang-Taman Mini | 5.0 Km | Rp. 500 | Rp.100/Km | JM |
| Jakarta-Tangerang Tollway | 26.8 Km | Rp.2,500 | Rp. 93/Km | JM |
| Tangerang Barat-Balaraja | 10.2 Km | Rp.1,500 | Rp.150/Km | BOT |
| Jakarta-Cikampek Tollway | 72.5 Km | Rp.6,500 | Rp. 90/Km | JM |
| Padalarang-Cileunyi Tollway | 43.0 Km | Rp.3,000 | Rp. 70/Km | JM |
| Surabaya-Gempol Tollway | 43.9 Km | Rp.3,000 | Rp. 70/Km | JM |
| Belawan-Tg. Morawa Tollway | 34.5 Km | Rp.2,500 | Rp. 72/Km | JM |
| 2) Flat Tariff System Tollway | | | | |
| Jakarta Intra Urban Tollway | 31 Km | Rp.2,000 | Rp. 65/KM *(Rp.170/Km) | JM/BOT |
| Cengkareng Airport Access | 13.4 Km | Rp.4,000 | Rp.300/Km | JM |

* Average trip length is 12 Km.
JM : PT Jasa Marga (Persero) (Indonesia Highway Corporation)

2) Financial Project Costs

The project costs were calculated in Chapter 13, and are allocated by the implementation schedule in Table 16.3.2.

Total initial investment costs is Rp.1,141.5 (billion) in 1994 prices, covering engineering services, ROW acquisition, construction and taxes.

The direct construction costs are categorized as follows :

Total Direct Construction Costs : Rp.825,220 (Mil.)

1) Throughway/Ramp Rp.762,366 (Mil.) (92.4%)

(including Toll Related Facilities) : Rp. 39,606 (Mil.)

2) Frontage Road/Others : Rp. 62,854 (Mil.) (7.6%)

The ROW costs are Rp.79,400 (Mil.)

The operation and maintenance costs is shown in Table 16.3.3 in the previous section.

The project costs (initial investment costs) in current prices are computed with the allocation following the proposed implementation schedule (refer to Chapter 13 and Chapter 15) with 7% p.a. escalation rate.

The results is Rp.1,528 (Billion) as follows :

| Year | Investment Costs (Billion Rp.) |
|---|---|
| 1995 | 14.55 |
| 1996 | 76.18 |
| 1997 | 286.04 |
| 1998 | 406.76 |
| 1999 | 434.70 |
| 2000 | 310.24 |
| Total | 1,528.47 |

15.4.2 Financial Evaluation

1) Investment Ceiling

Under the following conditions, the ceiling amounts of the investment against the toll rate level are examined for toll rate alternatives as follows:

- 12% p.a. discount rate,
- Revenues for 25 years period,
- Toll rate escalated by 7% p.a.
- 5% of revenue for the operation and maintenance costs and 5% for other expenses :

**Table 16.4.3 Investment Ceiling**

| Toll Rate in 1994 Prices | Ceiling Amount in 1994 Prices |
|---|---|
| Rp.2,000 per PCU-trip | 772 billion Rp. |
| Rp.3,000 | 1,079 |
| Rp.4,000 | 1,347 |
| Rp.5,000 | 1,519 |

2) Assumptions for Financial Evaluation

The following assumptions are made :

(1) Project Life Span is 25 years after opening;

(2) Construction starts in 1997 for 3 years after completion of the Engineering Services and the ROW acquisition; (refer to Chapter 12).

(3) Operation and management is to be carried out by a company with BOT scheme;

(4) For financial calculation, two prices are used,
- Constant 1994 prices
- Current prices with 7% p.a. escalation (to both costs and toll rate).

(5) In addition to the operation and maintenance costs as calculated, other management expenses are assumed at 5% of annual revenue;

(6) Cash flow analysis is made for the case of Rp.3,000 per trip case.

(7) Fund conditions are as follows :

- Equity ratio : 20% or 30%
- Long term loan : interest rate of 11% p.a. with the grace period for construction period and 15 years equal capital repayment,
- Short term loan : 18% p.a. interest rate.

(8) For sensitivity analysis, it was assumed that construction of frontage road and ROW acquisition would be carried out by the Government is examined.

3) Financial Rate of Return (FIRR) and Net Present Value (NPV).

The results are as follows :

**Table 16.4.4 (1) Summary of FIRR and NPV**

**Cost Case 1**

| Toll Rates | 1994 Constant Price | | Current Price | |
|---|---|---|---|---|
| | FIRR (%) | NPV (billion Rp.) | FIRR (%) | NPV (billion Rp.) |
| Rp.2,000 | 4.4 | -356 | 11.7 | -30 |
| Rp.3,000 | 7.3 | -243 | 14.8 | 312 |
| Rp.4,000 | 9.4 | -140 | 17.1 | 610 |
| Rp.5,000 | 10.7 | - 72 | 18.5 | 801 |

When the construction of frontage road and land acquisition are made by the government, the results are as follows :

**Table 16.4.4 (2) Summary of FIRR and NPV**

**Cost Case 2**

| Toll Rates | 1994 Constant Price | | Current Price | |
|---|---|---|---|---|
| | FIRR (%) | NPV (billion Rp.) | FIRR (%) | NPV (billion Rp.) |
| Rp.2,000 | 5.6 | -259 | 13.0 | 91 |
| Rp.3,000 | 8.8 | -146 | 16.4 | 433 |
| Rp.4,000 | 11.1 | -43 | 18.9 | 730 |
| Rp.5,000 | 12.5 | 25 | 20.4 | 921 |

The financial rate of returns (FIRR) in current price with the escalation rate of 7% p.a. and the project life span of 25 years lead to the recommendation of a Rp.3,000 per sedan trip toll rate in 1994 price.

If the Government acquires the right of way and constructs the frontage road and related improvement, the financial viability of this tollway operation increases by about two points.

4) Cash-flow Analysis

The cash-flow analysis is carried out for the Rp.3,000 toll rate case.

The assumed conditions are as follows, including the conditions to examine the sensitivity :

- Equity Ratio : 20% and 30%

- Long term loan : interest rate of 11% p.a. with the grace period for construction period and 15 years equal capital repayment,
- Short term loan : 18% p.a. interest rate.

- Cost Case : 1) 100% of Project costs by the tollway operator,
  2) Less frontage road and related improvement construction costs, as well as land acquisition costs

- A conservative assumption of no revenue in partial opening in year 2000 was applied for the cash-flow analysis.

- Management costs (including dividend) : two alternative for 30% of Equity case; 10% of revenue, and 10% of equity annually.

The results for base cases are shown in Table 16.4.5 (1) and the results for alternative cases are shown in Table 16.4.5 (2).

**Table 16.4.5 (1) Financial Evaluation (Base Cases)**

| | Cost Case 1 | | Cost Case 2 | |
|---|---|---|---|---|
| | Equity Ratio | | Equity Ratio | |
| | 20 % | 30 % | 20 % | 30 % |
| | Case 1 | Case 2 | Case 3 | Case 4 |
| 1) Interest During Construction (IDC) (bil. Rp.) | 398 | 348 | 326 | 285 |
| 2) Year of Single Year Surplus | 2013 | 2010 | 2009 | 2007 |
| 3) Year of Accumulated Surplus | 2019 | 2015 | 2015 | 2012 |
| 4) Year of Maximum Short-term Loan and Amount (bil. Rp.) | 2012 (1,155) | 2009 (484) | 2008 (402) | 2006 (114) |
| 5) Total Tax Paid up (bil. Rp.) | 2,397 | 2,865 | 2,964 | 3,132 |

Note : Cost Case 1) 100% of Project costs by the tollway operator,
Cost Case 2) Less frontage road and related improvement construction costs, as well as land acquisition costs

**Table 16.4.5 (2) Financial Evaluation (Alternative Cases)**

| | Cost Case 1 | | Cost Case 2 | |
|---|---|---|---|---|
| | Management Cost | | Management Cost | |
| | 10% of Revenue | 10% of Equity | 10% of Revenue | 10% of Equity |
| | Case 5 | Case 6 | Case 7 | Case 8 |
| 1) Interest During Construction (IDC) (bil. Rp.) | 348 | 348 | 285 | 285 |
| 2) Year of Single Year Surplus | 2011 | 2014 | 2008 | 2010 |
| 3) Year of Accumulated Surplus | 2017 | 2021 | 2013 | 2016 |
| 4) Year of Maximum Short-term Loan and Amount (bil. Rp.) | 2010 (673 | 2013 (1,477) | 2007 (204) | 2009 (539) |
| 5) Total Tax Paid up (bil. Rp.) | 2,558 | 2,207 | 2,894 | 2,930 |

Note : Equity ratio is 30%.
Cost Case 1) 100% of Project costs by the tollway operator,
Cost Case 2) Less frontage road and related improvement construction costs, as well as land acquisition costs

Through evaluation of the above results, including the sensitivity to the management expense, this tollway under the toll rate of Rp.3,000 per trip in 1994 price is financially evaluated as being viable.

The Cost Case 2 requires totaling 148.5 billion Rupiah of official development fund during five (5) years construction. 62.5 billion Rupiah of land acquisition cost at the second year will be required at peak and it will be born by both Bina Marga and DKI Jakarta. It is likely possible to implement the project by even Cost Case 2, considering that the present level of transportation development expenditure in Jabotabek is 210 billion Rupiah.

# CHAPTER 17 CONCLUSIONS AND RECOMMENDATIONS

# CHAPTER 17 CONCLUSIONS AND RECOMMENDATIONS

## 17.1 Conclusions

### 17.1.1 Basic Road Development Concept

The basic road development concept in Jakarta metropolitan area which is formulated based on Jakarta 2005, the master plan of road development in Jakarta city , the recommended scheme of JMDPR and the study results delineates the functional road network targeted in the year 2010.

The targeted roles and functions of project roads are to be designated on the assumption that the development concept would be realized, while the development concept stimulates development potential to sustain forecasted traffic demand in the project area, and ascertains the anticipated benefits resulting from the project.

### 17.1.2 Necessity and Urgency of the Project

Present chronic traffic congestion on major arterial roads necessitates the promotion of the development of a functional road network in Jakarta metropolitan area as soon as possible. This pertains especially to an alternative route of north-southward thoroughfares and a new east-west thoroughfare in conjunction with on-going tollway development and arterial road improvement.

It is predicted that delays in improvement of transport sector infrastructures, including development of a high standard road network and introduction of a mass transit system, will impede enhancement of the regional economy and will stifle the development of a desirable urban structure.

Only if the project roads are realized to increase traffic capacity, integrated effects of urban development along major arterial roads such as a great number of public institutions and business facilities, modernization of urban landscapes and housing complex with high living standard will be secured.

### 17.1.3 Feasibility of the North - South Axis

1) Technical Feasibility

Taking into account severe physical constraints such as limited ROW, elevated roads, high-rise buildings and monumental statue, the North - South Axis can manage to connect Kota to JORR in Cilandak by an elevated road on viaduct in the whole stretch utilizing public spaces

above roads and rivers with special structures of double deck with racket piers. Resultantly, additional land acquisition is minimized and it is limited to at localized areas.

2) Economic Feasibility

High economic returns are expected in all economic parameters such as B/C of 2.63 in case of 15% discounted rate and EIRR of 34.8% even though construction cost is considerably high.

3) Financial Feasibility

The implementation of the North - South Axis by a BOT scheme is financially feasible on the assumption that the toll is 3,000 Rp/trip with the escalation of toll rate by 7% per annum, the equity share is 30%, and the interest rates of the long-term loans are less than 11%.

17.1.4 Feasibility of the East - West Axis

1) Technical Feasibility

The proposed route location coincides in principle with city planning roads. To secure technical feasibility, a 40 m ROW scheme is adopted in developed area, while a 70 m ROW scheme is proposed in undeveloped areas as well as in urban redevelopment areas. It is indispensable to introduce a land readjustment technique to the urban redevelopment areas to avert resettlement problems.

2) Economic Feasibility

All of the economic parameters show a high economic feasibility, even when only direct benefits are taken into consideration. That is B/C is 4.3 in case of 15% discounted rate and EIRR is 33.2%. Indirect benefits such as development impacts along the East - West Axis would further enhance the economic feasibility of the project.

17.1.5 Environmental Impacts

The Central AMDAL commission has already issued the recommendation to the Minister for the approval of the ANDAL report for the project, which concluded that the expected negative impacts can be mitigated up to present level by applications of appropriate environmental considerations and measures. The Minister issued the approval of the ANDAL report in due procedure.

### 17.1.6 Overall Evaluation

The project roads in the priority sections are evaluated, considering that the targeted role and function of the North - South Axis are to strengthen the existing north-south thoroughfare, while that of the East - West Axis is to stimulate the development of planned east and west primary centers, to enhance the road capacity in the housing development area and to support through traffic in the central urban area.

The road configurations of the East - West Axis are to have elevated road on viaduct in built-up area and to have wide ROW with multi lanes. It is likely possible to keep good urban environment along road because potential high-rise buildings will work as a buffer for noise and air pollution.

Since the East - West Axis is planned to be a new arterial road it requires considerable land acquisition and property compensation. Where the East - West Axis passes built-up area, 40 m wide ROW is proposed to avert adverse social impacts by excessive demolition. On the other hand, 70 m wide ROW is proposed in an undeveloped area and areas designated as urban betterment. In an undeveloped area, the future ROW will be reserved by a subdivision method during development, while in the areas designated as urban betterment it is necessary to introduce land readjustment techniques in order to acquire land successfully to create considerable public spaces for urban betterment including roads as well as to avert resettlement problems.

Though the construction of the East - West Axis requires huge investment, the economic feasibility is enough high, considering direct benefits only. Annual required fund during construction is estimated 270 billion Rupiah at peak, and it accounts for 6 % of total development budget in transport and tourism sector. However, it is likely possible to implement the project, taking into considerations the development of Jakarta Intra Urban Tollway in assistance with official development aids for a long span of time.

The North - South Axis is designed as a full access controlled road to pass built-up area in its entire stretch. In order to make it practical and realistic, the route is selected to pass in public spaces such as the spaces above roads and rivers. Even steel structure of double deck with racket type pier, which it requires rather high technique and is possible to fabricate in Indonesia, is adopted where severe land conditions are found. Though the construction of the North - South Axis requires huge investment, the project is evaluated enough feasible economically and financially.

## 17.2 Recommendations

### 17.2.1 Land Acquisition for the Project Roads

It is indispensable to succeed a road project to freeze landuse, to control development and to acquire land along the proposed routes. Well begun is half done. Once the ROW acquisition problems are solved in an early stage it may be said that the urban road development is successfully completed in its major parts. It is strongly recommended that the exact future ROW should be determined at an earliest day possible based on a detailed design. Simultaneously, it is necessary to freeze landuse and to control development along the proposed routes based on this study.

### 17.2.2 Administrative Measures to incorporate the Scheme of Project Roads

The scheme of project roads still necessitates some modification of preceding projects or further considerations taken in planning along the proposed routes. The followings are pointed out to require administrative measures as of now;

North - South Axis

1) Modification design on Jakarta Outer Ring Road (JORR)
2) On/Off ramps at Pejompongan
3) Viaduct on Jl. Jati Baru
4) Utilization of space above the Kali Ciliwung

East - West Axis

1) Modification designs of both the western and the eastern sections of JORR
2) Future expansion of Taman Permata Buana housing estate
3) Urban betterment in Kec. Tambora and Kec. Grogol Petamburan

### 17.2.3 Implementing Body of the Project

1) North - South Axis
   Private investors in joint-venture with PT. Jasa Marga are recommended as the implementing body of the development of the North - South Axis.

2) East - West Axis
   DKI Jakarta is recommended as the implementing body of the development of Sections 1, 2 and 4 of the East - West Axis, while Bina Marga is recommended as the implementing body of the development of Section 3 of the East - West Axis, taking into account a strategic value in the national interest.

### 17.2.4 Improvement Plans of Related Facilities

The development of the toll road necessitates the improvement of parallel arterial streets and adjacent at-grade intersections to On/Off ramps. The development of the East - West Axis on existing roads also necessitates the improvement of existing roads as frontage road and adjacent at-grade intersections to On/Off ramps. To develop a functional road network and to stimulate the diversion of medium to long trip traffic from existing north-south thoroughfares, the following administrative measures are necessary:

(a) Imposing an exclusive bus lane on existing north-south thoroughfares
(b) Relieving prohibition of right-turn at intersections
(c) Improving channelization of intersection and crossing roads
(d) Reviewing truck lanes, especially for crossing roads adjacent to On/Off ramps

On the other hand, the development of the toll road also necessitates establishment of parking space allocation wherever buildings will be developed in the urban area.
It is recommended that Bina Marga should initiate due procedures to promote these measures by agencies concerned under its jurisdiction.

### 17.2.5 Implementation of Basic Road Development Concept

It is indispensable to develop the East - West Axis in the entire stretch. Accordingly a feasibility study on the remaining should be carried out sections of Tangerang to the western section of JORR and Bekasi to the eastern section of JORR. Furthermore, the proposed Botabek Ring Road in conjunction with the remaining sections should be studied as soon as possible.

### 17.2.6 Urban Betterment by Land Readjustment

Urban betterment designated by the masterplan of Jakarta 2005 requires considerable public spaces in the high destiny, low income housing area in Kota. To carry out such urban betterment successfully, it is necessary to introduce land readjustment techniques to avert resettlement problems. It is recommended that the development of the East - West Axis in Kecamatan Grogol Petamburan and Kecamatan Tambora will be implemented under such a scheme as a pilot project.

### 17.2.7 Land Acquisition and Property Compensation

The conventional land acquisition method of purchasing land with money is still available in the case that the local government can settle the negotiation with affected land owners and inhabitants regarding prices and other conditions. It is recommended that sufficient time and compensation which ascertain not only land but also living at a relocated place should be granted to affected inhabitants to resettle.

### 17.2.8 Improvement of Public Transportation

High urban activity can be sustained only if proper modal splits are achieved. High standard roads including toll roads will mainly undertake the mobility of trip purposes of business and commodity, while commuter trips should be undertaken by public transport such as mass transit system and buses. It is recommended that public transport as well as high standard roads should be developed simultaneously to sustain each others.

### 17.2.9 Legislative Measures to Capture Development Gains

It is sure that high development impacts pertain to the project, but it is hard to capture development gains by the present taxation system. Special legislative measures such as contribution of land, sharing costs and revenue of certain local tax should be consider to capture development gains to sustain relevant development and to stimulate similar projects.

### 17.2.10 Intensive Utilization of the Space under Viaduct

The project will create many spaces under viaduct, which may become very lucrative land tenure. In Japan, for example, spaces under viaduct sometimes are utilized as parking lots, office and business purposes and play grounds. It is recommended that intensive utilization of space under viaduct should be studied.

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