# PART I : Short-term Implementation Plan

# 1. Introduction

## 1.1 Study Objectives

The development objective of The Study on Integrated Transport Master Plan for JABOTABEK (Phase 1) is to identify policy measures and to propose concrete solutions that are geared at alleviating transportation problems in the Jabotabek region, especially in the central part of DKI Jakarta, taking into account the existing and planned urban structure. The principal aim is to encourage public transport usage. The Study is divided into two phases, namely Phase (1) and Phase (2). The main objectives of the current Phase (1) Study, are as follows:

- To review the recent evolution of the policy framework, including decentralization, liberalization and privatization, in which the urban transport sector is administered and operated;
- To identify main issues and causes, which delayed the implementation of various projects/programs proposed in the past by a series of planning studies;
- To identify and study a basket of urgent projects that would ease tangible transportation problems in Jabotabek;
- To develop an appropriate study framework for the Phase 2 Study by taking into account the close linkage between the results of the transport surveys and final proposals; and
- To transfer urban transport planning, management skills and know-how to Indonesian counterparts through implementation of the Study.

## 1.2 Study Area

The Study area covers the Jabotabek region comprising DKI Jakarta, Bogor, Depok, Tangerang and Bekasi.

## 1.3 Target Years

The target year for the master plan to be formulated in the Phase (2) Study is the year 2020, while the target year for the short-term implementation plan to be formulated in the Phase 1 Study is 2005.

# 2. Existing Urban Structure and Changes in the Past

## 2.1 Population Growth and Urbanization

The total population size in Jabotabek amounted in 2000 to around 21 million people. The population size in Jakarta and Botabek was recorded at 8.4 million and 12.6 million people, respectively. Urbanization in Botabek has progressed very rapidly; the population growth in Botabek between 1990 and 2000 was 3.7 percent per annum while the growth in Jakarta was merely 0.2 percent per annum. This implies that suburbanization has proceeded rapidly and population has spread out in Botabek area.

**Table 2.1.1 Population and Annual Growth (%)**

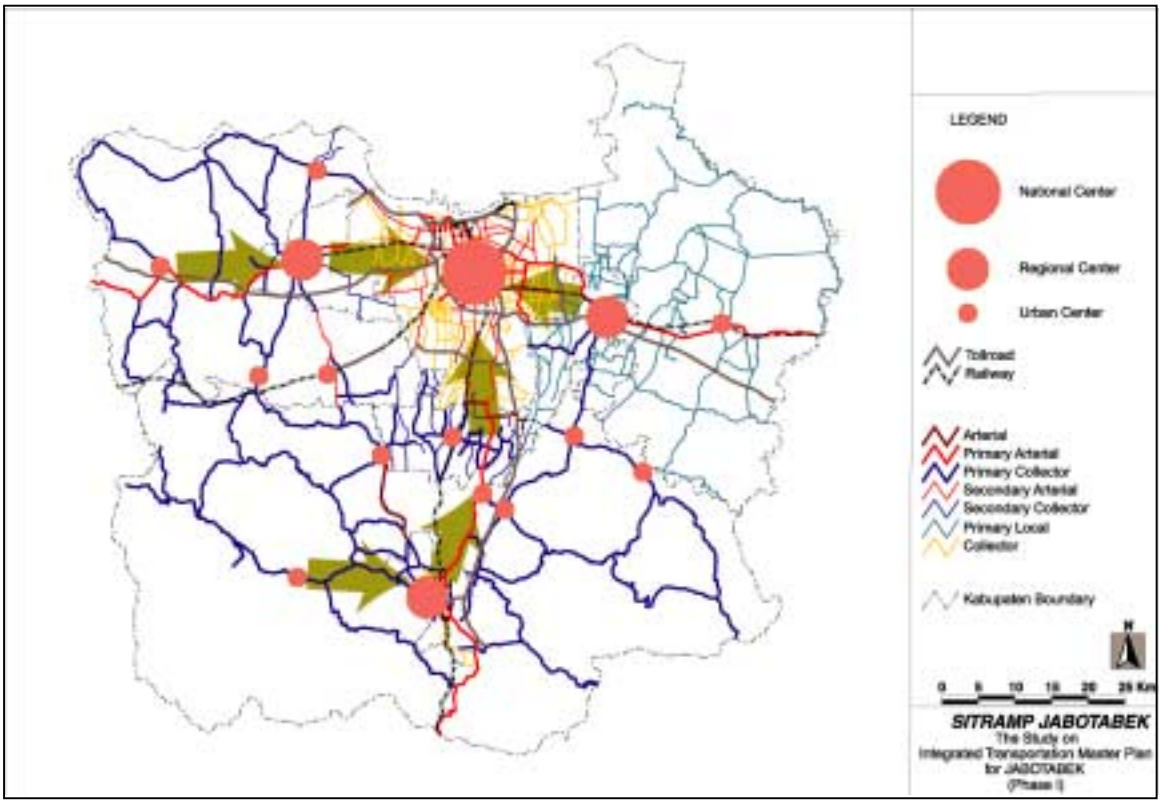
(unit: 000 persons)

| Region | 1971 | 71-80 | 1980 | 80-90 | 1990 | 90-00 | 2000 |
|---|---|---|---|---|---|---|---|
| DKI Jakarta | 4,579 | 4.0% | 6,503 | 2.4% | 8,210 | 0.2% | 8,364 |
| Bogor | 1,863 | 4.4% | 2,741 | 3.7% | 3,949 | 3.0% | 5,300 |
| Tangerang | 1,067 | 4.1% | 1,529 | 5.9% | 2,724 | 4.2% | 4,100 |
| Bekasi | 831 | 3.6% | 1,143 | 6.1% | 2,073 | 4.4% | 3,200 |
| Botabek | 3,761 | 4.1% | 5,413 | 4.9% | 8,746 | 3.7% | 12,600 |
| Jabotabek | 8,340 | 4.0% | 11,916 | 3.6% | 16,956 | 2.1% | 20,964 |

Source: Statistical Year Book of Indonesia 1998; Population of Jawa Barat 1995, Population Census 2000

## 2.2 Urban Development in DKI Jakarta

Rapid urban development has been taken place in the central area of Jakarta in 1990s. Some areas, which was previously utilized as residential areas (urban Kampung) have been converted to high-rised office and commercial buildings. The most remarkable area is so called “Golden Triangle” in Jakarta, which is enclosed by Jl. Sudirman, Jl. Gatot Subroto, and Jl. Rasuna Said. More than 50 percent of work places of Jakarta are provided in the central area enclosed by the semi-loop railway lines and the newly emerging urban centers. Comparison of the density of work places between 1985 and 2000 illustrated in Figure 2.2.2 indicates that the central area with high job density has been expanded outward and in particular, expansion to the south direction is outstanding. The magnitudes of the old centers such as Kota, Senen, Manggarai, Jatinegara, and Tanah Abang have been decreased.




Source: Jabotabek 2015 (Draft)

**Figure 2.2.1 Regional Structure of Existing Urban Centers**

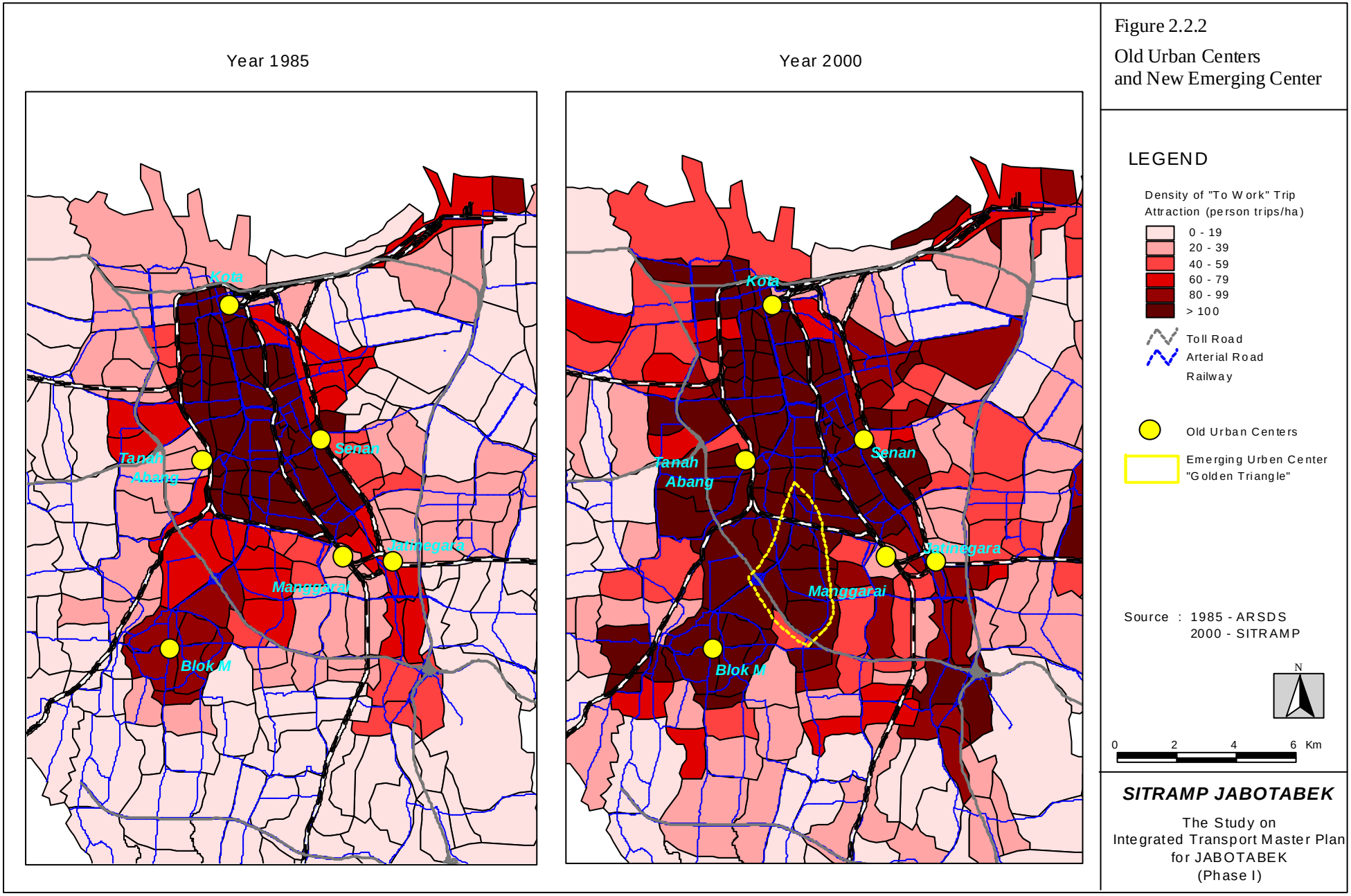



Figure 2.2.2
Old Urban Centers
and New Emerging Center

**SITRAMP JABOTABEK**

The Study on
Integrated Transport Master Plan
for JABOTABEK
(Phase I)

# 3. Impacts of Economic Crises on Urban Transport Sector

## 3.1 Impacts of Economic Crisis on Economic Activities

(1) Real GRDP by Industrial Sector in DKI Jakarta

The recession in the Jakarta in 1998 was worse than on national average as evidenced by a contraction of real GRDP of -17.6 percent, -4.4 percent lower than the national average as indicated in Table 3.1.1. As was the case for the national economy, highly affected economic sectors were the construction sector (-38.3%), followed by manufacturing (-18.3%), trading (-15.4%), agricultural (-15.3%), transport (-12.8%), services (-11.6%) and financial (-9.6%) sector.

**Table 3.1.1 GRDP Growth of DKI Jakarta by Industrial Origin**

| | At 1993 constant prices | | | | |
|---|---|---|---|---|---|
| **Industrial Sector** | **1995 (bil. Rp)** | **1995-1996** | **1996-1997** | **1997-1998** | **1998-1999** |
| Agriculture, etc. | *123.0* | -0.7% | 1.1% | -15.3% | 0.7% |
| Mining & Quarrying | *0.0* | 0.0% | 0.0% | 0.0% | 0.0% |
| Manufacturing | *12,865.3* | 8.2% | 5.7% | -18.3% | -1.2% |
| Electricity, Gas, etc. | *1,009.4* | 6.1% | 12.9% | -8.8% | 0.6% |
| Construction | *8,783.5* | 15.4% | 5.4% | -38.3% | 0.2% |
| Trade, Hotel, Restaurant | *13,664.0* | 10.1% | 5.8% | -15.4% | 1.4% |
| Transport, Comm. | *5,100.6* | 10.2% | 6.9% | -12.8% | 0.7% |
| Financial, Property, etc. | *13,326.5* | 7.6% | 4.3% | -9.6% | -10.8% |
| Services | *5,776.4* | 2.4% | 0.3% | -11.6% | -0.1% |
| Total (with oil & gas)* | *60,648.7* | 9.1% | 5.1% | -17.6% | -2.7% |
| Total (without oil & gas) | 60,648.7 | 9.1% | 5.1% | -17.6% | -2.7% |

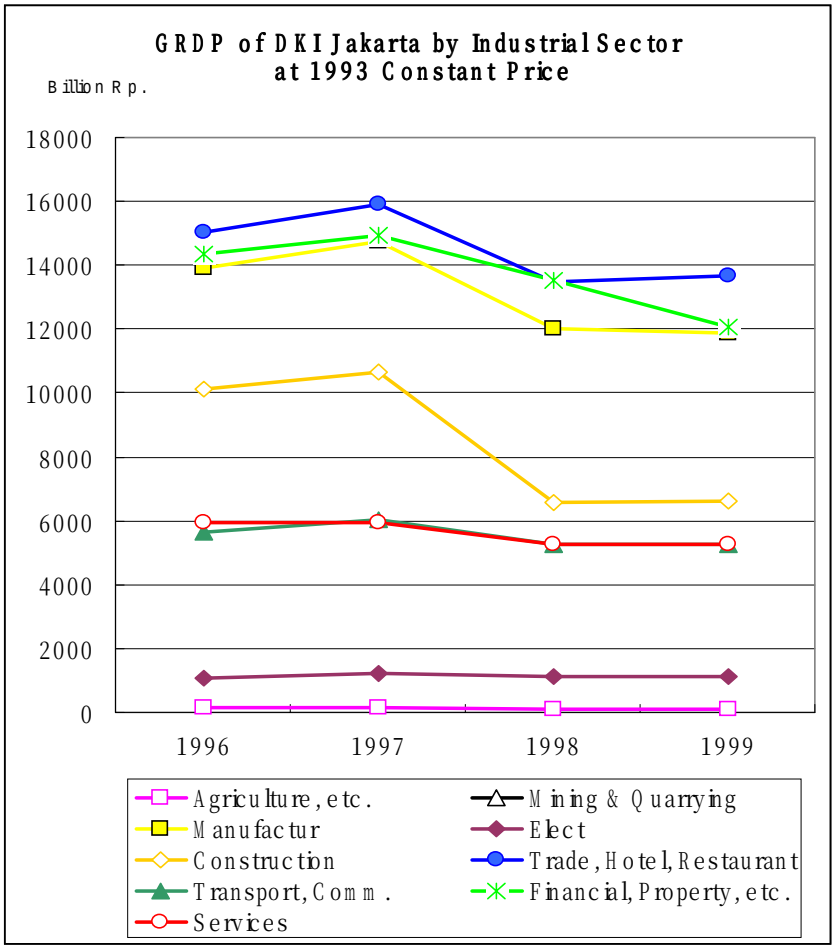
Source: Gross Regional Domestic Product of Provinces in Indonesia by Industrial Origin, 1995 - 1999, BPS

It appears that within Jabotabek itself, the Botabek region's real GRDP contracted well above national and slightly above Jabotabek average (-18.5% in 1998). It also appears that the contraction of DKI's real GRDP continued in 1999 (-2.7 percent), though the pace has slowed considerably.

As a consequence, real per capita income has declined in 1998 dramatically exceeding national average by about 5 percent in DKI Jakarta, about 6 percent in Botabek and also roughly 6 percent for Jabotabek as a whole.

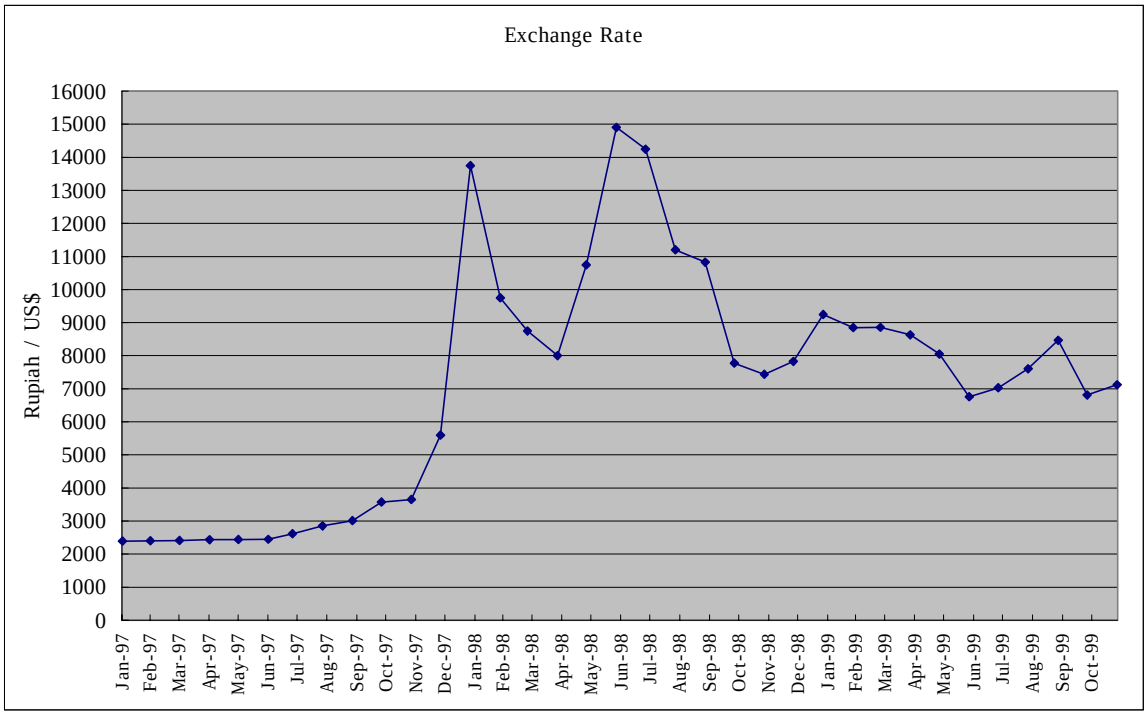
(2) Exchange Rates

The exchange rate against the US dollar decreased sharply from the then stable rate of Rp.2,385 in December, 1996 to Rp.5,700 in December, 1997 and Rp.8,100 in December, 1998. (See Figure 3.1.2) The Rupiah recovered in December, 1999 to a level of Rp.7,161 but the Rupiah fell again as of 12$^{th}$ of July, 2000, to about Rp.9,300 (middle rate). Prudent macro-management has avoided the hyperinflation threat and brought inflation in 1998 under control.




Source: Gross Regional Domestic Product of Provinces in Indonesia by Industrial Origin, 1995 - 1998, BPS

**Figure 3.1.1 Change of GRDP in DKI Jakarta : 1996 - 1999**




Source: IBRA ORR Valuation Study

**Figure 3.1.2 Exchange Rate : Jan. 1997 – Dec. 1999**

## 3.2 Impact of Economic Crisis on Public Finance

Generally speaking, the economic crisis resulted in serious difficulties for the central government and local government to maintain pre-crisis level revenues and expenditures, in particular development and/or net-investment expenditures. Revenues (including grants, but excluding receipts from privatization) have declined from 16.1 percent of GDP in FY 1994/95 to 10.2 percent in FY 1999/2000. Expenditures have grown, on the other hand, from 15.7 percent in FY 1994/95 to 16.0 percent in FY 1999/2000. Current expenditures have grown from 8.4 percent of GDP in FY 1994/95 to 11.0 percent in FY 1999/2000, while development expenditures have declined from 7.3 percent of GDP in FY 1994/95 to 5 percent in FY 1999/2000.

Major purposes on the expenditure side are 1) to cover recurrent expenditures, 2) to cover cost (recapitalization and guarantees) for bank restructuring, and 3) to maintain the social fabric of the country through social safety-net expenditures.

As a result of, inter alia, the above, outstanding Government debts have increased dramatically further limiting the Government's short to medium-term capability to increase investment expenditures. Government debt service amounted in FY 1996/97 to 23 percent of GDP, but it has drastically increased since then to 60 to 70 percent during the economic crisis of fiscal year 97/98 and 98/99. In fiscal year 99/00 it is estimated to increase to as much as 90 percent, due to the increase in domestic debt for bank restructuring. Total government debt service payment was projected to account for about 40 percent of tax revenues in 2000.

This situation has been forcing the Central government to reduce the outstanding debt as much as possible, as the State Policy Guidelines pointed out the importance of control government debt and external borrowing. Therefore it appears difficult for the government to implement a large-scale infrastructure development project by its own source and/or external borrowing in short term.

**Table 3.2.1 Government Debt Outstanding**

(unit: billion US $, end of period)

| | FY96/97 Actual | FY97/98 Actual | FY98/99 Actual | FY99/00 Projection | 2000 Projection |
|---|---|---|---|---|---|
| Total | 52.6 | 51.2 | 78.1 | 147.4 | 161.9 |
| Domestic a) | 0.0 | 0.0 | 18.9 | 84.7 | 95.9 |
| External b) | 52.6 | 51.2 | 59.2 | 62.7 | 66.0 |
| Government Debt/GDP | 22.9 | 61.9 | 67.2 | 90.9 | 93.4 |
| Of which External Debt/GDP | 22.9 | 61.9 | 50.9 | 38.7 | 38.1 |

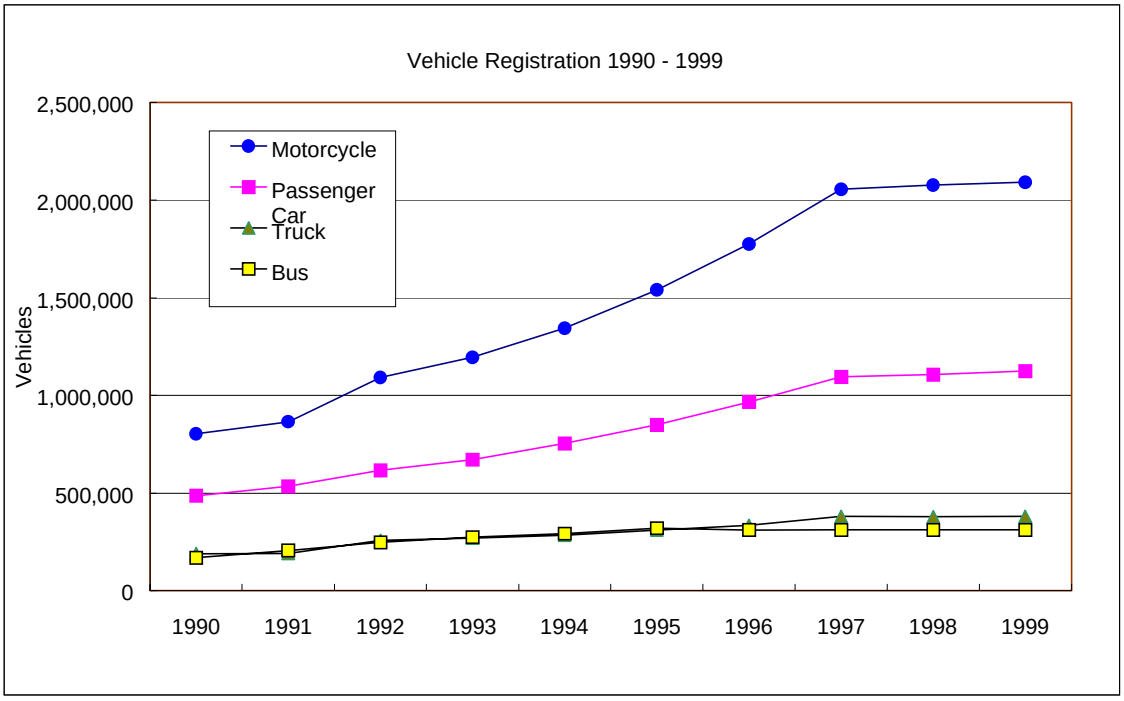
Source: Economic Brief for the Consultative Group of Indonesia, Indonesia: Seizing the Opportunity, World Bank Office in Jakarta, January, 2000

Note: a) Assuming an exchange rate of Rp. 7000 per US Dollar for 2000
b) This excludes credits owed to the IMF.

## 3.3 Impact of Economic Crisis on Land Transport Sector

(1) Vehicle Registration

The total number of registered motor vehicles has increased dramatically in the years 1995, 1996, and 1997 reaching a total of 3.8 million units in that year. After the economic crisis the growth has been much reduced compared to the pre-crisis period.




Source : Ditlantas Polda Metro Jaya

**Figure 3.3.1 Change in Vehicle Registration**

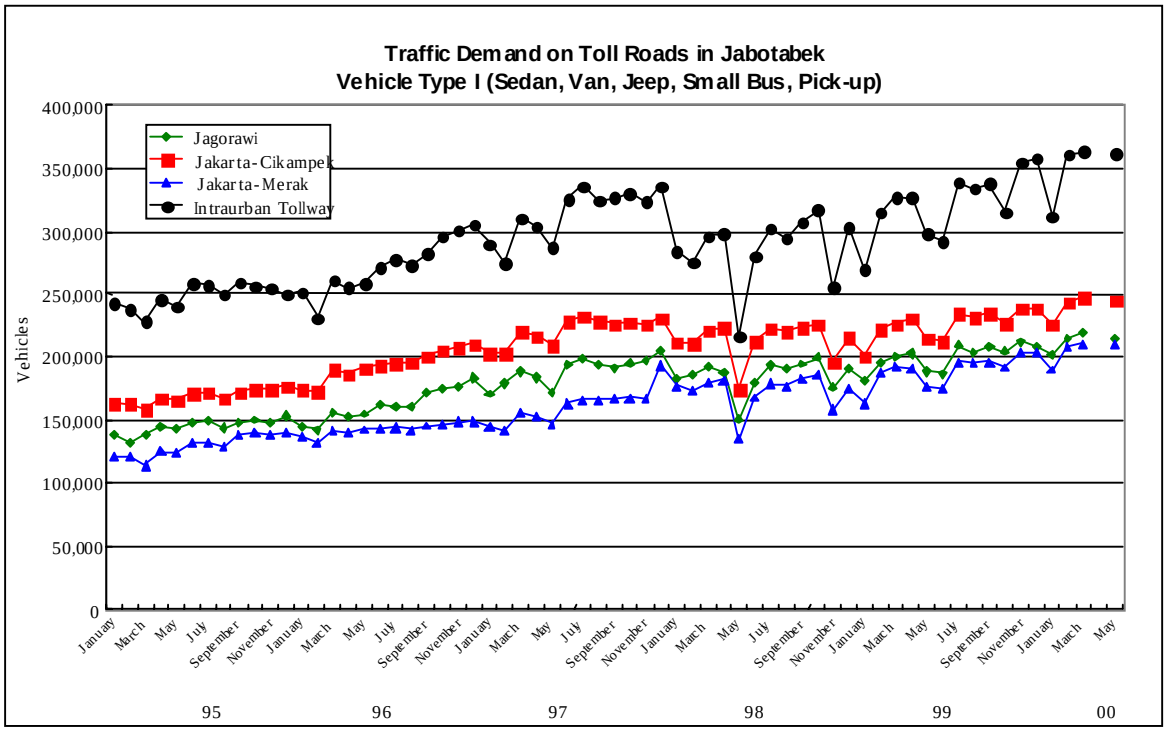
(3) Traffic Demand on Jabotabek Toll Roads

Economic crisis hit the travel demand on toll roads significantly as shown in the Figures 3.3.2 through 3.3.4. The number of vehicles using toll roads has sharply dropped after the crisis. From the middle of 1998 the number of vehicle type I, including sedan, jeep, small bus and pick-up, had been decreasing until May 1998. In May 1998, a dramatic decrease in vehicular trips was observed due to the riots in Jakarta. After the mid of 1998 the demand has been in recovery and in the end of 1999, the demand of vehicle type I has already reached the level before the crisis.

Compared with vehicle type I, although the traffic volumes of both vehicle types II and III have been recovering after the crisis, traffic demand of vehicle type II and III indicated slower recovery than vehicle type I. Since vehicle type II and III are mainly consisted trucks and trailers, traffic volumes of these types of vehicles directly depend on economic activities, therefore, slower recovery of cargo vehicular demand reflects slow recovery of the regional economy.

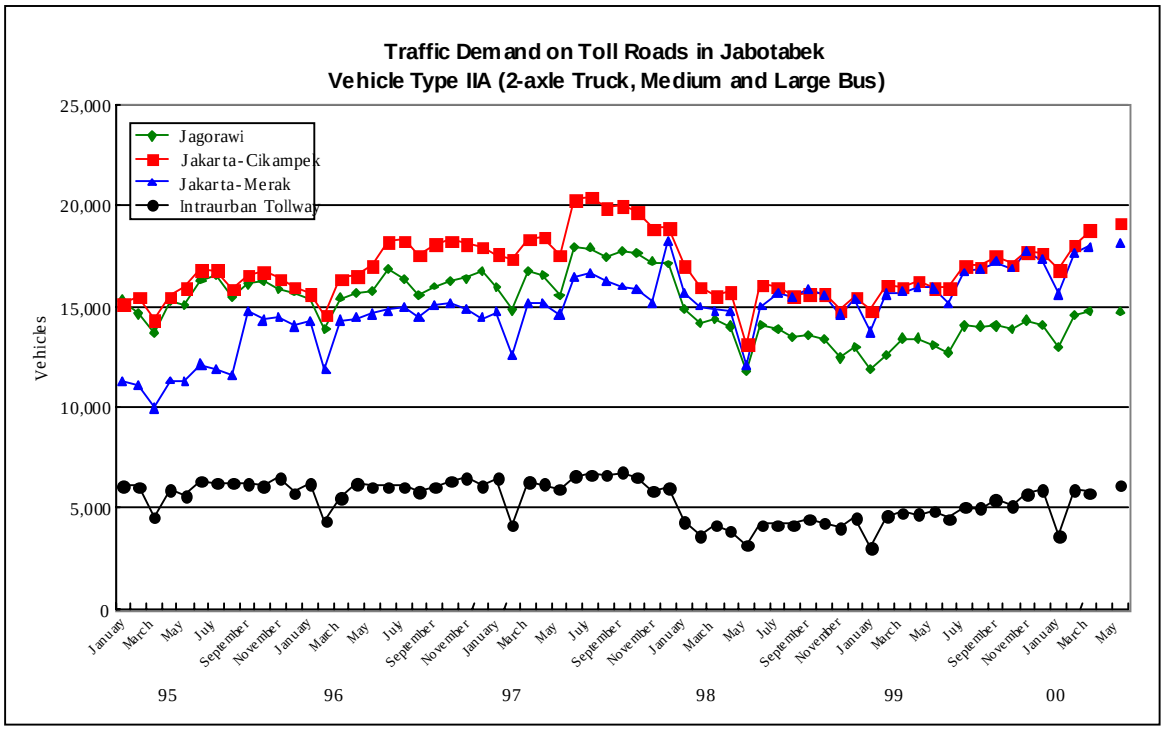
Nevertheless the economic crisis hit the regional economy in Jabotabek seriously and usage of automobiles had been temporarily decreased due to fear of the riots,

the vehicular demand, especially private passenger cars, appears robust recovery. This trend implies that when the regional economy recovers the traffic demand would increase rapidly like the pre-crisis period and would bring about traffic congestion.



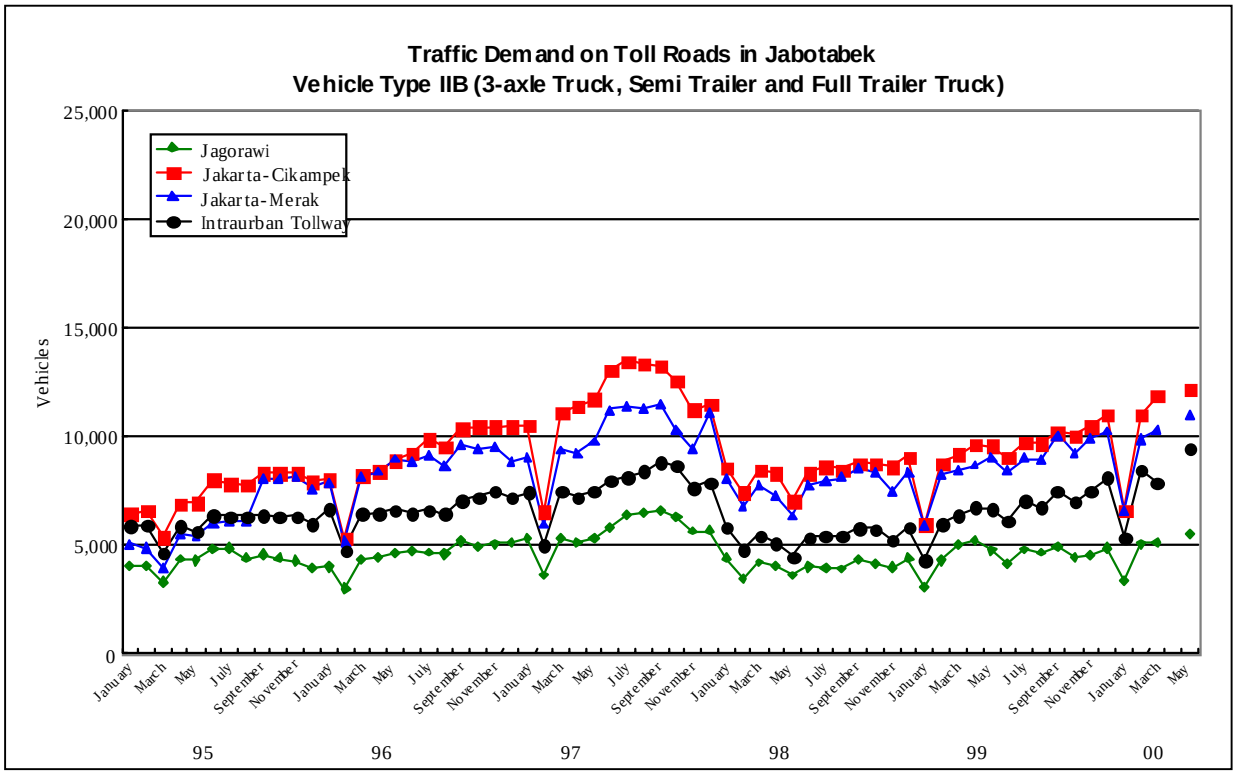

Source: Jasa Marga Monthly Report 1995 - 2000

**Figure 3.3.2 Traffic Demand on Toll Roads in Jabotabek (Type I)**




Source: Jasa Marga Monthly Report 1995 - 2000

**Figure 3.3.3 Traffic Demand on Toll Roads in Jabotabek (Type IIa)**




Source: Jasa Marga Monthly Report 1995 - 2000

**Figure 3.3.4 Traffic Demand on Toll Roads in Jabotabek (Type IIb)**

# 4. Lessons from the Past Studies and Projects

## 4.1 Impediments to Project Implementation

Based on the review of the past studies and transport system development projects, impediments to project implementation were explored. There are four major groups of impediments that lead to a delay or suspension in project/program implementation. They are:

- Absolute shortage of development funds,
- Land acquisition problems,
- Institutional failure: lack of power and co-ordination, and
- Lack of human resources, planning data and master plan at local government level

Each type of impediment is presented below.

(1) Absolute Shortage of Development Funds

The government budgets for the fiscal years 1999/2000 and 2000 show clearly that the transport sector development budget relies very much on external loans as shown in Tables 4.1.1 and 4.1.2.

**Table 4.1.1 Transport Sector Development Budget Fiscal Year 1999/2000**

(Rp. million, current price)

| Sub-sectors | Rupiah Funding | | External Loans | | Total | |
|---|---|---|---|---|---|---|
| Road | 2,003,129 | (38%) | 3,240,438 | (62%) | 5,243,567 | (100%) |
| Land Transport | 251,700 | (16%) | 1,328,531 | (84%) | 1,580,231 | (100%) |
| Sea Transport | 166,000 | (37%) | 286,110 | (63%) | 452,110 | (100%) |
| Air Transport | 190,000 | (18%) | 890,612 | (82%) | 1,080,612 | (100%) |
| Others | 20,000 | (29%) | 50,100 | (71%) | 70,100 | (100%) |
| Total | **2,630,829** | **(31%)** | **5,795,791** | **(69%)** | **8,426,620** | (100%) |

Source: Bappenas, State Budget Draft of 2000, 24 Jan. 2000 ("The Future of Public Transport in Jakarta" presented by Dr.Suyono Dikun at the International Conference on Sustainable Transport and Clean Air, Jakarta, May 29-31, 2000)

**Table 4.1.2 Transport Sector Development Budget Fiscal Year 2000 (Apr.-Dec.)**

(Rp. million, current price)

| Sub-sectors | Rupiah Funding | | External Loans | | Total | |
|---|---|---|---|---|---|---|
| Road | 400,000 | (23%) | 1,308,087.0 | (77%) | 1,708,087.0 | (100%) |
| Land Transport | 116,000 | (20%) | 451,480.0 | (80%) | 567,480.0 | (100%) |
| Sea Transport | 57,390 | (12%) | 424,380.6 | (88%) | 481,770.6 | (100%) |
| Air Transport | 81,775 | (20%) | 334,482.3 | (80%) | 416,257.3 | (100%) |
| Others | 6,065 | (100%) | 0.0 | (0%) | 6,065.0 | (100%) |
| Total | 661,230 | (21%) | 2,518,429.9 | (79%) | 3,179,659.9 | (100%) |

Source: Bappenas, State Budget Draft of 2000, 24 Jan. 2000 ("The Future of Public Transport in Jakarta" presented by Dr.Suyono Dikun at the International Conference on Sustainable Transport and Clear Air, Jakarta, May 29-31, 2000)

External loans for the transport sector development accounts for 70% and 80 of the national budget in 1999/2000 and 2000, respectively. Generally, the counter-budget, such as land acquisition, compensation and administration costs, is

required in association with the committed external loan. Accordingly, the Rupiah budget payable purely for those other than external loan projects remains very limited. Taking into account continued projects, the Rupiah budget for the new project seems quite difficult to come out, unless the external loan is committed for it. Thus, a purely Rupiah funded project is confined inevitably to small projects.

(2) Land Acquisition Problems

Currently, pre-loan conditions for the external loan commitment are getting severe and which usually require the clearance of environmental and land acquisition problems. Previously, the government could allocate the land acquisition budget after the loan commitment was made, however, the Rupiah budget for the land acquisition and compensation has to be prepared prior to the loan commitment.

Another problem with land acquisition lies in the difference in prices paid by different sources. Such a price difference results in a claim by the people for additional payment to the previous selling price.

The move toward the democratization is progressing at a faster speed especially among the people in the urban areas. The people became aware of right to settle the land dispute as stipulated by the law.

Despite such social changes in the value system of the people, the government cannot expand the land acquisition budget alone. Since a share of the land acquisition cost is increasing dramatically for the new road or even the road widening projects in the urban area, it is unavoidable to delay the project that requires the land acquisition in general.

(3) Institutional Failure: Lack of Power and Co-ordination

Institutional problems concerning the project implementation also vary and will be categorized as shown below:

- Planning process and fund source problems
- Insufficient planning co-ordination among related sectors
- Failure in co-ordination of region-wide planning procedure
- Lack of co-ordination, cooperation and collaboration between the central and local governments.

1) Planning Process and Fund Source Problems

A plan can be realized, only if a budget is available. As mentioned previously, Rupiah development budget is chronically and greatly less than what is required, and the balance is covered by the external financial aids.

Development plans prepared through the technical assistance from JICA, IBRD, ADB, etc. should be authorized independently by the government or should be incorporated into the above five-year plans or long-term development plans for realization. The planning study will not be achieved till the plan goes through the authorization process. This is the responsibility of the local governments that participate in the steering committee. The extent of local government involvement in the study might be one of determinants to fully utilize the planning study in such secondary system development.

2) Failure in Co-ordination of Region-wide Planning Procedure

BKSP Jabotabek was been established in 1976 when the first Jabotabek Metropolitan Development Plan was prepared. BKSP does not have enough planning personnel and most of the technical assistance and co-ordination function are derived largely from the former Cipta Karya (Directorate General of Regional Development and Human Settlement) of the previous Ministry of Public Works. Therefore, the role of BKSP is that of a secretariat rather than a technical coordinator, with little capacity, authority and funds for planning and co-ordination.

3) Lack of Co-ordination, Cooperation and Collaboration between Central and Local Governments

Co-ordination, cooperation and collaboration lacks between the DGLC/PT. KAI and local governments in case of railway projects. Unclear definition of responsibility and authority to utilize the existing railway land is an impediment to develop the station area.

4) Lack of Human Resources, Planning Data and Master Plan by Local Governments

Causes that hamper the project implementation can be summarized as follows:

- Lack of human resources to flexibly respond to the reality of changes in land use patterns as well as land use intensities;
- Lack of data and information to timely examine the progress of land development and administrative processes in a timely manner;
- Lack of institutional, administrative frameworks, and their weakness in overall land development control and management.

# 5. Existing Urban Transportation System and Problems

## 5.1 Present Travel Demand and Characteristics

(1) Trip Production Rates

Trip production rates were estimated by trip purpose and by income group based on the trip data obtained in Mini Person Trip Survey, as indicated in Tables 5.1.1, 5.1.2 and 5.1.3.

Compared to the trip production rate of 1.69 per person per day observed in 1985, the overall trip production rate has remained at the same level of 1.70. Taking increased availability of private modes of transport into account, the trip rate should have been increased. This unchanged trip rate may be partly attributable to increased unemployment due to the economic crisis.

**Table 5.1.1 Home Based Work Trip Production Rate per Employee**

| Income Group | Home to Work Place | Work Place to Home |
|---|---|---|
| High & U Middle | 0.823 | 0.816 |
| Lower Middle | 0.824 | 0.839 |
| Low | 0.796 | 0.784 |
| All Income | 0.813 | 0.812 |

Source: SITRAMP Mini Person Trip Survey, 2000

**Table 5.1.2 Home Based School Trip Rate per Student**

| Income Group | Home to School | School to Home |
|---|---|---|
| High & U Middle | 0.984 | 0.951 |
| Lower Middle | 0.984 | 0.981 |
| Low | 0.974 | 0.988 |
| All Income | 0.980 | 0.976 |

Source: SITRAMP Mini Person Trip Survey, 2000

**Table 5.1.3 Trip Production Rates for Other Trip Purposes**

(unit: trips per person per day)

| Income Group | All Purpose | Home to Others | Others to Home | Non Home Based Business | Non Home Based Others | Non Home Based Total |
|---|---|---|---|---|---|---|
| High &U Middle | 1.846 | 0.212 | 0.225 | 0.037 | 0.109 | 0.146 |
| Lower Middle | 1.699 | 0.161 | 0.160 | 0.017 | 0.064 | 0.081 |
| Low | 1.604 | 0.163 | 0.163 | 0.010 | 0.029 | 0.039 |
| All Income | 1.701 | 0.175 | 0.178 | 0.019 | 0.062 | 0.082 |

Source: SITRAMP Mini Person Trip Survey, 2000

(2) Average Trip Length

Average trip length varies according to trip purpose and income level. In general higher income group indicates longer average trip length. Compared with the other trip purposes, the trip length of Home Based School trips are relatively shorter on average.

As urbanized areas have been expanded outward to Botabek, around 760 thousand workers commute to Jakarta every day. The average trip length for "to work" purpose has increased from 6.68 km in 1985 to 8.51 km in 2000, while the

**Table 5.1.4 Average Trip Length by Trip Purpose and Income Group**

(Unit : km)

| Income Level | To Work | | To School | |
|---|---|---|---|---|
| | 1985 [1)] | 2000 [2)] | 1985 | 2000 |
| High | 8.98 | 10.22 | 4.36 | 7.43 |
| U. Middle | 8.05 | 10.04 | 3.47 | 4.59 |
| L. Middle | 7.02 | 9.96 | 2.65 | 3.89 |
| Low | 5.58 | 5.95 | 2.14 | 1.96 |
| All | 6.68 | 8.51 | 2.69 | 3.52 |

Source: 1) ARSDS Supporting Report No3., JICA 1985
2) SITRAMP Mini Person Trip Survey, 2000
Note: ARSDS Home Interview Survey was conducted in DKI Jakarta only.

length for "to school" trips also increased from 2.69 km to 3.52 km. This increase in trip length have imposed heavier burden on transport network in terms of person kilometers.

(3) Concentration of Trips in CBD

Concentration of travel demand in CBD causes traffic congestion on the road network as well as buses and train overcrowded. Trip attraction of "to work" as illustrated in Figure 5.1.1, is concentrated in the central area enclosed by the railway semi-loop line, a newly developed "Sudirman-Kuningan Golden triangle" area and areas along the Cawang – Grogol – Pluit toll road (Jakarta Intra Urban Tollway S-W section). The trip attraction of these areas accounts for 53 percent of the total trip attraction of "to work" trips in DKI Jakarta.

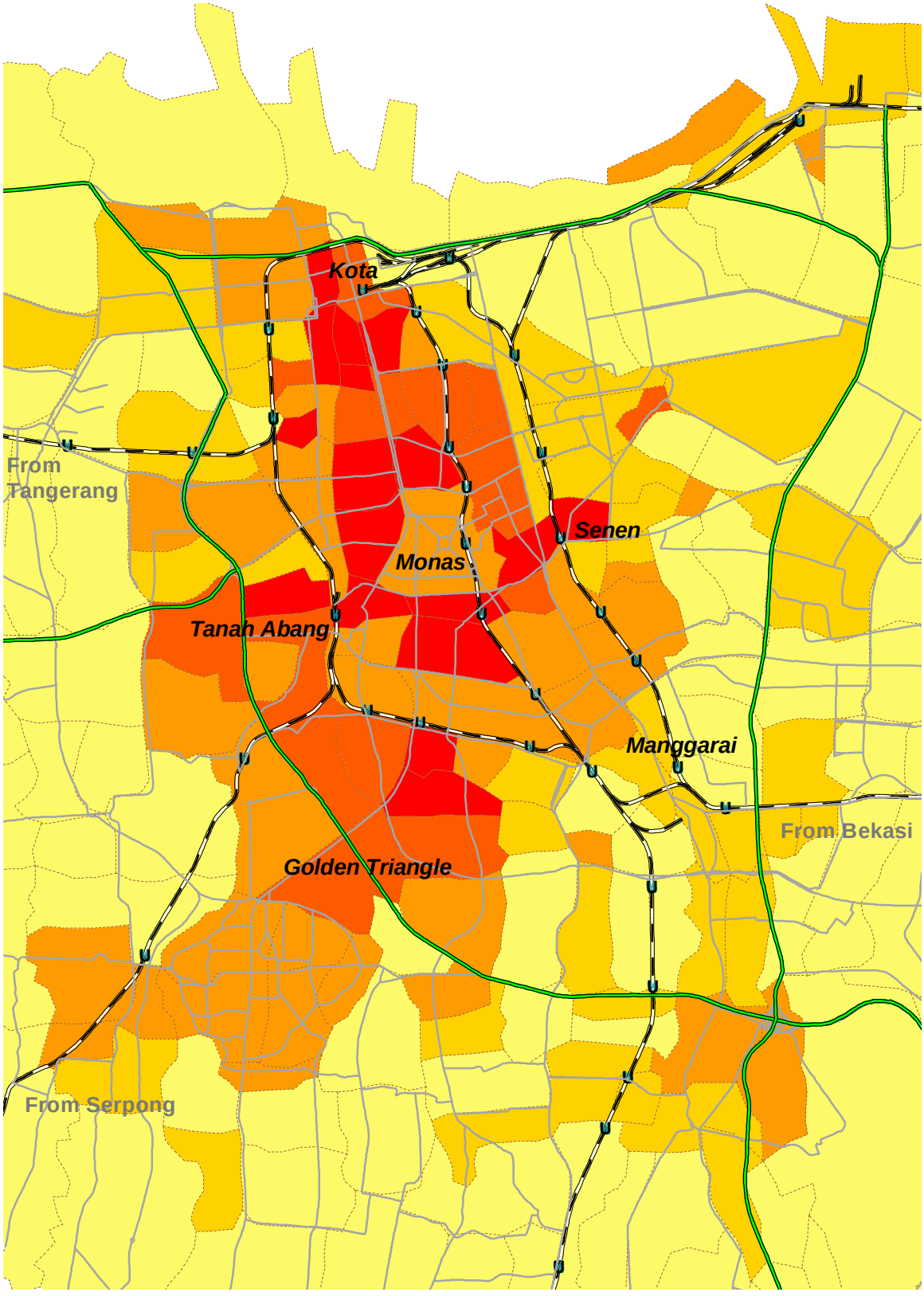
(4) Modal Composition

The modal composition in the Jabotabek region was estimated as shown in Table 5.1.5. Of all the person trips made by motorized modes of transport, more than 50 percent are made by buses. Even though the number of buses has been decreasing due to the economic crisis, a bus is still the most significant mode of transport used by the majority of citizens in the region. On the other hand, among private modes of transport, a car is used by 30 percent of people and a motorcycle is used by 18 percent of people. Compared to the modal share in 1985, the share of public transport has been decreasing slightly from 57 percent to 52 percent. In contrast, the share of private cars has increased from 22.8 percent to 30.8 percent. The share of motorcycle has reduced from 20.2 percent to 14.2 percent. General trend of modal shift from public transport to private mode has been observed during the last 15 year period.

**Table 5.1.5 Person Trips by Mode of Transport, 2000**

| Description | Person trips per day | Composition Of all modes | Of motorized modes |
|---|---|---|---|
| All modes of transport | 29,168,330 | 100.0% | - |
| Non-motorized modes of transport | 8,402,771 | 28.8% | - |
| Motorized modes of transport | 20,765,559 | 71.2% | 100.0% |
| - Motorcycle | 2,954,512 | 10.1% | 14.2% |
| - Car | 6,404,503 | 22.0% | 30.8% |
| - Bus (incl Patas AC) | 10,938,646 | 37.5% | 52.7% |
| - Train | 416,426 | 1.4% | 2.0% |

Source: SITRAMP Estimate




**LEGEND**

- Railway Station
- Railway Line
- Tollway
- Major Road
- Kelurahan/Desa Boundary

- - 50
- 50 - 100
- 100 - 300
- 300 - 500
- 500 -

0 1 2 3 4 Km

N

Figure 5.1.1

Work Place Density 2000

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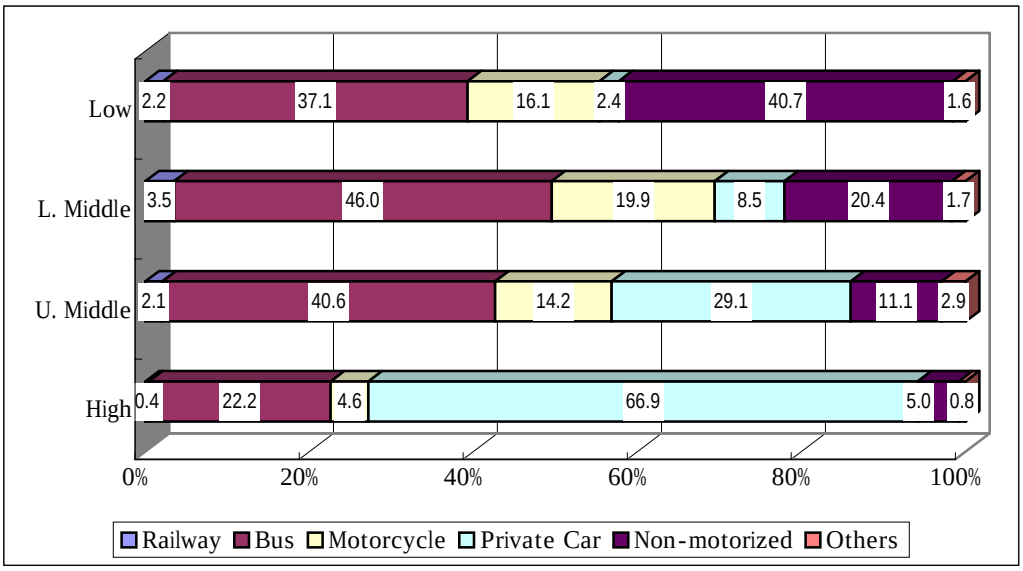
The Study on
Integrated Transport Master Plan
for JABOTABEK
(Phase I)

(5) Limited Choice of Transport Modes

The modal share varies according to income level. High income households depend strongly on private car for their travel need and its share amounts to 66.9 percent as illustrated in Figure 5.1.2. Even though not as high as the high income group, the upper middle income households also rely on the use of private cars. The usage of public and non-motorized transport is rather limited for these two income groups. Public transport, non-motorized transport and motorcycle are dominant modes for the lower middle as well as the low income group. For instance, as for the lower middle income group, the usage of bus transport accounts for 46.0 percent and that of motorcycle is 19.9 percent. For the low income group the share of non-motorized transport is as high as 40.7 percent. This implies that even use of public transport is economically difficult for low income group. Thus they heavily rely on non-motorized modes. Therefore, provision of transport means for transportation for the transportation poor is one of important issues to tackle with.




Source: SITRAMP Mini Person Trip Survey, 2000

**Figure 5.1.2 Modal Share by Income Level**

## 5.2 Road Network and Traffic Demand

The remarkable feature of the road network in Jakarta is that several wide arterial streets exists but the network is short of collector streets, which connects arterial street and local streets, thus a road network hierarchy has not been well developed. On the other hand, the road network in Botabek consists of a few arterial roads connecting Jakarta and other regions.

(1) Traffic Demand on Road Network

Traffic demand on road network has been continuously growing. The 16-hour traffic demand on the cordon lines in 1993 showed a total volume of 523 thousand vehicles, excluding motorcycles (Table 5.2.1; representing an increase from the 290 thousand vehicles in 1988, the volume continued to grow to 782 thousand vehicles in 2000. Thus, the total cordon line traffic demand has increased by almost six (6) percent per annum during 1993-2000; a rate lower than that during 1988-1993 (around 12.6 percent per annum).

Analysis on the cordon traffic growth by direction (see also Figure 5.2.1) confirms the general decrease in the growth rate. Although during 1988-1993 the traffic at the west and east segment of the cordon line grew at a similar rate of around 16 percent per annum, the rate declined to 8.1 percent p.a. and 6.4 percent p.a., respectively during 1993-2000. The south segment of the cordon line has the smallest growth at 7.4 percent per annum throughout 1988-1993, yet the growth rate declined further to 3.4 percent per annum during 1993-2000.

On the other hand, traffic in inner Jakarta tended to maintain a stable growth rate in the past decade. From 1988 to present, traffic on the screen line A grew at a rate ranging from 6.1 percent to 6.5 percent per annum, while the screen line B grew at a modest 1.9 percent to 2.2 percent per annum. The growth of 16-hour traffic (excluding motorcycles) on screen line B is lower than that on screen line A, particularly because of the fairly small increase of traffic to/from south Jakarta.

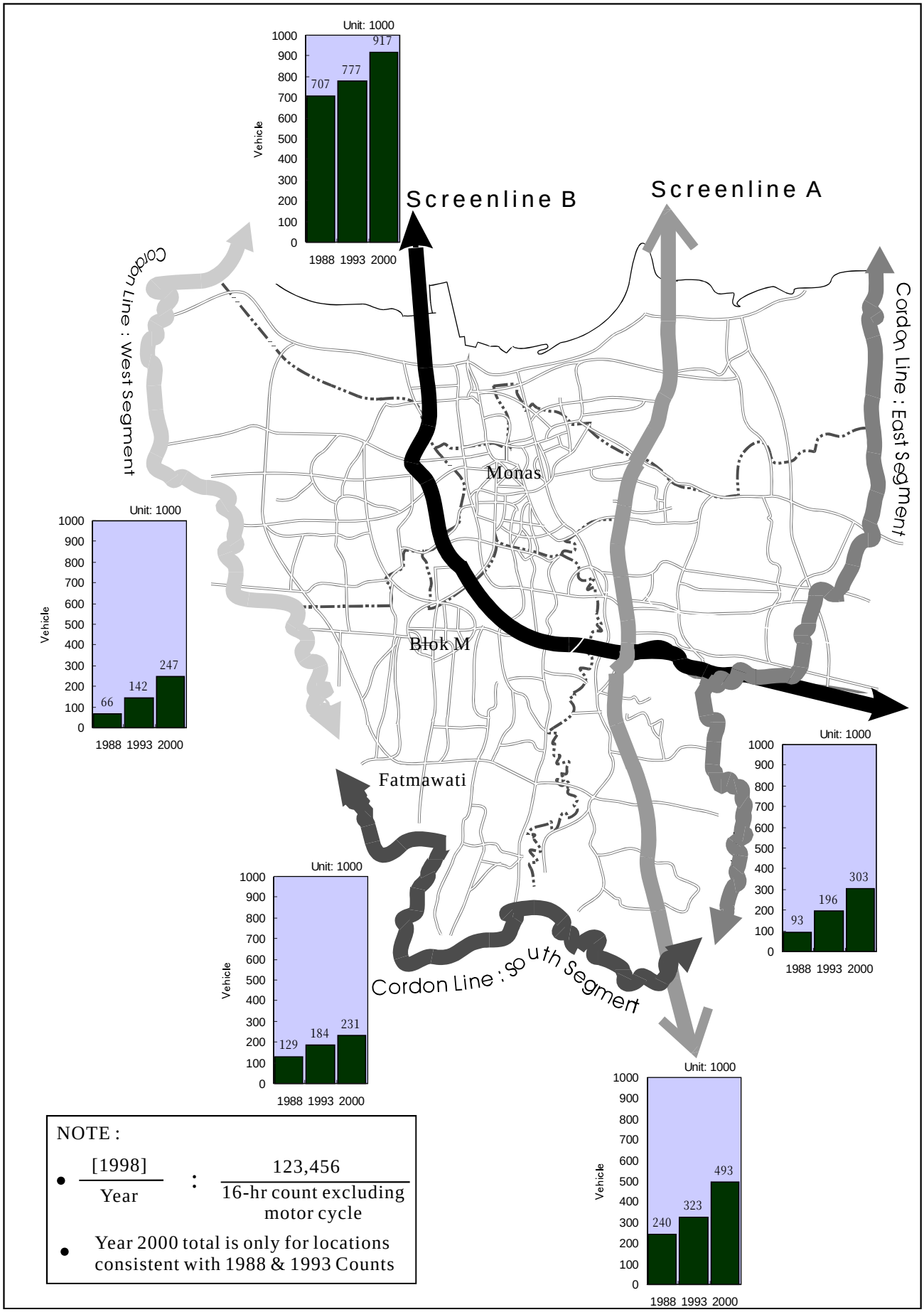
The analysis on traffic growth indicates a continuous growth of traffic along the east-west axis of the Jakarta metropolitan area exceeding that on the north-south axis.

**Table 5.2.1 Screen Line and Cordon Line Traffic Volume Comparison 1988-2000**

(unit: 000 vehicles per 16 hours)

| Section | Traffic Volume[1] | | | Growth Rate | |
|---|---|---|---|---|---|
| | 1988[2] | 1993[3] | 2000[4] | 1988-1993 | 1993-2000 |
| **Cordon Line** | | | | | |
| - West Segment | 67 | 142 | 245 | 16.3% | 8.1% |
| - South Segment | 129 | 185 | 233 | 7.4% | 3.4% |
| - East Segment | 94 | 196 | 304 | 16.0% | 6.4% |
| **Cordon Line Total** | **290** | **523** | **782** | **12.6%** | **5.9%** |
| Screen Line A | 241 | 323 | 501 | 6.1% | 6.5% |
| Screen Line B | 708 | 777 | 905 | 1.9% | 2.2% |

(1) 16-hour volume excluding motorcycle
(2) Source : Jakarta Outer Ring Road Study, 1988
(3) Source : Arterial Road System Development Study, JICA, 1993
(4) Only on locations consistent with those in 1993




Source: SITRAMP Traffic Count Survey, 2000

**Figure 5.2.1 Traffic Growth on Screen and Cordon Lines: 1988-2000**

(2) Traffic Congestion

Congestion is the most visible symptom of traffic problem. Generally speaking, congestion occurs when and where demand exceeds the capacity. Traffic congestion on the road network is indicated by travel speed in the morning peak hours in Figure 5.2.2.

There are numerous locations in Jabotabek where traffic congestion is a daily occurrence. These locations are shown in Figure 5.2.3. Various root causes of congestion are described below. Often congestion is caused by multiple reasons.

- Physical bottleneck due to inconsistent carriageway width
- Intersection
- Street market/street vendors
- Inadequate place for bus passenger boarding and alighting
- On-street parking (illegal parking, double parking and parking maneuver)
- Bus terminal
- U-turn
- Railway crossing
- Others Causes such as weaving, bad pavement, flooding, and the like.

## 5.3 Existing Traffic Control and Management System and Problems

(1) Existing Traffic Signal System and Complexity

A traffic signal is the most basic facility of traffic control. Currently, there are three ATC systems in Jakarta supplied by Sainco of Spain, Siemens of Germany, and AWA of Australia through Telnic of Indonesia. Coexistence of three different systems is a result of consolidation of the previous fragmented traffic signal system. The approach taken would have been economical in the short term. But DLLAJ had to procure three different kinds of central systems and now has to maintain three systems requiring different set of spare parts. In addition, DLLAJ staff has to master the knowledge of control software and database for each system, which imposes a burden on the human resources.

The existing traffic signal system has the following drawbacks:

- Signal timing is not responded to real time traffic demand,
- Operation and maintenance cost for communication is expensive,
- Hardware maintenance work is minimal level,
- Updating of signal timing is not sufficient and has not been modified, and

Number of traffic signals is in shortage in Botabek.

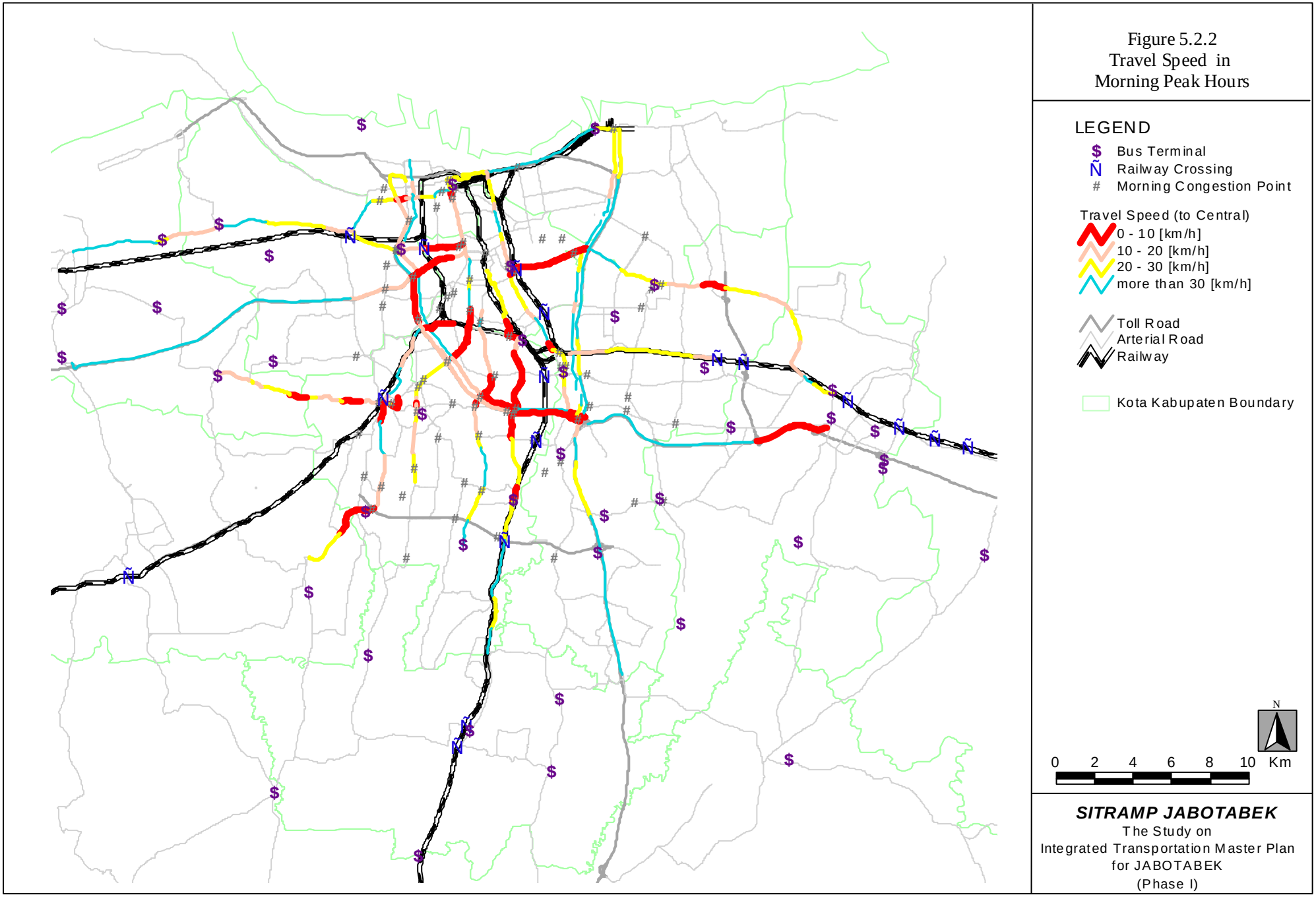


Figure 5.2.2
Travel Speed in
Morning Peak Hours
LEGEND
$ Bus Terminal
Ñ Railway Crossing
# Morning Congestion Point
Travel Speed (to Central)
0 - 10 [km/h]
10 - 20 [km/h]
20 - 30 [km/h]
more than 30 [km/h]
Toll Road
Arterial Road
Railway
Kota Kabupaten Boundary
N
0 2 4 6 8 10 Km
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(Phase I)

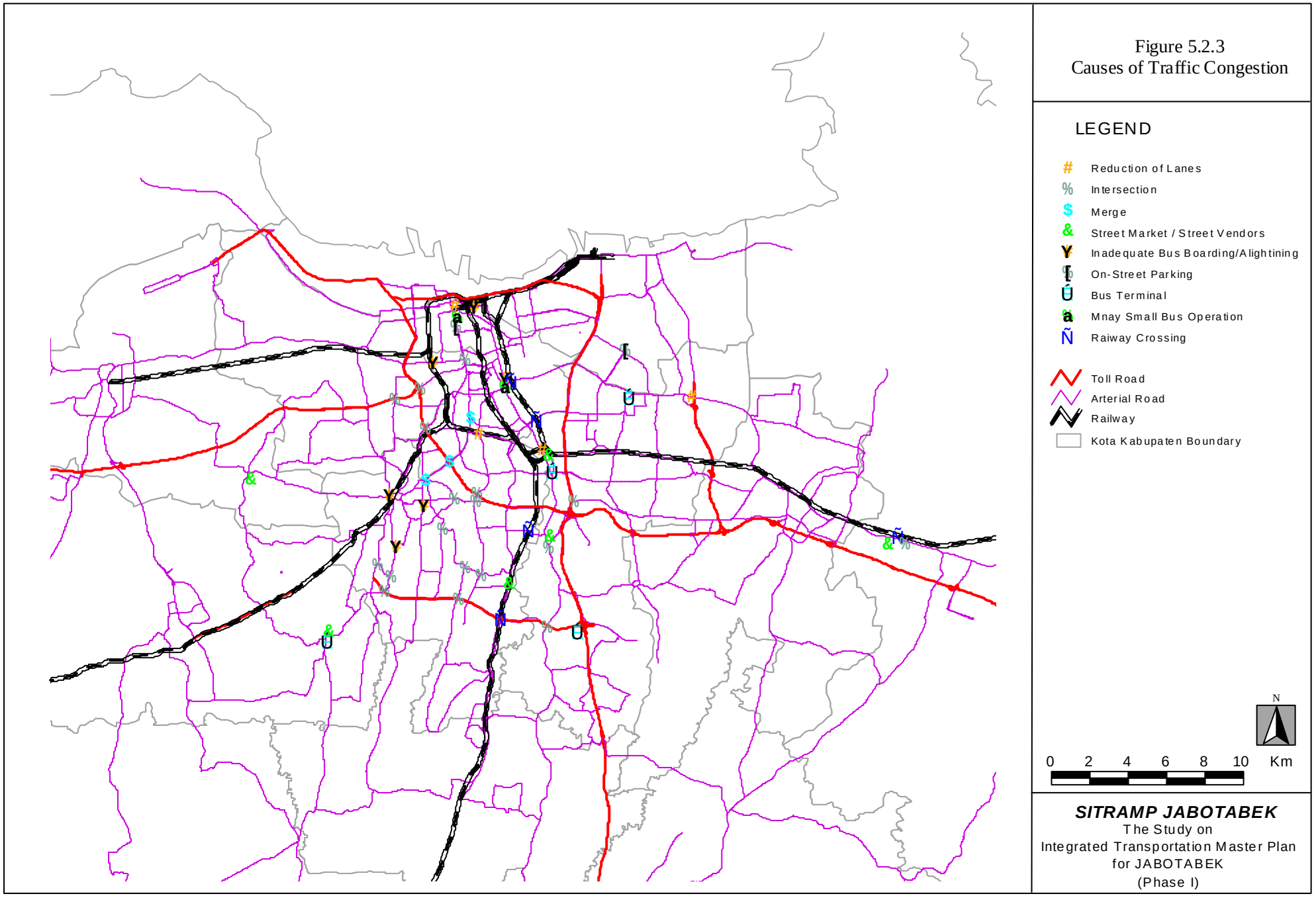
Figure 5.2.3
Causes of Traffic Congestion
LEGEND
# Reduction of Lanes
% Intersection
$ Merge
& Street Market / Street Vendors
Y Inadequate Bus Boarding/Alightining
[ On-Street Parking
Ú Bus Terminal
a Mnay Small Bus Operation
Ñ Raiway Crossing
Toll Road
Arterial Road
Railway
Kota Kabupaten Boundary
N
0 2 4 6 8 10 Km
SITRAMP JABOTABEK
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(Phase I)

(2) Difficult Application of One-way System

One-way system restricts the flow direction to one direction. It increases capacity of road section as well as intersection, and it simplifies the movement at an intersection. On the other hand, the trip length becomes longer, due to the restriction on flow direction, and public transport users suffer inconvenience due to route diversion. To circumvent the second disadvantage, one-way is not applied and one lane is assigned only to buses in the opposite direction along Melawai Raya (permanent) and Panglima Polim (during contra flow time). Normally one-way system is applied to two streets parallel to each other. But this is not a case for the most of one-way systems in the Study area. Most of the one-way systems in the Study area have irregular shape due to peculiar road network configuration.

(3) Right-turn Prohibition and U-turn Problem

On almost all major roads, right-turn is not allowed, thus, vehicles, which want to turn to the right must turn 3 times to left or make U-turn on the road. However 3-time left turn is not practical in Jakarta due to little presence of suitable roads to turn left. Vehicles, therefore, are forced to use U-turn openings of median strip. Since U-turn maneuver heavily disturbs traffic flows, interval of U-turn openings is set generally at long distance and long queue of waiting vehicles is observed at every U-turn opening. Prohibition of right-turn at intersections enables to avoid traffic obstruction caused by right-turn vehicles especially at the intersections without traffic signal and allow traffic on main road run at high speed until next obstruction by U-turn opening. On some of major trunk roads, therefore, median is opened in long interval to maintain high vehicular speed. This traffic control was effective when traffic volume was not large and signal control was not introduced. However it may be the time of review of this policy from time and energy consumption viewpoint and also environmental viewpoint.

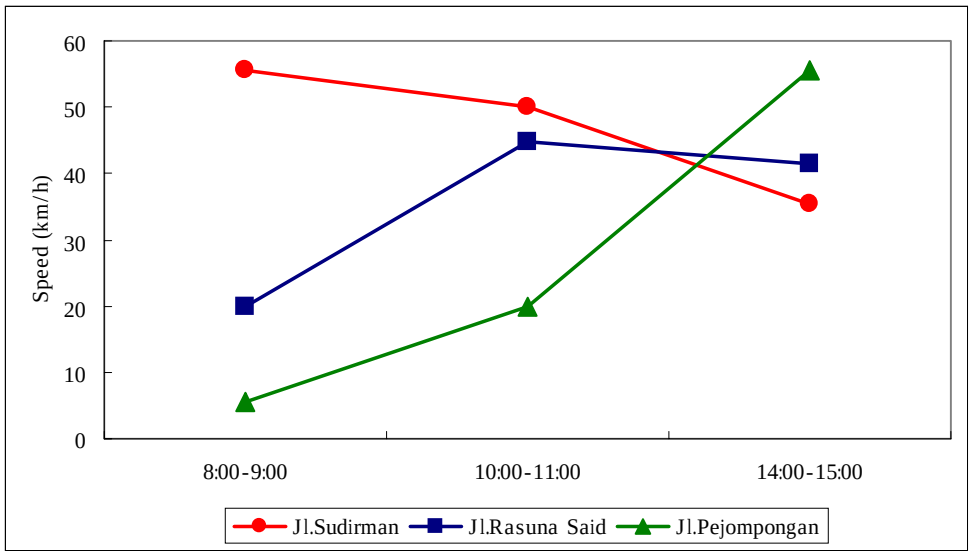
(4) Traffic Restraint Scheme: 3-in-1 Policy and its Drawback

In Jakarta, 3-in-1 scheme is applied to Jl. Thamrin, Jl. Sudirman and a part of Jl. Gatot Subroto from 6:30 a.m. to 10:00 a.m. on Mondays through Fridays. During the restricted time, only vehicles with three or more passengers are allowed to enter the restricted road sections. Taxi and public bus are exempted from the restriction. Enforcement is done through surveillance by traffic police and offenders are apprehended on the spot.

The scheme is generally observed and the measure is effective in reducing the number of vehicles entering the restricted zone resulting in a smooth traffic flow during the restricted time. But it has repercussions.

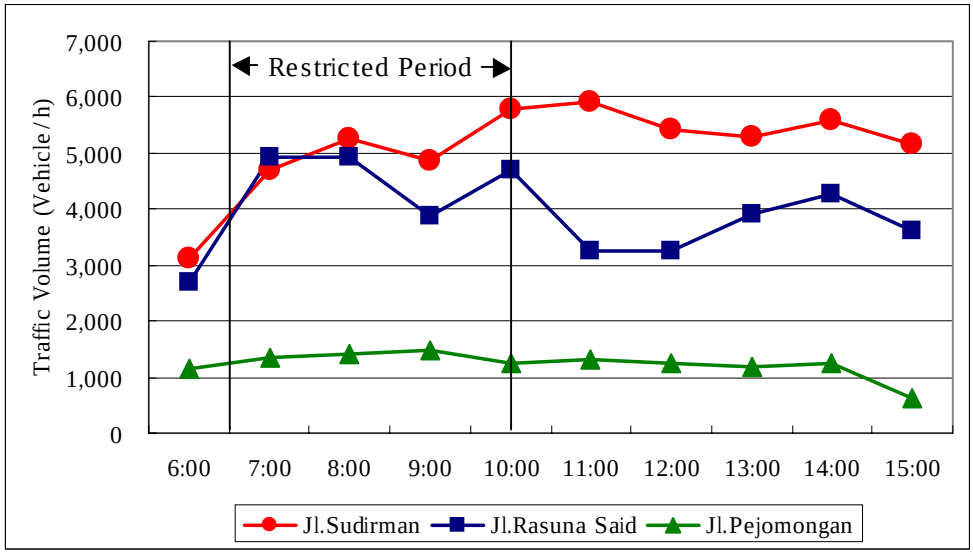
a) Congestion on Parallel Streets

The streets running parallel to the restricted streets, such as Jl. Rasuna Said and Jl. K. H. Mas Mansyur, are crowded by the vehicles bypassing the restricted streets. Consequently traffic demand on the parallel streets increases during the restricted hours and it decreases travel speed significantly. (See Figures 5.3.1 and 5.3.2) Therefore it is in question that merely traffic restriction on one road could achieve efficiency for a whole network.




Source: SITRAMP Travel Speed Survey, 2000

**Figure 5.3.1 Impact of "3 in 1" Policy on Travel Speeds of the Parallel Streets**




Source: SITRAMP Traffic Count Survey, 2000

**Figure 5.3.2 Impact of "3 in 1" Policy on Traffic Demand of the Parallel Streets**

b) Jockey Problem

Furthermore temporary passengers called "jockey" are waiting just outside of the restricted zone to satisfy the requirement of the number of passengers for normally Rp2,000. This practice reduces the effect of the traffic restraint policy by disturbing achievement of one objective of reducing vehicular traffic on the restricted roads.

c) Inflexibility and Lack of Revenue

Other drawbacks of 3-in-1 are inflexibility and lack of revenue. The current requirement of minimum three passengers cannot be raised for stricter restriction nor eased for more lenient restriction. The former is too restrictive and the latter is too generous in Jakarta where use of a driver for a private car is common. Unlike congestion charging or road pricing, there is no revenue to the City Government, while enforcement incurs cost to the traffic police.

## 5.4 Traffic Safety

(1) Traffic Accidents on Non-Toll Roads in Jakarta Metropolitan Area

Total number of victims in traffic accidents in the Jakarta metropolitan area has significantly decreased in the last decade as shown in Figure 5.4.1. The total number of accident victims in 1998 was decreased to one third of those in 1986. However the total number of lives lost in traffic accidents has not been decreased and it varies around 500 persons in a year.

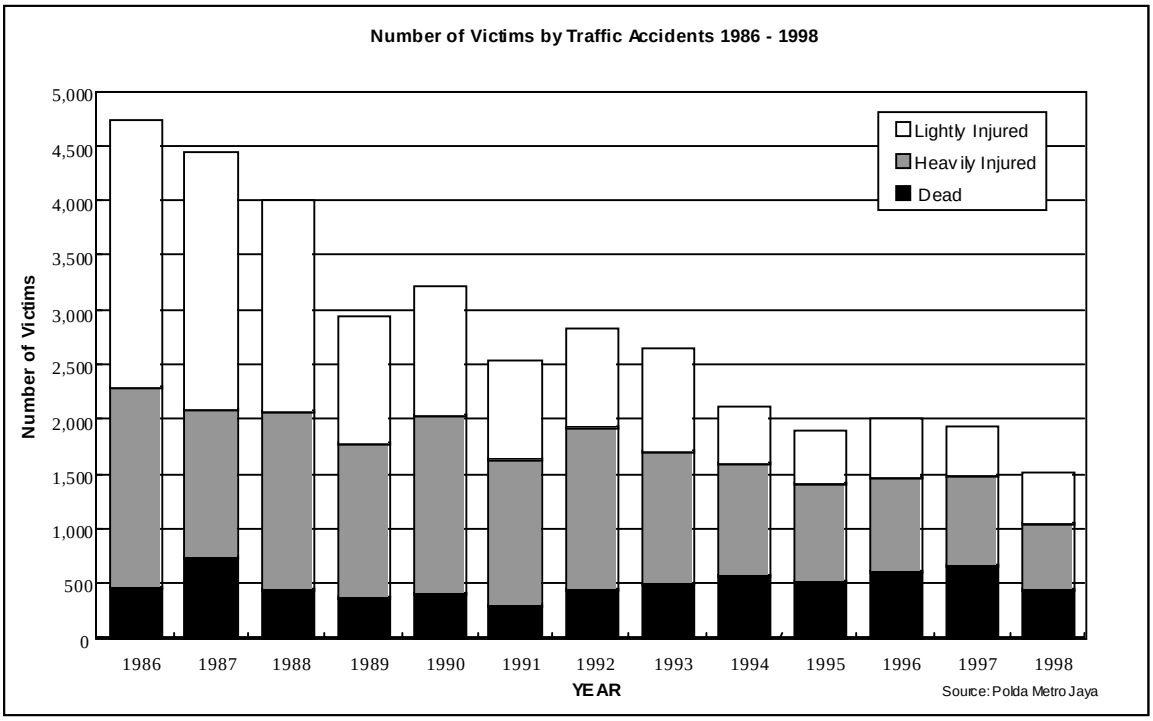



**Figure 5.4.1 Number of Traffic Accident Victims: 1986 – 1998**

(2) Causes of Traffic Accidents on Non-Toll Roads

Causes of traffic accidents are largely categorized into four groups; namely driver's mistake, lack of vehicle maintenance, lack of road maintenance and bad weather. About three fourth of traffic accidents are attributed to driver's mistake, consisting of "careless driving (26.3 percent)," "violation of traffic law (24.7 percent)," "unskilled driver (15.0 percent)," and so forth. In order to reduce the traffic accidents caused by driver's mistakes or carelessness traffic safety education should be enhanced.

It is remarkable that lack of vehicle maintenance accounts for 16.3 percent of causes for traffic accidents. Problem with tires amounts to 9.3 percent whereas brake problem 6.7 percent. Besides, bad road condition such as holes on the road and damaged or slippery roads also cause traffic accidents, accounting for 9.5 percent of total accidents.

(3) Traffic Accidents on Toll Roads

Number of traffic accidents on toll roads has not been decreased. The number of traffic accidents in 1996 was recorded at 3123 and the total number of accidents

has remained at the same level in 1999 as shown in Table 5.4.1. The probability of occurrence of traffic accidents, however, has been decreased because the total number of vehicles on toll roads has increased in the same period. The traffic accident rate, which was 48.6 accidents per 100 million vehicle kilometers in 1996, reduced to 39.6 in 1999. Injury rate has also steadily decreased from 64.3 persons per 100 million vehicle kilometers in 1996 to 47.8 persons in 1999, whereas fatality rate from 4.81 persons in 1996 to 3.64 in 1999. Although both the injury rate and fatality rate on toll road accidents has significantly reduced in recent years, the rate is still high compared with the injury rate of 16 persons and the fatality rate of 0.4 persons per 100 million vehicle kilometers in Japan as of the year 1998.

(4) Causes of Traffic Accidents on Toll Roads

Similar to the causes of traffic accidents on non-toll roads, traffic accidents on toll roads are also mostly caused by driver's mistakes. Composition of accidents attributed to driver related causes amounted to more than 60 percent in the last four years. Among the causes related to driver's mistakes, "sleepy" is remarkably high at some 20 percent of all the accidents, compared with non-toll road accidents. In the same way as non-toll road traffic safety, driving education programs should be enhanced and driving technique on expressway should be incorporated in the program.

Causes related to lack of vehicle maintenance indicate much higher composition of 37.4 percent than non-toll road accidents. Among the causes related to the vehicles, "flat tire" accounts for as much as 25.7 percent, followed by "slippery" of 5.4 percent. To deal with this problem, vehicle inspection system to private vehicles should be introduced at earlier time, since malfunction of vehicles would bring about severe traffic accidents especially on expressway.

**Table 5.4.1 Traffic Accidents on Toll Roads: 1996 - 1999**

| | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|
| Road length (km) | 441 | 446 | 478 | 478 |
| Traffic volume per day (number of vehicles) | 1,192,399 | 1,267,352 | 1,336,662 | 1,620,894 |
| Average travel length (km) | 14.8 | 15.9 | 14.1 | 13.6 |
| Total vehicle km per day | 17,609,826 | 20,209,180 | 18,874,359 | 22,081,599 |
| Number of traffic accidents | 3,123 | 3,267 | 2,972 | 3,192 |
| Traffic accident rate per 100 million vehicle km | **48.6** | **44.3** | **43.1** | **39.6** |
| Number of accidents without victims | 1,399 | 1,582 | 1,403 | 1,523 |
| Number of accidents with light injury | 788 | 789 | 704 | 756 |
| Number of accidents with heavy injury | 727 | 673 | 656 | 711 |
| Number of fatal accidents | 209 | 223 | 209 | 202 |
| Number of victims with light injury | 2,739 | 2,377 | 2,046 | 2,504 |
| Number of victims with heavy victims | 1,397 | 1,317 | 1,236 | 1,347 |
| Number of fatalities | 309 | 335 | 277 | 293 |
| Injury rate per 100 million vehicle km | **64.3** | **50.1** | **47.6** | **47.8** |
| Fatal accident rate per 100 million vehicle km | 3.25 | 3.02 | 3.03 | 2.51 |
| Fatality rate per 100 million vehicle km | **4.81** | **4.54** | **4.02** | **3.64** |

Source: Traffic accident monthly report of December [*Laporan Kecelakan Lalu Lintas di Jalan Tol*], each year from 1996 to 1999, PT. Jasa Marga
Note: All the traffic accidents in Indonesia are included

## 5.5 Present Railway Transportation Problems

Although passenger demand of Jabotabek railway passenger has been increasing rapidly, the share of railway is still low and accounts for merely two percent of the total person trips made by motorized modes of transport in Jabotabek.

The low passenger demand is partly attributed to low level of service such as low frequency, lack of punctuality, poor station facilities, insufficient station plazas and access roads.

## 5.6 Present Bus Transport Problems

The level of bus service at present is low in many aspects, such as lack of punctuality, unexpected cease of operation, long waiting time, insecurity on board, untidy inside bus fleets, among others. One of the root causes of unreliable and uncomfortable bus operation has been found in the bus rental system. Another cause is weak capability in bus route planning, and a lack of enforcement on bus operations.

Bus transport has also been damaged by the Asian Economic Crisis. After the economic crisis, purchase of spare parts imposed an additional financial burden on bus operators and they cannot afford to maintain bus fleets properly. The number of buses operating on the roads has decreased, due to lack of investment for replacement of buses; thus, buses are overloaded.

Factors causing bus transport problems related to other factors and many factors are in "cause and effect" relation. This relationship can be expressed in a problem structure diagram as depicted in Figure 5.6.1. The existing bus operation regime, namely bus rental system, weak financial capability of bus operators, weak enforcement and lack of planning and management capability of regulatory agency have been identified as the "root causes" of urban bus transport problems.

In order to improve bus operation system, reformation of bus operation regime is a primary issue. As being planned by DLLAJ, complete change of bus licensing scheme, such as tendering system for bus route, is urgently needed. To materialize the reformation, first of all, specification of bus operation should be established. Furthermore how to monitor the bus operation and how to collect bus fares properly are two main planning issues.

## 5.7 Lack of Integration between Land Use and Transport System

Until recently, the railway network has not been developed for passenger travel within urban areas. Currently the land use surrounding the railway stations is not appropriate for railway transport system. In order to attract rail passengers it is preferable if highly dense urban facilities were located in the walking distance from the stations. However at present high-rised office buildings and commercial facilities are seldom found. The present land use nearby the stations is often occupied by low-class housings in urban areas. Consequently sufficient passenger demand for the railway cannot be expected from the existing urban land use.

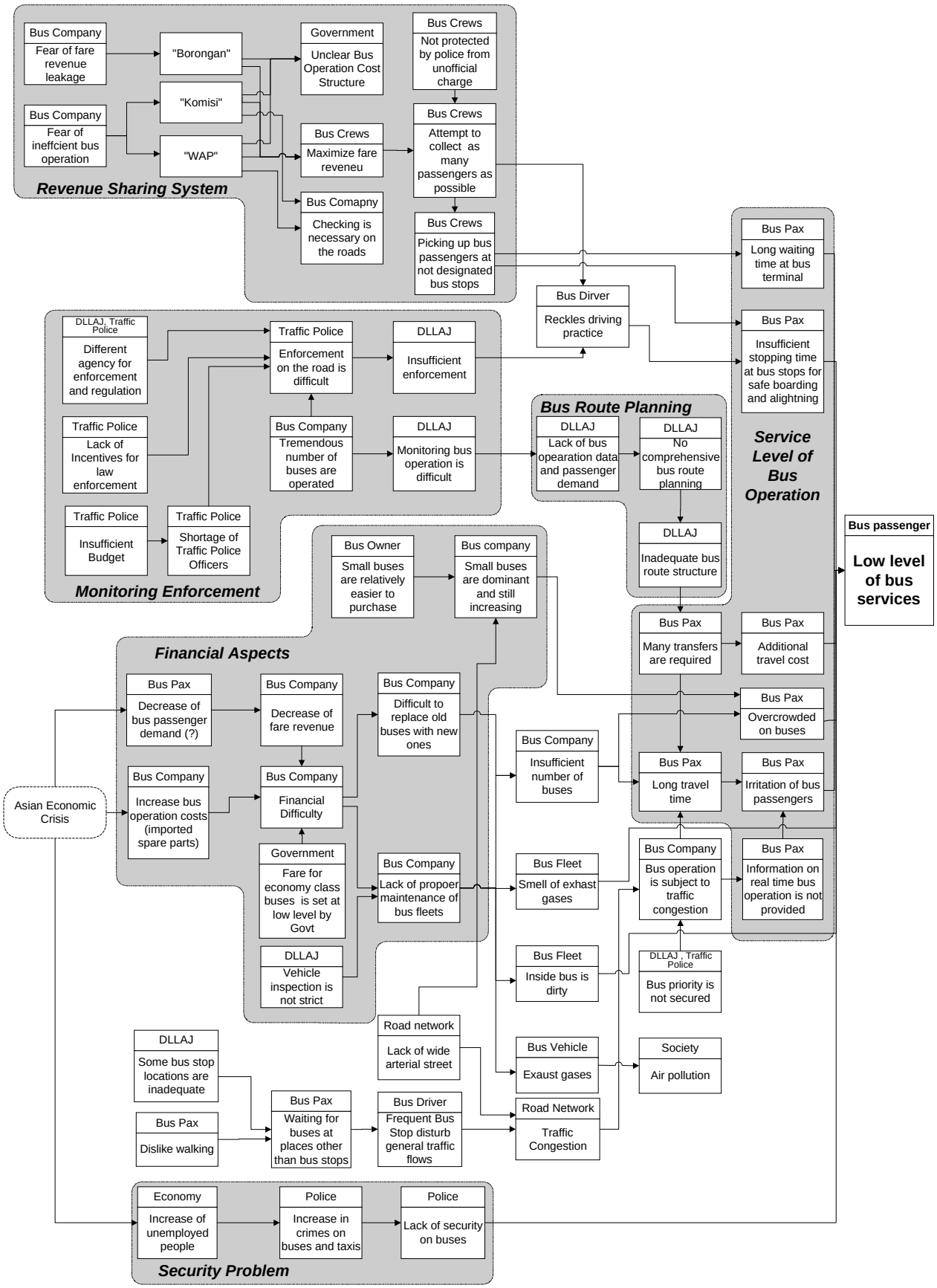



**Figure 5.6.1 Problem Structure of Present Bus Operation**

## 5.8 Lack of Integration between Different Modes of Transport

Integration between railway and other modes of transport can be made at an interchange transport node, namely, a station plaza. Furthermore, integration between railway and road transport is provided by access roads to railway stations. However, these transport facilities have not been well developed.

## 5.9 Air Pollution Problems caused by Automobiles

Air pollution in Jabotabek was an occasional annoyance in the past, but it has become a new chronic issue as a threat to the urban people's health.

(1) Air Conditions in Jabotabek

Although Nitrogen Oxide (NOx) and Lead (Pb) concentration levels measured at survey location are all within the allowable levels, daily maximum values of Total Suspended Particles (TSP) exceed the air quality standard at five locations in residential areas and at one location each in commercial and industrial areas out of 12 stations. The value of Sulfur Dioxide ($SO_2$) also exceeds the standards at one residential area. Figures 5.9.1 and 5.9.2 shows the air condition of Jabotabek in comparison with environmental standard.

(2) Sources of Air Pollutant Emissions

The summary of air pollutant emissions by source; i.e. industries, households, automobiles, ships, and aircraft, in Jabotabek is shown in Table 5.9.1 and Figure 5.9.2. As indicated, the main source of air pollutant emissions for NOx is automobiles (68.8%), for SOx is industries (76.3%) and for TSP are industries (57.1%) and automobiles (40.2%).

**Table 5.9.1 Estimated Total Pollutant Emissions by Sources in Jabotabek**

| No | Source | NOx | | SOx | | TSP | |
|---|---|---|---|---|---|---|---|
| | | (ton/year) | ( % ) | (ton/year) | ( % ) | (ton/year) | ( % ) |
| 1 | Industries | 36,832 | 25.7 | 42,697 | 76.3 | 13,581 | 57.1 |
| 2 | Households | 4,962 | 3.4 | 4,220 | 7.5 | 642 | 2.7 |
| 3 | Automobiles | 98,738 | 68.8 | 8,142 | 14.6 | 9,563 | 40.2 |
| 4 | Ships | 1,960 | 1.4 | 808 | 1.4 | - | - |
| 5 | Aircraft | 1,026 | 0.7 | 91 | 0.2 | - | - |
| Total | | 143,518 | 100.0 | 55,958 | 100.0 | 23,786 | 100.0 |

Source: The Study on the Integrated Air Quality Management for Jakarta Metropolitan Area, JICA, 1997

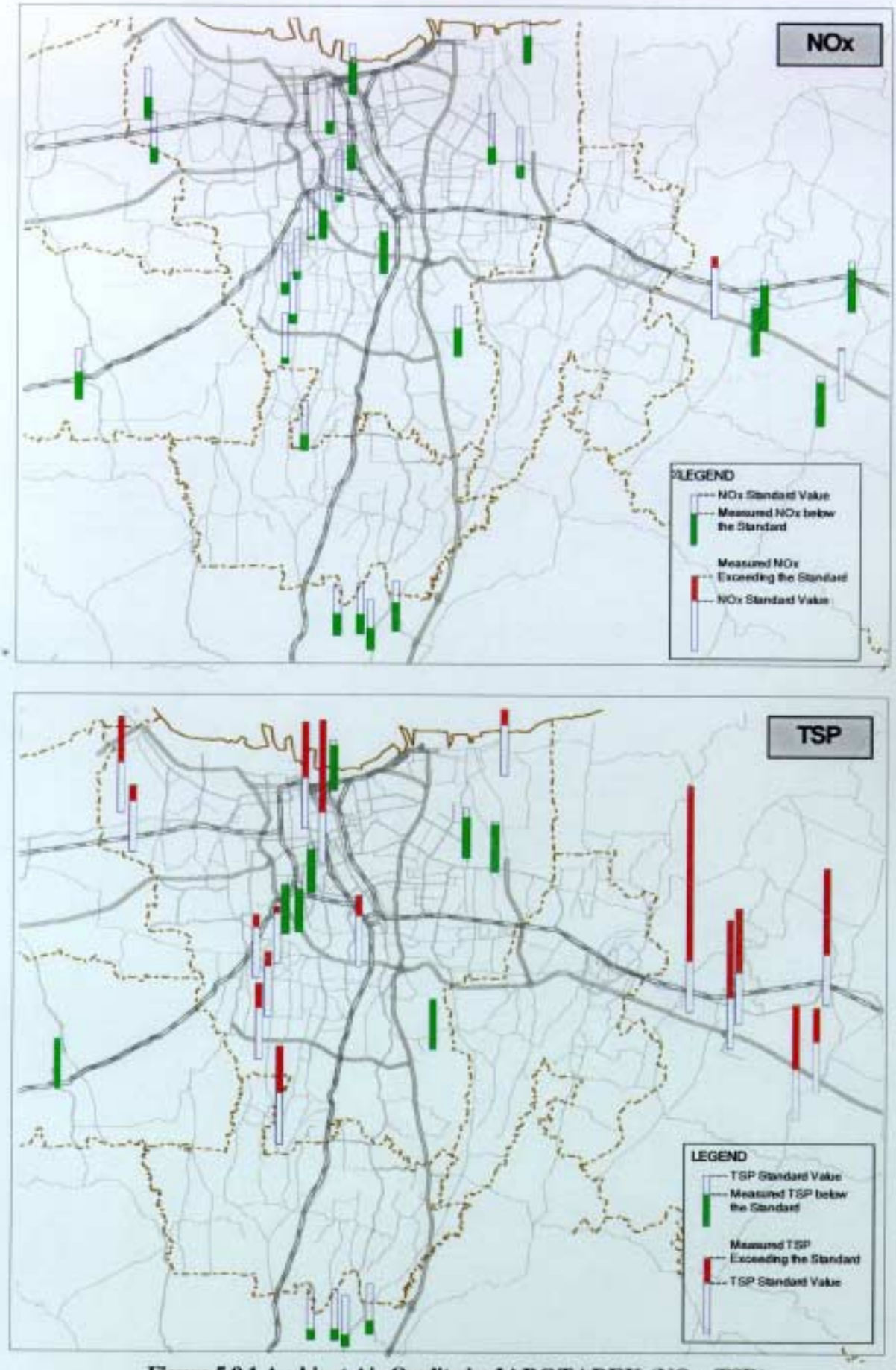



**Figure 5.9.1 Ambient Air Quality in JABOTABEK (NOx, TSP)**

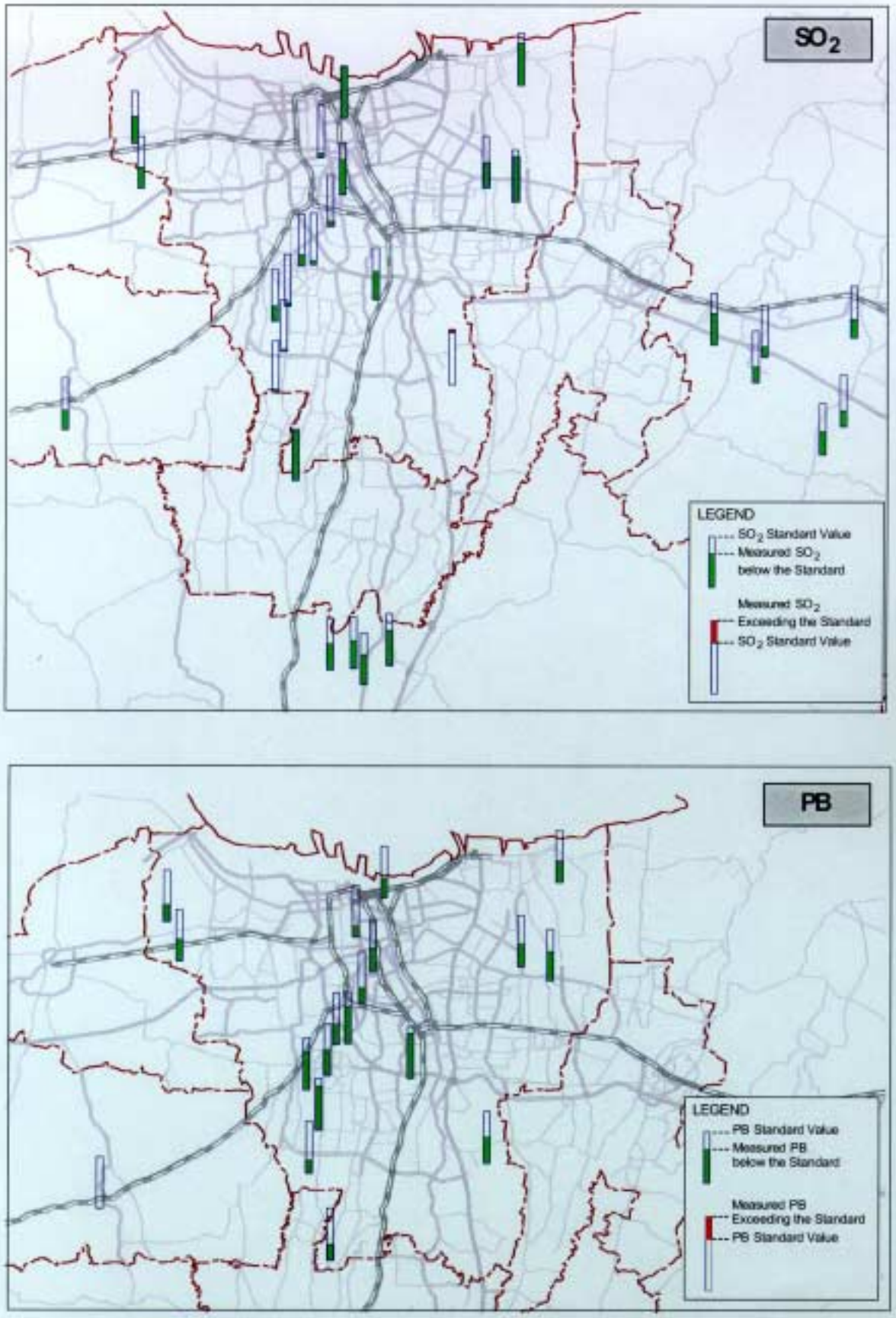



**Figure 5.9.2 Ambient Air Quality in JABOTABEK (SO2, PB)**

## 5.10 Social Factors Affecting Transport System Development and Performance

Many laws and regulations have been drafted and in some are effective, however, some of them have been ignored by citizens or the parties concerned due to lack of cultural climate to obey laws and regulations.

- Compulsory wearing a helmet
- Compulsory wearing a seat belt
- Progressive vehicle tax
- Ticket system for bus transport
- Timetable for bus operation
- 2 in 1 policy of bus fleets

The reason why people do not adhere to the laws and regulation is that people are not aware of these laws and regulations due to lack of public relations and lack of enforcement.

In the era of democracy people easily oppose to government policies due to distrust of policies. Whatever the government propose, people often tend to refuse the proposed policies.

# 6. Decentralization and Changes in Transport Administration

## 6.1 Role and Function of Agencies for Transportation Administration

Indonesia is now in the transition period of decentralization, and it casts significant influence on urban and regional development. The key regulations are Law No.22/1999 on local administration and Law No. 25/1999 on financial demarcation (equalization) between central and local governments. The Law 22/1999 removes the hierarchical structure between province and regency/municipality, and the responsibility of transportation and public works will principally devolve to regency/municipality. A project planning and operation are carried out by local governments, but policy-making remains at the central level. The role of provincial government will become to act as an arm of the central government. The Law 25/1999 allows local governments to enjoy more freedom on budgeting, yet the central government still reserves the authority on tax collection policy.

A major institutional challenge of the transport sector will be role sharing and collaboration with other agencies within the structure of local governments as well as with the provincial and central governments. Financial and human resources shall be allocated accordingly to meet the share of responsibility.

## 6.2 Public Finance

DKI Jakarta has generated more locally raised revenue than other local governments in Botabek, and it received 1.5 times on average as much financial assistance as Java Barat in terms of per household. The resource for development has been unevenly distributed, and the accessibility to the resources generated from their own jurisdiction is appreciably varied. Although DKI Jakarta has spent significant amount of budget for the transport sector compared with local governments in Botabek, they have allocated more share of the budget on transport sector development. However, it is prevailingly understood that an absolute amount of transport development fund is not at a sufficient level to provide sound public services.

# 7. Future Perspective of the Jabotabek Region

## 7.1 Socio-Economic Framework for Jabotabek

(1) Population Framework

The future population was projected based on the population growth analysis as shown in Table 7.1.1.

**Table 7.1.1 Proposed Demographic Framework for Jabotabek**

| Local Administration | Area (Sq.Km) | Population (million) | | | Population Density (/ha) | | |
|---|---|---|---|---|---|---|---|
| | | 2000* | 2005 | 2015 | 2000 | 2005 | 2015 |
| DKI Jakarta | 650 | 8.4 | 9.3 | 10.9 | 128.7 | 143.4 | 167.4 |
| Kab. Bogor | 2,868 | 3.5 | 3.9 | 4.8 | 12.2 | 13.5 | 16.6 |
| Kota Bogor | 119 | 0.7 | 0.9 | 1.0 | 62.5 | 72.0 | 87.2 |
| Kota Depok | 200 | 1.1 | 1.5 | 1.9 | 57.3 | 76.8 | 95.0 |
| Kab. Tangerang | 1,113 | 2.8 | 3.2 | 4.2 | 24.9 | 28.8 | 37.9 |
| Kota Tangerang | 158 | 1.3 | 1.9 | 2.4 | 83.0 | 119.9 | 154.7 |
| Kab. Bekasi | 1,274 | 1.6 | 2.0 | 3.0 | 12.9 | 15.6 | 23.6 |
| Kota Bekasi | 210 | 1.6 | 2.0 | 2.3 | 78.1 | 96.3 | 107.8 |
| BOTABEK | 5,943 | 12.7 | 15.4 | 19.6 | 21.5 | 25.9 | 33.0 |
| JABOTABEK | 6,593 | 21.1 | 24.7 | 30.5 | 32.0 | 37.5 | 46.3 |

Source: SITAMP Estimate
*: Preliminary survey results of Census 2000, BPS Jakarta and BPS West Java Province

(2) Forecast of Future Industrial Employment

Taking into account current changes in employment structure by region and the future development directions and policies, the future employment was projected for the major industrial categories as shown in Tables 7.1.2 and 7.1.3.

## 7.2 Deployment of Suburbanization

Since population in Jabotabek will continue to expand steadily, especially the relatively high growth is expected in Botabek compared to Jakarta. Distribution of population will be further dispersed over the Jabotabek region, and it is predicted that the eastern and western areas will grow more rapidly than the southern areas.

Residential areas therefore will be developed further in Botabek. Planned real estate housing developments can be seen from the permitted real estate housing developments. Most of real estate type housing developments are planned in the east and the west directions. According to the SITRAMP mini-person trip survey, many households in high or upper-middle income groups reside in this kind of housings developed by real estate developers. They are significantly dependent on cars for their travel needs. When they move to suburban area to purchase or rent a new housing, they seem to look for an appropriate housing and its location to meet their needs on the basis of private car use. Under the poor level of public transportation service at present, this tendency would continue again and it would result in dispersed residential area development in suburban areas in Botabek.

## Table 7.1.2 Forecast Future Employment by Industry in DKI Jakarta

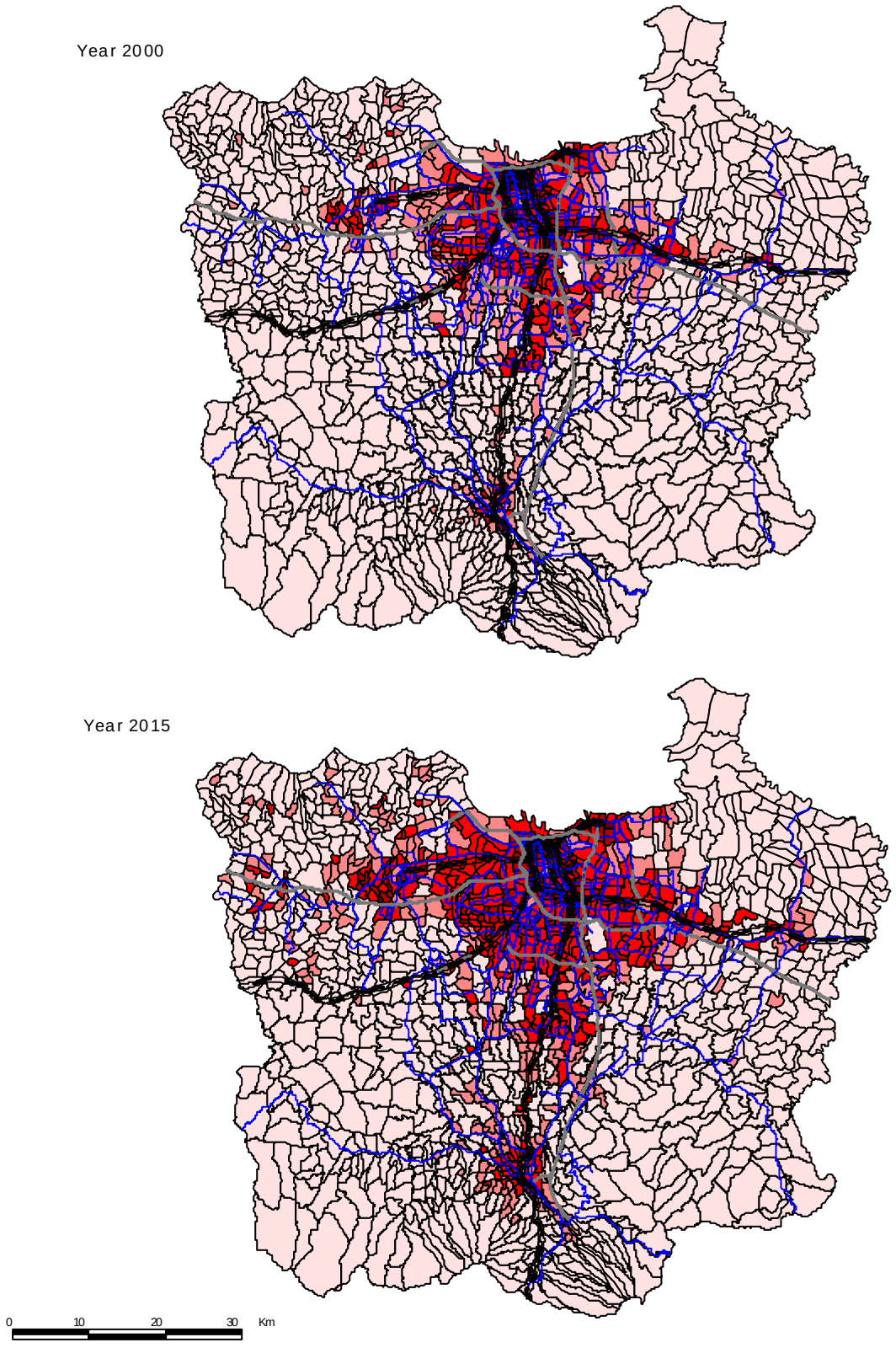
| **Year 2000 ( persons)** | | | | | | |
|---|---|---|---|---|---|---|
| Main Industry | Selatan | Timur | Pusat | Barat | Utara | Total |
| Agriculture, etc. | 2,651 | 4,204 | 1,187 | 3,837 | 10,540 | 22,419 |
| Manufacturing | 72,047 | 175,091 | 47,766 | 167,752 | 126,638 | 589,293 |
| Other 2nd Industry | 34,611 | 35,023 | 10,043 | 24,407 | 14,415 | 118,499 |
| Trade and Services | 584,768 | 682,665 | 285,446 | 534,767 | 384,822 | 2,472,469 |
| Total | 694,077 | 896,983 | 344,442 | 730,763 | 536,415 | 3,202,680 |
| **Year 2005 (persons)** | | | | | | |
| Main Industry | Selatan | Timur | Pusat | Barat | Utara | Total |
| Agriculture, etc. | 2,555 | 3,208 | 983 | 3,336 | 9,989 | 20,070 |
| Manufacturing | 98,225 | 190,964 | 56,303 | 207,183 | 169,852 | 722,527 |
| Other 2nd Industry | 19,927 | 15,025 | 4,785 | 12,350 | 8,125 | 60,211 |
| Trade and Services | 836,643 | 784,506 | 353,971 | 694,315 | 541,797 | 3,211,232 |
| Total | 957,350 | 993,702 | 416,042 | 917,183 | 729,762 | 4,014,040 |
| **Year 2015 (persons)** | | | | | | |
| Main Industry | Selatan | Timur | Pusat | Barat | Utara | Total |
| Agriculture, etc. | 2,239 | 2,079 | 734 | 2,638 | 8,500 | 16,190 |
| Manufacturing | 122,150 | 183,731 | 61,033 | 236,247 | 206,325 | 809,486 |
| Other 2nd Industry | 13,899 | 7,757 | 2,844 | 7,773 | 5,503 | 37,776 |
| Trade and Services | 1,290,466 | 954,366 | 480,621 | 989,058 | 818,613 | 4,533,124 |
| Total | 1,428,755 | 1,147,934 | 545,232 | 1,235,715 | 1,038,940 | 5,396,576 |

Source: SITRAMP Estimate

## Table 7.1.3 Forecast Future Employment by Industry in Botabek

| Year 2000 (persons) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Main Industry | Kab. Bogor | Kota Bogor | Kota Depok | Kab. Tang. | Kota Tang. | Kab. Bekasi | Kota Bekasi | **Botabek Total** |
| (1) Agriculture | 233,890 | 4,493 | 45,009 | 130,721 | 10,798 | 107,272 | 6,782 | 538,964 |
| (2) Manufacturing | 263,729 | 63,056 | 40,976 | 222,770 | 158,825 | 158,546 | 125,112 | 1,033,014 |
| (3) Other 2nd Industry | 80,818 | 15,710 | 9,613 | 58,680 | 20,589 | 24,017 | 15,142 | 224,568 |
| (4) Trade and Services | 581,220 | 185,175 | 302,981 | 570,089 | 302,612 | 301,628 | 451,116 | 2,694,820 |
| Total | 1,159,657 | 268,433 | 398,579 | 982,260 | 492,823 | 591,463 | 598,152 | 4,491,367 |
| Year 2005 (persons) | | | | | | | | |
| Main Industry | Kab. Bogor | Kota Bogor | Kota Depok | Kab. Tang. | Kota Tang. | Kab. Bekasi | Kota Bekasi | **Botabek Total** |
| (1) Agriculture | 225,165 | 3,730 | 48,610 | 114,013 | 11,279 | 98,092 | 6,492 | 507,381 |
| (2) Manufacturing | 412,560 | 86,160 | 70,943 | 319,010 | 265,703 | 237,143 | 194,048 | 1,585,566 |
| (3) Other 2nd Industry | 163,873 | 27,882 | 21,520 | 109,116 | 44,522 | 46,623 | 30,422 | 443,958 |
| (4) Trade and Services | 831,586 | 230,784 | 481,151 | 745,032 | 464,430 | 412,062 | 640,314 | 3,805,358 |
| **Total** | 1,633,184 | 348,556 | 622,223 | 1,287,172 | 785,934 | 793,919 | 871,276 | 6,342,264 |
| Year 2015 (persons) | | | | | | | | |
| Main Industry | Kab. Bogor | Kota Bogor | Kota Depok | Kab. Tang. | Kota Tang. | Kab. Bekasi | Kota Bekasi | **Botabek Total** |
| (1) Agriculture | 110,333 | 1,725 | 25,221 | 63,534 | 5,531 | 67,969 | 2,529 | 276,841 |
| (2) Manufacturing | 647,248 | 128,058 | 115,798 | 546,754 | 411,917 | 478,530 | 255,546 | 2,583,851 |
| (3) Other 2nd Industry | 295,800 | 47,680 | 40,329 | 214,097 | 79,259 | 106,986 | 46,373 | 830,523 |
| (4)Trade and Services | 1,181,044 | 310,555 | 712,179 | 1,160,611 | 652,894 | 759,743 | 759,796 | 5,536,823 |
| **Total** | 2,234,425 | 488,017 | 893,527 | 1,984,995 | 1,149,602 | 1,413,228 | 1,064,244 | 9,228,038 |

Source: SITRAMP Estimate




LEGEND

Population Density (Person/Ha)
- 0 - 50
- 51 - 100
- 101 - 300
- 301 - 500
- >500

Toll Road
Arterial Road
Railway

N

Figure 7.2.1
Expansion of
Sub Urbanization : 2000 - 2015

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## 7.3 Concentration of Job Opportunity in the Central Area of Jakarta

Jakarta will continue to play a significant role as a gateway for international trade and business and social communication. Jakarta also provides a variety of services as a national center and the primary center of the region. Up to present a considerable number of industrial estates have been established in Botabek and further development of industrial estates are being planned.

It is expected that the manufacturing industry will take a leading role for providing job opportunity in the Botabek area. In contrast, agriculture will decrease its share in economic activities under the pressure of urbanization. The present function of the service sector is still weak in Botabek and it does not absorb employed population from local communities. It at most provides population related services, including local government services in suburbs and rural areas. As many as 70 to 80 percent of workers in the surrounding areas in Botabek, except those find their working places in manufacturing and neighborhood services, commute to Jakarta every day.

If urban centers in Botabek will not provide sufficient job opportunities for surrounding communities, many people still should commute to Jakarta for their working place.

In this regard, fostering of urban centers in Botabek is of great importance not merely for balanced and sustainable regional development but also for alleviating excessive concentration of economic activities and travel demand in Jakarta.

## 7.4 Increasing Commuting Trips from Botabek to Jakarta

As the urbanized area expands, more commuters from Botabek to Jakarta will increase continuously. The total number of commuters from Botabek to Jakarta will increase from 762 thousand persons in 2000 to about 1.8 million in 2015, it accounts for 2.4 times of the present demand. To deal with this enormous commuter trip demand, it will require to develop transportation facilities and emphasis should be given to develop efficient mass rapid transit system connecting Botabek and Jakarta, since merely development of road network seems to be difficult to meet the increasing demand.

**Table 7.4.1 Commuter Trips from Botabek to Jakarta: 2000 and 2015**

Unit: thousand person trips per day

| | 2000 | 2015 | Growth Rate |
|---|---|---|---|
| Tangerang | 279 | 735 | 2.63 |
| Bekasi | 232 | 463 | 2.00 |
| Bogor | 251 | 596 | 2.37 |
| Total | 762 | 1794 | 2.35 |

Source: SITRAMP Estimate

## 7.5 Increase in Private Car Use

Vehicle ownership will increase in accordance with an increase in real household income. At present owing private passenger cars directly implies use of private cars for travel needs.

When compared with the current poor level of public transport, private cars provide much higher level of convenience, comfort, and security. Private passenger cars are considerably expensive for most of households in the society, thus once people purchase a car even a second-hand car, they attempt to maximize their investment by using their vehicles as much as possible at any occasions. Increase in car ownership, therefore, would imply increase in vehicular trips at the present situation.

If the government does not take any interventions, such as increase in fuel cost by decreasing subsidy for fuel price, or transportation demand management measures including road pricing and support for improving public transport, traffic congestion would be surely worsened than present.

## 7.6 Urban Transportation Planning Issues

As pointed out above, the transportation system in Jabotabek would not be able to accommodate the increasing travel demand without enhancement of mass public transportation system. In particular, if people shift to private mode of transport represented by private passenger cars, it is apparent that serious traffic congestion is inevitable and cause enormous economic loss. Therefore, it is essential to prevent the existing and potential public transport users from shifting to private mode of transport or even to attract the existing car users to public transport through improving the level of public transport service. If the level of service of public transport remains the same as is at present, people would surely shift to using private mode of transport.

Promotion of public transport leads to reduction of private car usage and contributes to improve ambient air quality as well. Improvement of public transport system, however, is not so simple. Public transport fare is generally set by the government at low level, taking into account affordability of the low income group. With insufficient amount of revenue due to the low fare level, it is difficult for operators to provide sufficient level of middleservice that satisfy upper middle or high income groups, who usually use cars. Thus the core urban transportation issue in Jabotabek is how to improve public transport service under the limited ability to pay of the majority of the residents.

# 8. Urban Transportation Policies and Strategies

## 8.1 Objectives of Urban Transportation System Development

Based on an understanding of the present urban transportation problems and issues, four major objectives have been identified through the analyses of the present urban transportation problems and issues in the Jabotabek region.

- Efficiency to support economic growth,
- Equity in mobility among all the members of society,
- Improvement of the urban environment by minimizing the adverse effects of vehicle emissions and noise, and
- Safety to reduce victims in transportation accidents.

(1) Efficiency in Transport System to Support Economic Activities in Metropolitan Area

Traffic congestion is chronic phenomena in Jabotabek due to lack of road density and increased traffic demand, and it has caused considerable amount of economic loss to the society by longer travel times and deterioration of environment. An efficient urban transport system, therefore, should be developed with a view to strengthen urban function and to support economic growth in the Jabotabek region. Efficiency in transportation can be achieved by balancing transportation demand and transportation network capacity. Thus efficiency in transport can be achieved through alleviation of traffic congestion and reduction of vehicular traffic should be realized by promotion of public transportation usage.

Alleviation of traffic congestion can be dealt with the following three ways,

- by increasing road capacity through developing and improvement of road network,
- by optimizing utilization of the existing road capacity through traffic control system and provision of traffic information,
- by decreasing excessive vehicular traffic demand through transportation demand management and diverting to public modes of transport

At the same time promotion of public transport usage would also contribute to achieve economic efficiency by reducing vehicular traffic demand on the congested urban road network. Mass transit system has advantage over private mode of transport in terms of travel costs and less consumption of space in the context in urban area.

(2) Equity in Transport for All the Members in the Society

A minimum level of transportation service should be provided for all members of society in order to secure a civil minimum. There are two types of "transportation poor"; one is the economically poor, who cannot afford to pay expensive transportation cost, and the other the physically handicapped citizens, who have difficulties in their mobility.

In Jabotabek mobility of low-income group is limited due to insufficient income. Low-income group depends heavily on non-motorized mode of transport; around

40 percent of their trips are made by walking or bicycles. This implies that the activity area of low income group is limited due to available transport modes and they lose job opportunities as well as far from enjoying various urban services.

The role of public transport is thus of great importance to provide affordable means of transport for lower income people to access urban services. Sufficient level of public transportation service should be provided for those people at reasonable costs. In setting fare of public transport, the fare level should be determined from the viewpoint of "ability to pay."

At the same time it is needed to develop transportation facilities for handicapped people. Such facilities are seldom seen in Jabotabek at present time but gradual improvement of transport facilities is needed.

(3) Environmental Betterment related to Transport

Although concentration level of Nitrogen Oxide ($NO_x$) are within allowable range at all the station surveyed and the daily maximum value of Sulfur Dioxide ($SO_2$) also are below the environmental standard, the daily maximum of Total Suspended Particles (TSP) exceed the air quality standard value at two third of survey locations in Jakarta and all the locations in Bekasi. 40 percent of the emission load of TSP in Jabotabek is generated from automobiles, following 57 percent of factories. The measured daily maximum values of Lead (Pb) meet the Indonesian National Standard but exceed one third of survey stations in DKI Jakarta. In Jabotabek 90 percent of lead emissions are estimated due to the use of leaded gasoline because unleaded gasoline has not become popular despite the efforts made by the government such as the promotion of unleaded gasoline in Blue Sky Program.

Air pollution caused by motorized vehicles should be minimized through promotion of public transport and traffic demand control, in particular, in congested areas. Particularly countermeasures to reduce TSP and Lead should be focused in the Study area.

(4) Transport Safety

Transport safety is one of concerns in urban transportation in Jabotabek. Although the total number of victims involved in traffic accidents on non-toll roads has gradually decreased in recent years, the number of lives lost in traffic accident has not been decreased. Similar to non-toll roads, the rate of traffic accidents on toll roads has been gradually decreased but the fatality rate is still high compared with developed countries.

Since lives is invaluable and death and injury due to traffic accidents will bring great grief to family members and friends, traffic safety should be enhanced and the number of victims in accidents should be minimized through enforcement of laws and regulations, intensive public campaigns, training and education for drivers as well as the general public. Improvement of traffic facilities by engineering design would contribute to reduction of traffic accidents.

Railway accidents should also be minimized by improving signal facilities as well as the dissemination of information regarding the danger for riding on the roof of trains, and the enforcement of closed-door operations.

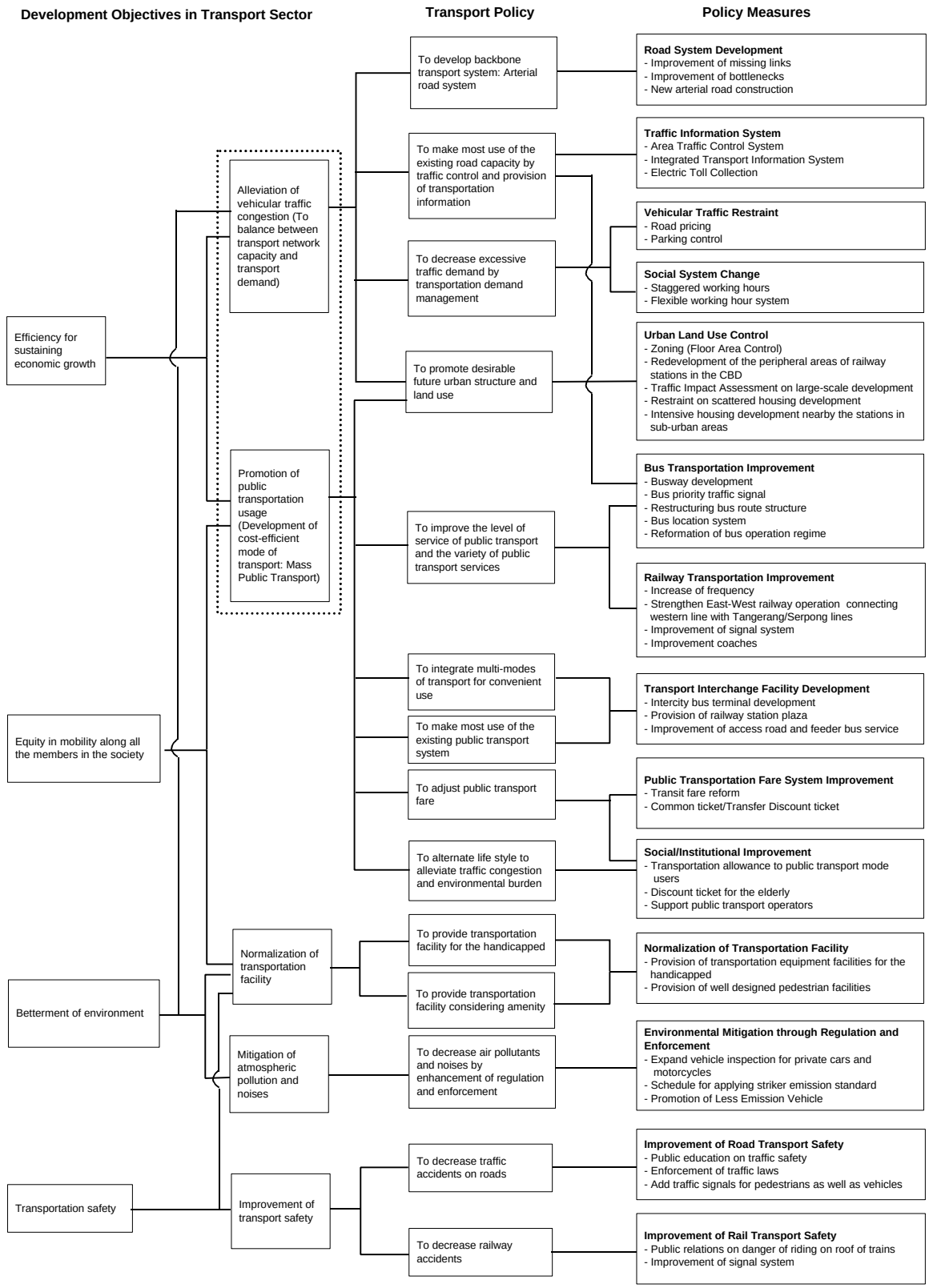


**Figure 8.1.1 Objectives of Urban Transportation System Development and Policy Measures**

## 8.2 Urban Transportation Policies

The following four major urban transportation policies should be established and implemented to achieve the four development objectives of the urban transportation system.

- Alleviation of Traffic Congestion
- Promotion of Public Transport
- Reduction of Air Pollution and Noise
- Improvement of Transport Safety

## 8.3 Urban Transportation Policy Measures

More concrete policy measures were examined in line with the urban transportation policy. There are a variety of countermeasures such as infrastructure development, traffic control and transportation demand management, improvement of public transport services, among others as described below.

Infrastructure development is a supply side approach, which includes development of facilities of the road and railway networks. A traffic control system aims at optimizing the utilization of the existing road facilities by controlling traffic flows. Improvement of public transport services can be achieved through bus transport and railway transport network improvements, but emphasis should be given to the integration of modes of public transport and integration between land use and transportation systems. Transportation demand management techniques have become more popular including road pricing, parking control, traffic generation fee, traffic impact assessment, increase of fuel price, and flattening peak traffic demand. Normalization of transport facilities includes development of transportation facilities for handicapped citizens and transportation poor and the non-motorized modes of transport. Reducing air pollution should be made through reduction of exhaust gases from vehicles by enhancement of vehicle inspection, upgrading to stricter environmental standard, enforcement and adoption of new energy sources. In addition, shift to public transport from private vehicles significantly contributes to reduce air pollution. To improve transport safety enforcement, education, public campaigns and improvement of geometric designs are of great importance. Improvement of signal system is also an urgent measure for the railways.

## 8.4 Conceptual Transportation System Development Plan

Based on the understanding of a desirable urban structure designated in the regional development plans, a conceptual transportation infrastructure development plan has been proposed in line with the transport infrastructure development policy proposed previously. The proposed major development policies of transportation system development (see Figure 8.4.1) are as follows:

- Development of primary transportation system to support inter-regional transport demand,
- Strategic corridor development,

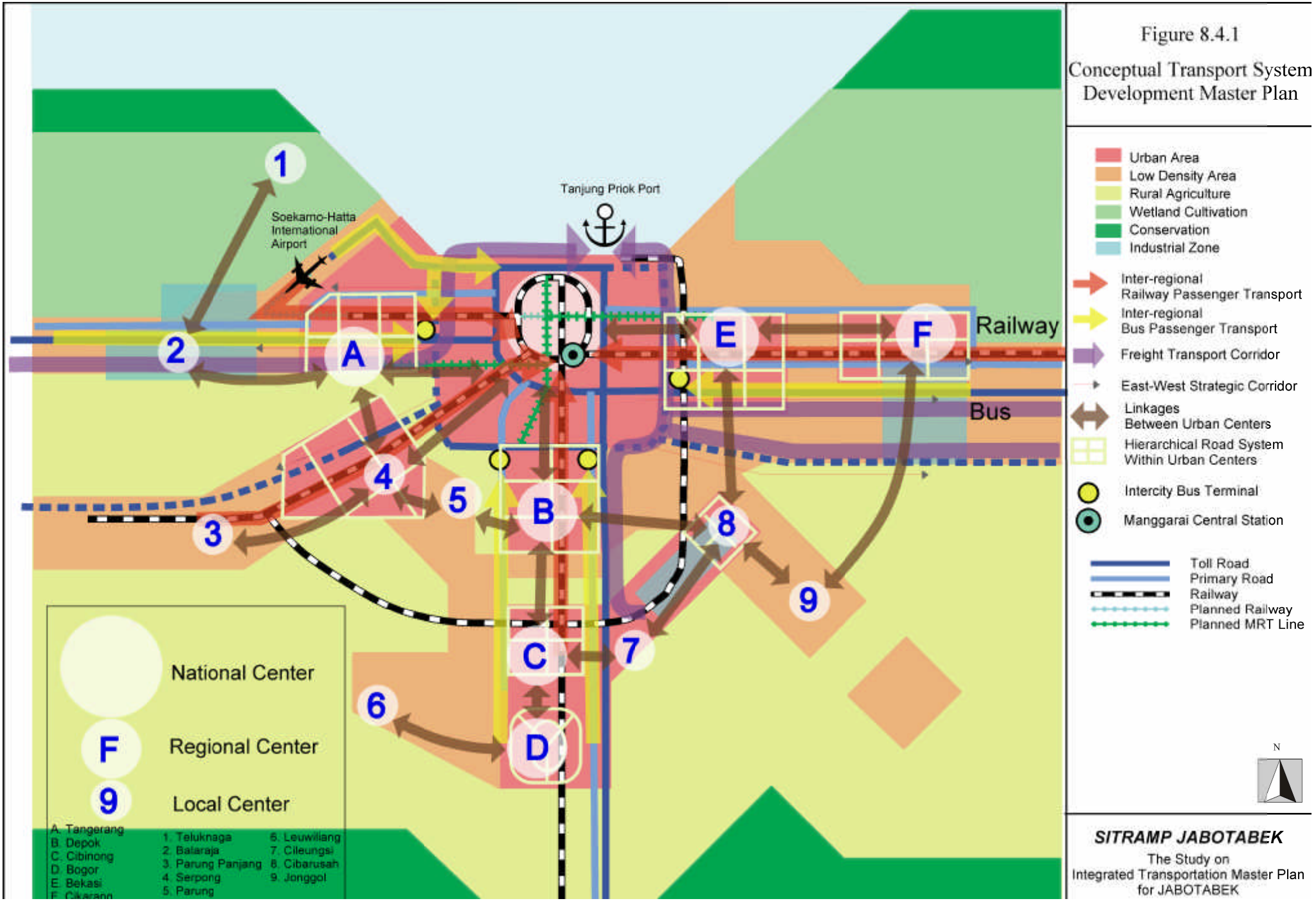
Figure 8.4.1
Conceptual Transport System Development Master Plan
Tanjung Priok Port
Soekarno-Hatta International Airport
Railway
Bus
National Center
Regional Center
Local Center
A. Tangerang
B. Depok
C. Cibinong
D. Bogor
E. Bekasi
1. Teluknaga
2. Balaraja
3. Parung Panjang
4. Serpong
5. Parung
6. Leuwiliang
7. Cileungsi
8. Cibarusah
9. Jonggol
Urban Area
Low Density Area
Rural Agriculture
Wetland Cultivation
Conservation
Industrial Zone
Inter-regional Railway Passenger Transport
Inter-regional Bus Passenger Transport
Freight Transport Corridor
East-West Strategic Corridor
Linkages Between Urban Centers
Hierarchical Road System Within Urban Centers
Intercity Bus Terminal
Manggarai Central Station
Toll Road
Primary Road
Railway
Planned Railway
Planned MRT Line
N
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- Strengthening accessibility between urban centers in Botabek,
- Improving accessibility between Jakarta and urban centers in Botabek, and
- Street network as a framework for urban unit (Hierarchical road system development)

## 8.5 Urban Transportation Strategies

The urban transport system cannot be developed in the short-term. It requires a long-term framework and continuous efforts to develop toward the final stage of the integrated transportation system proposed in the conceptual transportation master plan.

In order to reach the final configuration of the transportation system, the combination of measures should be carefully arranged, taking time-sequence and logical order among various countermeasures into consideration, and a strategy should be established by prioritizing and packaging transportation policies and measures.

Among these components, the key policy measure is promotion of public transportation system. Since the service level of public transportation system in Jabotabek has been further deteriorated due to the Asian Economic Crisis, an immediate action should be taken to restore the previous service level. In this regard, a rescue program for bus transport and railway service is urgently needed. Furthermore taking the dramatically shrunk government financial capability into account, the short-term policy measures should be selected from those do not require a huge amount of costs and that generate immediate effects.

## 8.6 Evaluating Urban Transport Policy Measures

The urban transport policy measures have been assessed from the effectiveness viewpoint to achieve the objectives and from the viewpoint of easiness of implementation. The effectiveness of the urban transport policy measures are evaluated for the following items,

- Impact on promoting public transportation usage,
- Impact on alleviating traffic congestion,
- Impact on environmental betterment, and
- Impact on transport safety

## 8.7 Selecting Short-term Policy Measures

Among the items for evaluating urban transport policy measures, the possibility of project implementation should be accentuated for selecting short-term policy measures. Thus policy measures for short-term plan have been selected from the projects from the followings:

- Projects that do not require huge amount of funds, and
- Projects without land acquisition problem

# 9. Short-term Implementation Plan

The Jakarta metropolitan area will grow and the population in Jabotabek will reach thirty million persons in 2015. Although once traffic demand decreased for a couple of years after the economic crisis, traffic congestion has already come back on the streets. In line with an increasing population and revitalizing economy in the future, it is expected that traffic situation in the region will worsen. It is urgently required to promote public transport usage; otherwise the road network in Jabotabek will not be able to deal with the increasing traffic demand.

The level of services of public transport, however, has been deteriorated due to the economic crisis. At present not merely low level of services in terms of convenience, amenity and travel time but also lack of security has recognized as a concern of public transport users. With the existing level of service, it is difficult to divert people using private cars to public modes of transport; therefore, it is urgently required to improve public transport services.

However, taking into account the current budget constraint of the government, it is recommended to implement the projects which do not require a huge amount of funds in short term. In line with this, it should be focused to make use of the existing transport facilities. At the same time, projects with land acquisition problem should be avoided in selecting the short-term implementation projects.

Although the financial resources of public sectors are currently limited, the government has been facing various urban transportation problems and should take countermeasures to tackle with the problem such as traffic congestion. A way to lessen the financial burden of the government is to pursue a private-public partnership for developing transportation system in which private sectors can be involved.

The description of the short-term projects are listed below and recommended for immediate implementation.

As mentioned above, the primary urban transport policy is promotion of public transport system. In order to promote public transport, improvement of the existing Jabotabek railway and enhancement of bus transport is key components of the short-term public transport improvement.

## 9.1 Railway Transport Improvement Plan

To increase convenience for passengers and to secure transport capacity, main improvements of the railway transport should be focused on rehabilitation of the existing facilities such as railway station facilities, signal system, level crossing facilities, and communication facilities. For increasing passenger transport capacity, the number of electric cars should be added and stabling yard should be reinforced.

Furthermore, to meet an increasing commuter flows in the east-west direction, construction of the two short-cut sections connecting the Western line and the Tangerang/Serpong lines are proposed. The short cuts enable direct train operation between Tangerang/Serpong and Dukuh Atas/Manggarai. Although the projects are categorized in intermediate term plan since they need acquisition of land, earlier implementation period is recommended because the distance is

short and investment cost is relatively small compared with a new line development. When a direct operation commences, the Jabotabek trains should be integrated with the trunk bus system plying the busway on Jl. Sudirman in short term and future development of Jakarta MRT System at Dukuh Atas station. The function of Dukuh Atas station should be enhanced for smooth transfer of passengers.

Short-term projects selected for the railway improvement are categorized as follows:

- Improvement of Station Facilities,
- Rehabilitation of Railway Electric Facilities,
- Communication Facilities,
- Rehabilitation of Level Crossing Equipment, and
- Phased Procurement of Electric Cars

## 9.2 Bus Transport Improvement Plan

For bus transport improvement, it is essential to reform bus operation regime. The bus licensing system should be changed from the existing system to tendering system by establishing specification and standard of bus services. To achieve more efficient and reliable bus operation, the possibility of bus fare collection by public sector should be explored and introduction of bus operation monitoring system should also be discussed among the regulatory agency, bus operators, bus drivers and bus passengers. Cooperation on improvement of bus operation between public and private sectors should be explored.

It is recommended to give more priority for bus transport by developing busway or bus priority lanes. However, strong objection from car users is expected, since introduction of busway or an exclusive bus lane takes one lane from private car use and reduces the existing road capacity. The government should make efforts to obtain consensus of the society. If preferential public transport policy were not taken, shifting from public transport to private mode of transport would be inevitable and resulted in worsen traffic congestion.

## 9.3 Traffic Restraint Scheme

At the same time, traffic restraint scheme should be employed in the congested area to control excessive traffic demand. It should be recognized that without "Push" policy private car users would not change their mode of transport. Traffic restraint policy such as road pricing should be implemented after providing sufficient level of public transport services.

## 9.4 Road Construction Project

In the short term road maintenance and rehabilitation should be given priority because road condition has been deteriorated due to lack of budget for road maintenances. Road construction should focus on missing links, bottleneck sections, and suspended on-going road projects.

**Jakarta – Bekasi Connecting Road Project**

The Jakarta – Bekasi Connecting Road, Jl. I.G. Ngurah Rai extension, is a missing link. Construction of the road would increase road capacity between Bekasi and Jakarta and reduce traffic congestion on the parallel road of Jl. Raya Bekasi because some of cars will divert to the new road. This reduction of private vehicles would make easier to introduce busway on Jl. Raya Bekasi. The project cost is estimated at Rp. 30,470 million.

**Kota Bogor Ring Road Project**

Another proposed road construction project is Bogor Ring Road. This road aims at providing bypass for through traffic to the Bogor City and also connecting the northern part of the city to Jagorawi Toll Road. In relation with this road development project, the existing intercity bus terminal located in the heart of the city will move to the area along the Project road. The project cost is estimated at Rp. 36,664 million.

## 9.5 Traffic Control and Management

Traffic control and management are short term measures in nature. This includes improvement of traffic signal system, installment of traffic control devices, geometric improvement, pedestrian facility improvement and traffic control system.

There are several bottleneck points in the study area, where heavy traffic congestion is a daily occurrence causing large economic loss in terms of vehicle operating cost and passenger time cost. Slow moving vehicles emit excessive pollutants and contribute to the worsening air quality in Jabotabek. The most representing intersections of kindthis kind include the following places:

- Tomang intersection in DKI Jakarta
- Ciledug intersection in Kota Tangerang
- Ciputat area in Kabupaten Tangerang
- Tambun intersection in Kabupaten Bekasi

## 9.6 Soft Measures

Soft measures can be implemented even in short term since they require a relatively small amount of funds. Some of them require long time to realize the effects but the action should be taken at earliest time. The soft measures include traffic safety enhancing program, environmental improvement program, land use zoning and so forth.

## 9.7 Institutional Setup

To materialize the short term implementation plan, it is recommended to establish a new organization that deals with metropolitan-wide urban transportation planning and travel demand management.

## 9.8 Cost Estimation for Short Term Implementation Plan

Cost estimate for short term implementation plan is summarized in Table 9.8.1.

**Table 9.8.1 Summary of Cost Estimate for Short Term Implementation Plan**

| Field | Project | Implementing Agency | Project Cost (Mil. Rp.) | Remarks |
|---|---|---|---|---|
| Railway | Station Facility Improvement | Ministry of Communication | 93,875 | 16 stations |
| | Countermeasure of Lightning for Signaling | Ministry of Communication | 37,437 | |
| | Rehabilitation of Communication Facilities | Ministry of Communication | 121,192 | |
| | Improvement of Level Crossings | Ministry of Communication | 52,329 | |
| | Addition of Recycled Electric Cars | Ministry of Communication | 18,668 | 32 used cars |
| | Short-Cut on Tangerang/Serpong Lines | Ministry of Communication | 211,185 | |
| | Busway Development | | | |
| | Pramuka Pemuda Corridor (11.4 km) | DLLAJ | 7,903 | With flow operation |
| | Sudirman Thamrin Corridor (8.2 km) | | 8,436<br>(6,230) | With flow operation<br>(Contra flow operation) |
| | Bus Location System | DLLAJ,<br>Bus Operator | 8,703 | For 35 buses |
| Road Development | Jakarta – Bekasi Connection Road Development Project | DKI Jakarta<br>Kota Bekasi | 37,470 | |
| | Bogor Ring Road Development Project | Kota Bogor | 36,664 | |

# 10. Conclusions

## 10.1 Recommendation

In the course of executing the recommended short-term implementation plan, it is of great importance to focus on promotion of public transport services. Under the current limited budget constraint of the governments, the most realistic approach is making most use of the existing facilities.

In line with this approach, it is strongly recommended to give more priority for bus transport in the form of development of busway or bus priority lanes. However, introduction of busway or exclusive bus lane takes one lane from private car use and reduces the existing road capacity. Consequently strong objection from car users is expected.

The government should have a strong will to implement the policy as well as make efforts to obtain consensus in the society. If preferential public transport policy were not taken, shifting from public transport to private mode of transport would be inevitable and resulted in worsen traffic congestion.

At the same time, traffic restraint scheme should be employed in the congested area to control excessive traffic demand. It should be recognized that without "Push" policy private car users would not change their mode of transport. Traffic restraint policy such as road pricing should be implemented after providing sufficient level of public transport services.

To materialize the plan, it is recommended to establish a new with metropolitan-wide urban transportation planningorganization that deals with metropolitan-wide urban transportation planning and travel demand management.

## 10.2 Toward the Phase 2 Study

A variety of information is needed in order to establish an integrated urban transportation master plan for Jabotabek. In the Phase 1 study, eventually, various data have been collected through the cooperation of the city and regencies. It has been revealed, however, that some important data for urban transportation planning such as the number of employees at work place are not available in the Study area. Employment data are important because "to work place" and "to school" trips are two major constituents in urban travel demand and these trips form the morning and afternoon peak trip demand. It is essential to understand the travel pattern of commuting trips. Therefore the surveys to be conducted in Phase 2 Study should explore this kind of missing data.

In addition, in the Phase 2 Study, person trip survey and other relevant transport surveys are planned to execute. Statistical data and the data obtained through the field surveys are important not merely for the master plan study but also transport studies to be conducted in the future and research on urban transportation. An urban transportation database system, which can be opened to the public, should be developed in the course of the Study and an agency should be established for maintenance and updating of the database.

As genuine decentralization starts from the year 2001, local governments will bear more responsibility for infrastructure development including transportation network in their jurisdictions. In the Phase 2 Study in-depth study should be

conducted on road network development in the jurisdictions of local governments. Road network development master plan shall be established to guide future urban development and to avoid urban sprawl in suburban area. In addition, according to the change in administration, responsibility of infrastructure development and maintenance should be reviewed and clarified. Budget allocation shall be examined in accordance with the responsibility for transport infrastructure, which is determined by the analysis based on a comprehensive trip demand data to be obtained from the person trip survey and other surveys.

In Phase 1 Study a conceptual master plan was proposed to avoid conflicts between the short-term implementation plan and the urban transportation master plan. However the conceptual master plan has not given concrete picture of future urban transportation system and merely provides the direction of transportation infrastructure development. In the Phase 2 Study the conceptual transport master plan should be a concrete proposal based on more reliable travel data. Short-term implementation plan should also be re-examined and should be more specific to materialize the plan.

Demonstration projects proposed in the Phase 1 Study shall be executed to pursue the viability of the projects during the Phase 2 Study. Discussion with relevant agencies is essential prior to the implementation. Evaluation of the demonstration projects will give valuable insights for full-scale implementation. Special attention should be paid to understand the level of public transport service that attracts private car users.

In formulating the master plan, emphasis should be placed on developing consensus in the society. In this regard, the Study should make efforts to involve the general public and to reflect feedbacks from public opinion in as many occasions as possible. Stakeholder meetings and public hearings would give good opportunities for receiving such feedbacks.

# PART II : Review of MRT Project

# 11. General

## 11.1 Project Background

The terms-of-reference (TOR) for "The Study on Integrated Transportation Master Plan for Jabotabek (Phase I)" call for a review of the "Mass Rapid Transit –MRT" project.

The history of the MRT concept goes back to the late 80s, when rapid expansion of overwhelmingly private vehicle transport in combination with insufficient public bus and rail transport started to result in serious traffic congestion. In fact, the GOI wanted to proceed in 1996 with the implementation of the first stage of a MRT system for Jakarta as part of a comprehensive MRT system for the City. Realization of the MRT project at that time was intended with strong private sector participation and a Memorandum of Understanding (MoU) with a private sector consortium was signed to that effect. The private sector consortium proceeded with the appointment of a consulting group that issued their basic design for the MRT project in December 1996 in a report titled "Jakarta Mass Rapid Transit Project Blok M – Kota".

The MRT project that was based on the 1996 Basic Design was, however, shelved when the 1997 financial crisis affected the Republic of Indonesia. It was revitalized in 1999 with a revision of the 1996 Basic Design, undertaken by international consultants for the Ministry of Communication and reflected in a document titled "Revised Basic Design Study for Jakarta MRT System". The primary objective of revised basic design study was to reduce the capital cost needed of the MRT project.

## 11.2 Status of MRT Project

The MRT project remains a vital element in DKI Jakarta and the Jabotabek region that will establish the first modern public transport system in Jakarta, thereby making a significant contribution to de-congestion as well as the promotion of public transport sector use.

The Government of Indonesia (GOI) attaches high priority to the early realization of the MRT project and it has, therefore, requested financial assistance from the Government of Japan (GOJ) under the SYL scheme.

## 11.3 Major Assessment Objectives

The primary objective of this review was to provide a technical, financial and economic review of the MRT project. Particular emphasis was to be placed on the following:

- To reconfirm the overall MRT project system configuration and its project components, and

- To identify broad implications for MRT stakeholders resulting from MRT realization.

## 11.4 Major Sources of Information for Project Review and Assessment

The primary data source for the review exercise was the following document:

Japan Transport Cooperation Association; "Revised Basic Design Study For Jakarta MRT System"; February 1999.

In addition, data were collected and/or verified through interviews with the relevant Indonesian planning, coordination and implementation agencies and through site inspections.

# 12. Review of Basic Design

## 12.1 Selection of Optimum Alignment Plan

Five alternative technical implementation options, as presented in Figure 12.1.1, were considered under this review exercise. Comparative cost analysis was undertaken for these alternative options, and differences among them from technical perspectives were discussed below.

**(a) Base Case** (cost index=100)**:**

This case is so-called "Revised Basic Design" by JTCA Study in 1999. In Revised Basic Design, it was recommended with elevated structure between Fatmawati and Blok M due to decrease the enormous construction cost.

**(b) Alternative 1** (cost index=130)**:**

This case is almost the same as "Basic Design" originally proposed by IJEG in 1996. The "Basic Design" recommended a full underground structure with Jakarta Gudang freight Yard as a MRT Depot. Difference between Base Case (Revised Basic Design) and Alternative 1 (Basic Design) lies in location of depot. The latter recommended Kota Gudang Depot, while the former recommended Fatmawati Depot because of social instability and economic decline in Jakarta Kota area that took place in 1998 and the situation still remains un-recovered yet.

**(c) Alternative 2** (cost index=90)**:**

This Alternative 2 was derived from a revision of Base Case, and which was brought about by the result of site survey around the planned transition trough. The location of transition trough of the latter (Base Case) falls in the residential land use along Jl. Sisingamangaraja. Therefore, Alternative 2 was planned to avoid land acquisition from private owners, and as the consequence, the alignment plan of the elevated structure was further extended to the north until Semanggi inter-change (Extended length=1.7 km).

**(d) Alternative 3A** (cost index=98)**:**

This case was the result of revision from "Alternative 2" and intended to reduce adverse impact on environment around Fatmawati Hospital by the underground structure rather than the elevated structure. Also, Fatmawati station was planned with double layer type under Jl. Fatmawati.

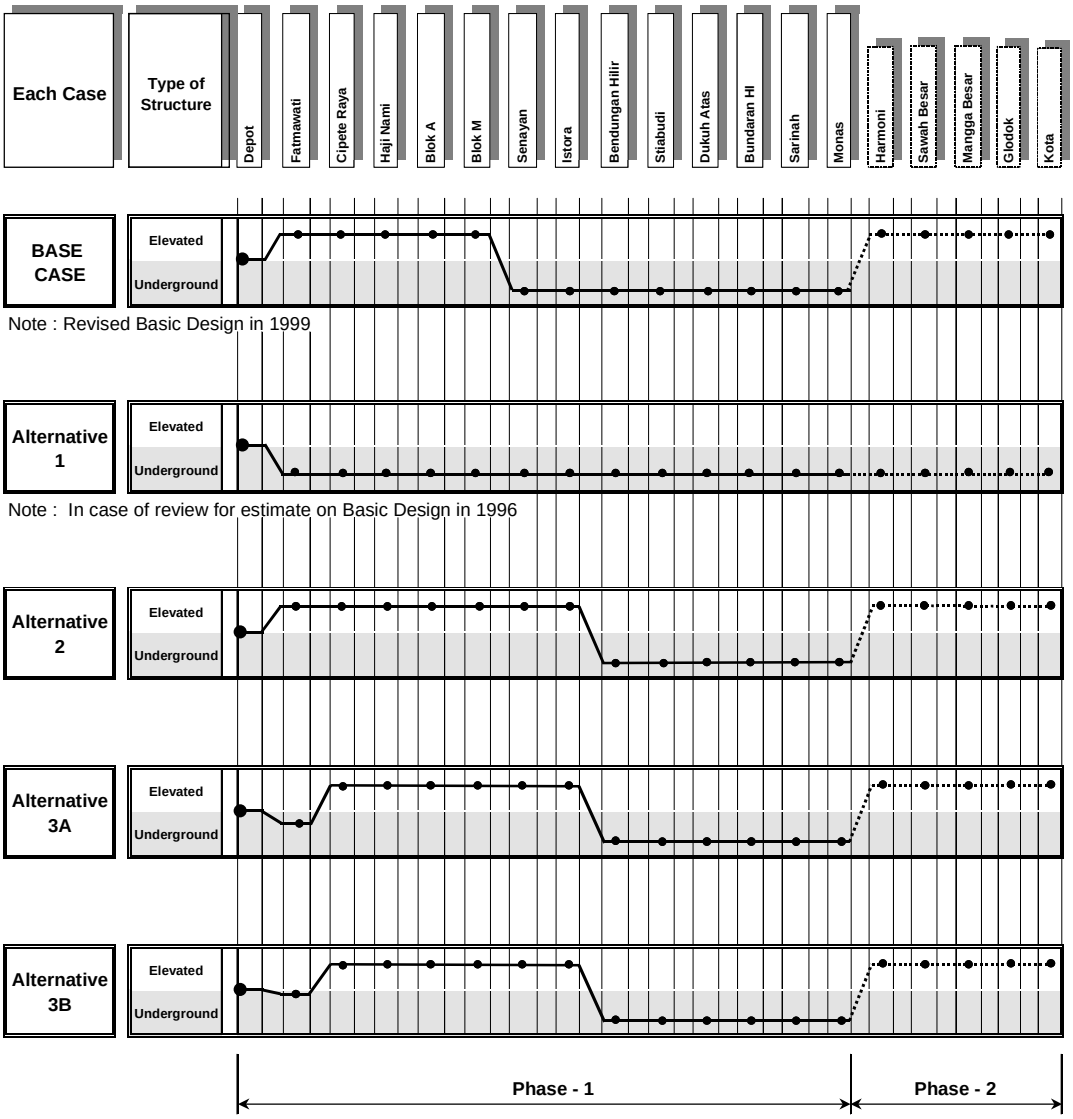


**Figure 12.1.1 Vertical Alignments of Alternative Plans**

**(e) Alternative 3B** (cost index=95)**:**

This case was developed from "Alternative 3A" by using a shallow cut & cover method at Fatmawati station. Therefore, this plan could decrease the construction cost compared to Alternative 3A. However, it requires additional land acquisition (A=21,000m$^2$) for Fatmawati station, since a single layer type station will be adopted.

As compared among 5 alternatives above, "Alternative 3B" was selected as an optimum solution in planning its alignment. The reasons are as follows:

- The transition trough area of Alternative 3B is less affected by the required widening of the road relative to other Alternatives, except for Alternative 1 (Because alignment of Alternative 1 is full underground).

- The route alignment of Alternative 3B entails comparatively lower construction cost (Base Case=100, Alternative 1=130, Alternative 2=90, Alternative 3A=98, and **Alternative 3B=95**).
- Although the cost of Alternative 2 is the lowest among others, a vertical alignment between the crossing point over the existing toll road and Fatmawati Station will become very steep, and the noise will bring about significant impact upon the settlement environment.
- The construction of Fatmawati underground station, adopted for Alternative 3B, by using a shallow cut & cover method is environmentally sound compared to other Alternatives (Base Case, Alternative 1 and Alternative 2).

## 12.2 MRT Project Definition

The Study Team investigated five different MRT system configurations. Alternative 3B, the major features of which are shown in Table 12.2.1 and Figure 12.2.1 was selected.

**Table 12.2.1 Alternative 3B**

| Section | Distance | No. of Station | Structures |
|---|---|---|---|
| Fatmawati Depot | - | - | Ground |
| Fatmawati Station | 1.3 km | 1 Station | Underground |
| Cipete Raya - Istora | 8.0 km | 6 Stations | Elevated Guideway |
| Bendungan Hilir – Monas | 6.2 km | 6 Stations | Underground |
| Total | 15.5 km | 13 Stations | |

Source: JICA Study Team

All further considerations in this review and assessment exercise are based on the MRT project definition as outlined above.

## 12.3 Project Base Cost

The project base cost was estimated for the selected "Alternative 3B". Total MRT project base cost in constant 2000 prices was estimated at **Rupiah 13,683 billion (rounded)** and its breakdown is presented in Table 12.3.1

**Table 12.3.1 Total MRT Project Base Cost**

| **Fatmawati – Monas Section** | **Japanese Yen (million)** | | | **Indonesian Rp.(million)** | | |
|---|---|---|---|---|---|---|
| | **L/C** | **F/C** | **Total** | **L/C** | **F/C** | **Total** |
| (1) Civil works & Equipment | 39,123 | 81,026 | 120,149 | 2,934,208 | 6,076,936 | 9,011,143 |
| (2) Detailed Design & Tender Assistance | 1,176 | 2,448 | 3,623 | 88,166 | 183,566 | 271,732 |
| (3) Construction Supervision | 2,347 | 4,862 | 7,209 | 176,052 | 364,616 | 540,669 |
| (4) System Integration & Trial Running | 80 | 526 | 606 | 5,976 | 39,438 | 45,414 |
| (5) Physical Contingency | 4,610 | 6,365 | 10,975 | 345,723 | 477,369 | 823,092 |
| (6) Insurance | 1,369 | 2,836 | 4,205 | 102,697 | 212,693 | 315,390 |
| **Sub-total (Engineering Base Cost)** | **48,704** | **98,062** | **146,766** | **3,652,823** | **7,354,618** | **11,007,441** |
| *L/C & F/C Composition (%)* | *(33.2%)* | *(66.8%)* | *(100.0%)* | *(33.2%)* | *(66.8%)* | *(100.0%)* |
| (7) Land Acquisition & Compensation, etc. | 10,286 | 0 | 10,286 | 771,457 | 0 | 771,457 |
| (8) Import Duty, VAT, etc. | 25,384 | 0 | 25,384 | 1,903,808 | 0 | 1,903,808 |
| **Sub-total (GOI Contribution)** | **35,670** | **0** | **35,670** | **2,675,266** | **0** | **2,675,266** |
| **Total (Project Base Cost)** | **84,375** | **98,062** | **182,436** | **6,328,088** | **7,354,618** | **13,682,706** |

Source: JICA Study Team
Note: US $ 1= Yen 106= Rp.7,950

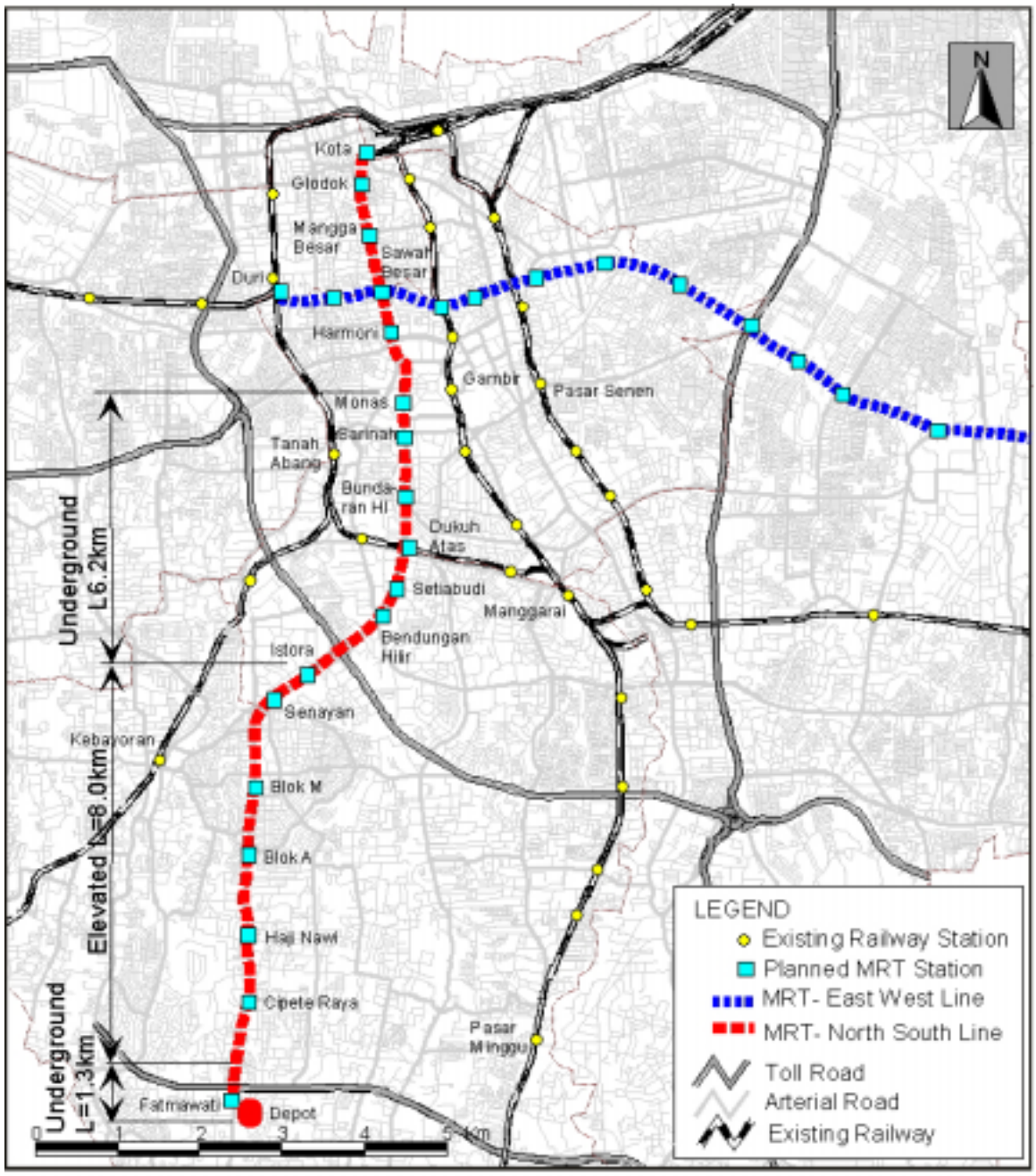


**Figure 12.2.1 Route Plan of Alternative 3B**

# 13. MRT Demand Profile

## 13.1 Potential Market of MRT Users

Substantial efforts were rendered by the Study Team to gather field data and information pertaining to bus transport operation particularly along the MRT corridor since such bus travelers is deemed to represent the greatest potential MRT market. Bus passenger count and interview as well as stated preference surveys to both private vehicle and public transport users were carried out to get a comprehension of bus passengers' trip magnitude and characteristics.

## 13.2 Trip Pattern of Potential MRT Users

The present trip pattern suggests that the dominant movement related to MRT corridor is for bus passenger trips between origin zones inside MRT corridor to destination zones elsewhere in DKI Jakarta and vice versa. Trips which are fully inside MRT corridor account for less than one fifth of the total bus passenger trips. The spatial distribution of trip origin and destination indicates the wide spread of passenger origin-destination throughout Jabotabek.

Analysis of the route structure of buses traversing the MRT corridor confirms the wide coverage of bus destinations beyond the corridor. At present, more than 70 bus routes pass by Jl. Sudirman/Thamrin, but only very few serve the whole stretch of the corridor. More than half of the total passenger use cheaper fare buses (regular, medium or at most 'Patas' buses) rather than the more convenient 'Patas AC', most probably dictated by the income level.

## 13.3 Gross Traffic Demand

Jabotabek area person trip demand by motorized mode of transport is forecast to increase from its current 20.7 million daily trip to almost double (38.2 million trips per day) in the year 2015. Public transport is by far the most used mode of transport throughout Jabotabek with a share of constantly above 50 percent of the available modes.

## 13.4 Demand Projection with "No Enhancement Measures"

Demand forecast for the Jakarta MRT was carried out under the most basic assumptions with 'no enhancement measures' such as road pricing imposed onto the system. Given this a condition, several fare levels were examined to find an optimum fare that maximizes the fare box revenue. Consequently, the optimum fare was found to be Rp.2,600/pax on an average with a split fare system of Rp.800/access plus Rp.325/km, which is almost the same level as the fare of Air-conditioned Express "Patas AC" bus services of Rp.2,500/pax.

Thus, the total passenger demand for the Fatmawati-Monas stretch of the Jakarta MRT is forecast to be 176,800 boarding passengers per day or around 53 million annual ridership in the year 2005. This demand may reach around 98 million annual ridership in the year 2015. Dukuh Atas and Blok M stations are predicted to become the busiest stations whereas the Dukuh Atas – Setiabudi – Bendungan Hilir section the busiest sections in the Jakarta MRT system. The maximum line

loading is around 103,000 passengers (year 2005) and 191,600 passengers (year 2015) per day for both directions as shown in Table 13.4.1.

## 13.5 Demand Projection with "Enhancement Measures"

Preliminary economic and financial analysis on the MRT project revealed that the MRT demand level projected under the assumption of "no enhancement measures" would not be able to achieve the project feasibility. Eventually, the demand projection was made for such conditions of "with enhancement measures" as (i) road capacity capping, which constrain the growth of corridor traffic beyond the existing service level, (ii) additionally to the above (i), competition from buses on the same corridor is limited, and (iii) additionally to the above (i) and (ii), intensive land use around MRT railway stations is encouraged.

Compared to the "No Enhancement Measure" condition, the passenger demand estimated under the "road capacity capping" condition was pushed upwards by more than 50% or about 100,000 passengers increase from the "No Enhancement Measure" condition in 2005. "All the enhancement measures" condition, i.e. (iii) above, could attract more than 400,000 passengers/day to the MRT in 2005, and which is more than double the demand for "No Enhancement Measure" condition as shown in Table 13.4.1.

## Table 13.4.1 Projection of MRT Passengers for Alternative Demend Scenarios

| | Case Description | Year 2005 | | | | Year 2015 | | | | Note |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Total Passenger** *(pax/day)* | | **Max Loading** *(pax/day 2way)* | **Pax.km** *(daily)* | **Total Passenger** *(pax/day)* | | **Max Loading** *(pax/day 2way)* | **Pax.km** *(daily)* | |
| **Without Enhancement Measures** | | | | | | | | | | |
| CASE 1 | **"Draft Final Version"**<br>*Fare Structure :* Rp 500 access + Rp 286/km<br>*Enhancement :* No enhancement | 185,518 | 105% | 108,462 | 1,029,971 | 340,651 | 105% | 201,160 | 1,921,564 | Avg Fare Rp. 2100<br>Target Market :<br>Patas AC users |
| CASE 2 | **"Comparable to Patas AC"**<br>*Fare Structure :* Rp 800 access + Rp 325/km<br>*Enhancement :* No enhancement | 176,751 | 100% | 103,012 | 975,103 | 325,043 | 100% | 191,560 | 1,822,319 | Avg Fare Rp. 2600<br>Target Market :<br>Patas AC users |
| CASE 3 | **"Fare 50% higher"**<br>*Fare Structure :* Rp 800 access + Rp 425/km<br>*Enhancement :* No enhancement | 137,414 | 78% | 79,661 | 745,778 | 285,870 | 88% | 167,500 | 1,578,899 | Avg Fare Rp. 3100<br>Target Market :<br>Patas AC users |
| CASE 4 | **"Double the Fare"**<br>*Fare Structure :* Rp 1000 access + Rp 575/km<br>*Enhancement :* No enhancement | 84,309 | 48% | 49,084 | 446,865 | 229,497 | 71% | 133,131 | 1,238,110 | Avg Fare Rp. 4050<br>Target Market :<br>Patas AC users |
| CASE 5 | **"Half the Fare"**<br>*Fare Structure :* Rp 500 access + Rp 100/km<br>*Enhancement :* No enhancement | 367,782 | 208% | 217,309 | 2,109,993 | 491,745 | 151% | 293,454 | 2,857,681 | Avg Fare Rp. 1075<br>Target Market :<br>All bus users |
| **With Enhancement Measure(s)** | | | | | | | | | | |
| CASE 6 | *Fare Structure :* Rp 500 access + Rp 286/km<br>*Enhancement :* Road capacity capping | 286,409 | 162% | 165,613 | 1,480,034 | 586,514 | 180% | 330,207 | 2,969,576 | "Push" car user on Senayan-Monas to use MRT |
| CASE 7 | *Fare Structure :* Rp 800 access + Rp 325/km<br>*Enhancement :* (1) Road capacity capping | 277,633 | 157% | 160,189 | 1,425,287 | 570,912 | 176% | 320,590 | 2,870,380 | |
| CASE 8 | *Fare Structure :* Rp 800 access + Rp 325/km<br>*Enhancement :* (1) Road capacity capping<br>(2) Limit competition from bus | 391,849 | 222% | 225,015 | 2,070,294 | 636,774 | 196% | 356,181 | 3,254,524 | |
| CASE 9 | *Fare Structure :* Rp 800 access + Rp 325/km<br>*Enhancement :* (1) Road capacity capping<br>(2) Limit competition from bus<br>(3) Land Use Dev around sta. | 402,395 | 228% | 230,888 | 2,133,827 | 649,806 | 200% | 363,902 | 3,337,777 | |

# 14. Economic and Financial Analyses

## 14.1 Projected Revenues

The projected ridership on the MRT (measured in terms of both, annual ridership and passenger-km) depends crucially on the development scenario underlying the assignment projections. The magnitude of revenues, which in turn have in combination with project base cost, a profound impact on the MRT project IRR and therefore financial viability, are strongly dependent on the passenger-km achieved on the MRT system.

If a split fare system of "access fee" plus "distance proportional fee" is applied, as was done by the many previous studies and as was the case in this review's case study computations, generated revenues depend to only around 25 percent on the access fee (estimated annual ridership), but to around 75 percent on the total annual passenger-km.

Hence, a more important factor than only increasing annual ridership will be to intensify the use of the MRT system in terms of passenger-km-year. It is suggested that this will only be possible by adopting various measures geared at creating "captive markets" through, for example, MRT supporting area developments along the MRT corridor.

## 14.2 Economic Internal Rate of Return (EIRR)

The benefit streams were calculated from savings in vehicle operation costs and user time costs. The cost savings were derived from a comparison between the "with" and "without" MRT cases in the transport network. The traffic assignment results were compiled and compared in vehicle-kilometers broken down into different travel speed bands and in vehicle-hours broken down into the different types of representative vehicles.

Cost and benefit streams were based on the estimated project cost, the proposed implementation schedule, future traffic demand, and a project life cycle of 47 years (including the construction period). The Economic Internal Rate of Return (EIRR) was subsequently calculated for alternative MRT demand scenarios, the results of which are summarized below as:

- **Demand Scenario 1: EIRR=7.48%**
- **Demand Scenario 2: EIRR=13.19%**
- **Demand Scenario 3: EIRR=14.11%**

Note: Demand Scenario 1: "No enhancement" measures are assumed.
Demand Scenario 2: "Road capacity capping" measures are assumed.
Demand Scenario 3: "Road capacity capping, bus route restructuring and intensive land use around rail stations" measures are assumed.

## 14.3 Return on Investment (ROI in constant prices)[1]

The Draft Final Report established already that the full scale MRT investment, i.e. the total initial investment and all other life cycle costs, could not bring about the MRT project's feasibility from a financial point of view. Hence, it was both necessary and useful to investigate alternative investment scenarios that assume different financial burden sharing between the central and local governments and the MRT operating entity. The fundamental financial logic of the alternative investment scenarios applies, whether the MRT project will be implemented as a full public, a PPP, or a fully private undertaking. The alternative investment scenarios are defined as described below:

- **Investment Scenario 1:** Total project base cost and all life cycle investments into new rolling stock and replacement investment are to be borne totally by the operating entity.
- **Investment Scenario 2:** Only directly operations related initial investment cost and all life cycle investments into new rolling stock and replacement investment are to be borne by the operating entity. However, the remaining, i.e. the non-directly operations related initial investment cost are to be borne by the central government.
- **Investment Scenario 3:** Only directly operations related initial investment cost and replacement investments are to be borne by the operating entity. The remaining initial investment cost, as well as additional future investment into rolling stock is to be borne by the central government.
- **Investment Scenario 4:** Only directly operations related initial investment cost is to be borne by the operating entity. The remaining initial investment cost and additional future investments into new rolling stock and replacement of old facilities is to be borne by the central government.

The investment options inherent in the above alternative scenarios are summarized in Table 14.3.1 and the result of the financial analysis on Return on Investment (ROI) of the MRT project was established as presented in Table 14.3.2.

**Table 14.3.1 Investment Options and Alternative Scenarios**

| | Initial Investments | | All life cycle investment into additional rolling stock | All life cycle investment into facility replacement | Recurring operation and maintenance |
|---|---|---|---|---|---|
| Investment Scenarios | Only operations related initial investment | The remaining Investments | | | |
| **Scenario 1:** | X | x | x | x | x |
| **Scenario 2:** | X | - | x | x | x |
| **Scenario 3:** | X | - | - | x | x |
| **Scenario 4:** | X | - | - | - | x |

Note: "x" means the operating entity bears the relevant cost
"-" means the central government bears the relevant cost

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

**Table 14.3.2 Return on Investment of MRT Project under Different Demand Scenarios**
**(Constant 2000 prices)**

(Unit: percent)

| Investment Scenario Options | Parameter | Demand Scenario 1 [1] | Demand Scenario 2 [2] | Demand Scenario 3 [3] |
|---|---|---|---|---|
| **1** | Total Project Base Cost & All Life Cycle Investments into New Rolling Stock and Replacement Investments | **Negative** | **Negative** | **Negative** |
| **2** | Only Operations Related Initial Investment Cost & All Life Cycle Investments into New Rolling Stock and Replacement Investments | **4.16%** | **6.39%** | **7.06%** |
| **3** | Only Operations Related Initial Investment Cost and Replacement Investments | **5.10%** | **7.56%** | **7.94%** |
| **4** | Only Operations Related Initial Investment Cost No Investment into New Rolling Stock & No Replacement Investments | **7.12%** | **9.35%** | **9.63%** |

Source: JICA Study Team.
Notes: [1] This demand scenario is based on "no enhancement" measures.
[2] This demand scenario is based on "road capacity capping" measures.
[3] This demand scenario is based on "road capacity capping"; "limited competition from bus" and "land use development" measures.
(4) The terminology "no investment into…" means that such cost are treated as "sunk cost" in the ROI/IRR computations.
(5) All revenue streams reflect "capping" when maximum capacity is reached.

Based on the ROI analysis, the result can be summarized as follows:

1) The full-scale investment assumed under investment scenario 1 resulted in the financially negative feasibility with any of the demand scenarios 1, 2 and 3.

2) In order to achieve a positive ROI (or project IRR) to the operating entity, about 80% of the required initial investment of Rp.13,683 billion has to be borne by the central government and the balance, about 20% of the required initial investment, which approximates the directly operations related investment, has to be borne by the operating entity.

3) It is a vital precondition for the central government to secure a long-term loan that matches the life cycle of the MRT project and that offers favorable terms & conditions, such as lower rate of interest, longer repayment and grace periods. The terms & conditions of Special Yen Loan are an interest rate of 0.75% and a 40 years repayment period, inclusive of 10 years grace.

4) On-lending terms that the central government intends to impose on the MRT operating entity should be as low as around 5% for the investment scenario 2 or around 7-8% for the Investment Scenario 3.

5) Therefore, it will be a matter of choice for the central government whether it provides a softer on-lending rate to the operating entity or it guarantees additional investments required in future for additional rolling stock and replacement of old facilities.

## 14.4 Cash Flow Analysis

The cash flow analysis was undertaken for scenarios combining demand and investment as follows:

1) **Cash Flow Case 1**: Demand Scenario 1 with Investment Scenario 4
2) **Cash Flow Case 2**: Demand Scenario 2 with Investment Scenario 2
3) **Cash Flow Case 3**: Demand Scenario 2 with Investment Scenario 4
4) **Cash Flow Case 4**: Demand Scenario 3 with Investment Scenario 2, and
5) **Cash Flow Case 5**: Demand Scenario 3 with Investment Scenario 4.

For the cash flow analysis, the following conditions were assumed for the Equity-Debt ratio of operations related initial investment and the long-term loan conditions:

- Equity-Debt ratio: 30% - 70%
- Terms and conditions of lender to GOI: 40 years repayment period with 10 years grace, and a rate of interest 0.75% p.a.
- On-lending terms to operating entity:40 years repayment period with 10 years grace, and a rate of interest 5.0% p.a.

The cash flow analysis revealed that case 1 and 2 could only attain in 2025 and 2030, respectively, a positive surplus of cumulative net cash flow after servicing of long-term-debts. The implication is that these two cases would need to reduce the burden of long-term debt service by, for example, increasing the equity portion to over 60% of the required investment capital. Therefore, these two cases should not be assumed for planing the MRT project implementation, since such a high portion of equity in the investment structure is not realistic

The remaining cases 3, 4 and 5 result in a sound positive cash flow after long-term debt service from the very beginning of the MRT operation. Eventually, the following conclusions can be obtained from the cash flow analysis:

1) If the operating entity should shoulder directly operations related initial investments, additional rolling stock and facility replacement investments additionally to the annual O/M costs (investment scenario 2) the target MRT rider-ship will require more than 400,000 passengers per day in 2005, and 650,000 passengers in 2015 (demand scenario 3), in order to achieve a sound financial condition for the operating entity.
2) If the operating entity should shoulder only directly operations related initial investments additionally to the annual O/M costs (investment scenario 4) the target MRT rider-ship will require about 280,000 passengers per day in 2005 and 570,000 passengers in 2015 (demand scenario 2), in order to achieve a sound financial condition for the operating entity.

# 15. Conclusion and Recommendations

All previous studies have confirmed the need for a MRT system in the Fatmawati-Kota corridor, in which commercial, financial, administrative, diplomatic and other economic activities at international, national and regional levels are located on an intensive scale.

The traffic demand on this corridor has already exceeded the road capacity (a volume/capacity ratio at a cross section in front of Atmajaya University near Semanggi Interchange was 1.16 in the peak one hour, 2000) and the ratio is estimated to rise up to 1.76 in 2015 without MRT network condition. Therefore, it is absolutely necessary to introduce the MRT system as planned either in the Jakarta Structure Plan 2010 and/or the Jabotabek Structure Plan 2015.

The economic internal rate of return (EIRR) analysis proved the economic feasibility of the MRT project at a rate of over 13%-14% with enhancement measures of the MRT rider-ship.

The financial viability can be confirmed only when the government guarantees to provide the operating entity with the infrastructure component (equivalent to about 80% of the initial investment cost). Under this condition, the investment scenario 2 and 3 will attain a Return on Investment (ROI or Project IRR) of over 7%.

The recommendations that make the MRT project financially viable are summarized as follows:

1) It is quite essential for the central government to procure a very soft loan, such as the Special Yen Loan (i.e. interest rate: 0.75% p.a. for 40 years repayment period including 10 years grace period), and on-lend these resources to the operating entity at an as low as possible interest rate of around 5% p.a.

2) The central government may on-lend funds to the operating entity at 7-8% p.a., but the investment scenario 2 combined with any of the alternative demand scenarios shows that the operating entity cannot service its long-term debt at such a high rate. If the higher on-lending rate is the condition, it is indispensable to apply the investment scenario 3, which requires the central government to provide the operating entity with additional investments for future rolling stock requirements and facility replacement. On the other hand, a lower on-lending rate would eliminate such additional investments by the government in future operation.

3) The government's limited, but clear-cut support to the operating entity at the initial investment stage will help foster stronger responsibility and management of the operating entity in future, rather than the management/additional investment continues to rely on the central government even after the MRT operation starts. Therefore, the investment scenario 2 is recommended as a government policy on the MRT investment.

4) If the investment scenario 2, which assumes that the operating entity should shoulder directly operations related initial investments, additional rolling stock and facility replacement investments additionally to the annual O/M costs, the target MRT rider-ship will require more than 400,000 passengers

per day in 2005, and 650,000 passengers in 2015 (demand scenario 3), in order to achieve a sound financial condition of the operating entity.

5) In order to optimize the use of the MRT, enhancement measures as listed below should be further pursued and evaluated towards a step to be taken for the realization of the MRT project.

**List of possible enhancement measures:**

- road pricing
- increase fuel taxes
- increase vehicle registration fee
- prioritize rail and busway service improvement to feed the MRT
- improvement of land use intensity around the MRT stations
- increase parking charges, or parking restriction area
- improve pedestrian access to the MRT stations and inter-modal facilities
- develop the MRT network extensively in Jabotabek
- others.

If such MRT system enhancing measures are adopted in a timely fashion, they would not only strengthen the financial sustainability of the MRT, but they would also contribute to the timely realization of Jakarta MRT as the first modern public mass transit system.

Finally it is essential, in the context of decentralization, to obtain the consensus among all the citizens in the country that the Central government would bear about 80 percent of investment costs of the MRT project.

# PART III : Review of JORR Project

# 16. General

## 16.1 Project Background

The history of the JORR concept goes back to the late 70s, when the Government of Indonesia (GOI) requested the Government of Japan (GOJ) to assist in the preparation of a master plan for the JORR. The master plan study was subsequently followed-up by a planning and a preliminary design study, both of which constituted the basis for further Government planning and JORR implementation. PP No.8/1990 paved the way for private sector participation in the construction and operations of toll roads. In fact, construction and operations of toll roads under BOT schemes commenced in 1994 in accordance with the then prevailing Government policy.

Concessions for the JORR toll way were awarded to four private sector companies and Sections S and E2 were almost completely constructed. The sections were opened to traffic in August 1995. The 1997 financial crisis, which resulted in an a severe economic and political crisis, has brought full realization of the JORR under the then existing BOT-based concessionaire agreements to a practical standstill, due to the actual and/or legal bankruptcy of the concessionaires. Hence, the JORR, with the exception of Sections S and E2, remains uncompleted up-to-date.

## 16.2 Status of JORR Project

The Government of Indonesia (GOI) continues to attach high priority to the finalization of the JORR. In fact, the GOI has, in reference to the 1999 Blue Book project proposal "Jakarta Outer Ring Road" (code no. 990323), requested the Government of Japan (GOJ) to support the realization of the JORR through the provision of "Special Yen Loan- SYL" financial assistance.

## 16.3 Major Assessment Objectives

The primary objective of this assessment was to review and assess the JORR project, for which the GOI had already requested financial SYL assistance from the GOJ.

Particular emphasize was to be placed on the following:

- To reconfirm the overall JORR project system configuration and its project components
- To identify the implications for the implementing entity resulting from the JORR project's internal rate of return (IRR), taking into account prevailing regulatory and legal demands and limitations, and
- To define realistic financing and implementation plans

# 17. Review of JORR Project Configuration and Costs

## 17.1 JORR Project Configuration, Technical and Environmental Aspects

The Study Team reconfirmed the following JORR project system configuration and its major project elements are defined, in principle, as comprising Sections W1, W2, S, E1, E2 and E3 as shown in Table 17.1.1. The section N, which had been a constituent of the original JORR project, was excluded from the confirmed configuration due to difficulty in land acquisition. In substitution of the section N, Jl. Cakung Cilincing Raya, Jl. Ampera/Jl. Cilincing and Jl. Sulawesi are upgraded for reinforcing accessibility between Tanjung Priok Port and JORR.

**Table 17.1.1 Location and Length of Sections**

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

Source: JICA Study Team compilation

The cost structures underlying the 1999 Implementation Program and the 2000 Valuation Study were harmonized, in order to make them compatible with each other, design standards were checked and adjusted were necessary, and prices were advanced to September 2000 price levels. Subsequently, the project engineering base cost was prepared for a closed toll system, which is applied to the existing operational sections of S and E2, and the system was planned to comprise a basic traffic information and control system covering the JORR as a preferred toll road operation and management.

The results of the previous EIA studies were reviewed and it was confirmed that an EIA (AMDAL) has been carried out for each JORR section. The results were approved by the Central AMDAL Commission organized by the Ministry of Public Works up to the year 1997.

## 17.2 Project Base Costs

Total JORR project base cost in constant 2000 prices are estimated at **Rupiah 6,015.4 billion** with such breakdown as:

- Engineering Base Cost = Rp. 5,100.9 billion
- Land Acquisition and Compensation = Rp. 511.1 billion
- Taxes and Duties = Rp. 403.4 billion

Details of the above are presented in Table 17.2.1

## Table 17.2.1 Summary of Engineering Base Cost

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

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

Source: JICA Study Team computations

Notes:

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

# 18. Traffic Demand Forecast for JORR

The Jakarta Outer Ring Road Tollway is expected to absorb a considerable amount of traffic volume in future. Total On-ramp volume may reach around 465,000 vehicles per day in 2005 and continue to grow to 678,000 vehicles per day in 2015.

Section S is forecast to carry the highest traffic volume among JORR sections, with average sectional volume of almost 71,000 and 108,000 pcu per day in both ways in 2005 and 2015 respectively. Other JORR sections' volume in 2005 are ranging between 21,000 and 62,000 pcu per day in both ways; while in the year 2015 the range would be between 44,600 to 89,500 pcu per day in both directions (Table 18.1.1). The projected sectional volumes suggest that generally up to the year 2015 demand can be adequately accommodated by a six-lane cross section.

**Table 18.1.1 JORR Sectional Traffic Volume**

| | Average Sectional Volume (pcu/day - two way) | |
|---|---|---|
| **Section** | **Yr 2005** | **Yr 2015** |
| W1 | 55,975 | 76,585 |
| W2 | 39,831 | 63,214 |
| S | 71,339 | 108,203 |
| E1 | 21,738 | 44,649 |
| E2 | 62,080 | 89,567 |
| E3 | 48,928 | 85,337 |

Source : JICA Study Team

Graphical representation of traffic loading in the area encircled by the Jakarta Outer Ring Road is presented in Figures 18.1.1 and 18.1.2. Despite the addition of arterial road networks, the 2015 loading is shown as being very congested in majority of the principal roads.

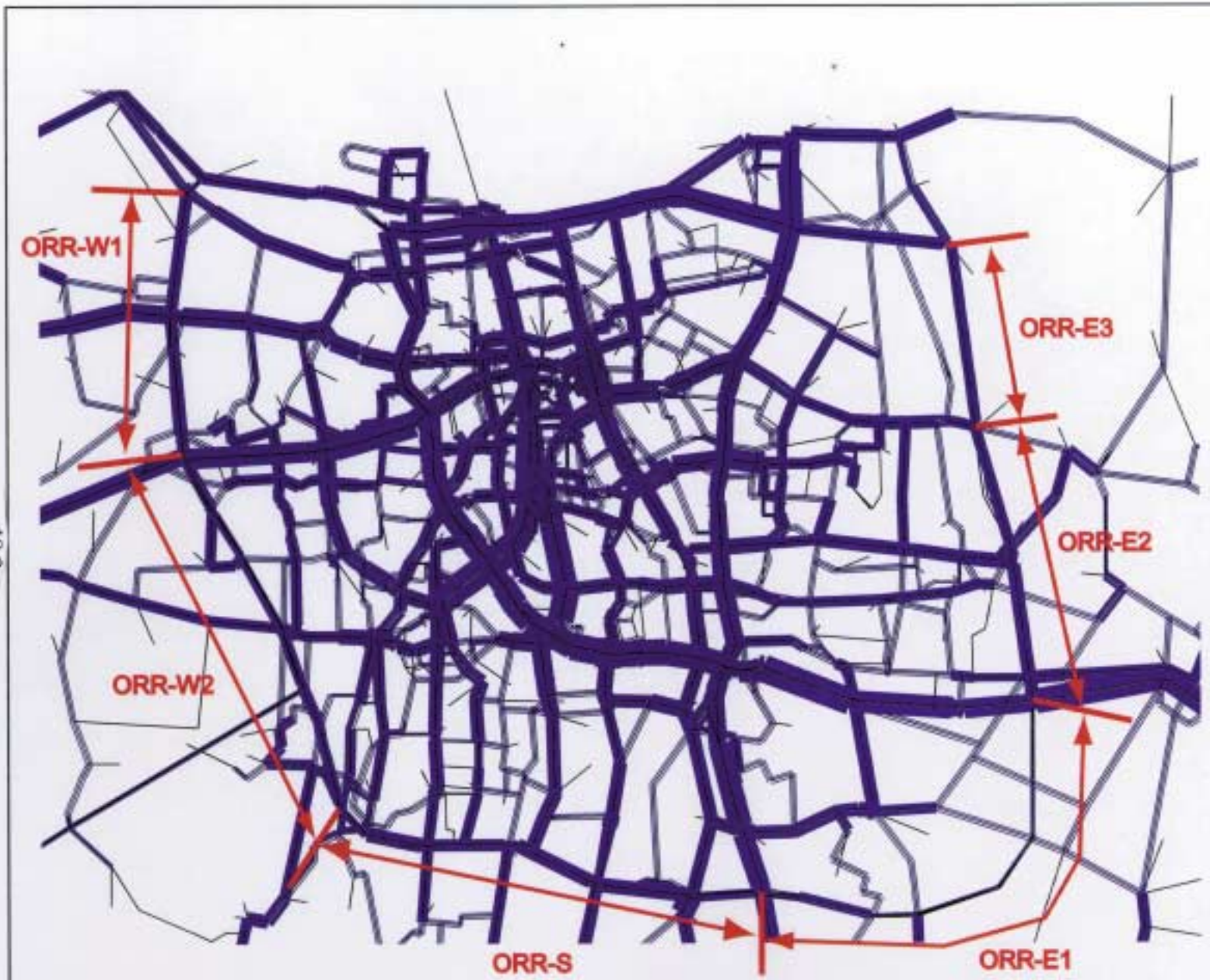


**Figure 18.1.1**

**Traffic Assignment 2005**

LEGEND

Unit:pcu/day/dir

10,000 30,000 50,000

***SITRAMP JABOTABEK***

The Study on
Integrated Transportation Master Plan
for JABOTABEK
(Phase I)


**Figure 18.1.2**

**Traffic Assignment 2015**

LEGEND

Unit:pcu/day/dir

10,000 30,000 50,000

***SITRAMP JABOTABEK***

The Study on
Integrated Transportation Master Plan
for JABOTABEK
(Phase I)

# 19. Economic and Financial Analyses

## 19.1 Project Economic Internal Rate of Return (EIRR)

The economic internal rate of return (**EIRR**) of the project is estimated at **28.9%**, and which is based on the economic project cost, benefits from savings in vehicle operation costs and time costs and the proposed project implementation schedule shown in Figure 19.1.1.

## 19.2 Return on Investment (or Project Internal Rate of Return)[1]

It is necessary, before proceeding to the estimation of JORR capital cost requirements, to define a suitable project structure and a suitable financing plan, to establish the JORR project's Return on Investment (ROI). The project's ROI provides, since it is calculated in constant prices, a fundamental measure of the project's inherent capacity to generate a return.

Traffic demand on the JORR was estimated using a distance proportional calibrated model. Demand was converted into vehicle/km/ year, broken down by JORR section and into GOL I, GOL IIA and GOL IIB categories. Revenues were subsequently estimated using a Rupiah 330/km base, adjusted for GOL IIA and GOL IIB categories by employing the prevailing adjustment factors of 1.5 and 2, respectively.

A standard life cycle of 25 years for projects of that type was assumed. Hence, given a JORR project implementation duration of 6 years, ROI and subsequent computation were undertaken for a 31 year project cycle, i.e. from the year 2000 to the year 2031.Assumptions had further to be made as to whether the implementing entity would assume responsibility for O&M expenditures of the already existing JORR sections S and E2, and whether such entity would be the beneficiary of the revenue stream already generated by the existing sections.

Therefore, two (2) fundamental cases can be distinguished, for which the project IRR results were determined at:

- **Case Study 1** (the implementing entity is the beneficiary of revenue streams generated by sections S and E2 and covers the O&M cost for these sections): **ROI 6.55%**
- **Case Study 2** (the implementing entity is neither the beneficiary of revenue streams generated by sections S and E2 nor covers the O&M cost for these sections): **ROI 5.63%**

Case study 1 was selected over case study 2 to proceed, because of its higher project ROI. Demand modeling allows for a standard error margin of plus/minus 20 percent. It was, therefore, necessary, to test the selected base case (Case Study 1) against the inherent demand error margins and to see what impact such

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

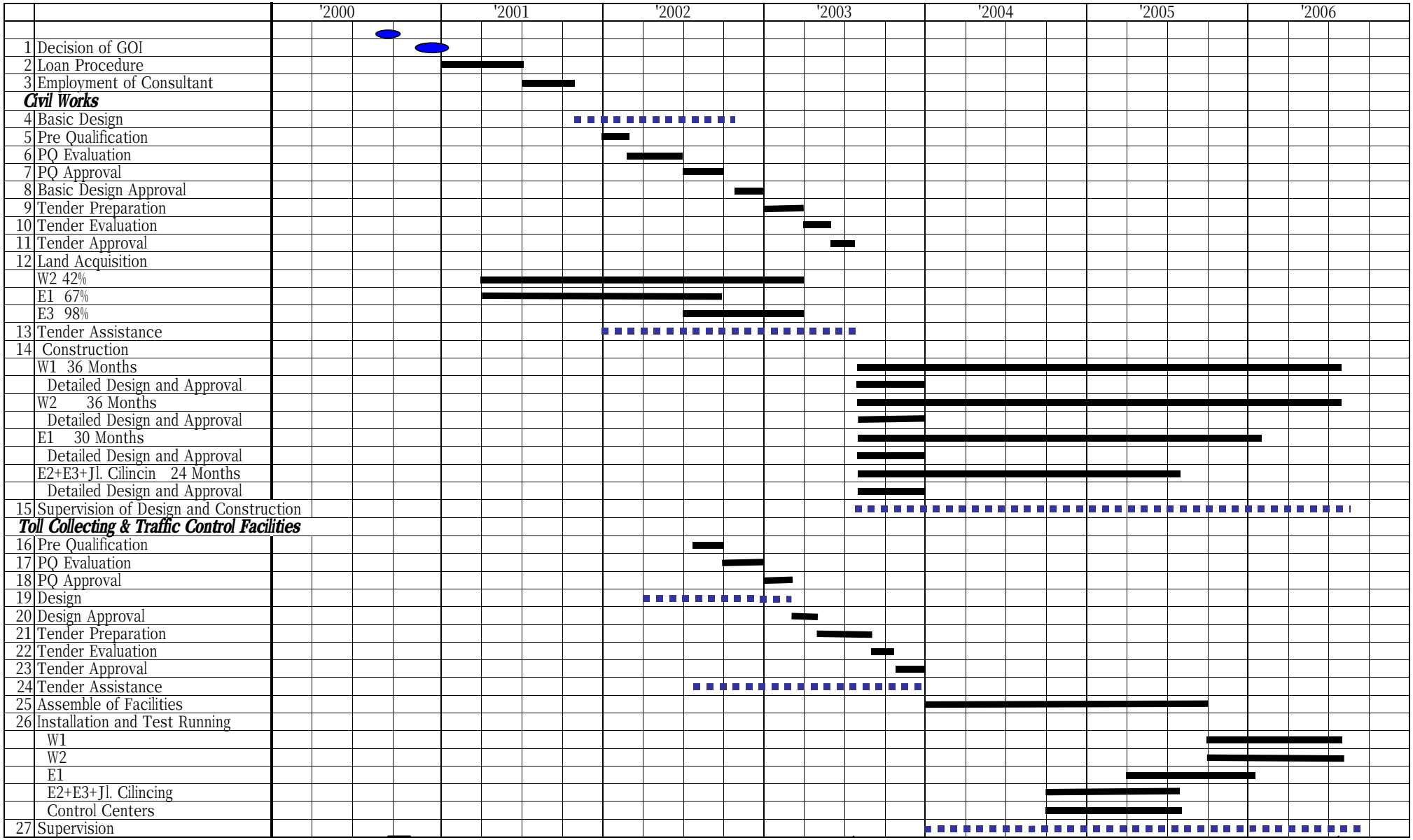


**Figure 19.1.1 Proposed JORR Project Implementation Schedule**

inherent estimation margins would have on the project's ROI. The results are:

- **Underestimated demand**. In this case the project's ROI would move upwards to 7.63% (10% underestimation) and 8.69% (20% underestimation)
- **Overestimated demand.** In this case the project's ROI would move downwards to 5.44% (10% overestimation) and 4.27% (20% overestimation).
- In the worst case the Project's ROI will be 2.78% and in the best case some 11.57%.

In summary, under the most optimistic assumption the JORR project will generate a return on investment in the order of magnitude of 11.6 percent, which is well below the current Indonesian lending rate of around 16.5 percent. It is self-evident that such ROI cannot meet commercial financing terms & conditions.

## 19.3 Investment or Capital Requirement Estimations

Investment or capital requirements were subsequently estimated by converting the constant year 2000 project base cost first into current prices, defining an appropriate project structure and, based on such structure, calculate interest during construction (IDC) with a view to keep this cost component as small as possible.

Total capital requirements for the selected JORR project base case are estimated at:

- **Rupiah 7,133.2 billion**, equivalent to Yen 95,109.3 million at an exchange rate of 1Yen to 75 Rupiah
- About 5.8% of this total, equivalent to **Rupiah 414.6 billion represents IDC** costs.

The total capital requirements, therefore, amounts to **Rupiah 7,547.8 billion**.

## 19.4 Project Structure

The following project structure is recommended, in view of the low project's ROI of around 6.55%, as shown in Table 19.4.1.

## 19.5 Cash Flow Projections and Debt Service Capability

The cash flow projections and debt service capability of the JORR project was established based on the above fundamental assumptions. The results show that the project is fully capable of meeting long-term debt service under the following assumption:

- As indicated above, the implementing entity is the beneficiary of revenue streams already generated by the S and E2 sections
- There is only one long-term loan, which is sovereign guaranteed. The loan terms and conditions are duration n= 40 years, interest rate to the GOI 0.75% and a grace period on principal repayment of 10 years On-lending

conditions from the GOI are 40 years repayment period, interest rate of 5% and a grace period for repayment of principal of 10 years.

The cash flow and debt service analysis shows a positive accumulated net cash flow after long-term financing of about Rupiah 821.3 billion in the year 2005. Hence, there will be no need to finance working capital requirements.

Furthermore, if the JORR project is implemented in the suggested fashion, there will be no need for short-term bridging financing.

**Table 19.4.1 Definition of Project Structure for Implementing Entity**

**(Unit :all figures are in current prices)**

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

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

## 19.6 JORR Project Financial Internal Rate of Return (FIRR) Current Prices

It was important, after having established the above fundamentals in constant price base, to check the JORR project's reaction to price escalation on the cost and revenue streams and establish the magnitude and split among the various resulting FIRRs.

The result of this sensitivity test is summarized as:

- The JORR project's **FIRR** under unchanged projected traffic demand conditions and toll rate increases at the level (**Consumer Price Index: 7% p.a. plus Per Capita Income growth: 5% p.a.**) and frequency of toll rate increase realization every three years would be around **16.66%**
- **If only CPI** is considered for toll rate increase, then the project's **FIRR** would be **10.87%**

It is obvious that the above FIRRs would all be lower, if toll rate adjustments were only linked to the CPI (which would imply that there are no real toll price increases) and/or the frequency of realizing such increases were different from the assumed three years cycle.

It can further be deducted from this exercise, that the GOI should accelerate all efforts to establish a transparent and just toll rate adjustment mechanism.

## 19.7 Strategic Implementation Options

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

There are, in principle, four strategic scenarios on how to proceed with JORR project realization. In addition to the project specific EIRR and ROI/IRR performance indicators presented previously in Sections 19.1 and 19.2, the Study Team employed a set of assessment factors, in order to arrive at a considered opinion on the level of realism and/or merits and demerits of each of these scenarios. The assessment factors are:

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

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

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

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

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

These scenarios were assessed with the following results:

(1) Strategic Scenario 2 and 3

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

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

That leaves the possibility of private capital as portfolio investor. However, this, too, appears to be unlikely, because the implementing entity would have to guarantee a certain return, most likely also US dollar dominated. Such guaranteed returns in similar projects can range anywhere between 15 to 20 percent per year on the private sector equity portion (US dollar base). The Study Team sees no merit in such approach, which would amount to a risk free private capital subsidy. Even if one assumes that either domestic and/or overseas private sector capital can be identified quickly and that no guaranteed return on equity (ROE) would be involved, financial closure of such project could not proceed.

This is so because (a) there is no standardized "authorization agreement" yet, on which P.T. Jasa Marga could base its negotiations, and (b) there is no new legal

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

mechanism yet in Indonesia that regulates toll rate adjustments. However, such a mechanism is a prerequisite for the authorization agreement to become bankable.

In short, the Study Team considers these two options have too many demerits and real obstacles to be viable over the short term and under prevailing circumstances.

(2) Strategic Scenario 1

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

(3) Strategic Scenario 4

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

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

# 20. Conclusions and Recommendations

The following is recommended in conclusion:

1. The JORR project should be realized as soon as possible to prevent further economic losses not only in transport sector but also in other industrial sectors.
2. The JORR project is most suitable for a public sector project, because of its high economic IRR (28.9%) but small financial IRR (6.6%).
3. The JORR project is estimated to accommodate relatively high traffic demand, and therefore it brings about the steady toll revenue. Unlike general infrastructure projects, the JORR is a revenue producing project and the revenue can be used solely for its operation/maintenance expenses and the loan repayment without further investments or expenses by the GOI.
4. If it is a decisive policy for the GOI to pursue the private sector participation into the JORR investment the GOI should deliberate how to impose on the private sector the responsibility to maintain safety and expressway function of the JORR as a public facility.
5. The JORR project is not going to be the last toll road project in Jabotabek. Hence, the GOI should investigate and establish appropriate toll road development policies such as:
    a) Toll road master plan that comprises a basic structure of the metropolitan toll roads
    b) Toll road law that allows for a transparent and suitable toll rate adjustment mechanism. This will greatly contribute to foreseeing a firm financial performance in future
    c) Standardization of “authorization agreement” and “concession agreement” which takes due account of private sector participation.