

## 1. INTRODUCTION

Jabodetabek, a large-scale metropolitan area with a population of 21 million, consists of DKI Jakarta, the capital city of Indonesia, and 7 local governments (Kabupaten and Kota Bogor, Kabupaten and Kota Tangerang, Kota Depok and Kabupaten and Kota Bekasi). Its gross regional domestic product is estimated at Rp. 351,000 billion in 2002, or 22% of the national gross domestic product, showing that Jabodetabek is strategically the most important region of the nation.

Since right after the economic and financial crisis in the late 1990's, a safety net program and other countermeasures have been undertaken and associated urgent programs have been almost completed. Now, the focus should be placed on sustainable economic development towards creation of better life in the region as well as for Indonesia's national growth.

To attract or recall more domestic and foreign investment is one of the vital issues to be addressed towards the region's further economic growth and development. However, inefficiency of the region's transportation system such as poor accessibility to the Tanjung Priok port among other things has made the region less attractive for investors. It is urgently needed to develop an efficient and reliable trunk transportation system to invite investments to the region.

Traffic congestion in the urbanized area is another severe problem faced in the region. Although rapid growth of car and motorcycle registration has been hampered by the economic crisis, the number of cars and motorcycles has again been increasing in recent years. It can be attributable to deterioration of the service level of public transportation. After the region's economy has recovered, real household income would increase again in the coming few years; it is anticipated that motorization will be further accelerated. If many residents use private modes of transportation, then traffic woes would be worsened and environmental pollution would be more serious than at present.

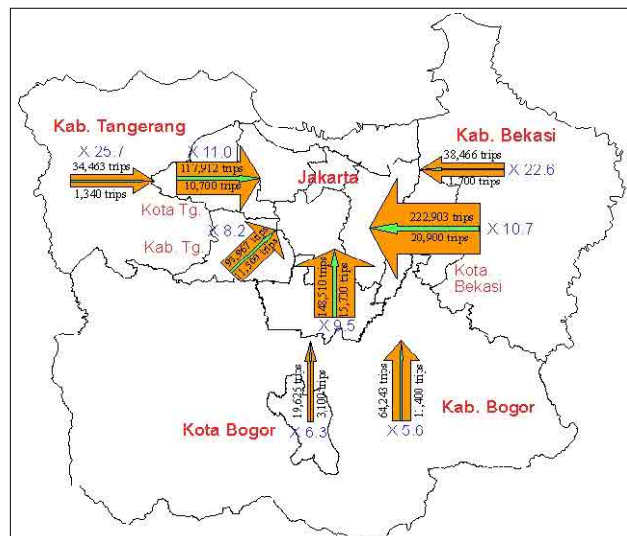
It seems difficult to foresee investments in large-scale transportation infrastructure development projects by the public sector considering their present difficult financial situation—a situation expected to continue in the near future. Besides securing the necessary costs for operation and maintenance for the existing transportation facilities, the way to develop the transportation system should be carefully examined to make utmost use of the remaining funds for development.

SITRAMP addresses the question of how to deal with those aforementioned problems and examines the desirable future transportation system by identifying the present and anticipated future transportation problems. SITRAMP outlines transportation development goals to be achieved in the next 20 years and associated transport policy measures and projects for regional development and improvement of the urban transport problems for the betterment of people's life in the region.

## 2. EXISTING CONDITION AND FUTURE PERSPECTIVE

### 2.1 EXPANSION OF URBANIZED AREA

Commuting trips from the surrounding areas to DKI Jakarta has increased about 10 times between 1985 and 2002. At present 700,000 people are commuting every day to Jakarta. These trips are concentrated in the CBD of Jakarta.

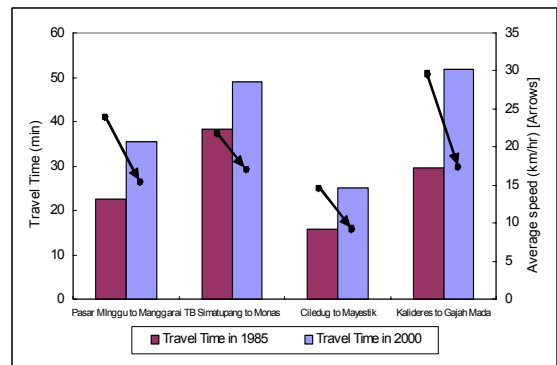


**Drastic Increase of Commuting Trips to Jakarta : 1985 – 2002**

## 2.2 ECONOMIC LOSS DUE TO TRANSPORTATION

Severe traffic congestion is often seen in the central area of Jakarta and the radial highways every morning and afternoon. The increasing traffic demand has brought about traffic congestion resulting in longer travel times on roads.

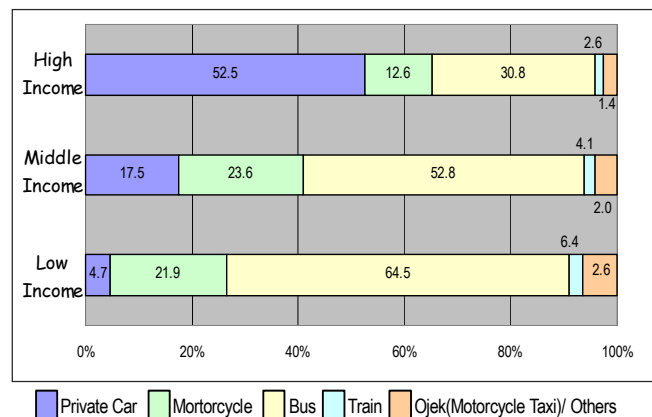
At present, the annual economic loss caused by traffic congestion in the region could be as much as Rp. 3,000 billion for vehicle operating costs and Rp. 2,500 billion for travel time.



Longer Travel Time: 1985 – 2000

## 2.3 LOW ACCESSIBILITY OF POOR HOUSEHOLDS

High income households indicate strong preference to private modes of transportation. Fifty-three percent of their travels are made by private passenger cars. In contrast, people belonging to the low income group heavily depend on public transportation. Among motorized modes of transportation, the bus is a major transportation mode for the low income.

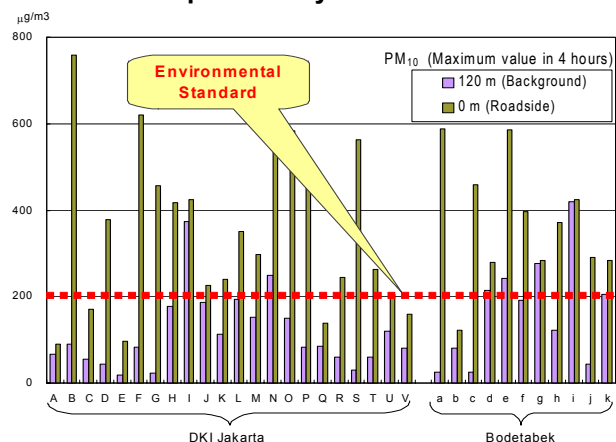


Modal Composition by Income Level

## 2.4 ENVIRONMENTAL DETERIORATION

High concentrations of PM<sub>10</sub> at roadsides indicate that automobiles should be the major source in the bottom layer of areas adjacent to heavily congested roads.

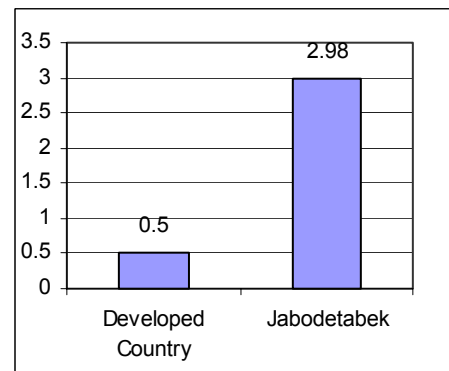
Out of 33 air quality survey stations, as many as 25 roadside stations were observed to register PM<sub>10</sub> concentrations exceeding the environmental standard. Moreover, the monitored PM<sub>10</sub> values at 10 stations exceed more than twice of the standard value. The health impacts from PM<sub>10</sub> in Jabodetabek could be valued at Rp. 2,815 billion in 2002.



Measured PM10 at Roadside and Background

## 2.5 ROAD AND RAILWAY ACCIDENTS

The number of lives lost in traffic accidents on ordinary streets has not decreased and the fatality rate on toll roads is still high compared to developed countries. Railway is widely considered as a safe mode of transport compared with road transport but this is not true in the case of the Jabotabek railway. During the period of 2000-2002, 174 accidents were reported including serious train collisions and crash accidents.



Fatality Rate on Toll Roads (Fatality per Million Vehicle km)

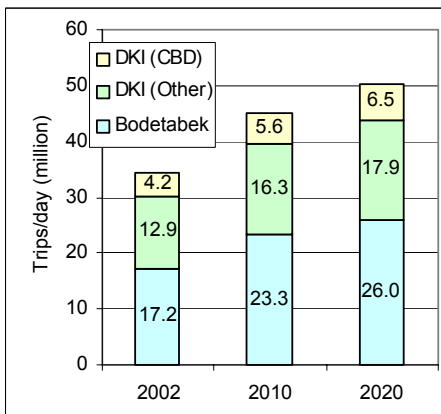
### 3. FUTURE PERSPECTIVE OF JABODETABEK REGION

#### 3.1 GROWING TRAVEL DEMAND

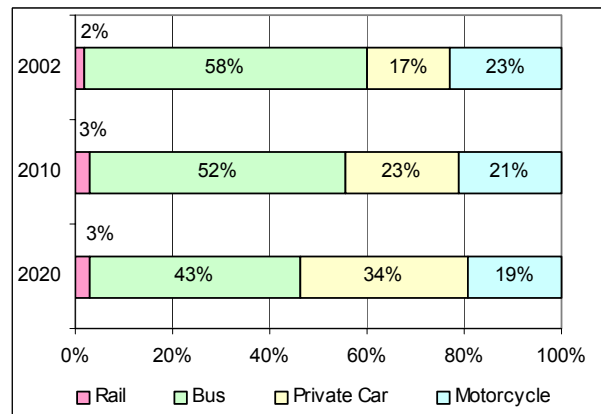
Population in the region would reach 26 million in 2020 and the travel demand would increase more rapidly by 40% in 2020.

#### 3.2 MANY PEOPLE WOULD SHIFT TO PRIVATE PASSENGER CARS AND MOTORCYCLES

At present, the modal share of public transport is about 60%, among motorized modes of transportation. If no action was taken, modal share of public transport, especially the share of buses, would fall to less than half of the total motorized share because of the low level of service, and the modal share of the private car would rapidly increase.



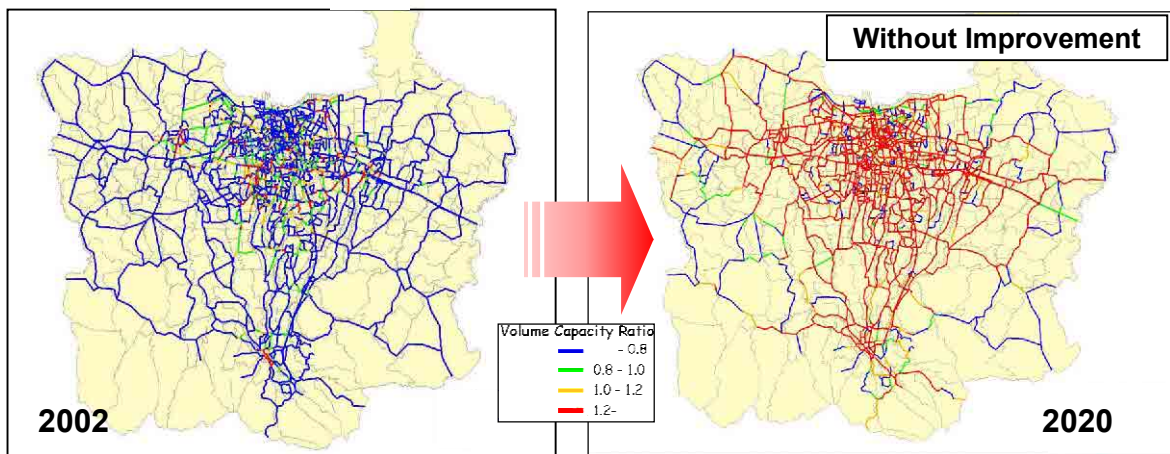
Expected Travel Demand Increase



More Dependence on Private Cars: Trend

#### 3.3 ANTICIPATED SERIOUS TRAFFIC CONGESTION

If no improvement were made for transportation network, almost all the roads would be very congested.



Anticipated Serious Traffic Congestion

#### 3.4 HUGE ECONOMIC LOSSES

Should there be no improvement undertaken in the period up to the year 2020, compared to the case in that the proposed Master Plan transportation system development is implemented, accumulated economic loss would amount to Rp. 65,000 billion, which consists of Rp. 28,100 billion for additional vehicle operating costs and Rp. 36,900 for longer travel times at the present value discounted by 12%. This estimated economic loss, even limited merely to vehicle operating cost and travel time, would be more than the development cost proposed in the master plan.

## 4. PRINCIPLES FOR ESTABLISHING AN INTEGRATED TRANSPORTATION MASTER PLAN FOR JABODETABEK

### 4.1 GOALS OF URBAN TRANSPORTATION SYSTEM

The analysis of the present urban transportation problems in the Jabodetabek region has resulted in the identification of four major goals:

- Efficiency in Transportation System to Support Economic Activities
- Equity in Transportation for All the Members in the Society
- Environmental Betterment related to Transportation
- Transportation Safety and Security

### 4.2 URBAN TRANSPORTATION POLICY

To achieve the four goals for urban transportation system development, the following transportation policies are essential for the Jabodetabek region:

Urban Transportation Policy 1: Promotion of Public Transportation Use

Urban Transportation Policy 2: Alleviation of Traffic Congestion

Urban Transportation Policy 3: Reduction of Air Pollutants and Traffic Noise

Urban Transportation Policy 4: Reduction of Transportation Accidents and Improvement of Security

### 4.3 STRATEGIES UNDER FOUR URBAN TRANSPORTATION POLICIES

Strategies for each urban transportation policy include a variety of policy measures as listed in the each category.

<b>Strategies under Public Transportation Promotion Policy:</b>
<ul style="list-style-type: none"><li>• Increase of Railway Transportation Capacity and Improvement of Service</li><li>• Enhancement of Maintenance System for Electric Train Cars</li><li>• Improvement of Management of Railway Operation</li><li>• Railway Operation Financial Reform</li><li>• Enhancement of Intermodality</li><li>• Provision of Extensive Public Transportation Network</li><li>• High Intensity Land Development in the Surrounding Area of Railway Stations</li><li>• Giving Priority for Public Transportation</li><li>• Reformation of Bus Operation Regime</li><li>• Public Transportation Fare Policy Reform</li></ul>
<b>Strategies under Traffic Congestion Alleviation Policy:</b>
<ul style="list-style-type: none"><li>• Efficient Use of the Existing Road Network</li><li>• Construction of roads connecting missing links</li><li>• Road widening to improve inconsistent carriageway width</li><li>• Construction of flyovers and underpasses to alleviate traffic congestion at bottleneck intersections.</li><li>• Clearing of illegal occupants on the streets, and</li><li>• Prohibit small buses stopping for passengers in the middle of the road</li><li>• Transportation Demand Management</li><li>• Traffic Control Improvement</li><li>• Secure Lands for Road Development</li><li>• Separation of Heavy Vehicles from General Traffic</li></ul>

**Strategies under Air Pollution and Traffic Noise Reduction Policy:**

- Establishment of Environmental Management Scheme
- Implementation and Enhancement of Air Pollutant/Noise Emission Standards
- Enhancement of I/M Program
- Low Sulfur Diesel Program
- Promotion of Bio-diesel
- Promotion of Natural Gas Vehicle
- Environment-Friendly Driving Behavior

**Strategies under Safety and Security Improvement Policy:**

- Education on Traffic Safety
- Inspection of Private Vehicles
- Proper Maintenance of Roads
- Rehabilitation and Installation of Traffic Signal System
- Rehabilitation of Railway Signal System
- Grade Separation between Railway and Road and Provision of Railway Crossing
- Analysis on Causes on Traffic Accidents
- Improvement of Security

#### **4.4 SITRAMP TRANSPORTATION MASTER PLAN 2020**

Major components of the SITRAMP transportation master plan are proposed by urban transportation policy.

**Major Projects/Programs under Public Transportation Promotion Policy**

- Busway development on major corridors
- Road widening for busway development
- Bekasi Line Double Double Tracking
- Serpong Line Double Tracking, Access Improvement, and Integrated Urban Development
- Jakarta MRT Kota – Ciputat
- Access Road Improvement to Railway Stations and Station Square Development
- Rehabilitation of Railway Signaling Facility
- Improvement of Railway Station Facility
- Intermodal Facility Development
- Railway Spareparts Factory Development
- Reformation of Bus Licensing Scheme
- Enhancement of Bus Feeder Services to Railway Station
- Bus Route Restructuring

**Major Projects/Programs under Traffic Congestion Alleviation Policy**

- Completion of Jakarta Outer Ring Road
- Tanjung Priok Access Road Development
- Improvement of Cenkareng Access Road
- Second Jakarta Outer Ring Road Development
- Kalimantan Toll Road
- Depok – Antasari Toll Road
- Jatiasri - Cikarang Toll Road (up to 2nd JORR)
- City bypasses at Parung, Ciputat and towns in Bodetabek
- Flyovers/Underpasses at bottleneck intersections
- Traffic Demand Management in CBD of Jakarta
- Unification and Upgrading of ATC System
- Traffic Information System both for surface road and toll road system
- Electric Toll Collection (ETC)
- Traffic Management at pasars and bottleneck intersections
- Sub-center Development in Bodetabek
- Increase of Fuel Tax

<b>Major Projects/Programs under Air Pollution and Traffic Noise Reduction Policy</b>
<ul style="list-style-type: none"> <li>• Enhancement of Vehicle Inspection and Maintenance Program</li> <li>• Promotion of Low Sulfur Diesel</li> <li>• Promotion of Bi-fuel</li> <li>• Promotion of Natural Gas Vehicle</li> </ul>
<b>Major Projects/Programs under Safety and Security Improvement Policy</b>
<ul style="list-style-type: none"> <li>• Traffic safety education programs for pupils at schools and drivers</li> <li>• Rehabilitation of Railway Signaling and Telecommunication Facilities</li> <li>• Automatic Train Stop (ATS) System</li> <li>• Train Radio System</li> <li>• Repair and Installation of Traffic Signals</li> <li>• Allocation of Security Guards at Public Transportation Terminals and Stations</li> <li>• Development of Traffic Accident Database System</li> </ul>

## **5. HOW TO MAKE IT HAPPEN**

### **5.1 ESTABLISHMENT OF REGION-WIDE TRANSPORTATION ADMINISTRATION**

Urbanized area of the Jabodetabek region has already extended over the administrative boundary of DKI Jakarta; therefore, a region-wide integrated transportation system should urgently be established. A single authority (tentatively called as Jabodetabek Transportation Authority) with talented personnel, sufficient authority and funds, which prepares a development plan and implements projects, should be established to materialize the integrated transportation system.

### **5.2 CREATION OF DEVELOPMENT FUNDS**

Implementation of the projects proposed in the Master Plan requires increase of revenue and allocation of budget to the transportation sector: the total master plan cost accounts for Rp. 80,400 billion. The Study team recommends the increase of budget to the transportation sector by the Central government from 0.08% of GRDP in 2002 to 0.20% in 2007. In addition, the following three revenue increases are proposed. If these increases of revenue are approved and all these revenues are earmarked for transportation system development, the projects and programs proposed in the master plan would be implemented. Furthermore, if the budgets of the local governments will also be increased from 0.25% at the current level to 0.30%, then the master plan costs would be sufficiently provided.

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| <ol style="list-style-type: none"> <li>1) Gradual fuel tax rate increase<br/>(Increase from 5% at current to 20% in 2010, totally Rp. 14,000 billion increase)</li> <li>2) Charges from Road Pricing (Assuming the charge level at Rp. 8,000 per entry from 2005 to 2009, Rp. 16,000 from 2010 to 2014, and Rp. 20,000 from 2015 to 2020, total revenue Rp. 15,100 billion)</li> <li>3) Urban Development Tax (0.01% of assessed property value, total Rp. 3,910 billion)</li> </ol> |
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<b>Required Cost for Master Plan</b>		<b>Funds for Master Plan 2004-2020</b> (Rp. billion)	
- Railway	19,280	- Devt. Budget of Central Govt.	21,400
- Road Network	38,950	- Devt. Budget of Local Govt.	27,600
- Busway	4,300	Subtotal of Development Budget (C)	49,000
- Traffic Management	4,650	- Revenue from Increase of Fuel Tax	14,000
Subtotal of Development (A)	67,180	- Revenue of TDM	15,100
- Maintenance of Existing Roads	13,220	- Revenue of Urban Development Tax	3,910
Subtotal of Maintenance (B)	13,220	Subtotal of Additional Revenue (D)	33,010
<b>Total of Cost (A)+(B)</b>	<b>80,400</b>	<b>Total of Budget (C)+(D)</b>	<b>82,010</b>

## **6. TOWARD MASTER PLAN IMPLEMENTATION**

### **6.1 DIRECTIONS FOR MASTER PLAN IMPLEMENTATION**

#### **(1) Promotion of Public Transportation**

In the short term and intermediate term, the public transportation network should be formulated by combining the maximum use of the existing railway network and busway system which would complement the railway network. In the long run, a rail-based transportation system is definitely needed to provide a higher level of services as well as a higher passenger capacity. Introduction of busway ensures the space for future public transportation system development with higher level of services. Improvement of public transportation services alone cannot suppress the deeply rooted preference to use private modes of transportation; consequently, traffic restraint scheme should be employed in the congested area in the central part of the region where traffic congestion is often observed.

Another important measure is to foster sub-centers in Bodetabek and to distribute urban functions, which currently concentrate in DKI Jakarta. By creating an alternative urban structure, traffic congestion problem would be alleviated to some extent.

#### **(2) Road Network Development**

Although promotion of public transportation is the most important policy to alleviate transportation problem in the master plan, road network has not been well developed and the capacity is significantly small in Bodetabek. In particular, progress of road network development has not caught up with the expansion of urbanized area; therefore, road network development is also important in Bodetabek.

#### **(3) Institutional Arrangement**

The Study indicates how to solve the transportation problems in the Jabodetabek region by explaining not only how the physical development of the transportation network should evolve but also how to ensure the required funds including sharing of costs by the citizens, regulatory reform, institutional rearrangement, and consensus building among the stakeholders. It also indicates what should be done now to make the master plan materialize.

#### **(4) Fund Raising for Transportation System Development**

The shortage of funds is expected for implementing the projects and programs proposed in the master plan, if allocation of funds in the central and local government is assumed to be at the same level of expenditure for transportation at present. It implies that the funds are very limited, not even enough to cover the maintenance costs of the existing facilities, and very possibly just a small amount could go to development of new transportation facilities. Funds for transportation system development and maintenance should be augmented through increase of fuel tax rate, charges of road pricing, new urban development tax and others.

#### **(5) Promotion of Private Sector Participation**

Furthermore, to make up for the shortage of development funds of the public sector, active private-sector participation in provision of transportation services should be encouraged. In this case, based on the

user-pay-principle, transportation fare should be charged on the users who get benefits from the services. To promote private-sector participation in the transportation business, it is urged that business laws and regulations be amended to create a more attractive environment and to reduce uncertainties for investment.

## **(6) Public Involvement**

The cooperation of the citizens, particularly in bearing the burden of increasing taxes, is indispensable for implementation of the master plan. Of course, it goes without saying that they have to be well-informed about the plan. This can be accomplished through such occasions as public hearings and stakeholder meetings, and their opinions should be incorporated in the plan; the effects of the project implementation should also be monitored. It is important that there be accountability by the government. Transparency is of significance to gaining public acceptance and cooperation; thus an information dissemination mechanism should be urgently established. The Study recommends, as a part of the master plan, to develop an urban transportation database system and a transportation performance monitoring system.

## **6.2 NEXT STEPS TO BE TAKEN**

To materialize the transportation master plan, as a first step, the following should be implemented in short term.

### **(1) Legal Framework of Jabodetabek Transportation Master Plan**

Legal framework is needed to materialize the master plan by relevant government agencies, thus it is recommended to draft a new law, or at least a presidential decree, on the transportation master plan for Jabodetabek.

### **(2) Establishment of Jabodetabek Transportation Planning Committee**

Since it seems difficult to establish a new transportation authority in a short term, a Jabodetabek transportation planning commission should be established for examining structure of the organization, functions, role sharing with the existing government agencies and for preparation of the authority to pursue the tasks in short term.

### **(3) Detailed Transportation Master Plan for DKI Jakarta and Local Governments in the Bodetabek Area**

The SITRAMP transportation master plan provides the trunk transportation system development plan in the Jabodetabek region. DKI Jakarta and the local governments in the region should develop sub-regional transportation master plan and should obtain legal basis for implementing the local transportation plan, which should be consistent with metropolitan-wide master plan. Furthermore, lower-level transportation network should be added according to local needs of each local government.

### **(4) Ensuring Funds for Transportation System Development**

Even taking private sector participation into account, financial burden of public sector was estimated at Rp. 80,400 billion in the 14-year master plan period from 2004 to 2020. About Rp. 31,400 billion would be required in addition to the current level budget for transportation sector. Relevant laws should be drafted regarding road pricing, increase in fuel tax rate and introduction of urban development tax to complement the shortage of development funds. Moreover, since all relevant agencies have not agreed on the concept of earmarking of transportation-related taxes to the transportation sector, discussion should be continued on the issue. Further discussion is necessary among relevant agencies with regard to possibility on application of CDM (Clean Development Mechanism) for developing a rail-based transportation system, which needs a huge amount of fund.



**(5) Appropriate Formulation of Private-Public Partnership and Cooperation among Public Sectors**

Participation of private sector in transportation system development and operation is of great importance in reducing financial burden of public sector as well as in introducing a more efficient management practice of private sector as previously described. More concrete and detailed analyses should be conducted on cost sharing between public and private sectors and incentives for private sector participation (such as provision of development right and guarantee by government and so on.)

**(6) Post Evaluation of the Projects**

In the final stage of master plan study, busway operation was initiated in January 2004 and enforcement of the 3-in-1 traffic restraint policy was also made stricter compared to the previous days. It is definitely important to execute a post evaluation study to understand responses of the citizens and impacts on traffic as well as on economic activities on the corridor. Then it should be fed back to the next stage and the plan should be modified and improved into a more efficient and convenient system; as a consequence, it leads to a transportation policy which could obtain consensus from the public.

## 7. PRE-FEASIBILITY STUDIES OF PRIORITY PROJECTS

Four projects from the components in the SITRAMP transportation master plan have been selected for pre-feasibility study; namely, 1) Busway extension project in the short term, 2) Traffic Demand Management (TDM) in the CBD of Jakarta, 3) Railway Serpong line double tracking, access improvement and integrated land development, and 4) 2nd JORR (Outer-Outer Ring Road) Project.

The first two projects, the busway extension and TDM, were selected because these two projects were proposed to be implemented in the short-term for promoting public transportation use as well as alleviating traffic congestion. On the other hand, the pre-feasibility studies for the latter two projects, the Serpong railway line double tracking and the 2nd JORR project, put more focus on implementation mechanism.

The pre-feasibility studies have examined technical, environmental, economic and financial aspects of the projects. It has also clarified the responsibility of relevant agencies and has suggested possible role sharing between public and private sectors.

### 7.1 BUSWAY EXTENSION PROJECT

#### 7.1.1 Background and Objective

Any conspicuous improvement on relieving traffic congestion has not been seen in Jabodetabek, although various measures to enhance public transportation have been recommended for a long time. Promotion of public transportation use is the most important transportation policy recommended in SITRAMP. It is urgently needed to improve the level of service of public transportation for preventing shift from public transportation to private modes of transportation. Busway development should be a viable and promising option for short-term public transportation improvement.

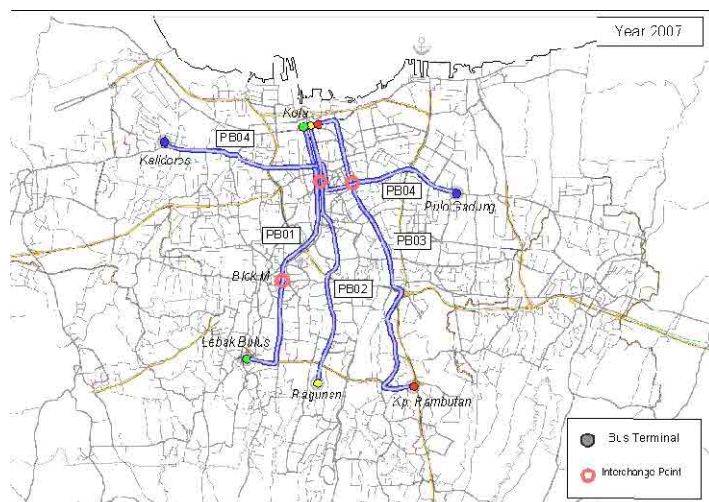
DKI Jakarta eventually started operation of busway between Kota and Blok M on 15<sup>th</sup> January 2004. SITRAMP proposed the extension of busway to enhance passenger convenience and comfort because public transportation service should be provided in the form of a network. Thus, it is recommended to develop eight busway routes in Jabodetabek, integrating with rail-based transportation system. The four busway routes among the total eight routes have been selected as short-term implementation projects. This pre-feasibility study examined viability and implementation plan of the four busway routes in DKI Jakarta, including the extension of the DKI Jakarta' first busway to Lebak Bulus.

#### 7.1.2 Busway Routes

The four short-term busway developments include three north-south routes and one east-west route as follows:

- 1) Extension of the existing busway Kota - Blok M to Kota-Lebak Bulus (extension 11.1 km and total length 21.8 km),
- 2) Kota - Ragunan (length 19.8 km),
- 3) Kota - Kampung Rambutan (length 24.9 km) and,
- 4) Pulogadung - Kalideres (length 25.9 km)

The planned busway routes are connected at major interchange points such as Kota, Monas and Senen.



**Busway Routes for Short-Term Implementation Plan**

#### 7.1.3 Bus Passenger Demand

The projected number of passengers on the busway routes would vary from route to route. In 2007 maximum line loading would be from 900 (PB02) to 3,800 persons (PB04) for one direction in a peak hour. In 2010 the passenger volume would increase and reach between 4,100 (PB01) and 5,600 passengers (PB04) in a peak hour per direction.

#### **7.1.4 Project Cost**

The investment cost of the project is composed of road widening, earthworks, pedestrian bridges, bus shelters, ticketing machines and traffic signals, and totally accounts for Rp. 1,660 billion. It is remarkable that land acquisition cost is high, accounting for around as much as 70% of the total investment cost.

Unit operating cost per bus-km reaches around Rp. 20,000 /bus/km including infrastructure improvement cost, related facility development cost, bus-coach procurement cost, operation and maintenance of busway system and interest accruing from borrowing for a short term.

#### **7.1.5 Implementation of Busway Extension and Operation**

The busway route PB04 (Kalidres - Pulo Gadung) needs to be developed following after the first operation of DKI's busway started from mid of January in 2004. By the year 2007 the four busway development are scheduled to be completed. It is assumed in the operation schedule that Monas – Blok M will be replaced with MRT system by 2010, when sufficient passenger demand is generated. As for the rest of the route PB01: from Blok M to Lebak Bulus, it is proposed that conversion to the MRT system be accomplished by 2020.

#### **7.1.6 Economic Evaluation**

The Net Present Value (NPV) discounted by 12% is estimated at Rp. 1,153 billion and the Economic Internal Rate of Return (EIRR) is 31.9 %, which is sufficiently high to show viability of the implementation of the project from a viewpoint of national economy.

#### **7.1.7 Financial Viability**

Analysis on financial viability revealed that it is possible for bus operators to shoulder even all the investment costs excluding land acquisition cost. The Financial Internal Rate of Return (FIRR) under such a precondition accounts for almost 40% and even if revenue decreased by 20%, FIRR still amounts to 28% . In other words, given the conditions that public investment covers the cost of infrastructure development, concessionaires can collect their investment from the revenue accruing from bus operation.

#### **Results of Financial Viability Analysis**

Tariff System	Cost Burden by Bus Operator				
	Land and Compensation	Infrastructure Facility	Bus Shelter, Bus Location System	Bus Purchase and Operation Cost of bus	FIRR
Flat tariff at Rp. 3,300 until 2009; and Distance proportional tariff after 2010 (Flag fall: Rp.1,000 and Distance portion: Rp.200 /km)	○	○	○	○	10.1%
		○	○	○	39.4%
Decrease of Revenue by 20%	○	○	○	○	4.3%
		○	○	○	28.1%

Source: SITRAMP

#### **7.1.8 Issues for Further Development of Busway System**

##### **(1) Monitoring and Improvement of Busway Extension Plan**

Since busway operation has been initiated between Blok M and Kota, monitoring on the current operation is of great importance for the planned busway extension project. Review of the system performance, passenger demand and opinions from the passengers and users of the private modes of transportation should be taken into consideration for further improvement of the busway projects.

##### **(2) Grade Separation at Intersections and Roundabouts**

Intersections, roundabouts and U-turn points are major bottlenecks for bus operation due to conflict with general traffic. In the short-term it is proposed to install bus priority signals at these places; however, in the long run, grade separation should be taken into consideration to ensure smooth bus operation on the busway.

## 7.2 TRANSPORTATION DEMAND MANAGEMENT (TDM) IN CBD

### 7.2.1 Background and Objectives

Vehicular traffic demand will increase rapidly according to the population growth, increase in real household income and shift to private modes of transportation. It is quite difficult to expand road network capacity by road construction or road widening in the central area of DKI Jakarta due to limited availability of land and expensive land acquisition cost. It is thus inevitable to employ traffic restraint scheme to deal with severe traffic congestion.

In fact, the traffic restraint scheme, 3-in-1, had been employed in the morning peak period from 6:30 until 10:00 along the Sudirman - Thamrin corridor for a long time. Recently DKI Jakarta has made the 3-in-1 scheme stricter and extended the operation hours as well as the restricted corridors. Furthermore, in the new scheme, it is regulated that three persons and more should always be in the car when passing on the corridor.

This pre-feasibility study examines the other Transportation Demand Management (TDM) measures effective in reducing congestion and acceptable to people such as road pricing, area pricing and cordon pricing. One aspect of pricing policy is generation of funds for transportation system development and the scale of revenue is also studied.

### 7.2.2 TDM Area

Provision of alternative means of transportation for the expected pushed-out users by TDM is of great importance to obtain public approval on TDM. One of the alternatives is public transportation development. Selection of TDM area thus greatly depends on availability of public modes of transportation with sufficient level of service. SITRAMP has proposed the four routes of busway system including extension of the current DKI Jakarta's busway system as short-term public transportation system improvement. This busway development would serve as alternatives for the pushed-out vehicle users.

In immediate-term, only one busway is available and covers the Blok M – Kota corridor. Even after the second east-west busway system is developed up to 2005, the service area will still be limited on the corridors. In such a circumstance, considering technical viability of surveillance system, it is recommended to employ road pricing on the designated corridor with manual surveillance system.

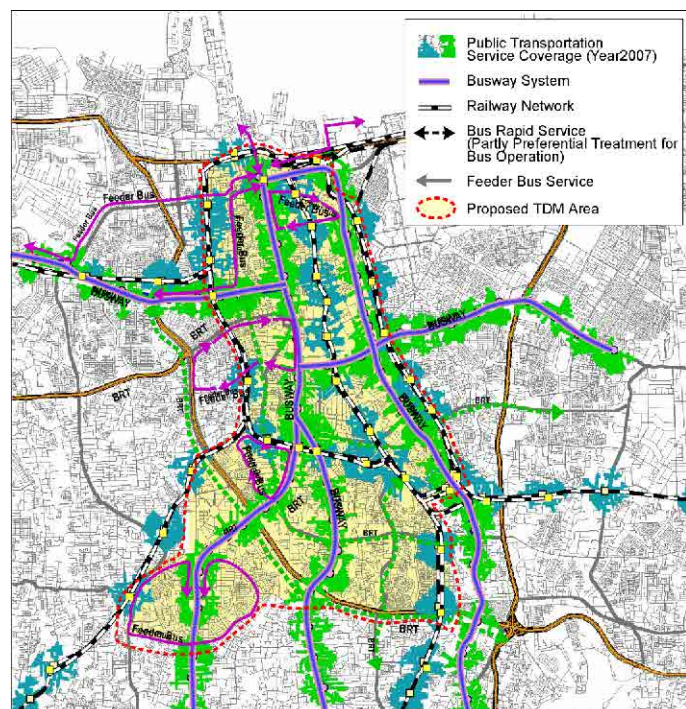
After the planned four busway routes is developed by 2007 and feeder bus services are provided for the areas which are inside TDM but are not well served by busway or railway, the area enclosed by the railway semi-loop line, the Serpong line, the Central line, Jalan Tol Cawang – Grogol, and Kebayoran Baru will be the TDM area because enormous vehicular traffic would be generated from or attracted in these areas.

### 7.2.3 Pricing Method

The following steps are desirable for realistic implementation:

- Road pricing should be taken, in combination with the currently adopted 3-in-1 regulation, as the first step (in 2005); and
- Area pricing will be adopted to restrain all the vehicular trips in the congested area in 2007.

It seems necessary to adopt area pricing instead of cordon pricing with a view to restraining the growing traffic in the CBD in the future.



Public Transport Service Coverage and Proposed Feeder Bus Services (2007)

#### **7.2.4 Level of Toll Levy**

Taking the balance between effectiveness and social impacts into consideration, Rp. 8,000 is preferable at the first stage in order to obtain broad approval from the public. The amount of Rp. 16,000 is applicable in 2010 with a view to reducing the serious traffic congestion in the CBD to the current level. The amount of Rp. 20,000 in 2015 is proposed by taking social impacts into consideration, though according to the analysis more than Rp. 30,000 is required to reduce the congestion ratio in 2020 to the current level. This is, therefore, also subject to monitoring in the future.

#### **7.2.5 Surveillance System Configuration**

It is recommended to take the following steps for implementation for realistic reasons:

- Manual method should be taken initially due to its flexibility and low initial investment and operation cost.
- The manual method should be switched to Electronic Road Pricing (ERP), when TDM enforcement becomes firmly established among the public. For this end, it is necessary to prepare an electronic vehicle registration system, which enables the surveillance to trace the vehicle users by license plate, in order to levy the toll and to find violation as well.

#### **7.2.6 Economic Considerations**

The capital investment cost of the TDM amounts to Rp. 693 billion of which Rp. 92 billion and Rp. 601 billion are allocated for Manual Surveillance System and ERP System, respectively. Operation and maintenance cost of the two systems is also estimated at Rp. 87 billion for the manual system in short-term and Rp. 88 billion for the ERP system in intermediate-term, respectively. Besides the cost of the ERP system, the purchase of in-vehicle unit, which is around Rp. 1.0 million per unit, is required for drivers and it is proposed to subsidize 50% of the cost to the users for promotion of the system. Considering the savings in the VOC and the TTC as the benefit of the project, the B/C ratio is estimated at 7.2 using a discount rate at 12%.

#### **7.2.7 Revenue of TDM**

There are many uncertainties that could affect the revenue generation by the TDM. An estimate is made under the following assumptions:

- The levy is fixed at Rp. 8,000 per entry (2005 – 2009), Rp. 16,000 (2010 – 2014), and Rp. 20,000 (2015 – 2020) in the restricted area; and
- Considering the reduction factors such as the 6-hour peak traffic, exemption of the vehicles with three or more passengers, discount for the vehicles entering the TDM area more than once in a day, the TDM levy is expected to be imposed on approximately 20% of the daily trip generation in the area.

Based on the assumption above, the revenue will account for Rp. 1,400 billion for the short-term, Rp. 1,800 billion in the intermediate-term, and Rp. 11,900 billion for the long-term period, respectively. The total revenue is estimated at Rp. 15,100 billion during the Master Plan period. However, there still remains the requirement for reduction of the levy rate for the vehicles of the residents in the restricted area.

#### **7.2.8 Legislative Provisions**

In terms of legislation for implementation of TDM, it is necessary to stipulate restricted areas and hours, target vehicle types, toll fees, and so on. Furthermore, it is important to leave some flexibility in order to be able to modify the contents of stipulations later when traffic situations or land use patterns have changed. Finally, for institutionalization of TDM, not only is it necessary to prepare sufficient documents for explanation of TDM in Parliament, but it is also necessary to spend enough time on socialization in order to have a general consensus of necessity of TDM, for example, through public hearings or campaigns.

### **7.3 SERPONG LINE DOUBLE TRACKING, ACCESS IMPROVEMENT AND INTEGRATED LAND DEVELOPMENT**

#### **7.3.1 Background and Objectives**

Large-scale housing complexes have been developed along the Serpong Railway Line. The residents in these residential areas belong to middle and high income households thus most of them commute to the

CBD by private passenger cars. However, the capacity of the road network to Jakarta is not sufficient, thus the roads are very congested every morning; consequently it often takes two hours from their homes to work places. Recently PT. KA has started executive train services from Serpong and Sudimara to Sudirman and the trains have attracted many people in the area. Thus it showed potential passenger demand if better railway service was provided.

The transportation master plan proposed in SITRAMP revealed that enhancement of public transportation is a key to the successful establishment of an efficient transportation system for Jabodetabek, and railway should be a backbone of public transportation system. In particular, improvement of the Bekasi and Serpong Lines has been given priority and it is proposed to provide east-west direct operation in the short term.

This pre-feasibility study examines technical issues, economic and financial viability and implementation mechanism for the project of the Serpong line double tracking, access improvement and integrated land development.

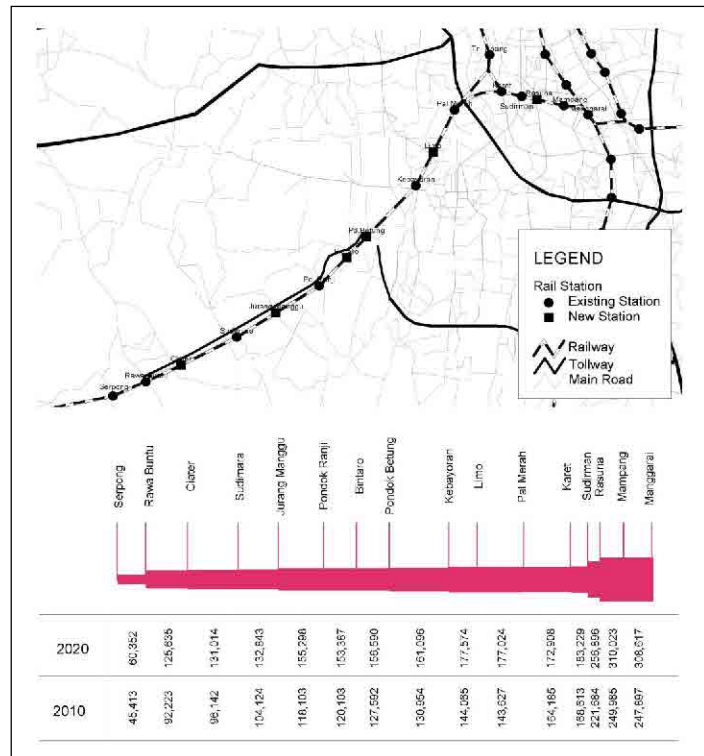
### **7.3.2 Railway System Development Plan**

Facility	Description of Improvements
Additional Track	Railway transportation capacity should be increased by double tracking to meet increasing passenger demand on the Serpong line. The alignment of additional track on the Serpong line is selected at eastern side of the existing single track, whereas the alignment of additional track between Palmerah and Tanah Abang is western side of the existing track in order to connect with the Western line at the Tanah Abang station.
Railway Station	The basic station structure is planned to be over-track station to deal with free-rider problems. Four new stations, Ciater, Bintaro, Pondok Betung and Limo, are proposed as over-track stations, while Jurang Manggu station is, however, planned as a ground station due to geographical situation. In addition, development of new Rasuna Said station on the Western Line is proposed to make easier transfer with the proposed busway PB02.
Station Square	A station square is an important facility for passengers to interchange from other modes of transportation to railway. Major station square development plans are proposed at Tanah Abang, Jurang Manggu (New Station), Rawabuntu, Sudirman (former Dukuh Atas), and Rasuna Said (New Station).
Access Roads	To make most use of the effect of the Serpong railway line improvement, road widening of the major access roads to the railway stations, as well as bus bay installation, where railway station squares are not available, is required.
Stabling Yard	The project requires additional 166 train cars by 2020. In order to park additional train cars, new stabling yards are planned in the Serpong station which can accommodate 120 ECs and at the Rawa Buntu for the remaining 46 ECs.
Palmerah – Karet Shortcut	It is recommended to provide a short-cut between Karet and Palmerah section to make east-west direct operation possible. An elevated structure is recommended from viewpoint of operational safety.



### 7.3.3 Passenger Demand Forecast

The passenger demand along the Serpong line has been projected and the daily passenger demand varies from 45,400 passengers at Serpong – Rawa Buntu section to 143,600 passengers at Limo – Palmerah section in 2010. Although a direct railway line is provided to connect Serpong in the west and Cikarang in the east, majority of the railway passenger movements is expected to be of a commuting nature, clustering in the Serpong-CBD and Bekasi-CBD trips. The section between Sudirman and Manggarai stations (being in the center of Jakarta’s CBD) is predicted to become the busiest section serving for more than 300,000 passenger trips in the year 2020.



Projected Demand in Serpong Railway Line, 2010-2020

### 7.3.4 Implementation Schedule

The project will be implemented in two phases. The double tracking project between Serpong and Tanah Abang will be implemented in Phase 1 and the shortcut line development project between Palmerah and Manggarai is planned to be implemented in Phase 2.

### 7.3.5 Economic and Financial Analysis

#### (1) Cost Estimates

The Project consists of three packages; namely, double tracking, access improvement, and integrated land development. The total investment cost of the project amounts to Rp. 4,312 billion during the period from 2004 to 2020, of which the cost of the Serpong Line Double Tacking accounts for 75%.

#### (2) Economic Evaluation

The Net Present Value (NPV) discounted by 12% is estimated at Rp. 1,993 billion and the Economic Internal Rate of Return (EIRR) is 18.9 %, which is sufficiently high to reveal the economic viability of the implementation of the project. The reduction of CO<sub>2</sub> emission is considered an important benefit to global environment. The reduction in CO<sub>2</sub> emission is estimated to amount approximately to 360,000 tons in 2020 with the project and can be valued at Rp. 30 billion assuming that the value of reduction of CO<sub>2</sub> is assumed at US\$ 10 per ton.

#### (3) Financial Analysis

The financial viability of the project was evaluated from the viewpoint of the affordability of PT. KA to bear the cost of the project through passenger tariff revenues.

The financial analysis implies that PT. KA will be unable to manage self-sufficiently when it is required to shoulder the investment cost as well as OM cost as currently regulated in Track Access Charge (TAC) payment. It would be rational that basic infrastructure facilities, such as civil and track works, electrical and signaling works are invested by the Government and the costs for procurement of rolling stock and operation and maintenance are shouldered through revenues from passengers and commodity transportation by PT. KA.

### 7.3.6 Integration with Land Use through Guidance of Urban Planning

Integration between land use and transportation system development is essential for efficiency of railway transportation system development. The concept of Transit-Oriented Development (TOD) should be introduced and it implies the necessity of guiding a highly dense urban development in the surrounding

area of railway stations. In land use plan, higher floor area should be allocated to the areas within ten-minute walking distance or about 600-meter radius from the stations.

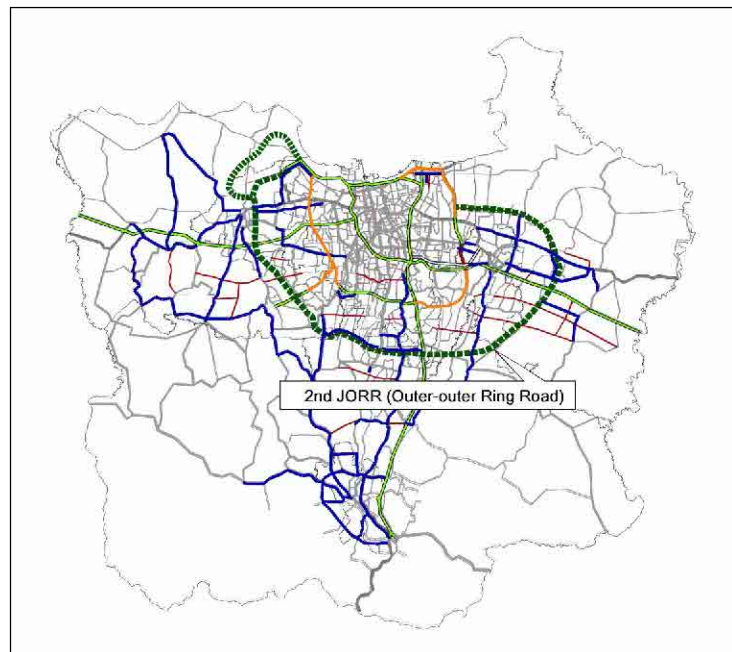
### **7.3.7 Implementation Mechanism for Serpong Line Improvement Project**

It is well known that transportation system brings about enormous economic benefits but transportation operators cannot fully benefit from the improvement of the transportation service. To internalize the benefits of railway transportation system development, one way is for a railway company to engage in real estate business along the railway corridor. PT. KA, however, does not have personnel with sufficient knowledge in real estate business. More realistically, it is proposed that PT. KA seek financial support from private real estate developer (Public-Private Partnership) or cooperate with urban development corporation (Permunas) in public sector.

## **7.4 2ND JORR (OUTER-OUTER RING ROAD)**

### **7.4.1 Background and Objectives**

This project aims not merely to meet future traffic demand in the region but also to promote sub-center developments, which was proposed in SITRAMP as a preferable regional structure for Jabodetabek. The project road extends to as long as 110 km and several local governments are involved in the project. Traffic demand varies from section to section; thus, it leads to a variety of implementation methods such as introduction of private-sector participation scheme including BOT, public investment and combination with regional development along the road. The pre-feasibility study addresses the viability of the project not merely from a technical aspect but from a viewpoint of available implementation scheme for the project.



### **7.4.2 Route**

The project road is connecting Koa Tangerang, Kota Depok and Kota Bekasi, functioning as sub-center in the region.

### **7.4.3 Project Cost**

The total project cost of the second JORR is estimated at Rp. 7,056 billion, with the land cost amounting to Rp. 2,060 billion. The project cost varies from section to section; the land cost between Serpong Toll Road and Jagorawi Toll Road is the most expensive because the land along the road is already urbanized and many housing complexes are located. In contrast, the construction cost for the section between Cikampek Toll Road and JORR East Section is relatively expensive due to weak land condition.

### **7.4.4 Traffic Demand**

The section between Merak and Jagorawi Toll Roads shows around from 40,000 to 50,000 pcu per day. On the other hand, the section between Cikampek Toll Road and the east side of JORR shows pcu as small as around 8,000 per day. Traffic demand between Serpong Toll Road and Cikampek Toll Road would increase by about 4,000 pcu if area development were materialized with toll road development.

### **7.4.5 Economic Justification**

The economic analysis on the basic case (all section is toll road) indicates that the Net Present Value (NPV) discounted by 12% is estimated at Rp. 595 billion and the Economic Internal Rate of Return (EIRR) is 16.3 %, implying that the project is economically feasible.



#### **7.4.6 Possible Toll Road Sections**

Based on regional development direction, traffic characteristics and financial viability as a toll road, the analysis on alternatives of toll-road sections concludes as follows:

- It is difficult to construct all the sections between Cengkareng access and East JORR as the toll road, considering such risks as future changes of economic and social conditions.
- Although the section between Merak Toll Road and Jagorawi Toll Road will surely succeed as toll business from a viewpoint of financial viability, only this section will not satisfy accomplishment of sub-center development scenario in Jabodetabek.
- The section between Jagorawi Toll Road and Cikampek Toll Road has difficulties to ensure financial viability as an independent toll road due to insufficient traffic volume. Some possibility still remains if revenue pool system is introduced in association with the section between Cengkareng Toll Road and Jagorawi Toll Road and integration with area development is materialized, by which land for the toll road is provided.
- Considering future risk and traffic characteristics, it is preferable to construct the section between Cengkareng Access and Cikampek Toll Road as a part of the 2<sup>nd</sup> JORR.
- As it is difficult to construct the Cikampek Toll Road – East JORR section as a toll road, one way to cope with the existing and future low traffic demand is to construct the road as an ordinary road and another way is to construct this section as a high mobility highway (HMH) with full or semi access control by public investment, charging low tariff to cover maintenance cost.

#### **7.4.7 Integration with Area Development**

Regarding the section between Jagorawi Toll Road and Cikampek Toll Road, there are two key issues to ensure financial viability as toll road; securing land for toll road and amplification of traffic demand on the road. The sole solution to meet the both requirements is to introduce a large-scale area development integrated with 2nd JORR. This is expected to satisfy the following:

- The west side of Jabodetabek has large-scale housing complexes such as Bintaro Jaya and Bumi Serpong Damai (BSD). On the other hand, the east side has industrial complexes and some housing complexes in medium size. It is necessary to induce a large-scale area development in the east side to strongly promote “East-west Corridor Development”.
- The integration with area development would induce additional traffic demand of maximum 16,400 pcu on the stretch. This greatly contributes to improvement of financial viability of the toll road and makes it easier to develop all the sections between Cengkareng Access and Cikampek Toll Road as a toll road.
- According to the current regulation, the land cost for toll road is covered by Kimpraswil. It seems, however, difficult to appropriate this land cost by the reduced central governmental budget under the current decentralization. On the other hand, the local governments are also facing financial difficulties. Under these situations, private investors are expected to provide the land cost, and this will, without doubt, reduce the financial viability of the project. The integration of area development with toll road can largely alleviate the problems mentioned above and can secure the right-of-way of the toll road as well.

#### **7.4.8 Issues on Implementation**

Issues to implement the project are summarized as follows:

##### **(1) Project Management**

On the premise that the section between Cengkareng Access and Cikampek Toll Road (around 80 km) will be constructed as a toll road, it is problematic for the related local governments to take an initiative to manage all the procedures necessary to implement the toll road, because all the related local governments have not had much experience on such a big project. It is preferable for JTA (Jabodetabek Transportation Authority), which has been proposed in SITRAMP, to manage the project. Furthermore, it becomes also an obstruction for the private investors to take only a certain section independently. All related investors have to be united, if possible, as a consortium to address implementation not only on profitable sections but also on lean section as an even manner.

## **(2) Preconditions for Viability**

Although toll raise was recently permitted, toll tariff had been left low for a long time in Indonesia and the governmental permission is required to raise the toll rate. Toll road is materialized by toll revenue. Setting up of initial toll tariff within the user's benefits and future raise of toll rate within real growth of GDP per capita become a precondition to materialize toll road business.

## **(3) Integration with Area Development**

The integration of area development with the toll road is also not so easy. The following issues have to be addressed for the implementation:

- It is necessary to stipulate the planning principles and boundary of the area development project in a local spatial plan. This will prevent small size uncontrolled development.
- It is preferable, if possible, for one investor to take responsibility for the implementation of area development project. However, in the case that plural investors participate in the project, it is necessary for all the related investors to bear land cost of the toll road, regardless if the area is beside or far from the 2nd JORR.
- Land speculation may happen in association with area development. In terms of land buying/selling within the designated area on the local spatial plan, it is strongly necessary for the local government to manage the land price - not to hike it up - by applying a regulation to obtain permission to buy/sell.
- As the large-scale area development is required, it is necessary to provide land use in the development to offer job opportunity in order to function as a sub-center.
- Lastly, some public transportation facility development will be required such as extension of busway from Bekasi through Jl. Siliwangi, which is proposed in SITRAMP, or a new rail-based system to connect Bekasi Railway Line to the area development along the 2nd JORR.