Republic of Indonesia
Coordination Ministry for Economic Affairs
Ministry of National Development Plan/ National Development Planning Agency
Ministry of Transportation

Feasibility Study for Jakarta-Bandung High-Speed Railway Project (As a part of Jakarta – Surabaya) Phase I

Final Report

May 2015

Japan International Cooperation Agency
(JICA)
Japan International Consultants for Transportation Co., Ltd.
Yachiyo Engineering Co., Ltd.
Oriental Consultants Global Co., Ltd.
Mitsubishi Research Institute, Inc.
Nippon Koei Co., Ltd
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Preface

This Report is for the “Feasibility Study for Jakarta-Bandung High Speed Railway Project, Republic of Indonesia”. Japan International Cooperation Agency (JICA) appointed Japan International Consultants for Transportation Co., Ltd., Yachiyo Engineering Co., Ltd., Oriental Consultants Gloval Co., Ltd., Mitsubishi Research Institute, INC. and Nippon Koei Co., Ltd. to conduct the Feasibility Study for Jakarta-Bandung High Speed Railway Project(Phase-1).

The objective of the “Feasibility Study for Jakarta-Bandung High Speed Railway Project(Phase-1)” is to evaluate the necessity, relevance and achievability, in addition to formulate the adequate Project Plan and to estimate the approximate project cost.

The study team hopes this project shoud be for Indonesia, of Indonesia and by Indonesia as a splits of JICA study, and we hopes that this report will help to realize the High-Speed Railway project in Indonesia and provide the useful considerations to the concerned parties and personeel for export of Infrastructure in Japan.

May, 2015

Japan International Consultants for Transportation Co., Ltd.
Yachiyo Engineering Co., Ltd.
Oriental Consultants Groval Co., Ltd.
Mitsubishi Research Institute, INC.
Nippon Koei Co., Ltd.

List of Abbreviations

Abbreviations	Formal Name
ADB	Asian Development Bank
AFC	Automati Fare Collection
AMDAL	Analisis Mengenai Dampak Lingkungan (Environmental Impact Assessment)
ANDAL	Analisa Dampak Lingkungan (Environmental Impact Assessment Report)
APBD	Anggaran Pendapatan dan Belanja Daerah (Indonesia's Regional Revenue and Expenditure Budget)
APBN	Anggaran Pendapatan dan Belanja Negara (Indonesia's State Revenue and Expenditure Budget)
ATACS	Advanced Train Administration and Communications System
ATC	Automatic Train Control
ATP	Automatic Train Protection
ATS	Automatic Train Stop
BAPPEDA	Badan Perencanaan Pembangunaan Daerah (Regional Development Planning Agency of Indonesia)
BAPEDAL	Badan Pengendalian Dampak Lingkungan (Environmental Impact Management Agency of Indonesia)
BAPPENAS	Badan Perencanaan Pembangunaan National (National Development Planning Agency of Indonesia)
BMKG	Badan Meteorologi, Klimatologi, dan Geofisika (Meteorology, Climatology and Geophysics Agency of Indonesia)
BKPM	Indonesian Investment Coordinating Board
BOT	Build-Operate-Transfer
BPN	National Land Agency of Indonesia
BPS	Bandan Pusat Statistik (Central Bureau of Statistics of Indonesia)
BPPT	Badan Pengkajian Dan Penerapan Teknologi (Agency for the Assessment and Application of Technology)
BTO	Build-Transfer-Operate
BUMN	Badan Usaha Milik Negara (Ministry of State Owned Enterprises of Indonesia)
B/C	Cost Benefit Ratio
CA	Cement Asphalt
CBTC	Communications-Based Train Control system
CTC	Centralized Traffic Control
CTCS	Chinese Train Control System
DAOP1	Daerah Operasi (Railway Operation Area 1 (Jakarta Area))
DAOP2	Daerah Operasi (Railway Operation Area 2 (Bandung Area))
DBFO	Design, Build, Finance and Operate
DBL	Design Build and Lease
DGCA	Directorate General of Civil Aviation, Ministry of Transportation of Indonesia
DGR	Directorate General of Railway, Ministry of Transportation of Indonesia
DKI	Daerah Khusus Ibukota (Special Capital Region)
DPL	Dewan Perwakilan Rakyat (People's Representative Councils)
DS-ATC	Tohoku & Joetsu Shinkansen Digital communication & control for Shinkansen ATC
DSCR	Debt Service Coverage Ratio
EIA	Environmental Impact Assessment

Abbreviations	Formal Name
EIRR	Economic Internal Rate of Return
ENPV	Economic Net Present Value
EoA	End of Authority
EqIRR	Equity Internal Rate of Return
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
EU	European Union
FIRR	Financial Internal Rate of Return
F/S	Feasibility Study
GCA	Government Contracting Agency
GDP	Gross Domestic Product
GNI	Gross National Income
GRDP	Gross Regional Domestic Product
GSM-R	Global System for Mobile communication for Railways
HSR	High Speed Railway
IDR	Indonesia Rupiah
IEDC	Indonesia Economic Development Corridors
IIA	Indonesia Investment Agency
IIGF	Indonesia Infrastructure Governmental Fund
IMO	Infrastructure Management Outsourcing
IRSE	Institution of Railway Signal Engineers
IRR	Internal Return Ratio
JABODETABEK	Jakarta Capital Region (Jakarta, Bogor, Depok, Tangerang and Bekasi)
JABODETABEKPUNJUR	Greater Jakarta Region JABODETABEK and Puncak & Cianjur
JARTS	Japan Railway Technical Service
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
JR EAST	East Japan Railway Company
JR TOKAI	Central Japan Railway Company
JRTT	Japan Railway Construction, Transport and Technology Agency
JR WEST	West Japan Railway Company
KA-ANDAL	Scoping Report of Environmental Impact Assessment
KP3EI	Committee for Indonesian Economic Development Acceleration and Expansion
KKPPI	National Committee for Acceleration of Infrastructure Provision
LARAP	Land Acquisition and Resettlement Action Plan
LCC	Low Cost Carrier
LCX	Leaky CoaXial cable
LGV-SEA	Ligne à Grande Vitesse Sud Europe Atlantique
LIBOR	London Interbank Offered Rate
LST	Luxury- goods Sales Tax
LZB	Linienzugbeeinflussung

Abbreviations	Formal Name
MOE	Ministry of Environment of Indonesia
MOF	Ministry of Finance of Indonesia
MOT	Ministry of Transportation of Indonesia
MOPW	Ministry of Public Works of Indonesia
METI	Ministry of Economy, Trade and Industry
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
M/P	Master Plan
MPA	Metropolitan Priority Area
MP3EI	Masterplan Percepatan dan Perluasan Pembangunan Ekonomi Indonesia (Masterplan of Acceleration and Expansion of Indonesia Economic Development)
NJOP	Nilai Jual Objek Pajak (Tax Object Selling Price)
NPV	Net Present Value
NRMP	National Railway Master Plan
O&M	Operation and Maintenance
OCC	Operation Control Center
OCR	Ordinary Capital Resources
OD	Origin-destination
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OMC	Operation and Maintenance Contract
PC	Pre-stressed Concrete
PJKA	Perusahaan Jwatan Kareta Api (Indonesian State Railways)
PPP	Public Private Partnership
PQ	Prequalification
PRC	Programmed Route Control
PSO	Public Service Obligation
PRUMKA	PRUM Kereta Api (Public Railway Corporation)
PT. INKA	Perseroan Terbatas Industri Kereta (Indonesia Railway Industry)
PT. KAI	Perseroan Terbatas kereta Api Indonesia (Indonesian Railways)
PT. LEN	Perseroan Terbatas Lembaga Elektronika Nasional
PT. MRT Jakarta	Perseroan Terbatas Mass Rapid Transit (PT Mass Rapid Transit-Jakarta)
PT. SMI	PT SARANA MULTI INFRASTRUKTUR
RBC	Radio Block Center
RFF	Réseau Ferré de France
RKL	Environment Management Plan
RPJM	Rencana Pembangunan Jangka Menengah (Medium-Term National Development Plan)
RPL	Environment Monitoring Plan
RPJPN	Rencana Pembangunan Jangka Panjang (Long-Term National Development Plan)
RTRWP	Rencana Tata Ruang Wilayah Provinci (Provincial Regional Spatial Plan)
Saint	Shinkansen Atc and INTerlocking system
SIPPT	Surat Izin Penunjukan Penggunaan Tanah (Permission of Land Use and Designation)
SNI	Standard National Indonesia
SP3L	Surat Persetujuan Prinsip Pembebasan Lahan (Principal Approval of Land Acquisition)
SP	Stated Preference

Abbreviations	Formal Name
SPC	Special Purpose Company
SPI	Indonesian Appraising Standard
SPV	Special Purpose Vehicle
STEP	Special Terms for Economic Partnership
TAC	Track Access Charge
TATRANAS	Tataran Transportasi Nasional (National Transportation System Master Plan)
TAV	Trem de Alta Velocidade
TOR	Terms of Reference
TVM	Transmission Voie-Machine
UKL	Upaya Pengelolaan Lingkungan Hidup (Environmental Management Effort)
UPL	Upaya Pemantauan Lingkungan Hidup (Environmental Monitoring Effort)
USD	US Dollar
VAT	Value- Added Tax
VOC	Vehicle Operating Cost

Sorce: JICA Study Team

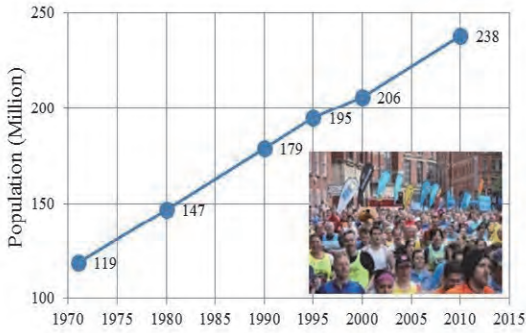
Chapter 0

Necessity of High Speed Railway in Indonesia

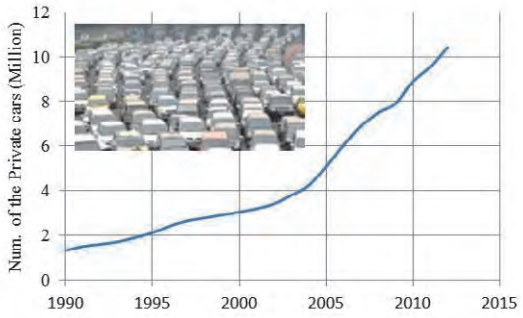
Chapter0 Necessity of High Speed Railway in Indonesia

0.1 Current Issues

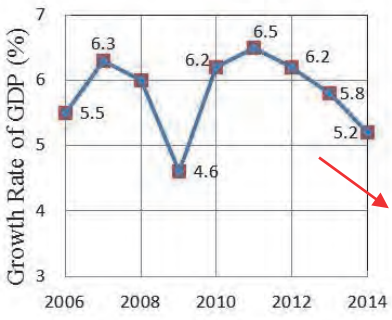
In Indonesia, population has been increasing and number of private cars has also been ever increasing. These conditions cause crucial traffic congestion. By looking at the graphs below, it can be seen that a large urban area that supports Indonesia's economy faces a serious problem of chronic traffic jams, which have considerable impact on economic activity and people's lives.



The population in 2010 is twice that of 1971.

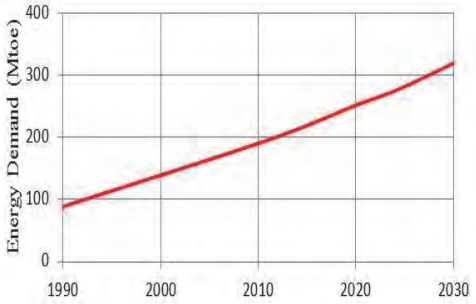


After 2005, 600,000 to 900,000 cars have continued to be added every year. (Except for 2009 due to the "Lehman Shock")



After "Lehman shock", the growth rate of GDP was in the steady 6% range, however, the rate in 2013 was 5.8% and in 2014 was 5.2%. This shows problems have begun to appear in a previously healthy economy.

※toe: Ton of all Oil Equivalent



Due to the economic growth, the growth of population, the growth in the number of cars, the delay of infrastructure development for public transportation and the chronic traffic jams, the energy demand has been increasing dramatically.

Fig. 0.1-1 Current issues in Indonesia

0.2 Effect of HSR Introduction

HSR Introduction would be one of the solutions to the above issues. HSR Introduction would enhance Modal Shift & TOD away from a car-centric social structure, would contribute a great deal to Indonesia's growth and innovation (the saving of transport energy, the mitigation of chronic traffic jams, economic revitalization, the narrowing of regional gaps and so on) by the infrastructure development of public transportation.
The effect of HSR Introduction is as follows.

(1) Mitigation of chronic traffic jams

Figure 0.2-1 shows the transition of traffic volume between Jakarta and Bandung. Nowadays, it seems that the traffic volume of Jakarta – Cikampek toll load almost reaches its capacity. In 2030, the traffic volume will go over its capacity materially. As an effect of HSR inauguration, large volume conversion to HSR will be expected. And it leads mitigation of traffic jams. Figure 0.2-2 shows estimated increasing traveling time between Jakarta and Bandung by private cars without HSR case. Traveling time will remarkably increase.

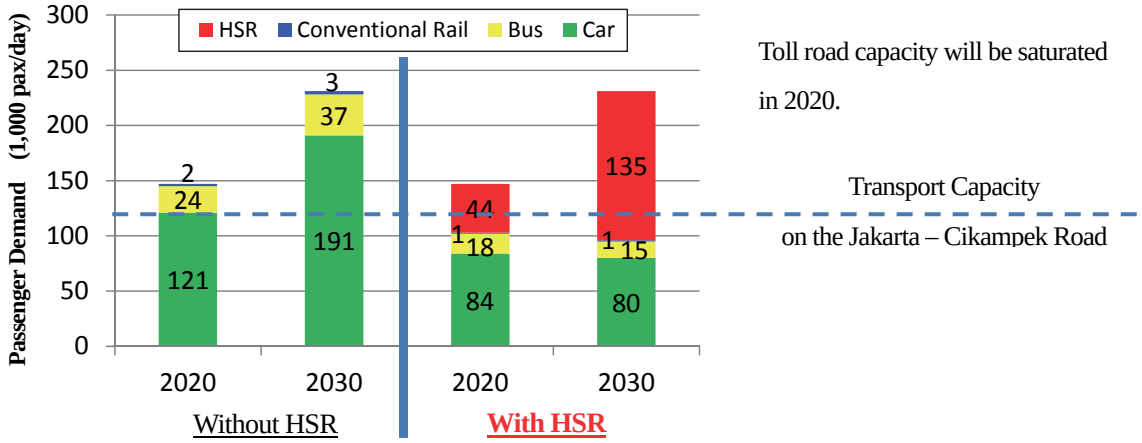


Fig. 0.2-1 Mitigation of Chronic Traffic Jams 2 (Growth of Passenger Demand (JKT – BDG))

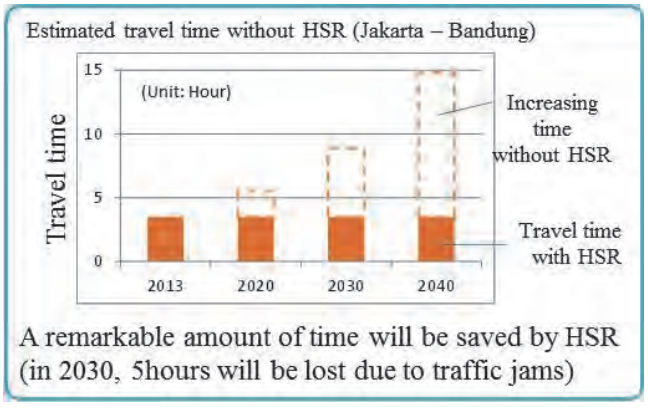


Fig. 0.2-2 Mitigation of Chronic Traffic Jams

(2) Saving travel time

In some cities, public transportation projects such as MRT and monorails are proceeding for the sake of mitigation of traffic jams. The TOD (Transit Oriented Development) planning in each city can get more effects

by connecting each terminal by HSR. Figure 0.2-3 shows the effective TOD image by utilizing HSR. HSR can contribute not only to mitigation of traffic jams but also to saving of travel time by cooperation with these public transportation projects.

Fig. 0.2-3 Modal Shift & TOD (TOD: Transit Oriented Development)

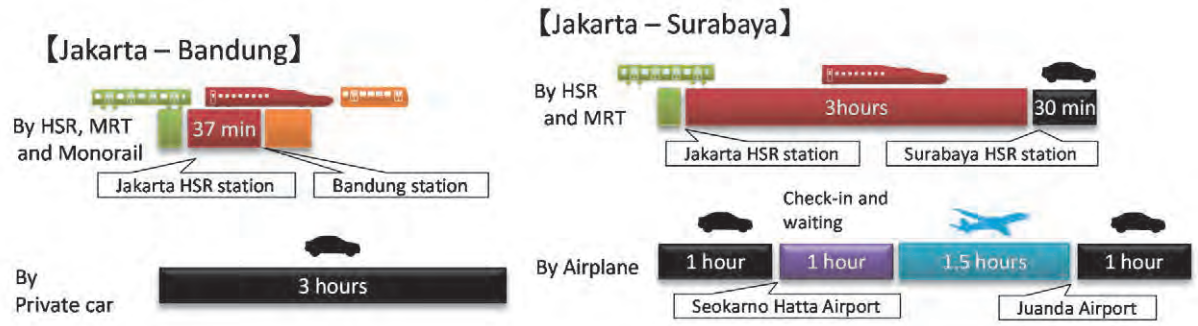


Fig. 0.2-4 Saving of Travel Time

(3) Energy Saving

HSR is very environmentally-friendly transportation because HSR Energy consumption per passenger is 1/5 of ca and 1/8 of airplane. It will be estimated that around 430 kl/day gasoline and 770 CO_2 emissions/day can be saved by HSR operation at inauguration.

Fig. 0.2-5 Comparison of energy consumption

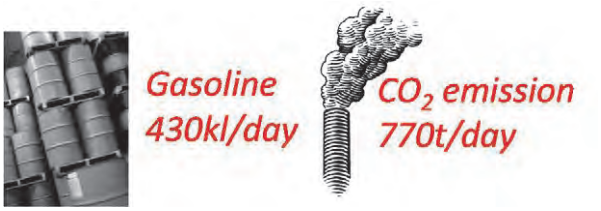
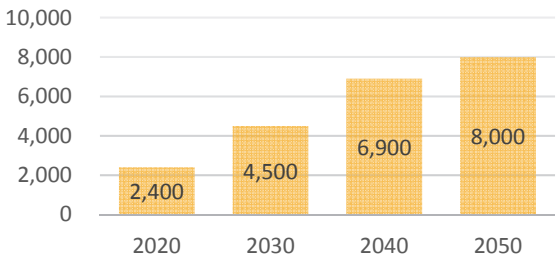


Fig. 0.2-6 Energy saving at inauguration

(4) HSR Project Effect

By HSR construction, demand of relevant industry sector will be increasing. It will be 21,400 billion IDR and it is almost same as the initial investment. After the inauguration, economic effect as shown in figure 0.2-7 will be expected by saving traveling time and reducing vehicle operation cost (VOC). In addition, employment creation of 35,000 workers will be expected in construction stage.



(Unit: billion IDR)

Fig. 0.2-7 HSR Project Effect

0.3 Timing of HSR Introduction

According to Fig. 0.3-1, Indonesia's recent GDP per capita has been much more than Japan's GDP in 1964 when the Tokaido-Shinkansen was inaugurated. And also, Indonesia's recent GDP per capita has been more than China's GDP in 2007 when China's HSR was inaugurated.

This indicates that it is good timing for starting the HSR project.

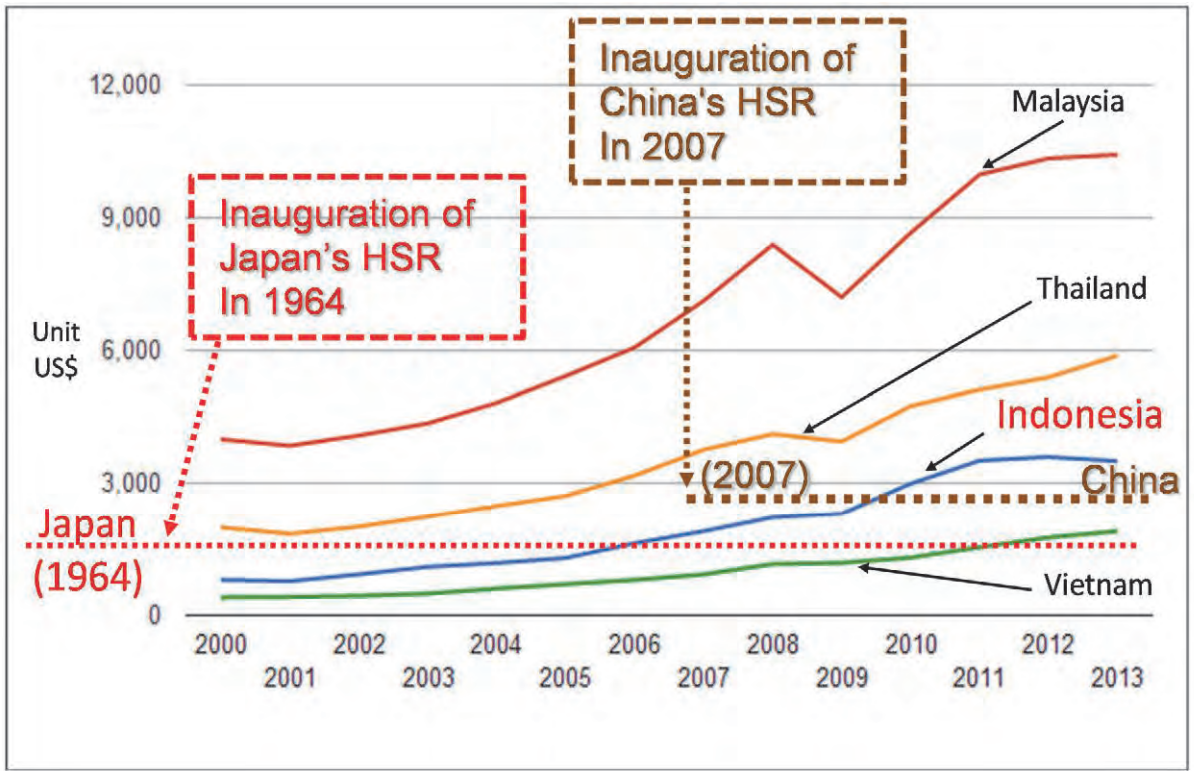
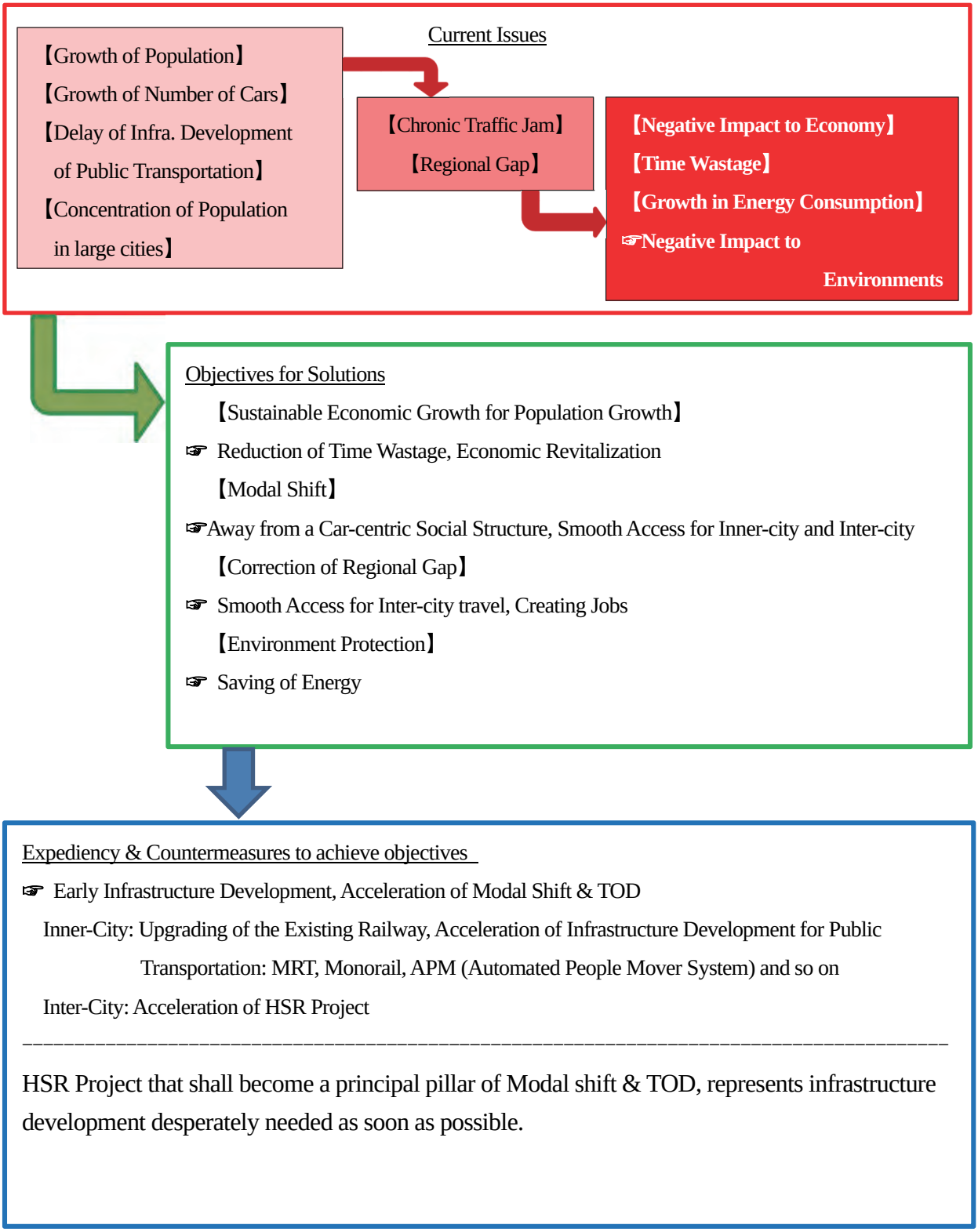


Fig. 0.3-1 Trend of GDP per Capita in South-East Asian Countries

Source: JICA Study Team

0.4 Summary of Nessecity

The above facts are summarized as follows:



Source: JICA Study Team

Chapter 1

Outline of Study

Chapter1 Outline of Study

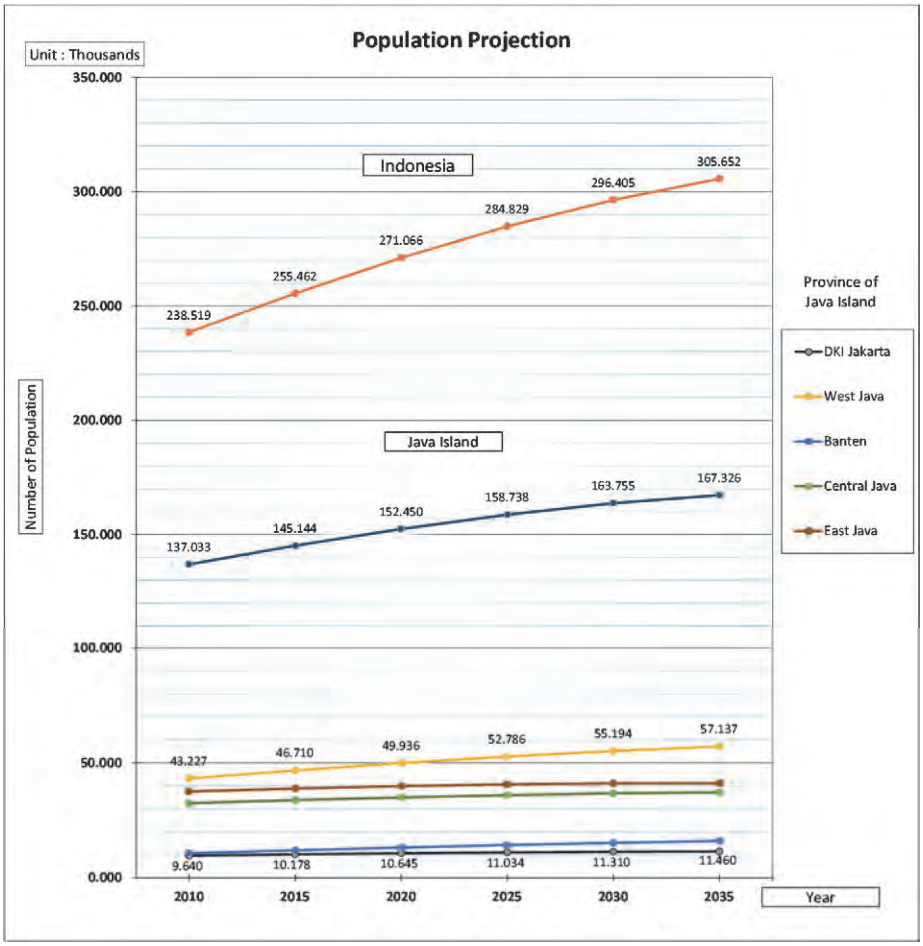
Project Name	:	Feasibility Study for Jakarta-Bandung High Speed Railway Project (Phase-1), Stage-I & Stage-II
Country Name	:	Republic of Indonesia
Duration	:	December 25th, 2013 – June 20th, 2015

1.1 Background and Objectives

(1) Background

The Republic of Indonesia (hereinafter referred to as "Indonesia") has a total population of approximately 240 million which is the fourth largest in the world, and which is estimated to reach more than 300 million in 2035. Java Island including the capital Jakarta is occupied by about 60% of the Indonesian population. The population of DKI Jakarta and West Java Province is 9.64 million and 43.23 million respectively as of 2010 and is estimated to reach 11.46 million and 57.14 million respectively in 2035 (Refer to Fig. 1.1-1).

The population density of the major cities along the route of the high-speed railway is shown in Table 1.1-1. The population density of DKI Jakarta, Bandung and Bekasi is high, like the Tokyo metropolitan area and Osaka city.



Source: Statistics Agency of each province (2013)

Fig. 1.1-1 Indonesian Population Projection

Table 1.1-1 Population Density of Major Cities

Name of City	Population Density Per km^2	Name of City	Population Density Per km^2
DKI Jakarta	15,253	Tokyo Metropolitan	14,570
Bekasi City	11,089	Yokohama City	8,506
Bandung City	14,676	Nagoya City	6,930
Cirebon City	8,076	Osaka City	11,990
Semarang City	4,172		
Surabaya City	8,463		

Source: Statistics Agency of each province (2013), Statistical Yearbook for each city

The geological situation of Indonesia which consists of more than 13,000 islands is that it extends 5,110 km from east to west and has the greatest number of islands in the world. Also, Indonesia is located in the Pacific Ring of Fire surrounded by the Australian Plate, Pacific Plate and Philippine Sea Plate and is an earthquake-prone country like Japan.

During recent years Indonesia's GDP has grown at a rate of approximately 6% and Indonesia has shown steady economic growth. However, in 2013 and 2014 the GDP growth rate fell to 5.8% and 5.2%, respectively (Refer to Fig. 1.3-3). Problems have begun to appear in the previously healthy economy.

On Java Island where the population is more than 130 million, DKI Jakarta and Bandung city in West Java Province, in particular, are both large metropolitan areas with dense populations where economic activity is flourishing. However, the transportation infrastructure has not been developed sufficiently. Therefore, the increase in population and economic growth has resulted in serious and inveterate traffic jams on the roads in the cities and highways between the cities. In order to break the excessive dependence on cars, a high-speed railway (hereinafter referred to as "HSR") needs to be developed between the two cities to provide an alternate means of transporting passengers and enable a large number of passengers to be transported in a short period of time.

The government of Indonesia is proceeding with plans for electrification and expansion of tracks to double or quadruple tracks in order to boost the transport capacity of the railway network in Java.

Java High Speed Railway Development has been positioned as outlined below in the main upper-level plan concerning railways.

<Masterplan Percepatan dan Perluasan Pembangunan Ekonomi Indonesia (MP3EI)>

(Master Plan of Acceleration and Expansion of Indonesia Economic Development)

Divides country into six economic corridors, and places priority on the development of infrastructure to strengthen coordination within each corridor and between corridors. This plan positions the Java economic corridor as the area with the foremost importance, under which the development of a high speed railway

route in the economic corridors between Jakarta - Bandung and Jakarta - Surabaya should be conducted as an integral part of the railway plan for this corridor.

<National Railway Master Plan (NRMP)>

Advocates coordination of achievement of multi-modal policies for railways with national land utilization plans / other transportation plans. This plan mentions the introduction of a high speed railway connecting Jakarta and Surabaya.

<Metropolitan Priority Area (MPA) Concept>

Formulates overall plan outlining vision for Jakarta metropolitan area in 2020 and development of infrastructure, identifies 45 priority projects and promotes 18 early stage implementation projects that should be commenced by the end of 2013. The Jakarta - Bandung High Speed Railway is positioned as one of the above priority projects.

In the new government formed in October 2014, the Presidential Decree of the Establishment about "Accelerating Infrastructure Priorities, KPPIP" was issued in January 2015 (The chairman of KPPIP is Minister of Coordination Ministry of Economic Affairs.). Some projects (Jakarta Sewage Project and MRT Project) of MPA have been nominated in the priority project list of KPPIP.

Based on the above plans, the three studies shown below have been carried out in previous years.

- ➢ Study on JAVA High Speed Railway Construction Project in the Republic of Indonesia (Japan External Trade Organization, March 2009) (hereinafter referred to as "JETRO-F/S")
- ➢ Pre-Feasibility Study for Jakarta-Bandung High Speed Railway PPP Project (Ministry of Land, Infrastructure, Transport and Tourism, March 2012) (hereinafter referred to as "MLIT-F/S")
- ➢ Study on the High Speed Railway Project (Jakarta - Bandung Section), Republic of Indonesia (Ministry of Economy, Trade and Industry, November 2012) (hereinafter referred to as "METI-F/S")

In JETRO-F/S, the feasibility of introducing a high-speed railway between Jakarta and Surabaya (approx. 733 km) was considered.

However, in MLIT-F/S, the feasibility of a high-speed railway on the Jakarta - Bandung route (approximately 144 km) was considered.

In METI-F/S, the proper route is examined for the high-speed railway plan between Jakarta and Cirebon as a priority section of the Jakarta - Surabaya high-speed railway plan by comparing two routes (Bandung route and coastal route).

With regard to the development of the Jakarta - Surabaya high-speed railway, from the standpoint of the scale of investment and economic viability, the decision was made to first implement a high-speed railway development project (hereinafter referred to as "this project") on the Jakarta - Bandung route (approximately 140 km), which is expected to have many passengers, as the first phase development section.

The government of Indonesia requested a feasibility study of this project in March 2013.

The Minutes of Meeting were made and entered by and between the governments of Japan and Indonesia in May 2013.

In addition, the Minutes of Understanding for TOR were signed by JICA and the implementation agency of the government of Indonesia in October 2013.

The government of Indonesia requested that a feasibility study (hereinafter referred to as "this work") concerning the achievability of this project be conducted on the assumption that the railway link will be extended to Surabaya in the future.

<Current Status after the formation of New Government>

In the previous government, this project was included in the draft of the Mid Term Development Plan 2015 – 2019 (Rencana Pembangunan Jangka Menengah Nasional). However, the new government formed in October 2014 has highlighted that this project shall "not be included in Mid Term Development Plan 2015 – 2019", that is to say, it has suspended the HSR project.

Now, as a result of the decision not to include this project in Mid Term Development Plan 2015 – 2019, the position of HSR and KPPIP should be paid close attention to.

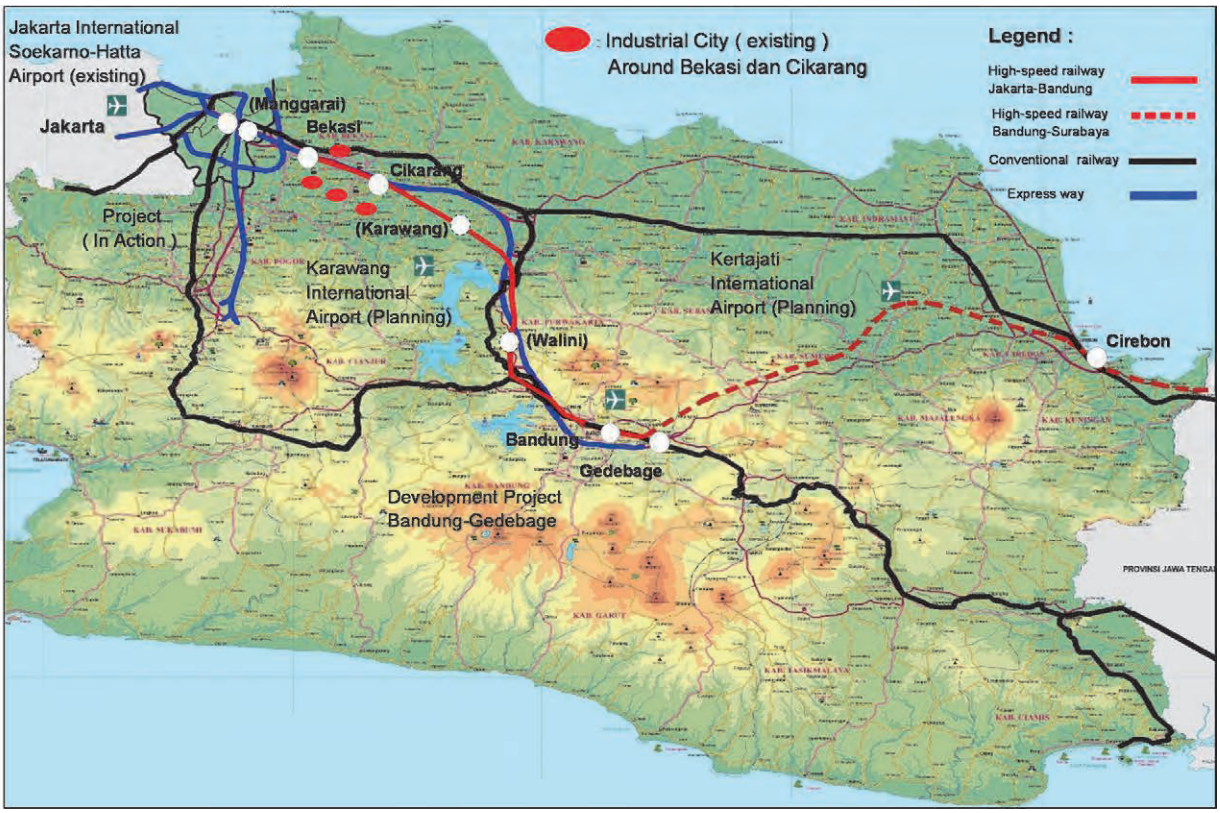
(2) Objective

The objective of this work is to evaluate the necessity, relevance and achievability of this project.

(3) Target Area

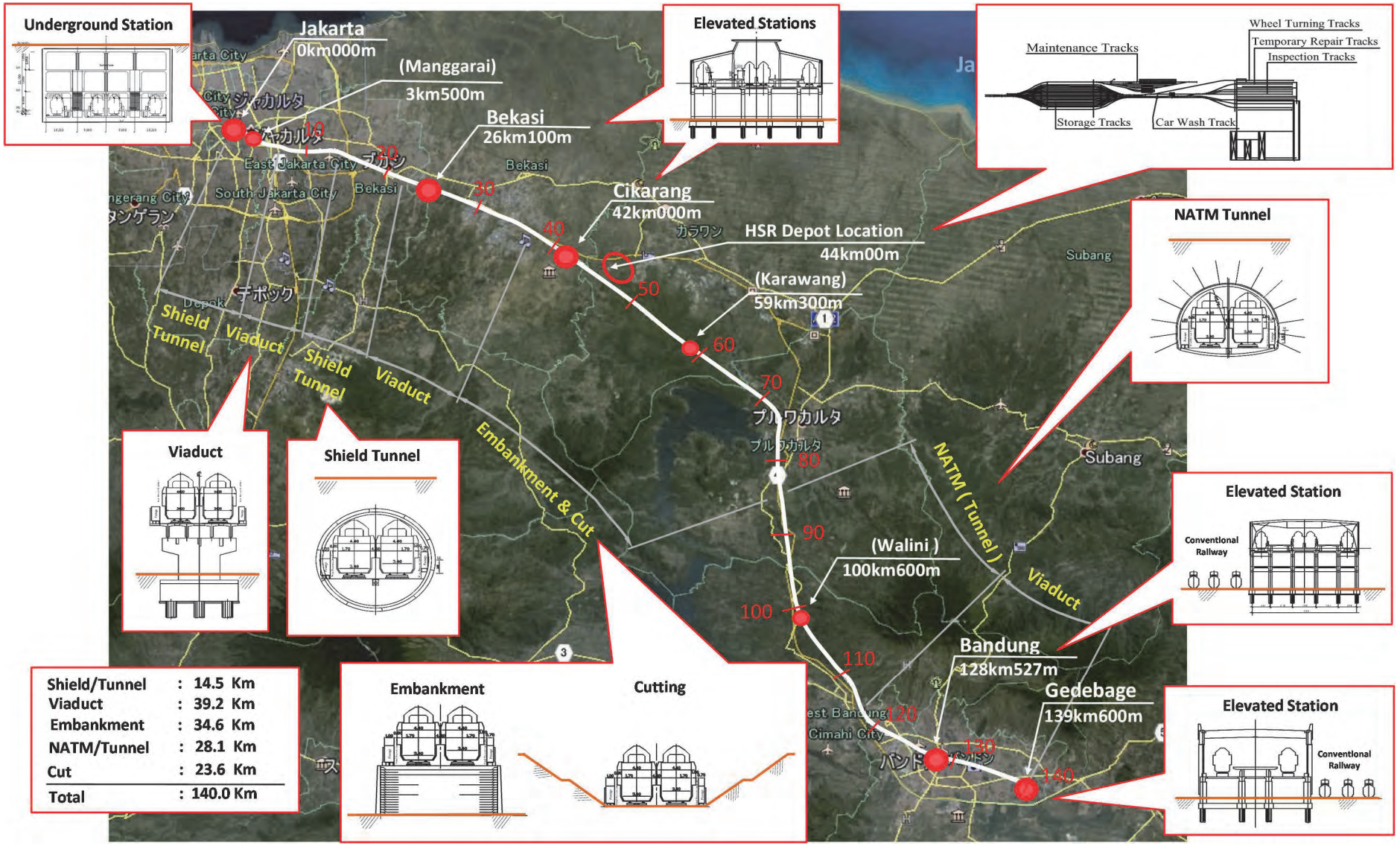
Target area of this work is shown in Fig. 1.1-2.

The optimum plan for the alignment and station location based on this work is shown in Fig. 1.1-3.



Source: JICA Study Team

Figure 1.1-2 Target Area



Source: JICA Study Team

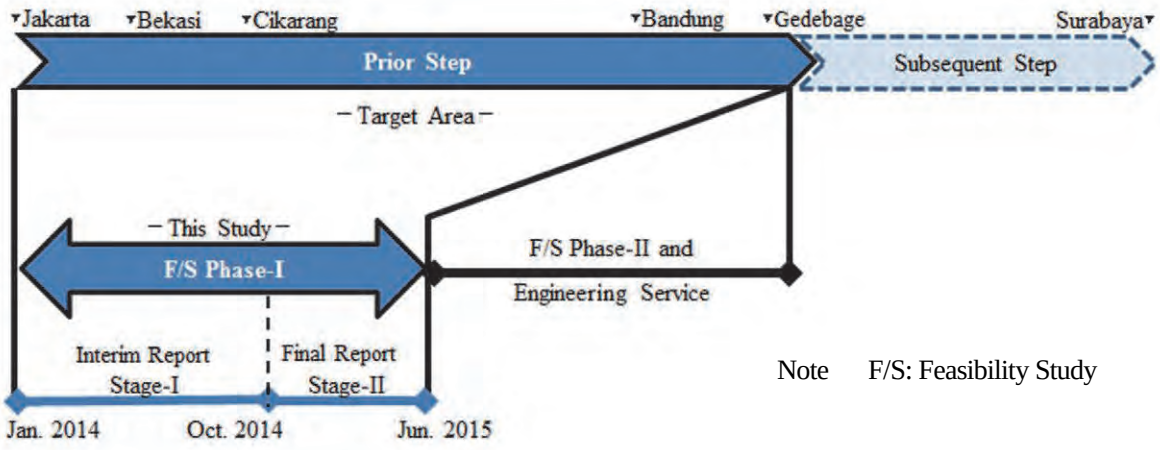
Figure 1.1-3 Optimum plan for the alignment and station location

1.2 Contents of Study

(1) Implementation Policy and Conceptual Diagram

This work was executed by dividing it into two stages, Stage-I and Stage-II. The conceptual diagram of this work is shown in Fig. 1.2-1.

At Stage-I, the review of proposed route (METI-FS) and preliminary alternative proposal for HSR were studied and compiled in Interim Report. After the confirmation of consensus building of Indonesia side to proceed to Stage-II study based on Japan's HSR technology, the deepening of the implementation structure, business scheme, project effect and so on was executed at Stage-II.



Source: JICA Study Team

Fig. 1.2-1 Conceptual Diagram

The major items implemented in Stage-I (Duration: January 2014 – October 2014) are shown below:

- ◆ Demand forecast
- ◆ Comparison of HSR specification of other countries
- ◆ Selection of the optimum technical specification
- ◆ The necessity and relevance of HSR
- ◆ Study and discussion for the alignment and station location
- ◆ Study for HSR facilities and structures
- ◆ Calculation of approximate project cost (incl. approximate cost between Jakarta and Surabaya)
- ◆ Economic and financial analysis
- ◆ Study for the implementation structure and business scheme
- ◆ Environmental and social considerations in Indonesia (Indonesia's laws, regulations, policies, and so on)
- ◆ Land acquisition and resettlement

Stage-I study was compiled in the interim report. After confirming Indonesia's decision to proceed to Stage-II study based on the Shinkansen technology in Stage-I, Stage-II study has commenced since October 2014.

The major items implemented in Stage-II (Duration: October 2014 – June 2015) are shown below:

- ◆ Tentative agreement for the alignment and station location with Indonesian side
- ◆ Geological and topographic survey along the agreed alignment

- Deepening of Stage-I for environmental and social considerations (discussion of Indonesia's laws, regulations and policies, calculation for the cost of land acquisition and the level of resettlement based on the agreed alignment and topographic survey, mitigation effect of the climate change, and so on)
- Discussion with Indonesian side and Deepening of Stage-I for the implementation structure and business scheme
- Calculation of project effect (incl. deepening of economic and financial analysis)
- Re-calculation of approximate project cost based on the agreed alignment, geological and topographic survey
- Schedule towards HSR inauguration (incl. the schedule of construction stage, establishment of the implementation structure, land acquisition and engineering service)

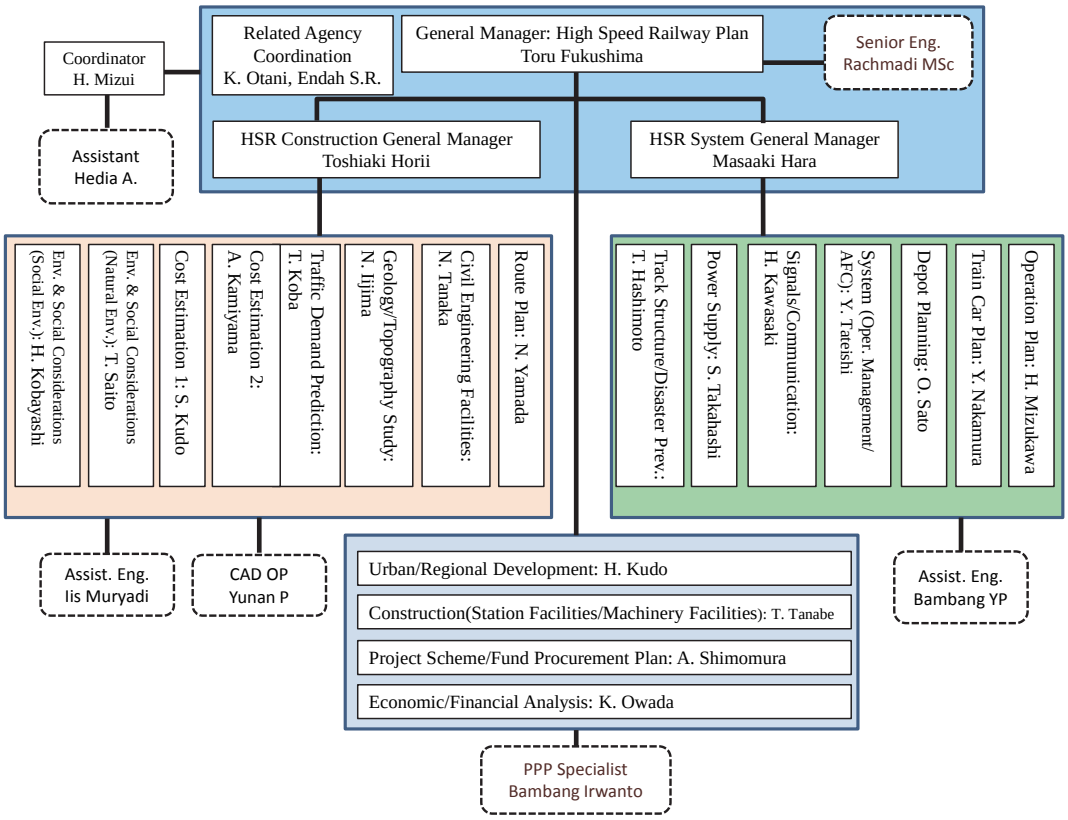
In this report, the study results of Stage-I & II have been compiled.

(2) Study Implementation System

Stage-I has commenced since the Kick-Off Meeting (IC/R Conference) held on 28th January 2014, and the coordination meeting (Interim Report conference) in the presence of the Indonesian and Japanese Government representatives was held on 26th June 2014.

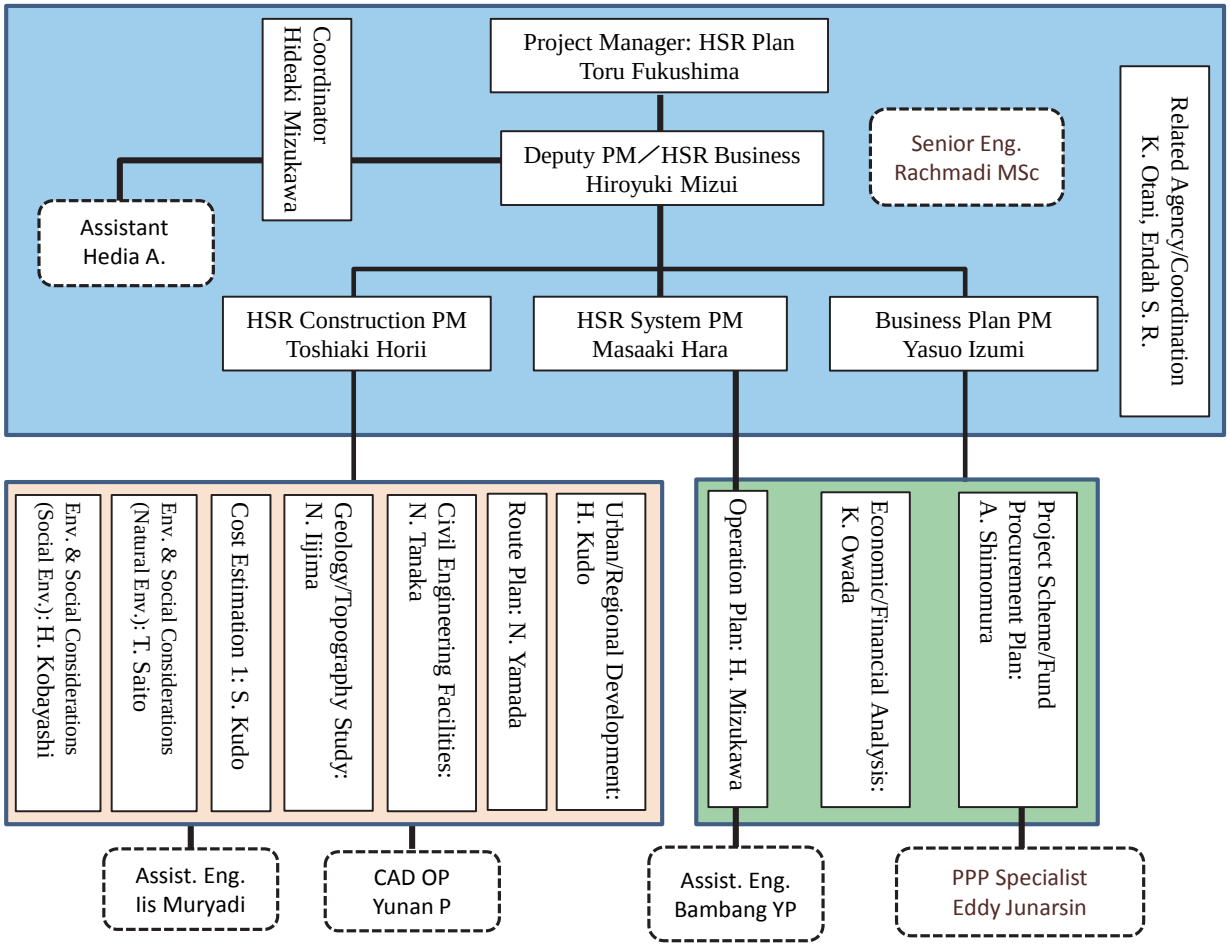
Stage-II has been taking place since 10th October 2014, and the coordination meeting (Draft Final Report conference) in the presence of the Indonesian and Japanese Government representatives was held on 10th April 2015.

This work for the feasibility of HSR has a wide variety of study contents and subjects of discussion (Refer to Appendix-3). From this standpoint, this work has been executed utilizing the following organization (Refer to Fig. 1.2-2 and 1.2-3).



Source: JICA Study Team

Figure 1.2-2 Stage-I Study implementation System



Source: JICA Study Team

Figure 1.2-3 Stage-II Study implementation System

(3) Implementation Agency and Related Agencies

Implementation Agency: Coordinating Ministry of Economic Affairs (CMEA)

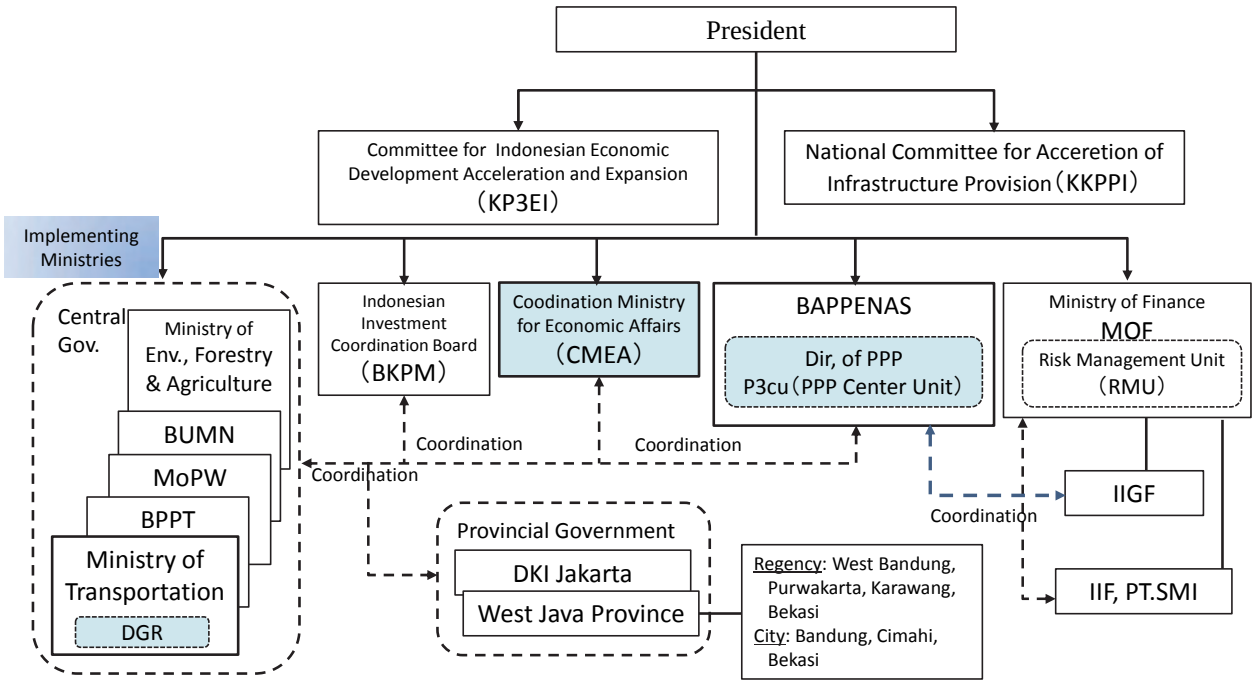
Related Agencies: Badan Perencanaan Pembangunaan Nasional (National Development Planning Agency of Indonesia) (BAPPENAS), Directorate General of Railway, Ministry of Transportation of Indonesia (DGR), Ministry of Environment of Indonesia (MOE), Badan Pengkajian Dan Penerapan Teknologi (Agency for the Assessment and Application of Technology) (BPPT), Ministry of Agriculture of Indonesia (MOA), Ministry of Forestry of Indonesia (MOFO), DKI, West Java Province

CMEA and BAPPENAS served a central role during the review processes of “fund procurement methods including yen loans” and “implementation system of this project”.

The Ministry of Transportation (Directorate General of Railways) served a central role during the review processes of “route alignment”, “station location” and “technical specifications”, and in addition, the Ministry of

Environment, Ministry of Public Works, Agency for the Assessment and Application of Technology (BPPT) and regional governments (DKI and West Java Province) were also involved.

In order to ensure consistency with the relevant upper-level plans and the existing plans in Indonesia and to integrate this project into the "Spatial Plan" and "Medium-Term (5-year) Plan", meetings and conferences were held with the related agencies. The related agencies for this work are shown in Fig. 1.2-4.



Source: JICA Study Team

Figure 1.2-4 Related Agencies for the Study

1.3 Schedule

The implemented main meetings and events are shown below.

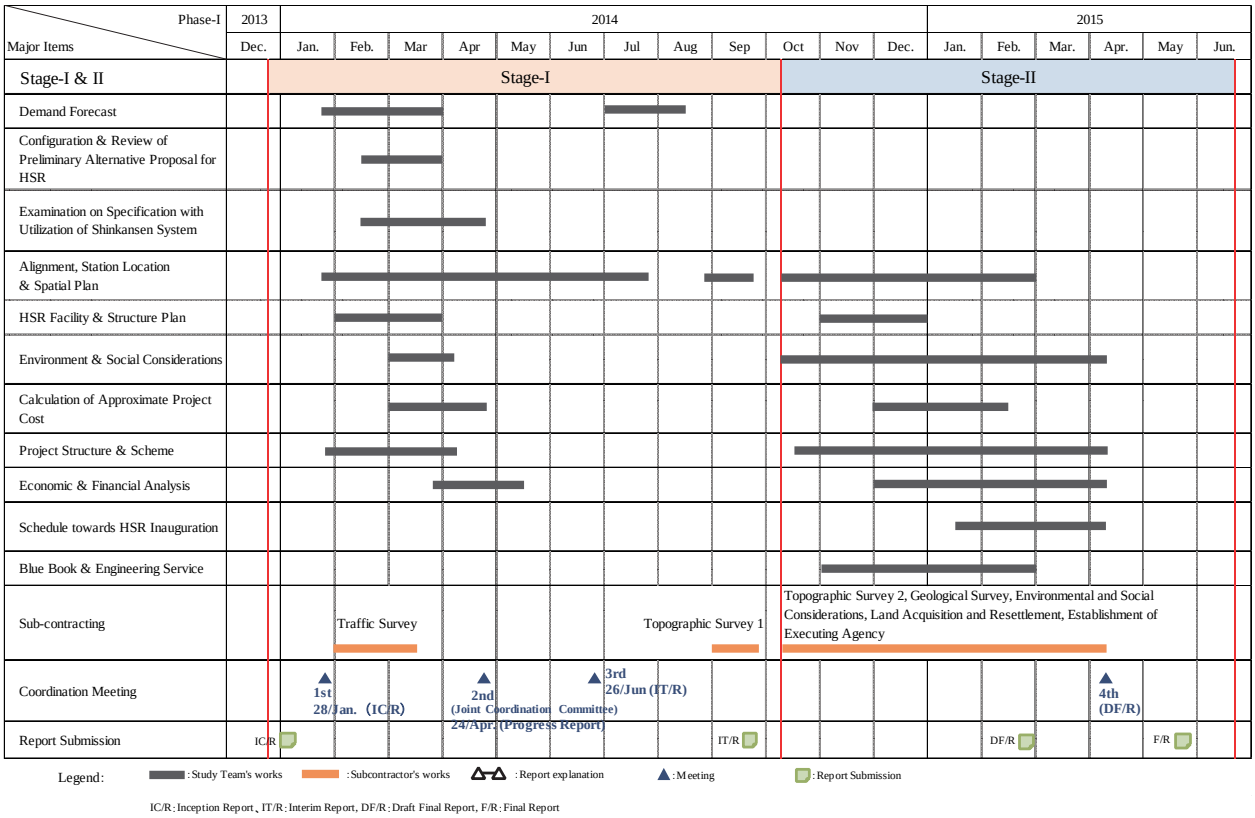
16 Jan. 2014: 1st Supporting Committee in Japan
28 Jan. 2014: 1st Coordination Meeting (Kick-Off & Inception Report)
24 Apr. 2014: 2nd Joint Coordination Committee (Progress Report: Alignment & HSR System)
4 Jun. 2014: 2nd Supporting Committee in Japan
26 Jun. 2014: 3rd Coordination Meeting (Interim Report)
20 Aug. 2014: 3rd Supporting Committee in Japan (Progress Report)
2 Mar. 2015: 4th Supporting Committee in Japan
10 Apr. 2015: 4th Coordination Meeting (Draft Final Report)

Major schedule of Phase-I is shown in Fig. 1.4-1.

Major schedule of Stage-I is shown in Fig. 1.4-2.

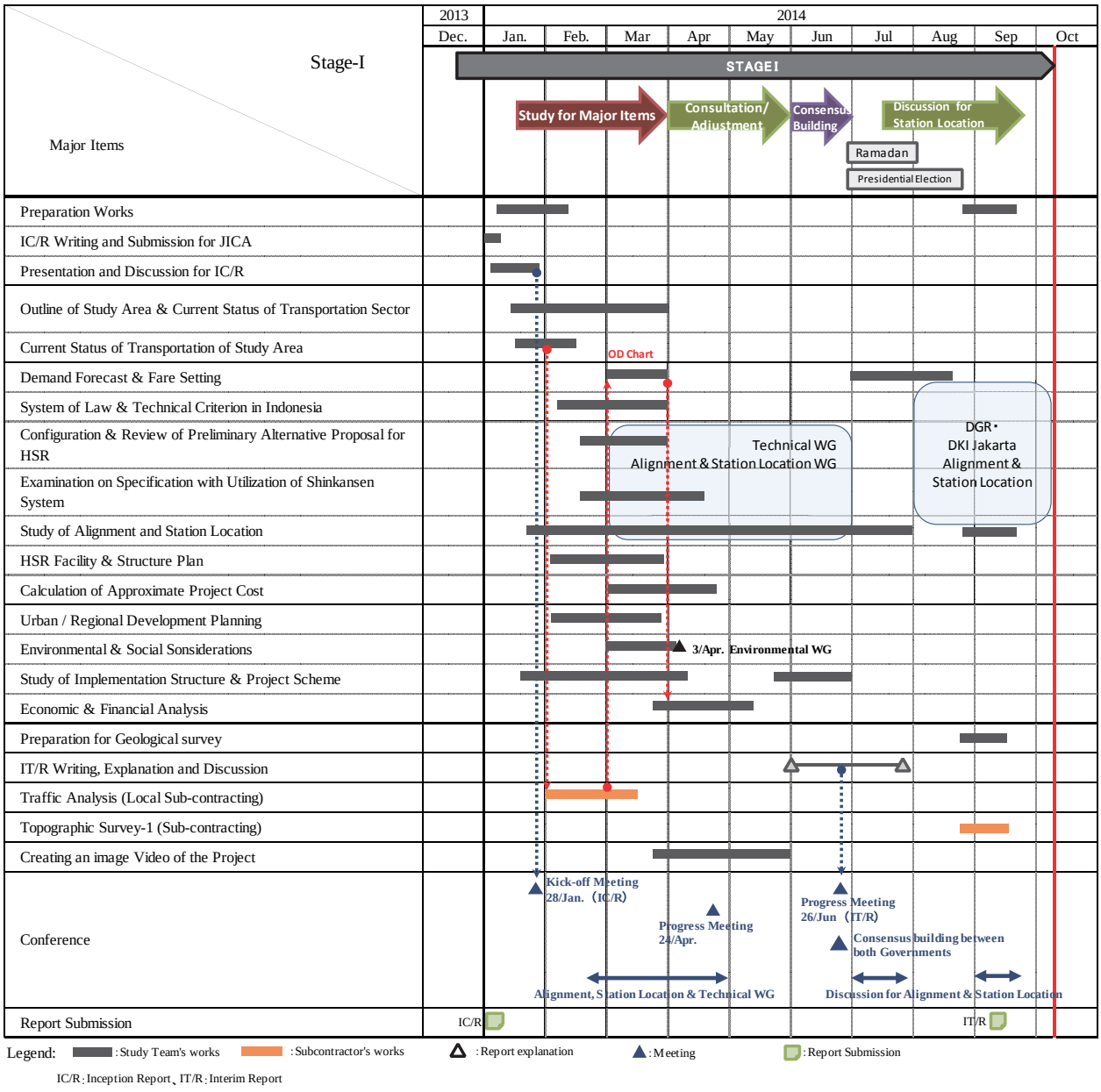
Major schedule of Stage-II is shown in Fig. 1.4-3.

Table 1.4-1 Phase-I Schedule



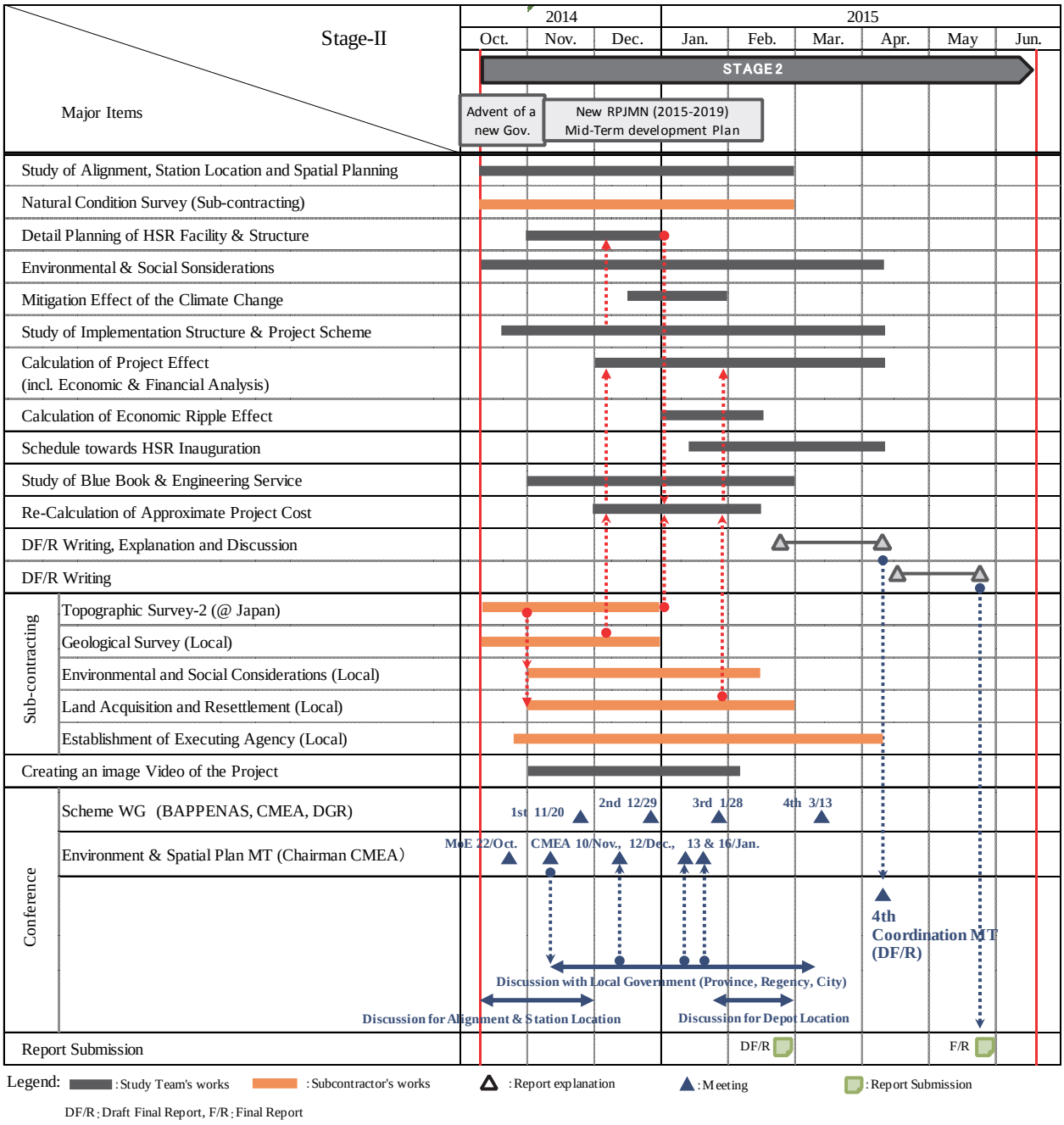
Source: JICA Study Team

Table 1.4-2 Stage-I Schedule



Source: JICA Study Team

Table 1.4-3 Stage-II Schedule



Source: JICA Study Team

Chapter 2

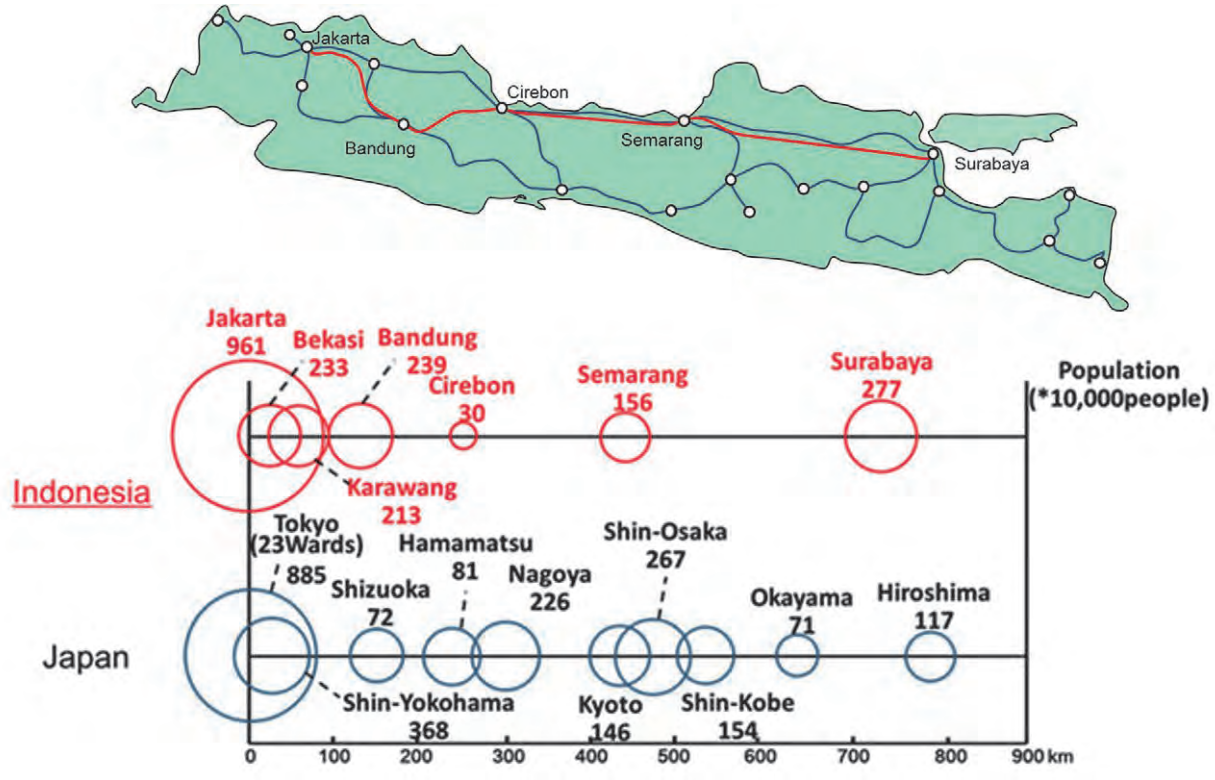
Overview of the Study Area and Transport Sector

Chapter 2 Overview of the Study Area and Transport Sector

2.1 Outline of the Study Area

2.1.1 Overview of the Country

The target area of this study, Jakarta to Surabaya, is located in Java Island. Java Island has an area of about 130,000 km^2, equivalent to no more than about 7% of the whole of Indonesia. On the other hand, Java Island has a population of about 137 million, accounting for 60% of the entire Indonesian population. The island is long and slender in shape, and it is 1,040 km long from west-northwest to east-southeast. The island is 300 km long from north to south, and about 200 km wide at the widest point. Compared with Honshu Island in Japan, its population is 1.32 times higher while it is about 56% in area, and the population is considerably dense. It is about 700 km from Jakarta to Surabaya. This is the study area and it equals Tokyo to Hiroshima in Japan. There are some large cities in the area such as Surabaya, Bandung, Bekasi, Karawang and Semarang that have populations of more than one million as well as Jakarta, and these cities form the same urban structure as the Tokaido and Sanyo Shinkansen area.



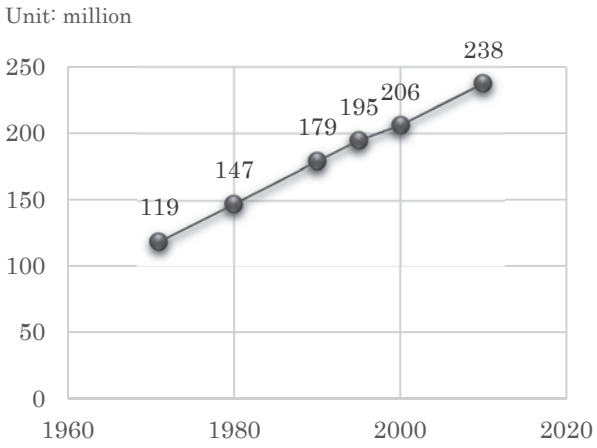
Source: JICA Study Team

Figure 2.1-1 Study Area

2.1.2 Socio-Economic Conditions

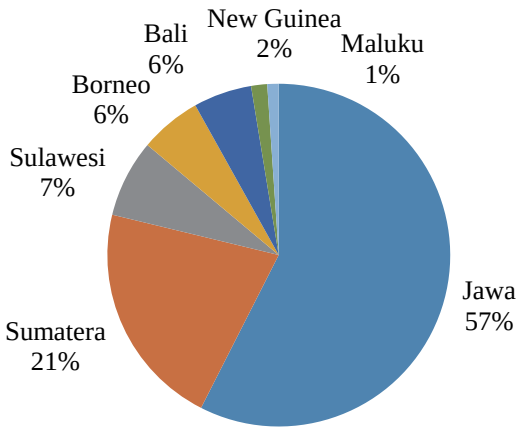
(1) Population

The total population is about 238 million as of 2010, the 4th largest in the world. The population growth rate is decreasing annually. As shown in Figure 2.1-3, about 60% of the population lives in Java Island, whose land area is only less than 7% of the total area. This indicates that the concentration of population in Java is high.



Source: Population Census(BPS)

Figure 2.1-2 Population Trends in Indonesia



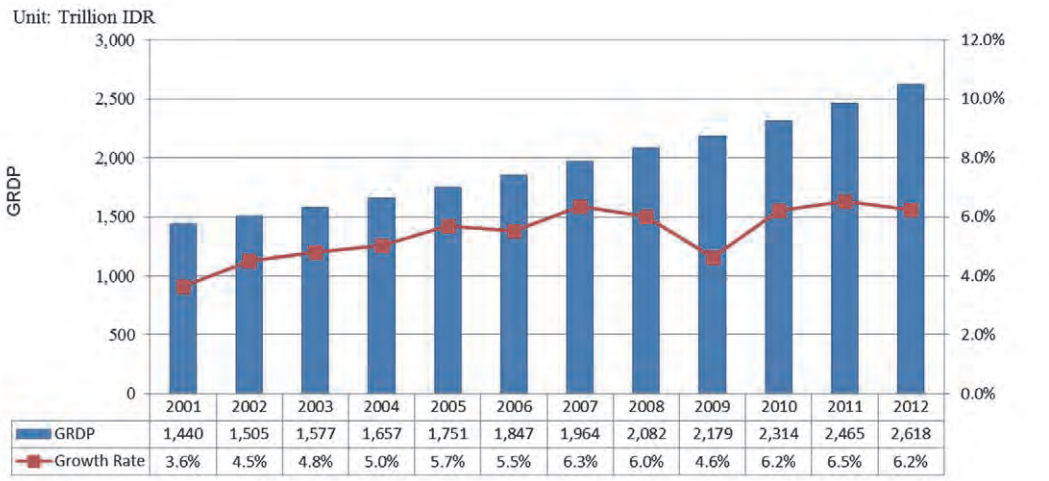
Source: Population Census(BPS)

Figure 2.1-3 Population by Island

(2) Economic Conditions

(a) National Economy

Due to the existence of rich natural resources such as petroleum and gas, the economy of Indonesia has steadily grown over the past 30 years. Following the occurrence of the Asian currency crisis in 1997, Indonesia was affected by economic crisis, with high inflation and decline of the value of the currency, resulting in economic deceleration. However, from the beginning of the 2000s, the economic situation recovered beyond what it had been before the currency crisis and the country enjoyed economic growth during this decade. The real growth rate of the Gross Domestic Product (GDP) in 2001 reached 3.6%, and excluding 2009 when the country was affected by the Lehman Shock with a growth rate of 4.6%, the growth rate has exceeded 6% in recent years.



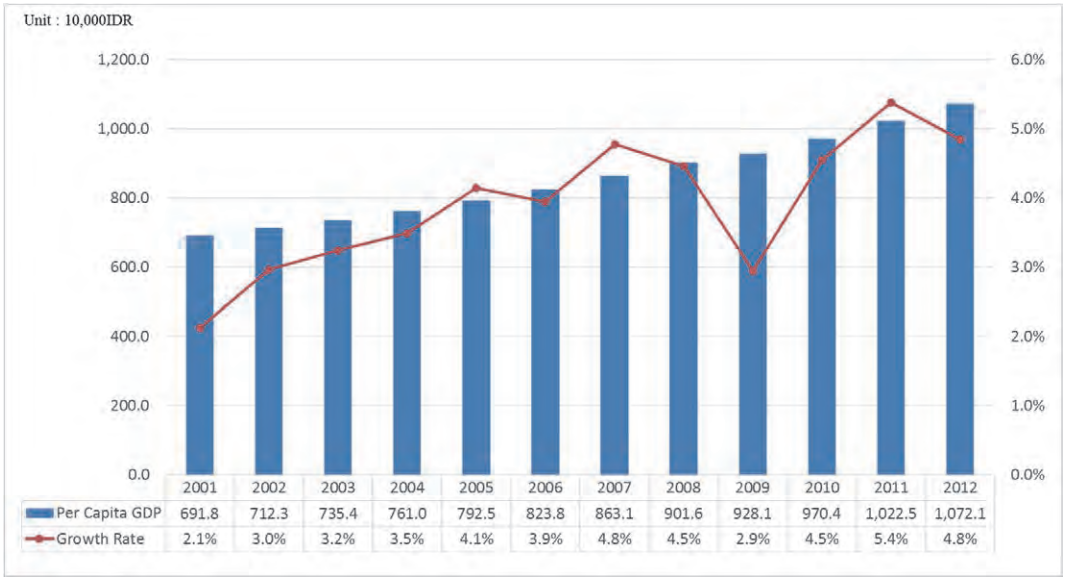
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
GRDP	1,440	1,505	1,577	1,657	1,751	1,847	1,964	2,082	2,179	2,314	2,465	2,618
Growth Rate	3.6%	4.5%	4.8%	5.0%	5.7%	5.5%	6.3%	6.0%	4.6%	6.2%	6.5%	6.2%

Source: Statistics Indonesia (BPS)

Figure 2.1-4 GDP and Growth Rate in Indonesia (2000 Constant Prices)

(b) Economic Condition per Capita

Regarding economic growth per capita, GDP per capita is increasing and the growth rate in the last 10 years shows a high trend of 4.2% on average.



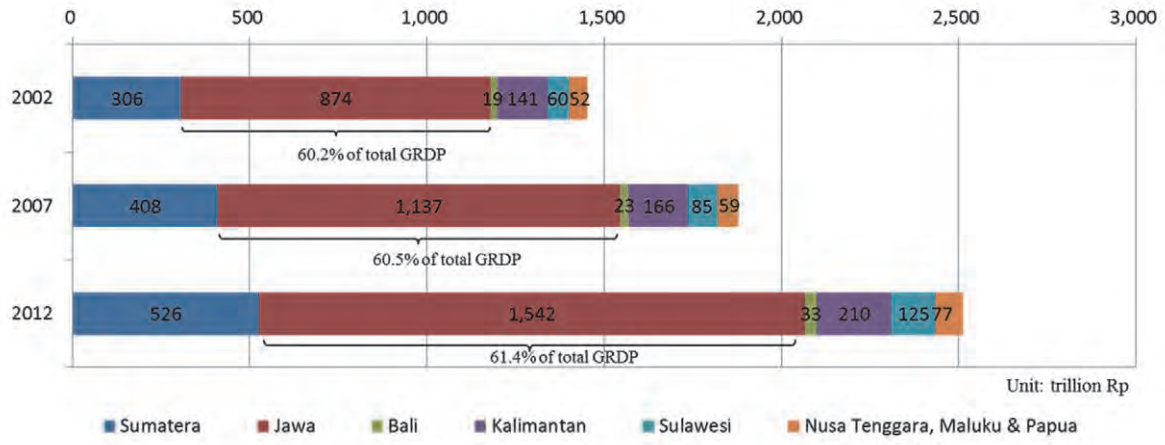
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Per Capita GDP	691.8	712.3	735.4	761.0	792.5	823.8	863.1	901.6	928.1	970.4	1,022.5	1,072.1
Growth Rate	2.1%	3.0%	3.2%	3.5%	4.1%	3.9%	4.8%	4.5%	2.9%	4.5%	5.4%	4.8%

Source: Statistics Indonesia (BPS)

Figure 2.1-5 GDP per Capita in Indonesia (2000 Constant Prices)

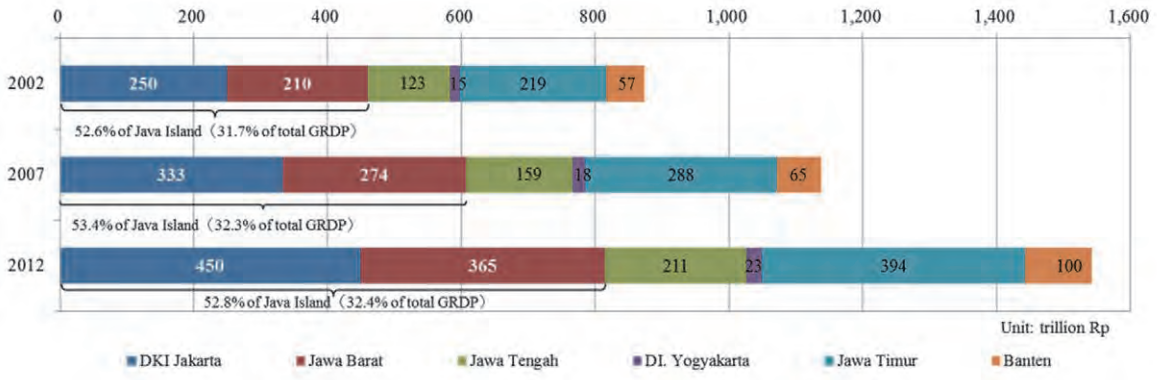
(c) Regional Economy

Java Island produces approximately 60% of the Gross Regional Domestic Product (GRDP) in Indonesia, which is the largest share compared to the other islands. Moreover, DKI Jakarta and West Java Province occupy about 50% of the GRDP of Java Island (approximately 30% of GDP).



Source: Statistics Indonesia (BPS)

Figure 2.1-6 GRDP by Island (2000 Constant Prices)



Source: Statistics Indonesia (BPS)

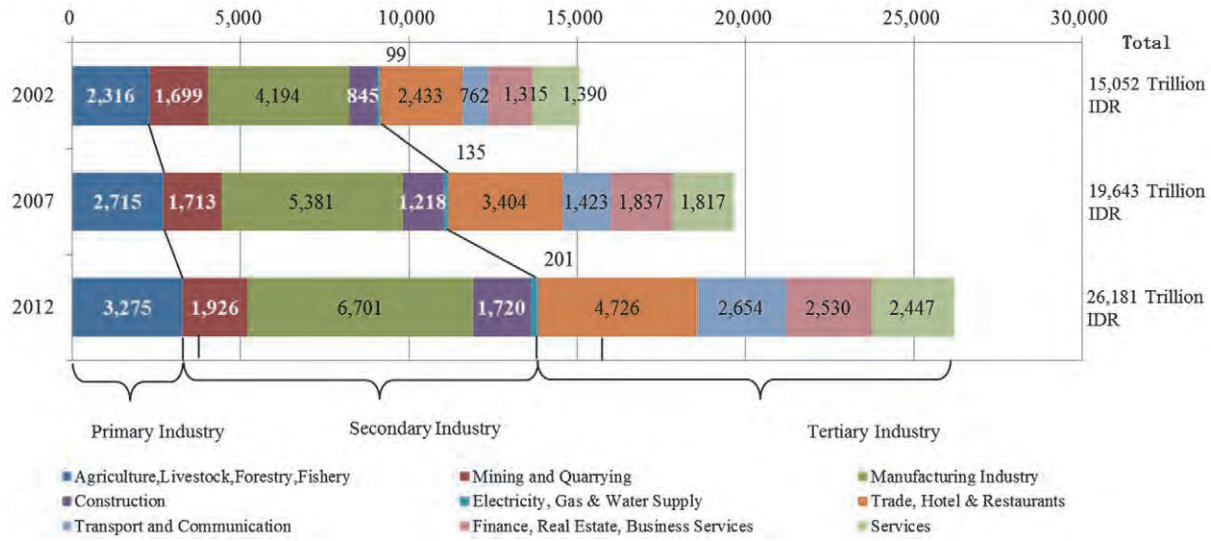
Figure 2.1-7 GRDP by Province in Java Island (2000 Constant Prices)

(3) Trends in Industry and Trade

(a) Trends in Industry

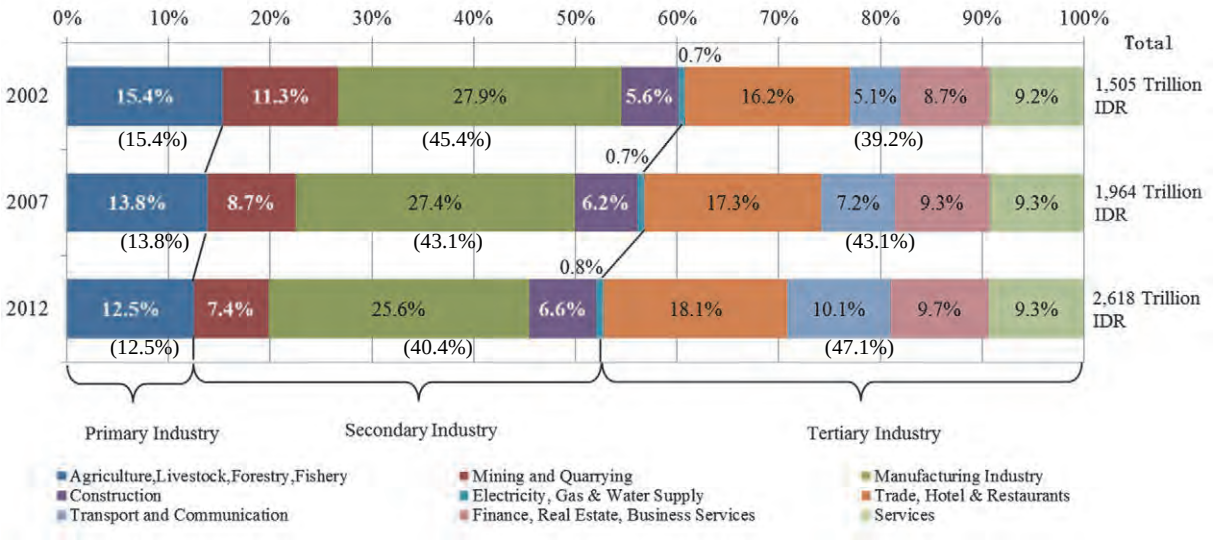
Regarding GDP by sector, all nine industrial sectors show a growth trend. Among them, the GDP of the transportation and telecommunication sector grew dramatically (approximately 1.9 times in 2007-2012) and the manufacturing sector which accounts for the largest share occupies about 1/4 of GDP. Primary industry consisting of agriculture, forestry and fisheries increased 1.4 times in terms of amount between 2002 and 2012. However, its share of GDP declined from 15.4% to 12.5%. Likewise, the amount of GDP in secondary industry increased 1.5 times., In particular, the GDP of sectors related to infrastructure development such as electricity, gas, water and construction more than doubled from 2002 to 2012. However, its share decreased from 45.4% to 40.4%. The amount of GDP in tertiary industry doubled and its share grew from 39.2% to 47.1%. The transportation and

telecommunication sector in tertiary industry more than tripled the amount of GDP. This indicates that economic development in Indonesia has been largely initiated by tertiary industry.



Source: Statistics Indonesia (BPS)

Figure 2.1-8 GDP by Sector (2000 Constant Prices)

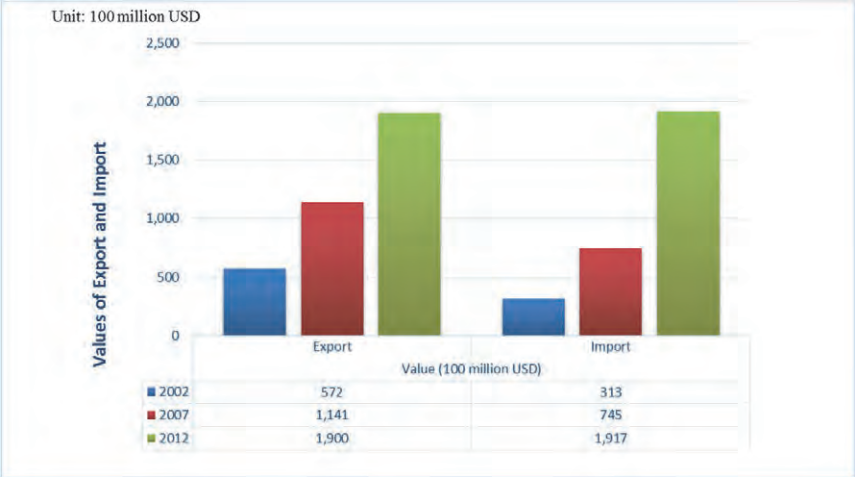


Source: Statistics Indonesia (BPS)

Figure 2.1-9 GDP Share and Amount by Sector (2000 Constant Prices)

(b) Trends in Trade

Concerning trade in Indonesia, the value of exports has exceeded that of imports in recent years, but in 2012 imports exceeded exports for the first time. Between 2002 and 2012, exports increased 3.3 times in terms of amount and imports increased 6.1 times. These figures indicate that trade is very active in Indonesia.



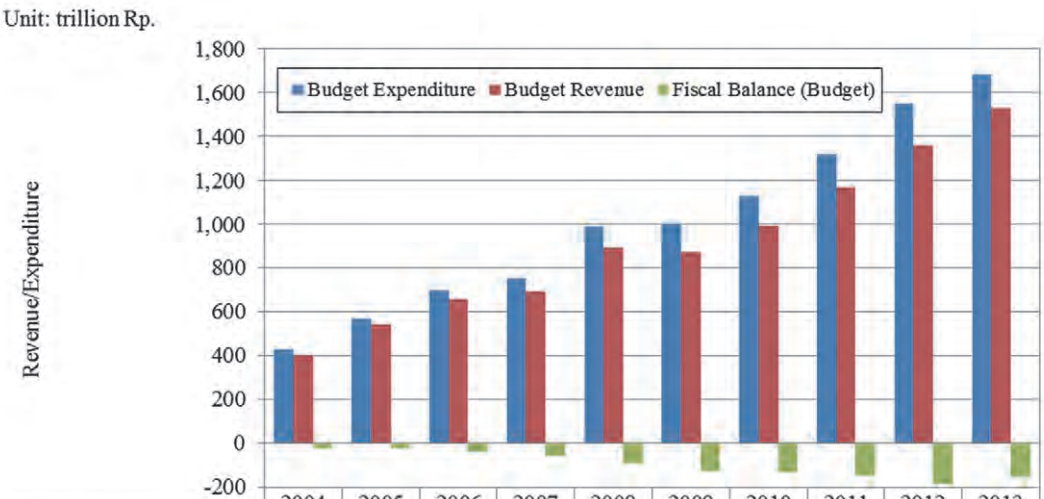
Source: Statistics Indonesia (BPS)

Figure 2.1-10 Annual Changes in Exports and Imports

(4) Financial Situation

(a) Fiscal Balance

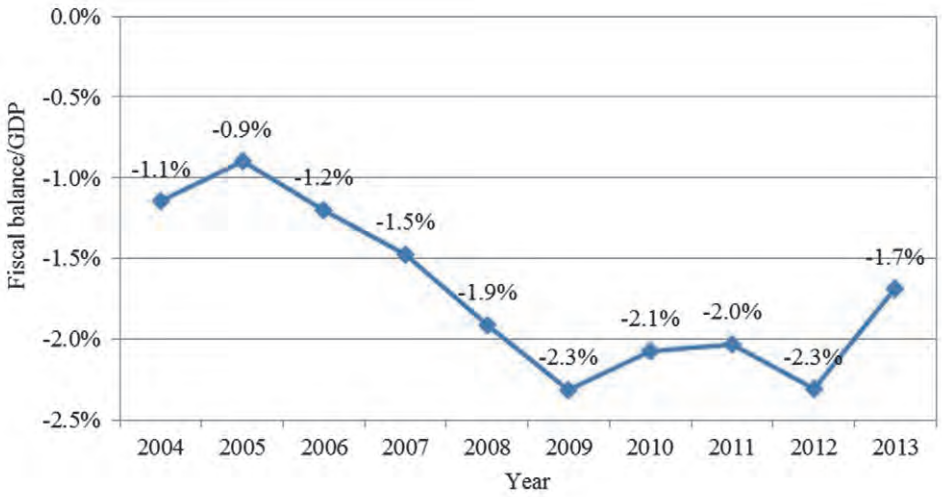
The fiscal balance in Indonesia shows that both the budgeted expenditure and the budgeted revenue increased approximately 4 times between 2004 and 2013, indicating that the national financial capacity is remarkably enhanced. The fiscal balance slightly decreased until 2005, and the fiscal deficit started growing after 2006. The yearly changes in the fiscal balance as compared to GDP decreased after 2010.



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Budget Expenditure	427.2	565.1	699.1	752.4	989.5	1,000.8	1,126.1	1,320.8	1,548.3	1,683.0
Budget Revenue	401.0	540.1	659.1	694.1	895.0	871.0	992.4	1,169.9	1,358.2	1,529.7
Fiscal Balance (Budget)	-26.3	-24.9	-40.0	-58.3	-94.5	-129.8	-133.7	-150.8	-190.1	-153.3

Source: Bank Indonesia

Figure 2.1-11 Fiscal Balance in Indonesia

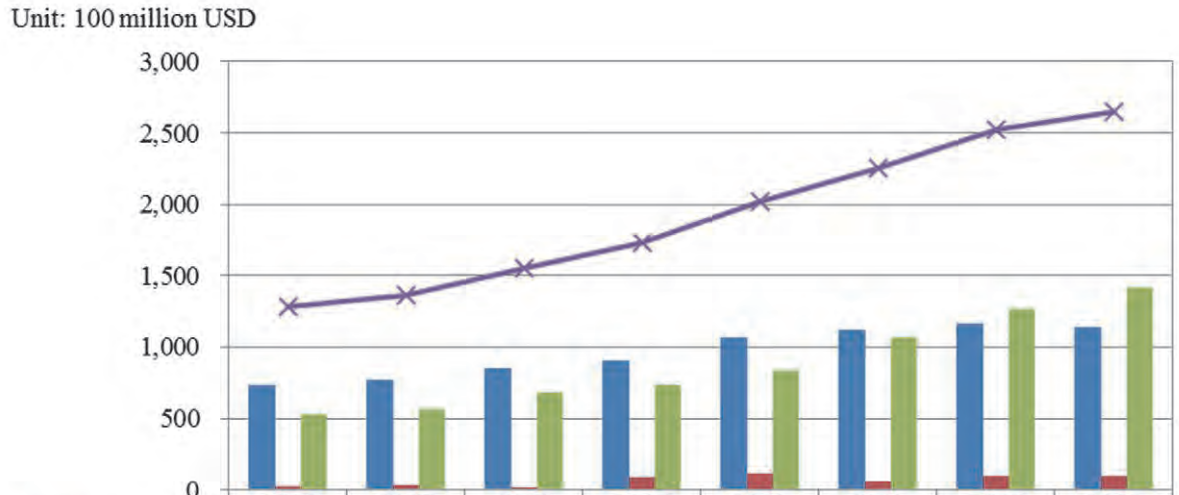


Source: Bank Indonesia and Statistics Indonesia (BPS)

Figure 2.1-12 Fiscal Balance against GDP (Nominal)

(b) Foreign Debt

The external debt of the government of Indonesia has increased by about 10% since 2006, reaching USD 265 billion as of 2013 compared to USD 129 billion as of 2006.



	2006	2007	2008	2009	2010	2011	2012	2013
Government	730.5	769.2	851.4	908.5	1,068.6	1,124.3	1,161.9	1,142.9
Central Bank	27.6	36.9	14.7	84.1	117.6	62.2	99.3	92.6
Private Sector	529.3	560.3	684.8	736.1	837.9	1,067.3	1,262.5	1,416.6
Total	1,287.4	1,366.4	1,550.8	1,728.7	2,024.1	2,253.8	2,523.6	2,652.1

Source: Government of Indonesia

Figure 2.1-13 Foreign Debt Balance

2.1.3 Development Plans

It is necessary to integrate the HSR development project with national level development plans for better Indonesian economic and industrial development, as well as with regional spatial development plans. As Indonesia is a country of islands in Asia, development of a linkage network among the islands is the key to more effective development of the country. In order to achieve this major step, the Indonesian government has formulated a national development plan, The Master Plan for Acceleration and Expansion of Indonesia's Economic Development 2011-2025 (MP3EI), and the government is finalizing the mid-term five-year development plan, Indonesian Infrastructure - Five Years and Beyond 2015-2019. Furthermore, there is a series of regional development plans for each province, regency and city, and these are designed to follow the above-noted national development plans.

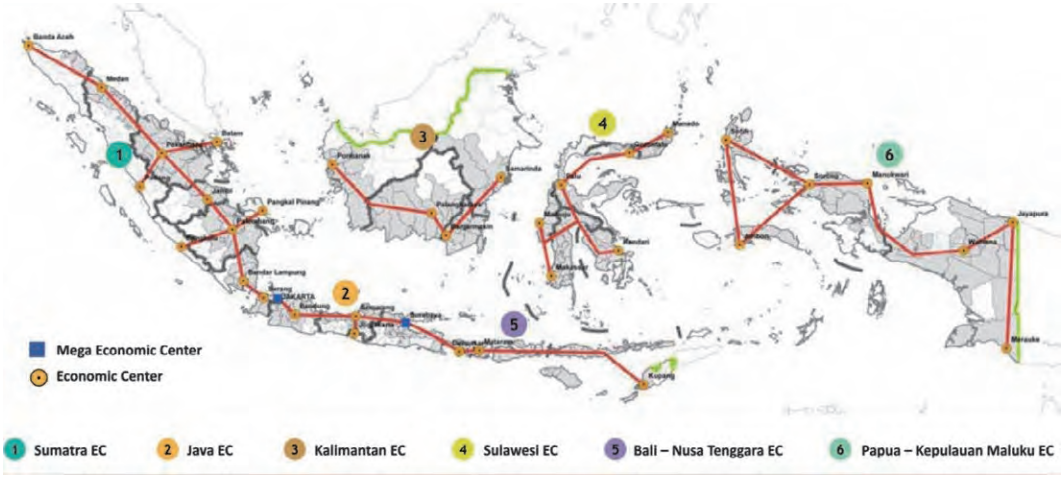
(1) National Development Plans

1) Master Plan for Acceleration and Expansion of Indonesia's Economic Development (MP3EI 2011-2025)

The government of Indonesia is seeking the best options in order to make Indonesia a leading economic developed country in the world by 2025, and it is rapidly developing its economy and society so that there will be equal opportunity and access to education and quality medical services with a sustainable quality of life for everyone while no more poverty should exist. Through such development of the country, the nation and its economy will gain higher purchasing stability and a higher share of the world market. It is important to maintain a 7% to 9% growth rate in economic development in order to keep Indonesia itself at the core of the world market and its activities. MP3EI is designed to develop the country and economy by integrated organization of three growth elements under its basic strategy for implementation. The three elements are described as follows:

[Three growth elements under basic strategy for implementation]

① Regional Economic Development on the Basis of Six Economic Corridors (refer to Figure 2.1-14)
② Strengthening Integration and Networking both Domestically and Internationally
③ Upgrading the Level of Science & Technology as well as Human Resources



Source: MP3EI: Ministry of Economic Affairs, Republic of Indonesia

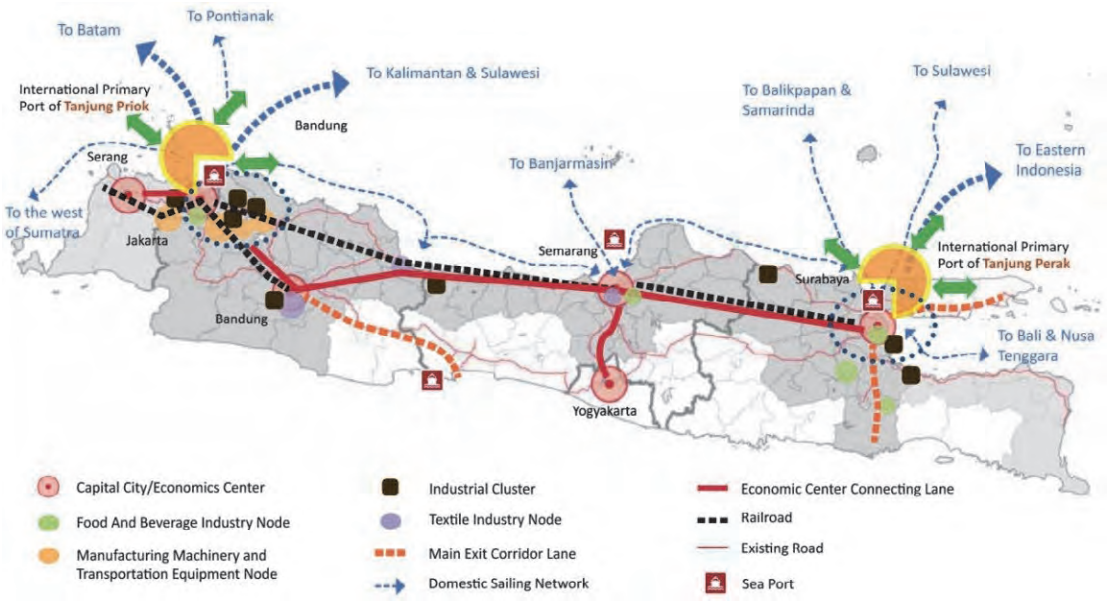
Figure 2.1-14 Six Economic Corridors in MP3EI

MP3EI describes each economic corridor development plan in detail, and the development theme and role of each economic corridor are also defined so that development actions can be taken accordingly. The following are the themes for each economic corridor (hereinafter referred to as "E.C.").

[Themes for each corridor]

- Sumatra E.C. — Energy protection, utilization of natural resources and creation of production centers
- Java E.C. — Leading the enhancement of national industry and services
- Kalimantan E.C. — Energy protection, creation of a refinery and production center for mineral resources
- Sulawesi E.C. — Development of a center for domestic production and manufacturing for agricultural and fishery industries including plantations as well as mineral and fossil fuel resources
- Bali – Nusa Tenggara E.C. — Securing tourism industry and entry to the world and national food security

The long northern coastal corridor area between DKI Jakarta and Surabaya on Java Island has developed as the industrial belt of the nation. Many industrial parks, in fact, have been developed especially in West Java Province between Jakarta and Cikampek, and a wide range of manufacturing industries are developing as production centers. MP3EI, under these circumstances, sets out the development vision particularly for the region as " **The Leader for Development and Enhancement of Manufacturing and Service Industries of the Nation**", and places high expectation on its role in further economic activity development and value chain expansion (refer to Figure 2.1-15).



Source: MP3EI: Ministry of Economic Affairs, Republic of Indonesia

Figure 2.1-15 Java E.C. Development Master Plan

The northern coastal area is expected to become the development center of the Java Economic Corridor in MP3EI, and the Trans-Java Toll Road and major trunk roads as well as a railway network are proposed for development parallel to the coastal line. In order to develop more effective water transportation and enhance the international trading network, the ports of Tanjung Priok, Cilamaya, Merak and Lamongan will focus on development for both domestic and international water transport networking. MP3EI also discusses a new airport development due to the capacity problem of the current Sukarno Hatta International Airport, and the new airport development is clearly projected in Majalengka as an alternate solution. The airport construction, in fact, is ongoing today in Kertajati.

2) Mid-Term Regional Development Plan (RPJMN)

The Indonesian government is currently finalizing the Mid-Term Regional Development Plan with assistance from Australia, and the Indonesia Infrastructure Initiative (IndII) prepared a technical report, “Indonesian Infrastructure - Five Years and Beyond”, targeting development from 2015 to 2019, which sets out a prioritized implementation plan and actions for development of (a) an integrated and highly reliable transportation network and (b) safe water supply and sanitary infrastructure based on the national development plan for 2025. Since RPJMN is still undergoing the finalization process before government approval, the items contained in the technical report are only studied during the project survey. For realization and implementation of the HSR project, it is necessary to arrange coordination with the government agencies concerned to incorporate the HSR project with the same high level of technology and quality as the Japanese system in the Mid-Term Regional Development Plan, as it is not clearly discussed at such technical level in most development plans.

(2) Regional Development Plan

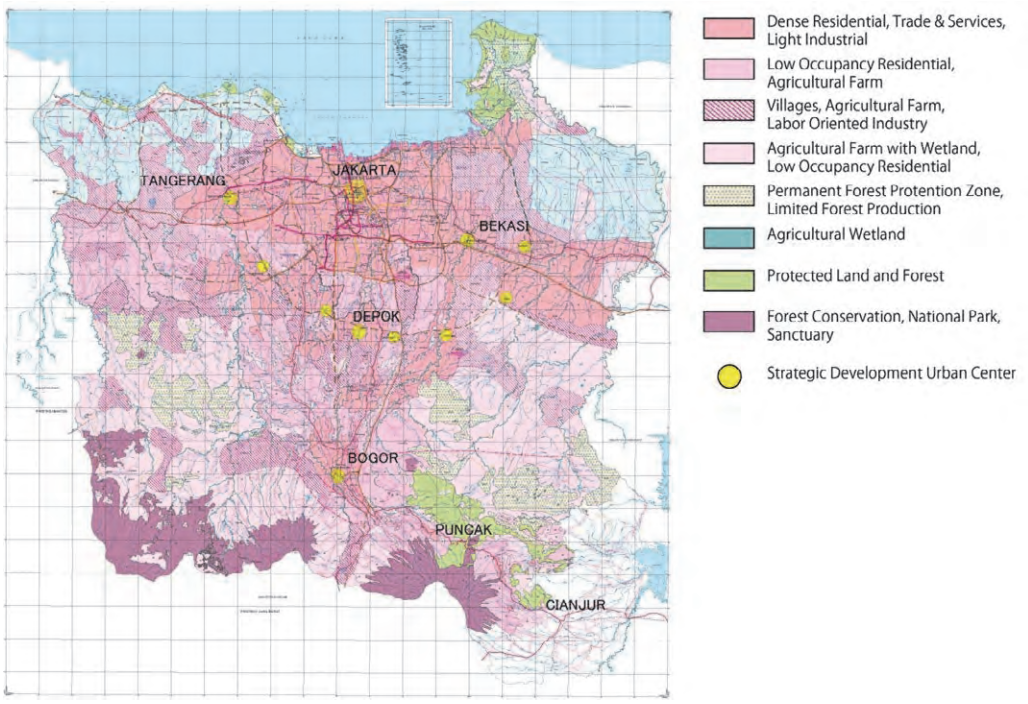
(a) JABODETABEKPUNJUR Development Plan

This development plan was issued in 2008, and focuses on the national strategic development area of greater Jakarta and the metropolitan area embracing Bogor, Depok, Tangerang, Bekasi, Puncak and Cianjur as well as DKI Jakarta, and it was enforced as a Presidential Decree. Jabodetabekpunjur region includes the above-noted urban areas, and the development plan contains an integrated land use plan with infrastructure development for a more synergistic effect in economic, industrial and transportation functions with neighboring regions such as West Java Province. The target area is the center for national development activities based on the policies and strategy plan proposed by the central government so this plan shall also present the guidelines for the overall development plan.

Figure 2.1-16 illustrates the spatial development plan for the JABODETABEKPUNJURE region.

[Spatial development plan for the JABODETABEKPUNJUR]

- Introduction of the Mass Rail Transit (MRT) system to replace the current road transportation system.
- Expansion of the capacity and utilization of the existing railway system, especially urban commuter railway network development and integration (in Bogor, Tangerang, Bekasi, Depok and DKI Jakarta)
- Development of the existing long distance railway network in connection with commuter railway system development and their integration.
- Development of a new regional road network with regard to the industrial development plans.
- Development of a new railway system between Cikarang and Bekasi as well as Tanjung Priok Port.
- Development of a metropolitan toll road network in DKI Jakarta strategic areas.
- Development of an integrated ring road system to connect Cikarang, Bekasi, Tanjung Priok Port and Citayam in Depok.
- Development of MRT connecting major development areas in greater Jakarta.
- Development of an integrated system of railways, monorail, buses and others as a high speed transport network.
- Creation of an integrated network by air and water transportation.



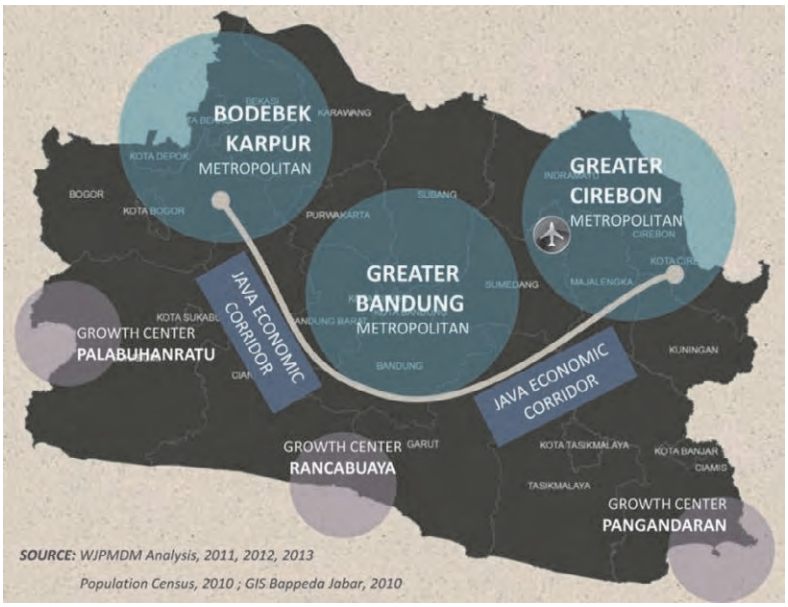
Source: JICA Study Team - Modified JABODETABEKPUNJUR Development Map

Figure 2.1-16 JABODETABEKPUNJUR Development Master Plan

(b) West Java Province Development Plan

As MP3EI is the national development plan to be implemented, each province, regency and city also has a development plan(s) based on MP3EI. West Java Province, as the HSR project target region, has prepared a series of development plans which correspond to MP3EI and others such as JABODETABEKPUNJURE Development Plan, and West Java Province Development Plan (RTRWP) is designed to be implemented in conjunction with others within the target years between 2009 and 2029. This is a spatial development plan which corresponds to the Long-Term Development Plan (RPJPD) and National Long-Term Development Plan (RPJPN), thus it consists of basic guidance, manuals, planning criteria and design standards for the development master plan.

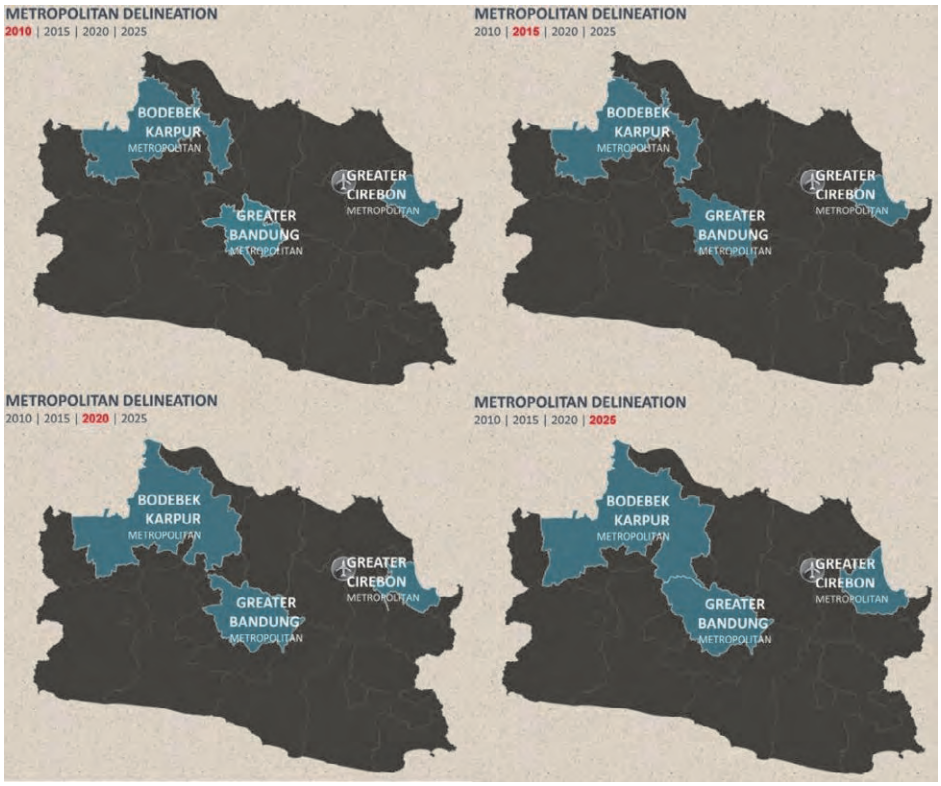
Figure 2.1-17 illustrates the West Java Metropolitan development concept in a spatial diagram. According to the concentration of the population in West Java, the three metropolitans (BEDEBEK KARPUR, GREATER BANDUNG and GREATER CIREBON) have been established and interlinked to complete part of the Java Economic Corridor for more effective economic and industrial development.



Source: BAPPEDA West Java Province

Figure 2.1-17 The Concept of Metropolitan Development in West Java Province

There are three development stages, in 2015, 2020 and 2025, and each metropolitan will develop in a specific manner. The economic and industrial development corridor between Jakarta and Bandung through Bekasi, Cikarang, Karawang and Purwakarta will expand so that the regional centers (cities) will be geographically connected (See Figure 2.1-18). On the other hand, Cirebon in the east will remain separated from the other metropolitans until 2025 due to its geographical position and it will take time for it to be connected in one development. However, more development is projected on the basis of Kertajati International Airport development.



Source: BAPPEDA West Java Province

Figure 2.1-18 Spatial Development Forecast for Next Four Stages

(c) Java - Bali Spatial Development Plan (Central & East Java Provinces and DIY)

Among the spatial plans prepared by the Ministry of Public Works, there are spatial development plans for each major island or group of islands, and the Java-Bali Spatial Development Plan is one of these. The plan defines the main economic corridor connecting Jakarta, Bandung, Semarang and Surabaya, utilizing the northern coastal area for Java regional development and economic growth. Jakarta, Bandung, Semarang and Surabaya, as the regional development centers along the Java economic corridor, will be closely connected by the upgraded transportation network in order to maintain development of the manufacturing facilities and other industries by more investment as these cities will be developed based on the scenario of integrated sectors. Figure 2.1-19 shows the major economic development corridors in the Java - Bali regional development plan, and the HSR development project should also be developed in this synergistic industrial development scenario due to the greater demand for a high-speed transportation network in Java Island.

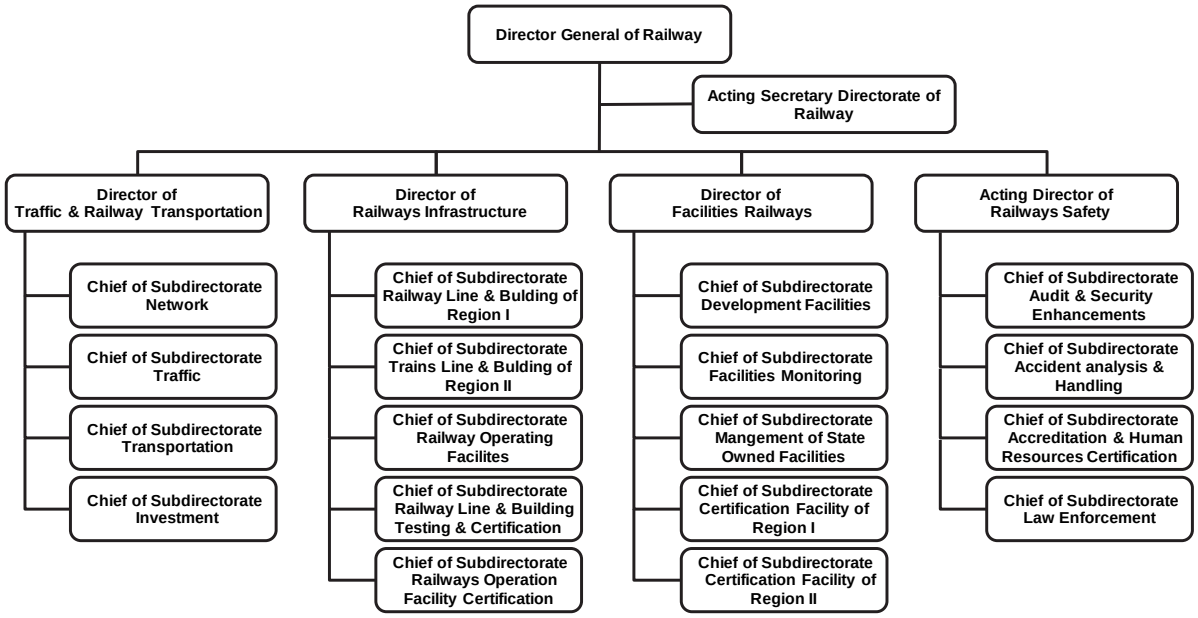
Source: Ministry of Public Works, Java - Bali Development Plan

Figure 2.1-19 Transportation Network in relation to Java - Bali Economic and Regional Development

2.2 Outline of Transport Sector

2.2.1 Transport administration

The central government agency in charge of transport administration in Indonesia is the Ministry of Transportation (hereinafter referred to as "MOT"), and the MOT consists of four directorates general, namely Land Transportation, Railways, Sea Transportation and Civil Aviation. The Directorate General of Railways (hereinafter referred to as "DGR") is engaged in railway administration and has four directorates: Traffic & Railway Transportation, Railways Infrastructure, Facilities Railways and Railways Safety. Figure 2.2-1 shows the organizational structure of the DGR.



Source: DGR

Figure 2.2-1 Organizational Structure of the DGR

State-owned enterprises called “BUMN” (Badan Umum Miliki Negara) also play an important role in transport, as well as the government agencies. The state-owned enterprises are classified into three types. The first type which is called “Perjan” is narrowly defined as a national company and is closely involved with the central government and the government is responsible for taking care of the company even if it becomes unprofitable. The former national railway was categorized as this type, but currently this type of company for transport does not exist. The second type which is called “Perum” is defined as a public corporation and is partially involved with the government and is asked to remain financially independent. The present Indonesian public bus corporation (DAMRI) is categorized as this type. The third type which is called “PT” is assumed to sell shares to the private sector and is asked to introduce the self-support accounting system instead of no governmental control.

To change the company form from Perum (Type 2) to PT (Type 3) has major implications, because the regulatory agency also changes from the minister of each government ministry to the Ministry of State Owned Enterprises. At present, most of the BUMNs have changed to PTs, and only two national bus companies (PPD and DAMRI) are still classified as Perum (public corporations) among all the transport companies. Also, the government did not succeed well in selling PTs to the private sector, and it retains 100% of the shares of most of the transport-related PTs. Railway-related state-owned enterprises are as follows:

[Railway-related state-owned enterprises]

- Indonesian Railway Company (PT. KAI) : Railway operator
- National Railway Industry (PT. INKA) : Railway rolling stock manufacturer

2.2.2 Current Situation of Each Transport Sector

(1) Railway Transport

The railways in Indonesia are operated in Java and Sumatra Islands and the total operational length is 4,675km. The gauge length is 1,067mm, which is the same as ordinary railways in Japan. The railway operator was formerly Indonesian National Railways (PJKA), but it was privatized in 1999, and the current operator is PT. Kereta Api (hereinafter referred to as “PT. KAI”).

According to the number of railway users from 2008 to 2013, as for passenger transport, the recent number of passenger-km shows a downward trend and the annual average rate of decline is 0.2% in Java Island and 4.6% in Sumatra Island. Looking at the composition ratio by island, railway passenger transport in Java Island accounts for 96%. On the other hand, as for freight transport, the number of ton-km shows an upward trend, and the annual average rate of increase is 24.5% in Java Island and 3.1% in Sumatra Island. Looking at the composition ratio by island, 64% of railway freight transport is operated in Sumatra Island.

Table 2.2-1 Annual Changes in Passenger-km for Railway Passenger Transport

(Unit: million passenger-km/year)

Region	2008	2009	2010	2011	2012	2013	Annual increase
Java	17,041	19,380	19,364	16,839	14,445	16,880 (95.8%)	-0.2%
Sumatera	896	917	915	985	833	709 (4.2%)	-4.6%
Total	17,937	20,697	20,282	17,824	15,278	16,959 (100.0%)	-1.1%

Source: Transportation Statistics 2013

Table 2.2-2 Annual Changes in Ton-km for Railway Freight Transport

(Unit: million ton-km /year)

Region	2008	2009	2010	2011	2012	2013	Annual increase
Java	884	1,116	1,826	1,811	2,178	2,645 (36.2%)	24.5%
Sumatera	4,399	4,504	4,869	4,667	5,126	5,126 (63.8%)	3.1%
Total	5,283	5,620	6,695	6,478	7,304	7,304 (100.0%)	6.7%

Source: Transportation Statistics 2013

(2) Road Transport

According to the number of vehicle fleets from 2008 to 2013, the growth rate in number of motorbikes is the highest at 11.8%, followed by the number of cars at 8.2%. On the other hand, the growth rate in number of buses is lower at 2.7% compared with other fleet types. This shows that the number of motorbikes and cars has increased drastically.

According to the composition by vehicle type in 2013, motorbikes are the highest with a share of 82%, followed by cars with a share of 11%.

Table 2.2-3 Annual Changes in the Number of Vehicle Fleets

(Unit: 1,000 vehicles /year)

Vehicle type	2008	2009	2010	2011	2012	2013	Annual increase
Passenger car	7,490	7,910	8,891	9,549	10,432	11,111 (10.9%)	8.64%
Bus	2,059	2,161	2,250	2,254	2,274	2,356 (2.3%)	2.5%
Truck	4,452	4,452	4,688	4,959	5,062	5,415 (5.3%)	4.4%
Motorcycle	47,684	52,767	61,078	68,839	76,381	83,390 (81.5%)	12.5%
Total	61,685	67,290	76,907	85,601	94,149	102,272 (100.0%)	11.2%

Source: Transportation Statistics 2013

PT. Jasa Marga has operated the toll roads since they opened the toll road with a length of 59 km in Jagorawi in 1978. The total opened length was 545 km in 2012, and they plan to open toll roads with a length of 193 km by the end of 2016.

According to the number of users from 2008 to 2013, the traffic volume has increased by 7.4% annually, which is almost same level as the growth rate of the number of car fleets, 8.2%.

Table 2.2-4 Annual Changes in the Number of Toll Road Users

(Unit: 1,000 vehicles /year)

	2008	2009	2010	2011	2012	2013	Annual increase
Traffic volume	880,057	916,483	956,890	1,091,779	1,201,366	1,260,000	7.4%
Toll road length (km)	527	531	531	545	545	560	1.2%

Source: Annual Report 2013, Jasa Marga

(3) Air Transport

According to the number of airplane users from 2008 to 2013, passengers and cargos on both international and domestic lines tended to increase. The average annual growth rate is 17.8% for international flights and 6.3% for domestic flights for passenger transport. On the other hand, the freight transport has fluctuated so much.

Table 2.2-5 Annual Changes in Passenger-km for Air Passenger Transport

(Unit: million passenger-km/year)

	2008	2009	2010	2011	2012	2013	Annual increase
International flight	10,715	12,750	16,369	22,898	23,264	24,323	17.8%
Domestic flight	44,868	75,424	59,436	53,455	69,236	60,962	6.3%

Source: BPS

Table 2.2-6 Annual Changes in Ton-km for Air Freight Transport

(Unit: million ton-km/year)

	2008	2009	2010	2011	2012	2013	Annual increase
International flight	10,715	12,750	16,369	22,898	23,264	2,681	17.4%
Domestic flight	44,868	75,424	59,436	53,455	69,236	5,428	6.5%

Source: BPS

(4) Sea/Inland Water Transport

Looking at the outline of sea/inland water transport, the number of embarked passengers was 26 million pax/year, the amount of international cargo was 558 million tons/year, and the amount of domestic cargo was 640 million tons/year. According to the change from 2008 to 2012, especially the growth rate in number of international cargo by sea transport is the highest.

Table 2.2-7 Number of Passengers by Sea/Inland Water Transport

(Unit: 1,000 pax/year)

	2008	2009	2010	2011	2012	Annual increase
Embarked	18,705.5	14,906.0	18,271.7	19,996.8	26,149.5	8.7%
Disembarked	18,919.0	14,858.9	18,314.8	19,704.8	24,197.8	6.3%
Total	37,624.5	29,764.9	36,586.5	39,701.6	50,347.3	7.6%

Source: BPS

Table 2.2-8 Amount of International Cargo by Sea Transport

(Unit: 1,000 tons/year)

	2008	2009	2010	2011	2012	Annual increase
Loaded	145,120	223,555	233,222	376,652	488,264	35.4%
Unloaded	44,925	61,260	65,641	78,836	69,645	11.6%
Total	190,045	284,815	298,863	455,488	557,909	30.9%

Source: BPS

Table 2.2-9 Amount of Domestic Cargo by Sea/Inland Water Transport

(Unit: 1,000 tons/year)

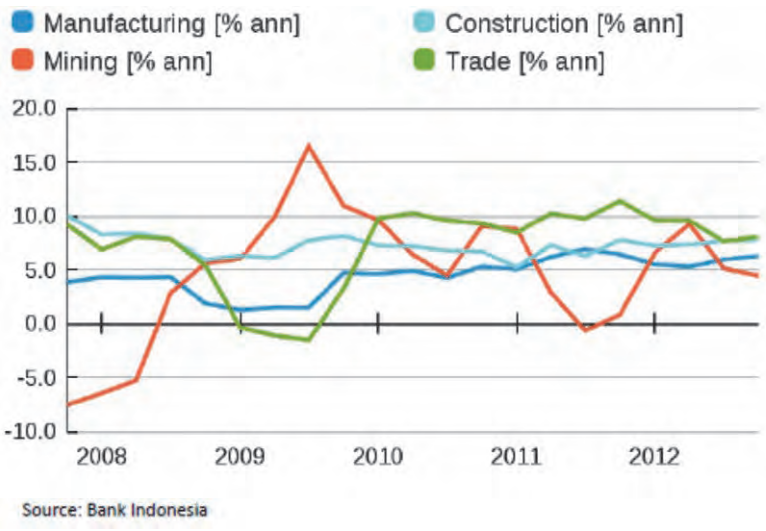
	2008	2009	2010	2011	2012	Annual increase
Loaded	170,895	242,110	182,486	238,940	312,599	58.0%
Unloaded	243,312	249,052	221,675	284,292	327,715	7.7%
Total	414,207	491,162	404,161	523,232	640,314	11.5%

Source: Transportation Statistics 2012

2.3 General Conditions of the Construction Market

2.3.1 Outline of Construction Market

Indonesia's economy was a standout performer among its Asia counterparts last year, when it posted another strong performance, expanding by 6.2%, down only marginally from 6.5%, according to Statistics Indonesia. On the production side, leading contributions to growth in 2012 came from a number of services, such as trade (which grew by 8.7%) and transport and communications (10%). Manufacturing expanded by 5.7%, while the construction sector posted strong growth of 7.5%. Mining and quarrying have been (excluding petroleum and gas) expanded by 6.4%.

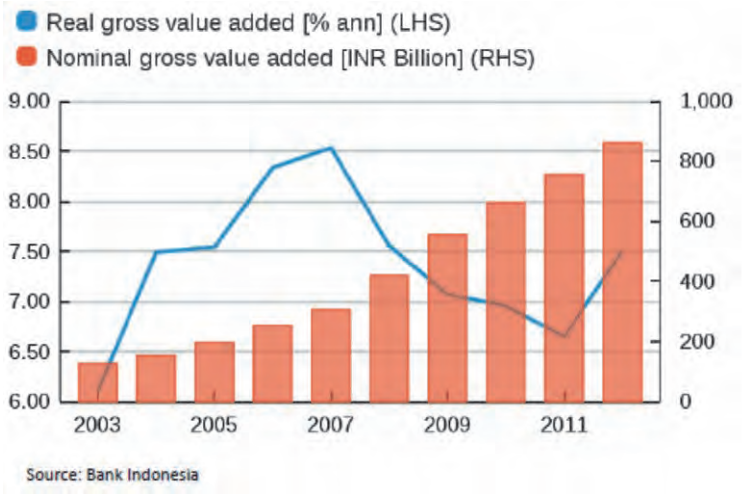


Source: Construction Equipment in Indonesia A Market Appraisal - April 2013, VMDA

Figure 2.3-1 Recent Growth in Key Sectors

Indonesia's construction sector has been performing well in recent years driven by strong economic activity and high levels of investment. Indeed, fixed investment has soared over the past decade, with its share of total GDP rising from 19.5% in 2003 to a historic high of 33.2% in 2012. The outlook for construction is favorable. In nominal output value terms, the sector will grow by 15% a year in the next five years, supported by urbanization, rising incomes and the government's effort to improve the infrastructure base as part of the Master Plan for the Acceleration and Expansion of Indonesia's

Economic Development (MP3EI). In order to attract investment for the master plan, which envisages spending of up to IDR 4,000 trillion (around USD 428 billion) during the 2011-2025 timeframe.

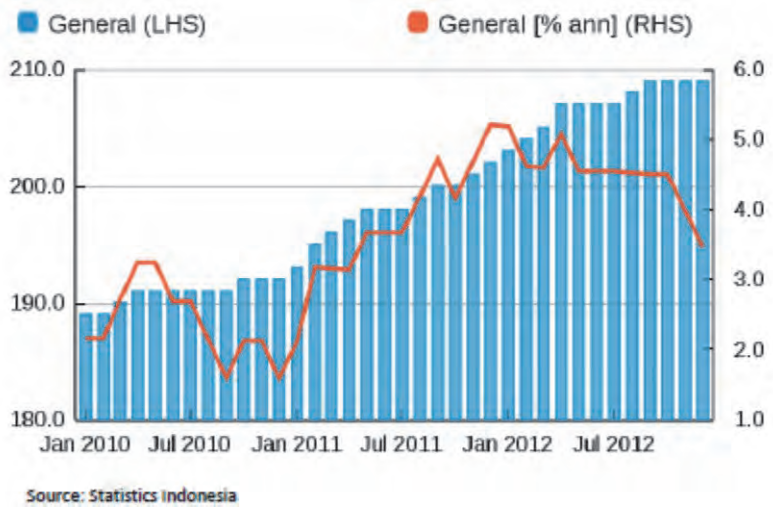


Source: Construction Equipment in Indonesia A Market Appraisal - April 2013, VMDA

Figure 2.3-2 Construction Activity

2.3.2 Construction Material

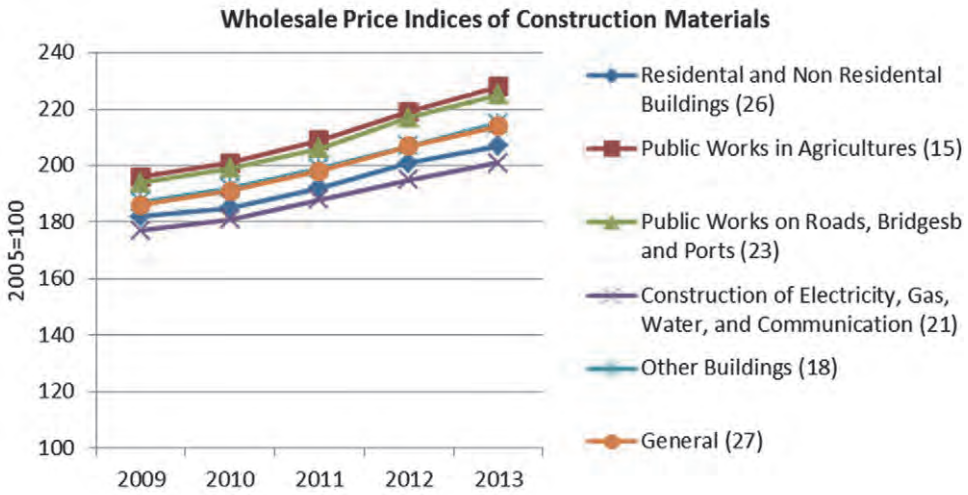
Although supply is expanding, the strong demand for construction materials is pushing up prices in Indonesia. Based on the wholesale price index, construction materials in general rose by 4.5% on an annual average basis in 2012, accelerating from 3.8% in 2011 and 2.4% in 2010. Prices for materials used in public works on roads, bridges and ports were up by 5%, and for materials in residential and non-residential buildings by 4.2%.



Source: Construction Equipment in Indonesia A Market Appraisal - April 2013, VMDA

Figure 2.3-3 Construction Materials Prices Index (2005=100)

Construction material prices have been inclesed approximatery 5% from the previous year for public works such as roads, bridges and ports, and 4.2% from the previous year for non-residential buildings and housing. Construction material prices in public works have been approximately doubled from the year 2005, 15% rised from 2009.



Source: Statistics Indonesia

Figure 2.3-4 Construction Materials Prices Index (2005=100)

2.3.3 Construction Equipment

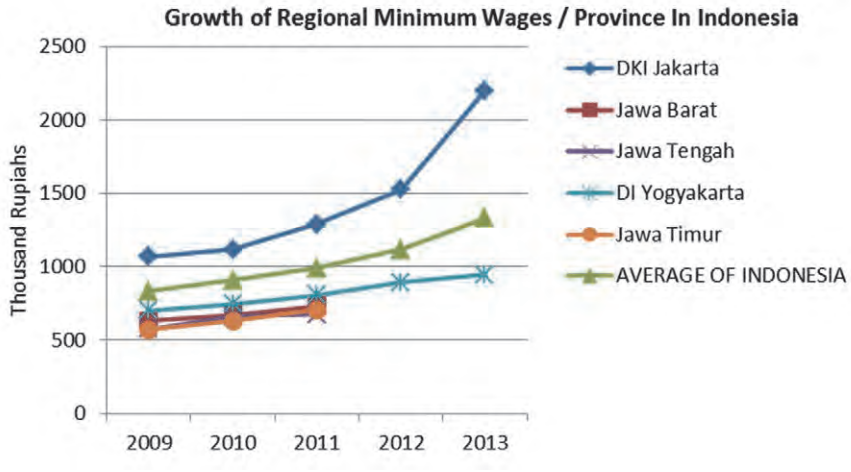
Indonesia's economic growth is forecast to accelerate over the coming five years, averaging around 6.5%, driven by rising investment and industrial expansion. This construction expansion will be supported by the government's massive infrastructure investment plans under its IDR 4,000 trillion (around USD428 billion) Master Plan for the Acceleration and Expansion of Indonesia's Economic Development (MP3EI). This is set to drive up demand for construction equipment, particularly small and medium-sized excavators, bulldozers, cranes, tractors and dump trucks. It will also boost demand for equipment for construction materials manufacturers. By 2017 Indonesia's construction equipment market value is forecast to reach USD6.84 billion, up from an estimated USD4.2 billion in 2012.

Source: Construction Equipment in Indonesia A Market Appraisal - April 2013, VMDA

Figure 2.3-5 Construction Equipment Market Value (Million USD)

2.3.4 Labor Cost

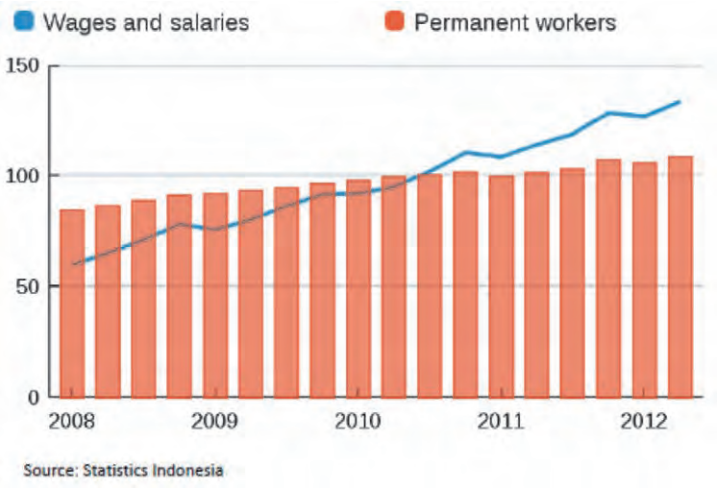
The minimum wage in Indonesia has been more than doubled in the past five years. In 2013. A rapid increase in the minimum wage about 44% in DKI Jakarta corresponding to the issuing of "Presidential Decree on setting policy in the minimum wage (2013 No. 9)", to assure the minimum wages. And it is expected to maintain the upward trend in the next few years.



Source: Statistics Indonesia

Figure 2.3-6 Minimum Wages in Major States of Java Island

The rapid growth of the construction sector and the high demand for construction workers has seen labor costs rise on a steep trajectory. The wages and salary index calculated by Statistics Indonesia shows that salaries and wages have increased approximately 19% on average in every month since 2009, reflecting strong activities in the sector.



Source: Construction Equipment in Indonesia A Market Appraisal - April 2013, VMDA

Figure 2.3-7 Construction Workers and Wages Index (2010=100)

2.3.5 Taxation System

(1) Value Added Tax[1]

VAT (Value added Tax: VAT) is levied when the delivery of goods and services subject to tax, import and export, transfer of rights, etc. were made in Indonesia. For consumers to be borne VAT, but the tax liability and the levy is imposed on corporates that the annual sales exceeds of 600 million rupiah and required to be registered as a taxable firm to the tax office. Registered company calculates the tax payments by aggregating the tax slip (Faktur Pajak) for each transaction.

The Rate of VAT is 10% in 2014 and there are the following exceptions.

- With increase or decrease in the range of 5% to 15% by Decree
- 0% for export of goods in principle but there are cases that the tax to be imposed
- Some goods and services to be untaxed

(2) Special Tax Treatment[2]

Government project funded with foreign loans or foreign grants may be eligible for special tax treatment for the income derived from that funding. The projects that typically qualify are set out in the state Project Table of Contents (Daftar Isian Proyek: DIP) or other similar documents.

The main contractors, consultants and suppliers will be given preferences from the following tax on the importation of goods and use of foreign taxable services and/or foreign intangible goods for foreign grant funded or foreign loan funded government projects.

- Exemption from Import Duty
- Non- collection of VAT (Value Added Tax) and LST (Luxury- goods Sales Tax)
- Non-collection of Import Income Tax (Article 22)

[1] JETRO, May 2013
[2] Indonesian Pocket Tax Book 2013, pwc

Chapter 3

Development Plan of the Project Target Area

Chapter 3 Development Plan of the Project Target Area

3.1 Current Development Status of the Project Target Area

The area called BODEBEK region between Jakarta and Cikampek along the Jakarta - Cikampek toll road (highway) is recognized as Indonesia's largest major industrial zone, and a series of industrial parks have been developed for major production of mainly automobile and electronic products. Jakarta - Cikampek toll road is under extension to Cirebon so further development of the industrial parks is expected in this region. There are other industrial developments also growing in Purwakarta Regency and Bandung Regency, where a large amount of textile products are manufactured. Both of these areas have projections for new industrial parks or zone development as this industry is increasing production.

The city of Bandung is one of the major tourist destinations in the region and over two hundred thousand people visit the Bandung area every weekend, and this activity also has a large impact on its economic growth. West Java Province has recognized the Bandung region as the Twin City of Jakarta, and Bandung city is considered to grow economically simultaneously with the capital's development.

In the following sections, the status of development in each concerned area is discussed in order to visualize the potential economic and industrial relevance and linkage to the high-speed railway development.

3.1.1 Development Status of Central Jakarta City

Without any doubt, Jakarta is the center of both economic activities and political decision-making, and the density of population is still increasing due to commercial and service industry development. The central city area along, for instance Sudirman Road, is well developed with high-rise towers containing commercial enterprises and high-class living spaces, drawing a large flow of workers every day. Most of the land along the proposed HSR alignment in DKI Jakarta is designated as regular settlement mainly for residential and commercial purposes, and except for the BKT canal stretch, there are no major issues of land use considering development regulations since the alignment is mostly underground in Jakarta city.

The guidelines for underground space utilization are now undergoing for finalization by the Ministry of Public Works, and the underground facility design and land use regulations are not seen as a main concern. However, some particular land or properties such as a cemetery may cause some issues between the developing entity and public groups who have some interest.

The Jakarta city area is covered by the city BRT network called Trans Jakarta, and this network is well used by the public. However, it does not efficiently cover all the residential areas of the city. The conventional commuter railway system is extensively used in the region as well. A few other developments are ongoing, such as the new MRT subway and the Airport Link project. However, some projects, especially the monorail, are currently on hold and it is not clear when the construction will resume and be completed for operation. The major issue of the urban transportation network is the lack

of connections. The network is incomplete and people in Jakarta tend to use their own automobiles (cars and motorbikes), thus serious traffic jams occur continuously in many places and this degrades economic activities. Reducing traffic jams in the metropolitan area is one of the keys to improving the urban living environment through healthier economic growth.

3.1.2 Development Status of Bekasi Regency

Bekasi city around the railway station has developed as Jakarta's suburban residential area with many commercial activities, and it is now growing further eastward as a major industrial development area of West Java Province. There are a few industrial parks and a number of Japanese companies, among others, operate production facilities for automobiles and electrical products.

The land in the area is flat. The northern part of the regency including the coastal area as well as the southern part of the regency is mainly used for agricultural production, especially rice fields. There are some plantation lands as well in some areas in the southern part of the regency.

The Jakarta - Cikampek toll road splits the region in two between north and south, and access between the north side and south side is very limited, thus the transportation network in the region is not well established. The outer ring road, the second toll road as well as the double-double track upgrade for the existing railway are the main development programs for the region, and these are awaited by the public as better life infrastructure.

3.1.3 Development Status of Bekasi City

There is a major commercial development along the Jenderal Ahmad Yani Road and the bridge crosses the railway to extend the development towards the north. The city area has been developed into a low density residential district, and it is quite difficult to establish a new large and dense development in the center of the city as well as in other parts of the city.

The development around the existing station is not well designed, and poor road maintenance makes city transport difficult because of narrow spaces. Since there is high demand for labor due to growing industrial production and service industries, more settlement is expected in this area. Public transportation in the city area is very poor with very limited private services to choose from, thus this could be a major bottleneck for better transport projects.

3.1.4 Development Status of Cikarang Area

Major development activity in this area is the current expansion of the industrial parks south of the toll road and residential settlements for migrants (factory workers). As for the current development of industrial parks in the region described in Section 3.1.7, eight industrial parks along the toll road are operational. One of these industrial parks "Kota Deltamas" has been master planned with Bekasi Regency Government office complex set in the middle of the industrial city, and this area will possibly be developed as the center of the industrial city of Cikarang. There is no public transportation effectively operating in this area between the industrial parks and prefectural office buildings, thus the

preparation of a better road network with a multimodal transit network is the priority of basic infrastructural development.

3.1.5 Development Status of Karawang Regency

There are several industrial park developments south of the toll road continuously from the Cikarang area, and industrial production in the area is increasing fast. Besides the existing industrial parks, there are more than ten new industrial park developments listed in the municipality approval records, and these are located south of the toll road as well and the area extends toward the proposed airport development land which also overlaps with the proposed HSR alignment. Furthermore, there are several residential development plans which have also been approved by the local government for development near the border of Purwakarta.

The northern part of the regency up to the coast has historically been utilized for agriculture. The extensive lands south of the industrial parks are mainly designated as permanent forest or for limited forest production use under the land use plan, and the land use regulations may need to be adjusted for project alignment on the protected forestlands.

The area between the existing railway and the toll road is mainly developed as residential settlements and a commercial activity center. The growing city area is served by passenger bus services, but the public transportation network is limited in the city area, thus upgrading the passenger transit system should be carried out along with the new development of industrial parks in the region.

3.1.6 Development Status of Karawang City Area

The city center and surrounding areas have been developed in the past with a certain density, but the buildings are old and small-scale structures are the main component of the city. The existing city roads are not well maintained and the width is not sufficient for the current traffic volume. The area near the toll road is currently developing as a new business center, and this development should be tied with the mega industrial development and residential settlement package. Due to the migration of workers from the surrounding regions to the factory production businesses, the area has become the factory workers' home township and the population is increasing today. An inland container dry port has been established in the city near the railway station, but it is not effectively functioning due to lack of wide roads and a logistics network in the region.

3.1.7 Current Development of Industrial Parks along the Project Alignment

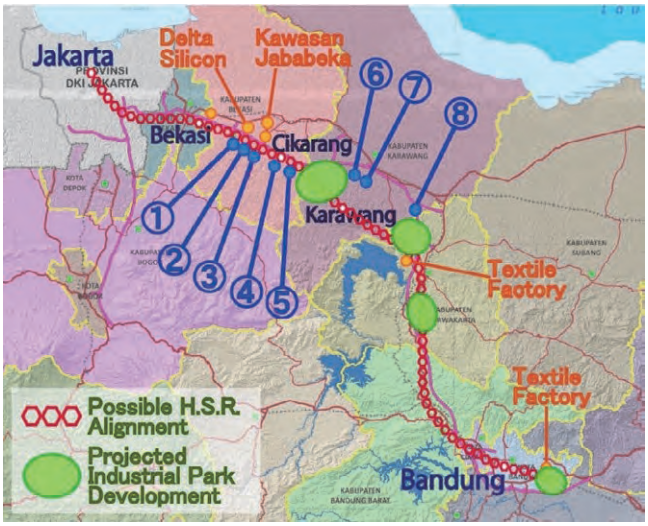
There are large industrial developments along the project alignment as well as along the Jakarta - Cikampek toll road between Cikampek in Karawang Regency and Cikarang in Bekasi Regency, where many Japanese companies have invested in factory development, and the area is now the center of the production industry on Java Island. MM2100 Industrial Town is an example, and there are many industrial parks that were developed in 1990 as well as others that have been recently developed for new operations, for instance Kota Delta Mas, and Greenland International Industrial Park (GIIC). According to Indonesia Investment Coordinating Board (BKPM), there are 12 industrial parks

between Jakarta and Karawang with two others in Cirebon. There are over ten industrial parks in the Karawang area which have permission for development. Since there are several industrial areas that are still developing, it is highly expected that a large number of companies will locate their production businesses here. As the following Table 3.1-1 illustrates, the majority of tenants are Japanese companies, and a production network and integration between the industrial parks have been implemented by some production sectors. According to interviews conducted of the operators of GIIC and Bukit Indah Industrial Park, the number of Japanese employees in each factory or company is uncertain. However, it is assumed that there is a large number of Japanese employees working in the Bekasi - Karawang area as there are thought to be an average of 5 Japanese management staffs. Figure 3.1-1 describes the current industrial park development in the area between Bekasi and Karawang.

Table 3.1-1 General Data of Industrial Parks in the Jakarta-Cikampek Area

Name of Industrial Park	Location (Regency)	Distance from Jakarta	Contact Information	No. of Tenants (Japanese)	Number in Map
MM2100 Industrial Town	Bekasi, West Java	24km	PT Megalopolis Manunggal, Marubeni	175 (119)	①
Bekasi International Industrial Estate (BIIE)	Bekasi, West Java	26km	PT Hyundai Inti Development	51 (40)	②
East Jakarta Industrial Park (EJIP)	Bekasi, West Java	29km	PT East Jakarta Industrial Park, Sumitomo Corporation	103 (76)	③
Bekasi International Industrial Estate	Bekasi, West Java	32km	PT Lippo City Development	8 (5)	④
Greenland International Industrial Center (GIIC)	Bekasi, West Java	37km	PT Purdelta Lestari, Sojitsu	67 (56)	⑤
Karawang International Industrial City	Karawang, West Java	47km	PT Maligi Permata Industrial Estate, Itochu-Shoji	92 (76)	⑥
Suryacipta City of Industry	Karawang, West Java	54km	Suryacipta Contact Desk Sumitomo Corporation	20 (13)	⑦
Bukit Indah Industrial Park	Karawang, West Java	67km	PT Indotaisei Indah Development, Taisei Corporation	80 (41)	⑧

Note 1: Prepared based on the Web page information or company catalogue of companies operating in March, 2014.
Note 2: Distance from Jakarta is calculated on the basis of Cawang Junction near Halim Airport.
Source: JICA Study Team



Note: Numbers in the map correspond to the numbers in Table 3.1-1.
Source: JICA Study Team

Figure 3.1-1 Current Development and Future Projection of Industrial Parks between Jakarta and Bandung

It is thought that the commuting border from Jakarta is up to 50km, to where Karawang International Industrial City (KIIC) is located. Due to the current increase in traffic demand around the area, it may take over 2 hours (maximum 3 hours at worst) to drive from Jakarta, though it took only 45 minutes to 1 hour several years ago. In order to deal with such traffic problems in the area, instead of fighting against the traffic congestion, several residential developments have been constructed. Lippo Cikarang is one example of the current movement, and it is estimated that there are over 400 Japanese people living in the new residential city.

On the other hand, in Bukit Indah Industrial Park in Cikampek, which is over 65 km from Jakarta, there are many Japanese manufacturing companies. Many employees commute from Jakarta due to their family's educational needs or the requirements of their children since there are no accredited international school facilities in the area. They have to spend over two hours in many cases commuting every day, thus residential development as well as basic public infrastructures have to be developed in this area, because there are no such facilities that fulfil the needs of these Japanese workers.

It is apparent that many industrial parks have developed along the proposed HSR alignment as illustrated in Figure 3.1-1 above, and a few industrial developments have been created for textile production in Purwakarta as well as in the Bandung area. The city of Bandung is now formulating a new urban master plan called "Bandung Technopolis Smart City" for the Gedebage area with a new special economic zone (SEZ) and industrial park development, according to BAPPEDA Bandung. The area in Bekasi and Karawang Regencies will be further developed for automobile and electrical product manufacturing.

Over ten industrial park developments applied for government permission in the 1990s in the Karawang area, and there are two industrial parks in the west of Purwakarta and one in the south of the city. It is thought that the new industrial developments are highly effective, as such increase in development brings more production and employment to the region.

3.1.8 Development Status of Bandung Regency

Bandung Regency is located in a mountainous region, and the urban development of Bandung city took place in the highlands of the mountain range. The altitude of the Bandung urban area is above 600 m so the climate is cooler and suitable for a summer resort in order to escape from the heat of the city. The primary industry is actively producing grain and tea, for instance, suitable for the highland climate. The secondary industry in the region mainly aims at textile production even in urban areas. The main activity in the service industry is tourism, especially eco-tourism utilizing regional natural resources, such as hot springs, and educational and related research service activities also lead regional industrial development.

3.1.9 Development Status of Bandung City Area

The core regional development concept for Bandung city, as indicated in the Bandung Regency spatial development plan, describes twin center creation for the future Bandung city. The existing Bandung city center will be revitalized as a historic, cultural and educational center representing the traditions of Bandung city, and Gedebage city is planned as a new secondary center of commercial and residential activities. This is a development vision where these two central districts will grow up interacting with each other.

Bandung city center today has developed with dense small-scale structures, and it is difficult to redevelop the area compared to new city center considering necessary land acquisition. On the other hand, there are large open or non-utilized lands in Gedebage area east of Bandung city center, and the open land south of the existing railway has been designated for the new secondary city center to be created. The master plan is now under consideration by BAPPEDA Bandung and the city. And, according to BAPPEDA spatial development planning division, the new urban center will be developed with residential and commercial area, and partly developed with industrial area. There is a large stadium already built in the same area and the district around the structure will be utilized for a major sports activity center. The new urban center is in close proximity to the existing textile factory complex, and this district will be further developed with the base of logistical network of the textile related industries.

3.2 Development Plan of the Project Target Area

3.2.1 Development Plan of DKI Jakarta and Jakarta Metropolitan Area

As already discussed in Chapter 2.1, the Ministry of Public Works has issued the JABODETABEKPUNJUR Development Plan for the Jakarta Metropolitan Area. In this plan, BODEBEK region, especially the area along the Jakarta - Cikampek toll road, is clearly categorized for major industrial and dense residential development area. This spatial development plan promises the potential of large demand for mass transportation along the toll road with future industrial park development.

The projected Second Outer Ring Road identifies an urban development ring as it networks the cities of Tambun, Setu, Cileungsi, Cimanggis, Depok, Cinere, Serpong and Tangerang as ring nodes for regional economic activity centers. The proposed HSR station location in Jakarta is at the center of this ring and located at the point where major public transportation is projected or under construction. The location of the station, namely Dukuh Atas, will be the hub of these projected public transit systems, such as the Airport Line, North-South MRT and LRT Line, together with the existing bus system and railway.

The area through which the proposed alignment will run, as noted above, is mainly designated for industrial development and dense residential zone, so there will be no major issues regarding HSR development in terms of urban development and land use regulations. There are areas on the north sea shore line and in the southern mountain regions that are designated as “Protected Land and Forest” and “Permanent Forest Protection Zone and Limited Forest Production.” However, these will not affect the project development because of distance.

(1) Road Transportation Network

The existing intra-urban toll road plays a major role in collecting and distributing the large traffic volume in the city, but its capacity is limited so traffic jams are permanent including the arterial roads. In order to overcome the traffic congestion with the intra-urban toll road, the outer ring road serves as another means of easing traffic to reduce incoming traffic, but it has a few sections still under construction so its function is incomplete. Today, under the DKI Jakarta spatial plan 2030, a larger and wider ring road called the “second outer ring road” is projected to connect the outer regions of Jakarta in view of more logistics activities and industrial growth by linking the developing industrial parks/zones and international sea port. This will divert the traffic between cargo transport and passenger transport in a more effective manner. With this road development scheme, the inner city area will be free from large cargo and goods transport and will be utilized more for passenger transit, while the outer city area and perimeter zone of the JABODETABEKPUNJUR area will have a highly-utilized cargo truck-oriented transit network although the second outer ring road may take quite some time before opening. Figure 3.2-1 shows the major road network development plan in Jakarta.

Source: DKI Jakarta - Jakarta Spatial Plan in 2030

Figure 3.2-1 DKI Jakarta Road Network Development Plan

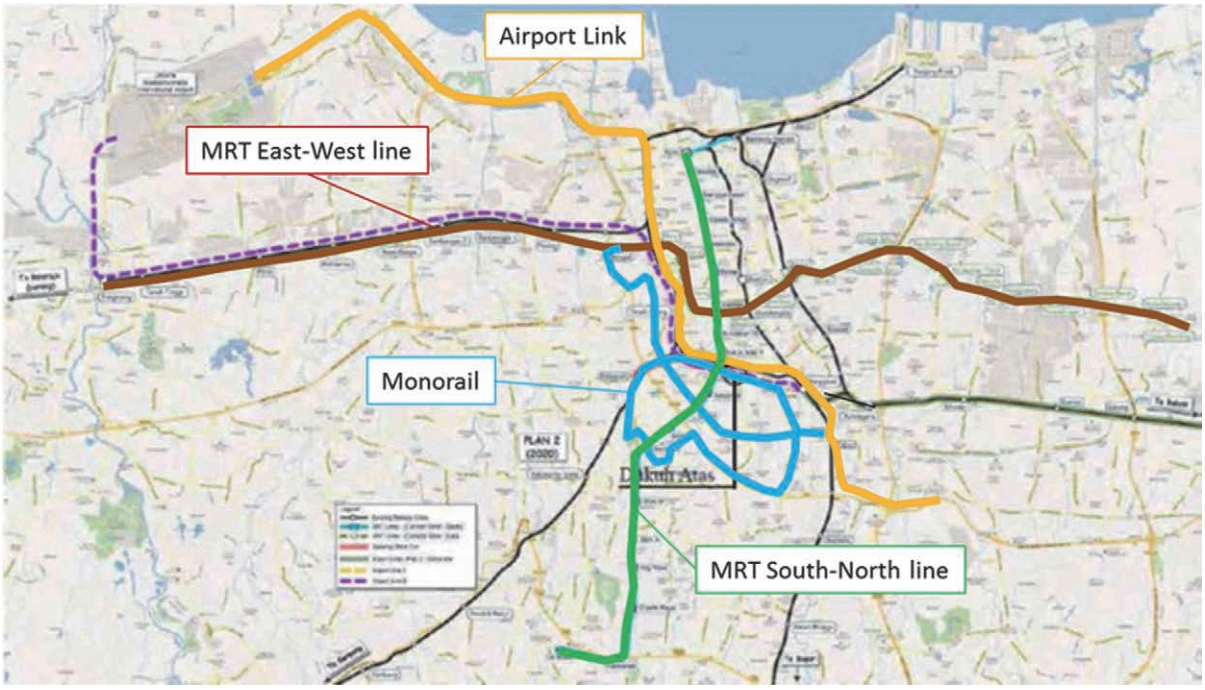
(2) Railway Transportation Network

PT KAI operates the largest commuter rail network in the JABODETABEK region which extends over 150 km in the region including the circular rail system in central Jakarta. This network connects Bekasi, Depok, Bogor, and south and west Tangerang.

A monorail project has also been initiated, and the construction is underway. Now another monorail network development is being considered under the new development scheme from central Jakarta to Cawang then to Bekasi. It is also said that an airport connection may be considered to connect with this monorail system. Government initiative is now necessary to identify the most appropriate system and alignment for the best network development in Jakarta.

As one of other rail systems in Jakarta, MRT (mass rapid transit) is under construction with Japanese funding, and this runs under Sudirman Road, the main spine of the city between north and south Jakarta. This seems to promise a network of rail systems.

There are two more east-west MRT networks considered by DKI Jakarta. These will be coming after the double-double track upgrading in the area. Figure 3.2-2 shows the major transit network of railway systems.



Source: DKI Jakarta - Jakarta Spatial Plan in 2030

Figure 3.2-2 Jakarta Urban Transportation Network by Rail System

(3) Water Transportation Network

Tanjung Priok Port is the largest operating international port in Jakarta. However, the road network connecting the port creates a bottleneck situation in Jakarta central and port districts, because the capacity of the port area is limited compared to the increasing freight truck transportation demand in proportion as the Indonesian economic growth. Due to the overloaded situation around the port district and road network, development plans including West Java Province Spatial Development Plan set out new development of an international port in Cilamaya on the coast in Karawang to reduce the concentration of trading activities in Tanjung Priok Port. However, such development will take years to complete the transportation network with roads and freight railway between the seaport and the targeted industrial activity areas, so the congestion at Tanjung Priok Port may remain for years.

(4) Air Transportation Network

The existing international airport at Cengkareng (Soekarno Hatta International Airport) is designed for 100 million passengers per year capacity, and the load today is about 60% of the designed capacity. The Ministry of Transport calculated that it will take another 15 years to reach full capacity, and the new runway development plan is preparing for land acquisition. Within a few years, though, a third runway will be constructed as planned, and part of domestic operations will be transferred to a new airport which may be constructed in Karawang Regency in the future. When the domestic airport is operational in Karawang, Halim Airport in Cawang will become a full military service facility as also projected in the government plan. Thus, Soekarno Hatta International Airport will bring a large number of tourists and business persons from all over the world to this region in the future.

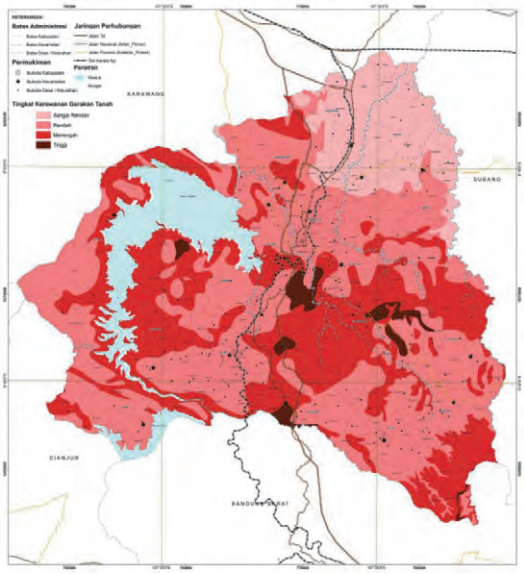
3.2.2 Development Plan of West Java Province

In its development plan, West Java Province focuses on the West Java Economic Corridor which connects the major metropolitan areas of BODEBEK KARPUR, Greater BANDUNG and Greater CIREBON. BODEBEK KARPUR Metropolitan is considered for main economic and industrial activities and development to be continuously expanded as Jakarta Metropolitan Area. Industrial activities of the many industrial parks adjacent to Jakarta city should lead economic growth in the region, and its development will stretch along the toll road (highway) where the project alignment also will run.

The industrial development continues to Karawang Regency and Purwakarta Regency, and production changes to textiles around the city of Purwakarta. Greater BANDUNG Metropolitan continues the industrial role, and new urban development is projected in the Gedebage area for commercial, services and residential development as well as the textile industry. Bandung development will also seek more business opportunities in attracting tourism (including eco-tourism) to the region.

Greater CIREBON Metropolitan is currently not well connected with the other major economic and/or development centers, and extension of the Jakarta - Cikampek road is underway. In addition to the road development, West Java Province is now constructing Kertajati International Airport as projected in the national development plan in Majalengka Regency. When the extension of the highway and the international airport are completed and operational, Greater CIREBON Metropolitan area will be developed dramatically as an extended industrial and economic core in the east part of West Java.

In addition, Purwakarta region is in the mountains and there are some disaster-related areas defined in the regional development plan. As there have been some landslides in the region due to heavy rains, for instance, major damage to the area along the conventional railway has occurred. Protective measures and/or careful position setting for the project alignment design should be made from this point of view. Figure 3.2-3 illustrates the disaster-designated areas of the Purwakarta region as an example.



Note: Dark-red areas are considered to be at high risk of soil disaster.

Source: BAPPEDA, Purwakarta Regency

Figure 3.2-3 Disaster Map (Landslide) in Purwakarta Regency

(1) Development Status of Urban Transportation Network in Bekasi Area

As described above, there are a few road network developments planned in the area, the Second Outer Ring Road and the Second Cikampek Toll Road. Since these are part of JABODETABEKPUNJUR region road development for industrial park expansion, the Second Outer Ring Road will be constructed first. The Second Cikampek Toll Road project may take more time in view of the alternative public transportation systems such as the monorail.

The stretch of existing railway between Jakarta and Karawang is projected for double-double track upgrading so more capacity in the future is promised for both passenger and freight transport in the area, but multimodal transit networking in the urban area including the upgraded line also needs to be well designed for effective functioning of railway operation.

There is another project for a monorail system in the Bekasi area, and the system will connect Cawang District in Jakarta (Halim Airport area) with Bekasi city along the Jakarta – Cikampek toll road.

(2) Development Status of Urban Transport Network in Cikarang Area

The Second Cikampek Toll Road and Second Outer Ring Road development plan in this area will have a positive impact on the expansion of the industrial parks in Cikarang. However, the implementation schedule is not clear for these road constructions.

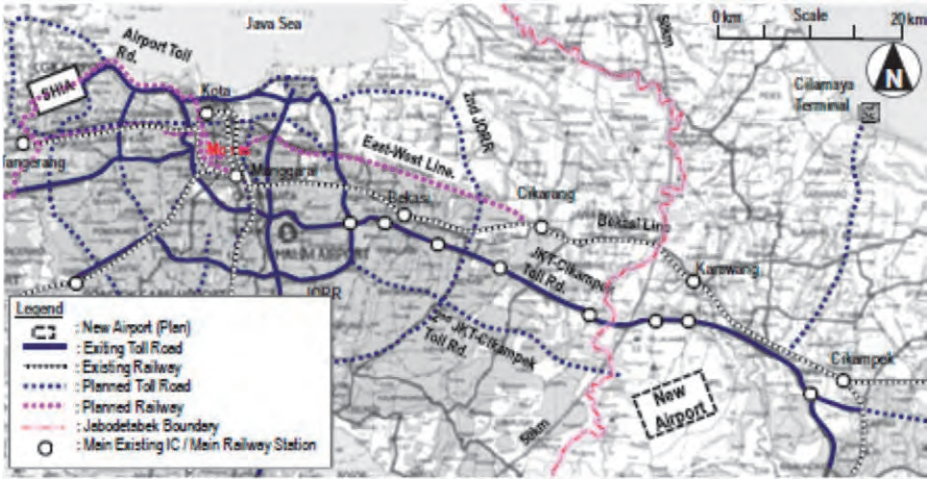
In addition, the double-double track upgrading of the existing railway is one of the priority projects of West Java Province, and this will bring more capacity and more frequent services. However, connectivity to the industrial parks south of the toll road needs to be well developed, and extension of the railway track from Cikarang Station to the industrial park district as well as the regency office complex will make that project more effective.

There is the Japanese (METI) studied monorail network project (currently called APM, the Automatic Passenger Mover project), and this may run through the existing major industrial parks south of the toll road to enable easy access between the industrial parks, residential areas as well as the existing railway station and government complex. This program has been discussed among the industrial park operators, and currently the Cikarang Regency government has given approval for the next feasibility study of the APM project.

(3) Development Status of Urban Transport Network in Karawang Area

There is no particular development for transportation planned in the city area except the possible double-double track upgrading of the railway. The newly projected international port development site in Cilamaya is to strengthen the potential product and goods export/import from the industrial parks in the region. The Cilamaya Port development is one of the national plans to transfer some of the port functions from Tanjung Priok Port in Jakarta. The Port is located about 30 km from the industrial park development site and this freight transport network development will greatly increase the production and the products of the region.

Moreover in this area, there is the prospect of Karawang Airport development in the future. However, its realization is still nowhere in sight, and the central government is preparing to upgrade the existing airport in Jakarta (Soekarno Hatta International Airport) and plans to construct a third runway to increase its capacity. Figure 3.2-4 below indicates the possible location of the proposed Karawang Airport.



Source: JICA Study Report –Greater Jakarta Region Airport Development Project

Figure 3.2-4 Proposed Location of Karawang Airport

(4) Development Status of Urban Transportation in Bandung Area

The current city transportation network and system are quite poor with no municipal-level initiatives. Although it is an international tourist destination from Asian countries, the transportation facilities at the airport are also very limited. The existing railway station is located in a center area and convenient area of the city, but the transit service from the station is not well structured to feed. Only

privately-operated small bus (Angkot) and taxi services exist, so the essential service to cover the entire city area of the railway is poor. Other than the existing railway service, the Ministry of Transport and the city of Bandung are jointly planning a commuter rail system in the region connecting Padalarang to Bandung, Gedebage then to Cicalengka, stretching for about 42 km. This MRT commuter rail system has been studied by a French consultant and has a fully elevated structure in the city area. The city as well as West Java Province are also planning to develop a city monorail network over a large Bandung city area including Gedebage.

The road network in the region will also be strengthened with several new north-south links which will lead to more residential development in the southern part of Bandung Regency. Airport development in West Java Province focuses on Kertajati international airport development where the runway is under construction. Once the airport is completed for operation, this will be another international and domestic hub of Java Island, and Husein Sastranegara international airport (Bandung Airport) will transfer its entire commercial operations and activities and become a military-based airport in the region.

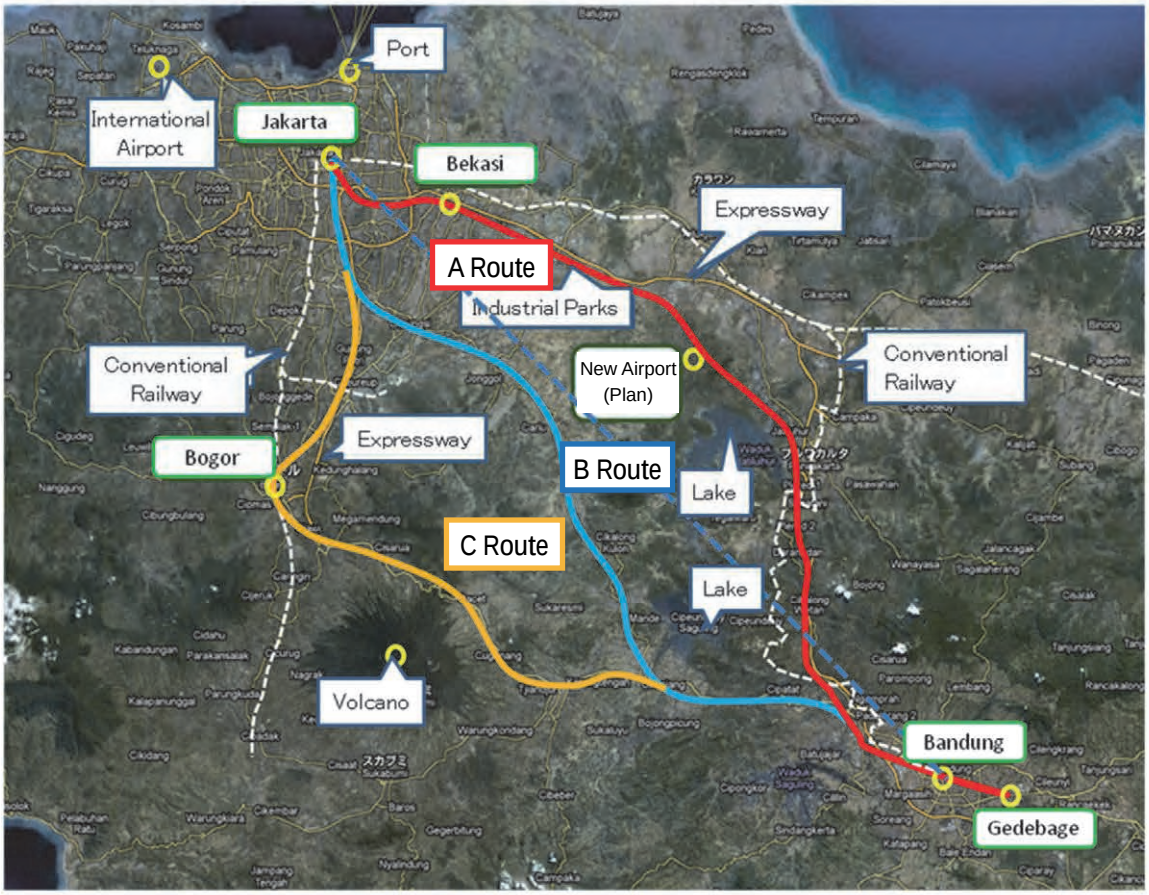
Chapter 4

Analysis of Route Alignment and Stations Location

Chapter 4 Analysis of Route Alignment and Stations Location

4.1 Setting a Basic Route

Three routes are considered to set a basic HSR route from Jakarta to Bandung as shown in Figure 4.1-1. The first one is a northern route that starts at Jakarta and passes through Bekasi, Cikarang and Karawang, then reaches Bandung (Route A). The second one is a southern route that connects Jakarta and Bandung via Bogor (Route C), and the third one is a route that goes in the middle of those two routes (Route B).



Source: JICA Study Team

Figure 4.1-1 Candidates for Basic HSR Route

These routes are evaluated from the aspects of route elements, ridership, bottleneck of construction, operation and cost as shown in Table 4.1-1. Route A has advantage in ridership because it passes the existing urbanized areas such as Bekasi and Cikarang. Moreover, Route A is also the most economical in the construction cost and has few bottlenecks of construction. Therefore Route A is concluded as most suitable regardless of a problem in land acquisition compared to the other routes.

Table 4.1-1 Evaluation of Basic HSR Route

			Route A: North Route			Route B: Central Route			Route C: South Route		
Outline			Route avoiding mountain area and dam reservoir via northern part			Route avoiding mountain area and dam reservoir via southern part			Route avoiding volcanic zone via Bogor		
Length	Route Length		130.0 km	(1.00)	○	130.0 km	(1.00)	○	158.0 km	(1.22)	×
	Time		33.4 minutes			33.4 minutes			40.6 minutes		
	Length by Structure	Earth	30.0 km	(23 %)	−	30.0 km	(23 %)	−	0.0 km	(0 %)	−
		Viaduct	55.0 km	(42 %)	−	35.0 km	(27 %)	−	35.0 km	(22 %)	−
		Tunnel	45.0 km	(35 %)	−	65.0 km	(50 %)	−	123.0 km	(78 %)	−
Ridership	Intermediate Town Area		Much ridership from Bekasi, Cikarang and New Karawang Airport		○	No prospective ridership in intermediate town area because of no big cities along route		×	Some ridership from Depok and Bogor		△
	Connection to Other Measures of Transportation		Connection to highway and the planned new airport		○	No connection to the other means of transportation		×	Connection to highway and conventional railways		○
Bottleneck of Construction	Land Acquisition		Coordination with built-up area and industrial parks		×	Less residence in suburb area		△	Less land acquisition due to long tunnel sections		○
	Difficulty in Construction Works		Short tunnel length and lower tunnel ratio		○	Tunnel with 20km length and long construction period required		△	High tunnel ratio and risk of prolonged construction period		×
	Material Conveyance		City area along the route and relatively easy to convey materials		○	No city area along the route and difficult to convey materials		×	No city area along the route and relatively difficult to convey materials		△
Operation	Future Plan		Possible to diverge to Surabaya on the way		○	Little area possible to be developed		△	No area possible to be developed because of many tunnel sections		×
	Disaster Risk		Land subsidence and land slide		△	Land slide and much time required for rescue		△	Land slide and much time required for rescue		△
Cost	Civil Works		23.3 Trillion IDR (1.00)		○	23.6 Trillion IDR (1.01)		○	33.8 Trillion IDR (1.45)		×
General Evaluation			7.5 points (○7, △1, ×1)			4.0 points (○2, △4, ×3)			3.5 points (○2, △3, ×4)		
			Possibility of extension in the future and conformity with relevant plans			Less resettlement and less ridership			Not high speed operation and high construction cost		

Note: ○ Good (1 point) △Fair (0.5 point) × Bad (0 point)

Source: JICA Study Team

4.2 Evaluation of the Candidate HSR Jakarta Station Sites

4.2.1 Evaluation Method

Evaluation of the candidate HSR Jakarta station sites was conducted in accordance with the following 3 steps. First, 8 candidate sites were chosen from major commercial and business districts in Jakarta and through the discussion with related organizations. Then, in the primary selection, 6 candidate sites for the HSR station were shortlisted under the following conditions:

1. Existence of open space for construction
2. Future scalability when the number of passengers increase
3. Exclusion of hazardous areas at risk of natural disaster.

In the secondary selection, the most appropriate site in Jakarta was selected by evaluating the candidate sites from technical, economic and environmental aspects.

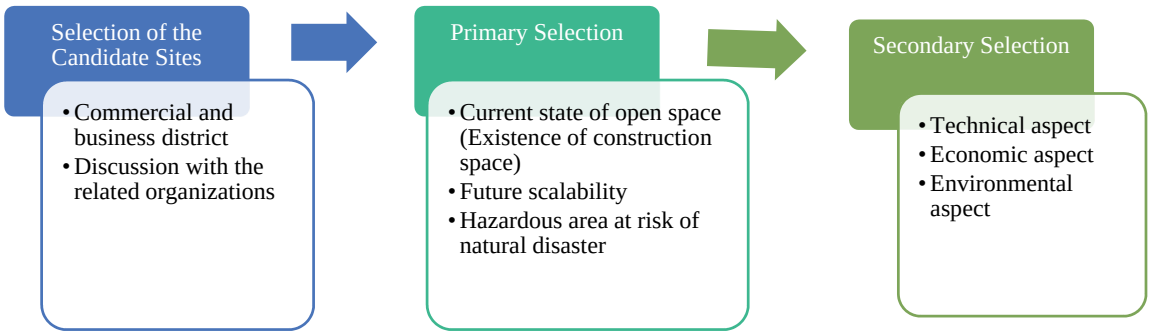
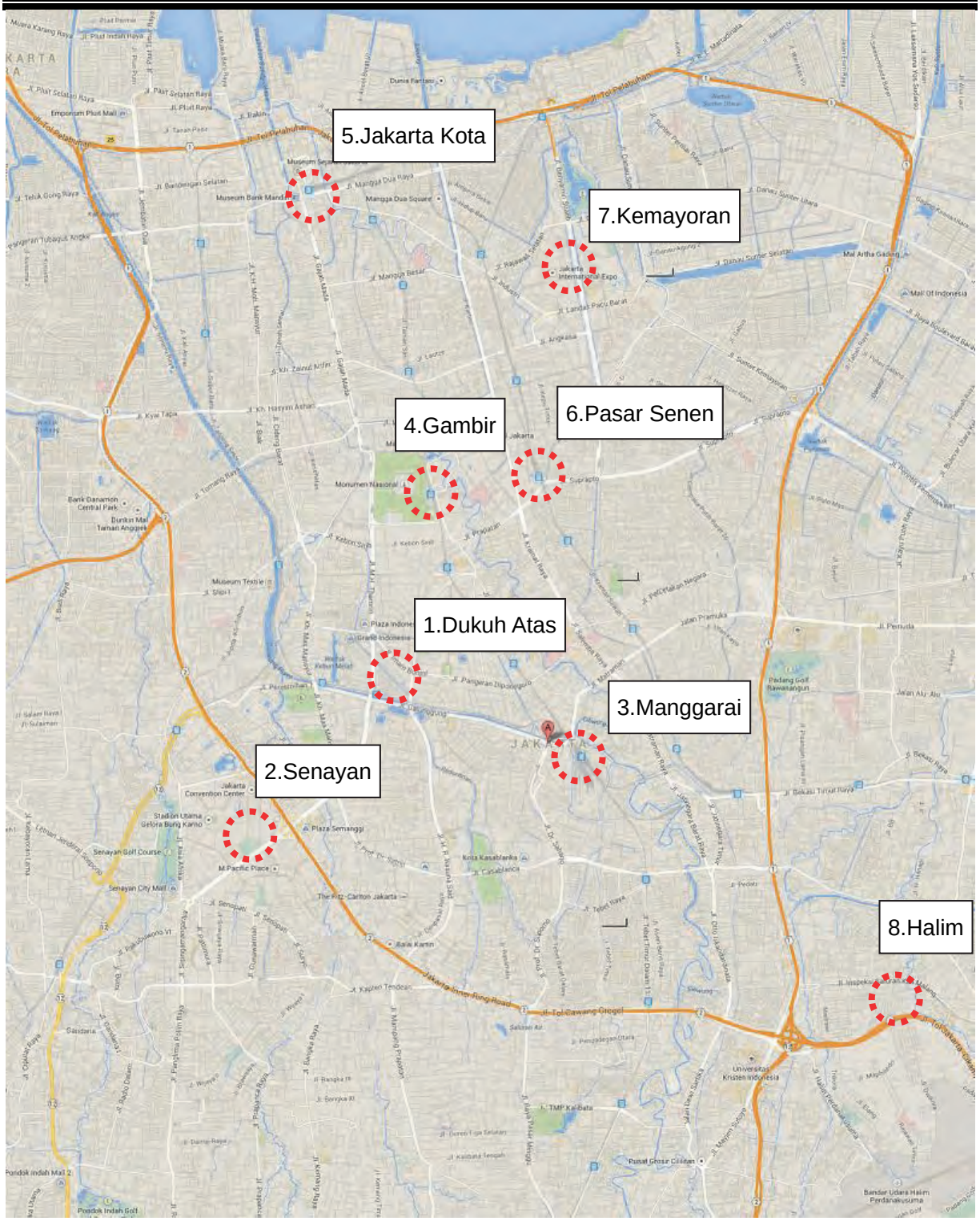


Figure 4.2-1 Evaluation Procedure for Jakarta Station Site

4.2.2 Selection of Candidate Sites

Since the candidate HSR Jakarta station sites can be a symbol of Jakarta, it is recommendable to develop the station at a site where it can represent a stately entrance to Jakarta. Moreover, from the viewpoint of convenience, the location is required to be adjacent to the commercial and business district where high ridership will be expected. With the above conditions and through discussions with the related organizations, the following 8 sites were selected as candidate sites for Jakarta Station. (See Figure 4.2-2)

1.Dukuh Atas	2.Senayan	3.Manggarai	4.Gambir
5.Jakarta Kota	6.Pasar Senen	7.Kemayoran	8.Halim



Source: JICA Study Team

Figure 4.2-2 Candidate Sites of Jakarta Station

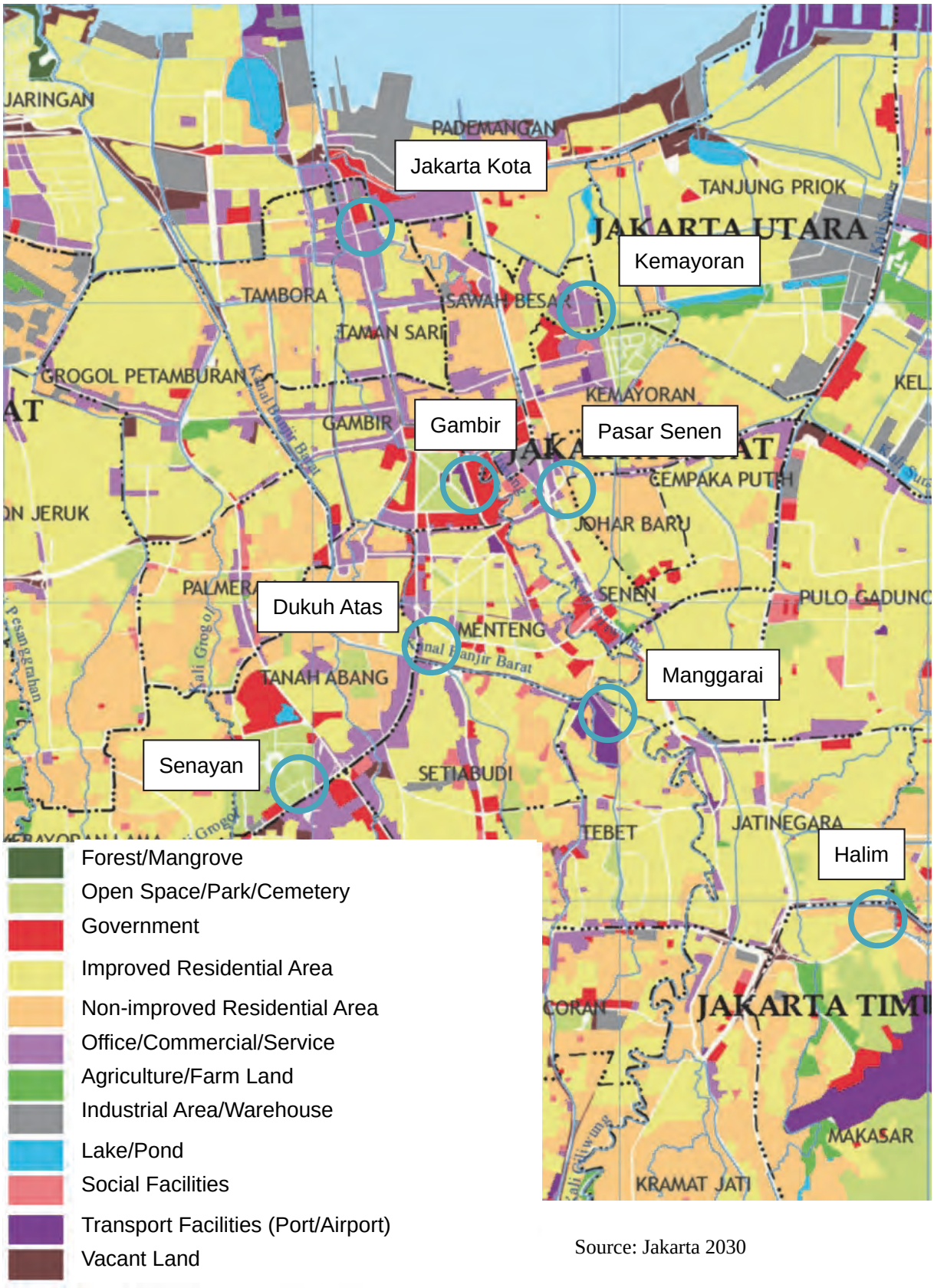
4.2.3 Primary Selection

In the primary selection, the 3 criteria shown in the previous section were evaluated in relation to each candidate site. As a result, Pasar Senen and Jakarta Kota were excluded because these sites have been designated as hazardous areas at risk of natural disaster in the Jakarta spatial plan (Jakarta 2030), and the selection was narrowed down to six sites.

Table4.2-1 Result of Primary Selection

Candidate Sites	Construction Space (Presence of open areas)	Future Scalability	Natural Disaster Risk	Evaluation
1. Dukuh Atas	Current Status: Canal and green area along the canal Area: approx. 2.5 ha	In Dukuh Atas area, a development master plan is prepared for a target site of approximately 6.5 ha that is sandwiched between the canal and Thamrin Street.	Low	
2. Senayan	Current Status: Parking area, plaza, golf driving range and baseball stadium Area: approx. 21 ha	There is a sufficient available land that can be fully utilized.	Very low	
3. Manggarai	Current Status: Terminal yard of conventional line Area: approx. 19 ha	There is a relocation plan of the terminal yard, so sufficient land can be secured if adjustable.	Low	
4. Gambir	Current Status: Basketball court and plaza Area: approx. 10 ha	It is a part of the MONAS Square, so sufficient land can be secured if adjustable.	Very low	
5. Jakarta Kota	Current Status: No open space (densely built-up area)	There is a cargo yard at a separate place, but connection to the existing station is difficult.	Very high	×
6. Pasar Senen	Current Status: No open space (densely built-up area)	Some space can be secured by elevation of the existing railroad, but it is not sufficient.	Very high	×
7. Kemayoran	Current Status: Park Area: approx. 8 ha	Extension is possible using some of the park land.	Low	
8. Halim	Current Status: Green land, but the shape is inadequate. Area: approx. 7 ha	Extension is difficult due to dense residential area.	Very low	
Remarks	See Figure 4.2-3	See Figure 4.2-3	See Figure 4.2-4	

Source: JICA Study Team



Source: Jakarta 2030

Figure 4.2-3 Current Land Use

1. Dukuh Atas

2. Senayan

3. Manggarai

4. Gambir

5. Jakarta Kota

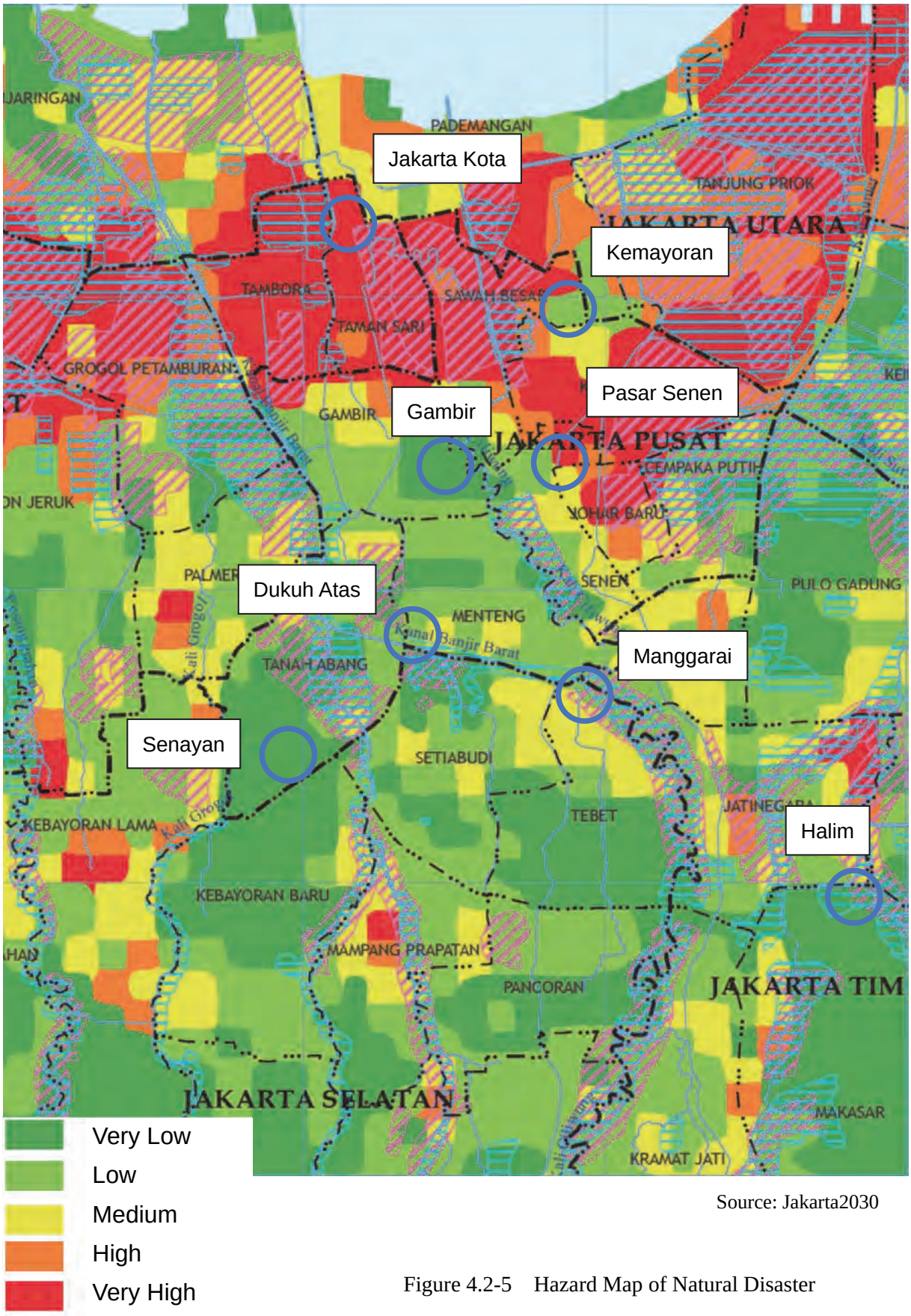
6. Pasar Senen

7. Kemayoran

8. Halim

Source: JICA Study Team

Figure 4.2-4 Construction Space



Source: Jakarta2030

Figure 4.2-5 Hazard Map of Natural Disaster

4.2.4 Secondary Selection

(1) Set Evaluation Criteria

6 stations selected in the primary selection were evaluated in the secondary evaluation. To conduct the secondary evaluation, detailed evaluation items from the viewpoint of technical, economic and environmental aspects were set as follows:

Aspect	Evaluation Item	Evaluation Criteria
Technical	Access road	Proximity to highways Accessibility to arterial roads
	Connection to other means of transportation	Connection to conventional lines Connection to BRT Connection to MRT Connection to Airport Link Connection to other planned lines
Economic	Ridership	Proximity to Golden Triangle Density of "To Work" trip Conversion rate from cars
	Construction Cost	Construction cost of civil works Area of land acquisition
Environmental	Construction space	Area of open space
	Possibility of expansion	Ease of development

(2) Comparison, examination and selection of alternatives for Jakarta Station

1) Technical Aspect

1)-1. Access Road

Accessibility to highway's interchanges and arterial roads is evaluated. Only Plan B Senayan has accessibility to a highway; in the future however, Plan A, C, E and F will be connected to highway's interchanges (See Figure 4.2-6). While Plan A, B and E have accessibility to arterial roads (See Figure 4.2-7). The result of the evaluation is shown in Table 4.2-2.

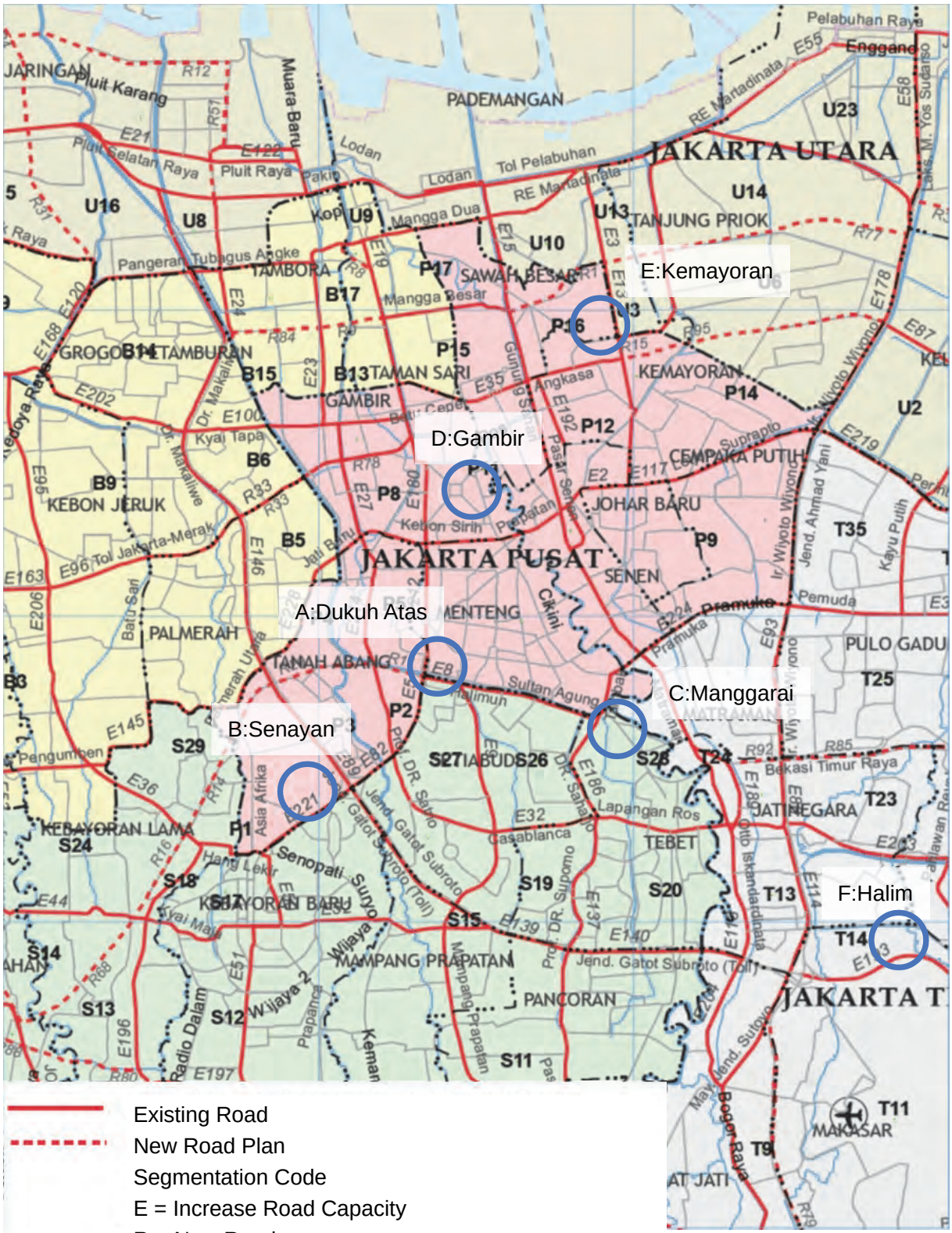
Table 4.2-2 Evaluation of Access Road

	Plan A: Dukuh Atas	Plan B: Senayan	Plan C: Manggarai	Plan D: Gambir	Plan E: Kemayoran	Plan F: Halim
Proximity to Highways (Present)	×	○ Intra-Urban Highway	×	×	×	×
Proximity to Highways (Plan)	○ New Intra-Urban Highway	×	○ New Intra-Urban Highway	×	○ New Intra-Urban Highway	○ New Highway
Accessibility to Arterial Roads	○ Jl. MH Thamrin	○ Jl. Jend. Sudirman	×	×	○ Jl. Benyamin Sueb	×

Note: ○ Good △Fair × Bad
Source: JICA Study Team

Source: Jakarta 2030

Figure 4.2-6 Highway Network



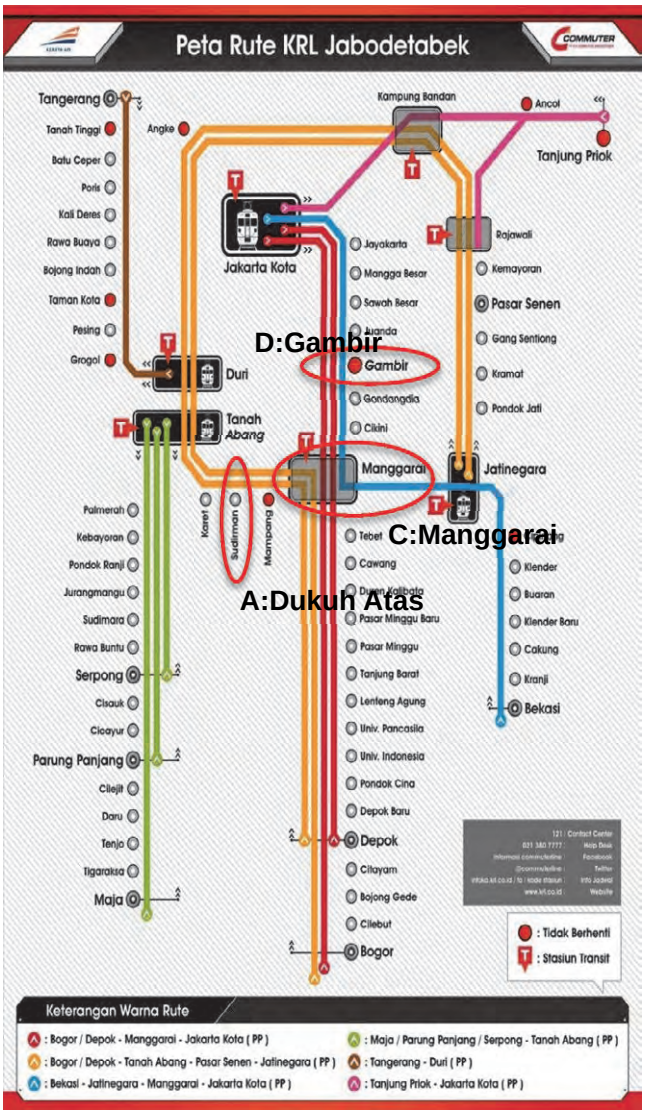
Source: Jakarta2030

Figure 4.2-7 Arterial Road Network

1)-2. Connection to Other Means of Transportation

Since easy access from other transportation to the HSR terminal is very important factor, connection to other means of transportation, such as conventional lines, MRT, BRT and other planned lines, is evaluated.

●Conventional Lines and the Candidate HSR Jakarta Station Sites



Source: PT.KAI

Figure4.2-8 Conventional Lines and the Candidate HSR Jakarta Station Sites

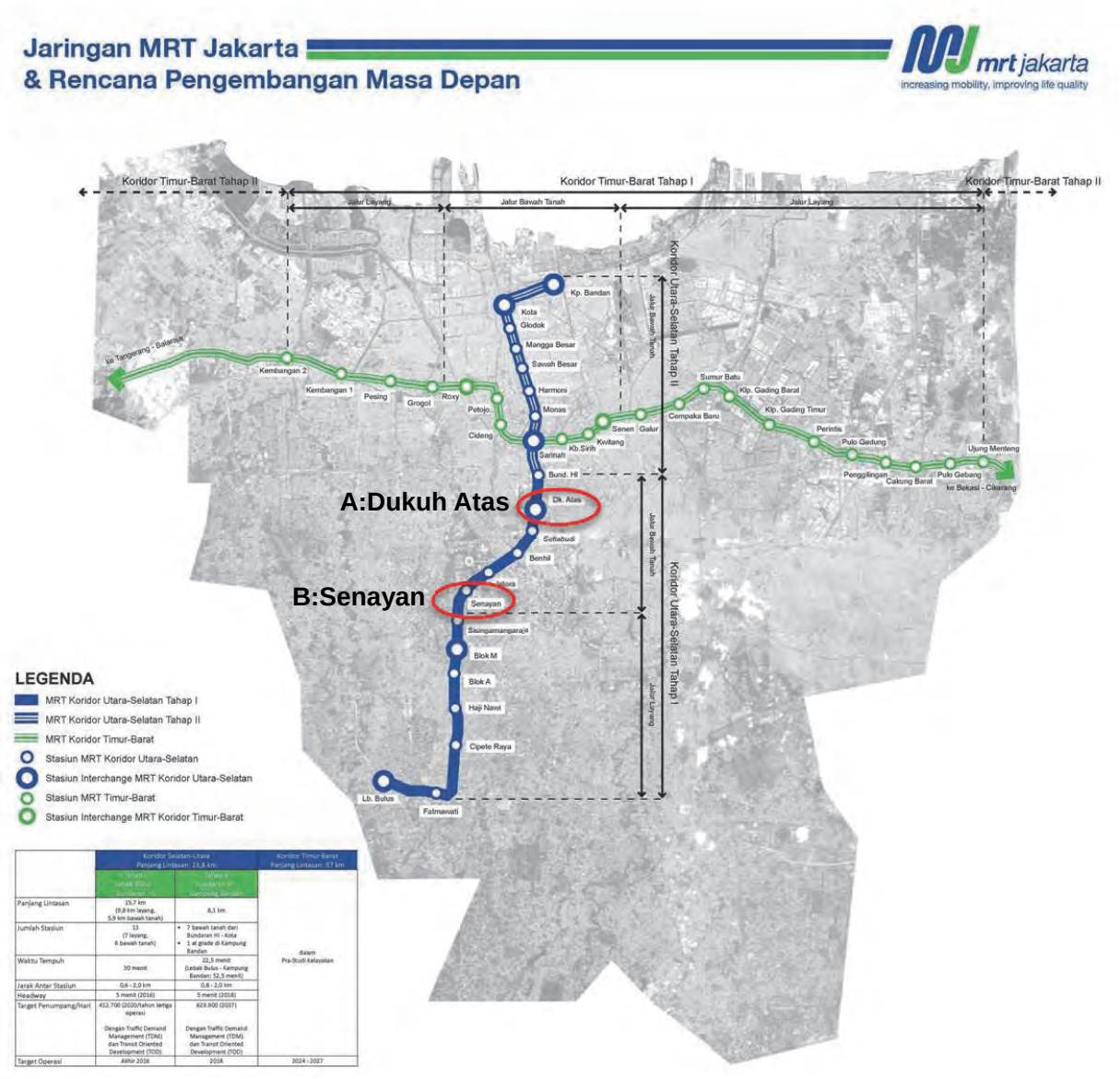
Figure 4.2-8 shows location of conventional line stations and the candidate HSR Jakarta station sites. Plans A, C and D have accessibility to the conventional lines. Table 4.2-3 shows the number of conventional lines each plan has connection to.

Table4.2-3 Connection to Conventional Lines

	Plan A: Dukuh Atas	Plan B: Senayan	Plan C: Manggarai	Plan D: Gambir	Plan E: Kemayoran	Plan F: Halim
Connection to Conventional Lines	1 line	No line	3 lines	1 line	No line	No line

Source: JICA Study Team

●MRT Lines and the Candidate HSR Jakarta Station Sites



Source: PT MRT Jakarta

Figure 4.2-9 MRT Lines and the Candidate HSR Jakarta Station Sites

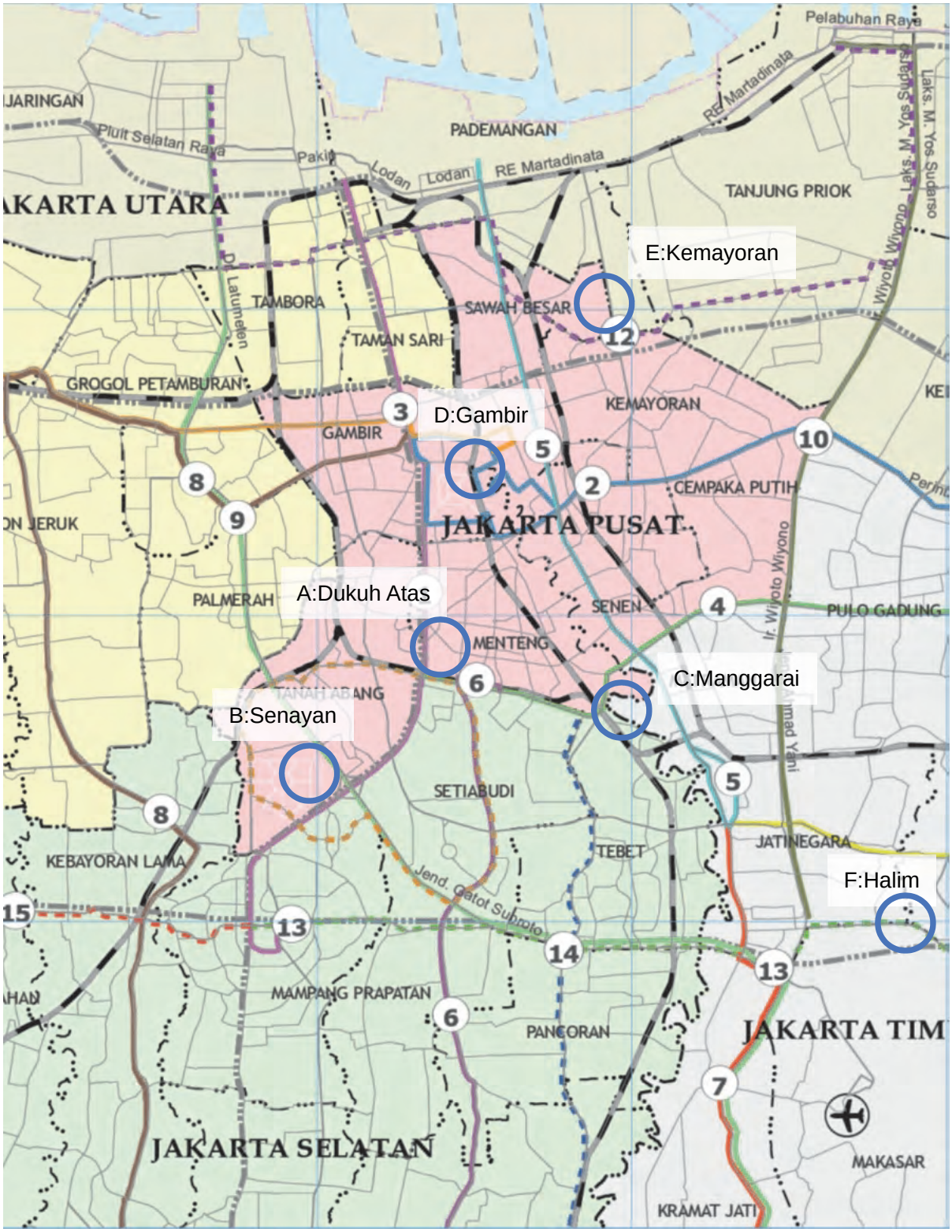
Figure 4.2-9 shows the MRT lines and the candidate HSR Jakarta station sites. Plan A, Dukuh Atas, and Plan B, Senayan, have accessibility to MRT. Table 4.2-4 shows the number of MRT lines each plan has connection to.

Table 4.2-4 Connection to the MRT Lines

	Plan A: Dukuh Atas	Plan B: Senayan	Plan C: Manggarai	Plan D: Gambir	Plan E: Kemayoran	Plan F: Halim
Connection to MRT Lines	1 line	1 line	No line	No line	No line	No line

Source: JICA Study Team

●**BRT (Transjakarta) Lines and the Candidate HSR Jakarta Station Sites**



Source: Jakarta 2030

Figure4.2-10 BRT Lines and the Candidate HSR Jakarta Station Sites

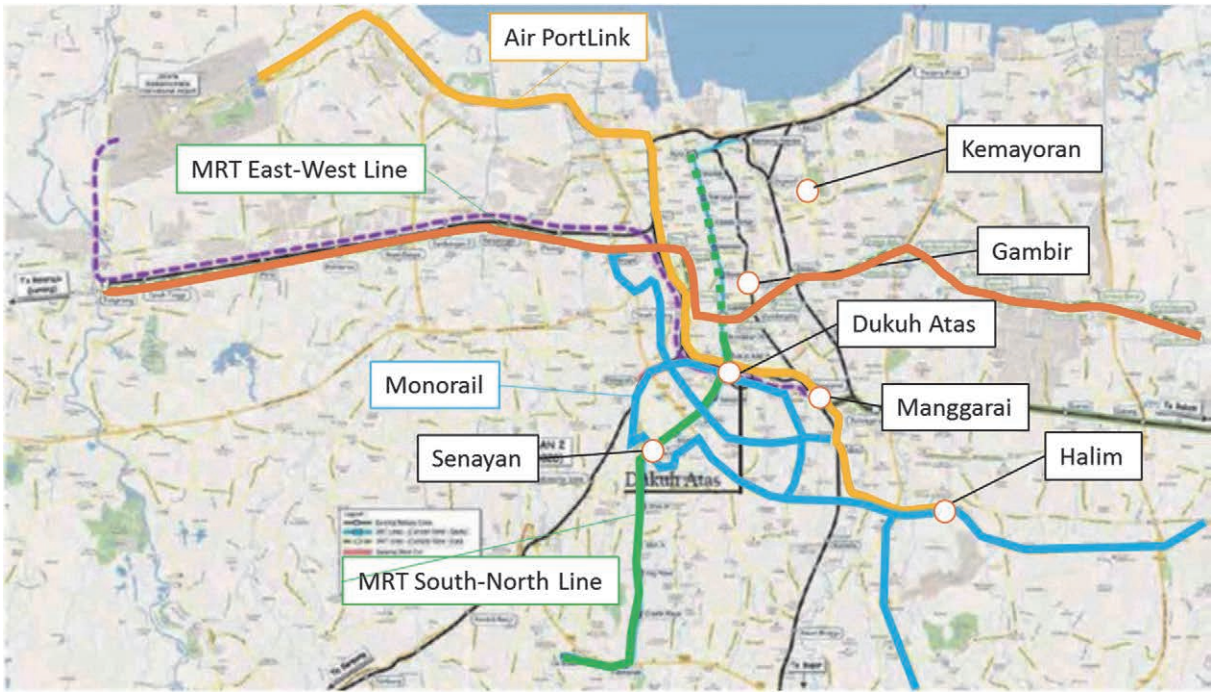
Figure 4.2-10 shows the BRT lines and the candidate HSR Jakarta station sites. All plans excluding Plan F, Halim, have connection to the BRT lines. Table 4.2-5 shows the number of BRT lines each plan has connection to. In addition, BRT No.12 and 14 are planned lines.

Table 4.2-5 Connection to the BRT Lines

	Plan A: Dukuh Atas	Plan B: Senayan	Plan C: Manggarai	Plan D: Gambir	Plan E: Kemayoran	Plan F: Halim
Connection to BRT Lines (Route No.)	2 lines (1, 4)	1 line (1)	1 line (14)	1 line (2)	1 line (12)	No line

Source: JICA Study Team

●Planned Lines and the Candidate HSR Jakarta Station Sites



Source: JICA Study Team

Figure 4.2-11 Planned Lines and the Candidate HSR Station Sites

Figure 4.2-11 shows the planned lines and the candidate HSR Jakarta station sites. All plans excluding Plan D Gambir and Plan E Kemayoran have connection to the planned lines. Table 4.2-6 shows the number of planned lines each plan has connection to.

Table 4.2-6 Connection to the Planned Lines

	Plan A: Dukuh Atas	Plan B: Senayan	Plan C: Manggarai	Plan D: Gambir	Plan E: Kemayoran	Plan F: Halim
Connection to the Planned Lines	Monorail Airport Link	Monorail	Airport Link	No Connection	No Connection	Monorail Airport Link

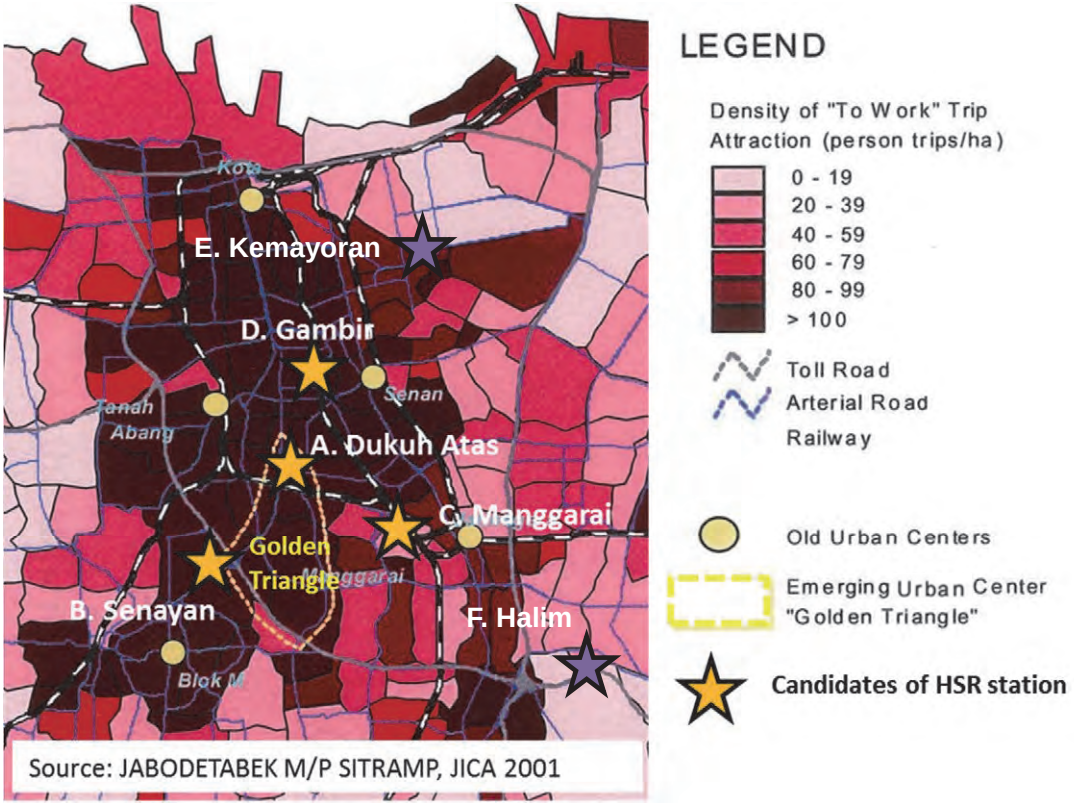
Source: JICA Study Team

2) Economic Aspect

2)-1. Ridership

●Proximity to Golden Triangle and Density of "To Work" trip

It is important for the HSR terminal to be located in the commercial and business district of Jakarta from the viewpoint of demand creation, and all candidate sites are placed in the central area of Jakarta. Moreover, the HSR terminal is to become one of Jakarta's landmarks and it is desirable to be adjacent to the Emerging Urban Center "Golden Triangle" which is defined as a strategic central area in Jakarta 2030. Table 4.2-7 shows the economic evaluation criteria results of each plan.



Source: JICA Study Team

Figure 4.2-12 Candidate HSR Jakarta Station Sites and Person Trips

Table4.2-7 Evaluation from the Economic Aspect

	Plan A: Dukuh Atas	Plan B: Senayan	Plan C: Manggarai	Plan D: Gambir	Plan E: Kemayoran	Plan F: Halim
Golden Triangle	Inside	Inside	Outside	Outside	Outside	Outside
Person Trips	>100 PT/ha	>100 PT/ha	20-60PT/ha	>100 PT/ha	20-100PT/ha	0-40PT/ha

Source: JICA Study Team

●Conversion Rate from Cars (Golden Triangle – Bandung OD Pair)

The conversion rates to HSR from cars are estimated for each plan based on the travel time and cost of HSR and cars between the Golden Triangle and Bandung. As a result, the conversion rates of Plan A, Dukuh Atas, and Plan B, Senayan, are the highest. Figure 4.2-13 shows the conversion rates of other plans in the case where the conversion rates of Plan A and B are set at 1.0. The farther the distance from the Golden Triangle, the lower the conversion rate, and Plan F, Halim, located the farthest shows the conversion rate lower by about 30%.

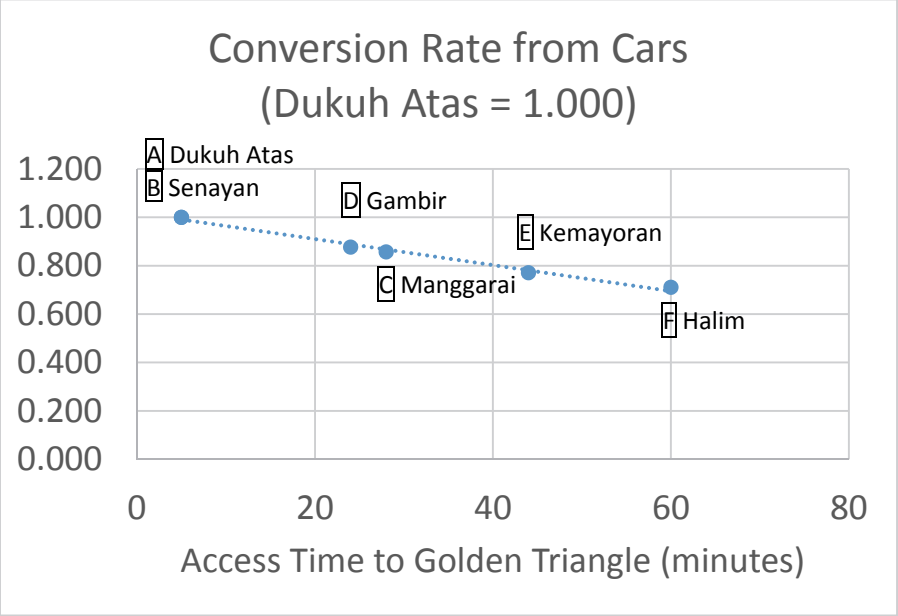


Figure 4.2-13 Conversion Rate from Cars (Golden Triangle – Bandung OD Pair)

2)-2. Construction Cost and Area of Land Acquisition

The terminal station will be located at the basement level for all plans and there may be little difference in the station construction cost by plan. Here, the construction cost of cut-and-cover for the station and civil works for route construction, and the area of land acquisition were estimated based on the supposed routes for each plan in Jakarta. Figure 4.2-14 shows these routes.. Two routes are supposed in Jakarta. The first one is a route over the Banjir Timur Canal and the other is a route along the Jakarta-Cikampek Toll Road. Plan B, Senayan, and Plan F, Halim, are supposed to pass by the toll road, and others plans are supposed to go over the canal. Table 4.2-8 shows the construction cost of each plan and the area of land acquisition. The costs of Plan B, Senayan, and Plan E, Kemayoran, are relatively expensive, while the areas of land acquisition of Plan B, Senayan, and Plan F, Halim, are relatively large.

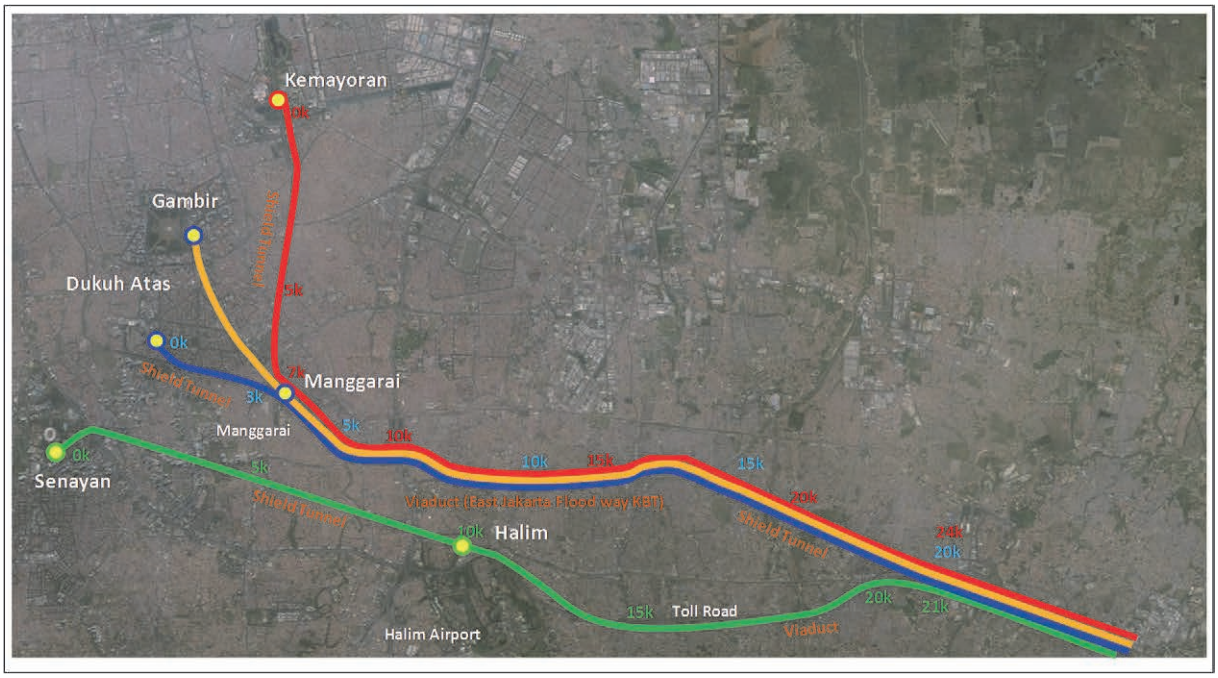


Figure 4.2-14 Route Plans from Each Candidate Station Site

Table 4.2-8 Construction Cost and Area of Land Acquisition

		Plan A: Dukuh Atas	Plan B: Senayan	Plan C: Manggarai	Plan D: Gambir	Plan E: Kemayoran	Plan F: Halim
Route Length (km)	Earth	3.0	1.0	3.0	3.0	3.0	1.0
	Viaduct	5.5	6.0	5.5	5.5	5.5	6.0
	Tunnel	11.6	14.7	8.3	12.7	15.5	4.9
	Total	20.1	21.7	16.8	21.2	24.0	11.9
Land Acquisition (ha)*1		4.8	11.2	4.8	4.8	4.8	14.9
Construction Cost (billion IDR)*2		8,660	10,106	8,277	9,163	10,443	6,751

Note) *1: The areas of land acquisition are supposed 2.5 ha at Senayan and Kemayoran, while 3.7 ha at Manggarai and Halim. Manggarai and Halim need more land for the station area considering future extension to the central area of Jakarta. Additionally no land acquisition occurs except in Plan F, Halim, because other plans are located on public land.

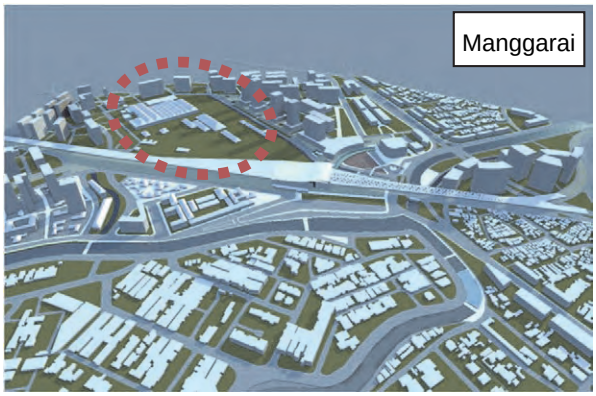
*2: Total cost of cut-and-cover work for the underground station and route construction inside Jakarta

3) Environmental Aspect (Open space and possibility of expansion)

Current condition of open space of each candidate route is shown in above-mentioned Table 4.2-1, and all sites except Plan C, Manggarai, have some open space like a park, green space or sports ground. However, Plan A, Dukuh Atas, has a slightly small space, and Plan F, Halim, has an inadequate shape for HSR station.

With regard to possibility of future expansion, Plan B, Senayan, Plan D, Gambir, and Plan E, Kemayoran, have sufficient available land. Plan A, Dukuh Atas, and Plan C, Manggarai, have development plans around the sites and it is possible to expand those areas (See Figure 4.2-15). Only Plan F, Halim, has difficulty to expand since the periphery of the site is a dense residential area.

Source: Jakarta Integrated Urban Transport Hub Development, Mar. 2013



Source: Draft Master Plan for Manggarai Transit Oriented Development

Figure 4.2-15 Future Development Plans

Table 4.2-9 Evaluation from Environmental Aspect

	Plan A: Dukuh Atas	Plan B: Senayan	Plan C: Manggarai	Plan D: Gambir	Plan E: Kemayoran	Plan F: Halim
Area and Space Condition	About 2.5 ha. Slightly small.	About 21 ha. Necessary to relocate driving range or baseball ground.	About 19 ha. Premises to relocate the existing terminal yard.	About 10 ha. Sufficient land can be secured, but adjustment necessary with park use.	About 8 ha. Sufficient land can be secured, but adjustment necessary with the existing facility (Jakarta International EXPO).	About 7 ha. There is an open space, but its shape does not fit HSR station.
Possibility of Expansion	A development plan is prepared.	Existence of sufficient available land.	Existence of terminal yard relocation plan.	Existence of sufficient available land.	Existence of sufficient available land.	Expansion is difficult.

Source: JICA Study Team

4) Overall Evaluation

Table 4.2-10 shows the overall evaluation results. Each evaluation item is classified into 3 score levels: 1.0 (Good), 0.5 (Fair) or 0.0 (Bad). Thereafter the overall evaluation is done by total score. As a result, Plan A, Dukuh Atas, is concluded as the place most suitable for the HSR Jakarta terminal station followed by Plan B, Senayan.

Table 4.2-10 Overall Evaluation of the Candidate HSR Jakarta Station Sites

	Plan A: Dukuh Atas		Plan B: Senayan		Plan C: Manggarai		Plan D: Gambir		Plan E: Kemayoran		Plan F: Halim	
Vertical Location of the Station	Underground		Underground		Underground		Underground		Underground		Underground	
Technical Aspect												
a. Accessibility												
Accessibility to Highways	Intra-Urban (Planned)	○	Intra-Urban	○	Intra-Urban (Planned)	○	No Accessibility	×	Intra-Urban (Planned)	○	Inter-City (Planned)	○
Accessibility to Arterial Roads （Road Name）	Jl. Thamrin	○	Jl. Jend Sudirman	○	No Accessibility	×	No Accessibility	×	J. Benyamin Sueb	○	No Accessibility	×
b. Connection to Other Means of Transportation												
Connection to Conventional Lines	1 line	△	No line	×	3 lines	◯	1 line	△	No line	×	No line	×
Connection to the MRT Lines	1 line	○	1 line	○	No line	×	No line	×	No line	×	No line	×
Connection to the BRT Lines (Transjakarta)	2 lines	◯	1 line	△	1 line	△	1 line	△	1 line	△	No line	×
Connection to the Planned Lines	Monorail Airport Link	◯	Monorail	△	Airport Link	△	No line	×	No line	×	Monorail Airport Link	◯
Economic Aspect												
c. Ridership												
Proximity to the Golden Triangle	Inside	◯	Inside	○	Outside	×	Outside	×	Outside	×	Outside	×
Person Trips “To Work”	>100 PT/ha	○	>100 PT/ha	○	20-60PT/ha	×	>100 PT/ha	○	20-100PT/ha	△	0-40PT/ha	×
Conversion Rate from Cars	1.000	◯	1.000	◯	0.857	△	0.877	△	0.771	×	0.711	×
d. Construction Cost and Area of Land Acquisition												
Construction Cost for Civil Works	8,660 billion IDR	△	10,106 billion IDR	×	8,277 billion IDR	△	9,163 billion IDR	△	10,443 billion IDR	×	6,751 billion IDR	◯
Area of Land Acquisition	4.8 ha	◯	11.7 ha	△	4.8 ha	◯	4.8 ha	◯	4.8 ha	◯	14.9 ha	×
Environmental Aspect												
d. Open Space (Possibility of Construction)												
Area	About 2.5 ha	△	About 21 ha	◯	About 19ha	◯	About 10 ha	○	About 8 ha	○	About 7 ha	×
Current Land Use	River, green space		Parking, plaza, driving range, baseball ground		Terminal yard for conventional line		MONAS plaza		Jakarta International EXPO (Green space)		Green space, but does not fit construction of HSR station.	
e. Possibility of Expansion												
Easiness of Development	Existence of Dukuh Atas development plan	◯	Existence of sufficient available land	◯	Existence of terminal yard relocation plan	◯	Existence of sufficient available land	◯	Existence of sufficient available land	◯	Expansion is difficult	×

Overall Evaluation (Total Score)	○10, △3, ×0	○8, △3, ×2	○5, △4, ×4	○4, △4, ×5	○5, △2, ×6	○3, △0, ×10
	11.5	9.5	7.0	6.0	6.0	3.0

Note: ○ Good (Score: 1.0) △Fair (Score: 0.5) × Bad (Score: 0.0)

Source: JICA Study Team

4.3 Study of Route Alignment

4.3.1 Policy on Setting Alternative Routes

A field survey was conducted based on the route plan set in the METI survey carried out in the preceding year, and the alternative routes were set. The concrete points to note when considering the alignment are as described below.

- The alignment shall connect the stations in the shortest possible distance. In addition, so as not to obstruct acceleration, successive straight and horizontal sections shall be secured for as great a length as possible.
- A maximum gradient of 30‰ shall be adopted, but there shall be no successive maximum gradient sections.
- Land acquisition shall be minimized. In particular, in central Jakarta the route shall run underground. Furthermore, the land for existing expressways and conventional railways shall be effectively utilized as far as possible.
- Passage through areas where there is risk of landslides, faults and other natural disasters shall be avoided as far as possible.
- To avoid long bridge spans, wide rivers shall be crossed at right angles as far as possible.
- Proximity to areas where there is the possibility of impacting the natural environment, animal protection, etc. shall be avoided.
- The maximum tunnel length shall be 20 km.

4.3.2 Setting of Route Alternatives

The draft route plans are shown in Figures 4.3-1 to 4.3-4. The approach to setting the route in each section is shown below.

(1) Jakarta City

Underground space, expressway land and river land are utilized to minimize land acquisition. Use of the Banjil Canal, the Kalimalang Canal or Jakarta - Cikampek toll road was suggested and altogether 3 proposals were studied.

(2) Bekasi – Cikarang

It was decided to use the site of the Jakarta - Cikampek toll road to minimize land acquisition.

(3) Cikarang – Purwakarta

One route that passes the Cikampek city area utilizing another route that accesses a new international airport planned in Karawang area and detours the existing urbanized area was studied.

(4) Purwakarta – Padalarang

This section rises 700 m in altitude all at once. Most of the section utilizes tunnel structures and two

alternatives were studied. One is a route that passes the vicinity of the existing toll road where we can judge its geological condition. Another is a shorter route with a rectilinear alignment.

(5) Padalarang – Gedebage

This is a crowded urban area and to avoid land acquisition, existing railway lines or the sites of toll roads will be utilized. A total of 3 proposals were studied.

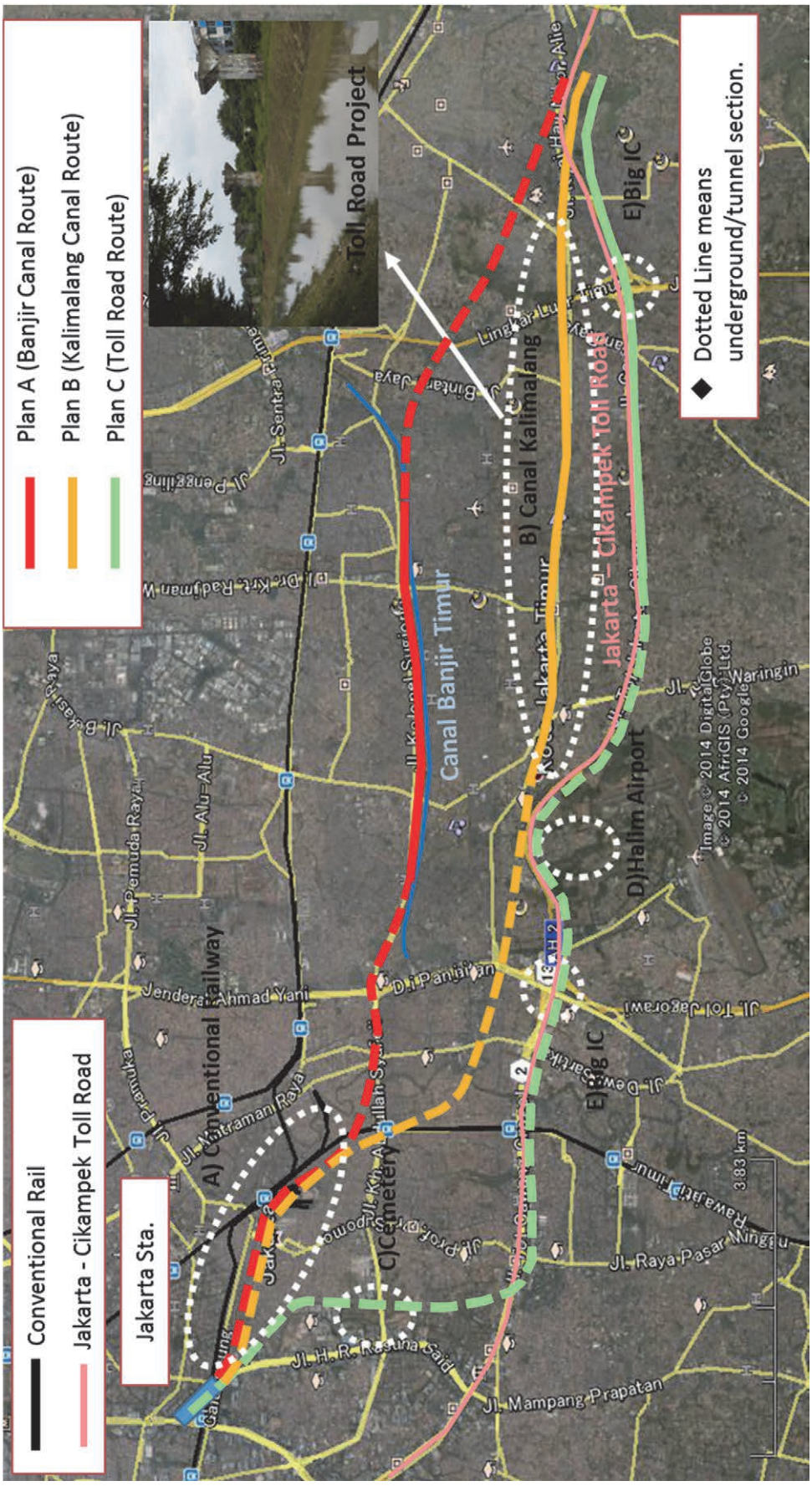


Figure 4.3-1 Route Alternatives in Jakarta

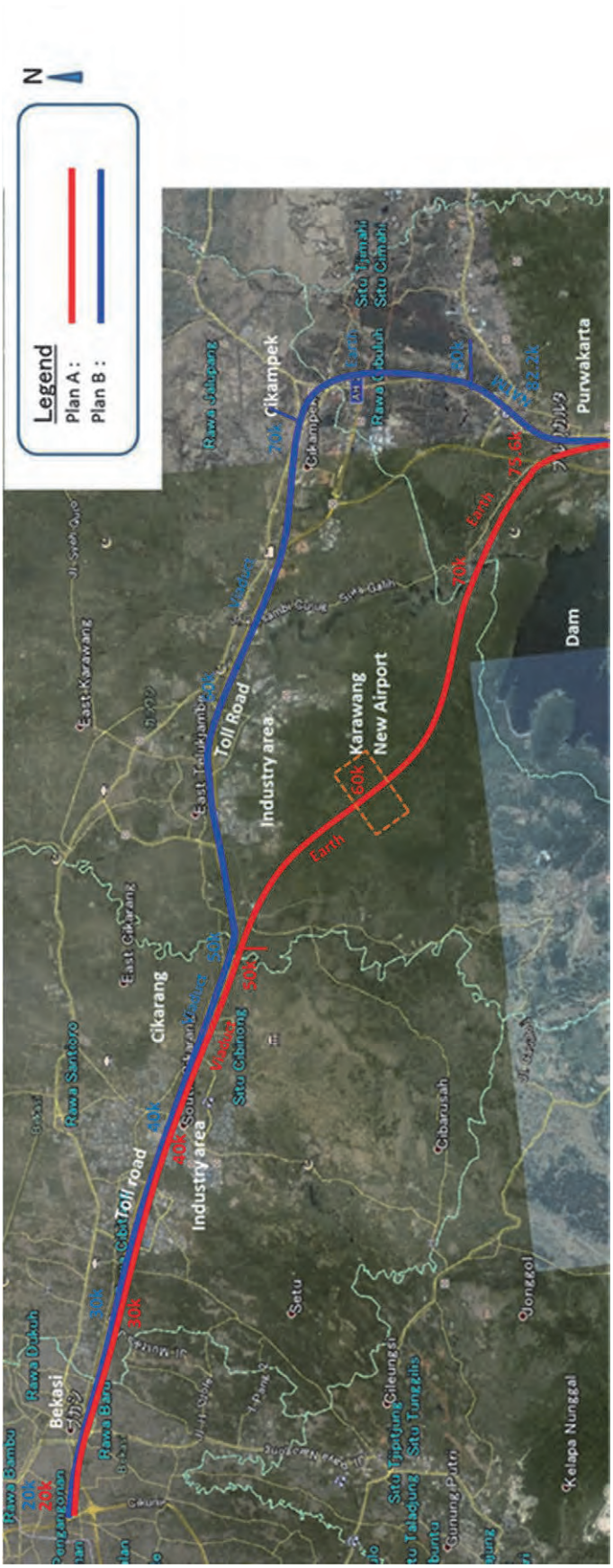


Figure 4.3-2 Route Alternatives from Bekasi to Purwakarta

Figure 4.3-3 Route Alternatives from Purwakarta to Padalarang

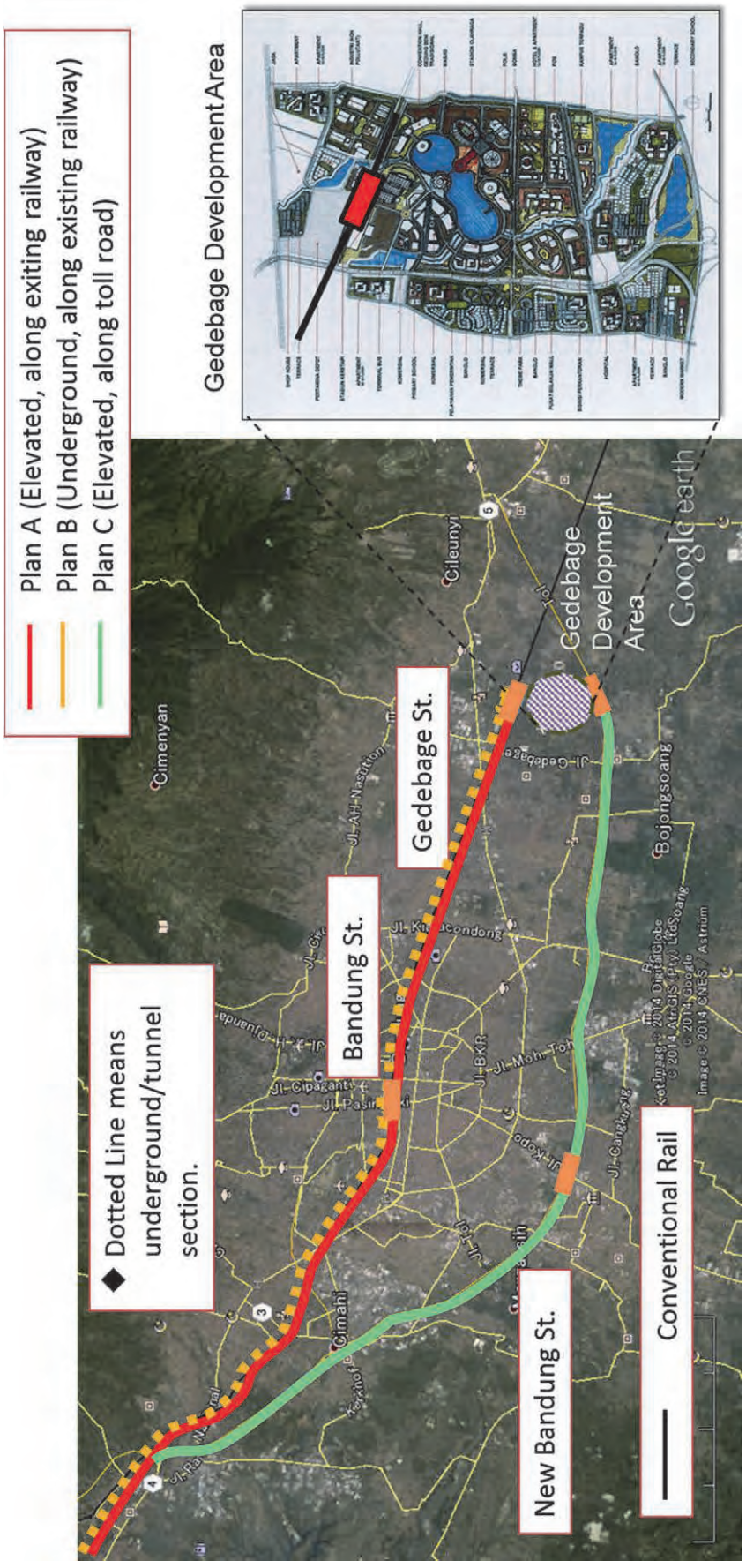


Figure 4.3-4 Route Alternatives from Padalarang to Gedebage

4.3.3 Evaluation of the Route Alternatives

(1) Evaluation of the Suitable Route from Jakarta to Bekasi Section

Plan A is a route to utilize underground of existing railway line and ROW of Banjir Timur Canal. Plan B is a route to utilize underground of existing railway line and ROW of Kalimalang Canal. Plan C is a route to utilize ROW of Jakarta-Cikampek toll road. Total length is the longest in Plan C, while Plan A and B are almost the same.

In Plan B, there is a toll road project (Refer to Figure 4.3-5) and an elevated BRT project along the Kalimalang Canal. Those projects are already authorized and the HSR project has to wait for those to reach completion. That means the HSR project will have high risk and uncertainty in its construction and inauguration.

Plan C is a route recommended in the previous study. However land acquisition is greater compared with other routes. Moreover, construction cost is the highest and it necessitates a longer construction period because it has a long tunnel.

To conclude, Plan A is preferable. Land acquisition is slightly larger than Plan B, but construction cost is relatively low and there are few bottlenecks to construction.

(2) Evaluation of the Suitable Route from Bekasi to Purwakarta Section

From Bekasi to Cikarang, we proposed the route to utilize ROW of Jakarta-Cikampek toll road. A route that passes the south side of the existing industrial parks was considered, but it was rejected because it was difficult to connect the existing built-up area. After Cikarang, two alternatives were examined. Plan A is a route via planned Karawang new airport and detours the existing built-up area. Plan B is a route via Cikampek Station where HSR connects with conventional railway to Surabaya.

Total length is shorter in Plan A. Plan B is a route accessible to the existing built-up area, but land acquisition is slightly larger as well as construction cost is much higher in Plan B.

In Plan A, HSR can connect with a planned new airport, and its traffic demand will increase when the new airport begins its operation.

To conclude, Plan A is preferable because of low construction cost and high ridership expected from the new airport.

(3) Evaluation of the Suitable Route from Purwakarta to Padalarang Section

This section mostly consists of tunnels, and the new station in Walini was requested from the West Java Province. Plan B is a route proposed in the previous study. However, in this plan, it is difficult to construct a new station in Walini (Refer to Figure 4.3-6). So, Plan A is preferable in that the new station might be located technically in future.

(4) Evaluation of the Suitable Route from Padalarang to Gedebage Section

Plan A is a viaduct plan over the existing railway line. Plan B is a plan underground of the existing railway line. Plan C is a route to run along the toll road. Total length of Plan C is slightly longer than Plan A and B.

Land acquisition is remarkably large in Plan C. Construction cost of Plan B is much higher than Plan A and C. Plan A has minimum land acquisition and construction cost. Moreover, Plan A can connect with the

current Bandung station and be accessible to Bandung central area. So Plan A is recommended in this section. However, in this section the existing commuter line is planned to be elevated. So, it is necessary to consider coordination with that project.

Table 4.3-1 Evaluation: Optimum Route from Jakarta to Bekasi

			Route A			Route B			Route C		
Outline			A route utilizing underground of conventional railways, trunk roads and private area and East Jakarta Flood Way (Banjir Timur Canal)			A route utilizing underground of conventional railways and private area via Kalimalang Canal			A route utilizing underground of public and private area via toll road		
Length	Route Length		20.1 km	(1.00)	○	20.0 km	(1.00)	○	22.0 km	(1.09)	×
	Length by Structure	Earth	3.0 km	(15 %)	-	2.0 km	(10 %)	-	1.0 km	(5 %)	-
		Viaduct	5.5 km	(27 %)	-	8.0 km	(40 %)	-	6.0 km	(27 %)	-
		Tunnel	11.6 km	(58 %)	-	10.0 km	(50 %)	-	15.0 km	(68 %)	-
Rider-ship	Intermediate City		Manggarai Sta.		△	Manggarai Sta., Halim Airport		○	Halim Airport		△
	Connection to Other Transport		Manggarai of Airport Link		○	Manggarai and Halim of Airport Link		○	Halim of Airport Link		○
Operation	Future Plan		No disturbing plans		○	Necessary to coordinate with the toll road project over Kalimalang Canal		×	No disturbing plans		○
	Disaster Risk		Land subsidence and flooding		△	Land subsidence and flooding		△	Land subsidence and car diving		△
Bottleneck of Construction	Land Acquisition		4.8 ha 570 Bill. IDR	(1.50)	△	3.2 ha 380 Bill. IDR	(1.00)	○	11.2 ha 1,320 Bill IDR	(3.50)	×
	Difficulty in Construction Works		Construction works near the canal with bad footing		△	Complex structure due to restriction of possible construction space		×	Construction works near the toll road with high traffic volume		△
	Material Conveyance		Possible to use existing roads along the		○	Possible to use existing roads along the		○	Necessary to construct access roads to enter into the highway compound		△
Const. Period	Civil Works		39 months (1.07)		△	36 months (1.00)		○	50 months (1.29)		×
Cost	Civil Works		6.6 Trill. IDR (1.00)		○	6.9 Trill. IDR (1.05)		△	8.2 Trill. IDR (1.25)		×
General Evaluation			7.5 points (○5, △5)			7.0 points (○6, △2, ×2)			4.0 points (○2, △4, ×4)		
			Slightly expensive but less risk than Plan B			Necessary to change the plan of highway project over the Kalimalang Canal			Expensive and long distance		

Note: ○ Good (1 point) △ Fair (0.5 point) × Bad (0 point)
Source: JICA Study Team

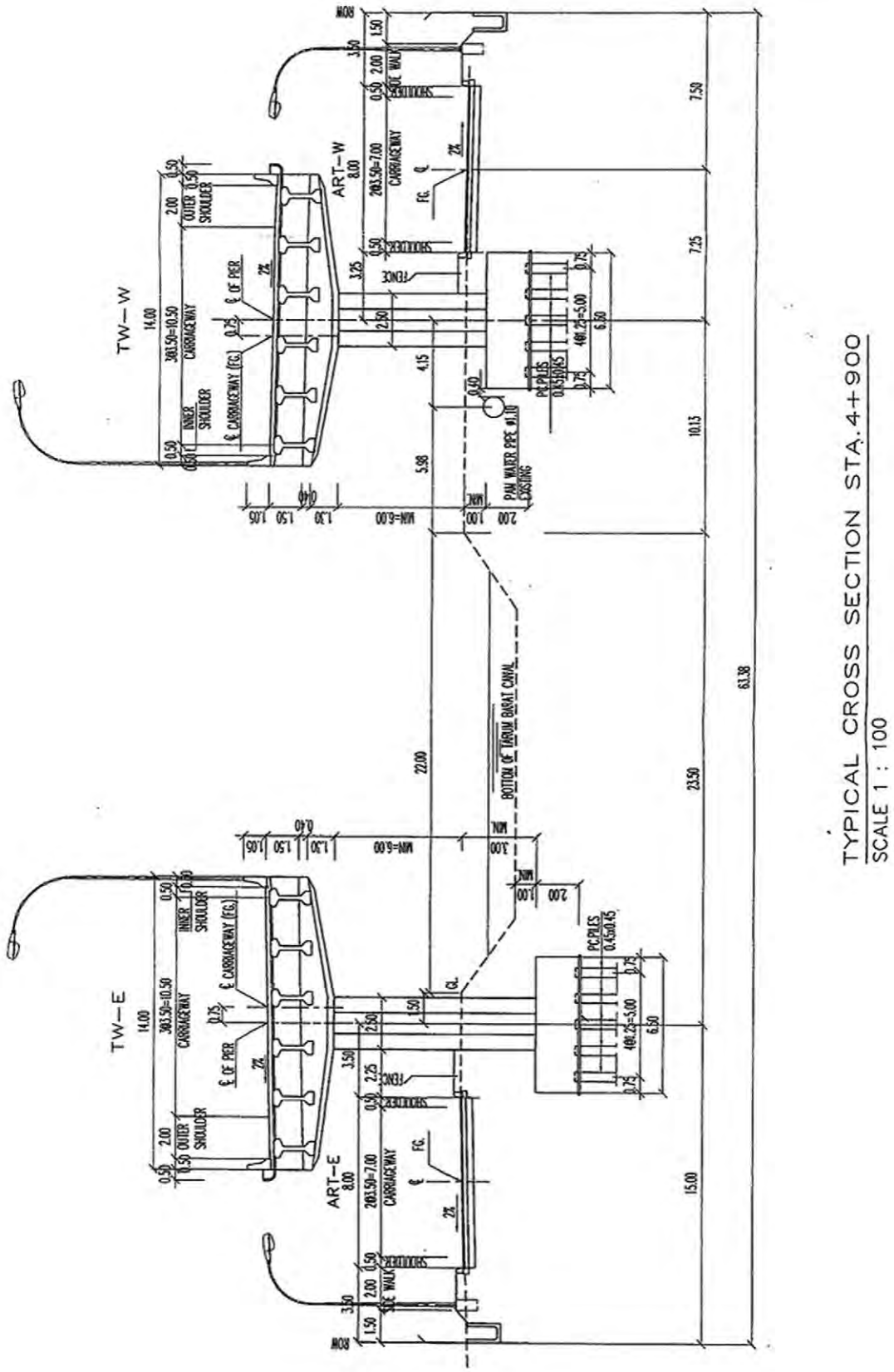


Figure 4.3-5 Toll Road Plan in the Kalimalang Canal

Table 4.3-2 Evaluation: Optimum Route from Bekasi to Purwakarta

			Route A			Route B		
Outline			Route via a planned airport in Karawang and utilizing the highway compound near Cikarang			Route via Cikampek where there is a divergence of conventional railways for Bandung and Surabaya		
Length	Route Length		55.6 km	(1.00)	○	62.5 km	(1.15)	×
	Length by Structure	Earth	25.6 km	(46 %)	−	10.0 km	(16 %)	−
		Viaduct	30.0 km	(54 %)	−	50.0 km	(80 %)	−
		Tunnel	0.0 km	(0 %)	−	2.5 km	(4 %)	−
Rider-Ship	Intermediate City		Industrial Parks and New International Airport		○	Cikanpek and Purwakarta		○
	Connection to Other Transport		New International Airport		○	Convention Railway to Surabaya		○
Operation	Future Plan		Significant increase in demand after inauguration of the planned airport		○	Redevelopment of built-up area required		△
	Disaster Risk		No Risk		○	No Risk		○
Bottleneck of Construction	Land Acquisition		83.8 ha 600 Bill. IDR	(1.00)	○	94.0 ha 670 Bill. IDR	(1.12)	×
	Difficulty in Construction Works		Coordination with the new airport construction		△	Construction works at the area Neighboring to existing railways		△
	Material Conveyance		New construction road required		△	There are improved roads.		○
Const. Period	Civil Works		36 months (1.00)		○	36 months (1.00)		○
Cost	Civil Works		6.0 Trillion IDR (1.00)		○	9.5 Trillion IDR (1.59)		×
General Evaluation			9.0 points (○8, △2, ×0)			6.0 Points (○5, △2, ×3)		
			Short length and more ridership			High cost		

Note: ○ Good (1 point) △ Fair (0.5 point) × Bad (0 point)

Source: JICA Study Team

Table 4.3-3 Evaluation: Optimum Route from Purwakarta to Padalarang

			Route A			Route B		
Outline			Route connecting via Walini development area			Route passing the valley area along the toll road		
Length	Route Length		35.1 km	(1.00)	○	37.0 km	(1.05)	△
	Length by Structure	Earth	1.0 km	(3 %)	−	1.0 km	(3 %)	−
		Viaduct	1.0 km	(3 %)	−	1.0 km	(3 %)	−
		Tunnel	33.1 km	(94 %)	−	35.0 km	(95 %)	−
Rider-ship	Intermediate City		Walini		△	Not Connected		×
	Connection to Other Transport		Connectable at Walini in future		△	No Connection		×
Operation	Future Plan		Necessary to coordinate with the Walini development plan		△	Difficult due to a long tunnel		×
	Disaster Risk		Necessary to pay attention to land slide		△	Necessary to pay attention to land slide		△
Bottleneck of Construction	Land Acquisition		3.0 ha 20 Bill. IDR	(1.00)	○	3.0 ha 20 Bill. IDR	(1.00)	○
	Difficulty in Construction Works		Necessary to conduct a geological survey carefully because a volcano is near		△	Necessary to do construction works paying attention to land slides		△
	Material Conveyance		Construction of new access roads required		△	Easy because there are toll road and trunk road nearby		○
Const. Period	Civil Works		54 months (Max.) (1.00)		×	54 months (Max.) (1.00)		×
Cost	Civil Works		15.9 Trillion IDR (1.00)		○	16.8 Trillion IDR (1.06)		×
General Evaluation			6.0 points (○3,△6×1)			3.5 points (○2, △3, ×5)		
			Shorter than Plan B			Relatively easy civil works but no benefit to the area along the way		

Note: ○ Good (1 point) △ Fair (0.5 point) × Bad (0 point)

Source: JICA Study Team

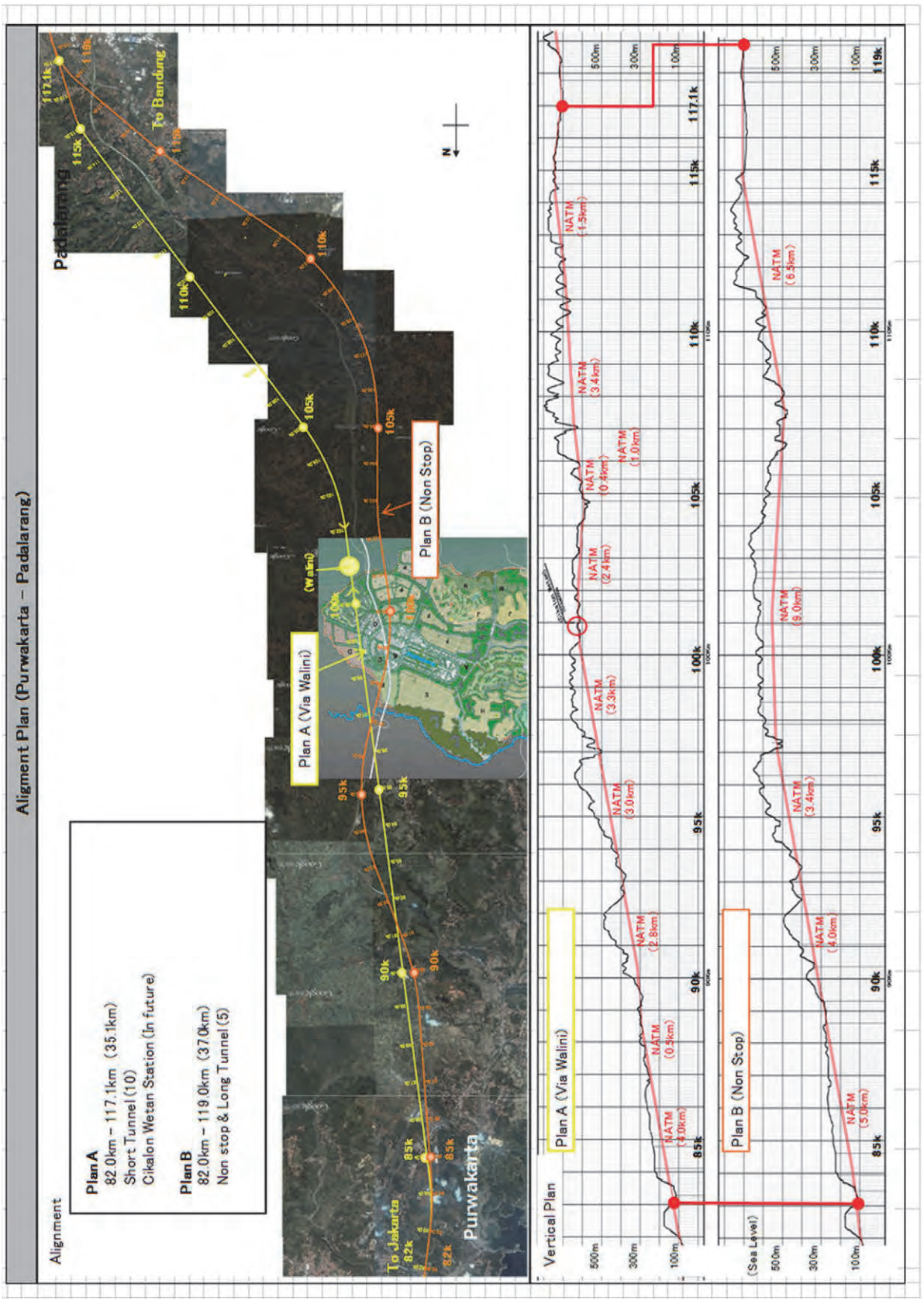


Figure 4.3-6 Profile of Section from Purwakarta and Padalarang

Table 4.3-4 Evaluation: Optimum Route from Padalarang to Gedebage

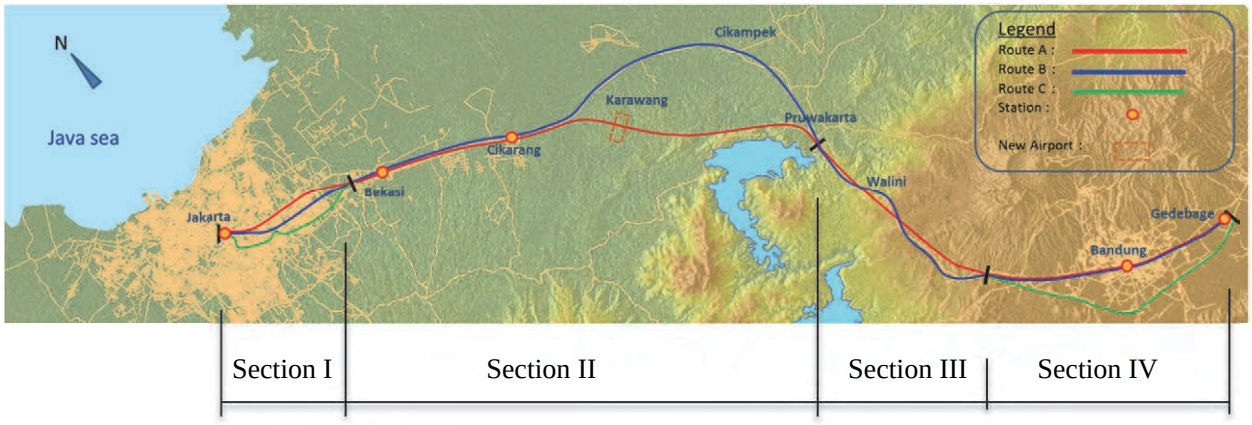
			Route A			Route B			Route C		
Outline			Plan of viaduct to utilize ROW of existing railway			Plan of underground of existing railway			Plan to utilize ROW of toll road		
Length	Route Length		22.2 km	(1.00)	○	22.2 km	(1.00)	○	26.1 km	(1.18)	×
	Length by Structure	Earth	0.0 km	(0 %)	−	0.0 km	(0 %)	−	0.0 km	(0 %)	−
		Viaduct	22.2 km	(100 %)	−	0.0 km	(0 %)	−	26.0 km	(100 %)	−
		Tunnel	0.0 km	(0 %)	−	22.2 km	(100 %)	−	0.0 km	(0 %)	−
Rider-ship	Intermediate City		Bandung central area		○	Bandung central area		○	Bandung suburban area		×
	Connection to Other Transport		Existing railway		○	Existing railway		○	No connection		×
Operation	Future Plan		Necessary to consider elevation of existing railways together		△	Necessary to consider elevation of existing railways together		△	Necessary to coordinate Gedebage development plan		△
	Disaster Risk		No risk		○	No risk		○	No risk		○
Bottleneck of Construction	Land Acquisition		12.0 ha 2,030 Bill. IDR	(1.00)	△	0.0 ha −	(0.00)	○	41.8 ha 7,070 Bill. IDR	(3.48)	×
	Difficulty in Construction Works		Special considerations because of construction works at the area adjacent to the existing lines		△	Long period of construction works for long distance tunnel		×	No difficulty		○
	Material Conveyance		No difficulty		○	No difficulty		○	No difficulty		○
Const. Period	Civil Works		36 months (1.00)		○	54 months(Max.) (1.50)		×	36 months (1.00)		○
Cost	Civil Works		3.9 Trillion IDR (1.00)		○	10.5 Trillion IDR (2.72)		×	4.6 Trillion IDR (1.18)		△
General Evaluation			8.5points (○7, △3)			6.5 points (○6, △1, ×3)			5.0 points (○4, △2, ×4)		
			Minimum land acquisition and low cost			High civil works cost			Long route and bad accessibility to the city center		

Note: ○ Good (1 point) △ Fair (0.5 point) × Bad (0 point)

Source: JICA Study Team

(5) Evaluation Result

Figure 4.3-7 and Table 4.3-5 show the evaluation results of the candidate routes.



Source: JICA Study Team

Figure 4.3-7 Route Options from Jakarta to Gedebage

Table 4.3-5 Comparison of the Candidate Routes

		I. Jakarta - Bekasi			II. Cikarang - Karawang		III. Purwakarta-Walini		IV. Bandung - Gedebage		
Outline		A North Canal	B South Canal	C Along the highway	A Via airport	B Via existing conventional lines	A Shortest	B Along the highway	A Over the existing railways	B Below the existing railways (basement)	C Along the highway
Length	Route Length	○	○	×	○	×	○	△	○	○	×
Roder-ship	Intermediate City	△	○	△	○	○	△	×	○	○	×
	Connection to Other Transport	○	○	○	○	○	△	×	○	○	×
Operation	Future Plan	○	×	○	○	△	△	×	△	△	△
	Disaster Risk	△	△	△	○	○	△	△	○	○	○
Bottleneck of Const.	Land Acquisition	△	○	×	○	×	○	○	△	○	×
	Difficulty in Construction Works	△	×	△	△	△	△	△	△	×	○
	Material Conveyance	○	○	△	△	○	△	○	○	○	○
Const. Period	Civil Works	△	○	×	○	○	×	×	○	×	○
Cost	Civil Works	○	△	×	○	×	○	×	○	×	△
General Evaluation		7.5	7.0	4.0	9.0	6.0	6.5	3.5	8.5	6.5	5.0
		A			A		A		A		

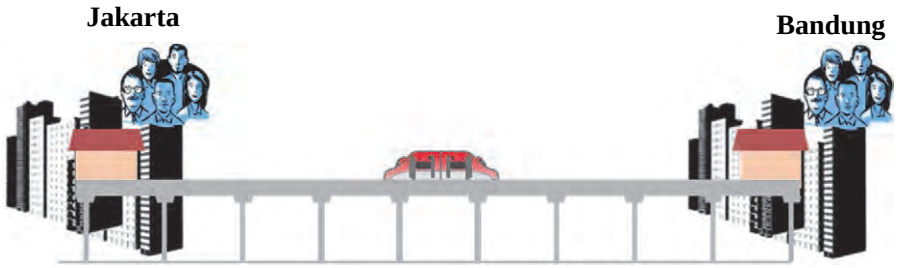
Note: ○ Good (1 point) △Fair (0.5 point) × Bad (0 point)

Source: JICA Study Team

4.4 Selection of Station Locations Other Than Jakarta

4.4.1 Policy on Selection of Station Locations

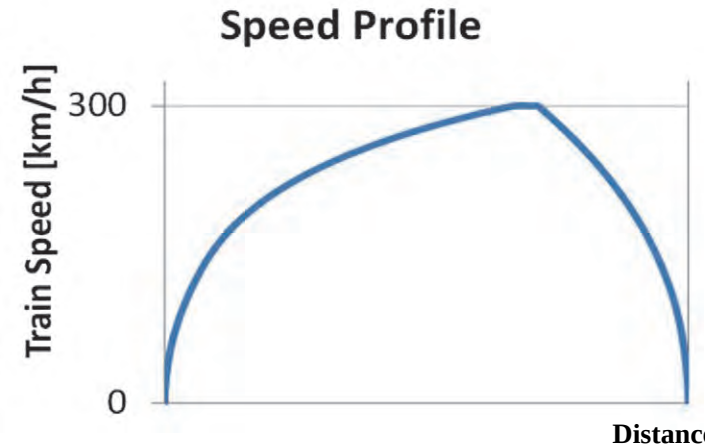
- As it is assumed that the HSR stations will be used mainly as passenger stations, it is desirable that they are located in passenger-dense areas. In particular, the stations in Jakarta and Bandung shall be located in the city center. (See Figure 4.4-1)
- On the other hand, as land acquisition is difficult in built-up areas and the likelihood of alignment constraints is high, stations other than the two stations mentioned above shall be located in the suburbs and the surrounding areas shall be developed.
- To avoid having to reduce the schedule speed (acceleration), the distance between HSR stations is roughly planned at 20 km or more unless there is some special reason (see Figure 4.4-2).
- Stations shall be located to allow easy transfer to other modes of transport.
- The gradient of station sections shall be level (horizontal).



To ensure passenger demand, it is desirable that the origins and destinations are located in central business districts (CBD).

Source: JICA Study Team

Figure 4.4-1 Station Construction Policy (1)



In view of train acceleration / deceleration, to ensure a maximum speed of 300 km/h, a minimum distance of 20 km between stations is required.

Distance: 20km and above is preferable.

Source: JICA Study Team

Figure 4.4-2 Station Construction Policy (2)

4.4.2 Study of Station Locations

(1) Bekasi (Figure 4.4-4)

Bekasi has developed into a commuter town for Jakarta and in recent years various commercial and business functions have assembled here. The existing urban area is already high-density and it is proposed to locate the station in the suburbs where construction space can be secured.

(2) Cikarang (Figure 4.4-5)

This area has many large-scale industrial estates containing Japanese companies and further growth in partnership with the HSR is anticipated. A depot is planned near the station and its location is proposed in the suburbs where construction space can be secured.

(3) Bandung (Figure 4.4-6)

This is Indonesia's third largest city and public agencies as well as the head office or branch functions of various companies are concentrated here. As described in the basic policy, from the perspective of stimulating ridership, it is desirable to locate the station in the city center as the actual HSR terminal in the east.

(4) Gedebage (Figure 4.4-7)

As a candidate site for relocation of the urban functions of congested Bandung City, large-scale redevelopment is planned in this area in future. Locating the station here is strongly requested by Bandung city authorities.

(5) Others (Figure 4.4-8 to 11)

HSR new station at Manggarai will be developed necessary compliment to Dukuh Atas according to an increasement in the number of passengers in Jakarta area. It is located on the linear section at about 400m sounth of the existing Manggarai station. Karawang is an intermediate point on the way from Cikarang to Purwakarta. It is desirable to locate the HSR station in the international airport terminal in view of enhancing the convenience of the newly planned international airport and stimulating ridership for the HSR. Moreover, Walini district is an area where a new provincial center is planned. The section other than a tunnel structurally was selected for HSR station in future.

Station Name	Distance from Jakarta
Jakarta (underground)	0km
(Manggarai*1)	(3.5km)
Bekasi	26.1km
Cikarang	42.0km
(Karawang*2)	(59.3km)
(Walini*3)	(100.6km)
Bandung	128.5km
Gedebage	140.0km

Stations to be open in future

*1 Manggarai station will start its commercial operation after passenger volume increasing by extension to Surabaya direction.
*2 Karawang station will start its commercial operation when new airport inagurates in future
*3 Walini station will start its commercial operation after Walini development as a new administration center of West Java Province Government.

Source: JICA Study Team

Figure 4.4-3 Stations Location

Figure 4.4-4 Location of Bekasi Station

Figure 4.4-5 Location of Cikarang Station

Figure 4.4-6 Location of Bandung Station

Figure 4.4-7 Location of Gedebage Station

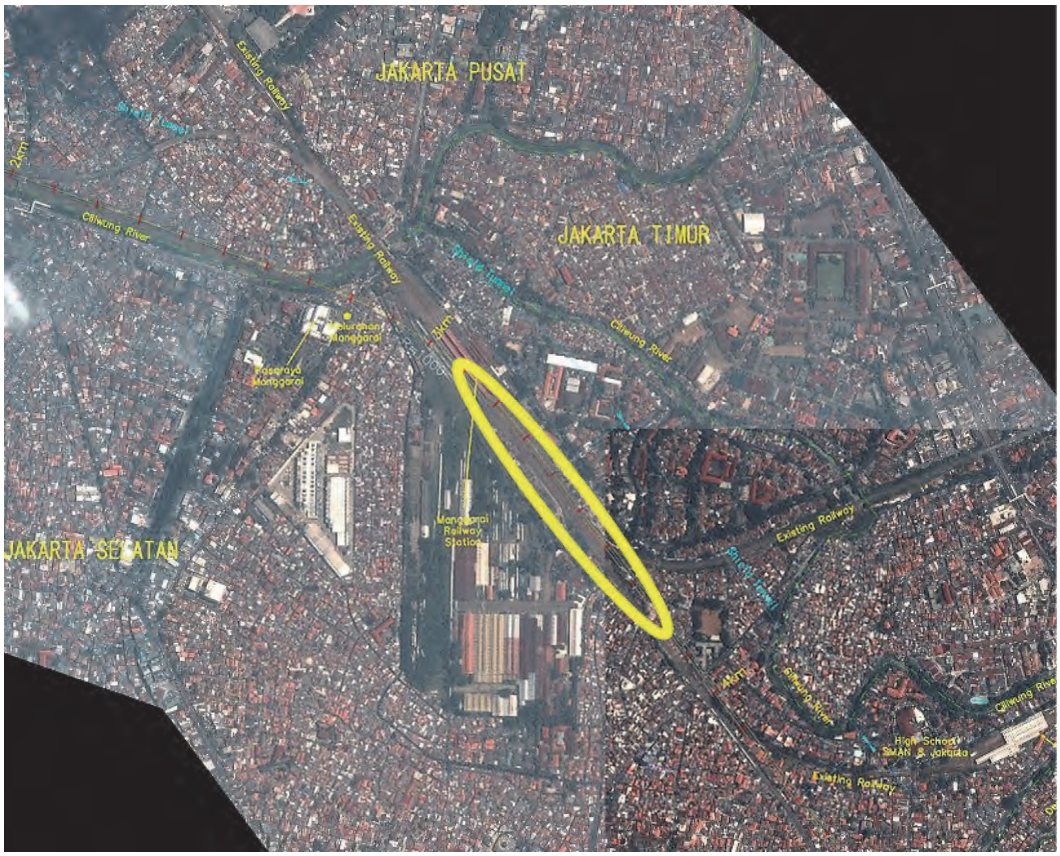


Figure 4.4-8 Location of Manggarai Station (Draft)

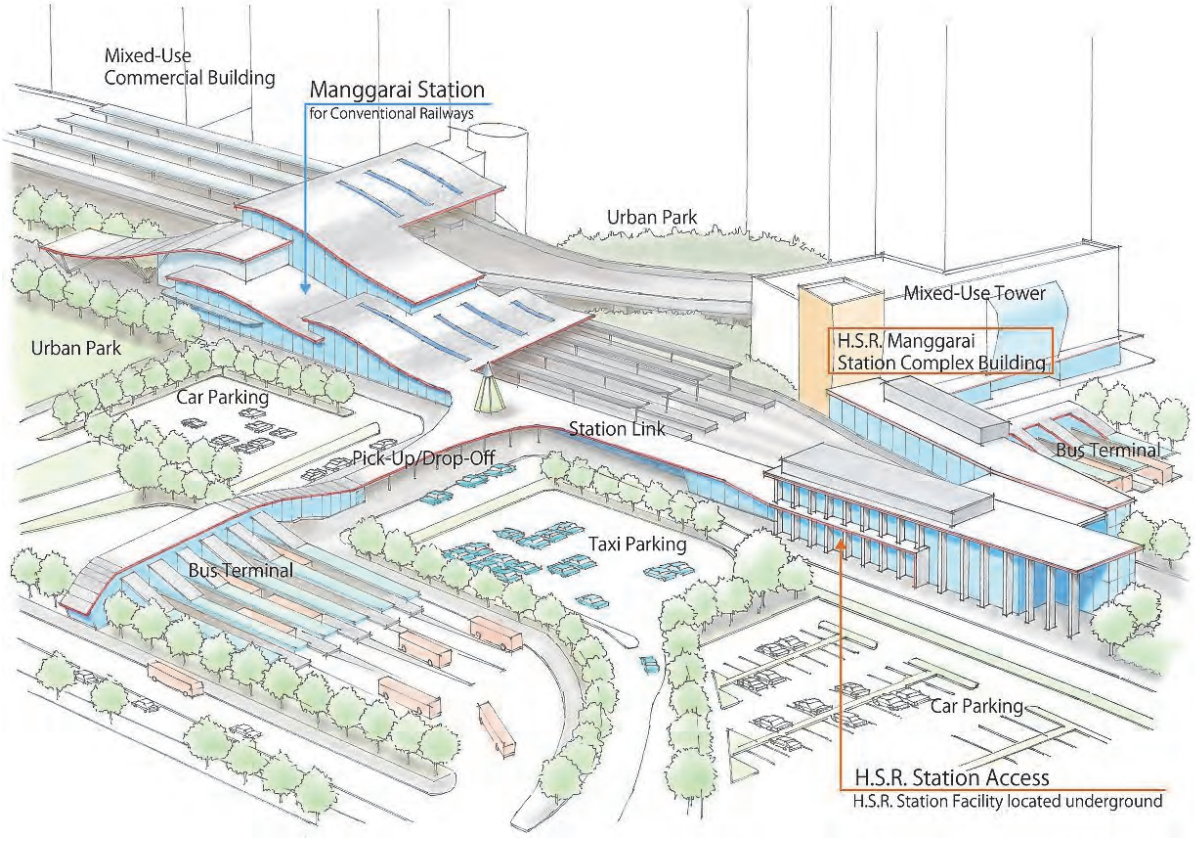


Figure 4.4-9 Development Image of Manggarai Station

Figure 4.4-10 Location of Karawang Station (Draft)

Figure 4.4-11 Location of Walini Station (Draft)