DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS (DOTC)
REPUBLIC OF THE PHILIPPINES

STUDY ON RAILWAY STRATEGY FOR CLARK-METRO MANILA FOR THE GREATER CAPITAL REGION IN THE REPUBLIC OF THE PHILIPPINES

FINAL REPORT

JUNE 2013

JAPAN INTERNATIONAL COOPERATION AGENCY

ORIENTAL CONSULTANTS CO., LTD.
ALMEC CORPORATION
KATAHIRA & ENGINEERS INTERNATIONAL

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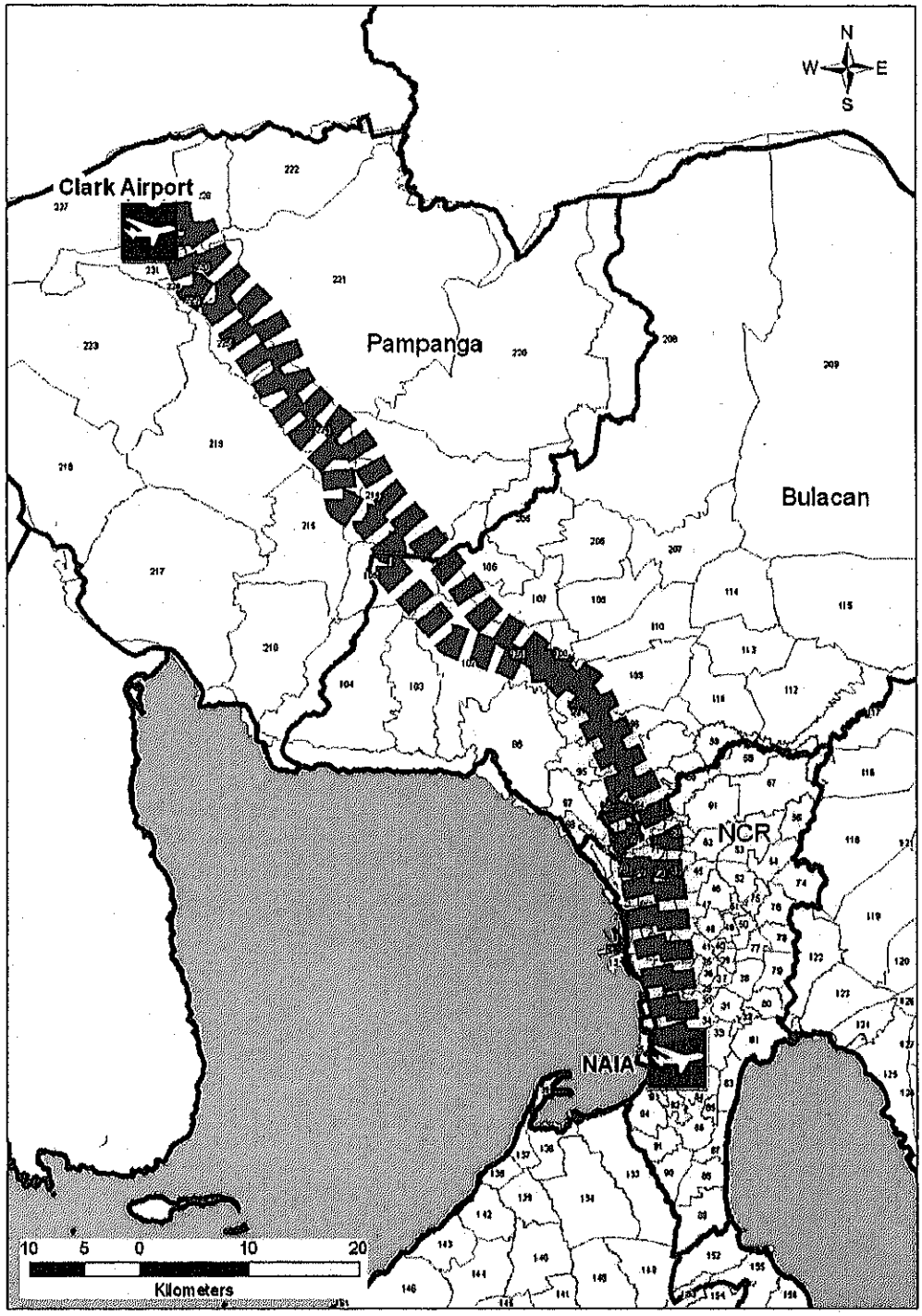
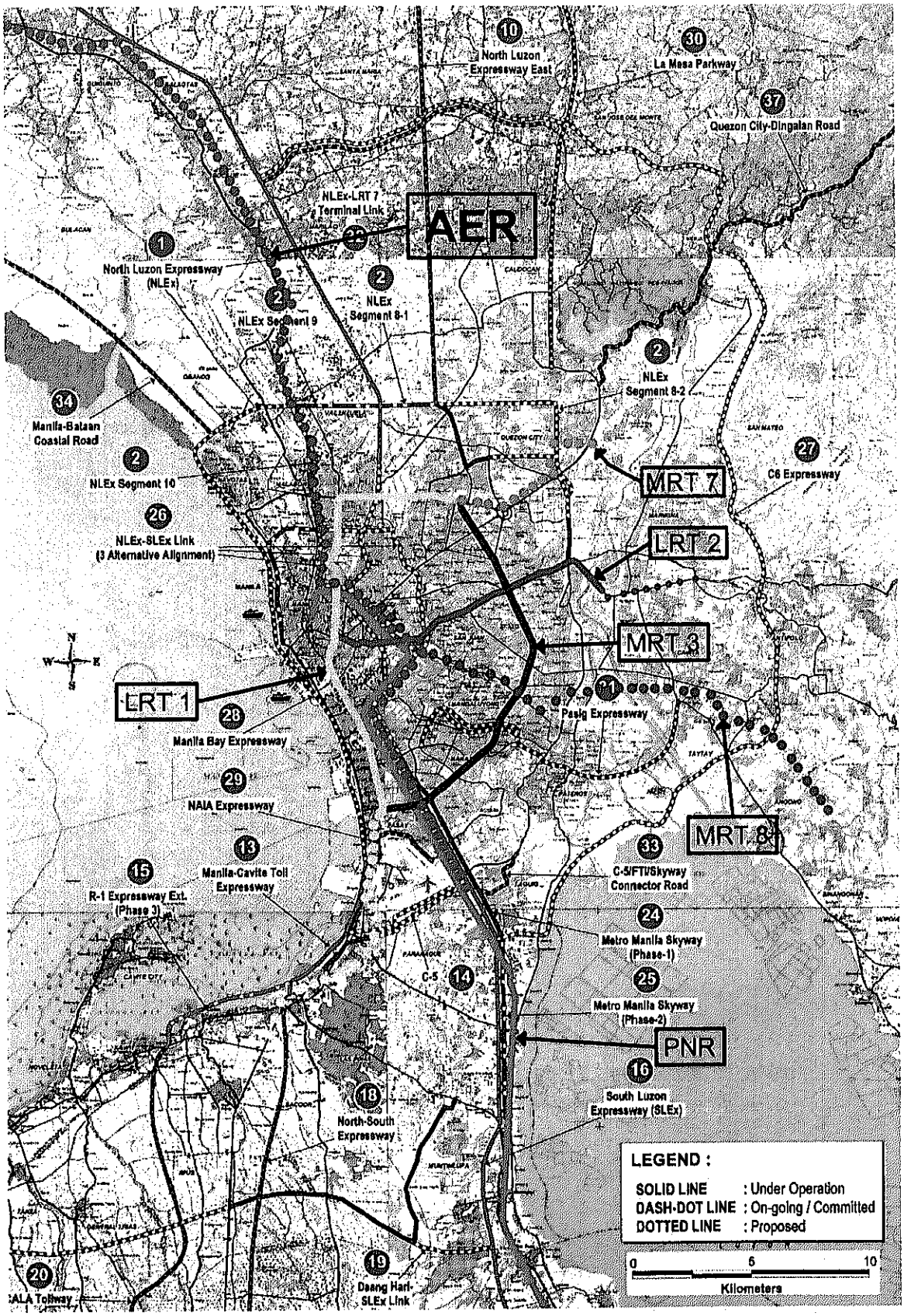
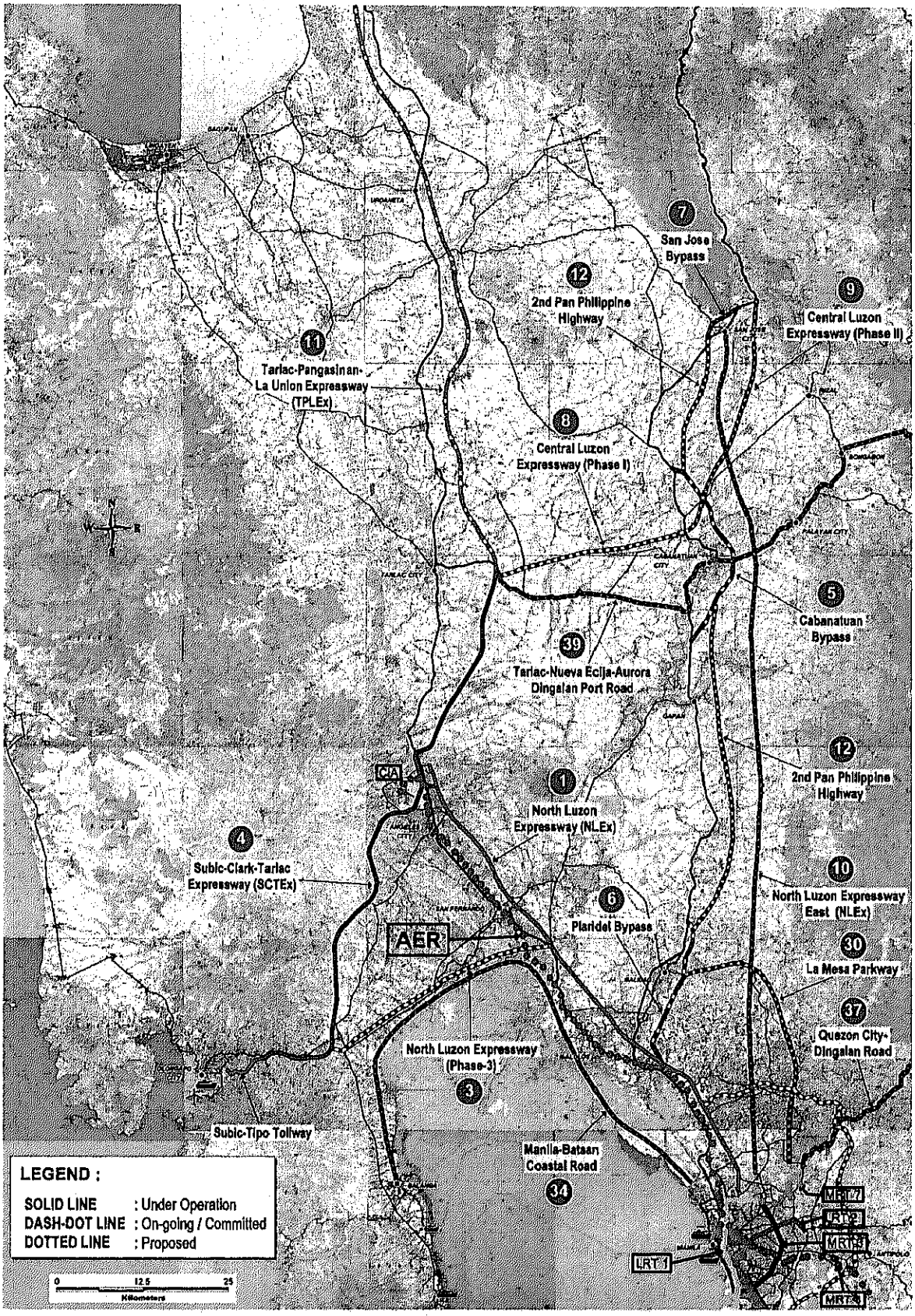
Exchange Rate (January 2013)		
1 Philippine Pesos (PhP)	=	2.09 Japanese Yen (JPY)
1 US dollar (US$)	=	85.81 JPY
1 US dollar (US$)	=	41.06 PhP



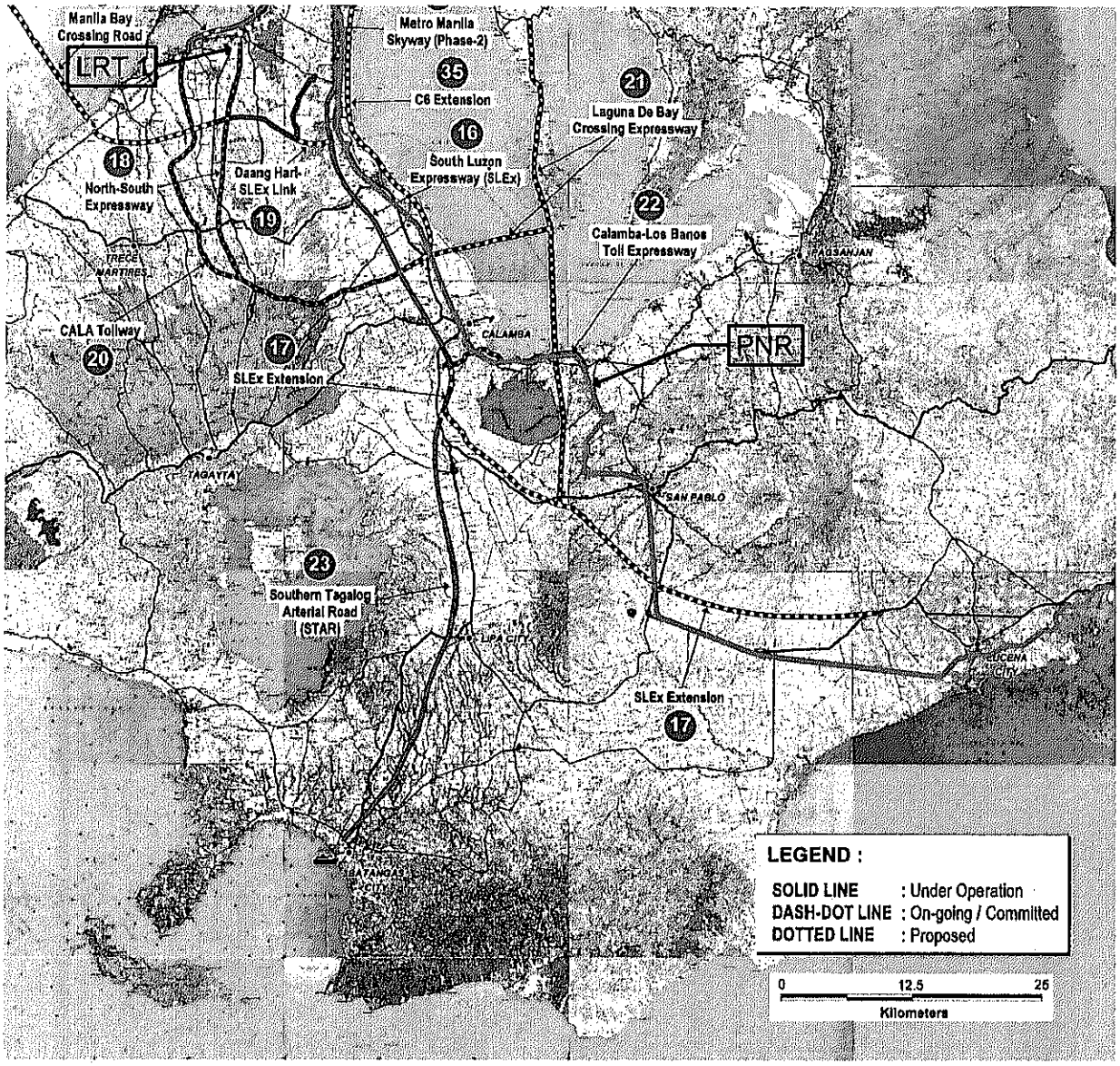
LOCATION MAP



RELATED RAILWAY/ ROAD DEVELOPMENT PLANS IN THE STUDY AREA (1)



RELATED RAILWAY/ ROAD DEVELOPMENT PLANS IN THE STUDY AREA (2)



RELATED RAILWAY/ ROAD DEVELOPMENT PLANS IN THE STUDY AREA (3)

STUDY ON RAILWAY STRATEGY
FOR
CLARK-METRO MANILA FOR THE GREATER CAPITAL REGION
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Term	English
ADB	Asian Development Bank
AER	Airport Express Railway
AFC System	Automatic Fare Collection System
ATC	Automatic Train Control
ATO	Automatic Train Operation
ATP	Automatic Train Protection
ATS	Automatic Train Stop
BCDA	Bases Conversion and Development Authority
BRT	Bus Rapid Transit
CBD	Central Business District
CBTC	Communication Based Train Control
CBR	Cost Benefit Ratio
CCTV	Closed Circuit Television
CIA	Clark International Airport
CTC	Centralized Traffic Control
DENR	Department of Environment and Natural Resources
DOF	Department of Finance
DOTC	Department of Transportation and Communication
DPWH	Department of Public Works and Highways
E&M	Electrical and Mechanical
ECC	Environmental Compliance Certificate
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
FIRR	Financial Internal Rate of Return
F/S	Feasibility Study
FTI	Food Terminal Incorporated
GAA	General Appropriations Act
GCR	Greater Capital Region
GDP	Gross Domestic Product
GOP	Government of Philippines
GRDP	Gross Regional Domestic Product
IEE	Initial Environmental Examination
JBIC	Japan Bank For International Cooperation
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
JV	Joint Venture
LCX	Leaky CoaXial cable
LED	Light Emitting Diode
LRC	Luzon Railway Corporation
LRT	Light Rail Transit
MERALCO	The Manila Electric Company
METI	Ministry of Economy, Trade and Industry
MM	Metro Manila

Term	English
MMDA	Metropolitan Manila Development Authority
MMTC	Metro Manila Transit Cooperation
MRT	Metro Rail Transit
MRTC	Metro Rail Transit Corporation Limited
NAIA	Ninoy Aquino International Airport
NCR	National Capital Region
NEDA	National Economic Development Authority
NLEX	North Luzon Expressway
NLRC	North Luzon Railways Corporation
NPV	Net Present Value
O&M	Operation & Maintenance
OCC	Operation Control Center
OCS	Overhead Catenary System
OD	Origin-Destination
ODA	Official Development Assistance
OEM	Original Equipment Manufacturer
PABX	Private Automatic Branch eXchange
PC	Prestressed Concrete
PCG	Philippine Coast Guard
PhP, PHP	Philippine Pesos
PMO	Project Management Office
PNR	Philippine National Railways
PPP	Public Private Partnership
PRA	Philippines Railway Authority
PSD	Platform Screen Door
PUJ	Public Utility Jeepney
ROW	Right-of-Way
RTU	Remote Terminal Unit
SCADA	Supervisory Control And Data Acquisition
SEA	Strategic Environmental Assessment
SLEX	South Luzon Expressway
SWR	Shadow Wage Rate
TMV	Ticket Vending Machine
TOD	Transit Oriented Development
TTC	Travel Time Cost
TWG	Technical Working Group
ULC	Universal LRT Corporation
UPS	Uninterruptible Power-supply System
VAT	Value Added Tax
VGF	Viability Gap Fund
VOC	Vehicle Operation Costs
VOT	Value of Time
VVVF	Variable Voltage Variable Frequency
WB	World Bank

CHAPTER 1

INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 Background of the Study

As the population of the Manila and Greater Capital Region (hereinafter referred to as GCR) rapidly increased and its economic zone expanded, the Government of the Philippines has promoted development of seamless transportation networks in Subic-Clark-Manila-Batangas growth corridor that is the distribution and growth corridor of the wider area of the GCR. (Philippine Development plan 2011-2016) Based on this plan, it is considered that Ninoy Aquino International Airport (hereinafter referred to as NAIA), is crowded and there is concern that it has problems in the safety of operation, and therefore the use of Clark International Airport (hereinafter referred to as CIA) should be promoted.

President Aquino (Benigno Simeon "Noynoy" Cojuangco Aquino III) announced the presidential decree No.64 in December, 2011, and he changed the administrative jurisdiction of Clark International Airport Authority from the executive office of the President to the Department of Transportation and Communications (hereinafter referred to as DOTC). This presidential decree No.64 clarified the role of CIA and NAIA. It also provided DOTC the authority to expand the airport based on the discussions with relevant ministries. DOTC is considering several policy options which include the possibility that CIA will be the international gateway.

Despite the role sharing of CIA and NAIA, however, in order to promote use of this airport, it is realized that there is no railway access connecting CIA to the National Capital Region (hereinafter referred to as NCR). This creates a bottleneck, which is a problem.

In order to solve this bottleneck, a railway construction plan which will connect CIA to NCR has been discussed. For example, there is the North Rail Project financed by The Export-Import Bank of China. Other plans have been proposed by the North Luzon Railways Corporation (hereinafter referred to as NLRC), and the Base Conversion Development Authority (hereinafter referred to as BCDA). DOTC is expected to select the most appropriate railway construction plan from among those plans.

Based on this situation, the Philippine Government has requested that the Japanese Government conduct a pre-feasibility study for development of a railway strategy connecting CIA to NCR.

1.2 Objectives of the Study

This study aims to develop an appropriate plan for the Airport Express Railway (hereinafter referred to as AER) which connects CIA to NCR. This plan will be a part of the development of seamless transportation networks in the Subic-Clark-Manila-Batangas growth corridor.

1.3 Study Area

The area of this study includes the provinces of Pampanga, Bulacan and NCR.

1.4 Scope of the Study

Items which were studied are shown in Table 1.4-1. Figure 1.4-1 shows the workflow of the Study. Three

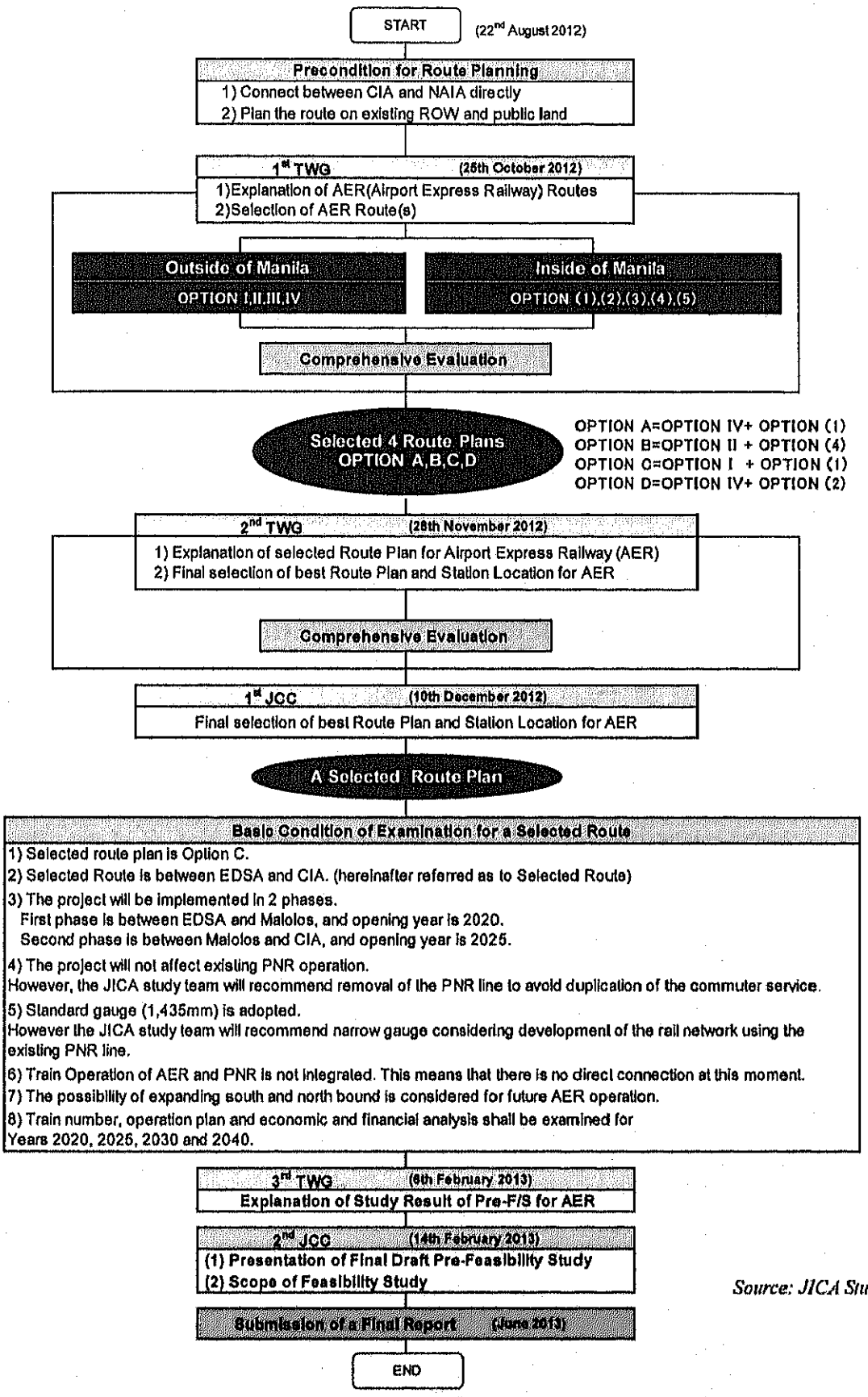
Technical Working Groups (TWGs) and two Joint Coordination Committees (JCCs) had been held with the attendance of representatives of JICA, DOTC, Northrail, BCDA, DPWH and other relevant organizations in both Philippine and Japanese Governments. During those meetings the selection of the optimal route for the AER, based on result of demand forecast, travelling time, and cost was discussed and agreed. Moreover, the economic and financial evaluation of selected route, and organizational structures were also discussed and agreed.

Additional traffic survey and topographic survey were required in order to obtain technical data regarding South bound extension of the optimum route between EDSA and Food Terminal Incorporated (FTI). Amendment of the contract was made in March 2013.

Table 1.4-1 Items to be Studied

	Classification	Substance
1	Preparation, Explanation and Discussion of the Inception Report	• Collection and analysis of relevant information • Preparation of the Inception Report
2	Confirmation of the Situation and Issues in the GCR Transportation Sector	• Confirmation of the current situation of railway utilization (PNR, LRT) • Confirmation of the current situation of NAIA and CIA airport access • Identification of the future role of CIA
3	Review of Existing Related Plans/ Studies of Access Railways	• Confirmation of existing development plans • Confirmation of intentions of the Philippine side • Confirmation of the current situation of the North Rail Project
4	Review of Related Organizations	• Confirmation of organization control, missions, staffs, capacity, authority • Confirmation of budget and financial situation
5	Demand forecast	• Review of existing traffic survey in GCR • Investigation of airport access • Setting modal split • Demand forecast
6	Consideration of Route Plan and Service Frequency	• Route planning (optimal locations of stations) • Train operation plan • Facilities service
7	Geological Survey	• Topographical survey (vertical/ horizontal) • Geological survey
8	Confirmation of Suitability of Applied Technologies	• Confirmation of predominance of Japanese railway technologies • Safe train operation, aseismic design and technology • Confirmation of relevant existing standards • Train operation management • Maintenance
9	Procurement and Facilities Planning	• Railway operation system • Project implementation schedule • Procurement plan for materials and equipment • Calculation of project implementation cost
10	Railway Operation and Maintenance Management Systems	• Proposal of implementation system • Capacity for implementation • Proposal of operation system • Operational capability
11	Environmental and Social Considerations	• Comparison of alternative plans based on strategic environmental assessment • Pre-scoping for environmental and social impact of priority project • Support for holding stakeholders' meetings and preparation for environmental and social impact advice committee • Implementation of survey for consideration of the environment and society
12	Economic and Financial Analysis	• Evaluation of economic and financial analysis • Proposal of project implementation scheme
13	Consideration Points and Proposals for Project Realization	• Identification of the critical paths for project realization • Identification of issues for project realization (Priorities concerning development, capacity of railway operation)

Source: JICA Study Team



Source: JICA Study Team

Figure 1.4-1 Workflow of the Study

1.5 Contents of the Report

The contents of this report are as follows:

CHAPTER 1 **INTRODUCTION**

Chapter 1 is an introduction of the Study: background, objectives and scope of the Study.

CHAPTER 2 **ASSESSMENT OF TRANSPORTATION SECTOR IN GCR**

Chapter 2 describes the results of the study on current status of railways in GCR, NAIA and CIA airports, and the road between GCR and CIA.

CHAPTER 3 **REVIEW OF EXISTING PLANS/STUDIES OF ACCESS RAILWAYS**

Chapter 3 describes the results of the review of existing plans and studies regarding the Access Railways to CIA and current situation of the Northrail Project.

CHAPTER 4 **REVIEW OF RELATED ORGANIZATIONS**

Chapter 4 is an introduction of the organizations relevant to the Study: DOTC, NLRC, BCDA and PNR etc.

CHAPTER 5 **TRAVEL DEMAND FORECAST**

Chapter 5 describes the results of the future travel demand forecast through the traffic surveys conducted by the Study Team, several analysis of future population, airport passenger demand of NAIA and CIA etc.

CHAPTER 6 **ROUTE PLAN AND RAILWAY SYSTEM**

Chapter 6 describes the study on the route plan and railway systems: planning concept of AER, selection of the best route and station locations, brief planning of train operation and rolling stock through site investigations, detailed analysis of the railway system, structure type, fare rate system etc.

CHAPTER 7 **CONFIRMATION OF SUITABILITY OF APPLIED TECHOLOGIES**

Chapter 7 describes the study on the superiority of Japanese railway technologies, train operation safety, relevant existing standards, train operation management, and maintenance for rolling stock, E&M and civil.

CHAPTER 8 **PROCUREMENT AND CONSTRUCTION PLAN**

Chapter 8 describes the study on the railway operation schemes, project implementation schedule and phasing, procurement plan for materials and equipment, construction workability, and project implementation cost for rolling stock, E&M and civil.

CHAPTER 9 **RAILWAY OPERATION AND MAINTENANCE MANAGEMENT SYSTEMS**

Chapter 9 describes the study on the railway operation and maintenance management systems.

CHAPTER 10 **ENVIRONMENTAL AND SOCIAL CONSIDERATIONS**

Chapter 10 describes the comparative analysis of alternatives based on the concept of strategic environmental assessment, pre-scoping for environmental and social impacts of priority projects.

The result of stakeholder consultation meetings will be reported in the Final Report.

CHAPTER11 **PROJECT EVALUATION**

Chapter 11 describes the study on the economic and financial evaluation, and a proposal of a project implementation scheme.

CHAPTER 12 **CONSIDERATION POINTS AND PROPOSALS FOR REALIZATION OF THE PROJECT**

Chapter 12 describes the study for project realization: critical paths and issues such as priorities concerning development, capacity of operation etc.

1.6 Basic Condition of Examination for Selected Route

Chapter 6 describes the selection process of the route plan for AER.

An optimum route for AER was selected in the 1st JCC meeting, and JST examined the Travel Demand Forecast, Travel Time and Economic Financials after 1st JCC meeting to comply with the following conditions.

1) Selected route plan is Option C.

2) Selected Route is between EDSA and CIA (hereinafter referred as to Selected Route)

3) The project will be implemented in 2 phases.
First phase is between EDSA and Malolos, and opening year is 2020.
Second phase is between Malolos and CIA, and opening year is 2025.

4) The project will not affect existing PNR operation. However, the JICA study team will recommend removal of the PNR line to avoid duplication of the commuter service.

5) Standard gauge (1,435mm) is adopted. However the JICA study team will recommend narrow gauge considering development of the rail network using the existing PNR line.

6) Train Operation of AER and PNR is not integrated. This means that there is no direct connection at this moment.

7) The possibility of expanding south and north bound is considered for future AER operation.

8) Train number, operation plan and economic and financial analysis shall be examined for Years 2020, 2025, 2030 and 2040.

CHAPTER 2

ASSESSMENT OF TRANSPORTATION SECTOR IN GCR

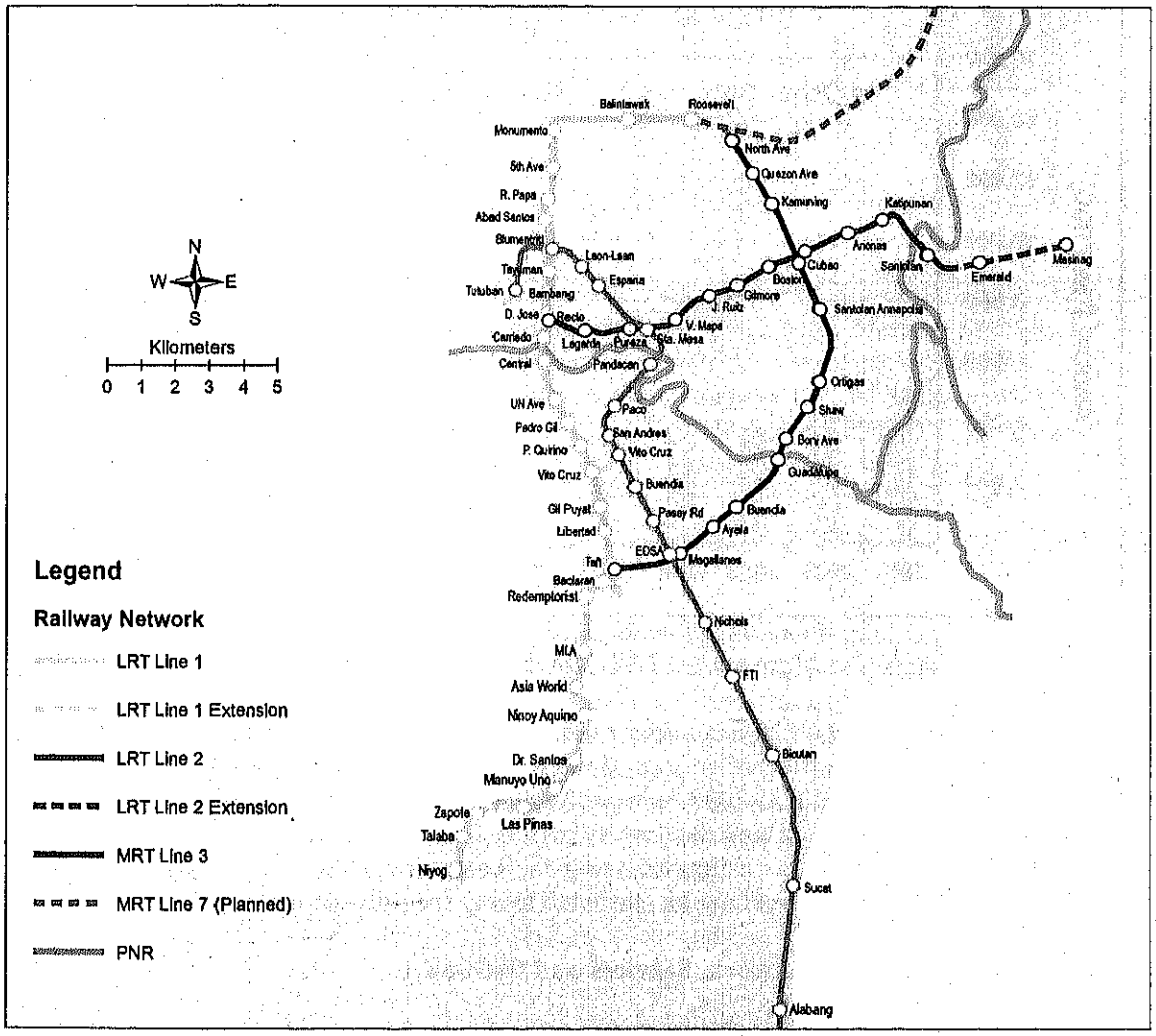
CHAPTER 2 ASSESSMENT OF TRANSPORTATION SECTOR IN GCR

2.1 Current Status of Railways in GCR

The current rail network in GCR consists of the Philippines National Railway Lines and urban mass transit lines within Metro Manila (MM). The operational lines and future planned/ proposed lines are shown in Figure 2.1-1 and may be summarized as:

- PNR Commuter service between Metro Manila and Alabang; and PNR long distance services in Luzon Island;
- LRT Line-1, a north-south line from Roosevelt (Quezon City) to Baclaran (Pasay City);
- LRT Line-2 an east-west line from Santolan (Pasig City) to Recto in Manila City, and
- MRT Line-3 a semi-circle north-south line from North Avenue in Quezon City to EDSA station in Pasay City.

This chapter describes the key features of these lines, services provided, and the future roles of these lines in serving the urban and sub-urban transportation needs of the GCR population.



Source: LRTA Website & Updated by JICA Study Team

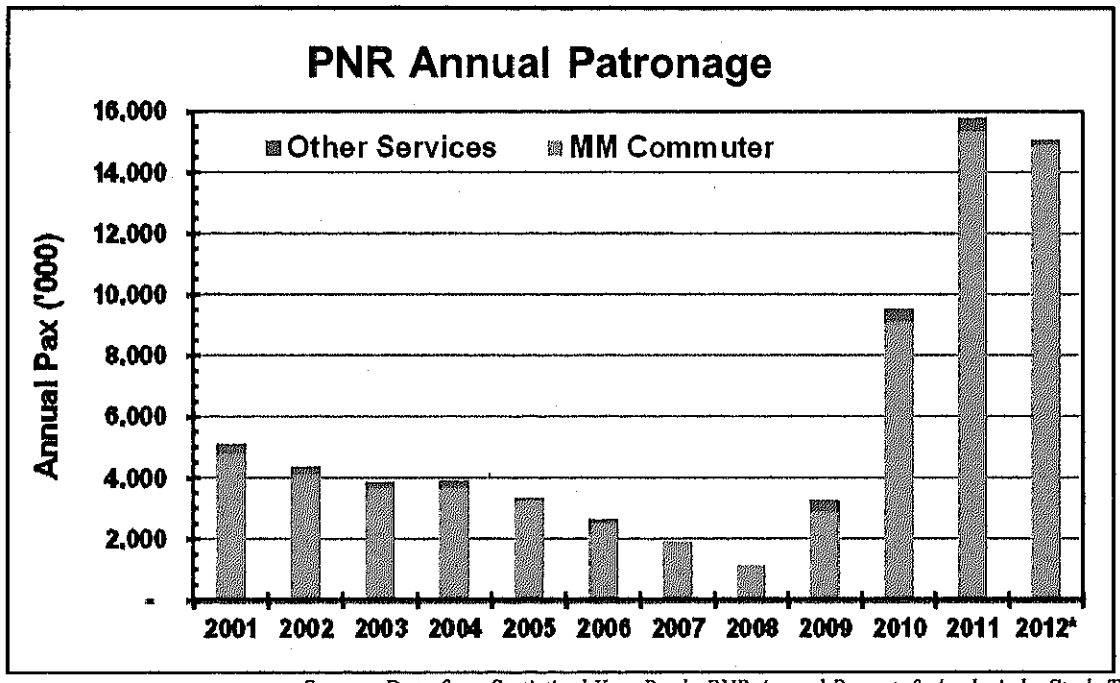
Figure 2.1-1Railways in GCR Area

2.1.1 Philippines National Railways (PNR)

1) History

The PNR network on Luzon Island mainly consists of a north-south line operating out of Metro Manila (MM) main railway station of Tutuban. The services and patronage has been in decline as far the record is available, as per the Philippines Statistical Year Book. Services to the north out of MM have been suspended almost since the conception of the North Rail (NR) Project, and the long distance services to the south of MM to Bicol were suspended after the severe typhoon in September 2006. The only remaining on-going service since 2006 has been between MM and Alabang.

Analysis of the patronage over the last decade paints a bleak picture. However, in 2009 PNR introduced new (mostly refurbished) rolling stock for services between MM and Alabang and some limited service to Binan, and beyond to Bicol. As a result, the patronage has increased considerably on the MM – Alabang section of the line. Figure 2.1-2 below shows the annual ridership on the PNR network for MM-Alabang and Other-services.



Source: Data from Statistical Year Book, PNR Annual Reports& Analysis by Study Team

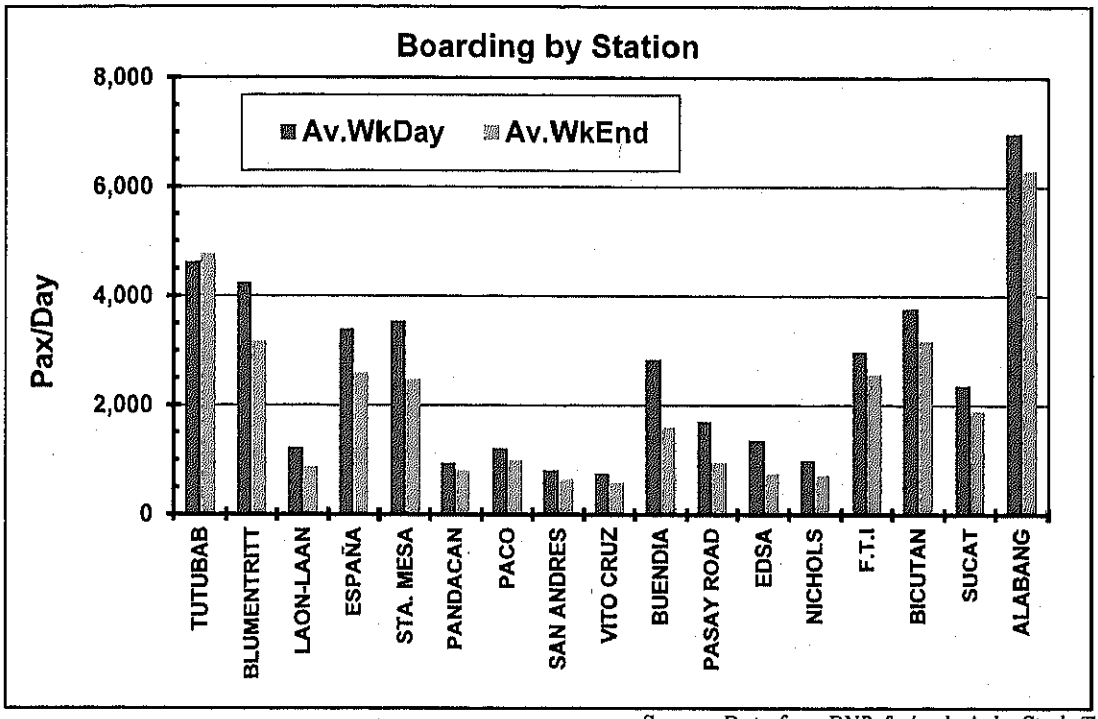
Figure 2.1-2 PNR Patronage 2001-2012

The data shows that since 2001 PNR was losing ridership by about ½ million passengers per annum, and hit bottom by 2008 at just over 1.1million Pax. However, with the introduction of when the new rolling stock (JR used car and DMU) in mid-2009 between MM and Alabang, the ridership decline reversed and reached a peak of about sixteen million passengers in 2011. The 2012 data was available for January to November, and December data was estimated using the past trend. The 2012 total patronage shows a small decrease over 2011, which could not be attributed to any specific factor.

2) PNR Current Operational Network, Services and Patronage

The PNR network in the GCR extends from Tutuban (MM) to Alabang, which is a narrow gauge double track (except Sucat – Alabang section) over a length of about 28km. PNR operates this section from 5:00A M to 19:00 daily, with ½ hourly service during the AM & PM peak periods (06:00-11:00 & 15:00-19:00) from Monday through Saturday and hourly service during the inter-peak times and on Sundays. The average week-day ridership by station for the MM-Alabang section is illustrated in Figure

2.1-3. The average week-day ridership during Jan-Nov 2011 was about 46,700 passengers per day, compared with around 34,700 Pax over the average week-end day. Patronage data shows that the demand on Saturday is similar to the average week day demand. Using the data it was estimated that the ratio of annual ridership to average weekday is about 340, compared to the factor of 330 estimated from the LRT lines of MM.

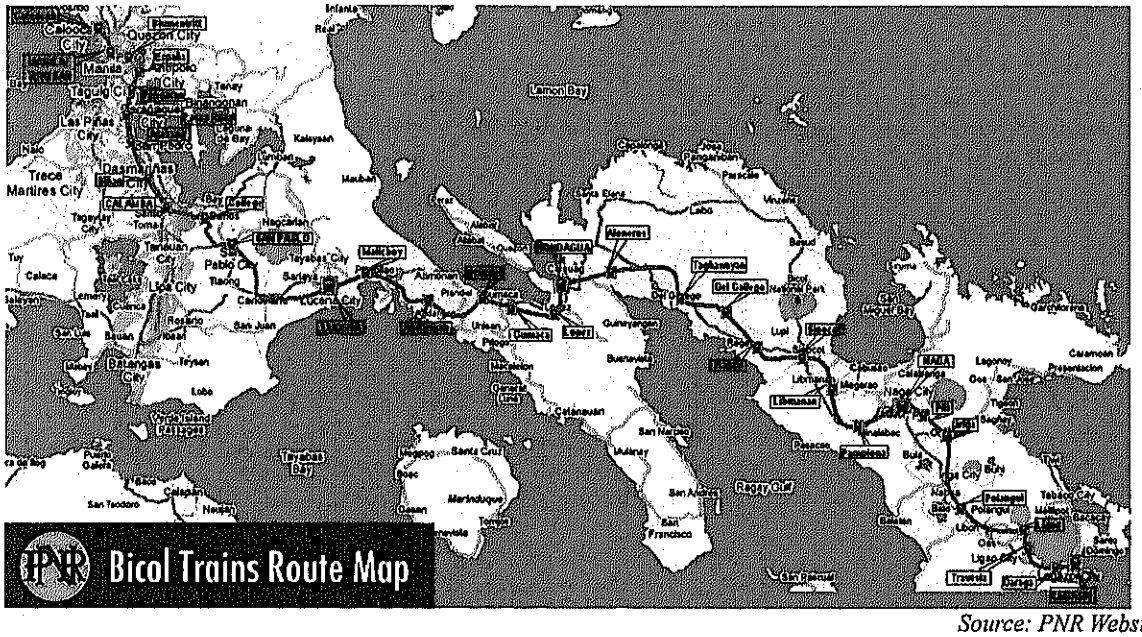


Source: Data from PNR & Analysis by Study Teams

Figure 2.1-3 PNR Patronage by Station Jan-Nov 2012 MM-Alabang Section

It can be seen that most of the demand is commuters from Alabang to MM either to Blumentritt or to Tutuban, the three stations with highest boarding per day. By international standards such demand of less than 50,000 Pax/day could easily be serviced with a well-planned BRT system let alone an LRT, mass transit or main-line railways. However, it is an important north-south corridor and cannot be ignored for its utility in the future. Personal travel on the corridor indicated that the lack of demand is more due to lack of infrastructure and decent service rather than lack of demand.

In addition, the PNR network in the south of Luzon Island is shown in Figure 2.1-4. It is a single track from MM to Bicol/ Mayon 415 km long. PNR runs 3-trains a week to Bicol and three trains back to MM. In addition PNR also runs limited commuter services in Bicol area with patronage less than 2,000 Pax per day. This is of little interest here. As per time-table the journey should take about 13 hours from MM to Bicol, but it is common knowledge that more often it takes up to 20~24 hours. This is mostly due to very poor track condition, numerous at-grade level crossings, and old rolling stock. Therefore, for obvious reasons the patronage is very low on the long haul section. This service is run for social reasons at a very low fare rather than to provide rail travel between MM and Bicol.



Source: PNR Website

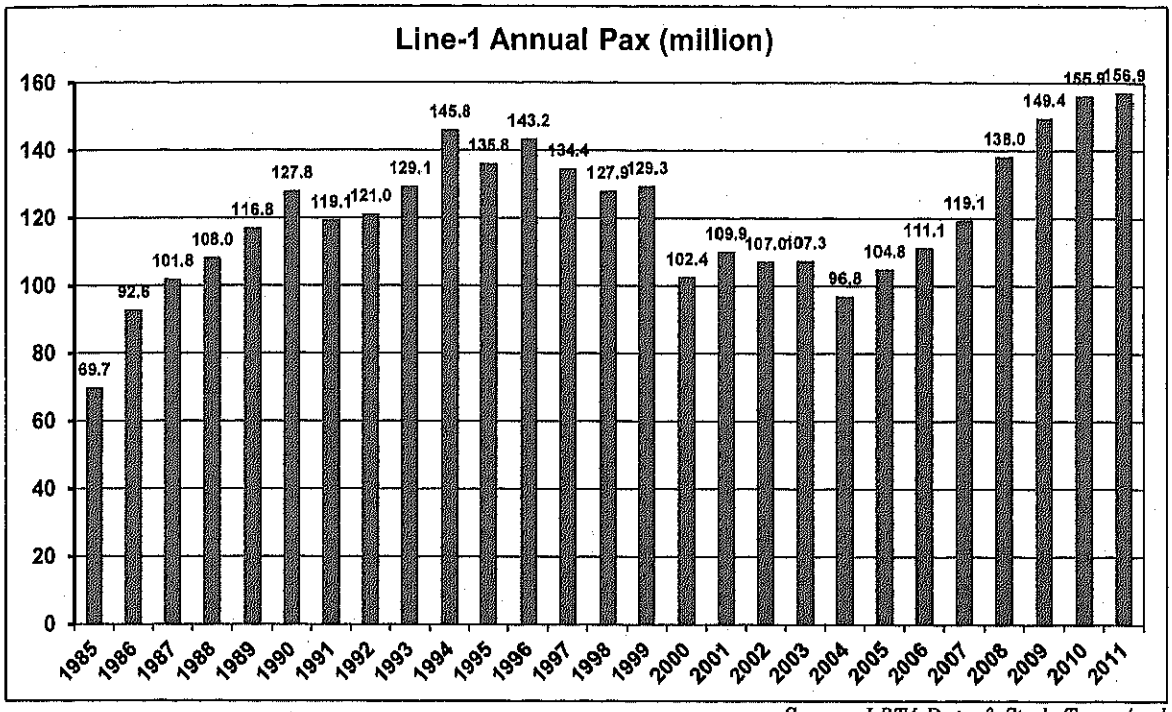
Figure 2.1-4 PNR Network in Luzon Island Philippines

2.1.2 Metro Manila LRT Line-1 Characteristics, Patronage and Future Expansion

1) History

Metro Manila's first elevated Light Rail Transit 14km long line from Baclaran in the south to Monumento in the north, with 18 stations along some of the busiest roads, Rizal Avenue and Taft Avenue opened for revenue service in December 1984. In 1985, the 1st full year of operation, the patronage of Line-1 was 69.7 million passengers (Pax). The growth in demand was steady and it reached 127.8m by 1990, and increased to a peak of 145.8 million Pax by 1994 (an average growth rate of about 8.5% p.a. from 1985 to 1994). Then the ridership started to decline due to poor maintenance and other technical reasons. The decline in patronage continued until 2004 (further exacerbated by the 20% increase in LRT fares in December 2003) and it was 96.8 million Pax in 2004, almost 40% less than it was a decade before that.

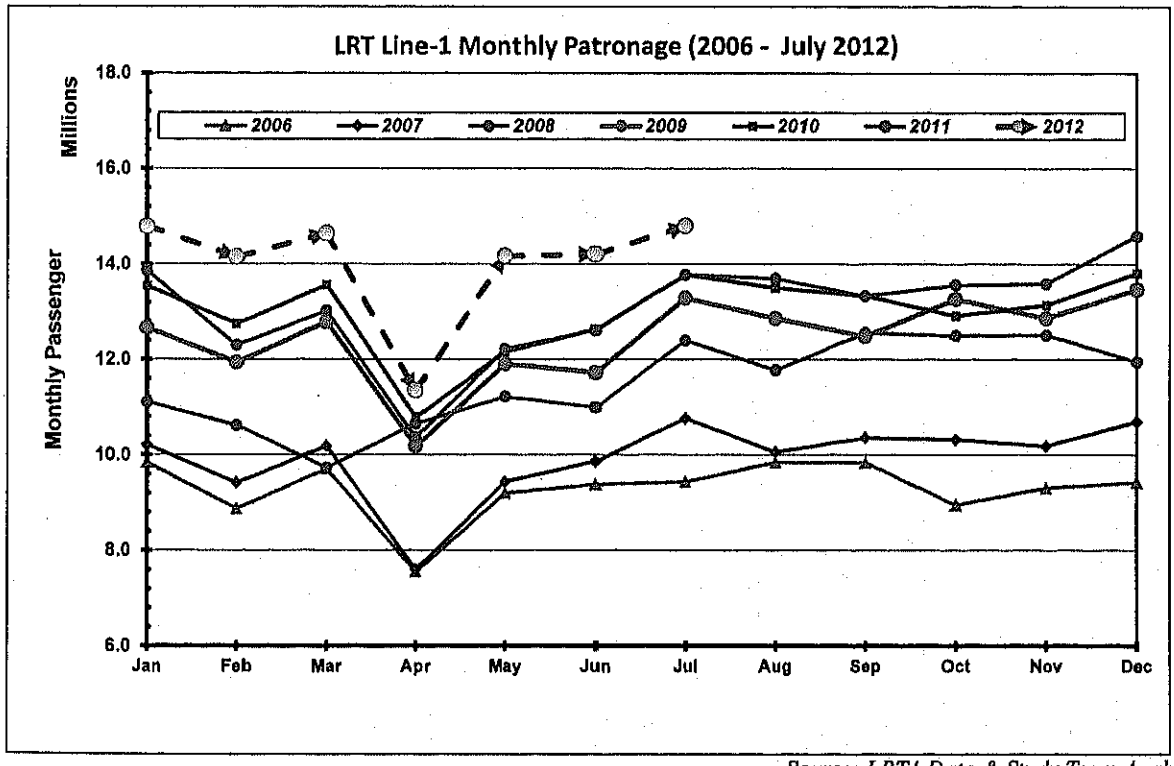
However, the declining patronage trend was reversed in 2005, and since 2005 it has been increasing steadily. In 2011 patronage of 156.9 million Pax were recorded on Line-1 after an eastward extension from Monumento of 5.7km with two new stations (Balintawak & Roosevelt), which opened in 2010. This gives an annual average growth rate for the decade: 2001 to 2011 of 3.62% per annum. Annual patronage of Line-1 since opening is shown below in Figure 2.1-5. It can be seen that the drop in patronage from 145 million annual Pax to around 100~110 million Pax annually throughout the 1st half of the last decade was mostly related to the available capacity of the rolling stock. With the provision of the additional rolling stock, growth in population and the economy, and ever increasing road congestion, Line-1 was able get its patronage back to the peak of 145+ million Pax per annum by 2009 and is able to sustain the patronage increase albeit at a lower growth rate. Line-1 still has capacity to carry more passengers, if the capacity expansion is carried out systematically and with the '*vision*' to provide accessibility and mobility to its '*Customers*', and not just as a means of transport from A to B.



Source: LRTA Data & Study Team Analysis

Figure 2.1-5 Line-1 Patronage 1984-2011

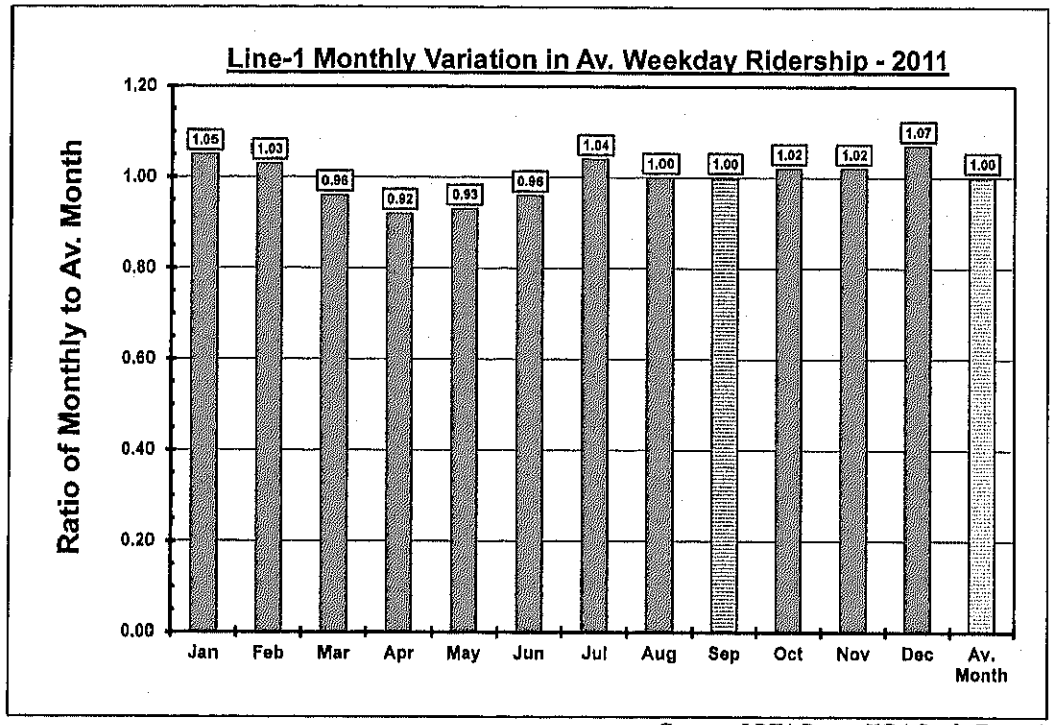
Analysis of the recent patronage data up to July 2012, shows a much higher than average growth rate since the 2005-06 period. The monthly patronage for the last six years is depicted in Figure 2.1-6. It can be seen that patronage in every month of 2012 is higher than the corresponding month in the past. The demand in July 2012 reached 14.8million Pax, over one million more than the same month the previous year. This is a healthy trend for an urban mass transit system providing a good commuter service.



Source: LRTA Data & Study Team Analysis

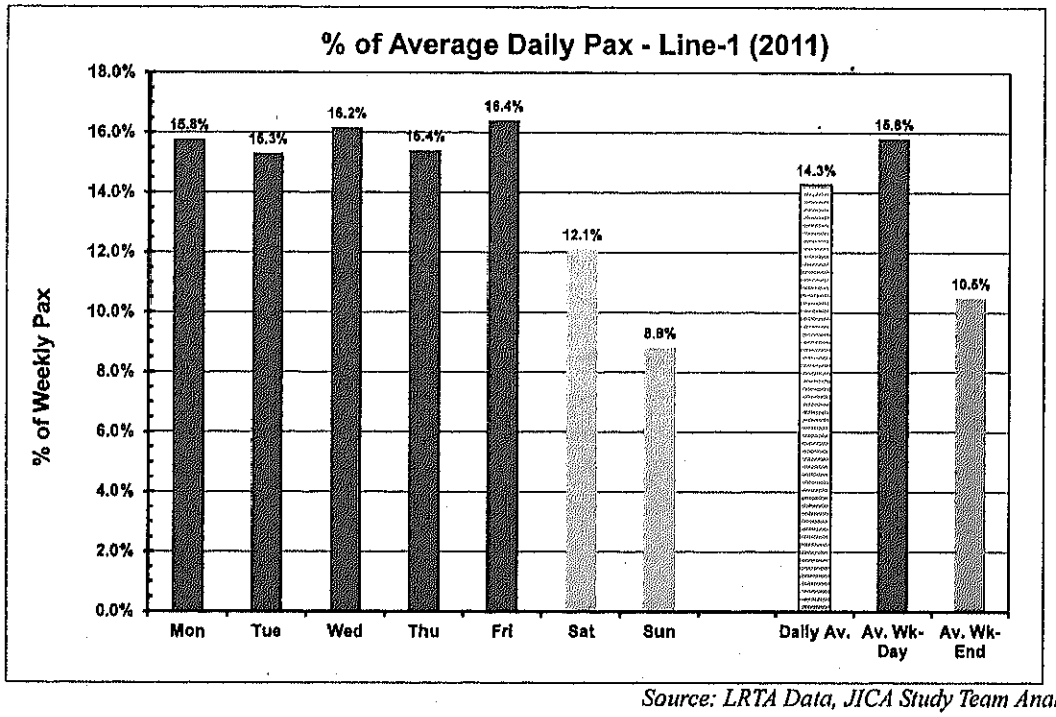
Figure 2.1-6 Line-1 Monthly Patronage 2006 to July 2012

The monthly variation in demand is illustrated in Figure 2.1-7, which shows that demand is highest during the festive month of December, and lowest in April during which the Line is closed for 4-day holidays. The weekday variation in Line-1 daily patronage demand is shown in Figure 2.1-8 below. During the weekday the demand tends to be similar, with slightly higher demand on Fridays. Over the weekend, patronage on Saturday drops to about 75% of the average weekday demand and Sundays account for 55% of the average weekday demand.



Source: LRTA Data, JICA Study Team Analysis

Figure 2.1-7 Monthly Variations in Line-1 Patronage

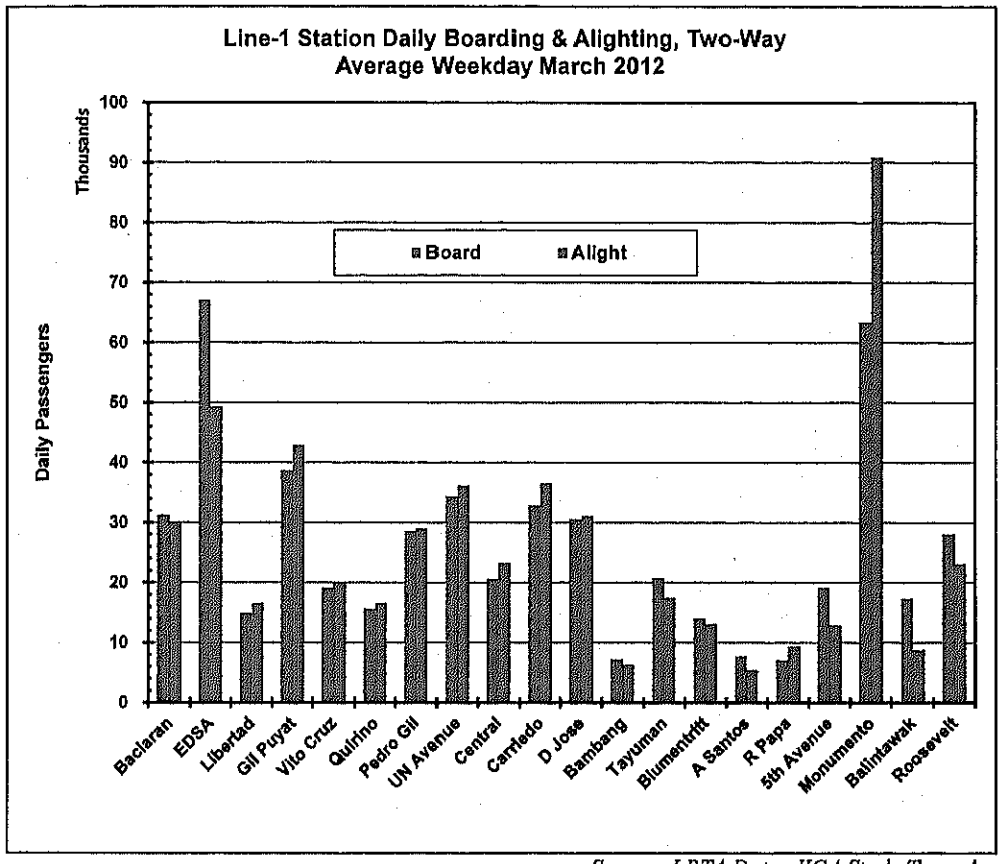


Source: LRTA Data, JICA Study Team Analysis

Figure 2.1-8 Daily Variations in Patronage Line-1

2) Current Demand and Peak Line Loading

The daily patronage on Line-1 is around 520,000 passengers. Pax distribution by station is depicted in Figure 2.1-9. It is interesting to note that the daily boarding and alighting numbers tend to differ considerably by station. In fact, in the case of Monumento station in March 2012, almost 30% more passengers alighted, than boarded. It shows that passengers choose different modes of travel in different directions of travel. Most stations have high patronage of around 40,000 boarding and alighting passengers daily, with the exception of a few intermediate stations. The line has no direct passenger transfer station with the PNR or the other two mass transit lines. However, passengers could exit Line-1 and transfer to PNR (via street transfer) at Blumentritt station and via footbridges/ shopping mall walkways to Line-2 at D Jose and Line-3 at Taft. These transfers are less than convenient to say the least, however passengers do transfer from Line-1 at these stations, and it is also evident from the high station boarding/ alighting at these stations.



Source: LRTA Data, JICA Study Team Analysis

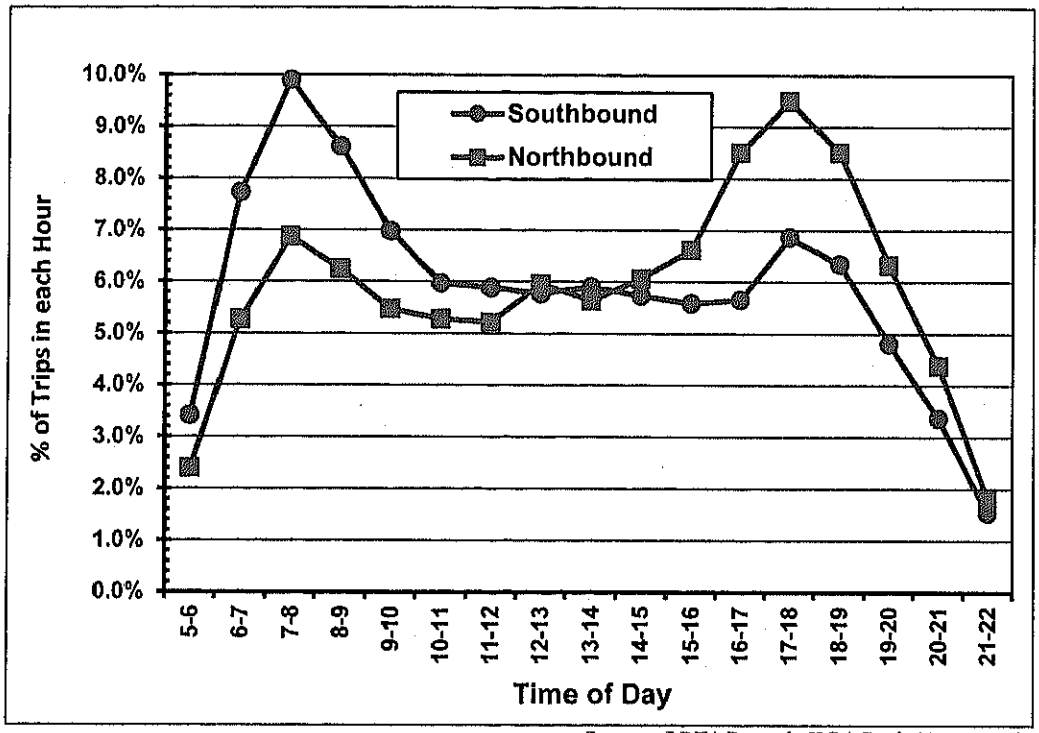
Figure 2.1-9 Line-1 Daily Passenger Boarding & Alighting by Station

LRTA passenger boarding/ alighting data by direction of travel was analyzed for an average weekday of March 2012 (most recent data available). Figure 2.1-10 shows the percentage of trips by time of day in March 2012. It can be seen that the demand is highest (9.9% of total daily trips) in the morning between 07:00 to 08:00 in the southbound direction, and in the evening the peak is 9.5% of daily northbound demand between 17:00 to 18:00. These peak proportions may seem to be on the high side in relation to the road traffic, but in fact in some cities the peak demand on transit systems is even higher and could be as high as 13% of the daily demand.

The demand in the morning peak is the highest between 07:00 to 08:00 in the southbound direction, the peak boarding, alighting and line volumes in the peak south direction are shown in Figure 2.1-11. In the evening, the peak is in the northbound direction between 17:00 and 18:00 and the passenger demand for each station and line volumes are illustrated in Figure 2.1-12. The line loading is much higher (20,000

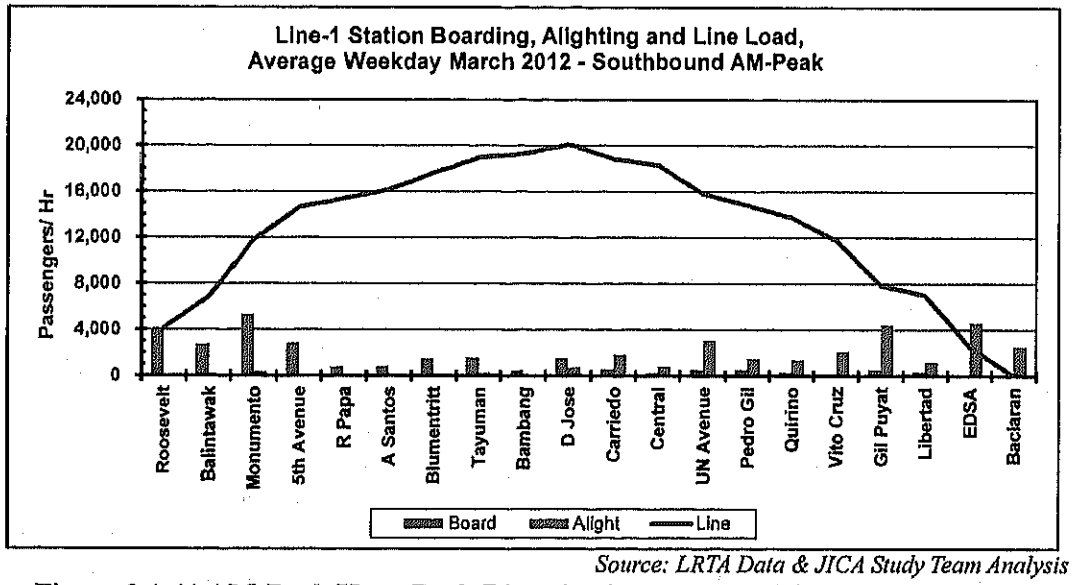
PPHPD) in the AM-Peak hour than in the PM peak hour of around 17,000 PPHPD.

The demand is met by train operation at maximum headway of about 3 minutes between trains with crush load of about 1,300 Pax per train. It can be seen that in the morning rush hour it is operating almost at capacity on the section between Blumentritt and UN Avenue station with line volume in excess of 17,000 Pax per hour per direction, a load factor of over 85%, barely a comfortable ride. The rolling stock used is a mixture of old and new 4 car trains of various ages.



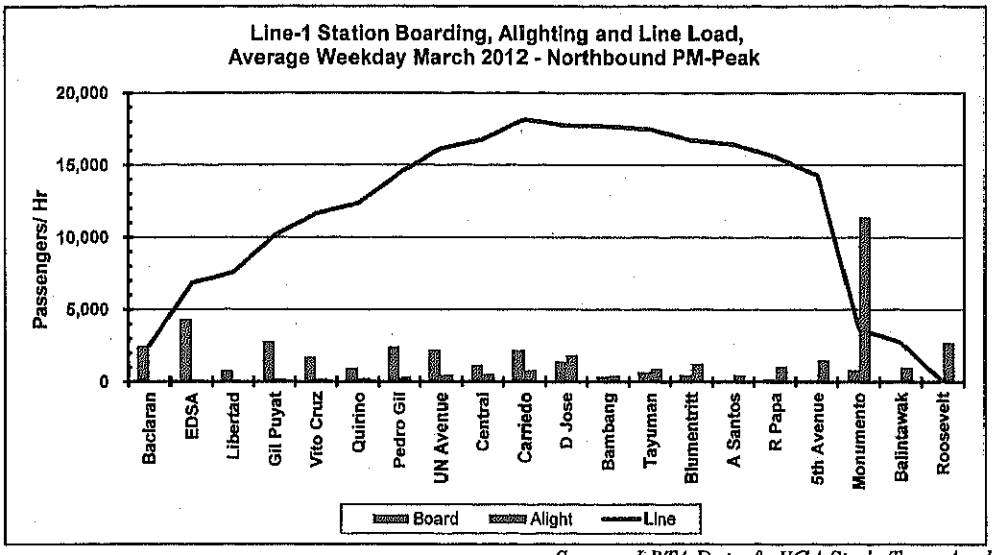
Source: LRTA Data & JICA Study Team Analysis

Figure 2.1-10 Line-1 Variations in Patronage by Time of Day



Source: LRTA Data & JICA Study Team Analysis

Figure 2.1-11 AM-Peak Hour Peak Direction Passenger & Line Volume, Line-1



Source: LRTA Data & JICA Study Team Analysis

Figure 2.1-12 PM-Peak Hour Peak Direction Passenger & Line Volume, Line-1

3) Future Extension to the South & North

The Line-1 south extension project (in tendering stage as of December 2012) would extend the line by 11.8km to Niyog in Cavite province, with ten new stations. This planned extension was first proposed in the late 1990's and its implementation is long overdue. The extension would also provide new rolling stock for the existing section of the line, thus improving the much needed service standard. The proposed extension has also been outlined on GCR railways map shown in Figure 2.1-1 at the beginning of this section.

The Line-1 extension to the north-east to connect with MRT Line-3 via a new station or directly to North Avenue station has been under planning for some time without conclusion. This project would provide direct transfer of passengers between Line-3 and Line-1. There is a possibility that the gap could also be closed by extending Line-3 to Line-1 (Roosevelt Station), so that passenger could have easy transfer between lines, irrespective of which line is extended. However, the status of this project and how to close the gap is unclear at this stage. If the gap is closed then it could also be possible to run continuous train operation along Lines 1 & 3, an ideal situation, where passengers would not have to transfer between Lines 1 and 3.

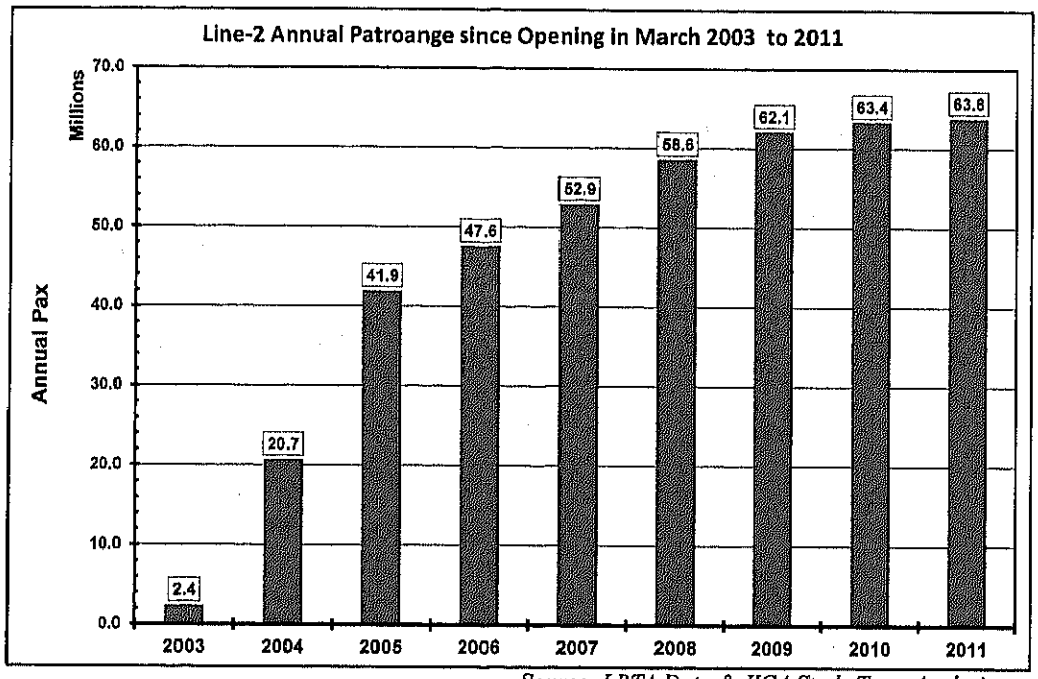
2.1.3 Metro Manila LRT Line-2 Characteristics, Patronage and Future Expansion

1) History

Metro Manila's latest elevated Light Rail Transit Line-2 12.6km long with 11 stations runs from Recto in Manila City to Santolan (Pasig City) in the east along the busy east-west radial Marcos Highway, Aurora Blvd. Magsaysay Av. and CM Recto Av. The line opened for revenue service in April 2003. In 2004, the 1st full year of operation, the patronage on Line-2 was 20.6 million passengers (Pax). The growth in demand was instantaneous and the ridership more than doubled by 2005 to 41.9 million Pax, and increased by another 40% by 2008 to reach 58.9 million Pax. After that the demand growth rate steadied and an average growth of about 3% from 2008 to 2011 has been recorded. By the end of 2011 the annual patronage had reached nearly 63.8 million Pax.

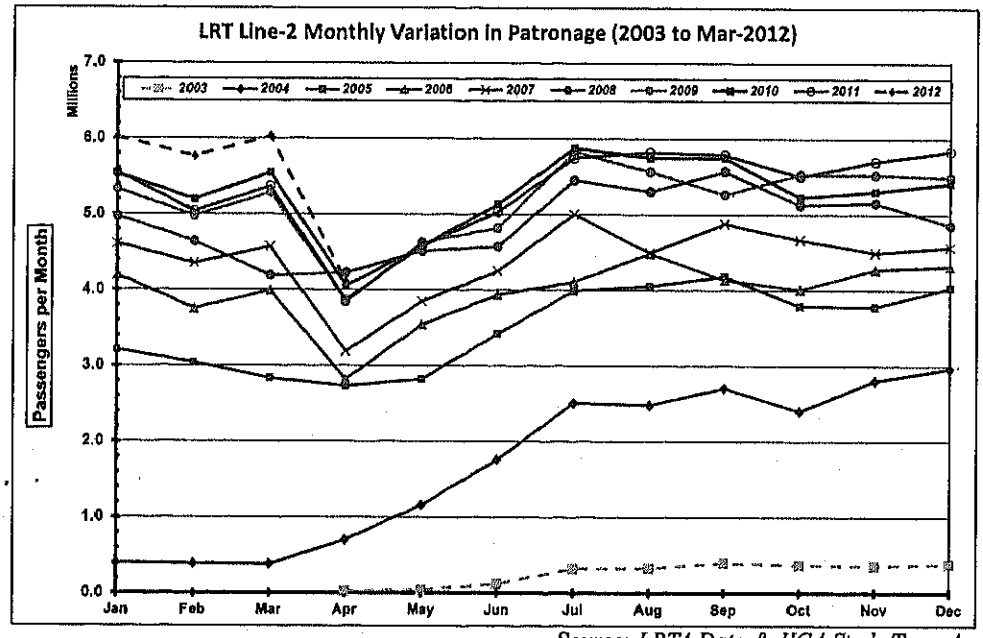
Analysis of the 1st seven month (January to July 2012) ridership data shows that it increased by 12.6% compared with the patronage for the same period of 2011. Line-2 annual patronage since opening is illustrated below in Figure 2.1-13. It can be seen that since 2008 the growth had steadied. However, the lower growth of the last three years has been more than compensated for by higher than average growth

in the 1st and 2nd quarters of 2012. Figure 2.1-14 shows the monthly demand from 2003 to April 2012, and the high growth of 2012 is evident. Similar growth in demand is expected in the later months of the year, and if projected on the same basis the 2012 patronage is likely to be around seventy million Pax. Based on the available 2012 ridership data analysis it was estimated that the average weekday demand is expected to be around 212,000 passengers per day. This takes into account the variations in monthly demand analyzed for 2011 and shown in Figure 2.1-15.



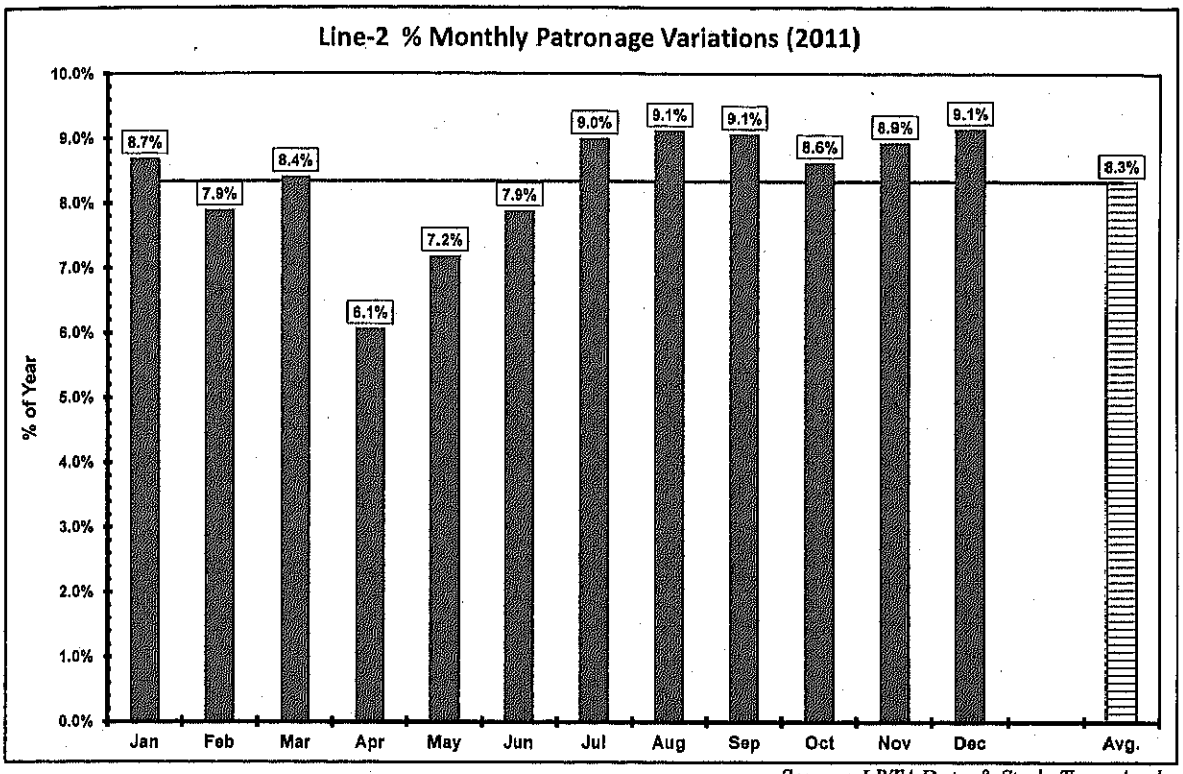
Source: LRTA Data & JICA Study Team Analysis

Figure 2.1-13 Line-2 Ridership, 2003-2011



Source: LRTA Data & JICA Study Team Analysis

Figure 2.1-14 Line-2 Monthly Ridership, 2007 to July 2012



Source: LRTA Data & Study Team Analysis

Figure 2.1-15 Line-2 Monthly Ridership 2011

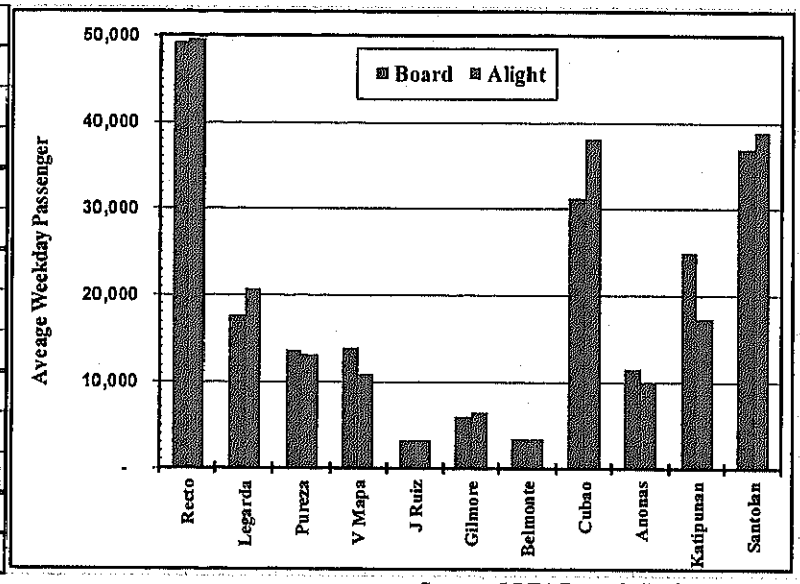
2) Current Demand and Peak Line Loading

The total daily boarding and alighting estimated for an average weekday demand for 2012 is illustrated in Figure 2.1-16. It can be seen that the busiest station is Recto, closely followed by Santolan, the two terminal stations. Cubao station is the next busiest station, as it is a major hub for commercial activity and also for passengers to interchange with MRT Line-3. The daily boarding and alighting for some stations over the daily operational hours differ substantially like Cubao and Katipunan stations, where the difference is more than 10% of daily demand.

This aspect was further analyzed using available data from other months. It is a strange phenomenon, not common on mass transit lines around the world, and the directional variations changes by the day throughout the year and in some cases it is quite extreme, whereas on other days boarding and alighting for a station can be quite similar. This has to do with the choice of different modes/ routes to and from work, for example some passengers returning from work may stop off for other activities, or on the other hand some passengers may get a lift or use a more comfortable mode in the morning and return by LRT.

It can be seen that other than the terminal and interchange stations, patronage on other stations is small, particularly: J Ruiz, Gilmore and Belmonte where the daily boarding and alighting were less than 20,000 Pax per day. This goes to show that most passengers use the line from the eastern end of Metro Manila to the busy Manila centers of Legarda and Recto. This is also evident from the analysis of average trip length frequency distribution of the patronage data which gives a daily average trip length of 7.9km for the 12.6km long line, which indicates that, on average, every passenger traveled almost 2/3 of the entire length of the line.

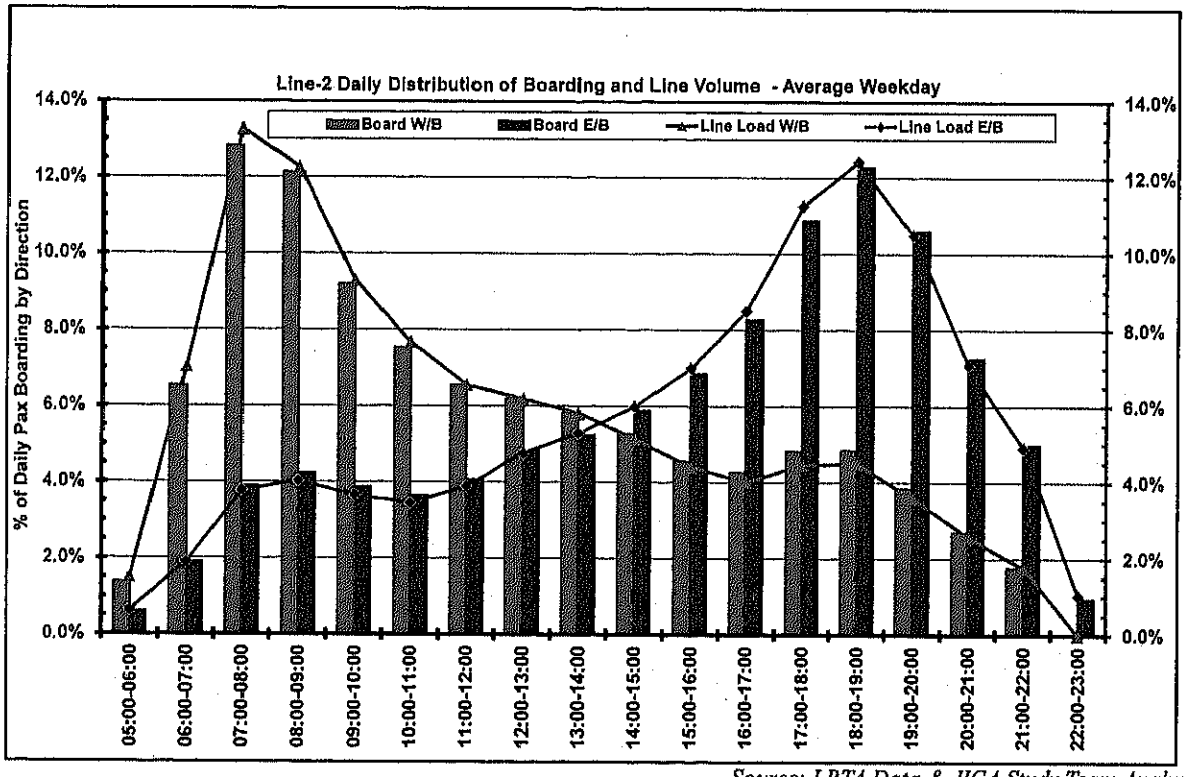
Station	Board	Alight
Recto	49,300	49,600
Legarda	17,600	20,800
Pureza	13,700	13,200
V Mapa	14,000	10,900
J Ruiz	3,200	3,200
Gilmore	6,000	6,500
Belmonte	3,500	3,400
Cubao	31,300	38,100
Anonas	11,500	10,100
Katipunan	25,000	17,400
Santolan	37,000	38,900
Total	212,200	212,200
Average Trip Length (km)		7.86



Source: LRTA Data & Study Team Analysis

Figure 2.1-16 Line-2 Daily (Average Weekday) Station Boarding & Alighting - 2012

Analysis of daily distribution of demand by direction of travel over the operational hours is illustrated in Figure 2.1-17. It can be seen that the AM-Peak loading on Line-2 is more pronounced than the PM-Peak. In the morning, the recorded peak is 13.3% of daily boarding in the westbound direction between 07:00 and 08:00. The evening peak ridership is lower than the morning, and it is estimated to be 12.4% of the daily demand. The evening peak occurs between 18:00 and 19:00. The patronage during the off-peak hours of 10:00-16:00 is less than 7% of the daily ridership.

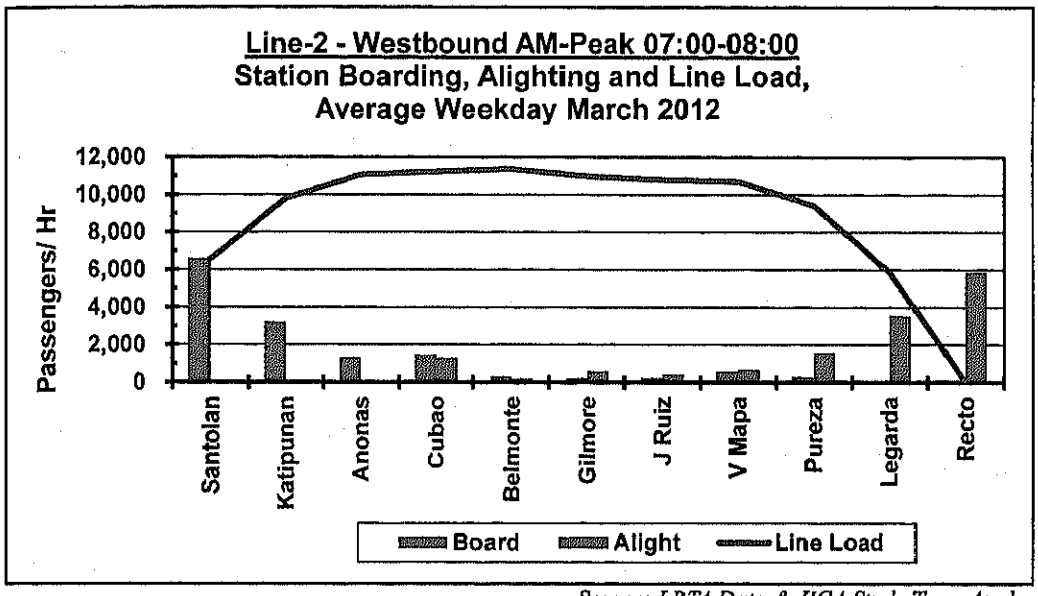


Source: LRTA Data & JICA Study Team Analysis

Figure 2.1-17 Line-2, % of Average Weekday Ridership During Operational Hours-2012

The AM-Peak hour (07:00-08:00) is the busiest ridership period on the line. Figure 2.1-18 illustrates the station boarding, alighting, and line load as maximum Passengers Per-Hour Per- Direction (PPHPD) for

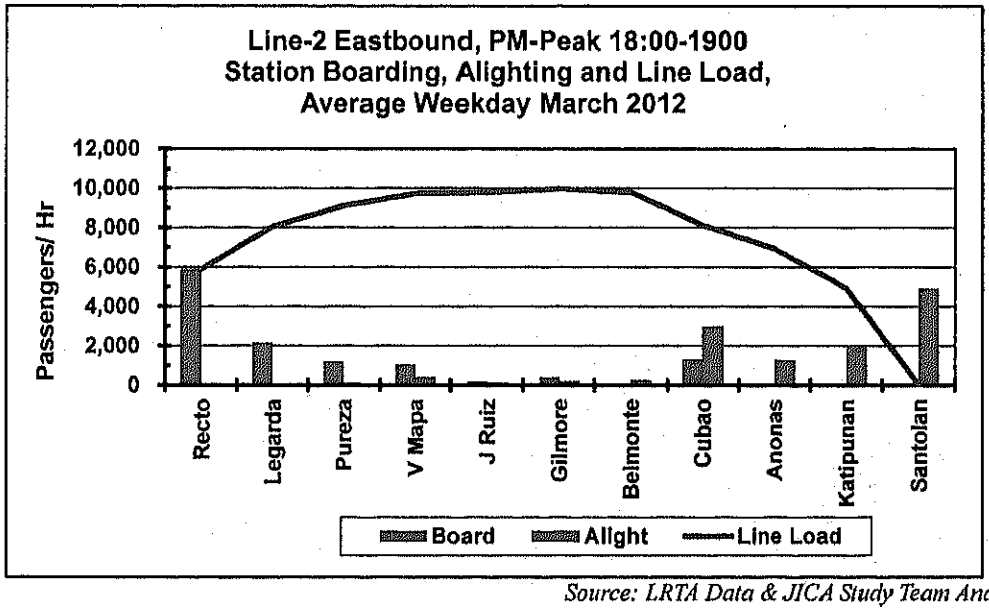
both directions of travel in the morning 07:00 to 08:00. The peak hour (2-way) demand accounts for about 8.5% of the daily total (2-way) ridership. The current 2012 peak ridership (PPHPD) is estimated to be 11,000 Pax/hour/ direction between Belmonte and Gilmore stations in the westbound direction. It is also interesting to note that the line load is similar, above 10,000 Pax from Anonas to Pureza station over half the length (7.2km) of the line



Source: LRTA Data & JICA Study Team Analysis

Figure 2.1-18 Line-2 AM-Peak Hour Demand Characteristics – 2012

The demand in the evening peak is about 10% lower than in the morning peak hour of 08:00-09:00, and is in the westbound direction between 18:00 and 19:00 and the passenger demand for each station and line volume is estimated to be close to 10,000 PPHPD as illustrated below in Figure 2.1-19.



Source: LRTA Data & JICA Study Team Analysis

Figure 2.1-19 Line-2 PM-Peak Hour Demand Characteristics – 2012

The peak demand is met by operation of 4-car trains at 5 minute headways, at a comfortable load factor of about 60~70% under 1,000 Pax per train which has a crush capacity of 1,600 passengers per train. In the evening peak the load factor is even lower than the morning peak, providing a more comfortable ride.

3) Future Extension to the East and West

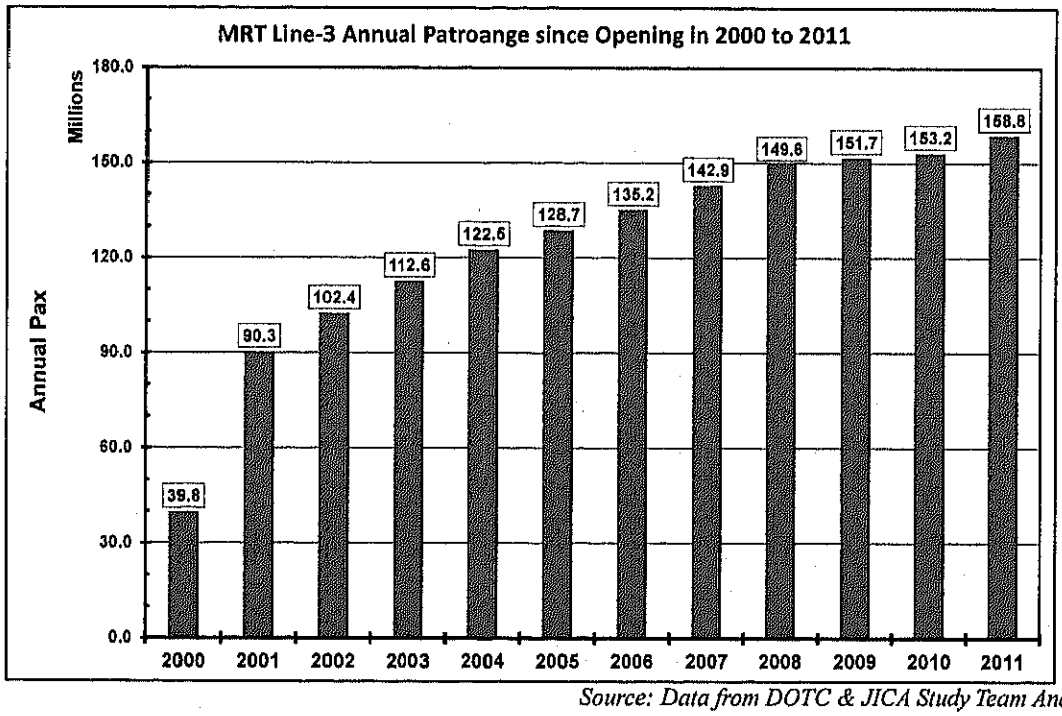
The Line-2 extension to east for about 4.2km with two new stations at Emerald and to terminate at Masinag has been recently studied by JICA and DOTC. Its implementation schedule remains uncertain. Similarly, an extension to the West beyond Recto towards the coast through dense urban areas has also been investigated, but was found to be not very feasible, and therefore remains as a pending project. The Line-2 extension to the east is shown in Figure 2.1-1 in the previous section.

2.1.4 Metro Manila MRT Line-3 Characteristics, Patronage and Future

1) History

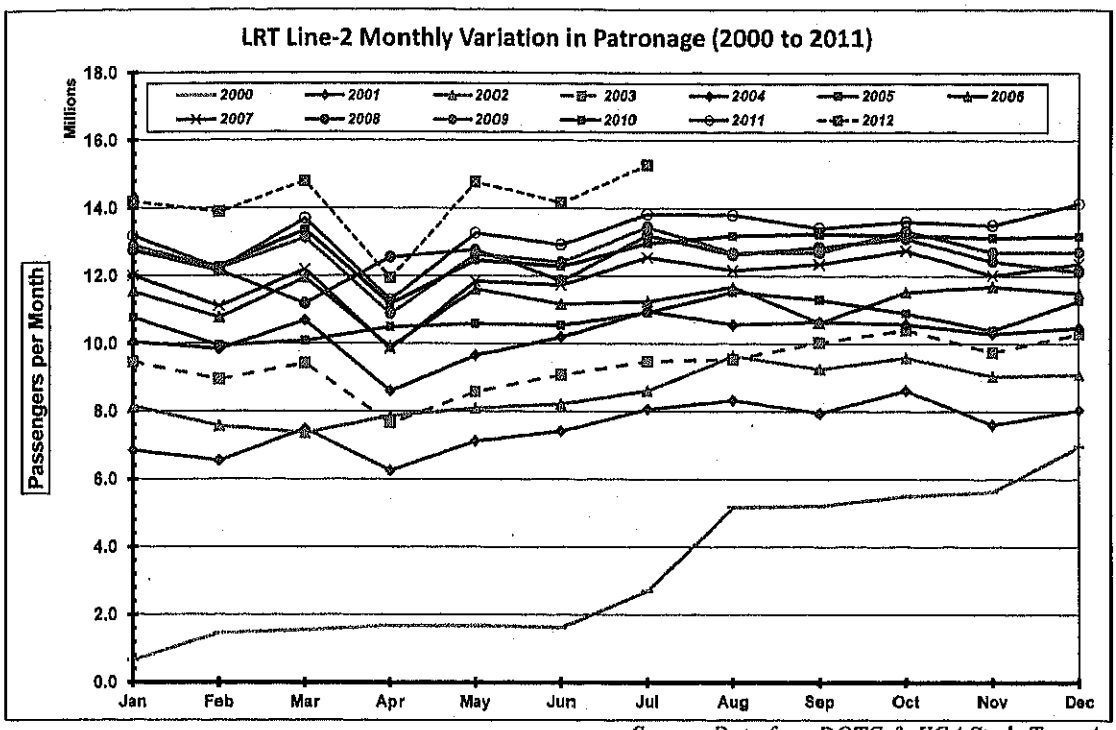
Metro Manila's Mass Rail Transit MRT Line-3, is 16.9km long with 13 stations from EDSA (Pasay City) in the south to North Avenue (Quezon City) in the north-east. The alignment is mostly elevated along the busiest circumferential road (C-4) of MM, with the exception of a small section in Makati City where it is underground. It partially opened to service in late 1999, and the full line opened for revenue service in July 2000. In 2001, the 1st full year of operation, the patronage on the line was 90.2 million passengers (Pax), more than double the Pax carried in 2000. The growth in demand was instantaneous from the opening and the ridership grew at more than 10% per annum for the next two years and then steadied to around 5% p.a.

By 2009 it had reached almost peak carrying capacity and exceeded 150 million Pax per annum, with some month's patronage above 13 million passengers. Line-3 annual patronage and growth rate since opening is illustrated below in Figure 2.1-20. Figure 2.1-21 shows the variation in monthly demand in 2011. It was estimated that the average weekday demand on Line-3 is about 570,000 passenger/day, despite higher than average growth in demand in June and July 2011.



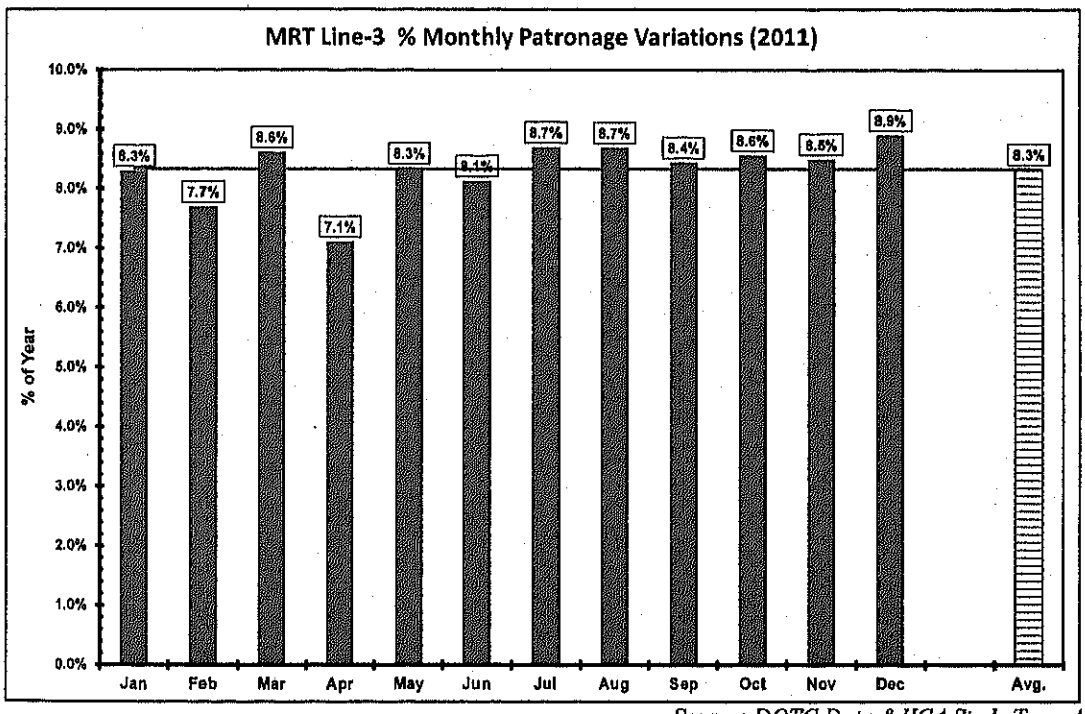
Source: Data from DOTC & JICA Study Team Analysis

Figure 2.1-20 Line-3 Ridership, 2000-2011



Source: Data from DOTC & JICA Study Team Analysis

Figure 2.1-21 MRT Line-3 Monthly Ridership, 2000 to 2011

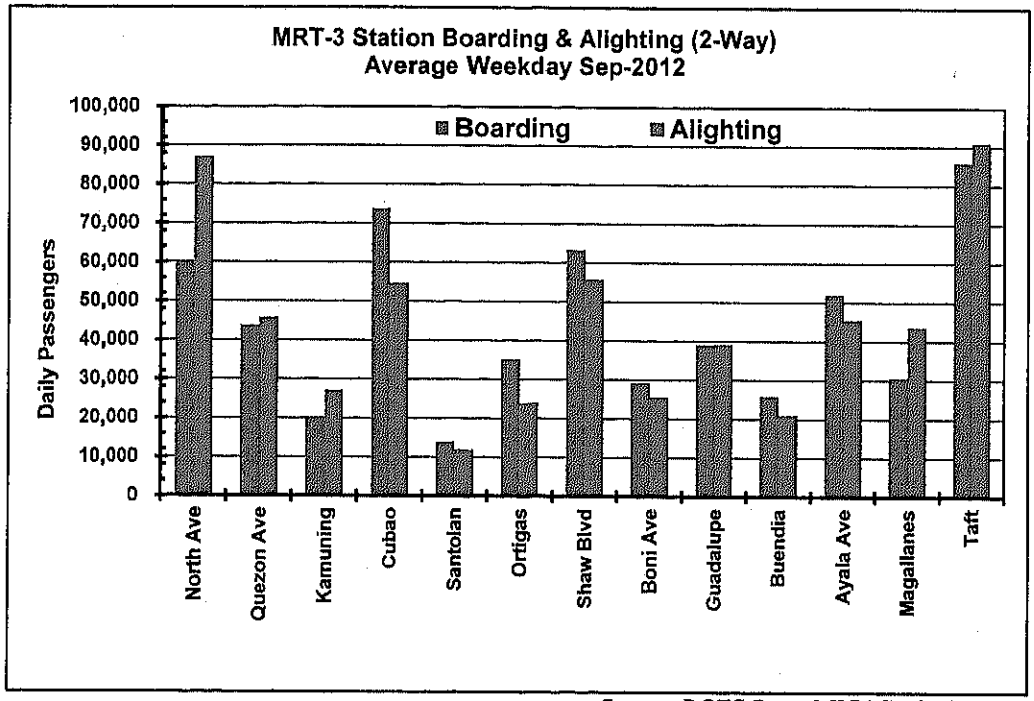


Source: DOTC Data &JICA Study Team Analysis

Figure 2.1-22 MRT Line-3 Variation in 2011 Monthly Ridership

2) Current Demand and Peak Line Loading

The total daily boarding and alighting estimated for an average weekday demand of 570,000 in 2012 is illustrated in Figure 2.1-23. It can be seen that the busiest stations are the two terminal stations, with Taft exceeding 90,000 boarding/ alighting and North Avenue around 80,000 daily, similar to Cuba station where passengers transfer to/ from Line-2.



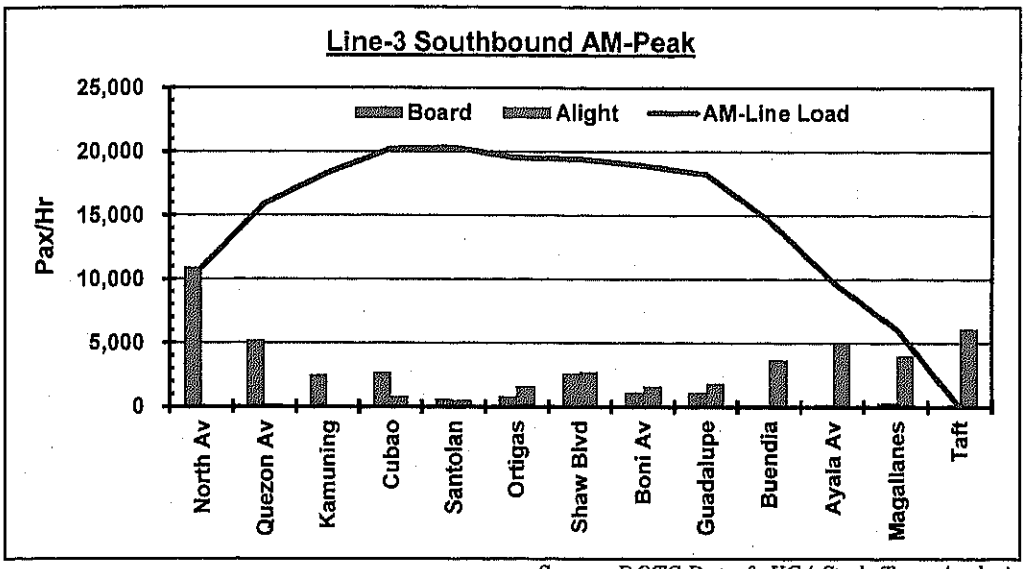
Source: DOTC Data &JICA Study Team Analysis

Figure 2.1-23 MRT Line-3 Average Week-day Station Boarding & Alighting, 2012

Analysis of daily distribution of demand by direction of travel over the operational hours revealed that the AM-Peak loading on Line-3 is similar to the PM-Peak, and accounts for 8.4% of the daily Pax. In the morning, the recorded peak is in the southbound direction between 07:00 and 08:00. The evening peak ridership occurs between 18:00 and 19:00. The patronage during the off-peak hours of 10:00-16:00 is 5.4% per hour, of the daily ridership.

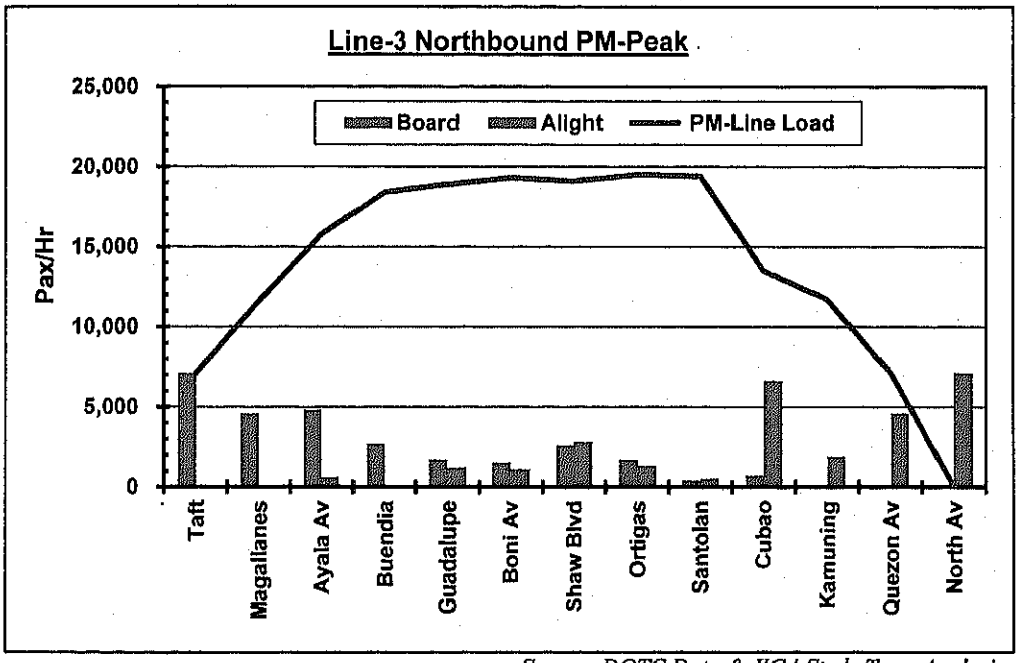
The AM-Peak hour (07:00-08:00) is the busiest ridership period on the line, Figure 2.1-24 illustrates that the station boarding, alighting, and line load as maximum Passengers Per Hour Per Direction (PPHPD) exceeds 20,000 in the southbound direction between Cubao and Guadalupe stations with an average trip length of 8.9km. This implies that most passengers travel in the discomfort of a packed train over ½ of the length of Line-3. The situation in the PM-Peak is similar to the morning peak, but in the northbound direction. The line volume is in excess of 19,000 PPHPD between Ayala and Cubao stations, with maximum boarding and alighting at the terminal stations of Taft and North Avenue, as shown in Figure 2.1-25.

The peak demand is met by operation of 3-car trains at about three minute headways, at a fairly un-comfortable load of factor of over 90% of the stated capacity of the train of 1,080 Pax. The situation is further worsened (as revealed by the latest operational data) that during the peak hours 17~19 trains per hour are available for operation. This results in over-crowding on the platforms and some times blocking back to ticket gates causing a dangerous situation for passengers on the platforms and in the concourse areas. In addition, the passengers suffer unnecessary delays due to delayed trains.



Source: DOTC Data & JICA Study Team Analysis

Figure 2.1-24 Line-3 AM-Peak Hour Demand Characteristics – 2012



Source: DOTC Data & JICA Study Team Analysis

Figure 2.1-25 Line-3 PM-Peak Hour Demand Characteristics – 2012

3) Future Capacity Expansion of Line-3 and Possible Line Extension/ Capacity Expansion

Of immediate concern is the capacity expansion of line volume by decreasing the headway with the introduction of additional rolling stock. In the medium to long term, the station access arrangements would need to be upgraded at many stations for a comfortable walk, and level change through escalators and overcrowded stairs. In addition, access to many stations from the immediate walk-in catchment area needs to be improved through widening of footpaths, direct access to adjacent buildings etc. Further, when planning and implementing Line-7 to the Quezon area, it should be connected to Lines 1 & 3 through an integrated transfer station, rather than some 500-700m away like the current transfer stations between all lines, as shown in Figure 2.1-1.

2.2 Current Status of NAIA and CIA

2.2.1 Introduction

There are six operational airports in the NCR and Philippines Region III, of which only three airports are in the Greater Capital Region (GCR), there are three airports which provide international and domestic passenger transport:

a. Ninoy Aquino International Airport (NAIA) – gateway airport of the Philippines,
b. Clark International Airport (CIA); and
c. Plaridel in Bulacan Province.

Both domestic and international air traffic volumes in the Philippines have been growing at high annual growth rates of some 10% in the past 5 years. NAIA is currently facing capacity problems on both airside and landside facilities during peak hours. In comparison, CIA is not fully utilized despite the fact that it was designated as a premier international gateway airport for the Philippines by Executive Order No. 174 more than 17 years ago in 1994, and its status has been re-iterated/ defined many times after that through other Executive Orders. However, its use has remained limited until recently, with the introduction of Budget carriers to/ from the Asian region that use CIA.

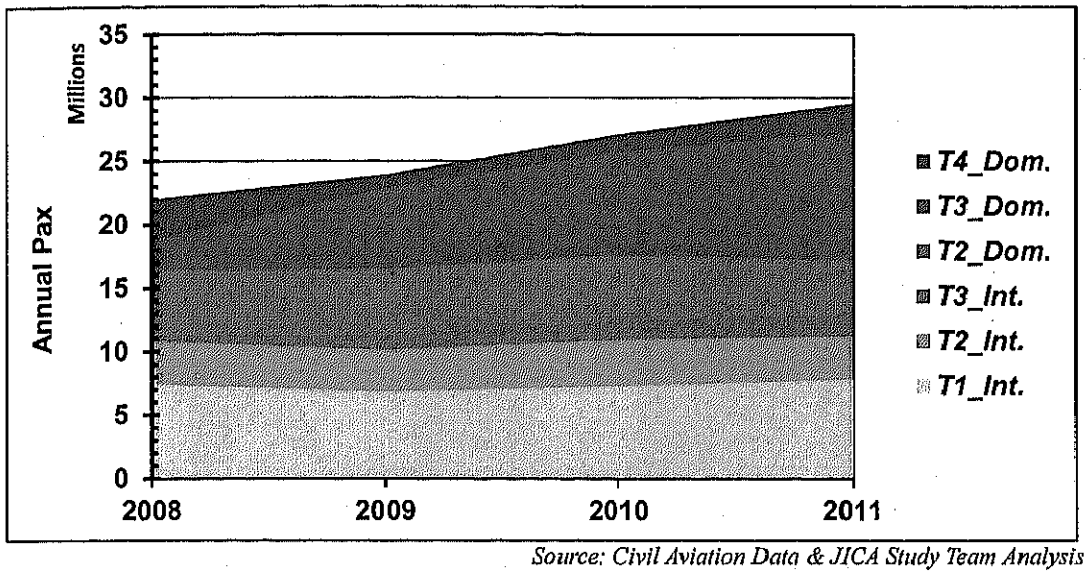
One of the main reasons for the under-utilization of CIA is likely to be the unpredictable travel time between CIA and the main centre of air passenger demand in Metro Manila caused by the prevailing poor land transport facilities. In addition, there has been a lack of clear and definite policy on how to share the Greater Capital Region (GCR) air traffic demand between NAIA and CIA. A recent major study on this subject, funded by JICA, details these reasons in much detail, yet a clear answer as to roles of NAIA and CIA in the GCR remains elusive.

Plaridel airport mostly handles General aviation flights, with limited public passenger services. In 2009, it handled just over 5,000 air passengers (*Source: Philippines Statistical Year Book – 2011*). Hence, it is of little interest to this study.

2.2.2 Air Passenger Demand at NAIA and CIA

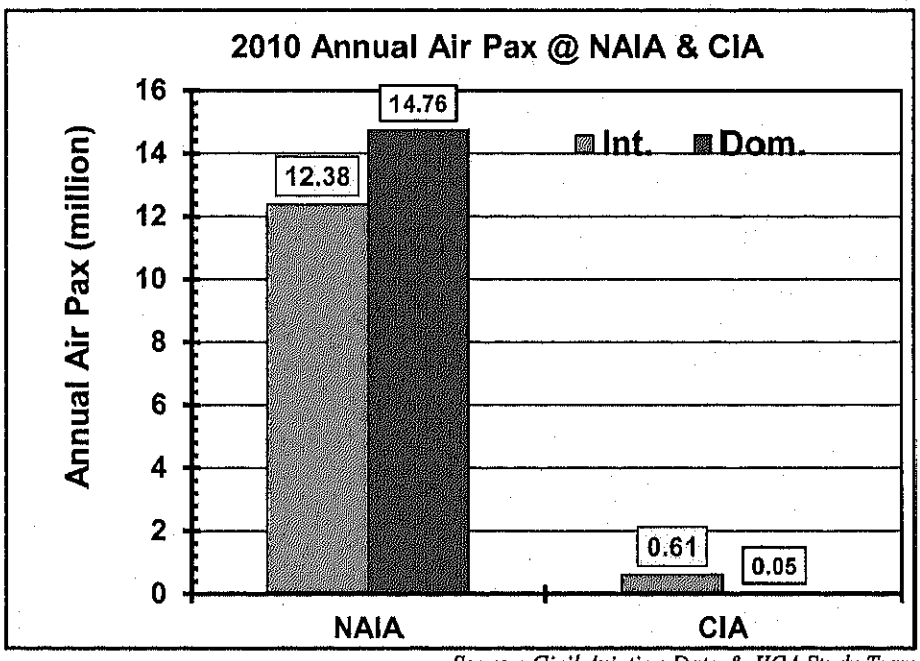
There has been considerable growth in air passenger demand at NAIA. The international demand is more volatile than the domestic demand. However, international Pax grew on average of around 5% p.a., whereas domestic demand has been growing at more than 10% p.a. since 2008. In 2009, the domestic demand was greater than the International demand for the first time, and in 2011 it was 25% more than the international demand. The international and domestic passenger growth since 2008 is illustrated in Figure 2.2-1 for each of the four terminals of NAIA. NAIA is currently handling around 30million Pax per annum and is almost at its technical capacity for handling aircraft at peak times. Recently, there have been incidents where flights have been diverted from NAIA due to technical issues, as reported in the local press.

In contrast, in 2010 (*most recent data available for CIA*) NAIA handled over 97% of the GCR air transport demand of 27.8million Pax, compared to just over 650,000 international and domestic Pax at CIA. This comparison is further illustrated below in Figure 2.2-2. It is also interesting to note that there is little domestic demand at CIA, further strengthening the issue of access to CIA from the NCR (MM) region, the main domestic demand center. This recent high growth in the domestic demand is not sustainable due to lack of capacity at NAIA and the domestic demand to/ from CIA would remain low due the unpredictable and long travel time to/ from Manila. However, CIA, in the short term, would continue to attract low cost (budget) international carriers used by Philippines workers abroad, mostly in the Asian region. If further supported by provision of improved terminal facilities and better local transport, CIA could support the GCR air passenger growth until the role for NAIA and CIA is confirmed and materialized by the development of CIA.



Source: Civil Aviation Data & JICA Study Team Analysis

Figure 2.2-1 Air Passenger Demand at NAIA



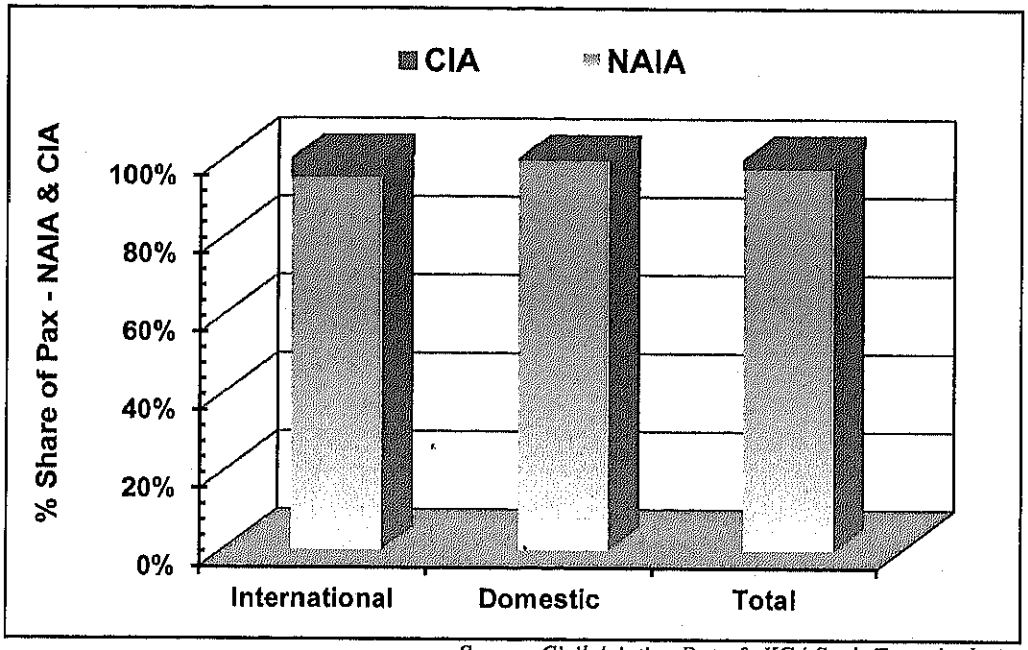
Source: Civil Aviation Data & JICA Study Team Analysis

Figure 2.2-2 Comparison of Air Passenger 2010 Demand at NAIA & CIA

In order to fully understand the current travel demands of the passengers, meeters and greeters, and workers both at NAIA and CIA comprehensive traffic and interview surveys were conducted for this study. The results of these surveys are presented in Section 5.2 of this report.

2.2.3 Development of Airports in GCR

There has been strong growth in air travel demand and it is anticipated to continue in the GCR. However, both airlines and passengers continue to use and focus on NAIA. This is evident from the CIA share of air passengers in the region, and it is illustrated below in Figure 2.2-3. The Government of the Philippines' various decrees, and efforts to promote CIA have not materialized. Its distance and lack of good, reliable, and dependable access mode(s) remains the main stumbling block.



Source: Civil Aviation Data & JICA Study Team Analysis

Figure 2.2-3 Comparison of Air Passenger 2010 Demand at NAIA & CIA

As a result of the lack of progress on the development of CIA, a number of studies / proposals (both solicited and unsolicited) have put forward a number of options. These options, as surmised in the 2011 JICA study are listed below. These options were studied in quite some detail by the JICA study. However, there was no concrete conclusion/ recommendation of the study on the choice of any one or multiple options; other than to divide the air transport demand on some rational basis between NAIA and CIA, and proceed with connecting CIA to MM by a high speed rail link – the main objective of this study.

- Option 1: San Nicholas Shoals (offshore airport site in Manila Bay);
- Option 2: Angat-Pandi-Bustos (inland airport development in Bulacan);
- Option 3: Obando (offshore airport development in Bulacan);
- Option 4: Taguig (offshore airport site in Laguna de Bay near NAIA);
- Option 5: Rizal-Talim Island (offshore airport site in Laguna de Bay); and
- Option 6: Clark International Airport (CIA).

Further analysis of the distribution of demand between NAIA and CIA is discussed in detail in Section 5.5 of this report under a range of scenarios for the forecast years.

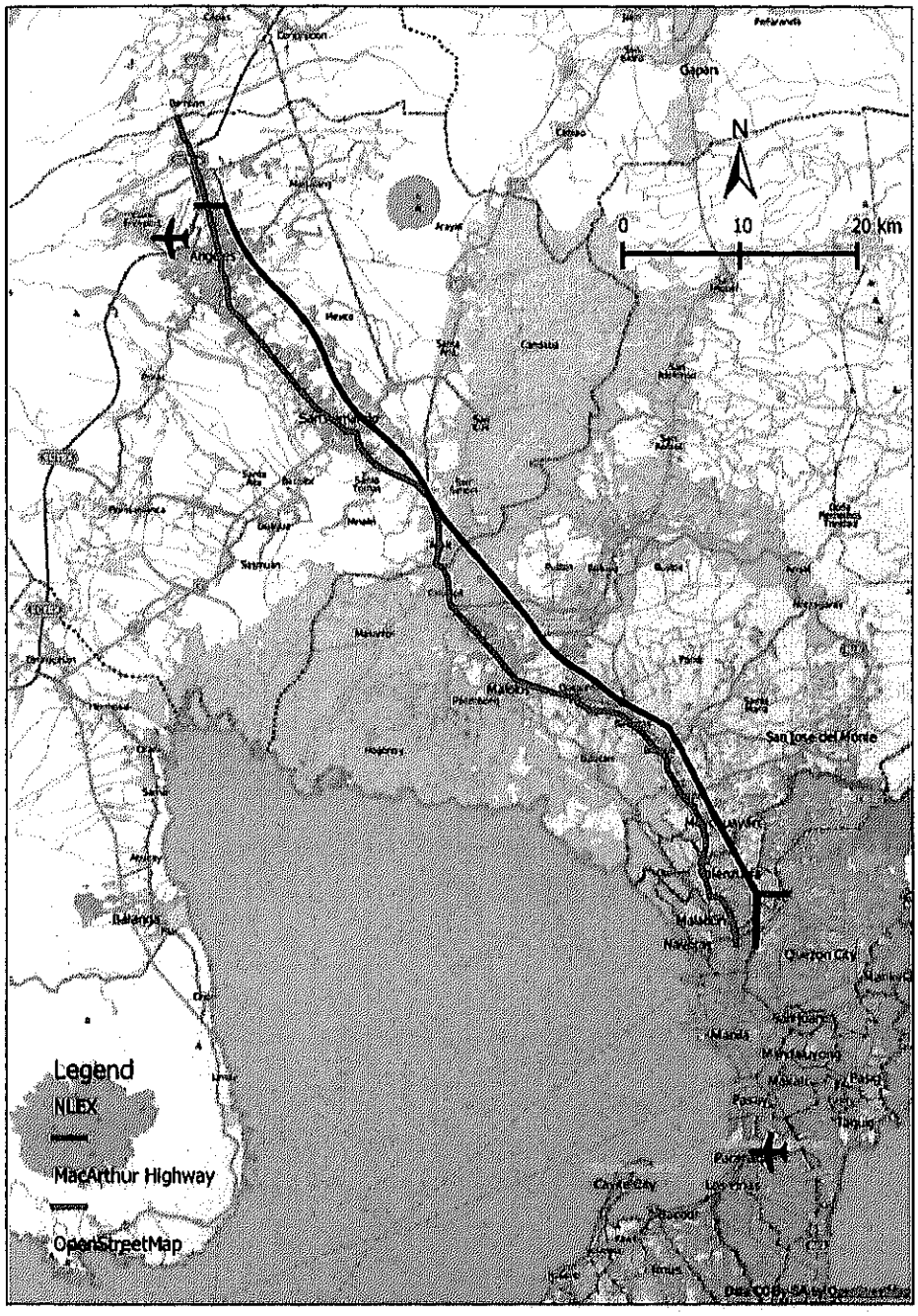
2.3 Current Status of Road Network between GCR and CIA

The location of CIA as a major airport for the GCR is less than ideal, as it is some 100km from the center of Metro Manila. It is connected to MM through local access roads, which lead to high standard dual 2-4 lane toll road, usually called the North Luzon Expressway or NLEX. As part of its development as a major airport CIA would need to have a direct link to NLEX. At the MM end NLEX connects with the circumferential road C-4/ EDSA for access to most of MM. EDSA provides access to major CBD areas of Manila but it is heavily congested and during peak periods speeds drop below 10kph. The location of NAIA, CIA and major roads is depicted in Figure 2.3-1.

In addition, the main north-south national road in central Luzon is the MacArthur Highway. It links CIA/ Clark/ Angles City to the main cities of Pampanga and Bulacan provinces along the north-south axis to Metro Manila. In MM, it is also connected with C-4/ EDSA. This national highway is a good quality dual-2 lane road However, Its capacity is limited and the traffic speed hardly goes above 30~40kph, due

to numerous frontage access points and side friction, which is along it entire length, from MM to Angles City. This makes this road unsuitable for the long journey between MM and CIA.

For travel to other provinces in the east and north CIA is also linked via local access roads to the toll road – Subic-Clark-Tarlac Expressway (SCTEX). This toll road does provide a high quality connection to the northern and eastern provinces of Luzon, but the air travel demand from these regions is limited.



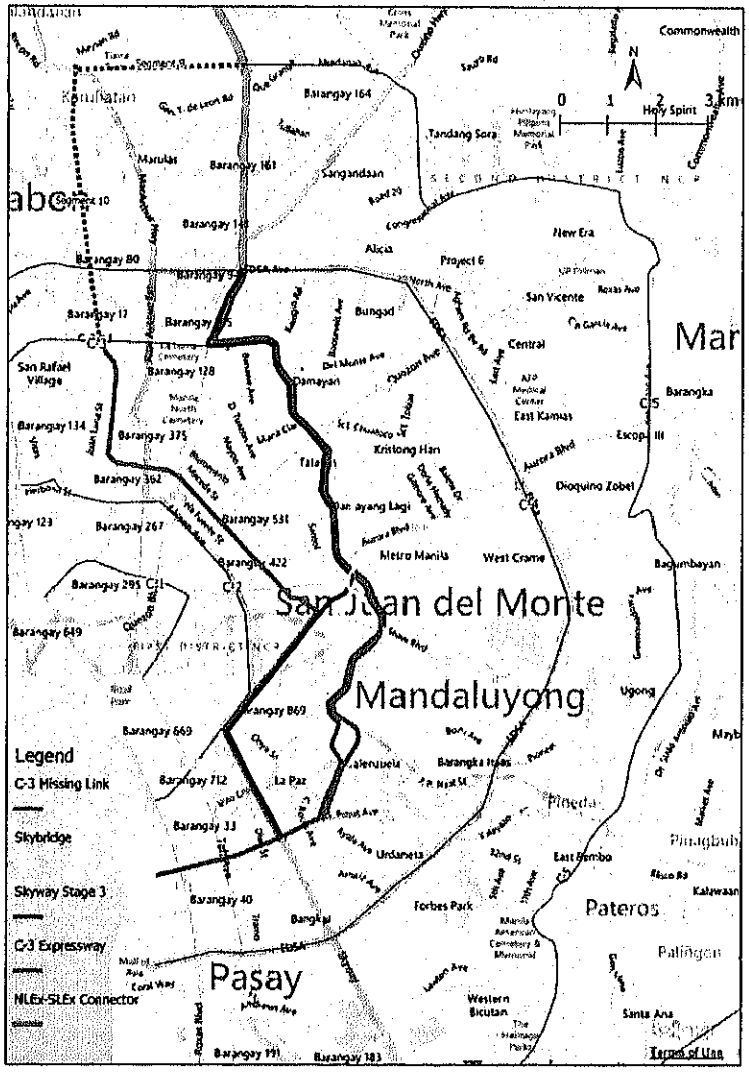
Source: JICA Study Team

Figure 2.3-1 GCR Regional Road Network and Connections to NAIA & CIA

The location of NAIA is ideal for a major Metropolitan airport. It is accessible from most of the seventeen cities of MM. It could be reached within 30 minutes to an hour by road from most locations. Public transport to/ from the airport is limited, and is less than ideal for air passengers, because of poor quality

vehicles and irregular service. Taxis or FX (local high-occupancy taxis) provide cheap travel to NAIA by road and are generally available in most areas of MM, thus provide a very good mode of access to/ from NAIA. The travel time to NAIA by road (Private Car / Taxis – used by the majority of air passengers) is also unpredictable due to severe road congestion.

Currently there are a number of road proposals in various stages of planning, design and implementation by both the private sector and GoP. These proposals are designed to reduce congestion in the MM area and also provide high-quality links to regional roads north & south to/ from the center of MM. These proposals are outlined in Figure 2.3-2. Some of these roads are duplications of links in the same corridor. At this stage it is not clear which of these proposed road(s) would be built, or when. Most if not all of the proposed roads are quite complex projects, requiring interface with other competing/ complementary road projects, and hence their implementation schedule remains quite uncertain. Therefore, at this stage it would be prudent not to rely solely on these new roads to relieve MM of its chronic traffic congestion.



Source: Various, Compiled by JICA Study Team

Figure 2.3-2 Road Projects in Metro Manila

CHAPTER 3

REVIEW OF EXISTING PLANS/ STUDIES OF ACCESS RAILWAYS

CHAPTER 3 REVIEW OF EXISTING PLANS/STUDIES OF ACCESS RAILWAYS

3.1 Existing Plans/Studies of Access Railways to CIA

3.1.1 Background of the Feasibility Studies[1]

The idea of a Manila- Clark Rapid Railway System (MCRRS) was born out of a bold plan to reactivate rail service to the north and to transform the former Clark Airbase into the country's premier international airport of the 21st century.

Several series of feasibility studies on MCRRS have been conducted by NLRC. In the regional transport context, the completion of the project will encourage the dispersal of Metro Manila population towards Central Luzon, and potentially, Northern Luzon. For a sustainable national capital region, most of the growth should occur outside the current metropolitan boundary and into Central and Northern Luzon. The project is also a key component of the long-term solution of Metro Manila's traffic congestion. Commuters from areas north of Metro Manila will have seamless transfers to various LRT lines for destinations anywhere in Metro Manila.

Table 3.1-1shows a summary of existing plans and studies of access railways to CIA.

Table 3.1-1 Existing Plans/Studies of Access Railways to CIA

No.	Title	Date	Submitted by
1.	NorthRail Rapid Railways System	Aug. 1996	Santander Investment
2.	Revised Feasibility Study of Manila-Clark Rapid Railway System Project	Mar. 1998	NLRC-BCDA
3.	Feasibility Study for Manila-Clark Rapid Railway System Project	Feb. 2000	NLRC.
	Feasibility Study for Manila-Clark Rapid Railway System Project (Monumento – Calumpit)	Feb. 2000	NLRC.
4.	Feasibility Study for Caloocan-Malolos	Jan. 2003	NLRC.
	Feasibility Study for Caloocan-Malolos Section I, Final Draft Report	Jan. 2003	NLRC.
	Feasibility Study for Northrail Project Section I (Caloocan-Malolos)	Mar. 2003	NLRC.
5.	Feasibility Study for Northrail Project Draft Final Report	Feb. 2003	Pacific Consultants International/ Halcrow
6.	Feasibility Study for Northrail Phase I Section I (Caloocan-Clark)	Sept. 2006	NLRC.
7.	Feasibility Study for Northrail Project vol. 1	Nov. 2008	NLRC.
	Feasibility Study for Northrail Project vol. 2	Dec. 2008	NLRC.

Source: JICA Study Team

3.1.2 Project Phasing

The overall scope of the Northrail project was approximately 470 km in total for the main line and approximately 110 km for the branch lines. The MCRRS F/S route was divided into Phase I to Phase IV. This project phasing had been shown in the "NorthRail Rapid Railways System" conducted by Santander

[1] *"Revised Feasibility Study of Manila-Clark Rapid Railway System Project" Mar.1998, NLRC-BCDA*

Investment in 1996 (Santander F/S).

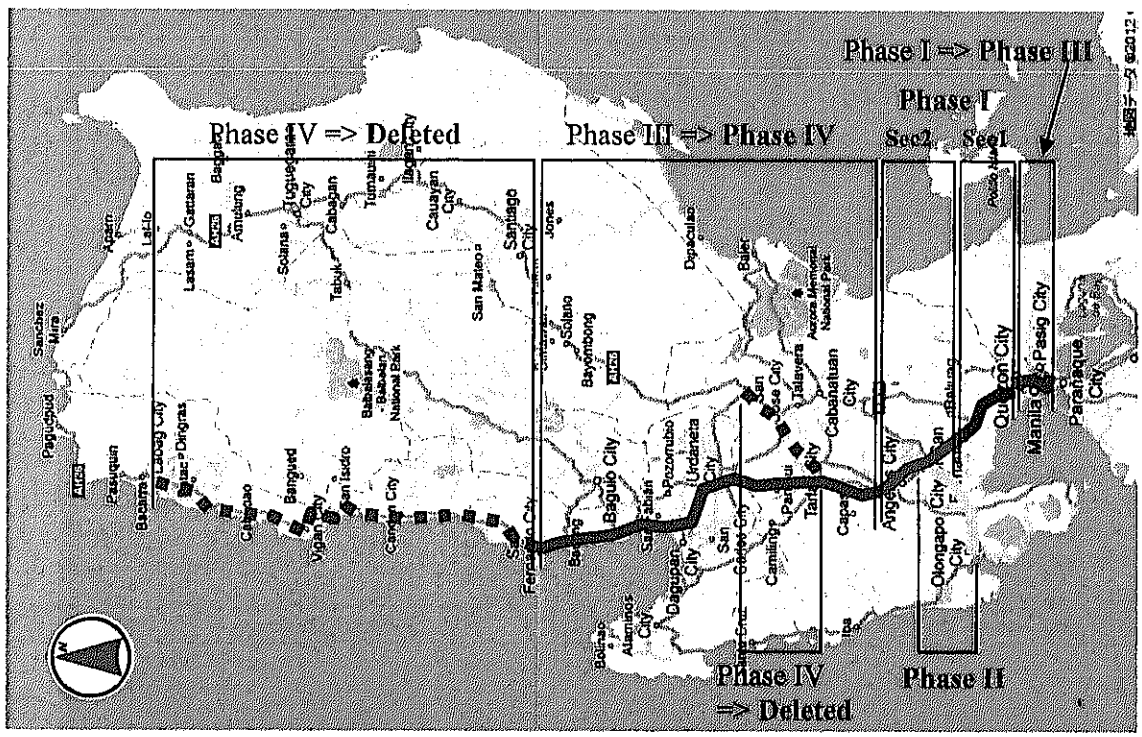
The project phasing in the following F/S, a series of the "Feasibility Study for Manila- Clark Rapid Railway System Project" (MCRRS F/S, conducted by NLRC beginning in 1998), "Feasibility Study for Northrail Project" (PCI F/S, conducted by a joint venture of Pacific Consultants International and Halcrow, 2003) are basically the same as the Santander F/S.

The project phasing had been amended after the MCRRS F/S in 2003 as shown in Table 3.1-2. The section of San Fernando to Laoag City and a branch line to San Jose City was excluded, the section between Caloocan and the Special Economic Zone (SEZ) of Clark was divided into Section 1 and 2.

Table 3.1-2 Project Phasing of the Northrail Project

Section	1996 Santander 1998 MCRRS 2003 PCI	After 2003 MCRRS		approx. Km
Fort Bonifacio to Caloocan (Metro Manila)	Phase I	Phase III		20
Caloocan to Malolos		Phase I	Section 1	50
Malolos to Clark Special Economic Zone			Section 2	30
Branch line to Subic Economic Freeport Zone	Phase II	Phase II		50
CSEZ to San Fernando	Phase III	Phase IV		170
San Fernando to Laoag City	Phase IV	Deleted		200
Branch line to San Jose City				55

Source: JICA Study Team

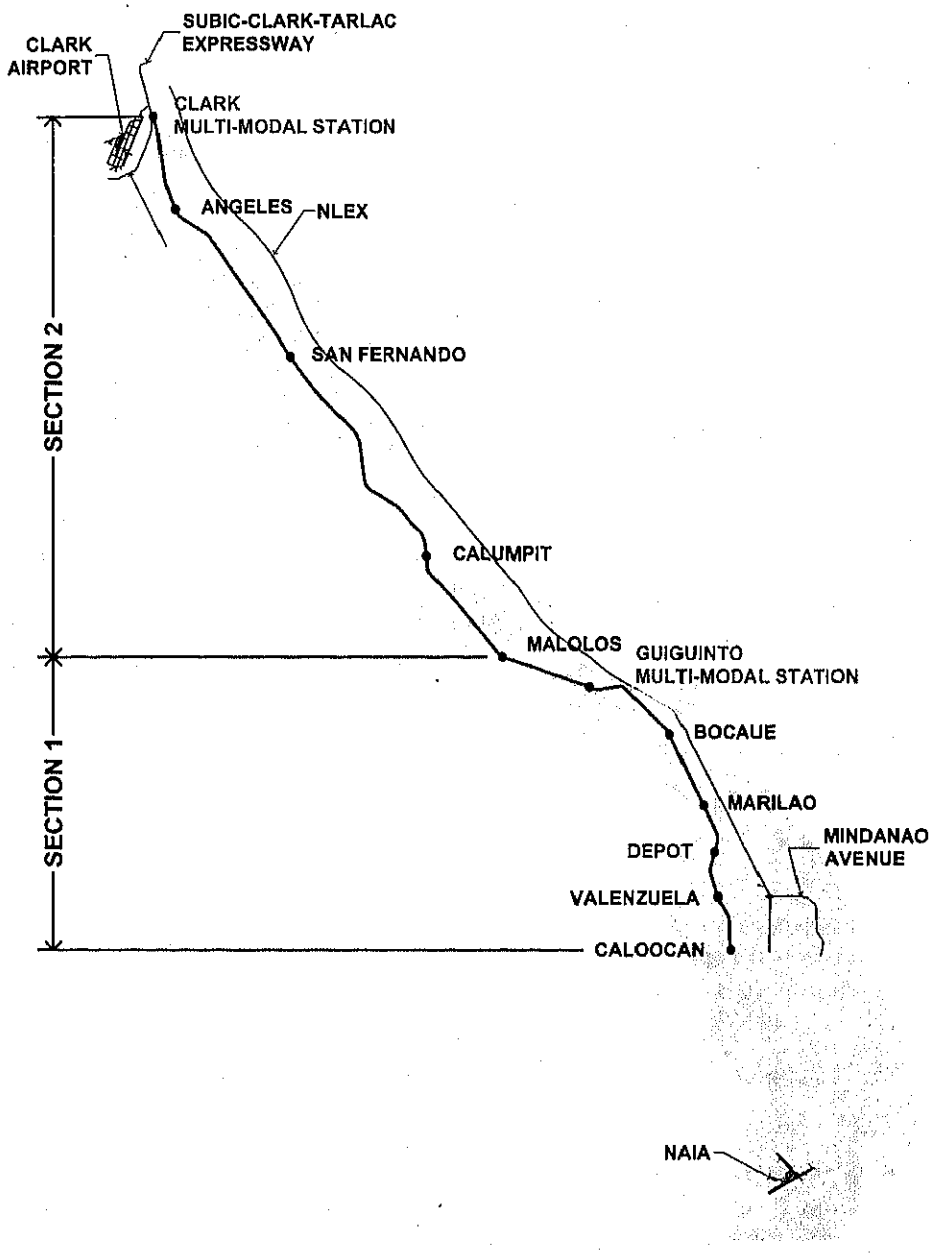


Source: JICA Study Team based on the MCRRS F/S

Figure 3.1-1 Overall Scope of the Northrail Project

Santander F/S Phasing was Phase I-A1 (CIA to Valenzuela), I-A2 (Valenzuela to Monumento) and I-B (Monumento to Fort Bonifacio). After that the MCRRS F/S had been focusing on the Phase I: outbound section of Metro Manila. Since 2003 in the MCRRS F/S, Subsection of Caloocan to Malolos named "Section 1" was designated as the highest priority section because of many favorable reasons as follows:

- It was completely along the PNR right-of-way;
- It had the ridership, Bulacan being the site of major dormitory towns of Metro Manila workers and students; and
- Unlike Section 2, the travel demand was not dependent on the opening of the DMIA.



Source: NLRC

Figure 3.1-2 Phase I Alignment

3.1.3 Features of the Access Railways to CIA in Existing Plans/Studies

The following technical issues were addressed in the above feasibility studies.

1) Type of Mass Transit System

Light rail and heavy rail transit were compared and heavy rail transit had been recommended.

2) Type of Service and Service Pattern

The envisioned types of services in the Santander F/S were airport service, freight service and commuter service, offered by NLRC. Each service was designated as follows:

- Commuter Service: These trains shall serve commuters in Metro Manila, Bulacan and Pampanga; Clark SEZ and Clark International Airport (CIA). This commuter service shall originate and end in Clark and Fort Bonifacio.
- Airport Service: These trains shall serve all passengers of CIA commuting to Metro Manila. The main terminal will be located at Clark, multi modal stations at Fort Bonifacio and at Meycauayan, Interconnected at NAIA.
- Cargo (Freight) Service: Clark multi modal station. Cargo and freight trains can be accommodated by the system in the nocturnal hours.

However, airport service and freight service were not yet covered in the MCRRS F/S. In the design of the system, interurban and metro services were considered. Interurban service would be considered between Clark SEZ and the Multi Modal Terminal of Guiguinto. Metro service would be considered between Guiguinto to Bonifacio Global City. Interurban service would be considered between Caloocan and Malolos.

It was also recommended to consider flexibility to expand to accommodate airport and freight services for planning of the initial infrastructure and backbone system.

3) Multi Modal Terminals

There are three multi modal terminals at both ends of Clark SEZ and Bonifacio Global City and one for the middle of the route were planned. Candidate sites of Valenzuela, Guiguinto and Balagtas were evaluated from the view point of connectivity with road transport, availability of land and operational suitability.

In the Santander F/S in 1996, the Valenzuela site was designated as a multi modal terminal.

In the PCI F/S in 2003, Malolos, Guiguint and Marilao were identified as multi modal terminals.

In the MCRRS F/S in 1998, the Balagtas site was recommended from the viewpoint of connectivity with the line that diverges to Clark and the proposed interurban line to Cabanatuan. However, since the MCRRS F/S in 2000, the Guiguinto site (see Figure 3.1-2) had been recommended because it had been earmarked for development by the Provincial Government of Bulacan and had already been offered as a station location.

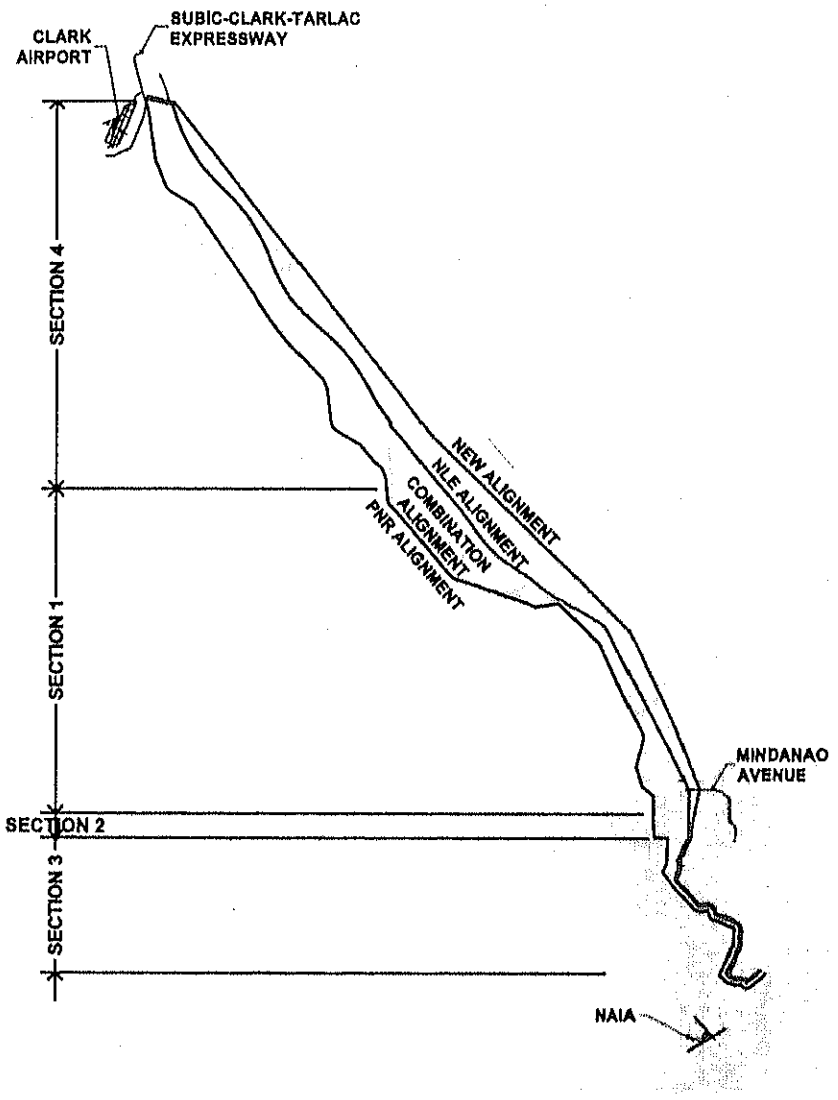
4) Alignment and Form of Construction

a) Caloocan to Clark Section

Since the MCRRS F/S in 1998, the following alternative alignments were evaluated between Caloocan and Clark section.

- New alignment
- PNR alignment
- NLEX alignment
- Combination of PNR and NLEX alignments

As a result of the evaluation, the MCRRS F/S recommended the use of the existing PNR right-of-way, dealing with the problem of informal settlers rather than conduct extensive land acquisition for the new alignment.



Source: NLRC

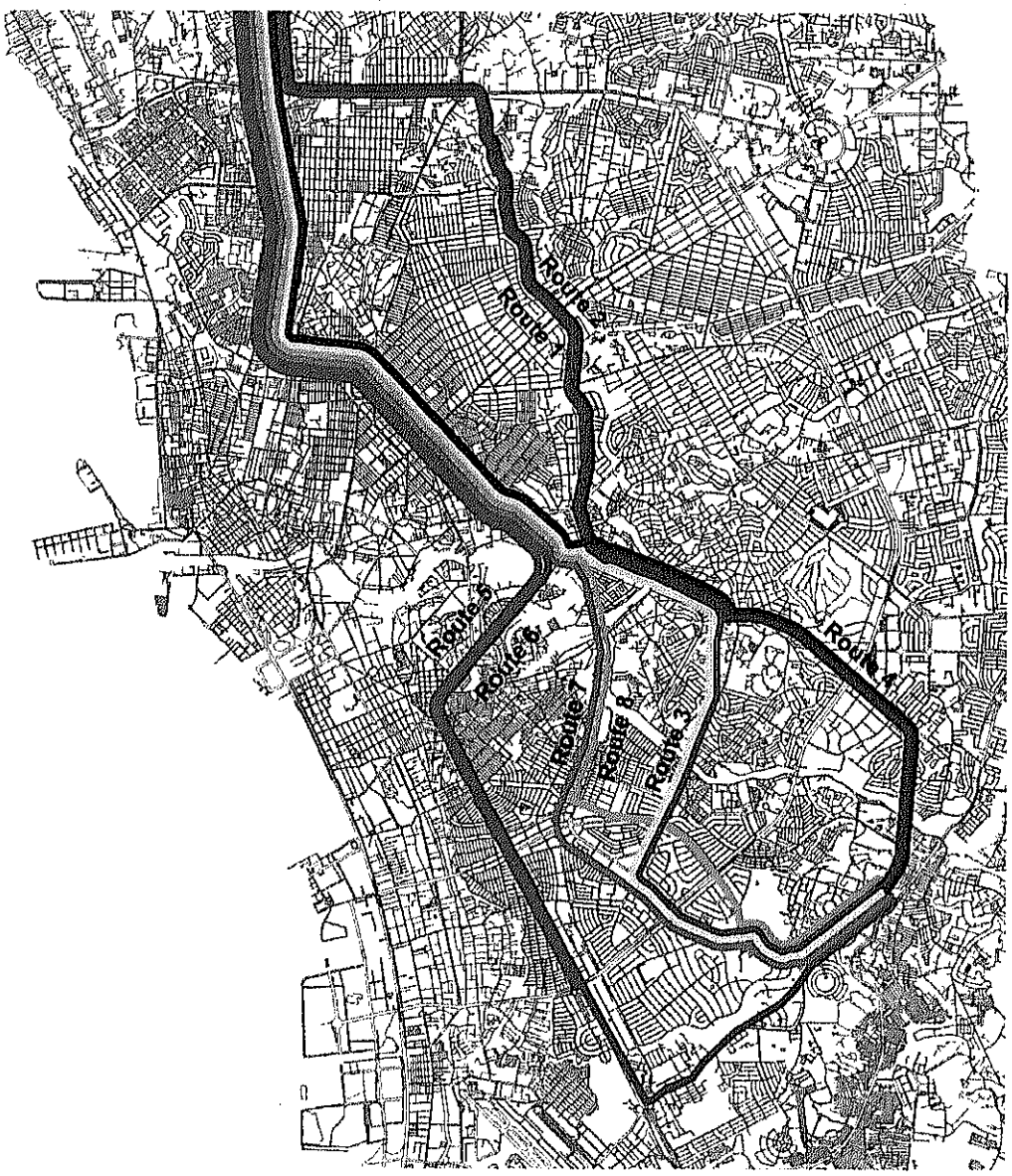
Figure 3.1-3 Alternative Alignment (Interurban)

b) Fort Bonifacio to Caloocan Section

In the Santander F/S in 1996, an alignment within Metro Manila area was planned basically by using PNR's ROW, 26km in length and 19km would be tunneling. This is the same as the alignment named "Route 2" in the MCRRS F/S shown in Figure 3.1-4.

The MCRRS F/S since 1998, seven alternative routes shown in *Source: NLRC*

Figure 3.1-4 were evaluated not only based on the fare revenues versus the cost of civil and track works but also the geometric features of the alignment. Route 7: Caloocan- via PNR's ROW up to Sta.Mesa- Ana- Metropolitan Ave.- via Ayala- EDSA- Fort Bonifacio was finally recommended not only because of its higher revenue/ cost ratio, but also because of the alignment with a lesser number of tight curves.



Source: NLRC

Figure 3.1-4 Alternative Alignment (the Inside of Manila)

5) Number of Tracks

Double track had been recommended in several F/S.

6) Traction System

In the Santander F/S in 1996 and the MCRRS F/S in 1998, a 25 kV AC at 60Hz traction system was recommended. This was also mentioned in the MCRRS F/S in 1998, it was due to the requirements of

high speed interurban and airport services to Clark and future extension farther north. However, since the MCRRS F/S in 2003 diesel traction was recommended for initial adoption for Phase I due to the higher basic capital cost of an electric traction system.

7) Track Gauge

In several F/S, a narrow gauge of 1,067mm and a standard gauge of 1,435mm had been evaluated. From the viewpoint of high speed operation, frequency of track maintenance, passenger comfort, and compatibility with LRT lines, the standard gauge had been recommended since the Santander F/S in 1996.

In the MCRRS F/S in 2003 and 2006, narrow gauge was recommended due to physical and organizational compatibility with the present and future PNR operation. Finally, standard gauge was recommended considering the current trend of adopting standard gauge in the Philippines.

8) Train Control and Signaling System

In the MCRRS F/S, different train control methods of manual/ visual control, signal control, ATO and ATS had been evaluated. The recommendation for train control feature in the MCRRS was as follow:

- System which utilizes computers
- With central traffic control
- With signaling system that will permit interworking among airport, interurban, and metro services (single system for the whole line)
- With ATP features
- Moving block system
- Continuous vehicle detection and data gathering capability

Table 3.1-3 Summary of F/S

No.	Year	Name of F/S	Type of Service	Multi Modal Terminal	Alignment	Nos. of Track	Traction System	Track Gauge
1	1996	Santander	Commuter, airport access and cargo	Clark, Valenzuela, Fort Bonifacio	PNR's ROW	Double	25 kV AC	1,435
2	1998	MCRRS	Inter urban and metro	Clark, Balagtas, Fort Bonifacio	ditto	ditto	ditto	1,435
3	2000	MCRRS	ditto	Clark, Guiguinto, Fort Bonifacio	ditto	ditto	ditto	1,067
4	2003	MCRRS	ditto	ditto	ditto	ditto	Diesel	1,067
5	2003	PCI	ditto	Clark, Malolos, Guiguint, Marilao, Fort Bonifacio	ditto	ditto	-	1,067
6	2006	MCRRS	ditto	Clark, Guiguinto, Fort Bonifacio	ditto	ditto	Diesel	1,067
7	2008	MCRRS	ditto	ditto	-	ditto	ditto	1,435

Source: JICA Study Team

3.2 Current Situation of Northrail Project

3.2.1 Project Overview

1) Northrail Project Overview

Section 1, Phase 1, of the NORTHRAIL Project is a 32.12 km, double track railway line running in a North-South direction within the existing Philippine National Railways (PNR) Right of Way (ROW). It starts from Caloocan City, metro manila up to Malolos, Province of Bulacan and includes six stations (Caloocan, Valenzuela, Marilao, Bocaue, Guiguinto, and Malolos) and one Depot (Valenzuela). Nineteen Diesel Multiple Units (DMU) will carry passengers at a maximum speed of 120km/h.

The Project is funded through a loan secured from the Export-Import Bank China (China Exim Bank), People's Republic of China (PROC).

An EPC Contract Agreement between NLRC and the Contractor SINOMACH (former China National Machinery and Equipment (Group) Corp., (CNMEG) was signed December 2003 with a total cost amounting to US$ 421,050,000.00 wherein NLRC has the obligation to provide CNMEG with a ROW free of squatters and of any obstacles to construction (utilities, trees, light structures).

NLRC issued a Notice to Proceed (NTP) to SINOMACH on 19 February 2007, with an effective date of 26 February 2007.

a) Contract between NLRC and SINOMACH

Table 3.2-1 Contract for Contractor

Project Name	North Luzon Railways Project (Northrail) Section 1, Phase 1
Project Location	From Caloocan to Malolos, Bulacan
Employer	North Luzon Railways Corporation Republic of the Philippines
Contractor	China National Machinery Industry Corporation (SINOMACH)
Contract Effectively	1,952 c.d
Commencement Date	February 26, 2007
Contract Duration	48 Months from Commencement
Total Contract Amount	USD 593,880,248.55
Source of Funds	China Export Import Bank (China Exim)

Source: NLRC

The typical revised project schedule was changed as per Amended Contract dated 29 September 2009. Total Loan Amount became $ 593 Million as a result of the amendment:

- Pre-Construction Phase finishing 29 April 2010, (Engineering Design)
- Construction Phase beginning 30 June 2012
- 4 months Testing and Commissioning including Trial Run Period
- 12 months Warranty Period

b) Bill of Quantities

The Bill of Quantities for the North Luzon Railway Project Section 1, Phase 1 between Caloocan and Malolos is as follows after amendment of the contract;

Table 3.2-2 Bill of Quantities

No.	Activity Description	Amount (US$)
0	Survey, Site Investigation and Preliminaries	49,760,563.42
0101	Main line Track	37,876,209.04
02	Mainline Embankment	158,220,761.43
03	Bridges and Culverts	167,552,646.40
12	Temporary Facilities and Temporary Works	6,946,611.00
13	Other Costs	2,484,651.00
05	Water Supply and Drainage System	1,779,524.78
0102	Station Tracks	670,552.79
0601-0603	Stations	10,637,708.45
0604	Buildings	8,786,613.88
0605	Depot and other Facilities for Operation	21,907,652.61
07	Communications	5,411,870.01
08	Signalling	20,473,374.00
14	Ticketing System	4,831,065.00
09	Power Supply	6,082,331.00
10	ATP for Cab Signalling	2,400,000.00
15	Rolling Stock including DMU and Spare Parts	33,440,000.00
16	ROW Expenses & Public Utilities Diversion	27,540,000.00
17	Contingencies	27,078,113.74
	Total	**593,880,248.55**

Source: NLRC

c) Scope of Works of Contractor

The whole project is divided into three stages, the Pre-Construction Stage, the Construction Stage, and Post Construction Stage (Testing and Commissioning). The Pre-Construction Stage includes two parts which are the Survey and Site Investigation and Engineering Design, Review and Approval.

The Survey and Site Investigation is divided into two stages namely, the Preliminary Survey and Site Investigation and Detailed Survey and Site Investigation. The Preliminary Survey and Site Investigation were completed in June, 2005. The components of the Detailed Survey and Site Investigation are Alignment Definition, Site Survey, Sub-soil Investigation, Document review and acceptance. Due to the delay in the confirmation of the final location of the depot, the Detailed Survey and Site Investigation have been delayed and are now behind schedule.

The Engineering Design, Review and Approval were composed of the Preliminary Design, and Detailed Design. The Preliminary Design Documents were submitted to NLRC for review and approval on March 1, 2006. The Detailed Design will be worked out based on the review of NLRC.

Construction Stage:

The construction stage includes:

- Temporary Facilities and Mobilization
- Civil Work for Alignment

- Civil Work for Buildings
- Track Laying
- Equipment Installation
- DMU Manufacturing

The Temporary Facilities are basically composed of Construction Fence, Temporary Facilities in Caloocan Station, Temporary Facilities in San Francisco, Temporary Facilities in Valenzuela, Temporary Facilities in National Food Authority, and Temporary Facilities in Malolos Station.

d) Contractor's Statement of Work Accomplished

Table 3.2-3 Contractor's Statement of Work Accomplished

Contractor's Statement of Work Accomplished
From February 01, 2012 to February 29, 2012
Project Name: NORTHRAIL PROJECT, PHASE 1-SECTION 1

CONTRACTOR: China National Machinery Industry Corporation (SINOMAC)
AMOUNT OF CONTRACT: US$ 593,880,248.55

Item No		Description	Amended Contract Amount	Weight	Total Accomplishments (base on Amended Contract)			% Weight (base on Amended Contract)		
			($)	(%)	Previous Month	This Month	To Date	Previous Month	This Month	To Date
00		Pre-Construction Stage	49,760,563.42	8.38%	45,431,471.12	0.00	45,439,471.12	7.65%	0.00%	7.65%
01	01	Mainline Track	37,876,209.04	6.38%	1,589,403.38	0.00	1,589,403.38	0.27%	0.00%	0.27%
02		Mainline Track Embankment	158,220,761.43	26.64%	24,853,975.77	0.00	24,853,975.77	4.19%	0.00%	4.19%
03		Bridge and Culvert	167,552,646.40	28.21%	38,087,691.12	0.00	38,087,691.12	6.41%	0.00%	6.41%
12		Temporary Facilities and Temporary Works	6,946,611.00	1.17%	6,514,527.54	0.00	6,514,527.54	1.10%	0.00%	1.10%
13		Other Cost	2,484,651.00	0.42%	2,172,899.60	0.00	2,172,898.60	0.37%	0.00%	0.37%
05		Water Supply and Drainage System	1,779,524.78	0.30%	0.00	0.00	0.00	0.00%	0.00%	0.00%
01	02	Station Track	670,552.79	0.11%	0.00	0.00	0.00	0.00%	0.00%	0.00%
0601-	0603	Station	10,637,708.45	1.79%	0.00	0.00	0.00	0.00%	0.00%	0.00%
06	04	Building	8,786,613.88	1.48%	0.00	0.00	0.00	0.00%	0.00%	0.00%
06	05	Depot and Other Facilities for Operation	21,907,652.61	3.69%	0.00	0.00	0.00	0.00%	0.00%	0.00%
07		Transportation and Communication System	5,411,870.01	0.91%	0.00	0.00	0.00	0.00%	0.00%	0.00%
08		Signaling	20,473,374.00	3.45%	0.00	0.00	0.00	0.00%	0.00%	0.00%
14		AFC System	4,831,065.00	0.81%	0.00	0.00	0.00	0.00%	0.00%	0.00%
09		Electric Power System	6,082,331.00	1.02%	0.00	0.00	0.00	0.00%	0.00%	0.00%
10		ATP for Cab Signaling	2,400,000.00	0.40%	0.00	0.00	0.00	0.00%	0.00%	0.00%
15		Rolling stock	33,440,000.00	5.63%	0.00	0.00	0.00	0.00%	0.00%	0.00%
16		ROW Expense & Public Utilities Diversion	27,640,000.00	4.64%	23,240,000.00	0.00	23,240,000.00	3.91%	0.00%	3.91%
17		Contingencies	27,078,113.74	4.56%	0.00	0.00	0.00	0.00%	0.00%	0.00%
			593,880,248.55	100.00%	141,890,168.53	0.00	141,897,967.53	23.90%	0.00%	23.90%

Prepared by: REN JUNAN, Project Manager
Checked and Verified: FERMIN M. RULONA,JR, Engg. Manager; RAFAEL M. PEREZ, Const. Manager
Approved: NRADO K. TOLENTI, President

Source: NLRC

e) Updated based on the existing situation of Northrail ROWA Take-over

Based on the Project Implementation Schedule (PIS), the ROWA and public utilities diversion shall be finished by the timetable below:

Table 3.2-4 Northrail ROWA Take-over

No.	Segment	Turn-over Date
1	ROW turn-over 118+334.6~120+600	7-1-2009
2	ROW turn-over 120+600~122+500	11-28-2009
3	ROW turn-over 122+500~124+680	10-24-2009
4	ROW turn-over 124+708.5~127+247.12	7-1-2009
5	ROW turn-over 127+247.12~129+775	11-28-2009
6	ROW turn-over 129+775~132+036.21	10-24-2009
7	ROW turn-over 132+036.21~133+903	8-10-2009
8	ROW turn-over 133+903~135+975.35	8-10-2009
9	ROW turn-over 135+975.35~137+985	8-10-2009
10	ROW turn-over 137+985~140+330.5	8-10-2009
11	ROW turn-over 140+330.5~142+000	8-10-2009
12	ROW turn-over 142+000~143+100	8-20-2009
13	ROW turn-over 143+100~145+300	11-4-2009

Source: NLRC

However, as of February 29, 2012, the acquisition of those segments listed above still have no more new progress and there has been a terrible delay corresponding to its original planning. The listed areas remain impossible to access for works. This was one of the major barriers delaying the project implementation, and is not acceptable for take-over by SINOMACH. The PIS attached herewith updates the record of the great delay.

2) Consultancy Background of Northrail Project

SYSTRA-ESCA-SPI JOINT VENTURE, a joint venture between and among SYSTRA S.A., E.S. De Castro and Associates and SYSTRA Philippines, Inc responded to the invitation to bid together with several consultancy firms, namely: The Louis Berger Group Phils., Parson's Brinckenhoff Phils., Design Science Inc, TCGI Engineers, Halcrow, TUV Phils., SNC-Lavalin Intl., Design Coordinates, Inc. SMEC Intl. PTY Ltd, Katahira and Engineers, Inc, Prointec, United Technologies, and Filipino Chinese Development Managers & Consultants, Inc.

After the submission of the eligibility requirements on 26 May 2006 only four applicants for eligibility were declared "passed", namely: the Joint Venture of Louis Berger Phils And Louis Berger Inc. (Louis Berger), the joint venture of SMEC International and SCHEMA (SMEC), the Joint venture of TUV, DE Consult, PCI, Intl., PCI Phils. & JF Cancio & Associates (TDPPJ) and the Joint Venture of SYSTRA S.S., E.S. De Castro and Associates, and SYSTRA Phils, Inc. (SYSTRA-ESCA-SPI).

Two bidders, namely: Louis Berger and SMEC withdrew from the bidding. Upon submission of the bid documents on 15 August 2006 by the two remaining eligible bidders, the TDPPJ Joint Venture submitted a bid bond not "callable on demand", which caused its outright disqualification, while the SYSTRA-ESCA-SPI submitted all documents in proper form and substance.

The technical and financial bid of SYSTRA-ESCA-SPI was evaluated by the Technical Working Group (TWG), post qualified, and thereafter recommended to the Bids and Awards Committee (BAC) that the same be declared as the Highest Rated Responsive Bidder, which the BAC approved and was then concurred with by the President, Mr. Jose L. Cortes, Jr.

The award of the consultancy contract for the PMST to the SYSTRA-ESCA-SPI as the Highest Responsive Bidder was forwarded to the Board of Directors of NLRC, which the Board passed upon the merits of the recommended award and approved such award to SYSTRA-ESCA-SPI.

a) Contract between NLRC and SYSTRA-ESCA-SPI JOINT VENTURE

Table 3.2-5 Contract for Consultant

Source of Funds	Development Bank of the Philippines Arranged Loan
Consultant	Systra-ESCA-SPI – Joint Venture
Contract Start Date	February 01, 2007
Notice to Proceed (Partial)	January 31, 2007
Notice to Proceed (Construction Supervision)	July 30, 2007
Partial Demobilization Notice	February 2008
Contract Duration	48 Calendar Months
Contract Completion Date	* February 14, 2011
Consultancy Fee	USD 8,396,511.00

Source: NLRC

NLRC has engaged SES-Joint Venture (Systra SA, ESCA, Systra Philippines Inc.) as Consultant for the project and a Contract Agreement was signed 30 January 2007. NLRC issued a NTP for advance works dated 31 January 2007 and SES-JV started mobilizing the Consultant team on 01 February 2007.

SYSTRA and its partners have gained extensive experience in Project Management and Monitoring for Major Mass Transit Projects through the expertise accumulated within the Paris Transit Authority and the French National Railways.

The partner ESCA, an ISO Certified Company, has more than 30 years of exposure and gained recognition in the Structural Design and Project Management of Bridges, High Rise Buildings and Commercial Establishments both in the local and international communities.

SYSTRA has complemented this expertise with highly qualified profiles who have gained international recognition in miscellaneous fields. To perform NLRC's services, SYSTRA has not only reunited highly qualified profiles, but also has an extensive and integrated team to be mobilized over the estimated 4-year contract duration.

SES-Joint Venture's consultancy contract was approved and extended from 15 February 2011 to 14 August 2011 on a month to month basis.

b) Scope of Works of SYSTRA-ESCA-SPI JOINT VENTURE

The scope of work of the consultant included Pre-Construction, Construction and Post Construction as the following three stages:

General

During the Pre-Construction Stage the Consultant shall mainly perform the following:

- Assist the NLRC General Management,
- Develop the Project Implementation Management Plan,
- Review and evaluate all Engineering Designs, Technical Specifications, working Plans and Drawings,
- Review the Contractor's Preliminary Survey and Investigation,
- Review of the Traffic Study and Traffic Management Plan,
- Issue a Traffic Management Report,
- Review of Maintenance and Train Operation Outline.

Construction Supervision Stage

During the Construction Stage the Consultant shall mainly perform the following:

- Review Program Management/Project Management Support/ Construction Management and,
- Set-up the Consultant's Site Project Management Office,
- Review the Detailed Design,
- Review Construction Methodology and Schedule-Program,
- Assist NLRC in Regular Meetings with the Contractor,
- Monitor the Contractor's Environmental Management,
- Witness Factory Acceptance Testing and System Integration Testing,
- Assist in the coordination with Other Agencies/Groups,
- Assist in the presentation to Other Government Agencies and Third Parties,
- Review the Contractor's Work Plans,
- Review the Contractor's Working Drawings,
- Carry-out Site Inspections,
- Carry-out Material Inspections,
- Monitor the Contractor's Spare parts and Submit a Report,
- Make Known Defects and Deficiencies,
- Review and Recommend Work Completion,
- Assist in the Commissioning of Trial Runs,
- Transfer know-how to NLRC counter-part personnel.

Post Construction Stage

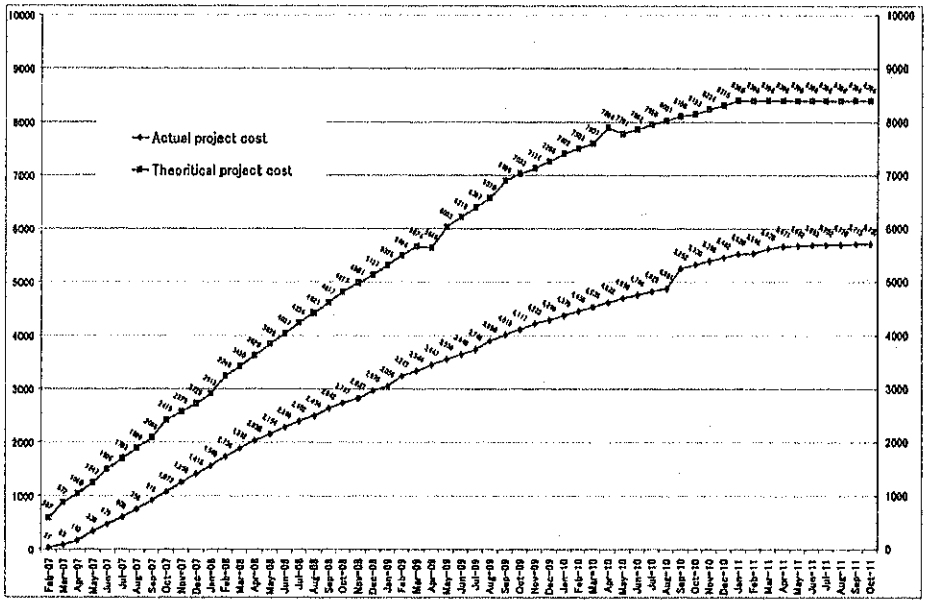
During the Post Construction Stage the Consultant shall mainly perform the following:

- Assist in Operation Planning and in the Review of the Maintenance Plan,

- Monitor the Testing and Commissioning activities of the Completed Railway system including Rolling Stock,
- Assist in determining Defect Liability,
- Conduct a Final Inspection with NLRC, the Contractor and other interested parties upon completion of all corrections from the punch list,
- Certify completion works in accordance with approved plans and specifications and recommend the issuance of Certificate of Completion after the final inspection and acceptance,
- Review Contractor's As-Built drawings for the project including maintenance books and manuals for all equipment installed,
- Prepare all necessary documents required for payments and turnover in accordance with the government accounting and auditing rules and regulations as well as other pertinent laws and rules,
- Assist NLRC and the Contractor in the preparation and submission of all forms and supporting documents that may be required by the Commission on Audit (COA)
- Prepare and submit final the project report to NLRC,
- Develop and prepare the Terms of Reference (TOR) and manuals all for the bidding of NLRC Operation and Maintenance (O&M),
- Develop the processes, plans and programs, together with the training materials for the eventual privatization of NLRC's Operation and Maintenance (O&M).

c) S-Curve of Contract Cost

S-Curve of Contract Cost of SYSTRA-ESCA-SPI JOINT VENTURE is as shown in the following:



Source: NLRC

Figure 3.2-1 S-Curve of Contract Cost

3) Major Issues Raised regarding the Northrail Project

a) MI 11070029. PROPOSED REINSTATEMENT OF CLAIMS BY NORTHRAIL AND CONSEQUENCES IF AMENDED CONTRACT IS DECLARED NULL AND VOID.

SES-JV proposed to NLRC through letter dated 15 July 2011 to begin in earnest the compilation of all its possible claims against the Contractor, so that NLRC will be prepared for the immediate reinstatement of these claims upon the lapse of the effective period of the "no harm" arrangement, especially if those claims will lead to a termination of the contract due to default or by reason of a "just cause" that warrants such termination.

b) MI 11070030. SES-JV'S FINAL AND NON-EXTENDIBLE CONTRACT EXTENSION.

NLRC issued to SES-JV a Final and Non-Extendible one month extension for NLRC and SES-JV Contract Agreement for Consultancy Services, to expire on 14 august 2011. For this purpose, only two personnel, one Document Controller and one additional personnel to digitize SES-JV documents, shall be deployed to which SES-JV submitted its position paper on 25 July 2011.

c) MI 11050028. SUBMISSION OF CLAIM FOR TIME EXTENSION AND ADDITIONAL COMPENSATION BY SINOMCH

SINOMACH submitted to NLRC a detailed statement of SINOMACH's entitlement to an extension of time and additional compensation for Northrail Project Phase 1, Section 1.

d) MI 11040027. SUSPENSION OF THE IMPLEMENTATION AMENDED CONTRACT OF NORTHRAIL WITH SINOMACH FOR NORTHRAIL PROJECT PHASE 1, SECTION 1

In a meeting between NLRC and SINOMACH representatives, both parties mutually agreed to suspend the implementation of the contracts for two (2) months stating on March 28, 2011.

3.2.2 Relationship between Philippines and China regarding Northrail Project

According to press reports, situation of negotiation between Philippines and China is as follow:

The Department of Finance (DOF) has successfully renegotiated with the Chinese government the payment terms of a portion of a $593-million loan to be used supposedly to finance the controversial North Luzon Railways Corp. (North Rail) project.

The Philippine government was due to pay the Export-Import Bank of China (China Export - Import Bank) this year a lump sum of $184 million, but DOF officials were able to lengthen the payment period for two years or up to 2014.

Data from the DOF showed that instead of a lump sum payment of $184 million, the government will pay China Export - Import equal payments of $46 million over two years starting September 2012. The amount represents preparation costs for the project such as right-of-way costs and other land acquisition expenses.

- The Philippine Star; 09/24/2012

The Supreme Court eventually ruled that the project was contrary to law as it did not undergo proper bidding process.

- The Philippine Star, 10/02/2012

Source: The Philippine Star

Table 3.2-6 NLRC – SINOMACH Contract Suspension/Termination Chronology and in the Future

March 28, 2011	Start of 2-month suspension of Northrail project
June 13, 2011	DOTC gave their opinion as to NLRC's query on the validity of the Amended Contract due to absence of certificate of funds availability
August 13, 2012	Notice of Termination was issued by SINOMACH based on alleged breaches
September 2012	Notice of Arbitration issued to NLRC by SINOMACH
June 7, 2013	SINOMACH will make claim to NLRC through the Court of Appeals
October 6, 2013	NLRC shall respond to SINOMACH within 4 months after claim

出典：*NLRC*

In 2011, the Office of the President said the government will revise the project but will carry some elements of the original Northrail design.

Source: JICA Study Team

Figure 3.2-2 Uncompleted Substructure near Guiguinto and Substructure near Caloocan

CHAPTER 4

REVIEW OF RELATED ORGANIZATIONS

CHAPTER 4 REVIEW OF RELATED ORGANIZATIONS

4.1 Department of Transportation and Communications (DOTC)

4.1.1 General

Mandate

The Department of Transportation and Communications (DOTC) is the primary policy, planning, programming, coordinating, implementing and administrative entity of the executive branch of the government on the promotion, development and regulation of a dependable and coordinated network of transportation and communications systems, as well as in the fast, safe, efficient and reliable transportation and communications services.

As one of the first government agencies established under the Malolos Constitution on January 21, 1899, the DOTC plays a crucial role in accelerating the country's economic development. It provides the backbone for growth and enhances the country's competitive edge by providing effective and efficient transportation and communications infrastructure systems that narrow the geographical and physical divide, connecting the country, its islands, and its people to the rest of the world.

Vision

The DOTC is a world class organization, providing integrated transport, connecting people, islands, families, communities and the nation with the rest of the world, and constantly responding for environmentally sustainable and globally competitive transport and communications system.

Mission

To provide the country with efficient, effective and secure transportation systems that are globally competitive, compliant with international standards and responsive to the changing times.

4.1.2 Sectorial and Attached Agencies

The DOTC has three (3) Sectorial Offices and fifteen Attached Agencies. The Office for Transportation Security (OTS) is in charge of transportation security for all sectorial offices and attached agencies. The Metro Rail Transit (MRT) Line 3 remains a Project Management Office (PMO) of the Department.

4.1.2.1 Sectorial Offices

1) Maritime Transport

The Philippine Coastal Guard (PCG)

The PCG is an armed and uniformed service primarily tasked with enforcing all applicable laws within the Philippine waters, conducting maritime security operations, safeguarding of life and property at sea and protecting the marine environment and resources.

2) Road Transport

The Land Transportation Office (LTO)

The LTO promotes the safety and comfort of the traveling public with respect to motor vehicles. The LTO is also tasked with collecting various fees from the registration of motor vehicles, the issuance of licenses

to qualified motor vehicle drivers, the collection of fines and penalties for motor vehicle related infractions, and the sale of motor vehicle license plates.

The Land Transportation Franchising and Regulatory Board (LTFRB)

The LTFRB was created by virtue of an Executive order issued on June 19, 1987, with the goal of simplifying the land transportation industry franchising system. Since the creation of the LTFRB, the issuance of franchises for land transport operators has become more stringent, resulting in higher safety standards for land travel. Technical evaluation staff ensure that operating and safety standards of commercial and private vehicles are observed, prior to the issuance of operating franchises.

3) Rail Transport

Metro Rail Transit (MRT)

MRT3, designated as the Blue Line, is also called the EDSA MRT, or Metrostar Express. It was implemented by the DOTC through a Build-Lease-Transfer contract with the privately owned Metro Rail Transit Corporation (MRTC). It has 13 stations on a 16.9 km rail system along Edsa from North Ave., Quezon City to Taft Ave., Pasay City. It became fully operational in 2000.

4.1.2.2 Attached Agencies

'Office for Transportation Security (OTS)

The Office for Transportation Security (OTS) is the single authority responsible for the security of the transportation systems of the country, including, but not limited to, the following: Civil Aviation, Sea Transport and Maritime Infrastructure, Land Transportation, Rail Systems and Infrastructure. It was created by virtue of Executive Order No.277. In response to the international mandate (i.e. ICAO and IMO guidelines) calling for a single authority for all modes of transportation security in the Philippines, E.O. 311 was issued on April 26, 2004.

1) Civil Aviation

Civil Aviation Authority of the Philippines (CAAP)

The CAAP is responsible for implementing policies on civil aviation in order to ensure safe, economical, and efficient air travel. As an independent regulatory body with quasi-judicial and quasi-legislative powers, the CAAP is mandated to set comprehensive, clear and impartial rules and regulations for the Philippine aviation industry.

Manila International Airport Authority (MIAA)

Created by Executive Order 778, the MIAA provides safe, efficient, and reliable airport facilities for international and domestic travel at the Ninoy Aquino International Airport (NAIA). It is also tasked with promoting NAIA as a center for international trade and tourism.

Clark International Airport Corporation (CIAC)

Executive Office Building, Civil Aviation Complex Clark Freeport Zone 2023, Pampanga
Head: President Victor Jose I. Luciano

Civil Aeronautics Board (CAB)

The CAB is tasked with regulating, promoting, and developing the economic aspects of civil aviation in the Philippines. The CAB regulates the lease, purchase, and sales of aircraft, along with overseeing consolidations and mergers of domestic air carriers.

Mactan-Cebu International Airport Authority (MCIAA)

The MCIAA is in charge of operating and maintaining the Mactan International Airport, which is currently the premier gateway to the Central Visayas. The MCIAA provides airport safety and security, and also implements airport rules and regulations.

Philippine Aerospace Development Corporation (PADC)

The PADC undertakes business and development activities for the establishment of a reliable aviation and aerospace industry within the Philippines. It engages in the design, manufacture, and sale of all forms of aircraft, and also develops local capabilities in the maintenance, repair, and modification of aviation equipment.

2) Road Transport

Toll Regulatory Board (TRB)

The Toll Regulatory Board supervises and regulates the construction, operation, and maintenance of toll facilities, and is also responsible for the collection of toll fees. It was created by virtue of Presidential Decree (P.D.) No. 1112 (a.k.a. the Toll Operation Decree).

Office of Transport Cooperatives (OTC)

The OTC was created in 1963 by virtue of Executive Order 898, and was originally known as the Committee on Transport Cooperatives. The current objective of the OTC is to integrate the transport cooperatives program into the public transport and transit system, in order to achieve economies of scale with respect to fuel consumption.

3) Railways

Philippines National Railways (PNR)

The PNR was created via legislation in June 1964, in order to provide a nationwide railway transportation system. There are currently plans to create new lines connecting the rapidly developing areas in Central Luzon and the South Tagalog region with Metro-Manila.

Light Rail Transit Authority (LRTA)

The LRTA was created via Executive Order 603 on July 12, 1980, in order to oversee the construction and operation of the Light Rail Transit project extending from Baclaran in Pasay City, to Monumento in Caloocan. Since then, the LRTA's mandate has expanded to encompass other light rail projects in Metro-Manila.

North Luzon Railways Corporation (NLRC / Northrail)

The North Luzon Railways Corporation (NLRC), or Northrail, was created to implement the Northrail Project, a major undertaking of the Philippine government which aims to build a fast, reliable, and

efficient railway system in Central and Northern Luzon. The railway system is expected to further enhance the development and growth potential of the aforementioned areas.

4) Maritime Transport

Philippines Ports Authority (PPA)

The PPA is the primary government agency concerned with the planning and development of the country's seaports. Established in 1974, the PPA charter was amended by Executive Order 857, which expanded its functions to include the integration and coordination of ports nationwide.

Maritime Industry Authority (MARINA)

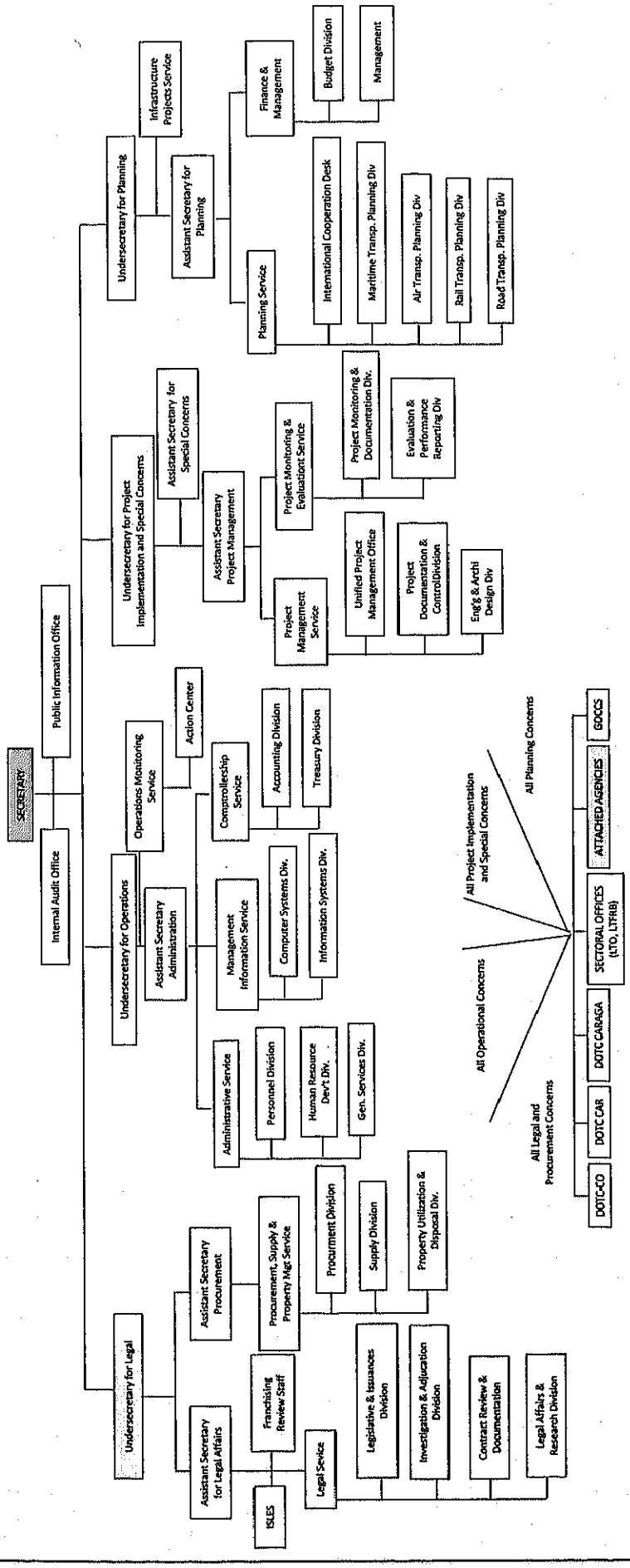
The MARINA oversees the promotion and development of the maritime industry, and also provides effective regulation of shipping enterprises. Since its establishment in June 1994, MARINA was granted the authority to issue Certificates of Public Convenience (CPC), permitting the operation of domestic and overseas water carriers. Other functions of the agency include the registration of vessels, the issuance of licenses, the addressing of safety concerns pertaining to vessel construction, and the enforcement of maritime law.

Cebu Ports Authority (CPA)

The Cebu Ports Authority (CPA) was created through the enactment of Republic Act No. 7621, signed on June 26, 1992. The CPA's mandate is to administer all ports located in Cebu Province, thus effectively separating these ports from the Philippine Ports Authority (PPA) system. The CPA began operations and officially took over all Cebu ports on January 1, 1996.

Philippines Merchant Marine Academy (PMMA)

The PMMA, formerly known as the Philippine Nautical School, was created in January 1963 via Republic Act 3680. The PMMA produces efficient and well-trained merchant marine officers of an international caliber. PMMA graduates spearhead Philippine efforts in international trade, and are also capable of serving as auxiliary naval officers during times of conflict.



Source: JICA Study Team

Figure 4.1-1 Organizational Structure of DOTC

4.1.3 Budget and Financial Situation

To be completed as of 2012, the DOTC Operating Budget for Major Final Outputs (MFO) was PhP34,574.48 million, of which 73.88% correspond to Infrastructure Development Services, 13.03% to Regulatory and Enforcement Services, 12.15% Operation and Management Services, and 0.94% Policy Plan Formulation Services.

4.2 Bases Conversion Development Authority (BCDA)

4.2.1 Historical Background

On 14 March 1947, the Military Bases Agreement (MBA) was signed by President Manuel A. Roxas and Paul V. McNutt, the United States high commissioner in the Philippines allowing the Americans to continue maintaining the military bases and stations established in the Philippines during the American and Japanese occupations[1]. The agreement had a 99-year duration. On September 16, 1991, the MBA was reduced from 99 to 25 years. The new treaty for the extension was rejected by the Philippine Senate, compelling the pull-out of US military presence on Philippine soil.

Before the bases pullout, the Legislative-Executive Bases Council (LEBC) was created by Joint Resolution No. 1 in 1989 and mandated to make recommendations on the following (1) the conversion of the U.S. Bases into the alternative social, economic, and security programs and projects; (2) the maximization of development of the Baselands reverted in 1979; (3) the formulation of alternative uses for the military camps in Metro Manila as well as the facilitation of the transfer of some units of the Philippine Armed Forces to the Clark facilities and other locations; and (4) the reduction of the social and economic dislocation which could result from the withdrawal of the U.S. facilities from the Bases.

The US bases withdrawal had immediate impact on the area in terms of job losses and cut economic and military support. This was aggravated by the 1990 earthquake and 1991 eruption of Mt. Pinatubo that laid to waste much of the area. It was during this time when the Bases Conversion and Development Act of 1992 was passed by Congress to address the impact of the pull-out.

4.2.2 Corporate Profile

The BCDA was created by virtue of RA 7227, a law signed by President Corazon Aquino on 13 March 1992. It has a three -tiered mandate: (1) Accelerate the conversion of the Clark and Subic military bases and their extensions into alternative productive uses; (2) Raise funds from the sale of Metro Manila camps and use such funds for its conversion activities; and (3) Promote the economic and social development of Central Luzon in particular and the country in general.

In the pursuit of its mandate, BCDA was given powers such as it can (a) own, hold and/or administer the military reservations transferred to it by the President; (b) adopt, prepare and implement a comprehensive and detailed development plan for the sound and balanced conversion of the Clark and Subic military reservations; (c) encourage the active participation of the private sector ; (d) serve as the holding company of subsidiary companies; (e) manage and operate through private sector companies developmental projects outside the jurisdiction of subsidiary companies and Special Economic Zones; (f) establish a mechanism in coordination with the appropriate local government units to effect meaningful consultations regarding plans, programs and projects; and (g) plan, program and undertake the readjustment, relocation, or resettlement of population within the Clark and Subic military reservations and their extensions. In addition, BCDA possesses special corporate powers that enabled it to (a) construct, own, lease, operate and maintain public utilities as well as infrastructure facilities; (b) reclaim or undertake reclamation projects as it may deem necessary in areas adjacent or contiguous to the Conversion Authority's lands; (c) invest its funds and other assets other than those of the Special Economic Zones; (d) exercise the right of eminent domain; and (e) exercise oversight functions over the Special Economic Zones as declared under RA 7227.

With its vision of "leading the way towards the sound conversion and development of former military baselands into self-sustaining, globally competitive investment centers resulting in the balanced and sustainable growth of their environs, in particular Central Luzon" and its core purpose/ mission "to

[1] *http://kahimyang.info*

transform baselands into beacons of globally competitive, sustainable economic zones as part of nation building", BCDA observes the following policy framework in its conversion activities: (a) Master Development Planning of properties; (b) Consultation with the affected local government units of BCDA plans; and (c) Privatization.

BCDA has total landholdings of approximately 35,745 hectares, spread in Northern and Central Luzon and in Metro Manila. This includes Fort Bonifacio, Villamor Air Base, Fort Abad, Camp Melchor, Camp Atienza and Camp Claudio. Outside Metro Manila, BCDA owns the (a) Poro Point Freeport Zone (PPFZ) in San Fernando, La Union; (b) Bataan Technology Park (BTP) in Morong, Bataan; (c) John Hay Special Economic Zone (JHSEZ) in Camp John Hay, Baguio City; and (d) Clark Freeport and Special Economic Zone (CFSEZ) in Clarkfield, Pampanga.

BCDA, as a Government Owned and Controlled Corporation (GOCC), is engaged in the following: (a) real estate/ property development; (b) infrastructure development; (c) utilities; (d) economic zone and freeport development; and (e) socialized housing/ housing for the military. It has formed subsidiaries managing the BCDA properties that are all 100% owned. These are the Clark Development Corporation (CDC) for the management of CFSEZ, Poro Point Management Corporation (PPMC) for the management of PPFZ, John Hay Management Corporation (JHMC) for the management of JHSEZ, Bataan Technology Park, Inc. (BTPI) for the management of BTP, North Luzon Railways Corporation (NLRC) and BCDA Management and Holdings, Inc. (BMHI). The Clark International Airport Corporation (CIAC), a former subsidiary of BCDA, was transferred to the Department of Transportation and Communications (DOTC) through Executive Order (EO) 64 issued in December 2011. By law, BCDA has oversight functions over the Subic Bay Metropolitan Authority (SBMA). In addition, BCDA is also affiliated with other private companies operating inside its Fort Bonifacio property: (a) a 45% interest in Fort Bonifacio Development Corporation (FBDC); (b) 10% in Bonifacio Water Corporation (BWC); (c) 33% in Bonifacio Estates Services Corporation (BESC); and (d) 25% in Bonfacio Communications Corporation (BCC).

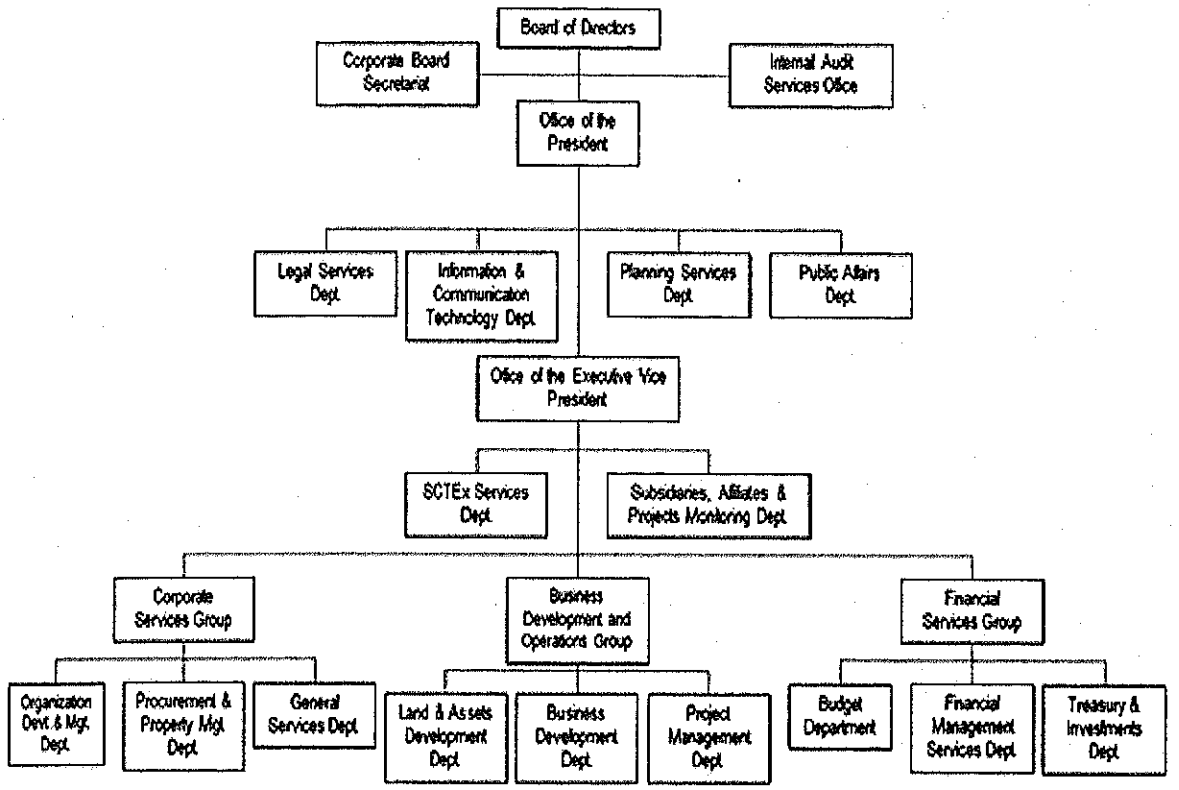
BCDA undertakes infrastructure projects to enhance accessibility to the BCDA economic zones, most notable is the Subic-Clark-Tarlac Expressway (SCTEX) project. The SCTEX, which started operation in 2008, is a 93.77 km, 4-lane divided toll road limited access highway that features 11 interchanges, four major bridges, 30 minor bridges, 47 underpasses, 303 drainage structures, and toll road facilities and equipment. Other infrastructure projects in the pipeline are the (a) Kennon Road Improvement Project; (b) Taguig-Makati-Pasay Monorail and (c) Poro Point Airport Mall and Terminal.

Moreover, BCDA supports its chartered beneficiaries with the Armed Forces of the Philippines (AFP) as the major stakeholder from the revenues it generates from the disposition of its assets. Since its creation in 1992 until September 2012, BCDA has generated PhP 55.81 B from the disposition of former Metro Manila camps. Of this amount, (a) 39% or PhP 21.79 B has been remitted to the Bureau of Treasury for the AFP, (b) 20% or PhP 10.89 B went to BCDA's share in the proceeds, and (c) 13% or PhP 7.27 B went to the share of other beneficiary agencies.

BCDA is a self-sustaining GOCC, not reliant on yearly budget appropriations from the National Government.

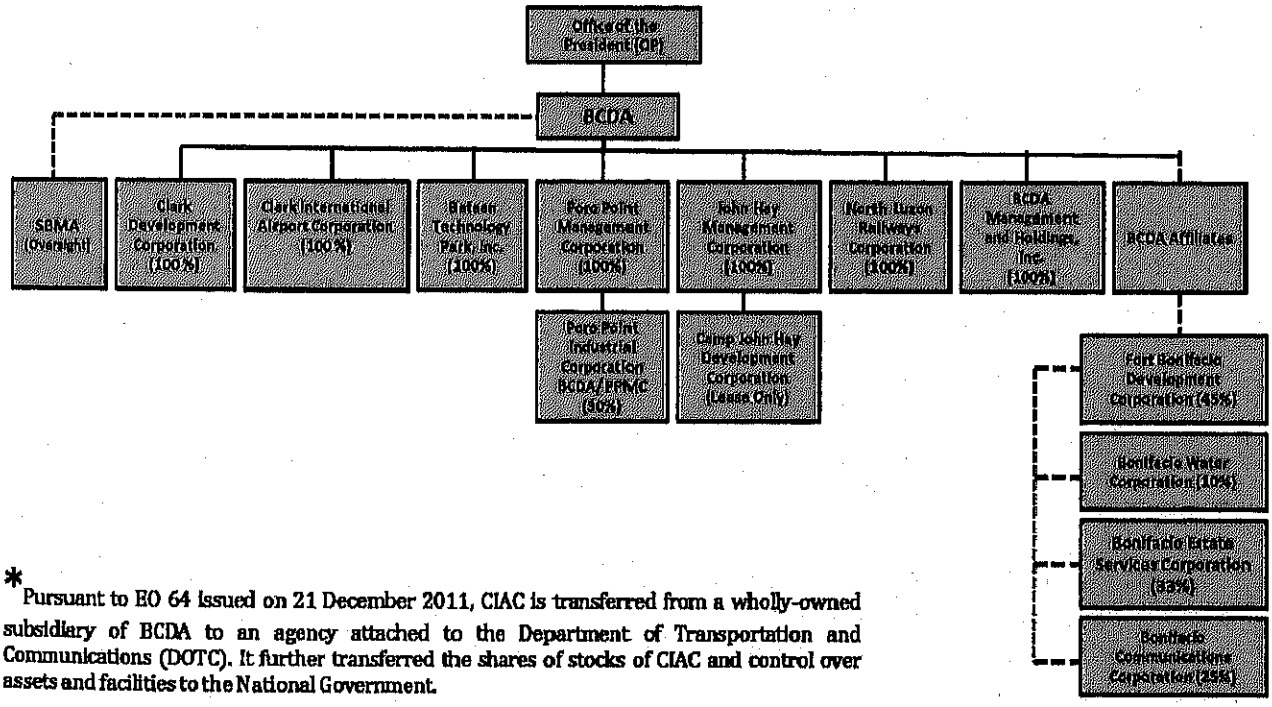
4.2.3 Organizational Structure

The organizational staffing structure of BCDA is shown in **Figure 4.2-1**, while the corporate and ownership structure, such as 100% owned filial or affiliated companies, is shown in **Figure 4.2-2**.



Source: BCDA

Figure 4.2-1 BCDA Organization Chart



* Pursuant to EO 64 issued on 21 December 2011, CIAC is transferred from a wholly-owned subsidiary of BCDA to an agency attached to the Department of Transportation and Communications (DOTC). It further transferred the shares of stocks of CIAC and control over assets and facilities to the National Government.

Source: BCDA

Figure 4.2-2 BCDA Corporate and Ownership Structure Chart

4.2.4 Budget and Financial Situation

The financial condition of BCDA as of 31 December 2011 is of a Total Assets of PhP 127.816 Billion, with total liabilities for PhP 46.694 Billion, and Equity of PhP 81.122 Billion.

4.2.5 Staffing Situation

The staffing situation of BCDA is as follows: All personnel are full time employees, having no contract-staff currently hired.

Table 4.2-1 BCDA Staffing

Department	Staff
Office of the President % CEO	5
Corporate Board Secretariat	3
Internal Audit Services Office	8
Legal Services Department	15
Public Affairs Office	7
Planning Services Department	5
Information Technology Department	10
Office of Executive Vice President	5
Security Services Department	2
SCTEX Services Department	6
Subsidiaries Affiliates & Projects Monitoring Dept.	12
Financial Services Group	4
Financial Management Services Department	7
Budget Monitoring Department	8
Treasury & Investment Department	8
Business Development and Operation Group	4
Land and Assets Development Department	8
Business Development Department	7
Project Management Department	8
Corporate Services Group	3
Organization Development and Management Dept.	2
Personnel and Compensation & Benefits Division	10
Procurement and Property Management Dept.	12
Premises Administration & Transportation Services Dept.	16
Records Management & Office Services Division	7
Total	**182**

Source: JICA Study Team

4.3 North Luzon Railway Corporation (NLRC)

4.3.1 General Background

NLRC was incorporated and registered with the Securities and Exchange Commission as a wholly-owned subsidiary of BCDA, whose primary purpose is to develop, construct, operate and manage a railroad system to serve Metro Manila, and Central and Northern Luzon.

Pursuant to executive Order No. 859, series of 2010, NLRC became an attached agency of the DOTC. Under the direction of the DOTC, NLRC shall provide a fast, reliable, and efficient railway system that connects the Ninoy Aquino International Airport (NAIA) and CIA, hereinafter referred to as the "*Project*".

Primary Purpose

To develop, construct, operate and manage a railroad system to serve Metro Manila, and Central and Northern Luzon;

Secondary Purposes

- To develop, construct, manage, own, lease, sublease and operate establishments and facilities of all kinds along the railroad system for residential, commercial, business, mixed development, institutional, recreational, tourism, amusement, and other purposes;
- To develop, construct, manage, own, lease, sublease, operate, secure, maintain the resources, and generally carry out all the activities of a railway line, i.e. commercial and waste transportation, drainage and sewerage, telecommunications and utility systems and common facilities, all in accordance with the Business Plan and internationally and locally accepted design parameters.
- To purchase, acquire, own, lease or sell and convey real properties such as lands, buildings and warehouses and machinery, equipment and other personal properties as may be necessary or incidental to the conduct of the corporate business, to pay in cash, shares of its capital stock, debentures and other evidences of indebtedness, or other securities, as may be deemed expedient for any business or property acquired by the Corporation, and to enter into joint venture agreements as may be deemed necessary subject to applicable provision of law;
- To borrow and raise money from both local and international financial institutions necessary to meet the financial requirements of its business; to issue bonds, promissory notes and other evidences of indebtedness; and to secure the repayment thereafter of mortgage, pledge, deed of trust or lien upon the properties of NLRC, or to issue pursuant to law, shares of its capital stock, debentures and other evidences of indebtedness in payment for properties acquired by NLRC or for money borrowed in the prosecution of its lawful business;
- To devise, formulate and conduct business research, business studies, and surveys; to create, install and utilize business systems, methods, controls, layouts and plans, all as are required or expedient to the management, administration or operation of NLRC's assets.
- To invest and deal with the money of NLRC in such manner as may from time to time be considered wise and expedient for the advancement of its interests; and to sell, and dispose of or transfer the businesses, properties and goodwill of NLRC or any part thereof for such considerations and under such terms as may be approved by the Board;
- To grant concessions, rights to persons, corporations, associations or entities to establish, operate and manage all types of establishments and facilities, which include, but are not limited to residential, commercial, business, recreational, tourism and development centers, roads/infrastructure, power and electrical, water and water distribution, drainage, sewerage, telecommunications, security and other utility systems and activities covered by the railway system;
- To acquire or obtain from any government authority, national, provincial, municipal or otherwise, or any corporation, company or partnership or person, such charters, contracts, franchise, privileges, exemptions, licenses and concessions as may be conducive to any of the objectives NLRC;
- To establish and operate one or more branch offices or agencies to carry out any or all of its operations and businesses without any restrictions as to the place or amount, including the right to hold, purchase, or otherwise deal in and with real and personal property anywhere in the Philippines;
- To create, maintain, manage, and regulate the method, plan and systems of security and maintenance, protection and preservation of peace and order and safety of individuals, establishments, facilities, utility systems and activities mentioned in the Primary Purpose, inside and within the peripheries of the area under NLRC's control.
- To conduct and transact any and all lawful businesses, and to do or cause to be done any one or

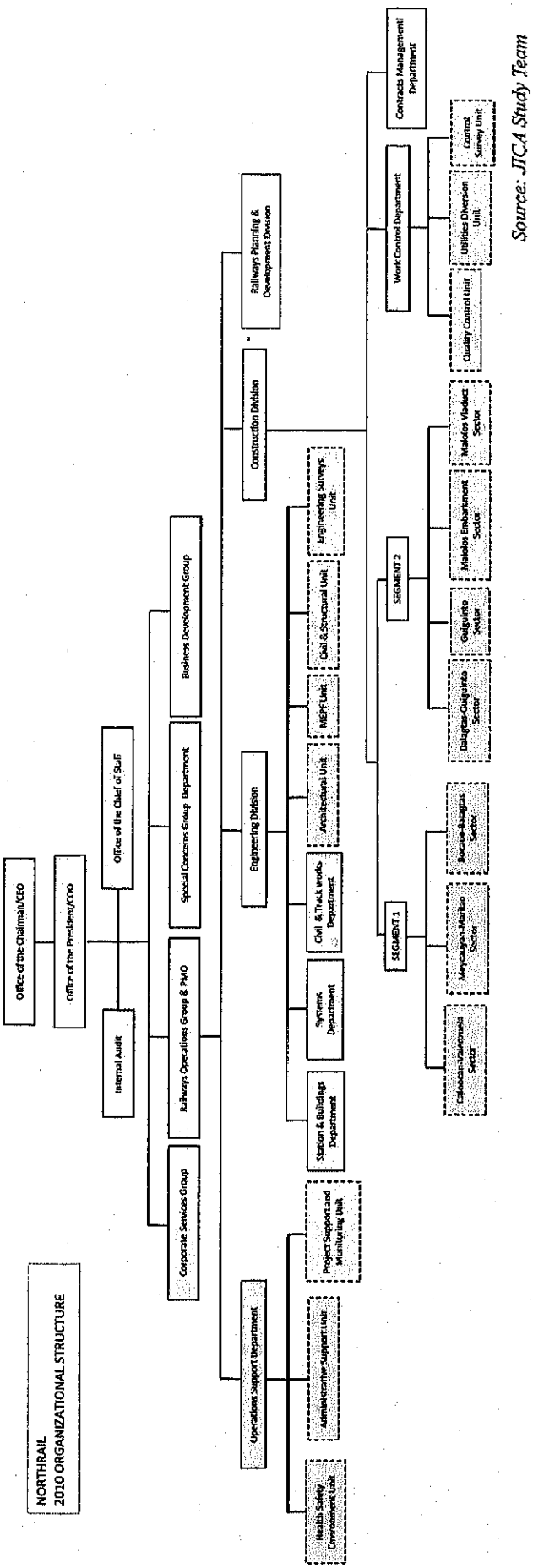
more of the acts and things herein set forth as its purpose, within or without the Philippines, and in any and all the foreign countries, and to do everything necessary, desirable or incidental to the accomplishment of the purposes or the exercise of any of one or more of the powers herein enumerated, or which shall at any time appear conducive to or expedient for the protection or benefit of NLRC.

4.3.2 Organization Structure

Figure 4.3-1 shows the organization structure of NLRC as of 2010 when launched for the implementation of the Project.

4.3.3 Budget and Financial Condition

As of 2012, the Corporate Operating Budget was PhP153,397,407, of which 48% corresponds to Personal Services, 50.6% to Maintenance and other Operating Expenses, and 1.4% Capital Outlay.



Source: JICA Study Team

Figure 4.3-1 NLRC Organization Structure Chart

4.4 Philippines National Railway (PNR)

4.4.1 Historical Background

The state-owned Philippine National Railways (or Pambansang Daangbakal ng Pilipinas in Filipino), commonly abbreviated as PNR, is the sole operator of the most extensive intra-island railway on Luzon, the largest island in the Philippines.

PNR officially began operations on June 26, 1875 as the *Ferrocarril de Manila-Dagupan*, during the Spanish colonial period, and later becoming the *Manila Railroad Company* (MRR) during the American colonial period. It became the Philippine National Railways on June 20, 1946 by virtue of Republic Act No. 4156. The PNR is an attached agency under the Department of Transportation and Communications. The Act says that PNR shall exist for a term of fifty years from the date of approval of this Act.

It operates two commuter rail services in Metro Manila and the Bicol Region. The Bicol service is currently under rehabilitation in preparation for the resumption of the Bicol Express run to Naga City in Camarines Sur province, and eventually to the southern terminal in Legazpi City in Albay. The existing and well-patronized commuter service in Metro Manila is part of the metropolitan transit system and is referred to as the Orange Line.

PNR officially began operations on June 26, 1875 as the Ferrocarril de Manila-Dagupan, during the Spanish colonial period, and later becoming the Manila Railroad Company (MRR) during the American colonial period. It became the Philippine National Railways on June 20, 1946 by virtue of Republic Act No. 4156. The PNR is an attached agency under the Department of Transportation and Communications.

4.4.2 Current Services

1) Green & Orange Lines

The Philippine National Railways owns two different rail lines, namely the North Main Line (Green Line) and the South Main Line (Orange Line), along with the three spur lines, which serve various parts of Luzon. The only operating line, which is presently under rehabilitation, is the South Main Line (Orange Line), which serves as the regional rail backbone of Southern Luzon.

The PNR currently operates in the Manila metropolitan area and the provinces of Laguna, Quezon, Camarines Sur and Albay. In the past, the PNR also used to serve the provinces of Bulacan, Pampanga, Tarlac, Nueva Ecija, Pangasinan and La Union on the North Main Line, and Batangas on the South Main Line. The North Main Line will be partly replaced under the current North Rail project. Plans are also afoot to revive previously discontinued services.

2) Commuter Express

The Commuter Express (also known as the Metro Commuter), commonly called the Commex, serves as the commuter rail service for the Manila metropolitan area, extending as far south as Binan, in Laguna. The PNR uses GE locomotives hauling Commex passenger cars, as well as newly procured Hyundai Rotem diesel multiple units (DMUs), for this service.
Commex service using the new DMUs is currently offered between Tutuban and Alabang in Muntinlupa City, while a daily Commex run between Manila and Biñan City, Laguna runs using GE locomotives. Currently, Commex trains make 38 daily trips, 19 in each direction.

3) Bicol Commuter

The Bicol Commuter service serves as the commuter rail backbone of the Bicol Region, serving stations

between Tagkawayan, in Quezon province and Ligao City, in Albay, with Naga City in Camarines Sur acting as a central terminus. The service was launched on September 16, 2009, in time for the feast of Our Lady of Peñafrancia, but was once suspended due to typhoon damage and is pending full rehabilitation.

When service is restored, Bicol Commuter trains will make seven trips a day, alternating between Tagkawayan, Sipocot, Naga and Ligao as termini. Five trips will run using a Commex DMU sent to the Bicol Region, while two trips will use GE locomotives.

4.4.3 Station Layout

All PNR stations are at-grade, using a side platform layout. Most have only basic amenities: platforms and ticket booths, while rehabilitated stations along the Metro Manila line have been fitted with wheelchair ramps. Several stations have extended platforms, having an upper platform catering to DMU services, and a lower platform for regular locomotive-hauled services.

4.4.4 Peak Ridership

While there are spotty records for actual ridership levels and quantities during the PNR's "best years" during the late 1960s and early 70s, existing data on train operations show such daily passenger figures or ridership during peak seasons as follows:

For the Metro Commuter Operation, an estimated 47,000 passengers rode 24 motor cars at 62 trips per day to six routed destinations. This was when services extended between Tutuban and such destinations as San Jose, Nueva Ecija; Carmona, Cavite; Calamba and College, Laguna; Malolos, Bulacan; and Guadalupe.

For Mainline North, PNR had six trips daily from Tutuban to San Fernando, La Union using 14 passenger cars. Estimated peak ridership was at 3,000 passengers daily.

For the long-distance trains of the Mainline South, the estimated peak ridership was at 7,560 passengers daily on ten trips using 36 cars to various destinations in the Bicol Region.

4.4.5 Virtual Monopoly on Land Travel

The factors surrounding these figures included PNR's virtual monopoly of long-distance land travel and commuting, when it had much less competition in either the Metro Commuter or the two Mainline train operations. Highways were less developed, there were not LRTs, and no diversion roads.

The PNR then had 47 open stations from Manila to Legazpi and 26 to San Fernando, La Union. In Metro Manila, all commuter stations were manned by PNR Station Personnel, while the company itself employed more than 7,000 personnel in plantilla positions compared to 264 today.

4.4.6 Rehabilitation and Revival

PNR used to operate over 797 km (495 miles) of route from La Union down to Bicol. However, continued neglect and damage from natural calamities in past decades reduced PNR's efficiency and railroad coverage. Persistent problems with informal settlers in the 1990s contributed further to PNR's decline. In 2006, Typhoons Milenyo and Reming caused severe damage to the network, resulting in the suspension of the Manila-Bicol services.

In 2007 the Philippine government initiated a rehabilitation project aiming to remove informal settlers from the PNR right-of-way, to revitalize commuter services in Metro Manila, and to restore the Manila-Bicol route as well as lost services in Northern Luzon. The government actively pursued the

rehabilitation and revival of Philippine rail transport through various investments, despite the numerous problems involved.

By 2011, work was ongoing for the total reconstruction of rail bridges and tracks, including replacement of the current 35-kilogram track with newer 50-kilogram tracks and the refurbishing of stations. The first phase, involving the conversion of all the tracks in the Manila metropolitan area, was completed in 2009. On July 14, 2009, PNR launched its diesel multiple units (DMU) newly acquired from South Korea.

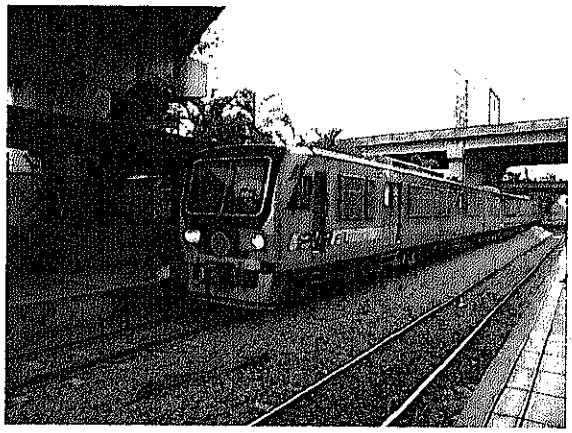
In mid-2011, a test run of the Bicol Express between Manila and Naga City was conducted although it encountered a problem with the tracks and typhoon-damaged embankment in the Malaguico, Sipocot area. Full repairs have been undertaken since then.

4.4.7 Rolling Stock: Maintenance and Increase in Hauling Capacity

Five types of rolling stock run on PNR's lines. These are the locomotives, the Commex passenger cars, baggage cars, diesel rail cars or DRC, and the newly acquired Manila commuter trains, the Korean DMUs. There are 14 locomotives, 18 Commex passenger cars, two baggage cars and eight DRC currently operating.

PNR recently (November 2010) acquired surplus sleeper coaches and passenger cars from Japan Railways East and more rolling stock are expected to arrive. As of July 2011, these units have been installed with safety window screens and the exteriors repainted.

PNR's hauling capacity has also been increased with repair, reconditioning, and repainting of seven Diesel Electric Locomotives (DEL). At the same time, passenger convenience once the Bicol run is resumed will be augmented with on-board dining as the repair and conversion of the line's dining car has been completed.



Source: JICA Study Team

Figure 4.4-1 Rolling Stock and Existing Facility of PNR

CHAPTER 5

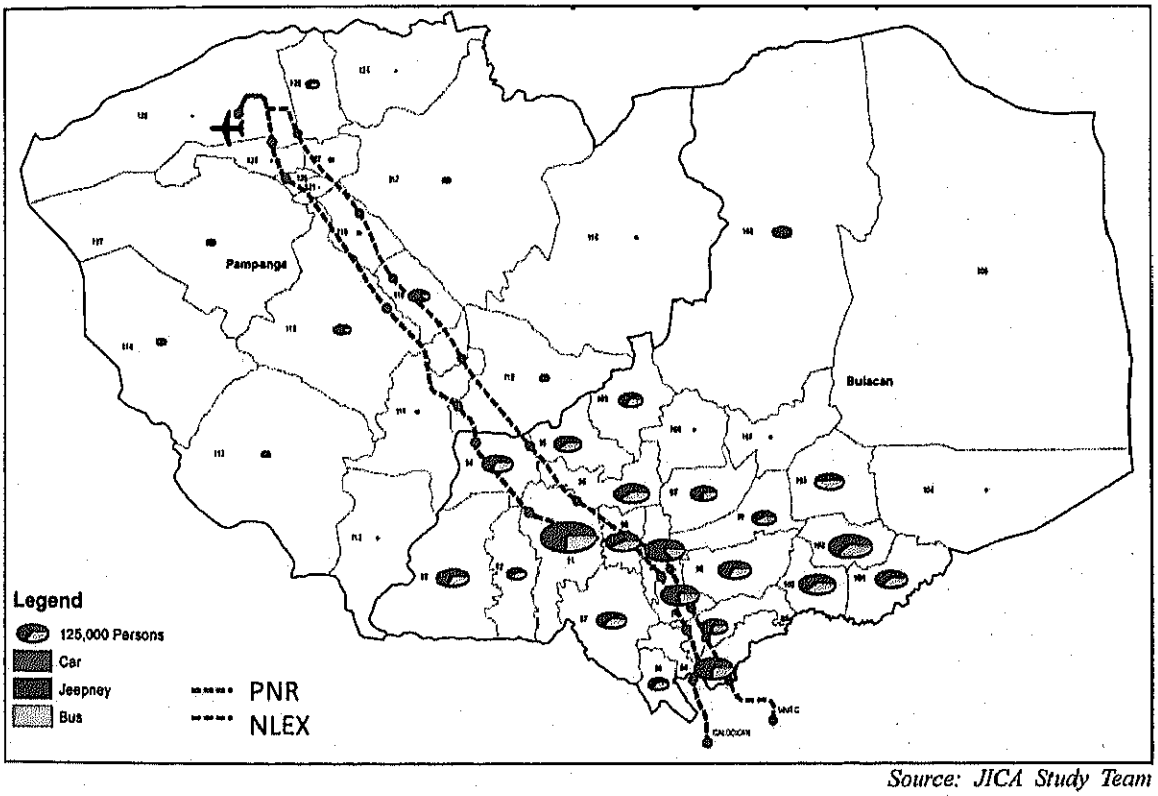
TRAVEL DEMAND FORECAST

CHAPTER 5 TRAVEL DEMAND FORECAST

5.1 Current Trip Patterns

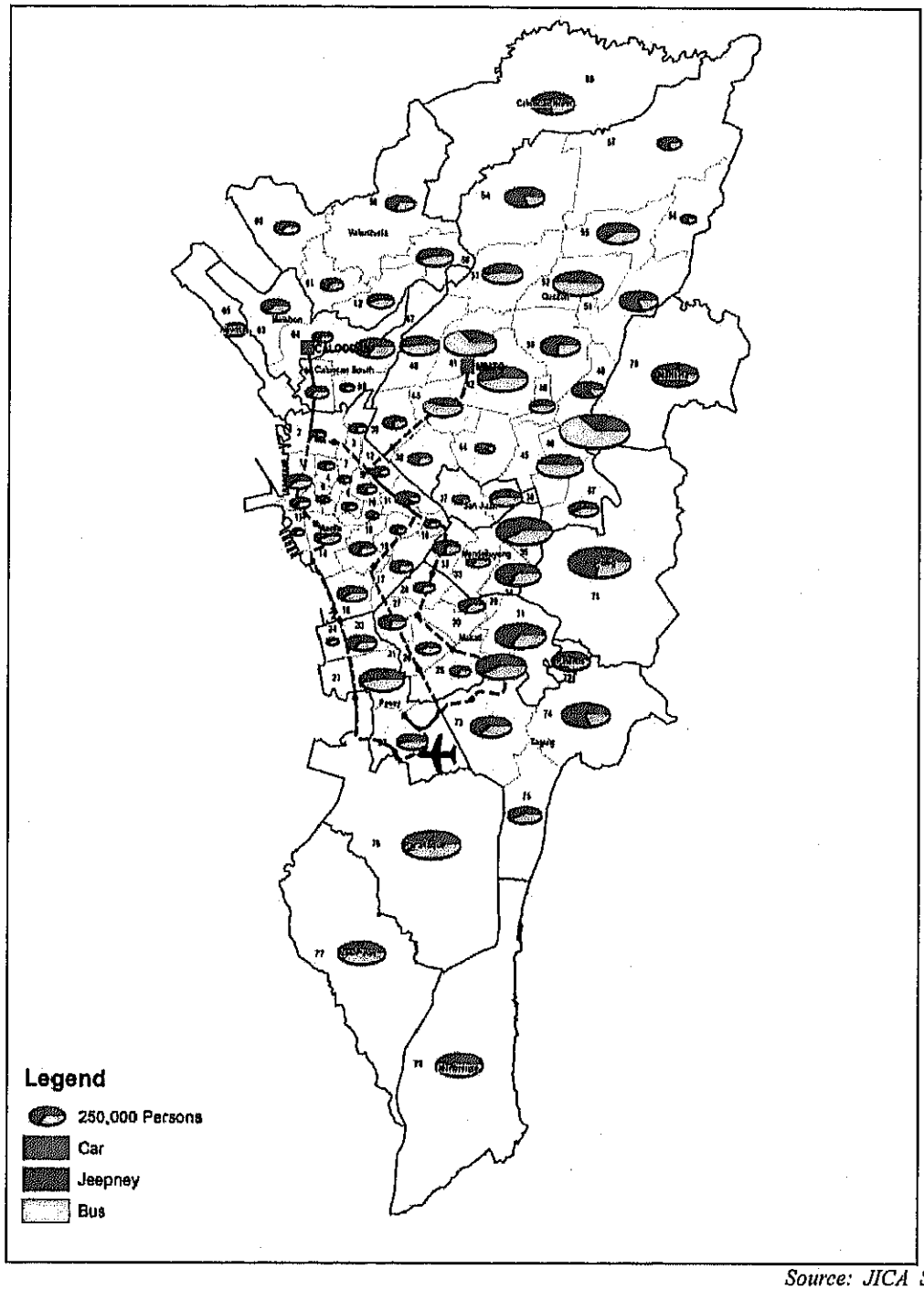
This section illustrates the current trip pattern in the study area. Figure 5.1-1 shows person trip ends by mode in Bulacan and Pampanga provinces in 2009. Travel demand in Bulacan is higher than in Pampanga, which is mostly a rural area. The majority of the trips are by Jeepney. Trips by bus are more than by Car, and reflect that intra-regional travel by Car is limited and indicates the low car ownership and lower incomes of the residents of Pampanga Province. Person trip ends by mode in Metro Manila in 2009 are shown in Figure 5.1-2. Travel demand is much higher along the eastern side of MM. The inner city and surrounding areas have more Jeepney trips. Bus trips are mostly in Quezon, east and south-eastern areas, which indicates inter-regional travel. Car trips are higher in the south and east. Car trips in the central area are limited, mostly due to congestion caused by over-crowded roads, and limited parking availability.

Figure 5.1-3 shows the number of trips and mode share of trips crossing the boundary of Bulacan and Pampanga in 2009. Daily border crossing trips were about 200,000. Most trips used NLEX. The majority of the trips on MacArthur highway are by Jeepney. On the other hand, Bus trips are higher than other modes on NLEX. Figure 5.1-4 shows the number of trips and mode share of crossing the boundary of Bulacan and Metro Manila in 2009. Total trips that cross the boundary are about 450,000. The trend in mode share is the same as at the boundary of Bulacan and Pampanga.



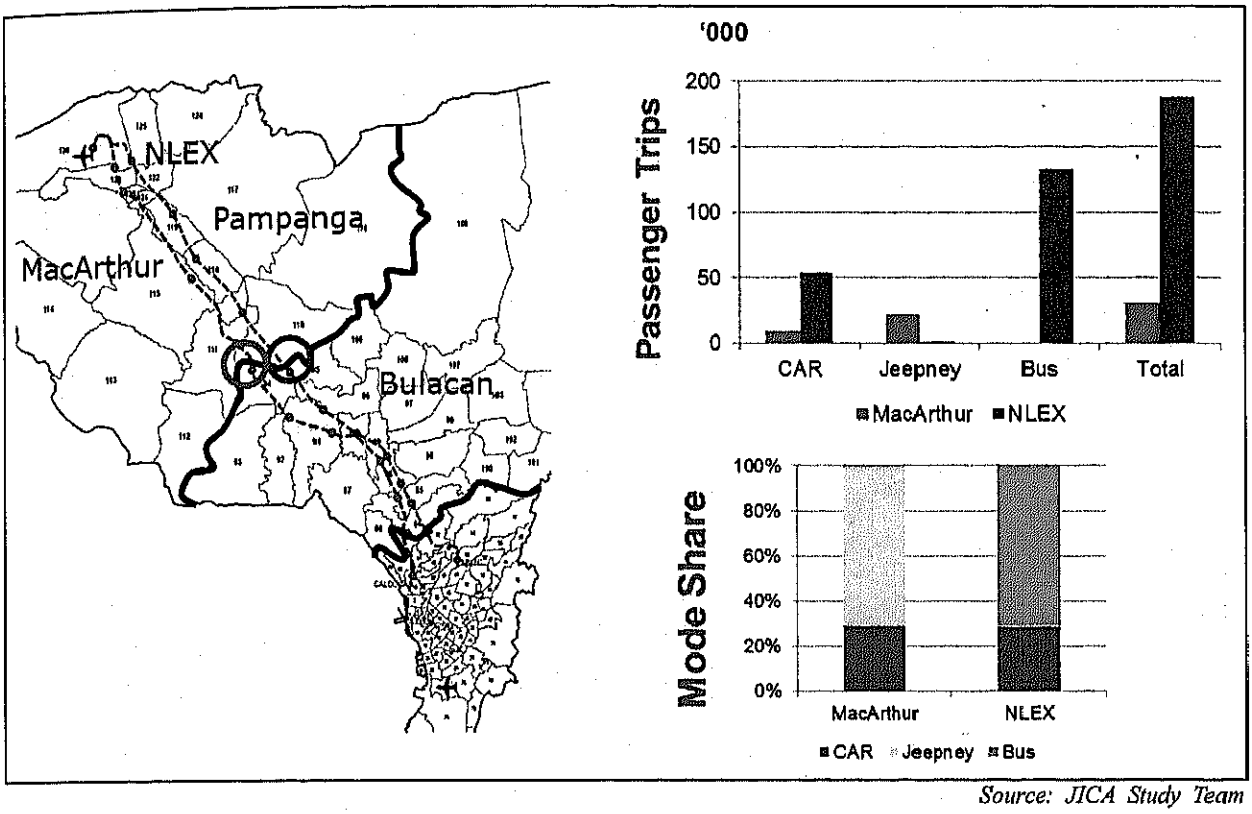
Source: JICA Study Team

Figure 5.1-1 Person Trip Ends by Mode in Bulacan and Pampanga (2009)



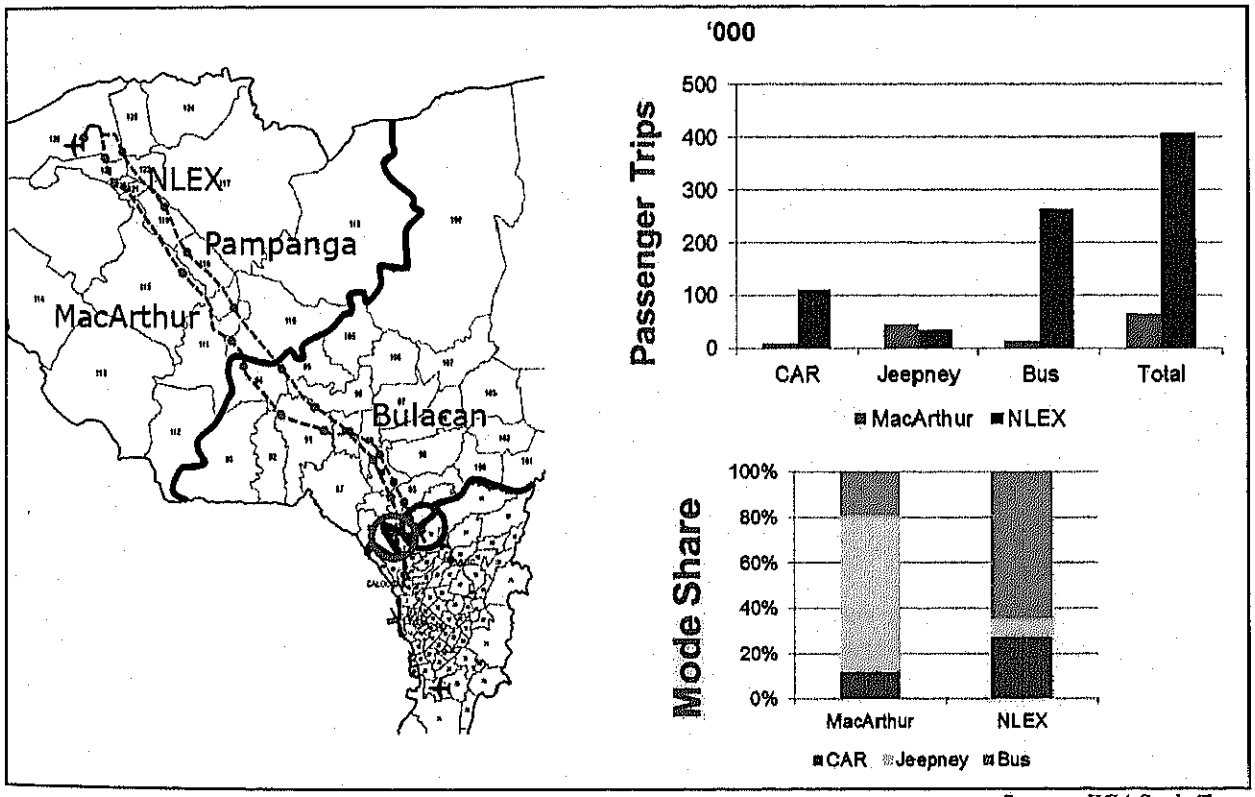
Source: JICA Study Team

Figure 5.1-2 Person Trip Ends by Mode in Metro Manila (2009)



Source: JICA Study Team

Figure 5.1-3 Across Boundary of Bulacan and Pampanga (2009)

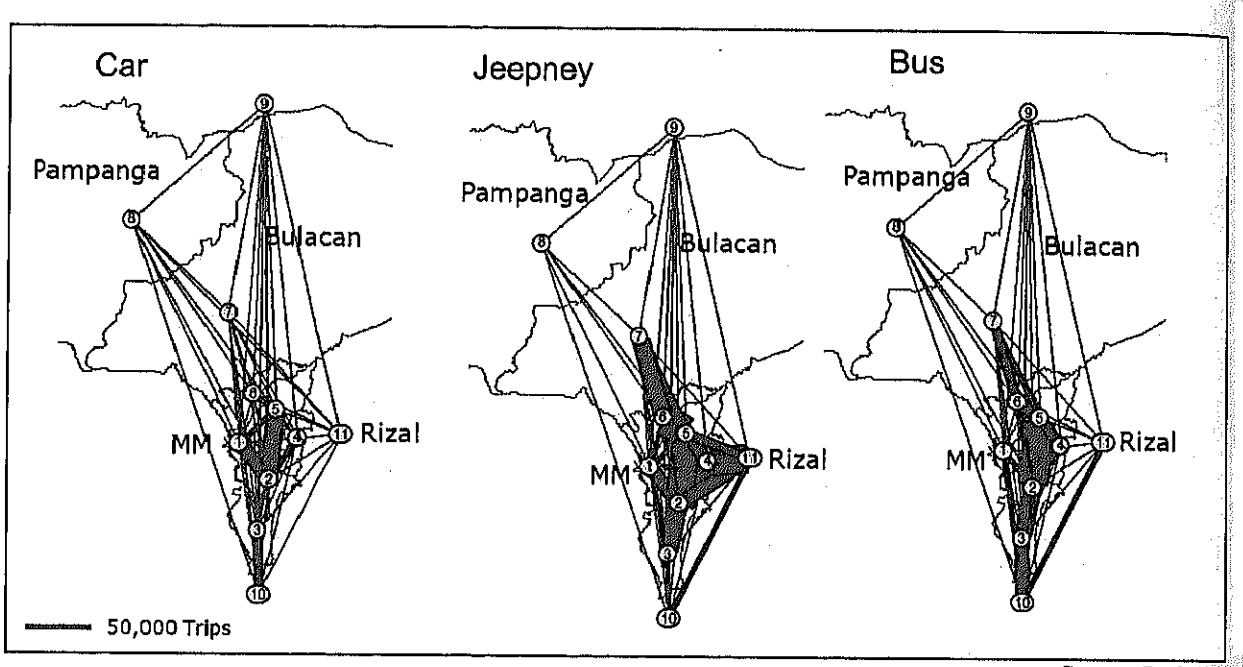


Source: JICA Study Team

Figure 5.1-4 Across Boundary of Bulacan and Metro Manila (2009)

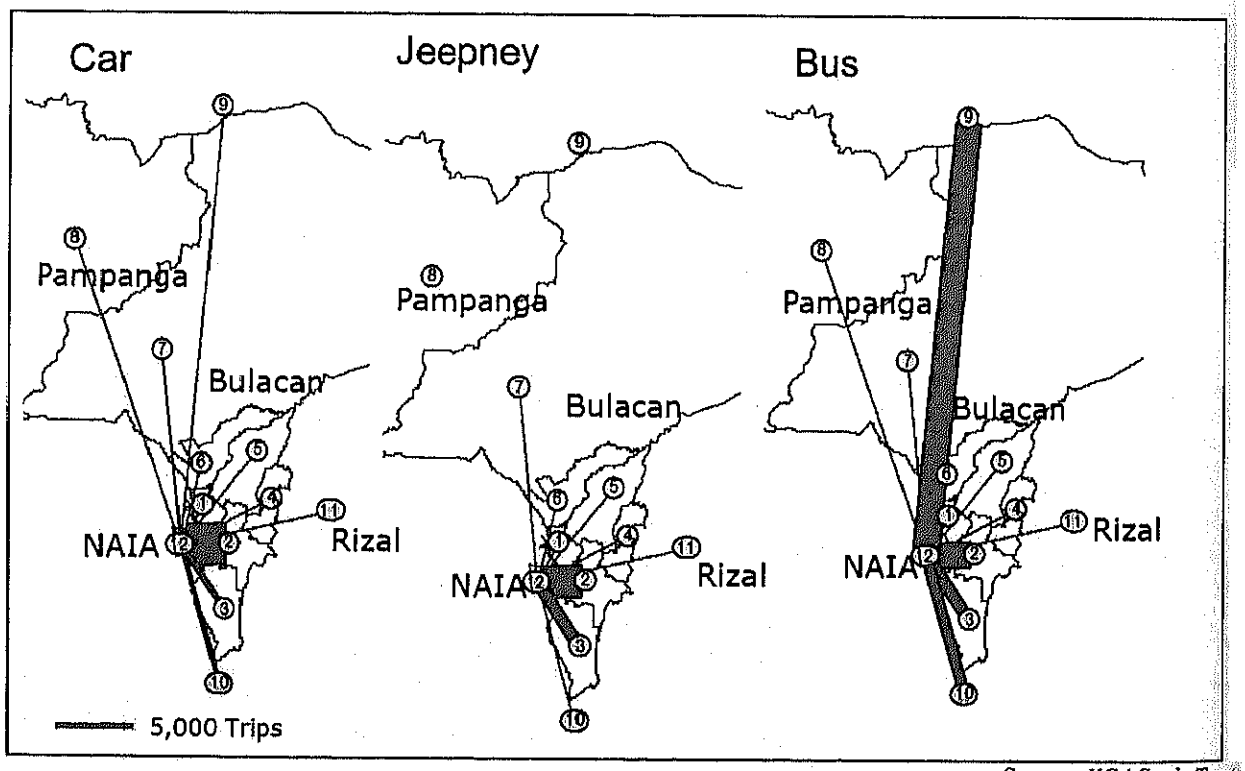
The desired line of travel patterns in the study area in 2009 are shown in Figure 5.1-5. The majority of the travel is intra Metro Manila. The number of trips between Metro Manila and the Western area or Southern area are higher than the trips between Metro Manila and Bulacan or Pampanga.

Figure 5.1-6 shows the desired line of travel pattern by mode to/ from NAIA in 2009. Main trips to/from NAIA are trips from Metro Manila. Trips from Bulacan and Pampanga are few. Bus trips are mostly from the northern areas, these indicate the long distance trips from provinces to MM.



Source: Study Team

Figure 5.1-5 Travel Pattern by Mode - Desire Line (2009)



Source: JICA Study Team

Figure 5.1-6 Travel Pattern by Mode to/ from NAIA - Desire Line (2009)

5.2 Traffic Surveys in the GCR

5.2.1 Traffic and Travel Demand Surveys

The study examined various data sources for the development of the travel demand forecast model for the Airport Express Rail (AER) link, including: "The Master Plan on High Standard Highway Network Development in the Republic of the Philippines (HSH)"; the "Study on Airport Strategy for the Greater Capital Region in the Republic of the Philippines 2011" and the on-going MUCEP study. It was realized that none of these studies had a database covering the AER study area or the requisite travel pattern data required for the AER demand model. In order to update and improve the database available, the following travel surveys were conducted.

- Manual Classified Counts, Vehicle Occupancy Counts, and Roadside Interview Surveys – at NLEX, MacArthur Highway and CIA
- Journey Time Surveys along NLEX & MacArthur Highway
- Bus Passenger on-board Interview Surveys on buses between Metro Manila and most provinces north of MM;
- Air passengers, Meeters & Greeters and worker interview surveys at NAIA and CIA.

5.2.2 Traffic and Travel Demand Surveys on NLEX and Mac Arthur Highway

1) Outline of Traffic & Transport Surveys

The following surveys were conducted on NLEX and Mac Arthur Highway.

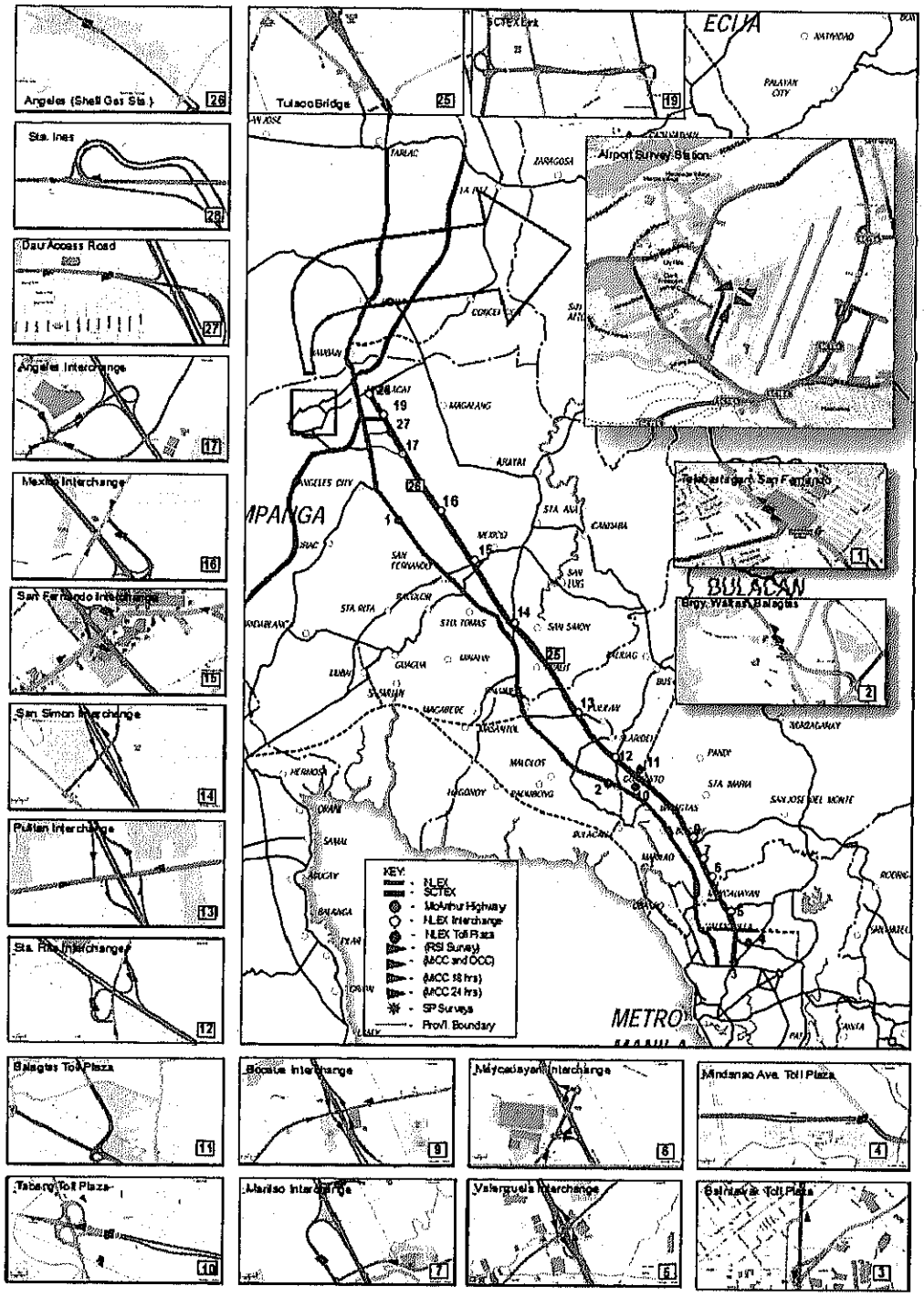
- Manual Classified Counts – all vehicles by five vehicle types
- Vehicle Occupancy Counts – for all vehicles, except goods vehicles
- Roadside Interview Surveys – for all vehicles, except goods vehicles
- Journey Time Surveys – along MacArthur Highway and NLEX

Manual classified counts were made to determine the traffic volume by hourly interval, by vehicle type, and direction of travel. The survey duration was 18 or 24 hours. For the vehicle occupancy survey, enumerators recorded the number of passengers in the vehicle chosen at random by hour, vehicle type, and direction of travel. The survey duration was also 18 hours or 24 hours. Roadside passenger interview surveys at NLEX were conducted only for vehicles entering the toll way. The surveyed vehicles were classified by 5 types:

- Vehicle Type 1: Sedan, SUV, Pick-up, Taxi, Airport Taxi
- Vehicle Type 2: Private or Public Van (with 8~16 passenger seats)
- Vehicle Type 3: AUV-Public FX/Jeepney (with 16+ passenger seats)
- Vehicle Type 4: All Buses (Mini or other sizes, public or tourist etc.)
- Vehicle Type 5: Other Vehicles (generally goods vehicles)

Three types of roadside interviews were conducted. One was interviews with private mode passengers including taxi passengers (Vehicle Type-1). The second one was interviews with public mode passengers in vehicle types 2 and 3. The third one was interviews with public mode drivers i.e. of vehicle types 2 and 3. For private mode passenger data, the trip origin and destination, trip purpose, vehicle occupancy, and home address of the interviewee was recorded. For public mode passenger data, the trip origin and destination, trip purpose, and home address of the interviewee were recorded, as well as, the total fare paid from origin to destination for the trip. For public vehicle drivers vehicle information such as the number of passengers, seating capacity of the vehicle, vehicle route origin and destination were recorded. The survey duration was also for 18 hours or 24 hours. The duration of 18-hour surveys was from 05:00 to 23:00. At the NLEX bridge south of Angeles River near Apalit and the cordon around CIA the survey

duration was 24 hours from 5am to 5am of the following day. The surveys were conducted from October 12 to 30. Survey locations are shown in Figure 5.2-1. There were two survey sites on MacArthur Highway and eighteen survey sites on NLEX and one survey site for CIA.



Source: Compiled by JICA Study Team

Figure 5.2-1 Survey Locations

The journey time survey was conducted using the "floating car method", which requires the survey vehicle to keep the same position in the traffic flow; for example, if the survey vehicle is overtaken by other vehicles, it should overtake the same number of vehicles. In addition GPS data recorders were used to record the position of the car and time at any given position. This is the most accurate way to conduct such surveys, rather than manually recording time and position.

Three routes were selected for this survey as listed in Table 5.2-1. One was between CIA and Mindanao Avenue, and the other was between CIA and Balintawak using NLEX. The third route was between EDSA and CIA via MacArthur Highway. Three cars were allocated for the NLEX route. One started in Balintawak and ended in CIA, then back to Balintawak via Mindanao Avenue. After reaching Mindanao Avenue, the survey vehicle went back to CIA and back to Balintawak. This routine was continued for 17 hours. The second car started from CIA then proceeded to Mindanao Avenue, and then went back to CIA. This routine was continued for 18 hours. The third car started from Balintawak and the survey was for 19 hours.

Two cars were allocated for MacArthur Highway, one started from CIA and the other started from EDSA. This survey was also continued for 14 or18 hours.

Table 5.2-1 Survey Routes & Durations

Route	Section	Survey duration
NLEX	CIA to Mindanao Avenue CIA to Ballntawak	3 cars for 17 -19 Hours
MacArthur Highway	CIA to EDSA	2 cars for 14-18 Hours

Source: JICA Study Team

2) Summary of Survey Result

Traffic count results by site and direction are summarized in Table 5.2-2.

Table 5.2-2 Summary of Traffic Count Results

Road Name	Station Code	Station Name	Entrance /Exit	SB (Entrance*)	NB (Exit*)	Total
MacArthur Highway	1	Telabastagan, San Fernando Pampanga	-	14,004	13,710	27,714
	2	Bgy. Wakas Bocaue, Bulacan	-	5,972	6,228	12,200
NLEX	3	Balintawak Toll	-	33,142	37,336	70,478
	4	Mindanao Ave. Toll	Entrance	12,044	12,320	24,364
	5	Valenzuela IC	Entrance	9,238	3,551	12,789
			Exit	3,894	5,804	9,698
			Total	13,132	9,335	22,467
	6	Meycauayan IC	Entrance	7,866	6,097	13,963
			Exit	888	2,507	3,395
			Total	8,754	8,604	17,358
	7	Marilao IC	Entrance	4,437	1,200	5,637
			Exit	1,231	4,538	5,769
			Total	5,667	5,738	11,405
	9	Bocaue IC	Entrance	4,528	2,993	7,521
			Exit	2,900	4,106	7,006
			Total	7,428	7,099	14,527
	10	Tabang Toll*	Entrance	8,050	7,640	15,690
	11	Balagtas Toll*	Entrance	4,681	4,939	9,620
	12	Sta. Rita IC	Entrance	1,948	1,032	2,980
			Exit	1,593	1,788	3,381
			Total	3,541	2,820	6,361
	13	Pulilan IC	Entrance	1,788	2,163	3,951
			Exit	2,100	1,775	3,875
			Total	3,888	3,938	7,826
	14	San Simon IC	Entrance	2,763	1,577	4,340
			Exit	1,701	2,012	3,713
			Total	4,464	3,589	8,053

Road Name	Station Code	Station Name	Entrance /Exit	SB (Entrance*)	NB (Exit*)	Total
	15	San Fernando IC	Entrance	7,953	2,742	10,695
			Exit	2,913	6,986	9,899
			Total	10,866	9,728	20,594
	16	Mexico IC*	Entrance	1,552	1,379	2,931
	17	Angeles IC*	Entrance	4,644	4,174	8,818
	19	Dau IC*	Entrance	5,742	6,534	12,276
	27	Dau Access Road*	Entrance	4,580	4,260	8,840
	28	Sta. Ines Access Road	Entrance	1,888	1,423	3,311
			Exit	1,466	1,728	3,194
			Total	3,354	3,151	6,505
	25	Bridge at Apalit	-	21,029	20,654	41,683
	26	Bridge at Angeles (24 Hours)	-	15,537	17,980	33,517
CIA	-	CIA (24 Hours)	Entrance	2,280	2,215	4,495

Source: JICA Study Team

The results of the journey time survey for the NLEX route are given in Table 5.2-3. The average travel speed between CIA and Mindanao Ave is about 60km/h and the average travel speed between CIA and Balintawak is also 60km/h. Travel speed at each point is shown Figure 5.1-2.

Table 5.2-3 Average Travel Time and Travel Speed for NLEX

Direction		Average Travel Time	Distance (km)	Travel Speed (Km/hr)
From	To			
EDSA	Mindanao Ave.	01:27:27	83	57
Mindanao Ave	CIA	01:22:43		60
CIA	Balintawak	01:27:27	85	58
Balintawak	CIA	01:25:42		60

Source: JICA Study Team

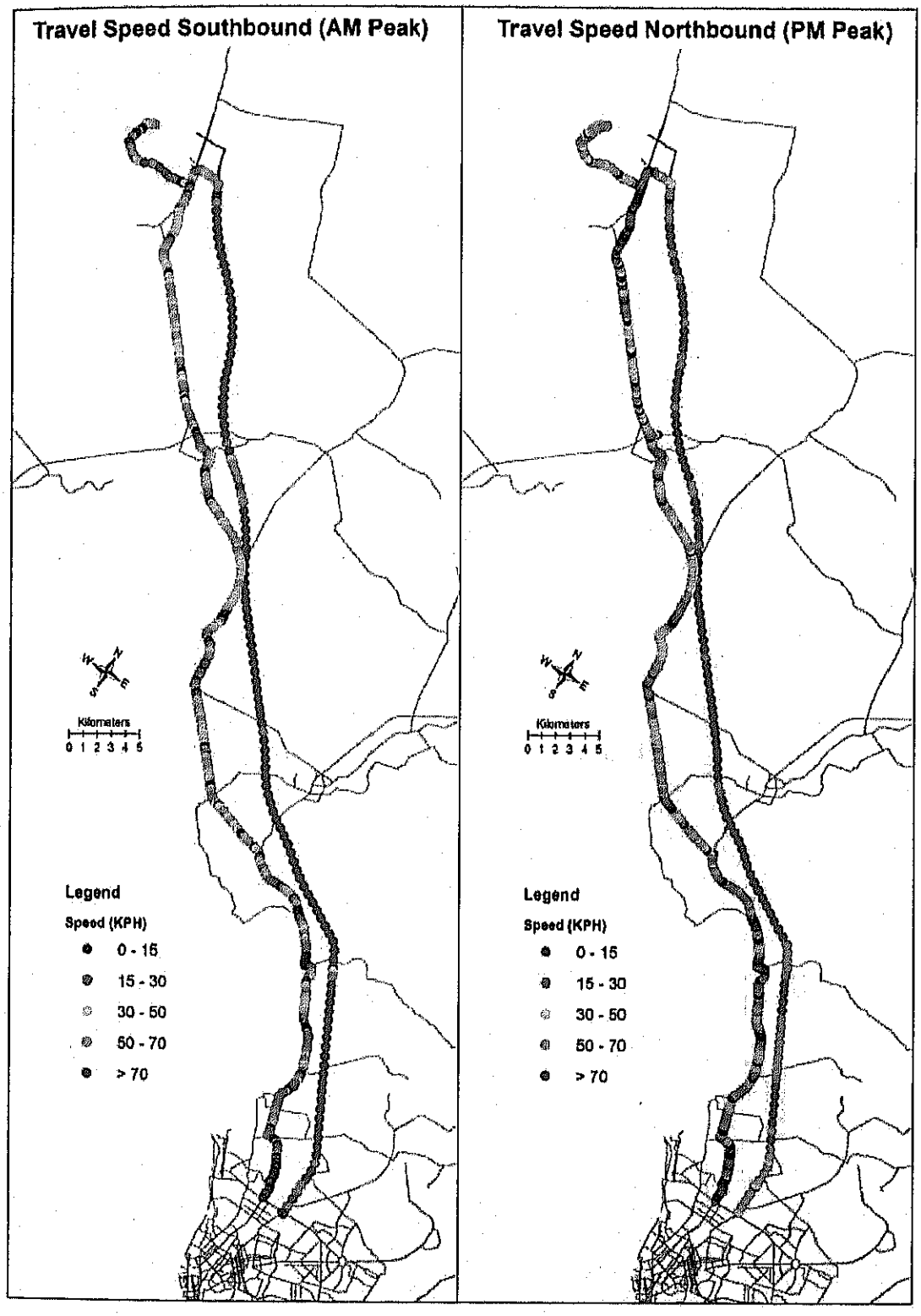
The journey time survey results for the MacArthur Highway route are presented in Table 5.2-4. The average travel speed between CIA and EDSA was about 25km/h.

Table 5.2-4 Average Travel Time and Travel Speed for Mac Arthur Highway

Direction		Average Travel Time	Distance (km)	Travel Speed (Km/hr)
From	To			
EDSA	CIA	03:17:05	86	26
CIA	EDSA	03:25:07		25

Source: JICA Study Team

The journey time survey results for both NLEX and MacArthur Highway routes are illustrated in Figure 5.2-2, as recorded by the GPS system and the categorized be convenient speed bands. Key features to notice are that travel speed along most of the NLEX route exceeds 70kph, except nearer Metro Manila. This indicates that most of the toll way still operates at level of service B or better indicating about 70% capacity utilization. In contrast, speed on MacArthur highway rarely exceeds 50kph, and is mostly around 35kph, i.e. half the speed of travel on NLEX.



Source: JICA Study Team

Figure 5.2-2 Travel Speed Survey Results

5.2.3 Bus Passenger Surveys

1) Outline of Surveys

This survey was conducted to determine the passenger travel characteristics (trip origin and destination, trip purpose, home address of interviewee, and total fare paid from origin to destination) and the bus information (number of passengers and seating capacity, and route origin and destination). Two types of interviews were conducted, one for public mode passengers and the other was for public mode drivers on the 29th and 30th of October and the 3rd of November 2012.

2) Survey Results

The number of buses surveyed and number of passengers interviewed are shown in Tables 5.2-5. These data were used to update the OD matrix.

Table 5.2-5 Outline of Bus Passenger Interview Survey

Origin			Destination	Number of Buses Surveyed	Number of Passengers Interviewed
Region	Province	City/Municipality			
3	Bulacan	Marilao	Muntinlupa City	1	10
3	Bulacan	Bulacan	Quezon City	2	20
3	Bulacan	Bulacan	Manila City	6	62
3	Bulacan	Balagtas	Manila City	7	70
3	Bulacan	Malolos	Quezon City	3	30
3	Bulacan	Hagonoy	Pasay City	7	70
3	Bulacan	Hagonoy	Quezon City	3	46
3	Bulacan	Calumpit	Caloocan City	2	20
3	Bulacan	Pulilan	Quezon City	4	40
3	Bulacan	Plaridel	Quezon City	4	40
3	Bulacan	Santa Maria	Quezon City	3	28
3	Bulacan	San Jose del Monte	Manila City (Sta. Cruz)	3	40
3	Bulacan	Ballwag	Pasay City	2	20
3	Bulacan	Ballwag	Quezon City	9	96
3	Bulacan	Ballwag	Caloocan City	4	40
3	Bulacan	Angat	Manila City	8	80
3	Bulacan	San Miguel	Manila City	4	40
3	Bulacan	San Miguel	Caloocan City	4	40
3	Bulacan	San Rafael	Caloocan City	4	40
TOTAL				80	832
3	Pampanga	Apalit	Manila City	2	14
3	Pampanga	Apalit	Pasay City	6	44
3	Pampanga	Apalit	Caloocan City	3	32
3	Pampanga	Apalit	Caloocan City	4	28
3	Pampanga	Masantol	Manila City	3	16
3	Pampanga	Guagua	Caloocan City	2	31
3	Pampanga	Guagua	Manila City	18	181
3	Pampanga	Guagua	Cavite City	1	7
3	Pampanga	Candaba	Quezon City	4	28
3	Pampanga	Arayat	Caloocan City	5	54
3	Pampanga	San Fernando	Manila City	5	50
3	Pampanga	San Fernando	Pasay City	12	165
3	Pampanga	San Fernando	Quezon City	10	100
3	Pampanga	San Fernando	Caloocan City	6	76
3	Pampanga	Angeles	Manila City	1	10
3	Pampanga	Angeles	Quezon City	1	6
3	Pampanga	Angeles	Caloocan City	7	42
3	Pampanga	Mabalacat (Dau)	Pasay City	8	46
TOTAL				258	2594
3	Bataan	Balanga	Manila City	5	34
3	Bataan	Balanga	Pasay City	5	30
3	Bataan	Balanga	Quezon City	16	178
3	Bataan	Mariveles	Manila City	6	42
3	Bataan	Mariveles	Pasay City	5	18
3	Bataan	Mariveles	Quezon City	9	70

Origin			Destination	Number of Buses Surveyed	Number of Passengers Interviewed
Region	Province	City/Municipality			
3	Zambales	Iba	Manila City	2	7
3	Zambales	Olongapo	Quezon City	1	10
3	Zambales	Olongapo City	Caloocan City	11	104
3	Zambales	Olongapo City	Pasay City	5	46
3	Zambales	Sta Cruz	Quezon City	1	10
3	Zambales	Olongapo City	Manila City	2	18
3	Tarlac	Tarlac	Manila City	3	24
3	Tarlac	Tarlac	Pasay City	2	20
3	Tarlac	Tarlac	Pasay City	5	48
3	Tarlac	Tarlac	Quezon City	4	38
3	Nueva Ecija,	Cabanatuan City	Caloocan City	2	20
3	Nueva Ecija,	Cabanatuan City	Pasay City	1	10
3	Nueva Ecija,	Cabanatuan City	Quezon City	12	112
3	Nueva Ecija,	Cabiao	Caloocan City	2	28
3	Nueva Ecija,	San Isidro	Caloocan City	24	242
TOTAL				639	6297
1	Pangasinan	Alaminos	Quezon City	10	106
1	Pangasinan	Anda	Quezon City	1	6
1	Pangasinan	Bolinao	Quezon City	1	12
1	Pangasinan	Bolinao	Pasay City	2	22
1	Pangasinan	Dagupan City	Manila City	1	14
1	Pangasinan	Dagupan City	Pasay City	9	86
1	Pangasinan	Dagupan City	Quezon City	29	294
1	Pangasinan	Lingayen	Quezon City	2	14
1	Pangasinan	Lingayen	Pasay City	1	14
1	Pangasinan	San Carlos City	Pasay City	6	70
1	Pangasinan	San Carlos City	Quezon City	6	68
1	Pangasinan	San Nicolas	Quezon City	1	12
1	Pangasinan	Urbiztundo	Quezon City	1	10
1	Pangasinan	Agno	Pasay City	1	10
1	Pangasinan	Alaminos-	Pasay City	2	20
1	Pangasinan	Anda	Pasay City	3	28
1	Pangasinan	San Fabian	Pasay City	1	10
1	Pangasinan	Tayug-	Pasay City	1	10
1	Pangasinan	Tayug-	Quezon City	1	10
1	Ilocos Norte	Laoag City	Manila City	4	26
1	Ilocos Sur	Candon	Manila City	3	17
1	Ilocos Sur	Vigan	Manila City	2	11
1	La Union	San Fernando	Pasay City	4	34
CAR	Cagayan	Tuguegarao	Manila City	14	310
CAR	Benguet	Baguio City	Manila City	2	26
CAR	Benguet	Baguio City	Pasay City	7	80
CAR	Benguet	Baguio City	Quezon City	5	38
CAR	Benguet	Baguio City	Mariveles	1	26
TOTAL				11122	14400

Source: Study Team

5.2.4 Stated Preference Surveys at NAIA, CIA and Car Passengers along NLEX

1) Outline

Stated Preference (SP) survey interviews were undertaken to gather information regarding the socio-economic profile of passengers and trip information including trip origin and destination, mode, and willingness to pay. This survey was conducted at Mac Arthur Highway, NLEX, NAIA and CIA and on provincial buses plying to Northern Luzon. For Mac Arthur and NLEX, private car users were interviewed at the roadsides. For NAIA and CIA, passengers and well-wishers were interviewed at each airport terminal. In addition, airport workers were also interviewed from NAIA and CIA offices. On board bus passenger interviews were conducted at the same time that the bus drivers were also interviewed.

2) Survey Results

The number of samples taken in this survey is shown in Table 5.2-6. A total of 2,961 samples were

collected by this survey. These data were used for updating OD matrixes and setting the rail fare and the value of time.

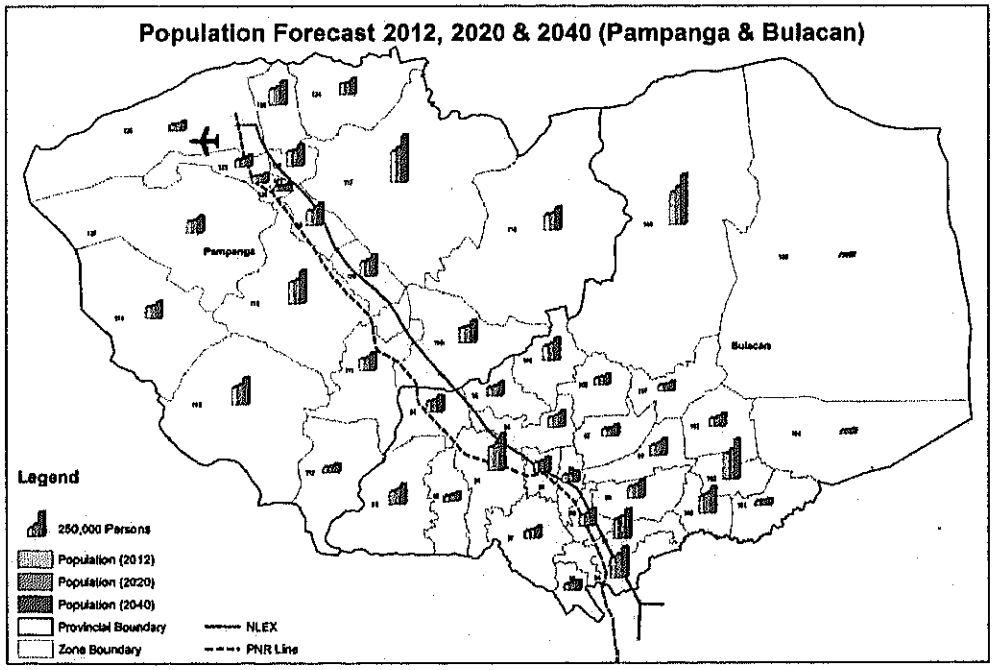
Table 5.2-6 No of Samples by Stated Preference Surveys

Type	Site	Total No. of Samples
MacArthur Highway	Petron (NB)	251
	Petron (SB)	148
NLEX	Petron (NB)	110
	Petron (SB)	88
CIA	Terminal 1	416
?NAIA	Terminal 1	425
	Terminal 2	451
	Terminal 3	451
	Terminal 4	199
On-Board Bus Survey	Selected areas	422

Source: Study Team

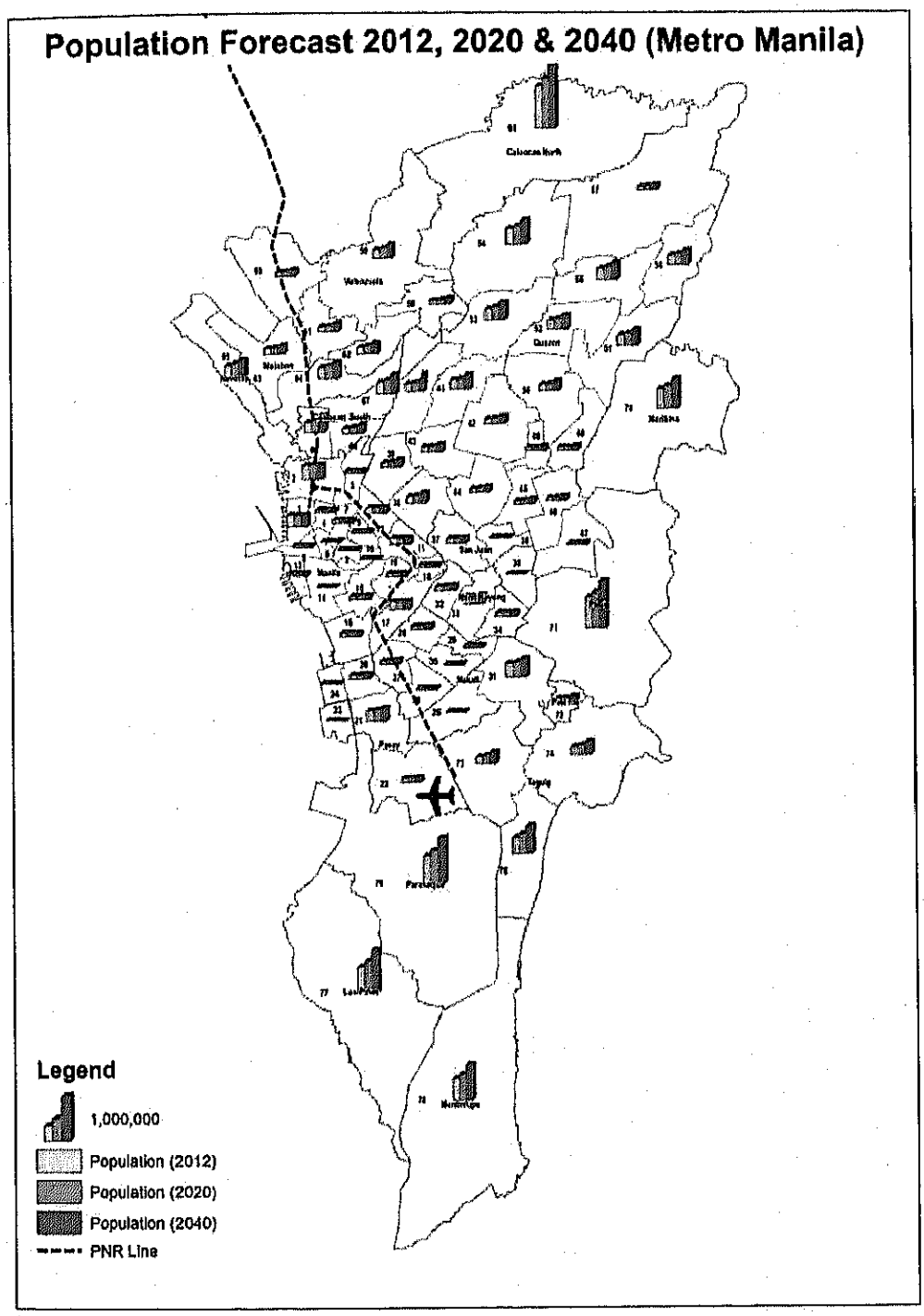
5.3 Population Forecast

One of the key inputs to the demand forecast model is the future population. Population Forecasts were made especially for this project using historic trends for 11 cities or combination of cities of Metro Manila, and by province for Pampanga, Bulacan, Cavite, Laguna & Rizal, and at the Regional level for regions III & IV-A and the whole of the Philippines. Current and Future populations in the study area are shown in Figure 5.3-1 and Figure 5.3-2, for Pampanga and Bulacan provinces, and for Metro Manila (NCR) respectively. The Philippine's population growth rate is expected to decline from 1.2%~1.5% from 2020 to 2040. On the other hand, the study area growth rate is above the Philippines growth rate. Bulacan and Pampanga are expected to grow at a higher growth rate than Metro Manila. In Metro Manila, population growth rates of the area east of Metro Manila, City of Manila, Caloocan City, and Pasay City are lower than on the west side of Metro Manila.



Source: JICA Study Team

Figure 5.3-1 Population Forecast Bulacan and Pampanga



Source: JICA Study Team

Figure 5.3-2 Population Forecast Metro Manila

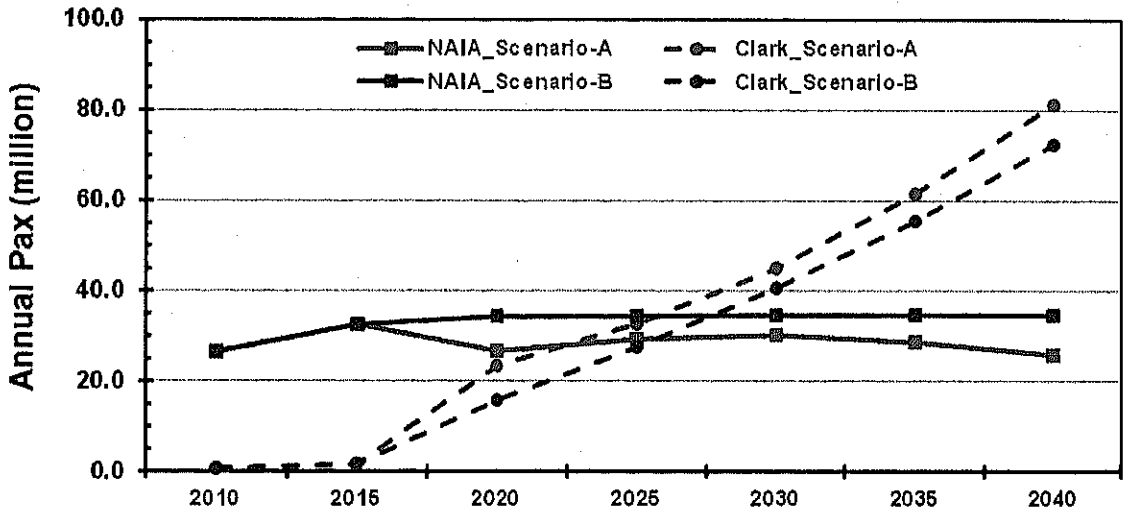
5.4 Airport Passenger Demand of NAIA and CIA

Air passenger demand forecast of the recently (November 2011) completed JICA Airport Strategy Study for the GCR, was reviewed and adopted for this study as most appropriate to estimate the rail travel demand from GCR airports and for the range of GCR airport development scenarios. The airport development scenarios allocate the total GCR air passenger demand to NAIA and CIA. The two scenarios used for this study were:

- **Scenario A:** Distance based allocation – all international flights operate to/from CIA, and domestic flights are distributed between NAIA & CIA, up to the capacity of NAIA.
- **Scenario B:** NAIA capacity based allocation – NAIA continues to handle International and Domestic Flights up to maximum NAIA capacity and CIA takes the overflow.

Total annual passengers using NAIA and CIA under both scenarios are the same as shown in Figure 5.4-1. It can be seen that air passengers demand at CIA would exceed that at NAIA between 2025 & 2030 under both scenarios. Under Scenario A, this would happen much earlier, just after 2020, as under this scenario all international flights would be handled by CIA, indicating a higher growth in domestic demand, but at the same time lower maximum capacity of NAIA in terms of Pax per year.

The total GCR area (NAIA + CIA) demand is as forecast under Base Case medium growth scenarios, and this forecast was made to fully understand the impact of allocation of demand. In reality – this may differ from actual due to a number of reasons – for example if domestic operation is allowed at NAIA, the demand may be higher than if it involves travelling to CIA (even with a railway). Similarly, some of the international demand may be suppressed or may divert to other regional airports if all international operation is transferred to CIA. Therefore, for this study, demand forecast analysis Scenario B was examined in detail.



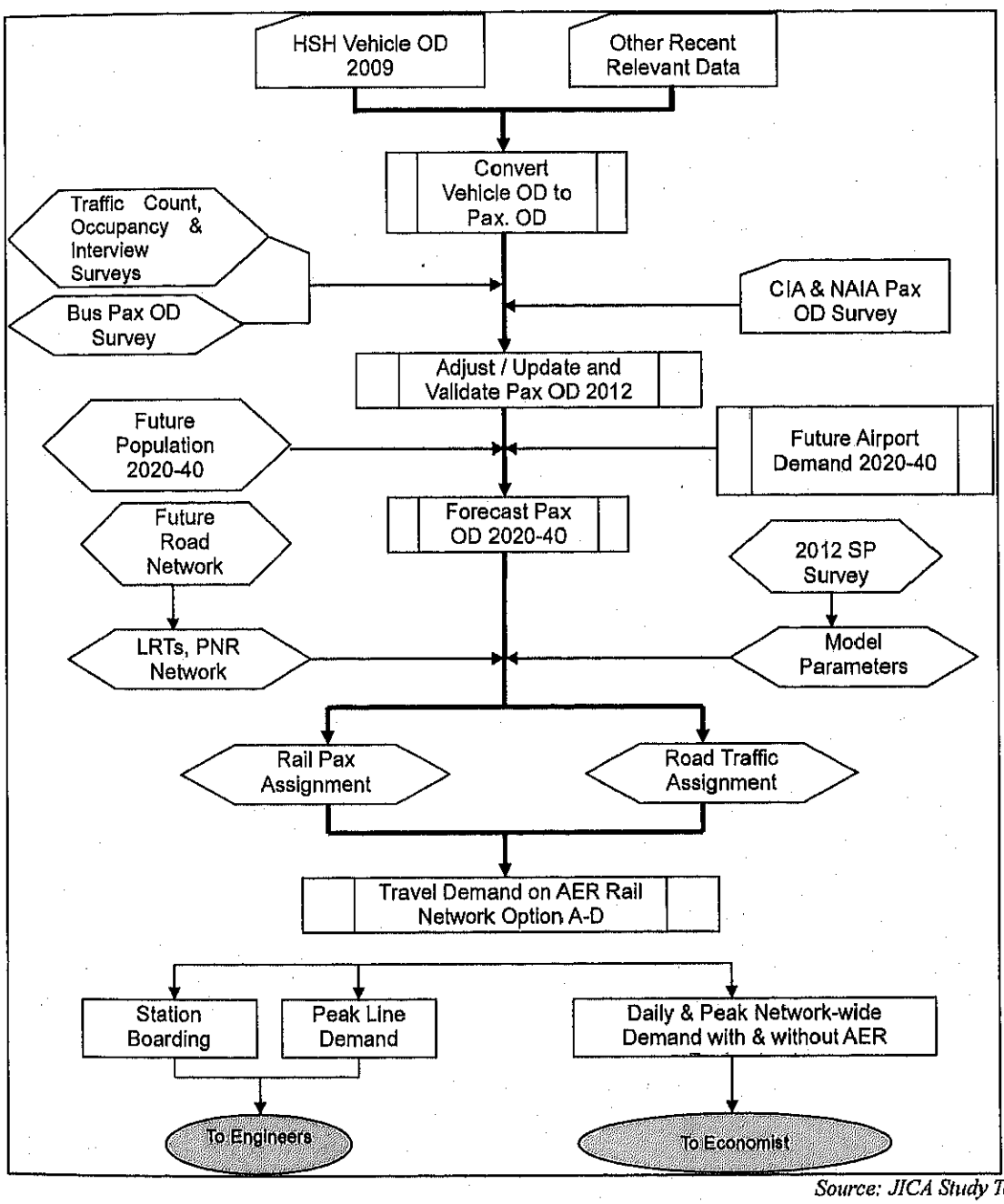
Source: JICA Airport Strategy Study for the GCR Nov-2011, further analysis by JICA Study Team

Figure 5.4-1 Annual Pax International & Domestic & NAIA & CIA

5.5 Demand Forecast for AER

5.5.1 Demand Forecast Model

For this study a travel demand model was developed to forecast patronage on the Airport Express Rail (AER) by express and commuter services between NAIA and CIA. Figure 5.4-1 shows the key features and main components of the travel demand model. The OD matrices by travel mode were developed from the HSH 2009 database, and updated/ validated to the 2012 base year using the recently conducted traffic and travel demand surveys as described in Section 5.1. The OD matrixes for the forecast years of 2020, 2030 and 2040 were modeled using the future year population, GDP and air passenger forecast data and Fratar method, within the CUBE software. The future year network model also included: LRT Line-1 extension to south, LRT Line-2 extension to east, and MRT Line-7 from North Avenue to San Jose in the north-east.



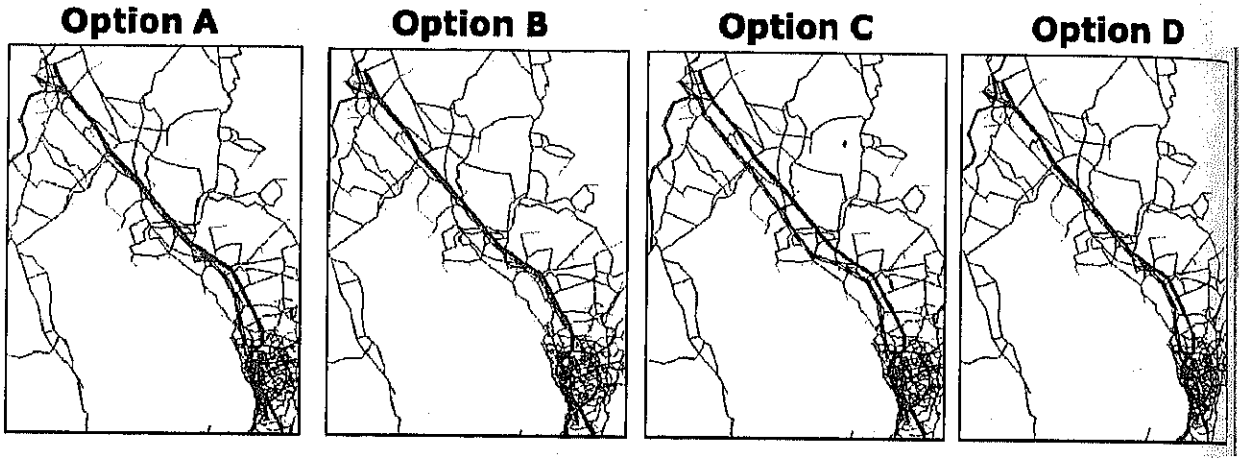
Source: JICA Study Team

Figure 5.5-1 AER Study Travel Demand Model, an Outline

5.5.2 Base Case Assumptions for Patronage Forecast for Alignment Options

The following preconditions are used for traffic demand forecasting.

- Airport Scenario B: NAIA continues to handle international and domestic flights up to maximum NAIA capacity and CIA takes the overflow.
- Mix Operation: Commuter line and express line.
- Forecast Years: 2020, 2030 and 2040.
- Commuter Fare (PhP): 20+1.5/km, Express Fare (PhP): 20+3/km
- Alignment Options (detailed information is shown in Section 6.2.2):



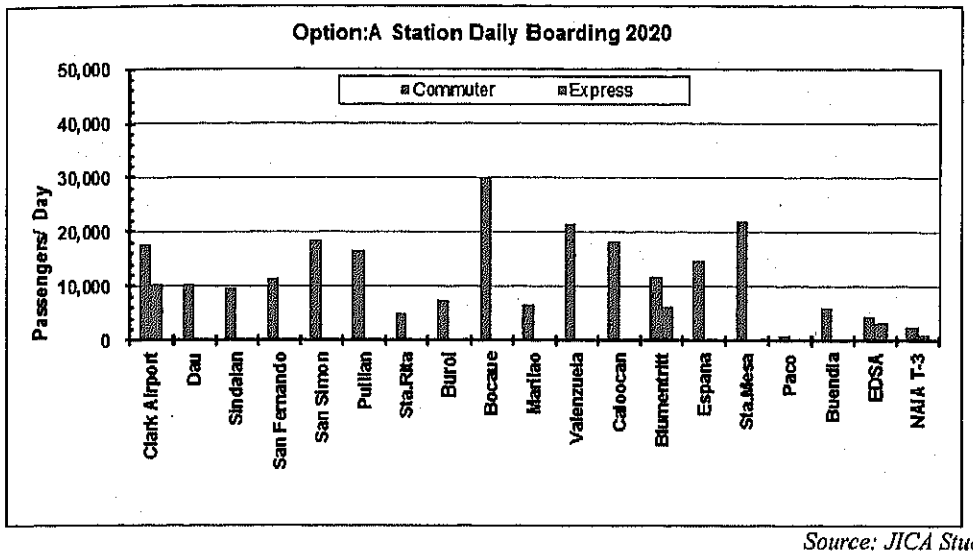
Source: JICA Study Team

Figure 5.5-2 Alignment Options

5.5.3 Patronage Forecast for Alignment Options

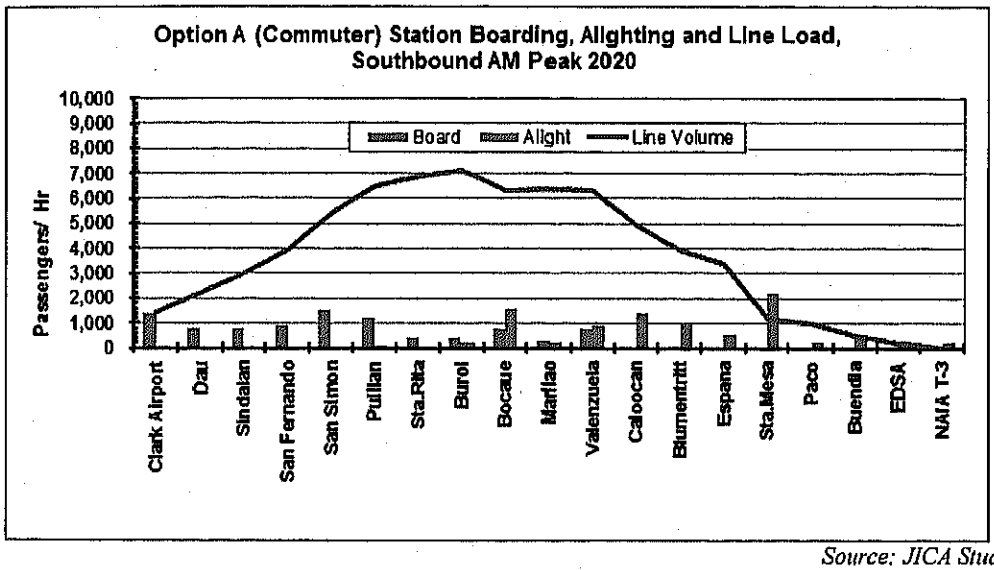
1) Option A

Figure 5.5-2 shows daily passenger demand of Option A in 2020. Total daily boarding is estimated to be 257,100 Pax. Number of daily boardings on commuter and express services are 235,800 Pax and 21,300 Pax respectively. Maximum boarding station is forecast to be Bocaue. Number of boarding passengers at NAIA station is forecast to be below 5,000 per day. The peak is in the AM-Peak period in the southbound direction, and line volumes on commuter and express services are shown in Figure 5.5-3 and Figure 5.5-4, respectively. Maximum line volume on the commuter service is 7,100 Pax/hour/direction (PPHPD). In the AM-Peak passenger boardings are high on the section from CIA to Burol, and they alight at Bocaue, Caloocan and Sta. Mesa. Maximum line volume on the half-hourly express service is estimated to be 800 Pax/Hour/Direction (PPHPD). The highest passenger demand is between CIA and Blumentritt stations.



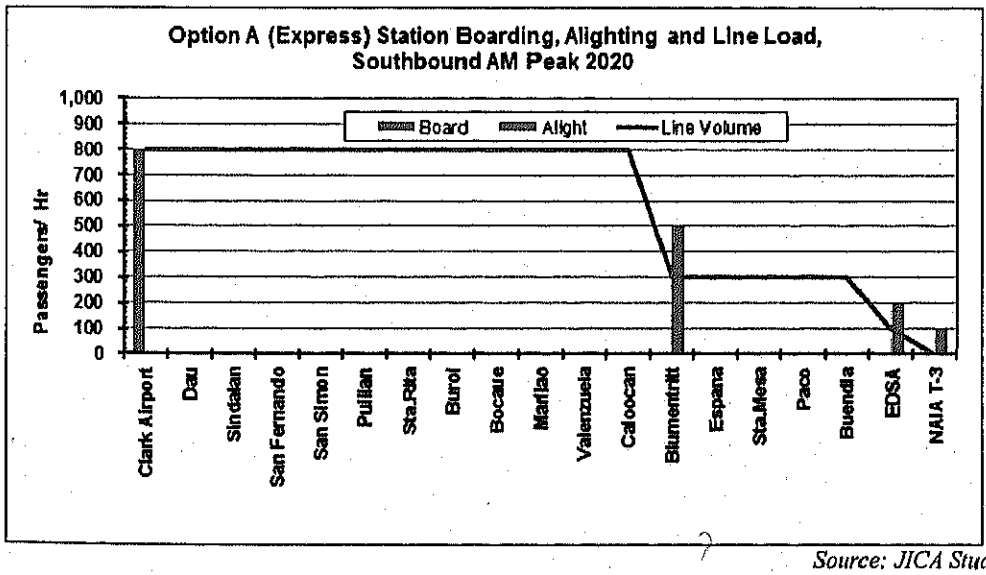
Source: JICA Study Team

Figure 5.5-3 Daily Passenger Boarding by Station – Option A



Source: JICA Study Team

Figure 5.5-4 AM-Peak Passenger Boarding & Line Volume (Commuter) – Option A

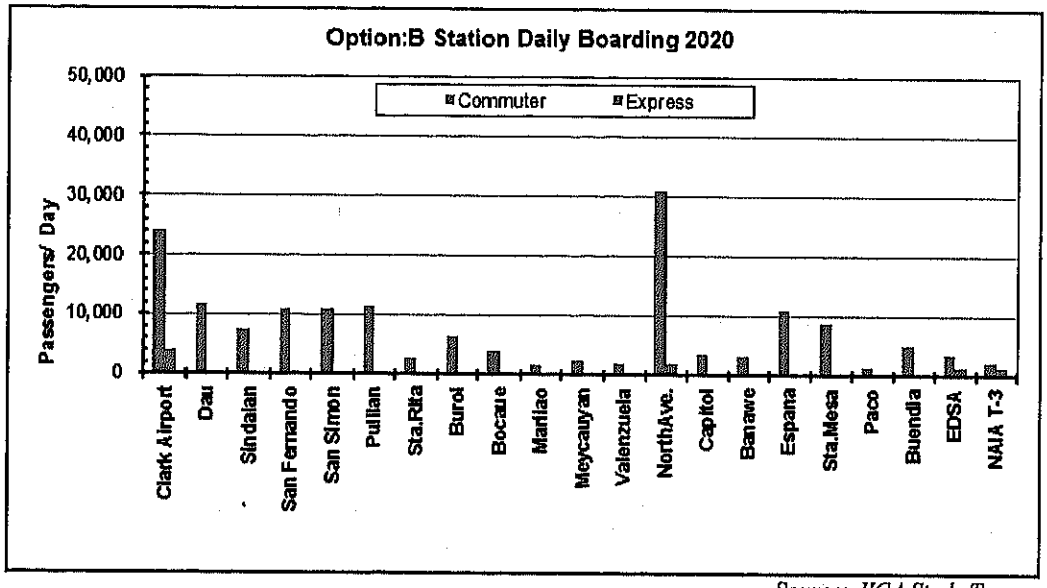


Source: JICA Study Team

Figure 5.5-5 AM-Peak Passenger Boarding & Line Volume (Express) – Option A

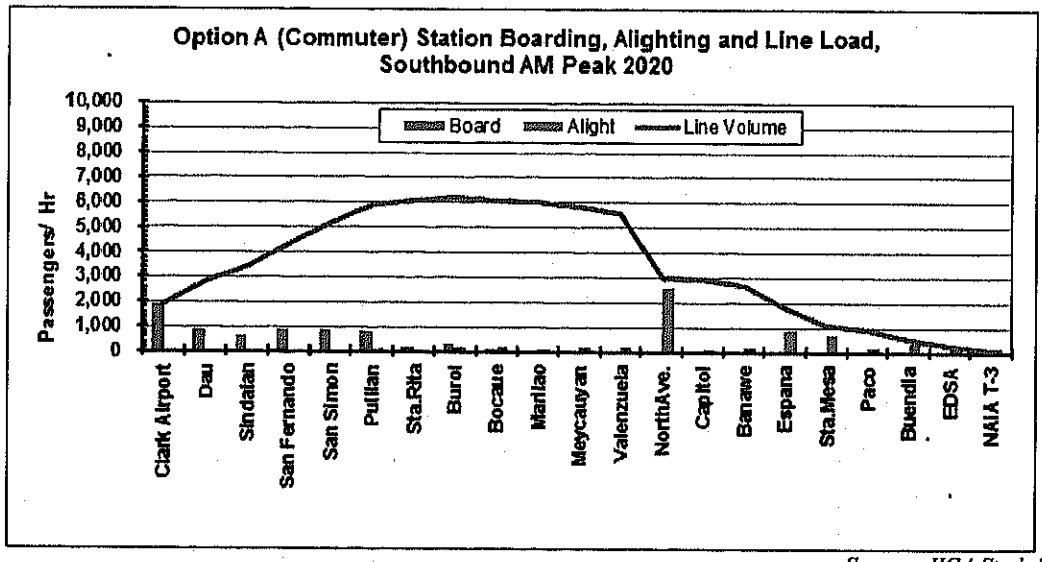
2) Option B

Daily passenger boarding in 2020 by station for alignment option B is shown in Figure 5.5-5. The number of boardings on commuter services is 164,500 Pax and on the express train is 8,600 Pax. Then total daily boarding is forecast to be 173,100 Pax. Boardings at the North Avenue station is the largest. Figure 5.5-6 and Figure 5.5-7 shows line volume southbound during AM peak. Maximum line volume on the commuter service is 6,100 Pax/Hour/Direction (PPHPD). Most of the passengers travel from the northern section of the line and alight at North Avenue. On this alignment the North Avenue station is the key as it will be the major station that will connect with LRT Line-1, MRT Line-3 and Line-7. Therefore, it would be the major passenger transfer station between AER and the MM mass transit network. Maximum line volume on express services is expected to be quite low, 300 Pax/Hour/Direction (PPHPD), almost half of that on Option A alignment.



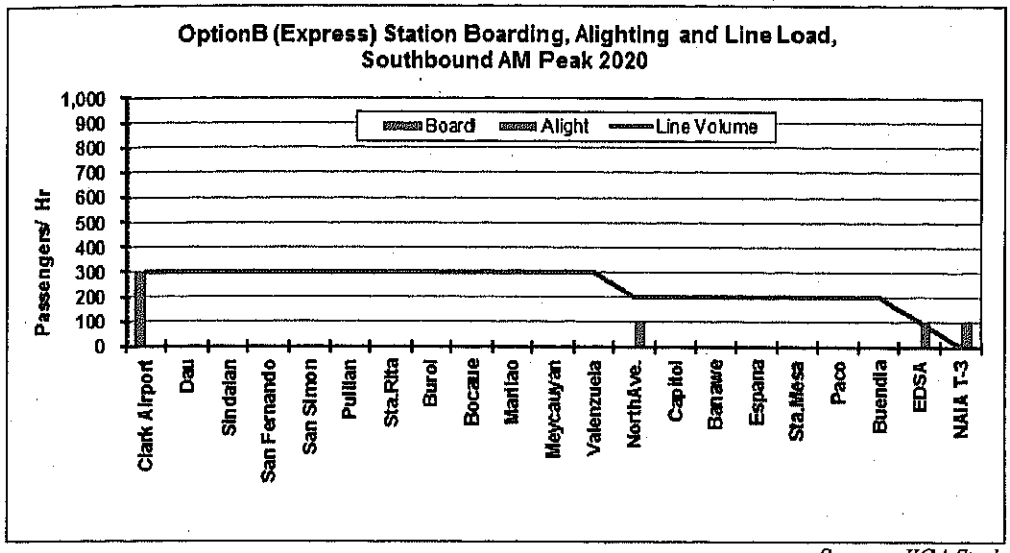
Source: JICA Study Team

Figure 5.5-6 Daily Passenger Boarding by Station – Option B



Source: JICA Study Team

Figure 5.5-7 AM-Peak Passenger Boarding & Line Volume (Commuter) – Option B

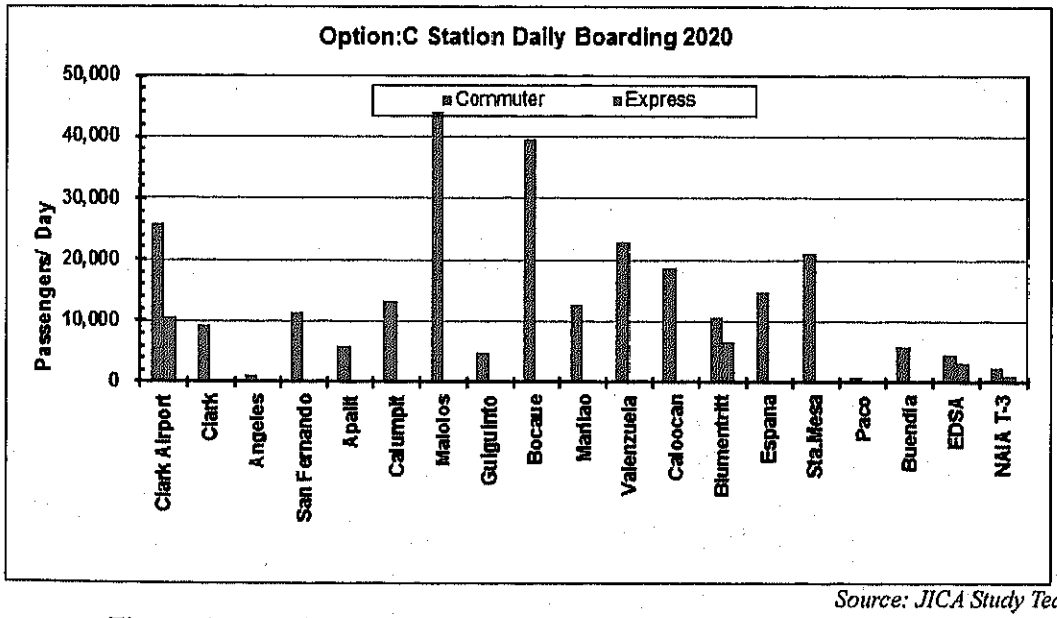


Source: JICA Study Team

Figure 5.5-8 AM-Peak Passenger Boarding & Line Volume (Express) – Option B

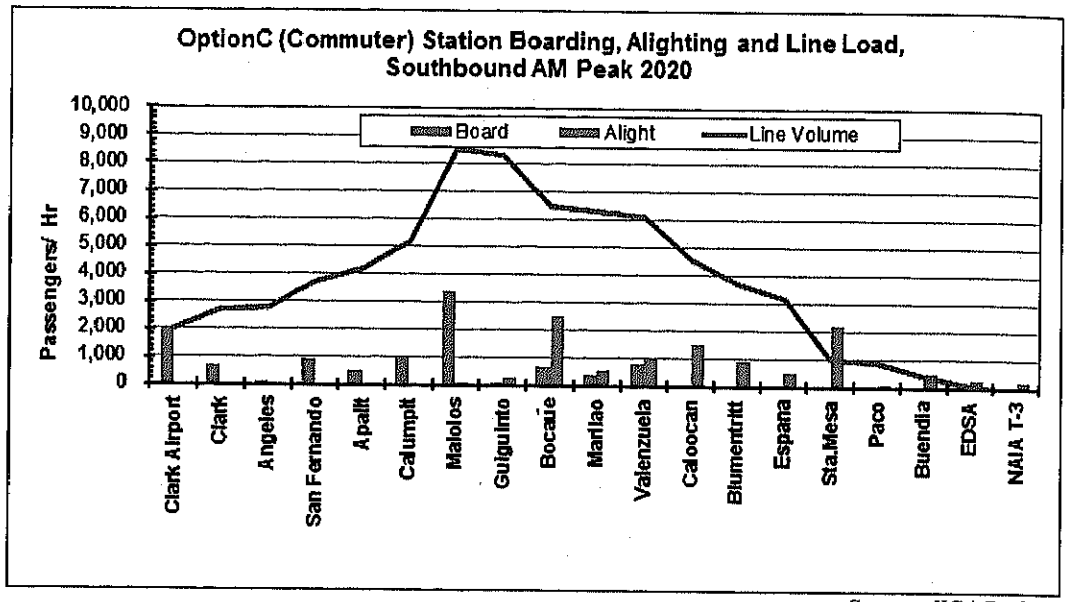
3) Option C

As shown in Figure 5.5-8, the stations with high boardings on alignment Option C are Malolos and Bocaue with boarding of 44,000 and 39,600 Pax respectively. Total daily boarding on all services is estimated to be 291,200 Pax. The daily boarding by commuter and express services are forecast to be 269,600 Pax and 21,600 Pax respectively in 2020. Figure 5.5-9 and Figure 5.5-10 show line volume in the southbound direction during AM peak. In case of the commuter train, the main boarding stations are CIA and Malolos. On the other hand, the main alighting stations are Bocaue and Sta. Mesa. Most of the passengers on the express service are airport passengers/employees and commuters from CIA to Metro Manila. Line volume between CIA and Blumentritt on the express service is forecast to be 800 (PPHPD).



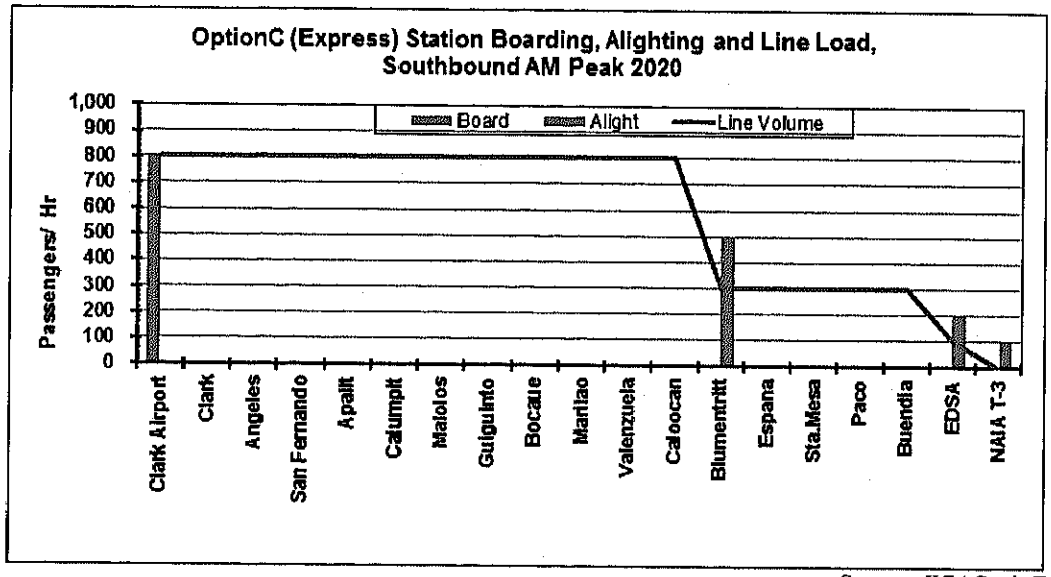
Source: JICA Study Team

Figure 5.5-9 Daily Passenger Boarding by Station – Option C



Source: JICA Study Team

Figure 5.5-10 AM-Peak Passenger Boarding & Line Volume (Commuter) – Option C

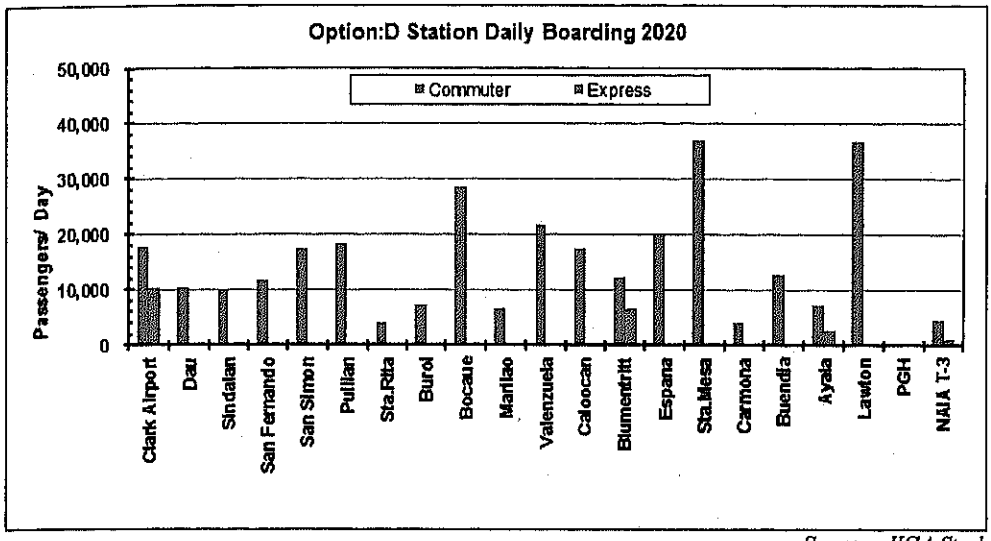


Source: JICA Study Team

Figure 5.5-11 AM-Peak Passenger Boarding & Line Volume (Express) – Option C

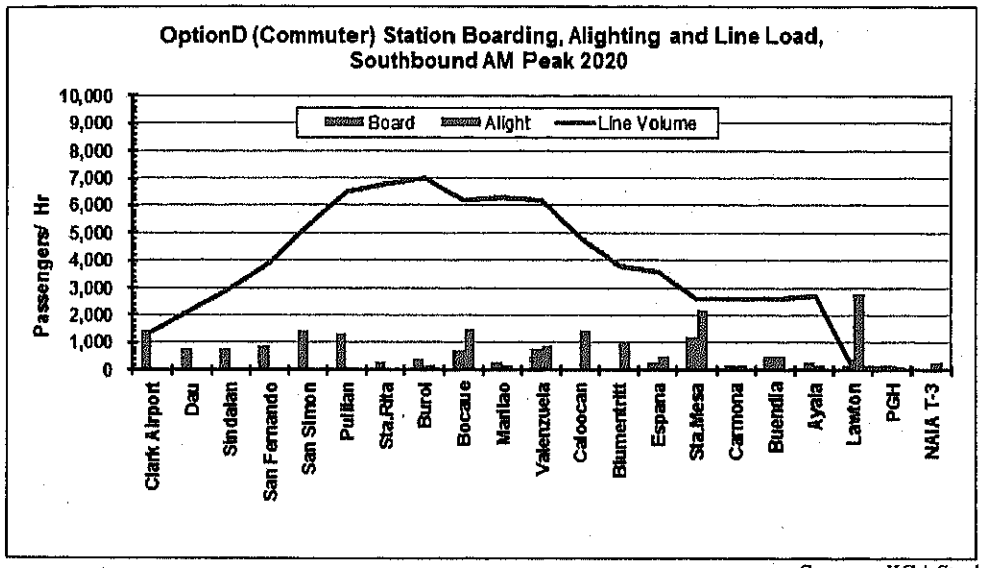
4) Option D

Daily passenger boarding forecast for 2020 for alignment option D by station are shown in Figure 5.5-11 and is estimated to be 325,500 Pax on both commuter and express services. Main boarding stations are Bocaue, Sta. Mesa and Lawton. Lawton is a major high density high-end developing area and a new CBD of Metro Manila. Figure 5.5-12 and Figure 5.5-13 show line volumes in the southbound direction during AM peak for commuter and express services. Maximum line volumes on commuter and express services are expected to be 6,700 and 800 PPHPD respectively. Most of the demand is from northern suburban areas to Metro Manila, with limited travel within the areas north of MM.



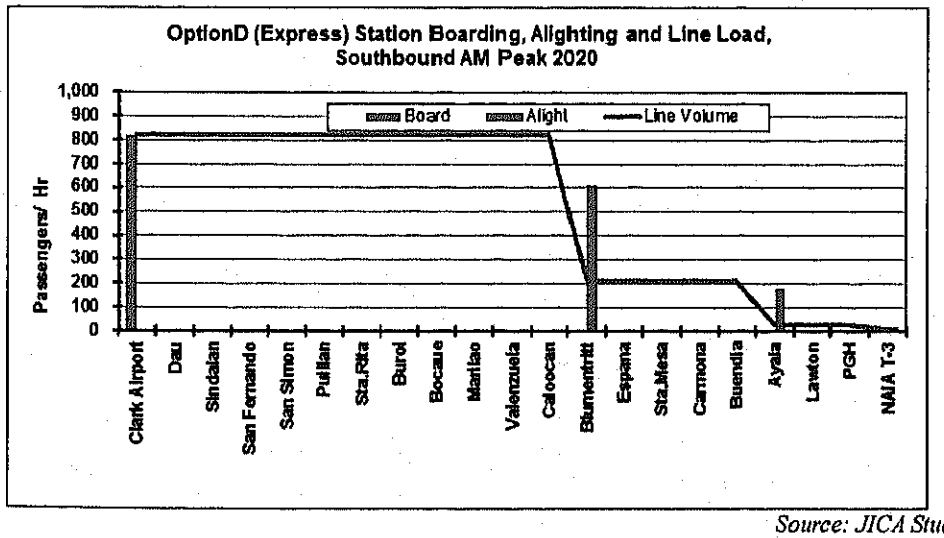
Source: JICA Study Team

Figure 5.5-12 Daily Passenger Boarding by Station – Option D



Source: JICA Study Team

Figure 5.5-13 AM-Peak Passenger Boarding & Line Volume (Commuter) – Option D



Source: JICA Study Team

Figure 5.5-14 AM-Peak Passenger Boarding & Line Volume (Express) – Option D

5.5.4 Summary Results

Table 5.5-1 shows the daily patronage on both express and commuter services for each of the four alignment options for forecast years of 2020, 2030 and 2040. Option D is expected to attract the most passengers. Daily commuting passengers on almost all alignment options would almost double by 2040 from those estimated for the year 2020. Passengers on express services would increase at a much higher rate than commuter services between 2020 and 2040. Maximum line volume for each alignment option for 2020, 2030 and 2040 is given in Table 5.4-2. Maximum line volume (PPHPD) on alignment option C is the highest of all options. Maximum line volume on commuter services is forecast to be 16,000 PPHPD.

Table 5.5-1 AER Forecast Daily Patronage Commuter and Express Services

Unit: '000 Pax

Year	Option A			Option B			Option C			Option D		
	Com	Exp	Total	Com	Exp	Total	Com	Exp	Total	Com	Exp	Total
2020	235.8	21.3	257.1	164.5	8.6	173.1	269.6	21.6	291.2	304.7	20.8	325.5
2030	356.7	38.9	395.6	263	15.1	278.1	398.4	38.1	436.5	402.2	54.2	456.4
2040	477.3	71.5	548.8	383.8	73.7	457.5	526.1	71.8	597.9	548.0	67.5	615.5

Source: JICA Study Team

Table 5.5-2 AER Forecast Daily Maximum Line Volume Commuter and Express Services

Unit: PPHPD

Year	Option A		Option B		Option C		Option D	
	Com	Exp	Com	Exp	Com	Exp	Com	Exp
2020	7,100	800	6,100	300	8,600	800	7,000	800
2030	11,100	1,600	9,800	600	12,900	1,500	11,200	1,500
2040	14,900	2,900	14,000	2,900	16,000	2,900	15,000	2,700

Source: JICA Study Team

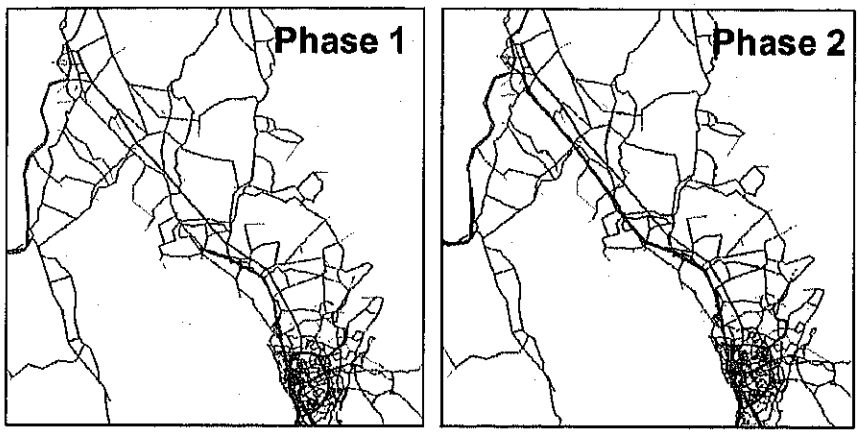
5.6 Demand Forecast for the Preferred Option

The demand forecast for the preferred option (Option C) was prepared. Project phasing of the selected option is divided into two phases: Phase 1 (EDSA-Malolos, commuter service only) and Phase 2 (EDSA-CIA, commuter and express services). Detailed information is shown in Section 6.2.4.

5.6.1 Base Case Assumptions for Patronage Forecast for Phase 1 and 2

The following base case assumptions are adopted for the traffic demand forecasts.

- Phase-1 (EDSA-Malolos, commuter service)
- Phase-2 (EDSA-CIA, commuter and express service)
- Forecast Years: Phase-1 (2020), Phase-2 (2025, 2030, 2040)
- Commuter Fare (PhP): 20+1.5/km, Express Fare (PhP): 20+3/km



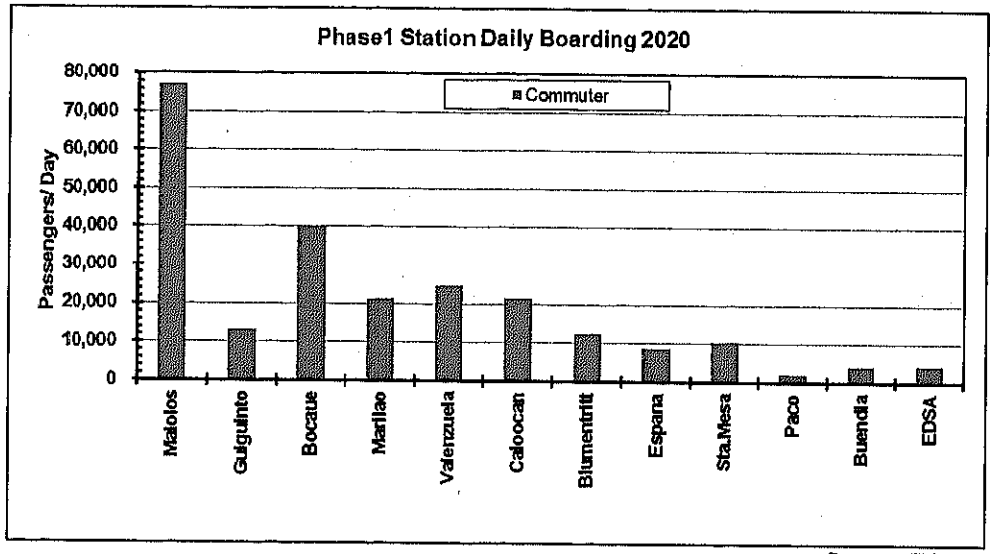
Source: JICA Study Team

Figure 5.6-1 Project Phasing

5.6.2 Patronage Forecasts for Phase 1 and 2

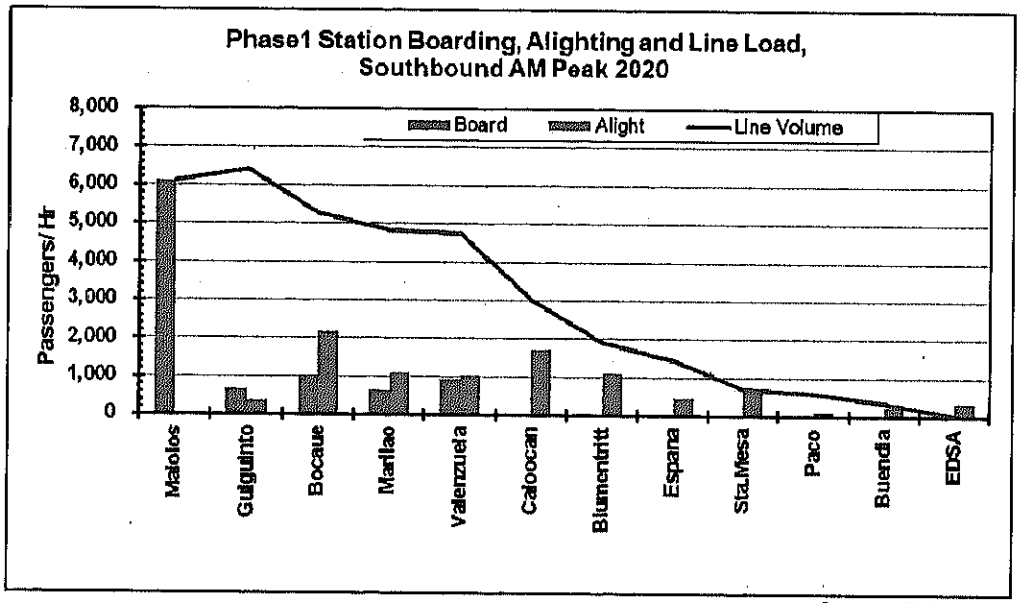
1) Phase 1 in 2020.

Figure 5.6-1 shows the daily patronage forecast for 2020 for Phase 1 by station. The highest boarding station is Malolos, 77,100 pax/day. Total daily boarding of all stations is estimated to be 237,700 pax/day. Line volume south bound during AM peak hour is shown in Figure 5.6-2. Maximum line volume is 6,400 PPHPD between Guiguinto and Bocaue.



Source: JICA Study Team

Figure 5.6-2 Daily Passenger Boarding by Station - 2020 Phase 1

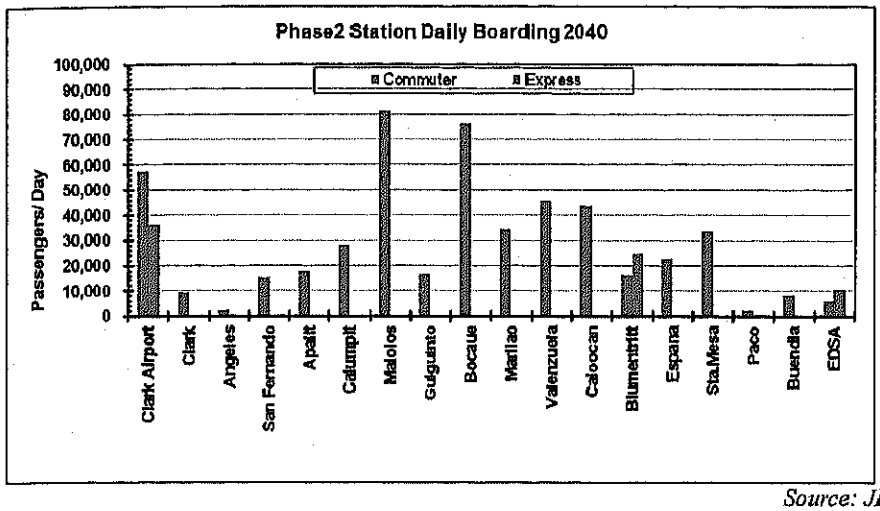


Source: JICA Study Team

Figure 5.6-3 AM-Peak Passenger Boarding & Line Volume (Commuter) – 2020 Phase 1

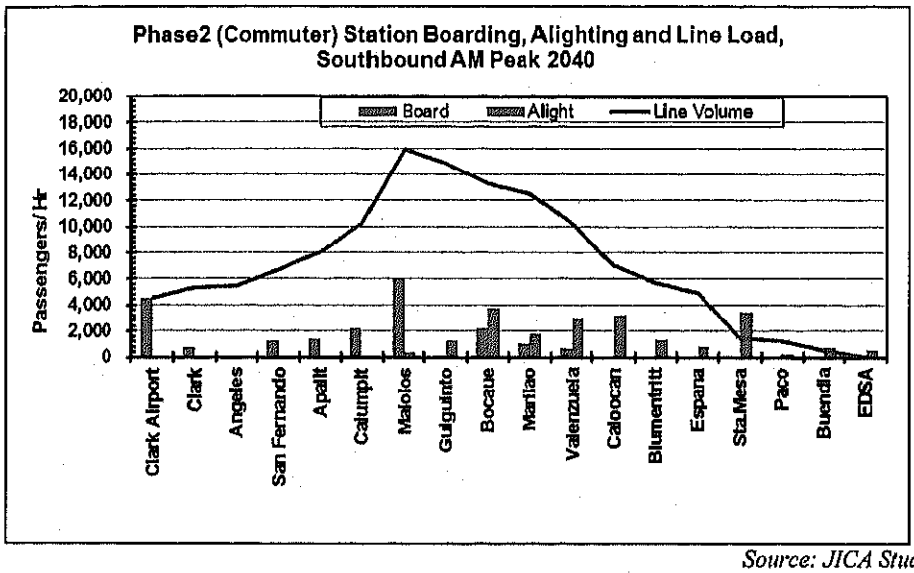
2) Phase 2 in 2040

Daily passenger boarding by station for Phase 2 in 2040 is shown in Figure 5.6-3. The main boarding stations are CIA, Malolos and Bocaue. Figure 5.6-4 and Figure 5.6-5 show line volume in the south bound direction for commuter and express services in 2040. Maximum line volume of commuter and express services were estimated at 16,000 and 2,900 PPHPD respectively.



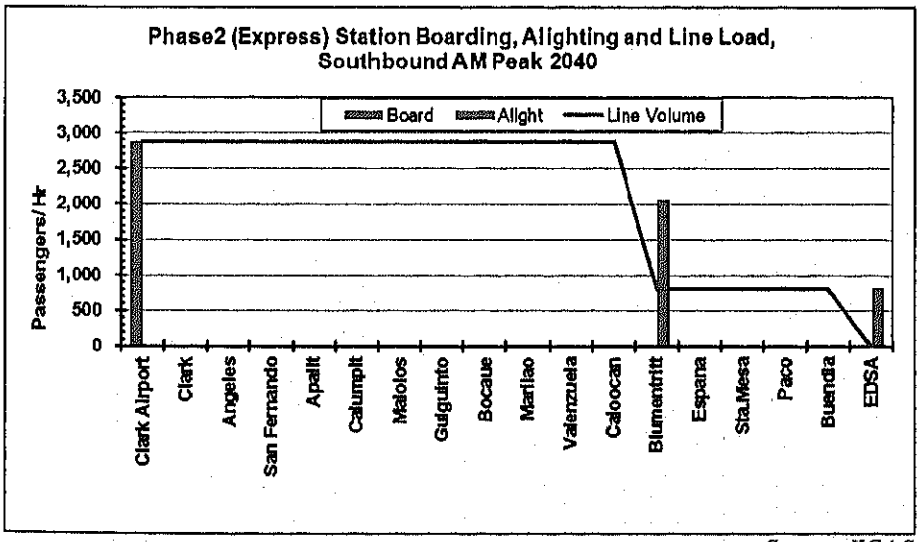
Source: JICA Study Team

Figure 5.6-4 Daily Passenger Boarding by Station - 2040 Phase 2



Source: JICA Study Team

Figure 5.6-5 AM-Peak Passenger Boarding & Line Volume (Commuter) – 2040 Phase 2



Source: JICA Study Team

Figure 5.6-6 AM-Peak Passenger Boarding & Line Volume (Express) – 2020 Phase 1

5.6.3 Summary Results – Phases 1 and 2

Table 5.6-1 and Table 5.6-2 show the forecast daily patronage and AM peak hour line volume each year. In 2020 total daily patronage was estimated at 237,700 Pax. In 2040 it will be 2.5 times compared with 2020. The AM peak hour maximum line volume of the commuter service also increase to 6,400 PPHPD in 2020 and to 16,000 PPHPD in 2040.

Table 5.6-1 Forecast Daily Patronage Commuter and Express Services - Phases 1 and 2

Unit: '000 Pax

Year	Com	Exp	Total	Phase
2020	237.7	-	237.7	1
2025	330.7	30.0	360.7	2
2030	396.4	38.3	434.7	2
2040	518,2	71.1	589.3	2

Source: JICA Study Team

Table 5.6-2 Forecast AM Peak Hour Maximum Line Volume Commuter and Express Services – Phases 1 and 2

Unit: PPHPD

Year	Com	Exp	Phase
2020	6,400	-	1
2025	10,700	1,200	2
2030	12,800	1,500	2
2040	16,000	2,900	2

Source: JICA Study Team

5.7 Demand Forecast – Conclusion and Recommendations

The broad estimates of the travel demand show that there is considerable demand for public transport in the corridor, and additional public transport services would be required in the near future, particularly, if the CIA is to develop as an international airport to take the over-flow from NAIA. The analysis of the level of demand also clearly demonstrates the need for a 'fixed track' (rail-based) high capacity transport system, which would be required to meet the future public transport demand in the corridor. It should be noted that at this stage the travel demand estimates were made to establish the need for a railway in the corridor, and also to choose the best alignment/ route option, within the engineering and environment constraints.

The demand forecast model has clearly demonstrated the level of travel demand on the four alternative alignments/ routes analyzed. The level of detail of the demand forecast is rather 'coarse', as intended, and it is recommended that these travel demand estimates could be used to establish the need for a rail system in the corridor and choose the 'best' possible route. These patronage demands could not be used to establish the number of stations on the proposed alignment well into the future, year of opening of each station, exact station location, or individual station sizing. Therefore the individual station boarding/ alighting should be taken as indicative, and these may change at the 'full' feasibility study stage of the alignment.