REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS (DPWH)
METROPOLITAN MANILA DEVELOPMENT AUTHORITY (MMDA)

MEGA MANILA REGION HIGHWAY NETWORK INTELLIGENT TRANSPORT SYSTEM (ITS) INTEGRATION PROJECT

FINAL REPORT

JULY 2013

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

CTI ENGINEERING INTERNATIONAL CO., LTD
ORIENTAL CONSULTANTS CO., LTD
METROPOLITAN EXPRESSWAY CO., LTD
MITSUBISHI RESEARCH INSTITUTE, INC.

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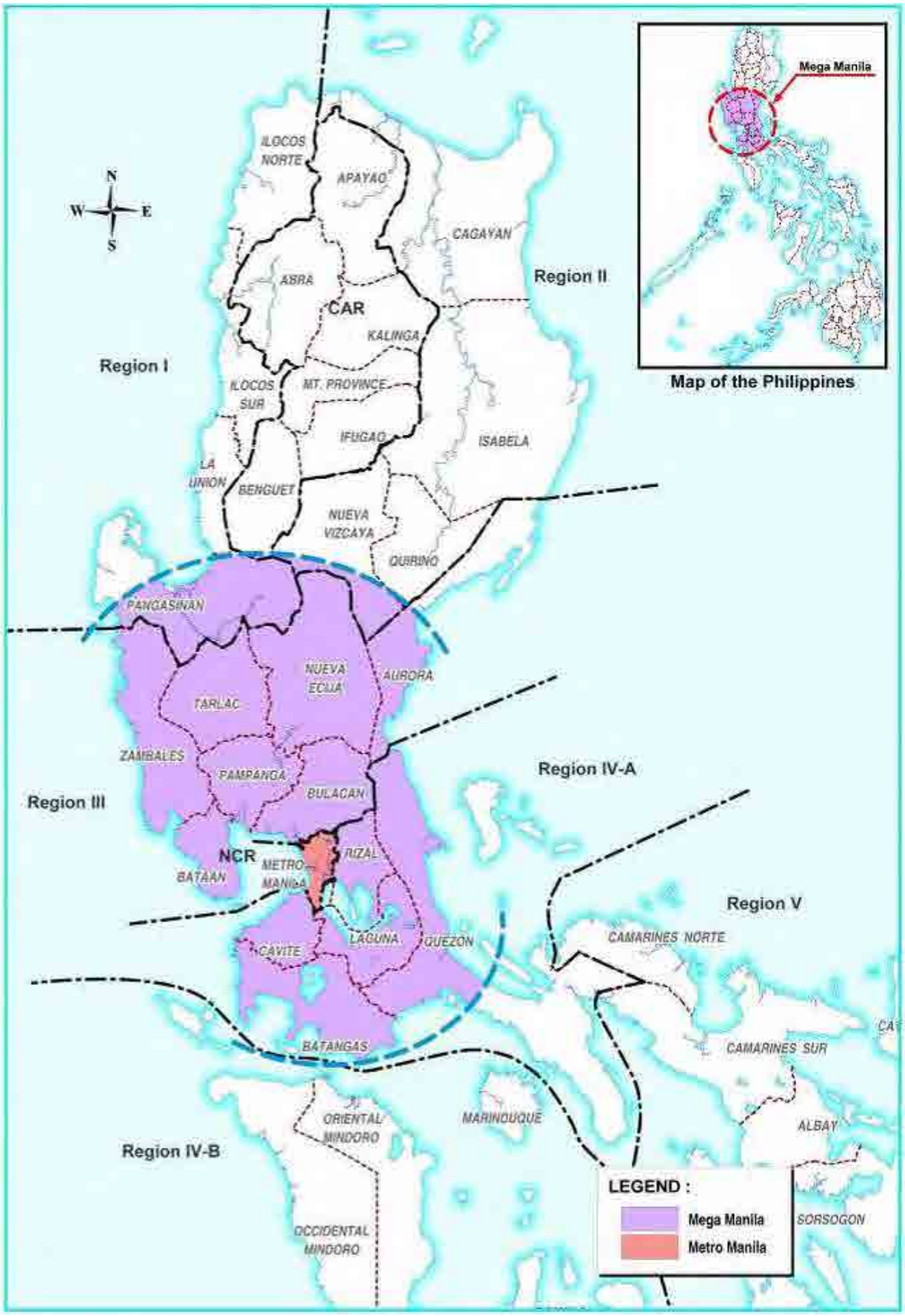

LOCATION MAP

Mega Manila Region Highway Network Intelligent Transport System (ITS) Integration Project

FINAL REPORT

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ACRONYMS AND ABBREVIATIONS

AUV	Asian Utility Vehicle
AVLS	Automatic Vehicle Locator System
BLT	Build-Lease-Transfer
BOT	Build-Operate-Transfer
BPH	Bureau of Public Highways
BTO	Build-Transfer-and-Operate
CAAP	Civil Aviation Authority of the Philippines
CAB	Civil Aeronautics Board
CALAX	Cavite-Laguna Expressway
CAVITEX	Manila Cavite Toll Expressway
CCCC	Communication Command and Control Center
CCTV	Closed-Circuit Television
CDCP	Construction Development Corporation of the Philippines
CLLEX	Central-Luzon-Link Expressway
CMMTC	Citra Metro Manila Tollways Corporation
CO	Capital Outlays
COE	Current Operating Expenditures
CPA	Cebu Port Authority
CPC	Certificate of Public Convenience
CPCN	Certificate of Public Convenience and Necessity
DBCC	Development Budget and Coordination Committee
DEO	District Engineering Office
DOTC	Department of Transportation and Communications
DPWH	Department of Public Works and Highways
DSRC	Dedicated Short Range Communications
EO	Executive Order
ETC	Electronic Toll Collection
FM	Frequency Modulation
GAA	General Appropriations Act
GIS	Geographic Information System
GPS	Global Positioning System
HDM-4	Highway Development and Management Version 4
HDV	High-Definition Video
IC	Infrastructure Committee
IC	Integrated Circuit
IRA	Internal Revenue Allotment
IRI	International Roughness Index
IT	Information Technology
ITS	Intelligent Transport System
JICA	Japan International Cooperation Agency
JV	Joint venture
KPI	Key Performance Indicator
LGC	Local Government Code
LGU	Local Government Unit
LRT	Light Rail Transit
LRTA	Light Rail Transit Authority
LTFRB	Land Transportation Franchising and Regulatory Board
LTO	Land Transportation Office
LTTC	Land Transportation and Traffic Code
MAIDS	Manufacturers, Assemblers, Importers, Dealers System
MARINA	Maritime Industry Authority
MCIAA	Mactan-Cebu International Airport Authority
MCTE	Manila-Cavite Toll Expressway

MIAA-NAIA	Manila International Airport Authority
MID	Management Information Division
MMDA	Metropolitan Manila Development Authority
MMPTS	Mega Manila Public Transport Study
MNTC	Manila North Tollway Corporation
MOA	Memorandum of Agreement
MPSS	Minimum Performance Standards and Specifications
MRT	Mass Rapid Transit
MTPDP	Medium Term Philippine Development Plan
MVIS	Motor Vehicle Inspection System
MVRS	Motor Vehicle Registration System
MVUC	Motor Vehicle User's Charge
NAIAX	Ninoy Aquino International Airport Expressway
NCR	National Capital Region
NEDA	National Economic and Development Authority
NLEX	North Luzon Expressway
OBR	Organized Bus Routes
ODA	Official Development Assistance
OTS	Office for Transportation Security
OVR	Ordinance Violation Receipt
PCG	Philippine Coast Guard
PD	Presidential Decree
PEGR	Philippines-Australia Partnership for Economic Government Reform
PLDT	Philippine Long Distance Telephone Company
PMO	Project Management Office
PMO-BOT	Project Management Office – Build-Operate-Transfer
PMO-FS	Project Management Office – Feasibility Study
PMO-TEAM	Project Management Office – Traffic Engineering and Management
PMS	Pavement Management System
PNCC	Philippine National Construction Corporation
PNP	Philippine National Police
PNR	Philippine National Railways
PPA	Philippine Ports Authority
PPP	Public Private Partnership
PRA	Philippine Reclamation Authority (formerly Public Estates Authority)
PSA	Public Service Act
PSC	Public Service Commission
PhP	Philippine Peso
RA	Republic Act
RB	Road Board
RBIA	Road and Bridge Information Application
RDC	Regional Development Council
RIMSS	Road Information Management support system
RMC	Route Measured Capacity
RO	Regional Office
ROCOND	Visual Road Condition
RTIA	Road Traffic Information Application
SCATS	Sydney Coordinated Adaptive Traffic System
SCTEX	Subic- Clark-Tarlac Expressway
SIDC	Star Infrastructure Development Corporation
SLEX	South Luzon Expressway
SLRF	Special Local Road Fund
SNS	Social Networking Service

SRSaF	Special Road Safety Fund
SRSuF	Special Road Support Fund
STAR	Southern Tagalog Arterial Road
STOA	Supplemental Toll Operation Agreement
SVPCF	Special Vehicle Pollution Control Fund
TARAS	Traffic Accident Recording and Analysis System
TCA	Toll Concession Agreement
TCR	Traffic Control Room
TCS	Toll Collection System
TDO	Traffic Discipline Office
TEAM	Traffic Engineering and Management
TEC	Traffic Engineering Center
TMC	Traffic Management Code
TOA	Toll Operation Agreement
TOC	Toll Operation Certificate
TPLEX	Tarlac-Pangasinan-La Union Expressway
TPMO	Traffic and Parking Management Office
TRB	Toll Regulatory Board
WB	World Bank
WIM	Weigh-in-Motion

CHAPTER 1
INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The extremely concentrated economic activity and population in the Mega Manila Region (i.e., National Capital Region, Region III and Region IV-A) have been causing serious traffic congestion and delays in the movement of people and distribution of goods. These impair the economy by lowering the country's international competitiveness as an investment destination. The living condition has also deteriorated due to air pollution, traffic noise and traffic accidents.

On the basis of the above-mentioned situation, the Japan International Cooperation Agency (JICA) constituted the Master Plan on High Standard Highway (HSH) Network Development in 2010 and the HSH Development Strategy, concluding that about 1,000 km of HSH network should be developed until 2030. This expansion more than doubles the existing 420-km HSH network.

While the HSH network is being developed and different toll expressways operated by different private entities are being connected, a unified tolling system should be required and distance-based tolling system could be applied. Furthermore, integrated traffic monitoring and management systems, covering toll and non-toll highways, will be required for optimization of traffic flow. The application of Public-Private Partnership (PPP) schemes in highway development projects, which can lead to the involvement of and coordination among stakeholders, will be necessary for the realization of the introduction of integrated traffic monitoring and management systems.

Innovation of information and communication technology (ICT) is rapidly progressing day by day. Real time traffic information can be collected and provided to road users by various means, typical one of which is smart phones. Smart (IC) cards can be also used in various ways including rail/bus fare payment, toll road payment, various payments for shopping, etc.

Based on the above-mentioned recognition, the Mega Manila Region Highway Network Intelligent Transportation Systems (ITS) Master Plan, covering toll expressways as well as urban roads, will be formulated through the efforts of both the Government of Japan (GOJ) and the Government of the Philippines (GOP). The ITS Master Plan preparation includes the formulation of a plan and a strategy to introduce an integrated traffic control system covering expressways and urban roads; and the formulation of a technical and organizational policy framework. The system, which is expected to be introduced in the short term or medium term, was examined and proposed as pre-feasibility projects.

On the part of GOJ, JICA, the official agency responsible for implementation of the technical program of GOJ, is undertaking the Study in accordance with the relevant laws and regulations enforced in Japan.

On the part of GOP, DPWH and MMDA act as the counterpart agencies to the Japanese Study Team (hereinafter referred to as "the Study Team") and also as the coordinating bodies in relation to other governmental and non-governmental organizations for the smooth implementation of the Study.

1.2 OBJECTIVE OF THE STUDY

The objectives of the Study are as follows:

- To develop a master plan to introduce Intelligent Transport Systems (hereinafter referred to as "ITS") in the Mega Manila Region.
- To formulate short, medium and long term ITS deployment plan.

1.3 STUDY AREA

The study area covers the Mega Manila Region (i.e., National Capital Region, Region III and Region IV-A).

1.4 SCOPE OF THE STUDY

In order to achieve the above objectives, the Study covers the following activities:

(1) Preparation, Presentation and Discussion of Inception Report
(2) ITS Seminars
(3) Data Collection of Transportation and ITS related information in Mega Manila Region and Metro Manila Region
(4) Identification and Evaluation of Existing ITS System
(5) Collection of Supplemental Data of ITS Needs
(6) Formulation of Basic Principle of the ITS Master Plan
(7) Preparation, Presentation and Discussion of Interim Report
(8) Formulation of ITS Master Plan for Toll Expressways in Mega Manila Region
(9) Formulation of ITS Master Plan for Urban Roads in Metro Manila Region
(10) Preparation, Presentation and Discussion of Progress Report
(11) Selection of Pilot Project and Implementation of Pre F/S
(12) Preparation, Presentation and Discussion of Draft Final Report
(13) Preparation and Submission of Final Report

1.5 SCHEDULE OF THE STUDY

The Study commenced in the beginning of June 2012 and completed in June 2013 as shown in **Table 1.6-1**.

1.6 ORGANIZATION TO CARRY OUT THE STUDY

The organization of the Study is shown in **Figure 1.6-1**.

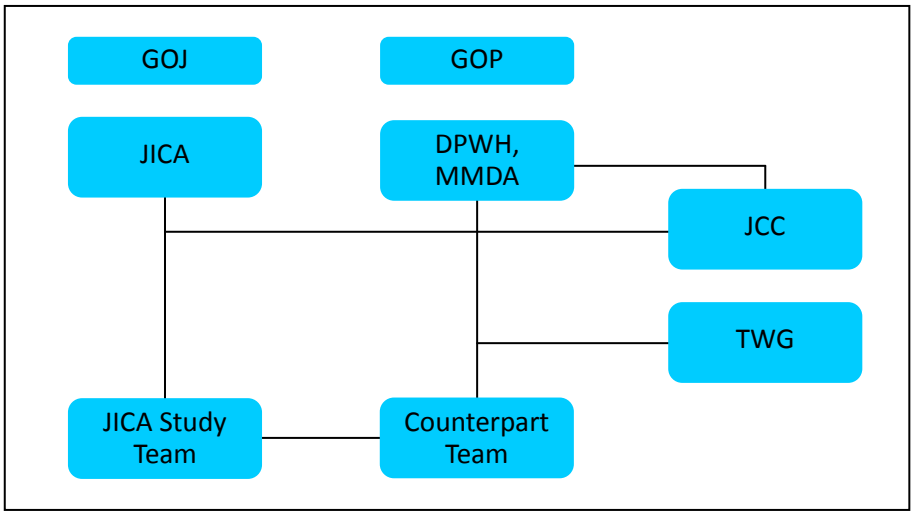


FIGURE 1.6-1 ORGANIZATION CHART

The Joint Coordination Committee (JCC) was organized by the DPWH, MMDA and other related organizations to discuss and approve reports submitted by the Study Team and to review and exchange views on major issues arising from or in connection with the Project. The members of the JCC was as follows:

Dr. Maria Catalina Cabral	Asst. Sec. for Planning Service and PPP, DPWH
Engr. Remedios G. Belleza	Project Director, PMO-TEAM, DPWH
Engr. Rebecca T. Garsuta	Project Director, PMO-BOT, DPWH
Engr. Danilo J. Idos	OIC-Project Director, PMO-URPO, DPWH
Engr. Constante A. Llanes Jr.	OIC -Director, Planning Service, DPWH
Engr. Reynaldo G. Tagudando	OIC-Regional Director, NCR, DPWH
Ms. Ma. Josefina J. Faulan	Asst. General Manager for Planning Service, MMDA
Mr. Librado F. Quitoriano	NEDA
Atty. Jaime Rafael C. Feliciano	Asst. Secretary, Infra., DOTC
Atty. Archangel B. Nape	Legal Officer - TRB
Dr. Hilario Sean O. Palmiano	Director, UP-NCTS

TABLE 1.6-1 SCHEDULE OF THE STUDY

Work Item	2012							2013					
	6	7	8	9	10	11	12	1	2	3	4	5	6
(1) Preparation of Inception Report													
Presentation and Discussion of Inception Report													
(2) ITS Seminars													
(3) Data Collection of Transportation and ITS related information in Mega Manila Region and Metro Manila Region													
(4) Identification and Evaluation of Existing ITS System													
(5) Collection of Supplemental Data of ITS Needs													
(6) Formulation of Basic Principle of the ITS Masterplan													
(7) Preparation, Presentation and Discussion of Interim Report													
(8) Formulation of ITS Masterplan for Toll Expressways in Mega Manila Region													
(9) Formulation of ITS Masterplan for Urban Highway in Metro Manila Region													
(10) Preparation, Presentation and Discussion of Progress Report													
(11) Selection of Pilot Project and Implementation of Pre F/S													
(12) Preparation, Presentation and Discussion of Draft Final Report													
(13) Preparation and Submission of Final Report													

Legend:
- Study in Japan
- Study in the Philippines

The Technical Working Group (TWG) was established to discuss detailed technical matters in which the National Center for Transportation Studies of the University of the Philippines participated (UP-NCTS).

Engr. Remedios G. Belleza	PMO-TEAM, DPWH
Mr. Carmelino Jesus C. Tizon	PMO- FS, DPWH
Engr. Ramonito C. Jimenez	PMO-BOT, DPWH
Engr. Jonathan L. Araullo	PMO-TEAM, DPWH
Engr. Carloyn A. Leyesa	PMO-TEAM, DPWH
Engr. Ruperto S. G. Cruz Jr.	PMO-URPO, DPWH
Engr. Lydia F. Chua	NCR, DPWH
Engr. Maximo M. Montaña II	PMO-FS, DPWH
Engr. Neomi T. Recio	TEC, MMDA
Mr. Michael M. Gison	Planning, MMDA
Atty. Yves Randolph P. Gonzalez	TOD, MMDA
Engr. Francisco Pesino Jr.	TEC, MMDA
Ms. Hazel Palapus	NEDA
Mr. Ernest A. Diaz	NEDA
Ms. Ederlyn Norte	NEDA
Joz Carlos Ordillano	TRB
Jeanice Magampon	TRB
Mr. Arnel Manresa	DOTC
Mr. Sajid A. Kamid	UP-NCTS

The Study Team was composed of the following.

Mr. Mitsuo Kiuchi	Team Leader
Mr. Ryuichi Ueno	Deputy Team Leader / Transport Planner / Traffic Engineer (1)
Dr. Yoichi Sakurada	Transport Planner / Traffic Engineer (2)
Mr. Tetsuya Sato	Traffic Control Engineer for Urban Road
Dr. Hiroshi Warita	Traffic Control Engineer for Expressway
Mr. Masaaki Goto	System Architecture / ITS
Mr. Takuma Hirano	ETC System Specialist
Mr. Teodoro Encarnacion	Institutional and Legislative Analysis Specialist
Mr. Hiroshi Kaneko	Transport Survey Specialist
Dr. Hussein Lidasan	ITS Needs Analysis Specialist
Mr. Hiroshi Ishizato	Financial and Economic Analysis Specialist
Mr. Takayoshi ITO	ITS Device / Device Specification Documentation
Mr. Atsushi Harada	Cost Estimation Specialist
Dr. Ricardo Sigua	ITS Promotion Specialist

1.7 FINAL REPORT ORGANIZATION

1.7.1 Reports Prepared

The following reports were prepared in the course of the Study and submitted to DPWH and MMDA.

- Inception Report
- Interim Report
- Progress Report
- Draft Final Report

1.7.2 Organization of the Final Report

The Final Report is organized as follows:

- Executive Summary
- Main Text
- Annex

1.8 MEETING AND COUNTERPART TRAININGS

The following meetings and counterpart training were hold in the course of the Study:

JCC Meeting

- First JCC meeting 19 July 2012 (Joint meeting w/ TWG)
- Second JCC meeting 06 December 2012
- Third JCC meeting 15 February 2013
- Fourth JCC meeting 26 April 2013

TWG Meeting

- First TWG meeting 19 July 2012
- Second TWG meeting 12 November 2012
- Third TWG meeting 05 February 2013
- Fourth TWG meeting 24 April 2013

ITS Seminar

The Seminar program, attendance, and minutes are attached in **Annex 1.1.**

- First ITS Seminar 29 August 2012
- Second ITS Seminar 25-26 September 2012
- Third ITS Seminar 26 February 2013
- Fourth ITS Seminar 29 April 2013

Counterpart Training Japan

Ten (10) counterparts were sent to Japan for a two (2) weeks training.

- Period: March 10 ~ March 23, 2013 (14 days)

TRAINEES AT THE TOKYO METROPOLITAN EXPRESSWAY

FIGURE 1.8-1 COUNTERPART TRAINING SCHEDULE AND PROGRAM IN JAPAN

Title	Japan's Training for Mega Manila Region Highway Network ITS Integration Project
Period	March 2013 (14 days)
No. of trainee	10 person (DPWH 4, MMDA 4, TRB 2)
Purpose	To understand Japan's ITS applications and operation systems

Date		Training hours	Training items		Training Location
Day	Date		Type	Contents	
10, March	Sun	Arrival to Japan			
11, March	Mon	3h	Lecture	Briefing, General information	JICA Tokyo
		1h	Lecture	Program Orientation	JICA Tokyo
		1h		Courtsy Visit to JICA headquarters and Welcome Party	JICA Headquarters
12, March	Tue	2h	Lecture	Traffic control center and traffic signal system	Sumitomo Electronic Industies, LTD
		1h	Field Visit	Traffic control center and traffic signal system	Metropolitan Police Department
13, March	Wed	2h	Field Visit	VICS Center	VICS Center
		2h	Field Visit	Lecture on Japan's ITS and Visit ITS-SPOT	Ministry of Land, infrastructure, Transport and Tourism
14,March	Thr	1h	Lecture	Traffic control in Tokyo Metropolitan Expressway	Metropolitan Exp. Company
		1h	Field Visit	ETC and other ITS service in Tokyo Metropolitan Expressway	Metropolitan Exp. Company
			Move from Tokyo to Hyogo		
15,March	Fri	2.5h	Field Visit	I-Higwa(Traffic provision system) and Floating data	West Nippon Expressway Company Limited
		2h	Field Visit	Test Course of ETC and ERP	Mitsubishi Heavy Industries, LTD.
16,March	Sta		-	Report Preparation (Free)	-
17,March	Sun		Move from Hyogo to Nagoya		
18,March	Mon	2h	Field Visit	Nagoya ITS (Guideway Bus System)	Nagoya Guideway Bus Co., Ltd.
		2h	Field Visit	VMS and Speed control equipment(Expressway)	Nagoya Electric Works Co., Ltd.
19,March	Tue		Move from Nagoya to Shizuoka		
		1.5h	Field Visit	Visit New Tomei Expressway	Central Nippon Expressway Company Limited
		1h	Field Visit	Visit Maintenance Service Center	Central Nippon Expressway Company Limited
			Move from Fuji to Kawasaki		
		1h	Field Visit	Vist Traffic control center	Central Nippon Expressway Company Limited
20,March	Wed		-	Report Preparation (Free)	JICA Tokyo
21,March	Thr	2h	Field Visit	Floating data utilization and traffic condition prediction	Honda
		3h	Lecture	Floating data utilization and traffic simulation	CTI International
22,March	Fri	2h	-	Presentation Prepration	JICA Tokyo
		3h	-	Presentation Meeting	JICA Headquarters
23,March	Sta	Departure to Mamila			

CHAPTER 2
GOVERNMENT'S TRANSPORT DEVELOPMENT POLICIESS AND PLAN

2.1 PHILIPPINE DEVELOPMENT PLAN (2011-2016)

The Philippine Development Plan (PDP), 2011-2016, was launched in 2011. Under this Plan, development policies for infrastructure are as follows:

DEVELOPMENT POLICIES FOR INFRASTRUCTURE

"**Accelerating Infrastructure Development"**

(1) To optimize resources and investment
- Improve project preparation, development and implementation.
- Synchronize planning and budgeting.
- Coordinate and integrate infrastructure initiatives.

(2) To attract investments in infrastructure
- Improve the institutional and regulatory environment of the infrastructure sector.
- Encourage PPPs.

(3) To foster transparency and accountability in infrastructure development
- Encourage stakeholder participation.

(4) To adopt to climate change and mitigate the impacts of natural disasters
- Institutionalize Climate Change Act (CCA) and Disaster Risk Reduction Management (DRRM).

(5) To provide productive employment opportunities
- Adopt labor-intensive schemes where applicable.

With regard to the transport sector, issues and challenges are established as follows:

TRANSPORT SECTOR ISSUES AND CHALLENGES

(a) Assessment and Issues
- Lack of integrated and coordinated transport network.
- Overlapping and conflicting functions of transport and other concerned agencies.
- Transport safety and security concerns.

(b) Strategic Plan and Focus
- Adopt a comprehensive long-term National Transport Policy (NTP).
- Develop strategic transport infrastructure assets
  - Prioritize asset preservation.
  - Provide access to major and strategic tourism destinations and production areas.
  - Promote environmentally sustainable and people-oriented transport.

(c) Develop an Integrated Multi-modal Logistics and Transport System
- Identify and develop strategic logistics corridors based on a National Logistics Master Plan.
- Improve Roll-on Roll-off (RORO) terminal system.
- Explore ASEAN connectivity through sea linkages.

(d) Separate the Regulatory and Operation Functions of Transport and Other Concerned Agencies. Address the overlapping and conflicting functions of transport and other concerned agencies.

(e) Comply with Safety and Security Standards. Ensure transport safety and standards.

(f) Provide Linkages to Bring Communities into the Mainstream of Progress and Development. Promote development in conflict-affected and highly impoverished areas.

2.2 MMDA GREEN-PRINT 2030

The Metro Manila Greenprint 2030 is a two-decade development plan that will be a spatial strategy, guiding the form of the urban region, trunk infrastructure, green systems and clustering economic activities.

The Greenprint 2030 covers Metro Manila and neighboring areas in the Cavite-Laguna-Batangas-Rizal-Quezon (CALABARZON) and Central Luzon Regions.

Currently, the framework for the visions for the extended Metropolitan Region has been formulated. The preparation of high-quality map, strategic road map and spatial strategy over the plan period will be done as the next step.

Draft Vision of Metro Manila Greenprint 2030

"Towards a Competitive, Inclusive and Resilient Metropolis."

Transform Metro Manila into a highly competitive East Asia Metropolis sustainably delivering adequate services and promoting higher standard of living.

- Business and Knowledge Process Outsourcing
- Green Large-Scale City Building
- Peri-Urbanization as an Opportunity
- Peri-Urbanization Livelihood
- Retrofitting Communities
- Reducing Vulnerability
- Attract Newly-Rich Regional Neighbors
- Reclaiming High-End Services

Source: http://www.metromanila2030.com/

2.3 REGION III DEVELOPMENT PLAN (2011-2016)

The Region III Development Plan, 2011-2016, was announced in 2011. Development directions under this Plan are as follows:

DEVELOPMENT DIRECTIONS

VISION

"Central Luzon: A Sustainable and Caring Global Gateway through Public-Private Partnership and Growth for All"

DEVELOPMENT GOALS AND OBJECTIVES

(1) High, Sustained and Inclusive Growth
- High GRDP per capita.
- High employment and family income level.
- Equity in income distribution.

(2) Globally-Competitive, Progressive and Resilient Citizenry
- Minimize natural disaster casualties and economic losses.
- Make food cheap and plentiful.
- Improve basic education achievement rates.
- Support the development of world-oriented higher education institutions.
- Develop higher employable technical and vocational skills.

(3) World-Class Passenger Mobility and Cargo Distribution Network
- Improve land transport access from the urban core to the east and west coasts.
- Increase the level of service of strategic roads and north-south arterial links.
- Integrate the three modes of transportation (land, air and sea).

(4) Sustainable Land-Using Activities
- Ensure that mining operations are environment-friendly.

(5) Socially Responsible Property Rights
- Ensure security over property rights.
- Improve the profitability and sustainability of MSMEs.
- Increase rural farming and fisher folk family income.

(6) Effective, Responsive and Transparent Governance
- Update tourism establishments.
- Development Clark-Subic regional tourism hub.
- Recover lahar-covered areas for productive uses.

2.4 REGION IV-A DEVELOPMENT PLAN (2011-2016)

The Region IV-A Development Plan, 2011-2016, was announced in 2011. Under this Plan, the development vision and strategy are as follows:

DEVELOPMENT VISION AND STRATEGY

VISION for Calabarzon

- Be the leading global economic hub of the country.
- Be a model, livable industrial region, highly urbanized with well-planned town clusters
- ideal for sustainable living.
- Have a vibrant countryside offering an excellent alternative place to live, work, and seek recreation in.
- Have a modern intermodal transportation system and digital infrastructure integrating the region within, to the country, and to the global community.
- Be complemented by high quality social service amenities accessible region-wide.
- Have a citizenry whose high creativity and competitive spirit, genuine concern for the environment and fellowmen, and love of country are inspired by their affinity to the region's heroes and unwavering faith in God.

MEDIUM-TERM GOALS AND DEVELOPMEMT OUTCOME

- High and sustained economic growth
  - Sustainable economic growth of 5 to 8 percent annually within the plan period which shall enable the economy to generate employment.
- Equal access to development opportunities
  - Maintain a single digit unemployment level throughout the plan period.
- Effective social safety nets
  - Achieve the MDG targets by 2015, with special focus on the target with low probability of achievement.

DEVELOPMENT STRATEGY

In order to achieve the Region's vision goals and developed outcomes, a spatial development strategy was formulated.

(1) Strengthening East- West Connections.
(2) Development of Manila Bay-Pacific Coast Corridor.
(3) Promotion of Mixed-use and Multi-Use Communities.
(4) Appropriate Land Use Management.
(5) Adoption and Implementation of Good Urban Design Principles.
(6) Development of Laguna de Bay as Manila's Water Gateway to Calabarzon.
(7) Ten Principles for Livable Towns and Cities.
(8) Design Guidelines for Physical Development.

2.5 DPWH PUBLIC INVESTMENTMENT PROGRAM (2011-2016)

The DPWH Public Investment Program (PIP) (2011 - 2016) was formulated by that Department in 2011. Goals were set as follows:

DEVELOPMENT GOALS UNDER DPWH PIP

1. Provide safe environment through quality infrastructure facilities;
2. Increase mobility and total connectivity of people through quality infrastructure resulting to improved quality of life;
3. Strengthen national unity, family bonds and tourism by making the movement of people faster, cheaper and safer;
4. Facilitate the decongestion of Metro Manila via a transport logistics system that would ensure efficient linkages between its business centers and nearby provinces;
5. Implement more Public-Private Partnership (PPP) projects for much needed infrastructure and level playing field for investment;
6. Ensure adequate and sustained maintenance of roads and bridges; and
7. Generate more transport infrastructure with minimal budget requirements and contingent liabilities.

The strategic focus of the DPWH PIP was set as follows;

STRATEGIC FOCUS

- Implement activities in the following order of priorities:
  a. Maintenance or asset preservation – to preserve existing roads in good condition.
  b. Rehabilitation – to restore damaged roads to their original designed condition.
  c. Improvement – to upgrade road features so that they efficiently meet traffic demands.
  d. New Construction
- Prioritize upgrading of the national road network, as to quality and safety standards.
- Prioritize national roads to address traffic congestion and safety in urban centers and designated strategic tourism destinations.
- Complete on-going bridges along national roads.
- Develop more Public-Private Partnership (PPP) projects to accelerate the provision of key infrastructure and level the playing field for investments.
- Study the mechanism for a longer maintenance period (5 – 10 years) for road and bridges under performance-based contracts.
- Prioritize flood control projects in major and principal river basins to address climate change based on master plan and adopt new technologies in flood control and slope management.

- Prioritize adequate flood control and upgraded drainage design standards and facilities in flood-disaster prone areas to mitigate loss of rivers and damage to properties.
- Promote innovative technology such as geo-textiles and coco-netting in slope protection and soil erosion control.
- Promote retarding basin and rain water harvesting for non-domestic use.
- Prioritize water supply in designated strategic tourist destinations/centers.

2.6 FORMULATION OF A NATIONAL TRANSPORT PLAN

A National Transport Plan was approved by the pertinent authorities including the National Economic and Development Authority (NEDA), the Department of Transportation and Communications (DOTC), and the Department of Public Works and Highways (DPWH).

TRANSPORT SECTOR VISION, GOALS AND OBJECTIVES

Transport Vision

"A safe, efficient, viable, dependable integrated, environmentally sustainable, and people-oriented transportation system"

Transport Goals and Objectives

Transport Sector Outcome: Improve access to markets and seamless connectivity.

A. International standard civil aviation system
   1. Improved national airport network for access and mobility of people, goods and services.
      - International standard gateway airports.
      - Improved secondary network of airports for tourism, trade and agricultural development.
   2. Enhanced navigational services for aviation safety and efficiency.
      - Improved landing/ take-off operations.

B. International standard maritime transport system
   1. Improved national maritime transport network for access and mobility of people, goods and services.
      - Expanded national RORO transport backbone.
      - Improved secondary network of ports for tourism, trade and agricultural development.
      - Enhanced maritime safety, security and environmental protection.

C. International standard railway transport system
   1. Improved Luzon and Metro Manila railway transport network for access and mobility of people, goods and services.

D. International standard road transport system
   1. Improved road-based transit system.
   2. IT-enabled regulatory and enforcement system.

CHAPTER 3
SOCIO-ECONOMIC CHARACTERISTICS OF PROJECT AREA

3.1 PHYSICAL PROFILE

The Study Area consists of Region III, Region IV-A and the National Capital Region (NCR). NCR or Metro Manila is composed of 16 cities, namely, Manila, Caloocan, Las Piñas, Makati, Malabon, Mandaluyong, Marikina, Muntinlupa, Navotas, Pasay, Pasig, Parañaque, Quezon City, San Juan, Taguig, and Valenzuela, and the Municipality of Pateros. Its total land area of 619 sq. km is only 0.2% of total land area in the country.

Region III, also known as the reconfigured Central Luzon Region due to inclusion of the province of Aurora, has the largest contiguous low land area in the country. Its total land area of 2.2 million hectares is 6.4% of total land area in the country.

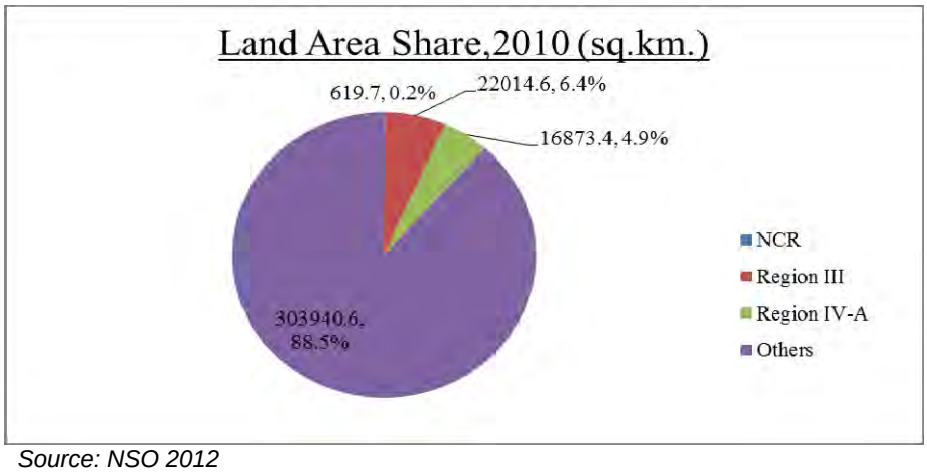
The southern part of the Study Area is bounded by the provinces of Cavite, Laguna, Batangas, Rizal and Quezon, all of which comprise Region IV-A, also known as CALABARZON.

Table 3.1-1 and **Figure 3.1-1** shows the land area share of NCR, Region III and Region IV-A to country.

TABLE 3.1-1 LAND SHARE

Region	Land Area (sq. km.)	Share to Philippines (%)
Philippines	343,448	
NCR	620	0.2
Region III	22,015	6.4
Region IV-A	16,873	4.9

Source: National Statistics Office(NSO) 2012



Source: NSO 2012

FIGURE 3.1-1 LAND AREA SHARE

3.2 DEMOGRAHIC AND URBANIZATION TREND

The past demographic trend is shown in **Table 3.2-1**. The population shares of the Study Area and its component regions to the Philippines are shown in **Figure 3.2-1**. The population density and population growth rate are graphically shown in **Figure 3.2-2** and **Figure 3.2-3**.

The characteristics of the demographic trend of the Study Area are as follows:

National Capital Region (NCR) or Metro Manila

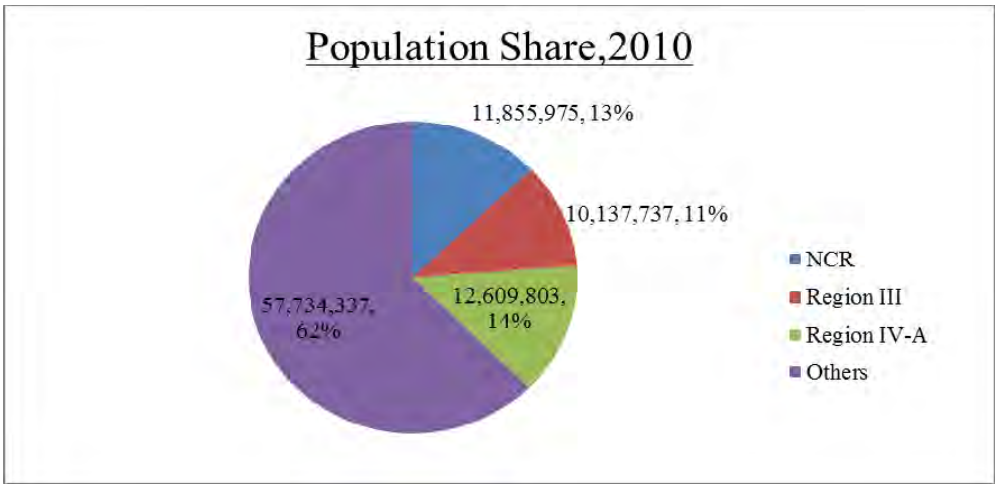
- Population reached 11.9 million in 2010 and shared 13% of the Philippine population.
- Population density is extremely high at 191 persons/ha.
- Population growth rate drastically dropped at 0.99% between 1995 and 2000, but again grew at the rate of 2.18% from 2000 to 2007, then again sharply dropped at 0.88%, lower than the national average.

Region III (Central Luzon)

- Population in 2010 was 10.1 million and shared 11% of the Philippine population.
- Population density is 4.6 persons per ha., much lower than NCR.
- The Region recorded a high population growth rate between 1995 and 2000 at 2.96%, however, it reduced to 2.45% between 2000 and 2007 and to 1.45% between 2007 and 2010.
- There is a steady trend of population increase at a high rate, because spilled over population from NCR is moving to this Region.

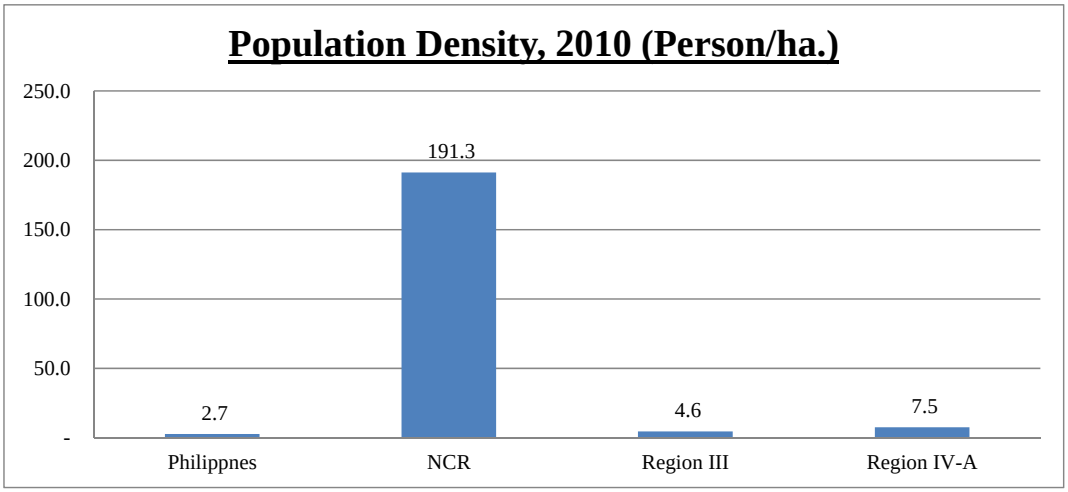
Region IV-A (CALABARZON)

- Population in 2010 reached 12.6 million and shared 14% of the country.
- Population density is 7.5 person/ha., which is much lower than that of NCR.
- The Region recorded high population growth rates at 4.07% from 1990 to 1995, 3.76% from 1995 to 2000, 3.37% from 2000 to 2007, and 2.36% from 2007 to 2010. Population spilled over from NCR moved to this Region. This trend is still continuing.



Source: NSO 2012

FIGURE 3.2-1 POPULATION SHARE



Source: NSO 2012

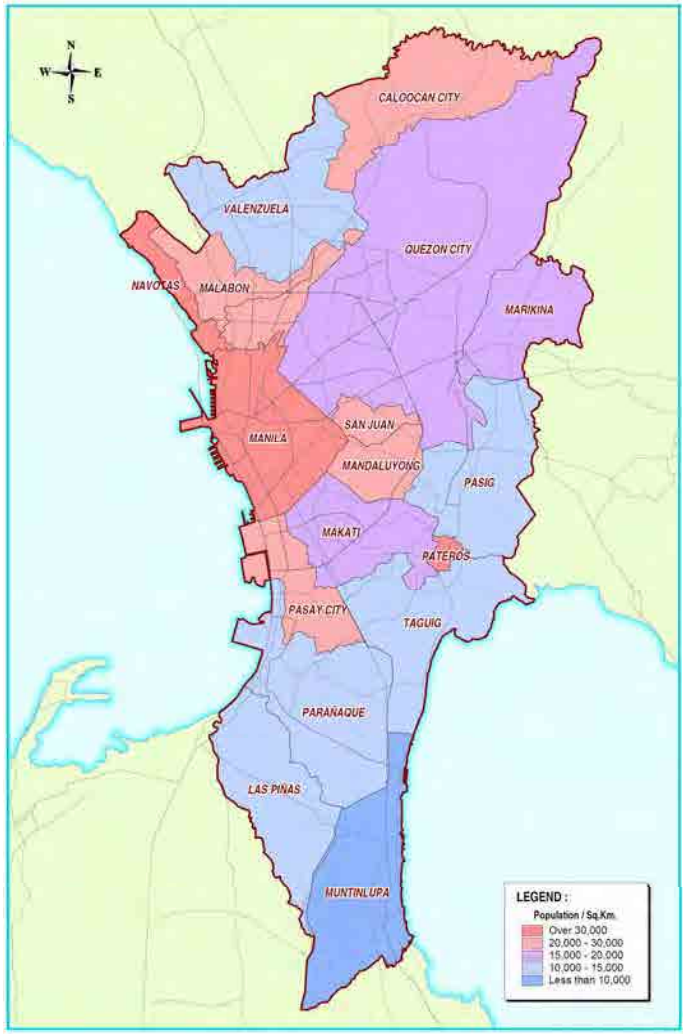
FIGURE 3.2-2 POPULATION DENSITY

TABLE 3.2-1 PAST DEMOGRAPHIC TREND IN STUDY AREA

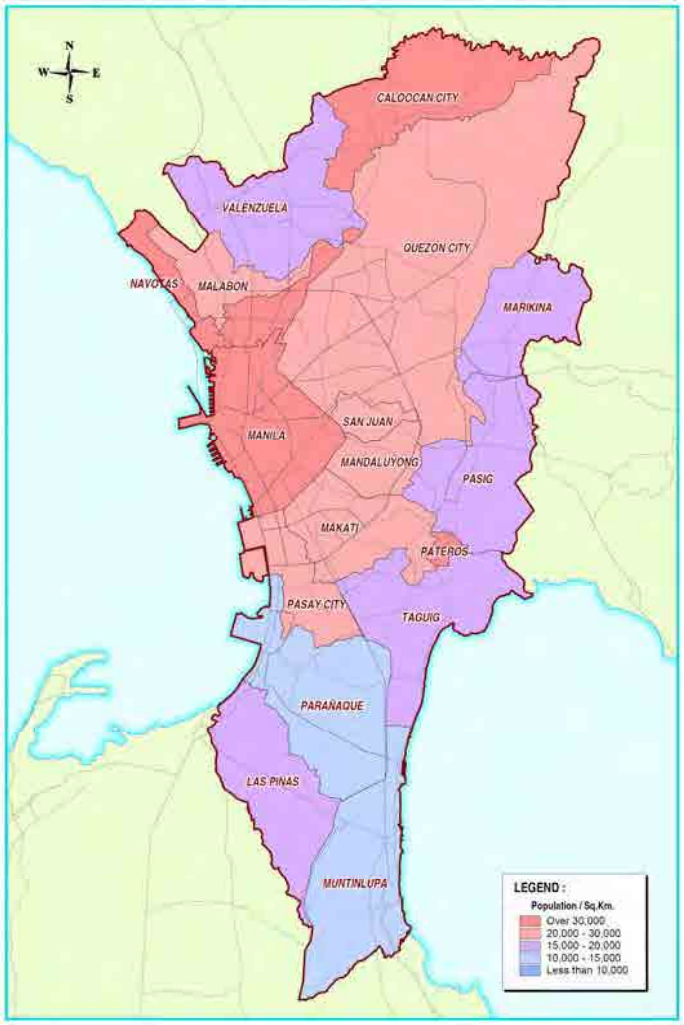
Region/Province/Highly Urbanized City	Total Population					Land Area	Density(person / sq km)					Population Growth Rate (%)			
	Y1990	Y1995	Y2000	Y2007	Y2010	(sq km)	Y1990	Y1995	Y2000	Y2007	Y2010	1990-1995	1995-2000	2000-2007	2007-2010
Philippines	**60,703,810**	**68,616,536**	**76,506,928**	**88,548,366**	**92,337,852**	**343,448.3**	**177**	**200**	**223**	**258**	**269**	**2.48**	**2.20**	**2.11**	**1.41**
National Capital Region	**7,948,392**	**9,454,040**	**9,932,560**	**11,547,959**	**11,855,975**	**619.7**	**12,826**	**15,256**	**16,028**	**18,635**	**19,132**	**3.53**	**0.99**	**2.18**	**0.88**
City of Las Piñas	297,102	413,086	472,780	532,330	552,573	32.7	9,086	12,633	14,458	16,279	16,898	6.81	2.74	1.71	1.25
City of Makati	453,170	484,176	471,379	548,983	529,039	21.6	20,980	22,416	21,823	25,416	24,493	1.33	(0.53)	2.20	(1.23)
City of Malabon	280,027	347,484	338,855	363,681	353,337	15.7	17,836	22,133	21,583	23,164	22,506	4.41	(0.50)	1.02	(0.96)
City of Mandaluyong	248,143	286,870	278,474	305,576	328,699	9.3	26,682	30,846	29,943	32,858	35,344	2.94	(0.59)	1.34	2.46
City of Manila	1,601,234	1,654,761	1,581,082	1,660,714	1,652,171	25.0	64,049	66,190	63,243	66,429	66,087	0.66	(0.91)	0.70	(0.17)
City of Marikina	310,227	357,231	391,170	424,610	424,150	21.5	14,429	16,615	18,194	19,749	19,728	2.86	1.83	1.18	(0.04)
City of Muntinlupa	278,411	399,846	379,310	452,943	459,941	39.8	6,995	10,046	9,530	11,380	11,556	7.51	(1.05)	2.57	0.51
City of Navotas	187,479	229,039	230,403	245,344	249,131	8.9	21,065	25,735	25,888	27,567	27,992	4.09	0.12	0.90	0.51
City of Parañaque	308,236	391,296	449,811	552,660	588,126	46.6	6,615	8,397	9,653	11,860	12,621	4.89	2.83	2.99	2.09
City of Pasig	397,679	471,075	505,058	627,445	669,773	48.5	8,200	9,713	10,414	12,937	13,810	3.45	1.40	3.15	2.20
City of San Juan	126,854	124,187	117,680	125,338	121,430	6.0	21,142	20,698	19,613	20,890	20,238	(0.42)	(1.07)	0.90	(1.05)
City of Valenzuela	340,227	437,165	485,433	568,928	575,356	47.0	7,239	9,301	10,328	12,105	12,242	5.14	2.12	2.29	0.38
Caloocan City	763,415	1,023,159	1,177,604	1,381,610	1,489,040	55.8	13,681	18,336	21,104	24,760	26,685	6.03	2.85	2.31	2.53
Pasay City	368,366	408,610	354,908	403,064	392,869	14.0	26,312	29,186	25,351	28,790	28,062	2.10	(2.78)	1.83	(0.85)
Pateros	51,409	55,286	57,407	61,940	64,147	10.4	4,943	5,316	5,520	5,956	6,168	1.46	0.76	1.09	1.17
Quezon City	1,669,776	1,989,419	2,173,831	2,679,450	2,761,720	171.7	9,725	11,587	12,661	15,605	16,085	3.57	1.79	3.03	1.01
Taguig City	266,637	381,350	467,375	613,343	644,473	45.2	5,899	8,437	10,340	13,570	14,258	7.42	4.15	3.96	1.66
Region III – Central Luzon	**6,338,590**	**7,092,191**	**8,204,742**	**9,709,177**	**10,137,737**	**22,014.6**	**288**	**322**	**373**	**441**	**461**	**2.27**	**2.96**	**2.43**	**1.45**
Aurora	139,573	159,621	173,797	187,802	201,233	3,147.3	44	51	55	60	64	2.72	1.72	1.11	2.33
Bataan	425,803	491,459	557,659	662,153	687,482	1,373.0	310	358	406	482	501	2.91	2.56	2.48	1.26
Bulacan	1,505,219	1,784,441	2,234,088	2,822,216	2,924,433	2,796.1	538	638	799	1,009	1,046	3.46	4.60	3.39	1.19
Nueva Ecija	1,312,680	1,505,827	1,659,883	1,843,853	1,955,373	5,751.3	228	262	289	321	340	2.78	1.97	1.51	1.98
Pampanga (excluding Angeles City)	1,295,929	1,401,756	1,618,759	1,911,951	2,014,019	2,002.2	647	700	808	955	1,006	1.58	2.92	2.41	1.75
Angeles City	236,686	234,011	263,971	317,398	326,336	60.3	3,925	3,881	4,378	5,264	5,412	(0.23)	2.44	2.67	0.93
Tarlac	859,708	945,810	1,068,783	1,243,449	1,273,240	3,053.6	282	310	350	407	417	1.93	2.47	2.19	0.79
Zambales (excluding Olongapo City)	369,665	389,512	433,542	493,085	534,443	3,645.8	101	107	119	135	147	1.05	2.16	1.86	2.72
Olongapo City	193,327	179,754	194,260	227,270	221,178	185.0	1,045	972	1,050	1,228	1,196	(1.45)	1.56	2.27	(0.90)
Region IVA – CALABARZON	**6,349,452**	**7,750,204**	**9,320,629**	**11,757,755**	**12,609,803**	**16,873.4**	**376**	**459**	**552**	**697**	**747**	**4.07**	**3.76**	**3.37**	**2.36**
Batangas	1,476,783	1,658,567	1,905,348	2,245,869	2,377,395	3,119.8	473	532	611	720	762	2.35	2.81	2.38	1.92
Cavite	1,152,534	1,610,324	2,063,161	2,856,765	3,090,691	1,574.2	732	1,023	1,311	1,815	1,963	6.92	5.08	4.76	2.66
Laguna	1,370,232	1,631,082	1,965,872	2,473,530	2,669,847	1,917.9	714	850	1,025	1,290	1,392	3.55	3.80	3.34	2.58
Quezon (excluding Lucena City)	1,221,831	1,359,992	1,482,955	1,646,510	1,740,638	8,989.4	136	151	165	183	194	2.17	1.75	1.51	1.87
Lucena City	150,624	177,750	196,075	236,390	246,392	80.2	1,878	2,216	2,445	2,948	3,072	3.37	1.98	2.71	1.39
Rizal	977,448	1,312,489	1,707,218	2,298,691	2,484,840	1,191.9	820	1,101	1,432	1,929	2,085	6.07	5.40	4.34	2.63

Source: NSO 2012

Year 2000

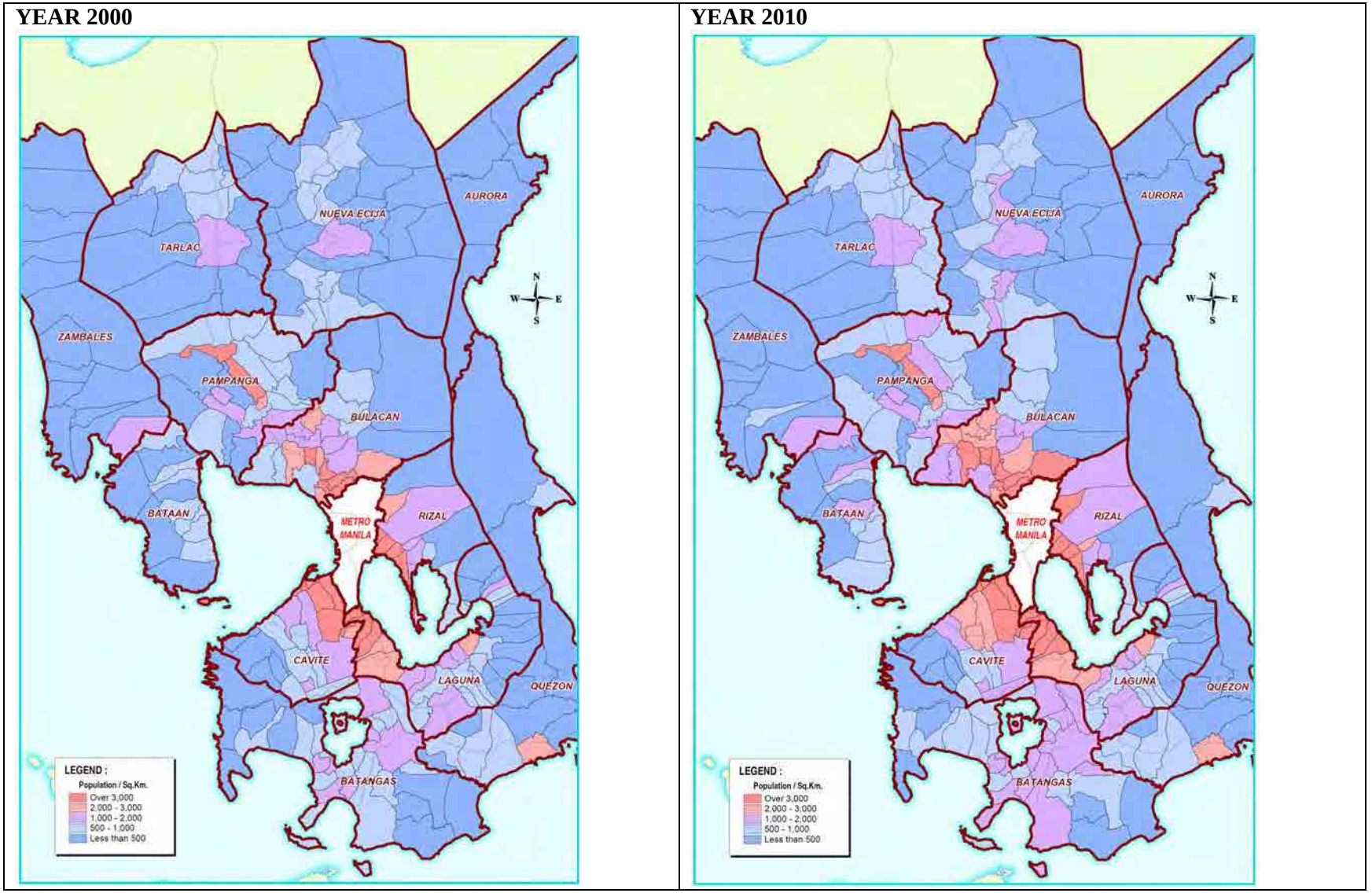


Year 2010



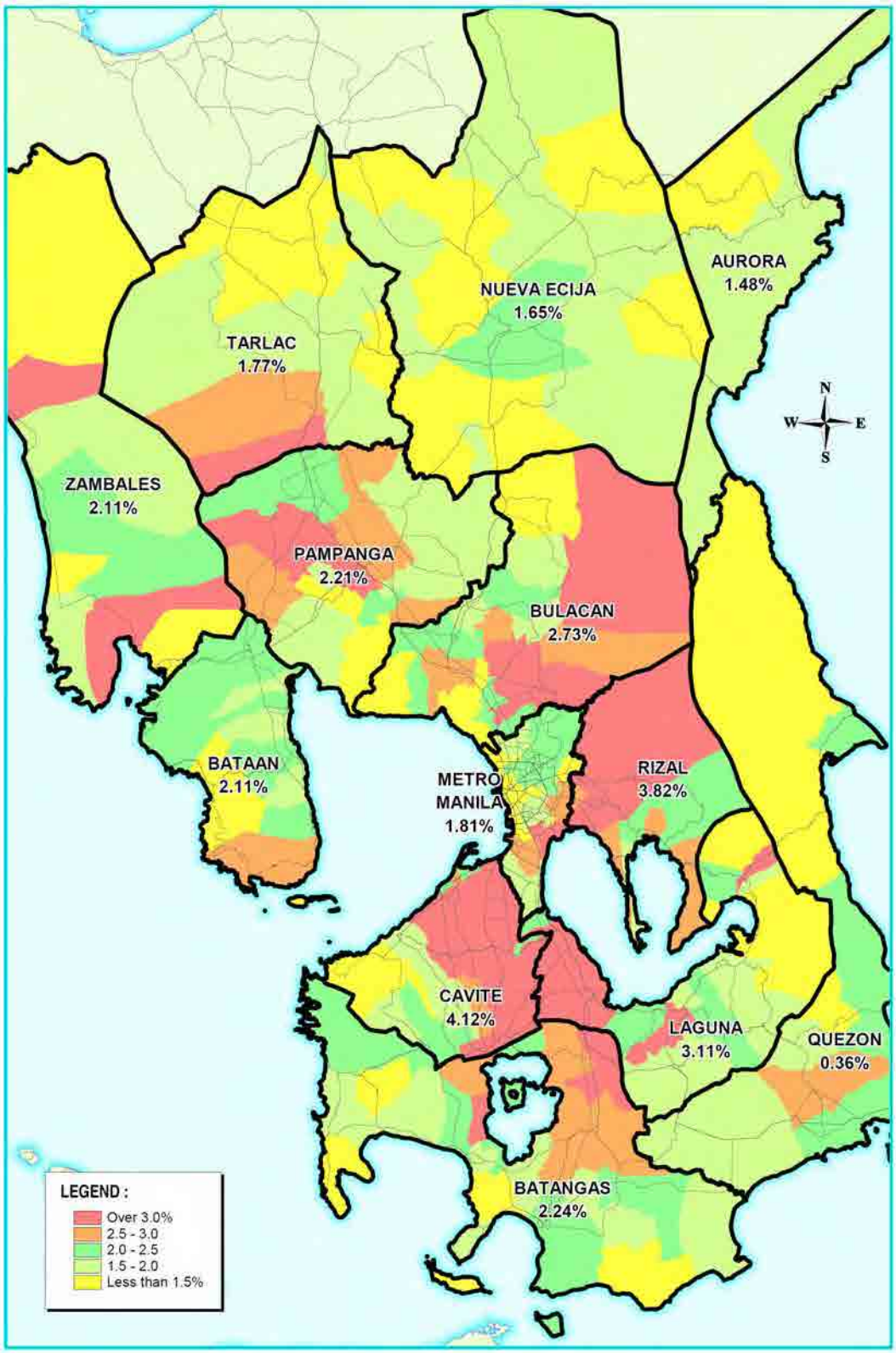
Source: NSO 2012

FIGURE 3.2-3 POPULATION DENSITY TREND IN METRO MANILA (YEARS 2000-2010)



Source: NSO 2012

FIGURE 3.2-4 POPULATION DENSITY TREND IN MEGA MANILA (YEARS 2000-2010)

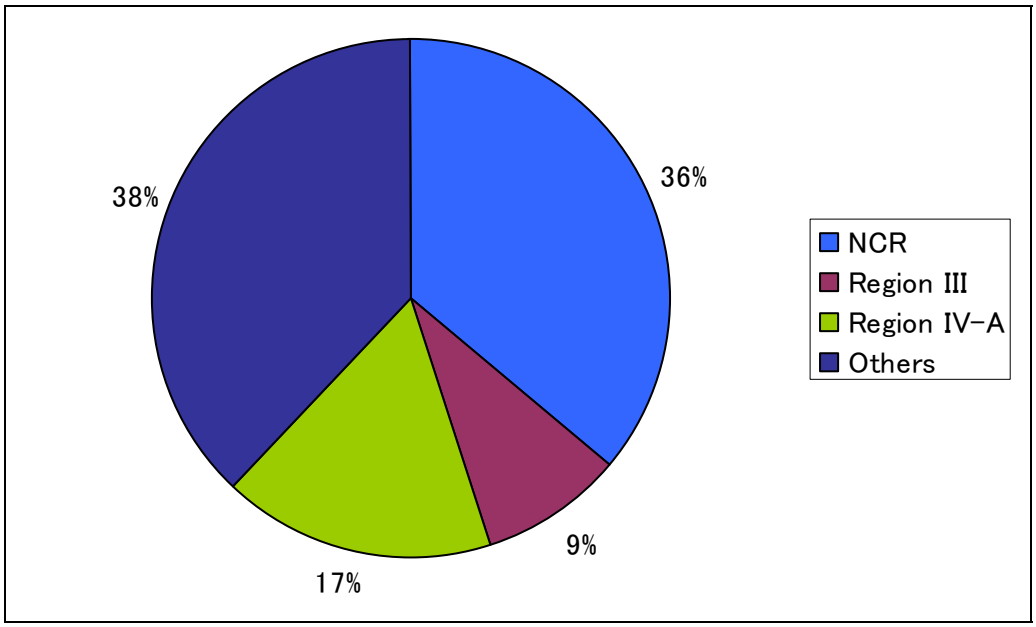


Source: NSO 2012

FIGURE 3.2-5 AVERAGE POPULATION GROWTH RATE (YEARS 2000-2010)

3.3 ECONOMIC TREND

Figure 3.3-1 ～ Figure 3.3-5 and **Table 3.3-1 ～ Table 3.3-6** shows the shares of GDP and GRDP of the Study Area.



Source: National Statistical Coordination Board (NSCB)

FIGURE 3.3-1 SHARE OF GDP (2011)

NCR

- NCR produces about 36% of the country's economic output.

- NCR's economic growth rate is almost the same as that of the country. Economic growth rate ranged from 3.5 to 7.6%.

- Industrial structure of NCR is as follows:

Primary Sector	- - - - - - - - - -	0%
Secondary Sector	- - - - - - - - - -	34%
Tertiary Sector	- - - - - - - - - -	66%

- The country's economy is highly depending upon the economic performance of NCR where economic activities are highly concentrating.

Region III

- Region III shares about 9% of the country's economic output.

- Region III's economic growth is higher than that of the country, ranging 7.5% to 10.7%.

- Region III's industrial structure is as follows;

  Primary Sector - - - - - - - - - - 24%
  Secondary Sector - - - - - - - - - - 36%
  Tertiary Sector - - - - - - - - - - 40%

- Since Region III is located close to Metro Manila and has the high potential areas of Subic and Clark, it is expected that the Region will achieve an economic growth rate higher than that of the country.

Region IV-A

- Region IV-A produces about 17% of the country's economic output.

- Industrial share of the Region is as follows;

  Primary Sector - - - - - - - - - - 18%
  Secondary Sector - - - - - - - - - - 40%
  Tertiary Sector - - - - - - - - - - 42%

TABLE 3.3-1 GDP AND GRDP GROWTH RATE

	Y2009 – Y2010	Y2010 – Y2011
NCR	7.6%	3.5%
Region III	10.7%	7.5%
Region IV-A	11.1%	2.6%
Philippines	7.6%	3.9%

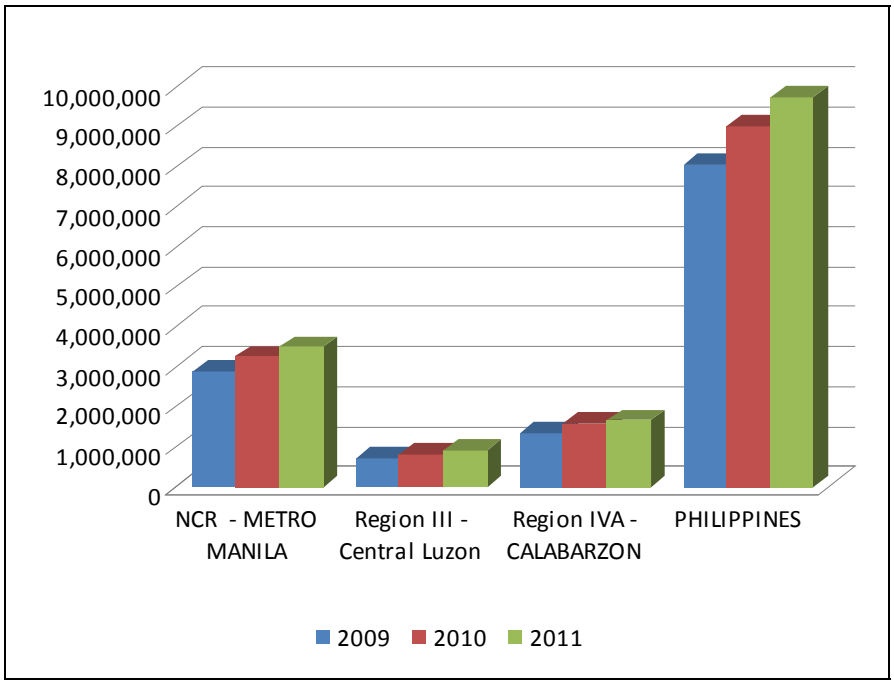
Source: NSCB

TABLE 3.3-2 GRDP IN CURRENT PRICES

Unit: In Million Pesos

	2009	2010	2011
NCR - METRO MANILA	2,871,470	3,236,353	**3,479,905**
Region III - Central Luzon	701,757	788,898	**882,806**
Region IV-A - CALABARZON	1,351,986	1,557,069	**1,644,843**
PHILIPPINES	**8,026,143**	**9,003,480**	**9,735,521**

Source: NSCB



Source: NSCB

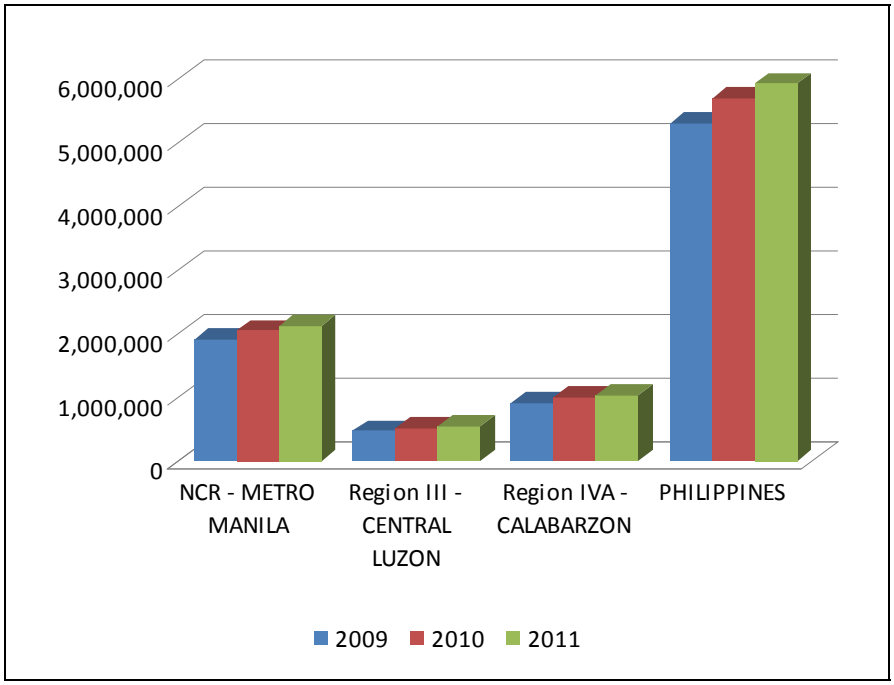
FIGURE 3.3-2 GRDP IN CURRENT PRICES

TABLE 3.3-3 GRDP IN CONSTANT (2000) PRICE

Unit: In Million Pesos

	2009	2010	2011
NCR - METRO MANILA	1,898,574	2,043,007	2,114,840
Region III - Central Luzon	464,403	514,244	552,769
Region IV-A - CALABARZON	903,911	1,004,315	1,030,165
PHILIPPINES	**5,297,240**	**5,701,539**	**5,924,409**

Source: NSCB



Source: NSCB

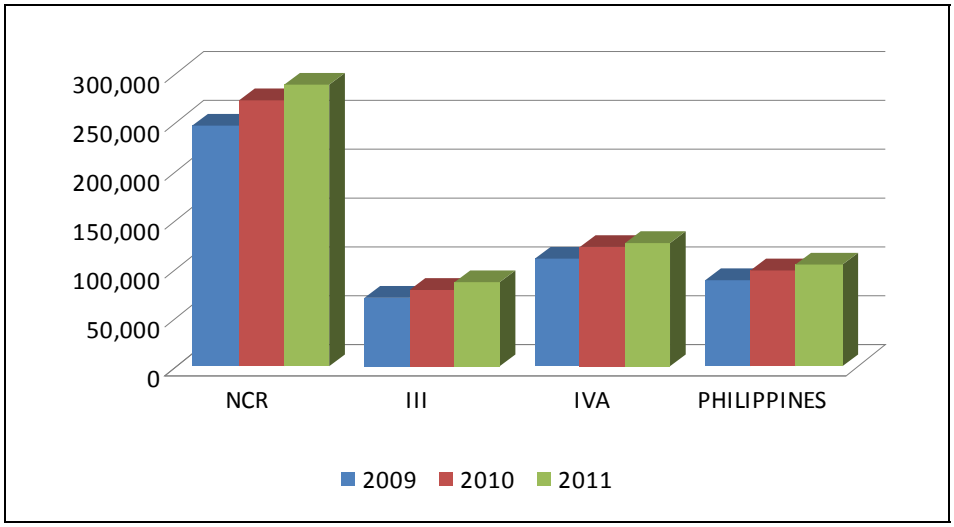
FIGURE 3.3-3 GRDP IN CONSTANT PRICES

TABLE 3.3-4 PER CAPITA GRDP AT CURRENT PRICES

Unit: In Pesos

	2009	2010	2011
NCR	245,500	272,227	288,062
Region III	70,335	77,569	85,186
Region IV-A	109,592	122,942	126,589
PHILIPPINES	**88,180**	**97,227**	**103,366**

Source: NSCB



Source: NSCB

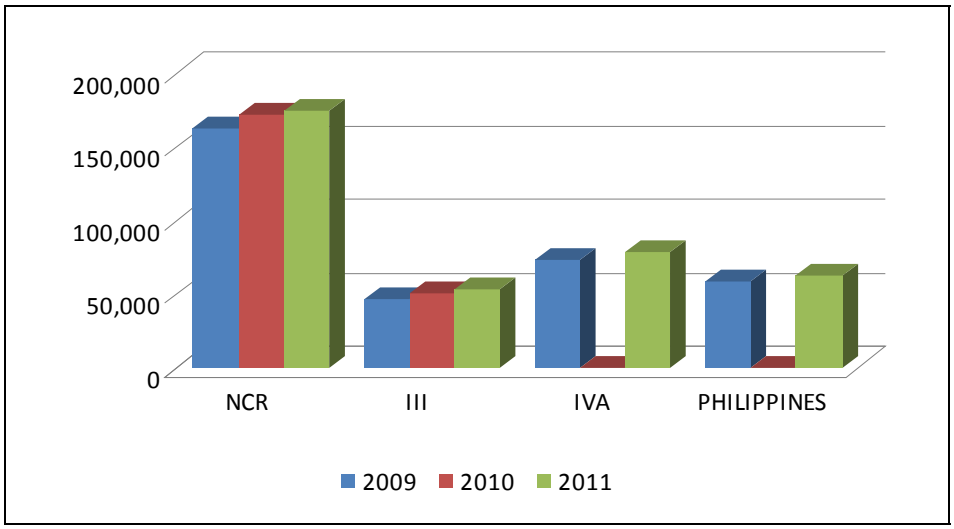
FIGURE 3.3-4 PER CAPITA GRDP AT CURRENT PRICES

TABLE 3.3-5 PER CAPITA GRDP AT CONSTANT (2000) PRICES

Unit: In Pesos

	2009	2010	2011
NCR	162,321	171,849	175,064
Region III	46,546	50,563	53,339
Region IV-A	73,271	79,298	79,283
PHILIPPINES	**58,199**	**61,570**	**62,902**

Source: NSCBd



Source: NSCB

FIGURE 3.3-5 PER CAPITA GRDP AT CONSTANT (2000) PRICES

TABLE 3.3-6 INDUSTRIAL STRUCTURE OF THE ECONOMY, 2008

	Primary	Secondary	Tertiary	Total
IN PERCENTAGE				
Philippines	18%	33%	49%	100%
NCR	0%	35%	65%	100%
Region III	24%	36%	40%	100%
Region IV-A	18%	40%	42%	100%

Source: NSO, 2007

3.4 TOURISM

The Department of Tourism is the Government agency responsible for the tourism business in the Philippines. It started to do the campaign called "It's more fun in the Philippines".

This is the summary of the tourism business in Metro Manila.

- Metro Manila accounted for 12% (2.9 million) of total country tourism arrivals (2010).
- Philippine direct employment: 778,000 jobs (2.1%).
- Philippine total employment: 3.55 Million jobs (9.6%).
- Significant growth opportunities
  - 2012 growth rate (contribution to GDP) expected to be highest (9.9%) in ASEAN, China and Australia.
- Regardless of final destination, 76.5% (2011) of tourist arrivals in country enter through Metro Manila.

Gambling Business

- Game development sector grew 13% in 2011, reaching $8 million in revenues and employing almost 1,400.
- Gambling industry in the Philippines is worth an estimated P100B/yr; illegal activities account for additional P50B/yr.
- 66% of gaming revenues comes from Metro Manila operations.
- Asia Pacific is expected to emerge as the world's leading region for casino gaming in the next 5 years, expanding to $80B in 2015
- Metro Manila can tap part of the Macau gaming market and grow to as much as $2

Gaming markets (2010)

Macau: $23.4B

Australia: $3.4B

Singapore: $2.8B

South Korea: $2.6B

Philippines: $0.5B

billion to $5 billion in size in the next five years. Mainland China will likely be the main market for local casinos; aside from Macau, Chinese only have the Philippines and Singapore as alternatives.

In the Study Area, there are such kinds of tourism potential.

Metro Manila and Environs

The Capital of the Philippines, its heart and soul, is Manila. It sets the archipelago's rhythm and is pulsating hub that blends the Oriental with the Occidental, the quaint with the modern, the day-to-day norm with the extraordinary.

At the heart of Manila's history is Intramuros. It features the grand Manila Cathedral with its detailed stone carvings and stained glass mosaics; Fort Santiago, the site of torture chambers and dungeons; and the favorite wedding spot, the San Agustin Church.

Metro Manila, made up of 16 cities and one town, is where the country's most prestigious business addresses and trendiest leisure establishments are found. Fashionable hotels, restaurants, discos, music bars, boutiques, and specialty shops converge around sleek Ayala and Ortigas Centers.

Aside from Manila, other major cities include Quezon City, also an entertainment hub as well as a government center; Marikina City, the shoe center of the Philippines; Paranaque City, known for its dry goods and seafood markets and restaurants; and Las Pinas City, which houses the world's only bamboo organ at St. Joseph's Parish Church.

Calabarzon, comprised of the five provinces of Cavite, Laguna, Batangas, Rizal, and Quezon, is only a few hours away from Manila. The area boosts of great destinations and leisure activities for day trips or overnight getaways as well as export processing centers.

Museums
The u-shaped government belt within Luneta features the National Museum, the Museum of Filipino People, and the Department of Tourism building, the future address of the Museum for Natural Sciences.

Tourist Belt
A stone's throw away from Rizal Park are the districts of Ermita and Malate, known as Manila's Tourist Belt. Ermita is antique and art galleries, curio, and souvenir shops, while Malate is cozy cafés, music lounges, and performance theaters.

Sunset Boulevard
Roxas Boulevard, which extends from Paranaque City to Manila, is the bay area from where one can have a view of the famed Manila Sunset. It is also lined with posh hotels, casinos, and lively nightspots. The Baywalk, a promenade along the boulevard, features bars and restaurants with nightly entertainment.

Food Trip
Metro Manila is one big gastronomic adventure. Fusion cuisine as well as authentic fare abounds in centers and hubs as well as alongside streets and off-the-beaten-track. To name a few, the Ilustrado Restaurant in Intramuros serves Spanish provincial cuisine; the Old Malate

district is a favorite Watering Hole; while authentic Chinese cuisine can be had at Binondo.

Taal Volcano
This enchanting volcano within a lake is the smallest in the world. Witness the splendor of the volcano with a panoramic view from the Tagaytay Ridge.

Source: http://www.philippinetourism.us

3.5 TELECOMMUNICATIN SERVICE

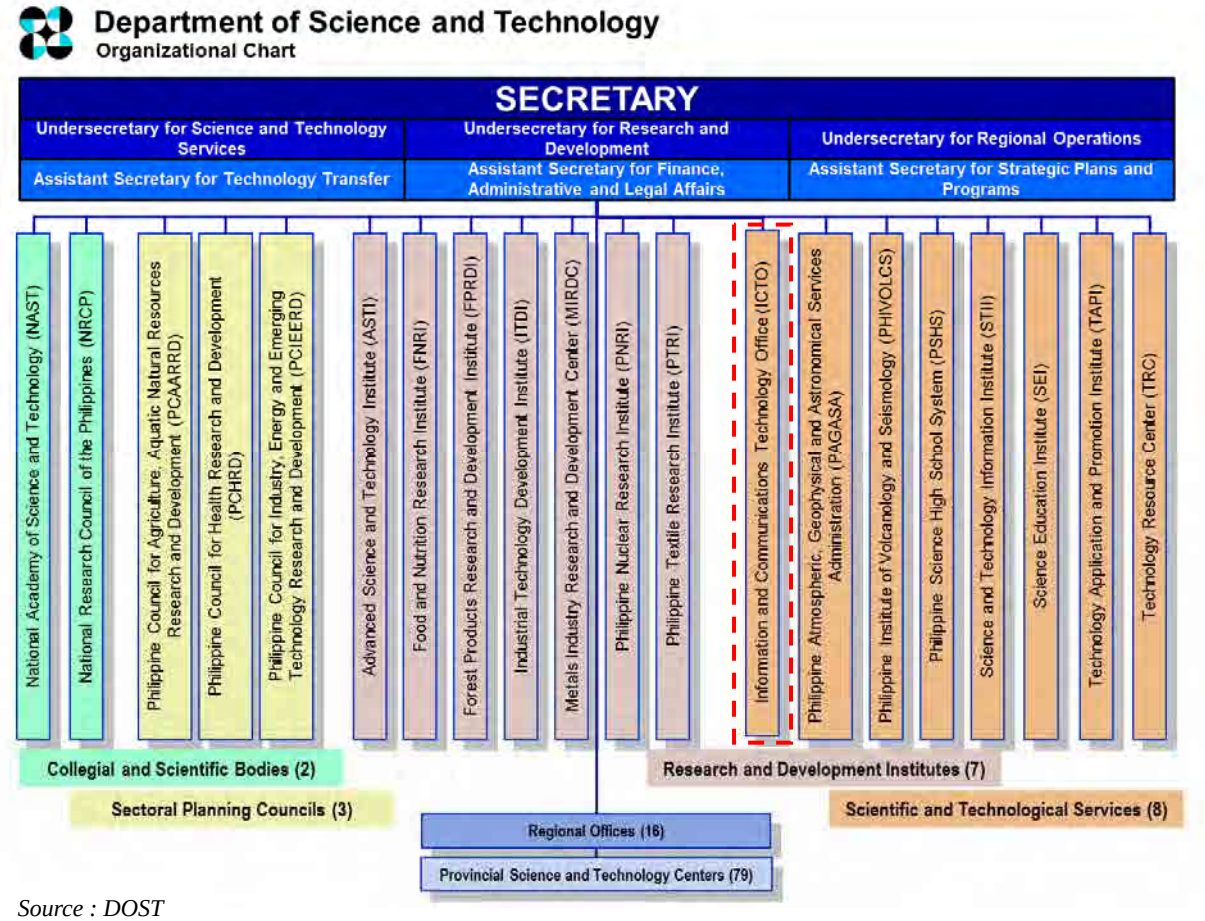
3.5.1 Related Government/Private Bodies

3.5.1.1 Government Bodies

(1) Department of Science and Technology (DOST)

The Department of Science and Technology (DOST) is the executive department of the Philippine Government responsible for the coordination of science and technology, related projects in the Philippines and the formulation of policies and projects in the fields of science and technology in support of national development.

As an organization towards the establishment of the Department of Information and Communications Technology, the Commission on Information and Communication Technology (CICT) was established in 2004 however, it was abolished in 2011. Then, CICT was reorganized into the Information and Communication Technology Office (ICTO) under DOST. ICTO has jurisdiction over the Information and Communication Technology field.



Source : DOST

FIGURE 3.5-1 ORGANIZATION CHART OF DOST

(2) National Telecommunications Commission (NTC)

The National Telecommunications Commission (NTC) is an agency of the Philippine Government under the Office of the President of the Philippines responsible for the supervision, adjudication and control over all telecommunications services throughout the Philippines. It was under CICT however, was transferred to under Office of President in July, 2011.

NTC has 5 departments, Legal Department, Telecommunications Planning and Development Department, Radio Regulation and Licensing Department, Common Carriers Authorization Department and Administrative and Finance Department.

For the ITS project, Telecommunication Planning and Development Department and Radio Regulation and Licensing Department are related especially.

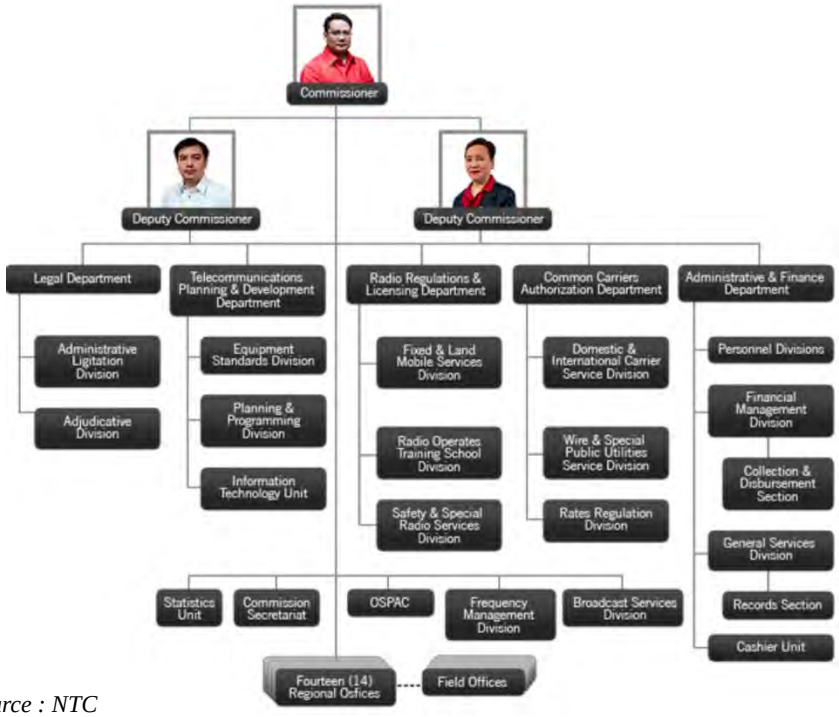
1) Telecommunications Planning and Development Department (TPDD)

TPDD shall be responsible for providing the Commission with economical, efficient and effective service relating to planning, programming and project development. It shall attend to the development of an effective radio frequency spectrum management program and shall provide technical service for the formulation of standards for the regulation and authorization of

telecommunications systems or services, stations, operations, and equipment.

2) Radio Regulations and Licensing Department (RRLD)

RRLD shall assume the functions relative to the implementation of issued Certificates of Public Convenience and Necessity, registration of radio transmitter/transceiver equipment, licensing of all radio stations, issuance of Safety Radiotelegraphy/Radiotelephony Certificates for ocean-going vessels or ships, recognition of radio training schools and the examination and licensing of radio operators.



Source : NTC

FIGURE 3.5-2 ORGANIZATION CHART OF NCT

3.5.1.2 Private Bodies

The Philippines telecommunication services have historically been operated by private companies as in few other countries on the world. In the past, there were some companies that provided Fixed-line and Mobile Services. However, the restructuring of companies has progressed due to alignment and amalgamation. At present, there are two influential groups, namely, PLDT and Globe.

In addition, there are some independent companies for Broadband Service, Internet service and Internet calling services, such as Bayan Telecommunication Inc, Eastern Communication, Liberty Telecom (W-tribe), etc.

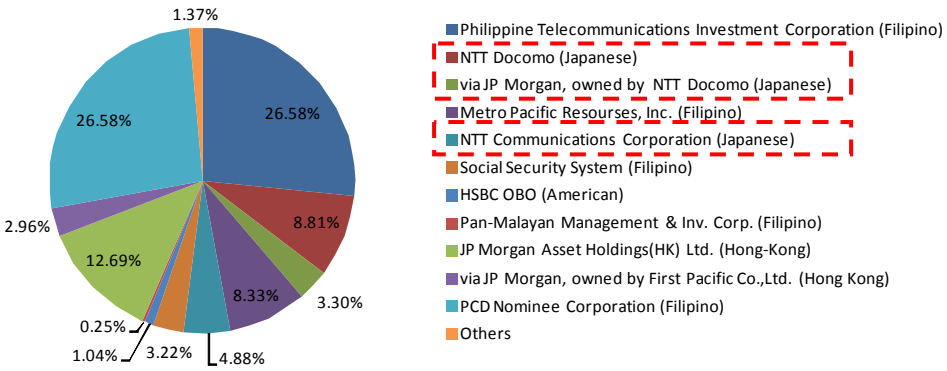
(1) Philippine Long Distance Telephone Company (PLDT)

PLDT is the original and leading telecommunications provider in the Philippines. PLDT was nationalized by the Government in 1981, becoming the country's telephone monopoly. However in 1986, after President Marcos was overthrown, the company was re-privatized.

Fixed line service is managed by PLDT, while mobile and wireless service is managed by SMART Communications and Digitel. PLDT is the largest telecommunications conglomerate, consisting of following companies,

- **Smart Communications** : Mobile telecommunication service provider
- **PLDT Communications and Energy Ventures Inc.** : The electricity distribution industry
  (It was Pilipino Telephone Corporation (Piltel), a subsidiary of PLDT from 2008)
- **ACeS Philippines** : Satellite telecommunications service provider
- **Digitel** : Fixed-line service provider (it is a subsidiary of PLDT from 2011)
- **Sun Cellular** : Mobile telecommunication service provider (it is a subsidiary of PLDT from 2011)
- **ePLDT Ventus** : Telecommunications solutions provider
- **SPi Technologies** : Knowledge process outsourcing (KPO) and customer relationship management (CRM) service provider
- **MediaQuest Holdings, Inc**. : The Beneficial Trust Fund for Associated Broadcasting Company (TV5), Nation Broadcasting Corporation (NBC) and Cignal Digital TV (Cignal), etc.

In addition, the stockholders of PLDT are PTIC (Filipino): 26.58%, NTT Docomo (Japan): 8.81% + 3.30% = 12.11%, Metro Pacific (Filipino): 8.33%, NTT Com. (Japan): 8.33%. Approximately 21% is shared by NTT Group. Therefore, two Japanese are members of the Board of Directors of PLDT.



Source : PLDT Annual Report

FIGURE 3.5-3 STOCKHOLDERS OF PLDT

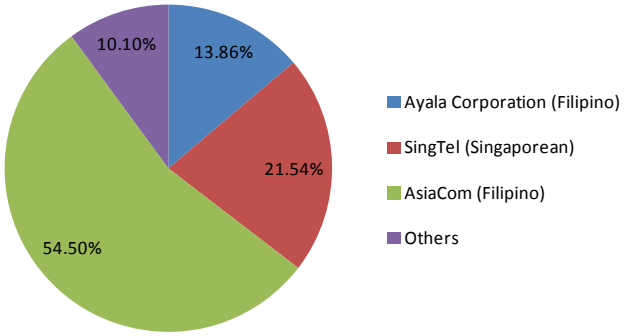
(2) SMART Communications

Smart Communications is the Mobile phone and Internet service subsidiary of the Philippine Long Distance Telephone Company (PLDT). It provides GSM, W-CDMA service to 47.6 million subscribers. Also, it started LTE service on August 25, 2012, with a maximum traffic speed of 42 Mbps.

(3) Globe Telecom

Globe Telecom is a Mobile phone and Internet service provider. It is providing GSM, W-CDMA service to 30.1 million subscribers. Also, WiMAX service is provided, with a maximum traffic speed of 2 Mbps. Globe Telecom is the main competitor of PLDT. It consists of following companies,

- **Innove Communications Inc.** : Fixed line telecommunications and broadband services, high-speed internet and private data networks for enterprise clients
- **G-Xchange, Inc.** : Mobile commerce services under the G-CASH brand
- **Entertainment Gateway Group Corporation** : Digital media content and applications
- **GTI Business Holdings, Inc.** : Investment company with authority to provide VoIP services
- **BPI Globe BanKO Inc.** : Mobile-based banking services in the Philippines to micro-finance institutions and retail clients



Source : Globe Annual Report

FIGURE 3.5-4 STOCKHOLDER OF GLOBE

(4) Bayan Telecommunications

Bayan Telecommunication (BayanTel) is a provider of telecommunications and communications line services, such as dedicated domestic and international leased lines, frame relay services, Internet access, and other managed data services like Digital Subscriber Lines (DSL).

3.5.2 Related policy of communication infrastructure

(1) Medium-Term Philippine Development Plan (MTPDP)

The Medium-Term Philippine Development Plan MTPDP provides "Cost Efficient Communication Connection" as a policy objective of digital infrastructure. Based on the MTPDP, the Department of Transportation and Communication (DOTC) announced in 2007 a plan to establish a National Broadband Network (NBN) between the national government and local government units. However, the NBN plan was shelved, and a Government Broadband Network (GBN) was presented in its stead. The GBN contains the form of the backbone, WiMAX, core network, data center, etc.

In addition, the National Telecommunication Commission (NTC) has announced a plan for universal access to Broadband for all local government units in 2009.

(2) The Philippine Digital Strategy

The Philippine Digital Strategy is offering “Internet Opportunities for All People” as a policy objective of digital infrastructure. According to the Digital Strategy, the targets for “Internet Opportunities for All People” include the following:

- Average prices for basic broadband Internet reduced by at least 5% annually.
- Investment in infrastructure expansion, especially into rural areas, increased by at 10% annually.
- 80% of households have access to 2Mbps.

TABLE 3.5-1 TARGETS: INTERNET OPPORTUNITIES FOR ALL PEOPLE (DIGITAL STRATEGY:CICT)

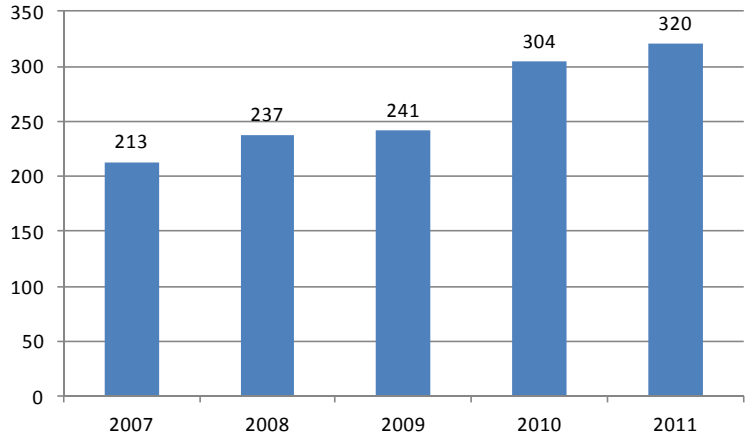
Improved, cost-efficient service delivery, network infrastructure expansion & upgrades	BASIC BROADBAND INTERNET			Secure, reliable ICT infrastructure & online safety
	Barangays	Schools & other public institutions	Consumers	
Herfindahl-Hirschmann Index lowered to below 3500 (around 20% reduction) Average prices for basic broadband Internet reducing at least 5% annually Investment in infrastructure expansion, especially into rural areas, increased by at least 10% annually	80% of barangays have Internet through CeC (2 Mbps), incl. awareness campaigns & training	100% of high schools & 80% of elementary schools (2 Mbps) 80% of other public institutions 100% of govt. offices	All central business districts have available download speeds of 20 Mbps 80% of households have access to 2 Mbps	Online consumer protection established Data security and data privacy regulations in place and enforced Cybercrime laws in place; police has special cybercrime task force Measures & procedures in place to protect vital ICT infrastructure
Objectives that are supported through the achievements of the targets				
Competitiveness	Digital literacy	Digital literacy	Competitiveness	Safety & security
Digital inclusion	Digital inclusion	Digital inclusion	Internet speed	Data privacy
Affordability	Affordability	Competitiveness	Digital inclusion	

Source : The Philippine Digital Strategy (CICT)

3.5.3 Internet Service Provider

Internet Service Providers (ISP) number approximately 320 in 2011. The largest ISP is PLDT/SMART, with 643,048 fixed line broadband subscribers using PLDT, and 1,377,956 wireless broadband subscribers using SMART. Also, fixed 289,000 line broadband subscribers and 1,122,000 wireless broadband subscribers are using Globe.

PLDT, BayanTel, Globe Telecom and Eastern Telecom offer DSL for broadband, and the number of WiFi spots is on the increase at shops such as Internet cafes, shopping malls, restaurants, etc. FTTH is not common at this time. However, Wireless broadband is offered by PLDT, Globe, and other firms through services such as WiMAX and LTE.



Source : NTC Annual Report (2011)

FIGURE 3.5-5 NUMBER OF ISPS (2007-2011)

TABLE 3.5-2 NUMBER OF ISPS AND NUMBER OF SUBSCRIBER (2011)

YEAR	No. of NTC Registered ISPs	Estimated No. of Subscribers
2007	213	2,500,000
2008	237	3,000,000
2009	241	3,600,000
2010	304	4,320,000
2011	320	5,184,000

* ISPs Registered with the Central Office

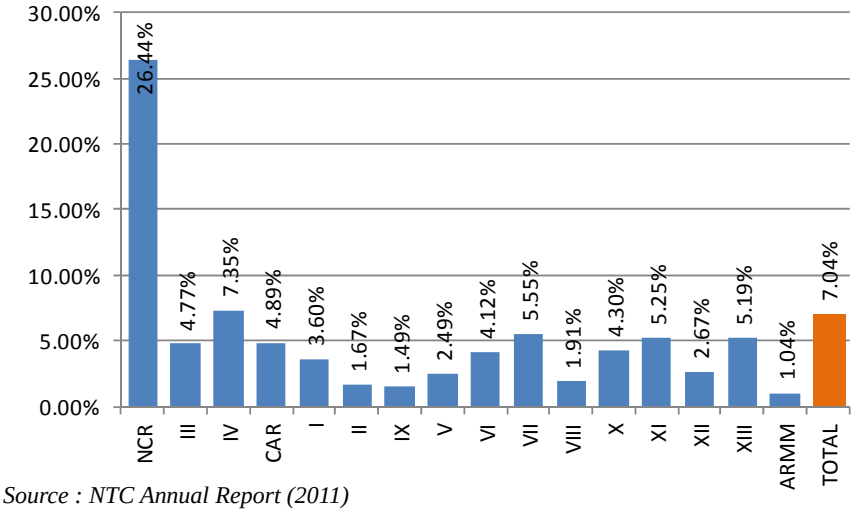
Source : NTC Annual Report (2011)

3.5.4 Fixed line Service Provider

The penetration rate of Fixed-line is low due to geographical conditions, particularly since the Philippines consists of numerous islands. The penetration rate of Fixed line in the Philippines is 7.04 in 100 inhabitants. It is 26.44 in NCR, 4.77 in Region III and 7.35 in Region IV-A.

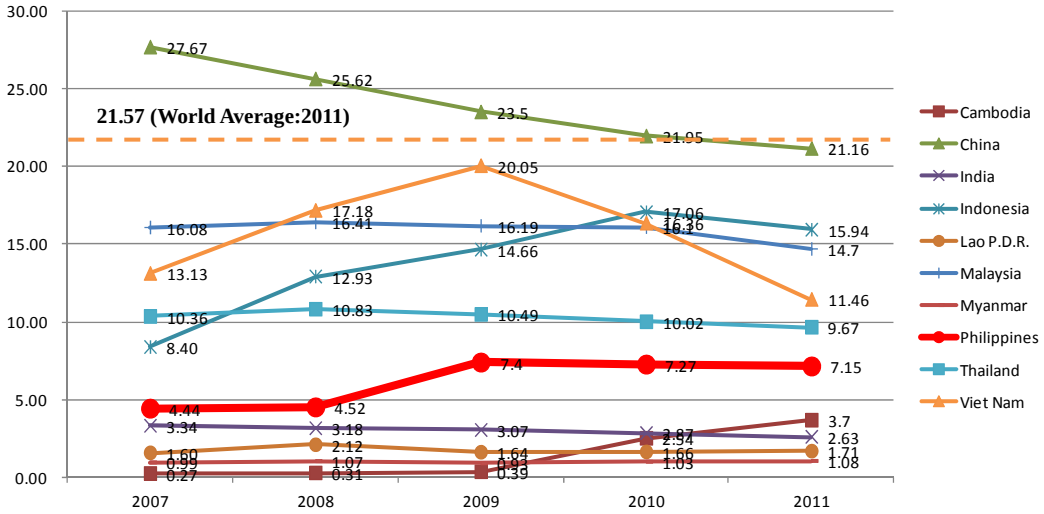
In comparison to other Asian countries, the penetration rate in the Philippines is higher than those of India and Cambodia, but, lower than those of Thailand and Vietnam. However, it is still low, being less than the world average.

In the market share of fixed line, PLDT has the largest share at 49.23%, while DIGITEL (subsidiary of PLDT): 8.74%. The second largest market share is registered by INNOVE which is a subsidiary of Globe Telecom.



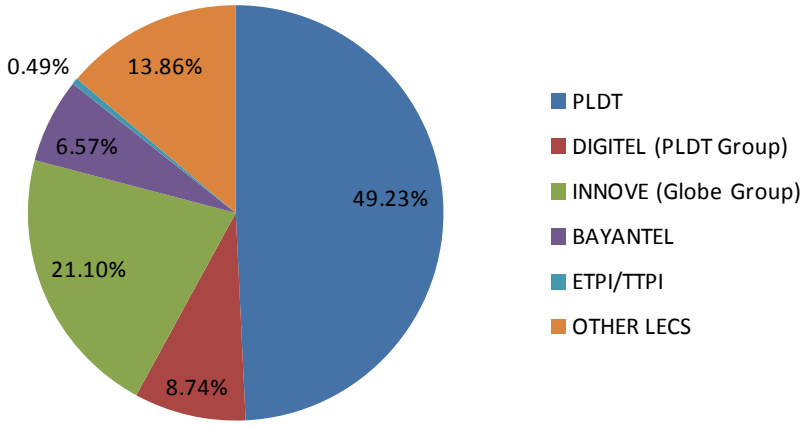
Source : NTC Annual Report (2011)

FIGURE 3.5-6 PENETRATION RATE OF FIXED LINE BY REGION



Source : ITU data

FIGURE 3.5-7 FIXED LINE SUBSCRIPTIONS PER 100 INHABITANTS BY COUNTRIES (2007-2011)



Source : NTC Annual Report (2011)

FIGURE 3.5-8 MARKET SHARE OF TELEPHONE (INSTALLED)

TABLE 3.5-3 NUMBER OF TELEPHONE INSTALLED AND SUBSCRIBER (2011)

Company	Line		Market share	
	Installed	Subscribed	Installed	Subscribed
PLDT	3,324,791	1,803,067	49.23%	50.71%
DIGITEL (PLDT Group)	590,265	196,296	8.74%	5.52%
INNOVE (Globe Group)	1,425,234	420,933	21.10%	11.84%
BAYANTEL	443,910	379,724	6.57%	10.68%
ETPI/TTPI	33,320	16,529	0.49%	0.46%
OTHER LECS	936,176	739,402	13.86%	20.79%
	6,573,696	**3,555,951**	**100.00%**	**100.00%**

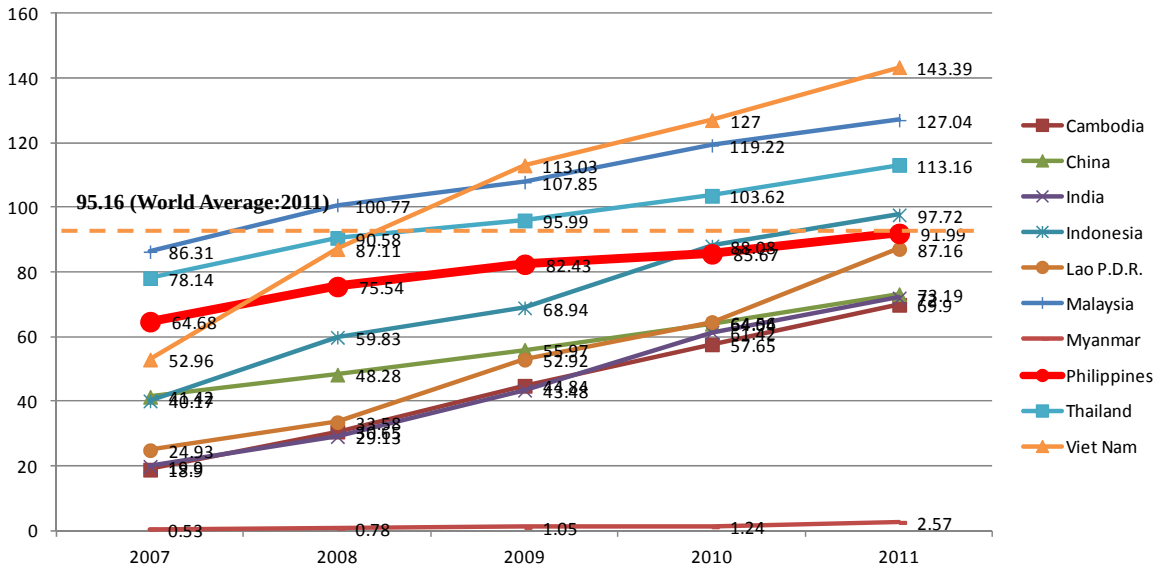
Source : NTC Annual Report (2011)

3.5.5 Mobile Line Service Provider

The penetration rate of Mobile line is higher than that of fixed line. It is 91.99 per 100 inhabitants in 2011. This situation is the same in all countries, especially developing countries.

Compared to other Asian countries, the Philippines has a Mobile line penetration rate which is higher than those of Lao P.D.R., China and India, but lower than those of Thailand, Indonesia and Vietnam. However, its penetration rate is still low, being less than the world average.

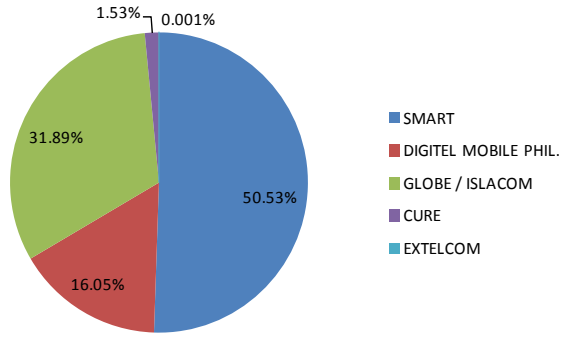
In the market share of Mobile line, the PLDT Group has the largest share, occupying the majority of the shares, with SMART: 50.53% and DIGITEL: 16.05% (subsidiary of PLDT). The second largest share is that of Globe at 31.89%.



Source : ITU data

FIGURE 3.5-9 MOBILE LINE (SIM) SUBSCRIPTIONS PER 100 INHABITANTS BY COUNTRIES (2007-2011)

TABLE 3.5-4 MARKET SHARE AND NUMBER OF MOBILE TELEPHONE SUBSCRIBER (2011)



Source : NTC Annual Report (2011)

Company	Subscriber	Share
SMART (PLDT Group)	47,590,797	50.53%
DIGITEL (PLDT Group)	15,119,241	16.05%
Globe (Globe Group)	30,040,000	31.89%
CURE	1,438,647	1.53%
EXTELCOM	1,110	0.001%
	83,150,138	**100.00%**

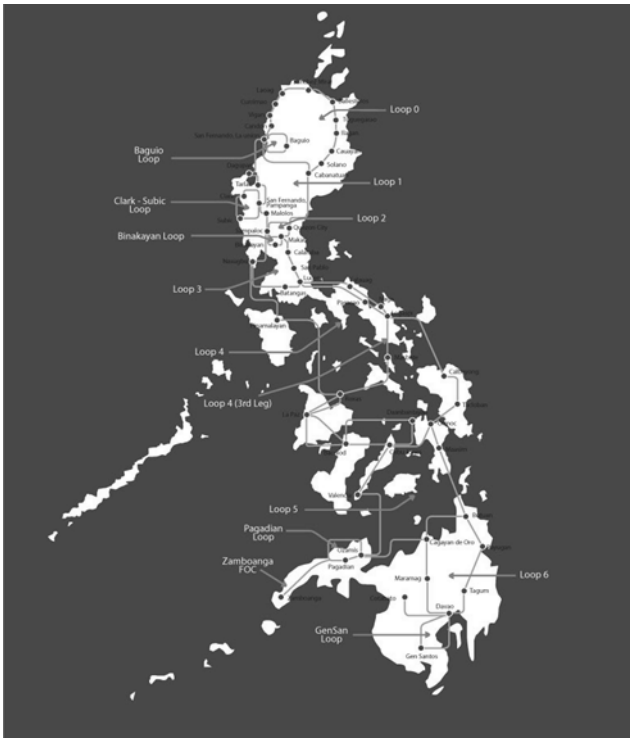
3.5.6 Backbone Network

A high-capacity fiber-backbone network is particularly important for broadband access to the internet. In 2009, 38 provinces had two competing fiber-backbone networks, 25 provinces had at least one fiber-backbone network, and 17 provinces had no fiber-backbone network. (see figure below)

The Philippine Long Distance Telephone Company (PLDT) is implementing multiple redundancy enhancement plans for its 10,000-kilometer domestic fiber optic network to meet increasing demand for improved resiliency and capacity of the off-shoring and outsourcing industry in several key regions in Luzon and Mindanao.

PLDT has also earlier announced the completion of a new undersea and inland cable that provides the third resilient route between Visayas and Luzon.

PLDT's Internet gateway, which is connected to multiple international cable routes, will also see improvement, bringing a total of 250 G-bps in total capacity.



Source : Digital Strategy (CICT)

Source : PLDT

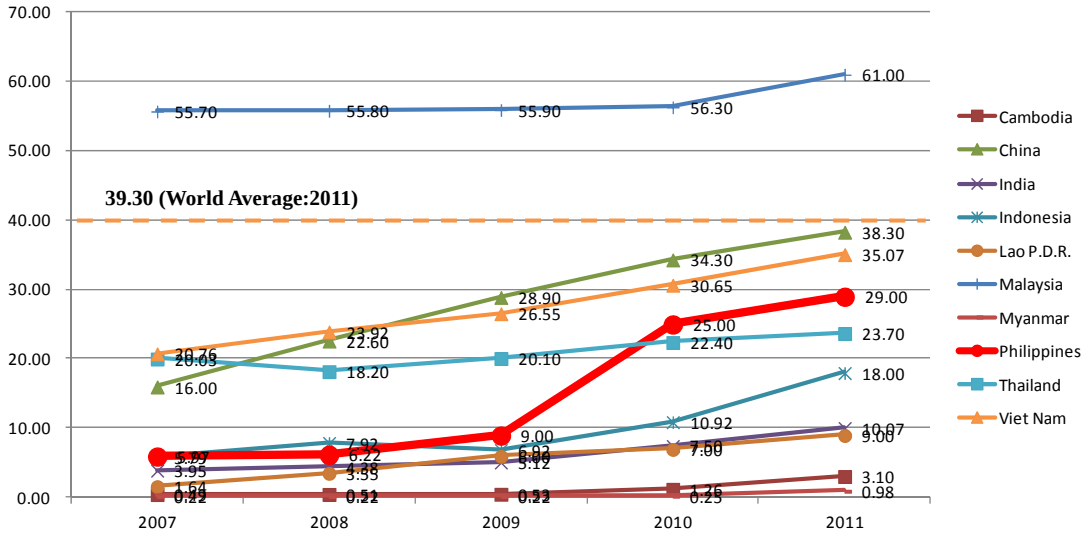
FIGURE 3.5-10 FIBER BACKBONE NETWORK (LEFT: PRESENT, RIGHT: PLDT'S PLAN)

3.5.7 Mobile Phone Coverage

The Philippines has a mobile subscriber penetration rate of 91.99 per 100 inhabitants in 2011. So, nearly all Filipinos can access the mobile network by using their own phones, or by borrowing from family members or friends. However, there remain some coverage gaps. According to the Digital Strategy (CICT), in the case of the 2010 national elections, out of 1,634 cities and municipalities, 86 or 5.26% were not covered by any mobile network. And in only 76% of polling precincts the mobile networks had sufficient data transmission capacity to transmit the election data using mobile phones.

3.5.8 Popularization of Internet

The penetration of Internet use is 29.00 per 100 inhabitants in the Philippines. This is higher than the rate in Thailand, Indonesia, and India; however, it is lower than that of Vietnam and the world average. For internet connection, there are some ways such as fixed line, mobile line, and WiFi spot. It is estimated that the cost of the internet connection in the Philippines is considerably higher than those of developed countries (see Section 3.5.10). Therefore, most of the internet users connect to the internet at WiFi Spots such as Internet Café.

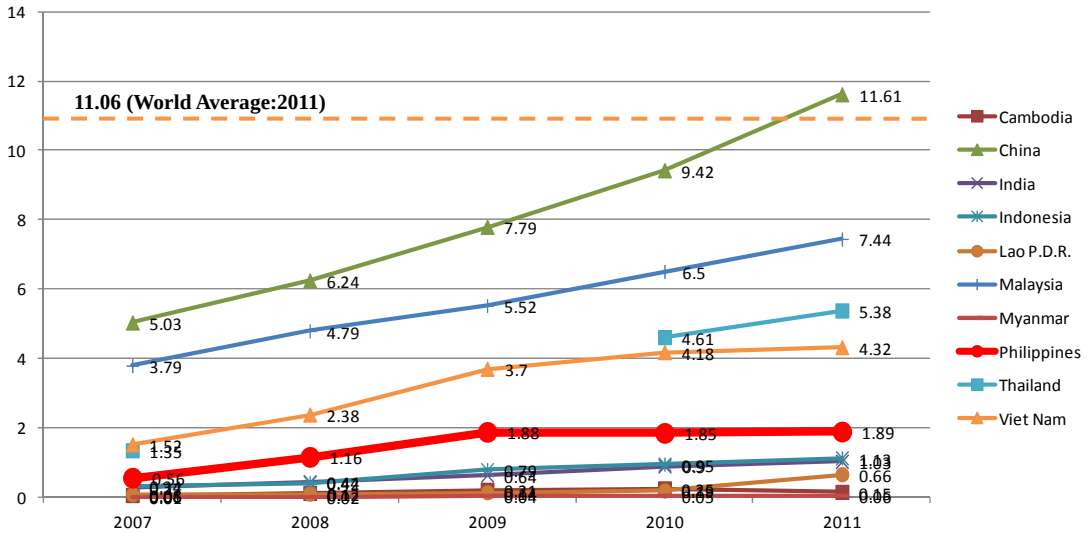


Source : ITU data

FIGURE 3.5-11 PERCENTAGE OF INDIVIDUALS USING THE INTERNET BY COUNTRIES (2007-2011)

3.5.9 Popularization of Broadband Network

The penetration of broadband use is 1.89 per 100 inhabitants in Philippines. This is higher than India, Indonesia; however, it is still lower than the world average.



Source : ITU data

FIGURE 3.5-12 BROADBAND (FIXED) SUBSCRIPTIONS 100 INHABITANT BY COUNTRIES (2007-2011)

3.5.10 Cost of Internet connection

The minimum fixed line cost in the Philippines is Php 999 with 1.5Mbps. It is provided by

PLDT. In case of 3.0Mbps, the cost is Php1,995. By comparison, in Japan, the minimum fixed line cost is Php1,570 with 47Mbps. It is a little bit more expensive than PLDT's 1.5Mbps service, but the speed is approximately 30 times faster.

Also, the minimum mobile line cost in the Philippines is Php899, but most of the service is provided from Php899 to Php999. SMART is beginning the LTE service, costing Php3,500 with 42Mbps. In Japan, the minimum mobile line service is Php1,591 with WiMAX (40Mbps). The speed is almost the same; however, the cost in the Philippines is two times more than in Japan.

The cost of Internet connection is very expensive in most of the developing countries, compared with developed countries. This condition is an important issue for penetration of internet usage.

TABLE 3.5-5 COST OF FIXED LINE (ADSL)

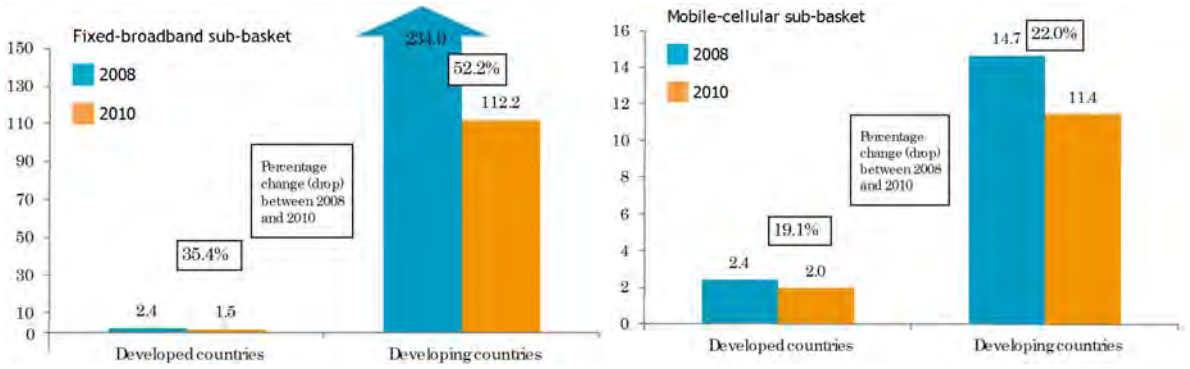
	Price : Month (Php)	
	1.5Mbps	3.0Mbps
PLDT	999	1,995
BayanTel	1,499	2,499

TABLE 3.5-6 COST OF MOBILE LINE

	Price : Month (Php)			
	3G	WiMAX (1Mbps)	4G (2.0Mbps)	LTE (42Mbps)
SMART	999	999	-	3,500
GLOBE	999	999	-	-
DIGITEL/SUN	899	-	-	-
WiTribe	998	-	998	-

TABLE 3.5-7 COST OF FIXED AND MOBILE IN JAPAN

Line type	Type	Price : Month		Speed (Mbps)
		Yen	Php	
Fixed line	ADSL	2,940	1,570	47
	FTTH	2,993	1,598	200
Mobile line	3G	5,680	3.033	14
	WiMAX	2,980	1,591	40
	LTE	4,935	2,635	75



Source : ICT Facts and Figures (ITU)

FIGURE 3.5-13 COMPARISON OF FIXED BROADBAND COST AND MOBILE LINE COST

3.6 ECONOMIC ZONES AND IT ECO-ZONES

3.6.1 Philippine Economic Zone Authority (PEZA)

The Philippine Economic Zone Authority (PEZA) is an investment promotion agency and a Government-owned corporation. It is a component of the Department of Trade and Industry. PEZA grants fiscal and non-fiscal incentives to developers of economic zones, export producers, and IT service exporters. It also offers locations ready for occupation to foreign investors, most of whom are export producers or IT service exporters in world class and environment friendly Economic Zones and IT parks or buildings.

3.6.2 Economic Zones and IT Eco-zones

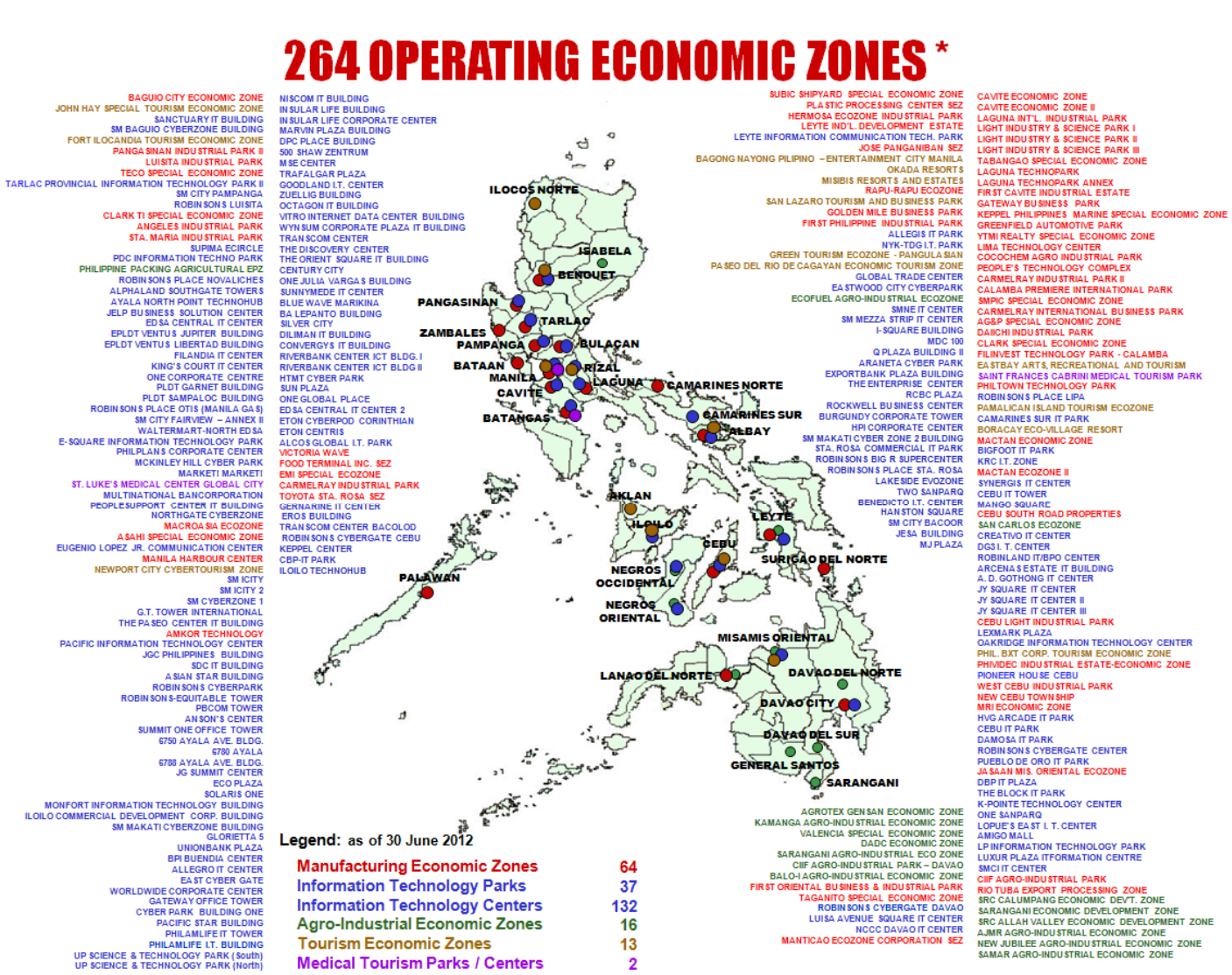
Philippine Economic Zones (Ecozones) are collections of industries, brought together geographically for the purpose of promoting economic development. Although designed to operate separately from the political and economic milieu of surrounding communities, Philippine economic zones do in fact interact with their neighbors.

There are 264 economic zones; 260 of them are private-owned economic zones and 4 of them are Government economic zones in the Philippines. The Government ecozones are Cavite Economic Zone, Bataan Economic Zone, Mactan Economic Zone and Baguio City Economic Zone. Thus, ecozones are useful for the economic growth of the country.

TABLE 3.6-1 NUMBER OF ECONOMIC ZONES (MAY, 2012)

Type of Economic Zone	Number of Zones
Economic Zone	264
IT Eco-zones	169
NCR	106
Region 3	5
Region 4	8
Total (Scope area)	119
Other	50
Other Eco-zones	95
NCR	11
Region 3	9
Region 4	35
Total (Scope area)	55
Other	40

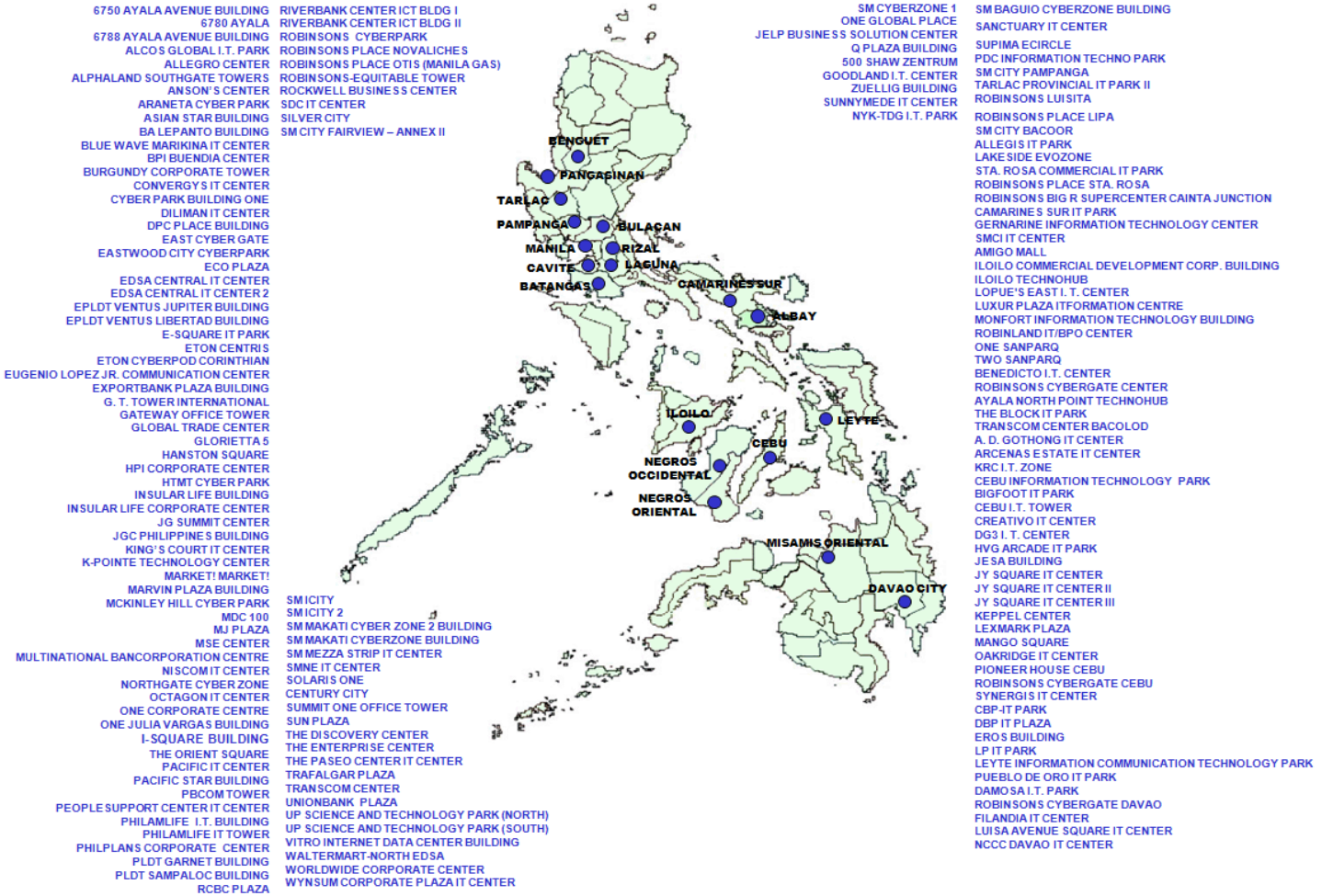
Source : PEZA



Source: PEZA

FIGURE 3.6-1 OPERATING ECONOMIC ZONE (INCLUDED IT PARK/IT CENTER)

169 INFORMATION TECHNOLOGY PARKS/CENTERS



Source: PEZA

FIGURE 3.6-2 OPERATING IT PARK AND IT CENTER

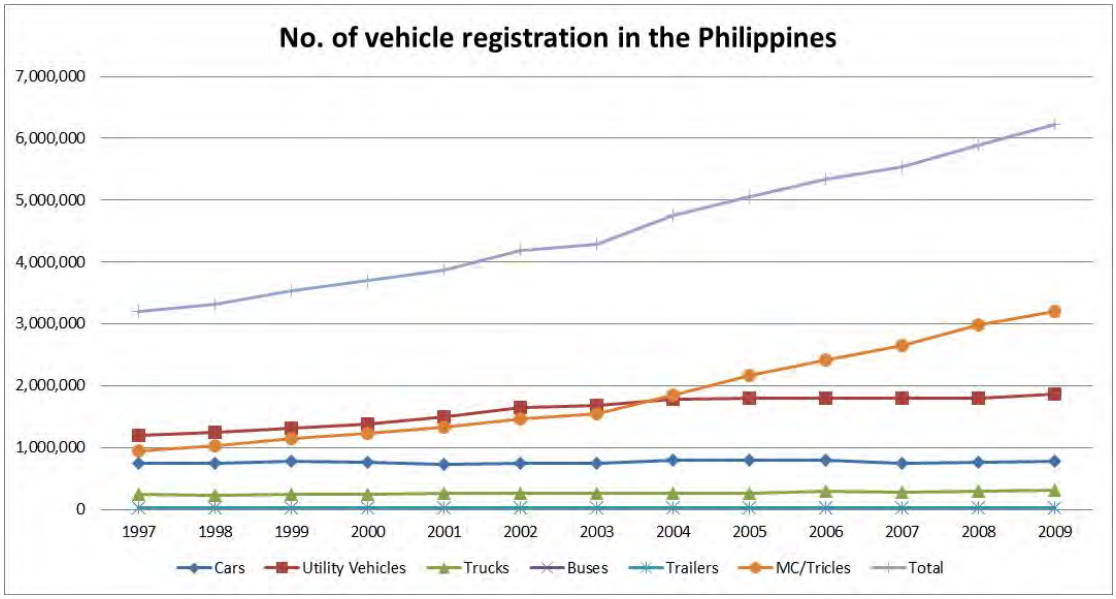
3.7 MOTORIZATION

In the whole country, the total number of vehicles was 6,222,422 in 2009, including 3,200,968 motorcycles and tricycles shown in **Table 3.7-1** and **Figure 3.7-1**. Since year 2004, the number of motorcycles and tricycles has increased. The share of motorcycles and tricycles was 51% in year 2009.

TABLE 3.7-1 NUMBER OF REGISTARAION VEHICLE IN THE PHILIPPINES, '97-'09

year	Cars	Utility Vehicles	Trucks	Buses	Trailers	MC/Tricycle	Total(exc. MC/ Trcyle)	Grand Total
1997	743,299	1,191,392	242,842	31,950	32,022	952,044	2,241,505	3,195,546
1998	749,204	1,244,019	231,342	31,806	27,852	1,032,594	2,284,223	3,318,815
1999	773,835	1,310,865	243,443	33,193	27,730	1,144,666	2,389,066	3,535,731
2000	766,948	1,388,117	248,369	33,886	26,612	1,236,241	2,463,932	3,702,173
2001	729,350	1,489,266	253,596	31,686	23,701	1,338,263	2,527,599	3,867,863
2002	749,553	1,652,314	257,774	33,915	23,734	1,470,383	2,717,290	4,189,675
2003	742,665	1,686,317	255,509	31,349	23,853	1,552,579	2,739,693	4,294,275
2004	798,160	1,788,971	267,977	35,003	23,121	1,847,361	2,913,232	4,762,597
2005	788,408	1,791,794	266,915	30,977	23,922	2,157,737	2,902,016	5,061,758
2006	792,373	1,790,895	285,901	29,144	23,898	2,409,363	2,922,211	5,333,580
2007	751,092	1,795,610	281,261	30,159	24,356	2,647,574	2,882,478	5,532,059
2008	761,919	1,793,659	296,276	29,645	27,162	2,982,511	2,908,661	5,893,180
2009	780,252	1,865,858	311,582	33,033	28,740	3,200,968	3,019,465	6,222,442
	13%	30%	5%	1%	0%	51%		100%

Source: NSO 2011



Source: NSO 2011

FIGURE 3.7-1 VEHICLE REGISTARAION TREND IN THE PHILIPPINES

In the Study Area, total number of vehicles in the NCR was 1,768,033 in 2009. The share of the NCR was 28%.

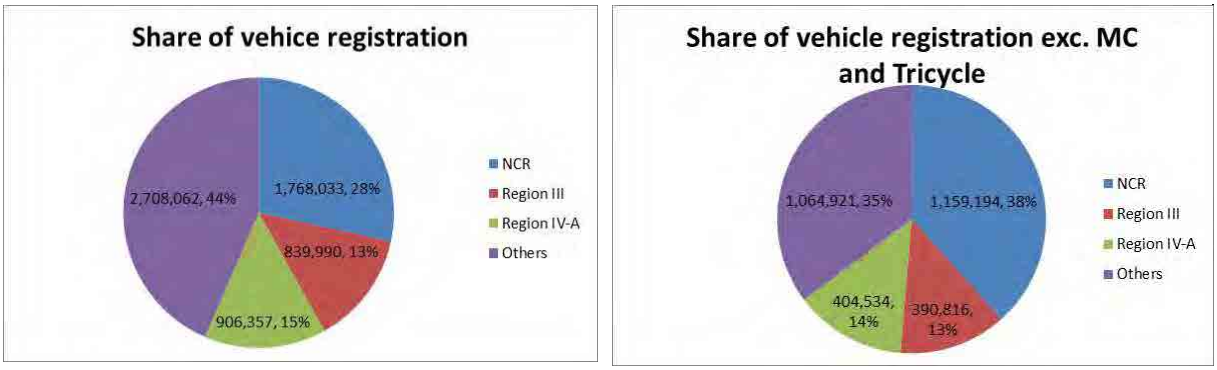
If the number of motorcycles and tricycles are excluded, the share of the NCR would be 38% as shown in **Figure 3.7-2**.

The growth rate of vehicle registration in Region III and Region IV-A is much higher than that of the NCR.

TABLE 3.7-2 NUMBER OF REGISTARAION VEHICLE IN THE STUDY AREA

	Year	Cars	Utility Vehicles	Trucks	Buses	Trailers	MC/ Tricycle	Total(exc. MC/ T)		Grand Total	
									AAGR		AAGR
NCR	2006	442,710	627,192	66,297	8,257	11,678	399,040	1,156,134		1,555,174	
	2007	413,248	645,484	59,203	9,961	11,565	452,575	1,139,461	-1.4%	1,592,036	2.4%
	2008	423,759	638,229	61,336	9,521	12,223	525,082	1,145,068	0.5%	1,670,150	4.9%
	2009	415,568	648,894	68,119	12,319	14,294	608,839	1,159,194	1.2%	1,768,033	5.9%
Reg. III	2006	71,360	254,828	37,383	4,035	3,225	319,580	370,831		690,411	
	2007	72,297	253,423	39,868	3,223	3,187	361,362	371,998	0.3%	733,360	6.2%
	2008	74,887	250,710	48,056	3,002	3,411	423,950	380,066	2.2%	804,016	9.6%
	2009	79,020	254,566	49,056	4,060	4,114	449,174	390,816	2.8%	839,990	4.5%
Reg. IV-A	2006	87,822	247,545	22,280	3,444	1,085	319,818	362,176		681,994	
	2007	88,547	247,939	23,455	3,256	1,084	358,486	364,281	0.6%	722,767	6.0%
	2008	92,424	262,367	26,020	4,461	1,147	476,873	386,419	6.1%	863,292	19.4%
	2009	99,187	273,086	27,570	3,581	1,110	501,823	404,534	4.7%	906,357	5.0%
Mega Manila	2006	601,892	1,129,565	125,960	15,736	15,988	1,038,438	1,889,141		2,927,579	
	2007	574,092	1,146,846	122,526	16,440	15,836	1,172,423	1,875,740	-0.7%	3,048,163	4.1%
	2008	591,070	1,151,306	135,412	16,984	16,781	1,425,905	1,911,553	1.9%	3,337,458	9.5%
	2009	593,775	1,176,546	144,745	19,960	19,518	1,559,836	1,954,544	2.2%	3,514,380	5.3%

Source: NSO 2011



Source: NSO 2011

FIGURE 3.7-2 VEHICLE REGISTRATAION SHARE OF REGION BASE (2009)

CHAPTER 4
PRESENT TRANSPORT LAWS AND ORGANIZATION

4.1 BASIC LAWS RELATED TO ROAD TRANSPORT

The following laws related to road transport were reviewed.

- Public Service Act (CA 136)
- Limited Highway Access Act (RA 2000)
- Built-Operate-and Transfer Law (RA 7718)
- Toll Operation Decree (PD1112)
- Land Transportation and Transportation Code or LTTC (RA 4136)
- Proposal Transportation Policy Act (House Bill No. 2222)
- Charters of Transport–Related Agencies

The detailed review is described in **Annex 4.1**.

4.2 OVERALL DELIENATION OF AGENCY RESPONSIBILITIES

For road transport, **Table 4.2-1** is a matrix of the responsibilities of the main agencies/groups concerned. Eight areas of responsibility are considered – namely, policy, planning, financing, construction/implementation, operation, maintenance, economic regulation and technical regulation. Eight principal Government agencies are involved – viz., DPWH, DOTC, MMDA, RB, TRB, LTO, LTFRB and LGUs. Three main private sector groups are concerned – viz., Tollway Concessionaires, Private Contractors, and Public Road Transport Operators.

The portions in bold italics are responsibilities pertaining to ITS which are not explicitly stated in the charters of the agencies concerned, but are deemed to be inherent in their respective mandates.

The agencies mandate, powers and function, organization budgets and etc. are described in **Annex 4.2**.

TABLE 4.2-1 EXISTING AGENCY RESPONSIBILITIES FOR ROAD TRANSPORT

AGENCY	POLICY	PLANNING	FINANCING	CONSTRUCTION/ IMPLEMENTATION	OPERATION	MAINTENANCE	ECONOMIC REGULATION	TECHNICAL REGULATION
DPWH	Policies & standards on road infra planning, design, const & maint; road classification system, ***promotion of ITS***	Road network & proj planning for national roads (NR), incldg tollways; databases for NR inventory/ condition, traffic, accidents, ***ITS infra***	General Appropriations Act (GAA) funding of NR const. & maint; Motor Vehicle User Charge (MVUC) funding for NR maint and safety, ***incldg ITS***	Const. (incldg design) of NR, mainly by contract; ***incldg ITS infrastructure***	Operation of traffic survey eqpt & weighbridges; ***opn of ITS facilities on NR & opns center; supvn of tollway opns incldg ITS/ETC***	Maint. of NR (GAA/MVUC-funded***), incldg ITS***, mainly by contract; ***supvn of tollway maintenance***		Engineering, const., maint., quality, & safety standards & regulations on NR & tollways; vehicle load limits; ***incldg ITS***
DOTC	Policies on road/ other modal transport systems & services, ***promotion of ITS***	Planning & proj. devt, for road transport services;	GAA funding of planning & regulation of road transp. services				Setting of Route Measured Capacity (RMC); appeals body for LTFRB decisions	
Metropolitan Manila Development Authority (MMDA)	Policies & standards on transport & traffic mgt in MM, ***promotion of ITS***	MM devt planning; prepn & coordn of transp./ traffic mgt. projs, **incl** ***IT database***	Funding of MMDA operations from GAA and other sources	Const./installation of traffic control systems, pedestrian facilities, ***incldg ITS infrastructure***	Provision of mass transp. system, admn of traffic engg & education. ITS traffic info to motorists		Enforcement of public utility transp franchise reglns	Regulation of road users; admn of traffic enforcement operations in MM
Land Transportation Office (LTO)			GAA funding of LTO opns; collection of MVUC for govt.		Operation of motor vehicle inspection systems; opn of database for vehicles & drivers	Maintenance of MVIS	Enforcement of franchise reglns	Registrn of vehicles & drivers; enforcement of traffic & transport rules; ***reqts forvehicle ITS***
Land Transportation & Franchising Board (LTFRB)	Policies on franchising of public land transp. services (buses, jeepneys, taxis)		GAA funding of LTFRB opns				Franchises for entry (routes & capacity) & approval of fares of public utility transp.; enforcement of franchise reglns	Setting of safety & service standards for public utility transp.; ***reqts for Public Transport ITS***
Road Board (RB)	Policies on allocation & use of MVUC funds	Annual/multi-yr work programs for MVUC –funded road maint & road safety, ***incldg ITS***	MVUC funding of road maintenance and road safety devices, ***incldg ITS operation***					MVUC fund utilization
Toll Regulatory Board (TRB)	Policies on toll rates & operations				Monitoring of tollway operations, ***incldg***		Approval of toll rates; grant of franchises/Toll Opn	

AGENCY	POLICY	PLANNING	FINANCING	CONSTRUCTION/ IMPLEMENTATION	OPERATION	MAINTENANCE	ECONOMIC REGULATION	TECHNICAL REGULATION
					ITS/ETC		Certificates (TOCs) to TCs	
LGUs	Policies & guidelines for local roads (LR), local transport & traffic mgt	Planning for LR, local transport services & traffic mgt	Funding of LR, traffic mgt (IRA/ local funds)	Const. of LR, traffic engg & transport devt. projs at local level	Traffic mgt. at local level	Maint. of LR and LGU transport assets	Permits for tricycles	Use of LR, traffic enforcement & public transp reglns at local level
Tollway Con-cessionaries (TCs)			Financing of tollways	Design & construction of tollways, incldg ITS/ETC	Operation of toll-ways, including toll collections, traffic control, use of ITS/ETC	Maint. of tollways incldg ITS/ETC facilities		
Private Contractors				Road design & const. by contract		Road mainte-nance. by contract		
Public Road Transport Operators					Operation of pub-lic road transport services, ***incldg use of ITS***	Maintenance of public road transport services		

Sources: DOTC and DPWH, AusAid PEGR RA 008-01- 2008, and Charters of Agencies.

4.3 ENFORCEMENT OF TRAFFIC AND TRANSORT-RELATED LAWS AND REGULATIONS

The regime for the enforcement of laws and regulations related to traffic and transport in Metro Manila is characterized by several Government agencies vested with and exercising powers and responsibilities that are interrelated and sometimes overlap across agencies. The main agencies involved are MMDA, LGUs, LTO, LTFRB, LGUs, PNP, and TRB.

In **Annex 4.3**, the traffic and transport-related enforcement powers and functions of these agencies are evaluated.

The main issues and problems concerning the enforcement of traffic and transport-related laws and rules in Metro Manila are summarized as follows:

- <u>Overlapping enforcement powers and functions</u>

  - Based on its charter (RA 7294), the MMDA can enforce all traffic laws and regulations in Metro Manila, covering National and Local Roads. On the other hand, pursuant to the Local Government Code, LGUs in Metro Manila can regulate the use of all streets and regulate traffic on all streets – City and National. At the same time, the LTO is authorized to enforce the provisions of the Land Transportation and Traffic Code (RA 4136) throughout the country – on both Local and National Roads. The PNP is responsible for investigating and logging road traffic accidents.

  - Although the powers and functions of these agencies overlap, they have reached an informal working agreement delineating their enforcement functions as follows:

    - The MMDA concentrates traffic enforcement on selected major National Roads.
    - The LGUs focus traffic enforcement on Local Roads.
    - The LTO may enforce traffic laws and rules anywhere, and deputize enforcers of the MMDA, PNP, and other agencies. The LTO also allows the MMDA and LGUs to confiscate drivers' licenses even if it believes that this is LTO's sole power.
    - The PNP investigates and logs traffic accidents, with the assistance of LGU and MMDA enforcers in the field.

    While this arrangement is currently working, it is the result of *ad hoc* consensus among the agencies. Hence, it may be legally challenged or modified anytime, especially with changes in administration and/or policies of the agencies.

- Basic traffic rules

  - The LTO and the MMDA use the provisions of RA 4136 (LTTC) as the basis of their enforcement activities. On the other hand, the LGUs employ the Uniform Traffic Management Code (TMC) covered by specific city/municipal ordinances as their guide for enforcement. The LTTC and the TMC are substantially similar in terms of basic regulations and areas of enforcement.

  - The LGUs and the MMDA, however, differ in their schedules of fines and penalties and in their tickets or Ordinance Violation Receipt (OVR) forms. There are also differences in the application of special rules among the LGUs and the MMDA - e.g., windows under the number coding scheme, truck ban exemptions.

  - The MMDA and all LGUs in Metro Manila have adopted since mid-2012 a single ticketing system, using a Unified Ordinance Violation Receipt (UOVR) form. They still use, however, different schedules of fines and penalties for traffic violations.

  - To effectively implement the anti-truck overloading regulations, there is a need to harmonize the current standards in determining overloading – viz., prescribed GVW based on manufacturer's specifications, GVW as registered with the LTO, and axle load – and to enforce the harmonized standards in all roads, both ordinary and toll roads. There is also a need for the TRB to enforce toll road standards that require the use of WIMS or similar devices to weigh trucks. The DPWH should immediately augment and make operational its weighbridges, man them with trained personnel and LTO or LTO-deputized enforcers, and, in the longer term, consider outsourcing weighbridge operations including anti-overload enforcement.

- Nature and quality of enforcement

  - While the LGUs adopt the same TMC, the actual level and quality of enforcement of the traffic rules therein appears to vary significantly among LGUs, as shown n the Pasig and Pasay cases.

    - For example, Pasig appears better organized and has proportionally more and better enforcement facilities than Pasay, e.g., traffic signals, motorcycles, License Redemption Center, CCTV cameras, and traffic control center.
    - Pasay, however, has required each of its enforcers to carry a handy TMC booklet for ready reference by the enforcer and motorists. Pasig does not have this requirement.

- There appears to be a greater degree of discretion by enforcers in citing violations and fines in Pasay than in Pasig, e.g., negotiating for lighter offenses and fines than actually applicable.
- Reports of *kotong* appear to be less prevalent in Pasig than in Pasay.

- Both Pasig and Pasay concentrate on "moving" violations, and the most frequent cited are those against the TMC rules requiring obedience to traffic control signals and signs.

- Both LGUs also give special attention to the regulation of public utility vehicles. The most common offenses cited are loading and unloading outside designated areas, *colorum* units, and out-of-line operations by buses, jeepneys, and AUVs.

- The MMDA enforcers place higher priority in getting the traffic to move fast on major thoroughfares, particularly during peak hours – than in apprehending offenders which would only add to the congestion.

- <u>Weak enforcement to address behavior-based congestion</u>

  - Many drivers are not disciplined and do not feel governed by traffic rules. While those rules exist, their enforcement is weak. Traffic enforcement does little to make drivers self-comply with the rules. Order in traffic is hard to attain because it is not enforced properly.

  - Many enforcers act as shepherds, lightly managing the traffic flow, and glossing over driver behavior. This approach induces some order only when the enforcer is around and engaging with drivers. Many enforcers do not act on most violations.

  - There is a need to make drivers primarily responsible for compliance with traffic rules. They must be motivated to comply with traffic regulations on their own. The most effective method to encourage compliance is deterrence, through strict and sustained enforcement.

  - Ticketing and fines are not properly implemented. The traffic ticket is a very effective deterrence to violations. Strict ticketing and imposition of fines will create an environment where non-compliance invariably leads to penalty.

- Congestion is caused by (a) aggressive driving behavior of public bus and jeepney drivers, (b) inappropriate turn-lane habits, (c) poor intersection behaviour, and (d) disorderly pedestrian movements.

- The MMDA enforcers consider their primary duty to be traffic direction and control in order to achieve orderly, fast and safe travel. Thus, during peak hours, the enforcers give higher priority to making the traffic move fast, than to apprehending traffic violations which they believe would only add to congestion.

- Subjectivity in enforcement

  - Despite the specific TMC provisions, some enforcers exercise their discretion and judgment in determining the type of violations and sanctions to be cited, and their decision is subject to negotiations with the motorists concerned. This practice is fraught with likely corruption.

  - This situation exists as enforcement is heavily done by manual means.

- Inadequate enforcers and facilities

  - MMDA and LGU enforcers are insufficient in number, need permanency in tenure, and have to be better screened and trained. They are also poorly compensated.

  - To address *kotong* and other corrupt practices, aside from modernizing enforcement systems and upgrading compensation, there is a need for a sustained moral reformation program to inculcate proper values and self-discipline among the enforcers.

  - Basic enforcement facilities of the LGUs – e.g., two-way hand-held radios and motorcycles – must be augmented to improve efficiency in enforcement.

  - To complement the manual means of enforcement by the LGUs and the MMDA, more traffic signals need to be deployed at major intersections, and existing non-functioning ones have to be repaired or replaced. More CCTV cameras need to be installed, and each LGU must have a properly equipped traffic control center. In the medium- and long-term, a suitable ITS is essential to facilitate enforcement.

  - The TRB is handicapped in enforcing the standards in the TOA/STOA by its limited staff, facilities, and budget. The TRB personnel and other se resources must be

reinforced to enable them to perform adequate technical and financial audits of the Toll Roads vis-à-vis the O&M Manuals and other provisions of the Concession Agreements.

- Difficulty in providing accurate and real-time traffic information

  - While the MMDA has successfully introduced the use of the internet, mobile applications, and related technologies to disseminate to the public traffic information on selected National Roads, the collection and evaluation of data on traffic conditions – e.g., congestion levels - are still largely manual and subjective, based on the judgment made by roadside enforcers, visual monitoring through feeds from CCTV cameras, and information from the public, as monitored by the MMDA Metrobase. The MMDA intends to upgrade and expand ITS applications to provide precise and teal-time traffic information to the motorists and commuters. Priority will be given to improved bus management to track and control bus locations, routes and schedules, among others.

  - At the LGU level, Pasig operates some multi-purpose CCTV cameras and a Communication Command and Control Center, but the traffic information is also inadequate and subjective and is used mainly for internal purposes and not for public dissemination. Pasay has neither CCTV cameras nor a traffic control center.

- Lack of connectivity of agency databases

  - The enforcement agencies - LTO, LTFRB, MMDA, LGUs, PNP, and TRB - find a strong need to provide on-line interconnection of their traffic and transport databases as well as to be linked with the databases of public utility operators, Toll Road companies, and the DPWH.

  - If realized, this data interconnectivity will enable the agencies to automatically interface and cross-check records on licenses, vehicle registration, franchises, bus/jeepney routes and schedules, traffic violations, penalties, and the like, in order to facilitate the enforcement of traffic laws and regulations, and reduce opportunities for irregularities.

The crafting and planning of an appropriate ITS for Mega Manila will carefully consider the measures needed to address and overcome the outstanding issues and weaknesses in enforcement identified above, with a view to creating a feasible system that will promote safer, faster, predictable, and more efficient mobility in the region.

CHAPTER 5
TRANSPORT NETWORK AND TRAFFIC CONDITIONS

5.1 ROAD TRANSPORT IN METRO MANILA

5.1.1 Road Administration

Under the DPWH Road Classification System, roads in Metro Manila (and in the entire Philippines) are categorized into four administrative classes - national road, municipal road, city road and barangay road. Each administrative road class is described below:

National Road	: These are roads continuous in extent that form part of the main trunk line system of the country. The road administrator for this type of road is the National Government, specifically DPWH.
City Road	: Roads/streets within the urban area of the city to be designated by the City Council. The City Government is responsible for the operation and maintenance of these roads/streets.
Municipal Road	: Roads or streets within the poblacion area of the municipality to be designated by the Municipal Council.
Barangay Road	: Rural roads located either outside the urban area of the city or municipality or outside industrial, commercial or residential subdivisions, which act as feeder and/or farm-to-market roads, and which are not classified as national, provincial, city or municipal roads. This type of road is to be designated by the Barangay Council concerned.

TABLE 5.1-1 ROAD CLASSIFICATIONS IN METRO MANILA WITH ROAD SURFACE TYPE AND TOTAL LENGTH

Road Classification	Concrete (km)	Asphalt (km)	Gravel (km)	Earth (km)	Total (km)
National Road	488.45	631.83	-	-	1,120.28
Municipal Road*	96.69	3.45	8.06	11.00	119.19
City Road*	829.73	918.72	57.48	0.21	1,806.13
Barangay Road*	119.60	73.12	66.20	0.15	259.07
Total	1,534.46	1,105.83	1,035.50	11.40	3,687.19

Source: DPWH Atlas 2012
**The data have not been updated since year 1999*

The lengths of National roads with classification and condition by district engineering office in Metro Manila or National Capital Region (NCR) are shown in **Table 5.1-2**. The NCR is divided into nine district engineering offices. These offices manage national roads, which consist of primary roads and secondary roads. The total length of national roads in Metro Manila is 1,120.28

km (primary road length is 87.40 km and secondary road length is 1,032.88 km). National roads in Good and Fair condition are 436.71 km and 194.29 km, respectively, comprising about 56% of the total national road length in Metro Manila.

TABLE 5.1-2 NATIONAL ROADS WITH CLASSIFICATION AND CONDITION BY DISTRICT ENGINEERING OFFICE

Region/District/Road Classification	Good	Fair	Poor	Bad	No Assessment	Total
NCR	**436.71**	**194.29**	**389.99**	**46.36**	**52.95**	**1,120.28**
Total Primary Roads	**31.24**	**12.48**	**31.71**	**5.66**	**6.32**	**87.40**
Total Secondary Roads	**405.47**	**181.81**	**358.28**	**40.70**	**46.63**	**1,032.88**
2nd Metro Manila Sub-DEO	**11.90**	**3.55**	**26.98**	**4.48**	**0.04**	**46.96**
Primary Roads	1.55	-	3.98	0.94	-	6.47
Secondary Roads	10.36	3.55	23.00	3.54	0.04	40.49
Malabon-Navotas DEO	**2.78**	**11.28**	**21.33**	**2.60**	**3.65**	**41.64**
Primary Roads	0.14	2.08	-	-	-	2.22
Secondary Roads	2.64	9.20	21.33	2.60	3.65	39.42
Metro Manila 1st DEO	**111.42**	**13.23**	**41.66**	**1.66**	**1.15**	**169.11**
Primary Roads	4.66	3.10	5.67	-	0.13	13.56
Secondary Roads	106.76	10.13	35.98	1.66	1.02	155.55
Metro Manila 2nd DEO	**41.32**	**20.28**	**60.46**	**3.07**	**0.05**	**125.18**
Primary Roads	8.83	1.12	10.66	-	-	20.60
Secondary Roads	32.50	19.16	49.80	3.07	0.05	104.58
Metro Manila 3rd DEO	**30.44**	**12.63**	**25.03**	**8.76**	**13.76**	**90.61**
Primary Roads	2.10	-	3.27	1.17	3.89	10.42
Secondary Roads	28.35	12.63	21.76	7.59	9.87	80.19
North Manila District Engineering Office	**33.68**	**42.07**	**56.24**	**14.15**	**0.53**	**146.66**
Primary Roads	-	-	-	-	-	-
Secondary Roads	33.68	42.07	56.24	14.15	0.53	146.66
Quezon City 1st DEO	**58.98**	**24.60**	**68.25**	**3.92**	**8.66**	**164.41**
Primary Roads	9.67	-	-	-	-	9.67
Secondary Roads	49.31	24.60	68.25	3.92	8.66	154.74
Quezon City 2nd DEO	**52.15**	**33.23**	**39.97**	**6.24**	**24.31**	**155.91**
Primary Roads	0.86	3.38	5.82	3.19	2.30	15.55
Secondary Roads	51.30	29.85	34.15	3.05	22.01	140.36
South Manila District Engineering Office	**94.00**	**33.43**	**50.09**	**1.48**	**0.80**	**179.80**
Primary Roads	3.43	2.80	2.31	0.36	-	8.91
Secondary Roads	90.57	30.62	47.77	1.12	0.80	170.89

Source: DPWH Atlas 2012

5.1.2 Road Network

(1) Urban Structure and Road Network

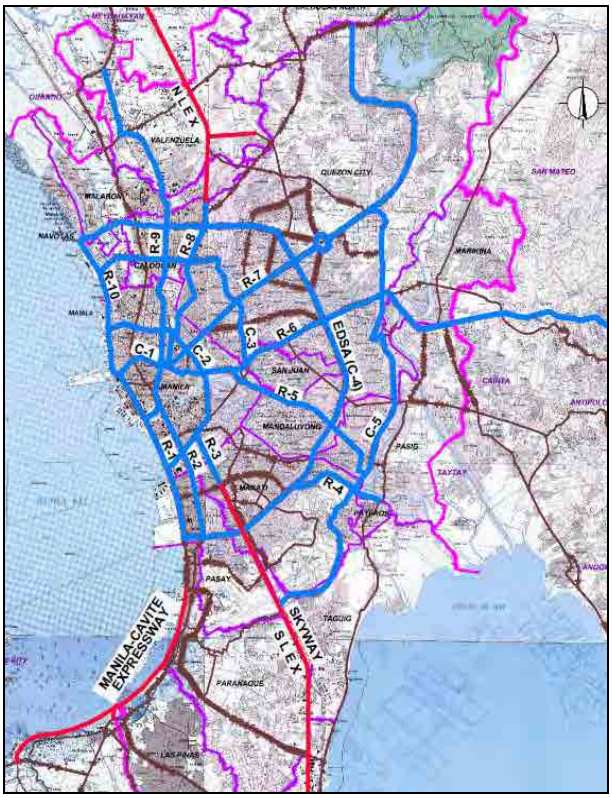
The transport network in Metro Manila is formed by roads and railways. The road network consists mainly of five (5) circumferential roads and ten (10) radial roads that are connected to the Central Business District (hereafter called CBD), commercial and residential areas. The road network is shown in **Figure 5.1-1**. There are three expressways, namely, NLEX, Skyway and SLEX, which connect Metro Manila with Region III and Region IV-A. The CBD is the commercial and geographic heart of a city which is concentrated along EDSA. Especially, the Makati CBD and the Ortigas CBD along EDSA are major economic centers in Metro Manila. Therefore, heavy traffic congestion is occurring during weekday along EDSA as shown in **Figure 5.1-2**. The Global City CBD has recently been developing rapidly; traffic volume along C-5 will tremendously increase in the near future.

The railways are LRT1 and LRT2, MRT3 and PNR. The MRT3, LRT1 and LRT2 are mostly elevated railway. The railway network, station and ridership are introduced in **Section 5.3.2** - Rail Transport.

(2) Number of lanes

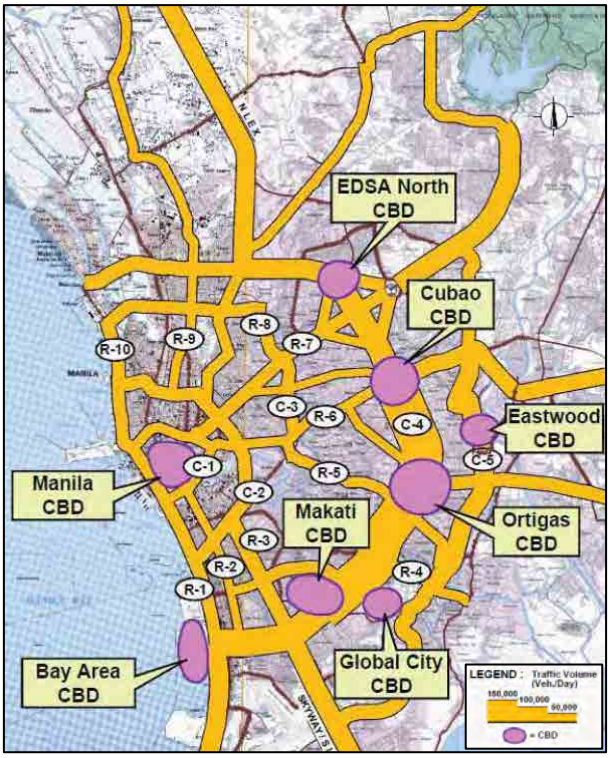
The number of lanes of national roads under the jurisdiction of the DPWH is shown in **Figure 5.1-3**.

Circumferential roads and radial roads



Source: JICA** Study **Team

FIGURE 5.1-1 ROAD NETWORK OF METRO MANILA

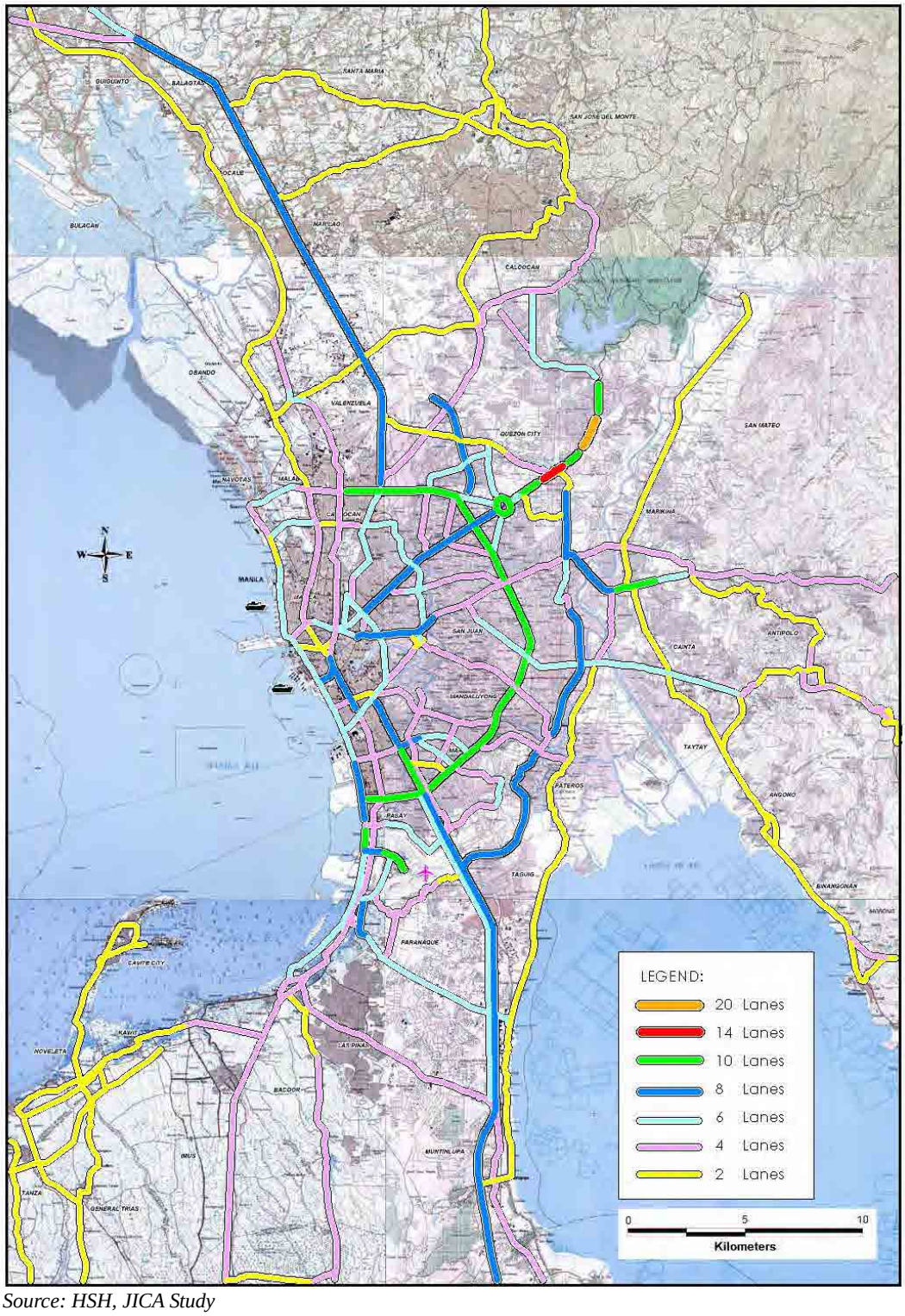


Source: JICA Study Team

FIGURE 5.1-2 CBDS AND ROAD NETWORK

are developed with more than 6 lanes: EDSA (C-4) is 10 lanes, C-5 is 8 lanes, and Quezon Avenue (R-7) is 8 lanes.

The main roads are sufficiently developed, but still traffic congestion occurs on these roads.



Source: HSH, JICA Study

FIGURE 5.1-3 NUMBER OF LANES OF METRO MANILA ROADS (DPWH JURISDICTION)

(3) Problems/Issues Summary

The NCR's national road problems and issues are summarized below:

- The NCR national road network is well constructed. However, the road condition of 44 % of primary and secondary roads of the NCR is bad and poor. Especially, the road surface was severely damaged in the rainy season.
- Population and road users continuously increase in Metro Manila. Widening and improvement of the ordinary road network is difficult; thus, traffic congestion in Metro Manila will be heavy in the near future.

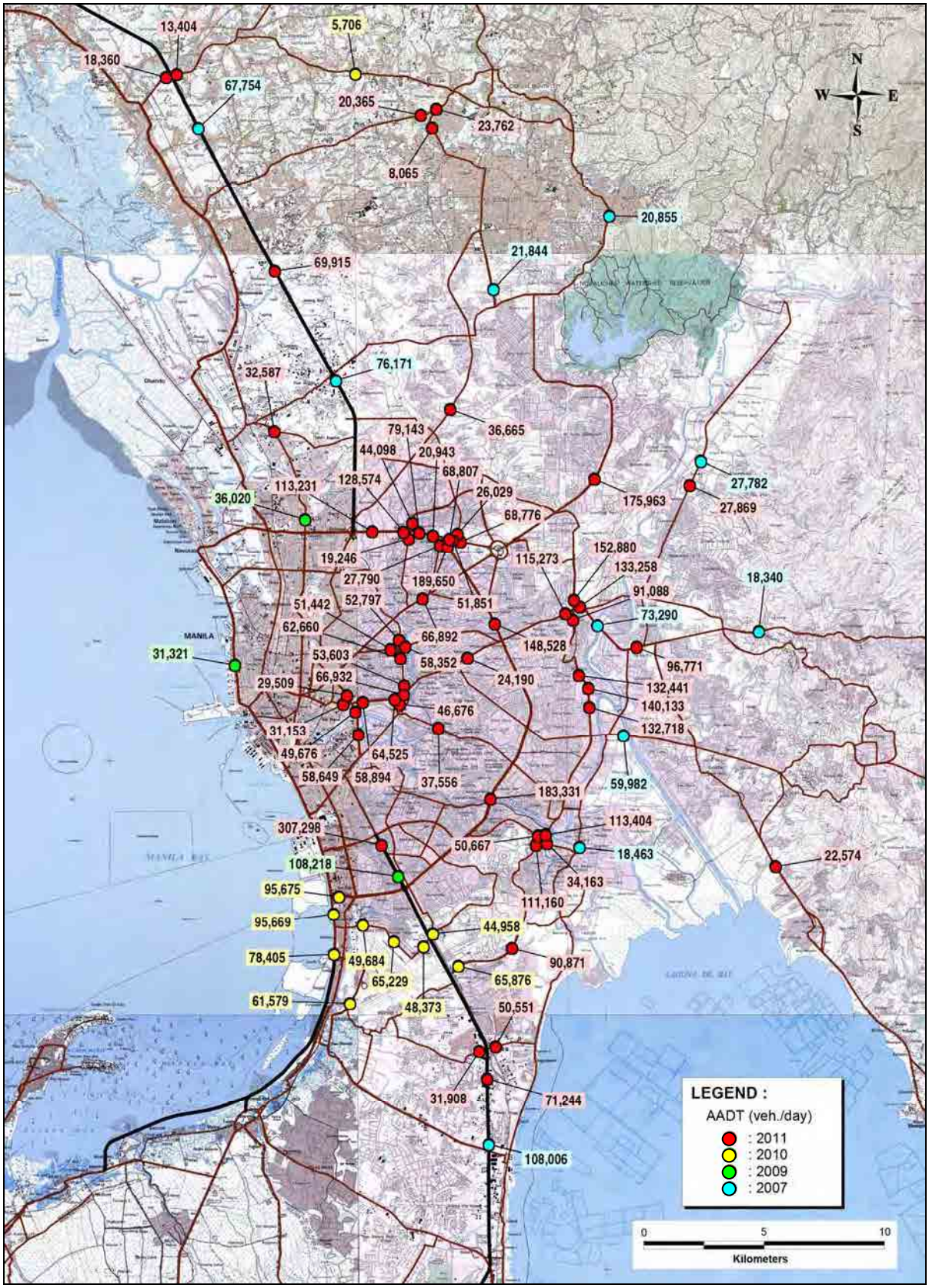
5.1.3 Road Transport Conditions

(1) Traffic Volume in Metro Manila

The traffic volume on the road network of Metro Manila is shown in **Figure 5.1-4**. EDSA remains the most heavily travelled road with 183,331 vehicles per day, followed by other circumferential roads such as C5, C3 and C2 which also registered high volumes of traffic. Roads connecting Metro Manila to the provinces of Rizal, Bulacan, and Cavite, such as Ortigas Avenue, Marcos Highway, Manila North Road, and Aguinaldo Highway, likewise carry significant traffic. This is despite the presence of NLEX and SLEX which serve as the two main arterials linking Metro Manila to the north and south, respectively.

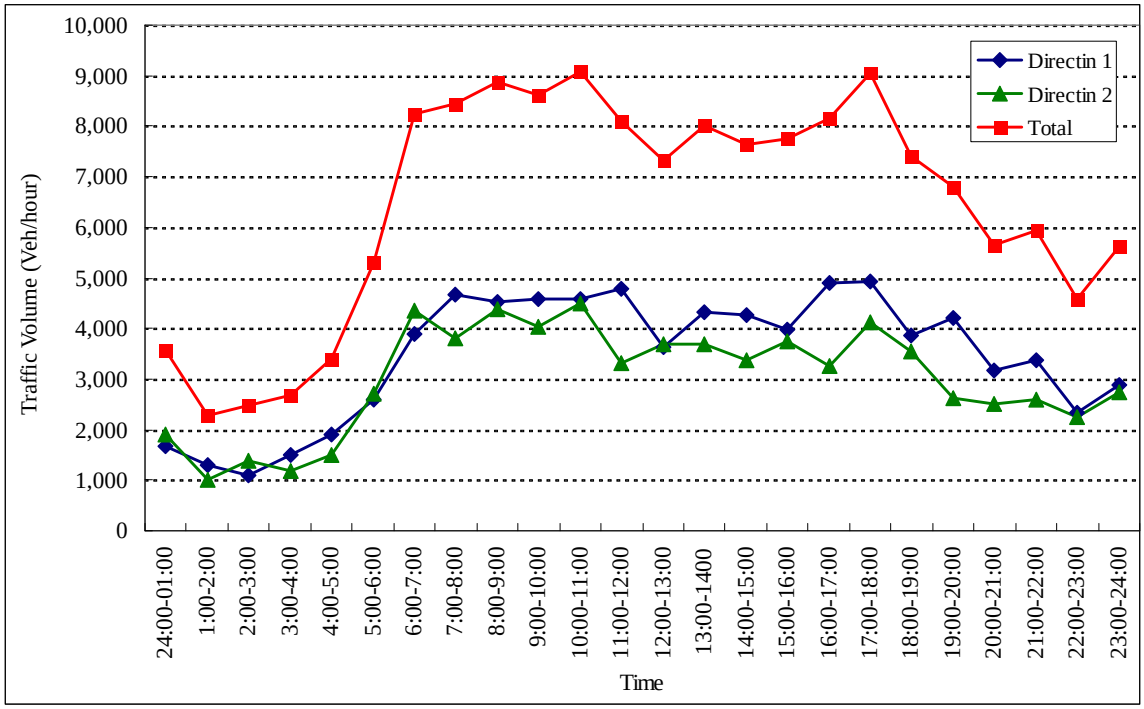
The hourly variation of traffic is presented in **Figure 5.1-5** and **Figure 5.1-6**. From these figures, the following are observed:

- High volume of traffic is continuous along EDSA throughout the daytime (6AM to 6PM) as well as on the other circumferential roads of Metro Manila (C2, C3 and C5).
- In contrast, radial roads (e.g. Ortigas Avenue and Marcos Highway) linking Metro Manila to neighboring provinces are observed to peak only in the morning (from 6AM to 7AM) and then decrease gradually.



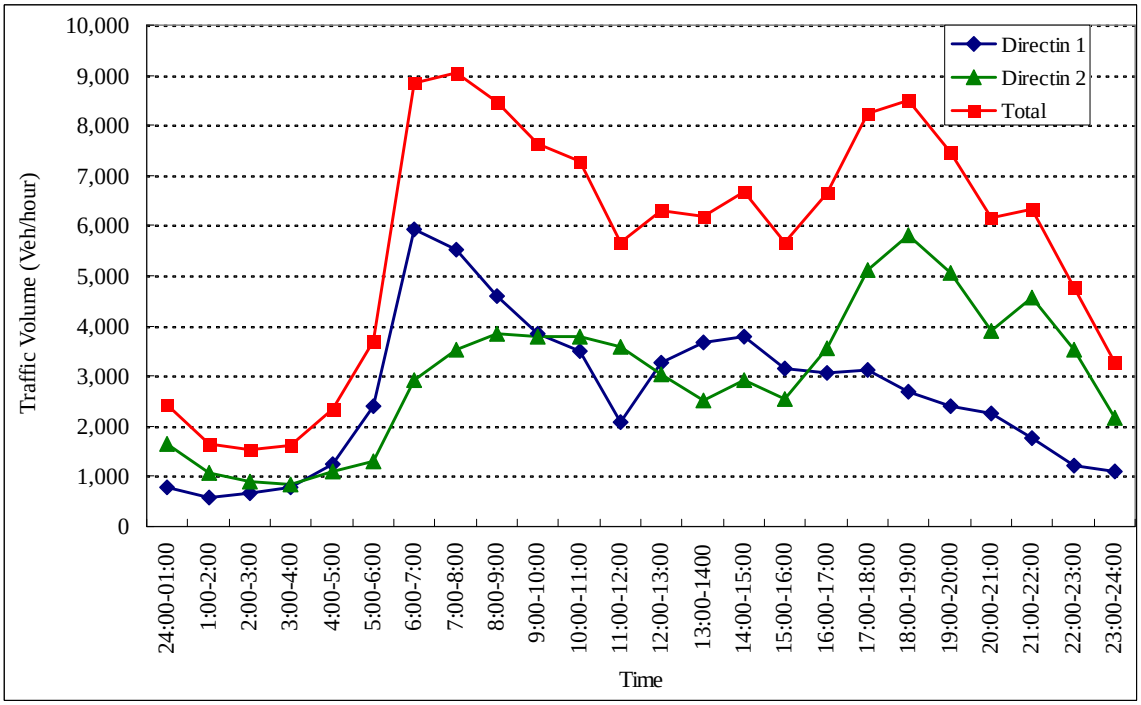
Source: DPWH AADT 2011, C-6 Expressway FS by 2011, ERIA Study by 2010, HSH by 2009, C-6 Expressway FS by 2007

FIGURE 5.1-4 TRAFFIC VOLUME IN METRO MANILA (AADT)



Source: C-6 Expressway FS by 2007

FIGURE 5.1-5 HOURLY VARIATION 0F TRAFFIC AT EDSA



Source: C-6 Expressway FS by 2007

FIGURE 5.1-6 HOURLY VARIATION OF TRAFFIC AT QUEZON AVE.

(2) Travel Time in Metro Manila

Travel speed is shown in **Figure 5.1-7** and **Figure 5.1-8**. The results of the survey depict a congested network where some sections registered a travel speed of less 10 km/hr. Radial roads such as Ortigas Avenue which connect Metro Manila to residential areas in Rizal are also experiencing severe traffic congestions at morning time and evening time. España Blvd also has substantial sections where travel speed is less than 10 km/hr.

Bottleneck (Morning time)

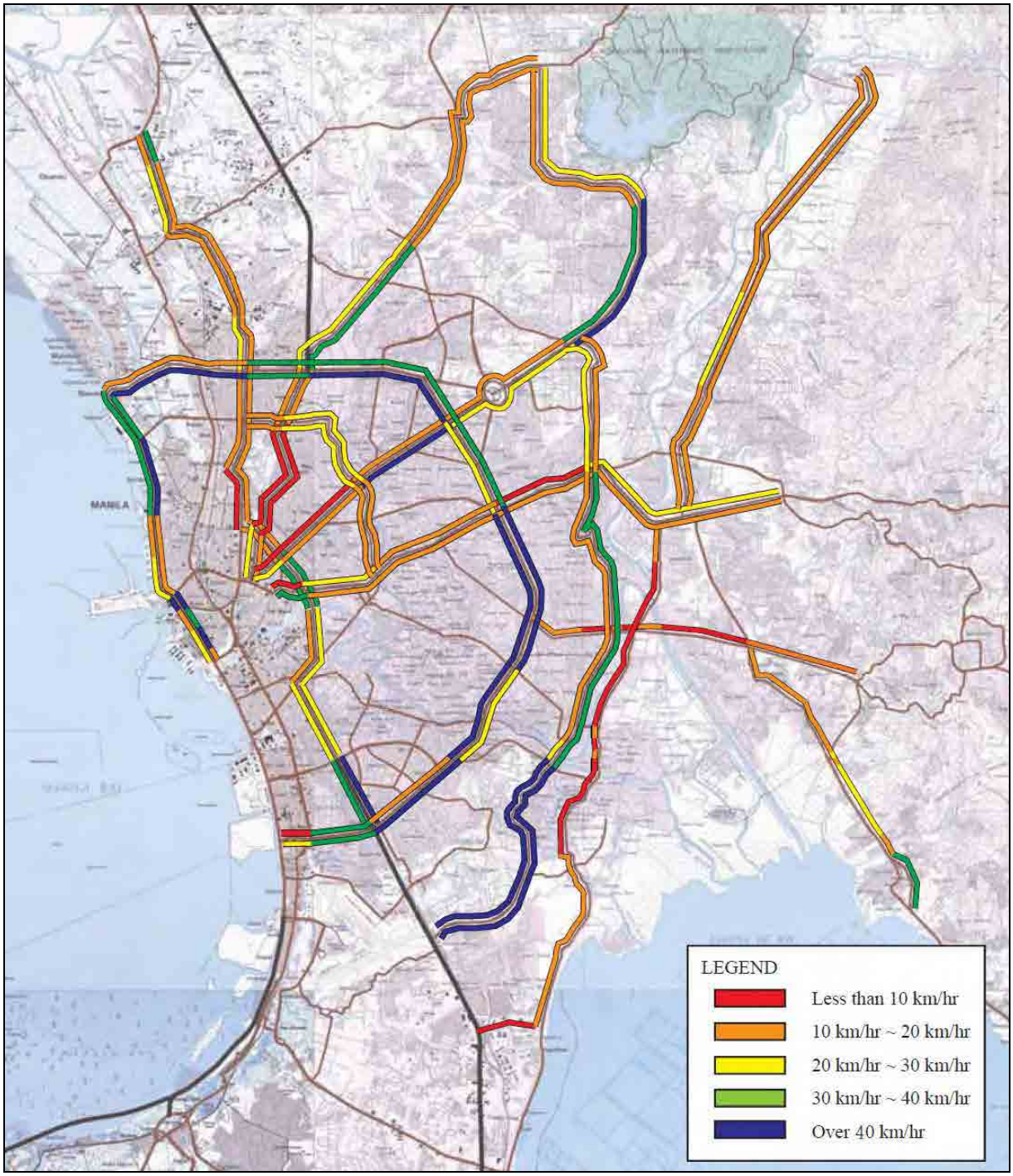
Road	Section	Congestion Length (km)	Speed (km/h)	Causes of Congestion
Rizal Ave.	Jose Abad Santos Ave. to C-2	1.4	4.2	Traffic Signal (Intersection in C-2)
A. Bonifacio Ave.	C-3 - C-2	3.6	8.9	Traffic Signal (Intersection in C-2)
A. Bonifacio Ave.	C-2 - C-3	3.6	9.1	Traffic Signal (Intersection in C-3)
Aurora Blvd.	C-5 - EDSA	2.8	8.7	Slow moving vehicle (tricycle, jeepney, heavy loaded truck), Traffic Signal (Intersection in EDSA)
Ramon Magsaysay Blvd.	C-2 - Claro M. Recto Ave.	1.0	3.3	Traffic Signal (Intersection in Claro M.Recto Ave.
España Blvd.	C-3 - Claro M. Recto Ave.	2.9	3.8	Traffic Signal (Intersection in Claro M.Recto Ave.
EDSA	Roxas Blvd. - Taft Ave.	0.9	3.3	Traffic Signal (Intersection in EDSA)

Source: C-6 Expressway FS by 2011, HSH by 2009, C-6 Expressway FS by 2007

Bottleneck (Evening time)

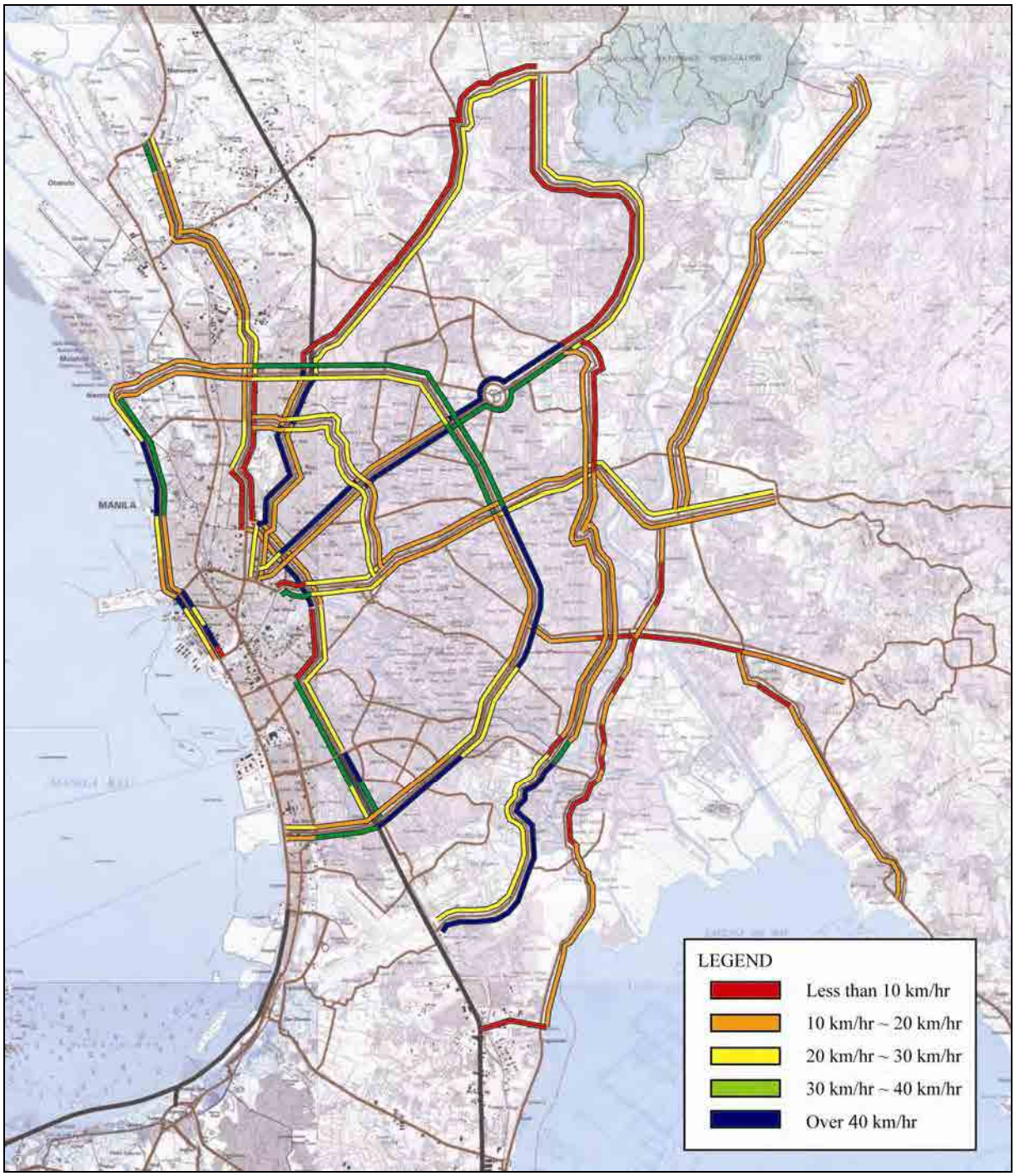
Road	Section	Congestion Length (km)	Speed (km/h)	Causes of Congestion
C-5	A. Marcos Highway – Commonwealth Ave.	4.3	9.0	Traffic Signal (Commonwealth Ave.)
C-5	Pasig Blvd. – Kalayaan Ave.	1.2	4.6	Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Roxas Blvd.	Kalaw – Burgos	0.4	8.8	Traffic Signal (Burgos Intersection)
Ramon Magsaysay Blvd.	C-2 - Claro M. Recto Ave.	1.0	3.0	Traffic Signal (Intersection in Claro M. Recto Ave.
Rizal Ave.	Jose Abad Santos Ave. – Monumento	1.4	6.4	Roundabout in Monumento
Rizal Ave.	Rizal Ave. – Jose Abad Santos Ave.	1.4	4.9	Traffic Signal (Intersection in Jose Abad Santos Ave.)
Pres. Quirino Ave.	Nagtahan Bridge - Pres. Quirino Ave.	6.8	8.5	Traffic Signal (Intersection in Osmeña Highway)

Source: C-6 Expressway FS by 2011, HSH by 2009, C-6 Expressway FS by 2007



Source: C-6 Expressway FS by 2011, HSH by 2009, C-6 Expressway FS by 2007

FIGURE 5.1-7 TRAVEL SPEED IN METRO MANILA (MORNING TIME)

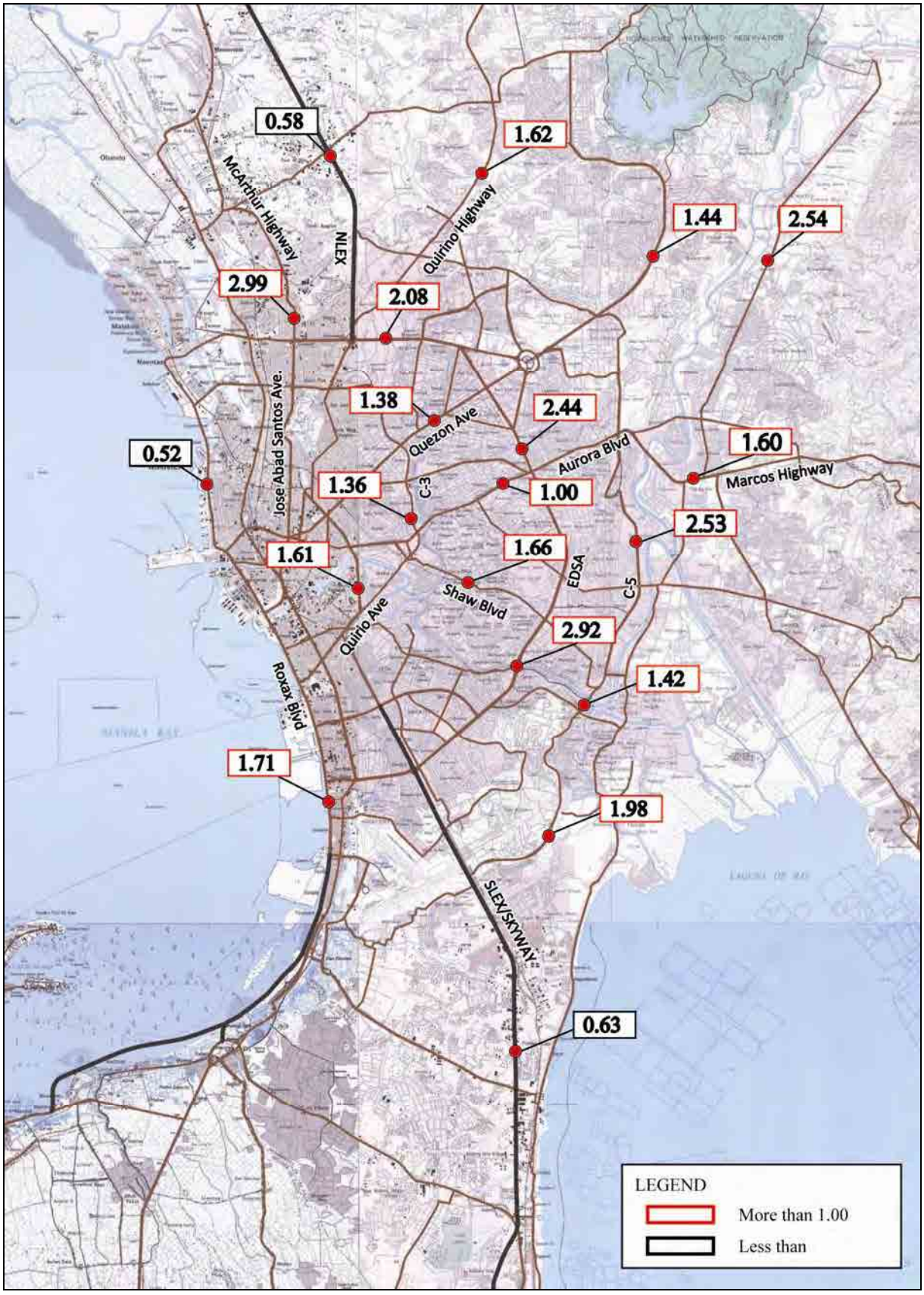


Source: C-6 Expressway FS by 2011, HSH by 2009, C-6 Expressway FS by 2007

FIGURE 5.1-8 TRAVEL SPEED IN METRO MANILA (EVENING TIME)

(3) Volume/Capacity Ratio

The Volume/Capacity ratio of a road represents its level of congestion and is the result of the analysis of the actual traffic volume on the road as against its carrying capacity referred to in **Figure 5.1-2** (?) and **Figure 5.1-4 (?),** respectively. The resulting Volume/Capacity ratios are shown in **Figure 5.1-9**. Based on these Volume/Capacity ratios, the congestion level at EDSA and C-5 is more than 2.00, while those of other roads are more than 1.00. Traffic congestion is very evident in almost all major roads.



Source: Traffic volume and No. of lanes

FIGURE 5.1-9 VOLUME/CAPACITY RATIO IN METRO MANILA

(4) Problems/Issues Summary

The following summarize the major NCR national road problems and issues:

- Traffic volumes in Metro Manila are huge as observed. Traffic congestion occurs at circumferential roads of EDSA and C-5 throughout the daytime.
- In radial roads, the volume/capacity ratio is less than 1.00. However, the observed travel speed in the morning and/or evening peak time is less than 10 km/h, such that traffic congestion occurs.
- In the near future, traffic congestion will be predicted to worsen in keeping with the growth of population and economic development in Metro Manila.

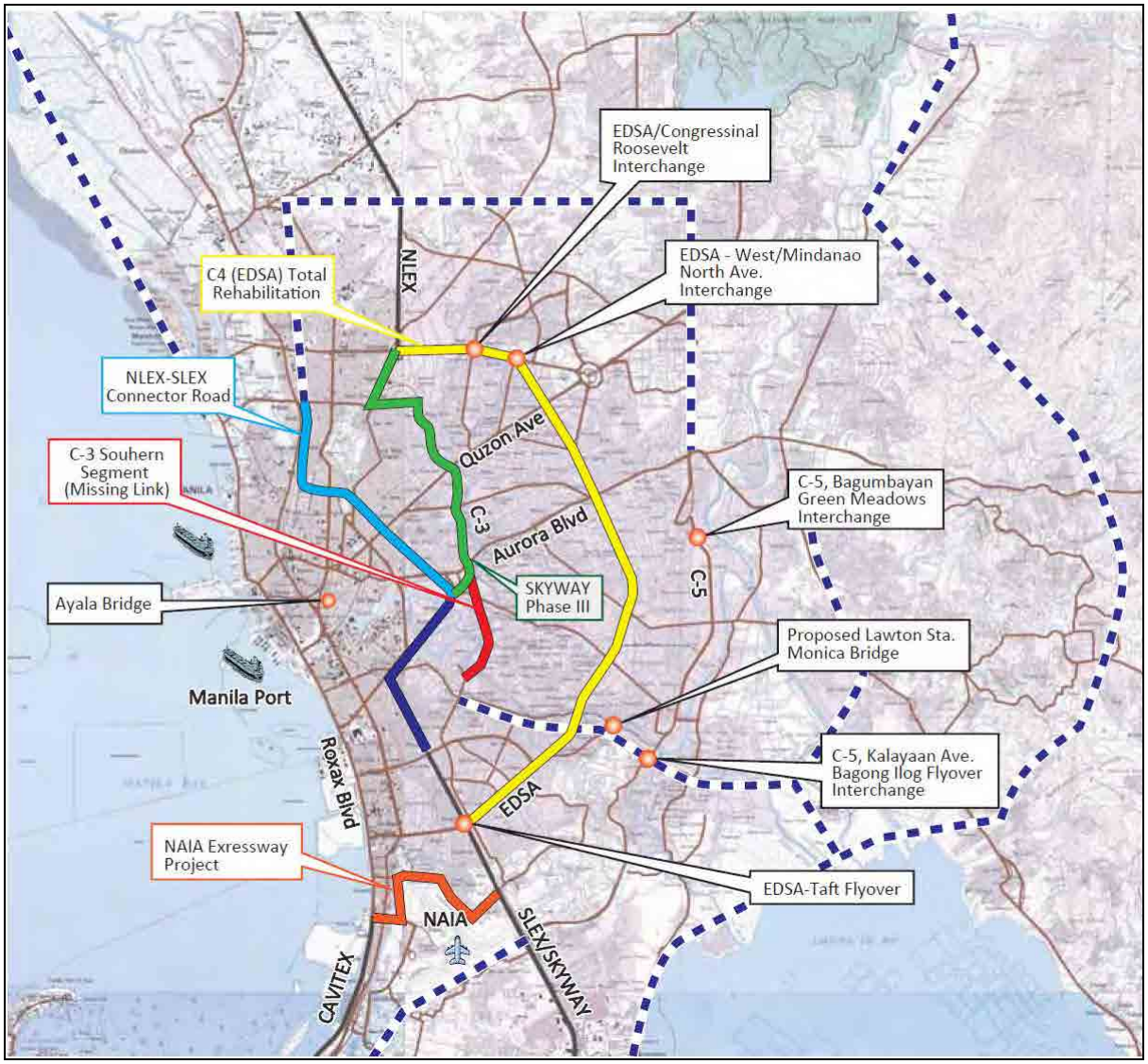
5.1.4 Road Projects

Major road projects in Metro Manila planned by DPWH are shown in **Table 5.1-3** and **Figure 5.1-10**. These projects include 3 expressway projects, 5 interchange/flyover projects, 2 bridge projects, and 1 rehabilitation project.

TABLE 5.1-3 MAJOR ROAD PROJECTS IN METRO MANILA

Road Project		Description
Expressway	NAIA Expressway	Construction of 4-Lane elevated structure along Sales Avenue from SLEX/Skyway to NAIA Terminal III (4 km.)
	NLEX-SLEX Connector Road	NLEX and SLEX are to be connected utilizing PNR ROW
	SKYWAY Phase III	NLEX and SLEX are to be connected utilizing C-3 ROW
Interchange/ Flyover	EDSA/Congressional Roosevelt Interchange	This interchange project was approved, and may start construction in 2013
	EDSA - West/Mindanao/North Ave. Interchange	This flyover project will connect EDSA and Mindanao/North Ave.
	C-5, Bagumbayan Green Meadows Interchange	This flyover project will connect C-5 and Bagumbayan Green Meadows.
	C-5, Kalayaan Ave. Bagong Ilog Flyover Interchange	This flyover project will connect C-5, Kalayaan Ave. and Bagong Ilog.
	EDSA-Taft Flyover	This flyover project will connect EDSA and Taft Ave.
Bridge	Ayala Bridge	This bridge will be replaced by DPWH, utilizing local funds.
	Proposed Lawton Sta. Monica Bridge	This bridge will be constructed at Lawton (Fort Bonifacio) - Sta. Monica (KAPITOLYO Pasig) Bridge across
Rehabilitation	C-4 (EDSA) Total Rehabilitation	Total rehabilitation will be conducted from NLEX to SLEX/SKYWAY.

Source: DPWH Strategic infrastructure policies and program in 2012



Source: DPWH Strategic infrastructure policies and program in 2012

FIGURE 5.1-10 LOCATION OF ROAD PROJECTS IN METRO MANILA

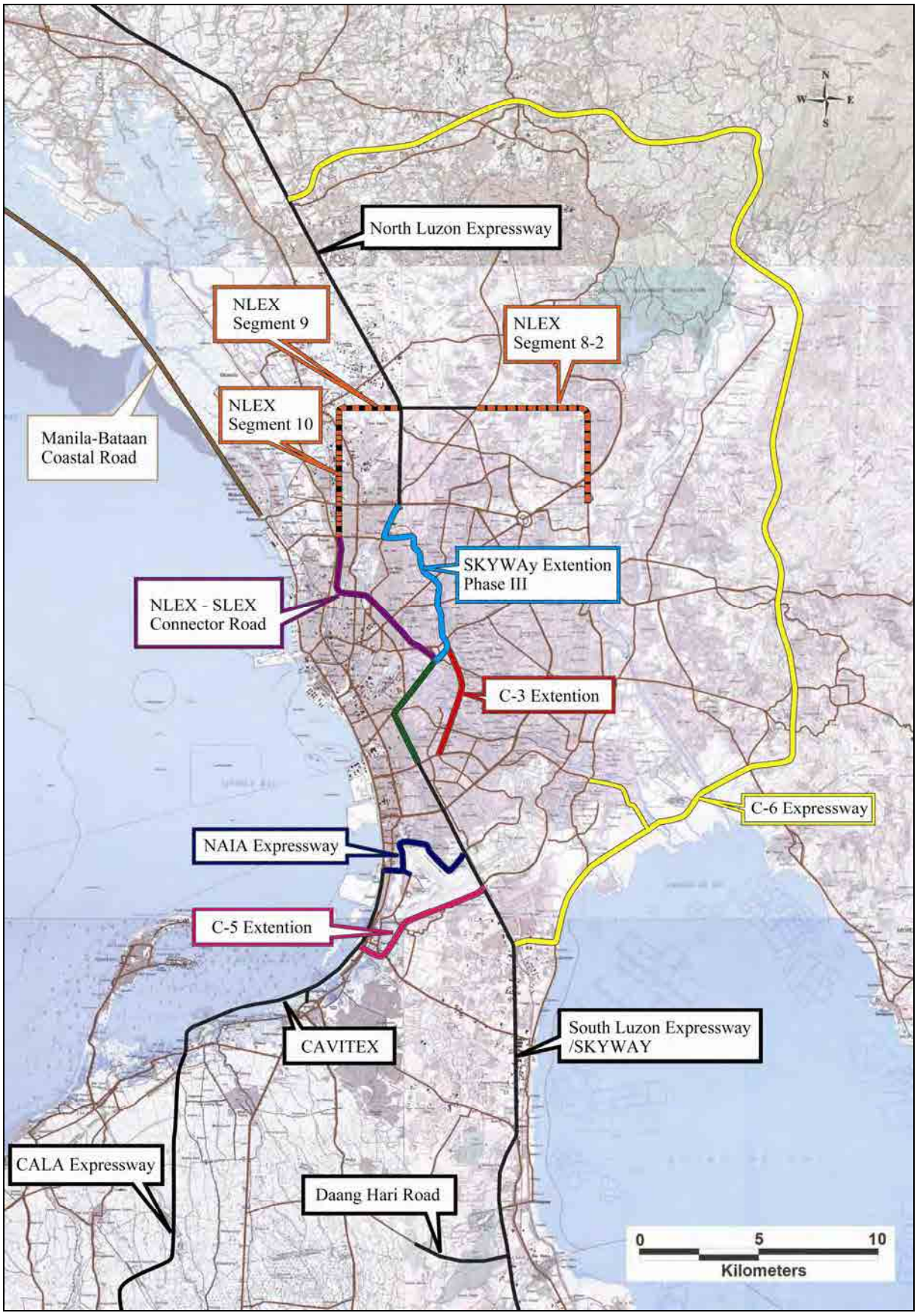
5.1.5 Future Road Network

The future road network is shown in **Figure 5.1-11**. This network is based on the "Master Plan on High Standard Highway Network Development in the Republic of the Philippines, JICA (2010)", which will be constructed until 2030. From this future road network, the priority projects shown in **Table 5.1-4** have been identified.

TABLE 5.1-4 FUTURE ROAD NETWORK IN METRO MANILA

Future Road Projects	Description	Status
North Luzon Expressway (NLEx) Phase 2 Circumferential Road C-5	The NLEx Segment 8.2 will connect NLEx segment 8.1 to the Congressional Avenue and Luzon Avenue.	MNTC is finalizing this Plan.
	Segment 9 will connect NLEx to the MacArthur Highway. This segment is now under construction and a part of C-5 Road North Extension. Detailed Engineering Design is ongoing.	Construction Stage.
	Segment 10 will connect NLEx segment 9 and NLEX-SLEX Connector Road.	MNTC is finalizing this Plan.
Manila-Bataan Coastal Road	Proposed early 1970s.	Conceptual Stage
C6 Expressway	(North Section) Starts from NLEX at Bocaue/Marilao boundary and traverses Sta. Maria, San Jose del Monte, Rodriguez, San Mateo, Antipolo, Taytay and Taguig and connected with Skyway at Bicutan. The north section is to be built by MRT-7 Consortium, 4 lanes, length 16.5 km	DPWH is undertaking the Detailed F/S.
	(South Section) C-6 Expressway will function as a distributor of traffic coming from the North Luzon Expressway (NLEX) up to the Metro Rail Transit Line 7 (MRT-7) Terminal. It starts from NLEX intersection at Bocaue/Marilao boundary and traverses to Sta. Maria and terminates at the province of Bulacan. The north section is to be built by MRT-7 Consortium, 4 lanes, length 50.7 km	
NLEX-SLEX Connector Road	Construction of a 13.4 km., 4-lane elevated expressway to link the existing SLEX and NLEX passing through Metro Manila and utilizing the existing PNR alignment as its route.	• MNTC completed Pre-F/S. • METI Study completed. • MNTC is undertaking detailed F/S. • MNTC completed D/D.
SKYWAY Phase 3	NLEX and SLEX are to be connected utilizing C-3 ROW	
NAIA Expressway	It is a 4-lane elevated expressway with a total length of 5.2 km. Starting from Sales St. going to Andrews Ave, Domestic Road, MIA Rd. and ends at Roxas Blvd. It includes to construction of toll plaza and 5 on and off ramps. Provide direct access to Food Terminal Inc. (FTI) from both Skyway and C-5, 2 to 4 lanes, length 50.7 km	FS is completed
C-5 Extension	The south end of the project will be connecting SLEX with the coastal road going to Cavite.	FS Stage

Source: DPWH Strategic Infrastructure Policies and Program in 2012, HSH by 2009



Source: DPWH Strategic infrastructure policies and program in 2012, HSH by 2009

FIGURE 5.1-11 FUTURE ROAD NETWORK IN METRO MANILA

5.2 ROAD TRANSPORT IN MEGA MANILA

5.2.1 Road Network

(1) Urban Structure and Road Network

The population distribution in the Region III and Region IV-A is plotted in **Figure 5.2-1**. From this figure, the followings can be deduced:

Region III

- Major cities are mainly distributed along the Pan-Philippine Highway and Manila North Road.
- Small and medium cities are clustered around the major cities of Dagupan, Tarlac, Cabanatuan, Angeles and San Fernando.

Region IV-A

- The area south of Metro Manila has a higher number of major cities than the area north of Metro Manila. In particular, Cavite is host to several major cities.
- Many medium cities are located along the South Luzon Expressway.

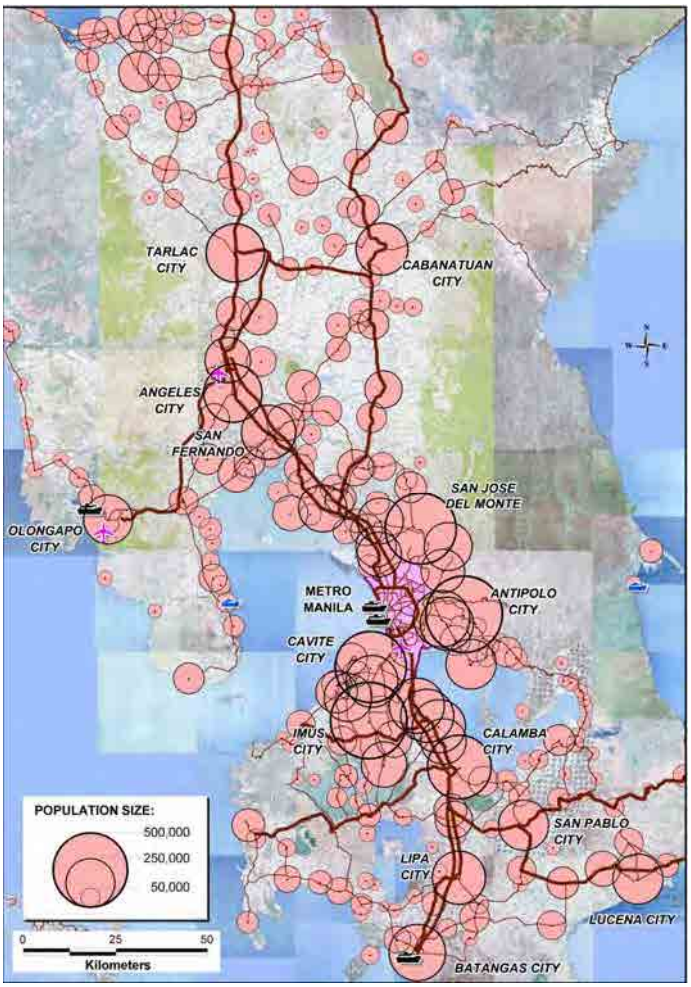


FIGURE 5.2-1 POPULATION DISTRIBUTION IN MEGA MANILA REGION

Figure 5.2-2 shows the expressway network in Region III , which consist of two expressways at present.

- NLEX
- SCTEX

Figure 5.2-3 shows the Road Network in Region III.

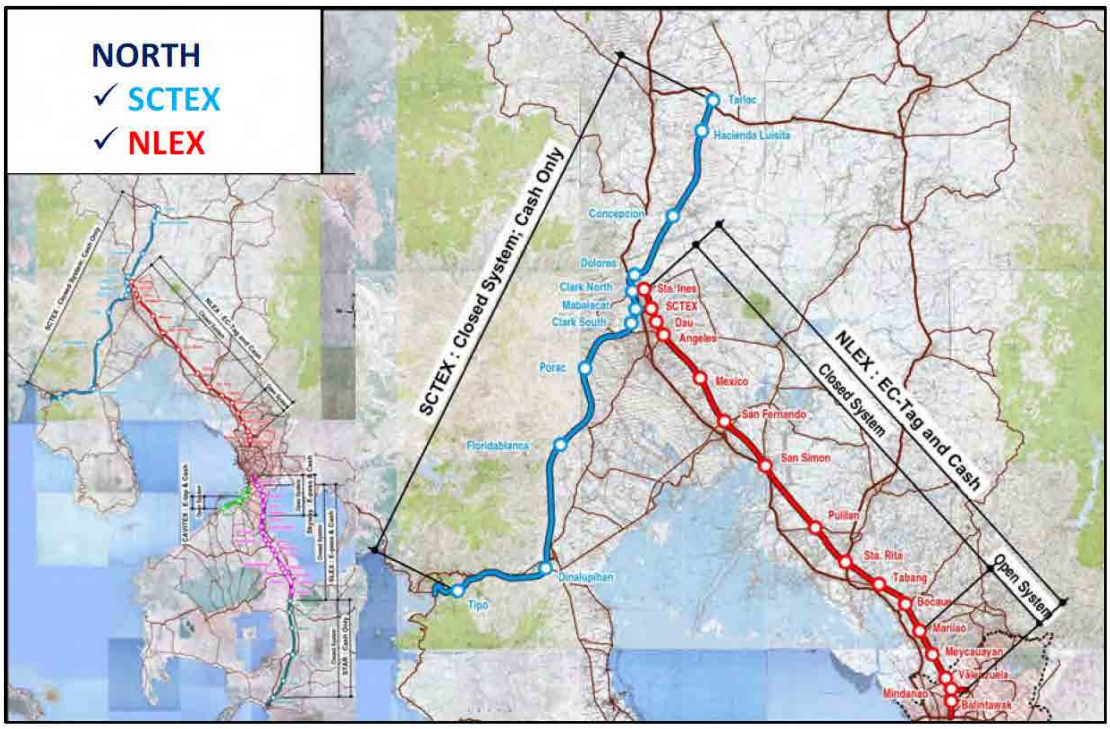


FIGURE 5.2-2 EXPRESSWAY NETWORK IN REGION III

Region III is composed of 14 district engineering offices of DPWH, which are administering national roads.

The major road network in Region III is dominated by an expressway - i.e., NLEX - and two national roads - viz., Manila North Road and Pan Philippine Highway - which connect Metro Manila and Central Luzon. A second expressway, SCTEX, connects Subic Bay and Tarlac City.

FIGURE 5.2-3 ROAD NETWORK IN REGION III

Figure 5.2-4 shows the Expressway network in Region IV-A, which is formed by four expressways.

- CAVITEX
- SKYWAY
- SLEX
- STAR

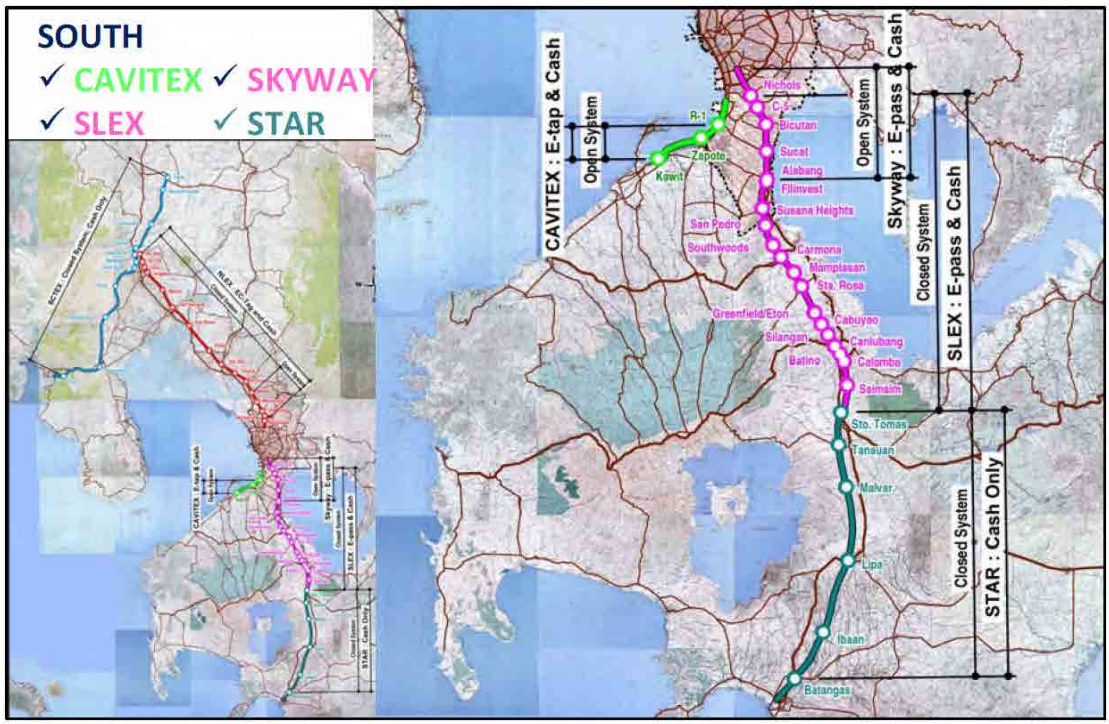


FIGURE 5.2-4 EXPRESS NETWORK IN REGION IV-A

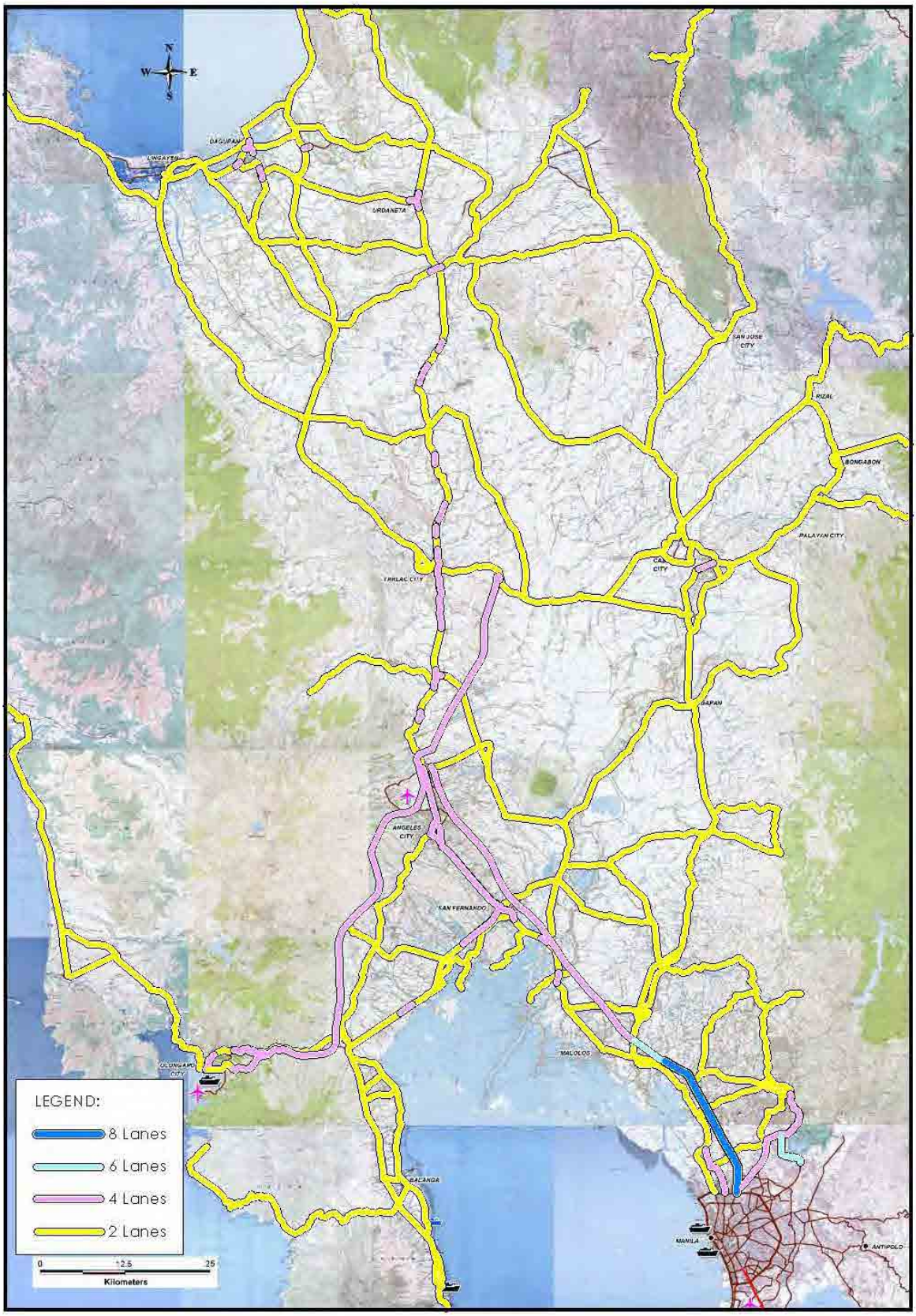
Region IV-A is composed of 15 district engineering offices of DPWH, which administers national road. In this region, Cavite and Laguna provinces have many economic zones. A national port is located in Batangas City to serve as the main shipment point in the region. The main road networks are the expressways of SLEX, STAR and CAVITEX, and the national roads of Aguinaldo Highway, Governor's Drive, Manila South Road (Pan-Philippine Highway), and other national highway which are connected to Metro Manila and the main cities in Region IV-A.

FIGURE 5.2-5 ROAD NETWORK IN REGION IV-A

(2) Number of lanes/ROW width

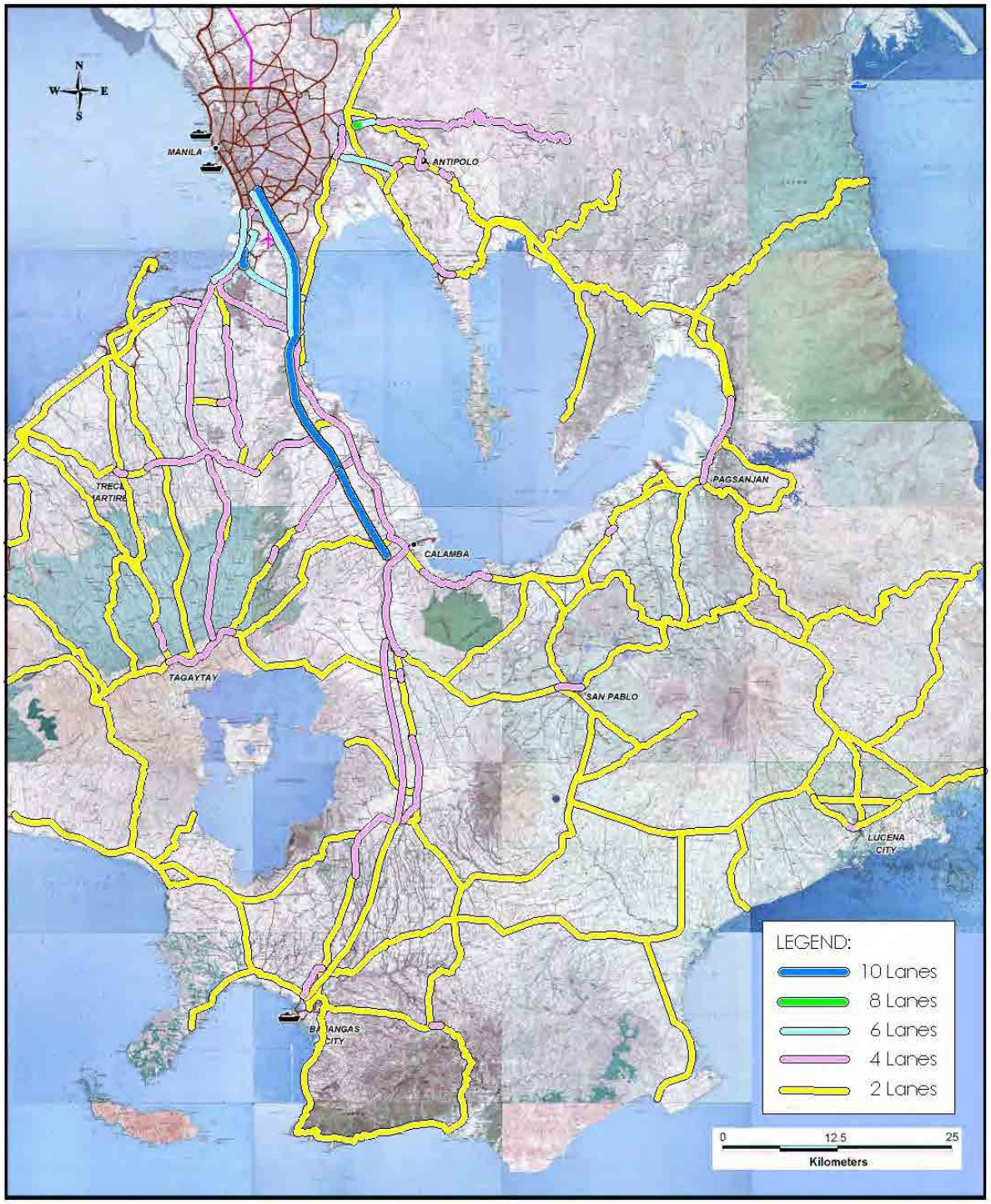
The number of lanes of national roads under the jurisdiction of the DPWH is shown in **Figure 5.2-6** and **Figure 5.2-7**.

The expressways in Region III and Region IV-A are 4 lanes or more, but the national roads are mostly 2 lanes.



Source: HSH by 2009

FIGURE 5.2-6 NUMBER OF LANES IN REGION III



Source: HSH by 2009

FIGURE 5.2-7 NUMBER OF LANES IN REGION IV-A

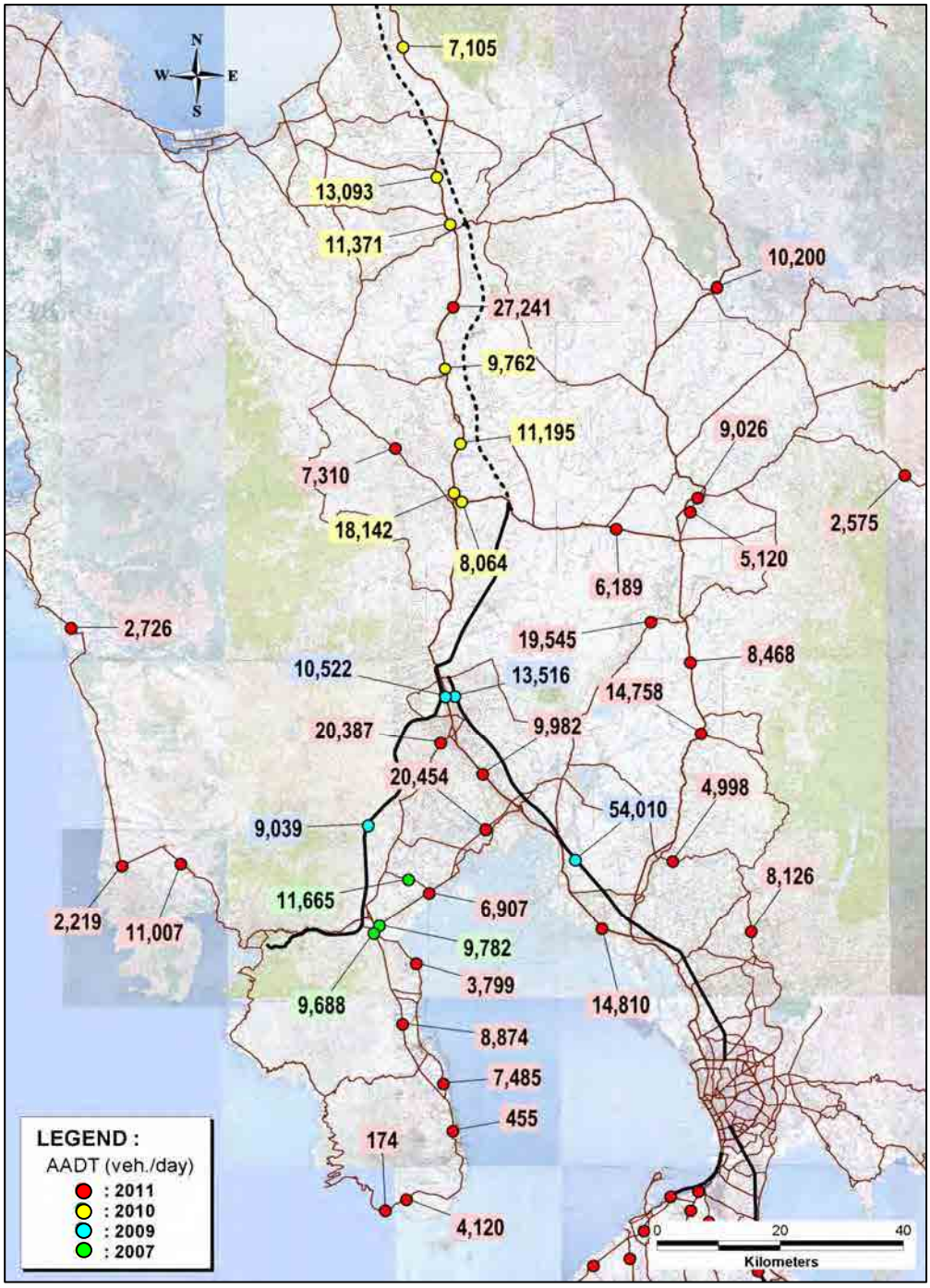
5.2.2 Road Transport Conditions

(1) Traffic Volume

1) Region III

The traffic volume on the road network of Region III is shown in **Figure 5.2-8**. The Manila North

Road remains the most heavily travelled road with 27,241 vehicles per day (observed in 2011) although other national roads such as the Pan-Philippine Highway have also registered high volumes of traffic. Roads connecting Metro Manila to the provinces of Tarlac, Bataan, Bulacan, Nueva Ecija, Pampanga and Zambales, such as Jose Abad Santos Avenue, also have significant traffic. This is despite the presence of NLEX which serves as the main arterial linking the North to Metro Manila as well as to the main cities.



Source: DPWH AADT 2011, Tarlac-La Union Expressway Project by 2010, HSH by 2009
Gapan - San Fernando Olongapo Road Phase ll by 2007

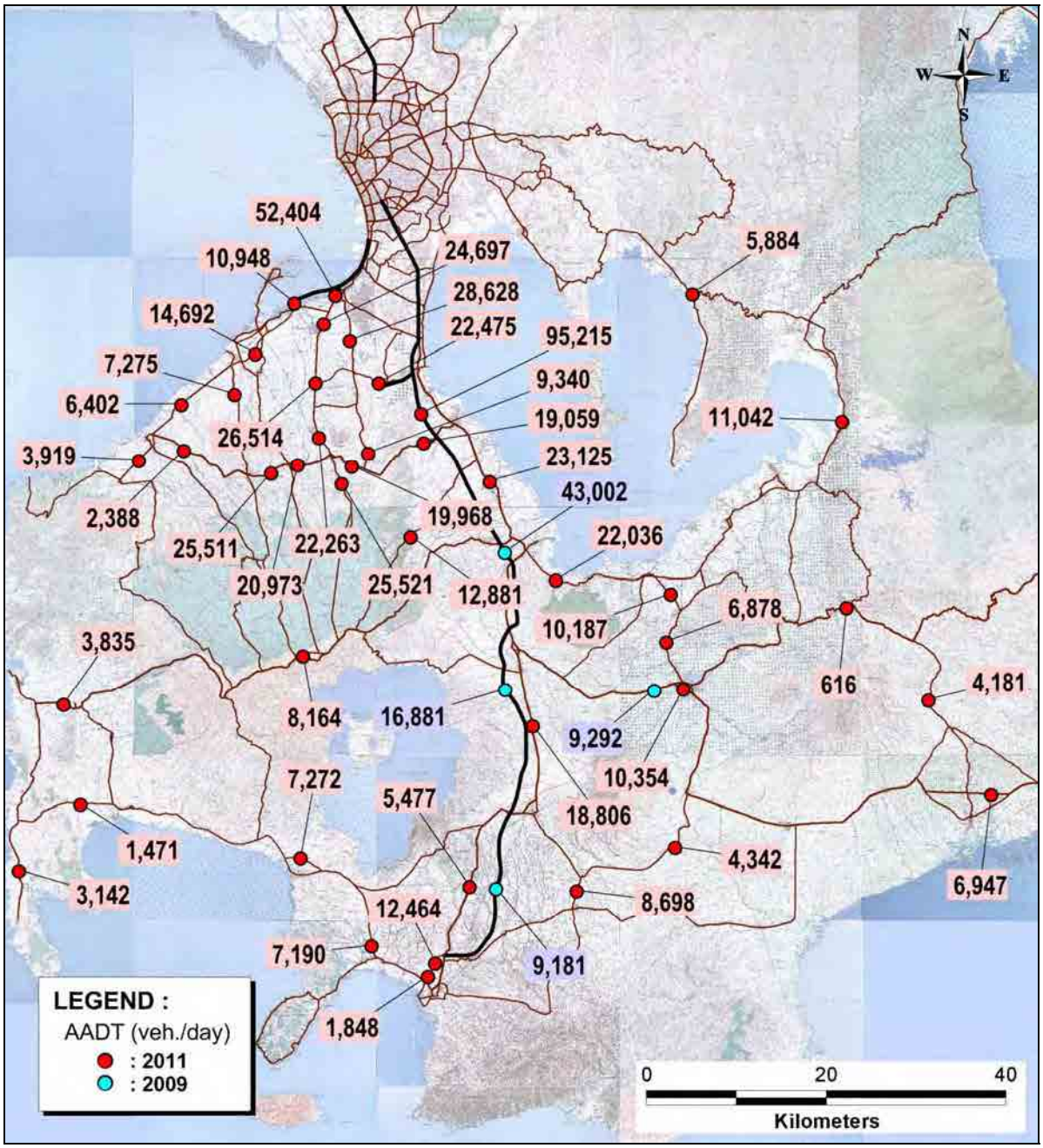
FIGURE 5.2-8 TRAFFIC VOLUME IN REGION III (AADT)

2) Region IV-A

The traffic volume on the road network of Metro Manila is shown in **Figure 5.2-9**. Aguinaldo Highway remains the most heavily travelled road with 26,514 vehicles per day although other roads connecting Metro Manila to cities of Cavite, Laguna and Batangas, such as Governor's Drive, Molino Road, and Manila South Road/Pan-Philippine Highway also carry significant traffic. These roads serve as the main arterials linking the main cities of the region.

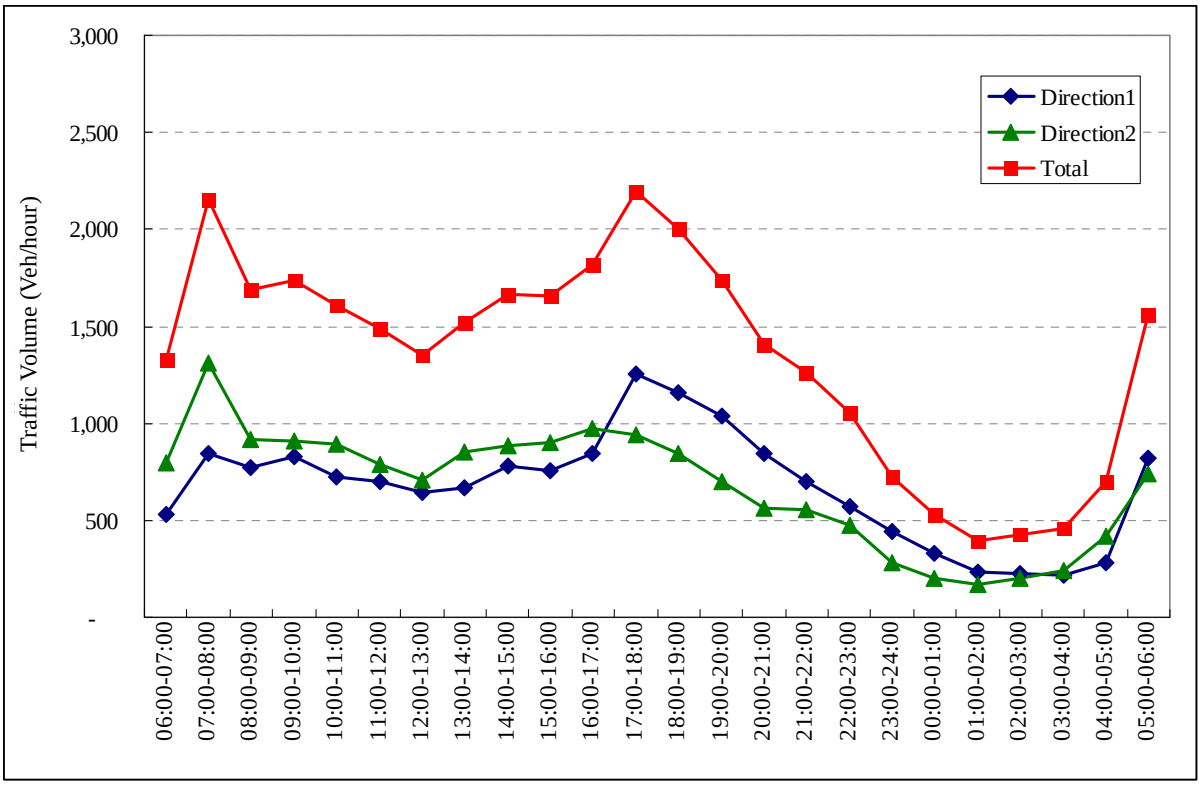
The hourly variation of traffic is presented in **Figure 5.2-10** and **Figure 5.2-11**. From these figures, the following are observed:

- High volume of traffic at Aguinaldo Highway is observed to peak in the morning from 7AM to 8AM and to peak in the evening from 5PM to 6PM.
- The East to West road linking Laguna to Dasmariñas carries a continued high traffic volume throughout the daytime from 6AM to 6PM.



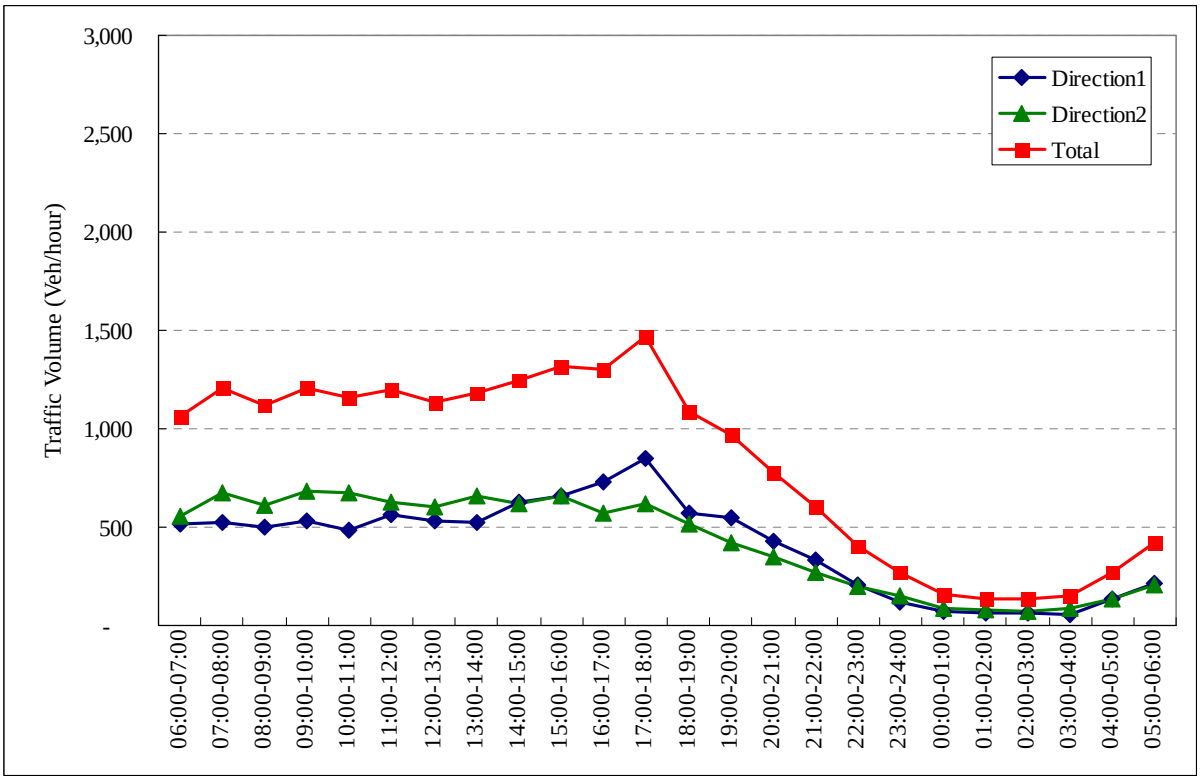
Source: DPWH AADT 2011, CALAX (Cavite section) FS by 2011, CALAX (Laguna section) FS by 2011, HSH by 2009

FIGURE 5.2-9 TRAFFIC VOLUME IN REGION IV-A (AADT)



Source: CALAX (Cavite section) FS by 2011

FIGURE 5.2-10 HOURLY VARIATION OF TRAFFIC AT AGUINALDO HIGHWAY



Source: DPWH AADT 2011, CALAX (Cavite section) FS by 2011

FIGURE 5.2-11 HOURLY VARIATION OF TRAFFIC AT GOVERNOR'S DRIVE

(2) Travel Time

1) Region III

Travel speed is shown in **Figure 5.2-12** and **Figure 5.2-13**. the results of the survey depict a congested national road network where some sections registered a travel speed of less 20 km/hr. The Pan-Philippine Highway which connects Metro Manila to areas of Cabanatuan is also experiencing severe traffic congestions at morning time and evening time at Cabanatuan City and near NLEX. The Manila North Road also has substantial sections where the travel speed is less than 20 km/hr.

Bottleneck (Morning time)

Road	Section	Congestion Length (km)	Speed (km/h)	Causes
Manila North Road	Urdaneta City Center - Mc Donald's	1.0	8.1	Uncontrolled Intersection around Mc Donald's
Manila North Road	By-pass Road Junction (North) - Manila North Road	0.9	11.8	Traffic Signal and Uncontrolled Intersection
Santa Rosa Tarlac Road	Road to Victoria - SCTEX Tarlac Exit	2.0	11.5	Traffic Signal (Intersection in C-3)
Manila North Road	Villasis-Urdaneta Boundary - Mc Donald's	1.0	13.1	Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Manila North Road	Carmen-Villasis Boundary (Bridge) - Villasis Town Center	1.2	18.2	Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Pan Philippine Highway	By-pass Road Junction (South) - NLEX (Sta. Rita Exit)	3.4	8.5	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Pan Philippine Highway	NLEX (Sta. Rita Exit) - By-pass Road Junction (South)	3.4	19.8	Uncontrolled Intersection, Slow moving vehicle(tricycle, jeepney, heavy loaded truck)
Pan Philippine Highway	San Leonardo - Sta. Rosa	6.7	18.9	Uncontrolled Intersection
Pan Philippine Highway	Jct. to Cabanatuan City Proper - Cabanatuan City Proper	3.2	14.3	Traffic Signal (Intersection in Cabanatuan City), Uncontrolled Intersection
Pan Philippine Highway	Sta. Rosa - San Leonardo	6.7	17.8	Uncontrolled Intersection
Pan Philippine Highway	Cabanatuan City Proper - Jct. to Cabanatuan City Proper	3.2	18.5	Traffic Signal (Intersection in Cabanatuan City), Uncontrolled Intersection

Source: Source: HSH by 2009

Bottleneck (Evening time)

Road	Section	Congestion Length (km)	Speed (km/h)	Causes
Manila North Road	Villasis-Urdaneta Boundary - Urdaneta City Center	3.7	6.6	Uncontrolled Intersection
Manila North Road	Urdaneta City Center - Mc Donald's	1.0	14.4	Uncontrolled Intersection
Manila North Road	By-pass Road Junction (North) - Manila North Road	0.9	5.1	Traffic Signal and Uncontrolled Intersection
Pan Philippine Highway	NLEX (Sta. Rita Exit) - Road to Candaba (Flyover)	3.4	6.8	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Pan Philippine Highway	Road to Pinaod - San Ildefonso TP (Market)	0.5	19.0	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Pan Philippine Highway	San Leonardo TP (Market) - Road to Pinaod	0.5	19.7	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Pan Philippine Highway	By-pass Road Junction (South) - NLEX (Sta. Rita Exit)	3.4	17.5	Traffic Signal (Intersection in Cabanatuan City), Uncontrolled Intersection
Pan Philippine Highway	Jct. to Cabanatuan City Proper - Cabanatuan City Proper	2.3	14.5	Traffic Signal and Uncontrolled Intersection
Pan Philippine Highway	Cabanatuan City Proper - Jct. to Cabanatuan City Proper	2.3	14.4	Traffic Signal and Uncontrolled Intersection

Source: Source: HSH by 2009

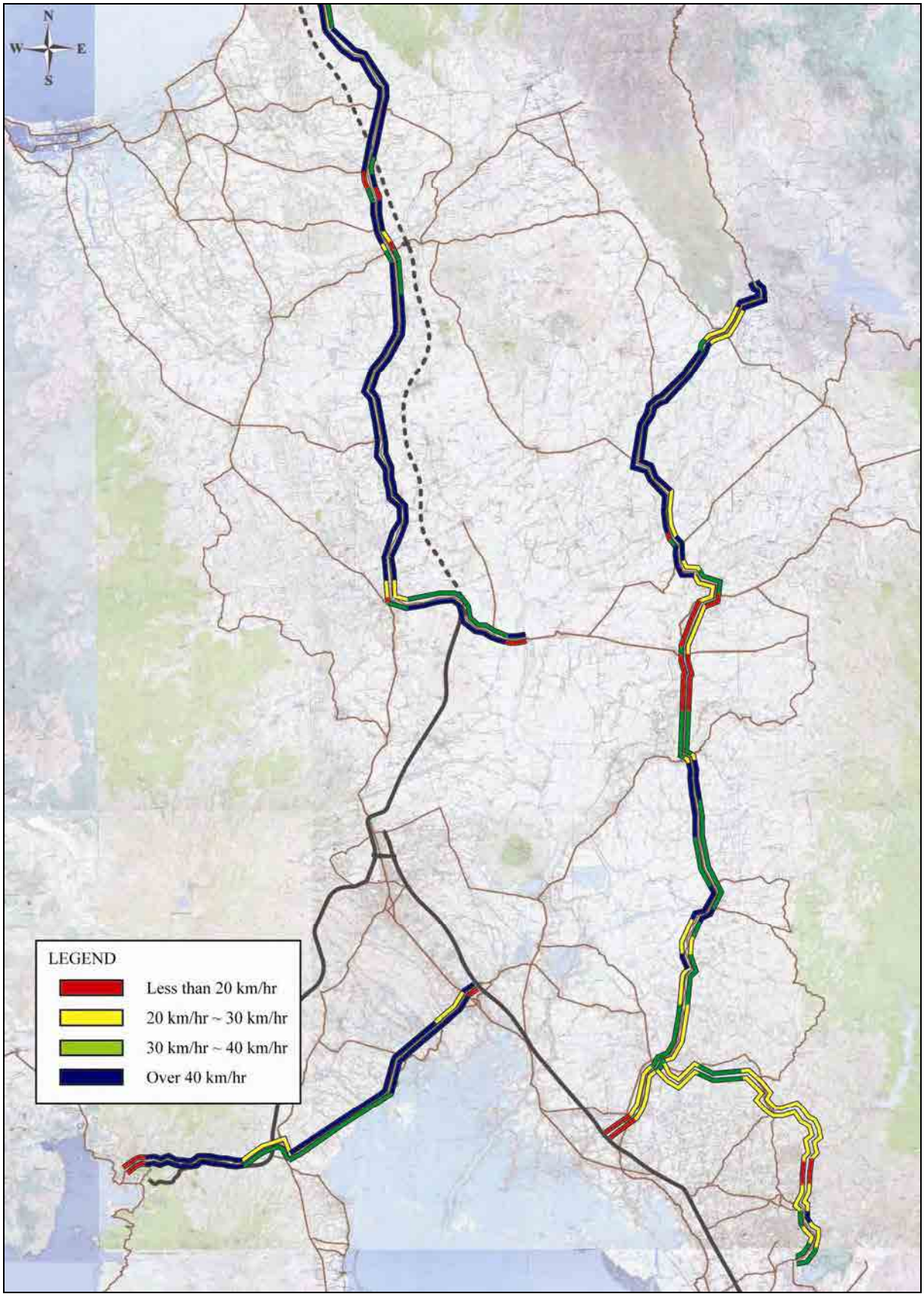


FIGURE 5.2-12 TRAVEL SPEED IN REGION III (MORNING TIME)

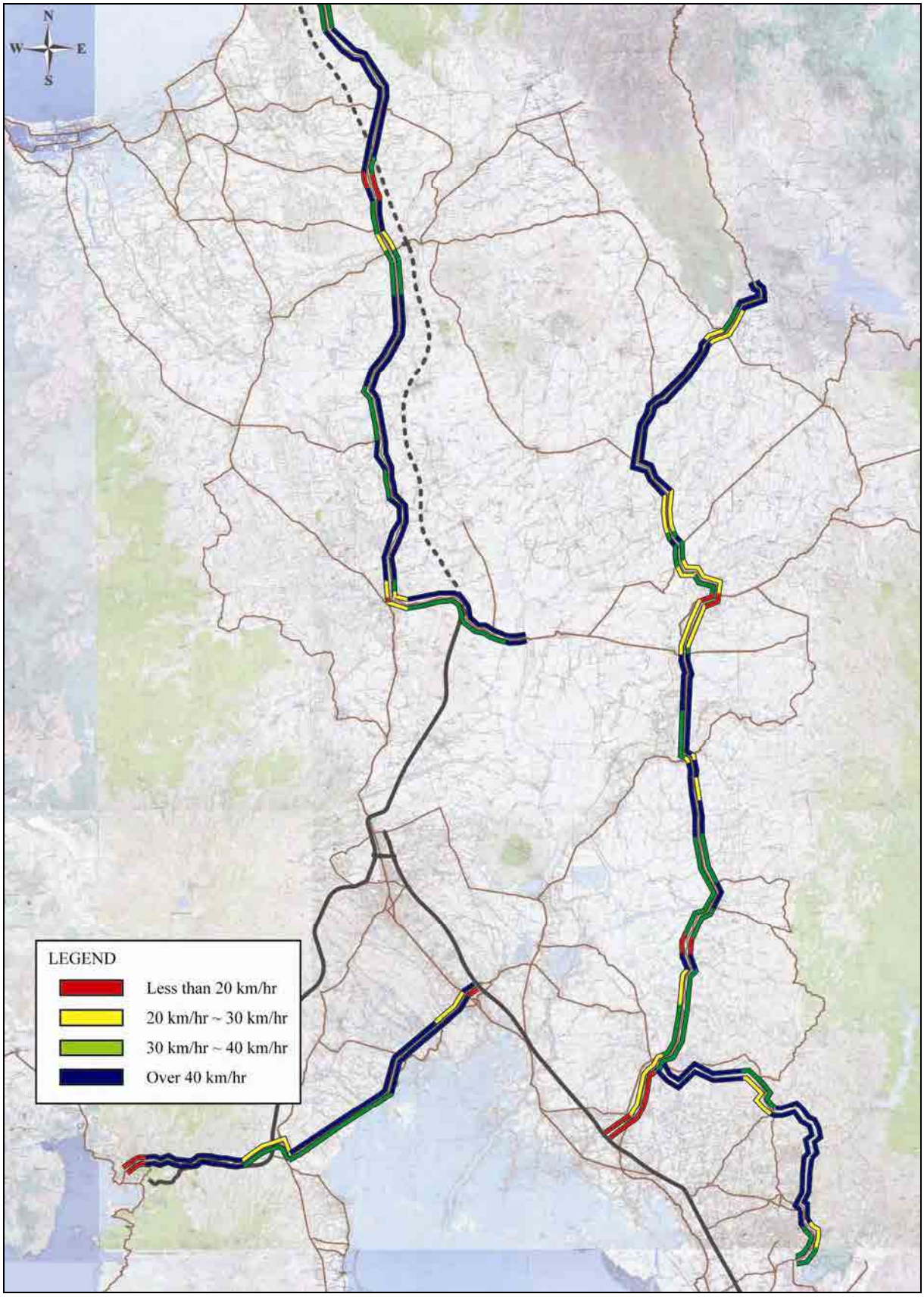


FIGURE 5.2-13 TRAVEL SPEED IN REGION III (EVENING TIME)

2) Region IV-A

Travel speed is shown in **Figure 5.2-14** and **Figure 5.2-15**. The results of the survey depict a congested national road network where some sections recorded a travel speed of less than 20 km/hr. National roads such as Aguinaldo Highway which connect CAVITEX to areas in Dasmariñas and Tagaytay are also experiencing severe traffic congestions at morning time and evening time. Molino Road and Governor's Drive also have substantial sections where the travel speed is less than 20 km/hr.

Bottleneck (Morning time)

Road	Section	Congestion Length (km)	Speed (km/h)	Causes
Molino Road	Daang Hari - Molino Road	2.4	19.8	Traffic Signal at Molino Road Intersection
Molino Road	Molino Road - Daang Hari	2.4	19.3	Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Arnaldo Highway	General Trias - Open Canal Road	3.7	5.7	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Arnaldo Highway	Open Canal Road - General Trias	3.7	12.8	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Gen Trias Drive	A. Soriano Highway - A. Bonifacio	1.2	16.0	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Antero Soriano Highway	Gen. Trias Drive - Tanza-Trece Martires Rd	1.2	18.8	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Centennial Road	Centennial Road - Aguinaldo Highway	4.3	17.8	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Governor's Drive	Crisanto De Los Reyes - A. Bonifacio	1.4	19.7	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Governor's Drive	Paliparan Road - Congressional Rd (west)	1.3	15.9	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Santa Rosa – Tagaytay Road	Laguna Bel Air Drive - Greenfield Parkway	1.0	18.1	Uncontrolled Intersection

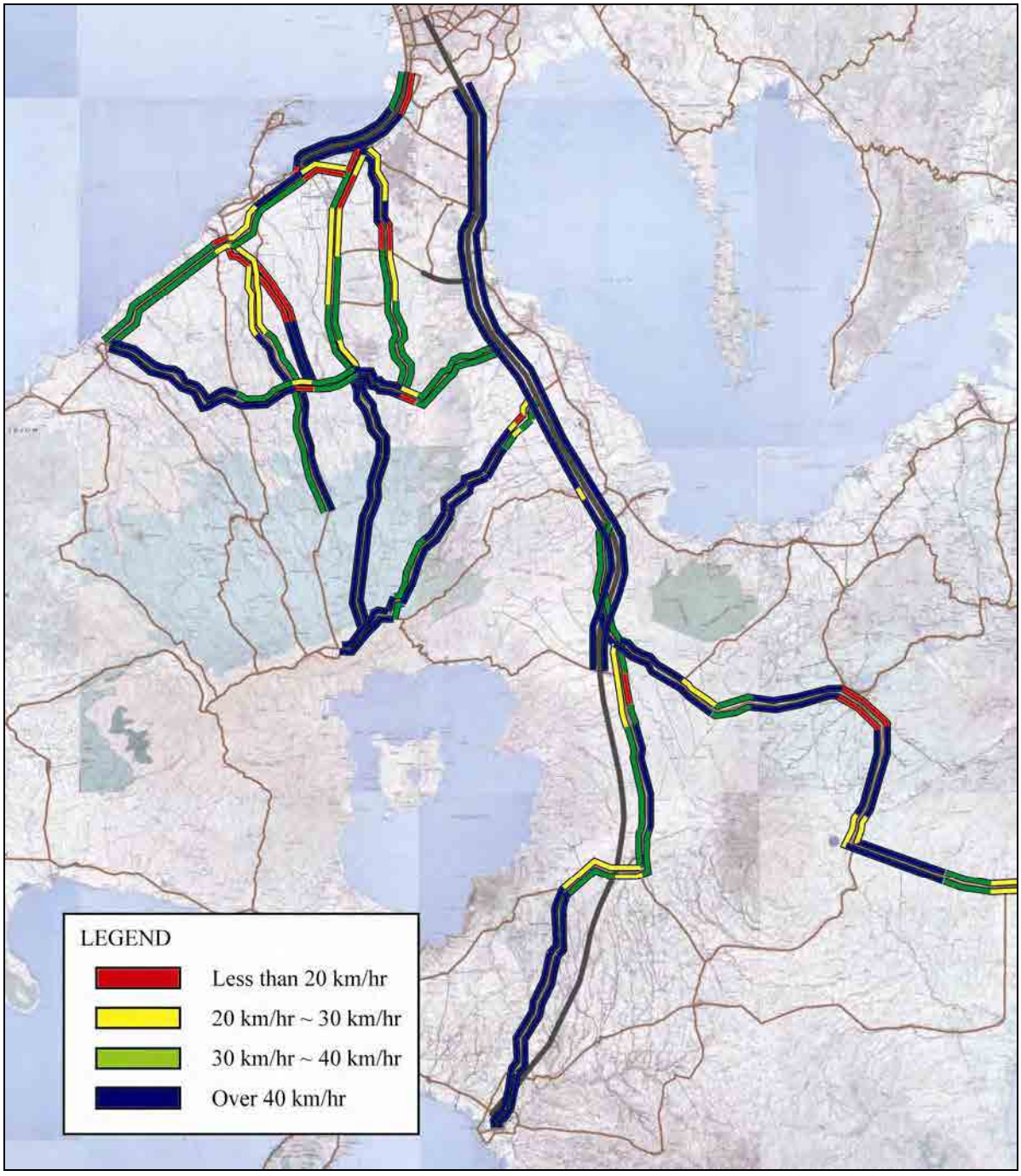
Source: CALAX (Cavite section) FS by 2011, CALAX (Laguna section) FS by 2011, HSH by 2009

Bottleneck (Evening time)

Road	Section	Congestion Length (km)	Speed (km/h)	Causes
Molino Road	Daang Hari - Molino Road	2.4	6.8	Traffic Signal at Molino Road Intersection
Molino Road	Palico Daanan St - Daang Hari	4.9	9.4	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Molino Road	Jose Abad Santos St - Fatima Rd	4.1	14.8	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Arnaldo Highway	General Trias - Open Canal Road	3.7	8.3	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Arnaldo Highway	Open Canal Road - General Trias	3.7	7.6	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Gen Trias Drive	NFA - A. Soriano Highway	4.9	17.5	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Gen Trias Drive	A. Soriano Highway - A. Bonifacio	2.5	13.8	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Centennial Road	Centennial Road - Aguinaldo Highway	4.3	17.4	Traffic Signal Aguinaldo Highway Intersection
Centennial Road	Aguinaldo Highway - Centennial Road	4.3	19.1	Traffic Signal Centennial Road Intersection
Antero Soriano Highway	Gen. Trias Drive - Tanza-Trece Martires Rd	1.2	20.0	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Governor's Drive	Tanza-Trece Martires - Crisanto De Los Reyes	1.4	18.5	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Governor's Drive	A. Bonifacio - Aguinaldo Highway	5.5	17.5	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Governor's Drive	Paliparan Road - Congressional Rd (west)	6.2	9.4	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)

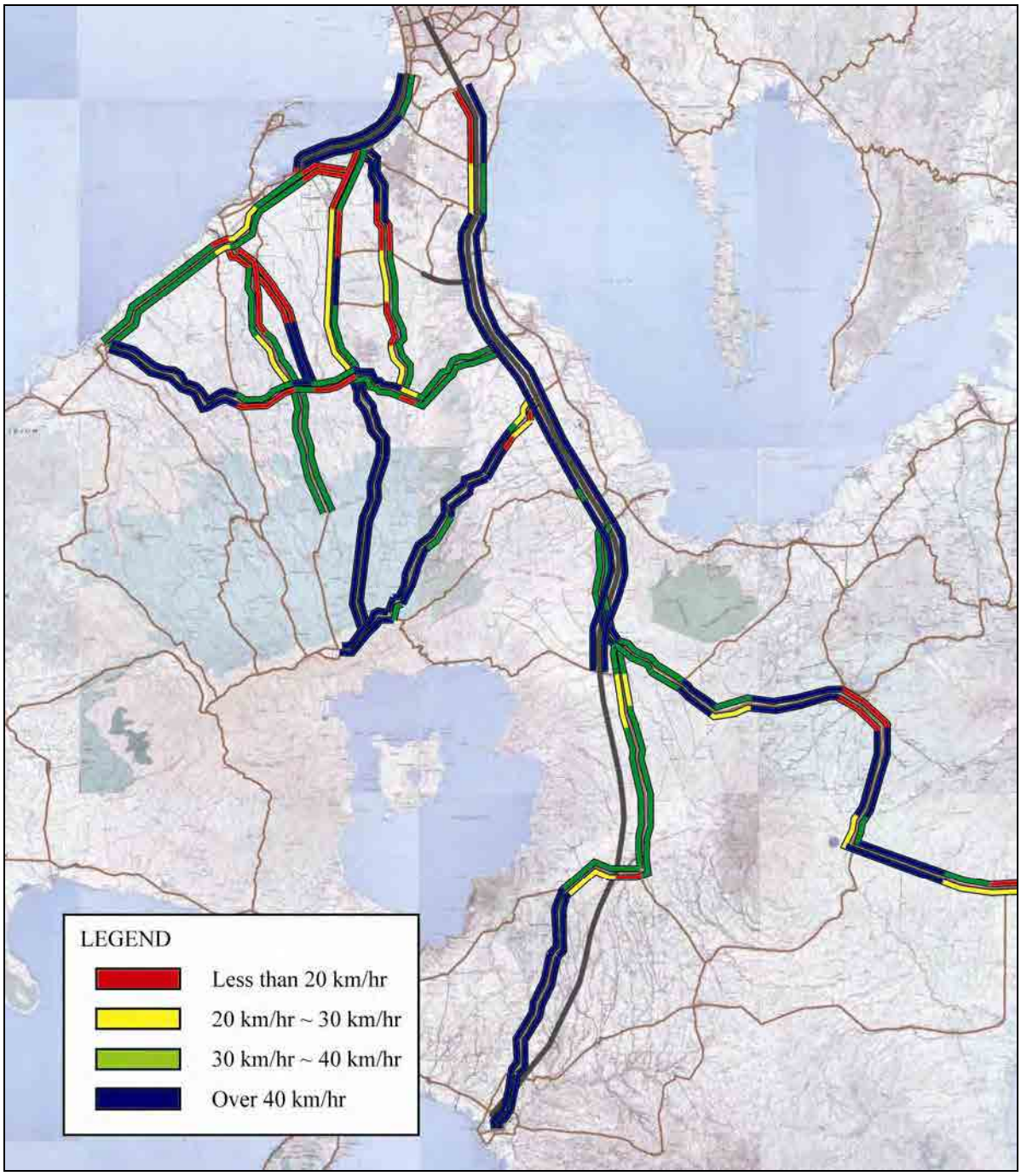
Road	Section	Congestion Length (km)	Speed (km/h)	Causes
Aguinaldo Highway	Palico - Daanan Road - Daang Hari	6.1	19.6	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Aguinaldo Highway	Alabang-Zapote Road - Palico - Daanan Road	5.4	7.1	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Santa Rosa – Tagaytay Road	SLEX Sta. Rosa - Laguna Bel Air Drive	2.8	10.8	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)
Santa Rosa – Tagaytay Road	Laguna Blvd. - Nuvali Road	1.3	17.6	Uncontrolled Intersection, Slow moving vehicle (tricycle, jeepney, heavy loaded truck)

Source: CALAX (Cavite section) FS by 2011, CALAX (Laguna section) FS by 2011, HSH by 2009



Source: CALAX (Cavite section) FS by 2011, CALAX (Laguna section) FS by 2011, HSH by 2009

FIGURE 5.2-14 TRAVEL SPEED IN REGION IV-A (MORNING TIME)



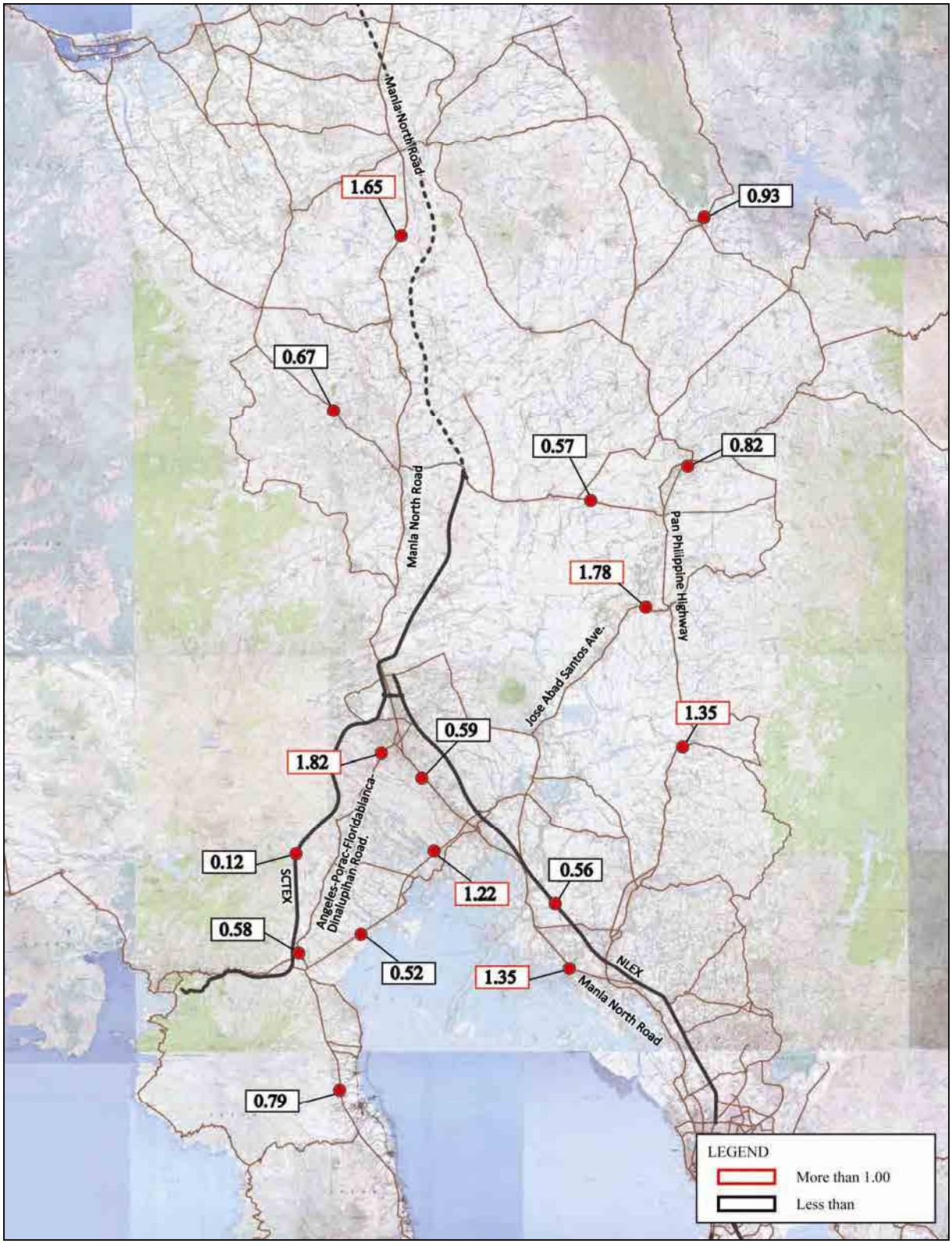
Source: CALAX (Cavite section) FS by 2011, CALAX (Laguna section) FS by 2011, HSH by 2009

FIGURE 5.2-15 TRAVEL SPEED IN REGION IV-A (EVENING TIME)

3) Volume/Capacity Ratio

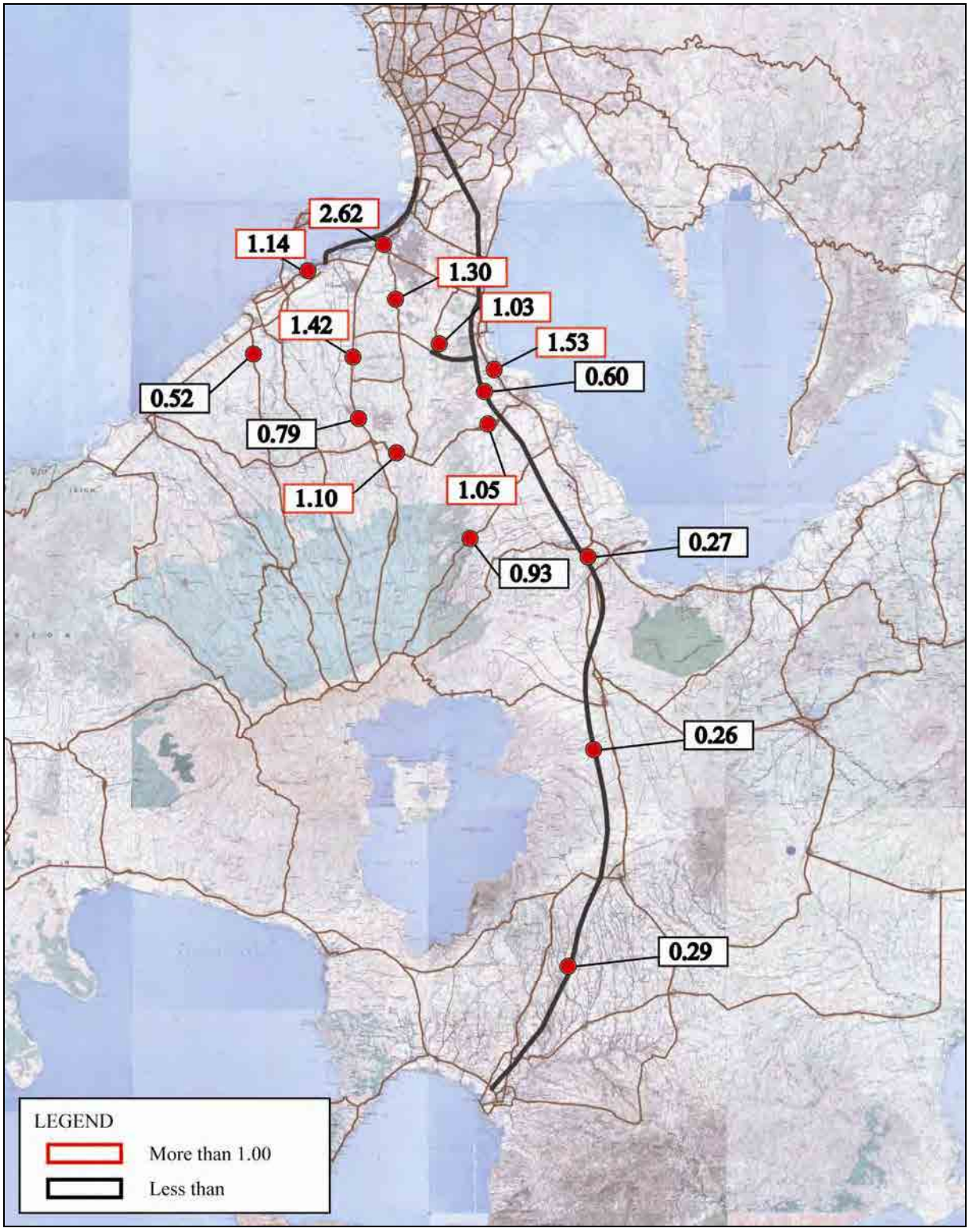
The Volume/Capacity Ratios, which result from the analysis of actual traffic volumes and design capacity of the roads referred to in **Figure 5.2-8** and **Figure 5.2-18** (?), are shown in **Figure 5.2-16** and **Figure 5.2-17**. The Volume/Capacity ratios in rural areas are lower than those in Metro Manila. However, the Volume/Capacity ratios in Region III are higher on the Pan Philippine Highway, Manila North Road, Angeles-Porac-Floridablanca-Dinalupihan Road, and Jose Abad Santos Avenue around intersections than on other road sections. On the other hand, the

Volume/Capacity ratios in Region IV-A are higher on roads closer to Metro Manila and Laguna city and Cavite city.



Source: Traffic volume and No. of lanes

FIGURE 5.2-16 VOLUME/CAPACITY RATIOS IN REGION III



Source: Traffic volume and No. of lanes

FIGURE 5.2-17 VOLUME/CAPACITY RATIOS IN REGION IV-A

4) Problem/Issues Summary

The following is a summary of problems and issues pertaining to national road and traffic condition at Region III and Region IV-A:

Road Network

- The main road network in Region III consists of the Pan Philippine Highway and Manila North Road, connecting the northern part of Metro Manila and the southern part of North Luzon. Road improvements are fewer in this region than in Metro Manila. Thus, when traffic congestion occurs on these roads, road users cannot avoid traffic congestion because there is practically no major detour road.
- Theroad network is moderately developed in Region IV-A. Especially, north-to-south connecting roads, viz., Aguinaldo Highway, Molino Road and Pan-Philippine Highway, and the west-to-east connecting road, i.e., Governor's Drive, already consist of 4 lanes. However, as population and economic continue to grow rapidly in Laguna and Cavite, traffic volumes are predicted to increase and concentrate in these corridors.

Traffic Condition

- Traffic volume in Region III is concentrated in the provincial areas of Tarlac, Cabanatuan and Angeles on the Manila North Road and Pan Philippine Highway. However, the volume/capacity ratio is less than 1.00. As the traffic volume is concentrated in the morning or evening peak times when travel speed is less than 20 km/hr, traffic congestion occurs during those times.
- Traffic volume in Region IV-A is high near Metro Manila. Traffic congestion occurs along Aguinaldo Highway throughout the daytime. Also, in the morning and evening peak times, traffic congestion occurs along Governor's Drive.
- In the near future, traffic congestion is predicted to worsen in keeping with the growth of population and economic development in Region IV-A.

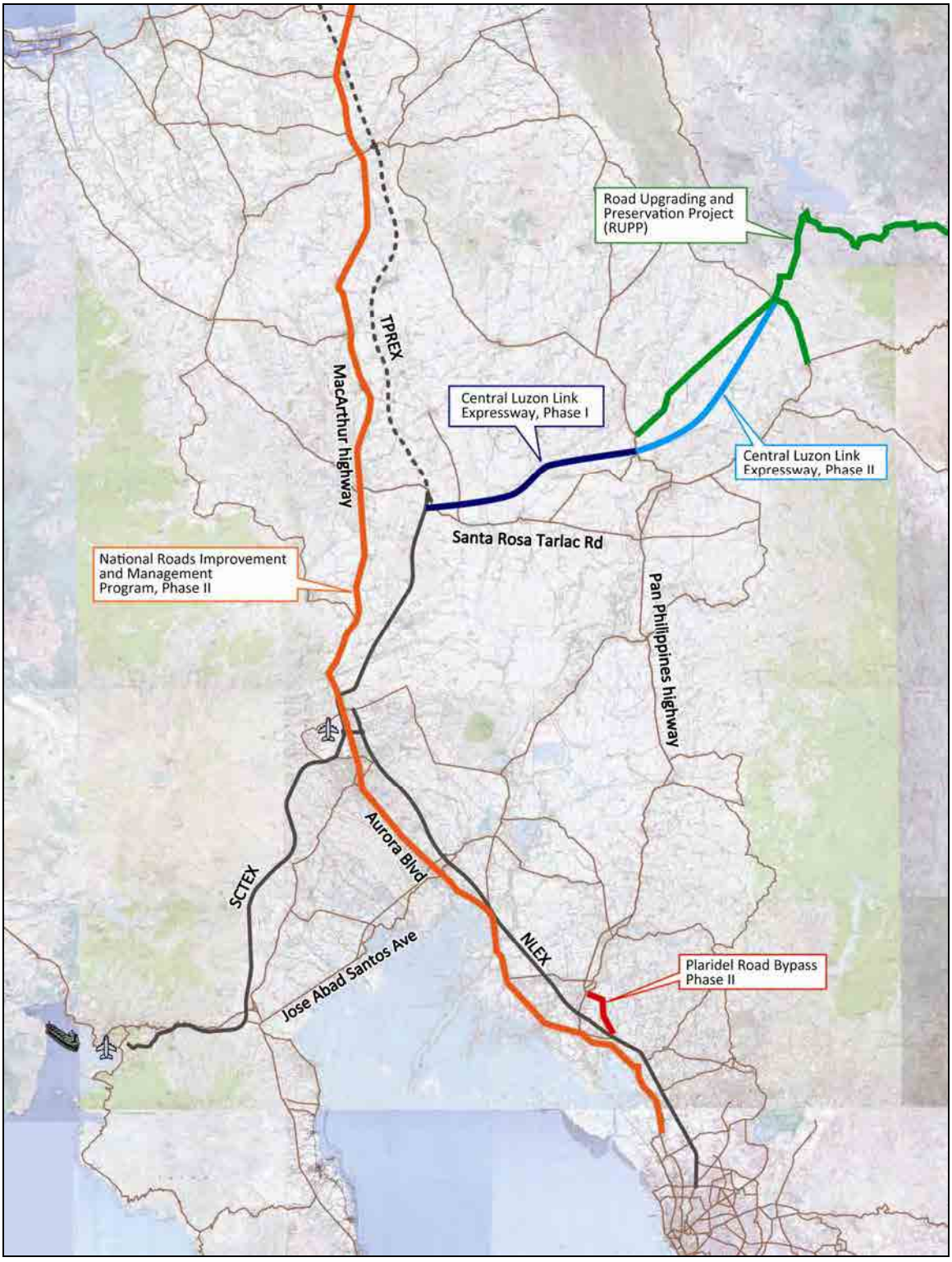
5.2.3 Road Projects

The major road projects in Region III and Region IV-A as planned by DPWH are shown in **Table 5.2-1** and **Figure 5.2-18**. These projects include construction and rehabilitation works on four (4) expressway projects, one (1) bypass project, two (2) road improvement and management projects, and two (2) road upgrading projects. Still many other projects are to be done.

TABLE 5.2-1 ROAD PROJECTS IN METRO MANILA

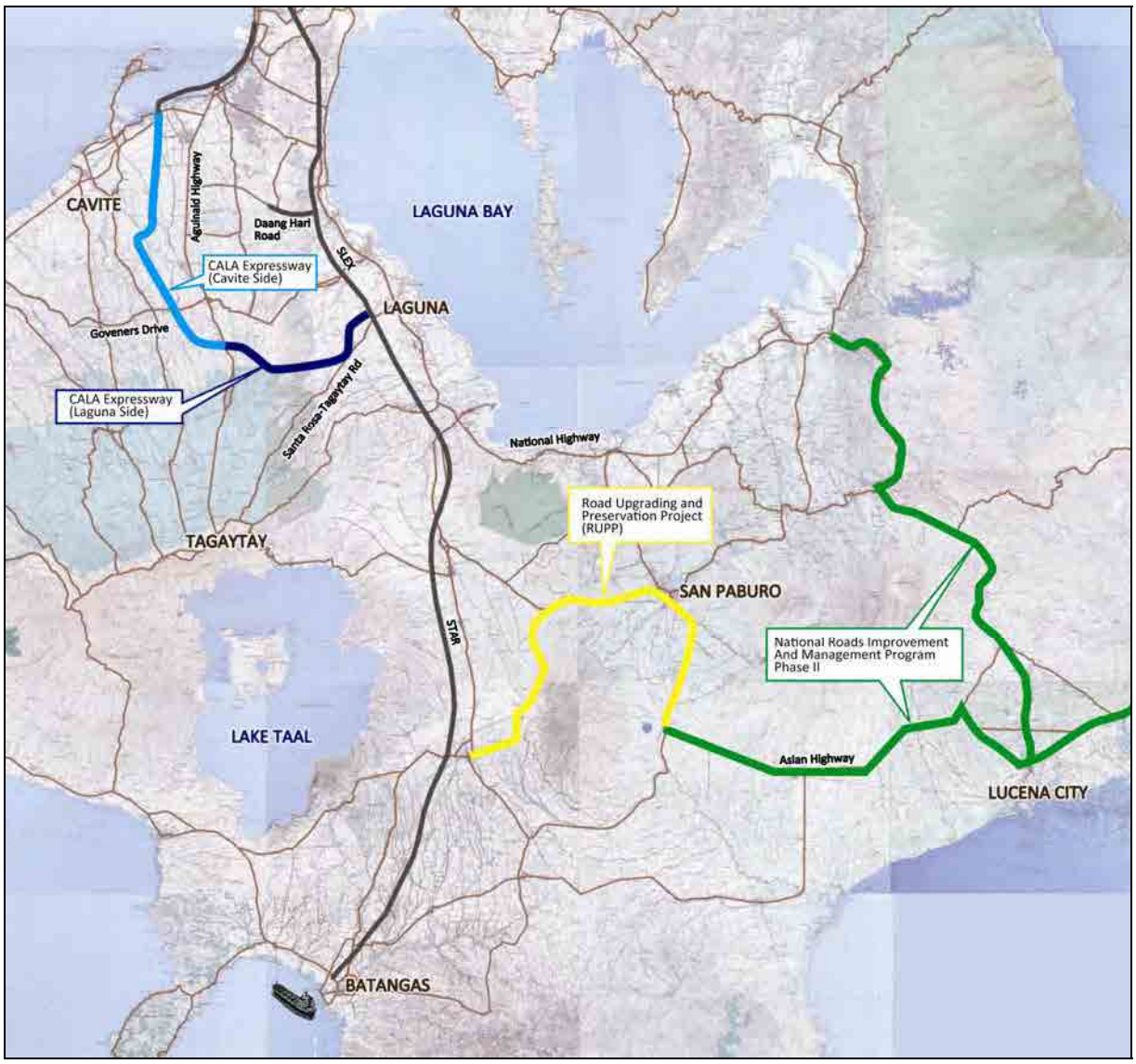
Road Project		Description
Expressway	Central Luzon Expressway Phase I	Construction of a 4-Lane expressway to decongest traffic at Daang Maharlika
	Central Luzon Expressway Phase II	The project is an extension of CLEx Phase I and will connect Cabanatuan City to San Jose City in Nueva Ecija Province. It will also provide faster and safer access to Region II.
	CALA Expressway (Cavite Section)	Construction of a 4-Lane to 6-Lane expressway with a total length of 28.2 km.
	CALA Expressway (Laguna Section)	Construction of a 4-Lane expressway with a total length of 18.8 km.
Bypass project	Plaridel Road Bypass Phase II	Completion of project: December 2016
Improvement and management	Road Upgrading and Preservation Project (RUPP) - Region III -	This road upgrading and preservation will be conducted from Bazal to Canili and from Pantabangan to Talavera on Pan Philippine Highway. Total length 98.9 km.
	Road Upgrading and Preservation Project (RUPP) - Region IV-A -	This road upgrading and preservation will be conducted from Lipa to Tiaong on Pan Philippine Highway. Total length 37.1 km.
Road upgrading	National Roads Improvement and Management Program (NRIMP), Phase II - Region III -	National roads improvement and management program will be conducted from Baguio to Metro Manila on Manila North Road.
	National Roads Improvement and Management Program (NRIMP), Phase II - Region IV-A -	National roads improvement and management program will be conducted from Tiaong to Pagsanjan and Calauag on Pan Philippine Highway.

Source: DPWH Strategic infrastructure policies and program



Source: DPWH Strategic infrastructure policies and program

FIGURE 5.2-18 ROAD PROJECTS IN REGION III



Source: DPWH Strategic infrastructure policies and program

FIGURE 5.2-19 ROAD PROJECTS IN REGION IV-A

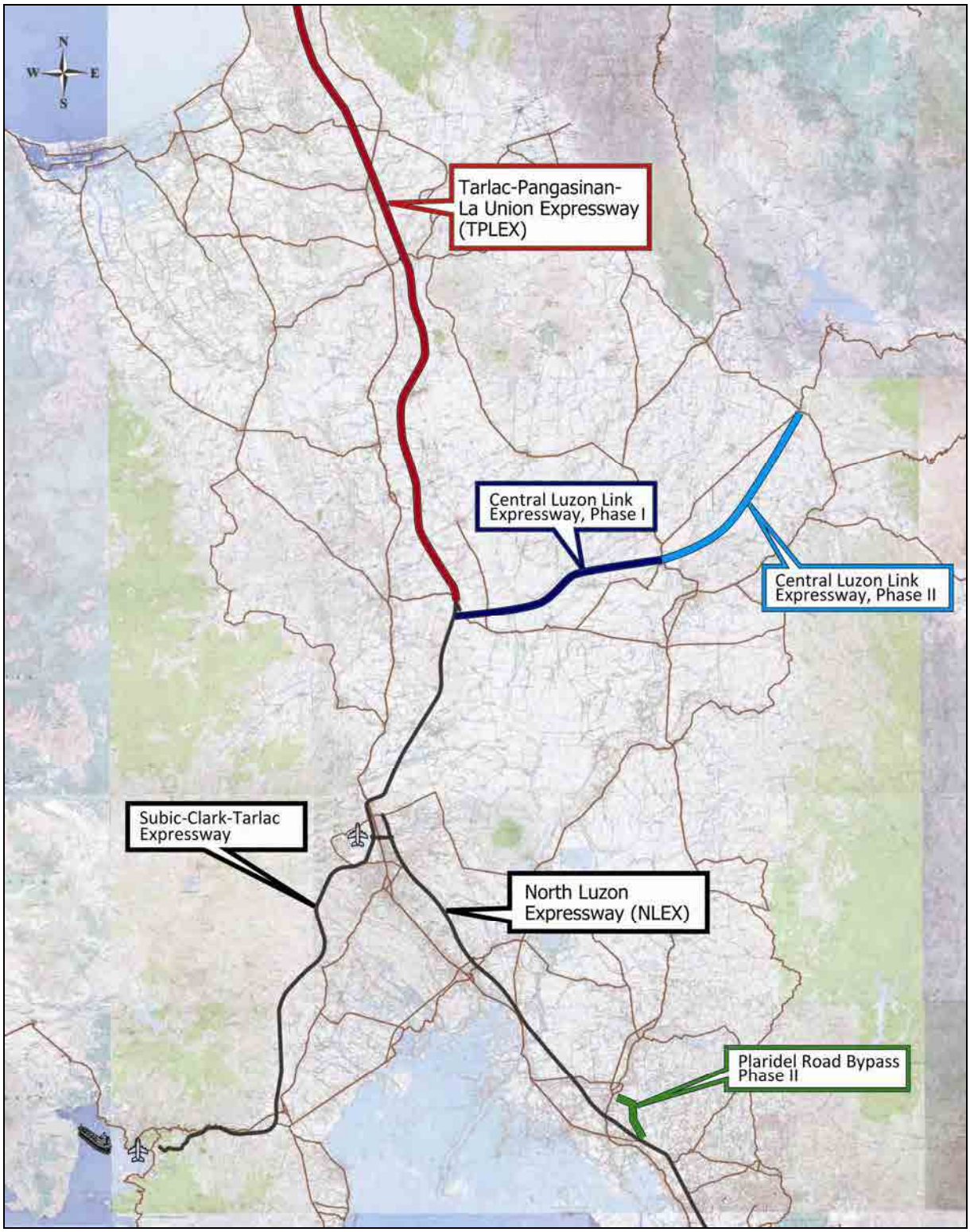
5.2.4 Future Road Network

The future road network is shown in **Figure 5.2-20** and **Figure 5.2-21**. This network is based on the "Master Plan on High Standard Highway Network Development Project in the Republic of the Philippines, JICA (2010)", which will be implemented until 2030. From this future road network, the major projects shown in **Table 5.2-2** have been lined up for priority implementation.

TABLE 5.2-2 FUTURE ROAD NETWORK IN REGION III AND REGION IV-A

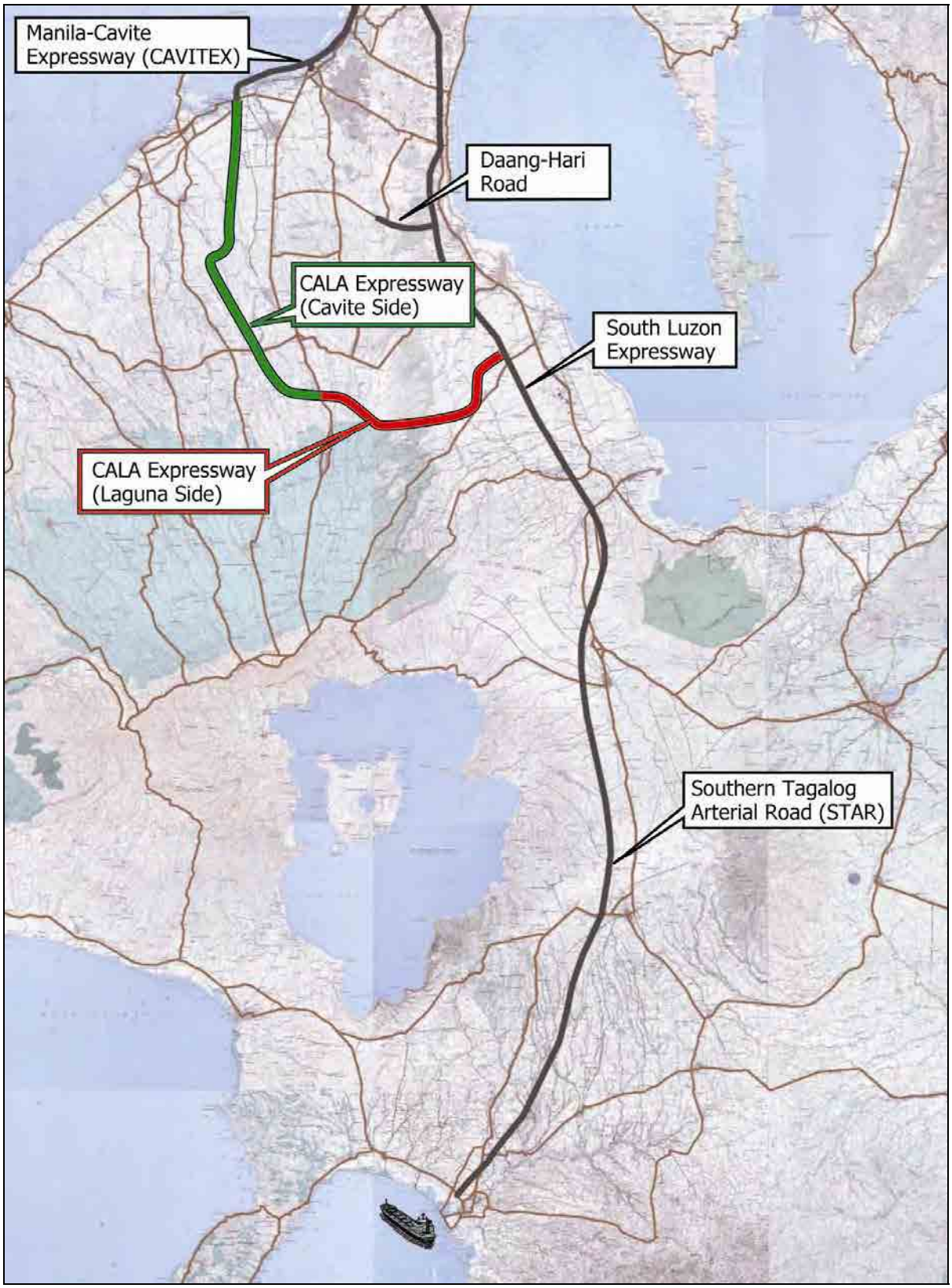
Future Road Projects	Description	Status
Central Luzon Expressway (CLLEX)	Construction of a 4-Lane expressway to decongest traffic at Daang Maharlika	Detailed Engineering Design will be conducted.
	The project is an extension of CLEx Phase I and will connect Cabanatuan City to San Jose City in Nueva Ecija Province. It will contribute to the development of the regional growth centers in Central and Northern Luzon areas and also aims to decrease overconcentration in Metro Manila for socio-economic development.	Conceptual Stage
North Luzon Expressway	Widening from Balintawak to SBMA	Completed / Operational
Subic-Clark-Tarlac Expressway	Construction of 4-lane expressway to connect end of Subic Bay - Tarlac City running parallel to Manila North Road	Completed / Operational
Plaridel Road Bypass Phase II	Phase I is From NLEX Guiguinto to Pan Philippine Highway in San Rafael, both in the province of Bulacan (23 kms). Phase II completion of project is on December 2016	Conceptual Stage
CALA Expressway	(Cavite Section) Construction of a 4-Lane expressway with a total length of 28.2 km.	• FS is completed • DD section will be conducted
	(Laguna Section) Construction of a 4-Lane expressway with a total length of 18.8 km.	• FS is completed • DD section will be conducted
South Luzon Expressway	Operating from Buendia Flyover (Gil Puyat Flyover) to Santo Tomas	Completed / Operational
Southern Tagalog Arterial Road	Operating from Santo Tomas to Batangas City	Completed / Operational
Manila-Cavite Expressway	Operating from NAIA Road Intersection to Kawit Interchange	Completed / Operational

Source: DPWH Strategic infrastructure policies and program in 2012, HSH by 2009



Source: DPWH Strategic infrastructure policies and program in 2012, HSH by 2009

FIGURE 5.2-20 FUTURE ROAD NETWORK IN REGION III



Source: DPWH Strategic infrastructure policies and program in 2012, HSH by 2009

FIGURE 5.2-21 FUTURE ROAD NETWORK IN REGION IV-A

5.3 PUBLIC TRANSPORT

5.3.1 Bus Transport

5.3.1.1 Bus Routes

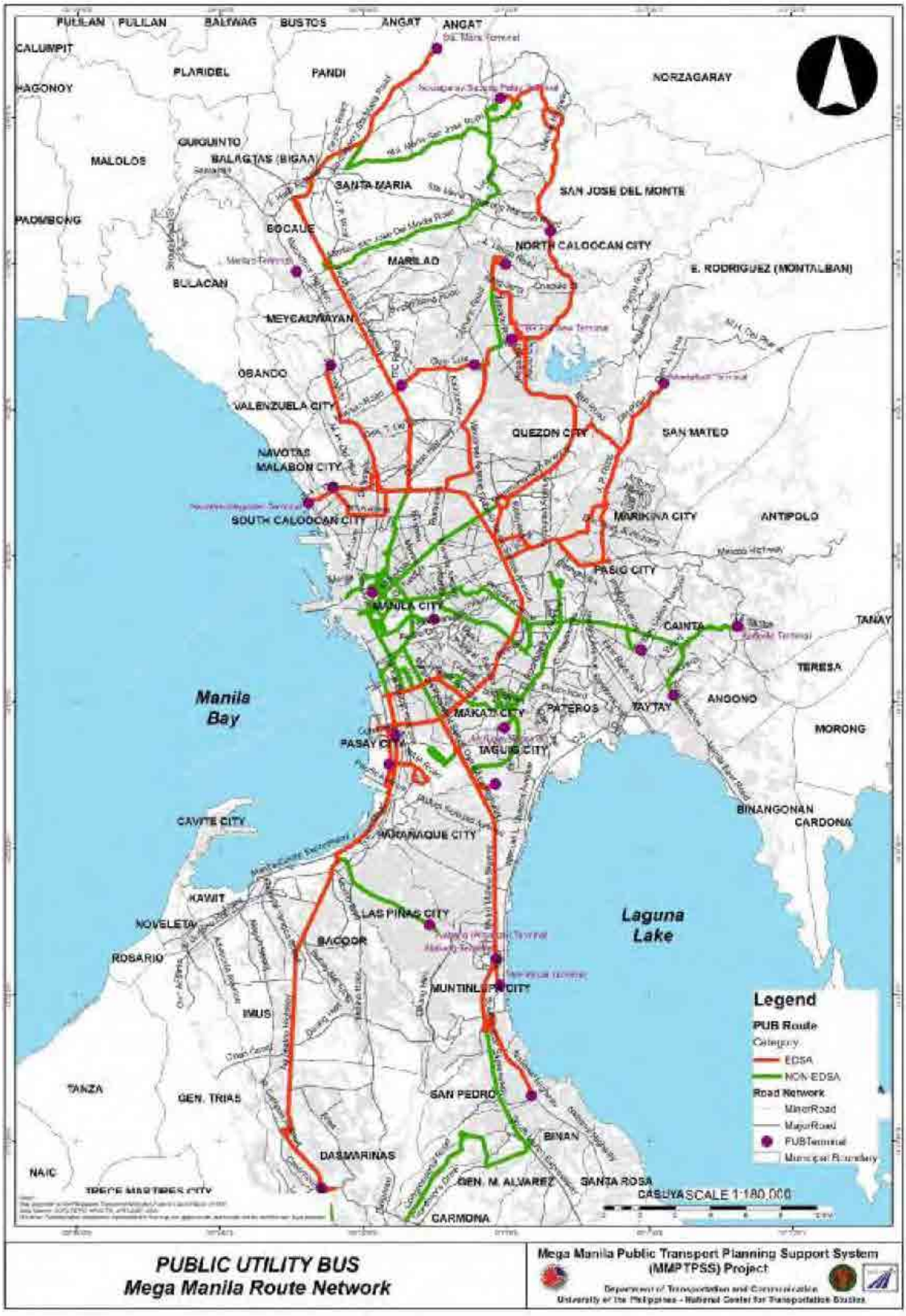
There are a lot of bus routes in Metro Manila, which run along the main roads and even in narrow streets.

Many bus routes ply along EDSA because it is where office and commercial areas are mostly located. All bus routes should be registered according to the regulation of the Land Transportation Franchising and Regulatory Board (LTFRB); however, there are many illegal buses which are called “colorum” vehicles.

Therefore, LTO, LTFRB and MMDA are considering, as enforcement tools against “colorum” vehicles, the use of Radio Frequency Identification (RFID) or Global Positioning System (GPS) and similar measures. **Figure 5.3-3** is a map showing bus companies and bus terminals in Metro Manila. In total, there are 43 bus companies and 50 bus terminals. Many bus companies and bus terminals are located along EDSA. Meanwhile, DPWH is planning “Integrated Terminal System” which can restrict provincial buses from entering EDSA.

Source: JICA Study team

FIGURE 5.3-1 BUS STOP AT AROUND GUADALUPE STATION / INTERIOR OF BUS



Source: DTC

FIGURE 5.3-2 EXAMPLE: BUS / JEEPNEY ROUTE MAP IN MAKATI CITY (MAY, 2004)

Source: Google Earth

FIGURE 5.3-3 BUS COMPANIES AND BUS TERMINALS IN METRO MANILA (2011)

5.3.1.2 Bus Operations

According to the database of registration of franchised vehicles in LTFRB, in 2011 the total number of the franchised cases was 1,396 in the NCR, Region III and Region IV, and the total number of buses was 2,982 (see **Table 5.3-1** and **Table 5.3-2**).

The registered buses are mostly for School Transport in the NCR, but in Region IV, most of the registered buses are for Public Transport and Shuttle Transport. In fact, most of the bus route destinations are in the NCR. The registration of public utility buses is done outside of the NCR only. The franchised bus routes are for connections among Region III, Region IV and the NCR.

TABLE 5.3-1 NUMBER OF BUS FRANCHISES IN NCR, REGION III AND REGION IV

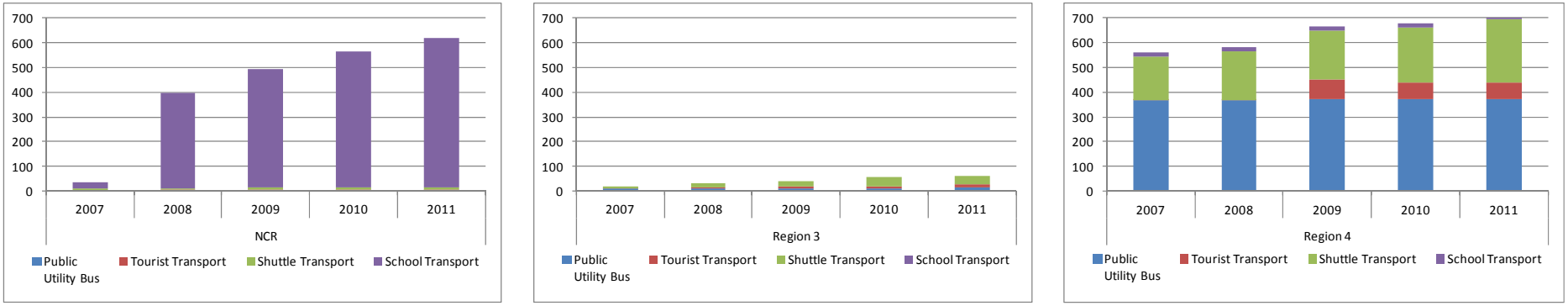
		Public Utility Bus	Tourist Transport	Shuttle Transport	School Transport	TOTAL	Growth Rate
NCR	2007	0	3	7	25	35	1.00
	2008	0	5	7	387	399	11.40
	2009	0	5	9	481	495	14.14
	2010	0	5	11	547	563	16.09
	2011	0	5	12	601	618	17.66
Region 3	2007	9	4	6	0	19	1.00
	2008	9	5	18	0	32	1.68
	2009	12	6	23	0	41	2.16
	2010	12	9	36	0	57	3.00
	2011	15	11	37	0	63	3.32
Region 4	2007	366	2	176	18	562	1.00
	2008	366	2	195	18	581	1.03
	2009	374	76	197	18	665	1.18
	2010	371	67	223	18	679	1.21
	2011	372	67	258	18	715	1.27

Source: LTFRB

TABLE 5.3-2 NUMBER OF FRANCHISED BUS UNITS IN NCR, REGION III AND REGION IV

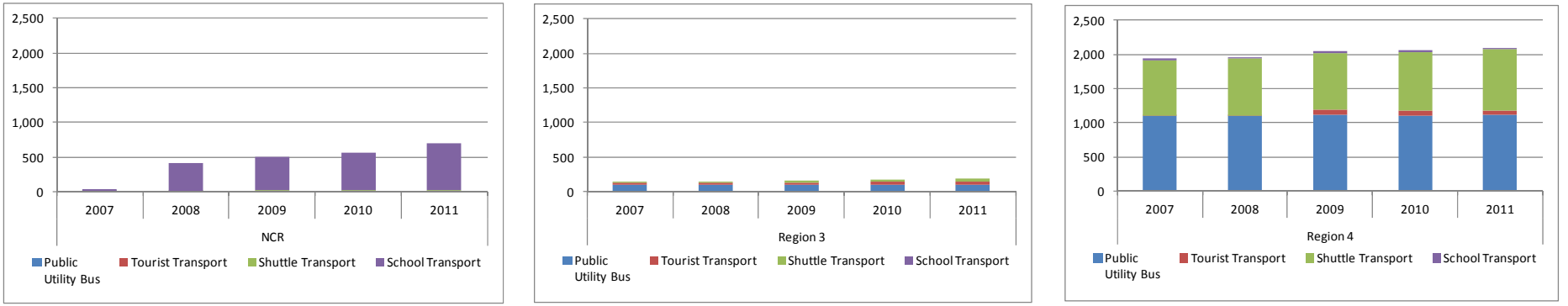
		Public Utility Bus	Tourist Transport	Shuttle Transport	School Transport	TOTAL	Growth Rate
NCR	2007	0	3	11	29	43	1.00
	2008	0	5	11	391	407	11.63
	2009	0	5	13	485	503	14.37
	2010	0	5	15	551	571	16.31
	2011	0	5	16	681	702	20.06
Region 3	2007	95	33	10	0	138	1.00
	2008	95	34	22	0	151	7.95
	2009	98	35	27	0	160	8.42
	2010	99	38	40	0	177	9.32
	2011	103	40	41	0	184	9.68
Region 4	2007	1,105	2	813	23	1,943	1.00
	2008	1,105	2	832	23	1,962	3.49
	2009	1,113	76	834	23	2,046	3.64
	2010	1,110	67	860	23	2,060	3.67
	2011	1,111	67	895	23	2,096	3.73

Source: LTFRB



Source: LTFRB

FIGURE 5.3-4 NUMBER OF FRANCHISED (LEFT: NCR, MIDDLE: REGION III, RIGHT: REGION IV)



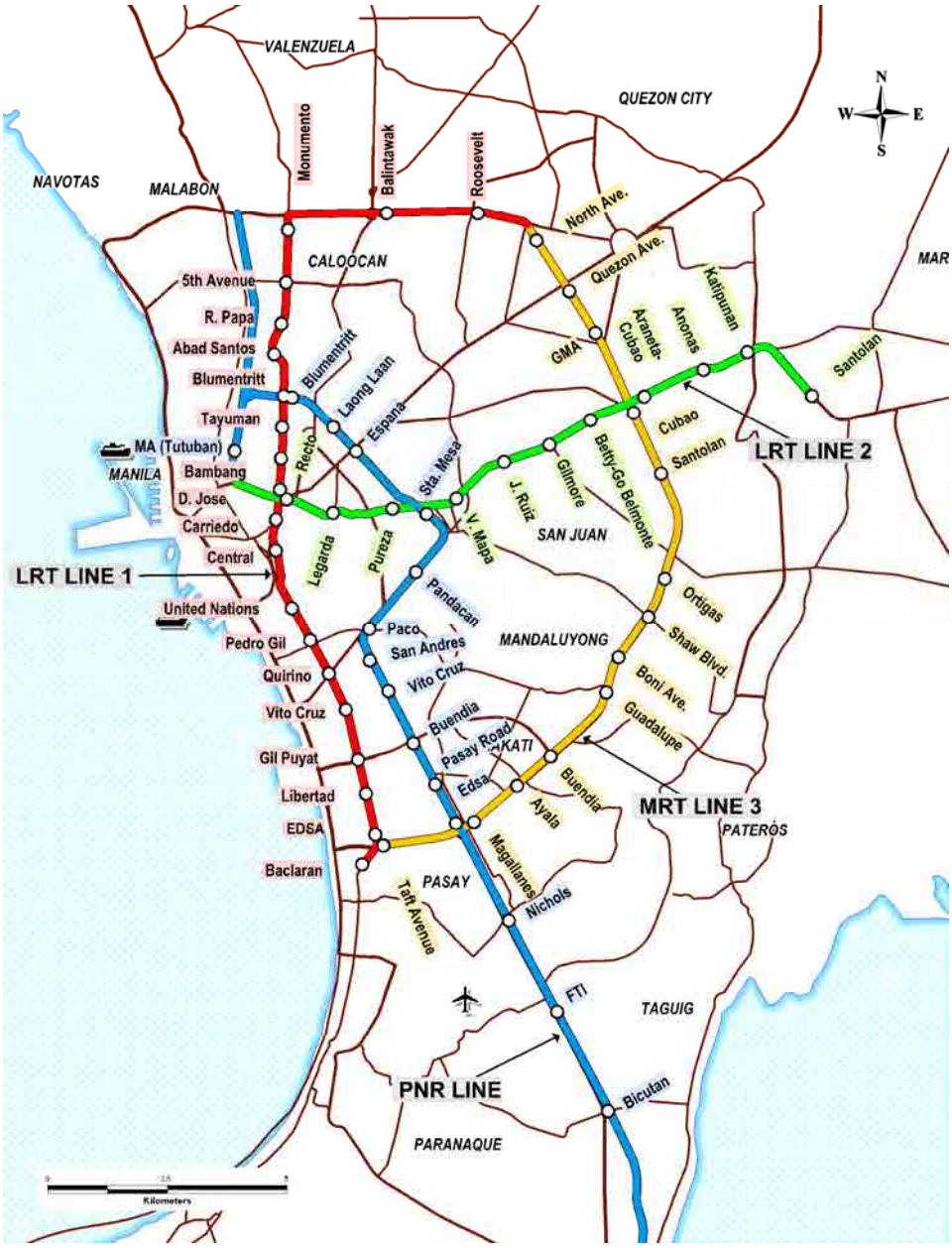
Source: LTFRB

FIGURE 5.3-5 NUMBER OF FRANCHISED UNIT (LEFT: NCR, MIDDLE: REGION III, RIGHT: REGION IV)

5.3.2 Rail Transport

5.3.2.1 Present Rail Network

In Metro and Mega Manila, currently there are four (4) railway systems, namely, the Light Rail Transit Line No.1 (LRT-1) running along Taft-Rizal Avenues, the Light Rail Transit Line No.2 (LRT-2) running along the Aurora-Recto-Aurora Avenues, the Mass Rail Transit Line No.3 (MRT-3) running along EDSA Avenue, and the South Main Line (PNR Line) which serves Southern Luzon, running from Metro Manila to Legaspi City. (see **Figure 5.3-6**)



Source: JICA Study Team

FIGURE 5.3-6 PRESENT RAIL NETWORK

5.3.2.2 Number of Passengers, Occupancy Rates

(1) Number of Passengers

1) MRT-3

The total number of passengers of MRT-3 is about 158,800,000 annually, or about 435,000 per day.

The stations which serve the most numbers of incoming and outgoing passengers are the Taft Avenue station with 26,130,000 annually (70,000 per day); the North Avenue station with 24,930,000 annually (68,000 per day); and the Cubao station with 16,560,000 annually (45,000 per day).

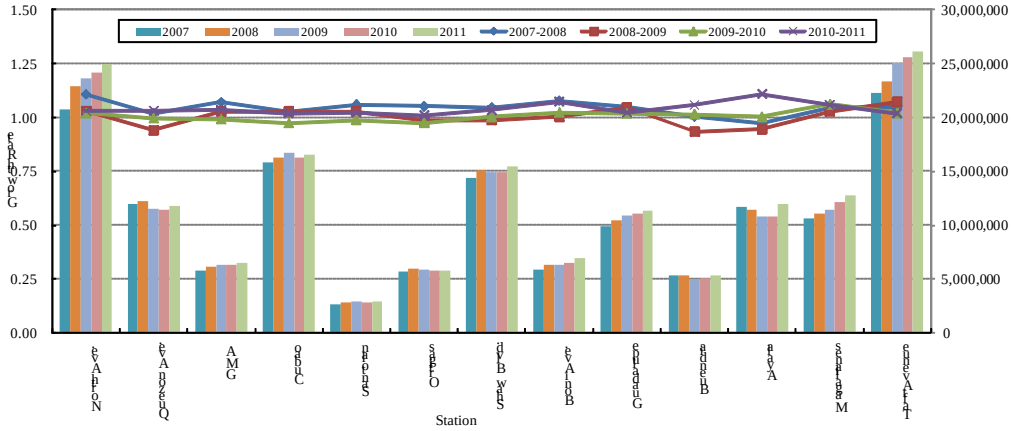
The North Avenue station is the terminal of MRT-3 and is situated close to the Roosevelt station which is the terminal of LRT-1. The Cubao station is close to the Araneta-Cubao station of LRT-2. The Taft Avenue is close to the EDSA station of LRT-1. Therefore, there is a high demand in the transfer of passengers from/to these different lines. Actually, the number of passengers is more at the stations of LRT-1 and LRT-2 which are closely situated to the station of MRT-3. The number of passengers is increasing every year and tends to further increase in the future.

TABLE 5.3-3 MRT-3 - NUMBER OF PASSENGERS AND GROWTH RATE 2007 - 2011

Stations	2007	2008	2009	2010	2011
North Ave.	20,736,106	22,955,572	23,664,718	24,171,273	24,932,084
Quezon Ave.	11,987,503	12,221,495	11,502,854	11,457,507	11,821,611
GMA	5,763,234	6,173,747	6,345,973	6,294,309	6,520,130
Cubao	15,791,384	16,247,130	16,696,362	16,248,569	16,558,828
Santolan	2,676,653	2,838,537	2,917,891	2,884,367	2,950,521
Ortigas	5,709,719	6,006,787	5,920,950	5,768,577	5,830,676
Shaw Blvd.	14,406,985	15,074,254	14,895,656	14,949,918	15,472,544
Boni Ave.	5,876,015	6,333,813	6,357,449	6,503,975	6,983,994
Guadalupe	9,958,072	10,443,279	10,913,430	11,120,755	11,388,026
Buendia	5,337,723	5,363,565	5,006,793	5,082,413	5,377,391
Ayala	11,711,713	11,413,666	10,793,992	10,833,856	12,019,781
Magallanes	10,630,937	11,117,181	11,416,511	12,122,732	12,822,452
Taft Avenue	22,300,013	23,396,537	25,089,185	25,640,519	26,128,011
Totals	142,886,057	149,585,563	151,521,764	153,078,770	158,806,049

Stations	2007-2008	2008-2009	2009-2010	2010-2011
North Ave.	1.11	1.03	1.02	1.03
Quezon Ave.	1.02	0.94	1.00	1.03
GMA	1.07	1.03	0.99	1.04
Cubao	1.03	1.03	0.97	1.02
Santolan	1.06	1.03	0.99	1.02
Ortigas	1.05	0.99	0.97	1.01
Shaw Blvd.	1.05	0.99	1.00	1.03
Boni Ave.	1.08	1.00	1.02	1.07
Guadalupe	1.05	1.05	1.02	1.02
Buendia	1.00	0.93	1.02	1.06
Ayala	0.97	0.95	1.00	1.11
Magallanes	1.05	1.03	1.06	1.06
Taft Avenue	1.05	1.07	1.02	1.02
Average	1.05	1.00	1.01	1.04

Source : MRT



Source : MRT

FIGURE 5.3-7 MRT-3 - NUMBER OF PASSENGERS AND GROWTH RATE 2007 - 2011

2) LRT-1

The passenger of LRT-1 is about 313,045,000 annually, or 857,000 per day.

The stations which serve the most numbers of incoming and outgoing passengers are the Monumento station with 44,506,000 annually (122,000 per day); the EDSA station with 41,102,000 annually (112,000 per day), and the Gil Puyat station with 26,521,000 annually (72,000 per day).

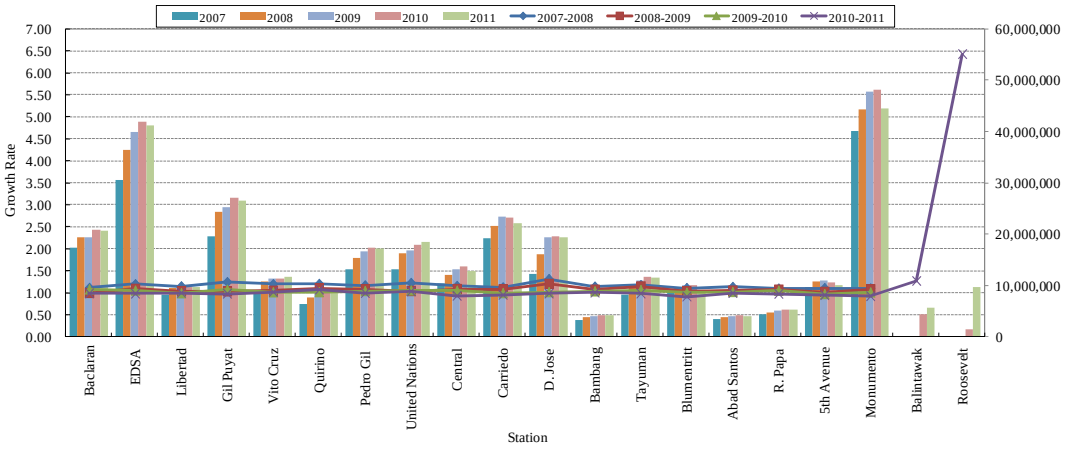
The Monumento station is the terminal of LRT-1 and located along the Rizal Avenue, and the Gil Puyat station is located at the intersection of Taft Avenue and Gil Puyat Avenue. Therefore, there is considerable transfer demand from/to LRT-1 and Buses/Jeepneys. The EDSA station is close to the Taft Avenue station of MRT-3; therefore, there is much demand in the transfer from/to the rail lines. Actually, the number of passengers is more at the Taft Avenue station of MRT-3. The number of passengers is increasing every year and tends to grow further in the future.

TABLE 5.3-4 LRT-1 - NUMBER OF PASSENGERS AND GROWTH RATE 2007 - 2011

Stations	2007	2008	2009	2010	2011
Baclaran	17,438,028	19,412,748	19,367,640	20,892,461	20,615,260
EDSA	30,501,466	36,497,164	39,836,813	41,902,458	41,102,015
Libertad	8,234,788	9,458,606	9,815,550	9,723,961	9,737,501
Gil Puyat	19,606,457	24,391,869	25,258,290	27,054,818	26,521,773
Vito Cruz	8,985,737	10,749,250	11,257,228	11,393,501	11,629,035
Quirino	6,387,342	7,684,802	8,477,788	8,624,916	9,230,731
Pedro Gil	13,140,457	15,359,157	16,641,652	17,329,257	17,228,888
United Nations	13,236,851	16,206,871	16,907,880	17,852,180	18,494,387
Central	10,471,792	12,111,941	13,158,405	13,800,738	12,867,921
Carriedo	19,262,161	21,654,170	23,336,061	23,223,372	22,136,012
D. Jose	12,237,940	16,039,540	19,319,458	19,644,656	19,319,458
Bambang	3,339,630	3,815,860	4,094,393	4,238,274	4,254,069
Tayuman	8,198,840	9,622,379	11,012,245	11,726,532	11,537,340
Blumentritt	8,726,649	9,659,868	9,979,923	10,022,795	9,185,272
Abad Santos	3388119	3,841,773	4,041,781	4,121,488	4,094,437
R. Papa	4332368	4,756,555	5,092,338	5,350,593	5,222,226
5th Avenue	9714503	10,757,810	10,999,922	10,679,393	10,117,186
Monumento	40169605	44,221,092	47,714,552	48,197,187	44,506,671
Balintawak				4,416,684	5,608,154
Roosevelt				1,499,294	9,636,590
Total	237,372,733	276,241,455	296,311,919	311,694,558	313,044,926

Stations	2007-2008	2008-2009	2009-2010	2010-2011
Baclaran	1.11	1.00	1.08	0.99
EDSA	1.20	1.09	1.05	0.98
Libertad	1.15	1.04	0.99	1.00
Gil Puyat	1.24	1.04	1.07	0.98
Vito Cruz	1.20	1.05	1.01	1.02
Quirino	1.20	1.10	1.02	1.07
Pedro Gil	1.17	1.08	1.04	0.99
United Nations	1.22	1.04	1.06	1.04
Central	1.16	1.09	1.05	0.93
Carriedo	1.12	1.08	1.00	0.95
D. Jose	1.31	1.20	1.02	0.98
Bambang	1.14	1.07	1.04	1.00
Tayuman	1.17	1.14	1.06	0.98
Blumentritt	1.11	1.03	1.00	0.92
Abad Santos	1.13	1.05	1.02	0.99
R. Papa	1.10	1.07	1.05	0.98
5th Avenue	1.11	1.02	0.97	0.95
Monumento	1.10	1.08	1.01	0.92
Balintawak				1.27
Roosevelt				6.43
Average	1.16	1.07	1.03	1.27

Source : LRTA



Source : LRTA

FIGURE 5.3-8 LRT 1 - NUMBER OF PASSENGERS AND GROWTH RATE 2007 - 2011

3) LRT-2

The total number of passengers of LRT-2 is about 127,616,000 annually, or 349,000 per day.

The stations with the most numbers of incoming and outgoing passengers are the Santolan station with 30,975,000 annually (85,000 per day); the Recto station with 24,341,000 annually (67,000 per day); and the Araneta-Cubao station with 20,603,000 annual (56,000 per day).

The Recto station is located close to the Doroteo Jose station of LRT-1, and the Araneta-Cubao station is near the Cubao station of MRT-3; therefore, much demand arises from the transfer of passengers between these two lines.

The Santolan station is the terminal station of LRT-2 and located along the Marcos Highway; therefore, there is a considerable demand of passenger transfers from/to Buses and Jeepneys. The

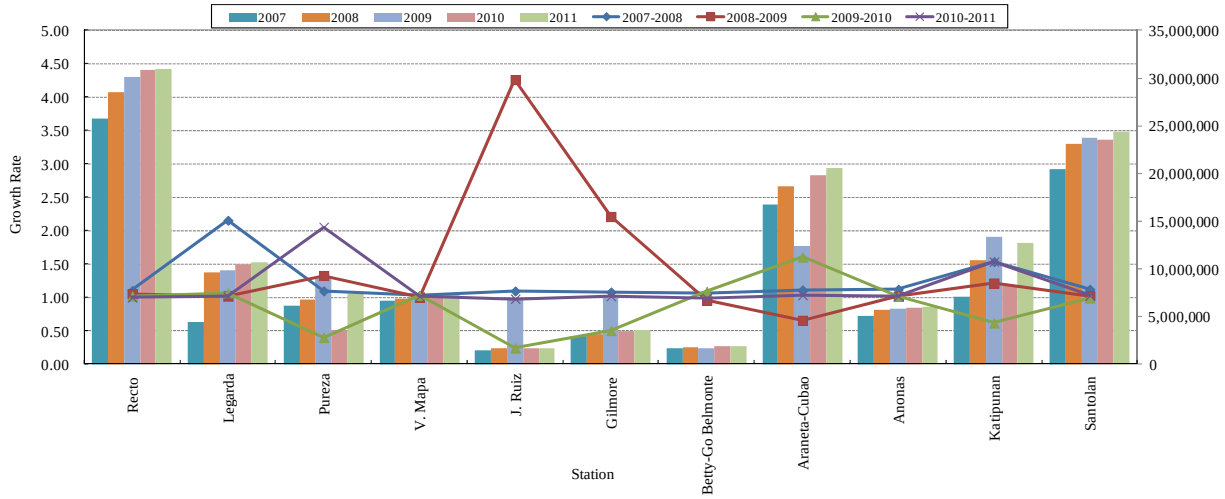
number of passengers is increasing every year and tends to further increase in the future.

TABLE 5.3-5 LRT-2 - NUMBER OF PASSENGERS AND GROWTH RATE 2007 - 2011

Stations	2007	2008	2009	2010	2011
Recto	25,767,663	28,468,105	30,112,413	30,841,342	30,975,801
Legarda	4,451,325	9,604,743	9,833,052	10,525,230	10,710,106
Pureza	6,116,430	6,730,999	8,957,886	3,621,623	7,450,929
V. Mapa	6,720,746	6,920,256	6,943,743	7,162,646	7,309,360
J. Ruiz	1,487,491	1,634,909	6,970,743	1,715,812	1,685,698
Gilmore	2,906,180	3,151,956	6,980,121	3,535,680	3,621,729
Betty-Go Belmonte	1,663,819	1,773,009	1,699,398	1,858,552	1,846,426
Araneta-Cubao	16,783,296	18,708,381	12,344,752	19,840,234	20,602,945
Anonas	5,034,482	5,667,728	5,786,185	5,891,888	6,030,908
Katipunan	7,098,764	10,922,986	13,304,961	8,259,497	12,699,808
Santolan	20,509,129	23,085,311	23,713,406	23,567,006	24,340,941
Total	108,079,279	119,131,500	122,883,815	125,297,061	127,616,449

Stations	2007-2008	2008-2009	2009-2010	2010-2011
Recto	1.10	1.06	1.02	1.00
Legarda	2.16	1.02	1.07	1.02
Pureza	1.10	1.33	0.40	2.06
V. Mapa	1.03	1.00	1.03	1.02
J. Ruiz	1.10	4.26	0.25	0.98
Gilmore	1.08	2.21	0.51	1.02
Betty-Go Belmonte	1.07	0.96	1.09	0.99
Araneta-Cubao	1.11	0.66	1.61	1.04
Anonas	1.13	1.02	1.02	1.02
Katipunan	1.54	1.22	0.62	1.54
Santolan	1.13	1.03	0.99	1.03
Average	1.23	1.43	0.87	1.16

Source : LRTA



Source : LRTA

FIGURE 5.3-9 LRT-2 - NUMBER OF PASSENGERS AND GROWTH RATE 2007 - 2011

4) PNR

The total number of passengers of PNR is about 15,059,000 annually, or 41,000 per day.

The stations with the most number of incoming and outgoing passengers are the Alabang station with 2,574,000 annually (7,000 per day); the Tutuban station with 1,500,000 annually (4,000 per day); and the Blumentritt station with 1,336,000 annually (3,600 per day).

The Alabang station is the southern NCR terminal station of PNR located at Muntinlupa City, and the Tutuban station is the northern NCR terminal station of PNR in Manila. Therefore, there is much passenger transfer demand from Buses and Jeepneys.

The Blumentritt station of PNR is close to the Blumentritt station of LRT-1; therefore, much demand comes from the passenger transfer from/to the two lines.

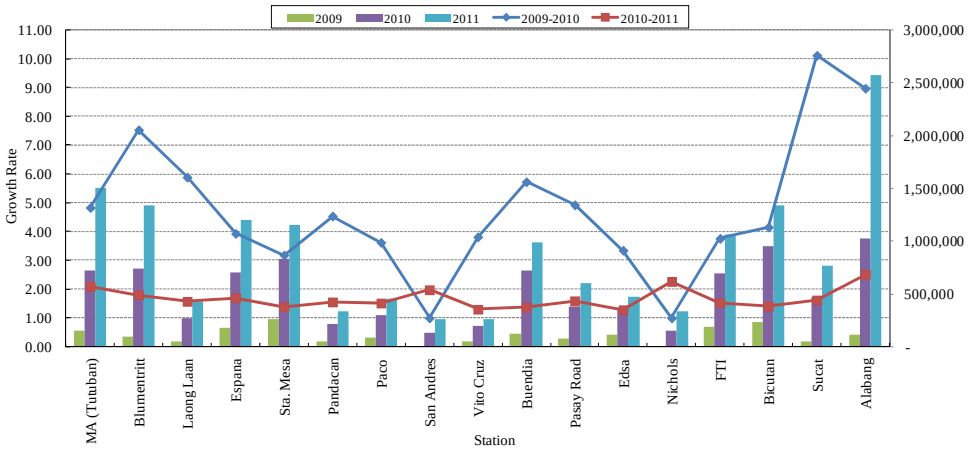
The number of PNR passengers is increasing dramatically, because the number of trains was increased by 3-4 times in 2010. The number of passengers increased by 4.72 times from 2009 to 2010, and by 1.67 times from 2010 to 2011. The potential demand is significant at the area along the PNR line.

TABLE 5.3-6 PNR - NUMBER OF PASSENGERS AND GROWTH RATE 2009 - 2011

Station	2009	2010	2011
MA (Tutuban)	148,412	717,010	1,500,563
Blumentritt	98,542	741,965	1,335,838
Laong Laan	46,520	273,779	430,840
Espana	179,817	706,743	1,198,875
Sta. Mesa	261,815	833,752	1,153,679
Pandacan	47,569	215,716	335,605
Paco	82,326	297,973	451,347
San Andres		129,971	256,918
Vito Cruz	52,700	200,960	261,482
Buendia	125,767	720,146	984,969
Pasay Road	76,548	377,154	600,810
Edsa	110,444	369,581	473,004
Nichols		147,873	335,029
FTI	184,640	694,160	1,057,508
Bicutan	229,891	954,708	1,338,384
Sucat	46,926	474,671	770,374
Alabang	114,369	1,025,661	2,573,920
Total	1,806,286	8,881,823	15,059,145

Station	2009-2010	2010-2011
MA (Tutuban)	4.83	2.09
Blumentritt	7.53	1.80
Laong Laan	5.89	1.57
Espana	3.93	1.70
Sta. Mesa	3.18	1.38
Pandacan	4.53	1.56
Paco	3.62	1.51
San Andres	1.00	1.98
Vito Cruz	3.81	1.30
Buendia	5.73	1.37
Pasay Road	4.93	1.59
Edsa	3.35	1.28
Nichols	1.00	2.27
FTI	3.76	1.52
Bicutan	4.15	1.40
Sucat	10.12	1.62
Alabang	8.97	2.51
Average	4.72	1.67

Source : PNR



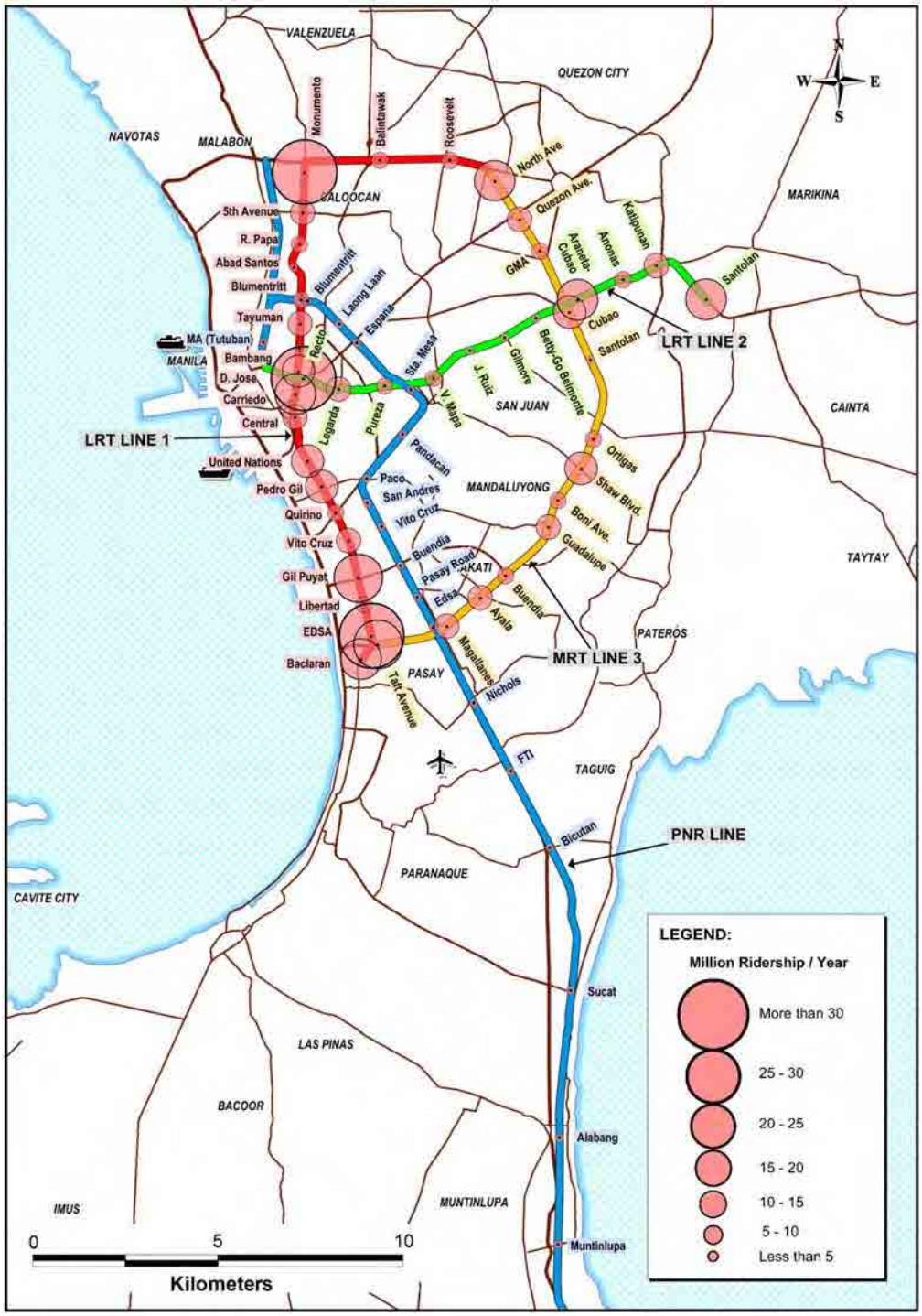
Source : PNR

FIGURE 5.3-10 PNR - NUMBER OF PASSENGERS AND GROWTH RATE 2009 - 2011

(2) Incoming and outgoing passengers on each stations

The number of incoming and outgoing passengers is shown in **Figure 5.3-11**.

There are more passengers at the terminal station of each line and at the station which is situated close to the station of the other line. Therefore, there is much demand for the transfer from/to each line. Especially, the most number of passengers may be observed at the Monumento station, the EDSA station of LRT-1, and the Recto station of LRT-2.



Source: DOTC

FIGURE 5.3-11 RIDERSHIP ON EACH STATION (PER YEAR: 2011)

(3) Origin and Destination

1) LRT-1

The most number of Origin and Destination passengers on LRT-1 is between the EDSA station and the United Nations station, noting that the EDSA station is the transfer station between LRT-1 and MRT-3. The annual number of passengers is 3,075,000 from the EDSA station to the United Nations station, and 2,818,000 from the United Nations station to the EDSA station, or a total of

5,893,000 which is 3.3 % of the passengers on LRT1. There is a significant number of Origin and Destination passengers between the Monumento station and the Gil Puyat (3,043,000 annually) and between the EDSA station and the Monumento station (2,407,000 annually). It is shown at **Table 5.3-7** and **Figure 5.3-12**.

2) LRT-2

The most number of Origin and Destination passengers is between the Santolan station and the Recto station which is the terminal station of LRT-2. The annual number of passengers is 5,235,000 from the Recto station to the Santolan station, and 5,761,000from Santolan station to Recto station, or a total of 10,996,000 which is 17.3 % of the passengers on LRT-2. There is also a significant number of Origin and Destination passengers between the Recto station and the Cubao station (3,548,000 annually) and between the Katipunan station and the Recto station (3,152,000 annually). This is shown at **Table 5.3-8** and **Figure 5.3-13**.

3) MRT-3

The most number of Origin and Destination passengers is between the Taft Avenue station, which is the terminal station of MRT-3, and the Cubao station, which is close to the Araneta-Cubao station of LRT-2. The number of passengers is 4,870,000 annually. The number of Origin and Destination passengers is also significant from Shaw station to Taft Avenue station at 4,770,000 annually, as well as from Taft Avenue station to Shaw station at 4,718,000 annually. There are three big shopping malls, one university and the head office of San Miguel Corporation near the Shaw station.

TABLE 5.3-7 LRT-1 ORIGIN AND DESTINATION (2012*)

Unit: million riders annual

	ENTRY STATIONS																			
EXIT STATIONS	Baclaran	EDSA	Libertad	G. Puyat	V. Cruz	Quirino	P. Gil	U. Nations	C. Terminal	Carriedo	D. Jose	Bambang	Tayuman	Blumentritt	A. Santos	R. Papa	5th Ave	Monumento	Balintawak	Roosevelt	*Total*
Baclaran	0.007	0.245	0.380	0.518	0.278	0.314	0.707	0.737	0.403	1.221	0.940	0.171	0.436	0.380	0.139	0.158	0.487	1.651	0.528	0.569	10.270
EDSA	0.246	0.020	0.142	0.788	1.886	1.205	2.141	2.818	1.681	2.167	1.674	0.484	1.468	0.961	0.492	0.386	0.938	2.541	0.619	0.650	23.307
Libertad	0.414	0.133	0.006	0.032	0.131	0.171	0.406	0.554	0.422	0.533	0.542	0.112	0.299	0.218	0.105	0.100	0.270	0.797	0.215	0.262	5.747
G. Puyat	0.538	0.805	0.023	0.024	0.119	0.267	0.619	1.267	0.802	1.282	1.427	0.404	1.160	0.794	0.435	0.393	1.084	3.043	0.803	0.897	15.166
V. Cruz	0.283	1.751	0.103	0.064	0.020	0.020	0.087	0.266	0.278	0.313	0.974	0.136	0.303	0.238	0.105	0.059	0.297	0.828	0.330	0.747	7.228
Quirino	0.307	1.117	0.138	0.142	0.010	0.012	0.018	0.121	0.153	0.321	0.503	0.098	0.255	0.195	0.102	0.096	0.261	0.789	0.262	0.424	5.353
P. Gil	0.637	2.205	0.366	0.423	0.076	0.019	0.018	0.035	0.114	0.278	0.717	0.156	0.429	0.347	0.166	0.185	0.515	1.649	0.571	0.827	9.751
U. Nations	0.609	3.075	0.489	0.817	0.188	0.083	0.026	0.029	0.039	0.130	0.582	0.101	0.324	0.323	0.209	0.244	0.652	2.309	0.763	1.056	12.077
C. Terminal	0.392	1.906	0.401	0.639	0.214	0.112	0.086	0.029	0.017	0.044	0.149	0.073	0.338	0.266	0.215	0.200	0.427	1.530	0.435	0.722	8.194
Carriedo	1.359	2.312	0.485	1.186	0.295	0.311	0.276	0.144	0.030	0.029	0.028	0.030	0.132	0.180	0.173	0.210	0.611	2.222	0.683	1.030	11.725
D. Jose	0.970	1.567	0.470	1.177	0.907	0.452	0.713	0.593	0.165	0.036	0.033	0.018	0.093	0.107	0.144	0.129	0.422	1.952	0.535	0.786	11.270
Bambang	0.186	0.444	0.102	0.322	0.128	0.087	0.137	0.095	0.046	0.024	0.024	0.006	0.003	0.004	0.007	0.012	0.058	0.246	0.089	0.191	2.213
Tayuman	0.490	1.318	0.255	0.917	0.259	0.235	0.356	0.278	0.231	0.088	0.100	0.002	0.019	0.004	0.012	0.020	0.106	0.643	0.273	0.817	6.221
Blumentritt	0.499	0.953	0.241	0.777	0.233	0.203	0.333	0.289	0.194	0.146	0.105	0.004	0.003	0.014	0.002	0.006	0.029	0.213	0.103	0.321	4.669
A. Santos	0.139	0.362	0.076	0.299	0.079	0.079	0.141	0.140	0.139	0.104	0.115	0.007	0.013	0.001	0.008	0.001	0.007	0.056	0.049	0.209	2.025
R. Papa	0.313	0.505	0.149	0.527	0.128	0.148	0.286	0.319	0.248	0.233	0.141	0.017	0.036	0.006	0.001	0.007	0.003	0.019	0.040	0.184	3.306
5th Ave	0.446	0.862	0.176	0.600	0.234	0.185	0.367	0.359	0.266	0.411	0.371	0.058	0.128	0.032	0.014	0.007	0.013	0.012	0.056	0.262	4.656
Monumento	2.037	2.407	0.772	2.810	0.864	0.816	1.782	2.096	1.593	2.163	1.965	0.304	0.874	0.328	0.132	0.038	0.013	0.018	0.051	0.232	21.295
Balintawak	0.391	0.315	0.108	0.342	0.167	0.144	0.311	0.312	0.181	0.341	0.223	0.066	0.164	0.090	0.042	0.028	0.036	0.034	0.007	0.013	3.316
Roosevelt	0.517	0.430	0.187	0.553	0.502	0.295	0.700	0.759	0.575	0.863	0.582	0.197	0.635	0.316	0.248	0.187	0.211	0.249	0.017	0.012	8.038
Total	*10.782*	*22.532*	*5.071*	*12.956*	*6.717*	*5.154*	*9.510*	*11.239*	*7.576*	*10.726*	*11.197*	*2.444*	*7.111*	*4.807*	*2.771*	*2.495*	*6.439*	*20.800*	*6.458*	*10.061*	*176.847*

*The ridership data are corresponding value from the monthly ridership of July, 2012

TABLE 5.3-8 LRT-2 ORIGIN AND DESTINATION (2011)

Unit: million riders annual

	ENTRY STATIONS											
EXIT STATIONS	**Recto**	**Legarda**	**Pureza**	**V.Mapa**	**J. Ruiz**	**Gilmore**	**Betty Go**	**Cubao**	**Anonas**	**Katipunan**	**Santolan**	**TOTAL**
Recto	0.015	0.076	0.521	1.058	0.339	0.547	0.411	2.788	1.298	3.152	5.761	15.966
Legarda	0.105	0.007	0.042	0.259	0.079	0.149	0.162	1.116	0.547	1.142	2.107	5.716
Pureza	0.332	0.017	0.005	0.030	0.009	0.048	0.062	0.881	0.393	0.737	1.135	3.649
V. Mapa	0.867	0.186	0.029	0.006	0.007	0.051	0.035	0.584	0.234	0.579	0.761	3.340
J. Ruiz	0.235	0.037	0.010	0.005	0.001	0.003	0.003	0.115	0.059	0.160	0.234	0.863
Gilmore	0.546	0.135	0.066	0.047	0.003	0.003	0.003	0.224	0.101	0.306	0.474	1.908
Betty-Go	0.366	0.118	0.077	0.041	0.004	0.004	0.002	0.030	0.031	0.101	0.142	0.915
Cubao	3.548	1.519	1.183	0.800	0.134	0.296	0.039	0.020	0.369	1.197	2.560	11.664
Anonas	1.225	0.417	0.350	0.268	0.048	0.089	0.028	0.397	0.005	0.019	0.077	2.923
Katipunan	2.460	0.687	0.504	0.525	0.096	0.158	0.066	0.790	0.016	0.008	0.018	5.327
Santolan	5.235	1.434	0.887	0.854	0.151	0.342	0.103	2.012	0.092	0.035	0.015	11.162
TOTAL	***14.933***	***4.633***	***3.675***	***3.895***	***0.871***	***1.690***	***0.914***	***8.956***	***3.144***	***7.435***	***13.286***	***63.432***

Source : LRTA

TABLE 5.3-9 MRT-3 ORIGIN AND DESTINATION (2011)

Unit: million riders annual

	ENTRY STATIONS													
EXIT STATIONS	**North**	**Quezon**	**GMA**	**Cubao**	**Santolan**	**Ortigas**	**Shaw**	**Boni**	**Guada**	**Buendia**	**Ayala**	**Magal**	**Taft**	***Total***
North Av.	-	0.285	0.288	1.447	0.368	1.216	2.837	1.375	1.879	1.322	2.841	2.116	2.821	18.795
Quezon Av.	0.128	-	0.061	0.524	0.133	0.498	1.327	0.703	1.294	0.697	1.494	1.577	2.189	10.625
Kamuning	0.133	0.052	-	0.151	0.039	0.151	0.504	0.292	0.652	0.425	0.753	0.920	1.465	5.537
Cubao	1.803	0.685	0.263	-	0.206	0.577	1.814	1.259	2.494	1.303	2.674	2.814	4.870	20.762
Santolan	0.675	0.181	0.077	0.088	-	0.027	0.153	0.117	0.451	0.111	0.223	0.496	0.927	3.526
Ortigas	2.414	0.858	0.321	0.664	0.047	-	0.044	0.144	0.414	0.197	0.377	0.937	2.527	8.944
Shaw	4.463	1.592	0.702	1.478	0.118	0.034	-	0.201	0.801	0.444	0.961	1.679	4.718	17.191
Boni	2.014	0.780	0.346	1.007	0.081	0.102	0.190	-	0.147	0.125	0.344	0.602	1.687	7.425
Guadalupe	2.290	1.233	0.646	2.007	0.371	0.334	0.899	0.250	-	0.058	0.283	0.399	1.899	10.669
Buendia	2.292	0.993	0.578	1.146	0.127	0.164	0.429	0.117	0.054	-	0.041	0.074	0.447	6.462
Ayala	3.918	1.904	1.024	2.431	0.325	0.489	1.231	0.462	0.391	0.100	-	0.221	1.828	14.324
Magallanes	1.850	1.043	0.622	1.444	0.254	0.384	1.083	0.422	0.409	0.073	0.140	-	0.594	8.318
Taft	2.907	2.185	1.523	4.106	0.843	1.794	4.770	1.604	2.317	0.464	1.825	0.885	-	25.223
Total	***24.887***	***11.791***	***6.451***	***16.493***	***2.912***	***5.770***	***15.281***	***6.946***	***11.303***	***5.319***	***11.956***	***12.720***	***25.972***	***157.801***

Source: MRTA

ENTRY STATIONS	EXIT STATIONS																			Total
	Baclaran	EDSA	Libertad	G. Puyat	V. Cruz	Quirino	P. Gil	U. Nations	C. Terminal	Carriedo	D. Jose	Bambang	Tayuman	Blumentritt	A. Santos	R. Papa	5th Ave	Monumento	Balintawak	Roosevelt	
Baclaran																				10.276
EDSA																				23.307
Libertad																				5.747
G. Puyat																				16.186
V. Cruz																				7.228
Quirino																				5.353
P. Gil																				9.751
U. Nations																				12.077
C. Terminal																				8.194
Carriedo																				11.725
D. Jose																				11.270
Bambang																				2.213
Tayuman																				6.221
Blumentritt																				4.669
A. Santos																				2.025
R. Papa																				3.306
5th Ave																				4.656
Monumento																				21.295
Balintawak																				3.316
Roosevelt																				8.038
Total	*10.782*	*22.532*	*5.071*	*12.956*	*6.717*	*5.154*	*9.510*	*11.239*	*7.576*	*10.726*	*11.197*	*2.444*	*7.111*	*4.807*	*2.771*	*2.495*	*6.439*	*20.800*	*6.458*	*10.061*	*176.847*

Unit: million riders annual

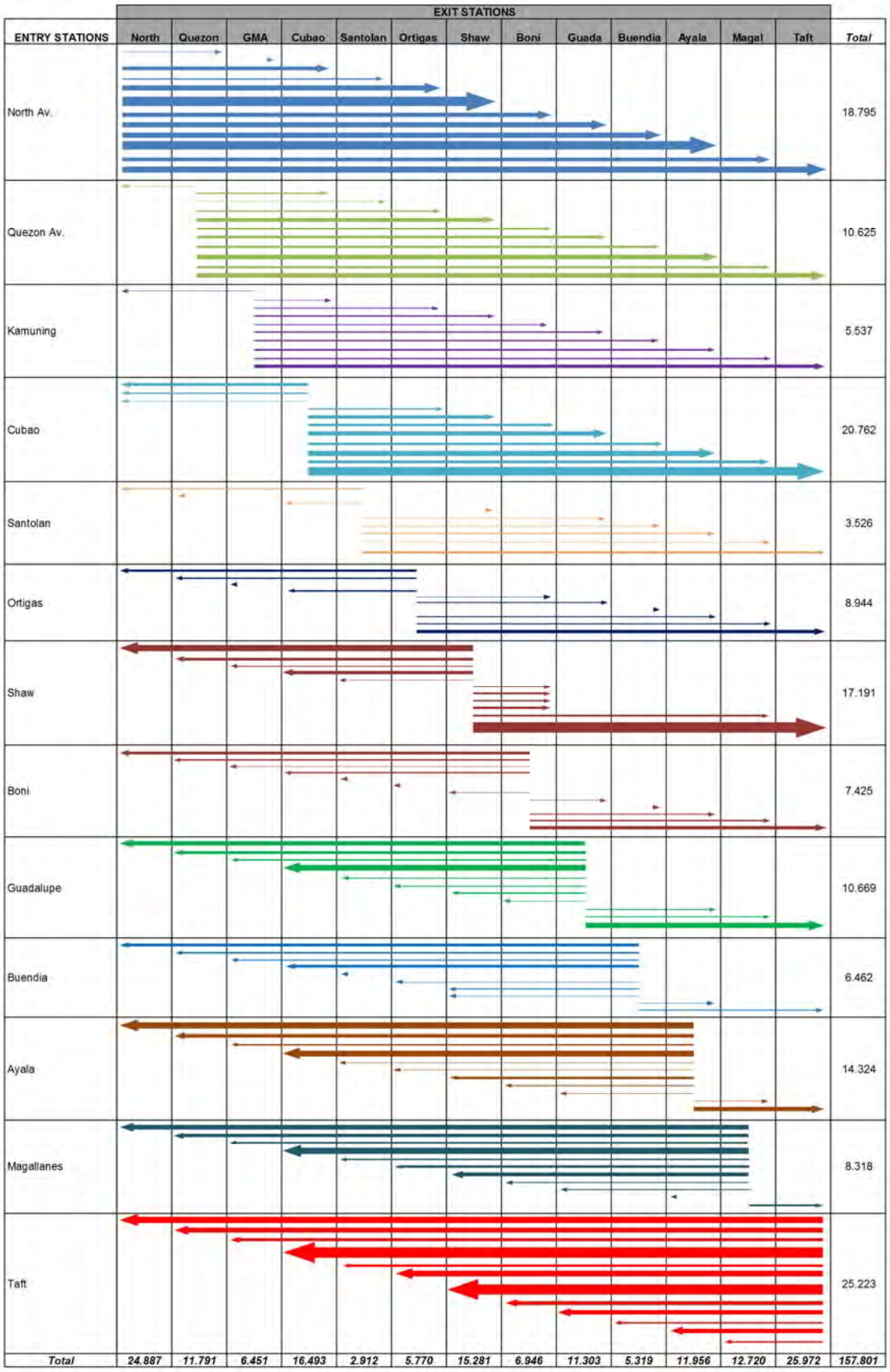
FIGURE 5.3-12 LRT1 ORIGIN AND DESTINATION (2012*)

*The ridership data are corresponding value from the monthly ridership of July, 2012 Source: LRTA

	EXIT STATIOSN										
ENTRY STATIONS	Recto	Legarda	Pureza	V.Mapa	J. Ruiz	Gilmore	Betty Go	Cubao	Anonas	Katipunan	Santolan	TOTAL
Recto												14,933,199
Legarda												4,633,376
Pureza												3,674,973
V. Mapa												3,894,654
J. Ruiz												870,731
Gilmore												1,690,132
Betty-Go												914,311
Cubao												8,955,841
Anonas												3,143,965
Katipunan												7,435,491
Santolan												13,285,802
TOTAL	*15,965,918*	*5,715,608*	*3,648,978*	*3,339,809*	*862,675*	*1,908,238*	*915,140*	*11,664,440*	*2,922,815*	*5,326,930*	*11,161,924*	*63,432,475*

Source : LRTA

FIGURE 5.3-13 LRT-2 ORIGIN AND DESTINATION (2011)

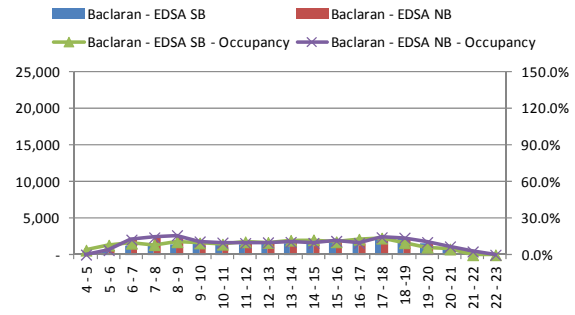


Source : MRTA

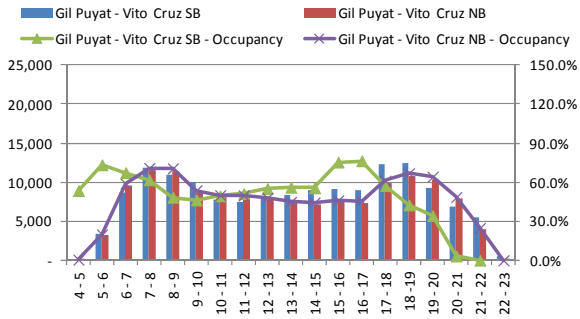
FIGURE 5.3-14 MRT-3 ORIGIN AND DESTINATION (2011)

(4) Occupancy Rate

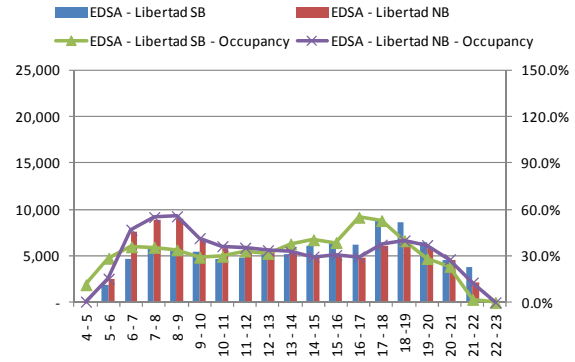
The number of hourly passengers between each station according to the number of incoming and outgoing passengers at each station in LRT-1 was calculated. The most number of passengers is noted on the southbound trains in the peak time of the morning. Especially, from the Blumentritt station to the United Nations station, the number of passengers which exceeds 20,000 is from 7 am to 8 am. The passenger capacity of LRT-1 is approximately 1,350 on 4 cars/train. The hourly capacity is 16,200 passengers when the headway of the trains is every 5 minutes. Therefore, the Occupancy Rate is 120 - 140 % at the peak time of the morning. Also, the most number of passengers is observed on the nrthbound trains in the peak time of the evening. Especially, from the United Nations station to the Blumentritt station, the number of passengers 15,000 – 18,000 from 5 pm to 6 pm. Therefore, the Occupancy rate is approximately 100 % at the peak time of the evening.



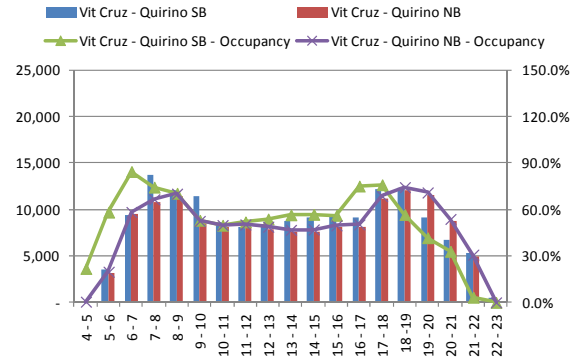
From/To Baclaran - EDSA



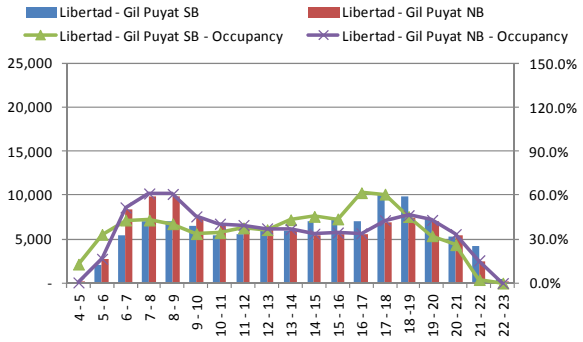
From/To Gil Puyat – Vito Cruz



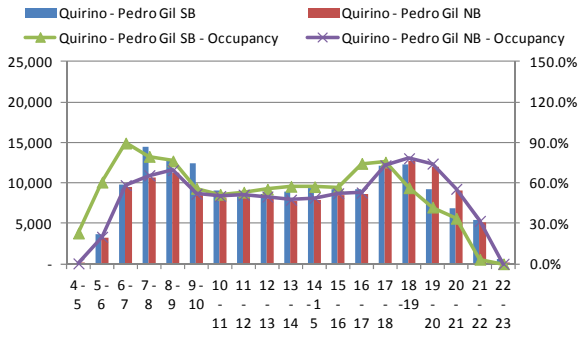
From/To EDSA - Libertad



From/To Vito Cruz - Qurino



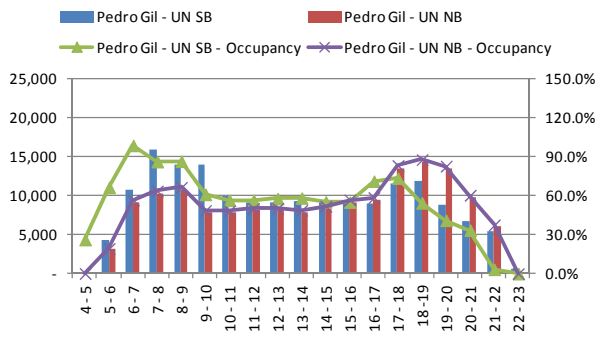
From/To Libertad – Gil Puyat



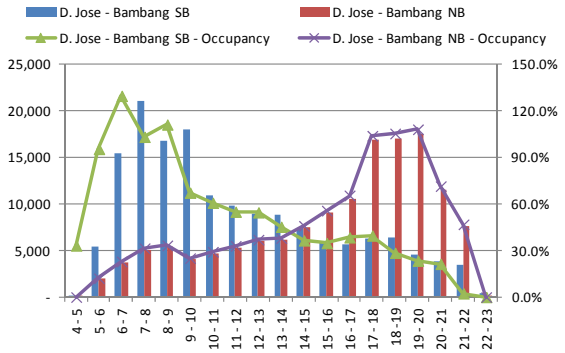
From/To Qurino – Pedro Gil

Source : LRTA, Study team

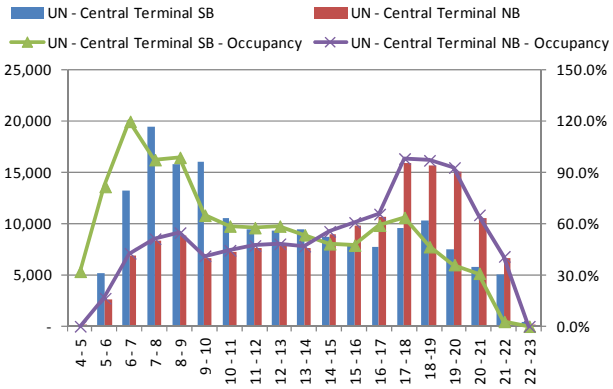
FIGURE 5.3-15 LRT-1 HOURLY RIDERSHIP AND OCCUPANCY RATE (1/3) (2011)



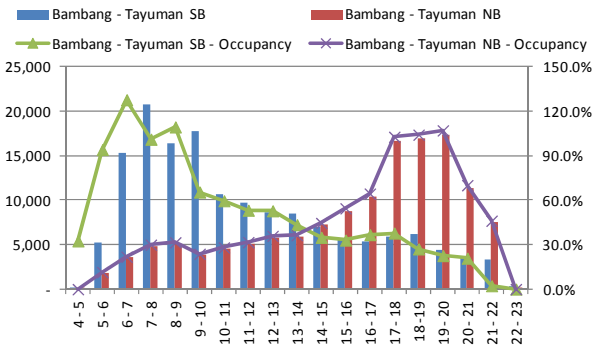
From/To Pedro Gil – United Nations



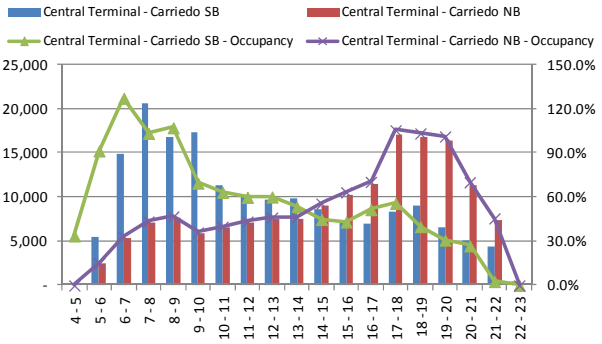
From/To D.Jose - Bambang



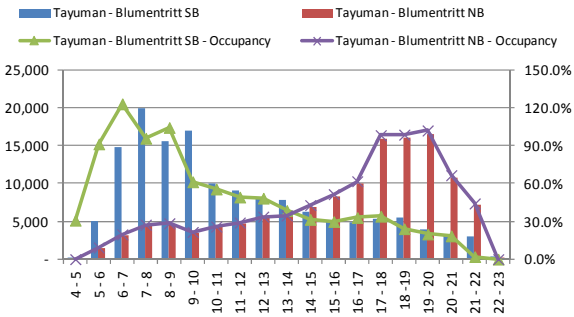
From/To United Nations – Central Terminal



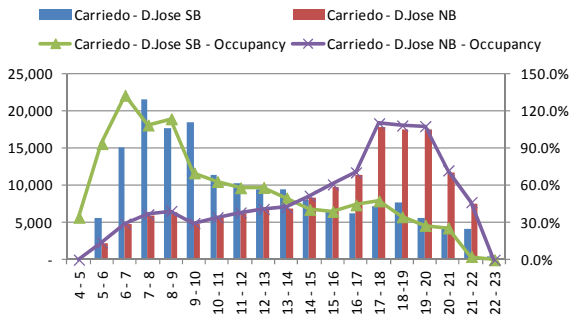
From/To Bambang - Tayuman



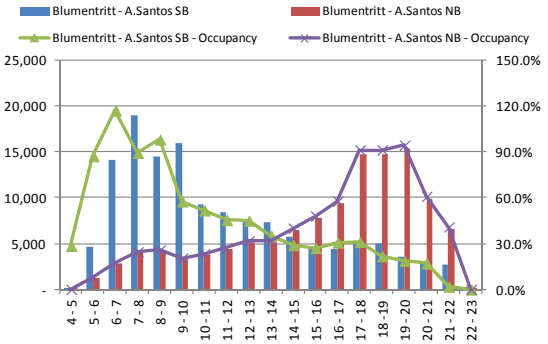
From/To Central Terminal - Carriedo



From/To Tayuman - Blumentritt



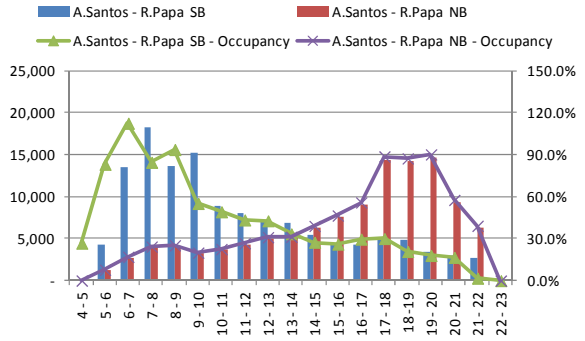
From/To Carriedo – D.Jose



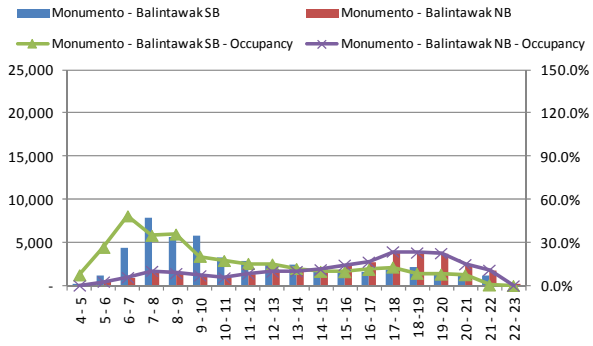
From/To Blumentritt – A.Santos

Source : LRTA, Study Team

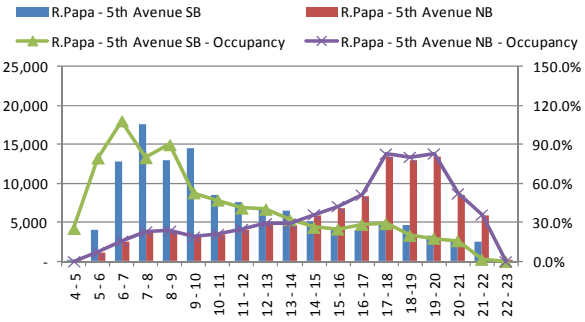
FIGURE 5.3-16 LRT-1 HOURLY RIDERSHIP AND OCCUPANCY RATE (2/3) (2011)



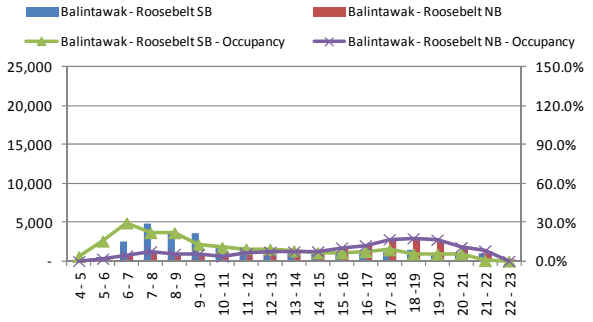
From/To A.Santos – R.Papa



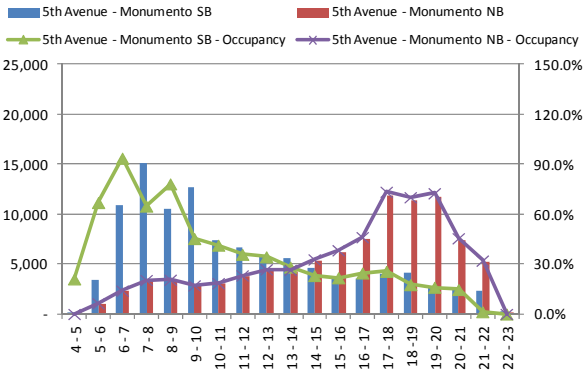
From/To Monumento - Balintawak



From/To R.Papa – 5th Avenue



From/To Balintawak - Roosevelt



From/To 5th Avenue - Monumento

Source : LRTA, StudyTeam

FIGURE 5.3-17 LRT-1 HOURLY RIDERSHIP AND OCCUPANCY RATE (3/3) (2011)

5.3.2.3 Rail Operation

The railway systems are controlled and operated by different authorities: the Light Rail Transit Authority operates both LRT-1 and LRT-2, the Metro Rail Transit operates MRT-3, the Philippine National Railways operates the Orange Line, and the North Luzon Railways Corporation will operate the Green Line.

The operation of the each company is described as follows;

(1) LIGHT RAIL TRANSIT AUTHORITY (LRTA)

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

(2) METRO RAIL TRANSIT (MRT)

The MRT-3, 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 is privately owned by 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.

(3) PHILIPPINE NATIONAL RAILWAYS (PNR)

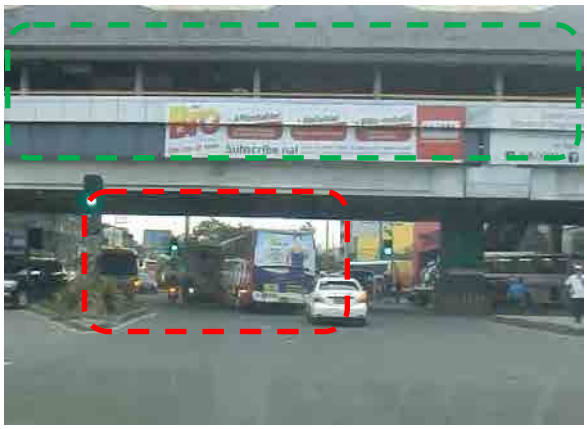
The PNR was created via legislation in June 1964, in order to provide a nationwide railway transportation system. There are currently plans to create new lines connecting the rapidly developing areas in Central Luzon and the Southern Tagalog Region with Metro-Manila.

(4) NORTH LUZON RAILWAYS CORPORATION (NLRC / Northrail)

The North Luzon Railways Corporation, 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 these areas once completed and operational.

5.3.2.4 Bus / Rail Transit / Transfer

With regard to the transfer between the railway and the buses in the railroad station, the bus station is connected to the station of MRT-3 which is along EDSA. Therefore, it is easy to transfer from/to the Bus and the Railway. By contrast, for example, the main road is approaching the Gil Puyat station and the EDSA station, so there are a lot of Buses and Jeepneys around the stations attracting passengers. However, there are no suitable bus stations around the railway station;hence, the road is being crowded by Buses and Jeepneys waiting for passengers;



Bus / Rail Transit at Gil Puyat station (LRT-1)

Bus / Rail Transit at EDSA station (MRT-3)

Bus / Rail Transit at Ayala station (MRT-3)

Bus / Rail Transit at North Ave. station (MRT-3)

Bus / Rail Transit at Boni station (MRT-3)

: Passenger flow line from/to station

: LRT station

: Bus station/bay

Source: JICA Study team

FIGURE 5.3-18 PRESENT RAIL NETWORK

5.3.2.5 Rail Projects

(1) The LRT Line 1 Cavite Extension Project

The project consists mainly of the extension of the existing 20.7-km railways by approximately 11.7 km from Baclaran to Bacoor at LRT-1. Also, the project includes 8 passenger stations inclusive of 1 satellite depot and 3 intermodal facilities, and the Operations and Maintenance of the integrated line by the concessionaire with systems enhancement works throughout the concession period. The project duration is from March 2012 to September 2017.

According to LRTA information, the status of the project is as follows;

- Posting of Invitation to Pre-qualify and to Bid (DOTC-SBAC) - June 4, 2012 on the following components:
  - Operation and Maintenance of the Existing System;
  - Design, Procurement, Engineering, Construction, Installation, Completion, Testing and Commissioning of the Cavite Extension facilities (Cavite Extension System);
  - Integration of the Existing System and the Cavite Extension System (Integrated System);
  - Operation and Maintenance of the Integrated System; and
  - System Enhancement Works covering whole-of-life investments for the Integrated System.
- On-going evaluation by the LRTA-BAC on the shortlist for prospective bidders for the Consulting Services for Geophysical, Geotechnical, and Topographic Surveys.
- On-going review and evaluation of the Environmental Performance Report Management Plan (EPRMP) for the issuance of ECC.
- Acquired 80.33% or 206,886 sq m of private and public lots for the Right of Way (ROW). Negotiation with the private property owners is on-going.
- Site Acquisition, Site Grading, Construction of Fence and Slope Protection, Roads and Water System, Drainage System and construction of 180 housing units for resettlement site of informal settlers were completed.
- Negotiation for the construction and completion of the remaining 1,820 housing units is on-going with the local government units of Cavite.

Additionally, the target implementation schedule is as follows;

- NEDA Approval ····· March 2012
- Conduct of Project Consultations/Road shows ····· July 2012
- Bidding Process ····· August 2012 - March 2013
- Expected Date of Award/ Effectivity ····· 2nd quarter of 2013
- Start of Construction (Phase 1) ····· August 2013
- Start of Construction (Phase 2) ····· August 2015
- Commissioning Phase 1(Baclaran to Dr. Santos Ave. Station) ····· September 2015
- Commissioning Phase 2(Dr. Santos Ave. Station to Niyog Station) ····· September 2017

(2) LRT Line 2 East Extension Project

The Preparatory Study for the LRT Line 2 Extension Project was prepared by the JICA and submitted to LRTA on October 2011. The project duration is from 2013 to 2016 based on the JICA preparatory study.

- Extension of the existing13.8-km LRT Line 2 by 4.14 km. eastward from the existing Santolan Station at Marcos Highway, terminating at the intersection of Marcos Highway and Sumulong Highway.
- Construction of two additional stations:
  - Emerald Station in front of Robinson's Place Metro East in Cainta Rizal; and
  - Masinag Station at the Masinag Junction in Antipolo City
- Financing proposed through Government appropriations and ODA (JICA Step Loan).

The Project was taken up during the NEDA Board Meeting on May 30, 2012. It was approved by the NEDA Board on September 4, 2012.

(3) MRT-7 Construction Project

The Metro Rail Transit Line 7 (MRT-7) construction project runs in a northeast direction, traversing Quezon City and a part of Caloocan City in Metro Manila before ending at the City of San Jose del Monte in Bulacan province. The line will be approximately 23 km, with 14 stations and a Bus terminal.

The consortium of Marubeni Corporation (Japan) and D.M. Consunji Inc (Philippines) is the contractor for the project. It is a build-operate-transfer (BOT) contract for 25 years. Marubeni will be responsible for overseeing the whole construction as well as the design, manufacture, installation, and trial testing of 108 railcars, signaling systems, communications systems, automatic fare gate systems, transformer and power distribution systems, and railcar maintenance facilities, while DMCI will be responsible for construction of stations, viaducts, the rail-yard, bus terminals, and tracks.

The line will extend from North Avenue in Quezon City - at a major terminal that will connect the Red Line (MRT-7) with the Yellow Line (LRT-1) and Blue Line (MRT-3) – and end at San Jose del Monte City.

Additionally, the railcars, railcar electrical equipment, and signaling systems will be manufactured by Japan Transport Engineering Company (J-TREC), Tōshiba, and Nippon Signal, respectively.

5.3.2.6 Future Rail Network

Source: Internet website

FIGURE 5.3-19 RAILWAY NETWORK AFTER EXTENSION

5.3.3 Jeepneys and Other Public Transport

5.3.3.1 Type of Public Transport

(1) Public Jeepneys

Public Utility Jeepneys (PUJ), commonly called as Jeepneys, are vehicles distinct only in the Philippines. It is an open air type of vehicle. It can accommodate 18 to 20 passengers. The route is from one point to another but with occasional stops. Fare is relatively cheap, with a base fare of Php 8 and an additional of Php 1 per km.


Source: JICA Study Team

FIGURE 5.3-20 PUBLIC JEEPNEY

(2) Shuttle Transport (FX)

Utility Vehicle Express Service (UV Express Service) is commonly known as FX. It is an air-conditioned type of vehicle. It can accommodate up to 10 passengers. Its route is from one point to another, but oftentimes it is diverted to areas that are notso congested. The fare is a little expensive compared to jeepneys, with a base fare of Php 10 and an additional of Php 5 per km.

Source: JICA Study Team

FIGURE 5.3-21 SHUTTLE TRANSPORT

(3) TAXI

The taxi is usually tagged as the rich-man way to commute. It is an air-conditioned vehicle that can accommodate up to 4 passengers. The route depends on where the passengers' destination is, non-stop. The flag-down rate is Php 40, with an additional of Php 3.50 per minute.


Source: JICA Study Team

FIGURE 5.3-22 TAXI

(4) School Transport

School Transport is commonly known as School Service. It is usually made up of a van, painted in yellow. It can accommodate 12 to 14 students. It caters only to students of their respective schools. Students are regular passengers whom the service driver picks up from home in the morning and then sends back home in the afternoon. Usually, payment is on a monthly basis.

Source: JICA Study Team

FIGURE 5.3-23 SCHOOL TRANSPORT

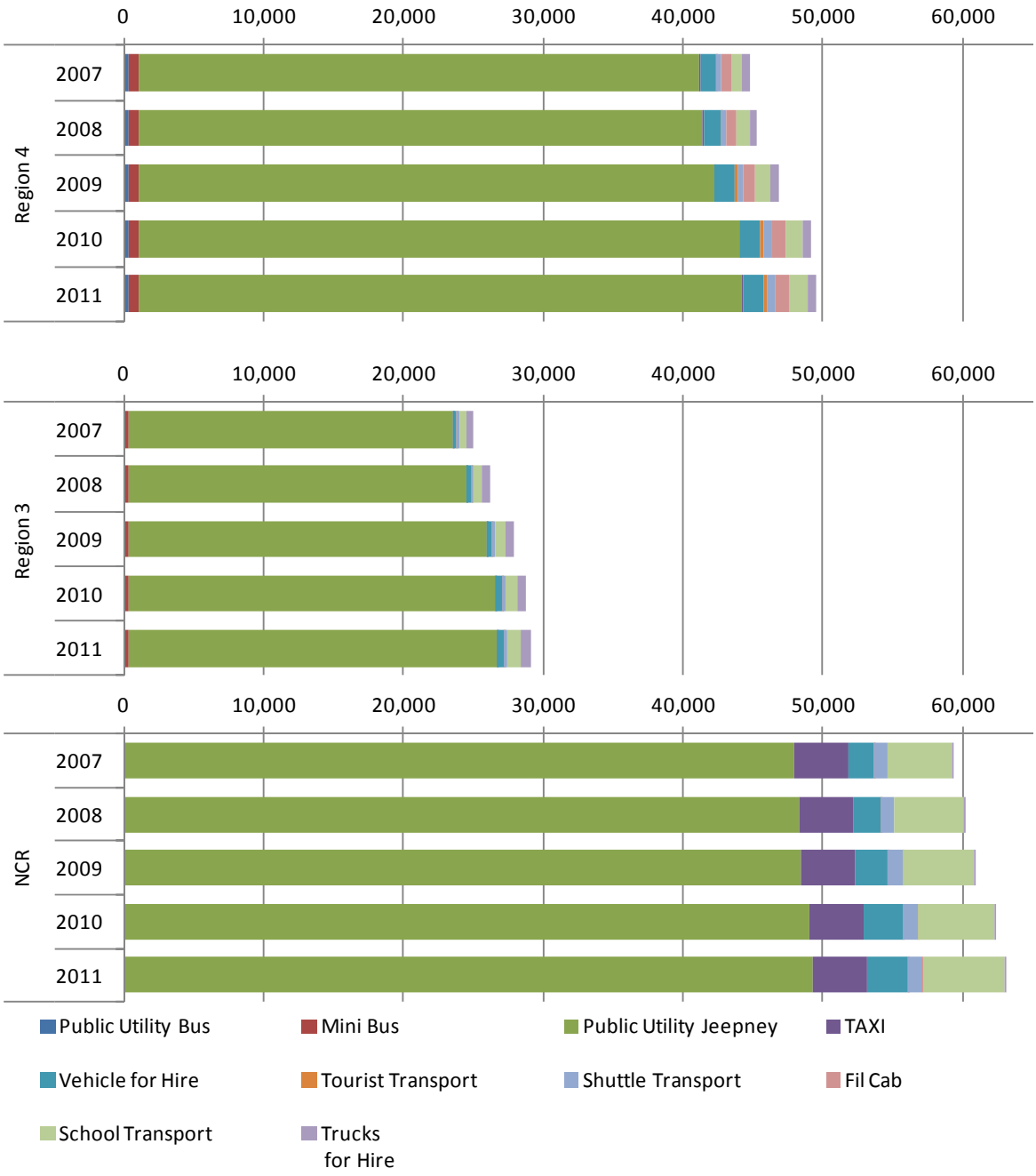
5.3.3.2 Number of Franchised and Jeepney Route

Figure 5.3-24 shows the number of franchises of public road transport. The most franchised type of vehicle is the Jeepney because the Jeepney performs the function of feeder transportation.

Jeepney route maps of Metro Manila are shown in **Figure 5.3-25** and **Figure 5.3-26,** which were published in 2010.

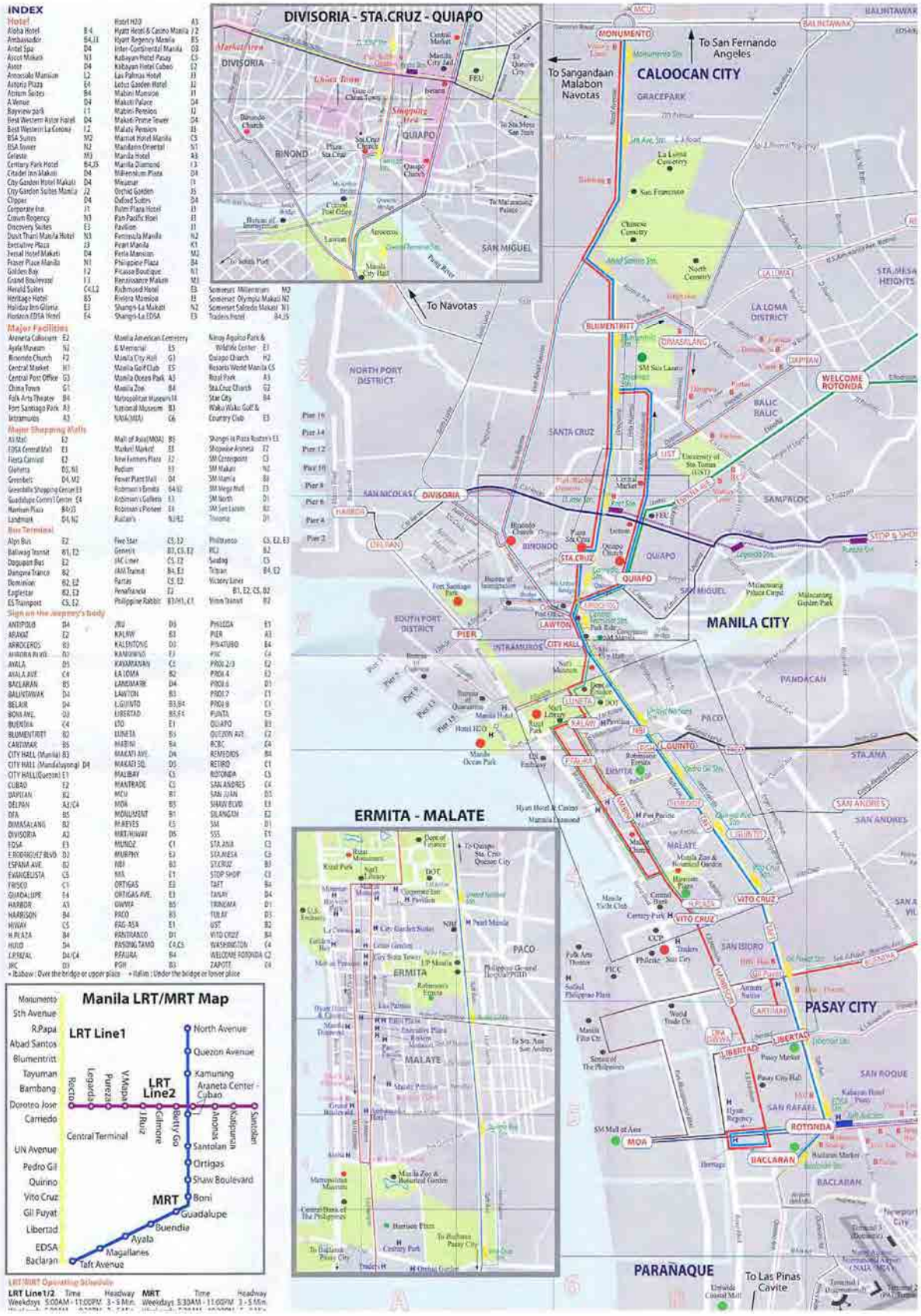
There are numerous Jeepney routes in Metro Manila, which are along the main roads and even in narrow streets.

The Jeepney is very convenient for passengers, who can board and exit wherever they want because the location of the jeepney stops are not specified. However, the travel speed of Jeepney is very low due to frequent stops, and this has a negative impact on the smooth running of other vehicles.



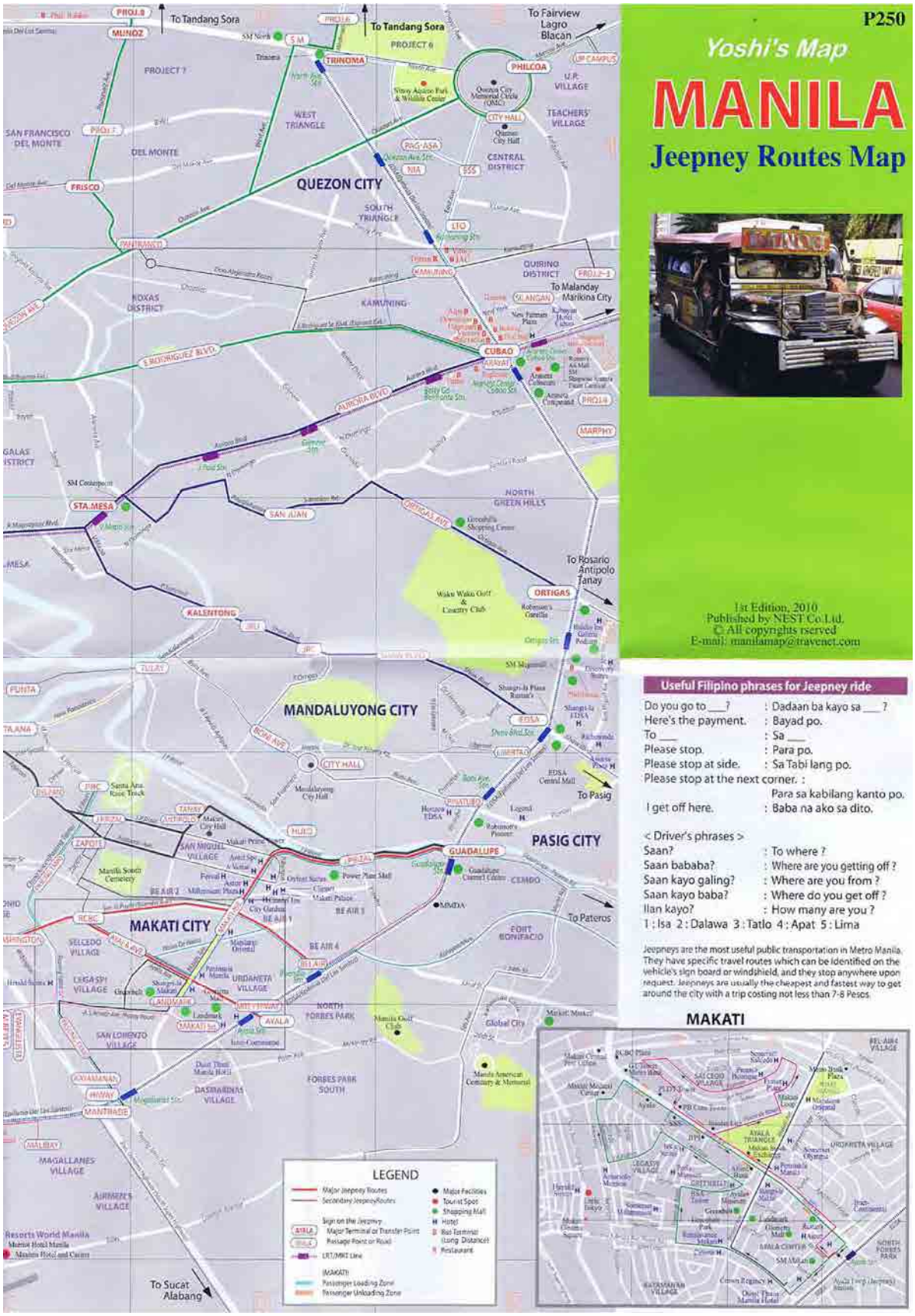
Source: LTFRB

FIGURE 5.3-24 NUMBER OF PUBLIC ROAD TRANSPORT FRANCHISES IN NCR, REGION III AND REGION IV (2007 – 2011)



Source: NEST Co. Ltd.

FIGURE 5.3-25 JEEPNEY ROUTE MAP AT AND AROUND MANILA CITY 1/2 (2010)



Source: NEST Co. Ltd.

FIGURE 5.3-26 JEEPNEY ROUTE MAP AT AND AROUND MANILA CITY 2/2 (2010)

5.4 TRAFFIC DEMAND MANAGEMENT (TDM) MEASURES AND TRAFFIC MANAGEMENT

The following traffic demand management measures are being implemented.

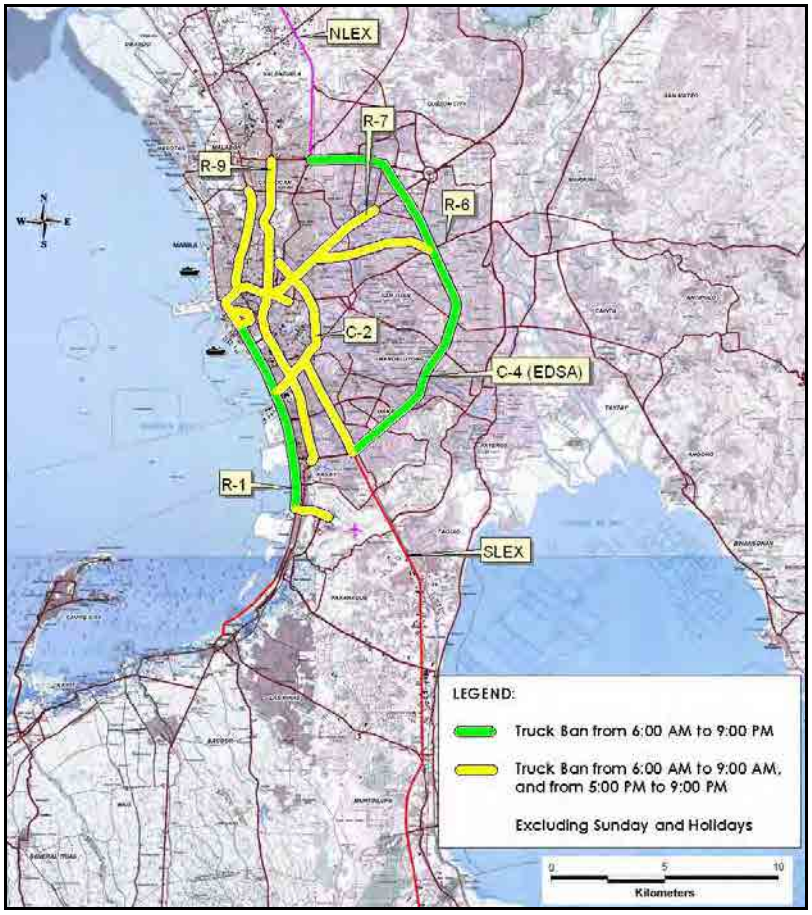
5.4.1 Unified Vehicular Volume Reduction Program (UVVRP) or Color Coding

- All motor vehicles, excluding large trucks, emergency vehicles and other exempt vehicles, are banned from all Metro Manila roads from 7:00 AM to 10:00 AM and from 3:00 PM to 7:00 PM, one day per week based on the last digit of their license plate number as follows: vehicles with last digit 1 and 2 are banned on Monday, 3 and 4 on Tuesday, 5 and 6 on Wednesday, 7 and 8 on Thursday, 9 and 0 on Friday. This is implemented in all the cities and municipalities of Metro Manila, except at Makati and Las Piñas Cities where UVVRP is from 7:00 AM to7:00 PM, without a "window" time.
- No restriction is applied and any vehicle can be used on Saturdays, Sundays and public holidays.

Number Coding	
1/2	Monday
3/4	Tuesday
5/6	Wednesday
7/8	Thursday
9/0	Friday

5.4.2 Truck Ban

- This regulation was introduced to decongest the roads and prevent invasion of trucks into small streets.
- In 1994, a revised truck ban was adopted, and new rules prohibit trucks along EDSA from 6:00 AM to 9:00 PM between Pasong Tamo and Balintawak, and prohibit trucks along other routes from 6:00 AM to 9:00 AM and 5:00 PM to 9:00 PM, everyday excluding Sundays and Holidays.(See **Figure 5.4-1**)
- This system has been affecting international competitiveness in industry and commercial sectors due to constraints of freight transport at daytime.



Source: JICA Study Team

FIGURE 5.4-1 TRUCK BAN IN METRO MANILA ROADS

5.4.3 Bus System

Bus Lane System (Yellow Lane)

- This system was introduced to alleviate traffic congestion and avoid road accidents along EDSA, which is mainly caused by undisciplined bus drivers and passengers.
- All provincial and city buses are allowed to use the Magallanes flyover but are not allowed to use tunnels and underpasses along EDSA.
- Two outer lanes out of the total of five lanes were designated as bus lanes.

Bus Stop Segregation Scheme

- The scheme was introduced in EDSA wherein buses are divided into two groups based on their destination.
- City and Provincial Buses should only load and unload passengers in their respective designated terminals and bus stops along EDSA.
- Provincial buses are not allowed to load and unload along EDSA except on authorized provincial bus stops.

5.4.4 Other Traffic Management Measures

Yellow Box

- A yellow pavement marking which indicates that vehicles should not enter an intersection when the exit is not clear.
- This is intended to prevent the blocking of the intersection and spread of congestion to the crossing streets.

One-Way System

- This system has been adopted at many locations in major cities. Counter-flowing is not allowed and will be penalized.

Blue Lane System (Motorcycle Lanes)

- This system was introduced in 2011. Motorcycle Lanes are non-exclusive, designated lanes for motorcycle. This means that private vehicles are allowed to use these lanes.
- Presently it is implemented along EDSA, Commonwealth Avenue, Diosdado Macapagal Avenue and Marcos Highway.

5.5 ROAD CRASHES

5.5.1 Road Crash of Urban Road in Metro Manila

As a Road Crash database system, the Metro Manila Accident Reporting and Analysis System (MMARAS) is operated by the Road Safety Unit (RSU) of the MMDA Traffic Operations Center (TOC) – Traffic Engineering Center (TEC) with the cooperation and assistance of the Traffic Enforcement Group (TEG) of the National Capital Region Police Office (NCRPO), Philippine National Police (PNP). This System was inaugurated in June 2002.

The latest set of Road Crash data available is for year 2007.

In Metro Manila, there were 338 fatal, 11,361 non-fatal injury and 51,374 damage accidents, or a total of 63,073 accidents in year 2007.

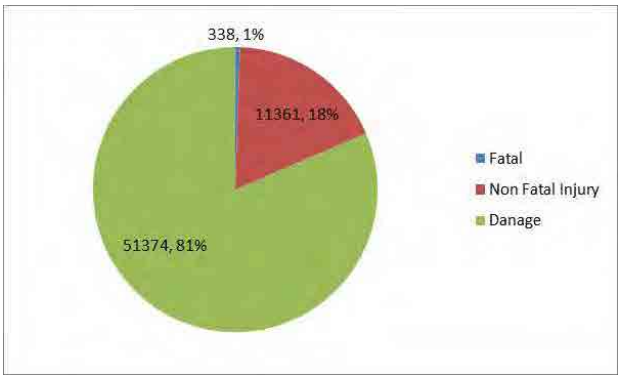


FIGURE 5.5-1 NUMBER OF ROAD ACCIDENTS (2007)

Type of person involved

Figure 5.5-2 and **Figure 5.5-3** show the type of persons involved in crashes. For fatalities, more than 50% of the cases had Pedestrians killed. Currently, MMDA and DPWH construct many footbridges and pedestrian overpasses to avoid the pedestrians from crossing the road. With regard to persons injured, 5,220 (37%) were drivers, 4,389 (31%) were passengers and 4,410 (32%) were pedestrians.

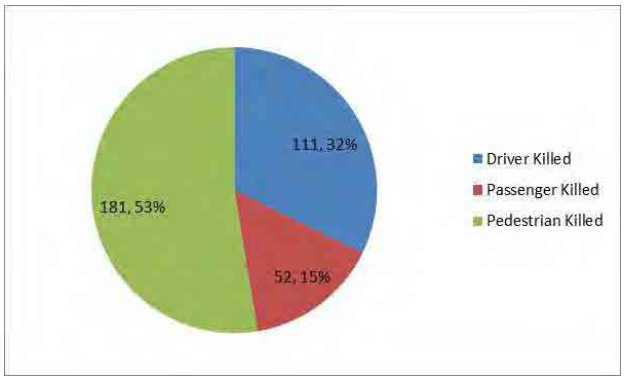


FIGURE 5.5-2 FATALITIES TYPE OF PERSON INVOLVED IN ROAD CRASHES (2007)

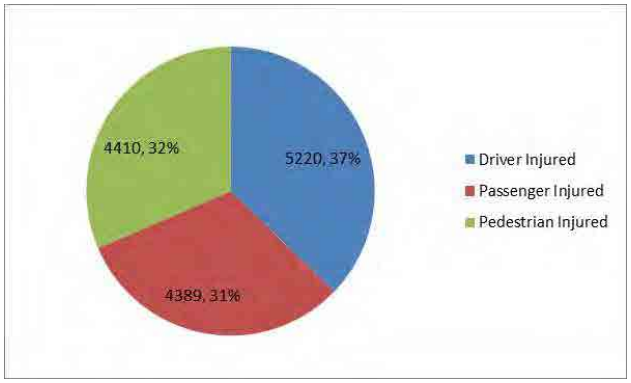


FIGURE 5.5-3 INJURIES TYPE OF PERSON INVOLVED IN ROAD CRASHES (2007)

Time of Day

A total of 19,739 or 31% of accidents occurred during the hours of darkness and without indicated time, while the 43,334 or 69% occurred during the daytime. It can be observed that most of the accidents occurred at day time but fatal accidents are high during nighttime and the early hours of the morning. Drivers, passengers and pedestrians are advised to be cautious and attentive during these particular hours.

TABLE 5.5-1 NUMBER OF ROAD CRASHES BY TIME OF DAY (2007)

Time hour	Fatal	Non-Fatal Injury	Damage	Grand Total
0	10	190	719	919
1	21	284	828	1,133
2	19	275	757	1,051
3	9	217	630	856
4	14	291	902	1,207
5	15	296	984	1,295
6	7	389	1,531	1,927
7	6	481	2,243	2,730
8	9	540	2,663	3,212
9	22	582	2,934	3,538
10	18	595	3,483	4,096
11	10	601	3,602	4,213
12	13	633	3,006	3,652
13	5	469	2,670	3,144
14	14	547	3,163	3,724
15	16	574	3,336	3,926
16	15	598	2,897	3,510
17	10	609	2,514	3,133
18	17	490	2,022	2,529
19	15	490	2,338	2,843
20	16	527	2,134	2,677
21	13	500	2,068	2,581
22	14	461	1,693	2,168
23	21	417	1,393	1,831
Blank	9	305	864	1,178
Grand Total	**338**	**11,361**	**51,374**	**63,073(100%)**
Day-time (6:00-18:00)	162 (0.026%)	7108 (11.27%)	36,064 (57.18%)	43,334 (68.71%)
Night-time (18:00-6:00)	176 (0.028%)	4253 (6.74%)	15,310 (24.27%)	19,739 (31.29%)

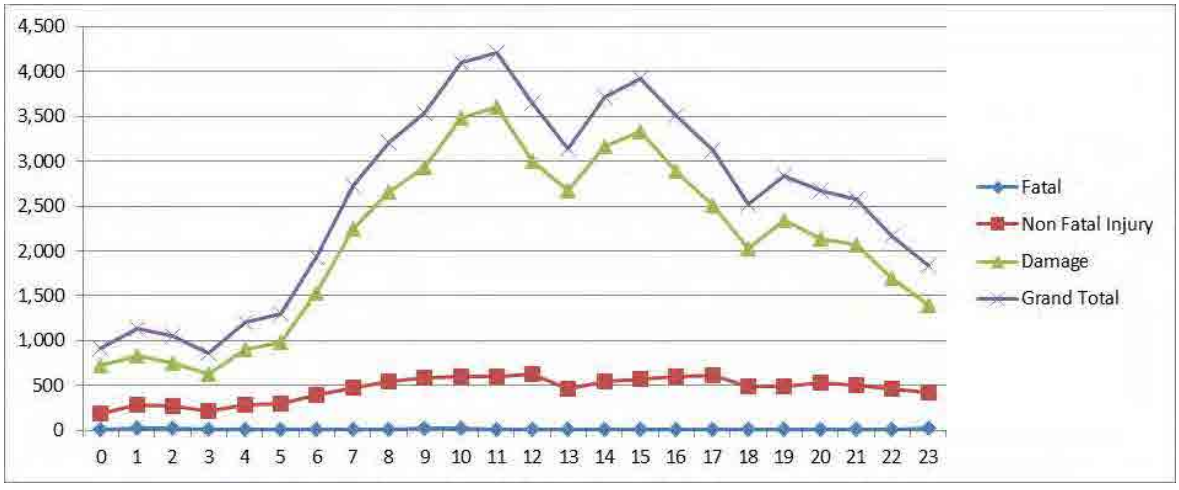


FIGURE 5.5-4 NUMBER OF ROAD CRASHES BY TIME OF DAY (2007)

Vehicle types involved in accidents

Figure 5.5-5 shows the vehicles involved in road accidents for each accident type. Motorcycles have the highest fatality accident rate with 113 involved or 24% of the total fatal accidents, and followed by cars with 91 or 19%. For non-fatal incidents, motorcycles still have the highest rate with 5,684 or 32% share and followed by cars with 5,201 or 29%

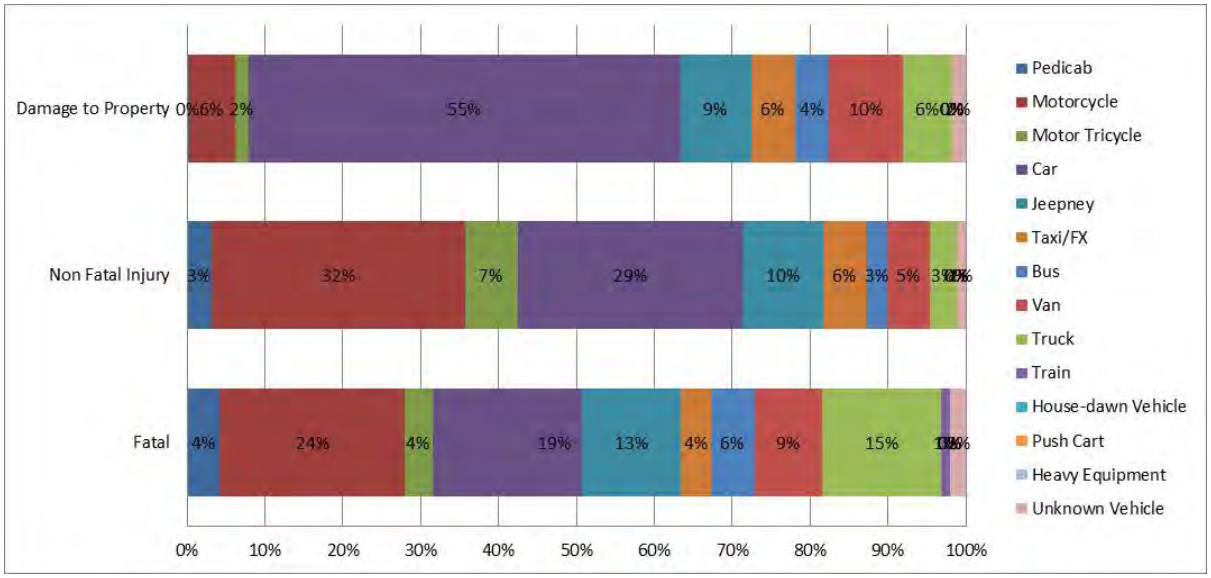


FIGURE 5.5-5 VEHICLE TYPE SHARE OF ROAD CRASHE (2007)

Collision Type

Figure 5.5-6 shows the collision type in road crashes for each incident type. “Hit pedestrian” cases have the highest fatality accident rate with 156 involved or 65% of the total fatal accidents, and followed by “side swipe” with 29 or 12% respectively. For non-fatal incidents, Hit pedestrian cases still have the highest rate with 3,942 or 56% share and followed by side swipe with 1,607 or 23%.

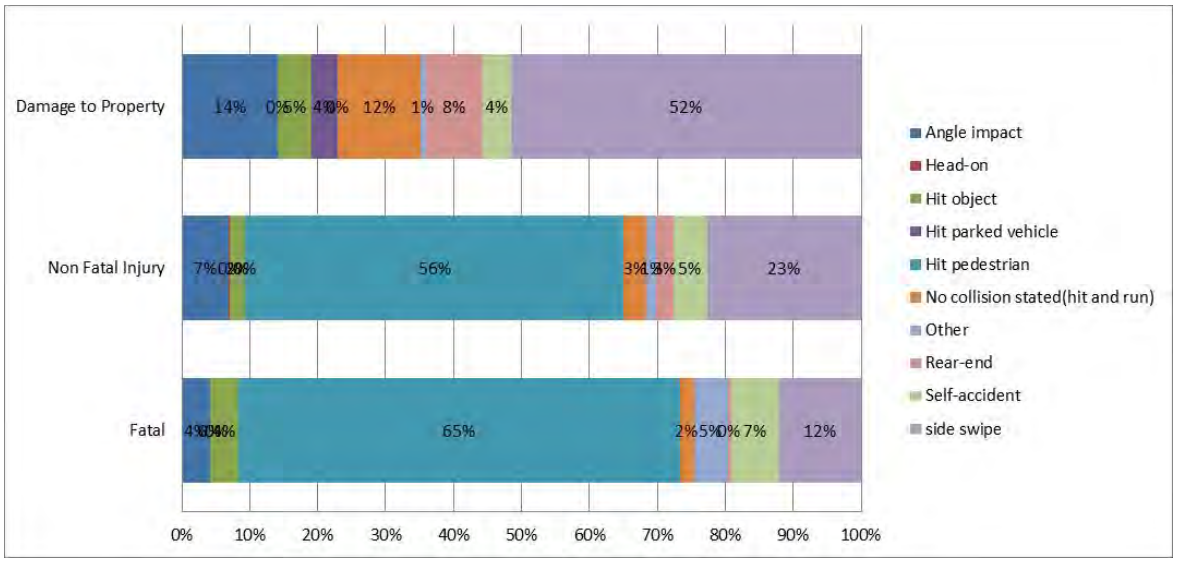


FIGURE 5.5-6 COLLISION TYPE SHARE OF ROAD CRASHES (2007)

5.5.2 Road Crashes of Urban Road outside of Metro Manila

DPWH has implemented a Traffic Accident Recording and Analysis System (TARAS). **Table 5.5-2** shows the summary of Road Crashes in 2011. The number of accidents was recorded only on national roads.

TABLE 5.5-2 SUMMARY OF ROAD CRASHE IN 2011

Area	Frequency of Accident	Severity of Accidents				Main Cause of Accident			Alcohol/ Drug Accident
		Fatal	Serious Injury	Minor Injury	Property Damage	Human Error	Vehicular Defect	Road Defect	
NCR	705	8	53	150	494	672	27	6	7
Region III	833	166	154	258	255	716	81	21	120
Region IV-A	654	55	86	198	315	627	24	1	52
Sub-total	2,192	229	293	606	1,064	2,015	132	28	179
Philippine	**9,992**	**1,261**	**1,927**	**3,179**	**3,625**	**8,968**	**676**	**178**	**1,173**

Source: DPWH

5.5.3 Traffic Accidents on Expressways

TRB has traffic accident data from O&M companies. **Table 5.5-3** shows the summary of traffic accident in 2011.

TABLE 5.5-3 SUMMARY OF TRAFFIC ACCIDENTS OF EXPRESSWAY IN 2011

	Driver's Error	Blown Tire	Mechanical Problem	Hit by Foreign Object	Others	Total
NLEX	1,885	0	405	0	61	2,331
SCTEX	142	37	35	15	73	323
SKYWAY	1,732	0	196	58	0	1,986
CAVITEX	45	2	10	0	1	58
SLEX	741	94	81	0	18	1,195
STAR	115	24	30	0	2	184

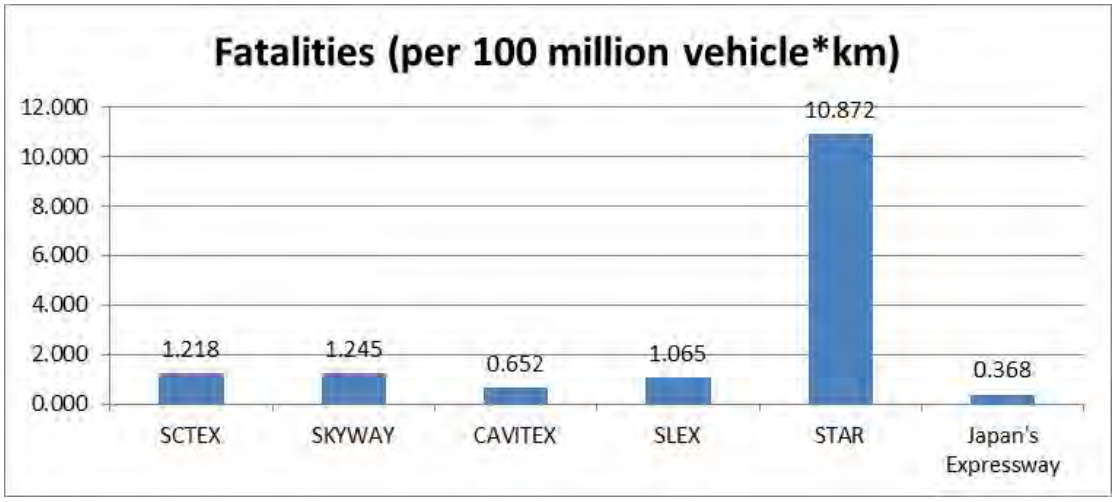
Source: TRB

Table 5.5-4 and **Figure 5.5-7~Figure 5.5-8** shows the normalized traffic accident fatalities and injuries.

TABLE 5.5-4 FATALITIES AND INJURIES ON EXPRESSWAYS IN 2011

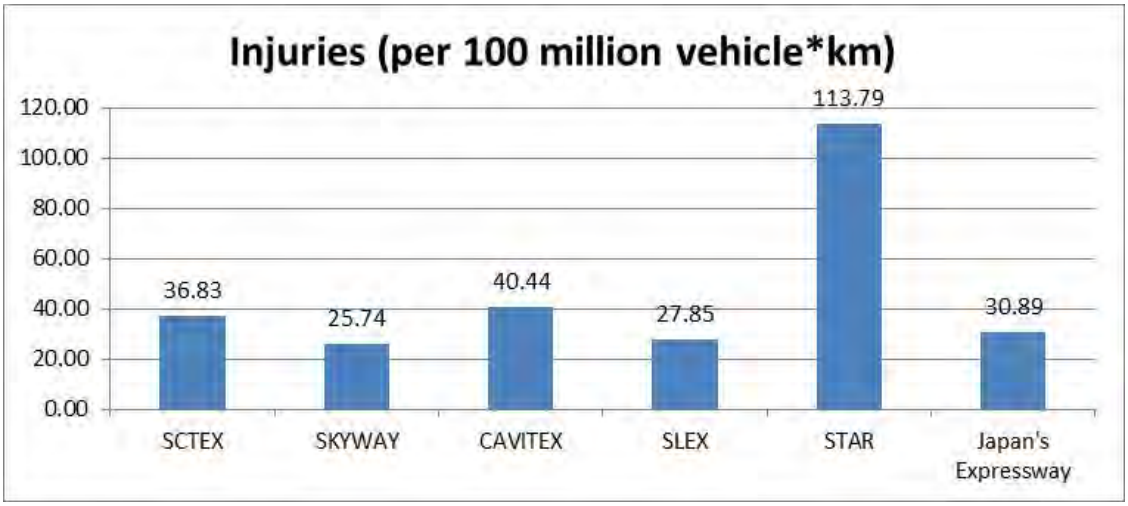
	No. of Fatalities In 2011	No. of Injuries In 2011	Fatalities Rate[1] (per 100 mil veh.-km)	Injuries Rate[2] (per 100 mil veh.-km)
NLEX	N/A	N/A	N/A	N/A
SCTEX	4	121	1.218	36.83
SKYWAY	15	310	1.245	25.74
CAVITEX	1	62	0.652	40.44
SLEX	7	183	1.065	27.85
STAR	15	157	10.872	113.79
Japans Exp.			*0.368*	*30.89*

. Source: TRB, Japan's expressway data in 2006.



Source: TRB

FIGURE 5.5-7 FATALITIES RATE OF EACH EXPRESSWAY



Source: TRB

FIGURE 5.5-8 INJURIES RATE OF EACH EXPRESSWAY

[1] *Fatalities rate= the number of fatality / (average daily volume *road length *365days)*
[2] *Injuries rate= the number of injury / (average daily volume *road length *365days)*

The highest fatalities rate is noted in STAR expressway at 10.872 (per 100 million vehicle*km), which is 10 times higher than those other expressways. Though other expressways have 4lanes or more, STAR has a 2-lane section from Lipa to Batangas City. As this 2-lane section can be used by high speed vehicles overtaking slow-moving vehicles (usually trucks) utilizing opposite lanes, it is expected that many severe traffic crashes would happen along this STAR section. The fatalities rates of other five expressways are much higher than those of Japan's expressways. By applying various traffic safety measures, it is expected that the number of fatalities in other expressways in the Philippines can be reduced.

5.6 VEHICLE WEIGHT CONTROL

5.6.1 Laws and Regulations

According to Republic Act No. 8754, the enforcement of gross vehicle weight (GVW) limits for trucks started in March 1, 2011. The DPWH is working out arrangements with the Philippine Ports Authority (PPA), Department of Trade and Industry (DTI), Land Transportation Office (LTO), Metropolitan Manila Development Authority (MMDA), Philippine National Police (PNP) and other stakeholders in the synchronization of the weighing operations and finalization of revised GVW limits for each truck / trailer type. However, the restriction on the allowable vehicle axle load of 13,500 kilograms shall be continuously enforced. (see **Table 5.6-1** and **Table 5.6-2**)

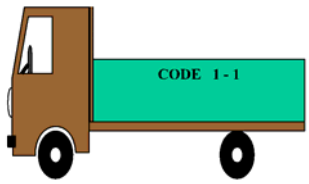
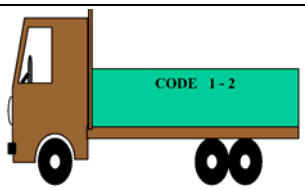
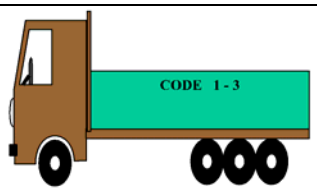
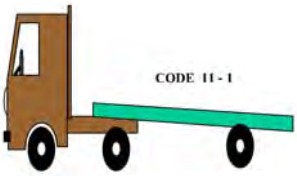
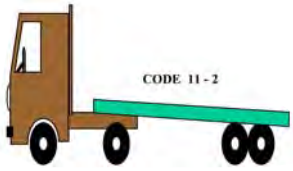
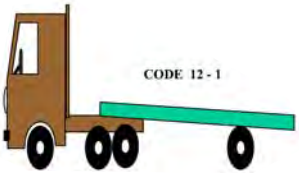
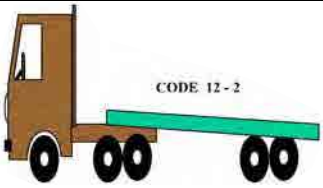
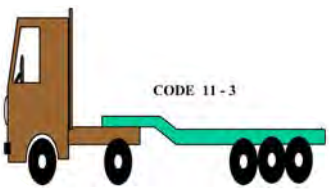
The Land Transportation Office (LTO) or its deputized officer requires the owner of truck or trailer which is loaded in excess of the maximum allowable gross vehicle weight (GVW) to pay a penalty in the amount equivalent to twenty five percent (25%) of the MVUC applicable to the vehicle at the time of infringement, provided that the penalty shall be waived for loadings exceeding the GVW by a tolerance of less than five percent (5%) and that no vehicle shall be permitted to proceed on the roadway if either a dual-wheel axle load exceeds 13,500 kg.

5.6.2 Related Government Agencies

On the enforcement of overloading, while the Land Transportation Office (LTO) has the capability to apprehend overloading vehicles, it has deputized qualified personnel of other government agencies such as DPWH, Metropolitan Manila Development Authority (MMDA), Philippine National Police (PNP), Philippine Ports Authority (PPA), Department of Trade and Industry (DTI), etc. to enforce the anti-overloading rules. The LTO-deputized DPWH personnel have the capability to apprehend with the assistance from the police. Both driver and the owner will be apprehended if the vehicle is found overloaded. There are some disputes between the driver and the enforcer when the apprehension is done by agencies. Therefore, they would like to explore non-physical contact apprehension methods. So far, all apprehension made for

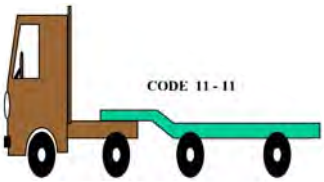
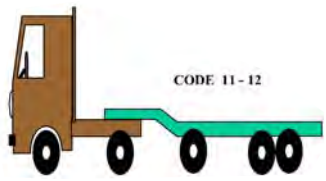
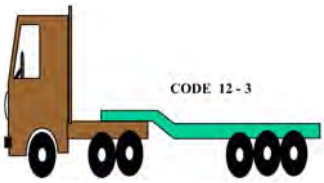
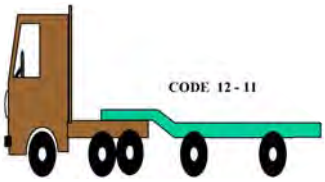
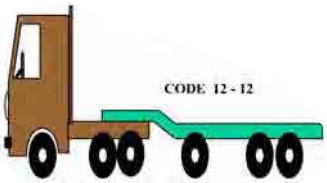
overloading vehicles are all via physical contact.

TABLE 5.6-1 MAXIMUM ALLOWABLE GROSS VEHICLE WEIGHT PER RA NO.8794 (1/2)
(BASED ON THE MAXIMUM ALLOWABLE AXLE LOAD OF 13,500 KGS.)

	TRUCKS/TRAILERS	DESCRIPTION	MAX. ALLOWABLE GVW (In kgs.)
1		TRUCK WITH 2 AXLES (6 WHEELS)	**16,880**
2		TRUCK WITH TANDEM REAR AXLE 3 AXLES (10 WHEELS)	**27,250**
3		TRUCK WITH TANDEM REAR AXLE 4 AXLES (14 WHEELS)	**29,700**
4		TRUCK SEMI-TRAILER WITH 3 AXLES (10 WHEELS)	**30,380**
5		TRUCK SEMI-TRAILER WITH 4 AXLES (14 WHEELS)	**30,380**
6		TRUCK SEMI-TRAILER WITH 4 AXLES (14 WHEELS)	**30,380**
7		TRUCK SEMI-TRAILER WITH 5 AXLES (18 WHEELS)	**37,800**
8		TRUCK-TRAILER WITH 2 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (18 WHEELS)	**30,378**

Source : DPWH

TABLE 5.6-2 MAXIMUM ALLOWABLE GROSS VEHICLE WEIGHT PER RA NO.8794 (2/2)
(BASED ON THE MAXIMUM ALLOWABLE AXLE LOAD OF 13,500 KGS.)

	TRUCKS/TRAILERS	DESCRIPTION	MAX. ALLOWABLE GVW (In kgs.)
9		TRUCK-TRAILER WITH 2 AXLES AT MOTOR VEHICLE & 2 AXLES AT TRAILER (14 WHEELS)	**30,378**
10		TRUCK-TRAILER WITH 2 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (18 WHEELS)	**36,900**
11		TRUCK-TRAILER WITH 3 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (22 WHEELS)	**41,000**
12		TRUCK-TRAILER WITH 3 AXLES AT MOTOR VEHICLE & 2 AXLES AT TRAILER (18 WHEELS)	**37,800**
13		TRUCK-TRAILER WITH 3 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (22 WHEELS)	**41,000**

Source : DPWH

5.7 SEA TRANSPORT

There are five (5) international ports in the Study Area, Manila North Harbor, Manila South Harbor, Manila International Container Terminal (MICT), Batangas Port and Subic Bay Free Port.

The number of ship calls, number of containers handled and passenger traffic are shown in **Table 5.7-1** and the trend of number of containers handled and passenger traffic are presented in **Figure 5.7-1** and **Figure 5.7-2** respectively.

Though Batangas and Subic Ports were constructed to decongest the Manila Port complex, their capacities to handle container traffic have been greatly underutilized, as most container traffic is still concentrated in the Manila Port complex. It is necessary to promote the intensive use of Batangas Port and Subic Port in order to use these ports more efficiently and reduce traffic congestion in Manila Port area.

TABLE 5.7-1 STATISTICS OF PORTS (2010)

	No. of Ship Calls			No. of Containers (in T.E.U.)			No. of Passengers
	Domestic	Foreign	Total	Domestic	Foreign	Total	
Manila-N.Harbor	4,436	531	4,967	553,548	0	553,548	821,983
Manila-S.Harbor	5,709	2,010	7,719	101,764	886,504	988,268	1,004,780
MICT	103	1,839	1,942	89,542	152,344	241,886	0
Subtotal	**10,248**	**4,380**	**14,628**	**744,854**	**1,038,848**	**1,783,702**	**1,826,763**
Batangas	42,922	1,068	43,990	4,646	1,091	5,737	6,826,589
Subic Bay	-	-	-	-	-	25,000	-

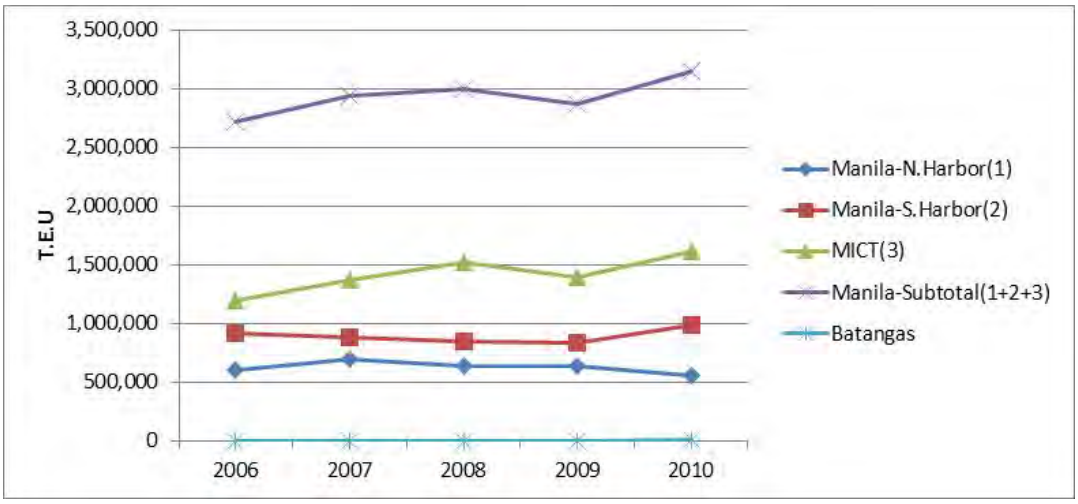


FIGURE 5.7-1 NUMBER OF CONTAINERS HANDLED BY PORT (2006-2010)

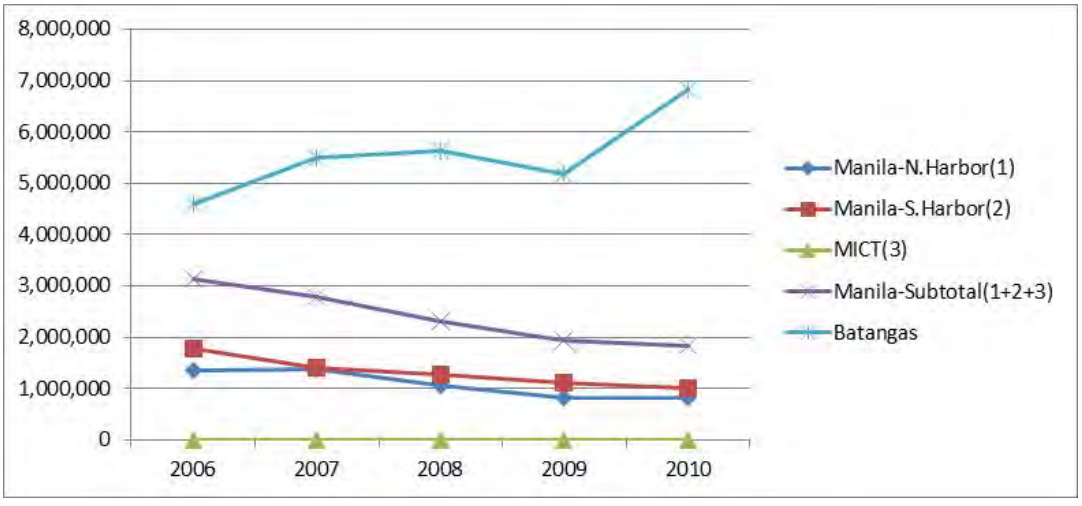


FIGURE 5.7-2 NUMBER OF PASSENGERS OF PORT (2006-2010)

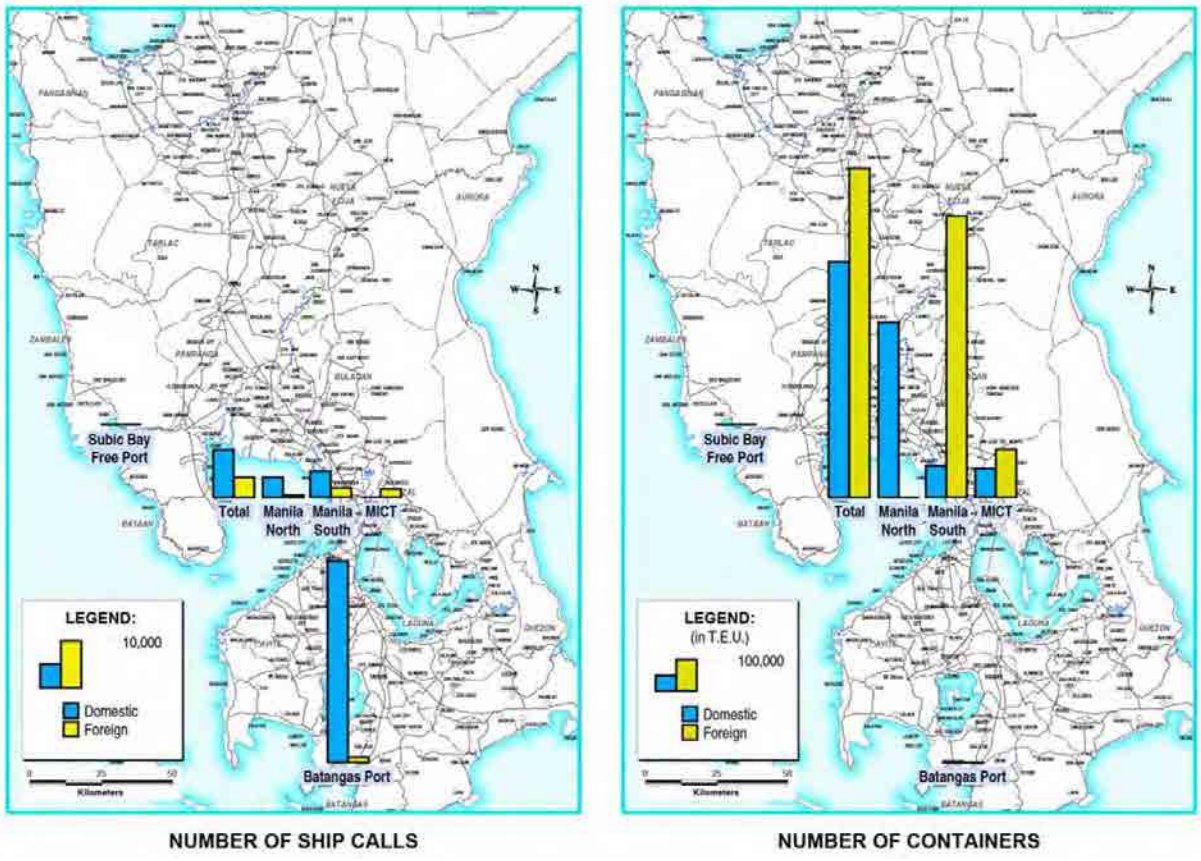


FIGURE 5.7-3 SEA TRANSPORT (2010)

5.8 AIR TRANSPORT

There are three (3) international airports within the Study Area, namely, Ninoy Aquino International Airport (NAIA), Clark International Airport (CIA, formerly Diosadado Macapagal International Airport) and Subic Bay International Airport (SBIA)

The number of flights, number of passengers and cargo traffic are presented in **Table 5.8-1**.

The international air passenger traffic demand of the Study Area was 12.99 million passengers in 2010. The share of NAIA was 95%. The domestic passenger traffic of the Study Area was 14.8 million passengers in 2010.

The international air cargo demand of the Study Area was 352,000 tons in 2010. The shares of air cargo demand between NAIA and CIA were 87% and 13 %, respectively.

The domestic air cargo demand of the Study Area was 118,000 tons in 2010. The shares between of NAIA and CIA were 99% and 1%, respectively.

CIA handled 132,000 tons of cargo in 2009; however, most of that cargo was UPS (mainly transit

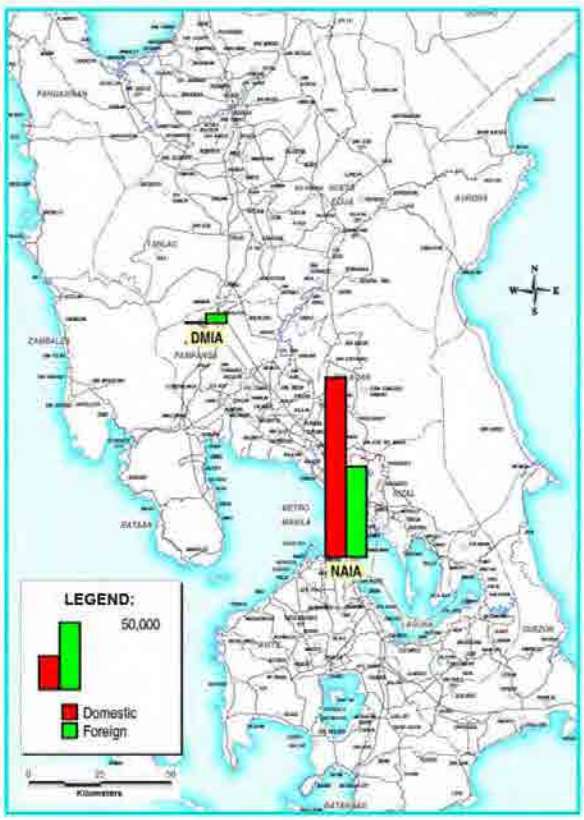
cargo) and the majority of the UPS operations subsequently transferred from CIA to Shenzhen in China.

Since NAIA's full capacity is expected to be reached within a few years, as a strategy to cope with this problem, DOTC has a plan to transfer a substantial part of NAIA operations from Metro Manila to Clark. In order to accomplish the plan, a high speed rail between the central business district of Makati City and CIA will be necessary. In order to avoid the road traffic congestion in Metro Manila, an elevated NLEX-SLEX connector road and/or Skyway Phase III will be necessary to achieve smooth access between Manila and CIA.

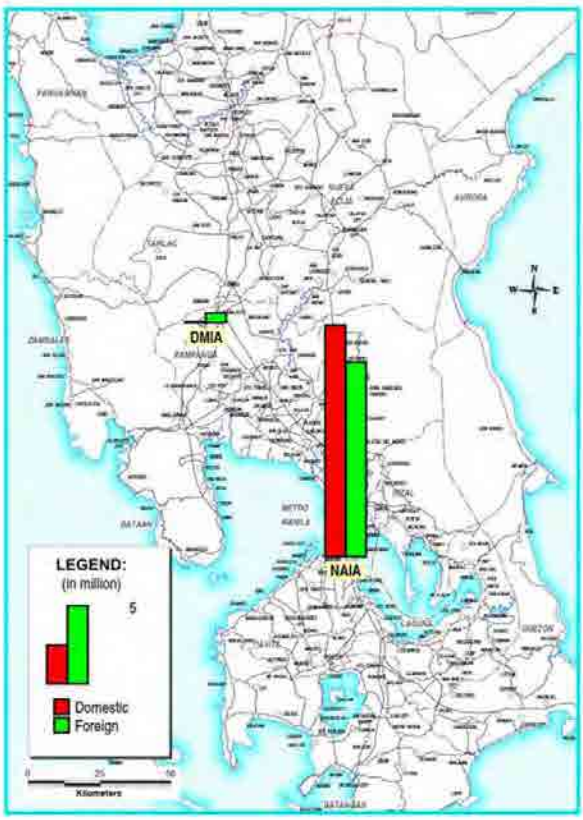
TABLE 5.8-1 AIRPORT STATISTICS IN THE STUDY AREA (2010)

		NAIA	CIA	Total
Aircraft Movements (times)	Domestic	132,786	871	133,657
	Foreign	67,321	6,796	74,117
	General Aviation	35,887	7,667	43,554
	Total	235,994	2,596	251,328
No. of Passengers (in 1,000)	Domestic	14,755	47	14,802
	Foreign	12,381	608	12,989
	Total	27,136	654	27,790
Cargo Traffic (M.T.)	Domestic	117,467	648	118,115
	Foreign	306,361	45,326	351,687
	Total	423,828	37,986	461,814

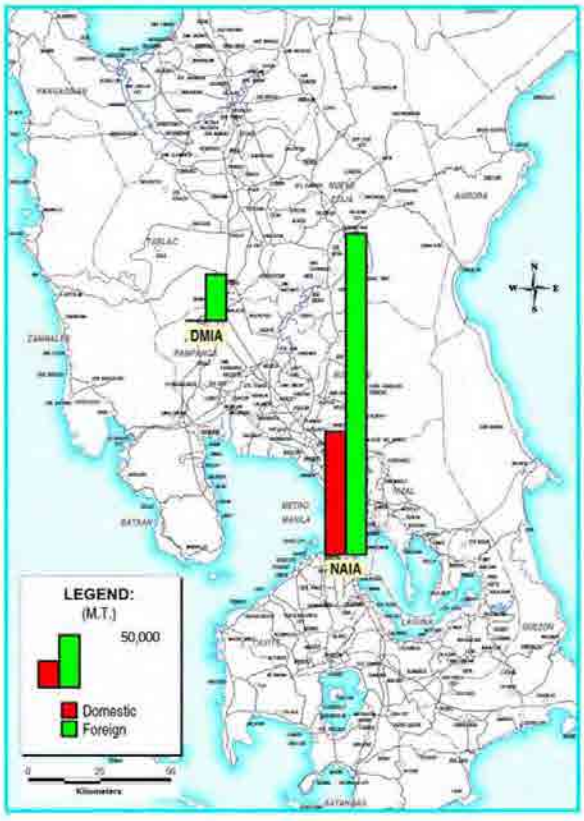
Note: Data of SBIA is not available.
Source: MIAA



NUMBER OF FLIGHTS



NUMBER OF PASSENGERS



CARGO TRAFFIC

FIGURE 5.8-1 AIR TRANSPORT (2010)