CHAPTER 9

PROJECTS PROPOSED BY VARIOUS ENTITIES AND PRE-SCREENING OF PROPOSED PROJECTS

CHAPTER 9
ROAD PROJECTS PROPOSED BY VARIOUS ENTITIES AND PRE-SCREENING OF PROPOSED PROJECTS

9.1 PROPOSED PROJECTS BY VARIOUS ENTITIES

Information on existing, on-going and proposed road projects was collected and summarized in **Table 9.1-1** and shown in **Figure 9.1-1.**

TABLE 9.1-1(1/3) MAJOR ROAD PROJECTS IN NORTH OF METRO MANILA

PROPONENT /OPERATOR	REF NO.	HIGH STANDARD HIGHWAY PROJECTS	DESCRIPTION	STATUS
Manila North Tollway Corporation (MNTC)	**1**	North Luzon Expressway (NLEx) Phase 1	(Segment 1) Widening from Balintawak to Tabang (27.62 kms).	Completed / Operational (opened to traffic Feb. 2005)
			(Segment 2) Widening from Burol to San Fernando (32.8 kms).	
			(Segment 3) Widening from San Fernando to Santa Ines (22.2 kms).	
			(Segment 7 - Subic-Tipo Tollway) Construction of from Bo. Tipo to SBMA (8.5 kms).	Completed / Operational
	2	North Luzon Expressway (NLEx) Phase 2 Circumferential Road C-5	(Segment 8.1) Construction of C-5 section from Mindanao Ave. to NLE (2.34 kms).	NTP issued by TRB to MNTC last 15 April 2009. Construction works is ongoing.
			(Segment 8.2) Construction of C-5 section from C.P Garcia to Mindanao Ave. (10.23 kms).	MNTC is putting on-hold plans for this section in view of the Government's ongoing widening of Katipunan Ave. and the construction of fly-over that will cross commonwealth Ave. and connect to Katipunan Ave., to Segment 8.1 at Mindanao Ave. via Luzon and Congressional Ave.
			(Segment 9) Construction of C-5 Section from NLE to Mc Arthur (4.06 kms).	Detailed Engineering Design is ongoing.
			(Segment 10) Construction of Section from Mc Arthur Highway to C-3 (5.63 kms).	MNTC will be conducting an alternative alignment study with the view of identifying shorter alignment.
	3	North Luzon Expressway (NLEx) Phase 3 Subic Expressway	(Segment 4) Construction of San Simon to Guagua (17 kms).	Construction scheduled 2012-2014
			(Segment 5) Construction of Guagua to Dinalupihan (31 kms).	
			(Segment 6) Construction of Dinalupihan to Tipo (10.50 kms).	
BCDA	**4**	Subic-Clark-Tarlac Expressway (SCTEx)	(Package 1) Construction of 4-lane expressway to connect end of Subic Bay - Tipo Expressway to Clark Special Economic Zone (50kms.)	Completed. Opened to traffic April 2008.
			(Package 2) Construction of 4-lane expressway from Clark Special Economic Zone to Tarlac City running parallel to Manila North Road (43kms.)	Completed. Opened to traffic July 2008.
DPWH	**5**	Cabanatuan Bypass	From PPH in San Leonardo to Pan Philippine Highway in Talavera, both in the province of Neva Ecija (35 kms).	Construction deferred

PROPONENT /OPERATOR	REF NO.	HIGH STANDARD HIGHWAY PROJECTS	DESCRIPTION	STATUS
	6	Plaridel Bypass	From NLEX Guguinto to PPH in San Rafael, both in the province of Bulacan (23 kms).	On-going Construction
	7	San Jose Bypass	San Jose City, Nueva Ecija (8 kms).	Detailed Design Completed
	8	Central Luzon Expressway (CLEX) Phase 1	(Route A) From the alignment of the proposed TPLEX in Ramos, Tarlac to PPH in Muñoz, Nueva Ecija. (Route B) From the alignment of the proposed TPLEX in Pura, Tarlac to PPH in Sto Domingo, Nueva Ecija. (Route C) From Tarlac City to the vivinity of the intersection of the north end of Cabanatuan Bypass and PPH in Nueva Ecija.	F-S (JICA Yen Loan)
	9	Central Luzon Expressway (CLEX) Phase 2	With 3 alternatives route both beginning at the vicinity of the intersection of Cabanatunan bypass, PPH and Proposed CLEX Phase 1.	F-S is on-going. (JICA Yen Loan)
	10	North Luzon Expressway East (NLEE)	Construction of 4-lane expressway to run parallel and East of Pan Philippine Highway from C5 in Quezon City to San Jose City in Nueva Ecija (126 kms).	Pre- feasibility study completed in 2000. Project was found not feasible for private sector.
Philippine Infrastructure Development Corporation (PIDC)	**11**	Tarlac-Pangasinan-La Union Expressway (TPLEx)	(Phase 1) Construction of 2-lane (initial) expressway from La Paz interchange of SCTEx to Rosario, La Union (88 kms.) (Phase 2) Expansion to 4-lane expressway when traffic volume reaches 25,000/day), and extension from Rosario to San Fernando, La Union	Detailed engineering, including parcellary survey by PIDC is ongoing. ROW acquisition from Tarlac City to Carmen, Pangasinan (49 kms) by DPWH is ongoing.
JICA	**12**	2nd Pan Philippine Highway	(Phase 1) Connecting Plaridel Bypass and Cabanatuan Bypass running parallel and to the west of PPH. (Phase 2) Connecting Cabanatuan Bypass and San Jose running parallel and to the west of PPH.	Conceptual Stage
UEM-MARA Phillippines Corp.	**13**	Manila Cavite Toll Expressway Phase 1 (R-1 Expressway)	Upgrading of existing R-1 Expressay into a dual 3-lane expressway from Airport Road to Junction to Zapote (6.75 kms).	Completed last May 1998.
	14	Phase 2 (C-5 Link Expressway)	Design and construction of dual 3-lane expressway from R-1 Expressway to SLEX and C-5 in Parañaque and Taguig (7.50 kms).	Detailed Design completed.
	15	Phase 3 (R-1 Expressway Extension)	Design and construction of dual 2-lane expressway from R-1 Expressway at Zapote to Noveleta, Cavite (11.24 kms, of which 4.0 kms will be reclaimed land).	On- going construction from end of R-1 expressway in Bacoor to Kawit on land reclamation along the coast of Manila Bay.

TABLE 9.1-1 (2/3) MAJOR ROAD PROJECTS IN SOUTH OF METRO MANILA

PROPONENT /OPERATOR	REF NO.	PROJECTS	DESCRIPTION	STATUS
Philippine National Construction Corp. (PNCC)/ South Luzon Tollway Corporation (SLTC)	**16**	South Luzon Expressway (SLEx) Phase 1	Toll Road 1 (TR1). Rehabilitation, upgrading and expansion of the existing 6-lane to 8-lane of Alabang Viaduct (1.20 kms)	Completed. Southbound lane opened to traffic June 2008. Northbound lane opened to traffic November 2008.
			Toll Road 2 (TR2). Rehabilitation, upgrading and expansion of the existing 4-lane toll road to 8-lane, from Alabang Viaduct to Sta Rosa; and existing 4-lane to 6-lane segment from Sta Rosa to Calamba (total 28.53 kms).	Ongoing, for completion within 2009
			Toll Road 3 (TR3). Construction of new 4-lane toll road from Calamba, Laguna to Sto Tomas, Batangas connecting SLEX to STAR Tollway (7.5 kms).	Ongoing, for completion within 2010
	17	Phase 2	Toll Road 4 (TR4). Construction of new 4-lane toll road from Sto Tomas, Batangas to Lucena City (56.6 kms).	Feasibility Study submitted to TRB
DPWH	**18**	North-South Expressway (CALA)	Construction of 6-Lane elevated expressway from R-1 to Molino Blvd. (2kms.)	Feasibility study of NS road completed (2007); EIS completed and submitted to EMB for review and approval.
			Existing Molino Blvd. by DPWH into 6-lane road (4.60 kms.)	
			Construction of 6-lane road from Molino Blvd. to Daang Hari Road traversing One Asia Property (6.30 kms)	
			Construction of 6-Lane road from Daang Hari road to Aguinaldo Highway (6.8 kms)	
			Construction of 6-Lane road from Aguinaldo Highway intersection to the proposed CALA Expressway in Silang, Cavite south of Governor's Drive to Gov. Drive (7.6 kms)	
PNCC	**19**	Daang Hari-SLEx Link	Construction of 4-Lanes toll road from SLE to Daang Hari on a combination of underground and ground level expressway (4kms)	Investment proposal submitted to TRB on October 2008 for review and approval, Construction ongoing.
DPWH	**20**	CALA Expressway	Construction of 6-lane expressway from Manila-Cavite Coastal Expressway Extension to Gov. Drive (14kms.)	• No Alignment Study yet. • WB will study.
			Construction of 6-lane expressway from Gov. Drive to NS road (6kms.)	Prefeasibility study by JICA completed on (2007)
			Construction of 6-lane expressway from NS Road to Aguinaldo highway (3kms.)	
			Construction of 6-lane expressway from Aguinaldo highway to Tagaytay- Sta. Rosa road(10kms)	

PROPONENT /OPERATOR	REF NO.	PROJECTS	DESCRIPTION	STATUS
			Construction of 6-lane expressway from Tagaytay- Sta. Rosa Road to SLEX (5kms.)	
IDI (International Development Institution, Japan)	**21**	Laguna de Bay Crossing Road	(Alternative Route 1) From junction of Quezon Blvd. in Cardona, Rizal and pass through Binangonan peninsula and Talim island in Laguna de Bay and end at the junction of Greenfield Exit of SLEX. (35 kms)	Still Conceptual Stage
			(Alternative Route 2) From junction of Quezon Blvd. in Cardona, Rizal and pass through Binangonan peninsula and Talim island in Laguna de Bay and the towns of Los Baños and Bay in Laguna and ends at the intersection with Maharlika Highway near town of Alaminos, Laguna (46.2 kms)	
DPWH	**22**	Calamba-Los Banos Toll Expressway	Construction of 4-lane expressway starting at the entrance of Greenfields and ends at Bgy. Masili, Calamba then crosses the rail line, close to the coastal areas going to Los Baños and finnaky terminates at the town of Bay (15.50 kms)	Feasibility study completed.
Star Infrastructure Development Corp. (SIDC)	**23**	Southern Tagalog Arterial Road (STAR)	(Stage I) Existing 4-lane expressway from Sto. Tomas to Lipa, Batangas (22 kms)	Operational.
			(Stage II) Construction of 4-lane toll road (initial 2-lane southbound) from Lipa to Batangas City (20 kms)	South Bound (2-lane) Completed October 2008. Opened to traffic April 2008.
PNCC Skyway Corp.	**24**	Metro Manila Skyway (Stage 1)	(Stage 1) Construction of 6-lane elevated expressway from Bicutan to Buendia, with Ayala Central Business District Access Ramps (9.38 kms); and rehabilitation of South Luzon Expressway from Magallanes to Alabang (13.43 kms).	Operational. Completed in December 1999.
	25	Metro Manila Skyway (Stage 2)	(Stage 2) Construction of 6-lane elevated expressway from Bicutan to Alabang (6.88 kms).	Noticed to Proceed (NTP) issued by TRB last 27 April 2009 and acknowledge by proponent on same date. Ongoing construction works.
	26	Metro Manila Skyway (Stage 3)	(Stage 3, with 3 Alternative Alignment) Construction of 6-lane elevated expressway from Buendia to NLE. PNCC/Skyway Corp. withdrew its franchise.	Updating of feasibility study.
MNTC/PNR	**26**	NLEx-SLEx Link Expressway	NLEx and SLEx are to be connected utilizing PNR ROW	• MNTC completed Pre-F/S. • METI Study completed. • MNTC is undertaking detailed F/S.

TABLE 9.1-1 (3/3) MAJOR ROAD PROJECTS IN METRO MANILA

PROPONENT / OPERATOR	REF NO.	HIGH STANDARD HIGHWAY PROJECTS	DESCRIPTION	STATUS
DPWH	**27**	C6 Expressway	Construction of 4-lane expressway from R-1 to NLE (96kms.)	• Feasibility study by JETRO completed in 2007 • Korean Government interested to provide technical assistance to conduct a project implementation program to identify priority segment attractive to PPP arrangements. Terms of Reference for the conduct of study have been finalized. Study to include NEDA/ TRB approval for BOT Law implementation.
			(Section-1) Construction of a 4-lanes elevated structure from MMS to Taguig dikes then to proposed Ortigas interchange at ground level (17 kms).	
			(Section-2) Construction of a 4-lane high standard highway at ground level to Montalban from proposed Ortigas interchange to Montalban interchange (25kms.)	
			(Section-3) Construction of a 4-lanes high standard highway from proposed Montalban interchange to NLE (23 kms).	
	28	Manila Bay Expressway	(Phase 1) From C2 to South Harbor with Pasig River crossing by double deck cable-stayed bridge (800 m), Total 3.2 km viaduct.	Pre- FS completed.
			(Phase 2) Construction of 3.8km tunnel under Roxas Blvd. from South Harbor to South Reclamation Area , and 0.9km viaduct for approach tunnel.	
			(Phase 3) From C2 Road to C4 Road, all viaduct with 2 interchange (3.6km)	
			(Phase 4) From C4 Road to Panghulo Rd, all viaduct with 1 interchange (7.3km)	
			(Phase 5) From Panghulo Rd to NLE Valenzuela, all viaduct with 1 interchange (5.1km)	
			(Phase 6) From South Reclamation to MIA Rd, all viaduct with 1 interchange (3.6km)	
	29	NAIA Expressway	(Phase 1) Construction of 4-Lane elevated structure along Sales Avenue from SLE/Skyway to NAIA Terminal III (4 kms.)	Construction on-going by DPWH, North and South turning ramps from MMS to Sales Avenue
			(Phase 2) Construction of 4-Lane elevated structure along Andrews, Domestic, MIA Road to R-1 (5 kms.)	Pre-FS is on-going by ERIA.
Ausphil Tollways Corporation (ATC)	**30**	La Mesa Parkway	(Stage 1) Cotruction of 4-lane tollway from Commonwealth Ave. in Fairview Subdivision to Bigte Norzagaray (18.40 kms).	• Unsolicited proposal submitted to MWSS in 2001 and to TRB in 2003; • Original Proponent status

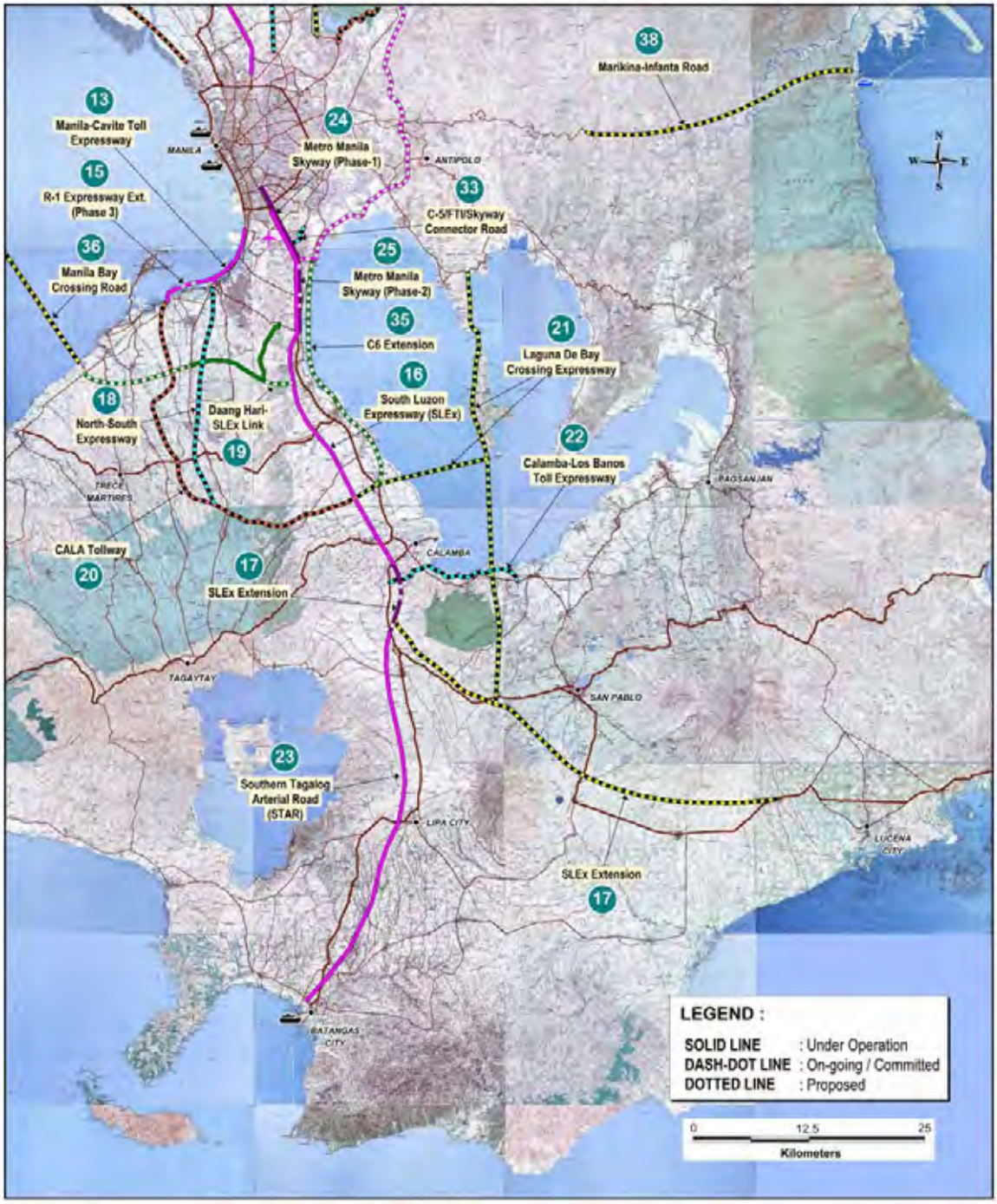
PROPONENT / OPERATOR	REF NO.	HIGH STANDARD HIGHWAY PROJECTS	DESCRIPTION	STATUS
Unsolicited Proposal BOT Law			(Stage 2) On-grade rehabilitation/widening of the existing 2-lane national road from Bigte junction in Norzagaray to Baliuag Bypass in Bulacan Province (38 kms)	given to ATC in 2007; • ATC submitted preliminary engineering plans and traffic study last January 2009; • ATC still to submit Final Feasibility Study, Financial Model, ECC from EMB, and RDC Clearance.
STRADEC	**31**	Pasig Expressway	(Component 1) Construction of 4-lane elevated expressway from Buendia Avenue-Ayala intersection following the alignment of the proposeed C-3 Road, then along both baks of Pasig River to the vicinity of Fort Bonifacio Gate	STRADEC to submit the final feasibility. Note: Design conflict with the MRT structure at Guadalupe.
			(Component 2) Construction of 4-lane elevated expressway from Fort Bonifacio Gate to C-5 Road along the existing Kalayaan Ave.	Elevated structure over MRT in Guadalupe to reach C-3 difficult and expensive.
			(Component 3) Combination of elevated and ground level expressway from C-5, Mangahan floodway, to Ortigas-Imelda Avenue Intersection.	
MRT-7 Consortium	**32**	NLEx-MRT 7 Terminal Link	MRT-7 Consortium is proposing to build this road, which is a part of C-6.	
DPWH (PMO - URPO)	**33**	C-5/FTI/ Skyway Connector Road	This connector road links C-5 with Skyway via FTI area.	Detailed Design is on-going.
DPWH	**34**	Manila-Bataan Coastal Road	Proposed early 1970s.	• Conceptual Stage
DPWH	**35**	C-6 Extension along Laguna de Bay	Proposed to be constructed together with flood control dike.	• Conceptual Stage
DPWH	**36**	Manila Bay Crossing Road	Proposed to connect Cavite Province with Bataan Peninsula.	• Conceptual Stage
Green Square Properties Corp.	**37**	Quezon City – Dingalan Road	Intended to provide access from Metro Manila to Dingalan Road.	• Conceptual Stage
DPWH	**38**	Marikina – Infanta Road	Intended to provide access to Pacific Ocean Area.	• Gradually extending by local fund.
DPWH	**39**	Tarlac – Nueva Ecija – Aurora – Dingalan Port Road	Intended to provide access to Pacific Ocean Area.	• Existing (National Road + Provincial Road)

Source: Prepared by the Study Team based on various proposal documents

FIGURE 9.1-1 (1/3) EXISTING, ON-GOING/COMMITTED AND PROPOSED EXPRESSWAYS: NORTH OF METRO MANILA

Source: Prepared by the Study Team based on various proposal documents

FIGURE 9.1-1 (2/3) EXISTING, ON-GOING/COMMITTED AND PROPOSED EXPRESSWAYS: METRO MANILA



Source: Prepared by the Study Team based on various proposal documents

FIGURE 9.1-1 (3/3) EXISTING, ON-GOING/COMMITTED AND PROPOSED EXPRESSWAYS: SOUTH OF METRO MANILA

9.2 INTEGRATION OF ROAD PROJECTS PROPOSED ALONG THE SAME CORRIDOR AND PRE-SCREENING OF PROPOSED PROJECTS

(1) Integration of Road Projects Proposed Along the Same Corridor

As shown in **Figure 9.1-1,** in some cases, there are several proposed projects along the same corridor and these are called in different project names. Projects proposed along the same corridor were integrated into one project and its project name was selected. **Table 9.2-1** shows which projects were integrated and representative name of the project.

(2) Pre-screening of Proposed Road Projects

Among proposed road projects, some are considered as too early to plan as HSH, thus excluded from HSH. Pre-screening criteria was established as shown in **Table 9.2-2**

TABLE 9.2-2 PRE-SCREENING CRITERIA

Following Types of road projects shall be excluded from HSH	
Type - A	A road project which will attract low traffic volume and considered to be firstly developed as a national road.
Type - B	There are 3 or more projects in the same direction and it has almost same purpose in catering traffic in the same direction (same OD) and considered to be quite expensive due to required long bridges/viaduct, thus priority is lower than other projects.
Type - C	DPWH encountered ROW acquisition problem, thus DPWH is now gradually constructing as a road of normal level of standard such as an urban street or a secondary national road.
Type - D	Project requires a long tunnel or an under-sea tunnel over 10 km and the construction cost is quite high.

The result of pre-screening is shown in **Table 9.2-1.**

TABLE 9.2-1 PRE-SCREENING OF PROPOSED PROJECTS BY VARIOUS ENTITIES

No.	PROJECT NAME	COMMENTS	INTEGRATION OF PROJECTS ALONG THE SAME CORRIDOR	PRE-SCREENING RESULT
5	Cabanatuan Bypass	• City Bypass already constructed. • No fixed construction schedule. • Planned to be a part of NLEx-East (proposed bypass alignment to be used as a part of NLEx-East alignment.	• Proposed projects of **5, 10, 12,** and **30** are located along the same corridor. • These are integrated and called as "**NLEx-East"** • La Mesa Parkway is considered as Phase-1 of NLEx-East.	• Important corridor to develop Eastern Central Luzon and provide vital access to Region II. • Pan-Philippine Highway south of Cabanatuan City is suffering traffic congestion. • To be developed as HSH-1.
10	North Luzon Expressway - East	• Originally proposed alignment is too far from urban centers. • Passes through the same corridor as 2nd Pan Philippine Highway		
12	2nd Pan Philippine Highway	• To be named as NLEx-East		
30	La Mesa Parkway	• To be connected with NLEx-East		
26	Metro Manila Skyway Stage 3	• One of alternative alignments of NLEx-SLEx Link Expressway	• After evaluation of alternative alignments, most optimum alignment will be selected for **NLEx-SLEx Link Expressway.**	• One of the most important links of expressway network in Metro Manila. • To be developed as HSH-1.
	NLEx-SLEx Link Expressway	• One of alternative alignments of NLEx-SLEx Link Expressway		
27	C-6 Expressway	• Almost same alignment is proposed for the northern section of C-6 and NLEx-MRT 7 Terminal Link.	• Both are integrated and named as **"C-6 Expressway".** • NLEx-MRT 7 Terminal Link is called **"Northern Section of C-6 Expressway"**	• To function as a traffic distributor of NLEx-East, and Skyway. • To support urban development of Eastern area of Metro Manila. • To be developed as HSH-1.
32	NLEx-MRT 7 Terminal Link			
3	NLEx-Phase 3	• Both projects pass through almost the same alignment between Calumpit, Bulacan and Dinalupihan, Bataan.	• The section between Calumpit , Bulacan and Dinalupihan, Bataan is named as **"NLEx-Phase 3".**	• Both roads are to be developed as HSH-1, although implementation priority is not high.
34	Manila-Bataan Coastal Road			
7	San Jose Bypass	• San Jose Bypass conflicts with Phase-2 of CLEx.	• San Jose Bypass to be developed as an arterial urban road of San Jose City. • Project is named as **CLEx".**	• CLEx will function to divert traffic on PPH to SCTEx/NLEx until such time NLEx-East is completed. • When NLEx-East is completed, CLEx will function to connect SCTEx/NLEx and NLEx-East. • To be developed as HSH-1.
8 & 9	Central Luzon Expressway (CLEx)			

No.	PROJECT NAME	COMMENTS	INTEGRATION OF PROJECTS ALONG THE SAME CORRIDOR	PRE-SCREENING RESULT
14	Manila-Cavite Coastal Expressway: Phase 2 (C-5 Link Expressway)	• Connection with SLEx is quite difficult. • Encountered ROW acquisition problem. • DPWH is partially developing as an urban road.		• Continue to be developed as an urban road. • **To be excluded from HSH. [Type C]**
17	South Luzon Expressway: Phase 2 (to Lucena City)	• SLTC has a franchise.		• Important link for development of Region IV-A and Region V. • To be developed as HSH-1.
18	North-South Expressway (CALA)	• Originally proposed as a bus-way. • Due to rapid progress of land development by various real estate companies, ROW acquisition is now quite difficult. • The proposed alignment passes very close to Aguinaldo Highway.		• In consideration of development of Aguinaldo Highway and CALA Expressway as well as ROW acquisition problems, this project is proposed to be developed as a national road. • **To be excluded from HSH-1. [Type C]**
20	CALA Expressway	• Many economic zones were developed along the corridor. • This will relieve traffic congestion of Aguinaldo Highway. • WB is going to study Phase-1.		• One of the most important links in Cavite Province. • To be developed as HSH-1.
21	Laguna de Bay Crossing Road	• Still conceptual stage. • This route conflicts with SLEx, Skyway, CALA Expressway and C-6 Extension along Laguna de Bay.		• Development of this project should be considered as a long-term project beyond 2030, thus **excluded from HSH. [Type B]**
22	Calamba-Los Banos Toll Expressway	• Los Banos Area is a tourist attraction area. To promote tourism industry in this area, the project is important. • Existing national road is highly congested.		• To be developed as HSH-1.
28	Manila Bay Expressway	• This expressway should be connected with Manila-Cavite Coastal Expressway and NAIA Expressway. • To relieve the traffic congestion of Roxas Blvd. and to provide access to		• To be developed as HSH-1.

No.	PROJECT NAME	COMMENTS	INTEGRATION OF PROJECTS ALONG THE SAME CORRIDOR	PRE-SCREENING RESULT
		Manila Port. This is an important link.		
29	NAIA Expressway	• Construction of Phase-1 is almost completed. • Important link to connect Skyway with Manila-Cavite Coastal Expressway and Manila Bay Expressway. • Important to provide access to NAIA.		• To be developed as HSH-1.
31	Pasig Expressway	• Important link to provide new access to Makati CBD from eastern area of Metro Manila. • Due to difficulty to acquire ROW in eastern area, the alignment is proposed to be amended to pass along Pasig River and Marikina River.	• Modified alignment is called as **"Pasig-Marikina Expressway."**	• To be developed as HSH-1.
33	C-5/FII/Skyway Connector Road	• Detailed design is on-going by DPWH. • Important link to re-develop Food Terminal and to connect Skyway with C-5.		• To be developed as HSH-1.
35	C-6 Extension along Laguna de Bay	• Proposed to be developed as a combined facility of flood control and land transportation. • Traffic generated areas between SLEx and Laguna de Bay is to be attracted by this road.		• To be developed as HSH-1.
36	Manila Bay Crossing Road	• Intended to connect Cavite Province with Bataan Peninsula. • Requires about 25 km of under-sea tunnel. • Still to be considered as a dream project.		• Too early to be planned as HSH, thus **excluded from HSH network. [Type D]**

No.	PROJECT NAME	COMMENTS	INTEGRATION OF PROJECTS ALONG THE SAME CORRIDOR	PRE-SCREENING RESULT
37	Quezon City-Dingalan Road	• The proposed route has to cross Sierra Madre Range, thus difficult to develop as a high standard road. • Traffic will be less than 3,000 veh./day, since Pacific Ocean Area at Dingalan is still to be developed.		• To be developed as a national road, and **excluded from HSH network. [Type A]**
38	Marikina-Infanta Road	• DPWH is continuing to develop this road. • This road has to cross Sierra Madre Range, thus difficult to develop as a high standard road. • Due to under-development of Infanta Area along Pacific Coast, traffic will be less than 3,000 veh./day.		• To be developed as a national road, and **excluded from HSH network. [Type A]**
39	Tarlac-Nueva Ecija-Aurora-Dingalan Port Road	• There is an existing road, composed of national road and provincial road. • The existing road should be firstly improved as national road standard.		• To provide reliable access to the Pacific Ocean Area for development of the area, this link included as HSH-2.

9.3 CANDIDATE PROJECTS FOR HSH-1 SELECTED AMONG PROPOSED PROJECTS

The result of integration of projects and pre-screening is summarized as follows;

Integration and Pre-screening	Project No.*
• Total number of proposed projects – 39	[1]~[39]
• 12 are existing/on-going projects	[1,2,4,6,11,13,15,16,19,23.24.25]
• 11 projects were integrated to 5 for candidates of HSH-1	[5, 10, 12],[26**] [27,32],[3,34], [7,8,9]
• 9 projects were selected as candidates for HSH-1	[17,30,20,22,28, 29,31,33,35]
• 1 project was selected as candidate for HSH-2	[39]
• 6 projects were screened out from HSH	[14,18,21,36,37,38]

** [Number] refers to the project location on the map in the preceding page.*

*** 3 alternative routes were integrated into [26].*

A total of 14 projects were selected for candidates of HSH-1 as follows;

Project Title	Project No.
(1) NLEx-East	5, 10, 12
(2) La Mesa Parkway	30
(3) NLEx-SLEx Link Expressway	26
(4) C-6 Expressway	27, 32
(5) NLEx Phase-3	3
(6) CLEx	7, 8, 9
(7) SLEx Extension	17
(8) CALA Expressway	20
(9) Calamba-Los Baños Expressway	22
(10) Manila Bay Expressway	28
(11) NAIA Expressway	29
(12) Pasig-Marikina Expressway	31
(13) C-5/FTI/Skyway Connector Road	33
(14) C-6 Extension	35

CHAPTER 10

FUTURE SOCIO-ECONOMIC FRAMEWORK AND REGIONAL DEVELOPMENT SCENARIO

CHAPTER 10
FUTURE SOCIO-ECONOMIC FRAMEWORK AND REGIONAL DEVELOPMENT SCENARIO

10.1 FUTURE SOCIO-ECONOMIC FRAMEWORK

Future socio-economic framework was established for items which are closely related to traffic generation/attraction as follows;

- Population
- GDP and GRDP of concerned regions
- Number of employment at job-site

10.1.1 Future Population

National Statistics Office (NSO) made the population projection in 2004 based on the 2000 census results. Population growth rate for the country and each region estimated by NSO is shown in **Table 10.1.1-1**. In 2007, another census was undertaken. Comparing NSO projection based on the 2000 census and 2007 census results, it can be said that population growth rate made by NSO projection is slightly lower than that of the actual at least up to 2007. For example, national level projection and actual have following difference;

NSO Projection	Actual based on Census
2000-2005: 2.07%	2000-2007: 2.11%
2006-2010: 1.97%	

Since there is no other official population projection, the Study adopted NSO projection with adjustment of population growth rate by population decrease pattern by copying population growth rates of Nation level, NCR, Region III and Region IV-A is shown in **Figure 10.1.1-1**.

Breakdown of regional population to province and traffic zone was made by referencing the past population growth rate and urbanization trend.
Projected population is shown in **Table 10.1.1-2**.

10.1.2 Economic Framework

Economic framework for the future was established for GDP and GRDP of concerned Regions.

Past economic performance represented by GDP was as follows;

PAST ECONOMIC PERFORMANCE

Period	Annual Average Growth Rate (%)
1993 – 2007 (14 years)	4.55%
1997 – 2007 (10 years)	4.36%
2002 – 2007 (5 years)	5.77%

As a long term average, the country made the economic growth rate of 4.5%. As a short term average, about 6% growth was achieved.

TABLE 10.1.1-1 GROWTH RATE OF NSO POPULATION PROJECTION

Growth Rate	2000-2005	2006-2010	2011-2015	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040
Philippines	2.07	1.97	1.84	1.66	1.47	1.28	1.10	0.92
NCR	1.59	1.38	1.13	0.89	0.68	0.49	0.28	0.07
CAR	2.16	2.10	1.99	1.81	1.61	1.39	1.23	1.07
Region I - Ilocos	2.09	2.02	1.86	1.66	1.48	1.32	1.15	0.98
Region II - Cagayan Valley	1.75	1.75	1.64	1.45	1.25	1.06	0.87	0.70
Region III - Central Luzon	2.17	2.01	1.83	1.63	1.43	1.21	1.01	0.81
Region IV-A - Calabarzon	2.49	2.24	2.00	1.80	1.60	1.37	1.16	0.96
Region IV-B - Mimaropa	2.73	2.64	2.51	2.31	2.15	1.99	1.82	1.64
Region V - Bicol	1.95	1.94	1.91	1.80	1.64	1.48	1.33	1.20
Region VI - Western Visayas	1.97	1.96	1.88	1.71	1.52	1.35	1.20	1.06
Region VII - Central Visayas	2.07	2.03	1.95	1.78	1.58	1.39	1.22	1.05
Region VIII - Eastern Visayas	2.07	2.03	2.01	1.94	1.82	1.64	1.48	1.34
Region IX - Zamboanga Peninsula	2.07	2.02	1.96	1.81	1.62	1.45	1.24	1.01
Region X - Northern Mindanao	2.14	2.10	1.99	1.81	1.59	1.39	1.18	0.99
Region XI - Davao	1.68	1.65	1.54	1.38	1.14	0.91	0.71	0.53
Region XII - Soccsksargen	2.37	2.26	2.09	1.87	1.64	1.43	1.24	1.05
Region XIII - Caraga	1.94	1.93	1.89	1.72	1.50	1.28	1.10	0.93
ARMM	2.42	2.31	2.13	1.92	1.73	1.56	1.38	1.21

Source: National Statistics Office.

TABLE 10.1.1-2 POPULATION PROJECTION: LUZON

(thousands)

Region/Province		Population Projection						2030/2009
		2009	2010	2015	2020	2025	2030	
Philippines		92,171	94,024	103,201	112,276	121,013	129,213	1.40
National Capital Region		11,960	12,200	13,331	14,362	15,180	15,810	1.32
	City of Manila	1,681	1,691	1,733	1,768	1,786	1,795	1.07
	Kalookan City	1,429	1,455	1,559	1,623	1,655	1,664	1.16
	Las Pinas City	551	560	608	658	705	749	1.36
	Makati City	530	541	594	646	696	732	1.38
	Malabon	371	375	394	414	434	454	1.22
	Mandaluyong City	314	318	337	357	375	393	1.25
	Marikina City	435	440	466	492	517	541	1.24
	Muntinlupa City	476	488	549	615	683	754	1.58
	Navotas	248	249	253	255	257	257	1.04
	Parañaque City	586	603	692	779	861	927	1.58
	Pasay City	416	423	453	481	506	526	1.26
	Pasig City	651	669	738	795	836	870	1.34
	Pateros	63	64	67	71	74	78	1.23
	Quezon City	2,837	2,919	3,319	3,701	3,987	4,190	1.48
	San Juan	128	129	134	140	145	150	1.18
	Taguig	651	670	755	825	876	911	1.40
	Valenzuela City	595	608	678	741	787	819	1.38
Cordillera Administrative Region		1,565	1,588	1,698	1,807	1,913	2,016	1.29
1 Ilocos Region		4,650	4,703	4,968	5,234	5,501	5,767	1.24
2 Cagayan Valley		3,122	3,158	3,336	3,514	3,694	3,872	1.24
3 Central Luzon		10,454	10,454	11,748	13,085	14,464	15,860	1.52
	Aurora	192	194	205	216	228	241	1.25
	Bataan	694	711	799	895	1,000	1,115	1.61
	Bulacan	3,022	3,125	3,658	4,200	4,752	5,298	1.75
	Nueva Ecija	1,913	1,944	2,094	2,234	2,359	2,480	1.30
	Pampanga	2,005	2,053	2,300	2,565	2,845	3,126	1.56
	Tarlac	1,297	1,325	1,471	1,624	1,784	1,950	1.50
	Zambales	511	520	567	617	670	725	1.42
	Angeles City	330	339	383	432	488	550	1.66
	Olongapo City	238	243	272	303	338	375	1.58
4A Calabarzon		12,530	12,946	15,143	17,534	19,977	22,283	1.78
	Batangas	2,355	2,411	2,715	3,057	3,433	3,847	1.63
	Cavite	3,126	3,269	4,035	4,910	5,831	6,760	2.16
	Laguna	2,624	2,703	3,103	3,511	3,876	4,196	1.60
	Quezon	1,696	1,722	1,855	1,993	2,137	2,285	1.35
	Rizal	2,480	2,584	3,144	3,734	4,329	4,779	1.93
	Lucena City	249	256	291	329	371	416	1.67
5 Bicol		5,238	5,304	5,641	5,996	6,371	6,763	1.29

Source: JICA Study Team.

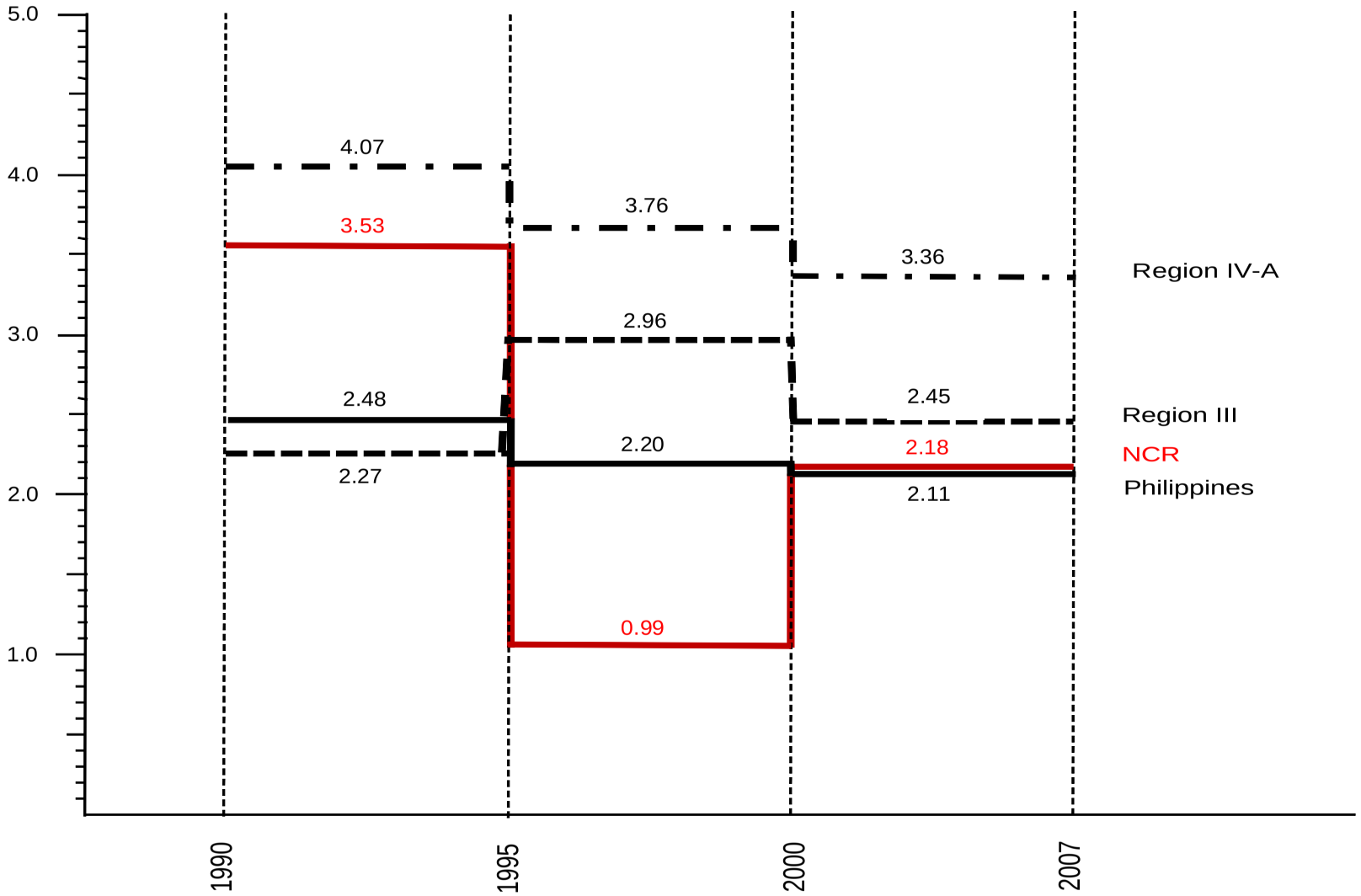


FIGURE 10.1.1-1 PAST POPULATION GROWTH RATE: NCR, REGION III AND REGION IV-A

Figure 10.1.2-1 shows GDP growth targets adopted by the Medium Term Philippine Development Plans and the actual growth rates. Due to international economic crisis in 2008, the Philippine economy was also greatly affected and dropped to 3.8%. NEDA's estimate for the economic growth rates for years 2009 and 2010 are as follows;

NEDA's ESTIMATE OF GDP GROWTH RATE	
2009	0.8% - 1.8%
2010	2.6% - 3.6%

NEDA does not release economic growth rates beyond 2011. The Study assumed that economic growth will be recovered by year 2012, than make sustainable economic growth at the rate of 5.0% to 6.0%. **Figure 10.1.2-2** shows proposed targets of GDP growth rate and assumed growth rate to be used for the Study.

For GRDP of concerned Regions, following assumptions were made;

NCR: The country's economic growth has been propelled by the economic performance of NCR. This will continue even in the future. Higher growth rate than GDP by 1 to 2% was assumed for this Region.

Region III: Taking advantages of proximity to NCR, and expected growth of the Subic-Clark corridor, economy of the Region will grow higher level than GDP.

Region IV-A: It is envisioned that existing Eco-zones will be expanded further and the manufacturing industry will recover the present economic crisis soon and further expanded in the future. Due to proximity to NCR, the service industry will also grow at high level. Economy of the Region will grow higher level than GDP.

Region VII: As the center of Visayas Regions, logistic center to connect Luzon, Visayas and Mindanao, and the center of tourism development, the Region's economy will grow sustainably with higher level than GDP.

Region XI: As the business, commercial, agro-industrial and educational center of Mindanao, and the Philippine side core of BIMP-East Asian Growth Area, the Region's economy envisaged to grow faster than GDP.

Region XII: The Region will grow as the food supply base to the rest of the Philippines, agri-fishery production and agro-industry will grow. The Region's economy will grow faster than GDP.

GDP and GRDP growth rate projection is shown in **Table 10.1.2-1**. Estimated GDP and GRDPs at constant 1985 prices are shown in **Table 10.1.2-2**.

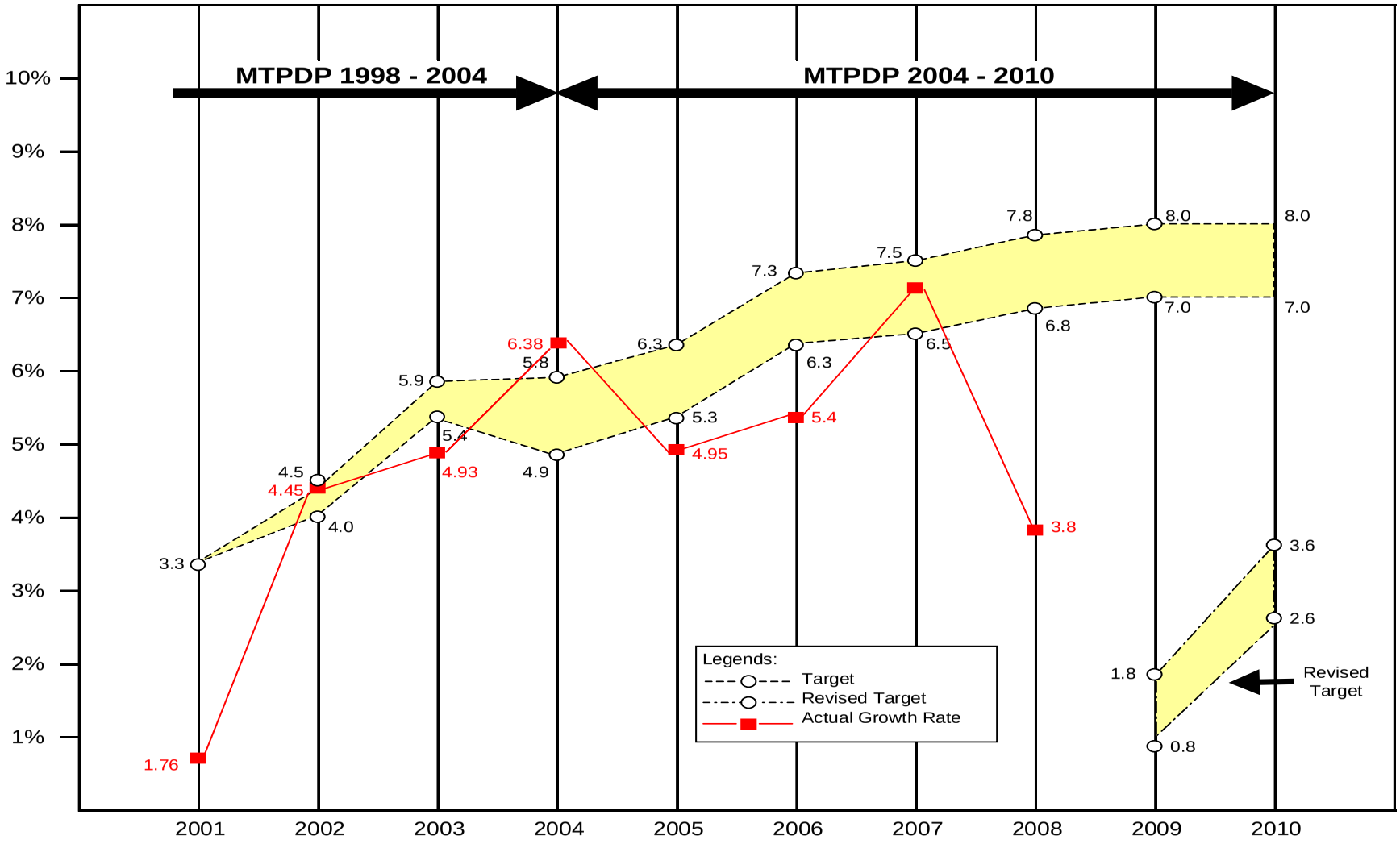
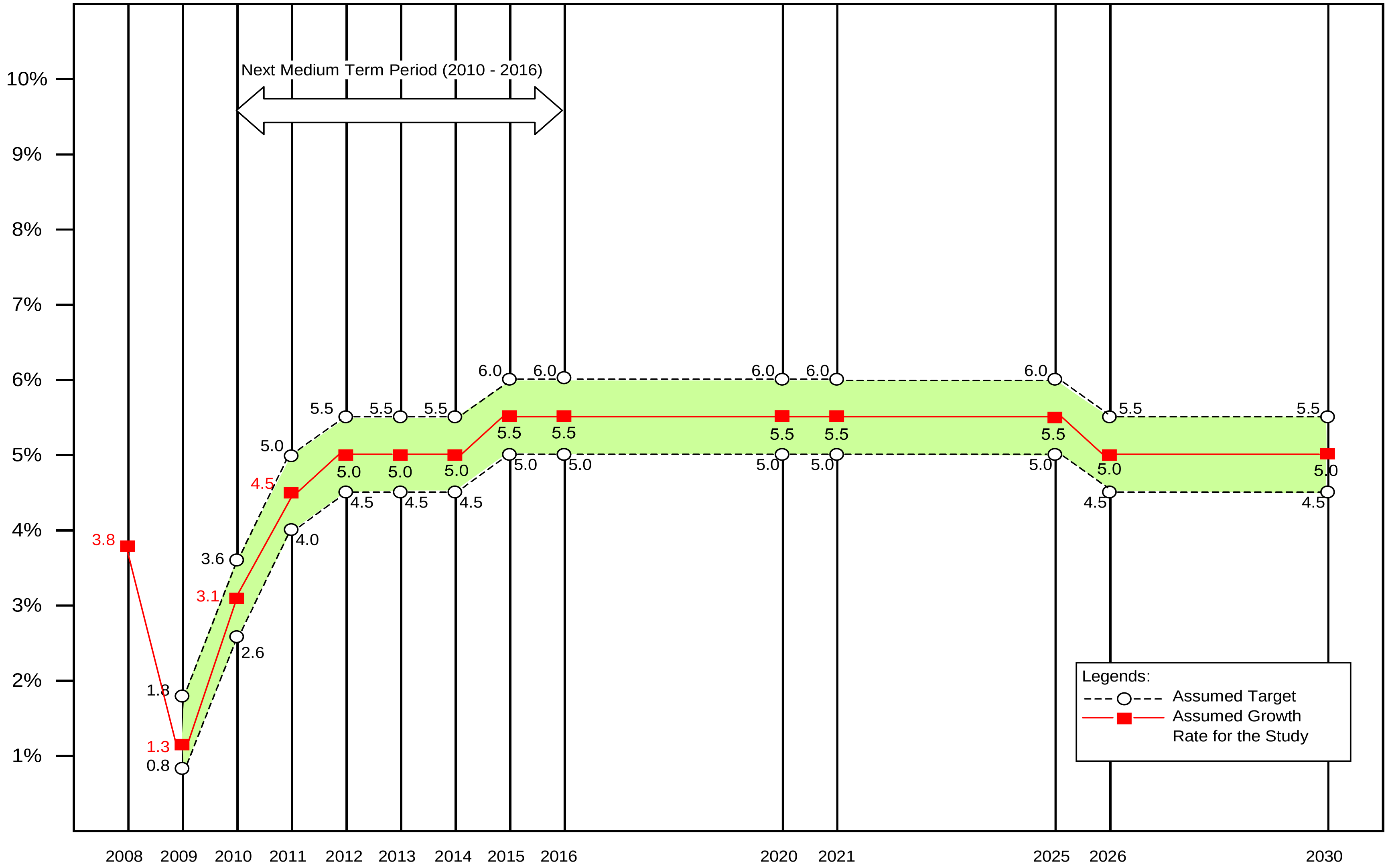


FIGURE 10.1.2-1 GDP GROWTH TARGETS BY MTPDP AND ACTUAL GDP GROWTH



Source: Study Team

FIGURE 10.1.2-2 PROPOSED TARGET OF GDP GROWTH RATE

TABLE 10.1.2-1 GDP and GRDP GROWTH RATE PROJECTION

			2008	2009	2010	2011	2012-2014	2015-2020	2021-2025	2026-2030
GDP			3.8	1.3	3.1	4.5	5.0	5.5	5.5	5.0
GRDP	NCR	National Capital Region	4.5	2.5	5.0	5.5	6.5	6.5	6.5	6.0
	III	Central Luzon	3.0	2.0	4.0	5.0	6.0	6.5	6.5	6.5
	IV-A	CALABARZON	3.5	2.5	4.5	5.5	6.5	7.0	7.0	6.5
	VII	Central Visayas	3.0	2.0	4.0	5.0	5.5	6.0	6.0	5.5
	XI	Davao Region	3.5	2.5	4.5	5.5	6.0	6.5	6.5	6.0
	XII	SOCCSKSARGEN	3.0	2.0	4.0	5.0	5.5	6.0	6.0	5.5

Source: JICA Study Team.

TABLE 10.1.2-2 ESTIMATED GDP AND GRDPS (2007-2030)

Region		2007	2008	2009	2010	2011	2012-2014	2015-2020	2021-2025	2026-2030	2030/2009
Philippines		1,369	1,421	1,439	1,484	1,550	1,795	2,475	3,235	4,128	2.87
NCR	National Capital Region	447	467	479	502	530	640	934	1,280	1,713	3.58
III	Central Luzon	114	117	120	125	131	156	227	311	427	3.56
IV-A	CALABARZON	166	172	176	184	194	235	352	494	677	3.84
VII	Central Visayas	98	101	103	107	113	132	188	251	328	3.18
XI	Davao Region	62	64	66	68	72	86	126	172	230	3.51
XII	SOCCSKSARGEN	48	49	50	52	55	64	91	122	160	3.18

Source: National Statistical Coordination Board.

10.1.3 Employment at Job Site

Employment at job site was selected as an index to reflect traffic attraction/generation. Number of employment by major industrial group was used as a control total of number of employment. Number of employment obtained by the Establishment survey was adjusted to meet the said control total. Break down of number of employment was made based on the development direction of the area and land uses.

Project employment at job site is shown in **Table 10.1.3-1**.

TABLE 10.1.3-1 PROJECTED EMPLOYMENT AT JOBSITE BY REGION: LUZON

Region/City/Municipality	Employment Projection (thousands)						2030/2009
	2009	2010	2015	2020	2025	2030	
PHILIPPINES	22,881	23,443	26,524	29,645	32,730	35,696	1.56
NATIONAL CAPITAL REGION	4,581	4,710	5,422	6,105	6,721	7,380	1.61
Manila	628	650	748	847	933	1,023	1.63
Kalookan (North)	78	80	87	91	94	96	1.23
Kalookan (South)	87	85	92	98	101	103	1.18
Las Pinas	64	66	76	91	107	110	1.72
Makati	1,120	1,154	1,344	1,518	1,677	1,855	1.66
Malabon	69	66	76	79	81	81	1.18
Mandaluyong	92	94	103	110	107	110	1.21
Marikina	55	57	65	73	81	88	1.61
Muntinlupa	257	268	309	354	403	456	1.78
Navotas	46	47	49	49	49	50	1.09
Paranaque	64	66	81	98	107	132	2.07
Pasay	257	264	309	354	396	434	1.69
Pasig	538	556	645	732	812	898	1.67
Pateros	23	24	24	24	25	25	1.09
Quezon	879	904	1,046	1,183	1,302	1,435	1.63
San Juan	37	38	38	39	39	40	1.10
Taguig	183	184	206	226	242	258	1.41
Valenzuela	105	108	125	140	168	184	1.75
CAR	315	318	335	352	366	377	1.20
1 ILOCOS REGION	1,095	1,110	1,173	1,239	1,295	1,341	1.23
2 CAGAYAN VALLEY	568	576	609	643	672	696	1.23
3 CENTRAL LUZON	2,640	2,734	3,205	3,708	4,187	4,689	1.78
BATAAN	227	235	263	297	327	356	1.57
BULACAN	676	705	840	975	1,105	1,243	1.84
NUEVA ECIJA	293	303	356	412	465	520	1.78
PAMPANGA	800	828	971	1,124	1,273	1,425	1.78
TARLAC	282	293	343	397	448	506	1.79
ZAMBALES	341	350	410	478	540	605	1.78
AURORA	21	19	22	26	29	33	1.55
4-A CALABARZON	3,631	3,755	4,364	5,018	5,666	6,330	1.74
BATANGAS	487	503	589	682	776	874	1.80
CAVITE	1,093	1,149	1,353	1,581	1,813	2,057	1.88
LAGUNA	1,369	1,393	1,593	1,807	2,011	2,216	1.62
RIZAL	454	473	559	652	737	823	1.81
QUEZON	229	237	271	296	329	361	1.58
5 BICOL REGION	1,058	1,067	1,121	1,178	1,226	1,263	1.19
LUZON TOTAL	13,888	14,270	16,227	18,243	20,133	22,077	1.59

SOURCE: JICA Study Team

10.1.4 Per Capita GDP and GRDP

Based on the future economic growth prediction and the future population projection, per capita GDP and GRDP was estimated and summarized in **Table 10.1.4-1**.

TABLE 10.1.4-1 ESTIMATED PER CAPITA GDP AND GRDP

(pesos at 1985 constant price)

Region/Province		GDP/GRDP Projection						
		2009	2010	2015	2020	2025	2030	2030/2009
Philippines		15,614	15,780	18,262	22,043	26,729	31,949	2.05
NCR	National Capital Region	40,014	41,188	51,159	65,061	84,336	108,363	2.71
Region III	Central Luzon	11,457	11,915	14,055	17,370	21,530	26,902	2.35
Region IV-A	CALABARZON	14,061	14,222	16,502	20,082	24,722	30,366	2.16
Region VII	Central Visayas	15,602	15,983	19,258	24,075	30,078	36,850	2.36
Region XI	Davao Region	15,226	15,638	19,137	24,284	30,898	38,544	2.53
Region XII	SOCCSKSARGEN	12,499	12,696	14,710	17,675	21,146	24,867	1.99

SOURCE: JICA Study Team

10.2 REGIONAL DEVELOPMENT SCENARIO

10.2.1 Trends and Directions of Regional Comprehensive Development

The preceding sections have provided the outlook for the regional development of the three regions that comprise the study area in Luzon. The direction of study area's development still follows the cluster development and integrative approach, which is aimed towards decongesting Metro Manila and enhancing the promotion and encouragement of development in the adjacent regions of the metropolis. As already mentioned previously, the necessary infrastructure support is needed to ensure the regional development of the regions covered in the study area. This is notably true in the provision of an appropriate transport system that will complete the intermodal logistics network system in support of the development of the study area. For this end, there is a need for a comprehensive planning, notably in the provision of the necessary infrastructure support such as strategic infrastructure. Notable of these strategic infrastructure facilities are the following:

- ✓ Transport infrastructure (highway systems and facilities)
- ✓ Power supply
- ✓ Communication systems
- ✓ Water supply
- ✓ Housing

The provision of the above strategic infrastructure is essential in ensuring urban competitiveness, poverty alleviation that will not only facilitate economic growth but also stimulate it for the study area and the country in general. Furthermore, the direction of regional development is towards the development and strengthening of local comparative advantages in order to contribute in significantly improving the quality of life of the residents in the study area. Moreover, at the macro level this will also be a factor for national economic development.

In summary, the outlook of the regional development of the study area supports the clustering development approach that is consistent with the economic framework defined earlier that is anchored on the following: a) urban development, b) industrial development, c) agricultural

development and d) tourism development. As defined, the economic framework is characterized by the geographical pattern and resources of the regions covered by the study area. Finally, a key factor in here is the strong involvement of the private sector not only in regional development, but also in the provision of infrastructure facilities, particularly in highway development.

10.2.2 Regional Development Scenario

National development policies as expressed in the 10-point Agenda in relation to regional development are as follows:

NATIONAL DEVELOPMENT POLICIES

- Promotion of decentralization through infrastructure development.
- To decongest Metro Manila.
- To develop Clark and Subic corridor as international logistics center.

Due to economic growth in the capital regions, economic sphere is expanding from Metro Manila towards its neighboring regions of Region III and Region IV-A. Thus, the development strategy cannot be planned only for Metro Manila but involving Region III and Region IV-A as a whole. Overall development strategy will be as follows;

1) Study Area as a whole

- Metro Manila together with Region III and Region IV-A will continue to propel the country's economy.

- To promote decentralization and to mitigate overconcentration of Metro Manila, regional urban centers outside Metro Manila will be developed. (see **Figure 10.2.2-1)**

- Strategic areas along the Pacific coast shall be designated as the core development areas for universal development and accessibility to those areas shall be strengthened. (see **Figure 10.2.2-2)**

- In order to support tourism development, the tourism development axes will be developed for the strategic areas of tourism development. (see **Figure 10.2.2-1)**

2) Metro Manila and its suburbs

- Due to accumulation of infrastructure of expressways, international airports and ports and economic zones along the north-south direction, the north-south industrial development beltway which connects Batangas-Metro Manila-Clark-Tarlac will be the key axis for the development of the Metropolitan areas and the country as a whole. (see **Figure 10.2.2-3)**

- Sound urbanization of Metro Manila and its suburbs will be achieved. (see **Figure 10.2.2-1)**

3) North of Metro Manila

- Clark-Subic corridor will be developed as a logistic axis not only for the country but also for the southeast and ASEAN countries. (see **Figure 10.2.2-3)**

- To support the development of CAR and Region I, the North-West Luzon development axis will be developed. (see **Figure 10.2.2-3)**

- For the development of Region II, the North-East Luzon development axis will be developed. (see **Figure 10.2.2-3)**

4) South of Metro Manila

- To support the development of Region V, the South-Luzon development axis will be developed. (see **Figure 10.2.2-3)**

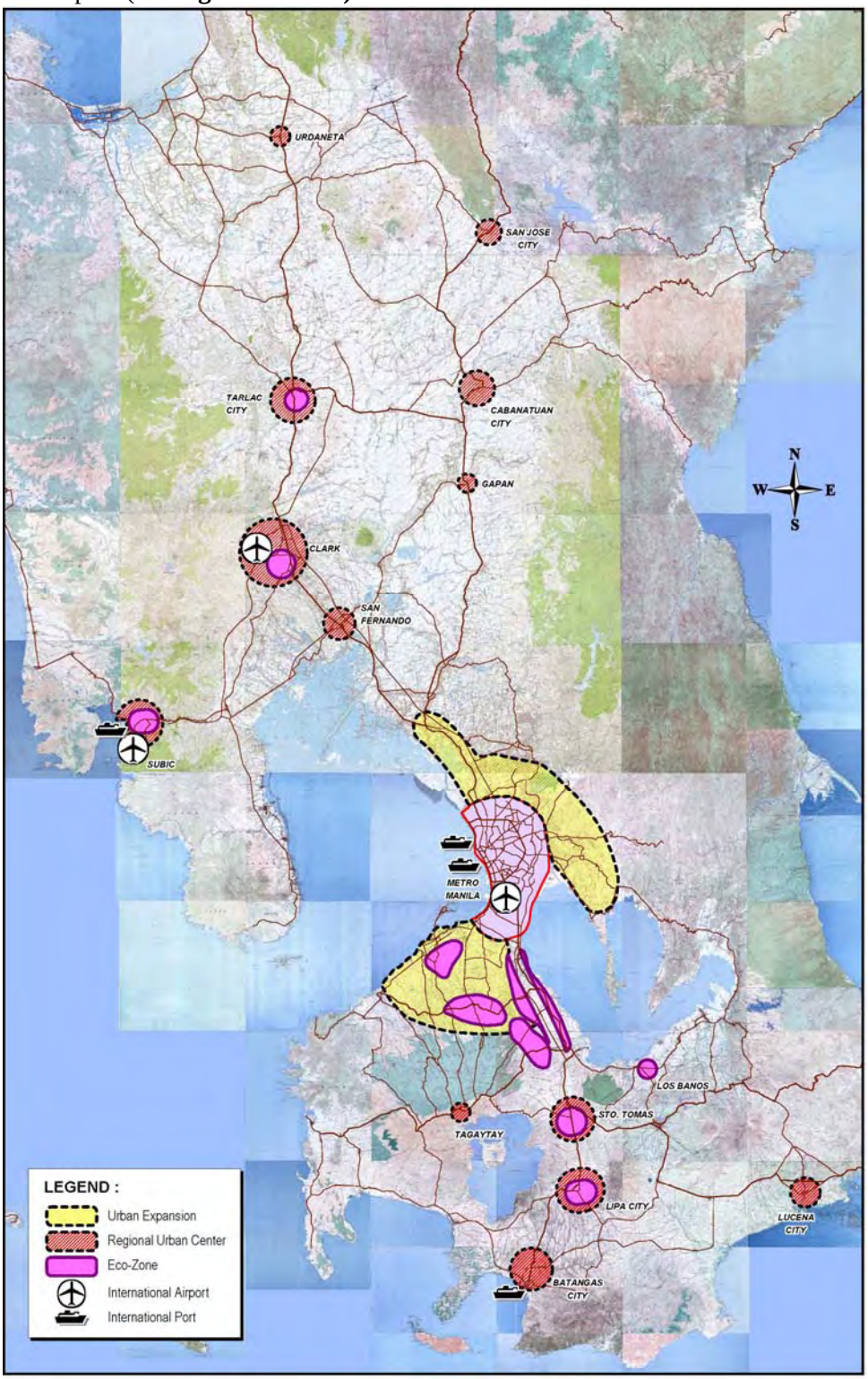


FIGURE 10.2.2-1 URBAN DEVELOPMENT STRUCTURE

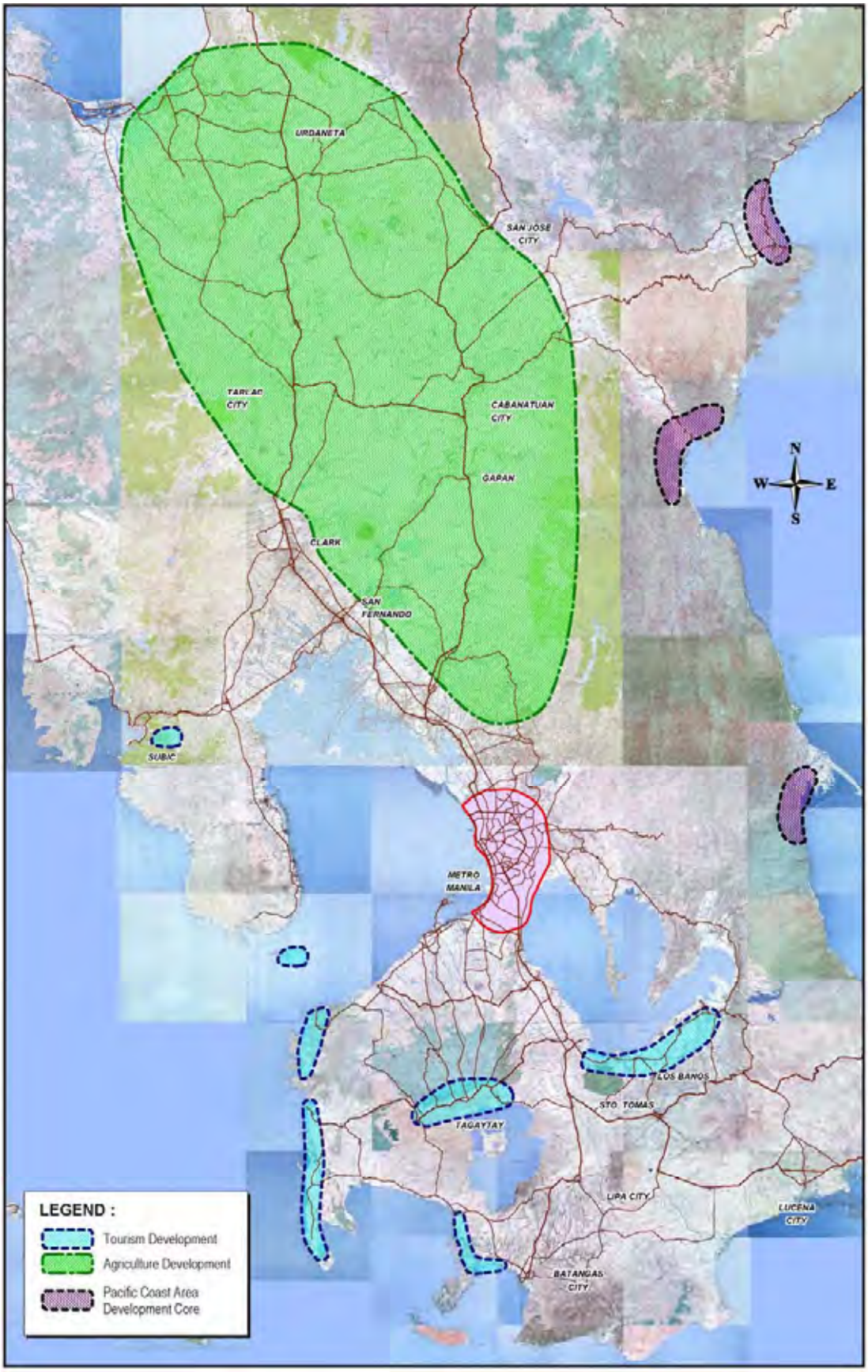


FIGURE 10.2.2-2 AGRICULTURE AND TOURISM DEVELOPMENT AND PACIFIC COAST DEVELOPMENT

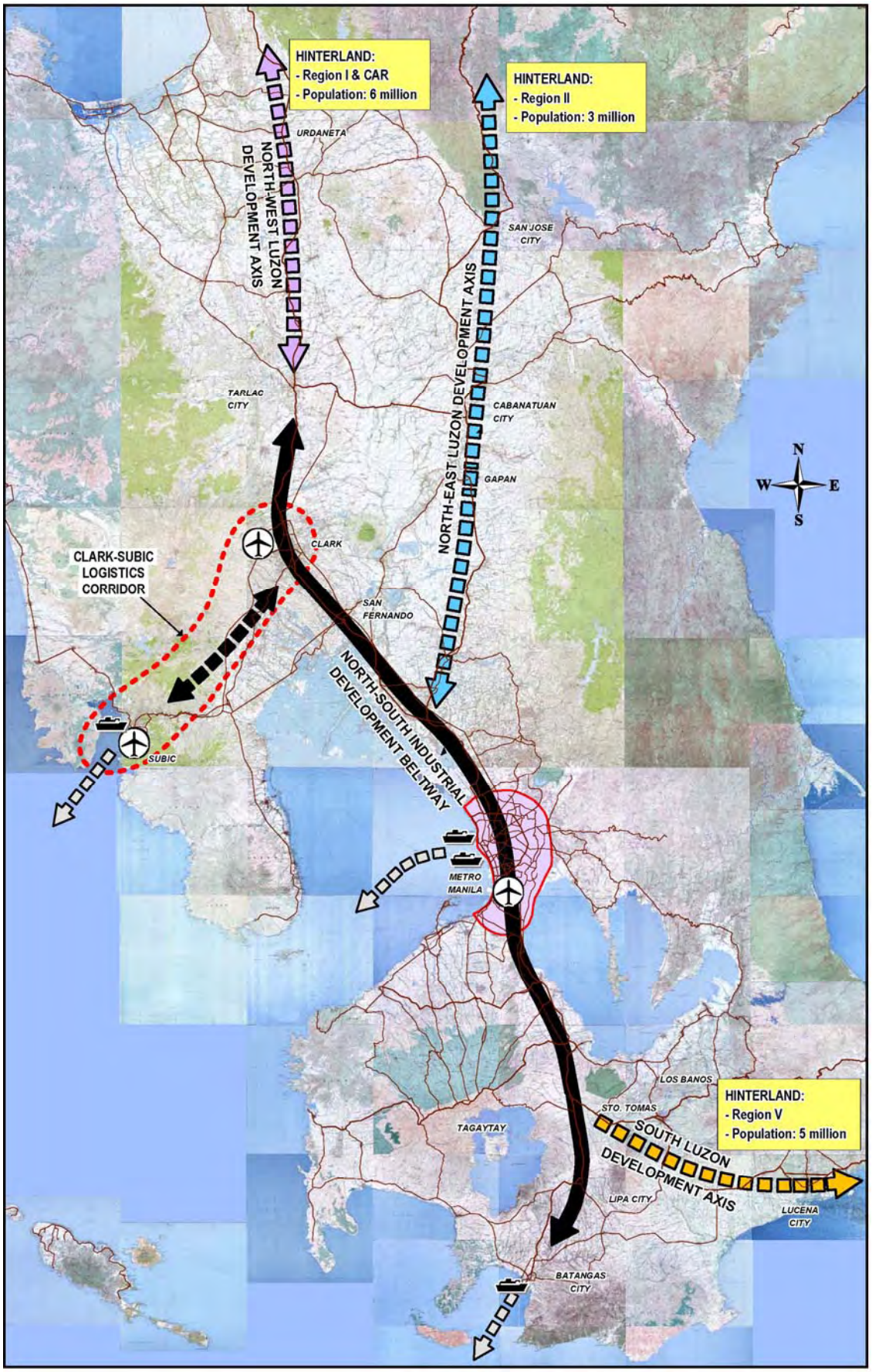


FIGURE 10.2.2-3 DEVELOPMENT AXES

Overall regional development strategy is shown in **Figure 10.2.2-4.**

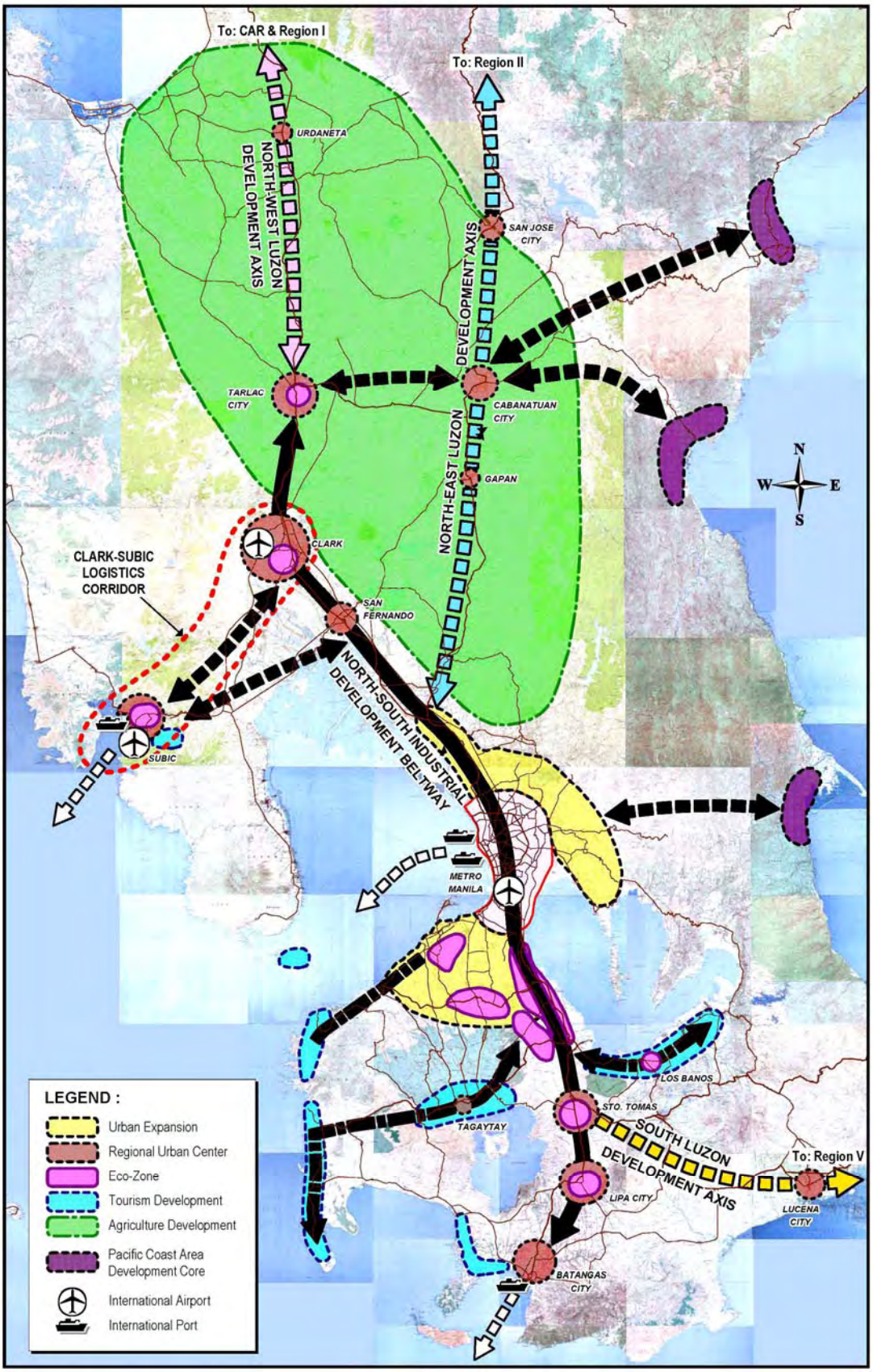


FIGURE 10.2.2-4 DEVELOPMENT STRATEGY: 200KM RADIUS SPHERE OF METRO MANILA

CHAPTER 11

FUTURE TRAFFIC DEMAND FORECAST

CHAPTER 11
FUTURE DEMAND FORECAST

11.1 ANALYSES OF TRAFFIC SURVEY RESULTS

This Section describes the OD Survey results. Other traffic survey results were discussed in Chapter 8.

11.1.1 Traffic Characteristics

(1) General

Roadside OD survey was conducted at twenty-one (21) stations. A number of samples and sample rate is shown in **Table 11.1-1**.

TABLE 11.1-1 ROADSIDE OD SURVEY STATION AND SAMPLE RATE

No.	Station	No. of Sample	AADT	Sample Rate
1	Manila North Road Sison, Pang. & Rosario, LU	2438	9179	26.6%
2	Maharlika Highway San Jose & Carranglan	1765	4252	41.5%
3	Camiling Road Camiling, Tarlac & Mangatarem	1457	2532	57.5%
4	Tarlac-LaPaz-Sta. Rosa Tarlac City & SCTEx	1965	5649	34.8%
5	Manila North Road Capas & Tarlac City	1742	16837	10.3%
6	NLEx-Dau Exit, National Highway After NLEx Dau Exit	2350	9584	24.5%
7	Olongapo-Gapan Road San Fernando & Bacoor	3033	20713	14.6%
8	Olongapo-Gapan Road Before Tipo-Subic gate	1169	6039	19.4%
9	Roman Highway After junction to Hermosa	1606	7194	22.3%
10	Maharlika Highway After Sta. Rita Exit to Plaridel	1508	17214	8.8%
11	McArthur Highway Malolos & Balagtas	1776	16785	10.6%
12	SJDM-Norzagaray Road SJDM & Norzagaray	1876	6603	28.4%
13	Tanay-Famy Road Rizal-Laguna Provinces	1074	2393	44.9%
14	Noveleta-Rosario-Naic Road Noveleta & Rosario towns	1156	15380	7.5%
15	Aguinaldo Highway Imus & Dasmariñas towns	1199	26621	4.5%
16	Carmona-Trece Martires Road Carmona & GMA towns	896	11974	6.4%
17	Sta. Rosa-Tagaytay Road After Paseo Sta. Rosa Complex	1391	14919	9.3%
18	SLEx exit, Calamba After Calamba Ex. Sto. Tomas	1328	41085	3.2%
19	Maharlika Highway Sariaya-Lucena City	722	13449	5.4%
20	Lipa-Cuenca-San Jose Road Cuenca & San Jose towns	803	9592	8.4%
21	STAR Access Road Star exit to Batangas City	801	12010	6.7%
	Average	**1526**	**12953**	**11.8%**

(2) Traffic by Trip Purpose

Trip purpose is estimated through the OD data as illustrated in **Figure 11.1.1-1**. Of the total car trips 37% were 'Business' trips, 23% were 'Private' trips, 21% were 'To/From Work' trips.

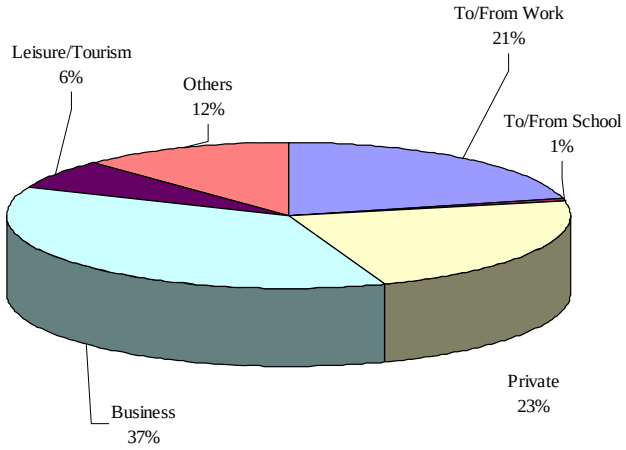


FIGURE 11.1.1-1 TRIP PURPOSE

(3) Average Number of Passengers by Vehicle Category

Vehicle OD is linked to passenger OD through the average number of passenger on board by type of vehicles as the vehicle occupancy rate. **Table 11.1.1-2** shows the average number of passenger on board by type of vehicles.

The survey results of 3.5 passengers for Car and 9.3 passengers for Jeepney, 30.8 passengers for Bus are used in this study (see **Table 11.1.2-3**).

TABLE 11.1.1-3 AVERAGE NUMBER OF PASSENGERS ON BOARD BY VEHICLE CATEGORY

Vehicle Category	Type of Vehicles	Average No. of Passengers (Person / veh.)
Passenger Car	Car/Taxi/Van	3.5
Jeepney	Jeepney	9.3
Bus	Mini-Bus, Large-Bus	30.8
Truck	2-Axle Truck, 3-Axle Truck, Truck-Trailer, Delivery Van	2.6

(4) Traffic Type of Commodity

Three representative commodity items were selected in this study. They are Agri./ Fishery / Forestry Sectors, Mining/Construction Sectors, and Manufacturing Sectors. Others commodities not included in the first two categories are considered to include in the third. The results of total commodity volume by road, which are summarized in **Table11.1.1-4**.

TABLE 11.1.1-2 AVERAGE NUMBER OF PASSENGERS BY VEHICLE CATEGORY AND BY ROAD

(Person/vehicle, including Driver)

Station	Car/ Taxi/ Van	Jeepney	Mini-bus	Large Bus	2-Axle Truck	3-Axle Truck	Truck-Trailer	Delivery Van
1. Manila North Rd Sison, Pang. & Rosario, LU	4.6	6.6	18.0	26.8	3.1	2.5	2.5	2.9
2. Maharlika Highway San Jose & Carranglan	4.6	13.0	13.0	41.5	3.3	2.8	2.5	2.6
3. Camiling Road Camiling, Tarlac & Mangatarem	4.1	9.3	2.0	20.3	3.3	2.7	2.0	2.4
4. Tarlac-La Paz-Sta Rosa Tarlac City & SCTEX	3.2	10.8	11.3	38.3	3.0	2.5	2.4	2.5
5. Manila North Rd Capas & Tarlac City	3.2	7.3	14.1	39.6	2.6	2.4	2.3	2.5
6. NLEX-Dau Exit, Nat'l Hwy After NLEX Dau Exit	3.2	18.5	12.7	35.9	2.6	2.4	2.3	2.4
7. Olongapo-Gapan Road San Fernando & Bacoor	2.9	7.6	16.2	28.8	2.7	2.2	2.5	2.4
8. Olongapo-Gapan Road Before Tipo-Subic gate	3.5	6.7	16.2	31.1	2.5	2.2	2.8	2.7
9. Roman Hwy After junction to Hermosa	3.2	6.8	30.0	19.1	2.9	2.1	2.1	2.5
10. Maharlika Highway After Sta Rita Exit to Plaridel	2.9	6.5	2.0	47.0	2.6	2.7	2.5	2.4
11. McArthur Highway Malolos & Balagtas	2.5	7.0	5.7	31.5	2.4	2.4	2.5	2.3
12. SJDM-Norzagaray Road SJDM & Norzagaray	2.9	8.6	16.2	22.1	2.5	2.4	2.7	2.6
13. Tanay-Famy Road Rizal-Laguna Provinces	5.1	19.7	21.5	54.1	3.4	2.8	2.3	2.7
14. Noveleta-Rosario-Naic Rd. Noveleta & Rosario towns	3.2	8.3	17.7	29.9	2.5	2.4	2.4	2.5
15. Aguinaldo Highway Imus & Dasmarinas towns	3.7	8.9	14.5	30.9	2.7	4.5	2.5	2.6
16. Carmona-Trece Martires Rd Carmona & GMA towns	3.1	9.6	16.2	39.8	2.3	2.3	2.7	2.4
17. Sta. Rosa-Tagaytay Road After Paseo Sta Rosa Cmplx.	3.0	12.7	16.5	25.0	2.8	2.3	2.7	2.4
18. SLEX exit, Calamba After Calamba Ex. Sto. Tomas	3.9	12.0	25.4	37.1	2.5	2.7	3.1	2.6
19. Maharlika Highway Sariaya-Lucena City	3.6	8.7	18.0	29.9	2.6	2.8	2.6	2.5
20. Lipa-Cuenca-San Jose Rd Cuenca & San Jose towns	2.8	8.4	21.0	39.8	2.8	2.5	2.7	2.4
21. STAR access road Star exit to Batangas City	2.7	6.1	6.4	20.9	2.5	2.3	2.1	2.4
Average	**3.5**	**9.3**	**16.2**	**31.5**	**2.8**	**2.4**	**2.5**	**2.5**

TABLE 11.1.1-4 TRAFFIC BY COMMODITY TYPE BY ROAD

(ton/day)

Station	Agri./ Fishery / Forestry	Mining/ Construction	Manufacturing	Total
1. Manila North Rd Sison, Pang. & Rosario, LU	1,418.7	331.7	250.5	2,001.0
2. Maharlika Highway San Jose & Carranglan	1,871.6	-	116.9	1,988.5
3. Camiling Road Camiling, Tarlac & Mangatarem	173.9	41.8	38.9	254.6
4. Tarlac-La Paz-Sta Rosa Tarlac City & SCTEX	193.4	198.0	232.8	624.2
5. Manila North Rd Capas & Tarlac City	517.2	312.2	133.7	963.1
6. NLEX-Dau Exit, Nat'l Hwy After NLEX Dau Exit	98.1	339.3	344.7	782.1
7. Olongapo-Gapan Road San Fernando & Bacoor	785.9	2,621.4	738.7	4,146.0
8. Olongapo-Gapan Road Before Tipo-Subic gate	114.5	208.9	345.3	668.7
9. Roman Hwy After junction to Hermosa	388.1	949.8	701.2	2,039.1
10. Maharlika Highway After Sta Rita Exit to Plaridel	524.6	47.4	391.4	963.4
11. McArthur Highway Malolos & Balagtas	5,146.9	2,699.6	1,937.2	9,783.6
12. SJDM-Norzagaray Road SJDM & Norzagaray	26.6	1,794.2	184.5	2,005.3
13. Tanay-Famy Road Rizal-Laguna Provinces	59.1	316.6	16.7	392.3
14. Noveleta-Rosario-Naic Rd. Noveleta & Rosario towns	249.3	370.0	112.5	731.7
15. Aguinaldo Highway Imus & Dasmarinas towns	542.6	247.7	517.3	1,307.5
16. Carmona-Trece Martires Rd Carmona & GMA towns	636.4	37.5	420.0	1,093.9
17. Sta. Rosa-Tagaytay Road After Paseo Sta Rosa Cmplx.	240.8	1,013.5	575.2	1,829.5
18. SLEX exit, Calamba After Calamba Ex. Sto. Tomas	1,251.1	3,283.9	2,229.2	6,764.2
19. Maharlika Highway Sariaya-Lucena City	1,137.2	600.0	324.3	2,061.5
20. Lipa-Cuenca-San Jose Rd Cuenca & San Jose towns	874.1	1,181.0	2,567.5	4,622.6
21. STAR access road Star exit to Batangas City	2,126.2	115.6	615.7	2,857.4
Total	**18,376.1**	**16,710.0**	**12,794.2**	**47,880.3**
Share (%)	**38.4%**	**34.9%**	**26.7%**	**100.0%**

(5) Average Loading by Type of Truck

Vehicle OD is linked to commodity OD through the average weight loaded by type of truck. **Table 1.1.1-5** shows the average weight loaded by type of truck.

TABLE 11.1.1-5 AVERAGE LOADING BY TYPE OF TRUCK

(unit;kg)

	Agri./ Fishery / Forestry	Mining/ Construction	Manufacturing	Gross Average Loading*	Net Average Loading**
2-AXLE TRUCK	5,840	5,060	3,589	4,917	2,401
3-AXLE TRUCK	14,069	13,990	11,509	13,323	6,943
TRUCK-TRAILER	16,067	18,197	11,911	15,663	8,294
DELIVERY VAN	3,370	2,960	1,760	2,573	1,559
Weighted Mean TRUCK	7,667	10,694	5,033	7,413	4,008

* Empty trucks are excluded.
** Empty trucks are included.

The average loaded volume by 2-AXLE TRUCK is 2.4 tons, by 3-AXLE TRUCK 6.9 tons, by Trailer 8.2 tons and by Delivery Van 1.6 tons. The survey results, 4.0 tons for truck, are used in this report.

11.1.2 Present OD Table

(1) Procedure of Estimating the Present OD Tables

(a) The maximum entropy method was applied to obtain the OD tables of aggregated 4 vehicle types. For the application of the maximum entropy method, it is necessary to utilize the traffic volumes by type of vehicle crossing the zones of the network.

(b) The traffic volumes crossing zone border were obtained from the traffic counting survey results and supplemented by DPWH survey records.

(c) Under the process described above, the maximum entropy method was applied and the OD tables by vehicle category (Car, Jeepney, Bus and Truck) were produced. All Vehicle OD, Passenger car (including Jeepney and Bus) OD and Truck OD (large zone) are shown in **Tables 11.1.2-1**, **11.1.2-2** and **11.1.2-3**.

(d) The average vehicle passenger occupancy rates and loading rates by commodity category obtained from the roadside interview survey were then applied to each OD pair by vehicle classification, and the passengers and commodity for the OD pairs were obtained.

(e) Passenger OD of large zoning is shown in **Table 11.1.2-4** and total commodity trips in **Table 11.1.2-5**.

(f) For the examination of the accuracy of OD tables, the established All vehicle OD was assigned on the present road network. **Figure 11.1.2-1** shows the traffic volumes which resulted through traffic assignment procedure of the OD tables in the road network. The differences between surveyed traffic volumes and assigned volumes are presented in **Figures 11.1.2-2**. The assigned volumes in this manner show good consistency to the observed traffic.

(2) OD Tables and Traffic Flow

The concluded OD trips are presented in tables and the corresponding traffic flow is shown in figures. All of OD tables were obtained on small zoning base, and aggregated to large zoning base. Traffic zoning system is shown in **Table 11.2.1-1**. ODs trips presented in the report are those of All vehicles, Passenger Car, Truck and each of them is assigned graphically on the road network as traffic flow.

TABLE 11.1.2-1 ALL VEHICLES OD (LARGE ZONES)

(Vehicle)

	Metro Manila	Cavite	Laguna	Rizal	Bulacan	Pampanga	Batangas	Quezon	Bataan	Zambales	Tarlac	Nueva Ecija	Pangasinan	Aurora	Outside of Study Area	Total
Metro Manila	3,236,908	53,738	62,265	87,708	51,167	2,479	8,345	2,357	1,256	1,291	814	1,542	1,548	352	2,792	3,514,562
Cavite	57,966	400,538	12,428	666	1,590	140	1,199	452	23	51	4	21	22	0	315	475,415
Laguna	38,890	17,094	301,024	6,718	754	123	5,670	596	76	15	29	21	28	0	494	371,532
Rizal	87,686	1,487	4,226	328,458	1,442	33	314	273	8	19	3	24	88	155	190	424,406
Bulacan	46,617	1,668	1,514	1,531	491,407	7,231	219	41	514	580	253	5,171	296	0	621	557,663
Pampanga	2,342	136	29	27	5,467	24,750	17	12	1,523	1,667	1,019	260	203	0	390	37,842
Batangas	6,182	2,219	5,531	73	257	26	19,184	3,407	46	19	24	30	46	0	328	37,372
Quezon	2,551	385	1,185	443	15	14	2,549	9,786	0	4	392	0	44	0	100	17,468
Bataan	1,238	30	25	49	819	1,595	82	0	12,686	1,289	599	200	93	2	161	18,868
Zambales	1,022	54	37	9	538	698	24	12	753	43	162	136	47	0	82	3,617
Tarlac	1,021	20	64	3	488	985	11	12	250	222	9,681	672	1,909	1	466	15,805
Nueva Ecija	2,390	4	11	17	3,196	106	164	0	238	85	1,066	11,599	624	0	2,051	21,551
Pangasinan	1,366	36	42	9	266	490	8	25	109	27	2,300	3,685	6,053	0	2,313	16,729
Aurora	165	0	0	0	7	2	0	0	0	168	0	3	0	0	2	347
Outside of Study Area	2,589	159	298	93	978	307	464	68	53	135	351	1,786	2,640	14	314	10,249
Total	3,488,933	477,568	388,679	425,804	558,391	38,979	38,250	17,041	17,535	5,615	16,697	25,150	13,641	524	10,619	5,523,426

TABLE 11.1.2-2 PASSENGER CAR (INCLUDING JEEPNEY & BUS) OD (LARGE ZONES)

(Vehicle)

	Metro Manila	Cavite	Laguna	Rizal	Bulacan	Pampanga	Batangas	Quezon	Bataan	Zambales	Tarlac	Nueva Ecija	Pangasinan	Aurora	Outside of Study Area	Total
Metro Manila	2,866,807	52,423	47,811	81,778	45,359	1,763	6,882	2,134	964	1,092	660	1,453	1,344	352	2,456	3,113,278
Cavite	55,683	382,856	11,140	653	592	66	863	418	21	49	2	12	16	0	292	452,663
Laguna	30,370	15,489	267,508	5,043	713	37	3,558	465	57	3	25	16	19	0	457	323,760
Rizal	82,730	1,437	3,046	271,196	1,269	11	225	250	0	17	3	24	88	155	183	360,634
Bulacan	41,103	645	1,251	1,410	417,378	4,284	71	9	360	431	191	4,759	223	0	261	472,376
Pampanga	1,710	130	11	13	4,215	23,052	11	9	1,239	1,328	919	232	170	0	361	33,400
Batangas	4,847	1,681	4,012	46	46	11	17,084	3,235	27	19	18	30	39	0	244	31,339
Quezon	2,186	351	995	379	3	0	2,402	8,308	0	0	390	0	39	0	18	15,071
Bataan	1,018	22	17	43	648	1,354	71	0	12,423	1,057	575	180	83	0	151	17,642
Zambales	778	43	7	6	233	549	11	7	637	28	143	131	43	0	78	2,694
Tarlac	764	11	52	3	377	894	4	4	224	214	8,259	609	1,760	0	427	13,602
Nueva Ecija	2,282	1	3	14	2,846	101	152	0	215	74	1,020	11,390	385	0	1,718	20,201
Pangasinan	1,200	28	35	7	93	464	0	25	99	26	2,130	3,542	5,651	0	1,883	15,183
Aurora	151	0	0	0	0	0	0	0	0	167	0	0	0	0	2	320
Outside of Study Area	2,300	155	261	89	689	286	252	11	40	132	329	1,521	2,226	14	244	8,549
Total	3,093,929	455,272	336,149	360,680	474,461	32,872	31,586	14,875	16,306	4,637	14,664	23,899	12,086	521	8,775	4,880,712

TABLE 11.1.2-3 TRUCK OD (LARGE ZONES)

(Vehicle)

	Metro Manila	Cavite	Laguna	Rizal	Bulacan	Pampanga	Batangas	Quezon	Bataan	Zambales	Tarlac	Nueva Ecija	Pangasinan	Aurora	Outside of Study Area	Total
Metro Manila	370,101	1,315	14,454	5,930	5,808	716	1,463	223	292	199	154	89	204	0	336	401,284
Cavite	2,283	17,682	1,288	13	998	74	336	34	2	2	2	9	6	0	23	22,752
Laguna	8,520	1,605	33,516	1,675	41	86	2,112	131	19	12	4	5	9	0	37	47,772
Rizal	4,956	50	1,180	57,262	173	22	89	23	8	2	0	0	0	0	7	63,772
Bulacan	5,514	1,023	263	121	74,029	2,947	148	32	154	149	62	412	73	0	360	85,287
Pampanga	632	6	18	14	1,252	1,698	6	3	284	339	100	28	33	0	29	4,442
Batangas	1,335	538	1,519	27	211	15	2,100	172	19	0	6	0	7	0	84	6,033
Quezon	365	34	190	64	12	14	147	1,478	0	4	2	0	5	0	82	2,397
Bataan	220	8	8	6	171	241	11	0	263	232	24	20	10	2	10	1,226
Zambales	244	11	30	3	305	149	13	5	116	15	19	5	4	0	4	923
Tarlac	257	9	12	0	111	91	7	8	26	8	1,422	63	149	1	39	2,203
Nueva Ecija	108	3	8	3	350	5	12	0	23	11	46	209	239	0	333	1,350
Pangasinan	166	8	7	2	173	26	8	0	10	1	170	143	402	0	430	1,546
Aurora	14	0	0	0	7	2	0	0	0	1	0	3	0	0	0	27
Outside of Study Area	289	4	37	4	289	21	212	57	13	3	22	265	414	0	70	1,700
Total	395,004	22,296	52,530	65,124	83,930	6,107	6,664	2,166	1,229	978	2,033	1,251	1,555	3	1,844	642,714

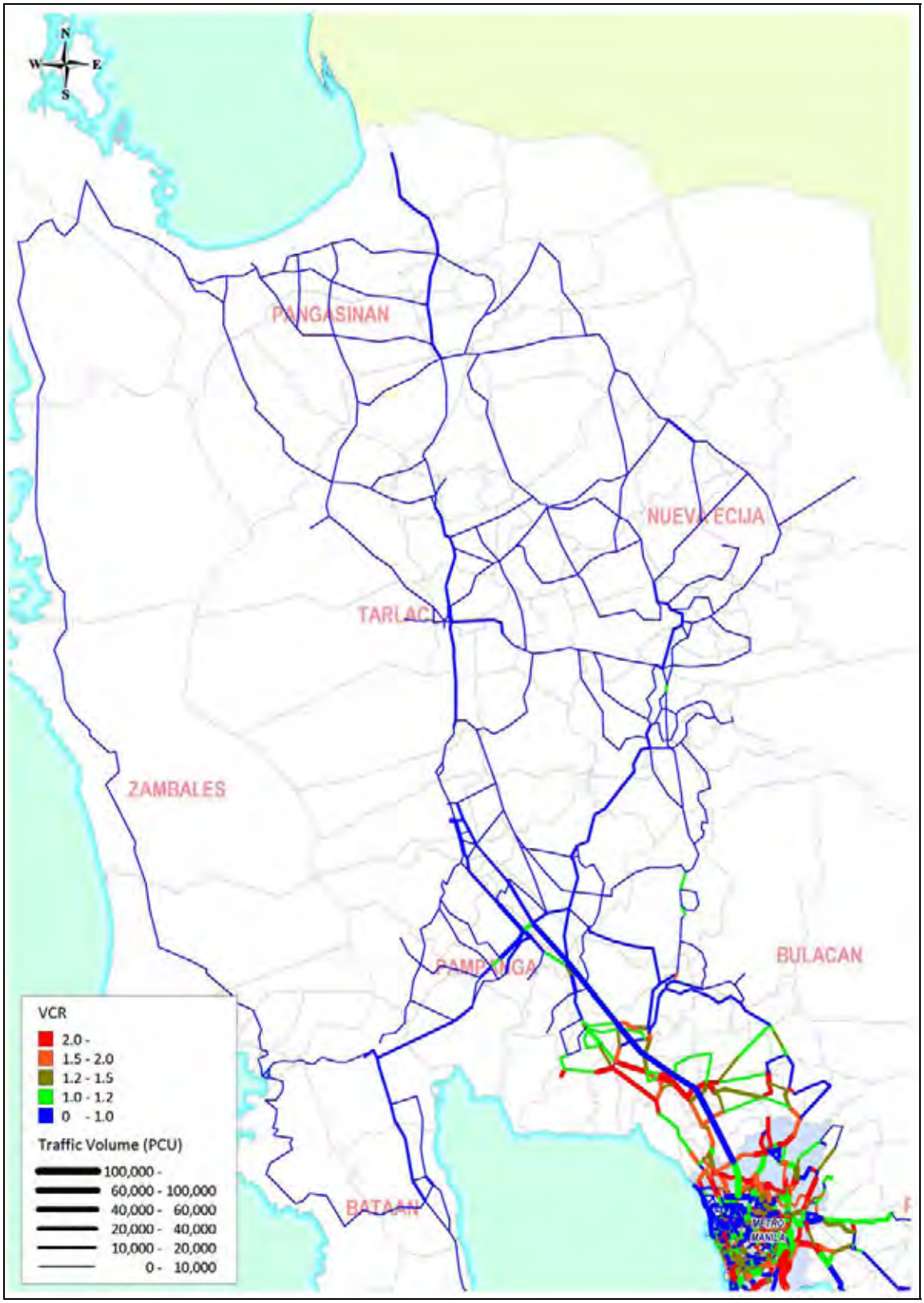


FIGURE 11.1.2-1 (1/3) PRESENT TRAFFIC FLOW: NORTH OF METRO MANILA (YEAR 2009)

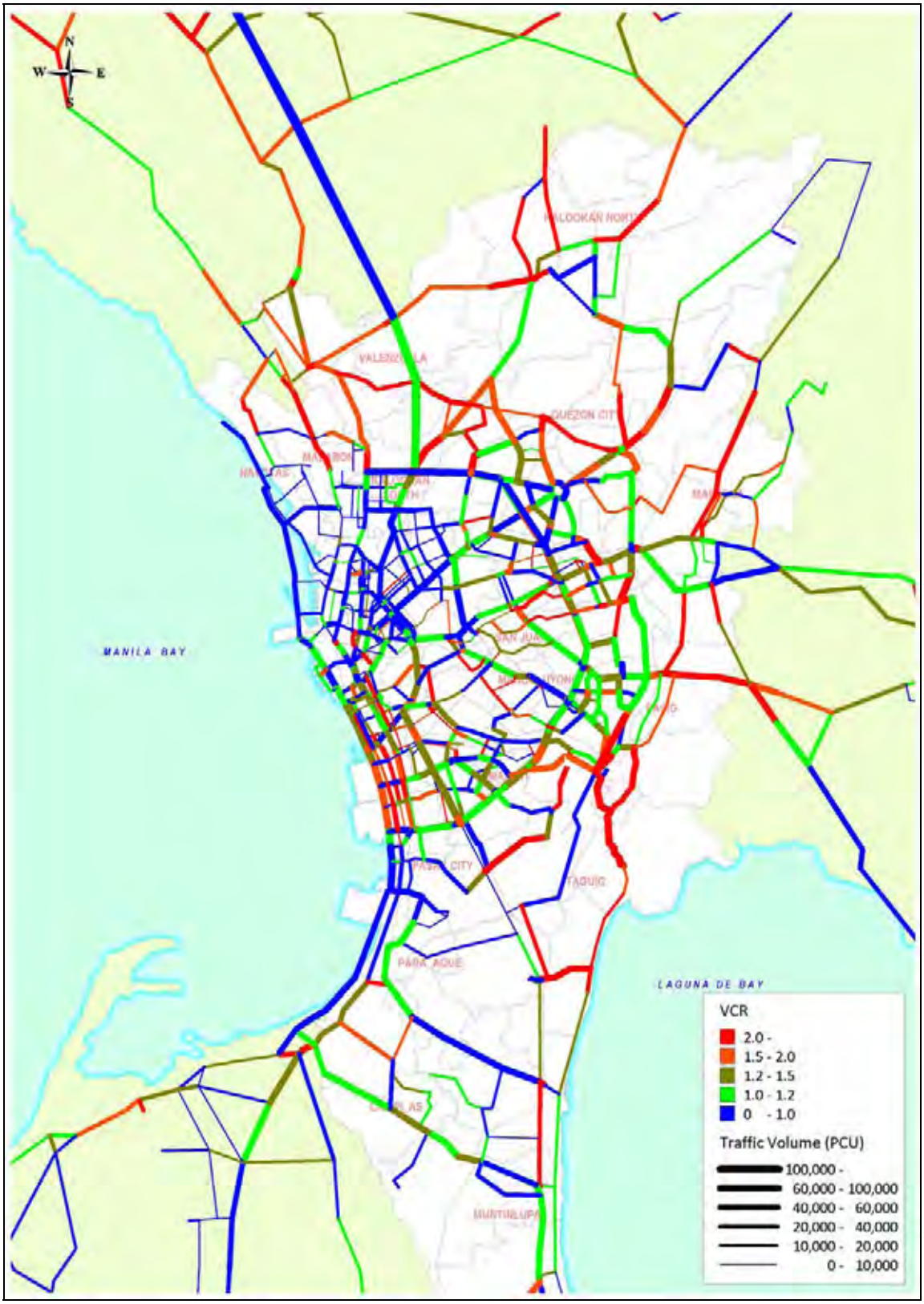


FIGURE 11.1.2-1 (2/3) PRESENT TRAFFIC FLOW: METRO MANILA (YEAR 2009)

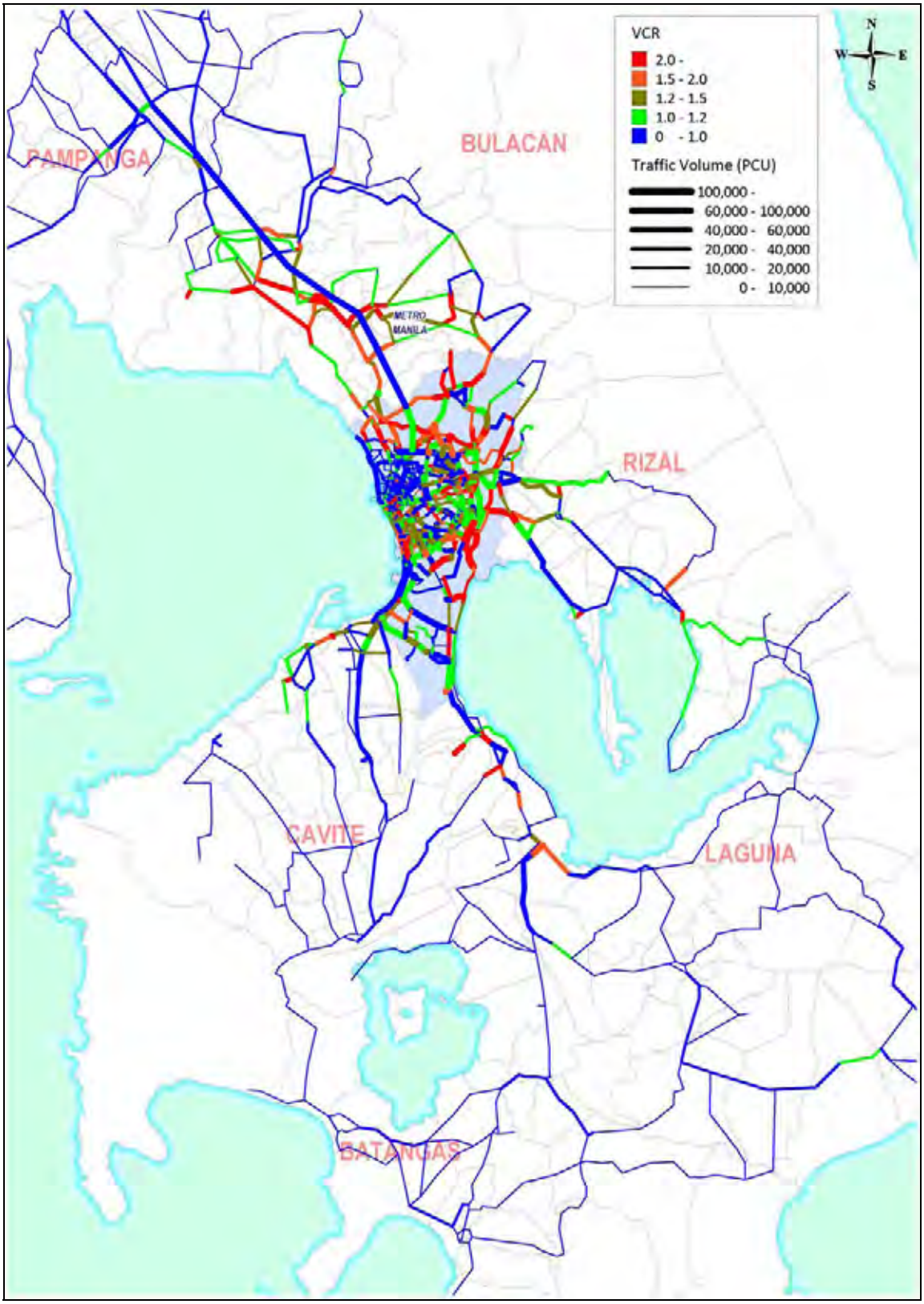


FIGURE 11.1.2-1 (3/3) PRESENT TRAFFIC FLOW: SOUTH OF METRO MANILA (YEAR 2009)

TABLE 11.1.2-4 PASSENGER OD (LARGE ZONES)

(Person/day)

	Metro Manila	Cavite	Laguna	Rizal	Bulacan	Pampanga	Batangas	Quezon	Bataan	Zambales	Tarlac	Nueva Ecija	Pangasinan	Aurora	Outside of Study Area	Total
Metro Manila	20,385,899	342,979	219,023	520,076	380,383	14,497	57,928	26,306	10,132	10,277	3,921	13,361	20,129	1,232	19,742	22,025,882
Cavite	353,520	3,270,074	68,755	7,253	2,953	751	5,904	1,463	74	963	7	42	138	0	2,036	3,713,932
Laguna	138,246	101,208	1,938,102	30,651	2,554	130	26,684	1,628	200	11	88	56	67	0	3,189	2,242,810
Rizal	523,660	11,415	14,669	2,072,870	6,925	39	4,203	875	0	112	28	84	702	543	1,261	2,637,385
Bulacan	357,832	3,304	4,412	6,984	3,300,161	15,383	318	32	1,393	1,647	669	34,585	808	0	1,291	3,728,817
Pampanga	14,310	960	39	46	16,484	120,479	39	32	10,030	7,550	4,367	812	1,365	0	2,434	178,945
Batangas	44,829	11,108	24,144	161	161	62	113,496	35,763	95	67	63	105	137	0	881	231,071
Quezon	29,605	1,886	7,121	1,354	11	0	19,510	43,402	0	0	1,365	0	137	0	63	104,452
Bataan	9,636	77	114	287	5,116	8,934	289	0	61,945	5,947	2,013	767	325	0	775	96,223
Zambales	8,557	997	25	21	952	3,166	39	25	3,874	133	501	595	178	0	382	19,443
Tarlac	6,601	56	182	11	1,320	3,938	14	14	948	776	48,797	3,871	9,960	0	2,778	79,265
Nueva Ecija	20,274	4	11	49	9,961	354	532	0	1,435	314	4,959	61,475	1,348	0	14,646	115,359
Pangasinan	14,325	98	123	25	326	2,316	0	88	584	91	12,036	14,214	28,897	0	19,986	93,106
Aurora	529	0	0	0	0	0	0	0	0	585	0	0	0	0	62	1,175
Outside of Study Area	17,999	891	1,637	312	2,412	1,538	1,311	39	358	544	2,039	11,521	23,851	240	3,129	67,820
Total	21,925,819	3,745,055	2,278,354	2,640,097	3,729,717	171,583	230,266	109,664	91,067	29,015	80,852	141,486	88,040	2,015	72,655	35,335,683

TABLE 11.1.2-5 COMMODITY OD (LARGE ZONES)

(Ton/day)

	Metro Manila	Cavite	Laguna	Rizal	Bulacan	Pampanga	Batangas	Quezon	Bataan	Zambales	Tarlac	Nueva Ecija	Pangasinan	Aurora	Outside of Study Area	Total
Metro Manila	1,480,404	5,260	57,816	23,720	23,232	2,864	5,852	892	1,168	796	616	356	816	0	1,344	1,605,136
Cavite	9,132	70,728	5,152	52	3,992	296	1,344	136	8	8	8	36	24	0	92	91,008
Laguna	34,080	6,420	134,064	6,700	164	344	8,448	524	76	48	16	20	36	0	148	191,088
Rizal	19,824	200	4,720	229,048	692	88	356	92	32	8	0	0	0	0	28	255,088
Bulacan	22,056	4,092	1,052	484	296,116	11,788	592	128	616	596	248	1,648	292	0	1,440	341,148
Pampanga	2,528	24	72	56	5,008	6,792	24	12	1,136	1,356	400	112	132	0	116	17,768
Batangas	5,340	2,152	6,076	108	844	60	8,400	688	76	0	24	0	28	0	336	24,132
Quezon	1,460	136	760	256	48	56	588	5,912	0	16	8	0	20	0	328	9,588
Bataan	880	32	32	24	684	964	44	0	1,052	928	96	80	40	8	40	4,904
Zambales	976	44	120	12	1,220	596	52	20	464	60	76	20	16	0	16	3,692
Tarlac	1,028	36	48	0	444	364	28	32	104	32	5,688	252	596	4	156	8,812
Nueva Ecija	432	12	32	12	1,400	20	48	0	92	44	184	836	956	0	1,332	5,400
Pangasinan	664	32	28	8	692	104	32	0	40	4	680	572	1,608	0	1,720	6,184
Aurora	56	0	0	0	28	8	0	0	0	4	0	12	0	0	0	108
Outside of Study Area	1,156	16	148	16	1,156	84	848	228	52	12	88	1,060	1,656	0	280	6,800
Total	1,580,016	89,184	210,120	260,496	335,720	24,428	26,656	8,664	4,916	3,912	8,132	5,004	6,220	12	7,376	2,570,856

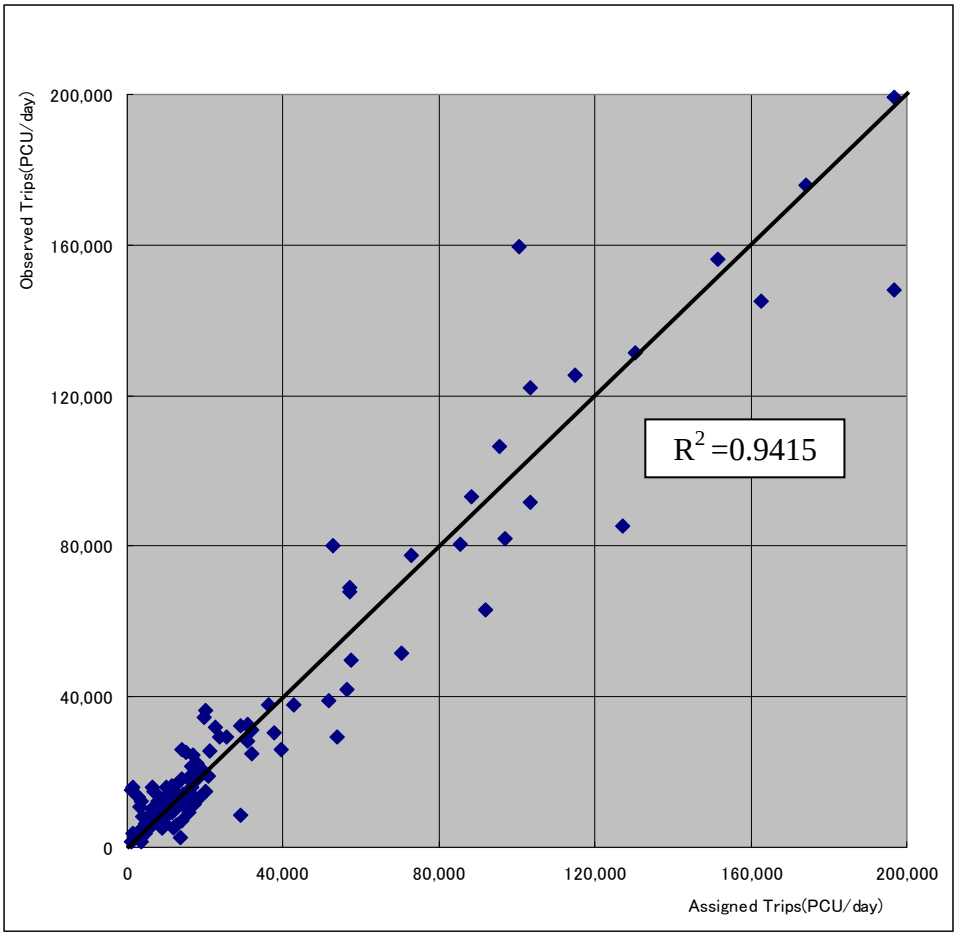


FIGURE 11.1.2-2 DIFFERENCE OF ASSIGNED AND OBSERVED TRIPS

11.1.3 Desire Line

Desire line of all vehicles, Passenger Cars, Public Transport (Jeepney and Bus) and Trucks are illustrated in **Figure 11.1.3-1.**

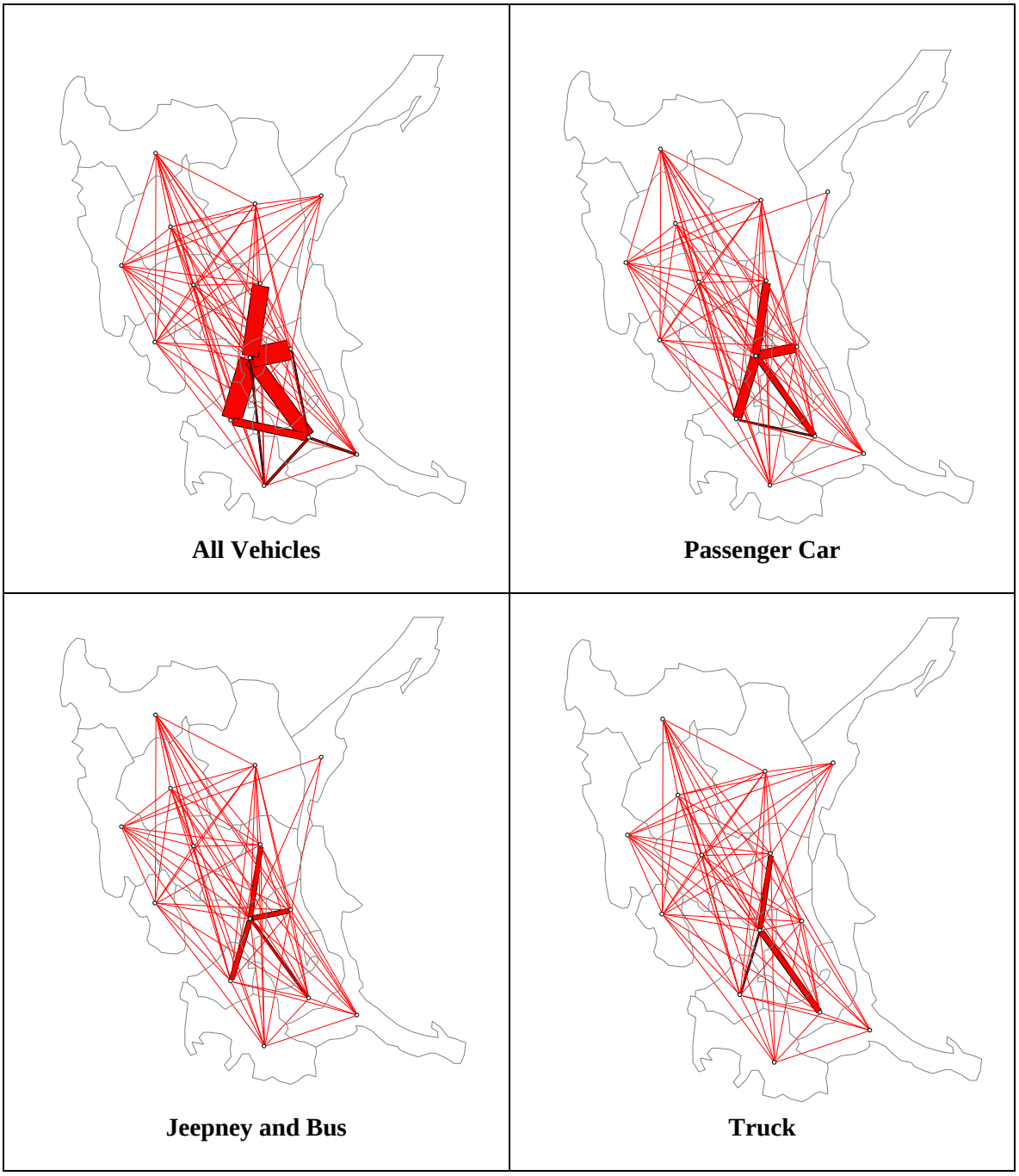


FIGURE 11.1.3-1 DESIRE LINE (YEAR 2009)

11.2 TRAFFIC DEMAND FORECAST

11.2.1 Approach

(1) Four Step Approach

Traffic demand forecast was carried out using four steps estimation procedure as shown in **Figure 11.2-1**.

- Trip Generation and Attraction – the prediction of trips produced and attracted to each zone;
- Trip Distribution – the prediction of origin-destination flows, the linking of trip ends predicted by trip generation;
- Modal Split – the estimation of percentages of trip flows made by each transportation mode in the model; and
- Traffic Assignment – the allocation of trips to routes in the road network.

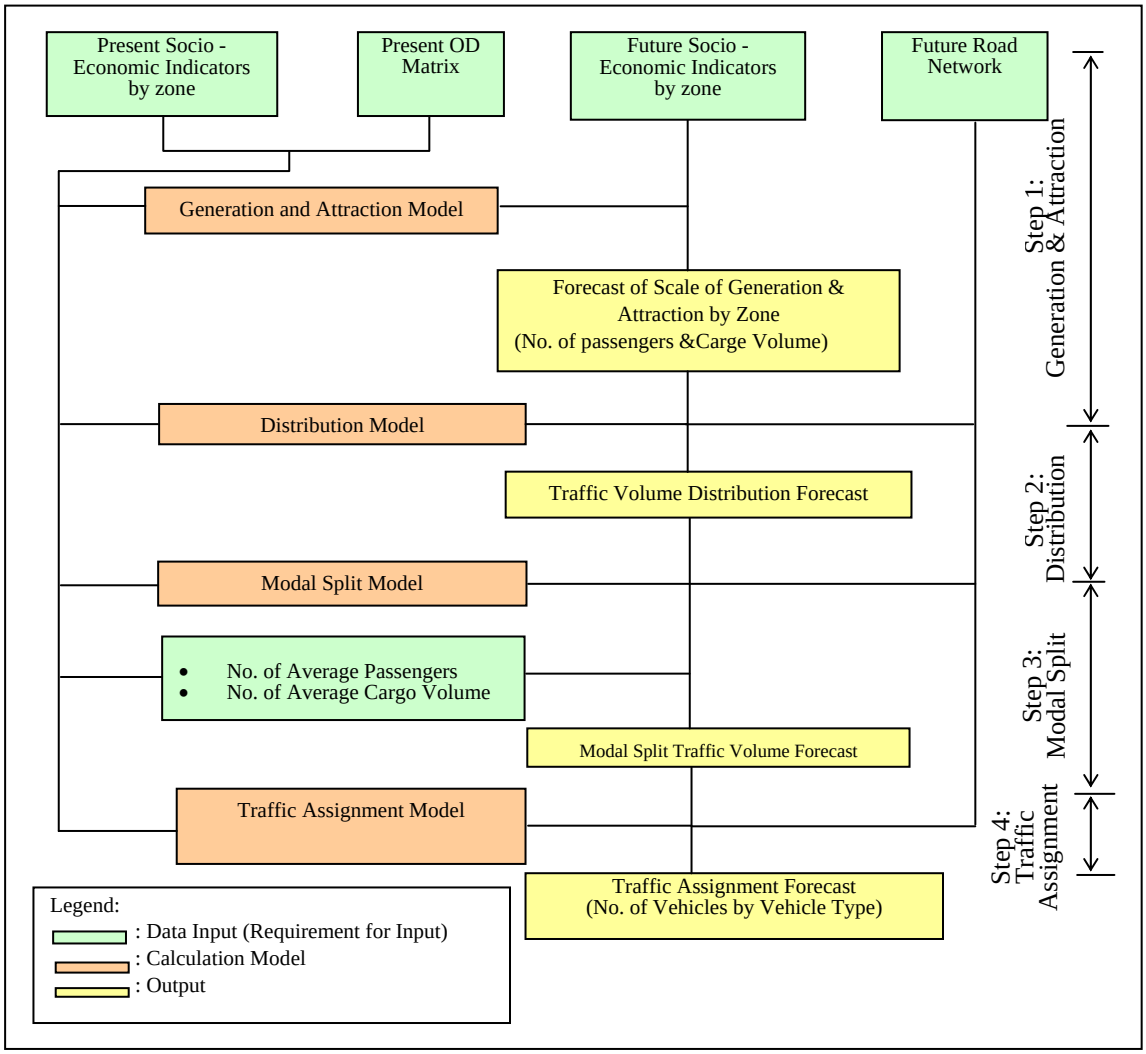


FIGURE 11.2-1 TRAFFIC DEMAND FORECAST PROCEDURE

(2) Zone System in the Study Area

The model predicts trips over the road network based on the attributes of traffic analysis zones (TAZ). Zonal Attributes used in trip generation including population and employment. A key component of the model development process was the development of zone system to cover the Study Area.

The study area is defined from zone 1 to 283 (Metro Manila (1~ 94), other area (98 ~ 283)) in traffic zoning system, and outside the study area is defined from zone, 284 and 319 and Manila port is defined as zone 320. (See **Table 11.2.1-1** and **Figure 11.2.1-2**, **11.2.1-3**).

(3) Modeling and Forecasting tolls

In all steps of travel model calibrations and demand forecast, JICA STRADA system and EXCEL spread sheet are employed. JICA STRADA is a software tool for the planning, managing, and analyzing of transportation systems. The software provides a set of tools for traffic demand modeling as well as capabilities for presentation graphics and transportation models. JICA STRADA system applied for simulation of travel time and cost. Modeling and forecasting in trip generation, trip distribution and traffic assignment is computed by JICA STRADA system. For better efficiency, modal split steps is calculated by using Excel spread sheet.

TABLE 11.2.1-1 (1) TRAFFIC ZONING SYSTEM

Small Zone	Barangay	Medium Zone	City/Municipality	Large Zone	Province	Region
1	City of Manila 1 - Barangay 20	1	City of Manila	1	Metro Manila	NCR
2	City of Manila 2 - Barangay 105					
3	City of Manila 3 - Barangay 375					
4	City of Manila 4 - Barangay 48					
5	City of Manila 5 - San Nicolas					
6	City of Manila 6 - Binondo					
7	City of Manila 7 - Barangay 310					
8	City of Manila 8 - Quiapo					
9	City of Manila 9 - Barangay 413					
10	City of Manila 10 - San Miguel					
11	City of Manila 11 - Barangay 570					
12	City of Manila 12 - Barangay 450					
13	City of Manila 13 - Port Area					
14	City of Manila 14 - Intramuros, Ermita					
15	City of Manila 15 - Paco					
16	City of Manila 16 - Malate					
17	City of Manila 17 - Santa Ana					
18	City of Manila 18 - Barangay 601					
19	City of Manila 19 - Pandacan					
20	Pasay City 1 - Barangay 46	2	Pasay City			
21	Pasay City 2 - Barangay 132					
22	Pasay City 3 - Barangay 183					
24	Pasay City 4 - Barangay 1					
82	Pasay City 5 - Barangay 76					
23	Parañaque City 1 - Don Bosco	3	Parañaque City			
25	Paranaque City 2 - Baclaran					
84	Parañaque City 2 - Sun Valley, San Martin De Porre					
85	Parañaque City 3 - Marcelo Green Village					
86	Parañaque City 4 - B.F. Homes					
92	Parañaque City 5 - San Isidro					
93	Parañaque City 6 - San Dionisio					
26	Makati City 1 - Bangkal, San Lorenzo	4	Makati City			
27	Makati City 2 - Palanan					
28	Makati City 3 - Olympia					
29	Makati City 4 - Guadalupe Viejo					
30	Makati City 5 - Bel-Air					
31	Makati City 6 - Rizal, Pembo					
34	Makati City 7 - Magallanes					
32	Santa Ana		Pateros			
33	Taguig 1 - Western Bicutan	5	Taguig			
81	Taguig 2 - Upper Bicutan					
83	Taguig 3 - Signal Village, Lower Bicutan					
35	Mandaluyong City 1 - Poblacion	6	Mandaluyong City			
36	Mandaluyong City 2 - Plainview					
37	Mandaluyong City 3 - Mauway					
39	Mandaluyong City 4 - Wack-wack Greenhills					
40	San Juan 1 - West Crame		San Juan			
41	San Juan 2 - Corazon de Jesus					
38	Pasig City 1 - Ugong	7	Pasig City			
78	Pasig City 2 - Santolan					
79	Pasig City 3 - Santa Lucia					
80	Pasig City 4 - Pinagbuhatan					
42	Quezon City 1 - Tatalon, Damayang Lagi	8	Quezon City			
43	Quezon City 2 - Santo Domingo (Matalahib)					
44	Quezon City 3 - Baesa, Sangandaan					
45	Quezon City 4 - Bagong Pag-asa					
46	Quezon City 5 - Pinyahan, (Trinoma/SM West)					
47	Quezon City 6 - Paltok, Del Monte					
48	Quezon City 7 - Kamuning					
49	Quezon City 8 - E. Rodriguez, Crame					
50	Quezon City 9 - Camp Aguinaldo					
51	Quezon City 10 - Kamias (East/West)					
52	Quezon City 11 - U.P. Campus					
53	Quezon City 12 - Pasong Tamo					
54	Quezon City 13 - Batasan Hills					
55	Quezon City 14 - Commonwealth					
56	Quezon City 15 - Payatas					
57	Quezon City 16 - North Fairview					
61	Quezon City 17 - Greater Lagro, Novaliches Proper					
62	Quezon City 18 - Tandang Sora					
75	Quezon City 19 - Pansol, Loyola Heights					
77	Quezon City 20 - White Plains, Libis (Eastwood)					
58	Kalookan City (North) 1 - Barangay 178	9	Kalookan City (North)			
59	Kalookan City (North) 2 - Barangay 176					
60	Kalookan City (North) 3 - Barangay 171					
63	Valenzuela City 1 - Ugong	10	Valenzuela City			
64	Valenzuela City 2 - Canumay, Maysan					
65	Valenzuela City 3 - Malinta					
66	Valenzuela City 4 - Malanday					
71	Valenzuela City 5 - Marulas					

TABLE 11.2.1-1 (2) TRAFFIC ZONING SYSTEM

Small Zone	Barangay	Medium Zone	City/Municipality	Large Zone	Province	Region
67	Malabon 1 - Concepcion	11	Malabon	1	Metro Manila	NCR
70	Malabon 2 - Potrero					
68	Navotas - North Bay Blvd South		Navotas			
69	Kalookan City (South) 1 - Barangay 12		Kalookan City (South)			
72	Kalookan City (South) 2 - Baranagay 132					
73	Kalookan City (South) 3 - Barangay 120					
74	Marikina City 1 - Concepcion Uno, Parang	12	Marikina City			
76	Marikina City 2 - Malanday					
87	Muntinlupa City 1 - Sucat		Muntinlupa City			
88	Muntinlupa City 2 - Alabang					
89	Muntinlupa City 3 - Putatan					
90	Las Pinas City 1 - Almanza (Uno, Dos)	13	Las Pinas City			
91	Las Pinas City 2 - B.F. International Village					
94	Las Pinas City 3 - Zapote					
320	Manila Port	-	-	1	Metro Manila	NCR
133		24	BACOOR	2	CAVITE	Region IV-A
134			IMUS			
135			CAVITE CITY			
136			KAWIT			
137			NOVELETA			
138		25	ROSARIO			
139	Tejero		GENERAL TRIAS			
140	Pasong Camachile II					
141						
142	Amaya		TANZA			
143	Halayhay					
144	Bagtas					
146	Ibayo Silangan	26	NAIC			
147	Palangue 2 & 3					
161			GENERAL EMILIO AGUINALDO			
145		27	TRECE MARTIRES CITY (Capital)			
148	Datu Esmael (Bago-a-ingud)		DASMARIÑAS			
149	Paliparan III					
150	Langkaan II					
151		28	SILANG			
153			GEN. MARIANO ALVAREZ			
154			CARMONA			
162			AMADEO			
163			ALFONSO			
164			TAGAYTAY CITY			
152		29	SAN PEDRO	3	LAGUNA	
155			BIÑAN			
156			CITY OF SANTA ROSA			
157		30	CABUYAO			
158	Pansol, Parian		CITY OF CALAMBA			
159	Canlubang					
160			BAY			
165		31	SANTA MARIA			
166			MABITAC			
167			FAMY			
168		32	KALAYAAN			
169			CAVINTI			
170		33	LILIW			
171			PAGSANJAN			
172		34	ALAMINOS			
173	Del Remedio		SAN PABLO CITY			
174	Santisimo Rosario					
175	San Francisco					
176	Santo Angel					
116	San Jose	19	RODRIGUEZ (MONTALBAN)	4	RIZAL	
117	Burgos					
118		20	SAN MATEO			
119	Cupang		CITY OF ANTIPOLO (Capital)			
120	San Jose (Pob.)					
121	Inarawan					
122		21	CAINTA			
123			TAYTAY			
124			ANGONO			
125		22	BINANGONAN			
126			TERESA			
127			MORONG			
128			CARDONA			
129		23	BARAS			
130			TANAY			
131			PILILLA			
132			JALA-JALA			
95		14	CITY OF MEYCAUAYAN	5	BULACAN	Region III
96			MARILAO			
97			OBANDO			
98		15	BULACAN			
99			BOCAUE			

TABLE 11.2.1-1 (3) TRAFFIC ZONING SYSTEM

Small Zone	Barangay	Medium Zone	City/Municipality	Large Zone	Province	Region
100		15	BALAGTAS (BIGAA)	5	BULACAN	Region III
101			GUIGUINTO			
102			CITY OF MALOLOS (Capital) 1			
103		16	PAOMBONG			
104			HAGONOY			
105			CALUMPIT			
106			PULILAN			
107			PLARIDEL			
108		17	PANDI			
109	Poblacion, Guyong		SANTA MARIA			
110	Pulong Buhangin					
111	Muzon	18	SAN JOSE DEL MONTE			
112	Gumaoc					
113	Kaypian					
114	Tigbe		NORZAGARAY			
115	San Mateo					
205		43	BALIUAG			
206			BUSTOS			
207			ANGAT			
208		44	SAN ILDEFONSO			
209			DOÑA REMEDIOS TRINIDAD			
214		46	APALIT	6	PAMPANGA	
220			CANDABA			
215		47	MINALIN			
219			BACOLOR			
224	Dolores		CITY OF SAN FERNANDO			
225	Bulaon					
216		48	MASANTOL			
217			LUBAO			
218			FLORIDABLANCA			
221		49	ARAYAT			
222			MAGALANG			
223		50	PORAC			
226	Dau		MABALACAT			
227	Mabiga, Calumpang					
228	Cutcut		ANGELES CITY			
229	Santo Domingo					
230	Balibago					
231	Malabanias					
177		35	BALAYAN	7	BATANGAS	Region IV-A
178			AGONCILLO			
179			LAUREL			
180		36	CITY OF TANAUAN			
181			SANTO TOMAS			
182			BALETE			
188	Marauoy		LIPA CITY			
189	Antipolo Del Norte					
190	Lodlod					
191	San Jose					
183		37	CUENCA			
187			ALITAGTAG			
184		38	PADRE GARCIA			
185			SAN JUAN			
186			LOBO			
192	Santa Rita Karsada	39	BATANGAS CITY (Capital)			
193	Gulod Itaas					
194	Libjo					
195	Pinamucan					
196		40	GENERAL NAKAR	8	QUEZON	
197			LUCBAN			
198		41	CITY OF TAYABAS			
203			LUCENA CITY (Capital)			
204			AGDANGAN			
199		42	SARIAYA			
200			CANDELARIA			
201			DOLORES			
202			SAN ANTONIO			
210		45	LIMAY	9	BATAAN	Region III
211			ABUCAY			
212			BAGAC			
213			DINALUPIHAN			
249	Barreto	56	OLONGAPO CITY	10	ZAMBALES	
250	East Bajac-bajac					
251	Santa Rita					
252	New Cabalan					
253	Calapacuan	57	SUBIC			
254	Cawag					
255	Pamatawan					
256	Naugsol					
257		58	CASTILLEJOS			

TABLE 11.2.1-1 (4) TRAFFIC ZONING SYSTEM

Small Zone	Barangay	Medium Zone	City/Municipality	Large Zone	Province	Region
258		59	BOTOLAN	10	ZAMBALES	Region III
259		60	CANDELARIA			
232		51	BAMBAN	11	TARLAC	
234			CAPAS			
233		52	CONCEPCION			
236			LA PAZ			
246	Matatalaib		CITY OF TARLAC			
247	San Rafael					
248	Maliwalo					
235		53	SAN JOSE			
240			CAMILING			
237		54	VICTORIA			
238			PURA			
239			GERONA			
241		55	RAMOS			
242			ANAO			
243			SAN MANUEL			
244	Poblacion Norte		PANIQUI			
245	Balaoang					
260	San Nicolas	61	CITY OF GAPAN	12	NUEVA ECIJA	
261	San Roque					
262			CABIAO			
263			JAEN			
264			SAN LEONARDO			
265			GENERAL TINIO (PAPAYA)			
266			SANTA ROSA			
267		62	GABALDON (BITULOK & SABANI)			
268			BONGABON			
282			CARRANGLAN			
269		63	GENERAL MAMERTO NATIVIDAD			
270			SANTO DOMINGO			
275			SCIENCE CITY OF MUÑOZ			
276			LUPAO			
281			SAN JOSE CITY			
271		64	ALIAGA			
272			LICAB			
277	Bantug Norte	65	CABANATUAN CITY			
278	Caalibangbangan					
279	San Josef Norte					
280	Campo Tinio					
273		66	GUIMBA			
274			CUYAPO			
284		68	UMINGAN	13	PANGASINAN	Region I
285			NATIVIDAD			
286			ASINGAN			
287			SAN MANUEL			
298			BALUNGAO			
288		69	POZZORUBIO			
289			BUGALLON			
290			CALASIAO			
291			BINMALEY			
294		70	AGUILAR			
295			BASISTA			
296			BAUTISTA			
297			VILLASIS			
299	Bayaoas		CITY OF URDANETA			
300	Pinmaludpod					
301	Palina East					
292		71	CITY OF ALAMINOS			
293			AGNO			
283		67	All Municipalities	14	AURORA	Region III
302	Zone 302-319 Out of Study Area.	72		15	Benguet	CAR
303						
308					Ifugao	
309						
312					Mt. Province	
313					Kalinga	
314					Abra	
316					Apayao	
304					Nueva Vizcaya	Region II
305						
306					Quirino	
307					Isabela	
317					CAGAYAN	
310					LA UNION	Region I
311					ILOCOS SUR	
315					ILOCOS NORTE	
318					All Provinces	Region IV-B
319					All Provinces	Region V

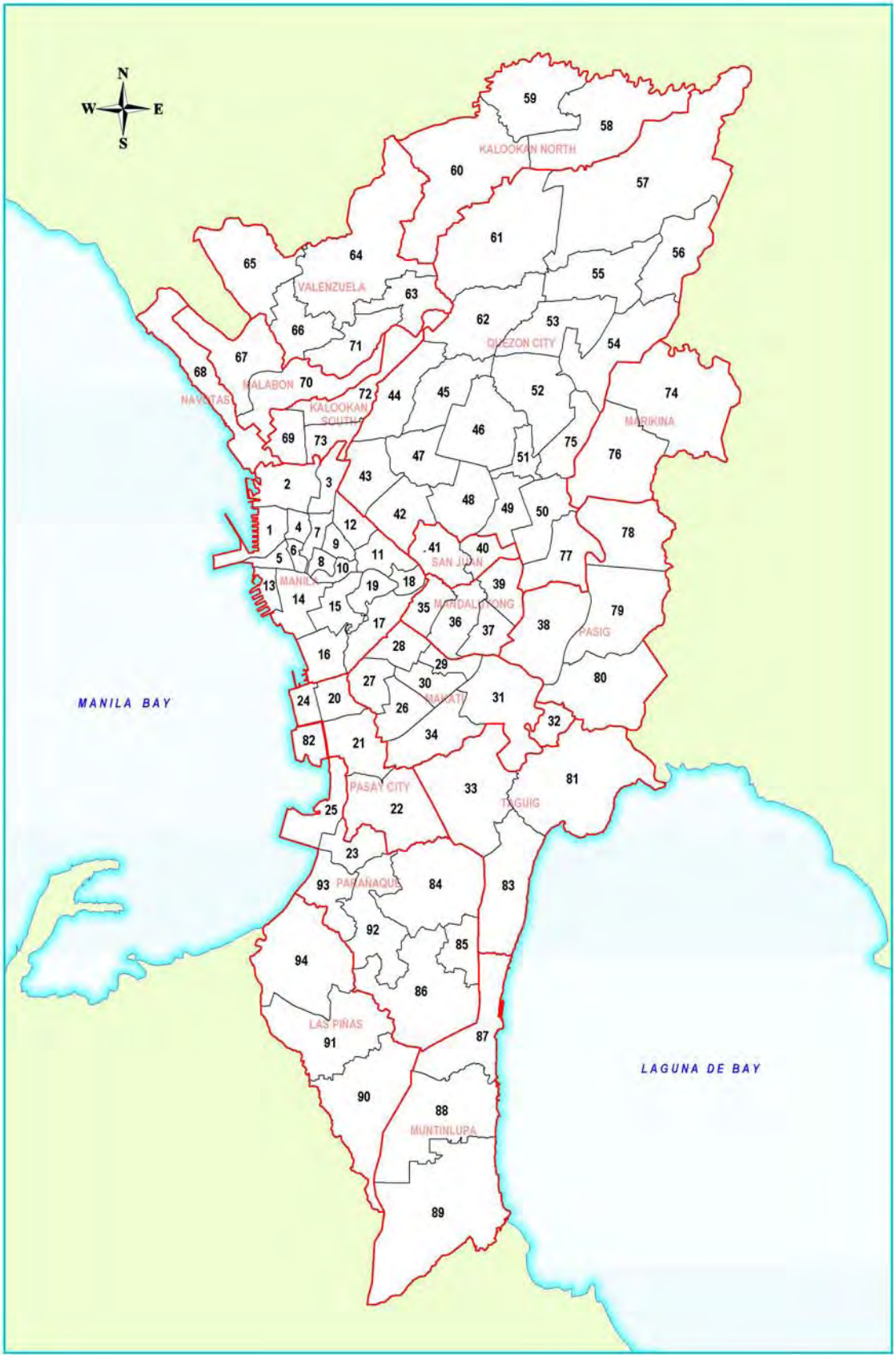


FIGURE 11.2.1-2 ZONING MAP – METRO MANILA

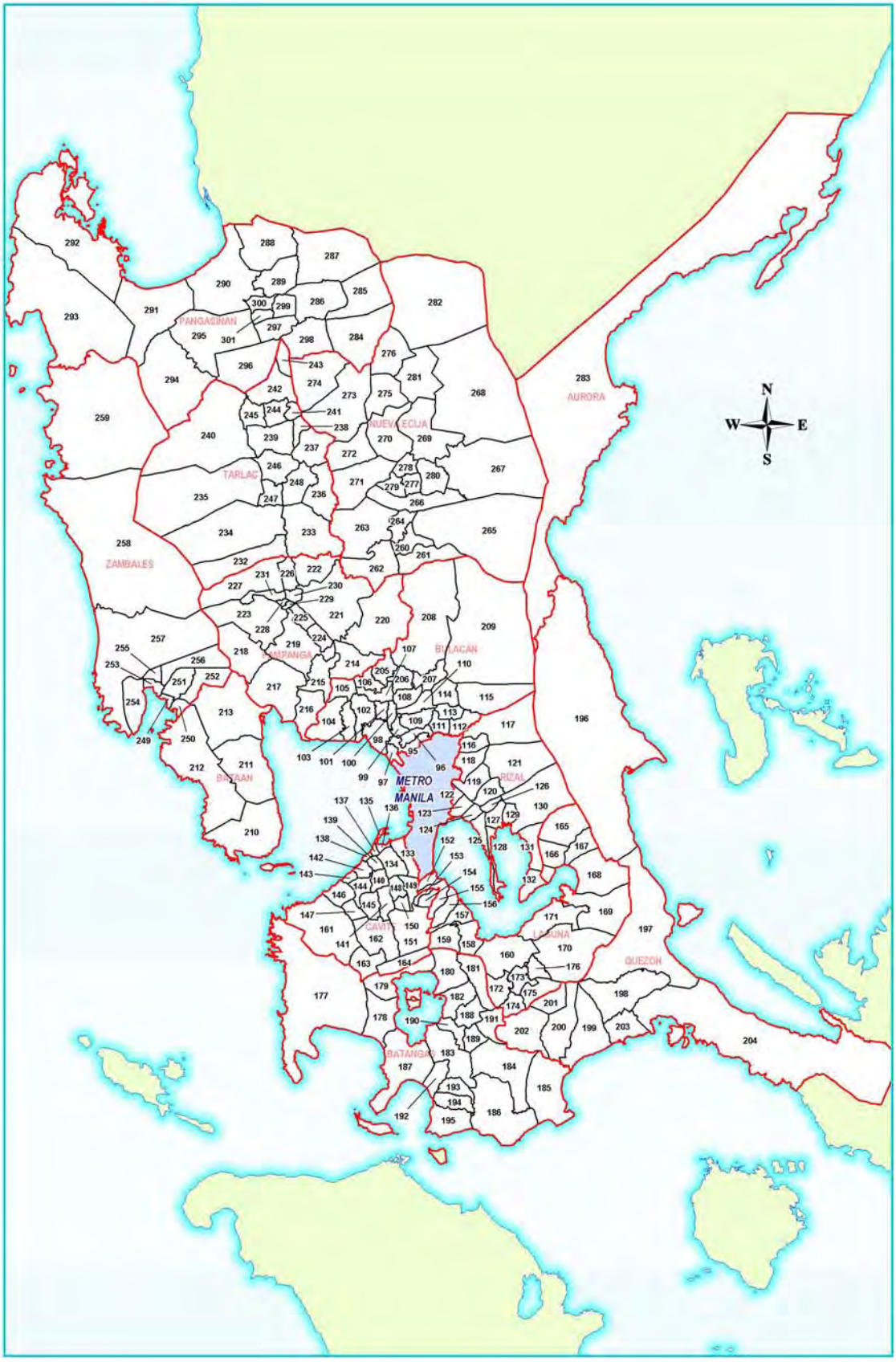


FIGURE 11.2.1-3 ZONING MAP – OUTSIDE METRO MANILA

11.2.2 Forecasting Trip Generation and Attraction

11.2.2.1 Modeling Trip Generation and Attraction

The objective of trip generation and attraction model is to forecast the number of trips that will start and arrive in each traffic zone within the study area. The linear regression models are adopted in the study. The model parameters are calibrated shown in **Table 11.2.2.1-1** and **Table 11.2.2.1-2**.

$G_i = a_i * X1_i + b_i * X2_i + c_i * D_i + C$
$A_j = a_j * X1_j + b_j * X2_j + c_j * D_j + C$

Where,

- G_i – Trip Generation in zone i
- A_j – Trip Attraction in zone j
- $X1_i$, $X2_j$ – Attributes in zone i,j
- D_i, D_j – Dummy Variables
- a_i, a_j, b_i,b_j – Coefficients
- C – Constant

TABLE 11.2.2.1-1 GENERATION/ATTRACTION MODELS (PASSENGER TRIPS)

Model Type	The Subject Area	Attributes		Dummy Variable	Constant	R^2 Multiple Correlation Coefficient
		Population	Employment			
Trip Generation	Metro Manila (MM)	2.0928	1.0289	-1,005,653	-206,717	0.9860
	Neighboring Province of MM (Cavite, Rizal, Laguna, Bulacan)	1.3837	-	619,554	-164,274	0.9378
	Other Areas	0.0680	-	47,542	-6,448	0.9013
Trip Attraction	Metro Manila (MM)	1.9863	1.0075	-835,149	-238,716	0.9829
	Neighboring Province of MM (Cavite, Rizal, Laguna, Bulacan)	1.3981	-	612,567	-168,183	0.9375
	Other Areas	0.0616	-	55,612	-4,920	0.9117

TABLE 11.2.2.1-2 GENERATION/ATTRACTION MODELS (CARGO MOVEMENT)

Model Type	The Subject Area	Attributes		Dummy Variable	Constant	R^2 Multiple Correlation Coefficient
		Population	Employment			
Trip Generation	Metro Manila (MM)	-	271.5	201,652	-206,717	0.9808
	Neighboring Province of MM (Cavite, Rizal, Laguna, Bulacan)	-	135.9	66,565	-164,274	0.8267
	Other Areas	-	17.2	5,910	-6,448	0.7675
Trip Attraction	Metro Manila (MM)	-	241.4	-835,149	195,530	0.9638
	Neighboring Province of MM (Cavite, Rizal, Laguna, Bulacan)	-	156.8	612,567	66,185	0.8171
	Other Areas	-	19.7	55,612	6,269	0.7934

11.2.2.2 Verification of Trip Generation and Attraction Models

Figure 11.2.2.2-1 shows the verification results between observed and estimated trips for passenger trips.

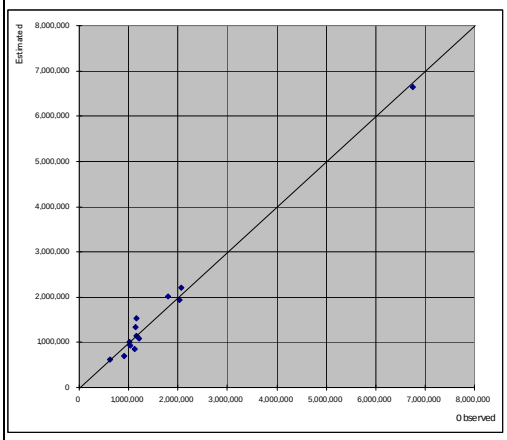
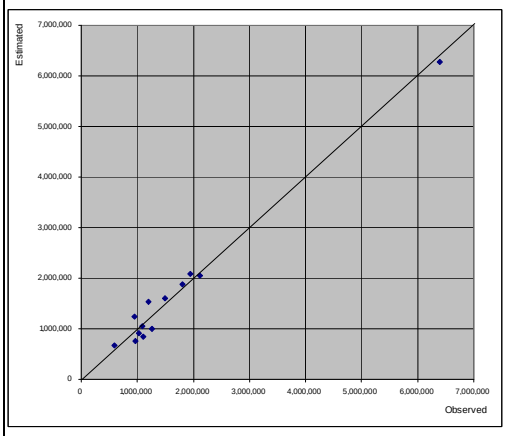
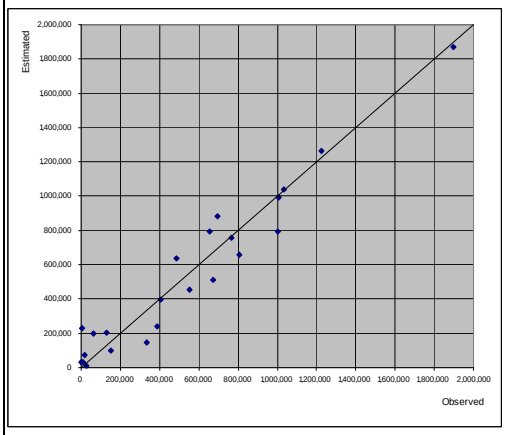
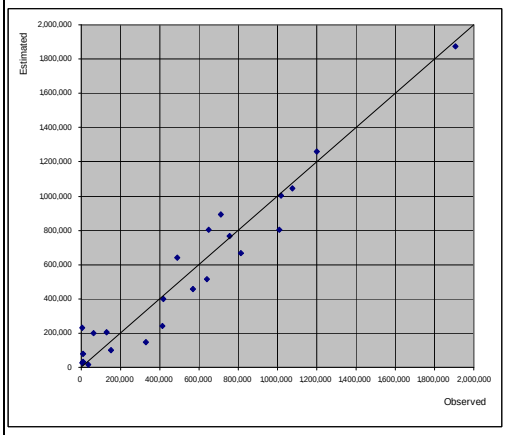
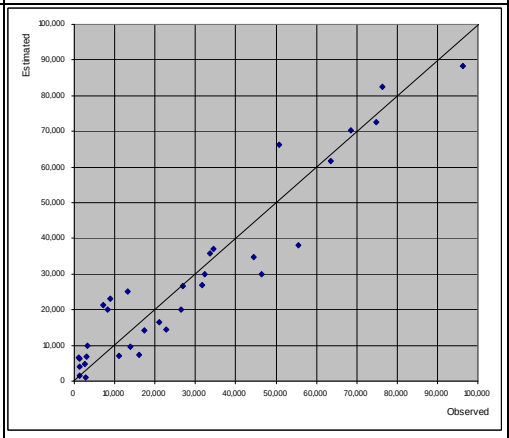
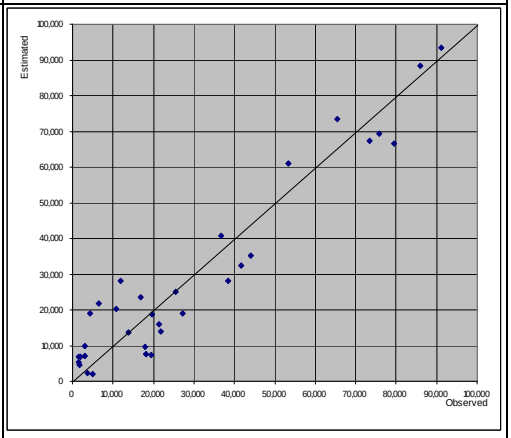
		Trip Generation Model	Trip Attraction Model
Passenger Trips	Metro Manila (MM)		
		$R^2 = 0.9860$	$R^2 = 0.9829$
	Neighbo-ring Province of MM		
		$R^2 = 0.9378$	$R^2 = 0.9375$
	Other Areas		
		$R^2 = 0.9013$	$R^2 = 0.9117$

FIGURE 11.2.2.2-1 VERIFICATION OF TRIP GENERATION AND ATTRACTION MODEL (PASSENGER TRIPS)

Figure 11.2.2.2-2 shows the verification results between observed and estimated trips for cargo movement.

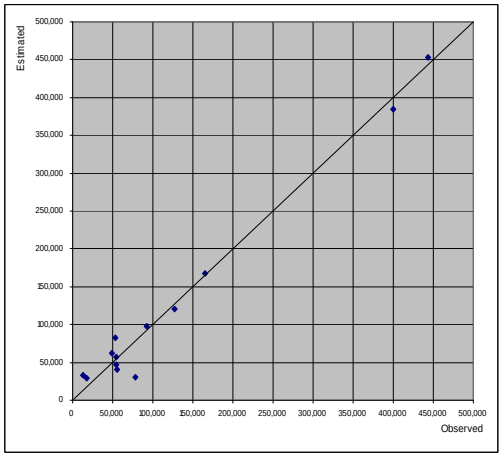
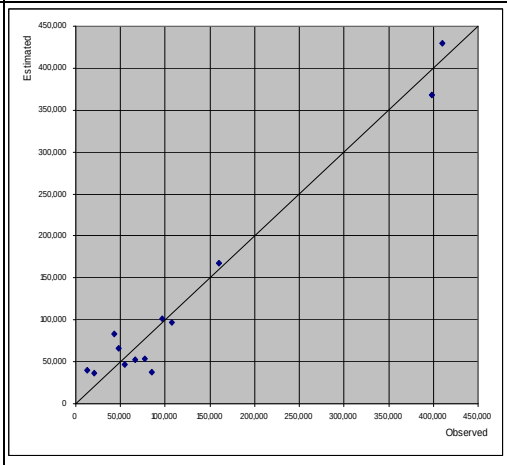
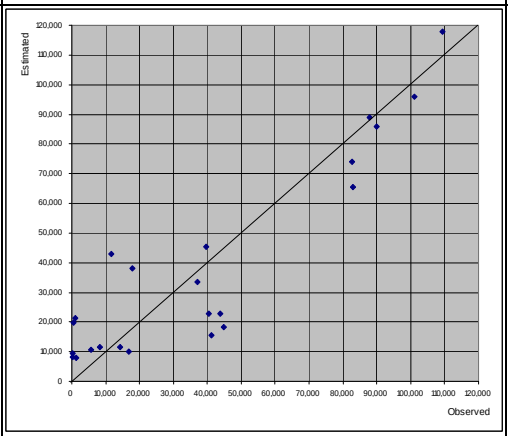
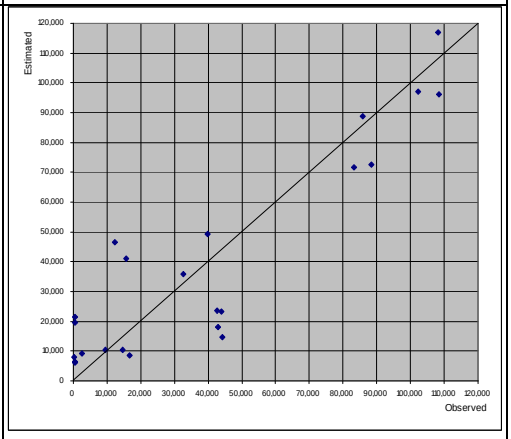
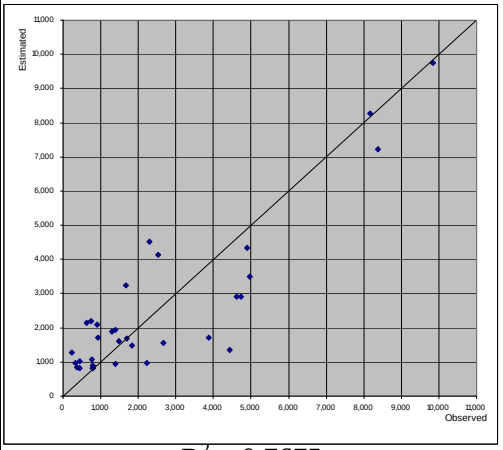
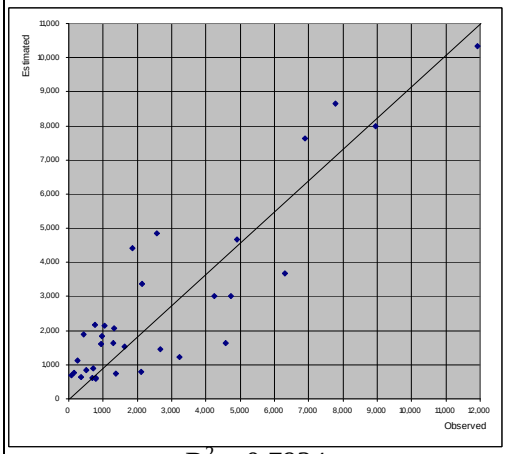
		Trip Generation Model	Trip Attraction Model
Cargo Movement	Metro Manila (MM)		
		$R^2 = 0.9808$	$R^2 = 0.9638$
	Neighbo-ring Province of MM		
		$R^2 = 0.8267$	$R^2 = 0.8171$
	Other Areas		
		$R^2 = 0.7675$	$R^2 = 0.7934$

FIGURE 11.2.2.2-2 VERIFICATION OF TRIP GENERATION AND ATTRACTION MODEL (CARGO MOVEMENT)

11.2.2.3 Future Zonal Framework

Figure 11.2.2.3-1 shows the framework in 2030 comparing with that in 2009.

The data tables of future framework are attached in Annex.

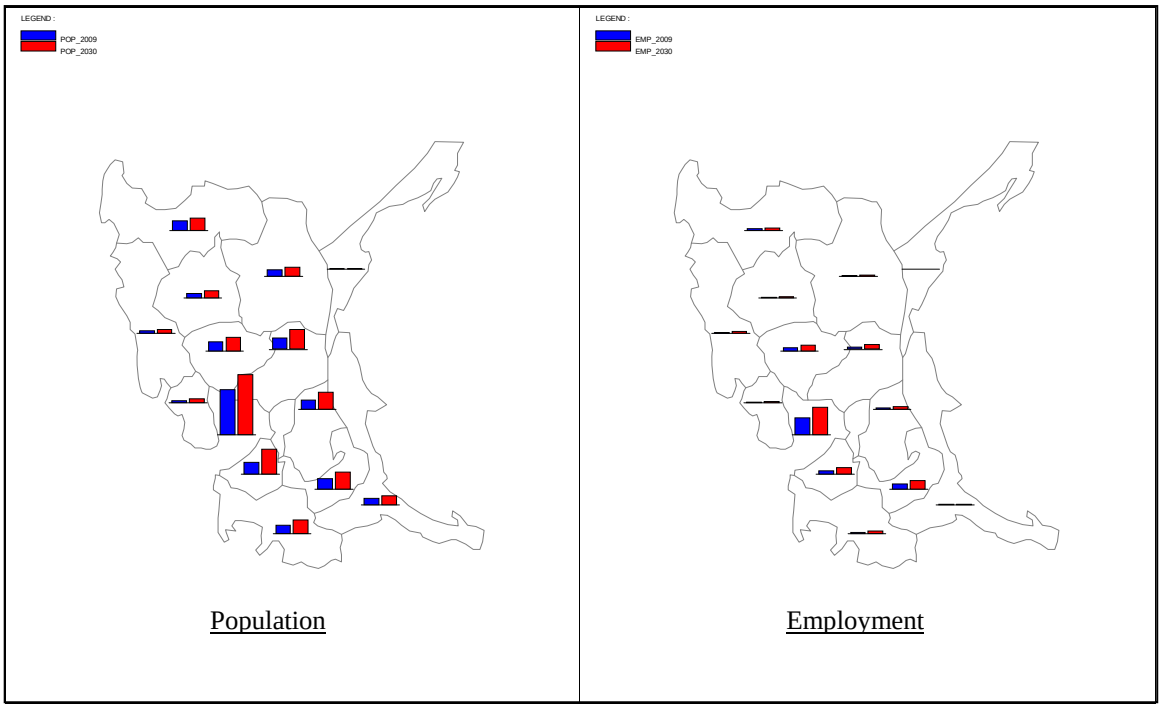


FIGURE 11.2.2.3-1 ZONAL FRAMEWORK IN 2009 AND 2030

11.2.2.4 Future Trip Generation and Attraction

The future trip generation and attraction is estimated by using the forecast models elaborated in previous sections. Target year are assumed as year 2020 and 2030.

(1) Passenger Trips

The future passenger trips were estimated as shown in **Table 11.2.2.4-1**. The total passenger demand is forecasted to grow as much as 1.54 times during the coming twenty-one years from 35 million trips in 2009 to 54 million trips in 2030.

Figure 11.2.2.4-1 shows the growth of trip generation by integrated zone. The estimation results are attached in Annex.

TABLE 11.2.2.4-1 PASSENGER TRIPS

Area	Passenger Trips (1,000 persons/day)			Annual Growth Rate		Increase Ratio	
	2009	2020	2030	'09-'20	'21-'30	'09-'20	'09-'30
Metro Manila (MM)	22,026	27,141	30,330	1.9%	1.0%	1.23	1.38
Neighboring Province of MM	12,323	17,777	22,781	3.4%	2.3%	1.44	1.85
Other Study Areas	929	1,134	1,341	1.8%	1.5%	1.22	1.44
Total	**35,278**	**46,052**	**54,452**	**2.5%**	**1.5%**	**1.31**	**1.54**

(2) Cargo Flow

Table 11.2.2.4-2 shows the total generation of cargo demand in the Study Area is expected to increase from 2,565,622 tons per day in 2009 to 3,478,682 tons per day in 2020 and 4,292,515 tons per day in 2030.

Approximately, two thirds of the total cargo movements will be continuously generated and/or attracted within Metro Manila.

TABLE 11.2.2.4-2 CARGO DEMAND GENERATION

Area	Cargo Demands (tons/day)			Annual Growth Rate		Increase Ratio	
	2009	2020	2030	'09-'20	'09-'30	'09-'20	'21-'30
Metro Manila (MM)	1,602,847	2,138,180	2,584,875	1.7%	1.7%	1.33	1.61
Neighboring provinces of MM	878,332	1,227,513	1,548,574	3.1%	2.1%	1.40	1.76
Other Study Areas	84,443	112,989	139,065	2.7%	1.9%	1.39	1.65
Total	**2,565,622**	**3,478,682**	**4,292,515**	**2.8%**	**1.9%**	**1.36**	**1.67**

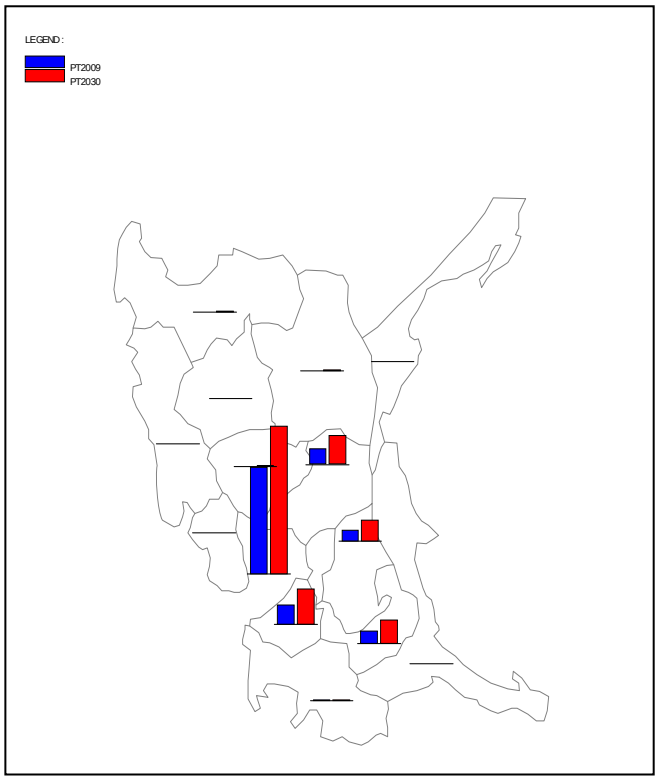


FIGURE 11.2.2.4-1 PASSENGER TRIP GENERATION IN 2009 AND 2030

11.2.3 Forecasting Trip Distribution

Trip distribution is the second major step in the traffic demand modeling process. Trip production (the first major step) provided methodology for estimating trip generations and attractions within each zone. Trip distribution is the process that links the generations and attractions with each zone. Trip distribution is the process that links the generations to attractions for each zone pair.

11.2.3.1 Building Trip Distribution Model

It is difficult to apply the distribution model with such a wide study area, and very different network density of Metro Manila, and Rural Area.

Although the gravity model was applied, the validation result was not good (correlation coefficient 0.53).Gravity model is expressed by the following:

Gravity Model

Inter zonal trip $Xij = K * Oi^{\alpha} * Dj^{\beta} / Lij^{\gamma}$

Where; Xij : inter zonal trip distribution from zone i to j
Oi : trip generation in zone i
Dj : trip attraction in zone j
Lij : travel length from zone *i* to j (km)
K, α, β, γ: model parameters

The distribution model was applied using the present pattern to estimate the future trip distribution.

11.2.3.2 Future Trip Distribution

Based on the trip distribution in 2009 and 2030, the charts by desired line, which clarify the trip distribution and interaction among zone pairs, are presented in **Figure 11.2.3.2-1** and **Figure11.2.3.2-2**.

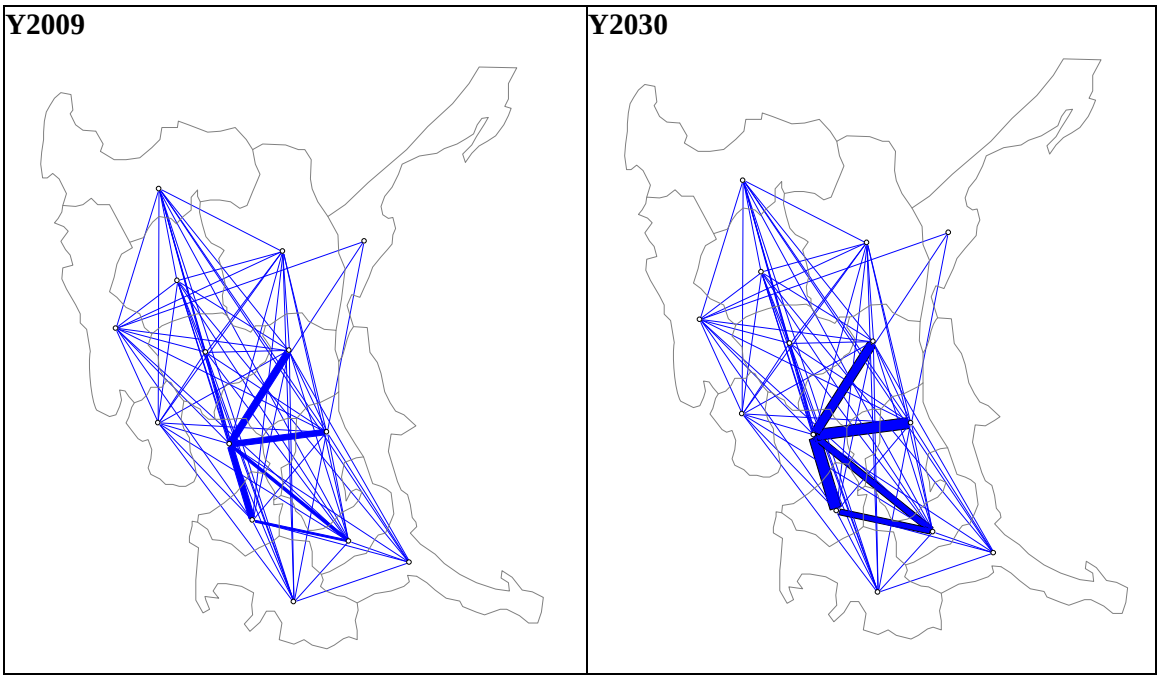


FIGURE 11.2.3.2-1 DESIRE LINE OF PASSENGER

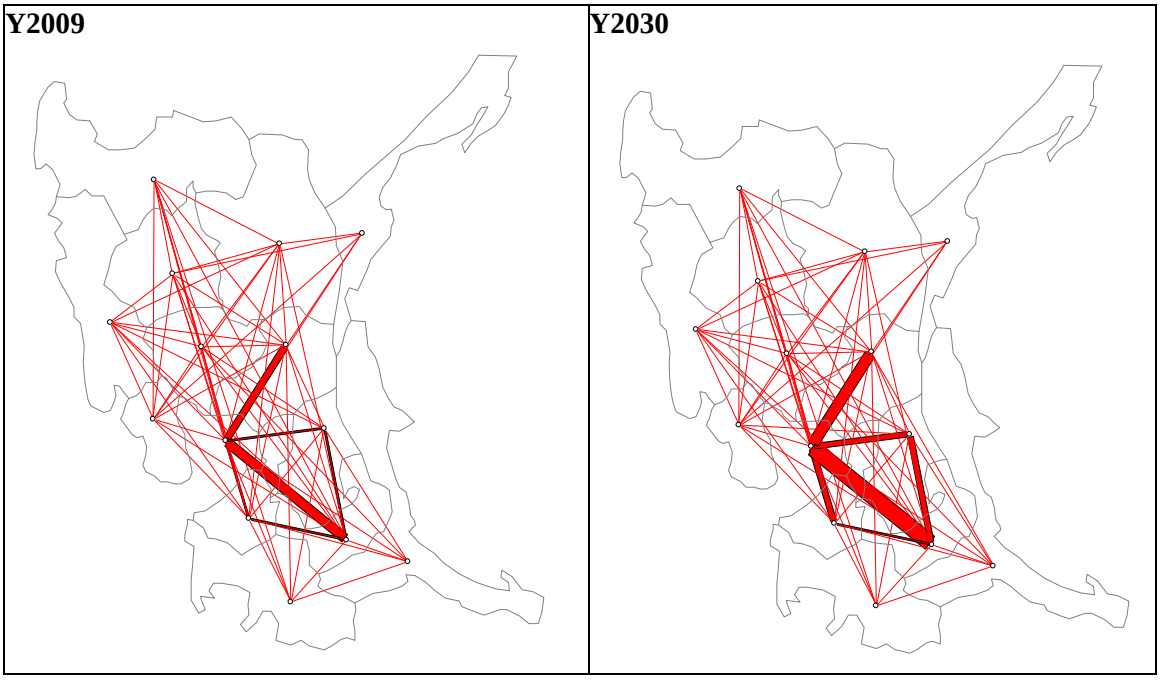


FIGURE 11.2.3.2-2 DESIRE LINE OF CARGO

11.2.4 Forecasting Modal Split

11.2.4.1 Modal Split Model

Figure 11.2.4.1-1 shows the procedure of Modal Split Model.

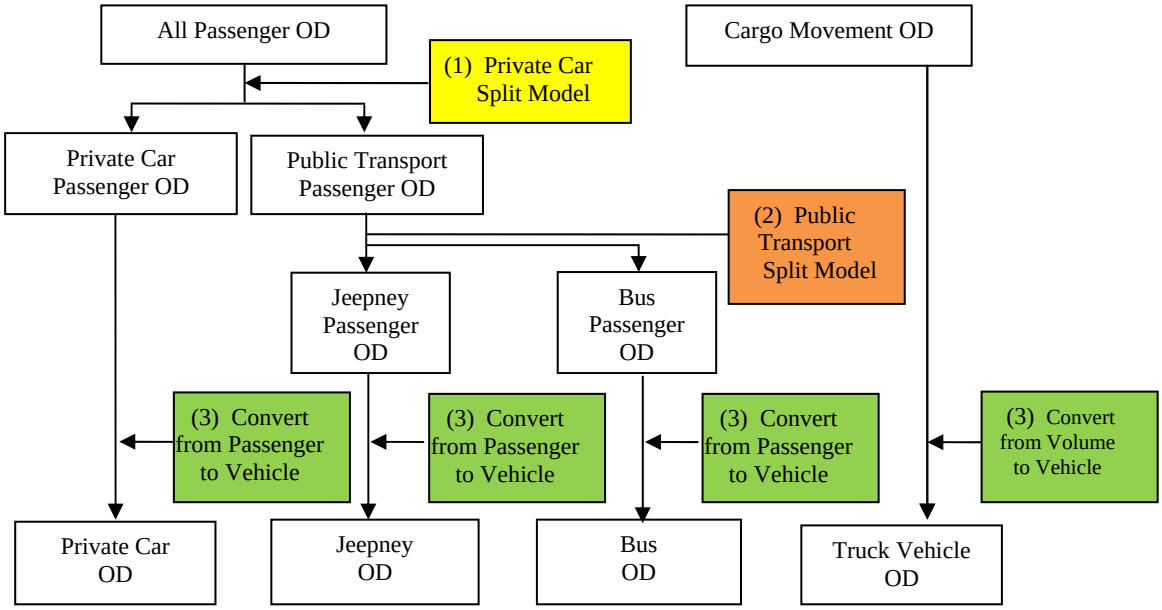


FIGURE 11.2.4.1-1 STRUCTURE OF MODAL SPLIT MODEL

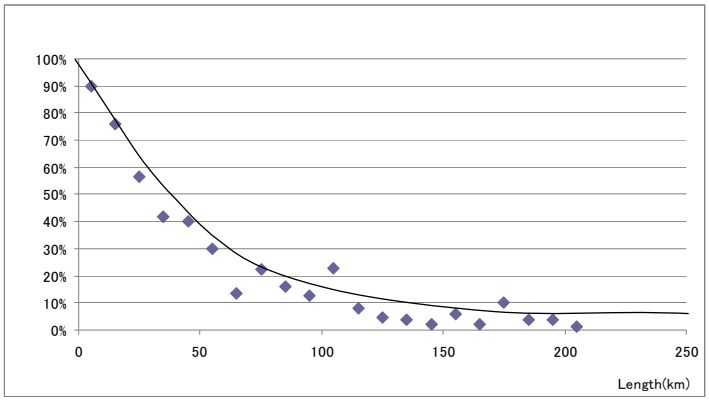
(1) Private Car Split Model

Based on the trend of vehicle registration, the number of private car passenger is estimated. Number of public transport passenger is estimated by subtracting number of private car passenger from all passengers.

(2) Public Transport Split Model

The modal split between bus and jeepney was estimated by using the relationship between zone i and zone j in distance calculated on the basis of Present OD matrix.

Figure 11.2.4.1-2 shows the modal share of jeepney to the public transport trips.



Note: Year 2009, Roadside OD Survey Result.

FIGURE 11.2.4.1-2 MODAL SHARE OF JEEPNEY TRIPS TO TOTAL PUBLIC TRANSPORT TRIPS

(3) Convert from Passenger, Cargo Movement to Vehicle

The vehicle trips are estimated by converting passenger trips and cargo movement into equivalent number of vehicle traffic. Conversion rate is shown in **Table 11.2.4.1-1**.

TABLE 11.2.4.1-1 CONVERSION RATE

Vehicle Type	Conversion Rate
Private Car	3.5 person/vehicle
Jeepney	9.3 person/vehicle
Bus	30.8 person/vehicle
Truck	4,008 kg/vehicle

11.2.4.2 Future Vehicle OD Trips

As shown in **Table 11.2.4.2-1**, the total vehicle trips by applying average passenger occupancy and loading weight are estimated to be 9 million trips per day in 2030, which will be about 1.62 times of current demand. Among them, the growth rate of private cart trips will be high, therefore, the modal share of private car to the total vehicle will increase from 55.7% at present to 58.4% in 2030.

TABLE 11.2.4.2-1 TOTAL VEHICLE TRIPS

Vehicle Type	Y2009		Y2020		Y2030		Increased Ratio	
	Trips	Share	Trips	Share	Trips	Share	20/09	30/09
	1000 veh/day	%	1000 veh/day	%	1000 veh/day	%		
Private Car	3,095	55.7	4,243	57.2	5,248	58.4	1.37	1.70
Jeepney	1,476	26.6	1,873	25.3	2,170	24.1	1.27	1.47
Bus	347	6.2	431	5.8	498	5.5	1.24	1.44
Truck	641	11.5	868	11.7	1,074	11.9	1.35	1.68
Total	**5,559**	**100.0**	**7,415**	**100.0**	**8,990**	**100.0**	**1.33**	**1.62**

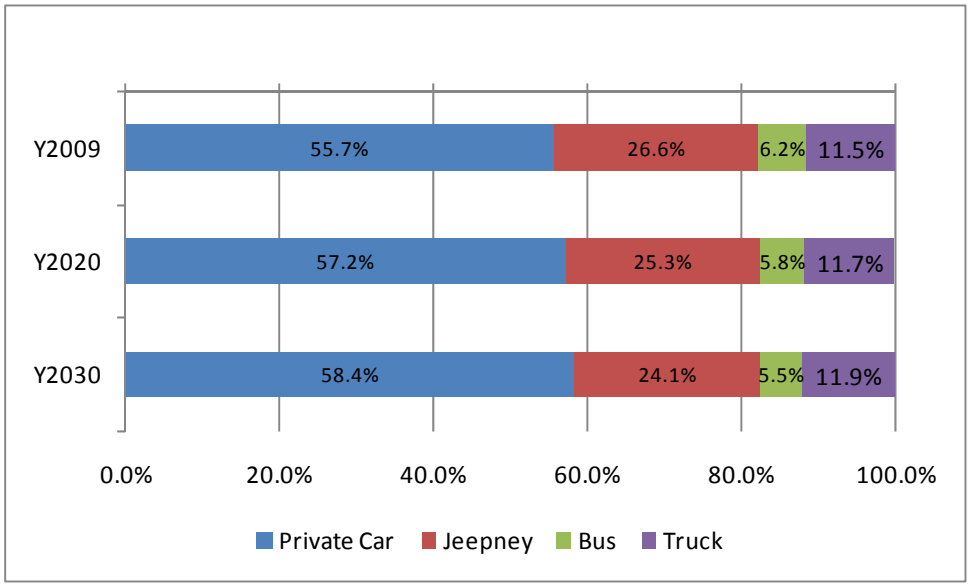
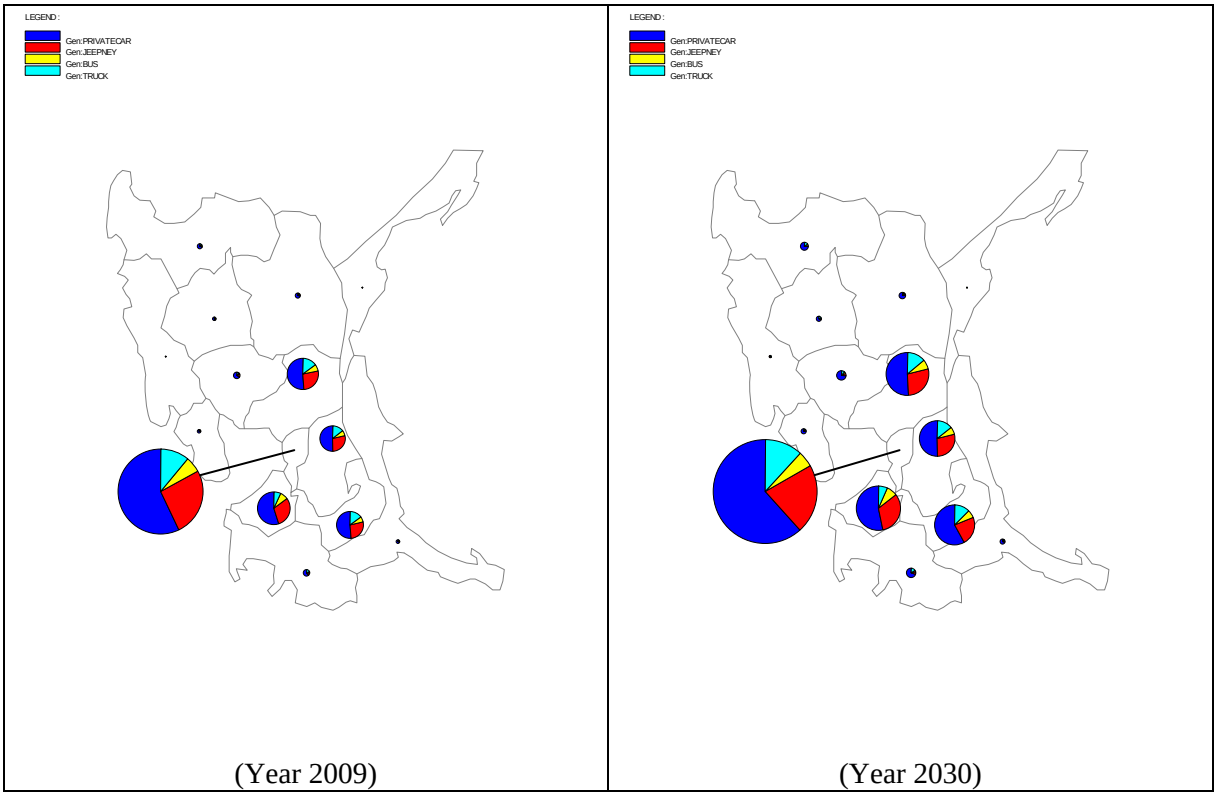


FIGURE 11.2.4.2-1 MODAL SHARE IN 2009, 2020 AND 2030 (VEHICLE BASE)



(Year 2009) (Year 2030)

FIGURE 11.2.4.2-2 MODAL SHARE BY ZONE (GENERATION BASE) IN 2009 AND 2030

11.2.5 Traffic Assignment Model

The traffic assignment process allocates vehicle traffic to individual road links. This step takes as input a matrix of flows (vehicles) that indicate the volume of traffic between origin and destination pairs.

11.2.5.1 Modeling Traffic Assignment

(1) Assignment Method

Various assignment techniques are used ranging from manual methods to complex iterative procedures by computer programs. In this study, the used methods the capacity restraint assignment which is the most straightforward for use in network models, and the most efficient particularly where the number of zones in the trip matrix is large. This assignment technique is based on the speed – flow relationship, and the flow chart of the applied methodology is shown in **Figure 11.2.5.1-1**.

In this assignment technique, and by calculating the required travel time for each link according to its travel speed and road conditions, the program determines the fastest routes between each origin and destination by evaluating the consuming time on links, and assigns the trips between the given origin and destination. As congestion increases till a certain level, alternative routes are introduced to handle the unassigned traffic. Zone-to-zone routing is built, which is the fastest path from each zone to any other, and all trips are assigned to these optimum routes.

Since the link-travel time varies with the traffic volume of vehicles using that link, which can be explained as a degree of link congestion, the OD tables are divided to apply an iteration procedure on ten stages. At each iteration, and depending upon the current link loadings, the flows are divided between all the shortest routes generated and a new travel time is computed for the average assigned link flow at each pass. The iteration continues to re-estimate the speed on that links considering the assigned traffic on links, and to produce alternative routes so that more accurate allocation can be achieved. The accumulated assigned traffic volume from each OD pair on the links composes the total assigned traffic volumes per direction for the network.

JICA STRADA is used to estimate traffic volumes.

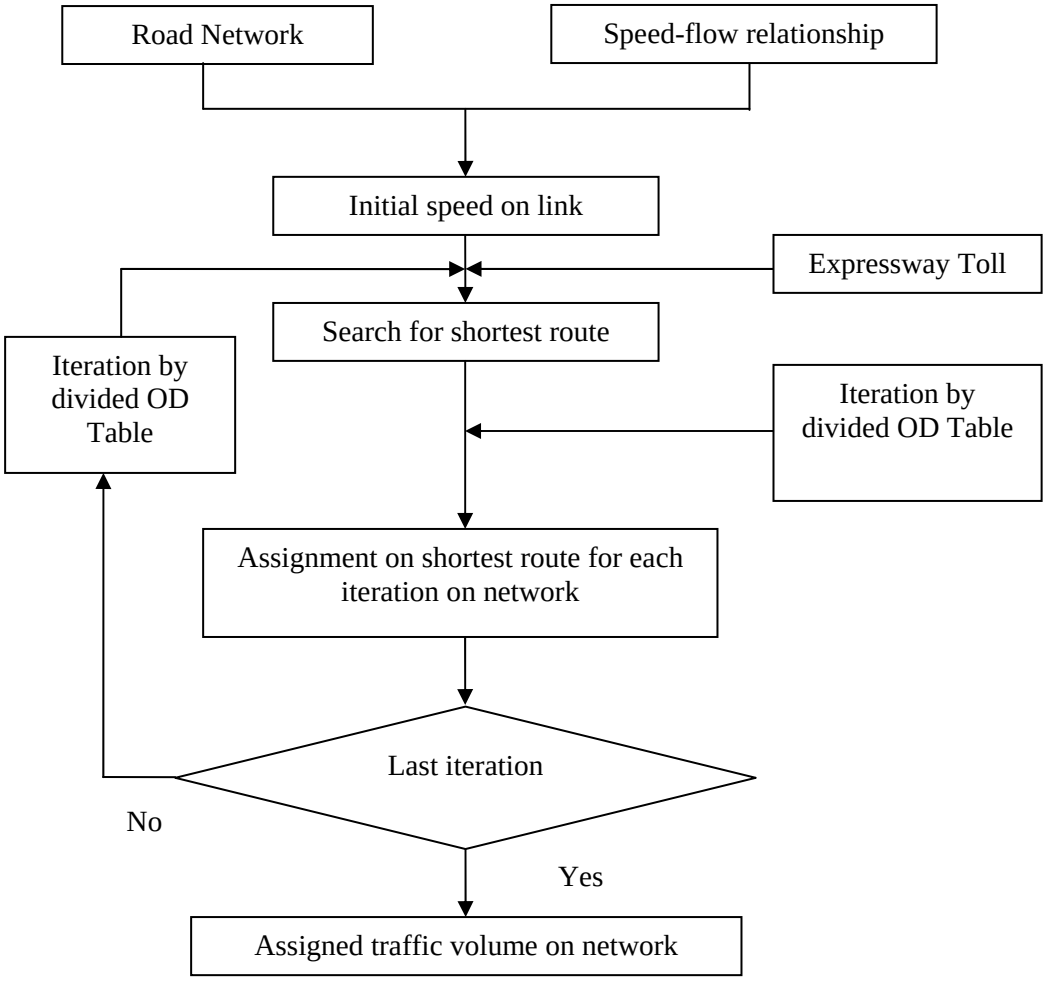


FIGURE 11.2.5.1-1 TRAFFIC ASSIGNMENT PROCEDURE

(2) Speed Flow Relationship

The speed-flow relationship used in the traffic assignment procedure is shown in **Figure 11.2.5.1-2**. When the traffic volumes are over the maximum capacity 0.3*Qmax, it is assumed that vehicle speed drastically reduces. The basic free flow and capacity is shown in **Table 11.2.5.1-1**.

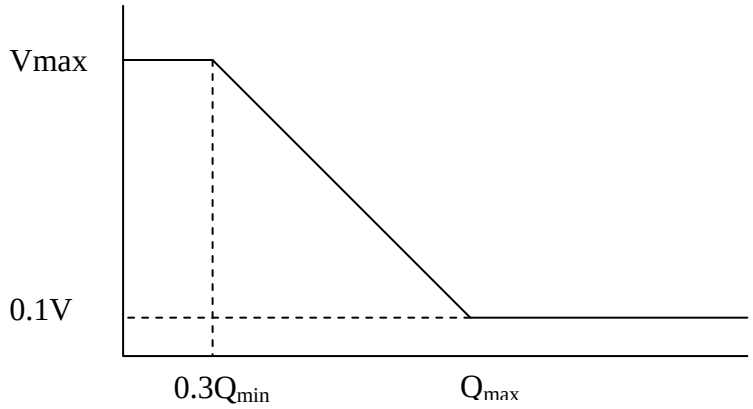


FIGURE 11.2.5.1-2 SPEED – FLOW RELATIONSHIP

TABLE 11.2.5.1-1 FREE SPEED AND CAPACITY BY ROAD TYPE

QV Type	Pavement	Road Class	Topography	Lane	Vmax	Qmax
1	Paved	Expressway	Plain	4	100	80,000
2				3	100	60,000
3				2	100	40,000
4				1	70	15,000
5			Mountains	2	70	28,000
6				1	60	10,500
7		Interstate Highway	Plain	4	40	60,000
8				2	30	18,000
9			Mountains	4	30	42,000
10				2	25	12,600
11		Urban Arterial	Mountains	10	60	120,000
12				8	60	96,000
13				6	50	72,000
14				4	40	48,000
15				2	30	14,400
16		Local	Plain	4	40	40,000
17				2	30	12,000
18			Mountains	2	30	8,400
19	Unpaved		Plain	2	20	6,000
20			Mountains	2	10	4,200

(3) Passenger Car Unit

Table 11.2.5.1-2 shows the Passenger Car Unit (PCU). This value is the same as that of DPWH.

TABLE 11.2.5.1-2 PASSENGER CAR UNIT

Vehicle Type	Passenger Car Unit
Passenger Car	1.0
Jeepney	1.5
Bus	2.2
Truck	2.5

(4) Time Evaluation Value

An important input for the demand forecast is the trip maker's time value. This time value is the basis for a trip maker to decide whether he or she will use toll expressway or not.

The time values were derived from MMUEN data. Supposing time value will be increased in accordance with inflation rate of 5% per year.

TABLE 11.2.5.1-3 TIME EVALUATION VALUE BY VEHICLE TYPE

Unit: Peso/hour

	Y2009	Y2020	Y2030
Car	331.4	566.8	923.3
Jeepney	465.9	796.9	1,298.1
Bus	1,524.2	2,606.9	4,246.4
Truck	873.2	1,493.5	2,432.7

11.3 "DO NOTHING CASE" TRAFFIC ASSIGNMENT

For the objective of road network policy and counter measure studies, it was first assumed that no improvement would be applied to transport supply, what is called "Do Nothing" case analysis. The traffic assignment results of existing case (2009) and (Do-Nothing case in 2020 and 2030, were summarized as follows (See **Table 11.3-1**).

TABLE 11.3-1 TRAFFIC ASSIGNMENT RESULTS IN DO-NOTHING CASE

	Year 2009	Year 2020	Year 2030	Ratio	
				2020/2009	2030/2009
Total Vehicle Trips 1000 (PCU)	7,675	10,171	12,284	1.33	1.60
1000 PCU-km	67,505	94,149	114,042	1.39	1.69
1000 PCU-hr	3,053	5,256	7,309	1.72	2.39
Volume/Capacity	0.63	0.86	1.03	1.37	1.63
Average Speed (km/hr)	22.1	17.9	15.6	0.81	0.71

Comparing the future road traffic with the existing one, it appears that radial arterial in the sub-urban area of Metro Manila will become heavily congested in the future (see **Figure 11.3-1 (1)** to **(3)**). Thus the following remarks are pointed out.

(a) Traffic Indicator

Annual traffic indicators of vehicle trips are evaluated from the viewpoints of changes in vehicle trips, pcu-hr, pcu-km and average speed. The vehicle trips are forecast to increase from 7,675 thousand trips in 2009 to 12,284 thousand trips in 2030 with a growth of about 1.60 times. In addition, the indicators of pcu-hr and pcu-km are also increasing, especially the pcu-hr that increases from 3,053 thousand pcu-hr in 2009 to 7,309 thousand pcu-hr in 2030 with a growth of about 2.39 times.

As a result, the average travel speed is decreased from 22.1 km/hr in 2009 to 15.6 km/hr in 2030, which means that the level of service on the road network will face a severe situation from the economic and environmental points of view.

(b) Traffic Congestion

Results of analyzing the volume to capacity ratio V/C to investigate the road congestion in 2009 show desirable ratio of 0.63.

Results of the year 2030 show unacceptable level of traffic congestion with an average value of 1.03.

(c) Summary

If any counter measures against traffic congestion are not implemented in the transport sector, when road traffic volumes drastically increase, the level of service will become worse.

Some new road constructions or widening to decrease traffic congestion is desired in the future.

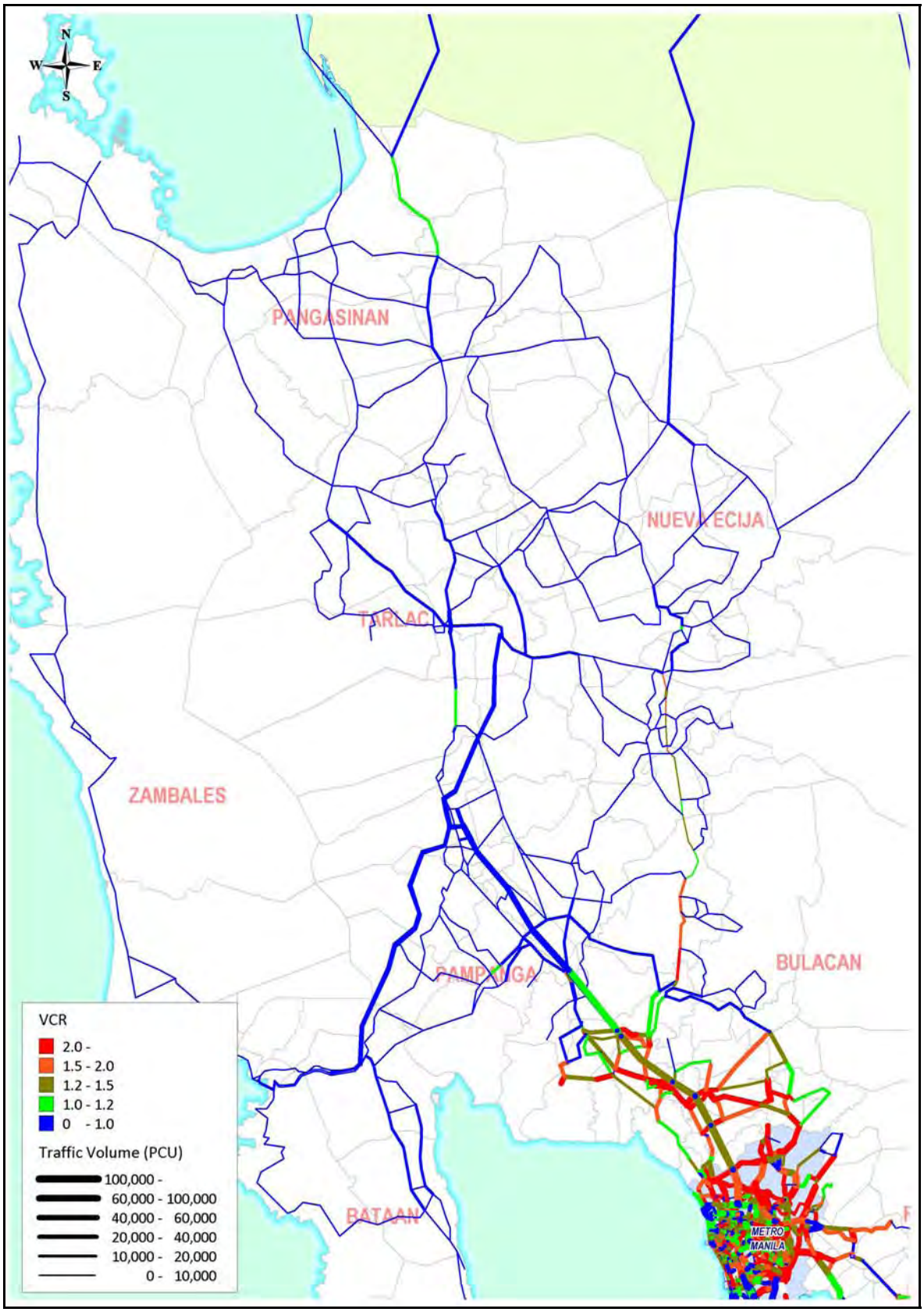


FIGURE 11.3-1 (1) YEAR 2020 TRAFFIC CONDITION (DO NOTHING CASE): NORTH OF METRO MANILA

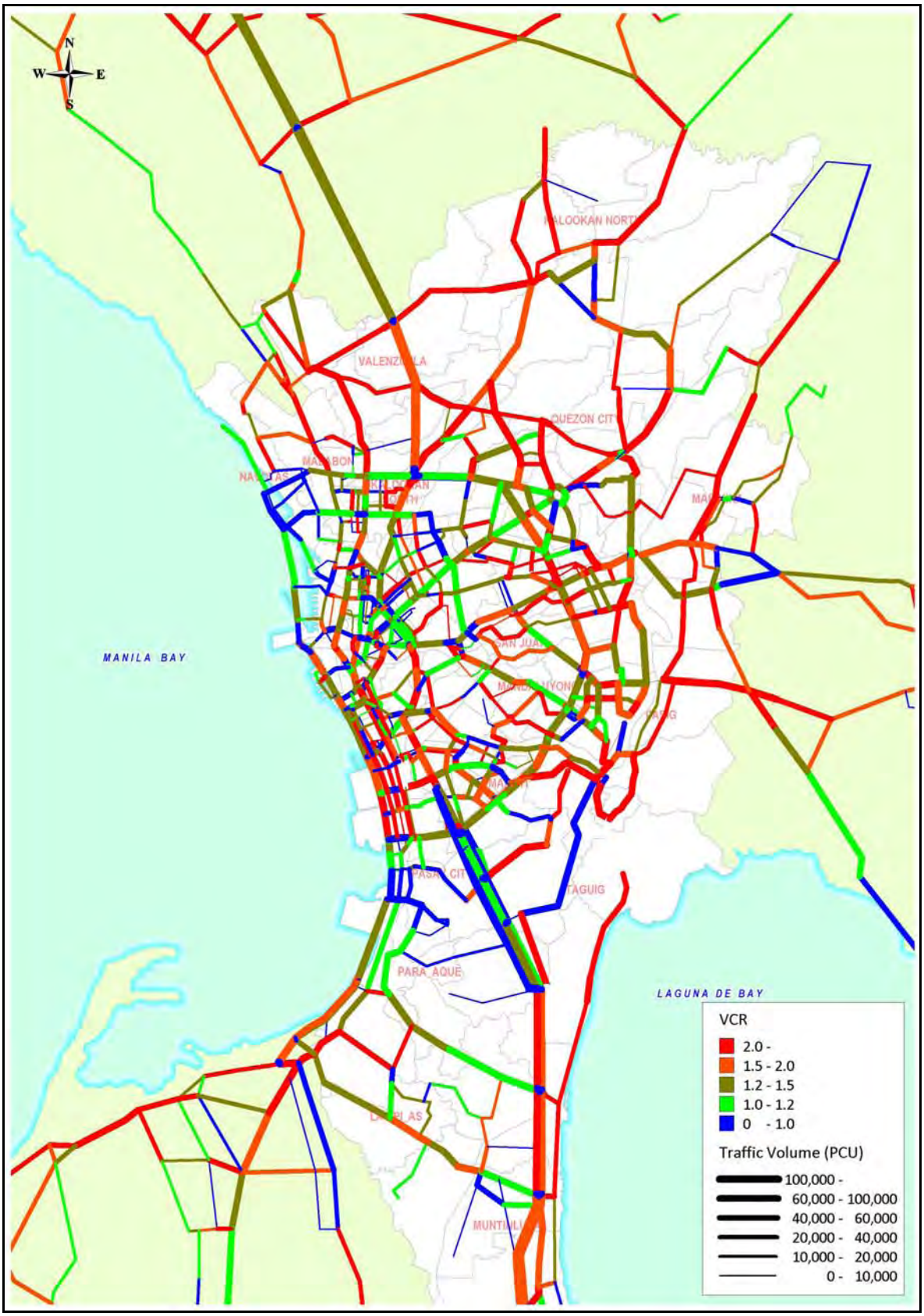


FIGURE 11.3-1 (2) YEAR 2020 TRAFFIC CONDITION (DO NOTHING CASE): METRO MANILA

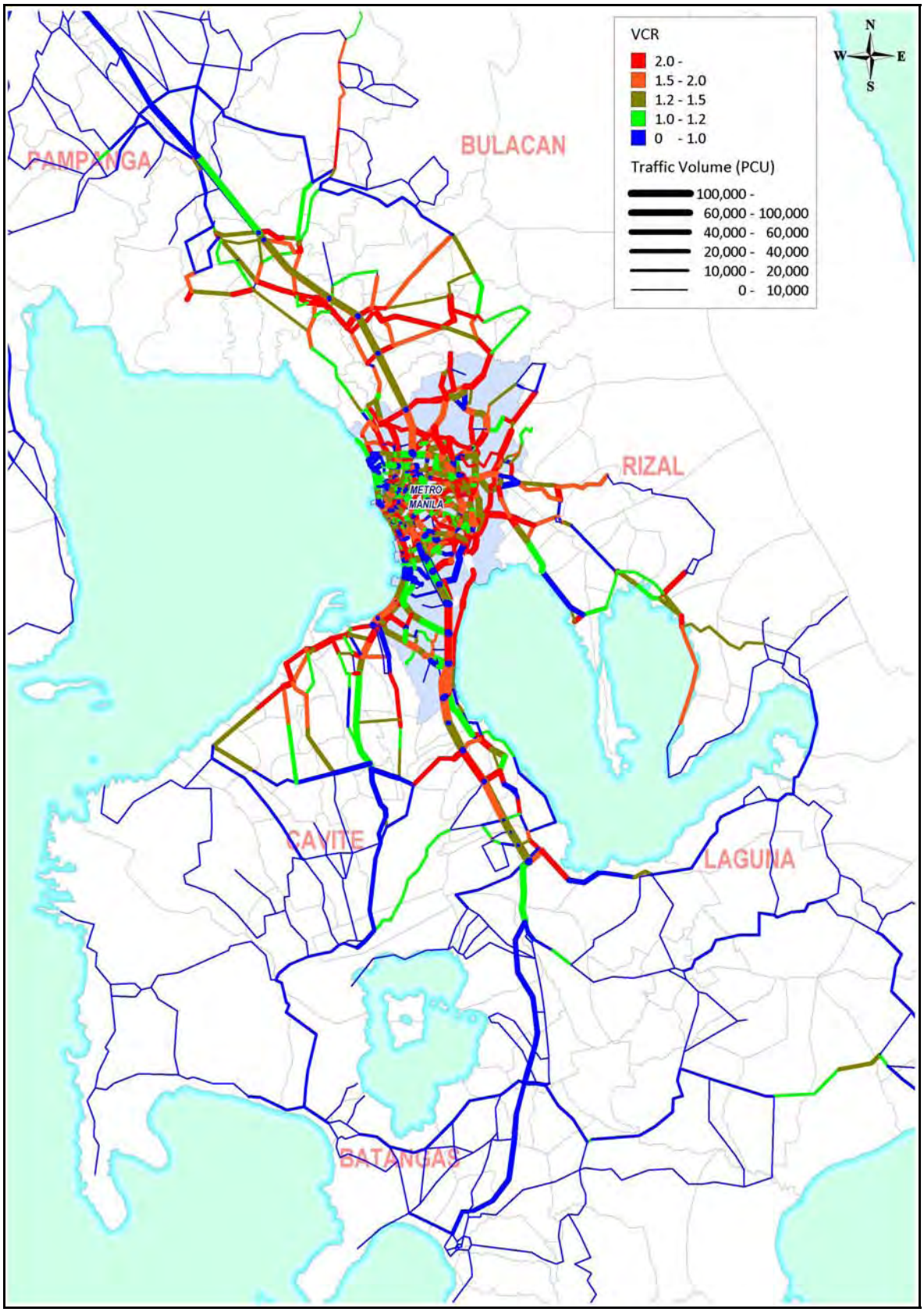


FIGURE 11.3-1 (3) YEAR 2020 TRAFFIC CONDITION (DO NOTHING CASE): SOUTH OF METRO MANILA

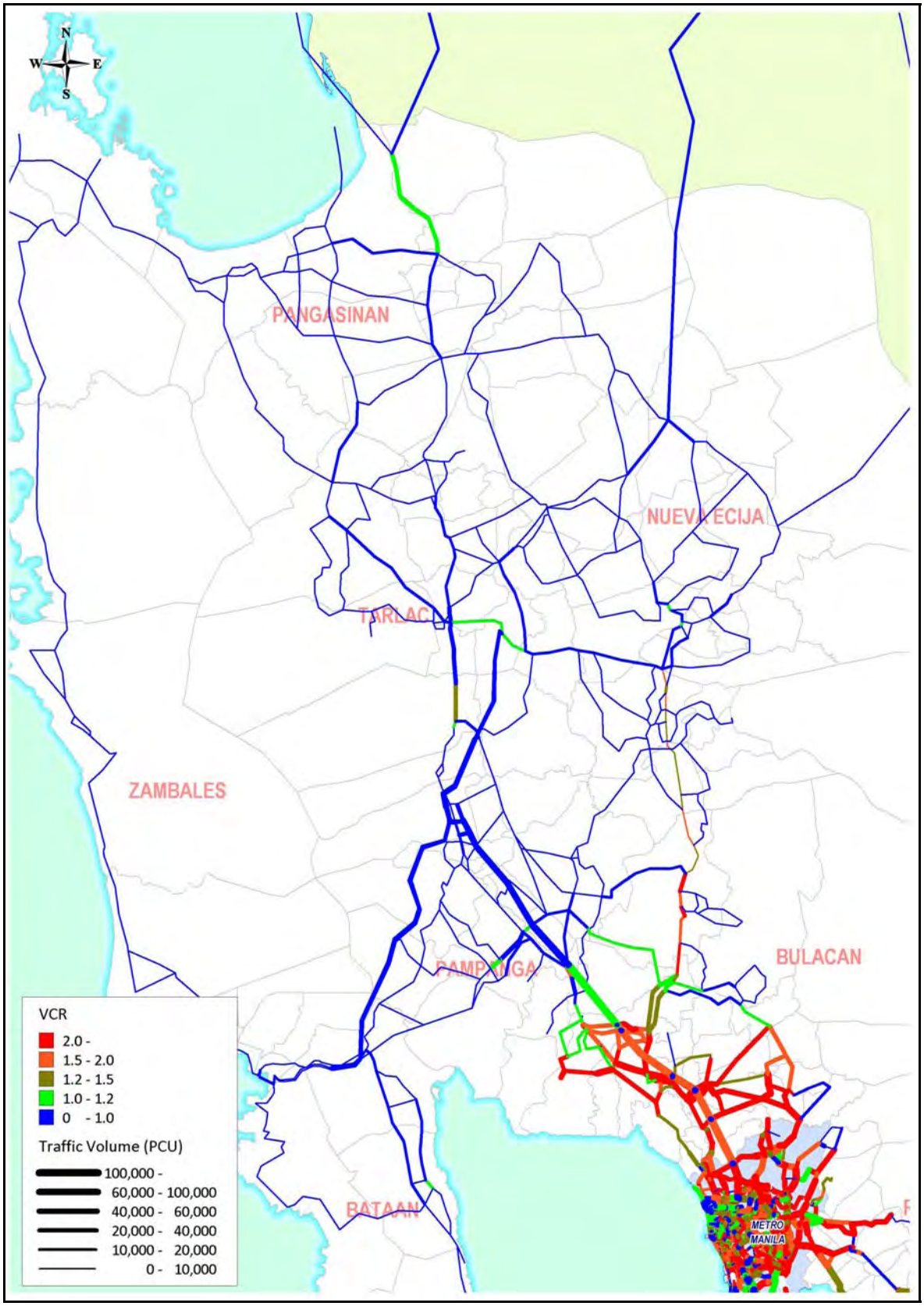


FIGURE 11.3-2 (1) YEAR 2030 TRAFFIC CONDITION (DO NOTHING CASE): NORTH OF METRO MANILA

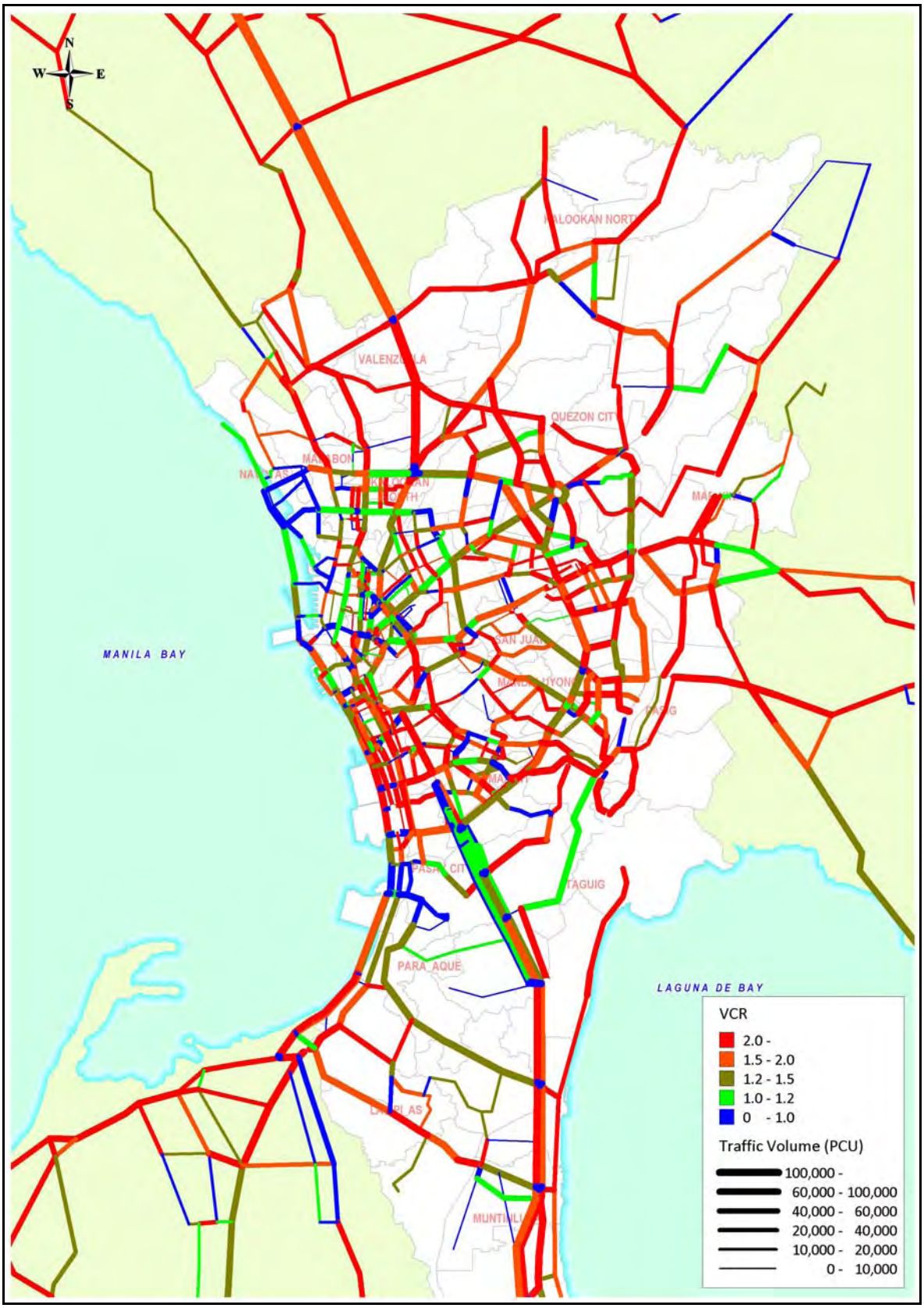


FIGURE 11.3-2 (2) YEAR 2030 TRAFFIC CONDITION (DO NOTHING CASE): METRO MANILA

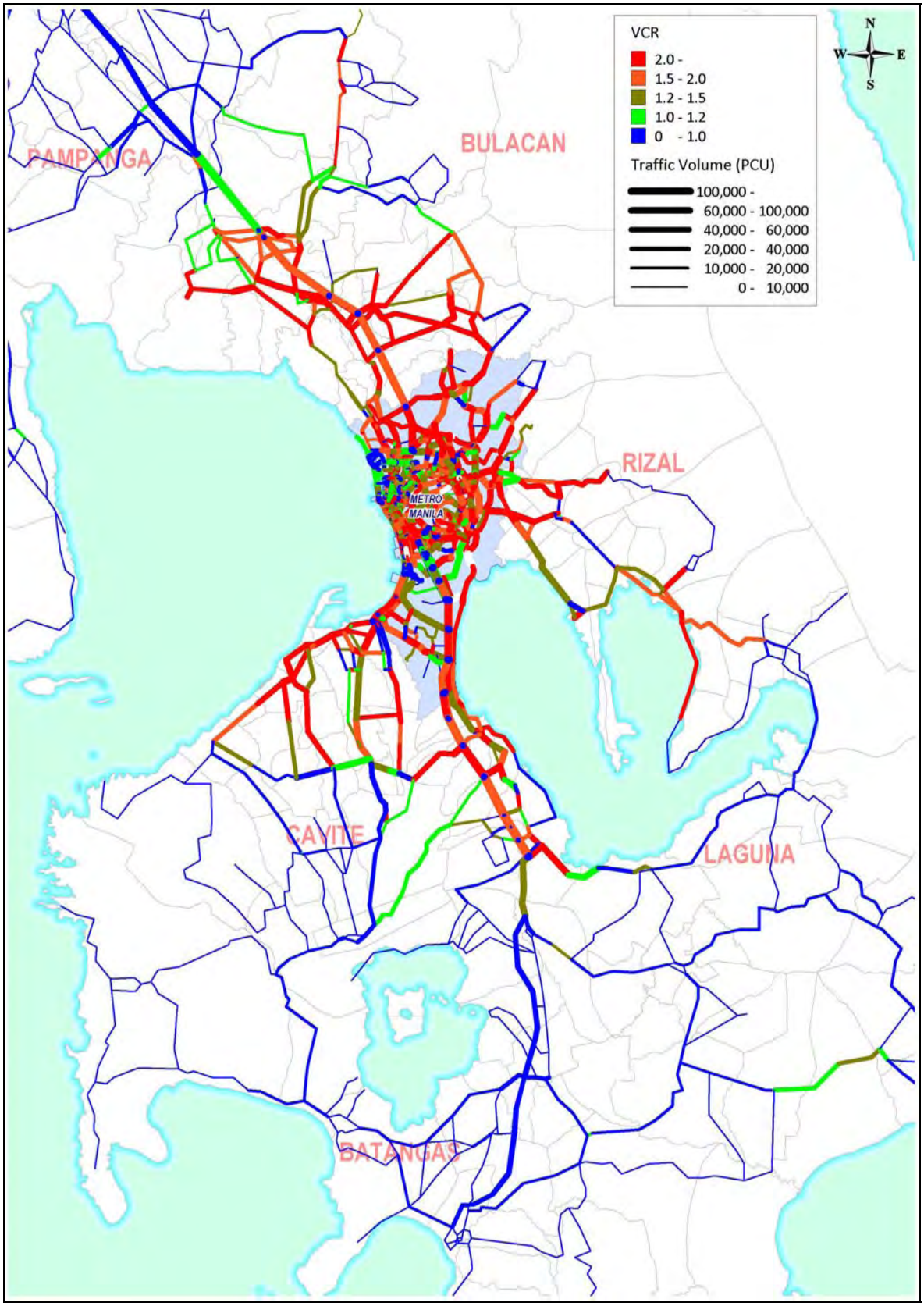


FIGURE 11.3-2 (3) YEAR 2030 TRAFFIC CONDITION (DO NOTHING CASE): SOUTH OF METRO MANILA