REPUBLIC OF THE PHILIPPINES NATIONAL ECONOMIC DEVELOPMENT AUTHORITY (NEDA)

FOLLOW-UP SURVEY ON ROADMAP FOR TRANSPORT INFRASTRUCTURE DEVELOPMENT FOR GREATER CAPITAL REGION (GCR)

FINAL REPORT

August 2019

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) ALMEC CORPORATION

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ABBREVIATIONS

AADT	annual average daily traffic
ADB	Asian Development Bank
Afab	Authority of the Freeport Area of Bataan
AFCS	automatic fare collection system
AQMS	Air Quality Monitoring Section
ASEAN	Association of Southeast Asian Nations
ATM	automated teller machine
AusAID	Australian Agency for International Development
BCDA	Bases Conversion Development Authority
BGC	Bonifacio Global City
BOI	Philippine Board of Investments
BRLC	Bulacan, Rizal, Laguna and Cavite
BRT	buss rapid transit
CALABARZON	Cavite, Laguna, Batangas, Rizal at Quezon
CAIT	Climate Analysis Indicators Tool
CALA	Cavite-Laguna
CBD	central business district
CCW	Center/Cluster-Corridor-Wedge
CDP	Comprehensive Development Plan
CEnergy	Climate Change and Clean Energy Project
CFZ	Clark Freeport Zone
CGC	Clark Green City
CLLEx	Central Luzon Link Expressway
CLUP	Comprehensive Land Use Plan
CO	carbon monoxide
CSEZ	Clark Special Economic Zone
D/D	detail engineering design
DENR	Department of Environment and Natural Resources
DOF	Department of Finance
DOST	Department of Science and Technology
DOTr	Department of Transportation
DPWH	Department of Public Works and Highways
DREAM	Disaster Risk and Exposure Assessment for Mitigation
DTI	Department of Trade and Industry
EDSA	Epifanio de los Santos Avenue
EMB	Environmental Management Bureau
FED	final engineering design
FGD	focus group discussion
F/S	feasibility study
FTI	Food Terminal Inc.
GAA	General Appropriations Act
GCR	Greater Capital Region
GHG	greenhouse gas
GIS	geographic information system
GMMA	Greater Metro Manila Area
GRDP	gross regional domestic product
HDMF	Home Development Mutual Fund
HLURB	Housing and Land Use Regulatory Board
HUDCC	Housing and Urban Development Coordinating Council

ISF	informal settler family
KPI	key performance indicator
LCC	low cost carrier
LGU	local government unit
LLED	Laguna Lakeshore Expressway Dike
LRT	light rail transit
LWUA	Local Water Utilities Administration
JICA	Japan International Cooperation Agency
MC	motorcycles
MCA	Metro Clark Area
MGB	Mines and Geosciences Bureau
MICT	Manila International Container Terminal
MMDA	Metro Manila Development Authority
MMUTIS	Metro Manila Urban Transportation Integration Study
MNTC	Manila North Tollways Corporation
MRT	Metro Rail Transit
MUCEP	Metro Manila Urban Transportation Integrated Study Update and
	Capacity Enhancement Project
MWSS	Metropolitan Waterworks and Sewerage System
NAAQGV	National Ambient Air Quality Guideline Values
NAIA	Ninoy Aquino International Airport
NEDA	National Economic and Development Authority
NFSCC	National Framework Strategy on Climate Change
NH	North Habor
NHA	National Housing Authority
NLEx	North Luzon Expressway
NOx	nitrogen oxides
NO2	nitrogen dioxide
NPC	National Privacy Commission
NSS	National Spatial Strategy
NTP	National Transport Policy
OD	origin and destination
ODA	official development assistance
O3	ozone
Pb	lead
PDP	Philippine Development Plan
SHFC	Social Housing Finance Corporation
PHP	Philippine peso
PIC	planned integrated community
PM	particulate matter
PPFP	Provincial Physical Framework Plan
PPP	public-private partnership
RDP	Regional Development Plan
ROW	right of way
SBD	secondary business district
SLEx	South Luzon Expressway
SMART	State-of-the-Art Metro Manila Adaptive Responsive Traffic System
SO2	sulphur dioxide
STAR	Southern Tagalog Arterial Road
TAZ	traffic analysis zone
ТС	tricycle
TEC	Traffic Engineering Center

TOD	transit oriented development
TSP	total suspended particulates
USAID	United States Agency for International Development
V/C	volume/capacity
VFS	Valley Fault System
VOC	volatile organic compounds
WHO	World Health Organization
WVFS	West Vally Fault System

MAIN TEXT

1 INTRODUCTION

1) Background of the Study

1.1 The Philippine Development Plan (PDP) 2017–2022, which was approved by the National Economic and Development Authority (NEDA) Board in February 2017, is the first medium-term plan to be anchored on a national long-term vision or *AmBisyon Natin* 2040 that represents the collective vision and aspirations of Filipinos for themselves and for the country. The Philippine Government stated inclusive growth, poverty reduction, and unemployment reduction as development targets in PDP 2017–2022. Accelerating strategic infrastructure development was raised as one of the cross-cutting bedrock strategies in order to achieve the targets.

1.2 "Roadmap for Transport Infrastructure Development for Metro Manila and Its Surrounding Areas (Region III & Region IV-A)" (Transport Roadmap 1), which was conducted from March 2013 to March 2014, set a long-term vision, formulated the development strategies of transport infrastructures, and identified the priority transport projects to realize the ideal transport network by 2030. This vision and development strategies were expected to guide in the development of the policies, prioritization, and design of programs and projects on transportation. The Transport Roadmap 1 was approved by the NEDA Board in June 2014 and was considered a long-term plan for the transport infrastructure development of the Philippine Government. This roadmap reported that the Transport Roadmap 1 with an aim to decongest Mega Manila¹ was within the budget envelope when the current economic growth continues.

1.3 While some of the short-term measures (e.g., expansion of the SMART Traffic signalling system and modernization of road-based public transport) began in 2015, these were piece-meal and slow-moving. The long-term railway program of the Transport Roadmap 1 is still the central focus of the Department of Transportation (DOTr). The lack of coherence among the different agencies involved in transport infrastructure has begun to emerge, while traffic congestion in Metro Manila has been worsening. However, new ideas on railway lines, expressways, and other projects have emerged. Therefore, a common plan in addressing, not only transport, but also the social and environmental problems of Mega Manila needs to be re-established.

2) Objective and Outputs of the Study

1.4 After more than two years since the formulation of the Transport Roadmap 1, this study was implemented to update and supplement the information in it. General objectives of this study are as follows:

- (i) Update the database of transport demand forecast prepared in MUCEP².
- (ii) Identify transport development policy and programs of Mega Manila by the new administration through the Transport Roadmap 1 update.
- (iii) Establish key performance indicators (KPIs) on transport performance, economic, financial and environment.
- (iv) Provide an update of priority programs based on the updated data and the consented KPI.

¹ Composed of Metro Manila and Provinces of Bulacan, Rizal, Laguna and Cavite.

² Metro Manila Urban Transportation Integration Study Update and Capacity Enhancement Project (JICA 2015)

- 1.5 The specific objectives of this study are:
- (i) to revise the transport development strategies and policies of the Transport Roadmap
 1 based on the updated transport demand forecast (see *Appendix 1*); and,
- (ii) to update the Transport Roadmap 1 with target years 2022, 2035 and beyond, and examine the validity of the priority projects.
- 1.6 Expected outputs of this study are as follows:
- (i) The outcomes of this study is approved as a development plan of the Philippine Government.
- (ii) The updated Transport Roadmap 1 was disseminated through appropriate public awareness strategies.

3) The Study Area

1.7 The study focuses on three levels of the study area of Greater Capital Region (GCR), Mega Manila, and Metro Manila as defined in the following:

- GCR, which covers three regions: National Capital Region or Metro Manila, Region III, and Region IV-A;
- (ii) Mega Manila, which is composed of Metro Manila plus the immediate adjoining provinces of Bulacan, Rizal, Cavite, and Laguna; and
- (iii) Metro Manila with its core 17 local government units (LGUs) (16 cities and 1 municipality).

4) Study Implementation

1.8 The study commenced on 28 March 2017. The following coordination activities and consultations ensued during this Study (see Table 1.1):

(1) Coordination with the Philippine Government

1.9 Coordination with NEDA, which is the main counterpart agency, was closely conducted during the study process. Moreover, several counterpart agencies meetings were held with representatives of NEDA, Department of Public Works and Highways (DPWH), DOTr, Metropolitan Manila Development Authority (MMDA), as well as other relevant national government agencies.

1.10 Aside from the coordination meetings with the relevant agencies, Roadmap2 was also presented in the NEDA Interagency Technical Committee on Transport Planning (IATCTP) and NEDA Board Technical Committee during the course of obtaining the NEDA Board Approval.

(2) Conduct of Traffic Surveys

1.11 In order to update the database of traffic demand forecasts, the following traffic surveys were conducted from May to July 2017. The compiled results are in the Technical Report (see details in *Technical Report 1*).

- (i) Cordon Line Survey;
- (ii) Screen Line Survey;
- (iii) Public Transport User Survey;
- (iv) Clark International Airport Traffic Survey; and,

(v) Port Traffic Survey.

(3) Conduct of Focus Group Discussion and Workshop

1.12 The focus group discussion (FGD) on how to develop new town with socialized housing was held on 25 July 2017. Around twenty representatives from public and private sectors were invited. The main objectives of this FGD were to brainstorm the elements or components of the proposed new towns in terms of land uses, facilities, movement system, and other features; to define two to three alternative options of how the proposed new towns can be implemented; and, to choose the most promising option and define the major elements of the strategy to implement it.

1.13 The first workshop was held on 16 August 2017 to share the interim outputs with stakeholders as well as to discuss the development scenarios and key performance indicators. About 50 people were invited from government agencies, academic sector, and the private sector, among others (see details in *Appendix 2*).

1.14 The Mayor's Forum of Bulacan Province was held on 18 August 2017 to discuss the development issues of North–South Commuter Railway and the possibility to develop the new township with TOD concept.

1.15 The second workshop was held on 22 September 2017 to share the interim outputs with stakeholders as well as to discuss the development scenarios and key performance indicators. About 70 people were invited from government agencies, academic sector, and the private sector, among others (see details in *Appendix 2*).

1.16 The final workshop was held on 8 November 2017 to share the draft Transport Roadmap 2 for Mega Manila with stakeholders. More than 60 people were invited from government agencies, academic sector, and the private sector, among others (see details in *Appendix 2*).

Date	Meetings and Seminars	Agenda	Participation		
2017	2017				
17 April	JICA Philippines	Inception Report	JICA officers (5 persons)		
18 April	1 st Counterpart Meeting	Inception Report	NEDA Usec, DOTr Assec, officers from NEDA Infrastructure Staff and Public Investment Staff, DOTr, DPWH, MMDA, JICA representative (approx 30 persons)		
20 April	JICA Philippines	Consultation meeting on transportation projects	JICA officers (4 persons)		
24 April	Meeting with Road Transport and Infrastructure Office, DOTr	Traffic surveys	Assistance Secretary and officers (7 persons)		
17 May	Meeting with NEDA	Existing projects	Officer of NEDA Infrastructure Staff		
1 June	JICA Philippines	Update on study progress	JICA officers (5 persons)		
14 June	Technical Working Group Meeting	Update on study progress, consultation on priority projects and its evaluation	Director of NEDA Infrastructure Staff, officers of NEDA Infrastructure Staff and Public Investment Staff		
20 June	2 nd Counterpart Meeting	Update on study progress, consultation on priority projects and its evaluation	NEDA Assistant Secretary, DOTr Undersecretary, officers from NEDA Infrastructure Staff and Public Investment Staff, DOTr, DPWH, MMDA, DOF, HLURB, JICA		

Date	Meetings and Seminars	Agenda	Participation
			representatives (approx. 45 persons)
3 July	Meeting with TEC, MMDA	Traffic data of Metro Manila	MMDA officers (4 persons)
5 July	Meeting with DOTr	Consultation meeting on development orientation and transportation projects	Officers from Road Transport and Infrastructure Office, Railway and Toll Road Office, Aviation and Airports Office, Maritime Office
12 July	Meeting with MMDA	Consultation meeting on development orientation and transportation projects	Director
13 July	Meeting with DPWH	Consultation meeting on development orientation and transportation projects	Officers of Planning Services
18 July	IATCTP	Progress of the Study	Members of IATCTP
26 July	Meeting with NEDA	Next steps	Director of NEDA Infrastructure Staff, officers of NEDA Infrastructure Staff, JICA representatives
25 July	Focus Group Discussion	How to develop new town with socialized housing	NEDA, HLURB, DPWH, UPA, HDMF, BOI, BTI, SHFC, OSHDP, PIDS, HOR.
31 July	Meeting with HLURB	How to develop new town with socialized housing	
16 August	Workshop 1	Discussion on the interim outputs	About 60 participants from public, academic and private sectors
18 August	Mayor's Forum in Bulacan Province	Discussion on the issues on NSCR and new town development	Participants from Bulacan Province and LGUs of Balagtas, Calumpit, Guiguinto , Malolos, Marilao and Meycauayan
7 September	Meeting with MMDA	Bottlenecks in Metro Manila	Director
13 September	Meeting with JICA	Presentation material for the WS2	JICA representatives
13 September	Meeting with Balagtas	Traffic issues, priority projects/plans	MPDO, ME
14 September	Meeting with Calumpit LGU	Traffic issues, priority projects/plans	Mayor, MPDO and City Municipal Administrator
14 September	Meeting with Malolos LGU	Traffic issues, priority projects/plans	CPDC
20 September	Meeting with NEDA	Presentation material for the WS2	Assistant Director of NEDA Infrastructure Staff, officers of NEDA Infrastructure Staff, JICA representatives
22 September	Workshop 2	Discussion on the interim outputs	About 70 participants from public, academic and private sectors
26 September	Meeting with Meycauayan LGU	Traffic issues, priority projects/plans	MPDC
27 September	Meeting with Guiguinto LGU	Traffic issues, priority projects/plans	MPDC, MPDO
29 September	Meeting with Marilao LGU	Traffic issues, priority projects/plans	MPDO, Councilors
5 October	Meeting with Bocaue LGU	Traffic issues, priority projects/plans	MPDC
11 October	Meeting with DPWH	Intersection improvement	Officer of TEC
19 October	Meeting with NEDA	Financing strategy	Officers of NEDA Infrastructure Staff
3 November	Meeting with NEDA/JICA Philippines	Presentation material for the WS3 and next steps	Director of NEDA Infrastructure Staff, officers of NEDA Infrastructure Staff, JICA representatives
7 November	Japan Embassy	Presentation material for the WS3 and next steps	Minister and other officials of Japan Embassy in the Philippines, JICA representatives
8 November	Workshop 3	Discussion on the draft updated Transport Roadmap	About 60 participants from public, academic and private sectors
7 December	Meeting with JICA	Pre-meeting for IATCTP	JICA representatives
12 December	Meeting with NEDA	Pre-meeting for IATCTP	Director of NEDA Infrastructure Staff, officers of NEDA Infrastructure Staff, JICA representatives
15 December	IATCTP	Results of the Study	Members of IATCTP
2018			

Date	Meetings and Seminars	Agenda	Participation
17 January	Meeting with NEDA	Pre-meeting for INFRACOM TB	Director of NEDA Infrastructure Staff, officers of NEDA Infrastructure Staff, JICA representatives
19 January	INFRACOM TB	Results of the Study	Members of INFRACOM TB
06 August	IATCTP	Follow-up discussion on the Study results	Members of IATCTP
9 October	NEDA IS	Additional scenarios	Officers of NEDA Infrastructure Staff
2019			
1 February	NEDA IS	Presentation for IATCTP	Director of NEDA Infrastructure Staff, officer of NEDA Infrastructure Staff
19 February	IATCTP	Results of the Study	Members of IATCTP
27 May	NEDA IS	Comments provided by MMDA	Officers of NEDA Infrastructure Staff
3 July	NEDA IS and MMDA	Comments response to MMDA	Officers of NEDA Infrastructure Staff and MMDA
23 July	NEDA IS	Presentation material for INFRACOM	Officers of NEDA Infrastructure Staff
5 August	INFRACOM	Presentation for INFRACOM	Members of INFRACOM

Source: JICA Study Team

2 SUMMARY OF ISSUES FACING MEGA MANILA

2.1 Spatial Structure

1) Greater Capital Region (GCR) Growth Engine of the Country

2.1 GCR, located in the center of Luzon Island in the Philippines, is regarded as the engine for economic growth of the nation. As of the 2015 population census, GCR is home to a population of 38.5 million or 38.1% of the national total. In terms of GRDP, it posted PHP9.0 trillion at current price in 2015, which accounted for 67.3% of the national total. Metro Manila is especially strong in leading this growth and Region IV-A, with its abundant land suitable for development, has been the destination of migrants and investments in recent years. Region III, on the other hand, has undergone rapid development since the restoration of Subic Bay Naval Base and Clark Air Base in 1992. However, results have yet to show. It is apparent that the development of GCR plays a large role in the nation's overall development and, given the expansion and functional degradation of Metro Manila, integrated regional development strategies are crucial for its sustainable development.

	Ite	em	GCR	Mega Manila	Metro Manila	
ea	km ²		39,508	20,289	620	
Are	% of Tot	al in Philippines	11.5	6.0	0.2	
ц	In thous	ands	38,510	25,766	12,877	
latio	% of Tot	al in Philippines	38.1	25.5	12.8	
Popu	Ave. Gro (2010–2	owth Rate 015: %/yr)	2.16	3.00	1.67	
	PHP bil (2015: c	lion urrent)	8,970	n.a1/	5,522	
RP	% of Tot	al in Philippines	67.3	n.a ^{1/}	41.5	
GD	04 have	Primary	10.3	n.a ^{1/}	0.2	
	% Dy Sector	Secondary	30.9	n.a ^{1/}	17.6	
	000101	Tertiary	58.8	n.a ^{1/}	82.1	
Pc 25,000 ⁽⁰	Population GRD 00 (000) (PHP buil					
20,000 -					- 5,000	
15,000 -				_	- 4,000	

Table 2.1.1 Profile of the Study Area







Figure 2.1.1 Study Area

2) Growth of Mega Manila

2.2 Manila has grown to Metro Manila and farther growing to Mega Manila. Population has been increasing and urban areas expanding during the last 5 to 6 decades.

2.3 Urban population growth in Metro Manila continues at a very high rate in terms of both internal growth and in-migration. As a result, this growth spilled over to towns and cities within a 50-kilometer radius of the metropolis (Figure 2.1.2). It was estimated that the population of Metro Manila and adjoining provinces will have to accommodate an additional of about three million by 2035.



Source: Roadmap for Transport Infrastructure Development for Metro Manila and Adjoining Provinces

Figure 2.1.2 Trend in Uran Expansion of Metro Manila

2.4 Despite the spillover to the periphery, population density of Metro Manila is quite high. Twelve out of 17 LGUs showed net density, which was calculated excluding areas of waterway, cemetery, port and airport, of more than 200 persons/ha (Table 2.1.2). Manila City was the densest with 505 persons/ha. At the barangay level, about 45% of the people live in high-density barangays (> 300 persons/ha population density).

2.5 At the time when Metropolitan Thoroughfare Plan and MMETROPLAN were formulated, Manila City was the main central business district (CBD) where people

traveled to. However, the main CBDs in Metro Manila now are in Makati, Mandaluyong, and Pasig Cities. Daytime and nighttime population ratio of those cities are more than 1.1 (Table 2.1.2).





Source: JICA Study Team

Figure 2.1.3 Population Density in 2015

Source: JICA Study Team

Figure 2.1.4 Population Growth in 2010-2015

	LGU	Area (ha)		No. of	No. of Population (000)			Population Growth (%/year)		Population Density in 2015 (person/ha)	
		Gross	Net 1/	2000	2010	2015	00-'10	'10-'15	Gross	Net 1/	Ratio in 2015
Metro	Caloocan City	5,314	5,226	1,178	1,489	1,584	2.37	1.24	298	303	0.90
Manila	Las Pinas City	3,176	3,150	473	553	589	1.57	1.28	185	187	0.96
	Makati City	2,172	2,097	445	529	583	1.75	1.95	268	278	1.29
	Malabon City	1,597	1,232	339	353	366	0.42	0.68	229	297	0.95
	Mandaluyong City	1,107	1,081	278	329	386	1.67	3.28	349	357	1.23
	Manila	4,219	3,524	1,581	1,652	1,780	0.44	1.50	422	505	1.06
	Marikina City	2,284	2,190	391	424	451	0.81	1.22	197	206	1.03
	Muntinlupa City	3,861	3,796	379	460	505	1.95	1.87	131	133	1.07
	Navotas City	1,133	587	230	249	249	0.78	0.03	220	425	0.94
	Paranaque City	5,117	4,769	450	588	666	2.72	2.50	130	140	1.01
	Pasay City	2,363	1,896	355	393	417	1.02	1.17	176	220	1.05
	Pasig	3,431	3,243	472	627	755	2.86	3.81	220	233	1.10
	Pateros	175	164	57	64	64	1.12	-0.10	364	389	0.96
	Quezon City	17,370	16,749	2,236	2,831	2,936	2.39	0.73	169	175	1.04
	San Juan	577	569	113	117	122	0.32	0.89	212	215	0.99
	Taguig City	3,828	3,418	467	644	805	3.27	4.55	210	236	1.02
	Valenzuela City	4,444	3,865	485	575	620	1.71	1.52	140	161	1.00

Table 2.1.2 Population Growth from 2000 to 2015 in Metro Manila

	LGU	Area	ı (ha)	No. of Population (000)		n (000)	Populatio (%/y	n Growth vear)	Population 20 (perso	Day-time/ Night-time Population	
		Gross	Net 1/	2000	2010	2015	00-'10	'10-'15	Gross	Net 1/	Ratio in 2015
	Sub-Total	59,627	55,496	9,519	11,421	12,877	1.84	2.43	216	232	1.03
Adjoini	ng Bulacan	112,363	91,407	1,734	2,309	2,640	2.91	2.72	23	29	0.96
Area	Rizal	67,870	67,465	1,795	2,763	3,315	4.41	3.71	49	49	0.92
	Laguna	34,456	34,410	1,088	1,602	1,888	3.95	3.34	55	55	0.91
	Cavite	125,838	124,635	1,707	2,485	2,884	3.82	3.03	23	23	0.91
	Sub-total	340,526	317,917	6,324	9,159	10,727	3.77	3.21	32	34	0.96
Mega M	Manila	402,692	375,474	16,255	21,037	23,604	2.61	2.33	59	63	1.00

Source: population data: PSA, area data: based on GIS

1/ Net area excludes areas of waterbody, cemetery, airport and port.

2.6 Assuming the current trend of population growth continues until 2035, the population of Mega Manila would be more than 38 million by then. The population growth in the adjoining areas is high with an average of 3.2% per year. However, the population density will be only 50–100 person/ha even if the population increases with the same growth rate. Thus, this assumption might happen considering the land capacity.

2.7 Densification accelerates the expansion of the existing urban areas unto outer areas beyond Metro Manila. Today, the actual metropolitan area extends to the adjoining provinces of Bulacan, Rizal, Laguna, and Cavite (BRLC). Many people reside in these peri-urban areas and commute to Metro Manila. Therefore, Mega Manila, which is composed of Metro Manila and BRLC provinces, needs to be considered as an actual metropolis. If the current trend of population growth continue, the population of BRLC will exceed that of Metro Manila by 2020 and Mega Manila will become one of the largest urban areas in the world with total population of 38 million by 2035. New growth centers will emerge because existing urban centers such as Makati, Ortigas, and Bonifacio Global City (BGC) are already congested (Figures 2.1.4 and 2.1.5).

2.8 The combination of high population density and rapid urbanization resulted in environmental degradation and poor quality of life. A lack of affordable housing and poverty force many to live in poor environment, if not settle in areas where disaster risk is high, such as along waterways. In these blighted areas, access to public facilities and social services (open spaces, education and health care) are also inadequate. LGUs, on the other hand, are unable to cope with the burden of providing for their needs. Uncontrolled urbanization is a by-product of weak land use policy and urban management. While there are laws and regulations leading to Comprehensive Land Use Plans (CLUP) in every municipality, in practice they remain as paper plans. Instead of as a guide to development, developers and property owners generally ignore CLUP and rarely get penalized for violations. Informal settlements referred to in the preceding section is because of weak land use control on the activities of the formal sectors. In particular, property developments by land owners who were predisposed to externalize their impacts on traffic.

2.9 The critical issue is while Metro Manila's growth is more or less predictable, meaning population growth is low or stabilizing, those in adjoining provinces would increase sharply. The estimated future population by the Philippine Statistical Authority (PSA) is only 29 million by 2035. There is a significant gap between the trend case and PSA estimation. (Table 2.1.3)



Figure 2.1.5 Population Density and Growth Rate in 2035 (Trend)

		•		, ,		
		20	15	20	35	
	LGU	No. (000)	Net Density (person/ha)	No. (000)	Net Density (person/ha)	AGR (%/yr): '15-'35
	Caloocan	1,584	303	1,812	347	1.2
	Las Pinas	589	187	679	215	1.3
	Makati	583	278	765	365	1.9
	Malabon	366	297	374	304	0.7
	Mandaluyong	386	357	658	609	3.3
	Manila	1,780	505	2,143	608	1.5
	Marikina	451	206	514	234	1.2
	Muntinlupa	505	133	652	172	1.9
Metro	Navotas	249	425	224	381	0.0
Manila	Paranaque	666	140	975	204	2.5
	Pasay	417	220	470	248	1.2
	Pasig	755	233	1,424	439	3.8
	Pateros	64	389	56	341	-0.1
	Quezon	2,936	175	3,036	181	0.7
	San Juan	122	215	130	229	0.9
	Taguig	805	236	1,750	512	4.5
	Valenzuela	620	161	750	194	1.5
	Sub-total	12,877	232	16,411	285	1.6
	Bulacan	2,640	29	4,624	51	2.7
	Rizal	2,884	23	5,803	47	3.0
BRLC	Laguna	1,888	55	3,936	114	3.3
	Cavite	3,315	49	7,509	111	3.7
	Sub-total	10,727	34	21,873	69	3.2
Mega Ma	Vega Manila		63	38,284	102	2.3
		(PSA Estimati	ion)	29,215		

Table 2.1.3 Population	Forecast by	2035	(Trend)
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Source: JICA Study Team

2.10 It is almost certain that the trend will continue and the population of adjoining provinces exceed that of Metro Manila. While doubling the population from 10.7 to 38 million in the adjoining provinces will be a great threat, which will not affect the provinces but also Metro Manila, which are main destination of socio-economic activities. Transport infrastructure, which at present insufficient, must be properly planned and provided in such a way the adjoining areas will be integrated as a part of Metropolitan Area.

2.2 Traffic Congestion

1) Traffic Demand

2.11 The summary of daily travel demand by main modes of travel in Mega Manila is shown in Table 2.2.1. The comparison between 2012 and 2017 travel demand shows a decline of 2% with car and 28% with public transport (jeepney and bus). In terms of vehicle trips, however, car trips increased by 1% (on average 0.2% per annum) while public vehicle trips decrease by 8% (average growth of -1.6% p.a.) in a span of 5 years. For public transport, jeepney and bus traffic decreased by 1% and 34%, respectively. The increase in car traffic can be ascribed to higher car ownership. As well, the decrease in public transport trips indicates increase of private transport usages.

			20	12			20	17		2017/2012	
		Persor	n Trips	s PCU		Persor	n Trips	PC	CU	Dorson	
		No. (000/day)	%	No. (000/day)	%	No. (000/day)	%	No. (000/day)	%	Trips	PCU
Car		6,170	31.7	3,629	72.3	6,054	38.8	3,784	73.8	0.98	1.04
	Jeepney	7,620	39.1	1,141	19.7	6,652	42.7	1,134	22.1	0.87	0.99
Public Transport	Bus	5,680	29.2	322	8.0	2,888	18.5	211	4.1	0.51	0.66
Transport	Sub-total	13,300	68.3	1,463	27.7	9,540	61.2	1,345	26.2	0.72	0.92
Total		19,470	100.0	5,092	100.0	15,594	100.0	5,129	100.0	0.80	1.01

 Table 2.2.1 Travel Demand in the Study Area—Inter-Zonal Trips in 2017

Source: JICA Study Team.

2.12 Comparing the traffic count results along the boundary of Metro Manila in 1996, 2012, and 2017, the daily traffic has been increasing in the period of 1996–2017 (Table 2.2.2 and Figure 2.2.1). In particular, the traffic to and from east and south increased about three times. This implies the rapid expansion of urban areas of Rizal, Laguna, and Cavite provinces.

2.13 Comparing the growth of the number of passengers and the number of PCU, the number of passengers increase 1.8 times in average while the number of PCU increase 2.7 times in average. Thus, more people use private vehicles rather than public transport such as bus and jeepney.

Diro	otion	М	MUTIS (199	6)	N	IUCEP (2012	2)	Ro	admap2 (20	17)	2017
Dire	CUON	Public	Private	Total	Public	Private	Total	Public	Private	Total	/1996
North	Pax No.	126,495	37,581	164,076	74,854	30,628	105,482	76,880	83,691	160,571	1.0
NOTUT	PCU	3,874	19,499	23,374	10,475	11,704	22,179	12,161	32,003	44,164	1.9
North	Pax No.	143,560	60,009	203,569	140,157	43,403	183,560	184,668	85,570	270,238	1.3
East	PCU	3,970	30,152	34,122	16,067	17,723	33,790	16,570	34,526	51,096	1.5
East	Pax No.	412,199	163,216	575,415	590,220	415,018	1,005,238	562,522	750,962	1,313,484	2.3
	PCU	11,442	110,802	122,244	57,604	177,298	234,901	55,256	314,083	369,339	3.0
South	Pax No.	130,591	36,837	167,428	120,611	82,102	202,713	122,306	148,692	270,998	1.6
(Laguna)	PCU	3,355	25,440	28,795	14,457	33,456	47,912	12,850	62,256	75,106	2.6
South	Pax No.	126,057	27,527	153,584	134,435	52,569	187,004	172,530	118,121	290,651	1.9
(Cavite)	PCU	3,240	18,539	21,779	23,363	20,636	43,998	18,438	53,563	72,001	3.3
Total F	Pax No.	938,902	325,170	1,264,072	1,060,277	623,720	1,683,997	1,118,906	1,187,036	2,305,942	1.8
	PCU	25,881	204,432	230,314	121,966	260,817	382,780	115,275	496,431	611,706	2.7

 Table 2.2.2
 Changes in Daily Traffic Crossing Metro Manila Boundary

Source: JICA Study Team



Source: JICA Study Team

Figure 2.2.1 Changes in Daily Traffic Crossing Metro Manila Boundary

2.14 The traffic volumes crossing Pasig River is shown in Table 2.2.3. This traffic flow can be interpreted to the traffic volume traveling between the north and south parts in Metro Manila. It can be seen that survey station along C4 consistently had the highest total traffic since 1996 in terms of both people and vehicle traffic. While the traffic volume along R8, R9, R10, C1, and C2 had decreased, that along C5 had increased dramatically. There seems to be a general redistribution of traffic along the screen lines.

2.15 Although vehicle traffic along the boundary of Metro Manila increased dramatically by 2.7 times, the traffic volume crossing the Pasig River increased by only 1.2 times. This is because the traffic volume on roads crossing Pasig River has been almost saturated since 1996. There is no more space to accommodate additional traffic. According to traffic count conducted in 2017 on roads crossing Pasig River, the hourly distribution of traffic on the roads remains already high throughout the day starting from 7:00 in the morning until about 8:00 in the evening as shown in Figure 2.2.2

Bridges along Pasig		N	MUTIS (1996	5)	1	MUCEP (2012)	Ro	oadmap2 (201	7)	2017
R	River	Public	Private	Total	Public	Private	Total	Public	Private	Total	/1996
D0	Pax No.	205,536	57,102	262,638	131,351	39,091	170,442	55,930	18,753	74,683	0.3
ко	PCU	17,069	22,639	39,708	15,449	18,309	33,758	7,894	8,323	16,217	0.4
DO	Pax No.	44,743	61,614	106,357	1,758	39,767	41,525	12,336	53,599	65,935	0.6
K9	PCU	4,561	29,875	34,436	278	21,647	21,925	1,930	27,471	29,401	0.9
D10	Pax No.	84,163	76,685	160,848	74,339	62,391	136,730	78,419	46,791	125,210	0.8
RIU	PCU	7,605	34,522	42,127	9,061	35,844	44,906	8,406	16,257	24,663	0.6
01	Pax No.	39,656	84,013	123,669	44,636	50,146	94,782	25,706	32,418	58,124	0.5
CI	PCU	3,041	35,494	38,535	3,891	34,566	38,457	3,297	16,325	19,622	0.5
C2	Pax No.	56,614	154,446	211,060	15,793	88,515	104,308	11,657	41,730	53,387	0.3
62	PCU	4,554	67,869	72,422	1,620	51,516	53,136	1,420	20,271	21,691	0.3
C4	Pax No.	818,217	307,623	1,125,840	497,789	192,213	690,002	1,247,471	255,892	1,503,363	1.3

Table 2.2.3 Traffic Volume Crossing the Pasig River

Bridges a	Bridges along Pasig		MUTIS (1996	5)	1	MUCEP (2012	2)	R	7)	2017	
R	liver	Public	Private	Total	Public	Private	Total	Public	Private	Total	/1996
	PCU	37,965	142,360	180,325	34,860	123,807	158,667	69,954	143,689	213,643	1.2
CE	Pax No.	12,612	101,706	114,318	8,080	238,464	246,544	3,972	375,905	379,877	3.3
C5	PCU	1,575	40,319	41,894	964	119,611	120,575	1,476	198,615	200,091	4.8
Other 8	Pax No.	492,816	244,153	736,969	1,006,148	302,993	1,309,141	360,682	391,152	751,834	1.0
Bridges	PCU	40,927	107,377	148,305	44,786	167,045	211,831	29,770	166,259	196,029	1.3
Total	Pax No.	1,754,357	1,087,342	2,841,699	1,779,894	1,013,580	2,793,474	1,796,173	1,216,240	3,012,413	1.1
l otal	PCU	117,297	480,455	597,752	110,909	572,345	683,255	124,147	597,210	721,357	1.2

Source: JICA Study Team







2) Network Performance of Existing Roads

2.16 Table 2.2.4 shows the traffic volumes on expressways and primary roads in Mega Manila as well as by areas, i.e., Metro Manila and BRLC. In Mega Manila, the traffic volume of most of roads are nearly or more than their road capacity. When the traffic volume of the road exceeds 50% of its capacity, the travel speed decreases dramatically and those roads are considered as with heavy traffic.

2.17 In terms of travel speed, the ratio of road sections at less than 10 kph varies while travel speed of 60% or more on road sections are at less than 20 kph. This means traffic volume of most of the roads have been reaching their capacity. The traffic volume/capacity ratio of each road section in Mega Manila and Metro Manila are shown in Figure 2.2.3. Orange and red color in the figures indicate road sections with 1.0 or more of a traffic volume/capacity ratio.

2.18 Among the five circumferential roads (C1 to C5) in Metro Manila, C5 has the largest vehicle traffic with 3.4 million PCU-km/day (7.7 million person-km/day) followed by C4 (EDSA) with 2.0 million PCU-km/day (9.4 million person-km/day). The vehicles on more than 80% of C5 and C4 run at 20 kph or less, which means these roads reach capacity in a day. Among the ten radial roads (R1 to R10), R7 has the largest traffic

volume with 3.2 million PCU-km/day (7.9 million person-km/day). Such large traffic concentration generates not only big economic loss, but also high air pollution and poor quality of living environment.

2.19 Traffic situation on expressways are better than on primary roads, particularly, CAVITEX, NLEX and SLEX have volume/capacity ratios of only 0.33, 0.07 and 0.31, respectively. Skyway marks relatively high at 0.83 volume/capacity ratio, but still lower than most of the primary roads in Metro Manila.

2.20 In terms of area-wise result, the entire Mega Manila has been suffering from serious traffic congestion. About 44% of Mega Manila roads show a travel speed of 10 kph or less. The average traffic volume/capacity ratio is 0.93. Although traffic management and new route improvement were proposed since the Transport Roadmap 1 was formulated, the traffic congestion has yet to be solved.

Category	Road/Area	Road Length	Average V/C	% of Roa with \$	nd Section Speed	PCU	(000)	Passenç	jer (000)
		KIII	Ratio	< 10 km/h	< 20 km/h	kms	Hrs.	Kms	Hrs.
Primary Roads	C-1	4.5	1.25	87%	100%	173	14.2	485	39.5
	C-2	10.7	1.04	75%	98%	475	30.6	982	62.9
	C-3	10.7	1.37	69%	100%	322	30.7	664	60.6
	C-4	21.9	0.57	31%	84%	1,983	176.1	9,420	289.1
	C-5	24.2	0.97	33%	89%	3,426	140.5	7,710	307.8
	R-1	8.6	1.03	52%	88%	988	45.7	1,979	89.7
	R-2	7.8	0.95	82%	95%	314	17.8	736	40.1
	R-3	18.7	1.04	28%	100%	1,268	67.1	3,224	169.3
	R-4	9.6	0.99	59%	85%	425	29.3	1,302	94.6
	R-5	17.6	0.94	16%	94%	1,296	52.2	3,035	120.7
	R-6	8.4	1.05	57%	93%	376	25.2	867	54.0
	R-7	30.4	0.80	26%	61%	3,189	132.1	7,924	303.3
	R-8	4.3	1.24	75%	100%	169	13.0	424	29.0
	R-9	10.9	1.19	90%	100%	456	30.7	1,204	79.6
	R-10	6.1	1.33	77%	95%	195	17.3	338	29.8
Expressway	CAVITEX	10.6	0.33	1%	1%	367	18.8	1,732	33.8
	Skyway	77.6	0.83	36%	61%	777	68.2	1,817	149.4
	SLEX	197.2	0.31	20%	36%	2,022	93.2	8,983	277.2
	NLEX	70.7	0.07	0%	14%	274	7.5	1,005	14.6
Classified Area	Metro Manila	1,009	1.04	53%	77%	32,765	3,188	110,755	9,049
	Bulacan	443	0.76	39%	76%	7,740	847	24,280	2,451
	Laguna	208	0.54	23%	50%	3,700	173	14,836	493
	Rizal	294	1.11	48%	66%	5,817	856	14,843	2,158
	Cavite	389	0.88	33%	63%	6,790	412	18,785	1,104
	Mega Manila (Total)	2,343	0.93	44%	71%	56,812	5,475	183,498	15,256

Table 2.2.4 Summary of Road Traffic Volume and Network Performance in 2017

Source: JICA Team.





3) Impact of Traffic Congestions

2.21 Comparing the traffic situation in 2012 and 2017, the number of trips in Metro Manila increased by 1.05 times while those in adjoining provinces decreased by 15%. Although the distance travelled by persons or vehicles decreased in both Metro Manila and the adjoining areas in the period of 2012–2017, the time travelled increased due to decrease of travel speed. In particular, the time traveled by persons or vehicles in the adjoining areas increased about three times. This resulted in the increase of economic cost of transport and vehicle emissions. Reduction in travel distance and increase in travel time implies that traffic congestion has worsened in the entire Mega Manila. (Table 2.2.5)

2.22 The estimated congestion costs¹ in Metro Manila and the adjoining provinces are PHP2.1 and PHP0.9 billion/day, respectively. Besides congestion cost, environmental emission can be also converted to monetary value. Based on the market value of CO_2 in April 2018,² CO_2 emission in Metro Manila and the adjoining areas cost PHP58,222 and PHP40,872 in a day, respectively.

¹ Congestion cost is the difference between the actual economic cost of transport and the economic cost of transport with free-flow traffic. The free-flow traffic in this Study was assumed that the travel speed of expressways, primary roads and secondary roads are 60 kph, 35 kph and 20 kph, respectively.

² 1 ton of CO2 = EUR13.44 (CO2 EUROPEAN EMISSION ALLOWANCES) on 26 April 2018.

EUR13.44 =PHP3,578.70 (JICA Conversion Rate in April 2018)

Table 2.2.5 Comparison of Broad Indicators on Transport Outcomes in 2012, 2014 and 2017

			201	2 ^{1/}	2014 ^{2/}		201	7 3/			
	Indio	cators	Value	Share (%)	Value	Share (%)	Value	Share (%)	14/'12	17/'14	'17/'12
		Million trips/day	12.8	68.1	10.8	72.5	13.4	72.8	0.84	1.24	1.05
	– <i>m</i>	Million person-km	132	57.7	110	53.6	98.5	63.0	0.83	0.90	0.75
	I raffic Demand	Million person-hours	15.0	71.4	7.7	60.6	23	61.0	0.51	2.99	1.53
	Demana	Million PCU-km	39.3	58.7	27.8	45.6	32.6	63.3	0.71	1.17	0.83
		Million PCU-hours	4.9	73.1	2	55.6	7.5	60.5	0.41	3.75	1.53
Metro	Volume Ca	pacity Ratio	1.25	-	1.17	-	0.98	-	0.94	0.84	0.78
Manila	Average Ti	ravel Speed (kph)	8.0	-	14.1	-	11.9	-	1.77	0.84	1.50
	Economic bil./day)	Cost of Transport (PHP	2.4	70.6	1.1	52.4	3.5	60.3	0.46	3.18	1.46
	Congestion	n Cost (PHP bil./day)	1.5	83.6	-	-	2.1	70.0	-	-	1.43
	A !=	CO2 (tons/day)	16,681	70.1	7,312	48.6	16,269	58.8	0.44	2.22	0.98
	Air quality	NOx (tons/day)	66.0	68.0	60.0	49.4	74.3	55.7	0.90	1.25	1.13
	quality	PM (tons/day)	2.9	70.3	2.6	52.0	3.4	54.3	0.90	1.30	1.17
		Million trips/day	6.0	31.9	3.9	26.2	5.1	27.7	0.65	1.31	0.85
	Traffic Demand	Million person-km	96.9	42.4	65.5	31.9	57.8	37.0	0.68	0.88	0.60
		Million person-hours	6.0	28.6	3.7	29.1	14.8	39.3	0.62	4.00	2.47
	Domana	Million PCU-km	27.8	41.5	20.8	34.2	18.9	36.7	0.75	0.91	0.68
		Million PCU-hours	1.8	26.9	1.2	33.3	5.0	40.3	0.67	4.17	2.78
Bulacan, Rizal	Volume Ca	pacity Ratio	0.53	-	0.72	-	0.9	-	1.36	1.25	1.70
Laguna,	Average Travel Speed (kph)		15.3	-	17.9	-	11.0	-	1.17	0.61	0.72
Cavite	Economic bil./day)	Cost of Transport (PHP	1.0	29.4	0.7	31.0	2.3	39.7	0.65	3.54	2.30
	Congestion	n Cost (PHP bil./day)	0.3	16.4	-	-	0.9	30.0	-	-	3.14
	Air	CO2 (tons/day)	7,118	29.9	5,092	33.9	11,421	43.1	0.72	2.24	1.60
	quality	NOx (tons/day)	31.0	32.0	38.8	32.2	59.0	0.1	1.25	1.52	1.90
	1	PM (tons/day)	1.2	29.7	1.8	36.0	2.9	0.1	1.47	1.59	2.34
		Million trips/day	18.8	100	14.9	100	18.4	100	0.79	1.23	0.98
	Troffic	Million person-km	228.8	100	205.1	100	156.3	100	0.90	0.76	0.68
	Demand	Million person-hours	21.0	100	12.7	100	37.7	100	0.60	2.97	1.80
		Million PCU-km	67.0	100	60.9	100	51.5	100	0.91	0.85	0.77
		Million PCU-hours	6.7	100	3.6	100	12.4	100	0.54	3.44	1.85
Mega	Volume Ca	pacity Ratio	0.8	-	0.53	-	0.95	-	0.66	1.79	1.19
Manila Total	Average Ti	ravel Speed (kph)	9.7	-	16.9	-	10.2	-	1.74	0.60	1.05
Total	Economic bil./day)	Cost of Transport (PHP	3.4	100	2.1	100	5.8	100	0.62	2.76	1.71
	Congestion	n Cost (PHP bil./day)	1.8	-	-	-	3	100	-	-	1.71
	Air	CO2 (tons/day)	23,799	100	15,038	100	27,690	100	0.63	1.84	1.16
	quality	NOx (tons/day)	97.0	100	120	100	133	100	1.24	1.11	1.38
	quality PM (tons/day)		4.0	100	5.0	100	6.2	100	1.21	1.25	1.52

Source: 1/ Roadmap for Transport Infrastructure Development for Greater Capital Region (GCR) (JICA, 2014), however, the figures for air quality were recalculated by JICA Study Team using the same basic unit as Roadmap2.

2/ JICA Study Team calculated using MUCEP Database

3/ JICA Study Team.

Note: Some figures cannot be explained logically because of the limitation of available data for demand forecast due to budget and time constrain. In order to analyze and compare the demand forecast data more strictly, more detail traffic and transport surveys are needed. For example, the traffic count surveys should be done every day including weekday and weekend, school break and non-break period, rainy seasons and dry seasons, etc.

4) Summary of Issues

2.23 The traffic congestions in Metro Manila and adjoining provinces have been getting worse and worse and congestions become normal not only morning and evening peak rush hours but also in many hourly period of the day. Congestions spread to outer areas and adjoining provinces. It is estimated that the cost of congestions reach P2.1 billion a day in Metro Manila and P0.9 billion a day in adjoining provinces comprising Bulacan, Rizal, Cavite, and Laguna. This huge economic loss due to increase in vehicle operating cost and travel time also affect the peoples life significantly.

2.24 Causes of traffic congestions are complex. Primarily, traffic demand exceeds capacities of infrastructure. Some new roads need to be constructed, but the construction of roads cannot solve the traffic congestions in Mega Manila. Before expansion of roads, it can be identified long list of negative factors, which contribute to the reduction of existing facilities, such as but not limited to:

- (i) Inadequate traffic intersection management. Capacities of roads as a network is constrained due to non-signalized intersection, signalized intersection with adequate traffic flow control including cycle time of traffic signals, channelization of intersections, enforcement of traffic rules around intersections.
- (ii) **Lack of corridor management.** This include loading and unloading of bus/jeepney passengers, which is particularly obvious in CBD area and LRT/MRT stations, illegal road side parking and vendors, driving manner, and jaywalking, etc.
- (iii) Lack of enforcement capacity. Lack of enforcement capacity in terms of number of enforcers and their ability resulted in disordered loading and unloading of bus/jeepney along trunk roads. Enforcers at the intersection with traffic signals also causes unnecessary congestion.

2.25 Impact of traffic congestion on land use is also notable. In 1970 and 1980, the most significant CBD was in the City of Manila, therefore, traffic distribution is radial which justify the radial road development and LRT Line 1. Thereafter, gravity center of CBD function gradually shifted to Makati and Ortigas areas. Today, urban spatial structure is more complex and a number of activities center emerges. Transportation and urban development are interactive.

2.26 Traffic congestion does not only cause travel cost and time losses, but also deteriorate air environment. The main vehicle emissions consist of CO₂, NOx, and PM. These will affect not only climate change, but also human health.

2.3 Environmental Sustainability

1) Lack of Green Space in Metro Manila

2.27 Green urban areas facilitate physical activity and relaxation, and form a refuge from noise. Trees produce oxygen and help filter out harmful air pollution, including airborne particulate matter, while water spots from lakes to rivers and fountains moderate temperatures. The World Health Organization (WHO) has suggested that every city should have a minimum of 9 m² of green space per person. An optimal amount would sit between 10 and 15 m² per person.

2.28 However, among 17 LGUs in Metro Manila, only five achieved the suggested 9 m² per person. While Las Pinas, Muntinlupa, and Valenzuela Cities have large open spaces, actual green space might be lesser than the indicated total.

2.29 In general, private subdivisions provide neighborhood parks, but other residential communities hardly have this kind of facility. Therefore, the main recreational activity during holidays and weekends is visiting shopping malls.

2.30 Increase in the urban green space in Metro Manila is essential to improve both air and living environment. However, some of parks in Metro Manila are occupied by informal settlers. Therefore, after the provision of those green spaces, the maintenance and management would be another challenge.

	Dopulation			Aroa por			
LGU	(2015)	Forestland	Open Spaces	Parks & Recreation	Total Green Space	Population (m2)	
Caloocan City	1,584	10	675	22	706	4.5	
Las Pinas City	589	1	663	1	665	11.3	
Makati City	583	-	16	102	118	2.0	
Malabon City	366	-	114	3	116	3.2	
Mandaluyong City	386	-	2	123	125	3.2	
Manila	1,780	11	64	163	239	1.3	
Marikina City	451	13	173	19	205	4.5	
Muntinlupa City	505	-	830	98	928	18.4	
Navotas City	249	-	1	1	2	0.1	
Paranaque City	666	20	588	11	620	9.3	
Pasay City	417	-	149	126	275	6.6	
Pasig City	755	2	361	42	405	5.4	
Pateros	64	-	2	1	3	0.5	
Quezon City	2,936	2,108	502	150	2,759	9.4	
San Juan	122	-	6	5	11	0.9	
Taguig City	805	-	166	59	226	2.8	
Valenzuela City	620	1	1,008	1	1,009	16.3	
Total	12,877	2,233	5,429	965	8,627	6.7	

Table 2.3.1 Urban Green Space in Metro Manila

Source: JICA Study Team

2) Air Pollution

2.31 Among major Asian cities, the air quality of Metro Manila is worse than with other major capitals of the ASEAN members (Table 2.3.2) except Beijing.

City	Country/Area	PM	SO ₂	CO	NO ₂	O ₃	Pb
Токуо	Japan	В	А	А	В	В	А
Beijing	China	E	D	D	D	С	В
Seoul	South Korea	D	В	А	С	В	А
Taipei	Taiwan	D	В	В	В	В	В
Bangkok	Thailand	E	В	В	В	В	С
Kuala Lumpur	Malaysia	В	В	С	С	С	С
Jakarta	Indonesia	E	С	С	В	С	D
Manila	Philippines	E	В	С	D	D	С

 Table 2.3.2 Air Pollution Status of Major Cities in Asia^{1/2/}

Source: N. Hayashi (2004) http://mee.k.u-tokyo.ac.jp/siee/eeip/2004fy/20041025hayashiC.pdf (in Japanese).

^{1/} Concentration level of respective materials in the atmosphere is:

A: Very low pollution: Less than half of the WHO guideline value

B: Low pollution: Within the level of WHO guideline value

C: Moderate pollution: Exceeded WHO guideline value by less than two-fold

D: Heavy pollution: Exceeded WHO guideline value by less than three-fold

E: Serious pollution: Exceeded WHO guideline value by more than three-fold

^{2/} PM: particulate matter, SO2: sulphur dioxide, CO: carbon monoxide, NO₂: nitrogen dioxide, O₃: ozone, Pb: lead

2.32 The Philippine National Emission Inventory in 2008 showed that emission of mobile sources was 65% of the total, followed by stationary sources at 21%, and area sources at 14%.³ This implies transport as the principal culprit, which would remain so even if more data becomes available.

2.33 Motor vehicles are the dominant source of air pollutant in the urban area. Emissions from mobile sources contribute significantly to total emissions of particulate matters (PM), volatile organic compounds (VOC), carbon monoxide (CO), and nitrogen oxides (NOx). According to Environmental Management Bureau (EMB)-Department of Environment and Natural Resources (DENR), the share of mobile sources to the total amount of VOC, CO, NOx, and PM10 in Metro Manila are 96%, 99 %, 89%, and 17%, respectively. In terms of vehicle class, jeepneys that are mostly powered by second-hand diesel engines, motorcycles, and tricycles (MC/TC) are major sources of PM. Other pollutants from jeepneys, such as NOx and SOx, also show a high proportion of the total mobile source emissions.

Vahiela Tupa	Eucl	TC)G	С	0	NOx		SOx		PM ₁₀	
venicie rype	ruei Useu	2008	2010	2008	2010	2008	2010	2008	2010	2008	2010
Cars	Gasoline	32,450	32,640	267,715	269,281	14,603	14,688	647	626	535	538
	Diesel	312	85	912	247	960	260	64	17	276	75
UV	Gasoline	68,793	63,934	515,948	479,502	25,797	23,975	411	384	1,023	951
	Diesel	11,655	12,551	41,626	44,825	23,310	25,102	1,657	1,775	14,386	15,492
Buses	Gasoline	1,108	1,126	1,108	1,126	120	122	1	1	1	1
	Diesel	6,122	8,027	6,122	8,027	6,172	8,091	39	39	217	285
Trucks	Gasoline	435	381	10,396	8,220	1,017	891	7	7	12	11
	Diesel	11,539	13,040	38,671	43,700	38,983	44,053	248	2,806	1,372	1,551
MC/TC	Gasoline	107,561	124,677	150,354	174,280	1,157	1,341	830	962	11,508	13,339
	Diesel										
Sub-Total	Gasoline	210,347	222,757	945,521	932,408	42,694	41,017	1,896	1,979	13,080	14,841
	Diesel	29,628	33,702	87,331	96,799	69,425	77,507	2,009	4,638	16,252	17,402
Total		239,975	256,459	1,032,851	1,029,207	112,119	118,524	3,905	6,616	29,332	32,243

Table 2.3.3 Motor Vehicle Emissions by Vehicle Type in Metro Manila in 2008 and 2010
(tons/year)

Source: EMB-DENR, Metro Manila Air Quality Status Report 2011.

CO= carbon monoxide, NOx= nitrogen oxide, PM= particulate matter, SOx= sulfur oxide, TOG= total organic gases

³ EMB, National Air Quality Status Report (2005–2007).

2.34 Among the pollutants, PM was established to have the most adverse impact on health. Though its level has been decreasing in recent years, it is still above acceptable standards. Increased use of motorization can only worsen the risk from CO emission.

The recent Air Quality Monitoring Section (AQMS) report of EMB-DENR shows a decreasing trend in the annual average total suspended particulates (TSP) from 2004 to 2014, setting an average TSP level of 100 micro grams per normal cubic meter (μ g/NcM) in 2014 (Table 2.3.4). However, this 11-year trend remains above the NAAQGV of 90 ug/NcM, which is the annual mean TSP guideline value over a one-year averaging time period.

Dogion	Stations			µg/NcM									
Region		Stations	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14
National Capital Region (NCR)	Makati Bureau of Fire (Buendia St., Bel-Air, M	Compound, Ayala Ave., cor. akati City	211	183	153	146	134	145	160	128	135		1301/
	Valenzuela Municipal H	Iall, Quezon City	206	152	157	146	156	164	162	121	123	143	122
	EDSA East Avenue BF	D Compound, East Ave., Q.C.	170	129	104	102	107	90	105	74	72	92	96
	NCR-EDSA NPO, Q.C		164	163	138	125	144	89	152	103	96	112	97 ^{1/}
	Ateneo de Manila Obse	ervatory, Ateneo University	105	87	72	65	74	62	79	58	62	70	50
	City Hall, Maycilo Circl	e, Plainview, Mandaluyong City	133	124	121	134	125	104	138	136	148		143
	Dept. Health, San Laza	aro St., Rizal Avenue	134	138	111	110	103	103	132	101	114	115	105
	LLDA Compound Pasi	g City Hall	109	106	90	92	85	126					
	Sports Complex, Sumu Marikina City	ılong Highway, Sto. Nino,							125	125	108	97	81
	MRT-Taft Avenue Stat Malibay, Pasay City	ion, EDSA cor. Taft Avenue,	236	323	316	257	282	283	294	219	213	197	216
Region III	San Fernando									128	243		2021/
	Saluysoy Station		190	309	186	116	106	124	61	21	14	6	411/
	Intercity Station									344	277		4821/
Region IV-A	Cavite									-	-		
	Batangas		144	140	46	49	50	19	22	-	-		
	Quezon									-	-		

 Table 2.3.4
 Annual TSP Trend by Monitoring Stations from 2004 to 2014

Source: EMB-DENR.

Note: There are other stations, but this focuses only on NCR and Regions 3 and 4A - Did not meet sampling criteria

^{1/} Did not meet required capture rate.

2.35 In 2011, EMB-DENR expanded its AQMS for PM10 in 27 stations nationwide, nine of which are in Metro Manila (Station IDs A to I in Table 2.3.5). Only 18 stations managed to produce good data for the year 2012. A few of those stations are in Metro Manila (i.e. National Printing Office, EDSA, Marikina, MRT-Pasay Taft, Valenzuela, and Caloocan) and these were able to record a risky level of PM10 Air Quality Guideline Value (AQGV) above 60ug/NcM.

Table 2.3.5	PM ₁	Monitoring	Results	in Metro	Manila	in 2011	and 2	2012 ^{1/}
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Station ID	Location	Year 2011 Annual Arithmetic Mean	Year 2012 Annual Arithmetic Mean
А	Ateneo (RT)	41	38
В	NPO-EDSA	78	65
С	Marikina	70	69
D	DOH-Manila	57	57
E	MMDA-Guadalupe	54	58
F	MRT-Pasay Taft	136	122
G	Valenzuela-Radio ng Bayan (RT)	55	63
Н	NAMRIA (RT)	50	46
	Caloocan	179	151

Source: EMB-DENR.

^{1/} AQGV of 60 ug/NcM



Source: EMB-DENR

Note: Annual arithmetic means are from monthly arithmetic mean results of each station

Figure 2.3.1 National PM₁₀ Monitoring Results in 2012

3) GHG Emissions

2.36 Under the National Framework Strategy on Climate Change (NFSCC) 2010–2022, low-carbon paths in the transport sector is a high strategic priority. The transport sector's contribution to GHG emission increased significantly both in absolute and relative terms since 1990 (Table 2.3.6). The GHG emissions from the transport sector are significantly large at approximately over 30%, excluding effect of land use change. Based on the current motorization growth of about 6%, emission contributions from road transport is projected to increase to 37 and 87 MTCO2 Eq. by 2015 and 2030, respectively, under a business as usual (BAU) scenario. A large part of these GHG emissions would come from Metro Manila's transport sector.

2.37 Metro Manila's GHG per capita emission level is relatively small despite being the 20th largest metropolis in terms of population in the global scheme of things. The GHG emission per person is almost the same as Tokyo's, and less than Jakarta's, which is 1.6x more, and Bangkok's at 5.4x more.⁴

2.38 The top-down Metro Manila GHG inventory was calculated under the Climate Change and Clean Energy Project (CEnergy) that was funded by USAID in collaboration with DENR, Manila Observatory, and the SEED Institute. The energy sector was the primary source of GHG emissions as it accounts for 89.27% of the overall. Contributions of the industrial, agriculture, and land use sectors to Metro Manila GHG emissions were insignificant.

Sector	1990		2000		2004		% Change	
Sector	CO ₂ (Mt)	%	CO ₂ (Mt)	%	CO ₂ (Mt)	%	1990-2000	2000-2004
Land Use Change & Forestry ^{1/}	79.4	66.9	94.9	55.9	N/A	N/A	20.0	N/A
Energy	36.0	30.4	68.9	40.6	72.6	91.8	91.0	5.4
Electricity & Heat	14.2	11.9	26.8	15.8	28.9	36.5	89.0	7.8
Manufacturing & Construction	8.3	7.0	9.2	5.4	11.2	14.1	11.0	21.7
Transportation	6.2	5.2	23.5	13.9	25.4	32.1	279.0	8.1
Other Fuel Combustion	7.4	6.2	9.4	5.5	6.8	8.6	27.0	-27.7
Industrial Processes	3.2	2.7	6.0	3.5	6.5	8.2	88.0	8.3
Total Energy	39.2		74.9		79.1		91.0	5.6
Total	118.6		169.8		79.1		43.0	N/A

Table 2.3.6 Philippines GHG Emissions by Sector in 1990, 2000 and 2004

Source: A Strategic Approach to Climate Change in the Philippines Final Report, World Bank April 2010, originally from Climate Analysis Indicators Tool (CAIT) Version 6.0. (Washington, DC: World Resources Institute, 2009)

^{1/} Land Use Change and Forestry data available every 10 years only. No data for 2004

⁴ World Bank, Cities and Climate Change: An Urgent Agenda, 2010.

Table 2.3.7 Combined Energy and Waste Sectors GHG Emissions for Metro Manila in 2010

				I housand to	on CO2eq (CO	² Equivalent)
	Category	%	CO2	CH4	N ₂ O	Total
Energy	Mobile Source	38.72	7,981.12	39.57	121.6	8,142.30
	Road		7,925.32	39.57	121.68	8,086.17
	Railways ^{1/}		55.8	0.003	0.32	56.13
	Stationary Source	61.28	12,855.61	18.45	9.6	12,883.67
	Residential /Commercial		8,475.28	15.41	2.77	8,493.46
	Industrial		4,380.33	3.04	6.83	4,390.21
Total Ene	rgy emissions		20,836.73	58.03	131.21	21,025.97
Waste				2,292.67	203.1	2,495.89
Gross Err	nissions		20,866.94	2,351.44	334.24	23,552.63

Source: USAID (2010) Annex 2 Climate Change and Clean Energy Project, Metro Manila Greenhouse Gas Inventory. ¹⁷ Breakdown of the Railways are Direct, diesel emission by PNR, indirect: 2.99, electricity consumption by LRT, 53.14. The inventory used 2010 as the baseline year.

4) Water Pollution

2.39 Concessionaires Manila Water Company, Inc. and Maynilad Water Services Inc., which are under contract with the Metropolitan Waterworks and Sewerage System (MWSS), provide potable water service to 95% of the Metro Manila population. In terms of sewerage and sanitation, however, only about 15% has connection to sewer systems. Those who have no connection to the system have individual septic tanks and/or discard sewage into street drains and waterways that eventually flow to Manila Bay.

2.40 Manila Bay serves as a natural harbor that made Manila an entrepôt of commerce and population. To date, however, Manila Bay has been considered heavily polluted that fish catch from it could be toxic or carcinogenic; swimming on its coast poses danger to health. In 1999, an environmental activist filed and won a case from the Supreme Court that compelled 12 government agencies to clean up the bay area. Environmental degradation was considered human rights issue that became a first-of-its-kind in the world and became a precedent that other countries now adopt.

5) Disaster Risk

2.41 The Greater Capital Region is vulnerable to natural disasters, i.e., earthquake, flood, landslide, tsunami, liquefaction, and typhoons. Geohazard maps were prepared under the DENR-Mines and Geosciences Bureau (MGB) National Geohazard Assessment Program. Under this program, the 1:10,000 scale landslide and flood susceptibility assessment of 1,634 cities and municipalities were completed in 2014. In order for communities to prepare for natural hazards and avoid disaster, printed copies of these maps were set to be distributed to all local government units in 2016.

2.42 Besides the National Geohazard Assessment Program, in response to the needs of better preparation for the country and its people for natural disasters, the Disaster Risk and Exposure Assessment for Mitigation (DREAM) Program was formed in 2011. Under this program, an up-to-date, detailed, and high-resolution three-dimensional (3D) flood hazard maps for the critical river basins were produced in the Philippines. Currently, the DREAM Program has transitioned to the Phil-LIDAR 1 Program—Hazard Mapping of the Philippines Using LiDAR with a target of 262 river basins to be completed.

2.43 For earthquake, the review of Valley Fault System (VFS) was conducted under the GMMA-READY Project funded by AusAID. Under this project, the location of fault traces was redefined and previously mapped traces of the Valley Fault System were validated.

(1) Geohazard

2.44 The hazard risk of flood is familiar and vivid to residents in Mega Manila because of its annual occurrence, albeit of differing severity. The most recent case was Typhoon Ondoy that hit the region in September 2009 and caused unprecedented widespread flood and heavy damages. The Master Plan for Flood Management in Metro Manila and Surrounding Areas (World Bank, 2012) was then formulated that proposed a comprehensive flood risk management program including 11 high-priority projects as a result from the analysis of flood simulation in areas affected by typhoon Ondoy.

2.45 According to this Master Plan, major flooding occurrences are (i) huge volume of water coming from Sierra Madre, (ii) drainage capacity constraints in the core area of Metro Manila, and (iii) low-lying communities around Manila Bay and Laguna Lake. In order to mitigate the flood hazard, eight priority waterways were also identified: San Juan Reiver, Manggahan Floodway, Estero Tripa de Gallina, Maricaban Creek, Tullahan Riever, Pasig River, Estero de Maypajo, and Estero de Sunog Apog.

2.46 For landslides, Rizal Province was identified one of the top 10 provinces highly susceptible to landslides in the country. A devastating landslide occurred in Cherry Hills Subdivision, Antipolo City, Rizal Province in August 1999 that killed 60 people and displaced hundreds of families. Heavy rains induced by Typhoon Ising (international name, Olga) triggered the landslide.

2.47 Based on the geohazard map by MGB, about 48% of people in Mega Manila lives in flood hazard areas and 13% in landslide hazard areas. More than 50% of people live in flood hazard areas of Metro Manila, while more than 50% in landslide hazard areas of Rizal Province. (Table 2.3.8)

Hazard	Province	Total Population	No. of Populat	tion Living in Flo (000)	od Hazard Area	Share of Population Living in Flood Hazard Area (%)			
		(000)	High	Moderate	Total	High	Moderate	Total	
Flood	Metro Manila	12,877	3,078	3,551	6,630	23.9	27.6	51.5	
	Bulacan	3,292	1,369	902	2,271	41.6	27.4	69.0	
	Rizal	2,884	508	74	582	17.6	2.6	20.2	
	Laguna	3,035	36	1,767	1,803	1.2	58.2	59.4	
	Cavite	3,678	633	450	1,083	17.2	12.2	29.4	
	Total	25,766	5,624	6,744	12,369	21.8	26.2	48.0	
Landslide	Metro Manila	12,877	-	501	501	-	3.9	3.9	
	Bulacan	3,292	88	24	112	2.7	0.7	3.4	
	Rizal	2,884	793	966	1,759	27.5	33.5	61.0	
	Laguna	3,035	210	364	574	6.9	12.0	18.9	
	Cavite	3,678	64	238	302	1.7	6.5	8.2	
	Total	25,766	1,155	2,093	3,248	4.5	8.1	12.6	

 Table 2.3.8 Population Living in Flood Hazard and Landslide Hazard Area

Source: Population Census 2015, MGB



Source: MGB

Figure 2.3.2 Hazard Area of Flood and Landslide

(2) Earthquakes

2.48 A number of faults located in Metro Manila and GCR can potentially cause significant damage. The last damaging earthquake in Metro Manila was the magnitude 7.3 Casiguran earthquake in August 1968. Considering the interval of the movement of the West Vally Fault System (WVFS), it has been said that the next big earthquake can occur anytime soon.

2.49 The VFS is an active fault system in the Greater Metro Manila Area (GMMA) with fault traces 10-km long East Valley Fault in Rizal and 100-km long West Valley Fault. The latter segment runs through different cities and towns of Bulacan, Rizal, Metro Manila, Cavite, and Laguna (Figure 2.3.2), and could possibly generate a magnitude 7.2 (M7.2) earthquake, which is almost as strong as the recent Nepal earthquake with magnitude 7.8 (M7.8). The East Valley Fault could generate a magnitude 6.2 (M6.2) earthquake. Ground shaking, liquefaction, tsunami, landslide, and fire are considered earthquake-related

hazards (Figure 2.3.4).



Source: GMMA-READY Project




Source: GMMA-READY Project.

Figure 2.3.4 Regional Vulnerability against Earthquake

2.50 The damage estimate from the West Valley Fault with a magnitude 7.2 would be 88.1 million m^2 of total floor area entirely collapsed, 31,000 fatalities, 126,000 serious casualties, and Php2,269 billion of economic losses. Infrastructure and lifelines would be heavily damaged.

2.51 There is also a tsunami hazard estimate based on a Manila Trench earthquake scenario with a magnitude 8.3. A tsunami of 3.5 to 5.5 m height is likely and arrival time is more than one hour after earthquake occurrence.

Table 2.3.9	Estimated Damages	s of Metro Manila fro	om a West Valley Fa	ault Earthquake
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Damag	M7.2	M6.5	
Total Floor Area in Complete to C	88.1	65.4	
Total Floor Area in Slight to Exter	172.9	162.8	
Total Fatalities (000 person)	31	23	
	Very Serious	14	10
Total Injuries (000 persons)	Serious	112	85
	Slight	385	302
Total Economic Losses (Php bil.)		2,269	1,773

Source: GMMA-READY Project

6) Summary of Issues

2.52 Issues on environmental sustainability in Mega Manila can be divided into the following:

- (i) Natural environment. Metro Manila had lots of green spaces in the 1980s, but have now diminished. The lack of green space gives more stress to residents. Children may not experience to play outside and feel the nature, which could make them more creative rather than play with computers, mobile phones, etc. Greenery can also absorb air pollution, but there is also the lack of trees in Metro Manila.
- (ii) Air pollution. Air pollutants emission is mainly from vehicles. As traffic volume increases, air environment worsens. The introduction of clean fuel, biofuel, and biodiesel has reduced pollution emitted by vehicles and has declined dust particles in the air. However, air pollution is still a critical issue in Metro Manila. There is a worldwide movement to expand the use of electric vehicles (EV), which are already being introduced on a pilot basis by ADB and private sectors. Although this movement is at its infant stage, the EV can provide a solution.
- (iii) Disaster risks. Mega Manila is highly prone to the natural disasters such as floods, landslides, and earthquakes. In Metro Manila, informal setters have a tendency to live along a water body that exposes them to flood risks. For earthquakes, government agencies have been conducting earthquake drills since 2015, but the vulnerability of infrastructures is still high and some government agencies are located in high risk earthquake areas.
- (iv) **Water pollution**. Water pollution is generated is mainly due to the lack of wastewater treatment system. Wastewater is discharged directly to the water body, which pollutes water channels Manila Bay and Laguna Lake.

2.4 Social Issues

1) Informal Settlers in Metro Manila

2.53 High population growth plus non-affordable housing resulted in the prevalence of urban poor⁵ including informal settlers throughout the region. The number of urban poor in Metro Manila is 506,053 in 2017. About 40% of urban poor concentrates on Quezon City, followed by City of Manila (11%), Taguig (6.3%) and Pasay (5.7%). Informal settler families (ISFs) along waterways also concentrate in Quezon City (17.2%). While Tondo is known as a slum in City of Manila, Payatas is the famous slums in Quezon City where new smoky mountains developed. Location of informal settlers is shown in Figure 2.4.1.

LGU		Urban Poor Fa	amilies (2017)	ISF along Waterways (2012)		
		No.	%	No.	%	
1	Caloocan	17,558	3.5	6,012	10.0	
2	Las Piñas	17,256	3.4	2,590	4.3	
3	Makati	4,460	0.9	1,810	3.0	
4	Malabon	23,310	4.6	3,991	6.6	
5	Mandaluyong	23,250	4.6	662	1.1	
6	Manila	55,693	11.0	2,249	3.7	
7	Marikina	9,088	1.8	430	0.7	
8	Muntinlupa	26,513	5.2	3,686	6.1	
9	Navotas	11,806	2.3	6,017	10.0	
10	Parañaque	14,645	2.9	914	1.5	
11	Pasay	28,790	5.7	4,200	7.0	
12	Pasig	10,557	2.1	7,449	12.4	
13	Pateros	3,709	0.7	1,869	3.1	
14	Quezon City	195,061	38.5	10,367	17.2	
15	San Juan	11,758	2.3	1,375	2.3	
16	Taguig	31,689	6.3	3,672	6.1	
17	Valenzuela	20,910	4.1	2,837	4.7	
	Total	506,053	100	60,130	100	

Table 2.4.1 Informal Settler Families along Waterways in Metro Manila in 2012

Source: No. of Urban Poor Family: Presidential Commission of Urban Poor, No. of ISF along waterways: LGUs

2) Shortage of Affordable Housing

2.54 Lack of affordable housing is a persistent, massive problem. Housing backlogs in Metro Manila and GCR are 310,480 and 567,733 units in 2016, respectively (Table 2.4.2). The housing backlog (or unmet housing needs) of GCR accounts for more than 45% of the country. Of which, Metro Manila accounts for more than 50% because of the presence of huge number of informal settlers.

⁵ According to the Presidential Commission for the Urban Poor, the urban poor is defined as individuals or families in urban areas with incomes below the poverty line as defined by the National Statistical Coordinating Board (NSCB).



Source: Metro Manila Urban Services for the Poor Project (ADB, 2006). The Study on climate Change Impact over Asia Mega Cities Phase 2 (JBIC 2008).

Figure 2.4.1 Locations of Informal Settlers in Metro Manila in 2007

Table 2.4.2	Housing	Backlog	in	GCR ^{1/}
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	Status	NCR	Region 3	Region 4-A	PH
	Rent-free without Consent of Owner	151,542	33,186	58,322	513,022
HHs in	Homeless	2,249	598	678	5,192
Unacceptable	Dilapidated/ Condemned	8,952	5,826	7,539	87,025
Housing Units	Makeshift/Salvaged Materials	21,086	16,616	25,299	159,807
	Sub-total	183,828	56,225	91,837	765,045
Doubled-Up HHs in Acceptable Housing Units		126,652	42,573	66,617	476,953
	Total	310,480	98,799	158,454	1,241,998

Source: HUDCC 1/ as of December 2016

3) Resettlement from High Hazard Risk Areas

2.55 Households residing in high and moderate hazard risk areas is 1.6 million and 2.1 million households, respectively. This includes 60,000 ISFs located along priority waterways who are to be relocated during the last administration together with budget allocation. However, finding relocation sites became constraints. Like other resettlement programs, the sites for relocating households is far from original locations and difficult to commute. Finding alternative sites is always a major issue in the program.

4) Lessons and Learnt from the Previous Relocation Programs

2.56 There have been attempts to address the issues of housing and informal settlers. Some LGUs crafted resettlement programs, but are constrained by the lack of relocation sites within their boundaries, compounded by resistance at the host or receiving communities. Supposedly, Republic Act No. 7279 would solve the dilemma as it requires subdivision developers to allocate 15% for socialized housing and condominium developers to allocate 5% for socialized housing—within the subdivision or another site, or at equivalent cost—but this formula has not succeeded to increase supply of socialized housing.

2.57 Even when the relocation site is developed and people are relocated, those people often return to Metro Manila. This is because the relocation sites are far from the cities where people do not have access to the social and economic infrastructures. In some cases, housing at the relocation sites do not have electricity, water supply, toilet, etc. As well, people do not have opportunities for work at relocation site or nearby.

5) Summary of Issues

2.58 Resettlement needs in Metro Manila mainly comprises of (i) those who are residing in hazard risk area; (ii) those who occupy public land illegally; and (iii) those who will be affected by construction of infrastructures, which is expected to increase due to Build!Build!Build!Program. The demand is so large that government must take a lead to address the issue involving LGUs and private sector.

3 Review of Existing Development Policy and Plans

3.1 In order to response the emerging urban issues, the Philippines Government has formulated several policies and plans. Those policies and plans were reviewed to examine the development direction of the Philippines Government. In addition, the status of priority projects in Roadmap 1 was studied to confirm the implementation progress of Roadmap 1.

3.1 Spatial Development Policy and Plans

1) AmBisyon Natin 2040

3.2 AmBisyon Natin 2040 represents the collective long-term vision and aspirations of the Filipino people for themselves and for the country in the next 25 years. The vision of AmBisyon Natin 2040 is: *"The life of all Filipinos in 2040: Matatag, Maginhawa at Panatag na Buhay.* (By 2040, Filipinos enjoy a strongly rooted, comfortable, and secure life.)"

3.3 By year 2040, Filipinos will all enjoy a stable and comfortable lifestyle. They will be secure in knowing they have enough for their daily needs and unexpected expenses and they can plan and prepare for their own and their children's future. Families live together in a place of their own and they have the freedom to go where they desire; protected and enabled by a clean, efficient, and fair government.

3.4 The following are priority sectors that have direct impact on AmBisyon (Figure 3.1.1):



Housing and Urban Development

Construction, construction-related manufacturing, house development-related manufacturing, and utilities (electricity, gas, and water).



Education Services Formal education and ^Lre-tooling services.



Manufacturing

Food processing, housing ^Lrelated, constructionrelated, ^Ltransport manufacturing, and other manufacturing.



Tourism and Allied Services Resort, rest-recreation hotels, accommodation, travel and tour cultural shows, heritage sites, etc.



Connectivity

Roads and bridges, port, airports, vehicles, transport ^Lsystems, and communication.



Agriculture

Food production, commercial and industrial crop, agricultural biotechnology, etc.





Financial Services

Primary, secondary, and tertiary care, pharmaceuticals, wellness facilities, sports and fitness facilities, etc.

Source: AmBisyon Natin 2040

Health and Wellness Services

Consumer financing, enterprise financing, and insurance savings mobilization.

Figure 3.1.1 Priority Sector in AmBisyon 2040

2) The Philippine Development Plan 2017–2022

3.5 The Philippine Development Plan (PDP) 2017–2022 was officially approved by the National Economic Development Authority (NEDA) Board in February 2017. The development plan aims to lay a stronger foundation for inclusive growth, a high-trust society, and a globally-competitive economy towards realizing the vision by 2040. The target of PDP 2017–2022 is to reduce poverty incidence from 21.6 percent in 2015 to 14.0 percent by 2022.

3.6 To support a higher growth trajectory and improve the quality of life in both urban and rural communities, infrastructure development will remain among the top priorities. Moreover, initial steps were taken towards developing new railway and other mass transit systems in and outside Metro Manila. For more efficient use of road infrastructure, the movement of people and goods will be prioritized over private vehicles. The desired shift from private to public transport with emphasis on mass transport will be encouraged by ensuring the accessibility, availability, affordability, adequacy, convenience, and reliability of rail transport and bus rapid transit (BRT) systems.

3.7 The National Spatial Strategy (NSS) aims to decongest Metro Manila and direct growth to key centers throughout the country where the benefits of agglomeration can have greater potentials of being realized. The NSS consists of regional agglomeration with growth in key centers, connectivity, and reduction of vulnerability. The key principles of spatial strategy are as follows:

- (i) integration of leading and lagging areas and urban-rural linkages through transportation networks;
- (ii) improvement of access to social services;
- (iii) identification of locations for major infrastructure to maximize their benefits;
- (iv) improvement of local, national, and international connectivity; and
- (v) promotion of sustainable development and resiliency.

3.8 Based on population trends, service catchments, and economic activities, the country's settlements were classified into three-tiered networks and these are (i) metropolitan centers, (ii) regional centers, and (iii) sub-regional centers. In the Greater Capital Region (GCR), the proposed network settlements are as follows (Table 3.1.1):

Table 3.1.1 Network Settlements of Greater Capital Region in PDP 2017–2022

	Network	Province	LGU
Metropolitan Cente	rs	Metro Manila	
Regional Centers	Regional Administrative	Pampanga	San Fernando City
	Center	Laguna	Calamba City
	International Gateways		Angeles City
	Others	Nueva Ecija	Cabanatuan City
		Tarlac	Tarlac City
		Zambales	Subic-Olongapo City
		Bataan	Balanga City
		Bulacan	Baliuag, Malolos City
		Cavite	Dasmarinas City
		Rizal	Antipolo City
		Batangas	Batangas City
		Quezon	Lucena City
Sub-regional	Industrial Centers	Laguna	Biñan, Santa Rosa

	Network	Province	LGU			
Centers		Batangas	Lipa City			
	Others	Tarlac	Capas, Concepcion			
		Pampanga	Arayat, Lubao, San Fernando City			
		Bulacan	Hagonoy, Mabalacat, Marilao, Mexico,			
			Meycauayan, San Ildefonso, San Jose del Monte			
			City, San Migue, Santa Maria			
		Bataan	Mariveles			
		Nueva Ecija	San Jose			
		Cavite	Bacoor City, Gen. Mariano Alvarez, General Trias			
			City, Imus City, Silang, Tanza			
		Rizal	Baras, Cainta, Rodriguez, San Mateo, Taytay			
		Laguna	Cabuyao, San Pablo, San Pedro			
		Batangas	Nasugbu, Tanauan City			
		Quezon	Sariaya			

Source: Philippine Development Plan 2017–2022

3) Regional Development Plan of the National Capital Region 2017 - 2022 (RDP-NCR)

3.9 The RDP-NCR 2017-2022 contains sectoral assessment and outlines the opportunities and challenges that face each thematic area. The Metro Manila Greenprint 2030 which identified the long-term vision for Metro Manila also guided the crafting of the development direction and priority strategies for the region. The RDP, as a development instrument, provides a strong basis for the determination of a strategic framework which will effectively guide the identification of priority programs, projects, and policy interventions to operationalize the RDP-NCR. This in turn will help ensure the attainment of development targets, in support of the President Rodrigo Roa Duterte's 0-10 Point Socioeconomic Agenda, AmBisyon Natin 2040, PDP 2017-2022, and 2030 Agenda for Social Development. This plan is intended to be used by stakeholders and partners as a tool to build on the promise of the region to transform Metro Manila into a highly competitive Asian metropolis in the future.

4) Metro Manila Greenprint 2030

3.10 The Metropolitan Manila Development Authority (MMDA) embarked on creating a green development plan for the metropolis to replace the outdated Metro Manila Development Plan. The vision of this plan is "Metro Manila for all; Green, connected, resilient; Offering talent and opportunity; Processing knowledge and delivering services at home and abroad." This plan also recommends relocation of the majority of commercial airport functions of NAIA to a site that has road and rail access to major urban nodes as well as realization of the full potential of Clark International Airport near Angeles City.

3.11 The vision will be achieved through a two-pronged approach, which divides goals into strategic areas (Figure 3.1.4). The first strategic area identifies major economic opportunities that could improve livelihoods in Metro and Mega Manila. The second strategic area focuses on physical interventions that will attract and sustain competitive industries and talent by making Metro Manila an inclusive, connected, and resilient metropolis. These strategic areas complement and reinforce each other.

3.12 The spatial strategies for Metro Manila Greenprint 2030 was planned to be developed in Phase 2. However, as of August 2017, no Phase 2 was conducted.



Figure 3.1.2 Two Strategic Areas in Metro Manila Greenprint 2030

5) Central Luzon Regional Development Plan 2017–2022

3.13 Central Luzon Regional Development Plan (RDP) 2017–2022 states that the vision of the region is: "to have globally competitive human resources, a highly productive and profitable agricultural sector, seamless and integrated physical access, and a transshipment and logistics hub in the Asia-Pacific Region."

3.14 In the Central Luzon RDP 2017–2022, the spatial structure of settlement is proposed as a five-tiered hierarchy that follows the principle of concentration. The upper tier is composed of Metro Cabanatuan, Metro Tarlac, and Metropolitan Clark Area (MCA). Metro Cabanatuan and Metro Tarlac are necessary components of the north–south link, while MCA is the industrial and residential heartland of Region 3. The W-growth corridor spatial strategy of Region 3 hastened the development of the emerging regional growth center (Metro Subic, Metro Balanga, and Metro Baliuag). Metro Baliuag is one of the key expansion centers of Mega Manila while Metro Subic and Metro Balanga are critical to the development of GCR.

3.15 Access and circulation between and among the different sub-regional, provincial, and town centers will be facilitated through the development of backbone, lateral, and strategic all-access roads. The critical sections of the existing MacArthur and Pan-Philippine Highways (north–south arterial backbone roads) will be rehabilitated or widened

Cagayari Valk Regia Noco Regio 1:1,333.662 Central Luzo Legend Metro Region **Regional Centers** CALABARZON Subregional Centers **Provincial Centers** al Centers MIMAROPA Source: Corpus, 2012

to improve capacity (Figure 3.1.2).

Source: Central Luzon Regional Development Plan 2017 - 2022

Figure 3.1.3 Twin-spine Connectivity Framework Showing Linkage between Urban Centers

6) CALABARZON Regional Development Plan 2017–2022

3.16 The CALABARZON Regional Development Plan (RDP) 2017–2022 states that the vision of Region 4-A is "a region of vibrant economic diversity and vitality with progressive, well-planned town clusters inhabited by God-loving people enjoying globally competitive, balanced, and resilient ecosystems."

3.17 To realize the region's vision, in 2011, the plan proposed a spatial development

strategy called Center/Cluster-Corridor-Wedge (CCW) to enhance development along the west–east and north–south axes. However, this was refined in CALABARZON RDP 2017–2022 and a five-tier network or hierarchy of settlements was proposed, which became consistent with the population and economic trends. The five-tier network of settlements proposes growth bias towards the upper part of the hierarchy that are the settlements belonging to the regional, sub-regional and—to a certain extent—the provincial centers. Under this network, the five regional centers in Region 4-A, namely Antipolo City, Batangas City, Calamba City, Dasmariñas City, and Lucena City, serve as regional markets and service centers to several provinces.

3.18 Consistent with the spatial development strategy of the country (concentration, connectivity, and vulnerability reduction), settlements were grouped based on their commonalities in terms of physical configuration, roles, and socio-economic potentials and constraints to improve their viability and competitiveness in the role they are expected to perform (Figure 3.1.3).

3.19 The Framework Strategy prioritizes the strengthening of the west–east connections to open opportunities for eastern waterfront and logistics development and to harness the potentials for development and growth in areas towards the Pacific Ocean from west to east. This west–east development direction will be pursued using a two-pronged approach:

- (i) strengthening of east-west connections; and
- (ii) implementation of a special area development program; a proposal to be known as the Manila Bay-Pacific Coast Metropolitan Region.



Source: CALABARZON Regional Development Plan 2017–2022

Figure 3.1.4 Calabarzon Quadrant and Cluster Framework Concept

7) Provincial Physical Framework Plan in Mega Manila

3.20 The Provincial Physical Framework Plan (PPFP) of Bulacan Province is not updated. The PPFP of Bulacan currently in use by the provincial government is the 1998–2008 version.

3.21 The adopted spatial strategy of Bulacan PPFP 1998–2008 is agri-industrial development. This strategy proposes a phased urban development process. In the spatial development concept, three major growth centers were identified to optimize the population distribution, namely Malolos–Meycauayan Urban Core, Norzagaray–San Jose Del Monte Growth Corridor, and Plaridel–Baliuag Growth Corridor. In order to support the proposed spatial development, several transportation projects were selected as priority projects including NLEx East Alignment, East–West Connector Road, Manila–Clark Rapid Railway System, and Plaridel–Baliuag Bypass Road.

8) MCA Preliminary Master Development Plan

3.22 The MCA spans over seven local government units (LGU) including Mabalacat, Angeles City, Porac, San Fernando, Mexico, and Bacolor. Mabalacat, Angeles City, San Fernando, and the Clark Freeport Zone (CFZ) comprise the inner core while parts of Mexico, Porac, and Bacolor make up the outer core. Over the long term (beyond 20 years), the MCA shall expand into the Greater MCA that will further include Bamban, Magalang, Arayat, Sta. Rita, and Guagua. Beyond 50 years, the Greater MCA is expected to expand to Mega MCA that would further include Floridablanca.

3.23 CFZ/CSZ will be the main economic driver of MCA and considered the central business district (CBD) of the metropolis. This primary business district will be supported by the following secondary growth centers: Mabalacat CBD, an old city center of Angeles; Porac secondary business district (SBD); and, San Fernando SBD. In order to promote the connectivity and accessibility to CBDs and SBDs, the following transportation projects are expected for implementation (Figure 3.1.5):

- (i) North Rail (Manila to Clark);
- (ii) West Rail (Clark to Subic) and East Rail (Clark to Tarlac);
- (iii) NLEx Service Road (West) or R2A;
- (iv) Dau-Magalang Road Extension (Dau Expressway to Angeles-Magalang Road);
- (v) Dau–Magalang–GGLH (elevated) or R-5;
- (vi) Southwest Loop Road;
- (vii) Road linking Angeles Magalang to Sta. Ines;
- (viii) East–West Road; and,
- (ix) more transit systems.



Source: Metropolitan Clark Area Preliminary Master Development Plan

Figure 3.1.5 Development Framework of Metropolitan Clark Area

9) Clark Green City

3.24 The recently approved Clark Green City (CGC) Project by NEDA is envisioned to become the Philippines' most modern and first technologically-integrated city with a mix of residential, commercial, agro-industrial, institutional, and information technology developments, while also having a green, sustainable, and intelligent community for its residents, workers, and business establishments (Figure 3.1.6). The 9,450 ha area of CGC is located within CSEZ. The development focuses on two key elements: (i) area's natural resources and ecosystems as the defining factors of development, and (ii) smart urban development. The development is generally mixed-use and structured into five districts defined by their main functions, namely Government District; Central Business District; Academic District; Agri-Forestry Research and Development District; and, Wellness, Recreation, and Eco-tourism District. The design competition for Clark Green City's conceptual master development plan is currently under formulation by a private firm. The first phase of the development of CGC would cover 1,300 ha. At full development, the future population projection is about 1.1 million residents and 800,000 workers.



Source: BCDA

Figure 3.1.6 Masterplan of Clark Green City

10) Comprehensive Land Use Plan of Cities and Municipalities

3.25 Although preparation of the comprehensive land use plan (CLUP) is mandatory for LGUs, many of them are outdated especially from those outside Metro Manila due to lack of human and financial resources (Table 3.1.2). The stated visions of LGUs are shown in Table 3.1.3.

				Latest CLUP Approved Year (No. of LGUs)						Provincial
LGUs		No. of LGUs	1980s	1990—1994	1995—1999	2000—2004	2005—2009	2010—2015	Approved CLUP (No. LGUs)	Plan Approved Year
Motro Ma	nila	17	0	0	0	11	1	4	0	-
	anna	17	0.0%	0.0%	0.0%	64.7%	5.9%	23.5%	0.0%	-
	Aurora	8	0	1	0	4	0	1	2	2002
	Bataan	12	0	1	0	11	0	0	0	2002
	Bulacan	24	6	4	5	6	2	0	1	2002
Desien	Nueva Ecija	32	1	1	2	26	2	0	0	-
Region	Pampanga	22	1	0	0	11	8	0	2	1999
	Tarlac	18	0	1	1	15	1	0	0	2001
	Zambales	14	1	0	7	5	1	0	0	2001
	Sub-total 130	120	9	8	15	78	14	1	5	-
		130	6.9%	6.2%	11.5%	60.0%	10.8%	0.8%	3.8%	-
	Batangas	34	3	0	2	22	5	0	2	1999
	Cavite	23	1	1	2	16	3	0	0	2006
Doglan	Laguna	30	1	0	2	22	3	0	2	2002
Region	Quezon	41	2	0	4	33	2	0	0	-
IV-A	Rizal	14	0	0	0	13	1	0	0	2000
	Sub total	140	7	1	10	106	14	0	4	-
	Sub-iolai	142	4.9%	0.7%	7.0%	74.6%	9.9%	0.0%	2.8%	-
	Total	200	16	9	25	195	29	5	9	-
	TUIDI	200	5.6%	3.1%	8.7%	67.7%	10.1%	1.7%	3.1%	-

Table 3.1.2	Existing	Comprehensive	Land Use	e Plans of LGUs
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Source: HLURB

Table 3.1.3 Development Visions of LGUs in Metro Manila

LGUs	Development Vision	Year of CLUP
Caloocan	The Historical City of Caloocan envisions itself to be progressive, accessible, self-reliant, resilient, peaceful and dynamic that welcomes new enterprise for economic growth with a sustained and balanced ecology that gives the highest premium to the needs of its citizenry.	2016 - 2025
Marikina	An industry and government-friendly, happy working- class community	2000–2010
Makati	Makati shall lead the Philippines in the 21st century; its global and national enterprises, leading the creation of a new responsible and sustainable economy; its citizens, productive, empowered and God-loving.	2013–2023
Malabon	"Mapagkalingang Pamahalaan sa Maginhawa at Masayang Malabonian" The oneness of the governing body and people leads to a dynamic and fruitful reality. The city government of Malabon's way of connecting with its people is by providing practical programs that would help improve their quality of life. In return, its citizenry recognizes the governing body by actively supporting the participating in its project. Proper coordination between the government and the people contributes towards a progressive future.	2018-2027
Mandaluyong	A world-class city of God-centered, responsible and resilient society living secured in a well-planned, sustainable and peaceful environment that nurtures inclusive economic growth towards global competence, under a leadership that is visionary, dynamic and pro-active.	2017-2032
Manila	A distinctly livable and progressive Manila, sustained by a common understanding of its unique heritage and an appreciation of the individual's role as trustee of the natural, physical, and economic environment.	2002–2012
Las Pinas	A well-planned, safe, progressive, resilient, gender, sensitive and environmentally sustainable city that is home to a healthy, selfreliant, and disciplined citizenry enjoying access to public services and resources that helps nurture altruistic families and foments community relations governed by a responsive, transparent and accountable leadership.	2016- 2025
Muntinlupa	We envision Muntinlupa City as one of the leading investment hubs in the country, with educated, healthy and God- loving people living peacefully and securely in a climate change-adaptive and disaster-resilient community, under the rule of transparent, caring and accountable leadership.	2016–2026
Navotas	Navotas as a world class Fishing and Industrial Eco Port with a God-Fearing, family oriented, disciplined, resilient and empowered citizenry, living in an ordered, green and aesthetically pleasing urban setting, supported by adequate, responsive, efficient, progressive infrastructure, sheltered by an ecologically balanced, sustainable, safe environment, strengthened by a financially self-sufficient, economically viable, dynamic local economy administered by a responsive, committed and strong leadership governance.	2016 - 2025
Paranaque	A prime habitat city of the Metro south with quality education, cultural, social justice, and a healthy environment sustained by an economically competitive and sound governance, synergized by capable, participative, and God-fearing citizenry.	2011 - 2025
Pasay	To serve the constituents and stakeholders of Pasay with enthusiasm, efficiency, and a firm commitment to adhering to the principles of good governance; and to provide services and infrastructure essential to making Pasay City a progressive, healthy and peaceful place worthy of respect and emulation	2015-2023
Pasig	Pasig City (The "City") is envisioned to be a healthy, livable and sustainable Ecopolis and a model of Urban development characterized by a vibrant and globally-competitive economy; disciplined empowered and resilient communities; with world-class infrastructure systems; led by a responsive, transparent and proactive City Government with a heart and conscience for good governance.	2015–2023
San Juan	A City of Excellence: A globally competitive community of dynamic, productive and empowered citizenry inspired by their rich historical and cultural heritage propelled by a sustainable and progressive economic in a healthy, peaceful, disaster-resilient and eco-friendly environment	2013–2023
Pateros	Pateros as an urban village sustained by the information economy and a healthy, educated, highly skilled and empowered citizenry living in a peaceful, orderly and environmentally sustainable community achieved through a highly responsive local government leadership.	2000–2010
Taguig	One of the Premier Cities in Asia" Taguig's image of rural-ness and isolation has been challenged by the city's dramatic vision for its future. The Taguig Strategic Concept Study is a step in translating that vision into reality. Taguig is already remarkable- internationally-for its social and visual diversity. From its western boundary with Forbes Park to Laguna de Bay, Taguig presents a rich palette of contrast: low-rise housing with a view of a 50-storey towers; dense neighborhoods looking out into open fields, Ian historic old town and a 21st century business district, the American memorial that is a focus of international tourism, and the lakeside barangay of Napindan, currently well outside the tourist orbit	2000–2020
Quezon City	Quezon City is set to assume a major role as the: Green lung of Metro Manila Knowledge industry capital of the Philippines Health and wellness center in Asia	2011–2025
Valenzuela	A Modern and World Class Valenzuela City in the 21st Century	2019–2018

Source: CLUP of each LGU

3.2 Transport Development Policy and Plans

1) National Transport Policy (NTP)

3.26 The NTP envisions the establishment of "a safe, secure, reliable, efficient, integrated, intermodal, affordable, cost-effective, environmentally sustainable, and peopleoriented national transport system that ensures improved quality of life of the people" as the Transport Vision.

3.27 The Philippine Government will adopt the NTP to achieve the Transport Vision, which all elements of the transport system and all sub-sectors of transportation, including passengers, shippers, service providers, investors, agencies and instrumentalities of government and those involved in the movement of people and goods and in the provision of transport infrastructure, facilities and services, shall abide by and use as guidance in transport development, management, operations, and use.

3.28 The NTP covers the following policy focus areas:

- (i) Resource Generation, Allocation, and Cost Sharing;
- (ii) Program and Project Selection;
- (iii) Cost Recovery and Subsidies;
- (iv) Regulation of Passenger Transport Services;
- (v) Transportation Management in Urban and Regional Areas;
- (vi) Support to Other Economic Sectors; and

(vii)Governance and Institutions.

3.29 The NTP was approved and adopted by NEDA Board in June 2017 meeting and is expected to unify all transport-related projects in the country.

2) Philippine Transportation System Master Plan (PTSMP)

3.30 The formulation of a comprehensive transport master plan on a nationwide scale is one of the strategies espoused in the NTP particularly to ensure the holistic and evidence-based program/project selection process.

3.31 The study aims to come up with a master plan, formulated based on a detailed assessment of the existing national transport network and the results of a comprehensive analysis of the gaps therein.

3.32 The PTSMP aims to guide the rational development of an intermodal transport network in the country through coordinated planning and operation of projects and programs as an integrated network of intermodal sub-systems. It also aims to promote sub-regional economic cooperation/agglomeration and utilization of multimodal transport system for more efficient connectivity between industrial/production areas, major cities, and rural areas in line with the Government's direction to decentralize development away from highly urbanized cities and metropolis.

3.33 The PTSMP is still on its early stages as of the writing of the planning document and is expected to be conducted and completed for a period of 12 months.

3) Public Utility Vehicle Modernization Program (PUVMP)

3.34 The PUVMP is a road-based transport reform program that envisions a

restructured, modern, well-managed, and environmentally sustainable transport sector where drivers and operators have stable, sufficient, and dignified livelihoods while commuters get to their destinations quickly, safely, and comfortably. It was declared that with the program, "By 2022, Filipinos will have a pleasant commuting experience."

3.35 The main objectives of the PUVMP are the following:

- (i) Modernize the current PUV fleet;
- (ii) Reform and consolidate the industry;
- (iii) Move towards low emission PUVs;
- (iv) Improve welfare of commuters and encourage modal shift; and
- (v) Improve standards of living of drivers, operators, and their families.

3.36 It is envisaged that the benefits of the PUVMP are (i) congestion reduction especially in highly urbanized area; (ii) improvement of public transport level of service; (iii) passenger and commuter welfare; (iv) Improvement of welfare for the transport sector; (v) creation of more jobs/employment by engaging the local manufacturing industry; (vi) reduction of both environmental and social costs (health) through less production of carbon dioxide and particulate matter emissions; and (vii) improvement of take-home pay for the drivers. The major components of the PUVMP are shown in Figure 3.2.1.

3.37 The Department of Transportation (DOTr) is in the process of seeking the support of all stakeholders for the government initiative to upgrade public utility jeepneys as part of the PUVMP.



Source: DOTr

Figure 3.2.1. Major Components of the PUV Modernization Program

4) High-Standard Highway Master Plan

3.38 In response to the request of the Government of the Republic of the Philippines, the Government of Japan decided to conduct the "Study of Master Plan on High Standard Highway Network Development in the Republic of the Philippines" and entrusted the study to the Japan International Cooperation Agency (JICA), which was conducted from April

2009 to May 2010.

3.39 The objectives of the High-Standard Highway Master Plan were the formulation of a Development Strategy for the High-Standard Highway (HSH) Network and the formulation of the High-Standard Highway Master Plan with the goal of eventually providing transport facilities that assure high mobility and high transport capacity.

3.40 The study areas covered by the HSH Master Plan were the 200-km radius area from Metro Manila, Metro Cebu, and the Tagum–Davao–General Santos Corridor. The location map of the study area is shown in Figure 3.2.2.



Source: The Study of Masterplan on High Standard Highway Network Development in the Republic of the Philippines

Figure 3.2.2. Location Map and Study Areas of the High-Standard Highway Masterplan

3.41 In September 2017, JICA and the Department of Public Works and Highways (DPWH) signed for the second phase of the Project for Master Plan on High Standard Highway Network Development and the project is in preparation stage (as of October 2017).¹ The project, which is a follow-up on the High-Standard Highway Master Plan, will cover the entire Philippines, formulate nationwide high-standard highway network and identify infrastructure projects that can be implemented until 2040.

5) Status of Priority Projects in the Transport Roadmap 1

(1) Progress of the Priority Projects

3.42 The Transport Roadmap 1 proposed 21 road projects, 10 railway projects, 3 roadbased public transport projects, 3 traffic management projects, 3 airport projects, and 5

¹ http://www.dpwh.gov.ph/dpwh/news/12149

port projects for the short-term (Table 3.2.1). In terms of the hard infrastructure component, three expressways and one railway projects were already completed by 2018.

3.43 While most road and railway projects were under study or construction and are subject to completion by around 2020, less progress can be seen in airport and port projects.

3.44 Considering the commitment on the NLEX–SLEX Connectors, North–South Commuter Railway, and Mega Manila Subway, the spatial development direction of Mega Manila is north–south direction as the previous roadmap proposed.

No		Name of Project	Amount (PHP mil)	Status	NEDA Board Approval	Schedule	Remarks
Urba	n Road						
1.	Missing Links of C5	Flyover on CP Garcia in Sucat Coastal Rd/C5 Ext'n South Flyover	251 210	Under construction		2017– 2019	New project name: C5 South Link Project Ongoing construction; 16%
		C5 South Ext'n Flyover at SLEX	235				completed as of April 2018.
2.	Global City–O	rtigas Link Road	8,120	Procurement	2015	2012– 2020	New project name: Bonifacio Global City to Ortigas Road Link Project
3.	Skyway/FTI/C	5 Link	17,880	Final Engineering Design (FED)		2016– 2020	New project name: Metro Manila Expressway Project (C6)
4.	C3 Missing Lir	nks (S. Juan to Makati [Sta. Ana oval])	24,000	-	-	-	New proposal of 8.6- kilometer C3 Elevated Expressway by Ayala and SM
5.	EDSA Rehabi	litation	3,744	-	-	-	
	Dioridal	Package 3		Construction	2016	2018– 2022	Near completion
6.	Plaridel Bypass	Package 4	3,341	Noticed proceed issued	-	-	Notice to proceed issued to CM Pancho on 16 May 2016.
7.	EDSA–Taft Fl	yover	3,033	D/D was completed in 2013	-	-	
8.	Metro Manila I Packages	nterchanges Construction Phase IV: 7	4,129	-	2014	2018– 2020	
Expre	essway		-	-		-	-
1.	Daang Hari–S	LEX Link Toll road	2,010	Operational since 2015	-	-	
		Link Expressway (MNTC)	25,556	D/D is on-going	2015	2017– 2021	Target construction starts in 2019,
2.	NLEX-SLEX	Metro Manila Skyway Stage 3 (CITRA)	26,500	Construction	-	2015– 2019	38.49% completed as of April 2018.
	Connectors	Seg. 9&10, and Connection to R10	8,600	Project development	-	-	New project name: NLEX Harbor Link, Seg.10 Seg. 9 is completed in 2015.
3.	NAIA Expressway, Phase 2		15,520	Operational since 2017	2015	2013– 2017	
4.	CALA Express	sway, Stages 1 and 2	35,420	Construction	2013	2017– 2020	6.92% completed as of April 2018.
5.	CLLEX Phase	I (La Paz, Tarlac–Cabanatuan)	14,936	Construction	2011	2012– 2017	Phase II is under F/S.

Table 3.2.1 Status of Priority Projects in the Previous Roadmap

No	Name of Project		Amount (PHP mil)	Status	NEDA Board Approval	Schedule	Remarks
6.	Calamba–Los Baños Expressway			-	-	-	Project was integrated into Laguna Lakeshore Expressway Dike (LLED)
7.	C6 Extension–Lak	teshore Dike Road	18,590	Scoping Study	-	-	New project name: Laguna Lakeshore Expressway Dike (LLED). ADB is currently conducting a scoping study on the project.
8.	Segment 8.2 of NI	LEx to Commonwealth Ave.	7,000	ROW Acquisition	-	2019– 2021	ROW Acquisition is from second quarter of 2017 to 4th quarter of 2018
9.	STAR Stage II (Ba	atangas–Lipa)	2,320	Completed on 21 May 2015	-	-	
Othe	r Roads		T		Γ	Γ	
1.	Secondary Road I	Packages	23,000	-	-	-	
2.	Preparatory Studie	es for Several Projects	500	-	-	-	
3. 1	Other Central Luz	on Road Projects	16,000	-	-	-	
4. Railw			30,300	-	-	-	
1.	LRT1–Cavite Exte	ension (Niyog)	63,550	Construction	-	2017– 2021	Groundbreaking held on 4 May 2017
2.	LRT2-East Extens	sion	9,759	Construction	2012	2015– 2019	
3.	MRT3 Capacity Expansion		8,633	Implementation	-	-	48 Coaches arrived. The coaches cannot use due to signaling system.
4.	MRT 7 stage1 (Qu	uezon AveCommonwealth Ave.)	62,698	Construction	2013	2017– 2020	
5.	AFCS Common T	icketing System	1,722	Operational since 2015	-	-	
6.	System Rehabilita	tions for LRT1 and 2	6,067	Implementation	-	2011– 2020	26 Projects were already completed and 9 are on- going.
7.	Mega Manila Nort	h-South Commuter Railway	24,800	Construction	2015	2016– 2023	
8.	Metro Manila CBD) Transit System Project Study	75	Completed in 2015	-	-	
9.	Mega Manila Subv	way Study	120	On-going DE/D	-	2018- 2025	
10.	Common Station f	for LRT1, MRT3, and MRT7	1,400	-	2013	2016– 2019	The final agreement was signed in 2016.
Road	-based Public Tran	sport		Desi			
	Integrated Transport	North		Project development	-	-	
1	System (Provincial Bus	South	5,080	Pre-construction	2014	2016- 2019	Groundbreaking on January 17, 2018
	Terminal)	Southwest		Construction	2014	2015– 2018	75.83% complete as of April 2018.
2	Public Road Pass	enger Transport Reform Study	60	-	-	-	PUV Rationalization Program is on-going
3	BRT System 1		3,200	Procurement	2015	2017– 2020	Along Quezon Ave.
Traffi	c Management		0.000				
<u> </u>	Iviodernization of	Famic Signaling System	3,309	Implementation	-	-	
Ζ.	Systematic Road	Salety Interventions	1,000	-	-	-	

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Chapter 3 Review of Existing Development Policies and Plans

No	Name of Project		Amount (PHP mil)	Status	NEDA Board Approval	Schedule	Remarks	
3.	Comprehensive Traffic Management Study		50	Implementation	-	-	The project was official started in March 2019.	
Airpo	ort							
1	NAIA	Airside package	4 240	Development/	-	-		
I	Improvements	Landside package	4,249	Implementation	-	-		
2	Clark International Airport Construction of a Budget/LCC Terminal		7,070	Project development	2015	2016– 2020	BCDA is taking a lead to do Terminal 2.	
3	Feasibility Study of a New NAIA		50	Pre-F/S was completed in 2015	-	-	After the Pre-F/S, 2 unsolicited proposals were submitted.	
Port							•	
1	Projects for North	Harbor	6,000	-	-	-		
2	Projects for South Harbor			-	-	-		
3	MICT		4,000	-	-	-		
4	Feasibility Study of NH Redevelopment			-	-	-		
5	Other Ports		1,010	-	-	-		

Source: JICA Study Team complied the information from several agencies.

(2) Evaluation of Completed Projects

3.45 The impact of completed projects, namely NLEx Segment 9, NAIA Expressway (NAIAX) and Muntinlupa-Cavite Expressway (MCX). The detail of the projects are shown in Figure 3.2.3.



	NLEx Seg. 9	NAIAX	MCX	
Length (km)	2.4	4.7	4.0	
Structure	At-grade	Elevated	At-grade	
No. of Lane	4	4	4	
No. of Access Point	4	11	2	

Source: JICA Study Team

Figure 3.2.3 Profile of Completed Projects

3.46 In order to evaluate the impacts of completed projects, the transport indicators were computed for with and without case of the completed projects. The results show that the Volume Capacity Ratio was slightly improved in Metro Mania while it was increased in the adjoining provinces. In addition, the transport cost and congestion cost in Mega Manila were also increased with the completed projects.

3.47 This was happened because the completed projects contributed to improve the traffic situation in Metro Manila as a whole, but the traffic congestion became worse along the specific sections. This resulted in increasing the transport cost of Metro Manila.

3.48 For BRCL, the entire traffic situation did not changed since the completed projects are located in Metro Manila. However, some people shifted to use the expressways. Those people need to take a long way but are able to save the travel time.

3.49 In order to avoid this kind of situation, the access road should have improved and/or constructed together with the completed expressways considering the road network as a whole.

Indicators		2012 (actual)			2017 (w/o completed projects)			2017 (actual)			Achievement		
					(A)		(B)			(C) = (B) - (A)			
		Metro Manila	BRLC	Mega Manila	Metro Manila	BRLC	Mega Manila	Metro Manila	BRLC	Mega Manila	Metro Manila	BRLC	Mega Manila
Network Performance	Volume Capacity Ratio (V/C Ratio)	1.3	0.5	0.8	1.0	0.9	1.0	1.0	0.9	1.0	-0.02	0.01	0
Transport Cost	Transport cost (PHP bil./day)	2.4	1.0	3.4	3.4	2.4	5.8	3.5	2.4	5.8	0.06	-0.03	0.02
	Congestions cost (PHP bil./day)	1.5	0.3	1.8	2.5	1.7	4.2	2.5	1.7	4.2	0.04	-0.04	0.01

Table 3.2.2 With-Without Analysis on Completed Projects

Source: JICA Study Team



Source: JICA Study Team

Figure 3.2.4 Impact of Completed Projects

3.3 Other Related Policies and Plans

1) Flood Management Master Plan for Metro Manila and Surrounding Areas

3.50 First phase of the Master Plan, the Metro Manila Flood Management Project - Phase 1, is being implemented by the DPWH together with the MMDA. Time frame of implementation is from 2018 - 2023. The project amounting to 500 million USD is being funded by the World Bank and the Asian Infrastructure Investment Bank.

3.51 The Project follows a programmatic approach and aims to improve flood management in selected areas of Metro Manila through 1) Modernizing Drainage Areas, 2) Minimizing Solid Waste in Waterways, 3) Participatory Housing and Resettlement, and 4) Project Management and Coordination. Among the project activities for 2019 include purchase of solid waste management equipment, development of Metro Manila Solid Waste Management Master Plan and implementation of Community-based Solid Waste Management System.

2) Developing a National Informal Settlements Upgrading Strategy of the Philippines (NISUS)

3.52 This was prepared with financial and technical support from Cities Alliance and World Bank. This will address the informal settler families (ISFs) mostly living in urban poverty. One of its major tasks is to reform the government's program on housing as it is too small in relation to what is needed to support the number of ISFs.

3.53 The vision statement is, "ISFs transformed into formal urban residents in resilient, vibrant, and connected communities." The mission states, "Profound commitment to a more dignified life for at least one million ISFs by 2025 through secure and better quality housing, improved physical infrastructure and social services, and greater access to jobs, transport, capital, and livelihood."

3.54 This will be a 10-year program that consists of three projects with the following components: (i) an investment component to prepare and implement informal settler upgrading and new towns through LGU standalone or Public-Private Partnerships (PPP) projects; (ii) a housing finance and microfinance component; a policy and institutional reform component; and (iii) a capacity development component. Some priority actions include (i) guiding future land development within the context of city-wide development, climate change adaptation, and disaster risk reduction management; (ii) programs that incorporate informal settlement upgrade, income, and employment generation; (iii) offering affordable housing programs with lower loan to value ratios and eliminating interest rate subsidies for government ISFs housing finance; and (iv) enhancing sectors that cater to ISFs such as the HUDCC, DILG and KSAs as they plan, design, and implementing other urban development strategies and ISF housing.

3) National Urban Development and Housing Framework (NUDHF) 2017 - 2022

3.55 The NUDHF provides an overarching framework for urban development and housing, consisting of a vision, policy statements, and strategies, encompassing core development sectors and spatial elements. It is intended to guide the efforts of the Philippine government, private sector, and other stakeholders in improving the performance and efficiency of the country's urban systems.

3.56 The NUDHF is intended to be used primarily to guide the formulation and

implementation of plans, programs, and activities (PPAs) of national government agencies and local government units. It provides the private sector, academe, non-government organizations, professional organizations, people's organizations, and other stakeholders with information and possible avenues of collaboration.

4) Metro Manila Earthquake Contingency Plan (Oplan Yakal Plus)

3.57 Oplan Metro Yakal Plus, the contingency plan of the Metro Manila Disaster Risk Reduction and Management Council (MMDRRMC), details the protocols and procedures that would take place in the event of a 7.2 magnitude earthquake.

3.4 Build!Build!Build! Program

3.58 President Duterte's administration released a 10-point Socio-economic Agenda as follows.

- (i) Continue and maintain current macroeconomic policies, including fiscal, monetary, and trade policies.
- (ii) Institute progressive tax reform and more effective tax collection indexing taxes to inflation.
- (iii) Increase competitiveness and ease of doing business. This effort will draw upon successful models used to attract business to local cities (e.g., Davao) and pursue the relaxation of the constitutional restrictions on foreign ownership, except in regard to land ownership, in order to attract foreign direct investment.
- (iv) Accelerate annual infrastructure spending to account for 5% of GDP, with PPPs playing a key role.
- (v) Promote rural and value chain development toward increasing agricultural and rural enterprise productivity and rural tourism.
- (vi) Ensure security of land tenure to encourage investments and address bottlenecks in land management and titling agencies.
- (vii) Invest in human capital development, including health and education systems, and match skills and trainings to meet the demand of businesses and the private sector.
- (viii) Promote science, technology, and creative arts to enhance innovation and creative capacity towards self-sustaining, inclusive development.
- (ix) Improve social protection programs, including the government's Conditional Cash Transfer program, to protect the poor against instability and economic shocks.
- (x) Strengthen implementation of the Responsible Parenthood and Reproductive Health Law to enable especially poor couples to make informed choices on financial and family planning.

3.59 Among the reforms that will drive this agenda is the acceleration of infrastructure and the development of industries that will yield robust growth across the archipelago, create jobs, and uplift the lives of Filipinos. Infrastructure is among the top priorities of this administration. Public spending on infrastructure projects could reach PHP8–9 trillion from 2017–2022.²

1) Flagship Transport Projects in Build!Build!Build! Program

3.60 The Build!Build!Build! Program is the administration's comprehensive infrastructure development program launched in April 2017. The program identified 70 infrastructure flagship projects or high impact projects. Among the 70, 19 projects are located in Mega Manila. Besides the flagship projects, four projects were also listed as key projects. See Table 3.4.1 for all projects in the Build!Build!Build!Program.

3.61 The projects for Mega Manila are composed of expressway, urban road, railway, road-based public transport, and traffic management. Completion of most of the projects is within or by end of current administration, i.e. by 2022. However, seven projects are still

² Source: Build!Build!Build! Portal (http://www.build.gov.ph/)

under project development. In terms of location, most of the projects are concentrated in Metro Manila rather than adjoining provinces (Figure 3.4.1).

	Category	Project Name	Cost (PHP Bil.)	Schedule	Implementing Agency	Status
		NLEX-SLEX Connector Road	23.2	2014-2021	DPWH	Implementation
		NAIA Expressway Phase II	17.9	2013-2017	DPWH	Implementation
	Expressway	NLEX Harbor Link, Segment 10	9.0		DPWH	Project Dev't
		Cavite - Laguna Expressway	35.4	2013-2020	DPWH	Implementation
		Laguna Lake Highway	123	2020–2025	DPWH	Procurement
	Urban Road	BGC to Origas Road Link Project	5.6	2017–2020	DPWH	Procurement
		Mega Manila Subway	355	2017–2024	DOTr	Project Dev't
		PNR North 1 (Malolos – Tutuban)	105	2016-2021	DOTr	Implementation
		PNR North 2 (Clark – Malolos)	139	2018-2024	DOTr	Project Dev't
	Railway	PNR South Commuter (Tutuban – Calamba)	134	2018–2021	DOTr	Project Dev't
Flagship		LRT 1 South (Cavite) Extension Project	65.9	2017–2021	DOTr	Implementation
PIUJECIS		LRT Line 2 East (Masinag) Extension Project	0.9	2015-2019	DOTr	Implementation
		Line 7 (MRT 7)	62.7	2016-2019	DOTr	Implementation
		Unified Common Station	2.8	2016-2019	DOTr	Procurement
	BRT	Metro Manila BRT- Line 1 (Quezon Avenue BRT)	4.8	2017–2020	DOTr	Project Dev't
		Metro Manila BRT- Line 2 (Central Corridor)	37.8	2017-2020	DOTr	Procurement
		BGC to NAIA BRT System	24.0	2016-2021	BCDA	Project Dev't
	Road-based Public	South Integrated Transport System (bus terminal)	4.0	2016–2019	DOTr	Implementation
	Transport	Southwest Integrated Transport System (bus terminal)	4.0	2015–2018	DOTr	Implementation
	Expressway	Skyway Stage 3	26.7		DPWH	Implementation
Other Koy		C5 Expressway	13.6		DPWH	Project Dev't
Projects	Railway	LRT1/MRT3 Capacity Expansion	10.7		DOTr	Implementation
	Traffic Management	Intelligent Transport System (traffic signal)	4.7	2012–2022	MMDA	Implementation
Total			1,210			

Table 3.4.1 Main Projects in Build!Build!Build! Program

Source: Build!Build!Build! Program website, NEDA





2) Impact of Build!Build!Build! Program

3.62 The Build!Build!Build! Program was evaluated from the economic and environmental viewpoints by comparing the current and do-nothing situations and Build!Build!Build!Program in 2035 (Figure 3.4.2 and Table 3.4.2).

3.63 Metro Manila traffic situation in 2035 will improve, even compared with the current situation in 2017. If nothing is done, the volume capacity ratio can reach 1.15 by 2035 and the congestion cost at that time will be PHP3.3 billion per day. But with the Build!Build!Build!Program, the volume capacity ratio could be 0.79 only with congestion cost of PHP2.4 billion per day. However, the access roads to CBDs such as in Makati, Ortigas, and BGC would still be congested. Therefore, CBD access must be strengthened.

3.64 On the other hand, congestion in adjoining areas will be more significant. More projects would be required, however, being there are few Build!Build!Build! projects in the adjoining areas of Metro Manila. With Build!Build!Build! projects, the situation will improve comparing with do-nothing scenario, but similar to current traffic condition.

		Indicators	2017	2035	2035	
			-	Do Nothing	With B!B!B! Project	
		Traffic demand (mil. trips/day)	13.4	16.1	16.1	
	Demand	Rail Ridership (mil. pax/day)	1.3	1.5	2.9	
		Expressway (000 pcu/day)	558	742	903	
Metro	Network	Volume Capacity (V/C) Ratio	0.98	1.15	0.83	
Manila	Performance	Average Travel Speed (kph)	11.9	9.0	15.0	
	Feenemie	Economic Cost of Transport (PHP bil./day)	3.5	5.4	3.0	
	Economic	Congestion Cost (PHP billion/day)	2.1	3.3	1.4	
	Environment	CO2 Emission (tons/day)	16,269	20,687	15,952	
		Traffic demand (mil. trips/day)	5.1	6.9	6.9	
	Demand	Rail Ridership (mil. pax/day)	-	-	0.8	
		Expressway (000 pcu/day)	244	385	491	
Adjoining Areas	Network Performance	Volume Capacity (V/C) Ratio	0.90	1.30	0.92	
		Average Travel Speed (kph)	11.0	6.4	8.9	
	Foonomia	Economic Cost of Transport (PHP bil./day)	2.3	6.1	4.3	
	ECONOMIC	Congestion Cost (PHP billion/day)	0.9	2.7	2.1	
	Environment	CO2 Emission (tons/day)	11,421	18,854	15,815	

Table 3.4.2 Impact of Build!Build!Build! Program

Source: JICA Study Team



2035 (Do-nothing)





3.5 Review of Existing Development Policy and Plan

3.65 In general, the current development polices and plans are in line with the proposed development directions in Roadmap 1, which is addressing the current urban development issues. As a foundation of entire development orientations, the spatial plans encourage the urban development toward north and south directions. This spatial plan is supported by the north-south commuter railways and expressways as north-south backbone. The proposed spatial structure will manage the urban growth of Mega Manila to decongest Metro Manila. On the other hand, the issue on ineffectiveness of CLUP is not addressed yet. This is very important to materialize the proposed spatial structure at local level.

3.66 In order to decongest Metro Manila, shifting to public transport use is encouraged in the relevant plans as well as on-going, committed and planned projects in Build!Build!Build! Program. Number of railway projects and the PUVMP will be the key for public transport promotion. However, the delay in railway projects is notable. As well, the unsolicited railway projects are emerged every so often, which are not considered the entire railway network.

3.67 The approach in road network development including expressways is not sufficient to mitigate the road traffic in Mega Manila. Although High-Standard Highway Master Plan was formulated, the urban expressway network is not included, which benefit to decongest at-grade traffic. Furthermore, the road network development in the adjoining provinces is not considered.

3.68 For the environmental and social issues, there are several plans and on-going projects. However, the sectoral plans and projects are focusing on each sector only. Considering the urban development issues are interrelated, the comprehensive development plan is necessary for Mega Manila which is missing in the existing development policies and plans.

4 Goals and Strategies

4.1 Goals and Transport Sector Strategies

1) Sustainable Transport

4.1 Sustainable urban development is the goal to achieve. Sustainability is defined as economic sustainability, social sustainability, and environmental sustainability. In Mega Manila, transport is the key driver to promote sustainable urban development because of the scale of the problems and the impact of transport on daily activity of the people, hazard risk management, and affordable housing. They are interactive as shown below.



Source: JICA Study Team

Figure 4.1.1 Sustainable Transport Development Concept in Mega Manila

4.2 The previous Transport Roadmap intended to find out if there is a solution to improve current traffic situation significantly and if the transport sector can contribute to the sustainable development of Metro Manila through five ways as follows:

- (i) No traffic congestions (economic, social, and environment);
- (ii) No air pollution (health and global warming);
- (iii) No barrier for seamless mobility (economic and social);
- (iv) No excessive transport cost burden for low income groups; and
- (v) No households living in high hazard risk areas.

4.3 The urban development issues facing Mega Manila is still the same and even has been worsen comparing with the time when the Transport Roadmap 1 was formulated. After formulating Transport Roadmap 1, national and regional development plans were updated and revised as well as some sectoral development plans were formulated as discussed in *Chapter 3*.

4.4 The general direction is the same as Transport Roadmap 1, and the spatial development concept, which encourages urban development in north and south, is assured by on-going and committed transport projects of NSCR, Mega Manila Subway, Metro Manila Skyway Stage 3 and NLEx-SLEx Connector. However, most of the priority projects proposed in Transport Roadmap 1 which was supposed to complete by 2016 or 2018 at the latest are delayed in their progress. This also indicates the medium and long-term projects of Transport Roadmap 1 are also in delay.

4.5 In order to achieve the sustainable urban development of Mega Manila, the development strategies need to be updated considering the current situation and the progress of the project implementation.

2) Proposed Spatial Structure in GCR

4.6 Spatial structure in GCR is highly mono-centric with the prominent feature of Metro Manila. Although developments are taking place in Clark, Subic and Tarlac on the north and in Batangas, Cavite and Laguna on the south, they are still pre-matured and implemented in an uncoordinated manner.

4.7 In order to develop GCR and Mega Manila sustainably, the spatial structure must shift from monocentric to polycentric. Growth centers will be developed in a hierarchical manner and in a way that they are connected and form clusters. The hierarchical development of urban centers and clusters can decentralize and complement the functions of each urban center and cluster.

4.8 The north-south transport corridors can minimize negative impacts on the environment and avoid hazard risks. These north-south transport corridors can be realized by the construction of North-South Railway, Mega Manila Subway, Skyway Stage 3 and NLEX-SLEX Connector Road. With the introduction of proposed development concept and strategies, the future will be different.

Current Spatial Structure (Monocentric)

Proposed Future Spatial Structure (Polycentric)



Source: JICA Study Team



3) Transport Sector Strategies

(1) Ensure the Achievement of Goals and Objectives

4.9 While it is not difficult to define vision and goals and objectives, it is nothing if they are not achieved. For the update Transport Roadmap, leverage on the north-south mass transit backbone and transformation of Metro Manila's urban structure will be the breakthrough to change the situation of Mega Manila.

4.10 The most significant decision on the new administration is to the commitment of the North–South backbone transport infrastructure such as North–South Commuter Railway (NSCR), Mega Manila Subway Project (MMSP), and NLEx–SLEx connectors. They will provide ample opportunities to function other transport projects and plans more efficiently. To decongest Metro Manila by encouraging the integrated urban development with transport.

4.11 Metro Manila is given an opportunity to transform the urban area in a more sustainable manner. They are specifically as follows.

- (i) Leverage the Impacts of North-South Transport Backbone. Development of growth centers will be in a hierarchical manner and in a way that they are connected and have formed clusters; the urban centers and clusters should be developed hierarchically to decentralize and complement the functions of each urban center and cluster. Metro Manila's urban structure needs to be transformed in two ways. Firstly, the transport network in Metro Manila needs to be shifted from the combination of circumstance and radial structure to ladder structure. The current system could be effective when the main urban center was only City of Manila and traffic demand concentrate there. Currently, there are several CBD and people travel from/to outside Metro Manila. Therefore, Metro Manila needs to be linked to the adjoining areas with ladder structure of road network, particularly north and south. Secondary, the urban issues Metro Manila has been facing such as traffic congestions, resettlement of households from high hazard areas, provision of affordable housing, among others cannot be solved within Metro Manila anymore. Considering the current urban areas are already expanded to the adjoining provinces, Metro Manila should transform to Mega Manila including Bulacan, Rizal, Laguna and Cavite provinces to decongest and sustain the urban expansion as a largest metropolitan area in the Philippines
- (ii) Leverage on the North-South Mass-transit Backbone. The north-south backbones are composed of NSCR and MMSP as public transport corridor that are supplemented by NLEx, SLEx, Skyway and NLEx-SLEx Connector. NSCR will connect Clark to Calamba City in Laguna via Manila City, while Metro Manila Subway will connect San Jose del Monte City in Bulacan to Dasmarinas City in Cavite via main central business districts in Metro Manila such as Ortigas and Bonifacio Global City. The north-south transport corridors can minimize negative impacts on the environment and avoid hazard risks. The roles of two public transport corridors are:
 - (a) **North–South Commuter Railway**: Provide rapid access from Pampanga, Bulacan, and Laguna to the center of Metro Manila, and provide opportunities of further development along the line especially outer areas.
 - (b) Metro Manila Subway: Provide and strengthen main transport corridor in Metro

Manila and create new urban centers along the line.

(iii) Expressway to Long Haul and Freight Traffic from Congested at-grade Roads. The north–south expressways including C5–Dyke Road will help the decongestion of road network in Metro Manila. The current through traffic can shift from at-grade roads to those expressways, in particularly freight traffic.

(2) Round-the-Clock Improvements

4.12 There are many big-ticket projects which are going on, committed and planned, such as expressway and railway projects. However, it takes long time to implement and complete these projects. Therefore, day-to-day efforts are important to maintain and improve the current situation. The required actions include the following.

- (i) Constant traffic management using ICT/ITS: Nowadays, there many technologies are available for traffic management using ICT and ITS. Traffic information sharing using ITS has been already conducted by MMDA. However, ICT/ITS can be applied for more aspects in including traffic demand management, parking management, operating and monitoring of public transport system, road maintenance, etc. (see more detail in *Chapter 4.2*)
- (ii) Constant removal of bottlenecks: There are huge numbers of bottlenecks in Metro Manila, which is generally at intersections, bus stops, etc. This cannot be solved naturally. If nothing was done, more bottlenecks will be generated. It is also important to look at the problem in the area, not only the site. The traffic flow succeeds to the adjoining intersections. So another bottleneck might be generated at the adjoining intersections even if the bottleneck at the specific intersection was solved.
- (iii) **Plan long-term projects and implement short-term actions:** As mentioned above, big-ticket projects take long time to implement and complete the constructions, so it is important to plan now for the long-term. On the other hand, while planning/studying those projects, there are many small projects which can implement from tomorrow such as traffic management.

(3) Coordinate Sectors

4.13 Developing the transport infrastructure and services is not a goal, and this is a tool to solve the urban issues and sustain the urban development. In order to maximize the effect of transport development, sectoral coordination is essential. They are more specifically as follows.

- (i) Transport, urban development, and disaster risk reductions: Transport development can encourage the transformation of urban structure of Metro Manila and create the opportunities for people to relocate from the disaster risk areas. Therefore, the planning for transport, urban planning and disaster risk reduction and management should be integrated.
- (ii) Road, rail network, bus/jeepney: Unless pretty good public transport system and services are provided, it is hopeless to have the modal shift from private vehicle use to public transport use in the Philippines. Therefore, it is important to have a balance among the transport sub-sectors considering the demand and supply. In addition, people usually need to transfer from one mode to another when they use the public

transport. It is also important to ensure providing the appropriate inter-modal facilities at the transport node such as railway stations, bus terminals, etc., walkable environment at/around railway stations, bus terminals and other inter-modal facilities, and convenient time schedule for transfer with good coordination among different modes.

(iii) **Involve LGUs:** Although many big-ticket projects are implemented by the national government, the LGUs have facing the actual urban issues. Moreover, LGUs are more close to the stakeholders including the residents rather than the national government and they have their own projects. Without good coordination among the national, regional, provincial and local government agencies, the project implementation can generate negative impacts unnecessary. For example, the national government dig the road to install the drainage pipe after LGU paved the road.

4) Transport Network Development

4.14 Transport infrastructure must not be built section by section or line by line, but as an integrated network to ensure seamless movement of the people.

4.15 In order to achieve the above goals, transport network and services must be designed as follows:

- (i) Hierarchical: The network must be designed in a way that it is a configured efficient network comprising of primary (high standard at regional level), secondary (main network at provincial/municipal level which is connected with primary network effectively to articulate basic transport network to serve the region/province), and tertiary network (main local transport network to connect communities with primary/secondary network). In addition, it is also necessary to consider the combination of level of services, i.e., local train, rapid train, express train and others as well as reserved seat and non-reserved seat.
- (ii) **Multi-modal:** Effective use of and connectivity between different transport modes such as rail, road, expressway, water, air as well as car, bus jeepney and others to satisfy diversified transport demands and provide choices for users is important.
- (iii) **Disaster-resilient:** Transport network must be disaster proof and designed in a way that it can provide alternative route.
- (iv) **Intelligent:** Available equipment and soft measures which can farther increase efficiency and service level of transport system must be incorporated in the transport system.
- (v) **Service-oriented rather than hard infrastructure:** Transport system must be always developed in a way that it serves users.
- (vi) **Transit-oriented:** Transport network must be transit-oriented to maximize the amount of residential, business and recreational spaces within walking distance to and from public transport services.

4.2 Traffic Management

1) Current Situation

(1) Traffic Situation in Mega Manila

4.16 Traffic congestion in Mega Manila has been getting worse as more vehicles enter the network. The number of registered vehicles in Greater Capital Region increased about 1.5 times over a 10-year span 2006 – 2015 (Figure 4.2.1). Motorcycle/tricycles and SUV/utility vehicles accounted for more than 35% each in NCR; while motorcycle/tricycles were predominant (> 50%) in Region 3 and Region 4. Since the figures only reflect domicile, the actual number of motor vehicles during daytime in Metro Manila is likely more.





4.17 Traffic congestion has been spreading quickly over Metro Manila, especially outer areas due to the expansion of urban areas and accelerating motorization. It is obvious that the traffic congestion is no longer an issue of Metro Manila.

(000	Metro Manila		
Metro Manil	21,724		
Adjoining	Bulacan	399	
Provinces	Rizal	1,432	
	Laguna/Cavite	511	
	Total	2,342	

Note: excluding intra-zonal trips



Source: JICA Study Team

Figure 4.2.2 Traffic Demand and Distribution in Mega Manila

4.18 Traffic demand spreads over the day from 6am to 9pm without significant peakhour period. This forces commuter long travel time to and from offices. Average travel time of "to work" trips has been increasing.



Source: JICA Study Team

Figure 4.2.3 Hourly Distribution of Traffic at Screenline (Pasig River) of Metro Manila

4.19 The causes of traffic congestion in Metro Manila are self-evident from the following:

- (i) The road network has reached saturation levels: Traffic volumes along most of the main roads exceed their capacity especially during peak-hours. The average travel speed is also very low at 10kph. The situation is aggravated due to missing links of the network such as bridges crossing the Pasig and Marikina Rivers, or northern section of C-3. Furthermore, an urban expressway network consisting of circumferential and radial expressways is not constructed yet unlike other metropolitan areas in the world.
- Bottlenecks at intersection, despite signalization: 70 intersections and seven road sections were identified as major bottlenecks in Metro Manila by MMDA (Figure 4.2.2). Of the 70 intersections, 60 intersections are signalized – indicating the need for grade-separation to boost road capacities.
- (iii) Misused of road space: illegal parking, use of public roads for car repairs, occupancy of sidewalks and road lanes by ambulant vendors, car-owners without off-street garage, add to further reduction of available roads.
- (iv) Poor traffic discipline: Negative driving behaviour (e.g., frequent lane changing, disregard of loading/unloading points, counter flows, jumping the queues, non-observation of 'yellow lanes' or bus-priority lanes, ignoring lane markers, idling or stopping even in the middle of a road to get more passengers or until bus/jeepney is full, etc.) degrades road capacity and induces 'traffic waves' that disrupt the smooth flow.
- (v) Lack of enforcement and traffic education: Use of available road space is constrained


by both enforcement side and road users, which are both sides of a coin.

Source: JICA Study Team prepared based on the information from MMDA

Figure 4.2.4 Bottlenecks in Metro Manila

(2) Current Practices of Traffic Management by MMDA

4.20 The conventional objective function for traffic management is to narrow the gap between the design capacity of the road and the volume of vehicles. Thus, the traditional tool of coordinated traffic signals, geometric improvements, and traffic enforcement. The focal objective is to increase efficiency of operations of the existing roadway system. These tools are still valid, but no longer adequate in the current metropolitan environment and the advent of digital technologies under the rubric of Internet of Things and Smart Transportation System.

4.21 Because Traffic Management is low-cost, it is often recommended as short to medium-term strategies to mitigate traffic congestion. Among these measures are:

- Intersection and signal improvements;
- Bottleneck removal programs on arterials;
- Traffic signal and intersection improvements (e.g., signal timing optimization,

controller/cabinet and signal head upgrades, vehicle detectors repair/replacement, communication with a central system, turning lanes, pavement striping, lane assignment changes, signage and lighting)

4.22 In the GCR, particularly NCR, the MMDA has pursued traffic management with zeal on traffic enforcement – and very little on other aspects of a comprehensive traffic management solution. More tellingly, it relies heavily on personnel on the ground. Understandably, this has been erratic (due to insufficient and poorly-trained manpower) and ineffective. To cite a few examples:

- Enforcement of the bus priority scheme on EDSA has been an off-and-on affair, since 1992. The last time this was seriously undertaken was in 2015.
- Traffic enforcers still exhibit its the habit of taking over manual control of signals oblivious of the adverse effects of long cycle times and disruption of the synchronization between successive intersections.
- Event management (e.g., ASEAN and APEC) is addressed via declaration of nonworking days.

4.23 Expressed in government documents, the 'new' objective function for traffic management has shifted to the broader goal of people throughput, i.e., more persons moved per lane of road. In contrast, the previous goal was vehicle throughput. This implies a focus on getting a higher number of commuters per vehicle on the road, which is not synonymous with vehicle reduction. That the government is still enthralled by the old objective can be gleaned from its attempts to widen the 16-year old UVVRP. Had there been a real shift in objectives, traffic management should have been tweaking the buspriority policy to become more effective. Of late, there is talk of a car-pooling scheme on EDSA; which is consistent with the new objective of person throughput. Although not yet implemented, it is likely to suffer the same fate as the bus-priority scheme; it is more difficult to enforce and sustain than the car-pooling.

4.24 Looking forward to the target year 2035, rapid advances in digital technologies will impact traffic management. Already, the region has witnessed the disruptive effect of carsharing and transport network vehicles (e.g., Uber, Grab, Easy Taxi, etc.). A telecommunications company has introduced into the local market its SmartBus system that promises efficient tracking of transport units, on-board security surveillance, monitoring real-time sales through an e-ticketing system, and WIFI connectivity inside the bus. Waze and other navigation tools via smartphones are becoming popular. In other countries, pilot-testing of driverless cars, Uber-Freight, and parcel delivery via drones, are being conducted. In August 2016, Singapore commenced pilot testing of a fleet of driverless cars on the road by 2020, followed by BMW in 2021. In the USA, Ford aims to roll out a fleet of driverless vehicles in a ride-hailing or -sharing service in 2021. The overall prognosis is the mainstreaming of the many technologies within 10 years.

4.25 To be sure, the government is not oblivious of the phenomenon. It has taken cognizance. A small concession to technology is the shift to 'no contact apprehension' (started in April 2016) for traffic violators – which frees up scarce human resource, and reduces occurrence of unnecessary disruptions in traffic flow. The MMDA has entered the

'social media' (e.g. Twitter, Facebook) to alert motorists about real-time traffic conditions. These are too little too late - considering advances elsewhere and the gravity of the problem. Instead of gingerly forays, a more aggressive pursuit of digital technologies is recommended. Especially because all the road and railway infrastructure projects will need more than 15 years to complete.

2) Proposed Roadmap for Traffic Management

4.26 A conceptual Roadmap for traffic management development in the GCR is illustrated in Figure 4.2.4. It is based on a strategy of leveraging current and emerging digital technologies to achieve inclusive urban mobility. Actual sequencing of specific technologies will require a detailed feasibility study and the formulation of a long-term master plan for an Intelligent Transport System. The vision is a smart metropolis where vehicles, roads, traffic lights, message signs, etc. become intelligent by embedding them with microchips and sensors and empowering them to communicate with each other through wireless technologies. Phasing is not intended to be discrete, but continuous, early measures serve as foundation or building blocks to the next; with appreciation that roll-out of technology packages would have dynamic timelines, since some may easily get off the ground, while others may get stalled. Unlike for road and rail projects, the obstacles to full-blown ITS are old laws rather than the acquisition of right-of-way. HOV and ride sharing will be also promoted utilizing ITS, which can discourage the low-occupancy vehicles.

4.27 Short-term actions with a long-term vision is important especially for traffic management. Day-to-day suffering from traffic congestions and conflicts must be addressed immediately. Lack of basic infrastructure and facilities, database required for digitalization, capacity building of traffic enforcers and institutional development for comprehensive traffic management are serious issues that they must be upgraded to move forward to the next step. As an initial improvement, for example, it is estimated that increasing in the existing road capacity by 10% can generate the benefits amount to one billion pesos per day.

4.28 In parallel, improvement and development of urban rails, expressway and roadbased public transport must be also considered and integrated with traffic management roadmap.

2018-2022	2023-2028	2028-2035
 Upgrade of traffic signals & expansion (adaptive, coordinated, syncrhonized, based on macroscopic models); Promotion of HOVs & ride sharing; Digital fleet management system for buses & jeepneys; Manual traffic enforcement improvement Institutional development 	 Next level of traffic signalization system, real-time dynamic response, using microscopic modeling; Automatic signal priority to public transit & emergency vehicles; Demand-responsive, real- time, deployment of public transport fleet Semi-automatic traffic enforcement 	 Intelligent Transport System (vehicles interact with traffic lights & other vehicles; static infrastructure interact with vehicles & drivers) Navigation of all vehicles (public and private) are guided through the network; Emergence of autonomous vehicles Automatic traffic enforcement

Source: JICA Study Team

Figure 4.2.5 Conceptual Roadmap for Traffic Management

4.29 Introduction and expansion of ITS for the GCR will be initially focused on the following areas:

- Next generation of smart traffic control system;
- Public transport fleet management (aimed at buses and jeepneys), and
- Shared personal mobility (aimed at cars, taxis, and vans).

4.30 An immediate and short-term project is to expand the existing traffic signaling system (>400 intersections to be synchronized) and upgrade it to adaptive control which allows local and global optimization. This can be considered as TEAM V project, where TEAM 1 was the initial project implemented in mid-1970s. It would require embedding new traffic sensors on the road. Sometime before 2000, traffic sensors (of the inductive loop type) were installed in major intersections but were abandoned and rendered inoperative in the decades that followed. New sensors have to be installed, to enable the operation of smarter traffic signalization and minimize demands on time of traffic enforcers. Over the last 5 years, the absence of detailed planning and engineering activities meant no major investments to expect in the next 5 years. Immediate action is therefore needed, to produce a budget (in the order of Php5.0 billion) followed by a bidding document for major system upgrade.

4.31 Another priority is the application of digital technologies on the on-going PUV Modernization Project of DOTr. This program aims to replace all outmoded jeepneys (placed at more than 200 thousand nationwide, with at least 50% in the GCR) into modern mini-buses operating as a group through consolidation (either corporate or cooperative). The critical element is the consolidation phase, and the change in the business model – away from the "boundary" mode of compensation. Revenue pooling and allocation based on vehicle-km is to be the new operating regime. It works in more developed countries because there was little fragmentation to begin with; it is unlikely to succeed in the Philippine context because of the starting condition – highly atomized and fragmented industry structure. The need for consolidation of ownership can be bypassed, by resorting to digital technologies as pioneered by Uber. The desired outcome can be realized by

resorting to digital technology. Thus, the government should learn from early transport network companies by adapting their model, and putting an Intelligent Fleet Management System at the center (not a footnote) of the PUVM program.

4.32 No less a short-term priority is the promotion (rather than the demonization) of ride-sharing and car-pooling schemes. It offers the quickest way to achieving higher people throughput per vehicle, and is more sensible than the unified vehicle volume reduction scheme. The government can contribute to the wider acceptance of these new breed of transport options by doing the following minima:

- Identifying and marking out aggregation points on digital maps, for providers of van pooling and ride-sharing applications and reference of riders:
- Physical improvements of bus stops, followed by their unique identifiers (say, a numbering system) on digital maps, as well as updated routes of buses and jeepneys, for reference of transport operators, commuters, and navigation apps;
- Systematic installation of sensors on roads and vehicles (e.g., vehicle plates with RFID) that will facilitate the future adoption of electronic road pricing, public transport fleet management, mainstreaming of automatic traffic enforcement, etc.);
- Providing up to date information to digital map providers (Waze, Google Maps, etc.) on road repairs, one-way street, temporary road closure, traffic-disrupting events, and the like.

4.33 In addition to the above mentioned traffic management measures, considering the planned Pasig River Ferry System, traffic management to secure the access to Pasig River Ferry System needs to be considered.

	Phase 1	Phase 2		
	2018-2022	2023-2029	2030 upward	
Objective of traffic management	 More Vehicle/lane/hour & priority to HOVs, particularly buses 	 People Throughput (more persons moved per hour per lane of road) in major roads 	Urban mobility (short travel time from origins to destinations) in entire network	
Digital Technology	Smart Traffic Control System	Intelligent Traffic Control	Intelligent Transport System	
Traffic management Scope	 Management of traffic flow, using historical data & pre-set response; Manual traffic enforcement; Fleet management system for bus and jeepney operators 	 Management of traffic flow using current data & dynamic response; Automatic traffic enforcement; Automatic signal priority to bus transit & HOVs 	 Management of traffic flow using real-time data & dynamic response with prediction; Public transport dispatching guided by real-time passenger demand; 	
On road sensors	 Inductive loop detection that counts number of vehicles during a unit time 	 Multiple detection devices including Bluetooth, audio and video, RFIDs for vehicles 	 Data fusion from multiple sensors; LiDAR technology detects moving & static objects, as well as discriminate 	
Motorists	 Passive recipient of traffic status; no interaction with traffic control system 	 Navigation through the road network is recommended; Interaction between in-vehicle and roadside devices 	Motorists become active participant in optimizing mobility; dynamic traffic light sequence; active priority to emergency and special vehicles; collision avoidance system	

 Table 4.2.1 Roadmap to Intelligent Transport System

Source: JICA Study Team

4.34 For a short-term action, it is intended by MMDA with a technical assistance of JICA to implement a comprehensive traffic management project for Metro Manila (the project commenced March 2019) with following objectives; (i) to formulate five-year plan which will be updated on yearly, (ii) to promote coordination with transport departments, especially DPWH and DOTr, and (iii) to enhance traffic management capacities of MMDA and Metro Manila LGUs. The project is carried out over three years involving the wider range of stakeholders.

4.3 Urban Railway Development

1) Current Situation

4.35 The railway system in Mega Manila consists of Philippine National Railway (PNR) for inter-urban or suburban service, and three LRTs for inner-city movements. PNR currently provides infrequent (and erratic) train services to the south - from Tutuban in Manila to Cabuyao in Laguna. Revival of the north commuter service (to Malolos in Bulacan) has stalled in the last decade with the failure of the Northrail project. The comparative performance of the 4 railway lines are summarized in Table 4.3.1.

Item	PNR	LRT Line 1	LRT Line 2	MRT Line 3
Guideway & Railway	At-grade	Elevated	Elevated w/UG	Elevated, w/UG
Туре	(HKT, Hallow-yauge)		(LRT, Slu yauye)	(LRT, Slu yauye)
Route	Tutuban (Manila)-	City) - Baclaran	Santolan (Pasig) to	North Avenue (Quezon
	Mamatid (Cabuyao)	(Pasay)	Recto (Manila)	City) – Taft (Pasay)
Route Length	54.0 km	18.1 km	13.5 km	16.9 km
No. of Stations	25	20	11	13
Capacity	-	1,358 pax/train	1,628 pax/train	1,182 pax/train
Max Speed	-	60 kph	80 kph	65 kph
Scheduled Speed	-	38 kph	32.8 kph	30 kph
Fare (distance-	Minimum PHP15; max	PHP11 + 1/km ^{2/}	PHP11 + 1/km ^{2/}	PHP11 + 1/km ^{2/}
based)	PHP60 ^{1/}			
Travel Time	2 hours 26 minutes	27.5 minutes	30 minutes	30 minutes
Headway	30 minutes	2 minutes	4.5 minutes	3 minutes

Table 4.3.1	Summary of Railw	vay Systems in	Mega Manila
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Source: Study Team updated based on Roadmap Study (2014)

1/ with AC, 2/ with store-value ticket

4.36 The aggregate number of railway passengers in 2015 was more than 304 million passengers - of which, MRT 3 accounted for 39%, followed by LRT 1 (34%). Passenger volumes in the four lines showed increasing growth from 2006 to 2014. The precipitous decline after 2014 was primarily caused by 45% reduction in train availability on MRT-3, about 20% on LRT-1, and ~16% on PNR. Incidents (or disruptions) on MRT3 alone was more than 10 times a week in 2017.



Source: Statistics from DOTr.

Figure 4.3.1 No. of Railway Passengers

2) Strategic Significance of Railway Development

4.37 It is nearly impossible to sustain a megalopolis the size of GCR without an extensive network of mass rail transit system. There is a limit to road expansion; whilst motor vehicles continue to grow unabated. Construction of much-needed railway lines, however, has been very slow, compounded by failure to complete committed investments. Construction of the 35-km Northrail project commenced in 2005, but was aborted in 2012 without completing a single kilometer. The 4-km extension of LRT-2 could've been completed in 2014, but the schedule has skidded to 2019.

4.38 The plans for the rail network of GCR have always been grand and ambitious, but haven't materialized for various reasons. Lethargic implementation could be ascribed to lack of financing – from 1990 to 2010. The 15-year MMUTIS Plan (see Figure 3.4.1) that was completed in 1999 contained a scaled-back rail network plan that took into account a projected budget envelope as well as corollary improvements in the road network to year 2015. Very little of this happened, as discussed in Table 3.4.1.



Figure 4.3.2 Existing and Proposed Railway Network

Name of Droject	Plan Realization	Domortico	
Name of Project	Plan for 2000–2012	Actual	Remarks
LRT-1 South Extension	Construction start in 2001 and	Deal with SNC Lavallin got scuttled.	18 years behind original
	completion by 2004. JV between	A new PPP tender was conducted;	schedule. Faulty structure of JV
	LRTA and SNC Lavallin got signed &	Concession awarded to LRMC in	and delays in the PPP tendering
	later terminated.	2015. New completion date is 2022.	
LRT-2 East Extension	Construction from 2002–2004.	The viaduct was completed in 2016,	Repetitive feasibility studies: 4
		but without tracks, station, power	done from 2006–2012.
		and signaling. New completion	Unnecessary unbundling of
		target is 2019.	project components.
LRT-2 West Extension	For implementation after 2004 and	None. No on-going effort to re-start.	Feasibility study updated in 2010.
	completion of East Extension.		
MRT-3 Phase 2	Completion by 2004 of the 4-km	Converted into an extension of Line	Connection to MRT-3 at Trinoma
	extension from North Avenue to	1 (North Loop); completed in 2010.	was deleted from North Loop
	Monumento.		project. Issue on Common Station
			with MRT-7 stretched for 7 years
PNR South Commuter	Packaged into Metro Commuter Line	DOTr disregarded MCX.	Track rehabilitation was deemed
	(MCX) as an unsolicited proposal	Rehabilitation of a 30-km line from	insufficient since double-tracking
		Tutuban to Alabang completed as	to Alabang fell short. Phase 2
		Phase 1 of N–S Linkage Project.	improvements cancelled
LRT-4	Phase 1 (Recto-to-Batasan) to be	Abandoned. Became the object of	Competing claimants on original
	completed by 2004	unsolicited proposal that never took	proponent status. BRT Line also
		off. New proposal in 2017.	adopted on same corridor.
MRT-7	Busway to be built on	Concession awarded in 2009 to	Project ownership changed hands
	Commonwealth after completion of	private proponent of unsolicited	3 times, before start of
	Line 4.	proposal. New completion is 2021.	construction in 2016.
Northrail (Manila–Clark)	Suburban commuter service	Contract with Chinese contractors	New plans as part of North-South
	between Malolos and Caloocan was	signed in 2004. Implementation	Commuter Railway. Change in
	to be completed by 2008.	problems led to contract termination	railway gauge reset timetable.
		in 2012.	Loan agreement signed with JICA
			in 2017.

Table 4.3.2 Railway Project in Last Decade

Source: JICA Study Team

4.39 Transforming the North and South Commuter service of PNR will entail doubletracking, grade separations, and new rolling stocks. On the other hand, it would be foolhardy to build a railway to Dasmarinas without first completing the LRT-1 extension to Bacoor.

4.40 The eastern side of NCR (i.e., Marikina Valley – Antipolo area) should not have been urbanized in the density now happening because the Valley is flood-prone and vulnerable to severe earthquake. This became evident when typhoon Ondoy brought heavy rains in 2008 and submerged nearly 80% of the plains. An urbanization that should have been prevented plus the lack of a high-standard trunk road have conspired to make the two east-bound roads (Ortigas Avenue Extension and Marilaque Highway) congested. Thus, the only practical option is to complete the LRT-2 extension to Masinag (or C6 junction).

4.41 The rice paddies in Bulacan, located north of Metro Manila, somehow tempered the urban spill over to the north. To relieve the pressure for conversion of agricultural lands, the revival of the PNR North Commuter Line up to Malolos is essential, its farther

extension to Clark is desirable. This line could partially compensate for the "loss" of LRT 3 extension west of Monumento – the CAMANAVA area is a casualty of swapping phase 2 of LRT-3 with the North Loop of LRT-1.

4.42 Under the MMUTIS master plan, a BRT was proposed on Commonwealth Avenue predicated on the completion of LRT-4 on Quezon Avenue. What happened is the reverse; the DOTC accepted an unsolicited proposal to build MRT-7 sometime in 2007. By 2009, the project can be considered as committed, after being subjected to a no-contest Swiss challenge. It is currently under construction, and is targeted for completion by mid-2020.

4.43 The PNR has received an unsolicited proposal for the old LRT-4 alignment on Quezon Avenue, this time re-branded as East-West Rail project. It was endorsed by DOTC to the NEDA-ICC. It is unclear whether it would be approved and proceed to implementation. If history is any guide, this project will not happen in the medium-term, especially with the government also signing a loan agreement with the World Bank for a BRT system on the same corridor. At one time, the Bases Conversion and Development Authority (BCDA) proposed a monorail system with underground route to Makati CBD. This has since been abandoned.

3) Issues on Railway Development

4.44 Rail projects are capital-intensive, high on foreign contents, and takes long to complete – from concept to commercial operations. LRT-1 has the shortest execution period of 5 years; while its extension to Bacoor has taken more than 20 years. Despite its inherently poor financial viability, unsolicited proposals abound. They require subsidy from the government. The imperative of integration – where individual rail lines form part of an integrated and/or inter-connected network – gets sacrificed in the name of expediency.

4.45 The cavalier attitude to railway development has produced unintended consequences – mostly adverse. Nothing illustrates this more than the tug-of-war on the location of the Common Station (for LRT-1, LRT-3, and LRT-7). The original plan enshrined in 1999 by MMUTIS has none, since the LRT-1 will connect with LRT-1 at Monumento, while LRT-4 & -7 will connect with LRT3 on Quezon Avenue. The construction plan for the North Loop had a transfer station at North Avenue; which was replaced by a station on Bansalangin (nearer to SM City North). It has taken 7 years (from 2009 to 2017), that held back a mere 500-km connection between Lines 1 and 3. It is important that a repeat of the problem be avoided.

4.46 The privatization of LRT-1, the increasing level of subsidy, and the sad experience with government's direct involvement in the Operations and Maintenance of the other lines (as exemplified especially on LRT-3) require a sustainable urban railway policy. This becomes even more critical in the case of MM Subway. The blending of public and private resources in the case of Bangkok's Blue Line as well as the Kuala Lumpur Airport Express are instructive for Metro Manila. For this purpose, the Philippine government can take a cue from the ADB study of 2006 "Integrating MRT in Bangkok: Options Report".

4) Proposed Roadmap for Railway Development

4.47 While it is recognized that the GCR has to play catch up game on its delayed railway plans, simultaneous execution would stretch the absorptive capacities – not only

of the infrastructure agencies but also contractors and equipment suppliers. Thus, a realistic timetable is called; else, substantial delays at enormous costs would happen. An integrated system of railway lines should guide every project decision. Table 4.3.3 outlines a carefully orchestrated roadmap. When new railways are constructed, reduction of road capacities along new railway should be minimized.

	Phase 1	Phase 2		
	2018-2022	2023-2029	2030 upward	
Strategic Thrust	 Fast track construction of shovel-ready rail projects 	New railway lines to expand urban rail network	Inter-urban railways within GCR but outside NCR	
Railway lines	Complete construction of LRT-1 south extension, LRT-2 east & west extension, MRT-7	 Complete construction of Phase 1 of Mega Manila Subway Complete the North Commuter (Tutuban to Clark) Build the South Commuter Service to Calamba East rail monorail to Taytay 	 Build Phases 2 and 3 of the Mega Manila Subway Manila-Clark Airport Express to in-City Terminal Monorail Line from Sucat to Alabang Extension of East monorail, from Taytay to Angono 	
The MRT-3 Case	 Major rehabilitation and upgrade of MRT-3 via a new PPP concession 	Revert North Loop to MRT-3 and build Depot & spur line to Malabon-Navotas	MRT-3 extension to Bay Area	

Source: JICA Study Team

4.4 Roads and Urban Expressway

1) Current Situation

4.48 Metro Manila has ten radial roads and five circumferential roads. Outside Metro Manila, MacArthur Highway is the open-access highway connecting Metro Manila with Bulacan and Pampanga Provinces. The high-capacity limited access expressways are: the 51-km South Luzon Expressway (SLEx), the 16-km Skyway above sections of SLEx; the 84-km North Luzon Expressway (NLEx) which connects to the 94-km Subic-Clark-Tarlac Expressway (SCTEx) (94km). To the southwest is the 14-km Manila-Cavite Expressway (CAVITEx).

4.49 The road system in Mega Manila is classified by administrative responsibility, which is nearly correlated with functional hierarchy. High standard roads and expressways are planned and built by the Department of Public Works and Highways (DPWH). Local roads such as city/municipality roads are under the jurisdiction of the respective local government units (LGUs). The economic regulation of privatized expressways is under the Toll Regulatory Board, which has been transferred from DPWH to DOTr.

4.50 By functional use, the national roads can be sub-divided into three categories: primary, secondary and tertiary roads. NCR has 1,161km of national roads which accounts for 85% of the national roads in Mega Manila. In terms of road density, NCR has nearly 2.0km/km² while the adjoining areas have less than 0.2km/km². The lopsided distribution is a function of the built-up space, but it also suggest the potential and the need for more roads in Bulacan, Laguna, Cavite, and Rizal.

	Area	F	Road			
	(km2)	Primary	Secondary	Tertiary	Total	Density (km/km2)
Metro Manila	620	170	393	598	1,161	1.87
Bulacan	2,796	82	18	246	347	0.12
Rizal	1,192	25	56	151	232	0.19
Laguna	1,918	117	80	152	349	0.18
Cavite	1,574	70	228	141	439	0.28
Mega Manila	8,100	294	383	691	1,367	0.17
Source: DPWH	•	•	•	•		

 Table 4.4.1 National Road Inventory and Road Density in Mega Manila in 2017

4.51 Since Metro Manila is bisected into two areas (north and south) by the Pasig River, bridge crossings funnel movements as to be chokepoints. There are fifteen bridges including small structures linking secondary roads. Additional bridges, if not expansion of existing ones, will therefore relieve current level of congestions.

2) Existing Plans for Urban Roads and Expressways

4.52 DPWH announced plans for 13 new bridges across Pasig River. This was followed by an announcement of a grant from China to build two bridges across Pasig River. There are also several urban road projects in the Three Year Rolling Plan (TRIP), but more projects are focused on Metro Manila.

4.53 The DPWH has unveiled a long term expressway network development which it dubbed as the "Luzon Spine Expressway Network" (Figure 4.4.1). Although the

implementation timetable is not clear, the implicit target is to complete 655 km of expressways by 2022. Approximately, 50% of this network are in GCR. A review of the records in the last three decades, as well as recent improvements in funding and ROW issues, suggest a more realistic 20-year horizon.



Source: DPWH

Figure 4.4.1 The DPWH Expressway Program for Luzon

4.54 The conspicuous omissions are: the Lakeshore Expressway (43-km), the Calamba-Los Baños Expressway (14.7 km), and the C-5 Expressway (46-km from Cavitex to San Jose del Monte in Bulacan). Presumably, the C-6 (proposed in the 2010 DPWH High Standard Highway program) will be in lieu of C-5. There are cogent reasons why the three projects should be included:

- Extensive studies and project preparation works have already been undertaken for the three projects. Their early realization is more likely, and lessen the infrastructure backlog.
- The Lakeshore and Calamba projects complement the flood control projects for Laguna Lake. Traffic congestions are already severe in the areas to be served. The Lakeshore project will provide relief to SLEX, which is almost a monopoly route to the south of Makati. The PPP tender in 2015 failed due to the stiff investment hurdle. It could and should be revived – by increasing the Viability Gap Funding and putting it upfront.
- An unsolicited proposal for C-5 has been submitted in early 2017 to DPWH (Figure 4.4.3). The spatial plan for GCR favors C-5 over C-6, aside from the higher natural hazard risks and do-ability for the latter.



Figure 4.4.2 Alignment of Laguna Lakeshore Expressway



Figure 4.4.3 Alignment of C-5 Expressway

4.55 There are two other expressways that have been put forwards recently by the private sector. These are:

- The NLEX-Cavitex Port Expressway Link Project, in two phases. Phase 1 is 6.4-km from R10 to MICT. Phase 2 is 8.6km from MICT to Cavitex along R-1. This was proposed by MNTC/MPIC.
- The C-3 Expressway, 8.6km from Sta Mesa to the Mall of Asia complex, submitted by AC Infrastructure to DPWH in March 2017. Variations of this project have been considered by DPWH in the last 10 years.



Source: DPWH

Figure 4.4.4 C3 Expressway to MoA

4.56 From a network standpoint, Phase 1 of the NLEX Port Link Project can be supported. It is a natural extension of Segment 10 of NLEX and its other project – the Link Expressway; aside mitigating the adverse impact of the truck ban on the operation of the gateway port of Manila. There is also a sound basis for the C-3 Expressway; but its interconnection and inter-operability with Skyway-3 and Link Expressway would be a tall order. Phase 2 of the NLEX Port Link project would face a different (albeit, non-technical) obstacle: It would be viewed as a visual pollution to the Rizal monument and a potential security risk to the US embassy.

3) Proposed Roadmap for Urban Roads and Expressways

(1) Urban Roads

4.57 The capacities of the 10 radial and 5 circumferential roads can be increased if all the interchanges proposed in the past are implemented. Many have been stalled by ROW issues. A complementary program with similar effect is the construction of modular flyovers or bridges across selected secondary arterials. Many of these roads have reached saturation levels for which signalization will not suffice. These land bridges should be simple in design (straight flyover), easy to build (less than a year to construct), billion) and not requiring additional ROW acquisition.

4.58 The traffic-impact objective is the same for major and minor interchanges: increase the capacities of existing urban roads by eliminating at-grade conflicts, thereby reducing turning and travel times, increasing average travel speeds, and reducing overall vehicular operating costs. The average EIRRs for the major interchanges exceeded 20%. The economic benefits of the secondary interchanges would likely be higher as the traffic per lane are almost the same. Calculation of economic benefits need not be detailed, or conducted per intersection; a benefit curve can be derived that relates the volume of traffic with corresponding benefit values – using data from previous interchange projects.

4.59 A quick ocular survey of various intersections in the metropolis easily revealed more than 10 congested intersections that can justify a flyover based on the aforementioned criteria. The number could easily exceed 20, if supplemented by traffic counts and data from the Traffic Engineering Center as to signalized intersections with long turning times. Easily, six (6) potential intersections can be scoped (Figure 4.4.5).

- (i) Alabang-Zapote Road: The most problematic is that crossing with BF Resort Drive and CAA Road, which involve at least 4 traffic patterns. The other five are T-junctions – which entail 3 traffic movements. A 4-lane flyover could be built in the middle of the Alabang-Zapote Road that would permit unimpeded flow of vehicles on the east-west direction. North-south traffic on BR Resort-CAA Road would be at-grade and signalized.
- (ii) Alejo Santos Avenue: Four intersections are potential sites, all of which are T-junctions. A flyover in one direction would suffice to relieve congestion. This is illustrated below for the junction with Juanita de Leon. A single or dual lane flyover could be built along Alejo Santos Avenue for south and east bound traffic. There is no need to provide a flyover for traffic in the opposite direction. Those bound for J de Leon would remain atgrade and controlled by signal lights.
- (iii) C-2 Quirino Avenue and Otis: The southern approach to Nagtahan (Mabini) Bridge is constrained by the high volume of traffic coming from Otis and intending to cross the bridge, as well as the cross-traffic that delays the flow on Quirino Avenue (C-2). It has two lanes each direction and ends at same elevation as the crest of the Mabini Bridge. It will be on the southern approach to Mabini Bridge. Possible complication is the existing Mabini Bridge, which may not be capable of supporting the northern landing of the flyover. In such a case, extending the flyover up to northern end of Mabini Bridge needs to be
- (iv) Ortigas Avenue Extension crossing with Imelda-Bonifacio Avenues: A 2-lane flyover for both directions along Ortigas Avenue will remove many traffic conflicts at the intersection. The Imelda-Bonifacio Avenues are also congested because of traffic between Marikina and Pasig cities. Through traffic along Ortigas Avenue will thus be unhampered by the cross-town traffic.
- (v) CM Recto and Jose Abad Santos: A 2-lane flyover along CM Recto Avenue will allow unimpeded flow of traffic, and reduce delays for vehicles on J. Abad Santos – in crossing and turning left to CM Recto.
- (vi) Congressional and Mindanao Avenues: The proposed flyover will be built along Congressional Avenue as it intersects with Mindanao Avenue. The high volume of left-turning vehicles on Mindanao Avenue will remain at-grade.

4.60 The preceding six (6) flyovers are not exhaustive, they are meant only to illustrate the opportunities of relieving traffic congestion in Metro Manila at the shortest possible time. More intersections can be identified for implementation over the next 5-year period from 2017-2022. Project preparation works can be done in the 2nd semester 2018. Recommended criteria for intersection selections are as follows:

- Currently congested, with long delays exceeding 2 minutes;
- Traffic signalization is no longer a viable option;
- The primary road is at least 3 lanes, preferably 4 lanes or more, to permit space for the flyover on the median;
- Required flyover should be simple, straight in configuration, to be suitable for modular, relocatable, and standard structure; and,

- (i) CM Recto-J. Abjad Santos (ii) C-2 Quirino Ave. (iii) C-2 Quirino Ave. (iii) delgo Santos Avenue (ii) delgo Santos
- Potential intersections which will be congested after constructing urban expressways.

Source: JICA Study Team prepared using Google Earth

Figure 4.4.5 Location of Proposed Flyover

4.61 The DPWH has to create an investment package for these interchanges, rather than for only one flyover. For example, PHP10 Billion for 10-15 flyovers. Otherwise, it has to go back to NEDA-ICC and to Congress for each and every flyover. This will be time consuming, and such an approach would undermine its rationale: rapid construction across a wide swath of the metropolis. Funding should be local, to avoid lengthy processing times through ODA. Other characteristics of the flyover are as follows:

- A standard modular pre-fabricated design that can be combined or recombined to fit an intersection, i.e., a modular structure of similar structural (load and earthquake) performance;
- Foundation works would be minimal, as the module can be laid over existing road pavements and suitable for relocation or dismantling in the future, if necessary;
- Easy and rapid constructability with minimal traffic disruption during erection;
- While utilitarian in design, the visual impact should be eye pleasing, if not iconic;

4.62 The form of procurement shall be Design-Build-Construct, for quick deployment, with the constructor-supplier guaranteeing performance for 15 years. This will attract creative designs that are likely proprietary in manufacture and method of erection. Examples of the envisioned urban flyovers are shown below.



Source: JICA Study Team

Figure 4.4.6 Examples of Urban Flyovers

4.63 Contract shall be awarded to the Bidder that offers the lowest cost and shortest construction period for a standard flyover (to be specified by DPWH, in terms of span, width, height, and gradient). An intersection requiring more lanes and wider spans shall be costed as a multiple of this standard module. Payment can be made in two tranches, per flyover: mobilization fee and upon completion.

4.64 The project concept of a prefabricated flyover is not new for DPWH. It has built several such structures (albeit, longer in length and of foreign progeny) in such places as Iloilo City (Jalandoni/Luna Avenue); San Fernando City, Pampanga (Abad Santos/Lazatin intersection); and the Puerto Flyover in Cagayan de Oro City. What this suggests is that the same modular design can be applied in other urban centers of the country- other than Metro Manila.

4.65 Considering the readiness and urgency of the projects, the Roadmap for urban roads is formulated as shown in Table 4.4.2.

(2) Expressways

4.66 Urban expressway separates long-haul trips from local trips, thus decongesting atgrade road traffic. In addition, urban expressway can provide alternative routes in the event of disaster. Therefore, it is indispensable to build urban expressway network in Mega Manila to decongest the traffic and to strengthen the disaster resilience. In order to cover the entire Mega Manila, the urban expressway network should be a combination of circumferential and radial expressways.

4.67 The expansion of the urban expressway network has not kept pace with the enthusiasm from private investors. If the same pace transpires in the next 15 years, only about 20% of the GCR expressway will get built by 2035. Clearly, there is a need to accelerate execution. Setting up a practical set of priorities is the starting point. Shovel-ready projects, i.e., those with highest degree of project preparation, should be accorded highest priority. Since private sector is interested in expressway construction, this is the time to implement more urban expressway projects. Secondly, the absorptive capacities in the public sectors is very limited. Hence, the government must lean on the private sector.

Attractiveness to the private sector can be enhanced through a creative blending of government (and ODA) funds with private funds, rather than the new policy of sequential approach – government first, followed by privatization of operations and maintenance. To minimize inter-operability issues, bundling of contiguous segments should be explored, i.e., concession granted to the same party. Lastly, whether the project is ready for tender or not, forward acquisition of Rights-of-Way should be undertaken. Considering the readiness of the project, the Roadmap for expressway is formulated as shown in Table 4.4.2.

	Phase 1	Phase 2			
	2018-2022	2023-2029	2030 upward		
Expressways	Complete Skyway 3 and Link Expressway	 Build the Lakeshore Road on PPP (after completion of dike component via GAA) Build C-5 Expressway Los Baños-Calamba- Expressway 	 North Luzon East Expressway Stages 1 and 2 Extension of Expressway from Calamba to Tagaytay 		
Urban Roads	 Build C4/Taft Interchange Build C2/Lacson Interchange Complete the Sta. Monica Bridge + 2 other bridges across Pasig River 	 Build C4/North Avenue Interchange Revive the C5/Kalayaan Interchange project Other interchanges on C5 in conjunction with C5 Expressway 	 Other missing interchanges on intersections of Circumferential (C1 to C5) & Radial Roads (R1 to R10) Transform major roads into intelligent highways vis-a-vis intelligent transport system 		

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Source: JICA Study Team

4.5 Road-based Public Transport

1) Current Situation

4.68 Buses, jeepneys and Asian Utility Vehicle (AUV) basically comprise the roadbased public transport services in Mega Manila. All are privately-owned and operated with entry and pricing heavily regulated by the Land Transportation Franchising Regulatory Board (LTFRB). Sometime in December 2015, DOTr (formerly DOTC) launched a luxury bus service that it dubbed point to point (P2P), utilizing modern low-floor buses with amenities such as GPS and WIFI. As of December 2016, P2P is under operation along 11 routes. Their patronage has been underwhelming, except for some routes like the Makati-Alabang.

4.69 Data from DOTr identified 677 PUJ routes and 82 PUB routes in NCR. They accounted for 55% share of daily commuter market. There are no precise data on the number, but the estimates are about 60,000 PUJs and 8,000 buses.

2) Existing Plans/Projects for Road-based Public Transportation

4.70 Following the recommendation of the "Dream Plan" in the 4th quarter of 2014Roadmap 1, DOTr embarked on a program to re-structure routes and replace the jeepneys with their modern equivalents. It has received strong opposition from existing operators. Two BRT lines – on Quezon Avenue and on EDSA – have also been announced by DOTr.

(1) Modernizing the Jeepneys

4.71 By 2016, the jeepney modernization has taken the form of a nationwide PUV Modernization that was more comprehensive, with nine (9) components:

- Regulatory reform
- LGU Public Transport Route Planning
- Fleet Modernization
- Industry Consolidation
- Financing PUV Modernization
- Vehicle Useful Life Program
- Pilot Implementation
- Stakeholder Support Mechanism
- Communication

4.72 The timeline laid out by DOTr is shown in Figure 4.5.1 below. With more than 200,000 PUVs in the country, the average annual conversion rate would be 40,000 units/year – assuming a 5 year timetable. It is estimated that at least 50% of these will be in the GCR, which would translate to a target renewal of 20,000 a year.

Major Components & Activities	20	17	2018	2019	2020	2021	2022	Lead Agencies	Remarks
Omnibus Franchising Guidelines					1	11.11	1	DOTr, LTFRB	June 2017
Formulation of JMCs & MCs								LTFRB, DOTr	May - June 2017
Route Rat Study within MUCEP/MManila			1				1	DOTr,LTFRB	Feb 2017 - Dec 2017
Route Rat Study outside MM (CBU, DVO)				1) ——	DOTrLTFRB	Mar 2017 - Dec 2017
Jeepney Design and Specifications						1-1	3	DTI-BOI, LTO, DOTr	Approval 3Q 2017
Pilot Area Implementation							1	DOTr,LTFRB,OTC,CDA	3Q 2017 - Dec 2017
Capacity building for LGUs							1	DOTr, DILG	Aug 2017 - Dec 2019
Local Public Transport Route Plan Preparation)	DOTr,LTFRB, DILG	July 2017 - Dec 2019
Local Public Transport Route Plan Approval							1	DOTr,LTFRB, DILG	July 2017 - Dec 2019
Industry Consolidation)	DOTr,LTFRB,OTC,CDA	3Q 2017 - 2020
Operator Selection)	DOTr,LTFRB,OTC,CDA	3Q 2017 - 2020
Financing								DOTr, DOF, DBM, GFIs	3Q 2017 - 2022
Jeepney Production								DTI-BOI, LTO, DOTr	3Q 2017-2022
Social Support Mechanism								LTFRB, TESDA, DOLE,	3Q 2017 - 2022
AFCS Program (Expansion)								DOTr, DBP,BSP	3Q 2017 - 2022
End of Useful Life Program (Scrappage)	(DOST,DENR,DTI	3Q 2017 - 2022
Communication Plan								DOTr,LTFRB	May 2017 + Dec 2022

Source: DOTr

Figure 4.5.1 The Government Timeline for the PUVM

4.73 The ambitious targets could be derailed by the following challenges:

- Preparation of route plans by LGUs, an activity for which they have no prior experience, and therefore no pre-existing capability.
- Industry consolidation through 'corporatization', either by forming a cooperative or a new company out of hundreds or thousands of operators in a given route or LGU. A local leader (preferably the Mayor) has to perform the coalition-building, to make this happen. In the GCR, the total number of cities and municipalities is 289, as of December 2015. Very few of the local leaders would take the risk of antagonizing the jeepneys, as they face a mid-term election in 2019.
- The funding from LBP/DBP can only flow into the borrowers, after the corporatization and assurance that the revenue-pooling systems to be instituted are in place. These preconditions will take time, and may in turn depend on the loan.
- The local capacity to manufacture the required vehicles is limited, and will take time to ramp up notwithstanding DTI's encouragement to the manufacturing industry. The big international automakers do not carry this particular vehicle model (conforming to the new PUV standards) in their traditional product line ups.
- The scrappage of old units will follow the rate of acquisition of new replacement units. DENR, DTI and DOST are the designated lead agencies. Private companies are supposed to step in and invest in a facility the scale of which is still uncertain.
- The grant of subsidy or financial support to encourage the conversion, and provide a safety net during the transition, is dependent on the passage of the Tax Reform Act. It is also uncertain how the funds will flow into the recipients.
- Program management hinges on a high degree of inter-agency collaboration that are untested at the ground level. Agency resources (men and budget) may not be available in a particular LGU at the required time. Not every LGU has LBP/DBP branches; LTFRB is present only in a few regional centers. OTC and CDA are in a

similar bind – a willingness to assist and support but without the wherewithal. An inter-agency project team at the LGU level will not materialize, simply because the officials in NCR have signed MOUs.

4.74 The government has to address the preceding implementation bottlenecks, otherwise a desirable program to raise the quality of public transport system in GCR and the rest of the Philippines would suffer a setback. It is hoped that the pilot project – scheduled for completion in December 2017 - would lead to the formulation of corrective or remedial measures. However, there is still no information on progress, much less the specific route or LGU where it would be conducted. A pilot project team should be organized, and fielded, as soon as possible.

4.75 It is recommended that a more realistic timetable be adopted – focusing on one LGU at a time over 10 years, with priority to the larger cities. However, the duration in every LGU should be short, say 2 years, where conversion is done by transport corridor (or set of adjoining routes). Operationally and publicly, it is difficult to allow a mix of old and new vehicles – especially with the simultaneous adoption of AFCS and its twin of revenue sharing. In addition, the following work-around steps can also be adopted:

- Appointment of a network service provider (similar to what Uber and Grab are doing for cars) per LGU, who will do the AFCS and fleet management and service scheduling. This can bypass the need for industry consolidation and operator selection.
- The necessary tweaking and adjustment of the route plan can also be performed by this network service provider, since the location tracking will be part of its obligation.
- LTFRB or DOTr can impose the revenue-sharing contract between the network company and the vehicle owners and drivers. A collection mechanism to repay the loans may also be plugged into the network service apps.
- To overcome early resistance, a capital subsidy should be offered but gradually tapering off to zero by year 5. This might be treated as trade-in value of old units and therefore payable directly to the new vehicle supplier who should also be tasked to take front-line responsibility for vehicle scrappage.
- A jeepney leasing company may have to be organized as the joint special purpose vehicle of DBP and LBP.
- Considering the enormity of the challenge, it be hooves DOTr to implement in tranches or bite-size. LGUs with supportive Mayors should be the first criterion, followed by the size of the LGUs. Smaller municipalities can wait, and they can offer a refuge for those marginalized by the program. In this way, islands of success stories can be racked up.

(2) Bus Transit

4.76 The urban bus mode needs also to be improved, in a similar fashion than the jeepneys but to a lesser degree. Massive replacement of fleets is not required, only in the business model. The bus fleet have undergone renewals in the last two decades; but many are still ill-suited for urban commuting. The number of operators are not as numerous, but still too many (171 on EDSA alone) to achieve the desired coordination

and integration of services. The onerous practice of 'boundary fee' for drivers is as prevalent in buses as in jeepneys.

4.77 The government has no explicit program to improve buses. And yet, one consequence of the PUVM is to convert some of the jeepney operators into buses (routes where demand exceed 1,000 pphpd, per the OFG of DOTr). One that could pass for a government strategy on buses is the BRT. Two BRT projects were listed in the Build-Build-Build program: BRT 1 on Quezon Avenue and BRT 2 on EDSA. The BRT 1 is 12.3-km, from Quezon Memorial to Manila City Hall, and is funded with a USD64.6 million loan from the World Bank; it is supposed to be completed by Dec 2020. On the other hand, BRT 2 is 48.6 km at a cost of Php38.8 Billion; it is supposed to be completed a month after BRT-1.



Source: Build!Build!Build! Program

Figure 4.5.2 Government's Plan for BRTs in Metro Manila

3) Proposed Roadmap for Road-based Public Transport

4.78 The Quezon Avenue route is probably the best corridor on which to build the second BRT system in the Philippines, after Cebu. There are no competing bus operators to merge or remove, and very limited jeepneys running on that avenue. Except for some section, the road is wide enough to dedicate 2 lanes for buses and still leave 2 lanes for other traffic. The endorsement of DOTr for a LRT rail project on the same route cast doubts on the BRT's viability.

4.79 A roadmap for metro bus development is recommended, with an indicative timeline shown below.

Phase 1	Phase 2			
2018-2022	2023-2029 2030 upward			
 Issue technical standards for new metro buses (Euro 4, 2 side-door, low floor, etc.) Pilot test a digital fleet management system on EDSA (common ticketing, organized scheduling, GPS tracking, etc.) 	 Re-deploy non-compliant buses to inter-urban routes (between NCR and other cities in GCR) Improve the digital management system to include other functionalities (e.g., passenger information & interaction), and expand to other 	 Shift to electric or hybrid buses, with bus-to-bus communication and other advanced features Expand the ICT-based solution to other buses in GCR (outside of NCR) Establish a new franchising regime based on ICT platform 		
 Issue new franchising guidelines for urban buses. Pilot-test on EDSA 	parts of NCRRestructure bus routes, starting with NCR			

Source: JICA Study Team

Box 4.5.1 Next-generation Transport System in Intramuros

In October 2016, New Energy and Industry Technology Development Organization (NEDO), together with the Philippines' Department of Trade and Industry (DTI) and the country's Intramuros Administration (IA), has launched a project to demonstrate a next-generation public transport system that uses a combination of electric tricycles (e-tricycles) and an electric vehicle (EV) ecosystem.

The demonstration project was commissioned by NEDO and is being conducted by SoftBank Corp. and will be carried out for almost two years (October 2016–September 2018) in Intramuros, a district in Manila that attracts many tourists and is home to many educational institutions. The EV ecosystem used in the demonstration consists of four elements: a charging infrastructure that includes vehicle authentication, telematics for operation control and asset management, a service platform for fare collection and other operations, and an on-board communications device. The aim of the project is to introduce and promote a next-generation public transport system in the country and to reduce energy consumption by 85%. Currently, 50 e-trikes are under operation along two routes with 17 charging stations



Figure 4.5.4 E-trike Route Map and E-trike in Intramuros

Source: NEDO and Softbank

4.6 Logistics and Ports

1) Current Situation

(1) Truck OD from/to Ports

4.80 According to the track OD survey by the High Standard Highway Study (JICA, 2009), 53% of the tonnage of track cargo from Manila Port goes to outside of Metro Manila. Moreover, 17% of tonnage of track cargo from Manila Port goes to even outside of Mega Manila. The adjoining provinces are still close to Manila Ports rather than Batangas or Subic Bay Free Ports. However, many of other provinces locating outside of Mega Manila are more close to Batangas or Subic Bay Free Ports.

		Metro		Adjoining P	rovince (M	ega Manila))	G	CR	Oth	ners	Tatal
		Manila	Bulacan	Rizal	Cavite	Laguna	Sub-total	North	South	North	South	lotal
	Manila Port1)	21,786	6,370	1,137	2,046	2,972	12,525	2,299	1,621	2,784	489	41,504
Amount	Batangas Port	722	88	26	32	83	228	-	389	53	11	1,402
Amount (ton/day)	Subic Bay Free Port/Airport	1,094	1,792	271	75	40	2,177	1,707	120	441	232	5,773
	Sub-total	23,603	8,249	1,433	2,154	3,095	14,930	4,006	2,131	3,278	732	48,679
	Manila Port	52.5	15.3	2.7	4.9	7.2	30.2	5.5	3.9	6.7	1.2	100.0
	Batangas Port	51.5	6.2	1.8	2.3	5.9	16.2	-	27.8	3.7	0.8	100.0
Share (%)	Subic Bay Free Port/Airport	19.0	31.0	4.7	1.3	0.7	37.7	29.6	2.1	7.6	4.0	100.0
	Sub-total	48.5	16.9	2.9	4.4	6.4	30.7	8.2	4.4	6.7	1.5	100.0

 Table 4.6.1 Track Cargo from Main Ports in Greater Capital Region

Source: Track OD Survey by the High-standard Highway Study (JICA, 2009)

1) including North Harbor, South Harbor and MICT

4.81 In regard with the track cargo to ports, more than 95% of tonnage of track cargo from Mega Manila uses Manila Ports. Tack cargoes from other northern provinces also go to Manila Port, as well. On the other hand, track cargoes from southern provinces use Batangas Port more.

		Metro	ļ	Adjoining Pi	rovince (Me	ega Manila)	GC	R	Oth	ners	Tatal
		Manila	Bulacan	Rizal	Cavite	Laguna	Sub-total	North	South	North	South	Total
	Manila Port	14,942	2,487	2,238	2,084	4,730	11,539	3,724	86	81	-	30,372
Amount	Batangas Port	134	-	-	32	12	43	-	254	-	483	915
Amount (ton/day)	Subic Bay Free Port & Airport	359	392	33	-	115	540	199	-	-	-	1,098
	Sub-total	15,435	2,879	2,271	2,115	4,857	12,122	3,923	340	81	483	32,384
	Manila Port	96.8	86.4	98.5	98.5	97.4	95.2	94.9	25.2	100.0	-	93.8
	Batangas Port	0.9	-	-	1.5	0.2	0.4	-	74.8	-	100.0	2.8
Share (%)	Subic Bay Free Port/Airport	2.3	13.6	1.5	-	2.4	4.5	5.1	-	-	-	3.4
	Sub-total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

 Table 4.6.2 Track Cargo to Main Ports in Greater Capital Region

Source: Track OD Survey by the High-standard Highway Study (JICA)

1) including North Harbor, South Harbor and MICT

(2) Port Transport

4.82 In 2012, about 3.2 million TEU of container ships left from main ports in Greater Capital Region. Of which, 97% were from Manila Port. While about 85% and 100% of container ships from Manila and Batangas Ports went abroad, the destination of 75% of container ships from Subic Ports was Manila Port. The destinations of container ships

from Manila Port are varied in both domestic and international ports. The main destination in abroad is China and Taiwan.

Destination			Amoun	t (TEU)			Share by De	stination (%)		
Destination			Manila	Subic	Batangas	Total	Manila	Subic	Batangas	Total
	Luzon		54,063	40,607	-	94,670	2.7	74.6	-	4.6
Domostic	Visayas	Visayas		-	-	131,142	6.5	-	-	6.3
Domestic	Mindana	D	122,831	-	-	122,831	6.1	-	-	5.9
	Sub-total		308,036	40,607	-	348,643	15.2	74.6	-	16.8
	ASEAN	Indonesia	31,307	-	-	31,307	1.5	-	-	1.5
		Malaysia	80,678	120	-	80,798	4.0	0.2	-	3.9
		Singapore	185,036	3,456	-	188,492	9.2	6.3	-	9.1
		Thailand	101,756	-	-	101,756	5.0	-	-	4.9
		Vietnam	1,740	-	419	2,159	0.09	-	68.1	0.10
	East Asia	China	754,981	1,470	-	756,451	37.4	2.7	-	36.4
		Japan	100,738	-	196	100,934	5.0	-	31.9	4.9
International		South Korea	45,259	-	-	45,259	2.2	-	-	2.2
International		Taiwan	405,266	8,784	-	414,050	20.1	16.1	-	19.9
	South	Bangladesh	596	-	-	596	0.03	-	-	0.03
	Asia	India	596	-	-	596	0.03	-	-	0.03
		Australia	1,910	-	-	1,910	0.09	-	-	0.09
	Othors	PNG	126	-	-	126	0.006	-	-	0.006
	Others	Martinique	172	-	-	172	0.009	-	-	0.008
		Turkey	2,824	-	-	2,824	0.14	-	-	0.14
Sub-total		1,712,985	13,830	615	1,727,430	84.8	25.4	100	83.2	
Total			2,021,021	54,437	615	2,076,073	100	100	100	100

Table 4.6.3 Container Ship by Destination Port from Main Ports of Greater Capital Region(2012)

Source: IHS database

4.83 While container ships and general cargo ships account more than 75% of the total number of ships arrived at Manila Port, passenger ships have relatively high shares of Subic and Batangas Ports. In addition to this, chemical and chemical/products tanker and products tanker shares 1/4 of the total number of ships arrived at Batangas Port.

Table ACA	Turner	f Chine	A www.s.c.a.d	-1 M -:	Doute :		Conital	Dealers	(2042)
1 able 4.6.4	Ivpes o	T Shids	Arrived	at Main	PORTS II	n Greater	Cabitai	Region	(ZU1Z)
									(,

			No. of Ship Arrived				Share	e (%)	
		Manila	Subic	Batangas	Total	Manila	Subic	Batangas	Total
1	Container Ship (Fully Cellular)	2,605	50	0	2,655	52.1	8.8	0.0	42.2
2	General Cargo Ship	1,223	114	28	1,365	24.4	20.1	3.9	21.7
3	Passenger Ship, Passenger/Cruise, Passenger/Ro- Ro Ship	415	166	164	745	8.3	29.2	22.6	11.8
4	Tug	226	90	20	336	4.5	15.8	2.8	5.3
5	Chemical, Chemical/Products Tanker	46	27	183	256	0.9	4.8	25.2	4.1
6	Bulk Carrier	211	32	4	247	4.2	5.6	0.6	3.9
7	Products Tanker	65	18	145	228	1.3	3.2	20.0	3.6
8	Ro-Ro Cargo Ship	51	1	64	116	1.0	0.2	8.8	1.8
9	Vehicles Carrier	53	0	18	71	1.1	0.0	2.5	1.1
10	Anchor Handling Tug Supply	0	2	43	45	0.0	0.4	5.9	0.7
11	Training Ship	26	4	5	35	0.5	0.7	0.7	0.6
12	Asphalt/Bitumen Tank, Cement Carrier	29	0	4	33	0.6	0.0	0.6	0.5
13	Landing Craft	31	0	0	31	0.6	0.0	0.0	0.5

			No. of S	hip Arrived		Share (%)			
		Manila	Subic	Batangas	Total	Manila	Subic	Batangas	Total
14	LNG/LPG Tanker	0	1	28	29	0.0	0.2	3.9	0.5
15	Crude Oil, Crude/Oil Products Tanker	0	6	15	21	0.0	1.1	2.1	0.3
16	Yacht/Yacht (Sailing)	3	15	0	18	0.1	2.6	0.0	0.3
17	Research Survey Vessel	0	12	0	12	0.0	2.1	0.0	0.2
18 Other Types of Ship		19	30	5	54	0.4	5.3	0.7	0.9
Total		5,003	568	726	6,297	100	100	100	100

Source: IHS database

(3) Market Share of Ports

4.84 Batangas and Subic ports have a combined capacity of 1.0 million TEUs per year, but their current utilization is less than 30%. Either these ports were over-designed from the outset, or justified on illusory demand, or simply unattractive to shipping lines. On the other hand, Manila Ports (MICT and South Harbor) is reaching or exceeding it capacity. In theory, transferring more cargoes from Manila to the two ports would diminish the number of trucks on urban roads.

Port	Operator	Capacity (mil. TEU)	Handling Volume (mil. TEC)	Volume/ Capacity (%)
МІСТ	ICTSI	2.75	2.00	73
South Harbor	ATI	0.85	1.01	119
Batangas	ATI	0.40	0.16	40
Subic	ICTSI	0.60	0.12	20

 Table 4.6.5 Market Share of Ports in GCR, 2016

Source: Assembled by Study Team from multiple sources

2) Current Practices and Existing Plans/Projects

(1) Global Supply Chain and Port Development

4.85 In GCR, there are six alternative seaports from Port of Manila, including the planned ports. The air distances of the alternative seaports from the port of Manila are shown in Table 4.6.6 and Figure 4.6.1.

Table 4.6.6 Air Distance of Alternative Seaports from Port of Manila

Name of Port	Distance from Manila	Access to Freight Market
Casiguran	~ 215 km	Current road access is poor; too far from the load generators of Calabarzon & Central
		Luzon; international ship calls still to be developed
Subic	~ 80 km	Good access via NLEX and SCETEX, and with existing port facilities capable of handling
		600,000 TEUs vs current traffic of 200,000.
Calamba ICD	~ 50 km	An inland container depot for MICT via a railway link; proposed to be built by a private entity
		(M-Rail); currently on-hold due to DOTr's decision on PNR's South Railway; proposed
		capacity of 600 TEUS/day; to reduce truck traffic by 200/day.
Tanza (Cavite)	~26 km	A RoRo port dubbed as the Cavite Gateway Terminal aimed at moving truck traffic to barges
		from/to MICT. Proposed by ICTSI, the private operator of MICT, at a cost of Php1.5B. Impact
		is to reduce annual truck movements by 140,000/year (~425 trucks/day)
Sangley (Cavite)	~14 km	A private entity (All-Asia Resources & Reclamation Corp.) offered to build an airport and
		seaport complex in the Sangley area. If accepted, it would conflict with the new NAIA project
		proposed under the Dream Plan and subjected to feasibility study in 2015.

Name of Port Distance from Manila		Access to Freight Market
Batangas ~92 km		Good access via SLEX and STAR with existing port facilities capable of handling 450,000
		TEUs vs current traffic of 160,000.

Source: JICA Study Team consolidated from several information source



Source: JICA Study Team Figure 4.6.1 Location of Alternative Seaports

4.86 From an international trading standpoint, the competitiveness of a gateway seaport lies on its strategic location vis-a-vis international shipping routes. The frequency of ship calls is favoured by shippers as well as nearness to manufacturing bases. Therefore, the Casiguran port in APECO can be dismissed outright as a viable alternative. It should be noted that despite the presence of good facilities and access in the Ports of Subic Bay and Batangas, they have difficulty to enlarge its market share because of the higher frequency of ship calls on the Port of Manila.

4.87 The concentration of industries in CALABARZON and South of Metro Manila would favor the ports of Batangas as well as Sangley and Tanza if built; while industries in Central Luzon and north of Metro Manila would be the Port of Subic. The impetus to divert vessels to outlying ports (like Subic and Batangas) is an offshoot of the truck ban imposed by Manila in 2014 that crippled the supply chain and cost. The seven-month duration of the truck ban was estimated to cost Php43.85 billion.¹

4.88 The Calamba ICD and the Cavite Gateway RoRo Terminal can be seen as a defensive attempt of MICT to retain and enlarge its market share against Subic and Batangas. By sidestepping the traffic congestion in NCR, ICTSI hopes to retain its preeminent status.

¹ PIDS, "Easing Port Congestion and Other Transport and Logistics Issues, 2016.

(2) Truck Traffic

4.89 The reason for the truck bans imposed by MMDA (and other LGUs) is trucks are seen as cause of traffic congestion. In the Port of Manila, the annual average daily traffic (AADT) data of DPWH in 2013 showed that that nearly 37% of daily traffic of 40,000 vehicles on R-10 were considered trucks that fall under classifications 2 axle, 3 axle, truck-trailer, and lorry mixer and another 37% were good utility vehicles.

4.90 The claimed outcomes of the Cavite Gateway RoRo and Calamba ICD is a reduction of 600 truck trips per day. That would amount to 3% reduction of about 18,800 in truck traffic. The traffic alleviation is therefore not as significant as its stabilizing influence on port operations and reliability of the supply chain. With rail and water access, the port is less vulnerable to total shut out in case of temporary truck bans and road traffic disruptions. Since there is very little, if any, demands on public resources, the two private-sector funded projects should nonetheless be supported.

4.91 The conventional solution of creating a truck route no longer suffices. Truck routes exist, but to a very limited extent. Trucks are banned from C-4 (EDSA) for 24 hours. Recently, even light trucks are banned on EDSA during the day. C-5 has become the only route where trucks can operate for 18 hours, while they are still prohibited during the so-called rush hours. Accidents and overloading are recurring criticisms against trucks—a phenomenon possibly attributed to the truck ban itself. They are forced to rush and/or overload to compensate for reduced operating hours during the day, charge higher fees, or acquire more vehicles due to restricted productivity.

4.92 Terminal Appointment Booking System (TABS) was implemented in 2015 that was meant to reduce truck traffic at the port area. Before a truck is allowed entry into MICT and ATI, the two international container ports in Manila, it must first secure a time slot. TABS reduces queue and waiting time for trucks at the ports.

4.93 TABS is an electronic platform introduced by the government in partnership with an Australian firm. The system schedules the in- and out-flow of containerized cargoes, but does not reduce the movement of empty trucks on roads. It is akin to what was introduced in Southampton Container Terminal in UK and ports in California where road congestion is not as severe as in Metro Manila.

4.94 M-Rail Inc, a subsidiary firm of Meralco and Metro Pacific, has an unsolicited proposal to PNR for the revival of the Inland Container Depot. The ICD will run from Calamba to MICT in the Port of Manila, about 57-km, and use the existing tracks of PNR. This has been set back by the recent decision of DOTr to change the gauge. Hence, this has to be re-examined together with the so-called North-South Commuter. DOTr also expressed a wish to combine freight on passenger routes.

4.95 A feasibility study for a Subic-Clark Cargo Railway is also being initiated. Ostensibly, this is also for logistics. However, this is of doubtful viability. Distance is too short to compensate for the cost of double-handling. Truck traffic along the Clark-Subic section of SCETEX is sparse.

4.96 For political reason, a Senator was able to enact a law creating APECO (Aurora Pacific Economic Zone and Freeport) – following the model of Cagayan Economic Zone Authority which has the port of Irene in northern tip of Luzon. This is located east of Metro

Manila, across the Sierra Madre mountains, and proposes a port ala Subic. There are very few ports on the eastern seaboard of the Philippines because of typhoons. Thus, this project has elicited controversy. This new port was probably the reason for NEDA mentioning a port in the Pacific. Prior to APECO, there was also a proposal for a port in Dingalan Bay; it was promoted by a property owner who wants to boost value of his property.

4.97 PIDS has published a study (2016) called "Easing Port Congestion and Other Transport and Logistics Issues". One of its recommendations is the revival of the ICD, as mentioned above, as well as the conduct of a "more thorough study regarding goods and passenger movements in the GCR".

4.98 Although not highlighted by the current administration, there has been (off-and-on) proposal to build a railway to the Port of Batangas.

4.99 Truckers in GCR are also being squeezed by government regulations. MMDA has widened the truck bans. LTFRB has ordered the phase out of trucks >15 years old by 2019.²

3) Potential Conflicts to Avoid

4.100 The implementation of the Calamba ICD, however, was placed on-hold due to the change of plans for North–South Railway, particularly, the PNR South Commuter. DOTr decided to change the gauge for the South Railway from narrow to standard and force the line to handle freight as well. This would entail additional and lengthy engineering studies; moreover, increase in capital cost.

4.101 Should the entire stretch of the South Commuter line be made into an elevated structure, the ground level to be vacated can be under operation of ICD. There can be more frequent train services if without competition in the track use of the commuter rail. Instead of 200 truck trips reduction, consider a replacement of 800 truck trips (headway of 30 minutes, 10 cars/train, 20 hours operation, two-way freight movements). Both projects may possibly be accommodated, unless government wants to monopolize freight transport on railways.

4.102 Meanwhile, the Philippine Global Gateway Project at Sangley is different. It is not possible to accommodate this project and the proposed new NAIA. While it seeks to reclaim 2,500 hectares, it would subdivide this area into an airport, a seaport, and an industrial complex. In contrast, the required area for a new gateway airport is 2,400 hectares. The situation, therefore, is one or the other and not both.

² most truckers buy pre-owned vehicles >10 years old

Source: JICA Study Team

Figure 4.6.2 Schematic Land Use Plan of the Global Gateway Project

4) Proposed Roadmap for Logistics

4.103 An improvement of TABS should aim to reduce the flow of empty trucks on the road. This implies a facility for cargo-swapping whereby a truck entering the port with a container load gets the first option to carry a cargo on its way out. It avoids the entry of an empty truck that would pick up that container. This is possible with modern ICT systems that permit truckers to swap physical delivery contracts for a fee and with minimal loss of revenues from their clients. GCR Part 2 could initiate a survey on the number of empty truck movements that a system could avoid. Conceivably, it might yield more reductions of trucks on the road than the combined impact of the Cavite RoRo Terminal and Calamba ICD.

4.104 The substantive recommendation of the JICA Study to Decongest Manila and Divert Container Traffic to Subic and Batangas Ports (2012) focuses on the use of marketbased instruments to incentivize both shippers and shipping lines to use the latter two ports. There is no compulsion to restrict the expansion plans of existing port operators. It is unclear whether these soft measures got implemented or that they have yielded beneficial results.

4.105 In the medium-term period, decongestion would have to rely on the completion of elevated expressway projects (e.g., Skyway 3, Link Expressway, and Segment 10 of NLEX). The three projects are expected to be completed by 2020. In addition, the Build-Build Infrastructure Program has the following road projects that could ease the constraints on trucks: C-5 South Link Expressway, C-5 Expressway, and C-6 Southeast Metro Manila Expressway.

4.106 In the long run, phase out of the domestic port at North Harbor and its relocation to the Port of Batangas should be pursued. The North Harbor is currently under a 25-year concession to a private consortium known as Manila North Harbour Port, Inc. Its redevelopment to handle general cargo and provide passenger terminal services is a commitment to PPA. PPA would likely agree to a conversion, provided, its revenue base is not degraded. On the other hand, the private operator would willingly convert its 52.5 hectare property (into a mixed-use waterfront development linked to LRT-2 if it is more lucrative.

	Phase 1	Pha	se 2
	2018-2022	2023-2029	2030 upward
Support infrastructure	 Extend Segment 10 of NLEX to MICT (Harbor Link Expressway) Upgrade Truck Appointment Booking System (TABS) 	 Upgrade of STAR Expressway to Batangas Port Real-time system to match cargo & empty trucks at Port 	 Network-based digital platforms to optimize truck- port-freight movements Port Harbor Management system for Manila Bay
Managed expansion in port capacities	Adopt a cap on Manila port expansion	Expand capacity in the Port of Batangas	Expand capacity in the Port of Subic
Other measures	 Build the Cavite Gateway Terminal (Freight) in Tanza, Cavite 	 Transfer domestic shipping to Port of Batangas & convert North Harbor into mixed-use development 	 Develop Subic-Clark into Transparks (logistics- manufacturing-transport complex)

Table 4.6.7 Roadmap for Logistics and Ports

Source: JICA Study Team

4.7 Gateway Airport Strategy

1) Current Situation

4.107 There are two major airport systems in GCR as shown in Figure 4.7.1. These are the Ninoy Aquino International Airport (NAIA) located within Metro Manila and the Clark International Airport (CIA) located within the Clark Freeport Zone in Angeles City, Pampanga. Both airports cater to international flights and domestic flights.

Figure 4.7.1 Location of NAIA and Clark

4.108 NAIA has been and continues to be the gateway international airport of the Philippines, conveniently located approximately 5 km southwest of Makati and approximately 10 km southeast of Manila. There are two convergent runways at NAIA, namely the main runway 06/24 (3,410m x 60m) and the secondary runway 13/31 (1,998m x 45m). Runway 24 and the extended centerline of Runway 13 cross at a point almost one-third along the length of Runway 24, resulting in a capacity limitation of the runway system because only one aircraft can land or take-off at any given time (except for the general aviation aircraft under Land-And-Hold-Short Operations).There are currently four passenger terminals at NAIA.

4.109 CIA is located approximately 80 kms northwest of Metro Manila. It serves both the GCR and the northern regions of Luzon. From/to Metro Manila, it can be reached using the Subic-Clark-Tarlac Expressway, which is connected to the North Luzon Expressway (NLEX). The airport is currently the hub of Asian low cost carriers. CIA has two parallel runways. The primary runway is equipped with various navigational aids and lighting facilities and has a category 1 precision approach rating. The secondary runway is currently used for Visual Flight Rules (VFR).

4.110 The capacity of NAIA is assumed approximately 35 million passengers per annum and 250,000 aircraft movements.³ In 2016, the passenger traffic at NAIA was 39.5 million in 2016 (excluding general aviation) and the number of aircraft movements was more than 258,000. Thus, NAIA has already reached its capacity. For CIA, although the existing passenger terminal building had expanded to accommodate 5 million international and domestic passengers per year, the annual passenger count as of 2014 was only 878,000 passengers.

2) Development Directions of the Government and Existing Plans

4.111 The Transport Roadmap adopted a dual gateway airport strategy with Clark International Airport (CIA) as a given constant. Instead of closing NAIA and transferring everything to CIA, the roadmap is recommending a replacement airport for NAIA in which alternative sites were evaluated in detail in a subsequent study.4 Three alternative sites were identified as a replacement for NAIA and, among those, DOTr rejected the Manila Bay option and chose Sangley site before May 2016.

4.112 Into the first semester of the new administration, several proposals for a new international airport surfaced. The shift to a multiple airport strategy became apparent during the forum sponsored by the Joint Foreign Chambers of Commerce of the Philippines last 15 February 2017. Reports about the shift became public in March 2017. Inter- and intra-line transfers between and among domestic and international trips would become more difficult geometrically when the number of gateway airports increase. Building the infrastructure to ensure connectivity and accessibility on the surface will also become costlier and more complex.

4.113 The policy shift apparently triggered business groups that vie for "unsolicited status." One is a Sangley submission from All Asia Resources and Reclamation Corporation. Its proposal is a re-iteration of a previous one from Solar Group called Philippine Global Gateway Project that aims to develop a seaport and airport complex in that area. Solar Group's proposal was reviewed in the JICA airport study from 2016, but not given credence. The key features of the new proposal are 2,500 hectares reclamation, a new airport for up to 90 million passengers, seaport capable of 2 million TEUs, and an industrial complex. In its earlier version, the project was positioned as an alternative to CIA while the latest is a replacement to NAIA. All Asia Resources and Reclamation Corporation partnered with Belle Corporation, which is part of the SM conglomerate.

4.114 San Miguel also has an unsolicited proposal in a new site on the south-western side of Bulacan. This is different from its 2015 proposal on Manila Bay; on a reclaimed land off the coast of Las Piñas and Parañaque. The new site suffers from a number of negatives: (i) competes with CIA 's market if not air space; (ii) too small at 1,168 hectares for an airport complex compared to the requirements specified in the 2016 Gateway Airport Study; (iii) entails reclamation over swamp lands that is the natural flood plains of Central Luzon; and, (iv) poor accessibility.

4.115 The development of CIA stalled in the last 6 years. On 28 February 2017, an Executive Order was issued by the President that reverted Clark back into BCDA. By March, an unsolicited proposal to develop Clark at a cost of Php187 billion based on the

³ JICA, "Information Collection Survey for New Manila International Airport in the Philippines", Jan 2016

⁴ JICA, "Information Collection Survey for New Manila International Airport in the Philippines", Jan 2016

master plan prepared earlier for CIAC by Aeroport de Paris was submitted by JG Summit, which owns Cebu Pacific Air, and Filinvest Development Corporation. This was contested by GMR-Megawide Consortium that claims to submit a similar unsolicited proposal on 27 July 2016.

4.116 The pending redevelopment and privatization of NAIA further complicates the government's dilemma on the airport issue. The process started in September 2014, but the bidding was not finished by end June 2016. The new administration initially considered a tender by 2017 after NEDA approval in September 2016. Several groups (e.g., Ayala, MPIC, Aboitiz, GMR-Megawide) expressed interest to participate in the bidding, however, it was put on hold on February 2017. The implication of the proposed concession period of 15 years for a project billed at Php74 billion would be a deferment of efforts to develop a replacement to NAIA.

4.117 In the rush to ease the air traffic congestion at NAIA, DOTr decided to transfer general aviation to Sangley. A bidding for the provision of necessary facilities commenced, yet was suspended after the Public Reclamation Authority (PRA) requested a review of the same. Should the project be implemented, Sangley would not be considered as replacement site to NAIA conclusively because evicting general aviation so soon after they relocated would invite litigations.

3) Proposed Roadmap for Gateway Airport

4.118 Considering the current situation of NAIA that has reached its capacity, it is urgent to complete the construction of new passenger terminals and other improvement in CIA as well as transfer the general aviation from NAIA to Sangley. However, it is not feasible to transfer the function of NAIA to CIA due to the distance from Metro Manila to CIA. Therefore, it is advisable to decide the site for new NAIA soon since it takes long time to build the airport.

	Phase 1	Pha	ise 2
	2018-2022	2023-2029	2030 upward
What to do with Clark	Complete the new CRK International Passenger Terminal in tandem with private O&M	 Expand capacity and upgrade systems to absorb spill over from & provide relief to existing NAIA 	 Build the 2nd and 3rd runway, as well as expand Pax Terminal building & Cargo Terminal
What to do with NAIA	 Complete the transfer of General aviation from NAIA to Sangley Terminal space expansion & management improvements (T1 to T4) via PPP 	 Build a new NAIA in another site south of NCR (if not Sangley 1, then Laguna Lake or Lipa-Batangas) 	 Shutter existing NAIA and convert to "green lungs of NCR" plus socialized housing community
Regional airports outside GCR	Complete the night landing facilities in other airports feeding into NAIA	 Complete full development of regional airports, as well as tourism-based airports (Bohol, Palawan, etc.) 	 Aviation policies to steer traffic growths from GCR to regional airports (Cebu, Davao, Iloilo, Laoag)

Table 4.7.1	Roadmap	for Gateway	Airport
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Source: JICA Study Team

4.8 Transport Sector Management

1) Historical Antecedents

4.119 Before 1980, the DPWH and DOTr were one infrastructure organization called DPWTC. The split was made in 1979 primarily to separate the construction functions from the service functions, and allow equal (cabinet-level) emphasis on service delivery. Nearly all departments had a central office that had a similar organizational template (Planning and Project Development Service, Finance and Comptrollership, Administrative and Legal Service, Management Information and Project Management Service). Each of the 4 services were headed by Assistant Secretaries, with 4 Undersecretaries to assist the Secretary. The operational decisions are lodged at the 2nd tier, or bureau level; with a 3rd tier at the regional offices of each bureau.

4.120 With the onset of a new administration in 1986, the different departments were reorganized; with Executive Order No. 125 crafted for DOTC. The organizing principle was subsidiarity, i.e., devolve as much responsibilities to the lowest-level (principally, regionlevel) instrumentalities. Accordingly, the Central Office (or Department Proper) was designed to be a holding company focused on policies and long-term directions. To defang the 2nd-tier Bureau-level units of line functions, they were renamed into staff "Offices". The focus on region-wide integration materialized in the case of DPWH, but not for DOTC. The Bureaus merely got renamed into Offices, but remained as line agencies supervising the regional units. For example, the Bureau of Land Transportation became the Office of Land Transportation, the Bureau of Air Transportation became Air Transportation Office. The existing GOCCs were retained, such as MARINA for water transport, PNR and LRTA for rail, PPA for ports. No single regional command transpired for DOTC. It was akin to a military organization where the navy, air force, and army followed a vertical chain of command sans a regional commander.

4.121 Then basic character of the Central Office taking the role of a holding company (responsible for policy and general supervision) remained unchanged, notwithstanding the issuance of EO#366 on 4 October 2004 entitled "Directing a Strategic Review of the Operations and Organizations of the Executive Branch and Providing Options and Incentives for Government Employees who may be Affected by the Rationalization of the Functions and Agencies of the Executive Branch".

4.122 Modal specialization, however, started to become pronounced 2004 to the present, as more high-level officials were appointed – initially, for political accommodation, and later with central authority for each mode. Thus the emergence of such nomenclature as Undersecretaries for Rail, Maritime, and Land Transportation at the Central Office. The 2nd-tier bureau-level offices, as well as the GOCCs, were untouched except that they now reported to what in private corporations would term a Group CEO. The PEGR-initiated "Formulating a National Transport Plan" (March 2010) endorsed this silo-oriented structure but with the counterweight of a strong Transport Policy Committee in the short-term. Its long-term recommendations is to create two Undersecretaries for Coordinating Plans and Projects, and for Coordinating Policies and Regulations.

4.123 None of previous efforts to streamline and re-organize the Department ever entertained the idea of re-engineering the Department Proper according to its 3 fundamental missions of DOTr, viz.: expansion of the transport system, enhancing the
efficiencies of existing system, and mainstreaming safety and security in the system.

4.124 The appointment of mode-specific officials in the Department Proper induced horizontal and vertical coordination problems. Operational responsibilities were no longer left to 2nd-tier agencies, with the operation of MRT-3 being absorbed at the Central Office (rather than delegated to LRTA where it belonged). The level of decision-making got centralized, rather than decentralized.

4.125 The modal-centered structure temporarily vanished in 2012 when functional Undersecretaries were appointed – for Planning, Operations and Legal. But what characterized the 'new order' was the pre-occupation of the Department Proper in the tendering of big-ticket infrastructure projects; instead of leaving these activities to the 2nd and 3rd-tier, they were consolidated at the 1st tier. As a consequence, the 1st tier lost its policy and oversight mojo, and became embroiled with day-to-day operational activities.

4.126 The change in administration in July 2016 accentuated the centralization and silotendencies of the DOTC, now renamed DOTr. Seven Undersecretaries were appointed: 1 each for the 4 modes (land, rail, air, maritime), and 1 for the 3 functional activities (Legal and procurement, Planning, Administration and Finance). This arrangement – mixing functional and modal orientations – spawn its own cross-currents:

- (i) The role of the Undersecretary for Planning would naturally overlap, if not conflict, with the 4 Assistant Secretaries for planning (road, rail, air, and maritime);
- (ii) Between the 1st tier and the 2nd tier agencies with respect to planning, operations, and project executions;

4.127 Manifestations of the above tensions can be seen in the following: a) PNR pursuing the East-West Railway line on a PPP-track, in parallel with the Central office pushing a BRT system on the same Quezon Avenue corridor; b) a north commuter railway project that kept two railway agencies - PNR and Northrail – out of the loop.

4.128 The internal structure of DOTr, as well as the responsibilities of MMDA and DPWH, are not conducive to the realization of the Transport Roadmap for the Mega Manila. The intrinsic strategy of Transport Roadmap is inter-modal integration on a defined urban geographic space. Neither DOTr or DPWH has dedicated units for urban concerns – despite the large resources devoted to Metro Manila, and other metropolises in the country.

2) Towards a Regional Transport Authority

4.129 Considering the preceding weaknesses and constraints, the formation of a Greater Capital Region Transport Authority (GCRTA) appears to be the most workable arrangement for the realization of the Transport Roadmap for Mega Manila. For one, it avoids the issue of changing the political boundaries; whereas a political entity with elected leaders is equivalent to creating a new metro government from existing LGUs. A GCRTA however, cannot avoid taking out some powers and responsibilities from national agencies as well as from the LGUs. The minimum concession from below should be the power to veto or overrule LGUs when it comes to transport and traffic matters. It is a minor concession compared to what national agencies has to devolve or delegate to GCRTA; these should include, inter alia:

- (i) Transferring the powers of LTFRB in so far as regulating intra-urban public transport is concerned;
- (ii) Intra-urban railway services and operations from LRTA.
- (iii) Not imperative, but ideal if the GCRTA also takes over the port of Manila as well as jurisdiction over Pasig River ports and navigation from PPA and MARINA, the absorption of the Manila International Airport as a subsidiary or attached agency. The expanded scope would be more suited under a federal set up, which is being debated under the present administration.

4.130 There have been proposals in the past and at present, touching on metro governance and rail re-structuring, the most notable ones are the following:

- Formation of a Strategic Railway Office within DOTr, to act as the railway regulator and concessioner to private railway operating entities (Transport Infrastructure and Capacity Development, ADB 1999);
- (ii) Amend the LRTA charter to include other railway technologies such as monorail and heavy rail (LRT Financial Restructuring Study,1996);
- (iii) Amend the PNR charter (House Bill #0250, House Bill#1867, House Bill#2037), so as to increase its capital base and capacity to take on more intra-urban (i.e., commuter service) and inter-urban (i.e., long lines or provincial service);
- (iv) Creation of a Philippine Railway Authority (Senate Bill No.644), which may have been inspired by the proposal contained in the NSCR Feasibility Study (2015) shown in Figure 4.8.1.



Source: NSCR FS (JICA 2015)

Figure 4.8.1 Institutional Proposals on Intra- & Inter-Urban Railways

- (v) Creation of a Land Transportation Authority that merges LTO and LTFRB (which is, in effect, a revival of the 1978 Land Transportation Commission);
- (vi) Creation of a Metro Rail Transit Regulatory Authority (House Bill 1103);

4.131 International experience in the organization and functioning of a transport authority offers the following pillars, which revolve around public transport:

- (i) Regulation in close cooperation with the LGUs;
- (ii) Planning of transport infrastructure and transport services;
- (iii) Tendering and awarding of concessions for different types of mass transport systems;
- (iv) Integration as a strategic issue on inter-modality and co-modality, leading towards sustainable modes of transport;
- (v) Promotion of public transport as a key tool to shift passengers from individual to collective modes of transport;
- (vi) Management of the transport service contracts;
- (vii) Control and monitoring

4.132 Transport authorities help to ensure the integration of, and improvements to, the public transport system by providing priority for public transport on the road, integrated ticketing and fare management, incentives to improve quality, integrated timetables, coordinated information systems and marketing campaigns. Table 4.8.1 below shows examples of urban transport authorities in selected cities.

		Governing Body	Constituent Local Gov't Units (LGUs)			Publi	c Trans	sport F	unctio	ons		
				Planning		Regulation		Fares/ Marketing		Infra	astruc	ture
СІТҮ	Name of Authority			Strategic Planning	Service Planning (Bus, Rail)	Procuring & Regulating Services	Fare Setting	Managing Fare Collection System	Marketing PT services	Planning Infrastructure	Funding Infrastructure	Construction Management
London	Transport of London	Appointed Expert	Boroughs	V	V	V	V	Ø	V	By bo	By boroughs	
Paris	Syndicat des Transports d'Ile de France (STIF)	Board of 29 members, 1 is from Business sector	Region and counties	V	V	A	V	Ø	Ø	A	A	V
Frankfurt	Rhein-Main- Verkehrsverbund Gmbh	Representatives from constituent cities	11 cities, 15 districts, State of Hessen	V	V	V	V	Ø	V	By M	By Municipalities	
Singapore	Land Transport Authority	Appointed Board of Directors	No local gov'ts	\mathbf{N}	V	V	By PTC	Oper ators	V	V	V	V
Hongkong	Transport Bureau	Appointed Transport Advisory Committee	No local gov'ts	V	V	N	By TAC	Ope	rators	V	Ø Works Ø Departme nt	
Manila	Metro Manila Dev't Authority	Mayors of constituent LGUs	13 cities+ 4 municipalities	V	Ø	Nat'l	Nat'l	V	Oper ators	Ø	V	V

Table 4.8.1 Typology of Selected Transport Authorities

Source: GTZ, Urban Transport Institutions;

3) Proposed Breadth and Scope of GCRTA

(1) Core Functions

4.133 The basic minimum responsibilities of GCRTA must necessarily emanate from its Vision and Mission. Suggested vision and mission is the following:

- **Vision:** A globally competitive and sustainable Greater Capital Region made possible by efficient and affordable public transport for all.
- **Mission:** To provide mobility and accessibility for the central capital community which meets their needs and expectations, supports economic and environmental goals.

4.134 As proven elsewhere, private cars cannot support the mobility of large cities without incurring huge cost penalties in terms of traffic congestion. Public transport is the only sustainable means to move an ever-increasing population over limited road space. Thus, GCRTA's most basic goal is to enable – by itself or through other players – a good public transit system, starting with railways, buses, and jeepneys. At the moment, this is being handled by a national level agency who must simultaneously deal with the other regions of the country.

4.135 If a new body like GCRTA is created, it must be given the tools to persuade users into patronizing public transport (and non-motorized transport), while developing strategies to "push them out" of cars and similar personal transport modes. To attract commuters, there must be good quality of service in public transport, infrastructure facilities for public transport, and non-motorized transport. This tool must necessarily include traffic management. Hence, responsibilities for traffic management over urban roads must be part of GCRTA's remit right from the beginning. Corollary to this function is the power to enact traffic ordinances, including other transport demand management measures – such as truck bans. This would necessitate veto powers over local ordinances on traffic.

4.136 The role of strategic railway authority for the Region will be one of the responsibilities of GCRTA. On the presumption that operations and maintenance of rail transit systems are best left in the hands of the private sector, the GCRTA would simply focus on the transport planning aspects and railway asset owner that contracts out the O&M to private entities. The long-haul railways shall be excluded from the GCRTA's loci.

4.137 Responsibilities for traffic signals used to be with DPWH, until it was transferred to MMDA. The logic for road and signaling in one agency fits the objective of maximizing the flow of vehicles. In large urban areas, however, the objective is to maximize the flow of people (not vehicles). The latter should be GCRTA's orientation.

(2) Beyond Core Functions

4.138 Most proposals in the past concerning institutional arrangement have mistakenly assumed that integrated solutions require placement of all functions under one super organization. This is the underlying philosophy in proposal to merge DOTr and DPWH (again). It is the view of this Study that such an organizational design is not advisable in the Philippine setting.

4.139 Coordination and collaboration with other agencies in the GCR, as well as with LGUs, is the operative word for the following activities that should be left where they are now:

- Land use planning, in so far as it leads to shorter trips (e.g., TOD), minimizes the need to travel, avoids negative traffic impact of property developments;
- Road network planning within and outside GCR has always been a function of DPWH, but GCRTA should vet their approval and implementation for purposes of inter-modal harmonization within GCR.
- Managing a fare collection system (which is usually a prerogative of rail and bus companies) that needs to be integrated across all modes and tied to a subsidization regime;

- Limiting the acquisition of private cars via quota system, or imposing additional conditions to restrain their growths, are important tools for GCRTA but difficult to circumscribe within GCR only;
- The business of taxis and trucks for hire. As carrier of passengers, solo or shared, taxis ought to be licensed by GCRTA. Trucks, on the other hand, cross local boundaries, but are the object of bans during busy roads.
- Power of eminent domain (acquire land for right-of-way), as well as power to close roads temporarily or permanently;
- Opportunities for the provision of adequate sidewalks, as well as off-road bus loading and unloading bays, usually occur during road construction.

4.140 Coordination is an important role for GCRTA, especially in the light of the above. For this reason, the GCRTA should include the following as members of its Board:

- The Secretary of DPWH, DOTr and DILG;
- The Head of the PNP Traffic Management Group;
- The Chairman of MMDA;
- The Governors of Cavite, Rizal, Laguna, Batangas, Bulacan, and Pampanga
- The head of the jeepney operators' association;
- The head of the bus operators association;
- The General Manager or CEO of LRTA and PNR (or its successor agencies)
- Representative from the business group

(3) Outside of GCRTA's Ambit

4.141 To maintain its focus on coordination and enabler of mobility and accessibility, the following responsibilities should remain outside of GCRTA's remit:

- Design and construction of roads, since construction is not its core competence (this will remain with DPWH for national roads, and LGUs for local roads) as well as avoid being distracted from its focus on public transit;
- Vehicle and driver licensing, as the standards and requirement apply nationally, and is not limited or unique to GCR. However, specific standards for urban buses – large, minibus, microbus – may need to come from GCRTA, in coordination with LTO of DOTr;
- Direct engagement in the operations of bus, rail and river ferry companies

4.142 A functional description of GCRTA and its component functions is depicted on Figure 4.8.3. The Chairman of the Board should have the rank of a Secretary and be appointed by the President. The CEO of GCRTA should be a professional, and insulated as much as possible from the vagaries of political winds.



Source: JICA Study Team

Figure 4.8.2 Functional Description of GCRTA

(4) Implications of Creating GCRTA

4.143 The biggest question is what shall be done with MMDA, once the GCRTA is created. Its responsibility for solid waste management and flood control would remain. Conversion of NCR into a province would imply election of a Governor, and the concomitant absorption of its remaining functions by the new provincial government. Should the country shift to a federal form of government, then what is left with MMDA after the emergence of GCRTA would logically be transferred to the sub-state government.

4.144 On the other hand, the territorial jurisdiction of GCRTA would be larger than the existing MMDA or its successor province. It can be defined by law to be flexible, i.e., LGUs can be added in the future and by voluntary consent.

4.145 The implementation of several urban railway projects can proceed as is, but with a gradual transition or transfer to GCRTA. An immediate task for GCRTA on railway is the creation of a long-term, sustainable, institutional framework for the following railway lines or projects:

- (i) LRT lines 1, 2, 3, 4, 7 and their extensions;
- (ii) North-South Commuter Railway, from Calamba to Clark;
- (iii) Metro Manila Subway Project;
- (iv) Pending and emerging proposals from LGUs and private sector on LRT and Monorail projects in the region.
- 4.146 The policy recommendation is to establish a common railway regulator, at least for

the region but can be national in scope, and to farm out long-term concessions for operations and maintenance to the private sector. The factor conditions in the Philippines warrant this hybrid approach; among these conditions are: i) railway as a stand-alone business is not financially viable and would entail viability gap funding from the public sector; ii) incentives, weaknesses, and constraints in the public sector lead to inefficiencies in O&M; iii) TOD approach to urban development requires heavy private sector participation.

4.147 The DOTr is currently implementing the PUV Modernization Program. To succeed, it needs to shift from ad hoc and fragmented responsibilities into an institution focused on its realization. For example, the current program is predicated on: i) LGUs being able to formulate a set of integrated routes, ii) LTFRB to review these routes and issue the corresponding franchises, iii) replacement of inefficient but iconic jeepneys with new paratransit vehicles suited for urban operations, with financing from GFIs, and iv) organizing the thousands of mom-and-pop small enterprises into cooperatives by the Office of Transport Cooperatives or into corporations devoid of a strategic investor. Any of these could trip the program.

	Phase 1	Pha	se 2
	2018-2022	2023-2029	2030 upward
Railway Organizations	 Capacity building for LRTA and PNR Create Railway Regulatory office in DOTr 	 Transform LRTA into a regional railway planning, development & regulatory authority overseeing private- sector managed railway lines in GCR, integrated with regional transport authority or stand-alone railway SOE 	 Elevate capacity of the regional transport and traffic authority towards an intensive and extensive
Metro Transport & Traffic	Amend charter of MMDA to strengthen its powers over traffic in NCR	 Create a GCR transport and traffic authority, that merges LRTA & absorbs the LTFRB franchising functions over PUV and PUB 	Intelligent Transport System

Table 4.8.2	Roadmap	for Transport	Institutions
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Source: JICA Study Team

5. New Town/Urban Area Development Integrated with NSCR/MMSP

5.1 Background

5.1 Railways, expressways, highways, and other transport systems catalyze urban development especially around major intersections, transit stations and transport terminals. These transport nodes generally attract a large number of riders which, in turn, generate a wide range of commercial and other land uses around these nodes. In a number of countries, specific policies, rules, regulations and standards have been adopted to guide such transit-induced development with the objective of enhancing patronage of the transport system and optimizing the potentials of these transport nodes.

5.2 These have given rise to the concept and practice of Transit Oriented Development (TOD). The TOD has evolved and become recognized as a real estate development strategy that takes advantage of the concentration of passengers in stations and/or terminals of mass public transport systems, especially railway, to promote smart urban growth.

5.3 The Philippines has no laws, policies, rules or standards for TOD. The existing laws that are closest to relating to TOD are focused on housing, land use, subdivision and building construction and as such tend to produce separate, unrelated projects. They do not enable large, mixed-use, integrated developments such as TODs, townships or new towns unless the land parcels involved are first purchased and consolidated.

1) Assessment of Existing Laws, Regulations and Standards in the Philippines

5.4 Although the country has no laws explicitly promoting the development of TODs or other large, integrated developments, there are laws, regulations and standards on housing and land development which can be used as reference for the planning of the development that transit systems are expected to catalyze.

5.5 Based on R.A. 7160 (Local Government Code) and R.A. 7279 (Urban Development and Housing Act), LGUs have the powers to plan, guide, implement and regulate housing and urban development projects through their Comprehensive Land Use Plan (CLUP), Comprehensive Development Plan (CDP), and Zoning Ordinance. They also have the authority to approve or disapprove proposed residential subdivision and other private sector projects, provided they comply with the requirements of PD 957 (Standards for Open Market Housing), or BP 220 (Standards for Economic and Socialized Housing), and PD 1096 (National Building Code).

5.6 A critical aspect of this power of LGUs is the enforcement of the Balanced Housing requirement of R.A. 72791. However, many LGUs have not implemented the actions required of them. They also often lack the capacity to undertake planning at the project level and to implement major infrastructure and land development projects. Based on the powers vested in them by the Local Government Code as well as Republic Act No. 7279, LGUs are able to identify and define areas for urban development through their CLUP and its accompanying Zoning Ordinance.

¹ It used to be called 20% Balanced Housing, but it now 15 percent for subdivisions and 5 percent for condominiums, as recently promulgated under R.A. No. 108841: Strengthening the Balanced Housing Program

5.7 In spite of these powers, LGUs' interventions in urban growth and development are rather passive and largely reactive. While they prescribe land uses (through the CLUP) and enforce this through their Zoning Ordinance, it is the private landowners and/or developers who decide what specific type of development to implement, where these developments will be, and when such developments are implemented. Even for Socialized Housing, LGUs may identify sites for it, but will not be able to implement it unless they acquire the properties concerned, which is very rarely done by most LGUs. Moreover, private housing developers have found several ways to comply with the Balanced Housing requirement without necessarily building these housing units within the LGU's territory that issued them the development permit.

5.8 Both the Local Government Code and UDHA prescribes what actions must be done to accomplish certain outcomes, but their Implementing Rules and Regulations (IRR) do not explicitly define how these actions can be carried out. For example, a LGU may designate the land use of a specific land parcel to be "Industrial" or "commercial" but cannot force the landowner to comply with this unless the LGU purchases the land and implements the prescribed land use.

5.9 The other laws on housing, real estate development, and building construction (such as PD 957, BP 220, and the National Building Code) focus on individual projects such as residential subdivisions, industrial estates, and condominiums. With such an orientation, they tend to produce individual, piece-meal, unrelated projects, except when different land uses and building types are within a contiguous, large, master-planned developments that are owned and developed by a single entity, which could be a private real estate developer or government.

5.10 Table 5.1.1 shows the list of major real estate developments, referred to as townships. All of these townships were either private properties or former government-owned lands that were sold (through bidding) to private developers. Common to all of them is that the land was owned by one or just a few owners prior to their development as townships. While they are all referred to as "townships," they vary in size and function. They are also referred to as mixed-use developments, referring to their having a wide mix of land uses. However, none of them include socialized housing.

	Township	Location	Land Area (ha)	Remarks
	Makati-Ayala	Makati City	-	Privately owned, developed and managed
	Circuit Makati	Makati City	21	Former privately-owned horse racetrack
	Alabang Town Center	Muntinlupa City	-	Former government land; sold to private sector
	South Park District	Muntinlupa City	6.6	
	Newport City	Pasay City	-	Former military base; sold to private sector
	Woodside City	Pasig City	12.3	Former privately-owned industrial site
Motro Monilo	Araneta Center	Cubao, Quezon City	35	Privately owned, developed and managed
INIEU O IVIAI IIIA	Eastwood City	Quezon City	17	Privately owned, developed and managed
	Vertis North	Quezon City	326	Developed by private in partnership with NHA
	Greenhills	San Juan City	-	Privately owned, developed and managed
	Bonifacio Global City	Taguig City	-	Former military base; sold to private sector
	Arca South	Taguig City	74	Former government land; sold to private sector
	Uptown Bonifacio	Taguig City	15.4	Inside Bonifacio Global City
	Veritown Fort	Taguig City	10	Inside Bonifacio Global City

Table 5.1.1 List of Existing Township in Mega Manila

	Township	Location	Land Area (ha)	Remarks
	Altaraza	San Jose del Monte, Bulacan	41	Private land; joint venture with landowner
	Nuvali	Sta. Rosa, Laguna	7,200	Former privately-owned sugarcane hacienda
	Sta. Elena City	Canlubang, Laguna	300	Private land; Joint venture with landowners
Adjoining	Greenfield City	Canlubang, Laguna	-	Private land; joint venture with landowners
Provinces	Laguna Bel-Air	Canlubang, Laguna	-	
	Eton City	Canlubang, Laguna	-	
	Alegria Dos Rios	Canlubang, Laguna	-	
	South Forbes Golf City	Silang, Cavite	-	

Source: ABS-CBN

2) Transit Induced Urban Growth Models

5.11 Transit induced urban growth models can be divided into three models based on the distance from the transit node as follow: (i) Micro Growth (immediately adjacent to or surrounding the transit station); (ii) Intermediate Development (up to 1km radius of the transit station; and (iii) Macro Development (up to 5km of the transit station).

(i) Micro Growth: This growth model is generally characterized by land uses, buildings and activities that take advantage of the foot traffic going in and out of the transit stations. Public transport vehicles are likely to congregate on the streets adjacent to the station. It can be expected that land values in these areas are high because of the active commercial activities. The dominant land use and overall character of these areas will be retail commerce.

The development of these areas as TODs to optimize their economic potentials in terms of generating jobs and livelihood opportunities as well as a source of increased revenue for LGU will entail a mix of actions by the private building and business owners and the LGU. The private sector can be expected to attend to the development or improvement and cleanliness of their properties, while the LGU will take responsibility for improvements, sanitation, and general administration of the public realm including traffic management and parking regulations. For these actions by the LGU, the applicable laws and regulations include the Local Government Code, the CLUP, Zoning Ordinance, and the Building Code.

At this level, it is necessary for the LGU to formulate and enforce a micro area development plan and program, detailing such features as infrastructure improvements and traffic management measures.

(ii) Intermediate Development: Transit stations can be expected to induce urban growth up to one kilometer away or even farther from the transit station, although the intensity of development especially commercial facilities will tend to decrease with distance from the station. Public transport routes leading to and from the stations will tend to have more intensive development. The farther the properties are, the lower will be their land values, and hence will be attractive to land users requiring large areas. Hence, compared with the Micro Growth model, this model will have a wider mix of land uses and may even include such uses as parking lots, parks and community facilities.

To optimize the potentials of the railways, it would be beneficial for the LGU where a station is located to formulate an integrated area development plan that would define

the mix of land uses, improvements in the public realm, and guidelines for improvements of private properties and buildings. The LGU will need to coordinate with the landowners concerned for the formulation of an integrated spatial plan and implementation program for the area's development. The laws and regulations relevant to the Intermediate Development model include those that apply to the Micro Growth model mentioned above, as well as the Urban Development and Housing Act, PD 957, and BP 220.

(iii) Macro Development: In order to fully optimize the benefits arising from the operations of the railway and address the core issues facing Metro Manila mentioned earlier, it is ideal to acquire, consolidate, plan and develop large areas as mixed use communities with substantial provision of affordable housing. These do not necessarily have to totally be "greenfield" areas and thus can be integrated with existing developments. The integrated community can have a wide range of land uses including light manufacturing, BPO offices, commercial enterprises, community and recreational facilities, and a mix of housing types for different income groups.

The rationale behind the Macro Development model is derived from its advantage over suburban sprawl from the standpoint of environment, fiscal management, and quality of life. These master-planned communities are envisioned to have the following features:

- A wide mix of land uses including residential, commercial, institutional, industrial, recreational, and a network of parks and public open spaces;
- Located within easy access from stations of the railway (within 5 km) in order to enhance these communities' connectivity and accessibility to other communities, employment hubs, and larger urban centers;
- A mix of housing types, with different forms of housing tenure and pricing including especially Socialized Housing units;
- A range of essential community facilities, such as schools, health centers, public markets, sports facilities, etc.;
- An efficient network of pedestrian footpaths, bicycle paths and vehicular roads, together with an affordable public transport system;
- Adequate and reliable water supply, drainage and sewerage system, and power distribution system; and
- Safe from risks of natural disasters.

5.2 Developing the Macro Transit Oriented Community

5.12 The planning and development of the macro transit oriented community in the context of the North-South Commuter Railway and Mega Manila Subway has to consider specific factors in order to achieve the desired outcomes.

1) Land Acquisition

5.13 The site to be developed as an integrated community is presumably composed of several individually owned private land parcels. If the development of this community is to be fast-tracked, these individual land parcels need to be purchased and consolidated either by government or by a private developer. However, because of the many landowners involved, private real estate developers are generally not attracted to such areas. Hence, in order to achieve the development objectives for the area within a shorter period of time, specifically the provision of affordable housing, government to acquire and consolidate the land parcels located farther away from the transit stations because of their lower land values. Additionally, land parcels in areas with low economic productivity will likely be easier to acquire, such as marginal agricultural areas and fishponds.

5.14 It will probably be the national government that has to acquire the land, with the local government concerned assisting in identifying the landowners concerned and helping negotiate the selling price. Or, the national government can provide some funding support to the LGU concerned for land acquisition purposes. Another alternative is that land acquisition for Socialized Housing can be provided through the enforcement of the Balanced Housing requirement.

5.15 Aside from the direct purchase of land by government, there are existing government programs that could be explored to acquire the land for the Transit Oriented Community (TOC), such as the Community Mortgage Program (CMP), the Local Community Mortgage Program (LCMP), and the High Density Housing Program (HDHP) that are all managed by the Social Housing Finance Corporation (SHFC). These three housing finance and development programs have originally been designed to cater to low income and informal settler families (ISF) through the provision of low-interest, long-term housing loans.

2) Provision of Socialized Housing

5.16 This is a fundamental objective of the transit oriented communities along the North-South Commuter Railway and Mega Manila Subway. There are three possible types of socialized housing that can be developed in these communities. One is the type that is developed by private housing developers in compliance with the Balanced Housing requirement of Republic Act 7279 (UDHA) and Batas Pambansa No. 220 (Socialized Housing Standards). The other type is developed by the LGU as part of its Local Shelter Program, which also uses the housing design standards provided by BP 220. The third type is developed by SHFC through the modified CMP, LCMP and/or HDHP.

5.17 It is most likely that many ISF cannot afford to avail of the housing units even with the loans mentioned above. For those who cannot afford, some of the housing units can be rented out through fixed term leasehold of, say, 10 years. After this period, the tenant-family could "graduate" to a higher-level housing facility and the government takes possession of the rental housing unit to either lease out to another household or to redevelop the structure into a higher-use facility. If it were the LGU that acquired the land and developed

the rental housing units, it retains ownership of the land and benefits from the appreciation in land value as well as income from the higher-use facility.

3) Provision of Jobs and Livelihood Opportunities

5.18 This is a critical challenge that is directly related to the resettlement of households presently occupying high hazard areas. It implies that if these households are to accept relocation to the transit oriented communities, these need to contain or at least be easily accessible to jobs and livelihood opportunities. This means investors and businesses need to be enticed to locate in the communities. This can be achieved through the targeting and application of existing programs of the Board of Investments (BOI) relating to mass housing and of the Philippine Economic Zone Authority (PEZA) relating to incentives for investors and businesses locators.

5.19 The BOI and PEZA Guidelines seem to be complimentary in the provision of both job/livelihood-generating developments and mass housing projects. Combining these activities and complying with the guidelines can be an option for local governments, which may yield not only to job/livelihood opportunities in TOCs/TOD areas, but also provision of residential areas for the future working population.

4) Estate Management

5.20 The management system of the completed community, including its operations and maintenance, and especially the socialized housing units, has to be clearly defined together with the community's development plan. Experience from the BLISS Housing projects that were built during the Marcos administration show that these project's homeowners associations are too fragile and prone to mismanagement especially when there is a change in government and operations are disrupted. Estate Management, particularly for the Socialized Housing component of the TOC, will most likely be directly linked with the system of housing finance and loan amortization. Whoever will provide the housing loans will likely need to be directly involved. However, the LGU concerned will have a role to play considering that the TOC is within its territorial jurisdiction.

5.3 Implementing the Macro Transit Oriented Integrated Community

5.21 There are two alternative implementing strategies to implement the envisioned transit-oriented integrated communities with the key features described in the preceding sections – easily accessible to a CMR station, large, mixed-use, includes Socialized Housing, provides jobs and livelihood opportunities, and integrated with the host community.

1) Implementation by the National Government

5.22 In this alternative, an inter-agency Task Force composed of the national agencies and LGU concerned is established to plan, implement and manage the transit-oriented community. The functions of the Task Force include:

- Acquisition and consolidation of the properties to be developed as the transit-oriented community;
- Formulation of the development master plan and construction details;
- Development of the Socialized Housing delivery system, to include development and end-user financing;
- Development of the implementing strategies to attract investors and business locators to the TOC;
- Construction of the infrastructure, utilities, Socialized Housing units, and all other facilities of the community

5.23 In addition to the host LGU, the other members of the Task Force should include SHFC, PEZA, BOI, DPWH, and HDMF. Based on their mandates, their suggested roles are:

- SHFC: Acquisition of lands, and financing for socialized housing through the enforcement of Balanced Housing requirement, in partnership with LGU.
- HDMF: Support for housing finance, mostly through loans for Pag-IBIG members.
- BOI and PEZA: Provision of jobs and livelihood opportunities through the promotion of economic activities such as establishment of eco-zones, and provision of incentives to investors.
- DPWH: Planning of infrastructure such as roads, flood control, water resources projects and other public works.

2) Implementation by the Host Local Government

5.24 Existing laws and development programs provide LGUs with powers that they can use to take the lead in implementing the TOC. The Local Government Code empowers an LGU to establish a local development corporation that can enter into partnerships with private landowners and national government agencies for the implementation of the TOC – from land acquisition to site development, housing finance to housing construction, to estate management. This will require the passage of a local ordinance for the purpose. Furthermore, they may secure funding for the TOC from both their local budget and through application of grants, as authorized by Section 23 of the 1991 LGC (Refer to Annex 5 for pertinent provisions of LGC of 1991).

5.4 Proposed Roadmap for New Town Development

5.25 The transit oriented integrated communities along the North-South Commuter Railway and Mega Manila Subway are a nationally significant undertaking. They have a great impact in addressing the most critical problems that have plagued Metro Manila in the last four decades. Their potentials to provide integrated, sustainable living and working environments for a very large number of low income and disadvantaged households that offers not only affordable housing but jobs and livelihood opportunities as well, are of major significance not only to Metro Manila but to the entire country. This can only be realized through a concerted effort involving a meaningful partnership between the LGUs concerned, national government, and the private sector.

5.26 These opportunities as well as existing conditions suggest that the national government should take the lead in planning and implementing the integrated communities. A special task force comprising of national agencies and LGUs concerned should be established specifically to implement these communities, with a national agency chairing the multi-agency task force. The national government's responsibilities will include: a) acquisition of the land (if development is to be fast-tracked); b) construction of major infrastructure and utilities such as major roads, water supply, power supply, drainage and sewerage system; c) provision of investment incentives to business enterprises; and d) targeting of housing loans for socialized and economic housing.

5.27 The responsibilities of the LGUs concerned include: a) assistance in the acquisition of the land; b) integration of the community's development plan and program in the CLUP and CDP; c) facilitation of the issuance of development permits; d) construction of community facilities; and e) governance of the Socialized Housing component of the completed development.

5.28 The private sector's role will be defined in the community's implementation program, and will include investments in the community's development, construction of infrastructure and buildings, and management of specified completed facilities.

5.29 The special task force should be empowered to plan, implement and manage the transit oriented communities. It is recommended that there be a Cabinet-level Project Steering Committee (PSC) to set the policy and provide the direction and oversight. The composition of the Task Force is recommended as follows:

5.30 **Project Steering Committee** (Cabinet-level representatives): PSC should include the following agencies:

- HUDCC Chair
- LGUs concerned Co-Chair (Mayors of the LGUs where the TOCs are to be located)
- DPWH
- LWUA
- DTI / BOI / PEZA
- HLURB
- Home Development Mutual Fund (PAG-Ibig)
- Social Housing Finance Corporation

• Others as required

5.31 **Technical Working Group**: The PSC should be supported by a Technical Working Group (TWG) to attend to the day-to-day operations of the Task Force. The TWG is proposed to be composed of the same agencies as the national agencies in the PSC but composed of Undersecretary- or Assistant Secretary-level representatives. The LGUs will be represented by their Planning & Development Coordinators. The TWG should be manned with a full-time dedicated staff housed under lead national agency.

5.32 In order to facilitate the establishment of the Task Force and to ensure the participation and inputs of the national agencies and LGUs involved, it is recommended that an Executive Order for the purpose be issued by the President.

6. UPDATED TRANSPORT ROADMAP

6.1 Goals and Transport Sector Strategies

1) Review of Build!Build!Build! Program

6.1 On the basis of the analysis and studies made in the aforementioned chapters, the projects of Build!Build!Build! Program was reviewed and its impact on urban environment was assessed for the short-term (2022) and the mid to long-term (2035).

6.2 Build!Build!Build! Program includes a number of strategic projects including those endorsed by previous Transport Roadmap. One of the significance is that provision of the north-south backbone corridors of both mass-transit and expressways, which will provide opportunities to transform Metro Manila to Mega Manila, and decongest Metro Manila. The main focus of Build!Build!Build! Program is not to identify new project, but accelerate pending projects studied and endorsed. As shown in Table 6.1.1, the program comprises of railway, BRT, bus terminals, traffic management, expressways and urban roads. The total cost is estimated to be PHP2.4 trillion of which the cost to government is approximately PHP1.4 trillion.

			Cost	Cost	to GOP	Implemen		
Category	ID	Project Name	(PHP bil.)	%	PHP bil.	ting Agency	Schedule	Status
	R1	North South Commuter Rail	149	60	89.5	DOTr	2016-2021	DED
	R2	PNR North 2	284	60	170	DOTr	2018-2024	Loan Agreement Signed
	R3	PNR South Commuter	345	50	172	DOTr	2018-2021	Loan Agreement Signed
	R4	PNR Commuter Rail System Operations and Maintenance	0.10	0	-	DOTr	2017-2022	ICC Evaluation, RDC Approval
	R5	Cargo Rail Line	10.0	0	-	Private		
	R6	Mega Manila Subway	356	90	320	DOTr	2017-2022	Loan Agreement Signed
	R7	LRT Line 1 Cavite Extension and Operation & Maintenance	64.9	50	32.5	DOTr	2017-2021	Pre-construction
	R8	LRT-1 North Extension	15.9	60	9.6	DOTr		Implementation
	R10	LRT Rehabilitation Projects	7.1	60	4.2	DOTr	2011-2019	Procurement
	R11	LRT Line 2 East (Masinag) Extension Project	9.8	60	5.9	DOTr	2015-2019	Implementation
	R12	Acquisition of Four (4) New Train Sets (LRT2)	2.1	60	1.2	DOTr	2018-2020	
	R14	LRT Line 2 West Extension	10.1	60	6.1	DOTr	2016-2019	Procurement
	R15	MRT 3 Capacity Expansion Project	8.6	20	1.7	DOTr	2012-2019	Implementation
Railway	R18	LRT Line 4 Project	85.0	60	51.0	DOTr	2018-2024	F/S
	R19	Metro Manila Line 5	302	60	181.1	DOTr(PN R)	2018-2023	F/S
	R20	LRT Line 6	64.7	60	38.8	DOTr		ICC Evaluation, Unsolicited
	R21	MRT Line7	62.7	50	31.4	DOTr	2016-2020	Implementation
	R22	Unified Common Station	2.8	10	0.28	DOTr	2017-2019	Procurement
	R23	Secondary Railway (Marikina, Pasig, Alabang, Cavite)	70.5	60	42.3			
	R24	Comprehensive LRT/MRT Business/Commercial Development Plan/Roadmap	0.004	100	0.004	DOTr	2018-2019	
	R25	Performance Testing and Evaluation of Prototype Train Set	0.02	100	0.02	DOST	2017-2017	DED
	R26	Deploying DOST Hybrid Electric Road Train as a Mass Transport System in Urban Areas	0.19	100	0.19	DOST	2018-2019	
	R27	System Expansion of the 120 Passenger per	0.01	100	0.01	DOST	2017-2017	DED

Table 6.1.1 Main Projects in Build!Build!Build! Program

			Cost	Cost	to GOP	Implemen		
Category	ID	Project Name	(PHP bil.)	%	PHP bil.	ting Agency	Schedule	Status
		Coach Capacity Automated Guide-way Transit System						
	R28	Testing for the Standardization and Optimization of Hybrid Road Train – Phase III	0.02	100	0.02	DOST	2017-2017	DED
	R29	Development of a Commercial Prototype Automated Guide-way Transit System in UP Diliman	0.02	100	0.02	DOST	2017-2017	
	R30	Development of Pilot Commercial Model Train Set	0.25	100	0.25	DOST	2018-2020	DED
	PT1	PUV Route Rationalization Study – Metro Manila	0.07	100	0.07	DOTr	2017-2017	F/S
	PT2	South Integrated Transport System Project	4.0	20	0.8	DOTr	2016-2019	
	PT3	Southwest Integrated Transport System (ITS) Project	3.2	20	0.6	DOTr	2015-2018	Implementation
	PT4	Integrated Transport System-North Terminal Project	4.0	50	2.0	DOTr	2017-2021	Project Dev't
	PT5	NAIA Intermodal Terminal	2.0	50	1.0	DOTr	2019-2022	Pre-F/S
Road-Based	PT6	Metro manila Bus Rapid Transit – Line 1 (Quezon Avenue BRT)	4.8	20	1.0	DOTr	2016-2021	DED
Public Transport	PT7	Metro manila Bus Rapid Transit – Line 2 (Central Corridor)	37.8	20	7.6	DOTr	2017-2019	Loan negotiation
	PT8	Metro Manila BRT – Line 3 (C-5)	31.2	20	6.2	DOTr	2017-2022	
	PT9	Metro Manila BRT Line 4 – Roxas Blvd	19.9	20	4.0	DOTr	2017-2022	Project Dev't
	PT10	BGC to NAIA Bus Rapid Transit (BRT) System	21.9	20	4.4	BCDA	2016-2021	Project Dev't
	PT11	BRT Greenways	4.0	100	4.0	DOTr	2018-2022	
	PT12	Ortigas Greenways	0.60	100	0.60	DOTr	2018-2020	Pre-F/S
	PT13	Public Transport Information Management Center	0.05	100	0.05	DOTr	2016-2018	F/S
	PT14	Public Transport Facility Improvement Project	0.02	100	0.02	DOTr	2019-2022	Pre-F/S
Traffic Management	TM1	Installation of Intelligent Transport System (Traffic Signal System Upgrading and Communication and Monitoring System)	10.0	100	10.0	MMDA		Implementation
Management	TM2	Comprehensive Traffic and Transport Management Study/Plan for Metro Manila	-	0	-	MMDA	2017-2019	Implementation
	E1	NLEX Harbor Link, Segment 10	9.0	30	2.7	DPWH		ROW Acquisition (100%)
	E2	Skyway Stage 3	37.4	30	11.2	DOTr(TR B)	2015-2019	Ongoing Construction, 56.34% completed as of August 2018
	E3	NLEX–SLEX Connector Road Project	23.3	30	7.0	DPWH	2017-2021	Ongoing Review of DED
	E5	Manila - Taguig Expressway	66.6	30	20.0	DPWH	Medium Term	Unsolicited/For Evaluation of DPWH
Expressway	E8	Metro Manila Expressway Project (C-6)	45.0	30	13.5	DOTr(TR B)	2018-2020	ROW Acquisition
	E9	Laguna Lakeshore Expressway Dike	76.0	60	45.6	DPWH	2020-2025	Evaluation of Bid Doc.
	E11	Arterial Road Bypass Project Phase II (ARBP II)	3.7	30	1.1	DPWH	2018-2022	ROW Acquisition
	E12	Plaridel Bypass Phase III	5.3	30	1.6	DPWH	2018-2020	(Varying stages)
	E14	Cavite-Laguna Expressway	35.7	50	17.8	DPWH	2015-2020	ROW Acquisition/Ongoing Construction
	B1	Metro Manila Interchange Construction Project Phase VI (MMICP IV)	4.0	100	4.0	DPWH	2015-2019	(Varying stages)
Bridge/Flyover	B2	C-2 (Gov. Forbes St.)/R-7 (Espana St.) Interchange Project	2.6	100	2.6	DPWH	2018-2019	Implementation (ECC?)
	B3	Ortigas Avenue – Santolan Road Interchange Project	0.60	100	0.60	DPWH	2018-2020	F/S

			Cost	Cost	to GOP	Implemen		
Category	ID	Project Name	(PHP bil.)	%	PHP bil.	ting Agency	Schedule	Status
	B4	EDSA-Taft Flyover	0.70	100	0.70	DPWH	2018-2020	ECC
	B5	Gil Puyat Avenue/Makati Avenue-Paseo de Roxas Vehicles Underpass Project	1.1	100	1.1	DPWH	2015-2018	Work Suspension
	B6	Metro Manila Priority Bridges Seismic Improvement Project (MMPBSIP)	4.3	100	4.3	DPWH	2016-2021	ROW Acquisition
	B7-1	Pasig River-Marikina River-Manggahan Floodway Bridges Construction Project (2 bridges)	6.0	100	6.0	DPWH	2020-2023	NEDA Board Approval
	B7-2	Pasig River-Marikina River-Manggahan Floodway Bridges Construction Project (10 bridegs)	27.4	100	27.4	DPWH	2020-2023	NEDA Board Approval
	B8	Bonifacio Global City to Ortigas Road Link Project, Sta. Monica-Lawton Bridge and Viaduct (Phase I & II-A)	5.7	100	5.7	DPWH	2012-2020	Procurement
	UR1	Circumferential Road 3 (C-3), Southern Segment from N. Domingo St. in San Juan City to Buendia Avenue in Makati City	10.5	100	10.5	DPWH	2020-2023	Pre-F/S
	UR2	C-5 Kalayaan-Bagong Ilong Improvement Project	8.5	100	8.5	DPWH	2016-2016	For NEDA Approval
	UR3	C.P. Garcia (C-5) SLEX to Coastal Road, Zapote Bound Coastal Service Road	0.10	100	0.10	DPWH	2017-2017	DED
	UR5	Widening of C-6	0.25	100	0.25	DPWH	2017-2018	DED
	UR6	C-6 Napindan-ML Quezon Ave	0.64	100	0.64	DPWH	2016-2018	DED
	UR7	C-6 Taguig Pateros	0.03	100	0.03	DPWH	2017-2017	DED
	UR8	By-Pass Road (Marcos Highway to JP Rizal St)	0.14	100	0.14	DPWH	2017-2018	DED
	UR9	Taguig Diversion Road to Elizco By-Pass Road (via Visitacion Street) incl. ROW	0.05	100	0.05	DPWH	2017-2017	DED
	UR15	Marcos-Alvares Road	0.18	100	0.18	DPWH	2016-2017	F/S
	UR16	Improvement/Widening of General Luis Road Project	2.9	100	2.9	DPWH	2017-2019	DED
	UR17	Pulilan-Baliuag Diversion Road, incl. Bridge	0.78	100	0.78	DPWH	2015-2017	F/S
Ushan Daad	UR18	Candaba – San Miguel Bypass Road	0.39	100	0.39	DPWH	2016-2018	DED
Urban Road	UR19	Western Bulacan Connector	0.39	100	0.39	DPWH	2017-2021	DED
	UR21	Jct. Batasan-San Mateo-Rodriguez By-pass Link Road, Phase III & IV, incl ROW	1.5	100	1.5	DPWH	2014-2018	F/S
	UR23	Bucal Bypass Road incl Briding Widening	0.20	100	0.20	DPWH	2014-2017	DED
	UR24	Alaminos-San Pablo City Bypass incl ROW and Bridge	1.0	100	1.0	DPWH	2016-2020	F/S
	UR26	General Aguinaldo-Magallanes-Nasugbu Road (East-West Road) Section III, Magallanes-General Aguinaldo-Maragondon Section	1.5	100	1.5	DPWH	2015-2021	DED
	UR27	Malagasang-Bucandala-Alapan Road incl ROW	0.40	100	0.40	DPWH	2016-2018	DED
	UR28	General Aguinaldo-Magallanes-Nasugbu Road (East-West Road), Amadeo Section	0.20	100	0.20	DPWH	2016-2020	DED
	UR29	General Aguinaldo-Magallanes-Nasugbu Road (East-West Road) Section II, Indang-Silang Section	0.80	100	0.80	DPWH	2016-2021	F/S
	UR30	Kaykulot Road connecting Tagaytay-Calamba Road to Sta Rosa Ulat Tagaytay Road	0.40	100	0.40	DPWH	20182020	F/S
Airport	A1	Sanglay Airport Development Project	0.71	100	0.71	DOTr	2017-2017	For ICC Review
	M1	Pasig River Ferry System	5.6	100	5.6	DOTr	2020-2023	For ICC Review
Maritime	M2	Design and Development of an Inter-Island Maine Vessel	0.02	100	0.02	DOST	2018-2020	R&D with Philippine Navy

			Cost	Cost to GOP		Implemen			
Category	ID	Project Name	(PHP bil.)	%	PHP bil.	ting Agency	Schedule	Status	
	M3	Brgy Lumbac	0.01	100	0.01	DOTr	2020-2020	For ocular inspection	
	M4	Construction of Maragondon Port	0.01	100	0.01	DOTr	2018-2018		
Total		2,385		1,411	-	-	-		

Source: NEDA collected from the relevant agencies. 1/ bus terminal project



Source: JICA Study Team prepared based on the collected information

Figure 6.1.1 Location of Big-ticket Projects of Build! Build! Build! Program

2) Estimated Impacts of Build!Build!Build! Program

6.3 The most significant impact of Build!Build!Build!Program is that traffic situation in Metro Manila is improved while that in the adjoining areas such as Bulacan, Rizal, Laguna and Cavite would not be improved so much. In Metro Manila, volume/capacity ratio improves 0.98 to 0.78 by 2035 as compared to the current situation while in the adjoining areas it is still improved but only from 0.90 to 0.86 during the same period.

6.4 If nothing is done, traffic situation becomes worse. Metro Manila's volume/capacity ratio increase to 1.2 by 2035 and that of adjoining areas to 1.3. Motorists have to pay the PHP4.2 billion/day and PHP4.9 billion/day of the congestion cost in Metro Manila and the adjoining areas, which are huge economic loss to the city. Therefore, there is a significant need to attend transport development in the adjoining areas, in integration with the backbone corridor main areas if attention is secondary network.

Aroo		Indiaatora	2017	20	22	2035		
Alea		mulcators	(actual)	Do Nothing	With BBB	Do Nothing	With BBB	
	— "	Traffic demand (mil. trips/day)	13.4	14.1	14.1	16.1	16.1	
	Traffic Demand	Rail Ridership (mil. pax/day)	1.3	1.4	2.2	1.5	4.9	
	Demanu	Expressway (000 pcu/day)	558	596	751	742	981	
Metro	Network	Volume Capacity Ratio	0.98	1.02	0.77	1.15	0.78	
Manila	Performance	Average Travel Speed (kph)	11.9	11.7	18.8	9.1	16.8	
Transport Cost Environm	Transport	Transport cost (PHP bil./day)	3.5	3.73	2.13	5.37	2.64	
	Cost	Congestions cost (PHP bil./day)	2.53	2.73	1.23	4.23	1.62	
	Environment	CO2 emission (000 tons/year)	16.3	17.2	13.6	20.6	15.5	
Traffic Deman	T (7)	Traffic demand (mil. trips/day)	5.1	5.6	5.6	6.9	6.9	
	Traffic Demand	Rail Ridership (mil. pax/day)	-	-	0.4	0.0	1.1	
		Expressway (000 pcu/day)	244	280	315	383	551	
	Network Performance	Volume Capacity Ratio	0.90	1.00	0.66	1.30	0.86	
BRLU		Average Travel Speed (kph)	11.0	9.5	12.1	6.5	9.0	
	Transport	Transport cost (PHP bil./day)	2.35	3.09	2.26	5.89	4.35	
	Cost	Congestions cost (PHP bil./day)	1.67	2.33	1.58	4.91	3.43	
	Environment	CO2 emission (000 tons/year)	11.4	13.2	10.9	18.9	16.2	
	T (7)	Traffic demand (mil. trips/day)	18.4	19.7	19.7	22.9	22.9	
	Traffic Demand	Rail Ridership (mil. pax/day)	1.3	1.4	2.6	1.5	6.0	
	Demana	Expressway (000 pcu/day)	802	876	1,066	1,125	1,532	
Mega	Network	Volume Capacity Ratio	0.95	1.01	0.72	1.21	0.82	
Manila	Performance	Average Travel Speed (kph)	11.5	10.7	15.3	7.7	12.0	
	Transport	Transport cost (PHP bil./day)	5.84	6.82	4.49	11.26	6.99	
	Cost	Congestions cost (PHP bil./day)	4.21	5.06	2.81	9.13	5.05	
	Environment	CO2 emission (000 tons/year)	27.7	30.4	24.5	39.4	31.7	

Table 6.1.2 Impact of Build!Build!Build! Program

JICA Study Team



Figure 6.1.2 Impact of Build!Build!Build! Program (2022 and 2035)

6.2 Additional Projects to be Included by 2035

1) Review of Additional Projects

6.5 In order to improve the traffic situation farther, those projects included in the list of the previous Roadmap was added to the Build!Build!Build! Program, which is called Roadmap2. The detail of each project are stated in *Technical Report 2*. Main focus given in the additional projects is to develop transport infrastructure is as follows.

- (i) Articulating Urban Rail as an Integrated Network. While existing LRT/MRT was constructed with insufficient consideration of connectivity for rail passengers. With commitment in the current government policy on the development of NSCR and MMSP, which are two north–south high capacity and quality transport lines, farther rail project is reviewed and developed based on the two north–south transit backbone in an integrated manner. Connectivity is important to benefit fail passengers for convenient and safe movement and increase in ridership on operators' side.
- (ii) Strengthen CBD Access. Within and around the CBDs are extremely congested mainly attributed to excessive development compared to infrastructure capacity. Absence of proper development control and lax enforcement is a root cause. As expansion of roads is extremely difficult and, if possible, the roads are soon filled up by private cars. Solution is elevated rails extension of the primary lines to expand the catchment area by walking.
- (iii) Integrated Urban Development along the Line. Time has come to seriously look into an integrated urban development along NSCR and MMSP. These two lines will bring about tremendous impacts on transport and urban development. Various feeder rail systems can be developed and large-scale urban development may take place.

Box 6.2.1 Experience of Rail Development in Tokyo Metro Politan Area

As the Mega Manila becomes similar size of Tokyo which has an extensive urban rail network and most of the lines are financing independent, it is good to learn from the experience of urban rail development in Tokyo. In CBD, most of the areas are covered by rail within walking distance and lines in Marunouchi area is connected with underground walkway. Tokyu (private railway company) bought large-scale lands at cheaper price, then constructed railway together with housing to sell them in the market at much higher price.



Tokyu Tama Denentoshi along Tokyu Denentoshi Line



Coverage of Urban Railway = 2.5 km



Urbanground Network (Marunouchi)

Source: JICA Study Team

			Cost	Cost	to GOP	Implementing	
Category	ID	Project Name	(PHP bil.)	%	PHP mil.	Agency	Schedule
	R13	LRT-2 East Extension (Phase II)	80.5	20	16.1	DOTr	Medium to Long Term
Railway	R16	MRT-3 Extension - South and West	68.6	60	41.2	DOTr	Medium to Long Term
	R17	MRT-3 Extension - North	68.6	60	41.2	DOTr	Medium to Long Term
Expressway	E4	CAVITEX - C-5 - San Jose Del Monte (Bulacan)	92.7	30	27.8	DPWH	Medium Term
	E6	Sta. Mesa - Pasig (Shaw Boulevard) R-4 Expressway	23.4	30	7.0	DPWH	Medium Term
	E10	North Luzon Expressway (SJ Del Monte-Cabanatuan-San Jose)	44.6	30	13.4	DPWH	Medium Term
	E13	C6 North Section	4.3	30	1.3	DPWH	Medium Term
	E15	CAVITEX Extension West to Rosario	12.7	30	3.8	DPWH	Medium Term
	UR10	Navotas/ Malabon/ Valenzuela Package	23.9	100	23.9	DPWH	Medium to Long Term
	UR11	Marikina Package	8.7	100	8.7	DPWH	Medium to Long Term
	UR12	Ortigas Avenue	8.9	100	8.9	DPWH	Medium Term
Urban Road	UR13	Amang Rodriguez Av. & Pres. Manuel Quezon	9.9	100	9.9	DPWH	Long Term
	UR14	Alabang-Zapote Areas	0.27	100	0.27	DPWH	Medium to Long Term
	UR20	Marcos Highway	4.0	100	4.0	DPWH	Medium to Long Term
	UR22	Calamba Local Area Roads Package	0.4	100	0.4	DPWH	Medium Term
	UR25	Rosario Package	4.0	100	4.0	DPWH	Long Term
Total			455.6	-	211.9	-	-

Table 6.2.1 Additional Project for Mega Manila

Source: JICA Project Team

2) Impacts of Roadmap2 (Build!Build!Build! Programs + Additional Projects)

6.6 The additional projects will bring about farther improvement in Metro Manila. Average travel speed becomes nearly 20kph and congestion cost will reduces to PHP1.4 billion. Overall volume capacity ratio becomes 0.7.

6.7 However, in adjoining provinces, the improvement is still limited. There is a limitation of adjoining areas compared to Metro manila, including insufficient data, wider coverage, and lack of information. Therefore, the indicators are preliminary and need to be elaborated.

	1	ndiaatoro	Existing	2035				
	I	IIUICALOIS	(2017)	Do Nothing	With BBB	Roadmap2		
	Troffic	Traffic demand (mil. trips/day)	13.4	16.1	16.1	16.1		
	Domand	Rail Ridership (mil. pax/day)	1.3	1.5	4.9	4.0		
	Demanu	Expressway (000 pcu/day)	558	742	981	1,273		
Metro	Network	Volume Capacity Ratio	0.98	1.15	0.78	0.71		
Manila	Performance	Average Travel Speed (kph)	11.9	9.1	16.8	19.0		
	Transport Cost	Transport cost (PHP bil./day)	3.5	5.37	2.64	2.40		
		Congestions cost (PHP bil./day)	2.53	4.23	1.62	1.37		
	Environ	CO2 emission (000 tons/year)	16.3	20.6	15.5	15.4		
	Troffic	Traffic demand (mil. trips/day)	5.1	6.9	6.9	6.9		
	Domand	Rail Ridership (mil. pax/day)	-	0.0	1.1	1.0		
	Demanu	Expressway (000 pcu/day)	244	383	551	545		
	Network	Volume Capacity Ratio	0.90	1.30	0.86	0.77		
DKLC	Performance	Average Travel Speed (kph)	11.0	6.5	9.0	8.7		
	Transport	Transport cost (PHP bil./day)	2.35	5.89	4.35	3.95		
	Cost	Congestions cost (PHP bil./day)	1.67	4.91	3.43	3.11		
	Environ	CO2 emission (000 tons/year)	11.4	18.9	16.2	14.2		

Table 6.2.2 Impact of Roadmap2 in 2035

Indicators			Existing			
			(2017)	Do Nothing	With BBB	Roadmap2
	Troffie	Traffic demand (mil. trips/day)	18.4	22.9	22.9	22.9
	Domand	Rail Ridership (mil. pax/day)	1.3	1.5	6.0	5.0
	Demanu	Expressway (000 pcu/day)	802	1,125	1,532	1,818
Mega	Network	Volume Capacity Ratio	0.95	1.21	0.82	0.74
Manila	Performance	Average Travel Speed (kph)	11.5	7.7	12.0	12.7
	Transport	Transport cost (PHP bil./day)	5.84	11.26	6.99	6.35
	Cost	Congestions cost (PHP bil./day)	4.21	9.13	5.05	4.48
	Environ	CO2 emission (000 tons/year)	27.7	39.4	31.7	29.6

Source: JICA Study Team



Figure 6.2.1 Volume/Capacity Ratio of Additional Projects (2035)

3) Farther Considerations

6.8 As shown in Figure 6.2.1, bottlenecks will remain in various locations due to urbanization towards 2035 and more likely then after. As stated, in order to elaborate the Transport Roadmap for the adjoining provinces, the required data for analysis needs to be collected.

6.3 Budget Envelope

6.10 The Philippines continues to be one of the fastest growing economies in the region. The short term economic outlook gleaned from projections, not only of the government but other multilateral institutions show strong economic growth. In 2016 the Philippines posted a GDP growth of 6.9%. The government targets a growth rate ranging from 7 to 8% from 2017 to 2022, or the end of the current plan period.

6.11 The "Build, Build, Build" Program plans a total public spending in infrastructure ranging from 5.4% of GDP in 2017 to 7% in 2022. Beyond the plan period, the target is to increase investments to 10% of the GDP by 2030. The planned increase in 2017 alone is almost a two-fold increase in investments, which on average was at 2.9% of the GDP from 2010 to 2016.

6.12 Two scenarios are hypothesized for the medium to long term period:

- (i) High Scenario: the economy grows at 7 to 8%, and a 5 to 7% ratio of public infrastructure investments to GDP until 2022 and 10% share in GDP in 2030 and 2040; transport sector gets 65% of the public investments
- (ii) **Low Scenario:** the economy grows slower at 5% and the public infrastructure investment ratio is at 3% of the GDP; transport sector gets only 50% of the public investments.
- (iii) Likely Scenario: in between the above two scenarios.

6.13 In the high scenario, the dominance of the three regions in the Study Area is assumed to decline by 1.0% a year. This means that regional growth rates would be lower than the country as a whole by 2.0% per year, at 5.5%. On the other hand, under a pessimistic scenario, the GRDP of the three regions remain static at 60.2% of the Philippines.

6.14 The resulting budget envelopes for the three scenarios are shown in table below.

(PHP billion)

Scenario	2018 - 2022	2023- 2030	2031 - 2035	Total
High ^{1/}	2,499	7,945	5,477	15,922
Medium	1,669	4,898	3,530	10,096
Low ^{2/}	839	1,850	1,582	4,271

Source: JICA Study Team

1/ GDP growth rate: 7-8%/year, share of 3 regions: 30-60%, % of allocation to infrastructure: 5-10%, % of allocation to transport sector: 65% 2/ GDP growth rate: 5%/year, share of 3 regions: 60%, % of allocation to infrastructure: 3%, % of allocation to transport sector: 50%

6.15 Short term planned spending from 2018 to 2022, is at PhP3.6 trillion, broken down to PhP 627.4 billion in 2018, PhP 764.5 billion in 2019 and PhP 937.8 billion in 2020; of which 65% will be allocated to transportation projects¹, or a 14% increase from its previous allocation of 50% of the public investments for infrastructure.

6.16 According to NEDA, 66% of the funding will come from local financing (GAA), 18% from PPP arrangements and 15% from ODA. The latter has a 3% increase from the 12% average spending of the previous plan.

¹ Deputy Governor Diwa Guinigundo at the 2017 Economic Forum

	2018	2019	2020	3-year Total	Ave
Total – All Infrastructure	1130	1180	1290	3600	1200
Transport Infrastructure (65%)	730	762	833	2326	775
Public funds (82%)	599	625	683	1907	636
Private funds (18%)	131	137	150	419	140

Table 6.3.2 Estimated Budget Envelope, 2018–2020 (PHP Billion)

Source: Bangko Sentral ng Pilipinas and National Economic and Development Authority

6.17 The increase in ODA financing may be largely due to the shift to hybrid PPPs, or projects that are partly financed from public and private resources. NEDA cites two major advantages of ODA financing, namely: i) longer term maturity and favorable concessional financing terms, with grant element of at least 25%, and ii) wider access to knowledge, experience and technology2. Hence, government is expected to assume the bulk of capital investments, with the private sector playing a bigger role in operation and maintenance.

² Undersecretary Rolando Tungpalan at the General Membership Meeting of the Management Association of the Philippines, May 2017

6.4 Implementation Schedule

6.18 All the proposed projects by DOTr, DPWH, MMDA, other transport related agencies as well as the backlog from the previous Transport Roadmap were evaluated on the following criteria to prepare the implementation schedule in short term (2018 - 2022) and medium – long term (2023 - 2035).

- (i) Consistency with policies and strategies. The priority projects must be consistent with the transport development goals and strategies.
- (ii) Doability: Considering the transport development history in the Philippines, the readiness of the projects is a key for the actual implementation.
- (iii) Effectiveness: The ability of the project in resolving present and future capacity constraints is important.

6.19 Based on the above criteria, 99 projects were categorized as short-term project or medium-long term project as shown in Table 6.4.1. In the railway projects, the detail engineering study of north-south backbone projects, i.e. NSCR and MMSP, have been conducted. Therefore, these projects together with some main railway projects are classified into short-term projects while newly proposed main railway and secondary railway projects can be considered for short-medium term projects. The projects of road-based public transport, traffic management, bridge/flyover and urban road improvement can implement soon as quick actions while expressway projects may take more time to continue until medium-long term.

6.20 The total project cost of proposed Transport Roadmap is about PHP2.9 trillion, of which the government needs to shoulder PHP1.6 trillion. In short-term project costs PHP1.5 trillion while the projects of medium-long term cost PHP1.4 trillion.

				Cost	Cost	to Gov't		Schedule	Note Current Status Note Pre-construction L/A Signed NOTE NOTE NOTE NOTE NOTE NOTE NOTE NOTE	
	ID	Category	Project Title	(PHP bil.)	%	PHP bil.	'18-'22	'23-'35	Note	Current Status
	R1		North Phase 1 (Malolos – Tutuban)	149	60	89.5				Pre-construction
	R2		North Phase 2 (Malolos – Clark)	284	60	170				L/A Signed
	R3	NSCR	South Commuter (Tutuban - Calamba)	345	50	172				L/A Signed
	R4		Commuter Rail System Operations and Maintenance	0.1	0	0				ICC Evaluation
			Sub-total	778		432				
	R5	PNR	Freight Line	10	0	0.0			TBC	Pre-F/S
	R6	Metro	Phase 1 (Mindanao Ave. – FTI)	356	90	320				L/A Signed
ž		Manila Subway	Phase 2	-		-				
ailwa			Sub-total	356		320				
Ľ.	R7		LRT Line 1 Cavite Extension and Operation & Maintenance	64.9	50	32.5				Pre-construction
	R8	LRT1	LRT 1 North Extension	15.9	60	9.6				-
			Sub-total	80.8		42.0				
	R10		Rehabilitation Projects	7.1	60	4.3				Procurement
	R11		East Extension Project (Santolan - Masinag)	9.8	60	5.9				Implementation
	R12	LRT2	Acquisition of Four (4) New Train sets	2.1	60	1.2				-
	R13		East Extension (Masinag - Antipolo)	80.5	20	16.1				-
	R14		West Extension (Recto - Pier 4)	10.1	60	6.1				Procurement

 Table 6.4.1 Transport Roadmap for Mega Manila

			egory Project Title	Cost Cost to		o Gov't	Schedule			
	ID	Category		(PHP bil.)	%	PHP bil.	'18-'22	'23-'35	Note	Current Status
			Sub-total	99.4		27.4				
	R15		Capacity Expansion	8.6	20	1.7				Implementation
	R16	MDT2	South Extension	68.6	60	41.2				-
	R17	R13	North Extension	68.6	60	41.2				-
			Sub-total	146		84.0				
	R18	Manila Metro Line 4 (Metro Manila - Taytay)		85.0	60	51.0			TBM	F/S
	R19	Manila Metro Line 5 (Makati Transit System Loop)		302	60	181			TBM	F/S
	R20	Manila Metro	Line 6 (Niyog – Dasmarinas)	64.7	60	38.8				ICC Evaluation
	R21	Metro Rail Tr	ansit Line 7 (North Ave San Jose Del Monte)	62.7	50	31.4				Implementation
	R22	Unified Comr	non Station	2.8	10	0.3				Procurement
	R23		Marikina Secondary Line	31.5	60	18.9				-
	R23		Cavite Secondary Line	25.6	60	15.4				-
	R23	Secondary	Alabang Secondary Line	13.4	60	8.0				-
	R23	Line	Pasig Secondary Line	-	60	-			TBC	-
			Sub-total	70.5		42.3				
	R24	Comprehens Plan/Roadma	ive LRT/MRT Business/Commercial Development ap	0.004	100	0.004				-
	R25- 30	Research Projects		0.57	100	0.57				DED
		Total (Railwa	ay)	2,067		1,257				
	PT1		PUV Route Rationalization Study - Metro Manila	0.07	100	0.07				F/S
	PT2		South Integrated Transport System	4.0	20	0.8				Implementation
	PT3	Dur	Southwest Integrated Transport System	3.2	20	0.6				Implementation
	PT4	BUS	North Integrated Transport System	4.0	50	2.0				Project Dev't
	PT5		NAIA Intermodal Terminal	2.0	50	1.0				Pre-FS
			Sub-total	13.2		4.5				
ort	PT6		Metro Manila BRT - Line 1 (Quezon Avenue)	4.8	20	1.0				DED
c Transpo	PT7		Metro Manila BRT - Line 2 (EDSA/Central)	37.8	20	7.6			TBC	Loan Negotiation
Publi	PT8	BRT	Metro Manila BRT - Line 3 (C5)	31.2	20	6.2				-
ased	PT9	1	Metro Manila BRT Line 4 - Roxas Blvd.	19.9	20	4.0			TBC	Project Dev't
ad-b	PT10		Metro Manila Bus Rapid Transit System (BGC-NAIA Segment)	21.9	20	4.4				Project Dev't
Rc		1	Sub-total	116		23.1				
	PT11		BRT Greenways (green walkways to BRT lines)	4.0	100	4.0				-
	PT12	1	Ortigas Greenways (high quality walkways within Ortigas)	0.6	100	0.6				Pre-F/S
	PT13	Others	Public Transport Information Management Center	0.05	100	0.05				F/S
	PT14	1	Public Transport Facility Improvement Project	0.02	100	0.02				Pre-F/S
			Sub-total	4.7		4.7				
		Total (Road-	based Public Transport)	133		32.3				
ement	TM1	Intelligent Tra Communicati	ansport System (Traffic Signal System Upgrading and ion and Monitoring System)	10.0	100	10.0				Implementation
iffic Manag	TM2	Comprehens Manila	ive Traffic and Transport Management Study/Plan for Metro	-	-	-				Implementation
Tra		Total (Traffic	: Management)	10.0		10.0				
e u	E1	Urban	NLEX Harbor Link, Segment 10	9.0	30	2.7				Implementation

				Cost	Cost	to Gov't	't Schedule			
	ID	Category	egory Project Title	(PHP bil.)	%	PHP bil.	'18-'22	'23-'35	Note	Current Status
	E2	Expressway	Skyway Stage 3	37.4	30	11.2				Implementation
l	E3	-	NLEX-SLEX Connector Road Project	23.3	30	7.0				DED Review
	E4		C-5 Expressway	92.7	30	27.8				-
	E5		Manila - Taguig Expressway	66.6		20.0				DPWH Evaluation
	E6		R4 Expressway (Shaw Blvd.)	23.4	30	7.0				-
	E7		R7 Expressway (Manila - San Jose Del Monte)	24.5	30	7.3				-
			Sub-total	277		83.1				
	E8		Southeast Metro Manila Expressway (C-6) Project	45.0	30	13.5			TBC	ROW Acquisition
	E9		Laguna Lakeshore Expressway Dike (LLED)	76.0	60	45.6				Evaluation of Bid Doc.
	E10		North Luzon Expressway East, Phase I and II	44.6	30	13.4				-
	E11	Others	Arterial (Plaridel) Road Bypass Project Phase II (ODA)	3.7	30	1.1				ROW Acquisition
	E12	1	Plaridel Bypass Phase III	5.3	30	1.5				-
	E13	1	C6 North Section	4.3	30	1.3				-
	E14	1	Cavite-Laguna Expressway	35.7	50	17.8				Construction
	E15	1	CAVITEX Extension	12.7	30	3.8				-
			Sub-total	227		98.1				
		Total (Expre	ssway)	504		181				
	B1		Metro Manila Interchange Construction Project Phase VI (MMICAP IV)	4.0	100	4.0				D/D
	B2		C-2(Gov.Forbes St.)/R-7(España St.) Interchange Project	2.6	100	2.6				Implementation
	B3	Interchange	Ortigas Avenue - Santolan Road Interchange Project	0.6	100	0.6				F/S
	B4	/Flyover/Un dernass	EDSA-Taft Flyover Project	0.7	100	0.7				ECC
	B5	doipado	Senator Gil Puyat Avenue-Paseo de Roxas/Makati Avenue Vehicle Underpass Project	1.1	100	1.1				Work Suspension
			Sub-total	9.0		9.0				
	B6		Metro Manila Priority Bridges Seismic Improvement Project	4.3	100	4.3				ROW Acquisition
ads	B7		Pasig River-Marikina River-Manggahan Floodway Bridges Construction Project (2 bridges)	6.0	100	6.0				NEDA Board Approval
Urban Rc		Bridges	Pasig River-Marikina River-Manggahan Floodway Bridges Construction Project (10 bridegs)	27.4	100	27.4				NEDA Board Approval
	B8		Bonifacio Global City to Ortigas Center Road Link Project , Phase I, IIA & IIB	5.7	100	5.7				Procurement
			Sub-total	43.4		43.4				
	UR1		C-3 Missing Link (N. Domingo St. (San Juan) - Buendia Ave. (Makati))	10.5	100	10.5				Pre-F/S
	UR2	1	C-5 Kalayaan- Bagong Ilog Improvement Project	8.5	100	8.5				NEDA Approval
	UR3	Primary Roads	C-5 (SLEX to Coastal Road, Zapote Bound Coastal Service Road)	0.1	100	0.1				DED
	UR5		Widening of C-6	0.3	100	0.3				DED
	UR6		C-6, Napindan-ML Quezon Ave	0.6	100	0.6				DED
	UR7	1	C-6, Taguig Pateros	0.03	100	0.03				DED

				Cost	Cost t	o Gov't		Schedule		
	ID	Category	egory Project Title	(PHP bil.)	%	PHP bil.	'18-'22	'23-'35	Note	Current Status
	UR8		By-Pass Road (Marcos Highway to JP Rizal St.)	0.1	100	0.1				DED
	UR9		Taguig Diversion Road to Elizco By-Pass Road(Via Visitacion Street) incl. ROW	0.1	100	0.1				DED
			Sub-total	20.2		20.2				
	UR10		Road packages (Navotas/Malabon/Valenzule)	23.9	100	23.9				
	UR11	Secondary	Road packages (Marikina)	8.7	100	8.7				
	UR12		Road packages (Ortigas)	8.9	100	8.9				
	UR13		Road packages (A. Rodriguez Ave. and Pres. M. Quezon)	9.9	100	9.9				
	UR14	Koad (Metro	Road packages (Alabang – Zapote)	0.3	100	0.3				
	UR15	Manila)	Marcos-Alvares Road	0.2	100	0.2				F/S
	UR16		Widening/improvement of General Luis StKaybiga-Polo-Novaliches Road	2.9	100	2.9				DED
		1	Sub-total	54.9		54.9				
	UR17		Pulilan-Baliuag Diversion Road, incl. Bridge	0.7	100	0.7				F/S
	UR18	1	Candaba - San Miguel Bypass Road	0.4	100	0.4				DED
	UR19	1	Western Bulacan Connector	0.4	100	0.4				DED
	UR20		Road packages (Marcos Hwy)	4.0	100	4.0				
	UR21		Jct. Batasan-San Mateo-Rodriguez By-Pass Link Road, Phase III & IV, incl. ROW	1.5	100	1/5				F/S
	UR22		Road packages (Calamba)	0.4	100	0.4				
	UR23		Bucal By-Pass Road incl. Bridge Widening	0.2	100	0.2				DED
	UR24		Alaminos-San Pablo City By-Pass incl. ROW and Bridge	1.0	100	1.0				F/S
	UR25	Secondary	Road packages (Rosario)	4.0	100	4.0				
	UR26	Road (BRLC)	General Aguinaldo-Magallanes-Nasugbu Road (East-West Road) Section III, Magallanes-General Aguinaldo-Maragondon Section	1.5	100	1.5				DED
	UR27		Malagasang-Bucandala-Alapan Road, incl. ROW	0.4	100	0.4				DED
	UR28		General Aguinaldo-Magallanes-Nasugbu Road (East-West Road), Amadeo Section	0.2	100	0.2				DED
	UR29		General Aguinaldo-Magallanes-Nasugbu Road (East-West Road) Section II, Indang-Silang Section	0.8	100	0.8				F/S
	UR30		Kaykulot Road connecting Tagaytay-Calamba Road to Sta. Rosa Ulat Tagaytay Road	0.4	100	0.4				F/S
		1	Sub-total	16.0		16.0				
			Total (Urban Road)	91.0		91.0				
ort	A1	Sanglay Airp	ort Development Project	0.7	100	0.7				ICC Review
Air p		Total (Airport)		0.7	100	0.7				
	M1	Pasig River F	erry System	5.6	100	5.6				ICC Review
	M2	Design and D	Development of an Inter-Island Maine Vessel	0.02	100	0.02				R&D
Maritime	M3	Brgy Lumbac		0.01	100	0.01				For ocular inspection
	M4	Construction	of Maragondon Port	0.01	100	0.01				
			Total (Maritime)	0.04		0.04				
	Grand Total					1,630				

Source: JICA Study Team complied from the several sources (e.g., NEDA, DPWH, DOTr, MMDA) TBM = to be modified, TBC = to be considered

7 CONCLUSION AND RECOMMENDATIONS

1) Conclusion

(1) On Spatial Development Orientation

7.1 **Accelerating Urbanization: Threat or Opportunity?:** The concentration of economic activities have brought with it the ills of rapid urbanization, such as housing shortages for low-income households, traffic congestion, environmental degradation, and a general inadequacy of transport infrastructure, and which are considered serious at present. By 2030 when the population would have ballooned by 1.3 times and the combined GRDP by 2.8 times, the situation could be worse. Unless these problems are addressed properly, now and not later, the engine of growth could falter and drag down the country's economic development.

7.2 **Emerging World-class Megacity: Metro Manila to Mega Manila:** Metro Manila will truly become a mega city if the current trend continues: By 2035, the population of adjoining provinces, i.e., Bulacan, Rizal, Laguna, and Cavite, and that of Metro Manila will grow to 38 million, of which Metro Manila will share 16 million. The negative impacts of suburbanization can already be felt and will continue to affect the region and its neighboring provinces: The constant pressure of urban development in Metro Manila, long commuting time in the outer areas, and deteriorating living environment in both areas. The sustainable development of Mega Manila must thus be looked at from the perspective of metropolitan management.

7.3 **Sustainable Spatial Structure: From Radial-Circumferential to Ladder Pattern:** Managing the distribution and spatial pattern of social and economic activities will go a long way in mitigating urban ills. Hazard maps have pinpointed areas to avoid, but land use controls have not been effectively wielded to achieve a sustainable path to the future. Nevertheless, the goal of re-shaping the spatial orientation towards the north and south, and less to the east and in hazardous and protected zones, remain. The provision (or nonprovision) of transport infrastructure over the next 15 years will promote this orientation, the nurturing of new development nodes for new housing, as well as meeting the mobility needs of a growing—and demanding—population.

7.4 **Integrated Development: Institutional and Sectoral Integration:** Many serious urban issues facing Metro Manila, such as traffic congestion, resettlement of households away from high hazard areas, provision of affordable housing, expansion of urban lands, decongestion of highly populated areas, among others, can no longer be solved within Metro Manila alone. Ample opportunities exist wherein Region III and Region IV-A could benefit from the urban development pressure of Metro Manila, when the three regions are connected through an efficient transport system and when the projects and actions of other related sectors are integrated.

(2) On Traffic Management and ITS

7.5 **Mobility Management: From Management of Vehicles to People:** Metro Manila is one of the most significant and large public-transport-based urban areas where nearly 70% of passenger trips are made using public transport, though this is not well recognized because 70% of vehicle trips are accounted for by private transport. The experience of many cities show that as the people become more affluent and start buying cars, the public

transport share decreases. Before the latter happens, the government has to provide proper attention to public transport improvement.

7.6 **Upgrading and Expansion of Existing System:** With better traffic management and engineering, more capacities can be extracted from the existing road network. This means installing coordinated traffic signals in more intersections in a wider area of Metro Manila, together with geometric improvements, provision of pedestrian facilities and traffic surveillance, accident prevention, and traffic enforcement. The current signalling system, therefore, has to be expanded and upgraded into a true intelligent transportation system.

7.7 In the medium to the long term, Metro Manila may have to adopt various ITSs and transportation demand management measures (TDMs), such as road pricing, as a means to ration demand on scarce roads. Other cities in the study area would need to install their respective ITSs, albeit on a smaller scale than Metro Manila.

(3) On Expressway Development

7.8 **Dramatic Impacts of an Integrated Network of Expressways:** The major arterial roads for Central Luzon (e.g., SCTEX) and CALABARZON (Star Expressway) are already in place in suburban areas outside of Metro Manila, while connecting these two expressways is ongoing. Meanwhile, C5 Expressway, connecting the proposed Central Luzon Expressway and Laguna Lakeshore Dyke Expressway, is expected to strengthen the north–south traffic flow. The second expressway connecting both north and south expressway corridors can effectively complement each other and strengthen the resilience of the road network. With the proposed network, together with the east–west expressways, Metro Manila will have an integrated urban expressway system which will contribute in dramatically reducing at-grade traffic congestion (see Figure 7.1). The network includes the C6 Extension Flood Control Dike Expressway as a co-product of the Laguna flood protection program, the port access improvements on the back of committed projects (i.e., Segment 10 of NLEX, Link Expressway, and Skyway 3), and the C-5 to FTI Link, which is riding on the redevelopment of FTI, and the proposed link along Shaw Blvd.

(4) On Road Improvement

7.9 **Completion of Missing Links:** To solve current problems, the focus of road development will be to clear backlogs of unimplemented (but still valid) road projects. For Metro Manila, this means completing the missing links of C-2, C-3, C-4, and C-5, as well as building the flyovers/interchanges on or before 2020. To ride on the momentum of other infrastructure initiatives, public and private, key road projects should also be implemented as soon as possible.

7.10 **Integrated Development of Secondary Roads and Land Use in Outer Areas:** To complement DPWH projects, the resources of LGUs in the outer areas of Metro Manila and in the adjoining provinces should be harnessed to articulate the many secondary roads that have to be built to improve efficiency and reach. At the same time, secondary roads must be developed in compliance with the envisioned spatial structure of LGUs for which the Comprehensive Land Use Plan (CLUP) must be updated.

(5) On Mass Transit Systems

7.11 **Importance of Developing North-South Backbones and Integrated Network:** The expansion of the mass transit network, consisting of a mix of HRT, LRT, monorail, and BRT, will entail a more massive investment than roads. A total of 268 km of main lines (in 6 corridors) and 60 km of secondary lines has to be provided as an integrated system. When fully built, these lines will capture as many as 5 million person trips per day compared to the current level of 1.5 million (see Figure 7.2).

7.12 **Accelerating Pending Work:** Hence, the urgency of clearing the backlog of railway projects by 2016, such as LRT-1 Cavite extension (12 km), LRT-2 east extension (4 km), reconstructing PNR's North commuter service (32 km), and the much-delayed MRT-7 (22 km). Delays would eventually result in the non-realization of the medium-term program.

7.13 **Opportunities for BRT:** To compensate for the long gestation for railways, developing the BRT mass transit ahead of the rail line in specific corridors should be pursued. The choice of the first line is critical to success. This Study prefers the Quezon Boulevard corridor and the MRT-7 corridor via Quezon City Circle, due to lower hurdles to overcome on the corridor. It will function as a pre-Metro mode and its operation will terminate once rail starts operating. C5 can also be a candidate BRT route, especially if it is developed into an expressway.

(6) Other Public Transport Systems

7.14 **Importance of Buses and Jeepneys:** Even if all the railway projects and proposed roads are built, they will still be insufficient unless the operations of buses and jeepneys are rationalized. By 2030, the latter mode would still carry more than 30% of daily trips. Doubling their productivity is now feasible with the advent of low-cost ICT systems. However, this would require a parallel change in the archaic business model (where every driver and unit compete against each other on crowded streets) towards a collaborative service model (where each unit cooperates to serve the public).

(7) Integrated Urban and Transport Development in Adjoining Provinces

7.15 **Attention to Increasing Demand in Adjoining Areas:** It is expected that Metro Manila's population growth will slow down due to congestion and the difficulty in finding affordable housing in the area, even as urbanization continues. More people will reside in the adjoining provinces, resulting in more commuting trips to offices in Metro Manila. The north–south mass transit will help them to commute smoothly. Since this trend is difficult to change, more urban areas in adjoining provinces should be able to provide employment and schools. Affected LGUs in these areas must thus prepare strategic urban plans to minimize the negative impact of Metro Manila's urban growth on them.

(8) Investment Funding

7.16 **Funding is No Longer Critical but Execution is:** For the first time in three decades, the funding outlook has become positive. The estimated budget envelope from 2018 to 2022, is PHP1,669 billion, while the proposed investment program for the same period only reaches PHP1,471 billion. Clearly, the problem in the short term is the capacity to execute. For the medium- to the long-term period (2022–2035), the budget envelope ranges from a low of PHP3,432 billion to a high of PHP13,422 billion. In comparison, the indicative transport investment program is PHP1,388 billion. At the worst case, therefore, the investments can be supported. The bottleneck in the medium term is the institutional capacity for planning and project preparation.



Figure 7.1 Concept of the Proposed Expressway Network


Source: JICA Study Team Areas where interline connectivity must be ensured.



(9) Sector Governance

Proposed Institutional Reforms: To implement the short-term TRIP, the capacity 7.17 of the infrastructure agencies for tendering, in accordance with the Government Procurement Reform Act and the BOT Law, must be ramped up. In support of the PPPbiased strategy, three institutional reforms are recommended: two on the road subsector and one the railways subsector. With regard to roads, the role of the TRB should be delimited to that of a toll regulator; its occasional venture as a toll road authority should be curtailed as a matter of good economic policy, notwithstanding the broad interpretation of its charter. The second reform revolves on the franchise of the PNCC under Presidential Decree No.1894. Doubts persist about its broad privilege. While it would be ideal to pass a law to remove any doubt, the government can choose to not exercise what is contrary to policy: a government-owned and controlled corporation (GOCC) in competition with private enterprises. The policy on urban rail is still unclear. Privatization was pursued in LRT 1 but not on the other lines. In MRT 7, the situation is even in reverse. Despite policy prescription on cost recovery, fares on the three urban rail lines have been kept stagnant since 2003. And contrary to the policy of separating regulation from operation, the DOTr continues to be both. For the rapid expansion of the urban rail network as envisaged in the medium-term TRIP, it is imperative that a clear policy framework be put in place. Privatization of the three rail lines into three separate concessions would avoid a monopoly and extricate government from direct involvement in rail operations.

7.18 **Enhancement of Capacity Building:** Another action, which always has to be given attention, is the continuous stream of capacity building for technical personnel within the agencies. This is a requisite for government to lead private sector initiatives and capacities for a more balanced benefit sharing between public and private sectors. In this connection, the coordinating mechanism and capacity of NEDA and the planning sections of the departments would need to be enhanced. In like manner and on the local scene, capacity building of LGUs in urban planning and management is always warranted.

2) Recommendations

7.19 A few of the proposed projects in the short-term period are lacking in the preparatory studies to move them to the tendering stage. Information gaps can be narrowed considerably, and rapidly, if the following actions can be made as soon as possible:

(a) **Expand and Upgrade Traffic Engineering and Management:** The current system is the product of four phases of systematic upgrading that has widened the coverage and has expanded the number of signalized intersections (435 at end of TEAM 4). Since then, the signalling system has not been widened nor upgraded. The MMDA needs technical assistance to ramp up this important component. Economic analyses show that traffic engineering measures would positively benefit any new road project. For example, rehabilitating and doubling the track up to Calamba, as well as providing a higher level of commuter service more at par with the LRT, will mean high trip frequency, faster travel, and grade separations in many road-rail crossings. To further improve traffic engineering and management, a comprehensive traffic management project for MMDA has commenced in early 2019 wherein a five-year action plan will be formulated.

- (b) **Reform Road-based Public Transport System:** The atomized operation of more than 35,000 jeepneys and 5,000 buses in Metro Manila¹ are ill-suited to the requirements of a modern metropolis. They are, however, necessary modes of public transport now and in the future, notwithstanding the massive expansion of the railway network. This study shall formulate a comprehensive plan of action to make their operations more efficient, lower their carbon footprints, and make them attractive to car users, without using their role as big employment generators. The MMDA has attempted to put some sanity and order in the operations of buses on EDSA, but many factors outside its control have hindered such effort. There are many cases of public transport reforms in other countries which have improved the coordination of bus and metro services and have fully integrated the fare structure and ticketing system routes as well as modes.
- (c) **Develop Secondary Roads:** The proposed expressways, trunk roads, and extensive railway lines will be ineffective without a supporting system of secondary roads. However, the LGUs in the GCR, as well as the regional and provincial units of national agencies, do not have the capability to identify and design the appropriate road links.
- (d) **Integrate Urban Rails:** Urban rail lines are implemented line by line with insufficient connectivity. Connectivity must be improved for rail passengers, not for operators. With the NSCR and the MMSP already committed for implementation, it is a good time to review all lines to integrate them as a network.
- (e) **Connect Urban Expressways:** Metro Manila will have a basis to pursue spatial restructuring when NLEX and SLEX are connected via the city center. Urban expressways should be configured as a network. Conflicts of above-ground space between rail lines at various locations must be addressed.
- (f) **Integrate Urban Development Programs**: Extensive urban and suburban rail transit development provides ample opportunities to solve many urban issues such as resettling residents from high hazard risk areas, providing affordable housing, promoting new towns, and promoting urban developments along the lines. Various types of TOD must be incorporated with rail development to ensure convenience and safe travel by urban rail and increase rail ridership to enhance financial viability. Capturing the value due to rail development must also be sought.
- (g) **Update Mega Manila Comprehensive Urban Plan:** Continuous urbanization, which is associated with economic growth, will generate significant impact on urban development and land use. In addition, when the north–south transport backbones (expressways and high-capacity rail) are in place, the future urban form and land uses will change considerably. Managing Metro Manila's transformation into a megalopolis will be difficult. Hence, it is high time that the comprehensive strategic urban plan for Mega Manila is updated to ensure that the mega region's socioeconomy, environment, transport, and land uses, among other aspects, are integrated and planned well.
- (h) Study Feasibility of Secondary MTS Lines: Several mass transit lines have been proposed in the medium-term TRIP. None has pre-existing studies. Their realization hinges on line-specific feasibility studies. To ensure that they do not emerge as fragmented lines, a railway network development plan should thus be prepared with particular focus on common stations.

¹ Based on LTFRB's 2012 records of active and expired franchises.

(i) Study Feasibility of North Harbor Redevelopment: Since domestic shipping is primarily from the south of Manila, there would be savings in ship operating costs if they dock at Batangas Port rather than at Manila North Harbor. This would also trigger a shift of cargo movements away from Manila and provide a volume of exportable TEUs that may entice foreign vessels to call at Batangas Port. This would free up North Harbor, which has an area of about 600 hectares, for possible conversion into a mixeduse waterfront property. For the City of Manila, this represents an opportunity to revitalize the city and regain its old glory.