No.

Republic of the Philippines

DOTC*MMDA*DPWH*NEDA*PNP-NCR*HUDCC*UP-NCTS*EMB
Japan International Cooperation Agency (JICA)

METRO MANILA URBAN TRANSPORTATION INTEGRATION STUDY

FINAL REPORT SUMMARY

March 1999

ALMEC CORPORATION

PACIFIC CONSULTANTS INTERNATIONAL
YACHIYO ENGINEERING CO.,LTD.

mmutis

SSF
JR
99-036(1/16)

EXCHANGE RATE USED

1 US$ = 40 PhP

Republic of the Philippines

DOTC*MMDA*DPWH*NEDA*PNP-NCR*HUDCC*UP-NCTS*EMB
Japan International Cooperation Agency (JICA)

METRO MANILA URBAN TRANSPORTATION INTEGRATION STUDY

FINAL REPORT
SUMMARY

March 1999

mmutis

ALMEC CORPORATION

PACIFIC CONSULTANTS INTERNATIONAL
YACHIYO ENGINEERING CO.,LTD.

PREFACE

In response to a request from the Government of the Republic of the Philippines, the Government of Japan decided to conduct a master plan study on Metro Manila Urban Transportation Integration Study(MMUTIS) and entrusted to study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Dr. Shizuo Iwata of ALMEC Corporation and consists of ALMEC Corporation, Pacific Consultants International and Yachiyo Engineering Co., LTD. to Philippine, there times between March 1996 to December 1999. In addition, JICA set up an advisory committee head by Dr.Shigeru Morichi, professor of University of Tokyo between March 1996 and February 1999,which examined the study from specialist and technical points of view.

The team held discussions with the officials concerned of the Government of Philippines and conducted field surveys in the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Philippine for their close cooperation extended to the study.

March 1999

Kimoto Fujita
President
Japan International Cooperation Agency

March 1999

Mr. Kimio Fujita
President
JAPAN INTERNATIONAL COOPERATION AGENCY
Tokyo

Letter of Transmittal

Dear Sir,

We are pleased to formally submit herewith the final report of the "Metro Manila Urban Transportation Integration Study (MMUTIS)".

This report compiles the result of the Study which was undertaken both in the Philippines and Japan from March 1996 to March 1999 by the Study Team, composed of ALMEC Corporation, Pacific Consultants International and Yachiyo Engineering Co., Ltd.

We owe a lot to many people for the accomplishment of this report. First, we would like to express our sincere appreciation and deep gratitude to all those who extended their kind assistance and cooperation to the Study Team, in particular the Department of Transportation and Communications and other government agencies of the Philippines.

We also acknowledge the officials of your agency, the JICA Advisory Committee, and the Embassy of Japan in the Philippines.

We wish the report would be able to continue significantly to Philippine's transportation development.

Very truly yours,

Shizuo Iwata
Team Leader
Study Team
METRO MANILA URBAN TRANSPORTATION INTEGRATION STUDY

MMUTIS FINAL REPORT
SUMMARY

Table of Contents

List of Tables

List of Figures

Glossary

ADB	Asian Development Bank
ALS	Area Licensing System
BOT	Build-Operate-Transfer
CALA	Cavite-Laguna Urban Development and Environment Project
CBD	Central Business District
CIF	Capital Investment Folio
DOTC	Department of Transportation and Communications
DPWH	Department of Public Works and Highways
ECA	Environmentally Critical Area
ECP	Environmentally Critical Project
EDSA	Epifanio de los Santos Avenue
EIRR	Economic Internal Rate of Return
EIS	Environmental Impact Statement
HOV	High-occupancy Vehicle
JICA	Japan International Cooperation Agency
JUMSUT	Metro Manila Transportation Planning Study
LGU	Local Government Unit
LIL	Learning Innovation Loan
LRT	Light Rail Transit
MCX	Manila Calabarzon Express
MMDA	Metro Manila Development Authority
MMETROPLAN	Metro Manila Transport, Land Use and Development Planning Project
MMUESS	Metro Manila Urban Expressway System Study
MMUSTRAP	Metro Manila Urban Transportation Strategy Planning Project
MMURTRIP	Metro Manila Urban Transport Improvement Project
MMUTDP	Metro Manila Urban Transport Development Plan
MMUTIP	Metro Manila Urban Transportation Improvement Project
MMUTIS	Metro Manila Urban Transportation Integration Study
MRT	Mass Rail Transit
MTDP	Medium-term Transport Development Plan
NAIA	Ninoy Aquino International Airport
NEDA	National Economic Development Authority
OD	Origin-destination
ODA	Official Development Assistance
OECF	Overseas Economic Cooperation Fund
PNR	Philippine National Railways
PM_{10}	Particulate Matter 10
PTSS	Philippine Transport Strategy Study
ROW	Right of Way
STRADA	System for Traffic Demand Analysis
TDM	Traffic Demand Management
TEAM 4	Metro Manila Traffic Engineering and Management Project Phase IV
UP-NCTS	University of the Philippines - National Center for Transportation Study
UTSMMA	Urban Transport Study in the Manila Metropolitan Area
UVVRP	Unified Vehicular Volume Reduction Program
WB	World Bank

TRANSPORT MASTER PLAN FOR GREATER METRO MANILA

1. INTRODUCTION

Background and Purpose

The MMUTIS study area[1] has been suffering from worsening traffic situation and severe environmental degradation. Roads have become more congested, commuting time and distance lengthened, in-vehicle congestion and comfort level of public transport decreased, air pollution worsened, and accidents increased. Many of these are attributed to the current transport situation which is characterized by a lack of infrastructure, poor maintenance, inadequate traffic and vehicle management, undisciplined drivers and pedestrians, uncontrolled roadside activities and land use, etc. Fast-growing population and urban areas are serious threats to a sustainable development of urban transportation from the medium to the long term. While the requirements for more strategic transport planning are necessary, updated database and effective planning tools are insufficient.

The Metro Manila Urban Transportation Integration Study (MMUTIS) was conducted, upon request of the Philippine Government, with technical assistance of the Japan International Cooperation Agency (JICA) with the following objectives:

(1) To establish an updated transportation database system similar to the one built in JUMSUT which is intended to contribute to transportation planning research and education in the Philippines;

(2) To formulate a Master Plan for an integrated urban transportation system for Metro Manila for the target year 2015; and

(3) To formulate a Medium-term Transportation Development Plan (1999 – 2004) based on the Master Plan.

Study Outputs

The MMUTIS produced the following major outputs:

(1) Transportation Master Plan up to year 2015
(2) Medium-term Transportation Investment Plan (1999 – 2004)
(3) Urban Transport database and models including the System for Traffic Demand Analysis or STRADA
(4) A set of technical reports.

During the study period, the MMUTIS also produced various technical notes and papers which were presented in the workshops/seminars.

[1] The MMUTIS study area covers Metro Manila and the adjoining municipalities/cities in Bulacan, Rizal, Cavite, and Laguna Provinces.

Study Implementation

The MMUTIS was undertaken between March 1996 and February 1999 by the Study Team, which is composed of consultants selected by the JICA and counterpart members from the Department of Transportation and Communications (DOTC), Metro Manila Development Authority (MMDA), Department of Public Works and Highways (DPWH), and the University of the Philippines' National Center for Transportation Study (UP-NCTS). In order to guide the Study, a Steering Committee and a Technical Advisory Committee were organized. An Advisory Committee to the JICA was also formed. The Study was undertaken maintaining close coordination among the concerned agencies, resulting in a total of 102 regular meetings. A total of 26 agencies/proponents were also invited to discuss the MMUTIS plans and projects.

Figure 1.1
Study Organization

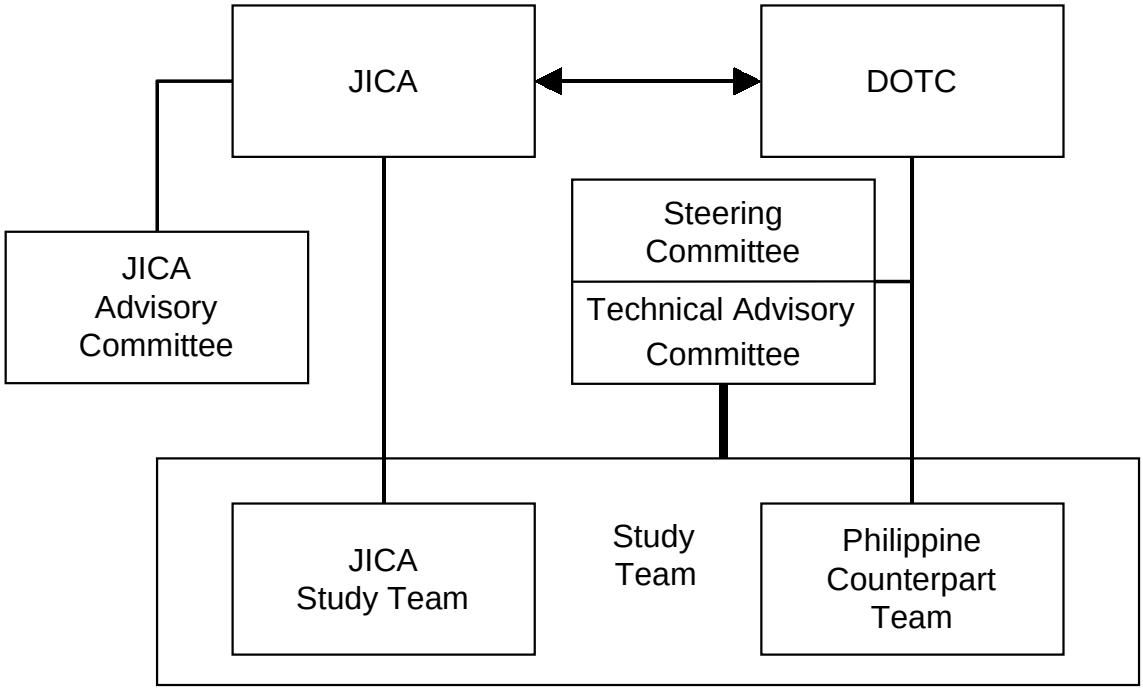


Figure 1.2
MMUTIS Study Area

2. THE CONTEXT FOR TRANSPORT STRATEGY

Historical Context

Transport developments in Metro Manila have been under government control. There was an effective City Plan, and in many locations roads were developed as planned. The current radial-circumferential road network plan can be traced back to the "Major Thoroughfare Plan" formulated by the Metropolitan Planning Commission in the 1940s. It was after the 1950s that the government seemed to have lost control over the development of transport facilities and services. As urban transport problems have become more and more a social concern, a series of transport studies had been undertaken, on which plans were based. They included the Urban Transport Study in the Manila Metropolitan Area (UTSMMA, 1973), the Metro Manila Transport, Land Use and Development Planning Project (MMETROPLAN, 1977), the Metro Manila Urban Transportation Improvement Project (MMUTIP, 1981), the Metro Manila Urban Transportation Strategy Planning Project (MMUSTRAP, 1982-85), the Metro Manila Transportation Planning Study (JUMSUT, 1981-84), the Metro Manila Urban Transport Development Plan (MMUTDP, 1991), and the Metro Manila Urban Expressway System Study (MMUESS, 1993). While substantial resources have been deployed in a large number of major studies, implementation has been limited and selective. In general, planning in Metro Manila has been in hiatus since the early 1980s and only now is it beginning to reassert itself. During that period, what has happened has been the result of individual actions of government agencies and private developers and investors. Today, there is no officially recognized development plan that is used to determine the infrastructure development strategy for Metro Manila. Further, there is no common planning database which can be used to help coordinate the activities of the main infrastructure sectors.

Prospects Facing Metro Manila

Metro Manila has been constantly growing and is expected to expand further to a size which only a few cities have experienced in the world. It has to be recognized that the future will, and needs, to be very different from the past. A new direction needs to be set based on the substantive progress of the recent past. At present, there is a considerable consensus in the Philippines about the major thrust of the national policy which provides the framework for the Study area. Several broad imperatives that dictate future approaches include the:

- Recognition that the private sector needs to have a substantial stake in many aspects of future development projects,
- Recognition that while much have been achieved recently, the performance of the transport sector should be further improved, and
- Recognition that city governance needs to be further strengthened to promote and ensure environmentally and financially sustainable urban development and management.

Government Policy Objective

Urban management is a central policy issue that has not been adequately addressed in the past, and this is the root cause of current urban problems. To a considerable extent, the deterioration of the environment and mobility has resulted from the failure of the transport strategy to address the sector's needs and the lack of control of the authorities over its growth. To ensure the improvement of transport systems it is thus necessary to complete some "unfinished work", of extending basic infrastructure networks and providing for their adequate maintenance. It also requires attention to the new problems posed by uses of better-quality services and by the adverse effect of rapid motorization. To support and ensure a better quality of life in the long term, the basis of a more demanding transport policy must focus on economic, financial, environmental, and social sustainability. Increasingly, urban sustainability has become the objective of city administrators worldwide.

Sector Constraints

The three major constraints in the transport sector are funding, institutional effectiveness and land for needed infrastructure. Despite limited public funds, there is still no systematic and rational allocation to planned transport projects. Although private funds for infrastructure projects substantially increase the volume of investments, recent experiences show that such projects still use up public funds somewhere along the process. A number of fundamental institutional problems have been noted: harmonization of activities at the metropolitan level needs to be closely monitored; local government units need to strongly assert their rights over land-use controls to prevent developers from implementing unplanned developments; and, traffic management and enforcement have been unified but still need further streamlining.

Ongoing Initiatives

There are three major studies that have impacted on the MMUTIS and vice versa. These are the Asian Development Bank-funded Philippine Transport Strategy Study (PTSS), the Metro Manila Urban Transport Improvement Project (MMURTRIP) and the Cavite-Laguna (CALA) Urban Development and Environment Project, both funded by the World Bank. The first two are finished, while the third has just commenced. The PTSS concerns the national transport strategy and its implications on the MMUTIS including the Philippine National Railways (PNR) right of way (ROW) and operation and access to the Manila Port and the Ninoy Aquino International Airport (NAIA). The MMURTRIP prepared short-term solutions on transport improvement on selected corridors such as the LRT Line 2 corridor, the EDSA corridor, the C-5 corridor, the Southern Luzon Expressway (SLE) corridor, and the Marikina Valley area. The CALA study aims at formulating long-term transport strategies in compliance with the MMUTIS proposal and short-term specific projects for implementation. Other initiatives include the Metro Manila Traffic Engineering and Management Project Phase IV (TEAM 4), which will replace and upgrade the area traffic control system in the main urban area, the ADB-funded Air Quality Improvement Project and PNR Restructuring Study.

3. CURRENT TRANSPORTATION SITUATION, PROBLEMS AND ISSUES

Profile of the StudyArea

The study area is defined as the combined jurisdiction of Metro Manila and most of the municipalities in the adjoining provinces of Cavite, Laguna, Rizal, and Bulacan. Metro Manila's area of 636 km^2 is densely populated and the metropolitan area has been expanding rapidly toward the outer areas covering 3,670 km^2.

Urban Development Characteristics

Under enormous population pressure, Metro Manila has been experiencing a drastic process of change in urban transportation, exhibiting the following characteristics:

- Suburbanization has not decreased the density of inner areas with the stepping-in of commercial activities. Growth rates have been low, negative even, in some sections as was observed in the City of Manila. Infrastructure in the inner urban core has not improved, and the environment has deteriorated.

- There are significant clusters of mixed land uses as well as squatter/slum communities, both of which exert strong but contrasting influences on transport.

- The spatial separation of residences from workplaces and educational centers has worsened. With more households opting to live outside Metro Manila, and farther away from jobs and schools, the number of trips and trip distances has increased proportionately.

- Development and land-use controls have not been evident in the study area. In outer areas, ribbon developments have prevailed with adverse impact on future road flexibility and capacity. High-intensity structures (reflected in very high floor-to-area ratio) have risen in areas intended for low-density development. Traffic impact assessment is non-existent. Private sector interests in urban development have not been properly tapped to secure public interests.

- The outer urban areas (which are receiving the influx of suburbanization) are generally unprepared. Infrastructure is inadequate, if not lacking, and neither the local nor national government is addressing the problem.

Socio-economic Characteristics

The population in the Study area was 8.4 million in 1980, 11.7 million in 1990 and 14.4 million in 1995. The annual growth rate between 1990 and 1995 was as high as 4.2% per annum, significantly higher than the 2.5% national average. Thus, the concentration of the population in the study area has intensified from 17.4% in 1980 to 20.9% in 1995. Metro Manila is the largest provider of

employment and education. It provides 3.6 million jobs[2] and accounts for 1.7 million primary and secondary enrolments and 1.3 million tertiary enrolments.

Table 3.1
Socio-economic Profile, 1996

Item	Metro Manila	Adjoining Municipalities	MMUTIS Study area
Population:	9,454	4,914	14,368
No. of Households: 000	1,988	1,002	2,990
Ave. Household Size	4.8	4.9	4.8
Employment:[1)] 000 (%)	3,642 (100.0)	1,428 (100.0)	5,070 (100.0)
- Primary	39 (1.1)	118 (8.2)	157 (3.1)
- Secondary	851 (23.4)	440 (30.8)	1,291 (25.4)
- Tertiary	2,752 (75.5)	870 (61.0)	3,622 (71.5)
School Attendance[1/]: 000 (%)	2,966 (100.0)	1,624 (100.0)	4,589 (100.0)
- Pupil	1,696 (57.2)	990 (61.0)	2,686 (58.5)
- Student	1,270 (42.8)	634 (39.0)	1,903 (41.5)
Car Ownership			
- No. of 4-wheel vehicles: 000	527	212	739
- Car-owning Households: %	19.7	16.9	18.7
- Ownership: no./000 pop.	59	45	54
Household Income			
- Average: Peso/month	11,780	9,820	11,109
- % HHs below Poverty Line	6.5	12.8	8.7

Source: MMUTIS Person-trip Survey and various official statistics.
1/ Employment and school attendance are at workplace and at school place, respectively.

Motorization

Motorization has increased rapidly. During the period 1980-1995, the number of registered vehicles, both private and for hire, increased at an average rate of about 6% a year. More than 40% of all vehicles registered in the Philippines are concentrated in Metro Manila. Compared to other Asian cities, Metro Manila's car ownership level is still low. It is interesting to note that the motorcycle has never been a popular transport mode in Metro Manila. The MMUTIS estimated the number of cars in the Study area in year 2015 at 2.1 million, 2.9 times higher than the present level.

Transportation Demand

The study area generated a total of 30 million person trips a day in 1996, 81% or 24.6 million of which are motorized, while 19% or 6.3 million are nonmotorized. Trip characteristics are as follows:

- About 79% of the residents make daily trips.
- Trip rate (average number of daily trips made by a person above four years old) is 2.3.
- Males make more trips than females with respective trip rates of 2.6 and 2.0.
- Car-owning household members make more trips than noncar-owning household members with respective trip rates of 2.6 and 2.2.

[2] The number of jobs grew at about 6% per annum between 1980 and 1996.

- Those who belong to higher-income households (e.g. ₱ 200,000/month and above) make more trips than those from lower-income households (e.g. ₱ 3,000/month and below) with respective trip rates of 3.1 and 1.8.

An analysis on traffic demand by transportation mode for Metro Manila revealed the following characteristics (refer to Table 3.2):

- Of the total traffic demand of 17.8 million person trips, about 70% is met by public transport modes, 8% by semi-public modes (which is defined to include taxi, HOV taxi, private bus) and 21% by private modes. Passenger cars share 18.5% of the total demand.
- However, in terms of vehicle trips estimated based on the average occupancy of relevant modes, private modes share 53%, semi-public modes 13% and public modes 34% of the total vehicle trips. Passenger cars share 34%. Whether or not the efficiency of transport modes has been explicitly reflected in current urban transport policy has not been examined.
- The high modal share of public transport in Metro Manila compared to other Asian cities[3] is unique and needs to be maintained.
- The distribution of demand has changed drastically as compared to 1980 (JUMSUT Survey). While the traditional city center in Manila was the center of demand distribution in 1980, the demand pattern is now spread over the study area. The emergence of new traffic generators along EDSA is evident.
- The average trip length has become longer from 5.3 km in 1980 to 6.4 km in 1996 (Metro Manila residents only).
- The average commuting time of "To work trips" has also become longer, from 36.6 minutes in 1980 to 51.3 minutes in 1996 (Metro Manila residents only).

Table 3.2
Traffic Demand in Metro Manila by Transportation Mode

Mode		Person Trips		Average Occupancy	Vehicle Trips		
		No. (000)	(%)		No. (000)	(% vehicle)	(% PCU[2/])
Private	Motorcycle	125	0.7	1.1	114	3.2	1.6
	Car/Jeep+UV[1/]	3,289	18.5	2.5	1,316	37.0	37.2
	Truck	422	2.4	2.1	201	5.7	11.4
	Subtotal	3,836	21.6	-	1,630	45.8	50.2
Semi Public	Taxi	862	4.9	2.2	392	11.0	11.1
	HOV Taxi	226	1.3	4.7	48	1.4	1.4
	Private Bus	440	2.5	22.3	20	0.6	1.1
	Subtotal	1,528	8.6	-	460	12.9	13.6
Public	Tricycle	2,373	13.4	2.5	949	26.7	13.4
	Jeepney	6,952	39.1	15.1	460	12.9	19.5
	Bus	2,653	14.9	46.5	57	1.6	3.2
	LRT	409	2.3	-	-	-	-
	PNR	6	0.0	-	-	-	-
	Subtotal	12,394	69.8	-	1,467	41.2	36.2
Total		17,758	100.0	-	3,556	100.0	100.0

Source: MMUTIS Person-trip Survey
1/ UV: utility vehicle
2/ PCU (Passenger Car Unit): conversion factor of different sizes of vehicles in terms of passenger car size for comparison.

[3] Bangkok and Jakarta have long favored private transport. Singapore and Tokyo maintain a higher public transport share of 66-67%.

Urban Road Development

Urban road development has consistently received high priority judging from the amount of public funding. Many studies were undertaken to accelerate road development and improvements. Nevertheless, there are still many areas for improvement such as network capacity increase through improvement of connectivity and capacity of existing network, removal of bottlenecks on the existing network through grade separation and local widening, among others, and strengthening of maintenance/rehabilitation work on the entire existing network. It is also critical to work out ways to accelerate smooth right-of-way acquisition and to minimize the negative social impact on the urban poor due to road development. New roads and major improvements of existing road networks are particularly important in the periphery of Metro Manila prior to full urbanization.

Traffic Management

Although the fundamental cause of congestion is an imbalance between demand and supply, traffic management potentials have not been fully tapped. Traffic management refers to a wide range of actions and measures to improve the traffic flow, environment and safety without substantial capital investment but through legislative, engineering and operational measures. Areas for improvement are signalization of intersections including renewal of existing system, skills upgrading of traffic enforcers and aides, traffic safety improvement through safety education for drivers and school children, updating of traffic regulation, development of traffic information system, etc. Traffic engineering and management measures need also to be applied to specific corridors and areas as was done by the MMURTRIP. Similar programs should be implemented in other corridors and areas. Traffic management during the construction period of mega projects, which will be continuously implemented in the future, is also critical.

Public Transport

Most of the residents depend on public transport, which generally provides good service through a mix of LRT, bus, jeepney, and tricycle. While service level and comfort have declined as congestion worsened, new types of services (such as the Tamaraw FX, a shared air-conditioned taxi with about 10 seating capacity providing point to point service), as well as air-conditioned express bus services have emerged. On this score, public transport services in the study area have responded to the market ahead of regulation. However, this should not cause complacency since the demand may quickly shift to private transport if the experience of other Asian cities is any indication. The key is to expand the rail transit system combined with other measures that would create integration, seamless transfers between different public transport modes, and traffic priority to buses and jeepneys.

Transport Terminals

Potential roles of public transportation terminals are large. At present, the establishment of a clear cut definition of terminals in the urban transport policy for the metropolis is underway. Now, they are mostly indistinct limits of existing road space where vehicle and passenger movements and activities are handled often creating serious bottlenecks. For example, Baclaran, Cubao, Guadalupe, Divisoria, Blumentritt, Libertad, etc. are the typical terminal areas where adequate policy intervention is warranted. The establishment of definite policies and development guidelines on terminals, or transport nodes, is recognized to be very important to sustain public transportation and to integrate transport modes with each other and with urban development.

Water Transport

Water transport fulfils a very small portion of personal transportation needs in and around Metro Manila. However, for those who use it, water transport is important. The *banca*, which carries about 26,000 passengers a day, is an important timesaving mode for low-income residents, while ferries carry about 1,000 passengers a day along the Pasig River. The river is also an important conduit for carrying goods to industry sites. Cleaning the river is one of the major issues in the operation of passenger boats. Another is improving access to piers.

Airport and Port Access

The NAIA is one of the largest traffic-generating sources in Metro Manila, absorbing about 30,000 vehicles and 80,000 persons a day. Traffic congestion around the NAIA is so serious that improving access is an important issue. Although, relocation of the NAIA must be considered, this needs a strong political leadership and a social consensus to reach a solution.

Environment

Road environment has been worsening day by day as the number of motor vehicles increase and traffic congestion worsens. However, reliable data on traffic caused pollution such as air and noise levels have not been made available. Based on the limited data including those surveyed in the MMUTIS, it is indicated that existing TSP values exceeded the standard value in many locations in Metro Manila, especially Valenzuela and Ermita. Particulate Matter 10 (PM_{10}) concentration is high in EDSA and Quezon Avenue. Since unleaded gasoline became available in February 1994, the lead concentration has declined substantially.

4. TRANSPORT POLICY

New Transport Policy Directions

A new paradigm in urban transport planning and management has emerged, emphasizing sustainability and private-public partnership. The environment is being given greater attention, not as an afterthought, but as an intrinsic element of economic growth and poverty reduction. While the planning horizon is necessarily long, the requirements of the short-to-medium term period cannot be sacrificed. In the case of the greater Metro Manila area, failure to adopt and follow a long-term plan has severely restricted its present options. True, there is already a perceptible shift from dependence on public sector management and funding to greater reliance on private sector skills and resources. However, the requisite adjustment in government institutions, regulations and processes has been lethargic as to limit the volume of privately financed transport infrastructure. With less government share of investment in transport projects, there is greater need to focus on capacity building, institutional restructuring, user charges, and policy reform to create competitive markets.

Infrastructure Development and Management

ROW acquisition has become more and more difficult and expensive for most of the infrastructure projects and often causes a delay in project implementation. Alternative methods to the current practice need to be seriously looked into, such as the introduction of the "Land Readjustment Scheme", closer integration of resettlement with the projects, strengthening city planning/land-use controls and so on.

Integrated Transport Planning and Development

Good planning should be a central requisite for transport sector administration. For this, planning capabilities need to be strengthened and supported with good and reliable database and decision support system. Expansion of the research and development capabilities for the transport sector is also much needed in connection to improving and sustaining good planning.

Public Transport Operations

Public transport operations in the study area are facing needs for change. The MRTs/LRTs are being developed; many radial corridors are congested by jeepneys, while new bus/jeepney routes are restricted in many cases. Increasing incomes require increasingly diverse services, etc. These changes include the restructuring of existing bus/jeepney routes with the MRT/LRT as the center of the public transport system, review of existing franchising system, improvement/provision of off-street terminals/interchanges, development of bus/jeepney priorities, on-street enforcement, etc. Mass transit strategy requires purposeful planning by the government, scrutiny of the system/line integration and effective participation of the private sector.

Traffic Management and Demand Management

It is needless to elaborate on the importance of traffic management. Traffic management and low-cost measures can greatly contribute to the transport improvement of the Study area. With a number of mega projects underway and planned, traffic management along the corridors where these projects are located is critical. TEAM 4, MMURTRIP, Metro Manila Air Quality Improvement Project are in the pipeline.

The issue of overlapping responsibilities has already been resolved in favor of the MMDA. For all intents and purposes, the MMDA is primarily responsible for traffic management and enforcement in Metro Manila (excluding other parts of the study area). Efforts are already underway to train and equip traffic enforcers. This should be accelerated and supported by improvement in the management of traffic resources. Serious efforts in the implementation of traffic mitigation measures during the construction of mega projects (like LRT and Skyway) has been made but improvements could still be introduced like the use of real-time geographic-based information.

The term traffic demand management (TDM) is usually applied to measures that are intended to increase the cost of making undesirable trips. The modified vehicular volume reduction scheme (or color coding) is a temporary measure to control demand on a limited supply of roads. It, and similar schemes like odd-even, is not a permanent solution. There are trip demands which can be met either by walking, riding a car, taxi, jeepney, bus, and/or LRT and should be explored more extensively. Traffic management experiences worldwide show that there are many ways of reducing vehicular volumes but since demand for trips usually gets diverted to some other modes, traffic managers are looking at other measures to address this issue.

Demand management measures are a necessary complement to the construction of more infrastructures, and may even reduce the need for such physical facilities, but they exact a heavier load on overworked institutions. Hence, they should be carefully weighed on their cost and benefits. It is also noted that pricing measures contribute significantly to the increase in revenue to the government.

Attracting the Private Sector

Private sector participation has become a policy, especially with the imperatives of limited public resources. Infrastructure development has been opened to the private sector, while government has largely stayed out of the operations and delivery of transport services.

However, private investments in road and rail facilities have not been as extensive as desired. Project closures (e.g., Skyway, LRT 3, C-5) have been few because of the high transaction costs, procedural delays, inadequate preparatory works, and the unavoidable learning curves for government and business leaders. To realize most of the plan targets, there must be a quantum increase in the flow of private funds into expressways and rail projects. While full government guarantees tend to speed up project negotiation, it is dangerous and should be avoided or minimized as a matter of policy. Otherwise, a new-style debt crisis may blow up at a later stage.

Attracting the private sector will entail more intensive promotional efforts to actively package and bid out road projects to private proponents instead of waiting for unsolicited proposals, and to advance expenditures on securing ROWs. For rail projects, the desirable rail network has been defined by the MMUTIS but the realization of the different lines needs to be prioritized. Under a new framework track infrastructure is separated from rolling stock operations. Rail project designs should precede open solicitation of bids, and commercial or market risks should be borne by the private concessionaire.

National Transport Issues

The framework for private sector participation is clearly not just a metropolitan issue but a national one. It needs resolution at that level.

Other national issues with significant impacts on the study area are: (a) level of taxation on motor vehicles and fuels, (b) relative pricing of gasoline and diesel, (c) earmarking of transport-related revenues, (d) devolution of road responsibilities, and (e) future locations of the international airport and the Manila port.

The growth rate of motor vehicles, particularly cars, has outpaced the supply of roads. One method of tempering this growth is by increasing their prices through taxation. High car prices may have less impact on traffic congestion than high gasoline prices, but their revenue generation is quite high. This would raise available public funds, and also funding for Metro Manila transport projects even without enlarging its share. Obviously, it cannot be applied in the study area only.

Diesel has always been priced lower than gasoline – whether premium, regular or unleaded. This policy was predicated on social grounds, i.e., public transport uses diesel and by extension helps the poor. It has encouraged an unwelcome shift toward diesel engines, with the consequent rise in air pollution (PM_{10}) levels in Metro Manila. Encouraging the use of cleaner fuels (such as liquefied gas for buses and taxis) need to be supported by an appropriate tax regime.

Without necessarily getting a bigger slice of the national pie, the transport sector needs a more stable and long-term source of funds. Without the creation of a dedicated fund, this is not possible. Principal benefits of such a fund, even if set up for the metropolitan region only, will be the early acquisition of ROWs, better road maintenance and better coordination of project implementation.

The DPWH has adopted a long-term strategy of divesting itself of responsibilities for a large part of the national road network. For the study area, this means assumption by the MMDA and different local government units (LGUs) of the obligation to finance, build and maintain devolved roads. The division of responsibilities for the various roads identified in the Master Plan is therefore critical.

At one time or another, the national government has announced the development of Batangas and Subic ports to relieve the congestion at the Manila port. Similarly, the transfer of the international airport to Clark has been declared. Transport demand in the region will be altered when, and if, these push through.

Air Pollution

Improvement of traffic flows will have the salutary effect of reducing pollution from motor vehicles. Other counter measures include introduction of cleaner fuels (e.g., unleaded gas, less sulfur on diesel), cleaner engines (low-emission engines), and mandatory vehicle inspection and maintenance. Only the first has been implemented in the last six years, while the last two measures suffered setbacks. There should be renewed efforts in the short term to implement the clean air program for motor vehicles.

Over the medium-term period, public transport fleet modernization should focus on low-emission vehicles (through alternative fuels, use of catalytic converters or smoke traps). Administrative measures like on-road anti-smoke belching campaign and off-road vehicle inspection should be supplemented by fiscal incentives or disincentives. A graduated tax in relation to emission levels is easier to implement.

5. LAND-USE /TRANSPORT NETWORK DEVELOPMENT SCENARIO

Growth of the Metropolitan Area

Metro Manila has been growing rapidly and expanding its urbanized area. It is predicted that suburbanization would be further accelerated. As a result, the estimated size of the urban area in 2015 would be doubled to roughly 1,500 km^2. The current trend of suburban development is more directed to the south and east, while the movement to the north has been limited.

Future Socio-economic Framework

While population growth in outer areas has been accelerated, employment opportunities tend to concentrate in Metro Manila. The future population growth would still be so significant that the study area would have to accommodate 25.7 million by 2015. Estimated increment in 19 years' time is 11.4 million people, 4.3 million jobs and 3.8 million students (see Table 5.1). This impact on urban development is so enormous that the issue on how to manage the metropolitan growth has become the most fundamental long-term urban development concern for the study area.

Table 5.1
Socio-economic Framework of the Study Area

Item		1996	2015	Growth	
				2015/1996	1996-2015 % / year
Population (000)		14,368	25,720	1.79	3.11
Employment at Workplace (000)		5,149	9,443	1.83	3.24
Students at School Place (000)		4,589	8,394	1.83	3.23
GRDP (₱ billion)	High Growth Medium Growth Low Growth	856 856 856	2,846 2,706 2,420	3.32 3.16 2.83	6.53 6.24 5.62
Per Capita GRDP (₱)	Medium Growth	59,580	103,490	1.74	2.95
Average Household Income (₱/month)		12,356	20,730	1.87	3.35
Car Ownership	No. of Cars (000)% of HHs	730 18.5	2,340 28.2	3.21 1.52	6.32 2.24

Source: MMUTIS
1/ Projection is based on past trends.

Land-use/Transport Network Development Scenario

Transportation development in Metro Manila has strongly affected the urban development direction and land use, while the urban development pattern has influenced the form of transportation services. Land-use zoning plans enacted in 1981 and currently being updated have not been effectively enforced and did not guide the development as they were envisioned. Strong market forces and an active private sector have been playing key roles in determining urban formation wherein the availability of transportation infrastructure was their concern. In order to formulate a long-term transportation network plan, scenarios on future urban development pattern have been prepared. They are:

1) Scenario I: This assumes that the current urban development trend and transportation network development and management will continue. High density in urban cores and low density in outer areas are the basic features of development. However, population will increase relatively faster in outer areas while employment density will intensify in city centers.

2) Scenario II: This assumes that even as the current land-use/urban development trend continues, transport network would develop more strategically, since it is significantly affected by the former. For example, although most of the existing transport projects/plans are concentrated in Metro Manila, these would be modified and restructured to comply with the fast-growing population in outer areas.

3) Scenario III: In this scenario, land use will be controlled and urban growth managed more effectively, in terms of density control, zoning enforcement, decentralization of excessively accumulated urban function, etc. The transport network in this scenario will remain basically the same as Scenario II's unless drastic change in land-use pattern is introduced.

4) Scenario IV: This scenario assumes that further decentralization and growth management policy would be in force at regional level. The successful development of outside growth centers, such as Subic, Clark, Batangas, etc., would discourage the influx of migrants into the study area.

Selected Scenario

On the basis of the socio-economic framework and zonal data[4] and planned future transport network, prepared for Scenario III and commonly applied for other scenarios, the estimated future traffic demand (four different origin-destination, or OD, tables were prepared.) was assigned and the network performance was assessed. The results indicated that when socio-economic activities are dispersed in an integral manner with transport network development, the effect is significant. Overall congestion level decreases, the network is more evenly utilized and significant reduction in transportation costs is expected. Although the effect of urban development/land-use control on traffic has been found significant through this hypothetical analysis, the MMUTIS considers that Scenario III is still unrealistic and took Scenario II for further analysis and planning.

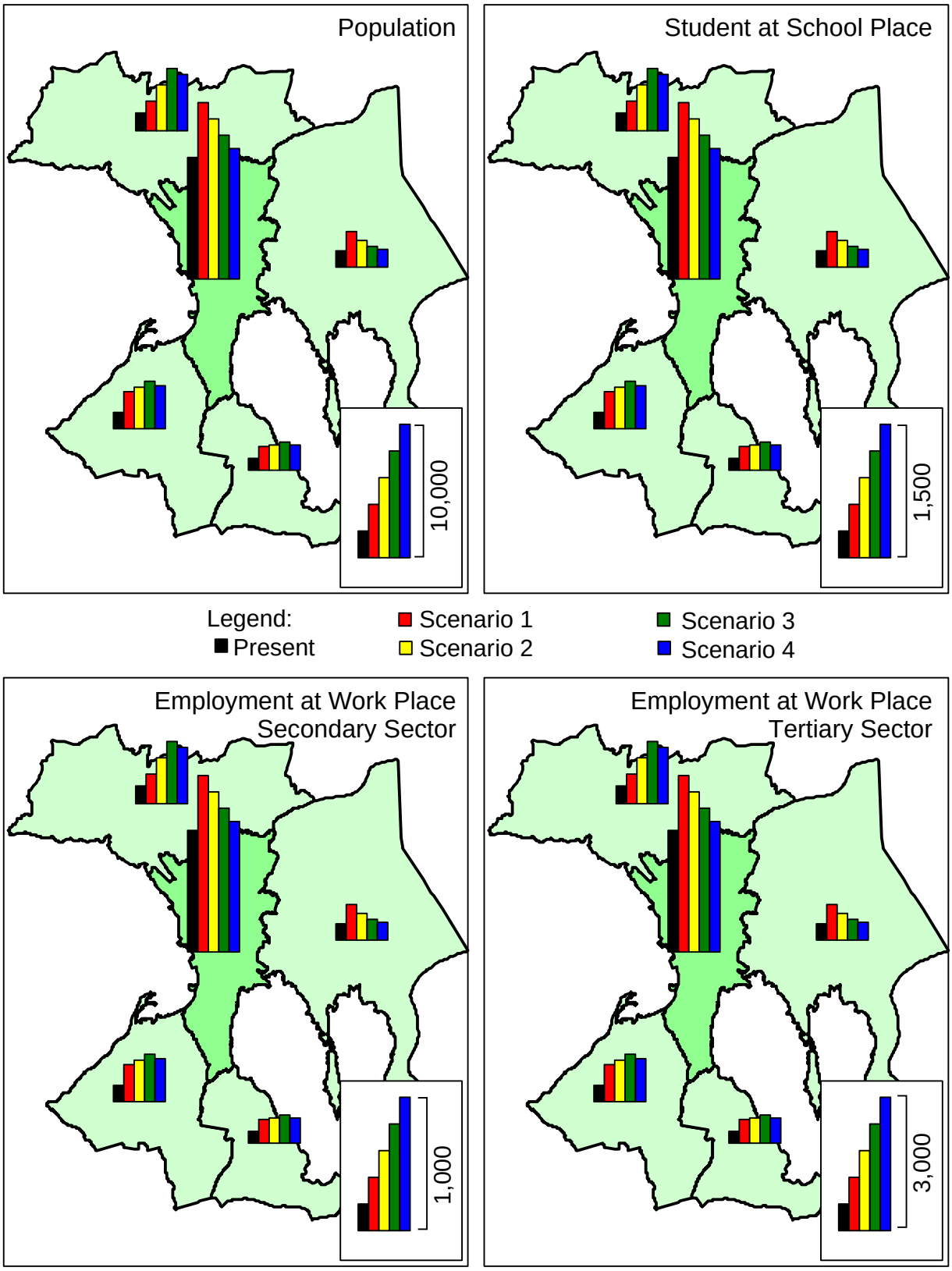
Table 5.2
Socio-economic Framework by Scenario

		Scenario I	Scenario II	Scenario III	Scenario IV
		000 (%)	000 (%)	000 (%)	000 (%)
Population	M Manila	1,3836(58)	12,579(53)	11,323(48)	10,191(48)
	North	2,319(10)	3,589(15)	4,859(20)	4,373(20)
	East	2,802(12)	2,173(9)	1,545(7)	1,391(7)
	South	4,757(20)	5,371(23)	5,986(25)	5,387(25)
	Total	23,713(100)	23,713(100)	23,713(100)	21,342(100)
Employment at Workplace	M Manila	6,240(75	5,315(64)	4,390(53)	3,951(53)
	North	569(7)	879(11)	1,190(14)	1,071(14)
	East	466(6)	522(6)	579(7)	521(7)
	South	1,012(12)	1,570(19)	2,128(26)	1,915(26)
	Total	8,827(100)	8,827(100)	8,827(100)	7,458(100)
Attendance[1/] In School	M Manila	2,028(64)	1,866(59)	1,704(53)	1,534(53)
	North	282 9)	391(12)	501(16)	451(16)
	East	316(10)	286(9)	256(8)	230(8)
	South	562(18)	644(20)	726(23)	653(23)
	Total	3,187(100)	3,187(100)	3,187(100)	2,868(100)

Source: MMUTIS
1/ Students aged over 16 years only.

[4] The socio-economic data was broken down into traffic zones for network assessment

Figure 5.1
Summary of Socio-economic Data by Scenario



6. TRANSPORT DEMAND CONTEXT

Transportation Demand Model

Future traffic demand has been projected based on the conventional four-step model with modifications to reflect traffic characteristics of the study area: (1) trip generation/attraction, (2) modal split between public and private modes, (3) trip distribution, and (4) traffic assignment. Taking into account that mobility of car-owning household is considerably higher than that of noncar-owning household, the forecast model was constructed separately. Although, at present, public transport is hardly substitutional to private transport, there is an increasing probability of diversion from private mode to public mode when quality rail mass transit system is developed in the future. With this, an additional step to analyze the modal shift from private to public between step (3) and step (4) above was included, and a diversion model was developed based on the results of the "willingness-to-pay" survey. For traffic assignment, an incremental assignment model called STRADA developed under JICA was used.

Future Demand

Future transport demand in the study area is as much as 43.7 million trips (motorized) in 2015 which is 1.84 times that of 1996. The modal share between public and private was 78 : 22 in 1996 to 66 : 34 in 2015 in favor of private mode (refer to Table 6.1 and Table 6.2).

Table 6.1
Future Demand by Purpose[1/]

	Purpose	1996		2015		2015/1996
		000	%	000	%	
Motorized	To Work	4,100	17.3	7,557	17.3	1.84
	To School	3,449	14.6	6,348	14.5	1.84
	Business	1,828	7.7	3,717	8.5	2.03
	Private	3,483	14.7	6,910	15.8	1.98
	To Home	10,824	45.7	19,157	43.8	1.77
	Total	23,684	100.0	43,689	100.0	1.84
Walk Total		6,507	21.6	10,776	19.8	1.66
TOTAL		30,191	-	54,465	-	1.80

Source: MMUTIS
1/ Includes trips made by residents of the study area

Table 6.2
Future Demand by Mode

Mode[1/]	1996		2015		2015/1996
	000	%	000	%	
Public	18,452	77.9	28,930	66.2	1.57
Private	5,233	22.1	14,759	33.8	2.82
TOTAL	23,684	100.0	43,689	100.0	1.84

Source: MMUTIS
1/ Excluding walk trips

Assessment of Demand Supply Balance

In order to formulate a "good" future transport network plan which is efficient in terms of meeting future demand and affordable in terms of public sector funding, a series of analytical steps were undertaken. First, future demand (2015) was assigned on the assumed network of "Do Nothing" and "Do Committed" to identify the demand/supply gaps by corridor and area.

They are defined as follows:

(1) "Do-nothing" network is that as of 1996.
(2) "Do-committed" network further includes committed projects and other existing plans of the government and build-operate-transfer (BOT) proposals.

Assessment results shown in Table 6.3 and Table 6.4 indicate that even with "Do Committed" [5] the traffic situation is not expected to improve satisfactorily. Average volume/capacity ratio of the network would remain 2.1 and demand-supply gaps will be seen over the entire study area. Most of the corridors would also be critical.

Table 6.3
Volume/Capacity Ratio on Roads Across Mini-Screenline by Corridor, 2015

		1996	Do Nothing	Do Committed
Cavite	IS1	0.8	2.0	1.7
	OS1	1.6	6.1	6.1
	OS2	1.9	10.6	10.6
Laguna	IS2	1.1	3.6	3.6
	OS3	1.1	3.3	3.2
Rizal	IE1	0.7	1.6	1.5
	IE2	1.1	2.6	2.4
	OE	0.6	2.4	2.4
North-east	INE	1.2	3.0	2.7
	ONE	0.4	1.5	1.5
North Plateau	IN1	1.1	3.5	3.5
	ONI	2.0	6.3	6.3
North Coastal	IN2	1.0	2.9	2.7
	IN3	1.6	3.9	3.9
	ON2	1.2	5.2	5.0
EDSA	KK	1.0	2.2	1.8
	GLP	0.9	2.3	2.0
	SSH	0.9	1.9	1.6

Note: Refer to Figure 6.4 for locations of screenlines.

Table 6.4
Volume/Capacity Ratio on Roads by Area, 2015

		Area	1996	Do Nothing	Do Committed
Metro Manila	1	Within EDSA	0.8	1.7	1.6
	2	North	0.8	2.3	2.2
	3	Northeast	0.9	2.3	2.2
	7	East	0.8	2.0	1.9
	8	East South	0.8	2.1	1.8
	11	Southwest	0.8	2.2	1.9
	12	Southeast	0.9	2.7	1.8
Bulacan	4	North	1.0	4.2	4.2
	5	Northwest	0.5	1.8	1.8
	6	Northeast	0.6	3.5	3.5
	9	East North	0.9	0.9	3.4
	10	East South	0.7	0.7	2.5
Cavite Laguna	13	West North	1.1	5.1	5.1
	14	West South	0.4	1.7	1.7
	15	General	0.8	3.2	3.2
	16	Southeast	0.3	1.3	1.3
		Total	0.7	2.3	2.1

Note: Refer to Figure 6.4 for locations of areas.

Implications for Future Transport Strategy

The completion of ongoing and committed projects will hardly improve the future traffic situation except in some corridors and areas in Metro Manila. Congestion is expected to spread quickly as urban areas expand.

[5] The estimated investment cost of the network is roughly ₱ 146 billion, of which ₱ 31 billion is for road/expressway and ₱ 115 billion is for the MRT/LRT. Public sector's share is roughly ₱ 66 billion.

Figure 6.1
Current Traffic Situation

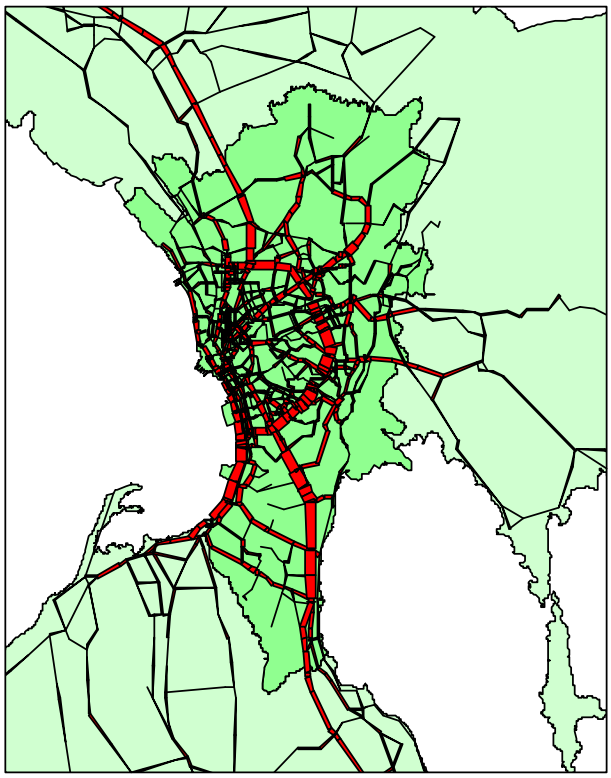


Figure 6.2
"Do-nothing" Situation, 2015

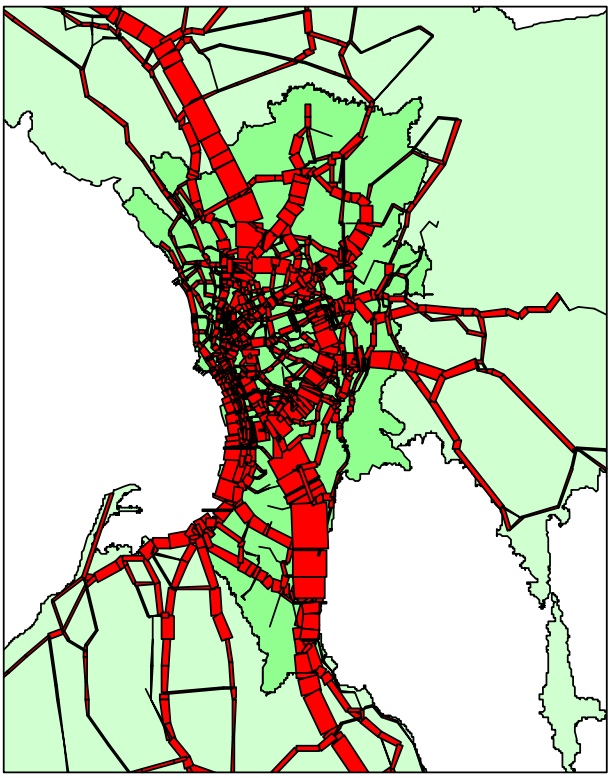


Figure 6.3
"Do-committed" Situation, 2015

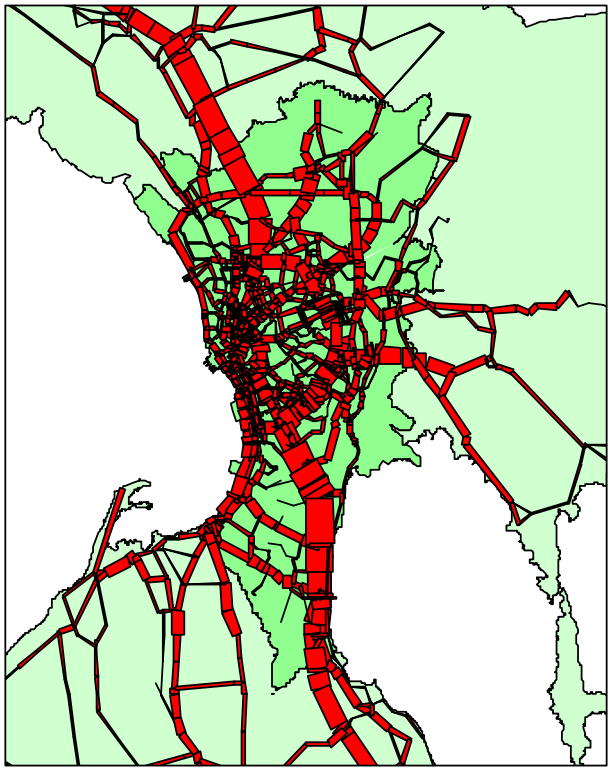
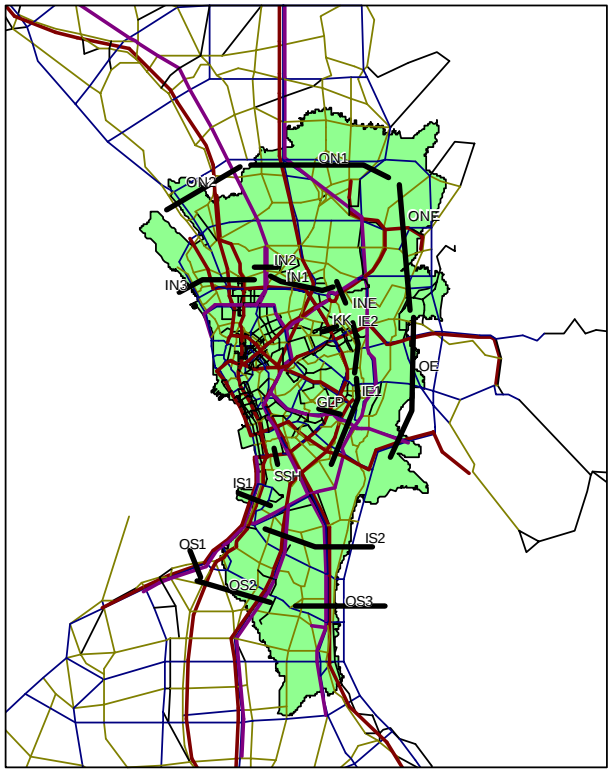


Figure 6.4
Legend for Transport Corridor/
Area Performance Analysis



7. FORMULATION OF THE TRANSPORT MASTER PLAN

Approach

A drastic approach is required for the many problems and issues facing Metro Manila's transport sector to gradually transform the existing situation and to manage the process of change. The key issues, which are prominent in developing a practical transport strategy for the study area, are:

- to support north-south urban growth and expansion;
- to develop a hierarchy of transport network and facilities;
- to gradually develop a rail transit-based public transport system; and
- to ensure accessibility to central business districts (CBDs), NAIA and port.

Constraints and Opportunities

Major constraints which influence transport strategy include institutional effectiveness, the ability to acquire land, environmental clearance to construct infrastructure, funding and actual status of so-called committed projects. On the other hand, opportunities include public-private venture partnership, integration of transport development with city planning institutions, gradual shift of existing land use to more public transport-based city structure using mass rail transit as the center of public transport, and the further introduction/expansion of TDM measures to manage demand and increase funding sources.

Funding and Affordability

On the basis of the analysis on current transport spending and future trends in transport spending under alternative economic growth scenarios, the best available budget envelope for the future study area was estimated. The revised estimate[6] for public sector funding for the transport sector of the study area is US$ 4.2 billion (₱ 168 billion) and US$ 8.7 billion (₱ 348 billion) under the low economic growth (4%/year) and high growth (7.0%/year) scenarios, respectively. In simple terms, the public sector budget is about US$ 250 million (₱ 10 billion) to US$ 500 million (₱ 20 billion) per year. Private sector funding (from BOT and similar schemes) is considered to be additional to this.

A preliminary analysis was made on possible new fund sources in relation to traffic demand management, specifically the increase in vehicle registration tax and fuel tax. The impact of the former measure would curb car ownership rate depending upon the rate of increase. With a 30% increase[7], car ownership rate is expected to reduce from 25%[8] to 22.3% in 2015 or 2.1 million cars to 1.85 million cars in 2015. With a 50% increase, the ownership rate will reduce to 18.9% and

[6] The original estimate made before the financial crisis was revised in the Interim Report. The revised estimate is one-quarter to one-third lower than previously estimated due to lower economic growth and the depreciation of the peso.

[7] The present level of tax rate is 15%, therefore it will become 45% in total.

[8] The estimate under the current level of tax rate would remain in the future.

the number of cars to 1.6 million. The corresponding revenue increases are ₱ 300 billion and ₱ 460 billion during the next 15 years.
The impact of the increase in fuel tax on traffic is a possible shift from private to public mode, which, however, is insignificant. Only when the fuel prices double would 5.5% of car users give up the use of their cars. On the other hand, the impact on the revenue side is great. With a 50% increase in fuel (gasoline) prices, additional ₱ 380 billion will be generated during the next 15 years.

Considering the practice on the above taxes of other countries, there is an opportunity to study this further and obtain social and political consensus.

"Do-maximum" Network

The "Do-maximum" network plan was prepared, which best complied with the envisioned future urban structure of the study area, to assess the level of infrastructure required to improve traffic situation and maintain adequate service level in the future. The plan is composed of at-grade primary and secondary roads, elevated/at-grade expressways and elevated/at-grade MRT, LRT and busways. Planning principles involved in this plan are as follows:

- The overall network is structured in a way that the future urban development is effectively guided mainly toward the north-south direction where development and environmental conditions permit urban expansion.

- The existing primary road network is restructured to integrate effectively emerging suburban areas with existing urban areas. The primary system will be further complemented with secondary roads.

- All major corridors will be provided with mass rail transit line(s) which should be adequately integrated with and provide smooth access to CBDs.

- Expressways with toll should integrate strategic economic centers (such as CBDs, port, airport), provide congestion-free services and divert traffic from passing through congested areas.

The network shown in Figure 7.1 is composed of 280 km of expressways, 800 km of primary arteries, 880 km of secondary arteries, and 350 km of urban rails. Of these, the virtually new constructions are 190 km of expressways, 590 km of primary arteries, 700 km of secondary arteries, and 300 km of urban rails. The estimated investment for this network is roughly US$ 30 billion, of which US$ 20 billion is the cost to government and US$ 10 billion is the cost to the private sector. Urban rail shares 50% of the total investment costs. With this level of investment in the future transport network, the overall traffic situation in the entire study area is expected to improve (refer to Table 7.1 and Table 7.2).

Figure 7.1
Future Transport Network (Do Maximum)

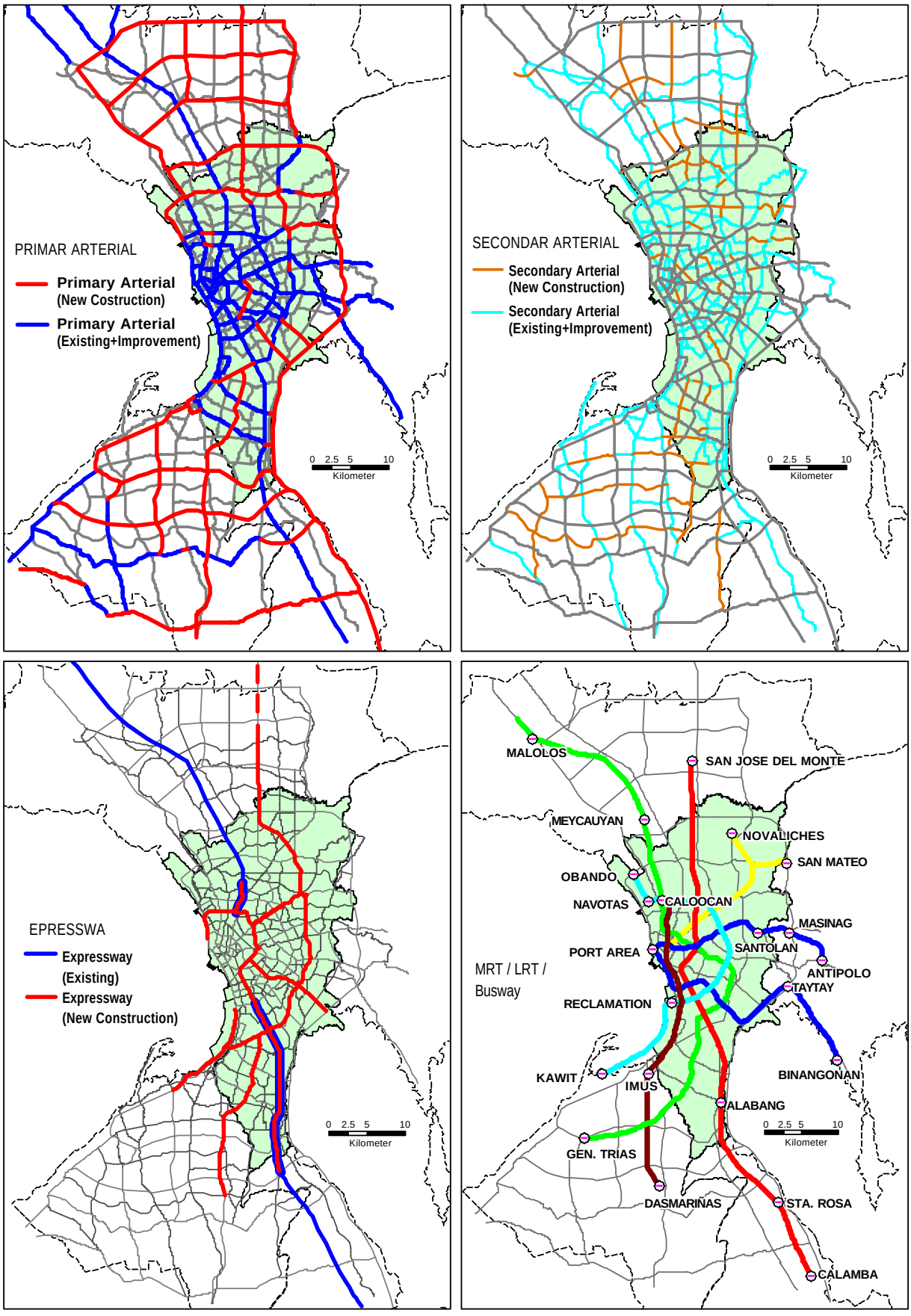


Table 7.1
Volume/Capacity Ratio on Roads Across Mini-Screenline by Corridor, 2015

Corridor/Mini-Screenline[1/]			Do-committed Network	Do-maximum Network
Cavite	IS1	(Coastal Road/Quirino Avenue)	1.9	0.7
	OS1	(Bacoor Bypass)	6.1	0.5
	OS2	(Aguinaldo Highway)	10.6	0.6
Laguna	IS2	(South Super Highway)	2.1	0.9
	OS3	(South Luzon Expressway)	1.9	1.0
Rizal	IE1	(J.P. Rizal/Shaw/Ortigas)	2.0	0.8
	IE2	(Aurora Blvd.)	2.5	1.0
	OE	(Marcos Highway/Ortigas Avenue)	2.5	0.7
Northeast	INE	(Commonwealth Avenue)	2.3	0.8
	ONE	(E. Rodriguez Highway)	3.7	0.7
North Plateau	IN1	(Quirino Highway/Mindanao Avenue)	3.5	0.9
	ON1	(Quirino Highway)	7.8	0.6
North Coastal	IN2	(North Diversion Road)	2.5	0.8
	IN3	(McArthur Highway)	2.0	0.9
	ON2	(North Diversion Road/McArthur Highway)	5.2	1.0
EDSA	KK	(Kamuning-Kamias)	1.5	0.8
	GLP	(Guadalupe)	1.8	0.7
	SSH	(South Super Highway)	1.4	0.8

1/ Refer to Figure 6.4 for locations of corridor/screenline.

Table 7.2
Volume/Capacity Ratio on Roads by Area, 2015

	Area		1996	Do-Committed	Do-Maximum
Metro Manila	1	Within EDSA	1.1	2.2	1.0
	2	North	1.0	2.0	0.8
	3	Northeast	1.1	2.5	0.8
	7	East	1.0	3.9	0.6
	8	East South	0.5	1.8	0.6
	11	Southwest	0.6	3.6	0.3
	12	Southeast	1.2	3.0	1.0
Bulacan	4	North	1.1	2.2	1.0
	5	Northwest	1.0	3.5	2.1
	6	Northeast	0.6	2.3	1.6
	9	East North	0.8	2.1	0.7
	10	East South	0.9	2.1	0.9
Cavite Laguna	13	West North	1.1	5.1	0.6
	14	West South	0.4	1.7	0.1
	15	General	0.9	3.6	0.4
	16	Southeast	0.5	1.5	0.7
	Total		0.9	2.3	0.7

Master Plan Network

In formulating an affordable Master Plan, discussions were held on what should be the reasonable size of the budget envelope for the study area. It was then assumed that with the possible introduction of additional funding sources to the transport sector in the study area, US$ 10 billion or ₱ 400 billion would not be unrealistic.

On this ground, the "Do-maximum" network was reviewed and reassessed to downsize it without decreasing much its performance and balance. The planning process of network formulation and traffic assessment across mini-screenlines and classified areas were reiterated and the Master Plan network was formulated within the assumed budget constraints (refer to Figure 7.2).

The performance of the network is assessed from the demand-supply gap across the screenlines set in major corridors. The assigned traffic volume and the assessment results are shown in Figure 7.3 and Table 7.3 respectively, with following characteristics:

- Although, in most corridors, the traffic situation is considered within tolerable range, some corridors, such as South Luzon Expressway (IS2), Aurora Boulevard (IE2), Mindanao/Quirino Highway (IN1), McArthur Highway (IN3) and EDSA (KK and SSH), would still be congested.

- In general, the network capacity will be so fully utilized on a daily basis that the network would likely be heavily congested during peak hours. Therefore, traffic and demand management as well as intervention to urban development/land-use control would also be important policy options for the effective use of the provided infrastructure.

- For these corridors, policy options other than infrastructure development include road pricing, color coding, HOV scheme (introduction of higher-capacity public road transport, enforcement of higher passenger occupancy of private cars, etc.) and maximum utilization of rail transit capacities.

Table 7.3
Assessment of Demand Magnitude by Corridor/Mini-Screenline
(Master Plan)

Corridor/ Mini-Screenline		Demand (000 pax/day)				Required Capacity				VCR on Roads
		Rail	Road			Rail[1/] (No. of Lines)	Road (000PCUs/day)			
			Public	Private	Total		Public	Private	Total	
Cavite Coastal	IS1	961	465	574	1039	1.1	29	302	331	0.8
	OS1	-	618	381	999	-	38	200	239	0.7
	OS2	611	83	423	507	0.7	5	222	227	0.9
Laguna	IS2	1034	217	1267	1485	1.2	13	667	680	1.1
	OS3	1036	148	959	1107	1.2	9	504	514	1.0
Rizal	IE1	41	846	852	1698	-	52	448	501	1.0
	IE2	565	485	450	935	0.7	30	237	267	1.2
	OE	538	496	673	1170	0.6	31	354	385	0.7
North-east	INE	895	282	370	652	1.1	17	194	212	0.9
	ONE	47	234	498	732	0.1	14	262	276	0.7
North Plateau	IN1	-	545	462	1008	-	34	243	277	1.1
	ON1	-	919	574	1493	-	57	302	359	0.9
North Coastal	IN2	-	1078	501	1580	-	67	263	331	1.1
	IN3	498	581	512	1094	0.6	36	269	306	1.3
	ON2	-	962	585	1547	-	60	308	368	1.0
EDSA	KK	802	589	280	870	0.9	36	147	184	1.2
	GLP	862	379	313	692	1.0	23	164	188	1.0
	SSH	483	505	273	778	0.6	31	143	175	1.1

1/ Railway capacity was assumed to be 850,000 passengers a day for both directions at any cross-section.

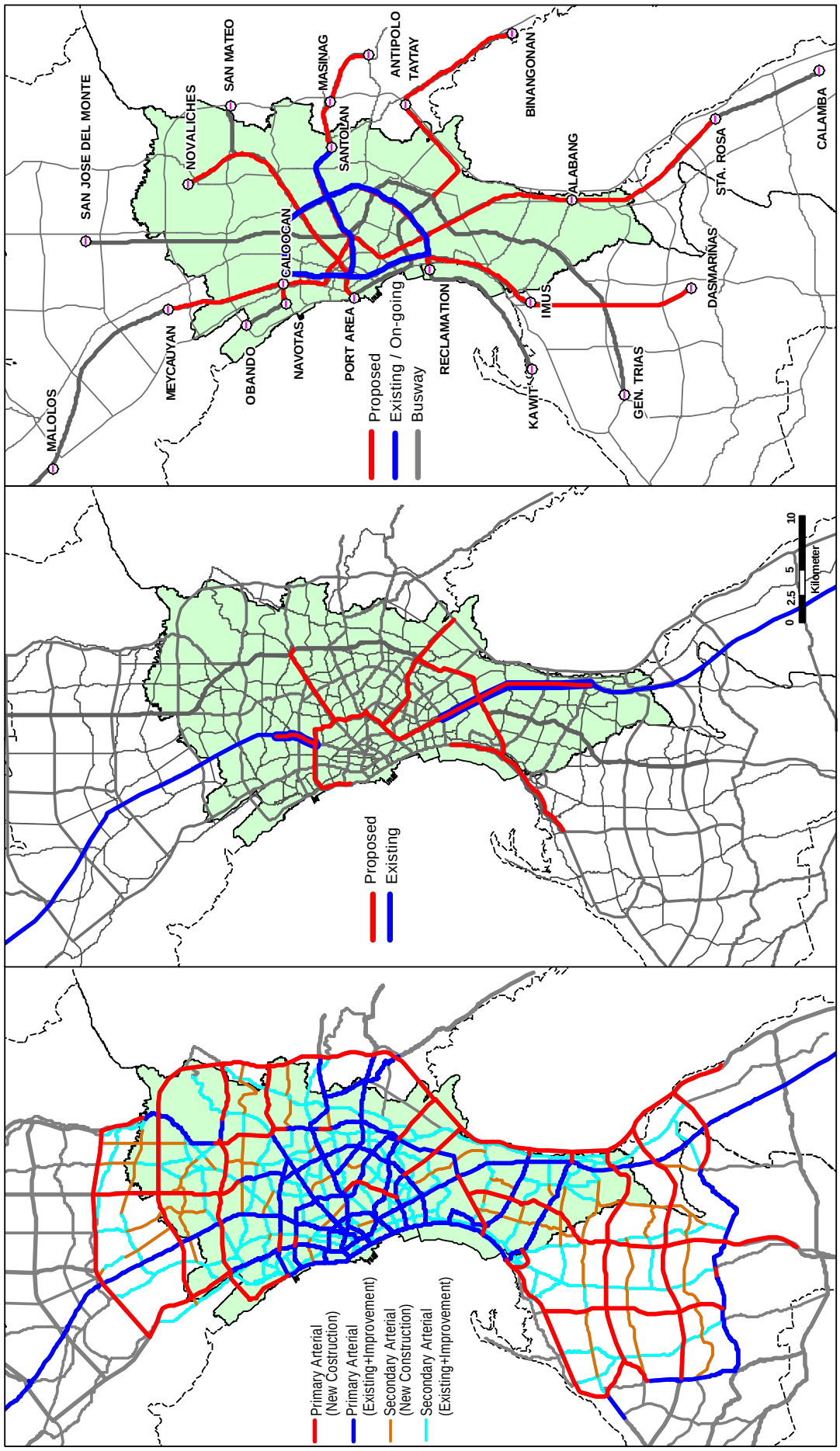
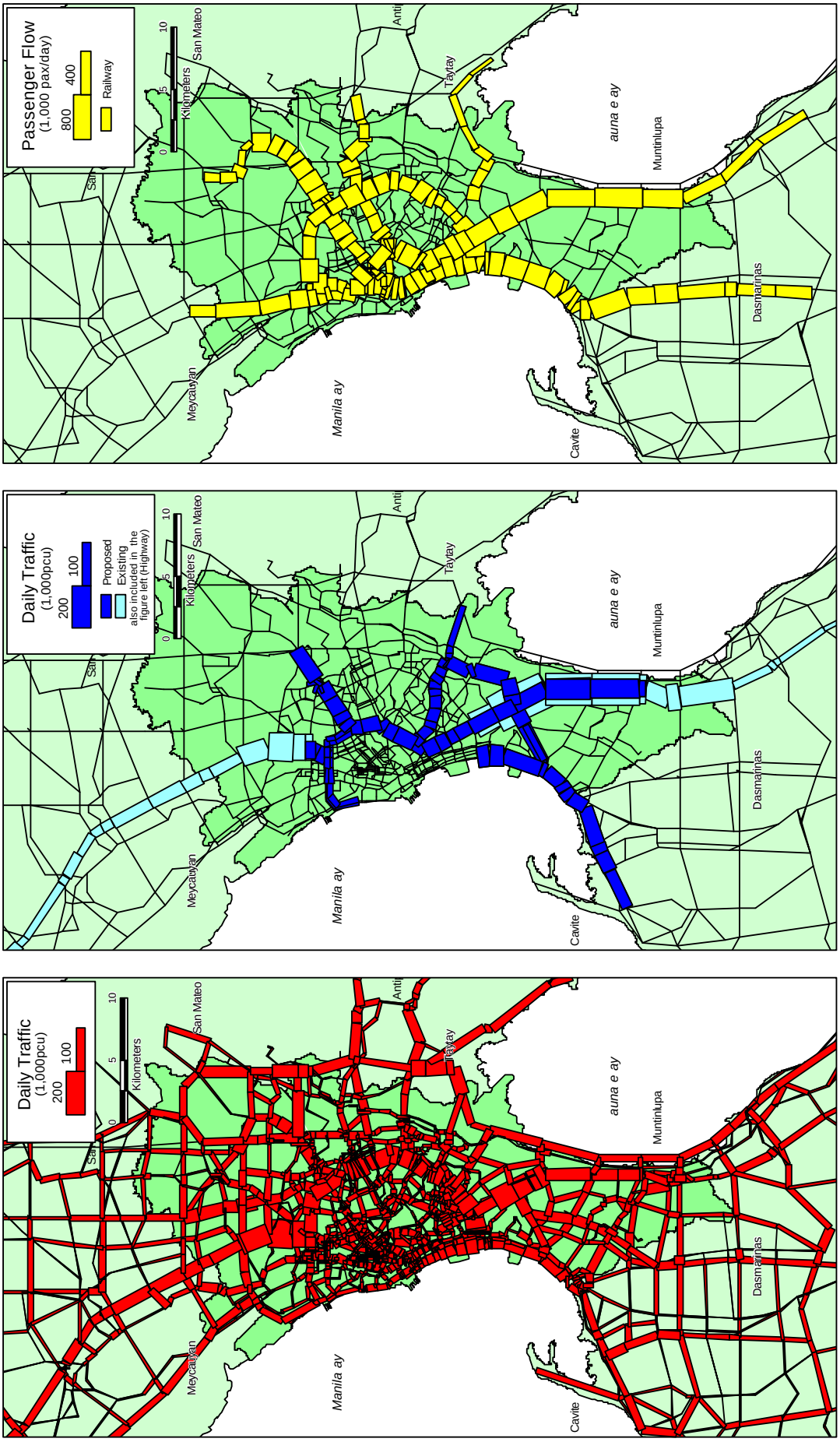


Figure 7.2
Master Plan Network, 2015

1/ Busway includes major bus priority measures



(1) Highway (2) Expressway (3) Railway

Figure 7.3
Traffic Volume on the Master Plan Network, 2015

The Master Plan is expected to meet the future requirements of socio-economic activities in the study area. The proposed network (with arterial systems of MRT/LRT, expressway and at-grade primary roads) will integrate the outer area with the existing urban area. It will likewise provide a base infrastructure in the outer areas on which subcenters are to be developed to disperse the population and urban function in a more balanced manner. The Master Plan provides a reasonable level of transport infrastructure capacity although the overall service level is for supply to meet demand only slightly. This implies that with the proposed level of infrastructure alone, traffic congestion would still remain during peak hours and along some corridors. The estimated share of public transport in 2015 will be 62% (in terms of passenger km) and the share of rail in public transport, 35%. Traffic and demand management measures as well as priority measures for public transport will remain important and have to be strengthened.

Profile of the Plan Components

Inasmuch as priority in the Master Plan should be given to management and low-cost measures, such as traffic management, maintenance, rehabilitation, and improvement, these are identified and being implemented continuously under the TEAM, MMURTRIP, etc. The focus of the MMUTIS is to formulate a future transport network which will be primarily composed of primary and secondary arteries, expressways and MRT/LRT/busways (refer to Table 7.4 and Table 7.5). The MMUTIS proposal includes 78 km of expressways, 346 km of primary arteries, 409 km of secondary arteries (of which 160 km is improvement of existing roads), and a total of 197 km MRT/LRT/busways.

Table 7.4
Summary of the MMUTIS Master Plan (Roads)

		Length (km)			Estimated Cost (₱ billion)
		Metro Manila	Outer Areas	Total	
Expressway	Existing[1/]	34	49	83	2
	Ongoing/Committed	9	–	9	20
	MMUTIS Proposal	103	12	115	136
	Subtotal	146	61	207	158
Primary Artery	Existing	211	–	211	–
	Ongoing/Committed[2/]	8	–	8	8
	MMUTIS Proposal	112	241	353	170
	Subtotal	331	241	572	178
Secondary Artery	Existing	307	21	328	–
	MMUTIS Proposal (existing)	2	81	83	10
	MMUTIS Proposal (new)	108	85	193	65
	Subtotal	417	187	604	71
TOTAL		894	489	1,383	407

1/ Sections of NLE and SLE located in the study area.
2/ C-3 (Caloocan, Mandaluyong), EDSA (Samson) and C-5 (Katipunan) missing Links (cost estimated by the MMUTIS).

Table 7.5
MRT/LRT/Busway Line (Master Plan)

Lines	Section		Profile		Type	Estimated Capital Cost ($ mil)		
			Length (km)	System		Infra	E & M	Total
Line 1 & Line 6	Existing (Mon.– Baclaran)	RIO	14.5	EL-LRT	U	-	-	-
	S. Extension (Imus)	RIS_a	15.0	EL-MRT	S	450	450	900
	S. Extension (Dasmariñas)	RIS_b	15.0	AG-MRT	S	150	300	450
	Subtotal		44.5			600	750	1,350
Line 2	E. Extension (Antipolo)	R2Ea	7.7	AG/EL Busway	S	77	-	77
	E. Extension (Masinag)	R2E	4.0	EL-MRT	S	137	91	228
	Existing (Recto – Santolan) *	R2O	14.0	EL-MRT	U/S	(488)	(368)	(856)
	W. Extension (N. Harbor)	R2W	4.0	EL-MRT	U	137	91	228
	SE. Extension (Taytay)	$R2E_b$	19.8	AG/EL-MRT	U/S	168	150	318
	SE. Extension (Binangonan)	$R2E_c$	12.0	AG/EL Busway	S	120	-	120
	Subtotal		53.7			639	332	971
Line 3	NW Extension (Navotas)	R3N	10.0	EL-MRT	U	258	216	474
	Existing (Q. C. – Pasay Rtd.)[1/]	R3O	16.8	EL/AG-LRT	U	(235)	(420)	(655)
	S. Extension (Reclamation)	R3S	2.0	EL-MRT	U	48	45	93
	Subtotal		28.8			306	261	567
Line 4	Main (Recto – Batasan)	$R4O_a$	15.1	EL-MRT	U	453	453	906
	Phase 2 (Novaliches)	$R4O_b$	7.7	EL-MRT	U	231	193	424
	Branch Line (San Mateo)	$R4O_c$	4.0	AG/EL Busway	S	40	-	40
	Subtotal		26.8			724	646	1,370
North Rail & MCX	Meycauayan (Caloocan)	R5N	18.0	AG-MRT	IC,S	349	409	758
	Caloocan – Sta. Mesa	R5M	8.0	EL-MRT	IC,U	240	240	480
	Sta. Mesa – EDSA	$R6S_a$	8.6	EL-MRT	IC,U	258	258	516
	EDSA – Alabang	$R6S_b$	22.1	AG-MRT	IC,U	177	442	619
	Alabang – Sta. Rosa	$R6S_c$	14.8	AG-MRT	IC,S	119	296	415
	Subtotal		71.5			1,143	1,645	2,788
TOTAL			196.5			3,412 (P136B)	3,634 (P145B)	7,046 (P281B)

1/ Ongoing projects

Investment Summary

The summary of the Master Plan projects and investments are shown in Table 7.6. In formulating the investment program with particular regard to new investments for the Master Plan network, it is to be noted that the investment required for the basic program, such as the low-cost management including traffic management, maintenance/rehabilitation and existing network improvements, is the indispensable part of the program. The portion of the investment costs in which public sector budgets are allocated beyond 1999 is also included in the program.

Table 7.6
Master Plan Investment Summary

		Total Cost ₱ Billion	Cost to Government	Remark
Core	Basic Program	30	30	
	Ongoing/Committed Projects	181	153	
	MMUTIS Projects			
	Primary Road	153	153	Grade separation, airport access
	Secondary Road	75	75	Subdivision road
	Expressway	53	11	Skyway, Port Access
	MRT/LRT/Busway	175	84	Line 6 (Imus), Line 2 (Masinag), Line 3 Extension, Line 4, PNR Improvement
	Subtotal	667	468	
Core Plus	1) Primary Road	24	24	
	2) Expressway	84	17	
	3) MRT/LRT/Busway	47	26	
	Subtotal	155	67	
	TOTAL	822	535	

1/ Cost to government: 100% for primary/secondary roads; 20% for expressways, infra cost for MRT/LRT/Busway.

Economic Evaluation

The economic assessment of the Master Plan network was conducted based on a number of assumptions.[9] With an economic internal rate of return (EIRR) of 46.7%, the Master Plan is economically feasible. Also, all the projects have EIRR values of more than 15% and are economically feasible.

Table 7.7
Economic Evaluation Results

	EIRR (%)	B/C	NPV (million ₱)
Master Plan	46.4	4.7	632,361
MRT/LRT/Busway	40.6	3.5	153,883
Expressway[1/]	50.8	3.8	107,340
Primary Arterial	47.5	6.3	298,165
Secondary Arterial	28.7	2.7	45,127

1/ Assumes a toll rate of ₱ 4/km.

[9] The assumption provides that the entire investment is done at the same time and the benefits include VOC reduction and passenger time saving only.

8. IMPLEMENTATION

Requirements of the Planning Process

Many plans are not implemented. Often, projects which are implemented are not the results of planning. It is because plans are often unrealistic, stakeholders are not adequately consulted, political intervention takes place, among others. To minimize the above, a common and shared planning process should be established based on an updated database and plans should be institutionalized.

Strengthening Metropolitan Governance

Good management is the key to implement the Master Plan effectively. It requires vigorous planning, interagency coordination, rational resource allocation, effective involvement of local governments and stakeholders in the process of development, etc. The MMDA is expected to act as the central agency. Transport and development planning process should be established, mega projects coordinated, public transport regulatory process improved, city officials trained, and institutional fragmentation rectified. An adequate set of database and planning tools are also needed. An increasingly important approach to infrastructure development is the integration among transport modes and facilities as well as between transport and urban planning and development.

Financing Strategy

Funding is critical in all major transport projects of the Master Plan. The government traditionally contracts loans for much of Metro Manila's transport sector and this is expected to continue. Private sector financing is a potential source to supplement the needed funds.

Privatization of transport operation, such as LRT and PNR, is the current thrust of the government. Private investment for various BOT projects is currently based on unsolicited proposals which, however, entail processes that are not transparent and require in the end substantial counterpart public funds. Formulation of BOT projects and public sector funding should be carried out in a planned manner. Moreover, the absolute lack of funds to cover the Master Plan projects requires the government to establish a new funding source.

Improving Private Sector Participation

Although much of the private sector participation is expected in transport projects, it always takes time before actual commitment and the process is often not transparent.

MEDIUM-TERM TRANSPORT DEVELOPMENT PLAN

9. DEVELOPMENT OF THE PLAN

Approach and Policies

The Medium-term Transport Development Plan (MTDP) was formulated by increasing the essential components of the Master Plan. The primary directions of the MTDP include the following:

- **Integration:** While a number of mega projects both in the transport and urban sectors are already underway, they are not coordinated, with insufficient basic transport facilities and services in many locations. The MTDP focuses on integrating new and existing facilities and services to maximize the benefits of the huge investments being made.

- **New Strategies:** It is almost sure that the future transport situation would never improve if society seeks for traditional solutions. The rapid growth of population and urban areas has been a constant pressure on transport sector development. Increasing car ownership and a shift to private transport are the most serious threats. Conventional infrastructure development alone, even if funds were available, would not provide effective solutions. Hence, the MTDP focuses on introducing possible new strategies to prepare for further demand management, integration of urban and public transport development, and improved public-private partnership.

- **Reality:** Public funding capability for the MTDP is severely constrained due to the lack of sources and the standing commitment to a number of mega projects. Institutional capacity is also limited and has yet to improve. The MTDP focuses on this reality.

Available Funds

Public funds available for the MTDP (1999-2004) under low and high estimates have been pegged between ₱ 24 billion (or US$ 0.6 billion) and ₱ 64 billion (US$1.6 billion), respectively. These funds, however, are not only for new projects but mainly allotted for committed projects.

Broad Priorities

Under severe financial constraints, investment priorities have been broadly set forth as follows:

- Management and low-cost measures, such as traffic management, minor widening, rehabilitation, public transport priorities, terminals, intersection improvements, etc.

- At-grade roads, particularly primary (missing links and those promoting north-south urban expansion) and secondary arterials (to strengthen road network hierarchy). Such roads in the study area are extremely important for an effective urban expansion and to accommodate the elevated expressway and MRT.

- The MRT and urban expressway will increasingly become more important to sustain large urban areas. These projects assume the private sector's effective participation.

Candidate Projects

Selected candidate projects totaling ₱ 236 billion are shown in Table 9.1. They are composed of committed projects worth ₱ 99 billion and MMUTIS-proposed projects worth ₱ 137 billion. After the costs are spread over the MTDP period (1999-2004), the actual costs to government would reach ₱ 68.6 billion and ₱ 53.6 billion for committed/carried-over projects and MMUTIS proposal, respectively. Of the available funds of ₱ 64 billion (high estimate) only 23% or ₱ 14.6 billion is available for new projects.

Selected Projects

Table 9.1 indicates serious fund constraints for implementing new projects. A review of the actual cash flow of committed projects may provide wider opportunities to accommodate new projects.

Table 9.1
Candidate Projects for the MTDP (1999-2004)

Category	Project/Project Package	Est. Cost (₱ bil)	Cost to Govt.		Responsible Agency	
			Total (₱ bil)	MTDP (₱ bil)	Primary	Support
1. Committed	1) LRT 3	26.2	Rental	18.0	DOTC	DPWH
1.1 BOT	2) Skyway (Stage I)	20.0	4.0	2.0	DPWH	LGU
	3) C-5 South Section	5.6	1.1	0.5	DPWH	LGU
1.2 IFI Loans (committed)	4) LRT 1 Capacity Expansion, OECF (revenue surplus)	6.3	6.3	-10.8	DOTC	-
	5) LRT 2, OECF	39.5	27.4	21.0	DOTC	DPWH
	6) Interchanges (3 nos.), OECF	1.5	1.5	1.5	DPWH	-
	7) TEAM 4, AusAid	1.6	1.6	0.9	MMDA	DPWH
(almost committed)	8) ADB Air Quality Improvement	18.6	18.6	18.6	MMDA	DPWH,DENR
	9) WB-LIL	5.0	5.0	5.0	MMDA	LGU
	10) WB – MMURTRIP (Priority 1 & 2)	7.9	7.9	7.9	MMDA	DPWH
	11) OECF Interchanges (4 nos.)	1.2	1.2	1.2	DPWH	-
	12) PNR Commuter Improve.: North Rail I	30.3	14.0	(8.4)	DOTC	-
	13) Line 3 Extension (Mon./Caloocan)	12.6	7.6	(3.8)	DOTC	DPWH
1.3 Government-funded	14) Primary & Secondary Roads/Flyovers	2.8	2.8	2.8	DPWH	LGU
	Subtotal	179.1	99.0	68.6		
2. MMUTIS Strategy	1) MMURTRIP 2	5.0	5.0	5.0	MMDA	DPWH/LGU
2.1 Management/ Low-cost Mgt.	2) TEAM 5	2.0	2.0	2.0	MMDA	DPWH/LGU
	3) Provincial TEAM (South, North, East)	2.0	2.0	1.2	LGU	DPWH
2.2 Roads :Primary and Secondary Arteries	1) Northern Package1/	10.6	10.6	7.1	DPWH	LGU
	2) Southern Package2/	13.7	13.7	10.6	DPWH	LGU
	3) Central Package 3/	10.8	10.8	8.3	DPWH	LGU
	4) Eastern Package 4/	3.6	3.6	3.4	DPWH	LGU
	5) Road Environmental Facilities	2.0	2.0	2.0	DPWH	LGU
Expressway (BOT)	6) N-S Link (Skyway Stage 2 & 3)	40.4	8.1	4.8	DPWH	LGU
	7) Port Access (R-10/C-3)	12.7	2.5	1.5	DPWH	LGU
	8) C-5 North Section	14.1	2.8	2.0	DPWH	LGU
2.3 Airport Access	1) Skyway I.C. Improvement, etc.	2.1	0.7	0.7	DPWH	
2.4 Public Transport	1) MRT Integration (Line 1/Line 3)	3.2	2.3	2.3	DOTC	DPWH/LGU
	2) MRT Mode Interchange Facilities	2.3	2.3	1.1	MMDA	DOTC/LGU
MRT (BT-BOO)	3) Line 2 Extension (Masinag)	9.1	5.5	1.6	DOTC	DPWH/LGU
	4) Line 4 (Recto-Batasan)Phase I	36.2	18.1	(10.6)	DOTC	DPWH/LGU
	5) Line 6 (Baclaran-Imus) Phase I	36.0	18.0	(9.0)	DOTC	DPWH/LGU
	6) PNR Commuter Improve MCX	64.6	27.0	(27.0)	DOTC	DPWH/LGU
	Subtotal	270.4	137.0	53.6		
Total		449.5	236.0	122.2		

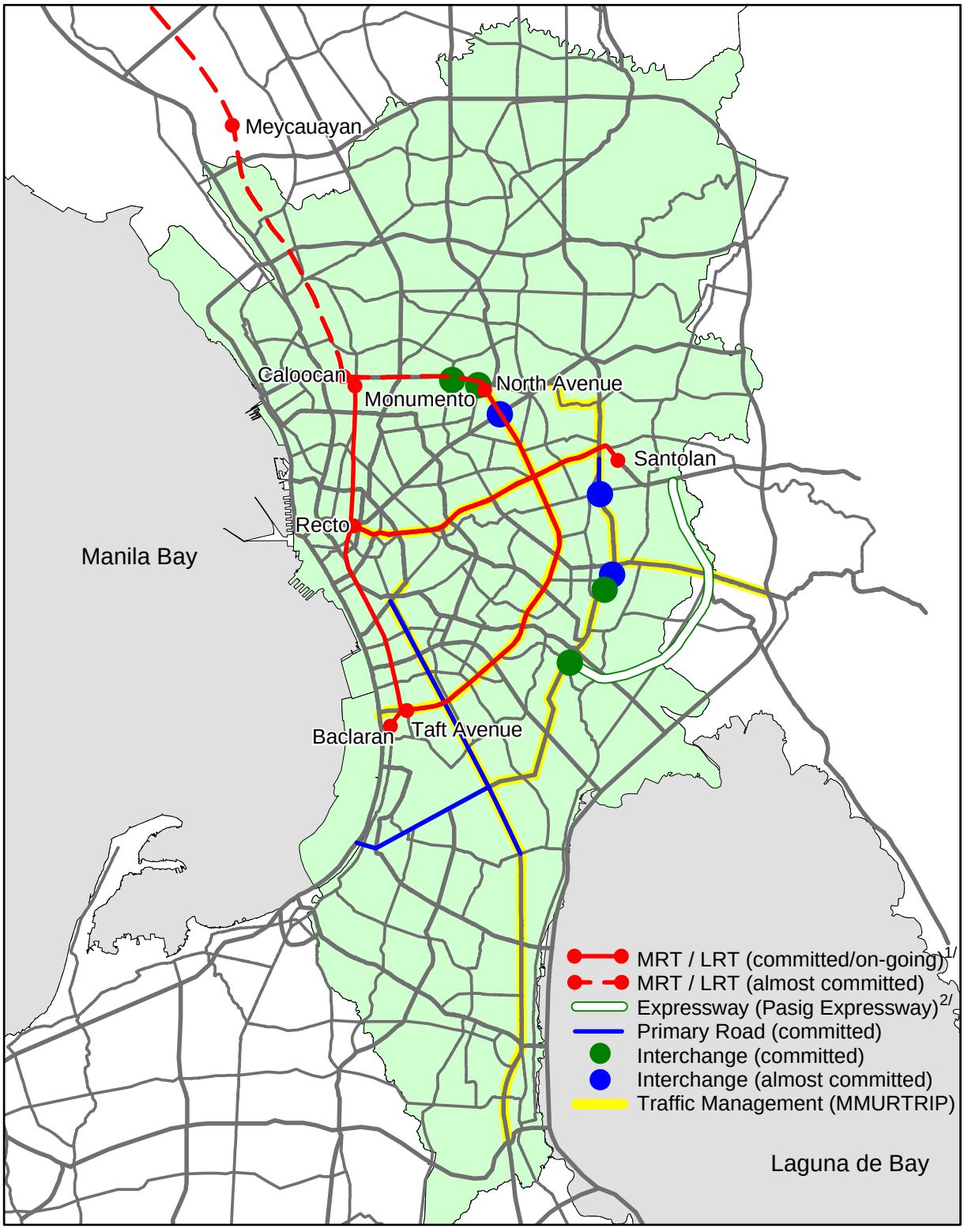
1/ Northern Package includes the following: PN3 – North Central Road (Quirino Hwy-SM16); SM13 – Don M. Marcos Ave. Ext. to N. Central Rd.; and SM14 – Quirino Hwy Novaliches Bypass.

2/ Southern Package includes the following: SM1 – Aurora Ave. Ext. to R10; SM2 – A.M.Maceda & Ext. to Aurora Blvd.; SM3 – F. Martinez Ext. to Ortigas Ave.; SM4 – SLE Ext. (Pres. Quirino – J.P. Laurel); SM5 – Gilmore Ave. Ext. to Roosevelt; SM6 – Victoneta Ave. Ext. to Congressional Ave.; SM17 – Kalayaan Ave. Ext. to 20th Ave.; GS1-5 – Primary/Primary Grade Separation Projects.

3/ Central Package includes the following: PS1 – Talaba-Kawit Road; PS3 – Kawit-Bucandala Road; PE1 – Bucandala-Muntinlupa Road; SM21 – Pasay Road Ext. (Lawton-Gen. Santos); GS6 – Primary/Primary Grade Separation Projects.

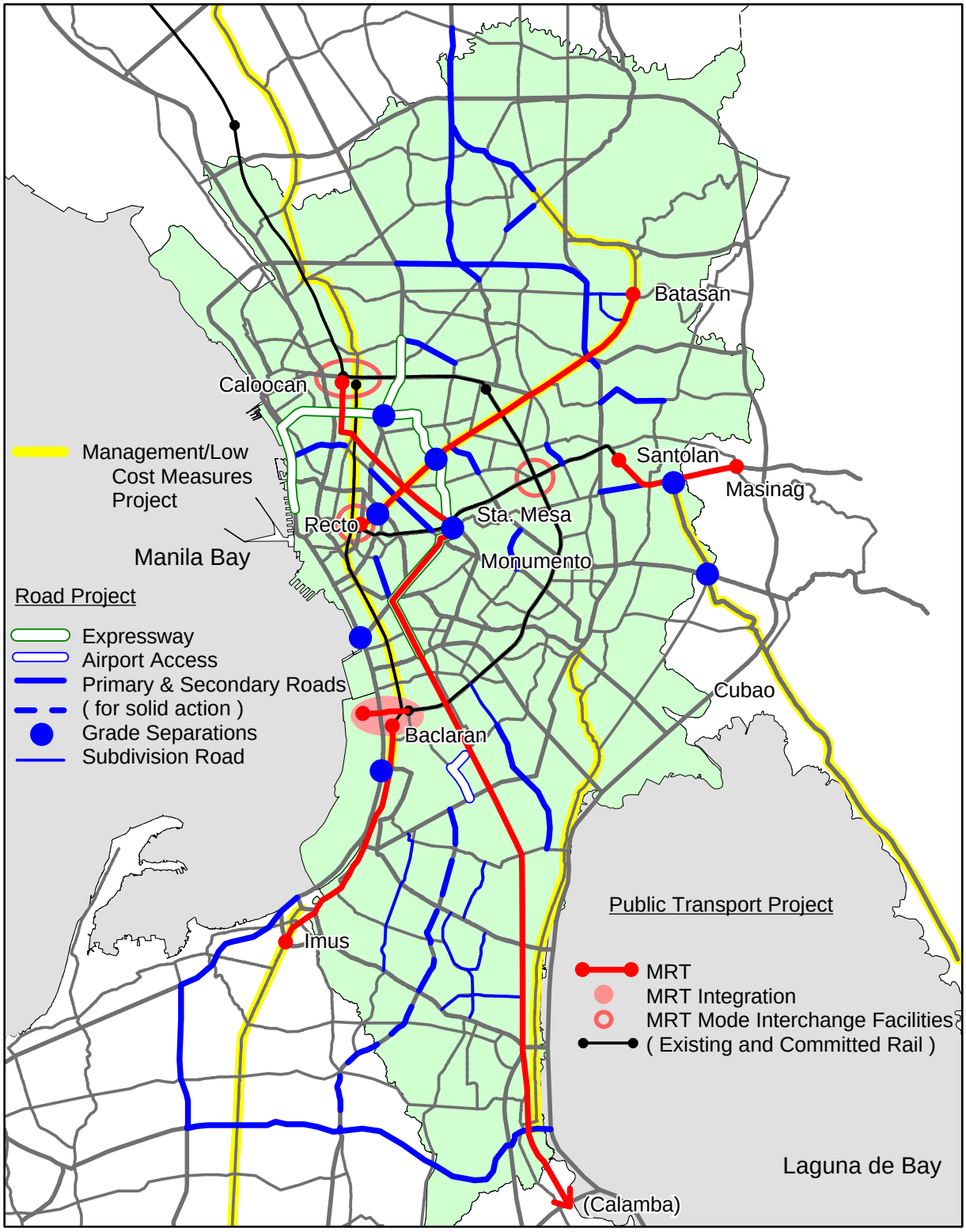
4/ Eastern Package includes the following: SM18 – New Marikina Road; SM20 – col. B. Serrano Ave. Ext. to Marcos Hwy; GS7,8 – Primary/Primary Grade Separation Projects.

Figure 9.1 Committed Projects for the MTDP (1999-2004)



1/ LRT Line 1 (Monumento-Baclaran) is an existing line.
2/ not fully committed yet.

Figure 9.2 Proposed Projects for the MTDP (1999-2004)



10. PROFILE OF THE PLAN COMPONENTS

Committed Projects

Portions of the investment costs of a number of committed projects under the external official development assistance (ODA) loan or government funding will have to be carried over to the next MTDP period of 1999-2004. They include committed and almost-committed projects. BOT projects include the MRT Line 3, C-5 South Section and the Skyway. Included under the committed projects for external ODA loan are the LRT 1 capacity expansion (Overseas Economic Cooperation Fund), LRT 2 (OECF), three highway interchanges (OECF), and TEAM 4 (AusAid), while the almost-committed projects include Air Quality Improvement (ADB), LIL (WB), MMURTRIP (WB), and four highway interchanges (OECF). Two railway projects are also almost committed under the BOT scheme – North Rail Phase I and MRT Line 3 Extension. In addition, some government-funded road projects are committed. The total project cost of the above is ₱ 179.1 billion, ₱ 68.6 billion of which will be carried over to the next MTDP period.

Proposed Traffic Management Projects/Low-cost Measures

Selected projects of this category are as follows:

1) MMURTRIP 2: This covers corridors other than those covered by MMURTRIP 1. Candidate routes include McArthur Highway and M.L. Quezon/Gen. A. Luna/M. Almeda roads. A case study has been conducted for LRT Line. Estimated project cost is ₱ 5.0 billion.

2) TEAM 5: Ongoing TEAM Project Phase 4 only replaces the existing signals. TEAM 5 intends to further improve the traffic signal system and traffic safety in Metro Manila. Project components include establishment of Traffic Information Center, rehabilitation of the existing signal system, signalization of additional intersections, geometric improvements at intersection, and traffic safety improvements. The estimated project cost is ₱ 2.0 billion.

3) Provincial TEAM: This includes signalization of intersections, traffic management and intersection improvements, training of LGU traffic management personnel in the municipalities of adjoining provinces of the study area. The project may be divided into three packages by geographic area. The total project cost is estimated at ₱ 2.0 billion.

Proposed Road Projects

Road projects cover primary arterials, secondary roads and urban expressways. Since at-grade roads are intended to promote orderly urban expansion, they are packaged into a number of project packages. Road project components are as follows:

(1) Northern Roads Package: This package includes primary arterials to serve urban expansion in the north, improvements of radial corridors and several secondary and subdivision roads, with a total cost of ₱ 10.6 billion (refer to Figure 10.1).

(2) Southern Roads Package: This package is composed of new primary arterials to support the expansion of the urban area, opening/improvement of subdivision roads and improvement of critical corridors. Detailed study on the development of the central primary road (PS 4) should be undertaken (refer to Figure 10.1). Total cost is ₱ 13.2 billion.

(3) Central Roads Package: This package is composed of new primary and secondary roads, grade separation of intersections and R4 corridor improvement with a total cost of ₱ 10.8 billion (refer to Figure 10.1).

(4) Eastern Roads Package: This package is composed of new primary and secondary roads, grade separations and corridor improvement toward Rizal province with a total cost of ₱ 3.6 billion (refer to Figure 10.1).

(5) Road Environment Improvement: This project component includes improvement/ expansion of pedestrian facilities and environment with a total cost of ₱2.0 billion.

(6) Expressway N-S Link: This project is Skyway Phase 2 & 3 which connects North Luzon Expressway via the Skyway (refer to Figure 10.1). The total cost is ₱ 40.4 billion.

(7) Port Access: This provides the port with a direct expressway link (refer to Figure 10.1) at an estimated cost of ₱12.7 billion. A proposed traffic scheme (MMURTRIP) is shown in Figure 10.2.

(8) C-5 North Section: This is currently being promoted as a BOT project. Government is to shoulder land acquisition cost while the private sector constructs and operates the road as a toll road. However, the MMUTIS is of the opinion that the road should be provided with adequate service roads for the public who reside alongside it. The estimated cost is ₱ 14.1 billion.

(9) Expressway C-5 Airport Access: The improvement plan on the NAIA access has been prepared (refer to Figure 10.3). For the short term, the proposed plan includes improved traffic circulation and minor roads improvement, while medium-term solution includes improvement of Nichols Interchange. The estimated cost is ₱ 2.1 billion.

Figure 10.1
Candidate and Selected Road Projects for the MTDP (1999-2004)

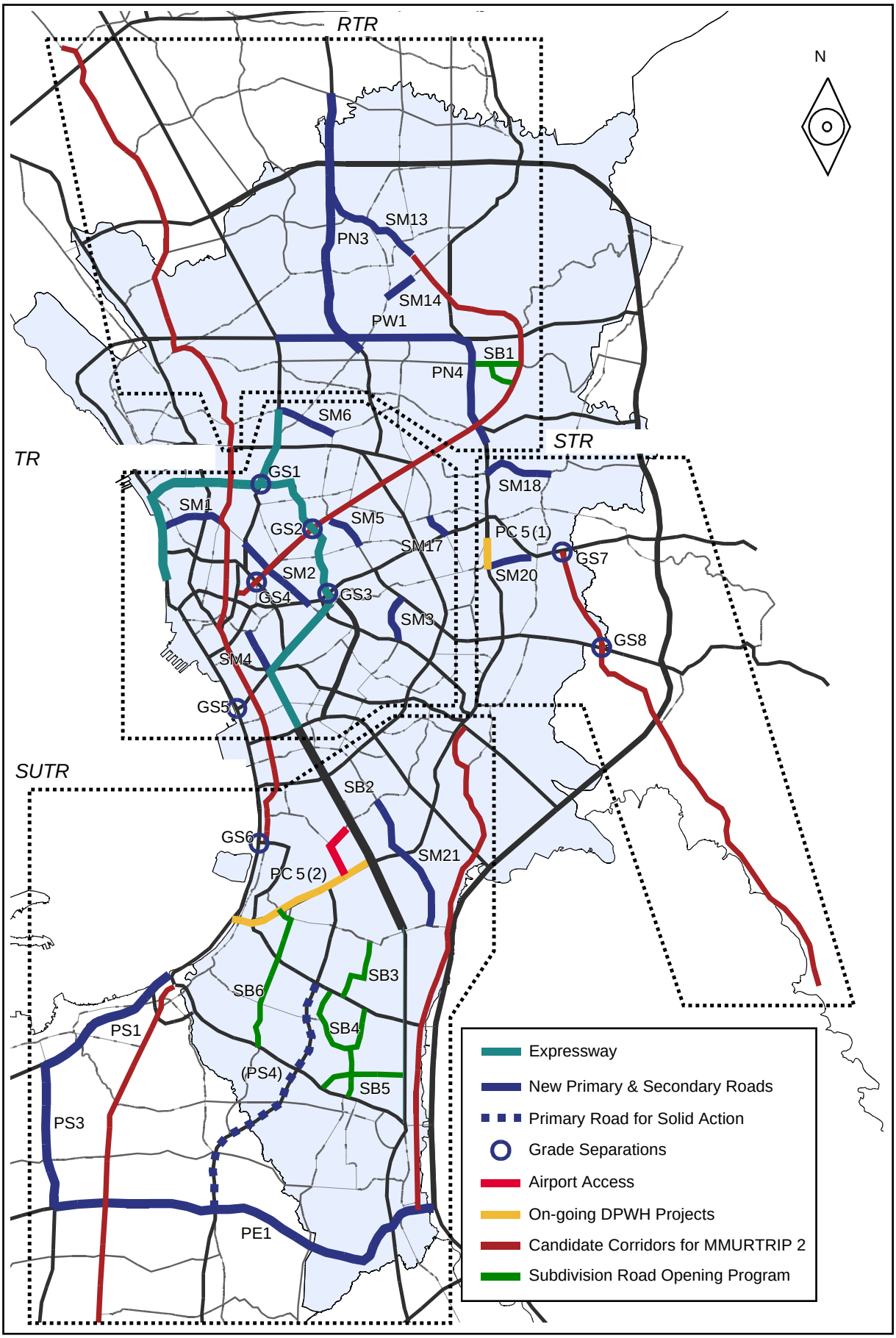


Figure 10.2
Port Access Improvement Plan

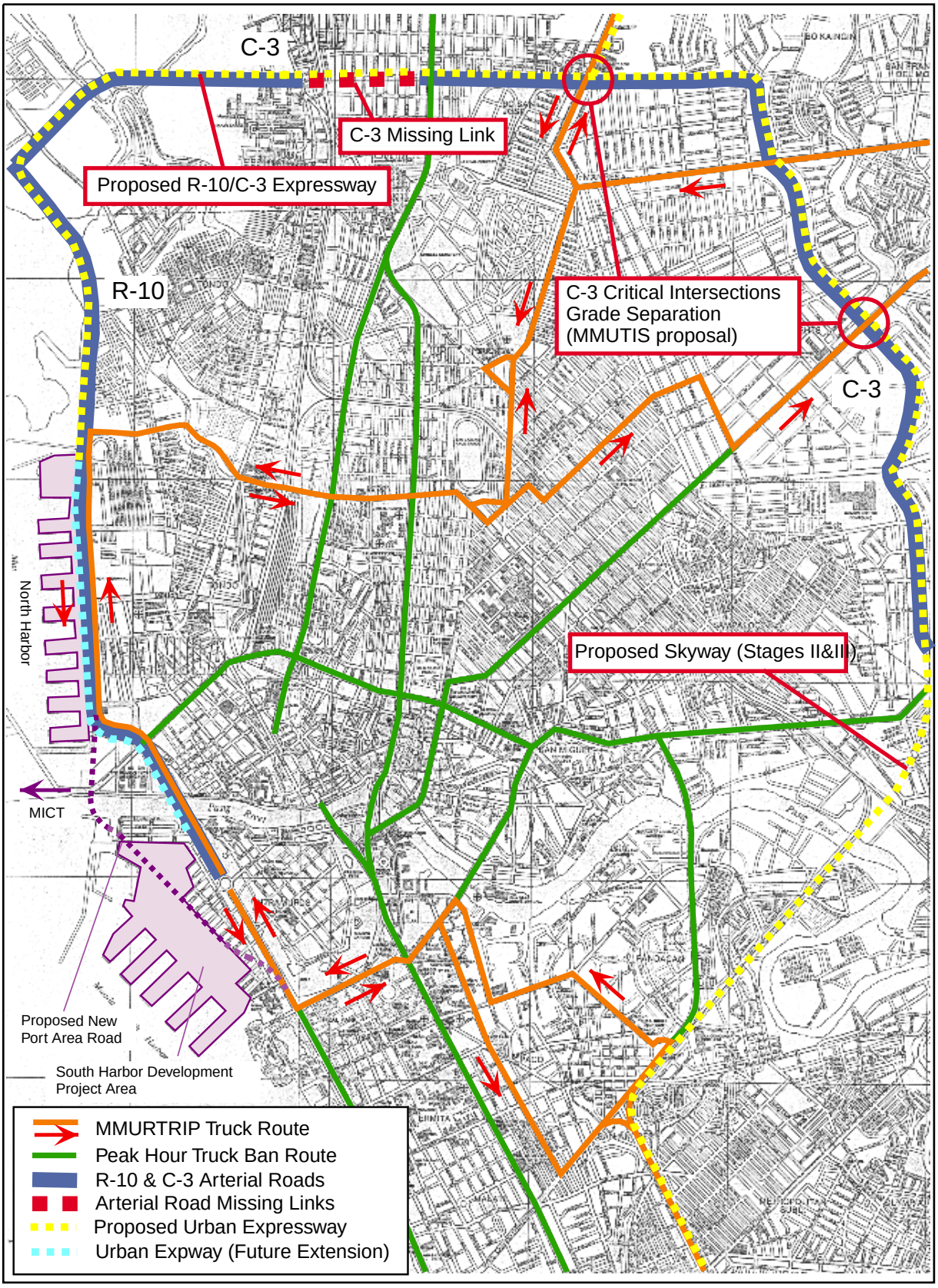
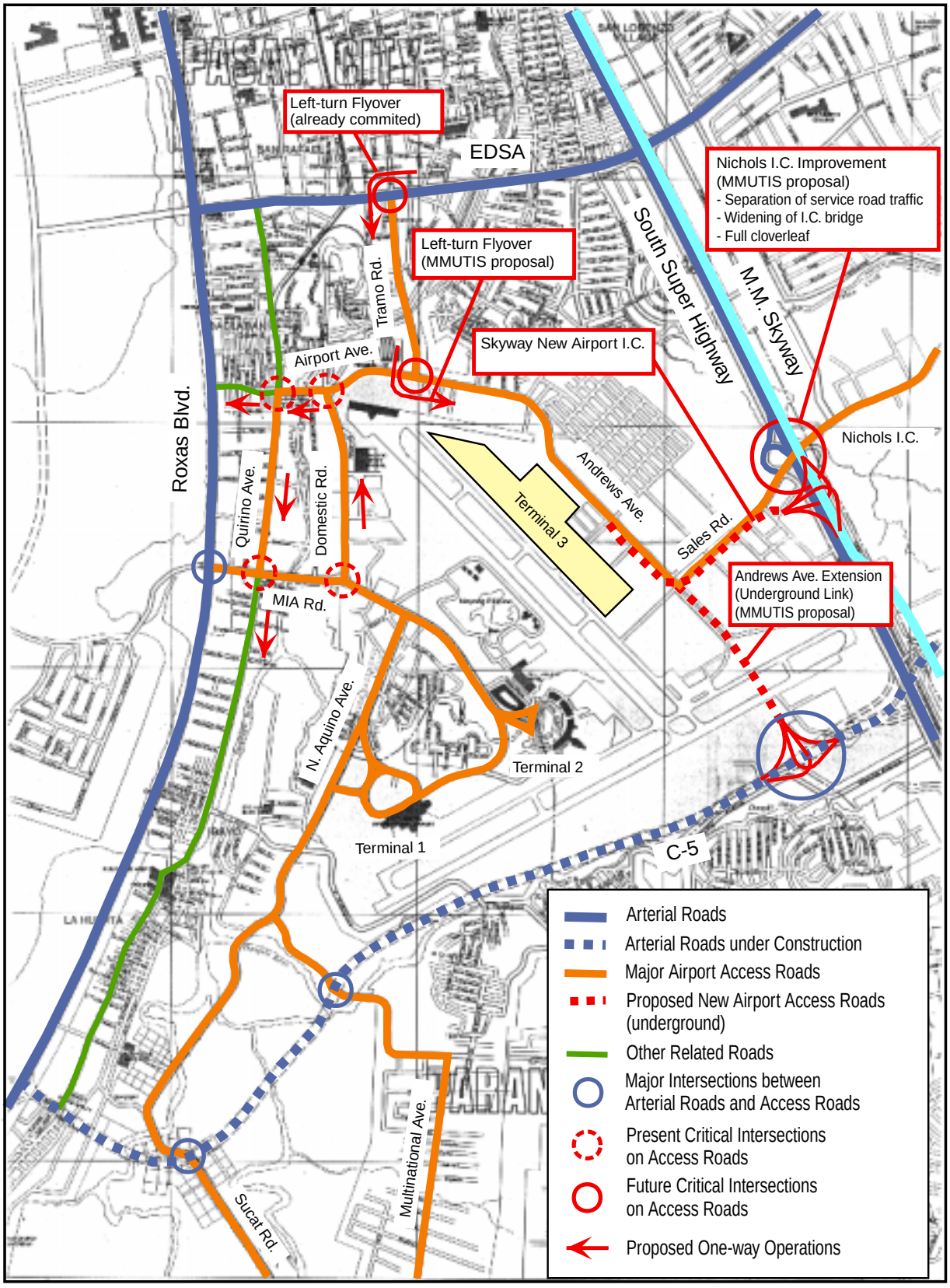


Figure 10.3
Airport Access Improvement Plan



Proposed Public Transport Projects

Public transport projects include the following:

(1) MRT Integration: The current plan that Line 3 terminates at Line 1 at-grade would create serious traffic problem in the area and restrict the opportunity to serve the reclamation area. This project also intends to improve the integration of Line 1 and Line 3 and possible Line 6 in Baclaran-Pasay Rotonda area. Line 3 will be elevated or moved underground to link the reclamation area and Line 1 and Line 3 stations are to be integrated. The project should allow further integration of Line 1 and Line 3 with Line 6. The estimated project cost of the additional work except rolling stock is ₱ 3.2 billion.

(2) MRT Modal Interchange Facilities: The integration of the MRT with access modes is critical for the improvement of traffic circulation and passenger convenience and comfort in the interchange areas. This project focuses on the improvement of modal interchange function at critical locations of Line 1, Line 2 and Line 3 such as Baclaran-Pasay Rotonda (Lines 1 and 3) and Cubao (Line 2 and access to the east). The project is composed of pedestrian decks, which provide direct walk links between the MRT lines, bus/jeepney bays and terminal areas for smooth transfer and other pedestrian facilities and space for possible commercial/service facilities. The estimated cost is about ₱ 2.3 billion.

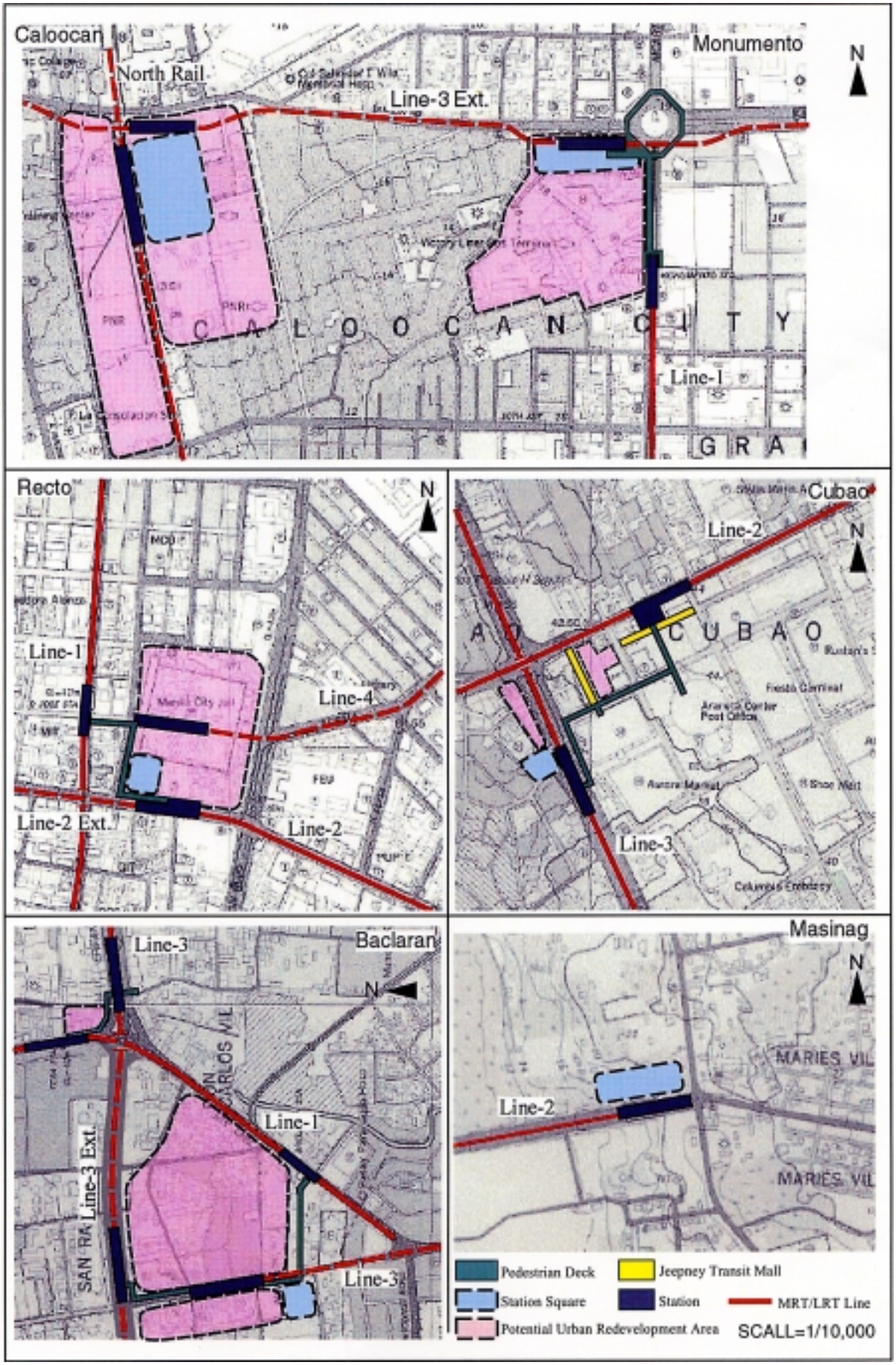
(3) MRT Line 2 Extension: The MRT Line 2 needs to be extended to the east where accessibility to the city center is constrained due to the lack of roads and efficient public transport services. The cost is ₱ 9.1 billion.

(4) MRT Line 4: This project intends to serve R4 corridor between Recto and Batasan (and eventually Novaliches). The cost is ₱ 36.2 billion.

(5) MRT Line 6: This project intends to provide mass transit system between the center of Metro Manila and Cavite, by laying a MRT line between Baclaran and Imus (and eventually Dasmariñas). The cost is ₱ 36.0 billion.

(6) PNR Commuter Improvement (MCX): The PNR ROW is ideally located to serve the strong north-south transport demand. This project is a part of the PNR Commuter Improvement that is composed of North Rail section and MCX section, with the former almost committed. This project intends to improve the PNR line between Caloocan and Alabang. The project cost is ₱ 64.6 billion.

Figure 10.4
Proposed Development of Modal Interchange Facilities at Critical MRT/LRT Stations



11. PROJECT EVALUATION

Economic Evaluation

Regarding two remarkable benefits – reduction of vehicle operating cost and passenger time saving cost – as the economic benefit of the projects, a set of economic evaluations of the MTDP were conducted. The results indicate that all projects demonstrate relatively high economic viability, though the EIRR varies between 14.6% and 61.5%. The projects with the highest EIRRs are the Skyway project (Phase 2 & 3) and Southern Road Package, while those with the lowest EIRRs are MRT Line 3 Extension, MRT Line 2 Extension and Central Road Package (see Table 11.1).

Table 11.1
Economic Evaluation of MTDP Projects

Project	EIRR (%)	BCR (%)	NPV (₱ million)
MTDP Projects	30.9	2.4	181,737
North Package (Road)	28.3	3.7	22,765
Southern Package (Road)	52.8	6.8	64,703
Central Package (Road)	19.8	1.6	4,133
Eastern Package (Road)	29.0	3.3	3,554
Skyway Stage 2 and 3	61.5	7.2	118,715
Port Access (R10/C3)	30.3	2.8	10,827
C5 North Section	30.1	3.8	28,841
MRT 2 Extension (Santolan-Masinag)	19.1	1.4	1,439
MRT 3 Extension (North Avenue-Caloocan)	14.6	1.0	234
MRT 4 Phase 1	29.7	2.3	18,977
North Rail (Meycauayan-Caloocan)	21.4	1.6	8,305
MCX/PNR Improvement (Caloocan-Alabang)	27.7	2.2	31,646
MRT 6 (Baclaran-Imus)	23.8	1.9	13,614

Financial Evaluation

For revenue-generating projects proposed in the MTDP, a financial evaluation was carried out using the discounted cash flow analysis. The results show that the FIRR of the expressway project is not high and that of railway projects are also moderate except for the MCX/PNR Improvement (see Table 11.2).

Table 11.2
Financial Evaluation of Revenue-generating Projects in the MTDP

Project	FIRR (%)	
Skyway Stages 2 and 3	11.7	
Port Access (R10 - C3)	3.5	
MRT 2 Extension (Santolan-Masinag)	10.1	(25.7)
MRT 3 Extension (North Avenue-Caloocan)	4.8	(13.2)
MRT 4 Phase 1	9.5	(20.2)
North Rail (Meycauayan-Caloocan)	6.7	(14.1)
MCX/PNR Improvement (Caloocan-Alabang)	16.2	(30.3)
MRT 6 (Baclaran-Imus)	10.1	(20.3)

Note: Figures in parenthesis show FIRR when only M & E costs are considered.

Environmental Consideration

The Philippine Environmental Impact Statement (EIS) system was formally established in 1978, which requires environmentally critical projects (ECPs) and those in environmentally critical areas (ECAs) to submit an EIS. The environmental assessment of the MTDP indicates that both positive and negative impacts are concentrated on the socio-environment sphere. Actually, not a few projects require a large number of resettlement due to ROW acquisition. A comprehensive relocation policy and methodology must be formulated to implement these projects in a limited period.

12. IMPLEMENTATION PLAN

Funding

ODA and private sector funds are the primary fund sources, both of which require counterpart local funds. While traffic management/low-cost measures, at-grade primary and secondary roads mostly require public funds, expressways and MRT/LRT/busway could attract private funding. If they are properly handled, cost to government in terms of capital and operation costs could be substantially reduced. If land acquisition is minimal, 80% of the construction costs could be shouldered by the private sector on a BOT basis, and if the infrastructure cost of a mass rail transit is shouldered by government, the system could be operated by the private sector on a BOT basis.

Investment Plan

The investment schedule for the MTDP period (1999-2004) has been assumed as shown in Table 12.1.

Table 12.1
Mid-term Cost Allocation Plan

		Project/Project Package	Cost to Govt.		Cost Allocation for Mid-term Plan Period					
			Total (P bil)	MTDP (P bil)	1999	2000	2001	2002	2003	2004
1. Commited										
1.1 BOT	1)	LRT 3	Rental	18.0		2.0	4.0	4.0	4.0	4.0
	2)	Skyway (Stage I)	4.0	2.0	1.0	1.0				
	3)	C-5 South Section	1.1	0.5	0.2	0.3				
1.2 IFI Loans (committed)	4)	LRT 1 Capacity Expansion, OECF (revenue surplus)	6.3	-10.8	-1.2	-1.2	-1.2	-1.2	-3.0	-3.0
	5)	LRT 2, OECF	27.4	21.0	6.0	6.0	5.0	4.0		
	6)	Interchange (3 nos.), OECF	1.5	1.5	0.1	0.6	0.6	0.2		
	7)	TEAM 4, Aus Aid	1.6	0.9	0.4	0.5				
(almost committed)	8)	ADB Air Quality Improvement	18.6	18.6	3.7	3.8	3.7	3.7	3.7	
	9)	World Bank LIL	5.0	5.0	2.0	2.0	1.0			
	10)	World Bank MMURTRIP (Priority 1 & 2)	7.9	7.9	0.1	1.5	2.3	2.3	1.7	
	11)	OECF Interchanges (4 nos.)	1.2	1.2			0.4	0.4	0.4	
	12)	PNR Commuter Improvement: Northrail I	14.0	(8.4)			(1.4)	(1.4)	(2.8)	(2.8)
	13)	MRT Line 3 Extension (Monumento/Caloocan)	7.6	(3.8)				(0.8)	(1.5)	(1.5)
1.3 Government-funded	14)	Primary & Secondary Roads/Flyovers	2.8	2.8	0.7	0.7	0.7	0.7		
Subtotal			**99.0**	**68.6**	13.0	17.2	16.5	14.1	6.8	1.0
2. MMUTIS Strategy										
2.1 Management/ Low-cost Measures	1)	MMURTRIP 2	5.0	5.0				1.0	2.0	2.0
	2)	TEAM 5	2.0	2.0				0.4	0.8	0.8
	3)	Provincial TEAM (South, North, East)	2.0	1.2				0.4	0.4	0.4
2.2 Roads:	1)	Northern Package	10.6	7.1			1.0	1.8	1.8	2.5
Primary and Secondary Arteries	2)	Southern Package	13.7	10.6		0.1	1.2	3.2	3.8	2.3
	3)	Central Package	10.8	8.3		0.7	1.7	2.4	1.4	2.1
	4)	Eastern Package	3.6	3.4		0.2	0.7	1.4	0.9	0.2
	5)	Road Environmental Facilities	2.0	2.0		0.4	0.4	0.4	0.4	0.4
Expressway (BOT)	6)	Expressway, N-S Link (Skyway Stage 2 & 3)	8.1	4.8			0.8	0.8	1.6	1.6
	7)	Expressway, Port Access (R-10/C-3)	2.5	1.5			0.2	0.3	0.5	0.5
	8)	C-5 North Section	2.8	2.0		0.3	0.3	0.3	0.5	0.6
2.3 Airport Access	1)	Skyway I.C., Nichols Improvement, etc.	0.7	0.7		0.1	0.1	0.2	0.2	0.1
2.4 Public Transport	1)	MRT Integration	2.3	2.3		0.3	1.0	1.0		
	2)	MRT Mode Interchange Facilities	2.3	1.1		0.2	0.2	0.2	0.2	0.3
MRT (BOT)	3)	MRT Line 2 Extension (Masinag)	5.5	1.6					0.5	1.1
	4)	MRT Line 4 (Recto-Batasan) Phase I	18.1	(10.6)				(2.2)	(4.2)	(4.2)
	5)	MRT Line 6 (Baclaran-Imus) Phase I	18.0	(9.0)				(2.0)	(3.5)	(3.5)
	6)	PNR Commuter Improvement: MCX	27.0	(27.0)				(9.0)	(9.0)	(9.0)
Subtotal			**137.0**	**53.6**	0.0	2.3	7.6	13.8	15.0	14.9
Total			**236.0**	**122.2**	13.0	19.5	24.1	27.9	21.8	15.9

TRANSPORT DATABASE & RESEARCH CAPACITY DEVELOPMENT

13. OVERVIEW

One of the main objectives of the MMUTIS is to establish an updated transport database and build transport models and procedures to facilitate research and education in transport planning fields and further use by counterpart agencies for transport planning and project studies.

Available transport databases prior to the MMUTIS were limited to those owned by individual agencies for their specific administrative use and old data produced by past studies. The MMUTIS' attempt to prepare a comprehensive transport data for planning is the first since JUMSUT in 1981 under JICA technical assistance. In the MMUTIS, a number of transport surveys, including a comprehensive Household Interview Survey, were conducted which produced the primary base for updating the existing database. The MMUTIS' contribution is not limited to updating the transport database but also various transport models including STRADA for demand analysis and assessment of transport network and projects. Procedures to use the database and models are also documented and training is provided to selected counterparts. The NCTS is expected to function as the center for further training and management of the transport database and planning tools.

14. MMUTIS TRANSPORT SURVEYS

Person-trip Survey

The primary objective of the person-trip survey (otherwise known as the Household Interview Survey or HIS) is to acquire information on the travel and socio-economic characteristics of the residents in the study area. A total of 50,516 households in Metro Manila and 8,004 households in municipalities of adjoining provinces were sampled at sampling rates of 2.5% and 0.8%, respectively during the period August to November of 1996.

Other Surveys

Other major surveys conducted in the MMUTIS and summarized in Table 14.1 include those on roads (including subdivision roads), vehicular traffic, travel speed, public transport operation, parking, truck routes, airport and port traffic, water transport, landuse, road environment, willingness-to-pay, and so on.

Table 14.1
Outline of Transportation Surveys Conducted in the MMUTIS

No.	Survey	Objective	Coverage	Method
1	Person-trip Survey	• socio-economic profile of residents • trip information of residents	• 235 thousand samples for Metro Manila (2.5%) • 39 thousand samples for adjoining area (0.8%)	• direct interview with household head/members
2	Cordonline Survey	• traffic volume on cordonlines • socio-economic profile and trip information of residents outside the Study area	• 19 stations on Metro Manila boundary • 14 stations on the Study area boundary	• 16 or 24-hour traffic count and vehicle occupancy survey with 16-hour roadside direct interview survey
3	Screenline Survey	• traffic volume on screenlines	• 37 stations on the Pasig River, San Juan River and PNR	• 16 or 24-hour traffic count and vehicle occupancy survey
4	Public Transport Operation/Utilization Characteristics Survey	• operation and utilization characteristics of bus and jeepney	• representative routes jeepney (102), bus (45) • time periods morning/evening peak, interpeak	• on-board observation to obtain no. of passengers boarding/ alighting and time arrived and departed by stop
5	Public Transport Passenger Interview Survey	• transfer characteristics • time value and "willingness-to-pay" attitude	• selected major terminals jeepney (12), bus (8), LRT (5)	• 16-hour direct interview with passengers
6	Bus/Jeepney/Tricycle Terminal Survey	• route identification • service frequencies	• all routes operating • all terminal location/ characteristics • service frequencies at major terminals jeepney (83), bus (30)	• route reconnaissance • terminal location / characteristics survey • 8 or 16-hour service frequency count survey
7	Parking Survey	• parking capacity • service frequency	• on-road parking on entire road of Metro Manila • off-street parking spaces in CBD	• parking inventory survey • 16-hour number plate survey • 16-hour direct interview with off-road parking users
8	Travel Speed Survey	• travel speed on major road sections	• 15 major routes • time periods morning/evening peak, interpeak	• floating car method • 3 round trip by time period by route
9	Truck Survey	• approximate goods flow characteristics	• 7 cordonline stations on Metro Manila boundary • 8 gates of Manila Port	• 16-hour traffic count and roadside interview with truck driver
10	Bus/Jeepney/Tricycle/Taxi Driver Interview Survey	• working condition of drivers & operational characteristics	• 10 terminals for each mode	• direct interview with jeepney/ bus/tricycle/ taxi drivers
11	Airport Survey	• characteristics of NAIA related traffic	• NAIA (Ninoy Aquino International Airport) • domestic terminal • cargo terminal	• airport employee survey • 24-hour traffic count and vehicle occupancy survey at all gates • 24-hour direct interview with passengers, well-wishers/visitors
12	Bus/Jeepney Operator Survey	• characteristics of bus/jeepney industry	• public transport operators bus (51), jeepney (49+18)	• direct interview with operators
13	Garbage Truck Movement Survey	• traffic volume, vehicle type, loading volume and service area of garbage trucks	• 5 major dump sites of Metro Manila	• one week continuous observation
14	Willingness-to-pay Survey	• willingness-to-pay attitude and value of time	• 6 public transport mode and private car • major terminal areas for public transport, and EDSA, SLE and NLE for private car • 1,000 samples per mode (7,000 in total)	• direct interview with passengers and drivers
15	Water Transport Demand Survey	• socio-economic characteristics of river ferry passengers • opinion/preference for river ferry	• 600 river ferry, 400 banca, 1,800 jeepney and 600 bus passengers	• direct interview with passengers at selected terminals/routes
16	Traffic Accident Survey	• traffic accident analysis	• 18 police districts • 3,200 accident files in 1997	• collection of records • interview with investigators
17	Road Inventory Survey	• basic planning information by road section	• all major roads in the Study area	• observation and measurement of roads
18	Subdivision Road Inventory	• basic planning information of selected roads of selected subdivisions	• 24 subdivisions/areas	• observation and measurement of roads
19	Landuse Survey	• updating present landuse map	• Metro Manila (detailed) • Study area (general classification)	• observation
20	Road Environmental Survey	• environmental quality of MMUTIS Study area	• 14 selected points in the Study area • Air pollution (NO_x, CO, SO_2, SPM and Pb) and noise level coupled with meteorological and traffic data.	• Direct measurement and analysis in laboratory.

15. TRANSPORT MODELS

Various transport models have been prepared and used in the planning process of the MMUTIS. They are as follows:

(a) Trip Generation/Attraction Model: This model deals with trip generation/attraction by residents in terms of car owner vs. noncar owners and home-based vs. nonhome-based. The model was built based on socio-economic indicators and trip generation/attraction by zone.

(b) Modal-split Model: Both trip end model and trip interchange model have been dealt with in the Study. The model was built to determine the split between "walk", "public" and "private" trips.

(c) Trip Distribution Model: This is composed of two submodels for intrazonal and interzonal trips. Various models were tested before Voorhees Gravity Model was selected.

(d) STRADA: The JICA STRADA consists of 25 program modules mainly to cover database needed for traffic assignment, models for trip generation/attraction, trip distribution and modal split, and traffic assignment for highway and transit traffic.

16. PROPOSED DATABASE AND MMUTIS CONTRIBUTION

The NCTS, as the center for database management, has started to prepare a database system for transport planning and research work. Servers will be installed at the network center. The main server will maintain the homepage of the system and contain applications which process data requests. Remote users can access the database through the Internet, view the output on-line and request for other outputs. Remote workstations can be installed on key planning agencies such as the MMDA, DOTC, DPWH, National Economic Development Authority (NEDA), National Mapping and Resource Information Authority (NAMRIA), and so on.

For the proposed database system, the MMUTIS will initially provide the primary inputs which will be further expanded and updated in the future. The contents of the MMUTIS database was developed based on the series of surveys and studies made in the Study (refer to Table 16.1).

The MMUTIS database has already been utilized by many planning agencies for planning and studies and by graduate students for their research and thesis. Likewise, other ongoing studies by private entities have relied in part on the MMUTIS database for their planning process.

Table 16.1
MMUTIS Database Contents

(CORE DATA)

Data Category	Data	Year	Update Source
Core Data	1) HIS	1980, 83, 96	-
	2) Cordonline data	1980, 83, 96	-
	3) Screenline Data	1980, 83, 96	-
	4) Land-use Map	1986	NAMRIA
	5) Administrative Boundary Map	1996	LGUs
	6) Population Census	1980, 90, 95	NSO

(PRIMARY & SECONDARY)

Data Category	Primary Data (Original Data)	Secondary Data (Processed data)	Update Source
Socio-economic	• Population/household • Zone Map • HIS Master file	• Population data • Employment • School attendance • Income • Car ownership	NSO
Land-use	• Land-use Map (GIS)	• Land-use data	NAMRIA
Transport Demand	• HIS Master file	• OD trip tables • Demand data	
Road and Road Traffic	• Road Inventory • Traffic Count • Travel speed	• Road network • Road facilities • Road traffic • Intersection traffic	DPWH
Public Transport	• Rail transit data • Bus/jeepney data • Public Transport terminal data • Passenger/driver/operator interview survey data	• Rail facilities operation • Bus/jeepney routes and operation characteristics • Terminal Location	DOTC
Other Transport-related	• Port/airport traffic data • Water transport related data • Parking data • Truck survey data • Traffic accident data • Willingness-to-pay survey data		
Environment	• Air pollution data • Noise level data		EMB-DENR

(TERTIARY DATA)

Data Category	Year	Zone Basis
Socio-economic parameters (population, employment, income, etc.)	2015	32,171
Road network data	2005,2015	171
OD matrices – person trip basis (by trip purpose for public and private mode)	2005,2015	171

17. TECHNOLOGY TRANSFER

The MMUTIS shared its resource for effective technology transfer and dissemination of study outputs through various forms such as conducting regular counterpart meetings, seminar-workshops, training course, and preparing a fact book. As of 4 December 1998, a total of 103 meetings between the JICA Study Team and Counterpart Team and 13 seminar-workshops on various topics were held. A seven-day intensive training course on MMUTIS transport models, including STRADA, is currently undertaken in the NCTS. A fact book on traffic conditions in the study area distributed to various agencies and stakeholders in the above-mentioned seminars and meetings contributed to a better understanding of the transport problems and issues.

CONCLUSIONS AND RECOMMENDATIONS

18. CONCLUSIONS

- The study area will continuously face critical transport situation in the future unless a number of important and difficult policy measures are taken in an integral manner now. Demand grows rapidly due to population growth, expansion of urban areas and shift from public to private transport, while government funds available for new infrastructure remains constrained. The capability to manage available facilities and resources also needs to be improved. Under this situation, the right policies are extremely hard and difficult to implement. There will be no easy solution and no single project/scheme to improve the situation drastically. Moreover, many of the problems are related to institutional issues. The manner in strengthening metropolitan governance is the central issue to tackle the complex situation facing the transport sector.

- Planning should form the core of transport administration. Without an established transport and development planning process and consented/institutionalized development framework plan, coordinated effort may not be enough to provide a sound basis for the required measures and neither would it produce the intended outcome.

- Many of the existing transport problems are due to ineffective traffic management as has been identified in many of the past studies including the recent MMURTRIP. Existing capacities are considerably reduced due to poor maintenance of roads, lack of traffic management of vehicles, pedestrians and roadside activities along major roads and critical intersections, widespread minor bottlenecks and so on. It is easy to pinpoint that improved management and low-cost measures could improve the capacity of road sections by 10 to 20% in many locations.

- The current transport policy lacks medium to long-term strategy on how to guide the future urban areas effectively. While transport sector investments are concentrated in existing congested areas, new problem areas emerge in many locations. Unless short-term measures comply with long-term strategies, the investment effects would not be maximized and the city will never improve. Because of this, the MMUTIS Master Plan worked out the transport network plan to effectively link the outer area with the existing urban areas.

- Although traffic management and other low-cost measures are important and are continuously undertaken to maximize the use of available facilities and to improve management capabilities in the process, it is also critical to provide new infrastructure to cope with the increasing backlog and future demand. Balancing short-term measures and long-term strategies is becoming critically important.

- In order to make the future better, or at least not worse than now, needed transport infrastructures require considerable amount of government funds.

The needed amount is approximately ₱ 530 billion and ₱ 120 billion for the Master Plan and the MTDP period, respectively. The estimated public funds are ₱ 200 – ₱ 400 billion for the Master Plan period (up to 2015) and ₱50 – ₱100 billion during the MTDP period (1999-2004), based on conventional revenue source available for the transport sector in the study area under the low and high economic growth assumptions, respectively. This is a critical constraint for the improvement of transport infrastructure. The gap is roughly ₱ 100 billion for the Master Plan.

- Constraints in the availability of public funds are also critical during the MTDP period largely due to the committed and ongoing mega projects such as urban rail Line 2 and Line 3, a substantial portion of whose costs are carried over to the MTDP period. When priorities are given to management/low-cost measures and other cost-effective solutions, not much funds will be left for new impact projects which support long-term strategies. This explains clearly the need for a strong demand management or new funding source, or probably both.

- Although many constraints exist, there are opportunities to improve the situation in the study area. The people's preference for public transport, which is mostly operated by the private sector, is still strong compared to other Asian cities. A drastic car use restriction measure (UVVRP or color coding scheme) is socially accepted, and the basic road network in the central area (within EDSA) is relatively well configured. Large urban development opportunities exist in the emerging suburban areas, basic city planning institution exists (although not practiced adequately), and there is dialogue among concerned agencies and stakeholders. Considerations on these positive elements indicate the following:

  – Effective management of and minor investment in the existing infrastructure have great opportunities to improve the transport situation.

  – The public transport market is large and diverse and investment opportunities are amply available requiring improved regulatory framework to respond to demand flexibly.

  – Infrastructure investment in the emerging area could be cross-subsidized by urban development if they are properly integrated and guided by the government through proper regulatory measures.

  – The people's acceptance of further demand management measures is considered high, taking into account the support for UVVRP by both public transport and private car users.

19. RECOMMENDATIONS

- Strengthening metropolitan governance is the critical success factor for transport development and management in the study area. Toward this end, the MMDA should be strengthened to function as the center of management to cover the following:

  – Incorporation of alignment and locations of major transport facilities in the statutory city planning institution such as zoning.

  – Strengthening and improvement of the practice of land-use zoning and development permit issuance to guide private sector investments based on the updated zoning plan and development standards/guidelines.

  – Establishment of a transport and development planning process based on an updated database, planning procedures and investment criteria. The Capital Investment Folio (CIF) which was practiced successfully during the early 1980s under the Metro Manila Commission should be reviewed for possible introduction into the planning system. The UP-NCTS should provide the MMDA and other transport agencies with the needed technical support and training on state-of-the-art technologies on transport planning

  – Coordination of mega projects, such as MRT, expressways, arterial roads, and major terminals. This is a critical function of the MMDA and is not limited among transport agencies but also between transport and urban development authorities. Without vigorous coordination, it will become more and more difficult to accommodate new infrastructures.

  – Improvement of traffic management, which will be of primary importance not only to maximize the effective use of the infrastructure but also to upgrade management capacity and educate drivers and pedestrians in the process.

  – Introduction of other TDM measures, which will become more important to manage the demand and at the same time to expand user charges.

  – Promotion of public involvement, which is becoming increasingly critical to implement impact projects/programs.

- Promoting public transport-based urban areas should be placed in the center of the overall city planning and development policy which are to be supported by the following measures:

  – Promotion of rail transit system as the center of the public transport system of the metropolitan area through the participation of the private sector, effective use of ODA and integrated urban development.

  – Establishment of an improved basis for private sector participation in MRT projects including termination of unsolicited proposal method,

government commitment at least to shoulder the infrastructure component and competitive bidding for the operation component by the private sector.

- Promotion of transport terminal development. The MMDA is expected to take the lead to coordinate stakeholders. For this, new development methods, such as urban renewal and land readjustment systems, may provide alternative opportunities.

- Improvement of public transport regulatory process to promote adequate submodal split especially between bus and jeepney, and mass rail transit.

- Improvement of pedestrian environment including sidewalk, crossings, street lighting, trees, and shade.

- Supportive measures should be expanded to accelerate infrastructure development including the following:

  - Incorporation of major transport infrastructure with city planning institution.

  - Government-led planning to protect and balance public interest.

  - Establishment of clear rules/guidelines on private sector involvement, particularly on BOT projects.

  - Introduction of project development schemes such as integrated development, land readjustment, etc.

  - Strategic use of ODA (eg. from short-term project loan to long-term program loan, urban rail development fund).

- Securing new source to fund transport infrastructure and implementing expanded demand management through the following:

  - Shift from physical restraints to pricing measures such as road pricing, Area Licensing System (ALS), parking pricing, etc.; and

  - Increase in car sales tax, registration fee and fuel tax.

- Establishing public involvement in transport planning and development through:

  - Public information on traffic situation;

  - Participation in transport planning process and public information on the results; and

  - Transport education.

Members List (1)

Steering Committee

Chairman	:	Undersecretary Dr. Primitivo Cal, DOTC
	:	Undersecretary Willie Evangelista, DOTC (successor)
Vice Chairman	:	General Manager Robert Nacianceno, MMDA
	:	General Manager Violeta Seva, MMDA (successor)
Members	:	Undersecretary Teodoro Encarnacion, DPWH
	:	Assistant Director-General Augusto Santos, NEDA
	:	Chief Supt. Job Mayo, PNP-NCR Command
	:	Director-General Dionisio dela Serna, HUDCC
	:	Chancellor Claro Llaguno, UP Diliman

Technical Advisory Committee

Chairman	:	Assistant Secretary Cesar Valbuena, DOTC
	:	Assistant Secretary George Esguerra, DOTC (successor)
Vice Chairman	:	General Manager Violeta Seva, MMDA
Members	:	Assistant Secretary Manuel Bruan, LTO
	:	Chairman Dante Lantin, LTFRB
	:	General Manager Jose Dado, PNR
	:	Administrator Manuel Clasara, LRTA
	:	Assistant Secretary Manuel Bonoan, DPWH
	:	Director Godofredo Galano, DPWH-TEC/BOT
	:	Director Elisa Joson, DPWH-TECH/BOT
	:	Director Ernesto Camarillo, MMDA
	:	Director Ricardo Sigua, NCTS
	:	Director Ruben Reinoso, NEDA
	:	Chairman Arsenio Yulo, PEA
	:	Col. Rogelio Luis, President, PNCC
	:	Commissioner Romulo Fabul, HLRB
	:	Director Amelia Dulce Supetran, EMB-DENR

JICA Advisory Committee

1) Dr. Shigeru MORICHI	:	Chairman
2) Dr. Haruo ISHIDA	:	Vice Chairman
3) Dr. Seiji NISHIOKA	:	Urban Transportation Planning
4) Mr. Kazuhiro TANAKA	:	Public Transportation Planning
5) Mr. Hiroshi YOSHINAGA	:	Public Transportation Planning
6) Mr. Soki SATO	:	Public Transportation Planning
7) Mr. Tetsuya KAMURA	:	Public Transportation Planning

JICA

1) Mr. Ikufumi TOMIMOTO	:	Director, First Social Development Study Division
2) Mr. Takao KAIBARA	:	Director, First Social Development Study Division
3) Mr. Masami FUWA	:	Deputy Director, First Social Development Study Div.
4) Mr. Masaei MASTUNAGA	:	Deputy Director, First Social Development Study Div.
5) Ms. Eri HONDA	:	Deputy Director, First Social Development Study Div.
6) Mr. Hiroyuki KANZAKI	:	First Social Development Study Division
7) Mr. Yukihiro KOIZUMI	:	First Social Development Study Division

(Philippine Office)

8) Mr. Hiroshi GOTO	:	Resident Representative
9) Mr. Toshiyuki KUROYANAGI	:	Deputy Resident Representative
10) Mr. Hisakatsu OKUDA	:	Assistant Resident Representative

Members List (2)

JICA Study Team

1) Dr. Shizuo IWATA	:	Team Leader
2) Mr. Takashi SHOYAMA	:	Deputy Team Leader, Public Transportation Planning 1
3) Dr. Katsuhide NAGAYAMA	:	Urban Development
4) Dr. Geronimo V. MANAHAN	:	Land-use Analysis
5) Mr. Kenji MARUOKA	:	Road Planning
6) Mr. Tetsuo WAKUI	:	Deputy Team Leader, Demand Forecast
7) Mr. Kazuyuki OTSUKA	:	Public Transportation Planning 2
8) Mr. Yoshinori KOTANI	:	Mass Transit Facility Planning
9) Mr. Rene SANTIAGO	:	Public Transportation Project Management/ Organization
10) Mr. Seiya MATSUOKA	:	Traffic Management
11) Mr. Michimasa TAKAGI	:	Transportation Node Planning
12) Ms. Venetia Lynn M. SISON	:	Transportation Survey 1
13) Dr. Tetsuji MASUJIMA	:	Transportation Survey 2
14) Mr. Naoshi OKAMURA	:	Transportation Planning/ Modeling 1
15) Mr. Masayuki ISHIYA	:	Transportation Planning/ Modeling 2
16) Mr. Mazhar IQUBAL	:	System Analysis/ Modeling 3
17) Mr. Alan J. PEAKALL	:	Financial/ Fiscal Analysis
18) Ms. Theresa. J. VILLAREAL	:	Macro Economy
19) Mr. Roger ALLPORT	:	Transportation Policy
20) Mr. Mitsuyoshi ASADA	:	Facility Planning
21) Mr. Isao HARA	:	Construction Planning
22) Mr. Yoshinori TANAKA	:	Engineering Design / Cost Estimate
23) Mr. Tsukasa KISHIMOTO	:	Environmental Planning
24) Mr. Yosuke SASAKI	:	Natural Condition Analysis

Counterpart Study Team

Project Director	:	Assistant Secretary Cesar Valbuena, DOTC
Project Manager	:	Assistant Secretary George Esguerra, DOTC
Assistant Project Managers	:	Director Cora Cruz, MMDA
	:	Director Elisa Joson, DPWH
	:	Director Olegario Villoria, Jr., NCTS
Members	:	Mr. Arnel Manresa, DOTC
	:	Ms. Cora Japson, DOTC
	:	Mr. Eleuterio Galvante, DOTC
	:	Ms. Marites Tuason, DOTC
	:	Ms. Josephine Bondoc, DOTC
	:	Mr. Victor Dato, NEDA
	:	Ms. Cora Marquez, MMDA
	:	Mr. Emmanuel Supe, DPWH-URPO
	:	Mr. Dante Inciong, DPWH-TEC
	:	Mr. Darren Badion, DPWH-URPO
	:	Mr. Florencio Alano, DPWH-BOT
	:	Ms. Sheila Gaabucayan, NCTS
	:	Mr. Noreil Tiglao, NCTS
	:	Ms. Aileen Mappala, NCTS
	:	Mr. Segundo Palancia, Jr., DOTC