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Japan International Cooperation Agency (JICA)**

**METRO MANILA
URBAN TRANSPORTATION
INTEGRATION STUDY**

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TABLE OF CONTENTS

	Page No.
1	INTRODUCTION 1-1
1.1	Study Background 1-1
1.2	Study Objectives 1-1
1.3	Study Area 1-1
2	OVERVIEW OF PUBLIC TRANSPORTATION SYSTEM 2-1
2.1	Railway 2-1
2.1.1	PNR 2-1
2.1.2	LRT 2-1
2.2	Road-Based Public Transportation System 2-3
3	CHARACTERISTICS OF ROAD-BASED PUBLIC TRANSPORTATION 3-1
3.1	Service Coverage and Terminals 3-1
3.2	Demand Characteristics 3-5
3.2.1	Boarding/Alighting 3-5
3.2.2	Transfers 3-6
3.2.3	Passenger Flows 3-6
3.2.4	Average Trip Length 3-17
3.2.5	Travel Time 3-17
3.3	Operational Characteristics 3-22
3.3.1	Travel Speed 3-22
3.3.2	Load Factor 3-22
3.4	Levels of Service 3-27
4	FINACIAL VIABILITY OF BUS AND JEEPNEY SERVICES IN METRO MANILA 4-1
4.1	Introduction 4-1
4.2	Costs of Operating a Bus and Jeepney Service 4-1
4.2.1	Assumptions 4-1
4.2.2	Vehicle Utilization 4-2
4.2.3	Annual Operating Cost 4-4
4.3	Potential Revenues and Financial Viability-Theory 4-10
4.4	Potential Revenues and Financial Viability On-Street-Practice 4-11

4.4.1	Increasing Revenue	4-11
4.4.2	Reducing Cost	4-32
4.5	Threats and Opportunities	4-43
4.5.1	Infrastructure	4-43
4.5.2	New Vehicle Types	4-45
4.6	Measures to Improves Financial Viability	4-46
4.6.1	Regulation	4-46
4.6.2	Tariffs	4-47
4.6.3	Operations	4-49
5	PROBLEMS AND PROSPECTS	5-1
5.1	Short and Long Term Problems	5-1
5.2	Prospect of Diminishing Market Share	5-1
6	OPTIONS AND RECOMMENDATIONS.....	6-1
6.1	Options	6-1
6.2	Rail Transit	6-1
6.3	Road-Based Public Transit	6-2
6.4	Common Ticketing	6-2
6.5	Strategic PT Terminals or Mode Interchange Areas	6-3

LIST OF TABLES

Table No.	Title	Page No.
1.1	Population of the Study Area	1-2
2.1	PNR Commuter Statistics	2-1
2.2	LRT Operations Statistics	2-3
2.3	Supply Characteristics of Road-Based Public Transportation	2-4
2.4	Number of Passengers and Average Occupancy of Road-Based Public Transportation	2-4
3.1	Number of Jeepney and Bus Routes, 1983 and 1996	3-1
3.2	Average Route Length of Jeepney and Bus, 1983 and 1996	3-5
3.3	Average of Bus, Jeepney and Tricycle Terminals, 1996	3-5
3.4	Number of Transfers between Travel Modes, Study Area, 1996	3-6
3.5	Average Trip Length of Bus and Jeepney Passengers, 1996	3-17
3.6	Distribution of Travel Time by Representative Mode, 1996	3-22
3.7	Travel Speed of Bus and Jeepney, 1996	3-22
3.8	Load Factor of Bus and Jeepney, 1996	3-27
3.9	Bus/Jeepney Service Levels by Corridor, 1996	3-27
4.1	Operating Cost Model Inputs for New and Reconditioned Bus	4-3
4.2	Percentage of Distance-Related Costs that are Incurred for fuel	4-8
4.3	Vehicle Utilization and Annual Operating Cost at Low Speed – Jeepney	4-9
4.4	Vehicle Utilization and Annual Operating Cost at Low Speed – New Bus	4-9
4.5	Vehicle Utilization and Annual Operating Cost at Low Speed–Reconditioned Bus	4-9
4.6	Vehicle Utilization and Annual Direct Cost at Low Speed – Jeepney	4-37
4.7	Vehicle Utilization and Annual Direct Cost at Low Speed – New Bus.....	4-37
4.8	Vehicle Utilization and Annual Direct Cost at Low Speed – Reconditioned Bus	4-38

LIST OF FIGURES

Figure No.	Title	Page No.
1.1	Geographical Boundary of the Study Area	1-3
2.1	Existing Railway Network	2-2
3.1	Bus Service Coverage and Terminals, 1996	3-2
3.2	Jeepney Service Coverage and Terminals, 1996	3-3
3.3	Tricycle Service Coverage and Terminals, 1996	3-4
3.4	No. of Leaving/Arriving Busses by Terminals, 1996	3-7
3.5	No. of Leaving/Arriving Jeepney by Terminals, 1996	3-8
3.6A	No. of Boarding/Alighting Passengers of Bus and Jeepney, 1996	3-9
3.6B	No. of Boarding/Alighting Passengers of Bus and Jeepney, 1996	3-10
3.7	Distribution of Transfers between Bus and Other Modes	3-11
3.8	Distribution of Transfers between Jeepney and Other Modes	3-12
3.9	Distribution of Transfers between Tricycle and Other Modes	3-13
3.10	Distribution of Transfers between Taxi and Other Modes	3-14
3.11A	Bus and Jeepney Passenger Flows, 1996	3-15
3.11B	Bus and Jeepney Passenger Flows, 1996	3-16
3.12	Average Trip Length of Bus Passengers, 1996	3-18
3.13	Average Trip Length of Jeepney Passengers, 1996	3-19
3.14	Travel Time of Bus Passengers from Each Zone (Representative Mode), 1996 ...	3-20
3.15	Travel Time of Jeepney Passengers from Each Zone (Representative Mode), 1996	3-21
3.16	Travel Speed of Bus by Section, 1996	3-23
3.17	Travel Speed of Jeepney by Section 1996	3-24
3.18	Load Factor of Bus by Section, 1996	3-25
3.19	Load Factor of Jeepney by Section, 1996	3-26
3.20	Public Transport Problems in Levels of Service	3-28
4.1	Assumed Jeepney Utilization	4-5
4.2	Assumed Bus Utilization	4-5
4.3	Extrapolation of Vehicle Operating Cost Model Assumptions to Low Speed-Jeepney	4-6
4.4	Extrapolation of Vehicle Operating Cost Model Assumptions to Low Speed-Bus	4-6
4.5	Annual Costs – Jeepney	4-7
4.6	Annual Costs – New Bus	4-7
4.7	Costs – Reconditioned Bus	4-7
4.8	Annual Costs at Low Speeds – Jeepney	4-12
4.9	Annual Costs at Low Speeds – New Bus	4-12
4.10	Annual Costs at Low Speeds – Re-Conditioned Bus	4-12
4.11	Public Transport Fares	4-13
4.12	Relationship between Average Speed, Load Factor and Financial Viability – Jeepney	4-14

4.13	Relationship between Average Speed, Load Factor and Financial Viability – Bus	4-14
4.14	Relationship between Average Speed, Load Factor and Financial Viability – Reconditioned Bus	4-14
4.15	Correlation between Trip Length and Average Speed Jeepney	4-16
4.16	Correlation between Trip Length and Average Speed Ordinary Bus	4-16
4.17	Correlation between Trip Length and Average Speed AC Bus	4-16
4.18	Cumulative Vehicle Trips and Vehicle km. by Average Speed–Jeepney	4-18
4.19	Cumulative Person Trip and Passengers km. by Average Speed–Jeepney	4-18
4.20	Cumulative Vehicle Trips and Vehicle km. by Average Speed–Ordinary Bus	4-19
4.21	Cumulative Person Trips and Passenger km. by Average Speed–Ordinary Bus	4-19
4.22	Cumulative Vehicle Trips and Vehicle km. by Average Speed – AC Bus	4-20
4.23	Cumulative Person Trips and Passenger km. by Average Speed – AC Bus	4-20
4.24	Fare per km. for Different Trip Lengths, Jeepney	4-23
4.25	Relationship between Average Speed, Load Factor and Financial Viability of Jeepney – Revenue ₱ 0.52 per Passenger km	4-24
4.26	Relationship between Average Speed, Load Factor and Financial Viability of Jeepney – Revenue ₱ 0.62 per Passenger km	4-24
4.27	Relationship between Average Speed, Load Factor and Financial Viability of Jeepney – Revenue ₱ 1.00 per Passenger km	4-24
4.28	Correlation between Route Profitability and Load Factor – Jeepney	4-29
4.29	Correlation between Route Profitability and Passenger Trip Length Jeepney	4-29
4.30	Correlation between Route Profitability and Average Speed – Jeepney	4-29
4.31	Correlation between Route Profitability and Load Factor – Ordinary Bus.....	4-30
4.32	Correlation between Route Profitability & Passenger Trip Length-Ordinary Bus .	4-30
4.33	Correlation between Route Profitability and Average Speed – Ordinary Bus.....	4-30
4.34	Correlation between Route Profitability and Load Factor – AC Bus	4-31
4.35	Correlation between Route Profitability and Passenger Trip Length – AC Bus.....	4-31
4.36	Correlation between Route Profitability and Average Speed – AC Bus.....	4-31
4.37	Annual Direct Costs – Jeepney	4-39
4.38	Annual Direct Costs – New Bus	4-39
4.39	Annual Direct Costs – Reconditioned Bus	4-39
4.40	Difference between Full and Direct Costs – Jeepney	4-40
4.41	Difference between Full and Direct Costs – New Bus	4-40
4.42	Difference between Full and Direct Costs – Reconditioned Bus	4-40
4.43	Annual Direct Costs and Low Speeds – Jeepney	4-41
4.44	Annual Direct Costs and Low Speeds – New Bus	4-41
4.45	Annual Direct Costs and Low Speeds – Reconditioned Bus	4-41
4.46	Difference between Full and Direct Cost at Low Speeds – Jeepney	4-42
4.47	Difference between Full and Direct Cost at Low Speeds – New Bus.....	4-42
4.48	Difference between Full and Direct Cost at Low Speeds – Reconditioned Bus.....	4-42

1. INTRODUCTION

1.1 Study Background

Metro Manila, like other large urban areas in Asia, has been suffering from serious transportation problems. Although a number of comprehensive studies and feasibility studies have been undertaken and various transportation infrastructure projects implemented, there are still many problems to be addressed and areas to be improved.

The Metro Manila Urban Transportation Planning Study (JUMSUT) Phases I and II, conducted between October 1982 and September 1985, have contributed much to the research and planning activities of the National Center for Transportation Studies (NCTS) and other projects in Metro Manila. However, the worsening transportation situation has become a serious socioeconomic concern of society, thus, the government has decided to urgently undertake a coordinated and integrated development of transportation infrastructure. This required a precise understanding of traffic/transportation activities and a thorough assessment of the results of major transportation studies, particularly JUMSUT. The Japanese Government, through the Japan International Cooperation Agency (JICA), responded favorably to the request of the Philippine Government to conduct a comprehensive transportation study, including a feasibility study on selected priority projects. JICA dispatched a preliminary study mission between November and December 1995, which led to the signing by both governments of the Implementing Arrangement for the Metro Manila Urban Transportation Integration Study (MMUTIS).

1.2 Study Objectives

The objectives of MMUTIS were as follows:

- 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 a comprehensive urban transportation system of Metro Manila for the target year 2015; and
- 3) To conduct a feasibility study on priority projects which are to be implemented by the year 2005.

1.3 Study Area

The MMUTIS study area is composed of the following:

- 1) Metro Manila; and
- 2) Adjacent municipalities which form or will form part of the actual metropolitan area.

The geographical coverage of the study area was determined with due consideration to the traffic interaction and the present and future integrity of urban areas. For this purpose, the cordonline survey data of the Metro Manila Expressway Study

(MMUES) conducted in 1992 by JICA/Department of Public Works and Highways (DPWH) were analyzed and an aerial observation survey was conducted on April 3, 1996.

The study area covers the entire Metro Manila and six municipalities of Laguna Province, 12 municipalities of Rizal Province, 16 municipalities of Bulacan Province, and 12 municipalities and two cities of Cavite Province (see Figure 1.1). Based on the National Statistics Office (NSO) census of population, the study area is home to 11.6 million persons of which 7.9 million reside in Metro Manila (see Table 1.1).

TABLE 1.1
POPULATION OF THE STUDY AREA ^{1/}

Area	Area (sq. m.)	Population			Pop. Density (persons/ha.)	Growth Rate (%/yr.)	
		1990	1980	1970		1980-90	1970-80
Metro Manila	636	7,928,867	5,925,884	3,966,695	125	3.0	4.1
Bulacan Province	1,244	1,088,978	777,192	495,630	9	3.4	4.6
Cavite Province	690	963,578	623,744	405,330	14	4.4	4.4
Laguna Province	391	692,397	439,581	279,614	18	4.6	4.6
Rizal Province	1,186	931,105	520,386	284,071	8	6.0	6.2
Total	4,147	11,604,925	8,286,767	5,431,340	28	3.4	4.3

Source: NSO Census

^{1/} Refer to Appendix 3 for more details.

FIGURE 1.1
 GEOGRAPHICAL BOUNDARY OF THE STUDY AREA



2. OVERVIEW OF PUBLIC TRANSPORTATION SYSTEM

The public transportation system of Metro Manila and its adjoining provinces consists of railway and road-based transportation.

2.1 Railway

The railway system includes the Philippine National Railway (PNR) and the LRT Line No.1. Their railway lines that they service are shown in Figure 2.1.

2.1.1 PNR

When PNR started its commuter service before 1979, it was carrying about 4-5 million long-distance passengers a year. After then, however, PNR's operation of long-distance trains continuously diminished due to frequent natural disasters, the lack of rehabilitation works, and decreased patronage, thereby reducing the number of its long-distance passengers to about 300,000 by 1996. At present, the long-distance train is operated only on the 400 km section (Tayuman-Naga) of the Main Line South (see Figure 2.1)

TABLE 2.1
PNR COMMUTER STATISTICS

	1991	1992	1993	1994	1995	1996
Revenues (P000)	13,561	7,248	14,472	16,151	13,754	10,998
No. of Passengers	4,315,383	2,225,646	4,639,356	5,006,847	4,054,634	2,837,626
Ave. Revenue/Pax-Km(P)	0.228	0.238	0.228	0.232	0.242	0.170
Trains Run	9,117	11,669	6,603	12,520	9,864	10,939
Train-Km (000)	337.7	235.2	409.8	442.7	336.0	416.0
Seat-Km (000)	142,567	86,473	142,454	126,312	113,712	120,85
Load Factor, %	41.8	35.2	44.6	55.2	50.0	55.3

Source: MIS-DOTC

2.1.2 LRT

LRT Line 1 opened partially in 1984 and became fully operational in 1985. This is a 15-km, fully elevated railway, and has carried 100-150 million passengers a year (see Table 2.2). The headway is 2-5 minutes and the scheduled speed is 30 km/h. Mainly due to its high speed and punctuality, the patronage is large and the fare revenue has been able to cover its operating expense. This is one of the exceptional cases in the world's urban railway system, although its operation and maintenance practice has much room for improvement.

FIGURE 2.1
EXISTING RAILWAY NETWORK

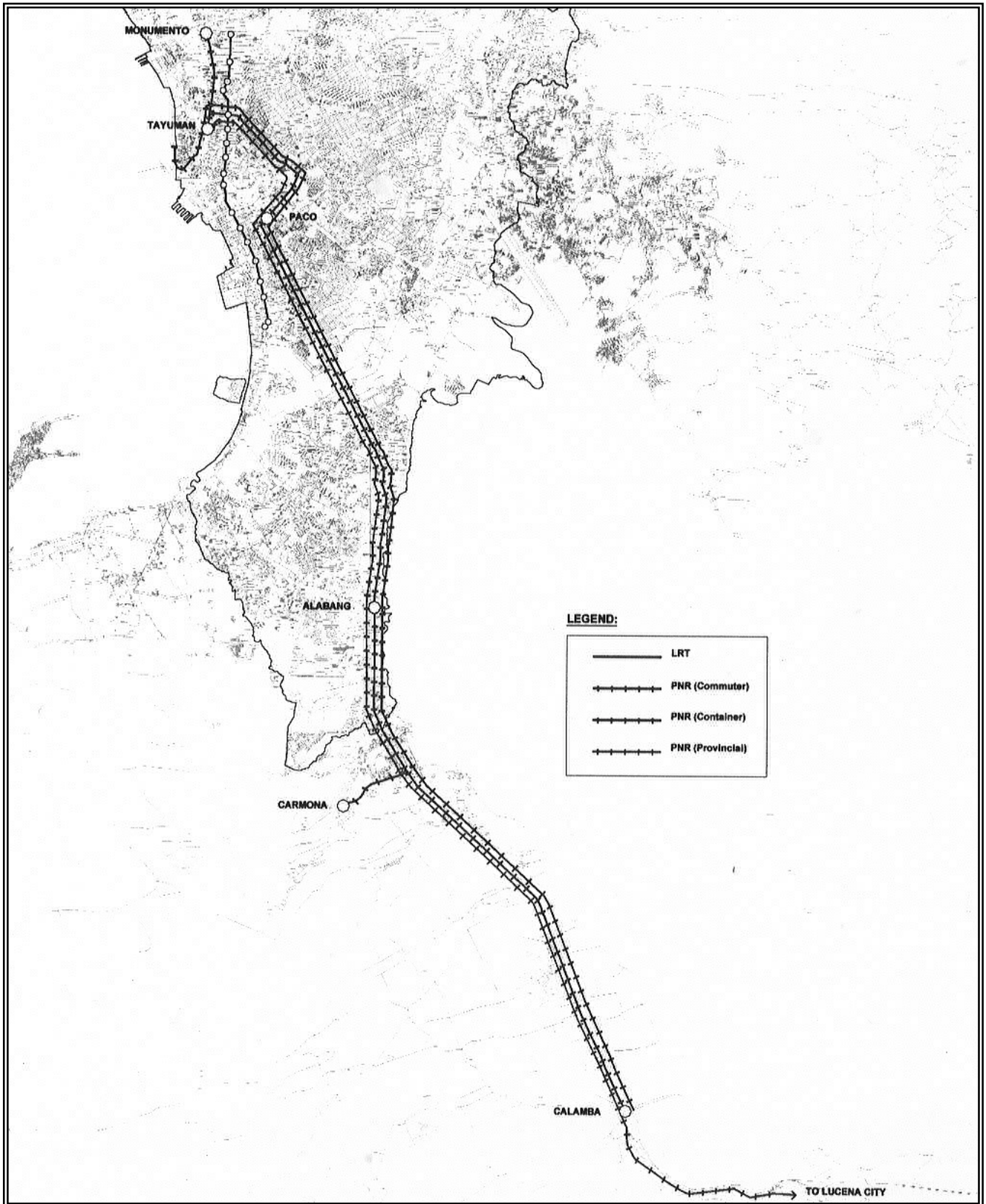


TABLE 2.2
LRT OPERATIONS STATISTICS

	1991	1992	1993	1994	1995	1996
Ridership						
Annual (in Million pax)	120.11	120.29	129.10	148.84	135.90	143.23
Daily Average (000 pax)	330.9	330.5	355.6	402.9	377.5	397.9
Net Revenues (P million)	513.26	657.05	701.25	789.74	735.00	783.27
Other Income	13.87	19.59	15.33	17.57	21.85	30.26
Total Revenues	527.13	676.64	716.58	807.31	756.85	813.53
Operating Expenses	608.67	678.23	681.9	727.1	707.96	668.78
Operating Margin	(81.54)	(1.58)	34.68	80.21	48.89	144.75
Add: Misc. Income & Grants	59.42	42.43	74.84	61.76	21.68	15.61
Less: Financial Charges	545.23	503.35	445.68	398.9	443.23	715.32
Net Losses (P million)	(567.35)	(462.50)	(336.16)	(256.93)	(372.66)	(554.96)
Labor Cost/Km-Run (P)	51	56	61	71	100	99
Maint. Mat'ls Cost/Km-Run	30	32	28	22	29	37
Ave. Km-Run/day	7,624	8,417	8,466	8,708	7,603	8,417

Source: Light Rail Transit Authority (LRTA)

2.2 Road-Based Public Transportation System

The road-based public transportation in Metro Manila is comprised mainly of bus, jeepney, tricycle and taxi. This combination has been almost the same since the 1960's. However, as compared to the findings of the Japan Update of the Metro Manila Study on Urban Transportation (JUMSUT) project in 1983, present supply/demand characteristics have changed significantly, as outlined below (refer to Tables 2.3 and 2.4).

- a) For buses, the number of routes and terminals has been reduced considerably. However, the number of operating units has doubled from 5,900 to 12,900 units and the number of passengers has increased by about 74%. Notably, the number of airconditioned bus routes has remarkably increased from 28 in 1983 to 84 in 1996.
- b) For jeepneys, the number of routes has decreased similarly to buses. The number of units has nearly doubled from 35,500 to 63,200 units, but the number of passengers has increased only by about 56%. Unlike buses, air-conditioned jeepneys are not yet popular (less than 20 units in Metro Manila as of October 1997).
- c) Tricycles have shown the most remarkable increase in terms of number of terminals, number of operating units, and number of users.
- d) For taxis, there was very little data in 1983. However, judging from the results of the person trip survey, both supply and demand have largely increased. Most of the taxis now are airconditioned.

The emergence of new types of transport services has upset operators of the traditional segments and blurred the distinction between public and private. The most controversial one is the case of the Tamaraw FX, which was initially fielded as an exclusive taxi service but has subsequently been moonlighting as a shared taxi or an air-conditioned jeepney. The vehicles used are vans (e.g., Toyota FX vans, Mitsubishi L300 vans, Besta, HiAce, etc.), and the service is as close to a car-for-hire

at a lower charge. As of October 1997, it was reported that 13,400 units were already in operation. The services have been legalized lately.

As a whole, the road-based public transportation has shown a significant growth during the period 1983 to 1996, with emerging new services.

TABLE 2.3
SUPPLY CHARACTERISTICS OF ROAD-BASED PUBLIC TRANSPORTATION

Mode	Item	Service Area	1983	1996	1996/1983
Bus	No. of Routes	MM Intracity ¹		89	0.59
		MM Intercity ¹		61	1.30
		Total	197	150	0.76
	No. of Terminals	Inside MM	121	35	0.29
		Adjoining Area	n.a.	23	-
		Total	n.a.	58	-
Estimated No. of Operating Units	MM Intracity ¹	4,400	9,600 ²	2.18	
	MM Intercity ¹	1,500	3,300 ²	2.20	
	Total	5,900	12,900	2.19	
Jeepney	No. of Routes	MM Intracity ¹	640	486	0.76
		MM Intercity ¹	104	91	0.88
		Total	744	577	0.78
	No. of Terminals	Inside MM	184	210	1.14
		Adjoining Area	n.a.	113	-
		Total	n.a.	323	-
Estimated No. of Operating Units	MM Intracity ¹	29,300	57,400 ²	1.96	
	MM Intercity ¹	6,300	12,300 ²	1.95	
	Total	35,500	69,700	1.96	
Tricycle	No. of Terminals	Inside MM	276	640	2.32
		Adjoining Area	n.a.	551	-
		Total	n.a.	1,191	-
	Estimated No. of Operating Units	MM Intracity	17,000	60,700	3.57
Adjoining Area		n.a.	56,600	-	
	Total	n.a.	117,300	-	

Source: 1983 JUMSUT and 1996 MMUTIS

¹ Between Metro Manila and adjoining areas (inside the study area only)

² Estimated based on the vehicle registration

TABLE 2.4
NUMBER OF PASSENGERS AND AVERAGE OCCUPANCY OF ROAD-BASED PUBLIC TRANSPORTATION

Mode	Item	Service Area	1983	1996	1996/1983
Bus	Estimated No. of Passengers (000/day)	MM Intracity	1,424 ³	2,584	1.81
		MM Intercity	313 ³	434	1.39
		Total	1,737	3,018	1.74
	Ave. Occupancy ² (pass/veh.)	MM Intracity	38.7	50.0	1.29
	MM Intercity	37.2	38.4	1.03	
Jeepney	Estimated No. of Passengers (000/day)	MM Intracity	7,420	12,078	1.63
		MM Intercity	1,013	1,096	1.08
		Total	8,433	13,174	1.56
	Ave. Occupancy ² (pass/veh.)	MM Intracity	10.3	15.0	1.46
	MM Intercity	9.7	15.6	1.61	
Tricycle	Estimated No. of Passengers (000/day)	Inside MM	n.a.	5,340	-
		Adjoining Area	n.a.	3,056 ¹	-
		Total	n.a.	8,396	-
	Ave. Occupancy ² (pass/veh.)	Inside MM	1.3	2.6	2.00
	Adjoining Area	1.2	2.3	1.92	
Taxi	Estimated No. of Passengers (000/day)	MM Intracity	n.a.	1,251	-
		MM Intercity	n.a.	114	-
		Total	n.a.	1,365	-
	Ave. Occupancy ² (pass/veh.)	MM Intracity	2.1	2.2	1.05
	MM Intercity	n.a.	2.2	-	

Source: 1983 JUMSUT and 1996 MMUTIS

Notes:

¹ Inside the adjoining area only.

² Average occupancy for inside Metro Manila (or MM intracity) was taken from those on the screenline, while that for the adjoining area was from those on the cordonline.

³ Re-estimated from JUMSUT data.

3. CHARACTERISTICS OF ROAD-BASED PUBLIC TRANSPORTATION

3.1 Service Coverage and Terminals

Figures 3.1, 3.2 and 3.3 show the service coverage of bus, jeepney and tricycle. The bus service covers most of the primary arteries of Metro Manila while that of the jeepney covers most of primary and secondary arteries. In 1996, the coverage of bus was slightly less than that in 1983 since the bus service had been removed from J.P. Rizal, J. Luna and some other streets. On the other hand, the jeepney coverage has extended to, for instance, inside the Ortigas Center, the northern part of Quezon City and the residential area in Las Pinas.

Tables 3.1 and 3.2 show the number and average route length, respectively, of bus and jeepney routes.

The number of Metro Manila bus routes has been reduced while that of intercity bus routes has increased. The average route length has increased for Metro Manila bus routes and has decreased for intercity bus routes. The most important change is the proliferation of premium (airconditioned) bus routes.

The number of jeepney routes has decreased both for Metro Manila and intercity routes. The average route length has been reduced as well. This is partly due to the Government's regulation that jeepney routes should not exceed 15 kms, and the jeepney seems to have strengthened its characteristics as a feeder service.

TABLE 3.1
NUMBER OF JEEPNEY AND BUS ROUTES, 1983 AND 1996

	Jeepney		Standard Bus						Mini Bus		Total	
	1983	1996	Ordinary		Premium		Sub-Total		1983	1996	1983	1996
			1983	1996	1983	1996	1983	1996				
1. Within Metro Manila	640	486	114	42	27	47	141	89	9	6	150	95
2. Metro Manila-Adjoining Area	104	91	26	24	1	37	27	61	20	7	47	68
3. Metro Manila-Outside Study Area		1	n.a	80	n.a	144	n.a	224	n.a	0	n.a	224
Sub Total	744	578	n.a	146	n.a	228	n.a	374	n.a	13	n.a	387
4. Within Adjoining Area	n.a	93	n.a	0	n.a	0	n.a	0	n.a	0	n.a	0
5. Adjoining Area-Outside Study Area	n.a	11	n.a	0	n.a	2	n.a	2	n.a	0	n.a	2
Total	n.a	682	n.a	146	n.a	230	n.a	376	n.a	13	n.a	389

Source: JUMSUT (1983) and MMUTIS (1996)

FIGURE 3.1
BUS SERVICE COVERAGE AND TERMINALS, 1996

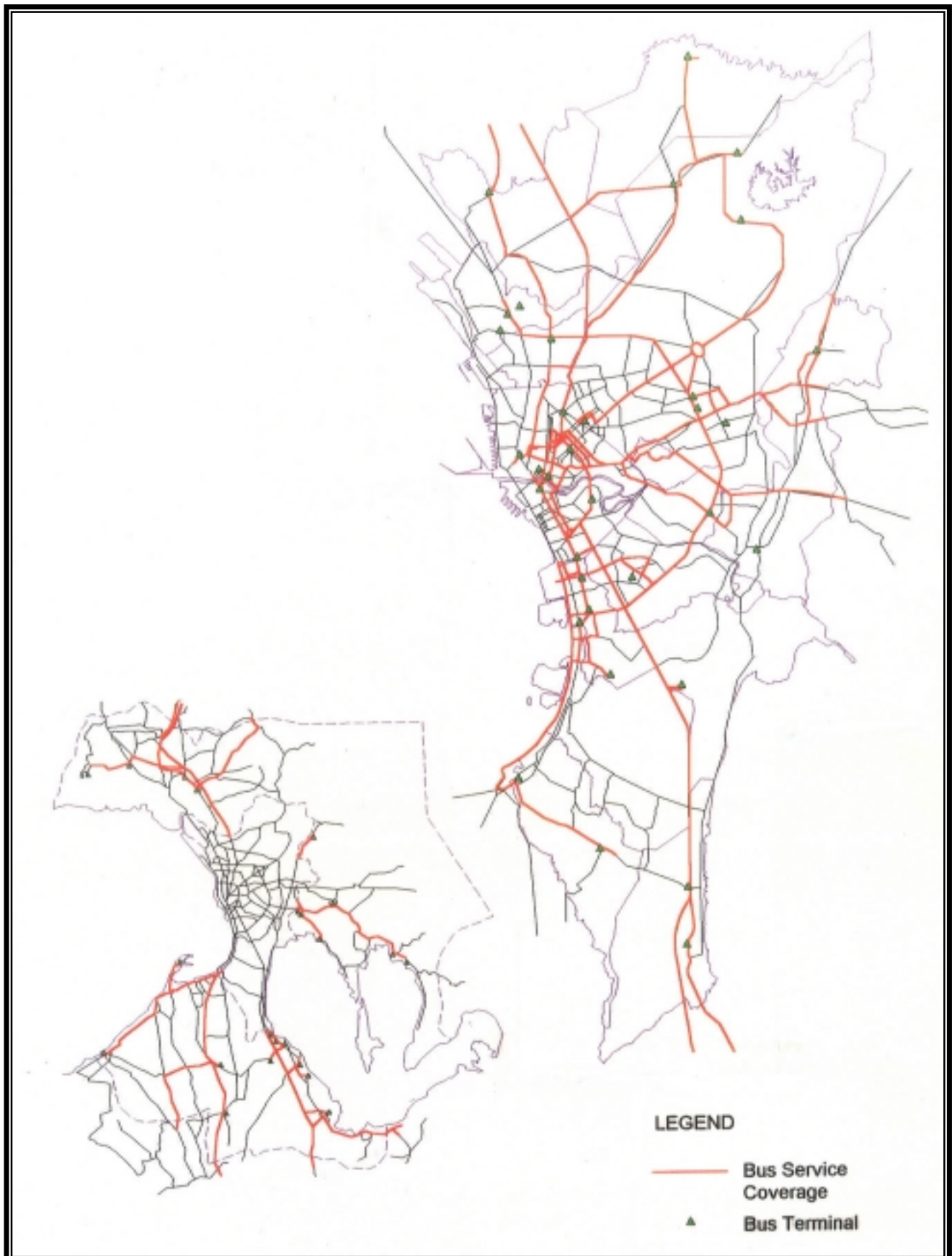


FIGURE 3.2
JEEPNEY SERVICE COVERAGE AND TERMINALS, 1996

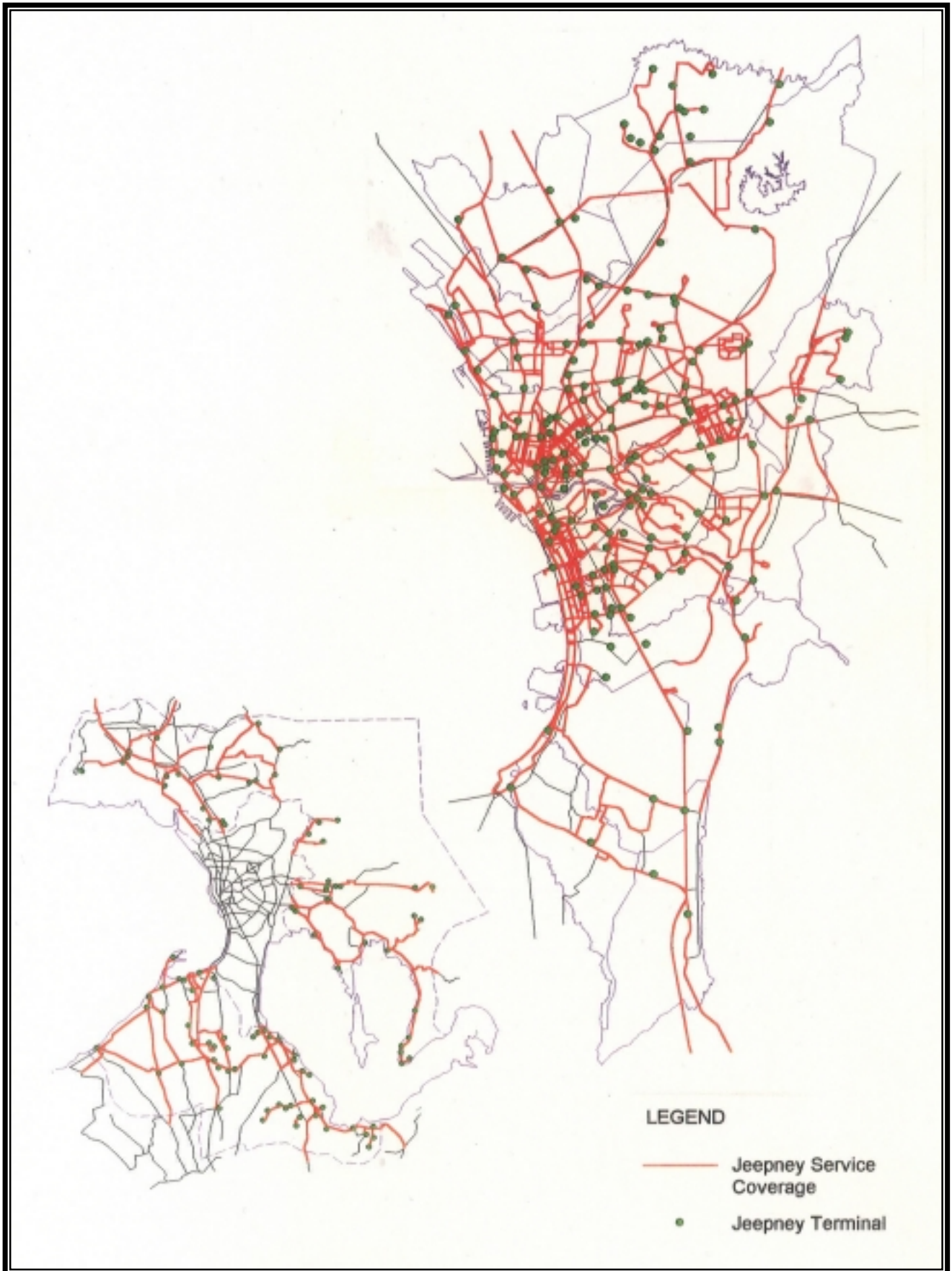


FIGURE 3.3
TRICYCLE SERVICE COVERAGE AND TERMINALS, 1996

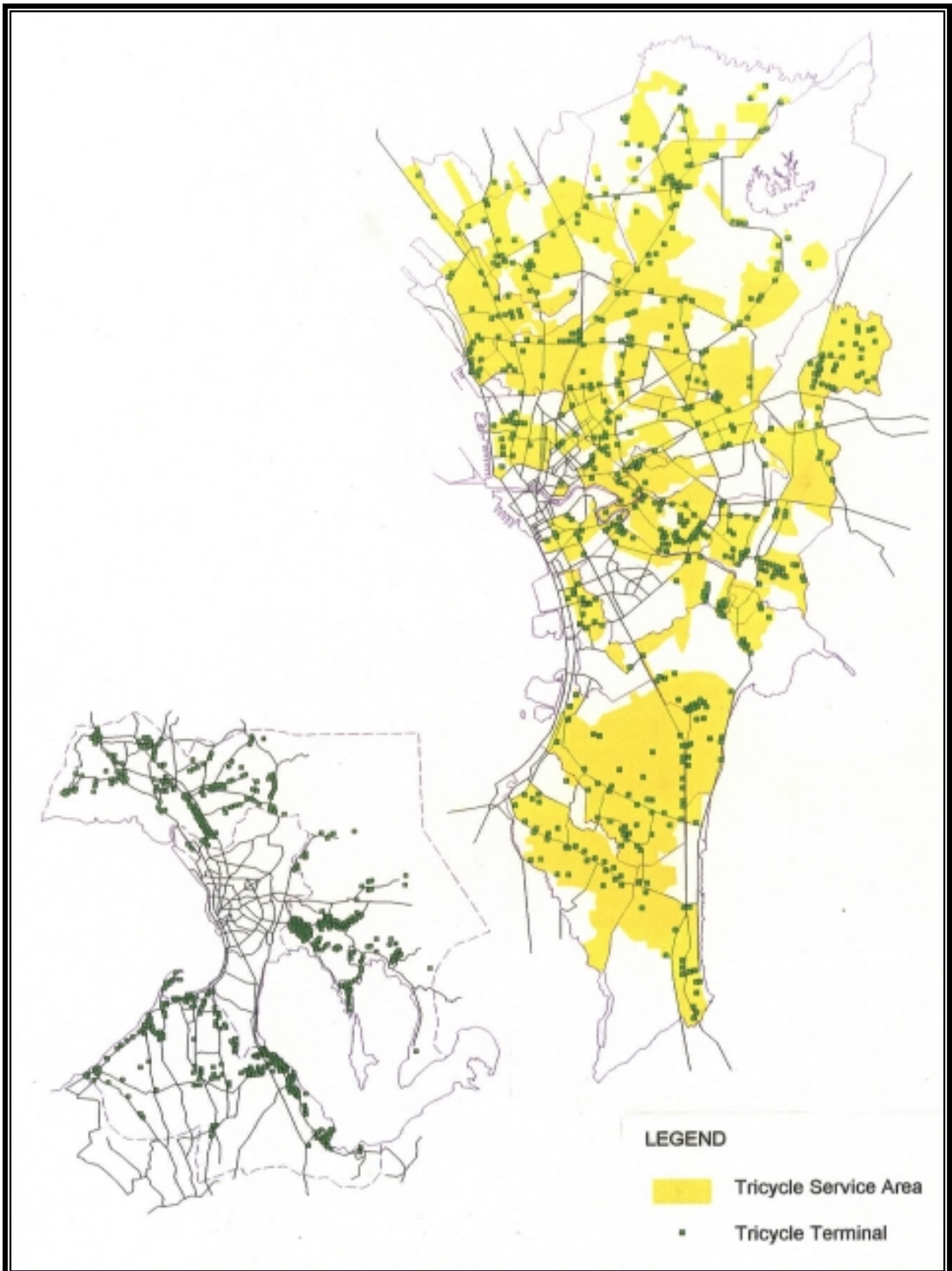


TABLE 3.2
AVERAGE ROUTE LENGTH OF JEEPNEY AND BUS, 1983 AND 1996

		1983	1996
Jeepney	MM Intra-City	10.4 kms.	7.6 kms.
	MM-Adjoining Area	24.6	17.6
	Average	12.4	9.4
Bus	MM Intra City	21.1	29.1
	Ordinary Bus	22.3	29.7
	Premium Bus	14.5	29.9
	(Ave. Standard Bus)	20.8	29.8
	Mini Bus	27.1	18.5
	MM-Adjoining Area	40.5	33.7
	Ordinary Bus	45.5	33.7
	Premium Bus	23.0	35.1
	(Ave. Standard Bus)	44.7	34.5
	Mini Bus	35.1	26.9
	Average	25.8	31.0
	Ordinary Bus	26.6	31.2
	Premium Bus	14.8	32.2
	(Ave. Standard Bus)	24.6	31.7
	Mini Bus	32.9	23.0

Source: JUMSUT (1983) and MMUTIS (1996)

Table 3.3 summarizes the number of bus, jeepney and tricycle terminals both in Metro Manila and its adjoining areas.

TABLE 3.3
NUMBER OF BUS, JEEPNEY AND TRICYCLE TERMINALS, 1996

Location	Bus	Jeepney	Tricycle
Metro Manila	35	210	640
Adjoining Area	23	113	551
Study Area Total	58	323	1,191

Figures 3.4 and 3.5 outline the extent of terminal use by bus and jeepney, respectively. Large-scale bus terminals are distributed in Cubao, Buendia, Baclaran, Quiapo/Sta. Cruz, Monumento, Alabang, etc. It is noted that the share of intercity bus is high in Cubao. Jeepney terminals are concentrated in the City of Manila, around EDSA and in some suburban areas like Novaliches and Alabang.

3.2 Demand Characteristics

3.2.1 Boarding/Alighting

Figures 3.6a and 3.6b show the distribution of the number of boarding/alighting passengers for bus and jeepney, respectively. This includes both the passengers generated/attracted on the sites and the passengers transferring from one mode to another.

The major sources of boarding/alighting bus passengers are around EDSA, Makati, Manila City and large activity centers along intercity arteries. For jeepneys, the distribution is much more scattered all over the study area.

3.2.2 Transfers

Table 3.4 shows the number of transfers between travel modes in the study area. The largest number of transfers, at 3.1 million, is observed between jeepney and tricycle. Between jeepney and jeepney, it is about 2.9 million, and between jeepney and bus, 2.2 million.

TABLE 3.4
NUMBER OF TRANSFERS BETWEEN TRAVEL MODES, STUDY AREA, 1996

(Unit: '000 trips/day)

Mode	LRT/PNR	Tricycle	Jeepney	Bus	Taxi	Car/Truck	Others	Total
LRT/PNR	1	19	172	30	2	1	0	225
Tricycle	15	93	1,542	358	30	4	6	2,048
Jeepney	165	1,532	2,923	1,097	55	20	8	5,800
Bus	31	359	1,116	108	24	11	0	1,651
Taxi	4	48	67	30	11	4	1	163
Car/Truck	0	4	12	4	1	1	0	22
Others	0	6	8	1	0	1	0	16
Total	217	2,061	5,840	1,627	122	42	16	9,925

Figures 3.7 to 3.10 present the distribution of transfers for each road-based public transportation mode.

Transfers between bus and other travel modes occur mainly along EDSA, particularly with the jeepney. Bus to bus transfers are noticeable in Baclaran and Cubao.

Transfers between jeepney and other travel modes occur everywhere. However, transfers are made mainly with buses along EDSA, with tricycles in suburban areas, and with jeepneys inside EDSA.

Transfers between tricycle and other travel modes occur everywhere except inside EDSA. They are made mainly with bus and jeepney.

3.2.3 Passenger Flows

Figures 3.11a and 3.11b illustrate the daily passenger flows for bus and jeepney, respectively.

FIGURE 3.4
NO. OF LEAVING/ARRIVING BUSES BY TERMINAL, 1996

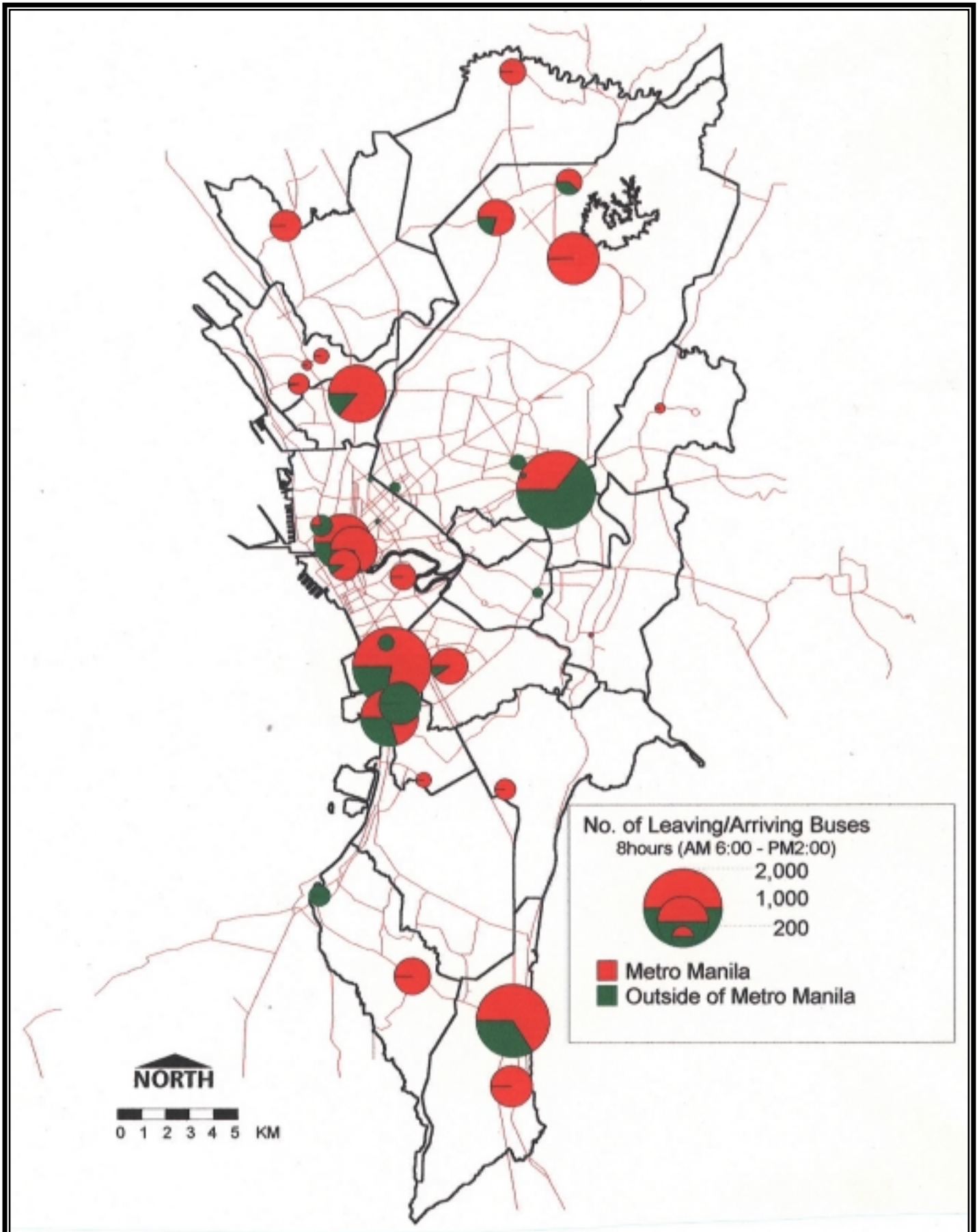


FIGURE 3.5
NO. OF LEAVING/ARRIVING JEEPNEYS BY TERMINAL, 1996

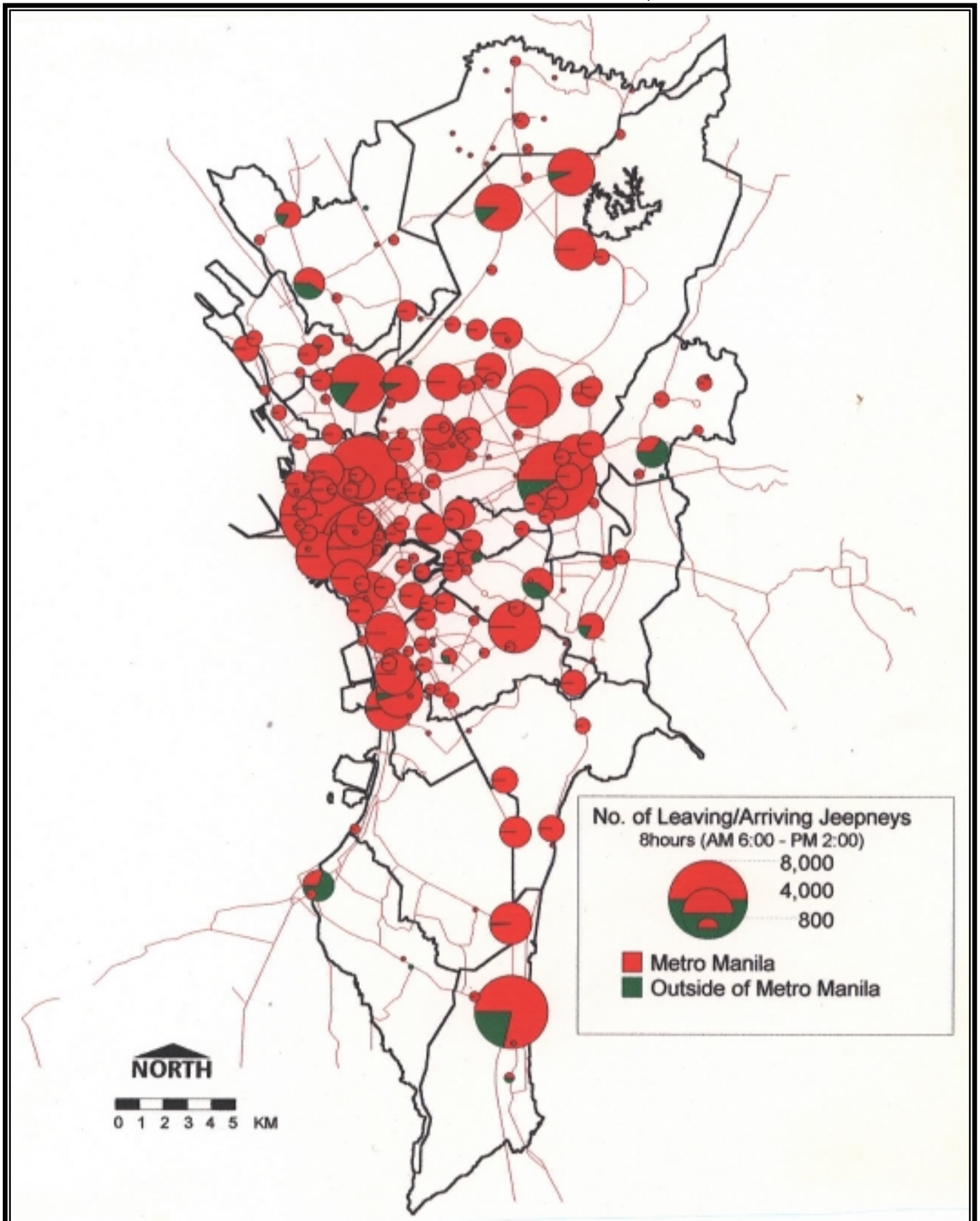


FIGURE 3.6A
NO. OF BOARDING/ALIGHTING PASSENGERS OF BUS AND JEEPNEY, 1996



FIGURE 3.6B
NO. OF BOARDING/ALIGHTING PASSENGERS OF BUS AND JEEPNEY, 1996

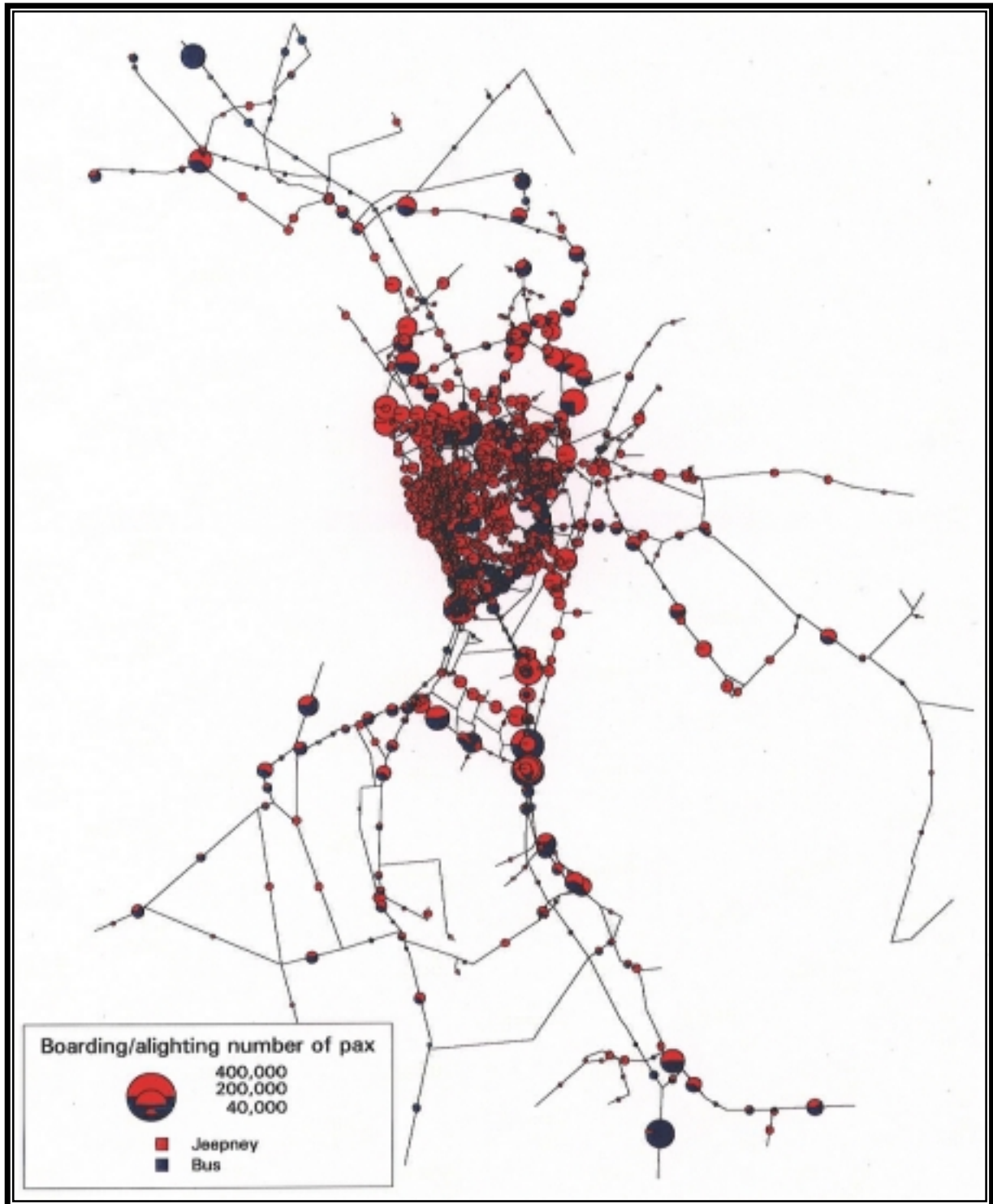







FIGURE 3.7
DISTRIBUTION OF TRANSFERS BETWEEN BUS AND OTHER MODES

Legend

Scale: 1cm²= 100000
(per day)

-  (Bus ↔ Taxi)
-  (Bus ↔ Tricycle)
-  (Bus ↔ LRT)
-  (Bus ↔ Jeepney)
-  (Bus ↔ Bus)

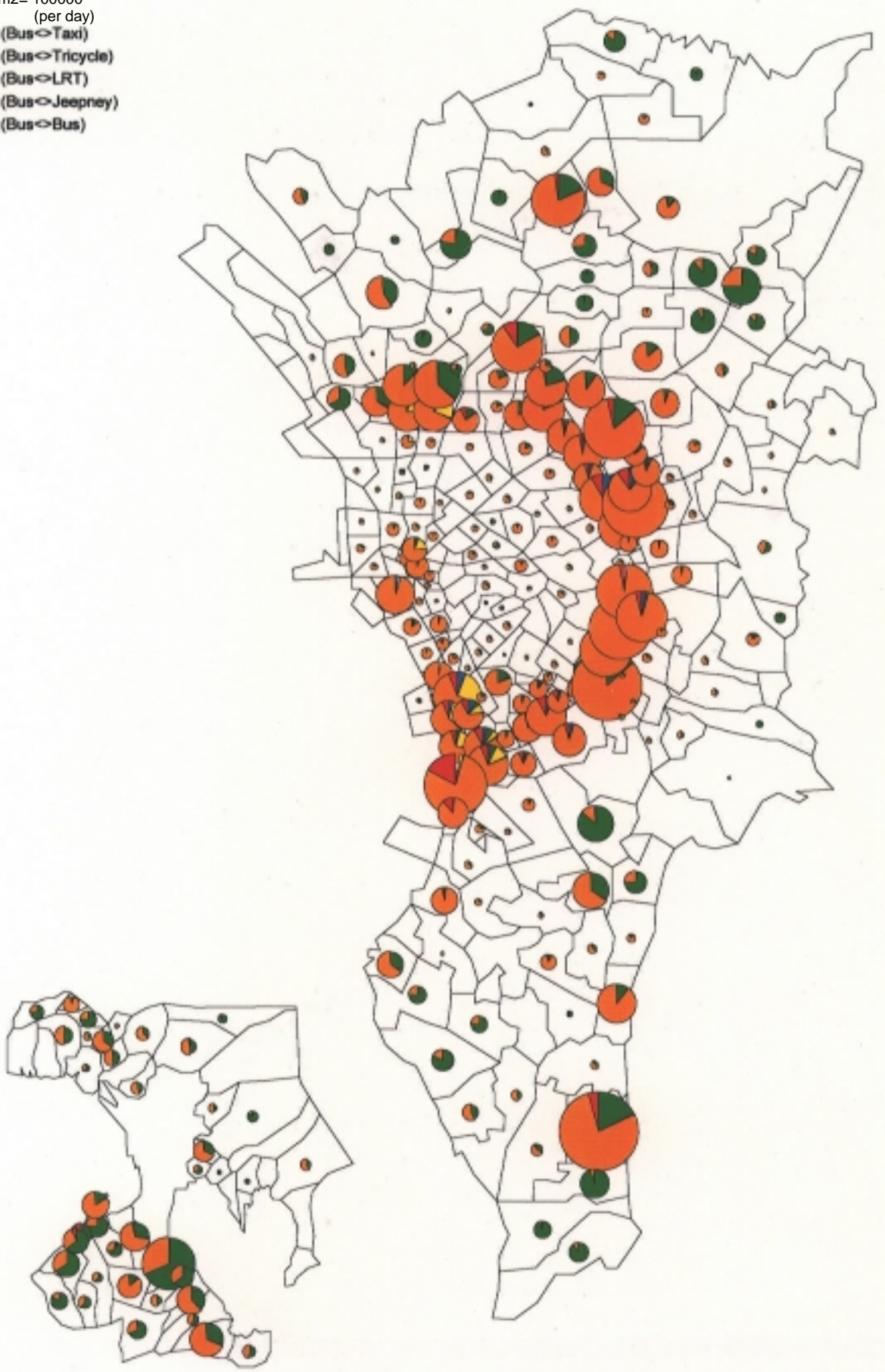







FIGURE 3.8
DISTRIBUTION OF TRANSFERS BETWEEN JEEPNEY AND OTHER MODES

Legend

Scale: 1cm²= 150000
(per day)

-  (Jeepney↔Taxi)
-  (Jeepney↔Tricycle)
-  (Jeepney↔LRT)
-  (Jeepney↔Jeepney)
-  (Jeepney↔Bus)

