

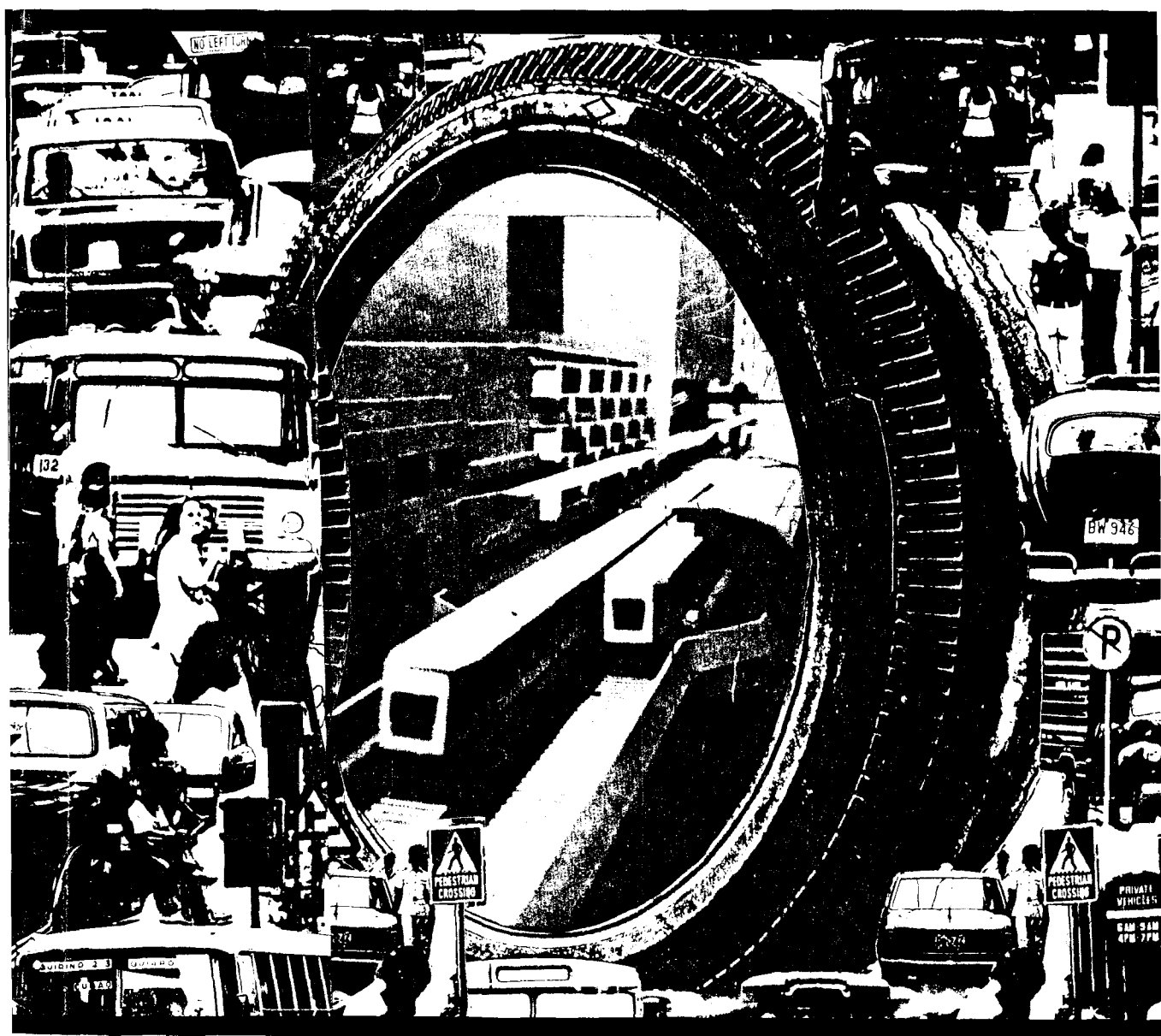
# PHILIPPINE PLANNING JOURNAL

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## THE METRORAIL SYSTEM

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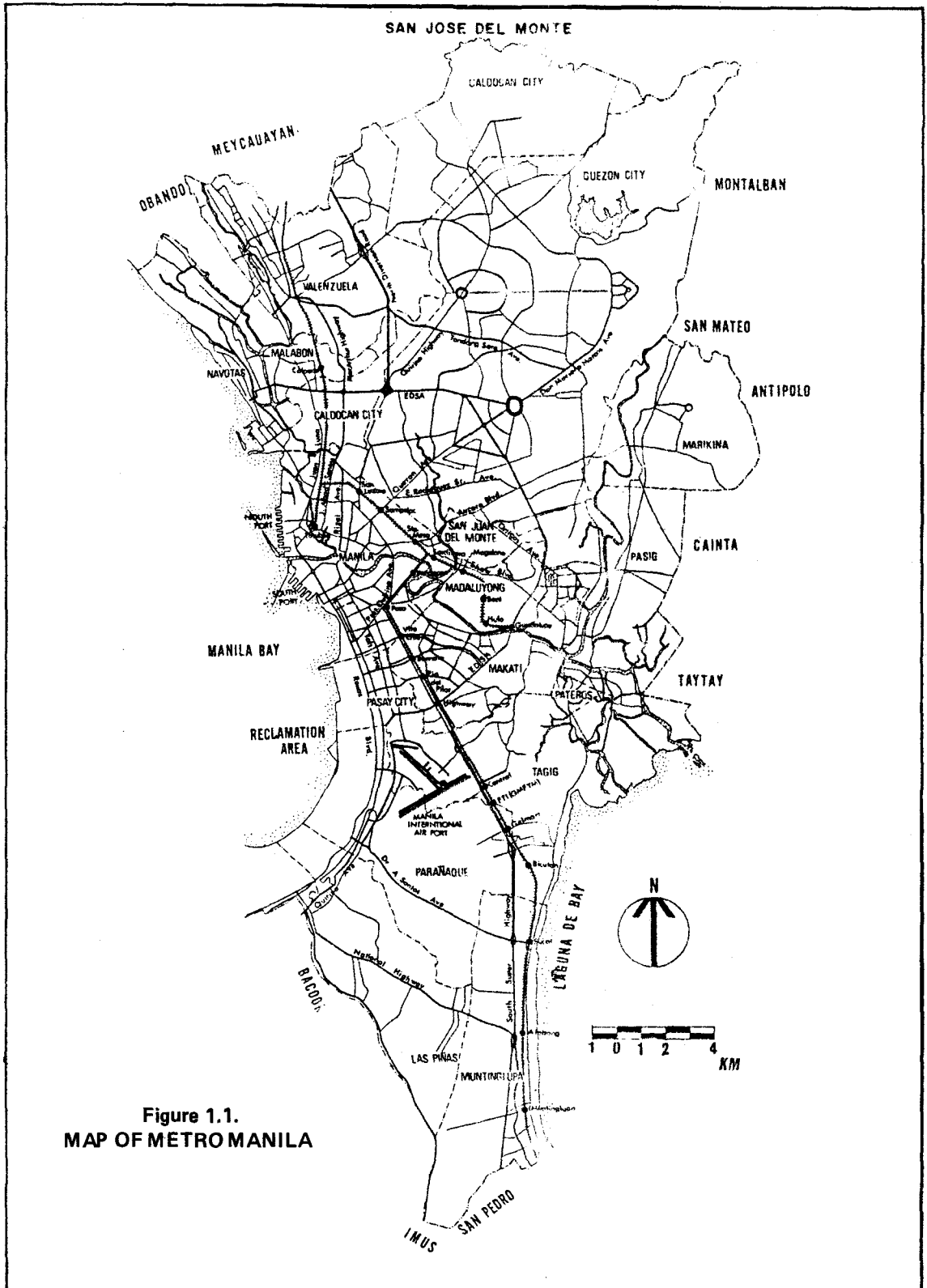
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**Figure 1.1.**  
**MAP OF METRO MANILA**

# URBAN TRANSPORTATION IN METROPOLITAN MANILA\*

by  
*Selected Officials of the  
Ministry of Transportation & Communications*

## BACKGROUND

The urban mass transportation in the Philippine setting is best appreciated and analyzed in the context of Metro Manila. The choice is significant as Metro Manila, the primary city of the Philippines, is also the seat of the government and the center of culture, education, finance, trade and commerce. It is the port city and the site of the country's principal international airport. Major transport and traffic problems in Urban Philippines are found in Metro Manila wherein government efforts in terms of resources have been concentrated.

### Metropolitan Manila

Metro Manila, also called the National Capital Region, is an area, comprised of four (4) cities, namely: Manila, Quezon, Pasay and Caloocan, and thirteen (13) municipalities, namely; Mandaluyong, Makati, Malabon, San Juan, Pasig, Pateros, Taguig, Muntinlupa, Marikina, Navotas, Las Piñas and Parañaque, all in the province of Rizal and Valenzuela in the province of Bulacan. Metro Manila has a population of about seven million people which is rapidly expanding at a growth rate of 3.6 percent per annum. Its area extends 25 kilometers from north to south and 12 kilometers west to east, covering an area of 636 square kilometers. Figure 1.1 shows Metro Manila's composition and Figure 1.2 indicates the population densities in the different cities/municipalities.

Traditionally the center of the country's activities, Manila and its immediate periphery exerts a profound influence and a commanding role over its outlying areas and for that matter, the Philippines as a whole. Metro Manila is home to the highly centralized national government. It has most of the institutions of higher learning and research, the major medical centers and, the major share of national cultural activities.

It is also emerging as an international conference center. As the seat of the national government, Metro Manila attracts the head offices of major local and international companies. It is the financial capital of the Philippines and has aspirations of becoming a major financial center for South-East Asia. Metro Manila is the dominant center for consumption, processing and distribution of imports and having the main international port of the Philippines, it handles the bulk of incoming trade. It is also the center of air traffic, Manila International Airport, to the south of the city, plays a pivotal role as a connecting point for international flights to all other parts of the country.

### Historical Development of Transportation

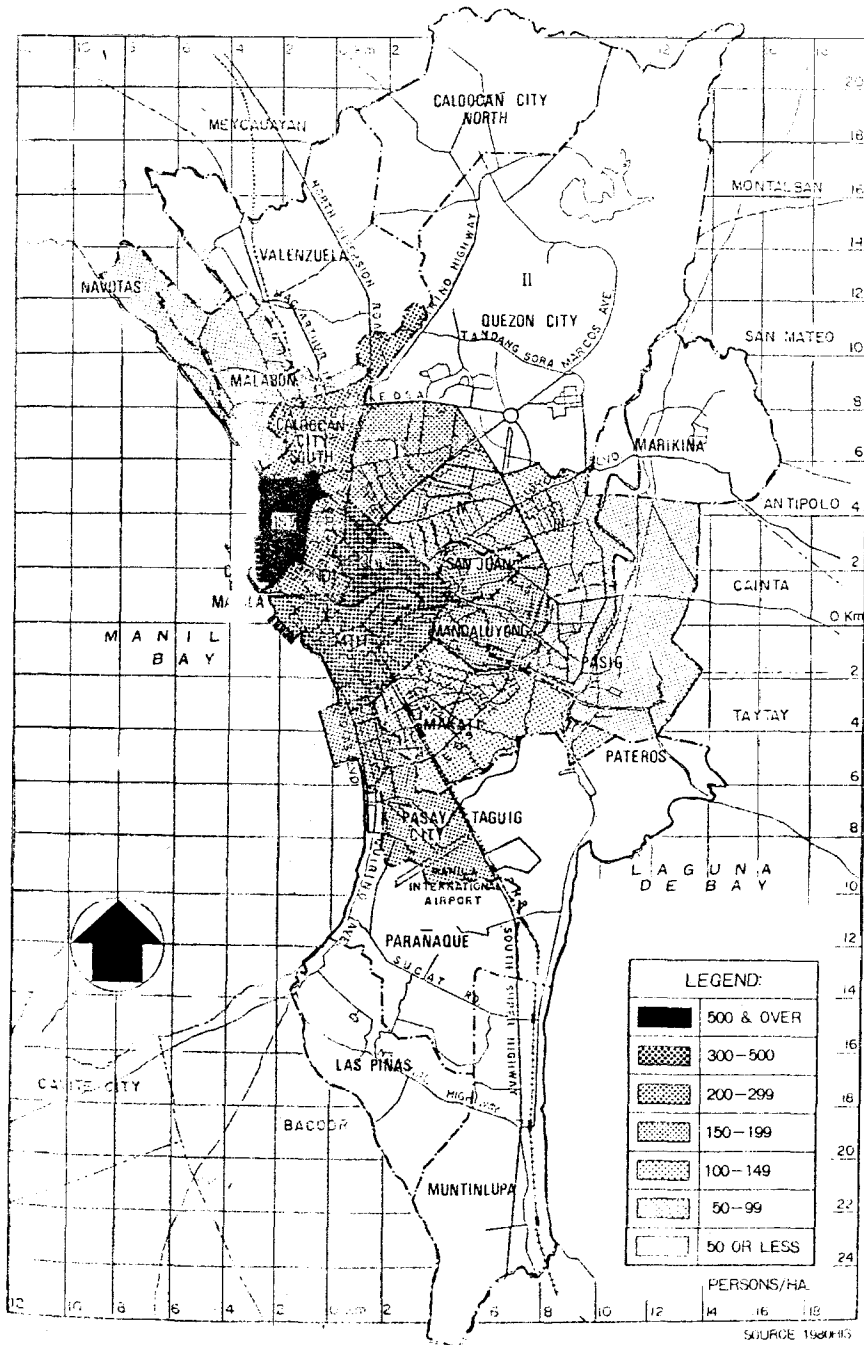
The first form of public transport system in Manila, and the Philippines, for that matter, is the horsedrawn streetcars introduced by the "Compania de los Tranvias de Filipinas" in 1881 until 1902. Prior to this, journeys were made mostly by foot or by horsedrawn calesa and carromatas. The horsedrawn streetcar, which was confined to the old city of Manila, brought a big change in the Filipino lifestyle and commerce.

Before the turn of the century, the company added a subsidiary 4.3-mile tramway with

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\*Paper prepared for the Workshop and Seminar on Urban Mass Transport, organized by the Ministry of Transportation and Communications, Manila, 1985.

**Figure 1.2**  
**POPULATION DENSITIES IN METRO MANILA**



steam-powered locomotives which was abandoned at the start of the American regime in 1900. In 1903, an American firm established the Manila Electric and Railway Company (MERALCO), which was franchised for fifty (50) years, to operate an electric railways streetcar service in Manila.

In 1927, twenty (20) motor buses were initially put on the road as supplementary service to the MERALCO tramcars. From this small beginning, bus routes radiated from the Manila CBD to provide crosstown public transportation linking the different districts and fringe towns adjoining Manila. At the end of 1930, MERALCO has eighty five (85) buses in Manila and it was at this point that Manila saw the growing importance and usage of motorized transport called automobiles.

By 1936, the switch from trams to buses began and by 1942, passenger traffic was equally divided between streetcars and buses. World War II, however, left most of the highways surfaces or pavements and railways severely damaged. Trams, however, were rendered inoperable, they had to be replaced by buses. Damaged roads and railways were rehabilitated later with reparation funds from Japan.

Another post-war transport development was the "jeepney" which represented the desperate and ingenious response of a totally devastated city to its urgent transportation needs. Surplus army jeeps or the so-called McArthur type vehicles used during the war were hastily transformed into little buses with entrance at the rear, (later called auto calesas) to seat 8 passengers and made to ply Manila's half-bombed streets and highways. Since that time on, Filipino ingenuity transformed these vehicles into highly decorated and vibrantly hand-painted "jeepneys" which became the country's most popular and dominant public transport mode.

## OVER-ALL URBAN TRANSPORT SITUATION

Metro Manila, situated at the southwestern portion of Luzon mainland, is made up of lowlands from the coastal side towards the center, a valley (Marikina Valley) at the easternmost side and, relatively high grounds (Guadalupe plateau) running north to south between the lowlands and the valley. Because of its strategic location, it is conveniently linked to the rest of

the Luzon provinces by highways and expressways and to the rest of the Philippines, by air and water transport. It has the biggest domestic airport in the country and local port, as well.

To ease traffic congestion and provide accessibility and linkage to outlying areas and the rest of the Luzon mainland, several major expressways and by-passes were constructed as shown in Figure 2.1.

To the south, the South Superhighway provides access to residential and industrial areas adjoining Metro Manila while the South Expressway Extension, which was completed in 1978, provides linkage to the southeastern provinces. The newly opened Manila-Cavite Coastal Road is a by-pass of Radial Road # 1 for Cavite Coastal area-bound passengers.

To the north, the Manila North Diversion Road provides a relief for the over-saturated McArthur Highway leading to the Central and Northern Luzon provinces.

To the east, the Marikina by-pass and the Manila East Road, which is undergoing completion, provide access to outlying areas and relief to roads crossing the Marikina Valley, as well as, linkage to the eastern provinces of Luzon.

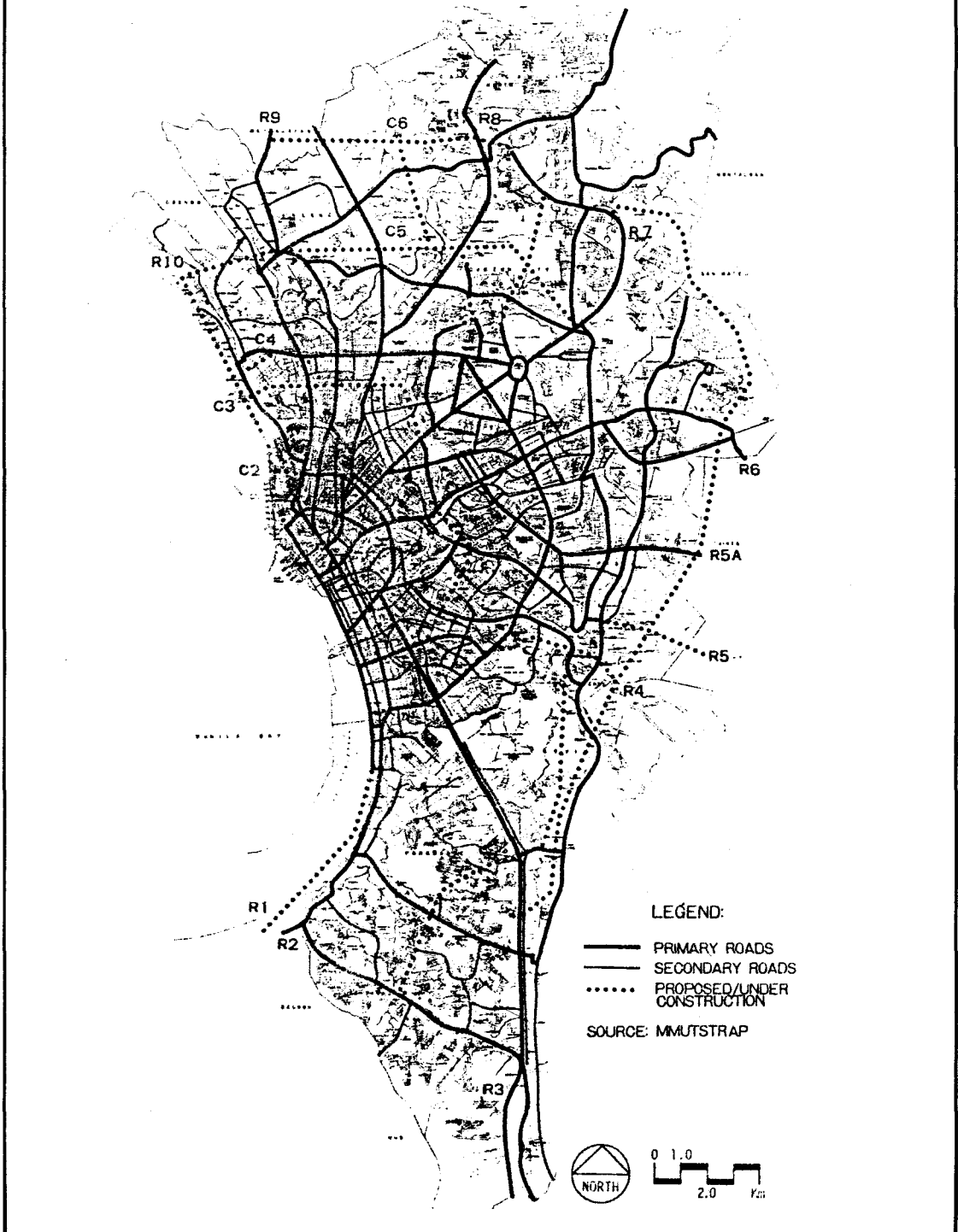
On the other hand, Radial Road # 10, when completed, will serve as a by-pass going to the northwestern provinces.

Furthermore, there is also a railway line for commuter services running from Malolos, Bulacan in the north to Carmona, Cavite in the south.

## Land Use Pattern

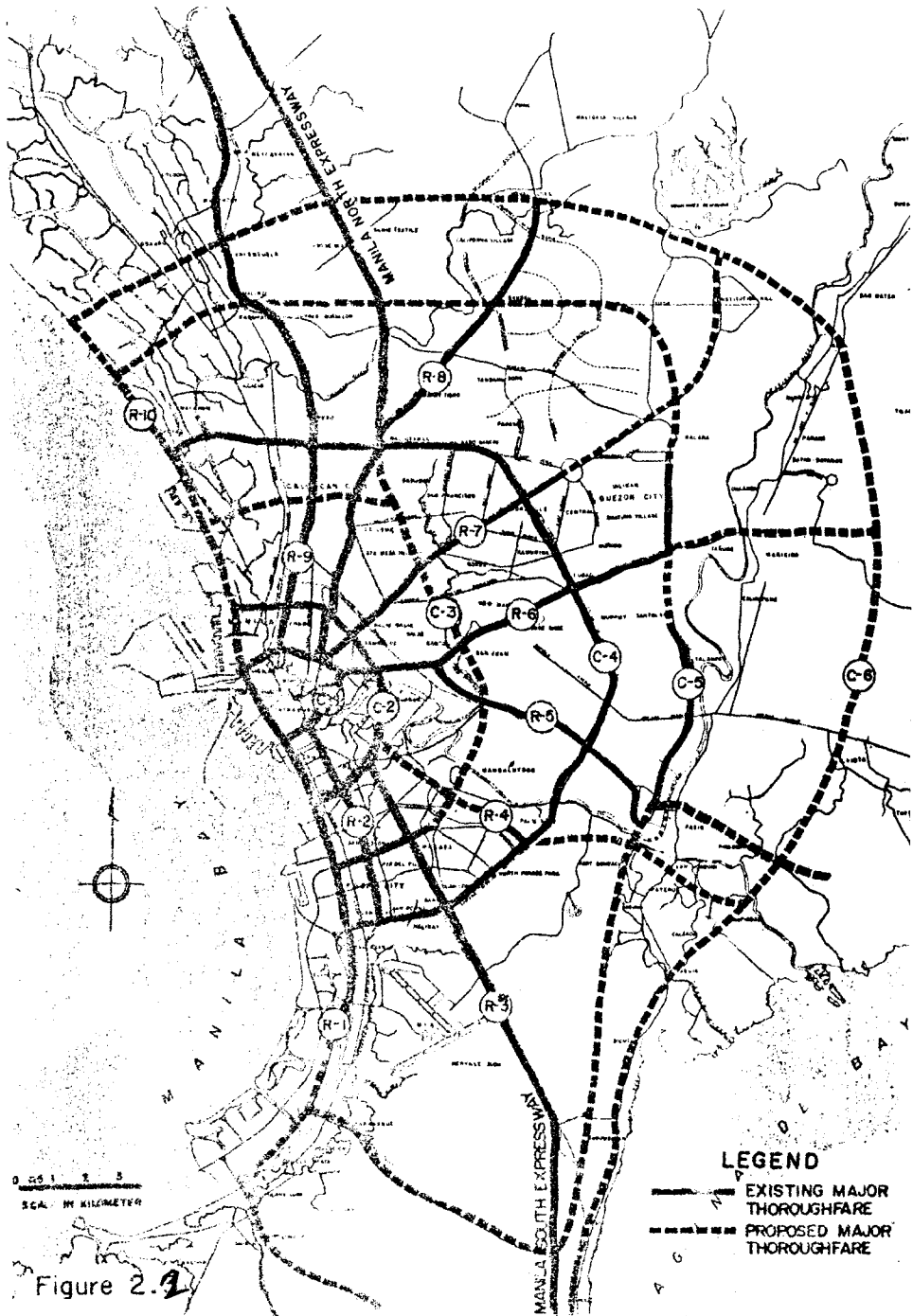
The present EDSA was constructed (1955-1965) in such a way that it surrounded the urban areas. This helped intensify the development of existing areas and at the same time accelerate the new development along and outside EDSA, such as business and commercial centers in Makati and Cubao and subdivision developments in Las Piñas, Marikina Valley, etc. The urban area is growing in all directions: government-led reclamation to the west, population-forced expansion to the northwest, and private sector — led expansion to the north, south and east. The growth of Metro Manila has resulted in a complex pattern of continually changing relationships and movements. Makati has developed as a major business center and Quezon City as a government center. Major education areas are the university belt in Manila and the Diliman area in Quezon City. Indus-

Figure 2.1  
METRO MANILA ROAD NETWORK





**Figure 2.2**  
**CONCEPTUAL HIGHWAY NETWORK IN THE METRO MANILA AREA**



trial areas include those along the Pasig and Marikina River banks. Residential areas are concentrated in the northern and southern parts of Metro Manila and fairly distributed at the center and eastern portions of Metro Manila.

**Road Network System**

The Metro Manila road network totalling some 2,800 kms. basically or partially developed ring and radial roads and a multiple minor roads running through densely populated and developed areas inside the Metropolis. Figure 2.2 shows the existing and proposed Metro Manila road network.

At present, 10 radial roads are already existing. The extension of R-10 or the Manila-Bataan Coastal Road, however, is not yet completed while the extension of R-1 (Roxas Boulevard) which is the Manila-Cavite Coastal Road, has just been opened to traffic very recently.

Of the ring or circumferential roads, C-1, C-2 and C-4 already existed. C-1, however, is not a circumferential road in the real sense as it has inadequate alignment and it only links several busy streets. C-2 and C-4 are more circumferential and perform very important roles in the Metro Manila traffic system. C-3, on the other hand, is still undergoing completion while C-5 and C-6 exist only in concept although some sections of which have already been identified. The plans for C-5 and C-6, however, have been abandoned temporarily and plans to merge the two, is being considered.

Metro Manila roads are administratively classified as follows:

National roads	:	790 kms.
Provincial roads	:	164 kms.
City roads	:	1,118 kms.
Municipal roads	:	533 kms.
Barangay roads	:	197 kms.
-----		
Total	:	2,802 kms.

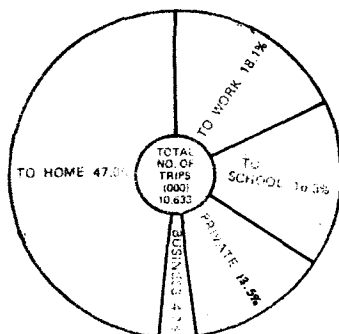
This administrative classification, however, does not necessarily match with the actual functional classification of roads as shown in the preceding table.

**Existing Travel Demand**

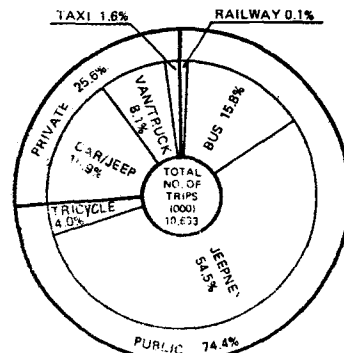
Based on recent studies, the total public transport demand is estimated to be 10,633 trips for 16 hours or approximately 11 million trips per day, exclusive of walking trips or an average of 63 million passenger-kilometers per day. Eighty seven (87) percent of the total demand are intra-city movement and the rest is contributed by inter-city bus and jeepney transport between Metro Manila and peripheral areas. The jeepneys carry 77 percent of the total passenger demand or approximately 8.4 million/day. Buses service the remaining 23 percent on approximately 5.6 million/day. The average passenger trip length varies considerably between inter-city or intra-city bus or jeepney movements as shown below:

	<i>Intra-City</i>	<i>Inter-City</i>
Jeepneys	3.8 kms.	8.8 kms.
Buses	8.5 kms.	15.6 kms.

The trip rate for Metro Manila is set at 2.2 trips/day/person. The public transport demand distribution by purpose and mode is clearly indicated in the following figures.



Overall Transport Demand by Trip Purpose



Overall Transport Demand by Transport Mode

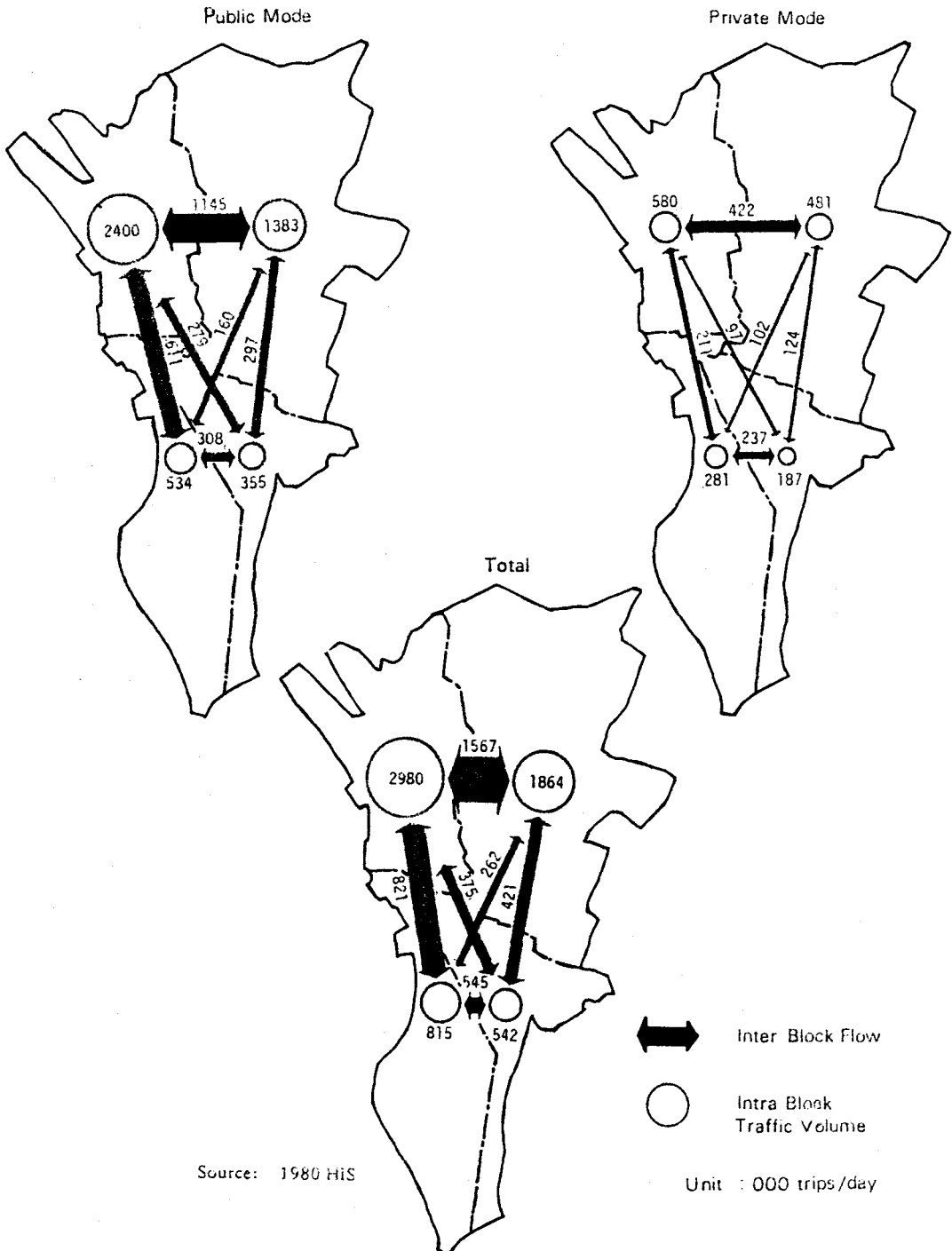
**FUNCTIONAL CLASSIFICATION OF ROADS  
(GENERALIZED CRITERIA)**

<i>CLASSIFICATION</i>	<i>FUNCTION</i>	<i>TRAFFIC CONDITIONS</i>	<i>THROUGH TRAFFIC</i>	<i>PUBLIC TRANSPORT BUS</i>	<i>JPY. TRI- CYCLE</i>	<i>PRIVATE CAR PARKING PEAK PERIOD</i>	<i>OFF- PEAK</i>	<i>PEDESTRIAN CROSSING CONTROL</i>	
Primary Roads	Freeways/Expressways Primary Arterials: Principal arterial routes for inter- suburban traffic movements	High volume and access control	Yes	Yes	Some	No	No	No	Signals or grade sepa- rated (i.e., bridges or underpass)
Secondary Roads	Secondary Arterials Collectors: Non-primary roads which distribute traffic between the primary roads and local roads	Medium Volume and some access control	Some	Some	Yes	No	No	Maybe	Signals or Zebra cross- ing
Local Roads <sup>1</sup>	Streets, not being primary or secondary roads, whose main function is to provide access to abutting property	Low volume without access control	No	No	Some	Yes	Yes	Yes	None

Source: MMUTSTRAP Part A: Final Report

<sup>1</sup>"Local" here relates to function rather than administrative responsibility

Figure 2.3 below, indicates the person trip flows in Metro Manila.



## URBAN MASS TRANSPORT SITUATION

Public transport in Metro Manila is predominantly road based. The inter-city mass transit system consists largely of jeepneys, a form of "paratransit", standard buses (ordinary and premium), mini-buses, taxis, tricycles or pedi cabs and a few horse-drawn carriage called "calesas" while the inter-city services between Manila and adjoining areas are provided by standard and mini-buses, provincial buses, and some jeepneys. Buses provide services for the arterials while jeepneys serve both the trunk and secondary systems. In some cases, jeepneys serve as feeders to buses. Tricycles provide feeder services to both trunk and secondary systems.

On the rail system, the Philippine National Railway (PNR) provides services within Metro Manila on a very limited scale. Most of the PNR's lines are long distance providing services to the provinces north and south of Metro Manila.

The latest addition to the Metro Manila mass transit system is the newly constructed Light Rail Transit (LRT) which started operation in 1984. It is on an elevated track running north to south from Monumento to Baclaran via Rizal and Taft Avenues. The line is approximately 15 kms. long and interspersed with 18 stations.

### Physical Features

#### *Buses*

There are different types of buses currently in operation in Metro Manila. Among these are the ordinary or standard buses, double-deckers, limited buses, love and Pag-ibig buses, and mini-buses.

As provided by law, standard buses measures 11 meters in length and 2½ meters in width with a minimum height of 3 meters. The minimum seating capacity for it to be considered a standard bus is 45 passenger-seats. Buses falling short of these specifications fall under the category of mini-buses. Double-deckers, on the other hand have seating capacities of 100 passenger-seats. Limited buses are also standard buses but they differ in that the former follow the "no-standing" system and, like the double-deckers have limited stops thus, having a fare scale slightly higher than ordinary buses. Love and Pag-ibig buses are both air-conditioned buses owned and operated by MMTC while the latter is part of the MMTC bus leasing program extended to private bus companies although

majority of these units are now being operated by the MMTC. The only difference is in rates as Love Buses charge higher than Pag-ibig buses.

#### *Jeepneys*

World War II left the Philippines with a devastated road network and transport system. Pressed by the urgent need for transportation, the Filipinos transformed surplus American army general-purpose vehicles into open-air vehicles that looked like little buses. With entrance at the rear, it is capable of seating and transporting 8 passengers. These, later on, evolved to be the vibrantly painted and highly decorated small vehicles known as "jeepney". At present, these 8 passenger capacity jeepneys can only be seen in cities or provinces outside Metro Manila. On the other hand, the 41,000 jeepneys operating in the city are longer with an average seating capacity of 16 persons. These are powered by either gasoline or diesel fuel.

#### *PNR*

The PNR commuter trains were introduced in 1972 and have become part of the mass transit system of Metro Manila, serving primarily, the working population of the commercial and industrial establishments in the outlying areas of Metro Manila.

There are nine (9) sets of trains being utilized for Metro Manila Commuter Services, six (6) sets of which are diesel railcars (DRC's) having a seating capacity of 80/car or standing capacity of 156 persons/car and three (3) sets of Diesel-Electric Locomotive (DEL) — hauled passenger coaches, each with a seating capacity of 115/coach or standing capacity of 200/coach. Each train consists of 3 to 4 cars or coaches. Trains consisting of DRC's differ from DEL-hauled trains in that each of the DRC's is powered with individual engines while DEL-hauled train are sets of coaches (not powered) having a single motive power which is the locomotive or the engine. All tracks run at-grade.

#### *LRT*

The latest addition to the Metro Manila mass transit system is the newly constructed Light Rail Transit or LRT system. Constructed 7 meters above road level, the LRT line has a

length of about 15 kms. running from southwest of the Metropolis towards the northwest cutting across downtown Manila parallel to the bay. There are 64 articulated cars provided as initial fleet. Although stations could accommodate three (3) cars, each train is composed of only two (2) cars with capacity of 374 passengers each (81 seating and 293 standing). Maximum design speed is about 60 kms. while commercial speed is 18 kph. Maximum capacity is 18,000 passengers per hour or 324,000 passengers per day. At present, there is an average of about 245,000 passengers daily.

### *Tricycles*

Another mode of public transportation in Metro Manila which can not be considered a mass transportation but has been playing a significant role in the local mass transit system is the tricycle. It is, generally, a motorcycle (and in some instances, a bicycle) attached to a sidecar with a seating capacity of two (2) persons. They provide services to inner areas not serviced by buses or jeepneys.

## **Operational Characteristics**

### *Buses*

At present, there are eleven (11) bus consortia or corporations existing in Metro Manila namely; DM Consortium, DMTC, FILTRANS, MCL, MCBC, JD Transit, GMTCC, CERT, EMBC, PASVIL and MMTCC. All, except the MMTCC or Metro Manila Transit Corporation are privately owned. The MMTCC is a government-subsidized corporation and the sole corporation where bus drivers and conductors are given basic monthly pays. In addition to this, they get a percentage or the so-called "commission" from the revenues exceeding the daily quota. The private operators, on the other hand, follow the "commission basis." They receive a certain percentage of the daily revenue plus additional percentage of the revenue in excess of the daily quota.

This practice however, is unfavorable as it has a negative effect on road safety. Drivers, in their desire to get more passengers so as to attain a higher revenue for the day, tend to overspeed and get reckless with their driving and race with co-drivers in order to reach the

bus stops ahead of the others. Another adverse effect resulting from this practice is longer standing time of buses trying to get more passengers in bus stops which increases travel time of passengers.

### *Jeepneys*

The jeepney is the dominant form of public transport in Metro Manila. It accommodates 77% of the total public transport demand in the metropolis. It would be interesting to note that all jeepneys in Metro Manila are privately owned. They are either federation or transport cooperative members. However, those who joined the transport cooperative, which is a government-instituted body, shall abide by all the constitution and by-laws of cooperatives thus, giving the latter the authority to manage the operation of their jeepney units.

Only a few are driver-operators. Most of them hire drivers to operate their jeepneys on "boundary" basis. By boundary system, the driver agrees to remit to the operator at the end of the day, a fixed amount ranging from P100.00-P180.00 per day as prescribed by the operator based on the route length and fuel used for the jeepney.

Generally, jeepney operators own less than 5 units. A jeepney unit, on the other hand, is operated at maximum capacity for a period of thirteen (13) hours per day on the average, for 6 days in a week. The 7th day is usually allotted for engine/brakes tune-up, servicing and other maintenance work.

The daily income of an average operator is P83.00 excluding the direct expenses totalling approximately P30.00 which will go to the oil, tires, repairs and maintenance of the vehicle and P17.00 that goes to miscellaneous annual expenses.

From the driver's point of view, jeepney operation, despite the economic crises, still appears to be profitable. Based on recent surveys, the drivers take-home pay average P90.88 per day which makes jeepney operation a viable undertaking.

The table below depicts the financial condition of an operator in terms of revenues and expenses *before depreciation*:

Route Length (kms.)	Expenses					Net Income
	Daily Revenue	Daily	Semi-annual	Annual	Total	
0 – 5	111.29	18.78	9.98	7.44	35.20	76.09
5.1 – 10	117.64	23.13	8.86	7.63	39.62	78.02
10.1 – 15	140.00	31.68	8.82	8.30	48.80	91.20
15 – up	142.16	41.14	9.30	8.36	58.80	83.36
Average (P/day)	127.77	28.69	8.99	7.93	46.60	82.17
(P/km.)	(0.77)	(0.17)	(0.05)	(0.05)	(0.27)	–

### Light Rail Transit (LRT)

Train operation starts from 0500 HRS till 2300 HRS. Trains operate on a three minute headway during peak hours and five minutes for off-peak hours, including Saturdays and Sundays. The average travel time per turn around trip is one hour. Dwell time ranges from 20 to 30 seconds per station. Maximum capacity is about 18,000 passengers per hour or 500,000 passengers per day. At present, there is an average of about 245,000 passengers per day and about 330,000 passengers per day during Wednesday. Single-fare system and token-operated turnstiles are used. Fare is P2.50.

### PNR Commuter Trains

The Commuter trains account for 26.5 percent of the total revenue train-kilometers for combined passenger, freight and commuter train services in CY 1984.

As of August 1985, there are nine (9) train routes moving some 13,000 commuters daily. Daily run is at 38 trains/day. These routes are provided with thirty one (31) station outlets, 24 of which have ticket dispensers while the rest are operated by franchised agents. Five (5) of the 31 stations cater to long distance passengers and freight services. Ticketing is done by zone. Fare computation is P1.50 for the first zone and P1.40 for every zone thereafter.

For southbound routes, train operation starts at 4:30 a.m. up to 7:00 p.m. at an average of one (1) train per hour, for both directions. In contrast, northbound routes are scheduled depending on the peak flow of passengers, thus having only one (1) train bound for Manila in the morning and one train that goes back in the afternoon.

### Routes/Areas Served by Different Modes

There are 744 routes, at present, operated in Metro Manila by jeepneys and 184 by buses as shown below:

#### Number of Existing Jeepneys and Bus Routes in Metro Manila

Mode	Intra-City	Inter-City	Total
Jeepney:	640	104	744
Bus:	150	34	184
– Standard Bus	106	13	119
– Double-Decker	3	0	3
– Limited Bus	5	0	5
– Love Bus	27	1	28
– Mini-bus	9	20	29

In general, jeepney routes are short and concentrated in most radial roads and inner or secondary streets while buses, generally, are long and dominate the most important circumferential road, C-4 or EDSA.

Among the major roads dominated by jeepneys are Rizal Taft Avenues, Quezon Avenue, C.M. Recto Avenue, España and Aurora Boulevard.

Bus routes, on the other hand, dominate EDSA, Ayala and Buendia Avenues and South superhighway. The routes they ply also vary by service type. Most of the ordinary and premium bus routes are concentrated in EDSA, Buendia and Ayala Avenues and portions of Taft and Quezon Avenues.

Minibus routes are mainly inter-city and operating on the North Diversion Road, South Superhighway, Sumulong Highway and Quirino

Avenue. However, there are nine (9) intra-city routes still operated by mini-buses.

As previously mentioned, the only LRT line existing is Line No. 1 servicing the Taft and Rizal Avenue corridors while the PNR Commuter Trains provide services from Malolos, Bulacan from the north up to Carmona, Cavite in the south, crossing the CBD's of Metro Manila.

Figures 3.1 and 3.2 show the different route structure by mode.

### **Complementarity of Modes**

Jeepney and bus routes seem complementary to each other but in most cases where jeepneys operate on the same line with buses, they directly or indirectly compete with each other. More often, buses are at the losing end since riders prefer the door to door service jeepneys offer. It is only in cases where roads are dominated by buses, as in EDSA, that complementation of modes is clearly seen. In this case, jeepneys provide feeder services to buses. The LRT and PNR trains, on the other hand, complement with the jeepney and bus routes as provided for in the route rationalization scheme for Metro Manila.

### **Route Characteristics of Different Modes**

Under the route rationalization scheme, long routes passing arterials, with high passenger demand shall be operated on by buses and short routes and these servicing the secondary streets are assigned to jeepneys. On the other hand, where the route is long and passenger demand is not considerably high or not viable for standard bus operations, minibuses are assigned. This is the reason behind the diversion of minibuses from intra-city to inter-city services. Moreover, there is a standing policy limiting the route length of Metro Manila jeepneys to 15 kms. As such, Metro jeepneys are limited to the periphery of Metro Manila only. Similarly, provincial jeepneys bound for the city are curtailed or allowed to enter a little past the metropolitan Manila boundaries.

This policy would bring about some increase in transfers since commuters have been used to direct door to door services but this is only one against the many benefits which can be derived from the overall route rationalization of Metro Manila.

On the average, intra-city jeepney routes are 10.4 kilometers long while inter-city routes have an average of 24.6 kms. Bus routes are twice as long as jeepney routes, both for intra-city and inter-city routes. Load factors of jeepneys is 54 percent while buses have 56 percent based on seating capacity alone. Intra-city routes have higher load factor than inter-city routes.

Travel speed is generally low in the inner areas of Metro Manila especially within C-2 where jeepneys travel at a rate of 10 kph. or lower. As it is commonly observed, travel speed of bus is generally faster than jeepneys but it should also be noted that it is not only by the overall traffic situation that travel speed is determined but also by driving attitudes and operating practices of getting passengers.

### **OPERATIONAL VIABILITY OF MASS TRANSPORT MODES**

Operational viability for any public transportation mode depends on several factors. Most significant of these factors are: a) type of route, its length and physical characteristics, b) level of competition from other units or modes, c) demand on the route, and d) fare structure.

The length of the route to some extent affects the viability of operations considering that buses may be more viable for longer routes than in short routes. Likewise the physical characteristic of the road surface, whether it is well paved or not affects the degree of wear and tear on the unit.

The level of competition whether from same modes or from other modes definitely dictates the income of a mass transport unit. The presence of jeepneys in a route also operated on by buses have been shown to be detrimental to the buses. Several bus routes have been known to cease as bus routes because of competition with jeepneys.

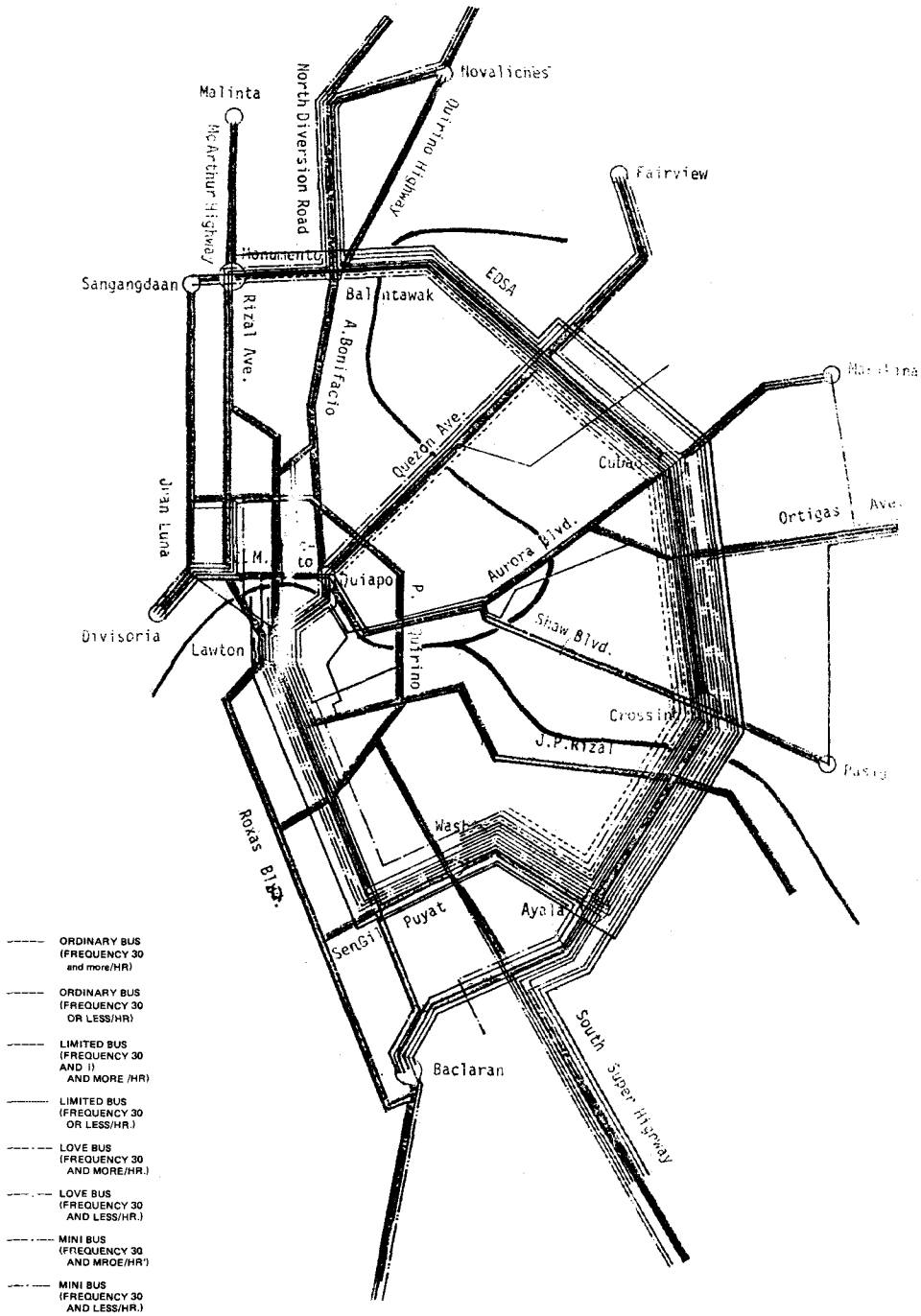
Demand on the route likewise directly dictates the viability of the unit. Even with very few competition from others, a route will not be viable if there is not enough demand in it.

The fare structure is of prime importance also in the viability of a route. No operator would venture into the business if the fare structure is not that favorable.

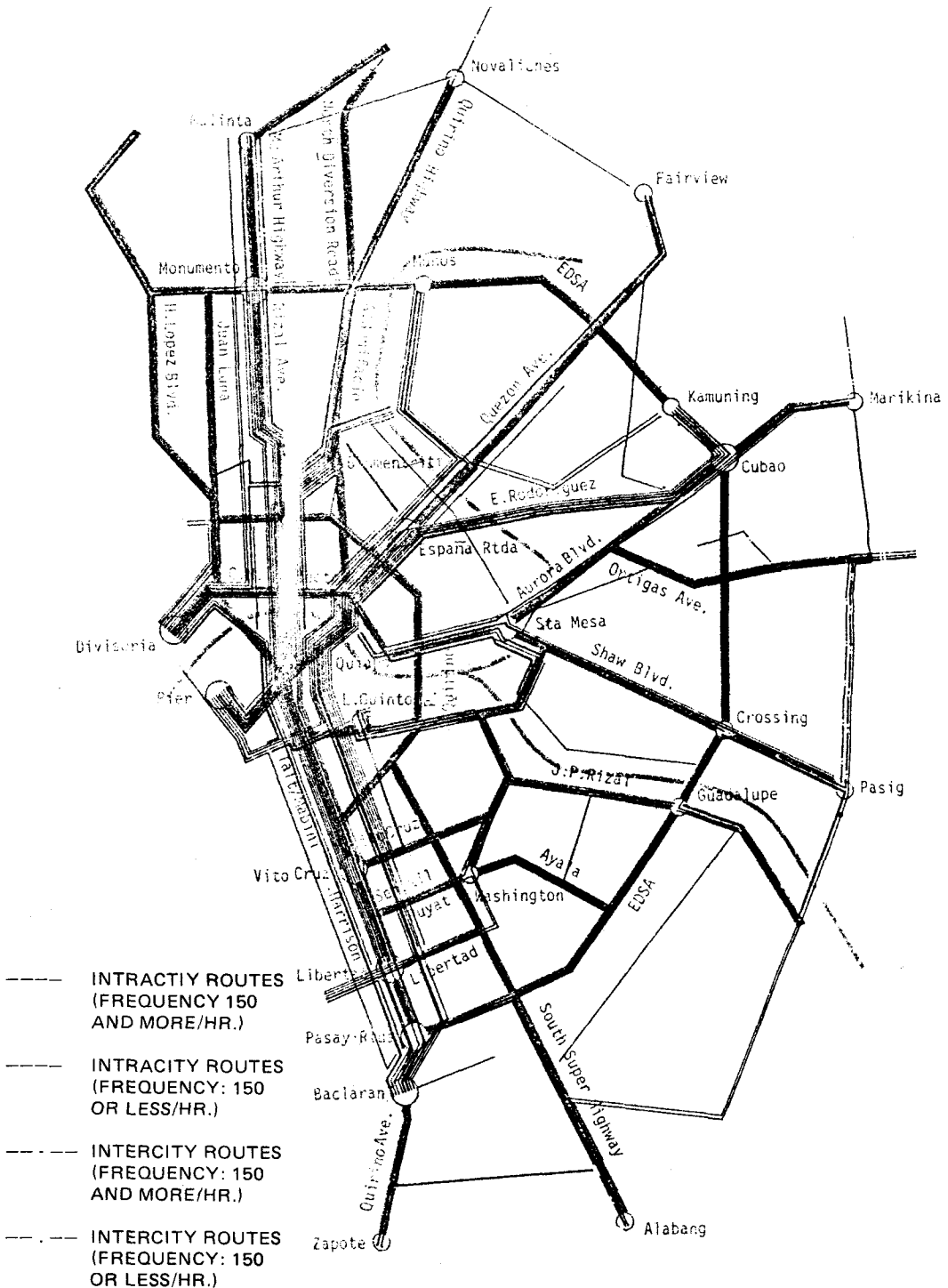
All these factors affect the four modes considered in this paper differently.



**Figure 3.1**  
**ROUTE STRUCTURE OF BUSES**



**Figure 3.2**  
**ROUTE STRUCTURE OF JEEPNEYS**



### Buses

The viability of the Metro Manila bus firms maybe looked at in two ways. *Firstly*, it may be seen from the point of view of the unit acquired under the bus-leasing program of the government. Such unit is owned and operated by the corporation. There are twelve bus corporations formed in 1981 through the voluntary incorporation of the approximately 120 small bus companies prior to 1981. *Secondly*, viability of a unit may be seen from the point of view of the old unit owned by the former small company whose franchise and route is now transferred to the new corporation, one of whose incorporator is the owner of the unit. Such unit is not owned by the new corporation but is leased or run by the corporation in one of its franchised routes. The owner of the unit only pays a management fee to the new corporation. Daily operational expenditures and maintenance for this unit is handled by the owner.

For the first unit (the unit owned by the new corporation), the income goes to the usual direct and indirect expenses. In addition, the new corporation pays for the amortization of the unit to MMTC who administers the government's bus leasing program and also for its maintenance by either of two government-designated companies who maintain these new units under the program. Their maintenance charge is considerably higher than what the old operators use to spend for their own units. For the second unit, the owner pays a minimal management fee to the new corporation on top of his usual direct and indirect expenses which are relatively lower in most cases than those of the new buses.

Taking all things equal, these two units would be earning just about equal amounts per day. Yet, in most cases the old unit would be making money while the new one owned by the corporation does not make a profit. Thus, majority of the Metro Manila bus corporations say they are losing.

Other factors that make Metro Manila operations unprofitable as some operators say is the low-demand route they operate on and the high indirect expenses they incur. Some are requesting LTC for changing and/or lengthening of their routes.

### Jeepneys

For the same fare structure, the jeepneys enjoy a profit compared to the buses. Reasons for this are the following:

- a. Jeepneys operate on shorter routes where demand is relatively high compared to long bus routes passing to thinly populated areas.
- b. Jeepneys, because of their size easily out maneuver buses to pick-up passengers.
- c. Passengers prefer jeepneys for inter-city rides because of their short waiting time. Buses take long to wait passengers.
- d. Jeepney operators seldom if ever they pay income taxes.
- e. Jeepneys can easily earn extra money by delivering passengers to destinations slightly out of their route.

A recent study conducted by the MOTC showed that the average jeepney driver who drives his borrowed jeepney for 8 hours earns around P90.00 after deducting from his earning the P130 he pays to the operator or owner of the unit and the day's expenses covering diesel, fuel and oil including his meal and cigarettes.

### Light Rail Transit

The Light Rail Transit has lived up to expectation as far as its patronage and income generating capability is concerned. Since it opened its total length to commercial operation in May 1985, it has attained its projected patronage of approximately 240,000 passengers per day for a daily income of approximately P700,000.

At this level of income it can be said that the system can maintain its operations without external subsidy. However, if we include its loan amortizations it cannot be similarly said that the system can operate without subsidy.

The relatively high level of patronage of the LRT stems from the fact that it offers fast, safe and efficient service compared to the bus and jeepneys which are subject to traffic congestions.

### PNR Commuter Train

PNR's Commuter Service in the north goes up to Malolos in the province of Bulacan (see map). Prior to LRTs operation, the PNR Com-



muter Service from Malolos in the north to Manila and Makati and Carmona in the south to Manila and Makati, was a big help to commuters in these areas even with the good roads running parallel full of buses and jeepneys. This is because the fare is cheaper and has less transfer points. With the opening of LRT, the situation is changed. Commuters from the north take the bus or jeepney up to the north station of LRT at Monumento and then take the LRT southward to their destination. Travel time is lessened with the 2-3 minute headway of the LRT. Fare is cheaper at P2.40 flat rate whereas for PNR's Commuter Service this would cost P2.90.

Whether the PNR commuter service, especially in the north, was viable or not before LRT, the fact is that it has suffered a reduction in patronage roughly estimated at 21% from 8,669 weekly average to 6,789.

Like the PNR Commuter Service, the LRT cut in heavily from the bus and jeepney patronages. Majority of bus and jeepney riding commuters from the northern terminals of the LRT going south to Makati or Baclaran now take the LRT.

#### MAJOR MASS TRANSPORT PROBLEMS

Like any urban mass transportation system in a developing country, Metro Manila's mass transportation system has its fair share of problems. For one, Metro Manila continues to face its perennial transportation problems characterized by: a) the long waiting time of commuters especially during rush hours when passengers have to wait for as long as 30 minutes to more than an hour to get a ride, b) the slow movement of traffic during rush hours, c) the heavy traffic congestion at road intersections, and d) the unruly driving habits of mass transportation drivers. These are manifestations of problems that need to be addressed not only by the government agencies concerned, but by the riding public and public transportation operators and drivers as well.

Among the problem areas that can be cited as major causes or contributors to the prevailing problems plaguing the public mass transport system in Metro Manila are:

a) the current state of inter-modal competition and complementation of the various modes of mass transportation in the metropolis;

- b) the kind of discipline and mentality that both the drivers and riders of the mass transportation system have as well as that of the pedestrians;
- c) the relatively weak enforcement of traffic rules and regulations; and
- d) the inadequacy of the road infrastructure in the Metropolis.

#### *Unhealthy Inter-and-Intra-Modal Competition*

Competition among the various mass transport modes in Metro Manila especially between the buses and jeepneys, not to mention the competition between bus units of different companies and between jeepney units of different operators, has long been recognized as a major contributor to traffic congestion and accidents in the thoroughfares of the Metropolis. This intense competition among transportation units is a natural phenomenon in business where everyone hopes to make a higher income than the rest. This is however aggravated by the way most public transport drivers (bus and jeepney and even tricycle drivers) earn their daily wage. They earn their daily wages as the net amount after they deduct the rent of the vehicle, cost of fuel and oil, and cost of minor repairs from his days income. This system is called the "boundary" system. Under this set-up, it is expected that the driver has to exert all efforts to get a better share of the market than his competitors. This impels him to disregard some courtesies on the road and at times safety precautions.

How do we eliminate this problem? While the solution may depend to a large extent on the agreement between operator and driver, the operator finds this arrangement convenient for him since he only receives daily his "boundary" without bothering about fuel, oil and other daily operational needs. It becomes imperative therefore for government to study other means which can be proposed to the operator for adoption.

In the case of inter-modal competition (between buses and jeepneys), it is an accepted fact that several traditional bus routes (most major thoroughfares) have now become jeepney routes. Buses have been displaced from these routes because they are "crowded out" by the jeepneys in the daily competition for the next passenger. If this goes on without proper government control, the buses are bound to be eased

out of operation in Metro Manila by the jeepneys.

To remedy this situation government has banned jeepneys and mini-buses from operating along the major circumferential route, C-4 (or E. delos Santos Avenue). Current transportation rationalization moves by government in Metro Manila is geared towards minimizing this unfavorable competition between buses and jeepneys in the same route. Rather, complementation of service is the guiding concept in rationalizing public transport system in the Metropolis.

#### *Poor Discipline of Drivers, Riders and Pedestrians*

Closely linked with the unhealthy competition of modes is the problem of poor discipline among both the drivers of public transportation units, the passengers and the pedestrians. We believe that while the wage system contributes to the behavior of drivers, there is a need to discipline the drivers and the riding public as well. Low educational attainment of jeepney drivers and their economic status should be considered. Another thing that pushes drivers to disregard rules and regulations is their knowledge that if they commit an offense their firm will bail them out of the predicament without much trouble for them.

Towards minimizing this problem, the bus companies and jeepney operators should make the drivers feel that they are responsible for their wrong doing hence they should be made to pay for it. Also transport companies should have a program for training and improving not only skills but discipline of its drivers and conductors. It is one thing to have on paper a company program/policy that provides for all these and another to implement effectively such programs. Metro Manila Commission and the Land Transportation Commission provide for seminars of drivers as part of their penalties for driving violations.

For the passengers and pedestrians, the Land Transportation Commission has been coordinating with the Education Ministry to incorporate in the primary grade curriculum the basis of traffic rules, regulation and courtesies.

#### *Weak Enforcement of Traffic Rules/Regulations*

Enforcement of traffic rules and regulations

is a major component of any efficient mass transportation system. One may have good traffic rules/regulations but if enforcement is weak it will not be of much help.

In the country in general and Metro Manila in particular, we are not wanting in good traffic rules and regulations. In fact some say we have more than what we can enforce. This may be true since there are some rules that have not been enforced for sometime already. But most traffic rules/regulations enforced have not been effectively enforced and in a sustained manner. Various enforcement groups enforce laws on specific offenses. Some of them overlap. This has lead to confusion on the part of drivers as to what agency enforces what type of laws.

Reports of traffic enforcement personnel being bribed by drivers/operators sometimes occur in the Metropolis. This has lead to the weak enforcement of laws. Rather than strictly follow the rules, the drivers would rather break them and if found guilty, they pay the fine or bribe the enforcement officer.

A solution to this problem does not lie solely on the enforcement officers but on both the driver/operator and the lawman. If there are no bribers there would be no bribees or vice-versa This is a "chicken and egg" situation.

Currently an inter-agency team composed of the various traffic law enforcement groups including the Metro Manila Commission (MMC) and the Land Transportation Commission (LTC) is studying the possibility of coming up with only one traffic violation ticket to be used by all traffic enforcement groups enforcing different rules/regulations. This will lessen confusion among transportation operators/drivers and will also complement the efforts of LTC to computerize violations by drivers.

#### *Inadequate Road Capacities*

Most of the roads in Metro Manila were built before the advent of motorized transportation. This holds true particularly for the cities of Manila, Pasay and Caloocan. It is therefore expected that capacities of major roads in these cities are inadequate to cater for the traffic demand today. Expansion of road widths have become prohibitive because of the heavy build-up of business and residential building along these streets.

To remedy this problem of inadequate road space, mass transport along the major thorough-

fares through these three cities have to be remedied by larger capacity and faster mass transit modes. This had to be balanced by the presence of jeepneys in these main thoroughfares. Thus the decision to build a light rail transit system to traverse these three cities on elevated rail above the jeepneys and buses at the road level. This has proven to be a right decision as shown by the current patronage of the LRT.

#### *Other Problems*

Another problem that has contributed to the current state of traffic congestion in Metro Manila is the ease of flooding in portions of major streets in Manila with the slightest down-pour of rain or even the rise of the tides at the bay.

This problem of flooding is currently addressed to by the Metro Manila Flood Control program of the Ministry of Public Works and Highways.

#### **FUTURE OF URBAN MASS TRANSPORTATION**

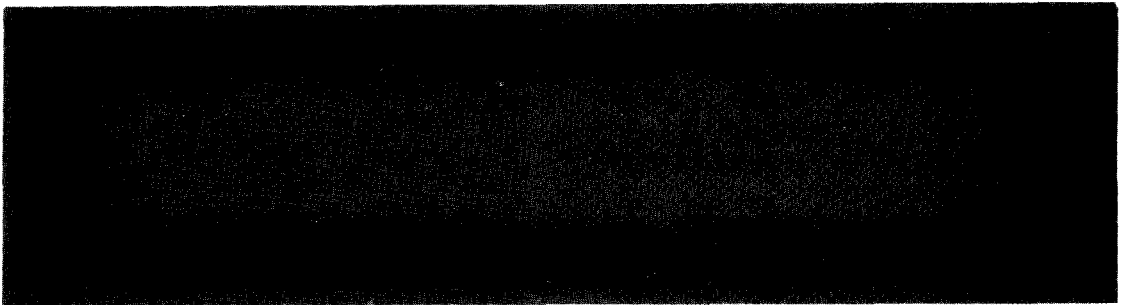
The future of urban travel is closely related to population size, economic growth, and

family incomes. Even with perfect forecasts of these variables, conversion into estimates of future transport demand is no simple matter and is all the more risky in view of the uncertainties of today.

Past studies have shown that Metro Manila's population will reach about 1.6 times the 1980 levels of 5.9 million people, or almost 10 million by the 2000. This is on the conservative assumption of a declining urban growth from 3.1 in 1980-85 to 2.0% in the 1990s. Motorized person trips/day in Metro Manila estimated in 1980 to be around 10.7 million is projected to be near the 20 million mark by the year 2000. Motorized trips/person/day will likely rise from 1.8 in 1980 to 2.2 at the turn of the century.

No new transport technologies are foreseeable in Metro Manila for the next 15 years up to year 2000. The public mass transit system is expected to consist of the same modes, but their future roles should be examined closely.

The current economic slump in the country may have a profound effect on the unusually high growth rate of car ownership in the early eighties. This should support the hope that public mass transit ridership would at least retain or improve its share of the total trips.



# PEDESTRIANIZATION OF A CITY CORE AND THE LIGHT RAIL TRANSIT

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## I. INTRODUCTION

Pedestrianization of streets, at least in the city core, seems to have been revived in at least a few instances, and it has taken several forms. In Italy, for instance, an increasing number of towns, from the capital to the smallest provincial outposts, have banned motor traffic from the town centers, thereby reclaiming streets for their original use. The same holds true for a few American towns.<sup>1</sup> In other cities, the use of automobile in certain streets at certain times have been restricted, as in the case of Ginza in Tokyo as well as in Fifth and Madison Avenues in New York. In still other cities, attempts have been made to create localized peaceful coexistence by placing people in higher or lower levels as in the case of the elevated sidewalks and bridges<sup>2</sup> (e.g., the Bridge Approach for pedestrians in Minneapolis) or of underpasses (e.g., the underpass in Montreal, Canada and the Lacson underpass in Quiapo, Manila).

City administrators and planners are realizing that freeing urban spaces from traffic and rededicating them to pedestrians is not only popular with the public, it also helps boost the urban economy. Seattle's Pioneer Square, Boston's Quincy Market and San Antonio's River walk are examples of how improved pedestrian environment has contributed to in-

creased economic activities in the area.<sup>3</sup> It is perhaps this realization which has led many cities to set off pedestrian streets or pedestrian zones on a temporary or permanent basis.

Such realization is not surprising when one considers the fact, as discussed in *The City of Adelaide Plan* that "the prosperity of a city core depends on the speed and ease with which people can move about within the core." The quickest and cheapest form of movement within the central area of the city is of course on foot.

This paper involves a proposed pedestrianization concept to ease movement and to revitalize the city core of Manila. It tries to relate pedestrian's behavioral pattern demands and needs with the physical environment of a city core as the setting for their activities. While this study analyzes the wide range of human activity occurring within a city core, it looks into the development of such a core, not only in relation to pedestrian needs, but also as a significant locus of change resulting from the introduction of a new transport system, such as the Light Rail Transit. The intention is not only to make the conditions better for the pedestrians but also to recommend ways by which the blighted city core may be improved.

In general, this study seeks to formulate a set of design criteria and to present a design concept for the pedestrianization of the core of the City of Manila specifically the Quiapo-Sta.

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<sup>1</sup>Rudofsky Bernard, *Streets for People: A Primer for Americans*, (New York: Doubleday, 1969).

<sup>2</sup>Victor Gruen, *Centers for the Urban Environment: Survival of the Cities*, (New York: Van Nostrand Reinhold Company, 1973) p. 664.

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<sup>3</sup>Kenneth C. Orski, "Transportation Planning as if People Mattered," *Practicing Planner*, March, 1979, p. 24.



Cruz area. This area serves both as a religious and commercial center, thus people have tended to concentrate there, resulting in a high pedestrian population density. With the operation of the LRT, still more people are expected to converge there since its 11th station is located in Carriedo. This, in turn, is expected to seriously hamper movement of both pedestrians and motor vehicles, which, even without the LRT station, is already a problem.

This study therefore is necessary since the blight and continued decay of the Quiapo-Sta. Cruz area has long been a matter of deep concern for city administrators and planners. Fear has been expressed that "the LRT may merely further blight downtown Manila, unless this area is transformed into something more than a transit point."<sup>4</sup> It is precisely with the transformation of the area that the study is concerned.

## II. STUDY AREA

The study covers the area bounded by Gonzalo Puyat (formerly Raon) to the north, the Pasig River to the south, Quezon Blvd. to the east and Plaza Sta. Cruz and Plaza Goiti to the west. It occupies a strategic location in relation to the entire Manila Central Business District (CBD). North of the study area winding from Sta. Cruz District, G. Puyat St. intersects Estero de Quiapo just before the waterway disappears off Quezon Blvd. Passing the small bridge over the estero, one could not possibly miss one of Quiapo's landmark, the Ocampo Pagoda. Further north are downtown universities, movie-houses and commercial establishments. There is also a full blown university which is tucked away on R. Hidalgo, the same street where the once-imposing houses of the rich stand decaying.

In the southeastern side beyond the Quezon Blvd. is a Muslim mosque, the first in Manila since Sulayman's.<sup>5</sup> The Muslim dome and minaret

commemorating Christian and Muslim Filipino brotherhood dominates the neighborhood at Globo de Oro and Elizondo. About three blocks away at Basan St. is the new Zamboanga Traders Flea Market housed in one big structure across the Balikbayan Handicrafts Export Wholesale-Retail. In the northwestern area lies the Binondo and San Nicolas area where Chinatown is located. With all these landmarks around, not to mention those located within, the site seems to be the crossroads of the Region. Thus, it is always teeming with humanity.

## III. METHODOLOGY

Direct observation and interviews were the primary methods of gathering relevant in-depth information. Photography was extensively used but the principal tools were pads of paper, a pencil and a place to observe, following Whyte's methodology in his study of crowding in New York and Tokyo, (1976). Collection of other data was done by means of a Physical/Environment Study and a Pedestrian Study.

The Physical Environment Study included a land use survey, visual surveys and a photo image study of street scape, (analysis of photographs to measure the physical form content of the street scene were used to ascertain personal preferences). The Pedestrian Study included actual counting of pedestrians within the study area, random interview of pedestrians and recording of pedestrian behavioral characteristics. Various situations were also recorded with the camera and video tape to enable one to see details that may have been missed out which could be valuable. To discover whether, during the course of the day any pattern of activity could be recognized, tracking studies (i.e., following a pedestrian which are picketed by random) were conducted. These studies were supplemented by interviews.

## IV. FINDINGS

Some of the relevant physical and environmental characteristics of the study area based on the surveys and observations conducted are shown in Table 1. It is noteworthy that the roads, parking and open spaces comprise only

<sup>4</sup>Nick Joaquin, "Glorifying the Inner City," *Times Journal*, (Monday Special), 3 October, 1983.

<sup>5</sup>"A Patch of Splendor," *The Sunday Times Magazine*, August 25, 1968, pp. 44-45.

Table 1

SPACE UTILIZATION*	Net Area (hectares)	% of Study Area
1. Religious	1.7	6.6
2. Department stores/bazaars	6.44	25.1
3. Shoe stores	1.21	4.8
4. Shops (pawnshop, repair shop, press, etc.)	0.67	2.6
5. Jewelry and watch store	0.49	1.9
6. Drug store	0.14	0.5
7. Bank, school, offices	2.80	10.9
8. Optical	0.70	2.7
9. Restaurant and bakery	1.56	6.1
10. Hotel lodging and condominium	0.45	1.8
11. Private house	0.84	3.3
12. Moviehouse	0.72	2.8
13. Under construction	0.56	2.2
14. Roads, parking and open space	7.34	28.7
Total	25.62	100.0

\*Space utilization refers only to the ground floors of the buildings. The upper floors are utilized as offices, schools and residential except for some buildings of hotels and condominiums.

28.7% of the total land area. This partly explains the perennial crowding and congestion in the area. Space utilization of major and important streets have specific uses. For example:

*Carriedo*, the main artery of Manila's pedestrian, flowing to and from Plaza Miranda, is a whole row of stores selling shoes of all sizes and styles.

*Evangelista* is where most of the jewelry stores are located although textile and electronic shops can also be seen.

*Palma* had been a ready-to-wear market long before Manila's couturiers discovered the term RTW and made it expensive.

*C. Palanca*, (Formerly Echague) one of Quiapo's busiest streets, is a row of plates and glasses stores on one side and textile, hopia and tikoy factory on the other. An interior open court is located along the street which is used as multi-purpose area by tenants and residents.

According to the barangay captain who resides in the area, this open court was supposed to be the site of a movie house but it was never built. The court is also used by some students from FEATI for their group meetings.

*Avenida Rizal*, the main street of Sta. Cruz District and also Manila's longest street is a chain of shops, bazaars, movie houses and restaurants.

*Villalobos Street* is where fabric, cheap or expensive, coarse or fine, can be seen just as every conceivable thing to eat can be bought in the *Quinta Market* just below the bridge.

All these merchandizes available plus the establishment of popular eateries like McDonald's, Tropical Hut, Dunkin Donuts, Shakey's, Jollibee and Big Daddy's contribute to the crowd-drawing power of the area, in addition to the two churches within the study area.

Major landmarks, pedestrian and vendor concentration, crowd-drawing establishments and points of conflict/problem areas were mapped.

The vertical image of the area is dominated by three-to-six-storey structures. Royal Hotel is the only towering building in the area which can be seen framed by the rows of structures from several streets. The view of the hotel from the streets like Hidalgo and P. Gomez is magnificent, however, the view from the west seemed to dwarf the human scale because the whole structure is seen. However, the LRT station at Carriedo gives a horizontal balance to this vertical structure. Surprisingly, the LRT carriage-way seems to blend with the city's urban form.

Not to be overlooked besides the pedestrians are the other users of streets and sidewalks who always been a part of the physical setting of the area. Randolph David<sup>6</sup> identified them as the hawkers/sidewalk vendors, money changers, scavengers, *metro-aides*, beggars, *watch your car boys*, magicians and fortune tellers. From the actual survey of these users, the most dominant, as expected, are the sidewalk vendors (excluding the pedestrians) comprising 78% of the total users.

The hawkers seen in the study area can be classified into three types:

- *Itinerant peddlers*<sup>7</sup> and *sidewalk vendors* who carry their wares around
- *Hawkers in semi-fixed location* (on pavements/sidewalks near department stores or churches) with wares often clipped on the walls
- *Hawkers in more or less permanent location* (in kiosks around market places, sidewalks and vacant lots in commercial areas)

These vendors became such a problem to police enforcement that in late 1979, the government launched the *Kabalikat ng Bagong Lipunan* — a project to legalize vending activity in the Quiapo area. Unfortunately, just as fast as the project was conceived and put up in a

record time of two months, the whole of it was removed. The removal was a good decision because the permanent structures put up didn't seem to blend with the existing environment. Besides, the project was not that successful both for the buying public and the vendors. A major reason was that the stalls were built so close to one another that there were not enough space for people to move about.

Activities of hawkers are still regulated by a city/MMC ordinance designating areas where hawkers can ply their trade and regulating further the size of hawkers' stalls. It also provides that stalls should measure one meter by one meter and piles of wares must not be more than one meter. With the P5.00 per day fee, the Hawker's Office was able to collect P5,838,624.40 in 1983.

According to the head of the Manila Hawkers, an ocular survey showed that there are actually about 20,000 vendors. If they could only legalize just 50% of these vendors, the government would be getting about P30 million per annum in fees.

The survey of pedestrians on each location revealed that highest pedestrian volumes are still at Carriedo and Avenida (see Table 2) inspite of the on-going LRT construction at the time of the survey.

Observations were also made at three locations to determine the direction of pedestrians. These are at Plaza Miranda, Quiapo underpass and at corner Escolta/Plaza Sta. Cruz. It is interesting to note that most of the pedestrians used Carriedo as thorough path to get to their destination either to Sta. Cruz/Avenida or Quiapo public transportation stop. This pattern, however, was altered towards noontime and late in the afternoon when people were seen dropping at some establishments or restaurants. An observation of people coming from Plaza Miranda beyond the Quiapo Church revealed that their direction are distributed as follows: 35.5% to Carriedo, 31% to Villalobos, 20.5% to Evangelista and 13% to Hidalgo. On the other hand, the observation of people coming from the Quiapo underpass on the Plaza Miranda side revealed that 49.5% goes to Carriedo, 28.8% to Evangelista, 11.5% to Villalobos and 10.2% to Hidalgo. The same obser-

<sup>6</sup>Randolf David, "Manila's Street Life: A Visual Ethnography," *A Comparative Study of Street Life*, Occasional Paper No. 5 (Tokyo: Research Institute for Oriental Cultures, Gokushuin University, 1978).

<sup>7</sup>Itinerant peddlers are probably the least obstructive because they normally walk with their potential customers instead of obstructing their path.

Table 2

**HIGHEST PEDESTRIAN VOLUME PER HOUR\*  
BY STREET AT A GIVEN TIME AND DAY**

<i>Street</i>	<i>Pedestrian Volume</i>	<i>Day</i>	<i>Time</i>
1. Avenida	3,735	Sunday	10:00-11:00 a.m.
2. Carriedo	3,216	Friday	5:00- 6:00 p.m.
3. Plaza Miranda	2,940	Friday	9:00-10:00 a.m.
4. Villalobos	2,850	Friday	9:00-10:00 a.m.
5. Quinta Market	2,745	Friday	9:00-10:00 a.m.
6. Evangelista	2,056	Friday	9:00-10:00 a.m.
7. Hidalgo	1,968	Friday	4:00- 5:00 p.m.
8. P. Gomez	1,179	Friday	5:00- 6:00 p.m.
9. Ronquillo	1,170	Sunday	4:00- 5:00 p.m.
10. Raon	1,028	Sunday	10:00-11:00 a.m.
11. Escolta	922	Monday	5:00- 6:00 p.m.
12. Bustos	826	Sunday	9:00-10:00 a.m.
13. Palanca/Plaza Lacson	628	Monday	4:00- 5:00 p.m.
14. Estero Cegado	538	Saturday	4:00- 5:00 p.m.

\*The number of pedestrians were counted for a period of ten minutes. This was repeated every hour and the survey was conducted for three days on weekdays, for three Fridays, and for three weekends, to get the day and time of highest pedestrian volume.

SOURCE: From actual counts of pedestrians

vation was done of people coming from Escolta and their travel directions were distributed as follows: 49% to Carriedo/Avenida, 36% to Echague and 15% towards the bridge.

It seems that inspite all the hindrance to walking, the pedestrians in the city core have become experts in it. The study showed that a comfortable walking pace in the city as observed, recorded, and compared is about 247 feet per minute or 74 meter per minute even allowing for delays at street crossings. At this pace, a study area map was drawn to walk time scale (see Table 3). The physical dimensions of the site/study area are approximately 550 meters from North to South, 480 meters from East to West plus about 280 meter stretch of Escolta Street.

Considering that the maximum walking time is only about 7 minutes, the whole study area can be easily pedestrianized. In fact, a wider walking area can be made. Studies show that

normal free walking speed increases as more area becomes available.

With regard to pedestrian accidents, a study of Minoru Kobayashi on "Pedestrian Accidents in the City of Manila" revealed that almost 80% of traffic accident fatalities were pedestrians. This is an extremely high rate when compared with urban areas in other developed countries.

The MMETROPLAN<sup>8</sup> reports stated that the absolute number of death and severity in Metro Manila is similar to that in Greater London which had 25% more people and was seven times bigger in area so something could be done to reduce accidents.

A check on the accident records at the Western Police District showed that in the study area, the intersection of Sta. Cruz as well

<sup>8</sup>MMETROPLAN is an acronym for Metro Manila Transport, Land Use and Development Planning Project.

**Table 3**  
**WALK TIME SCALE**

<i>EAST-WEST WALK</i>	<i>TIME (Minutes)</i>	<i>DISTANCE (Meters)</i>
Plaza Miranda to Avenida (LRT Station)	4.4	330
Plaza Miranda to Escolta	7.0	520
Plaza Miranda to FEATI	6.0	450
Royal Hotel to Escolta	5.4	400
<i>NORTH-SOUTH WALK</i>	<i>TIME (Minutes)</i>	<i>DISTANCE (Meters)</i>
Raon corner Evangelista to Quinta	6.8	500
Ronquillo to Plaza Goiti	4.2	350
Ronquillo corner Avenida to Escolta	6.1	450
Sta. Cruz to Quezon Blvd. Public Transport Terminal	6.2	460

SOURCE: From actual survey conducted

**Table 4**  
**TRAFFIC ACCIDENTS**  
**Manila**

<i>Type of Accident</i>	<i>1982 Jan. to Dec.</i>	<i>1983 Jan. to Dec.</i>
Killed	86	72
Serious	136	118
Less serious	315	127
Slight	2233	1277
<b>TOTAL</b>	<b>2770</b>	<b>1594</b>

SOURCE: Record Section, Western Police Traffic Division

as the intersection at Raon/Quezon Blvd. registered the most number of accidents.

It is important to note however that physical injury from accidents comprise only 7.6% of the total crimes registered within Manila District. The study area which is under Station Number 3 has the biggest share of reported

crimes. Theft and robbery have the biggest share at 34.8% and 30.3% respectively (see Table 5). These thefts mostly involve pick-pockets and bag snatchers.

Study findings showed that the movement systems in the whole study area are directed to three major areas: the Quiapo/Plaza Miranda

Table 5

FREQUENCY OF CRIMES (1983)  
Manila

	<i>Number</i>	<i>Percentage (%)</i>
Theft	1000	34.8
Robbery	870	30.3
Physical Injuries/accidents	220	7.6
Murder	350	12.2
Homicide	400	13.9
Rape	35	1.2

SOURCE: Records Section, Western Police Traffic Division

area, Sta. Cruz area and the Quinta Market. The common denominator of these three areas is their being directly adjacent to public transport routes. All the streets between them serve as linkages where heavy pedestrian traffic flows in both directions. The pedestrian volume study shows that the heaviest flow is at Carriedo and Avenida. Density of pedestrian is obviously influenced by factors such as: location of modes of major traffic route; presence of major landmarks such as Quiapo Church or major establishments such as Shoe Mart; the presence of road intersections that hinder the continuous movement of pedestrians; and, of course, the presence of sidewalk vendors occupying a big portion of sidewalks and therefore slowing down movement of pedestrians.

It is noteworthy that the highest concentration or clustering of vendors are also where pedestrian concentrations are. In fact, the vendors practically occupy the sidewalks, leaving barely a meter's effective width left for the pedestrians. Thus, pedestrians spill out to the streets where the vehicles are, resulting in traffic conflict congestion.

There is no one easy and complete solution to this problem posed by the traffic conflict between man and vehicle, considering that there is also the problem of sidewalk vendors which cannot be taken for granted. They have become part of the character of the area that their presence should be considered in any design concept for the area.

The results of the analysis of pedestrian and vehicular movement, identification and prediction of conflict points, pedestrian site lines, appropriate location for sidewalk vendors and alternative convenient routes form the basis for the proposed design concepts. The pedestrianization of streets, on the other hand, are designed to conform to a set of design criteria formulated with the pedestrian's needs in mind, along with other relevant factors such as servicing of establishments.

The pedestrianization of the area is therefore a design concept that could provide a means by which the needs for freedom of movement as well as the safety of the pedestrians in the area may be achieved. It should be noted, however, that pedestrianization as proposed in this study, does not mean total exclusion of vehicles, but in creating a condition where there is less conflict between pedestrian and vehicular movement.

Avenida Rizal could be another ideal pedestrian-oriented area, but to completely close the street to vehicular traffic does not seem feasible because there are not enough North-to-South roadways. However, the sidewalk width on both sides of the Avenue from Carriedo to Ronquillo is increased substantially. Helios Street, with the construction of the new Isetann, becomes a major pedestrian area. Plaza Sta. Cruz has the potential for redevelopment as an important area for pedestrian activity but because Sta. Cruz Church already has a plaza, it will be

retained and complimented with a car parking area and a loading/unloading zone for jeepney passengers.

The existing network of shopping arcades and sidewalks shall be closely and continuously linked, extended and enhanced. Continuous pedestrian shelter through linked system of awnings, colonades and arcades shall be provided to connect places of interest.

Pedestrian space, particularly the Plaza Miranda area, shall be enlivened with trees, flower beds and shrubberies. Greeneries shall serve as focal point and buffer between traffic and people, as well as control and guide for pedestrian.

The sidewalk vendors/hawkers, being part of the overall character of the study area, will be provided with common toilet facilities and utilities in appropriate areas. For instance, covered flower stalls along the sidewalk of Hidalgo street could be further enhance the view of Royal Hotel, as one walks through this street (please refer to Hidalgo St. Design Concept) This is now designated as a pedestrian area.

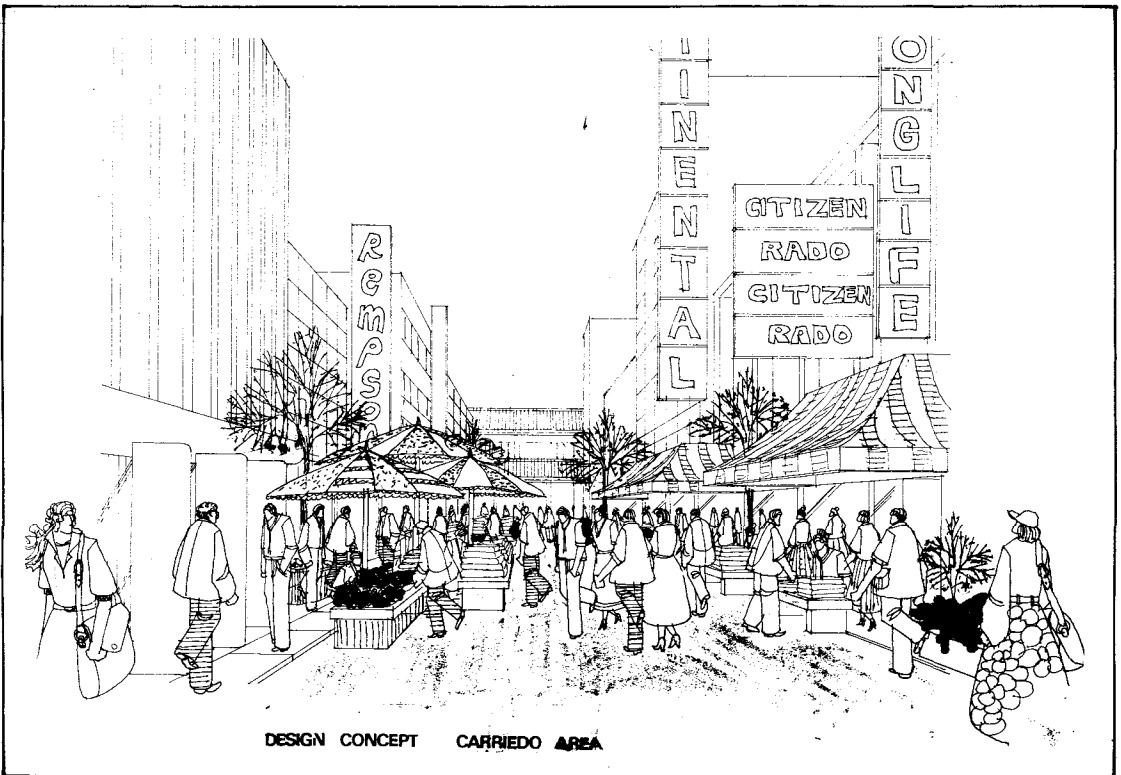
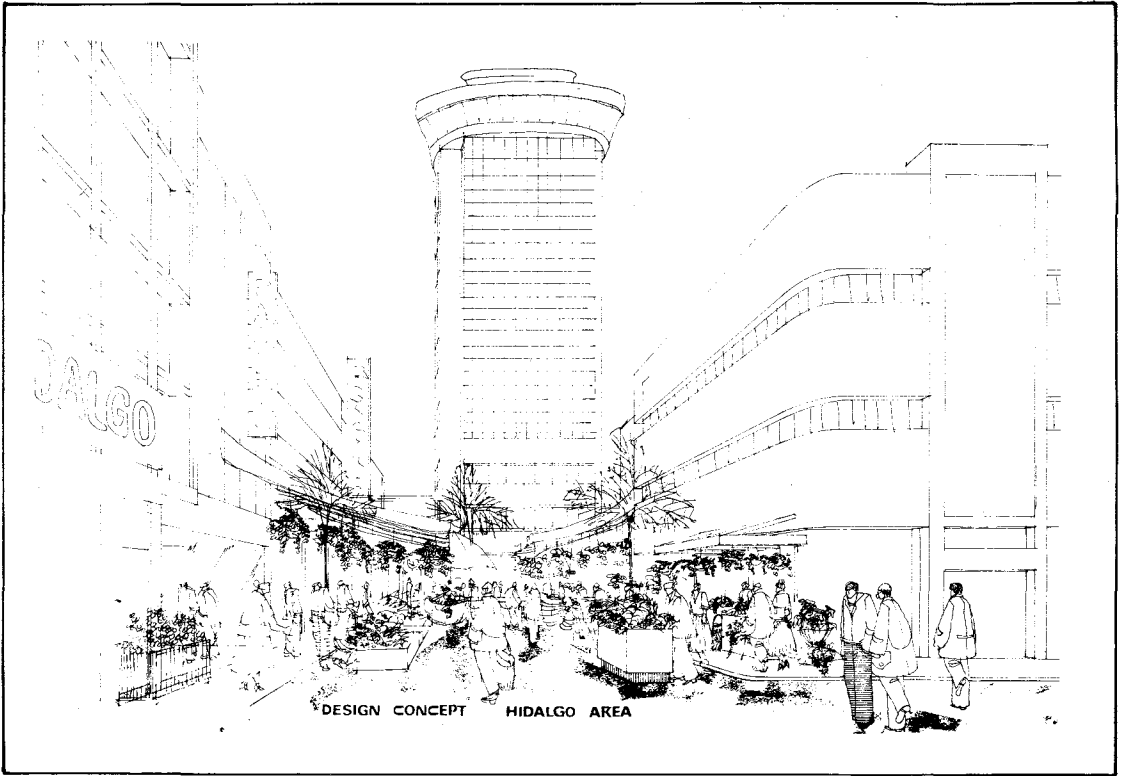
At the Carriedo area, awnings and umbrella-type canopies will be provided for the vendors selling ready-to-wear clothes and accessories. The P. Gomez/Carriedo corner has been a favorite hangout for chess enthusiasts since the closure of the bazaar occupying the adjacent areas. The queuing of players at this small canopied area is a good indication to develop the now unused bazaar area into a possible recreation center (refer to design concept for Carriedo Area).

Vendors of religious articles will be retained at the Carriedo side of Quiapo Church while the front area, which is the Plaza Miranda, will be developed into a real plaza, complete with fountain, benches and trees. Covered food kiosks can be located in strategic areas was observed during a Quaipo fiesta that the underpass roof can carry a large number of people. It is therefore recommended that instead of putting up a stage during rallies and other activities in the area, this underpass roof can double as stage if leveled and provided with stairs (Design Concept for Quiapo/Plaza Miranda area).

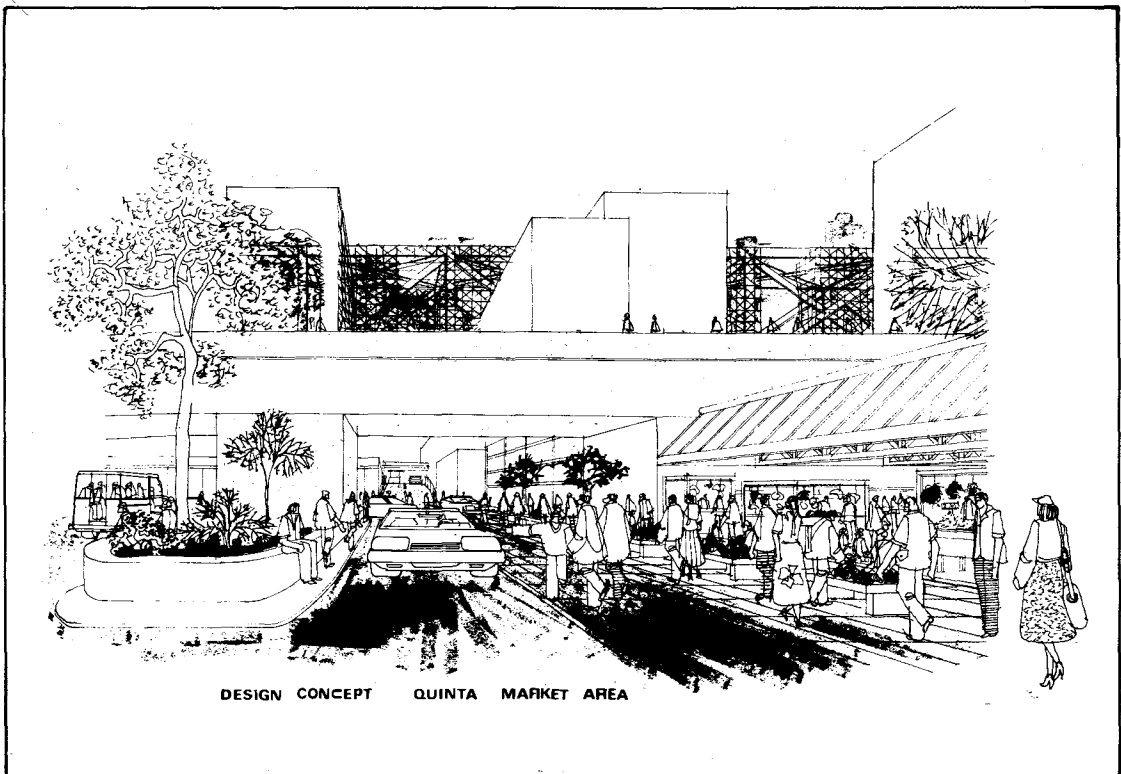
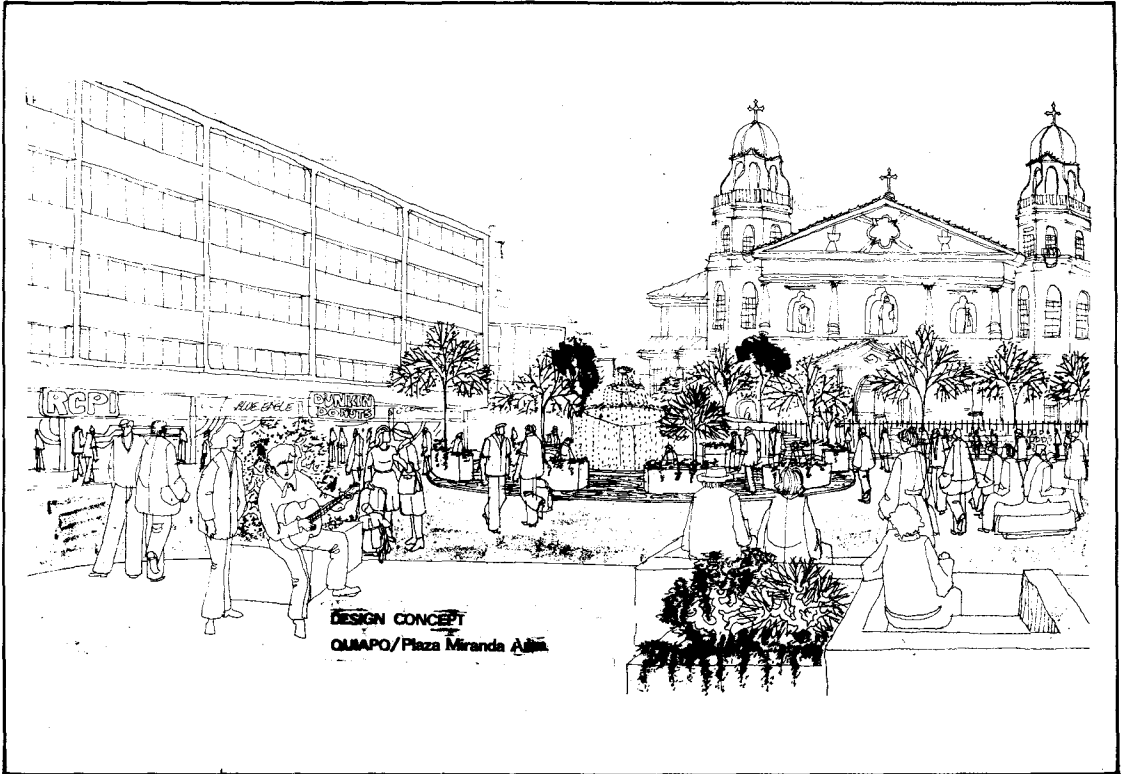
The Quinta Market/Quiapo underpass area (Design Concept for Quinta Market) if integrated with the New Zamboanga Flea Market and the Balikbayan Handicraft establishment can be a potential tourist attraction. The development of the area can be further enhanced by the rerouting of private, service and necessary vehicles from Echague to P. Ducos passing through the back of Quinta Market, then under the bridge, then out to Echague through Basan Street. This proposed scheme will make the area accessible to both pedestrians and vehicles, thereby heightening commercial growth (see Proposed Development Plan).

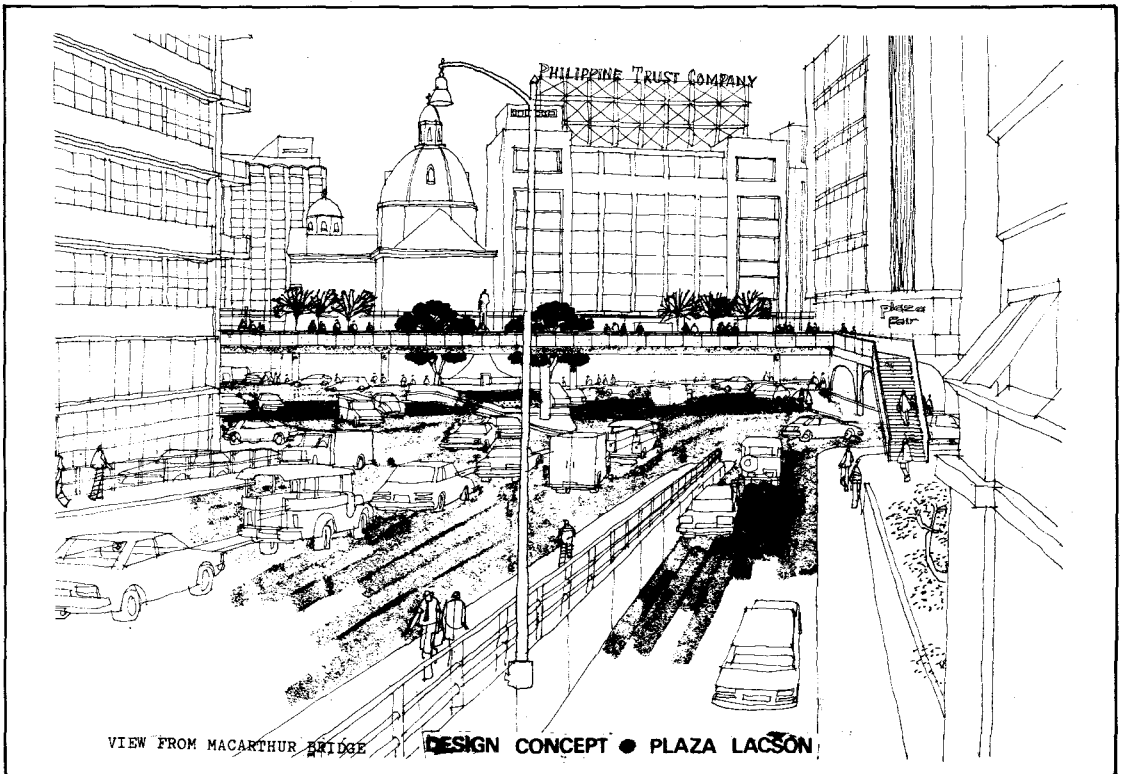
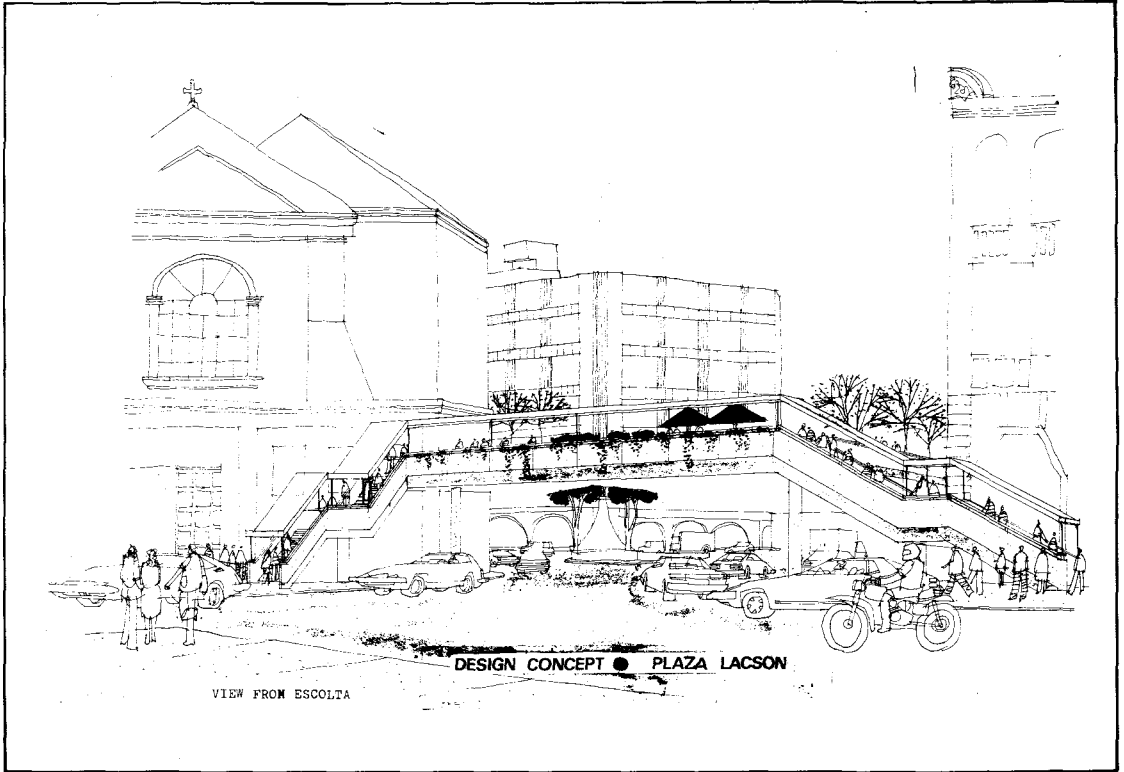
The LRT station at the Carriedo/Avenida Rizal junction and the rerouting of public transport to the Plaza Lacson area have tremendously increased the number of pedestrians in the area. Thus, an elevated plaza, enlivened with trees and pedestrian amenities featuring: a covered pedestrian walk, integrated with LRT station and commercial establishments seems to be the best solution for the area. This elevated plaza will have access points from the proposed parking area near FEATI University. If extended to the proposed modern Flea Market project at the west side of McArthur Bridge, two elevated plaza will perhaps boost the project which has been temporarily stopped due to lack of takers (Design Concept for Plaza Lacson).

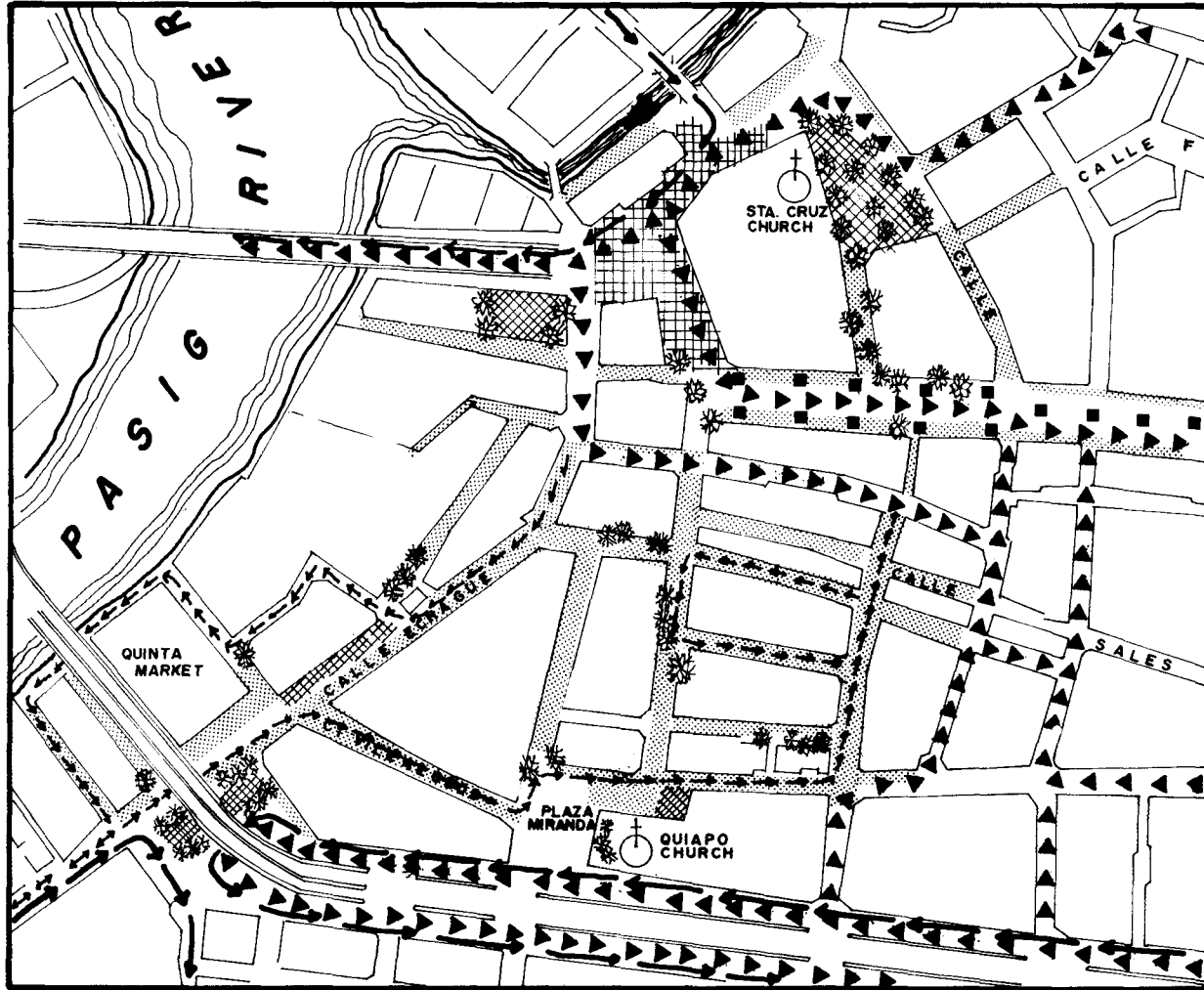
Except for this elevated plaza, all the proposed design concepts are not very expensive. Furthermore, development can be phased. In as far as the proposal of this study with respect to sidewalk vendors/hawkers is concerned, funding would not be a problem. According to the City of Manila Hawker's Office, collection fees amount to more than a million pesos monthly from the almost 4,000 vendors with hawker's permit. This being only about 20% of the hawkers actually plying their trade in the area, the proposed organization of stalls will realize more income in additional permit fees that could be charged from actual stall holders. According to the head of the Manila Hawker's Office there are actually about 20,000 vendors. If they can only legalize just 50% of these vendors the government will be getting about 30 million per annum in fees.



















### PROPOSED DEVELOPMENT CONCEPT PLAN



#### LEGEND:

-  PEDESTRIAN AREA
-  PARKING AREA
-  ELEVATED PLAZA
-  JEEPNEY ROUTES
-  BUS ROUTES
-  NECESSARY VEHICLE ROUTES (DELIVERY TRUCKS)
-  LRT POSTS
-  TREES & GREENERIES

With regard to the proposed elevated plaza, the Manila Citizen's Businessmen Council (MCBC) and commercial establishments adjacent to it can jointly fund this project with perhaps some assistance from the government. An interview with Mr. Juan Miguel Vasquez, 1983 President of MCBC, disclosed that the group has been seriously considering undertaking development projects with the government that will improve and enhance Manila's business environment.

To strengthen the relationship of new developments with existing ones, Urban Design Guidelines should also be established such as:

- Floor area bonuses-additional floor for new structure providing for urban open space
- Residual space, a narrow area adjoining the public sidewalk use to enhance the building and the surrounding should be developed as a usable space or purely visual amenity
- Continuous sheltered pedestrian movement should be provided through linked system of awnings, colonades and arcades

(e.g. for Avenida Rizal).

- Spaces between buildings should be utilized as pedestrian linkages
- Commercial establishments should be integrated with LRT stations
- Mezzanine floor like the station at Carriedo should be developed into pedestrian malls and linked to developments at the side like the proposed elevated plaza concept for Plaza Lacson
- Spaces underneath the LRT structure should be utilized as pedestrian space, vending space for small stalls or as traffic lanes
- Little plazas enlivened by greeneries, benches and other street furniture should be encouraged.

In short, one should aim at an ecologically harmonious environment for man at which efficient use of the vehicle plays a crucial part. It is believed that the realization of this development concept will definitely open great opportunities for the revitalization of Metro Manila's city core. □

# THE LRT AS A COMPONENT OF METRO MANILA'S TRANSPORT SYSTEMS\*

Ministry of Transport and Communications

## INTRODUCTION AND GENERAL CHARACTERISTICS

Over the recent years a considerable amount of transport data collection has been undertaken in studies for the Ministry of Transportation and Communications (MOTC). This section presents a brief description of the more important aspects of these data. The reader is referred to the reports of the Metro Manila Urban Transport Improvement Project (MMUTIP), Traffic Engineering and Management Office (TEAM), JICA Update of Manila Studies on Urban Transport (JUMSUT), and Metro Manila Urban Transportation Strategy Planning Project (MMUTSTRAP) Parts A, B1 and B2 studies for a fuller in-depth treatment of Metro Manila's transport system.

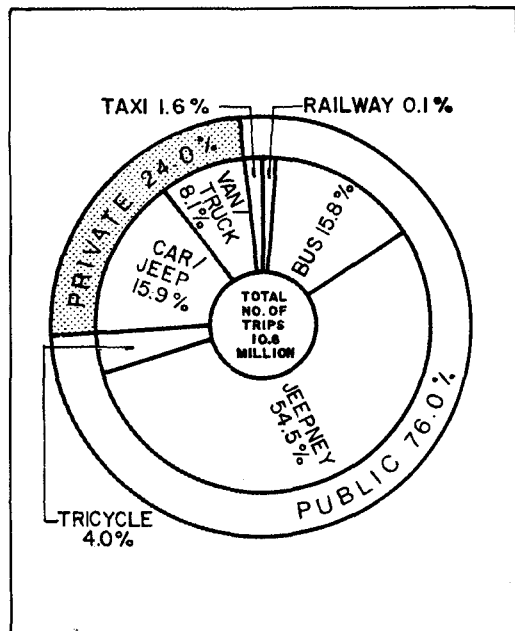
The total population of Metro Manila in 1980 was 5.9 million of which 4.8 million were above 7 years of age.

According to the JUMSUT 1980 household interview survey results,<sup>1</sup> there were approximately 10.6 million person trips per day in Metro Manila in 1980. Of these trips approximately 24 percent are made by private means (car, jeep, van, and truck) and 76 percent by public transport (taxi, bus, jeepney, tricycle, and train); (see Figure 1). This represents a trip rate of 2.2 trips per day per person (seven years

old and above). Buses and jeepneys carry the majority of public transport trips catering for 93 percent or approximately 7.5 million trips per day.

Today, year 1985, it is estimated that approximately four percent of daily public transport trips is made on the newly opened Metrorail Taft-Rizal Line. The Metrorail market share is not shown in Figure 1 as that figure represents the 1980 situation only.

Fig. 1: Overall Transport Demand by Transport Mode Made in 1980



<sup>1</sup>JUMSUT, Main Text, Part I, Summary and Recommendation, page 2-3; excluding walk trips (estimated to be about 30% of all trips) and population under 7 years of age.

## HIGHWAY SYSTEM

The existing highway network of Metro Manila is characterized by a combination of radial and circumferential arterials which encompass usually narrow and disconnected streets of residential, industrial, and commercial areas. In addition, there are two major toll expressway links between Manila and provincial areas, one to the North and the other to the South. (see Figure 2).

In total there are some 2,800 kilometers of primary and secondary roadways within Metro Manila. The existing network has several major discontinuities which result in indirect routing of trips and creation of several "bottlenecks." Proposals for elimination of many of these discontinuities are presently being evaluated as part of a systems approach to transport planning and policy.<sup>2</sup> Whilst many of these proposals are likely to be undertaken and completed in the near future (for example, RIO Coastal Road and associated access roads), others, because of major acquisition problems are unlikely to be realized in the foreseeable future (for example the southern leg of C3 especially between Aurora Boulevard and Gil Puyat).

## PRIVATE TRANSPORT SYSTEM

Current statistics from the Bureau of Land Transportation (BLT) show that there are some 265,000 private passenger motor vehicles (cars and jeeps) registered in Metro Manila. (see Table 1)

Assuming a total population of 6 million, this means that there is one private passenger vehicle for every 23 persons in Metro Manila.

Private passenger vehicles cater for some 1.7 million trips per day.

Truck and trailer registrations in Metro Manila account for approximately 30 percent of the total motor vehicle registration.

## ROAD BASED PUBLIC TRANSPORT SYSTEM (JEEPNEY, BUS, AND TRICYCLE)

According to the latest JUMSUT studies there are 29,261 jeepneys plying 640 intra-city routes and 4,368 buses (standard, double decker, limited, love bus and minibus) plying 150 intra-city routes. In addition vehicles from the provinces enter and service Metro Manila.

Jeepney routes cover approximately 610 kilometers of the metropolitan primary and

Table 1

Number of Registered Vehicles<sup>3</sup>

Vehicle Type	1975	1976	1977	1978	1979	1980	1983	%
1. Car	166,743	169,248	188,264	219,726	227,726	227,726	218,130	50.5
2. Jeep	41,280	41,861	39,495	44,636	50,703	36,770	46,892	10.8
3. Taxi	8,512	11,460	14,666	11,870	7,513	10,125	6,149	1.4
4. PUJ	13,359	14,640	23,763	27,752	19,067	28,174	27,886	6.5
5. Bus,	5,725	6,205	4,640	4,703	2,437	3,578	4,381	1.0
*PUB	4,940	5,030	4,136	3,839	1,811	2,890	3,591	—
*Others	785	1,175	504	864	626	688	790	—
6. Truck/Trailers	73,364	81,393	93,715	113,035	128,267	100,966	128,761	29.8
7. Others	5,818	8,393	7,269	4,219	6,933	6,651	unknown	—
TOTAL	317,801	333,200	371,812	426,046	442,016	404,521	432,199	100.0
8. Motorcycle	14,701	41,438	42,987	50,607	47,883	41,621	38,609	—

<sup>2</sup>MMUTSTRAP, Part A, B1 and B2.

<sup>3</sup>JUMSUT, Main Text, Part II, Metro Manila Public Transportation, Table 4-9, page 4-13.

Fig. 2: Metrorail Taft-Rizal Line



**NORTH TERMINAL**

5TH AVENUE STATION

R PAPA STATION

J ABAD SANTOS STATION

BLUMENTRITT STATION

TAYUMAN STATION

BAMBANG STATION

D JOSE STATION

CARRIEDO STATION

**CENTRAL TERMINAL**

U N AVENUE STATION

PEDRO GIL STATION

PRESIDENT QUIRINO STATION

VITO CRUZ STATION

GIL PUYAT STATION

LIBERTAD STATION

E D S A STATION

**SOUTH TERMINAL**

DEPOT WORKSHOP

Fig. 3: Metro Manila Road Network

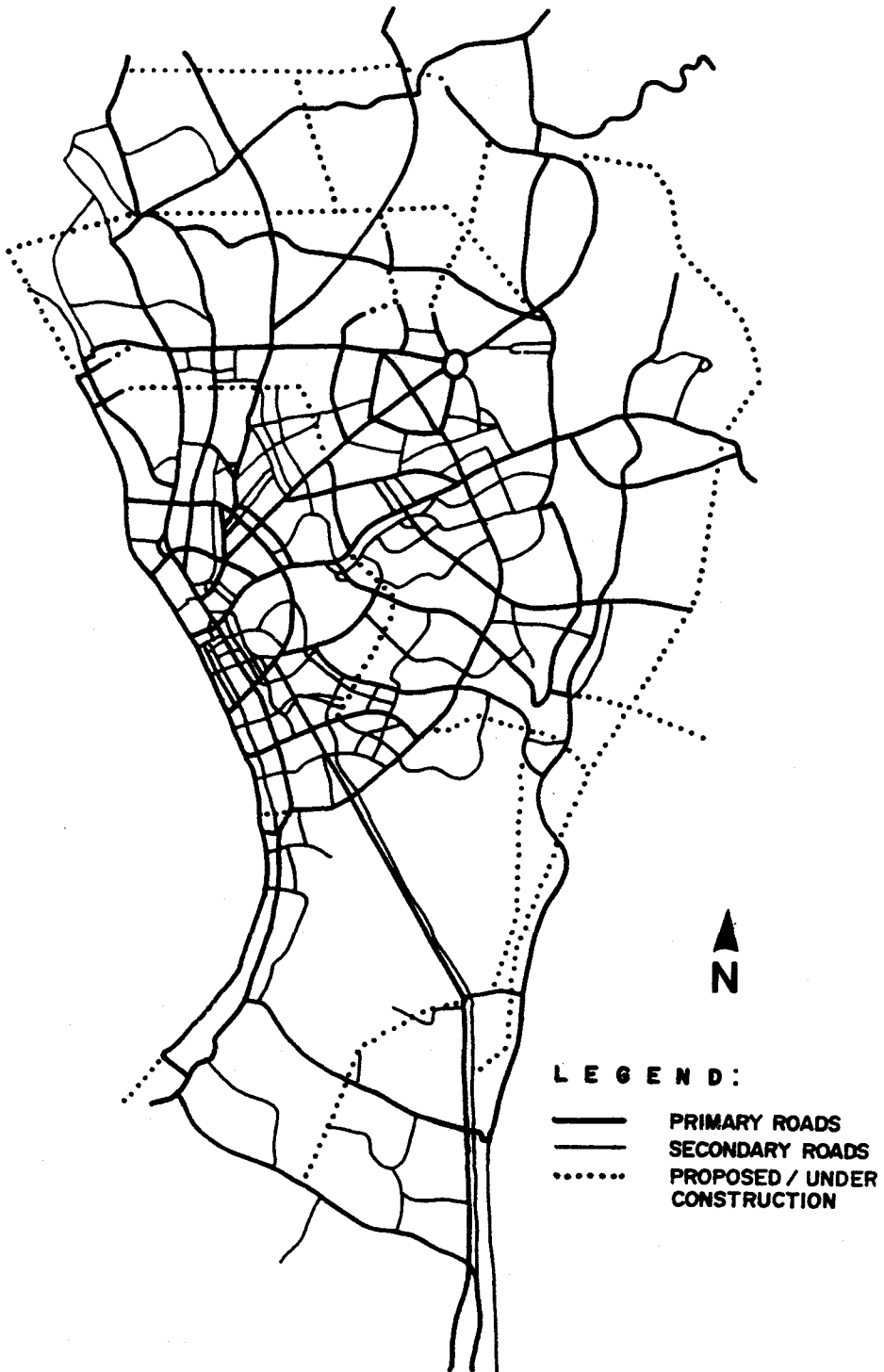




Table 2  
Estimated Number of Routes and Units by Public Transport Mode

	<i>Intra-city</i>		<i>Inter-City</i>		<i>Total</i>	
	<i>Routes</i>	<i>Units</i>	<i>Routes</i>	<i>Units</i>	<i>Routes</i>	<i>Units</i>
Jeepneys	640	29,261	104	6,266	744	35,527
Buses						
•Standard Bus	106	3,750	13	346	119	4,096
•Double Decker	3	25	—	—	3	25
•Limited Bus	5	87	—	—	5	87
•Love Bus	27	299	1	15	28	314
•Mini Bus	9	207	20	933	29	1,140
•Provincial Bus	—	—	13	249	13	249
<b>TOTAL</b>	<b>150</b>	<b>4,368</b>	<b>47</b>	<b>1,543</b>	<b>197</b>	<b>5,911</b>

secondary road network whilst buses cover approximately 330 kilometers. Direct competition between buses and jeepneys occurs on 290 kilometers of the road network.

Within Metro Manila jeepney services carry approximately 5.8 million passengers per day (about 72 percent of total public transport passenger demand) and buses carry most of the remaining demand.<sup>4</sup>

Other road-based public transport modes (e.g. taxis, motorized tricycles and horse-drawn calesas), complement the main bus and jeepney services. Taxis cover the entire metropolitan area. Tricycles and horse-drawn calesas being generally prohibited from main thoroughfares tend to serve localized transport needs but also provide an important feeder function between residential areas and the city bus and jeepney routes. Hence, an almost door to door public transport system is provided in the majority of the urbanized area within Epifanio delos Santos Avenue (EDSA).

Existing jeepney and bus route structures are presented in Figures 4 and 5.

## METRORAIL SYSTEM

### Description

The Taft section of the Metrorail commenced operation on 1st December 1984 and the full Taft-Rizal line from Baclaran in Pasay

City to Monumento in Caloocan City came into service on 13th May 1985. This line which forms the first part of a possible Metro Manila Metrorail network is about 15 km. in length and runs entirely on an elevated structure supported by columns located in the center of the roadway below.

The alignment generally follows the right of way of Taft and Rizal Avenues (see Figure 6).

The 8 m wide viaduct rises about 8 m above street level, with the two standard gauge (1,435 mm) tracks embedded in ballast.

Some 18 elevated stations have been erected along the line. Each station is a simple addition of two platforms on each side of the track with covered stairs leading to the street level. Very economical and utilitarian treatment is given to station design. To facilitate heavy boarding and alighting passenger volumes, special pedestrian mezzanines have been constructed at some stations.

The terminals and the central station are equipped with special turnback facilities and sidings, permitting turnaround and storage of non-operational vehicles.

The maintenance facilities and station yard are located in Andrews Avenue, Baclaran, close to the Domestic Airport Terminal. The administration and welfare buildings are also located on this site. This depot and workshop area is linked via a short spur line to the South Terminal. The Taft-Rizal line receives its power supply via special rectifier substations (9 in total) fed from the public network. These substations provide 750 volt direct current for the

<sup>4</sup>Op cit, Table 6-5, page 6-9.

Fig. 4: Existing Jeepney Route Structure

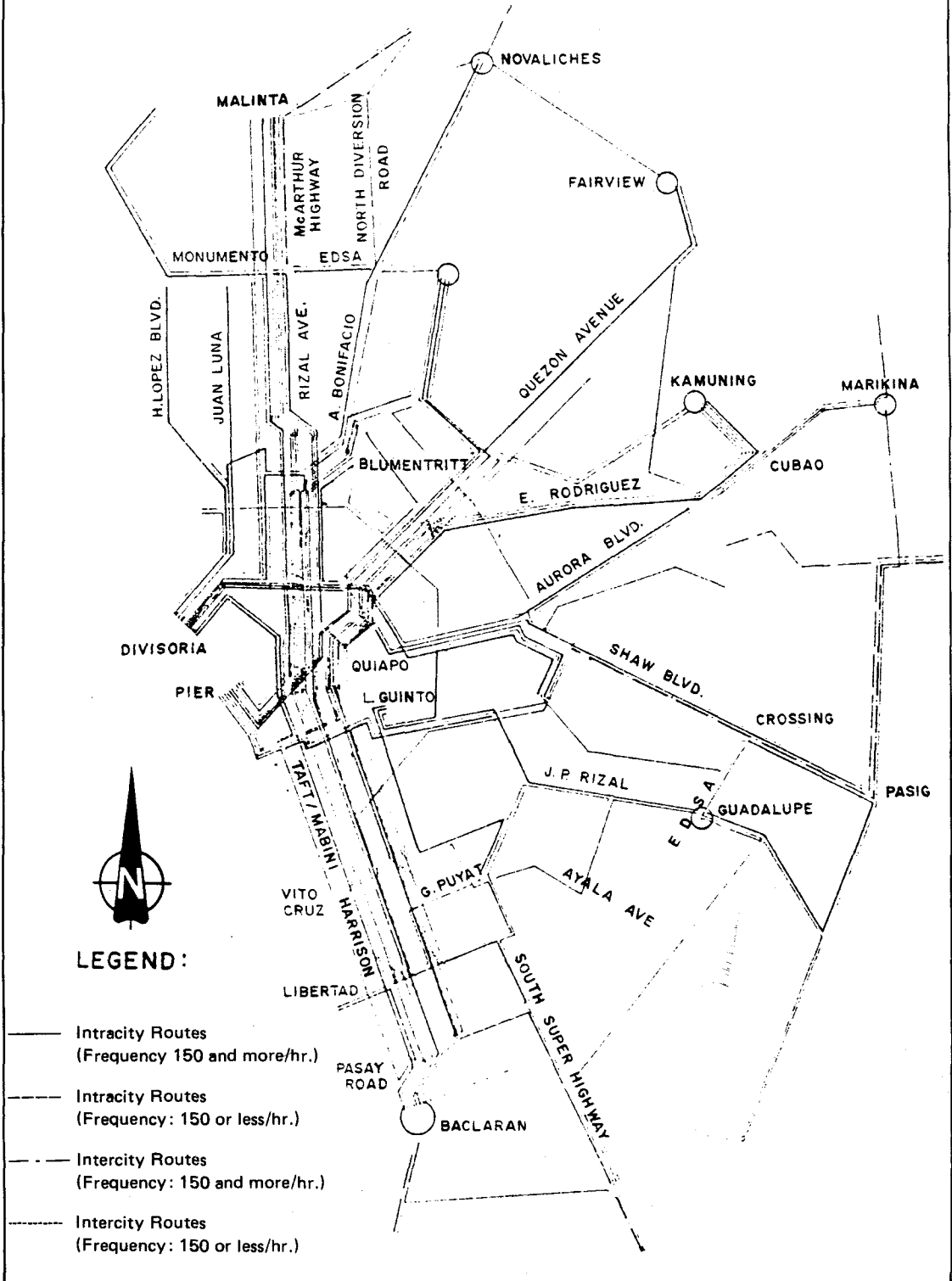
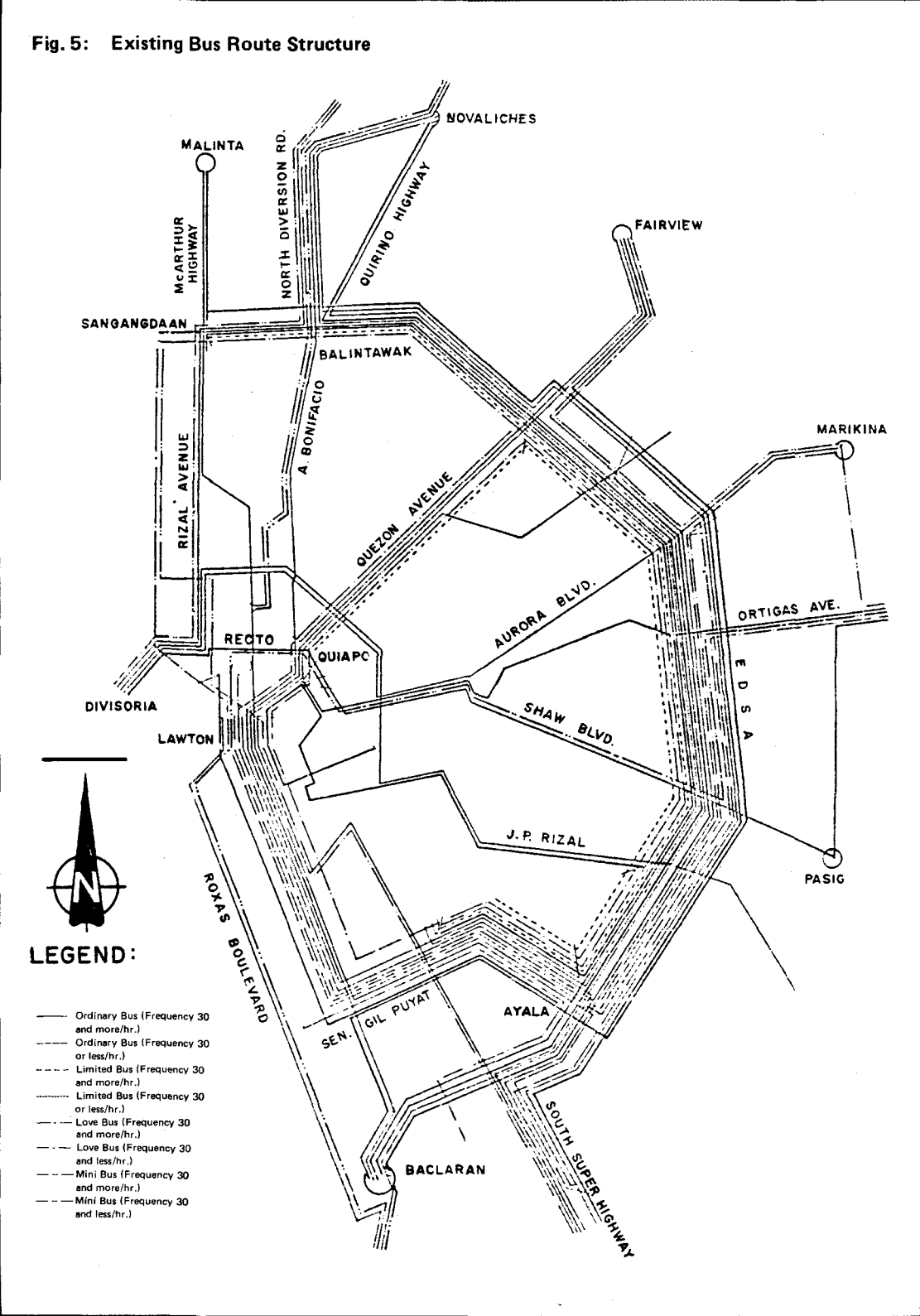


Fig. 5: Existing Bus Route Structure



trains as well as low voltage for signalization, lighting, and other auxiliary installations. The power is carried along the line with two overhead copper contact wires.

Rolling stock consists of 8-axle double articulated vehicles of the following main dimensions:

- Body length: 29.28 m.
- Total width: 2.50 m.

The vehicles run in married couples with a crush capacity of 750 passengers per train. The presently supplied equipment (64 vehicles including spares) allows for a two-car train service at a two-minutes 30 seconds headway. This is equivalent to a flow capacity of 18,000 passenger per hour.

The system includes further the auxiliary equipment such as signalling with automatic train stop and speed control, loud speakers in stations and trains, telecommunication between trains and control, and fare handling equipment. A flat fare structure using tokens has been adopted. The selling and collection of tokens take place at stations only.

Photographs of the important features of the Taft-Rizal line are presented in Figure 6.

**Experience with Initial Operation Phase**

The Metrorail system has been well accepted by the public. Average ridership for the first months of full line operation period is shown in Table 3.

Table 3: Taft-Rizal Metrorail Line:  
Average Ridership<sup>1</sup> for the  
Period May 13 to November  
25, 1985

	Average Ridership
Monday, Tuesday, Thursday, Friday	238,989
Wednesday	307,804
Saturday	201,568
Sunday	194,764

The daily ridership pattern since the commencement of the Metrorail service is presented in Figure 7. This figure shows daily ridership for the half line operation Baclaran to Arroceros from 1st December 1984 to 13th April 1985, Baclaran to Carriedo from 14th April 1985 to 12th May 1985, and full line operation commencing 13th May 1985.

Ridership levels show a distinct day of the week pattern with Wednesdays being the peak day due to demands generated by Baclaran Church and Market.

**PHILIPPINE NATIONAL RAILWAYS (PNR)**

In addition to the road-based public transport services and Metrorail, the PNR commuter rail system which comprises a northern line between Tutuban and Caloocan and a southern line between Tutuban and Carmona (see Figure 8) services public transport demands.

The PNR route from the South closely parallels the South Super Highway and the latter's extension to President Quirino (C2). Then it diverts North-East to cross the Pasig River to Sta. Mesa and then back North-West to bypass north of the CBD crossing Rizal Avenue at Blumentritt. It then joins the North Luzon line and connects to Tutuban Railway Station.

PNR commuter services carry less than one percent of all public transport passenger demand. The potential of the system, a narrow gauge railway, is severely restricted by poor track and signalling systems and by lack of grade-separated road crossings. In terms of travel demand, only the South line has significant potential at present and in the near future.

Although in this study no specific investigations were conducted to indicate the type and scale of necessary improvements and the extensions of the existing PNR network, a tentative improvement program has been established. For the analyses of Metrorail extensions, it was assumed that the PNR network would maintain the following characteristics:

- Maximum travel speed : 18 kph;
- Maximum train capacity: 1,500 passengers;
- Minimum headway: 10 minutes

Further, the influence of provincial and outer suburban demands was not considered.

**THE NEED FOR RAIL TRANSIT**

An examination of the present traffic conditions as reported in the JUMSUT I Study and summarized in Figure 9 reveals that there exists severe capacity restraint along most major corridors within EDSA. In terms of the theoretical volume to capacity ratios indicated, it is clear that the radial corridors Taft Avenue (R2), J.P. Rizal-Imelda Avenue (R4), Shaw Boulevard



**Fig. 6: The Existing Taft-Rizal Metrorail System**

- 1. Metrorail Train**
- 2. Line Station**
- 3. Elevated Structure**
- 4. Maintenance Facilities and Stabling Yard**
- 5. Central Terminal**

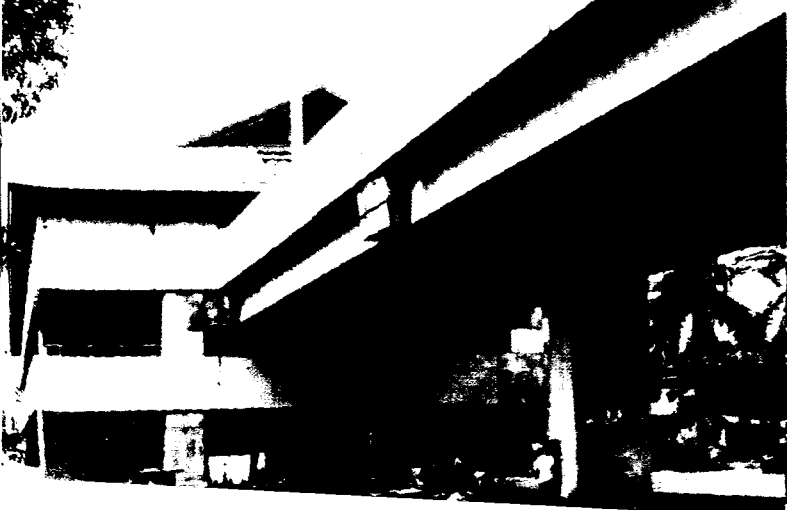


Fig. 7: Taft-Rizal Line Ridership Pattern

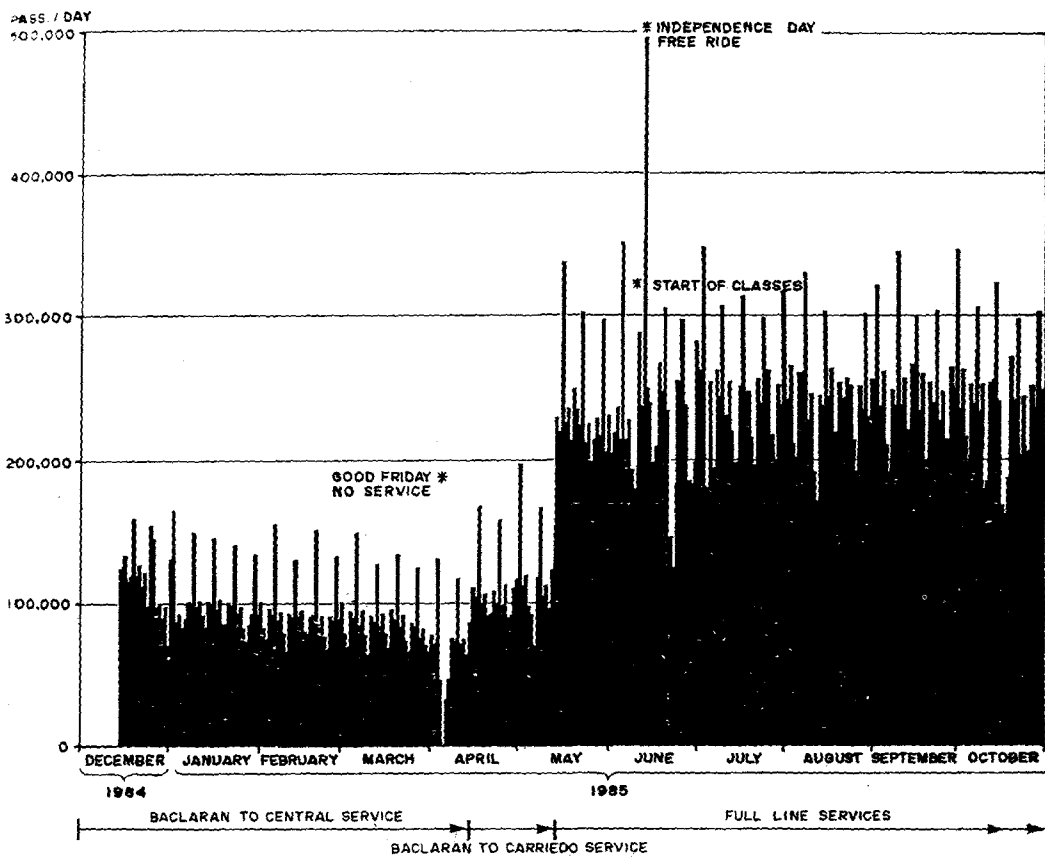


Fig. 8: PNR Commuter Network in Metro Manila

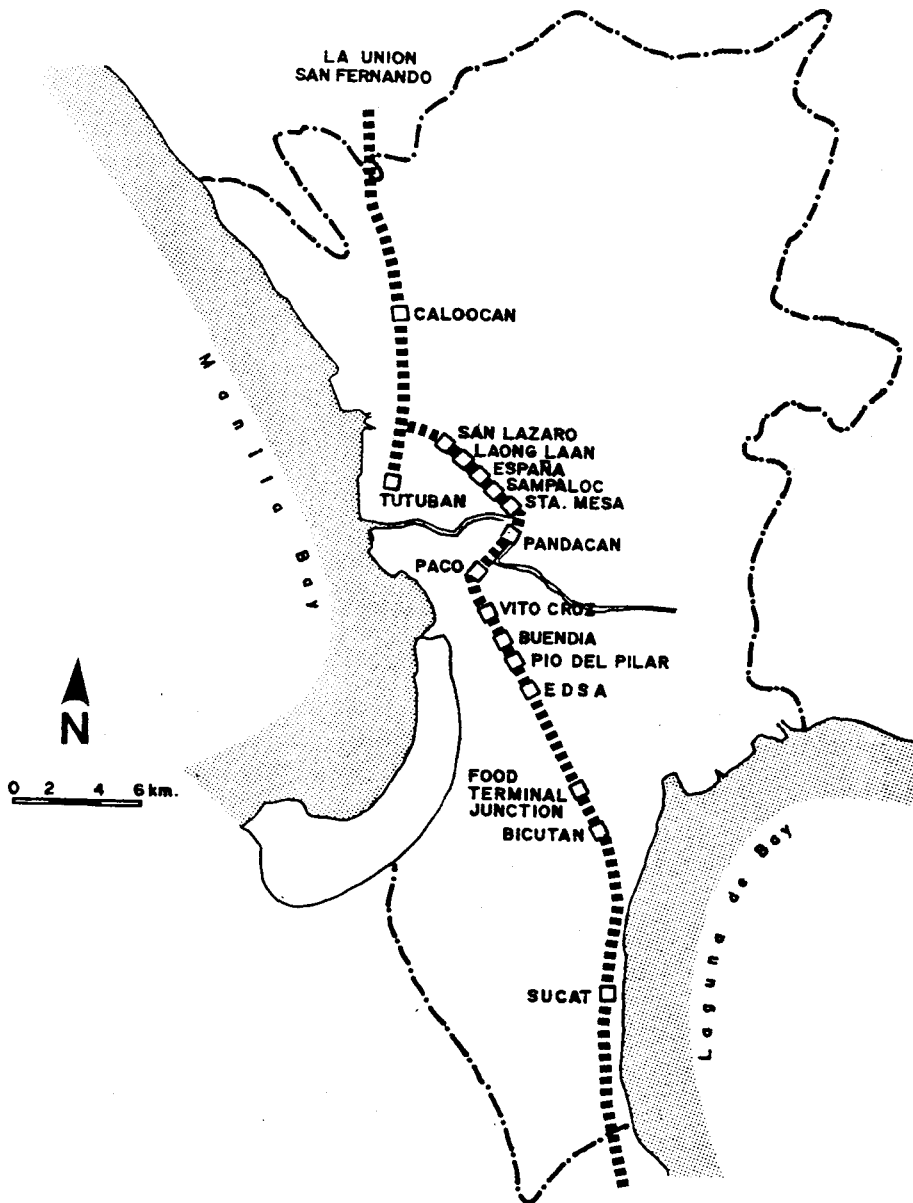
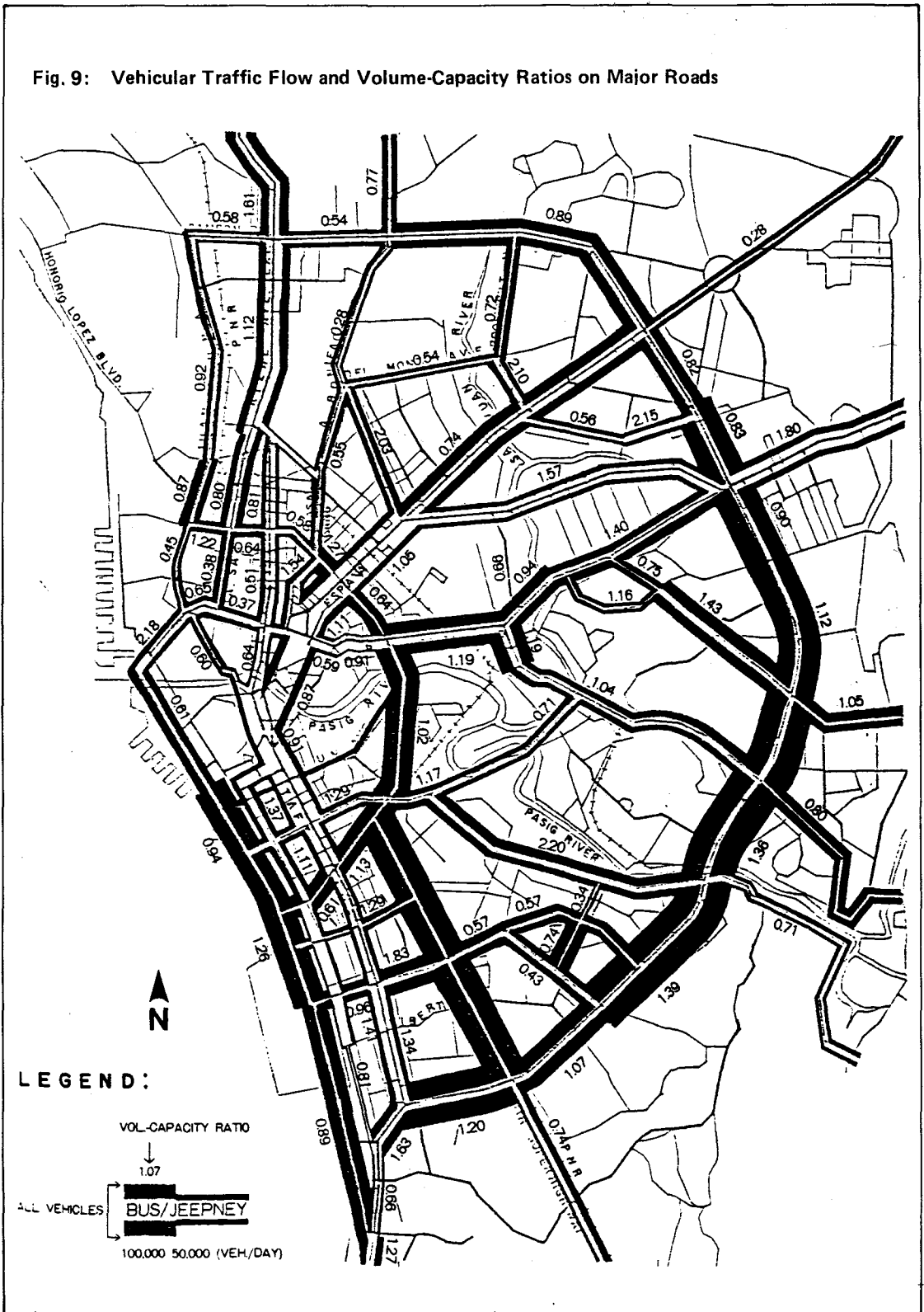


Fig. 9: Vehicular Traffic Flow and Volume-Capacity Ratios on Major Roads





(R5), Aurora Boulevard (R6), Quezon Boulevard (R7), Rizal Avenue (R9), and EDSA (C4) have capacity limitations along most of their length.

Current and proposed road works for the region will tend to add capacity to the outer areas and the circumferential corridors. The construction of C5 and C3 will help carry traffic which is presently forced to use the EDSA (C4) corridor. Moreover, failure to construct either C3 or C5 will place serious pressures on EDSA, which will result in a deterioration of the level of service offered by this facility.

The recently opened Taft-Rizal Metrorail line adds considerable public transport capacity in that corridor. The completion of the R10 road project will add capacity to the northern coastal corridor. Together, these facilities will improve capacity for north-south movement in the region.

Of the remaining radial corridors little improvement in road capacity is proposed apart from some new links in the J.P. Rizal-Imelda Avenue (R4) corridor. Because of this, severe pressure will continue to be placed on the radial corridors particularly those with high public transport volumes.

Road widening along Ramon Magsaysay, Shaw, and Aurora Boulevards is difficult due to high land acquisition costs and the need for relocation of a large number of residents and businesses. Quezon Boulevard/Espana will have some spare capacity and potential exists (in the short term) for the introduction of transport system management measures to provide additional throughput of passengers.

In terms of improving system capacity, rail systems have greatest potential in corridors where public transport demand is high and roadway capacities limited with no practical potential for improvement. The Taft-Rizal Metrorail line is a good example of how a rail system can readily improve capacity in a restricted high demand corridor. The need for rail system solutions would appear to exist along most radial corridors and if proposed roadworks are not undertaken the need will arise for such solutions in the circumferential corridors. This conclusion has been reached by several previous studies including MMETROPLAN and more recently completed JUMSUT II Study which identified the Aurora corridor as one in need of a rail solution to the problem of capacity constraint and high public transport demand.

# URBAN LAND MANAGEMENT STUDY: Urban Redevelopment in Connection with Metrorail\*

Metro Manila Commission  
Office of the Commissioner for Planning

## URBAN LAND MANAGEMENT STUDY AND THE LIGHT RAIL TRANSIT

The Urban Land Management Study (ULMS) is one of the components of the Third Urban Development Project Loan Package granted by the World Bank to the Metropolitan Manila Commission (MMC) for purposes of providing technical assistance in the formulation of a *comprehensive urban land policy* for the entire Metropolitan Manila Area.

The Metropolitan Manila Area has undergone several urban transformations over the decade which saw the further growth of urban centers such as Cubao, Greenhills, and Makati. In the eighties, the most significant urban development to take place is the introduction of the Light Rail Transit (LRT), otherwise known as the METRORAIL. The ongoing construction of its Line 1 which is traversing a major radial route in the transport network of Metropolitan Manila coincides with the program of the Third Urban Development Project Loan Package.

It is anticipated that traditional centers of commercial activity such as the Carriedo Area, Binondo (Escolta) and the Recto Area can regain their importance with improved accessibility. At the same time, it is expected that the absorptive capabilities of these old districts will be strained by the imminent redevelopment and the consequential introduction of more urban activities.

With the recognition that mass transit systems exercise a strong influence on urban development, an initial step towards the formulation of a comprehensive urban land policy in a metro-wide context is then taken. Two pilot sites around two LRT stations have been identified and assessed as to their redevelopment problems and potential.

## OBJECTIVES OF THE STUDY

With the main objective of formulating a comprehensive urban land policy for the entire Metropolitan Manila Area in mind, *specific objectives* that are deemed to go hand in hand with the main objective, have been formulated. They are as follows:

1. To promote the development of idle, under-utilized and blighted properties in Metro Manila.
2. To enhance the commercial potential generated by the LRT especially in the immediate vicinity of Doroteo Jose and Blumentritt stations.
3. To be able to encourage the undertaking of pilot projects that will help improve the administrative and technical capability of the Metro Manila Commission.
4. To be able to delineate the roles and functions of government agencies or institutions and private groups which may be involved in the redevelopment of key areas in the LRT Corridor, specifically in the Doroteo Jose/C.M. Recto/Bilibid Area and in Blumentritt.

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\*Excerpted from a report of the same title & edited for publication with permission from the Metropolitan Manila Commission.

## PREVIOUS AND ON-GOING RELATED STUDIES

Various studies are related to ULMS; they have either been recently concluded or are still on-going. These are the following:

### 1. "Urban Consequences of the LRT"

This study analyzed prevailing conditions along the LRT corridor and presented tentative approximations of how such conditions will change as influenced by LRT. It also identified five (5) major *planning areas* which can be studied by MMC, namely:

- The Northern Terminal Area.
- The Rizal/C.M. Recto/Doroteo Jose areas including the Old Bilibid Prison area.
- The Rizal/Carriedo junction including FEATI Building and the Pasig River shore.
- The Central Terminal including the area bounded by Arroceros and Pasig River.
- The Southern Terminal area along Taft Ave. Ext.

### 2. The MMUTSTRAPP Study

This study which is called Metro Manila Urban Transportation Strategy Planning Project (MMUTSTRAPP) is mainly concerned with *transport terminals* and has identified Blumentritt (one of the two selected areas of this study) as one particular critical area, where a railway, a large number of jeepney routes and the LRT will intersect. This study was initiated by the Ministry of Transportation and Communications (MOTC) in 1982 and is now on its second phase.

Joint meetings between the MMUTSTRAPP and the ULMS groups have been conducted enabling the ULMS group to develop and adapt the MMUTSTRAPP recommendations to fit the specific objectives of the ULMS.

### 3. The JUMSUT Study

This study known as JICA Update of Manila Studies on Urban Transport (JUMSUT), also undertaken by MOTC, has looked

into *transport-planning issues* in the entire Metropolitan Manila Area. Recently, information has been received that the next project phase is considering to look into transport-planning aspects of the Recto Area (also one of the two selected areas of this study).

The involvement of JUMSUT in detailing transportation aspects in the Recto Area would be most welcome, especially because transport interchange is one of the most important elements of the planning and design concept for the Recto area.

### 4. The Recto Central Park Project (RCPD)

On February 14, 1979, the Human Settlements Development Corporation (HSDC) was designated to control and administer the Old Bilibid Compound in a contract issued in their favor by the Ministry of General Services (MGS). In this respect, the Recto Central Park Project (RCPD) was put up leading to the conception of the development plan for the area. HSDC, then, initiated the relocation of facilities utilized by other government offices in the area, namely: Bureau of Telecommunications, Bureau of Records Management and Bureau of Prisons in preparation for the implementation of Phase I of the approved development plan.

When HSDC has started the implementation of the development plan, it caught the interest of the private developers representing anchor commercial establishments such as Gotesco and Shoemart. This interest was concretized when a Contract of Lease was executed between HSDC and Consolidated Ventures, Inc. (Gotesco) last December 1979 for the use of 9,036 square meters in the area. However, the intended use of the area did not materialize because issues for the provision of access/frontage to the area have not been resolved. Meanwhile, another proposal was submitted by Shoemart and Gotesco for a joint undertaking in the area and is still awaiting the decision of the HSDC Management.

In undertaking the development plan, HSDC was faced with various *constraints* that have impeded the implementation of the project, mostly pertaining to the following:

- Funding for the relocation of the lock-up jail
- Issues on illegal occupants
- Issues on occupants with pending cases in court
- Issues on how to provide access/frontage to the area

## PRE-SELECTION

With the formation of a study group consisting of consultants from the Electrowatt Engineering Services, Ltd. and the Technical Staff of the Metropolitan Manila Commission, a discussion of the general *urban characteristics and the development potentials* of each of the eighteen (18) stations was conducted. The study group then agreed to shortlist the number of *priority areas* to seven (7) (see Table 1). The list is as follows:

- South Terminal
- Buendia/Libertad
- Central Terminal
- Carriedo
- Doroteo Jose /Old Bilibid
- Blumentritt
- North Terminal

The three (3) terminals function as points of interchange and will surely generate related urban activities. As such, they offer greater opportunities for urban development. This potential is further reinforced by the availability of sizeable plots either privately or publicly owned in the area. The locational advantages of the areas around the terminals are too apparent to be overlooked by leading urban developers. In fact, for each of the three terminals, there is at least one major shopping complex integrated with the LRT station and is ready for implementation. At the *South Terminal*, Galleria Baclaran Shopping complex will be constructed above the LRT layover area and will connect to the mezzanine level of the terminal. At the westside of the terminal, two other property owners have plans to develop. At the *Central Terminal*, Rustan's shopping complex will occupy the entire Mehan Garden and will likewise integrate with the terminal at the mezzanine level. At the *North Terminal*, the Cecilio Apostol Elementary School will give way to the construction of Gotesco shop-

ping complex which will connect to the eastside passenger handling area and at the intermediate landing of the terminal.

*Buendia* and *Libertad* are two urban nodes that are very proximate to each other, as such, were treated as one study area. Note that this area is not in the list of the planning areas recommended in the "Urban Consequences of the LRT". The Study group, however, considered this area on the basis of its high pedestrian density, particularly in the vicinity of Libertad Public Market and Buendia's potential to develop as a transfer point in the future.

Among on-line stations, Carriedo is expected to have one of the highest passenger volumes as it lies in the core of Manila's Central Business District. The importance of the area will further be boosted by the proposed redevelopment of the former site of Isetann and President's Hotel, the buildings that gave way to the construction of the LRT.

Like the Buendia/Libertad area, the *Doroteo Jose/Old Bilibid* area was considered because of its possibility as an interchange. At the same time, the proximity of an available land for redevelopment, the Old Bilibid Prison area, occupying 6.5 hectares of land which has been lying idle for years, makes land consolidation prior to urban redevelopment less of a problem.

*Blumentritt* was especially considered for its unusually high pedestrian density and business intensity occurring in a heavily blighted physical setting.

The *North Terminal* is very near a major transport node — EDSA and Rizal Ave. In its immediate vicinity is the Victory Liner Compound, one of the largest bus terminals in Metro Manila. The urban redevelopment momentum of the area is expected to accelerate with the purchase of the Cecilio Apostol Elementary School site by the owners of the Gotesco chain of moviehouses and Ever Emporium.

## FINAL SELECTION

The seven (7) study areas in the shortlist were further subjected to evaluation in terms of the following criteria to which weights were assigned by the group:

- **Intensity of Land Use**

This is normally measured in terms of total floor area to lot area ratio. The concentration of tall buildings around a particular

Table 1 – Evaluation of LRT Stations/Terminals

	28	24	20	16	12	8	4	
	INTENSITY OF LAND USE	EXPECTED ECONOMIC YIELD	IMPACT ON URBAN RESTRUC-TURING	LAND- OWNERSHIP	EXISTENCE OF COMMUNITY ACTIVITIES	STRUCTURAL CHANGE IN THE PAST	ANTICIPATED CHANGE AFTER LRT	TOTAL POINTS
RECTO/BILIBID	28 High	18 Med. to high	20 High	16 One large Gov't. property rest private fragmented	12 University belt close by markets	2 Very low	4 Few private individual together with Bilibid, high condition- frontage	96
NORTH TERMINAL	21 Med.	18 Med. to high	15 High	12 large priv. no public	6 B and J term	8 High self dev. force	4 High	84
CARRIEDO	28 High	24 High	5 Low	4 mostly priv. fragmented	12 Market Churches	4 Structure med.	4 Yes, high but only on ind. plots	81
CENTRAL TERMINAL	7 Low	18 ex. low frnt-high under cond.	20 high	16 large public no private	6 city hall Met. Theater Intramuros	2 low	3 high, depends on dev. plans	72
SOUTH TERMINAL	7 v. low	12 med.	10 med.	12 4 large priv.	6 Baclaran Church Public market B & J term	2 low	4 high, 4 big plots (2E,2W)	53
BUENDIA/ LIBERTAD	14 med-low	12 med.	5 low	4 Mostly priv. fragmented one large public market, newly built	3 Market	4 Med-low	2 Med.	44
BLUMENTRITT	7 low	12 med.	5 low	4 fragmented small plots private	6 railway, jeepney Terminal Bus	2 Very low	1 small indi- vidual only interchange with PNR, prob. low effect	37

station would, therefore, yield a high land use intensity. A reliable tool for analysis is the plot size and building height map. Generally, pedestrian density is expected to be high whenever the land use intensity is high. In exceptional cases, however, as in Libertad and Blumentritt areas, pedestrian density is extremely high in spite of the proliferation of low structures. This can be attributed to the presence of public markets whose functions are limited to a neighborhood level and to the dominance of sidewalk/street vending activity. This criterion was given the highest weight of twenty-eight (28) points.

● **Expected Economic Yield**

This is determined by the floor space demand, the types of business or activities occupying floor space, the land's and rental values that prevail in relation to building cost.

Conservative developers would therefore safely expect a higher economic yield in an area where land use intensity is already high instead of pioneering investments in a relatively underdeveloped but already built-up urban area like Blumentritt. Likewise, areas where a rapid urban change is occurring are expected to have a high economic yield.

The study group conducted a land use survey, interviews of shop owners and vendors, and researched on the current rental rates and land values from the City Assessors and from realtors. Classified as second in the ranking, expected economic yield as criterion has a weight of 24.

● **Impact of Urban Restructuring**

This is dependent on the following factors:

- i) availability of vacant lots (not completely built-up)
- ii) consolidation of land ownership (either private or public)
- iii) extent of dilapidation of buildings
- iv) land use intensity
- v) rate of urban change

The actual conditions of the above factors are clearly documented in the land use maps, cadastral maps, structural quality or building conditions maps and building height maps and

the rate of urban change map which shows both the functional changes and the physical changes that have transpired in the area. In the absence of vacant properties in what are considered "soft" areas where the existing structures are low and/or dilapidated, demolition is a likely alternative. In "hard" areas occupied by tall buildings made of more permanent materials, the possibility of urban restructuring will be little. This criterion has a weight of twenty (20) points.

● **Land Ownership**

Single ownership of a sizeable plot is an advantage for urban development. A consolidated land allows more urban design flexibility in terms of introducing primary and secondary activities or uses and providing an efficient linkage between such activities. Consequently, a large scale development will have a strong catalyzing effect on its surroundings. On the other hand, fragmented lots under various ownerships will have a constraining effect on urban redevelopment. The weight assigned to land ownership is sixteen (16) points.

● **Existence of Community Activities**

The existence of community activities exerts a strong influence on the urban growth of a particular area. The University Belt, for instance, has spawned several bookstores and dormitory houses. In the same way, the line of moviehouses along Rizal Avenue and the concentration of large department stores are the major magnets that have drawn further ancillary activities in downtown Manila. In Libertad and in Blumentritt, the presence of public markets has resulted into an intense pedestrian activity. An efficient linkage with these community facilities/activities will help insure the success of any redevelopment project. This criterion has twelve (12) points.

● **Structural Change in the Past**

This can be determined through interviews with realtors, developers, residents and local planners who are familiar with the urban growth of Metro Manila. It has been observed in the Monumento area, for instance, that once new major projects are started, redevelopment

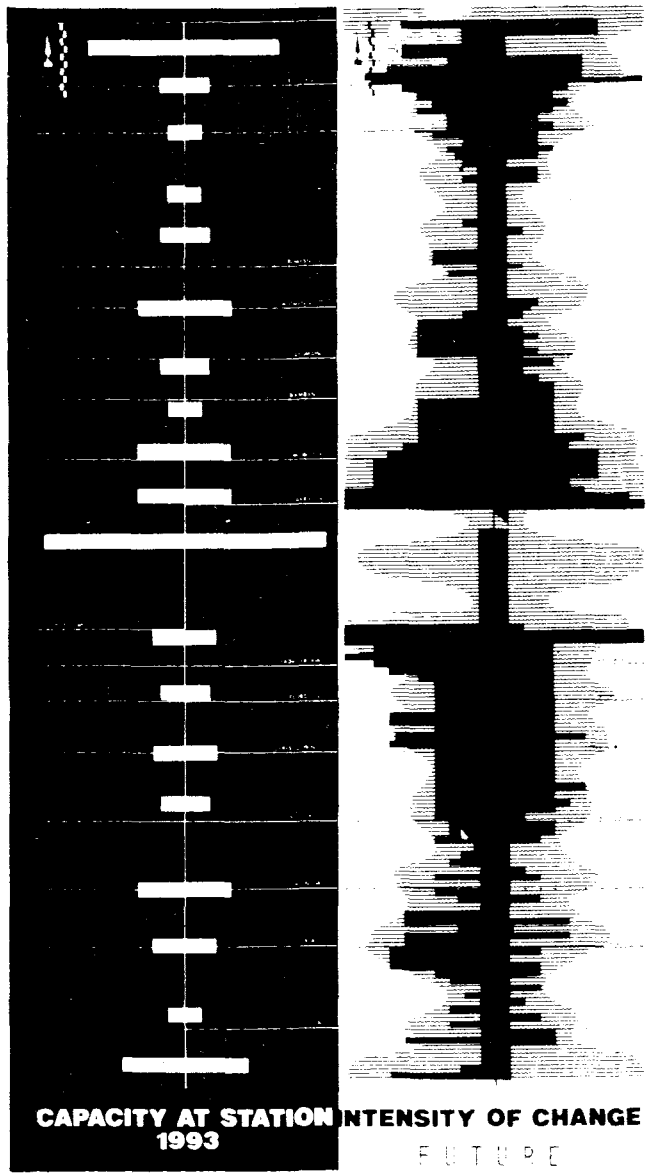


Fig. 1 URBAN CONSEQUENCES OF THE LRT. This study done in 1981, projected the intensity of development along the first METRORAIL Line. A strong correlation between station capacity and expected development is noticeable.

tends to accelerate further. In contrast, blighted areas such as Blumentritt and Baclaran tend to stagnate further because most of the building owners are not interested to make the first move towards rehabilitation. In some areas, changes occur but in a very limited scope making redevelopment unable to gain momentum.

The building age and building condition maps graphically show how much urban changes have occurred in the past.

Eight (8) points is assigned to this criterion.

● **Anticipated Change Brought by LRT**

This criterion is directly related to the previously mentioned criterion and will, admittedly, demand a highly subjective judgment. This criterion, therefore, requires a knowledge of existing and proposed projects of both the private developers and the government agencies and a study of other sites with the the biggest potentials for development. A clear identification and description of all factors affecting urban growth can then be made for a closer approximation of what is most likely to occur in the future. The study group assigned four (4) points to this criterion.

**EVALUATION RESULT**

The application of the seven (7) criteria described above has established the following priority rankings: (See table 1)

● Doroteo Jose/Old Bilibid	96 points
● North Terminal	84 points
● Carriedo	81 points
● Central Terminal	72 points
● South Terminal	53 points
● Buendia/Libertad	44 points
● Blumentritt	37 points

The evaluation result is tabulated hereunder in Table 1. In order to obtain some interesting results, the study team has made a fairly unorthodox choice: instead of selecting the two highest ranked areas, it has selected the *highest* and the *lowest ranked*. The reader of this report will find that one important proposition (namely, the creation of a development fund) is entirely due to this choice.

These sites serve as realistic case studies to test critical issues of land management. They are typical examples of the many other urban

areas, where underutilization and decay contrast with strong potentials for redevelopment.

Blumentritt has been specially singled out as a study area because of the following reasons:

- Blumentritt is unique from the rest of the study area in the sense that it is a traditional residential neighborhood transforming slowly into an urban sub-center. The high pedestrian density and the concentration of ten (10) major banks attest to this.
- With the highly fragmented land ownership structure and the uncoordinated efforts of property owners, on one hand, and the various government agencies concerned with public facility improvements, on the other hand, Blumentritt will continue to decay, if left without government intervention in the form of urban land management.
- With the selection of both the highest ranked and the lowest ranked areas for redevelopment, the proposals and approaches, being varied for the two sites, will yield a contrast of effects and consequences. Such extreme diversity will provide good bases from which proposals for varied types of development/redevelopment related to LRT can be drawn.
- The availability and integrability of the development of the PNR airspace with the LRT station makes the Blumentritt area a more attractive development.
- Blumentritt may not have the greatest potential for commercial redevelopment but it will definitely serve as an interesting test case for land consolidation, institutional coordination and development syndication which could help develop the in-house capability of MMC's Urban Land Management Team in these fields.

**COMPARISON BETWEEN THE RECTO/BILIBID AREA AND THE BLUMENTRITT AREA**

The *Recto/Bilibid Area* and the *Blumentritt Area* have contrasting urban characteristics but both are in need of and have the potential for redevelopment.

Both areas enjoy locational advantages in terms of transport interchange development: *Blumentritt* being in an important urban junction traversed by about seventeen (17) jeepney



routes and *Recto/Bilibid* being very proximate to the Doroteo Jose LRT station with 6.5 hectares of land available for redevelopment.

*Recto/Bilibid* has undergone both functional and physical changes while *Blumentritt* has not shed off its residential character inspite of the intense commercial activity. Both areas are now showing signs of decay with *Blumentritt* in a more advanced stage.

Both areas are heavily built-up. Land utilization is not considered rational and optimal. In *Blumentritt*, the PNR track cuts through prime commercial land and its airspace is not utilized. In *Recto/Bilibid* the large Old Bilibid Prison site has become incompatible with the other land uses.

Land ownership is highly fragmented in *Blumentritt* whereas large landholdings, aside from the Bilibid site, exist in *Recto/Bilibid*.

In both areas, there are no significant urban developments, if at all, these are limited to a stall by stall refurbishings.

Pedestrian density and business activity in *Blumentritt* are almost as high as in *Recto/Bilibid* indicating that building height is not the only measure of the intensity of economic activities.

## ALTERNATIVE CONCEPTS FOR IMPLEMENTATION

The different stages of a realty development project may take different arrangements. Thus, options are available on the disposition of land, on the occupancy rights of the premises and on the parties concerned to construct and own the buildings, to finance the construction of the buildings, to implement the development and to manage the premises upon completion of the construction works.

### *Disposition of Land*

There are different ways of disposing land such as sale, lease, a combination of sale and lease, and joint venture arrangements.

In a general situation, sale and lease gives the Project Owner/Manager (the government agency in this case) flexibility in the financial operations.

Some portions of the property can be sold, others leased, depending upon the present and projected cash flow of the project, its land ownership policy and marketability of the sites.

In a sale arrangement the Project Owner/Manager cedes the title of the land. The *sale* may be either in cash or installment.

In a *lease* arrangement, the one who will make use of the land obtains the right to use the property through periodic payments for the entire duration of the contract. The land user or lessee as part of the arrangement, may obtain the right or option to subsequently purchase the land, usually, at a pre-agreed price. Some or all of the rentals paid up to the time the option is exercised may be considered as part of the purchase price.

In a *joint venture* arrangement, the land owner and the one who constructs a building thereon become joint owners of both the land and the building.

### *Party to Construct the Building*

The building in the development project may be constructed and, initially, (at least) owned by the *government agency*, or by a *developer* who constructs the building for sale or lease to others, or by an *anchor enterprise* which will use all or big part of the building or by several small enterprises.

In the case of government projects, the most preferred parties to develop the projects are the anchor enterprises because they are the ones who can handle big building projects due to their ability to sell, lease, or use huge building spaces.

### *Occupancy Rights of Premises*

The occupant of a building or a building unit may be the *owner* or just a *lessee*, with or without an option to buy.

If the building is constructed by an anchor enterprise, then most of the spaces shall be owned and occupied by that enterprise. If the building is put up by a developer, the spaces can either be owned or leased by tenants, depending upon the developer.

### *Financing*

The party constructing and initially owning the building may resort to any of the following financing sources or any combination of them:

- Self-financing or equity financing
- Rental rights with advance payment

- Sales deposits as part of the total selling price
- Loan

If the construction is to be financed one hundred percent (100%) by a loan and the building is to be rented out, the receipts from rentals during the initial years are usually not enough to pay for the loan interest and amortization and they are unreliable, being dependent on the response of the tenants, hence, a substantial part of the financing has to come from the equity capital.

Sales deposits can be required if the developer is reputable and the project is deemed highly viable by the investors. These can help raise the capital.

#### *Project Management*

If the *Project Owner* is in the business of project development, he usually handles the project management, otherwise, it is better done by a professional project management group under contract with the Project Owner. The other possible parties who may handle the job are: a firm newly organized by the Project Owner or a group jointly organized by future owners/tenants. The first is advisable if the Project Owner plans to undertake several land development projects. The latter is usually not recommended due to the lack of cohesiveness of the members and their inability to cope with the complexities of a project management job.

#### *Operations Management*

The different groups who may handle the operations management are: an association of the owners/tenants, a private group engaged in project operations management business or the government's implementing agency. The first option seems to be the most practical if this is acceptable to the owners/tenants. The second option shall be resorted to only if the owners/tenants cannot agree on the management structure of the association. The last one is not advisable since the agency will be tied down to a purely housekeeping job. Its effort should be directed to the development of the rest of the project area.

### ALTERNATIVE CONCEPTS FOR THE IMPLEMENTATION OF THE RECTO/BILIBID PROJECT

Since the recommendation in this section is for a private party to construct the building, alternative concepts on occupancy rights of premises, financing and management are no longer discussed since these will be decided by the private party.

#### *Disposition of Land*

It is recommended that the government acquire the access road and private areas, clear the land of occupants, subdivide the land into a number of parcels and sell for cash. If the agency encounters difficulties in selling for cash, it may sell on an installment basis or lease some of them, initially. If the agency does not need much cash for the first few years, it may sell the initial sites to provide the funds for development. Subsequently, land may be disposed on a lease basis.

A variation of the above-stated system can also take any of the following forms, provided, the necessary clearing and acquisition of the access road and private properties are accomplished:

- The government agency shall form a joint venture with other parties, with the government agency contributing the land and the other parties putting up the improvements. The joint venture shall then sell and/or lease the buildings or the spaces therein. The disadvantage of this set-up is the conflicting interests of the joint venture participants in subsequent decision on composition of management, declaration of cash dividends, expansion programs, use of funds, and other major matters.
- The government agency shall put up the improvements on the land, and sell/lease the buildings or the spaces therein. This alternative requires heavy funding and may be resorted to only if the agency can source the funds and get commitments from others to buy the building.

From the viewpoint of the developer, an outright purchase gives them the biggest leeway in project management, thus enabling them to

have an efficiently developed and operated business.

- Outright purchase gives them higher leverage in obtaining financing.
- Outright purchase gives them a continuous and uninterrupted use of property.

One possible disadvantage of sale, from the developer's perspective, is that it requires so much initial cash. Therefore, the area has to be sub-divided and its sale and developments be phased.

If no firm is willing to purchase the lots for cash, specially the ones in the first phase, they can either be sold on an installment basis or leased. The government agency has to clear the land prior to disposal because the private sector is hesitant to undertake the clearing due to the legal complications involved which may increase their risk and delay their implementation time table.

#### *Construction of Buildings*

If a developer constructs the buildings for lease, the rental income for the initial years is not enough to service the loan even at a low interest rate of 24%. Hence, it is necessary that the developer has an adequate equity capital to substantially, if not fully finance the project. This condition (low initial return) also precludes the government agency from being the owner of the building for the first few phases due to the cash capital requirement. Pre-selling a big part of the building can augment the capital needed to construct the building.

An investment of P205,000,000 on Site A (land for P62,000,000.00) and buildings for P143,000,000.00) will yield a net profit, before interest and income tax, equivalent to only 8% of the investment in its first year. Thus, for the initial years, the net profit is not even enough to cover the interest of the investment, if fully financed by a loan.

#### *Alternative Strategies*

A number of alternative methods of integrating the project area prior to development is

possible. Two of these are as follows:

- The present owners retain ownership of their properties but these shall be subject to the rules of the project.
- The application of the land readjustment concept wherein the present owners contribute their land to the pool. The entire area is then resurveyed and resubdivided with the present owners ending up to own a portion of the resubdivided property which may not be the same as their original holdings in terms of actual location. Adjustments in value area done and the difference that arises between the value of the original holdings and the value in the readjusted site is settled in cash.

### **ALTERNATIVE CONCEPTS FOR THE IMPLEMENTATION OF THE BLUMENTRITT PROJECT**

#### *Construction of Buildings*

The PNR airspace is more suitable for small stalls than big establishments due to its limited area. Since it will be subdivided into several small spaces, it is likely to be leased to various store owners by the investors.

Maximum participation of other parties in this development should be encouraged so that the implementing agency can reserve its resources to other critical projects wherein private participation is not likely.

#### *Institutional Arrangement*

The developer shall deal directly with the PNR as the owner of the air rights, and with the LRT Authority and PGH (Philippine General Hospital) Foundation for the LRT station link-up.

The management agency shall only be concerned with the formulation and compliance monitoring of general development guidelines. It may also serve as adviser to the PNR in the latter's dealings with the developers.

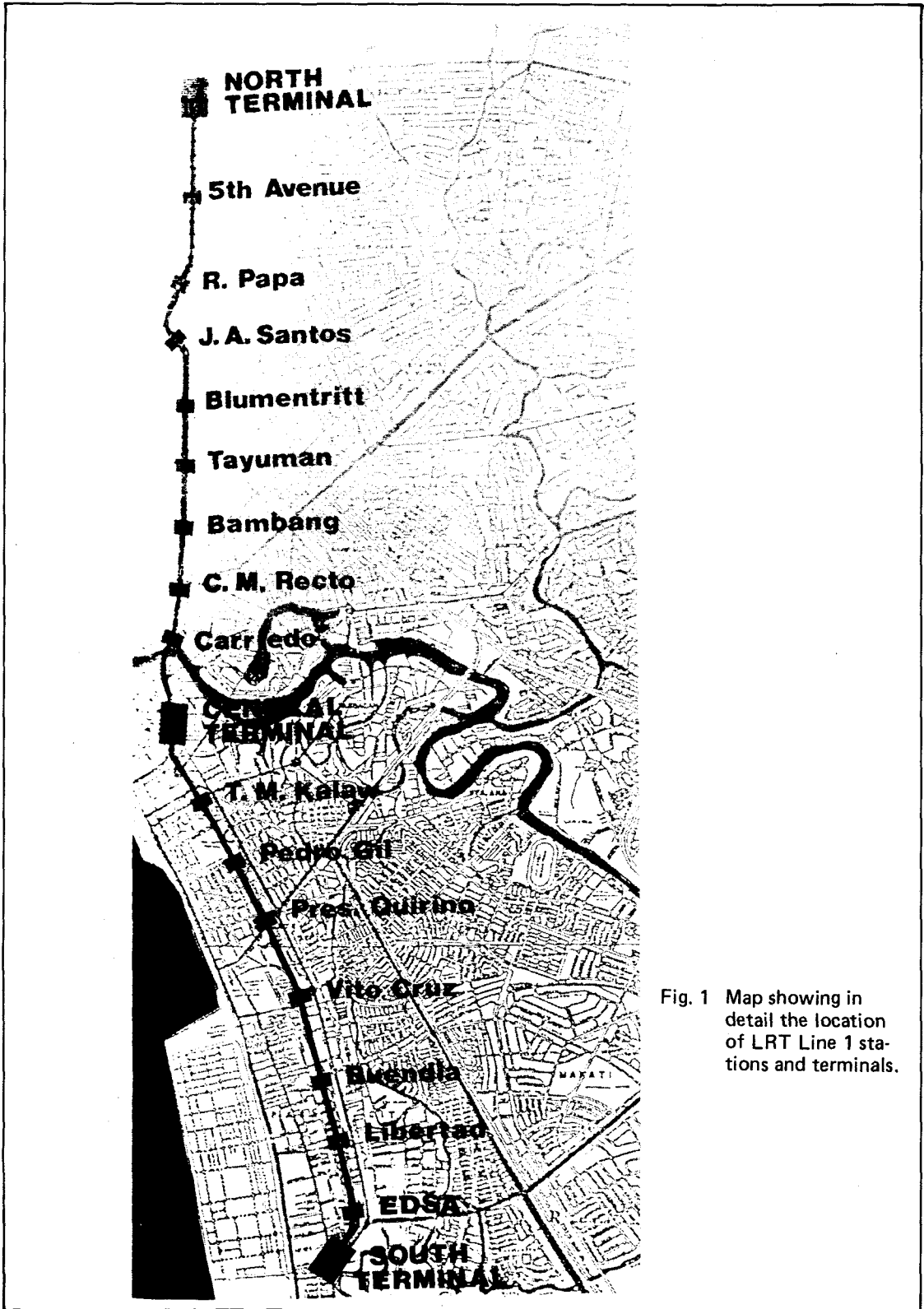


Fig. 1 Map showing in detail the location of LRT Line 1 stations and terminals.

INDEX TO ARTICLES IN THE PPJ  
1980-1985

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INTRODUCTION

The Philippine Planning Journal during the past 20 years has been publishing articles within the field of urban and regional planning. As the official journal of the School, it has provided planners and decision-makers alike with concepts and issues pertaining to Philippine development.

This is the third in the series of indexes. It includes articles appearing from 1980 to 1985.

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"The LRT as a Component of Metro-Manila's Transport System" uses the data/reports of the following projects: Metro Manila Urban Transport Improvement Project (MMUTIP), JICA Update of Urban Transportation Strategy Planning Project (MMUSTRAP) and Traffic Engineering and Management Office (TEAM) for an indepth treatment of the primate city's transport system.



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