社会開発協力部報告書

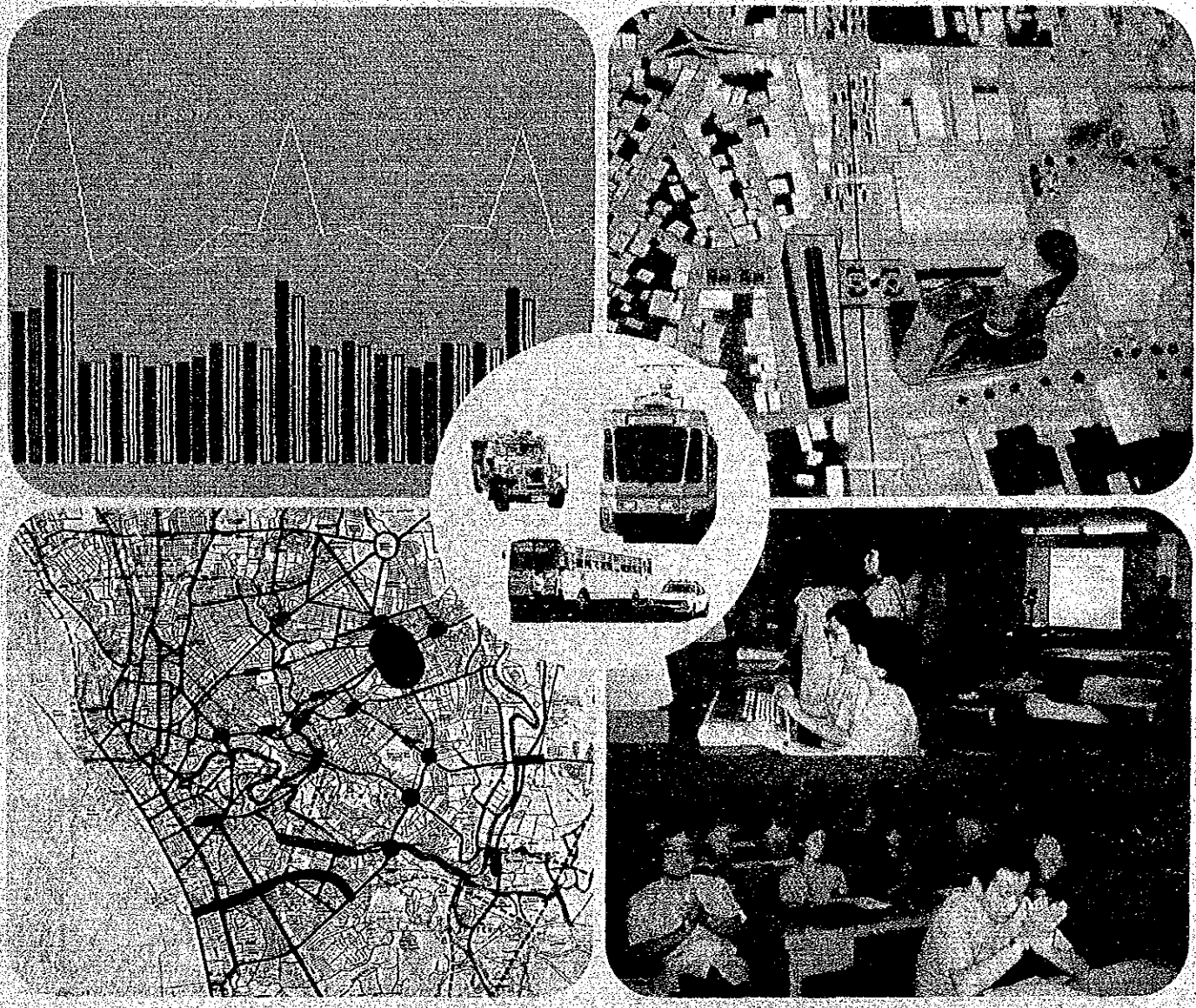
REPUBLIC OF THE PHILIPPINES No. 51

JUMSTP

The Metro Manila Transportation Planning Study Phase II Final Report

TECHNICAL REPORT

Divisoria Mode Interchange Area Study



SEPTEMBER 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

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1.0 THE PROJECT SCOPE

1.1 DIVISORIA IN METRO MANILA

A bustling market district located in the west side of Metro Manila, Divisoria, is bordered by the Pasig River and North Harbor. Similar to Quiapo, Divisoria continues to exist as a traditional commercial and business center quite unlike the more modern and privately-developed complexes of Cubao and Makati.

Divisoria, per se, connotes different things to different people which makes it a subject of great interest. Its diversity is reflected in the contrasting feature of its north and south sections. The northern section is basically a wet market (fish, meat, fruits and vegetables) where everything is handled by individual sellers. In this particular section also, the market proper almost always extend to the main roads, nearby sidestreets and sidewalks. The southern section's business activities, on the other hand, are dominated by Chinese wholesale traders. However, there are a number of retailers and small businessmen plying their trade in the surrounding areas.

That commerce thrived and grew in the area could be attributed to its accessibility and proximity to the Port. One can reach Divisoria by water transport through Pasig river and North harbor; by land transport through numerous main and minor arteries, like C. M. Recto; and by rail through PNR's Tutuban station. In recent times, the access to Divisoria has suffered quite a bit because of traffic congestion and yet, because of the historical momentum and its image of bargain prices, it continues to draw the crowds.

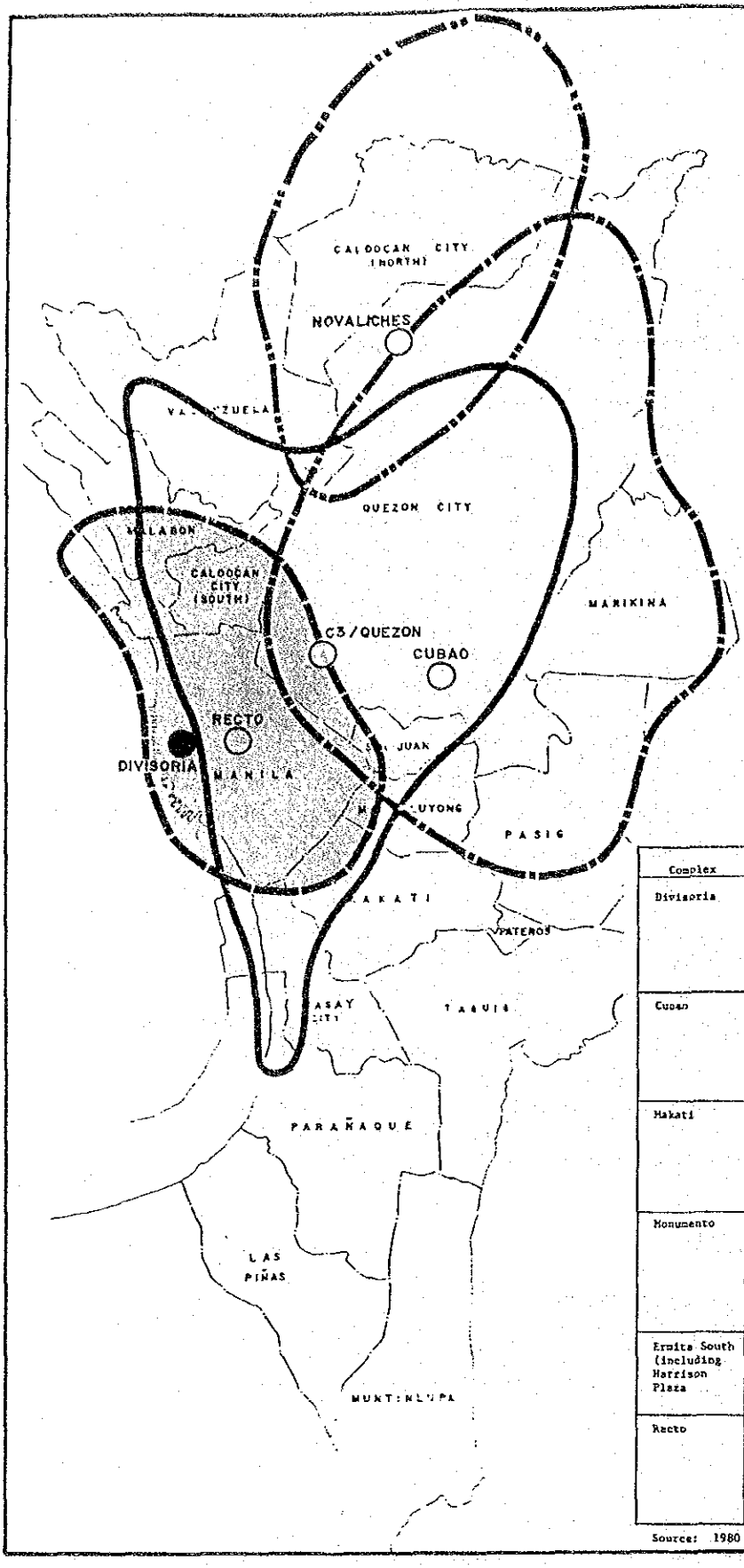
Based on the 1983 HIS, the influence area of Divisoria appears small, as shown in Figure 1.1, but its highly dense population provides a large market to the commercial activity therein.

1.2 BOUNDARY OF STUDY AREA

For analytical or planning reasons, the study area was delimited to the approximate perimeter shown in Figure 1.2. This boundary extends approximately 1.8 km. from east to west between R-10 and J. A. Santos, and also 1.8 km. from north to south between Pasig River and Moriones.

1.3 JUMSUT II'S BRIEF ON DIVISORIA

Divisoria is one of the most important, if not leading, commercial/business centers in Metro Manila. The progress of the area and its industries are hampered by an indistinct road hierarchy. Accordingly, JUMSUT II aims to undertake a feasible plan for the



Characteristics of Commercial Complex/Areas in Metro Manila

Complex	Characteristics	Access Transportation Mode 1/
Divisoria	* traditional development of the old Manila * mixture of commercial and business activities induced by the busy ports of entry * no room available for new development except redevelopment	public 78% private 22%
Cubao	* non-traditional planned development with no associated planned residential zones * mainly commercial activities * further growth can be expected through denser development/redevelopment	public 72% private 28%
Makati	* a modern Western-type planned development with corresponding planned residential neighborhoods * commercial and business activities * intensive development still in progress though at a decelerating pace	public 54% private 46%
Monumento	* mainly traditional development similar in character to Cubao and Carriedo * mixture of commercial and business activities * not much room is available for future growth in the absence of a single large developer	public 83% private 17%
Ermita South (including Harrison Plaza	* mixture of non-traditional and traditional development * mixture of commercial and business activities * little room for new development	public 63% private 37%
Recto	* traditional development that coasted along Quiapo's pace * mixture of commerical and business activities with no focus * a large block of land for development available but at tremendous constraints	public 86% private 14%

Source: 1980 HIS results

LEGEND:

CUBAO ○
RECTO ○
DIVISORIA ●
NOVALICHES ○

0 1 2 3 5 8 KM

Figure 1.1
Catchment Area of Selected Major Commercial and Business Complex/Area

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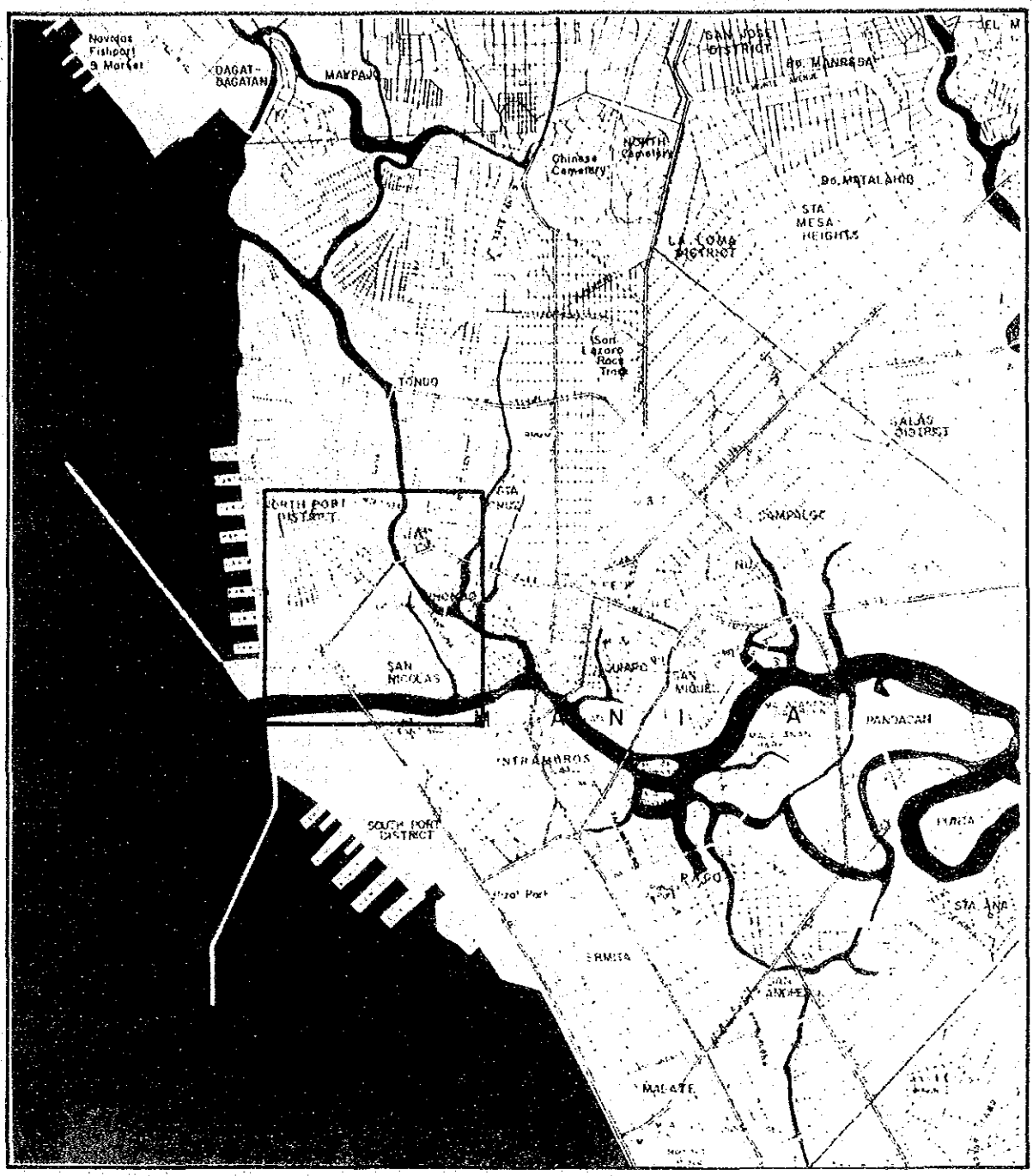

LEGEND:

STUDY AREA

0 500 1000 2000 m

Figure 1.2
Study Area

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Divisoria MIA directed at optimizing the use of present public transportation, its support system, general traffic movements, and at refining other vital functions. Three main themes were perceived as crucial to accomplish such tasks:

a) Reinforcement of the critical functions of C. M. Recto and Juan Luna relative to R-10 to increase the efficiency of through traffic and to augment accessibility to the area.

b) Improvement of internal traffic to support the commodity flow and its complementary facilities.

c) Improvement of requisite public transportation systems and its functions in answer to serious direct and indirect traffic problems.

Pertinent to the preceding frame of reference, JUMSUT II will re-examine the following areas in detail and propose, viz.:

a) Rerouting of public transportation in Divisoria. Proposals to rationalize the public transportation routes and traffic flow will be made.

b) Improvement of road utilization along C. M. Recto. Proposal made by MMUTSTRAP will be reviewed and expanded.

c) Effective utilization of sidestreets. Related recommendations concerning the north side of C. M. Recto area as forwarded by MMUTSTRAP will be reviewed and extended.

d) Improvement of pedestrian movement. Proposals made by MMUTSTRAP will be reviewed and examined based on new data vis-a-vis public transportation passenger flow and rerouting schemes.

e) Development of integrated mode interchange area facilities. Potential terminals to be recommended over the long-term, will be outlined.

2.0 THE PRESENT SITUATION

2.1 LAND USE, SOCIO-ECONOMIC AND COMMERCIAL CHARACTERISTICS

2.1.1 Land Use

The Divisoria study area is predominatly a highly dense commercial and residential development (Figure 2.1). Its economic base of retail and wholesale operation extends from the Pasig River to Lakandula in Moriones. The wholesale trade and its ancillary activities are carried out in storehouses that also serve other uses. Divisoria, typifies the multiple land uses apparent in old town centers.

Another notable feature of the area is its row of warehouses located along Estero de Binondo, the Pasig River, Juan Luna, Dagupan and A. Rivera streets.

The residential zone is located in the western and northern parts. Characterized by high density, it is populated by low-income households living is small houses and shanties close to each other. This is more prevalent in the western section of Divisoria, otherwise known as the Tondo Foreshore Project area. Squatters converge along the Pasig River and Estero de Binondo.

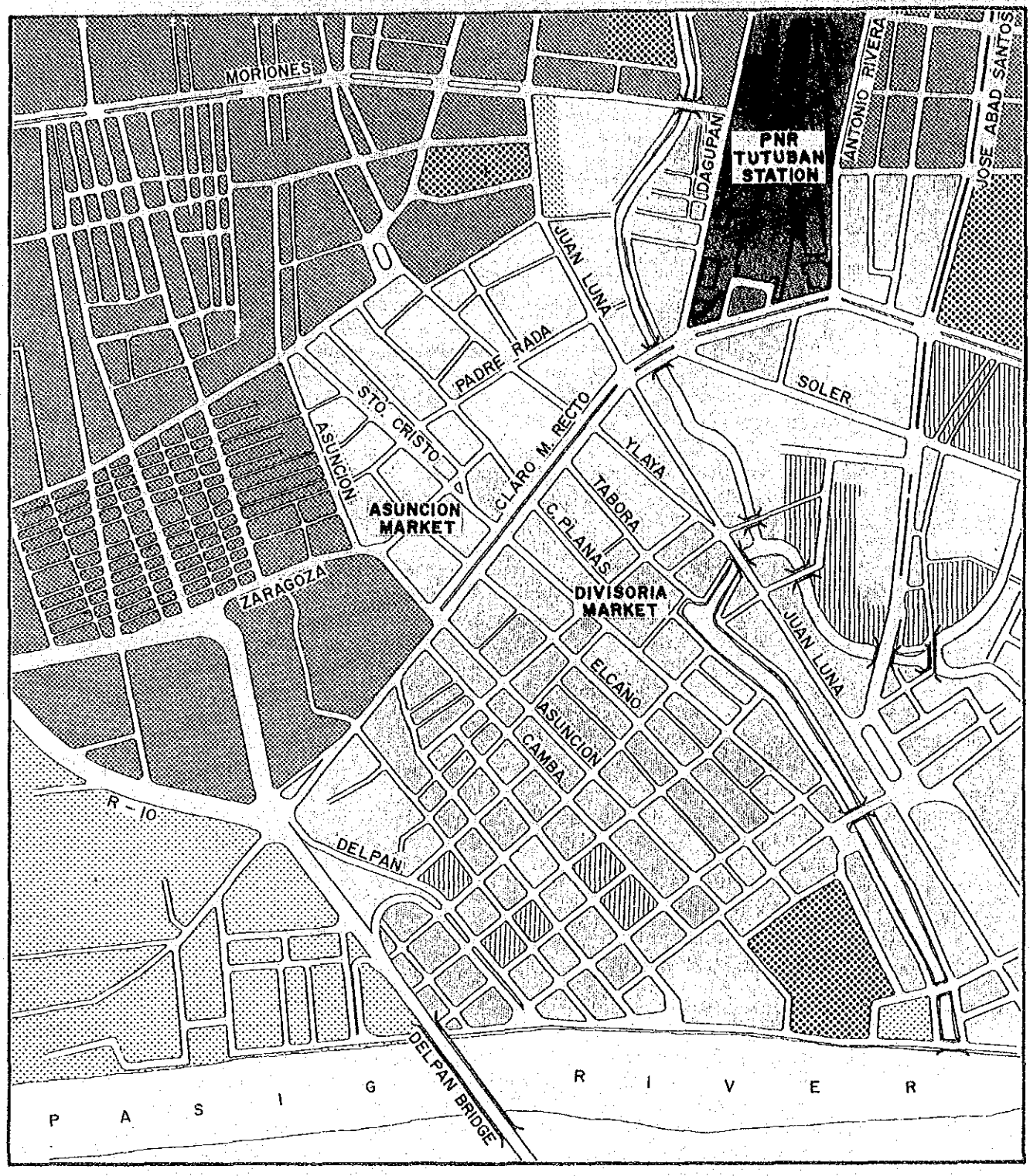
The industrial zone, on the other hand, is based around Del Pan. Large factories like the San Miguel Corporation are established in the western part. Its main attraction is its proximity to North Harbor. The continued growth of port traffic has created demand for more space which the Philippine Port Authority (PPA) has chosen to provide.

However, because of the electric build-up through the years, the potential for new land development is nil - except for one relatively vacant block.

2.1.2 Socio-Economic Characteristics

Divisoria is divided for analysis into 5 zones as shown in Table 2.1 which also outlines the various socio-economic indices. While one zone situated in the northern part of C. M. Recto is mainly residential, the other zone in the southern part is primarily commercial and business. This is further manifested in the ratio daytime population to nightime where in Binondo has 3.3 compared to 0.7 in the northern zones.

On the average, there are 588 persons/hectare with Zone 10 (especially along Juna Luna) exhibiting the lowest population density, and Zone 9 (along Del Pan) the next since it is mostly an industrial area. Among all zones, San Nicolas (Zone 9) has the biggest number of workers (at 31.2 thousand) primarily engaged in wholesale trading activities.



LEGEND:

- RESIDENTIAL (MEDIUM DENSITY)
- COMMERCIAL (MEDIUM DENSITY)
- COMMERCIAL (HIGH DENSITY)
- INSTITUTIONAL (LOW DENSITY)
- FACTORY
- TUTUBAN PNR STATION
- PARKS AND OPEN SPACE

0 50 100 300 M

Figure 2.1
Existing Land Use

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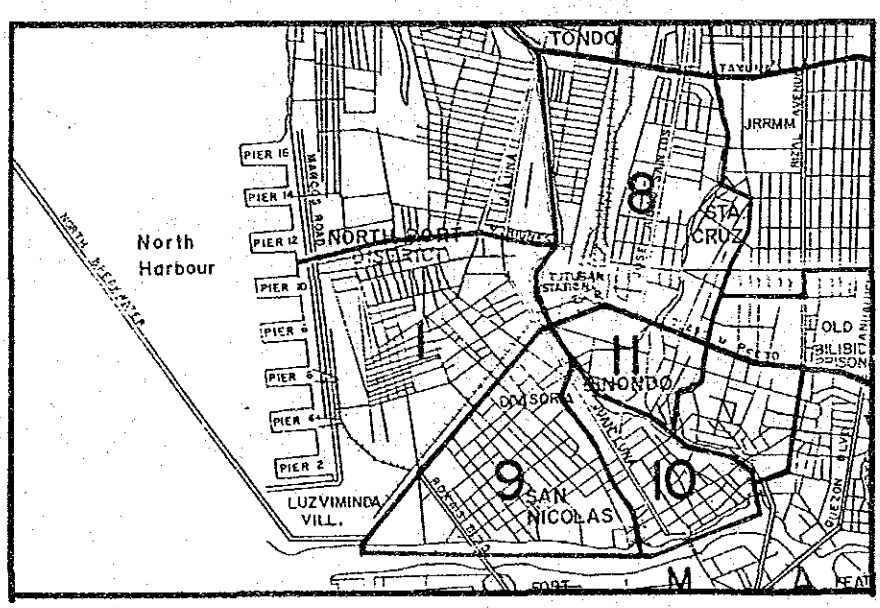
Table 2.1
Characteristics of Divisoria
Mode Interchange Area

		HIS 202 Zone[1/]				
		1	8	9	10	11
Socio-Economic	Population	103,800	78,700	39,000	5,600	10,900
	Daytime Population	77,100	58,000	56,600	34,200	21,000
	No. of Employment by Workplace	24,400	12,400	31,200	26,000	4,900
	Population Density (person/ha.)	880	840	450	170	600
	Daytime Population Density (per/ha.)	650	620	640	1,020	1,150
	Average Household Income (₱/mo.)	900	1,020	250	1,220	950
	Car Owning Rate (%)	7	3	2	14	12
Traffic	No. of Trips	253,051	248,355	296,877	184,074	60,780
	Public	199,376	195,395	225,847	110,944	44,972
	(%)	78.8	78.7	76.1	60.3	74.0
	Private	53,585	52,960	71,030	73,130	15,808
	(%)	21.2	21.3	23.9	39.7	26.0

Source: JUMSUT I

1/ Zone boundaries are outlined below:



Residents belong to the low or middle income class where the average household income in the representative zones range from ₱200 to ₱1,200 a month. The average income for Metro Manila is ₱1,200.

The average car ownership rate is 7.6% which is much lower than the metropolitan average (9.5%). Binondo stands out among all the zones with its 37.6%. Residents and individuals doing business in Divisoria constitute a natural user of the public transport system. The modal split shows that trips via the public modes average 75% of total.

2.1.3 Commercial Characteristics

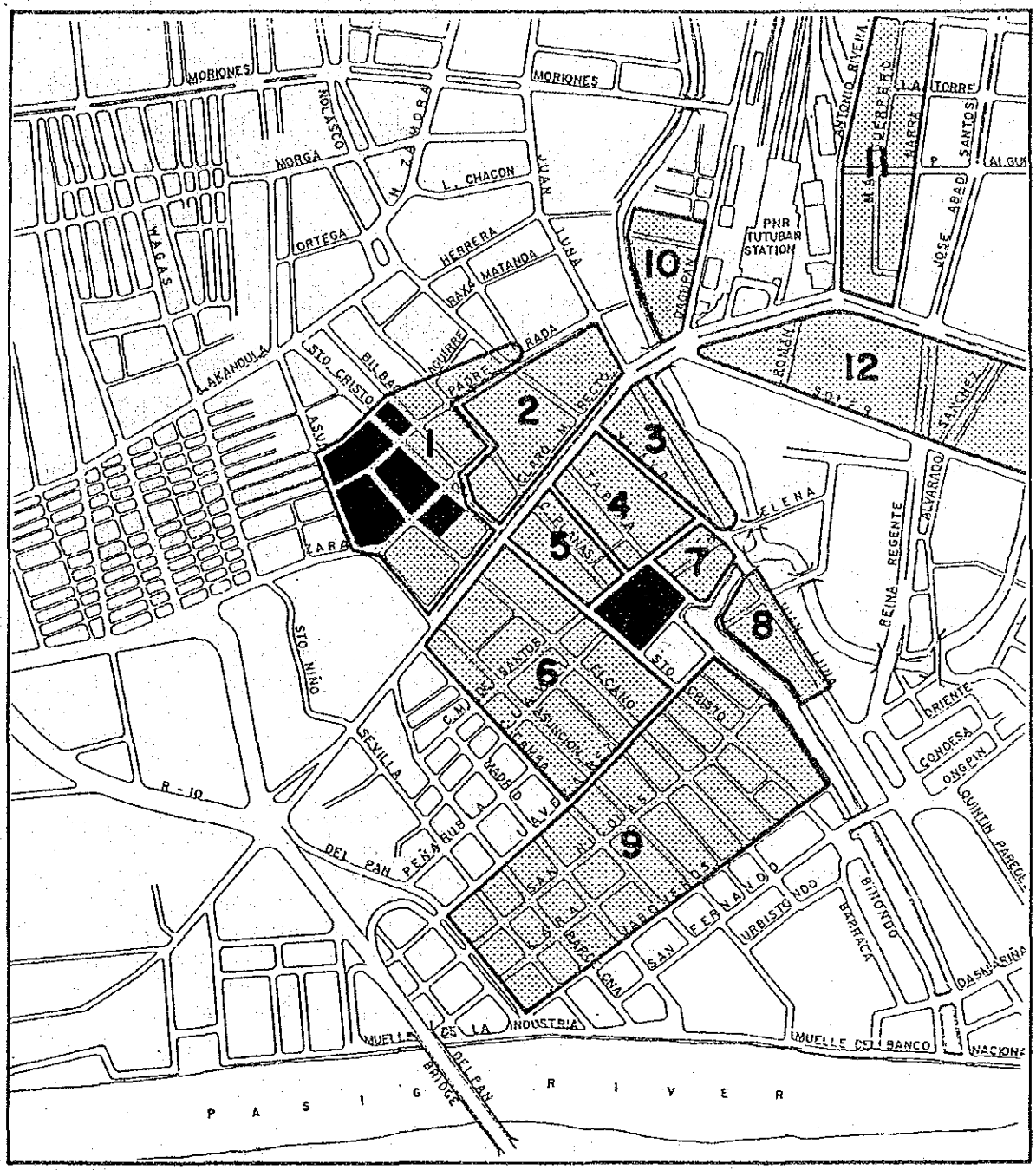
Commercial activity in study area is predominantly of the retail trade variety in the Divisoria and Asuncion markets, and of wholesale trade in the San Nicolas zone. The latter is principally a warehousing operation which begets substantial mobility of people and vehicles. The Divisoria public market, like the traditional commercial areas of Quiapo and C. M. Recto is the hub of the retail business not only of the study area but for the whole of Metro Manila.

The market reach of Divisoria, in terms of its channels of distribution from supplier/dealer to middleman/seller to final consumers, is fairly extensive. An illustrative case in the dry goods market, specifically textiles, where buyers come from all over Metro Manila. The accessibility of the study area is less of a reason for the thriving business between traders and wholesalers. More likely, it is the availability of numerous and diverse goods at lower prices that attract them to Divisoria.

Another prominent characteristic of commerce in Divisoria is the teeming number of street vendors pre-empting the main roads to the detriment of vehicular traffic. The area along the northern side of C. M. Recto is a good example of the uncontrolled and vibrant trading - where from 6:00 a.m. to 6:00 p.m., the dry goods market is most alive while from 6:00 p.m. to 6:00 a.m. the fresh/wet vendors congregate (mostly snacks cooked in stalls/carts, i.e., lugao, etc.).

The wholesale trade, is dominated by the Chinese merchants who are considered the largest group of wholesalers in Metro Manila. In this matter, Divisoria functions as a vast commodity-based center where goods originating from the nearby port (like North Harbor) and other regions of the country change hands. Other goods, like fresh fruits, that come by air from Mindanao and/or Japan find their way into various market centers via Divisoria. The continued primary of Divisoria in the wholesale business attests to the resiliency and efficacy of the supportive marketing structure that has evolve through the years.

The wide variety of goods traded in the area included grain, paper, food, raw materials, steel, wood, spare parts of vehicles, textiles and other general merchandise.



LEGEND:

MARKET

ZONING BY COMMODITY TYPE

1 FISH / VEGETABLE / FRUIT
2 TEXTILE / CLOTHING MATERIALS
3 DRIED FISH
4 DRIED GOODS / TEXTILE
5 FRUIT
6 MISCELLANEOUS (GEN. MERCHANDISE / HARDWARE, ETC.)
7 FISH (BROKER)
8 FISHING GEAR
9 LOCAL SHIPPING LINES / IMPORTER / EXPORTER
10 RICE
11 CONSTRUCTION MATERIALS
12 SPARE PARTS

0 50 100 300 M

Figure 2.2
Distribution of
Commercial Activities

2.2 ROAD SYSTEM AND TRAFFIC

2.2.1 Road Network

The primary road network consists of R-10 (Radial Road No. 10), C. M. Recto and Juna Luna. C. M. Recto traverses from west to east; R-10 and Juan Luna are transverse to C. M. Recto. The supporting road network north and south of C. M. Recto is roughly gridiron in pattern as shown in Figure 2.3.

An indication of the intensity of road use in the network is depicted in Figure 2.4. The major roads in the study area are as follows:

Primary Roads:

a) C. M. Recto (between R-10 and Asuncion: 2 lanes, 2-way; between Asuncion and Juan Luna: 10 lanes, 2-way).

C. M. Recto is a section of C-1 (Circumferential Road No. 1) which is one of the primary roads of the Metro Manila road system. C. M. Recto is the portion connecting C-1 to R-10. It is vital in that it serves east-west vehicle movement in the Divisoria area. Usage is heavily by the public transport, accounting for approximately 80% of total traffic volume. The length of the road is characterized by dense, traditionally-developed commercial properties.

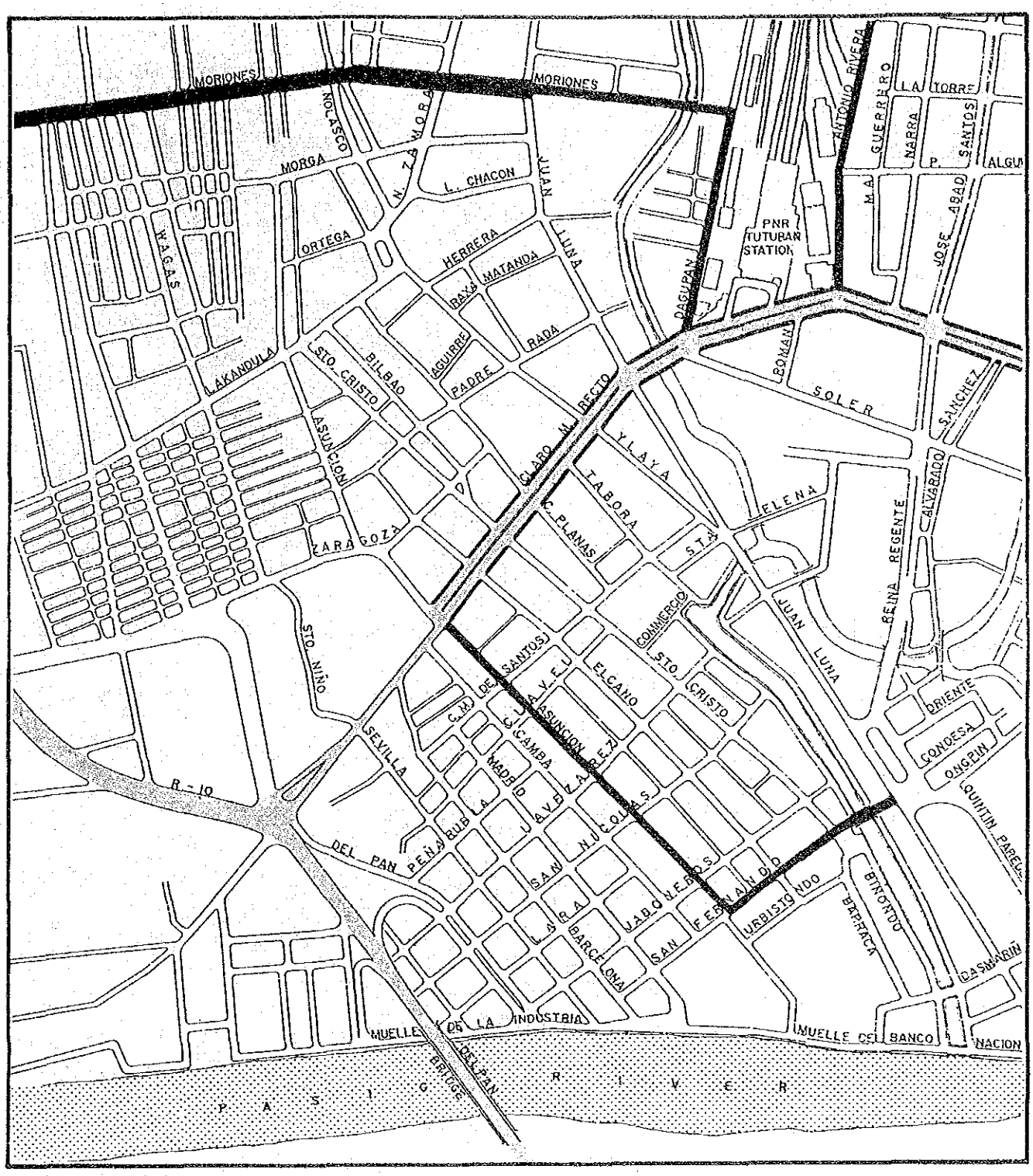
Daily traffic volume between Asuncion and Juan Luna is 16 thousand with an estimated volume capacity ratio of 0.5; this low ratio is misleading due to multi-purpose usage such as roadside parking, public transport terminal, and street vending in competition with through traffic on the same carriageway. The same pattern holds on the section between R-10 and Asuncion which is presently too narrow, the daily traffic volume being 8 thousand with volume capacity ratio of 0.7.

b) R-10 (6 lanes undivided)

This road is newly constructed and serves the freight movement between the North Harbor and the CBD. At present, there are two circumferential roads providing access, namely C-1 and C-2. Easing of the bottleneck at the C-1/R-10 connection cannot be expected because of the narrow road section and conflicting road uses. Current traffic volume ranges from 21 to 30 thousand per day.

c) Juan Luna (2 lanes, 1-way)

This road serves the north-south vehicle movement. It was originally planned that Juan and Ylaya form a one-way couple, but the occupation of the latter by vendors has precluded this. The most congested portion of this road is the section between P. Rada and Ylaya. Congestion is due to heavy volume of jeepneys. The daily traffic volume is 5 thousand with volume capacity ratio of 0.6.



LEGEND:

PRIMARY ROAD

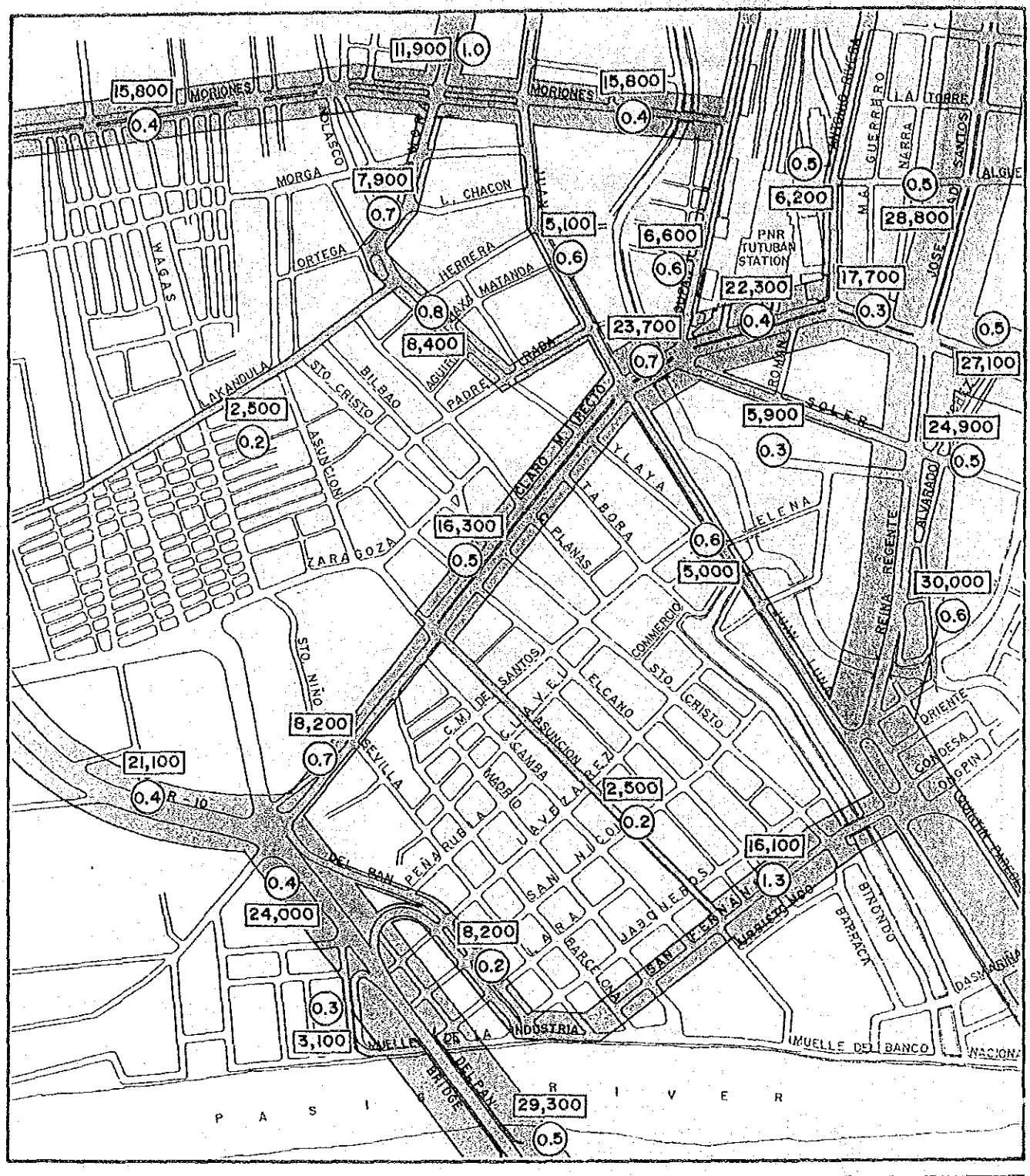
SECONDARY ROAD

LOCAL ROAD

0 50 100 200 300 m

Figure 2.3
Existing Road Network

JUMSUT II



LEGEND:

30,000 / 20,000 / 10,000 / DAY — TRAFFIC VOLUME

(0.7) VOLUME / CAPACITY RATIO

0 50 100 300 M

Figure 2.4
Road Traffic Flow

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Secondary Roads:

a) Moriones (4 lanes, divided; east of Juan Luna, 2-lanes, 2-way).

This road caters to freight movement to and from the port area. The daily traffic volume is approximately 16 thousand. Despite the adequacy of carriageway, traffic volume is low due to poor pavement conditions.

b) Dagupan (2 lanes, 2-way)

Like Moriones, this road provides access to and from the port area. Located along this road are a number of storehouses. The daily traffic volume is 6.6 thousand with a volume capacity ratio of 0.6.

c) Antonio Rivera (2 lanes, 2-way)

This road serves the jeepneys going north - to Blumentritt, Monumento, etc. The daily traffic volume is approximately 6 thousand with a volume capacity ratio of 0.5.

d) San Fernando (2 lanes, 2-way)

This road functions as:

- main access route from the South to C. M. Recto
- collector road for jeepneys coming from Sta. Cruz

The daily traffic volume is 16 thousand with volume capacity of 1.3.

e) Asuncion (2 lanes, 2-way)

This road links up with San Fernando and C. M. Recto to provide access for the San Nicolas zone. The daily traffic volume is 2,500 vehicles. Traffic volume is well below capacity as illegal road parking create obstructions.

Other Local Roads:

The road network of Divisoria consists not only of the links mentioned above, but also of the following important local roads:

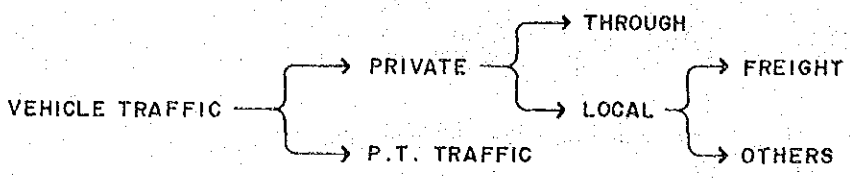
- Lakandula, parallel to and north of C. M. Recto
- N. Zamora, north of C. M. Recto, crossing Moriones and constituting part of the one-way couple with Juan Luna
- Padre Rada, north of C. M. Recto and transverse to Juan Luna; section between Ylaya and Juan Luna is used as a jeepney terminal

- Ylaya previously forming a one-way pair with Juan Luna; road space is presently occupied by a market

- Sto. Cristo and Elcano both perpendicular to C. M. Recto, and forming a one-way pair.

2.2.2 Traffic Flow Characteristics

Traffic flow in Divisoria provides a clue to the intensity of present commercial and business activities in the area. Through traffic is classified into 2 main types: 1) pedestrian and 2) vehicle. The latter is further divided as shown below:



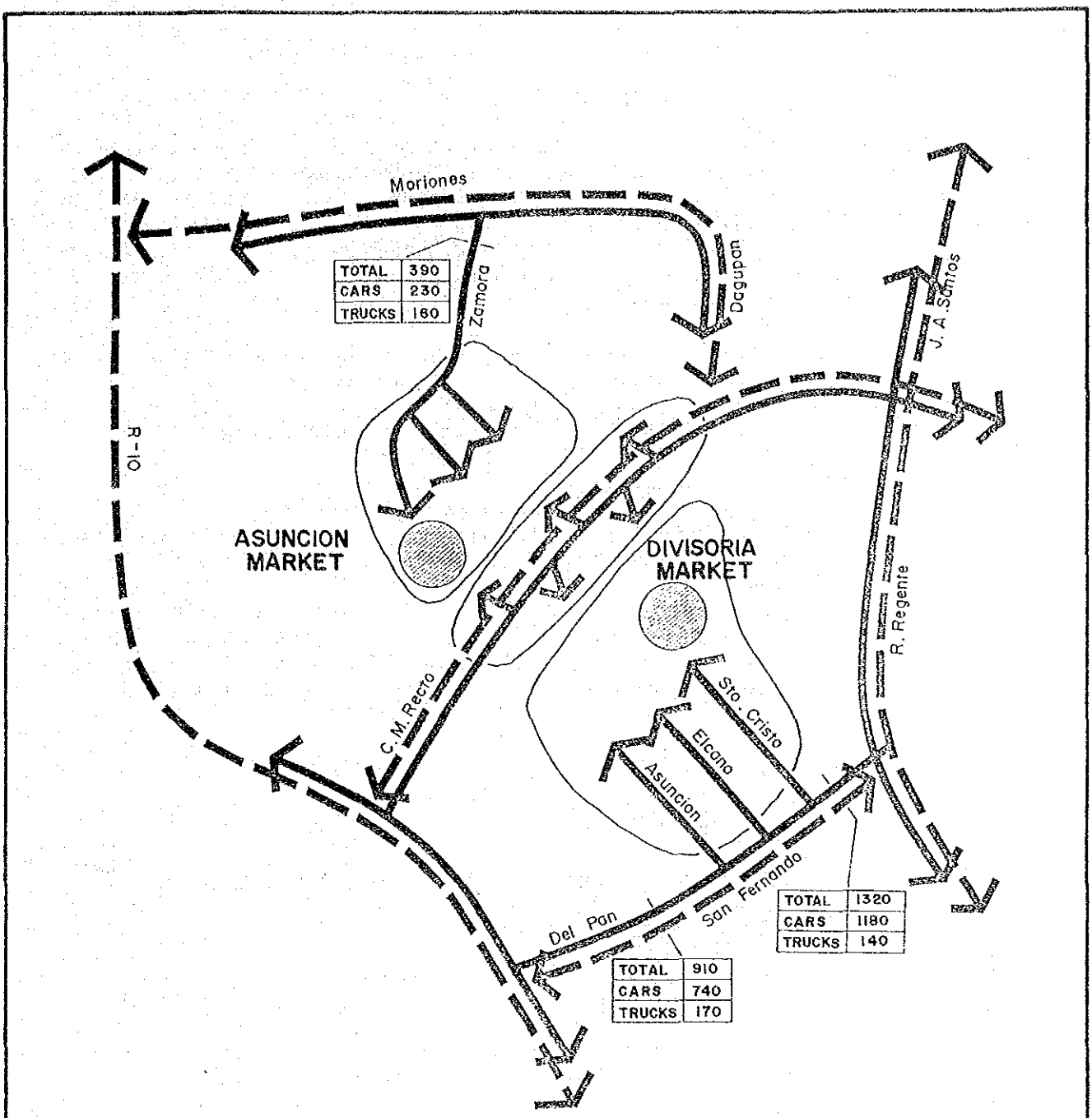
This section will focus more about private vehicle traffic, while Section 2.3 will deal on public transport.

a) Local Traffic

The main access roads to the Divisoria area are C. M. Recto, Zamora and San Fernando. To a large extent C. M. Recto does not serve local traffic since it is not directly used as access to the inner section of the north (Asuncion - Sto. Cristo - P. Rada) nor the south (Ylaya) where other routes are taken instead. C. M. Recto is thickly populated with vendors and stalls are to displace vehicles. To reach the northern part, Moriones and Zamora streets are utilized; while the southern part is reached via San Fernando. The basic access roads of the area are outlined below and shown in Figure 2.5.

DESTINATION	ACCESS ROAD	SUB-NETWORK
ALONG C. M. RECTO	C. M. RECTO	
NORTH AREA	MORIONES → ZAMORA	→ ASUNCION, → BILBAO, → C. PLANAS
SOUTH AREA	DEL PAN, MUELLE DE LA INDUSTRIA, SAN FERNANDO	→ STO. CRISTO, → ELCANO, → ASUNCION

Out of the totality of inflows and outflows of traffic in the area, the proportion of freight movement is 40%, a ratio greater than the northern part due to its busy market. The southern part accounts for 10% of total vehicular traffic, it being the industrial center and the convergence point of wholesale traders.



SOURCE : JUMSUT II SURVEY

LEGEND:

GENERATING TRAFFIC TO / FROM STUDY AREA

PASSING THROUGH TRAFFIC

TOTAL	(VEH./HR.)
CARS	(VEH./HR.)
TRUCKS	(VEH./HR.)

NOT IN SCALE

Figure 2.5
Private Traffic
Flow Concept

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What makes Divisoria unique from the other MIAs is the liberal use of pushcarts in the Divisoria and Asuncion markets, in the area bounded by C. M. Recto and P. Rada. They serve as alternative transport for freight in a road space occupied by street vendors and parked vehicles. Though considered as very convenient and economical means of transport, pushcarts pose as traffic hazards in an urban setting. Their specific area of concentration is defined as follows:

South - Ylaya, Tabora, C. Planas, Sto. Cristo, C. M. de Santos

North - Ylaya, C. Planas, Sto. Cristo, Elcano

b) Through Traffic

For traffic passing through in the North-South direction, the roads are R-10, J. Luna and J. Abad Santos. It is almost impossible for private vehicles to get through the intersection of J. Luna and C. M. Recto due to the parked jeepneys and on-street market activities nearby. Since 80% of traffic flow along C. M. Recto is taken by public transport vehicles, private traffic has to make do with R-10 and J. Abad Santos.

In the East-West direction, non-local traffic use mainly C. M. Recto, San Fernando and Moriones. C. M. Recto is inefficiently used as the total traffic volume of 14,600 vehicles/day is well below its design capacity. Through traffic is estimated to be 30% of total along C. M. Recto.

c) Road Utilization

Road space utilization in the study area is generally inefficient, and in some cases the road itself is inadequate in capacity. The basic lack of off-road terminal facilities like lay-over areas for private and public vehicles create this adverse situation. Any proposal for improving road utilization will have to contend with the conflicting demands of pedestrian, vehicular and commercial activities - where the carriageway itself is the arena of conflict.

C. M. Recto

C. M. Recto exemplifies a Manila road with sufficient space - 10 lanes on a right-of-way of 45 m. - but very inefficiently used. As illustrated by Figure 2.6, the principal reasons for the congested state of C. M. Recto can be traced to any or all of the following:

- The public transport vehicles which constitute 80% of the volume and whose street behavior are very counter-

productive. Jeepneys load and unload passengers wantonly between J. Luna and Dagupan. A virtual jeepney terminal, for example, operates at the north side between Ylaya and Dagupan with approximately 45 units. Mini-buses occupy the space between Asuncion and Sto. Cristo and in the southern section between Ylaya and J. Luna.

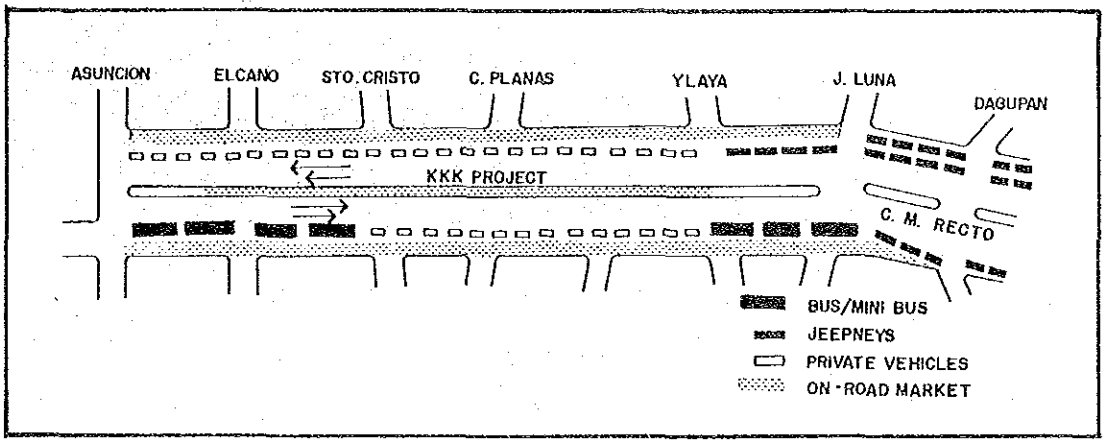
- Blocked sidestreets as to restrict exit and entry into C. M. Recto.

- The few private cars that use C. M. Recto exacerbate the situation thru illegal parking. Unauthorized car parking reaching 80 vehicles were observed between Asuncion and Ylaya.

- With the exception of Asuncion and J. Luna, numerous retail activities flourish on the streets. Approximately 270 stalls dot the area, including the median island.

- To make matters worse, about 10 horse-drawn carts regularly ply different routes.

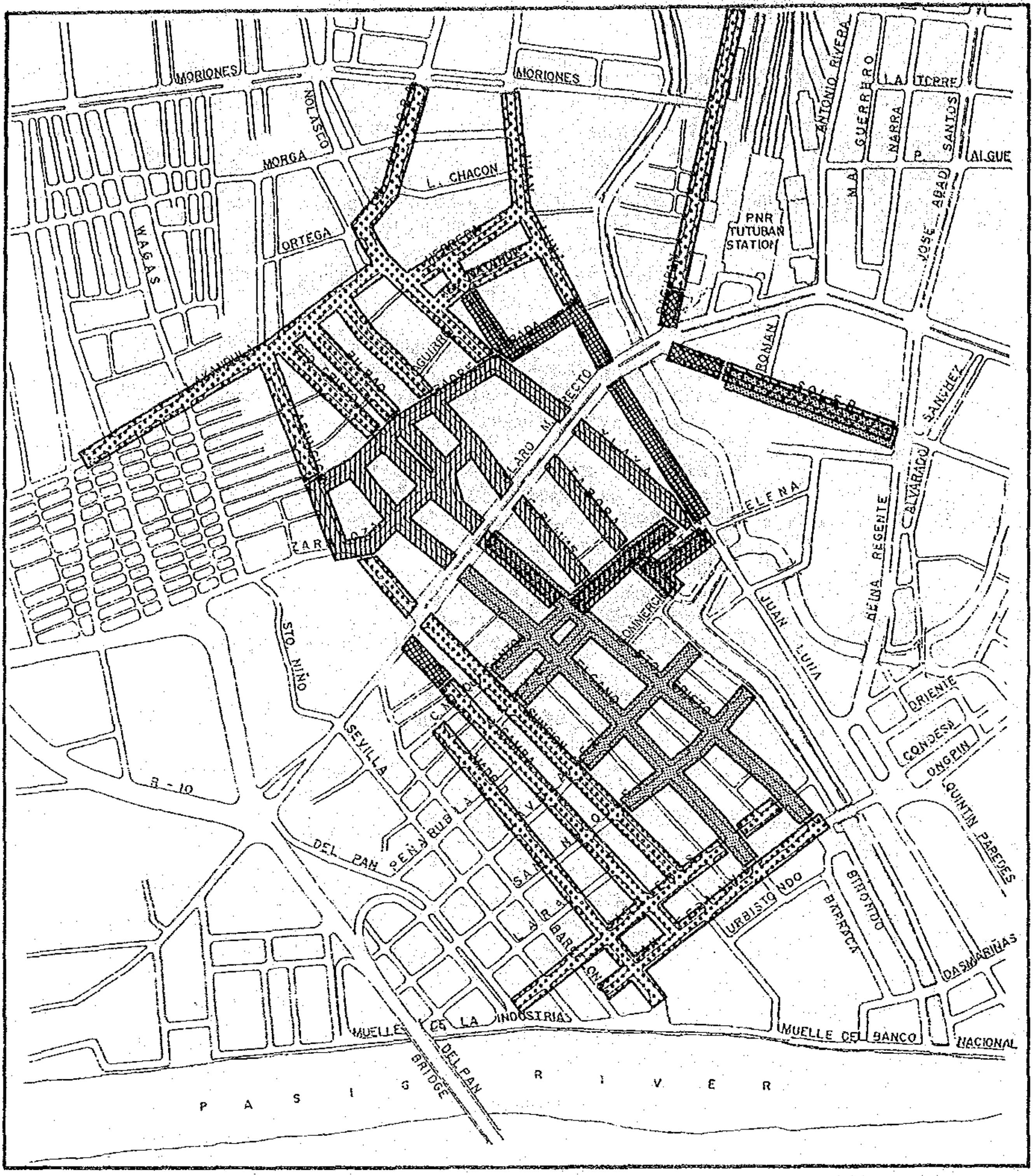
Figure 2.6
Utilization of C. M. Recto (Asuncion - Juan Luna)



Other Side Streets

Not too different in its road utilization are the many side streets shown in Figure 2.7. On street parking at Elcano and Sto. Cristo, where 1,210 vehicles in the south and 540 in the north could be counted at any particular time.

External access to the market area is provided by several streets such as Asuncion, Camba, and Madrid Streets in the south sector, and Lakandula, N. Zamora, Asuncion, Ylaya,



LEGEND:

- FOR PASSING THROUGH
- FOR ON-ROAD PARKING
- FOR ON-ROAD MARKET
- FOR JEEPNEY TERMINALS

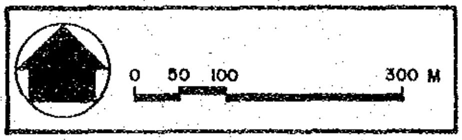


Figure 2.7
Road Utilization
Conditions of
Selected Sidestreets

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Herrera, Raja Matanda in the north sector. Streets functioning as markets are Padre Rada, Zaragoza, Planas, Tabora, and other adjoining roads.

2.2.3 Traffic Congestion in the Area

Traffic bottlenecks in the Divisoria Area are most severe along C. M. Recto, particularly between Juan Luna and Dagupan. The causes are many, such as:

a) Undisciplined loading and unloading of jeepneys

b) Mixed vehicle and pedestrian crossings

c) Deterioration of road surface with an abandoned PNR track on the middle of the road

d) Jeepneys waiting for passengers occupy one or two lanes, thus, decreasing available lanes for through traffic

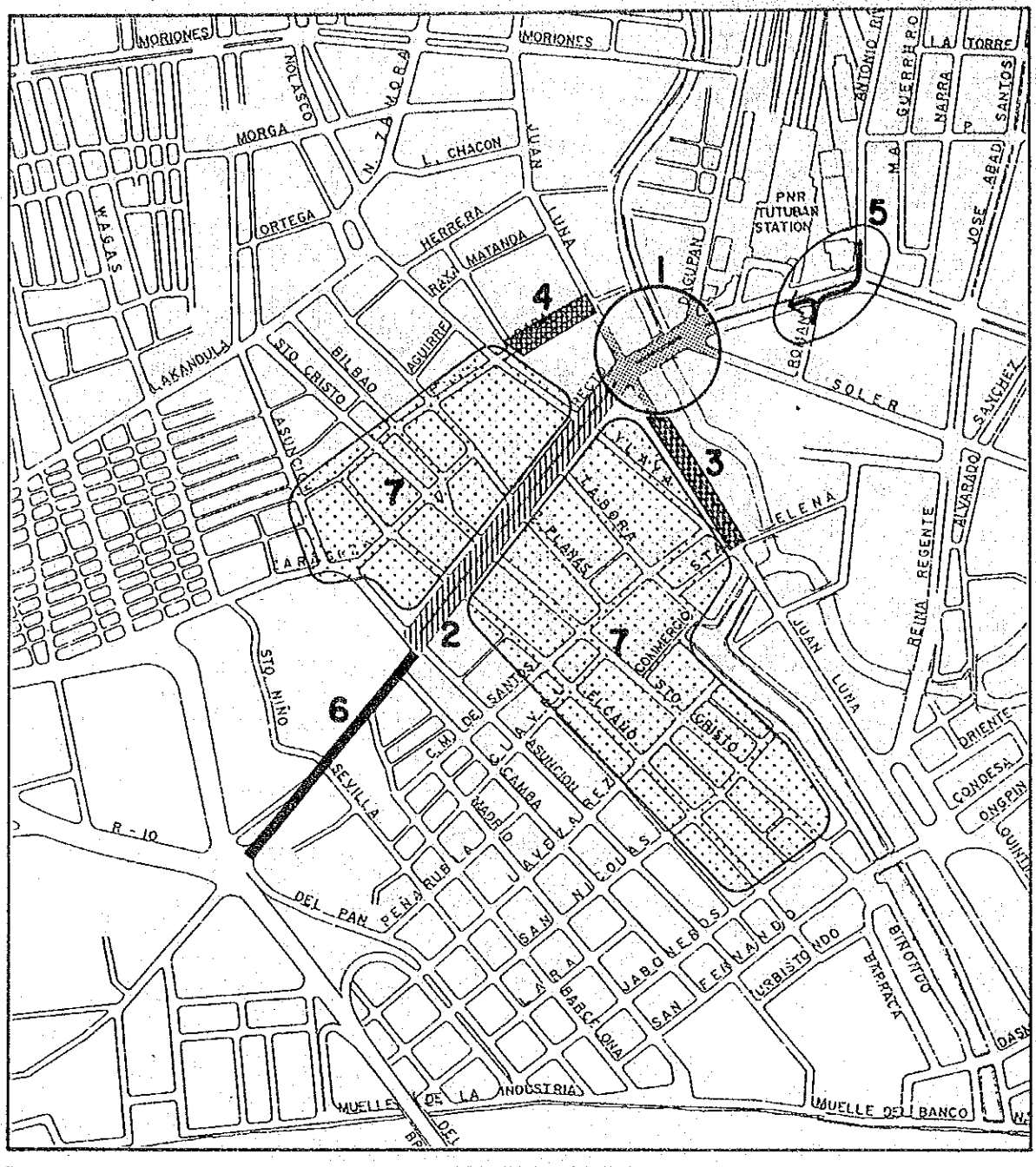
e) Non-functioning traffic signals at the intersection of C. M. Recto/J. Luna and C. M. Recto/Dagupan

f) Very poor traffic enforcement

Less critical, yet severe congestion is also observed in other locations at or near intersections. Table 2.2 summarizes the current situation of congestions which is depicted in Figures 2.8 and 2.9.

Table 2.2
Traffic Congestion in the Area

Location	Characteristics
1. C.M. Recto (J. Luna-Dagupan) C.M. Recto (Asuncion side) C.M. Recto (JA Santos side)	- Queue length along C.M. Recto toward R-10 is 600 meters in the evening peak-hour period - Queue in every direction occurs in the evening peak-hour period
2. C.M. Recto (Elcano-J. Luna)	- Obstruction to moving vehicles as the outer 3 lanes cater to standing uses (e.g., peddling, parking terminal)
3. Juan Luna (Recto-Ylaya)	- Congested all day due to uncontrolled loading/unloading plus waiting passengers. (Turning points of southbound jeepney routes)
4. P. Rada (Ylaya-J. Luna)	- Entire stretch is occupied by jeepneys. (Turning point of northbound route)
5. C.M. Recto/A. Rivera	- Jeepneys approaching its adopted terminal point cut in against the normal flow of traffic with the intention of avoiding the long queue
6. C.M. Recto (R10, Asuncion)	- Limited road capacity due to the deterioration of road surface (unpaved and flooded), slows down traffic considerably.
7. Southern area of C.M. Recto	- Impassable road due to a combination double parking, market use, and freight loading/unloading
8. Northern area of C.M. Recto	- Most of the sidestreets are occupied by ambulant stalls.



LEGEND

1. Extremely congested section of C.M. Recto between J. Luna and Dagupan due to jeepney loading/unloading, pedestrians and street vendors.
2. Disordered multi-purpose utilization of C.M. Recto between Asuncion and J. Luna.
3. Congested section of J. Luna due to the PT turning points.
4. Congested section of P. Rada due to the PT turning points.
5. Jeepneys approaching terminal into the opposite lanes against the flow of traffic with the intention of avoiding the long queue.
6. Inadequate road section along C.M. Recto between R10 and A suncion.
7. Most of the sidestreets are occupied by vendors, on-road parked vehicles, and goods delivery trucks.

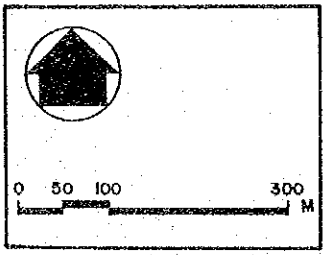
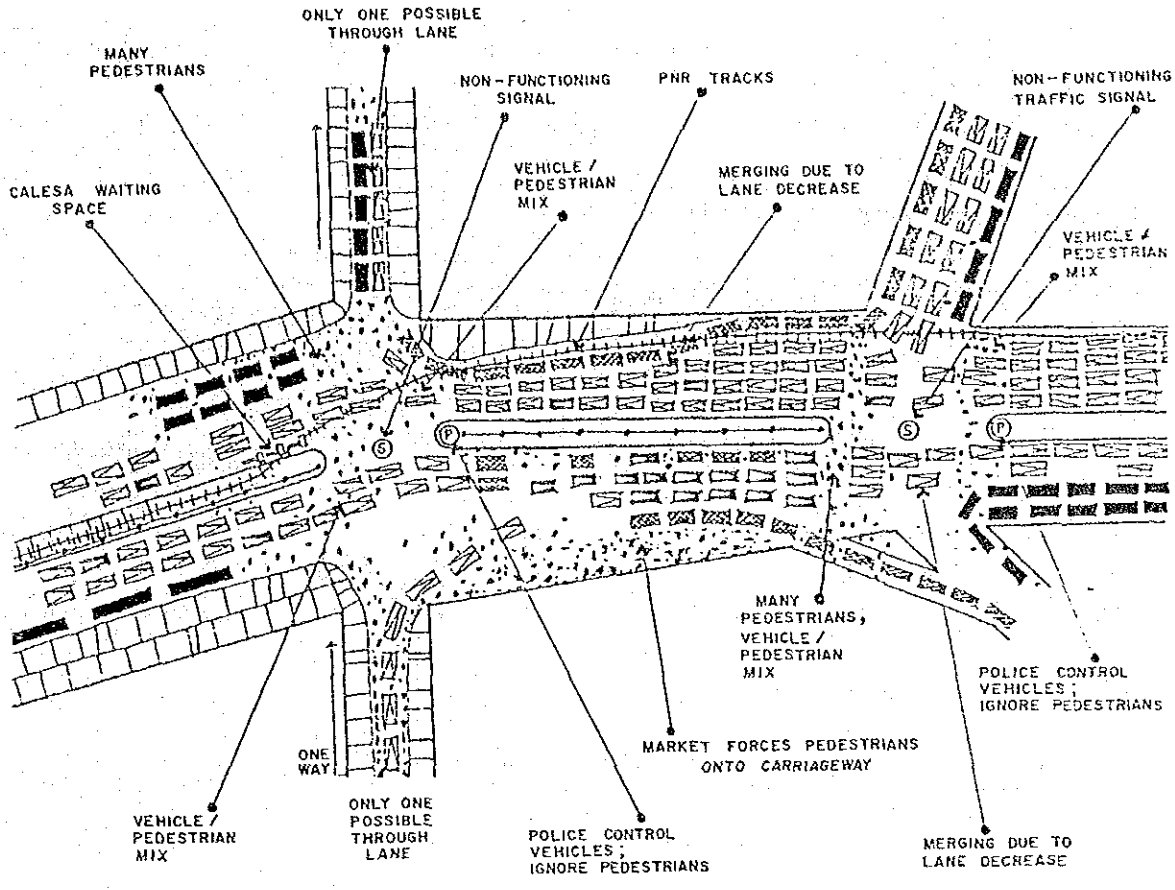


Figure 2.8
Existing Traffic
Problems



Pedestrians Walking on Carriageway since Sidewalk Occupied by Vendors

Merging of Vehicles due to Lane Decrease

LEGEND:

- JEEPNEY PASSING THROUGH
- JEEPNEY SLOWING DOWN
- JEEPNEY WAITING
- BUS
- PRIVATE CAR
- PEDESTRIANS
- BARRIERS
- RAILWAY TRACKS
- ON STREET MARKET
- (P) POLICE OUTPOST
- (S) TRAFFIC SIGNAL

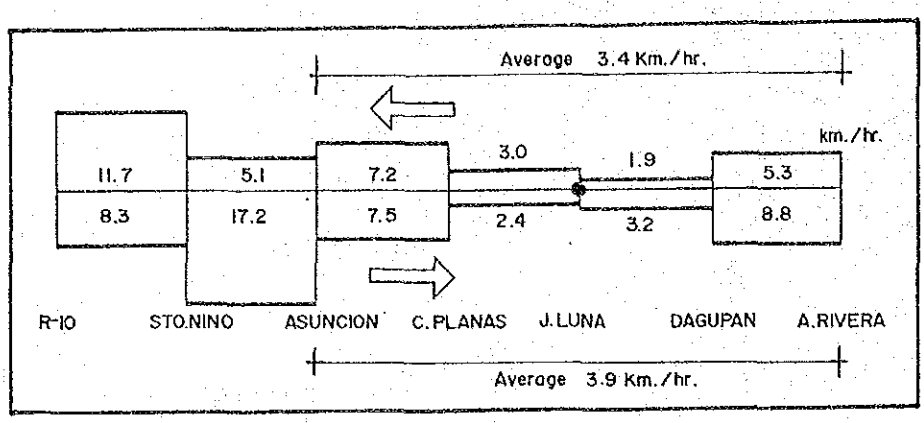
Figure 2.9
Traffic Congestion along C. M. Recto between J. Luna and Dagupan

JUMSUT II

Result of on-board jeepney survey provided additional insights into the congestion prevailing in the area. Bottleneck for jeepney is the intersection of C. M. Recto/J. Luna.

Travel speed of jeepney, as shown in Figure 2.10 is quite low when approaching J. Luna from both directions.

Figure 2.10
Average Travel Speed



SOURCE : JUMSUT II SURVEY

The major factor for jeepney delay is the congested intersection. Other causes, excluding loading/unloading, are shown on Table 2.3. Crossing vehicles and pedestrians account for 22%. The share of calesa and pushcarts is also high at 13%.

Table 2.3
Causes of Jeepney Delay

Causes of Delay	%
Stop Light	6
Accident	-
B/A with Baggage	4
Leaving of parking vehicle	6
Intersection delay	49
Pedestrian crossing	12
Vehicle crossing	10
Calesa	8
Pushcarts	5
Others	-

Source: JUMSUT II

2.3 PUBLIC TRANSPORT ASPECTS

2.3.1 Jeepney and Bus Routes

The public transport route network centered at Divisoria is composed of 54 jeepney and 24 bus routes. Most of the jeepney routes are terminating. In fact, only two routes are classified as passing-through. Approximately 3,000 jeepneys and 500 buses use Divisoria as a terminal in one way or another.

Table 2.4
Existing Public Transportation Routes
Related to Divisoria

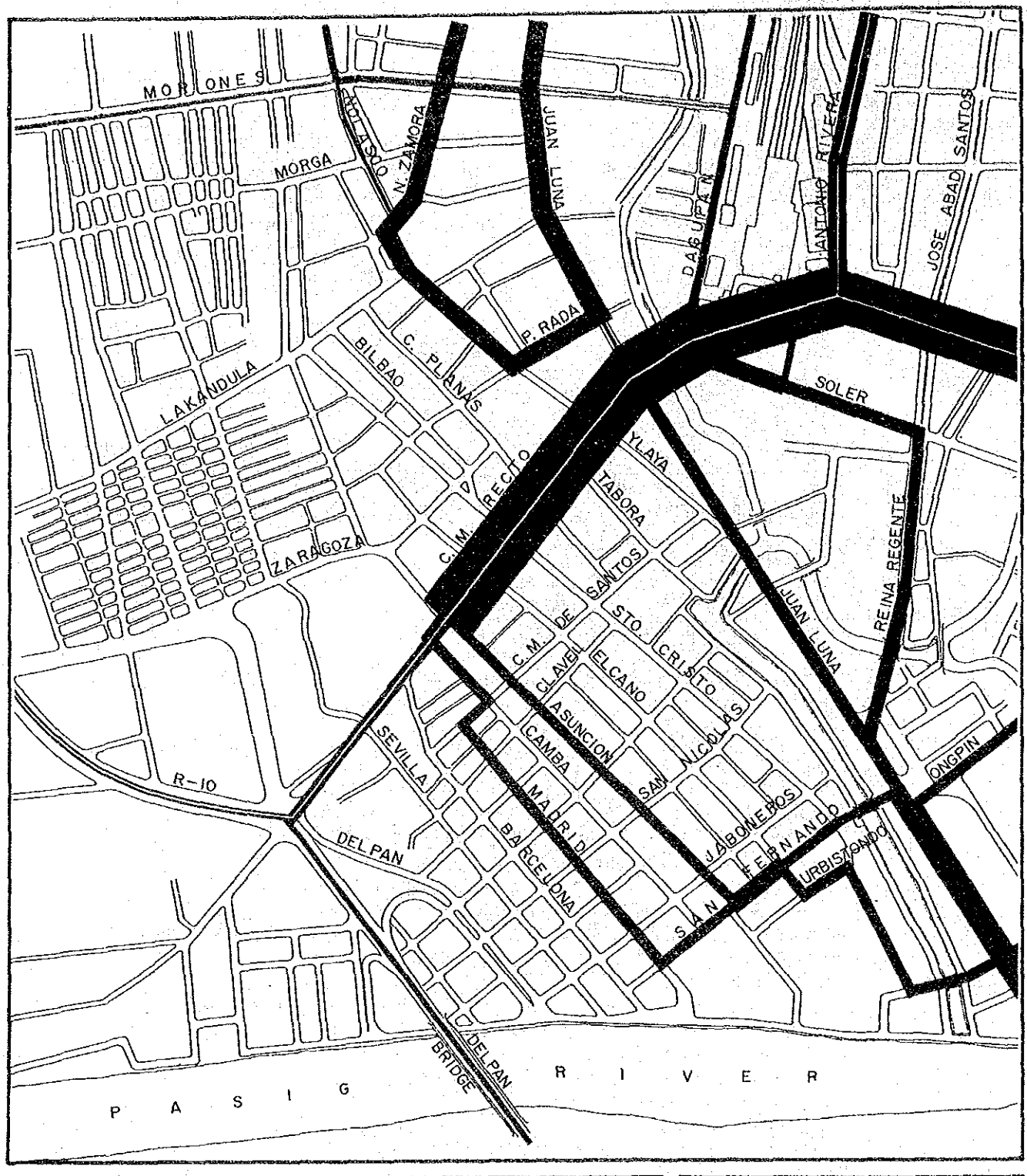
Mode		Terminate		Passing Through		Total	
		No. of Routes	No. of (units)	No. of Routes	No. of (units)	No. of Routes	No. of (units)
Intra-City	JPY	49	(2,985)	2	(91)	51	(3,076)
	BUS	11	(268)	-	-	11	(268)
Provincial	JPY	3	(36)	-	-	3	(36)
	BUS	13	(208)	-	-	13	(208)

Source: JUMSUT I

The frequencies of jeepneys and buses around Divisoria MIA are illustrated in Figures 2.11 and 2.12. Jeepneys and buses use C. M. Recto, Juan Luna, Dagupan, A. Rivera and Moriones as major access roads. Though the basic route is as shown in Figure 2.13, jeepneys deviate to the sidestreets even at the risk of being "out-of-line" to avoid the congestion and poor road conditions at the turning points. The intersection of C. M. Recto and Asuncion is supposed to be the turning point of vehicles on the C. M. Recto Line; instead, Sto. Cristo and Juan Luna are used.

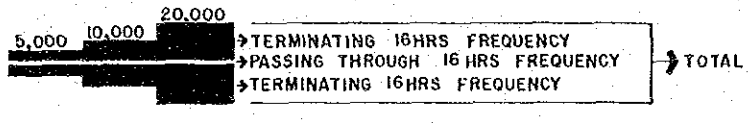
The generic structure of the routes for jeepneys is a halfloop with C. M. Recto as main leg, as shown in Figure 2.14. Smaller versions of this loop are centered in Dagupan, J. Luna and Asuncion in various orientations as to induce inherent conflict in traffic. As a further complication, jeepney approaching their terminal cut against other vehicles to avoid the queue build-up infront of the Tutuban Station.

The bus route structure is simpler since its routes converge only at Dagupan and J. Luna. Originally, as in Figure 2.14, buses took a U-turn at C. M. Recto (JUMSUT I survey) but now, they take the longer route via J. Luna-Moriones-R-10 and back to C. M. Recto (JUMSUT II survey). A large percentage of buses plying the long distance trips use the PNR Tutuban Station or C. M. Recto as terminals.



LEGEND:

NO. OF VEHICLES/16 HRS.



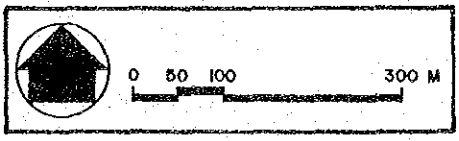
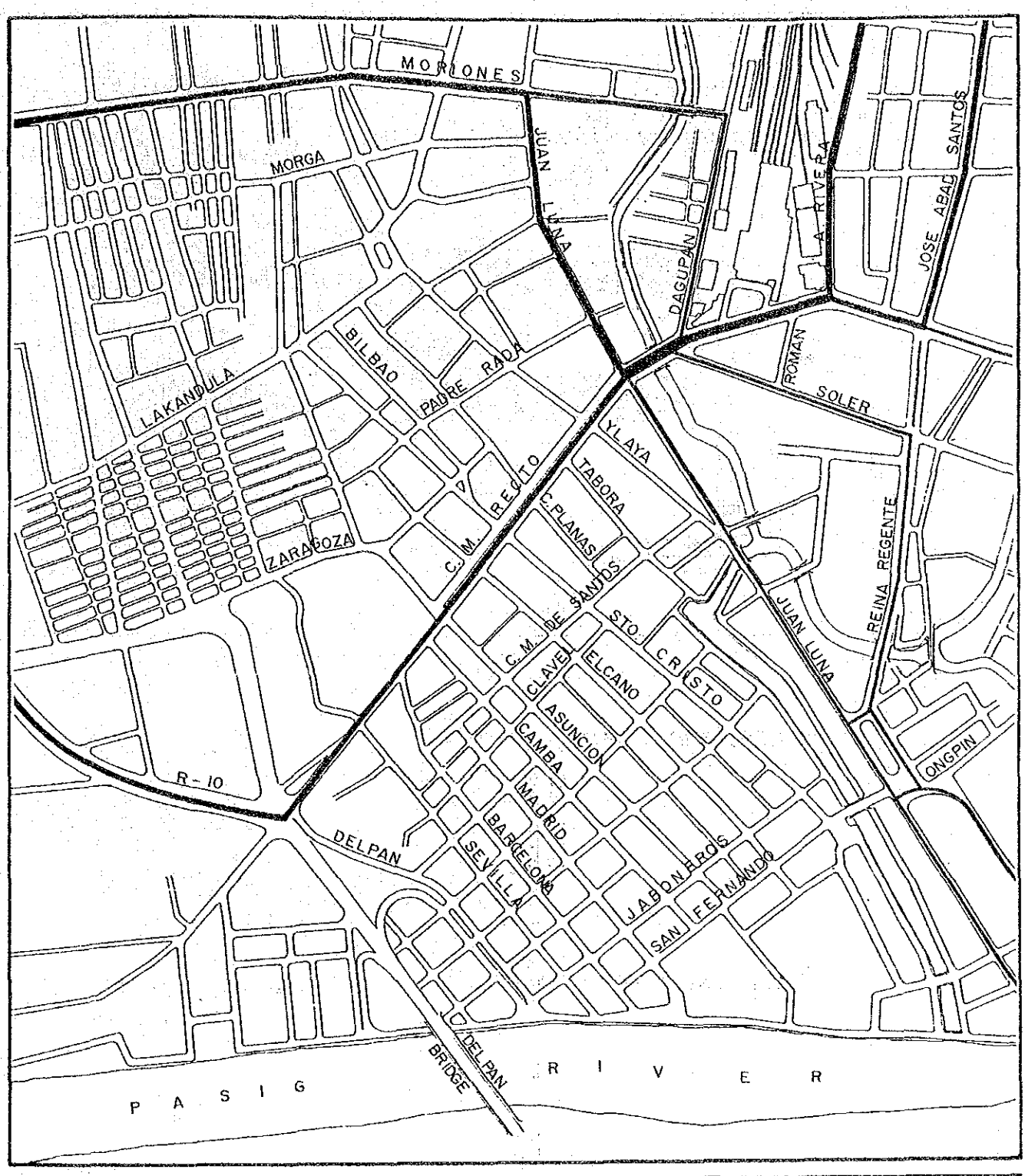


Figure 2.11
Jeepney Route Coverage
and Frequency

JUMSUT II



LEGEND:

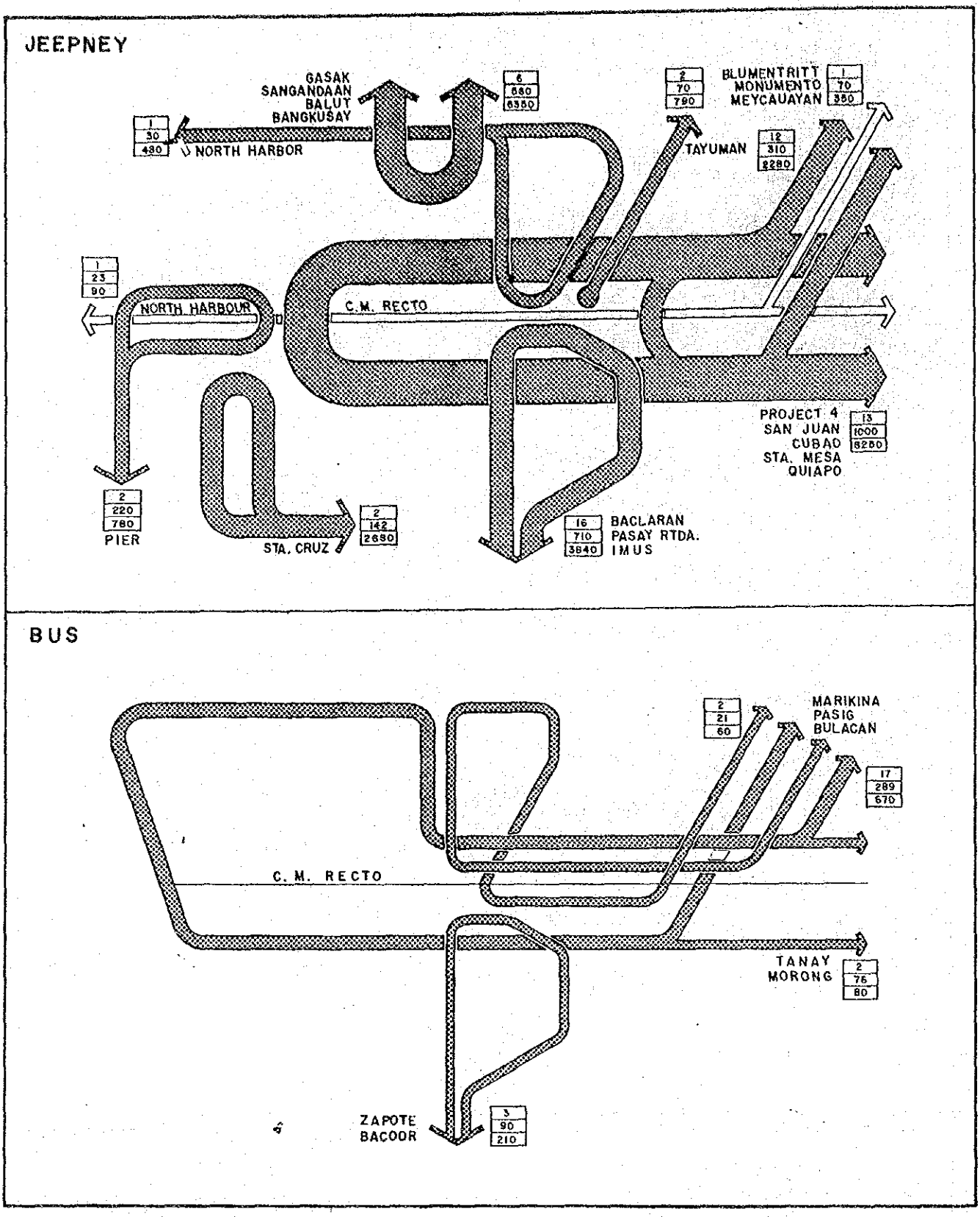
(00) NO. OF VEHICLES / 16 HRS.

15-20 10-15 5-10 0-5 TERMINATING 16 HRS FREQUENCY

0 50 100 300 M

Figure 2.12
Bus Route Coverage
and Frequency

JUMSUT II

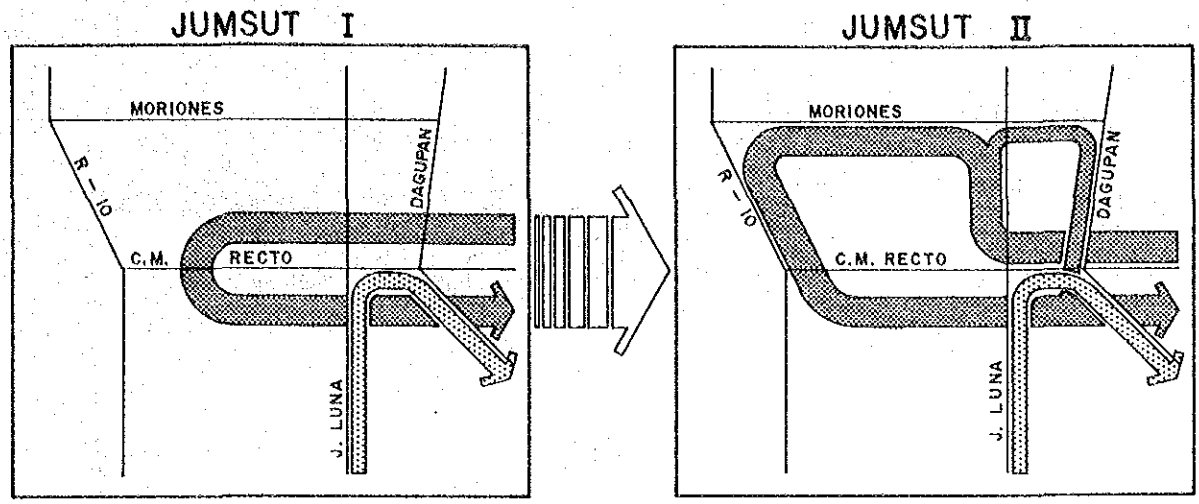


LEGEND:

13	NO. OF ROUTES
1000	NO. OF UNITS
8250	16 HRS. FREQUENCY

Figure 2.13
Existing Public
Transportation Route
Structure

Figure 2.14
Existing Bus Route Structure



Jeepney routes radiate into three major corridors (Aurora-Rizal, McArthur, and Taft-Quirino) and smaller roads that feed the contiguous and outlying areas. Under the first category, the service areas of these routes are:

- East of Cubao and Sta. Mesa and suburbs
- South of Taft and Quirino and suburbs
- Northern zones of Navotas to Rizal Avenue and McArthur Highway

Routes that fit the second category are:

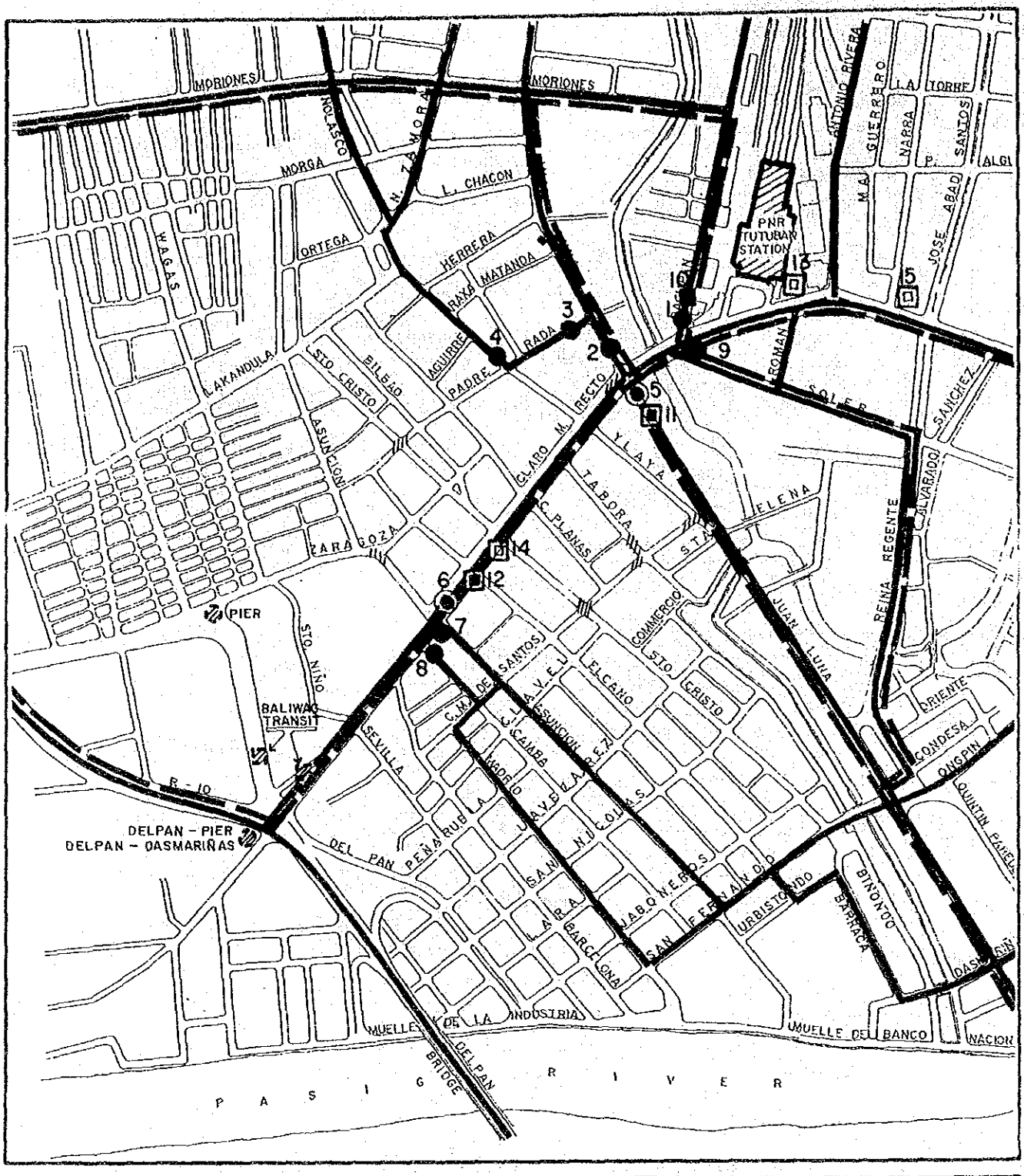
- Coming from Blumentritt and Frisco through Rizal, EDSA and Quezon Avenues

Intra-city city-bus routes are distributed into four major corridors: Aurora Boulevard, Shaw Boulevard, J. P. Rizal and Taft-Quirino. Provincial buses, on the other hand, utilize 5 major corridors: Rizal - North Diversion, Aurora Boulevard, Shaw Boulevard, South Superhighway, and Taft - Quirino.

2.3.2 Existing Terminals and Turning Points

Figure 2.15 maps the location of jeepney and bus turning points inclusive of the three intra- and three inter-city bus terminals. Most of the jeepney terminals are on-street except for one small vacant lot at the corner of C. M. Recto and Asuncion.

Similarly, bus terminals are located on-streets with the exception of two off-road ones serving the long-distance routes. The PNR Tutuban Station functions both as a railroad and provincial bus



LEGEND:

- JEEPNEY ROUTE
- BUS ROUTE
- JEEPNEY TERMINAL (INTRA)
- JEEPNEY TERMINAL (INTER)
- ILLEGAL JEEPNEY WAITING PLACE
- BUS TERMINAL (INTRA)
- BUS TERMINAL (INTER)
- LONG DISTANCE BUS (INTER)
- ON-ROAD BUS WAITING PLACE
- PNR TUTUBAN STATION
- CALESA WAITING PLACE

0 50 100 300 M

Figure 2.15
Location of Existing Terminal Turning Points

SOURCE : JUMSUT II SURVEY

JUMSUT II

terminal. While there is difficulty in delineating exactly the jeepney and bus boarding and alighting stations, the C. M. Recto, J. Luna, P. Rada, Dagupan and Asuncion areas fit the bill.

Problems revolving around the inherent need of public transport for terminal or pick-up points are all too common. The absence of a separate space for terminals lead to traffic bottlenecks such as those at P. Rada, C. M. Recto (Dagupan - J. Luna) and Juan Luna. The intermixing of public transport with private vehicle and pedestrian traffic at the busy intersection of C. M. Recto and Asuncion risk passengers, drivers and pedestrians alike.

2.3.3 The Philippine National Railway (PNR)

At the northeastern section of the Divisoria Study Area is found the central station of PNR. The Tutuban Station handles 32 commuter trains/day and 12 long distance trains/day (as of October 1984). It has capacity for more.

Statistics complied by PNR in 1982 showed a volume of 3,300 boarding and alighting passengers per day. This rail passenger volume is negligible compared to jeepneys and buses for the same period.

Tutuban Station is however a microcosm of a Mode Interchange Area, being the terminals of buses, jeepneys, trains, taxis, and calesas.

Figure 2.16
Existing Tutuban PNR Station

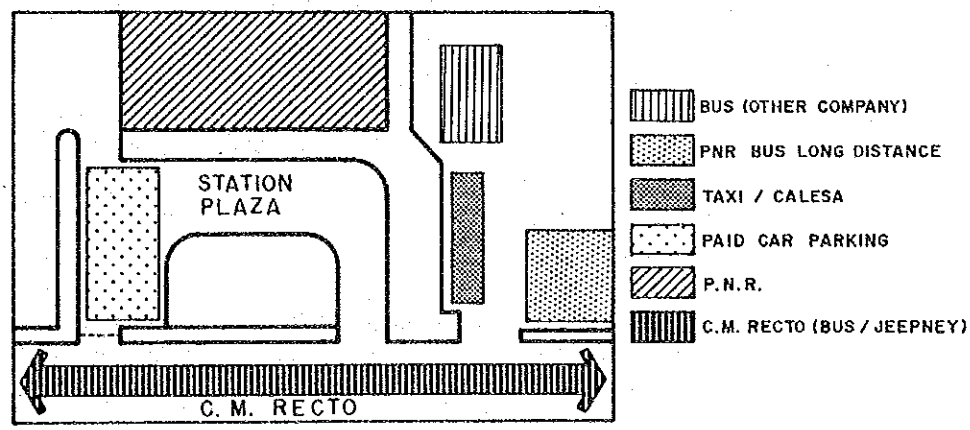


Table 2.5
Existing Public Transportation Terminals in Divisoria

Mode	Name/Location	Type	No. of Routes	No. of Units	Average Freq./hr.	Remarks
JEEPNEY	1. Dagupan	Intra-City, on road	2	70	47	dispatcher
	2. Juan Luna (North)	Intra-City, on road	1	31	27	1 association 2 dispatchers
	3. Padre Rada	Intra-City, on-road	5	471	419	2 association 4 dispatchers
	4. Ylaya	Intra-City, on road	1	91	70	6 dispatchers
	5. Juan Luna (South)	Intra-City, Inter-City, on road	16	710	371	1 association 3 dispatchers
	6. C.M. Recto	Intra-City, Inter-City, on road	21	1,133	765	
	7. C.M. Recto/ Asuncion	Intra-City, off-road	2	221	73	1 association 3 dispatchers
	8. Camba	Intra-City, on road	2	142	215	1 association 1 dispatcher
	9. C.M. Recto/ Soler	Intra-City	2	152	80	dispatcher
BUS						
	10. Dagupan	Intra-City, on road	2	21	3	
	11. Juan Luna (South)	Intra-City, Inter-City, on road	3	88	18	
	12. C.M. Recto	Intra-City, Inter-City, on road	19	367	52	
	13. *Tutuban	Inter-City, off-road	4	-	(15)**	PNR
			1	14	(25)	Macabebe Express ₱4,000/mo. 2 Berth
			1	20	(64)	New Sto. Rosario Transit & Inc. ₱4,900/mo. 3 Berth
			1	6	(58)	F. Nito Transit ₱4,000/mo. 2 Berth
			2	19	(72)	PANTRANCO ₱9,000/mo. 5 Berth
	14. *C.M. Recto	Inter-City, on road	1	10	(20)	San Antonio
			2	15	(72)	F. Nito/Nisan Transit
			1	6	(15)	Vergara Express
			3	64	(216)	Baliuag Transit
			-	-	-	E. Jose Transit
	15. *Narra	Inter-City, off-road	1	16	(27)	St. Maria Liner

* Long Distance Bus Terminal
** ( ) Frequency/day

2.3.4 The Calesa

The carry-over from the horse and buggy era is the slow but enduring calesa. Calesas in Metro Manila are not regulated by BOT, but administered by the Weight and Measure Division of the City of Manila which reported in October 1984, 808 are registered units. Historical data indicates a declining trend.

A Calesa Interview Survey was conducted to establish the characteristics of this quaint mode of transport. The calesa owner usually hires a driver of "cochero" not unlike the practice for jeepneys.

Despite their limitations, calesas cover a wide area of Divisoria. It plods through the primary roads of C. M. Recto and J. Luna, and into the small sidestreets. One of its biggest terminal is found at the corner of Juan Luna and Sta. Elena where 20-30 units are stationed, on the average.

It it is not clear what makes the calesa endure or retain a degree of patronage. For sure, its slow travel speed has adverse effect on movement of motorized vehicles. the jeepney on-board survey pointed at the calesa as a contributory factor to the extent of 8% of the delays suffered by jeepneys on C. M. Recto.

Table 2.6
Major Findings from the Calesa Interview Survey

Item	Unit	Remarks
Fare	Min. ₱5.00	Negotiable depending on distance covered Ex. Divisoria - Quiapo ₱8 - 15
No. of trips/day	10-20 trips/day	Usually short-distance trips
Hours of operation	7 a.m. - 10 p.m.	Approx. 12 hours
Daily Net Income	₱100.00/day	Ranges from ₱80-130/day
Income of Owners	₱ 50.00/day	Ranges from ₱40-60/day
Registration Fee	₱ 15.00/year	
Cochero's License Fee	₱ 20.00/year	
Type of Passenger	Mostly Chinese	
Sections Off-Limits to Calesa	Ongpin and Rizal Avenue	Calesa crossing is permitted

2.3.5 Public Transport Passenger Behavior

Commuters on public transport vehicles are segmented further as shown in Table 2.7. Out of the total boarding/alighting passengers in this study area, approximately 453 persons per 16 hours or 91.2% are jeepney passengers.

Bus passengers comprise 8.8% of the total, but 3.6% (18,000) is traceable to provincial buses. Thus, the Divisoria MIA is a significant terminus for provincial buses.

Table 2.7
Public Transport Passenger Traffic in Divisoria
Mode Interchange Area

Mode	No. of boarding/alighting/16 hrs.					
	Intra-City		Inter-City		Total	
	000	(%)	000	(%)	000	(%)
Jeepney	452	(91.0)	1	(0.2)	453	(91.2)
Bus	26	(5.2)	18	(3.6)	44	(8.8)
Total	478	(96.2)	19	(3.8)	497	(100.0)

Source: JUMSUT I

Table 2.8 gives further amplification on passenger behavior. More than 44% of the total PT passengers are transferees - much more on buses than jeepneys. In other words, jeepney riders are likely to terminate at Divisoria rather than transfer.

Table 2.8
Percentage of Transfer and Terminating Public
Transportation Passengers by Mode at Divisoria

Mode	Transfer	Terminating	Total
	%	%	%
Jeepney	42.9	57.1	100.0
Bus	49.3	50.7	100.0
Total	44.4	55.6	100.0

Source: JUMSUT II

In terms of inter-modal connections, the PT Passenger Interview Survey revealed that 68% of total transfers occur from one jeepney to another jeepney. Table 2.9 also shows that transfers from bus to jeepneys is 24.8%, while bus to bus transfers is less than 1%.

Table 2.9
Modal Transfer of Public Transport
Passengers at Divisoria

Mode Used To Reach Divisoria	Mode Used to Leave From Divisoria (%)			
	Jeepney	Bus	Others	Total
Jeepney	67.5	23.9	1.4	92.8
Bus	2.9	0.7	-	3.6
Others	3.6	-	-	3.6
Total	74.0	24.6	1.4	100.0

Source: JUMSUT II

Around 82% of total passengers going into Divisoria ride the jeepneys (see Table 2.10). Terminating passengers tend to prefer buses more than the jeepneys.

Table 2.10
Access Mode to Divisoria of Public
Transport Users by Type

Mode	Type of Passengers (%)		Total
	Transfer	Terminating	
Jeepney	92.8	74.6	82.2%
Bus	3.6	12.4	8.7
Others	3.6	13.0	9.1
Total	100.0	100.0	100.0

Source: JUMSUT II

Locationally, the inter-modal transfer are sorted out in few pockets: one between eastbound (C. M. Recto) and northbound (P. Rada), and the other between northbound (P. Rada) and southbound (Juan Luna). The pattern of transfer flow is portrayed in Figure 2.17. A large portion of the passenger exchange occur between C. M. Recto and the midpoint of Sta. Cruz - Pier and northbound routes. The transfer volumes of jeepneys to bus, eastbound and southbound, are also noticeable but that of jeepney to jeepney are small. This is due to the fact that most jeepney riders terminate their trip. Busy transfer movements can also be observed along C. M. Recto and between Del Pan and Ylaya.

As can be expected, the center of passenger activity is the Divisoria market. Figure 2.18 clearly illustrates the destination and boarding points. Because the sorting process occurs on several streets, pedestrian crossings would be critical.

Detailed analysis of boarding/alighting phenomenon along C. M. Recto gives further substantiation to the extended breadth of interchange activities. Alighting passengers along the northside of C. M. Recto is widely dispersed at all sections (from east to U-turn to east). Boarding passengers however are concentrated between C. Planas and Juan Luna (Figure 2.19) on the southside. the average occupancy of jeepneys at the corner of C. M. Recto and Asuncion is 2.3 persons. As it turns eastward, it picks up passengers on the south curb of Recto.

2.4 PEDESTRIAN FACILITIES

Figure 2.20 shows two types of pedestrian movement and their corresponding volumes. Pedestrians either cross the road or move parallel to the roads. There are approximately 10,000 pedestrians who cross C. M. Recto Avenue during the peak-hour period. Pedestrians are greatly imperilled as approximately 5,200 cross the road with no signals, while another 14,400 move parallel to the road spilling into the carriageway.

Sidewalk or arcades are provided along most of the roads in Divisoria but some segments are not passable because of street vendors. In the more congested sections of C. M. Recto, between Ylaya and Dagupan shown in Figure 2.21, pedestrians are even forced to walk on the carriageway.

2.5 TRAFFIC MANAGEMENT ASPECTS

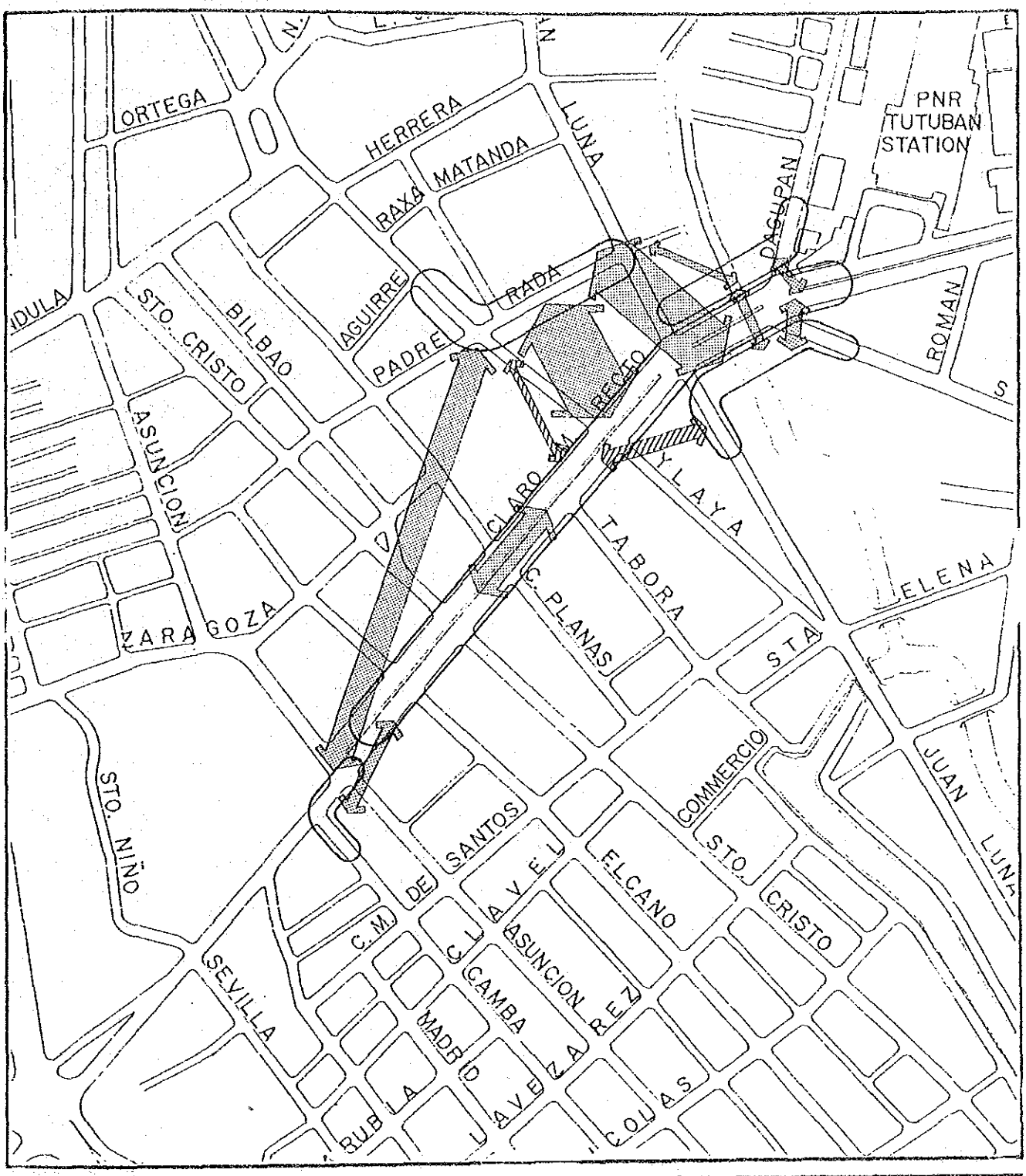
Figure 2.22 portrays the prevailing traffic management situation in the Divisoria area. A number of streets is designated as oneway, line Juan Luna and Ylaya (one-way couple), although the former is functionally classified as a primary road. Nevertheless, traffic here is constrained by pedestrian and vendor activities, particularly along Ylaya.

In the San Nicolas area, one-way street follow the orderly arrangement of road network. Except for the complicated one-way couple in the Sto. Cristo area at the northern part of C. M. Recto, the rest are simple in operation.

Traffic signals installed at six intersections in the Divisoria area (such as C. M. Recto/Dagupan, C. M. Recto/A. Rivera, and C. M. Recto/Juan Luna) are manually operated by traffic cops who, invariably set counterproductive time phases.

Turning is prohibited at a number of intersections to minimize conflicting traffic movements.

While there is a ban on parking at many sections of Divisoria, it is virtually ineffective for lack of enforcement.



LEGEND:

JEEPNEY - JEEPNEY

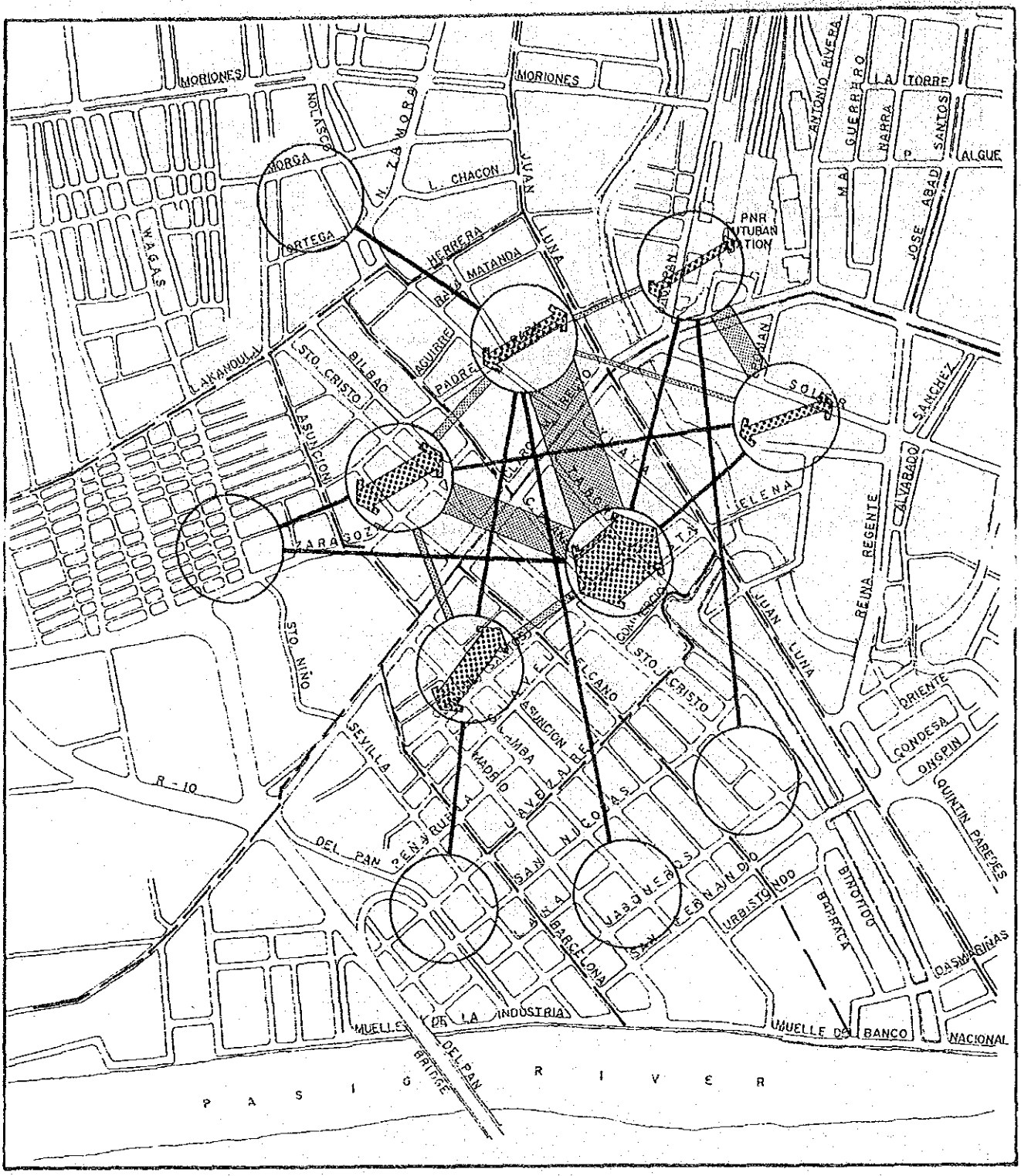
JEEPNEY - BUS

PASSENGER BOARDING/ ALIGHTING SECTION

SOURCE : JUMSUT II SURVEY

Figure 2.17
Transfer Passenger
Flow

JUMSUT II



LEGEND:

VISITING AND BOARDING POINT / AREA

NUMBER OF PASSENGER

1,000 BELOW
5,000
10,000
20,000

0 50 100 300 M

SOURCE : JUMSUT II SURVEY

Figure 2.18
Terminating Passenger Flow

JUMSUT II

Figure 2.19
Average Boarding/Alighting Passengers by Section
along C. M. Recto

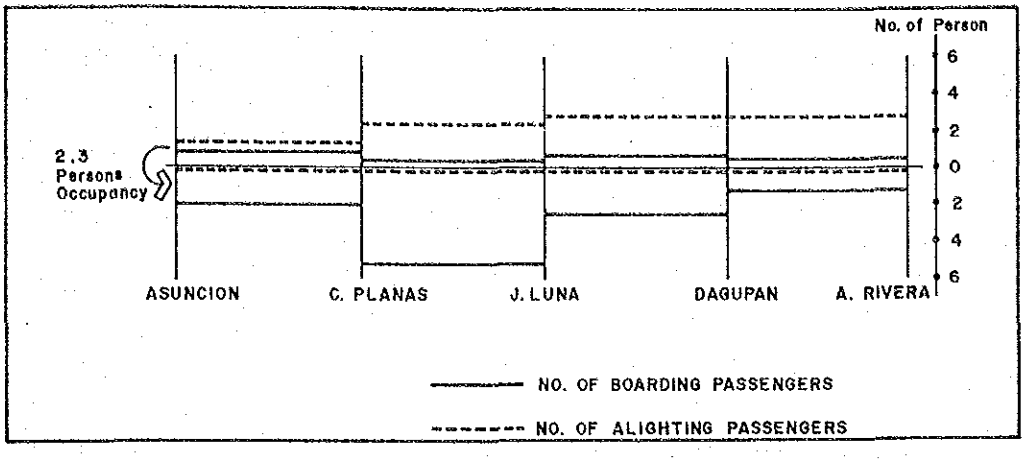
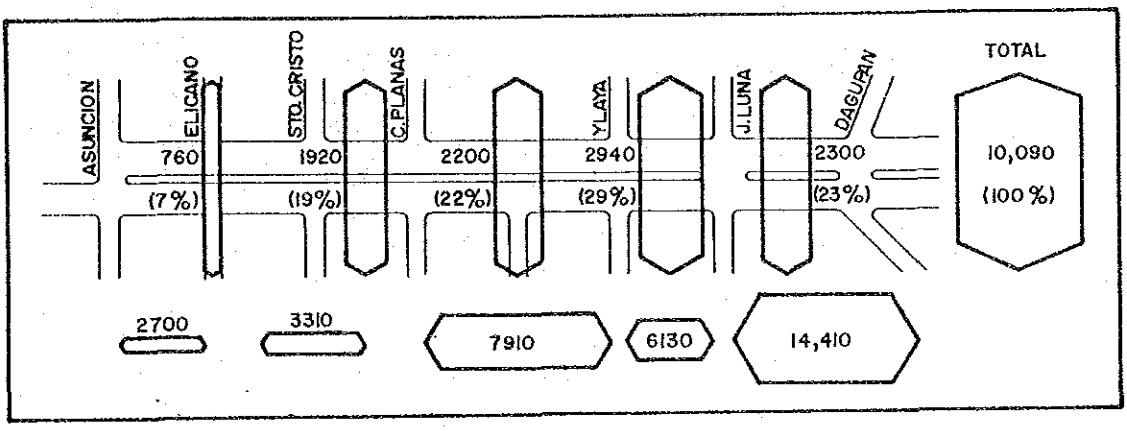
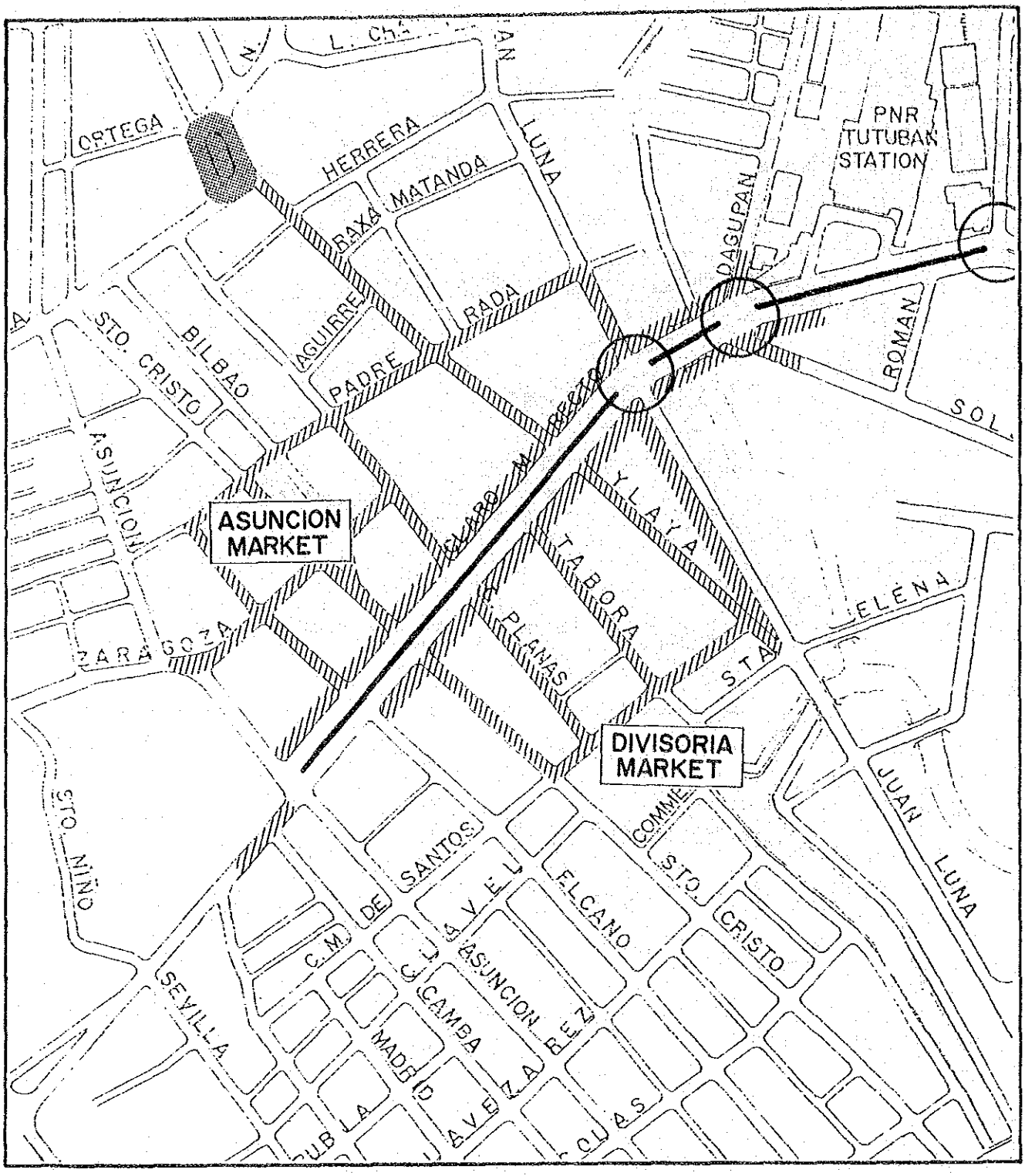


Figure 2.20
Pedestrian Movement along C. M. Recto



SOURCE : JUMSUT II PEDESTRIAN COUNT SURVEY

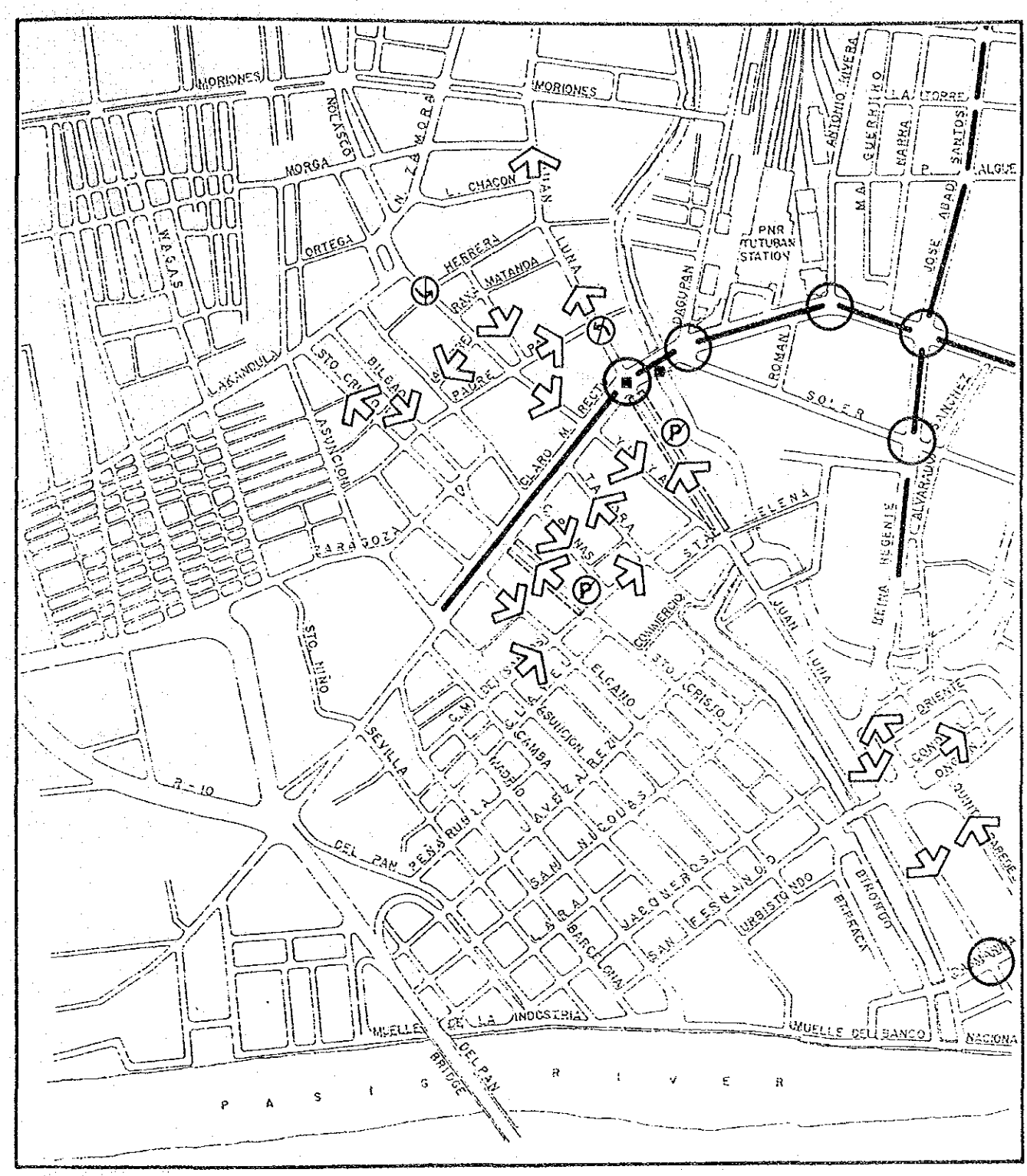


LEGEND:

- Traffic Signal (not functioning)
- Median / Barrier
- Congested Section by Pedestrian
- Plaza

Figure 2.21
Existing Pedestrian Facilities

JUMSUT II



LEGEND:

- ONE WAY
- NO PARKING AREA
- NO LEFT TURN
- TRAFFIC SIGNAL
- MEDIAN / BARRIER
- POLICE OUTPOST

0 50 100 300 M

Figure 2.22
Existing Traffic
Control

JUMSUT II

2.6 CAR PARKING

The number of slots for off-road parking is very low in relation to the magnitude of commercial and business activities in the area. Even the few spaces available at the northern part are preempted for other purposes, if not fully occupied. Naturally roads become the next best alternative.

The number of parked vehicles on the streets is approximately 1,800 based on a parking survey. Streets with prevailing on-road parking are as follows (see Figure 2.23):

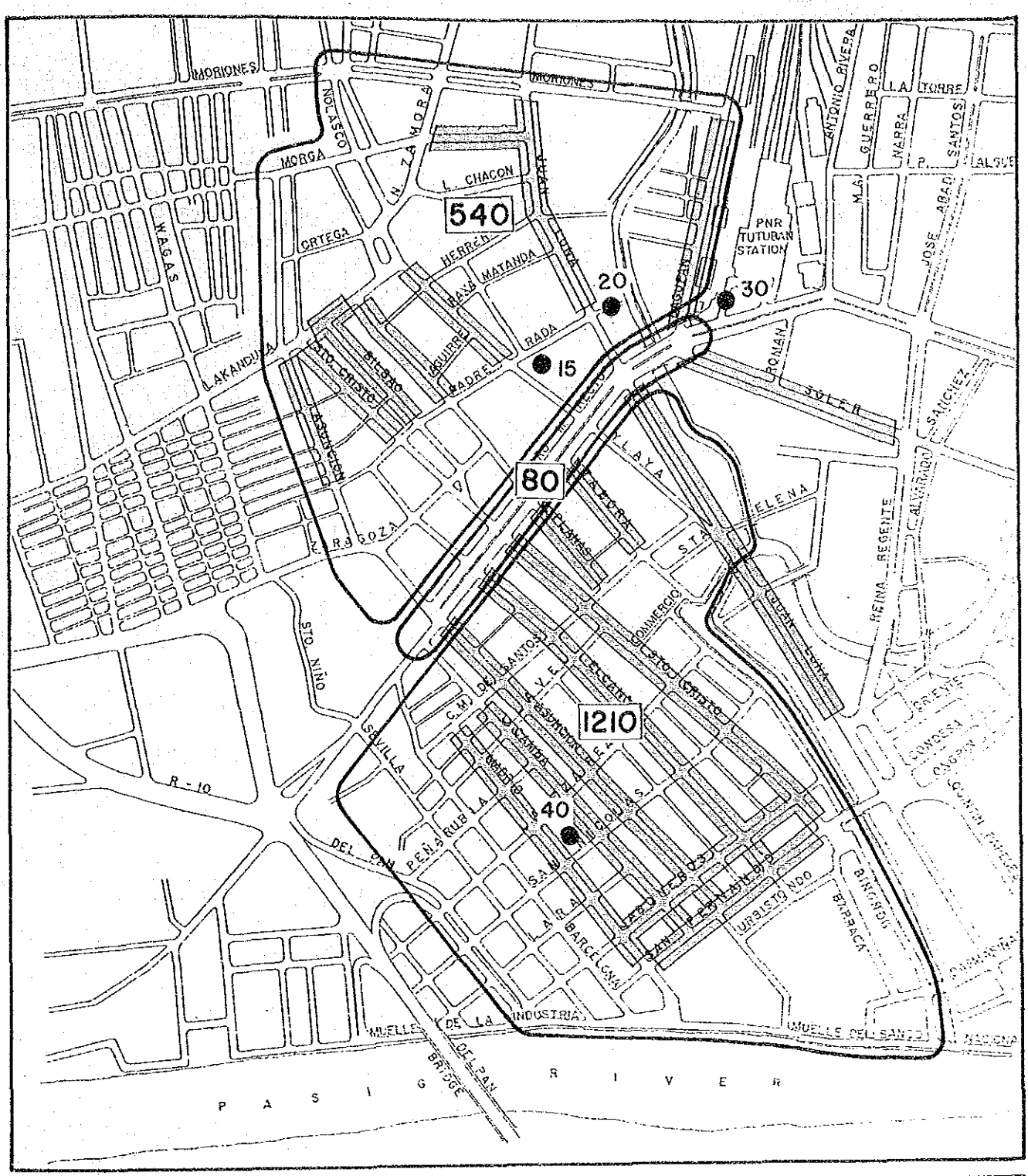
- Sto Cristo
- Juan Luna
- San Fernando
- Elcano
- Asuncion

The mix of vehicles parked on the road is shown in Table 2.11. Freight trucks are very significant (more than 45% of total) in all areas even disregarding their size.

Table 2.11
Proportion of On-Road Parked Vehicle by Type

Area	Private Car	Truck		Others	Total
		Heavy	Light		
	(%)	(%)	(%)	(%)	(%)
San Nicolas	50	15	33	2	100
C.M. Recto	55	-	45	-	100
Tondo	51	28	18	3	100

Source: JUMSUT II



LEGEND :

- ● OFF ROAD PAY PARKING
- 40 CAPACITY OF OFF-ROAD PAY PARKING
- SECTION OF HIGH DENSITY ON-ROAD PARKING
- 540 ESTIMATED NO. OF ON-ROAD VEHICLES IN THE AREA

0 50 100 200 M.

Figure 2.23
Existing Parking Condition

JUMSUT II

3.0 PREVIOUS STUDIES AND PROPOSALS

3.1 PRECEDENTS

MMTEAM II and MMUTSTRAP have undertaken studies on Divisoria focusing on the traffic management aspects. The following reports have been reviewed vis-a-vis Divisoria:

- MMUTSTRAP B1 Technical Report No. 8
- MMTEAM II
- R-10 and Related Roads Project
- Tondo Foreshore Upgrading Project

3.2 MMTEAM II

This project has been planning and on the verge of implementing the installation of traffic signals at about 170 locations spread over an area between C-2 and C-4. Divisoria is included with six (6) intersections. One of these, the proposed signal at C. M. Recto - Ylaya intersection, may no longer be needed if the measures recommended in the MMUTSTRAP study are adopted.

3.3 MMUTSTRAP B1

MMUTSTRAP Part B1 broadened by analysis of the area, but limited itself to traffic engineering. It covered the area bounded by C. M. Recto, R-10, R. Regente and Pasig River, and identified potential traffic system improvements in matters of:

- area access and traffic circulation;
- pedestrian facilities;
- public transport; and,
- freight movement management.

The recommended widening of C. M. Recto between Asuncion to R-10 is highlighted since C. M. Recto is a major link in the primary road network and an access route to the port area. The MMUTSTRAP recommendations are summarized in Table 3.1.

3.4 R-10 AND RELATED ROADS PROJECTS

Phase 1 of this project is about to be finished and its Phase 2 has been committed. R-10 is viewed not only as a collector road for C-1 (C. M. Recto), C-2, C-3, and C-4, but also potentially a direct route between Metro Manila and Bataan Peninsula. Several industrial development activities are sprouting along this bay area that would capitalize on the eventual transport capacity of R-10.

3.5 TONDO FORESHORE UPGRADING PROJECT

This project embraces slum upgrading improvement of the Tondo foreshore area and reclamation of Dagat-dagatan. A component involves construction of major infrastructures including main roads. As reported, 26,000 linear meters of road has been completed and the construction of R-10 and C-2 is being undertaken by MPWH. R-10 is the major access to this project area.

Table 3.1
Summary of Proposals and Recommendation
Made Under MMUTSTRAP B1

Concern	Proposals Made
Area access and traffic circulation	1) Widening of C.M. Recto between R10 and Asuncion to two lanes in each direction, provided PNR right-of-way and minor squatter relocation is effected. 2) Provision of outer separator islands and sidewalk-widening between Asuncion and Juan Luna. 3) The existing one-way street system in the Divisoria area is recommended formalized and amended, where necessary. (See Appendix) 4) Traffic signals at various intersections were installed under TEAM II program and endorsed by MMUTSTRAP, except for C.M. Recto-Ylaya intersection.
Pedestrian facilities	1) Two of the five lanes of C.M. Recto between Asuncion and Juan Luna are proposed as slow movement areas which pedestrians can utilize. The other three lanes will serve the through traffic. The area bounded by C.M. Recto, Juan Luna, Estero de Binondo, Lavezares and Sto. Cristo is also proposed to be a slow movement area.
Public transport	1) Potential off-road public transport terminal improvements along Del Pan between R10 and Zaragoza.
Freight movement management	1) Exploratory studies on the potential for selective prohibition of delivery trucks along major routes during peak traffic flow periods are proposed.

4.0 TRANSPORT SYSTEM ANALYSIS

4.1 SPECIFICATION OF THE PROBLEM

4.1.1 General Observations

Divisoria generates traffic not only as a result of trading/retailing-activities, but also as a major transfer point for commuters.

Despite its apparent multi-directional accessibility which is favorable to growth of industries, traffic bottlenecks along such primary roads as C. M. Recto and Juan Luna dampen future development and redevelopment.

The strategic issue for Divisoria is whether to intervene and redevelop it or allow it to remain static.

Aside from minor civil works, the latter option implies a benign neglect and erosion of the role of Divisoria in the metropolitan context. The other option of renewing Divisoria's primacy suggests an aggressive posture which would entail at the very least the following:

a) Strengthening of primary road network

The completion of R-10 and linkage to Recto will radically alter the existing traffic flow. This necessitates better handling of through and local traffic to improve the effective accessibility of the area. The forecasted traffic flow for C. M. Recto at completion of R-10 is 56,000 vehicles per day.

b) Improvement of internal traffic system

If the objective is to sustain and induce further industrial activity in the area, then traffic circulation should be improved. This can only be achieved if roads are freed of street vending, parking, goods unloading and the like. In short, controlling the "tiangge" orientation that has also made Divisoria unique and alive.

c) Rationalization of the public transportation system

Divisoria, being an important mode interchange area, require remedies to its intractable traffic headaches and the corollary measure of expanding its off-street terminal capacity.