

* REPUBLIC OF PARAGUAY *

**THE URBAN
TRANSPORT STUDY
IN
ASUNCION
METROPOLITAN AREA**

PROGRESS REPORT II

MARCH 1985

**JAPAN INTERNATIONAL
COOPERATION AGENCY**

* REPUBLIC OF PARAGUAY *

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TRANSPORT STUDY
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JAPAN INTERNATIONAL
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PREFACE

The Urban Transport Study in the Asuncion Metropolitan Area was started in August 1984. After collection of related materials and implementation of various surveys on prevailing conditions, the study next entered the analysis phase. Progress of the study as of October 1984 was previously described in the Progress Report (I) submitted earlier. The present Progress Report (II) describes the progress of the study between November 1984 and January 1985 including various results of analysis.

Prior to the implementation of this study, the Asuncion Urban Plan and Asuncion Public Transport Plan were formulated by the World Bank and the Brazilian Government, respectively. The former ranks above the present study plan, while the latter is similarly on a lower level. At present the latter plan has been received by Asuncion in the form of a proposal and has not yet been authorized. The former plan has thus far been submitted only in draft form, and evaluation within the World Bank has not yet been completed.

The study team intends to give careful study to the contents of these two plans and to take a specific stance regarding their disposition. Then the selection will be made through discussions with the Asuncion authorities, and modifications will be carried out.

As of the end of January, progress on the study implemented by the study team has reached only the calculation and analysis stages. Therefore, the response of the study team to the two plans shall be reported in concrete terms beginning with the next report.

CUADRO DE INSTITUCIONES RELACIONADAS AL ESTUDIO Y
SIGLAS RESPECTIVAS EMPLEADAS EN EL PRESENTE INFORME

N° de ORDEN	INSTITUCION	SIGLA
1	Asociación de Municipalidades del Area Metropolitana	AMUAM
2	Administración Nacional de Aeropuertos Civiles	ANAC
3	Administración Nacional de Electricidad	ANDE
4	Administración Nacional de Navegación y Puertos	ANNP
5	Administración de Transporte Eléctrico	ATE
6	Banco Central del Paraguay	BCP
7	Confederación de Empresas de Transporte Público del Area Metropolitana	CETRAPAM
8	Ferrocarril Central del Paraguay "Carlos Antonio López"	FCPCAL
9	Flota Mercante del Estado	FME
10	Instituto Geográfico Militar	IGM
11	Instituto Paraguayo de Vivienda y Urbanismo	IPVU
12	Municipalidad de la Ciudad de Asunción	MCA
13	Ministerio de Hacienda, Dirección General de Estadísticas	MHDE
14	Ministerio de Industria y Comercio	MIC

(Cont.)

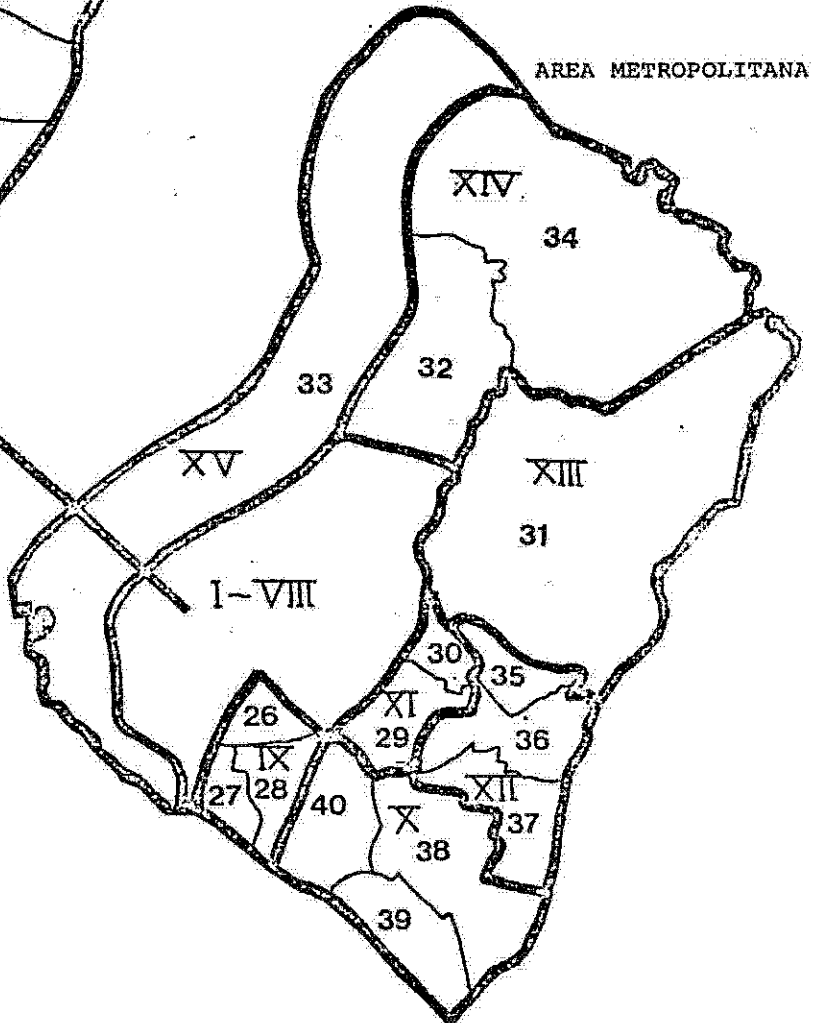
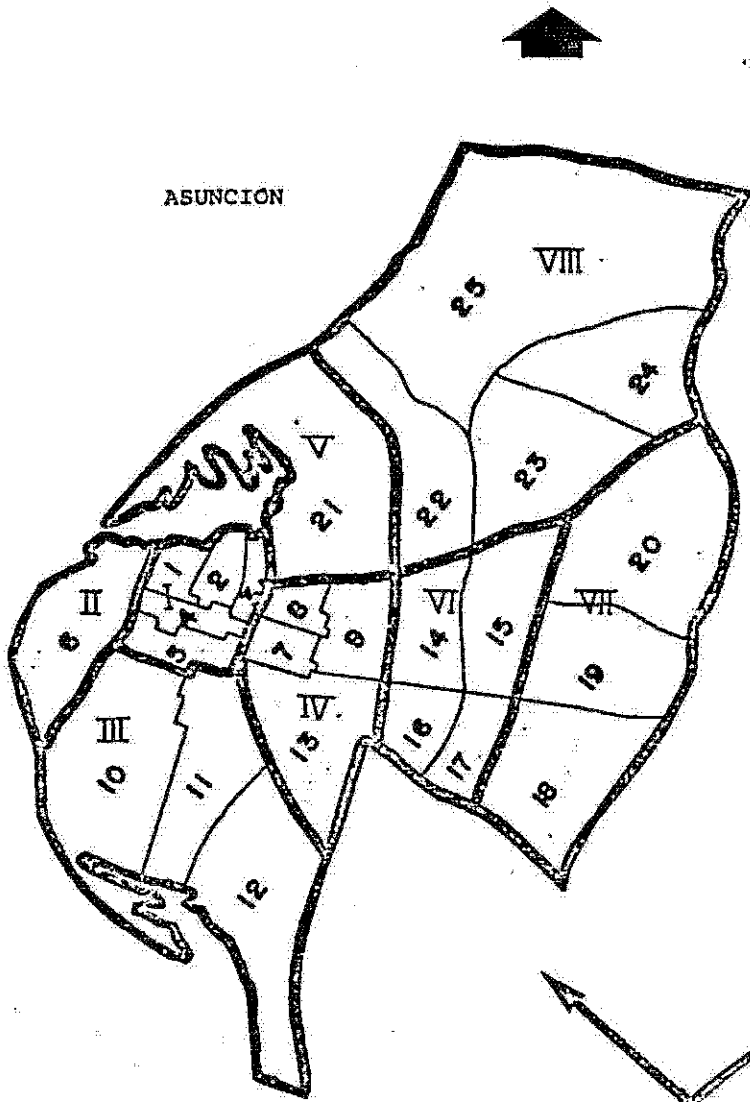
N° de ORDEN	INSTITUCION	SIGLA
15	Ministerio de Obras Públicas y Comunicaciones	MOPC
16	Organización Paraguaya de Cooperación Intermunicipal	OPACI
17	Secretaría Técnica de Planificación	STP
18	Municipalidad de la Ciudad de Asunción, Dirección de Tránsito	TRANSITO

ZONAS DEL ESTUDIO DE VIAJES DE PERSONAS

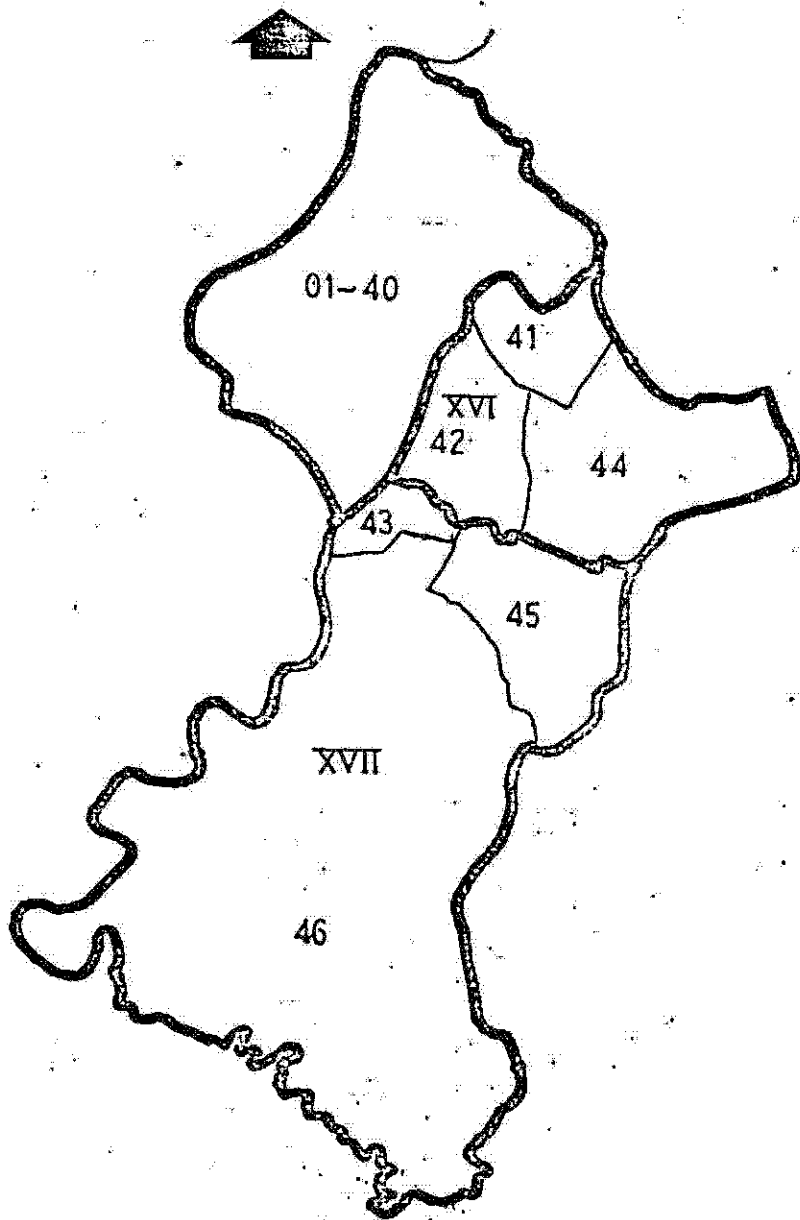
ZONA	NOMBRE	ZONA	NOMBRE
1	Encarnación	26	Lambaré Norte
2	Catedral Este	27	Lambaré Oeste
3	San Roque Norte	28	Lambaré Este
4	Catedral Oeste		Lambaré (26-28)
5	Grál. Díaz	29	Fdo. de la Mora Sur
6	Carlos A. López	30	Fdo. de la Mora Norte
7	San Roque Sur		Fdo. de la Mora (29-30)
8	San Roque Este	31	Luque
9	Las Mercedes	32	Mariano R. Alonso
10	Tacumbú	33	Villa Hayes
11	Obrero	34	Limpio
12	Republicano	35	San Lorenzo Norte
13	Pettirossi	36	San Lorenzo Central
14	Mburicaó	37	San Lorenzo Sur
15	Recoleta		San Lorenzo (35-37)
16	Vista Alegre	38	Nemby
17	Nazareth	39	San Antonio
18	Pdte. Stroessner	40	Villa Elisa
19	Villa Aurelia		Area Metropolitana (1-40)
20	Ycua Satí	41	Areguá
21	Jara	42	Capiatá
22	Bella Vista	43	Ypané
23	Santo Domingo	44	Ypacarai
24	Mburucuyá	45	Itá
25	Botánico	46	Villeta
	Asunción (1-25)		Central (26-46)
		47	Chaco
		48	Región Norte
		49	Región Oriental
		50	Región Sur

CONCEPTO DE ZONA INTEGRADA

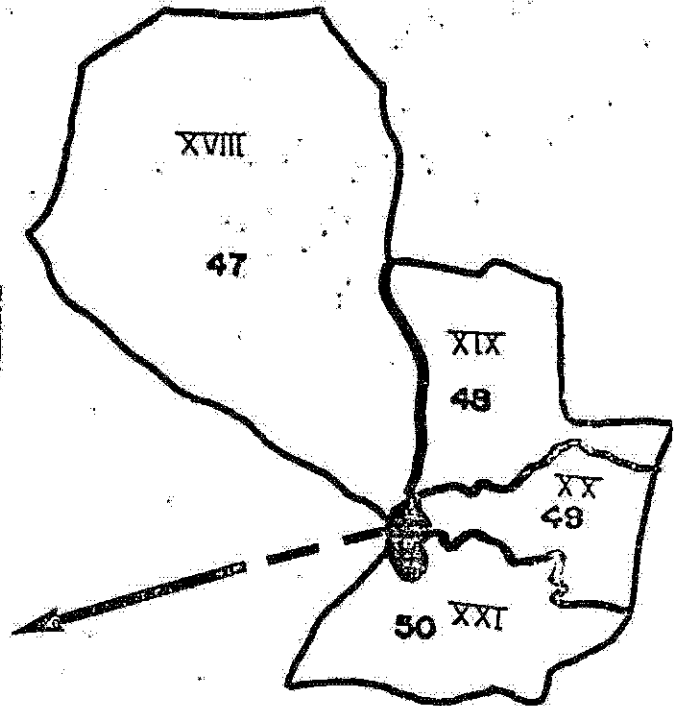
ZONA INTEG.	NOMBRE	P.T.ZONAS
I	Centro	1-2-3-4-5
II	Sajonia	6
III	Bo. Obrero	10-11-12
IV	Pettirossi	7-8-9-13
V	Parque Caballero	21
VI	Mburicá	14-15-16-17
VII	Terminal	18-19-20
VIII	Botánico	22-23-24-25
IX	Lambaré	26-27-28
X	San Antonio	38-39-40
XI	Fdo. de la Mora	29-30
XII	San Lorenzo	35-36-37
XIII	Luque	31
XIV	Limpio	32-34
XV	Villa Hayes	33



ASUNCION Y DPTO. CENTRAL



PARAGUAY



CONCEPTO DE ZONA INTEGRADA

ZONA INTEGRADA	NOMBRE	P.T. ZONAS
XVI	Ypacaraf	44-42-41
XVII	L. Ypoá	46-45-43
XVIII	Chaco	47
XIX	Norte	48
XX	Este	49
XXI	Sur	50

CHAPTER 1: STUDY PROGRESS REVIEW

In the interim from November 1984 through January 1985, studies were carried out according to the schedule indicated in the Inception Report. Their contents can be broadly divided into the general categories listed below. Table 1-1 shows the implementation process.

- (1) Socio-economic and land use studies
- (2) Person trip survey implementation, and tabulation and analysis of results
- (3) Study of transportation facilities
- (4) Study of road traffic
- (5) Preparation of topographic map

1-1. Socio-Economic and Land Use Studies

The current socio-economic status of the Asuncion Metropolitan Area within Paraguay was learned through the collection and analysis of existing data relating to population, population movements, gross domestic product, employment structure, etc. In order to learn the urban structure, land uses and economic indexes for each zone relating to person trips in the Asuncion Metropolitan Area, in addition to the collection and analysis of existing materials, land use maps were prepared, land area by usage was calculated, and attributive data from the person trip survey was tabulated.

1-2. Person Trip Survey Implementation, and Tabulation and Analysis of Results

- 1) Implementation of Person Trip Survey

A home interview survey aimed at acquiring data on person trips was carried out in November. Following inspection, editing and coding, the data was fed into computer. This work was completed in mid-January.

Other surveys pertaining to the person trip survey were also performed and their results tabulated during this time, including a screen line count, cordon line count and a passenger survey.

2) Expansion and Compensation of Survey Results

Because the home interview survey was conducted through a sampling method, in order to attain values for the entire present population of the Asuncion Metropolitan Area it was necessary to undertake expansion work based on population statistics. A screen line comparison with traffic volume was also performed to compensate the person trip values. These tasks were carried out in the latter half of January. Then these were coordinated with the results of the cordon line count and a current OD table was prepared.

1-3. Transportation Facilities Study

1) Roads

A road inventory was prepared using existing materials, topographic maps, etc. For items for which there was no existing data -- e.g., width of major roads -- data collected in the surveys implemented in October was coordinated and used. Fundamental materials for preparing an up-to-date arterial road network were readied based on historical road changes, land use, road traffic volume, person trip zoning, etc. Existing plans such as World Bank projects were also coordinated.

2) Wide-Area Transportation Facilities

To acquire current data on wide-area transportation facilities such as airports, ports, railroads and long-distance bus terminals, existing materials were collected. At the same time, studies were performed relating to passenger arrivals/departures at Asuncion's railway station, port and bus terminal. Data was tabulated and analyzed.

3) Study of Public Transportation Facilities

A study on the number of passengers boarding and alighting at bus stops on major roads was performed in October; data tabulation was carried out in November. The same type of study was performed for streetcars, and data was tabulated. In addition, reviews of existing studies such as World Bank projects and studies conducted in cooperation with the Government of Brazil were also continued.

1-4. Road Traffic Studies

1) Roadside Traffic Volume, Traffic Volume at Intersections

Surveys of traffic volume in various locations were performed in November. Related data tabulation and analysis were completed in January.

2) Travel Time Study

From October through December travel time studies were conducted pertaining to the major trunk roads in the

Asuncion Metropolitan Area and major streets in the Centro district, and the resulting data was tabulated and analyzed.

3) Parking Study

In order to learn both the on-street and off-street parking situations primarily in the Centro district, related studies were performed from December through January. Data tabulation and analysis were completed by the end of January.

4) Traffic Accident Study

Data on traffic accidents which occurred during 1983 was compiled and coordinated. At the same time, existing statistics were collected and an analysis of traffic accidents was undertaken. This study was performed in January.

5) Traffic Control Study

To attain a grasp of the current traffic control situation, studies of traffic regulations and traffic signs were performed and related data was tabulated. Studies were also made of traffic signal installation locations and signal phasing. These studies were all carried out between December and January.

1-5. Preparation of Topographic Map

Site surveys required for preparation of a topographic map were completed in October. Next, the following tasks were performed in Japan and completed in January.

- (1) Rigorous Adjustment of Control Station
- (2) Aerial Triangulation
- (3) Map Compilation
- (4) Quality Check

CUADRO 1-1

TRABAJO DESARROLLADO

AREAS	ITEMS	1984		1985
		Noviembre	Diciembre	Enero
Socio-Económico y Uso de suelo	<ul style="list-style-type: none"> • Recolección de datos • Graficación y tabulación • Análisis 			
Estudio del viaje de las personas	<ul style="list-style-type: none"> • Encuesta a las personas • Edición y codificación • Grabación y control de errores • Encuesta en línea pantalla y cordón • Expansión • Ajuste 			
Estudio de facilidades del transporte	<ul style="list-style-type: none"> • Recolección de datos • Revisión de otros proyectos • Listado de red vial • Estudio de la red vial • Tabulación de datos de transporte interurbano • Tabulación de datos de transporte público 			
Estudio de tránsito	<ul style="list-style-type: none"> • Revisión de otros proyectos • Encuesta y análisis de tráfico • Encuesta y análisis de velocidad de viaje • Encuesta y análisis de estacionamiento • Tabulación y análisis de accidentes • Estudio de control de tránsito 			
Mapeamiento	<ul style="list-style-type: none"> • Cálculos de precisión de la poligonal • Triangulación aérea • Compilación de mapas 			

CHAPTER 2: ROLE OF ASUNCION METROPOLITAN AREA IN PARAGUAY

2-1. Population

2-1-1. Population Trends

The most recent population census conducted in the Republic of Paraguay took place in 1982, and current population figures are based on the results of a 10% sampling. Between 1962 and 1982 the nation's population increased at an average rate of 2.6% per year, growing from 1,800,000 to 3,000,000. During the same period, the population of the Asuncion Metropolitan Area advanced at a yearly average of 3.4%, doubling in scale from 400,000 to 800,000. As a result, the share of the national population living in greater Asuncion has climbed by 3.8% points from 22.5% in 1962 to 26.3% in 1982.

While a comparison of population growth rates in the 1960s and 1970s shows a gradual decline from 2.70% to 2.55% per annum at the national level, the drop in the rate of increase is sharper in the Asuncion Metropolitan Area, falling from 3.62% to 3.27%. This sudden change is due to the significant deceleration in the population growth rate within Asuncion proper, which makes up the major portion of the greater Asuncion Metropolitan Area.

In contrast with the decline in the rate of population increase within Asuncion proper, extremely high growth rates continue to be seen in the cities which are contiguous within the greater Asuncion Metropolitan Area (Fernando de la Mora, Lambare, San Lorenzo, etc.). In addition, sharp rates of population increase were registered in the 1970s in cities toward the perimeter of this region such as Luque, Mariano Roque Alonso, Nemby, Villa Elisa and Villa Hayes.

As a result, the percentage of the Asuncion Metropolitan Area which lives within Asuncion proper has gradually declined from 70.6% in 1962 to 67.2% in 1972 and 57.2% in 1982 (Table 2-1-1).

2-1-2. Natural Increase

According to estimates released by STP, both the birth rate and death rate are on the decrease in Paraguay. Because the decline in the birth rate is somewhat steeper, the rate of natural increase is also gradually declining. In contrast, within Region I (Asuncion and Departamento de Central) both the crude birth rate and the natural increase rate are on the rise in spite of a drop in the total fertility rate (Table 2-1-2).

Because the above estimates do not reflect the results of the 1982 national census, the following is a general discussion of the changes in the birth rate based on the 1972 census and the 1982 (10% sampling) census.

Table 2-1-3 shows the uncompensated total fertility rate and crude birth rate as calculated from the census data for 1972 and 1982. (Because it is necessary to carry out compensation using W. Brass's or other methods in order to obtain a proper birth rate,) There are difficulties involved in viewing these values as absolute; nevertheless, it is possible to use these values to compare regional differences and yearly trends.

According to the table, although the total fertility rate is slightly declining the crude birth rate is on the rise. This is attributed to the fact that the number of females of child-bearing age (15-49) has increased 1.36-fold from 525,000 to 715,000 (vs. 1.29-fold increase in total population), accompanied by an increase in their national share from 22.3% to 23.5%.

The total fertility rate is also rising marginally in Region I. Although it is declining in Departamento de Central, the decline has been offset by a sharp increase in the rate for Asuncion proper from its quite low level of 1972.

The total fertility rate in Paraguay is thus on the decline within the rural areas which have relatively high rates, and is bottoming out in the urban areas. Within the Asuncion Metropolitan Area, in fact, it is gradually beginning to rise as the region proceeds with urbanization.

A comparison of Tables 2-1-2 and 2-1-3 shows that the crude birth rate in Paraguay was nearly even at 37-38 persons per 1,000 between 1972 and 1982. As the crude death rate was around 7-8% and was dropping slightly, it can be assumed that the rate of natural increase in Paraguay during this period was approximately 3%.

2-1-3. Social Movements

1) International Social Movement

The rate of population growth in Paraguay between 1972 and 1982 was 2.55%. Since the rate of natural increase is seen to be around 3%, it can be assumed that the rate of international social movement produced an excess of 0.5% in persons leaving Paraguay.

According to the 1982 census, there were 104,000 Paraguayans living in foreign countries in 1977. This means that an average of 20,000 persons entered the nation each year. Of the total population of some 3 million, if 0.5% or 15,000 more persons left the country than entered, then approximately 35,000 are leaving Paraguay each year.

2) Domestic Social Movement

According to the 1972 national census, in the five years between 1967 and 1972 55,000 persons moved to Asuncion. On the other hand, some 28,000 persons left Asuncion, resulting in an excess influx of 27,000 persons. A similar excess of 19,000 persons was registered in Departamento de Central. Some 47,000 persons moved from other departments to Region I, which is comprised of Asuncion and Departamento de Central. Within Region I, more than 6,000 persons moved from Asuncion into Departamento de Central (Table 2-1-4).

Beginning in the latter 1970s the concentrated movement toward Asuncion started to ease somewhat and instead grew conspicuous in Departamento de Central. Some 10,000 more persons moved out of Asuncion than moved to the city, and in particular the excess flow from the city into Departamento de Central numbered 33,000. While the number of persons moving out of Departamento de Central has remained almost at the level of 10 years ago, the number of persons moving into this department has increased 2.3-fold to record an influx excess of 61,000 persons (Table 2-1-5).

While no materials are available which directly describe the number of persons moving into and away from the Asuncion Metropolitan Area, since the population of the area not including Villa Hayes accounts for 83.3% of the population of Region I and since population movements are relatively large within this remaining area within Region I, in general the population trends which have been outlined above may be accepted to hold true for the entire Asuncion Metropolitan Area.

2-1-4. Population Makeup by Sex and Age Group

Trends in the breakdown of Paraguay's population by sex

and age group are shown in Table 2-1-6. From this table it is seen that the sex ratio (number of males for every 100 females), which was 98.3 in 1972, has reversed itself to 100.3 in 1982, indicating a plurality of males. By age group, while the percentage of minors (ages 0-14) has declined from 44.8% in 1972 to 41.0% in 1982, the percentage of persons of productive age (15-64) has increased sharply from 51.2% to 54.7%. The percentage of elderly citizens (age 65 and above) has increased marginally from 4.0% to 4.3%. These figures reflect the declining trends seen in both the birth and death rate over the past ten years as described earlier in the section on natural increase.

A comparison of the Asuncion Metropolitan Area with nationwide figures shows several special features: (1) a high proportion of females and (2) a high proportion of persons of productive age. Although the sex ratio in greater Asuncion has climbed slightly from 90.5 in 1972 to 91.3 in 1982, it is still as much as 9 points lower than the national average. The main reason for this high percentage of females in the capital area is the overwhelmingly large number of females among persons moving into the area from rural regions (Table 2-1-7).

According to the data presented in Table 2-1-8, females accounted for nearly 80% of all persons over the age of 12 moving to the major sections of the Asuncion Metropolitan Area in 1981-82. Among these, females less than 45 years of age accounted for over 70% and girls under 14 accounted for another 10%. Two reasons for the relatively high proportion of persons of productive age in the overall population makeup are the large influx of such persons, especially females, into the capital area as well as the traditionally low birth rate.

2-2. Economic Activities

2-2-1. Trends in the Paraguay GDP

From the mid-1970s through the early 1980s, Paraguay experienced an outstanding level of growth averaging more than 10% per annum. In 1982, however, growth entered the negative zone and in 1983 it fell to its worst level of -3.0%. In 1984, aided by strong showings of the nation's two major export items -- cotton and soybeans -- recovery is expected at a rate of 2.9% in BCP (Table 2-2-1).

The structure of the Paraguayan economy may be described as follows: namely, cotton, soybeans, lumber and other primary products are exported and raw materials, semi-products, machinery and final products which cannot be produced domestically are imported. As a result, the growth of the national economy is greatly affected by factors such as weather, international prices of its export items, oil prices and currency exchange rates. The major reasons for the recession since 1982 may be outlined as follows.

(1) Continuing worldwide economic recession, particularly in Paraguay's major trading partner nations (Brazil and Argentina)

(2) Two consecutive years of unfavorable weather conditions

(3) Sharp drop in soybean prices on the international market in 1983

(4) Elimination of advantages formerly reaped through favorable currency exchange rates with Brazil and Argentina -- important export customers and sources of tourist revenues -- following sharp revisions in such rates by both countries

(5) Drop in demand for hydro power related construction as the Itaipu Dam neared completion and

commencement of the Yacireta Dam was delayed

A breakdown of Paraguay's GDP shows that the production sector and the services sector are nearly of equal size. Within the production sector, although the primary industries increased in terms of absolute value through the period of high growth lasting until 1980, the ratio which such industries occupied gradually declined. This trend has been reversing itself, however, since 1981.

The secondary industries show the exact opposite movements. The manufacturing industries were down 3.7% in 1981-82 and 4.0% in 1982-83, and the construction industry was down by 6.0% and 5.7% for the same years, thereby playing a "leadership role" in the nation's negative growth. In 1982 the textile and petroleum industries kept the manufacturing industries from advancing as a whole, the former due to a poor cotton harvest and the latter due to an increase in crude oil import prices. The situation was further aggravated in 1983 by flood damage to factories, shortages of raw materials for domestic industries, spiraling prices of imported raw materials and unstable currency exchange rates.

The tertiary industries normally follow the trends of the industrial sector in general, accounting for a share of approximately 50% of total production value. Although they do not represent large amounts overall, key service industries such as electricity, water and sewers, and transport and communications, which scored steady growth through 1982, fell by 1.4% in 1983.

Calculated according to the figures of the 1982 national census, the per capita GDP is 242,800 guarani. When converted at the free market exchange rate for July of that year of 188 guarani to the dollar, the per capita GDP is \$1,290.

2-2-2. Employment Structure by Industry

The population of employed industrial workers, based on the 1982 national census, was 1,040,000. Among these, 43% belonged to the primary sector, 18% to the secondary sector and 39% to the tertiary sector. These proportions vary considerably from the makeup of the GDP, a situation caused by major differences in the productivity of the various industrial sectors (Table 2-2-2).

While productivity in the cattle-farming and forestry and fishing industries, which involves few workers, is high, the average per capita GDP for persons belonging to the primary industrial sector is 428,000 guarani, or less than half the figures for the other two sectors. Within the tertiary sector, while productivity of "other services" is low it is high in the commercial and financial industries, resulting in the highest overall level of the three sectors.

Table 2-2-3 shows the employment structure and worker population by district for the Asuncion Metropolitan Area in 1984. A gap of approximately 2,100 persons exists between the worker population in the entire capital areas when calculated on a permanent or non-permanent living basis, owing to the influx of commuting workers into the city from outside areas. The gap is approximately 50,000 persons for Asuncion proper, which indicates that commuters come in concentrated numbers from the cities at the periphery of the Asuncion Metropolitan Area and outside the area.

The industrial structure of the capital area in terms of worker population shows the following breakdown: primary industries 3.5%, secondary 16% and tertiary 80.5%. Tertiary industries, particularly "other services," are especially concentrated in Asuncion proper.

2-2-3. Estimated Gross Regional Product of Metropolitan Asuncion

Table 2-2-4 shows the estimated gross regional product of the Asuncion Metropolitan Area in 1984. The total product figures to 305 billion guarani (1982 values), comprised of tertiary industries with 82% and secondary industries with 16%. A comparison with the GDP for 1984 according to BCP estimates, 735 billion guarani (1982 values), yields a relative share of approximately 40%.

2-3. Wide-Area Transportation Systems

The modes of transportation available between the Asuncion Metropolitan Area and (a) other areas of Paraguay and (b) other nations include air, sea and land. These various wide-area transportation facilities in the Asuncion Metropolitan Area are shown in Fig. 2-3-1.

2-3-1. Airport

The airport which serves the Asuncion Metropolitan Area is Presidente Stroessner International Airport, located in Luque east of the capital approximately 15km from Centro. The airport terminal was completed in March 1980. The runway is 3,353m long. These facilities used not only for international aircraft but also domestic airlines and private planes. The airport is under the control of the Administracion Nacional de Aeropuertos Civiles (ANAC), which belongs to the Ministerio de Defensa Nacional.

The total number of air passengers using this airport in 1983 was 222,000. 84% of this figure was comprised of passengers on international lines. The number of users has been declining over the past several years. The amount of

cargo which is handled at the airport was approximately 1000 tons in 1983, and cargo volumes are also in decline (Table 2-3-1). As of December 1984, there were 8 international and 2 domestic airlines using the airport. The domestic airlines provide service between Asuncion and Pilar, Mcal. Estigarribia, Ingavi, Valle Mi, Pto. Casado, Concepcion, San Pedro, P.J. Caballero and Capitan Bado. The total number of regular aircraft using the airport each day, international and domestic airlines combined, is 15. Non-scheduled flights and private planes use the airport 53 times per day.

2-3-2. Ports

All of Paraguay's ports and marine transport are under the control of the Administracion Nacion de Navegacion y Puertos (ANNP). Transport is handled by la Flota Mercante del Estado (FME). These two organizations both come under the jurisdiction of the Public Works Ministry. While there are numerous ports of various size located within the study area, the only one of nationwide importance is Asuncion Port. Villeta Port is located in the area adjacent to the study area.

1) Asuncion Port

Asuncion Port is located in the Centro district of Asuncion City on Asuncion Bay in the Rio Paraguay. The port has a long history and is the nation's foremost port. It has a total pier length of 874m, 740m of which is used for cargo. An average of 9-10 ships dock here at any given time. The amount of export cargo handled here in 1983 was 186,000 tons; agro-forestry products and livestock accounted for the overwhelming portion (92%) of this figure. The amount of import cargo handled during the same year was

93,000 tons; this included manufactured products, metals, chemicals and pharmaceutical products, petroleum products and some foodstuffs. Domestic cargoes amounted to only 5,000 tons, consisting primarily of farm products (Table 2-3-2). A review of cargo volumes in recent history shows that volumes have been decreasing in recent years after peaking in 1979 (Fig. 2-3-2).

2) Villeta Port

Villeta Port is located on the Rio Paraguay at a point 45km south of Asuncion. It has a pier length of 100m. In 1983 the port handled 69,000 tons of export cargo and 8,000 tons of import cargo, as well as 7,000 tons of domestic cargo. The main items handled are soybeans, cotton and other agricultural products. (Table 2-3-3)

2-3-3. Railroad

The national railway of Paraguay is known as Ferrocarril Central Presidente Carlos Antonio Lopez (FCPCAL). It is operated as an independent company under MOPC. The railroad was founded in 1861 using British capital and is the oldest railway in South America. The 370km rail link between Asuncion and Encarnacion, the nation's second most important city, was completed in 1913. The railway was nationalized in 1962. Today the total length of the company's rail lines is 440km, including the 6km Encarnacion-Pacu Cau line and the 64km San Salvador-Abai line. From Pacu Cau, a ferry connection across the Rio Parana connects with the Argentinian national railway at Posadas.

The railway is a single track with a 1.435mm gauge. The most common type of rail is 37kg/m, but three other

types (30/32.5/42.5kg) are also used. Locomotion is provided by 28 wood-burning steam locomotives, and there are 22 passenger and 190 freight cars. Both the rail facilities and the cars are in a state of decay and maintenance is inadequate, resulting in a poor operating ratio.

In 1983 the railway handled 131,000 tons of freight and 259,000 passengers. Of the freight, 75,000 tons or 57% consisted of international cargo, including major items such as lumber, sugar, soybeans and salt. 98% of the passengers were domestic travelers, and the percentage of international traffic is very low. In recent years the volume of rail traffic was on the increase until 1981-82; a drop was recorded in 1983 due to natural disaster and economic recession. (Fig. 2-3-4)

The number of passenger trains utilizing Asuncion Station are 2 to Ypacarai (44km away) each day and 2 to Encarnacion each week, including 1 international train each week to Argentina. There are also 3 freight trains each week.

2-3-4. Long-Distance Bus Terminals

A modern new long-distance bus terminal was completed at the intersection of Ave. Fernando de la Mora and Ave. Republica Argentina in Asuncion in May 1984. Prior to its completion, long-distance bus traffic was handled at several terminals scattered about the city, and parked buses controlled the streets. The new terminal now handles the departure and arrival of buses on all international routes (to Brazil, Argentina and Uruguay) and long-distance routes to Paraguay's major cities. The terminal occupies a land area of 6 ha and has platforms to accommodate 45 buses. It also contains managerial rooms, offices of the various bus companies, ticket offices, restaurants and stores, all in a

building with a total floorspace of 4650m². Several intercity bus routes also connect here, and there are facilities for taxi pickup and regular vehicle parking. It should be mentioned, however, that a considerable number of passengers choose instead to use the bus terminal at Avda. Fernando de la Mora and Avenida Ayala, owing to the convenience of connections here as well as to the facts that the new terminal is still relatively unfamiliar and that passengers using the new facility are required to pay 50 guarani.

According to records for October 1984, the average number of persons departing per day from the new terminal was 569 international passengers (20 buses), 1,936 passengers to points outside Central (132 buses), 449 passengers to points within Central (49 buses), and 1,758 passengers to within the Asuncion Metropolitan Area (533 buses). The daily total therefore figures to 4,713 passengers on 734 buses.

CUADRO 2-1-1 VARIACIONES EN LA POBLACION DEL AREA METROPOLITANA DE
ASUNCION Y EN EL RESTO DE LA REPUBLICA DEL PARAGUAY.

Municipios	P O B L A C I O N			Indice de crecimiento anual (%)	
	1962 1)	1972 2)	1982 3)	1962/72	1972/82
Asunción	288,882	388,958	457,210	3.10	1.63
Fdo. de la Mora	14,519	36,892	66,450	10.04	6.06
Iambaré	20,778	31,732	67,180	4.44	7.79
Limpio	10,126	12,767	16,650	2.41	2.69
Luque	30,834	40,677	63,210	2.88	4.51
M.R. Alonso	5,686	7,388	14,520	2.72	6.99
Nemby	5,984	6,899	12,310	1.47	5.96
San Antonio	5,965	7,321	8,110	2.12	1.03
San Lorenzo	18,573	36,811	74,240	7.27	7.27
Villa Elisa	3,214	4,774	11,600	4.14	9.28
Villa Hayes	4,712	4,795	7,660	0.18	4.80
Total Area Metropolitana	409,273	579,014	799,140	3.62	3.27
Paraguay	1,819,103	2,357,955	3,035,360	2.70	2.55

Fuente: 1) Censo Nacional de Población y Viviendas, 14 de octubre de 1962

2) Censo Nacional de Población y Viviendas, 9 de julio de 1972

3) Censo Nacional de Población y Viviendas, 11 de julio 1982 (Muestra 10 %)

CUADRO 2-1-2 INDICADORES DEMOGRAFICOS ESTIMADOS PARA EL PARAGUAY Y LA REGION I

	Paraguay			Región I ¹⁾		
	1970	1975	1980	1970	1975	1980
	1975	1980	1985	1975	1980	1985
Fecundidad						
Indice bruto de natalidad (por mil)	37.53	36.75	36.03	22.15	22.19	27.79
Indice global de fecundidad	5.62	5.21	4.86	3.35	3.25	3.16
Mortalidad						
Indice bruto de mortalidad (por mil)	8.14	7.67	7.24	4.71	4.82	4.99
Duración esperada de vida (en año)	63.1	64.1	65.1	69.2	69.8	70.4
Crecimiento natural						
Tasa natural de crecimiento (por mil)	29.39	29.08	28.79	17.44	20.57	22.80

Fuente: Proyección de la Población Urbana y Rural, Regional y Departamental por sexo y grupo de edades. Período 1970 - 2000 (Presidencia de la República, Secretaría Técnica de Planificación, División de Población y Recursos Humanos, 1981).

Nota: 1) Asunción y Departamento Central.

CUADRO 2-1-3 VARIACIONES EN LOS INDICES DE FECUNDIDAD Y NATALIDAD EN LA REGION I Y EN LA REPUBLICA DEL PARAGUAY

	Indice global de fecundidad 1972	¹⁾ Indice global de fecundidad 1982	Tasa bruta de natalidad 1972	²⁾ Tasa bruta de natalidad 1982
Asunción	2.86	3.25	24.1	29.7
Dpto. Central	4.84	4.43	32.8	37.3
Región I Total	3.65	3.83	27.9	33.7
Paraguay	5.86	5.44	37.0	38.7

Fuente: Censos Nacionales de Población y Viviendas, 1972 y 1982.

Nota: 1) Estos valores fueron calculados en base al número de hijos tenidos nacidos vivos, según las edades de las mujeres en el último año del Censo Nacional de Población y Viviendas, y para obtener la fecundidad global adecuada deberán introducirse correcciones utilizando por ejemplo el Método de W. Brass.

2) Este valor fue obtenido dividiendo el número de hijos tenidos nacidos vivos en el último año por población total en el momento del Censo. También deberán introducirse correcciones.

CUADRO 2-1-4 MIGRANTES DE 5 AÑOS Y MAS POR RESIDENCIA EN 1967 Y EN 1972

Residencia en 1967	Residencia en 1972			Total
	Asunción	Central	Resto del país	
Asunción	-	15,906	11,884	27,790
Central	9,508	-	4,898	14,406
Resto del país	45,560	17,912	-	63,472
Total	55,068	33,818	16,782	105,668

Fuente: Censo Nacional de Población y Viviendas, 1972

CUADRO 2-1-5 MIGRANTES DE 5 AÑOS Y MAS POR RESIDENCIA EN 1977 Y EN 1982

Residencia en 1977	Residencia en 1982			Total
	Asunción	Central	Resto del país	
Asunción	-	41,770	21,310	63,080
Central	8,650	-	7,390	16,040
Resto del país	44,540	35,590	-	80,130
Total	53,190	77,360	28,700	159,250

Fuente: Censo Nacional de Población y Viviendas, 1982.

CUADRO 2-1-6 VARIACIONES EN LA COMPOSICION DE LA POBLACION
 POR SEXO Y EDAD EN LA REPUBLICA DEL PARAGUAY
 (%)

Grupo de edad	1972			1982		
	Ambos Sexos	Hombres	Mujeres	Ambos sexos	Hombres	Mujeres
0-14	44.8	22.9	21.9	41.0	21.0	20.0
15-64	51.2	25.0	26.2	54.7	27.2	27.5
65-	4.0	1.7	2.3	4.3	1.9	2.4
Total	100.0	49.6	50.4	100.0	50.1	49.9
Indice de masculinidad		98.3			100.3	

Fuente: Censos Nacionales de Población y Viviendas,
 1972 y 1982

CUADRO 2-1-7 VARIACIONES EN LA COMPOSICION DE LA POBLACION
 POR SEXO Y EDAD EN EL AREA METROPOLITANA DE -
 ASUNCION

Grupo de edad	1972			1982		
	Ambos sexos	Hombres	Mujeres	Ambos sexos	Hombres	Mujeres
0-14	36.1	18.0	18.1	32.1	16.0	16.1
15-64	59.6	27.8	31.8	62.9	29.7	33.2
65-	4.3	1.7	2.6	5.0	2.0	3.0
Total	100.0	47.5	52.5	100.0	47.7	52.3
Indice de masculinidad		90.5			91.3	

Fuente: Censos Nacionales de Población y Viviendas, 1972 y 1982

CUADRO 2-1-8 COMPOSICION DE LOS MIGRANTES POR SEXO Y EDAD, DENTRO DEL AREA METROPOLITANA DE ASUNCION¹⁾, PROCEDENTES DEL RESTO DEL PAIS²⁾ (12 AÑOS Y MAS), 1982 (%)

Grupo de edad	Area Metropolitana			Ambos sexos	Asunción	
	Ambos sexos	Hombres	Mujeres		Hombres	Mujeres
12-14	15.6	5.2	10.4	16.8	6.9	9.9
15-44	76.7	14.9	61.8	76.7	14.7	62.0
45-	7.7	1.2	6.5	6.5	0.7	5.8
Total	100.0	21.3	78.7	100.0	22.3	77.7

Fuente: Encuesta Mano de Obra, 1982

- 1) Asunción, Fernando de la Mora, Lambaré y las Áreas Urbanas de Luque y San Lorenzo.
- 2) Se excluye el Departamento Central, por lo tanto las figuras en el Cuadro han sido calculadas sin tener en cuenta a los migrantes del Area Metropolitana, procedentes del resto del Departamento Central.

Cuadro 2-2-1 EVOLUCION DEL PRODUCTO INTERNO BRUTO POR SECTORES ECONOMICOS
(En millones de Guaraníes constantes de 1982)

Rama de actividad	1976	1977	1978	1979	1980	1981	1982	1983
Agricultura	73,397 (16.4)	80,589 (16.3)	84,541 (15.3)	90,425 (14.7)	99,296 (14.5)	113,947 (15.3)	114,677 (15.6)	111,413 (15.6)
Ganadería	47,341 (10.6)	47,615 (9.6)	49,727 (9.0)	51,716 (8.4)	53,285 (7.9)	55,398 (7.4)	55,506 (7.7)	55,429 (7.2)
Export. Forestal	11,957 (2.7)	13,055 (2.6)	14,124 (2.6)	15,911 (2.6)	18,424 (2.6)	19,471 (2.6)	18,370 (2.5)	18,039 (2.5)
Caza y Pesca	459 (0.1)	524 (0.1)	720 (0.1)	949 (0.2)	1,019 (0.1)	1,060 (0.1)	1,092 (0.1)	1,045 (0.1)
Sub-total Sect. prim.	133,154 (29.8)	141,963 (28.6)	149,112 (27.0)	159,001 (25.9)	172,524 (25.9)	189,577 (25.5)	190,645 (25.9)	185,991 (26.0)
Minería	1,040 (0.2)	1,276 (0.3)	1,457 (0.3)	2,118 (0.3)	2,569 (0.4)	3,070 (0.4)	3,111 (0.4)	2,812 (0.4)
Industria	73,813 (16.5)	86,626 (17.5)	96,712 (17.5)	106,289 (17.3)	120,422 (17.6)	123,613 (16.9)	120,966 (16.4)	115,851 (16.2)
Construcción	15,013 (3.6)	20,888 (4.2)	27,573 (5.0)	35,243 (5.8)	45,104 (6.6)	52,707 (7.1)	49,544 (6.7)	46,720 (6.5)
Sub-total Sect. secund.	90,791 (20.3)	108,790 (22.0)	125,772 (22.8)	144,252 (25.5)	168,255 (24.6)	181,390 (24.4)	173,652 (23.5)	165,493 (23.1)
Electricidad	6,472 (1.4)	7,230 (1.5)	8,363 (1.5)	10,081 (1.6)	12,137 (1.8)	12,322 (1.7)	15,778 (2.1)	15,014 (2.0)
Agua y Serv. Sanit.	1,102 (0.2)	1,240 (0.2)	1,529 (0.3)	1,716 (0.3)	1,887 (0.3)	2,123 (0.3)	2,342 (0.3)	2,753 (0.4)
Transp. y Comunic.	19,932 (4.5)	21,608 (4.4)	23,985 (4.3)	26,743 (4.4)	29,551 (4.3)	30,497 (4.1)	31,107 (4.2)	30,242 (4.2)
Comercio y Finanzas	116,267 (26.0)	130,219 (26.3)	148,841 (27.0)	167,446 (27.3)	185,028 (27.0)	200,570 (26.9)	196,158 (26.6)	190,171 (26.6)
Gobierno General	19,129 (4.3)	20,277 (4.1)	21,879 (4.1)	24,045 (3.9)	25,728 (3.8)	31,594 (4.2)	32,852 (4.5)	32,172 (4.3)
Viviendas y otros Serv.	59,789 (13.4)	64,167 (12.9)	72,220 (13.1)	81,103 (13.2)	89,373 (13.1)	95,688 (12.9)	94,501 (12.6)	92,321 (12.9)
Sub-total Sect. terci.	222,712 (49.9)	244,751 (49.4)	276,848 (50.2)	311,139 (50.6)	343,907 (50.2)	373,095 (50.1)	372,744 (50.6)	353,445 (50.2)
TOTAL	446,656 (100.0)	495,493 (100.0)	551,732 (100.0)	614,362 (100.0)	694,586 (100.0)	744,361 (100.0)	737,041 (100.0)	714,929 (100.0)
Tasa de crecimiento anual (%)	-	10.2	11.4	11.4	11.4	8.7	-1.0	-3.0

Fuente: Banco Central del Paraguay.

Nota: Las cifras que se encuentran dentro del paréntesis demuestran el porcentaje del total.

CUADRO 2-2-2 POBLACION OCUPADA Y PRODUCTIVIDAD POR SECTOR

Ramas de actividad	Población ocupada.1)	Porcentaje.	PIB por sector. ²⁾ (millones de Gs.)	Valor medio por empleado (miles de Gs.)
Sector primario	445,900	42.8	190,645	427.6
Sector secundario	192,200	18.5	173,652	903.5
Sector terciario	403,200	38.7	372,744	924.5
TOTAL	1,041,300	100.0	737,041	707.8

Fuente: 1) Censo Nacional de Población y Viviendas, 1982.

2) Banco Central del Paraguay.

CUADRO 2-2-3 POBLACION OCUPADA RESIDENTE Y NUMERO DE TRABAJADORES
EN EL AREA METROPOLITANA

Actividades	Población ocupada residente en el A.M.			Número de trabajadores en el A.M.		
	Asunción	Distrito perifer. Metropolit.	Total Area Porcentaje	Asunción	Distrito perifer. Metropolit.	Total Area Porcentaje
Sector primario	3,392	8,718	12,110 3.6	4,217	7,675	11,892 3.5
Minería y Construcción	12,734	17,708	30,442 9.1	16,850	12,974	29,824 8.8
Industria	10,760	13,168	23,928 7.1	14,260	9,710	23,970 7.1
Sub-total Sector secund.	23,494	30,876	54,370 16.2	31,110	22,684	53,794 15.9
Electric. agua y Serv. sanit.	4,002	3,081	7,083 2.1	5,201	1,392	7,093 2.1
Transporte y Comunicaciones	8,049	7,819	15,868 4.7	10,353	5,399	15,752 4.7
Comercio y Finanzas	50,546	35,202	85,748 25.6	63,012	23,982	86,994 25.8
Otros Servicios	104,659	55,649	160,308 47.8	129,623	32,434	162,057 48.0
Sub-total Sector terc.	167,256	101,751	269,007 80.2	208,689	63,207	271,896 60.5
TOTAL	194,142	141,345	335,487 100.0	244,016	93,566	337,582 100.0

CUADRO 2-2-4 PIB ESTIMADO PARA EL AREA METROPOLITANA DE ASUNCION

(En millones de guaraníes constantes de 1982)

Ramas de actividades	Valor del PIB	Porcentaje
Sector primario	5,085	1.7
Sector secundario	48,603	15.9
Sector terciario	251,368	82.4
TOTAL	305,056	100.0

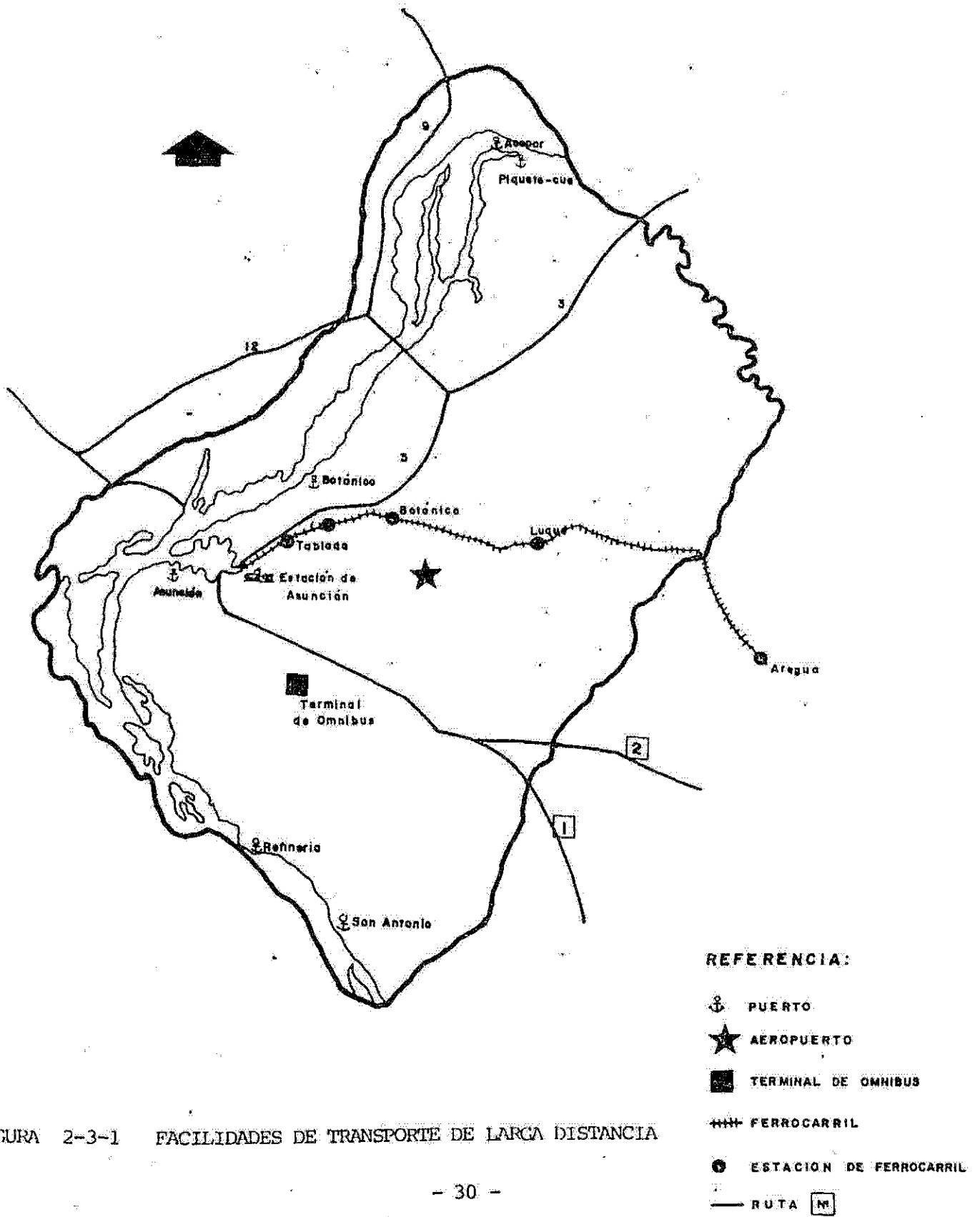


FIGURA 2-3-1 FACILIDADES DE TRANSPORTE DE LARGA DISTANCIA

CUADRO 2-3-1 TRAFICO DE PASAJEROS Y CARGA - AEROPUERTO INTERNACIONAL "PRESIDENTE STROESSNER" .

MILES DE PERSONAS		1980	1981	1982	1983
PASAJEROS	INTERNACIONALES	242	239	196	187
	NACIONALES	28	28	39	35
	TOTALES	270	267	235	222
CARGAS	MILES DE TONELADAS	3,329	3,130	1,126	1,065

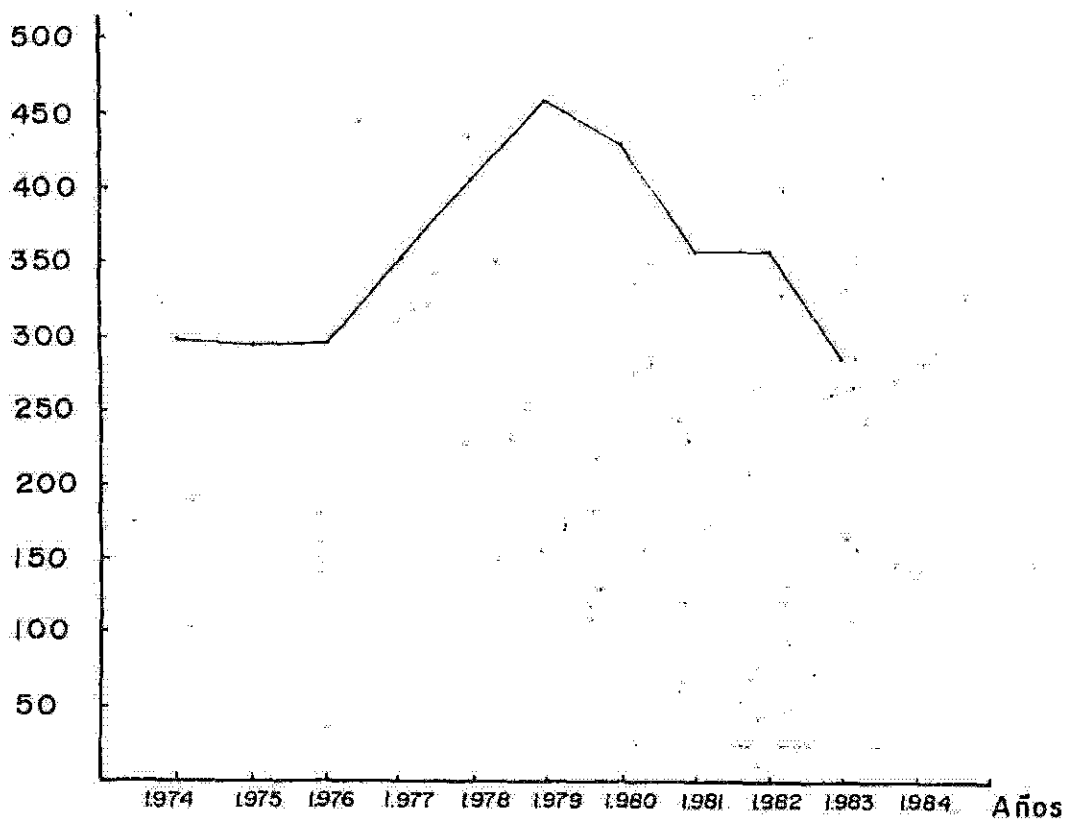
Fuente : A.N.A.C

CUADRO 2-3-2 CARGAS DE EXPORTACION, IMPORTACION Y T. INTERNO
 POR PRODUCTO EN EL PUERTO DE ASUNCION - AÑO 1983 .

PRODUCTOS	UNIDAD : TONELADAS		
	EXPORTACION	IMPORTACION	T. INTERNO TOTALAS
Cereales, legumbres y derivados	16,956	4,088	180 21,224
Maderas y Ptos. de la madera.	9,427	4,159	372 13,958
Papel y cartón	35,291	10,284	1,655 47,230
Artículos alimenticios			
Otros Ptos.agricolas y silv.dé-	109,101	478	928 110,507
rivados- no alimenticios			
Combustibles y lubricantes-Ptos	---	8,614	122 8,736
del petróleo (excepto gas)	430	20,536	611 21,577
Objetos manufacturados			
Minerales y materiales de cons-			
trucción	1	2,051	466 2,518
Ptos.químicos y farmacéuticos	44	12,338	7 12,389
Ptos.metalúrgicos y derivados	59	14,811	45 14,915
Misceláneas	14,329	16,073	210 30,612
TOTALES	185,638	93,432	4,596 283,666

Fuente: Memoria y Balance 1983 A.N.N.F

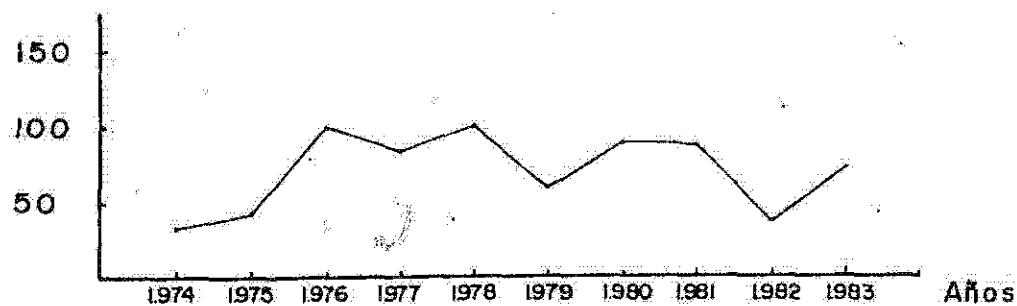
Miles de Toneladas



Fuente: Memoria y Balance 1983 A.N.N.P.

FIGURA 2-3-2 TRANSPORTE DE CARGAS EN EL PUERTO DE ASUNCION

Miles de Toneladas



Fuente: Memoria y Balance 1983 A.N.N.P.

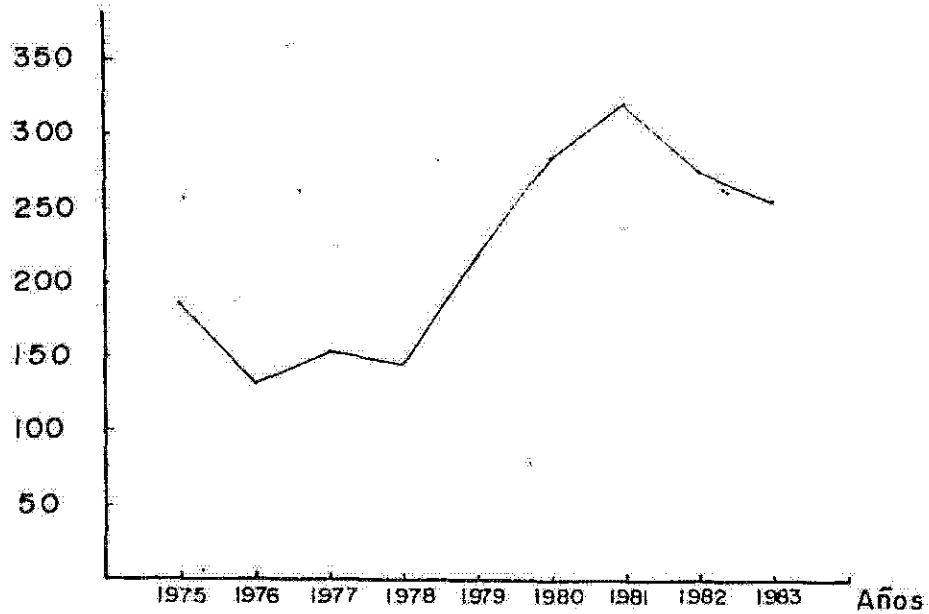
FIGURA 2-3-3 TRANSPORTE DE CARGAS EN EL PUERTO DE VILLETA

CUADRO 2-3-3 CARGAS DE EXPORTACION, IMPORTACION Y T. INTERNO
 POR PRODUCTO EN EL PUERTO DE VILLETA - 1983

PRODUCTOS	UNIDAD : TONELADAS		
	EXPORTACION	IMPORTACION	T. INTERNO TOTALES
Cereales, legumbres y derivados	20,233	1,900	22,133
Maderas y Ptos.de la madera -	---	---	---
Papel y carton .	---	---	---
Artículos alimenticios	---	---	---
Otros Ptos.agricolas y silv.de-	48,576	500	49,076
rivados - no alimenticios	---	---	---
Combustibles y lubricantes-Ptos.	8	500	508
del petróleo (excepto gas)	---	1,241	1,241
Objetos manufacturados	---	---	---
Minerales y materiales de cons-	---	312	312
trucción	---	---	---
Ptos.químicos y farmacéuticos	---	---	---
Ptos.metalúrgicos y derivados	---	3,673	3,673
Misceláneas	---	---	---
TOTALES	68,817	8,126	76,943

Fuente: Memoria y Balance 1983 A.N.N.P

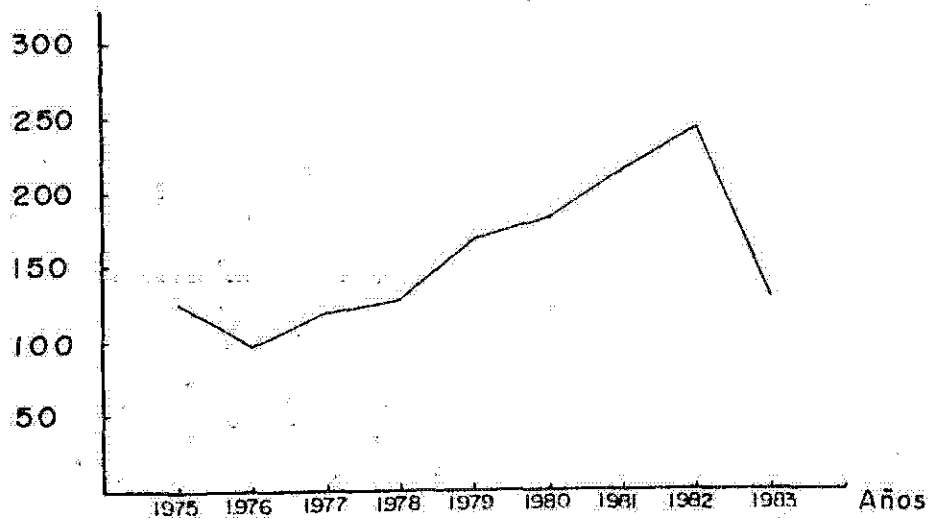
Miles de Personas



Fuente: FCPCAL

FIGURA 2-3-4 PASAJEROS TRANSPORTADOS POR FERROCARRIL (FCPCAL)

Miles de Toneladas



Fuente: FCPCAL

FIGURA 2-3-5 CARGAS TRANSPORTADAS POR FERROCARRIL (FCPCAL)

Chapter 3: Present Urban Structure and Land Use

3-1. Land Use

3-1-1. Development of Asuncion City District

The framework of Asuncion's innercity district was for the most part formed by 1950. Specifically, the city developed in a southeast direction from Micro Centro down along Ave. Eusebio Ayala and Ave. Mariscal Lopez. In the 1950s the city gradually expanded at its perimeter in the shape of a fan (Fig. 3-1-1). Starting in the 1960s residential development began in Fernando de la Mora, Lambare, San Lorenzo and other adjacent cities, and today these cities are nearly completely developed.

The topography of the Asuncion metropolitan area comprises gently rolling hills, and physically speaking there are virtually no areas where development poses difficulties. Areas lying less than 60m above sea level are subject to flooding by the Rio Paraguay; these districts are primarily occupied by poor persons born in Departamento de Central. (Fig. 3-1-2)

The commercial center of Asuncion is Centro, which is also the oldest section of the city. Commercial development has proceeded from Ave. Pellirossi along Ave. Ayala. The land along Ave. Mariscal Lopez serves as higher-class residential land and there are almost no commercial facilities located here.

Although small manufacturing industries continue to exist within Asuncion, since the enactment of Statute No. 25029/76 in 1976 almost all new industries have been forbidden within a radius of 20km of the city. On the other hand, following the granting of special tax privileges on new investments in the manufacturing industry under Statute

No. 550/75 of 1975, factories located on limited sites within the fixed city structure have begun relocating in the suburbs.

This same trend is also in evidence in the non-manufacturing industries. BCP, Mercado de Abasto and Terminal de Asuncion have all moved to the fringe area of Asuncion and construction is under way at present which will enable city administrative facilities to locate to the outskirts as well. (Fig. 3-1-3)

3-1-2. Present Land Use

1) Area Composition

The land area of greater Asuncion is 71,100 ha. The area of Asuncion itself is 11,700 ha, or 16.5% of the total scope of the metropolitan region.

Within these figures, 11,200 ha lie less than 60m above sea level and are frequently submerged with the waters of the Rio Paraguay. Together with 35,100 ha of agricultural and grazing lands, there are thus 46,300 ha of land not used for city development, leaving the other 24,800 ha as urbanized districts. In other words, approximately one-third of the overall land area of greater Asuncion is being used as developed urban districts. Some 3,300 ha, or 13%, of this land remains unused at present, however, although subdivision into residential lots has been carried out.

A major city district encompassing a total of 23,400 ha has been formed which includes the entire land area of Asuncion, Lambare and Fernando de la Mora (except for districts under water), 80% of San Lorenzo, Luque including the airport, and Villa Elisa including the oil refining plant.

The general breakdown of land use within these city districts is as follows: residential 41.0%, commercial 3.1%, industrial 1.9%, public facilities 15.5%, recreation 2.7%, unused 13.4% and roads 22.4%.

2) Features of Urban Land Use Along Trunk Routes

The following trunk roads extend radially outward from the Centro district of Asuncion: Ave. Artigas (Ruta Transchaco), Ave. Espana (Ave. Generalissimo Franco, Ave. General Genes, Ave. Aviadores del Chaco, Autopista), Ave. Mariscal Lopez, Ave. Eusebio Ayala (Ave. Mariscal Esli Garribia) and Ave. Fernando de la Mora. City districts extend in a fan shape along each of these arteries, and each route has its own special features in terms of land use. (Fig. 3-1-4)

(1) Ave. Artigas

Warehouses and factories are located along this route in great numbers. Near the border between Asuncion and M. R. Alonso are found botanical gardens and military facilities. On the other end of M. R. Alonso past Puente Romano, National Route #9 extends as far as the city districts of Villa Hayes. Adjacent to Villa Hayes construction is under way of Paraguay's first steel plant (ACEPAR).

Along the Rio Paraguay are the districts which frequently lie under water. Residential areas are gradually penetrating into these areas, and every time the river level rises residents take shelter in shacks built in the city's empty lots and roads, creating a serious environmental problem for the city.

(2) Ave. Espana

Within Asuncion this artery is lined by high-class residential lands as well as cultural facilities, sports clubs, hospitals, etc. BCP has recently relocated here from Centro. After the road enters Luque, vast areas of land are occupied by military facilities and the international airport. Opposite the military facilities, part of a factory district and new residential lands are being formed.

(3) Ave. Mariscal Lopez

This avenue is the site of Asuncion's most exclusive residential district, including the various embassies and the President's mansion. The city's new administrative building is presently being constructed near the intersection with Ave. Madame Lynch. The area extending from the border between Asuncion and Fernando de la Mora as far as the central commercial district of San Lorenzo is the site of newly developing city areas, and vacant lots can still be seen.

(4) Ave. Eusebio Ayala

Between Ave. Pettrossi and Ave. Eusebio Ayala are found shopping districts which primarily include clothing stores and general shops. Mercado 4 serves as a major collection and distribution point for both persons and commodities. In the area from near the intersection with Ave. Jusaelino Kubitscheck to the city border are found the horsetrack, automobile dealers, warehouses, etc., forming a relatively unsophisticated commercial district. Behind this commercial district are middle-class housing areas.

After this avenue reaches Fernando de la Mora, it

extends onward through the commercial shopping district. As it then reaches San Lorenzo, it comes to Asuncion National University.

(5) Ave. Fernando de la Mora

Commercial facilities and middle-class housing prevail in a mixed pattern as far as Ave. Republica Argentina, at which intersection the Terminal de Omnibus is located. To the south extends the upper middle-class residential district of Lambare. From San Lorenzo to Demby are food factories which have recently relocated here from Asuncion; residential development is proceeding also. Along the Rio Paraguay, in Lambare there is a high-class sports club and in Villa Elisa there is an oil refinery.

(6) Central Section (Centro)

This section serves as the commercial and administrative center of the Asuncion Metropolitan Area. Concentrated here are banks and other financial institutions, offices, governmental organizations, Asuncion City Hall and related organizations, a department store, specialty shops, hotels, Paraguay Port, etc. The total area of the section is approximately 400 ha, about 1/3 of which consists of roads. Of the remaining land area, 55% is used for residential purposes, 26% for commercial buildings, 14% for administrative facilities and 5% for parks and unused lands.

Approximately 20 ha in the section are located in flood-prone areas along the Rio Paraguay. This land is primarily covered with high concentrations of small dwellings which are occupied by unskilled laborers from small rural farms.

(7) Sajonia, Barrio Obrero

The area referred to here is situated where the Rio Paraguay turns sharply where Asuncion City juts out like a cape. The riverbank area is surrounded by facilities of the Paraguay Navy. The area contains the Medical Department of the Universidad Nacional de Asuncion, Universidad Catolica, Nuestra Senora de Asuncion, soccer fields, sports clubs and other large-scale facilities. Barrio Obrero has been urbanized only relatively recently and numerous vacant lots still exist. Dense concentrations of dwellings are found in the flood-prone area between the Navy facilities.

3-1-3. Current Land Use System

All preparation of development plans, land use regulations, development permission and preparation of planning standards for the Asuncion Metropolitan Area fall under the authority of La Oficina Tecnica de Programacion of AMUAM (association of 11 cities in the capital region). The head of this office is the Coordinator General, who happens also to hold the post of Director de la Oficina de Desarrollo Urbano of Asuncion. At present a land zoning system is enforced in Asuncion proper and detailed technical standards are set; however, no such system exists in the other 10 cities in the region, and authorization for developmental actions is evaluated and granted separately in each city based on the laws and regulations explained below and in conformity with the laws of Asuncion City.

The major relevant laws are as follows:

- a. 1954 Law No. 222 (Ley Organica Municipal No. 222/54)
- b. 1976 Presidential Decree No. 25029 (Decreto No. 25029/76)

- c. 1977 City Ordinance No. 9979 (Ordenanza No. 9979/77)
- d. 1978 City Ordinance No. 1822 (Ordenanza No. 1822/78)
- e. 1978 City Ordinance No. 2140 (Ordenanza No. 2140/78)
- f. 1980 Presidential Decree No. 19884 (Decreto No. 19884/80)
- g. 1981 City Ordinance No. 5556 (Ordenanza No. 5556/81)
- h. 1982 City Ordinance No. 6339 (Ordenanza No. 6339/82)
- i. 1983 City Ordinance No. 12225 (Ordenanza No. 12225/83)

1) 1954 Law No. 222

This law regulates in detail such matters as city roles, organization and income. This includes regulations relating to public projects and services which the city should perform (preparation of Plan Regulador, regulations governing construction and architecture of city plazas, etc.), contents of appropriate Plan Regulador, minimum size of residential properties (12m wide, 360m² area), maximum building-to-land ratio (75%), minimum street width (calle 16m, avenida 32m), expropriation of lands for public use, absorption of developmental benefit, obligatory submission of land for public benefit, obligatory bearing of street pavement expenses, etc.

Residential development currently in progress in the cities other than Asuncion demands that the following conditions be satisfied in accordance with the above law: minimum residential property size, maximum building-to-land ratio, minimum street width, and obligatory submission of land for public benefit.

Obligatory submission of land for public benefit entails the following:

- a. In the case of land subdivision, construction of streets and drainage ditches is carried out by the owner at his own expense and these lands are submitted to the city

with no financial recompense.

b. In the case of land subdivision exceeding 3 ha, the owner is obligated to provide to the city, at no charge, 5% of the total land area for a public plaza and park and 2% as land for a school, etc.

These legal regulations notwithstanding, Plan Regulador is presently being prepared only in Asuncion proper. According to this law, the main contents are as follows:

a. Urban areas should be divided into districts and the arrangement of each district should be clarified according to urban activities, with the architecture and building materials of each district regulated.

b. A system to provide necessary physical and cultural services, a system of health services, and green and vacant zones should be indicated.

c. Streets, widened areas and parking lots should be indicated.

d. In implementing the plan, those procedures which should be followed by the city and those which should be followed by private landowners should be indicated.

e. A system for procuring capital funds for the plan (e.g. including establishment of reserved lands) should be indicated.

This Plan Regulador has the equivalent power of enforcement at the city level as a law. Real estate properties which are necessary for its implementation are designated as lands for public use and are absorbed by the city under the condition that recompense shall be made to the owner within 5 years. In the event that homes of persons not having anywhere else to move are so designated, recompense must be paid within 3 months of eviction (expropriation of land for public use). In addition, persons who receive benefit from an increase in the price of real estate directly related to the public project are

required to pay 20% of such accrued benefit as a cooperative fund (absorption of developmental benefit).

Obligatory bearing of expenses for street pavement calls for street pavement costs to be borne equally by the owners of lands situated on both sides of the given street. In the case that such expenses cannot be met, the street will not be paved and in some instances the party unable to pay may be evicted from the premises.

2) 1976 Presidential Decree No. 25029

A total of 43 industries (e.g. industria de la carne vacuna y equine) are prohibited from establishing new factories within a 20km radius of Centro in Asunción (except in Departamento de Pte. Hayes). This decree does not apply to expansion or modernization of existing factories.

Together with Law No. 550 of 1975 which pertains to the promotion of industrial investments (the law sets tax incentives for industries undertaking new investments), this decree has contributed to some extent to the new establishment of industries outside the 20km radius (existing factories which relocate beyond this radius can also receive merits of the system).

Within the Asunción Metropolitan Area, only Luque, part of Limpio and Villa Hayes lie beyond the scope of this law.

3) 1977 City Ordinance No. 9979

Until specific land use is determined according to the laws on regional land use, all occupation, leasing or sale of the swamp regions, etc. on the perimeter of Asunción City is prohibited. Furthermore, building on such lands or transfer of ownership is also prohibited without the authorization of the city authorities.

4) 1978 City Ordinance No. 1822

This ordinance sets up 11 zones in the central area of Asuncion City and defines building uses, floorspace ratio (from which building height is determined), building lines, obligatory parking facilities and fines against violations for each zone. For example, commercial zones must have greater than 50% of the floorspace in newly constructed middle and high-rise structures applied to commercial or business use; residential zones must have at least 70% of floorspace dedicated to residential purposes. Capacity ratio must be between 400% and 1100%. In some zones buildings must be built on property boundary lines, while in other zones buildings must be set back by a minimum of 4m. Parking facilities must account for 15% of total floorspace area. Violations shall require payment of a fine of 10,000 guarani and reconstruction to conform with regulations.

Public buildings, religious buildings, cinemas and theaters are excepted from these regulations.

5) 1978 City Ordinance No. 2140

The major portion of Asuncion City (except for the swamp regions) is regulated in terms of land use regions and zones, zone particulars, and the applied geographical location and range of each zone. Among these, road width and other features are determined according to each type of land designated for road use.

However, there are some areas within these regions where overlapping exists, e.g. the high-density residential zone (Sector de Alta Densidad, where the average net population density is 120-160 persons/ha; geographical range of application for 1978 City Ordinance No. 1822), the

administrative zone (Sector Administrativo) and the central commercial zone (Sector Comercio Central), which overlap in the Centro district.

Each region and zone is regulated in detail under separate city ordinances.

6) 1980 Presidential Decree No. 19884

This is a government decree pertaining to the articles of AMUAM (La Asociacion de Municipalidades del Area Metropolitana) and granting of corporate status. The decree indicates the structural makeup of the 11 cities including Asuncion and their geographical range and touches upon the preparation of overall developmental plans, particularly goals of establishment, and plans by field. The organization comprises the following 3 levels: (1) Mayor's Committee (El Consejo Deliberante), (2) Directors Committee (La Mesa Directivo), (3) Planning Technology Office (La Oficina Tecnica de Programacion). The president of the Directors Committee is currently performed by the mayor (Intendente) of Asuncion; the coordinator general of the Planning Technology Office by the Director de la Oficina de Desarrollo Urbano of Asuncion.

The fiscal administration of the 11-city federation (La Asociacion) draws upon Asuncion for 50% of ordinary operating expenses, with the other 10 cities bearing shares appropriate to their specific budgets. Liabilities relating to specified projects (repayment of principal and interest) are shared in the same manner.

7) 1981 City Ordinance No. 5556

The land along 6 roads in Asuncion (Ave. Meal, F.S. Lopez, etc.) is designated exclusively as residential zones

(uso "eminente residencial"). Within these zones, all lands a minimum of 40m from the center line of the road must be used exclusively for residential purposes. Public buildings and facilities affiliated with roads which are not general commercial businesses are exempt from these regulations. The building line must also be set back a minimum of 9m from the property boundary with the road.

8) 1982 City Ordinance No. 6339

This ordinance divides residential zones in Asuncion into 3 types and defines the permissible ratio of mixture with other uses, the building-to-land ratio, type of sidewalk pavement, etc. for each type.

9) 1983 City Ordinance No. 12225

This ordinance sets technical standards to be followed when implementing communal residential plans.

3-1-4. Present Land Use and Problems by Zone

Present land use, location of major facilities, projects being carried out and problems are illustrated by zone in Fig. 3-1-6.

3-2. Population and Employment Distribution as Related to Worker's Home Area and Place of Employment

3-2-1. 1984 Population Estimates by Zone

Based on the special tabulation of the 10% national census sampling carried out in 1982, the population figures for each section (seccion) of Asuncion City are known for that year. In order to know the expanded population

resulting from the person trip survey and the population and employment distribution corresponding to the current land use situation, it is necessary to estimate the population distribution for 1984. (Because employment information utilizes the expanded results of the person trip survey, the basis here is information on population.)

First, the population figures by section resulting from the two national censuses of 1972 and 1982 were compared and the average annual rates of increase (rate of decrease in two sections in city center) were sought. The 1984 population by section was then assumed to include a 2-year extension at the same rate of increase (or decrease).

The results, shown in Table 3-2-1, indicate a 1984 population of 858,000 for the greater Asuncion Metropolitan Area and 472,000 in Asuncion proper.

3-2-2. Population Distribution and Density

Of the total Asuncion Metropolitan Area population of 858,000 in 1984, some 472,000, or 55%, live in Asuncion City proper and 386,000, or 45%, live in the surrounding cities. Within Asuncion City, precisely 50% of the population, i.e. 236,000 persons, lives on each side of the boundary formed north-south by Ave. Juscelino Kubitscheck. In the western half, 31,000 persons live in Centro which forms the city center and 117,000 persons in Sajonia and Barrio Obrero along the Rio Paraguay further west. In the eastern half, 89,000 persons are distributed in Pellirossi and Parque Caballero. In the surrounding districts, a total of 307,000 persons live in neighboring Lambare, Fernando de la Mora, San Lorenzo and Luque, and another 79,000 live in the regions beyond these cities. (Fig. 3-2-1)

Population density figures are as follows: 40 persons/ha for all of Asuncion proper, 33 persons/ha in

Lambare, 35 persons/ha in Fernando de la Mora and 20 persons/ha in San Lorenzo. These figures indicate that although population density is low, a conurbated region is formed throughout the area covered. While Luque also extends beyond Asuncion City on the other side of Aeropuerto Internacional Presidente Stroessner, because of the existence of expansive farmlands on the far side of that city its gross population density is low. (Table 3-2-1 and Fig. 3-2-2)

Analyzed according to zone, the population density of Asuncion City does not reach 100 persons/ha anywhere, with the highest figures being recorded in Zone 05 (Gral. Diaz) with 97.2 persons/ha. In the capital cities of most other nations, there is usually a zone in the city center or some other specified location which has a relatively high population density, such as an old residential and commercial zone, slum or new high-rise apartment zone; no such zone seems to exist in Asuncion. With minor exceptions, most residences are separate dwellings. Even in the mixed commercial/residential area in the city center, there is no slum containing persons who have moved to the city from outside.

The construction boom which accompanied strong economic growth after the 1970s created increased demand for construction laborers in the capital and thus hastened an influx of unskilled laborers into Asuncion. For this reason, persons originating from rural villages rapidly moved to the flood-prone areas along the Rio Paraguay and formed a dense district of small dwellings. However, because there is no zone which covers the entire expanse of these areas of high density, the gross population density by zones remains low overall.

In terms of net population density (population/residential land area), the commercial/residential zone of

Centro and Colon has some 200 persons/ha, the middle-class residential zones have about 100 persons/ha, and the upper-class residential zones have about 70 persons/ha.

3-2-3. Employment Distribution and Density

Of the total employment population of 337,600 in the Asuncion Metropolitan Area, 244,000, or more than 70%, are concentrated in Asuncion proper. Moreover, 70% of this number, or 171,400 workers, are found in the area to the west of Ave. Juscelino Kubitscheck. In Centro, 72,400 workers are heavily concentrated in a small land area (406.5 ha) to produce a workers' density as high as 182.5 persons/ha. In particular, Zone 01 (Encarnacion) and Zone 02 (Catedral) have high densities of 339.0 and 362.5 persons/ha, respectively, and thus form the commercial and business core of the greater Asuncion Metropolitan Area. Zone 04 (Catedral Oeste) contains 14,300 workers with a density of 178.0 persons/ha. Another area having high employment concentrations is Pettirossi, with 48,600 workers; particularly in Zone 07 (San Roque Sur) where Mercado 4 and clothing and general merchandise shops are located, there are 12,100 workers with an employment density of 144 persons/ha. (Figs. 3-2-3 and 3-2-4).

3-2-4. Special Fields of Employment in Each Zone

Table 2-2-3 above showed the working population by employment category for the whole Asuncion Metropolitan Area (persons working within the Asuncion Metropolitan Area, i.e., including those who live outside this area but work here) and the component percentages. Based on this data, the special fields of employment in each zone may be described as follows. (Table 3-2-2)

1) Centro

In addition to a high concentration of commercial businesses, this zone functions as a business and administrative center with relatively high percentages of financial business and public administrative offices. 67.6% of the Asuncion Metropolitan Area's financial businesses and 47.9% of its public offices are concentrated in the zone.

2) Sajonia

This zone specializes in manufacture, power and water industries, public administrative services and service industries. Located here are flour mills, ANDE, the Navy base, universities and hospitals.

3) Barrio Obrero

The construction, transport and communications, and service industries are relatively concentrated here. The construction industry undertakes road construction, the transport and communications industry includes several bus route terminals and Puerto Ita Enramada, and the service industries include Universidad Catolica, Nuestra Senora de Asuncion and sports clubs.

4) Pettirossi

Zone 07 (San Roque Sur) and Zone 13 (Pettirossi) specialize in commercial businesses. Zone 08 (San Roque Este) and Zone 04 (Las Mercedes) specialize in the power and water industries, service industries and public administrative services. Between Ave. Pettirossi and Ave.

Eusebio Ayala are located roadside commercial businesses and Mercado 4. Also within these zones are ANDE, Corposana, Universidad Nacional de Asuncion, Transit, IVU and the Itaipu Project Office.

5) Parque Caballero

This zone specializes in the power and water industries, service industries, transport and communications, financial businesses, etc.

6) Mburicao

This zone specializes in the construction industry (due to brisk activity in building and road construction), manufacturing (small to medium-scale factories) and home services (upper-class residential zone).

7) Terminal

Zone 18 (Pte. Stroessner) specializes in commerce and the transport and communications industry. The Terminal de Autobuses and Mercado de Abasto are located here.

Zone 19 (Villa Aurelia) contains ANDE. Zone 20 (Yena Sati) has many schools. This area also specializes in the construction industry as the site of frequent road and building construction (including the new city hall). It is also believed that many home service industries are found here.

8) Botanico

Zone 22 (Bella Vista) specializes in manufacturing industries (small and medium-scale). Zone 23 (Santo

Domingo) is home to the construction industry (construction around BCP) and public administrative offices (BCP). Zone 24 (Mburucuya) specializes in home services. Zone 25 (Botanico) specializes in transport and communications and service industries.

9) Lambare

Lambare generally specializes in the construction industry, with road construction is in progress on a large scale in the city. In addition, Zone 26 (Lambare Norte) specializes in manufacturing as the site of glass factories and sewing plants. Zone 27 (Lambare Oeste) specializes in the services industries with a high-class sports club along the Rio Paraguay. Zone 28 (Lambare Este) specializes in manufacturing and transport and communications; in addition to a few factories, the zone has a bus terminal and bus yard.

Farming is also relatively common in this city's northern and eastern sections, where farmlands continue to exist.

10) San Antonio

Owing to the continued existence of rather extensive agricultural lands, farming is extremely important within this region. Zone 38 (Nemby) contains a rock quarry and a beverage plant. Zone 39 (San Antonio) contains a sand quarry and a meat processing plant. Zone 40 (Villa Elisa) specializes in the construction industry and in manufacturing; it is also the site of residential development now in progress.

11) Fernando de la Mora

This region is strongly characterized by residential lands. While there is no one major conspicuous type of industry here, farming continues to be practiced to some extent. The zone's industries may thus be said to consist of agriculture and construction relating to residential development.

12) San Lorenzo

Zone 36 (San Lorenzo Central) at the city center is completely urbanized and may be said to specialize in the construction industry and transport and communications (bus terminal). In Zone 35 (San Lorenzo Norte) in the north, farmlands still exist and continue to be farmed; this zone also specializes in the power and water industry (ANDE substation) and the construction industry (accompanying residential development). Zone 37 (San Lorenzo Sur) is the site of agriculture, transport and communications, and commerce.

13) Luque

Due to the presence of vast expanses of farmland, this zone specializes in farming. There is also a high level of manufacturing, due to the presence of a factory zone around the airport.

14) Limpio

In Zone 32 (M.R. Alonso) urbanization is in progress and the degree of specialization in agriculture has declined to the level found in Fernando de la Mora. The high concentration seen in the construction industry here is

second only to that of Villa Hayes. Zone 34 (Limpio) contains farmlands and specialization in agriculture is extremely high; there is also some manufacturing in the form of peanut processing plants located here. Zones 32 and 34 both also have high levels of commercial development.

15) Villa Hayes

The construction industry is found here owing to the construction now in progress on a steel mill.

3-2-5. Relation Between Workers' Place of Residence and Place of Work

A review of the rates of employment within the home zone shows that Asuncion City has a high share of 93.6%, i.e. 93.6% of all workers living in the city are also employed in the city. However, in areas undergoing residential development these figures are much lower: Fernando de la Mora 39.6%, Lambare 41.3%, San Lorenzo 49.1%. In other words, more than half of the workers living in these cities are employed elsewhere (especially in Asuncion). In San Antonio, Luque and Limpio, which are located farther away from Asuncion and still have farmlands, the rates of local employment are higher at 55.5%, 68.9% and 63.0%, respectively. Moreover, in Villa Hayes on the far side of the Rio Paraguay, where steel mill construction is now in progress, the situation is reversed and construction workers are gathering here from surrounding cities (especially Asuncion and Limpio), resulting in a home zone employment rate of 80.7%. Commuting between cities in the perimeter of the Asuncion Metropolitan Area is extremely infrequent. In those cities, by category of industry, primary, secondary and tertiary industries have lower rates

of home zone employment in that order, and the rate of commuting into Asuncion is high. (Table 3-2-3)

Within Asuncion City proper, interzone commuting is very common, resulting in home zone employment rates ranging from 26-66%. A review of the ratio between the number of persons working in a particular zone and the number of workers who live in the zone (if the ratio is greater than 1, this means the number of incoming workers exceeds those living in the zone and indicates a zone of heavy employment concentration; if the ratio is less than 1, this means the number of outgoing workers exceeds the number of workers living in the zone, which indicates the zone's strong residential character) shows that Zone 1 (Encarnacion) and Zone 2 (Catedral Este) function as zones of high employment. Next in ranking are Zone 4 (Catedral Oeste), Zone 7 (San Roque Sur) and Zone 8 (San Roque Este). Zone 3 (San Roque Norte), Zone 5 (Gral. Diaz) and Zone 9 (Las Mercedes) have ratios of around 1.5, indicating good opportunities for employment in these zones in addition to high concentrations of residential land. Zone 6 (Carlos A. Lopez), Zone 13 (Pettirossi), Zone 14 (Mburicao), Zone 15 (Recoleta), Zone 18 (Pte. Stroessner), Zone 21 (Jara) and Zone 23 (Santo Domingo) have ratios of about 1, indicating good employment opportunities in spite of the high level of residential development. Other zones not mentioned here show excessive levels of residential development. (Table 3-2-4)

3-2-6. Income Level by Zone

The ranking of monthly incomes according to reported incomes for the 335,000 workers in the Asuncion Metropolitan Area is distributed as shown in Table 3-2-5. Because the minimum official wage of monthly contracted workers is approximately 40,000 guarani and the minimum official wage

for day workers is approximately 1,200 guarani, a monthly income under 30,000 guarani indicates that the minimum wage is not being secured. 46% of the workers in the Asuncion Metropolitan Area fall into this category, with more than 15% not even earning 15,000 guarani per month.

A monthly income between 30,000 and 110,000 guarani may be said to qualify as the middle income class. Those earning between 30,000 and 50,000 guarani are primarily unskilled and skilled laborers who have secured the minimum wage. Those earning between 50,000 and 70,000 guarani are primarily general office workers. Those earning between 70,000 and 110,000 guarani include persons such as bank workers and mid-level managers at public administrative offices. Although this middle-income class accounts for 49% of the total, the overwhelming majority of this class (30%) falls in the 30,000 to 50,000 guarani range.

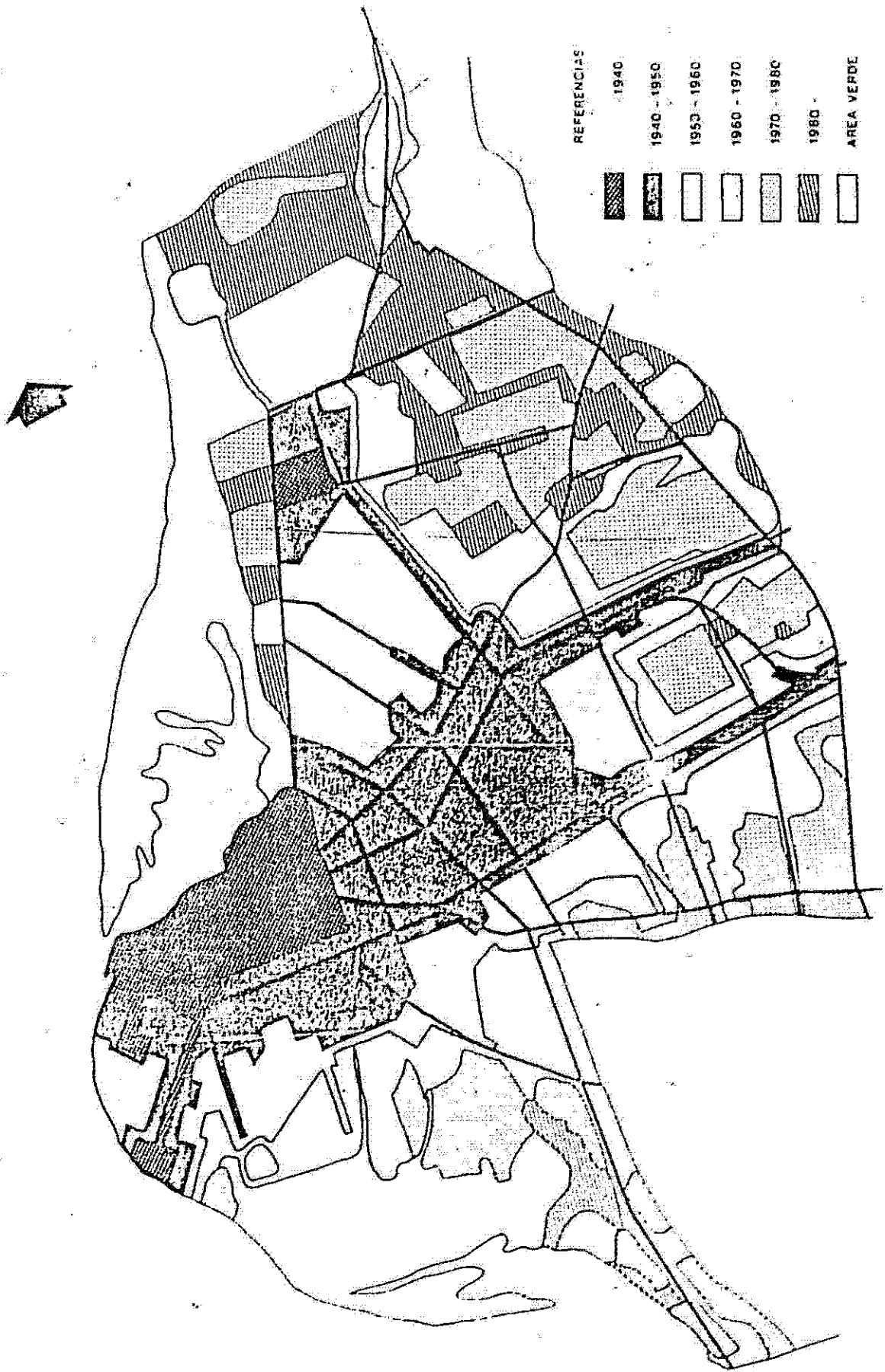
Workers in the upper-income class earning more than 110,000 guarani account for no more than 5% of the total.

Fig. 3-2-5 shows the special characteristics of each zone based on the income distribution for the entire Asuncion Metropolitan Area. As the Figure indicates, the zones characterized by middle and high-income earners (the percentage of workers belonging to this rank is higher than the average for the entire Asuncion Metropolitan Area) are the upper-class residential areas or the commercial zones. Zones characterized by middle-income earners are residential zones lying beyond these zones and in which urbanization took place fairly early. Zones characterized by income earners in the upper-low to middle income class are the suburban regions where residential development is now in progress. Zones marked by low-income earners are primarily those where farming continues to predominate.

On a household income basis, the average household in the Asuncion Metropolitan Area earns approximately 79,000

guarani per month. Zone 14 (Mburicao) shows the highest household income at 167,000 guarani per month, i.e., more than twice the average figure. The lowest average household income was recorded in Zone 34 (Limpio), which had an average of 42,000 guarani per month, or just over half the average for the entire area.

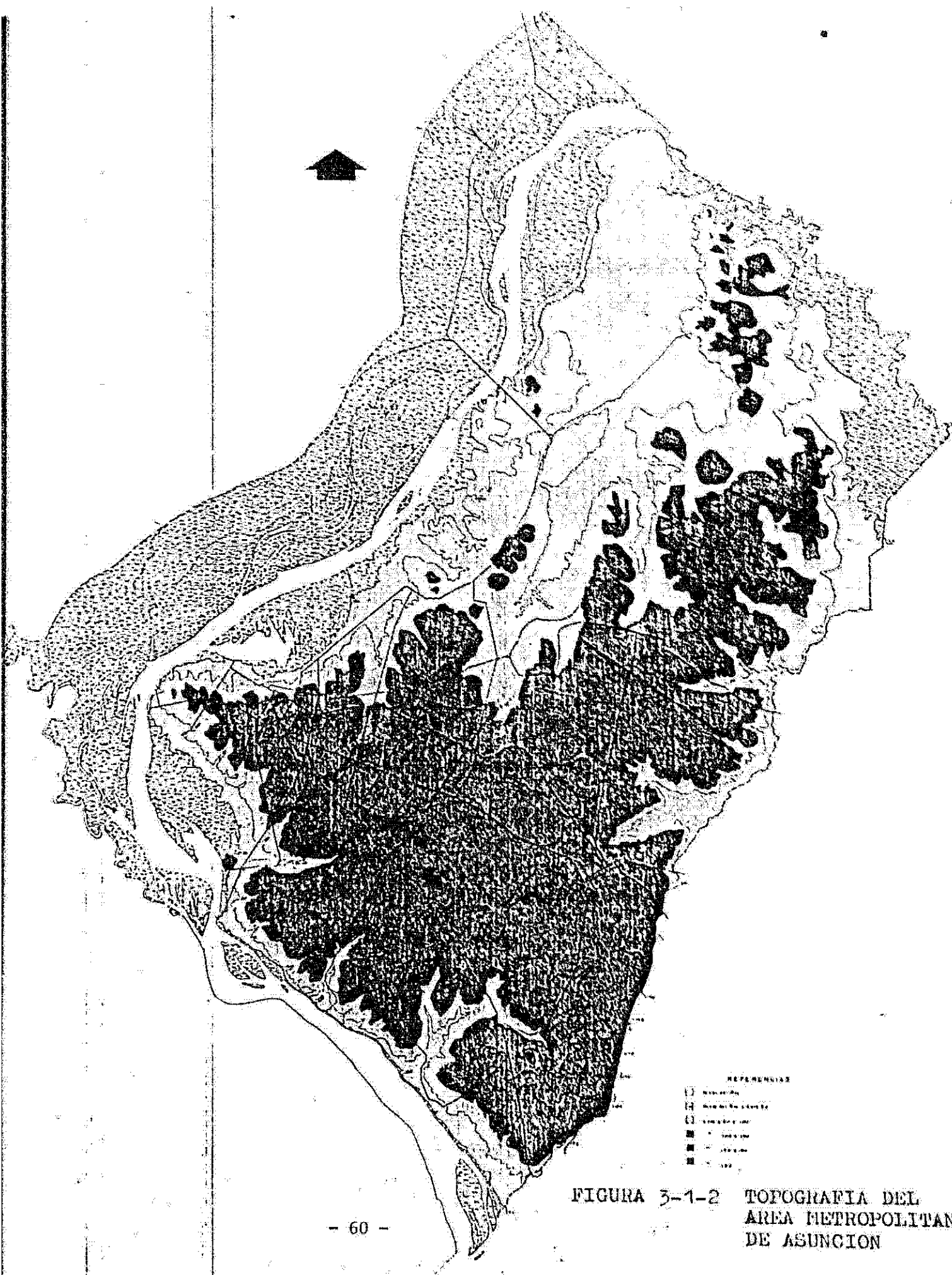
The average monthly household income for the high-income class is between 110,000 and 160,000 guarani per month; that for middle-income zones is between 70,000 and 110,000 guarani; that for upper low-income to middle-income zones is between 50,000 and 70,000 guarani; and that for the low-income zones is between 40,000 and 60,000 guarani.



REFERENCIAS

	1940
	1940 - 1950
	1950 - 1960
	1960 - 1970
	1970 - 1980
	1980
	AREA VERDE

FIGURA 3-1-1 CRECIMIENTO DE ASUNCION



- REFERENCIAS
- Elevación
 - Elevación superior
 - Elevación inferior
 - Elevación superior
 - Elevación inferior
 - Elevación superior

FIGURA 3-1-2 TOPOGRAFIA DEL AREA METROPOLITANA DE ASUNCION

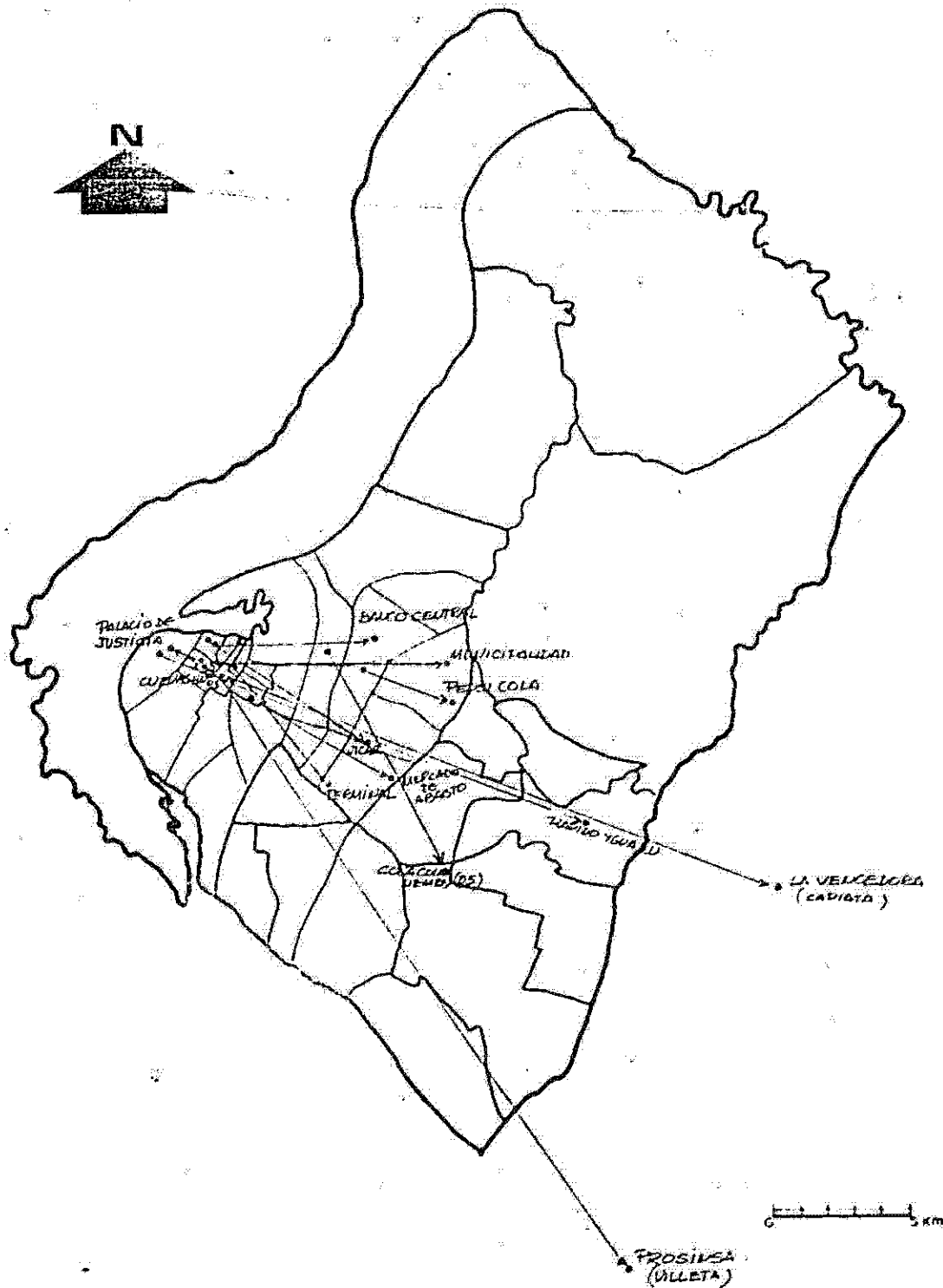


FIGURA 3-1-3 ESTADO GENERAL DE TRANSLADO DE LOS PRINCIPALES ESTABLECIMIENTOS DESDE LA ZONA CENTRICA DE LA CIUDAD DE ASUNCION

CUADRO 3-1-1 SUPERFICIE POR USO DE SUELO
(En hectáreas)

Municipio	Zona de Superficie estudio total	AREA URBANIZADA							Total parcelas	Agropecuaria	Verdes y Utilizables
		Residenc.	Comerc.	Indust.	Instituc.	Recreo.	Baldios	Circulación			
Azuación	01 - 25 (%) 11,734.4 (100.0)	5,388.0 (45.9)	425.8 (3.6)	85.8 (0.7)	1,266.9 (10.8)	414.7 (3.6)	762.7 (6.5)	2,048.2 (17.5)	10,294.1 (88.6)	-	1,246.2 (10.6)
Iambaré	26 - 28 (%) 2,386.6 (100.0)	909.9 (38.1)	54.1 (2.3)	23.3 (1.0)	17.0 (0.7)	155.3 (6.5)	598.8 (25.1)	582.7 (24.4)	2,341.1 (98.1)	-	43.5 (1.8)
Pdo. de la Mora	29 - 30 (%) 2,126.4 (100.0)	1,045.4 (49.2)	55.9 (2.6)	21.1 (1.0)	22.5 (1.1)	8.6 (0.4)	434.6 (20.4)	538.3 (25.3)	2,126.4 (100.0)	-	-
Luque	31 (%) 15,944.9 (100.0)	720.1 (4.5)	42.7 (0.3)	44.2 (0.3)	2,184.9 (13.8)	35.5 (0.2)	480.0 (3.0)	1,102.6 (6.9)	4,615.0 (28.9)	10,704.9 (67.1)	623.3 (3.9)
M.R. Alonso	32 (%) 4,233.0 (100.0)	92.3 (2.2)	8.2 (0.2)	16.2 (0.4)	25.8 (0.6)	3.2 (0.1)	62.2 (1.4)	66.6 (1.6)	277.5 (6.5)	2,405.4 (56.7)	431.7 (10.2)
Villa Hayes	33 (%) 12,626.9 (100.0)	86.1 (0.7)	19.7 (0.2)	79.8 (0.6)	20.9 (0.2)	7.5 (0.1)	52.4 (0.4)	66.4 (0.5)	337.8 (2.7)	7,229.2 (57.2)	5,059.9 (40.1)
Limpio	34 (%) 10,899.8 (100.0)	96.8 (0.8)	8.5 (0.1)	14.7 (0.2)	13.4 (0.2)	2.4 (0.1)	61.6 (0.5)	76.4 (0.7)	276.8 (2.5)	7,166.5 (65.7)	3,456.5 (31.5)
San Lorenzo	35 - 37 (%) 4,372.2 (100.0)	1,536.4 (35.1)	147.0 (3.4)	13.2 (0.3)	271.7 (6.2)	12.9 (0.3)	661.1 (15.1)	840.7 (19.2)	3,483.0 (79.7)	889.2 (20.3)	-
Sanby	38 (%) 3,403.5 (100.0)	70.5 (2.1)	2.2 (0.1)	75.1 (2.2)	2.9 (0.1)	10.1 (0.3)	47.6 (1.3)	61.3 (1.8)	269.2 (7.9)	3,133.8 (92.1)	-
San Antonio	39 (%) 1,678.0 (100.0)	89.1 (5.3)	5.6 (0.3)	22.7 (1.4)	7.5 (0.5)	3.9 (0.2)	59.4 (3.5)	59.4 (3.5)	247.6 (14.7)	1,276.1 (76.1)	154.3 (9.2)
Villa Elisa	40 (%) 1,705.6 (100.0)	142.4 (8.3)	5.8 (0.3)	78.5 (4.6)	10.5 (0.6)	12.7 (0.8)	95.5 (5.6)	109.3 (6.4)	451.7 (26.5)	1,196.6 (70.2)	54.5 (3.2)
TOTAL		71,111.3 (100.0)	775.5 (1.1)	476.6 (0.7)	3,846.0 (5.4)	666.8 (0.9)	3,223.9 (4.7)	5,556.9 (7.8)	24,823.7 (34.9)	35,095.7 (49.4)	11,121.9 (15.7)

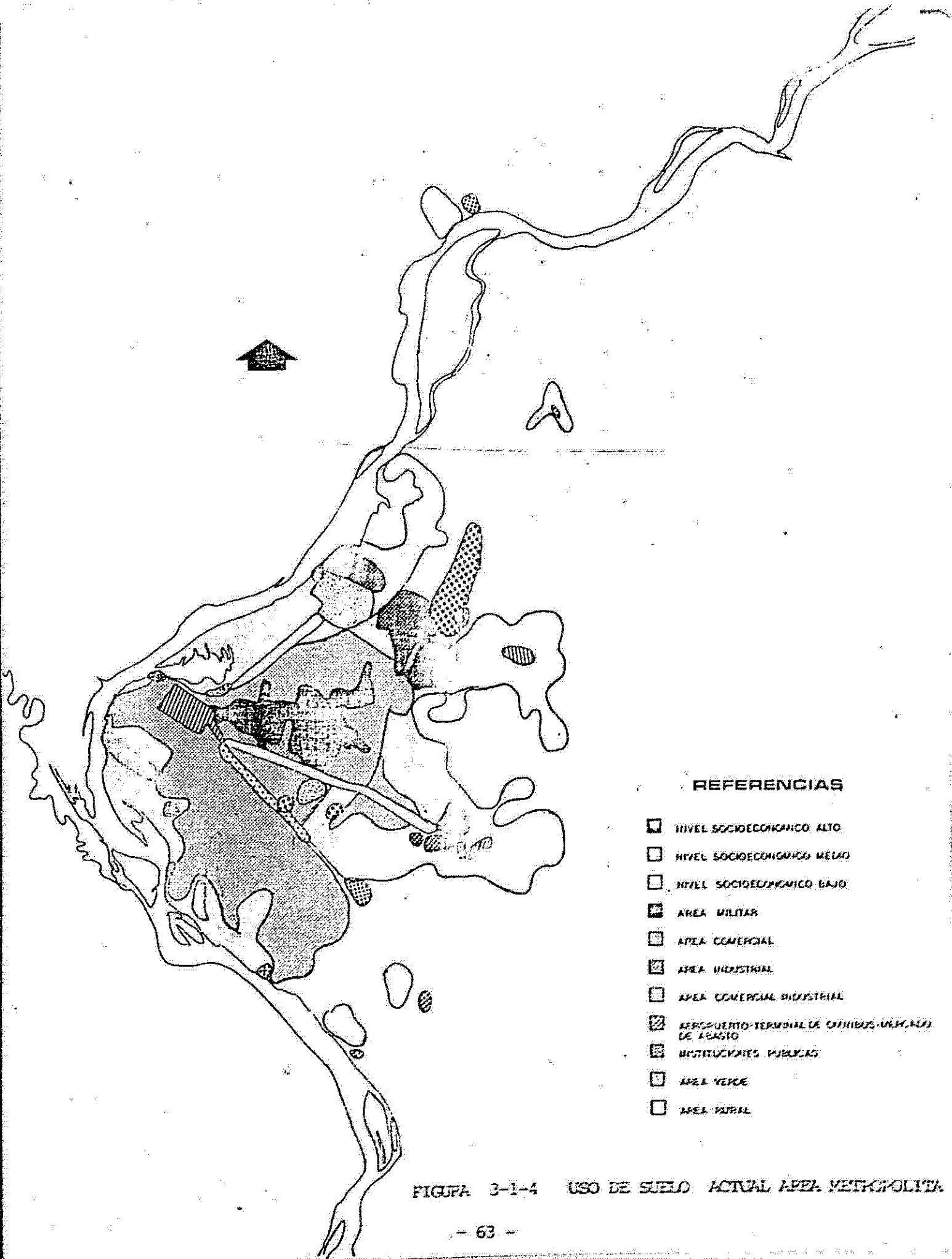


FIGURA 3-1-4 USO DE SUELO ACTUAL AREA METROPOLITANA

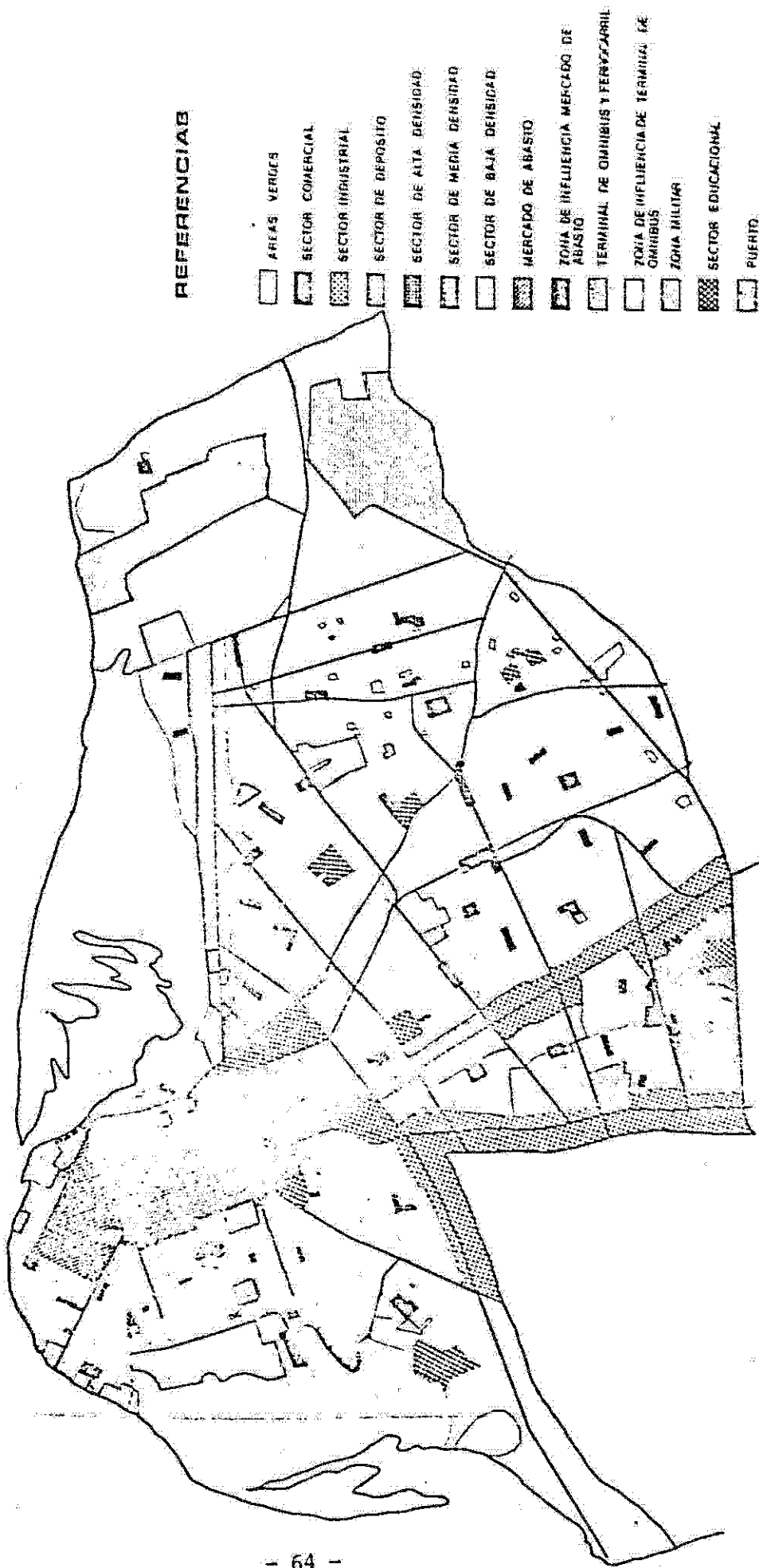
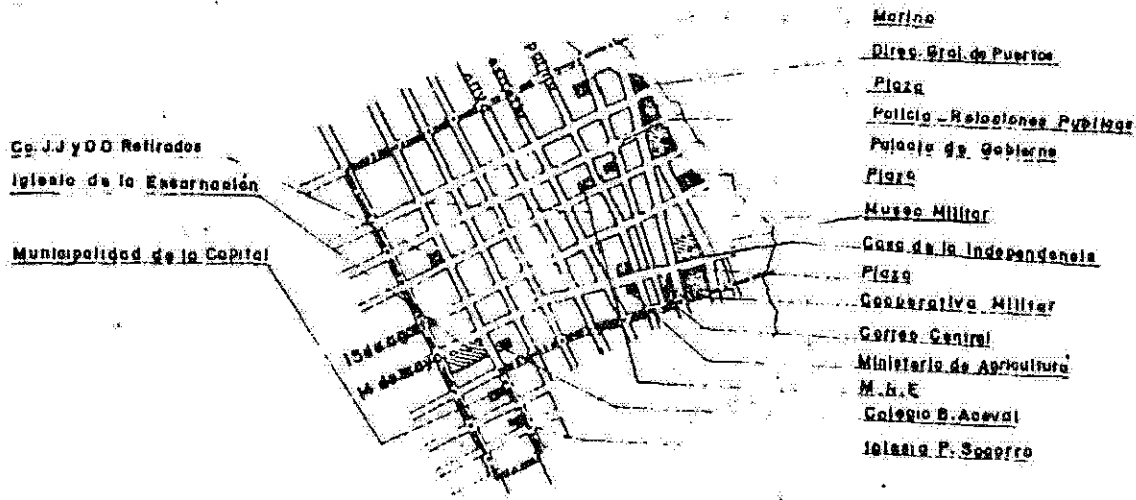


FIGURA 3-1-5 ZONIFICACION Y USO DE SUELO DE ASUNCION
OPUSCULO 2.140/78



ESC. 1/20.000

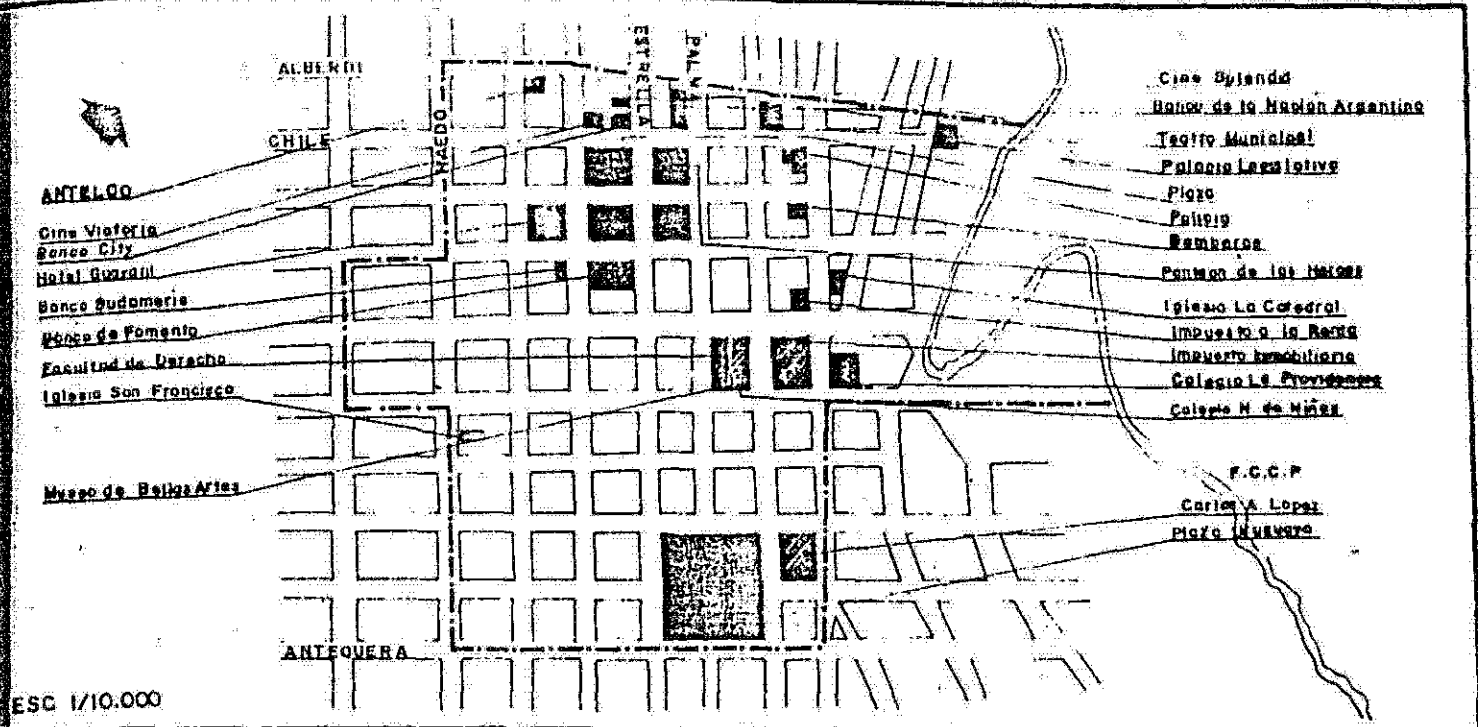
AREA TOTAL 73,9 Ha.
 POBLACION 3.950 hab.
 TRABAJADORES 25.080 hab.

a. Densidad Bruta: 53,5 hab./ha.
 b. Densidad Neta: 204,7 hab./ha.
 c. Densidad de Trabajadores Bruta: 339,4
 d. Densidad de Trabajadores Neta: 1.058,2

	A. Baldio	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no- utilizab.	Apropocua- rias	Total General
Ha	-	19,3	21,8	-	1,9	2,7	26,1	2,1	-	73,9
%	-	26,2	29,5	-	2,6	3,7	35,2	2,8	-	100

1. Antecedentes de la formación
 Antigua; edif. de la época; Palacio de Gobierno; luego los edificios en altura son posteriores a la década del 70.
2. Características referentes al uso de suelo
 Comercial, residencial media-alta; Inst. Públicas; Palacio de Gobierno; Ministerio de Relac. Exteriores, Municipalidad de Asunción, Area marginal
3. Características referentes al transporte
 Líneas de Transporte: 1-6-8-12-13-16-17-25-30-31-33-37-39-44a-44b-44c-40- 9-10- 15- 23-34-35-36-28-45-29-26-27-19-2-7-20.
4. Puntos problemáticos en cuanto al medio ambiente
 Area inundable en 2%, polución a consecuencia del excesivo transporte.
5. Tipos de actividad actual y futura
 Mejoramiento vial; señalizaciones; equipamientos de áreas verdes

FIGURA 3-1-6 (1) ASPECTO ACTUAL DE USO DE SUELO



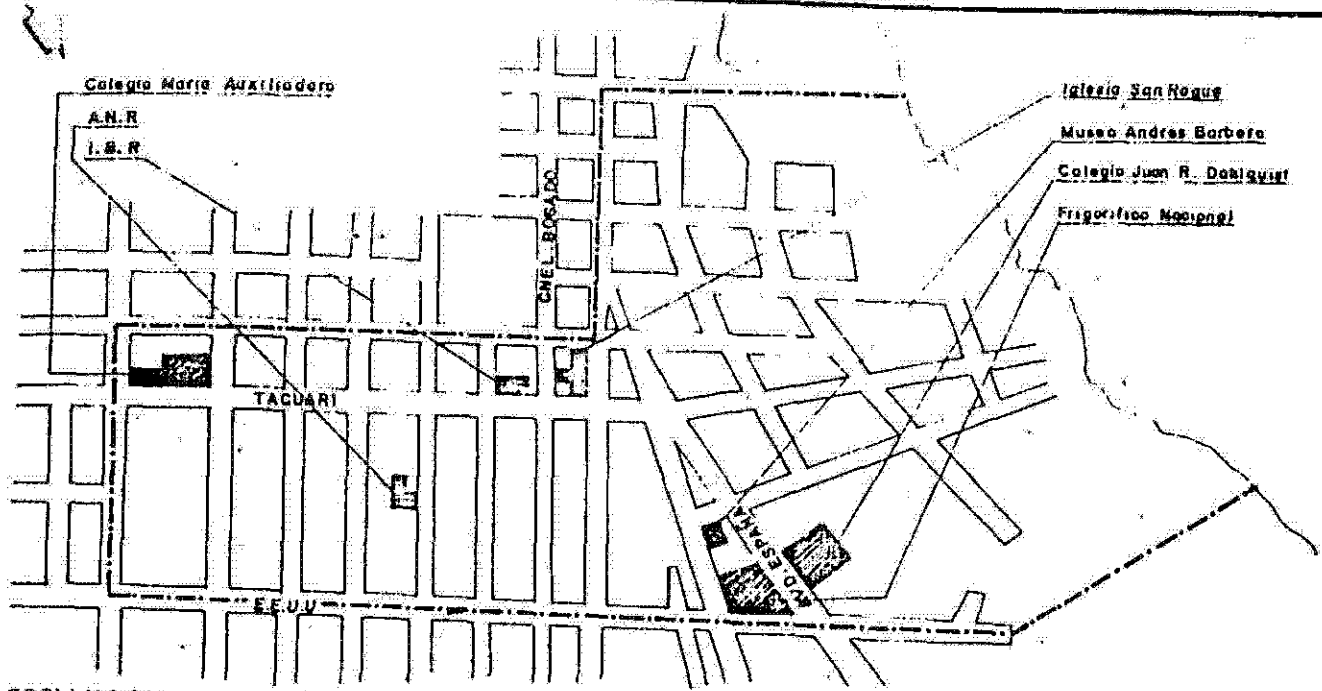
ESC 1/10.000

AREA TOTAL 58,5 Ha.
 POBLACION 1.770 Hab.
 TRABAJADORES 21.211 Hab.

a. Densidad Bruta: 30,3 Hab/Ha
 b. Densidad Netas: 182,5
 c. Densidad de Trabajadores Bruta: 362,6
 d. Densidad de Trabajadores Netas: 1122,3

	A. Baldio	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizado	apropecua- ción	Total General
Ha	-	9,7	13,7	-	5,2	7,1	20,6	2,2	-	58,5
%	-	16,6	23,5	-	8,8	12,1	35,2	3,8	-	100

1. Antecedentes de la Formación
 Zona antigua, anterior a 1.930, con edificios de época de Don Carlos A. López y Francisco S. López
2. Características referentes al uso de suelo
 Comercial, Residencial, Recreacional, Ferr. Central. Plaza Uruguay, La Catedral, Congreso Nacional, Janteón de los Héroes, Bco. de Fomento
 Policía, Bomberos
3. Características referentes al transporte
 Tranvía, Tren, Omnibus: 35-36-37-39-40-44a-44b-44c-45- Taxi-Est.
 1-6-7-8-9-10-12-13-14-15-16-17-19-20-23-25-26-27-28-29-30-31-33-34.
4. Puntos problemáticos en cuanto al medio ambiente
 Zonas inundables en un 34%; polución a consecuencia del excesivo transporte.
5. Tipos de actividad actual y futura
 Remodelación de la bahía- Equipamiento de la Plaza Uruguay
 Mejoramiento en cuanto a señalización vial.



AREA TOTAL 87,8 Ha.

POBLACION 8.450 Hab.

TRABAJADORES 5.881 Hab.

a. Densidad Bruta: 96,2 Hab/Ha

b. Densidad Neta: 251,5

c. Densidad de Trabajadores Bruta: 67,0

d. Densidad de Trabajadores Neta: 369,9

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Apropecua- ción	Total General
Ha	0,2	33,6	12,8	-	3,1	-	22,2	15,9	-	87,8
%	0,2	38,3	14,6	-	3,5	-	25,3	18,1	-	100

1. Antecedentes de la formación

Epoca anterior a 1.930. Los nuevos edificios a partir de la década del 70

2. Características referentes al uso de suelo

Residencial, comercial, Iglesia S. Roque, Museo A. Barbero- Frigorifi-
co Nacional, Col., Nacional Dahlquist.

3. Características referentes al transporte

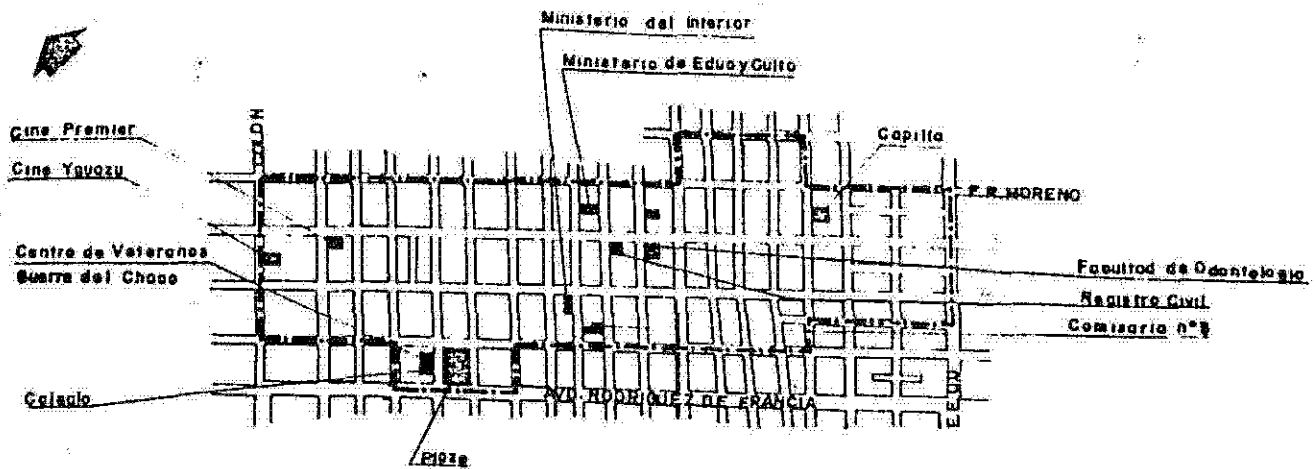
Tranvía, Ferrocarril, Omnibus: 10-14-19-21-27-29-45-2-7-1-6-8-12-
13-16-17-25-30-31-33-37-39-40a-44b-44c-40-9-15-23-28-34-35-36. Taxi

4. Puntos problemáticos en cuanto al medio ambiente

Zonas inundables en un 18,2 %- Polución constante a consecuencia del
medio de transporte; la zona inundable muy sucia, área marginal

5. Tipos de actividad actual y futura

Mejoramiento de las vías del tren, Construcción de la Av. Costanera,
limpieza de la zona inundable.



ESCALA 1:20.000

AREA TOTAL 80,6 Ha.
 POBLACION 6.590 Hab.
 TRABAJADORES 14.348 Hab.

a. Densidad Bruta: 81,8 Hab/ha.
 b. Densidad Neta: 199,1
 c. Densidad de Trabajadores Bruta: 178,0
 d. Densidad de Trabajadores Neta: 815,2

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recen- sional	Circu- lar	Verde me- diante	proporcio- nal	Total General
Ha	0,5	33,1	40,5	-	1,1	1,1	28,3	-	-	80,6
%	0,7	41,1	20,5	-	1,3	1,3	35,1	-	-	100

1. Antecedentes de la formación

La zona en sí, es más bien antigua, pero su urbanización comienza en 1.930- 1.950.

2. Características referentes al uso de suelo

Residencial media- alta- comercial, Plazas- educacionales- culturales- muchos vendedores ambulantes.

3. Características referentes al transporte

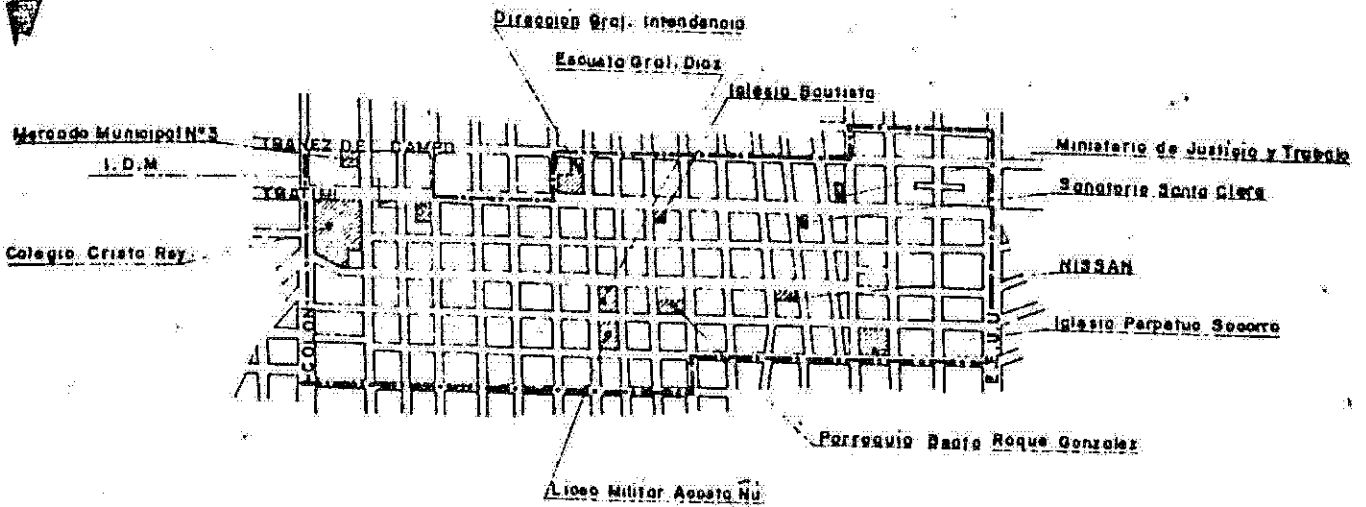
Líneas 1-3-7-20-22-26-34-35-19-21-24-32-39-41-45-2-4-42-38

4. Puntos problemáticos... cuanto al medio ambiente

Contaminación ambiental a causa de los transportes

5. Tipos de actividad actual y futura

Ampliación de la red de desagüe pluvial; equipar áreas verdes.



ESC 1:20,000

AREA TOTAL 105,7 Ha.
 POBLACION 10,270 hab.
 TRABAJADORES 7.663 hab.

a. Densidad Bruta: 97,2 hab/ha.
 b. Densidad Neta: 303,8 hab/ha.
 c. Densidad de Trabajadores Bruta: 72,5
 d. Densidad de Trabajadores Neta: 315,3

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	propocuu- rias	Total General
Ha	0,4	33,8	0,5	-	23,8	-	37,2	-	-	105,7
%	0,4	41,5	0,4	-	22,5	-	35,2	-	-	100

1. Antecedentes de la formación

1.940 aproximadamente, comienzan los grandes asentamientos urbanos.

2. Características referentes al uso de suelo

Residencial, comercial, Liceo Militar, escuela, colegio, Ministerio de Justicia y Trabajo, Sanatorio, Institución Pública.

3. Características referentes al transporte

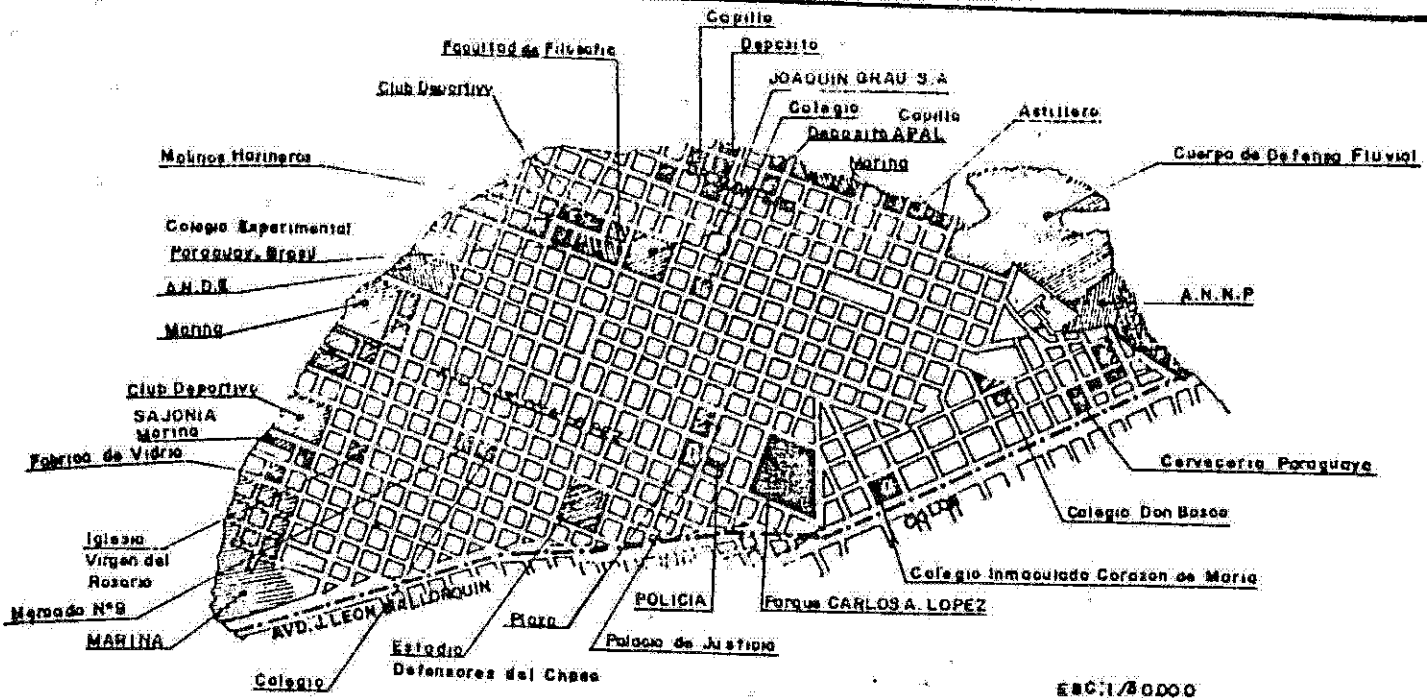
Líneas: 19-23-45-12-44 A y B - 30-3-43-38-13-12--36-42-34-46-6-27-15-16-23.-

4. Puntos problemáticos en cuanto al medio ambiente

Polución a causa de los medios de transporte.

5. Tipos de actividad actual y futura

Mejoramiento de las vías de acceso, proporcionar áreas verdes a la zona. Señalización.



AREA TOTAL 486,0 ha
 POBLACION 41.810 hab.
 TRABAJADORES 21.665 hab.

a. Densidad Bruta: 86,0 hab/ha.
 b. Densidad Neta: 314,6
 c. Densidad de Trabajadores Bruta: 44,6
 d. Densidad de Trabajadores Neta: 172,2

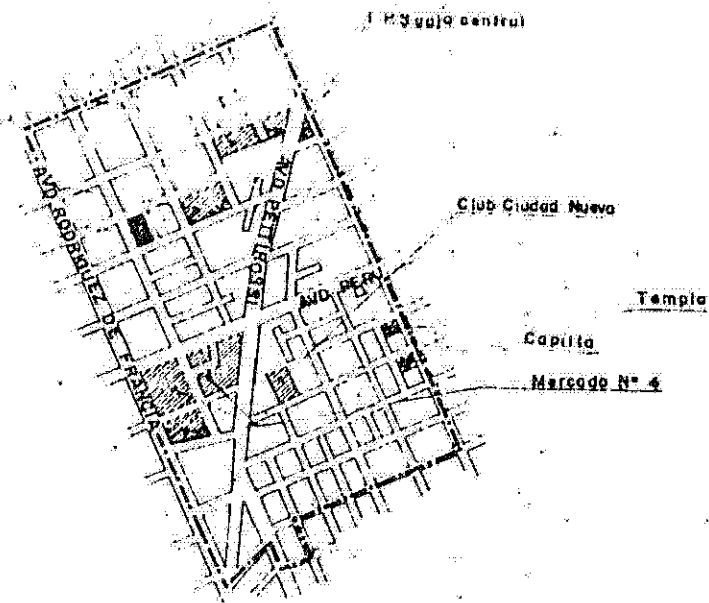
	A. Baldio	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no cultivada	proporcion vial	Total General
Ha	4,4	132,9	43,5	20,4	61,9	10,9	156,2	49,8	-	486,0
%	0,9	27,4	8,9	4,2	12,8	3,5	32,1	10,2	-	100

1. Antecedentes de la formación
Zona antigua, con asentamientos urbanos recientes, a partir de 1.930
2. Características referentes al uso de suelo
Residencial media, edificios públicos, Palacio de Justicia, Parque Carlos A. López, Estadio de fútbol, Facul. Ita Iytá Punta, Mol. Har. Paraguaya, Armada Nacional, I.I.V.U.
3. Características referentes al transporte
Puerto Sajonia, tranvía; Parada de Taxi; Area de Estacionamiento; Línea de Omnibus: 44C-39-32-31-25-16-19-1-23-8-17-12-45-14-27-30B-38-6-28-33-20-40-26-22-34-21-35-2-10-37-7-15
4. Puntos problemáticos en cuanto al medio ambiente
Zona inundable, con formación de áreas marginales, baldíos en mal estado de conservación.
5. Tipos de actividad actual y futura
Mejorar los predios baldíos en cuanto a estado de conservación equipamiento vial, extensión de servicios públicos.

Minist. de Salud publ. y bienestar social

Colégio Salesiano

Plaza



ESC: 1:20.000

AREA TOTAL 83,7 Ha
 POBLACION 7.840 Hab.
 TRABAJADORES 12.094 Hab.

a. Densidad Bruta: 93,7 Hab/ha.
 b. Densidad Neta: 279,0 Hab/ha
 c. Densidad de Trabajadores Bruta: 144,5
 d. Densidad de Trabajadores Neta: 380,3

A. Bldio -	Residen-	Comer-	Indus-	Inst. Pú-	Recrea-	Circu-	Verde no	proporcion-	Total
H _T	cial	cial	trial	blicas	cional	lacion	de r. de.	rial.	General
0,4	28,1	29,1	-	2,7	0,7	22,7	-	-	83,7
%	33,5	34,8	-	3,2	0,9	27,1	-	-	100

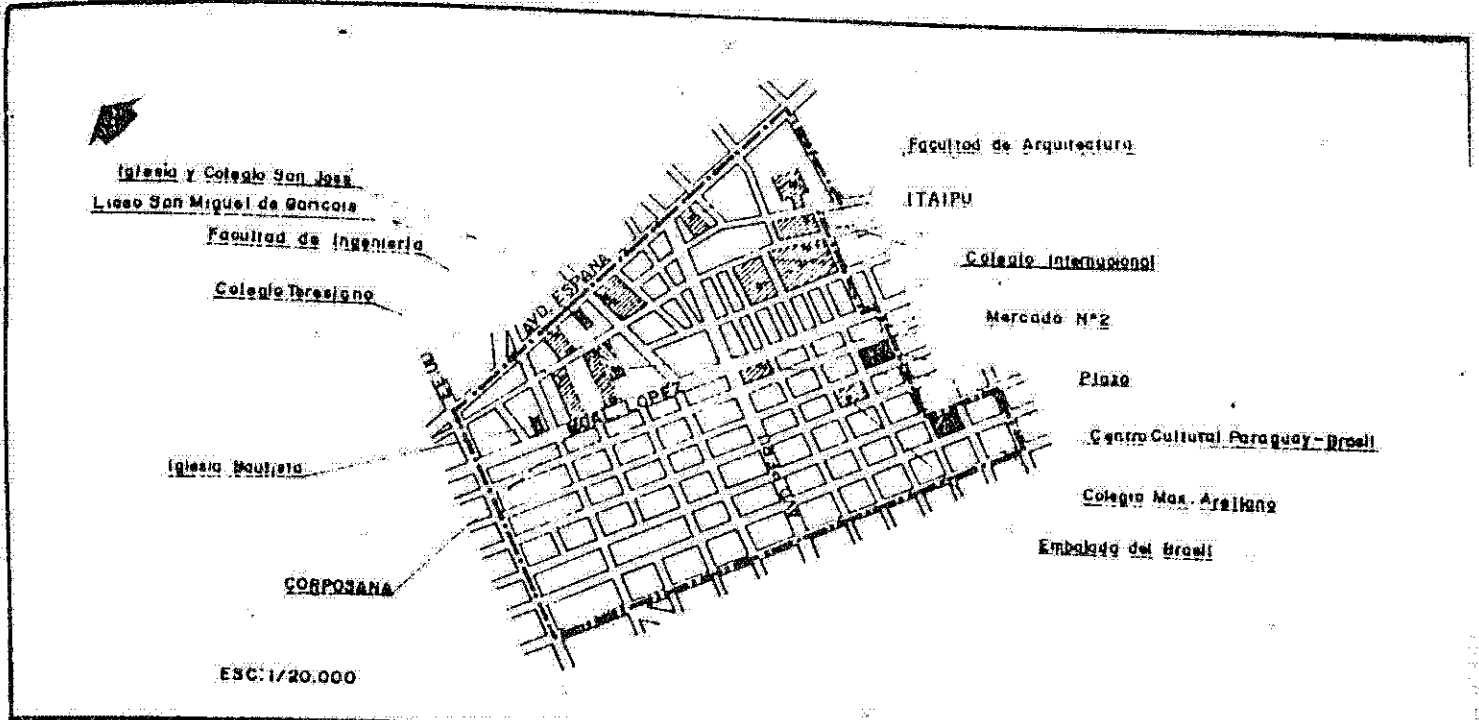
1. Antecedentes de la formación
Su crecimiento urbanístico comienza aproximadamente en 1.940-1.950

2. Características referentes al uso de suelo
Comercial, residencial media, Mercado 4, Plaza, Sanatorio, Escuela de sordos.

3. Características referentes al transporte
Parada de taxi, línea de Omnibus: 40-2-7-20-13-44A-44B-29-26-27
Area de Estacionamiento

4. Puntos problemáticos - cuanto al medio ambiente
La basura y la cantidad de gente como de vehículos hace el lugar muy contaminado.

5. Tipos de actividad actual y futura
Mejoramiento tanto de las instalaciones del Mercado 4, como de sus adyacencias.

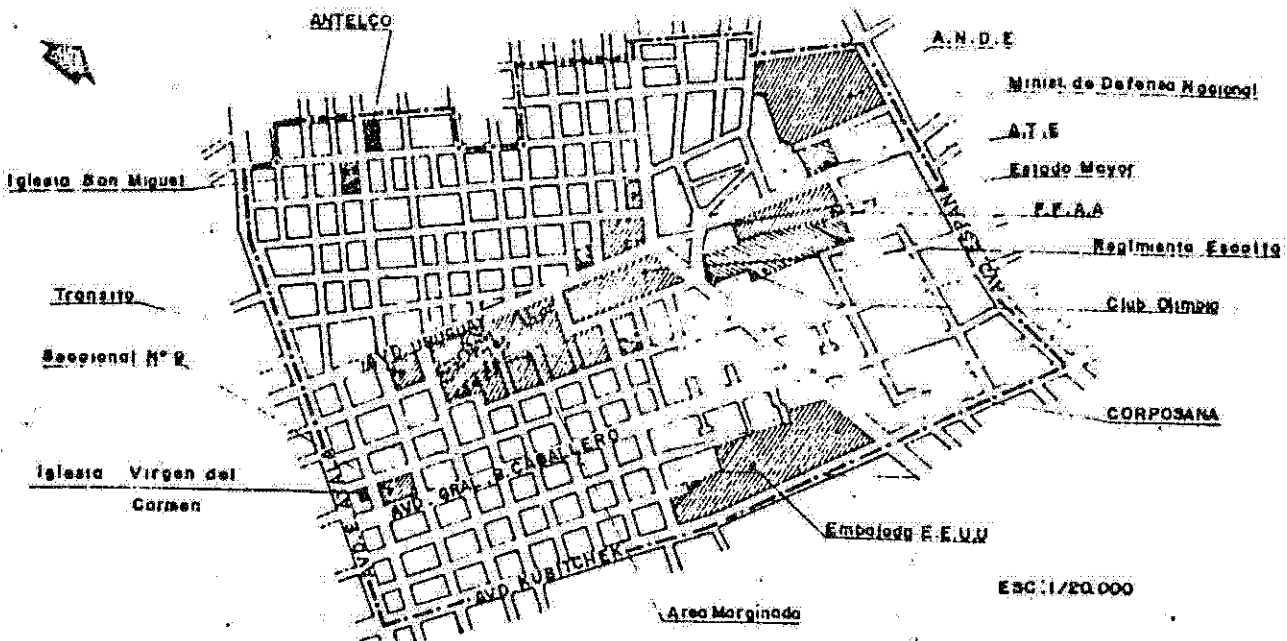


AREA TOTAL 103,0 Ha
 POBLACION 5.310 hab.
 TRABAJADORES 10.778 hab.

a. Demanda Bruta: 51,6 Hab/ha
 b. Demanda Neta: 105,4
 c. Demanda de Trabajadores Bruta: 104,6
 d. Demanda de Trabajadores Neta: 494,4

A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lar	Verde in- cívico	Protección Pública	Total General
Ha	0,4	50,4	15,1	-	6,7	1,1	29,3	-	103,0
%	0,4	48,9	14,8	-	6,6	0,9	28,4	-	100

1. Antecedentes de la formación
 Los asentamientos urbanos prácticamente comenzaron a partir de 1930.-
2. Características referentes al uso de suelo
 Residencial media, comercial, colegios, inst. públicas, áreas recrea-
 cionales, clínicas y consultorios médicos privados.
3. Características referentes al transporte
 Tranvía, Parada de taxi, Área de Estacionamiento; Líneas de Omnibus:
 Limpio, 35-30-37-17-39-27-29-42- 1-440 26-45-6-9
4. Problemas referentes al medio ambiente
 Polución constante del medio ambiente, por causa de los vehículos
 de transporte
5. Tipos de actividad actual y futura
 Mejoramiento de los servicios públicos, especialmente los sanitarios.
 Señalización vial.

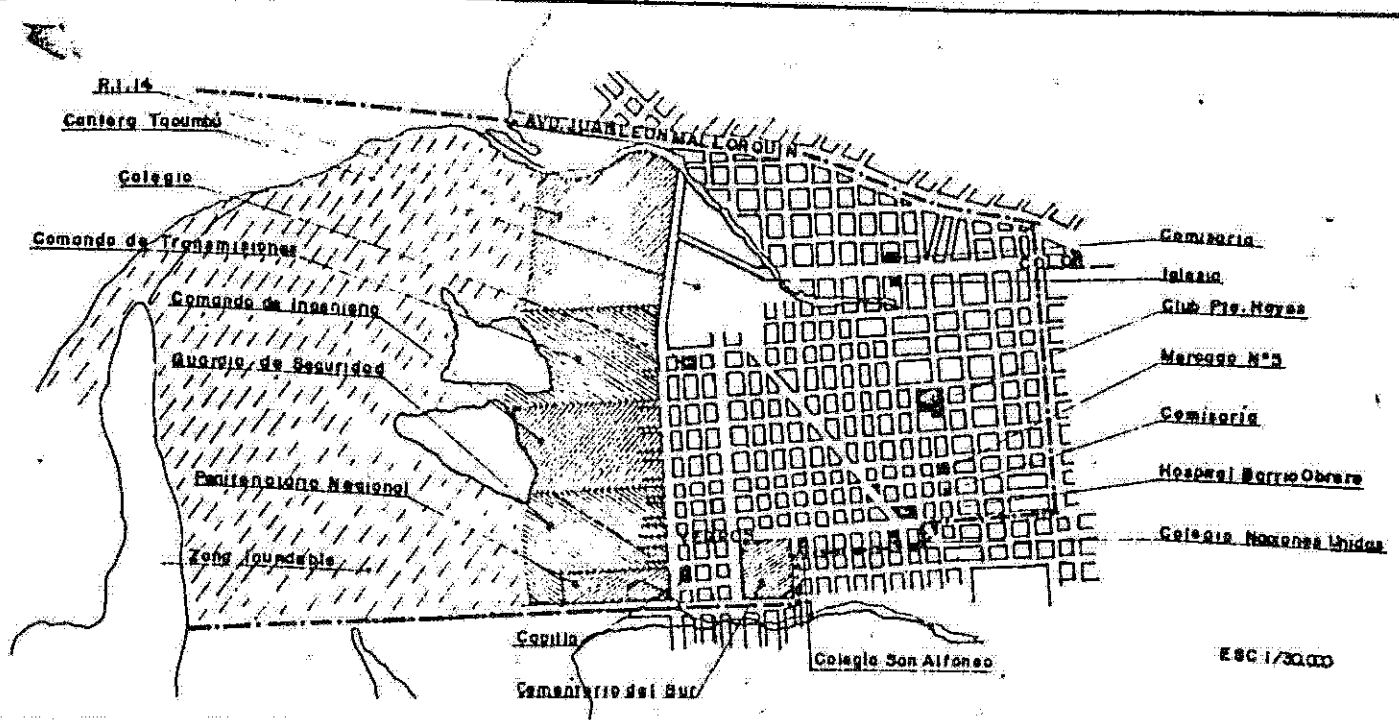


AREA TOTAL 232,0 Ha.
 POBLACION 15.360 hab.
 TRABAJADORES 11.379 hab.

a. Densidad Bruta: 66,2 hab/ha.
 b. Densidad Neta: 121,4 hab/ha.
 c. Densidad de Trabajadores Bruta: 49,1
 d. Densidad de Trabajadores Neta: 294,8

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Brecrea- ción	Circu- lacion	Verde no utilizab.	Arropecus- rias	Total General
Ha	1,4	126,5	11,9	-	26,7	4,2	61,3	-	-	232,0
%	0,6	54,5	5,1	-	11,5	1,8	26,5	-	-	100

- Antecedentes de la formación
 A excepción de algunos puntos antiguos, el resto de la concentración urbana fue posterior a 1.940.
- Características referentes al uso de suelo
 Residencial, comercial, Instituciones Militares, Batallón Escolta Pra. Embajada, Club Deportivo, Area Marginal, Ministerio de Defensa.
- Características referentes al transporte
 Tranvía, Líneas de Omnibus: 6-2-7- Tranvía 35-37-
 Omnibus 9-26-27-29-17-40-45-36-25-15-12-34-44A-B-C-3-28-23-31-30
- Puntos problemáticos en cuanto al medio ambiente
 La ubicación del área marginal, Mundo Aparte, sin la infraestructura suficiente de servicios, como cloaca, agua etc.
- Tipos de actividad actual y futura
 Rehabilitación urbana de Mundo Aparte (Banco Mundial), equipamiento de las vías actuales.

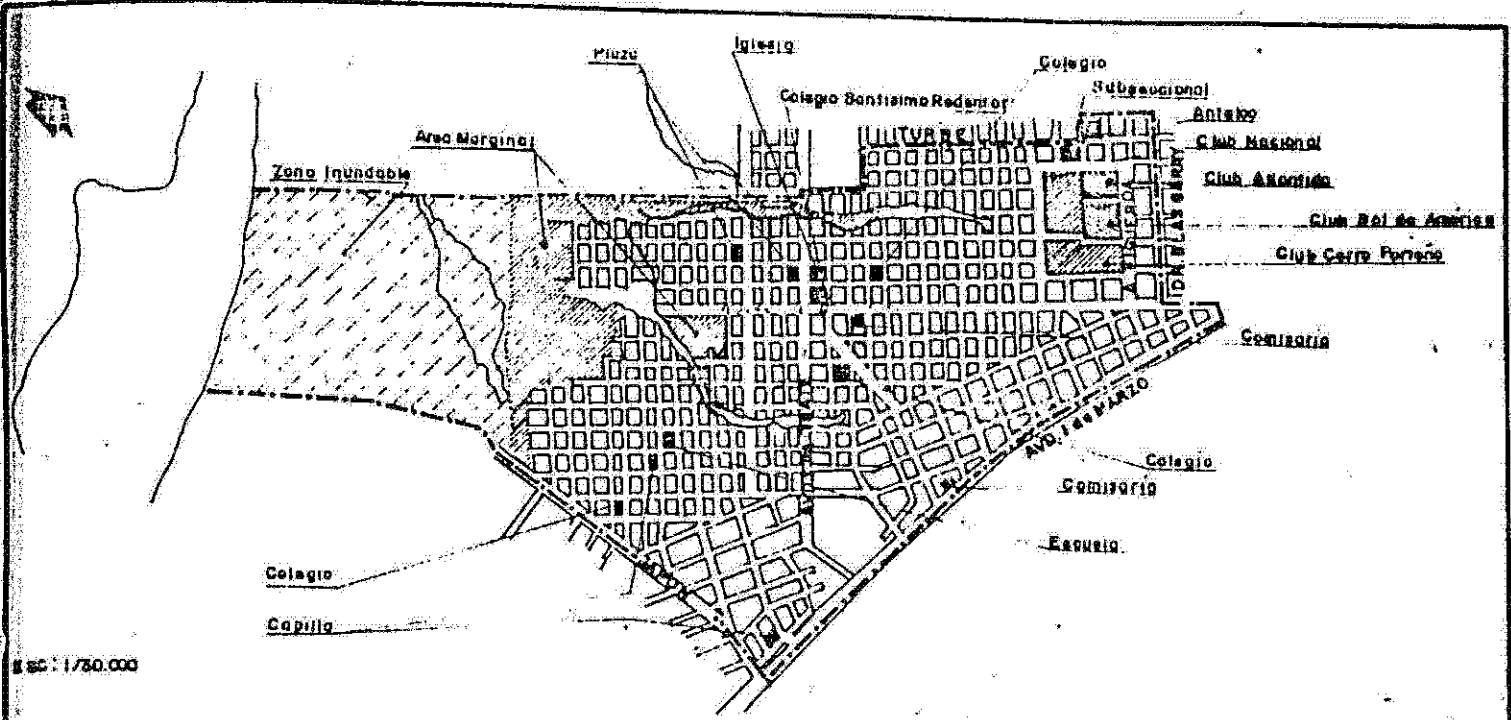


AREA TOTAL 649,6 Ha.
 POBLACION 22.820 hab
 TRABAJADORES 6.091 hab.

a. Densidad Bruta: 35,1 Hab/ha
 b. Densidad Neta: 108,4 hab/ha
 c. Densidad de Trabajadores Bruta: 9,4
 d. Densidad de Trabajadores Neta: 47,5

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recreo- cional	Circu- lacion	Verde no utilizab.	Arropecu- rios	Total General
Ha	1,4	210,6	13,4	0,4	114,5	1,6	95,2	212,5	-	649,6
%	0,2	32,4	2,1	0,1	17,6	0,2	14,7	32,7	-	100

1. Antecedentes de la formación
 La mayoría de su concentración urbana, se debió a la década de 1960.
2. Características referentes al uso de suelo
 Residencial, Comercial, áreas verdes, Club, Cuarteles (Instituciones Militares), Cementerio del Sur, área marginal, H. Barrio Obrero.
3. Características referentes al transporte
 Líneas de Omnibus: 3-10-14-16-25-26-33-38-24-44-40-27-36-23-15-13-19-34-30B - Taxi
4. Puntos problemáticos en cuanto al medio ambiente.
 Área inundable en un 22%, parte de la Salamanca, con todas las emanaciones propias.
5. Tipos de actividad actual y futura
 Rehabilitación urbana en las áreas marginales, mejoramiento de la red vial, rellenos sanitarios.

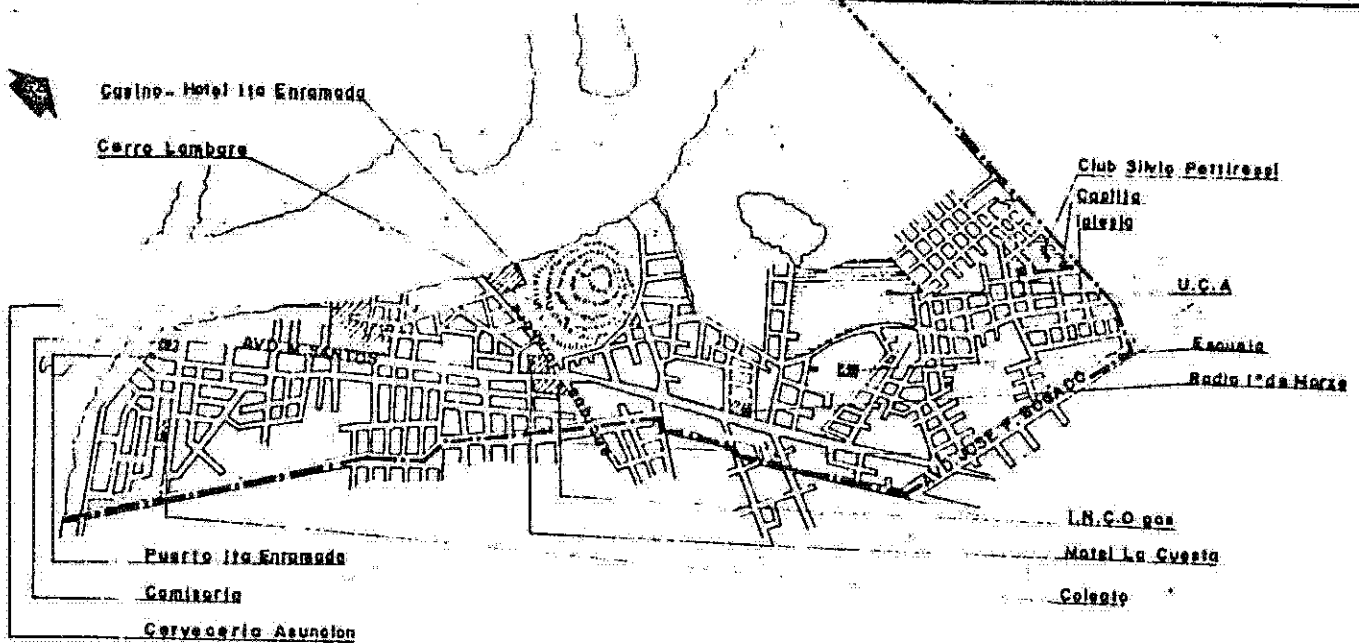


AREA TOTAL 519,1 Ha.
 POBLACION 33.420 hab.
 TRABAJADORES 6.665 hab.

a. Densidad Bruta: 64,4 hab/ha
 b. Densidad Neta: 105,9 hab/ha
 c. Densidad de Trabajadores Bruta: 12,8
 d. Densidad de Trabajadores Neta: 294,9

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde in- stitucio- nal	Artificia- les	Total General
Ha	5,7	315,6	22,6	-	5,1	17,5	96,7	55,7	-	519,1
%	1,1	60,8	4,4	-	1,0	3,4	18,6	10,7	-	100

1. Antecedentes de la formación
 La mayor parte de su asentamiento urbano fue a partir de 1.960; especialmente en la década del 70.
2. Características referentes al uso de suelo
 Residencial- comercial- Clubes Deportivos; Colegio; Vertedero municipal.
3. Características referentes al transporte
 Líneas: 10-19-12-23-45-44; área de estacionamiento; Parada de Taxi.
4. Puntos problemáticos - cuanto al medio ambiente
 Mal olor por el vertedero municipal; zona inundable en un área de 55,7 Ha.
5. Tipos de actividad actual y futura
 Ampliación y mejoramiento de la Av. F. Bogado, mejoramiento y equipamiento de la Av. Itá Ybaté, traslado del vertedero municipal.



ESCALA: 1/40.000

AREA TOTAL 755,8 Ha
 POBLACION 18.650 Hab.
 TRABAJADORES 4.357 hab.

a. Densidad bruta: 24,7 Hab/ha
 b. Densidad Neta: 61,4 hab/ha
 c. Densidad de Trabajadores Bruta: 5,8
 d. Densidad de Trabajadores Neta: 89,8

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	propiedad privada	Total General
Ha	97,4	303,7	3,9	10,3	34,3	9,3	121,5	175,4	-	755,8
%	12,9	40,2	0,5	1,4	4,5	1,2	16,1	23,2	-	100

1. Antecedentes de la formación

La zona aledaña al Cerro Lambaré es antigua, pero el resto de los asentamientos urbanos se intensifican a partir de 1.960

2. Características referentes al uso de suelo

Residencial; comercial- baldíos- Cerro Lambaré- Fac. Católica- Cervece-
ría Munich- Arenera- Hotel Casino Itá Enramada - áreas marginales

3. Características referentes al transporte

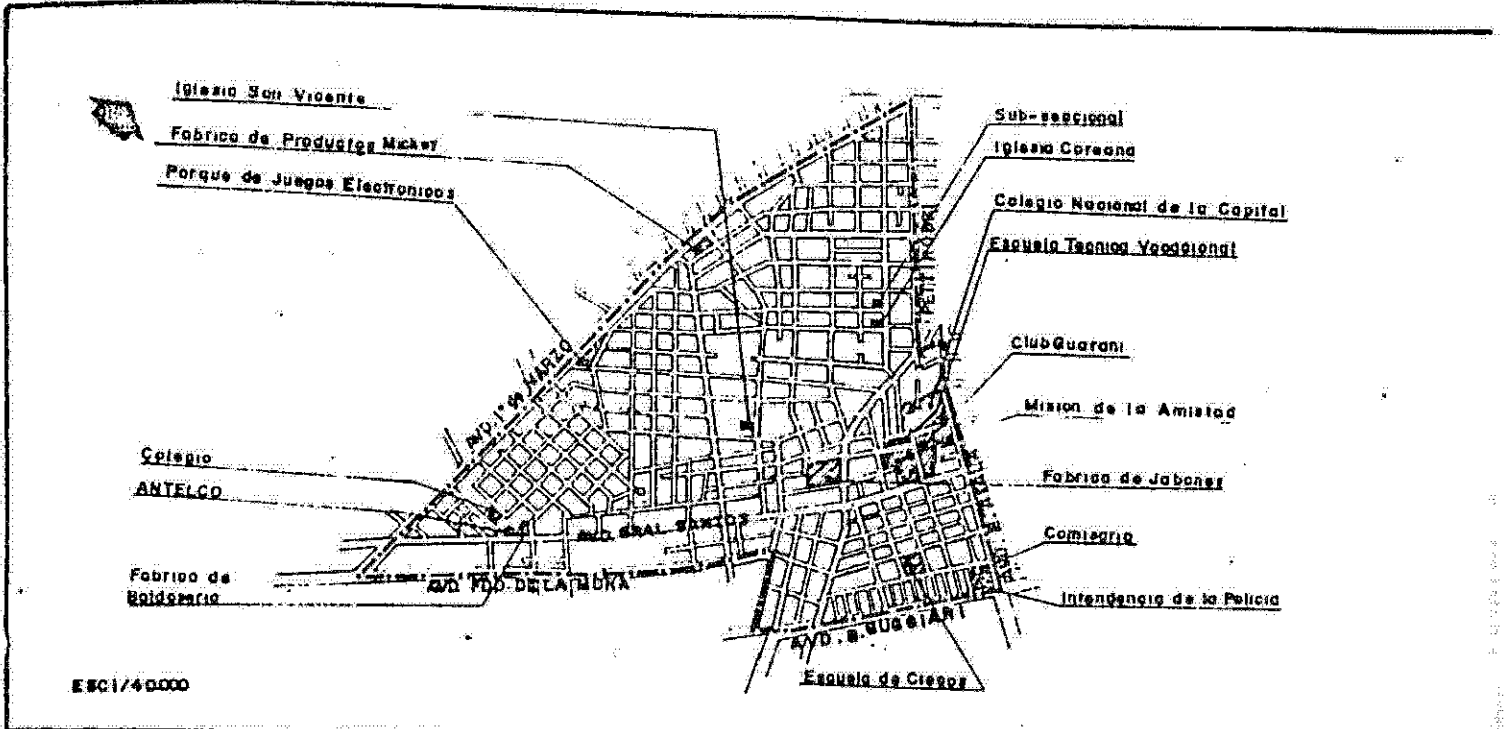
Línea: 19-12-27-23-40 ; área de estacionamiento
 Parada de taxi; Puerto Itá Enramada

4. Puntos problemáticos en cuanto al medio ambiente

Area inundable en un 32%
 Vertedero municipal- mal olor.

5. Tipos de actividad actual y futura

Ampliación de la Av. Félix Bogado- utilización de la Laguna Cateura p/
 vertedero municipal- traslado total de la Univ. Católica al Barrio
 Sta. María, rehabilitación de áreas marginales

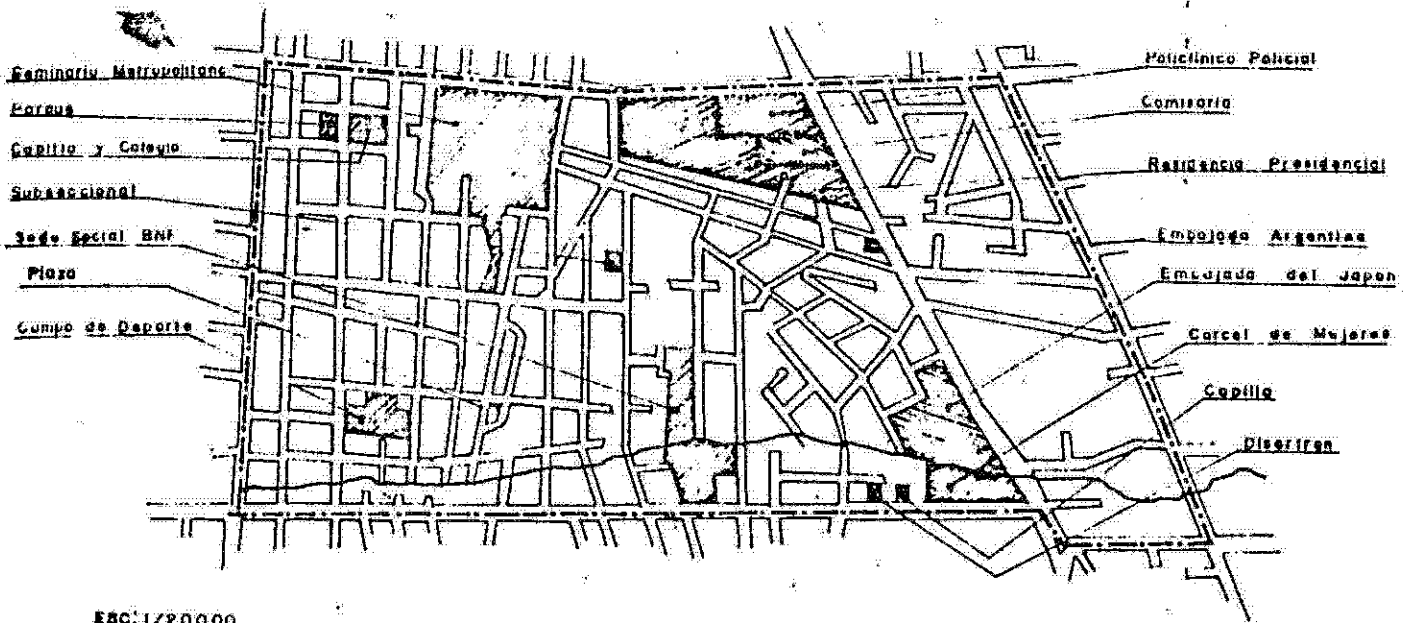


AREA TOTAL 499,0 Ha.
 POBLACION 35.720 hab.
 TRABAJADORES 14.350 hab.

a. Densidad Bruta: 71,6 hab/ha
 b. Densidad Neta: 100,2 hab/ha
 c. Densidad de Trabajadores Bruta: 28,8
 d. Densidad de Trabajadores Neta: 359,6

	A. Baldio	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	capacia- rias	Total General
Ha	15,5	356,5	32,1	0,4	7,4	2,2	84,9	-	-	499,0
%	3,1	71,4	6,4	0,1	1,5	0,4	17,1	-	-	100

- Antecedentes de la formación
 La parte correspondiente a Pettirozzi es más antigua (Camino a Ysaty) 1.850 . El resto 1.930.
- Características referentes al uso de suelo
 Residencial media, comercial, Sanatorio, Fca. de ropas, Galerías co-
 merciales, parte del Mercado 4, Estación de servicio, Colegio, Club
 Deportivo.
- Características referentes al transporte
 Colectivos: 8-26-27-42-38
 Parada de Taxi
- Puntos problemáticos en cuanto al medio ambiente
 Se siente la influencia del Mercado 4, con su acumulación de todo
 tipo de desechos.
- Tipos de actividad actual y futura
 Ensanchamiento de la Av. Próceres de mayo, con los debidos equip-
 mientos y señalizaciones; y área de estacionamiento.

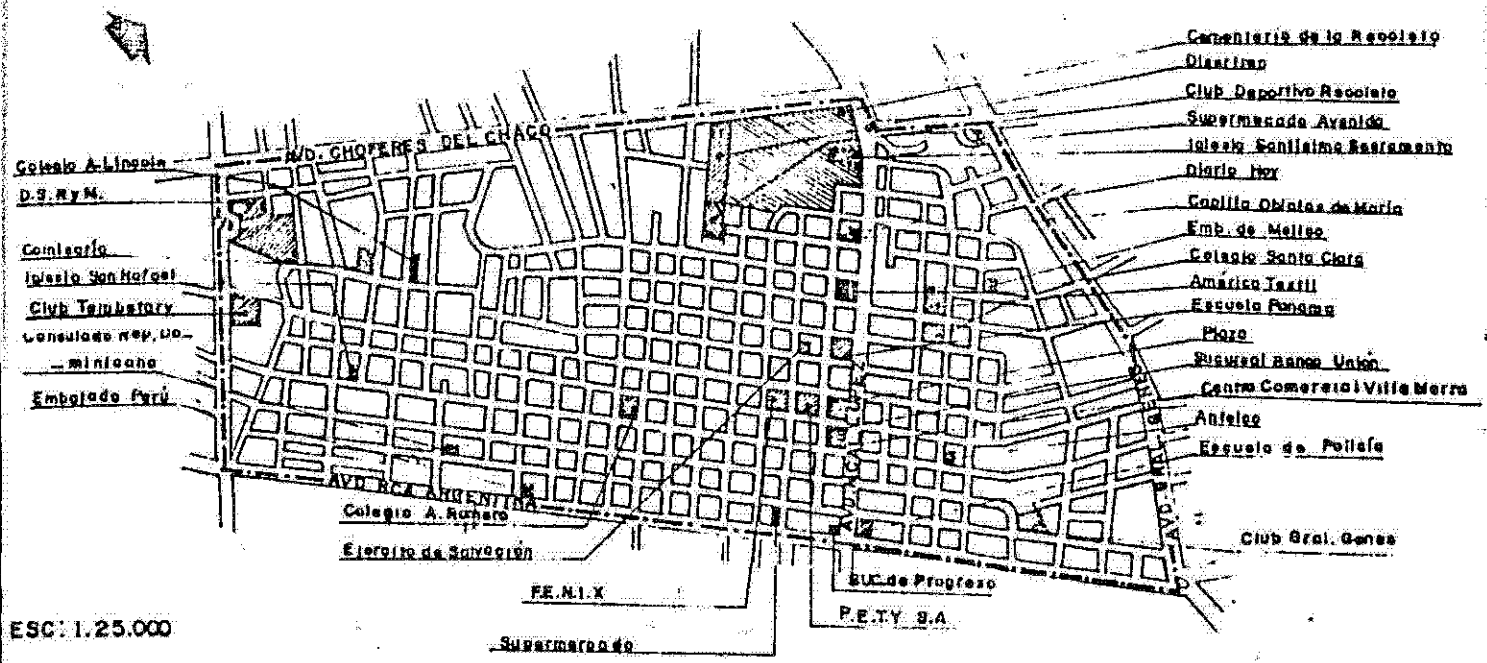


AREA TOTAL 256,2 Ha.
 POBLACION 10.870 hab.
 TRABAJADORES 5.803 hab.

a. Densidad Bruta: 42,4 Hab/ha
 b. Densidad Neta: 78,3 hab/ha
 c. Densidad de Trabajadores Bruta: 22,7
 d. Densidad de Trabajadores Neta: 122,4

	A. Baldio	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Propiedad privas	Total General
Ha	4,6	138,8	7,6	1,2	38,6	13,3	52,1	-	-	256,2
%	1,8	54,2	2,9	0,5	15,1	5,2	20,3	-	-	100

1. Antecedentes de la formación
 En la misma se encuentra, casas antiguas en forma aislada, el resto de los asentamientos es relativamente nuevo.
2. Características referentes al uso de suelo
 Residencial alta, comercial, Residencial Presidencial, embajadas, inst militares, Club Deportivo, Cárcel de mujeres
3. Características referentes al transporte
 Líneas de Transporte: 14-12-30-24-28-41-36-6-44a,b,c,-(41-42)-30-12-Parada de taxi, tranvía. 17-26-22-40-7-15-45-2-36.
4. Puntos problemáticos en cuanto al medio ambiente
 Ciertos tipos de acumulación de residuos en zanjas.
5. Tipos de actividad actual y futura
 Saneamiento del arroyo Mburicaó, actualmente destinado a la acumulación de basuras.

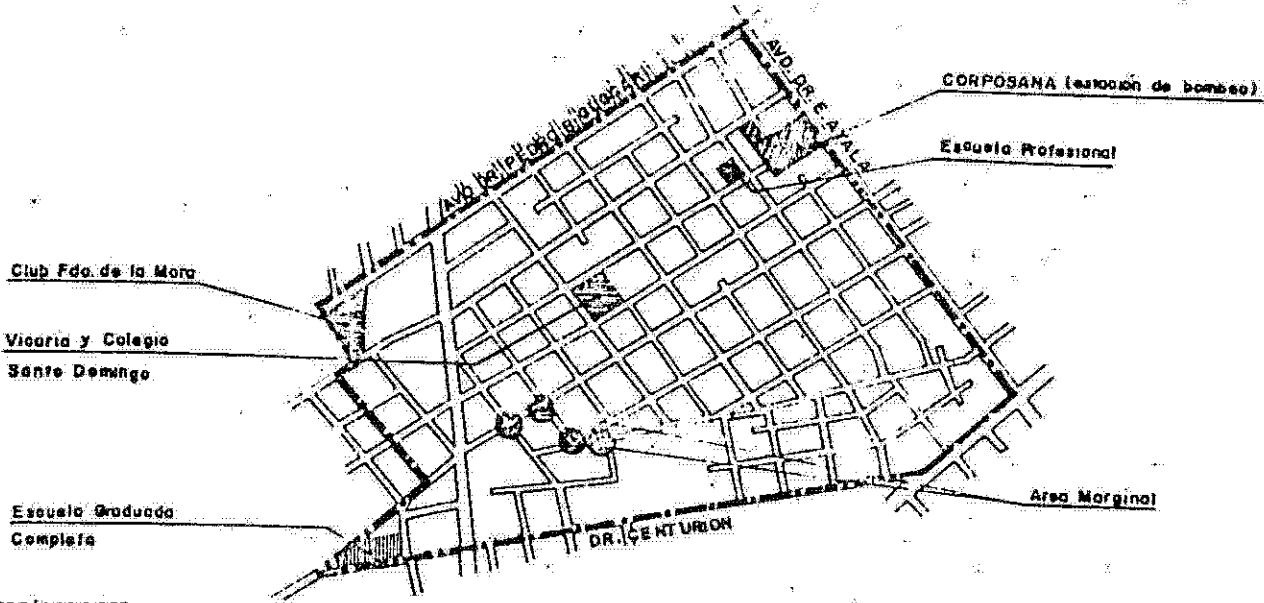


AREA TOTAL 403,1 Ha.
 POBLACION 17.440 hab.
 TRABAJADORES 6.962 hab.

a. Densidad Bruta: 43,3 hab/ha
 b. Densidad Neta: 69,7 hab/ha
 c. Densidad de Trabajadores Bruta: 17,3
 d. Densidad de Trabajadores Neta: 143,8

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	propiecia- rias	Total General
Ha	12,9	250,2	20,5	4,4	23,5	5,7	85,9	-	-	403,1
%	3,2	62,1	5,1	1,1	5,8	1,4	21,3	-	-	100

1. Antecedentes de la Formación
 La zona adyacente a la calle Mcal. López, es la más antigua, el resto es más nueva, aproximadamente del año 1.930.
2. Características referentes al uso de suelo
 Residencial alta, comercial, Cementerio, Sanatorio, Centros recreati-
 vos- educativos.
3. Características referentes al transporte
 Líneas de ómnibus: 2-7-17-22-31-40-41-42-43-20-10-16-27-29-36-30-23-
 26-12-15-34-28-24
4. Puntos problemáticos en cuanto al medio ambiente
 Acumulación de residuos en el arroyo Mburicaó.
5. Tipos de actividad actual y futura
 Saneamiento del arroyo Mburicaó - señalización vial.



AREA TOTAL 142,7 Ha.

POBLACION 9.760 hab.

TRABAJADORES 3.448 hab.

a. Densidad Bruta: 68,4 hab/ha

b. Densidad Neta: 108,8 hab/ha

c. Densidad de Trabajadores Bruta: 24,2

d. Densidad de Trabajadores Neta: 191,6

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Propie- dades	Total General
Ha	4,5	89,7	8,7	5,1	4,2	1,9	28,6	-	-	142,7
%	3,2	62,9	6,1	3,5	2,9	1,3	20,1	-	-	100

1. Antecedentes de la formación

Relativamente nuevo, a partir de 1.930.

2. Características referentes al uso de suelo

Residencial media, comercial, baldíos en estado de abandono, calles sin abrir, Misión de la Amistad, calles ocupadas.

3. Características referentes al transporte

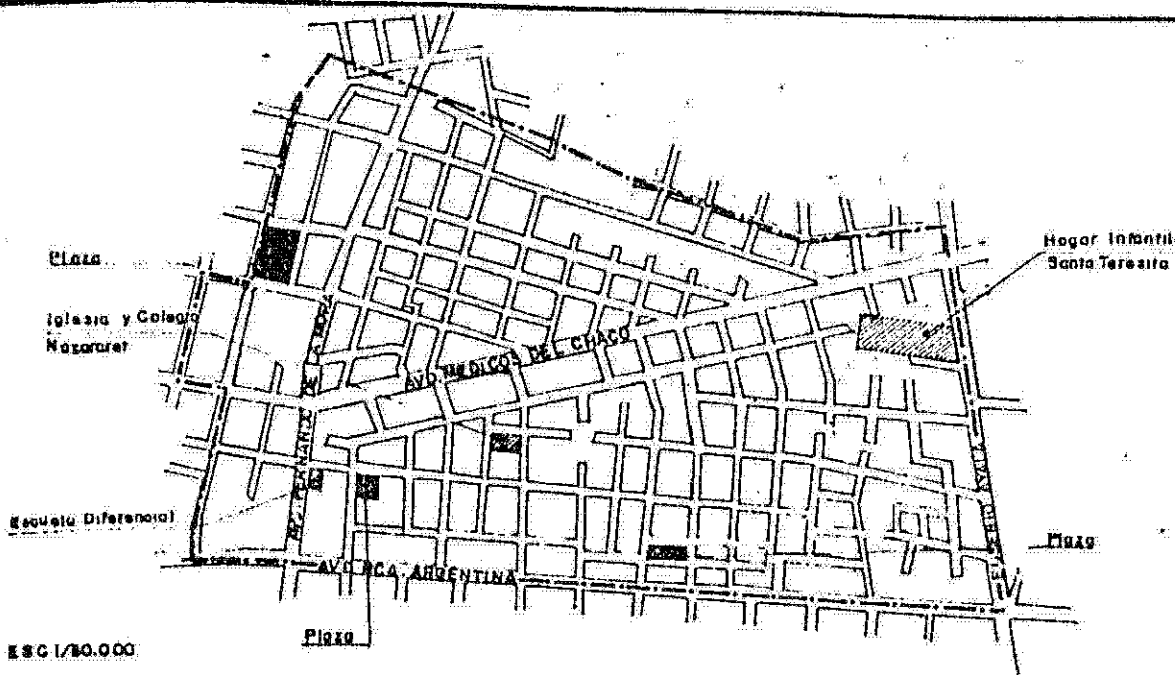
Servicios de transporte público perimetrales - Líneas de Omnibus- 22 - 17 - 15 - 8 - 10 - 13 - 38 - 25 - 17 - 26 - 27 - 45 - 29

4. Factos problemáticos en cuanto al medio ambiente

Basuras en la calle

5. Tipos de actividad actual y futura

Reubicación de los asentamientos en la vía pública, extensión de los servicios públicos (cloaca, desagüe pluvial).



AREA TOTAL 228,5 ha.
 POBLACION 12.600 hab..
 TRABAJADORES 2.467 hab.

a. Densidad Bruta: 55,1 hab/ha.
 b. Densidad Neta: 83,2 hab/ha.
 c. Densidad de Trabajadores Bruta: 10,8
 d. Densidad de Trabajadores Neta: 147,7

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. pú- blicas	Secrea- cional	Circu- lacion	Verde no utilizab.	Agropecu- rias	Total General
Ha	12,3	151,4	7,8	4,8	4,1	2,2	45,9	-	-	228,5
%	5,4	66,3	3,4	2,1	1,8	0,9	20,1	-	-	100

1. Antecedentes de la formación

El desarrollo urbano, es relativamente nuevo a partir de 1.930.

2. Características referentes al uso de suelo

Residencial media, comercial, industrial, sectorizado sobre avenida;
 Hogar infantil Sta. Teresita del Niño Jesús.

3. Características referentes al transporte

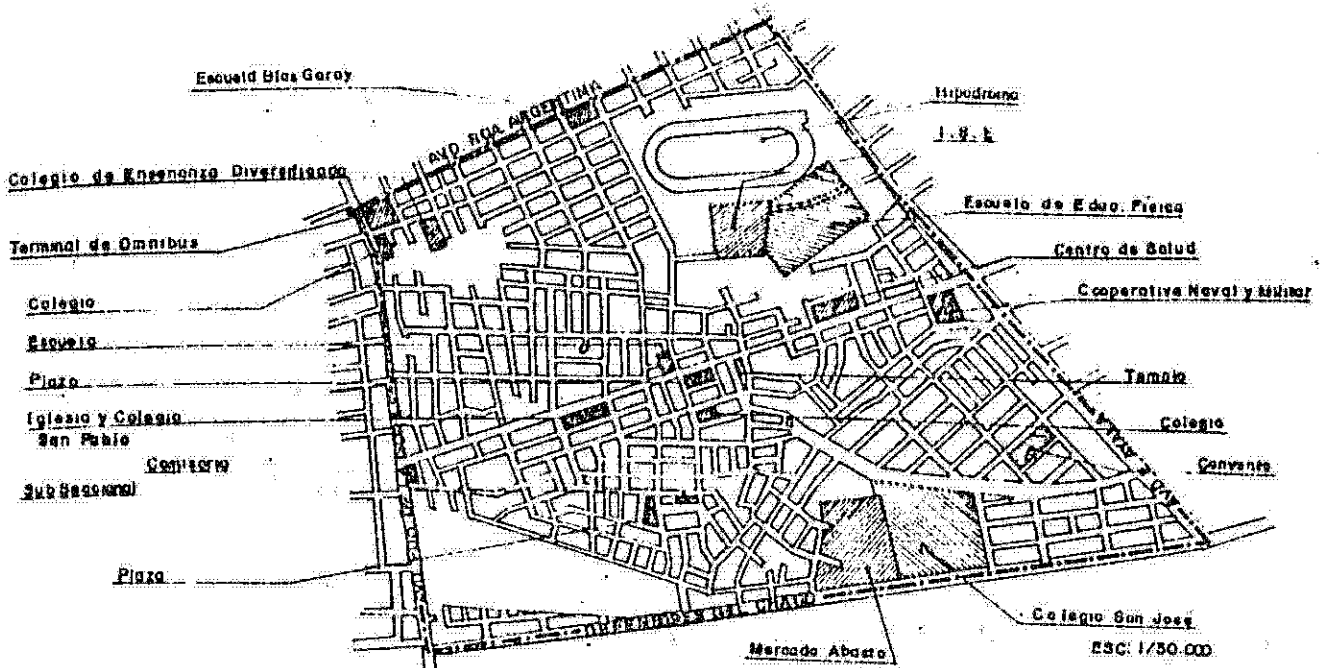
Líneas de omnibus: 2-7-19-41-40-26-27-10-17-31-42-51-45-25-29

4. Puntos problemáticos en cuanto al medio ambiente

Debido a la falta de desagüe pluvial, se ve mucha erosión. Como tambien
 contaminación a causa de los medios de transporte.

5. Tipos de actividad actual y futura

Reubicación de viviendas asentadas en predios destinados a áreas ver-
 des; extensión de servicios públicos (cloaca, desagüe pluvial).



AREA TOTAL 626,2 Ha.
 POBLACION 32.900 hab.
 TRABAJADORES 12.648 hab.

a. Densidad Bruta: 52,5 hab/ha.
 b. Densidad Neta: 95,2 hab/ha.
 c. Densidad de Trabajadores Bruta: 20,2
 d. Densidad de Trabajadores Neta: 191,3

	A. Baldio	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Arropecua- rias	Total General
Ha	88,1	345,7	32,6	9,4	24,1	19,4	106,9	-	-	626,2
%	14,1	55,2	5,2	1,5	3,8	3,1	17,1	-	-	100

1. Antecedentes de la formación

Relativamente nueva a partir de 1.960/1.970, desde esa fecha se dan los asentamientos en forma constante.

2. Características referentes al uso de suelo

Residencial media-comercial, hipódromo, I.S.E., Terminal de Omnibus, Barrio marginal Ntra. Sra. de la Asunción, Mercado de Abasto. C-Salud.

3. Características referentes al transporte

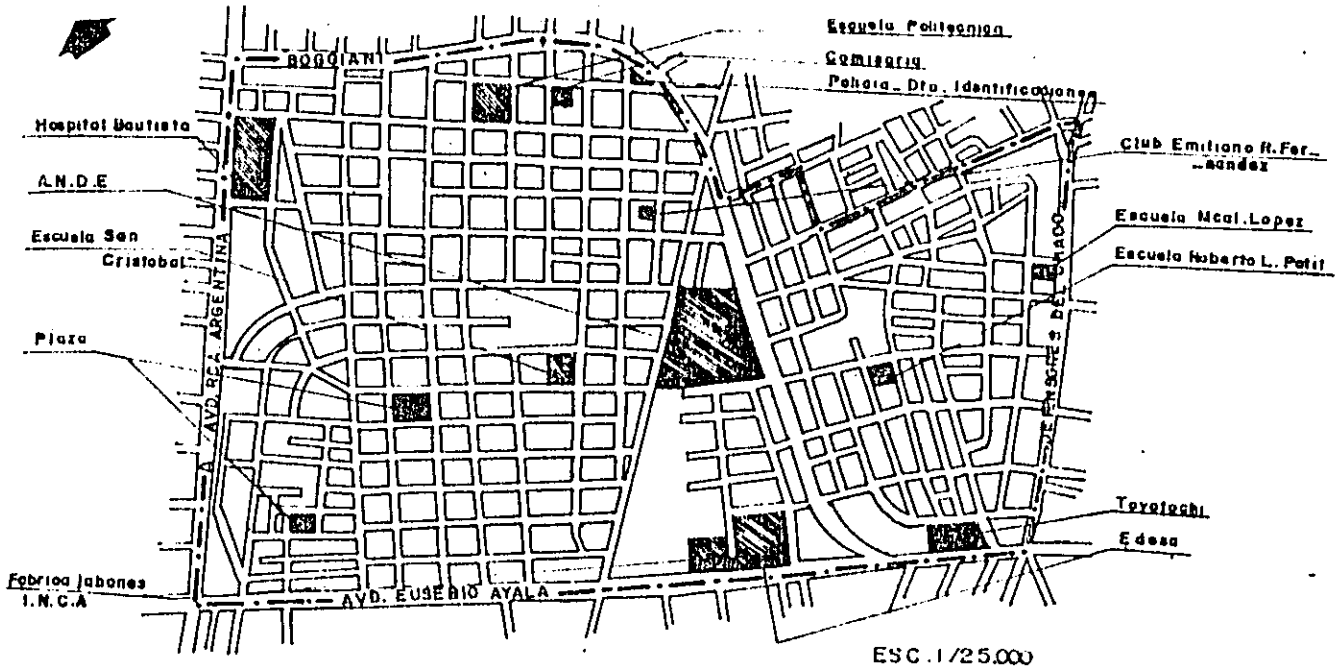
Líneas de Omnibus : 8-10-18-25-31-38-(41-42)-19-20-26-27-45. - Taxi -

4. Puntos problemáticos en cuanto al medio ambiente

La presencia del hipódromo con sus stud, molesta a las viviendas cercanas al mismo.

5. Tipos de actividad actual y futura

Rehabilitación urbana del Barrio Ntra. Sra. de la Asunción, ensanche de la Av. Defensores del Chaco, ampliación del Mercado de Abasto, pavimentación asfáltica de la Av. de la Victoria.



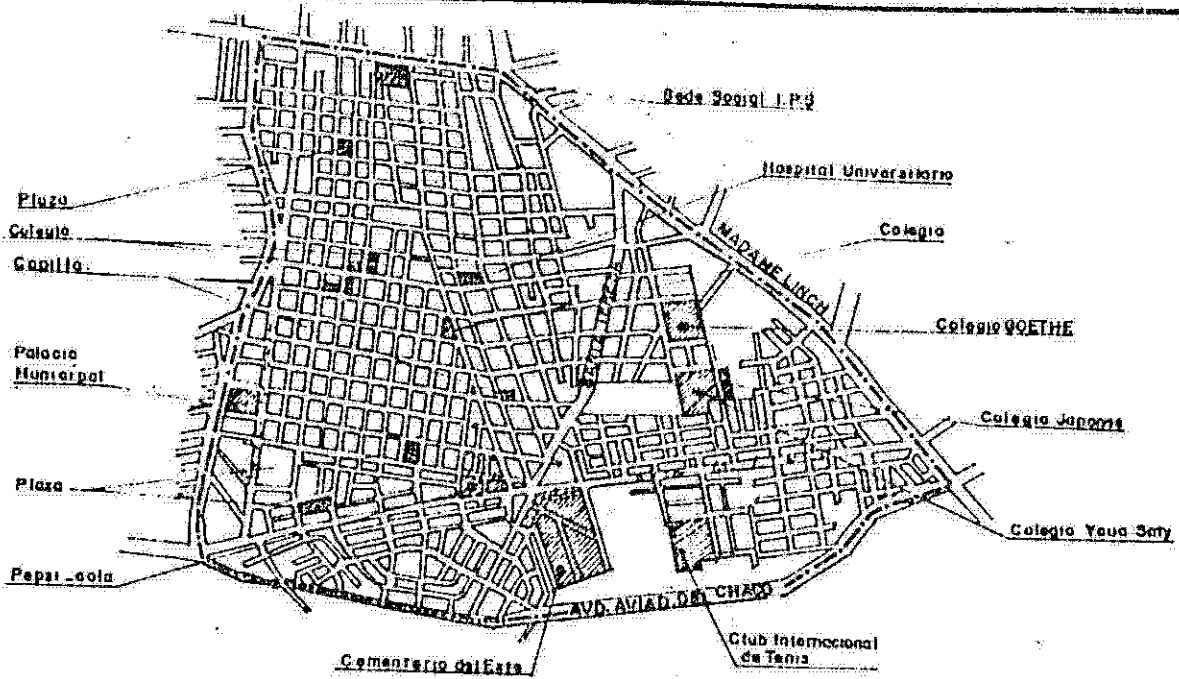
AREA TOTAL 470,2 ha.
 POBLACION 18.610 hab.
 TRABAJADORES 5.654 hab.

a. Densidad Bruta: 39,6 hab/ha.
 b. Densidad Neta: 60,9 hab/ha.
 c. Densidad de Trabajadores Bruta: 12,0
 d. Densidad de Trabajadores Neta: 241,6

	A. Baldio	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Agropecu- rias	Total General
Ha	30,9	305,4	12,2	-	11,2	15,1	95,4	-	-	470,2
%	6,6	64,9	2,6	-	2,4	3,2	20,3	-	-	100

1. Antecedentes de la formación
Lugares antiguos aislados, verdadera conformación urbana a partir de 1.950.
2. Características referentes al uso de suelo
Residencial media, comercial, elevado índice de baldíos, sub-estática de ANDE, Bancos, Embajadas, áreas verdes (plazas) ocupadas.
3. Características referentes al transporte
Líneas de Omnibus: 3-15-17-22-16-36-26-27-29-40-45; línea Ypané-San Antonio - Areguá - Taxi
4. Puntos problemáticos en cuanto al medio ambiente
Puntos problemáticos por la acumulación de agua en la Av. Defensores del Chaco.
5. Tipos de actividad actual y futura
Ensanche de la Av. Defensores del Chaco, reubicación de las viviendas asentadas en áreas destinadas a plazas.

CONT. FIGURA 3-1-6 (19)



AREA TOTAL 1570,4 ha.
 POBLACION 31.670 hab.
 TRABAJADORES 8.635 hab.

a. Densidad Bruta: 20,2 hab/ha
 b. Densidad Neta: 31,1 nab/ha.
 c. Densidad de Trabajadores Bruta: 3,7.
 d. Densidad de Trabajadores Neta: 114,5

A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Agropecu- rias	Total General
Ha	152,9	1018,3	24,7	5,3	45,4	8,9	314,9	-	1570,4
%	9,7	64,8	1,6	0,3	2,9	0,6	20,1	-	100

1. Antecedentes de la formación

Los asentamientos urbanos son a partir de 1.950 en forma constante.

2. Características referentes al uso de suelo

Residencial media, baldíos, cementerio del este, futuro Palacio Municipal, Col. Goethe, museo de Arte Moderno, Pepsi-Cola, Hospital Universi-
tario.

3. Características referentes al transporte

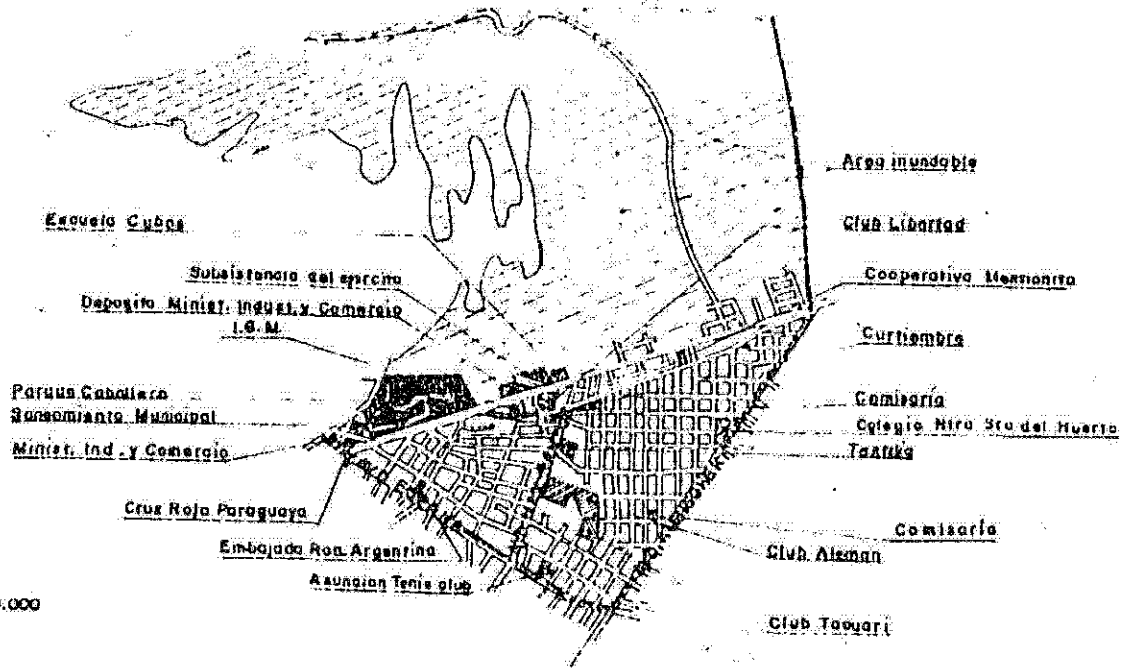
Lineas de Omnibus : 3-12-15-17-28-30-34-44-18-24.

4. Puntos problemáticos en cuanto al medio ambiente

Zona baja, especialmente la zona de Urbanización Aeropuerto, donde es inundable.

5. Tipos de actividad actual y futura

Mejoramiento y ensanche de la Av. Ime. Lynch, entubamiento de la mis-
ma (Banco Mundial).

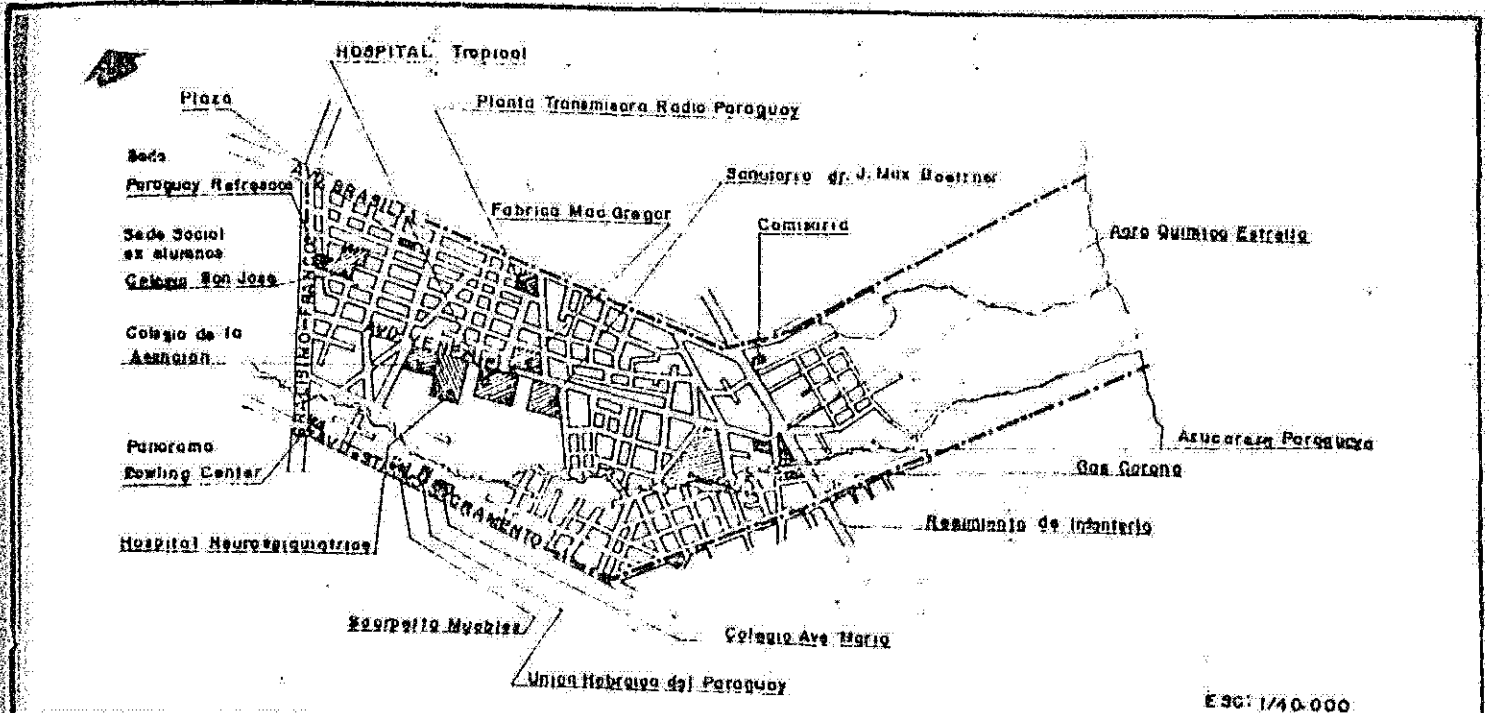


AREA TOTAL 980,0 Ha.
 POBLACION 24.770 hab.
 TRABAJADORES 9.821 hab.

a. Densidad Bruta: 25,3 hab/ha.
 b. Densidad Neta: 95,2 hab/ha.
 c. Densidad de Trabajadores Bruta: 10,0
 d. Densidad de Trabajadores Neta: 218,7

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. pú- blicas	Recrea- cional	Verde utilizab.	Verde no utilizab.	arropocua- rinas	Total Gen.
Ha	5,3	260,1	21,7	5,8	17,4	24,7	83,7	561,3	-	980,0
%	0,6	26,5	2,2	0,6	1,8	2,5	8,5	57,3	-	100

1. Antecedentes de la formación
Zona con lugares muy antiguos, como el Parque Caballero
2. Características referentes al uso de suelo
Residencial media-alta, comercial, alta, Cruz Roja; centros educacio-
nales, culturales, recreativos, áreas marginales, Depósitos
3. Características referentes al transporte
líneas de ómnibus: 1-13-35-37-5- Limpio-Mariano H. Alonso - 30 - Taxi
4. Puntos problemáticos en cuanto al medio ambiente
Zona inundable; la misma
5. Tipos de actividad actual y futura
Rehabilitación urbana en cuanto a las zonas inundables; limpieza gene-
ral.

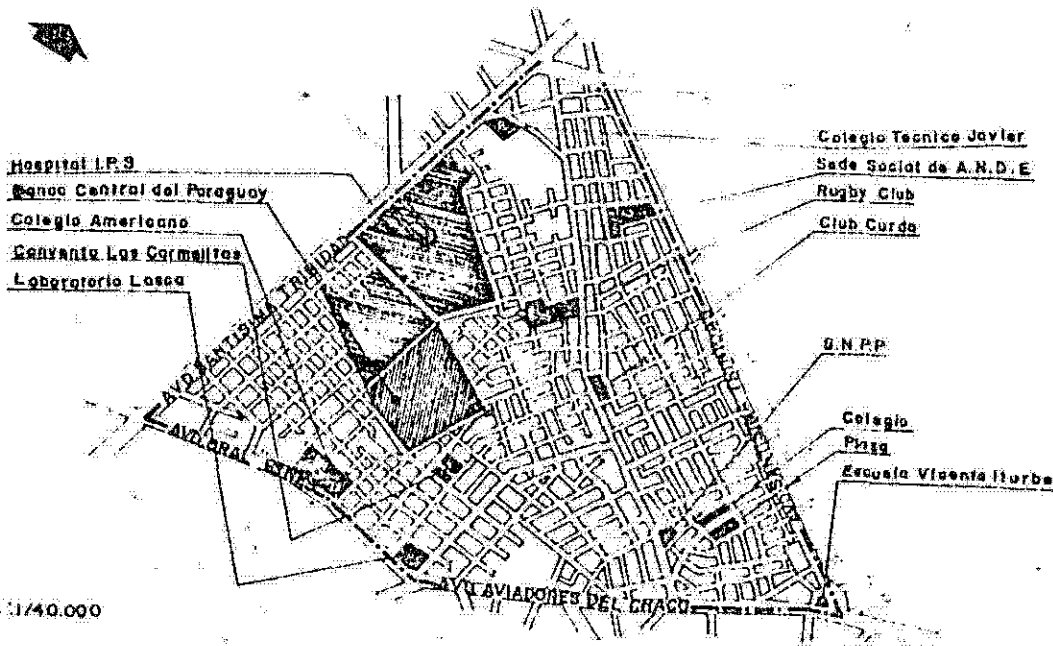


AREA TOTAL 474,1 ha.
 POBLACION 23.900 hab.
 TRABAJADORES 6.900 hab.

- a. Densidad Bruta: 50,4 hab/ha.
- b. Densidad Neta: 98,7 hab/ha.
- c. Densidad de Trabajadores Bruta: 14,6
- d. Densidad de Trabajadores Neta: 115,5

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Verde no utilizab.	Verde utilizab.	Total Gener
Ha	13,2	242,2	13,1	7,2	39,5	8,7	81,1	69,1	474,1
%	2,8	51,1	2,8	1,5	8,3	1,8	17,1	14,6	100

1. Antecedentes de la formación
El proceso de asentamiento urbano propiamente dicho, comienza a partir de 1960.-
2. Características referentes al uso de suelo
Residencial media, comercial, industrial, depósito; Hospital Médico Tropical, Manicomio Nacional, Asilo, San. Max Boettner, Esc. Normal 3, áreas marginales
3. Características referentes al transporte
Líneas de ómnibus: 1-2-3-18-30-6-37--40-42-44 C-23-36 - Parada de Taxi - Tren
4. Puntos problemáticos en cuanto al medio ambiente
Zonas inundables, las mismas no cuentan con servicios públicos, especialmente agua y desagüe cloacal.
5. Tipos de actividad actual y futura
Rehabilitación urbana de las áreas marginales; equipamiento vial; construcción de puentes en los lugares afectados por zanjas.



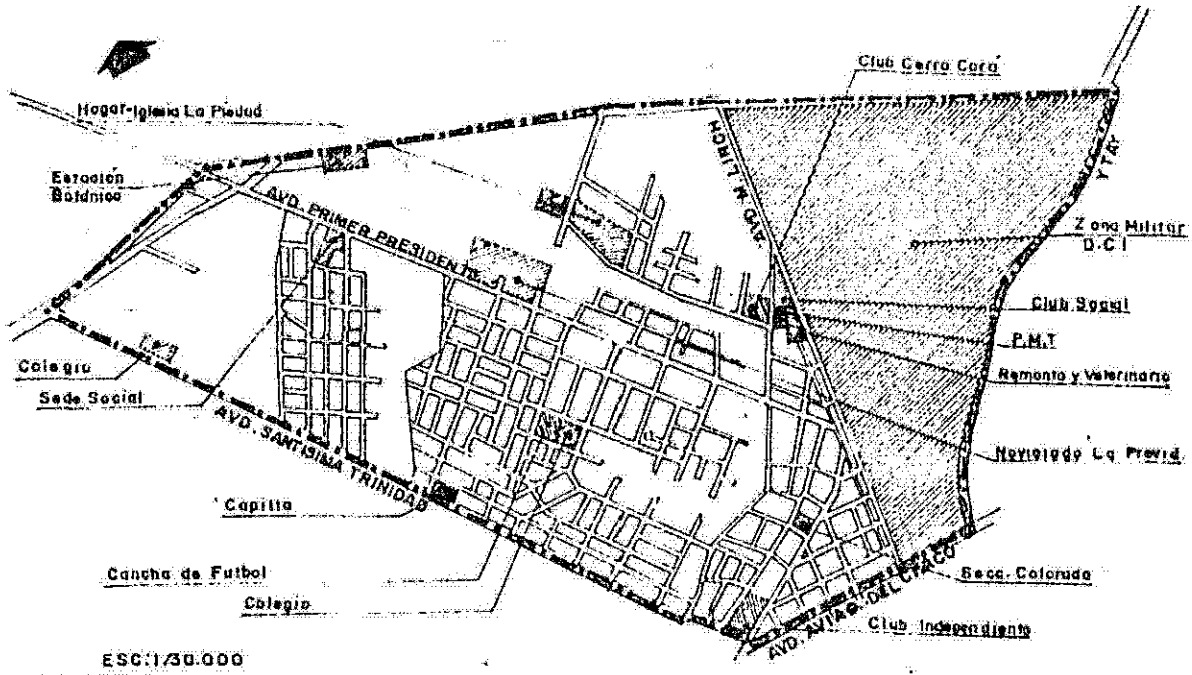
ESC 1/40.000

AREA TOTAL 520,8 Ha.
 POBLACION 14.660 hab.
 TRABAJADORES 7.096 hab.

a. Densidad Bruta: 28,1 hab/ha.
 b. Densidad Neta: 59,2 hab/ha
 c. Densidad de Trabajadores Brutas: 13,6
 d. Densidad de Trabajadores Netas: 63,1

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Apropecua- rias	Total General
Ha	62,2	247,8	8,1	3,6	100,7	16,9	81,5	-	-	520,8
%	11,9	47,6	1,6	0,7	19,3	3,2	15,7	-	-	100

1. Antecedentes de la formación
Algunos puntos antiguos; la gran mayoría de la concentración urbana a partir de 1.970.
2. Características referentes al uso de suelo
Residencial alta -media; comercial, industrial, baldíos, I.P.S., Colegio, Banco Central del Paraguay.
3. Características referentes al transporte
Líneas de Omnibus: 2-7-18-23-30A-40-101 - Taxi
4. Puntos problemáticos en cuanto al medio ambiente
En especial los predios baldíos, sin debidas condiciones de limpieza. (basura).
5. Tipos de actividad actual y futura
Equipamiento y señalización vial.

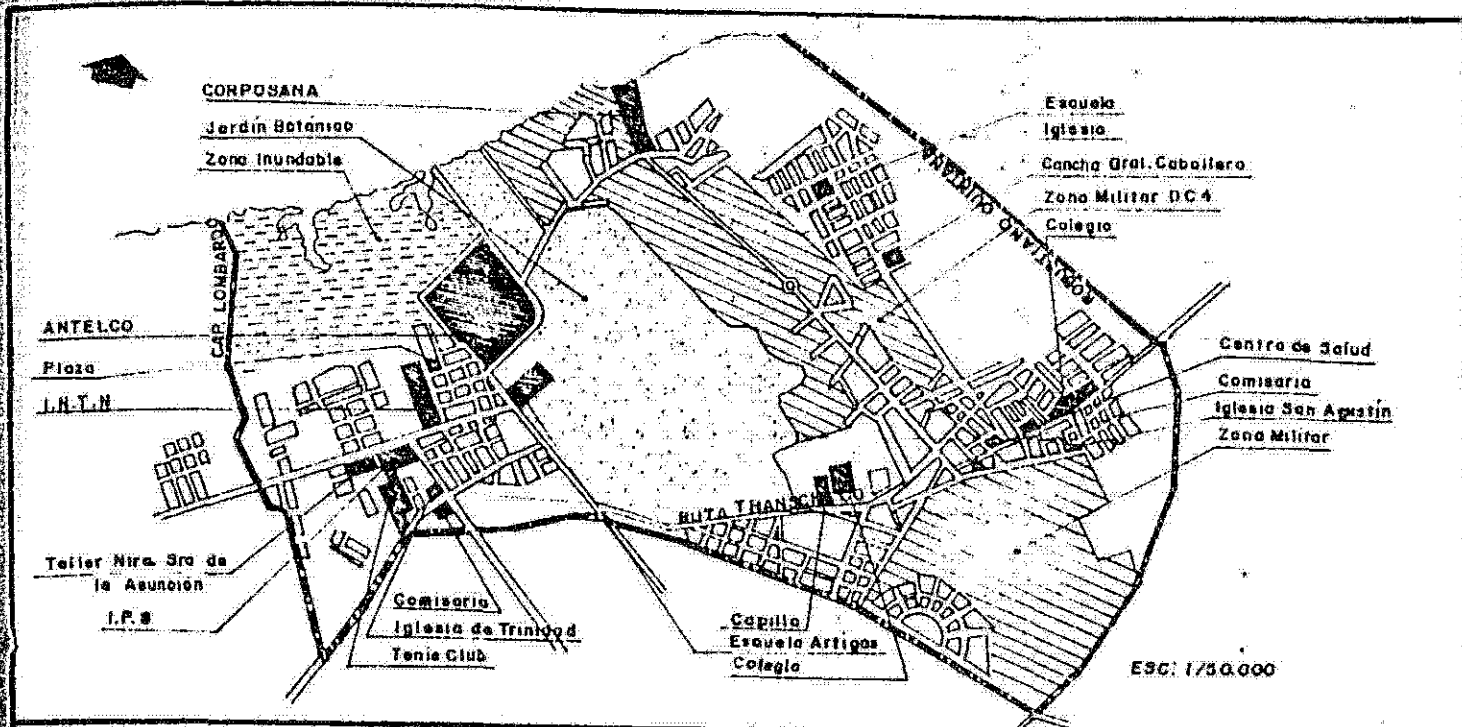


AREA TOTAL 509,0 Ha.
 POBLACION 22.250 hab.
 TRABAJADORES 4.190 hab.

a. Densidad Bruta: 43,7 hab/ha.
 b. Densidad Neta: 154,8 hab/ha.
 c. Densidad de Trabajadores Bruta: 8,2
 d. Densidad de Trabajadores Neta: 26,1

	A. Baldio	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde utilizab.	Verde no utilizab.	Agropecu- rias	Total General
Ha	127,6	143,6	5,4	-	154,9	9,8	72,7	-	-	-	509,0
%	24,1	28,2	1,1	-	30,4	1,9	14,3	-	-	-	100

1. Antecedentes de la formación
 El área de Santísima Trinidad, muy antigua, una muestra de ello es la Iglesia, en resto de los asentamientos a partir de la década del 70.
2. Características referentes al uso de suelo
 Residencial media-alta, comercial, colegios, Inst. Públicas.
3. Características referentes al transporte
 Líneas de transporte: 3-2-7-18-5-37- Mariano R. Alonso- Limpio- 35
 Taxi -
4. Puntos problemáticos de cuanto al medio ambiente
 Predios baldíos en mal estado de conservación (basuras).
5. Tipos de actividad actual y futura
 Mejoramiento red vial (capa asfáltica).

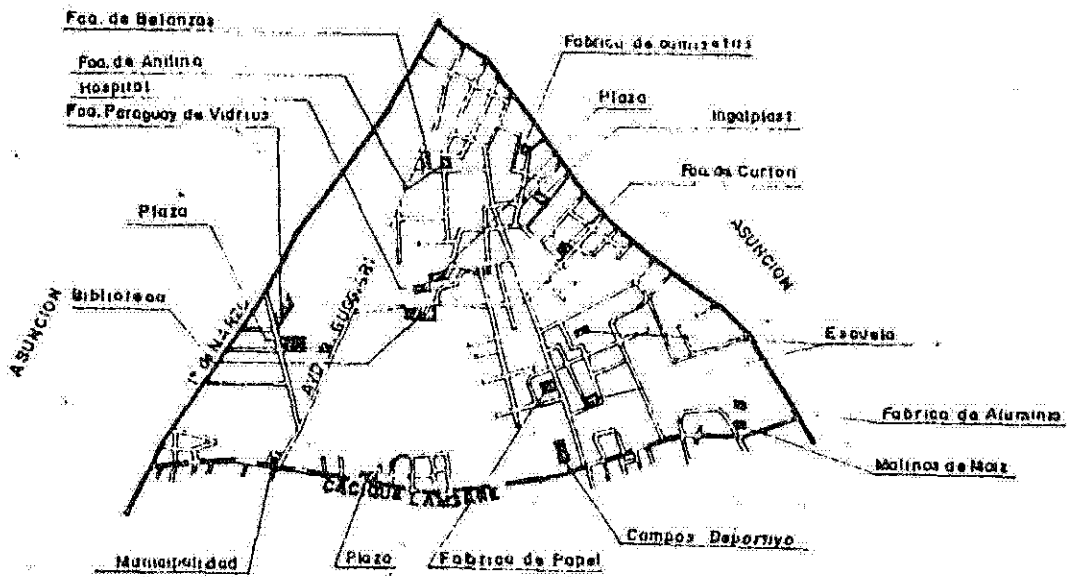


AREA TOTAL 1818,5 ha.
 POBLACION 40.870 hab.
 TRABAJADORES 8.820 hab.

a. Densidad Cruda: 22,5 hab/ha.
 b. Densidad Neta: 75,6 hab/ha.
 c. Densidad de Trabajadores Bruta: 4,9
 d. Densidad de Trabajadores Netos: 16,2

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Arropecu- rías	Total Gener
Ha	125,5	540,8	26,5	7,5	510,9	223,7	187,3	196,3	-	1818,5
%	6,9	29,7	1,5	0,4	28,1	12,3	10,3	10,8	-	100

1. Antecedentes de la formación
 Lugares muy antiguos, como el actual Botánico, donde la const. del actual Museo es del año 1860; el resto de los asent. es de a partir del año 1960
2. Características referentes al uso de suelo
 Residencial media-alta, comercial, inst. públicas, Jardín Botánico, Areas militares, áreas recreativas, Golf Club, Hípico
3. Características referentes al transporte
 Puerto Botánico-Taxis- Areas de estacionamiento libre
 Líneas de omnibus: 2-3-5-6-18-23-36-40
4. Puntos problemáticos en cuanto al medio ambiente
 Areas inundables, predios, baldíos muy sucios.
5. Tipos de actividad actual y futura
 Equipamiento vial (empedrado y capa asfáltica)
 Extensión de servicios públicos (desagüe cloacal y pluvial)

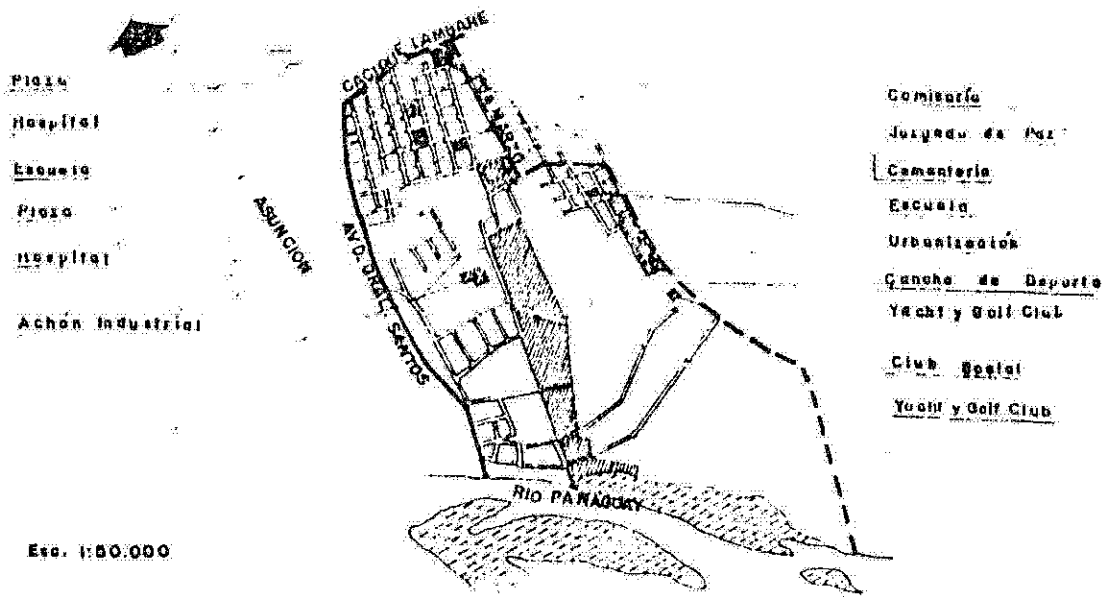


AREA TOTAL 722,8 ha.
 POBLACION 37.780 hab.
 TRABAJADORES 7.883 hab.

a. Densidad Bruta: 52,3 hab/ha.
 b. Densidad Neta: 125,1 hab/ha.
 c. Densidad de Trabajadores Bruta: 10,9
 d. Densidad de Trabajadores Neta: 211,9

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Arropecua- rias	Total General
Ha	185,2	302,1	17,1	16,2	3,9	8,2	19,1	-	-	722,8
%	25,6	41,8	2,4	2,2	0,6	1,1	26,3	-	-	100

- Antecedentes de la formación
1.930 - zona relativamente nueva, se fue formando debido a la expansión de Asunción.
- Características referentes al uso de suelo
Residencial, comercial, industrial, pequeñas industrias, colegios, Canal T.V. 13, Fca. Paraguaya de Vidrios.
- Características referentes al transporte
Paradas de taxi, líneas de omnibus 3-9-30-4-8-23-41-31.
- Puntos problemáticos en cuanto al medio ambiente
Las zanjas que se forman por los arroyos son lugares donde se acumulan basuras.
- Tipos de actividad actual y futura
Pavimentación total de la Av. Bueno Guigari, construcción del Puente Hernán Cortéz y pavimentación de la Avenida y zonas adyacentes a la misma.



AREA TOTAL 598,6 ha.
 POBLACION 10.840 hab.
 TRABAJADORES 2.271 hab.

a. Densidad Bruta: 18,1 hab/ha.
 b. Densidad Neta: 73,5 hab/ha.
 c. Densidad de Trabajadores Bruta: 3,8
 d. Densidad de Trabajadores Neta: 97,1

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Becrea- cional	Circu- lacion	Verde no utilizab.	Arropecua- rias	Total General
Ha	106,8	147,5	13,8	2,8	6,8	143,5	135,9	41,5	-	598,6
%	17,9	24,7	2,3	0,5	1,1	23,9	22,7	6,9	-	100

1. Antecedentes de la formación

Antigua- El centro actual, es una de las zonas más antiguas, inclusive se hallan asentamientos de épocas de la Conquista.

2. Características referentes al uso de suelo

Residencial, comercial e industrial, recreacional, Yacht y Golf Club, Asociación de funcionarios, casas precarias, Edif. Públicos.

3. Características referentes al transporte

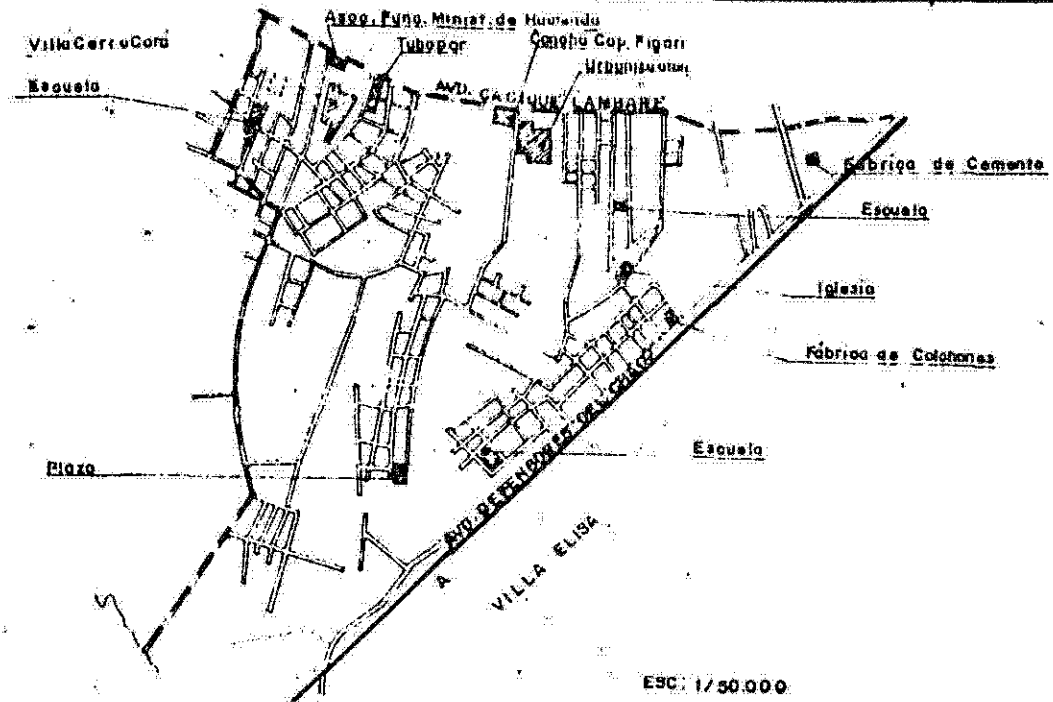
Líneas de Transporte 9-30, una parada de Taxi y el Puerto Itá Enrramada- Puerto Pabla. Línea 4

4. Puntos problemáticos en cuanto al medio ambiente

Zona inundable en un 6,9%, lo cual hace que proliferen los asentamientos precarios.

5. Tipos de actividad actual y futura

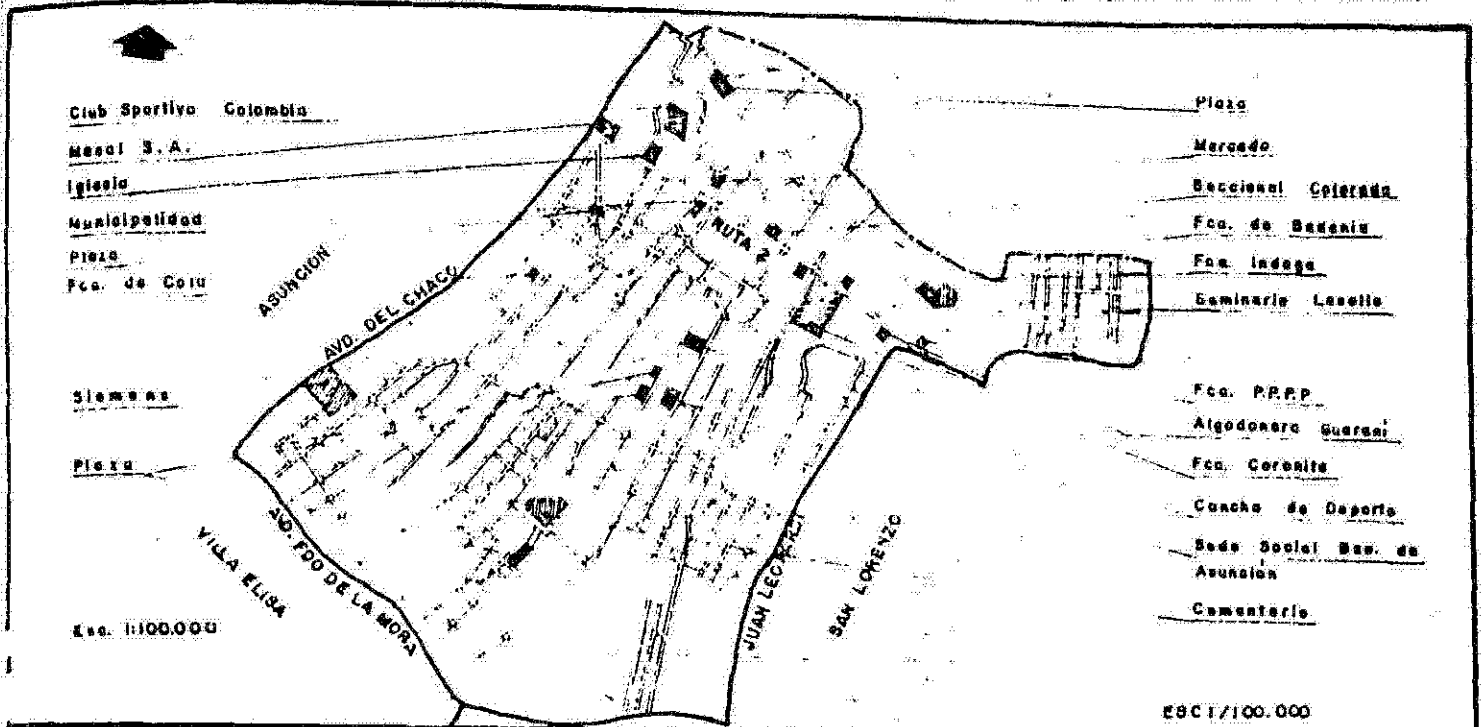
Ensanche de la Ruta Gral. Santos, reubicación de las personas afectadas por la inundación, pavimentación de las calles.



AREA TOTAL 1065,2 ha.	a. Densidad Bruta: 27,6 hab/ha.
POBLACION 29.430 hab.	b. Densidad Neta: 63,9 hab/ha.
TRABAJADORES 4.862 hab.	c. Densidad de Trabajadores Bruta: 4,6
	d. Densidad de Trabajadores Neta: 143,8

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cion	Circu- lacion	Verde no- utilizab.	Apropecua- rius	Total General
Ha	306,8	460,3	23,2	4,3	6,3	3,6	256,7	4,0	-	1065,2
%	28,8	43,2	2,2	0,4	0,6	0,3	24,1	0,4	-	100

- Antecedentes de la formación**
Relativamente antigua, una de las avenidas lleva el nombre de "Carretera de los López", por ser camino antiguo.
- Características referentes al uso de suelo**
Residencial media, comercial, industrial, Urbanización Cerro Corá, Valle Ybaté, San Isidro, colegios, escuelas, comisarias.
- Características referentes al transporte**
Líneas de omnibus 2 ; 8 ; 3 ; 31 ; 41 ; 38 ; 4
Puerto Paleta, resguardo Naval.
- Puntos problemáticos en cuanto al medio ambiente**
Zona inundable, lo más problemático son los predios baldíos con basuras.
- Tipos de actividad actual y futura**
Formación del área de industria y servicio, ampliación y mejoramiento de la Av. Defensores del Chaco, equipamiento vial.



AREA TOTAL 1461,0 ha.
 POBLACION 57.340 hab.
 TRABAJADORES 13.313 hab.

a. Densidad Bruta: 39,2 hab/ha.
 b. Densidad Neta: 81,9 hab/ha.
 c. Densidad de Trabajadores Bruta: 9,1
 d. Densidad de Trabajadores Neta: 145,3

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Secrea- cional	Circu- lacion	Verde no utilizab.	Agropecu- rias	Total General
Ha	272,3	700,3	55,2	18,7	17,7	8,2	588,6	-	-	1461,0
%	18,7	47,9	3,8	1,3	1,2	0,5	26,6	-	-	100

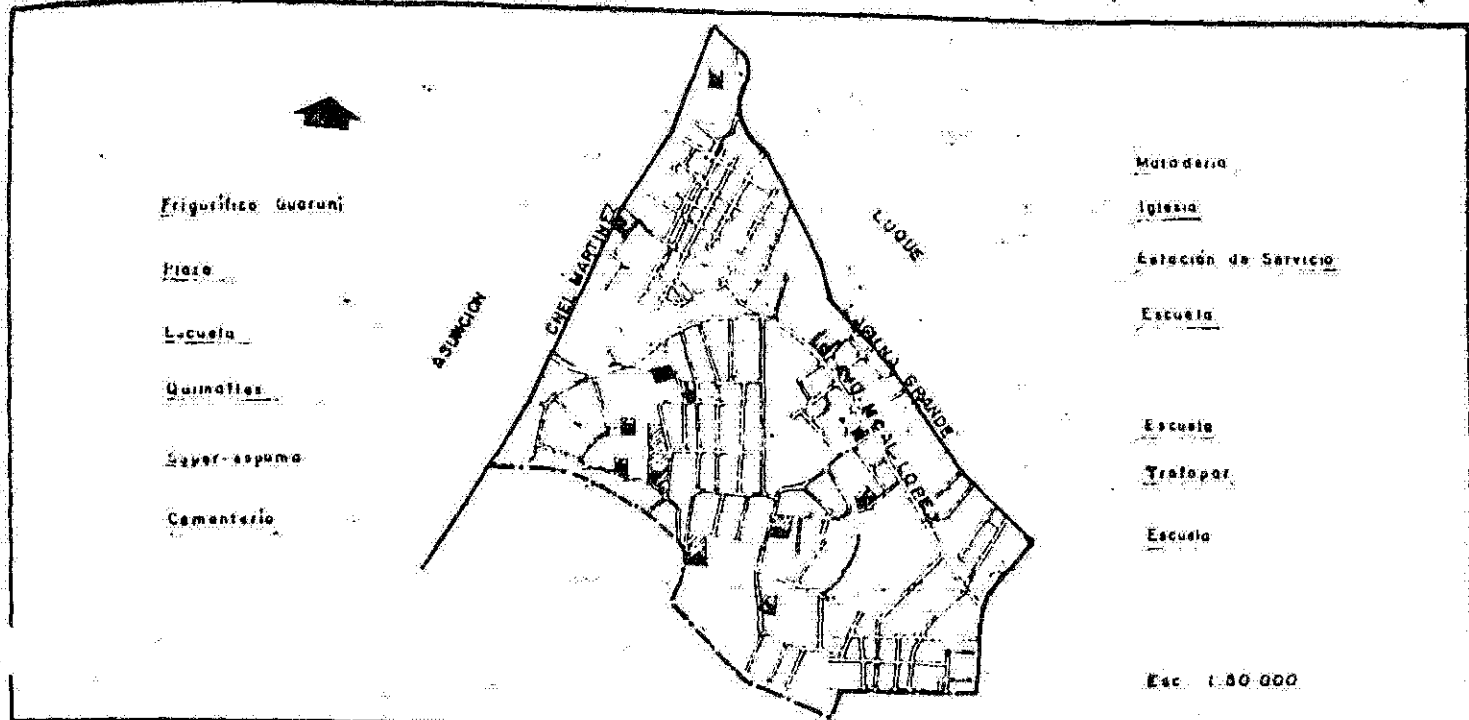
1. Antecedentes de la formación

2. Características referentes al uso de suelo
Residencial media, comercial, industrial, con baldíos, edificios Públicos, Centro Cívico, cercanía al Mercado de Abasto.

3. Características referentes al transporte
3-15-18-26-39-29-27. Todos los ómnibus del interior y exterior.
45 - Omnibus del Area Metropolitana (Ypané - Areguá).

4. Puntos problemáticos en cuanto al medio ambiente
Contaminación total por la afluencia de vehículos, tanto por la calle Def. del Chaco y la Ruta Ncal. Estigarribia.

5. Tipos de actividad actual y futura
Utilización de nuevos itinerarios, para el descongestionamiento del cruce E. Ayala y Def. del Chaco, equipamiento vial de vías de acceso al municipio.

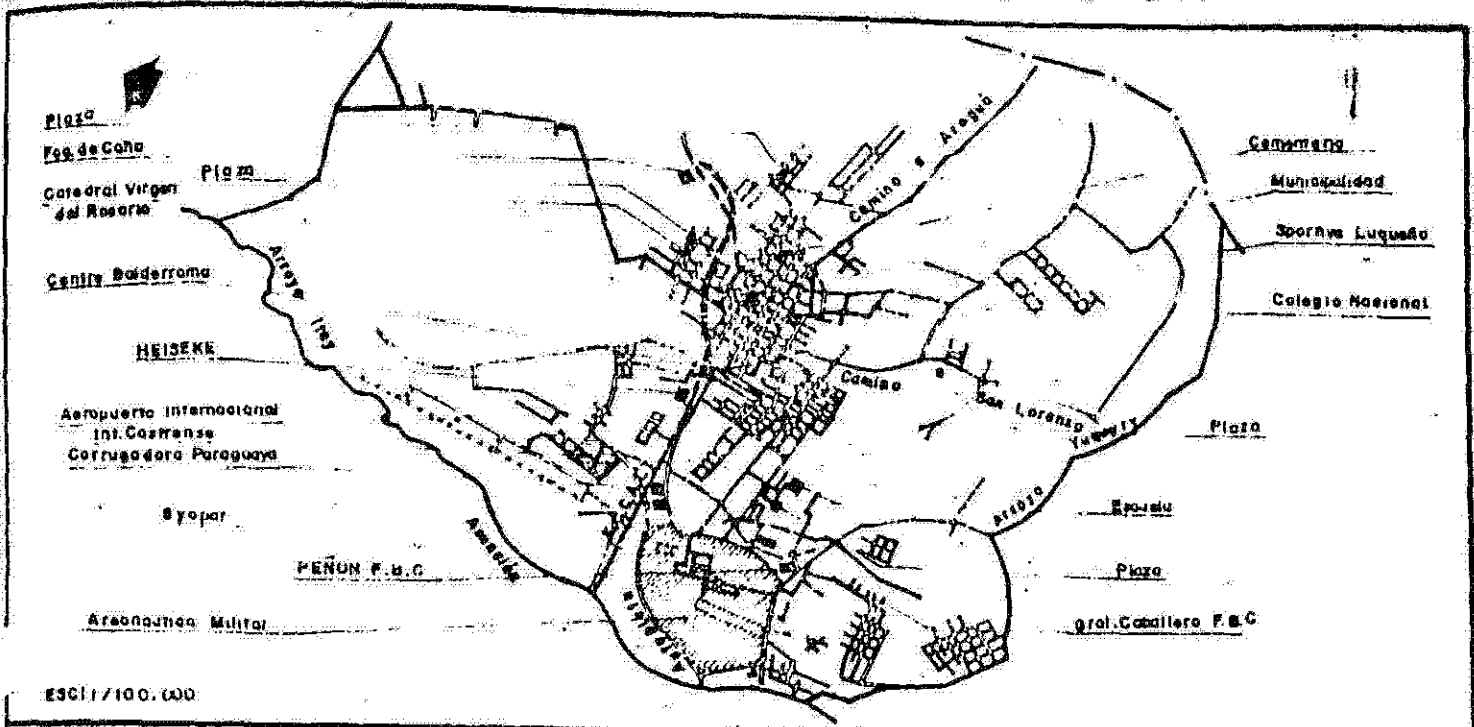


AREA TOTAL 665,4 ha.
 POBLACION 17.410 hab.
 TRABAJADORES 3.521 hab.

a. Densidad Bruta: 26,2 hab/ha.
 b. Densidad Neta: 50,4 hab/ha.
 c. Densidad de Trabajadores Bruta: 5,3
 d. Densidad de Trabajadores Neta: 445,7

A. Baldío -	Residen-	Comer-	Indus-	Inst. Pú-	Recrea-	Circu-	Verde no -	apropocua-	Total
Ha	cial	cial	trial	blicas	cional	lacion	utilizab.	rias	General
162,3	345,1	0,7	2,4	4,8	0,4	149,7	-	-	665,4
24,4	51,8	0,1	0,4	0,7	0,1	22,5	-	-	100

1. Antecedentes de la formación
2. Características referentes al uso de suelo
Residencial media, industrial, comercial, escuela, baldíos, supermer-
cado
3. Características referentes al transporte
Omnibus del interior y exterior del país. Líneas 12 - 22 - 34.
4. Puntos problemáticos en cuanto al medio ambiente
Problemas de inundaciones causados por el desborde del arroyo Ytay,
basuras en los predios baldíos.
5. Tipos de actividad actual y futura
Entubamiento y ensanche de la Av. Defensores del Chaco, equipamiento
de las vías.

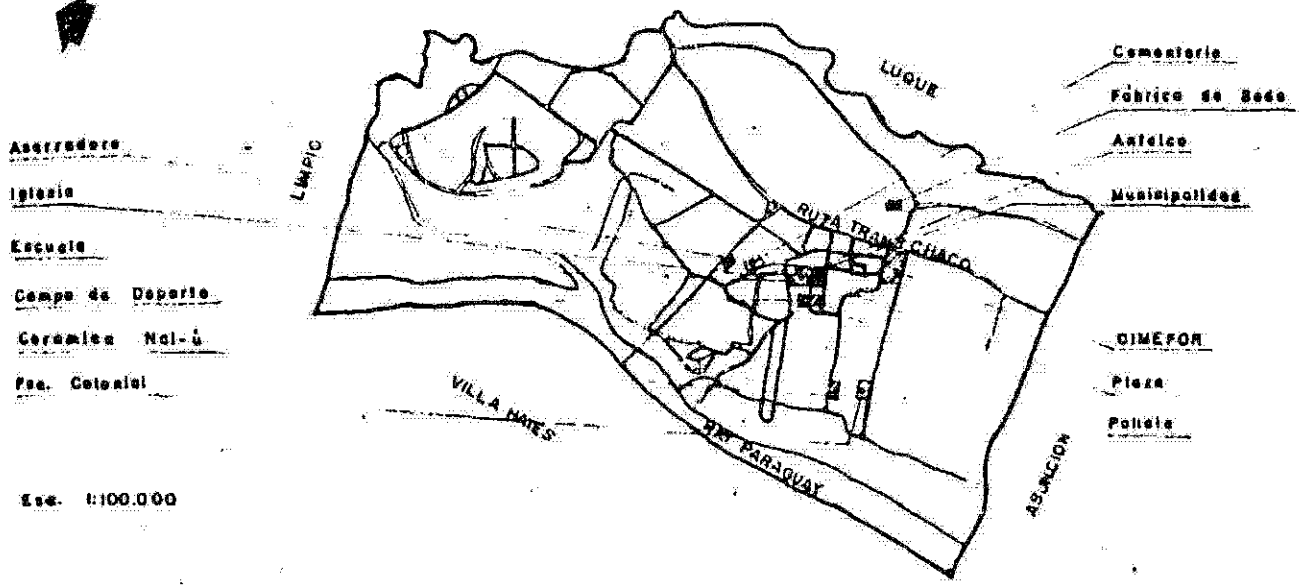


AREA TOTAL 15.944,9 Ha.
 POBLACION 69.040 hab.
 TRABAJADORES 19.753 hab.

a. Densidad Bruta: 4,3 hab/ha.
 b. Densidad Neta: 95,9 hab/ha.
 c. Densidad de Trabajadores Bruta: 1,2
 d. Densidad de Trabajadores Neta: 8,7

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Agropecu- rias	Total General
Ha	480,0	720,1	42,7	44,2	2.184,9	35,5	107,0	625,0	10.704,9	15.944,9
%	3,0	4,5	0,3	0,3	13,8	0,2	6,9	3,9	67,1	100

1. Antecedentes de la formación
Ciudad muy antigua, en una época fue la Capital del Paraguay, aún con-
 serva casas antiguas.
2. Características referentes al uso de suelo
Residencial media, industrial, comercial, Aeropuerto Internacional,
 Aeronáutica Militar, Cie., Club Deportivo, Urbanizaciones nuevas.
3. Características referentes al transporte
Líneas: 60-24-28, Parada de Taxi; Aeropuerto; Tren; Omnibus a Areguá
4. Puntos problemáticos en cuanto al medio ambiente
Zona inundable, cerca del Río Salado, algunos baldíos con basuras.
5. Tipos de actividad actual y futura
Mejoramiento vial; especialmente de la Ruta Elizardo Aquino.



AREA TOTAL 4233,0 Ha.
 POBLACION 16.620 hab.
 TRABAJADORES 4.134 hab.

a. Densidad Bruta: 3,9 hab/ha.
 b. Densidad Neta: 178,1 hab/ha.
 c. Densidad de Trabajadores Bruta: 1,0
 d. Densidad de Trabajadores Neta: 79,2

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Agropecu- rias	Total General
Ha	62,2	93,3	8,2	18,2	25,8	3,2	66,6	456,1	3.499,4	4.233,0
%	1,4	2,2	0,2	0,4	0,6	0,1	1,6	10,8	82,7	100

1. Antecedentes de la formación

La población propiamente dicha se formó en el año 1.944

2. Características referentes al uso de suelo

Residencisl media, industrial, comercial, agropecuario, con muchos baldíos, algunas nuevas urbanizaciones, Sede de la Asociación de Gana-

3. Características referentes al transporte

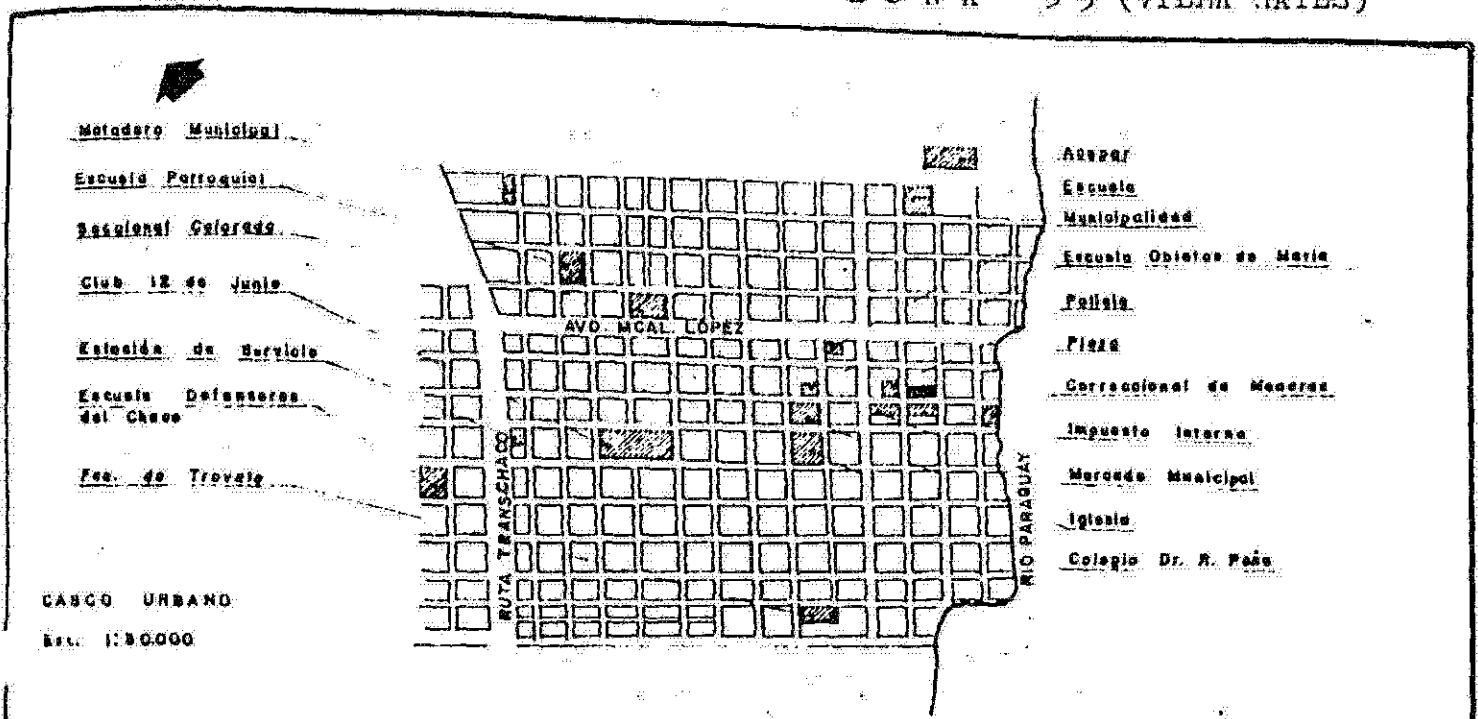
Puente Remanso que une con el Chaco Paraguayo y la Rep. Argentina, Río Paraguay, Omnibus: 2- 44 A-B-C; Limpio; Piquete; Emboscada

4. Puntos problemáticos en cuanto al medio ambiente

Zona inundable, con todas sus consecuencias, matadero, basurales, especialmente baldíos.

5. Tipos de actividad actual y futura

Extensión de los servicios públicos, especialmente el de agua, equipamiento de la Red Vial.



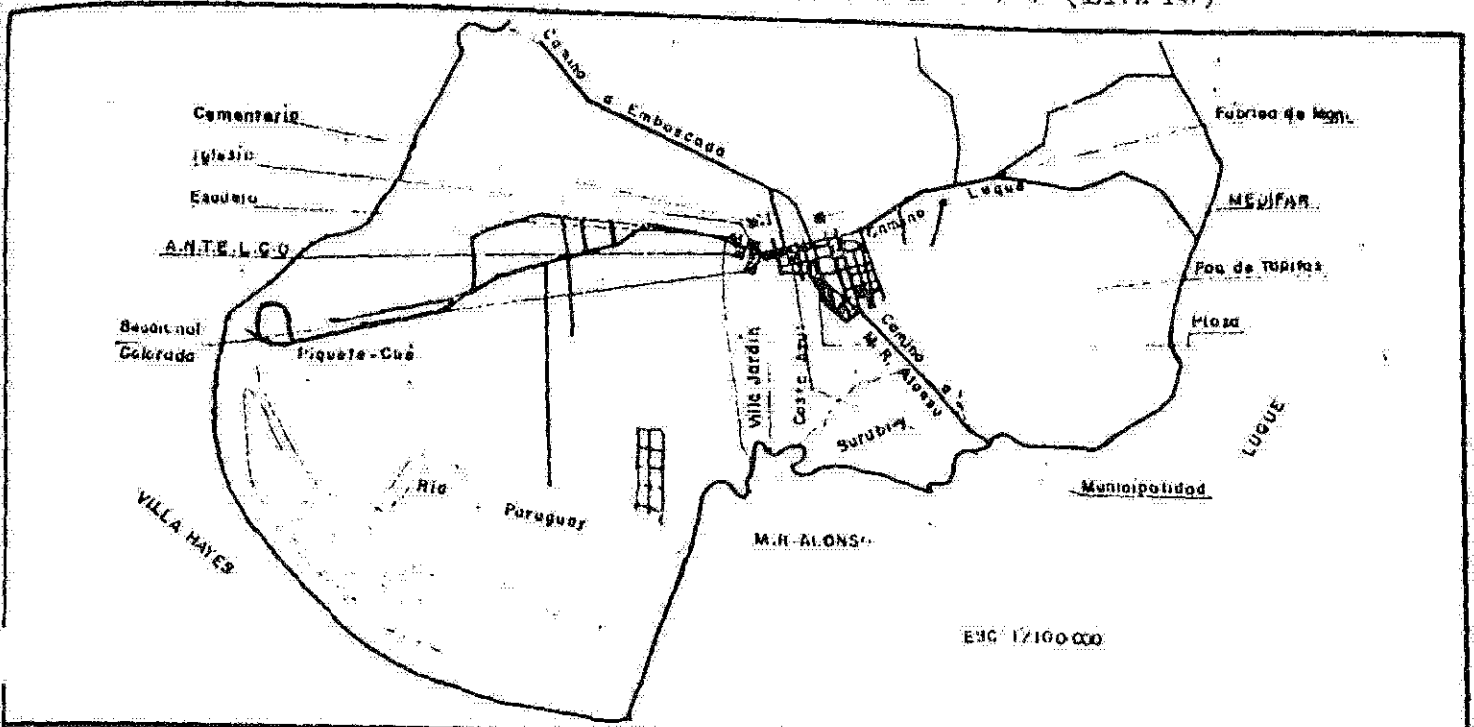
CASCO URBANO
Escala: 1:50.000

AREA TOTAL 12626,9 Ha.
POBLACION 8.410 hab.
TRABAJADORES 2.890 hab.

a. Densidad Bruta: 0,7 hab/ha.
b. Densidad Neta: 97,7 hab/ha.
c. Densidad de Trabajadores Bruta: 0,2
d. Densidad de Trabajadores Neta: 22,4

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Agropecu- ria:	Total General
Ha	57,4	86,1	19,7	79,8	29,7	7,5	66,4	5.059,9	7.229,2	12.626,9
%	0,4	0,7	0,2	0,6	0,2	0,1	0,5	40,1	57,2	100

1. Antecedentes de la formación
Población antigua, especialmente por su cabecera del Chaco, siempre se la utilizó como nexo entre la Región Oriental y Occidental.
2. Características referentes al uso de suelo
Agropecuaria, residencial media, industrial, comercial, con muchos predios baldíos, se encuentra la planta industrial de Acepar.
3. Características referentes al transporte
Ruta Transchaco, Río Paraguay, Puente Remanso, omnibus de las líneas: Empresa de Transporte Nasa, Puerto; Omnibus de Villa Hayes.
4. Puntos problemáticos en cuanto al medio ambiente
Áreas inundables, en el área rural las inclemencias propias del Chaco son evidentes.
5. Tipos de actividad actual y futura
Funcionamiento de la Planta Industrial de Acepar, equipamiento vial; nuevas urbanizaciones.

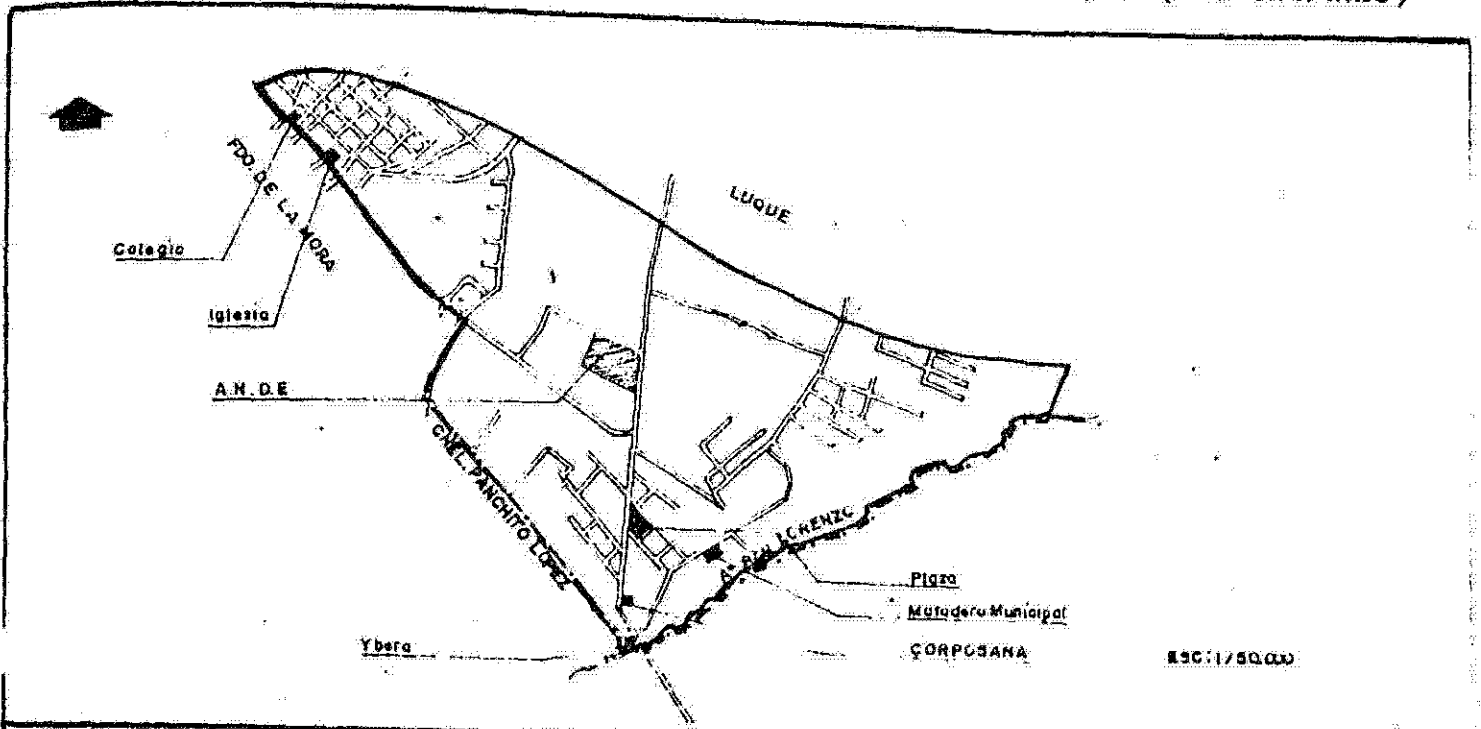


AREA TOTAL 10.899,8 ha.
 POBLACION 17.560 hab.
 TRABAJADORES 4.823 hab.

a. Densidad Bruta: 1,6 hab/ha.
 b. Densidad Neta: 181,4 hab/ha.
 c. Densidad de Trabajadores Bruta: 0,4
 d. Densidad de Trabajadores Neta: 131,8

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- ción	Circu- lacion	Verde no utilizab.	Apropecu- ria	Total General
Ha	64,6	96,8	8,5	14,7	13,4	2,4	76,4	3.456,5	7.166,5	10.899,8
%	0,5	0,8	0,1	0,2	0,2	0,1	0,7	31,7	65,7	100

1. Antecedentes de la formación
Población antigua, pero su ampliación y mejoramiento es de la década del 70.
2. Características referentes al uso de suelo
Apropecuaria, residencial media-baja, industrial, comercial, muchos baldíos, loteamientos y urbanizaciones nuevas, algunas sin habitar,
3. Características referentes al transporte
Cantera de piedra. Puerto de Piquete-Cué, Río Paraguay, Líneas de Transporte: Omnibus de Limpio, liquete-Cue; Emboscada
4. Puntos problemáticos en cuanto al medio ambiente
Zonas inundables, tanto del Río Paraguay como del Río Salado.
5. Tipos de actividad actual y futura
Equipamiento vial; habitar las nuevas urbanizaciones.



AREA TOTAL 803,4 ha.

POBLACION 17.570 hab.

TRABAJADORES 3.325 hab.

a. Densidad Bruta: 21,9 hab/ha.

b. Densidad Neta: 53,3 hab/ha.

c. Densidad de Trabajadores Bruta: 4,1

d. Densidad de Trabajadores Neta: 353,7

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Agropecu- rias	Total General
Ha	143,1	329,9	1,5	1,5	6,4	2,0	154,3	-	164,7	803,4
%	17,8	41,1	0,2	0,2	0,8	0,2	19,2	-	20,5	100

1. Antecedentes de la formación

Relativamente nueva

2. Características referentes al uso de suelo

Residencial media; agropecuaria; comercial; industrial; sub-estática de ANDE; pequeños tambos, escuela, Iglesia; Urbanizaciones.

3. Características referentes al transporte

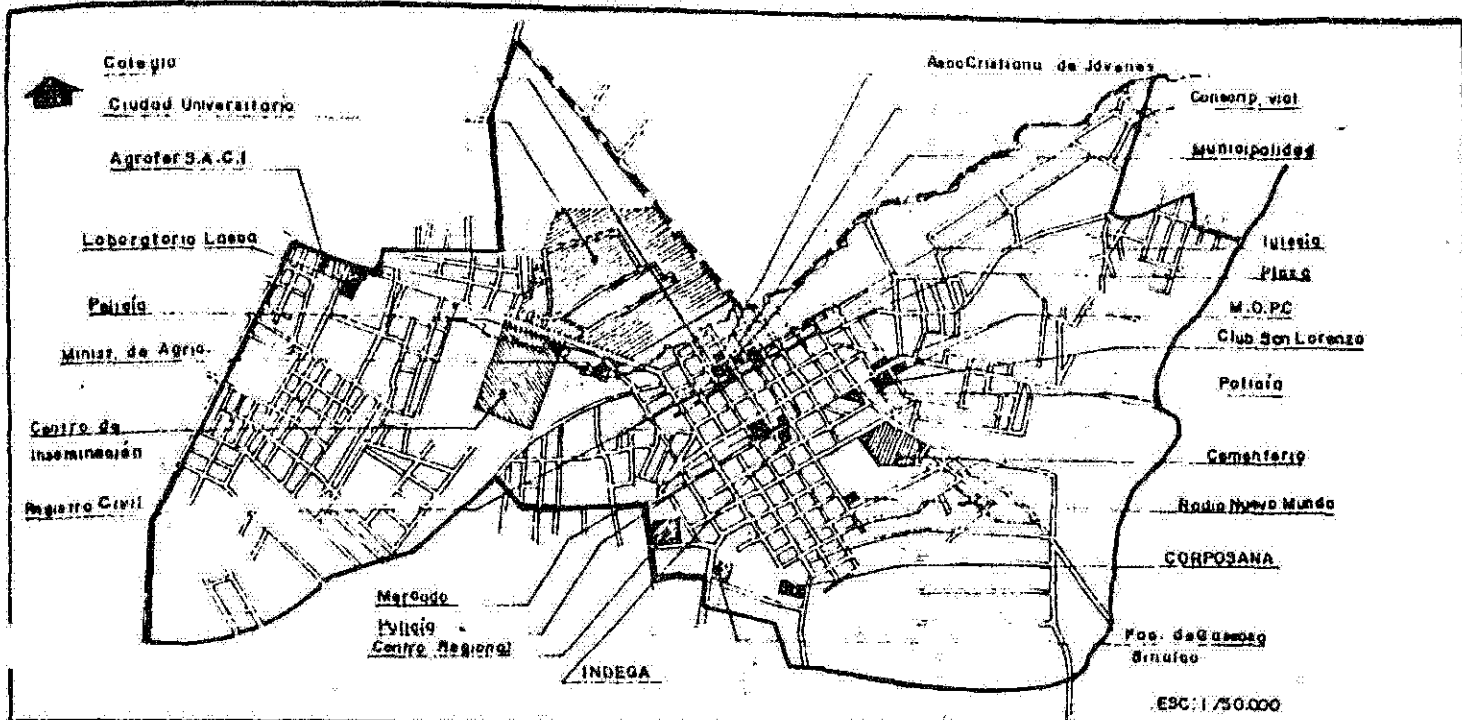
Línea de transporte: 19-29-27

4. Puntos problemáticos en cuanto al medio ambiente

Predios descuidados, algunos basurales.

5. Tipos de actividad actual y futura

Equipamiento vial, preservación de las áreas verdes, poblar las nuevas urbanizaciones.

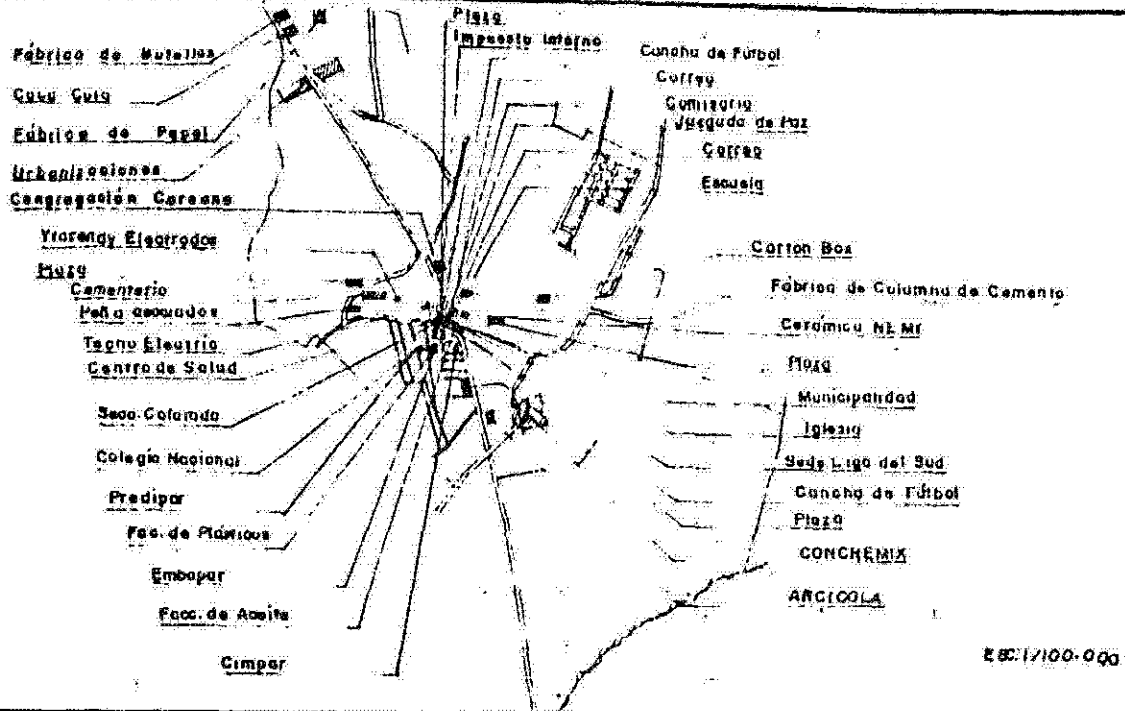


AREA TOTAL 1785,8 ha.
 POBLACION 47.580 hab.
 TRABAJADORES 12.542 hab.

a. Densidad Bruta: 26,6 hab/ha.
 b. Densidad Neta: 88,3 hab/ha.
 c. Densidad de Trabajadores Bruta: 7,0
 d. Densidad de Trabajadores Neta: 38,7

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Recrea- cional	Circu- lacion	Verde no utilizab.	Agropecu- ria	Total General
Ha	211,1	539,1	141,9	8,2	173,6	6,1	380,7	-	325,1	1785,8
%	11,8	30,2	7,9	0,5	9,7	0,4	21,3	-	18,2	100

1. Antecedentes de la formación
 Zona antigua, un edificio antiguo es la Iglesia, los asentamientos pos-
 teriores son a partir de la década del 50.
2. Características referentes al uso de suelo
 Residencial media; comercial ; industrial; agropecuaria; Campus Univer-
 sitario, centro educacional; Centro Comercial, Centro Cívico y Cultural
 Sede de la Policía Caminera.
3. Características referentes al transporte
 Línea de Transporte del interior y exterior; línea 19-29-27. Parada
 de taxi.
4. Puntos problemáticos en cuanto al medio ambiente
 Polución constante como consecuencia del excesivo transporte vial.
5. Tipos de actividad actual y futura
 Ensanche de la Ruta 2; equipamiento vial; nuevas urbanizaciones; me-
 joramiento de las áreas verdes.



AREA TOTAL 3.403,5 Ha.
 POBLACION 13.820 Hab.
 TRABAJADORES 3.610 hab.

a. Densidad Bruta: 4,1 hab/ha.
 b. Densidad Neta: 196,0 hab/ha.
 c. Densidad de Trabajadores Bruta: 1,1
 d. Densidad de Trabajadores Neta: 45,0

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Secrea- cional	Circu- lacion	Verde no utilizab.	Agropecu- rios	Total General
Ha	47,6	70,5	2,2	75,1	2,9	10,1	61,3	-	3.133,8	4.403,5
%	1,3	2,1	0,1	2,2	0,1	0,3	1,8	-	92,1	100

1. Antecedentes de la formación

El casco urbano es antiguo, pero el crecimiento es relativamente nuevo.

2. Características referentes al uso de suelo

Agropecuaria, residencial media-baja; industrial-comercial; Planta Ind de CERCI; Carvecería; Cantera de piedra; Planta Asfáltica; Urb. IPVU y Solar.

3. Características referentes al transporte

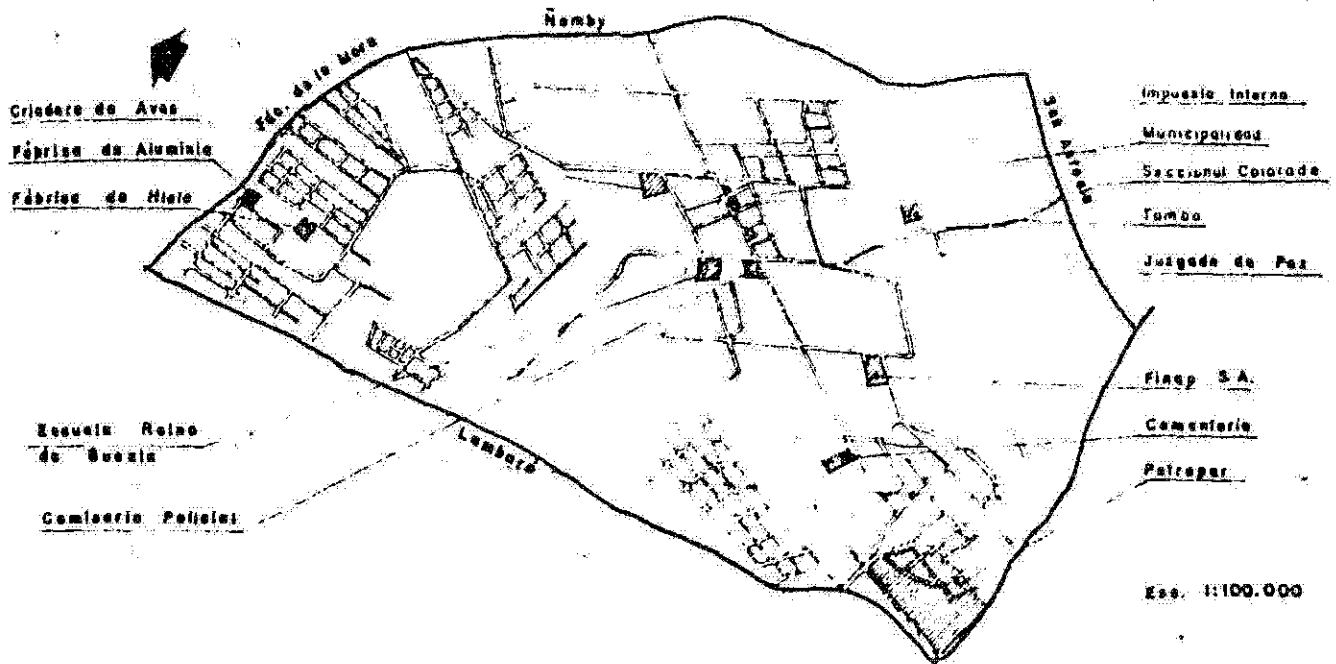
Línea de Omnibus: 18-39; Omnibus a San Antonio

4. Puntos problemáticos en cuanto al medio ambiente

Terrenos baldíos en mal estado de conservación, generalmente sucios.

5. Tipos de actividad actual y futura

Equipamiento vial, habitar las nuevas urbanizaciones; Mejoramiento de la Ruta de Acceso a Nemby.



AREA TOTAL 1705,6 Ha.
 POBLACION 13.850 hab.
 TRABAJADORES 3.534 hab.

a. Densidad Bruta: 8,1 Hab/ha.
 b. Densidad Neta: 97,3 hab/ha.
 c. Densidad de Trabajadores Bruta: 2,1
 d. Densidad de Trabajadores Neta: 37,3

	A. Baldío	Residen- cial	Comer- cial	Indus- trial	Inst. Pú- blicas	Secres- cional	Circu- lacion	Verde no utilizab.	Agropecu- rias	Total General
Ha	95,5	142,4	5,8	78,5	10,5	12,7	109,3	54,3	1.196,6	1.705,6
%	5,6	8,3	0,3	4,6	0,6	0,8	6,4	3,2	70,2	100

1. Antecedentes de la formación
Población antigua, con colonos extranjeros, especialmente alemanes y suecos. El mejoramiento urbano es reciente.
2. Características referentes al uso de suelo
Agropecuaria; residencial media-baja, ind., com. Posee tambo y flori- cultura. Petropar.
3. Características referentes al transporte
Puerto Medin- Petropar- Río Paraguay- Líneas de Transporte: 26 - 18 - 39 -
4. Puntos problemáticos en cuanto al medio ambiente
Zonas inundables; y muchos predios baldíos en no muy buen estado de conservación.
5. Tipos de actividad actual y futura
Ensanche de la Av. Defensores del Chaco, equipamiento vial, mejora- miento de las urbanizaciones.

CUADRO 3-2-1 POBLACION Y DENSIDAD BRUTA POR ZONA EN 1984.

ZONA		Superficie (ha)	Población	Densidad bruta(h/ha)
Nº	Nombre			
1.	Encarnación	73.9	3,950	53.5
2.	Catedral Este	58.5	1,770	30.3
3.	San Roque Norte	87.8	8,450	96.2
4.	Catedral Oeste	80.6	6,590	81.8
5.	Gral. Díaz	105.7	10,270	97.2
6.	Carlos A. López	486.0	41,810	86.0
7.	San Roque Sur	83.7	7,840	93.7
8.	San Roque Este	103.0	5,310	51.6
9.	Las Mercedes	232.0	15,360	66.2
10.	Tacumbú	649.6	22,820	35.1
11.	Obrero	519.1	33,420	64.4
12.	Republicano	755.8	18,650	24.7
13.	Pettirossi	499.0	35,720	71.6
14.	Mburicaó	256.2	10,870	42.4
15.	Recoleta	403.1	17,440	43.3
16.	Vista Alegre	142.7	9,760	68.4
17.	Nazareth	228.5	12,600	55.1
18.	Pte. Stroessner	626.2	32,900	52.5
19.	Villa Aurelia	470.2	18,610	39.6
20.	Ycua Satí	1,570.4	31,670	20.2
21.	Jara	980.0	24,770	25.3
22.	Bella Vista	474.1	23,900	50.4
23.	Santo Domingo	520.8	14,660	28.1
24.	Mburucuya	509.0	22,230	43.7
25.	Botánico	1,818.5	40,870	22.5
ASUNCION (1-25)		11,734.4	472,240	40.2

CUADRO 3-2-1 POBLACION Y DENSIDAD BRUTA POR ZONA EN 1984

(continuación)

ZONA		Superficie (ha)	Población	Densidad bruta(h/ha)
Nº	Nombre			
26.	Lambaré Norte	722.8	37,780	52.3
27.	Lambaré Oeste	598.6	10,840	18.1
28.	Lambaré Este	1,065.2	29,430	27.6
LAMBARE (26-28)		2,386.6	78,050	32.7
29.	Fdo.de la Mora Sur	1,461.0	57,340	39.2
30.	Fdo.de la Mora Norte	665.4	17,410	26.2
Fdo.DE LA MORA (29-30)		2,126.4	74,750	35.2
31.	Luque	15,944.9	69,040	4.3
32.	Mariano R.Alonso	4,233.0	16,620	3.9
33.	Villa Hayes	12,626.9	8,410	0.7
34.	Limpio	10,899.8	17,560	1.6
35.	Sañ Lorenzo Norte	803.4	17,570	21.9
36.	San Lorenzo Central	1,785.8	47,580	26.6
37.	San Lorenzo Sur	1,783.0	20,280	11.4
SAN LORENZO (35-37)		4,372.2	85,430	19.5
38.	Nemby	3,403.5	13,820	4.1
39.	San Antonio	1,678.0	8,280	4.9
40.	Villa Elisa	1,705.6	13,850	8.1
AREA METROPOLITANA (1-40)		71,111.3	858,050	12.1

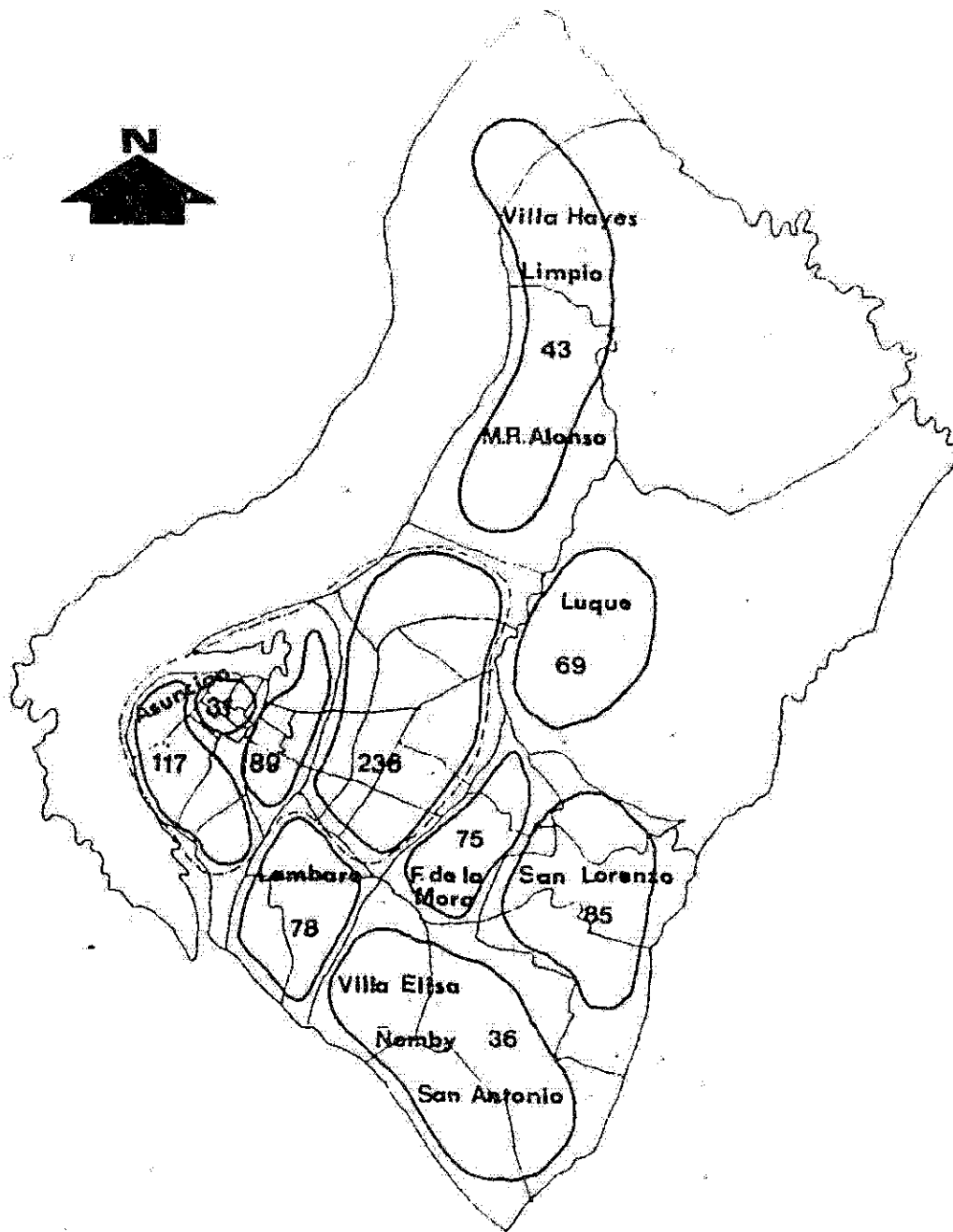


FIGURA 3-2-1 UBICACION ACTUAL DE POBLACION

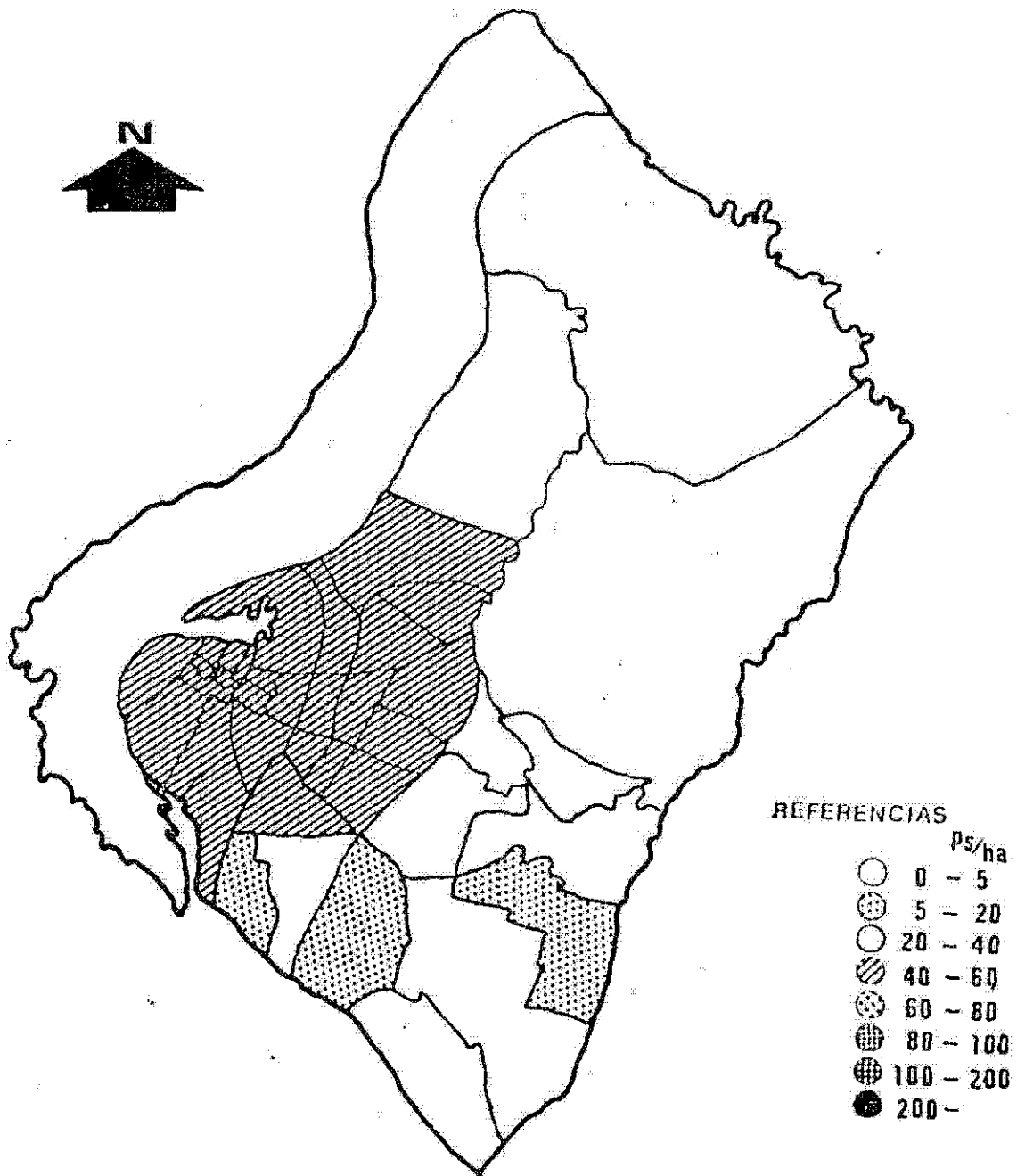


FIGURA 3-2-2-(1)

DENSIDAD POBLACIONAL POR ZONA
DE ESTUDIO (AREA METROPOLITANA), 1984

0 5 km

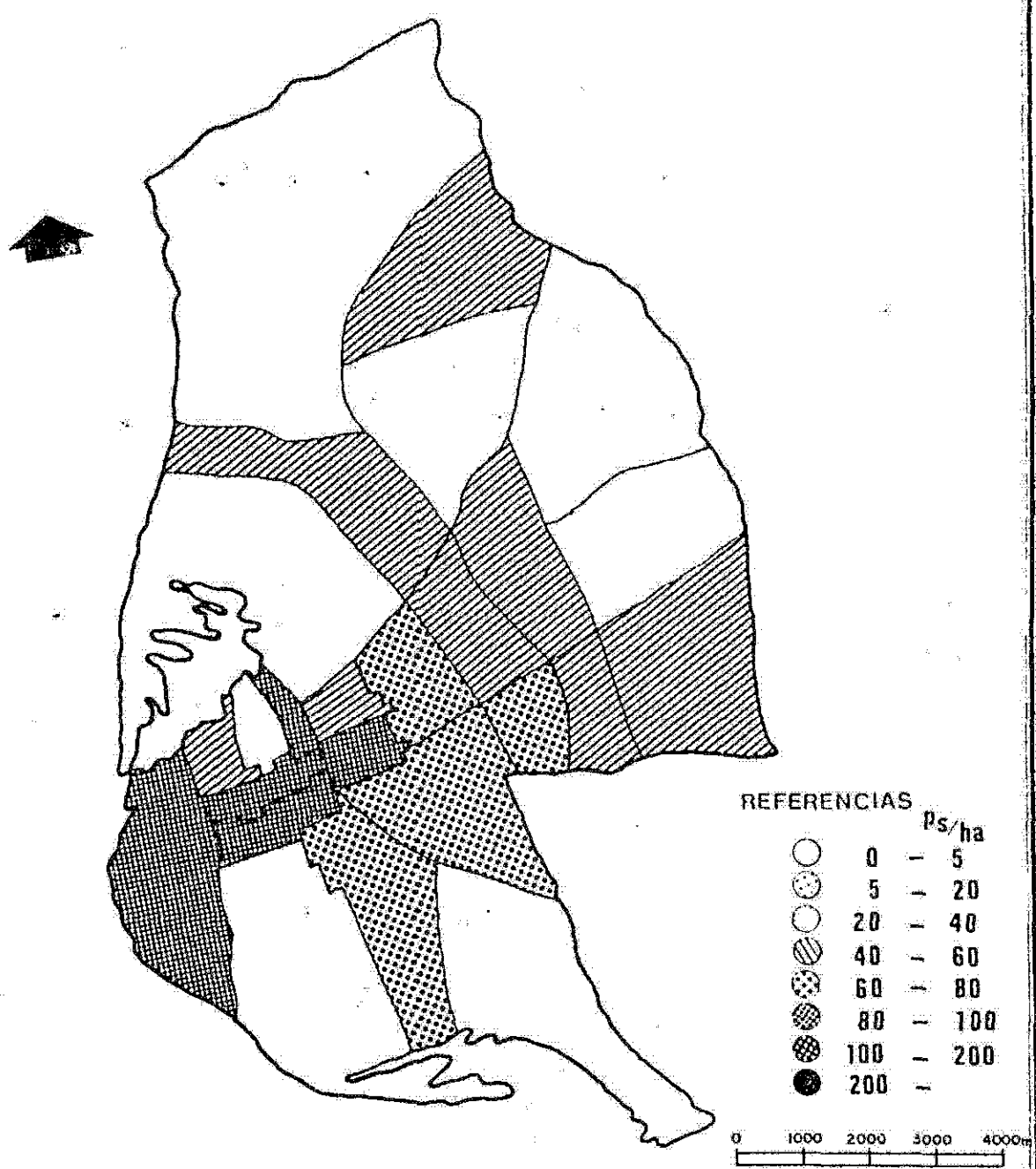


FIGURA 3-2-2-(2) DENSIDAD POBLACIONAL POR ZONA DE ESTUDIO
ASUNCION, 1.984

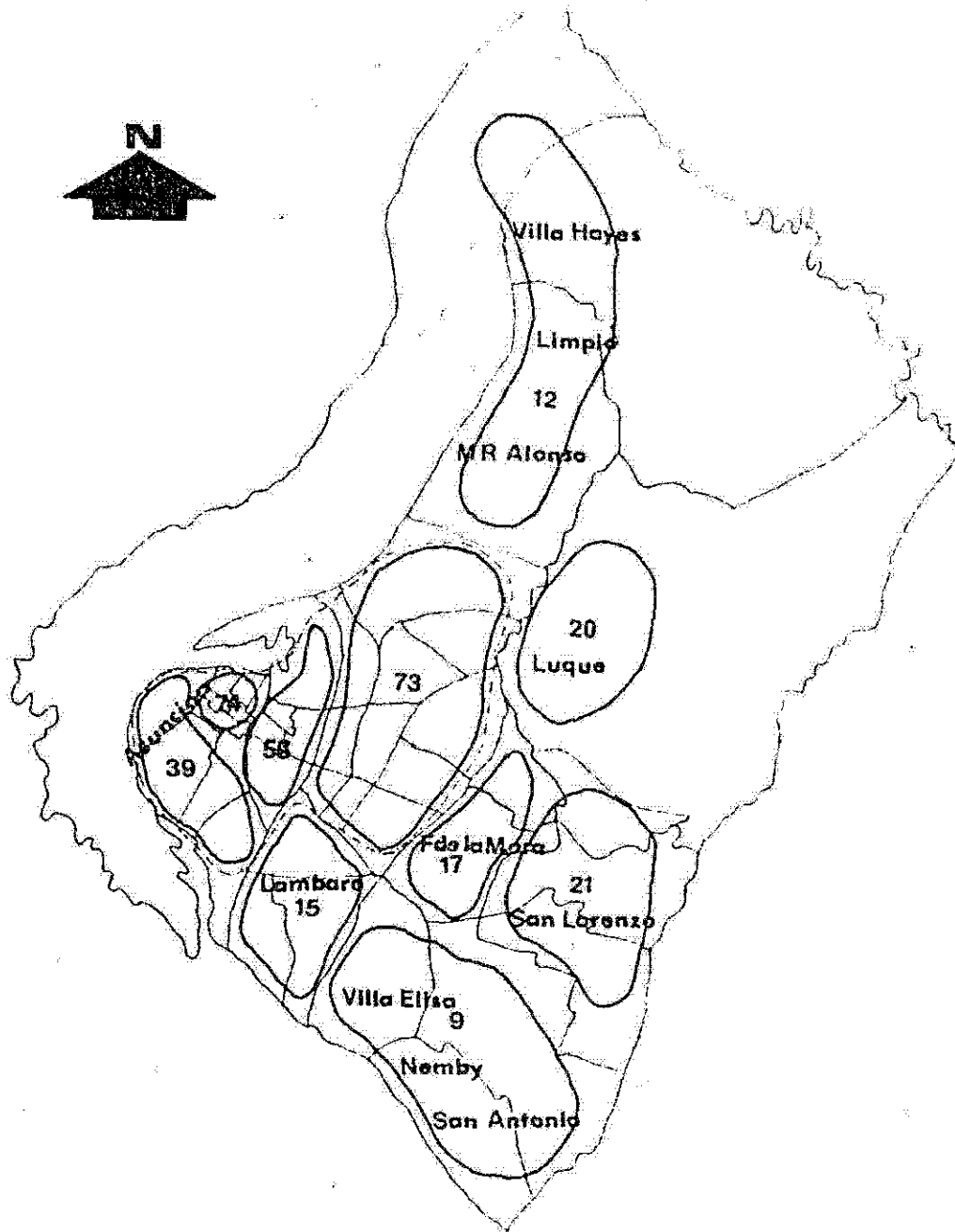


FIGURA 3-2-3 UBICACION ACTUAL DE INFLUENCIA

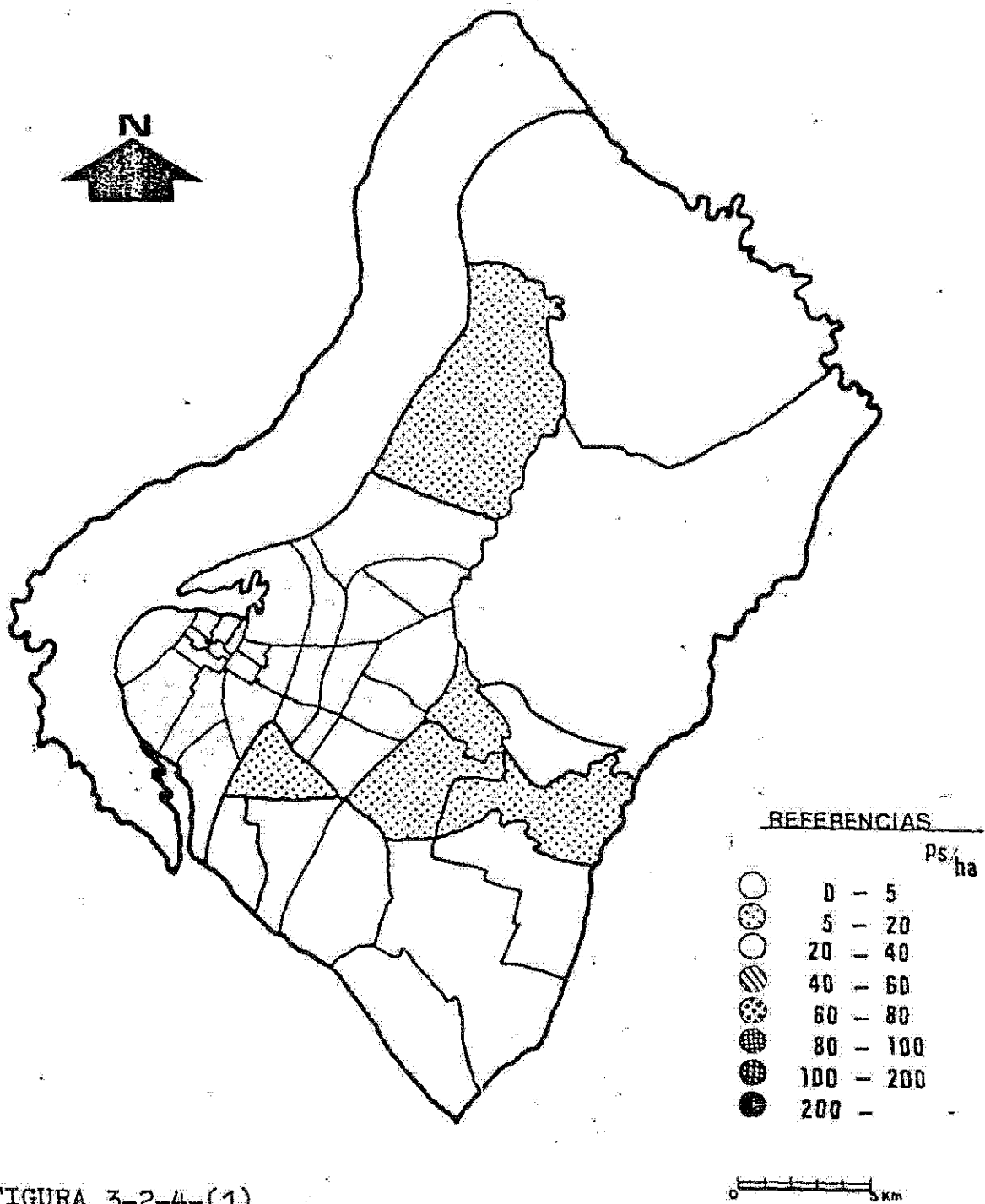


FIGURA 3-2-4-(1)

DENSIDAD DE EMPLEO POR ZONA DE ESTUDIO (1984)
(AREA METROPOLITANA)

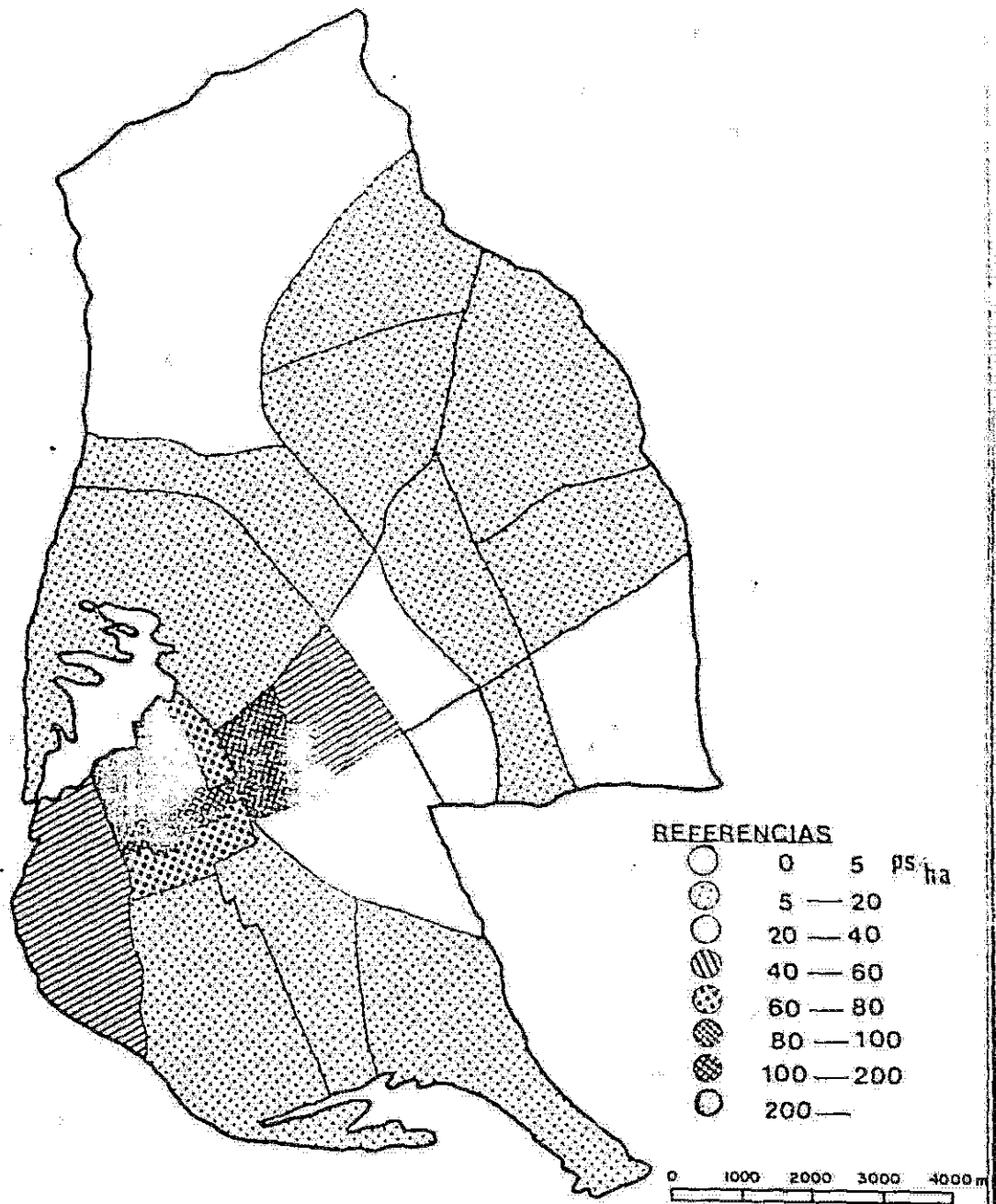


FIGURA 3-2-4-(2)

DENSIDAD DE EMPLEO POR ZONA DE ESTUDIO

ASUNCION, 1.984

CUADRO 3-2-2-(1) SITUACION ESPECIFICADA DE EMPLEO POR ACTIVIDADES
Y ZONA INTEGRADA (Indice de variación específica)

ACTIVIDADES		Agric.	Const.	Manuf.	Comer.	Finan.	Transp. Comun.	Elect.	Serv.	Oficina Gubernamental
ZONA INTEGRADA	Nº NOMBRE									
I	CENTRO	0.14	0.39	0.59	0.86	3.08	0.76	0.70	0.80	2.16
II	SAJONIA	0.34	0.67	1.42	0.65	0.32	0.93	1.65	1.19	1.34
III	EE OBRERO	0.62	1.25	0.83	1.07	0.23	1.41	0.47	1.20	0.53
IV	PEPPIROSSI	0.32	0.57	0.62	1.32	0.79	0.63	2.07	1.03	1.02
V	PASQUE CABALLERO	0.62	0.72	0.99	0.59	1.16	1.19	2.09	1.29	0.89
VI	FERRICAO	0.60	1.32	1.24	0.89	0.81	0.93	0.66	1.23	0.49
VII	BERNINAL	1.33	1.30	0.89	1.06	0.34	1.10	0.81	1.19	0.36
VIII	BOJANICO	0.77	1.16	0.92	0.78	0.32	1.18	0.77	1.27	0.83
IX	LAMBARE	1.11	1.87	1.47	1.12	0.06	1.14	0.40	1.03	0.17
X	SAN ANTONIO	4.08	1.31	2.92	0.83	0.25	1.21	0.54	0.69	0.24
XI	Eco. DE LA MORA	1.49	1.53	0.88	1.08	0.29	0.89	0.56	1.16	0.34
XII	SAN LORENZO	1.53	1.44	1.11	1.13	0.16	1.68	1.07	0.89	0.56
XIII	LUQUE	3.82	1.26	1.74	1.18	0.18	1.19	0.86	0.67	0.42
XIV	LIMPIO	3.10	1.57	1.51	1.48	0.12	1.15	0.44	0.59	0.33
XV	VILLA HAYES	0.94	4.22	0.46	0.74	0.20	1.20	0.96	0.64	0.69
TOTAL		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

CUADRO 3-2-3 POBLACION OCUPADA SEGUN LUGAR DE TRABAJO Y DE VIVIENDA

Lugar de trabajo y vivienda	Anunciación	Lambaré	San Antonio	Fdo. de la Hora	San Lorenzo	Luque	Limpio	Villa Hayes	Area Metrop.	Fuera del A. Metrop.	TOTAL	Indice de ocup. pro- pie zona (%)	Indice de traslado a Ac. Urb. (%)
Anunciación	181,642	1,689	727	2,274	2,395	1,661	851	446	191,685	2,456	194,142	93.6	-
Lambaré	15,872	12,249	315	250	204	256	106	-	29,385	297	29,682	41.3	53.5
San Antonio	4,565	129	7,323	385	334	95	-	19	12,851	333	13,184	55.5	34.6
Fdo. de la Hora	44,575	326	372	11,450	1,066	145	92	33	28,059	838	28,897	39.6	50.4
San Lorenzo	11,736	225	509	1,343	15,013	324	37	113	29,299	1,286	30,585	49.1	38.4
Luque	6,075	184	67	403	302	16,754	185	17	23,988	319	24,307	66.9	25.0
Limpio	3,758	76	22	-	57	226	7,633	174	11,945	171	12,116	63.0	31.0
Villa Hayes	163	20	-	-	-	-	-	2,077	2,259	316	2,575	80.7	6.3
Area Metrop.	238,385	14,898	9,336	16,236	19,371	19,461	8,905	2,878	329,470	6,016	335,487	98.2	-
Fuera de A. U.	5,644	119	152	598	1,242	292	52	12	8,111	---	---	---	---
TOTAL	244,029	15,017	9,488	16,834	20,613	19,753	8,957	2,890	337,581	---	---	---	---

CUADRO 5-2 - POBLACION OCUPADA DE ASUNCION POR ZONA

ZONAS	Pobl. ocup. residente en la zona (A)	Pobl. ocup. en zona donde vive	Tasa de pers. trab. en la zona donde vive	Pobl. ocup. trabajando en la zona (B)	Razón B/A
1. Encarnación	2,031	1,346	66.3	25,080	12.35
2. Catedral Este	950	609	64.1	21,211	22.32
3. San Roque Norte	4,064	2,004	49.3	5,881	1.45
4. Catedral Oeste	3,197	1,933	60.5	14,348	4.49
5. Gral. Díaz	4,841	2,204	45.5	7,663	1.58
6. Carlos A. López	17,844	8,541	47.9	21,665	1.21
7. San Roque Sur	3,581	2,060	57.5	12,094	3.38
8. San Roque Este	2,411	1,201	49.8	10,778	4.47
9. La Mercedes	6,849	3,053	44.6	11,379	1.66
10. Tacumbú	8,663	3,224	37.2	6,091	0.70
11. Obrero	13,626	4,458	32.7	6,665	0.49
12. Republicano	7,392	2,343	31.7	4,357	0.59
13. Pettirossi	15,537	6,014	38.7	14,350	0.92
14. Mburicaó	4,760	2,135	44.9	5,803	1.22
15. Recoleta	6,903	2,567	37.2	6,962	1.01
16. Vista Alegre	4,201	1,368	32.6	3,448	1.82
17. Nazareth	4,586	1,193	26.0	2,467	0.54
18. Pte. Stroessner	13,327	5,514	41.4	12,648	0.95
19. Villa Aurelia	7,489	3,145	42.0	5,654	0.75
20. Ycua Satí	12,303	4,724	38.4	8,635	0.70
21. Jara	10,396	4,403	42.4	9,821	0.94
22. Bella Vista	9,320	3,955	42.4	6,906	0.74
23. Santo Domingo	5,647	1,850	32.8	7,096	1.26
24. Mburucuya	8,204	2,582	31.5	4,190	0.51
25. Botánico	16,023	7,007	43.7	8,820	0.55
TOTAL ASUNCION	194,142	181,642	93.6	244,029	1.26

CUADRO 3-2-5 PORCENTAJE DE POBLACION OCUPADA POR RENTA MENSUAL

Niveles de ingresos	Renta mensual (mil Gs.)	Porcentaje de población ocupada (%)	
Bajo	- 15	15.4	} 45.7
	15 - 30	30.3	
Medio	30 - 50	30.0	} 49.3
	50 - 70	11.0	
	70 -110	8.3	
Alto	110 -	4.7	4.7
No especificado		0.3	0.3
TOTAL		100.0	100.0

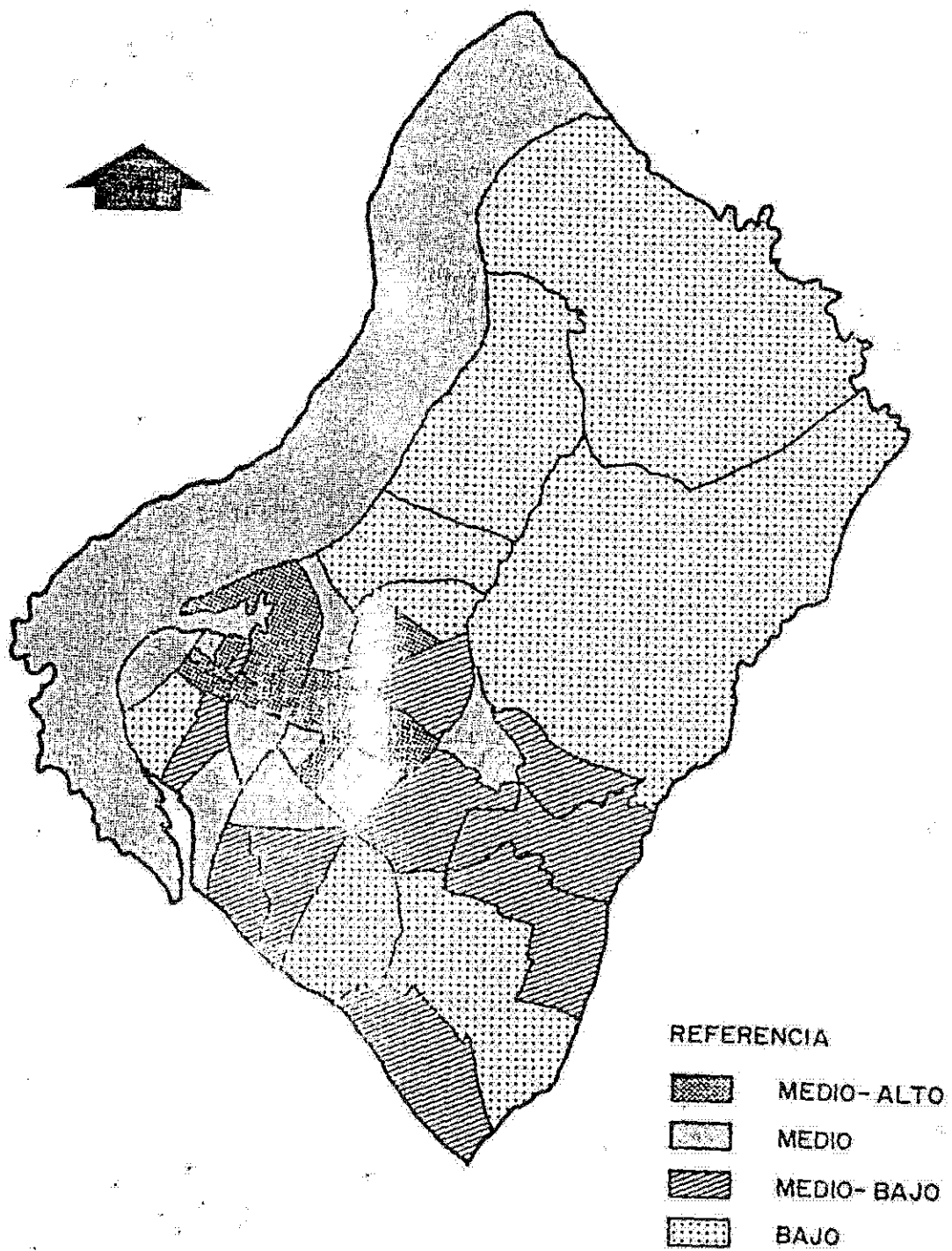


FIGURA 3-2-5 SITUACION ESPECIFICA DE RENTA MENSUAL DE LA POBLACION OCUPADA

Chapter 4: Preparation of Current OD Table

4-1. Study Results

The final results by zone of the person trip survey are shown in Table 4-1-1. Of a total of 732,005 persons included within the scope of the study for the Asuncion Metropolitan Area as a whole, 43,035 valid responses, or 5.9%, were received. Limiting the scope to the 412,262 persons in Asuncion City proper, 24,613 valid responses, or 6.0%, were received. Both of these percentages of return are higher than the 5.4% set as the target during the survey planning phase.

4-2. Expansion

4-2-1. Fundamental Approach to Expansion

Because the survey consists of a sample population, direct responses are not received from all persons residing within the Asuncion Metropolitan Area. For this reason, in order to acquire statistics on all residents it is necessary to perform an estimation using statistical methods based on the sampling. This process of reconstruction is called "expansion."

In the person trip survey, because both the trip population (total volume) and the sample (individual trips) are unknowns, it is common practice to employ a methodological system which considers groups of people as the trip population and individuals as the sampling. For the purposes of the present study also, the trip population was estimated according to the statistical method in which people are the medium.

4-2-2. Expansion Method

In performing a sample study, in the case where valid responses are received for all parties sampled it is possible to estimate the trip population by taking the reciprocal of the sampling rate (trip population/number of samples) as the expansion coefficient. However, in actual performance of the study part of the sampling is not returned. Furthermore, because the occurrence of such non-response is not uniform in terms of region or sex, age or other individual categories, the rate of valid response (number of valid samples/number of samples) and the actual survey rate (number of valid samples/trip population) may vary according to region and/or individual characteristics.

A review of the preliminary tabulation of this study shows a variation in the rates of valid response according to zone and sex. While the average rate of valid response for males and females combined reveals a smaller variation by zone, when the rates of response for males and females are analyzed separately the sampling rate for females is generally higher than that for males: males 5.6% vs. females 6.1%. Analysis on a zone by zone basis reveals that there are some zones showing large variations in these rates and other zones in which the relative shares in the total trip population for each sex group are reversed in weight from the shares for each group in the valid sampling.

Although the trip population for the Asuncion Metropolitan Area also shows a high rate of 52.8%, or approximately 40,000 persons, among females, the relative share of this group among all valid samples is even higher: females 55.3%, males 44.7%.

In view of the above discussion, for the purposes of this study expansion was performed separately for each zone and for the male and female categories in order to achieve a

proper balance with the current population composition. The actual rates of expansion are given in Table 4-2-1.

4-3. Screen Line Check

4-3-1. Objectives

A screen line check is a method used to check whether an expanded OD table matches with the actual traffic volume moving in a city. In other words, it represents a means of compensating the current OD table obtained by person trip survey to produce a more valid and balanced representation of the present traffic volume.

In real terms, a screen line is established in such a way as to divide the study area in two parts. By then comparing the traffic volume crossing this screen line with the traffic volume between the same two areas as determined in the current OD table, it is possible to check the accuracy of the OD table.

4-3-2. Average Number of Vehicle Passengers

While the OD table obtained from the person trip survey uses persons (trips) as its basic unit, traffic volume observation by the screen line method relies on the number of vehicles. In order to compare these two units fairly, it is necessary to convert the unit of traffic volume from individual persons to number of vehicles. The coefficient used for such conversion purposes is known as the average number of passengers per vehicle. To attain this coefficient, a separate screen line count is taken in conjunction with the person trip survey. The average numbers of passengers for each vehicle type are shown in Table 4-3-2. A comparison of these results with the results

of the person trip survey, which gives averages for the entire survey area, and related studies, reveals that the values of the former are slightly larger. Nevertheless, as the differences are quite small the values of the screen line count have been used as the conversion values.

4-3-3. Compensation

The observed traffic volume obtained in the screen line count is compared with the traffic volume crossing the screen line in the OD table for the results of the person trip, and the compensation coefficient is derived. Because the screen line count results also include traffic volume for persons living outside the given regions, prior to carrying out the above comparison a cordon line count is first used to eliminate this extraneous component to achieve the traffic volume for residents within the regions.

The flow of the compensation process is shown in Fig. 4-3-2. Compensation coefficients are shown in Fig. 4-3-3. Analysis of these compensation values indicates that the current person trip survey may be said to reflect the actual conditions quite accurately.

The results of the screen line compensation show that the total number of trips by residents of the regions is approximately 1.5 times that prior to screen line compensation.

4-4 Preparation of Current OD Table

The number of trips made by residents of the study area was taken as the number derived following screen line compensation. For the OD table, it is also necessary to know the number of trips made into the study area by residents of other regions. Using the results of the cordon

line count it is possible to determine the number of trips made into the study area by non-residents. In other words, the traffic volumes for the study area and outside the study area can be derived as follows: those by residents of the area from the results of the person trip survey, and those by non-residents from the results of the cordon line count. This information can then be used to organize the OD table. This preparation process is described in Fig. 4-4-1 and the final result is shown as the current OD table in Fig. 4-4-1.

CUADRO 4-1-1 RECUPERACION DE BOLETAS DE ENCUESTA

		Población del A. Metropoli- tana (personas)	Nº de Boletas Recuperadas	Índice de Estudio Real
1984	Masculino	345,647	19,307	5.586 ^b
	Femenino	386,358	23,728	6.141
	Total	732,005	43,035	5.879
(Consulta)				
1982	Masculino	313,719	19,307	6.153
	Femenino	352,710	23,728	6.727
	Total	666,500	43,035	6.457
Asunción				
1984	Masculino	190,932	10,672	5.589
	Femenino	221,330	13,941	6.299
	Total	421,262	24,613	5.842

Nota: Estudio de Viajes de Personas

OBSERVACIONES:

1. La cifra de la población de 1984 es la determinada inductivamente por el equipo de Estudio. (Poblac. mayor de 6 años)
2. La cifra de la población de 1982 es la del Censo Nacional (Poblac. mayor de 6 años).
3. La cifra corresp. al Número de Boletas Recuperadas está dada por la cantidad de Boletas Recuperadas Válidas arrojadas por la computadora, post-validación.
4. Índice de Estudio Real = Número de Boletas Recuperadas Válidas/Poblac. mayor de 6 años.

CUADRO 4-2-1 INDICE DE EXPANSION

ZO NA	SEXO	PROPORCION DE MUESTRA	INDICE DE EXPANSION	ZO NA	PROPORCION DE MUESTRA	INDICE DE EXPANSION
1	HOMBRE	7.398	13.52	21	H. 4.847	20.63
	MUJER	7.069	14.15		M. 6.159	16.24
	TOTAL	7.219	13.85		T. 5.535	18.07
2	H.	5.241	19.08	22	H. 5.535	18.07
	M.	5.581	17.92		M. 5.330	18.76
	T.	5.426	18.43		T. 5.424	18.44
3	H.	6.916	14.46	23	H. 4.808	20.60
	M.	7.143	14.00		M. 5.908	16.93
	T.	7.039	14.21		T. 5.377	18.60
4	H.	4.762	21.00	24	H. 4.387	22.80
	M.	7.314	13.67		M. 5.628	17.77
	T.	6.147	16.27		T. 5.028	19.89
5	H.	4.812	20.78	25	H. 5.306	18.85
	M.	6.354	15.74		M. 6.019	16.61
	T.	5.648	17.70		T. 5.675	17.62
6	H.	5.249	19.05	26	H. 5.245	19.07
	M.	6.711	14.90		M. 5.851	17.09
	T.	6.027	16.59		T. 5.556	18.00
7	H.	6.260	15.97	27	H. 5.371	18.62
	M.	6.790	14.73		M. 6.179	16.18
	T.	6.557	15.25		T. 5.786	17.28
8	H.	6.289	15.90	28	H. 6.368	15.70
	M.	8.862	11.28		M. 6.724	14.87
	T.	7.728	12.94		T. 6.561	15.26
9	H.	5.748	17.40	29	H. 5.435	18.40
	M.	7.230	13.83		M. 6.188	16.16
	T.	6.577	15.21		T. 5.827	17.16
10	H.	5.126	19.51	30	H. 6.860	14.58
	M.	5.964	16.77		M. 6.735	14.85
	T.	5.563	17.98		T. 6.795	14.72
11	H.	5.615	17.81	31	H. 5.973	16.74
	M.	5.953	16.80		M. 5.876	17.02
	T.	5.791	17.27		T. 5.922	16.89
12	H.	7.412	13.49	32	H. 4.606	21.71
	M.	8.223	12.16		M. 5.632	17.76
	T.	7.838	12.77		T. 5.107	19.58
13	H.	6.025	16.60	33	H. 5.090	19.65
	M.	5.982	16.72		M. 4.766	20.98
	T.	6.001	16.66		T. 4.926	20.30
14	H.	5.865	17.05	34	H. 5.265	18.99
	M.	7.074	14.14		M. 6.054	16.52
	T.	6.545	15.28		T. 5.657	17.68
15	H.	5.547	18.03	35	H. 5.147	19.43
	M.	6.349	15.75		M. 5.173	19.33
	T.	5.986	16.70		T. 5.161	19.38
16	H.	6.672	14.99	36	H. 5.259	19.01
	M.	6.775	14.76		M. 5.421	18.45
	T.	6.730	14.86		T. 5.345	18.71
17	H.	5.973	16.74	37	H. 5.440	18.38
	M.	6.693	14.94		M. 5.246	19.06
	T.	6.376	15.68		T. 5.338	18.73
18	H.	5.289	18.91	38	H. 5.366	18.64
	M.	5.932	16.86		M. 5.818	17.19
	T.	5.628	17.77		T. 5.596	17.87
19	H.	6.064	16.49	39	H. 7.019	14.25
	M.	5.958	16.78		M. 9.047	11.05
	T.	6.006	16.65		T. 7.976	12.54
20	H.	6.111	16.36	40	H. 5.058	19.77
	M.	5.817	17.19		M. 5.443	18.37
	T.	5.949	16.81		T. 5.256	19.03
					H. 5.586	17.90
					M. 6.741	16.28
					T. 5.879	17.01
TOTAL						

CUADRO 4-3-1 VOLUMEN DE TRANSITO EN LA LINEA PANTALLA

(Unidades/día)

Estación	Coche	Omnibus Urbano	Omnibus L. Dist.	Taxi	Camioneta	Camión menor de 5 tn.	Camión de mayor de 5 tn.	Moto	Total
1	5,388	2,055	44	194	2,894	800	604	1,120	13,099
2	1,821	379	--	71	679	136	235	358	3,679
3	12,188	909	5	439	3,165	505	249	1,022	18,482
4	16,980	2,780	20	739	3,992	486	226	969	25,192
5	4,653	68	--	150	1,268	268	182	362	6,951
6	210	7	--	8	50	19	8	11	313
7	543	189	--	28	291	45	37	84	1,217
8	7,161	56	--	249	2,173	415	252	747	11,053
9	211	16	8	4	151	25	27	35	477
10	6,626	47	4	262	2,653	610	267	726	11,195
11	9,202	6,749	41	515	4,276	1,354	1,083	1,033	24,253
12	631	442	64	78	220	100	68	100	1,703
13	338	226	--	20	216	75	53	49	977
14	372	20	3	34	153	48	66	88	784
15	8,430	1,496	174	879	3,680	1,162	947	1,397	18,165
16	890	671	--	41	415	137	63	201	2,418
17	116	199	2	3	78	45	22	81	546
18	421	444	1	15	185	69	23	121	1,279
19	3,656	763	4	195	1,503	373	247	712	7,453
20	1,966	1,213	--	127	1,015	222	360	255	5,158
TOTAL	81,803	18,729	370	4,051	29,057	6,894	5,019	9,471	155,394

Nota: El Volumen de Tránsito de 24 Horas fue obtenido por conversión aritmética, empleando el "Coeficiente de conversión diurno/nocturno"

CUADRO 4-3-2 CANTIDAD PROMEDIO DE PASAJEROS

	Volumen de Tránsito en la Línea Pantalla		Volumen de Tránsito en en área de Estudio	
	Result. Est.V.P.	Volumen Observ. en Línea Pant.	Result. Est.V.P.	Result. Est. Taxi- Omnibus
	(Pers./veh)	(Pers./veh)	(Pers./veh)	(Pers./veh)
Moto	-	1.12	-	-
Coche	1.46	-	1.50	-
Camión	1.55	-	1.59	-
Taxi	-	0.68	-	0.76
Omnibus	-	21.63	-	19.02

- Observación: 1. El rubro "camión" incluye camionetas
2. Los resultados del Estudio de Viajes de Personas son anteriores a la Ampliación.

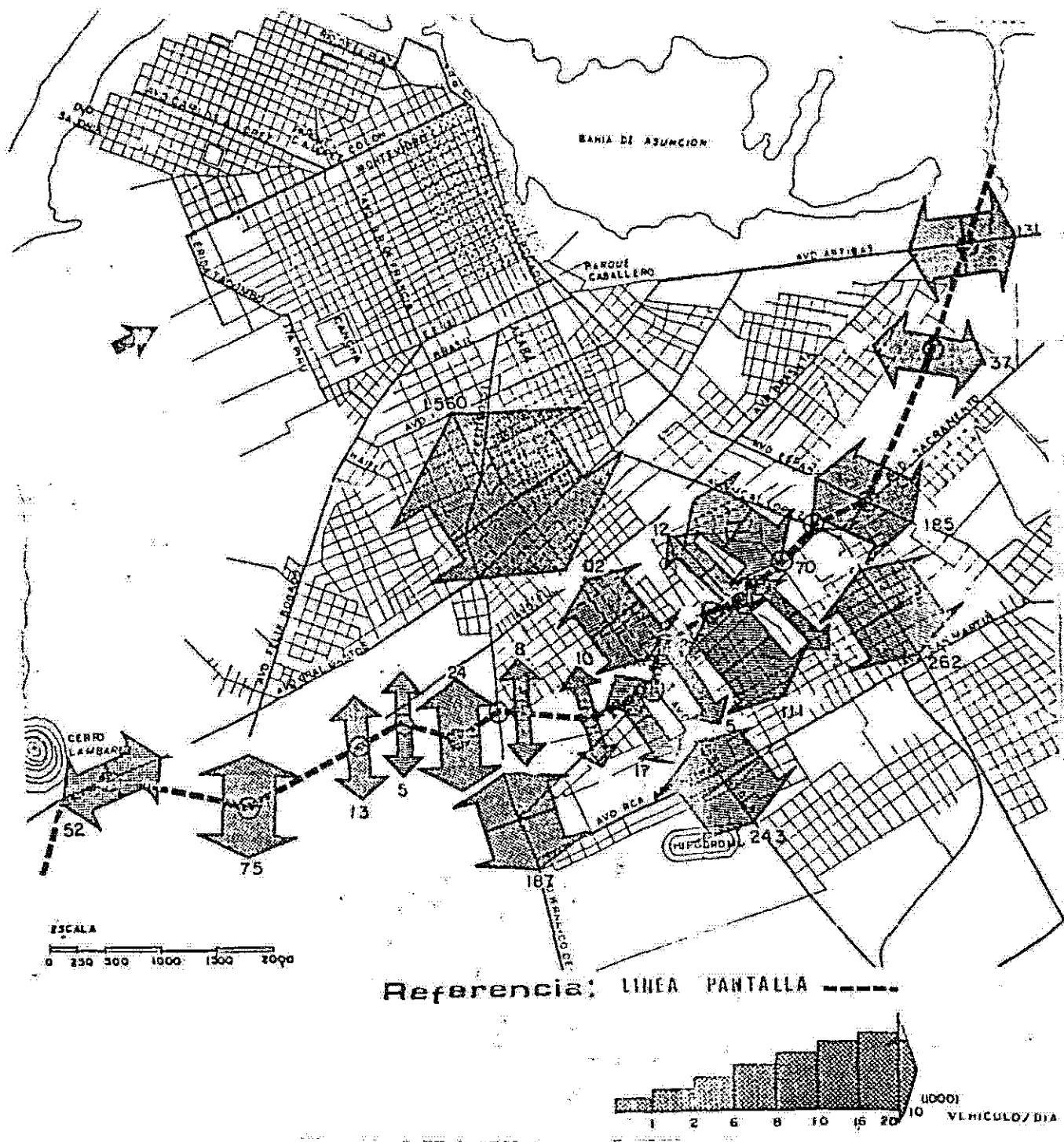


FIGURA 4-3-1 VOLUMEN DE TRAFICO EN LA LINEA PANTALLA - T O T A L

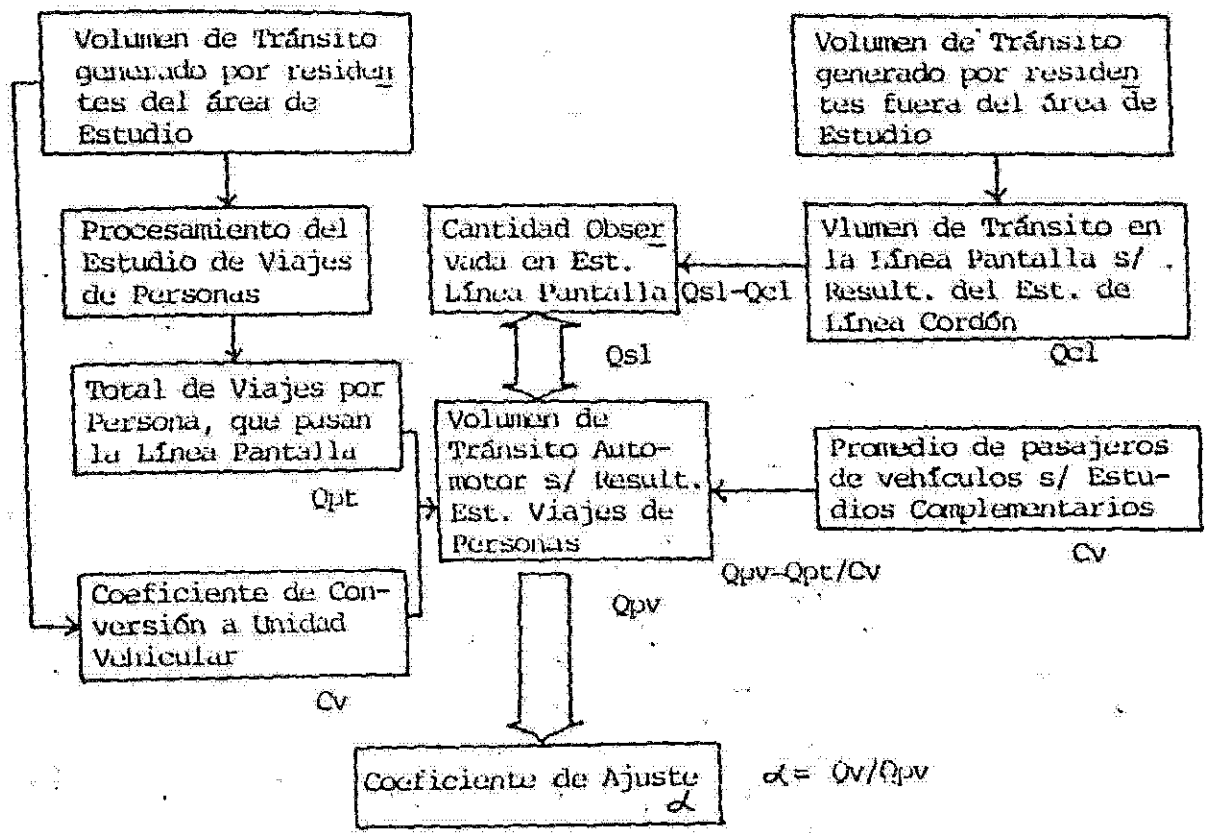


FIGURA 4-3-2 DIAGRAMA DE AJUSTE

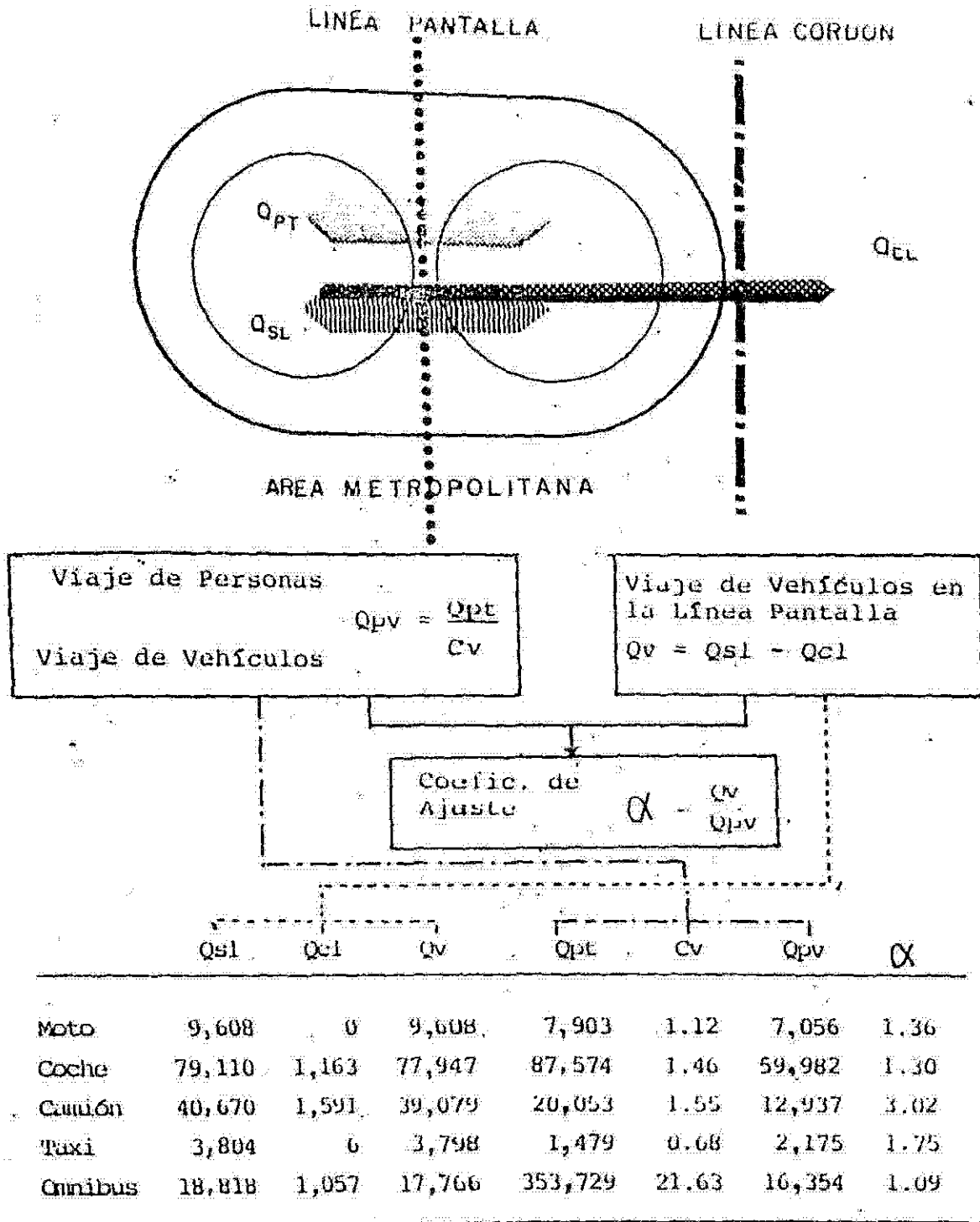


FIGURA 4-3-3 COEFICIENTE DE AJUSTE

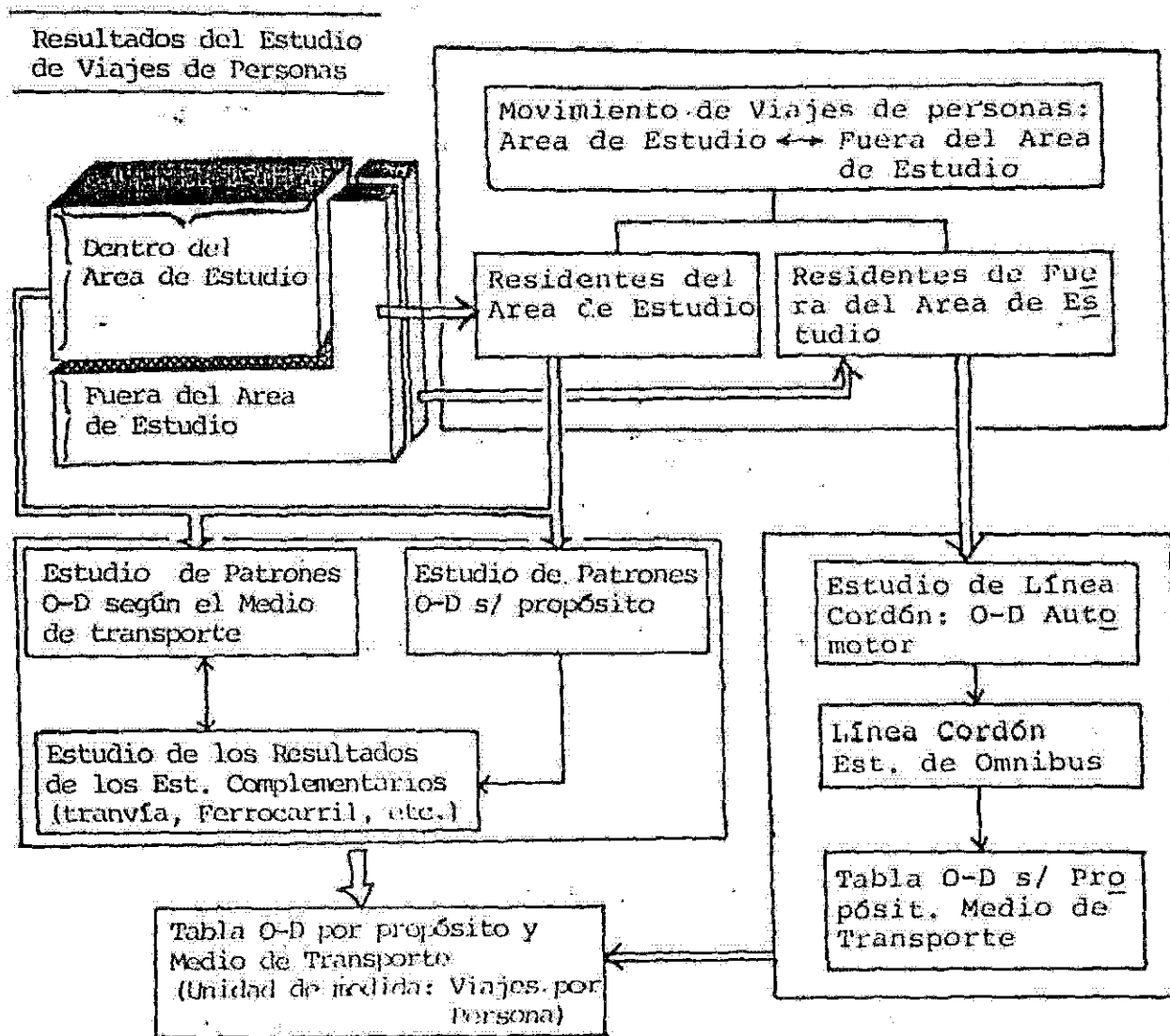


FIGURA 4-4-1 ELABORACION DE LA TABLA O - D ACTUAL

MATRIZ DE VIAJES 1984 - TODO OBJETIVO

CUADRO 4-4-1 (1)

ZONA	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201	211	TOTAL
1	52907	21543	26235	32736	10186	17762	18361	24147	15720	2765	12093	9505	5326	3486	91	2970	842	495	10	616	558	25429
2	21598	39474	7907	10942	2104	3870	4466	5439	5418	1092	3354	4770	1379	1401	227	1245	384	174	38	236	164	115105
3	26340	8280	55724	17493	1270	3759	4151	3689	5901	552	1362	2888	954	762	100	1039	147	218	31	279	203	135451
4	31745	10500	17726	94502	8499	18404	19774	20522	19381	5005	11759	11451	5210	4853	313	3065	1104	260	99	470	429	253164
5	10655	2107	1410	8410	22257	3507	1939	9602	798	287	1096	1027	1249	944	63	425	125	256	0	196	292	64547
6	17355	3915	4101	17938	3629	42838	11170	7394	4694	4388	3598	4913	1893	938	135	1255	432	214	117	265	213	126745
7	16264	4527	3995	18483	2127	10681	71078	9145	7018	4314	12726	7763	3145	1019	113	4102	2025	283	106	1972	842	163348
8	24270	5722	3474	20766	9398	7614	8984	132991	3569	991	3144	2886	2611	6502	770	1372	251	1010	64	638	295	237641
9	15756	5630	5868	18776	842	4633	6907	3684	62095	1781	2168	2342	1255	657	105	552	325	71	0	163	177	133933
10	2652	1101	527	4697	353	1356	4334	877	1664	45965	3300	2710	385	127	20	491	984	127	0	201	148	72400
11	12217	3364	1449	11319	1335	3703	12991	3261	2300	3114	83512	9281	1149	555	52	2806	1171	109	38	809	399	154534
12	9273	4845	3101	11261	948	5152	7632	3274	2359	2659	8668	132523	2351	556	147	9012	2039	523	31	637	702	267312
13	5519	1283	975	5280	1158	1889	3386	2589	1190	342	1214	2441	98451	2258	36	2015	168	161	0	249	176	130764
14	3513	1455	834	4524	971	781	1136	6321	526	95	492	613	2301	33579	642	553	49	177	0	529	45	59227
15	96	253	74	303	89	167	221	665	85	20	52	124	18	608	15249	77	4	1348	0	0	0	19410
16	4377	1618	953	3665	371	971	3347	1199	683	607	2904	8319	2181	266	69	358	0	196	7	232	24	32542
17	1224	462	216	1135	58	299	1348	300	433	956	1049	1697	100	46	6	43	150	81	0	96	0	9703
18	855	219	339	325	184	162	424	983	46	39	222	186	208	251	1015	246	115	19	16	145	29	5813
19	103	52	56	253	0	17	100	70	0	0	18	44	0	0	0	14	4	0	0	0	19	750
20	1394	299	299	695	183	266	1661	484	205	265	482	651	184	414	26	377	92	109	0	121	0	8553
21	1196	437	144	621	114	147	1164	137	189	196	381	832	347	34	0	0	0	104	0	0	37	6052
TOTAL	26268	11576	13547	28505	68045	17976	16198	23636	133974	72433	153941	206496	130898	59276	19239	31618	10381	5715	557	7854	4686	225054

MATRIZ DE VIAJES 1984 - AL TRABAJO

CUADRO 4-4-1 (2)

ZONA	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201	211	TOTAL
1	16171	1220	632	2191	552	308	360	462	250	74	139	189	46	325	0	164	65	25	0	10	51	17410
2	5770	4454	653	2405	441	676	571	900	276	151	233	134	115	117	116	90	67	3	25	74	0	20494
3	13555	2674	6756	5409	474	1397	891	894	395	51	248	325	184	93	34	101	10	100	0	65	15	35974
4	12614	1726	602	11163	954	1172	1245	1169	422	145	448	695	443	24	39	241	67	37	6	63	0	33473
5	8933	766	111	1520	3598	578	144	858	39	0	58	0	164	54	0	27	54	70	0	90	111	12857
6	9248	1218	351	4789	655	3992	1659	1122	346	142	375	639	220	54	42	203	45	95	51	0	36	23540
7	9338	1835	864	6680	619	2393	9077	1625	363	297	1015	1039	488	66	67	459	93	100	0	62	112	37345
8	11333	1632	531	5476	2333	1723	2235	12355	495	268	1031	510	712	764	397	267	51	530	0	142	106	43244
9	6232	2284	2269	5431	431	1719	2057	1100	6191	422	451	353	283	147	53	145	17	33	0	55	21	31722
10	1353	353	139	2019	159	601	1234	119	215	5257	699	374	144	0	20	187	125	0	0	20	41	13079
11	6842	1458	493	4627	655	1758	3562	1032	516	893	7634	1576	172	80	36	421	116	56	20	263	79	52266
12	5959	1442	552	3649	228	1263	2140	767	224	864	1761	11612	475	41	122	1343	134	158	0	171	83	32328
13	2879	540	217	1655	506	722	819	394	235	77	517	367	11385	220	18	219	0	69	0	26	0	20451
14	1042	404	257	632	217	253	396	591	64	24	0	39	310	3809	426	24	0	72	0	28	0	9240
15	21	0	0	0	42	23	0	23	26	0	0	0	0	0	1172	0	0	256	0	0	0	1544
16	1538	436	166	926	53	243	733	173	120	165	599	1167	165	24	0	57	6	13	0	6	0	4579
17	405	90	28	214	6	69	235	25	19	103	124	316	18	4	0	0	0	29	0	12	0	1763
18	0	0	0	0	3	0	0	6	0	6	0	0	0	0	27	6	0	0	0	0	0	103
19	3	0	0	7	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	35
20	240	25	10	68	0	0	155	40	0	3	24	77	26	0	0	0	10	0	0	0	0	693
21	135	63	33	117	13	13	501	4	8	52	40	34	3	0	0	0	0	12	0	0	0	1038
TOTAL	16555	23025	15124	59510	11524	18936	26031	24131	10740	8938	15602	19639	15353	5844	2569	3936	874	1659	96	1073	865	375544

MATRIZ DE VIAJES 1984 - AL ESTUDIO

CUADRO 4-4-1 (3)

ZONA	(VIAJES)																					
	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201	211	TOTAL
1	547	827	428	1623	363	453	168	91	37	77	52	1363	0	0	0	3	0	0	0	0	0	1093
2	270	5231	249	1223	142	133	58	0	190	0	16	979	32	0	0	0	0	0	0	0	0	11673
3	455	1452	9970	2593	204	232	251	0	191	0	0	1071	0	0	0	0	0	0	0	0	0	20515
4	325	763	502	11645	325	688	470	250	208	0	710	1706	21	0	0	4	4	0	0	0	0	20399
5	1482	203	63	2362	2654	188	189	801	62	80	242	0	0	0	0	62	0	0	0	0	0	8554
6	1999	566	373	3441	525	7183	1231	152	116	0	71	1065	45	0	0	15	0	0	0	0	0	16611
7	2762	349	134	2596	118	1494	13726	592	89	32	886	1620	344	0	0	8	0	0	0	0	0	24762
8	3879	603	179	2450	2092	919	541	18343	117	0	43	958	69	84	0	14	0	0	0	0	0	30301
9	2321	414	1034	3196	103	653	1683	121	10203	523	136	475	0	0	0	0	0	0	0	0	0	20912
10	380	20	118	447	26	125	505	0	40	5585	332	376	0	0	0	0	56	0	0	0	0	8063
11	1860	246	16	958	187	240	2522	18	220	146	12838	1399	0	0	0	23	0	0	0	0	0	26193
12	872	304	0	774	62	253	553	68	18	20	1244	18493	63	0	0	98	56	0	0	0	0	22925
13	590	91	328	519	161	165	149	77	18	0	18	405	13761	79	0	64	0	0	0	0	0	16249
14	313	55	16	409	158	35	48	1002	0	0	0	183	78	6100	0	0	0	0	0	0	0	8372
15	25	0	0	0	21	22	21	0	0	0	0	0	0	0	1917	0	0	0	0	0	0	2004
16	94	26	7	49	0	19	47	12	0	0	29	206	0	13	0	0	0	0	0	0	0	592
17	4	0	4	19	0	0	0	0	0	0	4	38	0	0	0	0	0	0	0	0	0	81
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	4261	11675	13224	34327	7399	12642	22505	21545	11509	6325	15659	30726	14433	6276	1925	291	116	5	0	3	26	24342

MATRIZ DE VIAJES 1984 - ACTIVIDADES DE TRABAJO

CUADRO 4-4-1 (4)

ZONA	(VIAJES)																					
	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201	211	TOTAL
1	3817	1335	453	1557	193	471	495	369	282	83	361	421	185	113	0	323	171	51	10	173	114	10937
2	1631	1604	281	891	52	235	405	514	581	201	466	273	154	416	0	255	38	79	13	66	51	8427
3	1133	567	1412	1159	59	164	663	445	199	95	275	309	54	19	41	221	7	57	0	112	44	7036
4	2273	497	413	2981	302	914	873	344	411	36	196	396	186	195	18	308	91	13	0	118	79	10228
5	757	186	66	559	436	254	112	444	52	48	0	44	116	164	0	114	0	118	0	35	3	3512
6	1173	178	286	951	274	1028	667	320	240	42	163	373	105	102	0	229	114	72	20	60	90	6447
7	1089	474	150	1294	261	572	1643	639	192	262	370	320	57	166	0	1017	195	61	42	999	339	8231
8	1131	656	278	1347	155	632	610	2215	343	65	43	41	232	919	50	149	17	171	57	125	75	6434
9	1305	1103	240	1498	20	251	478	709	1053	119	294	499	442	271	0	106	230	0	0	34	79	6783
10	193	205	0	360	0	62	308	34	36	1285	270	212	0	78	0	170	422	30	0	137	87	3931
11	1151	645	307	950	66	120	1011	263	147	457	273	515	82	0	0	366	167	13	18	242	151	6057
12	452	334	425	507	139	197	457	21	616	137	494	2615	282	42	0	1353	345	75	10	182	153	9234
13	344	124	89	607	0	190	445	143	376	51	129	423	3458	435	0	563	68	19	0	111	79	7657
14	645	455	167	620	70	49	255	472	100	24	174	124	361	1178	0	146	16	47	0	364	0	5245
15	26	26	25	21	0	43	74	67	59	0	0	0	18	0	538	59	0	409	0	0	0	1345
16	1055	321	445	791	67	145	775	137	104	146	566	1765	771	75	10	153	0	152	4	160	24	7716
17	269	126	115	354	4	67	358	39	125	323	251	298	27	15	6	24	131	24	0	26	0	2612
18	81	19	57	13	68	24	82	103	0	0	125	11	54	50	160	79	0	19	13	84	14	1058
19	51	31	26	37	0	7	68	0	0	0	0	9	0	0	0	3	0	0	0	0	19	251
20	571	176	56	273	26	150	953	65	29	107	108	197	71	35	0	69	18	14	0	17	0	2915
21	470	199	57	140	30	61	397	41	74	78	69	91	391	11	0	0	0	37	0	0	0	1976
TOTAL	19633	9705	5268	16979	2168	5493	11112	7376	4974	3581	6389	9156	6956	4284	823	5729	2043	1461	187	3119	1481	12605

MATRIZ DE VIAJES 1984 - REG. AL TRABAJO

CUADRO 4-4-1 (5)

ZONA	(VIAJES)																					
	1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)	12)	13)	14)	15)	16)	17)	18)	19)	20)	21)	TOTAL
1	155	106	112	316	154	224	132	169	25	43	141	22	0	0	0	32	0	0	0	3	1	3175
2	363	545	99	33	60	22	54	27	372	0	56	0	0	0	0	15	0	0	0	10	10	1655
3	116	87	288	0	21	0	21	54	20	0	112	0	168	25	118	0	0	0	0	7	0	1037
4	446	295	45	1108	168	136	140	23	63	0	56	96	65	72	0	4	0	0	0	0	0	2642
5	291	0	0	84	167	54	0	0	0	0	0	0	0	0	0	13	10	13	0	0	0	612
6	43	0	0	134	25	219	241	116	0	0	20	40	0	0	25	0	8	0	0	3	0	894
7	376	21	159	475	21	143	556	90	107	47	25	106	33	0	0	52	0	0	0	13	0	2234
8	1033	61	180	124	391	127	157	1721	164	40	132	25	66	147	0	4	141	0	0	7	0	4655
9	252	111	0	85	27	0	16	19	231	0	36	354	48	0	0	0	0	0	0	0	0	1133
10	29	0	0	0	0	23	60	30	0	162	0	168	0	0	0	7	0	0	0	0	0	471
11	27	0	0	19	0	56	75	0	0	20	393	275	0	0	0	15	0	0	0	7	7	892
12	145	22	0	25	0	40	86	24	22	170	226	1027	51	0	0	87	0	0	0	0	0	1926
13	146	0	0	0	22	0	0	109	56	22	36	0	1135	0	18	6	0	0	0	0	0	1545
14	155	57	0	81	0	19	0	93	0	0	0	0	19	588	0	0	0	0	0	0	0	972
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	304	0	0	0	0	0	0	312
16	117	4	0	42	71	3	65	45	56	4	77	294	6	0	0	78	0	0	0	0	0	632
17	21	0	0	14	0	0	8	6	77	114	20	0	0	0	0	0	0	0	0	0	0	261
18	32	6	0	0	6	0	0	3	0	0	38	3	3	26	19	24	0	0	0	0	0	156
19	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	452
20	111	0	59	37	0	0	63	0	0	55	52	0	0	71	0	42	0	0	0	0	0	452
21	159	10	0	7	0	0	20	26	25	0	6	6	0	0	0	0	14	0	0	0	0	145
TOTAL	5374	1255	942	2562	1133	1056	1651	2553	1720	678	1276	2562	1447	1054	391	439	22	246	0	56	18	25973

MATRIZ DE VIAJES 1984 - DE COMPRAS

CUADRO 4-4-1 (6)

ZONA	(VIAJES)																					
	1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)	12)	13)	14)	15)	16)	17)	18)	19)	20)	21)	TOTAL
1	535	287	167	2471	76	68	105	25	19	0	0	41	0	0	0	33	0	0	0	0	0	661
2	1754	530	163	1333	0	123	281	16	0	0	47	0	0	0	0	10	0	0	0	0	0	2734
3	1484	112	443	3594	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9237
4	2355	75	131	15902	133	118	167	92	0	19	194	81	0	0	78	16	16	0	0	0	0	10359
5	751	0	28	781	2448	85	245	129	0	0	0	0	22	0	0	0	0	0	0	0	0	4477
6	1821	51	0	3554	265	4992	533	45	0	0	0	45	177	0	0	0	0	0	0	0	0	9334
7	984	57	0	2374	65	236	6547	51	16	0	204	21	0	0	34	66	25	0	0	49	0	10742
8	2380	61	115	5533	483	335	993	13597	55	22	0	0	12	24	0	4	0	0	0	0	0	24310
9	686	37	245	5521	0	151	1159	58	7953	39	97	0	13	0	0	0	0	0	0	0	0	15784
10	247	20	0	1487	20	61	1333	12	0	484	92	152	15	19	7	0	0	0	0	0	0	35336
11	605	16	0	2733	0	70	1314	0	16	0	9713	137	0	0	0	0	0	0	0	0	0	22423
12	685	42	45	2455	0	42	461	58	18	21	358	17913	42	0	142	0	0	0	0	0	0	16143
13	679	55	22	1363	67	68	261	18	23	22	69	56	11033	256	0	0	0	0	0	0	0	6792
14	582	83	0	2563	0	0	245	132	0	0	19	0	195	2105	0	0	0	0	0	0	0	1467
15	25	0	0	38	26	0	59	0	0	0	0	0	0	1298	0	0	0	0	0	0	0	6792
16	564	24	20	767	27	27	475	0	6	0	153	947	62	0	57	0	10	0	13	0	0	3175
17	122	12	12	221	0	0	158	4	4	0	69	165	0	0	0	0	0	0	0	0	0	498
18	215	13	16	6	3	0	113	0	13	0	0	0	0	31	0	0	0	0	0	0	0	45
19	15	0	7	0	0	0	25	0	0	0	77	19	6	0	0	0	0	0	0	0	0	615
20	180	0	0	100	0	55	158	0	0	6	0	0	0	0	0	0	0	0	0	0	0	483
21	170	11	3	107	0	0	100	0	0	0	57	42	0	0	0	0	9	0	0	0	0	661
TOTAL	23597	6032	5512	49757	3559	6519	15043	14559	7210	4595	11179	19210	11406	2416	1329	403	176	292	0	152	124	17919

MATRIZ DE VIAJES 1984 - SOCIAL - PRIVADOS

CUADRO 4-4-1 (7)

ZONE	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201	211	TOTAL
1	7595	1414	790	2765	421	1116	620	920	587	55	329	210	85	53	21	242	83	79	0	98	154	17677
2	3570	5025	1104	1224	217	454	165	374	187	76	288	222	48	16	0	71	15	44	0	6	57	13169
3	3997	1333	5899	2586	190	833	622	429	371	73	168	113	130	144	0	89	4	23	0	64	121	17160
4	6705	1456	1095	10786	677	2642	1422	1804	569	53	487	347	231	64	53	311	162	125	62	138	64	26171
5	1335	263	101	1247	2610	685	235	1305	44	0	85	186	111	169	0	62	8	0	0	27	71	8747
6	2636	544	356	2610	605	4880	1230	910	367	124	340	330	117	152	19	125	60	23	22	85	36	15873
7	2336	752	442	2141	203	1572	6056	1053	317	120	614	362	280	25	0	332	325	19	19	333	207	17330
8	4220	724	548	3141	1225	1826	1137	20105	282	101	351	177	539	1048	107	285	77	59	0	216	71	36151
9	2524	1049	1020	2300	116	684	945	659	6864	215	237	213	140	0	0	78	25	17	0	56	58	17450
10	511	291	125	411	64	220	426	352	80	6438	392	164	0	0	0	0	226	0	0	14	13	9727
11	2879	541	99	1097	111	602	1368	420	189	387	932	788	139	34	16	470	123	19	0	162	107	16663
12	1187	67	378	1272	86	610	831	497	40	321	1058	355	83	25	1555	377	0	0	21	151	322	25545
13	911	288	135	443	125	284	599	482	77	70	37	148	9573	307	0	408	4	51	0	53	4	14259
14	656	345	69	635	193	200	107	1194	42	25	252	80	203	3527	108	93	0	11	0	95	0	7699
15	0	111	0	67	0	0	0	67	0	0	0	0	0	53	2628	0	0	449	0	0	0	3575
16	1025	445	135	751	106	201	543	347	88	26	631	1687	643	41	0	73	0	13	0	8	0	6971
17	292	165	34	156	0	61	331	91	58	79	274	374	4	4	0	19	0	19	0	49	0	2305
18	330	77	113	162	33	27	156	22	0	0	24	13	35	93	85	11	49	0	3	24	0	1287
19	36	0	0	17	0	10	0	13	0	0	0	14	0	0	0	4	0	0	0	0	0	94
20	285	97	33	110	47	68	372	39	11	11	39	23	10	12	0	4	38	95	0	50	0	1344
21	311	64	27	148	0	24	21	47	26	12	29	97	43	0	0	0	0	32	0	0	37	918
TOTAL	60358	13600	12404	33559	7035	14581	17238	30243	10109	8235	15463	22982	13005	3925	3092	4212	1876	1188	147	1672	183	21244

MATRIZ DE VIAJES 1984 - A LA CASA

CUADRO 4-4-1 (8)

ZONE	11	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201	211	TOTAL
1	18247	14524	25873	21677	8429	15900	18468	22091	14540	2495	11073	7399	5010	2995	70	2173	503	338	0	329	24	48767
2	2226	16411	5363	3632	1192	2317	3023	3656	3818	670	2315	2582	1030	852	111	805	284	43	0	76	66	52166
3	1850	2355	28455	2340	322	1840	1412	1855	4725	333	650	958	564	336	0	510	126	38	31	23	23	49333
4	5551	5576	14828	63315	6053	13333	13637	17167	17403	4723	10383	8139	4233	4508	203	2114	782	64	17	151	28	78373
5	1045	667	1061	1768	10459	1826	930	6242	601	239	873	545	836	557	63	147	53	38	0	40	21	27745
6	1145	1338	2805	3429	1367	23459	5584	4729	3423	1022	2729	2221	1359	630	49	683	175	36	24	117	47	53617
7	58	1079	2265	2763	838	1425	33529	5124	5914	3382	9592	4325	1923	740	103	2197	1344	76	45	510	26	81332
8	958	1103	1243	2440	2705	2652	3302	64251	2185	474	1534	1165	935	3516	216	673	109	52	7	28	43	85012
9	584	632	1020	644	145	935	599	1028	30458	483	911	446	324	239	52	194	53	21	0	15	5	36874
10	168	207	145	203	48	246	445	330	1293	22315	1379	1243	242	49	0	127	121	6	0	10	7	28160
11	359	458	534	855	316	857	2837	1478	1210	1332	40329	4593	741	422	0	1464	725	3	0	135	37	53735
12	672	1292	1707	2574	433	2742	3224	1911	1439	1105	3747	63653	1283	370	0	4434	1127	29	0	108	60	91199
13	185	204	384	666	275	439	1110	1366	403	100	408	1040	47853	971	0	732	98	22	0	59	49	58347
14	95	21	353	40	335	194	87	2437	300	22	114	167	1135	16232	103	93	47	0	0	50	17	21884
15	0	116	49	101	0	79	67	536	0	20	52	124	0	555	7352	12	4	156	0	0	0	9241
16	133	157	183	354	45	332	706	485	307	263	877	2123	534	113	59	0	0	8	3	43	0	6725
17	106	65	23	131	48	102	215	135	154	337	307	506	51	19	0	0	0	9	0	7	0	2217
18	23	104	159	139	21	111	85	832	33	33	73	124	116	72	685	108	66	0	0	37	15	2852
19	0	0	21	23	192	0	0	57	0	0	0	21	0	0	0	7	4	0	0	0	0	325
20	0	0	110	215	110	33	145	352	165	60	242	323	65	296	26	262	26	0	0	0	0	2494
21	71	90	43	106	71	49	125	21	116	44	204	542	0	25	0	0	0	0	0	0	0	1523
TOTAL	35520	5224	8783	8793	3303	6651	67576	13339	6522	3959	8783	10263	6303	3377	9160	16781	5574	949	127	1635	1124	63571

Chapter 5: Person Trip Analysis

5-1. Trip Composition

5-1-1. Trips

1) Total Number of Trips

The total number of trips recorded in the performance of the person trip survey was 2,250,684, which included 2,169,399 trips by persons within the scope of the study (Asuncion Metropolitan Area) and 81,285 trips by persons living outside the area.

The trips which comprise the cumulative total may be divided into the following categories: (A) trips by residents of the area within the area; (B) trips by residents of the area between the area and outside areas; (C) trips by residents of the area completely outside the area; (D) trips by residents of the area across the area; (E) trips by non-residents of the area between the area and outside areas; (F) trips by non-residents across the area. Data on these trips is given in Table 5-1-1 and Fig. 5-1-1.

2) Objectives of Trips

Trips can be divided according to their objectives. The number of trips by category is shown in Table 5-1-2.

The most numerous type of trip was return to one's residence. In all, such trips -- including trips home after being away for a variety of reasons, as well as trips home for lunch -- numbered 1,036,000, or 46.0% of the total. Ranking second in number were trips to commute to work, with 376,000 or 16.7%. In third place were trips for social purposes, private business or recreation, numbering 263,000

or 11.6%. As for business trips, which are normally difficult to grasp in conventional studies, such trips accounted for approximately 7% of the total. Trips for shopping comprised nearly 8%. (Fig. 5-1-2)

3) Means of Travel

Table 5-1-3 shows the total number of trips in each category as divided according to mode of transportation. The results of the study show that bus travel is particularly frequent in the Asuncion Metropolitan Area.

In second place after bus travel were trips completed on foot, which numbered 750,000, or 33.3% of the total. When trips on foot are excluded from the grand total, the percentages for each trip category may be described as follows. Bus trips numbered 896,000, or 59.7%, indicating the conspicuous importance of buses as a major mode of transportation in the Asuncion Metropolitan Area. In fact, bus travel accounts for large percentages among trips of all purposes. Automobiles are also frequently used, whether privately owned or not. Trips carried out by passenger car numbered 328,000, or 21.8%, i.e. just over one-third the number for buses. Cargo vehicles performed 203,000 trips, or 13.5%, i.e. 62% in comparison with the number of trips by passenger car. The primary type of cargo vehicle is the camioneta. Cargo vehicles are for the most part used in connection with business, although they are also used partially for commuting to work, shopping and social recreation. Motorcycles, being still relatively few in number, accounted for only 48,000 trips, or 3.1% of the total. Taxis made 8,000 trips, or only 0.5% of the total. City electric trams were also infrequently used (0.1%), owing to relatively inconvenient location of their routes and lengthy travel time. Train travel too was used only in

limited cases (approx. 700 persons, or 0.04%), due to the relatively long distances between stations and infrequent departures. (Fig. 5-1-3)

5-1-2. Unit of Trip Formation (Trip Production Rate)

The "unit of trip formation" refers to the number of trips performed by a given individual per day. These units fall into two categories:

- a) Gross formation unit: total number of trips divided by total population;
- b) Net formation unit: total number of trips divided by number of persons leaving their homes.

Accordingly, the relationship between "gross" and "net" can be expressed as follows:

Gross formation unit = rate of leaving home x net formation unit.

For the sake of meaningful comparison with the results of other studies and future statistics, unless otherwise specified the phrase "formation unit" as used below shall always refer to the gross formation unit. Also, because trips which can be analyzed by generative characteristic are those which were performed by residents of the area under study in the person trip survey, it is these trips which shall be used for the purposes of analysis here.

When the total number of trips performed by residents of the area (2,169,399) is divided by the number of persons over the age of 6 (731,899), this yields a (gross) formation unit of 2.96. The number of persons leaving home was 628,147 and the rate of leaving home was 85.8%, so the net formation unit is 3.45.

1) Trips by Sex and Age Group

The first special feature is the gap between males and females, with men having a considerably higher formation unit than women: 3.50 male, 2.49 female. When analyzed by age group, the males and females both have low rates among the young and elderly, with a broad expansion seen in the mid-range. The most active age span for males is from about 30 to 45, with more than 4 trips per person each day. This large number is attributable not only to trips to commute to work but also to numerous trips performed for business. In general, females commute to work infrequently and perform only a very limited number of business trips. The most active age spans for females are 20-24 and 10-14, with 2.8 trips per day; the spread among various female age groups is not as marked as that for men, however. In all age groups, the frequency of female trips for shopping purposes is higher than that for males for the same purpose. (Fig. 5-1-4)

2) Formation Unit by Occupation

The occupation with the highest formation unit is professional drivers, at 6.22 trips per day. Following drivers, the next highest categories were managers at 4.81 trips and specialists with 4.15 trips. These were followed by military personnel and salesmen with comparatively high figures of 3.72 and 3.60 trips, respectively. Much lower were unemployed housewives with 1.85 trips, students with 2.88 trips and service personnel with 2.89 trips. While the last three categories were the only categories which were below the average of 2.96 trips for the study area, owing to the high proportion occupied by these categories within the totals they served to bring down the overall average. (Fig. 5-1-5)

3) Formation Unit by Industry

When analyzed according to industry, the formation unit is highest for the transport and communication industries. Next highest are the financial and insurance industries with 4.64 trips, public administrative offices with 4.01 trips, public utilities (water, electricity, telephone) with 3.75 trips and commerce with 3.64 trips. At the lower end are the manufacturing industries with 3.28 trips, service industries with 3.36 trips and agriculture with 3.37 trips. The reasons for the high rate in the financial and insurance industries are the large number of trips to work and returning home, as well as the number of trips for private business, resulting from a two-part work day separated by a long midday break. In the public administrative and utilities industries, because the work day ends at midday, trips are believed to increase as these workers head for other places of work in the afternoon. The relatively high rate for commerce is due to frequent trips for business, shopping and private business. In summary, there appears to be a considerable gap among the various industries depending on the conditions of their respective businesses. (Fig. 5-1-6)

4) Formation Unit by Household Income

The term "household income" as used here refers, in the case where more than one person responding to the person trip survey had income and belonged to the same household, to their total income. The results were then divided into class levels and all members of a given household were included in the class of the household. The categories, as already demonstrated in the analysis for sex and age group, are largely controlled by the generative characteristics of

the individual members of the household. The trip formation units by household income are shown in Fig. 5-1-7. As seen, the formation unit increases with a rise in household income.

An extremely low formation unit results for the category of households having monthly income under 15,000 guarani. This is due to infrequent trips to work resulting from few employment opportunities among this group. Also, mobility increases considerably in the group with an income above 150,000 guarani. Furthermore, as monthly income rises (excluding the exceptional group having income over 500,000 guarani) the number of trips for commuting to work, business and private purposes increases. The reason for the increase in trips home is probably due to a tendency to return home when a specific trip is completed. The frequency of trips to school is about the same among all income groups, indicating a high motivation to attend school among all groups.

5) Formation Unit by Vehicle Ownership/Non-Ownership

Vehicle ownership here applies to all members of any household which possesses a motor vehicle (same principle as applied to household membership). The formation unit for members of households owning a vehicle was 3.50 trips, and that for households not owning a vehicle was considerably lower at 2.68 trips. While the former group had a rate of departure from the home of 87.6%, the latter was slightly less at 84.8%. In terms of trip purpose, the largest variation appears in the number of trips home, as vehicle ownership appears to sharply increase mobility in returning home. Other categories having some degree of variation are commuting to work, private purposes and business, also in reflection of the special characteristic of vehicle.

ownership. (Fig. 5-1-8)

5-1-3. Comparison with Other Cities

In recent years, person trip studies have been performed in Panama City (Panama) and Barranquilla (Colombia) through the technical cooperation of the Japanese International Cooperation Agency. Here, the results of these two studies will be compared with those of the Asuncion study. In addition to functioning as an administrative center, Panama City is also Panama's commercial and financial center. Barranquilla is a port city on the Caribbean Sea and serves as a base for commerce, distribution and industry. The major social indices and trip characteristics of Panama City, Barranquilla and Asuncion are shown in Table 5-1-4.

The population of the Asuncion Metropolitan Area is nearly equivalent to that of the Panama City Metropolitan Area. While the employment structure of the three cities is quite similar, the ratio of tertiary industries in Asuncion is slightly higher than in the other two cities, resulting in a correspondingly lower ratio for Asuncion's secondary industries. The income level in Asuncion (per capita GDP) lies between the levels for the other two cities. This fact is reflected in Asuncion's rate of private vehicle ownership, which is lower than in Panama City but higher than in Barranquilla.

The trip generation rate in Asuncion is 2.96, which is 10% higher than the rate for Barranquilla and approximately 20% higher than that of Panama City. It is conceivable that this circumstance is largely attributable to Asuncion's far higher rate of tertiary industry employment, which yields a high trip generation frequency. Also, another factor, as described below, is the relatively higher catch rate of

trips made on foot in Asuncion. By way of reference, a comparison of the number of trips per person using transport modes other than walking shows that Asuncion and Panama City both have statistics of 1.9 trips and Barranquilla, of 2.0 trips, thus indicating that the variation among the three cities nearly disappears when a comparison of this type is performed.

When the trips are broken down according to purpose, with the exception of school commutation trips -- the share of which is relatively lower in Asuncion -- there are no major differences among the three cities. Also, the trip generation rate for students in Asuncion is 2.8 trips, which in absolute terms is not lower than the rates for the other two cities. The reason for the relatively low share of such trips in Asuncion can probably be attributed to lower percentages of school-age population and school attendance.

A comparison of the trip structures by transport mode for the three cities shows that the ratio of trips completed on foot is higher in Asuncion than in the other two cities. Two feasible reasons may be cited. The first is the relatively compact scale of Asuncion's central districts, resulting in the adequacy of trips made on foot. The second reason relates to a problem of accuracy in the performance of the study, i.e. it is believed that the catch rate of trips on foot in Asuncion was higher than the rates for the other two cities. This fact can be implied from the fact that, in general, the share occupied by short trips for shopping and business is higher in Asuncion.

The relative ratios of trips completed by means other than foot show that in all three cities the primary modes of transport are passenger car and bus. Also, as might be expected, the higher the rate of vehicle ownership, the higher the rate of vehicle usage and the lower the rate of bus usage. In view of the fact that the rate of vehicle

ownership in Asuncion is nearly the same as that of Panama City, the rate of trips performed by passenger car are much lower in Asuncion than in Panama City. On the other hand, the rate of truck trips is extremely higher in Asuncion. From this data it may be speculated that in addition to serving as cargo transport vehicles, trucks are used in Asuncion much like passenger cars.

It should also be mentioned that the use of taxis in Asuncion is far below usage in the other two cities. This relates to the relative unwillingness of Asuncion's citizens to pay high transportation fees.

5-2. Trip Generation and Concentration

5-2-1. Trip Generation and Concentration by Zone

The respective volumes of trip generation and concentration per consolidated zone are shown in Table 5-2-1 and Fig. 5-2-1 (Note: The consolidated zones shown in the figure were established for convenience only. The actual zones to be analyzed later shall be established following separate, detailed study.). The greatest number of trips took place in Zone IV (Pettirossi), with 570,000, followed by Zone I (Centro) with 520,000 and Zone VIII (Botanico) with 470,000. The same ranking is seen for volume of trip concentration also. When analyzed by zone on the basis of per capita nighttime population, the highest volume of generation and concentration is found in Zone I (Centro) at 18.7 trips/person followed by Zone IV (Pettirossi) at 9.9 trips/person and Zone II (Sajonia) at 6.3 trips/person. The remaining zones, including Zone VIII (Botanico), have nearly equivalent values.

In terms of internal trip rates, the cities at the perimeter of the Asuncion Metropolitan Area -- i.e. Zone XV

(Villa Hayes), Zone XIII (Luque), Zone XII (San Lorenzo) and Zone X (San Antonio) -- may be said to be highly independent, showing rates of 78.8%, 75.2%, 64.0% and 63.5%, respectively. In contrast, the zone with the lowest rate of internal trips is Zone I (Centro), with approximately 20%, followed by Zones IV (Pettirossi), V (Parque Caballero) and VI (Mburicao) all at about 33%.

Within Asuncion City proper, the volume of trip generation and concentration is highest in Zone 6 (Sajonia) at 226,000, followed by Zone 13 (Pettirossi) with 213,000. In terms of nighttime population, the highest rate occurs in Zone 2 (Catedral Este) with 95.3 trips/person. This is followed by Zone 1 (Encarnacion) with 38.3 trips/person and Zone 8 (San Roque Este) with 22.3 trips/person. In terms of internal trip rate, Zone 25 (Botanico) ranks first with 54.6%, followed by Zone 22 (Bella Vista) with 43.6% and Zone 11 (Obrero) with 40.5%. In Zones 1, 2 and 4 (Catedral Oeste) at the city center, the rates are low and range from 4.6-9.7%, indicating the near totality of inter-zone traffic in these zones. (Fig. 5-2-2)

5-2-2. Breakdown by Trip Purpose

The volumes of generation and concentration by zone of trips to commute to work or school are shown in Fig. 5-2-3. A review of the trip generation and concentration volumes for each consolidated zone shows that the cumulative number of trips for these two purposes was highest in Zone I (Centro), with 123,000 trips, followed by Zone IV (Pettirossi) with 91,000 trips, Zone VIII (Botanico) with 67,000 trips and Zone VII (Terminal) with 64,000 trips. In terms of generation alone, Zone VIII (Botanico) ranked first with 43,000 trips, followed by Zone VII (Terminal) with 37,000 trips and Zone IX (Lambare) with 32,000 trips. In

concentration volume, Zone I (Centro) ranked first with 106,000 trips, followed by Zones VII (Terminal), VIII (Botanico) and II (Sajonia) with 26,000, 24,000 and 22,000 trips, respectively. Zone I (Centro) showed the largest gap between generation and concentration volumes, indicating this zone's role as the business center for the Asuncion Metropolitan Area. The second greatest gap was in Zone IV (Pettirossi), due largely to the presence of Mercado 4. In contrast, zones in which the generation volume exceeded the concentration volume by a wide margin were Zones III (Barrio Obrero), VII (Terminal), VIII (Botanico) and IX (Lambare), all residential zones located at the outer fringe of Asuncion. Within Asuncion proper, the highest concentration volumes were recorded in Zone 1 (Centro) and 2 (Catedral Este); the highest generation volume, in Zone 6 (Sajonia). In terms of per capita nighttime population, the volumes of generation and concentration were both high in Zones 1 and 2, with an especially high concentration in the latter.

A review of school commuter trips by consolidated zone indicates the highest volume of generation was in Zone VIII (Botanico) with 30,000 trips, followed by Zone VII (Terminal) with 25,000 and Zone XII (San Lorenzo) with 23,000. In terms of concentration volume, Zone IV (Pettirossi) ranked first with 34,000 trips, followed by Zone I (Centro) with 32,000 and Zone XII (San Lorenzo) with 30,000. These high rankings reflect the fact that all of these zones are the site of middle schools, high schools and universities. Within Asuncion proper, the highest incidence of generation was recorded in Zone 6 (Sajonia), followed by Zone 25 (Botanico) and Zone 20 (Ycua Sati). In terms of concentration volume, order of ranking was Zones 8 (San Roque Este), 2 (Catedral Este) and 18 (Pte. Stroessner). In terms of per capita nighttime population, the generation volume was highest in Zones 2 (Catedral Este) and 4

(Catedral Oeste), and the volume of concentration was highest in Zones 2 (Catedral Este) and 8 (San Roque Este).

5-2-3. Generation and Concentration Volumes by Hour

The total trip generation volumes by hour of the day are shown in Fig. 5-2-4. For all trip purposes combined, there are 3 daily peaks: 6:00-7:00, 11:00-12:00 and 17:00-18:00. The greatest peak is the one occurring from 6:00-7:00.

When limited to work commutation trips only, there are 2 daily peaks: at 6:00-7:00 and 14:00-15:00. These facts indicate the trend toward relatively early work hours and double commuting each day. The afternoon peak, however, is only about 1/3 the scope of the morning peak.

Trips to commute to school show 3 daily peaks: 6:00-7:00, 13:00-14:00 and 18:00-19:00. These trends reflect the fact that middle and high schools and universities all have both day and evening sessions.

Trips to return home peak twice: at 11:00-12:00 and 17:00-18:00. The higher peak is the earlier one, with 89.7% of all trips taking place at this hour being for this purpose.

Shopping trips are most concentrated between 8:00-9:00. Approximately 65% of all trips for this purpose are carried out during the morning hours.

Trips for social and private purposes increase after 13:00-14:00 and maintain a nearly even level until 21:00-22:00.

5-3. Distributed Traffic Volume

5-3-1. Distribution Pattern Outline

Of the total of 2,250,000 trips in the current OD table, 52% (1,161,000) take place entirely within Asuncion proper. When the traffic volume between the city and its outside areas -- which accounts for another 22% (500,000 trips) -- is added, the total volume of trips in or partially within Asuncion City comes to 74% (1,641,000 trips). This high percentage clearly indicates the great importance of the city within the traffic volume for the entire Asuncion Metropolitan Area. When the western half of the city -- i.e., consolidated Zone I (Centro) and its surrounding Zone II (Sajonia), Zone III (Bo. Obrero), Zone IV (Pettirossi) and Zone V (Parque Caballero) -- is considered as one district, trips occurring solely within this district account for 24% (543,000) of the total, and those occurring between this district and other areas form another 28% (638,000), thereby indicating that more than half of all trips in the Asuncion Metropolitan Area relate to this western half of the city.

An analysis of the distribution patterns of the consolidated zone OD table shows that Zone IV (Pettirossi) and Zone I (Centro) have conspicuously strong potential. These two zones have traffic flows with all zones in the Asuncion Metropolitan Area. The strongest ties of all are between Zones I and IV themselves. Among other consolidated zones, Zones VII (Terminal) and VIII (Botanico) rank next; these zones also have traffic flowing to all other districts.

The desire line map for trips of all kinds is shown in Fig. 5-3-1.

5-3-2. OD Patterns By Trip Objective

The OD pattern for work commutation trips shows the heaviest traffic volume concentrating toward consolidated

Zone IV (Pettirossi), which is the site of Mercado 4. Some 28% of all trips related to shopping are represented here. The next heaviest concentration is in Zone I (Centro), followed by Zone VII (Terminal). With the exception of trips made into these three zones, shopping trips of peripheral cities are limited almost entirely to those completed within those cities themselves. (Fig. 5-3-5)

The OD pattern of trips made for private purposes shows a high percentage of trips being completed within their respective zones. Trips to neighboring zones are also relatively frequent. The zone receiving the greatest concentration of such trips is Zone I (Centro), followed by Zones IV (Pettirossi) and VII (Terminal). These zones have the largest number of recreational facilities, etc. (Fig. 5-3-6)

Trips of return to the home refer to those which are made after completing any of the trip types described above. Such trips are great in number and show patterns similar to the overall patterns for the Asuncion Metropolitan Area. (Fig. 5-3-7)

5-3-3. Concentration Toward Centro

Among work commutation trips with Centro as their ultimate destination, the largest volumes are from Zones 6 (6,800 trips), 13 (4,900 trips) and 21 (4,000 trips), followed by Zones 11, 12, 26 and 29. These are heavily populated zones which directly border on Centro, in the area between Avda. Juscelino Kubitschek - Brasilia and Centro. Other cities with heavy traffic volumes are Lambare and F.D. Mora. These patterns are clear from the patterns for the consolidated zones given in Fig. 5-3-8. The same figure also reveals (1) that the volume of traffic from Limpio toward Centro is very small, (2) that the percentages of

traffic from Luque, San Lorenzo and F.D. Mora are nearly equally distributed at about 12%, and (3) that the percentages for the cities at Asuncion's borders and for the above-mentioned area between Avda. Kubitschek - Brasilia and Centro are nearly equivalent at about 25% each. (Fig. 5-3-9)

5-4. Transportation Mode Distribution

5-4-1. Transportation Mode Distribution by Trip Objective

The respective shares occupied by each transportation mode for the various types of trips are shown in Fig. 5-4-1. Among transportation modes used for work commutation trips, buses account for the highest share at 49.7%, or nearly half. In second place are passenger cars at 19.1%. Trucks are also used with relatively high frequency. Trips of commutation to school are most frequently completed on foot, as might naturally be expected. Ranking second in this category is bus transportation at 33.3%. Other transportation modes are used only infrequently. The transportation modes used to return to the home are almost identical to those for all trip objectives combined. Two special features of business-related trips are the high share of truck usage (33.5%) and the infrequent completion of such trips on foot. Buses are also used for such trips with surprisingly high frequency. Among shopping trips, more than half (52.7%) are completed on foot. Trips for private business are most commonly carried out using bus, foot and passenger car, in that order.

The shares of trip objectives for each transportation mode are shown in Fig. 5-4-2. Passenger cars are used more than the average among trips for work commutation and private purposes. Trucks are used most for business and to

a large extent for commutation to work also. Buses are used for a wide variety of objectives, especially commutation to work and school. Streetcars are most often used for commuting to school, shopping and private business. Trains are most frequently used for commuting to work.

5-4-2. OD Patterns for Each Transportation Mode

Trips completed on foot generally cover only a short distance and are thus primarily limited to the confines of a given zone or its neighboring zone. Such trips are therefore excluded from the discussion which follows.

The pattern of passenger car use shows a large quantitative OD pair in Centro and its surrounding zones, particularly between Zones 1 (Encarnación), 2 (Catedral Este), 6 (Carlos A. Lopez), 8 (San Roque Este), 9 (Las Mercedes), 13 (Pettirossi), 15 (Recoleta) and 21 (Jara). In general, trips covering long distances are not seen.

In contrast, the pattern of bus usage indicates a large volume of long-distance trips. The flow is greatest between the area including Lambare, F.D. Mora, San Lorenzo and Botanico and the area including Centro and its neighboring six zones. Although passenger car usage is frequent between Zones 8 (San Roque Este), 9 (Las Mercedes), 14 (Mburicao), 15 (Recoleta) and 21 (Jara), a similarly active OD pair is not visible for bus use in these zones; this phenomenon points to a clear distinction between bus and passenger car use in these areas.

The pattern of cargo vehicle usage differs considerably from the two patterns just described. In addition to Centro and its six surrounding zones, patterns of heavy concentration show core centers in Zone 13 (Mercado 4 is located here), Lambare, Zone 18 (Mercado Abastos is located here), F.D. Mora and San Lorenzo. For this reason, whereas

passenger vehicle traffic concentrates radially toward Centro, cargo vehicle traffic is more widely distributed and flows in loop configurations.

The flow of taxis occurs primarily within Asuncion City, and no outstanding patterns are detectable. The streetcar routes are limited in scope, with the highest traffic flow seen between Centro and Zone 21 (Jara). Train traffic is even less frequent and is limited to flows between those zones having stations.

5-4-3. Transportation Mode Shares and Distance Distribution

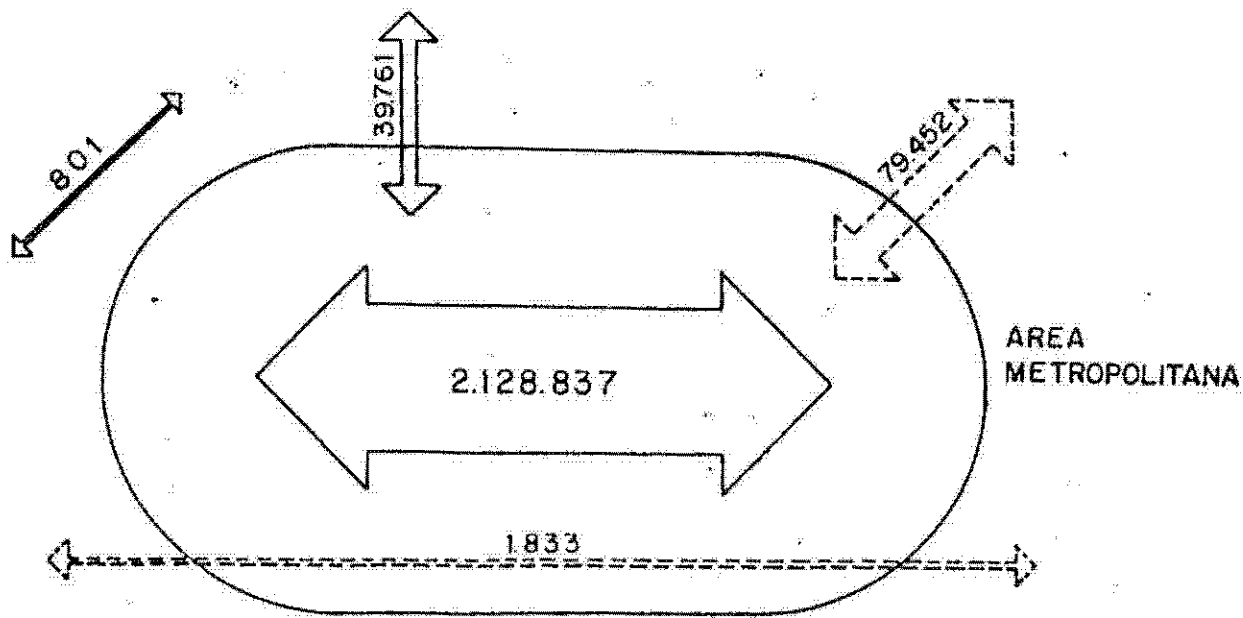
Fig. 5-4-3 shows the progressive curve of trip time distribution for each mode of transportation, divided by vehicle ownership or non-ownership. Among trips completed on foot, trips up to 20 minutes long account for about 80%. Members of households owning cars tend to have slightly shorter walking distances. As much as 80% of all passenger car trips are less than 30 minutes in duration, and members of households possessing cars used cars for traveling even shorter distances. Trips made by truck are approximately 10 minutes longer than those made by passenger car, again pointing to a difference between car ownership and non-ownership. Taxis are used for short distances. Buses are used over considerably longer distances, with 80% of such trips extending 45 minutes among car owner households and 60 minutes among non-owners.

Fig. 5-4-4 shows the shares of passenger car (i.e. private transportation) and public transportation for each trip objective and distance range. Concerning trips for work commutation, as distance increases the share occupied by passenger cars decreases and that of public transportation increases. With school commutation trips, public transport accounts for a large share and the share

for passenger cars is small; also, there does not appear to be a fluctuation in relative share depending on the distance factor. As for business trips and trips returning to work, while the share occupied by passenger cars is higher here than for other trip objectives, there is no apparent influence exercised by the distance factor. Shopping trips show the same pattern as school commutation trips. Trips for private business reveal a high share of car usage, but here again no sharp decrease is seen when distances increase.

CUADRO 5-1-1 CANTIDAD DE VIAJES DE PERSONAS

Clasificación de Viajes		Viajes
Residente del	(A)	2,128,837
Area Metropolitana	(B)	39,761
	(C)	752
	(D)	49
No Residente del	(E)	79,452
Area Metropolitana	(F)	1,833
T o t a l		2,250,684



UNIDAD VIAJES DE PERSONAS

TOTAL 2.250.684

←→ Residente

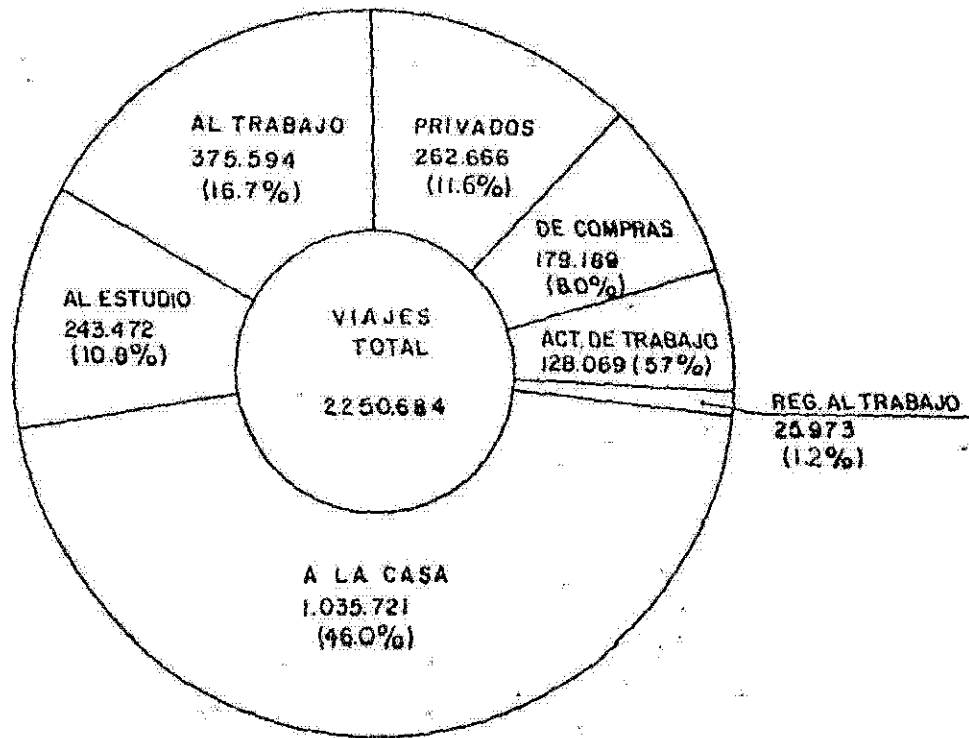
←- - - - -> No Residente

FIGURA 5-1-1

VIAJES TOTAL DE PERSONAS EN 24 HS.

CUADRO 5-1-2 CANTIDAD DE VIAJES POR PROPOSITOS

Propósitos	Viajes	Porcentaje
Al Trabajo	375,594	16.7 (%)
Al Estudio	243,472	10.8 (%)
A la Casa	1,035,721	46.0 (%)
Regreso al Trabajo	25,973	1.2 (%)
Actividades del Trabajo	128,069	5.7 (%)
De Compras, a Comer	179,189	8.0 (%)
Esparcimiento Social	262,666	11.6 (%)
T o t a l	2,250,684	100,0 (%)



UNIDAD: VIAJES DE PERSONAS

FIGURA 5-1-2 VIAJES DE PERSONAS POR DISTINTOS PROPOSITOS

CUADRO 5-1-3

CANTIDAD DE VIAJES POR MEDIO

Medios	Viajes	Porcentaje con Caminando	Porcentaje sin Caminando
Caminando	749,625	33.3 (%)	— (%)
Motocicleta	46,798	2.1 (%)	3.1 (%)
Coche, Jeep	327,592	14.6 (%)	21.8 (%)
Camión, Camioneta	202,982	9.0 (%)	13.5 (%)
Taxi	7,520	0.3 (%)	0.5 (%)
Omnibus	895,871	39.8 (%)	59.7 (%)
Tranvía	1,432	0.06 (%)	0.1 (%)
Ferrocarril	674	0.04 (%)	0.04 (%)
Otros	18,190	0.8 (%)	1.2 (%)
T o t a l	2,250,684	100.0 (%)	100.0 (%)

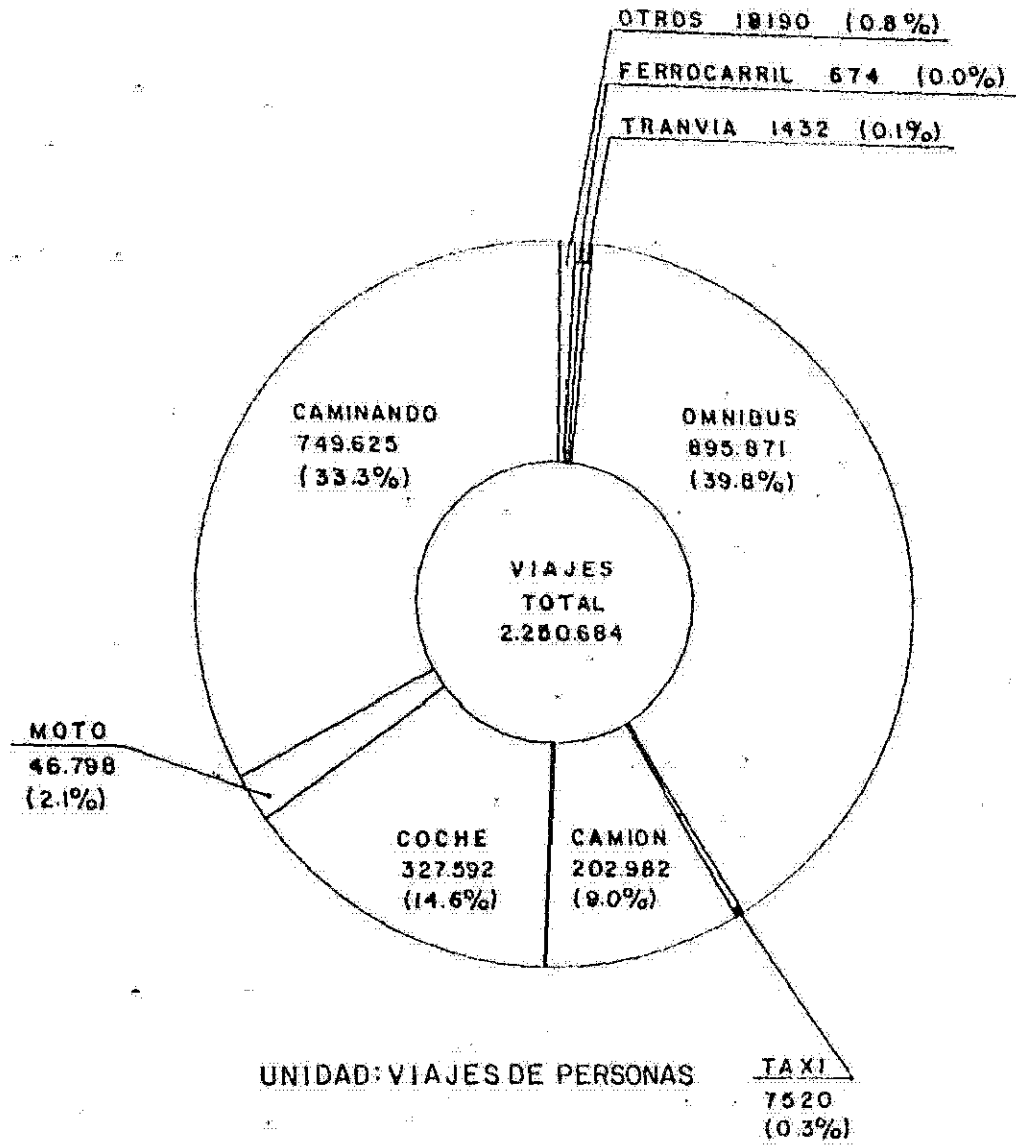


FIGURA 5-1-3 VIAJES DE PERSONAS POR DISTINTOS MEDIOS EN 24 Hs.

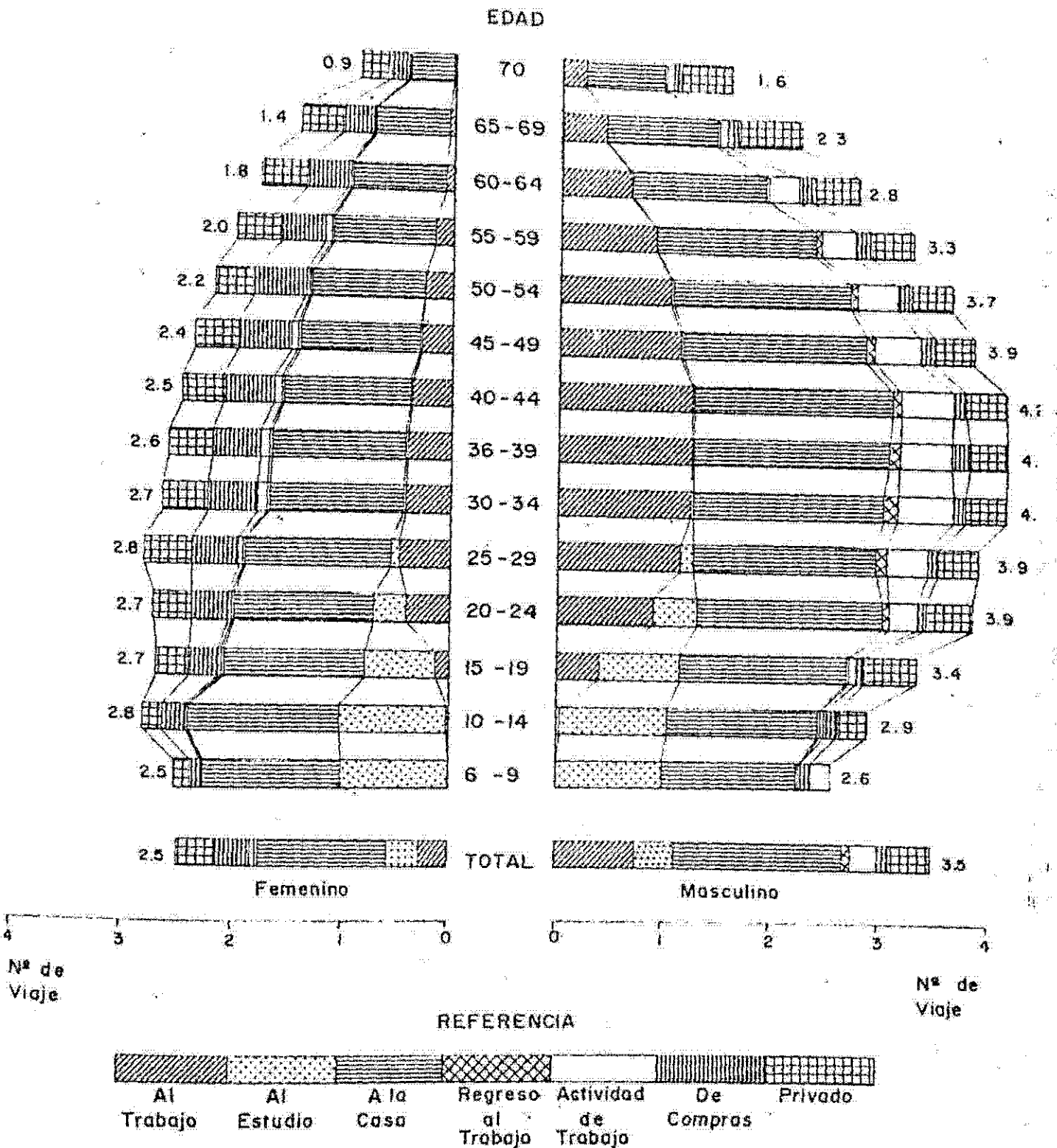


FIGURA 5-1-4 PRODUCCION DE VIAJES DE PERSONAS POR SEXO, EDAD Y PROPOSITO

Ocupación

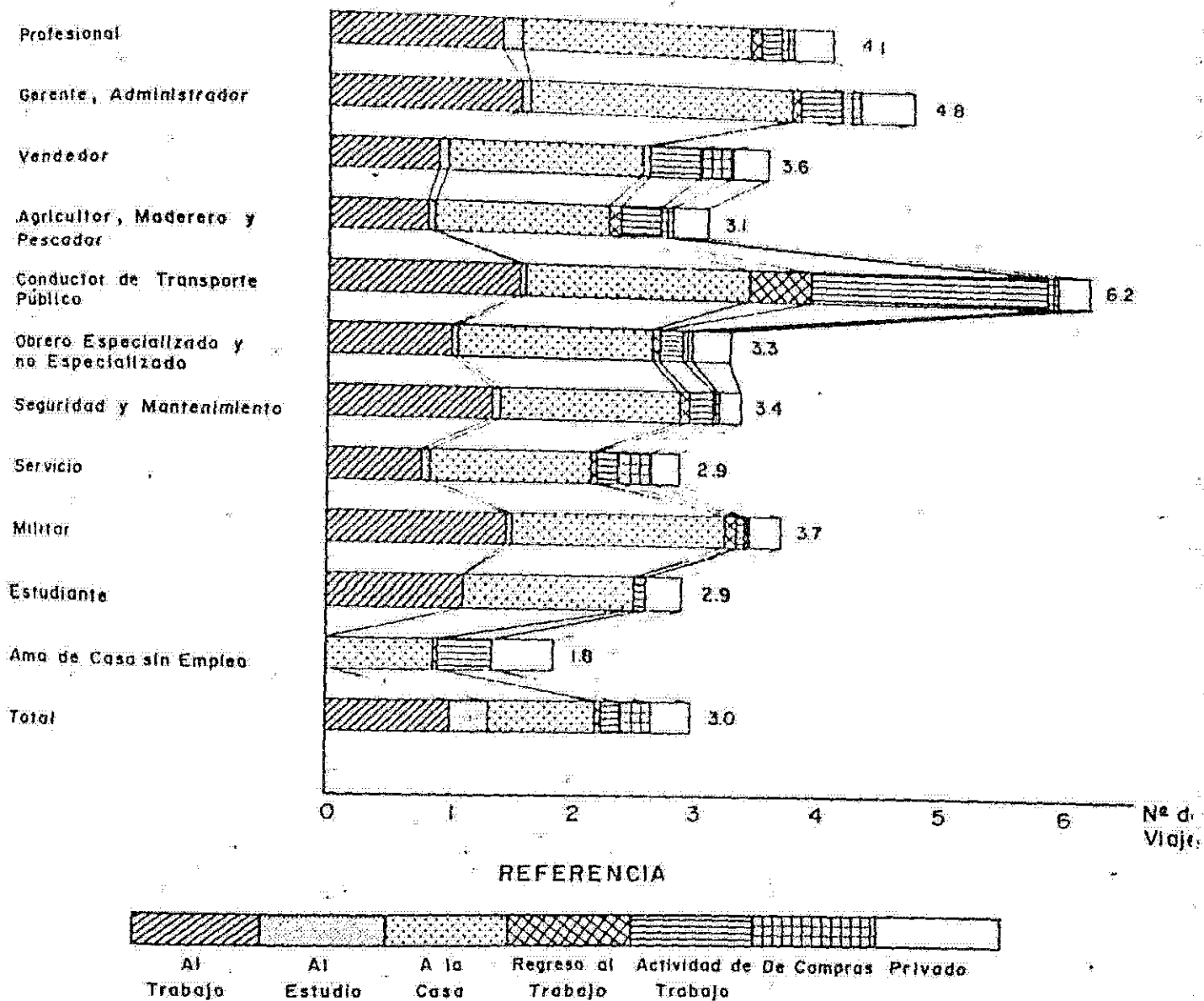


FIGURA 5-1-5 PRODUCCION DE VIAJES POR OCUPACION Y PROPOSITO

INDUSTRIAS

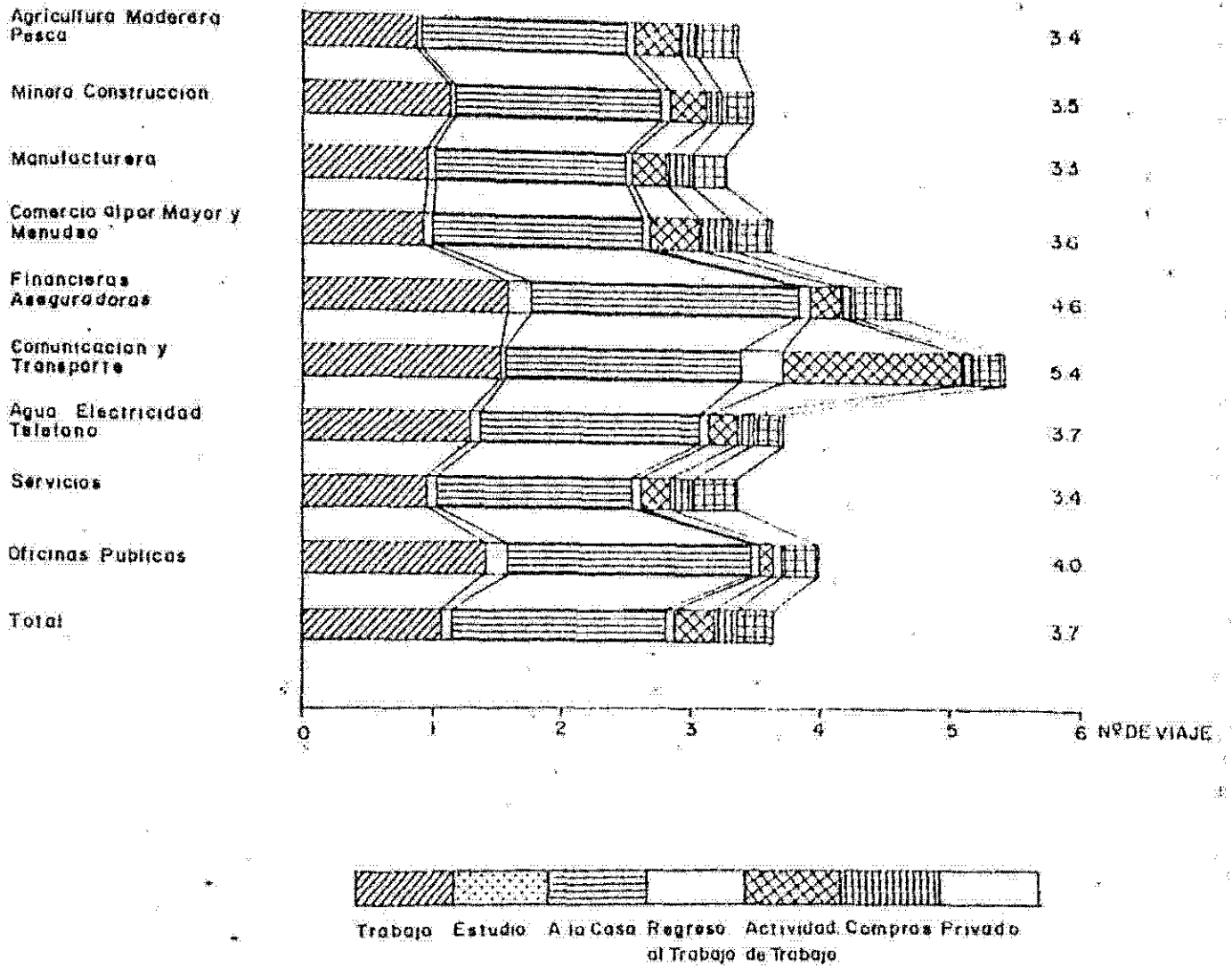


FIGURA 5-1-6 PRODUCCION DE VIAJES POR INDUSTRIAS Y PROPOSITO

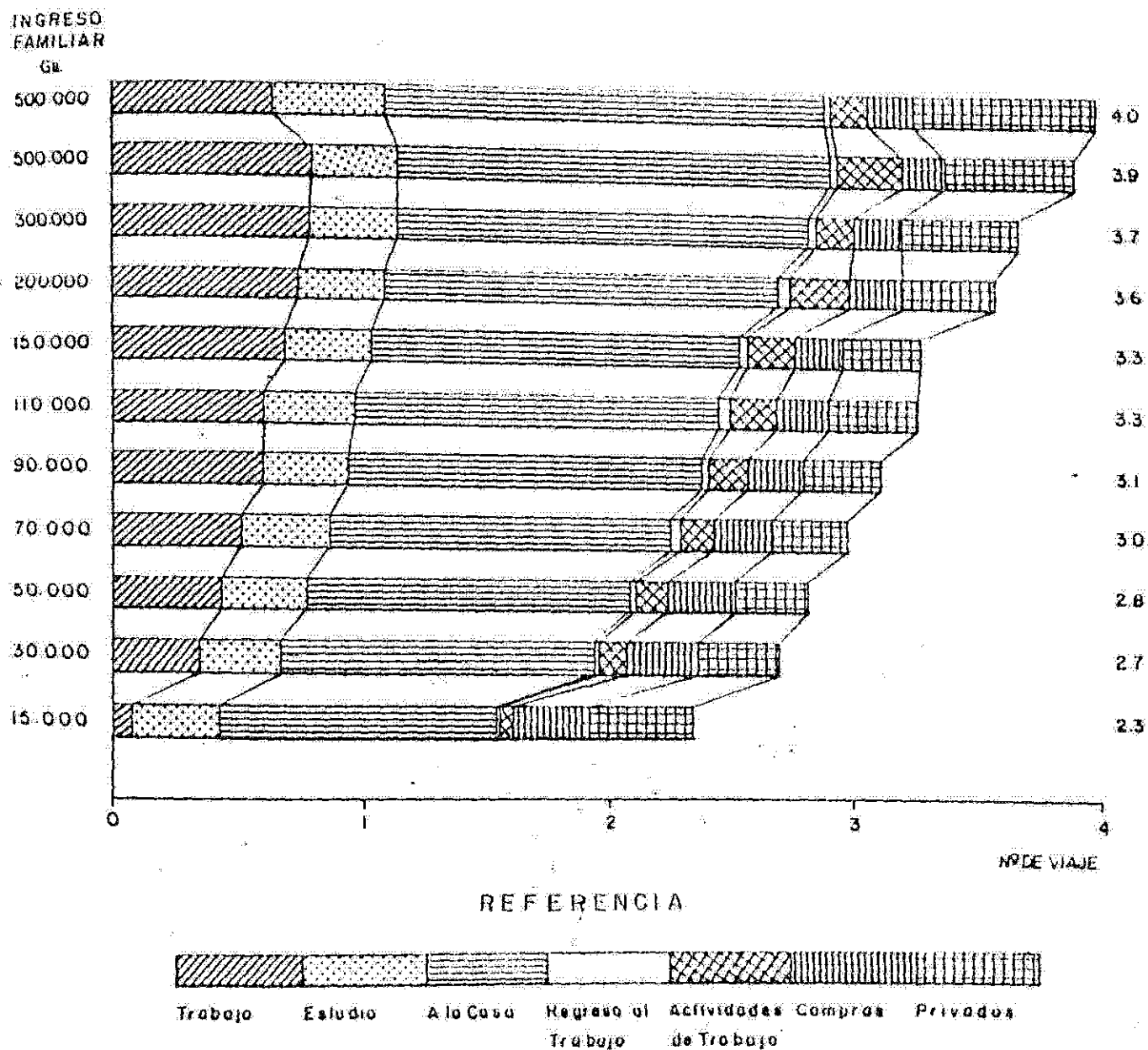
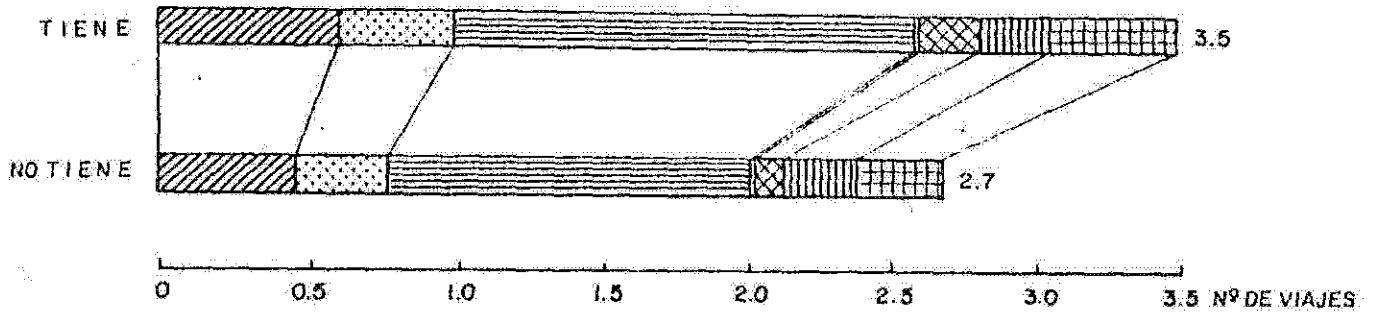


FIGURA 5-1-7 PRODUCCION DE VIAJES POR INGRESO FAMILIAR Y PROPOSITO

AUTO PROPIO



REFERENCIA

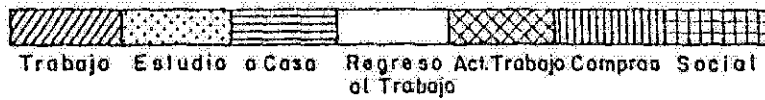


FIGURA 5-1-8 VIAJES DE PERSONAS-A PROPOSITO Y AUTO PROPIO

CUADRO 5-1-4 CUADRO COMPARATIVO DE RESULTADOS DE ESTUDIO DE VIAJES DE PROGRAMAS, EN TRES (3) CIUDADES DE LATINO-AMERICA

	Araucanía	Panamá	Barranquilla
1. Año de Estudio	1984	1980	1983
2. Superficie de Estudio (Km ²)	711	1,076	514
3. Población (1.000 hbts.)	858	759	1,108
4. Población trabajadora (1.000 hbts.)	338	220	340
5. Estructura Ocupacional (Sector Prim, Sec. y Terciario) %	3.5; 15.9; 80.6	3.7; 22.3; 74.5	2.3; 21.8; 73.9
6. PIB Per cápita (US\$ de 1981)	1,630	1,910	1,380
7. Índice de Tenencia de Automóvil (%)	33	37	15
8. Cantidad Total de Viajes (1.000)	2,169	1,474	2,581
9. Índice de Producción de Viajes (Bruto)	2.96	2.41	2.69
10. Índice de Producción de Viajes (Neto)	3.45	3.20	3.04
11. Índice de Salidas (%)	85.8	72.5	88.0
12. Estructura de los viajes según Propósitos (%)			
. Al trabajo	16.7	17.9	14.5
. Al estudio	10.8	15.6	16.5
. Regreso a la casa	46.0	43.6	48.5
. Regreso al trabajo	1.2	-	-
. Actividades de trabajo	5.7	4.0	3.8
. Compras	3.0	4.6	7.4
. Asuntos personales	11.6	14.2	10.3
13. Estructura de los viajes * Según Medios de Transporte (%)			
. a pié	34.6	22.1	25.6
. Biciclos	2.2 (3.3)	0.2 (0.2)	1.4 (1.8)
. Automóviles	14.8 (22.7)	26.9 (34.5)	10.9 (14.6)
. Camiones	8.8 (13.5)	6.9 (8.9)	4.1 (5.5)
. Taxi	0.3 (0.5)	4.8 (6.2)	5.0 (6.7)
. Omnibus	38.4 (58.6)	39.0 (50.1)	53.0 (70.9)
. Tran, tranvía	0.1 (0.1)	-	-
. Otros	0.8 (1.3)	0.1 (0.1)	0.4 (0.4)

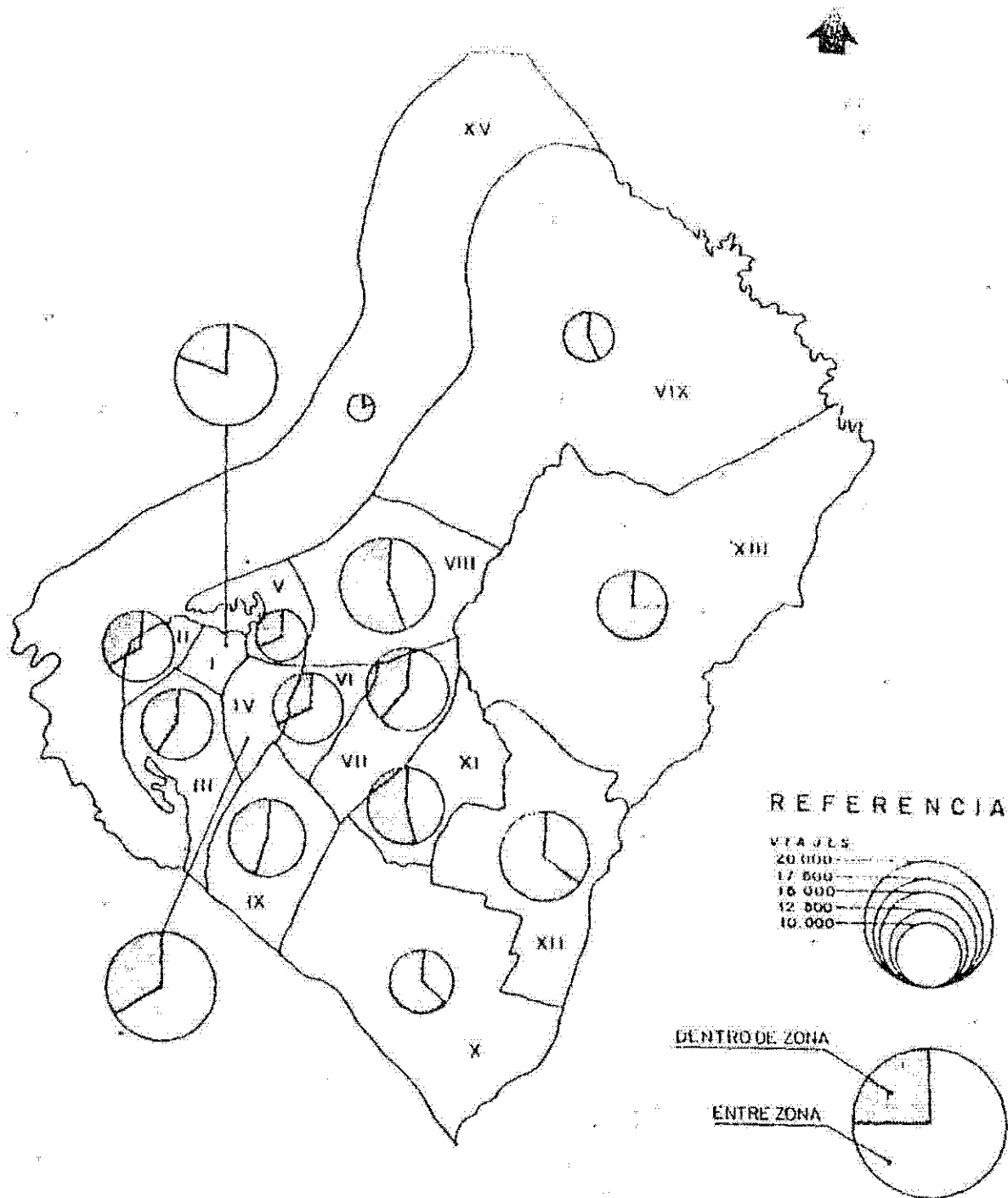
* Lo indicado dentro de los paréntesis (%) son índices de composición que excluyen viajes "a pié"

CUADRO 5-2-1 (T) GENERACION + ATRACCION DE VIAJES

Zona Integral	Genera- cion	Attrac- cion	Total	Pobl a- cion	Sobre Persona que habita		
					Gene.	Atrac.	Total
I	258.498	262.893	521.390	27.683	9.28	9.44	18.71
II	115.105	115.775	230.881	36.898	3.12	3.14	6.26
III	135.651	135.457	271.108	64.678	2.10	2.09	4.19
IV	283.196	285.005	568.201	57.468	4.93	4.98	9.88
V	66.541	66.046	132.587	21.720	3.01	3.04	6.10
VI	128.745	127.978	256.723	44.947	2.86	2.85	5.71
VII	183.848	185.192	369.040	71.752	2.56	2.55	5.12
VIII	237.541	236.650	474.191	86.925	2.73	2.72	5.46
IX	133.983	133.974	267.957	64.643	2.08	2.08	4.16
X	72.400	72.433	144.833	29.590	2.45	2.45	4.86
XI	154.934	153.941	308.875	60.684	2.47	2.46	4.93
XII	207.313	206.695	414.008	79.872	2.93	2.92	5.84
XIII	130.724	130.892	261.616	56.747	2.30	2.31	4.61
XIV	59.227	59.270	118.497	28.327	2.09	2.09	4.18
XV	19.450	19.230	38.680	6.965	2.79	2.70	5.50
Total	2.187.216	2.189.671	4.376.887	731.895	2.99	2.99	5.98

CUADRO 5-2-1 (2) GENERACION Y ATRACCION DE VIAJES

Zona	Generacion	Atraccion	Total	Poblacion	Sobre Persona que Habita		
					Gene.	Atrac.	Total
1	68.024	67.967	135.991	3.547	19.18	19.18	3.74
2	75.239	75.733	150.972	1.585	47.47	47.72	6.25
3	27.160	27.042	54.202	7.566	3.53	3.56	7.15
4	46.904	47.063	93.967	5.921	7.92	7.95	15.87
5	36.331	36.042	72.373	9.224	3.94	3.91	7.85
6	113.392	113.486	226.878	36.896	3.07	3.08	6.15
7	60.035	60.053	120.088	7.031	8.54	8.54	17.08
8	53.139	53.227	106.366	4.761	11.16	11.16	22.34
9	59.292	59.343	118.635	13.776	4.30	4.31	8.61
10	43.639	43.553	87.192	19.957	2.19	2.18	4.37
11	59.846	59.762	119.608	29.220	2.05	2.05	4.09
12	31.032	30.967	62.019	15.501	2.00	2.00	4.00
13	106.355	106.372	212.727	31.918	3.33	3.35	6.68
14	30.386	30.200	60.586	9.825	3.09	3.07	6.17
15	52.914	52.762	105.676	15.552	3.40	3.39	6.80
16	20.662	20.645	41.307	8.545	2.42	2.42	4.83
17	23.212	23.201	46.413	11.025	2.11	2.10	4.21
18	86.719	86.760	173.479	28.507	3.06	3.06	6.13
19	34.034	34.068	68.102	16.116	2.11	2.11	4.23
20	56.041	56.062	112.103	27.329	2.05	2.05	4.10
21	66.092	65.646	131.738	21.720	3.04	3.02	6.07
22	58.717	58.395	117.112	20.741	2.83	2.82	5.65
23	47.433	47.496	94.929	12.482	3.80	3.81	7.61
24	41.114	41.134	82.248	18.916	2.17	2.17	4.35
25	88.852	88.859	177.711	34.766	2.55	2.55	5.10
Total	1.386.500	1.386.464	2.772.964	412.269	3.36	3.36	6.72



AREA METROPOLITANA

FIGURA 5-2-1 GENERACION DE VIAJES DENTRO DE ZONAS Y ENTRE ZONAS

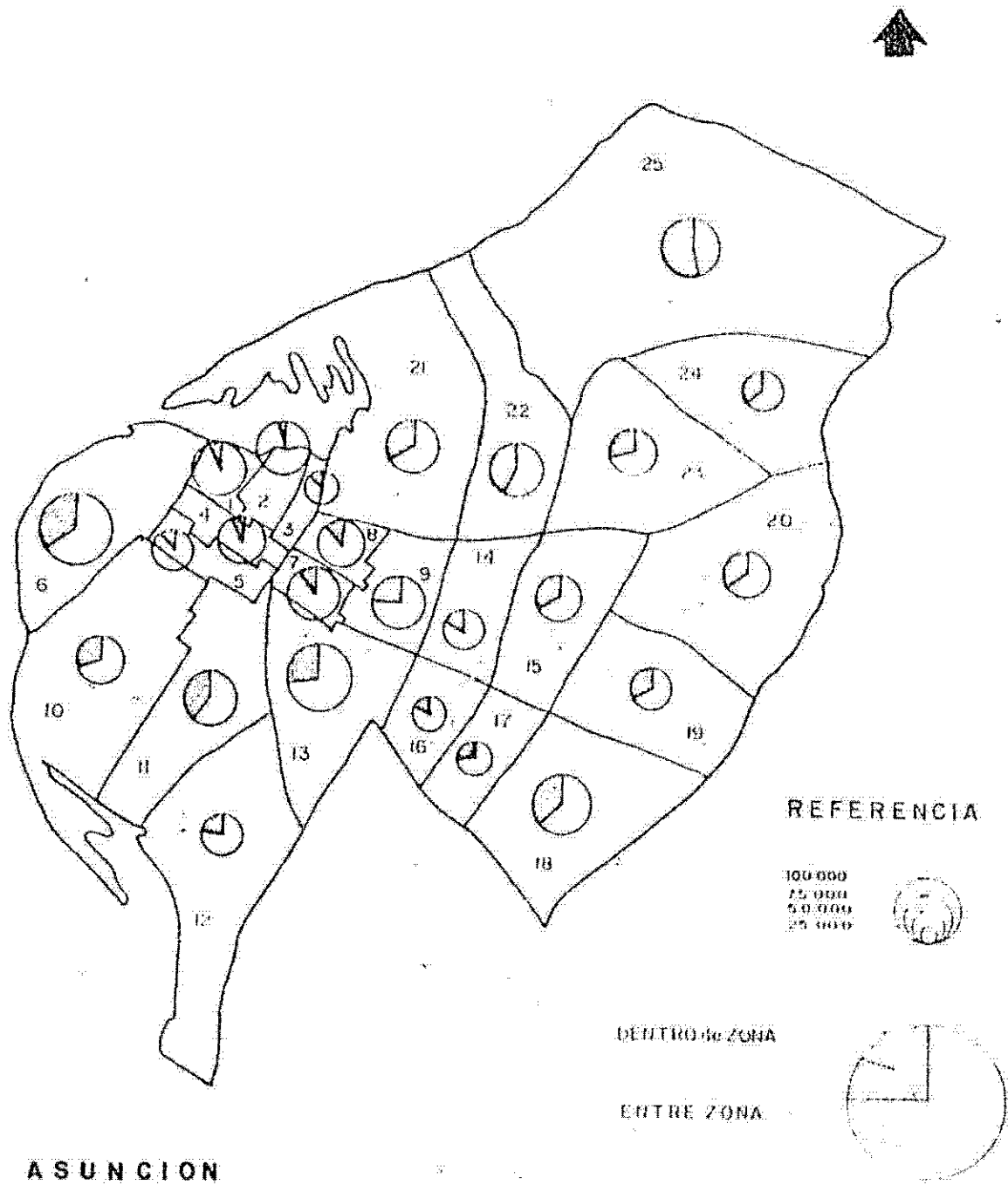


FIGURA 5-2-2 GENERACION DE VIAJES DENTRO DE ZONAS Y ENTRE ZONAS

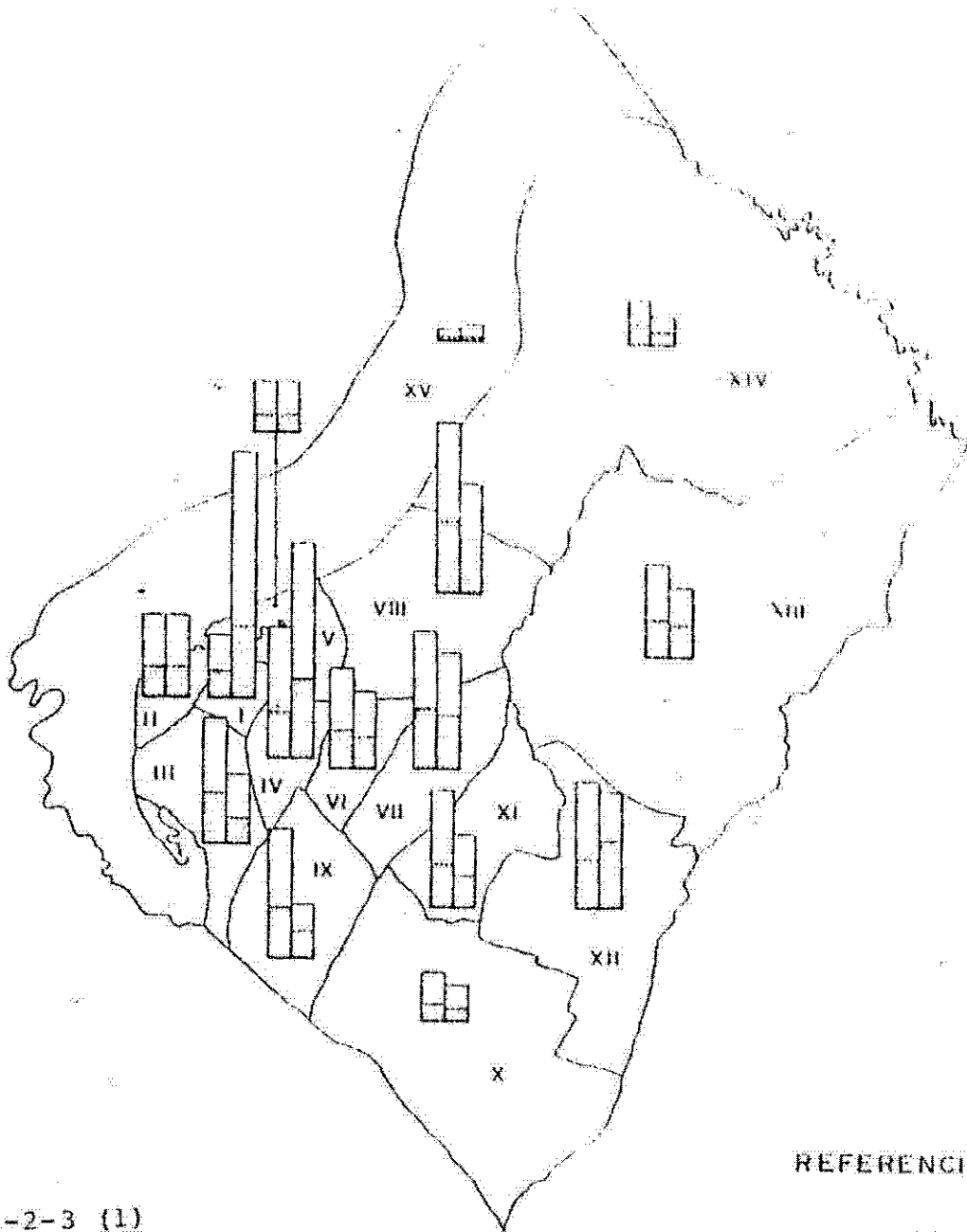
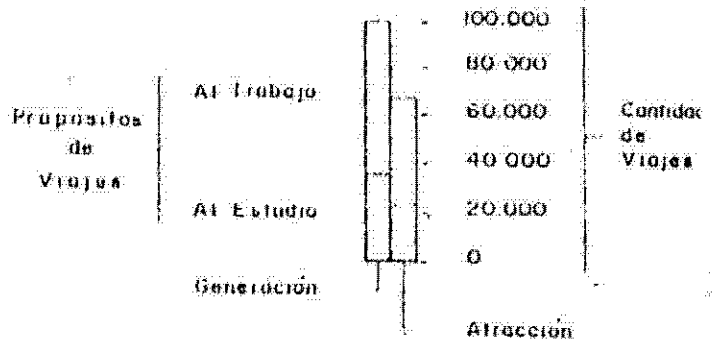


FIGURA 5-2-3 (1)

ATRACCION Y GENERACION DE VIAJES CON PROPOSITO AL TRABAJO Y AL ESTUDIO

AREA METROPOLITANA

REFERENCIA



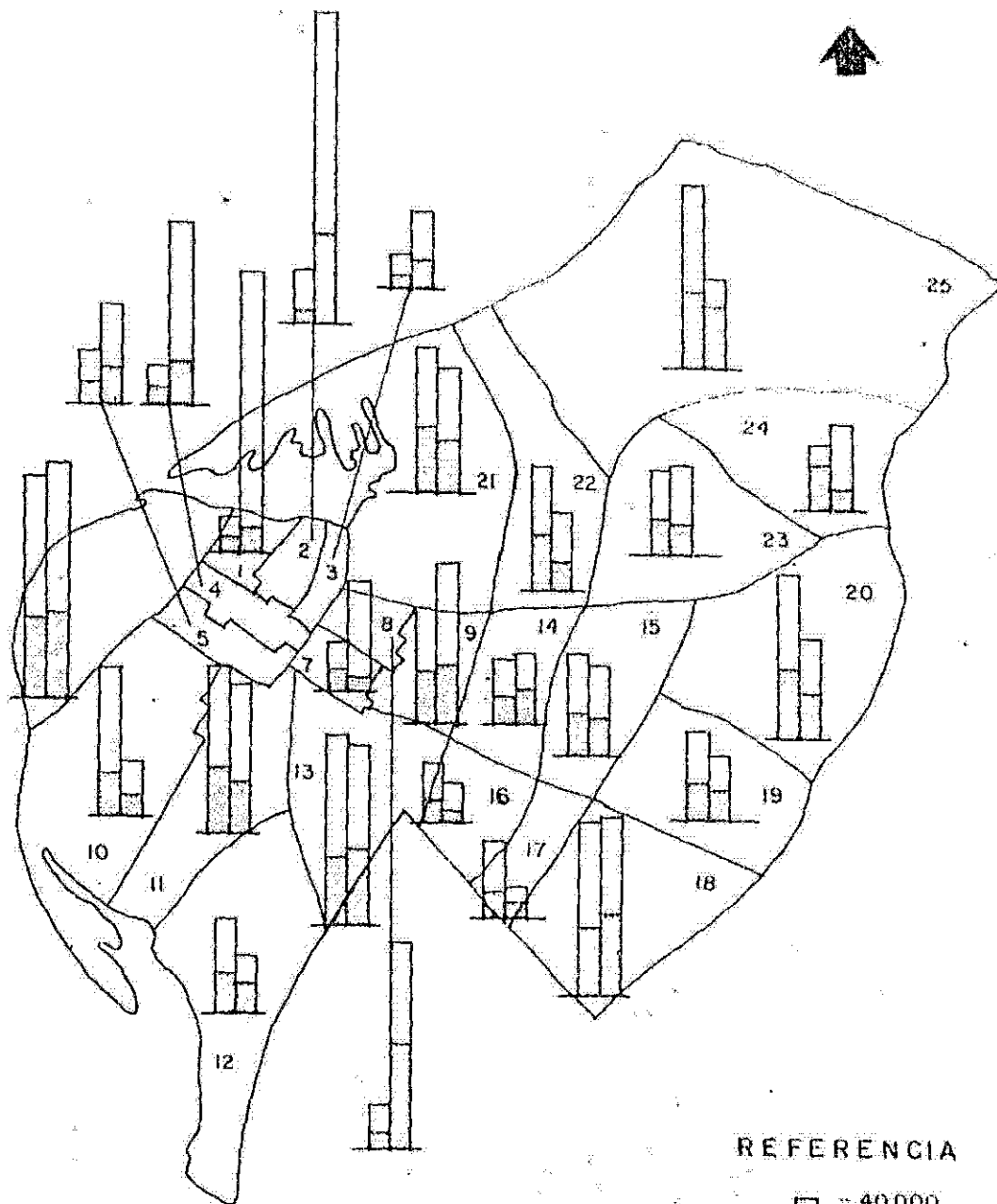
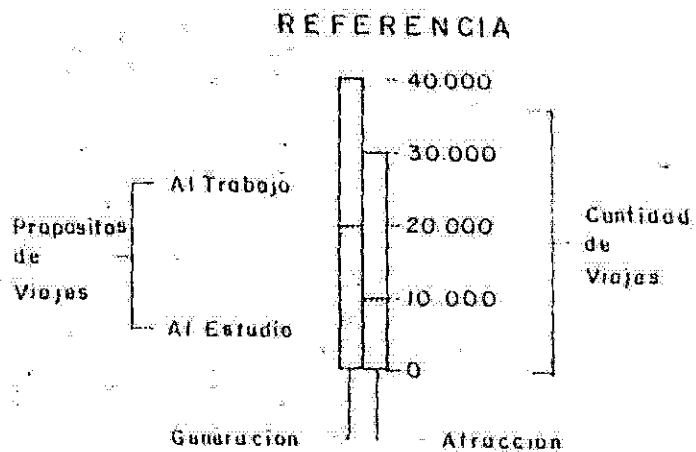
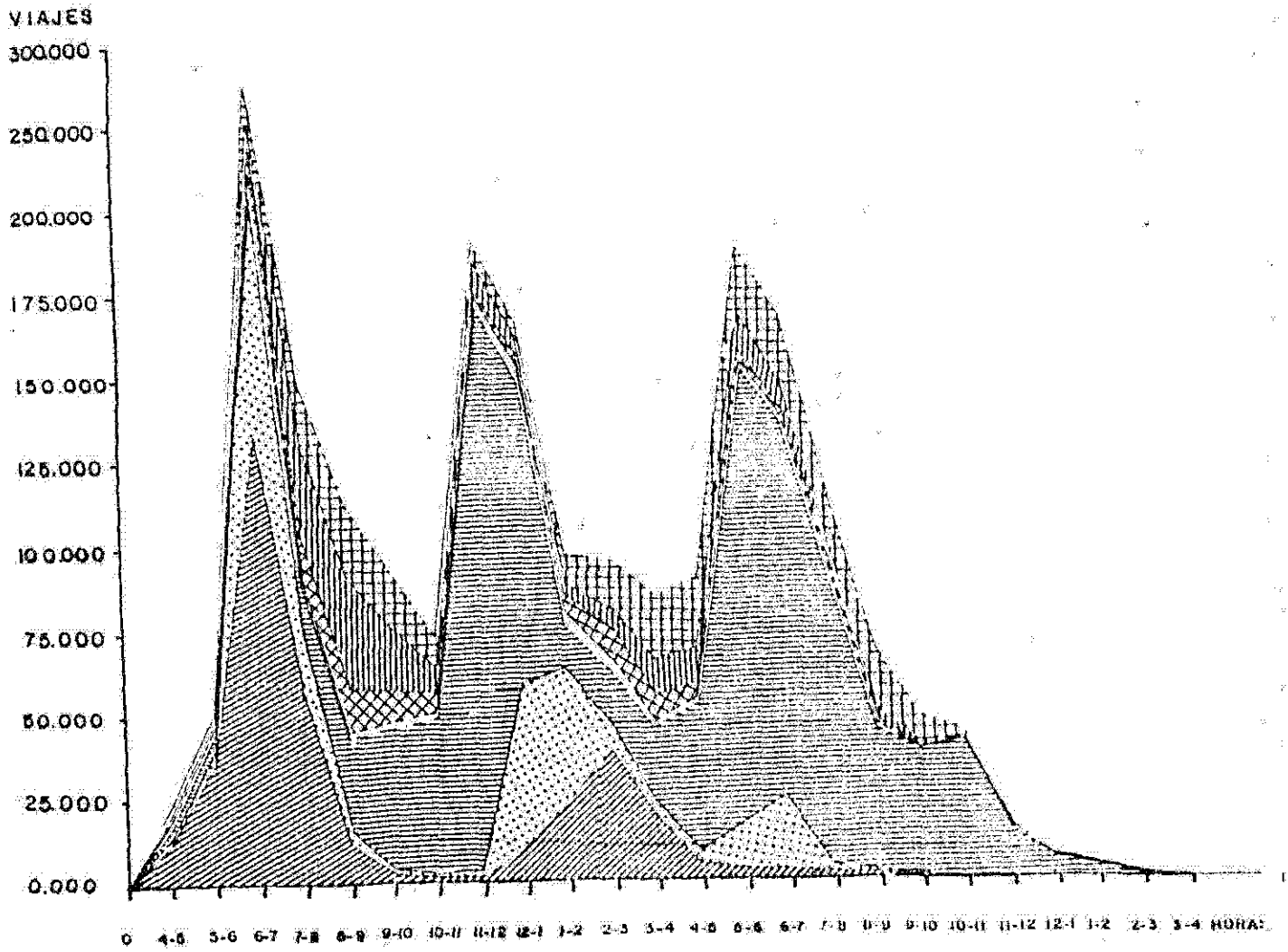


FIGURA 6-2-3 (P)

GENERACION Y ATRACCION DE VIAJES CON PROPOSITO AL TRABAJO Y AL ESTUDIO

ASUNCION





REFERENCIA



Trabajo Estudios Negocio Trabajo
Trabajo

GURA

5-2-4

VIAJES POR HORAS Y PROPOSITO

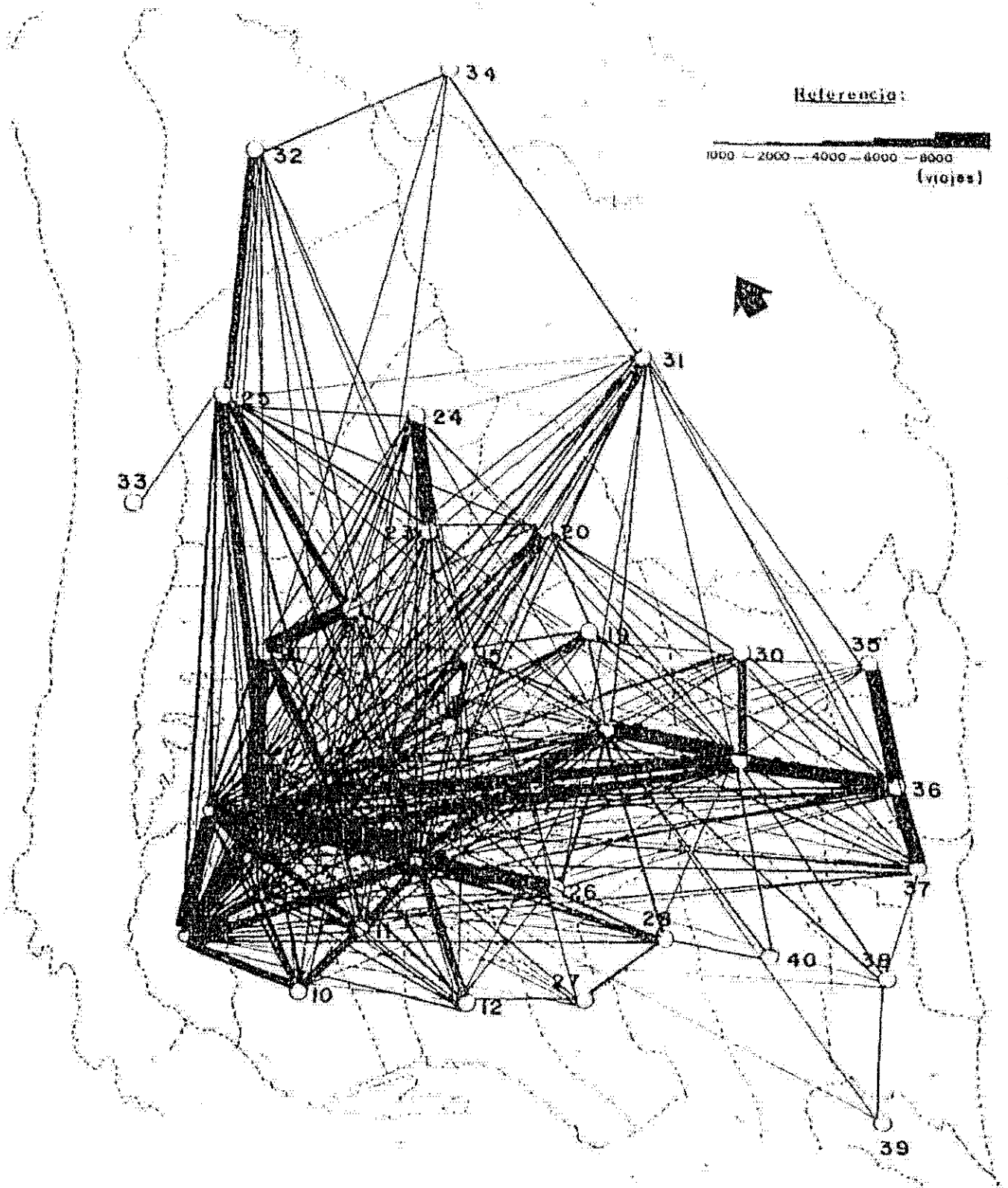


FIGURA 5-3-1 LINEA DE DESEO DE LOS VIAJES
(TOTAL)

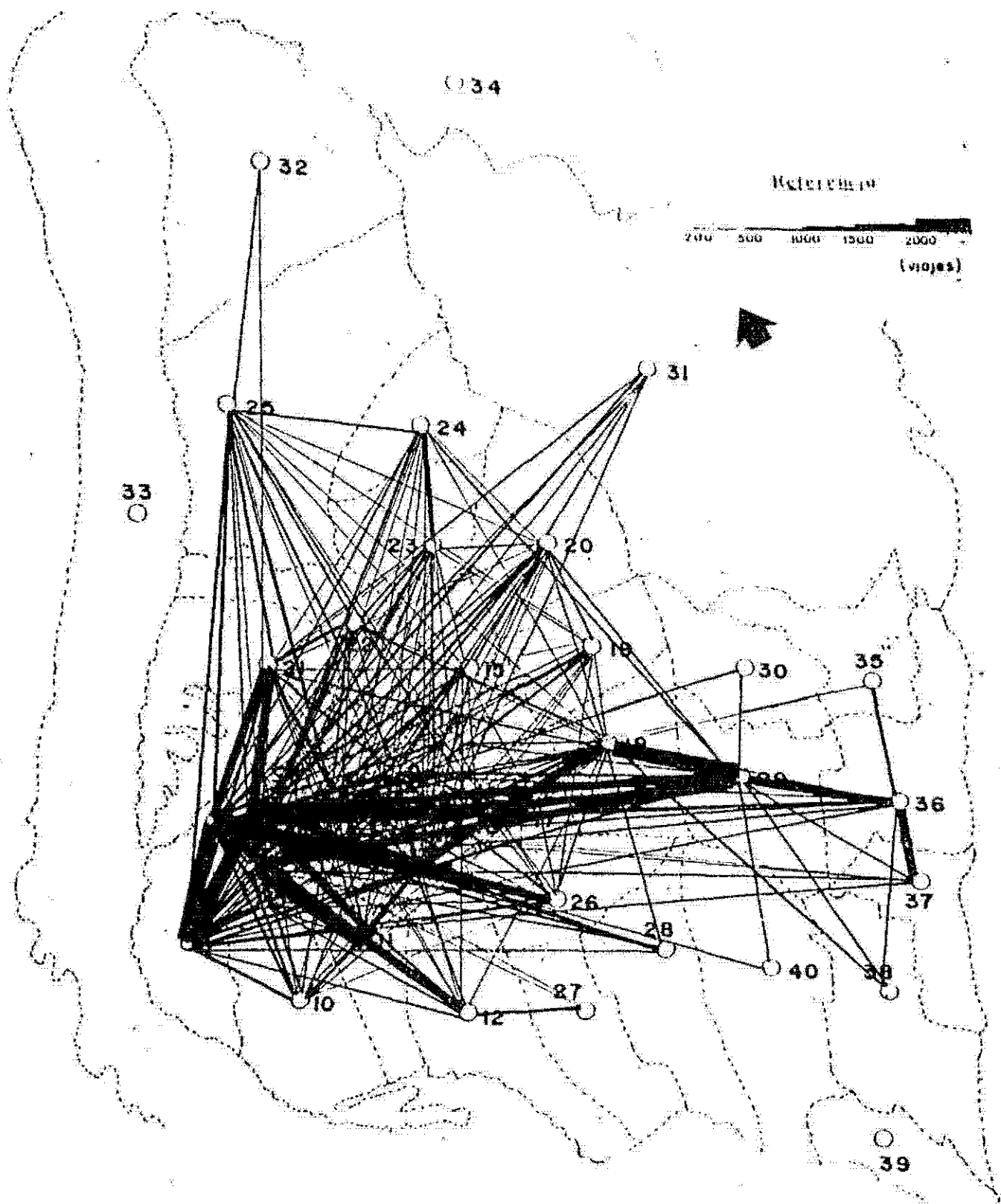


FIGURA 5-3-2 LÍNEA DE DESEO DE LOS VIAJES
(AL TRABAJO)

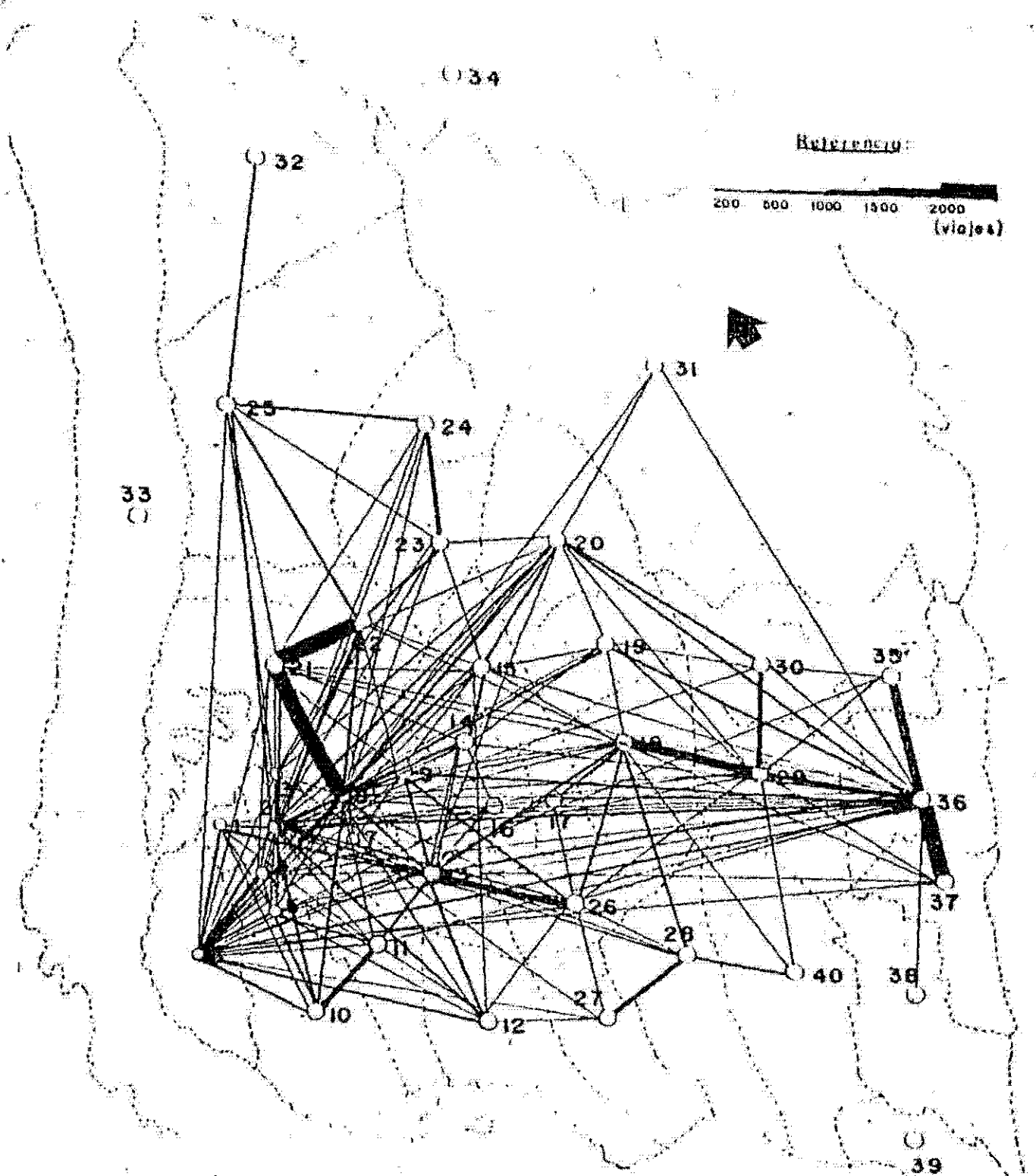


FIGURA 5-3-3 LÍNEA DE DESEO DE LOS VIAJES
(AL ESTUDIO)

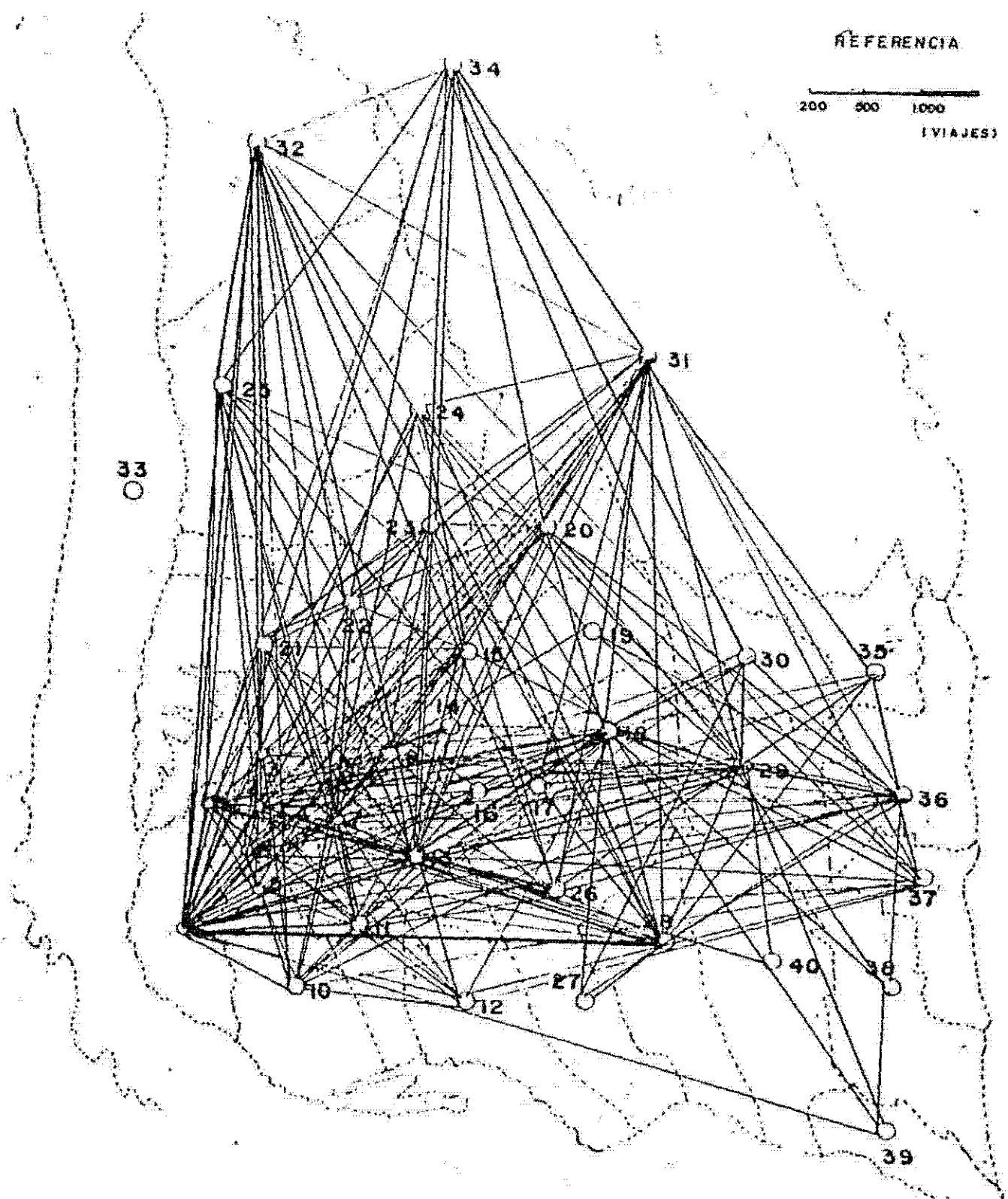


FIGURA : 5-3-4

LINEA DE DESEO DE LOS VIAJES
(ACT. DE TRABAJO)

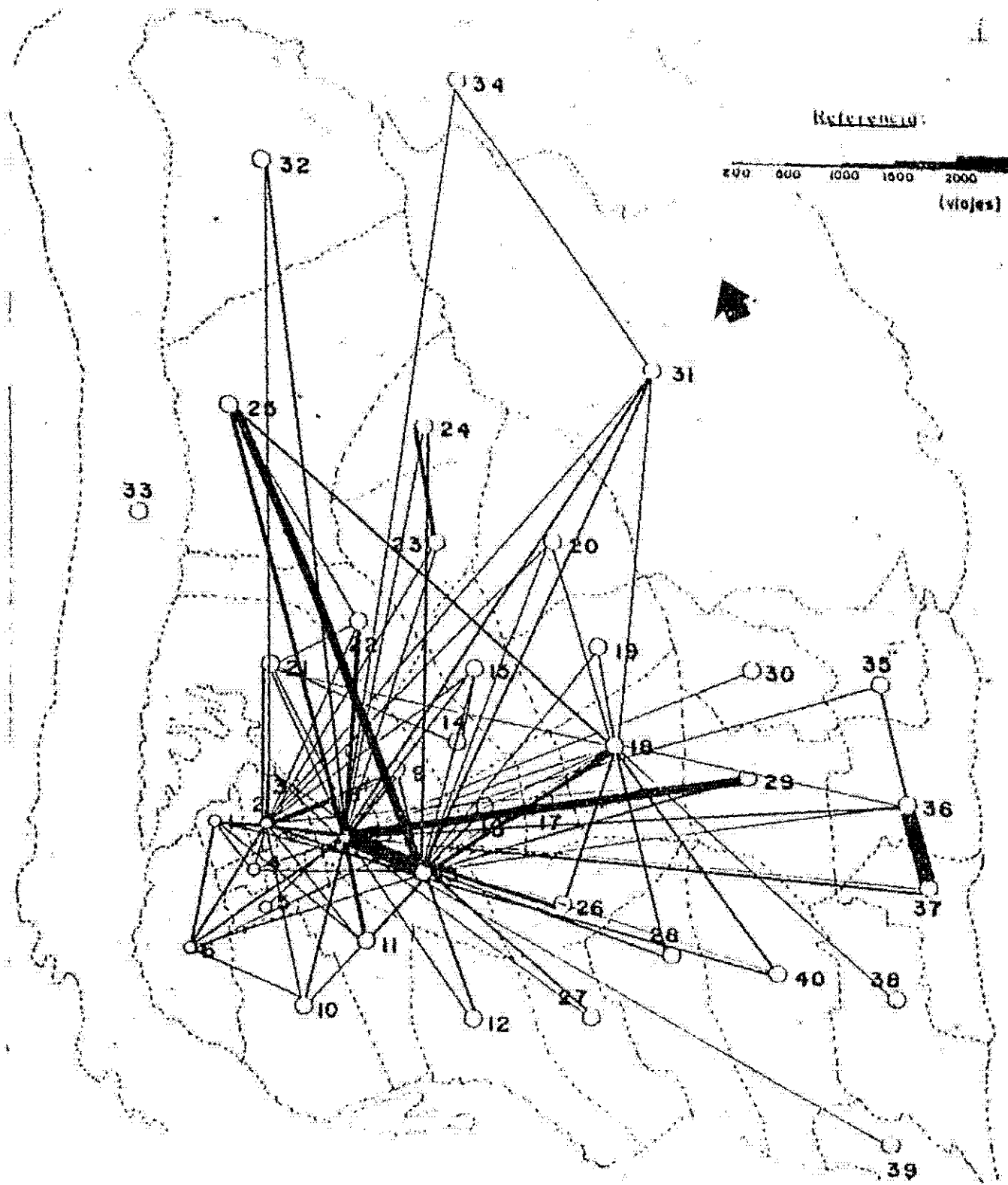


FIGURA 5-3-5

LÍNEA DE DESEO DE LOS VIAJES
(DE COMPRAS)

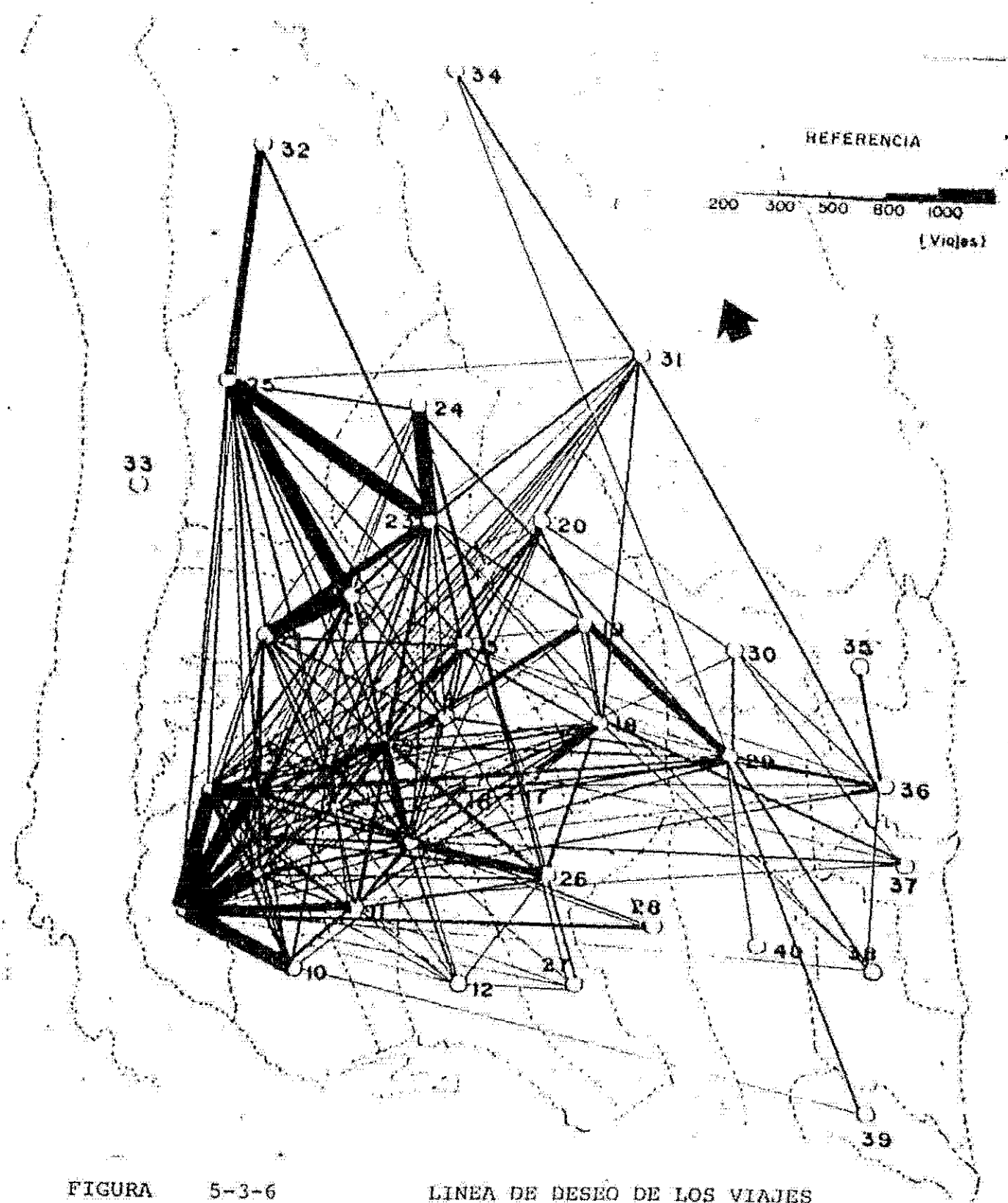


FIGURA 5-3-6

LÍNEA DE DESEO DE LOS VIAJES
(PRIVADOS)

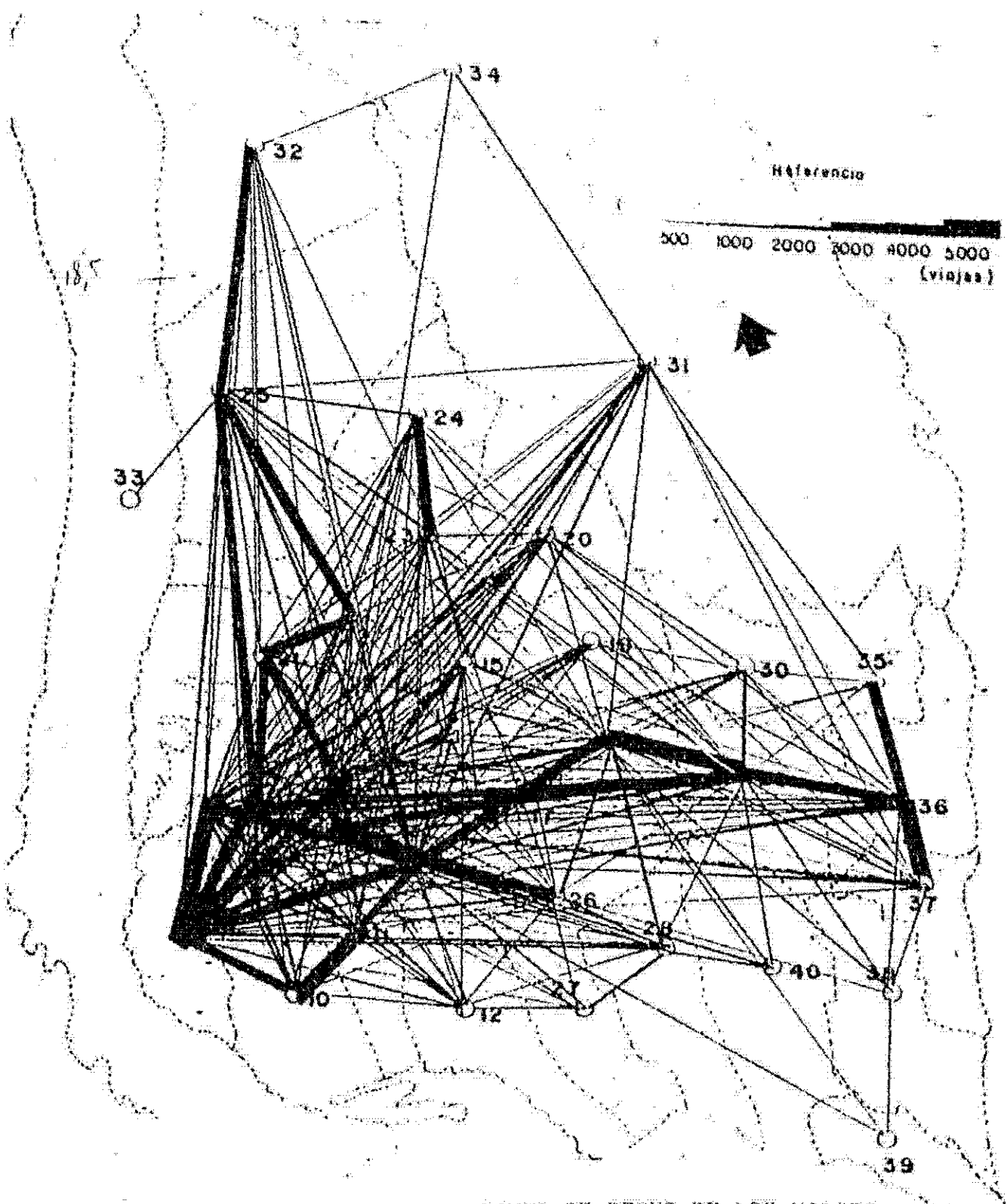
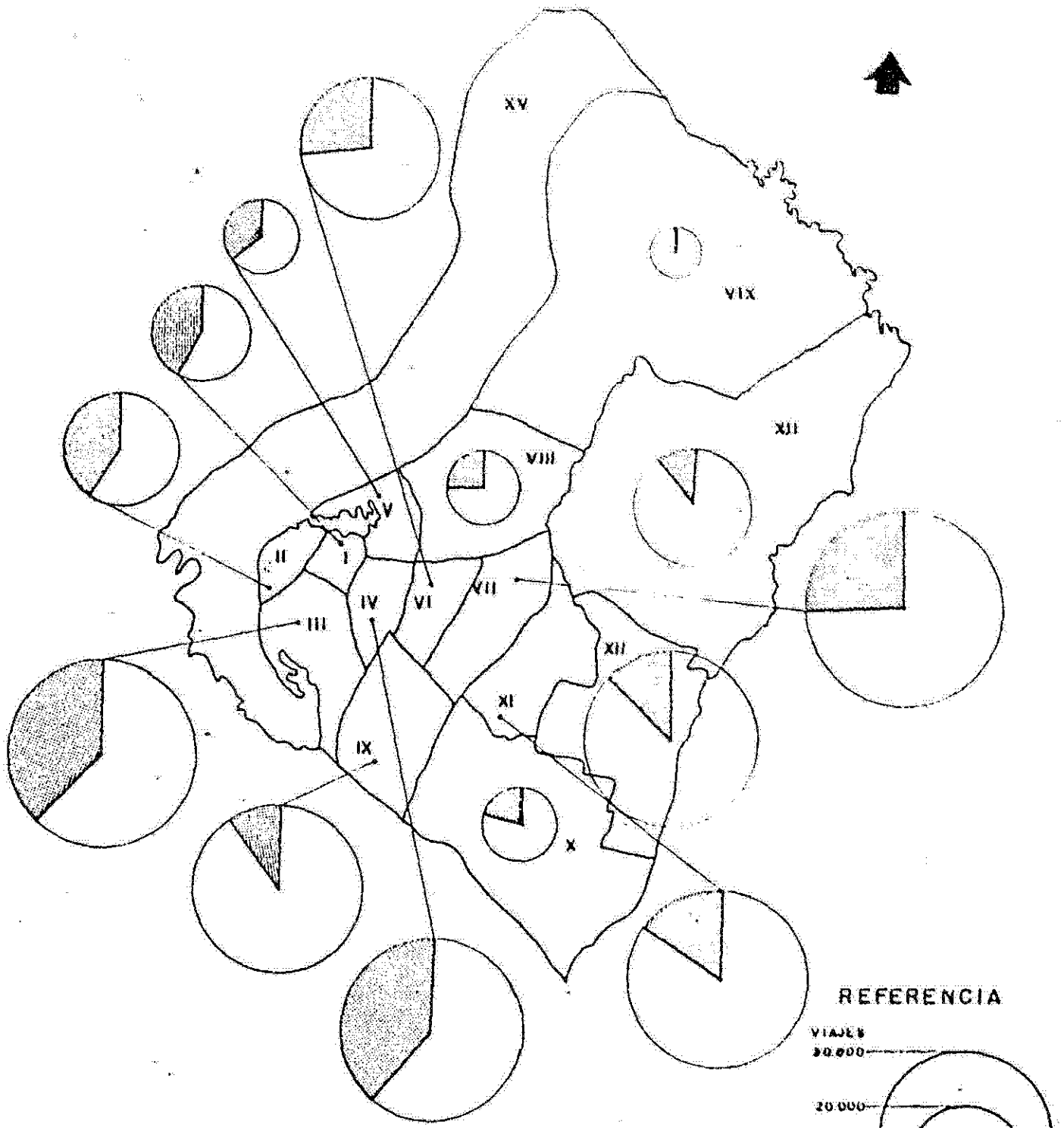


FIGURA 5-3-7

LÍNEA DE DESEO DE LOS VIAJES
(A LA CASA)



REFERENCIA

VIAJES

30.000

20.000

10.000

VIAJES A

ZONA I

FIGURA 5-3-8 GENERACION Y CONCENTRACION DE VIAJES DE TRABAJO AL AREA CENTRAL.

AREA METROPOLITANA

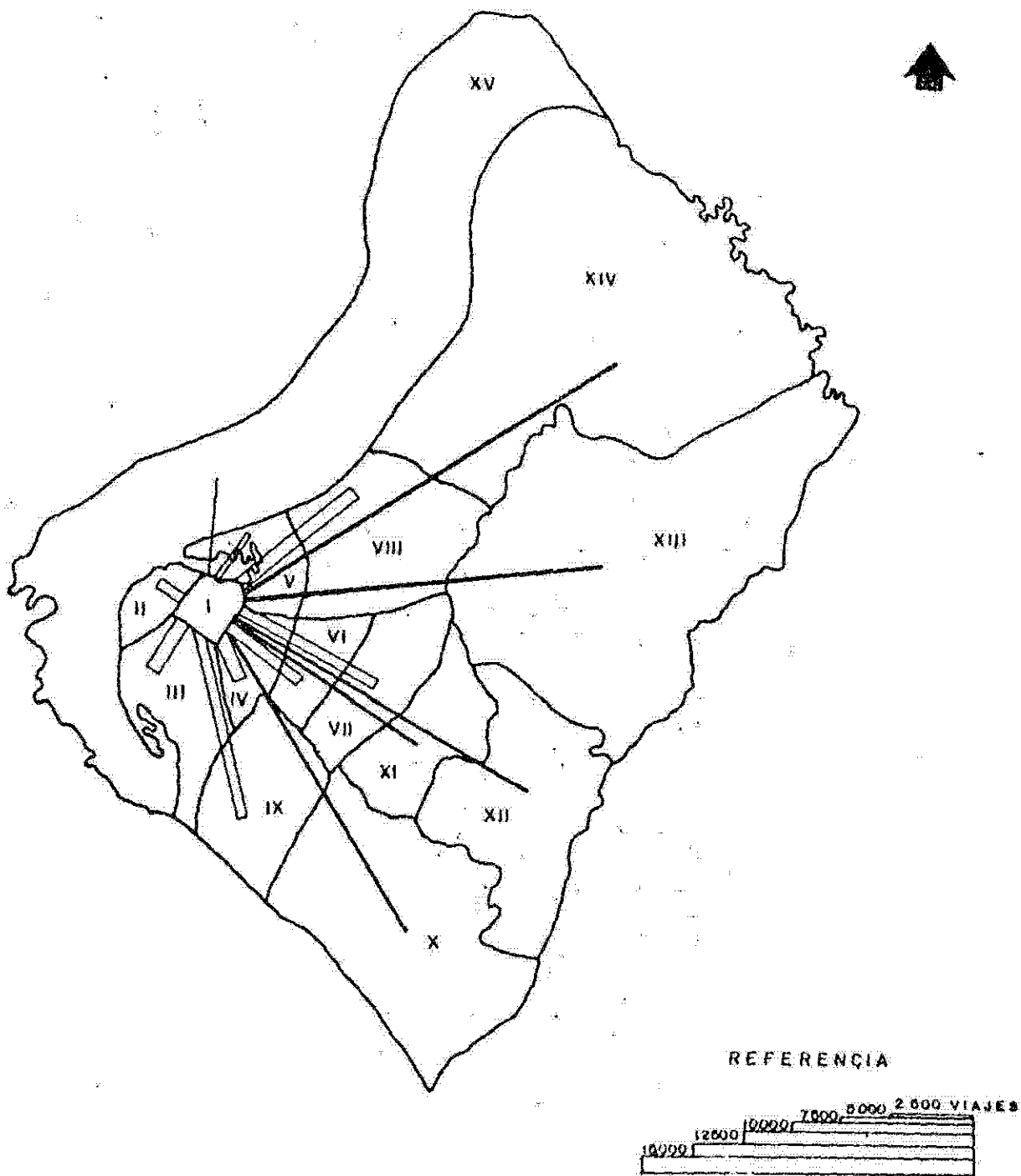


FIGURA 5-3-9 CONCENTRACION DE VIAJES AL AREA CENTRAL.

Ocupación

Al Trabajo

Al Estudio

A la Casa

Regreso al Trabajo

Actividad de Trabajo

De Compras

Social

Total

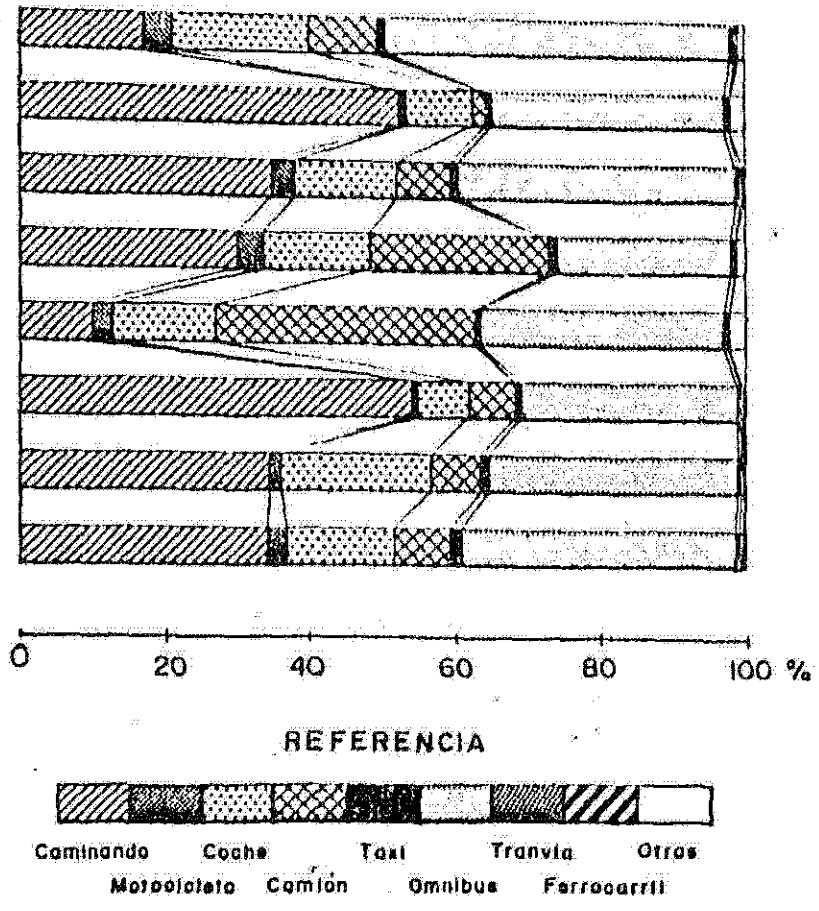
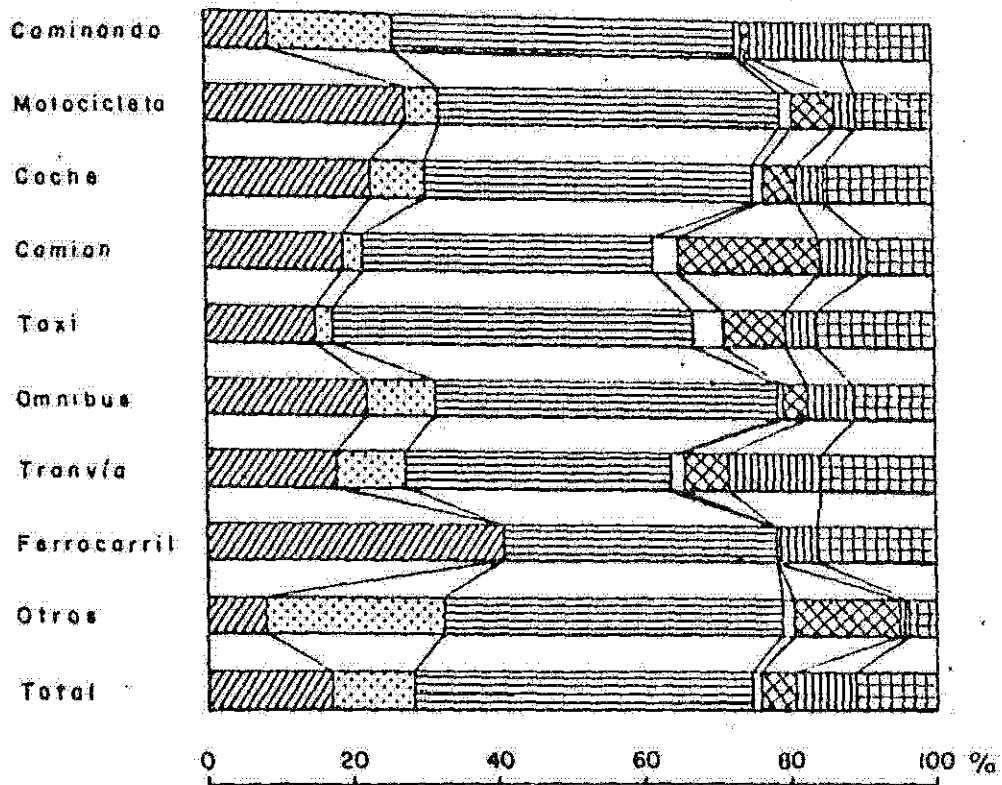


FIGURA 5-4-1 PORCENTAJE DE PROPOSITO POR MEDIOS

DISTINTOS MEDIOS



REFERENCIA



FIGURA 5-4-2 PORCENTAJE DE MEDIOS POR PROPOSITO

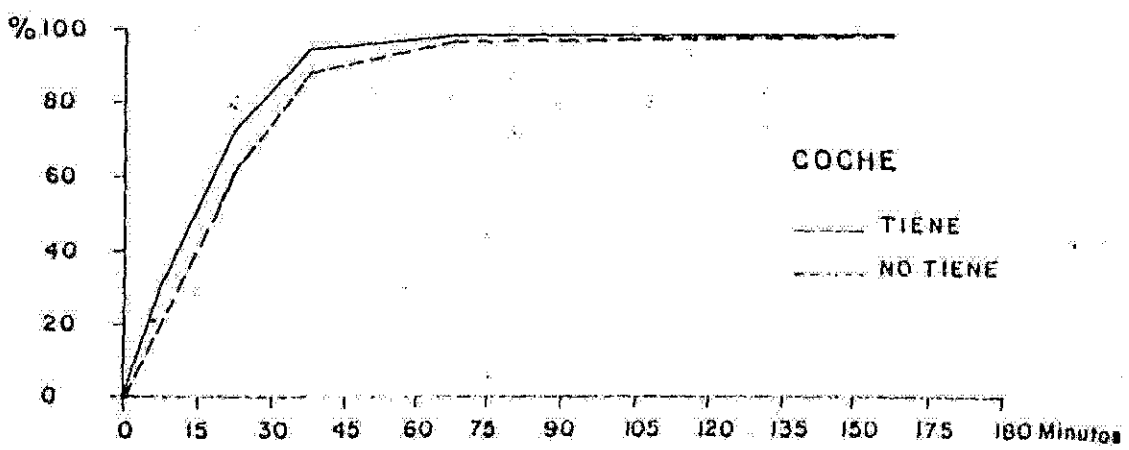
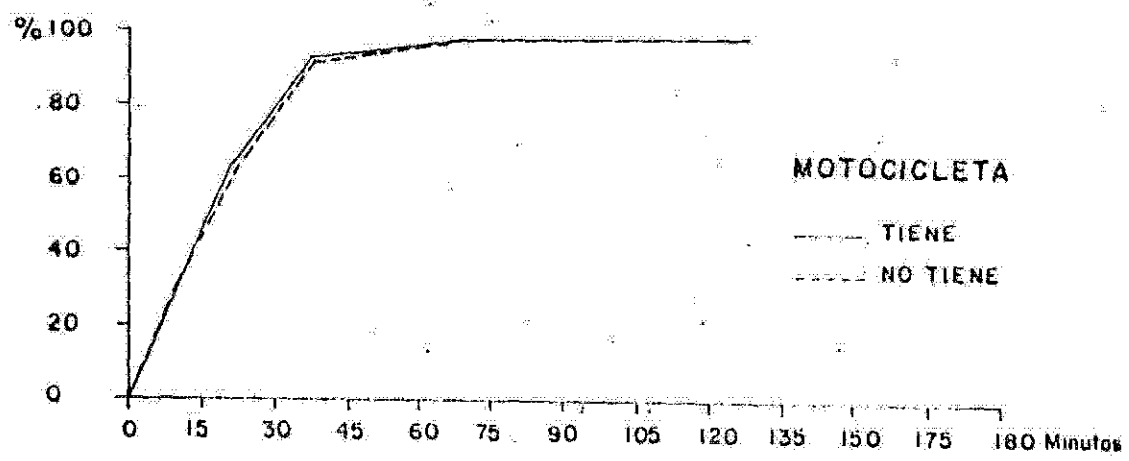
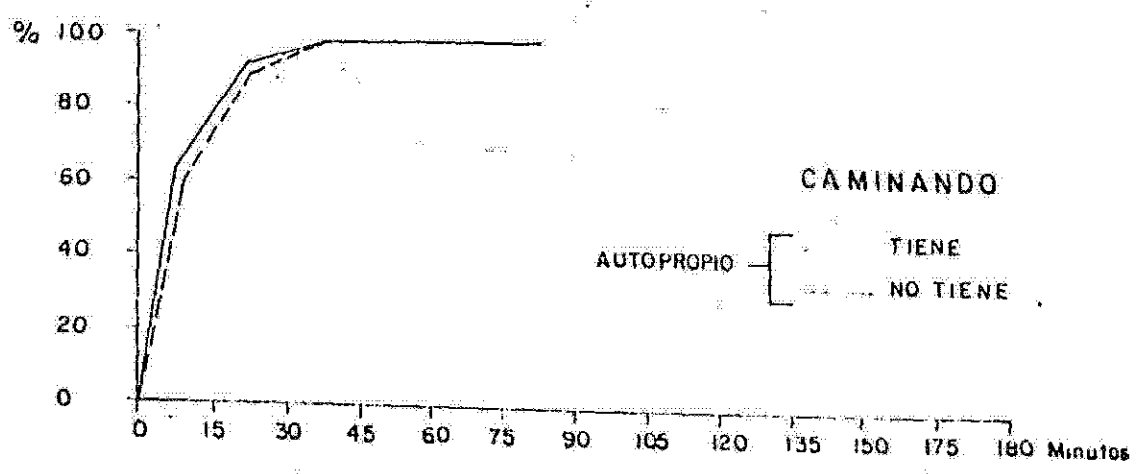


FIGURA 5-4-3 (1) ACUMULACION DE PORCENTAJE POR HORA Y MEDIO

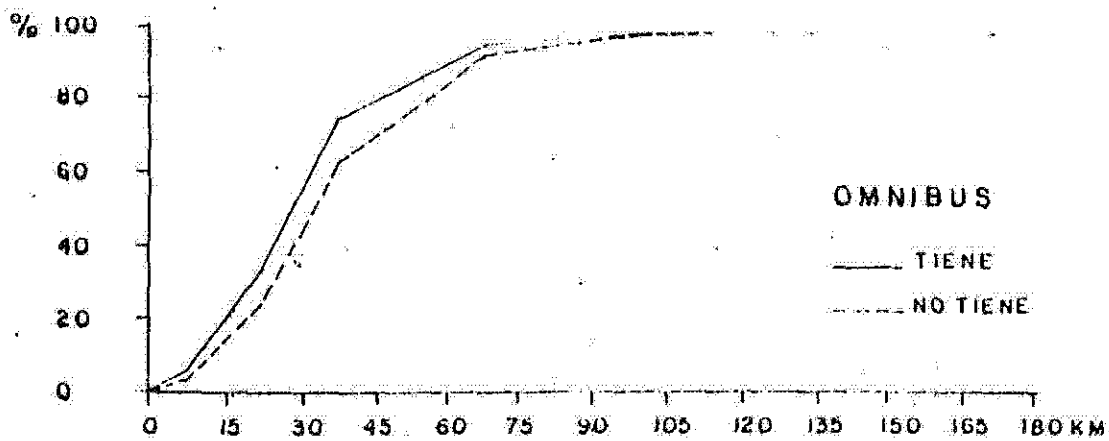
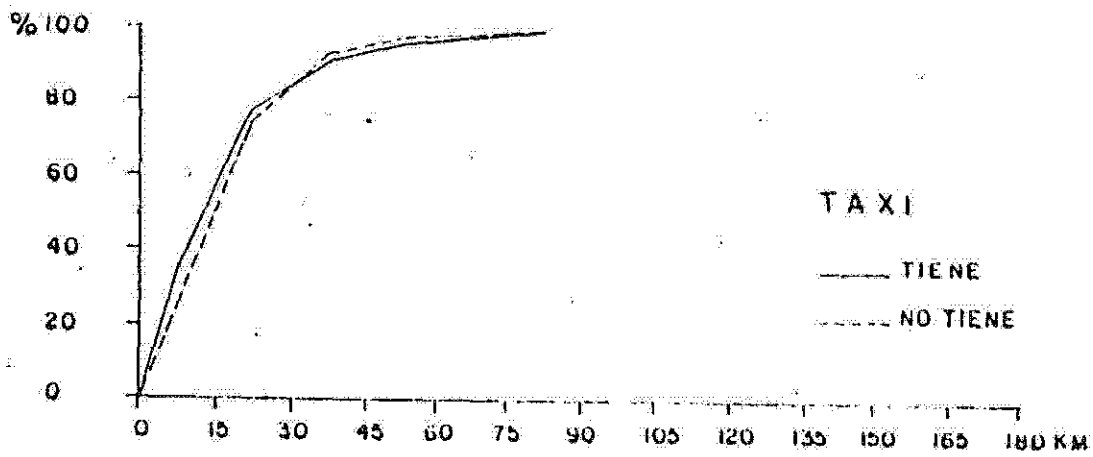
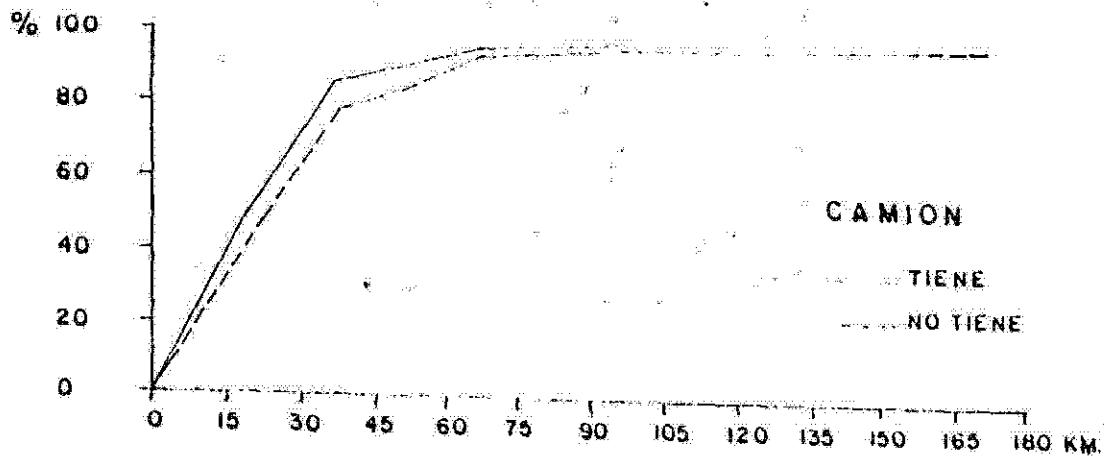


FIGURA 5-4-3-(2) ACUMULACION DE PORCENTAJE POR HORA Y MEDIO

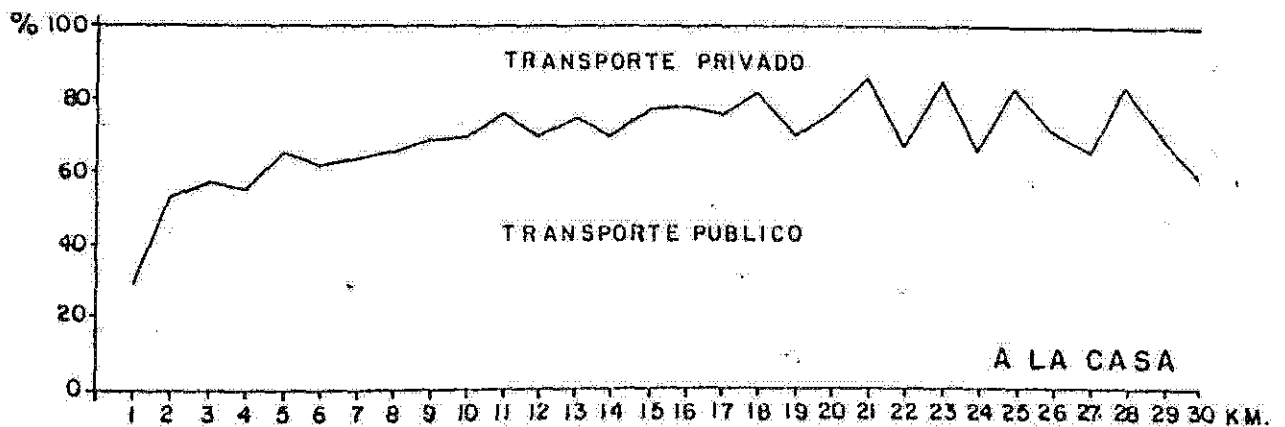
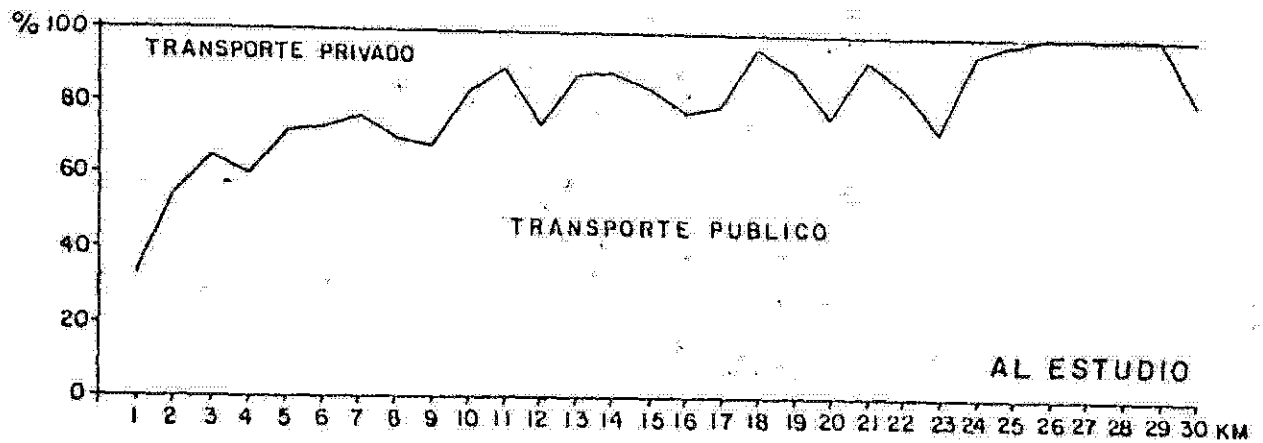
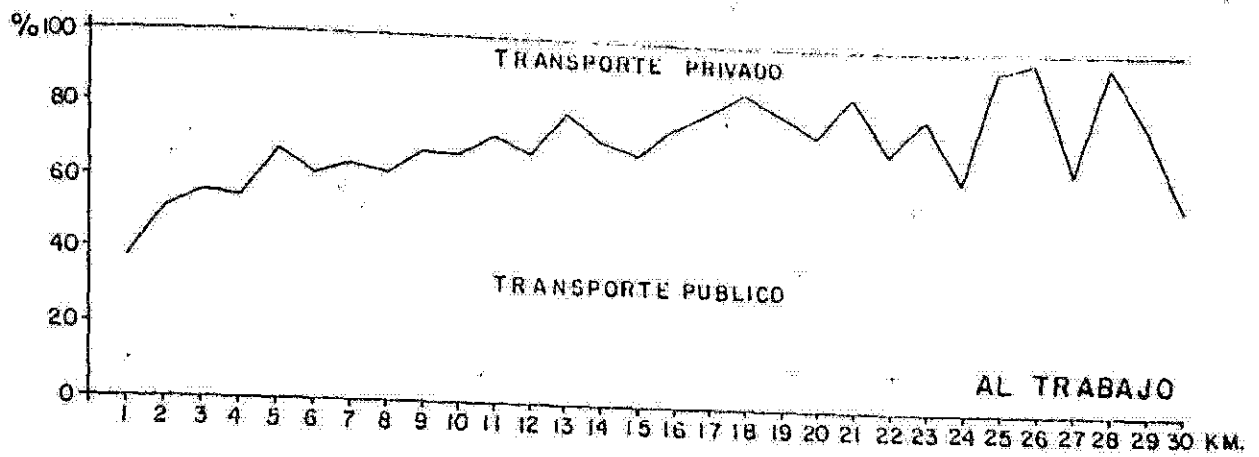


FIGURA 5-4-4 (1) DISTRIBUCION DE DISTANCIA DE VIAJES POR PROPOSITO

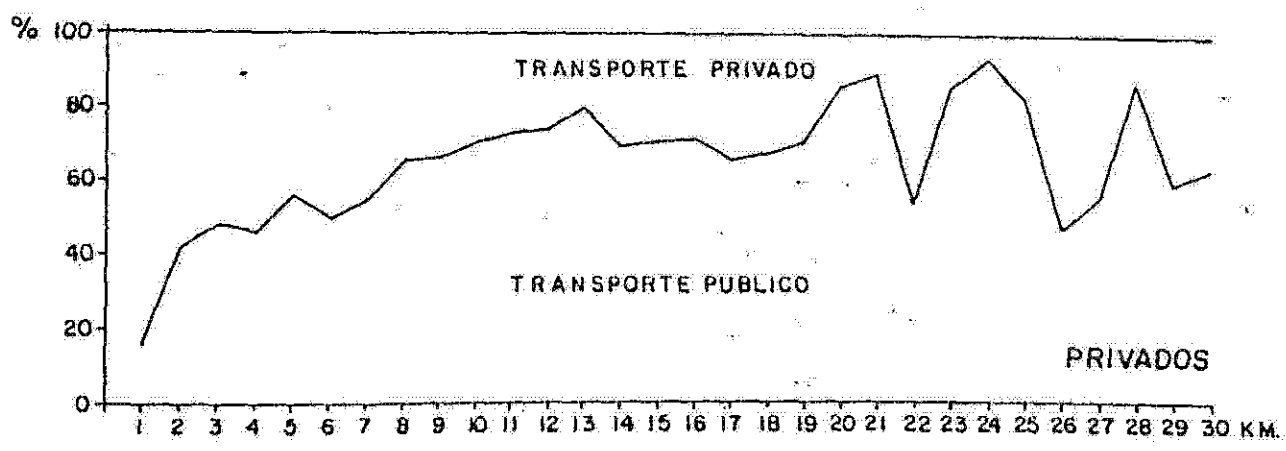
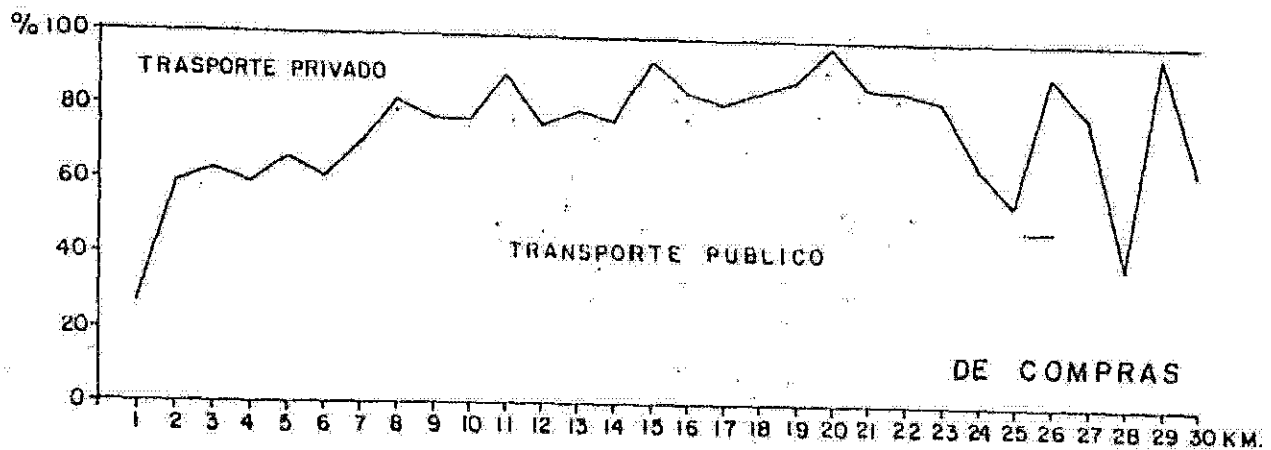
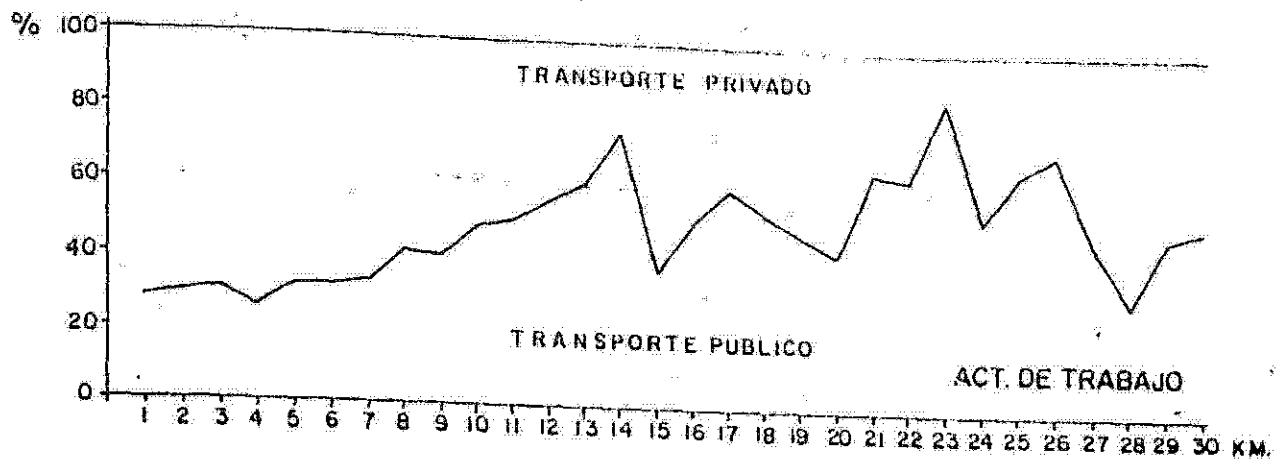


FIGURA 5-4-4 (2) DISTRIBUCION DE DISTANCIA DE VIAJES POR PROPOSITO

Chapter 6: Current Road Network

6-1. General Description of Road Network

6-1-1. Paraguay Road Network

The construction and maintenance of roads in Paraguay are carried out by each city and town within their respective urbanized areas; roads outside these areas are the responsibility of MOPC. The roads which MOPC manages include national roads (rutas nacionales) No. 1-12, departmental roads (camionos departamentales) and local roads (camionos vecinales). The actual construction and maintenance of national and departmental roads are performed by Direccion General de Vialidad; local roads are built and maintained by Unidad de Camionos Rurales. As of 1982, the total length of roads managed by MOPC was 12,840km. This includes 13.0% asphalt paved roads and 4.6% gravel roads, with the remaining 82.4% unpaved.

The 12 national roads form a road network as shown in Fig. 6-1-1. As shown in Table 6-1-1, the total length of these roads is 3,897km. Among these roads, Nos. 1, 2, 3, 9 and 12 lie at least in part within the Asuncion Metropolitan Area. However, because roads No. 3 and 12 are unpaved, the remaining three national roads serve as the major arteries for traffic coming into the Asuncion Metropolitan Area from the rural regions. National road No. 9 includes the Remanso Bridge over the Rio Paraguay, completed in 1977.

6-1-2. Asuncion Metropolitan Area Road Network

1) Suburban Road Network

The departmental roads lying within the Asuncion

Metropolitan Area are shown in Table 6-1-2. 4 Mojon-Ypane runs south in parallel to national road No. 1, closer to the Rio Paraguay, as far as Fernando de la Mora and forms one of the main road arteries of the Asuncion Metropolitan Area. The road serves as a trunk road connecting with the base of development along the Rio Paraguay, then the oil refinery at Villa Elisa, and on to the Defensores del Chaco extension. Mcal. Lopez connects Asuncion City with San Lorenzo and functions as a bypass for national road No. 1; in principle, however, heavy-duty vehicles are prohibited from traveling on this road. Santa Terresa runs from Mcal. Lopez to Gral. Genes, which is one of the city's trunk roads; outside the city area, however, this road is paved with cobblestones and thus is not well suited to fast travel. Elizado Aquino is a road which connects Asuncion with Luque, one of the satellite cities, and extends as far as Aregua, site of Lake Ypacarai, a popular tourist spot. The remaining departmental roads mainly link the trunk roads which radiate outward from Asuncion City.

2) City Road Network

The roads in Asuncion City are divided as shown in Fig. 6-1-2 under city ordinance (ordenanza). Among these, roads designated as "major arteries" (arterial mayor) have street names and sections specifically designated by ordinance and these roads are given preferential priority for paving and improvement. At present, nearly the entire road network is completed. Roads designated as "minor arteries" (arterial menor) do not have specific names. Also, there are no major arteries designated in Asuncion in the following districts: Sajonia, Centro, Barrio Obrero. Among the major arteries in Asuncion, the "principal arteries" (arterial principales) include 6 radial roads and 1 loop road. The radial roads

connect either with a national or departmental road. The loop road forms the city boundary line. "Secondary arteries" (arterial secund) connect the various radial roads.

3) Road Network in the City Center

In the Centro, Sajonia and Barrio Obrero districts at the center of Asuncion City, the road network consists of a grid pattern with uniform road width, pavement, etc. In structural terms it is difficult to distinguish here between trunk roads and non-trunk roads. There is also no particular systematic area division and, although priority and non-priority traffic indicators are partially in place, such signs are almost entirely absent. In the Centro district there is a heavy concentration of bus routes. Because of the relatively large volume of bus traffic on roads designated as bus routes, these roads are accorded relatively high priority. Roads comprising 10 or more bus routes are shown in Fig. 6-1-4. Because many roads in these areas are designated as one-way streets, the road network generally consists of pairs of streets, such as Cerro Cora - Azara and Herrera - Moreno in Centro and Garay - Acuna Figuerero in Barrio Obrero. Also, due to topographic reasons the main flow of streets run in parallel to Asuncion Bay. The major roads which run vertically are those which form the outer perimeter of the central urbanized districts of Estados Unidos and Colon. In the Sajonia district, the bus routes are relatively scattered. Owing to the geographic cul-de-sac formation of the district, there are no connecting trunk roads.

6-2. Current Road Conditions

6-2-1. Road Width and Lane Width

Roads in Asuncion having 4 lanes or more are shown in Fig. 6-2-1. Of the major principal arteries (arterial mayor principales), all have 4 lanes except Avda. Espana - Avda. Gral. Aranco and Avda. Madame Lynch - Avda. Defensores del Chaco. Among roads with 4 or more lanes which are not major arteries (arterial mayor), with the exception of Avda. 25 de Diciembre - Avda. Dr. Francia all such roads do not have asphalt pavement and are therefore not suited to high-speed travel. Also, because such roads are not in all cases connected to other trunk roads, many function only as intrazonal arteries.

Table 6-2-1 shows the average lane and road widths for each zone in Asuncion City. All zones have an average road width between 13-16m and an average lane width of approx. 9m, indicating that almost all roads contain two vehicle lanes.

The city's road construction regulations are described in the section of the city's ordinances relating to land zoning, where it states that roads fall into six categories with the following minimum width requirements: avenida 32m, calle principal 20m, calle local 16m, calle cul de sac 8m, calle marginal 8m and pasaje 5m.

6-2-2. Current Pavement Conditions

(1) Pavement Categories

Three types of pavement are used on roads in the Asuncion Metropolitan Area: asphalt, empedrado (cobblestone) and adoquinados (concrete blocks).

Empedrado pavement consists of the laying of basalt stones 15-25cm square in size; this type of pavement is used

on approximately 63% of the city's roads. Empedrado pavement is being performed at the present owing to the fact that construction costs are only about 60% of those required for asphalt pavement. However, since smooth traveling over such roads is impossible, drivers tend to avoid passage over these roads and favor using the asphalt roads.

Adoquinados pavement consists of the laying of hexagonal concrete blocks; pavement of this type presently accounts for only 2% of Asuncion's streets. This pavement is in used on trunk roads receiving large volumes of traffic and heavy-duty vehicles, such as Avda. Rca. Argentina. Concrete blocks account for 70% of all construction costs incurred for such roads.

(2) Pavement Distribution

The pattern of asphalt pavement distribution in Asuncion is shown in Fig. 6-2-2. Table 6-2-2 describes the total road length and area for each pavement type in each zone of the city. 100% asphalt pavement is found in Zones 1 (Encañacion), 2 (Catedral Este), 4 (Catedral Oeste), 5 (Gral. Diaz), 7 (San Roque Sur) and 8 (San Roque Este), all in the city center. The rate of asphalt pavement drops sharply, however, as distance increases from this central area. For example, in Zone 10 (Tacumbu) relatively close to the city center, only about 2% of the roads are paved with asphalt and the remaining 98% is paved with adoquinados. The percentage of unpaved roads is highest in Zone 25 (Botanico), at approximately 65%. Even in Zone 13 (Pettirossi) relatively near the city center, approximately 23% of the roads remain unpaved.

6-2-3. Current Road Facilities

Fig. 6-2-3 shows cross-sections of the main roads in Asuncion. (1)-(7) are principal major arteries (arterial mayor principales), (8)-(13) are secondary major arteries (arterial mayor secundari) and related roads, (14) and (15) are the Centro and Sajonia districts, and (16) are the roads in the city perimeter. (17) and (18) show the roads in peripheral cities, and (19) shows national and departmental roads.

The current road facilities of each are described below.

(1) Sidewalks

99.7% of all roads in Asuncion City are furnished with pedestrian sidewalks. However, many streets in the city are paved with stones or unpaved, and although many are registered as having sidewalks they in fact merely have space secured for this purpose and do not have sidewalk pavement or boundary stones, etc. Also, stone-paved streets generally only have boundary stones to mark pedestrian walk areas and no other facilities.

(2) Drainage Facilities

In general, drainage facilities to keep the road surface clear of water are provided only in road sections paved with asphalt. While fine sand in the topsoil tends to wash away in areas which remain unpaved, the stone pavement serves to prevent such sand flows. Fig. 6-2-4 shows the districts in the city which suffer traffic obstacles due to water coverage. Such damage is incurred near Avda. Defensores del Chaco - Avda. Madame Lynch - Avda. 1^o Presidente which together form the outer perimeter of the city, indicating the inadequacy of drainage routes along

this loop road.

(3) Median Dividers

With the exception of part of Avda. Mcal. Lopez, almost all 4-lane roads are equipped with median dividers. They are generally 2-3m in width and many have shrubs. Part of Avda. Eusebio Ayala is furnished only with a 1.10m mount-up. Avda. Ita Ybate, though paved with stone, has a central median 27m in width.

(4) Streetcar Tracks

Asuncion's streetcar tracks are shown in Fig. 6-2-5. The line which extends from Avda. Mcal. Lopez past Avda. Boggiani as far as Fdo. de la Mora is not currently operating. Nevertheless, the presence of the tracks does affect travel on Avda. Mcal. Lopez. Also, repair work is presently under way on the line which runs from Asuncion Port past Avda. Colon as far as Avda. Carlos Antonio Lopez.

6-3. Trunk Road Network

6-3-1. Trunk Road Network of Peripheral Cities

In the cities around Asuncion, except for the urban areas of each city the road networks basically serve to interconnect the cities themselves. These trunk roads consist of national and departmental roads. In particular, national roads No. 1, 2 and 9 form important axes of transportation, with the departmental roads serving to connect these axes.

6-3-2. Trunk Road Network at Perimeter of Asuncion

The trunk road network at the perimeter of Asuncion City is comprised of six radial principal major arteries, one loop principal major artery and seven loop secondary major arteries. The features of the radial roads are shown in Table 6-3-1. Among these roads, the one which is most closely tied to regions outside the city is Avda. Eusebio Ayala. This road acts as an important artery and receives a high percentage of heavy-duty vehicle traffic. Although Avda. Artigas is also closely linked with surrounding regions, this road does not receive as great a share of traffic. Instead, the percentage of bus traffic between Asuncion and the peripheral cities using this road is relatively high. The road with the heaviest amount of traffic is Avda. Mcal. Lopez. This road functions as a bypass to Avda. Eusebio Ayala for traffic traveling as far as San Lorenzo, and thus receives a heavy concentration of traffic traveling between Asuncion and the peripheral cities. The percentage of bus traffic on this road is quite low, and the principal mode of traffic using the road is the passenger car. In terms of road width, the road which has highest potential for expansion to six traffic lanes in the future is Avda. Eusebio Ayala; this road has a securable width of 32-37m. In contrast, Avda. Espana has a very limited width of only 10m. From the standpoint of connections between the roads in the Centro district and these radial roads, Avda. Mcal. Lopez and Avda. Espana are most satisfactory; Avda. Felix Dogado must change directions at Bras Gray and Acuna de Figueroa. Avda. Eusebio Ayala and Avda. Fdo. de la Mora are blocked by the one-way road which runs diagonally in relation to Avda. Pettrossi - Avda. Proceres de Mayo. Avda. Artigas merges with Avda. Espana and does not provide direct access to the Centro district.

The features of the loop roads are shown in Table

6-3-2. There are five roads which cut across the city in the north-south direction: (a) Avda. Defensores del Chaco - Avda. Madame Lynch - Avda. 1^o Presidente at the outermost perimeter; (b) Avda. Medicos del Chaco - Avda. Chofeves del Chaco - Avda. Santisma Sacramento; (c) Avda. Gugiari - Avda. Kubischek - Avda. Brasillia; (d) Avda. Gral. Santos - Avda. Uruguay; and (e) Avda. Peru. Among these roads, (b) and (c) have four lanes over their entire length. Plans are also under way to widen (a). On road (d), the Avda. Uruguay sector in the north has only two lanes; the intersection with Avda. Eusebio Ayala is separated, however. Road (e) is narrow over its entire length and is partially stone-paved. In terms of traffic volume, Avda. Choferes del Chaco is the busiest of the five roads, owing to traffic changing between the two radial roads of Avda. Espana and Avda. Mcal. Lopez. The road with the highest percentage of heavy-duty vehicle traffic is Avda. Defensores del Chaco - Avda. Madame Lynch, indicating the dispersion of such traffic at the roads outside the city.

6-3-3. Road Network in the City Center

The features of the road network in the center of Asuncion are shown in Tables 6-3-3 and 6-3-4, divided into streets running parallel to Asuncion Bay and those running perpendicular to it.

Among the roads running parallel to the bay, there are two traffic axes: (1) the axis with no directional restrictions which forms the outer perimeter of the Centro district, i.e. Paraguaya Independente - Coronel Bogado and Avda. 25 de Diciembre - Avda. Dr. Francia; and (2) the axis of one-way streets in the city center slightly away from the commercial axis, i.e. Oliva - Cerro Cora, Gral. Diaz - Azara, Haedo - Herrera and Humaita - Fulgencio R. Moreno.

Among these, Gral. Diaz - Azara forms a strong connective link with the Sajonia district and Haedo - Herrera provides good access to the areas at the city periphery. Also, in general access from the city center to the south is poor as traffic is blocked at Avda. Pettrossi. Connecting service to Sajonia district on the north side is also poor.

Among the roads running perpendicular to the bay, there are again two traffic axes, at both ends: (1) Colon and Montevideo, and (2) EEUU and Brasil. Next in importance are Chille, Nstra. Sra. de Asuncion and Ind. Nacional, likewise slightly away from the commercial district. On the eastern side, the three streets of Paraguai, Antequera and Parapti do not run the complete length, thus causing a certain concentration of traffic on Mexico and Tacuari on both sides.

The current trunk road network selected in consideration of the various points outlined above is shown in Fig. 6-3-1. It should be noted, however, that in the city center area two one-way streets have been grouped together for consideration as one road:

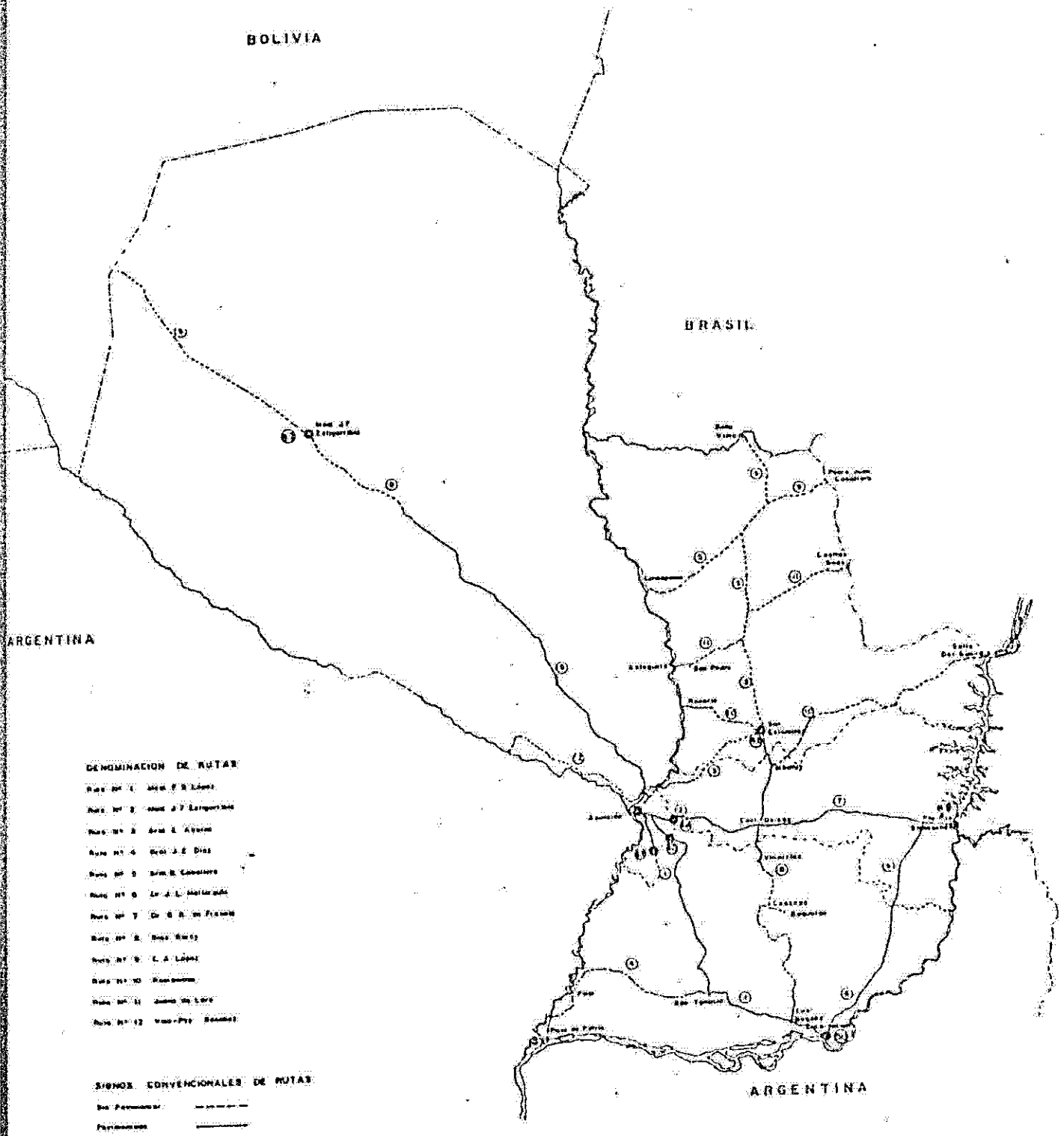


FIGURA 6-1-1

RUTAS PRINCIPALES

CUADRO 6-1-1 Cuadro de Distancia

No	Nombre	Longitud Km.
1	Mcal. F.S. López	370
2	Mcal. J.F. Estigarribia	132
3	Gral. E. Aquino	452
4	Gral. J.E. Díaz	156
5	Gral. B. Caballero	215
6	Dr. J.L. Mallorquin	300
7	Dr. G.R. de Francia	195
8	Blás Garay	109
9	C.A. López	743
10	Residentas	83
11	Juana de Lara	197
12	Vice Pte. Sanchez	154

CUADRO 6-1-2 Caminos Departamentales y Ramales
 Area Metropolitana

De	A	Longitud Km.	Nombre de Calle
Asunción Av. Mme. Lynch	Luque	7.3	
Asunción 4 Mojón	Refinería (Pto. Pabla)	6.0	
Asunción 4 Mojón	Nemby	6.0	
Nemby	San Antonio	6.0	
Limpio	Luque	12.0	
Luque	San Lorenzo	8.0	
San Lorenzo	Nemby	8.0	
Limpio	Piquete-cué	8.0	
Mme. Lynch	San Lorenzo	6.5	Hcal. López
Juan D. Perón	Av. Fdo. de la Mora	5.3	Cacique Lam baré
Mme. Lynch	Hcal. López	3.4	Santa Teresa

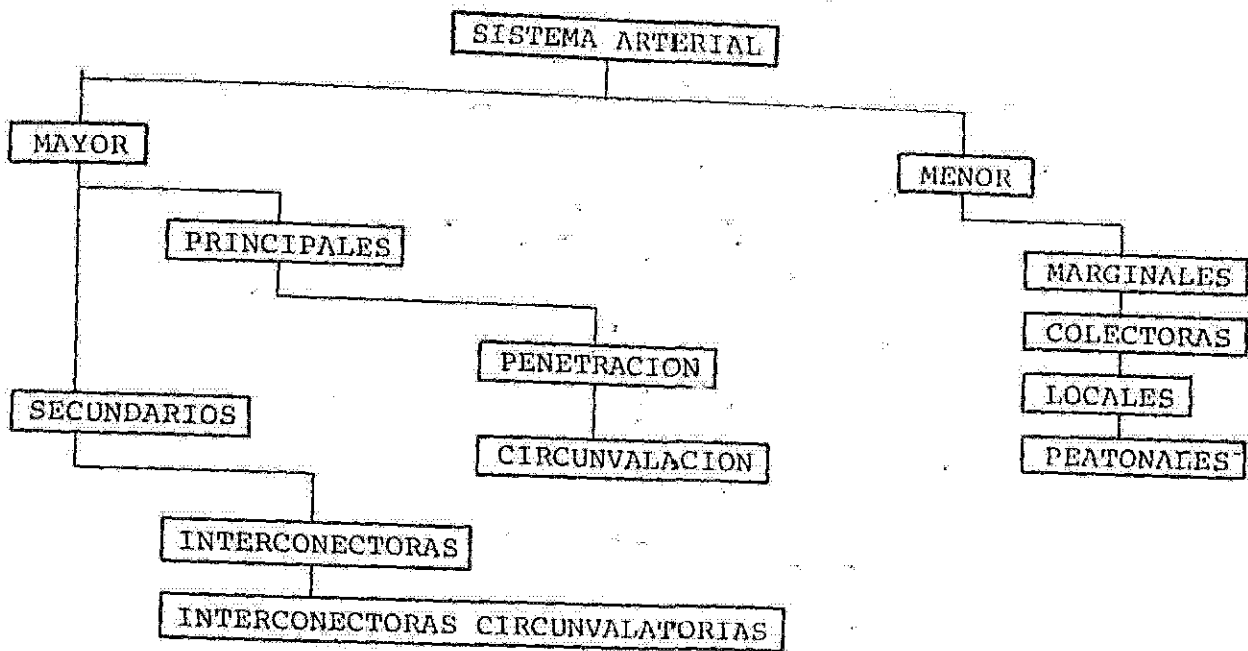


FIGURA 6-1-2 CLASIFICACION DE CALLES SEGUN ORDENANZA

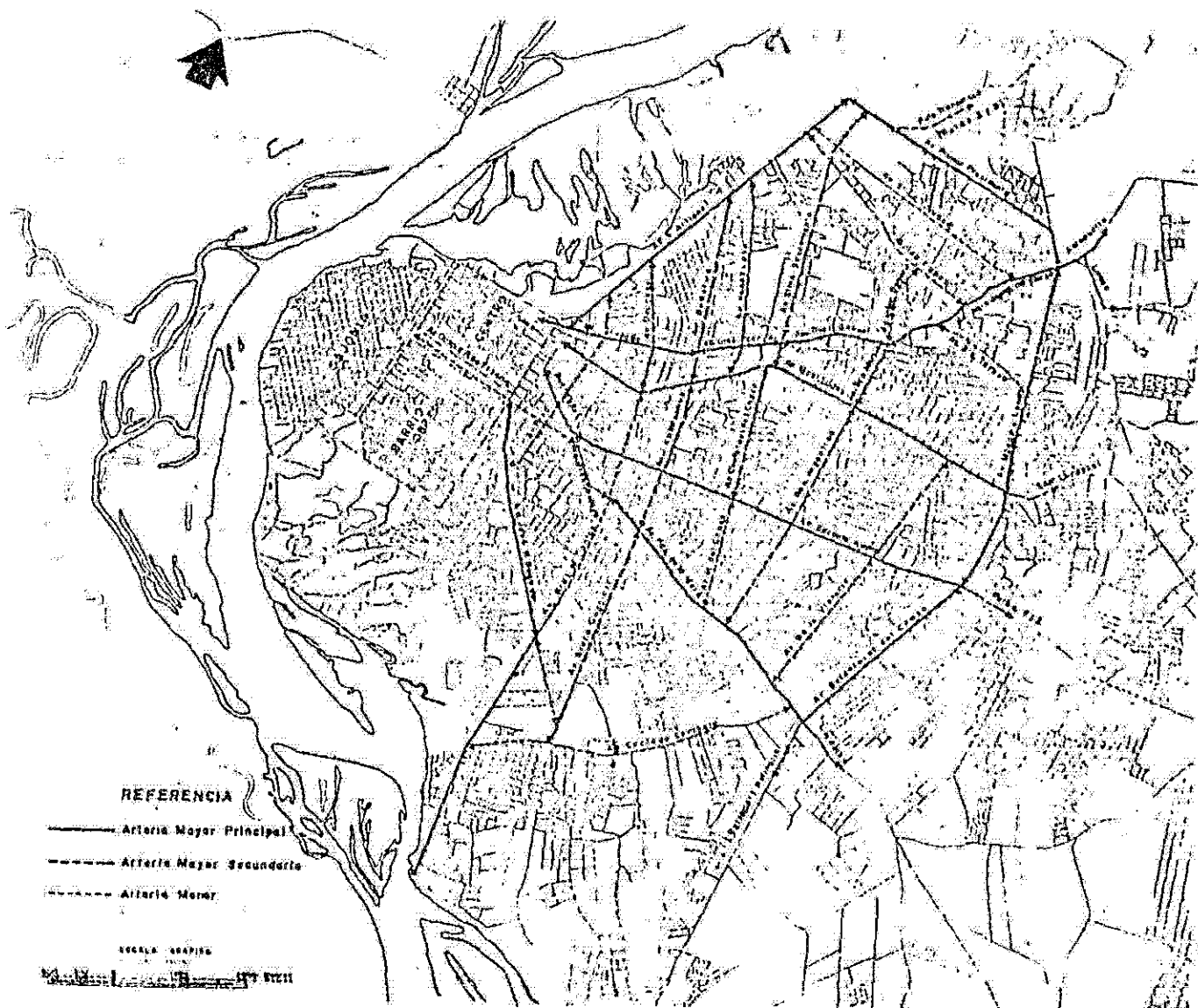


FIGURA 6-1-3 CLASIFICACION DE ARTERIAS SEGUN ORDENANZA

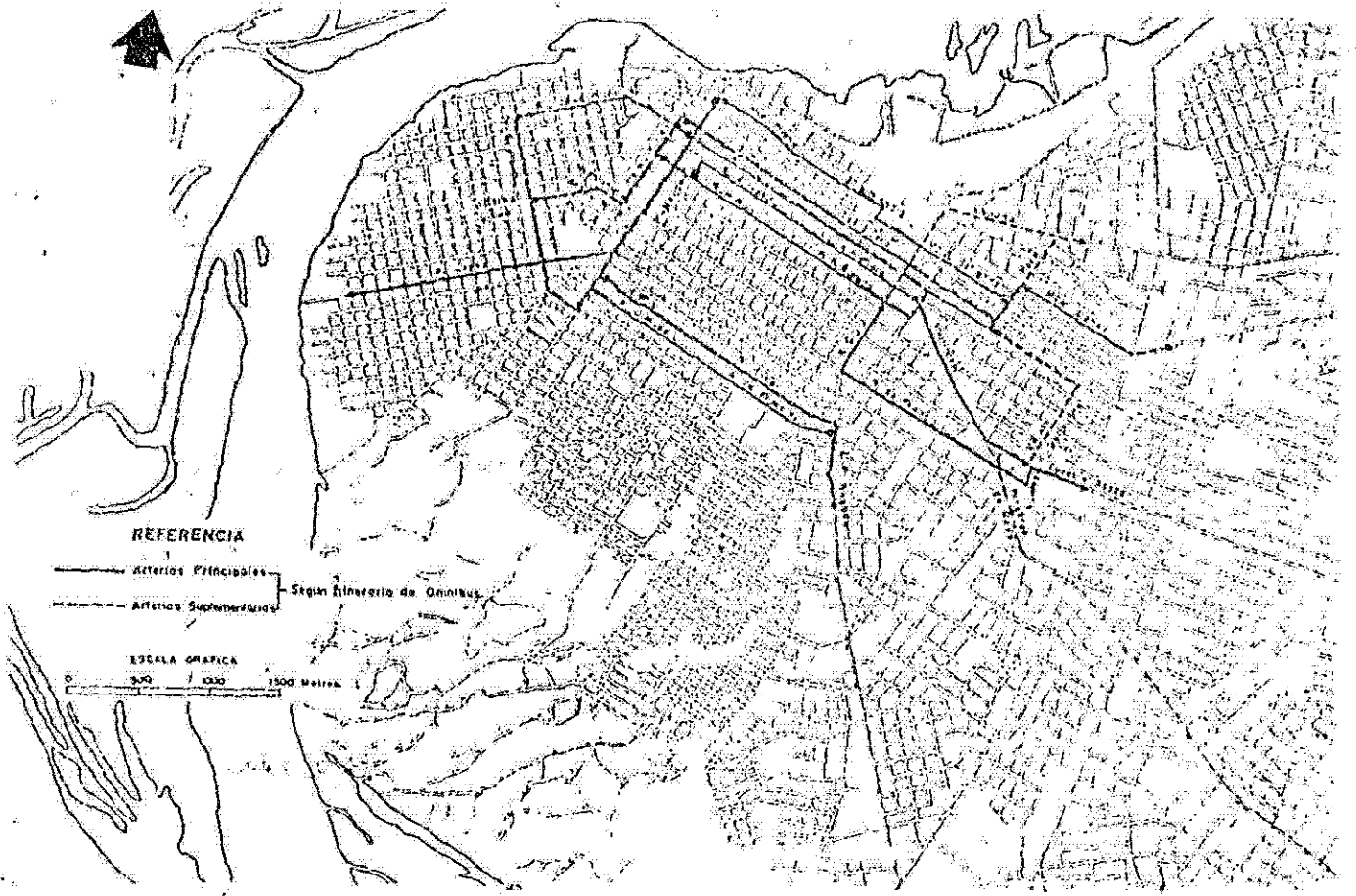


FIGURA 6-1-4 ARTERIAS SEGUN ITINERARIOS DE OMNIBUS

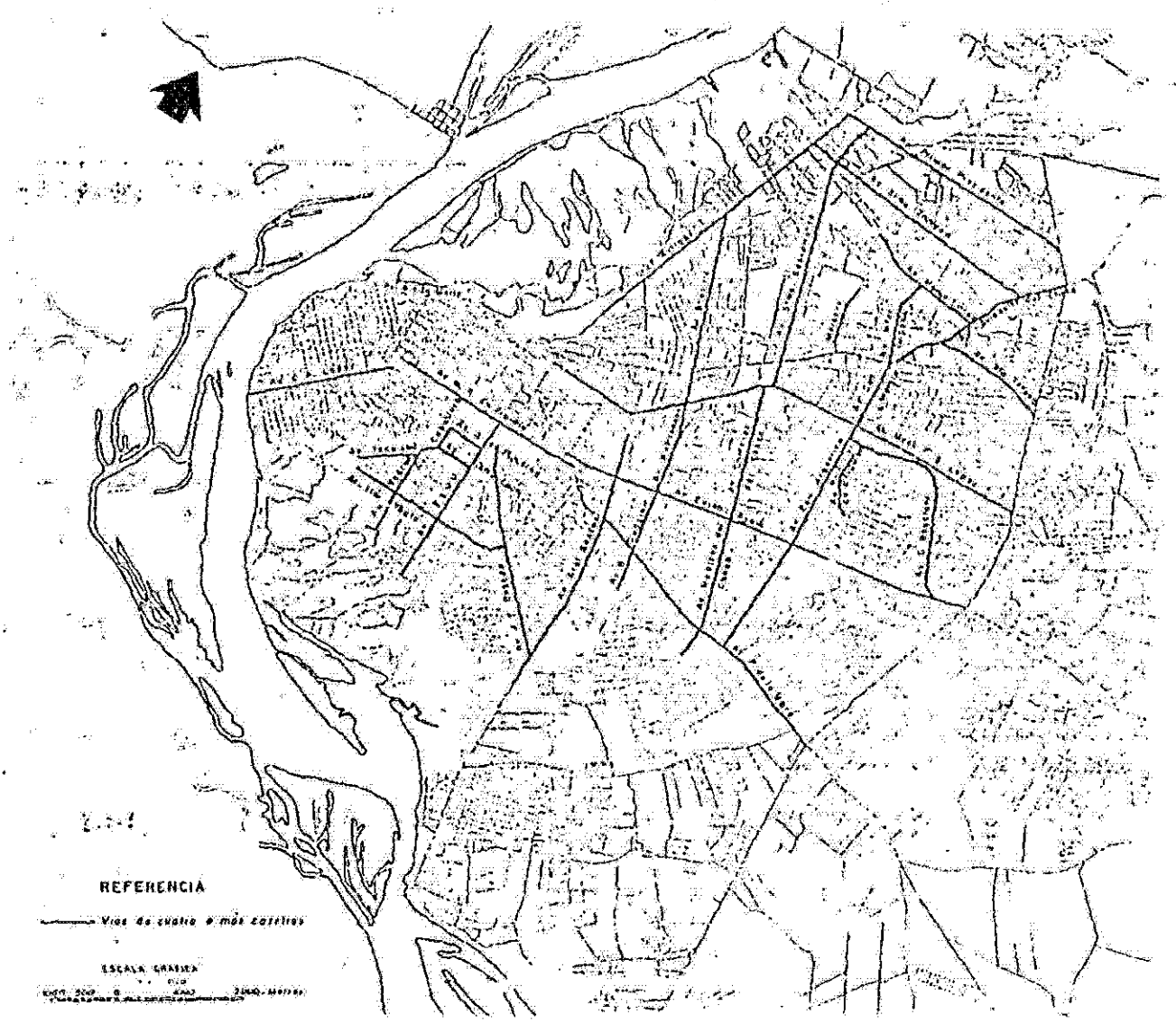


FIGURA 6-2-1 CALLES CON 4 CARRILES O MAS

CUADRO 6-2-1 Ancho de Vias y Calzadas

Nº de Zona	Promedio de Ancho de Calzada (m)	Promedio de Ancho de Calle (m)
1	8.96	13.71
2	9.02	13.83
3	8.63	13.04
4	8.83	13.10
5	9.04	13.79
6	8.59	14.21
7	9.41	13.01
8	8.83	13.57
9	9.20	13.69
10	8.63	13.41
11	8.54	12.91
12	8.72	14.86
13	9.09	14.77
14	9.08	14.92
15	9.20	14.97
16	9.08	14.99
17	9.38	14.82
18	8.94	14.95
19	8.99	15.12
20	9.04	15.21
21	9.57	13.66
22	8.76	14.25
23	9.57	14.90
24	9.00	15.96
25	9.02	14.32
Total Promedio	9.00	14.24



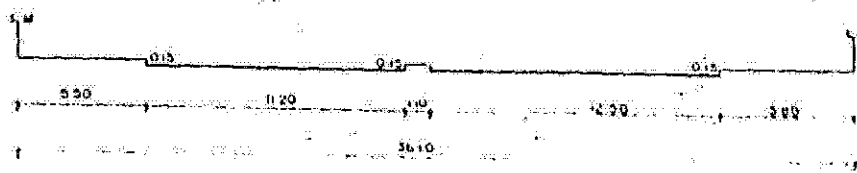
FIGURA 6-2-2 CALLES ASFALTADAS

FIGURA 6-2-2

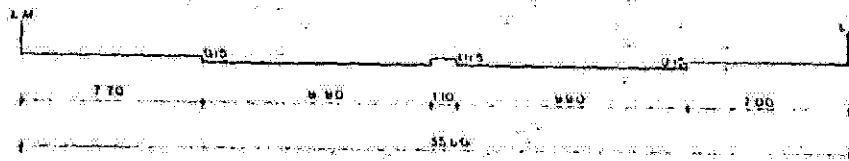
CUADRO 6-2-2 TIPOS DE PAVIMENTOS DE CALLE - PORCENTAJE

Zona	Asfaltado			Adoquinado			Empedrado			Sin pavimento			Total		
	Dist.	%	Area	Dist.	%	Area	Dist.	%	Area	Dist.	%	Area	Dist.	%	Area
1	12.27	100	16.7	0.00	-	0.0	0.00	-	0.0	0.00	-	0.0	12.27	100.0	16.7
2	10.56	100	14.5	0.00	-	0.0	0.00	-	0.0	0.00	-	0.0	10.56	100.0	14.5
3	4.82	75.1	6.5	0.00	-	0.0	1.42	22.1	1.7	0.18	2.8	0.2	6.42	100.0	8.3
4	16.11	100	21.4	0.0	-	0.0	0.00	-	0.0	0.00	-	0.0	16.11	100.0	21.4
5	20.80	100	30.6	0.00	-	0.0	0.00	-	0.0	0.00	-	0.0	20.80	100.0	30.6
6	29.26	39.1	43.7	0.00	-	0.0	39.32	52.6	55.6	6.19	8.3	8.8	74.77	100.0	108.2
7	15.87	100	22.6	0.00	-	0.0	0.00	-	0.0	0.00	-	0.0	15.87	100.0	22.6
8	19.21	100	25.9	0.00	-	0.0	0.00	-	0.0	0.00	-	0.0	19.21	100.0	25.9
9	17.63	55.2	28.7	0.00	-	0.0	12.96	40.6	18.5	1.34	4.2	0.1	31.93	100.0	47.3
10	1.11	2.4	1.4	0.00	-	0.0	45.10	97.6	61.8	0.00	-	0.0	46.21	100.0	63.3
11	8.29	12.4	12.1	0.00	-	0.0	45.85	68.5	61.3	12.82	19.1	16.9	66.96	100.0	90.3
12	1.07	3.2	1.3	0.00	-	0.0	27.36	83.0	40.7	4.52	13.7	6.8	32.95	100.0	48.8
13	6.63	10.0	11.7	0.00	-	0.0	44.21	66.7	66.6	15.45	23.3	22.8	66.29	100.0	101.1
14	5.44	17.8	8.4	0.00	-	0.0	24.47	80.2	36.6	0.59	1.9	0.9	30.50	100.0	45.9
15	5.01	5.4	6.1	0.00	-	0.0	45.13	80.4	67.4	7.99	14.2	11.9	56.13	100.0	85.5
16	1.16	5.4	2.0	0.00	-	0.0	19.94	92.4	29.8	0.47	2.2	0.7	21.57	100.0	32.5
17	1.25	4.3	2.6	0.00	-	0.0	28.00	95.7	43.0	0.00	-	0.0	29.25	100.0	45.6
18	2.99	3.9	6.1	1.42	1.8	3.7	62.30	81.0	95.7	10.23	13.3	13.7	76.94	100.0	119.2
19	2.36	3.7	4.2	0.00	-	0.0	57.61	90.6	88.6	3.58	5.6	5.5	63.55	100.0	98.2
20	4.67	4.9	7.3	2.93	3.0	5.6	60.80	63.5	94.2	27.44	28.6	41.1	95.90	100.0	148.2
21	22.70	49.0	35.8	0.00	-	0.0	16.01	35.3	22.8	7.12	15.7	10.4	45.33	100.0	68.7
22	1.28	3.3	2.0	0.00	-	0.0	31.63	81.5	45.0	5.89	15.2	8.4	38.79	100.0	59.4
23	2.32	3.0	5.3	3.35	4.3	7.1	61.11	78.6	95.1	11.01	14.2	17.0	77.78	100.0	124.5
24	0.95	2.2	1.5	0.18	0.4	0.3	21.78	50.9	34.5	19.88	46.5	31.7	42.79	100.0	68.0
25	1.38	3.6	3.2	2.40	0.1	6.2	9.34	24.7	13.6	24.69	65.3	35.7	37.81	100.0	58.7
TOTAL	212.62	20.5	321.4	10.28	0.99	22.9	654.38	63.1	922.6	159.38	19.4	232.7	1036.66	100.0	1549.6

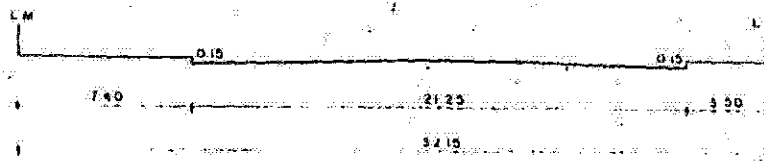
Av Eusebio Ayala y Urubiquina



Av Eusebio Ayala y Rca Argentina



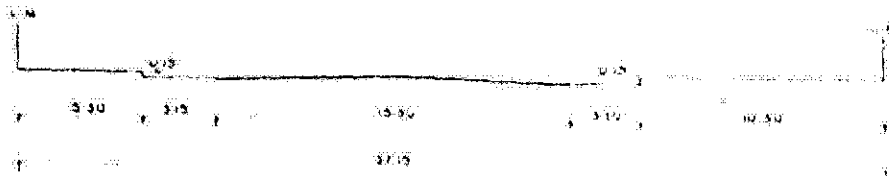
Av. Mcal Estigarribia y Av. Mine Lynch



Nota: L.M. = Calle Municipal

FIGURA 6-2-3 SECCION TRANSVERSAL (1-a)

Medio J. P. Estiguerribia y Barrancuela (Lado de la Sierra)



Medio J. P. Estiguerribia y Santa I. (San Lorenzo)

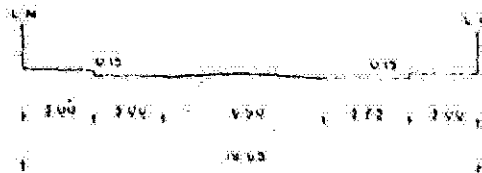
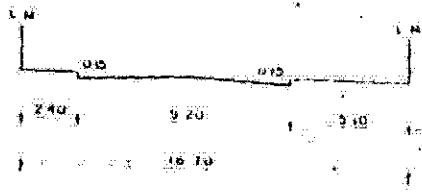
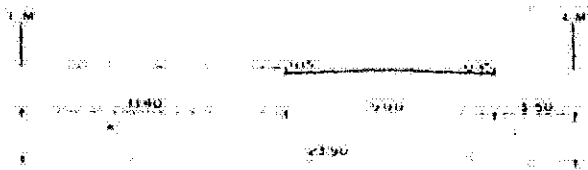


FIGURA 6-2-3 SECCION TRANSVERSAL (1-b)

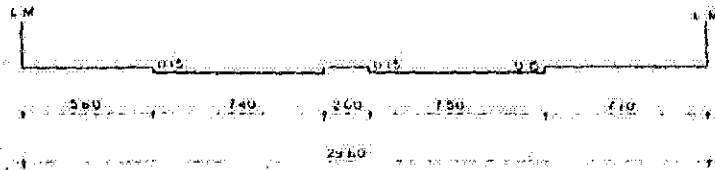
Av Díaz y Proceres de Mayo



Av Fdo de la Mora y Proceres de Mayo



Av Fdo de la Mora y Av Kubitschek



Av Fdo de la Mora y Av Red Argentina

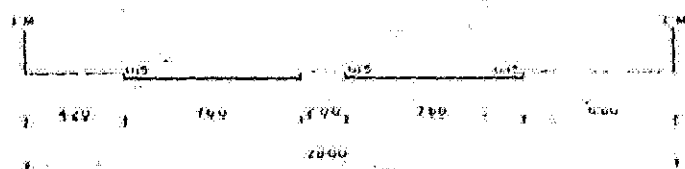
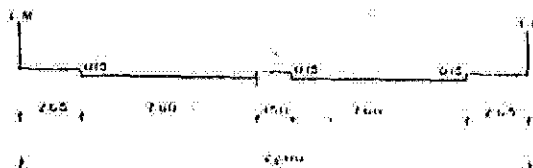


FIGURA 6-2-3 SECCION TRANSVERSAL (2)

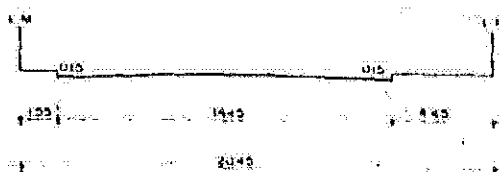
Av. Mca. López y Alameda



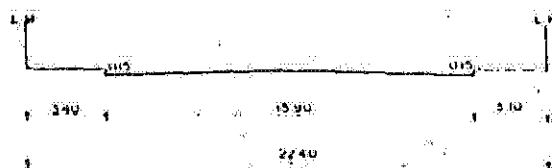
Av. Mca. López y Eugenio A. Guray



Av. Mca. López y Av. Venezuela



Av. Mca. López y Av. Perú



Av. Mca. López y Av. Brasil

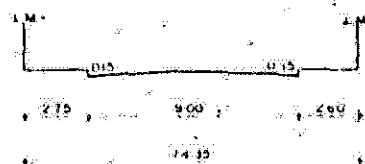
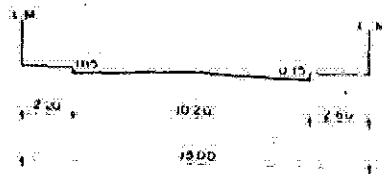
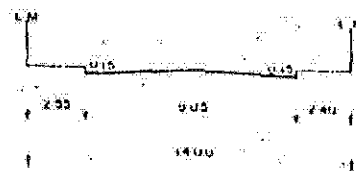


FIGURA 6-2-3 SECCION TRANSVERSAL (3)

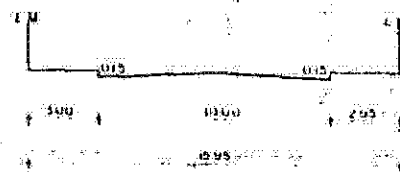
Av España y Río Parícutay



Av España y Padre Cardozo



Av España y Venezuela



Av España y San Martín

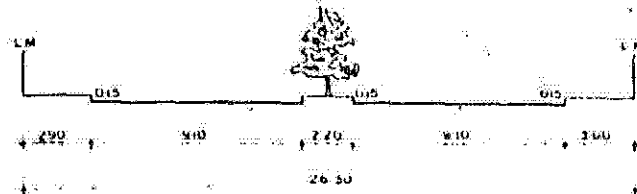
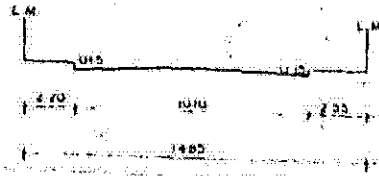
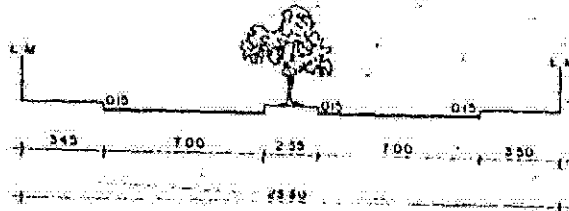


FIGURA 6-2-3 SECCION TRANSVERSAL (4)

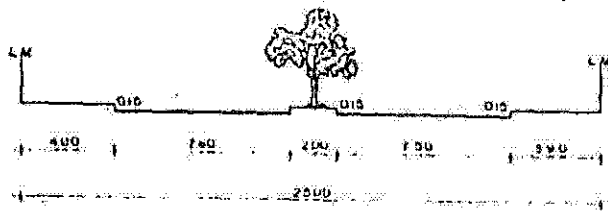
Av. G. Artigas y Av. España



Av. G. Artigas y Av. Venezuela



Av. G. Artigas y Av. 1ª Presidente



Avda. 1ª Presidente y Avda. Srno. Sacramento

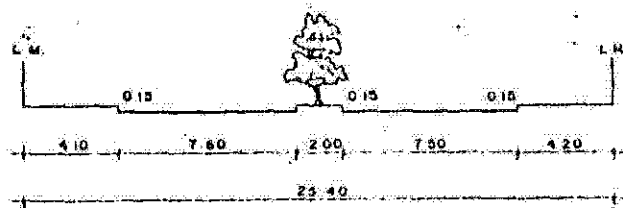
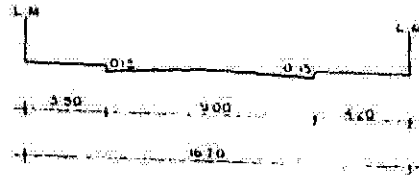
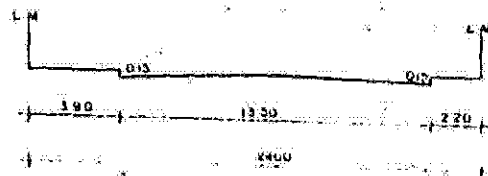


FIGURA 6-2-3 SECCION TRANSVERSAL (5)

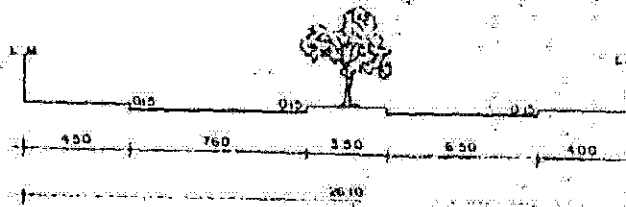
Av José Félix Bogado y Av Gaspar Rda Francia



Av José Félix Bogado y Blas Garay



Av José Félix y Gral Santos



Avda. Gral Santos y Cacique Lombare

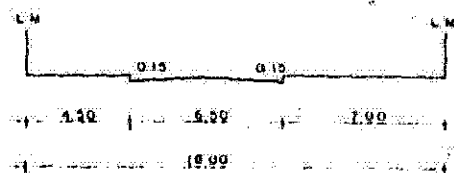
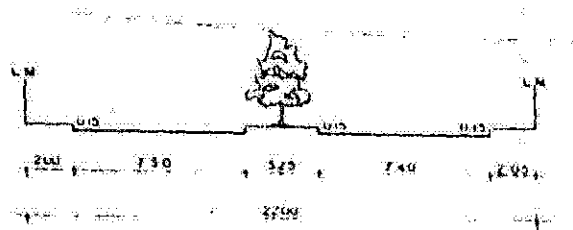
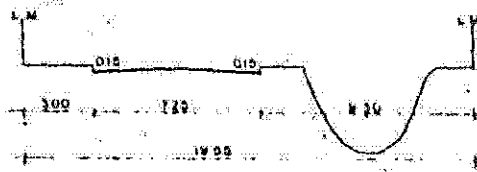


FIGURA 6-2-3 SECCION TRANSVERSAL (6)

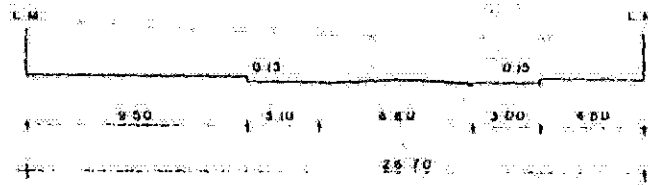
Av. Mima Lynch y Av. Aviladores del Chaco



Av. Mima Lynch y Av. Mat Lopez



Avda. Defensores del Chaco y Tte. Lopez



Av. Defensores del Chaco y Av. Fdo de la Mora

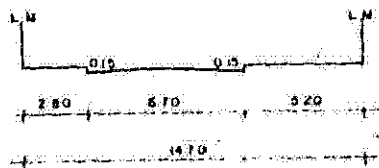
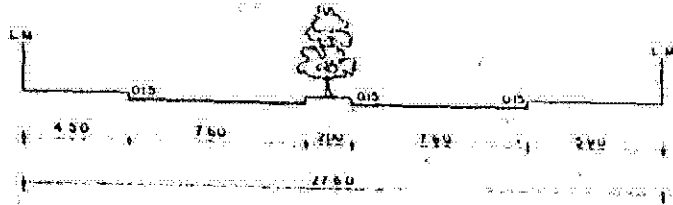
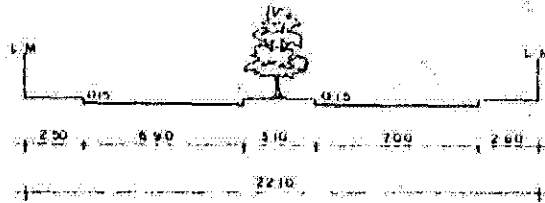


FIGURA 6-2-3 SECCION TRANSVERSAL (7)

Avda. Rca. Argentina y Avda. Fdo. de la Mora



Av. Rca. Argentina y Avda. E. Ayala



Avda. San Martín y Avda. Aviadores del Chaco

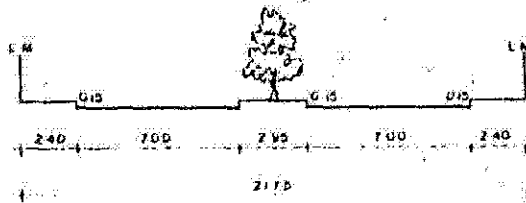
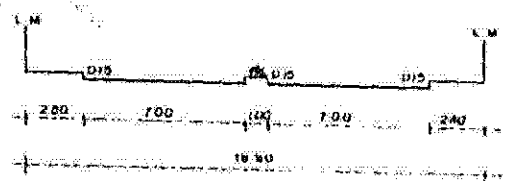
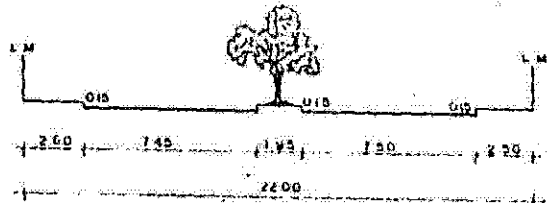


FIGURA 6-2-3 SECCION TRANSVERSAL (8)

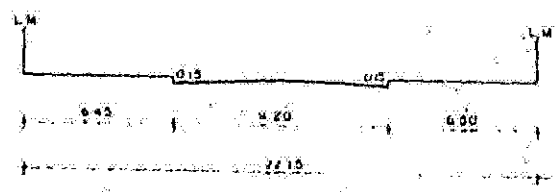
Av. Simón Sacramento y Av. Simón Trinitario



Av. Simón Sacramento e Itapúa



Avda. Chóferos del Chaco y 25 de Mayo



Avda. Chóferos del Chaco y Avda. E. Ayala

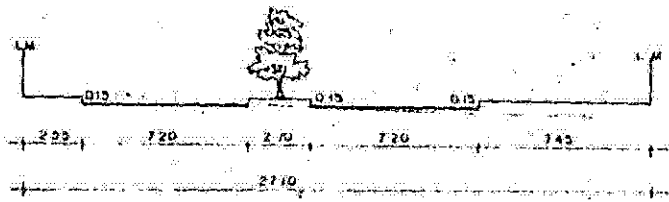
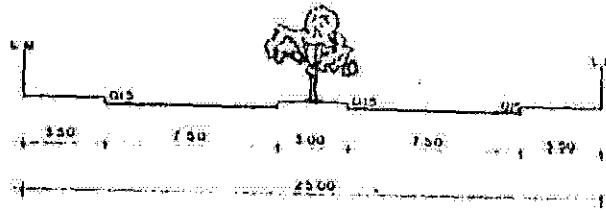


FIGURA 6-2-3 SECCION TRANSVERSAL (9)

Av J Kubitschek y 25 de Mayo



Av J Kubitschek y Fdo. de la Mora

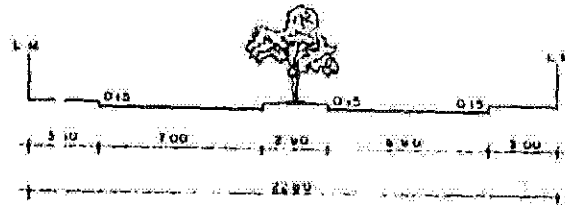
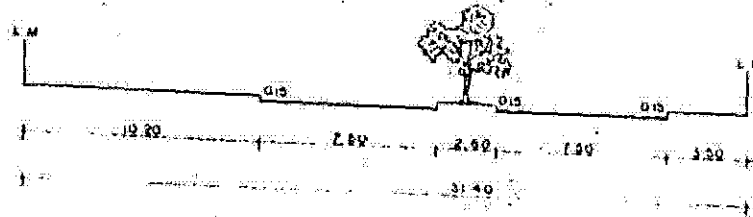
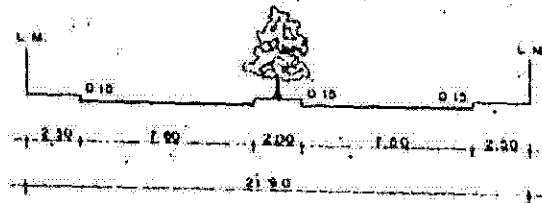


FIGURA 6-2-3 SECCION TRANSVERSAL (10)

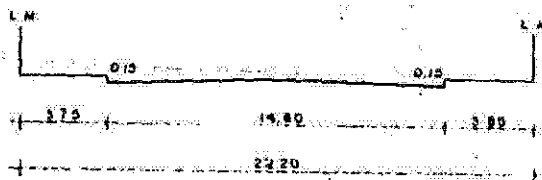
Av. Gral. Santos y Av. José Félix Bó



Avda. Gral. Santos y Edo. de la Mora



Avda. Gral. Santos y Avda. E. Ayala



Avda. Uruguay y Avda. G. Artigas

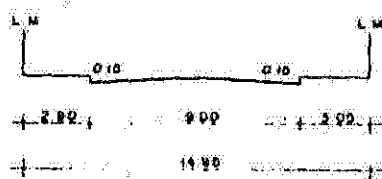
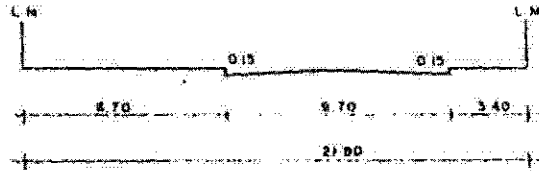
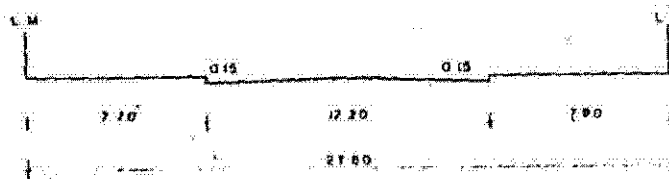


FIGURA 6-2-3 SECCION TRANSVERSAL (11)

Avda. Perú y Ana Diaz



Avda. Perú y Avda. Pettrossi



Avda. Perú y Juan de Zalazar y Espinosa

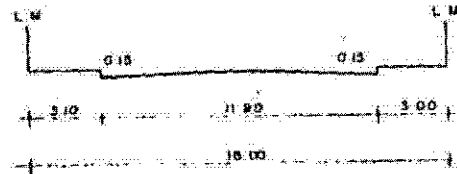
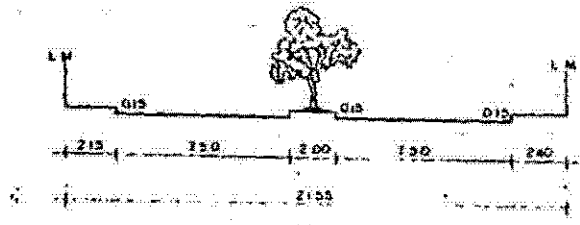
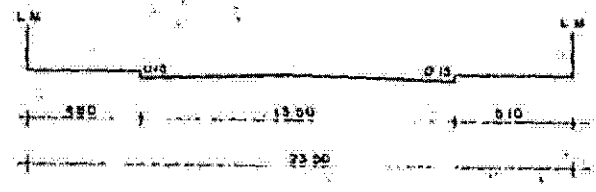


FIGURA 6-2-3 SECCION TRANSVERSAL (12)

Av. Santísima Trinidad e Itapúa



Av. Santísima Trinidad y Av. Artigas



Itapúa y 1^{er} Presidente

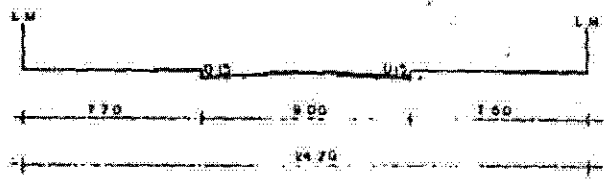
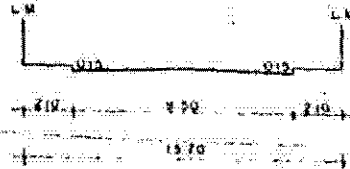
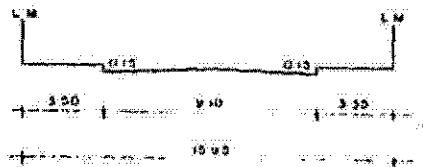


FIGURA 6-2-3 SECCION TRANSVERSAL (13)

Ay. Estados Unidos y Luis A de Herrera



Luis A de Herrera y Rca. Argentina



Montevideo y Milano

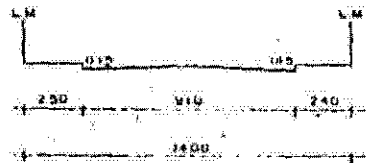
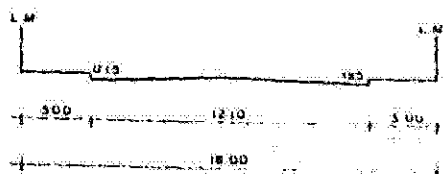
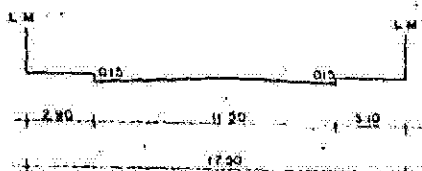


FIGURA 6-2-3 SECCION TRANSVERSAL (14)

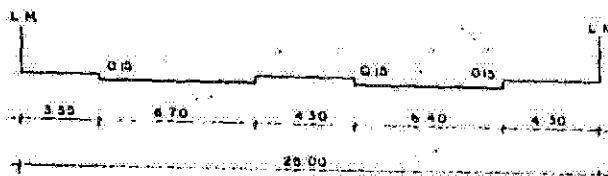
Av. Colón y Blas Garay



Av. Colón y Av. Carlos A. López



Avda. Carlos A. López y Dr. E. Paiva



Dr. E. Paiva y Avda. Carlos A. López

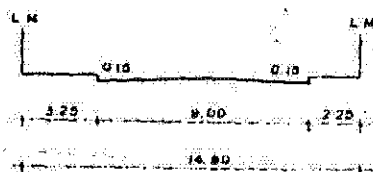
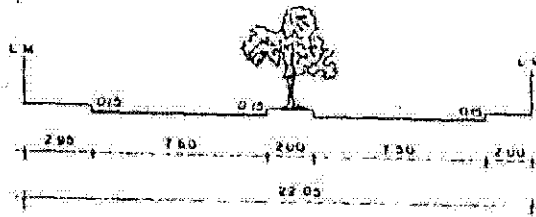


FIGURA 6-2-3 SECCION TRANSVERSAL (15)

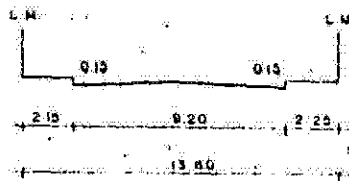
Av. Gaspar R. de Francia y Av. Peró



Av. Gaspar R. de Francia e Ygatimi



22 de Setiembre y Avda. Eusebio Ayala



Gral. E. Aquino y Avda. Eusebio Ayala

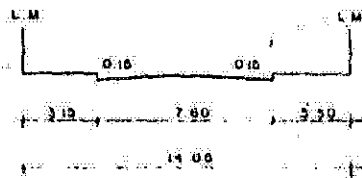
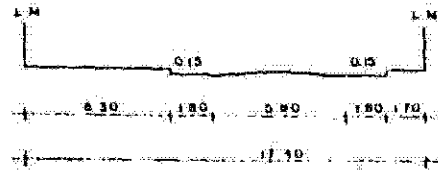
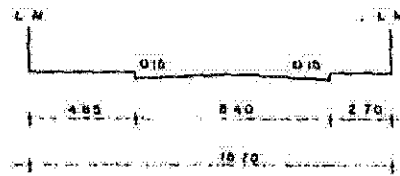


FIGURA 6-2-3 SECCION TRANSVERSAL (16)

Grat. E. Aquino y Grat. E. Diaz (Luque)



Grat. E. Diaz y Grat. E. Aquino (Luque)



Cerro Cará y Moises S. Bertani (Luque)

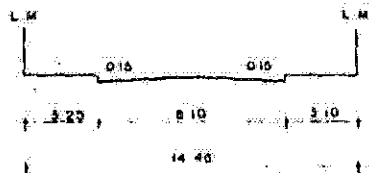
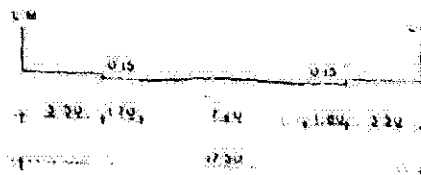
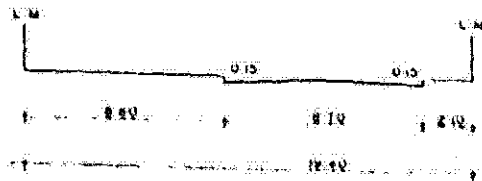


FIGURA 6-2-3 SECCION TRANSVERSAL (17)

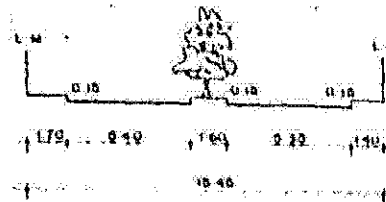
Julia M. Castro y Gaspar R. de Francia (San Lorenzo)



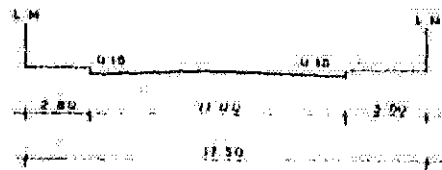
Avenida Gaspar R. de Francia y San Lorenzo (San Lorenzo)



Avenida Graf. Stroessner y Avda. G.R. de Francia (San Lorenzo)



Avenida Mca. F.S. López y Salaria Rias (San Lorenzo)



Avenida Mca. F.S. López y Avenida S. Teresa (Fila de la Matra)

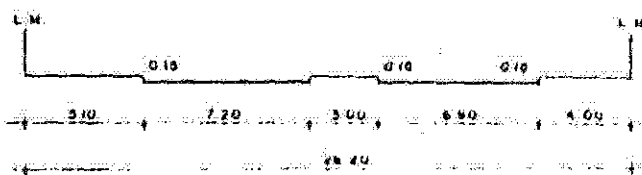
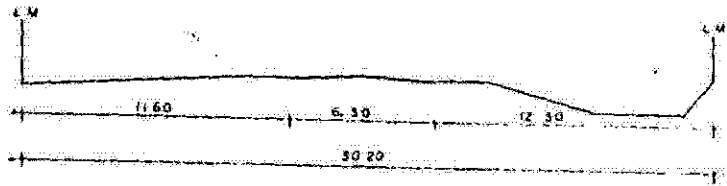
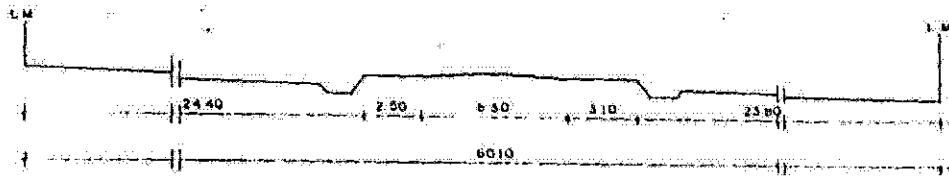


FIGURA 6-2-3 SECCION TRANSVERSAL (18)

Ruta Transchaco y Gregorio Villaiba



Ruta Transchaco - Km 14



Escala: 1:200

Ruta a Nemby

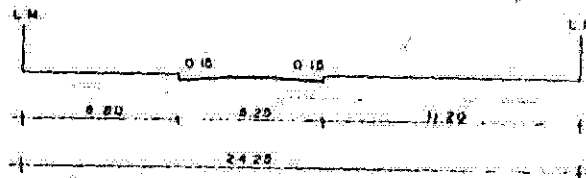


FIGURA 6-2-3 SECCION TRANSVERSAL (19)

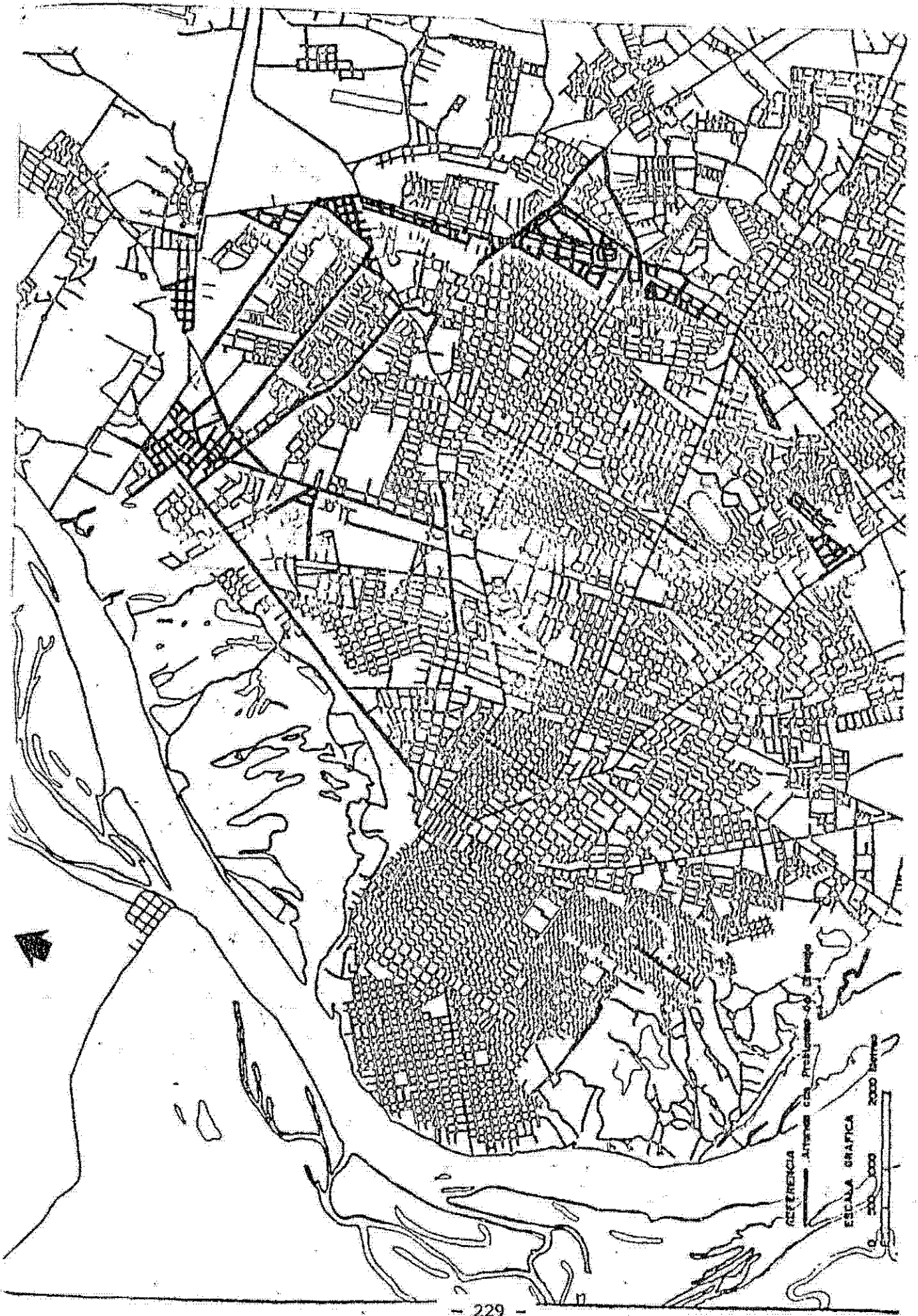


FIGURA 6-2-4 CALLES CON PROBLEMAS DE DRENAJES

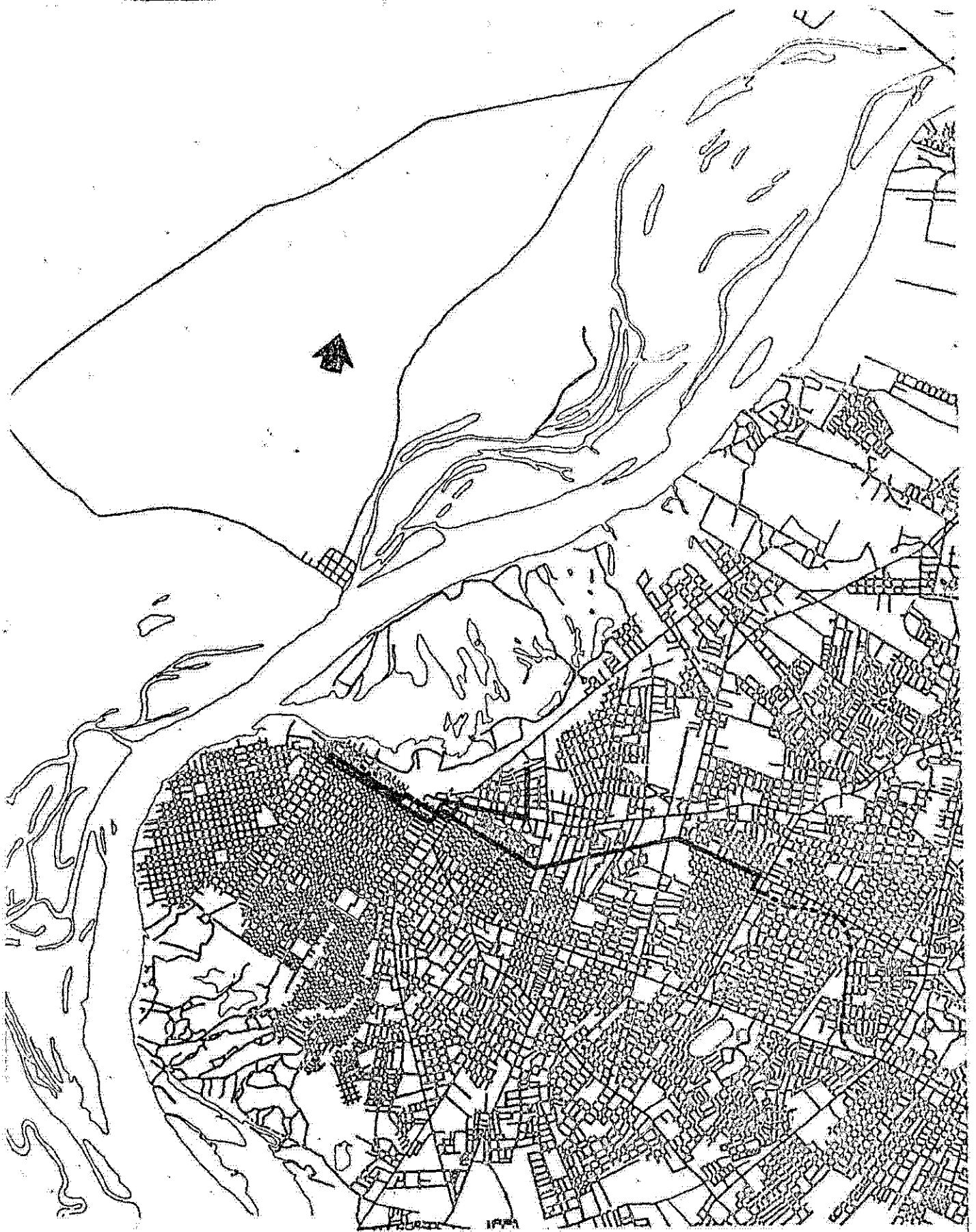


FIGURA 6-2-5 . ITINERARIO DE TRANVIA

CUADRO 6-3-1 CARACTERISTICA DE ARTERIAS DE PENETRACION

(1)

Nº	Nombre de Calle	Conecta	Derecho de Via	Nº de Carril	Punto Central	Otras	Tráfico Vol.(14)	Factor de Camiones %	Factor de Omibus %
1	J. Y. Bogado-Gral. Perón	Hanta Lambare	24.0-26.1	4	0	-	9.400	32.2	24.3
2	Edo. de la Mora	Ruta Kenby	23.9-29.6	4	0	-	17.000	14.6	15.6
3	E. Ayala	Ruta 1 y 2	32.2-37.2	4	0	-	21.000	31.8	28.7
4	Neal, López	Hanta S. Lorenzo	20.9-23.6	4	1/0	Tranvia	25.300	14.1	11.0
5	Empaña - Gral. Genes	Elizurdo Aquino	18.0/26.3	2/4	1/0	Tranvia	17.100	12.6	16.0
6	Artigas	Ruta 2 y 9	23.3-25.4	4	0	-	9.400	11.7	32.4

REFERENCIA (1)

- Hoy
- No Hoy

CUADRO 6-3-2 CARACTERISTICA DE ARTERIAS INTERCOLECTORAS

(1)

Nº	Nombre de Calle	Derecho	Ruta	Derecho de Via	Nº de Carril	Punto Central	Tráfico Vol.(14)	Factor de Camiones %	Factor de Omibus %
1	Defensores del Chaco - Dom. Lynch - Inf. Presidente	Villa Elisa	Artigas	18.7/26.0/19.6-22.8	2	1	13.000	32.5	29.2
2	La Victoria	Edo. de la Mora	Neal, López	24.0-25.5	2	1	-	-	-
3	Belgrano - San Martín	Edo. de la Mora	Gral. Genes	23.6-27.6	4	0	13.500	29.4	15.1
4	Defensores del Chaco - Defensores del Chaco - Inf. Presidente	Edo. de la Mora	Artigas	19.7-27.1	4	0	17.100	33.1	16.4
5	Yacaré	Neal, López	Artigas	15.0	2	1	1.500	30.0	26.5
6	Sagittario - Libertador - Uruguay	Gral. Lombard	Artigas	22.8-25.0	4	0	7.200	31.0	17.0
7	Gral. Rosales - Uruguay	Juan B. Pío	Artigas	21.9-22.2/15.0	4/2	0/1	6.000	23.8	5.5
8	Yaré	J. Y. Bogado	Artigas	18.0-27.8	4	1	11.500	23.5	13.0

REFERENCIA (1)

- Hoy
- No Hoy

CUADRO 6-3-3 CARACTERISTICA DE CALLES O - E (AREA CENTRO)

Nº	Nombre de Calle	Dirección	Continuación a Sajonia	a Barrios	Comercial	Omnibus	Tranvía	Volumen de Tráfico
1	Paraguayo Independiente-Coronel Bagado		⊙	⊙	Δ	⊙	⊙	⊙
2	Benjamin Constant	W - E	⊙	⊙	⊙	⊙	⊙	⊙
3	Presidente Franco-Eligio Ayala	E - W	⊙	⊙	Δ	⊙	⊙	⊙
4	Palma-Mcal. Estigarribia	E - W	Δ	⊙	⊙	⊙	⊙	⊙
5	Estrella-25 de Mayo	W - E	Δ	⊙	⊙	⊙	⊙	⊙
6	Oliva-Cerro Gorá	W - E	⊙	⊙	⊙	⊙	⊙	⊙
7	Gral. Díaz-Azara	E - W	⊙	⊙	⊙	⊙	⊙	⊙
8	Maedo-Herrera	W - E	Δ	⊙	⊙	⊙	⊙	⊙
9	Humboldt-Fulgencio H. Moreno	E - W	Δ	⊙	⊙	⊙	⊙	⊙
10	Piribebuy-Manuel Domínguez	W - E	⊙	⊙	⊙	⊙	⊙	⊙
11	Manduvirá-Pta. Veriña	E - W	Δ	⊙	⊙	⊙	⊙	⊙
12	Gral. Ibañez del Campo-Mca. de Colombia	W - E	Δ	⊙	⊙	⊙	⊙	⊙
13	25 de Diciembre-Gaspar M. de Francia	W - E	⊙	⊙	⊙	⊙	⊙	⊙

REFERENCIA

- ⊙ Muy Bueno
- Bueno
- Δ Regular
- X Mala

CUADRO 6-3-4 CARACTERISTICA DE CALLES N - S (AREA CENTRO)

Nº	Nombre de Calle	Dirección	Continuación	Omnibus	Comercial	Tranvía	Tráfico
1	Colón	N - S	○	○	○	○	○
2	Montevideo	S - N	○	○	○	○	○
3	Ayolán	N - S	○	○	○	○	○
4	O'Leary	S - N	○	○	○	○	○
5	15 de Agosto	N - S	○	○	○	○	○
6	14 de Mayo	S - N	○	○	○	○	○
7	Alberdi	E - S	○	○	○	○	○
8	Chile	S - N	○	○	○	○	○
9	Ntra. Bra. de Asunción	N - S	○	○	○	○	○
10	Ind. Nacional	S - N	○	○	○	○	○
11	Yegros	N - S	○	○	○	○	○
12	Iturbe	S - N	○	○	○	○	○
13	Caballero	N - S	○	○	○	○	○
14	México	S - N	○	○	○	○	○
15	Paraguari	N - S	○	○	○	○	○
16	Antequera	S - N	○	○	○	○	○
17	Tacuare	N - S	○	○	○	○	○
18	Parapiti	S - N	○	○	○	○	○
19	EE.UU.	S - N	○	○	○	○	○
20	Brasil	E - S	○	○	○	○	○

REFERENCIA

- ⊙ Muy Bueno
- Bueno
- Δ Regular
- X Mala

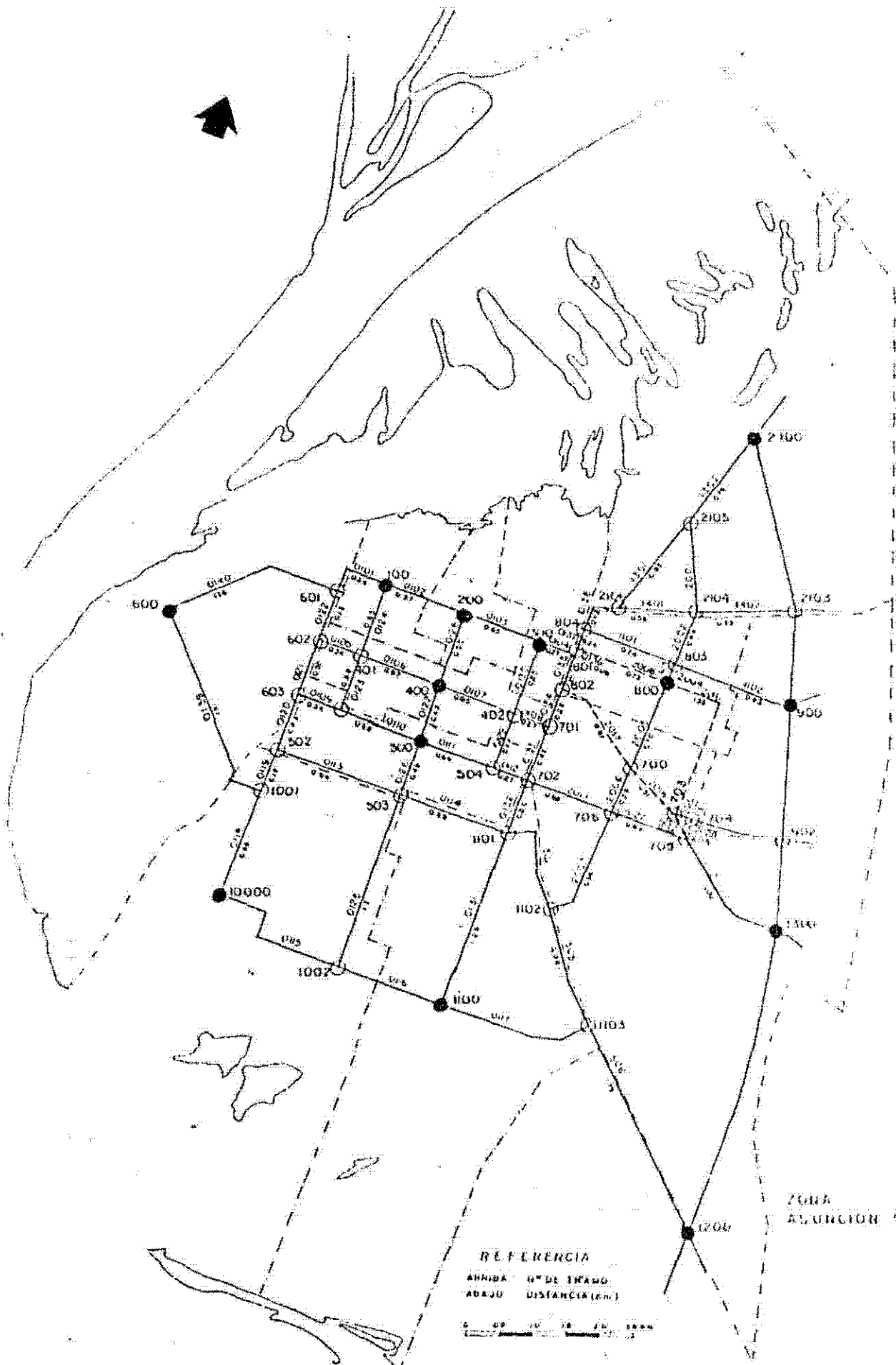


FIGURA 6-3-1 (1) RED VIAL AREA CENTRO

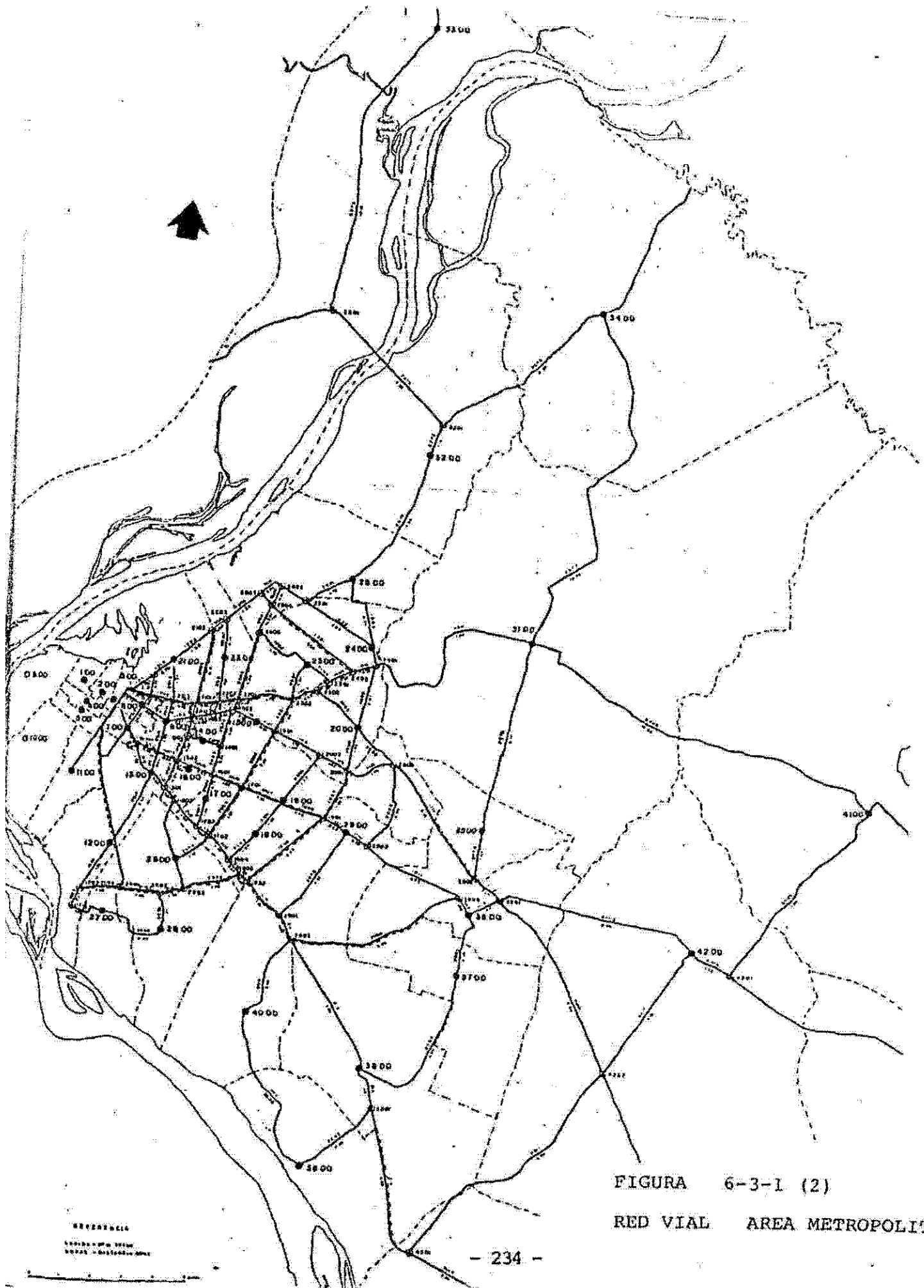


FIGURA 6-3-1 (2)
 RED VIAL AREA METROPOLITAN.

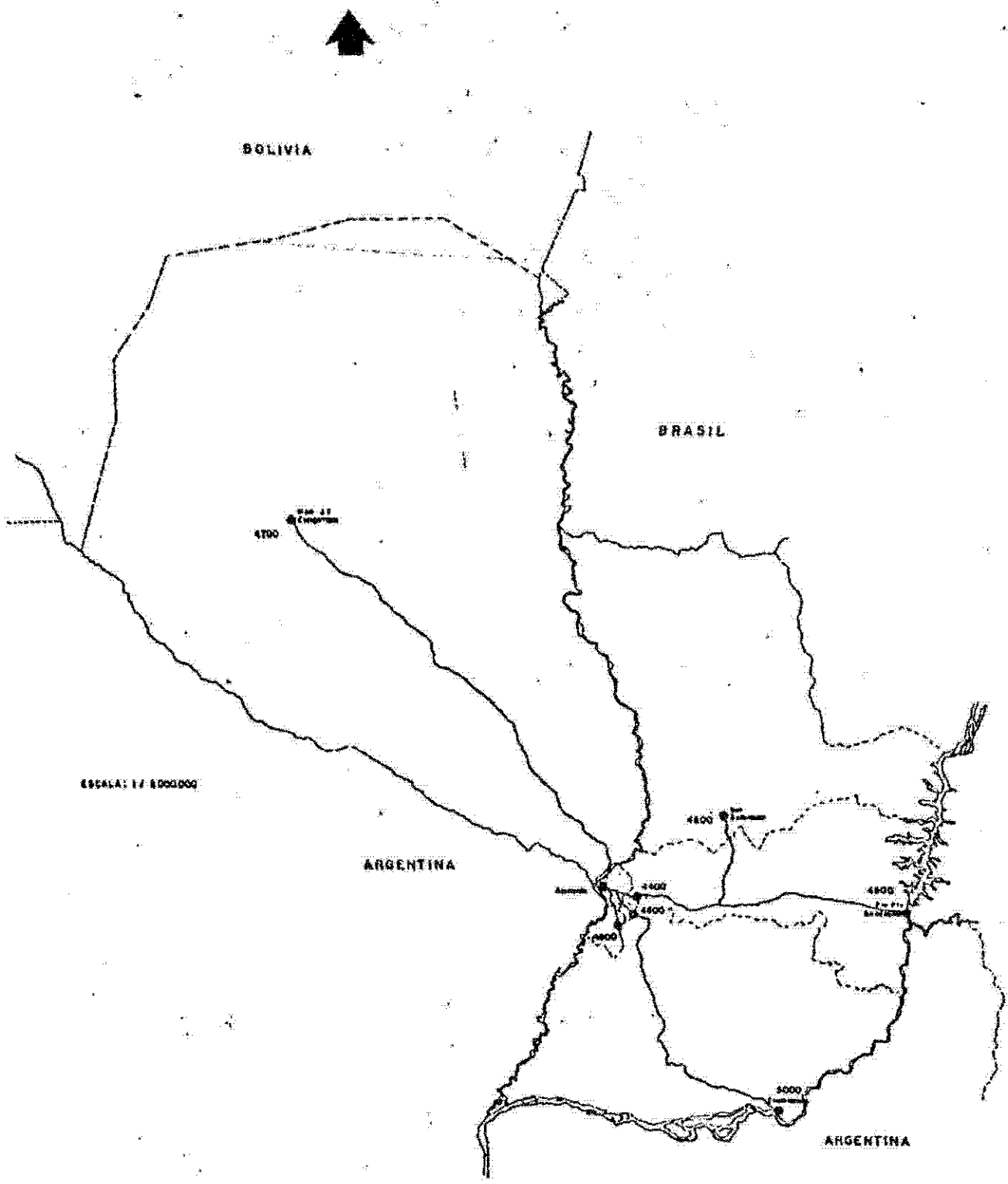


FIGURA 6-3-1 (3) FUERA AREA METROPOLITANA

Chapter 7: Present Road Traffic Situation

7-1. Traffic Volume

7-1-1. Traffic Flow Patterns

1) Traffic Volume at Metropolitan Area Borders

The traffic volume on major roads at the borders of the Metropolitan Area (14-hour round-trip traffic volume) is shown in Fig. 7-1-1. Traffic is significant on Ruta 1 and Ruta 2 in the eastern part of San Lorenzo, averaging between 4,800-6,800 vehicles per 14 hours.

When converted to passenger cars, the traffic flow volume at the two points on Ruta 1 and Ruta 2 is 7,000-9,000 PCU/14hrs.

2) Traffic Volume at Perimeter of Asuncion

The traffic volume on major roads at the perimeter of Asuncion is 11,800 vehicles per 14 hours on Ruta 2 in the western part of San Lorenzo. On major roads in northern Nemby, on Av. M. Lopez in the eastern part of San Lorenzo, and in eastern Limpio, traffic volume counts between 3,800-5,100 vehicles/14hrs. In terms of passenger cars, these figures convert to 12,000 PCU/14hrs on Ruta 2 and 5,300-7,000 PCU/14hrs for all other points.

3) Traffic Volume in Asuncion

The major traffic routes within Asuncion are the six main trunk roads and the seven loop roads which connect with them.

The 14hr traffic flow patterns of the major trunk roads

in Asuncion are shown in Fig. 7-1-2. The 14hr traffic volume on these roads is between 1,500-28,900 vehicles (or 2,000-34,000 PCU/14hrs when converted to passenger car units). Traffic volume is heaviest on Av. Espana, Av. E. Ayala and Av. M. Lopez, with the greatest concentrations in the Centro district and between Av. R. Argentina and Av. S. Martin.

7-1-2. Time Fluctuations of Traffic Volume

Time fluctuations of traffic volume at major points are shown in Fig. 7-1-3. Within the city, traffic volume shows three peak periods each day, with the remarkable traffic peak coming during the daytime. The three peak periods are between 6-8am, 11am-1pm and 4-6pm. There is a variance by approximately 1 hour between the peak periods in the city center and at the outskirts.

7-1-3. Breakdown by Vehicle Types

Fig. 7-1-4 shows the ratios for each type of vehicle at major traffic points. With the exception of part of the city outskirts, the relative proportion occupied by passenger car traffic is high. Roads showing a high ratio of bus traffic are Av. L. Herrera, Av. Palma and Av. 25 de Diciembre in the city center and Av. E. Ayala, Av. F. Mora, Av. Artigas, Av. S. Sacramento and Av. G. M. Santos in the middle area of the city. The ratio of heavy-duty transport vehicles (including goods transporters over 5 tons and buses) is highest in the area extending from the middle of the city to the outskirts, especially Av. D. Chaco, Av. M. Lynch, Av. E. Ayala and Av. C. Chaco where the ratio of such vehicles is between 30-55%.

7-2. Traveling Speed

Fig. 7-2-1 shows the vehicle traveling speed on major roads for various time periods of the day. Table 7-2-1 describes the reasons for slowdowns in areas having a traffic speed of less than 10km/h, categorized by road direction and time period. It should be noted, however, that these areas of slow traffic speed do not have adverse effect on their contiguous regions. Furthermore, the slowdown in traffic speed is a phenomenon which is alleviated within a short amount of time.

7-3. Vehicle Parking Situation

7-3-1. On-Street Parking by Zone

Fig. 7-3-1 shown the vehicle parking density according to zones. The parking density refers to the ratio between on-street parking demand volume vs. the on-street parking capacity. The on-street parking capacity has been calculated according to the districts where parking is allowed under present regulations.

The parking density distribution in each zone is described as follows. Parking density is high in the Micro Centro district surrounded by Av. L. A. Herrera, Av. Colon and Av. H. Unidos. In particular, during the commuting and business rush hours (8-10am) the parking density reaches 100% in P/T zones No. 1 and 2, thereby leading to frequent cases of illegal parking. In P/T zone No. 3, the parking density is between 50-100%, while in all other P/T zones it is less than 50%.

The parking density distribution in each zone by time period is described as follows:

- (1) 8-10am: Parking density in P/T zones No. 1 and 2

exceeds 100%. In zone No. 3 it is 75% and in all other zones, less than 50%.

- (2) 3-5pm: Parking density in P/T zones 1, 2 and 3 is between 50-100%. It is less than 50% in all other zones.

7-3-2. Parking Density Distribution by Link

Fig. 7-3-2 shows parking density according to link. Fig. 7-3-3 focuses on those areas where the parking density exceeds 100% or is between 50-100%, with equivalent density contours.

Links with parking densities over 100% are to be found in all areas within the scope of the present study. The center of this high-density region is the area bordered by Av. Colon, Av. L. A. Herrera and Av. H. Unidos.

7-3-3. Purposes for Parking

The various purposes for parking are described in Fig. 7-3-4 and Table 7-3-1. According to interviews conducted when the driver parks his vehicle, data compiled and combined for two survey points in Micro Centro (P/T zones No. 1 and 2) showed the purpose for parking was commutation to work (or school) in some 27% of the cases, business 25%, shopping and eating 17%, and return home or to place of work 3%. Other purposes, including recreation, were approximately 28%. The purposes for parking in each area are described as follows:

- (1) P/T zone No. 1: Business approx. 26%, work approx. 19%, shopping or eating 19%.
- (2) P/T zone No. 2: Business approx. 33%, work or school 27%, shopping or eating 12%.

7-3-4. Walking Distance

The average walking distance from on-street parking location to final destination in P/T zones No. 1, 2 and 3, based on a sampling survey, is approximately 50m, as shown in Fig. 7-3-5. In the case of off-street parking, the walking distance averages 290m.

7-3-5. Parking Time and Turnover Rate

Table 7-3-2 shows the average on-street parking time and turnover rate.

The average parking time for all purposes, according to combined data for the two survey points in P/T zones No. 1 and 2, is approximately 80 minutes. When broken down by parking purpose, the average parking time for business is some 40 minutes, for work or school 180 minutes, and shopping and eating (including recreation, etc.) 40 minutes.

The average turnover rates are 6.3 times per day. According to the results for each survey point, at the business district of N. S. Asuncion the turnover rate was some 5.1 times; in the commercial district of Alberdi, 7.8 times.

7-3-6. Off-Street Parking Situation

Fig. 7-3-6 shows the entering and exiting traffic volume fluctuations at off-street paid parking lots in P/T zones No. 1 and 2. The peak rate based on the demand volume of such parking lots is approximately 15%, with the peak time between 9-11am.

7-4. Traffic Accidents

7-4-1. Annual Patterns in Traffic Accidents

Table 7-4-1 and Fig. 7-4-1 describe the incidence of traffic accidents per year in Asuncion for the past eight years (1976-1983).

In the past several years, the number of traffic accidents per year had been on the increase. In 1983, however, the number dipped slightly. Even so, the number of accidents recorded for 1983 was nearly double the number for 1976. Also, the percentage of accidents each year per 100 vehicles registered in Asuncion peaked at 9.88 in 1981 and has been decreasing thereafter. In 1983, the ratio was 6.13.

7-4-2. Traffic Accidents by Category of Vehicle

Table 7-4-2 shows the number of traffic accidents in Asuncion in 1983 according to category of vehicle. Among 4-wheeled vehicles, passenger cars were involved in approximately 57% of all accidents, followed by trucks at 21% and buses at 19%. When viewed as percentages based on the number of such vehicles registered, the ratio of bus accidents is extremely high.

7-4-3. Number of Traffic Accidents by Road

Fig. 7-4-2 shows the number of accidents per 100m on major roads in 1983. The average incidence of traffic accidents for all such roads was 3.0 accidents per 100m. Roads showing relatively high rates of accidents were Av. R. Francia, Av. E. Ayala (between Av. Pettrossi and Av. C. Chaco), Av. Brasil and Av. M. Lopez (between Av. Brasil and Av. G. M. Santosa), where the rates were 9.78, 9.33, 8.33 and 8.21, respectively. Other roads with relatively high

rates of traffic accident incidence include Av. Azara, Av. Peru and Av. Pettrossi, which averaged rates between 6.0 and 8.0.

7-4-4. Points with High Traffic Accident Incidence and Types of Accident

1) Points with High Traffic Accident Incidence

Fig. 7-4-3 shows the points in Asuncion where more than 5 accidents occurred during 1983. Heaviest concentrations of accidents are at the intersections of such major roads as Av. R. Francia, Av. E. Ayala, Av. E. Unidos, Av. Brasil and Av. M. Lopez, all of which extend out from the Centro district. In particular, traffic accidents were most conspicuous between Av. E. Unidos and Av. R. Argentina on both the Av. R. Francia and Av. E. Ayala routes.

2) Types of Accident

Table 7-4-3 shows the types of accidents occurring at points with high rates of traffic accident incidence, and Fig. 7-4-4 describes traffic incidence for each point. Analysis of the 10 intersections with the highest rates of traffic accident incidence reveals that scrape accidents occurring when passing another vehicle account for approximately 41% of all accidents and rear-end collisions account for 40%. Together, therefore, these two types of collision comprise no less than 81% of all accidents.

Classified by traffic violation, collisions due to passing another vehicle against better judgment account for the highest frequency with approximately 22%, followed by collisions due to tailgating, at 20%. Inattentive driving is the cause of accident in 17% of all cases, and improper

lane changing is the cause of 14%.

Qualitative analysis based on the above data reveals the following conclusions:

(1) Judging from the high incidence of traffic accidents at intersections with traffic signals, there must be certain problems relating to the traffic signal processing system.

(2) Accidents involving the scraping of one vehicle by another during passing occur with great frequency near the entry to intersections. This may be said to be due to insufficient road width in such areas. Another reason is the presence of numerous cars parked in such areas.

(3) At intersections where there are no traffic signals, there are numerous accidents involving one vehicle running into the side or front of another vehicle coming from a side direction. Such accidents may be said to be due to unclear stop signs, unclear yield indicators, or to the lack of traffic signals despite heavy traffic flow.

(4) In areas of approach and exit from intersections, there are numerous accidents with parked vehicles or vehicles using off-street parking. Such accidents can be attributed to improper on-street parking or improper siting of such parking facilities too close to intersections.

(5) Numerous accidents occur near intersections caused by vehicles moving in reverse. These accidents are often due to the incline in the road near the intersection.

(6) At intersections which heavy traffic volumes, buses frequently are involved in rear-end accidents or scrape accidents when one vehicle passes another. Such accidents may be thought to result from passing moves by buses or from traffic flow blockage arising from buses stopping at bus stops.

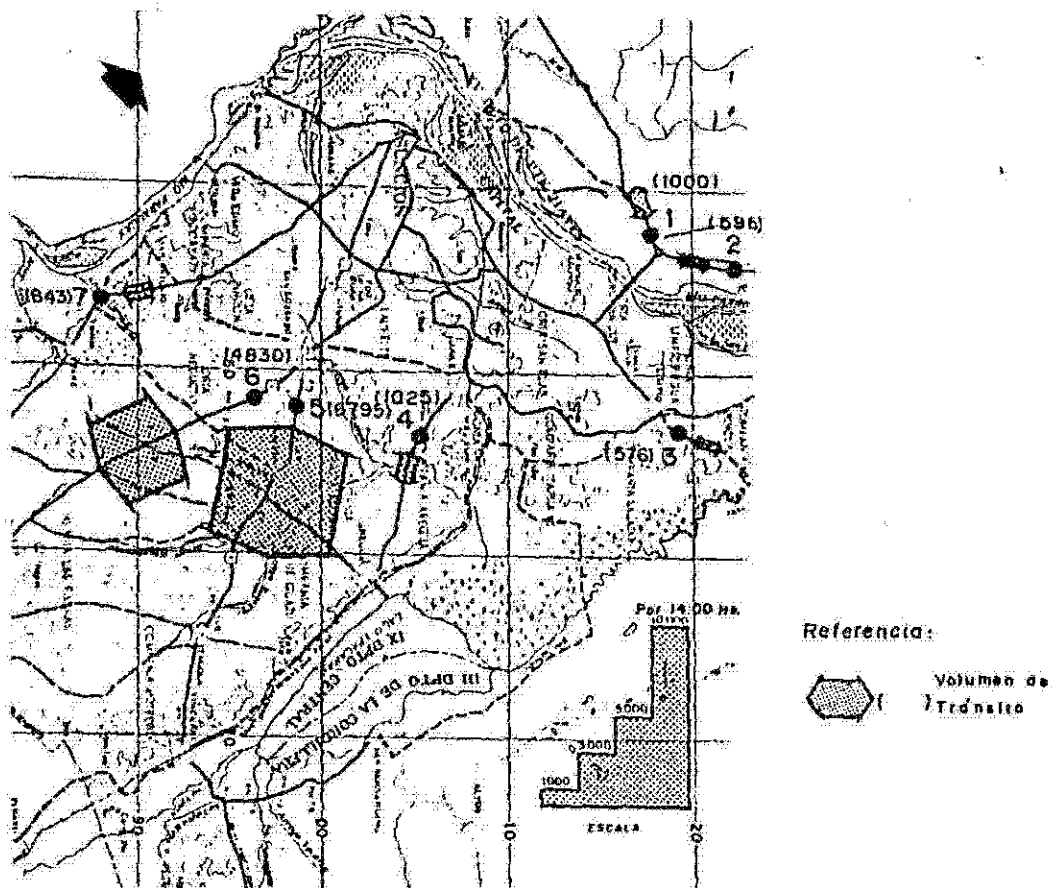


FIGURA 7-1-1 VOLUMEN DE TRANSITO EN LOS LIMITES DEL AREA METROPOLITANA

CUADRO 7-1-1 LOCALIZACION DEL TRANSITO VOLUMINOSO EN ASUNCION

Arteria	Rango Cuantitativo
	v / 14 Hs.
Av. España	9,400 - 19,600
Av. Mariscal López	5,900 - 28,900
Av. Eusebio Ayala	14,300 - 25,100
Av. Fernando de la Mora	9,100 - 16,100
Av. Choferes del Chaco - Av. Stmo. Sacramento	2,300 - 14,100
Av. Perú	6,300 - 14,600
Av. 25 de Diciembre - Av. Rodríguez de Francia	7,400 - 14,100
Av. Colón	10,900 - 16,300

Nº DE LUGAR	UBICACION
1	C.A. Lamié y Dr. Payne
2	Arce y Lamié
3	Costa y Tristán
4	Yegros y Oros
5	Dr. R. Franco y E. E. U. U.
6	Dr. R. Franco y E. E. U. U.
7	Dr. R. L. V. V. V. V.
8	Dr. R. Franco y J. J. J. J.
9	J. J. J. J. J. J. J. J.
10	Dr. R. Franco y J. J. J. J.
11	Dr. R. Franco y J. J. J. J.
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17	Dr. R. Franco y J. J. J. J.
18	Dr. R. Franco y J. J. J. J.
19	Dr. R. Franco y J. J. J. J.
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22	Dr. R. Franco y J. J. J. J.
23	Dr. R. Franco y J. J. J. J.
24	Dr. R. Franco y J. J. J. J.
25	Dr. R. Franco y J. J. J. J.
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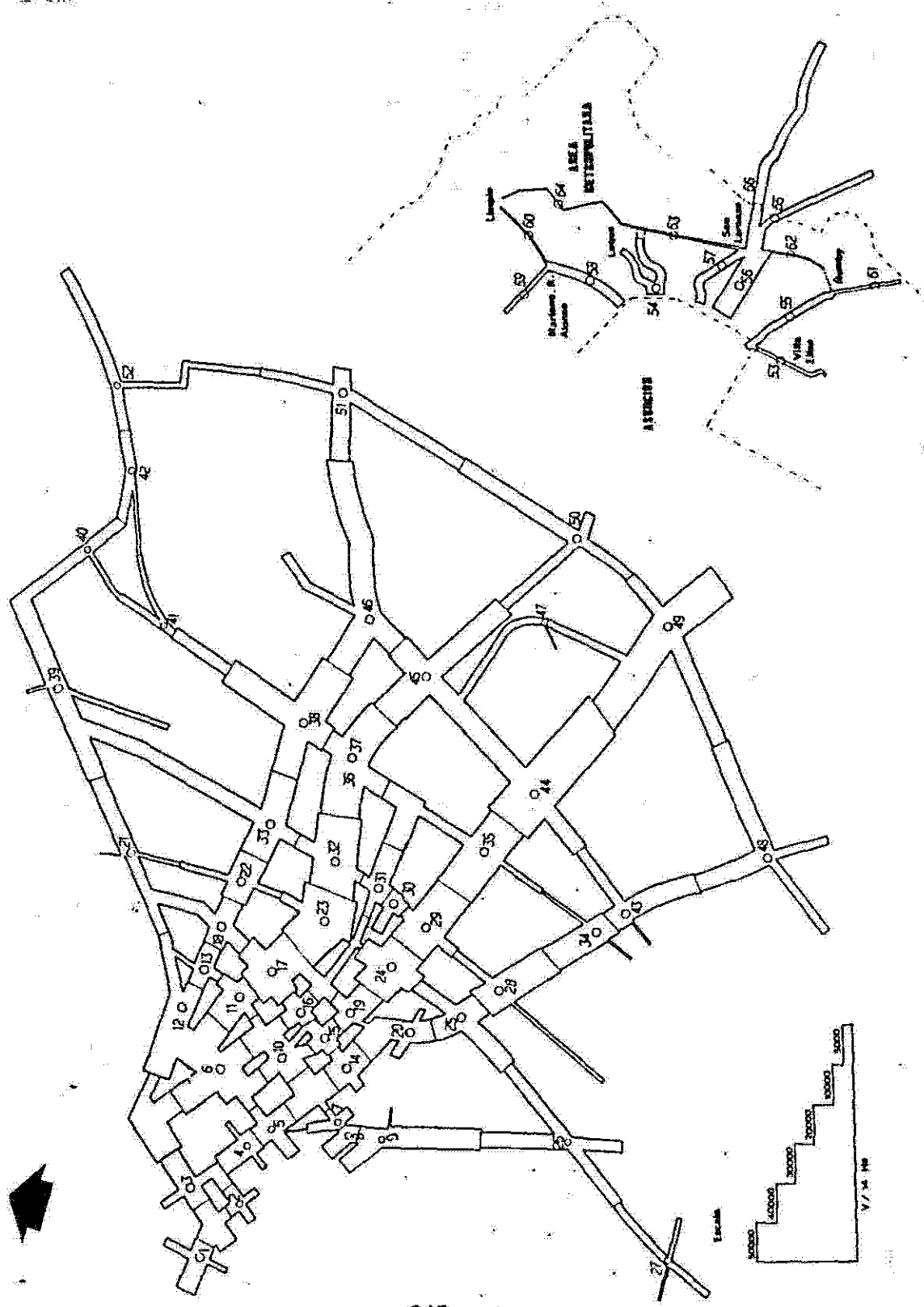


FIGURA 7-1-2 FLUJO DE TRANSITO AUTOMOTOR (ASUNCION)

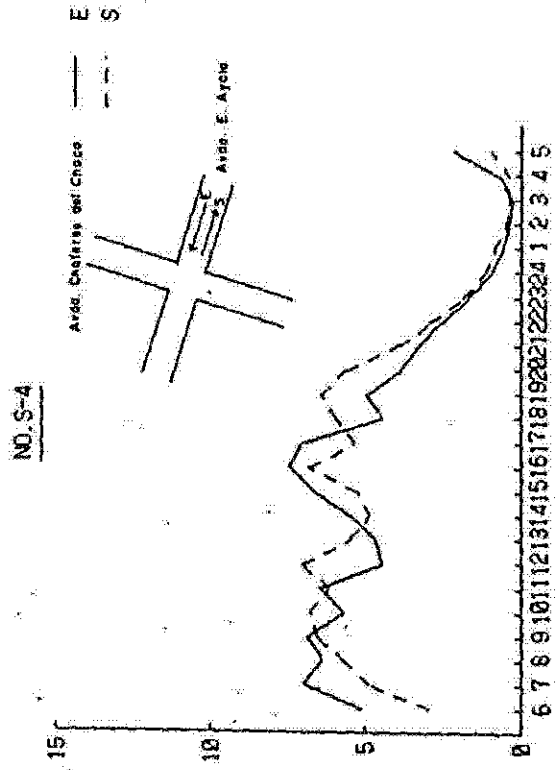
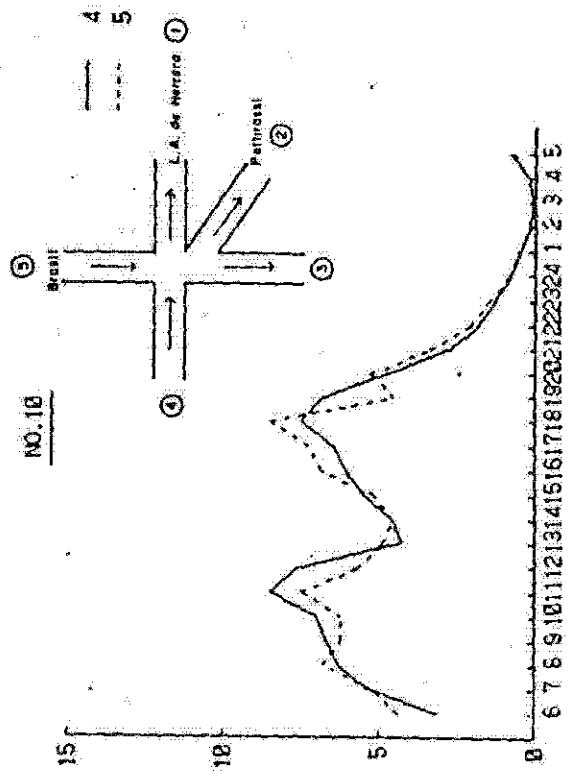
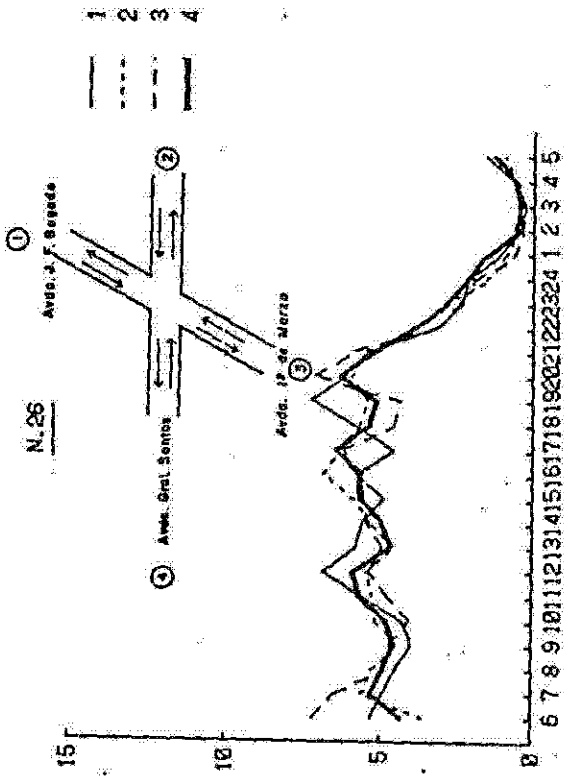
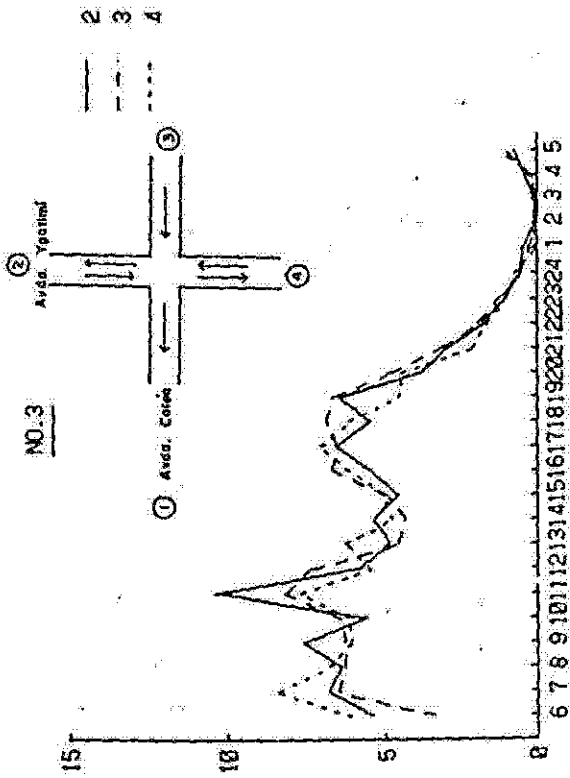
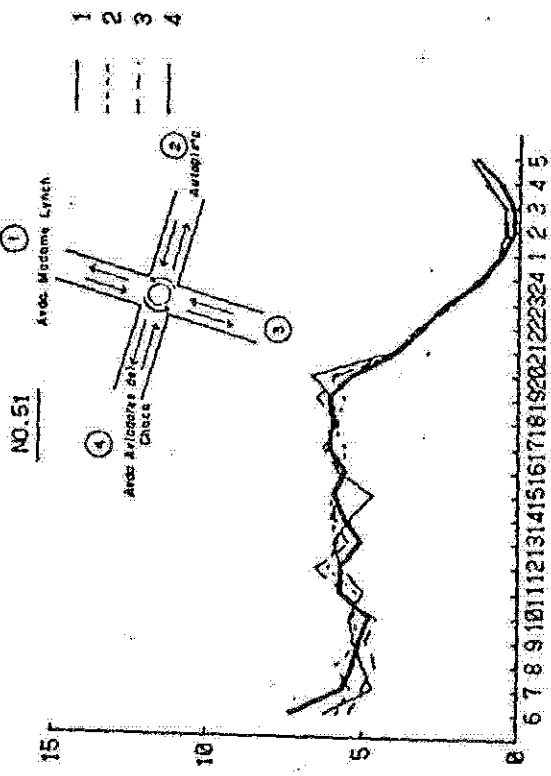
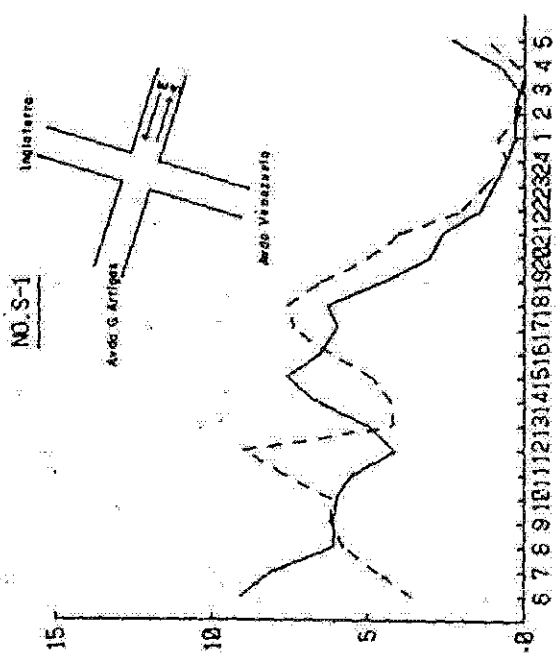
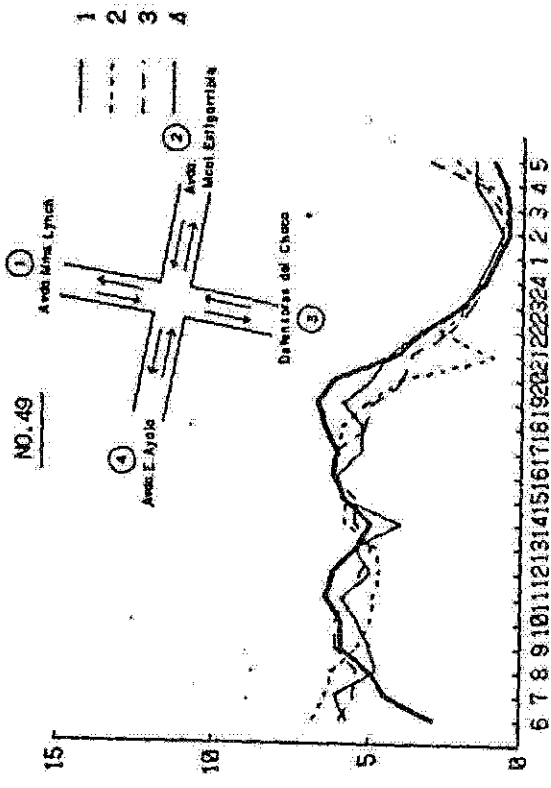
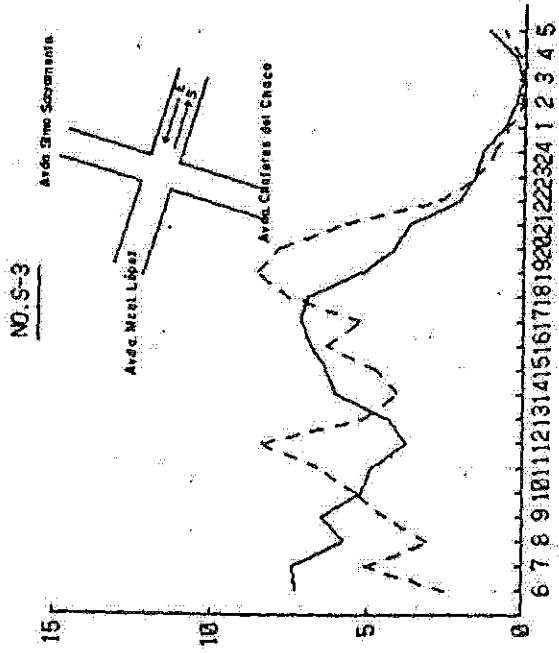


FIGURA 7-1-3 VARIACION HORARIA DEL TRANSITO



CONT. FIGURA 7-1-3

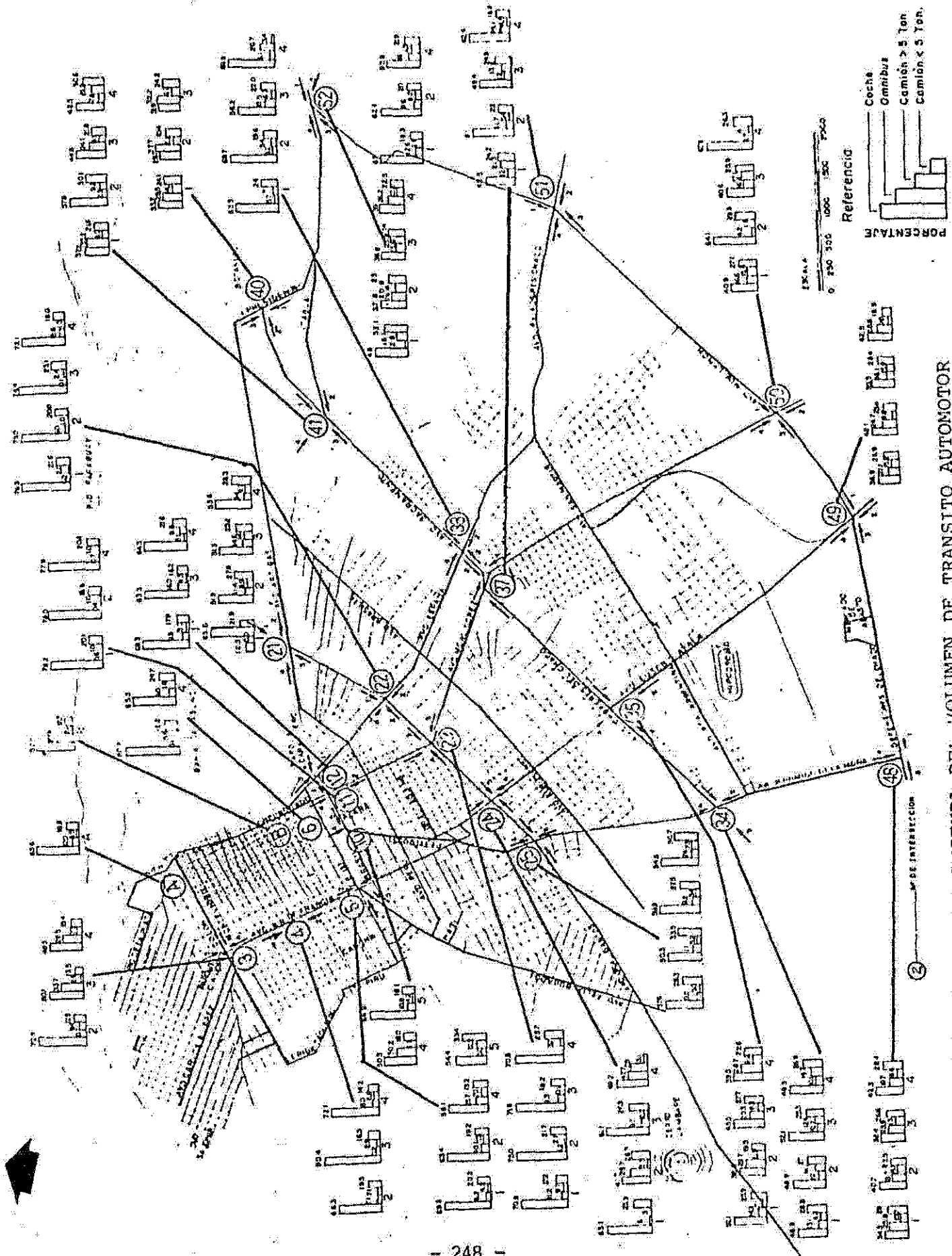


FIGURA 7-1-4 ESTRUCTURA DEL VOLUMEN DE TRANSITO AUTOMOTOR

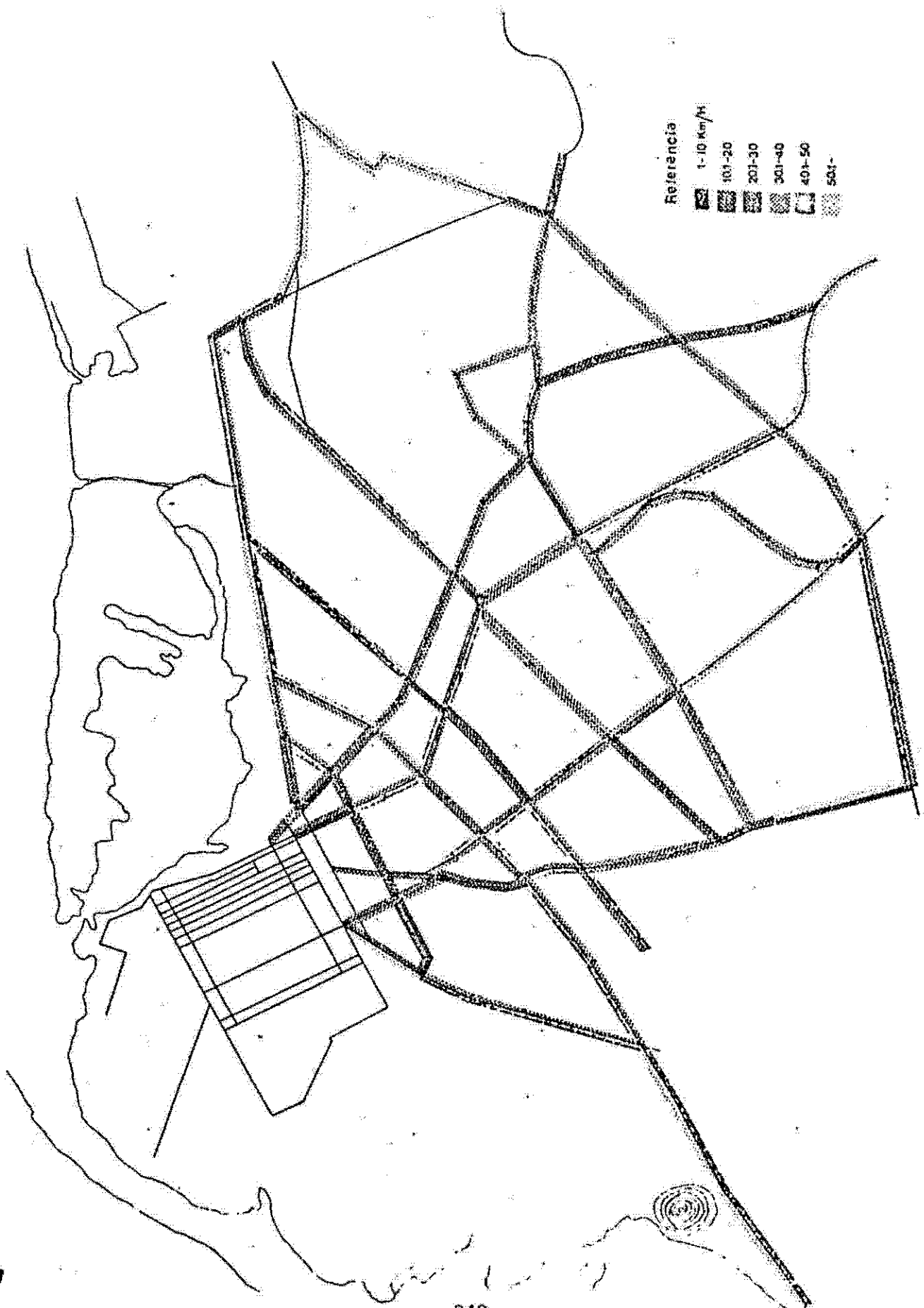
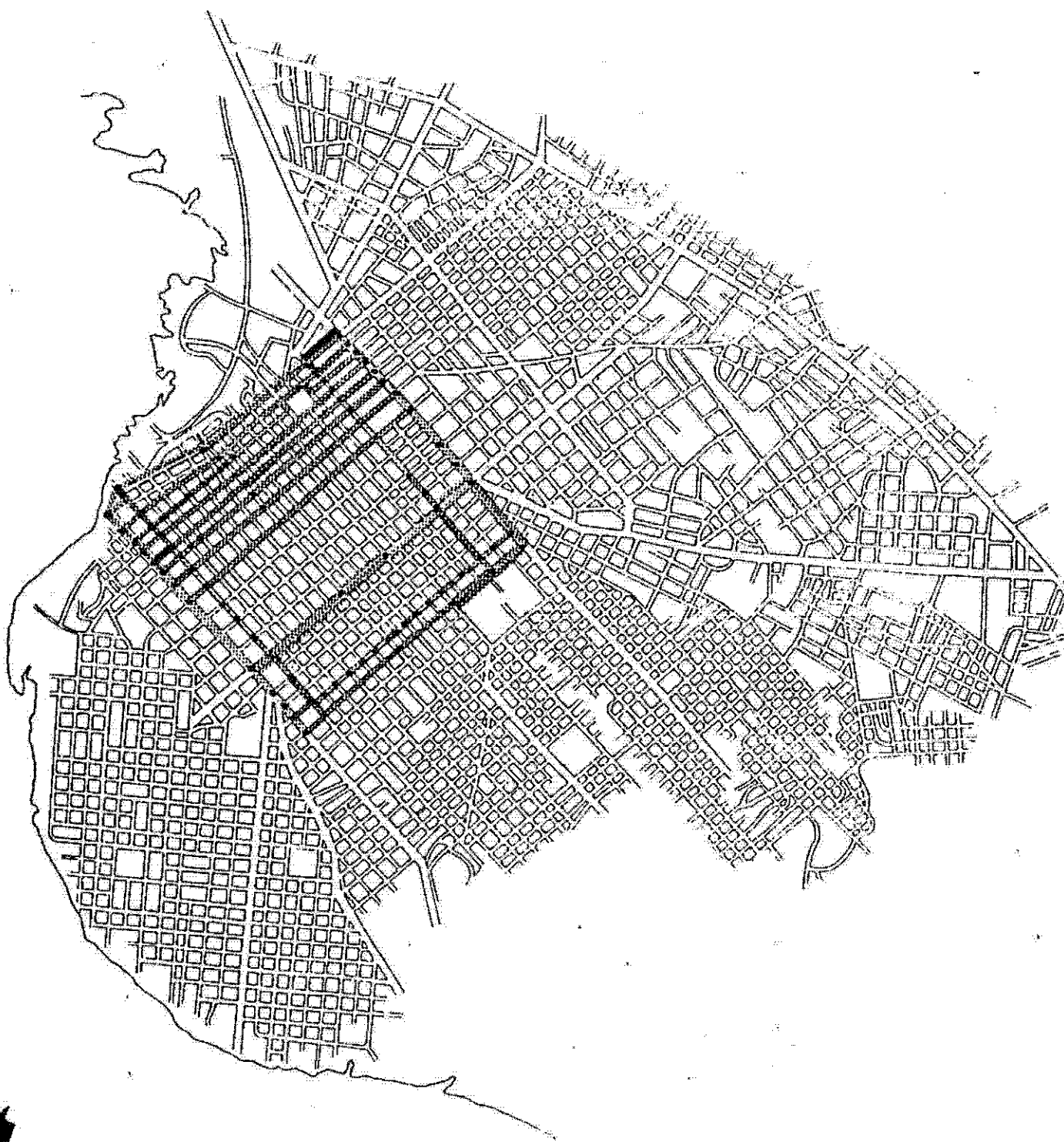


FIGURA 7-2-1 (1a) VELOCIDAD DE VIAJE (Horas "Pico" de la mañana)



CONT. FIGURA 7-2-1 (1b)

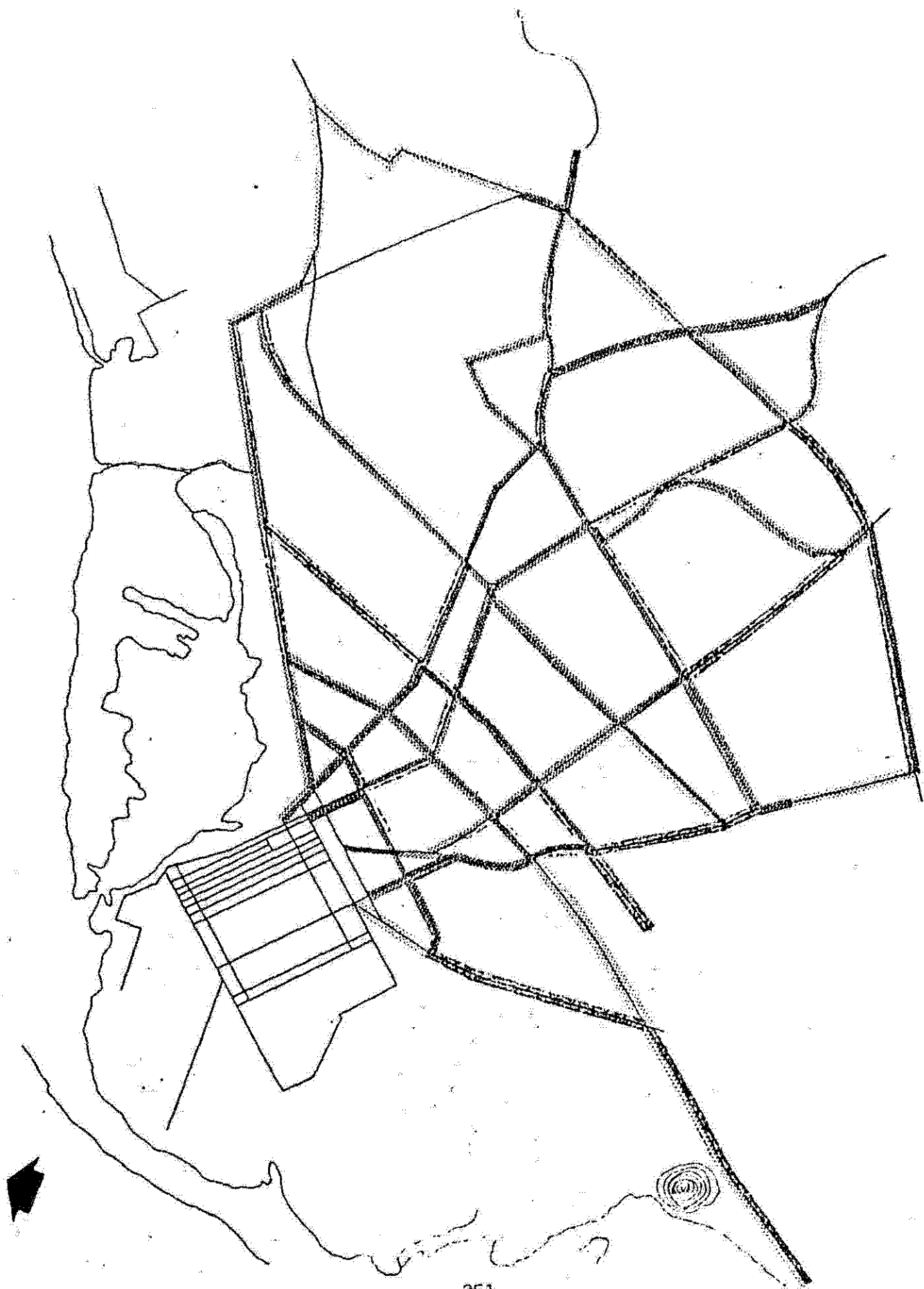
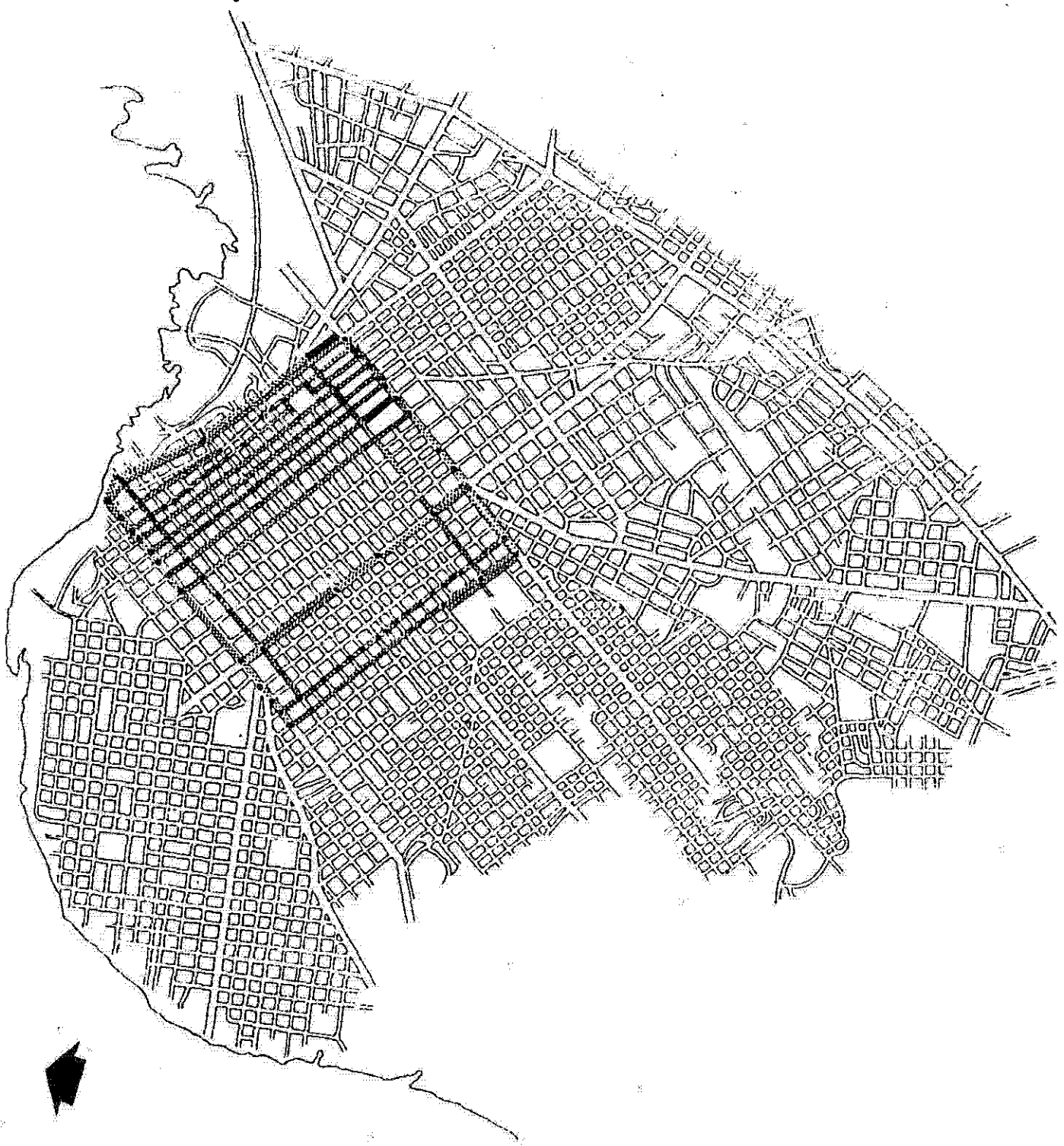


FIGURA 7-2-1 (2a) VELOCIDAD DE VIAJE (Horas "pico" del mediodía)



CONT. FIGURA 7-2-1 (2b)

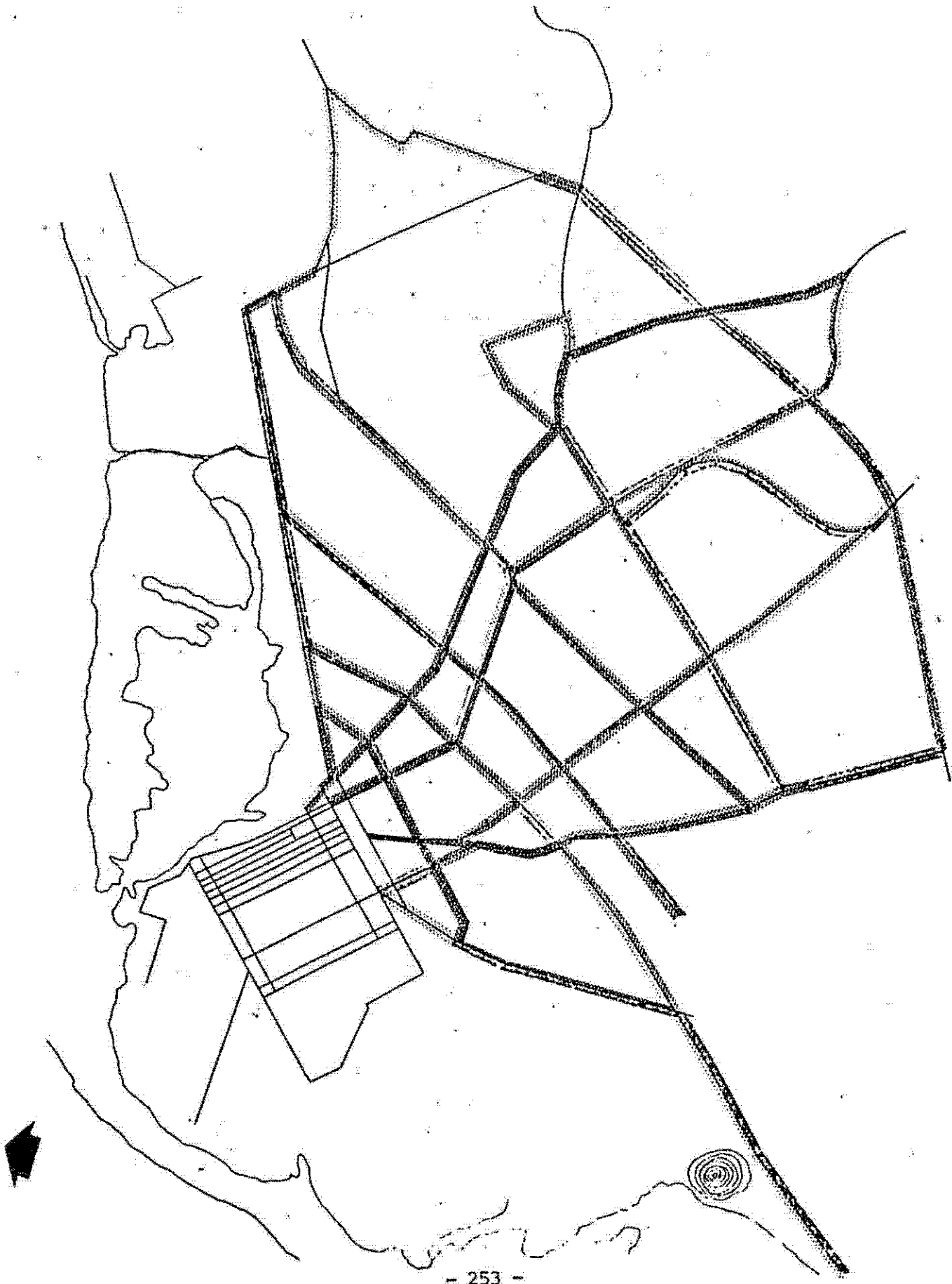
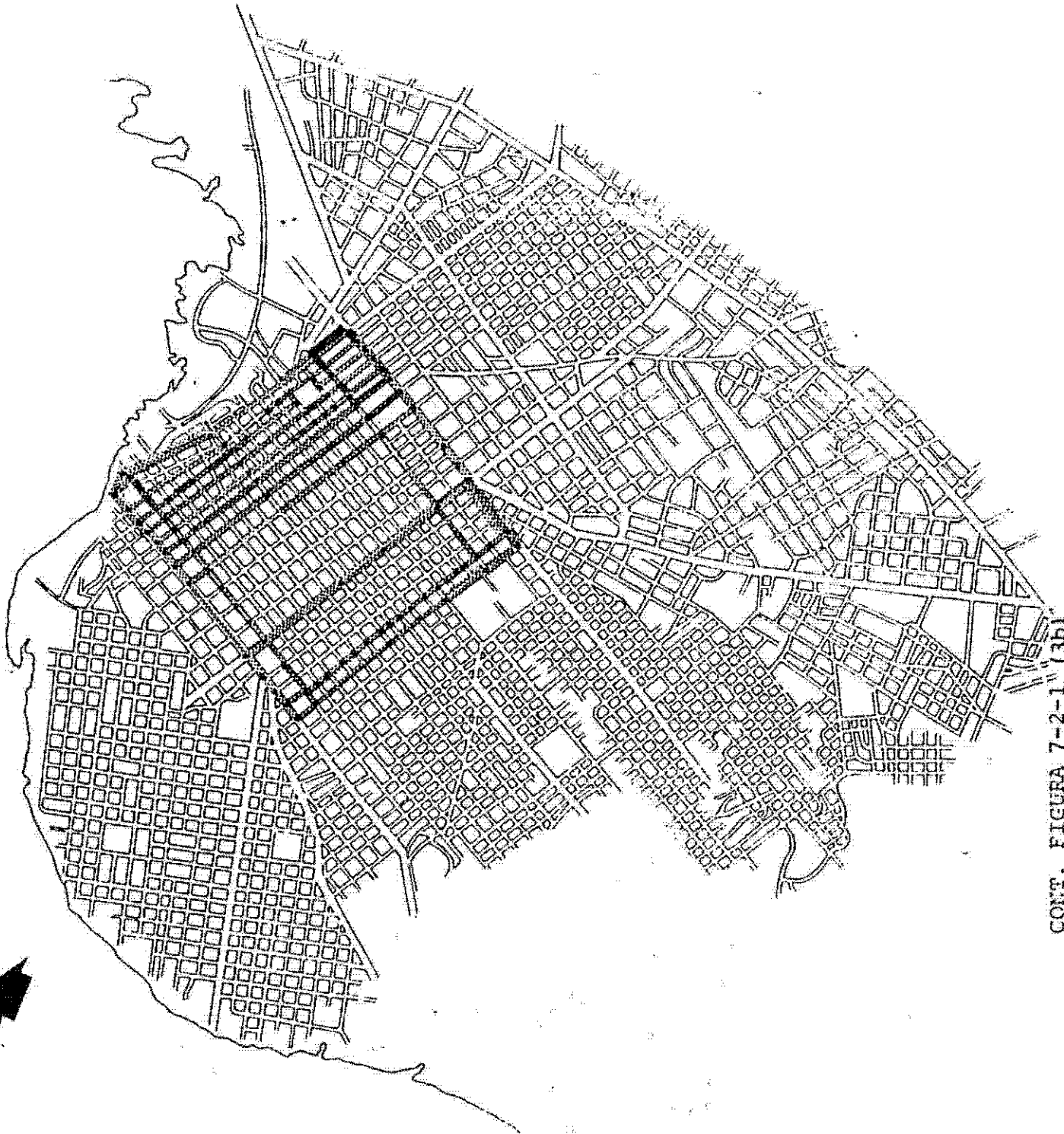


FIGURA 7-2-1 (3a) VELOCIDAD DE VIAJE (Horas "pico" de la tarde)



CONT. FIGURA 7-2-1 (3b)

CUADRO 7-2-1 PRINCIPALES SECCIONES CONGESTIONADAS
(VELOCIDAD MEDIA MENOR QUE 10 Km./H)

Horario	Calle	Sen- tido	Sec. Con- gestionada	Principales causas de detención										
				1	2	3	4	5	6	7	8	9	10	
Horas Pico de la mañana	Coronel Bogado	E→O	Tacuary - Estados Unidos	○										
	Coronel Bogado	E→O	Tacuary - Estados Unidos	○										
Hora Pico del Medio- día	Herrera	O→E	Tacuary - Estados Unidos	○		○							○	
	Estados Unidos	S→N	Mcal. Es- tigarribia - E. Ayala	○										
	Tacuary	N→S	25 de Mayo - Cerro Corá	○										
	R. de Francia	E→O	Próceres de Mayo - Perú	○			○							○
Hora Pico de la Tarde	Coronel Bogado	E→O	Tacuary - Estados Unidos	○										
	Estados Unidos	S→N	E. Ayala - Coronel Bogado	○										
	Tacuary	N→S	Coronel Bogado - E. Ayala	○										
			25 de Mayo - Cerro Corá	○										

NOTA: 1. Semáforo 2. Accidente de tránsito 3. Cruce Peatonal
4. Paradas de Omnibus 5. Congestión de tránsito
6. Entrada a vías menores 7. Salida de vías menores
8. Viraje del tránsito a la izquierda 9. Estacionamiento
sobre la vía 10. Pavimento en malas condiciones



FIGURA 7-3-1 (1) DENSIDAD DE ESTACIONAMIENTO POR ZONA (Horas "pico de la mañana)

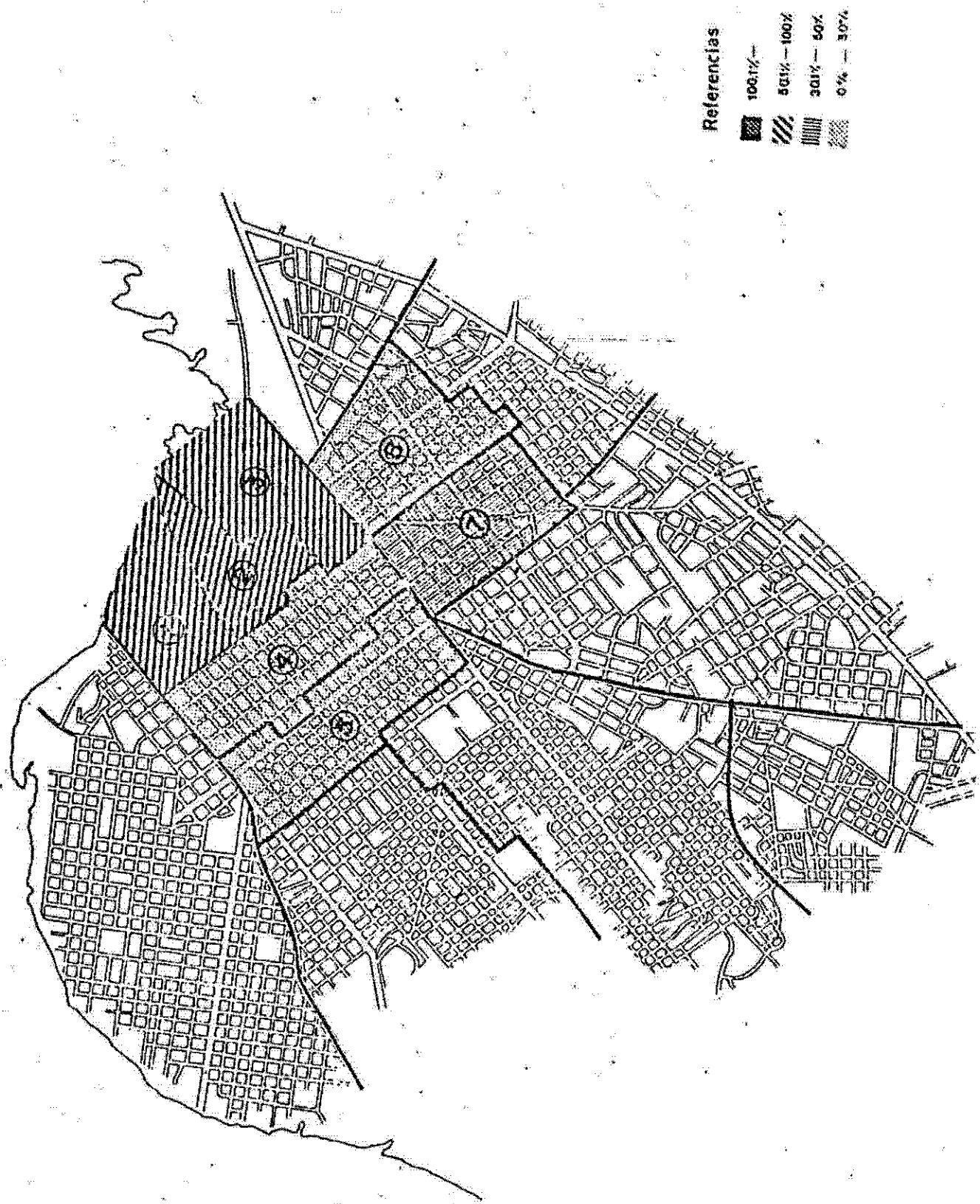


FIGURA 7-3-1 (2) DENSIDAD DE ESTACIONAMIENTO POR ZONA (Horas "pico" de la tarde)

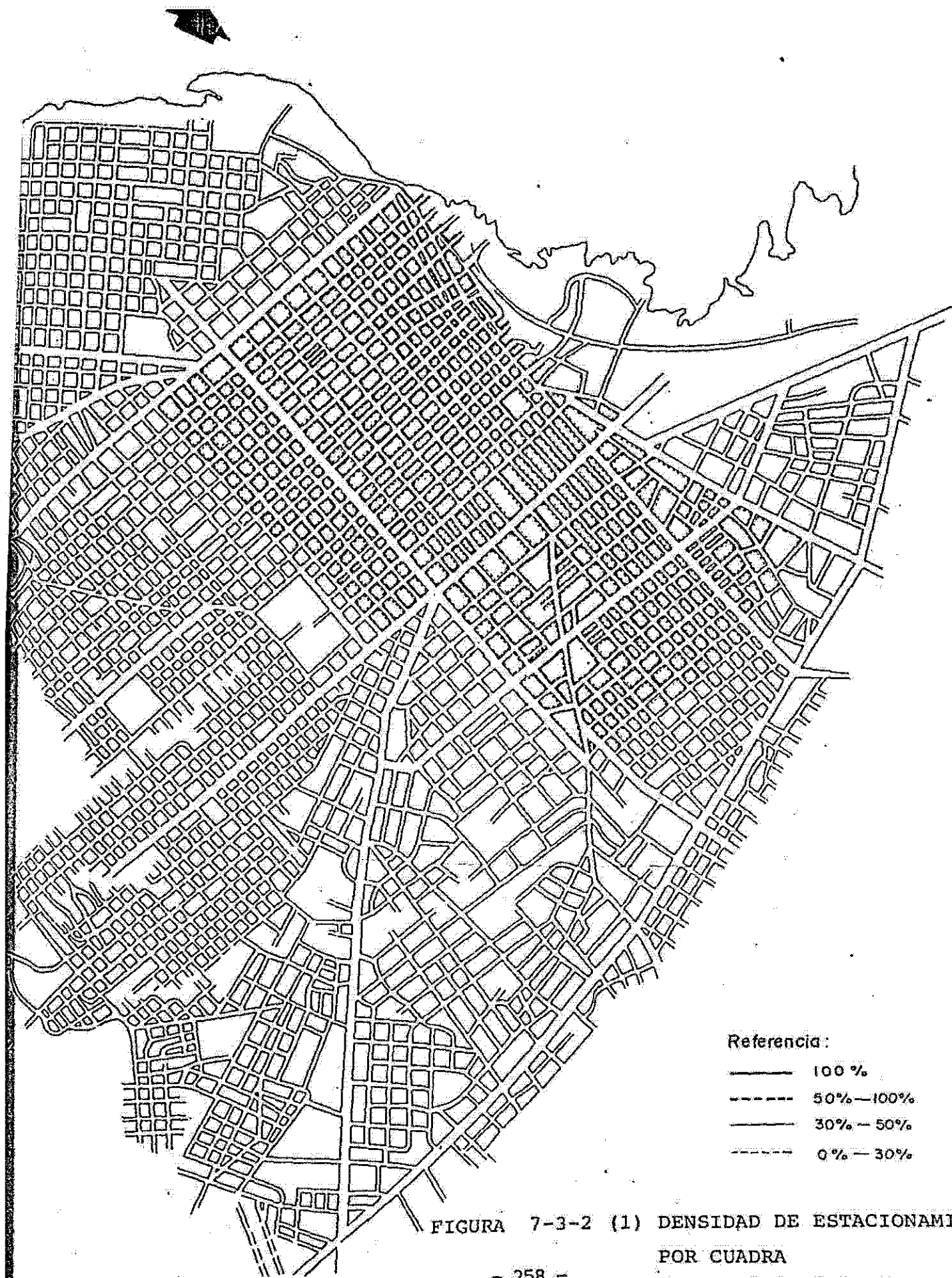


FIGURA 7-3-2 (1) DENSIDAD DE ESTACIONAMIENTO POR CUADRA

(Horas "pico" de la mañana)

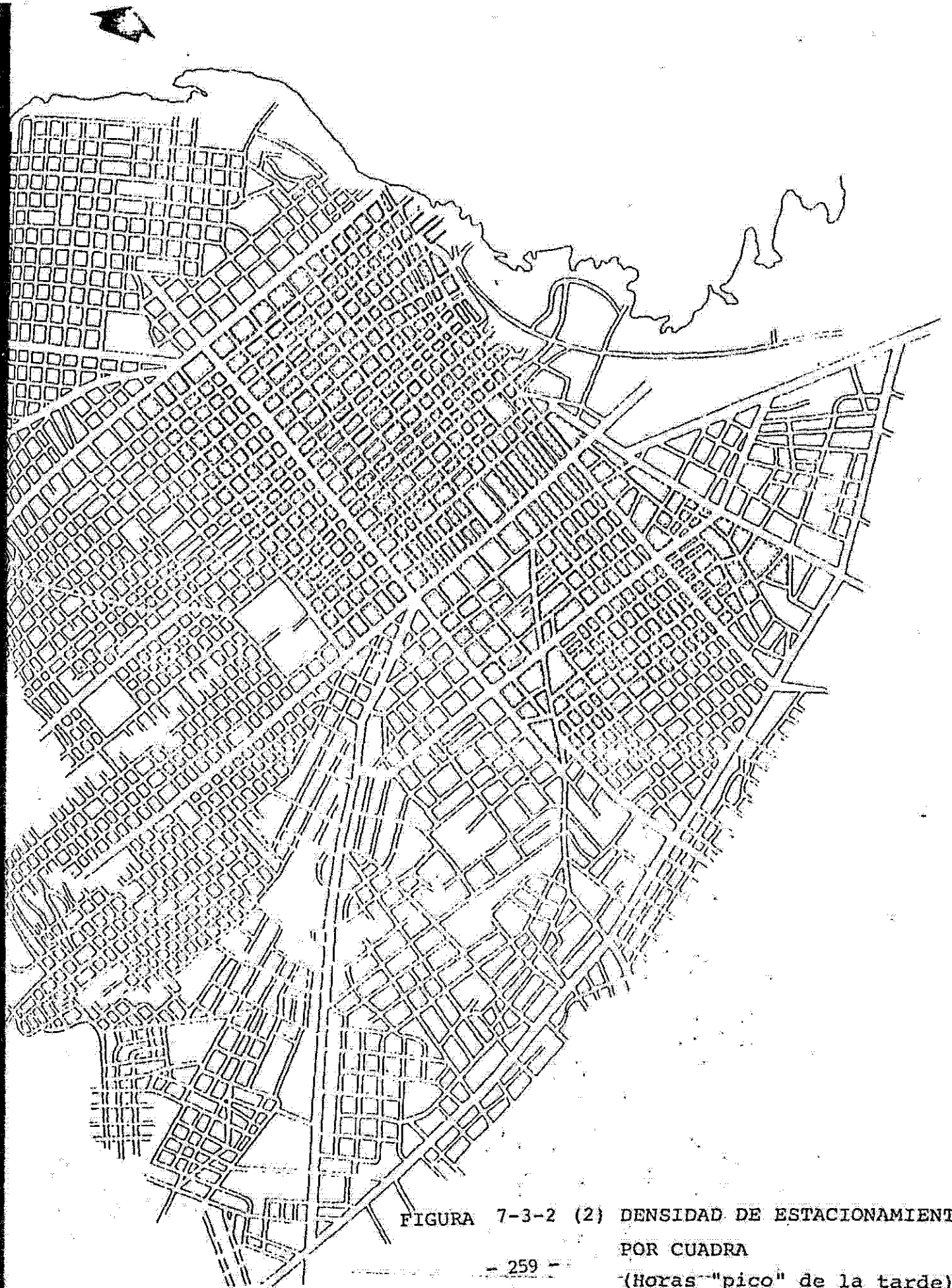
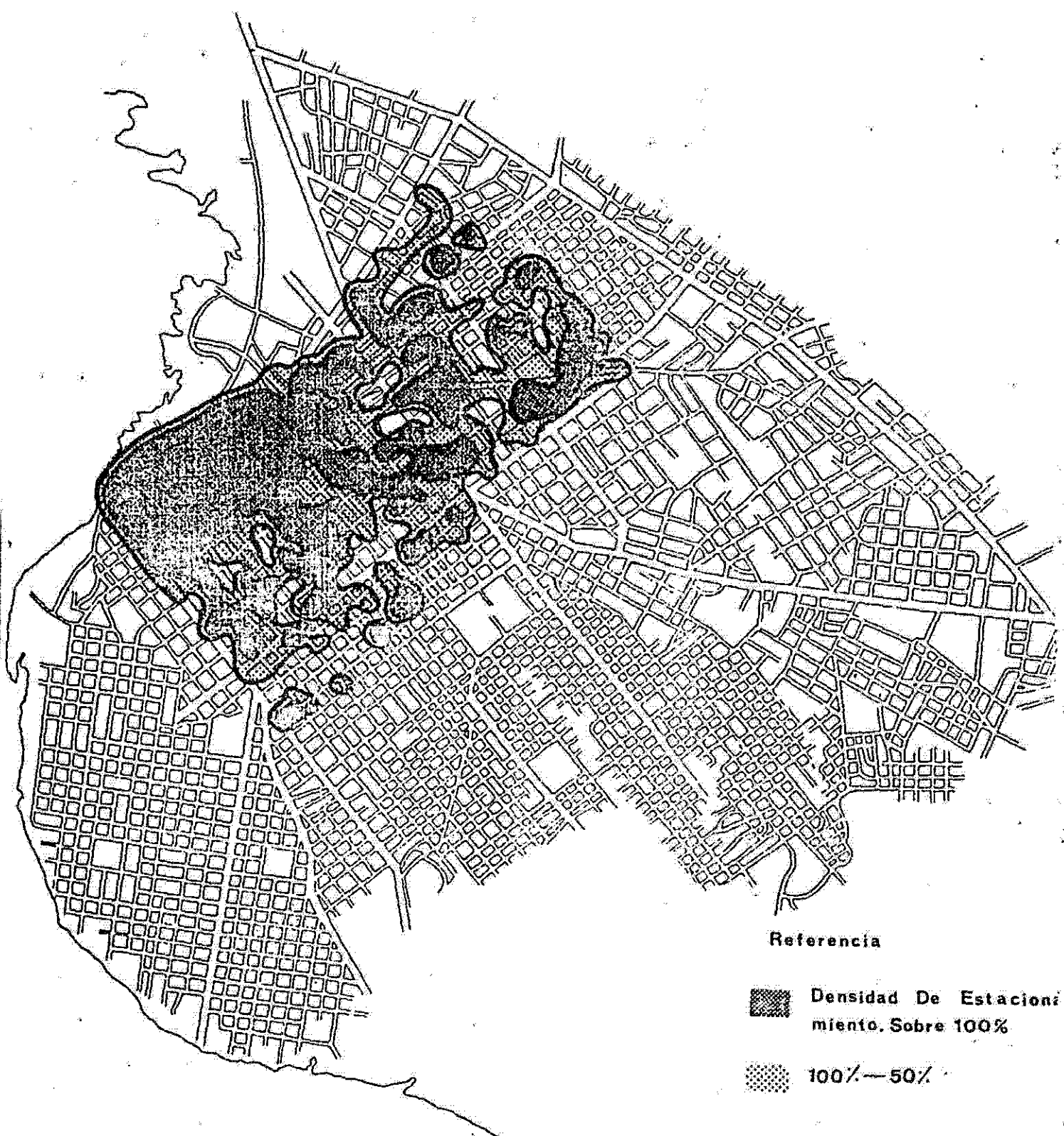


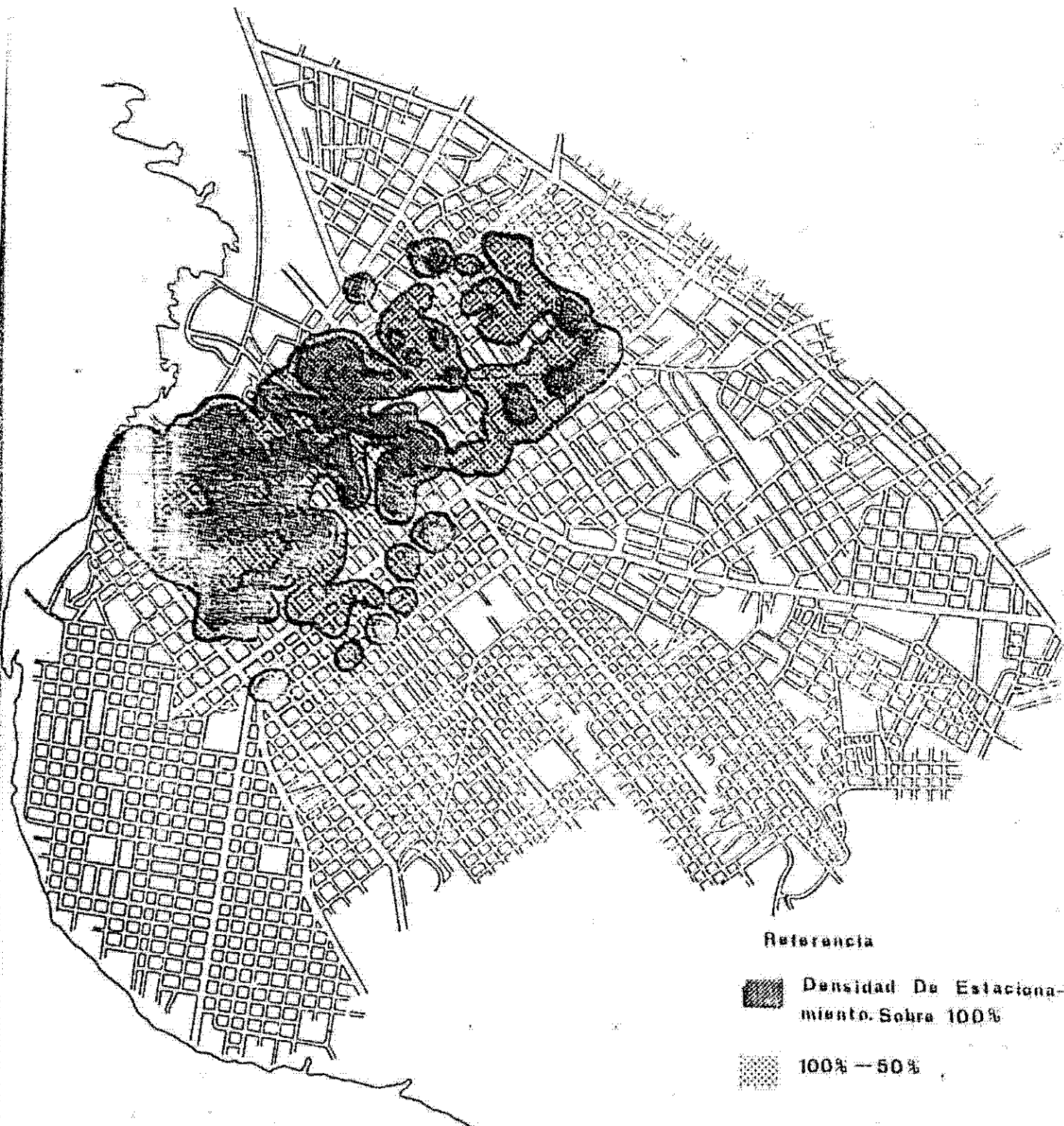
FIGURA 7-3-2 (2) DENSIDAD DE ESTACIONAMIENTO
POR CUADRA
(Horas "pico" de la tarde)



Referencia

- Densidad De Estacionamiento. Sobre 100%
- 100%—50%

FIGURA 7-3-3 DISTRIBUCION DE LA DENSIDAD DE ESTACIONAMIENTO (1)
 (Horas "pico" de la mañana)



Referencia



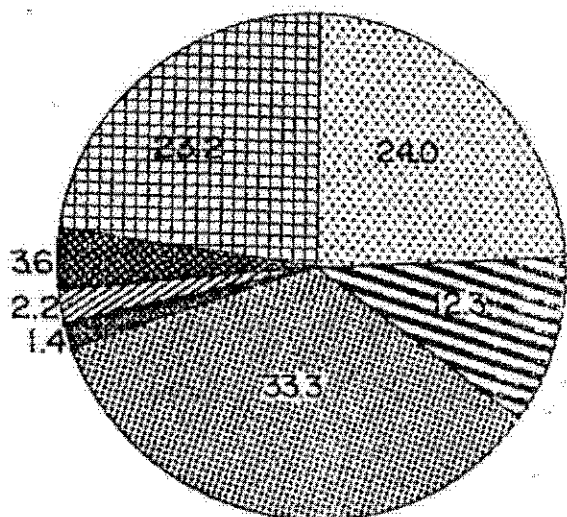
-  Densidad De Estacionamiento. Sobre 100%
-  100% - 50%

FIGURA 7-3- 3 DISTRIBUCION DE LA DENSIDAD DE ESTACIONAMIENTO (2)
 (Horas "pico" de la tarde)

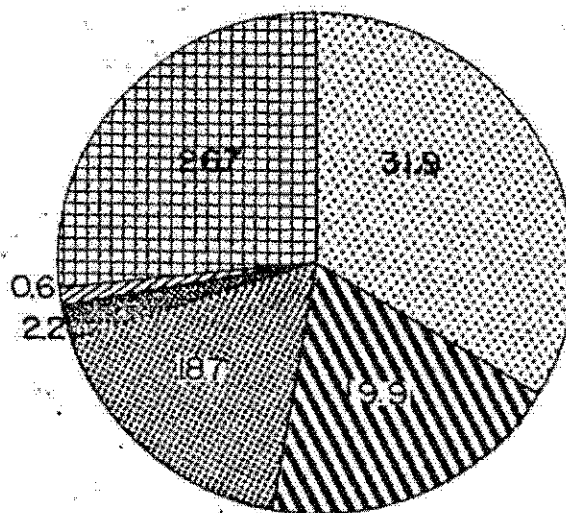
CUADRO 7-3-1 PROPOSITOS DE ESTACIONAMIENTO

Propósito	Localización	N.S. de la Asunción		Alberdi		Total	
		Nº de Muestras	%	Nº de Muestras	%	Nº de Muestras	%
1. Al Trabajo		32	23.2	47	26.7	79	25.2
2. Al Estudio		5	3.6	--	0.0	5	1.6
3. A la Casa		3	2.2	1	0.6	4	1.3
4. Regreso al Trabajo		2	1.4	4	2.2	6	1.9
5. Actividades de Trabajo		46	33.3	33	18.7	79	25.2
6. De Compras - A Comer, Asuntos Privados		17	12.3	35	19.9	52	16.6
7. Otros		33	24.0	56	31.9	89	28.2
T O T A L		138	100.0	176	100.0	314	100.0

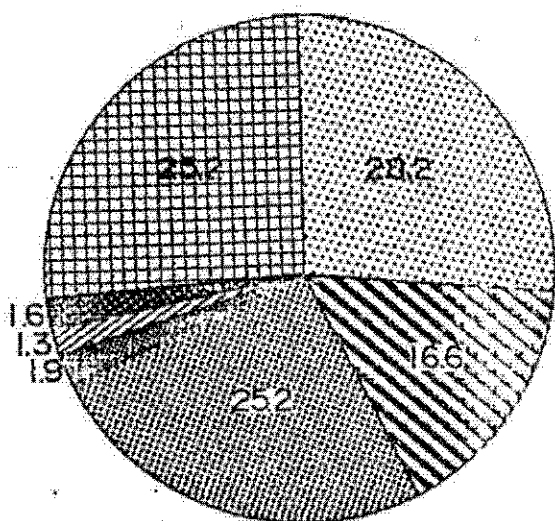
Ntra. Sra. de la Asunción



Alberdi



Total



Referencias:
% Unidad

- 1. Al Trabajo
- 2. Al Estudio
- 3. A la casa
- 4. Regreso al Trabajo
- 5. Actividades de Trabajo
- 6. De Compras o A Comer
- 7. Otros

FIGURA 7-3- 4 PROPOSITOS DE ESTACIONAMIENTO

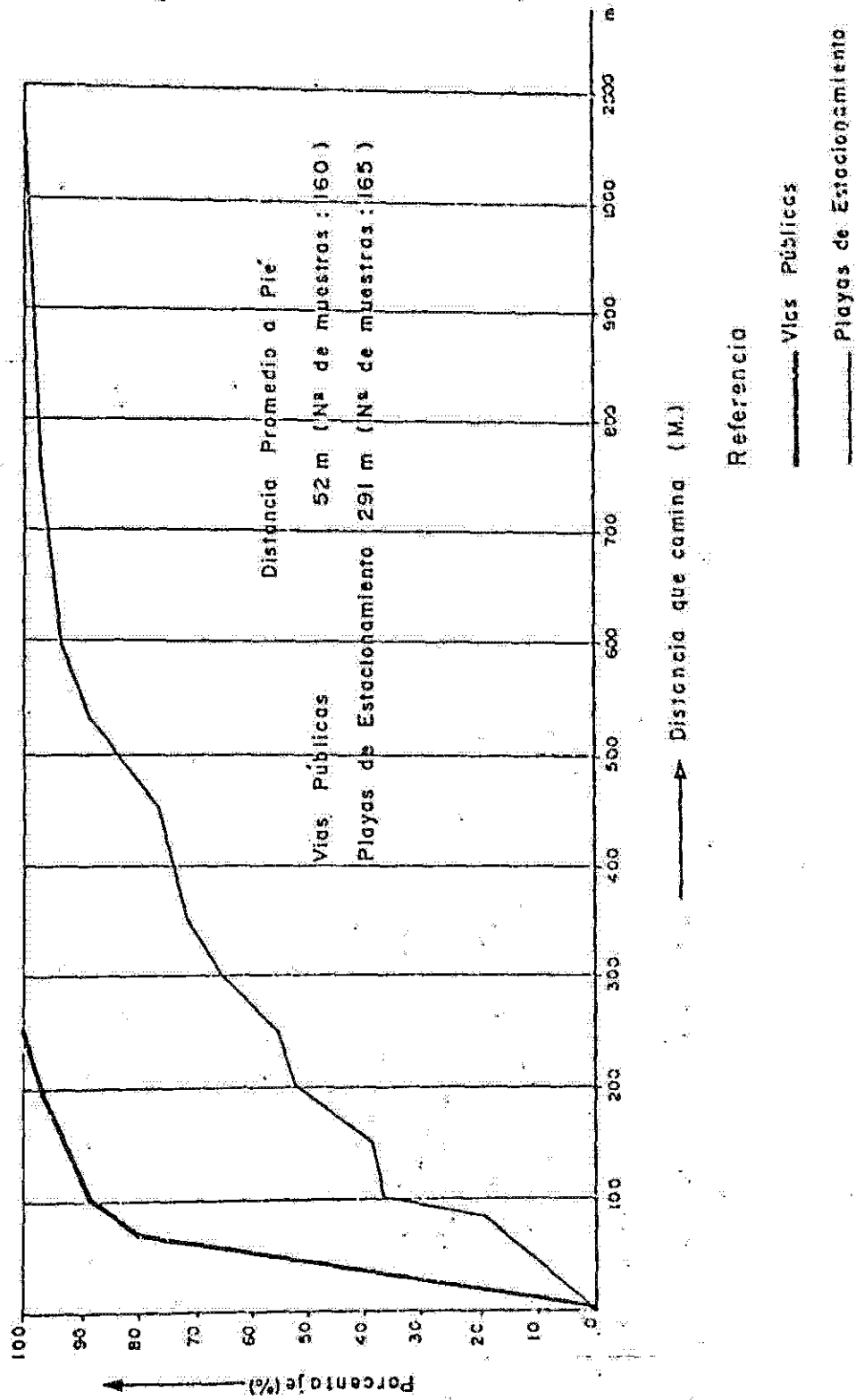
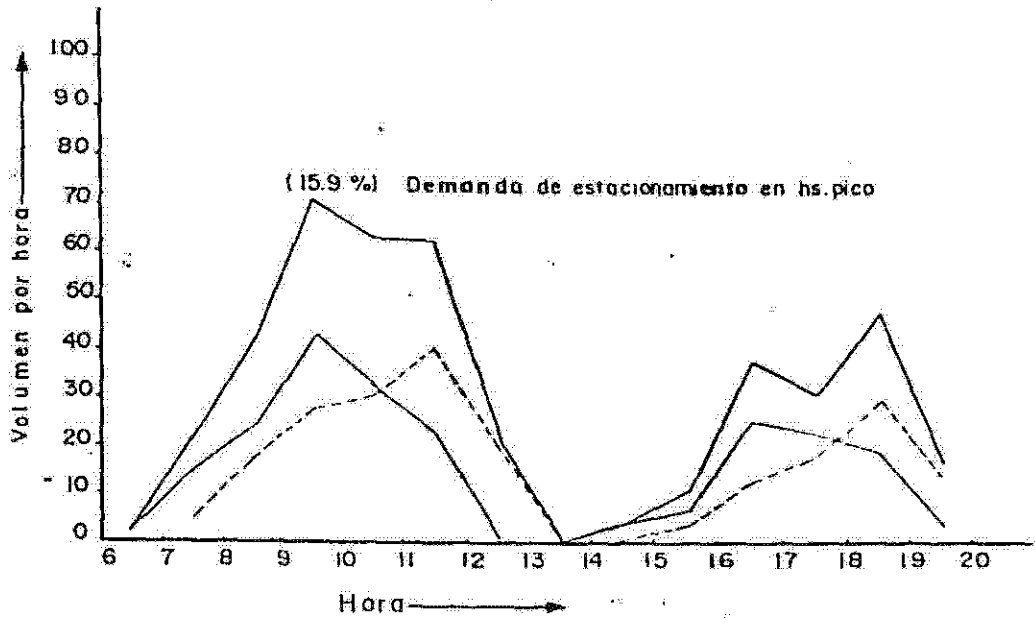


FIGURA 7-3-3 DISTANCIA QUE RECORRE A PIE

TABLA 7-3-2 DURACION DEL ESTACIONAMIENTO
E INDICE DE ROTACION

Localización	Propósito	Número de Muestras	Promedio de Duración del Estacionamiento (min.)	Promedio de Índice de Rotación
N. S. de la Asunción	Al trabajo, Al estudio	37	159.8	
	Activ. de Trabajo	46	41.6	5.1
	Compras, Recreación, Asuntos Privados	50	46.2	
	Total	133	76.2	
Alberdi	Al trabajo, Al estudio	47	194.9	
	Activ. de Trabajo	33	31.8	7.8
	Compras, Recreación, Asuntos Privados	91	28.4	
	Total	171	74.8	
Total	Al trabajo, Al estudio	84	179.4	
	Activ. de Trabajo	79	37.5	6.3
	Compras, Recreación, Asuntos Privados	141	34.7	
	Total	304	75.4	

Pte. Franco y 14 de Mayo



Oliva e/ 14 de Mayo y 15 de Agosto

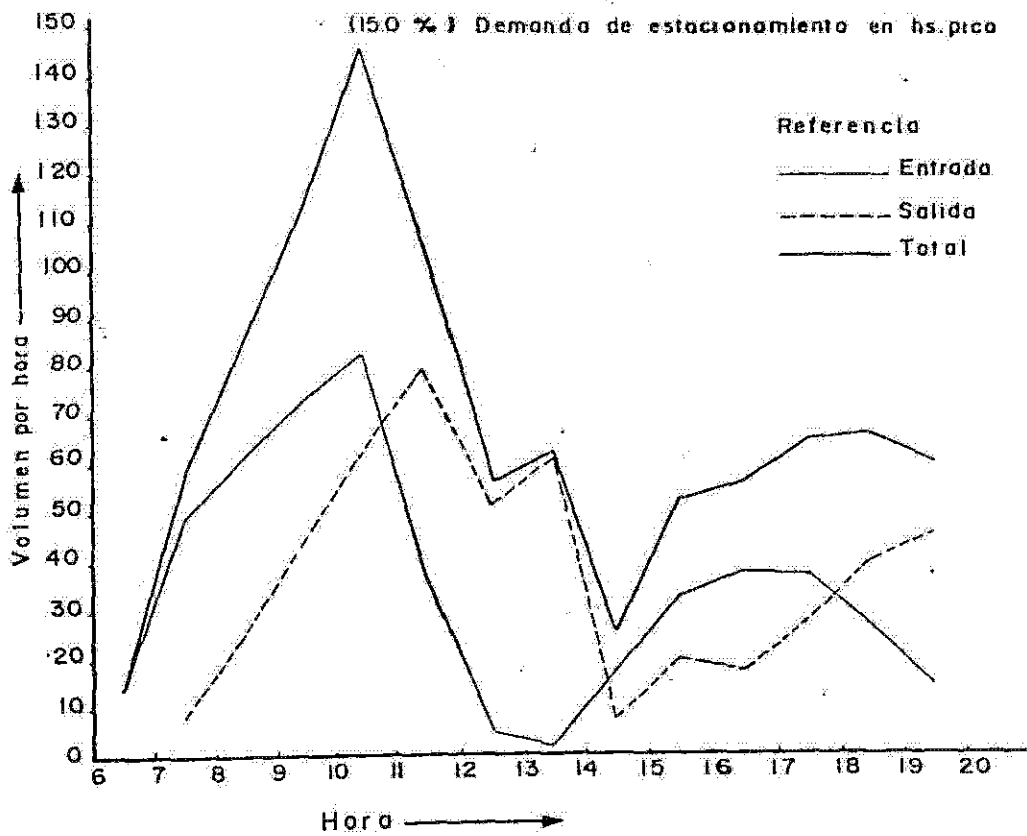
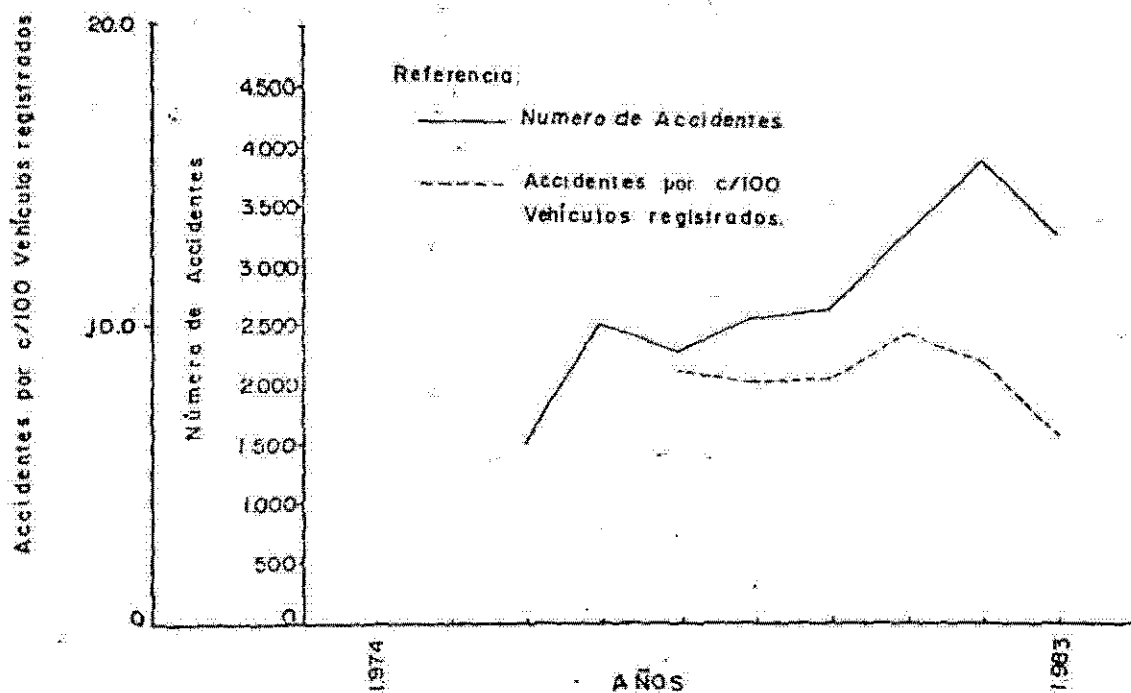


FIGURA 7-3-6 VOLUMEN POR HORA DE ENTRADA Y SALIDA DE VEHICULOS DE ESTACIONAMIENTOS FUERA DE LAS VIAS

CUADRO 7-4-1 CANTIDAD ANUAL DE ACCIDENTES DE TRANSITO EN ASUNCION

Años	Número de Accidentes	Número de vehículos Registrados	Accidentes por c/ 100 Vehículos Registrados
1983	3,346	54,588	6.13
1982	1,899	46,299	8.42
1981	3,367	34,074	9.88
1980	2,624	30,118	8.20
1979	2,587	32,000	8.08
1978	2,329	28,389	8.20
1977	2,531	--	--
1976	1,541	--	--

FUENTE: Dirección de Tránsito, División de Estadística



Fuente: Tránsito

FIGURA 7-4-1 EVOLUCION ANUAL DE ACCIDENTES DE TRANSITO

División de Estadística

CUADRO 7-4-2 ACCIDENTES DE TRANSITO POR TIPO DE
VEHICULO -AÑO 1983 -

Tipo de Vehículo	Número de Ac- cidentes de Tránsito	%	Número de Vehic. Registrados	Accidentes por c/100 Vehic. Registrados
Automóvil, Jeep	2,800	56.6	36,247	7.72
Rural, Camión, Camioneta, Furgoneta	1,072	21.4	11,394	9.41
Omnibus, Microbus	956	19.1	1,409	67.85
Taxi	46	0.9	1,179	3.90
Motocicleta	56	1.1	4,111	1.36
Varios	44	0.9	248	17.74
T O T A L	4,974	100,0	54,588	9.11

FUENTE: Dirección de Tránsito, División de Estadística

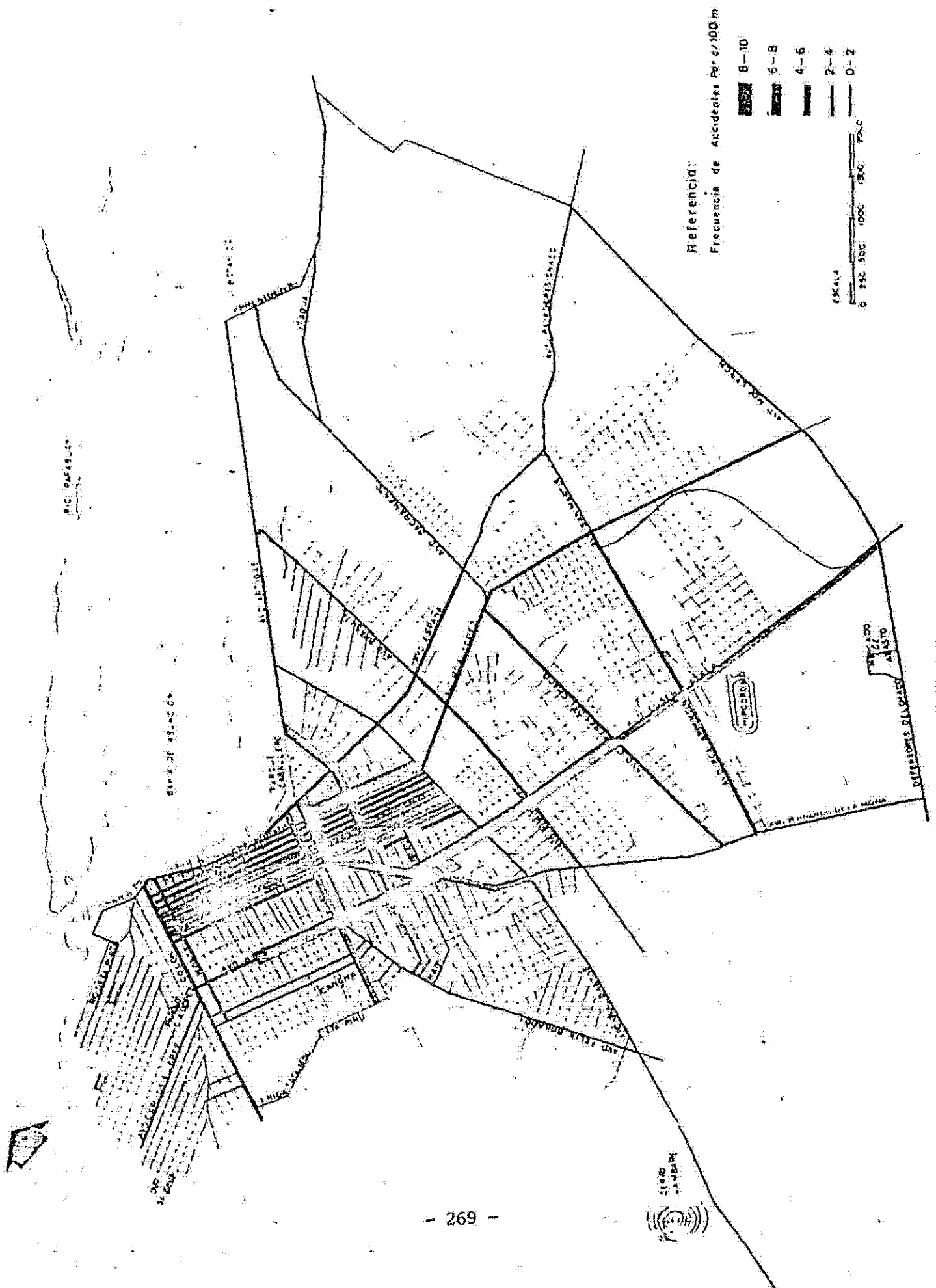


FIGURA 7-4-2 ARTERIAS CON FRECUENTES ACCIDENTES DE TRANSITO

CONT. CUADRO 7-4-3 (6)

Intracción	TOTAL DE INTERSECCIONES																
	Choque Tránsito	Choque de Frente	Choque Angular por no dar Preferencia	Choque al Girar	Choque Lateral	Acces Lateral	Contra Desgracias Personales	Contra Objetos Muebles	Choque Multiple	Contra Vehículos Estacionados	Pérdida de Control del Vehículo	Retorcida	Contra Animales	Caída de Pasajeros	Puerta de la Vía	Otros	Total
Conducción Impulsiva	4			1	1	1											12
Exceso de Velocidad	1																1
Comportamiento Siniestro																	
Operación Errónea																	
No Construcción de Dispositivo	50				4			3									67
Centro de Gravitación Inadecuado	6	1		33			2	2	1								45
Adequamiento Inadecuado	17			55				1	1								74
Retorcida Inadecuada											19						19
Conducción sin Registro	2																2
Conducción Temeraria	6																6
Fallo Mecánico	28			16				3	6								55
Distorsión al Conducir				1													1
Estacionamiento Inadecuado	1			3					2								9
Distorsión al Estacionamiento																	
Operación al PARE	1																1
Cruce Inadecuado																	
Puerta Abierta	2	2		11				1	1								20
Sire Inadecuada	1			2													5
Distorsión de Señales																	2
Cruce Inadecuado	5			2					1								8
Otros																	
Total:	133	3	3	333			4	15	13	19							2 333

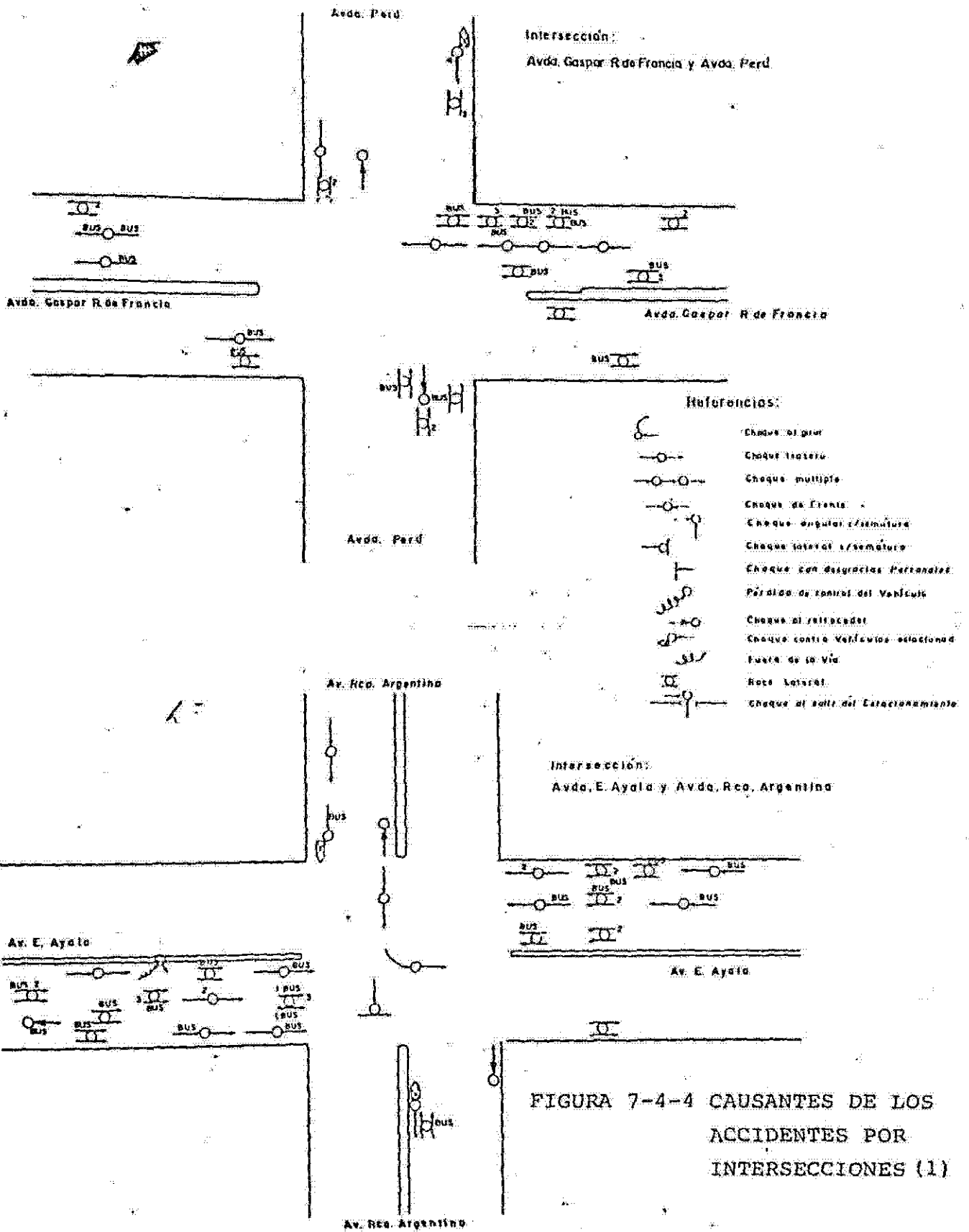
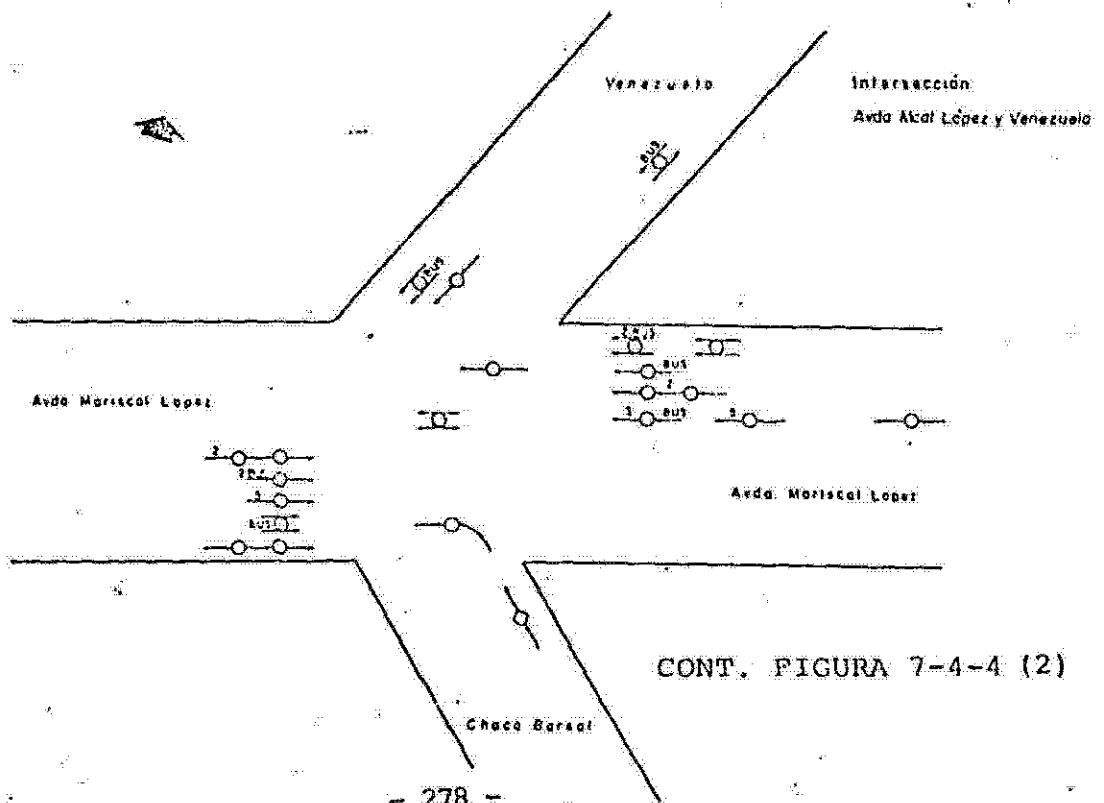
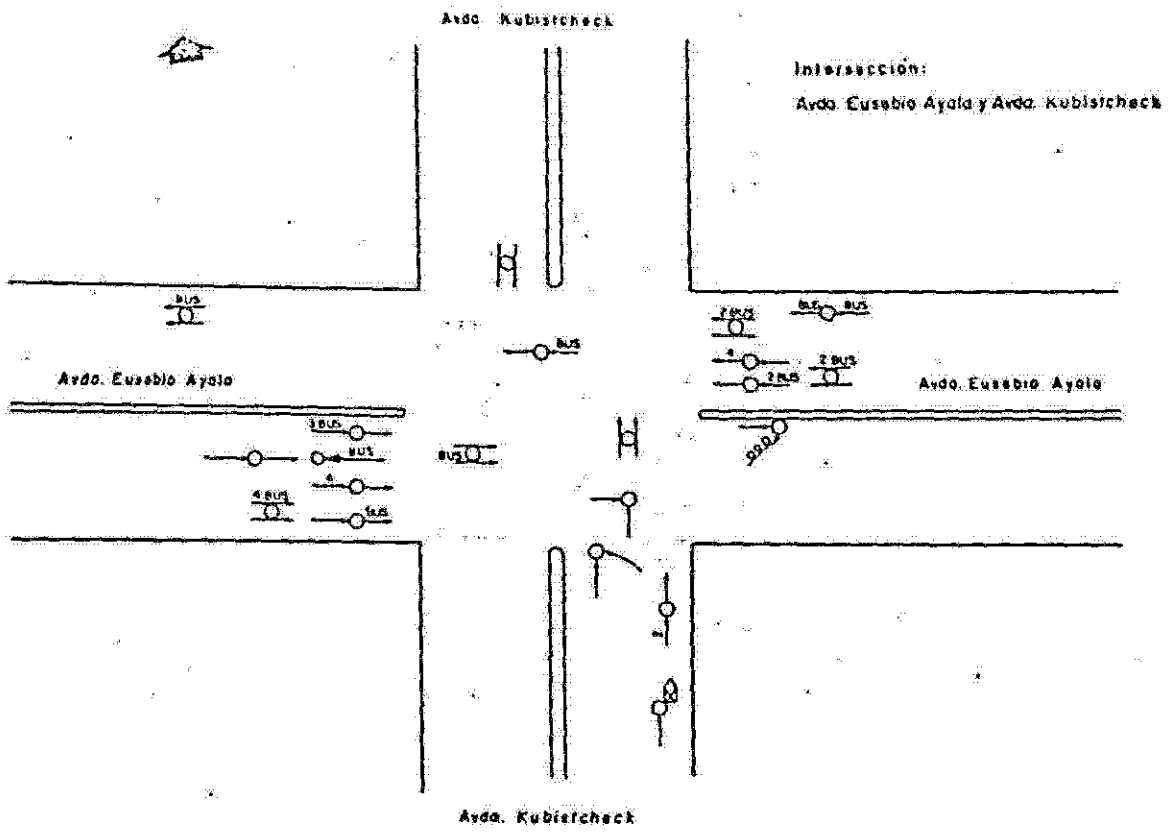
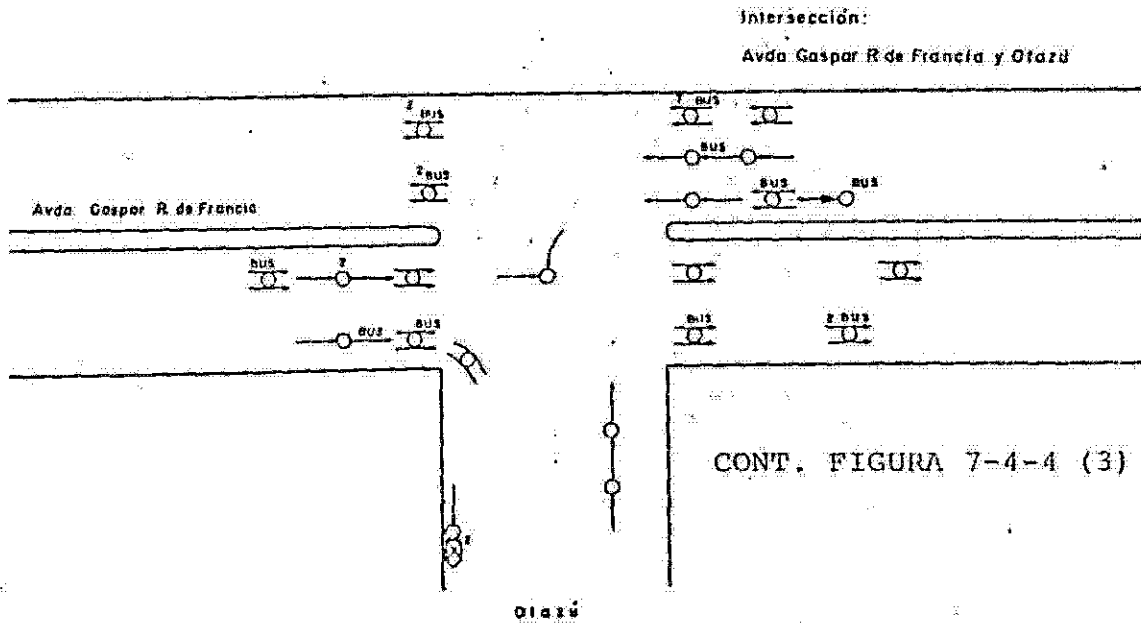
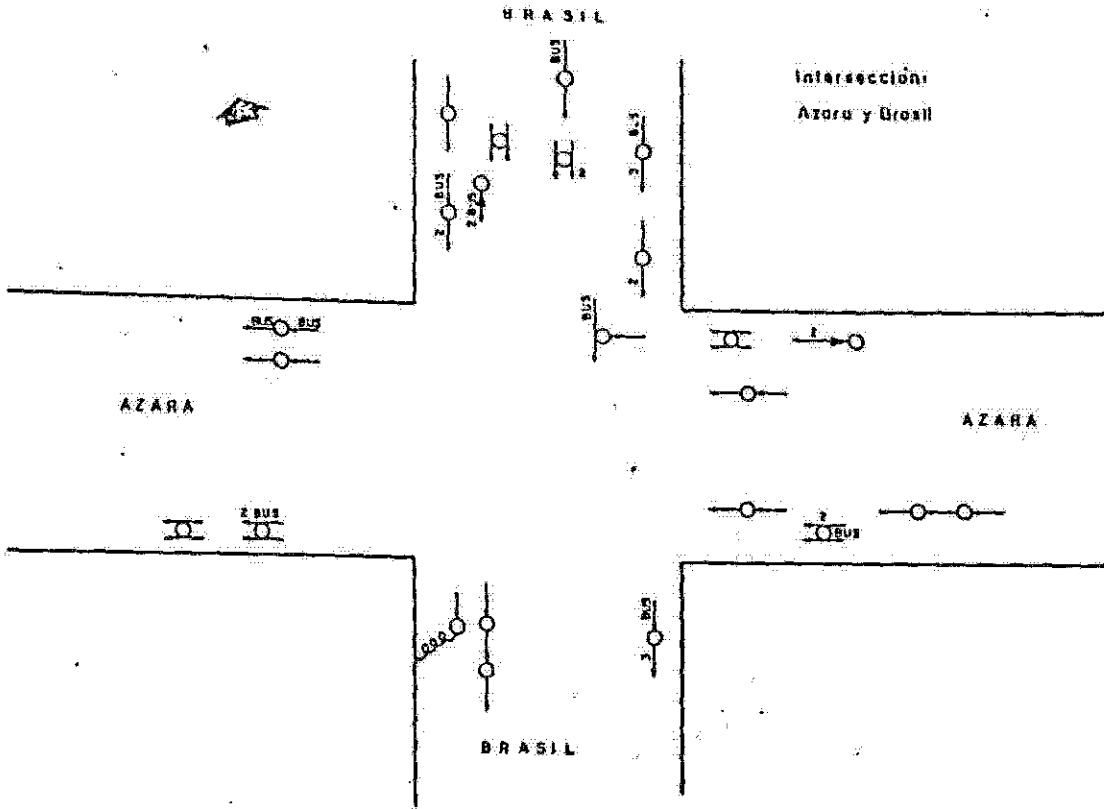


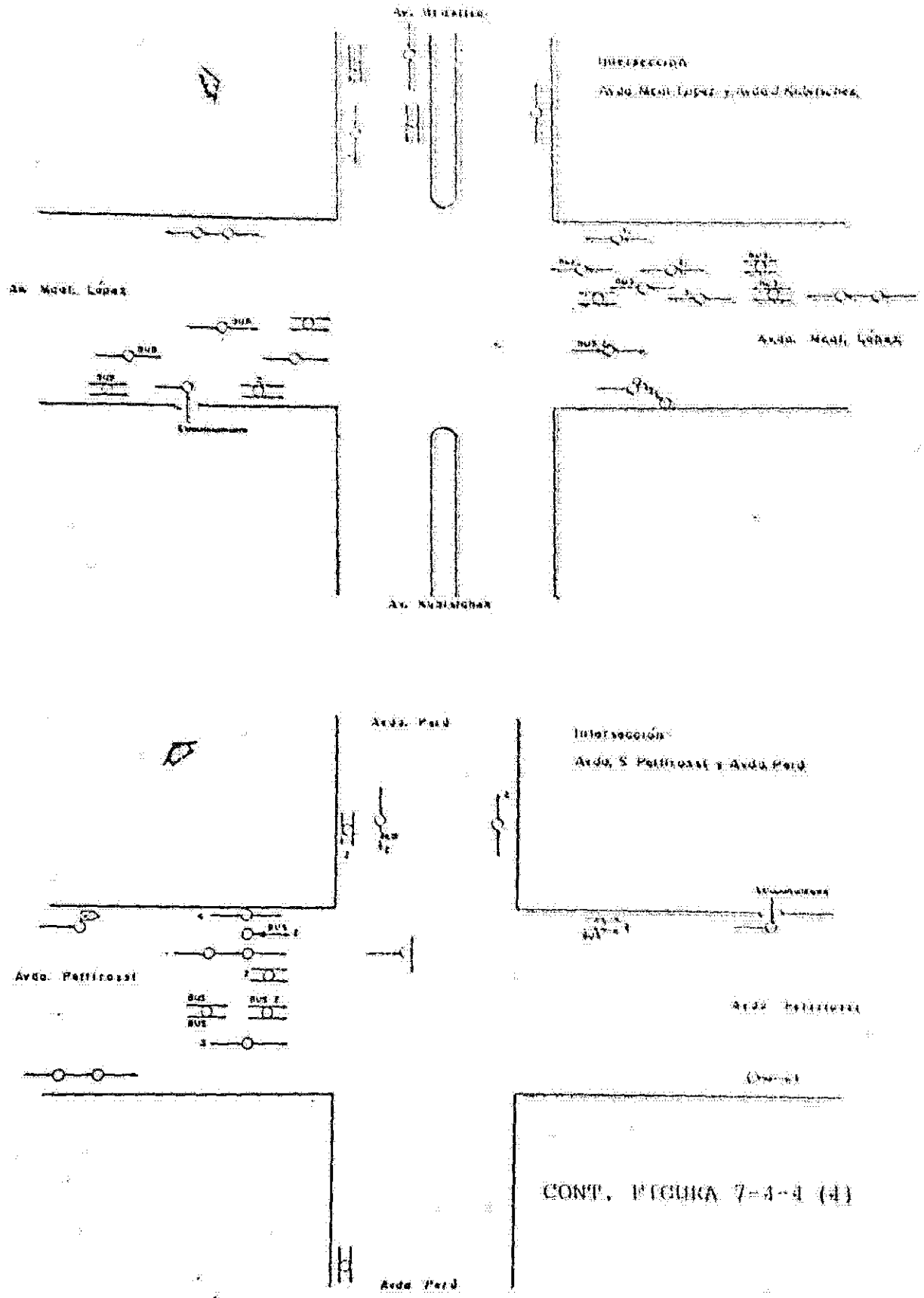
FIGURA 7-4-4 CAUSANTES DE LOS ACCIDENTES POR INTERSECCIONES (1)



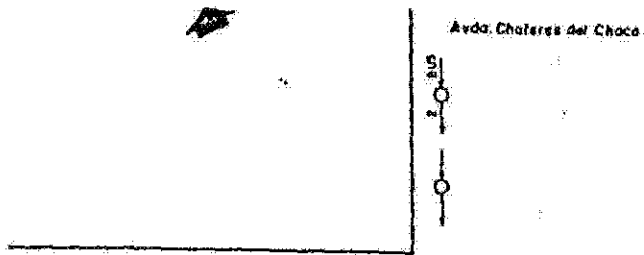
CONT. FIGURA 7-4-4 (2)



CONT. FIGURA 7-4-4 (3)

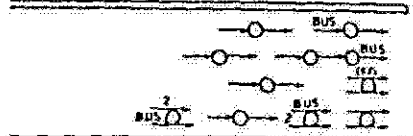
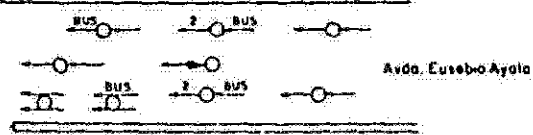


CONT. FIGURA 7-4-9 (d)

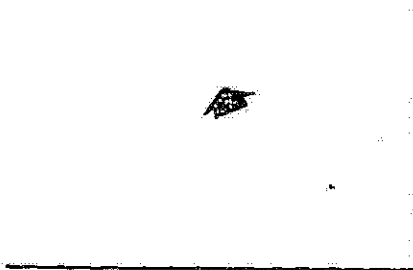
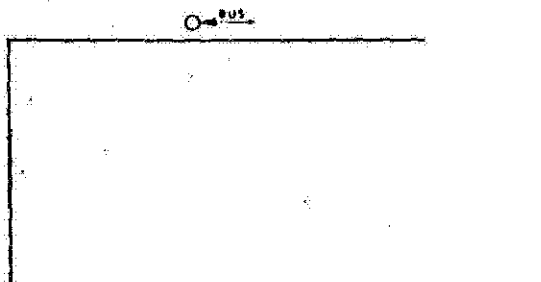


Intersección:
Avda. Eusebio Ayala y Avda. Choferes del Choco

Avda. Eusebio Ayala

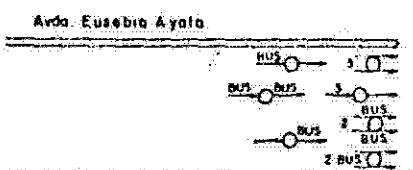


Avda. Medicos del Choco

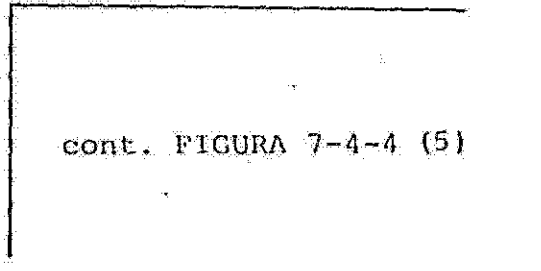


Cda. Claudio Nuñez

Intersección:
Avda. Eusebio Ayala y B. de las Casas



Bartolome de las Casas



cont. FIGURA 7-4-4 (5)

Chapter 8: Present Traffic Control Facilities

8-1. Traffic Regulations

8-1-1. One-Way Traffic Regulations

One-way traffic regulations enforced in Asuncion are described in Fig. 8-1-1. As shown there, such regulations are in effect primarily to the west of Av. G. M. Santosa, centered on the Centro district. The major thoroughfares with one-way traffic include Av. Estrella in the Centro district, Av. 25 de Mayo, Av. L. A. Herrera, Av. Pettrossi, Av. Palma, Av. C. Cora and Av. Azara. These roads tie the city center with the eastern section.

8-1-2. Speed Regulations

Fig. 8-1-2 shows the speed regulations in effect for Asuncion's major thoroughfares. In the city center the speed limit is 40km/h; in the perimeter areas, 60km/h. The speed limit on main roads outside the city is 80km/h.

8-1-3. Parking Regulations

The parking regulations enforced in the city center are shown in Fig. 8-1-3. Areas having on-street parking restrictions are concentrated in the city center. In P/T zones No. 2 and 4, the rate of parking restriction (ratio between the total on-street parking capacity where parking restrictions are in effect and the total on-street parking capacity including both legal and illegal parking) is between 42-43%; in P/T zones No. 1 and 3, 25-26%. The system employed in districts allowing on-street parking involves the advance purchase and submission of a parking

voucher. This system is in use only in the city center, in the area outlined by Av. C. Bogado, Av. Brasil, Av. T. Farina and Av. Colon.

8-2. Road Signs

8-2-1. Signs Providing Directional Information

Signs displaying street names are numerous both on major thoroughfares and smaller lanes. Signs providing information on direction and distance, on the other hand, are almost non-existent except in the outskirts of the city.

8-2-2. Signs Indicating Regulations

Fig. 8-2-1 shows the installation status in the city center relating to signs indicating traffic direction and parking regulations. Due to the presence of numerous one-way streets in the city center, signs to indicate directional regulations are especially important. Among such signs which are found in particularly large numbers are those indicating that the driver may go straight and/or left or right. These signs are installed at intervals averaging 2-2.5km in the city center. Also numerous are signs to indicate "no parking" or special restricted parking zones. "No Parking" signs are located at an average interval of 0.2km on streets where such restriction is enforced. Stop signs at intersections with no traffic signals are extremely few in number, being found at intervals of approximately 16km in the entire city center; lack of such signs is a major cause of traffic accidents occurring at such intersections. Signs indicating speed limit are also few in number, being located at intervals of approximately 37km in the city center.

8-2-3. Road Markings

While road center lines are well marked, street surface markings at intersections -- particularly pedestrian crosswalks and vehicle stop lines -- are inadequate. Furthermore, the street markings which do exist are not systematic; for example, pedestrian crosswalks are found both with latticework patterns and line markings.

8-3. Traffic Signal Controls

Traffic signals are installed in greatest number in the Centro district, at a total of 138 intersections. Their locations are shown in Fig. 8-3-1.

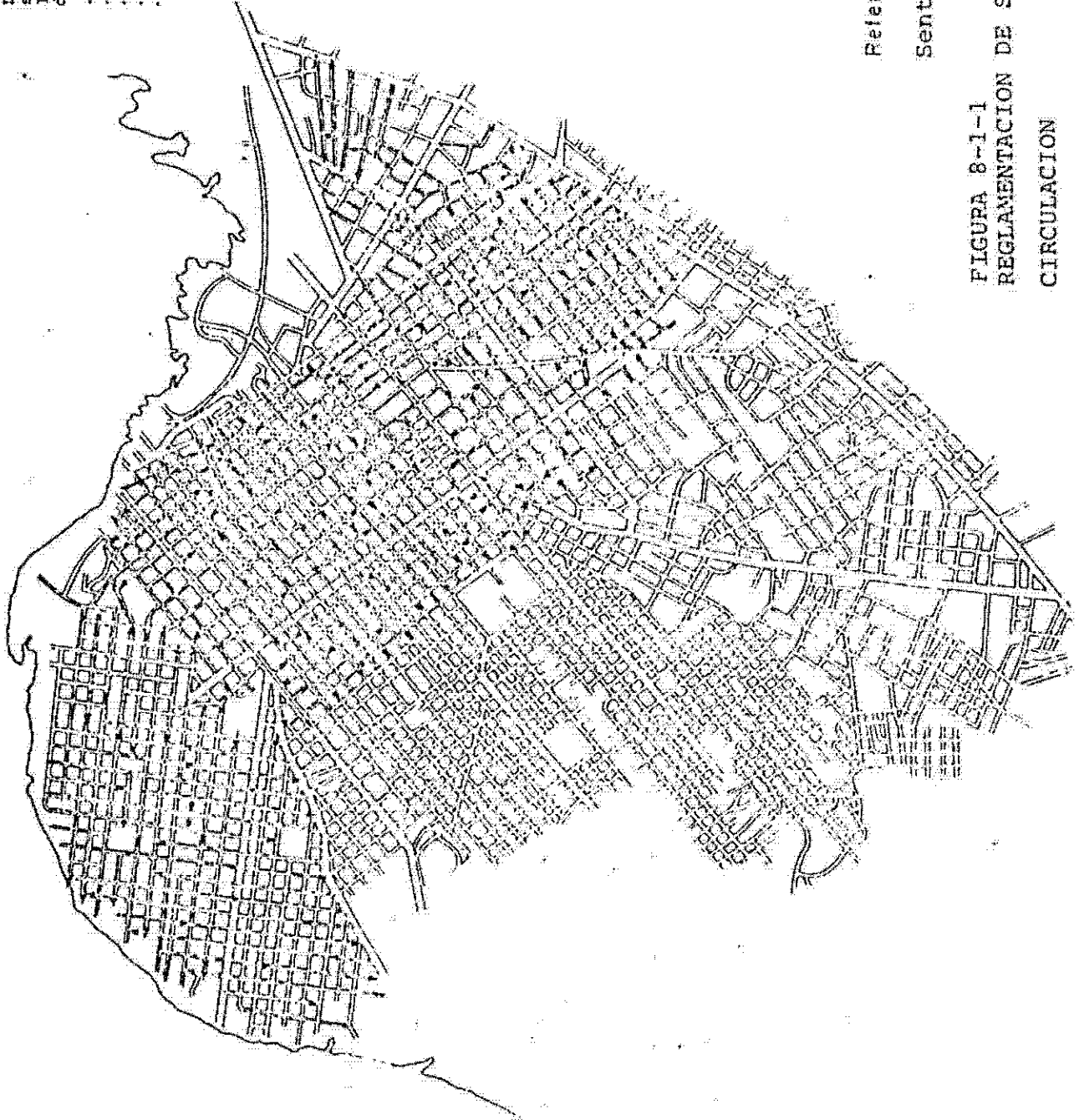
Of all traffic signals, some 14% are controlled in 3 or more phases with fixed times and 28% at 2 phases with fixed times. The remaining 57% are 2-phase time-variant types. Traffic signals at intersections can therefore be controlled to adapt to changes in traffic volume. The length of a signal cycle is generally between 58-80 seconds, with an amber signal of 2-3 seconds. These cycle times fall in the average range for typical city centers.

On streets where the distance between traffic signals is short, a coordinated control system is used. Such systems are found on 9 roads including Av. H. Unidos, Av. Montevideo, etc.

OBSERVACION:

Las calles de Asunción son de sentido doble, a excepción de las siguientes zonas que son de sentido único:

- : Centro y Microcentro
- : Entorno de Palacio de Justicia
- : Entorno del Mercado N° 1
- : Parte del Barrio Ciudad Nueva
- : Parte del Barrio Jara



Referencia

Sentido Único →

FIGURA 8-1-1
REGLAMANTACION DE SENTIDO UNICO DE
CIRCULACION

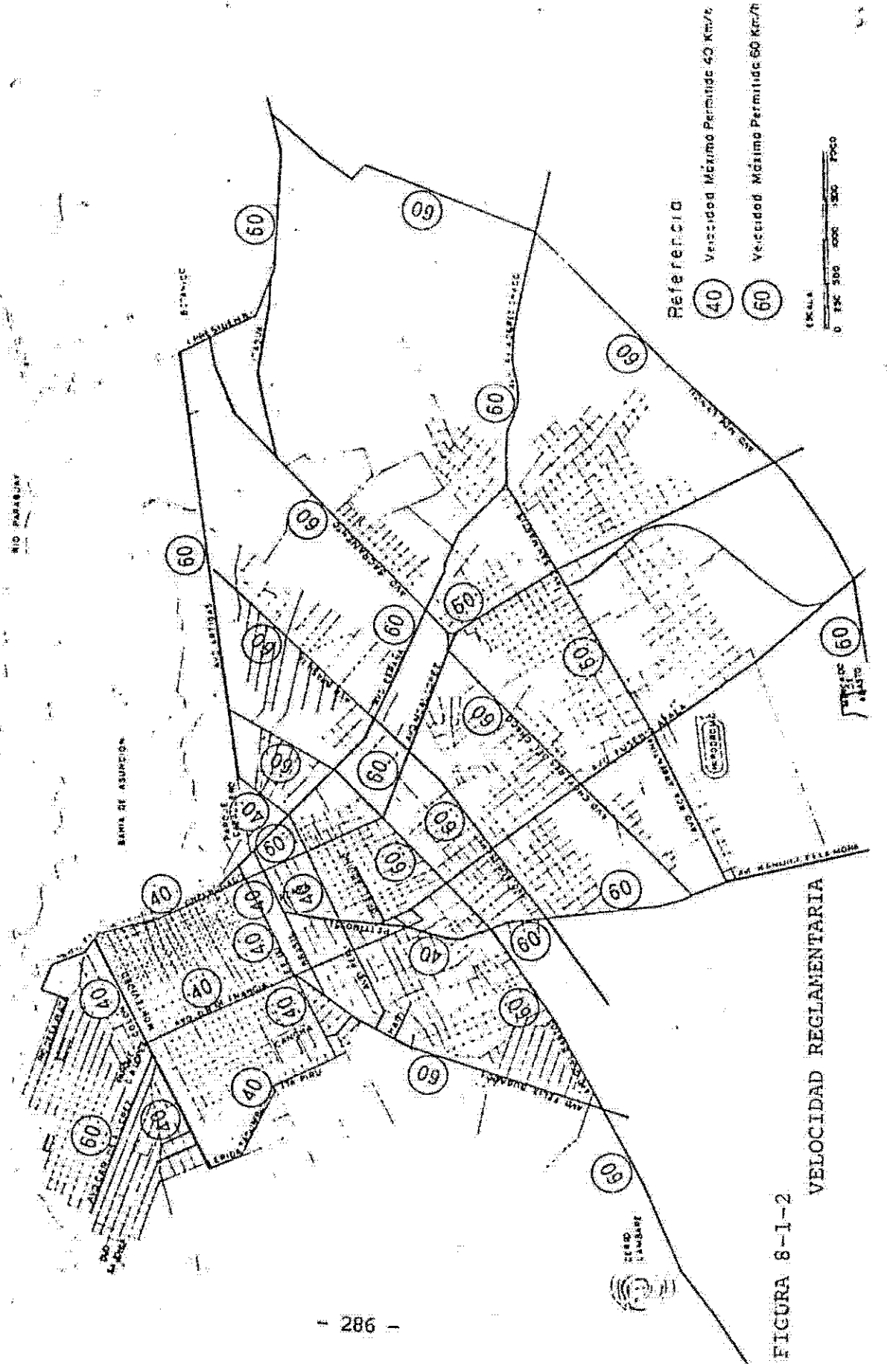
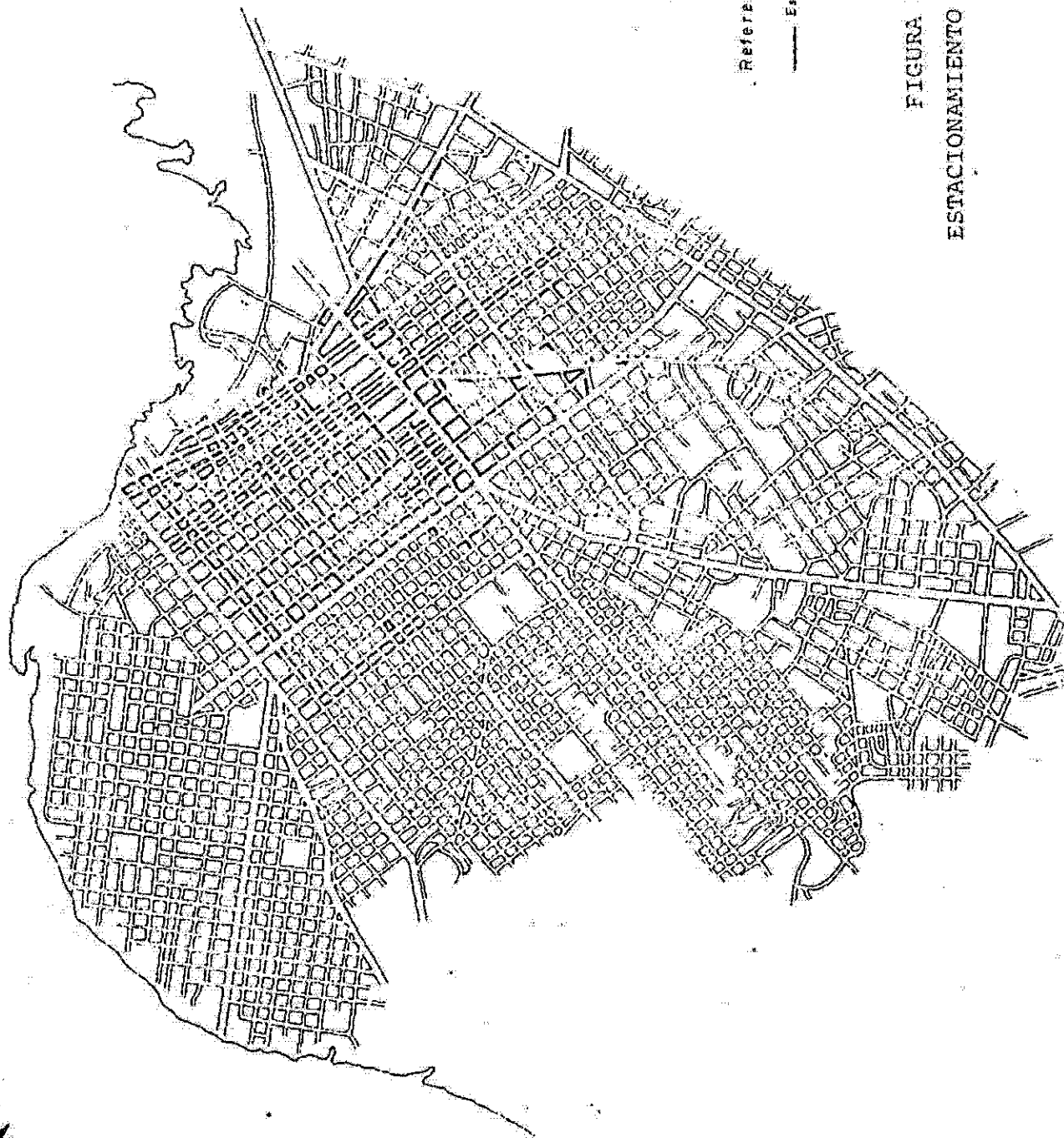


FIGURA 8-1-2
VELOCIDAD REGLAMENTARIA



Referencia

— Estacionamiento prohibido

FIGURA 8-1-3
ESTACIONAMIENTO REGLAMENTADO

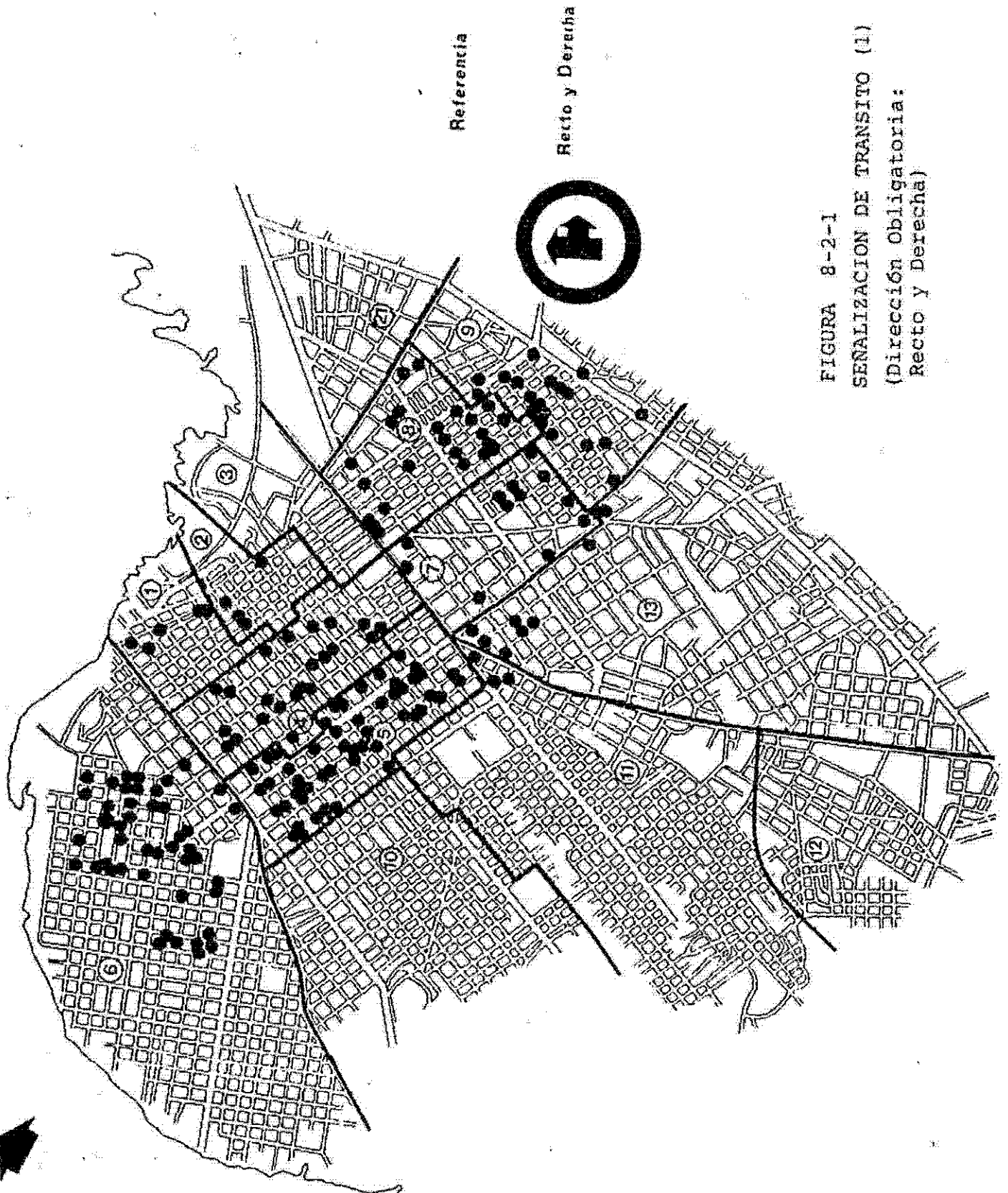
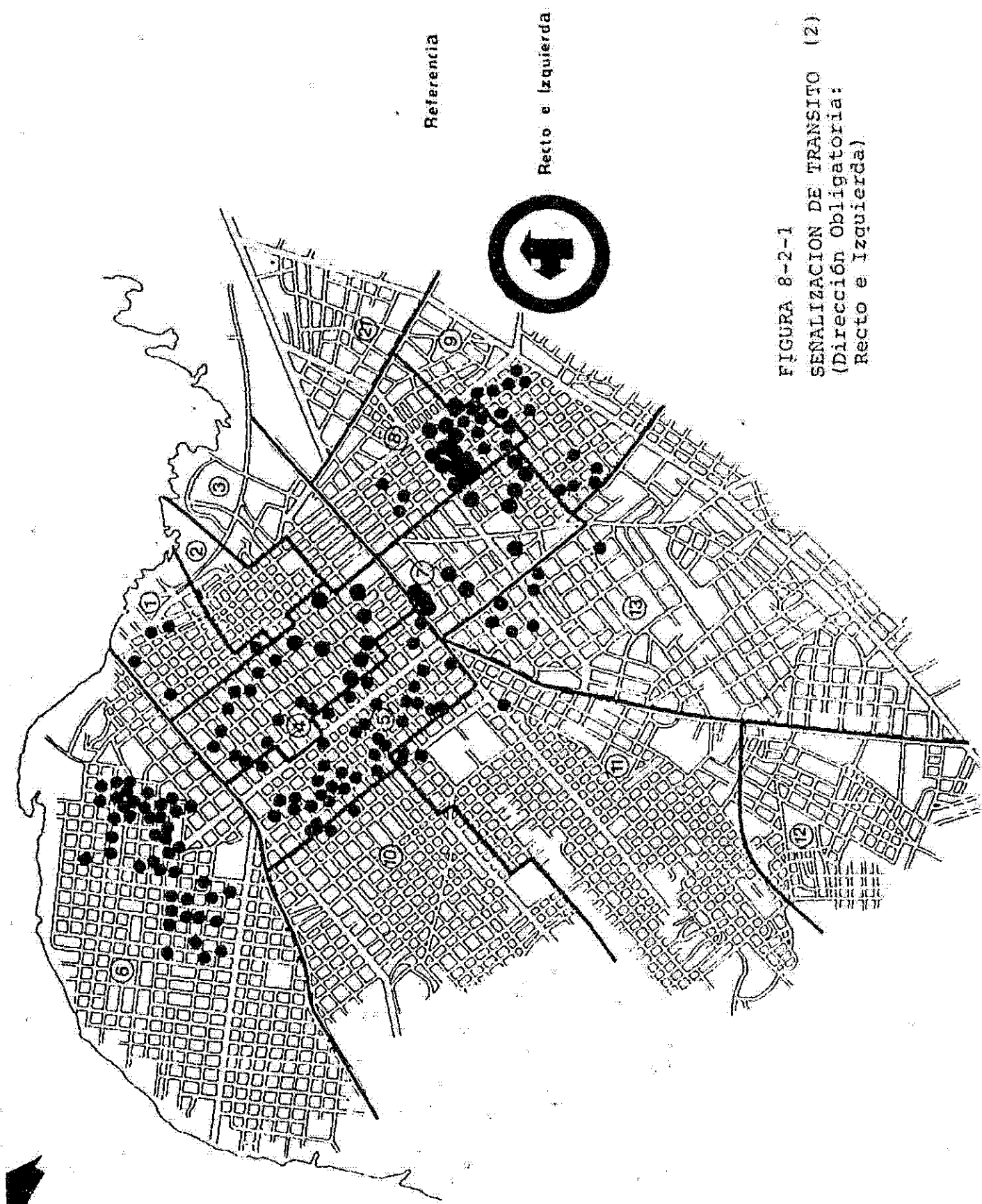


FIGURA 8-2-1
 SEÑALIZACIÓN DE TRANSITO (1)
 (Dirección Obligatoria:
 Recto y Derecha)



Referencia :

Estacionamiento Prohibido (●)

Estacionamiento Reglamentado (▲)

De 7 a 12 hs. a.m.
Y de 15 a 19 hs. p.m.

Estacionamiento Reservado (■)



FIGURA 8-2-1
SEÑALIZACION DE TRANSITO (3)
(Reglamentación sobre estacionamientos)

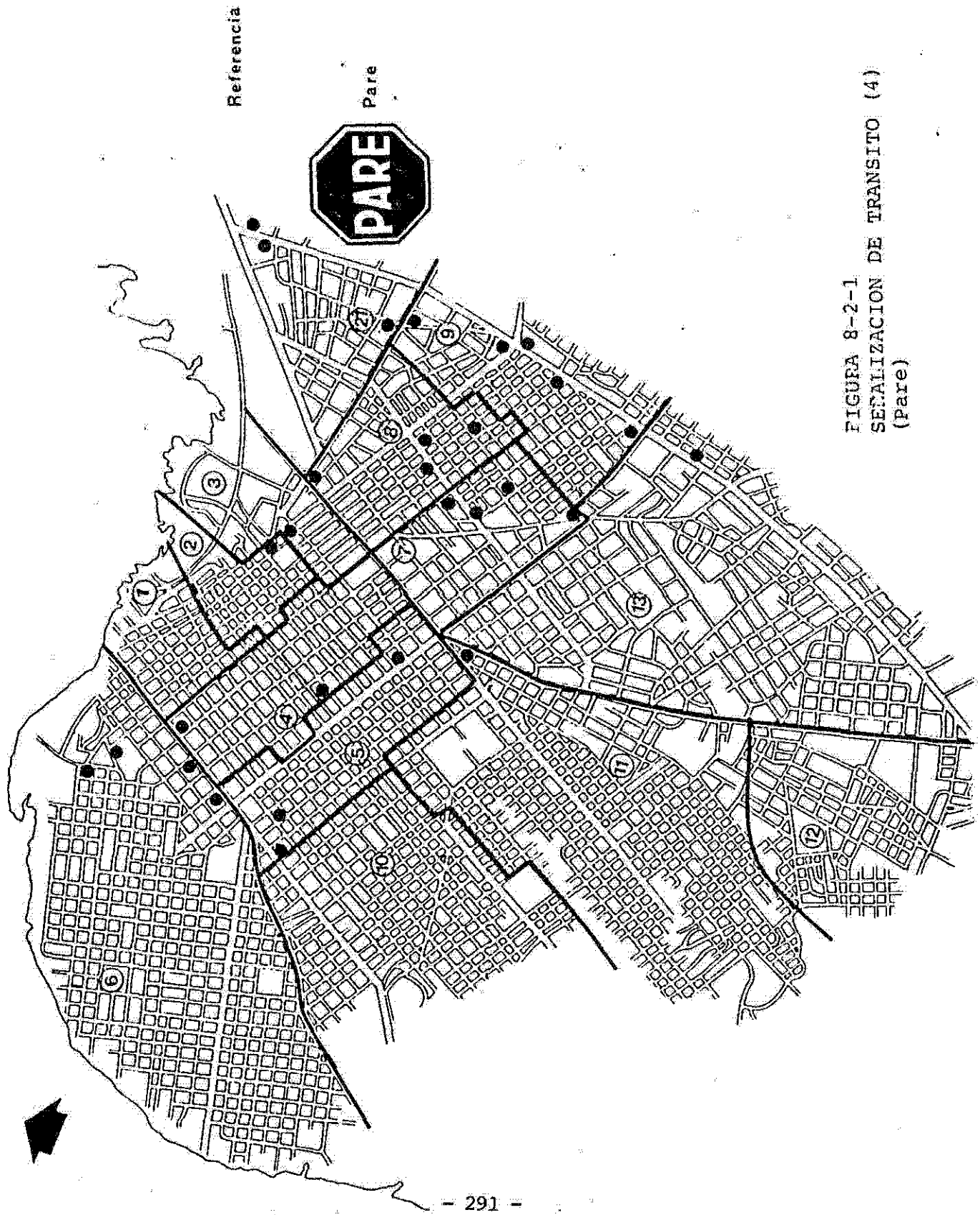


FIGURA 8-2-1
SEÑALIZACION DE TRANSITO (4)
(Pare)

