

## CHAPTER 8 TRAFFIC CONTROL ANALYSIS

8.1	Purpose of Traffic Control and Problems	215
8.2	Philippine and Davao City Traffic Control Systems	216
8.2.1	Republic Act No. 4136 and it's Rules	216
8.2.2	Traffic Rules and Penalties under Republic Act No. 4136	216
8.2.3	Traffic Ordinance No. 778	218
8.2.4	Traffic Control Organization	219
8.3	Traffic Facilities and Traffic Control	222
8.3.1	Road Network	222
8.3.2	Sidewalk	222
8.3.3	Center Median	222
8.3.4	Traffic Signal	222
8.3.5	Intersection	223
8.4	Parking Facilities and Traffic Control	227
8.5	Traffic Regulation	231
8.5.1	Speed Limit	231
8.5.2	One-Way Operation	231
8.5.3	No Parking	231
8.5.4	PUJ Loading/Unloading Zones	232
8.6	Road Signs and Markings	234
8.6.1	Road Signs	234
8.6.2	Road Markings	235
8.7	Traffic Accidents	236
8.7.1	Traffic Accident Frequency	236
8.7.2	Traffic Accident Locations	238
8.7.3	Types of the Traffic Accidents	242

### Tables and Figures

Table	8.1	Maximum Allowable Speeds	217
Table	8.2	Parking Lots in Poblacion	227
Table	8.3	Classification of Parking, P.T. Survey in 1979	227
Table	8.4	Private Car Trips by Block	228
Table	8.5	Number of Traffic Accidents in Davao City (1970–1978)	237

Figure 8.1	Center Median and Traffic Signal Map	223
Figure 8.2	Location of Major Intersections	225
Figure 8.3	Traffic Volume Map	225
Figure 8.4	Irregular Intersections	226
Figure 8.5	Current Density of Curb Parking	229
Figure 8.6	Traffic Regulation in Poblacion	233
Figure 8.7	Number of Traffic Accidents in Davao City	237
Figure 8.8	Traffic Accident Map	238
Figure 8.9	Poblacion Traffic Accident Map (1977)	240
Figure 8.10	Poblacion Traffic Accident Map (1978)	241
Figure 8.11	Type of Accidents	242
Figure 8.12	Accident and Ownership Distribution by Kind of Vehicle	243
Figure 8.13	Hourly Fluctuation of Traffic Accidents	245
Figure 8.14	Driver Violations	246
Figure 8.15	What the Pedestrian was Doing	247

## CHAPTER 8

### TRAFFIC CONTROL ANALYSIS

#### 8.1 Purpose of Traffic Control and Problems

The term "traffic control", in the wide sense of the word, denotes the control of people and vehicles in order to assure that the use of vehicles by man will afford him a safe, convenient, and pleasant social life (essential to which is the fulfillment of three Es: Education, Enforcement, and Engineering). In the narrow sense of the word, traffic control is the enforcement of fundamental traffic rules stipulated by laws and regulations.

The traffic problems existing in Davao City are primarily characterized, as previously pointed out, by the substantial qualitative and quantitative differences between the traffic in the central downtown area, "Poblacion," those in the urban areas surrounding it, those in suburban towns such as Talomo and Buhangin, and those in inland rural areas and also by the fact that traffic problems are concentrated in the central downtown area.

The secondary characteristic is the absence of railway, unlike cities in advanced nations, and the fact that public transportation depends on buses, taxis, jeepneys, and ACs, particularly on jeepneys.

The third pointed out is that the inadequate administration/enforcement of the established traffic control institutions (laws, regulations, organizations) is resulting in the occurrence of otherwise to be avoided traffic accidents and congestions.

The fourth is the much less developed, when compared with those in Manila, traffic signs, road markings, and other traffic facilities to include signals, sidewalks, center medians, and guardrails.

In view of these problems, the current traffic control in Davao City will be analyzed and the problems defined in detail.

## 8.2 Philippine and Davao City Traffic Control Systems

Republic Act No. 4136 entitled "Land Transportation and Traffic Code" provides the base for traffic control in the Philippines.

In Davao City, details of traffic control are stipulated by the Traffic Ordinance 778 issued by the local jurisdiction under the authority of said Code.

### 8.2.1 Republic Act No. 4136 and it's Rules

The Land Transportation and Traffic Code, Republic Act No. 4136, established June 20, 1964, and subsequently amended by Presidential Decrees No. 843, 896, and 1059, was enacted to maintain orderly, convenient, safe and peaceful use of motor vehicles. Therefore, this act controls the registration and operation of motor vehicles and the licensing of owners, dealers, conductors, drivers, and other parties.

The Land Transportation and Traffic Code consists of 5 chapters, or a total of 18 articles or 66 sections. Chapter 1 contains preliminary provisions (definitions, application), Chapter 2 provides for the registration of motor vehicles, Chapter 3 regulates the operation of motor vehicles, Chapter 4 stipulates traffic rules, and Chapter 5 provides penal provisions.

This Code, enforced in the entire nation, is directly administered by BLT under the jurisdiction of MOTC. The Philippine Constabulary, City Police Forces, and Municipal Police Forces are given authority to enforce the Code, and traffic courts, city courts, and municipal courts decide the violators of traffic rules.

### 8.2.2 Traffic Rules and Penalties under Republic Act No. 4136

The traffic rules provided for by the Act consist of the following:

#### TRAFFIC RULES

- I. Speed Limit and Keeping to the Right
- II. Overtaking and Passing a vehicle, and Turning at Intersections
- III. Right of Way and Signals
- IV. Turning and Parking
- V. Miscellaneous Traffic Rules

Motor Vehicle speed limits are listed below for information:

**Table 8.1 Maximum Allowable Speeds**

	Passenger cars and motorcycles	Motor trucks and buses
1. On open country roads, with no "blind corners" not closely bordered by habitations.	80 km. per hour	50 km. per hour
2. On "through streets" or boulevards clear of traffic, with no "blind corners", when so designated	40 km. per hour	30 km. per hour
3. On city and municipal streets with light traffic, when not designated "through streets"	30 km. per hour	30 km. per hour
4. Through crowded streets, approaching intersections at "blind corners" passing school zones, passing other vehicles which are stationary, or for similar dangerous circumstances.	20 km. per hour	20 km. per hour

Source: Republic Act No. 4136

Following are the penal provisions of this Act.

**PENAL PROVISIONS**

- (a) Failure to register within seven days after the acquisition of title to an unregistered motor vehicle or after the conversion of a registered motor vehicle to one vehicle which requires a greater registration fee than that for which it was originally registered, or the renewal of a delinquent registration . . . a fine in the amount equivalent to 50% of the registration fee corresponding to the portion of the year for which the vehicle is registered for use.
- (b) Failure to sign driver's license or to carry same while operating a motor vehicle. . . a fine in the amount of twenty pesos.
- (c) Driving a motor vehicle with a delinquent or invalid driver's license . . . a fine in the amount of fifty pesos.
- (d) Driving a motor vehicle with a delinquent, suspended, or invalid driver's license, or without registration or proper license plate for the current year . . . a fine in the amount of three hundred pesos.
- (e) Driving a motor vehicle without first securing a driver's license . . . a fine in the amount of three hundred pesos.
- (f) Driving a motor vehicle while under the influence of liquor or narcotic drug . . . a fine of not less than two hundred pesos but not more than five hundred pesos, or imprisonment of not more than three months, or both at the discretion of the

Court.

- (g) Violation of Section 32, 34 (a), (b), or (b-1), 35, or 46 . . . a fine not exceeding one hundred pesos; provided, however, that in the case of violation of Section 34 (b), the operation of vehicle or vehicles affected may not be allowed unless the requirements provided in said section are complied with.
- (h) Violation of Section 49, 50 or 52 . . . a fine not exceeding fifty pesos.
- (i) The making, using, or an attempt to make or use a false driver's license, badge, certificate of registration, number plate, tag, or permit in imitation or similitude of those which are issued under the Republic Act No. 4136 or which are intended for use as or for a legal license, badge, certificate, plate, tag, or permit with an intention to sell or otherwise dispose of the same to another, or the presentation, falsely or fraudulently as valid and in force of any driver's license, badge, certificate, plate, tag, or permit issued under said Act but which is delinquent or which has been suspended or revoked . . . a fine not exceeding three hundred pesos.
- (j) The use of a private passenger automobile, private truck, private motorcycle, or motorcycle, or motor wheel attachment for hire, in violation of Section 7, Subsection (a), (b), or (c), or said Act . . . a fine in the amount of two hundred pesos and the suspension of driver's license for a period of three months for the first conviction, a fine in the amount of three hundred pesos and imprisonment for a period of six months for the second conviction, and an imprisonment of one year and permanent revocation of the driver's license for the third conviction.
- (k) Permitting, allowing, consenting to, or tolerating the use of a privately owned motor vehicle for hire in violation of Section 7, Subsection (a), (b), or (c), of said Act . . . a fine upon the owner of the vehicle in the amount of five hundred pesos and the suspension of the certificate of registration for a period of three months for the first conviction, and an increase in the amount of the fine by an increment of one month for each subsequent conviction.
- (l) Violation of any provision of said Act or the regulations promulgated pursuant thereto not specifically punished elsewhere . . . a fine in the amount not less than ten pesos but not more than fifty pesos.
- (m) Offenders incapable of paying any of the specific fines mentioned in the above shall be made to undergo a subsidiary imprisonment as provided for in the Revised Penal Code.
- (n) In case of a traffic accident resulting from negligence or from reckless or unreasonably fast driving and involving personal death or injury, the motor vehicle operator at fault is, upon conviction, punished under the provisions of the Revised Penal Code.

It will be of a vital importance for the protection of the life and property from traffic accidents that each driver, law enforcement officer, and citizen will fully realize the significance of the penalty stipulated for each type of violation seen in the above.

### 8.2.3 Traffic Ordinance No. 778

The Traffic Ordinance of the City of Davao, Ordinance No. 778, is a revised ver-

sion of the old Ordinance Number 9 and was established by the City Assembly in 1973. Consisting of 16 articles, Ordinance 778 takes its skeleton from the Land Transportation and Traffic Code, under whose authority it was established, with some modifications to conform with the peculiar situation existing in Davao.

The provisions of this Ordinance which are deeply related to traffic control, the subject of this analysis, include rules pertaining to speed limits, one-way traffic, no parking and parking restrictions, and PUJ loading/unloading zones.

Most of these traffic rules are applicable in Poblacion and, therefore, traffic control analysis of Poblacion will provide adequate information for the entire Davao City.

Locations where such traffic rules are enforced will be discussed under 8.5 below.

The 16 articles of the Traffic Ordinance 778 are as follows:

ARTICLE I.	Title, Scope of Ordinance and General Provision
ARTICLE II.	Definitions
ARTICLE III.	Speed Limit and Keeping to the Right
ARTICLE IV.	Overtaking and Passing a Vehicle and turning at Intersections
ARTICLE V.	One Way Streets, thru streets and main streets
ARTICLE VI.	Right of Way of Signals
ARTICLE VII.	Forms of Parking
ARTICLE VIII.	Prohibition against improper sounding of automobiles horns and the use of siren or sirena
ARTICLE IX.	Police fire apparatus and fire hydrants; vehicles considered abandoned.
ARTICLE X.	Accessories of Motor Vehicles
ARTICLE XI.	Operation of Motor Vehicles
ARTICLE XII.	No Parking Zones and Loading and Unloading Zones
ARTICLE XIII.	Rights and Duties of Pedestrians on Public Places
ARTICLE XIV.	Miscellaneous Traffic Rules
ARTICLE XV.	Penalties
ARTICLE XVI.	Final Provisions

#### 8.2.4 Traffic Control Organization

A large number of organizations participate in the wide spectrum of traffic control in Davao City covering the planning, designing, construction, maintenance, and administration of road network and traffic facilities, as well as the enforcement of, and the trial of violations of, traffic laws and regulations. These organizations are basically as follows:

- (1) Planning, Designing, Construction, Maintenance, and Administration of Road Network

Roads are classified into the following three jurisdictional levels and responsibilities therefore shared by organizations accordingly: national roads, city roads, and ba-

rangay roads.

(a) National Roads

From planning to maintenance, national roads are under the jurisdiction of MPWH. MPWH headquarters in Manila and its regional office in Davao work jointly, but the headquarters is primarily responsible for the screening of plans and designs of national roads and for budgeting, while the regional office is directly involved in the accomplishment of planning, designing, construction, maintenance, and administration of those roads.

(b) City Roads

The planning and designing of city roads are primarily under the Planning & Development Office under the Mayor of Davao, while the construction, maintenance, and administration of such roads are under the prime responsibility of the City Engineer's Office. Guidance and construction subsidies are available from MPWH for the development of city roads.

(c) Barangay Roads

MPWH is responsible for barangay roads covering from planning phase to construction. Maintenance work is undertaken by MLGCD. The Bureau of Barangay Roads MPWH is charged with the screening of regional office, MPWH is charged with the accomplishment of planning, designing and construction of those roads.

(2) Enforcement

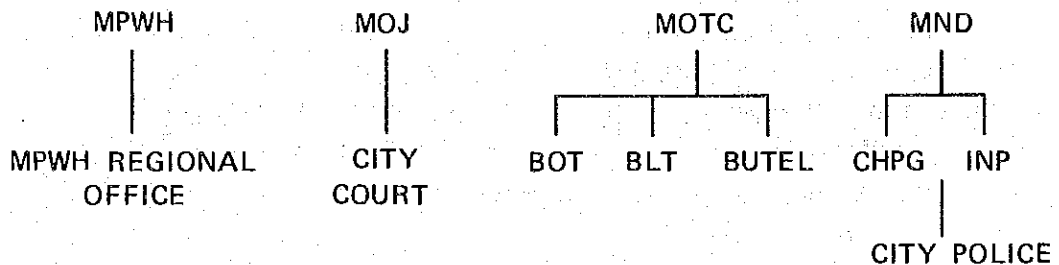
Both the Republic Act No. 4136 and the Traffic Ordinance No. 778 of the City of Davao are enforced. Representative of violations are negligence of obligation pertaining to motor vehicle registration and license and violations pertaining to the method of vehicle operation and traffic rules. Violations on national highways are under the jurisdiction of CHPG, while those committed on barangay roads are under the Barangay Police, which belongs to INP (which, in turn, belongs to MND just as does CHPG.)

(3) Trial

Violations of the Republic Act No. 4136 and the Ordinance No. 778 committed on national or barangay road are tried by the traffic court, an instrumentality of the republic government, and those committed on city road are tried by the City Court.

(4) Overall Organizational Structure

The structure of organizations concerned with traffic control is as follows:





The detail functions of these organizations are discussed hereunder:

(a) MPWH and its Regional Office

Accomplishes the planning, designing, and construction of safety control on national roads. Street lights, road signs, traffic signs, pedestrian crossings, side ditches, drainage facilities, shoulders, fences, safety islands, detour roads, sidewalks, and curbs are also to be developed.

(b) MOTC

The Ministry of Transportation and Communication is responsible for the formulation of traffic management/control policies and plans on both national and metropolitan levels.

(c) BOT

The Board of Transportation is for guaranteeing the reasonable and appropriate operation of public land transportation utilities and services and, as such, establishes and regulates service routes zone and/or area of operation of public land transports and determines and prescribes fares, charges and/or rates pertinent to the operation of such utilities and services.

It drafts and proposes laws, regulations, and standards for the purpose of promoting public transport convenience, administers, through the organization channel of the BOT, and enforcers, through the police and other relevant government authorities, such laws, regulations, and standards as established. BOT requires the operator of public land utilities to his vehicles, install in his stations, or otherwise provide such devices, equipment, facilities and operating procedures and techniques as may promote or insure the highest degree of safety, protection, conform, and convenience to persons and property in their charge, as well as the safety of persons and properties within his area of operation.

(d) BLT

The Bureau of Land Transportation is charged with the regulating and controlling of land transportation as follows:

- Registration of motor vehicles;
- Examination and licensing of drivers;
- Enforcement of the provisions of the "Land Transportation and Traffic Code."
- Collection of various fees, taxes and fines.

(e) CHPG

CHPG shares the following roles:

- The administration of traffic laws and regulations;
- Traffic control and enforcement;
- Anti-carnapping activities;
- Military supervision.

(f) INP, City Police, and Barangay Police

INP controls the city police, which enforces traffic laws and regulatins on city roads, and the barangay police, which enforces them on barangay roads.

### **8.3 Traffic Facilities and Traffic Control**

#### **8.3.1 Road Network**

Although a road network should consist of a balanced set of roads of varying functional levels for greater safety, convenience, and the amenity of road traffic, roads in Davao City are classified not according to distinct criteria of function such as width, intervals between intersections, and maximum traffic speed but according to jurisdictional responsibility, namely into national, city, and barangay roads. Therefore, various traffic problems are created. For instance, traffic accidents are frequent on the national highways, the artery of Davao City, due, it is believed, to the fact that the lane width is inadequate and is not in commensurate with the volume of traffic thereon but is the same, together with its maximum speed, with those of city and barangay roads. Furthermore, Poblacion suffers from the coexistence of radial and grid road patterns and roads with undefined functional characteristics: It is difficult to distinctly classify them into major roads, secondary roads, collector roads, and local roads. Disorderly passing and overtaking practiced frequently by drivers in the absence of lane markings add to the incidence of traffic accidents.

#### **8.3.2 Sidewalk**

In Davao City, sidewalks are found almost only in Poblacion. The degree of sidewalk establishment is greater in downtown than in other parts of Poblacion. In the downtown, sidewalks are created either as a part of the overall road width or by utilizing the space produced by setting back the ground floor part of buildings. The quality of sidewalk pavement is, however, not necessarily adequate to guarantee safe walking. Sidewalk development leads to a lower incidence of traffic accidents, as it is substantiated by traffic statistics which shows that accidents involving pedestrians mostly occurred when the pedestrian was walking on a carriageway due to the absence of or the poor pavement of sidewalk. Sidewalks will, in addition, be important to the citizens' amenity in their shopping and amusement activities. In this view, essential in the future will be the development of sidewalks through, among other things, clearly separating them from carriageways and giving them adequate pavement surfaces.

#### **8.3.3 Center Median**

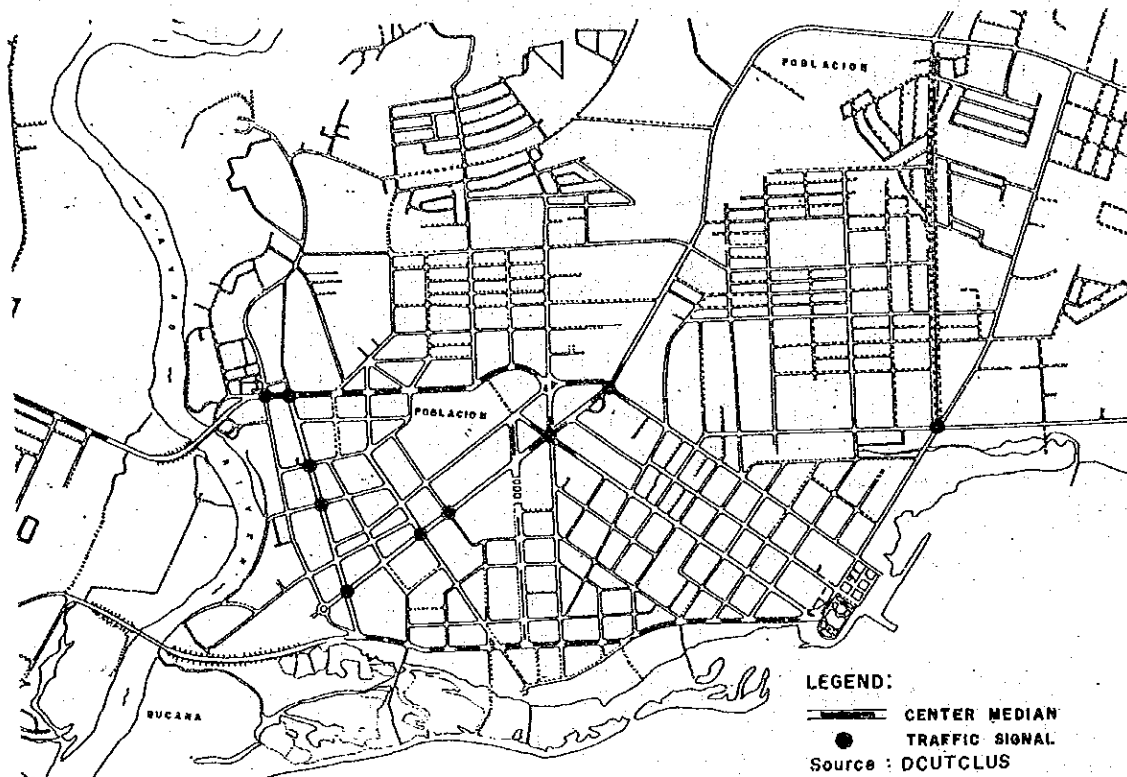
Portions of national highways in Davao City have a center median. It is observed that the occurrence of traffic accidents is markedly infrequent in road sections where a center median is established. For instance, the incidence is very low even though traffic is heavy on Quirino Avenue and Quezon Boulevard, which have a center median.

This proves that the establishment of a center median is an effective way to reduce traffic accidents and at the same time, suggests that the enforcement of one-way traffic (by traffic Ordinance) will facilitate the control of accidents.

#### **8.3.4 Traffic Signal**

In Davao City, a total of 9 traffic signals is installed currently on Quirino Avenue, San Pedro Street, and C.M. Recto Avenue. These signals are manually operated by policemen in response to the traffic condition and in accordance with the indications and phases given in the operation manual.

Inasmuch as the installation of signals at major heavy-traffic urban intersections generally results in a substantial reduction in the number of traffic accidents and the expansion of intersection traffic capacity, one of major tasks in Davao City in the future will be the installation of signals at various locations.



**Figure 8.1 Center Median and Traffic Signal Map**

### 8.3.5 Intersection

Radial and grid patterns of road coexist in Poblacion, and irregular intersections have been formed at the interfaces of the two patterns. Traffic congestion and accidents have been caused by motor vehicles flowing into all roads, because they have similar widths rather than being given varying width according to the function which each of them is expected to perform.

This existing situation is analyzed below in relation to the features which intersections are expected to have.

#### (1) Orientation

Intersections should provide clear orientation to vehicle drivers so as that they would not be confused about how they are to proceed toward their destination through the intersection, whether straight ahead or making a turn. Easy-to-follow-through intersections, without ambiguous or equivocal orientation, would at the same time have the effect of discouraging or preventing vehicles from proceeding into a wrong direction, a direction in which their destination does not exist. In this sense, the

road network in Poblacion fails to offer drivers easy-to-understand orientation, inasmuch as hierarchial function sharing between major roads, secondary roads, collector roads, and local roads is not clearly defined for the component roads of the network. The 5- or 6-leg shape of heavily travelled intersections, such as Agdao Market Intersection, C.M. Recto/Magsaysay Intersection, and Quirino/A. Pichon Intersection, is complicating the orientation and making it rather difficult for the traffic to follow through them, while making it easy for traffic congestions and accidents to occur.

(2) Even Service Distribution

The even distribution of major roads at fixed intervals and the resultant even distribution of intersections – hence, even distribution of road service – is desired for the realization of smooth traffic flow and a high level of accessibility in urban areas. The even distribution of service is to be achieved, among other things, through the assignment of hierarchial function level to each road.

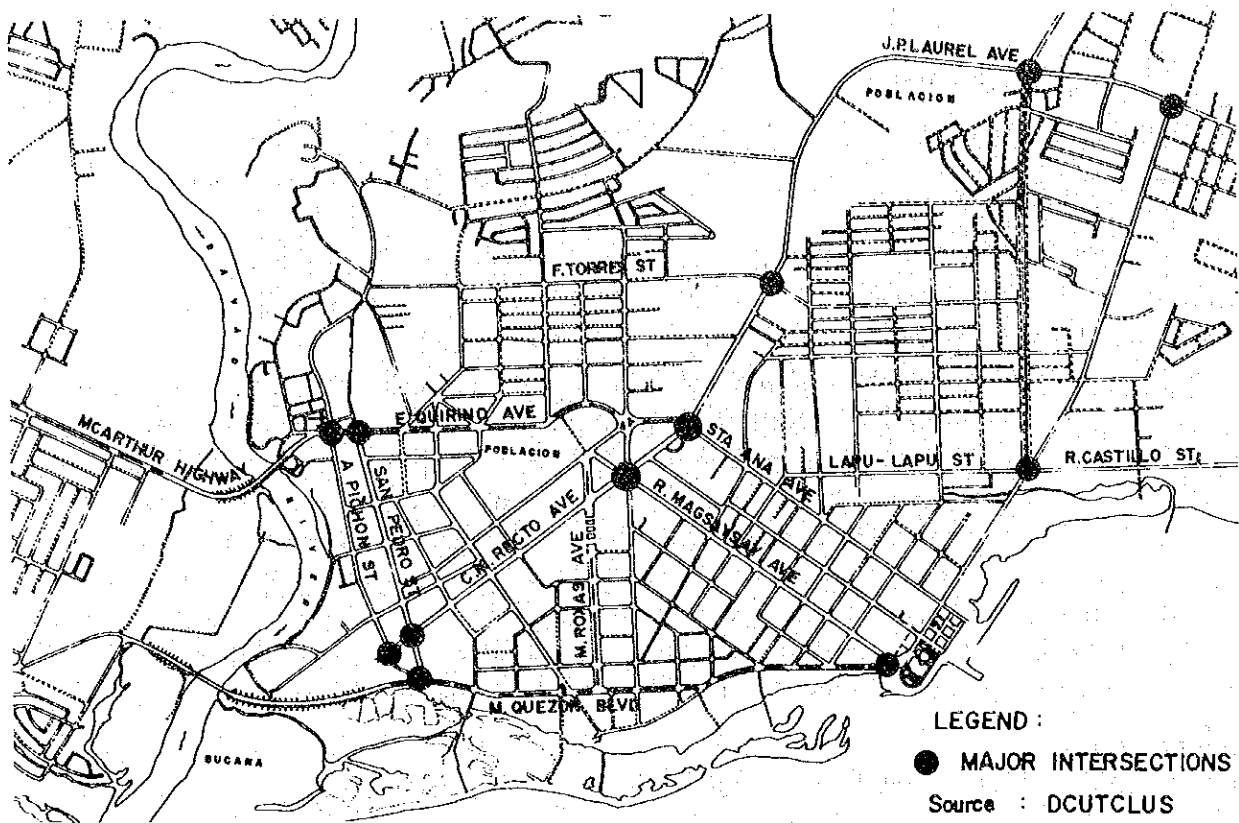


Figure 8.2 Location of Major Intersections

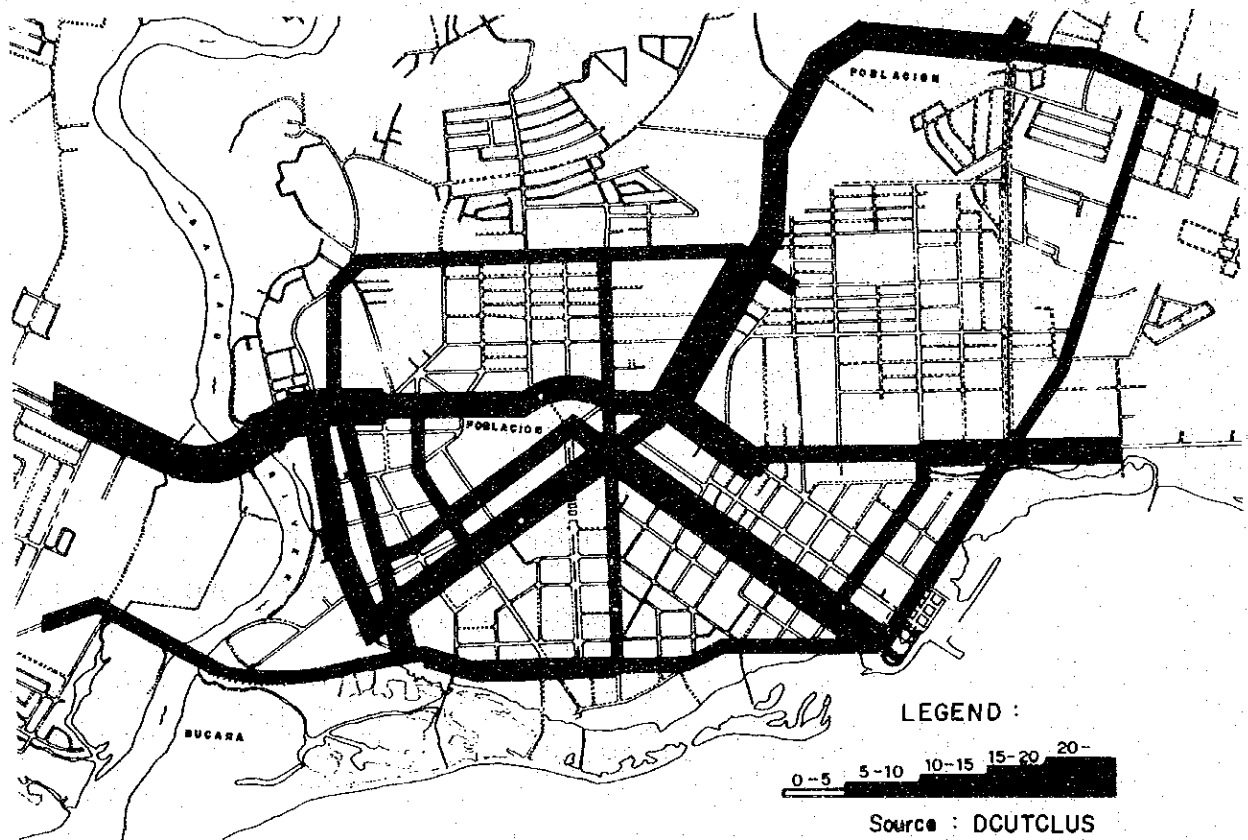


Figure 8.3 Traffic Volume Map

(3) Greater Safety

Many traffic accidents occur at intersections in and out of Poblacion and, in Japan, from 70 to 80 percent of all traffic accidents occur at intersections or within 10 meters of an intersection. Therefore, in order to achieve greater road safety, one of most important tasks to be performed is to improve intersections. Said 5- and 6-leg intersections, which are ubiquitous in Davao City, will have to be corrected.

(4) Greater Traffic Capacity

The number of lanes, the width of each lane, lateral clearance, ratio between large and small vehicles in traffic, and roadside conditions usually determine the road traffic capacity. With regards to most of roads in Davao City, the number of lanes and the lateral clearance are unknown due to the absence of lane markings and access control is impossible due to the absence of stop lines. The capacity of intersections, on the other hand, is affected by whether or not the intersection has signals; generally in urban areas the capacity of heavily travelled intersections is greater with signals. Therefore, the installation of traffic signals at major intersections should be considered along the correction of intersection shapes discussed in the above.

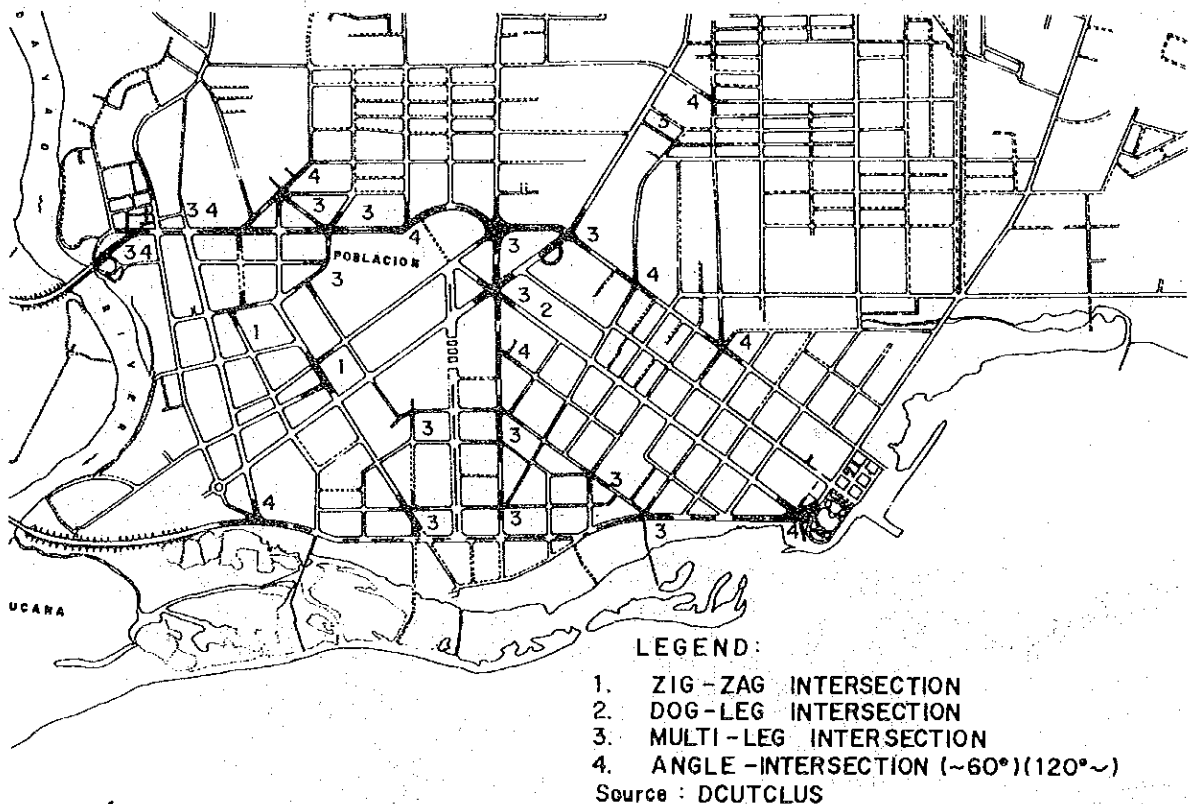


Figure 8.4 Irregular Intersections

#### 8.4 Parking Facilities and Traffic Control

The 1979 Person-Trip Survey revealed that 48% of all person-trips either originated or ended in Poblacion, indicating that the problem of parking space shortage is concentrated in Poblacion. A parking facility survey (conducted in January 1980) covering a total land space of 227.5 hectares along San Pedro Street, C.M. Recto Avenue, and R. Magsaysay Avenue, where commercial and business facilities are concentrated, found that the area had the total parking capacity of 1,306 vehicles, which came to 5.64 vehicles per each hectare of the urban area (see Table 8.2). Parking Characteristic by type of parking in the Project Area shown in the Table.

**Table 8.2** Parking Lots in Poblacion

Survey Area	227.5 ha.
No. of Parking Area	63
Total No. of Parking Capacity	1,306 lots

Source: 1979 Parking Survey, DCUTCLUS

**Table 8.3** Classification of Parking P.T. Survey in 1979

			(unit: vehicle/day)
On-Street parking	13,300	(37%)	A
Free-Parking	22,400	(62%)	B
Paid Parking	300	(1%)	C
Total	36,300	(100%)	A + B + C
Off-Street Parking	22,700	(63%)	(B + C)

Source: P.T. Survey in 1979, DCUTCLUS

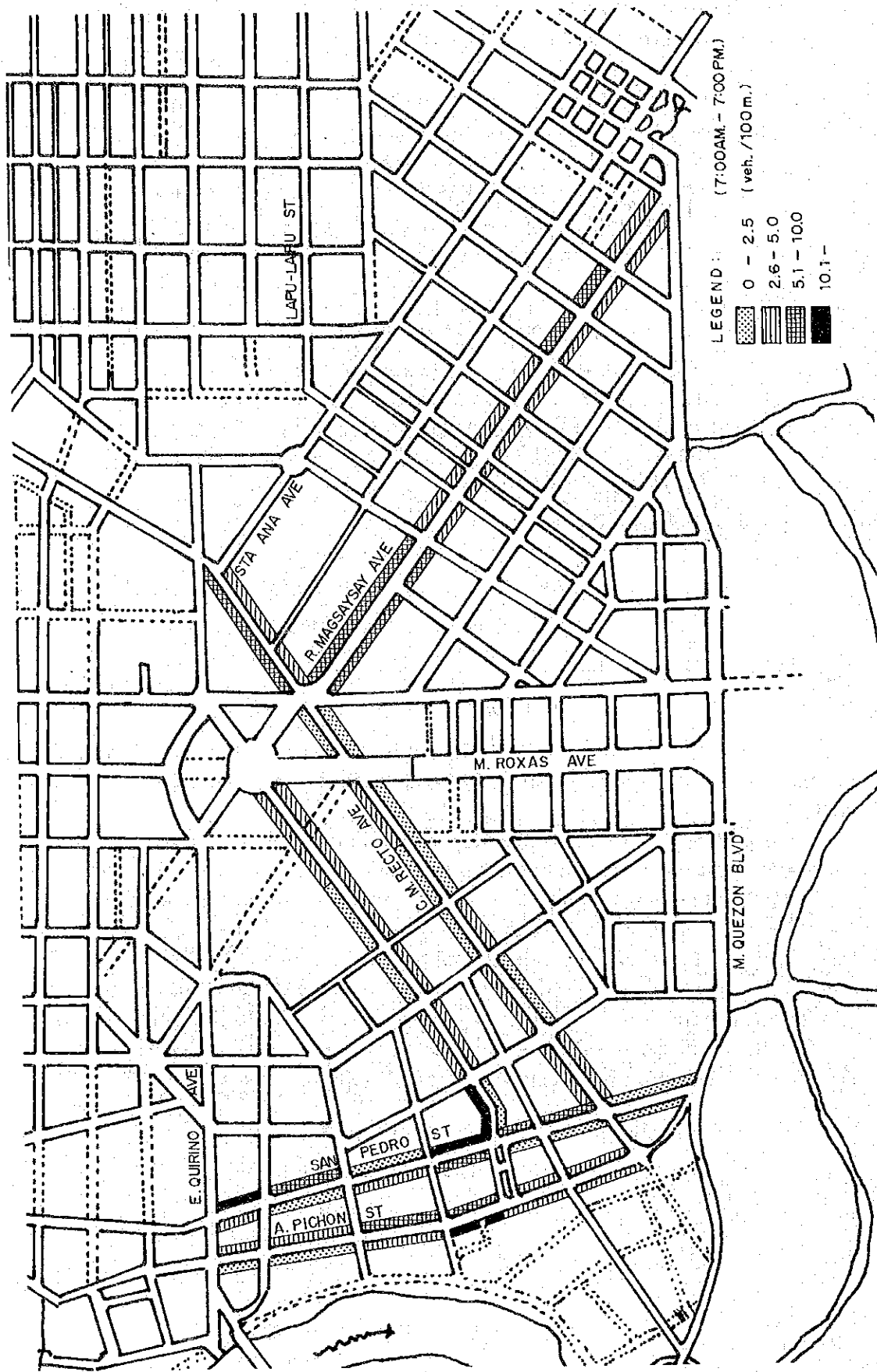
**Table 8.4 Private Car Trips by Block**

(unit: person trips/day)

		1979	
		NO.	%
BLOCK	I	3,015	2.7
	II	6,563	5.8
	III	6,779	6.0
	IV	64,294	57.2
	V	24,065	21.4
	VI	7,728	6.9
<b>TOTAL</b>		<b>112,444</b>	<b>100%</b>

Source: P.T. Survey in 1979, DCUTCLUS

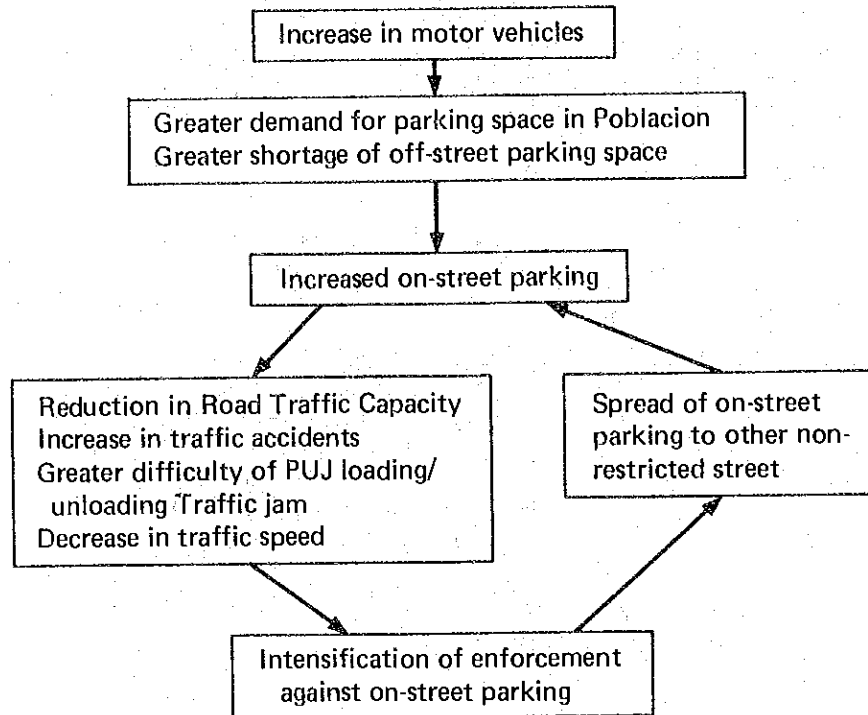




SOURCE : 1979 DCUTCLUS PARKING SURVEY

Figure 8.5 Current Density of Curb Parking

The process through which the problem of parking space shortage is currently being aggravated can be shown by the following diagram.



At present, in Poblacion area, parking on street is prohibited by Ordinance 778 on both sides of the road in 8 sections and/or side of the road in 5 sections. (See Figure 8.6).

The prohibition of on-street parking should on one hand facilitate the expansion of road's traffic capacities, the smoother flow of traffic on the road, and the improvement of convenience and safety, as well as the alleviation of traffic congestion, while, on the other, would impair the door-to-door convenience of those who utilize the motor vehicle. In the future, therefore, it will be necessary that roads on which parking should be prohibited and roads on which such convenience should be insured be clearly distinguished from each other based on detailed analyses and forecasts and that, thus, parking be controlled according to a prudent plan rather than as stopgap actions in response to short term circumstances as might develop from time to time.

## **8.5 Traffic Regulation**

### **8.5.1 Speed Limit**

Speed limits are imposed under the authority of Ordinance 778, and they range from 20 to 30 kilometers per hour (KPH) on trunk roads in the urban areas including Poblacion and from 70 to 80 KPH on trunk roads in suburban areas of Davao City. However, it is suspected that drivers in the City do not necessarily observe the speed limit and, therefore, it will be essential that speed limits be re-designated as appropriate to the hierarchial level of function assigned to each road and that such speed limits be strictly enforced.

### **8.5.2 One-Way Operation**

One-way traffic is enforced in parts of roads in Poblacion, chiefly in downtown areas, the vicinity of market, and the vicinity of PUJ terminals where traffic generation is high and vehicle parking and stopping are much practiced. One-way operation is limited to short distances between intersections. The evidence in Davao City that the incidence of traffic accidents is extremely low on roads which have a center median adequately explains the desirable effect of one-way operation should be fully considered in a wider scope in this City.

One way operations enforced under Ordinance 778 are as follows:

- From Hospital Ave. to C.M. Recto St. (Jones Circle)
- From C. Bangoy corner Rizal St. to San Pedro St. (crooked Road)
- From corner San Pedro -- Q. Blvd. to Bonifacio's monument. (Washington St.)
- From A. Pichon St. corner Marfori to Marfori, Datu Bago.
- From Datu Bago -- Marfori to E. Quirino Avenue
- Rasay and Posadas Streets totally closed for market vendors.

### **8.5.3 No Parking**

Currently no parking is effected in Poblacion only on roads in the midtown area, those in the vicinity of the market, those with a heavy traffic or a high traffic accident incidence, and those along major PUJ service routes. As revealed through the analysis of accident records, it is believed that the effectuation of no parking on San Pedro Street was the major reason why traffic accidents dwindled on that road. Parking space development, on street parking, and the effectuation of no parking in a wider scope should be considered in the future.

No parking is enforced under Ordinance 778 as follows:

(1) Both sides of the following National Highways:

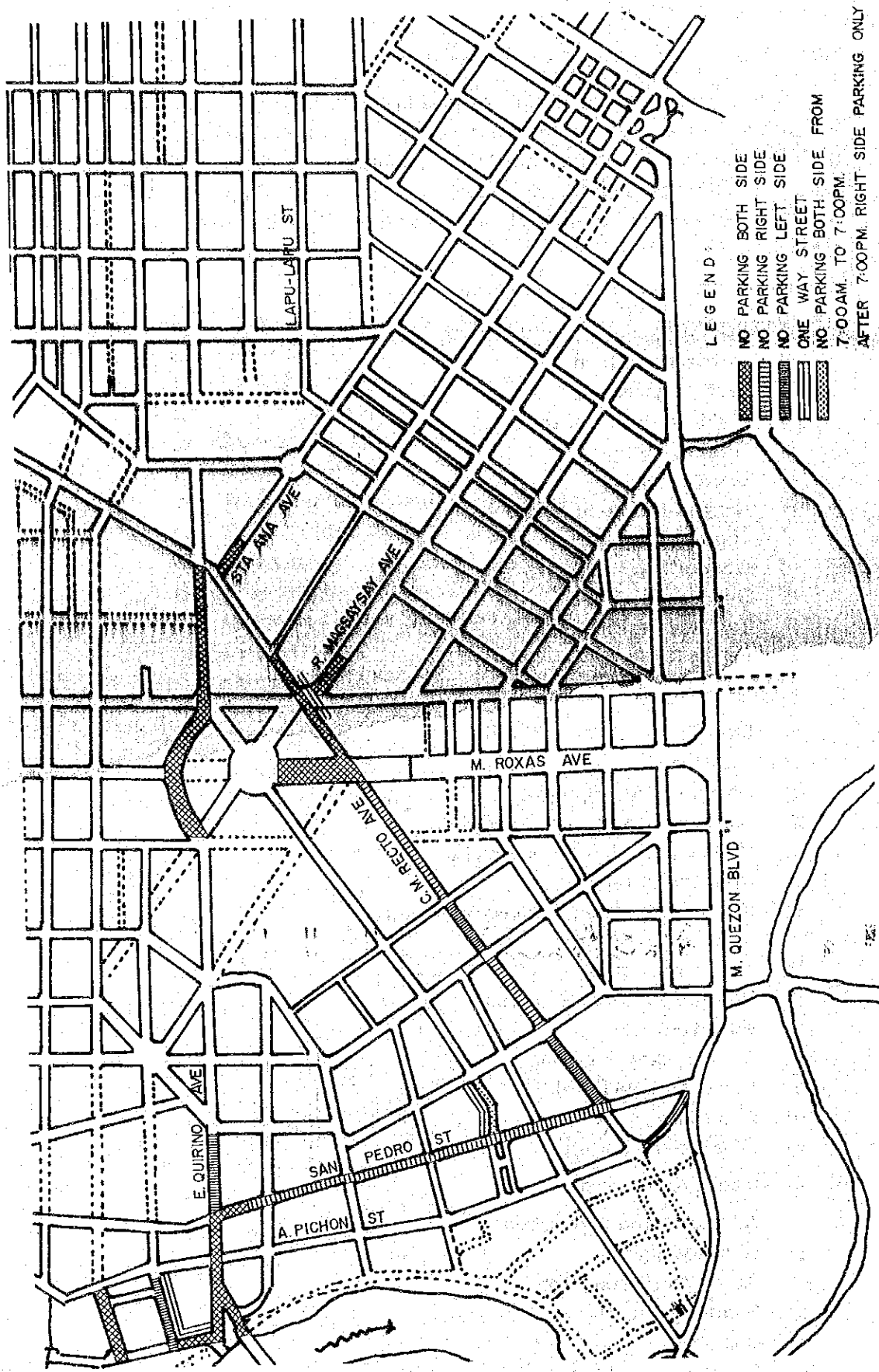
- a) A. Pichon Street
- b) Quezon Blvd.
- c) E. Quirino Ave.
- d) C.M. Recto St.
- e) R. Magsaysay Ave.
- f) Leon Garcia St.

- g) Sta. Ana Avenue
- h) Hospital Avenue
- (2) Right side of Ilustre St. from San Pedro to corner Duterte St.
- (3) Right side of Marfori St. from Datu Bago
- (4) Left side of San Pedro St. from C.M. Recto St.
- (5) Right side of Lapu-lapu St. from corner Bangoy to Leon Garcia St.

#### 8.5.4 PUJ Loading/Unloading Zones

An analysis of traffic police weekly reports reveals that public utility vehicles are responsible for more accidents than private use vehicles. PUJs are "double-edged sword" in that they are very important means of daily transportation for citizens, while they are responsible for a large number of traffic accidents and a high incidence of accidents.

Currently, PUJ loading/unloading zones are designated on San Pedro Street and C.M. Recto Avenue, but the designation of such zones on other roads will be highly essential for the expansion of traffic capacity of such roads and the improvement of PUJ passenger safety at their embarkation/debarkation.



LEGEND:






-  NO PARKING BOTH SIDE
-  NO PARKING RIGHT SIDE
-  NO PARKING LEFT SIDE
-  ONE WAY STREET
-  NO PARKING BOTH SIDE FROM 7:00AM. TO 7:00PM. AFTER 7:00PM. RIGHT SIDE PARKING ONLY

Figure 8.6 Traffic Regulation in Poblacion

## 8.6 Road Signs and Markings

### 8.6.1 Road Signs

Road signs are currently being installed in the Philippines in accordance with the International Road Signs of 1968, but the extent to which road signs have been installed in Davao City is still far from being complete. Only few road signs are seen in Davao City. The development of a complete road sign system is an urgent task that should be achieved, as it requires small installation expenses relative to its resultant effect on traffic control.

Major kinds of road signs to be installed are:

#### (1) Warning Signs

- a) Intersection Ahead
- b) Traffic signals ahead
- c) Children (or School zone)
- d) Road Narrow
- e) Uneven Road
- f) Dangerous Descent & Step Ascent
- g) Slippery Road
- h) Quay or River Bank
- i) Roundabout Ahead
- j) Two-way Traffic
- k) Falling Rocks

#### (2) Regulatory Signs

- a) Stop Signs
- b) Yield Signs
- c) Directions to be followed
- d) Compulsory Maximum Speed
- e) No Entry for all types of vehicles
- f) No entry for cars.
- g) No entry for cycles, motorcycles & tricycles
- h) No entry for Jeepneys
- i) No entry for buses
- j) No entry for trucks & trailers
- k) No U-Turn
- l) No overtaking or passing
- m) Quiet signs (No Horn)
- n) No Parking
- o) Other no entry signs.

#### (3) Information /Guide Signs

- a) Advance notice of direction
- b) Direction Signs
- c) Place identification Sign
- d) Pedestrian Crossing
- e) One-way
- f) Bus or Jeepney Stop

## 8.6.2 Road Markings

Road markings are currently being accomplished in the Philippines in accordance with the Road Marking Manual. However, as in the case of road signs, road markings are still inadequate in Davao City.

In this City, the completion of road markings is an urgent need for the purposes of improving intersections and of reducing traffic accidents. In addition, it is of a vital importance that proper road markings is effected whenever a new road is constructed, a road is widened, a traffic signal is installed, and/or a new traffic control is implemented.

Major kinds of road markings needed in Davao City are:

- a) Center Lines
- b) Lane Lines
- c) No Overtaking zones
- d) Pavement boundary lines
- e) Channel Lines
- f) Entrance or Exit Ramp
- g) Turning Direction
- h) Stop Lines
- i) Lines indicating Points at which Drive Must Yield
- j) Crosswalk Lines or Pedestrian Crossing
- k) Cyclist Crossing
- l) Parking Space Limits
- m) Word and symbol Markings
- n) Curb Markings
- o) Object Markings
- p) Reflector Markers

## 8.7 Traffic Accidents

Traffic accidents have been on the yearly increase in Davao City; according to the Traffic Control Division data the number of traffic accidents increased by a factor of 2.58 in eight years from the 1,507 in 1970 to 3,896 in 1978. Traffic accidents which have occurred in Davao City will be analyzed below based on the following three kinds of data:

- Traffic Control Division data (1978)

The total number of traffic accidents and its breakdown by the types of vehicle for each year from 1970 through 1978 are available from this data.

- Davao City Weekly Accident Reports of the City Police (March - September 1978)

Reports for March through September of 1978, covering a net period of about 6 months due to some missing reports, were used.

- Accident Records of the City Police (July - November 1978)

A total of 827 samples were taken from the file of traffic accident records of the City Police (one report per each accident), which represented 48% of the total 1,712 accidents occurred during the same period (July - November 1978) according to the Traffic Control Division Data.

### 8.7.1 Traffic Accident Frequency

The incidence of traffic accidents in Davao City has generally been on an upward trend from 1970 to 1978. Accidents rapidly increased particularly after 1975. Increase in accidents was faster than increase in the number of registered motor vehicles (PUV), and the average number of accidents per registered PUV rose from the 0.364 in 1970 to 0.525 in 1975, and, further to 0.769 in 1978. At this trend, this ratio might have caused at least one accident on the average.

Traffic accidents occurred in Davao City at the average rate of 325 per month or 11 per day in 1978. (Source: Traffic Division). The breakdown of those accidents was 2% fatal accidents, 23% casual accidents, and 76% property damage accidents on the average, one out of every 4 accidents involved Personal death or injury.

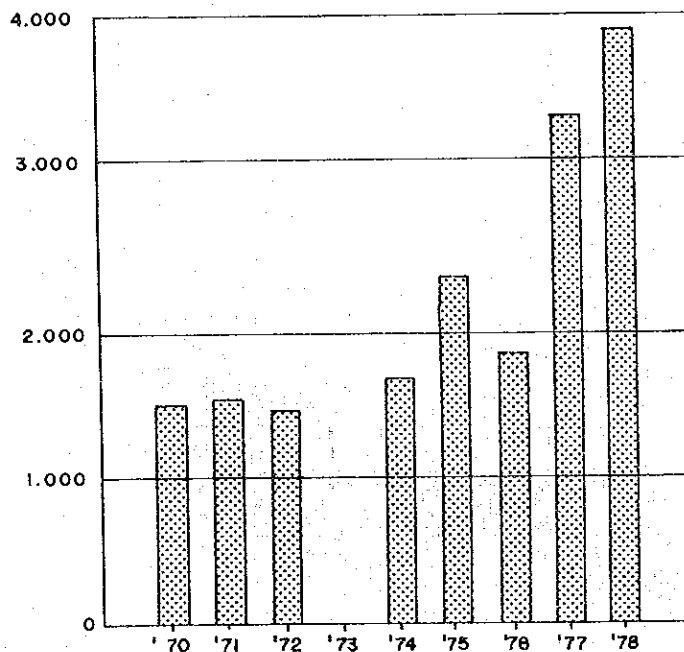


**Table 8.5** Number of Traffic Accidents in Davao City (1970-1978)

	Number of Accidents	Number of PUVS	Number of Accidents per PUV
		PUV	
1970	1,507	4,142	0.364
1971	1,562	4,602	0.339
1972	1,484	5,116	0.290
1973	—	5,946	—
1974	1,713	7,084	0.242
1975	2,397	4,562	0.525
1976	1,857	4,843	0.414
1977	3,293	—	—
1978	3,896	5,064	0.769

Source: Traffic Control Division, INP

Note: "—" shows unknown data.



Source: Traffic Control Division, INP

**Figure 8.7** Number of Traffic Accidents in Davao City

## 8.7.2 Traffic Accident Locations

### (1) Davao City as a Whole

A scrutiny of traffic accidents occurred in Davao City as a whole indicates that they were concentrated to Poblacion and, in urban areas on its perimeter and in suburban areas, to areas along national highways, particularly between Talomo and Poblacion and between Poblacion and Panacan. Few accidents have occurred on Diversion Road, which is one of trunk roads in Davao City but has a light traffic.

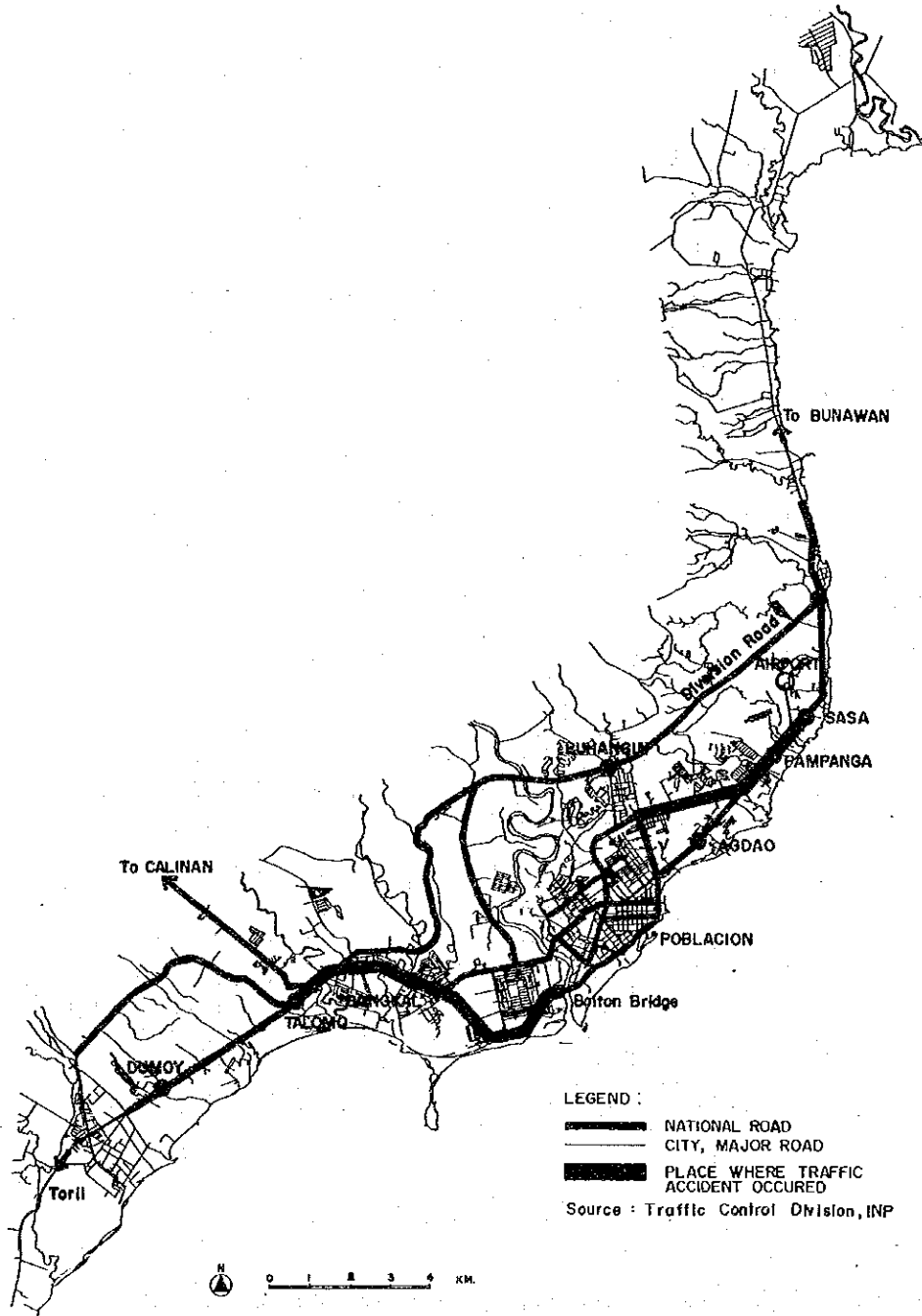
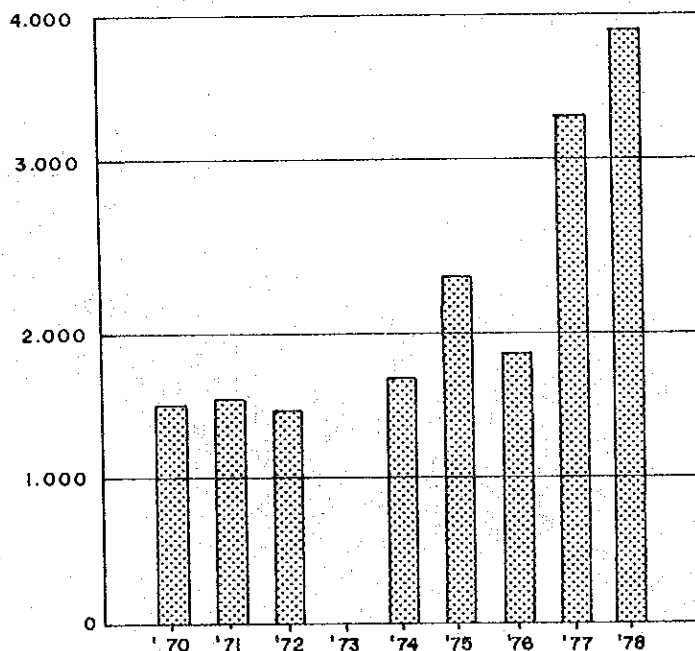


Figure 8.8 Traffic Accident Map

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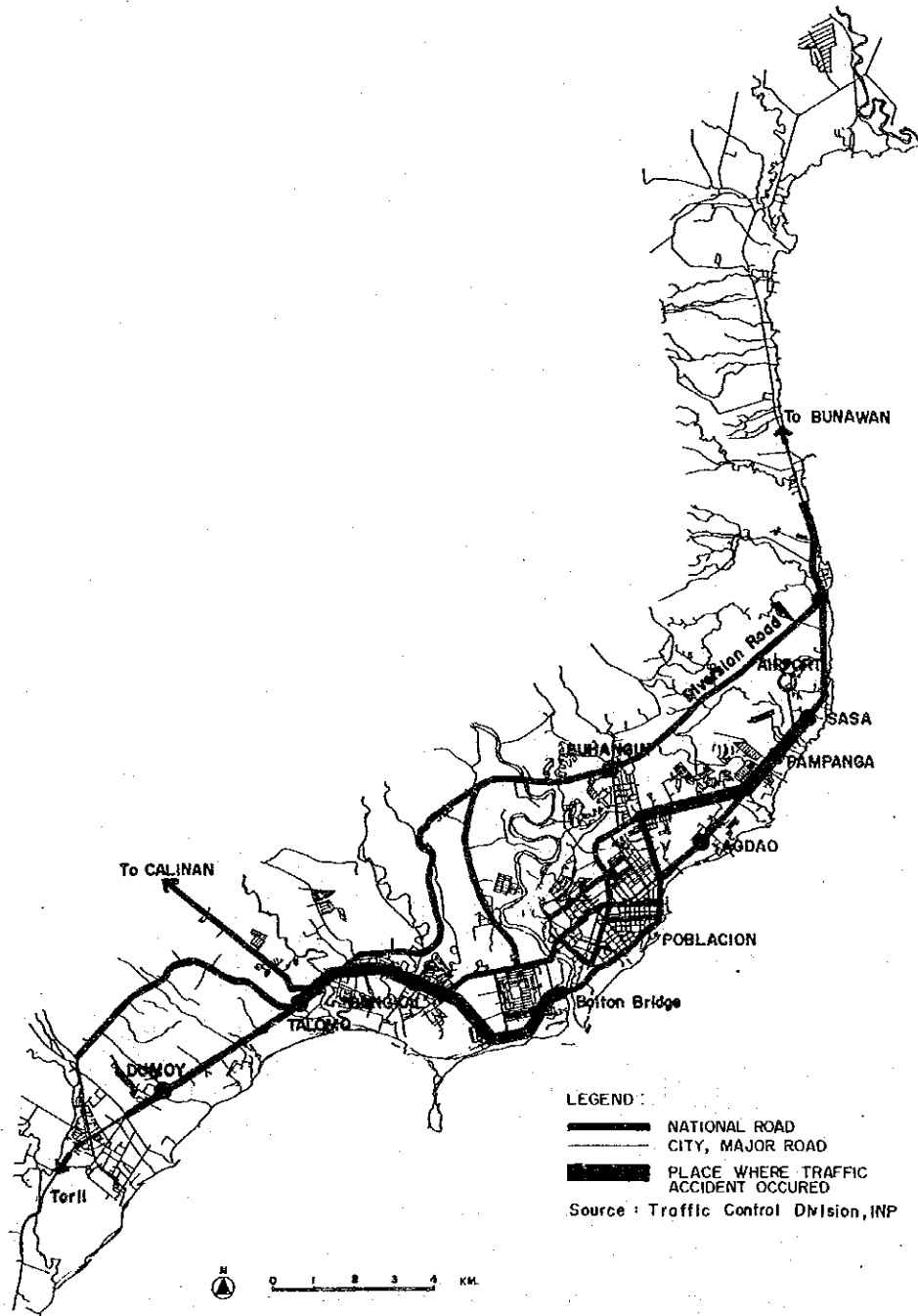
Source : Traffic Control Division, INP

**Figure 8.7** Number of Traffic Accidents in Davao City

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**Figure 8.8** Traffic Accident Map

(2) Poblacion

Traffic accidents concentrated in Poblacion are noted to have been distributed primarily to its south-western part (downtown area in the vicinity of the City Hall) and secondarily to the Magsaysay Avenue/Agdao market area of its north-eastern part.

Also, the concentration of traffic accidents was conspicuous at intersections. Whereas accidents concentrated to areas along national highways in 1977, they spreaded out to areas along almost all of access roads in the downtown around the City Hall in 1978.

Another phenomenon observed through the 1977/1978 comparison was, in the case of pairs of roads running in parallel, the concentration of accidents shifted from one of each such pair to the other of the pair.

	<u>Number of Traffic Accidents</u>	
	<u>1977</u>	<u>1978</u>
C.M. Recto Avenue	More	Less
F. Bangoy Street	Less	More
San Pedro Street	More	Less
A. Pichon Street	Less	More

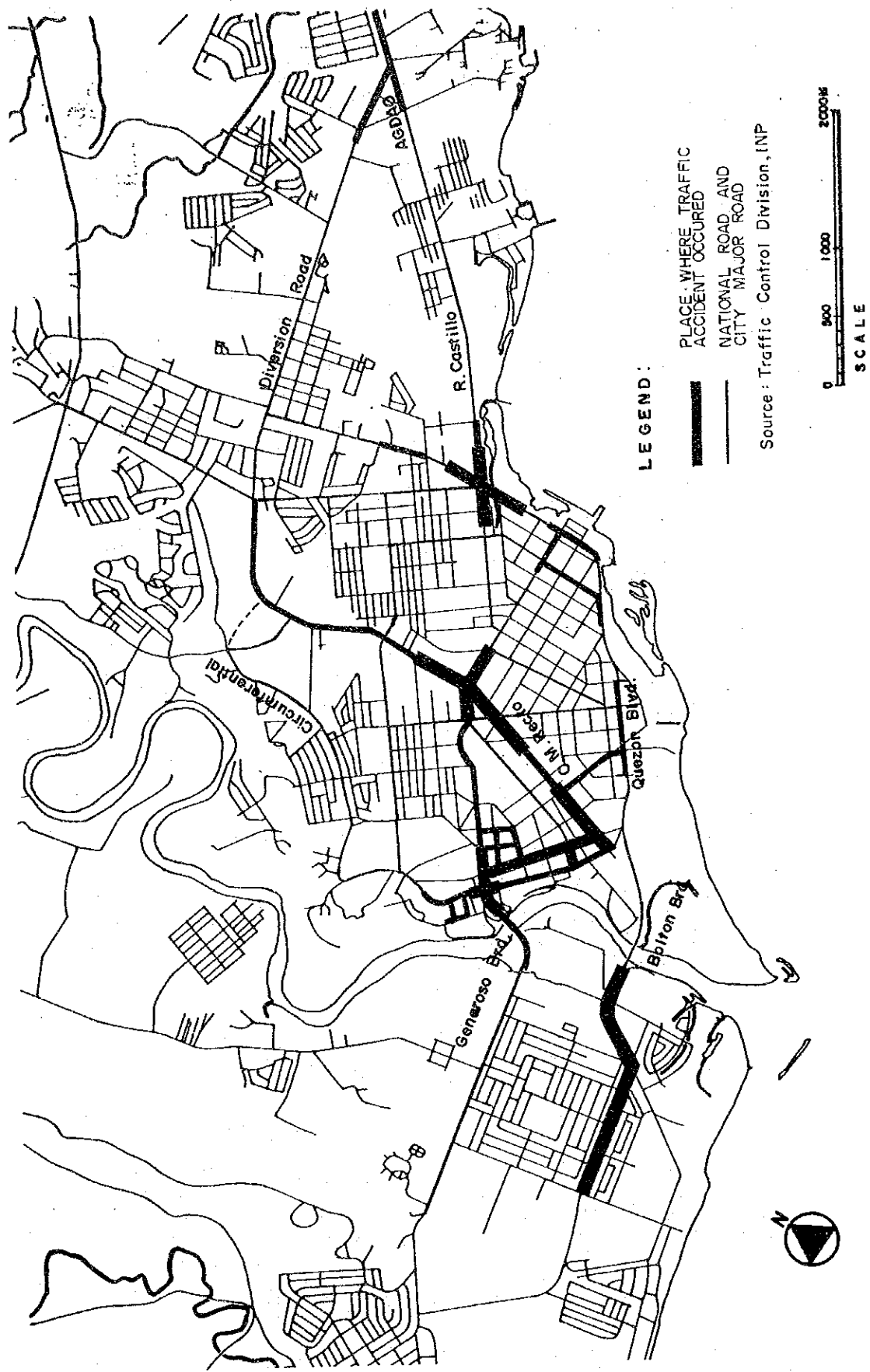


Figure 8.9 Poblacion Traffic Accident Map (1977)

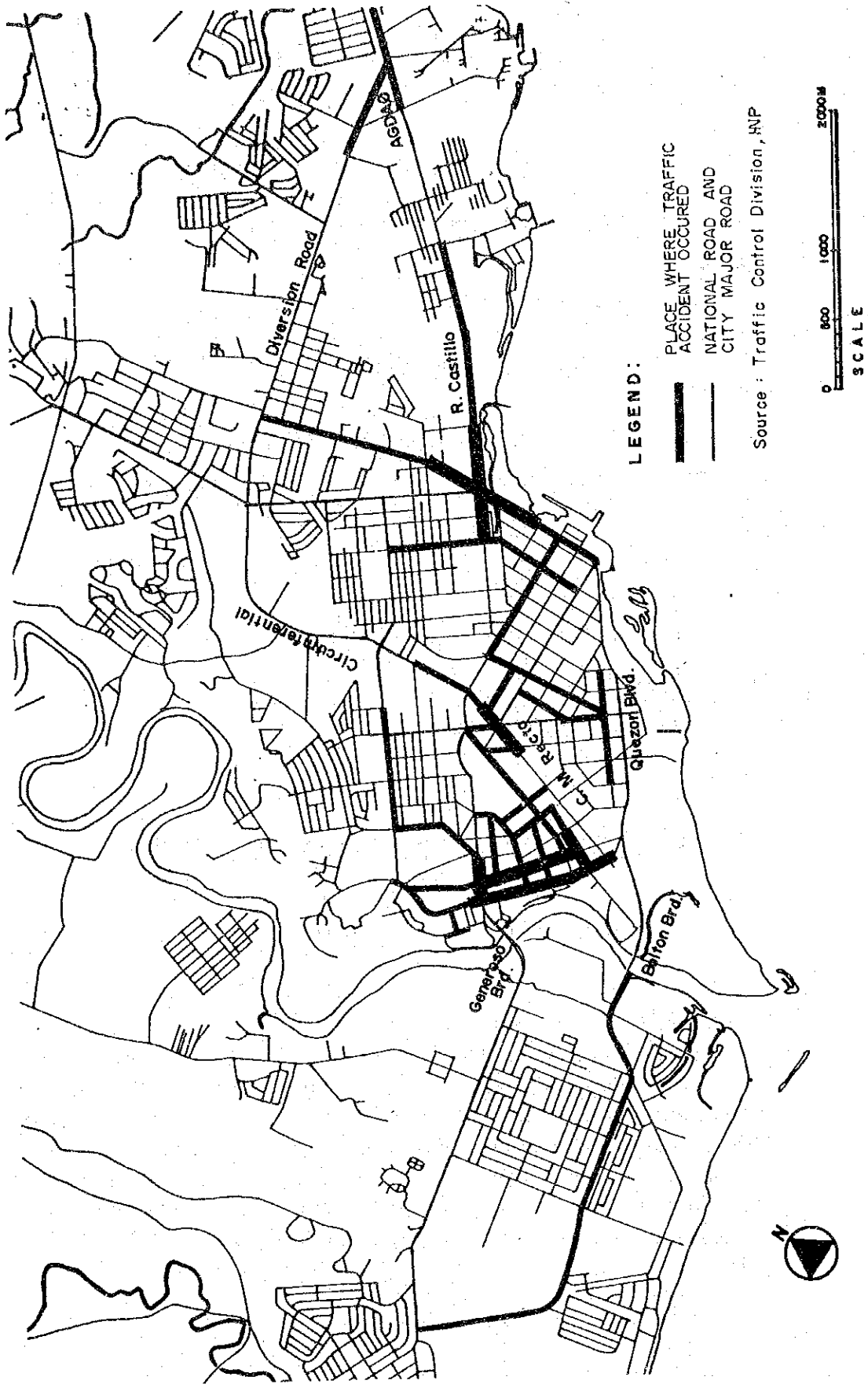


Figure 8.10 Poblacion Traffic Accident Map (1978)

### 8.7.3 Types of the Traffic Accidents

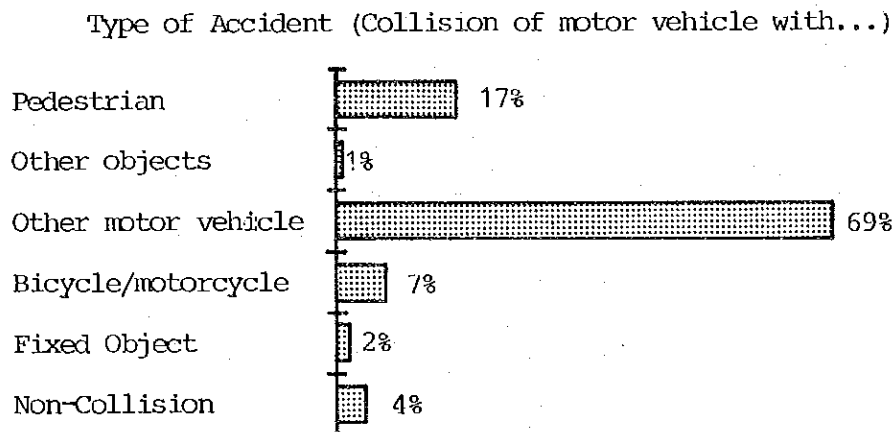
Traffic accidents are type-classified below based on the Davao City Weekly Accidents reports (for 6 months) and 827 Accident Records

#### (1) Casualties

During this 6-month period, a total of 32 people were killed in these traffic accidents (for monthly average of 5.3) and a total of 826 were injured (monthly average of 138 ) for a total of 858 casualties.

#### (2) Collisions

A total of 1,343 accidents (69% of all accidents) were collision between automobiles, 344 (17%) were collision wherein the automobile hit a person or persons, and 134 (7%) were collision between the automobile and the motor-cycle/bicycle.



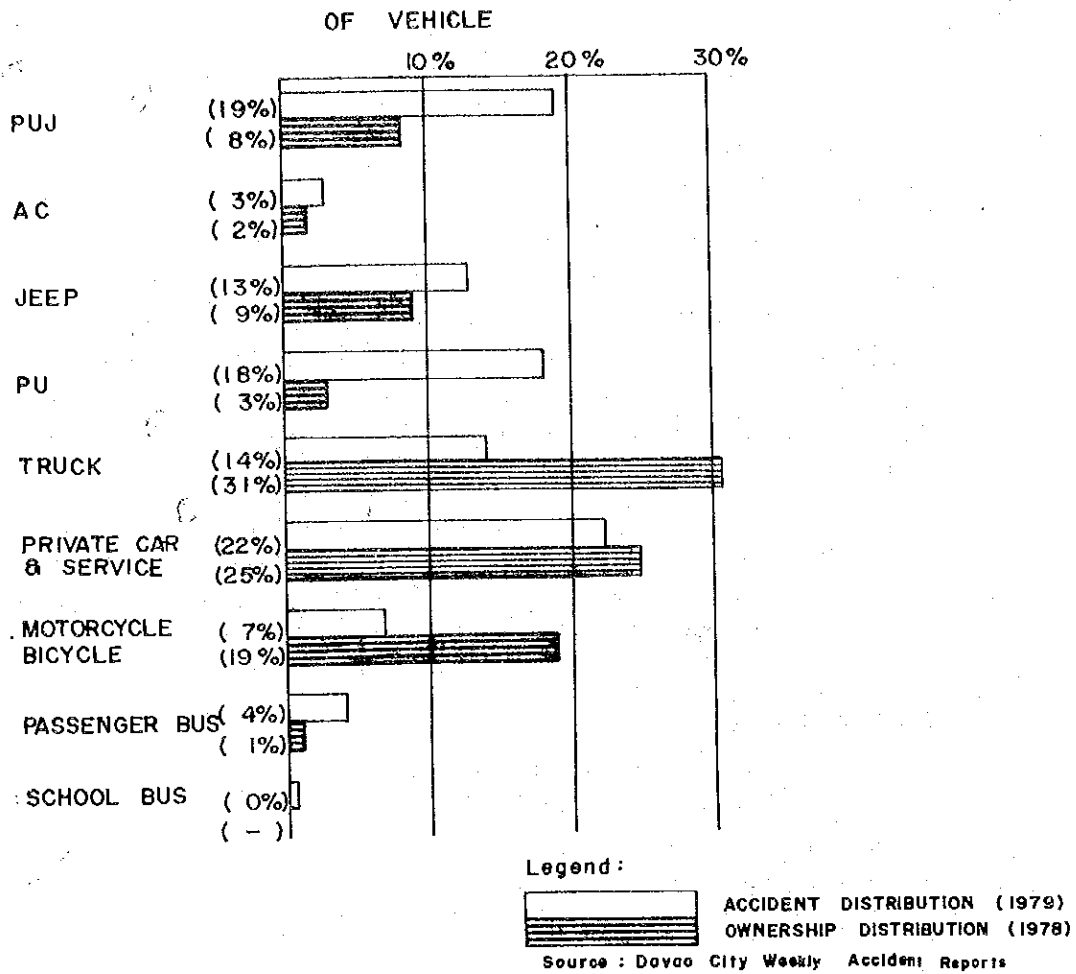
Source: Davao City Weekly Accident Reports

**Figure 8.11** Type of Accidents

#### (3) Vehicle Type

The breakdown by the types of vehicles which were the cause of traffic accident is as follows: 22% was private cars and service vehicles, 19% was PUJs, 18% was PU, 13% was jeeps, 14% was trucks, and 7% was motorcycles/bicycles. A comparison of this distribution against the distribution of vehicle ownerships in 1978 by the types of vehicle (BLT data) indicates that the rate of accidents is high among PUs and low among trucks and motorcycles/bicycles and, further, that such rate is generally higher among public utility vehicles than among private vehicles.





**Figure 8.12 Accident and Ownership Distribution by Kind of Vehicle**

(4) Fluctuation by the Day of the Week

It appears that accidents were somewhat more frequent on weekdays than on weekends (and holidays), although no definite trend could be established for each day of the week.

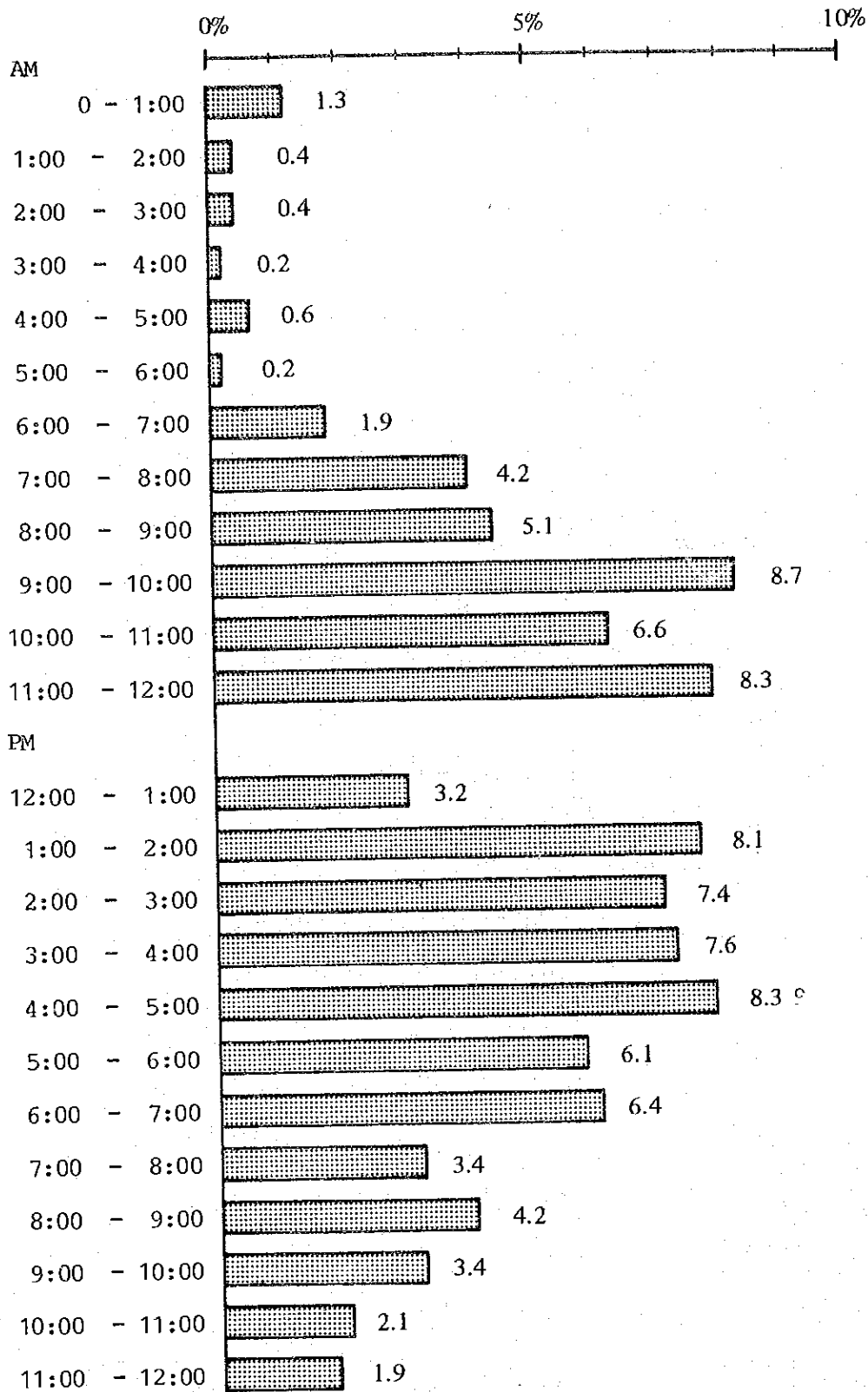
(5) Hourly Fluctuation

The maximum accident hour was from 9:00 to 10:00 A.M., followed by 11:00 to 12:00 A.M. and 4:00 to 5:00 P.M. Plotted into a graph, the accident curve starts rising rapidly from after 7:00 A.M., reaches the peak in 9:00 to 10:00 A.M., declines to about 34% of the peak level in 12:00 A.M. to 1:00 P.M., rises sharply again and remains at 85% to 95% level of the peak during the hours of the 1:00 P.M. to 5:00 P.M. the incidence drops to only about 1/3 of the peak hour level in 5:00 P.M. to 7:00 P.M., and finally steadily continue to dwindle after 8:00 P.M.

This fluctuation pattern is believed to directly reflect the level of the citizens' daily activities of commuting, going to school, shopping, amusement, and so forth. Also it is interesting that the number of accidents in the lunch hour, noon to 1:00 P.M. is only one-third of that in the peak hour.

(6) Road Structure

Traffic accidents are usually deeply related to the road structure (curvature, sight distance, horizontal and vertical alignments, and so forth). However, because the entire urban area of Davao City occurs on a flat land and the road network contains few curved sections, correlation between traffic accidents and the structure of roads in Davao City may not be determined based on available data.



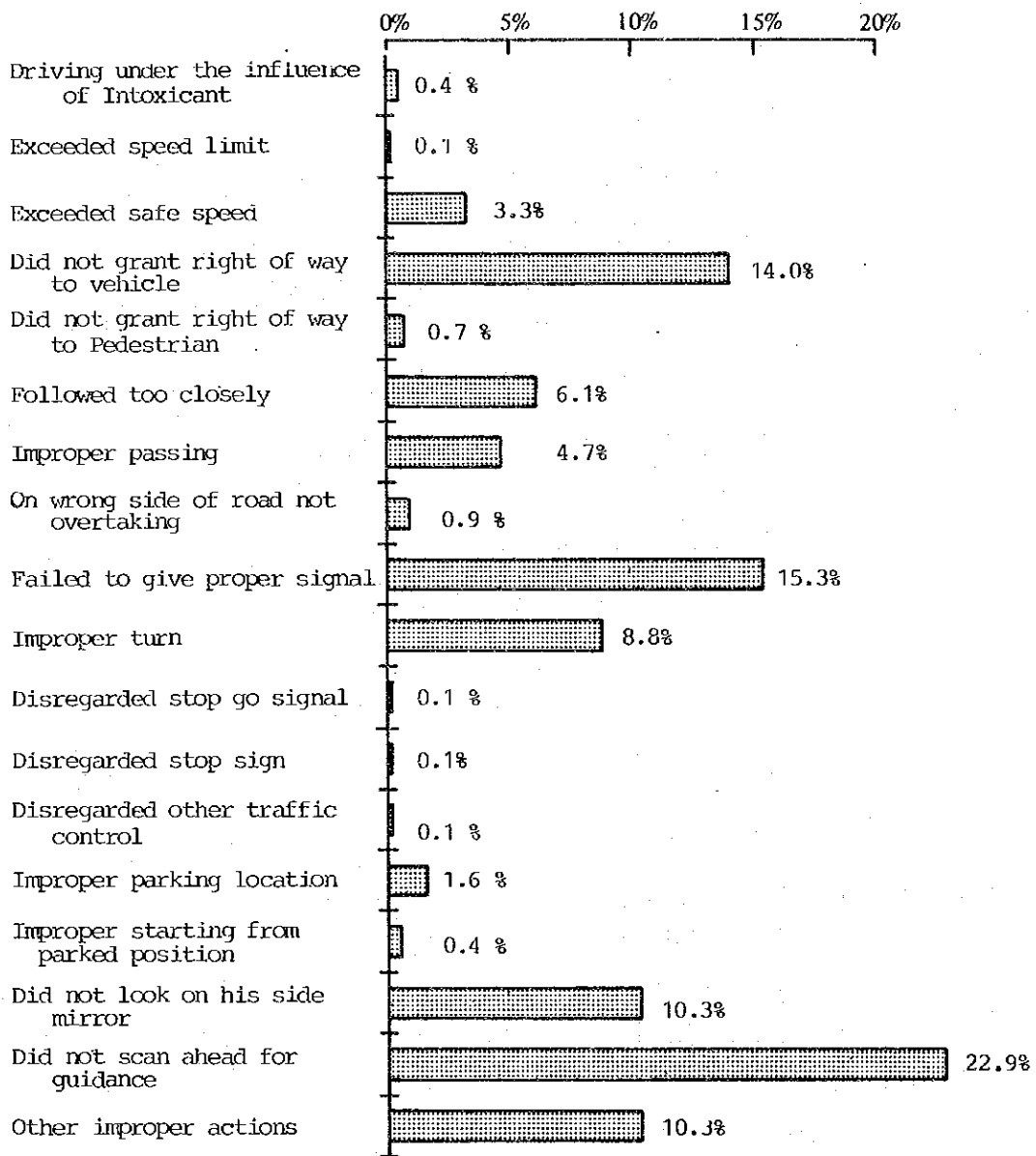
Source: Davao City Weekly Accident Reports

**Figure 8.13** Hourly Fluctuation of Traffic Accidents

(7) Driver's Condition

Vehicle drivers are required to observe 18 different practices. Of the 18, the failure to observe the following 5 are believed responsible for or contributory to the occurrence of traffic accidents (and these failures represent about 70% of total driver violations):

- Failure to watch ahead
- Failure to give proper direction signal
- Failure to yield right of way
- Failure to watch side mirrors
- Improper turn



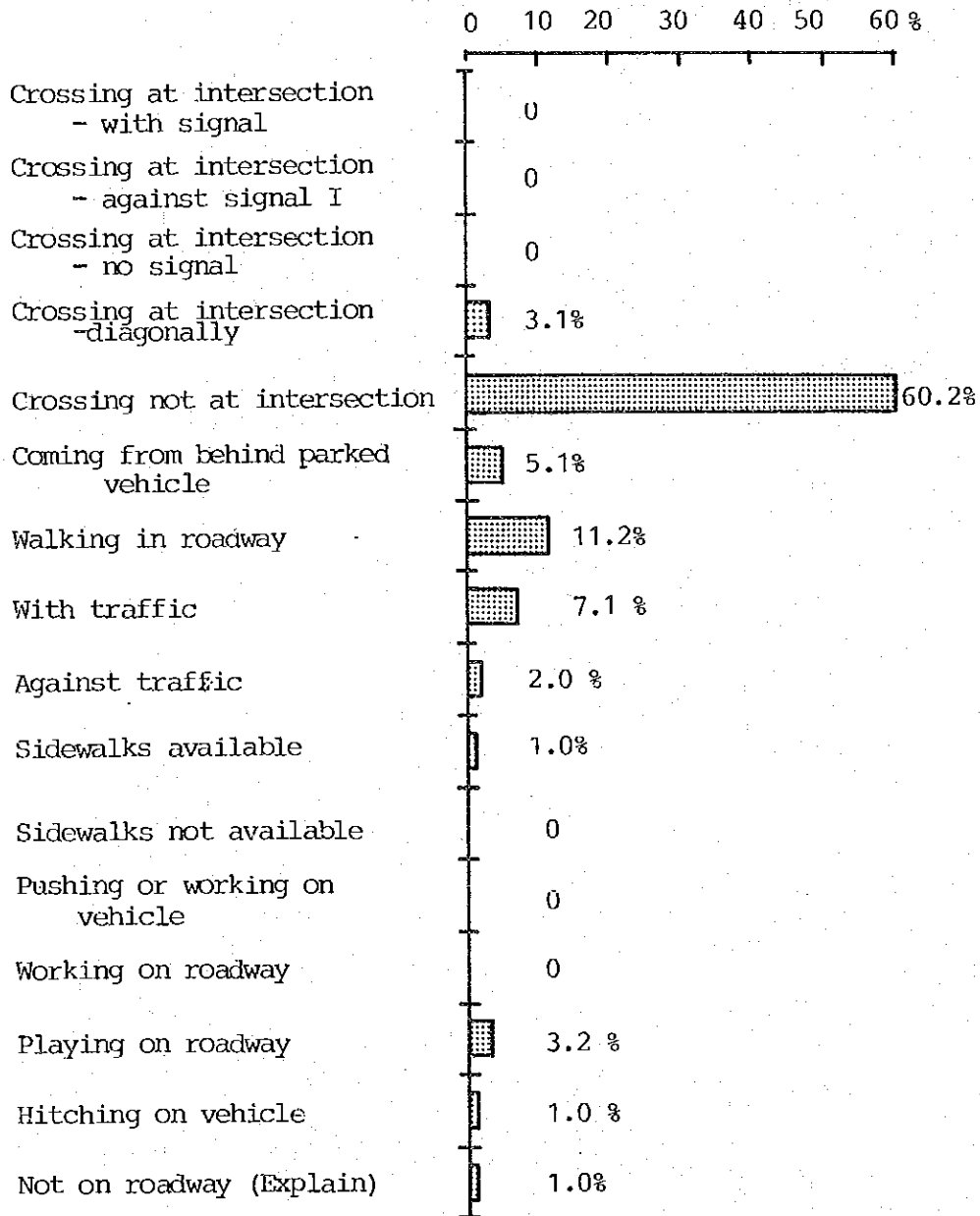
Source: Davao City Weekly Accident Reports

Figure 8.14 Driver Violations

(8) Pedestrian

What pedestrians were doing at the time they were involved in a traffic accident can be classified chiefly into the 16 practices listed below. Of the 16, the following 4 represent about 90% of all such cases:

- Crossing by crosswalk
- Walking in roadway
- Walking with motor traffic
- Dashing out from behind a parked vehicle



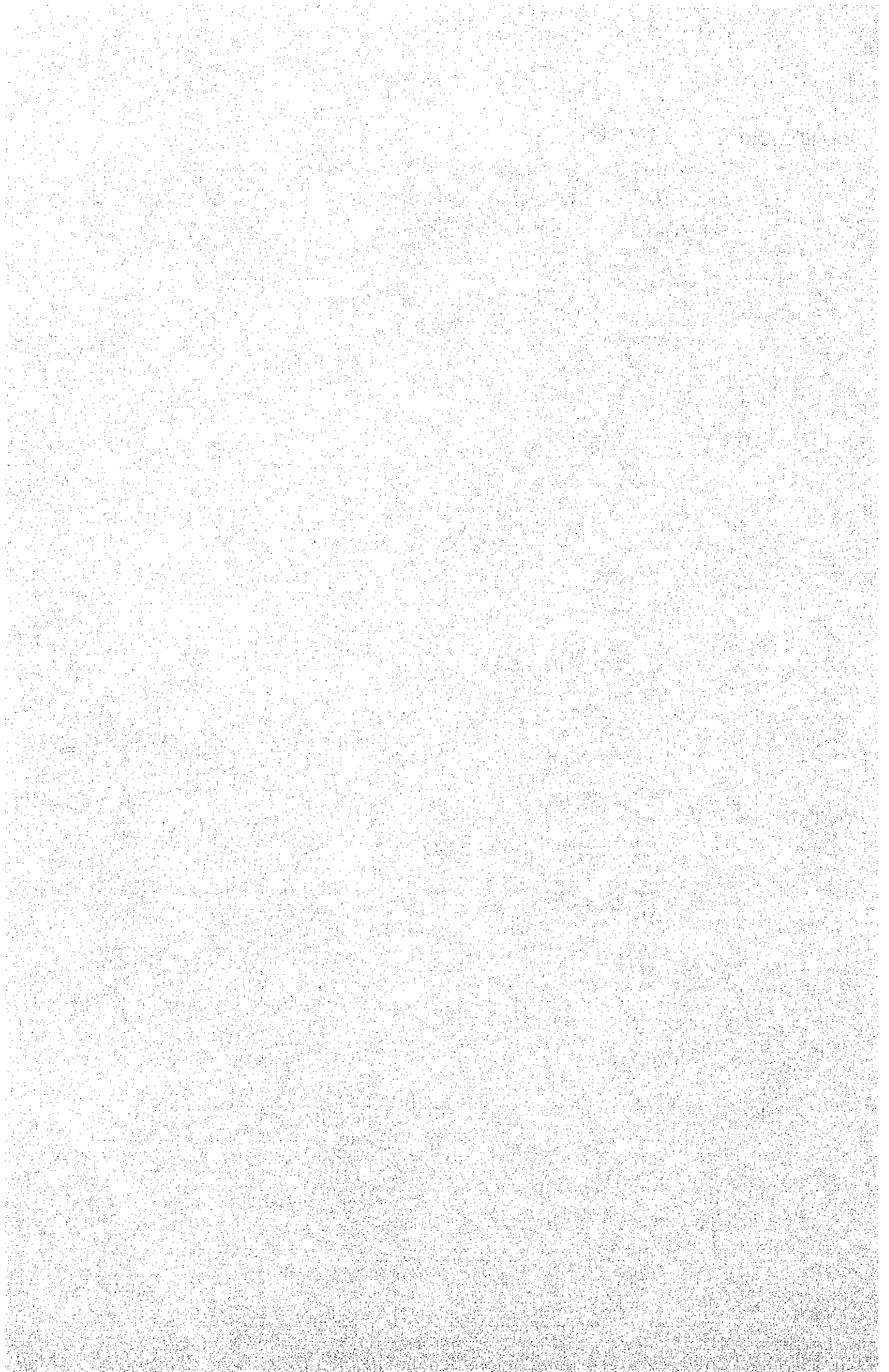
Source: Davao City Weekly Accident Reports

**Figure 8.15 What the Pedestrian was Doing**



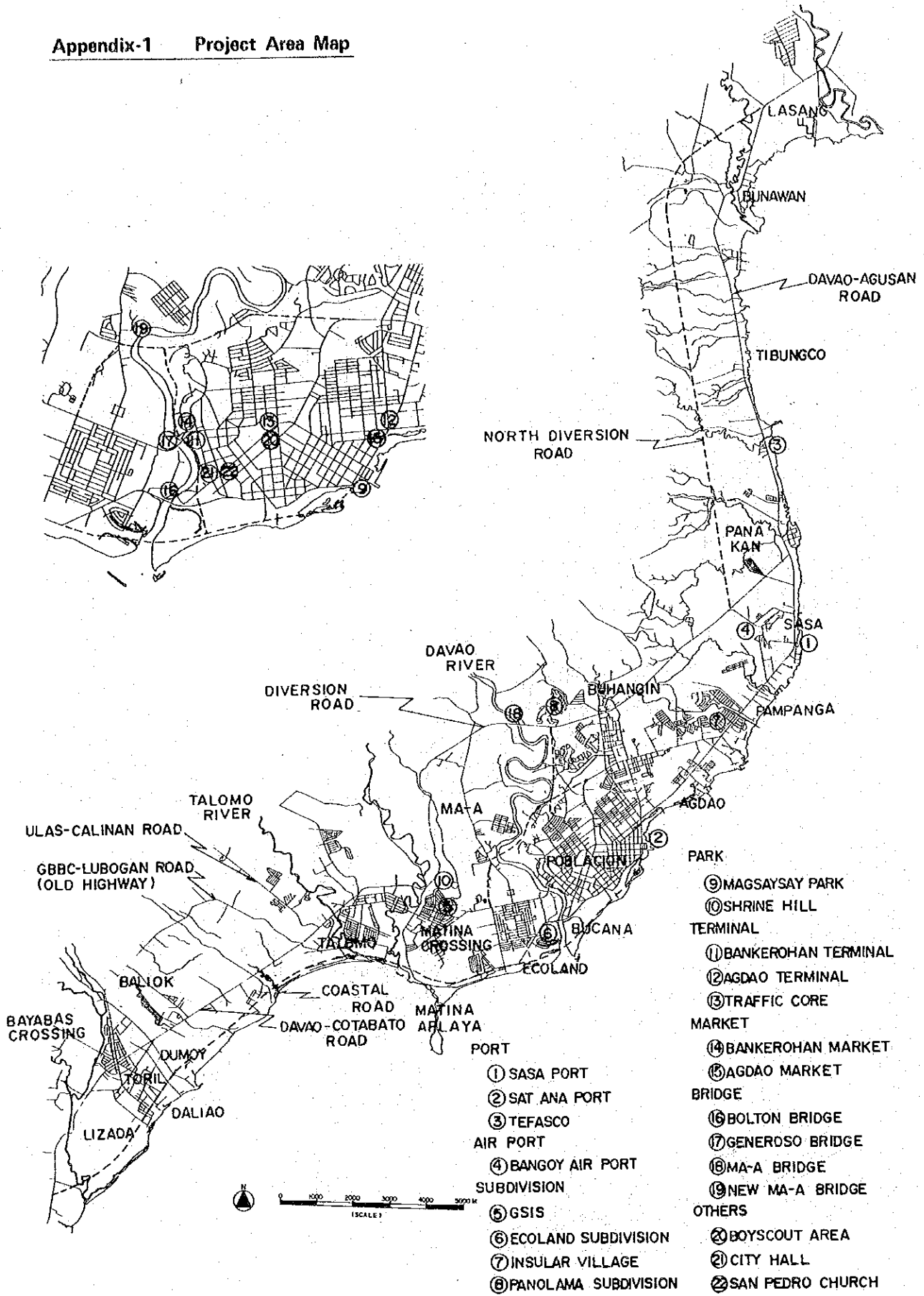
**APPENDICES**

Appendix—1	Project Area Map .....	249
Appendix—2	Road/Street Map in Poblacion .....	250
Appendix—3	Acronyms and Abbreviations .....	251

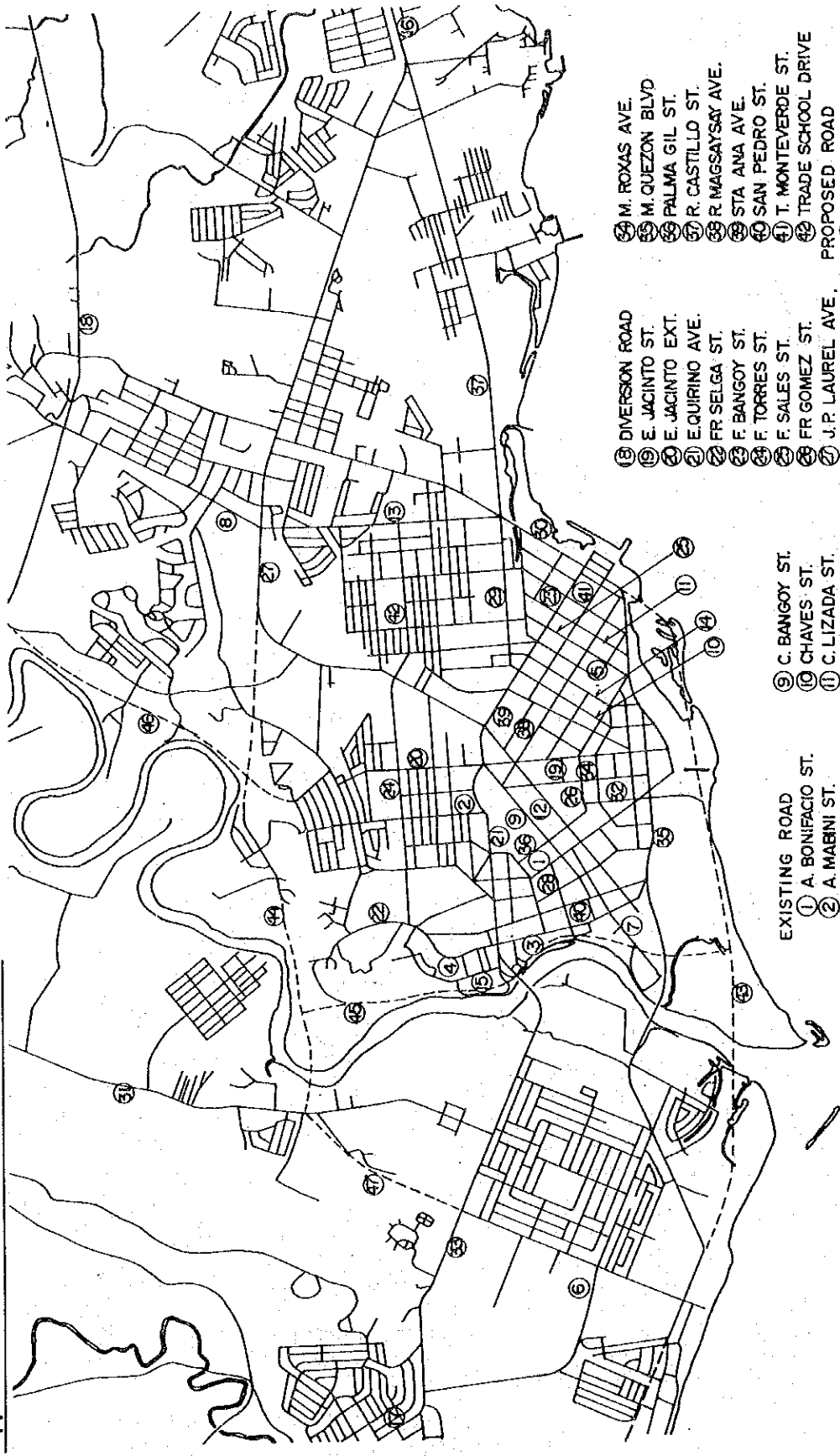




**Appendix-1 Project Area Map**



Appendix-2 Road/Street Map in Poblacion



- EXISTING ROAD
- 1 A. BONIFACIO ST.
  - 2 A. MABINI ST.
  - 3 A. PICHON ST.
  - 4 A. PICHON EXT.
  - 5 B. GEMPESAW ST.
  - 6 BOLTON DIVERSION ROAD
  - 7 BOLTON ST.
  - 8 BUHANGIN ROAD
  - 9 C. BANGGOY ST.
  - 10 CHAVES ST.
  - 11 C. LIZADA ST.
  - 12 C.M. RECTO AVE.
  - 13 DACUDAO AVE.
  - 14 D. SUAZO ST.
  - 15 DATU BAGO ST.
  - 16 DAVAO-AGUSAN ROAD
  - 17 DAVAO-COTABATO ROAD
  - 18 DIVERSION ROAD
  - 19 E. JACINTO ST.
  - 20 E. JACINTO EXT.
  - 21 E. QUIRINO AVE.
  - 22 FR SELGA ST.
  - 23 F. BANGGOY ST.
  - 24 F. TORRES ST.
  - 25 F. SALES ST.
  - 26 FR GOMEZ ST.
  - 27 J.P. LAUREL AVE.
  - 28 J. RIZAL ST.
  - 29 LAPU-LAPU ST.
  - 30 L. GARCIA ST.
  - 31 MA-A ROAD
  - 32 MABINI EXT.
  - 33 McARTHUR HIGHWAY
  - 34 M. ROXAS AVE.
  - 35 M. QUEZON BLVD
  - 36 PALMA GIL ST.
  - 37 R. CASTILLO ST.
  - 38 R. MAGSAYSAY AVE.
  - 39 STA ANA AVE.
  - 40 SAN PEDRO ST.
  - 41 T. MONTEVERDE ST.
  - 42 TRADE SCHOOL DRIVE
  - 43 COASTAL ROAD
  - 44 J.P. LAUREL EXT.
  - 45 RIVERSIDE ROAD
  - 46 ROLLING HILLS ROAD
  - 47 NEW MA-A ROAD

### Appendix-3 Acronyms and Abbreviations

<b>A</b>	<b>AC;</b>	<b>Auto Calesa</b>
<b>B</b>	<b>BCR;</b>	<b>Benefit/Cost Ratio</b>
	<b>BLT;</b>	<b>Bureau of Land Transportation</b>
	<b>BOT;</b>	<b>Board of Transportation</b>
<b>C</b>	<b>CBD;</b>	<b>Central Business District</b>
	<b>CHPG;</b>	<b>Constabulary Highway Patrol Group</b>
<b>D</b>	<b>DCTTMC;</b>	<b>Davao City Transport and Traffic Management Council</b>
	<b>DCUTCLUS;</b>	<b>Davao City Urban Transport Cum Land Use Study</b>
<b>E</b>	<b>EMK System;</b>	<b>Equivalent Maintenance Kilometer System</b>
<b>G</b>	<b>GDP;</b>	<b>Gross Domestic Products</b>
	<b>GNP;</b>	<b>Gross National Products</b>
	<b>GRDP;</b>	<b>Gross Regional Domestic Products</b>
<b>I</b>	<b>IBRD;</b>	<b>International Bank for Reconstruction and Development</b>
	<b>IRR;</b>	<b>Internal Rate of Return</b>
	<b>INP;</b>	<b>Integrated National Police</b>
<b>J</b>	<b>JICA;</b>	<b>Japan International Cooperation Agency</b>
<b>L</b>	<b>LRT;</b>	<b>Light Railway Transit</b>
<b>M</b>	<b>MHS;</b>	<b>Ministry of Human Settlement</b>
	<b>MPH;</b>	<b>Ministry of Public Highways</b>
	<b>MPWH;</b>	<b>Ministry of Public Works and Highways</b>
	<b>MOTC;</b>	<b>Ministry of Transportation and Communication</b>
	<b>MND;</b>	<b>Ministry of National Defense</b>

<b>N</b>	<b>NCSO;</b>	<b>National Census and Statistics Office</b>
	<b>NEDA;</b>	<b>National Economic and Development Authority</b>
	<b>NPV;</b>	<b>Net Present Value</b>
	<b>NTSS;</b>	<b>National Transportation System's Study</b>
<b>P</b>	<b>PCU;</b>	<b>Passenger Car Units</b>
	<b>PUJ;</b>	<b>Public Utility Jeepney</b>
	<b>PPA;</b>	<b>Philippine Ports Authority</b>
	<b>PUV;</b>	<b>Public Utility Vehicle</b>
	<b>PPDO;</b>	<b>Planning and Project Development Office</b>
	<b>PNR;</b>	<b>Philippine National Railways</b>
	<b>PU;</b>	<b>Public Utility</b>
<b>R</b>	<b>RCDP;</b>	<b>Regional Cities Development Project</b>
<b>S</b>	<b>SIR;</b>	<b>Slum Improvement and Resettlement Office</b>
	<b>SPDA;</b>	<b>Southern Philippines Development Authority</b>
<b>T</b>	<b>TTC;</b>	<b>Traffic Training Center</b>







JICA

