

## 6.6 Specific Characteristics of Travel Modes

### 6.6.1 Trip Purposes and Modes

#### (1) Modal Compositions by Purpose

The composition of travel modes for each trip purpose, graphically presented in Figure 6.21, is in summary as follows:

**To Office** : PUJ, with a high 35% composition ratio, is the important means of worker commutation. PUJ is followed by walking (21%) and car (12%).

**To School** : Walking, which shows a high composition ratio of 50%, is followed by PUJ (25%). These two modes represent over three-quarters of all trips to school.

**Business** : The composition ratios of car and truck are higher than for other purposes and are as high as the ratio of PUJ for this purpose. The characteristic of business trips is that they have the lowest reliance on walking of all trip purposes.

**Shopping** : PUJ shows a high composition ratio (36%) as in the case of "to office" trips, showing that PUJs are important means of transportation for going to shopping. Except for walking, another important role is played by AC.

**Private** : Of all private trips, 50% are by walking. PUJs are little used for private trips.

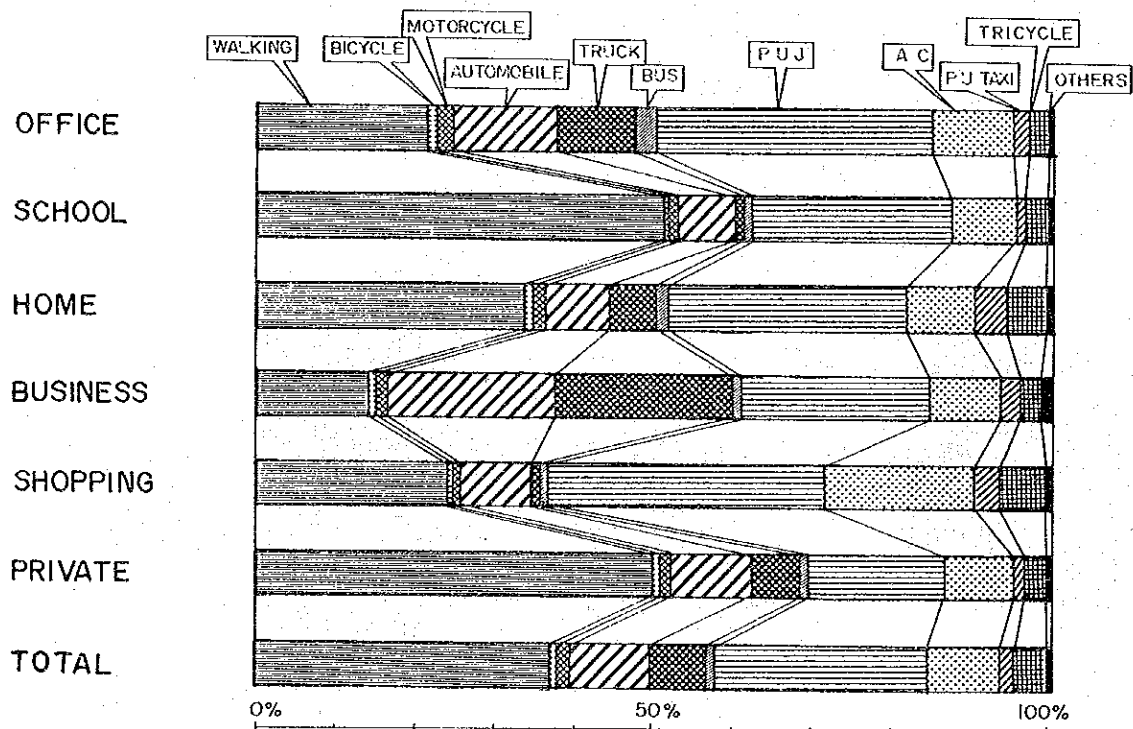
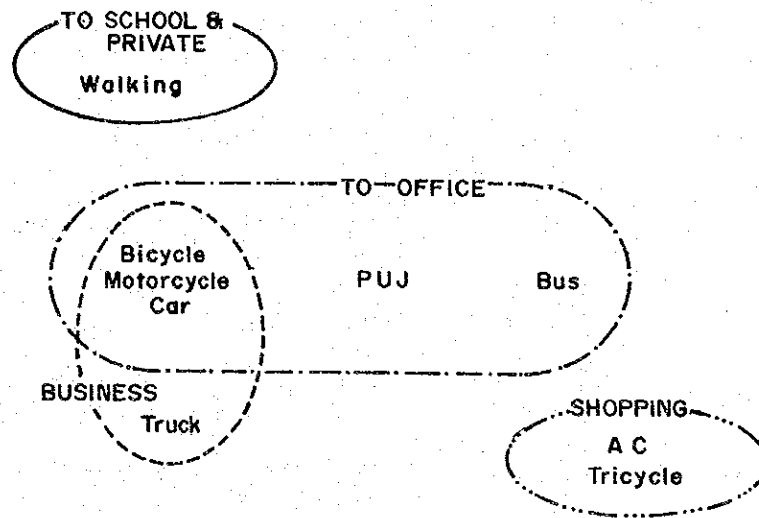


Figure 6.21 Modal Composition by Purpose

(2) Trip Purpose Compositions by Travel Mode

Aside from the common denominator that two trip purposes, namely, to home and private, represent high composition ratios with regard to every mode of travel, each mode shows a different characteristic purpose composition pattern. Focusing on purposes of trip performed with a mode which show a higher rate than the rate of trips made with all modes for the same purpose, a purpose mode pattern diagram is drawn below.

In the case of public utility vehicles (Bus, PUJ, AC, and tricycle), the composition ratio of to office is 12.8%, to school is 15.4% and to home is 39.6% Trips for these three particular purposes are concentrated in peak hours and represent about two-thirds of the total PUV trips. In other words, as much as one-third of total PUV trips are made during the long off-peak hours – a reason for the difficulty of PUV operation business.



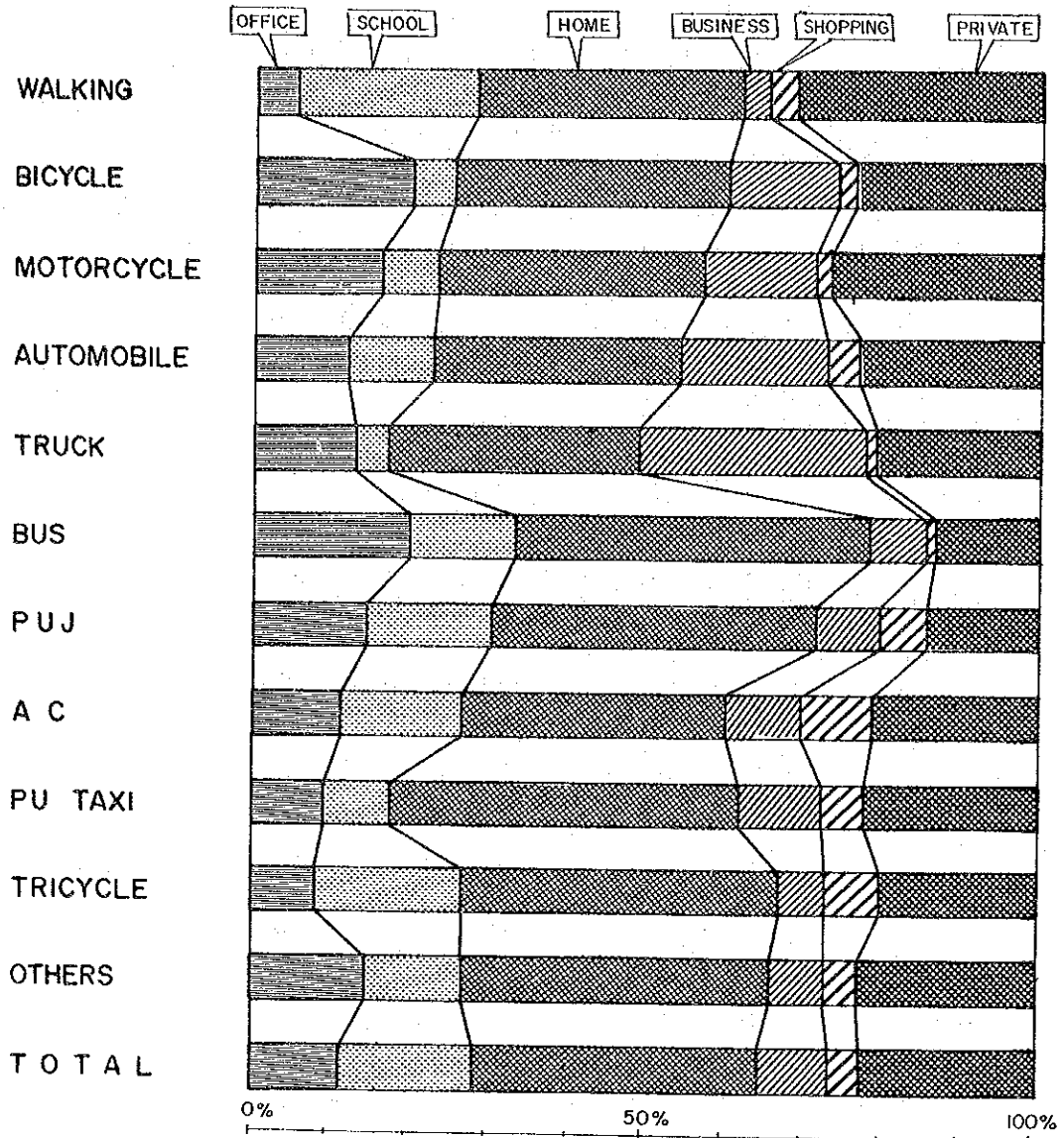


Figure 6.22 Trip Purpose Composition by Mode

## 6.6.2 Personal Attributes and Travel Modes

Personal attributes fairly reflect the preferences of modes of travel. The most used of all modes by working people, regardless of the industrial sector, is PUJ, which is the fundamental means of transportation in the survey area of Davao City, but those modal preference is characterized by a relatively high utilization of cars and trucks. Highly utilized is trucks by those engaged in secondary industry and cars by those in tertiary industry. Tertiary workers utilize ACs at a higher rate than primary and secondary workers, and this is because commercial activities are concentrated in Poblacion, which is the service area of ACs.

The basic mode of travel of school children and students is walking, and particularly so in the case of the former, who show 76% dependency on foot. Students often use PUVs, such as PUJs, ACs, and tricycles. This difference between school children and students is readily explained by difference in distance to their schools. Housewives and the jobless are characterized by their high rates of utilization of PUVs and PU Taxis.

A scrutiny of personal attribute composition of the passengers of each mode of travel, from the opposite viewpoint, indicates that those who utilize PUJs, ACs, and other PUVs are about 50% those at work and about 50% those not at work (school children, students, housewives, and the jobless). Those at work represent 60 to 70% each of the passengers of cars and trucks – so called private transportation mode. The fact that about one-half of those who utilize PUVs are those who have limited abilities to pay suggests the level of fare is important to PUV planning.

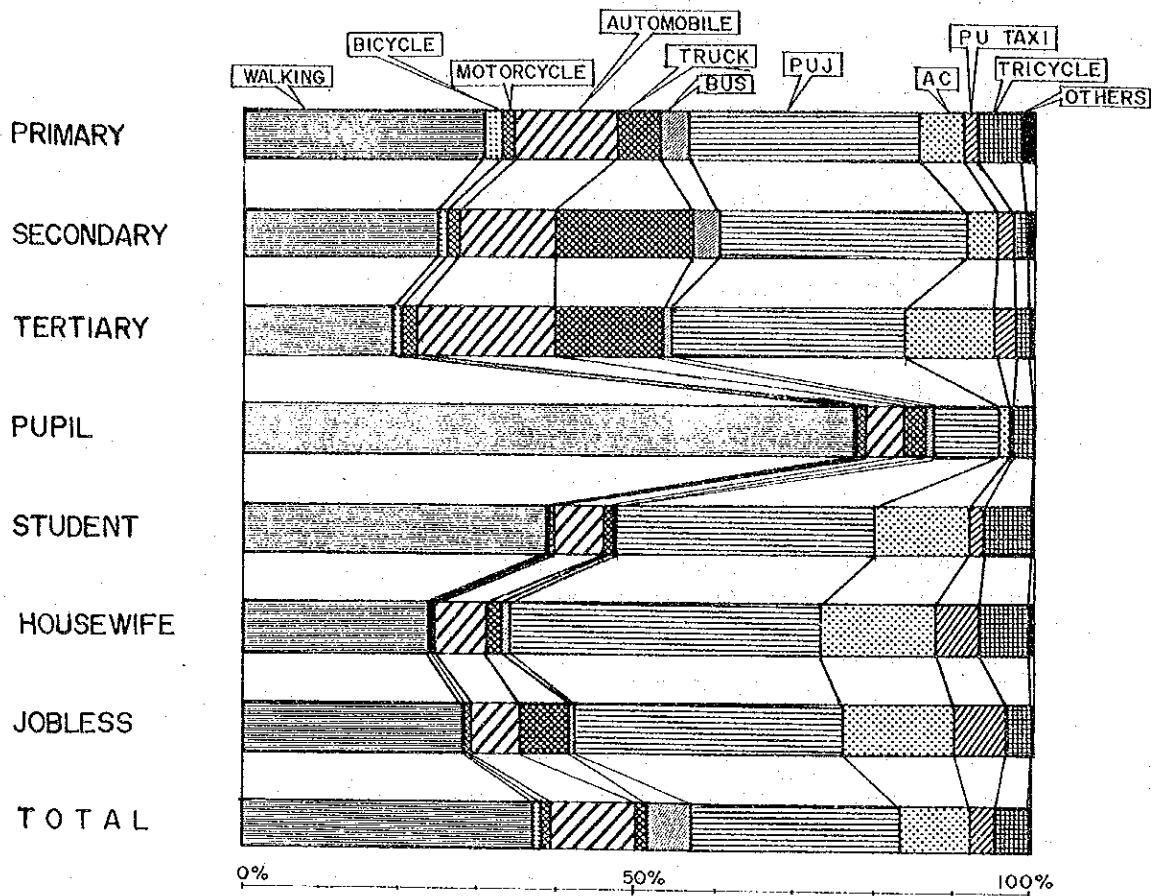


Figure 6.23 Modal Preference by People of Various Attributes

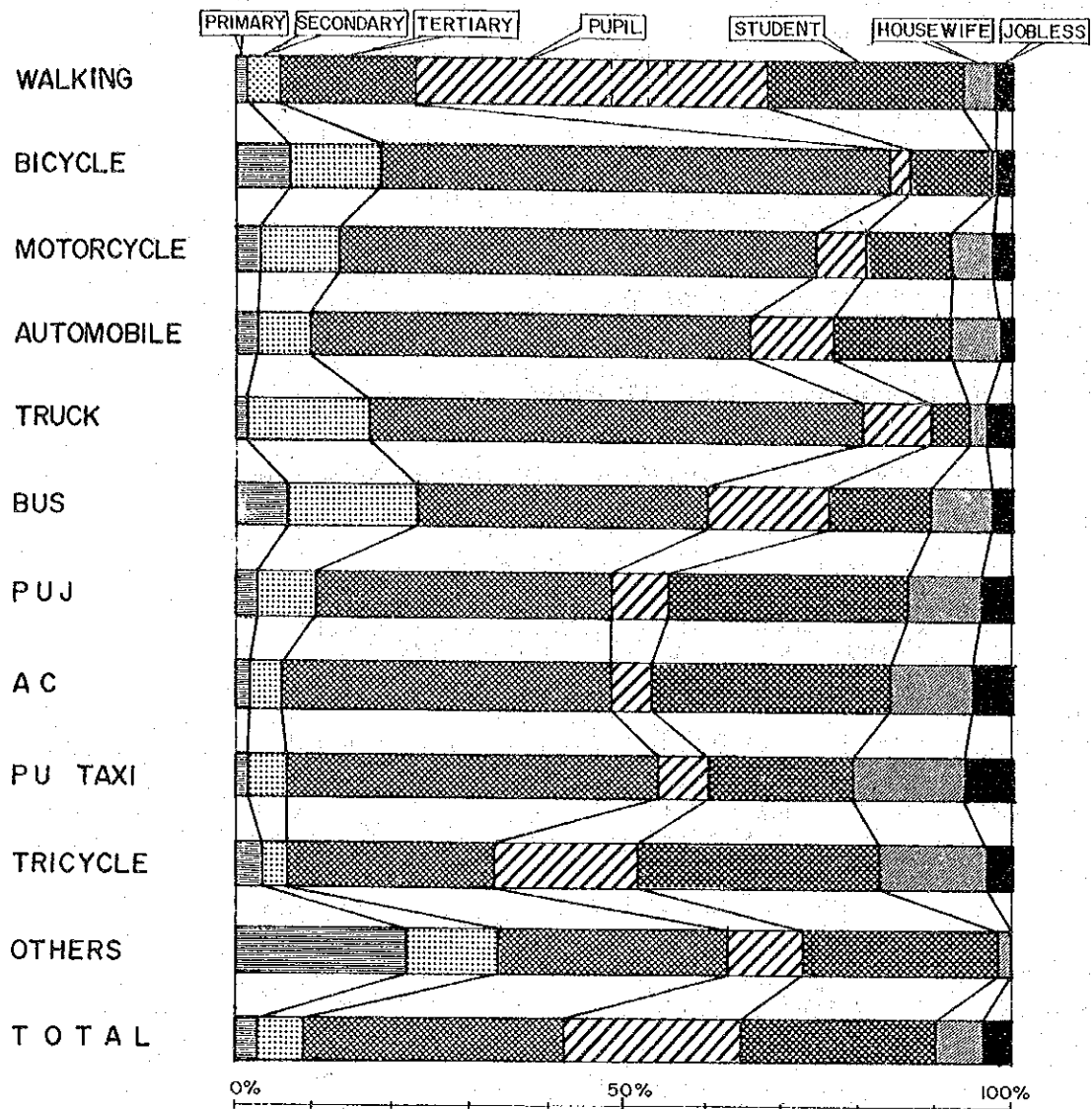


Figure 6.24 Person Trips Distribution by Personal Attribute

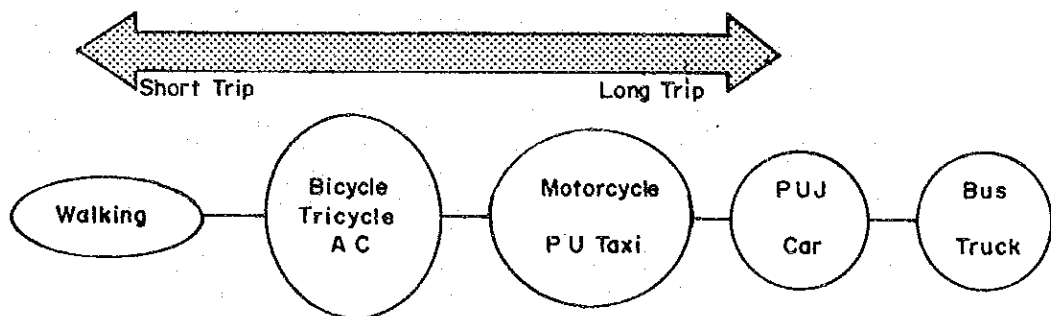
### 6.6.3 Trip Length and Travel Modes

The modal split structure of inter-zonal trips are seen as the function of trip length in Figure 6.25.

The modes of travel can be classified into the following four characteristics in relation to trip length:

- (1) Modes for short trips (walking, etc.)
- (2) PUVs for relatively short trips (AC, tricycle)
- (3) PUVs for relatively long trips (PUJ, bus)
- (4) Private means of transportation for relatively long trips (car, trucks)

The mode group (1) above has a high share in two kilometers or shorter trips, the group (2) in trips of one to five kilometers, and the groups (3) and (4) in trips over three kilometers. Group (3) modes and group (4) modes compete in a same trip length range. Based on the average length of trips in which each mode is used, these travel modes can be arranged into a pattern diagram such as one described below.



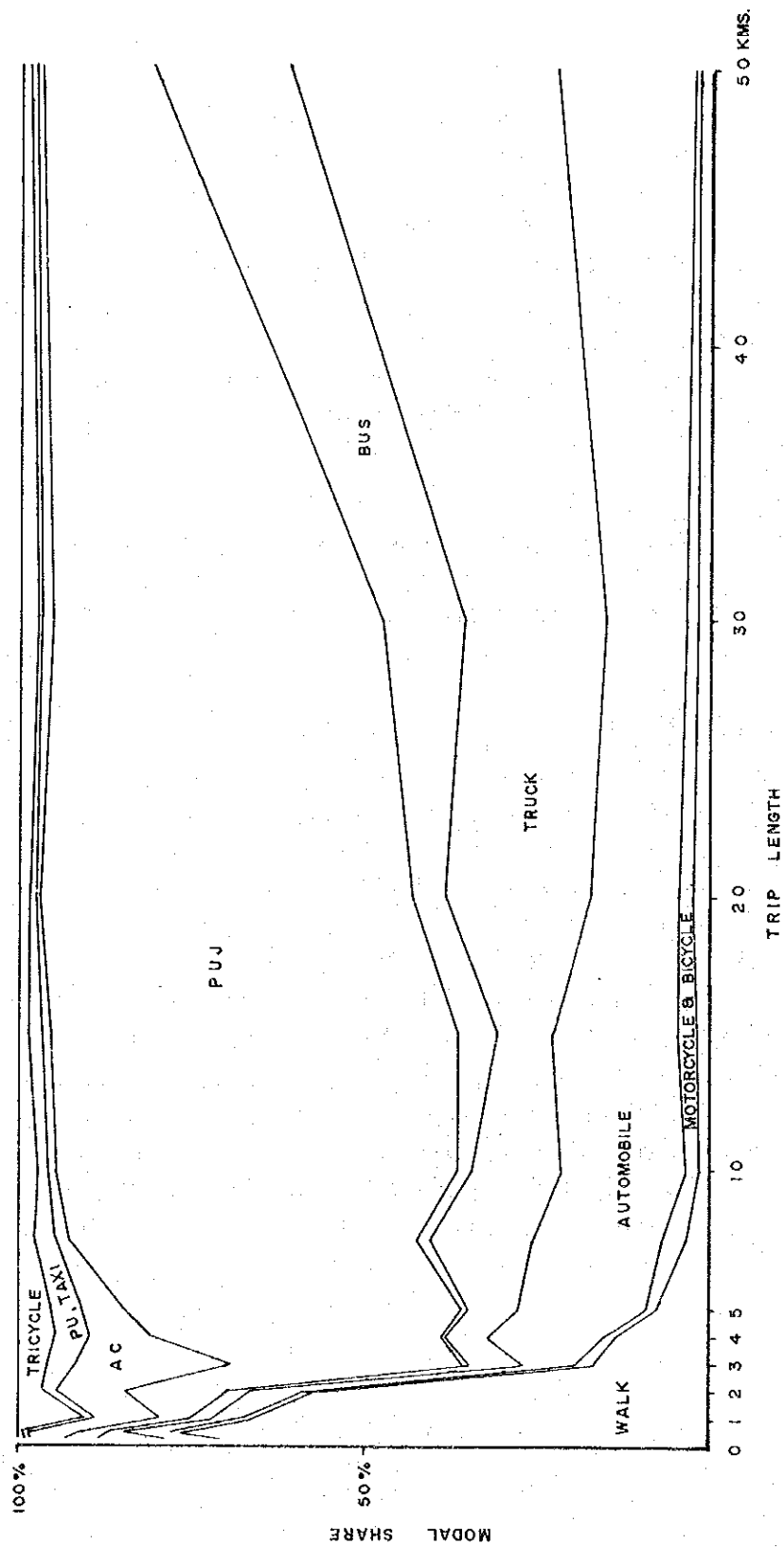


Figure 6.25 Modal Split Structure by Trip Length



## 6.7 Minor Travel Characteristics

### 6.7.1 Transfer

The less transfers are required, the greater flexibility (therefore better service, in terms of door-to-door convenience) is offered. Then, the degree of each travel mode's capability to flexibly conform to the peculiar needs of each passenger is inversely related to the number of transfers required. The modes of travel which require transfer are bus, PUJ, and AC, and other modes requires almost no transfer.

As it can be naturally expected from the property of the modes, those which require transfer, in the descending order, are: bus (27.9%), PUJ (13.1%), and AC (6.6%). In other words, such percentages of their passengers utilize some auxiliary (or sub) mode (s) in order to reach their destinations. The submode most often used in auxiliary to bus is PUJ (over 50%), followed by tricycle.

The modes which are highly used in auxiliary to PUJ trips are the PUJ itself, the tricycle, and the AC. AC is supplemented by tricycle in almost all cases. Of all, the mode most frequently used as auxiliary to any mode is the tricycle; 31% of unlinked tricycle trips are auxiliary. The next frequent is AC, whose 9.4% being auxiliary. Other modes show insignificant auxiliary rates, overall transfer rate is very small in the Survey Area.

### 6.7.2 Hourly Trip Variation

In addition to the morning and evening peak hours (when people go to work or school and when people go home) which are usually experienced in ordinary cities, another peak hour is observed in the Survey Area when people go home for lunch and come back to work or school after lunch. The peak hour traffic\* is 2.8 times the off-peak hour traffic\* in Metro Manila, whereas the peak hour traffic\* is as much as 3.6 times the off-peak hour traffic\* in the Survey Area. This fact tends to aggravate traffic congestion in the Survey Area in the peak hour while making Public Transportation business more difficult due to fewer passengers in the off-peak hour.

NOTE: \*The peak hour is the hour of the day in which traffic is the heaviest, and it is 7:00 to 8:00 in the morning in both the Survey Area of Davao City and Metro Manila. The off-peak hour is the hour of the day in which traffic is the lightest, and it is 9:00 to 10:00 in the morning in the Survey Area and 12:00 to 13:00 at lunch time in Metro Manila.

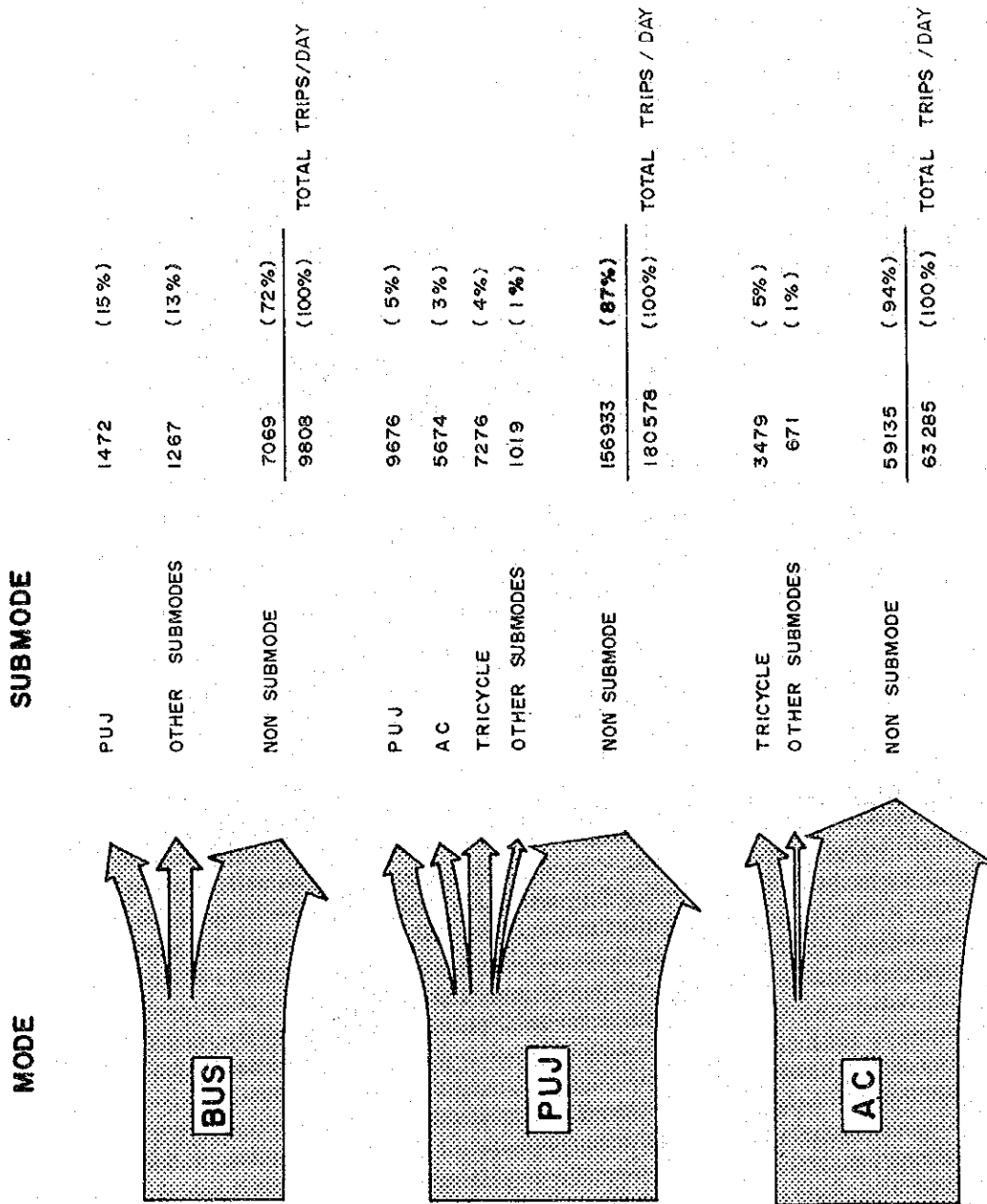


Figure 6.26 Transferring to Submode

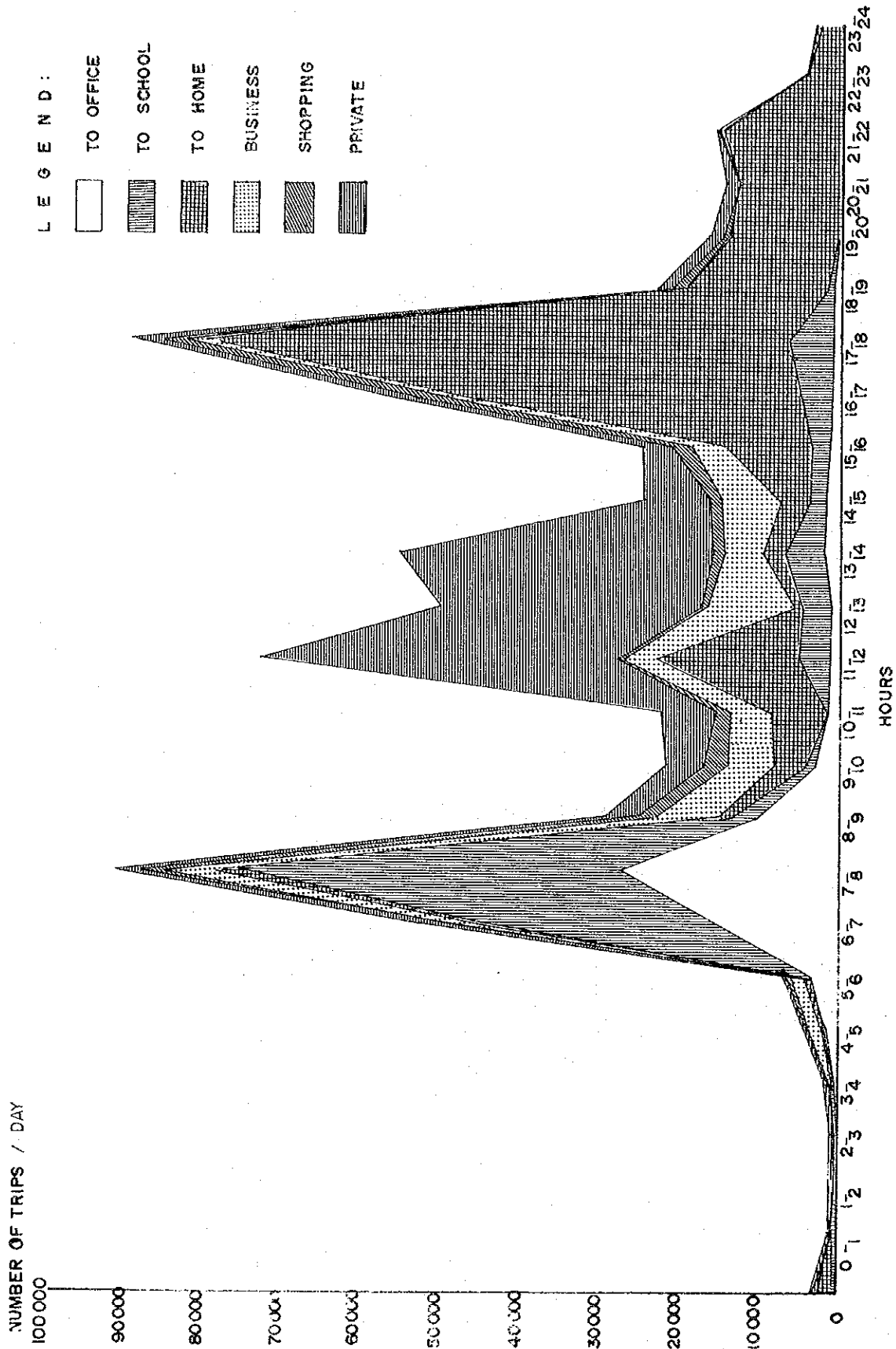


Figure 6.27 Hourly Variation of Trips by Purpose

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## CHAPTER 7

### CURRENT STATUS ON PUBLIC TRANSPORTATION

#### 7.1 Davao City Public Transportation

##### 7.1.1 Modes and Roles

In a land space about four times larger than that of Metro Manila, Davao City has a population of less than that of Metro Manila — or about 485,000, three fourths of which live in coastal areas of about 18,100 hectares extending 40 kilometers from north to south. In Davao City, therefore, no level of urban activity integration is seen, except for Poblacion.

Private car ownership rate is about 8% in Davao City, and, even in Poblacion, only one out of every 10 people owns a car.

In Davao City, where population is scattered over a great expanse of land and where motorization has little advanced, public modes of transportation have been developed in diverse ways according to the role each mode was expected to play. Five different modes of public transportation listed below are available in the City but only four or which perform the function of urban traffic service:

- a) **Bus:** Buses operate on routes connecting Davao with major cities in the eastern part of Mindanao and serve major towns which are located on the route; hence called "provincial buses". The utilization of these buses by passengers moving within the City is limited. Bus capacity ranges from 50 to 60 passengers. Most of these buses physically consist of a bus body fitted onto a truck chassis and are superannuated.
- b) **PUJ:** PUJ stands for "public utility jeepney". Aside from PU, PUJ is the only mode of transportation whose service covers the Project Area in its entirety. Judging from the shape of PUJ service routes, it is believed that PUJs serve two important urban traffic functions: (1) commuter transport connecting places of work and schools in Poblacion with residential areas in and around Poblacion, and (2) Distributor transport to support personal/private activities, i.e., business trips, which are much generated in Poblacion, as well as shopping, amusement, and other personal trips. PUJ routes are designated, and the service area is limited to the strip of land along arterial roads. Traditionally, PUJs are used to be made by the remodelling of used U.S. Forces jeeps, but chases for use in making 16 passenger jeepneys are now being sold by domestic or foreign manufactures.
- c) **AC:** AC is the abbreviation of "auto calesa" and means motorized calesa. "Calesa" refers to the 2 — passenger horse carriages which were imported from Europe, during Spanish rule. AC service routes are designated and limited to the City boundary of Davao. ACs are engaged in short distance transportation within the downtown area and performs distributive function in Poblacion. ACs are made by fitting eight passenger seats and a roof onto the chases.

- d) **Tricycle:** The tricycle is so called because it is made by attaching a sidecar (2-or 4-seater; 1 wheel) to a motorcycle (2 wheels) and, thus, consists of three wheels. The major type of tricycles operating in Davao City has a trailer with eight seats, rather than a sidecar. The service area of tricycles are restricted by the City Ordinance to a very small areas where PUJ and AC service is little available.
- e) **PU:** "PU" stands for public utility. These are usually mini-cars authorized for public use which have no fare meters. PU service rule is that the PU's operating in Davao City can take the passenger to any place as long as the passenger was picked up in Davao City, but actually, PU activities are overwhelmingly concentrated to Poblacion and the vicinity.

The sharing of roles by PUJs, ACs, and tricycles as the modes of urban public transportation is as shown below. (Fig. 7.1)

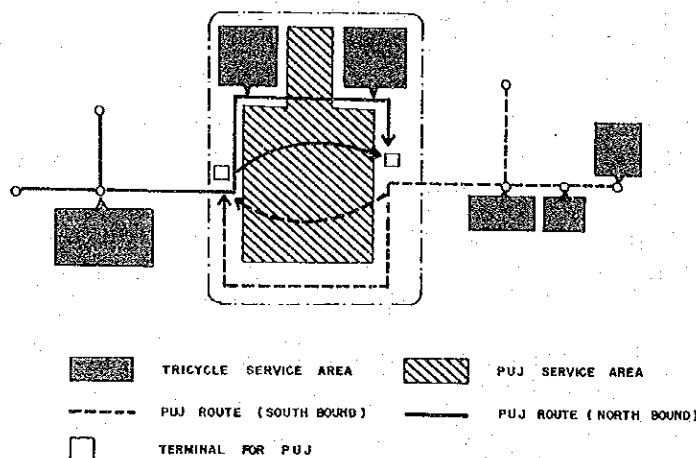
### 7.1.2 Registered Number of Vehicles

The total number of public utility vehicles (PUVs) has been on an increase trend during the past decade. Of PUVs, PUJs showed a greatest share of 45% in 1979 and are still increasing. PUJs are followed by tricycles, PUs, ACs, and buses in descending order. Tricycles tend to increase, while ACs, buses are notably decreasing.

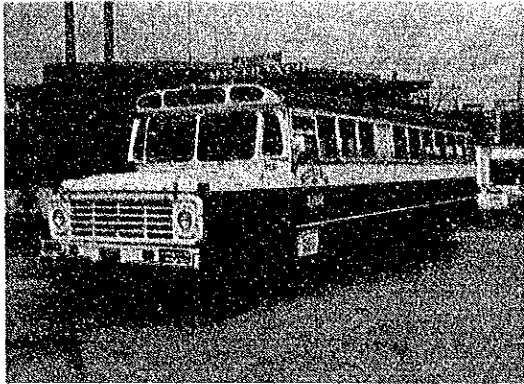
Changes in the recent five years are characterized by the gradual increase of PUJs, rapid increase of tricycles, PU increases, and notable decrease or phasing out of ACs due to the superannuation, the low efficiency, and the resultant service deterioration.

Buses registered in Davao City are on the decrease, but this does not necessarily mean any degradation of service, (Fig. 7.2) because buses registered in other cities serve in Davao City.

Decrease in the number of ACs means that the AC is in the process of phasing out due to their obsolescence and inefficiency of service.



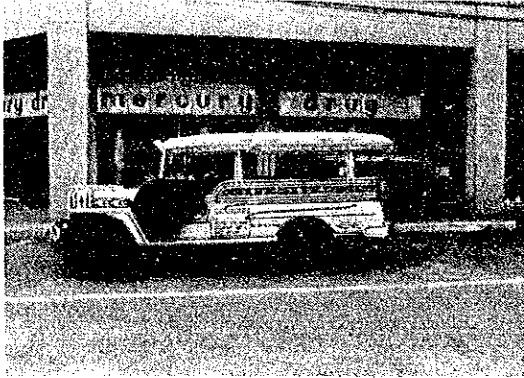
**Figure 7.1 Model of Public Transport Service in Davao City (Except Long Distance Bus)**



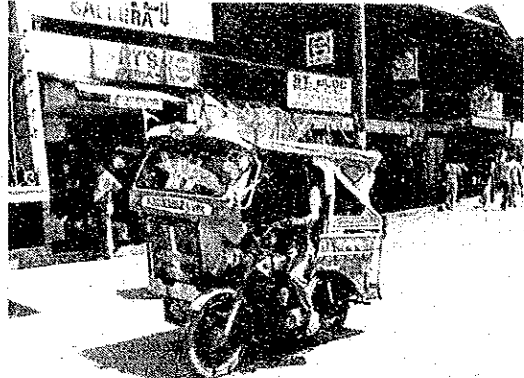
Provincial Bus



PU - Taxi



PUJ



Tricycle



AC



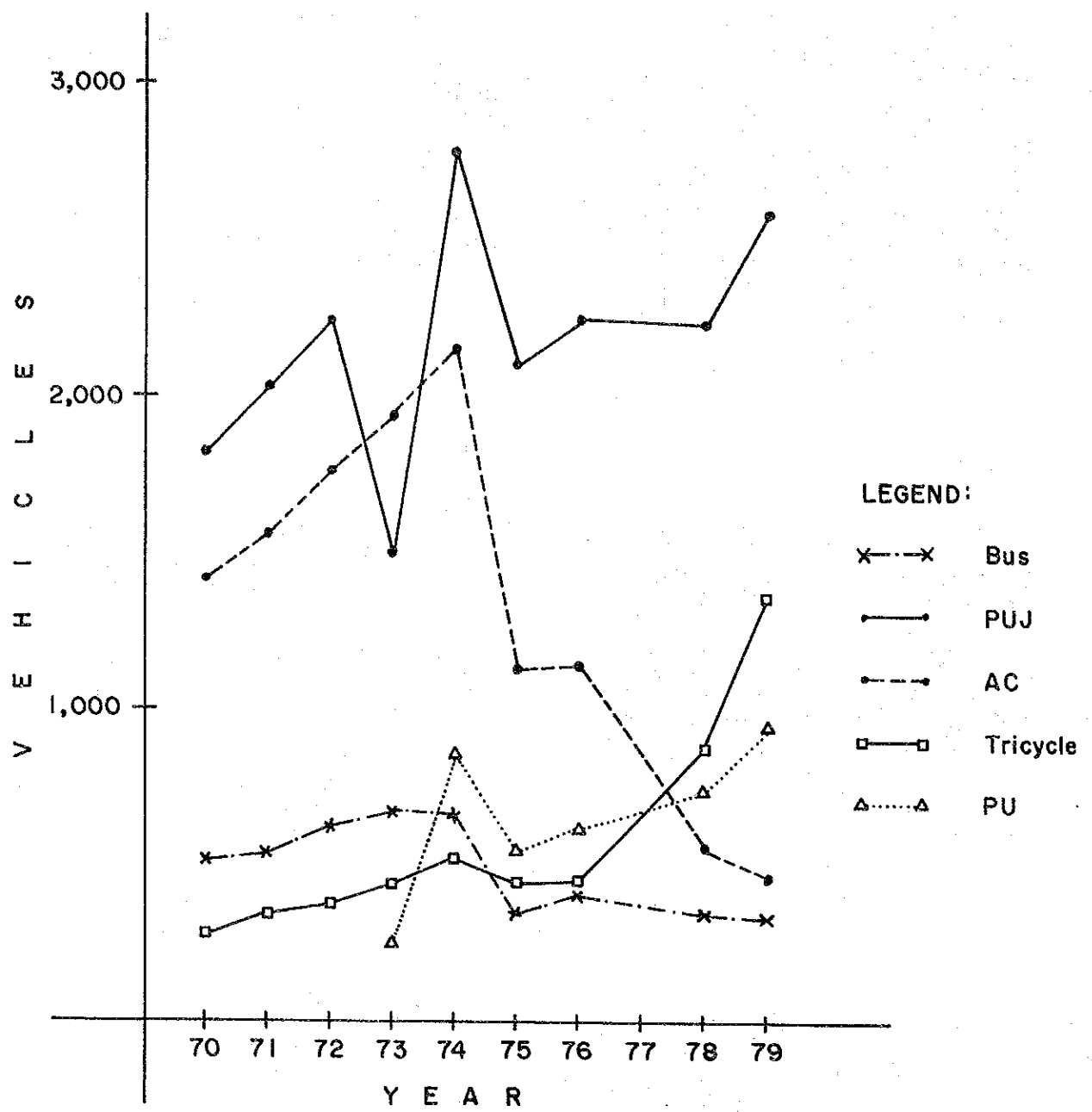


Figure 7.2 Variation of Registered Public Utility Vehicles

### 7.1.3 Supervision

#### (1) Registration and Franchise

The entire public transport service in Davao City is operated by the private sector. Bus operation, which inevitably be carried out in a substantial scale, is by company organizations whereas, other modes of public transport are operated by individual operators and by drivers hired by the operator.

One must have his vehicle registered with the Bureau of Land Transportation (BLT) and receive a franchise from the Board of Transportation (BOT) before he may engage in public transport service business, whether he be an individual operator or a corporation (bus company).

Franchise application is submitted to a regional BOT with an attached documentary evidence of the purchase or ownership of the vehicle (s), the regional BOT reviews the application and refers it to the Central BOT in Manila, which, in turn, approves or disapproves the application and (if approves) issues the franchise certificate through the regional BOT. Only with this franchise, may the operator now apply to BLT for the registration of his vehicle (s) for public use.

The BOT franchise application requirements and conditions in Davao City are as follows:

- a) PUJ and Bus applications need to specify both terminal points (origin and destination), but not the interim route. At least one of the terminal points is expected to be in Poblacion, but the indication of Davao City at large as one of the terminals is sufficient for the application.
- b) AC service is limited to the boundary of Davao City.
- c) Tricycle and PU service areas are designated by BOT as merely the city or town boundary.

The above discussed BOT franchise regulation does not designate service route for PUVs, and, therefore, Davao City enforces a separate set of regulation summarized below, in order to ensure an even spread and a high level of PUV services for the Davao citizens.

The City designates for each PUJ the route for passing through Poblacion. A terminal within Poblacion is to be designated by the City government (in this stage this designation is expected to be authorized by City Ordinance). Therefore, after the completion of all BOT and BLT procedures, the operator must have his service route decided by the City authority. The starting point outside Poblacion is also decided at the same time. This series of procedure was adopted during the process of formulating an experimental rerouting scheme jointly by Davao City and Regional CHPG Office.

Tricycle service routes are restricted by the City Ordinance. The tricycle operator may apply to BOT for franchise after obtaining police permission for the use of road.

#### (2) Enforcement

Traffic laws and regulations are enforced by the Constabulary Highway Patrol Group (CHPG), Integrated National Police (INP), and BLT in the entire

Philippines and, therefore, in Davao City. With dissimilar major duties due to different missions of these agencies, they show no discrepancy or discord between themselves in enforcement.

The central duty of CHPG is the ordinary traffic laws and regulations enforcement on national roads, while they carry out the same enforcement activities as the other two. INP's jurisdiction is roads other than national roads, but they also enforce traffic laws and regulations on national roads in downtown areas. BLT enforces chiefly the BOT regulations on the mechanical safety of vehicles, seating capacities, and public transport service personnel work rules and procedures for the purpose of securing public transport safety.

#### 7.1.4. History

The state in which the existing five modes of public transportation operate is the product of historical transitions reviewed graphically. (Fig. 7.3). It has been already 10 years since the beginning of PUJ era, which followed the post-war period in which ACs flourished. Having been through the oil crisis of the early 1970's, the advent of a new public transport service system that will overcome the future energy and urban traffic problems is waited for.

That which should not be overlooked in the history of urban transportation in Davao City is prewar and postwar bus service. The original prewar bus service was operated by the Davao Auto Bus Company with two standard size buses running in shuttle on the route: Bankerohan market — San Pedro Street, C.M. Recto Avenue — R. Magsaysay Avenue — Sta. Ana Pier. No bus stop existed, and passengers could catch the bus and get off the bus at any point on the route. This service was revived after the war in 1948 and continued until 1951, when it was finally driven out of business by ACs.

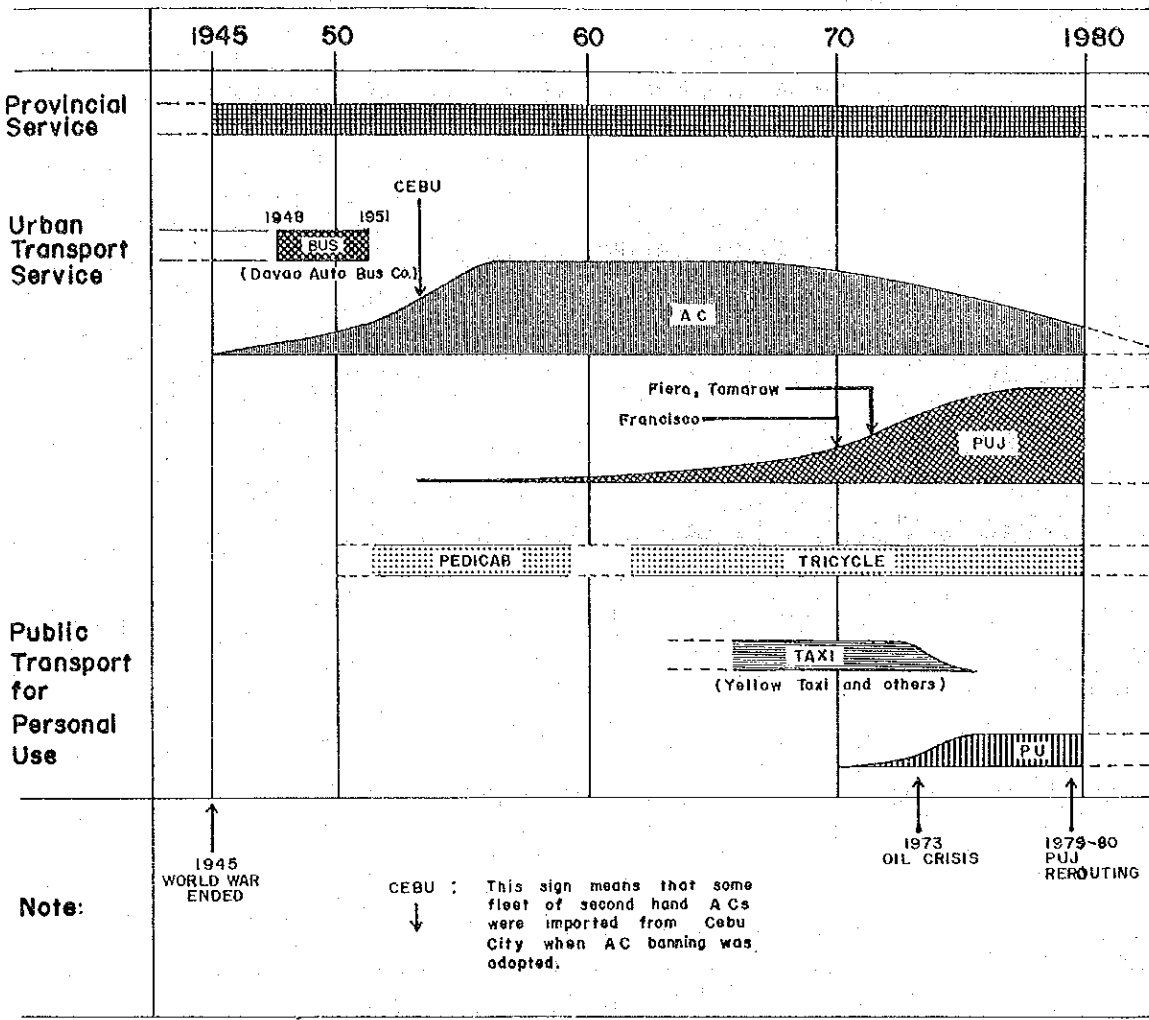
The entire Philippines saw the postwar rise of AC service and subsequent increases in the number of AC's, and Davao City was no exception. AC service was started immediately after the war and was welcomed by the citizen for its convenience. ACs increased on the strength of their popularity. It is reported that in the 1960's a large number of ACs were brought to Davao from Cebu City, where ACs were banned in an attempt to achieve coercive replacement of ACs with PUJs.

It appeared that PUJ service began in Davao City in the 1960's. The number of PUJs rapidly increased in the early 1970s after the introduction of new chases made by a domestic manufacturer called Francisco Motors, Ford's Fiera, and those made by Japan's Toyota Motors.

Meanwhile, ACs in service grew older and worn, and the 1970's appeared to be the time frame within which replacement of ACs with PUJs took place in Davao.

What is now called tricycle started out in the 1950s as "pedicab" which consisted of a bicycle and a sidecar for carrying one passenger. The bicycle was later motorized and, then, replaced by large motorcycles, while the passenger capacity was increased from two to the present eight.

Being lightweight automobile with a good fuel economy, PUs could always offer the service for a fare slightly less than taxi's fare meter readings. After the oil crisis of 1973, the fuel efficient PUs gained strenght and has driven taxis out of the market.



SOURCE: DCUTCLUS Hearing from various officials concerned.

Figure 7.3 Historical Variation of Public Transport Modes in Davao City

## 7.2 Utilization of Public Transportation

### 7.2.1 Modal Preference of Public Transportation Users

#### (1) Modal Preference in General

The total number of person trips generated in the Survey Area is about 685,000 trips per day, and 44%, or about 298,000 person trips, use public utility vehicles (PUVs). Of the PUV modes, person trips using the PUJ is about 180,000 or 61% of the total PUV users, followed by the Ac whose share is about 21% and the Tricycle, the PU and the Bus sharing about 9%, and 6% and 3% respectively.

Converted into passenger-kilometers (Pass. km) to know the total passenger volume, total PUV users in the Survey Area is about 1,480,000 pass. km. per day with the PUJ getting about 70% of the share, 13% for the Bus followed by 9% for the AC, and the Tricycle and the PU having 4% each.

**Table 7.1 Transport Demands in Terms of Passengers & Passenger - Kms.**

(Unit: Trip or Pass.)

	TOTAL TRIP	PRIVATE CAR	TOTAL PUV	BUS	PUJ	AC	TRICYCLE	PU TAXI
NUMBER OF PERSON TRIPS	684,984	131,669	298,365	9,808	180,578	63,285	25,950	18,744
PERCENTAGE SHARE OF TOTAL RT.	100%	19.2%	43.5%	1.4%	26.4%	9.2%	3.8%	2.7%
PERCENTAGE SHARE OF TOTAL PUV PASS.			100%	3.3%	60.5%	21.2%	8.7%	6.3%
NO. OF PASS. KM.			100%	12.7%	69.5%	9.2%	4.3%	4.3%
			1,480,290	187,670	1,028,720	136,760	63,000	64,140

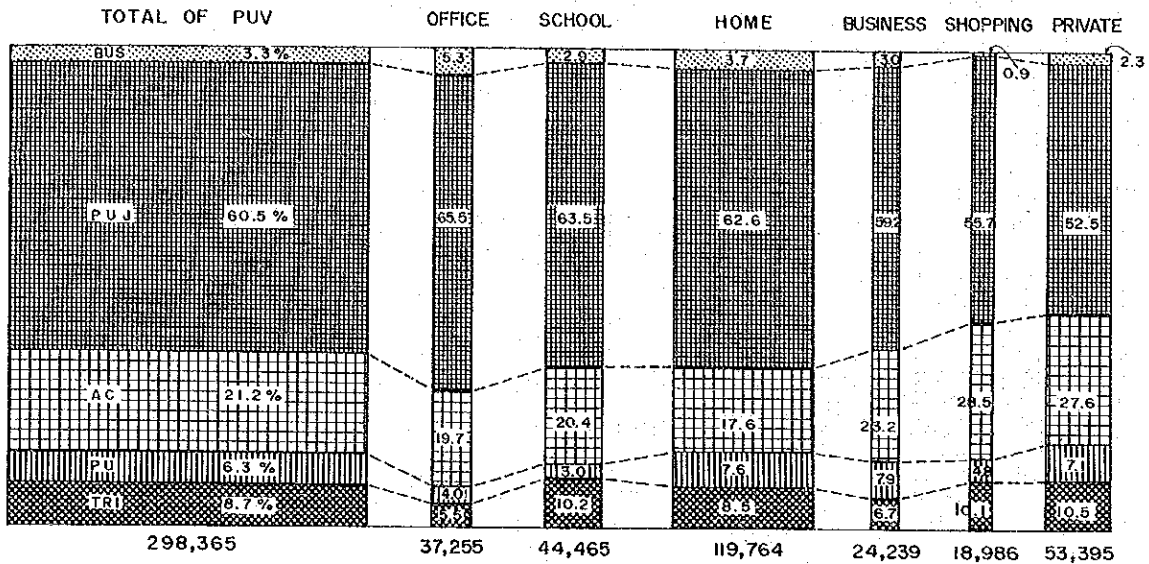
#### (2) Modal Preference for Various Trip Purposes

Of all purposes, "to go home" is that which represents the greatest number of PUV passengers, followed by "private", "going to school" and "going to office" in descending order. These four purposes and the order of their rank are true not only with PUVs but also with all other modes.

Of all PUVs, the PUJ has the greatest share (60.5%) in the total number of passengers. When classified by trip purposes, however, the PUJ represents even greater for the same purpose), for "going to school" (63.5%), and "going home" (62.6%). In other words, the frequency of PUJ use for going to office is higher by 5% than the frequency of PUJ uses for all purposes, and, likewise, its use for going to school is higher by 3% and for going home, by about 28. The bus enjoys only 3.3% of total PUV passengers, but 5.3% of PUV passengers "going home".

On the other hand, the ACs share is higher for "shopping", "private", and

"business" than its overall average of 21.2%, suggesting that trips for these purposes are confined mostly to Poblacion, where ACs are the handiest of all modes. Preferences are high for the PU for "business" and "going home" purposes and for tricycles for "going to school" and "shopping".

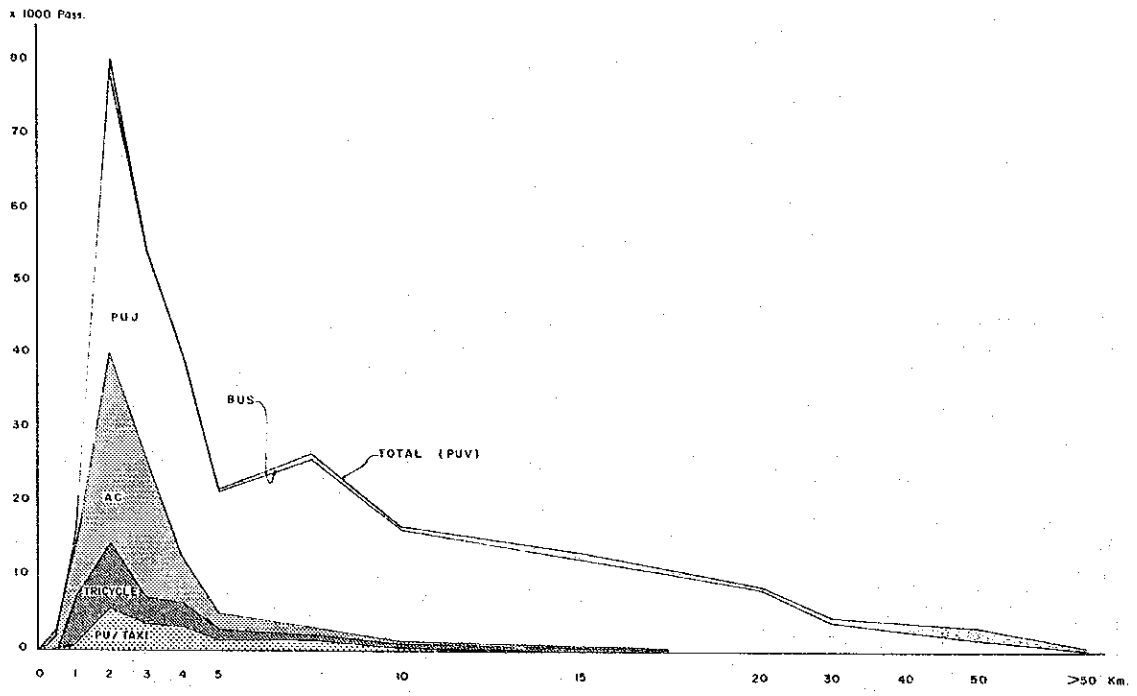


**Figure 7.4** Number of Trips and Modal Shares in Number of Passengers by Trip Purpose by Mode

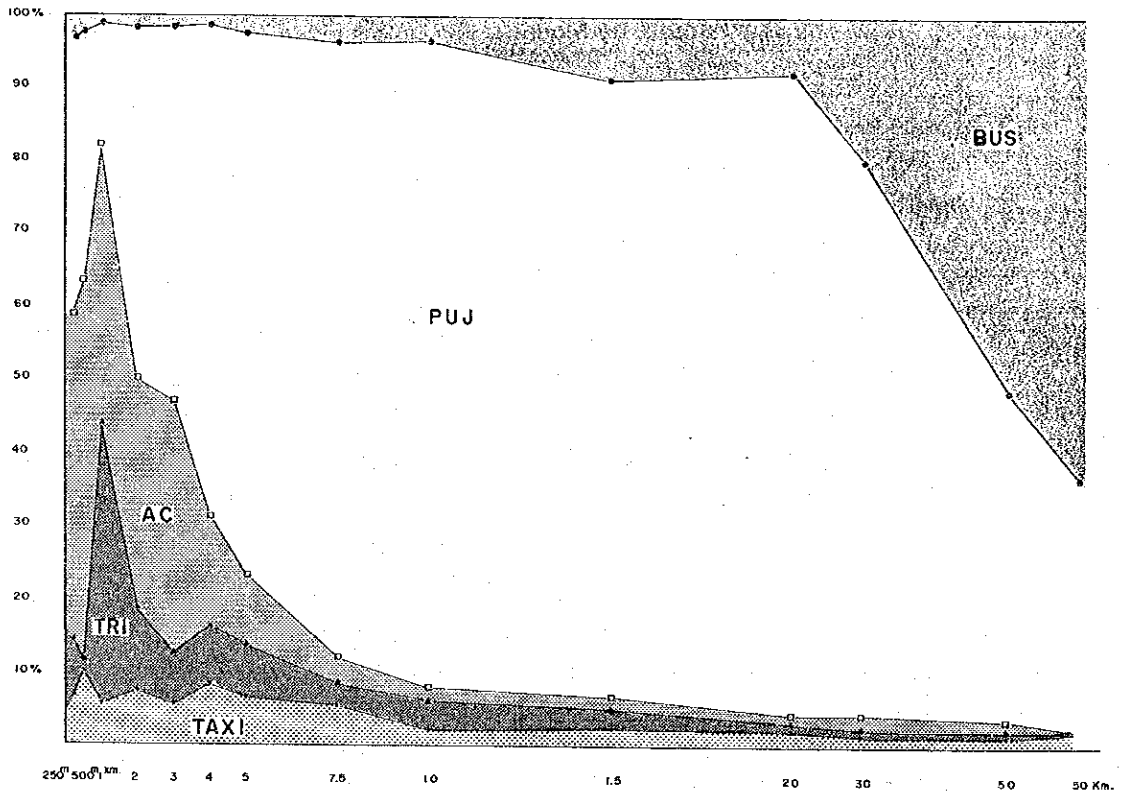
(3) Modal Preference by Trip Length

The distribution of the users of various modes of public transport by trip lengths, presented in Figure 7.5, shows the first set of peaks at the trip length of 1.0 to 2.0 kilometers. The P.U.J. is the only mode that shows a significant second peak at the trip length of 5.0 to 7.5 medium range trips in addition to short trips.

Figure 7.6 shows the modal shares of PUV by trip lengths, wherein P.U.J.'s percentage share is 50-80% up to 20 kms. trip length. AC user's share is about 30% for 0.50 to 3 kms. trip length, and tricycle users' is 40% for 0.50 to 1.0 km. trip length. Bus user's share gradually increases after 20 kms., which indicates that buses are utilized primarily for long distance trips.



**Figure 7.5** Distribution of Number of Person Trips by Trip Length, 1979



**Figure 7.6** Modal Share by Trip Length

(4) Hourly Variation of Modal Share

The day is divided into "peak hours" and "business hours", and the former is further sub-divided into morning noon and evening peaks. By these time zones, modal preferences of users of each mode of PUV vary slightly from their whole-day average.

In the case of Buses and PUJs, the utilization is highest during the morning and evening peaks as compared to other hours. For the Ac, highest utilization is during noon and evening peaks and the same is true also for the PU and the Tricycle.

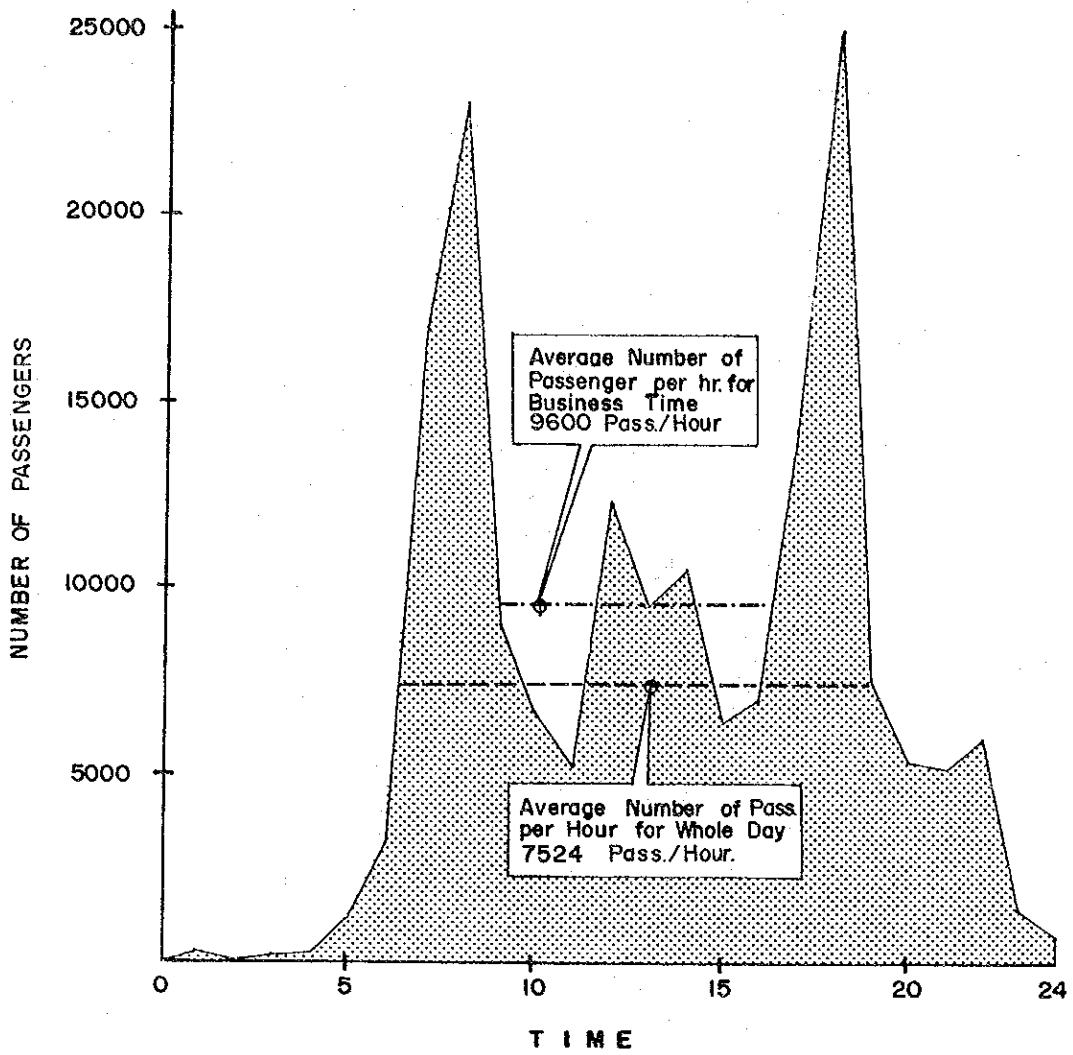
When PUJ users are singled out, (Fig. 7.7) demand during morning and evening peaks (23,000 to 25,000 PT) varies greatly from that in daytime, which is only about 9,600 PT on the average.

**Table 7.2 PUV Utilization by Time Zone**

							(Unit;Trips)
TIME ZONE	TOTAL P.T.	TOTAL PUV	BUS	PUJ	AC	PU TAXI	TRICYCLE
MORNING PEAK (7 & 8)	143,225	(100.0) 60,631	(4.4) 2,641	(66.8) 40,523	(15.6) 9,434	(3.2) 1,944	(10.0) 6,089
NOON PEAK (12 - 14)	177,630	(100.0) 58,315	(2.3) 1,362	(54.8) 31,976	(25.0) 14,585	(6.9) 4,008	(11.0) 6,384
EVENING PEAK (17 & 18)	147,509	(100.0) 64,176	(4.1) 2,648	(61.6) 39,534	(18.7) 11,992	(5.3) 3,410	(10.3) 6,592
A.M (9 - 11) BUSINESS	73,187	(100.0) 37,178	(2.1) 766	(57.8) 21,492	(24.6) 9,159	(7.8) 2,884	(7.7) 2,877
P.M. (15 & 16) BUSINESS	49,991	(100.0) 24,947	(3.3) 819	(55.1) 13,746	(29.0) 7,234	(7.3) 1,812	(5.3) 1,336
SUB-TOTAL BUSINESS HOURS	123,178	(100.0) 62,125	(2.5) 1,585	(56.7) 35,238	(26.4) 16,393	(7.6) 4,696	(6.8) 4,213
WHOLE DAY	684,984	298,365	(3.3)	(60.5)	(21.2)	(6.3)	8.7

Note: ( ) Percentage of PUV Utilization





**Figure 7.7** Hourly Variation of PUJ Passengers

(5) Modal Preference by Income Levels

Of the total Tricycle passengers, the share of income groups of ₱1,000/month and below shows a relatively high 70%. Also, on PUJs, ACs and Buses, the shares of said groups are 60%, 57% and 53% respectively. On the other side, for the PUs, utilization is slightly higher in income groups of more than ₱1,000/month.

The modal preferences reflecting the PUV users' travel characteristics could be summarized as follows:

The PUJ, which currently enjoys the largest share of the total PUV passengers in the Project Area, is commonly preferred for short to medium distance trips by the people of lower income levels during morning and evening peaks for purposes of going to office, school and home.

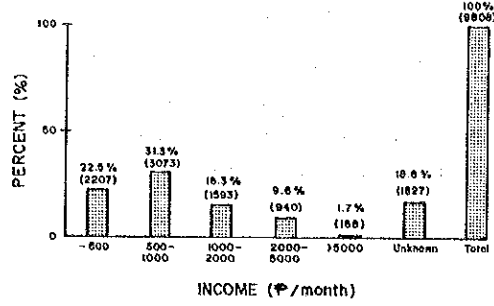
The bus, which serves generally on long distance routes, is characteristically preferred by the lower and middle income group for going to office in the morning peak.

The AC, for shorter distance or intra-poblacion service, is utilized mainly by middle income people during noon and evening peak hours on trips to go shopping, private, and business.

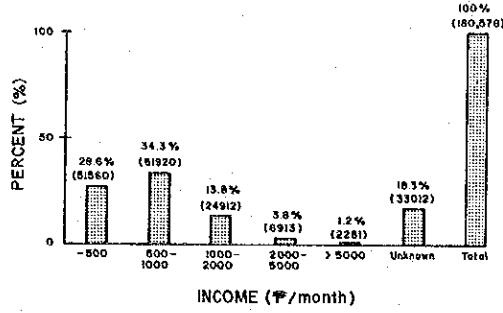
Tricycles, which are for highly localized short distance services, is preferably utilized by lower income people especially during evening and noon peaks, for trips to school and shopping.

PUs are utilized preferably by high or middle income people for going to business or home.

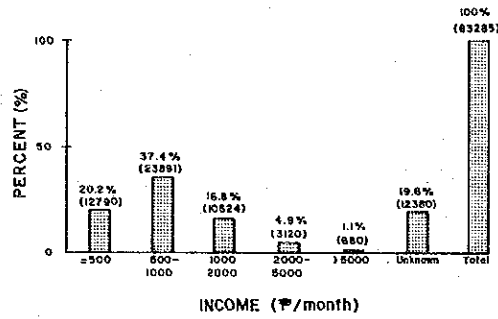
BUS



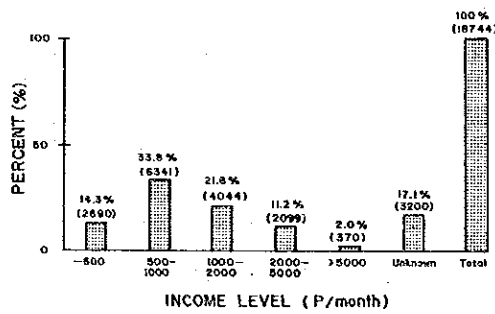
PUJ



AC



P.U.



TRICYCLE

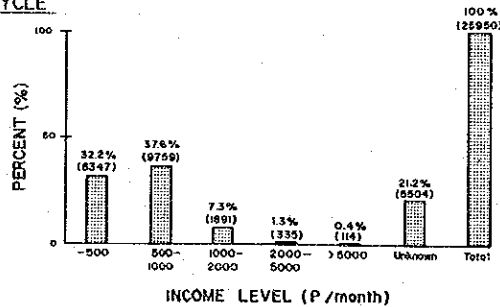


Figure 7.8 Modal Preference by Income Group

## 7.2.2 Travel Pattern of Public Transportation Users

### (1) Passenger Generation in A-Zones by Public Transport Modes

The greatest number of trips generated within the Survey Area by all modes of transportation is generated in Poblacion, which account for almost 50% of all trips. For PUV modes, the share of Poblacion in the total number of generated trips is more than 50%. (Table 7.3)

The total number of generated trips is biggest in Poblacion for all modes of PUV except for the tricycle, which enjoys the highest share of generated trips in Toril.

A comparison of overall average share against shares in various A zones in the Survey Area for each mode of the PUV indicates that the share of bus in Bunawan area (9.5%) is higher than it's overall average share, 3.3%. This is also true with the PUJ, but for the AC and the PU, their shares of total PUV passengers are higher in the Poblacion than in any other A zone and the share of tricycles in Toril area (72.1%) is the highest of all A zones and is higher than the overall average (8.7%).

Of the total number of generated trips by PUVs, about 53% are intrazonal, or trips with both trip-ends within the zone. The most popular modes for this

**Table 7.3 Generated Trips (Zone Pair & Intrazonal Trips)**

		(unit: trips/day)							
		ALL MODES	CAR	PUV SUB-TOTAL	BUS	PUJ	AC	PU TAXI	TRICYCLE
PROJECT AREA	1. Poblacion	(47.8) 327,475	36,363	(100.0) 160,336	(1.6) 2,617	(53.4) 85,696	(33.8) 54,126	(8.6) 13,718	(2.6) 4,179
	2. Bunawan	(8.7) 59,694	1,360	(100.0) 19,935	(9.5) 1,900	(87.5) 17,443	(0.7) 133	(0.2) 41	(2.1) 418
	3. Buhangin	(17.6) 120,997	9,867	(100.0) 55,214	(3.4) 1,889	(68.4) 37,789	(13.5) 7,463	(5.2) 2,851	(9.5) 5,222
	4. Talomo	(17.2) 118,099	19,484	(100.0) 38,530	(3.5) 1,344	(84.0) 32,352	(3.4) 1,301	(5.0) 1,930	(4.1) 1,603
	5. Toril	(6.9) 47,413	1,423	(100.0) 19,603	(2.0) 387	(24.7) 4,845	(0.8) 155	(0.4) 80	(72.1) 14,136
NON-PROJECT AREA	6. Davao City	(0.4) 2,889	354	(100.0) 1,562	(3.2) 50	(75.0) 1,172	(5.3) 83	(2.2) 34	(14.3) 223
	7. Outside Davao City	(1.2) 8,326	1,081	(100.0) 3,147	(51.5) 1,621	(40.7) 1,281	(0.8) 24	(1.6) 52	(5.4) 169
	UNKNOWN	(0.0) 91	53	38				38	
<b>TOTAL</b>		(100) 684,984	69,985	(100.0) 298,365	(3.3) 9,808	(60.5) 180,578	(21.2) 63,285	(6.3) 18,744	(8.7) 25,950

( ) : %

kind of trip are the AC, the tricycle and the PU, while the Bus and the PUJ are utilized mainly for interzonal trips, or starting or ending outside the Survey Area. (Table 7.4).

From Table 7.5, share of intrazonal trip by Bus in the Talomo area is highest as compared to other A-zones in the survey area. PUJ's share of intrazonal trips in Bunawan area is almost twice as that of its' average. AC's & PU's share is biggest in Poblacion area while Tricycle's share is biggest in Toril Area.

**Table 7.4 Comparison of Intrazonal and Interzonal Trips**

	(unit: trips/day)					
	TOTAL OF PUV	BUS	PUJ	AC	PU TAXI	TRICYCLE
	(100%)	(100%)	(100%)	(100%)	(100%)	(100%)
Total Generated Trip	298,365	9,808	180,578	63,285	18,744	25,950
	(52.8%)	(23.2%)	(41.4%)	(78.4%)	(56.3%)	(78.7%)
Total Intrazonal Trip	157,592	2,278	74,706	49,635	10,561	20,412
	(47.2%)	(76.8%)	(58.6%)	(21.6%)	(43.7%)	(21.3%)
Total Interzonal Trip	140,733	7,530	105,872	13,650	8,183	5,538

**Table 7.5 Intrazonal Trips By Mode**

		(unit: trips/day)							
		ALL MODES	CAR	PUV SUB-TOTAL	BUS	PUJ	AC	PU TAXI	TRICYCLE
PROJECT AREA	1. Poblacion	234,807	20,483	(100.0)	(0.9)	(40.3)	(46.8)	(9.1)	(2.9)
				102,482	894	41,350	47,977	9,437	2,914
	2. Bunawan	47,398	408	(100.0)	(4.0)	(92.8)	(0.5)	(0.2)	(2.5)
				11,018	446	10,221	56	17	278
	3. Buhangin	67,680	2,599	(100.0)	(0.7)	(67.8)	(7.2)	(4.3)	(20.0)
			20,258	133	13,735	1,462	866	4,062	
	4. Talomo	65,314	6,864	(100.0)	(5.4)	(87.0)	(0.7)	(2.8)	(4.1)
				10,195	548	8,868	70	286	423
	5. Toril	38,246	347	(100.0)	(1.5)	(3.3)	(0.6)	(0.3)	(94.3)
				13,473	204	448	70	45	12,706
NON-PROJECT AREA	6. Davao City	20	0	(100.0)	(0.0)	(100.0)	(0.0)	(0.0)	(0.0)
				11	0	11	0	0	0
	7. Outside Davao City	656	39	(100.0)	(34.2)	(47.1)	(0.0)	(0.0)	(18.7)
				155	53	73	0	0	29
<b>TOTAL</b>		<b>454,301</b>	<b>30,740</b>	<b>(100.0)</b>	<b>(1.4)</b>	<b>(47.4)</b>	<b>(31.5)</b>	<b>(6.7)</b>	<b>(13.0)</b>
				157,592	2,278	74,706	49,635	10,561	20,412

( ) : %

(2) Modal Preferences on Major O-D Zone Pairs

Different O-D zone pairs show different preferences of PUV type. As in the figure 7.9, about 64% of the person trips between Poblacion and Bunawan areas are by the PUJ. Poblacion and Buhangin also prefer the PUJ primarily and supplemented by the AC. Between Poblacion and Talomo, the PUJ is also the major PUV mode, while the Talomo – Toril O-D pair primarily depends on the PUJ between supplemented by the tricycle. Between Bunawan and Buhangin and between Talomo and Buhangin, the PUJ is also the major mode. The bus is usually the major public transport mode for O-D zone pairs between inside and outside the Survey Area, supplemented by the PUJ.

(3) Detailed Travel Pattern of Public Transport Users

i) General (Zoning for this Study)

In order to understand the behavioral pattern of public transport users in detail, the set of zones used for the person-trip survey has been rearranged by singling out four CBDs in Poblacion and five sub-centers outside of Poblacion in consideration of their land use and traffic characteristics by the purposes of trip generation and attraction. (Figs. 7.10, 7.11)

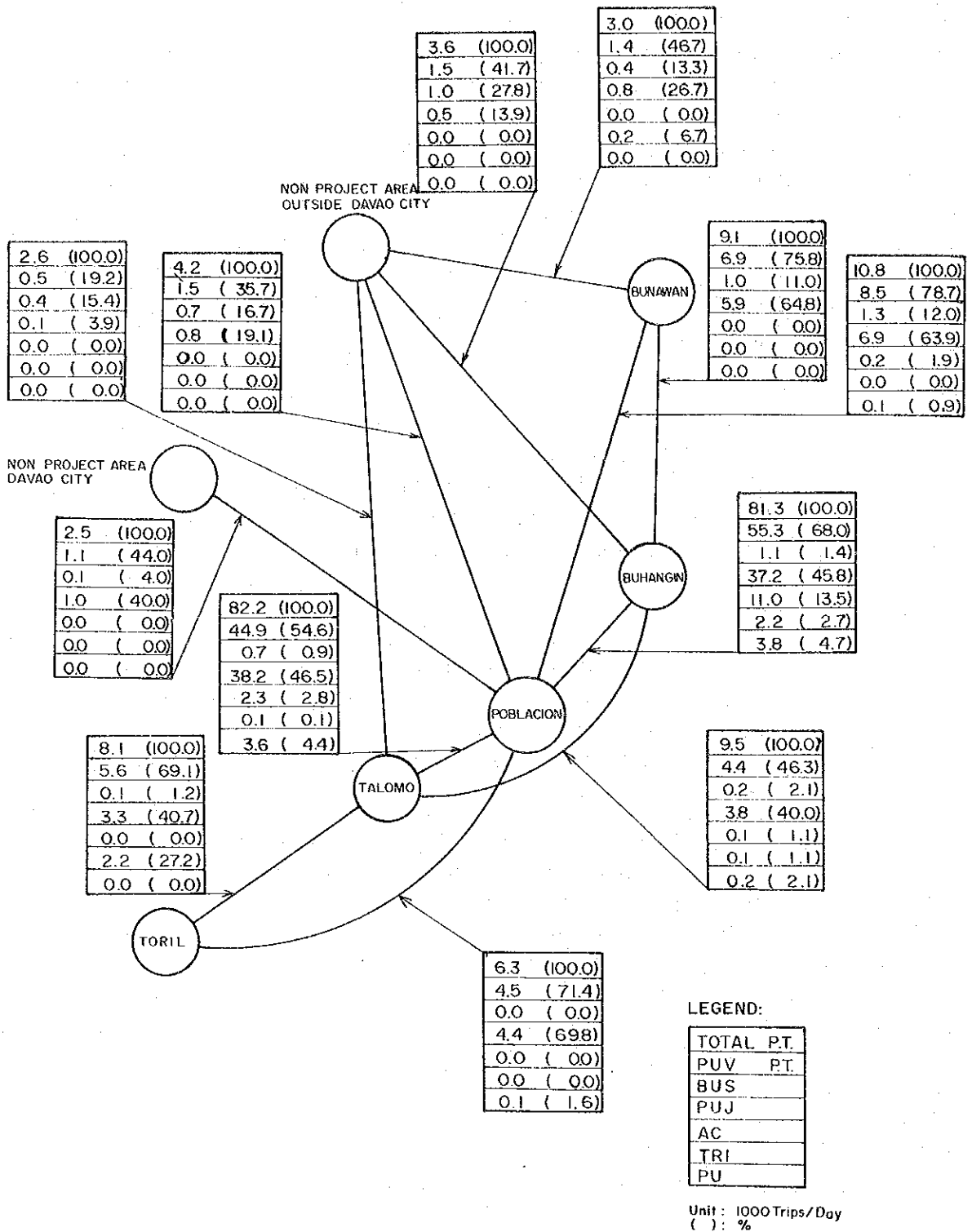
ii) Bus Passengers

a) Inside Poblacion including Agdao

Inasmuch as the bus is generally used for inter-provincial or long distance trips, its utilization within Poblacion is very minimal at only 204 person trips between Agdao and North of Poblacion at the most, followed by 168 person trips between CBDI (City Hall area) and Poblacion North. Other zone pairs show less than 100 person trips.

b) Outside Poblacion including outside Survey Area

In this case, the maximum number of person trips using bus is just a little over 600 between Poblacion and Panacan/Sasa area (SCN<sub>2</sub>) followed by 500 to 600 between Poblacion and Buhangin Area (SON<sub>1</sub>) and between Poblacion and Matina Area (SCS<sub>1</sub>). (Fig. 7.12)



**Figure 7.9** Number of Person Trips by Mode on Major OD Pair

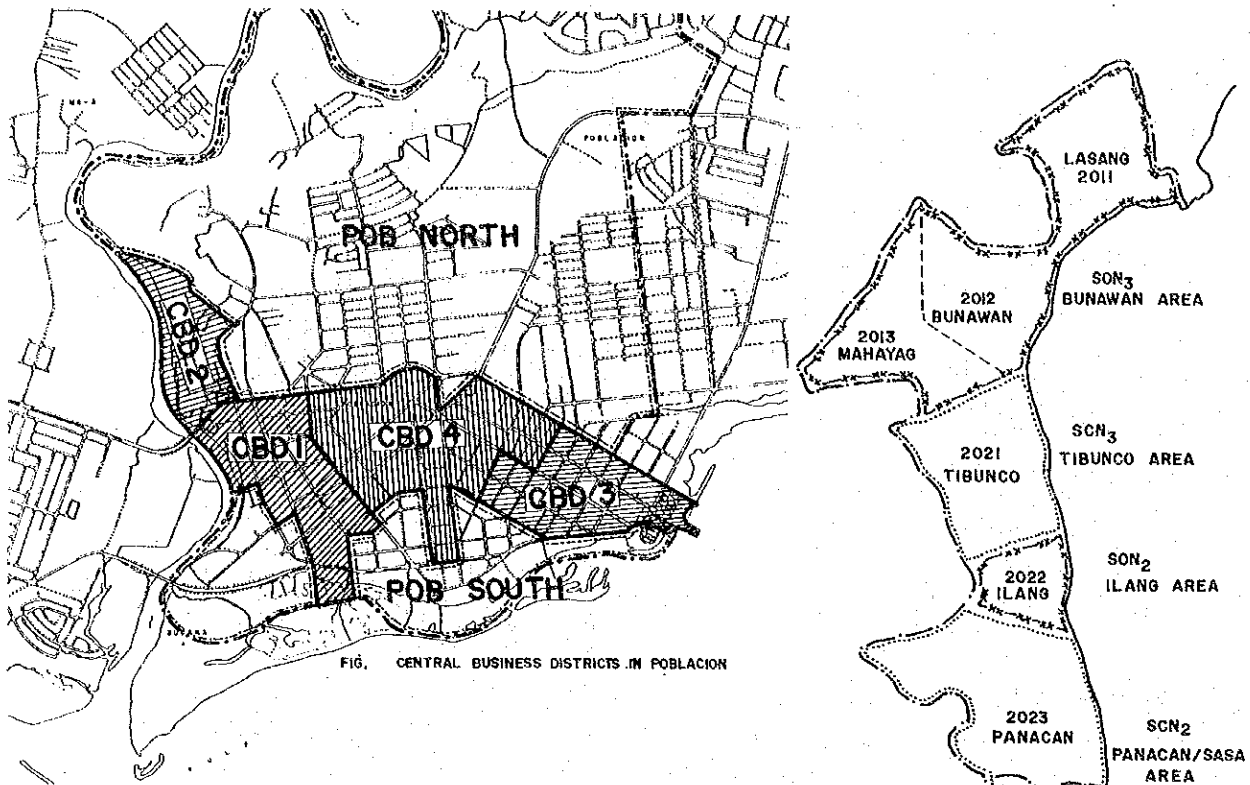


Figure 7.10 Central Business Districts in Poblacion

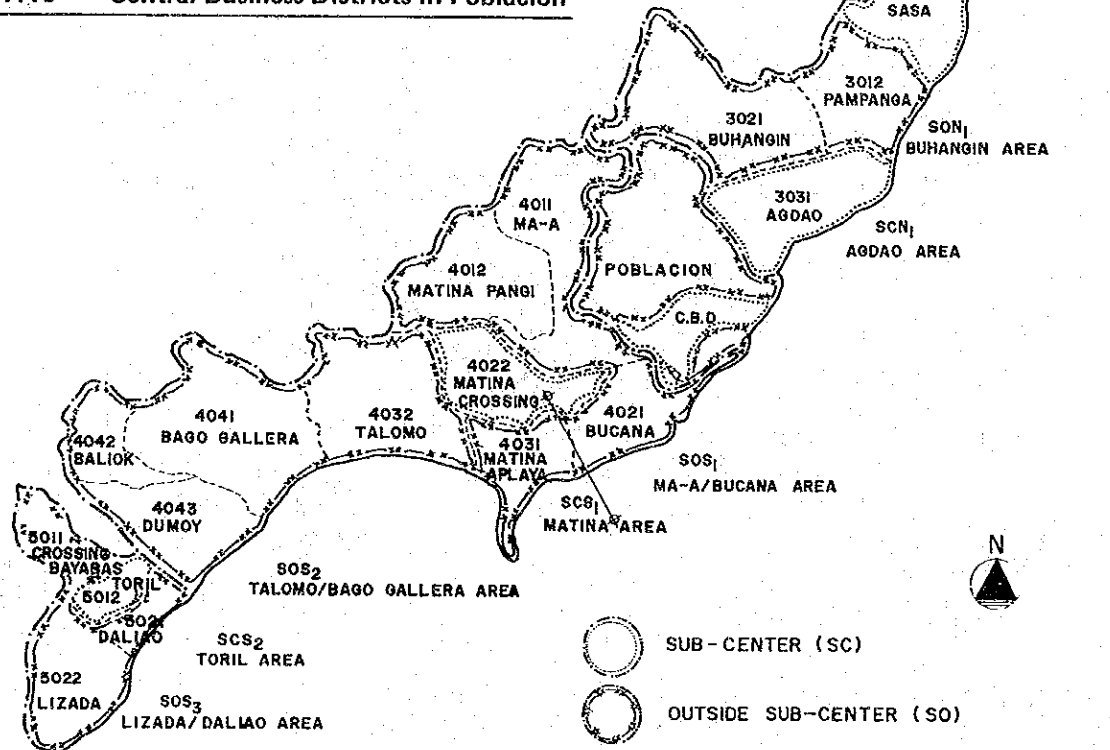


Figure 7.11 Sub-Centers in the Project Area



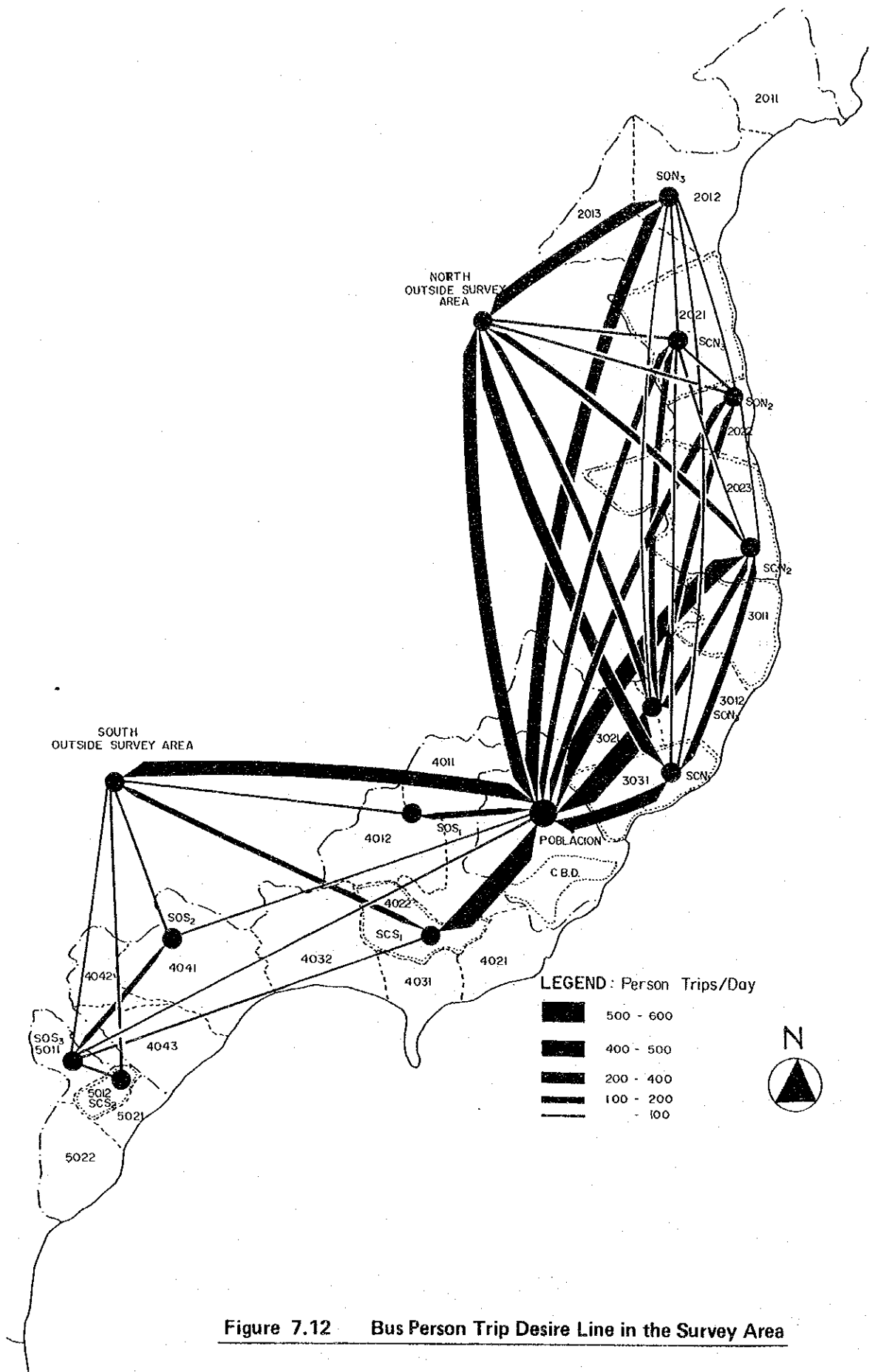


Figure 7.12 Bus Person Trip Desire Line in the Survey Area

iii) PUJ Passengers

a) Inside Poblacion including Agdao.

The largest number of person trips using the PUJ in Poblacion including Agdao is about 6,100, between CBD1 and North of Poblacion, followed by CBD 1 and Agdao with about 5,500 person trips. Also, the number of person trips between Poblacion North and Agdao, about 4,800 trips, and Poblacion North and CBD<sub>4</sub>, 4,000 trips, are quite high. Other travel patterns are shown in Fig. 7.13.

b) Outside Poblacion including outside Survey Area

Although there are some subcenters outside Poblacion, passenger flows still tend to converge toward the Poblacion area. The largest quantities of PUJ passengers flowing toward Poblacion are about 20,000 PT from Agdao Area (SCN<sub>1</sub>) and about 17,000 PT from Matina Area (SCS<sub>1</sub>). PUJ person trips are very few between other zones outside of Poblacion, where the maximum is only about 3,000 PT between SON<sub>1</sub> (Buhangin) and SCN<sub>2</sub>.

iv) AC Passengers

Intra-Poblacion person trips are generally served by the AC, although PUJ also plays a big role. The maximum number of person trips are between CBD 1 and North of Poblacion with about 6,700 P.T., CBD 1 and Poblacion South with 5,800 PT, and between CBD1 and CBD 4 with about 4,600 P.T. (Fig. 7.14)

For outside Poblacion, the greatest number of person trips is between Poblacion and Agdao area (SCN<sub>1</sub>), only about 600 P.T. between Poblacion and SON<sub>1</sub> (Buhangin Area) and between Poblacion and SCS<sub>1</sub> (Matina Area) and SOS<sub>1</sub> (Ma-a/Bucana Area) on the south.

v) Tricycle Passengers

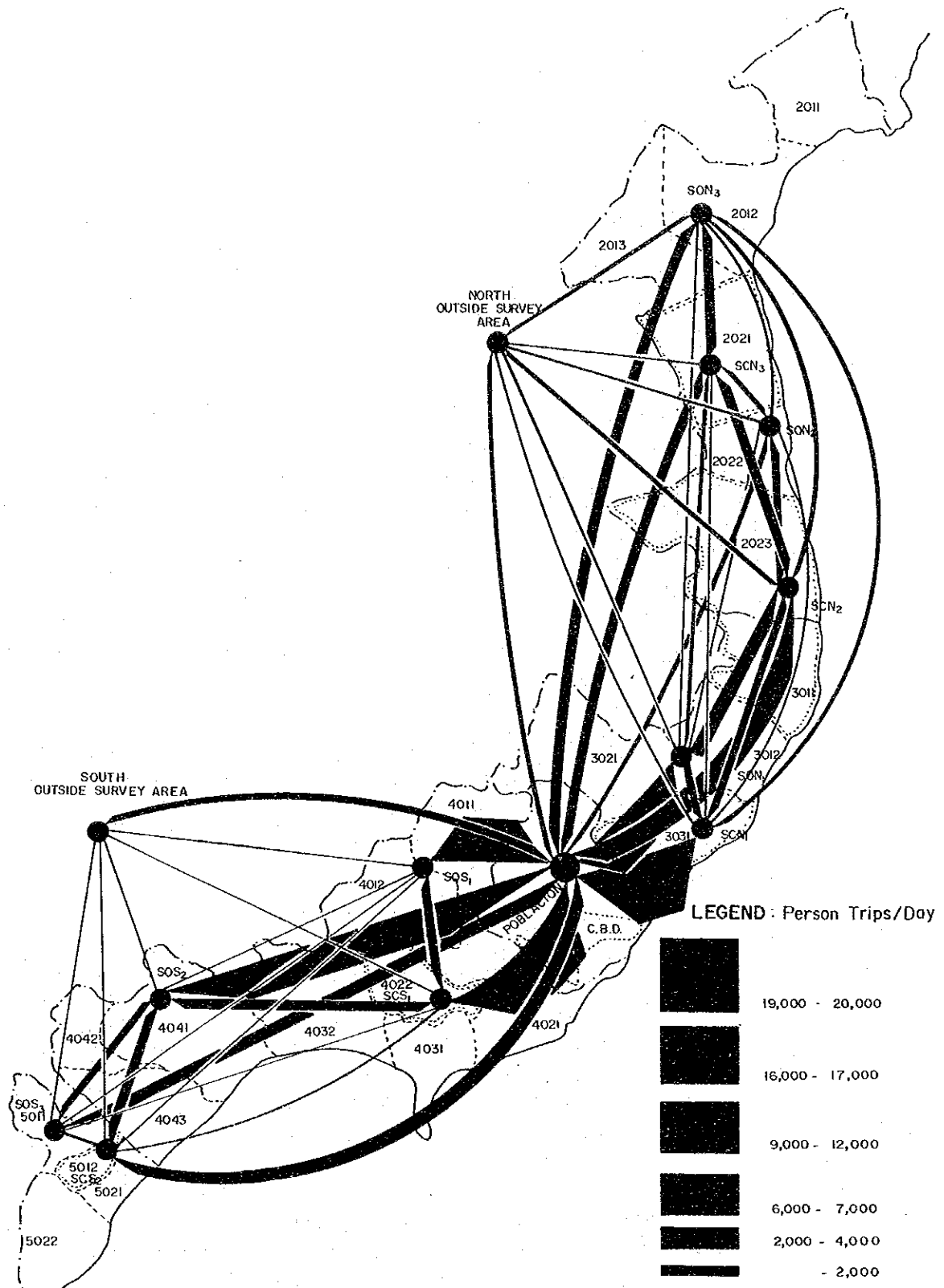
Since tricycle service areas within Poblacion are found in the northern part, the largest number of P.T. using this mode is between Poblacion north and Agdao, which has about 1,900 P.T., followed by about 900 P.T. between CBD 2 and Poblacion North.

Outside of Poblacion, especially in the Toril area, the biggest number of P.T. is about 5,700 between Toril area (SOS<sub>2</sub>) and Lizada/Daliao Area (SOS<sub>3</sub>) followed by about 1,500 P.T. between SCS<sub>2</sub> (Toril Area) and SOS<sub>2</sub> (Talomo/Bago Gallera Area). (Fig. 7.15)

vi) PU Passengers

Within Poblacion area strongest PU demand is between Poblacion North and CBD1 and between CBD4 and Agdao, with about 1,000 P.T. each, followed by about 800 P.T. between CBD 1 and Poblacion South and CBD1 and Agdao. (Fig. 7.16)

Another big demand for the PU mode is between Poblacion and Matina area (SCS<sub>1</sub>) with about 2,400 P.T. and between Poblacion and Talomo/Bago Gallera Area (SOS<sub>2</sub>) with about 900 P.T.



**Figure 7.13 PUJ Person Trip Desire Line in the Survey Area**

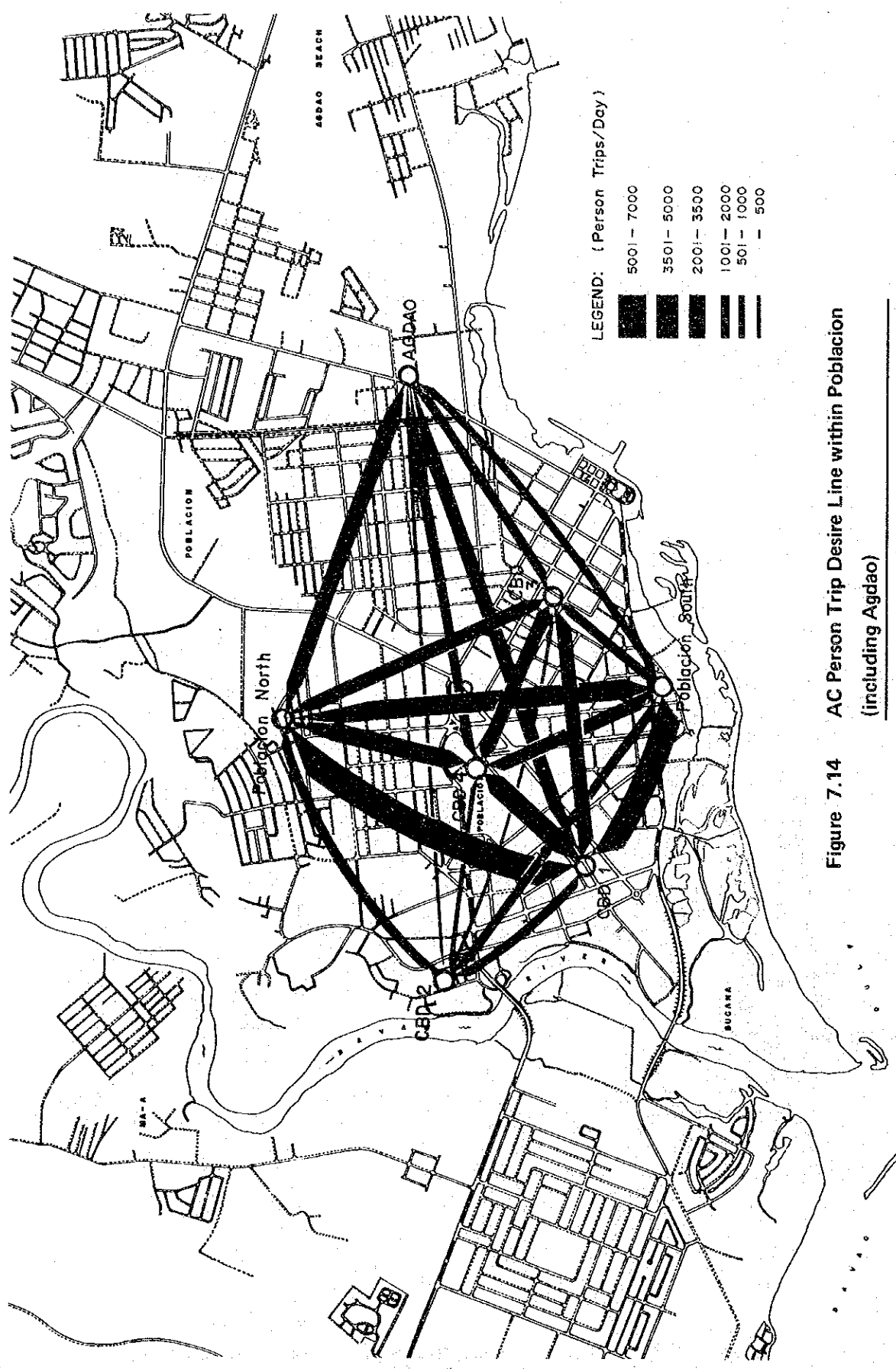
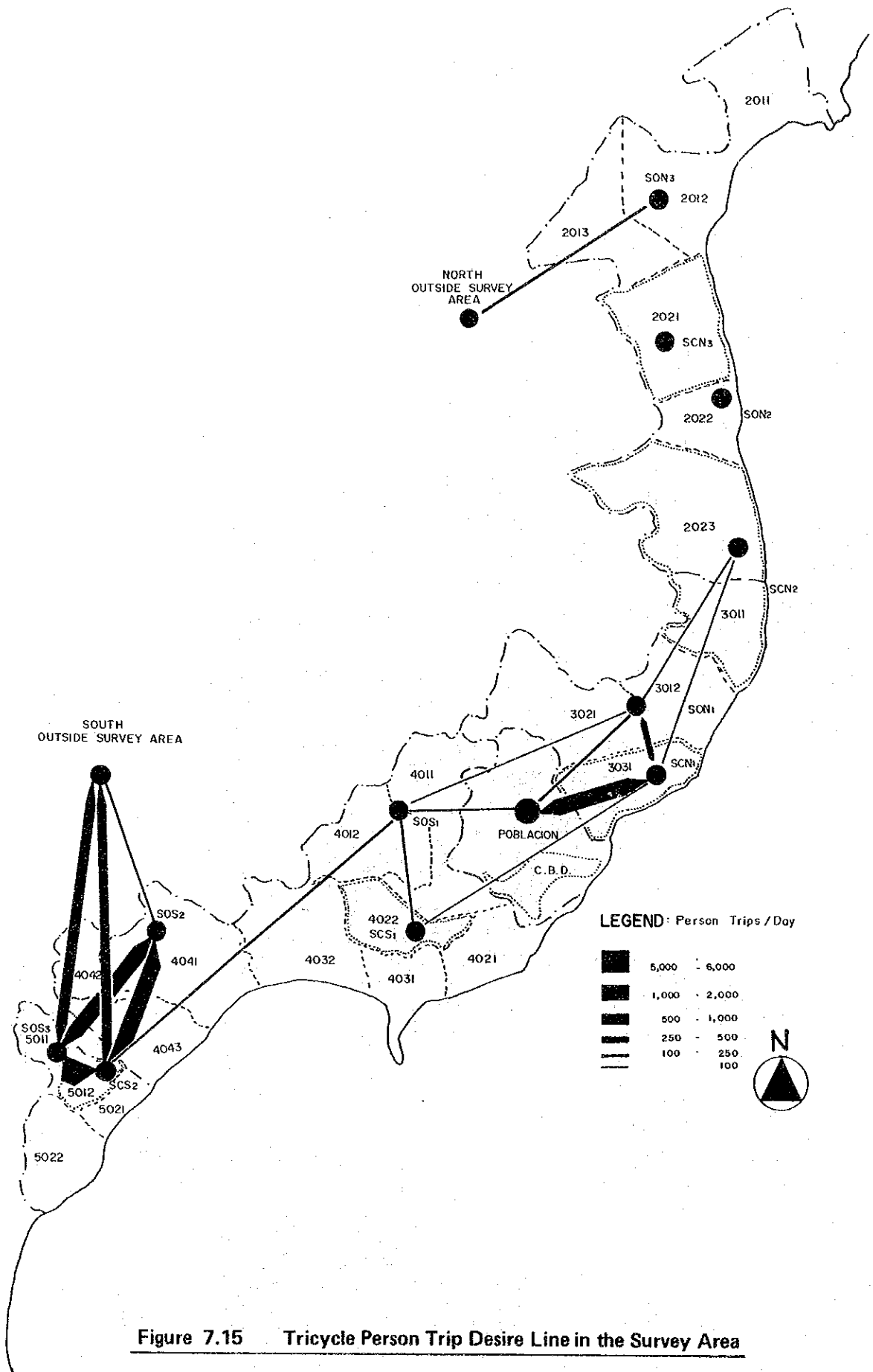


Figure 7.14 AC Person Trip Desire Line within Poblacion (including Agdao)



**Figure 7.15 Tricycle Person Trip Desire Line in the Survey Area**

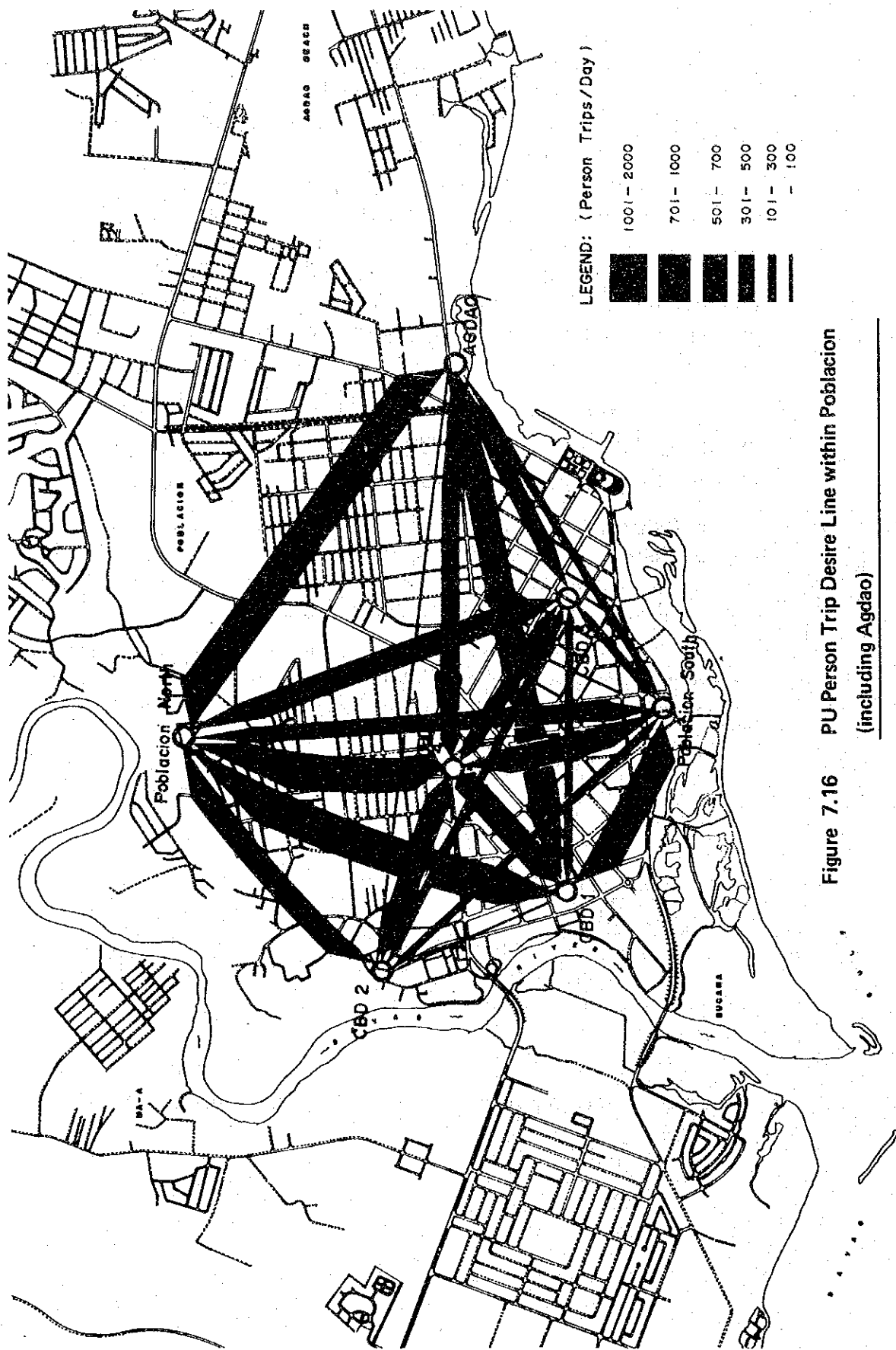


Figure 7.16 PU Person Trip Desire Line within Poblacion (including Agdao)

#### (4) Inter-Modal Transfer

Passengers change from one mode of transportation to another for multitudes of reasons, but the diagrams presented below will illustrate typical situations in which public transport passengers in the Project Area are compelled to transfer to some other mode. (Fig. 7.17)

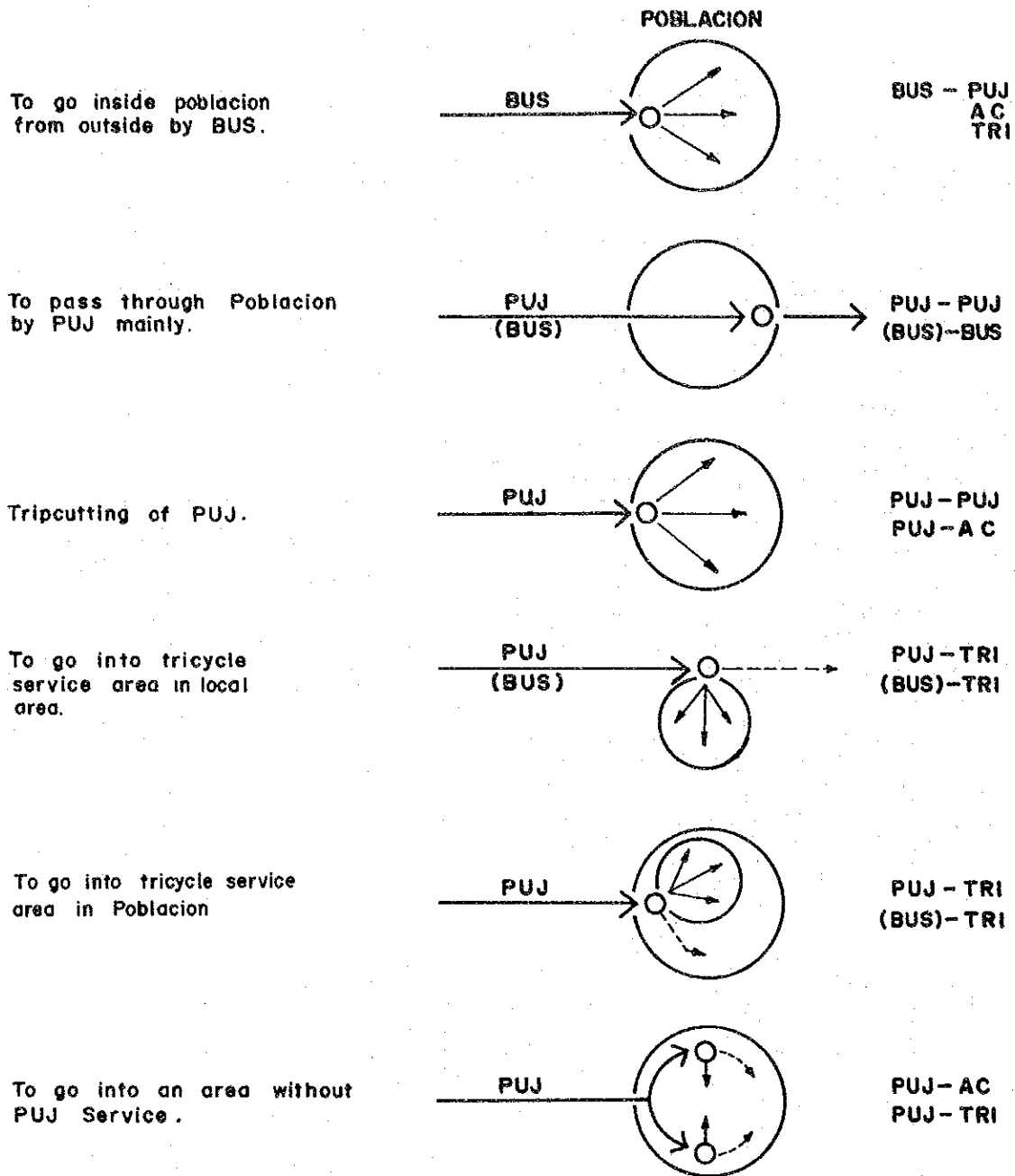
The highest rate of transfer is shown by tricycle passengers, wherein 34% of total person trips on the tricycle transfer to some other mode, 19% being transfers to the PUJ and 9% to the AC. The next highest is 15% shown by bus passengers, 8% being transfers to the PUJ and 6% to the tricycle. The third is the 15% shown by AC passengers, 8% being to the PUJ. PUJ and PU passengers show the transfer rates of 13% and 3%, respectively; about 5% of person trips on PUJs transfer to other PUJs. (Table 7.6)

Transfer patterns are categorized into two: (Fig. 7.18)

- a) Necessary Transit — caused by the present PUV service network, and the
- b) Avoidable Transit — caused mainly by drivers and/or passengers.

By C-zones within Poblacion, the greatest number of transfers are made in the Bankerohan area (C-zone 1031) which are mainly PUJ to PUJ and PUJ to AC transfers. Second biggest is around San Pedro Church area (C-zone 1024), also caused mainly by PUJ to PUJ and PUJ to AC transit.

Outside of Poblacion, most frequent transfers are observed in Agdao Area (C-zone 3031), mainly caused by PUJ to Tricycle transit followed by AC to tricycle transit. The figures 7.19 and 7.20 show the number of transit between PUV modes by C-zone.



**Figure 7.17 Typical Transfer Patterns of PUV Passengers**



**Table 7.6**      **Number of Transfer Between Public Transportation Modes**

	TOTAL NUMBER OF UNLINKED TRIPS BY MODE	TOTAL NUMBER OF TRANSFER (Passenger) TO PUV (Including Same Mode and excluding PU Taxi)	TRANSFER TO				
			BUS	PUJ	AC	TRI	PU
BUS	9,856 100%	2,489 25.3%	<u>48</u> 0.5	<u>1472*</u> 14.9	<u>394</u> 4.0	<u>575</u> 5.8	170
PUJ	19,1726 100%	24,129 12.6%	<u>(1472)</u> 0.8	<u>9707*</u> 5.1	<u>5674*</u> 3.0	<u>7276*</u> 3.8	299
AC	69,856 100%	10,217 14.6%	<u>(394)</u> 0.6	<u>(5674)</u> 8.1	<u>670*</u> 1.0	<u>3479*</u> 5.0	88
TRI	37,733 100%	12,754 33.8%	<u>(575)</u> 1.5	<u>(7276)</u> 19.3	<u>(3479)</u> 9.2	<u>1424</u> 3.8	32
PU	19,361 100%	589 3.0%	<u>170</u> 0.9	<u>299</u> 1.5	<u>88</u> 0.5	<u>32</u> 0.2	59

( ) : This number is counted already in another mode.

\* : These transit patterns involves same problems.

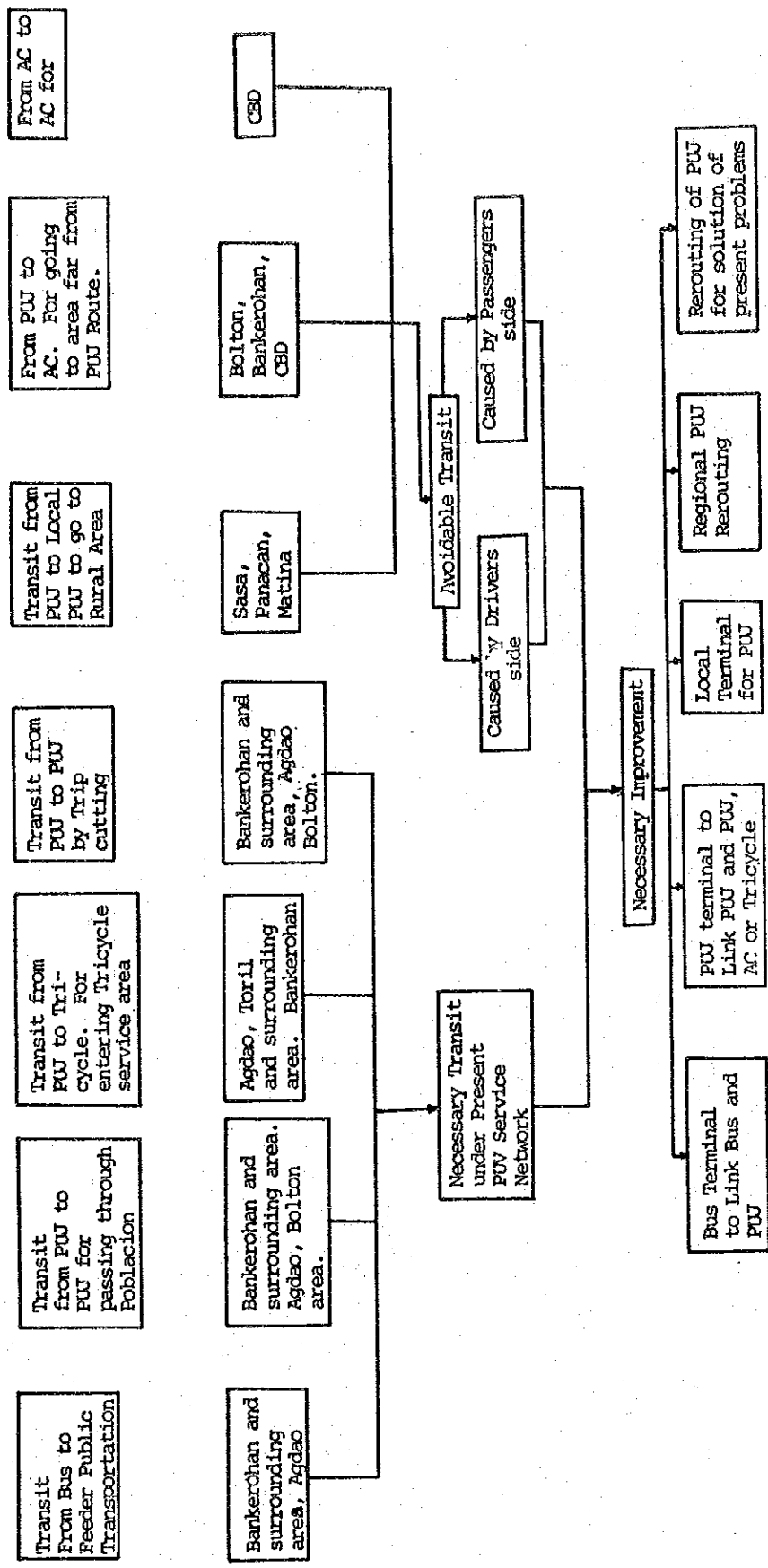
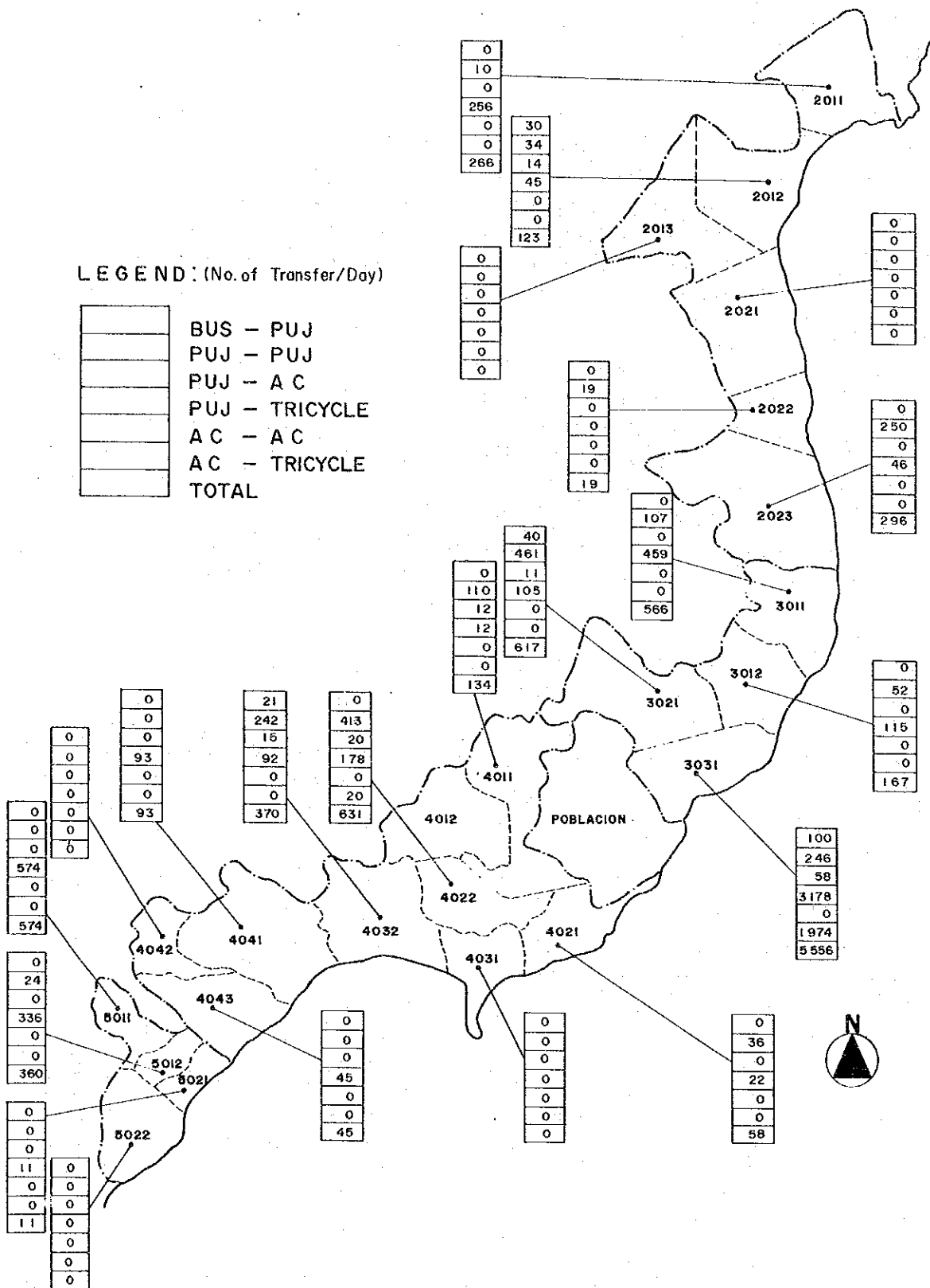


Figure 7.18 Transit between Public Transportations





**Figure 7.20** Number of Transfers between PUJ Modes by C-Zone (Outside Poblacion)

### 7.3 Public Transport Services: Method and Policy

#### 7.3.1 Provincial Bus

##### (1) Route

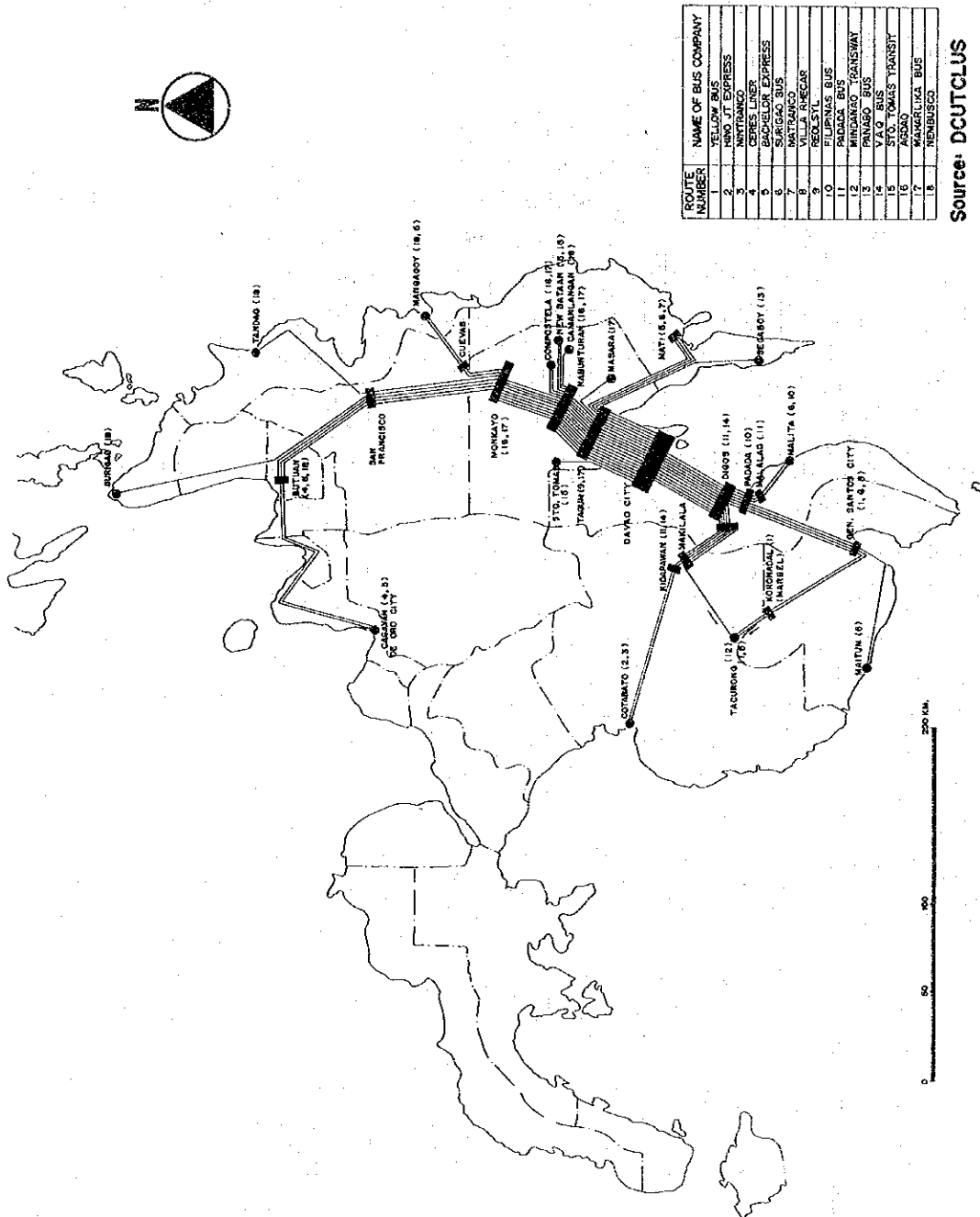
Bus routes having either the starting point or the ending point within Davao City are extended in the north-south direction along Davao-Agusan Road and Davao-Cotabato Road. Cities and municipalities connected by these bus routes are Cagayan de Oro, Butuan, and Tagum in the north of Davao and Cotabato, General Santos, Maitum, and Digos in the south. These towns are all located in the central or eastern part of Mindanao Island, which is as far as the hinterland of Davao City goes. (Fig. 7.21)

The total bus service frequency is about 670 per day, of which about 270 runs are to the north and 390 to the south. Northern service is well balanced: of the total 270 runs per day, 96 runs cover the distance of over 200 kilometers, 88 runs cover from 100 to 200 kilometers, and 96 runs cover less than 100 kilometers. Southern service is disproportionately heavy on the distance of 100 to 200 kilometers with about 273 runs per day, as against about 70 runs for over 200 kilometers and 48 runs for less than 100 kilometers. Shortest bus route is a little over 50 kilometers, which is longer than any PUJ route. (Table 7.7)

**Table 7.7** Bus Service Frequency by Distance to Destination

	(trips/day)		
	Less 100 km	100 km –200 km	over 200 km
<b>TO NORTH</b>			
No. of Bus Route	6	6	4
Service Frequency	96	88	96
<b>TO SOUTH</b>			
No. of Route	2	6	2
Service Frequency	48	273	72

Source: Bus Service and Passenger Survey in 1979, DCUTCLUS



Source: DCUTCLUS

Figure 7.21 Routes of Provincial Buses to/from Davao City, 1979

(2) Terminal

All six bus terminals existing in Davao City are owned and operated by private enterprises. The largest of the six is Bankerohan Terminal:

i) Bankerohan Terminal (Fig. 7.22)

Separate bus terminals owned by six bus companies and existed in the central part of Poblacion have been combined into this bus terminal under the City's terminal relocation policy, and this terminal, which is located near Bankerohan Bridge, is being utilized by the six companies.

More than 300 buses arrive and depart from this terminal each day. Of this, over 150 buses serve the areas south of Davao.

The terminal has a total land space of 6,500 square meters, which is divided into two for use by three companies each. The terminal premises is not yet paved, and spaces for bus parking or spaces for passenger loading/unloading are not specifically designated. Bus company office buildings and passenger waiting sheds are of inferior construction, and the explanation offered is that the terminal is only temporary.

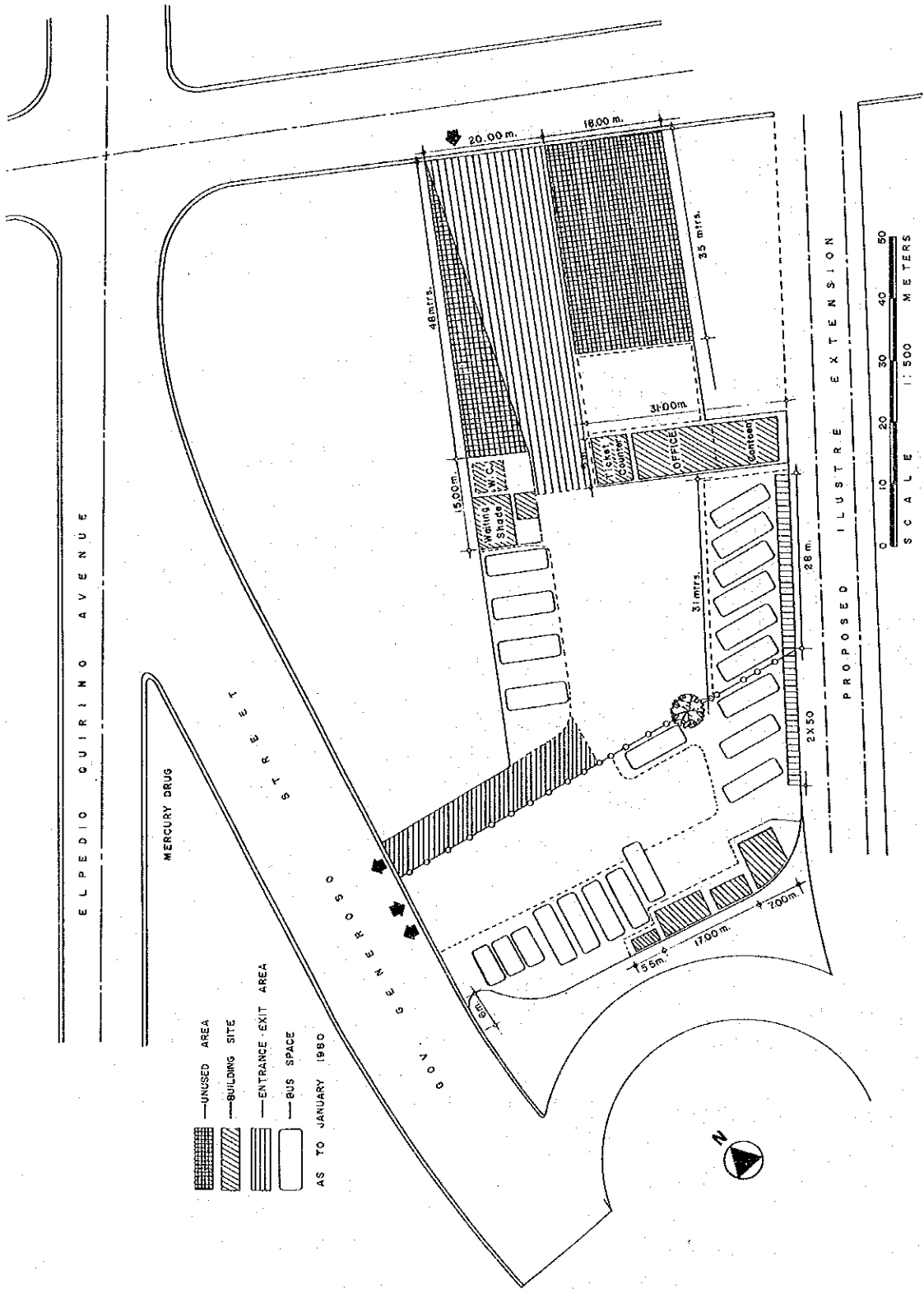


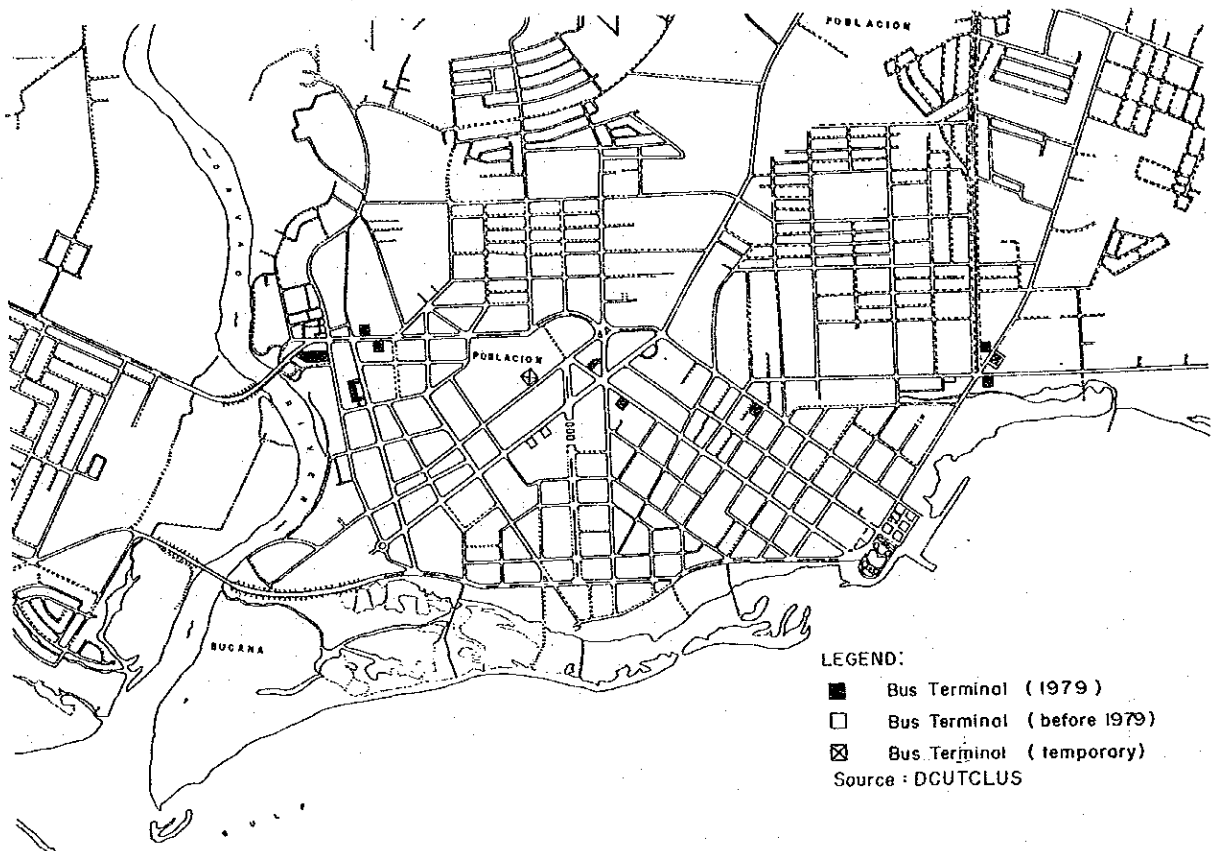
Figure 7.22 Bankerohan Bus Terminal



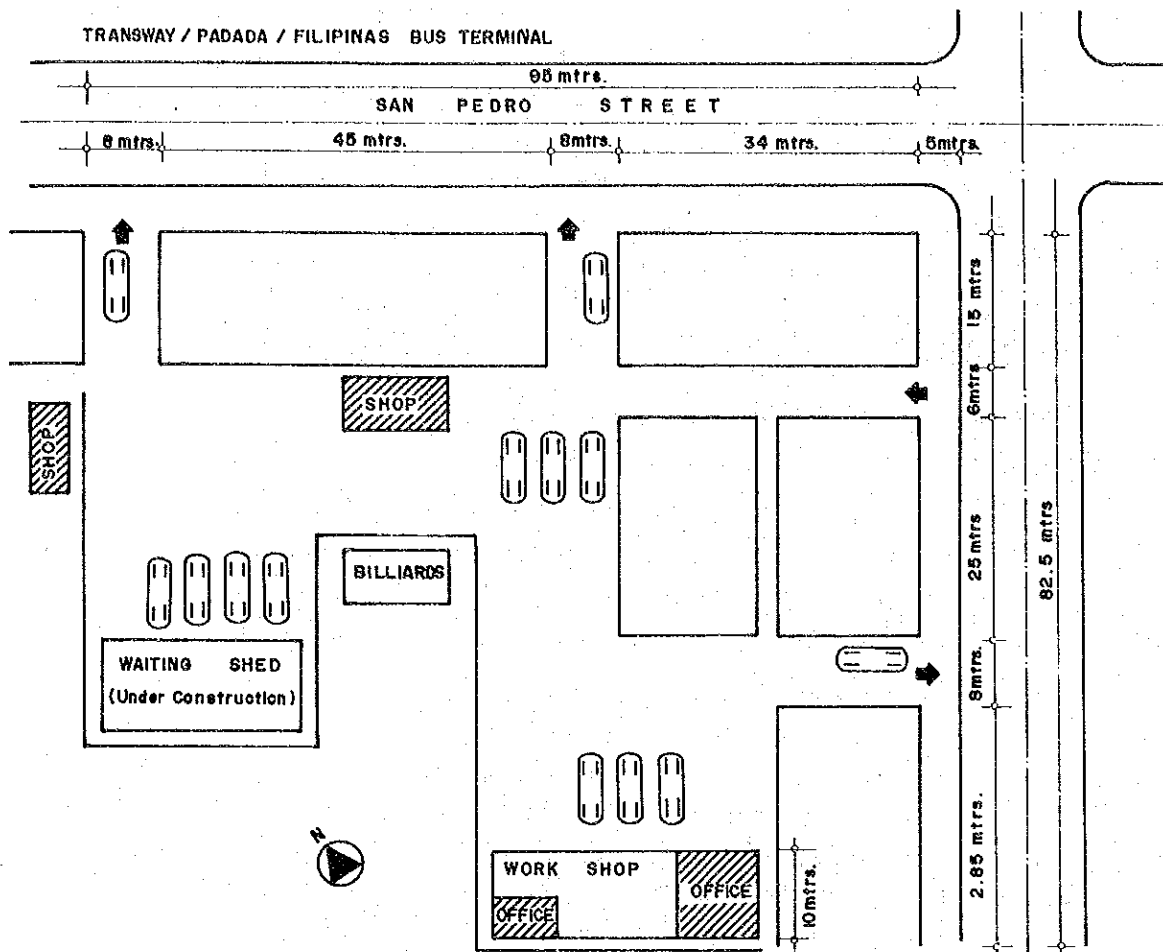
ii) Smaller Terminals

Five smaller terminals are located along arterial roads within Poblacion, and most of them are used jointly by two or three bus companies.

The largest of the five has a land space of about 4,000 square meters along San Pedro Street and is used by three bus companies: Transway, Pada-da and Filipinas. Villa Rhecarr terminal has a land space of about 1,800 square meters along R. Magsaysay Street and has an adjoining small market. The remaining three terminals have a land space from 400 to 700 square meters.



**Figure 7.23** Location of Bus Terminals in Poblacion



**Figure 7.24 Sample of Small Bus Terminal in Davao City**

**(3) Business**

Currently, 18 entities are engaged in the operation of bus service on routes starting from or terminating in Davao City. The 18 entities can be classified by the institutional status as follows: (a) 13 corporations, (b) 3 cooperatives, and (c) 2 groups of individuals (natural persons).

Corporate bus companies are generally engaged in long distance service covering Cagayan de Oro, Butuan, and Cotabato, using large 50 or 60-passenger buses. Bus personnel (drivers and conductors) are employed by the company for a fixed salary.

Cooperatives and individual operators serve cities relatively close to Poblacion, such as Tagum, Sto. Tomas, and Digos, using so-called mini buses with the capacity of 20 to 25 passengers. The driver leases the bus from the operator and, out of his earning from bus fares, pays the operator the rental, buys fuel, defrays the cost of minor repairs, bears other necessary expenses, and keeps the remainder as his income.

The bus fare is stipulated by BOT at 0.5 Peso for the initial five kilometers and 0.1 Peso for each additional kilometer.

The work hours of the driver depends on the distance of operation; for instance, in the case of bus for Cagayan de Oro, the driver's work hours extend to 13 hours while he is driving about 500 kilometers.

The amount of daily fare intake naturally fluctuates depending on the circumstances,, but generally ranges between 1,000 and 2,000 Pesos. Daily expenses are 300 to 600 Pesos for fuel, 30 to 40 Pesos for lubricants and about 70 Pesos for insurance. The remnant driver's income is 40 to 65 pesos per day.

### 7.3.2 Public Utility Jeepney (PUJ)

#### (1) Route

PUJ routes in Davao City are still in the midst of repeated process of study, experiment, and re-routing. The routes now in force are already different from those existed at the time various traffic surveys were conducted.

The recent PUJ rerouting activities in Davao City will be discussed hereunder.

#### i) PUJ Re-Routing Schemes

Davao City PUJ rerouting was tried three times during a short span of time from 1979 to 1980, and the last rerouting scheme is not yet implemented. The three were (1) CHPG Davao Office-formulated scheme, which was put into trial in February, 1979, (2) which was revised by the Davao City Transport Committee (DCTC) and implemented in August 1979, and (3) the further revision by DCTC, enforced from May 1980.

In force prior to the start of PUJ rerouting in Davao City was the sharing of public transport service by various modes as follows: ACs served inside Poblacion, PUJs served up to the entrance of Poblacion, tricycles served very short trips in areas where PUJ service was inadequate, and buses served inter-provincial trips.

This system was identified with the following problems: (1) commuters to Poblacion from outside were compelled to transfer at the Poblacion entrance twice (morning and evening) or four times (if they went home for lunch) daily and to pay an additional fare at each transfer, and (2) PUJ terminals which were operated by PUJ operators needed a fair degree of improvements.

In order to remedy these problems, the first re-routing plan (February 1979) banned the use of PUJ terminals and established continuous PUJ routes in and out of Poblacion. PUJs now entered Poblacion from either northern or southern entrance, circulate within Poblacion on the designated one-way route, and (were obligated to) return to the origin. All PUJs starting from the same origin were now given the same route. Four such routes were established from north and four from south, and each PUJ was assigned with a route in response to the desire of the PUJ operator.

The new routes were subject of successive complaints, chiefly from drivers, (1) that service routes were now unnecessarily too long and PUJ

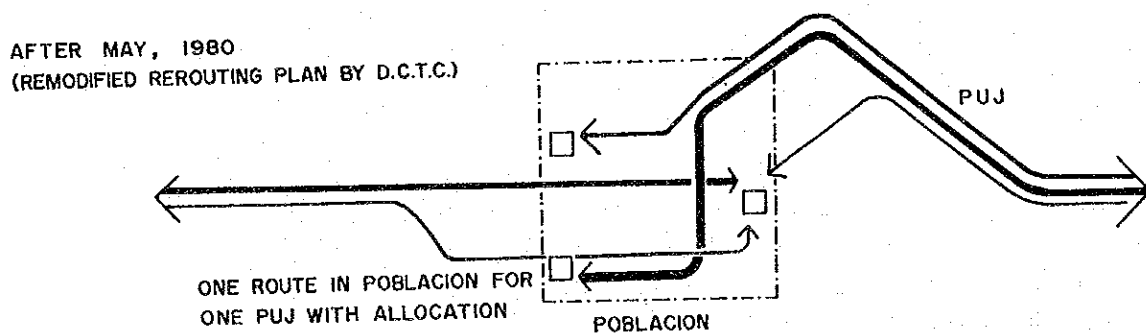
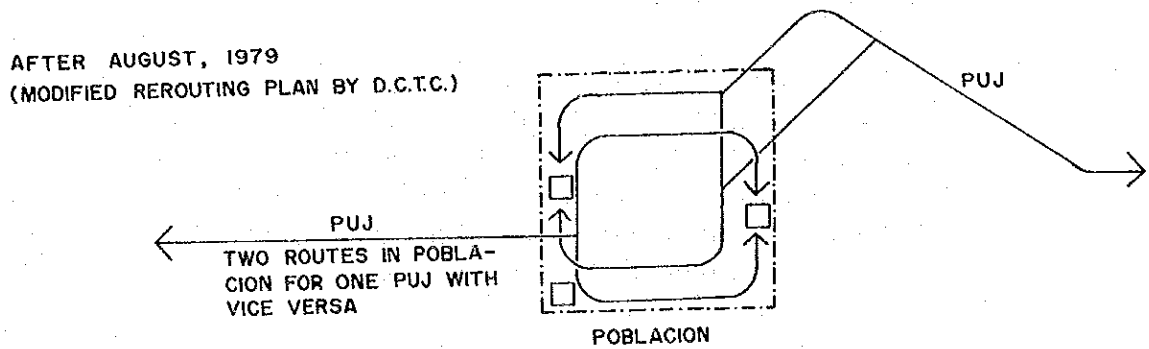
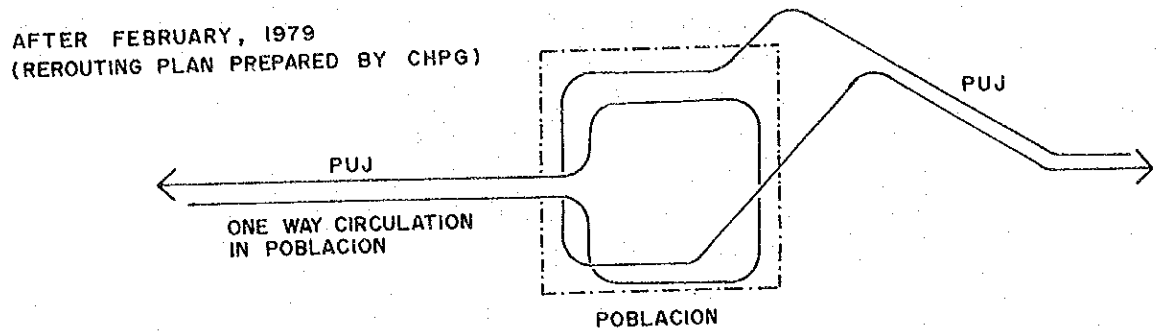
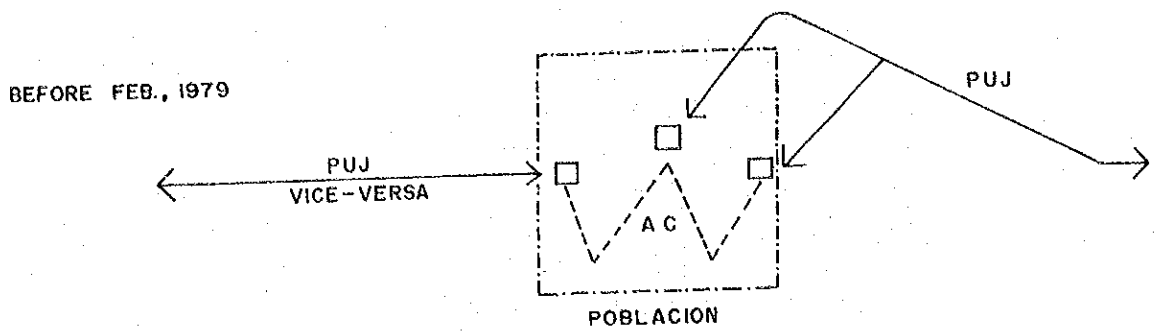
operation had become uneconomical, (2) that PUJ drivers could no longer rest in the vicinity of Poblacion, and (3) that the number of available passengers was too small on certain routes.

Again in order to solve the complained problems, the second re-routing plan was devised, under which (1) PUJ terminals were established on the edges of Poblacion where all PUJ routes were to terminate after making a round within Poblacion (although, no particular terminal facilities were ultimately constructed, and loading and unloading of PUJs took place on the road), and (2) every PUJ was now assigned with two routes, from which the driver could select the route to take depending on the level of demand.

Under this second rerouting plan, every driver started to continue to stay on the more lucrative of the two routes assigned, and as a result, frequent PUJ service was always available on certain routes, while only inadequate level of service was available on other routes. Consequently, some drivers started the practice of serving only a part or parts of the designated route — a practice called "trip cutting." Also, PUJs crowded the roads near PUJ terminals to the extent of blocking traffic.

The third rerouting plan allocated certain number of PUJs to each route depending on the demand on the route, as a means of overcoming the mis-matched demand and supply on individual routes as revealed during the preceding test period.

Observed in the above is a process of repeated trials and errors for the improvement of PUJ service system for both greater passenger convenience and better operator/driver profit. Unfortunately however, no basic data on the quantities of traffic and passenger had come out of the series of rerouting efforts made by the Davao City authority, and all the plans were based on empirical knowledges of the staff concerned.



**Figure 7.25 Variation of PUJ Routes in Davao City**

**Table 7.8 Aims and Problems of PUJ Rerouting Schemes**

SCHEME	AIM	PROBLEM
Prior to February 1979		<ol style="list-style-type: none"> <li>1. PUJ service only connected terminals on the fringe of Poblacion with origins outside Poblacion.</li> <li>2. Traffic congestion around PUJ Terminals</li> <li>3. Transfer at the terminal and double fare were necessitated.</li> <li>4. Terminal operation was in violation of traffic rules</li> </ol>
Rerouting Scheme by CHPG	<ol style="list-style-type: none"> <li>1. Extension of PUJ service to points inside Poblacion, so passengers could reach the city center without transfer.</li> <li>2. Elimination of double fare.</li> <li>3. Uniform display of destination</li> <li>4. Ban on the use of private terminals.</li> <li>5. Establishment of Intra-Poblacion circular routes and direction controlled one-way routes</li> </ol>	<ol style="list-style-type: none"> <li>1. Longer operational distances.</li> <li>2. Rapid increase in fare due to rise in gasoline price at this time.</li> <li>3. Drivers no longer had a place to rest after the ban on the use of terminals.</li> <li>4. At some of PUJ routes it was difficult to find enough passengers for drivers.</li> </ol>
Modified Rerouting Scheme by DCTC	<ol style="list-style-type: none"> <li>1. To shorten the length of routes through the placement of circular routes by shuttle routes.</li> <li>2. Establishment of two routes for each PUJ for selection by driver at each time; as demand on each route was unknown.</li> <li>3. Branch service routes were established to cover areas not previously served by PUJ.</li> <li>4. Uniform display of destination and route.</li> </ol>	<ol style="list-style-type: none"> <li>1. Parts of road were used as PUJ terminals and, therefore, they lacked sufficient space.</li> <li>2. Over-served routes and under-served routes resulted, and, therefore.</li> <li>3. Some drivers started to cut trips</li> <li>4. Area served by PUJs was not adequately expanded.</li> </ol>
Remodified Rerouting Scheme by DCTC	<ol style="list-style-type: none"> <li>1. The assignment of PUJ service to each route for even distribution of the service.</li> </ol>	

ii) Existing PUJ Routes

The DCUTCLUS Traffic Survey was conducted when the second rerouting scheme had just been put into trial, and therefore, "the existing PUJ routes" in this report means those which were stipulated by the second plan, unless otherwise specifically noted.

The second rerouting plan designated seven PUJ originating points outside Poblacion (4 in north and 3 in the south) and three terminals in Poblacion (2 for routes from the north and 1 for routes from the south) and established a total of 11 PUJ routes connecting one of the origins and one of the terminals (6 routes from the north and 5 routes from the south). (Fig. 7.26)

In Poblacion, the established PUJ routes followed only major arterial roads connecting Bankerohan Market or Bolton Bridge with Agdao Market, such as:

- A) F. Torres Street – Trade School Drive – N. Torres Street
- B) E. Quirino Avenue – Sta. Ana Avenue – Lapu-Lapu Street
- C) A. Pichon Street – M. Quezon Boulevard – L. Garcia St.
- D) A Pichon Street – C.M. Recto Avenue – R. Magsaysay Avenue – F. Bangoy Street

Assigned to each of the above roads were the following PUJ routes:

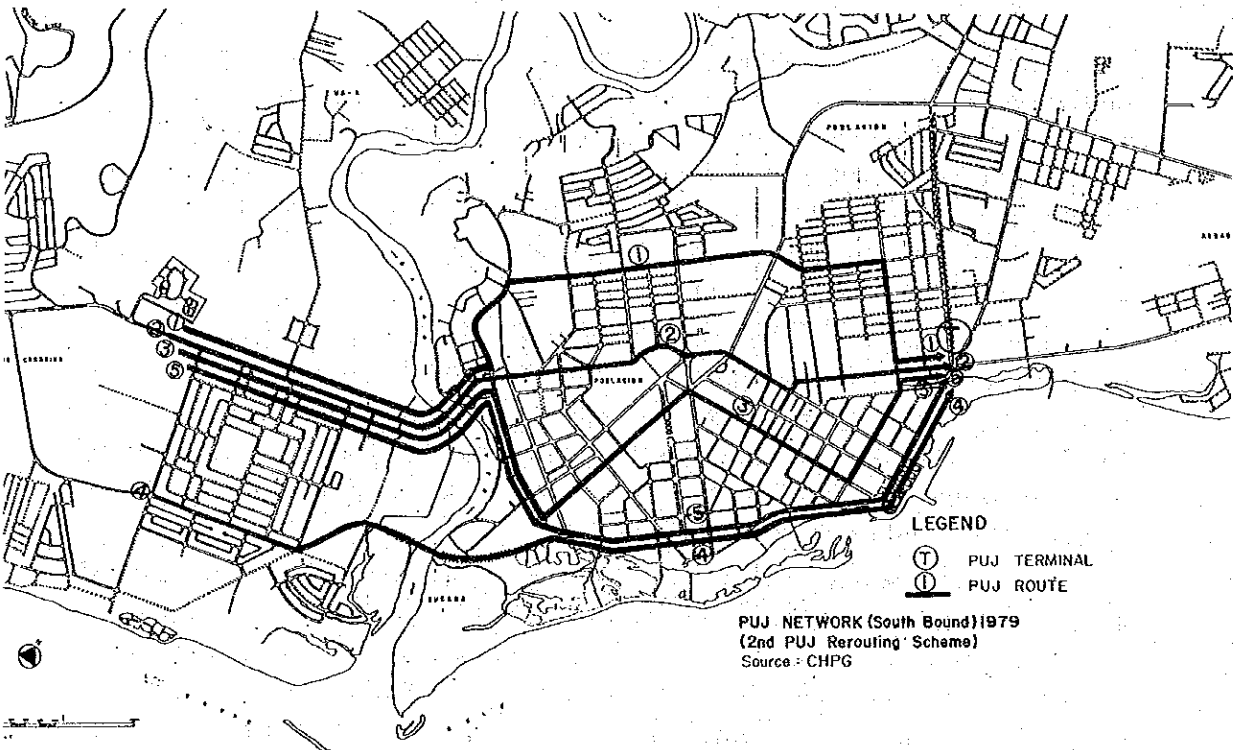
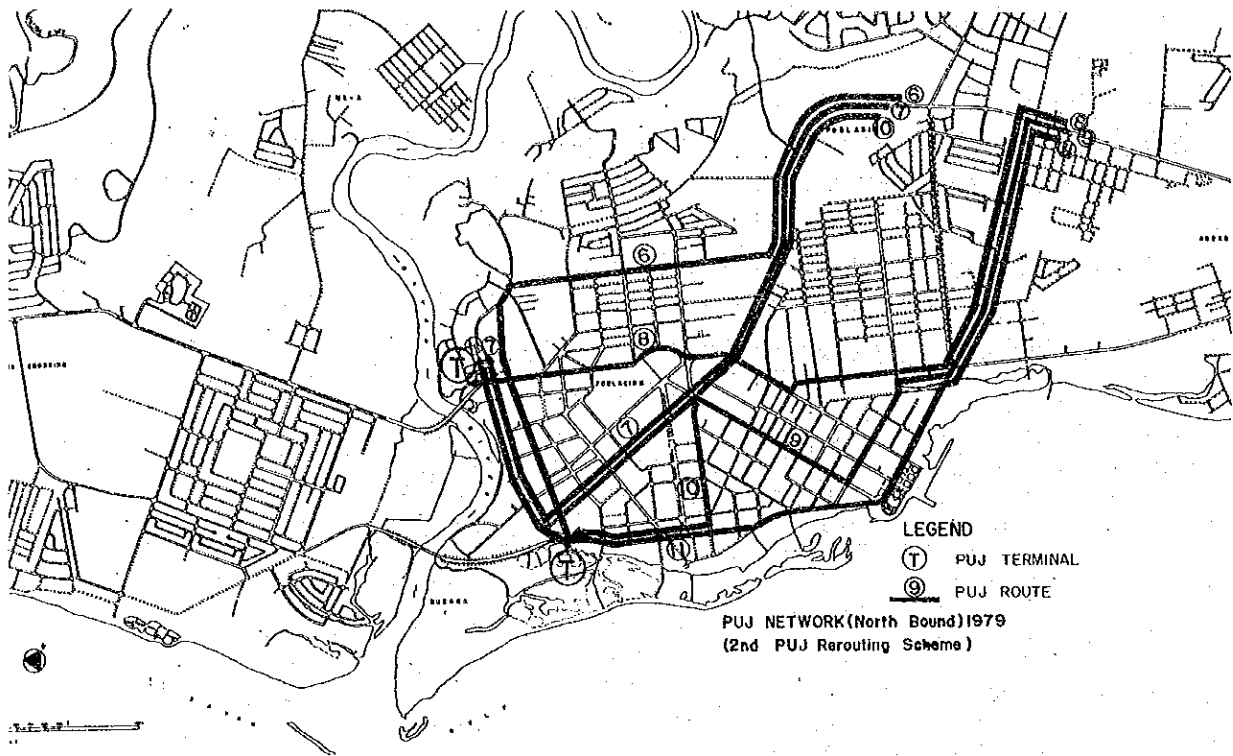
Road	PUJ Route from the north	PUJ Route from the South
A)	Route 6	Route 1
B)	Route 8	Route 2
C)	Route 11	Route 5
D)	Route 9	Route 3

Of these routes, those which came from the north entered Poblacion through either J.P. Cabaguio Street or Agdao Market and those which came from the south entered Poblacion through Bankerohan Bridge. Additionally designated were Route 4, which came from the south and entered Poblacion through Bolton Bridge and followed the road c) above except A. Pichon Street, Route 7, which came from the north, entered Poblacion from J.P. Laurel Avenue, and followed C.M. Recto Street and A. Pichon Street, and Route 10, which came also from the north, entered Poblacion from the same entrance, and followed E. Jacinto Street and M. Quezon Boulevard. These are believed to have been established so as that the equal number of routes would use the north entrance and the south entrance of Poblacion.

While the third rerouting plan followed the same principles as the second, it provided an additional southern route via Bolton Bridge where the volume of traffic was relatively small and PUJ service was scarce.

(2) Allocation and Service Frequency

At the time the Second Rerouting Plan was implemented (or when current status survey was being conducted under this Study), PUJs had not been allocated to each route, but each PUJ was assigned with two routes. The number of PUJs for each route pair is known.



**Figure 7.26 Modified PUJ Rerouting Scheme**



**Table 7.9 Registered Number of PUJ on PUJ Routes of Modified Rerouting Plan**

PUJs Come from South of Poblacion			PUJs come from North of Poblacion		
Route		PUJs	Route		PUJs
1 & 4		152	6 & 8		59
1 & 2		69	6 & 10		82
1 & 3		353	6 & 11		582
2 & 4		453	7 & 8		241
2 & 5		74	7 & 10		16
4 & 5		14	8 & 10		50
			8 & 11		43
			9 & 10		145
			10 & 11		122
<b>TOTAL</b>		<b>1,176</b>	<b>TOTAL</b>		<b>1,340</b>

Source: CHPG

Actual PUJ service frequency was known for each route from a separate PUJ survey. Of the overall service frequency of about 15,500 trips per day, that which enjoyed the maximum service frequency was Route 3 on which the frequency was about 4,900 trips per day, while that on the minimum service route, Route 5, was only about 80 trips per day (see Table 7.10). Of the total running distance of PUJs of about 181,000 kilometers per day. Route 3 received about 57,900 kilometers per day, and Route 5, about 1,000 kilometers per day.

Demand for PUJ could be known from Person-Trip Survey. The total distance of movement of Survey Area residents was about 929,000 kilometers (the true unit is passenger-kilometer). Route with the maximum demand is Route 3 with about 132,000 kilometers, and that with the minimum demand, Route 4 with 42,000 kilometers. (The actual total distance of movement was greater than indicated due to the inclusion of non-resident movement).

Based on these data, the concept of average occupancy rate could be explained as follows: If only one PUJ was available in Davao City, it ran 181,000 kilometers per day for business and, if there was only one passenger, it carried the passenger for a distance of 929,000 kilometers. This is the same as that the PUJ ran 181,000 kilometers with a constant number of passengers of 5.1- and this 5.1 is the average occupancy rate.

When this overall thinking was extended to reach route, differences between routes in demand-supply relationship could be known. (Table 7.10)

First of all, this Table revealed the polarization of PUJ service – the service was

concentrated on Routes 3, 10, 9, and 7, while the service was scarce on Routes 5, 8, 4, 2, and 1. Now, demand could be understood from the O-D table of the existing PUJ passengers, which showed that demand is large on Routes 3 and 6, and that demand is small on Routes 4, 10, 11, 2, and 8. The levels of service and the levels of demand generally coincide.

**Table 7.10 Comparison between PUJ Traffic Demand in Passenger-Kilometer and Number of Car Trip-Kilometer Modified Rerouting Scheme**

NAME OF ROUTE	SERVICE FREQUENCY	CT.KM <sup>2/</sup> BY ROUTE	INTRA-ZONAL PASS. KM. IN POBLACION	INTER-ZONAL PASS. KM.	TOTAL PASS.KM. BY ROUTE	AVERAGE OCCUPANCY RATE
R-1	765	8,688	5,829	87,516	93,345	10.7
R-2	529	5,630	12,040	66,300	78,340	13.9
R-3	4,896	57,866	8,536	123,480	132,016	2.3
R-4	456	5,151	4,314	37,706	42,020	8.2
R-5	83	962	11,535	76,423	87,958	91.4
R-6	143	1,927	6,497	100,389	106,886	55.5
R-7	1,349	20,091	16,443	64,859	81,302	4.0
R-8	116	984	10,687	65,102	75,789	77.0
R-9	1,940	27,198	9,796	73,489	83,285	3.1
R-10	2,026	32,491	21,790	48,415	70,205	2.2
R-11	1,454	20,349	11,230	62,849	74,079	3.6
Unknown	1,712		3,554		3,554	
<b>TOTAL</b>	<b>15,469</b>	<b>181,337</b>	<b>122,251</b>	<b>806,528</b>	<b>928,779</b>	

Source: DCUTCLUS

<sup>1/</sup> No. of PT x (Ave. P.T. Length)

Intrazonal = 1.92 Km/PT

Interzonal = 8.5 Km/PT South

8.7 Km/PT North

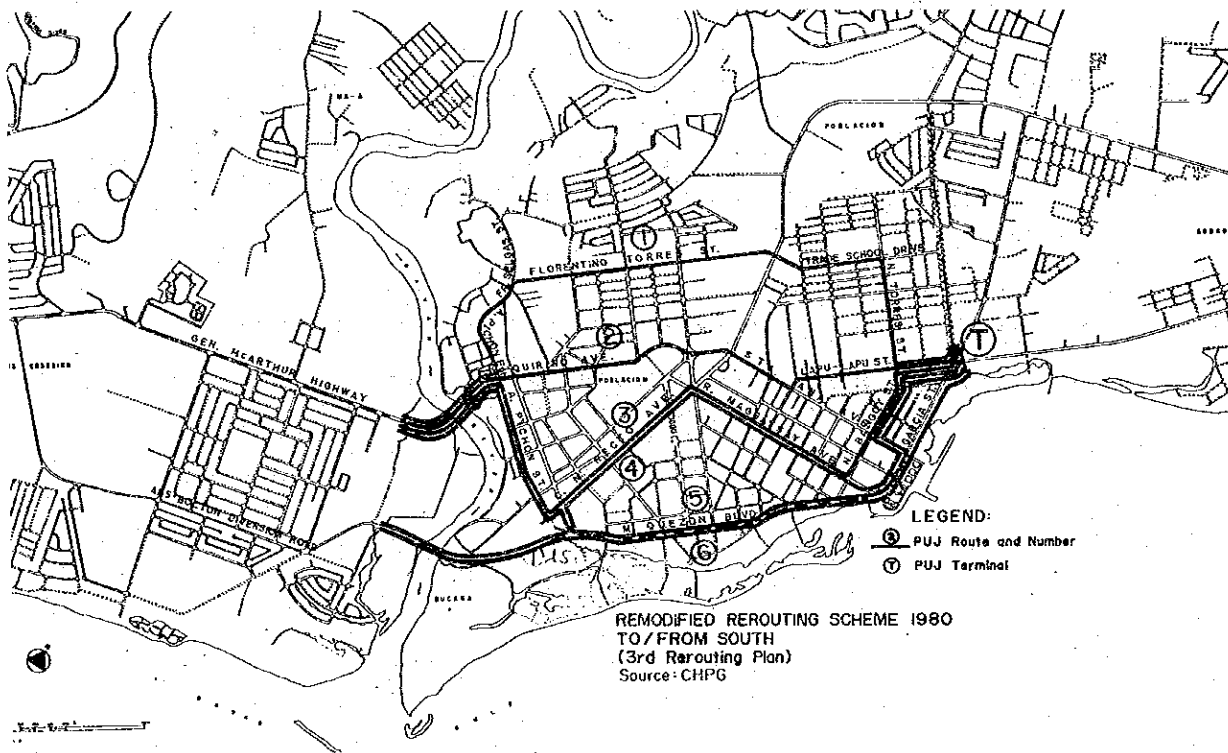
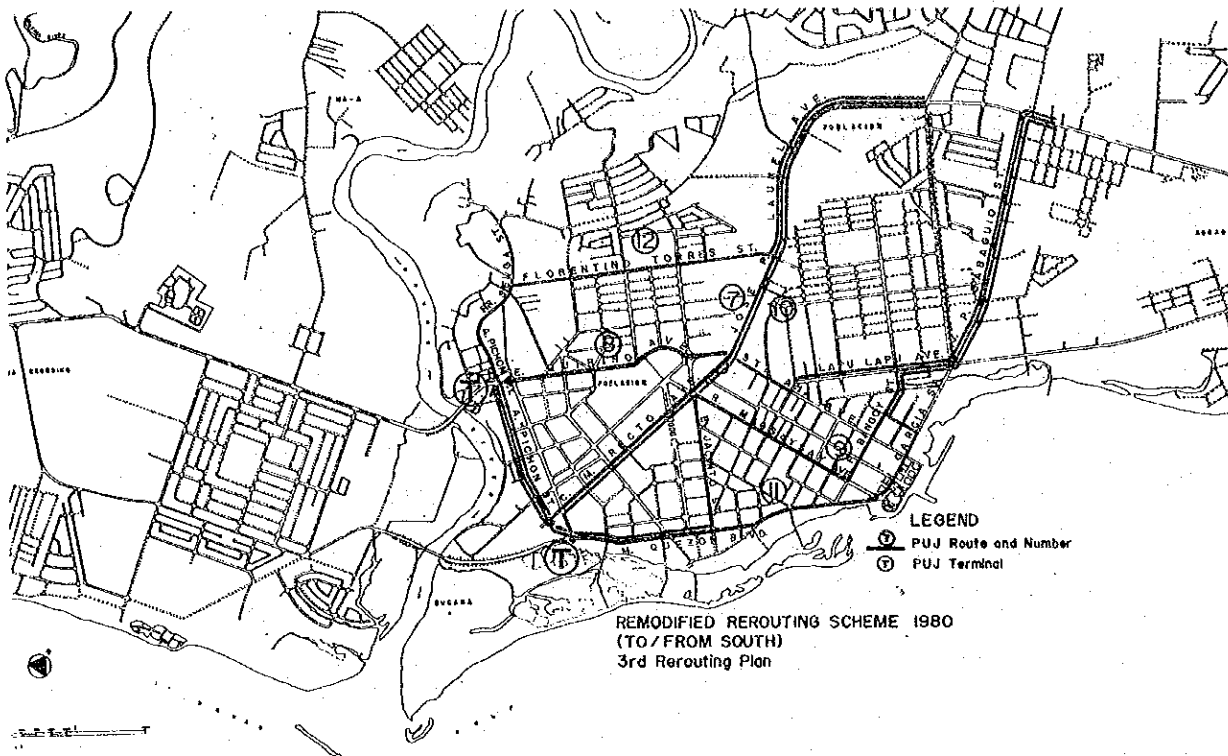
<sup>2/</sup> From Table "Estimation for Volume of Car-Transportation in CT.Km by PUJ Route"

Based on these calculations, the occupancy rate was calculated for each route. The largest occupancy rate was 91 on Route 5, followed by 77 on Route 8, and 55 on Route 6. These occupancy rates were too large to be significant, but the supply of PUJ service to these routes was markedly lower than the supply to other routes. It is assumed that passengers living along such routes walk to a frequently served route. Therefore the number of passengers are increasing on routes whose average occupancy rate was calculated as very low (such as the rate of 2 for Route 3 and 10, 3 for Route 9, and 4 for Route 7), and, therefore, the actual occupancy rates must have evened out among the routes. Given such consideration, the demand-supply imbalance still shown in this Table suggested a substantial polarization of service by the driver preference of route.

The third rerouting plan allocated the number of PUJs to each route as it changed PUJ routes. This was for the adjustment of demand-supply variations between routes, as revealed under the second rerouting plan.

As for routes, 6 routes were established for reaching Poblacion each from the north and the south. In the north, 4 PUJ originating points were designated (Buhangin, Mandug, Indangan, and Panacan-Sasa) and 3 in the south (Talomo — Ma-a, Toril, and Calinan) (Fig. 7.27). PUJs were allocated to 42 different combinations of such origins and routes.

The PUJ demand structure which is conceived of by the Davao City authority could be presumed from Table 7.11.



**Figure 7.27 Remodified PUJ Rerouting Scheme**

**Table 7.11 Allocated Number of PUJ for PUJ Route of Remodified Rerouting Plan**

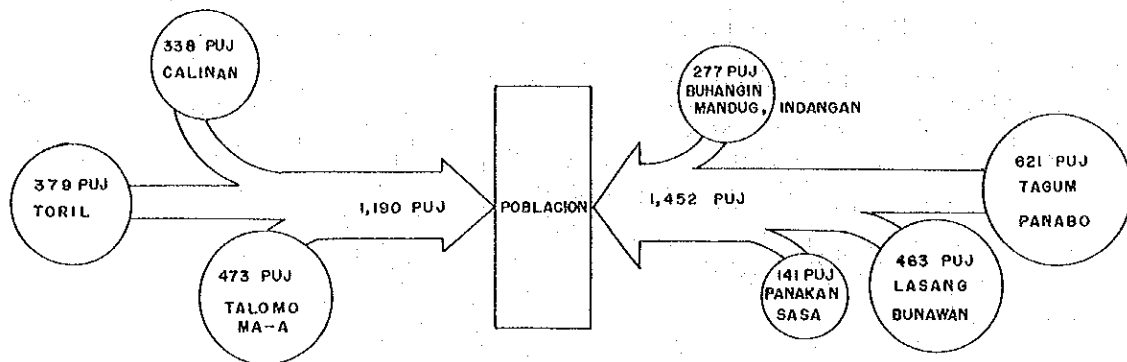
Route Number in Poblacion	Origin	(PUJ comes from South)			Total (A)	Actual Registration (B)	Notes B/A (%)
	Calinan	Toril	Talomo Ma-a				
1	10	11	14	35	18	51.4	
2	6	7	8	21	5	23.8	
3	135	149	185	469	469	100.0	
4	51	56	72	179	3	1.7	
5	68	73	97	238	164	68.9	
6	68	73	97	238	90	37.8	
Total	338	379	473	1190	749	62.9	

Route Number in Poblacion	(PUJ comes from North)				Total (A)	Actual Registration (B)	Notes B/A %
	Tagum Panabo	Lasang Bunawan	Panacan Sasa	Mandug Buhangin Indangan			
7	186	139	43	68	436	404	92.7
8	18	14	4	7	43	12	27.9
9	186	139	43	68	436	253	58.0
10	27	18	5	9	59	13	22.0
11	186	139	43	68	436	174	39.9
12	18	14	3	7	42	3	7.1
Total	621	463	141	277	1452	859	59.2

Source: Comparative Report on Vehicle Allocations and Actual Registration Per Designated Route (CHPG)

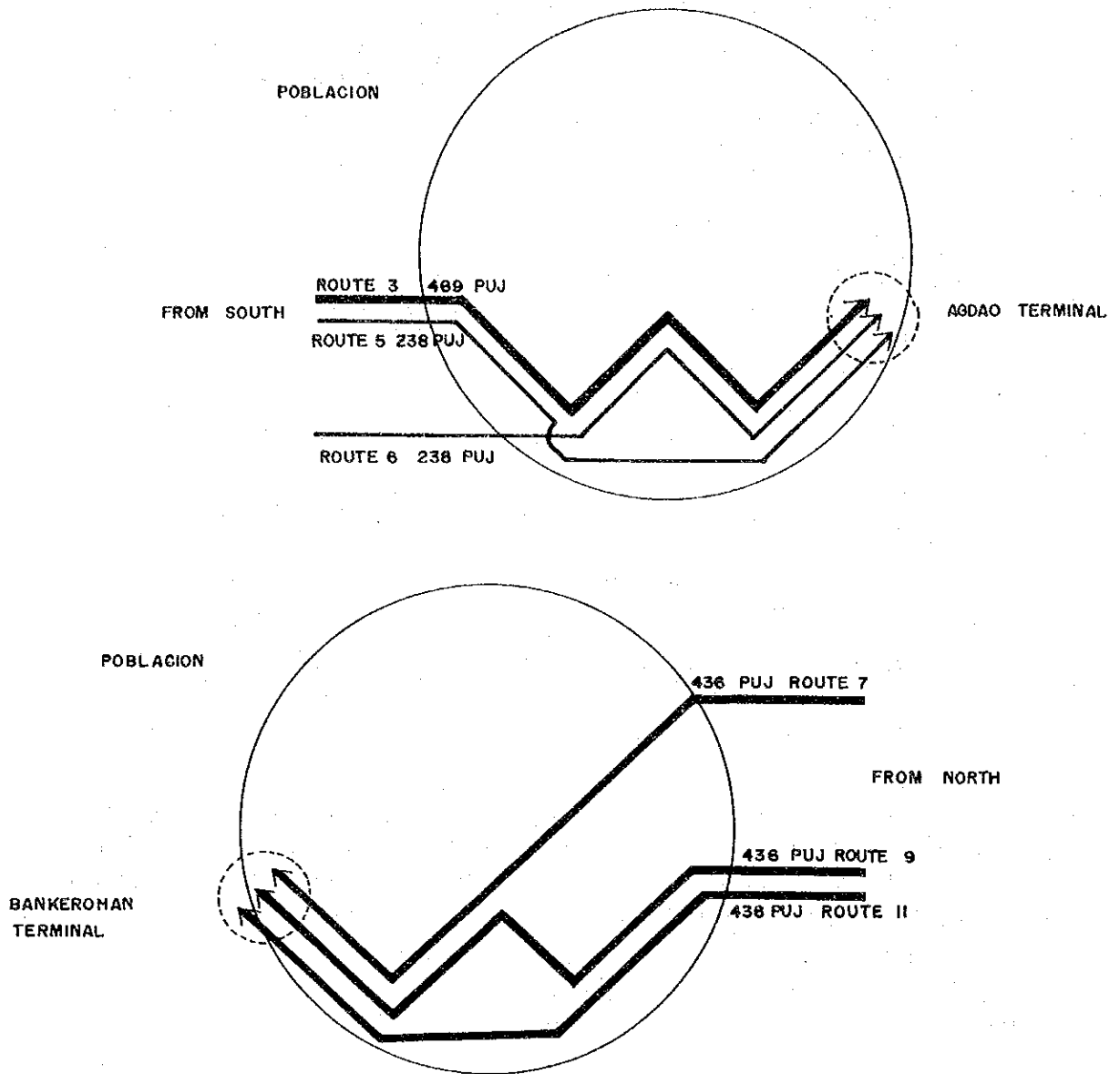
On the north, the number of PUJs per each origin generally becomes greater as the distance increases, and it is known that large demands are present in Bunawan and Lasang Districts, as well as Panabo and Tagum District which are adjacent to the first two on the north. On the other hand, a large number of origins in the south are in a short distance and the number of origins in a long distance is relatively small – showing that demand is large in short distances.



SOURCE: COMPARATIVE REPORT ON VEHICLE ALLOCATIONS AND ACTUAL REGISTRATION PER DESIGNATED ROUTE (CHPG)

**Figure 7.28 PUJ Allocation by Origin based on Remodified Rerouting Plan**

As for the allocation of PUJs to PUJ routes in Poblacion, it is obvious that emphasis was placed on Routes 7, 9, and 11 from north and Routes 3, 5, and 6 from the south. That is, emphasis was placed on areas along A. Pichon Street, C.M. Recto Avenue, R. Magsaysay Avenue, L. Garcia Street, and M. Quezon Boulevard.



NOTE: ONLY MAJOR PUJ ROUTES INDICATED ON THIS FIGURE.

SOURCE: COMPARATIVE REPORT ON VEHICLE ALLOCATIONS AND ACTUAL REGISTRATION PER DESIGNATED ROUTE (CHPG)

**Figure 7.29** PUJ Allocation for PUJ Routes in Poblacion based on Remodified Rerouting Plan

The PUJ allocation to routes by the Remodified Rerouting Plan (the third plan) could be evaluated by comparing against PUJ demand on each PUJ route. The number of passengers per each PUJ was calculated in order to offer a mark or an attribute for comparison between routes. It varied widely from 20 to 30 passengers per day to 300 or 700 passengers per day. The demand had been calculated ideally from O-D tables, and dispersion was relatively small. On the other hand, the number of PUJs allocated to each route showed a substantial scattering, as reflected on the scattering of the number of passengers per PUJ for each route. These calculations disregarded the travel distance of PUJ, and, therefore, the PUJ allocations to routes should not be directly evaluated against the calculation. However, it appeared that dispersion in the PUJ allocation was rather too big, if said conditions were about right for each route.

**Table 7.12 Comparison between Number of PUJ Passengers (Person Trips) and PUJ Service (CAR) based on Remodified Rerouting Scheme**

	ESTIMATED PERSON TRIPS BY PUJ ROUTE (PERSON TRIPS)			NO. OF PUJ ALLOCATED	AVERAGE NUMBER OF PERSON TRIPS PER ALLOCATION	
	INTRA-ZONAL TRIP IN POBLACION	INTERZONAL SOUTH	NORTH			TOTAL
R-1	2,355	10,174		12,529	35	357.9
R-2	8,237	7,555		15,792	21	752.0
R-3	5,491	9,906		15,397	469	32.8
R-4	1,530	3,966		5,496	179	30.7
R-5	6,042	8,336		14,378	238	60.4
R-6	3,389	6,113		9,502	238	39.9
R-7	8,957		11,928	20,885	436	47.9
R-8	6,569		8,099	14,668	43	41.1
R-9	6,699		7,191	13,890	436	31.8
R-10	4,686		6,958	11,644	59	197.3
R-11	5,605		6,865	12,470	436	28.6
R-12	4,098		6,672	10,770	42	256.4
TOTAL	63,658	46,050	47,713	157,421	2,632	59.8
		93,763				

Source: DCUTCLUS



### (3) Terminal

Before PUJ rerouting started (in February 1979), PUJ terminals were distributed chiefly in Bankerohan and Boy Scout Building areas. Four terminals in Bankerohan area were all located around Bankerohan Market, one for each destination. Each terminal had a passenger waiting space, passenger loading space, and PUJ parking space. With one exception, the terminal in Boy Scout area had no terminal space and PUJs were loaded and unloaded on the road.

From the time of the second plan (Modified Rerouting Plan), areas for PUJ terminals were designated by authorities as a part of the rerouting plan. Bankerohan area, Bolton area, and Agdao area were designated in order that the destination of PUJ routes in Poblacion be clearly indicated, that the traffic congestion in the vicinity of terminals be eliminated, that a space be provided in the terminal premises for PUJ parking and for PUJ driver resting. For this reason, a PUJ loading and unloading zone and a PUJ parking zone were designated inside the terminal and a route for PUJ "deadheading" was also designated. (Figure 7.30 through 7.32).

PUJ terminals are established either by a market owner, members of PUJ drivers/operators cooperatives or by the operator of a large PUJ fleet. Drivers are usually charged terminal fees for every utilization of terminals for waiting and loading of passengers. Of the existing PUJ terminals, the one which was established by the owner of Bankerohan Market may be used by anyone who pays the charge, while the other are used exclusively by their cooperative members.

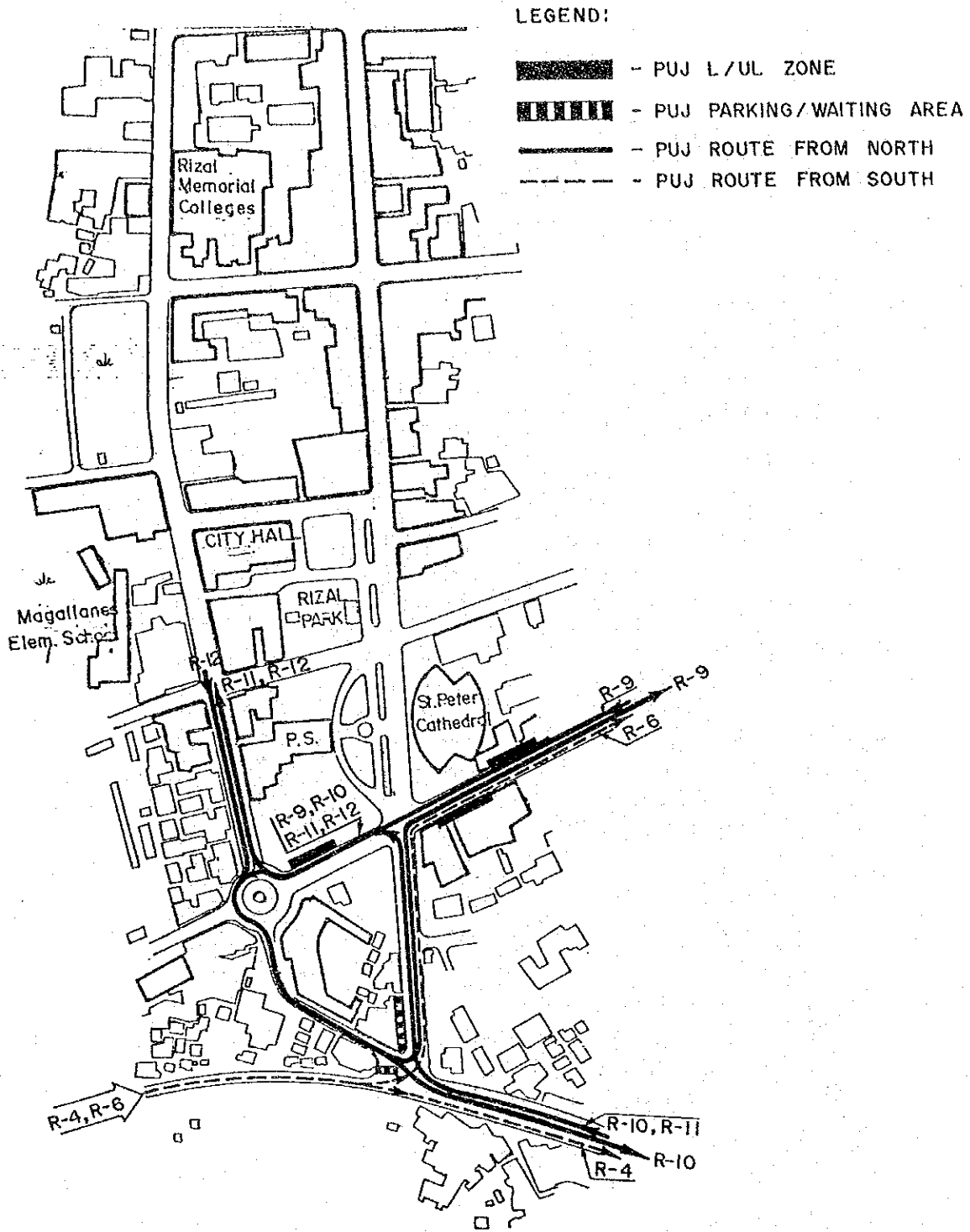


Figure 7.30 Present Condition in Bolton Terminal Area based on Remodified Rerouting Plan

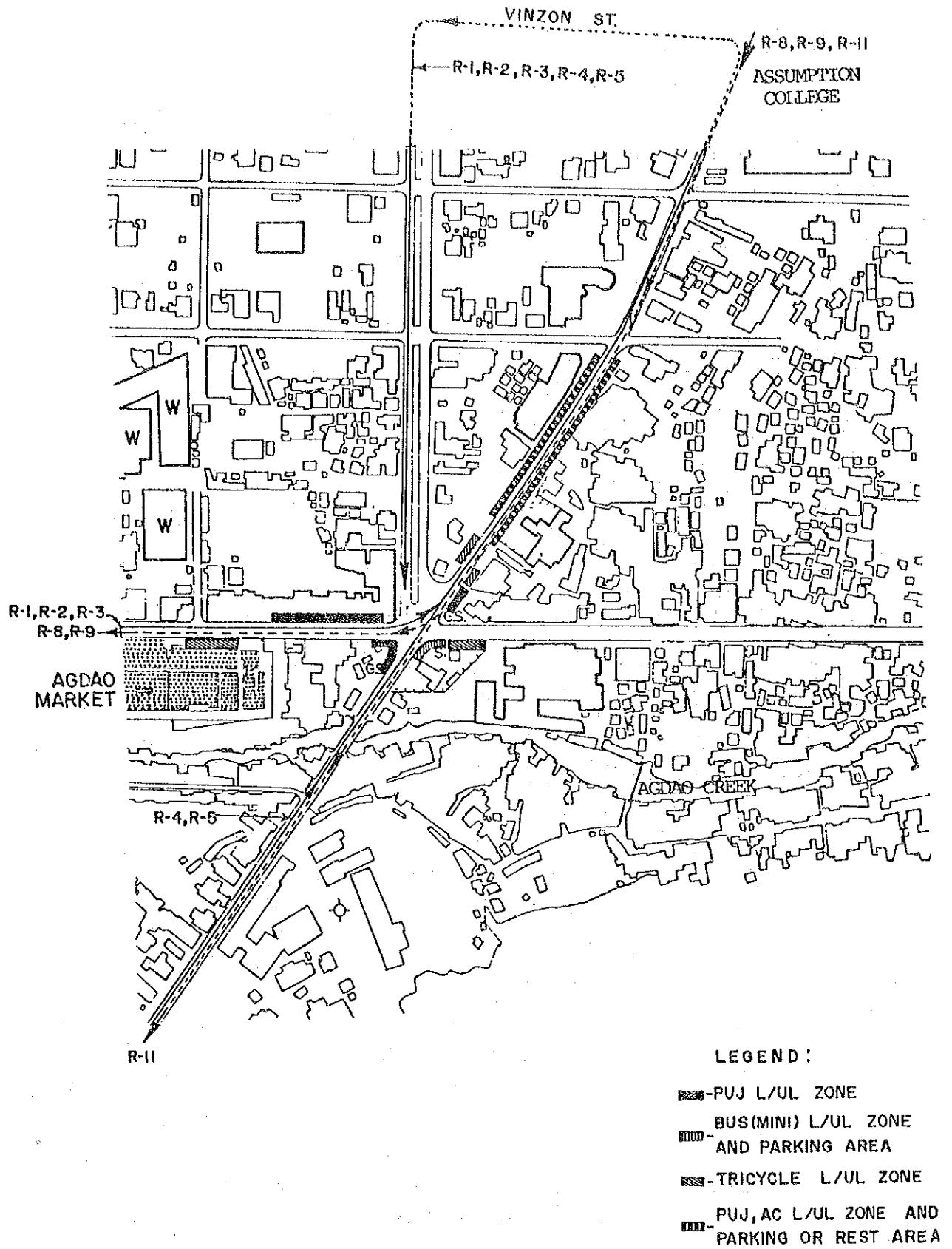
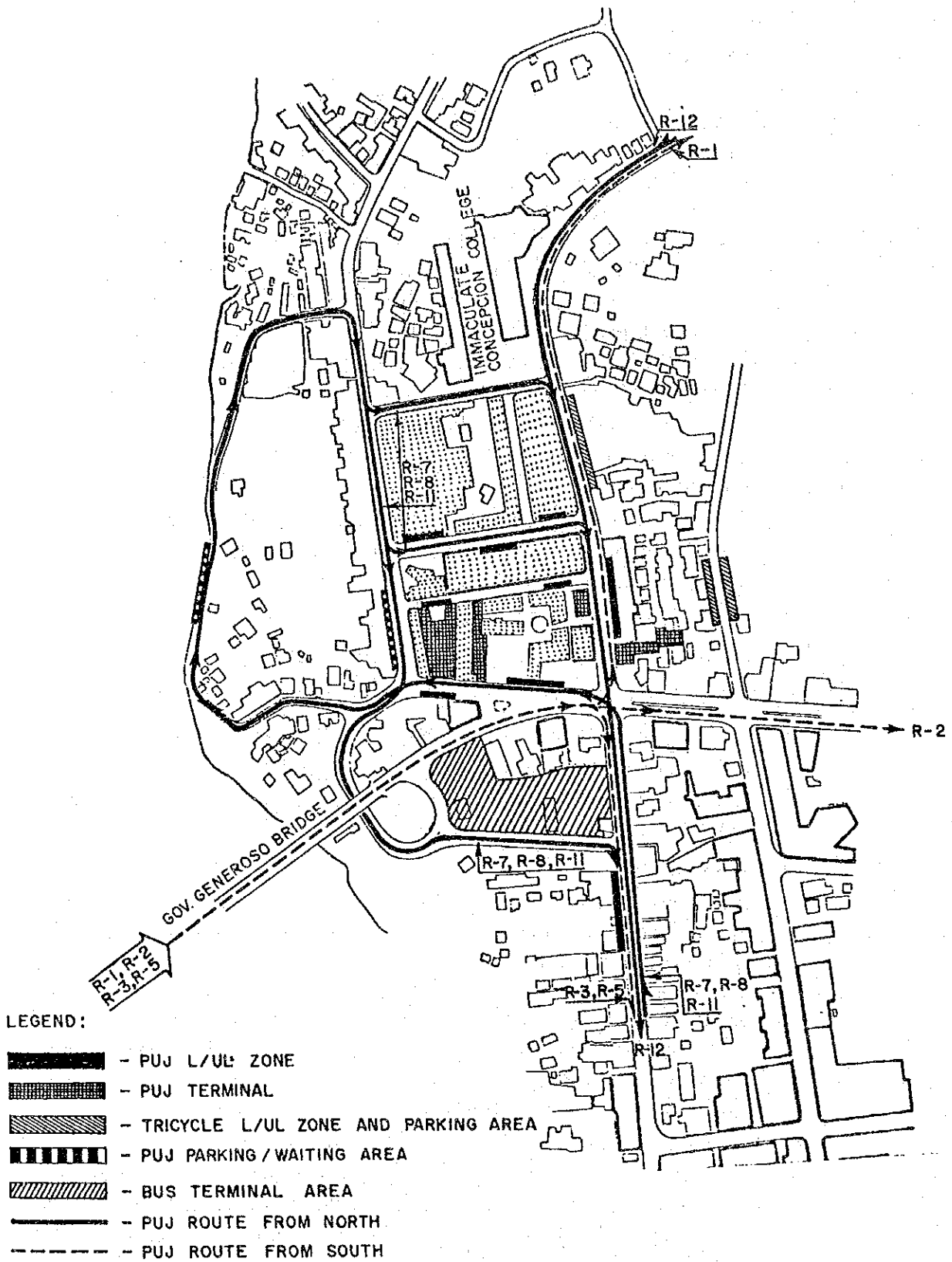


Figure 7.31 Present Condition in Agdao Terminal Area based on Remodified Rerouting Plan



**Figure 7.32 Present Condition in Bankerohan Terminal Area based on Remodified Rerouting Plan**

(4) Business

i) Operator

PUJs are operated either by cooperatives or individual (natural person) operators. Almost all individual operators own only one PUJ, and very few such operators own over 10 PUJs. In addition to individual operators, only one cooperative operator is in business. No statistical survey data is available on the total number of operators. However, the number of operators can be known from the number of applications for the PUJ route designation under the Remodified Rerouting Plan (third plan), which were accepted only from BOT franchised operators, during the months of May and June 1980. Furthermore, two interim reports were made during this application period. Therefore, the number revealed through this application procedure is believed to rather faithfully reflect the number of legally franchised operators.

Thus, there were 1,321 PUJ operators in business in Davao City and they owned a total of 1,672 PUJs. Average number of PUJs owned by each operator was 1.3.

Now, this Remodified Rerouting Plan expected to allocate a total of 2,642 PUJs, which was about 900 PUJs more than the actually registered. This discrepancy was explained by:

- a) PUJs not registered due to the operator's negligence
- b) PUJs illegally operated and therefore not registered
- c) PUJs formerly under franchise but no longer operated
- d) Overestimation of PUJ population to allocation purpose

From the above, it may be safe to assume that about 2,000 operators (including illegal ones) were in business and about 2,000 PUJs were in operation.

ii) Lease System

Some operators drive their PUJs, but most operators lease their PUJs to drivers for daily rental under contract. The rental rate would depend on the age and fuel efficiency of the vehicle, but ranged from 35 Pesos to 60 Pesos per day at the end of 1979. No fixed amount salary was available to the driver. The remainder of his daily fare intake the deduction of costs of fuel, minor repairs, maintenance, and management, as well as terminal use fee, was his income. The operator paid for depreciation, registration, and major repair expenses out of his rental receipts.

iii) Vehicle Maintenance

Franchise holders or operators are obligated to receive BLT inspection of the maintenance condition of their vehicles. Operators usually depend on corner garages for the repair of their PUJs, but some large operators with over 10 PUJs have their own repair shops.

iv) Tariff and Driver Income

PUJ fare is the same as that of bus and AC and the first five kilometers

is for 0.5 Peso, and each additional kilometer is for 0.10 Peso. Children whose height is one meter or less are free, and those over one meter but not over 1.3 meters, half the fare.

Fare intake per driver varies greatly depending on the vehicle type, service route, and work hours. Driver interviews resulted in the finding that their total daily intake ranged between 160 to 250 pesos, with the mode of about 200 Pesos/day. Said rental and fuel represented the two largest expense items, the fuel cost usually being 100 to 200 Pesos per day. After the deduction of such expenses, as well as terminal use charge, the driver's daily income was 25 to 35 Pesos.

Based on the Person-Trip Survey findings, average income was calculated at 0.129 Pesos per conveyance unit (expressed in terms of person-kilometer<sup>1/</sup>, the total quantity conveyed at 1,617,000 passenger-kilometers<sup>2/</sup>, and gross income at 229,500 Pesos<sup>3/</sup> or 90 Pesos per PUJ<sup>4/</sup>

- 
- 1/ According to the Person-Trip Survey Findings
  - 2/ Total passenger-kilometers of the Survey Area residents (of 1,029,720) and of non-residents (588,762)
  - 3/ Reflects 10% premium in actual practice.
  - 4/ A total of 2,597 PUJs were registered in (1979).
-

PUJ driver's cost was 115 pesos per day, consisting of a rental of 45 Pesos, fuel cost of 40 Pesos<sup>1/</sup>, and the driver's own "salary" of 30 Pesos. In this example, the total intake (89 Pesos per day) was less than the total expenditure (115 Pesos per day), and profitability was a negative figure. Breakeven point, in terms of the total number of PUJs, was about 1,955.

On the other hand, the Ministry of Public Highways calculated this cost at 1.15 Pesos<sup>2/</sup>, per each kilometer of operation. Intake per unit of operation distance was calculated at about 1.18 Pesos<sup>3/</sup> based on the PUJ survey findings. Then, PUJ service was definitely profitable, given the actual state of PUJ operation.

It is said that from 10 to 15% of registered PUJs are inoperative due to accident on repair, or some other reason. This means that the total number of PUJs actually in service was 2,200 to 2,300, but, in view of the breakeven point of 1,955 PUJs, the actual number was estimated at about 2,000.

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<sup>1/</sup> Fuel Cost = daily operation distance (100 Km) – mileage (7 Km/liter) x gasoline price (₱2.8/liter)

<sup>2/</sup> According to the MPH Vehicle Running Cost Study Project

<sup>3/</sup> Average occupancy rate =  $\frac{\text{PUJ passenger-kilometer}}{\text{PUJ Veh. Km.}}$   
 $= \frac{1,760,000 \text{ Pass. Km}}{193,840 \text{ Veh. Km.}} = 8.3 \text{ Pass./veh. trip}$

Revenue intake per km =  $8.3 \times ₱0.129 \times 1.1$  (Considering the practiced premium) = ₱1.18/Km.

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### 7.3.3. Auto Calesa

#### (1) Service Area

As in the case of other modes of public transportation, AC service area is defined by the franchise issued by BOT. Although the entire Davao City is actually designated as the service area of AC, frequent availability of AC service is actually limited to Poblacion, as reflected by the desired routes drawn by AC passengers.

AC service is particularly concentrated in CBD and on the line connecting the inland part and the costal part. This means that AC service is selectively offered in the areas where PUJ service is scarce. In other words, ACs and PUJs supplement each other in performing the roles of public transportation. If PUJ service area will expand, however, AC service area will inevitably have to shrink by the degree PUJ area expanded. In this significance, ACs and PUJs must be said competing with each other.

Although BOT franchise allows ACs to operate on any road within Davao City, the City authorities recently banned ACs from A. Pichon Street and C.M. Recto Street because ACs and all other types of vehicles had started to cause traffic congestion on important roads within CBD. San Pedro Street and F. Bangoy St., which ran parallel to said two streets and from which PUJ service is absent, were designated for AC service. This recent action on the part of Davao City is understood as an attempt to draw a clear distinction between the role of ACs and the role of PUJs which function to connect Poblacion with outer areas by assigning important roads in Poblacion to PUJ's and having them engage in the service of long distances and by having ACs engage in the service of relatively short distances within Poblacion.

These policies, however, are still under experiment and have not been legislated.

#### (2) Business

The accurate number of AC operators is unknown, in the absence of statistics. As PUJs, ACs are owned by the operator and leased to the driver, who is responsible for the operation of the AC. Rental is about 25 Pesos per day. AC rental is cheaper than PUJ rental presumably because AC passenger capacity (8 passengers) is smaller than PUJ capacity (16) and ACs are old and fuel efficiency is low (ordinarily, 5 km per liter of gasoline).

AC service started immediately after the World War II by the utilization of used U.S. Forces jeeps and, therefore, most of the existing ACs are made in the 1940's and are now superannuated. Their bodies are worn and their fuel economy is poor. One AC operator stated that the 17 ACs which he owned when he started the business in 1950 had since decreased through the process of inevitable cannibalizing of two ACs to save each AC, that he has only five ACs left, and that he was thinking of shifting to PUJ business.

The tariff of first five kilometers for 0.50 Pesos and each subsequent kilometer for 0.10 which is applicable to PUJs, is also applicable to ACs, but, because the average trip length of AC passengers is from two to three kilometers, this ta-



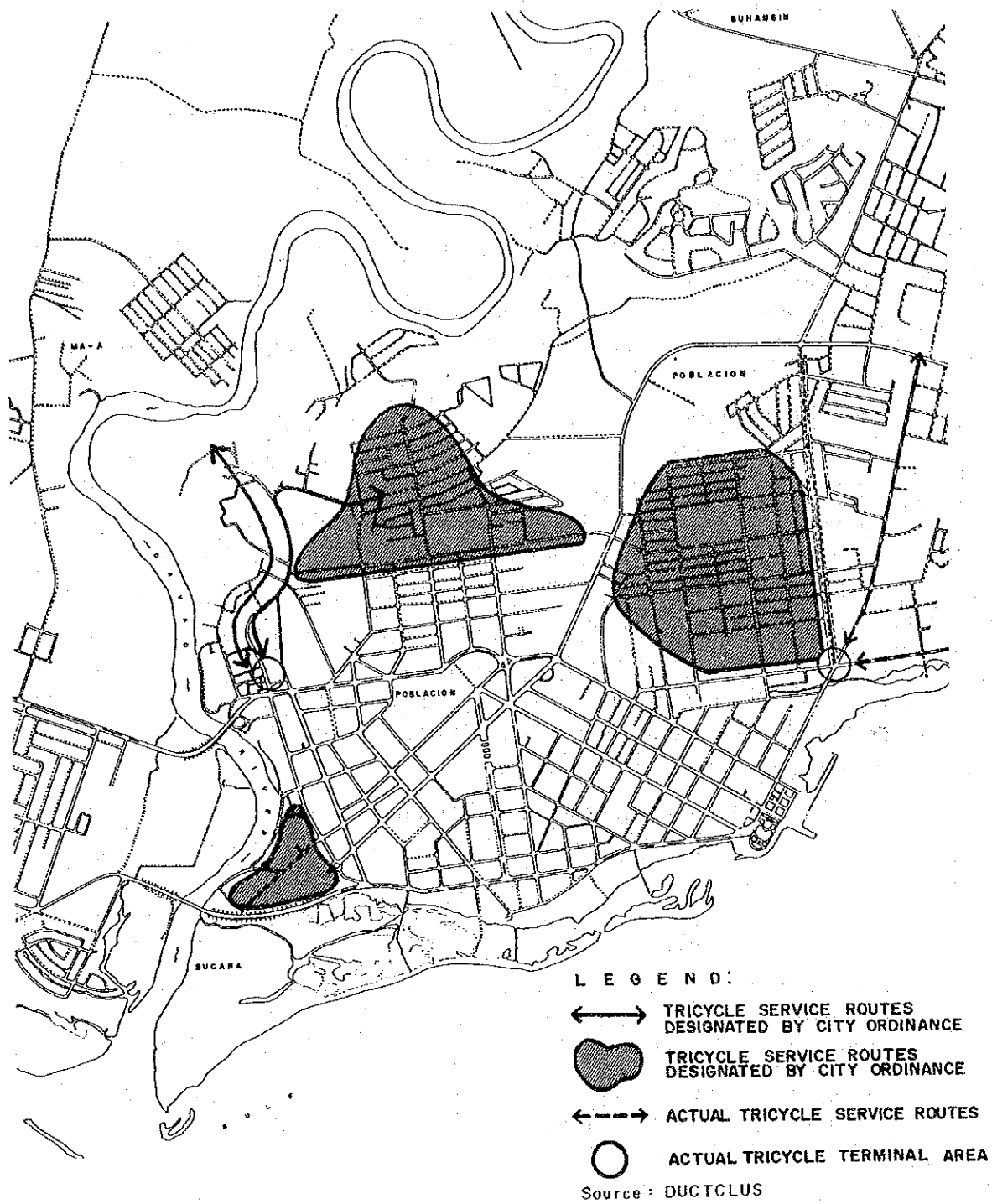
riff is very advantageous to AC operators.

While AC operator's revenue and expenditure statistics is non-available, one AC driver was interviewed and stated that he works about 10 hours daily, covering a total distance of about 90 kilometers, and realizes the gross revenue intake of 160 Pesos per day. After deducting the rental of 25 Pesos per day and fuel cost of about 100 Pesos per day, he make an income of 15 to 18 Pesos per day.

#### 7.3.4 Tricycle

##### (1) Service Area

Although the BOT franchise does not designate any service area for tricycles, the service area is de facto designated by the road use permission from the local police (INP) which must be obtained in advanced in order to get the franchise in Davao City. This police permission is to designate the roads provided for by the City Ordinance No. 226, but AC service is offered in fact on other roads also (see Fig. 7.33). In addition to those which are shown in said Figure, two routes are designated in Toril and the vicinity, one route is designated in Matina, and one route in Lasang within the boundary of the Project Area. Tricycle service is allowed in certain subdivisions under the condition of the subdivision owner's permission, and the City Ordinance has no specific controls over such tricycles.



**Figure 7.33 Tricycle Service Sphere**

## (2) Business

Ordinarily, each tricycle operator is franchised for one tricycle, and not for more than one, under the principle of BOT. This is because of the public nature of tricycle business and as the means of expanding employment opportunities. Exceptions are allowed under unusual circumstances, such as in the case of areas where public transport service is in a grave shortage or in the case of operation within a privately owned subdivision.

Tariff is stipulated by BOT and is first five kilometers for 0.45 Pesos. Tricycles are usually operated from about 6:00 A.M. until 7:00 or 8:00 P.M., for about 11 hours, covering from 60 to 70 pesos per day, and, after the deduction of vehicle rental, of 15 to 22 pesos per day and the fuel cost of 20 to 28 Pesos, net driver income is about 20 Pesos per day.

### 7.3.5 Public Utility Automobile (PU)

PU operation is not restricted to any prescribed service area, provided that PUs registered in Davao City are prohibited from picking up passengers out of the City boundary (but may carry passengers picked up inside the City boundary to outside).

Although tariff is stipulated by BOT with the initial fare of 1.5 Pesos, fare is actually negotiated between the customer and the driver.

PUs are usually operated for 16 to 18 hours over a distance of 100 to 300 kilometers each day, and realizes the gross revenue of 160 to 200 Pesos per day. After paying the rental of 60 to 70 Pesos per day and the fuel cost of from 70 to 100 Pesos per day, the driver makes an income of 15 to 30 Pesos per day.

### 7.3.6 Ability to Pay

The Davao City Integrated Area Development Plan which was formulated in 1977, included data on the number of households in various income brackets, as shown on Table 7.13.

According to this data, average income per household was 550 Pesos in the urban parts, and 404 Pesos in the rural.

On the other hand, household expenditure structure data shows that transportation expenditure is 8% in urban parts and 6% in rural. Another information at the time of this survey suggested a 14%.

From these considerations, the fare bearing capacity is estimated at about 50 to 60 Pesos per household per month.

**Table 7.13**      **Classification of Income, Urban  
Rural & City**

Income Classes	Urban		Rural		Total	
	No.	%	No.	%	No.	%
Below ₱200	42	7	80	12	122	10
₱200-299	54	9	154	23	208	16
₱300-399	112	19	220	33	332	26
₱400-499	64	11	89	13	153	12
₱500-599	50	8	37	5	87	7
₱600-699	40	7	31	5	71	6
₱700-799	39	7	16	2	55	4
₱800-899	37	6	11	2	48	4
₱900-999	29	5	9	1	38	3
₱1000-1999	93	6	13	2	106	8
₱2000-2999	16	3	3	0.45	19	2
₱3000-4999	9	1	4	0.60	13	1
₱5000 and above	4	1	5	0.74	9	1
<b>Total</b>	<b>589</b>	<b>100</b>	<b>672</b>	<b>99.79</b>	<b>1,261</b>	<b>100</b>

Source: Socio Economic Survey, Davao City  
IAD Project 1976.

