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The Metro Manila Transportation Planning Study Phase II Final Report

TECHNICAL REPORT Novaliches Mode Interchange Area Study

SEPTEMBER 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

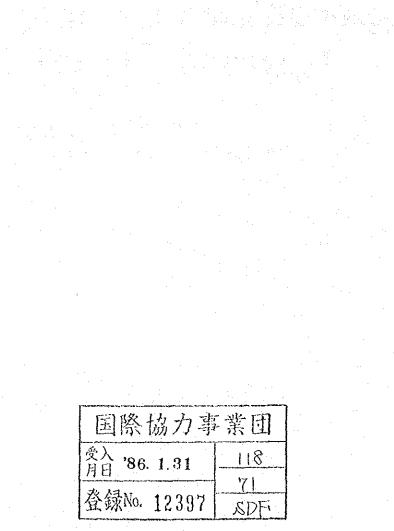


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#### 1.0 THE PROJECT SCOPE

#### NOVALICHES IN METRO MANILA

1.1

Novaliches is a district at the northern fringe of Quezon City with a total land area of 6,875 hectares. It is bounded on the north by San Jose Del Monte, on the south by district number 2 Councilors A and D of Quezon City, on the east by San Mateo, Marikina and on the west by portions of Caloocan and Bulacan.

At the center of this district and defined by the cross roads of Quirino Highway and Gen. Luis is the town proper shown in Figure 1.1. Novaliches has a relatively small but important influence area, - north of Caloocan City and parts of Grotto and San Jose outside of Metro Manila. It appears remote from the major commercial and business complexes/areas (like Cubao, Recto and Makati) only because of its constrained accessibility to Manila's urban centers and to Bulacan.

Novaliches proper functions as suburban center for commercial and industrial activities catering to a cluster of residential subdivisions. As expected, this town proper also acts as the major mode interchange area (MIA) in this part of Metro Manila. It serves as a transfer point for most subdivision residents on their way to and from their destinations.

As such, the Novaliches MIA is one of the major terminals in Metro Manila - the key one on the rapidly urbanizing northern suburbs.

#### 1.2 BOUNDARY OF STUDY AREA

For planning and analytical purposes, the study area was set following the perimeter shown in Figure 1.2. This area, approximately 1.4 kilometers from east to west, and north to south, includes the Quirino Highway and Susano Street intersection which is the heart of the Novaliches town proper. Traffic flow analysis covered a wider area but focused on this town proper.

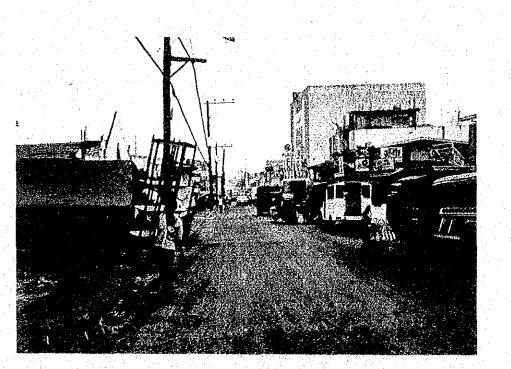
#### 1.3 JUMSUT II BRIEF ON NOVALICHES

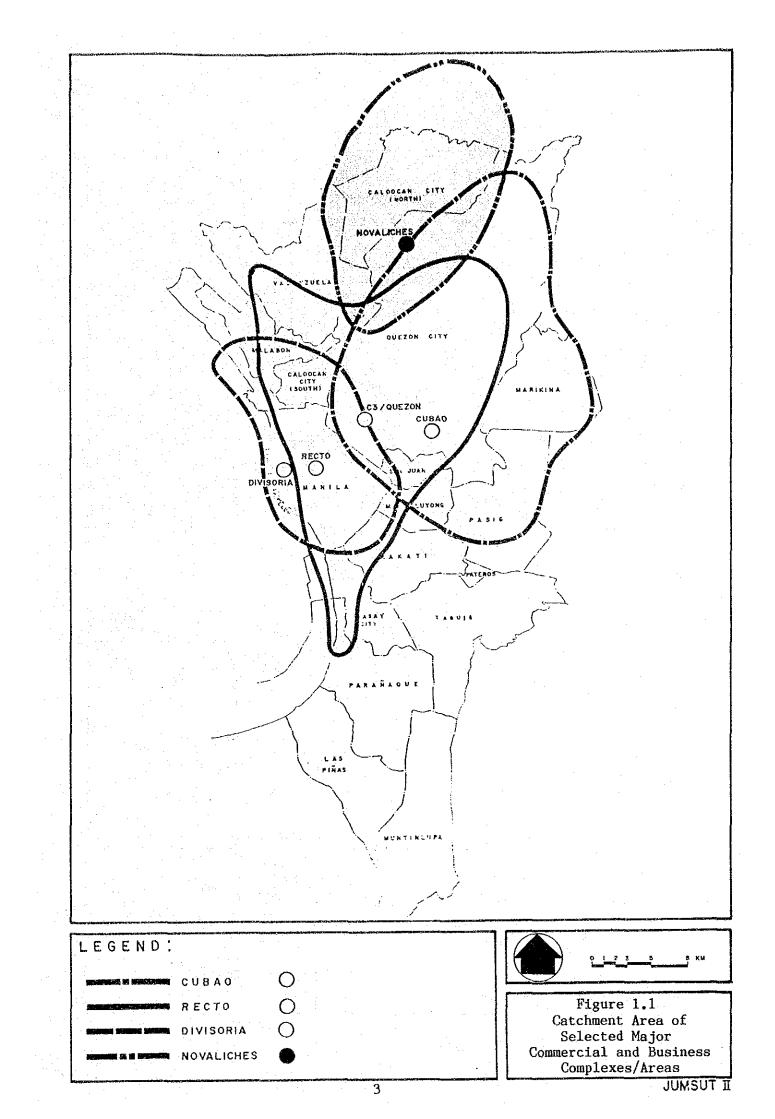
Novaliches has been growing at a rapid rate - mainly into a lowdensity residential community encouraged by the availability of vast tracts of land at a relatrively low price. This trend is spurred by private developers and lie in this desired direction of expansion for Metro Manila. As these residential developments multiplied, commercial shops have been attracted along the major roads and in and around community centers. Predictably, transportation activities has sprouted at a pace beyond the range of government regulation. Novaliches is one of the areas where extensive colorum operations of PUV occur.

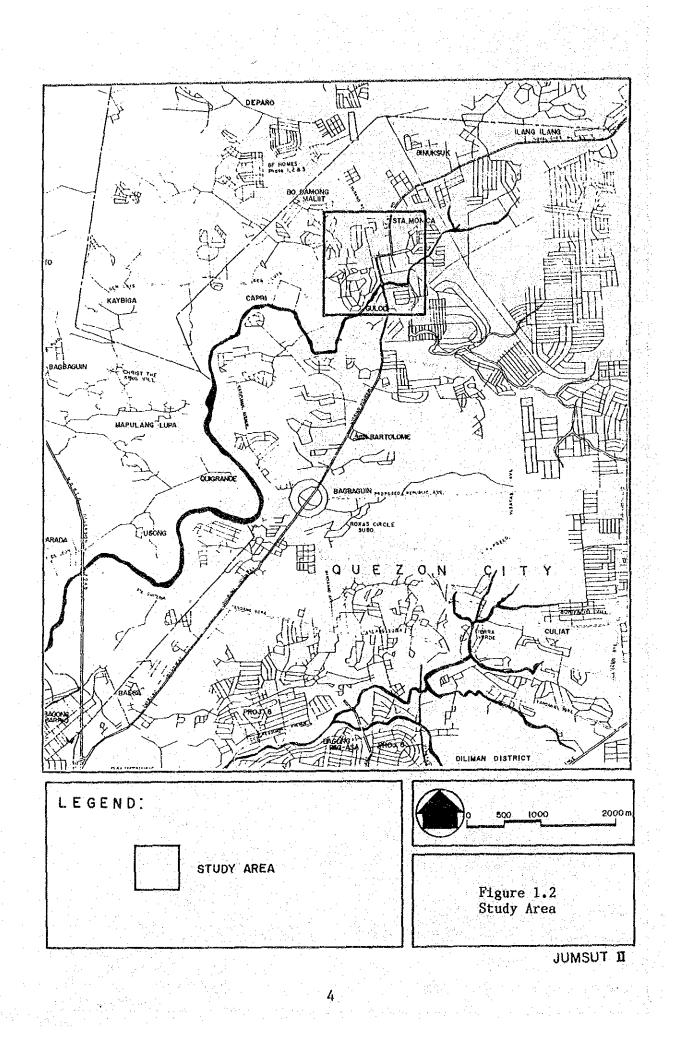
Unless properly planned and guided, the present development pattern will exacerbate the traffic congestion in the area and limit its role of servicing the future urban requirements of the residents. Small commercial activities and establishments already crowd the existing trunk roads, (e.g., Quirino Highway) and bear the early marks of chaotic and disorderly development.

Since Novaliches is in the direction where future growth of Metro Manila is desired, early planning of the area is needed before the rapid phase of developments preclude future options. JUMSUT II's recommendation in this regard are in the following subjects:

- a) Strengthening of public transportation capacity and management via the following:
  - 1) control of colorum operation
  - 2) appropriate change in the sub-modal split between the area and existing CBD
  - 3) expansion of feeder service within the area.
- b) Improvement and expansion of the road network. The existing demand is already heavy. Future growth of the area would require a major upgrading and addition to the road network.
- c) Development of planned regional growth centers to relieve the traditional CBDs. Several sub-regional poles can be envisioned north of Metro Manila; Novaliches is a natural suburban center.







#### 2.0 THE PRESENT SITUATION

2.1

#### LAND USE AND SOCIO-ECONOMIC CHARACTERISTICS

#### 2.1.1 Land Use

Characterized by a strip/linear pattern of development, activities occur along both sides of the highway with settlements tending stretch parallel to the main thoroughfares. Novaliches exhibits the marks of early urbanization - typical of towns located in the periphery of Metro Manila.

Set on an elevated topography, the area is ideal for further physical developments. Commercial activity is concentrated at the moment around the intersection of Quirino Highway and Susano Street - where two commercial complexes and a wet market are under construction. On the whole, Novaliches landscape is still largely open space where only 30% of the land is built-up.

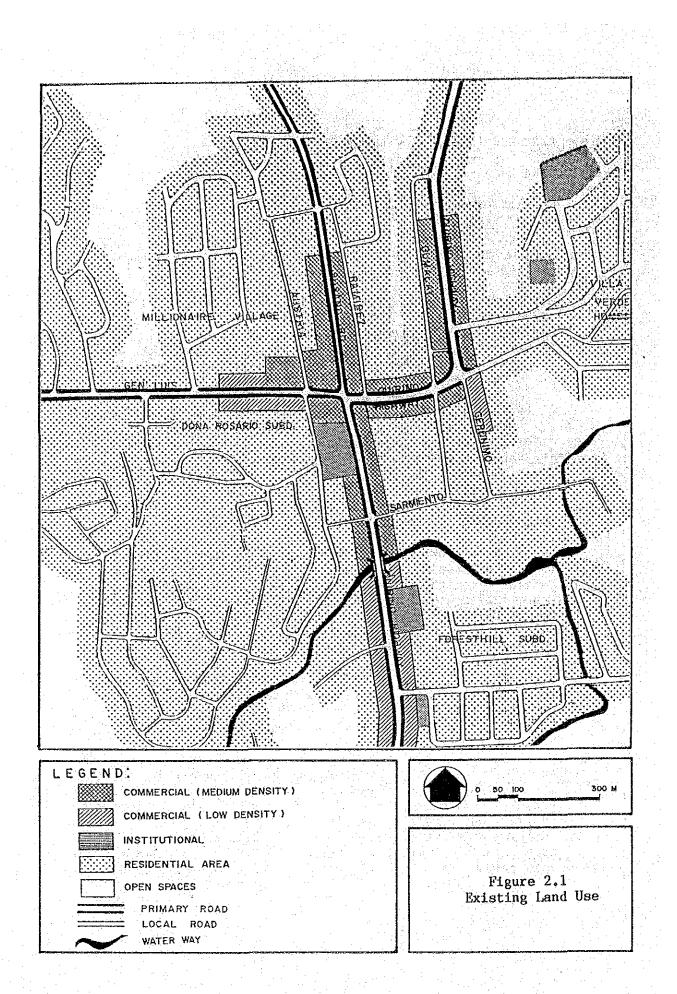
At the Novaliches town proper, can be observed low to medium density commercial areas at the center while low-density residential developments are on the outskirts with the institutional blocks interspersed among them. The residential areas within subdivisions have sprouted in clusters linked to the center by primary roads. These are illustrated plainly in Figure 2.1.

2.1.2 Socio-economic Characteristics

Novaliches shows a wide variation of population densities - although by itself, it is probably one of the least dense in Metro Manila. From the three zones into which the HIS analyzed the area, Zone 128 is the most densely-populated with 39 persons/hectare, twice that of either of the two other zones. Corollarily, its zone rates are highest in almost all the socio-economic indices (except in car ownership) shown in Table 2.1.

Since the study area is primarily residential, the ratio of daytime to nighttime population ranges from 0.70 to 0.95. A number of residential subdivisions exist. However, residents belong to the low-middle income class with an average income ranging from P980 to P1,160 per month.

As to car ownership, the rate for Zones 128 and 143 is approximately 7% with Zone 144 registering the highest at 13%. This difference is reflected also on the trip distribution profile; the high public mode trip rate of Zones 128 and 143 is matched by its low car-owning rate. Dependency on the public transport system is thus high at 85%. Likewise, Zone 144 registers approximately 30% private trips consistent with its higher car ownership rate.

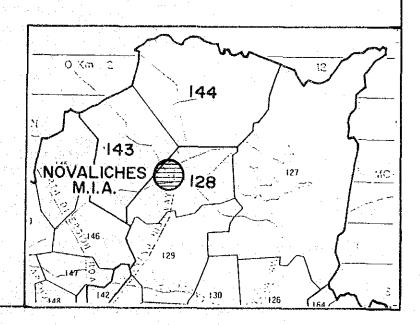


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	128	143	144
Population	60,400	24,700	48,100
Daytime Population	57,200	17,200	36,300
No. of Students in daytime	17,600	3,200	9,700
No. of Employment by Workplace	15,200	2,200	4,900
Population Density (Person/ha.)	39	15	18
Daytime Population Density (Persons/ha.)	37	10	14
Average Household Income (₽/mo.)	1,160	980	980
Car Owning Rate (%)	8	5	13
No. of Trips	215,000	84,000	84,000
Public	180,000 (83,7%)	71,000 (84.5%)	60,000 (71.4%)
Private	35,000 (16.3%)	13,000 (15.5%)	24,000 (28.6%)

#### Table 2.1 Characteristics of Zones Related to the Novaliches Mode Interchange Area

Source: JUMSUT I

1/ Zone boundaries are outlined below.



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#### 2.2 ROAD SYSTEM AND TRAFFIC

#### 2.2.1 Road Network

The road structure of Novaliches is still simple. It consists of only three (3) national roads, some city roads, and a large group of subdivision roads. The major roads are Quirino Highway, Gen. Luis Avenue and Susano Street (see Figure 2.1).

#### Primary Roads:

a) Quirino Highway (2 lanes, 2-way)

Quirino Highway serves as the backbone of the road network in Novaliches on a north-south direction. Road alignment is skewed at the town proper - thus giving rise to traffic bottlenecks at intersections and elbows. Public transport constitutes 80% of the daily traffic volume ranging from 10 to 15 thousand. The volume to capacity ratio vary from 0.9 to 1.3.

b) Susano Road (2 lanes, 2-way)

This is the only access road to the subdivision (e.g., BF Homes and Urduja Villages) located in the northern part of Novaliches. The daily traffic volume at its junction with Quirino Highway is approximately 5 thousand, with volumecapacity ratio of 0.4. This low ratio is due more to obstructions on the carriageway caused by roadside parking and onstreet vending, compounded by the passage of heavy delivery trucks.

Gen. Luis (between Quirino Highway and Austria, 2 lanes, oneway; west of Austria, 2 lanes, 2-way)

This road acts as access to North Diversion Road to the West Quirino Highway, thus serving the east-west vehicle movement. The subdivisions on the western part of the Novaliches town proper feeds into Gen. Luis. The daily traffic volume is 6.3 thousand with a volume capacity ratio of 0.7.

#### Secondary Roads:

c)

No secondary roads appear to function in this study area - a situation bred by the type of development that exists. Location of economic activities along the primary roads have not yet induced construction of the secondary road network. In pockets of development represented by subdivisions, the early manifestations of such a network may be seen.

#### Other Local Roads:

The more notable local roads are the following:

Austria, perpendicular to Gen. Luis. It should be noted that the southern lane of Gen. Luis is one-way between Austria and Quirino Highway. Ramirez, parallel to Susano Road, used by the northbound jeepney routes.

Geronimo, perpendicular to Quirino Highway at its northeast fork, where CBD-bound jeepney routes congregate.

Intensity of road use can be seen from Figure 2.2 where the traffic flows and congestion indices are noted.

#### 2.2.2 Traffic Flow Characteristics

Traffic in Novaliches is analyzed under 3 categories:

- a) Passing through traffic
- b) Generated/attracted traffic from/to subdivision
- c) Traffic associated with the Novaliches town proper.

#### A. Passing Through Traffic

Quirino Highway, which spans north to south serves not only the Novaliches-bound traffic but also those destined for San Juan del Monte, which is located outside Metro Manila. Traffic congestion is marked throughout its length due to the following reasons:

There is no alternative link aside from Quirino Highway.

Roadwidth is two lanes in most of its length; furthermore, smooth traffic flow is constrained by the skewed alignment.

Subdivision traffic has increased considerably from 1980 to 1984 without corresponding improvement in road. (Ratio of 1984 to 1980 traffic volume is approximately 1.5 based on the JUMSUT II cordonline and screenline surveys).

Passing through traffic volume along Quirino Highway is estimated at approximately 8,200 vehicles/day (from the traffic country survey of JUMSUT II).

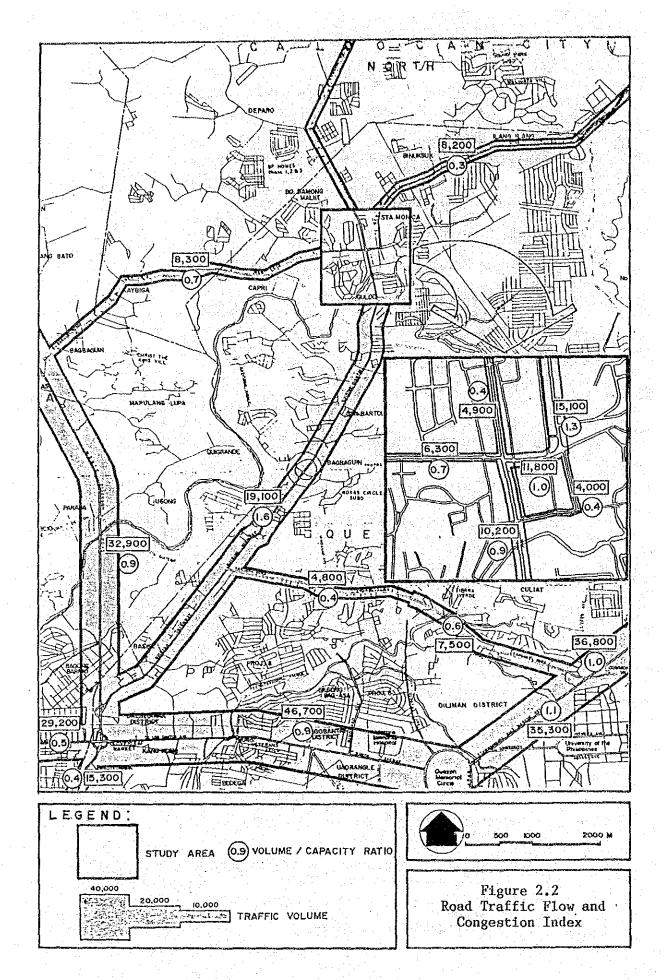
#### B. Generated and Attracted Traffic from/to Subdivision

Many subdivisions are located along Susano Road, which explains the predominant private car traffic.

The characteristics of subdivision-related traffic are summarized below (see Appendix A.1 for details of HIS and Traffic Volume Count Survey).

total generated/attracted traffic of the subdivision is 450 to 1,500 vehicles/day

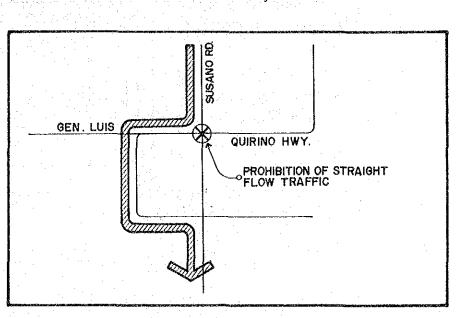
transfer passenger traffic at the Novaliches town proper is significantly large



through traffic has to pass the Novaliches town proper

traffic between subdivisions is insignificant.

Traffic flow from Susano Road to town proper is shown below. the prohibition against straight flow traffic is due to the geometric structure of the Quirino Highway-Susano Road intersection and the narrow width of Quirino Highway. This ban relieves traffic congestion at the intersection but loads the other links and intersections nearby.



#### C. Traffic Associated with Novaliches Town Proper

Novaliches is the center of urban activity in the north eastern part of Metro Manila.

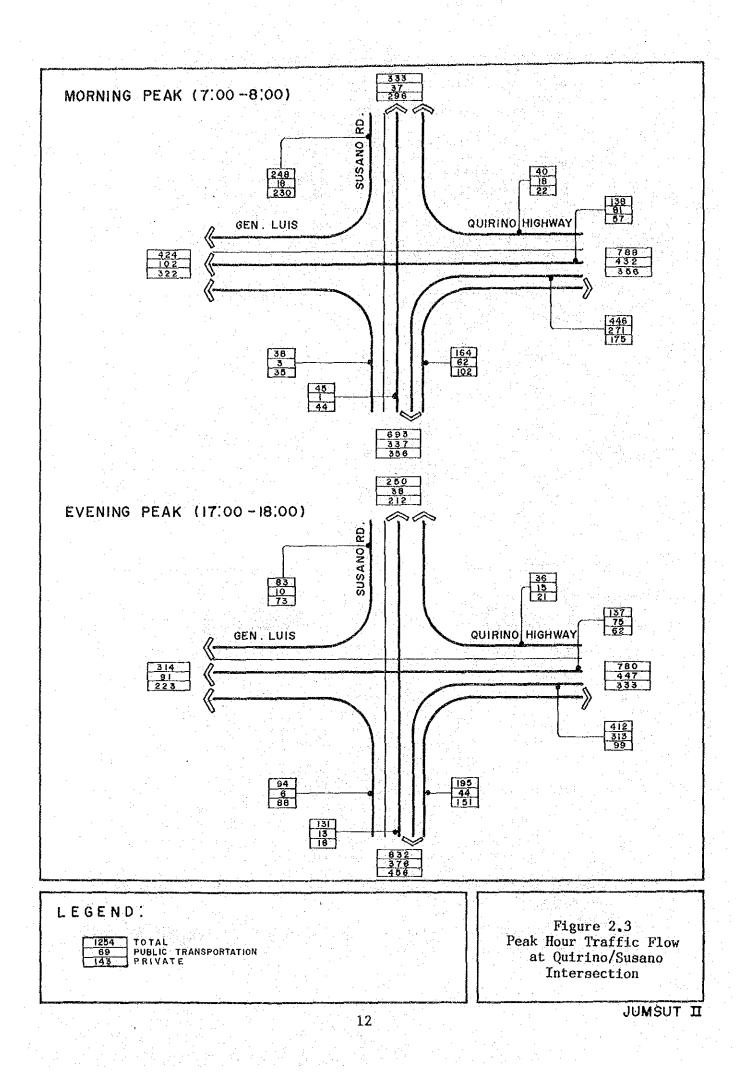
Susano Market, which is located in the town proper, is the most heavily patronized section if traffic generation is the criterion. Mixture of a large volume of heavy and light vehicles seriously hampers traffic along the narrow Susano Road.

#### 2.2.3 Traffic Congestion in the Area

Traffic flow in the Novaliches area has reached saturation along Quirino Highway. Severe congestion is observed at the intersection of Quirino Highway and Susano Road (see Figure 2.3).

Several factors can be deduced for the traffic congestion at Quirino Highway, viz.:

a) Skewed alignment and poor geometric structure at intersections.

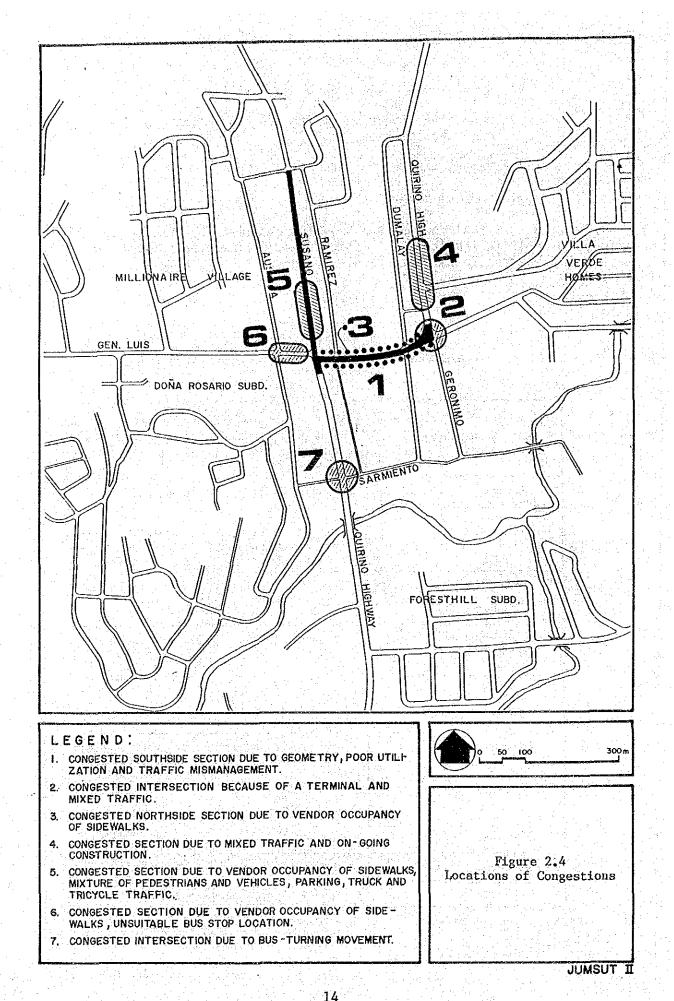


- b) Mixed vehicle and pedestrian traffic.
- c) Unsuitable location of YBL bus stop along Gen. Luis (too near the intersection).
- d) Use of sidewalk by vendors.
- e) Lack of traffic signs.

Less critical congestions are also observed in other locations at or near intersections. Table 2.2 summarizes the current situation in several roads while Figure 2.4 depicts their location.

Location	Characteristics
1. Quirino Highway/ Susano Road Section	<ul> <li>Congestion occurs in the following sections:</li> <li>Quirino Highway (Geronimo side), and Susano</li> <li>Road (North side)</li> </ul>
2. Quirino Highway/ Geronimo intersection	<ul> <li>Inadequate minibus terminal near the intersection</li> <li>Mixture of CBD-bound jeepneys, U-turn and passing through traffic near the intersection</li> </ul>
3. Quirino Highway (section between Susano Road and Geronimo)	<ul> <li>Mixture of pedestrians and vehicles due to the occupancy of sidewalks by vendors</li> </ul>
4. Quirino Highways	<ul> <li>Combined jeepney U-turn and passing through traffic</li> <li>Inflow and outflow traffic to/from the Pasvil Bus terminal</li> <li>New commercial complex under construction</li> </ul>
5. Susano Road	<ul> <li>Mixture of pedestrians and vehicles due to the occupancy of sidewalks by vendors</li> <li>Roadside parking</li> <li>Heavy trucks usage</li> <li>Big tricycle volume along the road</li> </ul>
6. Gen. Luis (section between Quirino Highway and Austria	<ul> <li>Unsuitable location of YBL Bus Stop</li> <li>Vendors occupying the sidewalks</li> </ul>
7. Quirino Highway	- Buses turn left at Quirino Highway and Interrupt the through traffic

Table 2.2 The Current Situation of Major Congested Roads



#### 2.3 PUBLIC TRANSPORTATION ASPECTS

#### 2.3.1 Routes

Novaliches area is served by 37 jeepney and 19 bus routes. Approximatley 1,100 jeepneys and 750 buses operate in these lines. Nearly 3/4 of all bus routes are passing through with 45% of the total number of units.

Outside of the morning peak, irregular behavior of jeepneys may be observed in trip cuttings that terminate at Novaliches MIA instead of passing through.

#### Table 2.3

#### Existing Public Transportation Route Count Related to Novaliches

		Passing-Through	Total
JUMSUT	Route Units	Route Units	Route Units
Intra - JPY	30 1,006	6 119	30 1,006
BUS	5 414		11 533
Provincial JPY	6 80	8 322	7 88
BUS			8 219

Source: JUMSUT II

Changes from official list of jeepney and bus routes were identified via a route verification survey (see Appendix A.2). The alterations were as follows:

New routes coupled with an increase in colorum jeepneys, expecially those that service subdivisions.

Jeepneys having long routes from the periphery to the CBD have cut trips at the Novaliches MIA.

Number of jeepneys has increased by 13% from previous count of JUMSUT I.

Buses have been authorized to ply longer routes that pass through, instead of terminating at the Novaliches MIA.

Provincial bus routes have decreased but were more than compensated by increase in provincial jeepney routes. Coverage and frequencies of existing jeepney and bus routes are shown in Figures 2.5 and 2.6. There are 10,000 public transport vehicles over a 16-hour period in the densest section of Quirino Highway.

Excluded from the analysis was the experimental bus route identified as the Baclaran-Novaliches route operated by PASVIL.

The basic structure of jeepney and bus routes in the study area are schematically shown in Figure 2.7. Jeepney routes along Quirino Highway, Susano Road and Gen. Luis are not integrated in the sense that each make a U-turn without overlapping each other.

On the other hand, the CBD and Quirino northbound routes converge at the Quirino Highway which contributes to traffic congestion. Furthermore, its patch from Geronimo to Quirino Highway loops back thus aggravating the problem.

The bus route structure, on the other hand, is simple. One route plies north-south along Quirino Highway and the other takes the east-west direction along Quirino Highway-Gen. Luis. Because of the one-way flow at Gen. Luis, westbound routes pass through sidestreets in Rosario Subdivision. The traffic volume at this bypass of 870 vehicles in a 16-hour/day is large enough to create congestion at the Quirino/Sarmiento intersection.

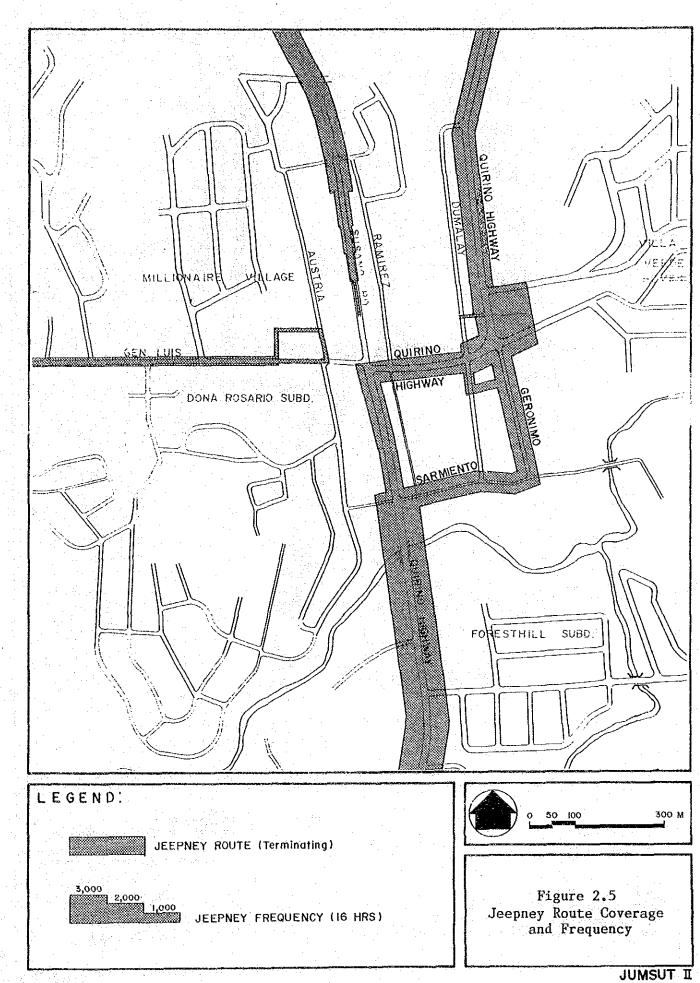
#### 2.3.2 Existing Terminals and Turning Points

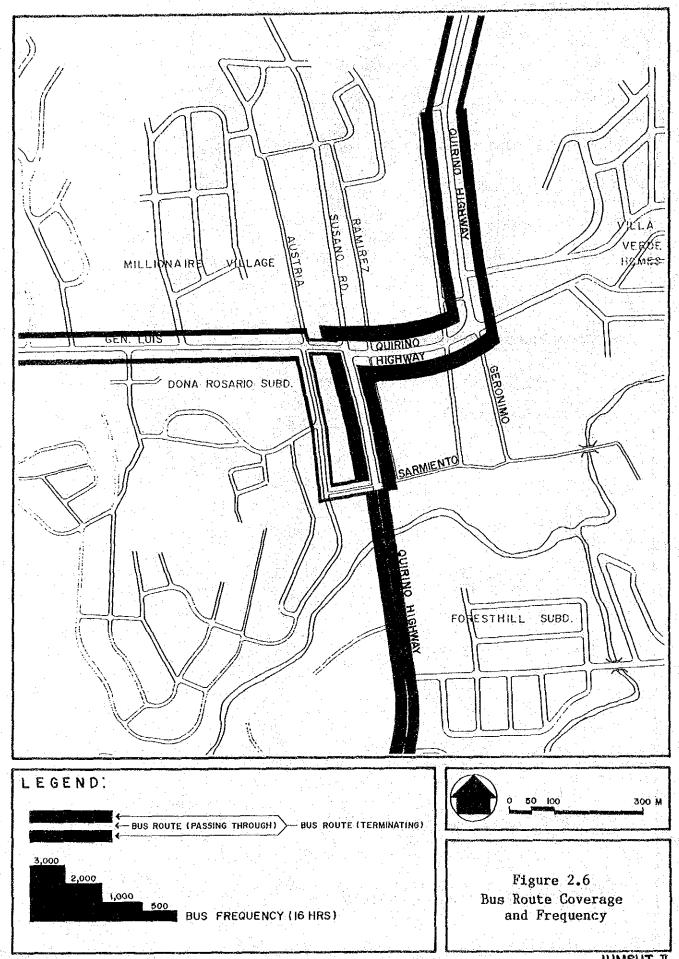
By the very nature of profit maximizing public transport, location of terminal or turning points congregate where passengers converge - which is Novaliches town proper.

Existing terminals are listed in Table 2.4 and mapped in Figure 2.8. These public transportation terminals can be described as follows:

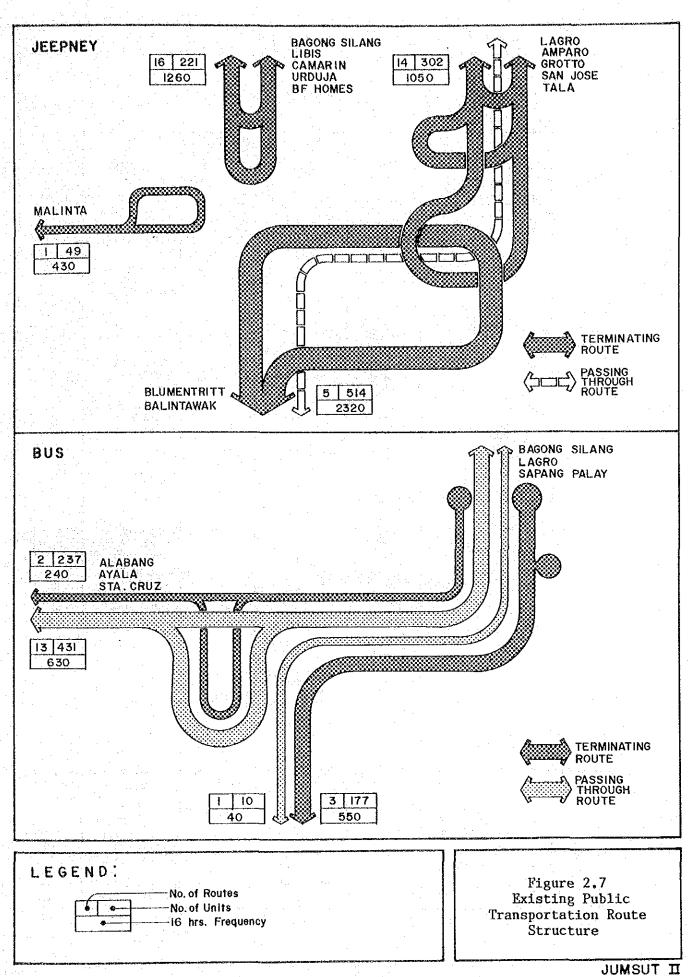
- a) There are 10 jeepney, 3 bus, and 7 tricycle terminals. In the absence of a central facility, these are dispersed around the Novaliches town proper.
- b) Most of the jeepney waiting areas are off-road. Two are on-street. All, including their turning points, are along Quirino Highway and Susano Road. Administration of these terminals are under various drivers' associations employing their own dispatchers.
- c) Bus terminals are sited along Quirino Highway. Loading/ unloading of buses are mainly at bus stops. The bus stops with significant loading/unloading volume are at the Quirino/Susano, Quirino/Geronimo, and Gen. Luis/Austria intersections. PASVIL, however, has two off-road terminals.

The narrow carriageway is occupied by buses that walt for passengers at bus stops.



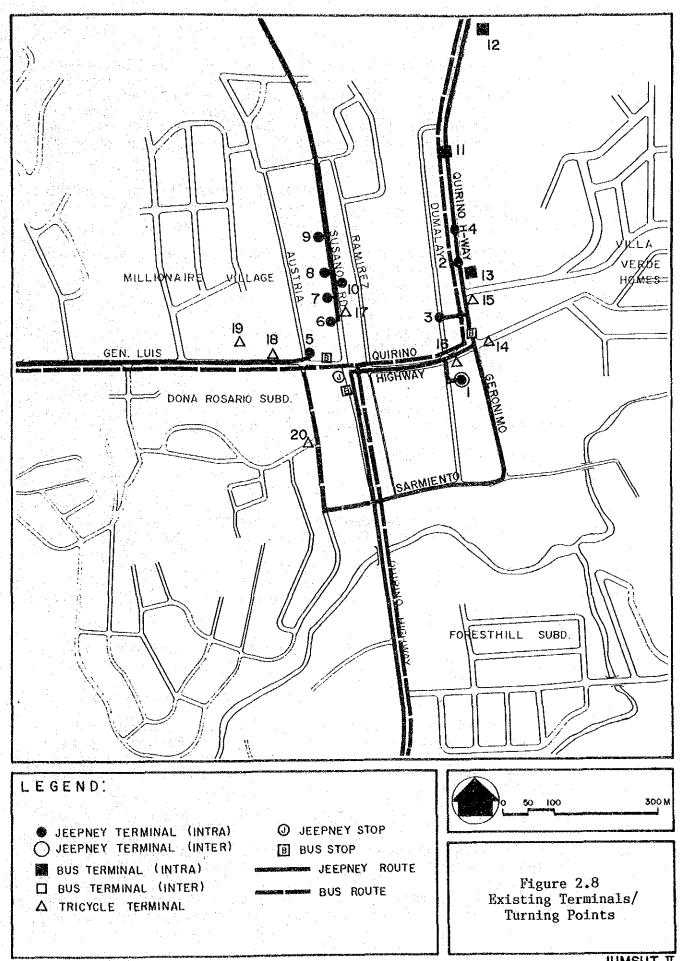


JUMSUT I



<b></b>				Rout	e Charac	teristics	
	••••••			No. of	No. of	Ave. Fre-	
L		Name/Location	Туре	Routes	Units	quency/16hrs	Remarks
Į.,	A:	JEEPNEY					
	1.	Geronimo	Intra-City	13	292	910	2 associations
	•		Inter-City Off-Road				2 dispatchers
	2	Quirino Hwy-1	Intra-City		514	2,320	1 dispatcher
	3.	Dumalay	On-Road Intra-City	1	12	110	1 association
			Off-Road				2 dispatchers terminal fee P2000/mo.
	4.	Quirino Hwy-2	Intra-City On-Road	1	6	40	
	5	Austria	Intra-City Off-Road		49	430	1 association 1 dispatcher terminal fee P110/day
	6.	Susano- 1	Intra-City Off-Road	1	9	140	1 dispatcher terminal fee P5/day
	7.	Susano-2	Intra-City Off-Road	3	21	260	I association 1 dispatcher terminal fee P100/day
	8.	Susano-3	Intra-City Off-Road	8	48	170	terminal fee P4/day
	9	Susano-4	Intra-City Off-Road	3	82	500	l dispatcher terminal fee ₽5/day
	10.	Sušano-5	Intra-City Off-Road	1	61	180	l association l dispatcher terminal fee ₽5/day
	B:	BUS					
	1.	Quirino Hwy-3	Intra-City On-Road	2	237	240	
1	2	Pasvil	Intra-City Off-Road	2	117	310	
	3.	Old Pasvil	Intra-City Off-Road	1	60	240	1 dispatchers
F	C:	TRICYCLE			1		
ł.	4.	Villa Verde	On-Road		20		2 associations
	5	Jordan	On-Road		40		and a second second
	6.	Quirino Hwy.	On-Road		70		2 associations
1	7	Susano Mkt.	On-Road		60		l association
1	8.	Novaliches Mkt.	Off-Road		28		l dispatcher l association
ļ					E0.		l dispatcher
1	9. 0.	Millionaire Dona Rosario	Off-Road On-Road		50 28		l association l association
							1 dispatcher

## Table 2.4 Existing Public Transportation Terminals in Novaliches



JUMSUT I

- d) Transfer passengers are inconvenienced by the scattered locations of bus and jeepney terminals. This is especially true for passengers between the central Business District and the subdivisions to the north. Passengers have to walk far between Quirino/Sarmiento intersections and Susano Road. Subdivision based terminals are spaced 300 meters apart along Susano Road.
- e) There are two types of tricycle terminals for subdivision and for town use. There are 4 terminals of the first type and 3 of the latter.

A few of the jeepney terminals in the study area are provided with sheds for queueing.

2.3.3 Jeepney Operating Characteristics

Operating characteristics of jeepneys in the study area was established via a Driver Interview Survey. (Tabulated results are shown in Appendix A.3).

A similar survey was conducted for jeepneys along the LRT corridor by JUMSUT I in 1983. Compared with JUMSUT I results for Manila City, the suburban operations are characterized by:

longer working hours (by 1.5 hours)

- slower growth of average total income

higher increases in annual fuel/oil consumption (40% for Novaliches vs. 28% for the Manila based jeepneys).

Operations are also differentiated by route types. Thus,

Profits on the routes that served subdivisions and Malinta are smaller.

Inter-city routes have gross revenues higher than intracity ones, but with lower net incomes.

Profits on a Sunday tends to be more than on weekdays.

New entrants to the subdivision-based routes may be discouraged by the low traffic demand and low profits. This situation gives rise to two routes - the flexible and fixed panel routes. In the latter, only the destination is fixed but the actual path varies according to individual passenger requirements.

2.3.4 Tricycle Operating Characteristics

Tricycle operating characteristics were similarly established via driver interview survey. (Results are in Appendix A.4).

Tricycle operations are classifiable into two types. One is for the exclusive use of subdivisions and the other serve town proper areas. Characteristics of tricycle operation are as follows:

Number of round trips/day differ in each terminal

Operating hours are from 6:00 a.m. to 8:00 p.m., which is shorter than jeepneys

Average gross revenue/day is around #110.00 while average net income is #35.00/day (half of jeepney net income)

Fuel/oil comprises 68% of total expenses

Boundary fee is ₽20.00 to ₽25.00.

Basic fare is  $\mathbb{P}1.50/\text{person}$ . Fare is dependent on distance, number of passengers and other prevailing conditions. Thus, extra charge is negotiated between driver and passenger. Travel fare on the whole is higher than those for jeepney or bus (e.g., over  $\mathbb{P}5.00$  is paid from town proper to subdivision).

#### Service Area

****

Every service area has a corresponding waiting or terminal point. Outside these areas, fare is settled at pick-up and is predictably higher than the ordinary rate.

#### Registration

All tricycles are privately-owned and most sport private plates. Issuance of franchises is now being coursed through Metro Manila Commission under the decentralization agreement with the Board of Transportation.

#### 2.3.5 Passenger Characteristics

For the PUJs and PUBs, the total number of passengers counted as boarding and alighting in the Novaliches area is 84,000 in 16 hours. Of these, 66,000 or 78.7% are jeepney passengers. Nine out of ten passengers are taking intra-city trips (see Table 2.5 below).

and the second sec	Number of Boardi	ng/Alighting Pa	ssengers/16 hrs.
and the graph	Intra-City	Inter-City	Total
Mode	000 (%)	000 (%)	000 (%)
Jeepney	625 (74.3)	37 (4.4)	662 (78.7)
Bus	146 (17.4)	33 (3.9)	179 (21.3)
Total	771 (91.7)	70 (8.3)	841 (100.0)

### Table 2.5Public Transportation Passenger Traffic

Source: JUMSUT I

A limited interview survey to define passenger travel characteristics was made. The following results/information were noted:

Those taking the jeepney or bus, exhibit the following characteristics:

Ratios of transfer passengers to total are as high as 57.6% and 58.2% for jeepney and bus, respectively. This validates the hypothesis that Novaliches serves an important interchange function between the CBD and the northern part of Metro Manila (see Table 2.6).

Inter-modal transfers occur largely between jeepneys (60.9% of the total transfers), followed by jeepney-bus (35.1%). Interchanges between buses are negligible due to the simple route structure (see Table 2.7).

Distribution of passengers boarding and alighting at Novaliches is shown in Figure 2.9. The OD pattern clearly illustrate the radial pattern of Novaliches-based passengers movements - which flow along Quirino Highway - A. Bonifacio and then EDSA.

Detailed analysis of inter-route transfers has revealed the major pair-transfers shown in Figure 2.10 and described below.

#### Jeepney-Jeepney:

- 1) Northbound routes CBD bound routes
- 2) Subdivision routes CBD bound routes
- 3) Subdivision routes Malinta bound routes
- 4) CBD bound routes Northbound (Tala) routes
- 5) CBD bound routes Northbound (Constellation) routes

#### Jeepney-Bus

- 6) Subdivision routes CBD bound (Old Pasvil)
- 7) Northbound routes CBD bound routes
- 8) Subdivision routes Westbound routes
- 9) Subdivisiodn routes CBD bound/northbound (Lagro) passing-through routes

Figure 2.11 provides a schematic diagram of the redistribution of passengers within the Novaliches study area. One conclusion is that traffic is concentrated around Susano Market, along Quirino Highway, between Susano and Geronimo, and north of Geronimo where terminals and commercial or business establishments abound.

	Table 2.6	
Transfer	and Terminating Public Transpo	rtation
	Passengers by Mode (%)	÷ .

Mode	Trans- fer	Termi- nating	Total
Jeepney	57.6	42.4	100.0
Bus	58.2	41.8	100.0
Total	57.7	42.3	100.0

	T	ab10	e 2.7	· · ·
Modal	Transfer	of	Public	Transport
	Pa	sser	ngers	1

	From Novaliches by:				
To Novaliches by:	Jeepney Bus	Others	Total		
Jeepney	60.9 20.6	0.3	81.8		
Bus	14.5 0.6	1.4	16.5		
Others	0.3 1.4	· · · · · · · · · · · · · · · · · · ·	1.7		
Total	75.7 22.6	1.7	100.0		

Characteristics of passenger traffic on tricycles are as follows:

57.3% of tricycle passengers transfer to or from other public transport modes - mainly jeepneys as shown in Table 2.8. The remaining 42.7% are captive tricycle riders that 85% of them use the same mode on their return trips.

Major routes fed by tricycles are shown in Table 2.9. CBD bound jeepney routes share 65.4% of the total followed by westbound (Malinta) jeepney routes which share 9.7%.

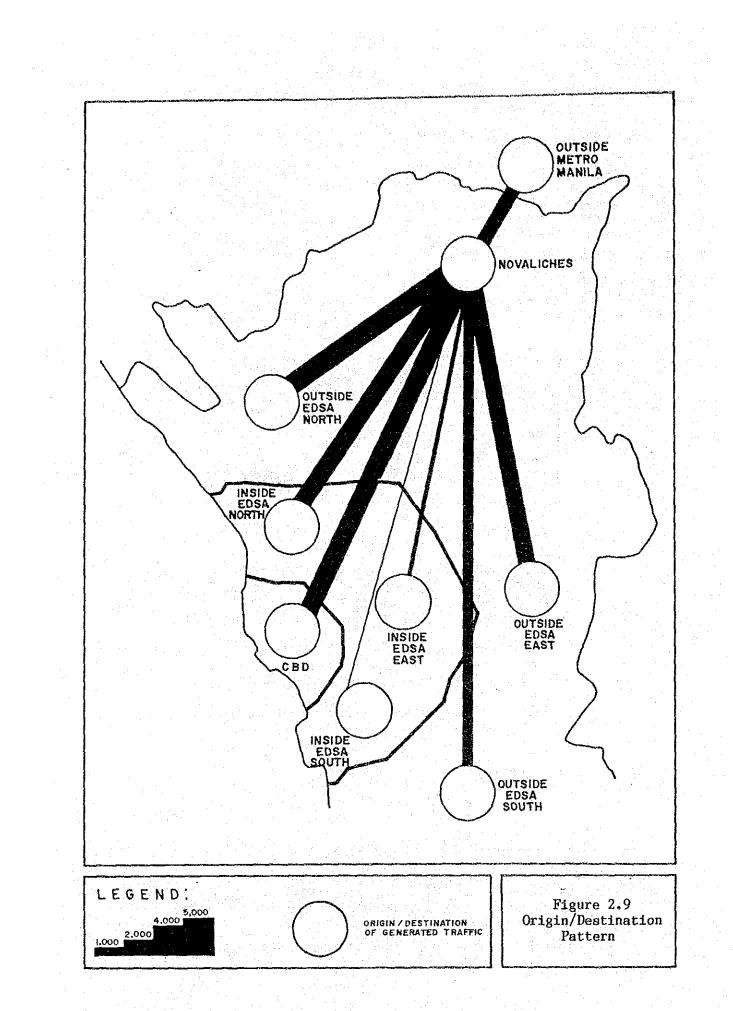
Table 2.10 shows the destination of tricycle passengers generated by subdivisions.

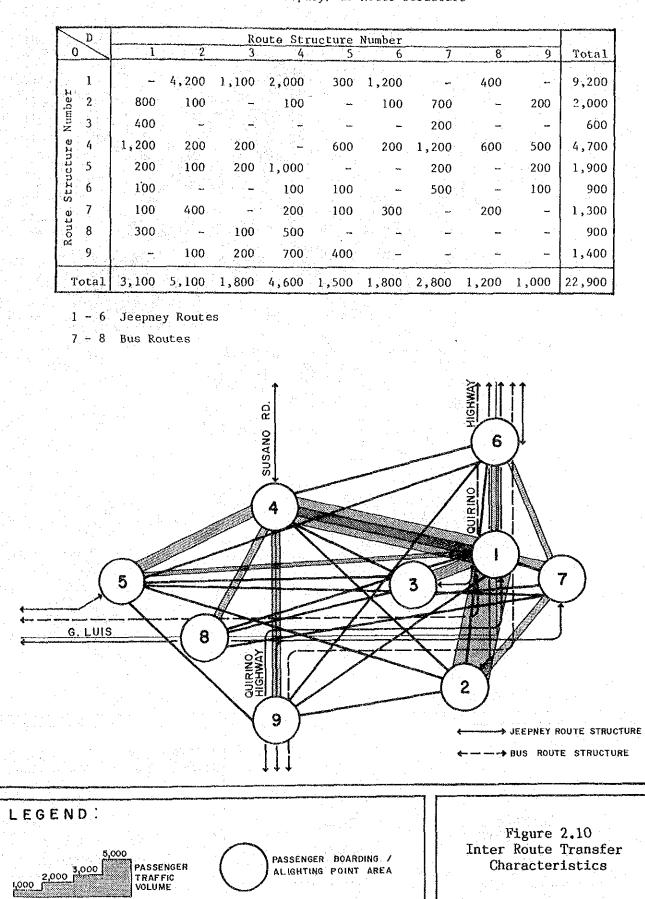
#### Table 2.8 Proportion of Transfer/Non-transfer of Tricycle Passengers (%)

	Tri-				1 /
	Jeepney	Bus	cycle	Others	Tota1 ¹ /
Transfers	78.2	14.6	5.5	1.7	55 (57.3%)
Non-Transfer	9.8	···	85.4	4.8	41 (42.7%)

Source: JUMSUT II

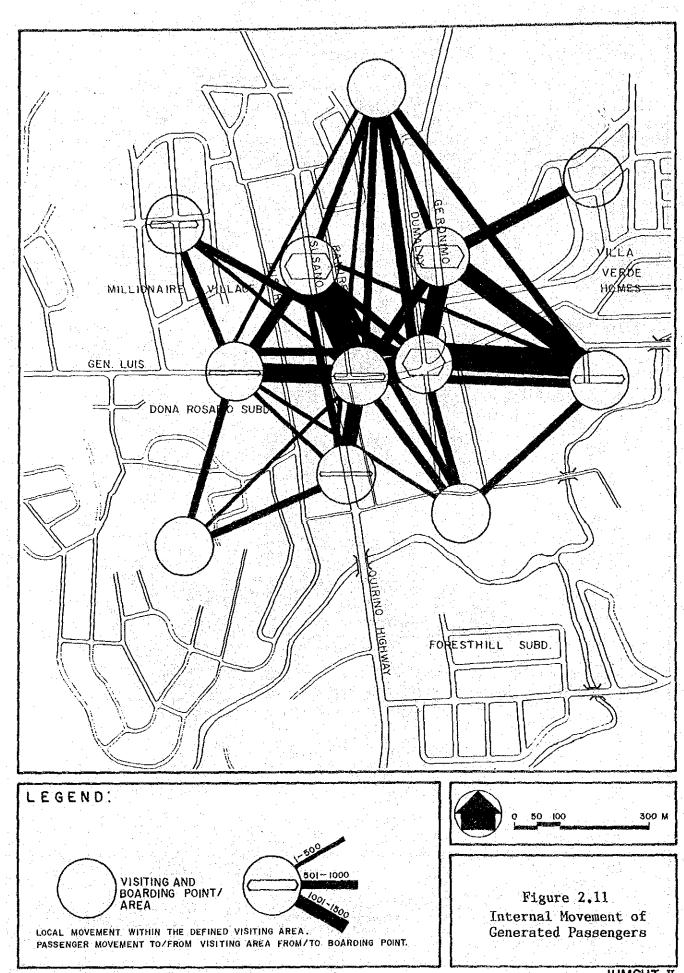
1/ Figures are in absolute number of transfers/non-transfers.





OD Table of Jeepney/Bus Route Structure

JUMSUT II



JUMSUT II

Route	Percentage	Remarks
JEEPNEY	84.6	
CBD Bound	65.4	Blumentritt, Balintawak
North-bound I	3.8	Lagro, Grotto, Constellation
North-bound II Northern	1.9	Tala
Subdivision West-bound	3.8 9.7	Urduja, B.F. Homes Malinta
BUS South-bound (Old Pasvil)	15.4 3.8	
West-bound	1.9	Sta. Cruz, Ayala
West-bound (Passing through)	5.9	Baclaran - Lagro
South-bound	3.8	Baclaran

Table 2.9TransferRoutes by Tricycle Passengers

Table 2.10 Destinations of Tricycle Passengers Generating from Subdivision

Destination	an Campanan an Araba an Anna an	Transfer	Non- Transfer
CBD		17.3%	- %
Between C2/C4	: North	19.3	_
	East	3.8	<b>-</b> .
	South	1.9	-
Outside C4	North	11.5	. –
	East	3.8	-
	South	3.8	<b>—</b> 1
Subdivisions	near Novaliches	23.2	21.1
Novaliches to	wn proper	13.5	78.9
Outside Metro	Manila	1.9	
TOTAL		100.0	100.0

Source: JUMSUT II

## PEDESTRIAN FACILITIES AND CHARACTERISTICS

Figure 2.12 portrays pedestrian behavior and volume during the evening peak hour in the survey area.

Concerning pedestrian facilities, a number of road sections lack sidewalks, while those available are narrow for the volume handled. As a result, pedestrians overflow unto the road and get in the way of vehicles.

Pedestrians tend to cross the road at any time in the absence of traffic signals and pedestrian crossing facilities. A school zone sign near the elementary school has no perceptible effect on driver behavior.

Pedestrian volume on Susano Road reaches 10,000 per hour mainly because of the Susano Market. This road has virtually become a pedestrian's mall. However, vehicles with no altrnative routes still negotiate the road despite the obstacles.

Pedestrian traffic volume on Quirino Highway is 3,500 per hour at the Quirino/Susano Road intersection where loading/unloading activities from jeepneys and buses are heavy. The pedestrian traffic goes down to 1,200 per hour near the Quirino/Geronimo intersection.

#### 2.5 TRAFFIC MANAGEMENT

The current traffic management situation in the Novaliches study area is shown in Figure 2.13 and described below.

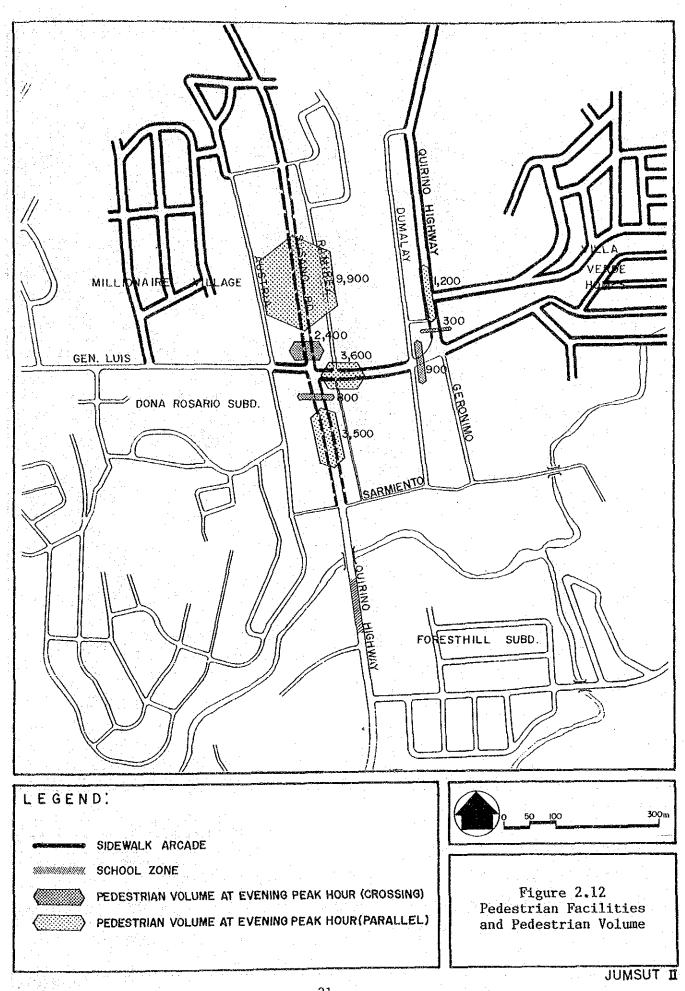
#### A. One-way Streets

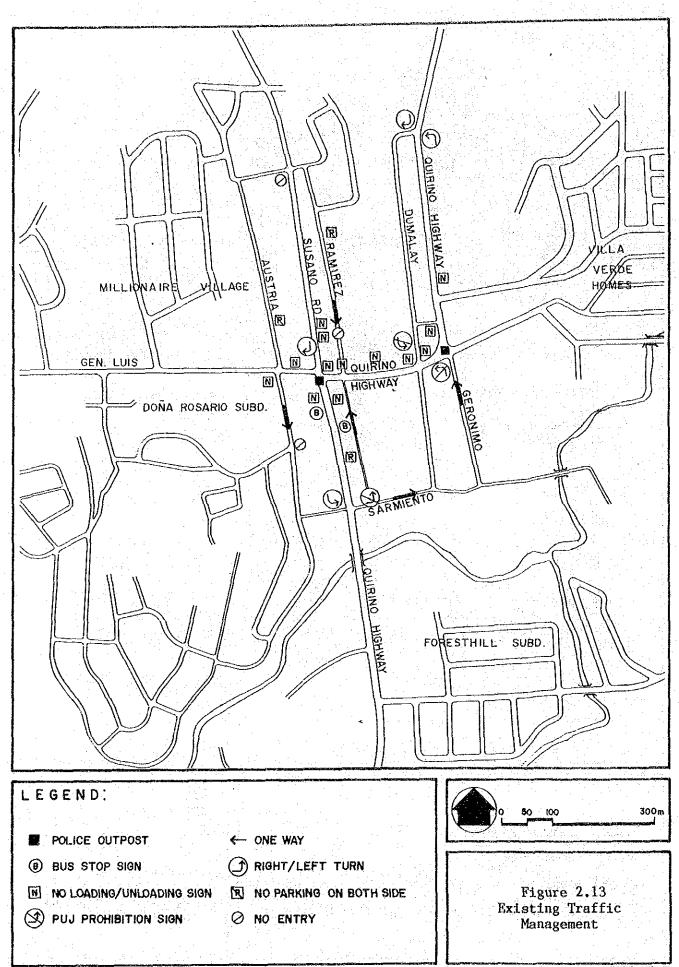
Several narrow streets may be considered as one-way, Gen. Luis, a primary road, is designated as one-way between Quirino and Austria. Consequently, sidestreets inside Rosario Subdivision absorb the counterflow. This leads to bottlenecks at the Gen. Luis/Austria intersection but reduces the traffic volume at Susano intersection. One-way sections are:

Direction	Road Name	Section
East -> West	Cen. Luis	Quirino - Austria
West -> East	Sarmiento	Quirino - Geronimo
North -> South	Ramirez Emerald Austria	Susano - Quirino Silver - Gen. Luis Gen. Luis - Susano
South -> North	Ramirez Geronimo	Sarmiento - Quirino Dumalay - Quirino

30

2.4





JUMSUT I

## B. Traffic Signal

There is not a single traffic signal found in the study area. At Quirino/Susano Road and Quirino/Geronimo intersections, traffic aides control the vehicle and pedestrian movements. Oftentimes, traffic congestion on Quirino Highway becomes severe as a result of erratic time phasing at intersections. Installation of signals would free the traffic aides to undertake other necessary traffic tasks.

#### C. Loading/Unloading Prohibition

Loading/unloading signs are prevalent along Quiirino Highway. These signs are generally observed by buses and jeepneys as designated stops.

#### D. <u>Turning Prohibition</u>

Turning prohibitions exist in the following intersections:

Intersections	
Quirino/Susano	Straight and left-turn prohibition from Susano
Dumalay/Quirino	Left-turn prohibition from Dumalay
Quirino/Dumalay	Left-turn prohibition from Quirino Highway

#### E. <u>Parking Prohibition</u>

Parking is prohibited along Quirino Highway, Susano Road and Gen. Luis. Widespread violation, however, is noticeable.

At one time, 127 parked vehicles were counted along the streets. These are brokendown by street locations as follows:

<	
(from South) - Susano	26
Susano - Geronimo	18
Geronimo - Dumalay	47
Quirino - Austria	28
Austria - (Westward)	8
Total.	127
	Susano - Geronimo Geronimo - Dumalay Quirino - Austria Austria - (Westward)

#### 2.6 TRAFFIC CHARACTERISTICS FROM SUBDIVISIONS

#### 2.6.1 Present Subdivision Development

Urban expansion of Metro Manila has been proceeding rapidly towards the north, east and south outside EDSA, particularly for residential uses. Growth potentials are higher for the north and south than the east where space is limited. Residential development in the south is led by the private sector and caters mainly to the middle and upper income classes. In the north, the initiatives come from both the private and public sectors and target the middle income market. Approximately 30% increase in population between 1985 and 1990 can be expected in these areas.

Novaliches is located in one of these rapidly growing areas to the north. Developments within the built-up urban communities have slowed down and replaced by extensive subdivision-type of development. Aside from the usual detached housing units, townhouses have become popular.

Both private and public sectors have been active in these developments, sometimes in joint venture. The size of development varies from a few hectares to more than 100 hectares.

Because of uncoordinated subdivision develoments the transportation pattern that emerges follows traditional growth. Thus, early growth centers on the town proper - whose centrality is reinforced by subsequent outer area developments. Traffic becomes heavy and dense at and around the Novaliches town proper and spreads outwards in traditional radial pattern along the major roads namely Quirino Highway, Susano Road Gen. Luis, Ipo Road, Geronimo, and Camarin Road (see Figure 2.14).

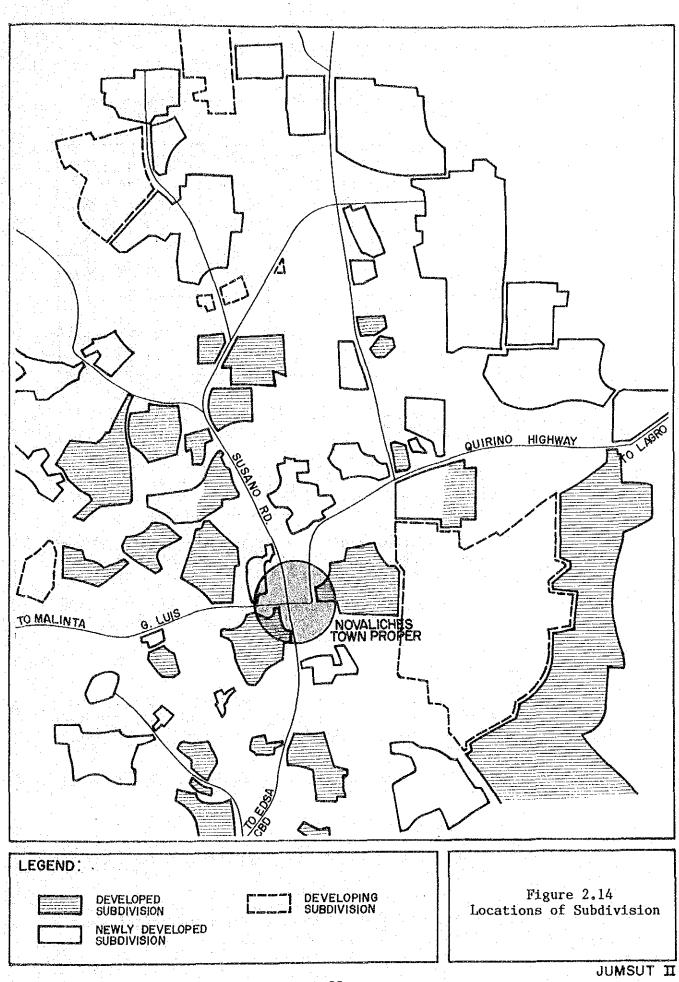
#### 2.6.2 Vehicular Traffic Demand

In the absence of subdivision-based traffic data, a limited traffic count survey was conducted for five selected subdivisions: BF Homes, Jordan, Forest Hills, Urduja, and Villa Verde. Jeepney services are available in BF Homes and Urduja. Jordan, Forest Hills and Villa Verde are situated closed to the town proper; the first two are served by tricycles with terminals.

Magnitudes of traffic generation/attraction for 12 hours between 7:00 a.m. to 7:00 p.m. are shown in Table 2.11 for the subdivisions concerned.

Although the traffic generation levels vary according to the availability of public transport and the income of residents, some useful planning indicators can be derived.

Hourly fluctuations of traffic in the different subdivisions are shown in Figure 2.15. The following observations can be made:



.

		Name o	f Subdivi	sions	
	Jordan	BF Homes Phases 'I-II	Forrest Hills	Urduja	Villa Verde
Jeepney Bus Private Car Tricycle	- 1,189 685	205 	593 597	319  410  93	447 389
Population	2,050	6,400	550	4,000	n.a.
No. of Households	400	480	110	520	n.a.
Area (ha.)	25	62	10	23	19

# Table 2.11Subdivision Traffic Volume (7:00 - 19:00)

Source: JUMSUT II

n.a. - data not available

Private car volume shows sharp peak behavior in the morning and evening. Percentage of peak hour to 12-hour traffic volume is 13%. Peak hours are experienced during 9:00-10:00 a.m. and 5:00 - 6:00 p.m.

Jeepney traffic exhibits a similar pattern with a more pronounced peak hour ratio of 13.5% (to 12-hour). Peak hours are 7:00-8:00 a.m. and 5:00 - 6:00 in the evening.

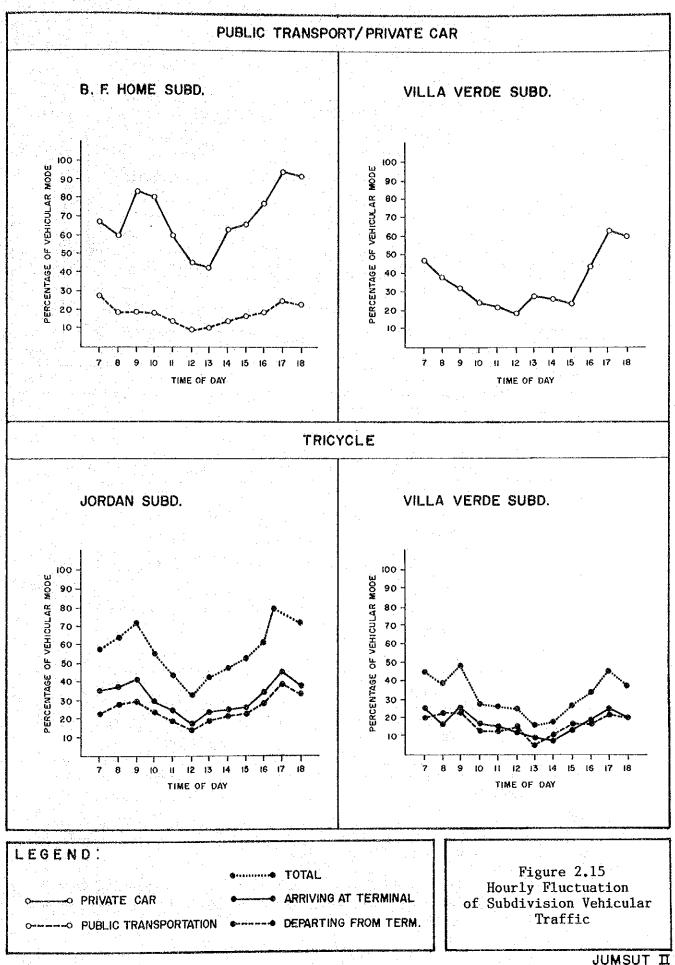
Tricycle traffic behaves similarly with minor deviation. Peak hours are 9:00-10:00 a.m. and 5:00 - 6:00 p.m. and peak hour ratio is 12.4%.

#### 2.6.3 Demand Characteristics

To get a more precise bearing on the subdivision traffic demand characteristics, home interview surveys with selected residents were conducted. The results and findings are contained in Appendix A.4 and summarized below.

- a) Table 2.12 gives the following conclusions on household and car-ownership:
  - average household size is 5.9
    - 68% of the total number of households employ domestic help

the percentage of car-owning households is 55% which is considerably higher than the Metro Manila average of about 10%



. .

motorcycle and bicycle ownership is significant at 87% and 67%, respectively. of the total households

average household income is P4,100/month in 1984 (equivalent to P1,900/month deflated using 1980 prices indices).

Subdivision	Ave.House hold size (persons)	% HHold employing domestic help	% of car-owning households	Ave.No.of cars owned by car- owning Household	% of Motorcycle owning Household	2 of Bicycle owning Household	Ave, Hill Income
URDUJA	6.4	45	46	1.26	95	65	4,000
B.F. HOMES	5.6	68	61	1.34	90	56	3,700
VILLA VERDE	5.2	84	72	1.53	60	78	4,900
JORDAN	5.9	100	51	1.17	94	74	3,800
Average	5.9	68	55	1.28	87	67	4,100

	Table 2.12	1
Household	and Car-ownership Characte	ristics

1/ Average Household Income is in P/month.

20.

- b) Trip characteristics are displayed in Table 2.13 and summarized as follows:
  - average number of trip makers per household is 3.51 persons/day
  - the trip rate per person is 1.21 trips/day
  - approximately 56.8% of the generated trips and 57.6% of the attracted trips require modal transfer at the Novaliches town proper
    - jeepney accommodates 75% of total transfer trips, then bus (16%), tricycle (8%), and mini-bus (1%).
    - of the non-transfer trips, private car mode shares 36% of total trips, followed by jeepney, walking, bus and tricycle modes.
- c) Service aspects of public transport are rated differently by residents, viz.:

public transport services are considered more convenient in the subdivisions nearer the town proper, such as Villa Verde and Jordan

dissatisfaction was high in BF Homes although this subdivision showed jeepneys with a frequency of 205 in 12 hours

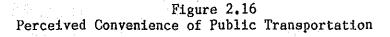
	Table 2,13	
Trip	Characteristics	

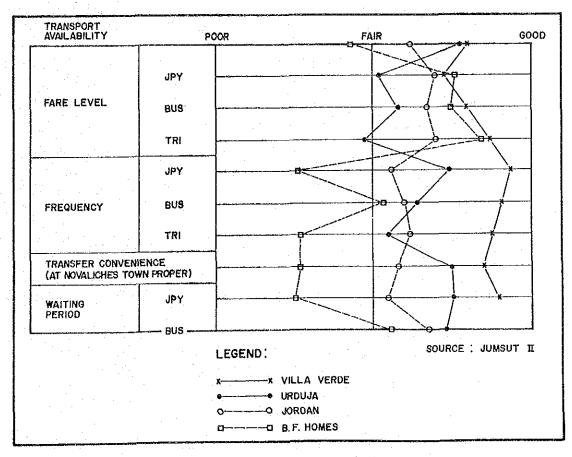
				9		frans Mode		Car Users of Non-
Subdivision				rips at NTP ² Attraction	-	Bus	Tri- cycle	Transfer Trips
URDUJA	3.54	1.10	65,3	66.5	81	14	3	30.2
B.F. HOMES	3.32	1.26	64.3	64.3	80	19	1	41.1
VILLA VERDE	4.12	1.57	35.2	35.2	61	10	29	44.7
JORDAN	3.02	1.07	59.7	59.7	47	18	35	11.4
Average Total	3.51	1.21	56.8	57.6	75	16	8	35 . 7

Source: JUMSUT II

1/ Average number of persons with trips per subdivision.

2/ Number of trips between subdivisions and Metro Manila with transfers at Novaliches town proper.





- d) Interactions between subdivisions are low, as shown in Table 2.14.
  - 52% of the residents admitted no visitation to other subdivisions in the Novaliches area
    - 61% of the residents say they do not visit the Fairview area.

			ele tradición de la pr
the Subdiv	isions in		raction of ivisions in Area
No	Yes	No	Yes
59	41	55	45
63	37	82	18
18	82	28	72
58	42	74	26
52	48	61	39
	the Subdiv Novaliches No 59	59       41         63       37         18       82         58       42	the Subdivisions in the Subdivisions in the Subdivisions in Fairview No Yes No 59 41 55 63 37 82 18 82 28 58 42 74

#### Table 2.14 Trip Attraction of Novaliches Subdivisions to Other Proximate Subdivisions (%)

Source: JUMSUT II

#### 2.6.4 Transportation Facilities in Subdivision

The show case or selling point of the subdivisions are their road network. Invariably planned with private traffic in mind, public transportation terminal facilities and spaces are hardly considered. Thus, jeepney and tricycle terminals are commonly on-road.

Jeepney operation within subdivisions tend to be flexible, although the routes are supposedly fixed.

#### 3.0 PREVIOUS STUDIES AND PROPOSALS

#### PRECEDENTS

3.1

3.2

MMTEAM Project and MMUTSTRAP Part B1 covered Metro Manila in some detail. MMTEAM I and II, however, were limited to traffic engineering and signalization within C-4 (EDSA).

Although Novaliches was included in the Northeastern Sector's Traffic Management Study of MMUTSTRAP Part B1, the study touched only Tandang Sora. No specific recommendation concerning Novaliches has been made.

Only the Northern Package Project is of direct relevance to this study. It recommended C-6 as a primary distributor of traffic and a catalyst for the urbanization of the area.

#### NORTHERN PACKAGE

The purpose of this project was to evaluate the feasibility of completing the circumferential and radial road network in the northern part of the National Capital Region (NCR) in terms of technical, economic, and financial considerations. These roads were as follows:

C--5

15 kilometers from the North Diversion Road to Aurora Boulevard via Republic Avenue and Katipunan Road

C-6

12 kilometers from North Diversion Road to D. M. Marcos (R-7)

Mindanao Avenue

9 kilometers from North Avenue to C-6

Visayas Avenue

- 8 kilometers from Elliptical Road to C-6

Among these roads, C-6 has direct impact on the area under study. Its alignment will bisect Quirino Highway northeast of the town proper and serve the following functions:

as the outer segment of the primary road network

as a circumferential road, it will redirect traffic away from the town proper of Novaliches

decrease traffic along EDSA

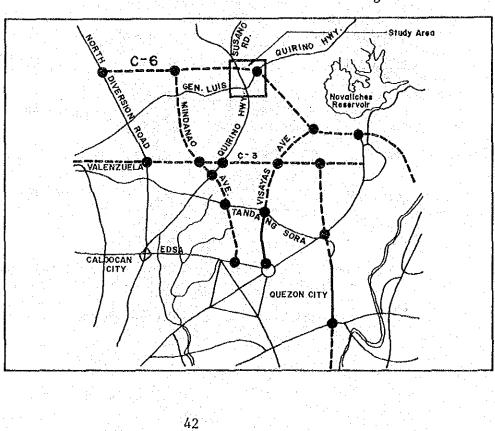
redistribute traffic on Quirino Highway to Mindanao Road or Visayas Avenue (see Table 3.1)

as a major link to satellite centers within the NCR

		(PCU/day)
	1989	2000
Major Roads	Without With	Without With
Quirino Highway (South Section of G. Luis	22,000 17,000	54,000 20,000
Quirino Highway (North Section of G. Luis	25,000 21,000	72,000 16,000
G. Luis	24,000 19,000	36,000 10,000
Susano Road	19,000 20,000	54,000 15,000
C - 6 (South Section of Quirino Highway)	22,000 20,000	48,000 61,000
C - 6 (between Quirino - Susano)		- 52,000
C - 6 (West section of Susano Road)		- 53,000

Table 3.1 Estimated Traffic Volume Related to the Construction of C-6

## Figure 3.1 Proposed Road Network in the Northern Package



#### 4.0 TRANSPORT SYSTEM ANALYSIS

#### SPECIFICATION OF THE PROBLEMS

#### 4.1.1 General Observations

4.1

Novaliches area has been growing rapidly as one of the suburban centers north of Metro Manila. Due to continuing pressures from increased urbanization in Metro Manila and the availability of space in this area, the trend will not abate in the future.

Consequently, transportation demand both for private and public modes would jump faster than the road network can expand. The predominant low-density develoment suggests that irregular operations of public transport would persist.

Problems that have to be dealt with for the Novaliches MIA can be stated as in Figure 4.1 and discussed from different viewpoints as follows:

#### A. Urban Development

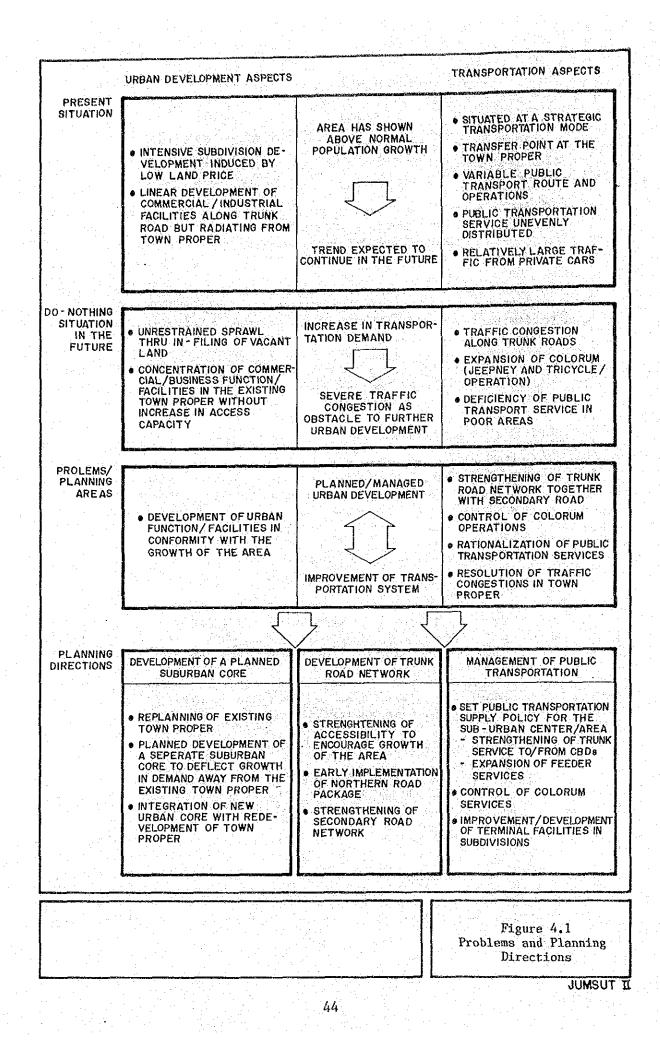
The array of urban services fulfilled by the present town proper would be swamped by the increased demand occasioned by growth. Development of a comprehensive suburban core integrating commercial, business, social and administrative services, with corresponding improvements in the transportation system is the key for a balanced and sound development of this area as well as of the metro region.

#### B. Road Network

Considering that the trunk road system is still undeveloped, the uptrend in transportation demand will mean greater reliance on existing major roads (such as Quirino Highway and Gen. Luis). Lack of alternative access means exacerbation of existing traffic congestions at several sections of the town proper. It will not be difficult to visualize this bottleneck becoming the main constraint to future urban growth.

#### C. Public Transportation

It is hard to imagine major improvements in public transport without a change in the existing road network. Nevertheless, by strengthening two types of services, some relief may be induced. The first one concerns direct link to/from CBD while the second refers to feeder services between Novaliches town proper and various subdivisions. Since the former cater to trip of relatively long distance and which traverse a road of limited capacity, expansion of bus services linking the Novaliches town proper to Metro Manila CBD appear suitable. As to the feeder services, a considerable number of colrum vehicles



are in operation in response to local demand. Their area of concentration, however, leaves many areas unattended because of low profitability.

#### 4.1.2 Problems

Problems extant in Novaliches are summarized below and arranged in Table 4.1. Discussion and possible solutions are likewise individually presented in the same table.

#### A. Traffic Management Component

- 1) Traffic congestion at Quirino Highway/Gen. Luis intersection
  - Vehicular flow hampered by pedestrians and vendors along Susano Road
  - Risk due to vehicle and pedestrian mix along Quirino Highway
  - 4) Obstructed flow of tricycles particularly along Susano Road and Gen. Luis
- 5) Induced detour traffic due to one-way control at key road segments
- 6) Reduction in road capacity due to curbside parking.
- B. Public Transport Component
  - 1) Delays due to left-turn traffic at Gen. Luis/Austria and Quirino Highway/Sarmiento
  - 2) Conflict between pedestrians and vehicles at the entrance/ exit points of the jeepney terminals which are scattered along Susano Road
  - 3) Slowdown in vehicular flow due to U-turn movements of jeeneys on Quirino Highway
  - 4) Environmental disturbance in residential areas due to the intrusion of jeepneys and buses in private streets
  - 5) Inconvenient transfers due to the scattered terminals
  - 6) Growth of colorum due to inefficiency of public transport regulation
  - 7) Low profitability of jeepney operation servicing the subdivisions.

# Table 4.1 Problems and Solutions for the Study Area

Quirino Highway/Gen. Luis intersectionflow due to improper geometric features of the intersection.of intersection and installation of tra signal.b) Hampered vehicular flow by pedestrians and ven- dors along Susano RoadPedestrians' almost ex- clusive use of road to- wards Susano Market, it being to the subdivi- sions in the north.Improvement of side to control of traffic dentrial due to any control of traffic along Quirino Highwaythe ture of Sidewalk function inhi- bited by venders and pedestrian mixture along Quirino HighwaySidewalk function inhi- bited by venders and physical discontinuity of facilities, along Quirino HighwayImprovement of side to segregate pedest and wehicle traffic dentrial.d) Hampered vehicular flow by tricycles particu- larly along Susano Road and Gen. LuisSidewalk function inhi- bited by venders and physical discontinuity of facilities along Quirino HighwayControl of on-road inon of private car to Austria.d) Hampered vehicular flow by tricycles particu- larly along Susano Road and Gen. LuisLarge tricycle volume (40% to 60% of total traffic long, Susano Road and left turn traffic from Gero- nimo because of requiredExamination of traf bitle slong, Susano Road and left turn traffic from Gero- nimo because of requirede) Ceneration of detour trafficInconvenienced north to south traffic from Gero- nimo because of requiredImprovement of traf installation of traf signal.e) Ceneration of detour trafficInconvenienced north to south traffic from Gero- road sections.Improvement of traf installation of traf	PROBLEM STATEMENT	DISCUSSIONS	POSSIBLE SOLUTIONS
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traffic turn traffic from tero- nimo because of required signal.	traffic due to direct-	south traffic along	
directional traffic control.	traffic	turn traffic from Gero- nimo because of required directional traffic	

# Table 4.1 cont'd

	PROBLEM STATEMENT	DISCUSSIONS	POSSIBLE SOLUTIONS
	f) Reduction in road capacity due to on- road parking	• Lack of off-road parking space.	<ul> <li>Provision of off-road parking space.</li> <li>Control of on-road parking.</li> </ul>
	g) Hampered vehicular flow by left-turn traffic at Gen. Luis/Austria and Quirino Highway/ Sarmiento	• Bus detour to avoid the narrow road width of G. Luis between Quirino Highway and Austria which is prone to a traffic bottleneck.	<ul> <li>Rerouting of bus to resolve detour.</li> <li>Improvement of Quirino/ G. Luis intersections.</li> </ul>
	<ul> <li>h) Conflicting traffic flow between pedes- trians and vehicles at the entrance/exit of the jeepney termi- nals which are scattered along Susano Road</li> </ul>	<ul> <li>Although an off-road terminal, traffic flow lines to/from the ter- minal are disordered.</li> <li>Large number of pedes- trians converge due to Susano Market.</li> </ul>	<ul> <li>Improvement of accesses by integrating terminal</li> <li>Simplication of jeepney traffic flow lines alon Ramirez and Austria.</li> </ul>
rt Component	i) Hampered vehicular flow due to U-turn of jeep- ney on Quirino Highway	• U-turning causes a bottleneck along the road section.	<ul> <li>Provision of left-turn movement by removing police outpost at the Quirino/Geronimo inter- sections.</li> </ul>
Public Transport	j) Environmental distur- bance in the residential areas due to the jeep- neys and buses entering narrow streets	• Jeepney and bus routes are permitted along Sar- miento, Geronimo and Austria which are bounded by residential areas and with narrow widths posing pedestrian danger.	
	<ul> <li>k) Inconvenience of trans- fer due to scattered terminals</li> <li>1) Generation of colorum</li> </ul>	<ul> <li>Despite transfer passen- gers at 60%, terminals are scattered along Susano Road and Geronimo.</li> <li>Two types exist:</li> </ul>	<ul> <li>Development of integrat terminals for increased convenience.</li> <li>Provision of public</li> </ul>
	due to the absence of public transportation management and control	<ol> <li>Those which cut their routes short at Nova- liches due to low profitability</li> <li>New routes servicing subdivisions where public transportation services are unavail- able.</li> </ol>	<ul> <li>transportation management guidelines for the suburban areas.</li> <li>Strengthening of route management and control</li> <li>Provision of new routes to areas of inadequate service.</li> </ul>
		<ul> <li>Public transportation management does not meet the existing local needs.</li> </ul>	

Table 4.1 cont'd

		PROBLEM STATEMENT	DISCUSSIONS	POSSIBLE SOLUTIONS
	m)	Low profitability of jeepney operation ser- vicing the subdivisions	<ul> <li>Demand is low and mainly "to work" and "to school" trips.</li> <li>Unlucrative to the opera- tors but badly needed by developers/residents.</li> </ul>	• Enforce provision of feeder services on developers.
	<b>n)</b>	Heavy convergence of road traffic to a li- mited number of trunk roads due to the lack of secondary/tertiary roads; local traffic impede through traffic greatly, causing congestions.	<ul> <li>Regional network trunk roads are limited to Quirino Highway, G. Luis and Susano Road which have to meet the increas- ing traffic demands.</li> <li>Maintenance of a good and reliable access to/from CBD as the key to the development of the area.</li> </ul>	<ul> <li>Improvement/expansion of trunk road network and a supplementing/secondary system.</li> <li>Increase of traffic capacity by better utili- zation of existing roads.</li> <li>Study of the construction of a by-pass road to Novaliches town proper (avoiding Gen. Luis, Susano congested areas)</li> </ul>
port Component	o)	Hampered vehicular flow due to poor road surface	<ul> <li>The generous right-of- way of Quirino Highway is ineffectively used with its deteriorated shoulder and poor surface conditions.</li> </ul>	• Improvement of road sur- face and sidewalk.
Public Transport	•		• Poor road surface of G. Luis and Sarmiento reduce the travel speed signi- ficantly.	
Pul	p)	Inadequate road width of G. Luis as a trunk road	<ul> <li>With it's width of only 7-9 meters, it does not function a trunk road toward Malinta and North Diversion Road.</li> <li>Sidewalks wanting in de-</li> </ul>	<ul> <li>Feasibility study of an alternative route or existing road widening.</li> <li>Improvement of sidewalks and pedestrian crossing facilities.</li> </ul>
	са) -	Difficulties in plan	velopment pose dangers in that it results to a mixture of vehicles and pedestrians. • Significant benefits from	• Feasibility study and
	<b>Ч</b> У	lay-out of subdivision roads with the existing road network	integrating subdivision roads with local road system, although the reluctance of developers for security reasons.	<ul> <li>Planning guidelines preparation.</li> <li>Network plan preparation including development of existing roads.</li> </ul>