6-2 BUS TRANSPORT

6-2.1 Targets for Bus Transport Improvement

1) Background Situation

The public transport systems of Guayaquil are currently encountered with the following difficult situations:

(1) There is no increase in the number of vehicles for the public transport systems of the city despite the increase in the urban population and, at the same time, the increase in the number of passengers who utilize the systems (Figure 6-2.1).

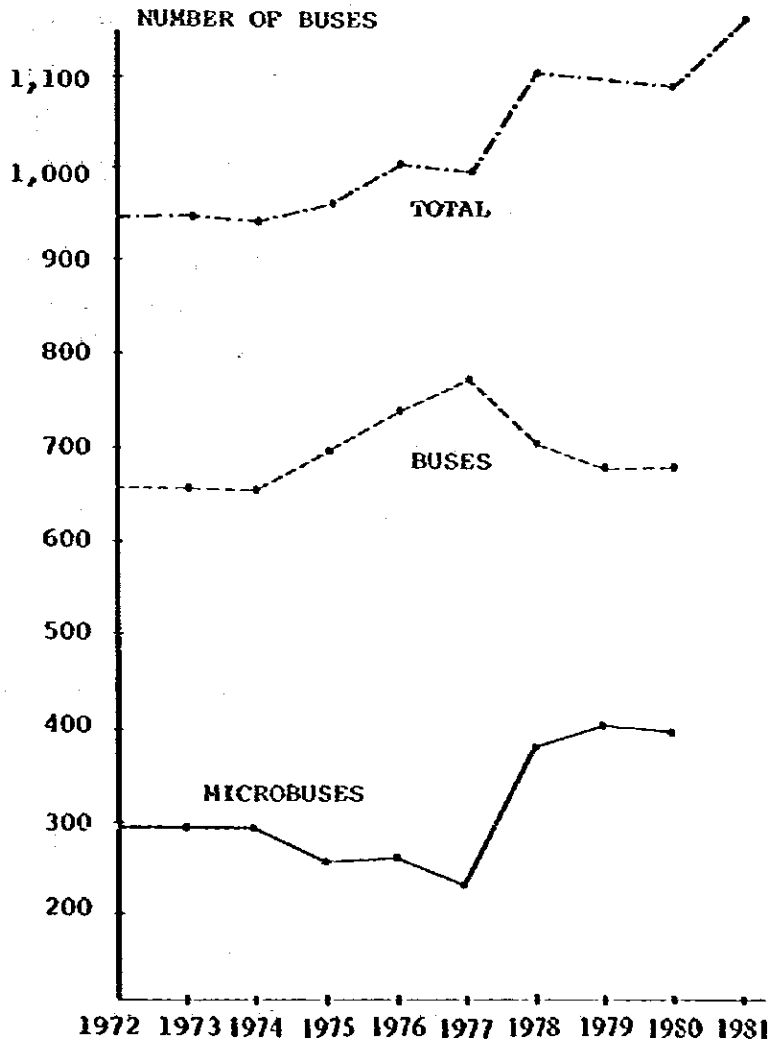


Figure 6-2.1 TREND OF NUMBER OF BUSES REGISTERED IN OPERATION

(2) In relation with a rise in prices of general commodities, the transport cost is also going up conspicuously and the rising speed of fares has been accelerated.

(3) With the road traffic congestion turning into heavier, smooth operation of buses is becoming more difficult.

(4) Free Ride System, which had been a main charming point of bus transport in the past, has turned into not only an obstacle to other road traffic but also a danger even to bus users.

(5) The users of the public transport systems are being eaten away by illegal vehicles' service which is not always rejected by passengers.

The primary subject is to find a way out of such situations and in order to enhance the transport efficiency of urban traffic as a whole, it is needed to provide at least such a space as to allow preferential operation of bus transport. In a long-term, furthermore, improvement of the public transport systems should be pushed forward by introduction of MRT. In this Chapter, our proposal is made covering how to improve the public transport systems on the short-term basis taking both mid-and long-term basis into consideration.

2) Targets for Bus Transport Improvement

The basic targets for improving bus transport in the Study Area are as follows:

(1) Improvement of mass transport function

(2) Achievement of social equality by improving transport means for those commuters and school attendants who cannot afford to use private cars

(3) Effective and full use of the precious space within the urban area

(4) Effort for making use of energy resources

(5) To make stupendous road investment postponed, necessary for cars increasing rapidly, by a mass public transport.

In order to achieve the abovementioned targets, consideration

is conducted paying attention to the followings:

Service level, Operation and management,
Infra-structure and facilities, Fare system,
Institutional system, etc.

Improvement of the above items can be accomplished not always in a short-term but sometimes takes a long term. The prospect as to the period needed for improving these items is shown in Table 6-2.1.

Table 6-2.1 COUNTERMEASURES FOR BUS TRANSPORT IMPROVEMENT

Countermeasures \ Term to be executed	Short term	Mid and long term	Note
Improvement of bus service			
1. Expansion of bus routes	o		
2. Improvement of network	o		
3. Improvement of frequency	o		
4. Securing punctuality	o	o	
5. Restriction on Free Ride system	o	o	In confused area,
6. Park and Ride system	o		If feasible
7. Cycle and Ride system	o		"
8. Bus hierarchy		o	Express bus, etc.
9. Lease system from bus companies	o		School Bus, Factory Bus
10. Information system	o		
Improvement of bus facilities			
1. Orderly arrangement of connecting points		o	Related with ordery arrangement of bus network itself, and MRT
2. Improvement of bus stop facilities	o	o	
3. Access road to bus stops	o	o	
4. Orderly arrangement of bus roads	o	o	
5. Preferential and exclusive lane for buses	o	o	
6. Exclusive roads for buses		o	

Countermeasures \ Term to be executed	Short term	Mid and long term	Note
7. Improvement of bus fleets	o	o	
8. Construction of bus terminal		o	When MRT introduced
9. Taxi bay	o	o	
Fare and pricing improvement			
1. Fare system in distances		o	Related with orderly arrangement of urban scale, bus network, etc.
2. Zone fare system		o	"
3. Fare pre-payment	o	o	
4. Discounted fare for selected group	o		
5. Premium service-premium fare	o		
Improvement in manage and operations			
1. Service and maintenance training	o		
2. Training for planning	o		
3. Training for control	o		
4. Other employee training	o		
5. Schedule control	o		
6. Line up riding of passengers	o		
Improvement in institutional system			
1. Systematic regulations	o		
2. Operation cost and revenue analysis	o	o	
3. Consultative committee		o	
4. Organization of administration		o	
5. Organization of bus enterprises	o	o	

Countermeasures \ Term to be executed	Short term	Mid and long term	Note
Innovation of public transport			
1. Improvement of network	o	o	
2. Introduction of new model bus	o	o	
3. Introduction of new kind of transport means		o	
Improvement of facility layout			
To improve facility layout so that every bus route may become neither extremely congested nor, inversely, extremely vacant	o		

6-2.2 Existing problems to be solved

In the following description, the existing problems on bus transport are pointed out classifying them into each side of passengers, suppliers and institutional aspect. Since these problems are wide-ranging, it is recommendable to solve them in line with the improvement programs described in the next clause. In the last place, description is given as to the present situation of taxis.

1) Passengers' Problems

(1) Insufficiency of Bus Frequency and Capacity

Both frequency and capacity of buses are insufficient resulting in causing heavy congestion and making users impossible to get on buses. (As to waiting time, see Figure 6-2.2.)

(2) Bus Routes

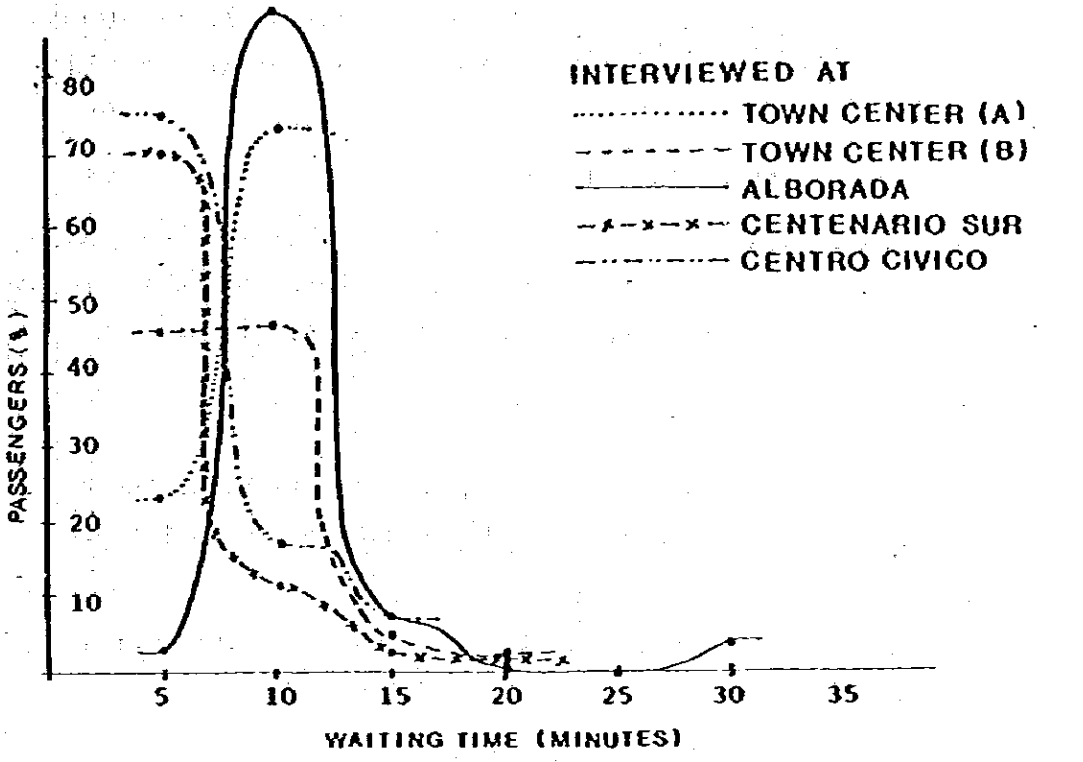
- In spite of CBD being the destination for many users, there are few bus routes entering into CBD. It is necessary, therefore, for these buses to improve accessibility to CBD.
- There are some areas where it is impossible for a user to get to a destination by bus in one route (Table 6-2.2) It is necessary, therefore, to re-locate such a bus route.

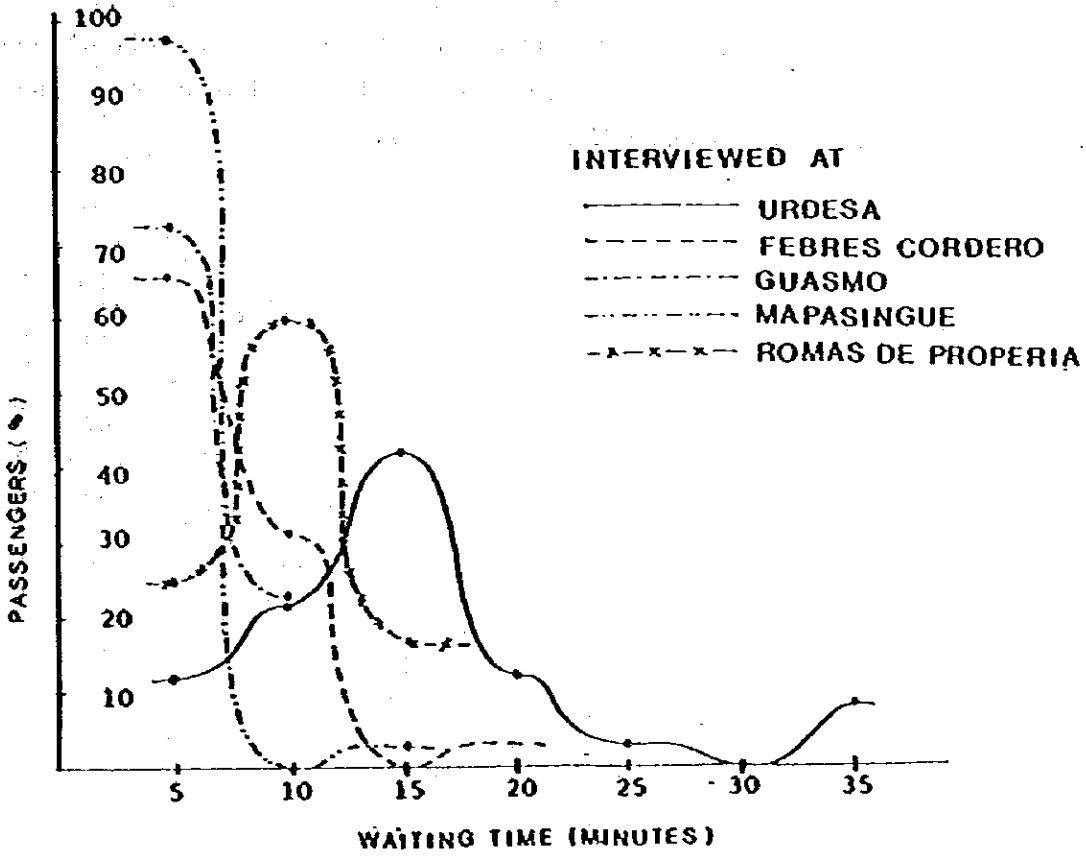
Table 6-2.2 RATE OF PASSENGERS WHO HAD TO TRANSFER BUS ROUTE TO GET TO DESTINATION

Destination	Rate of passengers who had to transfer routes
Town Center	12%
URDESA	11%
ALBORADA	24%
CENTENARIO SUR	51%
CENTRO CIVICO	55%
FEBRES CORDERO	33%
GUASMO	50%
MAPASINGUE	33%
ROMAS DE PRODERINA	86%

Source: Bus Passenger Interview Survey on Roads by the Study Team, August 1982

Figure 6-2.2 WAITING TIME DISTRIBUTION AT BUS STOPS IN EACH AREA





Source : Bus Passenger Interview Survey on Road by the Study Team August 1982

(3) Poor Bus Stop Facilities

Except a part, bus stop facilities are poor. Particularly, provision of shelters and benches is strongly requested by users.

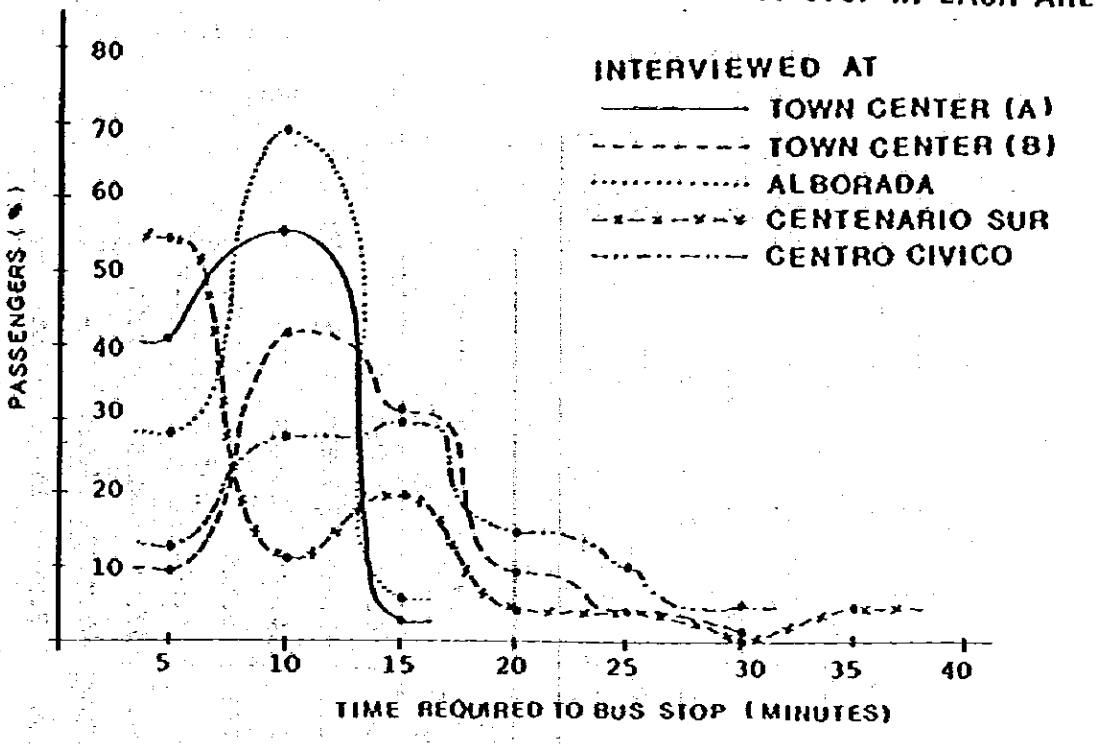
(4) Danger in Getting On and Off Buses

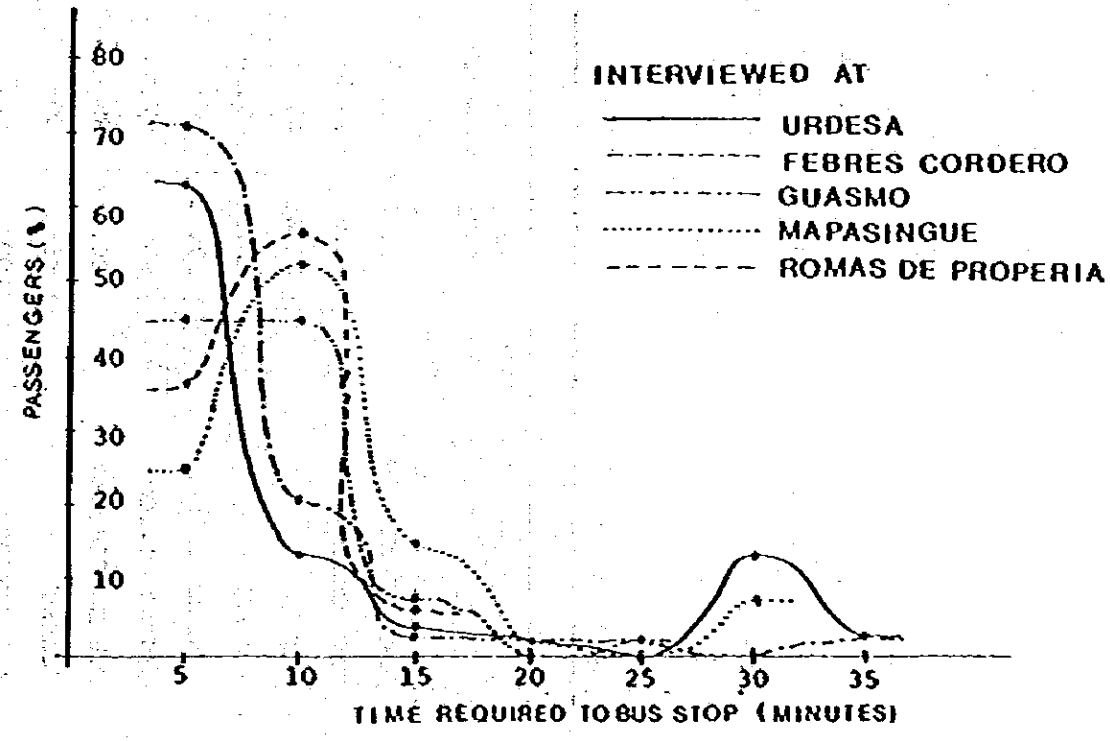
Getting on and off buses at the places other than bus stops can be seen frequently. In some cases, it happens within an interchange area and is very dangerous to users, as well.

(5) Others

- Bus stop coverage
  Although the density of the bus network is high, the bus stop coverage is insufficient in the northern area. (Figure 6-2.3)
- Other problems on bus stops
  Shortage in the length of bus bay and prohibition of stopping other vehicles
- Insufficiency of guide and publicity
  Publicity of the passing routes, time schedule, etc. at bus stops is insufficient. (Opinions got from bus passengers interview are shown in Table 6-2.3).

Figure 6-2.3 DISTRIBUTION OF WALKING TIME TO BUS STOP IN EACH AREA





Source : Bus Passenger Interview Survey on Road by the Study Team
August 1982

Table 6-2.3 OPINIONS ON VARIOUS INCONVENIENCE GOTTEN FROM PASSENGERS BY AREA

Inconvenience at BUS STOPS / Area	BUS STOP SIGN	NO SHELTER	NO BENCH	BUS DOESN'T STOP	DIRTY	CROWDED	LONG WAIT
TOWN CENTER (A)	7.32%	48.8%	41.48%	-	-		
TOWN CENTER (B)	9.8%	17.8%	21.96%	61%	12.2%	51.24%	17.8%
URDESA	9.8%	21.96%	26.84%	34.16%	19.6%	12.2%	78.08%
ALBORADA	5.12%	38.4%	20.48%	2.56%	20.48%	2.56%	5.12%
CENTENARIO SUR	-	6.81%	2.27%	13.64%	-	20.45%	56.82%
CENTRO CIVICO	60%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%
FEBRES CORDERO	93.18%	97.73%	100%	97.73%	97.73%	100%	56.82%
GUASMO	20%	92.5%	90%	22.5%	7.5%	17.5%	85%
MAPASINGUE	95%	100%	100%	100%	100%	100%	7.5%
ROMAS DE PRODERIA	97.7%	100%	100%	100%	100%	100%	77.27%

Inconvenience In Buses / Area	NO SEAT	OVER-CROWDING	RUDENESS OF DRIVER	HOT	DIRTY	OTHERS
TOWN CENTER (A)	9.8%	65.88%	14.64%	4.89%	4.89%	-
TOWN CENTER (B)	82.96%	36.6%	29.28%	41.48%	7.32%	-
URDESA	24.4%	46.3%	12.2%	14.64%	26.84%	-
ALBORADA	12.8%	66.56%	10.24%	5.12%	2.56%	1.56%
CENTENARIO SUR	22.7%	50%	-	4.54%	-	6.81%
CENTRO CIVICO	95%	97.5%	82.5%	97.5%	82.5%	2.5%
FEBRES CORDERO	20.45%	95.45%	72.73%	97.7%	88.63%	-
GUASMO	45%	40%	12.5%	7.5%	10%	5%
MAPASINGUE	100%	100%	100%	100%	85%	-
ROMAS DE PRODERIA	100%	100%	100%	100%	97.7%	2.27%

Source: Bus Passenger Interview Survey on Roads by the Study Team August, 1982

2) Operation and Management Problems

a. Operation

a-1 Bus Fleets

Since old vehicles are in use, frequent troubles with them cause not only a state of confusion in operating schedules but also increasing repair cost resulting in putting pressure upon management (Table 6-2.4).

Table 6-2.4 NUMBER OF BUS FLEETS IN OPERATION BY REGISTERED YEAR

Year	Registered number	Year	Registered number	Year	Registered number
1980	1	1972	37	1964	18
79	10	71	76	63	13
78	15	70	73	62	8
77	17	69	121	61	6
76	36	68	91	before 1960	92
75	126	67	61		
74	77	66	26		
73	42	65	16	Total	962

Source: C.T.G.

a-2 Operating Time Zone

Except a part, operating services terminate at 8 p.m. or thereabouts and this is inconvenient to bus users.

b. Management

b-1 Uniform Fare System over the Country

Although the fare of urban buses is made uniform all over the country, it is necessary to consider the fare corresponding to each urban scale and regional commodity prices.

b-2 Operation by Illegal Vehicles

Operations by illegal vehicles are eating away the passengers of the public transport systems. From a long-range view, however, it will disturb development of the public transport systems and eventually

affect the passengers disadvantageously.

3) Facilities and Institutional Problems

a. Facilities

Insufficiency of the facilities for passengers and operation at bus stations in the suburbs and the connecting points in CBD

b. Institution

Insufficiency of the necessary statistical data for analizing various problems, organizations for pushing forward various plans, etc.

4) Existing Conditions of Taxis

Opinions of taxi users are shown in Table 6-2.5, in which there is not so strong complaint except the one concerning taxi fare. Inconvenience to fare negotiation seems to be not so great, as well.

Although the number of places provided with taxi bays in CBD seems to be enough, these taxi bays are occupied by private vehicles. As there is no taxi station in residential areas, it is one idea to use bus stations in joint with buses' departure and arrival.

Table 6-2.5 OPINIONS ON INCONVENIENCE GOTTEN FROM TAXI PASSENGERS IN EACH AREA

Area interviewed \ Question	Too expensive	Poor condition inside car	Difficulty in picking up in CBD	Difficulty in picking up in residential area	Fare negotiation
TOWN CENTER (A)	% 56.1	% -	% 7.3	% 2.4	% 2.4
TOWN CENTER (B)	58.6	5.0	14.6	9.8	4.9
UPDESA	14.6	14.6	7.3	12.2	46.4
ALBORADA	41.0	15.4	-	-	-
CENTENARIO SUR	65.8	4.5	2.3	-	-
CENTRO CIVICO	67.5	82.5	92.5	95.0	90.0
FEBRES CORDERO	33.2	13.6	36.4	25.0	52.3
GUASMO	12.5	2.5	-	-	31.5
MAPASINGUE	87.5	89.5	92.5	90.0	92.5
PUNAS DE FRONTERA	97.7	84.1	95.5	54.0	15.9
TOTAL	61.5	31.6	35.8	29.4	34.1

(%) : Rate of answers in each question to 40 passengers by area

Source: Taxi Passenger Interview Survey by the Study Team, August 1980

6-2.3 Improvement Programs

The problems pointed out in the aforesaid clause are picked up in 1) as early action programs which will necessitate prompt improvement. Re-organization of the routes related with the Bus Terminal is also prepared for at an early date and this is described in 2). In the last place, several points to be improved in the mid-term are proposed getting them related with MRT under the long-term transportation plan.

1) Early Action Programs

a. Improvement of Routes

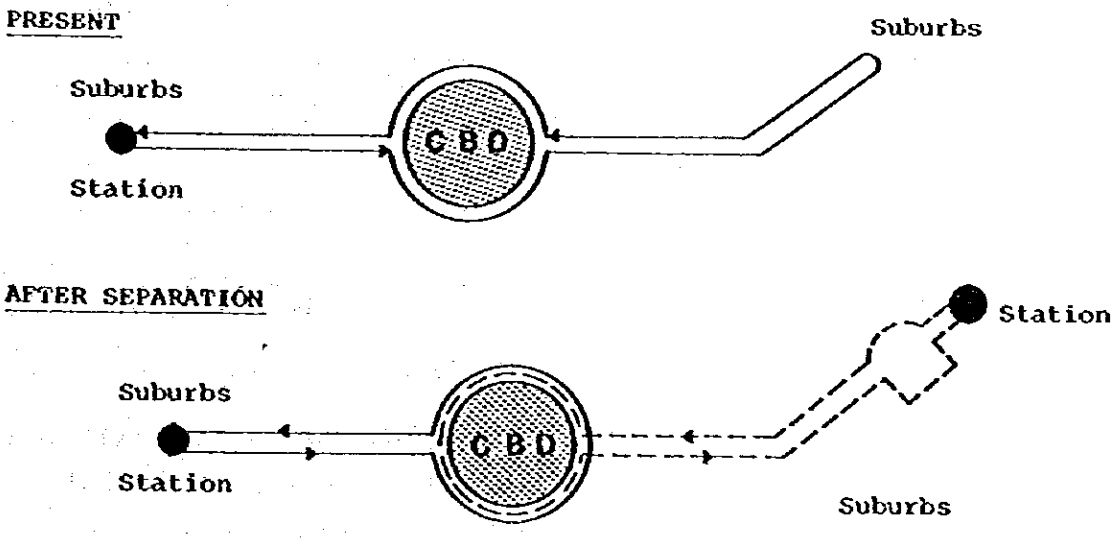
a-1 Extension of Routes

Extension of the routes toward Urdesa Norte, Alborada Sauces, Portete y Milagro with adequate frequency.

a-2 Division of Long Routes (Fig. 6-2.4)

Since the long routes make their operation control difficult, they should be divided into some parts and services in the suburban areas at the both sides shall be bettered more sufficiently.

Fig. 6-2.4 DIVISION OF LONG ROUTES



Applied Routes: No. 1, 2 BUS, 9, 10 BUS, 13 and 16 routes

a-3 New Routes around CBD

A loop-line route by small buses should be set so as to connect mutually the developping areas around CBD.

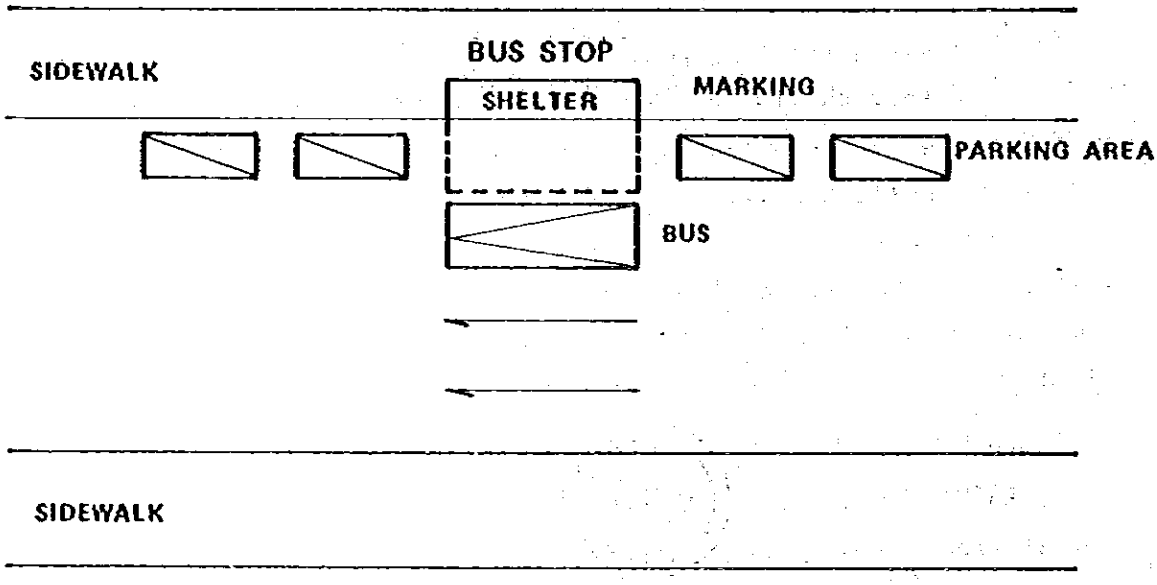
b. Improvement of Facilities

b-1 Orderly arrangement of bus stops with shelters, benches, route maps, etc.

b-2 Orderly arrangement and expansion of bus bay

- To prohibit parking and stop of other vehicles in the bay
- When impossible to prohibit parking, such a bus stop as shown in Figure 6-2.5 is recommended.

Fig. 6-2.5 EXAMPLE OF BUS STOP ON ROADS WITH PARKING AREA



b-3 Establishment of bus lanes on wide roads

b-4 Exclusive lanes for buses, pedestrians, etc.

- Including the effect of propaganda for urging utilization of the public transport systems, entrance of general vehicles should be regulated and exclusive lanes for buses, pedestrians and taxis be provided.
- This plan be put into practice for the time being on Sundays and holidays in Avenida 9 De Octubre as a trial case.

c. Fleet Improvement

Improvement of bus fleets and establishment of a reasonable renovation plan

d. Improvement of Management and Institution

- Renewal of the fare system and pricing policy
- Research on the bus suppliers' organizations as they ought to be

2) Re-organization of Inter-cantonal Routes after Completion of Bus Terminal

There are two kinds of passengers who get into the Bus Terminal via inter-cantonal routes as follows:

- Type-a: Daily trips made by the passengers like commuters or school attendants from the neighboring cities such as Milagro, Yaguachi, Naranjito, etc. to Guayaquil amounting to 70,000 presently.
- Type-b: Non-daily long distance trips by the passengers like sight-seers, business tourists, homeland visitors, etc. amounting to 20,000 presently.

Further increase in the transport demand is anticipated in future for both types, particularly for Type-b. Re-organization of the routes would be made toward the following direction:

- Type-a: It is recommendable to extend the routes into the urban area and connect directly with urban transport system.
- Type-b: It is recommendable to extend the routes into the Bus Terminal and connect with other urban transport system.

Since almost all departing and arriving places for the passengers of Type-b concentrate on and around CBD, it is considered recommendable to set up a Bus Terminal → CBD route. Considering that there are some long distance toruists departing from or arriving at CBD late in the night or early in the morning, the urban bus operation service should cover such time schedules.

After Introduction of MRT

It is recommendable to concentrate all inter-cantonal buses on the Bus Terminal where the passengers transfer from buses to MRT bound for CBD. By means of transporting these passengers to CBD separately from the road traffic congestion flowing into CBD, it is also possible to contribute to alleviation of load on the road traffic.

3) Conceptual Proposal for Mid-term Improvement

The following proposal is made concerning the principal courses for mid-and long-term re-organization of the bus network:

(1) For transport in the trunk lines of suburbs → CBD, large size fleets of Colectivo bus and Colectivo Especial bus are recommendable to be used. In CBD side, it is recommendable to get the bus routes concentrated on bus terminals or on specific roads (recommendably, exclusive bus lanes). Orderly arrangement of connecting points is made at several places located at the periphery of CBD, and in the Long-term, these trunk lines are replaced by MRT.

(2) The large size fleets should be limited to be used on the trunk line and the small size Buseta is recommendable to be used for feeder service so that it possibly corresponds with the traffic movement within CBD and even in heavy traffic congestion.

(3) The use of Furgoneta is recommendable to be limited to the service within a certain independent district such as Duran, Pascuales, etc. as well as to feeder service for supplementing the trunk line transport.

(4) Small size fleets such as Furgoneta, Buseta (and illegal vehicles) are better to be excluded from the trunk line for the purpose of establishing the trunk line.

(5) In order to promote supplying of vehicles for the trunk line, a higher fare corresponding to better service (a difference of fare between the one for Colectivo and for Colectivo

Especial, and higher fare in the nighttime) should be admitted within a certain area.

(6) As to the trunk line transport, guidance should be given so as to change Cooperativo into a incorporation system.

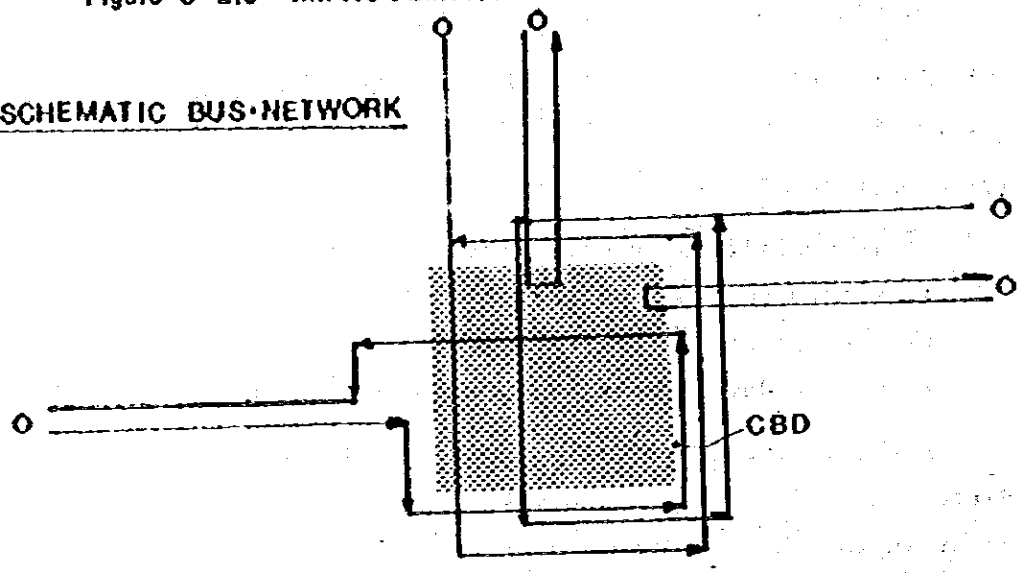
(7) Function of Estacion

It is considered recommendable that Estacions are put together into some number and orderly rearranged as transport connecting points of several routes and, at the same time, directed to aim at development as a respective regional center.

Although above proposals are conceptional, they abstract the direction to develop the present public transport systems by re-arranging the intentions of the present managers, suppliers and users as well as re-arranging the present situations and future change in traffic. In applying these proposals practically, it is necessary to proceed with it watching the change in road traffic, effect of parking regulation in CBD, etc.

Figure 6-2.6 IMPROVEMENT OF BUS NETWORK

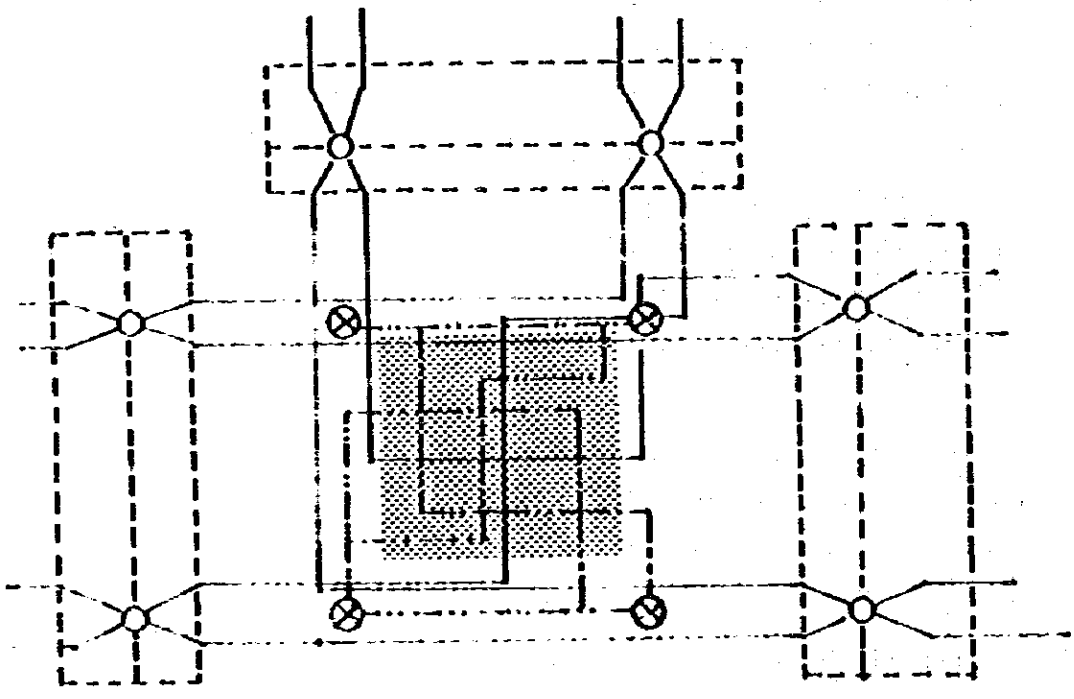
EXISTING SCHEMATIC BUS-NETWORK



BUS-COLECTIVO-BUSETA-CAMIONETA

TERMINAL (ESTACION)

PROPOSED SCHEMATIC BUS-NETWORK



BUS-COLECTIVO

MINI BUS

FURGONETA-CAMIONETA

BUSETA

CONNECTION POINT

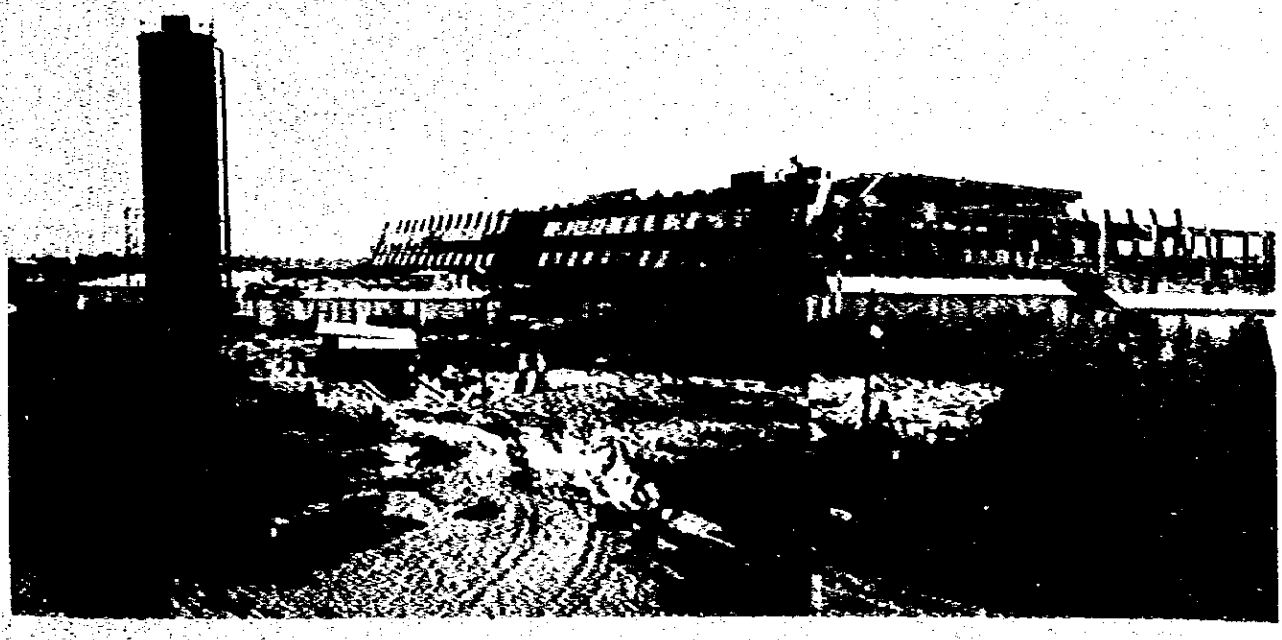
TERMINAL (ESTACION)

CENTRAL TERMINAL

CBD

CHAPTER 7.

IMPLEMENTATION PROGRAM



Chapter 7 IMPLEMENTATION PROGRAM

This chapter examines roughly the comparison between investment amount required for the master plan and applicable financial amount, and formulates an implementation program according to the following items:

1. Rough estimate of financial amount applicable to transportation infrastructure in the Study Area (transportation funds).
2. Comparison of the total amount of costs required for the projects with the above transportation funds.
3. Formulation of rough execution schedule until 2000.

7-1 CONSIDERATION OF APPLICABLE INVESTMENT AMOUNT

7-1.1 Authorities in Charge of On-land Transport

Construction and maintenance of the on-land transport facilities in the Study Area are carried out by each authorities shown in Table 7-1.1.

Table 7-1.1 AUTHORITIES IN CHARGE OF ON-LAND TRANSPORT

Authorities	Main matters to be in charge	Main financial sources
1. Ministerio de Obras Públicas	Construction and maintenance of roads inside and outside of the urban area in Guayaquil	National general accounts (National budget)
2. C.T.G. (Ministerio de Gobierno)	a. Execution of traffic and transport administration, management and installation of transport facilities	a. Independent budget of C.T.G.
	b. Construction of Bus Terminal	b. Loan from the Equador Development Bank for the full amount
3. Consejo Provincial del Guayas	Construction and maintenance of roads specially designated	Income by the toll bridge between Durán and Guayaquil. Allocation from national general accounts
4. Municipalidad de Guayaquil	Construction and maintenance of roads inside the urban area	Local tax income
5. Fondo de Desarrollo Urbano de Guayaquil	Grade separation of roads, specially designated bridges and construction of elevated roads inside	Independent budget irrelative to national general accounts

Transportation funds in future applicable to the Study Area shall be roughly estimated based on the expenditures covered by the abovementioned authorities in the past. However, there has been no such a type of project as this MRT, no payment has been made so far to cover the cost of the project from financial sources. Hereinafter, a comparison of the project costs with the transportation funds shall be based on the following premises:

Long-term transportation plan

1. The road projects proposed by the master plan and the on-going projects are executed by the budgets of the authorities other than C.T.G.
2. Taking it into account that the MRT projects have a character as new ones, some portion of them is executed by new financial sources and the other portion by the abovementioned budgets.

Short-term improvement plan

Various programs included in this plan are deemed to be improved by C.T.G. in the same way as they have been done conventionally and are therefore omitted from the comparison of their costs with the funds.

7-1.2 Present Situation of Transportation Investment

1) Transportation Funds by the National Budget

The national budget and its allocation to the transport and communication sector in the past 2 years are shown in Table 7-1.2. The budget allocated to this sector comprises Ministerio de Obras Públicas, Obras de Interés Provincial, Empresa de Ferrocarriles and others, and each of them is classified into construction fund and other expenses (personnel expenses, maintenance, etc.).

Among these budgets, the transportation funds in future are taken for the total construction amount of Ministerio de Obras Públicas and Obras de Interés Provincial. Although the budget for Empresa de Ferrocarriles can be included in the above financial funds, it was excluded since the amount was

too small to add it to the funds.

According to the comment of those who are related with Ministerio de Obras Publicas, the allocation rate to the Study Area was estimated to be 1.3% of the total amount of the national budget and the budget amount allocated to the Study Area in 1982 was estimated to be 8,420 million sucres (M.S.). (As to the calculation process to obtain 1.3% as the allocation rate, refer to Table 7-1.2.)

2) Transportation Funds by Other Budgets

Consejo Provincial del Guayas

The road construction expenditures in the past 5 years were about 600 M.S., corresponding to 20% of the national budget allocated to the Study Area abovementioned. Since some amount in 600 M.S. was allocated from the national budget, it was estimated that the expenditure in Consejo Provincial del Guayas corresponded to 15% of the transportation funds covered by the national budget.

Other Authorities

When calculated in the same way as the above one, the rate of the budget in each other authorities against the national budget was estimated as follows:

Road construction budget by Municipalidad de Guayaquil: 25%
Fondo de Desarrollo: 20%

3) Summary

Judging from the above data, the transportation funds in the Study Area in 1982 was estimated to be as follows:

National budget:	842 M.S.
Other authorities' budget:	505 M.S. (60% of the above)
Total :	1,347 M.S.

In addition to the above, there is the budget of C.T.G. which is to be used for the progran of the short-term irproverent plan.

Table 7-1.2 RATE OF TERRESTRIAL TRANSPORTATION BUDGET TO NATIONAL BUDGET

x 10^3 sucres

Budget	1981			1982		
	Personnel & maintenance expenses	Construction fund	Total	Personnel & maintenance expenses	Construction fund	Total
A. National Budget	39,149	16,652	55,800	48,282	20,488	68,770
B. Transportation & Communication (B/A, %)	1,013.9	4,724.1	5,738.0 (10.3%)	1,220.2	4,630.9	5,911.1 (9.1%)
(1) Ministerio de Obras Públicas	753.7	3,274.2	4,027.9	930.2	3,566.7	4,496.9
(2) Obras de Interés provincial	-	1,343.9	1,343.9	-	1,048.2	1,048.2
Sub-total	753.7	4,618.1	5,371.8	930.2	4,614.9	5,545.1
(3) Empresa de Ferrocarriles	260.2	60.0	320.2	290.0	30.0	320.0
(4) Others	-	46.0	46.0	-	46.0	46.0

Estimate of Study Area's share of transportation construction fund in the national budget

1. Rate of "Trans. & Comm." to "National Budget" = (10.3 + 9.1)/2 ≒ 10%
2. Rate of "Construction fund" to "Total of Trans. & Comm." = (80.5 + 78.1)/2 = 80%
3. Allocation rate to Guayas province in construction fund = 18% (Actual figures in last few years were 16 ~ 20%)
4. Assumption of allocation rate to the Study Area in Guayas province = 90%

Study Area's share of transportation construction fund in the national budget 10% x 80% x 18% x 90% = 1.3%

Construction fund for the Study Area in 1982 = 68,770 x 1.3% = 842 million sucres

Table 7-1.3 TREND AND RELATION BETWEEN GNP AND NATIONAL BUDGET

Item	Year	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
1. GNP	10^9 sucres	107.7	132.9	162.4	189.0	231.7	284.4	341.6*	410.0*		
2. Growth rate	%	-	23.4	22.2	16.4	22.6	22.6	20.0	20.0		
3. GNP in 1975 prices	10^9 sucres	107.7	117.7	125.0	131.8	139.5	145.9	153.6*	161.8*		
4. Growth rate	%	-	9.22	6.20	5.48	5.83	4.63	5.33	5.30		
5. GNP growth rate by National Development Plan 1980~84, %							6.5	6.5	6.5	6.5	6.5
6. National Budget	10^9 sucres	14.4	19.5	22.3	26.5	23.3	45.3	55.8	68.7		
7. Growth rate	%	-	33.6	13.9	18.8	10.6	54.6	23.2	16.1		
8. Rate of National Budget to GNP (1/6)	%	13.4	14.7	13.7	14.0	12.6	15.9	16.4	15.8		

* : Extrapolation by the average growth rate through 1978 ~ 80

Sources (1) Presupuesto del Estado 1980, 81, 82

(2) Memoria Anual del Gerente General del Banco Central del Ecuador 1980

(3) Plan Nacional de Desarrollo 1980 ~ 84, Primera Parte

7-1.3 Estimation of Transportation Funds in Future

The growth of the national budget is concerned with Gross National Product (GNP) to a great extent. The relationship between them in the past several years is shown in Table 7-1.3. The growth rate of GNP during 1975 - 1980 on average was 21.4% per annum in the nominal rate and 6.3% in the real rate. On the one hand, the growth rate of the governmental budget during 1975 - 1982 in the nominal rate was 23.9% which was approximately same as the nominal growth rate of GNP.

Therefore, it can be set as a premise that the growth rate of the national budget is same as that of GNP. The growth rate of GNP up to 1984 has been set to be 6.5% per annum in the real rate by the existing National Development Plan. Estimation of the same after 1985 up to 2000 is extremely difficult. However, in case of assuming that this growth should continue, the transportation funds in the Study Area is derived as shown in Table 7-1.4. However, since it is estimated that the actual growth rate has already become somewhat lower than 6.5% per annum on account of the world-wide stagnation in recent years, the transportation funds in case of the growth rate of 5% per annum is also shown in the same Table for reference.

Table 7-1.4 ESTIMATE OF TRANSPORTATION FUNDS IN STUDY AREA 1983 ∿ 2000

x 10^6 sucres in 1982 prices

Year	Growth rate: 6.5%/Year	Growth rate: 5.0%/Year (for reference)
1982 (projection)	1,350	1,350
1983 ∿ 1985	4,600	4,500
1986 ∿ 1990	9,900	9,100
1991 ∿ 1995	13,600	11,100
1996 ∿ 2000	18,600	14,800
1983 ∿ 2000 Total	46,700	39,500

7-2 COMPARISON OF TOTAL PROJECTS COSTS WITH APPLICABLE INVESTMENT AMOUNT

7-2.1 Total Projects Costs

The total projects costs are shown as follows:

TOTAL PROJECTS COSTS

in 1982 prices

On-going road projects		6,990 x 10^6 suores
Master plan	Proposed road projects	20,900
	MRT projects	28,250
Total		56,140

Note) 1. Since the programs included in the short-term improvement plan are deemed to be implemented by the budget of C.T.G., the costs of them are excluded from the above costs.

2. As for the costs of MRT, the costs for the urban railways were applied.

7-2.2 Comparison of Total Projects Costs with Transportation Funds

Since the transportation funds up to 2000 was estimated to be 46,700 M.S. from Table 7-1.4 while the total projects costs amounted to 56,140 M.S., 9,440 M.S. becomes short by 2000.

One of the reasons of this shortage is because the transportation funds has been calculated based on the expenditure for the existing transport facilities and no consideration has been given to such projects as MRT which has not existed so far. In other words, it would be necessary to provide the budget for this type of new projects with not only conventional budget but also new financial sources in the same way as in the case of the Terminal Terrestre of which total costs were covered by the fund provided separately.

Based on this concept, allocation of the transportation funds in future should be applied first of all to the road projects preferentially and then MRT be accommodated with the remainder of the amount. In addition, in case of being short to cover MRT with the remainder, the amount required for the shortage should be

obtained by raising new financial sources separately. The results of it are as follows:

Table 7-2.1 ALLOCATION PLAN OF TRANSPORTATION FUNDS UP TO 2000

$\times 10^6$ sucres in 1982 prices

Project		Project costs	Transportation funds (6.5%/year)	New financial sources necessitated
On-going road projects		6,990	6,990	
Master Plan	Proposed roads	20,900	20,900	
	MRT	28,250	18,810 (11,610)	9,440 (16,640)
Total		56,140	46,700 (39,500)	9,440 (16,640)

( ): Values for reference in case of the growth rate being 5% per annum

The road projects can be covered in full amount by the conventional financial sources. It is necessary for the MRT projects, however, to be provided with the separate new fund equivalent to 33% of the total projects costs in case of the growth rate being same as 6.5% per annum of the existing National Development Plan. In case of applying 5.0% of the growth rate, 60% of the total projects of MRT costs should be provided.

7-3 IMPLEMENTATION PROGRAM

7-3-1 Phasing Plan of Project Implementation

According to priorities of the major projects identified in the clause 5-6, all the projects are divided into 4 phases as shown below. The term and main target of each phase are as follows:

Phase 1: 1983 - 1985

Resolution of the existing transport problems

- Implementation of the short-term improvement plan
- Construction of on-going projects
- Preparation for Phase 2 projects

Phase 2: 1986 - 1990

Augmentation of transport capacity from CBD toward the northern area

- Construction of the urban section of North-south route of MRT
- Construction and improvement of the roads required for development of the northern area

Phase 3: 1991 - 1995

Augmentation of transport capacity and improvement of transport facilities in CUA (the central urban area), its peripheral area and toward the western area.

- Construction of the urban section of East-west route of MRT
- Improvement and arrangement of the roads in CUA and its peripheral area

Phase 4: 1996 - 2000

Linking up the southern area with CUA and restraint of through traffic from flowing into CUA.

- Completion of the whole MRT routes
- Construction of the south route of Via Perimental de Guayaquil

7-3-2 Implementation Program

1) Road projects

Based on the abovementioned phasing plan, the implementation program of road projects is shown in Table 7-3.1 and Figure 7-3.1 (1) ∿ (4).

2) MRT projects

Shown in Figure 7-3.2.

3) Short-term improvement plan

The countermeasures to be put into an early action in this plan are those which allow to expect in a short time for improvement of dangerous transport facilities and efficiency in traffic engineering as well as in bus transport. In succession, the improvement plan is pushed forward so as to be most effective in each phase taking into account the phasing plan of the above-mentioned road and MRT projects.

The schedule of these plans is shown in Tables 7-3.2 and 7-3.3.

7-3.3 Project Costs and Transportation Funds in Each Phase

Comparison of the transportation funds up to 2000 calculated in Table 7-1.4 by each phase with the project costs shown in Tables 7-3.1 and 7-3.2 is as follows:

The costs necessary for the short-term improvement plan are not included in this comparison because of being deemed that these costs should be covered by the budget of C.T.G.

Judging from the above Table, the excessive or insufficient status of the funds is as follows:

COMPARISON OF PROJECT COSTS BY EACH PHASE WITH TRANSPORTATION FUNDS

(Growth rate of national economy: 6.5%/year) $\times 10^6$ sucres in 1982 prices

Phase	Project costs				Applicable financial sources (2)	Deficits (2)-(1)
	On-going road pro.	Proposed road pro.	MRT pro.	Total (1)		
1 1983~1985	3,770	990	-	4,760	4,600	-160
2 1986~1990	170	5,740	8,120	14,030	9,900	-4,130
3 1991~1995	3,050	3,520	11,910	18,480	13,600	-4,880
4 1996~2000	0	10,650	8,220	18,870	18,600	-270
Total	6,990	20,900				
	27,890		28,250	56,140	46,700	-9,440

Note) MRT' cost: Urban railway

1 us dollar = 50 sucres (average in 1982)

Road projects

The funds can cover the total costs of the projects in the on-going and the master plan. Although the funds are slightly short in Phase 1, it can be managed by making execution of Phase 1 delayed to some extent.

MRT projects

Phase 1: Phase 1 is the stage for preparation and therefore a great amount of funds are unnecessary.

Phase 2: The shortage amounts to 54% of 8,760 M.S. of the total cost to be constructed in this phase (13.5 km of the urban section of the North-south route), and this shortage should be covered by new financial sources independent from the conventional budget.

Phase 3: The shortage amounts to 39% of 11,590 M.S. of the total cost to be constructed in this phase (14.5 km of the urban section of the East-west route), and this shortage should be also covered by new financial sources in the same way as in the case of Phase 2.

Phase 4: It is possible to cover the total cost for completing the whole routes remained.

Table 7-3.1 IMPLEMENTATION PROGRAM FOR ROAD PROJECTS

A-1 ∿ 34: Road projects B-1 ∿ 23: Intersection improvements

	Project	Length (Km) or type	Phase 1	Phase 2	Phase 3	Phase 4	Project cost (10^3 sucres in 1982) Proposed	On-going
A-1	Via Perimetral de Guayaquil	26.85						1,843,648
2	Via Perimetral de Guayaquil	22.80 17.50					6,930,000 10,480,316	
3	Via la Costa	8.65						114,894
4	Via Danle	16.75						222,482
5	Via Duran Boliche	6.10						154,828
6	Via Sarbolondon	6.70						88,993
7	Via al Trunfo	7.30						77,892
8	Francisco de Orellana	13.30						900,404
9	No. 9	7.40						435,050
10	No. 10	4.95						169,476
11	No. 11	6.90						236,240
12	No. 12	6.67						300,101
13	No. 13	6.25						392.434
14	Juan Tanca Marengo	10.10						166,260
15	25 de Julio	11.20						110,782
16	De las Americas	5.40						71,163
17	Carlos Julio Arosemena Tola	4.30						45,229
18	Pedro Menendez Gilbert	3.75						39,444
19	Revolacion	3.35						30,657
20	Oriente	13.25					198,976	-
21	4 de Noviembre	4.35						51,333
22	Malecon Simon Bolivar	1.30 11.62					287,290	652,486
23	No. 23	6.10					307,544	
24	No. 24	5.10					367,951	
25	No. 25	3.77						83,718
26	Poltete	6.95						49,981
27	Federico Godin	4.52					198,525	
28	No. 28	2.70						13,291
29	No. 29	1.55						7,630
30	No. 30	4.55						22,337
31	No. 31	1.45						7,138
32	No. 32	1.25					120,201	
33	No. 33	2.70						13,291
34	No. 34	4.10						20,183
B-1	Via Perimetral de Guayaquil and Av. 25 de Julio	C						195,845
2	and Trinitaria Island	D					57,564	
3	and Revolacion	T						91,115
4	and Via la Costa	C						124,882
5	and Av. J. T. Marengo	C					79,818	
6	and No. 11	T					81,346	

Table 7-3.1 to be continued

	Project	Length (Km) or type	Phase				Project cost (10 sucres in 1982)	
			1	2	3	4	Proposed	On-going
7	Via Perimetral de Guayaquil and Via Danle	C	———					79,818
8	and Francisco de Orellana	C	———					117,168
9	and No. 9	C			———		103,518	
10	and Via Sambolondon	D			———		57,564	
11	and Via al Tranfo	T			———		59,832	
12	and Via Duren Boliche	C				———	111,564	
13	and Santay Island	D				———	61,668	
14	Av. Quito and Av. Poltete	D			———		46,440	
15	Via Danle and No. 23	D			———		113,864	
16	Av. C.J. Arosezena T. & No.27	D			———		44,064	
17	Av. F. de Orellana & No. 27	D			———		44,064	
18	Av. F. de Orellana & No. 23	D			———		44,064	
19	Av. F. de Orellana and Av. J.T. Marengo				———		314,332	
20	Ploy Alfalo Intersection	D	———				681,448	
21	Circulo Guayas y Quil	D	———				65,652	
22	Av. de las Acerleas & Av. J.T. Malengo	D	———				44,064	
23	Av. P. Monendez G and No.9	D			———			60,100
Sub-total	On-going project		3,772	169	3,046	0	(Million sucres)	
	Proposed project		990	5,741	3,518	10,654	20,903	6,987
Total			4,762	5,910	6,564	10,654	27,890	

Note)

1. As for the location of the road projects (A-1 ∿ 34), see Figure 4-1,11.
2. The type of intersections (B-1 ∿ 23):

   C ... Cloverleaf
   D ... Diamond
   T ... Trumpet

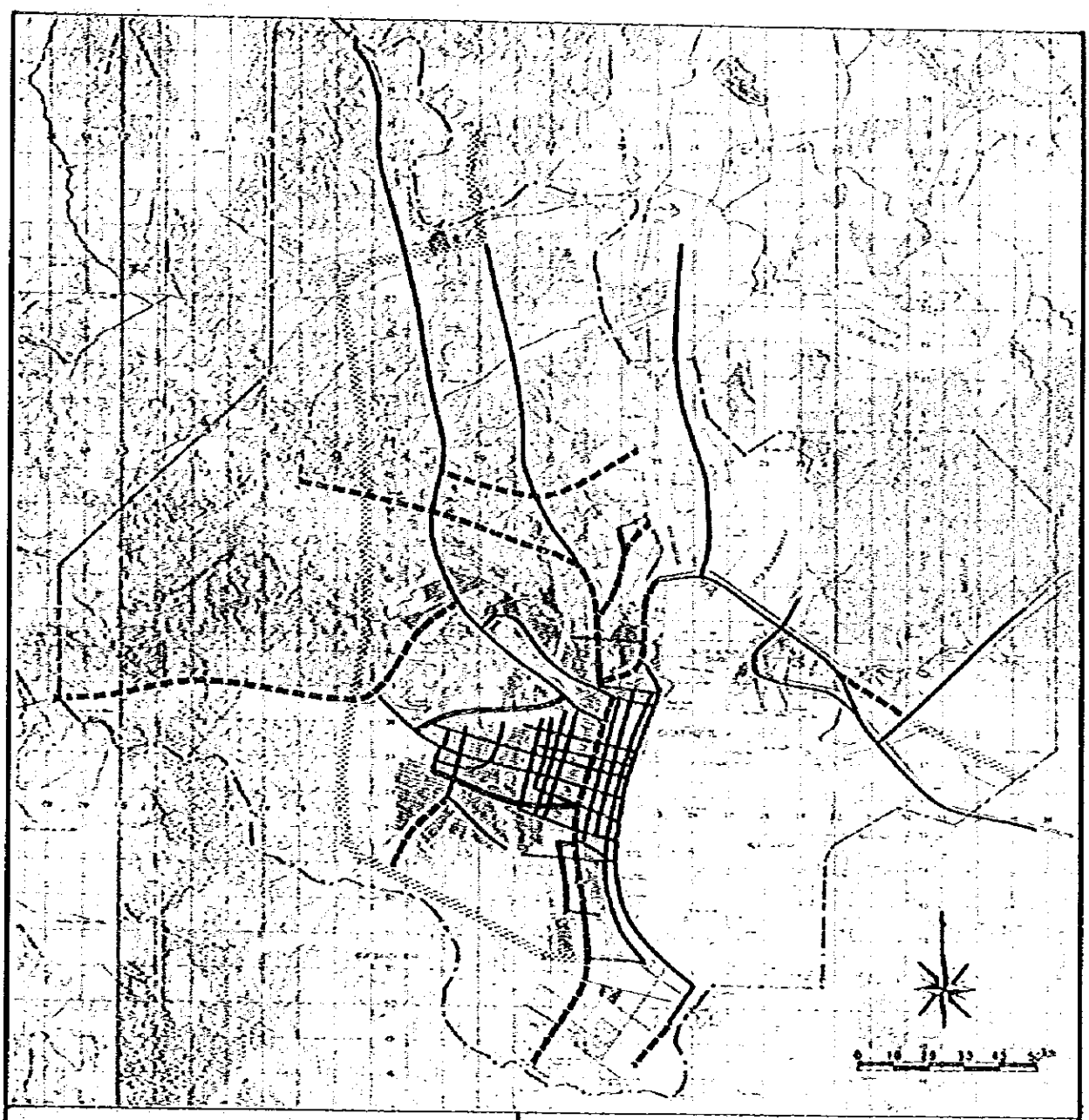


Figure 7-3.1 (1)

RECOMMENDED IMPLEMENTATION PLAN

Phase 1 (~1985)

PRIMARY DISTRIBUTOR
DISTRICT DISTRIBUTOR
LOCAL DISTRIBUTOR
EXISTING ROAD

THE STUDY OF THE GUAYAQUIL CITY URBAN TRANSPORTATION PLAN

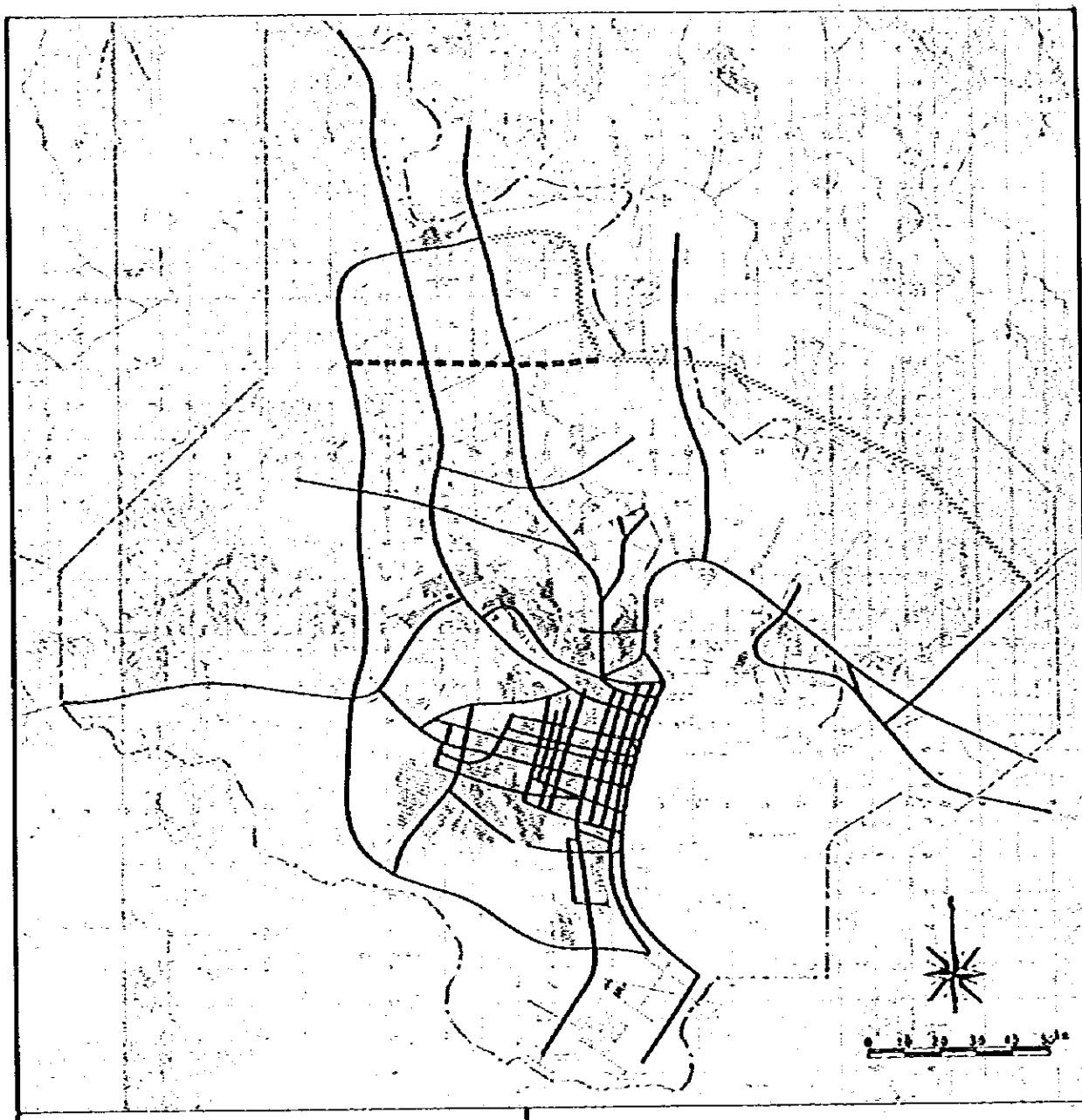


Figure 7–3.1 (2)

RECOMMENDED IMPLEMENTATION PLAN

Phase 2 (1986 – 1990)

THE STUDY OF THE GUAYAQUIL CITY URBAN TRANSPORTATION PLAN

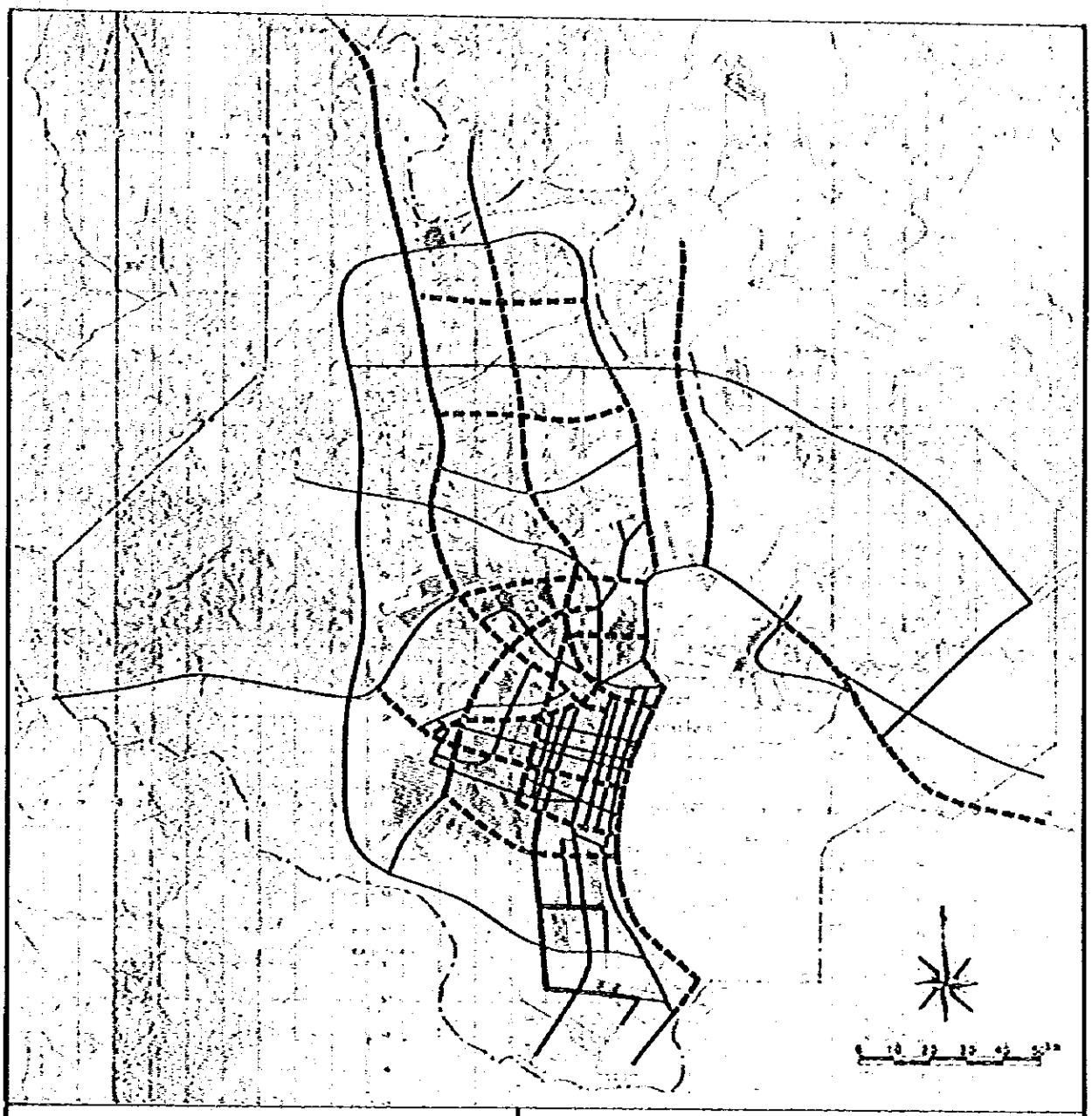


Figure 7-3.1 (3)

RECOMMENDED IMPLEMENTATION PLAN

Phase 3 (1991-1995)

PRIMARY DISTRIBUTOR
DISTRICT DISTRIBUTOR
LOCAL DISTRIBUTOR
EXISTING ROAD

THE STUDY OF THE GUAYAQUIL CITY URBAN TRANSPORTATION PLAN

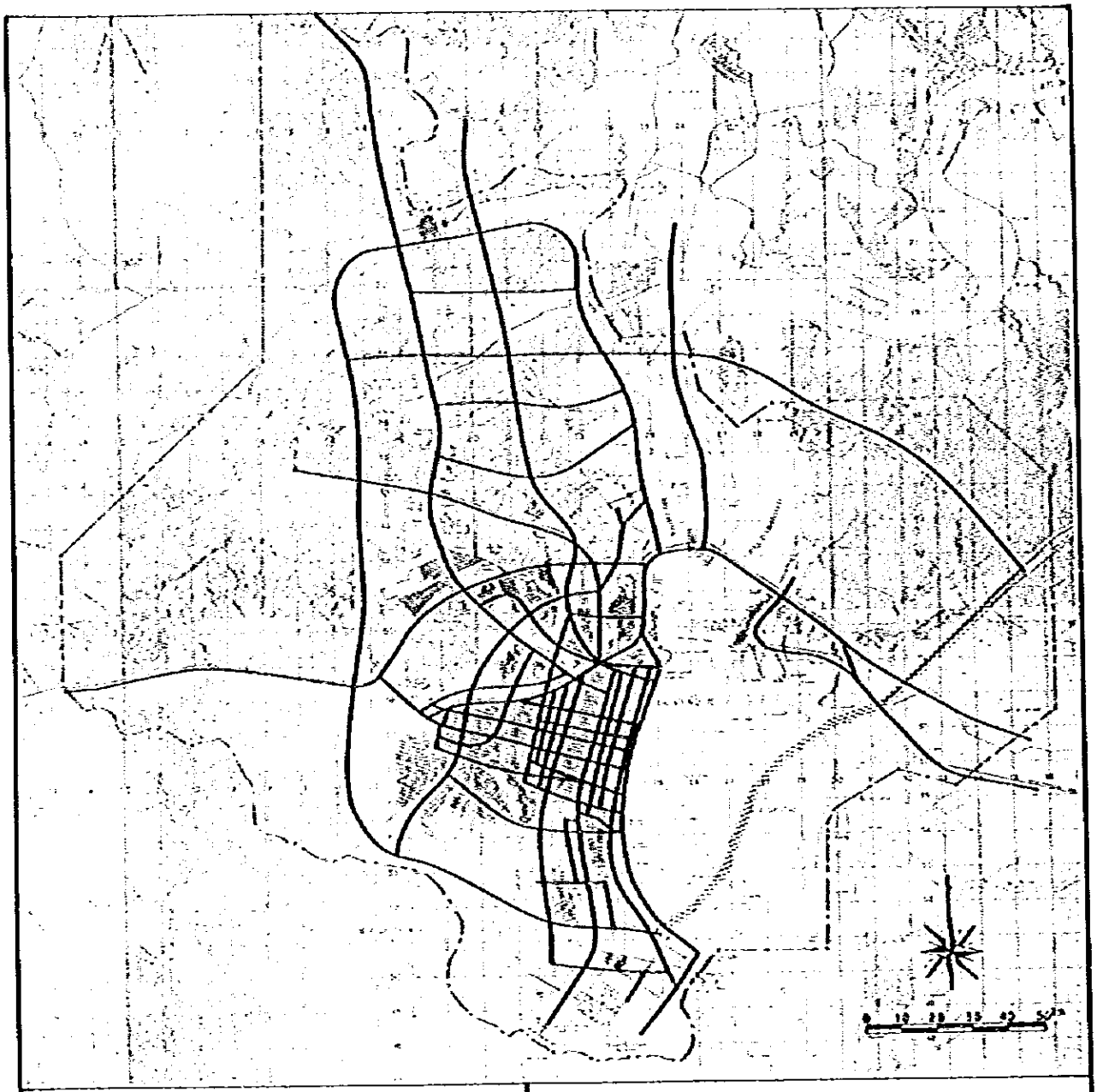


Figure 7–3.1 (4)

RECOMMENDED IMPLEMENTATION PLAN
Phase 4 (1996–2000)

THE STUDY OF THE GUAYAQUIL CITY
URBAN TRANSPORTATION PLAN

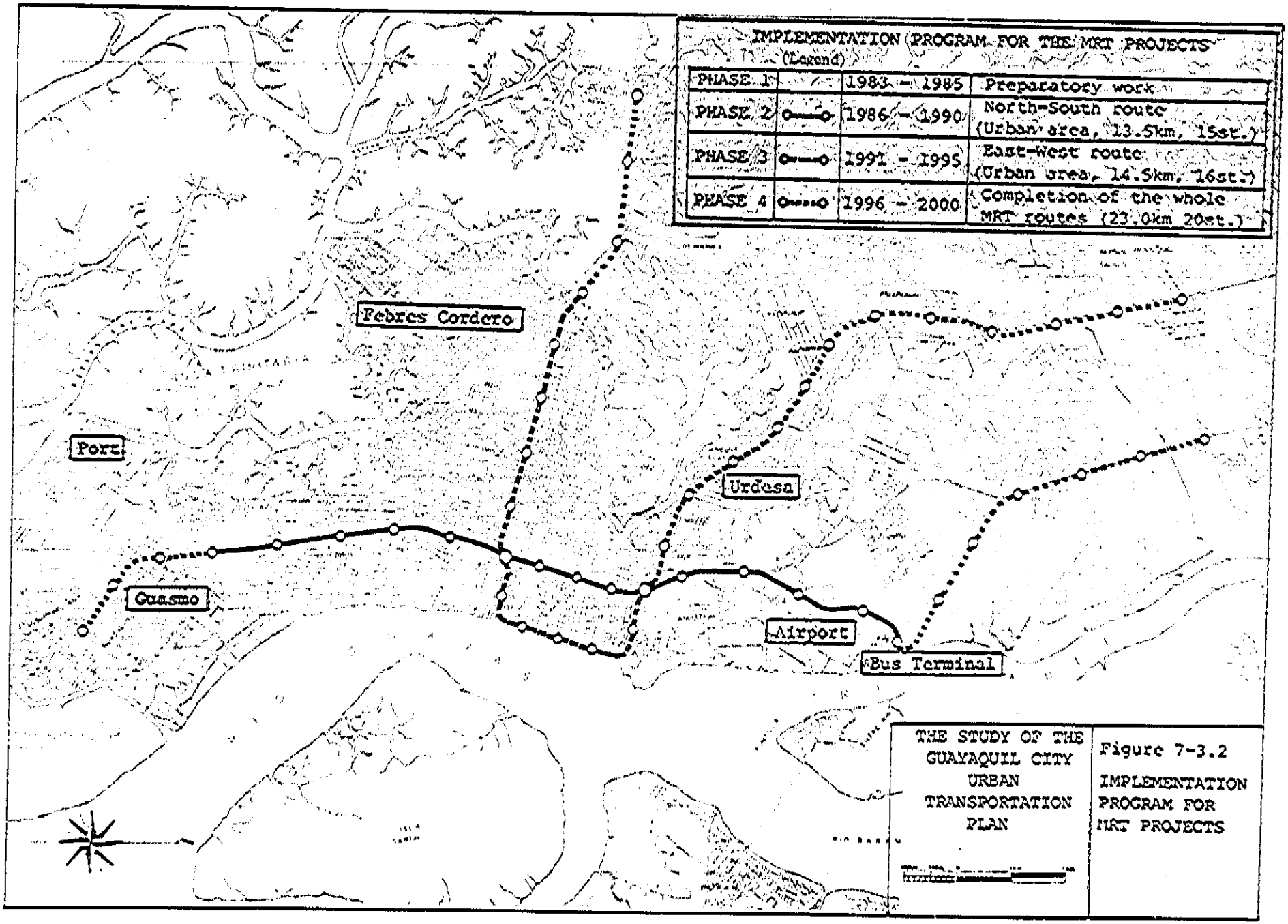

IMPLEMENTATION PROGRAM FOR THE MRT PROJECTS
(Legend)
PHASE 1 / 1983 - 1985 Preparatory work
PHASE 2 1986 - 1990 North-South route (Urban area, 13.5km, 15st.)
PHASE 3 1991 - 1995 East-West route (Urban area, 14.5km, 16st.)
PHASE 4 1996 - 2000 Completion of the whole MRT routes (23.0km 20st.)
Febres Cordero
Port
Urdesa
Guasmo
Airport
Bus Terminal
THE STUDY OF THE GUAYAQUIL CITY URBAN TRANSPORTATION PLAN
Figure 7-3.2
IMPLEMENTATION PROGRAM FOR MRT PROJECTS

Table 7-3.2 IMPLEMENTATION PROGRAM FOR TRAFFIC ENGINEERING AND MANAGEMENT

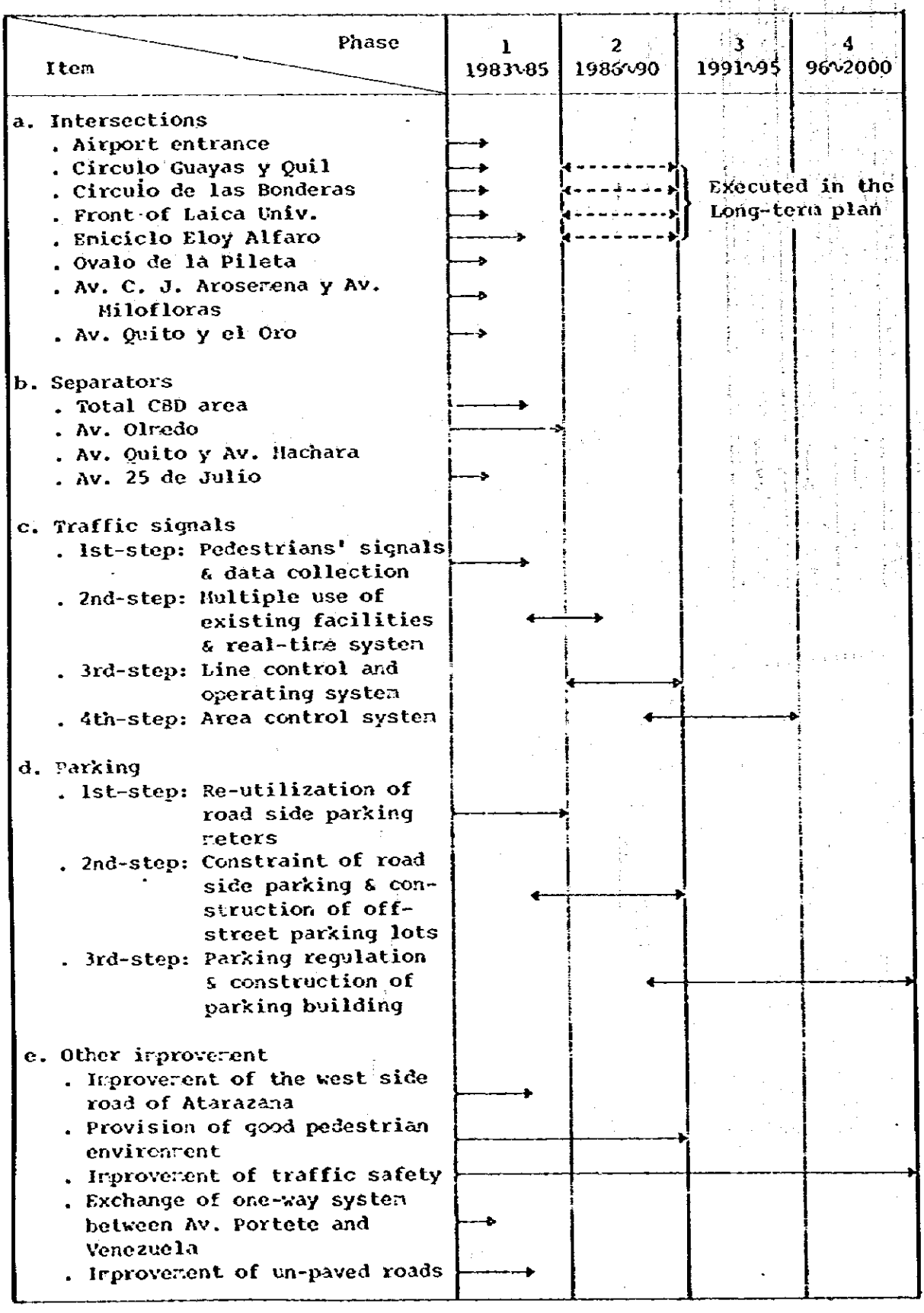


Table 7-3.3 IMPLEMENTATION PROGRAM FOR BUS TRANSPORT IMPROVEMENT

Item \ Phase	1 1983~85	2 1986~90	3 1991~95	4 96~2000
a. Route relocation & improvement				
a-1 Urban bus				
. Extension of service area	→			
. Division of long routes	→			
. Augmentation of service in & around CBD	→			
a-2 Long distance bus				
. Route relocation connecting to Terminal Terrestre	→			
. Relocation of other routes	→			
b. Improvement of transport facilities				
b-1 Equipment for passengers				
. Bus stop, shelter, etc.	→			
. Bus bay, taxi bay, etc.	→			
b-2 Exclusive lanes for bus				
. Reserved lanes on wide roads	→			
. Exclusive bus lanes	←	→	→	
b-3 Facilities for pedestrians				
. Exclusive lanes and facilities	←	→		
b-4 Bus fleet improvement				
. Arrangement of fleet, introduction of large-sized	→	→	→	
c. Improvement of manage & institution				
c-1 Research on fare system	→			
c-2 Augmentation of suppliers & associations	←	→		
c-3 Research on administrative & institutional aspect	→			

APPENDIX

APPENDIX A TRAFFIC ZONES

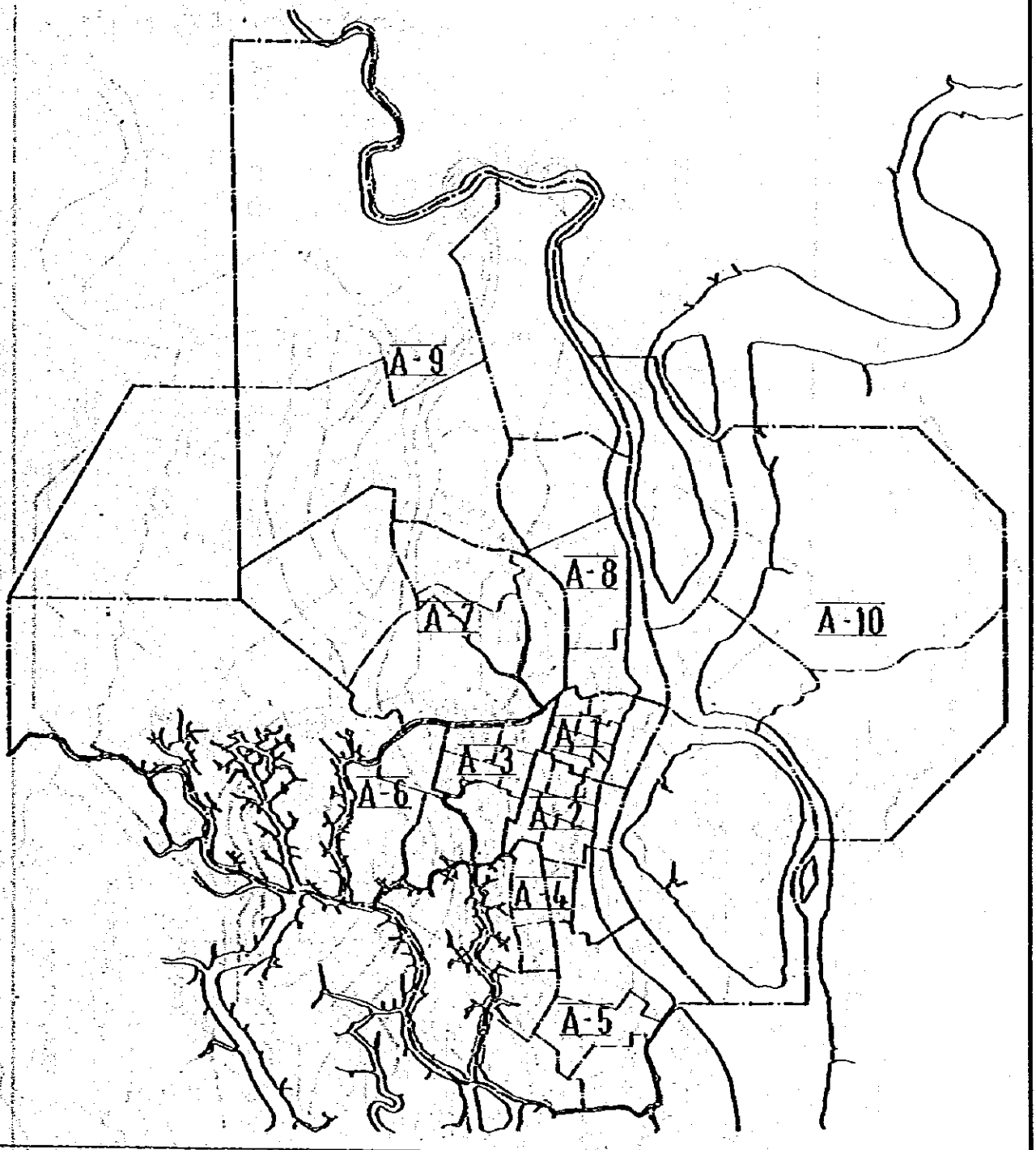


Figure A-1 BOUNDARY LINES OF A-ZONE

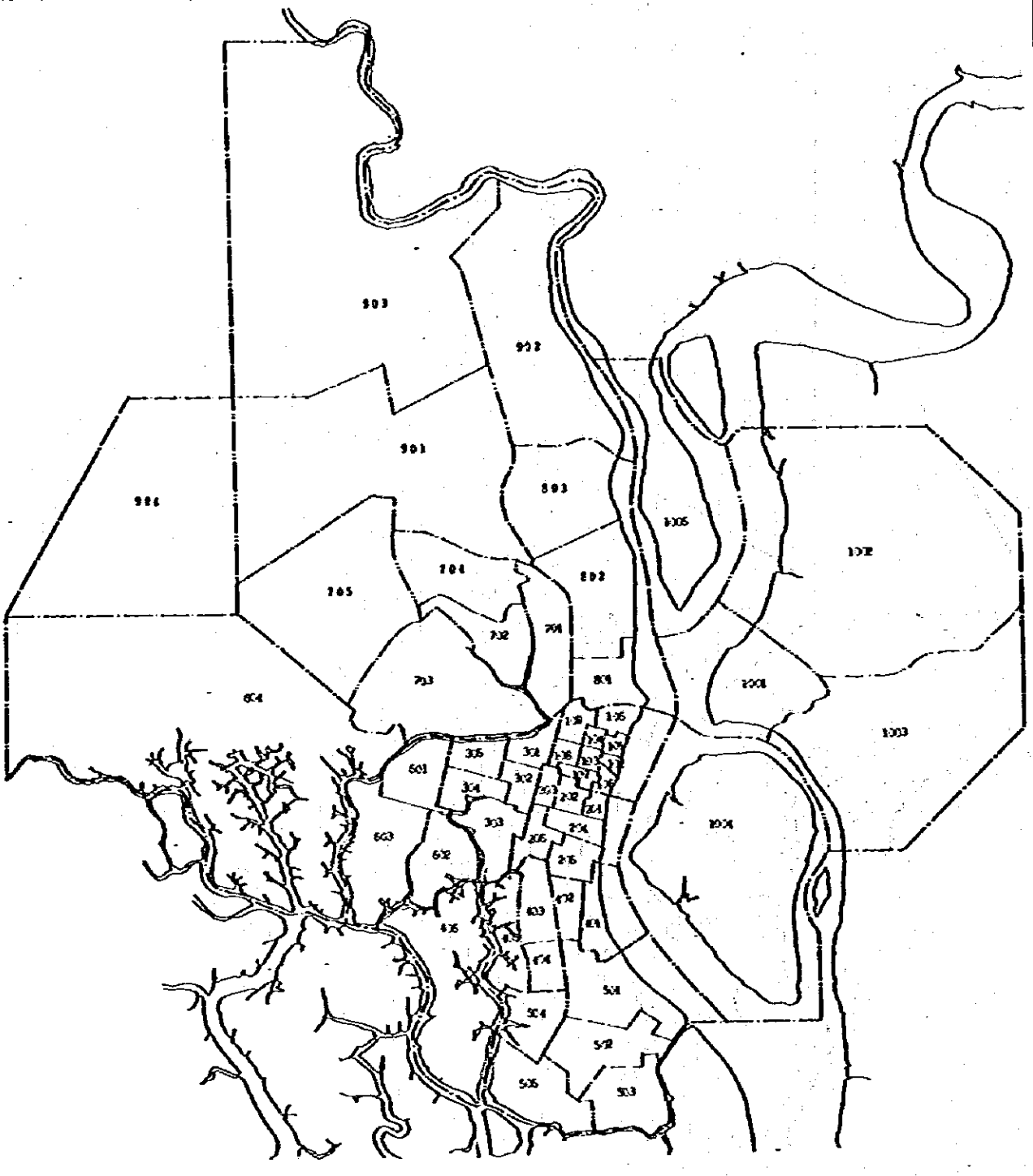


Figure A-2 BOUNDARY LINES OF B-ZONE

Figure A-3 OUTSIDE STUDY AREA

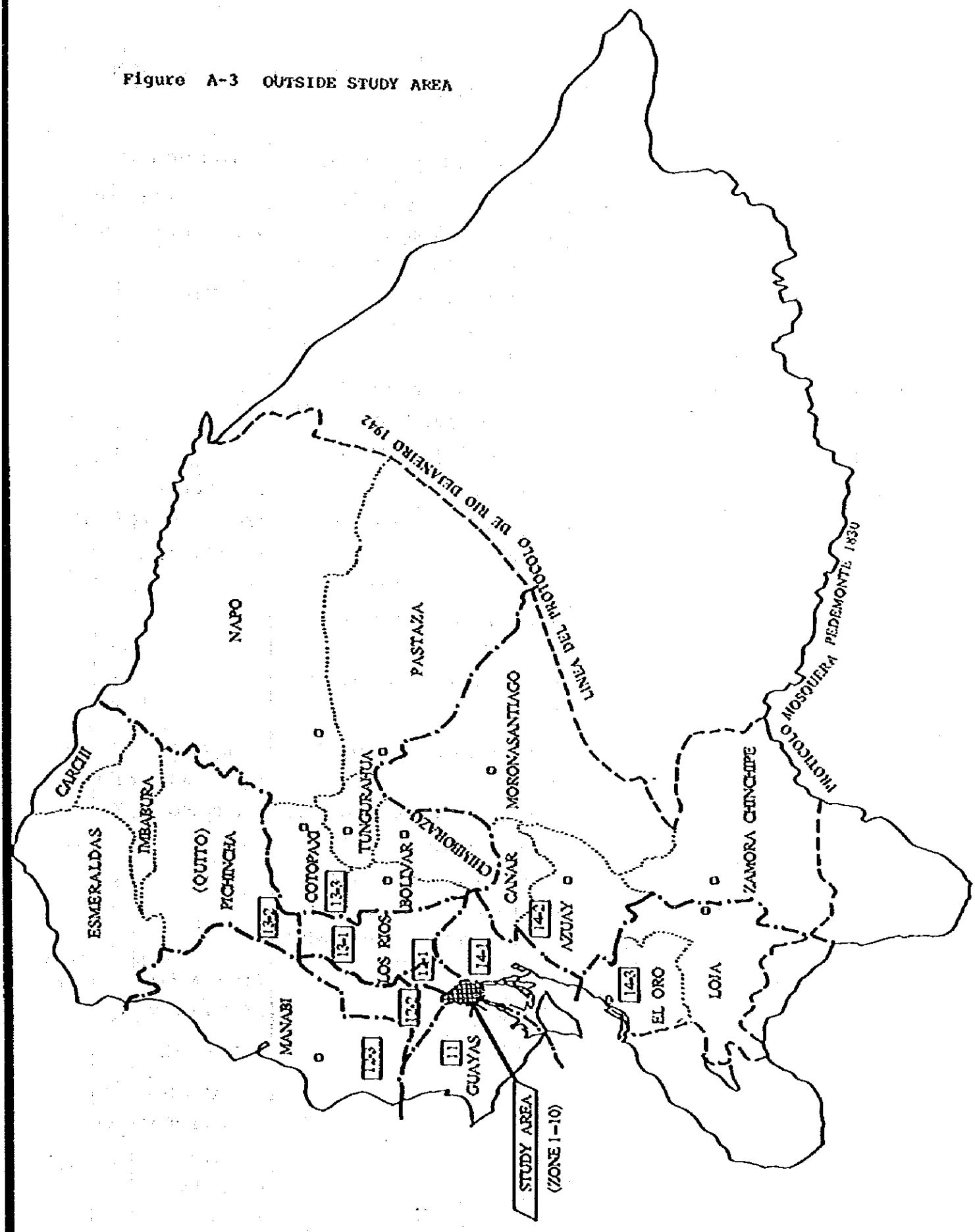


Table A-1 TRAFFIC ZONES

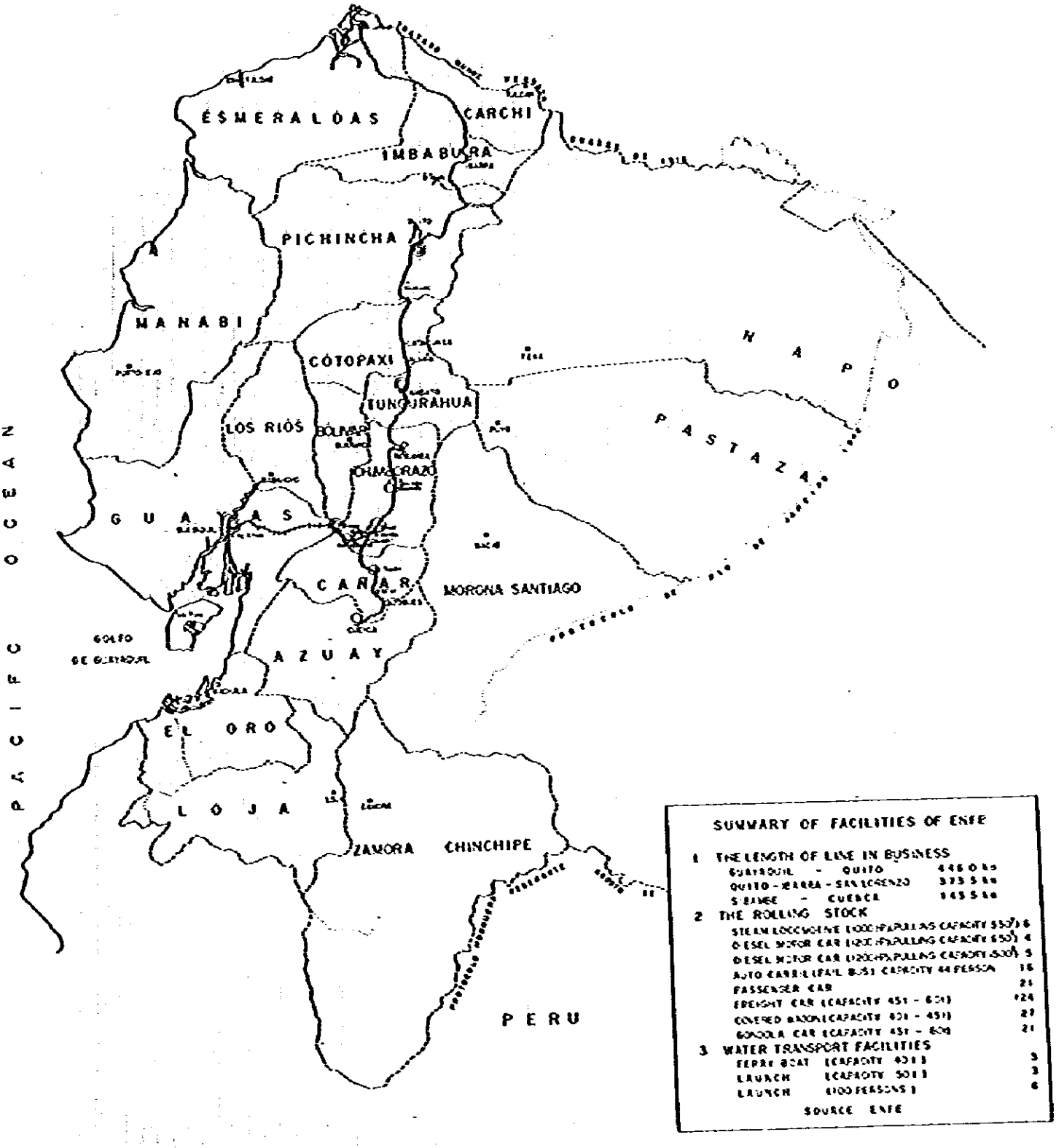
A	B	PROVINCE	CANTON	PARISH, MAIN CITY	MAIN DISTRICT
1	1	Guayas	Guayaquil	Rocafuerte, Roca, Carbo	Central Urban Area
	2			Olmedo, Rocafuerte	Including C.B.D.
	3			Bolívar, Olmedo, Rocafuerte	
	4			Rocafuerte, Roca	"CASCO"
	5			Roca, Carbo	
	6			Olmedo	
	7			Sucre, Bolívar, Olmedo	
	8			9 de Octubre, Sucre	
	9			9 de Octubre, Tarqui, Roca	
2	1			Ayacucho	Down Town
	2			Ayacucho, García Moreno, Sucre	"Zonas adyacentes" AL: CASCO
	3			García Moreno, Sucre	
	4			Ximena, García Moreno	
	5			Ximena	
	6			García Moreno, Letamendi	
				Ximena	
3	1			9 de Octubre, Tarqui, Sucre	Down Town
				Urdaneta	"Zonas Adyacentes"
	2			Sucre, García Moreno, Letamendi, urdaneta	Al: CASCO
	3			Letamendi, García Moreno	
	4			Febres Cordero	
	5			Febres Cordero, Letamendi	
4	1			Ximena	Pradera III
	2			Ximena	Pradera I y II
					9 de Octubre
					Los Almedros
					General Villamil
	3			Ximena	Acacias
					Guangala
	4			Ximena	Amazonas

A	B	PROVINCE	CANTON	PARISH, MAIN CITY	MAIN DISTRICT
4	5	Guayas	Guayaquil	Ximena	West of Estero del muerto
	6			----	Isla Trinitaria
5	1			Ximena	Guasmo Norte
	2			Ximena	Guasmo Central
	3			Ximena	Guasmo Sur
	4			Ximena	(Fertisa)
	5			Ximena	Autoridad Portuaria
6	1			Febres Cordero	Portete
	2			Febres Cordero	Puerto Liza
	3			Febres Cordero	Batallón del Suburbio
	4			---- ----	Salitral, Cerro Azul
7	1			Tarqui	Kennedy
	2			Tarqui	Urdesa
	3			Tarqui	Ferroviaria
	4			Tarqui	Mapasingue I
	5			Tarqui	Mapasingue II
8	1			Tarqui	Cerro del Carmen
	2			Tarqui	Aeropuerto
	3			Tarqui	Alborada
9	1			Tarqui	Sto. Guayas
	2			----	Sananes
	3			----	Pascuales
	4			----	Cerro Azul
10	1			Eloy Alfaro "Durán"	Durán Central
	2			Eloy Alfaro "Durán"	Durán (El recreo)
	3			Eloy Alfaro "Durán"	Durán (Las Brisas)
	4			-- ---- -----	Isla Santay
	5		Samborondón	-- ---- -----	Samborondón
11	1		Guayaquil	Progreso, Playas	
	2		Santa Elena	Santa Elena	
	3		Salinas	Salinas	

A	B	PROVINCE	CANTON	PARISH; MAIN CITY	MAIN DISTRICT
12	1		Daule Balzar	Daule Balzar	
	2		Samborondón Urvina Jado	Samborondón Urvina Jado	
	3	Manabí			
13	1	Los Ríos			
	2	Pichincha Imbabura Esmeraldas Carchi			
	3	Cotopaxi Bolívar Tungurahua Chimborazo Napo Pastaza			
14	1	Guayas	Guayaquil	Yaguachi Milagro Naranjal	
	2	Cañar Azuay Morona Santiago Zamora Chinchipe			
	3	El Oro Loja			

APPENDIX B RAILWAY NETWORK AND TRANSPORT VOLUME

Figure B-1 NETWORK OF RAILWAY



SUMMARY OF FACILITIES OF ENFE

1 THE LENGTH OF LINE IN BUSINESS

GUAYAQUIL - QUITO	446.0 Km
QUITO - IBARRA - SAN LORENZO	373.5 Km
SIBAMBE - CUENCA	145.5 Km

2 THE ROLLING STOCK

STEAM LOCOMOTIVE (1000 HP PULLING CAPACITY 550 T)	6
DIESEL MOTOR CAR (1200 HP PULLING CAPACITY 650 T)	4
DIESEL MOTOR CAR (1200 HP PULLING CAPACITY 500 T)	5
AUTO CARRIL (FIAT BUS) CAPACITY 44 PERSON	16
PASSENGER CAR	21
FREIGHT CAR (CAPACITY 45 T - 60 T)	124
COVERED WAGON (CAPACITY 40 T - 45 T)	27
GONDOLA CAR (CAPACITY 45 T - 60 T)	21

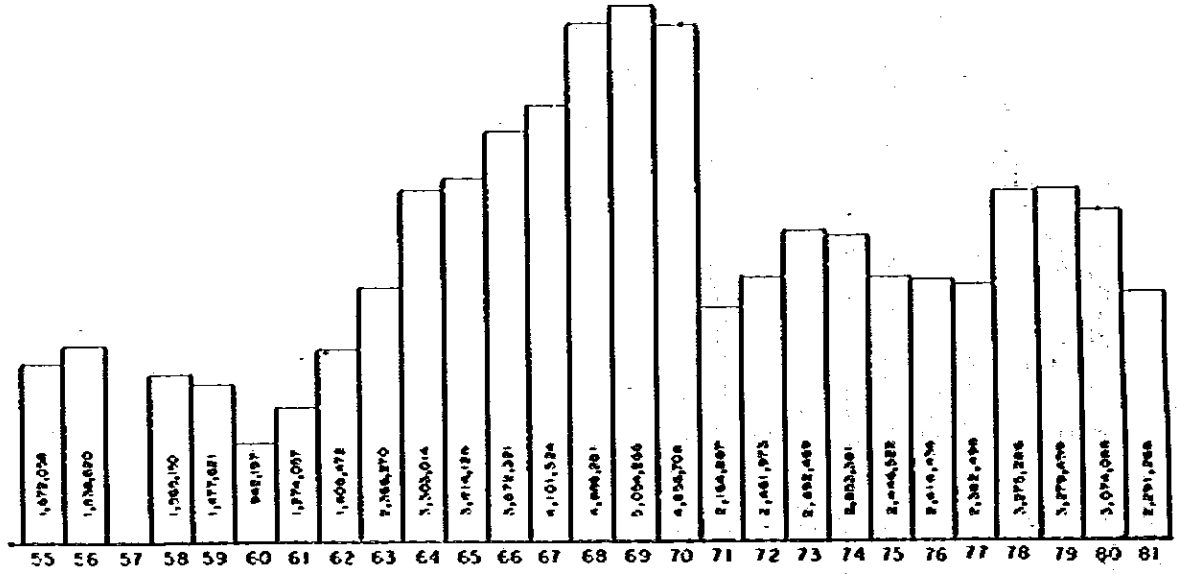
3 WATER TRANSPORT FACILITIES

FERRY BOAT	(CAPACITY 40 T)	5
LAUNCH	(CAPACITY 50 T)	3
LAUNCH	(100 PERSONS)	6

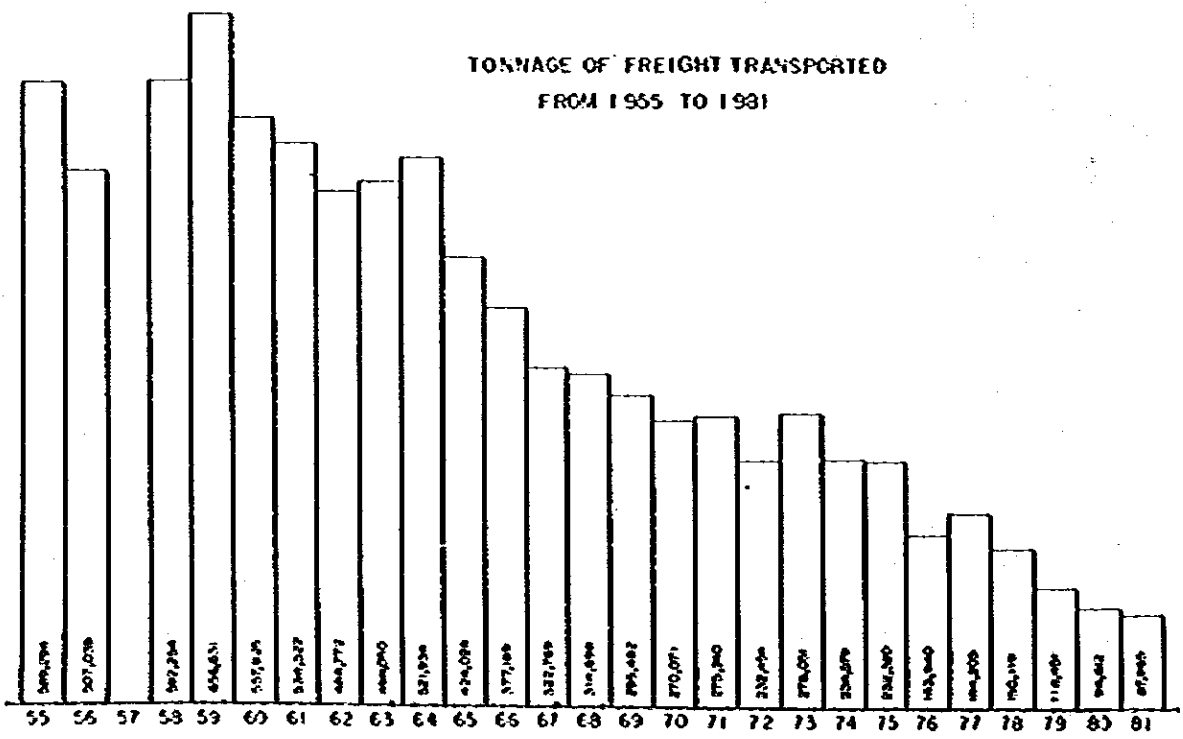
SOURCE ENFE

Figure B-2 TRENDS OF PASSENGERS AND FREIGHT TRANSPORTED

PASSENGERS TRANSPORTED
FROM 1955 TO 1981



TONNAGE OF FREIGHT TRANSPORTED
FROM 1955 TO 1981



SOURCE: ENFE

Table B-1 SCHEDULE OF RAILWAY SERVICE AT DURAN STATION

Departure or Arrival	Number	Class	Time	Schedule	To, From	Note
	9	3	PM 6:10	daily	To Bucay	C
	7	2	PM 5:00	daily	To Bucay	M
Departure	5	2	AM 6:25	daily	To Riobamba	M
	3	2	PM 6:00	Mon., Wed., Fri.	To Tixan	A·C
	1	1	AM 6:20	Mon., Wed., Fri.	To Quito	A·F
	2	1	PM 4:10	Tue., Thu., Sat.	From Quito	A·F
Arrival	4	2	AM 7:25	Tue., Wed., Fri.	From Tixan	A·C
	6	2	PM 1:30	Unfixed	From Riobamba	
	8	2	AM 7:35	Unfixed	From Bucay	
	10	3	AM 1:20		From Bucay	C

Note: C ... Cargo
M ... Mixed
A·C ... Auto Carril
A·F ... Auto Ferro

Table B-2 FARE AND TRAVEL TIME FROM GUAYAQUIL CITY TO MAIN CITIES

From Guayaquil To	Fare of Passenger			Fare of goods sucres/100kg	Time distance 1/	Kilometers From Duran
	Ordinary		Auto Ferro			
	1st class	2nd class				
Duran	2	2		4		
Yaquachi	8	7		4	22	21.2
Milagro	9	8	25	4	38	34.4
Bucay	21	17	70	6	1:35	87.4
Sibambre	31	25	80	8	2:48	130.7
Riobamba	46	36	100	10	5:10	230.5
Ambato			115	10	7:10	301.9
Quito			130	15	10:10	446.9
Cuenca			52	19		146.0 From Sibambre

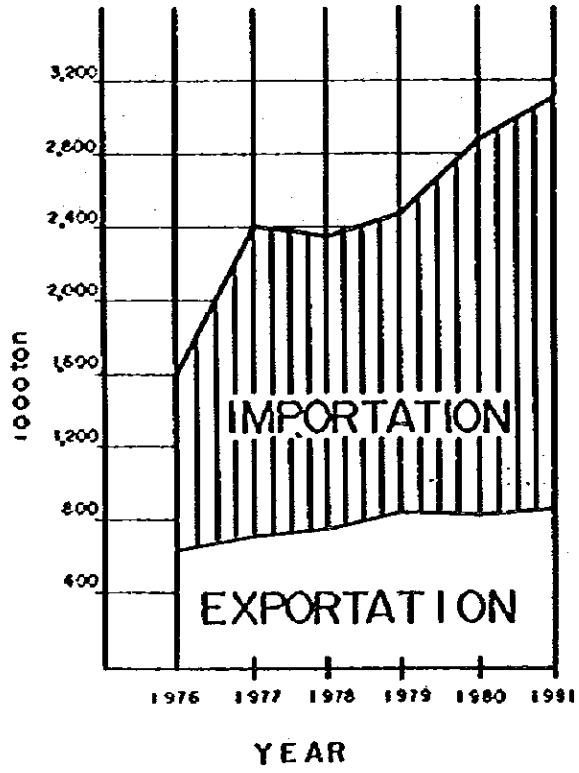
Note: 1/ By Auto Ferro

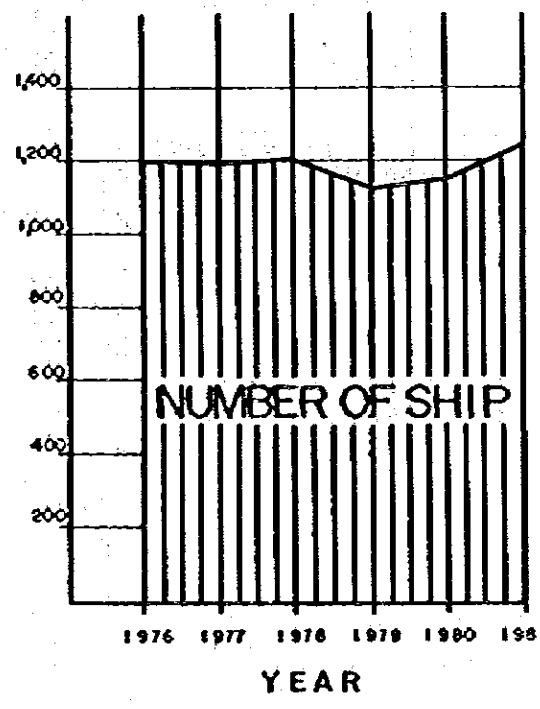
Source: ENFE

APPENDIX C TRADE OF THE GUAYAQUIL PORT

Figure C-1 TREND OF TRADE OF CARGO AT GUAYAQUIL PORT

YEAR: 1976 - 1981





CARGO AND SHIPS AT GUAYAQUIL PORT

YEAR	SHIPS	TOTAL	IMPORTATION	EXPORTATION
1976	1,196	1,621,368	987,391	633,977
1977	1,193	2,417,480	1,707,737	709,743
1978	1,200	2,360,883	1,627,740	733,143
1979	1,132	2,471,802	1,626,354	845,448
1980	1,156	2,884,428	2,043,244	841,184
1981	1,240	3,097,038	2,242,784	854,254

Table C-1 MAIN GOODS OF TRADE

Unit: 1000 tons

	Import						Export					
	1976	1977	1978	1979	1980	1981	1976	1977	1978	1979	1980	1981
Wheat	192	235	269	256	317	279	-	-	-	-	-	-
Banana	-	-	-	-	-	-	382	411	445	500	490	549
Cacao	-	-	-	-	-	-	23	21	16	6	11	25
Paste of Cacao	-	-	-	-	-	-	6	12	38	20	42	25
Others kafe from cacao	-	-	-	-	-	-	6	6	10	7	15	15
Sugar	-	-	-	-	-	-	18	24	18	53	45	35
Molasses	-	-	-	-	-	-	32	63	32	58	69	54
Coffee	-	-	-	-	-	-	52	36	59	-	36	34
Mineral products	206	568	453	420	714	906	-	-	3	1	3	2
Gasoline	32	157	65	9	291	337						
Other petrolium product	18	176	223	40	224	262						
Cement and its product	36	95	92	42	53	111				1	2	2
Metal goods	11	14	22	13	20	83						

Table C-2 MAIN COUNTRIES OF TRADE

Unit: 1000 tons

	Import						Export					
	1976	1977	1978	1979	1980	1981	1976	1977	1978	1979	1980	1981
German	24	49	68	34	41	62	130	133	171	93	27	35
Holland	83	382	205	266	363	432	-	-	-	-	-	-
Argentine	16	31	20	9	6	9	3	4	4	38	69	52
Belgium	16	25	40	25	30	39	95	70	66	108	115	125
Chile	52	33	23	64	52	31	44	56	66	91	108	125
China	2	8	7	9	46	82	2	-	-	-	1	19
Spain	5	83	9	10	13	81	2	2	4	5	3	1
United States	447	555	610	647	731	724	233	302	230	373	370	333
Japan	127	232	171	118	164	143	6	30	19	30	50	25
Mexico	8	76	43	29	41	128	12	-	4	13	10	13

APPENDIX D O-D TABLES IN PRESENT AND FUTURE

Table D-1 PRESENT O-D TABLES BY MODE

VEHICLE TRIP OD (ALL PURPOSES)

UNIT : TRIPS/DAY

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	845650	54420	29431	21543	9139	6407	65358	36625	11912	7513	368315
02**	56066	43233	32552	32379	5402	2834	15352	5344	2369	2316	160329
03**	28807	14453	16996	4103	2650	4237	13029	3721	431	11779	100274
04**	21222	12933	5369	6033	1376	496	5553	1655	450	122	57285
05**	8110	5023	2257	1624	2058	525	2107	1078	787	316	23333
06**	5558	2532	5318	691	336	7206	1560	856	59	153	24297
07**	63974	17316	12319	7735	1274	1027	50355	10335	1914	2521	169333
08**	33229	6555	3225	1773	836	886	11806	7138	1258	866	77261
09**	12063	3147	531	248	1295	229	2162	963	3032	22	24493
10**	6662	1757	12562	255	528	260	2366	633	6	6336	29853
INNER	367138	161319	98980	52385	25252	24157	133252	68476	21695	31972	1059307

BUS TRIP OD (ALL PURPOSES)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	52531	29103	32811	19735	23096	45345	32483	14135	2104	4593	222469
02**	29646	9741	12737	9530	9350	10136	9591	2282	307	492	94335
03**	33733	15585	12537	3117	3332	12130	8693	4234	632	480	114475
04**	18106	9293	2810	5755	3413	2511	6457	1242	200	166	49983
05**	20440	9764	3259	3206	4464	3243	3374	1456	249	223	50420
06**	46827	9629	14345	2531	3106	17437	6491	3439	368	202	104902
07**	33614	8459	10215	4621	3840	2318	17687	4396	1041	975	91564
08**	14131	1791	4235	955	1423	4003	5678	2051	243	963	35483
09**	2012	481	553	163	273	358	1374	494	656	81	5909
10**	5730	524	459	172	155	355	625	1107	30	1933	12186
INNER	262491	94355	114751	50043	52419	104874	91593	35458	6868	12114	841911

RAIL TRIP OD (ALL PURPOSES)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	77053	23823	20373	10371	1578	1856	17050	8329	2182	1048	163653
02**	23220	15422	6933	5336	1217	1321	3265	2225	0	193	65299
03**	20260	9188	11093	1128	225	1824	2118	1523	225	0	47581
04**	3835	6931	1306	4965	121	183	1351	382	90	0	25256
05**	1302	540	135	1304	541	0	90	270	9	0	4636
06**	3816	3492	2166	90	45	1398	541	835	45	0	8274
07**	28109	3606	2525	765	45	225	14391	4547	91	0	49335
08**	13350	2429	1849	255	535	406	5413	5223	226	353	37261
09**	1231	205	315	45	45	45	272	537	316	0	2836
10**	180	0	0	0	0	0	0	451	0	133	811
INNER	181552	70527	46693	24993	5311	7342	45872	33925	3963	1176	420059

Table D-2 PRESENT VEHICLE O-D TABLES BY PURPOSE

UNIT : TRIPS/DAY

VEHICLE TRIP OD (TO WORK)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	15872	3736	1139	529	1295	193	4024	1317	925	154	29246
02**	8317	3075	519	368	921	92	2230	521	273	129	15337
03**	5334	1508	1073	270	354	213	1455	551	176	162	11672
04**	3057	2376	91	266	325	44	474	122	230	13	5963
05**	760	366	76	56	328	14	242	115	422	0	2555
06**	1258	609	211	52	63	155	91	6	13	52	2316
07**	12139	1638	555	527	76	171	3557	315	407	96	19973
08**	3396	343	215	35	255	55	417	273	34	34	5309
09**	457	407	85	55	8	42	155	35	155	12	1403
10**	356	192	2	49	31	53	275	97	6	433	2127
INNER	51202	14340	4120	2303	3795	1033	13754	3321	2674	1675	97615

VEHICLE TRIP OD (TO SCHOOL)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	1116	536	235	167	48	19	4124	1212	0	0	[illegible]
02**	637	329	0	152	32	2	2659	421	20	25	2615
03**	295	33	28	35	55	0	1023	245	0	0	1723
04**	187	48	65	0	0	0	637	143	0	0	1092
05**	0	27	0	19	9	0	72	6	0	0	115
06**	33	6	0	2	6	35	61	0	0	0	130
07**	240	151	0	74	0	19	1952	450	0	0	2835
08**	211	0	0	3	55	0	652	423	0	14	1101
09**	6	0	0	0	3	5	49	6	5	0	63
10**	21	0	0	0	0	0	55	0	0	42	123
INNER	3348	1126	331	443	276	75	11234	2530	35	91	17513

VEHICLE TRIP OD (BUSINESS)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	50499	13933	7262	2675	4515	1475	14573	17554	9339	2544	134110
02**	18130	18245	4316	5275	2622	421	4756	1735	1616	810	59207
03**	8519	5370	7925	2310	1156	2312	6221	725	21	11375	45939
04**	7022	4593	3542	5555	1336	255	1446	257	96	39	24150
05**	3475	1270	554	772	1257	331	955	520	302	163	9592
06**	1647	125	2512	257	125	5554	221	452	10	0	12031
07**	14051	4333	4925	2225	543	242	10796	3590	1115	1635	43805
08**	23076	1673	527	145	256	372	3521	2665	456	545	33651
09**	10325	1674	147	53	1276	73	1055	455	1056	0	17146
10**	3833	560	12974	55	327	1	541	152	0	3565	19922
INNER	138156	52279	44747	25554	13545	13276	41267	23775	14527	21269	395333

VEHICLE TRIP OD (PRIVATE)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	35001	13023	5502	4391	2052	1422	12471	9334	760	1577	93442
02**	16539	10391	2936	3299	631	335	5405	2030	116	651	48184
03**	7435	3995	3520	772	624	932	3473	1238	25	96	22080
04**	4408	2972	394	1350	481	3	1270	411	20	0	11295
05**	798	627	347	274	391	44	357	74	0	0	2922
06**	616	476	552	209	35	476	859	142	0	0	4167
07**	12507	2684	1112	1275	265	53	17637	2516	143	194	39333
08**	5335	2028	526	705	157	133	4353	2142	176	80	15706
09**	710	272	73	53	34	23	296	244	270	4	1976
10**	1092	146	8	120	25	[illegible]	244	293	0	152	2676
INNER	82441	38614	15421	12355	4245	4493	52355	17356	1512	3354	237792

VEHICLE TRIP OD (TO HOME)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	27332	15853	9392	5298	439	2055	14859	5631	1905	2093	83717
02**	7818	7911	3140	2106	153	535	3133	656	265	251	25978
03**	3975	2184	3000	323	221	527	675	629	166	33	11505
04**	3528	2543	932	651	19	171	1176	577	56	49	9324
05**	2320	1624	1071	355	173	127	442	292	25	126	6513
06**	1253	733	577	57	59	332	156	132	15	59	3736
07**	15739	6690	4576	3252	150	177	12470	3592	191	296	47075
08**	6948	2139	1517	477	65	172	2650	1557	155	151	15354
09**	1269	515	162	33	46	55	562	291	397	6	3331
10**	1093	635	207	0	2	23	435	32	0	1022	3517
INNER	78275	42665	25154	12554	1477	4675	35552	12572	2359	4333	211022

VEHICLE TRIP OD (TO [illegible])

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	15238	7362	3956	2533	336	625	8232	2477	403	1015	47119
02**	6595	3159	1427	1033	393	334	933	232	52	156	14858
03**	3189	1063	1448	255	143	154	724	433	65	127	7709
04**	2410	871	273	250	92	35	434	145	0	25	4493
05**	577	1053	215	131	22	4	10	27	32	25	2126
06**	751	133	376	74	45	191	205	11	0	41	1891
07**	9298	1765	1117	471	0	220	3531	540	67	110	17039
08**	2253	332	359	247	27	11	370	517	25	21	4261
09**	96	19	55	0	0	31	60	23	283	0	635
10**	230	427	55	15	25	51	219	35	0	557	1593
INNER	40707	18074	9213	5049	1355	1593	14704	4555	767	2651	55545

Table D-3 PRESENT BUS O-D TABLES BY PURPOSE

UNIT : TRIPS / DAY

BUS TRIP OD (TO WORK)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	13450	4081	2813	2350	1843	2131	6746	2765	534	916	37834
02**	9304	2023	1036	1491	794	775	3191	538	119	33	19354
03**	20335	5981	2024	1099	536	1193	3088	2135	252	120	36761
04**	5509	2044	390	932	451	243	2162	422	126	46	12325
05**	8558	3624	1230	1198	652	781	2068	833	178	92	19214
06**	19016	4071	5331	1368	1322	3509	3747	2035	252	87	40538
07**	3695	1332	1095	779	241	241	4466	968	371	172	18550
08**	4289	265	344	196	159	395	1239	526	54	51	7446
09**	493	37	82	17	57	19	311	68	111	15	1610
10**	2266	271	204	88	47	46	202	393	25	414	3956
INNER	91835	23729	14604	9186	6000	9243	27220	10683	2222	1946	191188

BUS TRIP OD (TO SCHOOL)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	6724	1516	1206	1286	312	1109	5971	916	12	12	19864
02**	4178	1551	536	580	564	242	2787	556	0	4	10998
03**	8199	2878	1708	325	59	257	2835	865	0	0	17126
04**	3423	1670	456	1096	192	60	2117	272	4	0	9280
05**	2729	1825	655	424	398	119	585	210	0	10	6945
06**	8746	2112	2253	215	162	1720	1210	669	7	28	17122
07**	3780	682	631	210	158	393	2991	321	14	44	9224
08**	1542	120	112	52	21	95	899	440	0	0	3281
09**	242	29	65	0	5	0	148	30	49	9	577
10**	839	29	48	28	12	0	188	202	0	83	1439
INNER	40652	12412	8270	4206	1873	3935	19731	4481	86	190	95696

BUS TRIP OD (BUSINESS)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	5902	1785	1611	540	474	853	1190	442	32	360	13119
02**	3853	458	569	262	208	341	239	17	6	4	5957
03**	5857	1030	437	24	77	324	172	80	6	13	8070
04**	1706	348	134	325	114	11	81	12	0	0	2731
05**	2081	522	49	250	283	111	50	61	7	0	3414
06**	3466	395	865	36	38	626	85	62	0	0	5573
07**	2334	178	144	111	40	45	528	109	11	14	3514
08**	941	73	47	12	52	16	96	75	0	43	1355
09**	124	23	12	0	0	11	51	0	0	0	221
10**	910	22	49	6	0	12	5	54	0	270	1328
INNER	27224	4807	3917	1566	1236	2350	2497	912	62	704	65325

BUS TRIP OD (PRIVATE)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	16019	5051	5965	2381	2376	4231	4690	2627	335	908	45131
02**	8503	1914	1520	1745	1550	1055	1190	697	68	64	18316
03**	16065	3610	2847	787	522	1326	1040	988	134	130	27409
04**	5103	2422	365	1204	414	279	835	328	32	29	11006
05**	6251	2617	838	924	1362	952	447	304	45	69	14059
06**	13855	1924	3629	526	484	4236	1074	517	67	51	26333
07**	9634	1294	830	543	187	609	2803	697	183	144	16810
08**	4537	299	576	117	85	474	1874	452	53	100	8468
09**	679	87	49	29	5	45	156	29	72	26	1177
10**	2323	80	61	29	14	58	118	348	5	622	3663
INNER	82969	12498	16731	9790	7010	13206	14228	6870	924	2146	172372

BUS TRIP OD (TO HOME)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	13978	15289	35414	11087	14505	35042	12595	7037	1164	4053	150334
02**	3338	3499	8146	4969	5620	7581	1959	441	114	357	36086
03**	3212	1942	4694	901	1963	8553	1407	728	246	223	23719
04**	2163	2709	1296	2174	2121	1891	1242	185	38	91	13910
05**	803	956	1156	402	1650	1265	224	58	19	52	6587
06**	1577	1147	2649	392	1155	6316	368	155	42	36	14357
07**	3164	4358	7258	3102	3831	5345	6017	2659	525	588	42133
08**	2822	992	3071	591	1325	2916	1513	536	136	749	14361
09**	479	230	345	117	206	238	505	67	237	31	2498
10**	326	122	104	37	92	233	182	110	0	503	1619
INNER	35316	31737	64133	23632	31578	30429	25042	13946	2521	6683	305624

BUS TRIP OD (TO LUNCH)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	8454	8451	5197	1321	1496	3429	1891	378	29	348	16362
02**	410	296	378	483	554	710	225	33	0	30	3619
03**	345	89	337	91	97	567	61	83	1	0	1651
04**	232	100	158	34	128	27	49	30	0	0	731
05**	86	88	11	10	129	15	0	0	0	0	201
06**	167	40	118	4	183	510	7	0	0	0	929
07**	387	129	264	71	83	196	282	130	7	13	1490
08**	100	42	55	13	33	177	57	22	0	20	526
09**	0	5	0	0	0	2	3	0	16	0	26
10**	22	0	3	10	0	0	0	0	0	36	71
INNER	3065	2870	7031	2197	2563	5651	1875	636	53	445	25706

Table D—4 PRESENT EXTERNAL BUS TRIP O—D TABLE

UNIT : TRIPS/DAY

BUS CORDON TRIP OD (ALL PURPOSE)

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER	11**	12**	13**	14**
01**												4150	13941	9343	10556
02**												10	58	0	0
03**												7	0	0	11
04**												0	21	0	66
05**												0	0	0	0
06**												0	0	0	166
07**												17	54	0	0
08**												0	50	19	13
09**												0	0	0	0
10**												0	0	0	45
INNER												4184	14124	9362	10862
11**	5061	13	9	0	0	0	21	0	0	0	5104	0	0	144	206
12**	14771	69	0	20	0	0	54	55	0	0	14969	0	0	65	241
13**	12600	0	0	0	0	0	0	27	0	0	12627	144	65	0	0
14**	14935	0	10	73	0	202	0	25	0	64	15315	206	141	0	0
OUTER	47367	76	25	93	0	202	80	107	0	64	48014	350	206	209	347
TOTAL	47367	76	25	93	0	202	80	107	0	64	48014	4534	14330	9571	11209

BUS CORDON TRIP OD (ALL PURPOSE)

	OUTER	TOTAL
01**	37990	37990
02**	68	68
03**	18	18
04**	87	87
05**	0	0
06**	166	166
07**	71	71
08**	87	87
09**	0	0
10**	45	45
INNER	30532	30532
11**	350	5454
12**	206	15174
13**	209	12836
14**	347	15662
OUTER	1112	49126
TOTAL	39044	87048

Table D-5 FUTURE O-D TABLES BY MODE

FUTURE CAR TRIP OD

UNIT : TRIPS / DAY

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	195468	51020	38211	20177	18078	35957	53329	27581	43018	24619	507264
02**	46805	45829	16586	10819	8655	13622	15635	8230	15569	8476	190566
03**	31646	14776	26584	6426	5371	12636	13411	6509	12400	6642	135461
04**	17869	10352	7069	12328	6716	6992	7621	4031	5670	4551	85176
05**	15519	8110	5642	6600	8488	6424	6957	3781	8593	4422	74526
06**	34235	13991	14339	7413	7185	35261	23580	9396	31252	10825	183183
07**	51676	16593	15648	8184	7697	22643	53555	14418	37760	12576	249771
08**	25752	9308	7335	4161	3972	8930	13865	10587	29094	6923	109272
09**	42728	16680	15065	9704	9904	31649	40409	21732	111961	20352	323393
10**	24163	9130	8099	5054	5073	11655	13151	7453	20228	33366	142612
INNER	485911	195031	154554	90650	81139	185954	241713	113620	309525	139558	1996821

FUTURE BUS TRIP OD

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	187692	48559	55220	23928	41559	45225	47386	21245	41540	20218	532545
02**	53083	26564	20056	9669	14850	15856	14090	6305	13714	5557	180362
03**	65204	20747	32671	10961	19338	23461	18666	7668	17451	7951	226118
04**	29500	10659	13652	13145	11851	10350	8430	3132	8999	4189	113337
05**	50114	15442	19048	11109	23055	17165	13715	5926	15183	6947	177693
06**	55958	17433	24699	10326	19223	33151	20291	7370	27973	9802	230679
07**	54271	14896	19218	8154	14026	19456	30069	9173	23310	6490	201603
08**	23228	6433	7655	3528	5540	7312	8897	5693	11037	4123	83376
09**	50303	15258	18905	9216	16357	23010	25213	12327	52367	12113	235181
10**	25352	7556	9053	4492	7975	9255	9201	4559	12458	23952	119849
INNER	595035	183367	213165	102595	173121	204251	195934	84223	219470	100342	2076543

FUTURE TAXI TRIP OD

	01**	02**	03**	04**	05**	06**	07**	08**	09**	10**	INNER
01**	129768	30467	25541	9338	12856	15385	23017	15510	25253	9120	297255
02**	29526	18262	9641	4197	5219	5345	6554	4320	8650	2902	94506
03**	26273	10106	16754	3209	4324	6234	6854	4350	8690	2896	89700
04**	9920	4565	3276	5326	3045	2196	2502	1691	3773	1239	35542
05**	13037	5330	4246	2872	4647	3071	3483	2363	5653	1814	46591
06**	15536	5525	6189	2111	3052	7406	5291	3015	8522	2286	59069
07**	24527	7030	7939	2519	3643	5596	14384	5282	12193	3016	85256
08**	16812	4320	6623	1742	2533	3321	5415	3433	9290	2204	59223
09**	25716	7613	9243	3491	5450	8453	11374	8450	17386	5412	103135
10**	9289	3618	2860	1187	1811	2312	2906	2066	5588	4021	35553
INNER	309406	97786	82469	34992	45580	59319	81660	55564	105659	34910	906365

APPENDIX E SOIL SURVEY AND TEST

E-1 Outline of the soil Survey and Test

1) Purpose of the survey

Geologically the Guayaquil City has developed on the thick alluvium accumulated by the Guayas river. It consists of too weak strata to support the foundations of heavy structures, reaching 20 - 40 meters deep in many parts of the city.

Foundation's share of all construction costs, as is often case with such geological conditions, shall amount to very high percentage, sometimes resulting in underestimation of investment cost and indispensably changing the designs of structures.

This survey purposes to obtain further informaitons on the geological conditions through boring at several sites in the urbanized area and the laboratory test, in addition to collection and analysis of the existing data, to aim at accuracy for the estimations of the projects such as urban transportation system along the main traffic routes, highways, etc.

2) Survey items

a- Boring

b- Standard Penetration Test

c- Sampling, and

d- Laboratory Test includes:

Water Content Test, Specific Gravity Test, Atterberg Limits Test, Wet and Dry Bulk Density Test, Grading Analysis, Unconfined Compression Test, Consolidation Test, Permiability Test.

E-2 Location of Survey Points

Twelve survey points were selected, taking following two items into account.

a- To cover main parts of the city where the urban transportation systems shall be supposed to introduce.

b- To cover the space where the existing data could not provide for analysis.

The location of survey points are shown in Figure G-1.

E-3 Results of Soil Survey and Test

1) Outline of geological conditions

Structure of strutum is classified into two kinds of strata, soft clay and hard sand.
Clay strata is 30 - 40 meters deep in the area between the Guayas river and the Salado estuary (Estero Salado). In the both sides of the area which are southern part of BH-3 and northern part of BH-8, clay strata is 15 - 20 meters deep. Especially, clay strata is thicker in the western area of the city than the other areas.

Characteristics of the clay strata are as followings;

(1) Containing several very thin sand layers, which results from the geological accumulation.

(2) From the top of ground to about 8 meters deep, soil condition is very soft (N value is less than 1).

(3) Unconfined compression test value is 0.36 - 0.96 kg/cm^2 without relation of soil depth.
Sand strata is very hard and strong enough to support the foundations of heavy structures (N value is more than 50).

2) Details of soil survey and test

Figure G-2 shows the geological cross section of south-north direction (from BH-1 to BH-8 and Bus Terminal), while Figure G-3 shows the geological cross section of west-east direction and along Malecón Simon Bolivar Avenue (BH-9, -10, -4, -11, -12).

Table G-1 shows the results of soil test as a typical example.

Further detailed geotechnical information is described in "Report on the Geotechnical Investgation for the Study of the Guayaquil City Urban Transportation Plan".

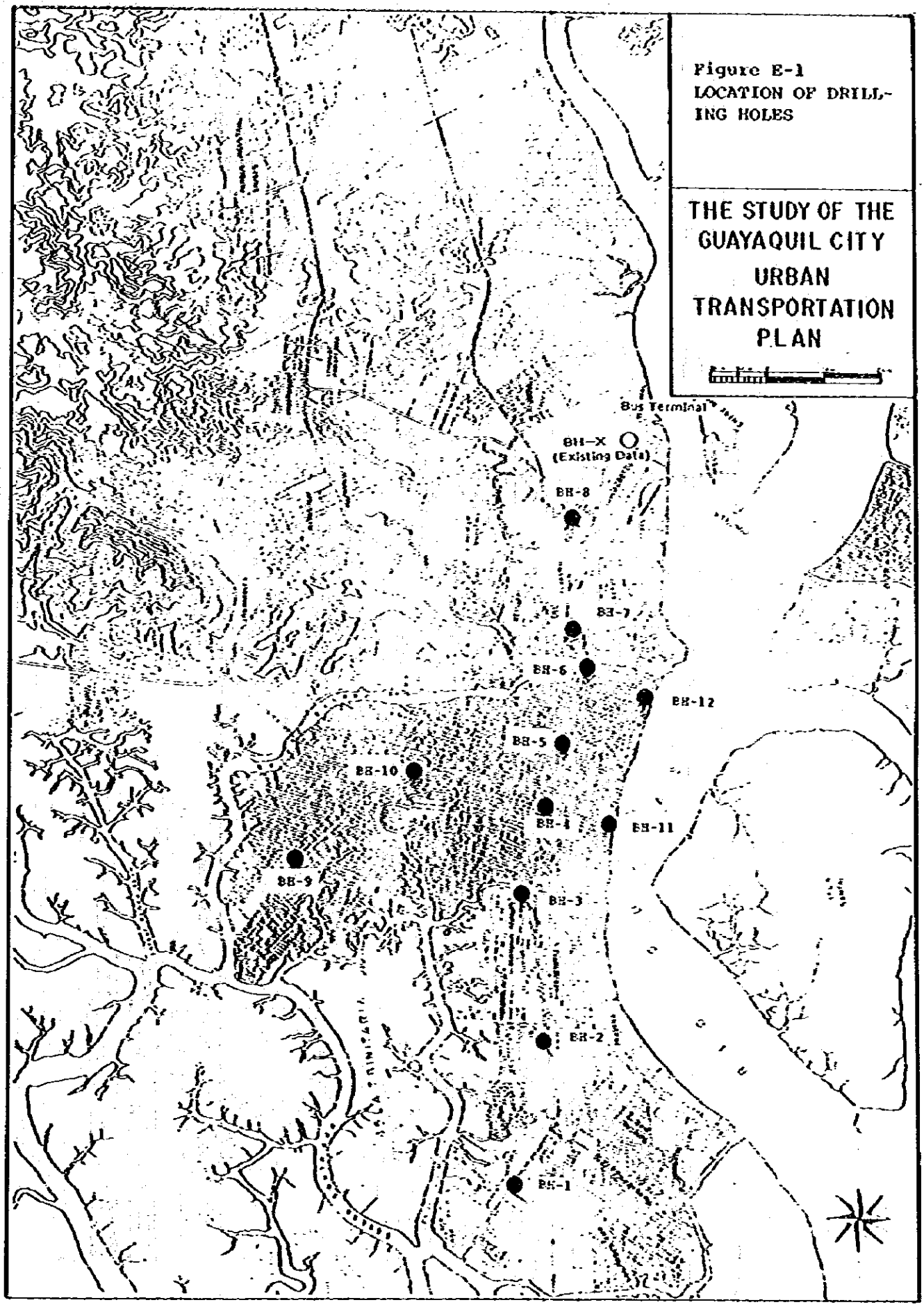
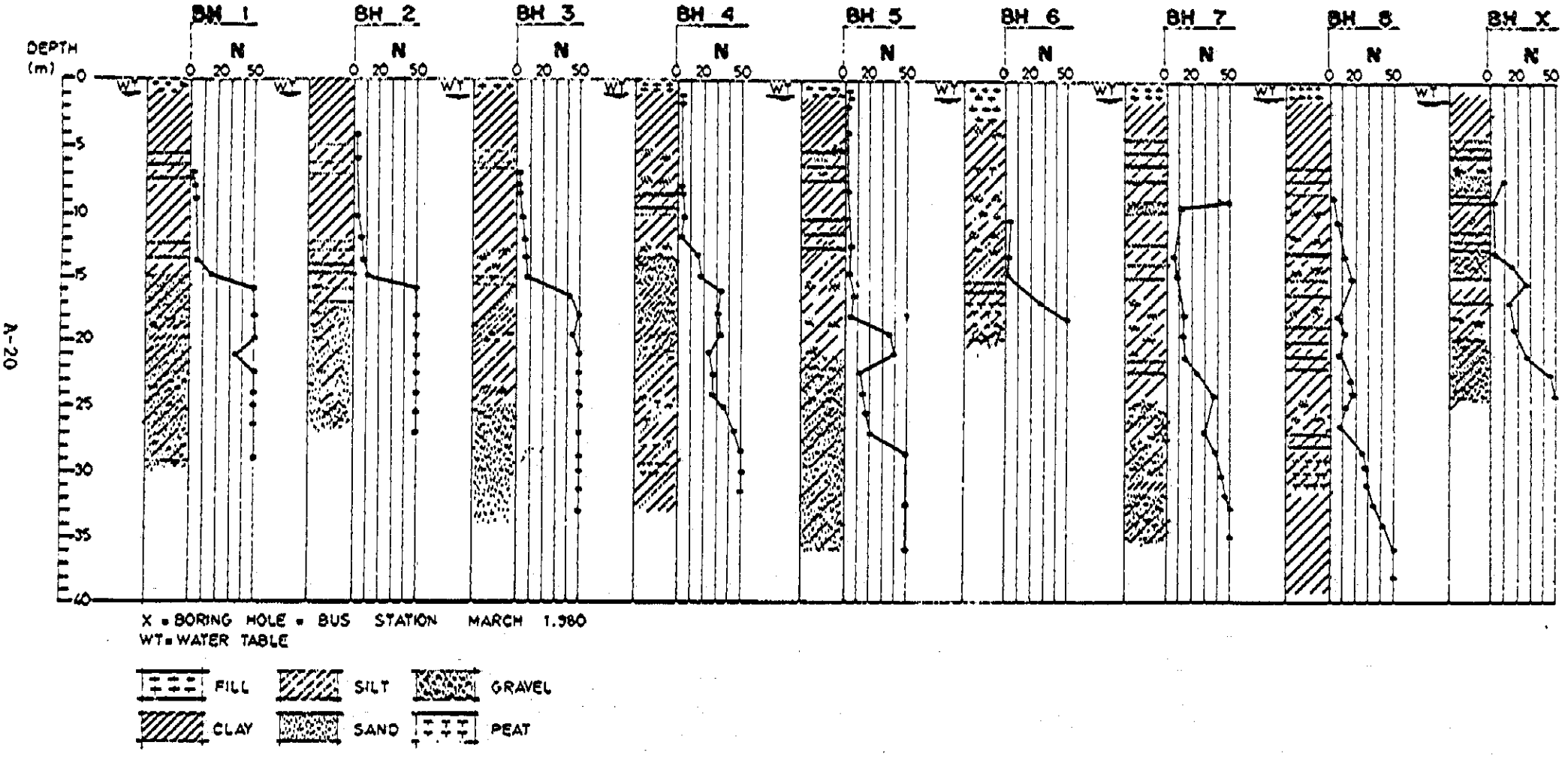


Figure E-1
LOCATION OF DRILLING HOLES
THE STUDY OF THE GUAYAQUIL CITY URBAN TRANSPORTATION PLAN
Bus Terminal
BH-X
(Existing Data)
BH-8
BH-7
BH-6
BH-12
BH-5
BH-10
BH-4
BH-11
BH-9
BH-3
BH-2
BH-1

Figure E-2 SOIL PROFILE A



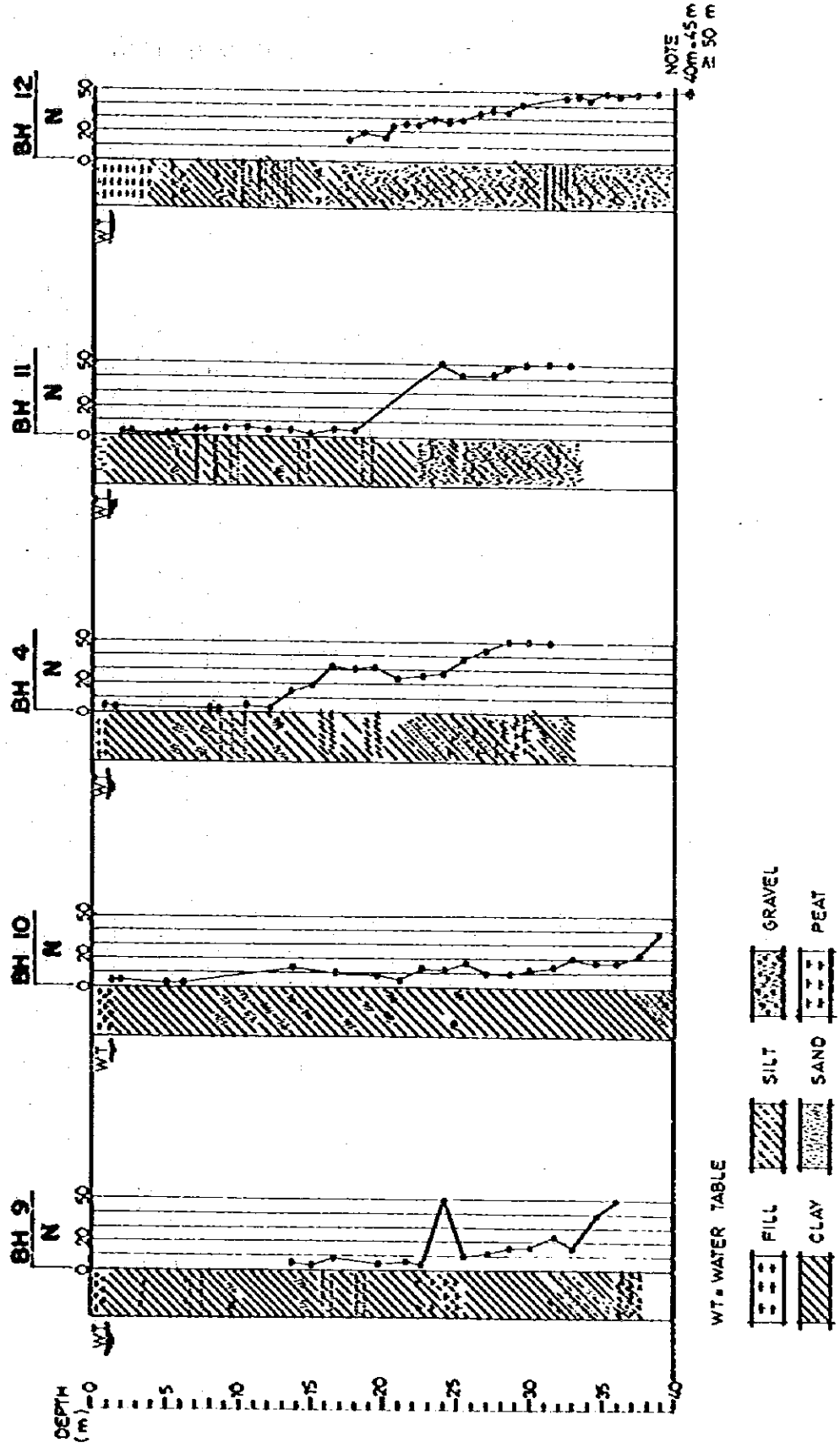
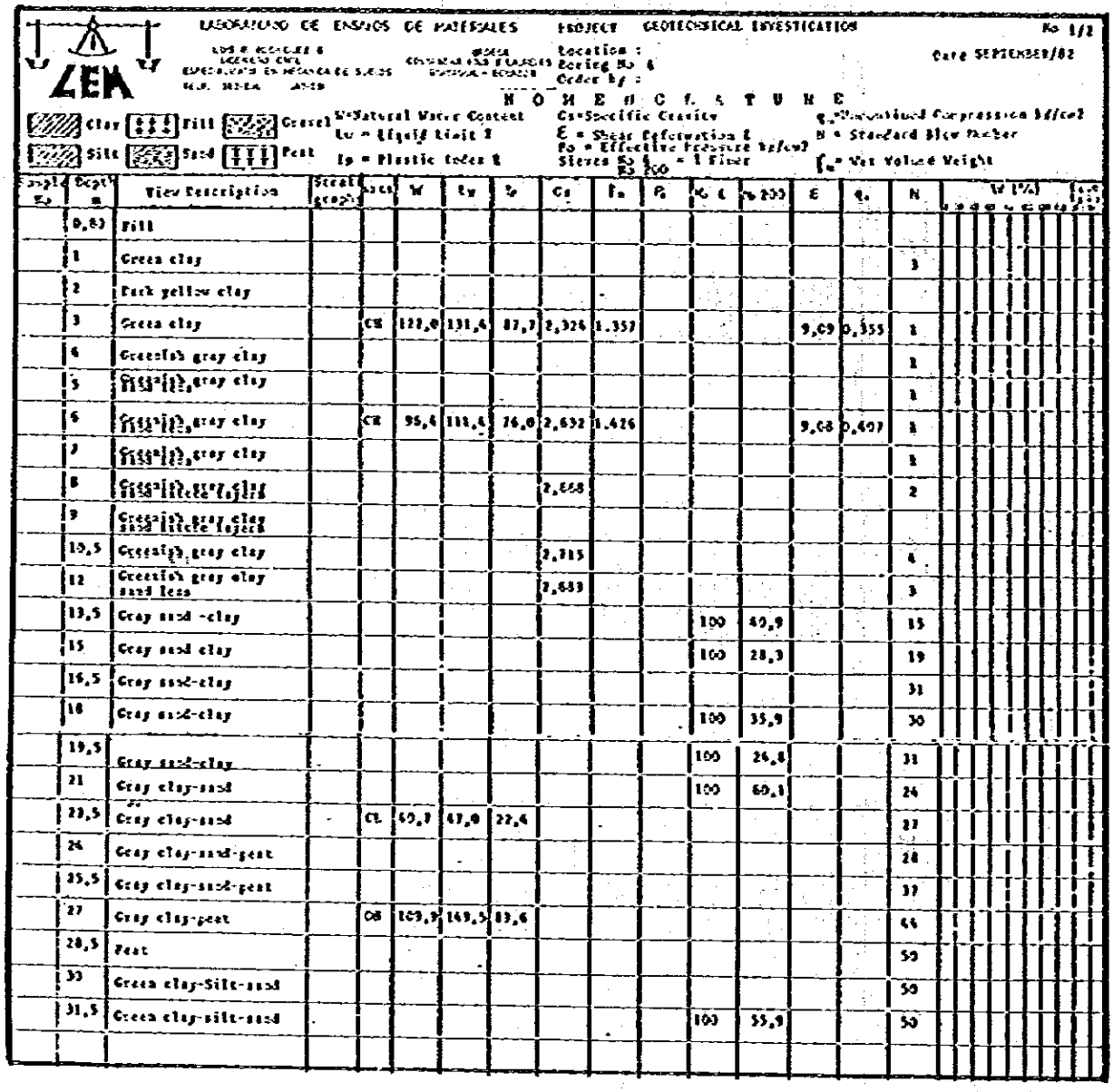


Figure E-3 SOIL PROFILE B

Table E-1 EXAMPLE OF THE SOIL TEST



LABORATORIO DE ENSAYOS DE MATERIALES — PROJECT: GEOTECHNICAL INVESTIGATION — No 1/1

ZEM

Location :
Boring No 4
Order by :

Date SEPTEMBER/82

N O M E N C L A T U R E

Clay | Fill | Gravel | Silt | Sand | Peat

Wn = Natural Water Content
Wl = Liquid Limit %
Ip = Plastic Index %

Gs = Specific Gravity
ε = Shear Deformation %
Po = Effective Pressure kg/cm²
Sieves #4 & #200 = % Finer

qu = Unconfined Compression kg/cm²
N = Standard Blow Number
γm = Wet Volume Weight

Sample No	Depth m	Visu Description	Soil group	USCS	W	Wl	Ip	Gs	γm	e	% #4	% #200	ε	qu	N	W (%)
	0,80	Fill														
	1	Green clay													3	
	2	Dark yellow clay														
	3	Green clay		CH	122,0	131,4	87,7	2,326	1.357				9,69	0,355	1	
	4	Greenish gray clay													1	
	5	Greenish gray clay													1	
	6	Greenish gray clay		CH	95,4	111,6	76,0	2,632	1.426				9,68	0,497	1	
	7	Greenish gray clay													1	
	8	Greenish gray clay						2,658							2	
	9	Greenish gray clay and little lajers														
	10,5	Greenish gray clay						2,715							4	
	12	Greenish gray clay and less						2,683							3	
	13,5	Gray sand -clay									100	40,9			15	
	15	Gray sand clay									100	28,3			19	
	16,5	Gray sand-clay													31	
	18	Gray sand-clay									100	35,9			30	
	19,5	Gray sand-clay									100	24,8			31	
	21	Gray clay-sand									100	60,1			24	
	23,5	Gray clay-sand		CL	69,7	47,0	22,4								27	
	24	Gray clay-sand-peat													28	
	25,5	Gray clay-sand-peat													37	
	27	Gray clay-peat		OH	109,9	149,5	83,6								44	
	28,5	Peat													50	
	33	Green clay-Silt-sand													50	
	31,5	Green clay-silt-sand									100	55,9			50	

SCOPE OF WORK
FOR
THE STUDY OF THE GUAYAQUIL CITY URBAN TRANSPORTATION PLAN
IN THE REPUBLIC OF ECUADOR

AGREED
BETWEEN
TRAFFIC COMMISSION OF THE PROVINCE OF GUAYAS
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

DATE: January 29th, 1982

PLACE: Guayaquil, Ecuador

CARLOS BEDALOO VALLEJOS
Governor
of the Province of Guayas

Tokyo, Japan

TERUMI UEDA
Director
Social Development Cooperation Department
Japan International Cooperation Agency

CRISTOFORO RODRIGUEZ VALERO
President
Traffic Commission of the Province of Guayas

I. INTRODUCTION

In response to the request made by the Government of the Republic of Ecuador, the Government of Japan has decided to conduct a study on the Guayaquil City Urban Transportation Plan in Ecuador (hereinafter referred to as "the Study").

The Japan International Cooperation Agency (hereinafter referred to as "JICA), an official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will carry out the Study in close cooperation with the Traffic Commission of the Province of Guayas (hereinafter referred to as "the Traffic Commission").

II. OBJECTIVES OF THE STUDY

The objectives of the Study is to formulate an urban transportation plan for the Guayaquil City in order to cope with the existing urban transportation problems and the future traffic demand.

III. SCOPE OF THE STUDY

1. Study Area.
   The Study covers the Guayaquil City area and her surrounding area.
2. Target Year.
   Target year for the Study is about 2000 A.D. (Long-term plan).
3. Study Items.

(2)

The Study will cover the following items:

3.1 Data Collection and Analysis.

1) Socio-Economic aspects such as population, commerce, industries, etc.

2) Urban transportation circumstances such as urban transportation facilities, public transportation system, traffic volume, number of cars registered, etc.

3) Existing land-use, future land-use plan and urban development plan.

4) Topographical and geological aspectes.

5) Land acquisition aspects.

6) Others.

3.2 Performance of O-D survey and traffic survey.

3.3 Economic and Technical Study.

1) Socio-economic activities forecast.

2) Traffic demand forecast.

3.4 Identification of existing and future traffic problems.

In this chapter, basic problems on the urban transportation in the Guayaquil City in future as well as in existence are studied, and main traffic route to deal with in chapter 3.6 is also recommended in order to cope with the urban transportation system and network.

3.5 Short-term urban transportation improvement plan.

A short-term improvement plan will be worked out in such a way as will help alleviate traffic congestion in the area involved by making maximum use of the existing facilities without major capital investment.

3.6 Long-term transportation plan for main traffic route comprising Medium-term implementation program.

1) Preparation of alternative projects on the urban transportation system.

2) Rough cost estimate.

3) Rough economic and financial analysis.

4) Evaluation of the alternative projects.

IV. REPORTS

JICA will prepare and submit the following reports in English to the Traffic Commission.

1)	Inception Report	30 copies
2)	Progress Report	30 copies
3)	Interim Report	30 copies
4)	Draft Final Report	50 copies
5)	Final Report	50 copies

V. UNDERTAKINGS BY THE TRAFFIC COMMISSION

1. The Traffic Commission shall bear claims, if any arises,

against the Japanese study team members in the survey resulting from, occuring in the course of, or otherwise connected with the discharge of their official function in Ecuador, except for those arising from the willful misconduct or gross negligence of the study team members.

2. The Traffic Commission shall provide the following.
   1) Available data and information related to the Study.
   2) Counterpart personnel for the Study.
   3) Traffic survey team composed of both counterpart and non-technical support personnel for the traffic survey and O-D survey in collaboration with the Japanese study team.
   4) Suitable office space with necessary equipment and services for the study team.
   5) Appropriate number of vehicles with drivers.
   6) Necessary office instruments for the Study, such as typewriter, photo-copier, etc.
3. The Traffic Commission shall make the following arrangements legally.
   1) To take necessary measures, according to the law, for obtaining Ministerial Agreements that exempt taxes and duties for the temporary entry into Ecuador of machinery, equipments and materials destined exclusively for the execution of this Scope of Work and consigned to the Study Team.

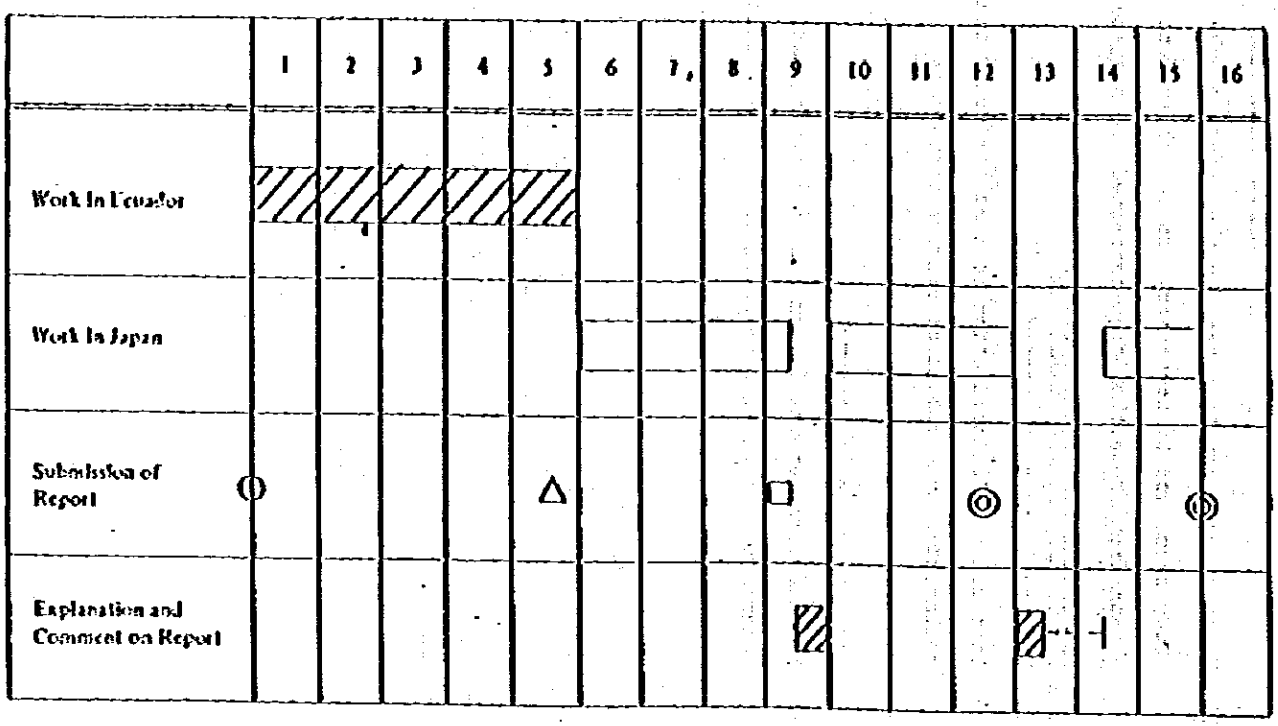
   2) To take necessary measures for the safety of the study team, and if necessary, to be obliged to obtain from the authorities concerned the assistance and protection of the Public Force.
   3) To hire laborers as needed.
   4) To obtain the authorization so that the study team could enter into public or private properties.
   5) To make arrangements for medical services to the study team when necessary.
   6) To make arrangements for smooth transfer of data and materials from Ecuador to Japan for the execution of the Study.

VI. UNDERTAKINGS BY JICA

1. To send a study team to Ecuador to undertake the Study.
2. To transfer technology and knowhow to Ecuadorian counterparts in Japan as well as in Ecuador during the study period.
3. To pay remuneration, subsistence and other allowances to the members of the study team and also their travelling expenses.
4. To cover the cost of communications which may necessitate for the study team.

VII. TENTATIVE SCHEDULE OF THE STUDY

TENTATIVE SCHEDULE



Remarks: ○ Inception Report, △ Progress Report, □ Interim Report,
◎ Draft Final Report, ◎ Final Report

- 6 -

The Study will be carried out in accordance with the attached paper.

RECORD OF DISCUSSIONS

FOR THE STUDY

OF THE GUAYAQUIL CITY URBAN TRANSPORTATION PLAN

IN THE REPUBLIC OF ECUADOR

The joint meeting for the above mentioned study was held both on 13th and 14th April, 1982 at the Traffic Commission of the Province of Guayas to discuss the Inception Report prepared by the Japan International Cooperation Agency (JICA). Attendants from the Traffic Commission and the Japanese Mission are listed in Attachment-1.

The meeting was co-chaired by Dr. Carlos Estarellas Merino, President of the Traffic Commission and by Dr. Yoshiji Matsumoto, Leader of the Japanese Mission. This Record of Discussions lists main items discussed in the meeting.

1. Inception Report has been agreed by both sides with the following clarifications.

   1-1 Basic policy for planning

   a. The Japanese Mission manifested that basic transportation problems for the Guayaquil city area would be made clear and a high-priority project for the main traffic route would be selected on the basis of this study.

   b. The Traffic Commission requested that above-mentioned project would be selected to become most profitable for Ecuador and the study for Mass Rapid Transit (MRT) would be conducted as soon as possible.

   1-2 Further detail study to Short-term Improvement Plan.

   The Japanese Study Team will work out Short-term Improvement plan which helps alleviate traffic congestion in the central area of the city, while the Traffic Commission will study it in more detail by themselves after getting all the data and information necessary for pushing the plan forward.

   1-3 Undertakings by the Traffic Commission

   Undertakings by the Traffic Commission were agreed as shown in Attachment-2 by both sides.

2. The Traffic Commission strongly hoped for the transfer of technology and knowhow to Ecuadorian counterparts, and especially counterparts training in Japan.

3. Attachments

   The followings are attached to this Record of Discussions.

   1) Attachment-1, Attendants of the discussions
   2) Attachment-2, Undertakings by the Traffic Commission

Guayaquil, Ecuador

April 15, 1982

Signed: (CARLOS ESTARELLAS MERINO)
President
of the Traffic Commission of
the Province of Guayas

Signed: (YOSHIJI MATSUMOTO)
Leader
of the Japanese Mission

SANTIAGO PENA ROLDOS
Executive Director of the
Traffic Commission of the
Province of Guayas

APPENDIX 8

RECORD OF DISCUSSIONS
FOR THE STUDY
OF THE GUAYAQUIL CITY URBAN TRANSPORTATION PLAN
IN THE REPUBLIC OF ECUADOR

The joint meeting for the above mentioned study was held on 21 st. September, 1982 at the Traffic Commission of the Province of Guayas to discuss the Progress Report prepared by the Japan International Cooperation Agency (J.I.C.A.). Accendants from the Traffic Commission and the Japanese Mission are listed in Attachment.

The meeting was co-chaired by Dr. Carlos Estarellas Merino, President of the Traffic Commission and by Mr. Yasushi Hirotani, Leader of the Japanese Mission. This Record of Discussions lists main items discussed in the meeting.

1. Progress Report has been agreed upon by both sides with the following clarifications.
   a. The Japanese Mission explained that all the traffic surveys described in the Inception Report have been finished and results of the surveys would be analyzed in detail in the Interim Report, while the studies for the population projection and the land development pattern in future have been at most completing.
   b. The Traffic Commission manifested that these results of surveys would be examined thoroughly so that they would be very useful for resolving the problems both in the existing - and in the future, and made it emphatic that the existing - traffic volume on the main roads would be derived as soon as possible.

2. Future transportation networks.

In addition to discussion on the Progress Report, the Japanese Mission explained the likely transportation networks for roads and MRT (Mass - Rapid Transportation) in the year 2000, which should be prospected in the Interim Report.

3. Donation of articles for measuring traffic volume
   a. The Traffic Commission requested that they would be very grateful if articles for counting the traffic, used for the surveys, would be donated to the Commission.
   b. The Japanese Mission accepted the request and proposed to be able to offer the automatic traffic counter and manual-type - counters.

Guayaquil, Ecuador
21 September, 1982

Signed:
(CARLOS ESTARELLAS MERINO)
President
of the Traffic Commission of
the Province of Guayas

Signed:
(YASUSHI HIROTANI)
Leader
of the Japanese Mission

A-29

RECORD OF DISCUSSIONS

FOR THE STUDY

OF THE GUAYAQUIL CITY URBAN TRANSPORTATION PLAN

IN THE REPUBLIC OF ECUADOR

The joint meeting between the Traffic Commission of the Province of Guayas and the Japanese Mission for the above-mentioned study was held on 31 of January, 1983 at the Traffic Commission of the Province of Guayas to discuss the Interim Report prepared by the Japan International Cooperation Agency (J.I.C.A.). The meeting was chaired by Dr. Carlos Estarellas Merino, the President of the Traffic Commission, and attendance from the Traffic Commission and the Japanese Mission are listed in Attachment.

This record of discussions lists main items discussed at the meeting.

1.- Interim Report has been agreed upon by both sides with following clarifications:

a. The Japanese Mission explained that although this Interim Report was at the intermediate stage and being reinforced toward the Draft Final Report, it has been almost coming to its conclusions, and combination of the proposed road network and the MRT (Mass Rapid Transportation) route plan would be an essential condition to meet the traffic demand in the year 2000.

b. The Traffic Commission manifested that of all MRT routes, the urban section of the North - South route would be necessary to be executed most urgently.

c. As for the alternative MRT systems, the Traffic Commission agreed to the urban railway system, which was recommended in the report, due to the reasons of the most technically feasible and economical in Guayaquil city of all systems.

2. Other Items

.....

- 2 -

2 - 1. Discussion was made as below concerning the Feasibility Study after this master plan study:

a. The Traffic Commission strongly requested that the Feasibility Study of the North - South MRT route considering improvement of road intersections along the route, starting from the Terminal Terrestre and passing Av. Quito toward the southern part of the city, would be started as soon as possible, and the Commission stated that they would like to send the official request letter to the Japanese Government.

b. In addition, the Traffic Commission hoped that the Japanese Government would bear in mind the one of the East - West route in the second place in future.

c. The Japanese Mission manifested that they would convey the above requests to the Japanese Government immediately.

2 - 2. The Traffic Commission hoped that the Japanese Government would consider to dispatch a technical expert to the Commission, if possible, to maximize effectiveness in the proposed short - term improvement plan.

2 - 3. The Traffic Commission expressed their sincere gratitude to the Japanese Government for training in Japan of the two Ecuadorian counterparts, and strongly hoped the same training in Japan to the Ecuadorian counterparts.

The Commission also hoped that the Japanese Government would consider to give technology transfer in Japan to two Ecuadorian staffs concerning how to manage and operate the Bus Terminal

.....

which will be completed in August, 1985.

Guayaquil, Ecuador

4 February, 1985

Signed: (CARLOS ESTARELLAS MERINO)

President

of the Traffic Commission of

the Province of Guayas

Signed: (YOSHIO ANCHIYA)

Leader

of the Japanese Mission

COMISION DE TRANSITO
PROVINCIA DEL GUAYAS
GUAYAQUIL

RECORD OF DISCUSSIONS

FOR THE STUDY

OF THE GUAYAQUIL CITY URBAN TRANSPORTATION PLAN

IN THE REPUBLIC OF ECUADOR

The joint meeting for the above mentioned study was held on 25th May, 1983 at the Traffic Commission of the Province of Guayas to discuss the Draft - Final Report prepared by the Japan International Cooperation Agency (JICA). Attendances from the Traffic Commission and the Japanese Mission are listed in Attachment.

The meeting was co-chaired by Dr. Dalton Bacigalupo Bucnaventura, President of the Traffic Commission and Dr. Yoshiji Matsumoto, Leader of the Japanese Mission.

This Record of Discussions lists main items discussed in the meeting.

1.- Draft Final Report has been agreed upon by both sides with the following clarification.

a. The Japanese Mission explained that all the items described in the Scope of Work of this study, have been completed in the - Draft Final Report and the comments on the Draft Final Report from the Ecuadorian side will be considered in the Final Report if they are sent to J.I.C.A. within one month from this - meeting.

b. The Japanese Mission expressed their thanks for the Ecuadorian cooperation rendered to the Japanese study team.

c. The Traffic Commission also expressed their sincere gratitude to the Japanese Government for this study, and manifested that they would do their best to establish the better urban transpor-

COMISION DE TRANSITO
PROVINCIA DEL GUAYAS
GUAYAQUIL

- 2 -

tation system according to the conclusions of the study under - further cooperation of the Japanese Government.

2.- As for the Feasibility Study after this master plan study, the following discussions were made:

a. The Traffic Commission strongly requested that the Feasibility Study for the urban section of the North - South MRT route, - including the improvement plan of the roads related to the route, would be put into action as early as possible.

b. The Traffic Commission explained that they have almost finished all the procedures in the Ecuadorian side necessary for - the official request for engineering cooperation of the Feasibility Study to the Japanese Government, and that they expected the papers to be sent to the Japanese Embassy soon.

c. The Japanese Mission manifested that they would convey the above request to the Japanese Government immediately.

d. The Japanese Mission suggested that it would be necessary to - establish such a new body in Ecuador within implementating the Feasibility Study as confers the project exclusively and will grow in future the nucleus of the organization which will actually operate the MRT, and explained that it would be very important to discuss the project closely between the new body and the Japanese side to promote the project very successfully.

e. The Traffic Commission stated that they could understand the necessity of the above new body being established.

COMISION DE TRANSITO
PROVINCIA DEL GUAYAS
GUAYAQUIL

3.- Technology transfer to the Ecuadorian staffs

The Traffic Commission strongly hoped that the Japanese Government would make their efforts to accept in the special training course in Japan two Ecuadorian staffs: one of the counterparts of this study and another one of the staffs who are in charge of the traffic management and control in the Traffic Commission.

4.- The Traffic Commission hoped again same as in the discussion of the Interim Report that the Japanese Government would consider to dispatch a technical expert to the Commission to maximize effectiveness in the short-term improvement plan.

Guayaquil - Ecuador

30 Mayo, 1983

Signed by:
(DR. DALTON BACIGALUPO BUENAVENTURA)
President
of the Traffic Commission of
the Province of Guayas

Signed by:
(DR. YOSHIJI MATSUMOTO)
Leader
of the Japanese Mission