5.9 Taxi Survey

5.9.1 Outline of Taxi

Taxis are also an important form of public transportation in the study area. About 3,000 taxis areoperating in the Study area, of which 60% are private. Since no meter is installed, fares are determined through negotiation between drivers and passengers according to the distance. On the other hand, the remaining 40% ply fixed routes and operate as omnibuses. These taxis usually carry more than one passenger. The fare is Lps. 2.5 per passenger.

5.9.2 Taxi Pool Inventory Survey

There are 18 taxi pools in the center of Tegucigalpa and 23 taxi pools in the center of Comayagüela. Figs. 4.7.2 (1)~(2) show their location and capacity. The outline of taxi pool inventory on 10 selected major taxi pools is summarized in Table 5.9.1. According to this table, if Centro ~ Colonia Hato de Enmedio and Centro ~ Mercado Las Américas are excluded, all locations have area ranging as 20 to 40 square meters. Moreover, there is no space to wait for taxis at half of the locations.

Table 5.9.1   Taxi Pool Inventory

Name of Taxi Pool	Area (m)	Capacity (persons)	Road Width (m)	Road Sidewalk (m)	1	2	3	4	5
Centro~Torocagua	28	48	11.8	2.1	E	0	0	0	0
Centro~Col. San Miguel	29	48	10.1	1.4	0	0	0	0	0
Centro~Col. Los Llanos	35	42	6.1	1.0	E	E	0	E	E
Centro~Col. Hato de Enmedio	112	66	5.5	1.9	E	0	0	0	0
Centro~Col. Kennedy	42	87	8.5	1.5	0	0	0	0	0
Mercado Las Americas	120	30	7.7	2.0	E	0	0	0	0
Acol. Centro America Oeste	34	50	5.0	1.4	0	0	0	0	0
A Col. El Pedregal	21	53	6.0	1.5	0	0	0	0	0
A Col. Kennedy	150	60	8.5	1.9	E	0	0	0	0
A Col. Hato de Enmedio	45	35	9.0	1.8	0	E	0	0	0

Note: 1 : Taxi Waiting Area   2 : Passenger Platform   3 : Taxi Routes/Map
4 : Information Table   5 : Public Telephone
E= Existing   O = Nonexistent

5.9.3 Taxi Passenger Survey

(1) Taxi Passenger

Figs. 5.9.1 (1) ~ (2) show the number of taxi passengers observed at 10 major taxi pools, which are at 5 selected locations in the center of Tegucigalpa and 5 locations in the center of

Comayagüela. Comparing Tegucigalpa with Comayagüela, the number of taxi passengers in Tegucigalpa is greater than those in Comayagüela. In Tegucigalpa, the number of taxi passengers is largest in the routes of Centro ~ Colonia Hato de Enmedio and Centro ~ Colonia Kennedy, about 3000 persons per 16 hours (6:00-22:00), followed by 2100 passengers in Centro ~ Torocagua. In Comayagüela, passengers to Colonia Kennedy are plentiful (1300 passengers).

Observing the number of passengers by time, while the number of taxi passengers in Tegucigalpa remains large between 16:00-22:00, in Comayagüela the peak of passengers is between 16:00-17:00, then decreasing after 17:00.
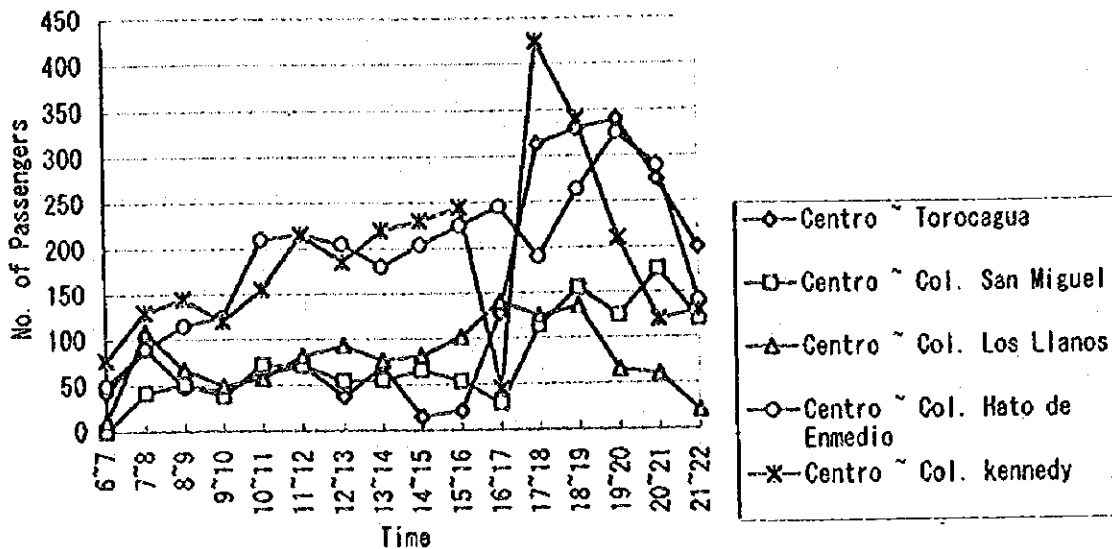

Fig. 5.9.1 (1)   Number of Taxi Passengers in Tegucigalpa
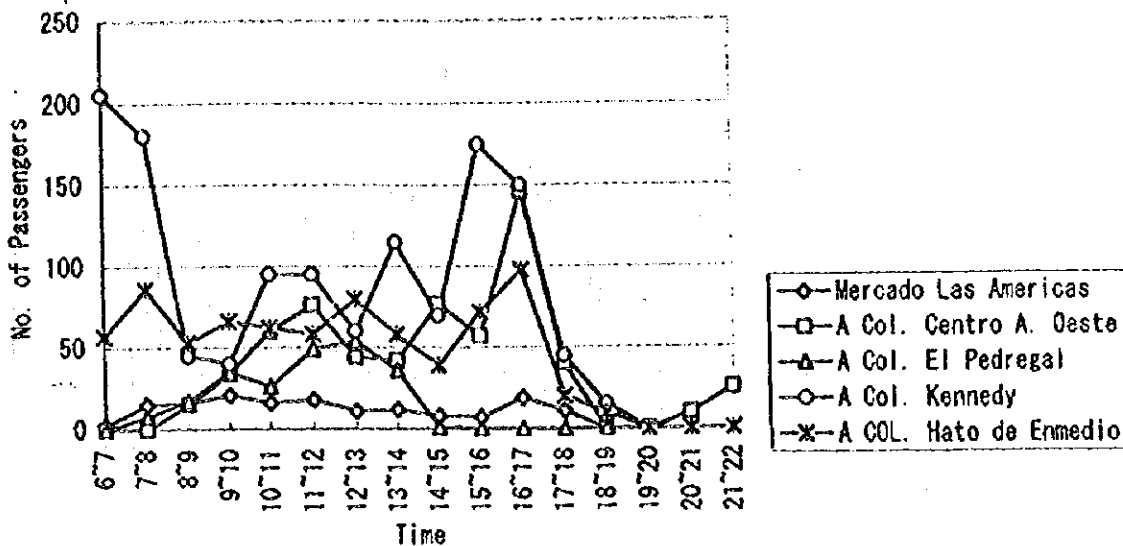

Fig. 5.9.1 (2)   Number of Taxi Passengers in Comayagüela

(2) Passengers Awaiting Taxis

The numbers of passengers awaiting taxis observed at the above 10 major taxi pools are shown in Fig. 5.9.2 (1) (2). According to these figures, the numbers are small between 6:00-17:00 at all taxi pools.   Centro~Colonia Hato de Enmedio and Centro~Colonia San Miguel in Tegucigalpa and to Colonia Centro América Oeste and to Colonia El Pedregal in Comayagüela have 30-50 people awaiting taxis at any given moment after 17:00.
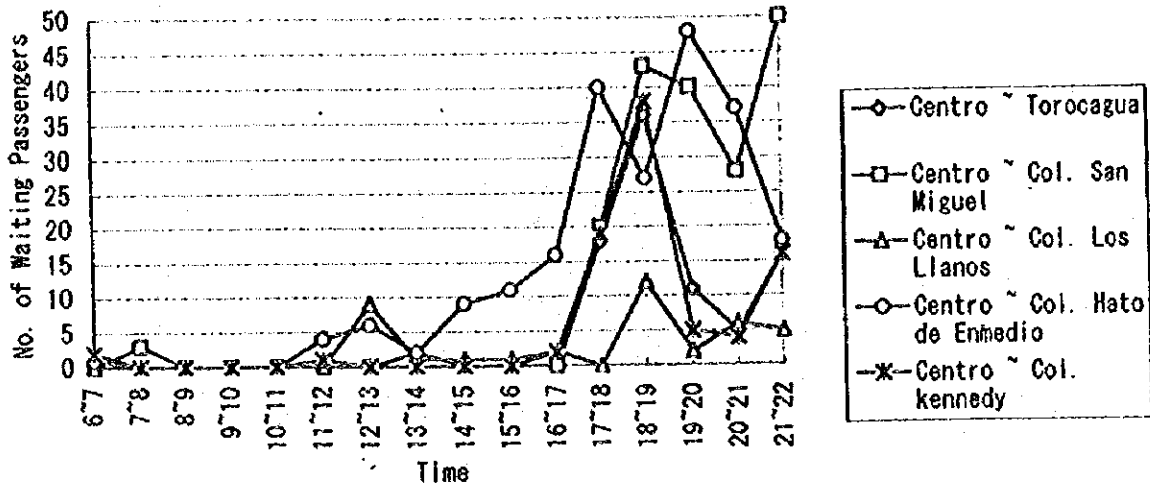

Fig. 5.9.2 (1)   Number of Passengers Awaiting Taxis in Tegucigalpa
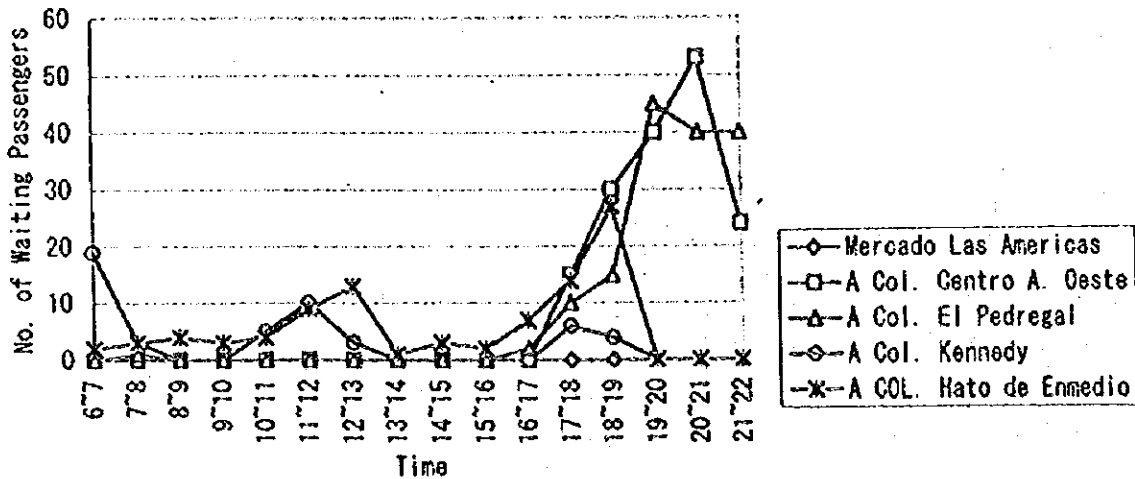

Fig. 5.9.2 (2)   Number of Passengers Awaiting Taxis in Comayagüela

During the daytime, both the numbers of taxis waiting for passengers and passengers waiting for taxis are very small, which indicates that the number of taxis and the number of passengers are balanced during the daytime. However, in the evening and at night many passengers are forced to wait for taxis for long periods of time, especially in the rain. For example, at one taxi stand, Comayagüela to Centro América Oeste (taxi stand No.6 in Comayagüela), 76 passengers were waiting taxis at 20:30, as shown in Table 5.9.2.

Table 5.9.2 Number of Taxis and Passengers Leaving and Waiting at Centro America Comayagüela
(Taxi Stand No.6 in Comayagüela)

Hour	No. of Taxies (Leaving)	No. of Passengers (Leaving)	No. of Taxies (Waiting)	No. of Passengers (Waiting)
14:00	0	0	0	0
14:15	4	20	0	0
14:30	4	19	5	0
14:45	4	20	4	0
15:00	4	20	0	0
15:15	3	14	5	0
15:30	3	14	4	0
15:45	3	12	3	0
16:00	3	16	2	0
16:15	8	38	8	0
16:30	7	35	7	0
16:45	9	42	5	0
17:00	11	52	0	0
17:15	4	20	0	15
17:30	5	25	0	20
17:45	5	15	0	24
18:00	4	20	0	18
18:15	3	15	0	17
18:30	4	20	0	35
18:45	2	10	0	50
19:00	1	5	0	60
19:15	1	5	0	45
19:30	1	5	0	30
19:45	0	0	0	25
20:00	0	0	0	45
20:15	0	0	0	67
20:30	2	10	0	76
20:45	0	0	0	22
21:00	0	0	0	32
21:15	3	15	0	13
21:30	2	10	0	14
21:45	0	0	0	37
22:00	0	0	0	40

5.9.4 Taxi Operation

There are two types of taxis in the study area. One is a route taxi similar to a bus called "Colectivo", and the other is a typical taxi. The former, at first, picks up passengers at fixed taxi stands and carries them to the fixed destination while picking up passengers until full capacity (5 persons) is reached.

The route taxi has 22 routes in Tegucigalpa and 27 routes in Comayagüela. Table 5.9.3 shows the route name and the number of taxis.

Table 5.9.3   Taxi Route and Number   of Route Taxi

Tegucigalpa			Comayagüela		
No.	Route	No. of Unit	No.	Route	No. of Unit
1	Colonia Kennedy - Centro	84	1	Mercado - Carrizal	20
2	Iglesia Los Dolores - Bo. Buenos Aires	23	2	Empresa Aurora - Puntos Varios	15
3	Colonia Villa Olímpica - Centro	24	3	Mercado Las Américas - Puntos Varios	27
4	Universidad Pedagogica - Colonia Aleman	17	4	15 de Septiembre - Centro	20
5	Colonia Torocagua - Centro	48	5	Hato de Enmedio - Comayagüela	30
6	Colonia El Sitio - Centro	18	6	Universidad - Prado	27
7	Colonia Los Robles - Centro	28	7	Centro América Oeste - Plaza Miraflores	17
8	Plaza Miraflores - Puntos Varios	21	8	Cerro Grande - Comayagüela	11
9	Col. 21 de Octubre - Centro	24	9	Centro América Oeste - Comayagüela	51
10	Mercado San Miguel - Puntos Varios	7	10	Res. Centro América - Comayagüela	20
11	Colonia San Miguel - Centro	35	11	Transp. Junqueños - Puntos Varios	8
12	Colonia San José de los Llanos - Centro	42	12	Colonia Kennedy - Comayagüela	68
13	Colonia El Loarque - Centro	35	13	Mercadito Hermano. Pedro - Puntos Varios	18
14	Barrio La Isla - Universidad	25	14	Empresa Hedman Alas - Puntos Varios	15
15	Colonia La Joya - La Isla	11	15	Central Automotriz - Carrizal	8
16	Hospital Escuela - Puntos Varios	18	16	Mercado - Col. Los Proceres	26
17	Colonia Hato de Enmedio - Centro	72	17	Colonia El Pedregal - Comayagüela	53
18	Iglesia Los Dolores - Barrio El Bosque	25	18	Transportes Norteños - Puntos Varios	14
19	Transp. Discua Litena - Puntos Varios	13	19	Transportes Mi Esperanza - Puntos Varios	13
20	Corte Suprema de Justicia - Centro	34	20	Empresa El Rey - Puntos varios	17
21	Col. Victor F. Ardón - Centro	20	21	Colonia Tiloarque - Comayagüela	8
22	Supermercado La Colonia - Puntos Varios	20	22	Supermercado Mirna - Col. El Carrizal	24
	Total	644	23	Mercado Mayoreo - Puntos varios	9
-	-	-	24	Transp. Saenz - Puntos Varios	13
-	-	-	25	Col. San Miguel - Comayaguela	28
-	-	-	26	Col. El Pedregalito - Centro	22
-	-	-	27	La Peña por bajo - Comayagüela	24
	Grand Total	1250		Total	606

5.10 Parking Survey

5.10.1 Off Road Parking

(1) Outline

In Tegucigalpa and Comayagüela, the number of parking lots and their capacity were investigated. The location of these parking lots is shown in Fig. 4.8.1 (1)~(2). It was found that there are 73 parking lots with a capacity of 2,840 vehicles in Tegucigalpa and 122 parking lots with the capacity of 3,614 vehicles in Comayagüela as shown in Table 5.10.1. The average capacity of parking lots was 38.9 vehicles in Tegucigalpa and 29.6 vehicles in Comayagüela. In Comayagüela there are many private parking lots in comparison to Tegucigalpa.

Table 5.10.1   Parking Lots by Owning

Manage- ment	Tegucigalpa		Comayagüela	
	No. of Lots	Capacity	No. of Lots	Capacity
Public	34	1,449	35	1,285
Private	39	1,391	89	2,329
Total	73	2,840	122	3,614

At 19 parking lots selected from among these, the number of parked vehicles and their tariff were investigated. The tariff per hour was 2 to 3 Lps., however, the tariff per month ranged from 70 to 300 Lps. as shown in Tables 5.10.2 (1)~(2).

Table 5.10.2 (1)   Tariff of Parking Lots in Tegucigalpa

Parking Lot No.	Time	Tariff				Notes
		Hour	Day	Week	Month	
1	6:00-22:00	2.00	20.00	75.00	300.00	Public
7	6:00-19:00	3.00			85.00	Only for customers and employees
15	6:00-21:00				250.00	Only for employees of clinic
19	6:00-20:00		8.00* 12.00•		100.00* 200.00•	
23	6:00-21:00	4.00				
38	6:00-21:00	3.00	18.00 26.00• 15.00*			Public
44	6:00-21:00	2.50	15.00		250.00	Public
57	6:00-21:00					Public (Only for employees)
66	6:00-22:00	2.00	7.00*		150.00	Public
74	6:00-20:00				70.00	Public

Note :   *   Night only,   •   Day and Night

Table 5.10.2 (2)   Tariff of Parking Lots in Comayagüela

Parking Lot No.	Time	Tariff				Notes
		Hour	Day	Week	Month	
7	6:00-22:00	2.00	16.00	30.00	90.00	Public
13	6:00-17:00	3.00			85.00	Public
15	6:00-18:00				250.00	Public
32	6:00-19:00		8.00* 12.00•		100.00* 200.00•	Public
48	6:00-18:00	4.00				Public
50	6:00-21:00	3.00	18.00 26.00• 15.00*			Public
51	6:00-20:00	2.50	15.00		250.00	Public
60	6:00-18:00					Only for customers
81	6:00-18:00	2.00	7.00*		150.00	Public

Note :   *   Night only,   •   Day and Night

(2)   Parking Demand

From among 73 parking lots in the center of Tegucigalpa, 10 parking lots with a total capacity of 955 vehicles were selected to investigate the number of parked vehicles. The total number of parked vehicles at these 10 parking lots for one survey day   were 2,036 vehicles. This indicates that the parking space for one vehicle   was used by about 2.13 vehicles for one day (2,036 / 955 = 2.13). If this space use rate is applied for the other non-surveyed parking lots, it is estimated that about 6,050 vehicles are using   parking lots in Tegucigalpa per day (2.13 x 2,480 = 6,050).

On the other hand, In Comayagüela, 9 parking lots with the capacity of 859 vehicles were surveyed from among 122 parking lots. On the survey day, 1,268 vehicles parked at these. One parking space was used by 1.48 vehicles. Therefore, about 5,350 vehicles are estimated to use parking lots in Comayagüela.

As a result, it is estimated that in the center of Tegucigalpa and Comayagüela, 11,400 vehicles (6,050 + 5,350 = 11,400) use parking lots per day.

(3)   Parking demand by hour

Table 5.10.3 (1)-(2) show the parking demand by hour in Tegucigalpa and Comayagüela, respectively. More than 400 vehicles are parking at the parking lots from 10:00 - 19:00 in Tegucigalpa and 9:00 - 18:00 in Comayagüela. In both Tegucigalpa and Comayagüela, the number of parking vehicles is less than the capacity for each hour except Parking No.19 in Tegucigalpa and No.7 in Comayagüela. This indicates that the parking space is sufficient at the moment in the CBD area.

Table 5.10.3 (1) Number of Parking Vehicles at Parking Lots (Tegucigalpa)

(Unit: vehicles)

No.of Parking Lot	1	7	15	19	23	38	44	57	62	73	Total
Capacity	250	60	60	70	200	70	80	50	70	45	955
7:00- 8:00	17	1	8	52	0	22	24	36	50	24	234
8:00- 9:00	9	4	17	52	19	12	17	49	46	26	251
9:00-10:00	23	10	23	65	43	21	32	62	46	29	354
10:00-11:00	27	6	23	64	66	41	55	53	53	25	413
11:00-12:00	33	10	31	64	88	57	53	53	52	24	465
12:00-13:00	40	8	26	64	89	58	44	57	53	26	465
13:00-14:00	34	7	17	66	83	50	39	54	48	26	424
14:00-15:00	38	8	18	65	96	50	43	66	41	24	449
15:00-16:00	41	10	29	62	77	54	47	59	41	27	447
16:00-17:00	39	11	42	57	82	66	64	63	40	23	487
17:00-18:00	70	11	61	54	64	66	69	59	42	26	522
18:00-19:00	103	7	55	51	35	53	51	50	40	23	468
19:00-20:00	96	1	35	39	30	39	38	50	46	22	396
20:00-21:00	85	1	17	30	30	29	35	52	47	28	354
21:00-22:00	67	1	13	30	28	13	26	53	47	28	306
22:00-23:00	31	1	13	30	28	13	26	53	49	28	272
Total	736	96	420	793	858	622	639	833	691	385	6073

Table 5.10.3 (2) Number of Parking Vehicles at Parking Lots (Comayagüela)

(Unit: vehicles)

No.of Parking Lot	7	13	15	32	48	50	51	60	81	Total
Capacity	80	150	200	65	60	120	40	24	120	859
7:00- 8:00	67	41	59	2	35	2	22	4	15	247
8:00- 9:00	67	50	61	9	36	27	19	4	26	299
9:00-10:00	65	74	108	24	36	54	23	11	29	424
10:00-11:00	67	78	112	36	41	76	33	12	34	489
11:00-12:00	73	63	106	40	41	75	34	14	38	484
12:00-13:00	65	40	93	52	46	80	37	14	41	468
13:00-14:00	70	46	83	59	46	81	32	15	31	463
14:00-15:00	64	55	91	64	45	86	31	15	29	480
15:00-16:00	63	68	88	58	43	98	31	15	27	491
16:00-17:00	58	68	107	34	41	99	30	22	30	489
17:00-18:00	68	43	82	21	41	90	32	13	30	420
18:00-19:00	70	43	84	2	39	63	16	7	17	341
19:00-20:00	72	43	84	2	39	21	15	7	17	300
20:00-21:00	72	43	84	2	39	16	18	7	17	298
21:00-22:00	70	43	84	2	39	15	18	7	17	295
22:00-23:00	71	43	84	2	39	15	18	7	17	296
Total	1082	841	1410	409	646	898	409	174	415	6284

(4) Parking hour by purpose

Table 5.10.4 shows the parking hour by purpose. In the center of Tegucigalpa the parking hours for the purpose of "Social Life and Others" and "Work" were longer, that is, the former was 9.0 hours and the latter was 8.7 hours and then followed by "Shopping and Restaurant" of 6.2 hours. On the other hand, in Comayagüela the parking hour of "Work" was 10.8 hours, followed by "Social Life and Others and "Shopping and Restaurant" (both were almost 3 hours). As a result, from this aspect the center of Tegucigalpa can be said to be the area of business, shopping/meal and social life, while the center of Comayagüela can be said to be mainly business area.

Table 5.10.4 Parking Hours by Purpose
(Unit: hours)

Purpose	Tegucigalpa	Comayagüela	Average
Work	8.7	10.8	9.7
School	0.0	0.0	0.0
Home	1.9	0.5	1.2
Go back Office	0.7	0.1	0.4
Business	2.0	2.0	2.0
Shopping/Restaurant	6.2	2.8	4.5
Social Life/Others	9.0	2.9	6.0
Average	4.1	2.7	3.4

5.10.2 On Road Parking

This survey was carried out over 20 blocks in Tegucigalpa (10 blocks) and Comayagüela (10 blocks) as shown in Fig. 4.8.2 (1)~(2). The total survey length is about 6.2 Km (Tegucigalpa 3.5 Km and Comayagüela 2.7 Km).

(1) Demand of on-road parking

The total number of parking vehicles is 6,393 (Tegucigalpa 3,444 and Comayagüela 2,949) in 16 hours as shown in Table 5.10.5. As a result, dividing the number of parking vehicles by the total survey road length, one vehicle parks per one meter of the road, that is, one vehicle resulted in parking every one meter on the road. Normally about 6 m is necessary for one vehicle to park, therefore, every parking space is estimated to be used 6 times during 16 hours. Since the total road length within the center of Tegucigalpa and Comayagüela is about 19 km and 20 km, respectively, 18,700 vehicles (19 x 3,444 / 3.5) and 21,800 vehicles (20 x 2,949 / 2.7) park on roads in the center of Tegucigalpa and Comayagüela, respectively, over a period of 16 hours.

Table 5.10.5   Results of On-Road Parking Survey

No. of Block	Tegucigalpa		Comayagüela	
	No. of Parking Vehicles	Length (m)	No. of Parking Vehicles	Length (m)
1	145	366	313	236
2	244	324	399	270
3	619	396	306	234
4	609	320	188	196
5	276	385	405	362
6	276	326	220	268
7	276	372	406	332
8	256	374	356	336
9	578	424	191	246
10	165	194	165	252
Total	3,444	3,481	2,949	2,732

(2) Parking demand by hour

Table 5.10.6 shows the number of parking vehicles by hour in the center of Tegucigalpa and Comayagüela, respectively. In the center of Tegucigalpa from 8:00 to 16:00 more than 100 vehicles were always parking on the roads, while in the center of Comayagüela more than 100 vehicles were parking from 9:00 to 17:00. Table 5.10.7 (1)~(2) shows the number of parking vehicles by hour and by surveyed block.

Table 5.10.6   Number of Vehicles Parking on Roads
(Unit : vehicles)

Hour	Tegucigalpa	Comayagüela
7:00 - 8:00	58	44
8:00 - 9:00	138	70
9:00 - 10:00	188	109
10:00 - 11:00	196	169
11:00 - 12:00	200	135
12:00 - 13:00	174	157
13:00 - 14:00	178	119
14:00 - 15:00	166	131
15:00 - 16:00	155	115
16:00 - 17:00	157	129
17:00 - 18:00	112	112
18:00 - 19:00	96	61
19:00 - 20:00	88	58
20:00 - 21:00	75	36
21:00 - 22:00	65	29
22:00 - 23:00	4	5
Total	2,050	1,479

Table 5.10.7 (1) Number of Parking Vehicles by Hour (Tegucigalpa)

No.of Parking Lot	1	7	15	19	23	38	44	57	62	73	Total
Capacity	250	60	60	70	200	70	80	50	70	45	955
7:00- 8:00	17	1	8	52	0	22	24	36	50	24	234
8:00- 9:00	9	4	17	52	19	12	17	49	46	26	251
9:00-10:00	23	10	23	65	43	21	32	62	46	29	354
10:00-11:00	27	6	23	64	66	41	55	53	53	25	413
11:00-12:00	33	10	31	64	88	57	53	53	52	24	465
12:00-13:00	40	8	26	64	89	58	44	57	53	26	465
13:00-14:00	34	7	17	66	83	50	39	54	48	26	424
14:00-15:00	38	8	18	65	96	50	43	66	41	24	449
15:00-16:00	41	10	29	62	77	54	47	59	41	27	447
16:00-17:00	39	11	42	57	82	66	64	63	40	23	487
17:00-18:00	70	11	61	54	64	66	69	59	42	26	522
18:00-19:00	103	7	55	51	35	53	51	50	40	23	468
19:00-20:00	96	1	35	39	30	39	38	50	46	22	396
20:00-21:00	85	1	17	30	30	29	35	52	47	28	354
21:00-22:00	67	1	13	30	28	13	26	53	47	28	306
22:00-23:00	31	1	13	30	28	13	26	53	49	28	272
Total	736	96	420	793	858	622	639	833	691	385	6073

Table 5.10.7 (2) Number of Parking Vehicles by Hour (Comayagüela)

No.of Parking Lot	7	13	15	32	48	50	51	60	81	Total
Capacity	80	150	200	65	60	120	40	24	120	859
7:00- 8:00	67	41	59	2	35	2	22	4	15	247
8:00- 9:00	67	50	61	9	36	27	19	4	26	299
9:00-10:00	65	74	108	24	36	54	23	11	29	424
10:00-11:00	67	78	112	36	41	76	33	12	34	489
11:00-12:00	73	63	106	40	41	75	34	14	38	484
12:00-13:00	65	40	93	52	46	80	37	14	41	468
13:00-14:00	70	46	83	59	46	81	32	15	31	463
14:00-15:00	64	55	91	64	45	86	31	15	29	480
15:00-16:00	63	68	88	58	43	98	31	15	27	491
16:00-17:00	58	68	107	34	41	99	30	22	30	489
17:00-18:00	68	43	82	21	41	90	32	13	30	420
18:00-19:00	70	43	84	2	39	63	16	7	17	341
19:00-20:00	72	43	84	2	39	21	15	7	17	300
20:00-21:00	72	43	84	2	39	16	18	7	17	298
21:00-22:00	70	43	84	2	39	15	18	7	17	295
22:00-23:00	71	43	84	2	39	15	18	7	17	296
Total	1082	841	1410	409	646	898	409	174	415	6284

(3) Parking Hour by Purpose

The parking hours were surveyed by interview as shown in Table 5.10.8. The average parking hours were 1.2 hours in Tegucigalpa and 0.6 hours in Comayagüela. In Tegucigalpa the parking hours of "School" and "Home" were much longer than other purpose, which indicated 2.4 hours for the former and 2.0 for the latter. On the other hand, in Comayagüela the parking hours of every purpose are less than that in Tegucigalpa except "Returning to Office" and the parking hours of all purposes are less than one hour.

Table 5.10.8 Parking Hour by Purpose
(On -Road Parking)

(Unit: hours)

Purpose	Tegucigalpa	Comayagüela
Work	80	49
School	141	43
Home	117	48
Returning to Office	15	45
Business	79	10
Shopping/Restaurant	61	34
Social Life/Others	59	37
Average	74	33

Comparing the parking hour on roads with off roads, the former is shorter by one third to one fifth than the latter for the following reasons;

• Almost all places within the center area are designated as the parking-prohibited area.
• Illegal parking is controlled strictly.
• The purpose of parking is not usually necessary for the long time to achieve the purpose.

5.11 Truck Terminal Survey

181 truck terminals and/or offices were surveyed as shown Fig. 4.9.1. Most of these truck terminals are located in the center of Comayagüela, others are scattered along the roads of Carretera a Lepaterique, Boulevard Los Proceres, Boulevard Morazán, Carretera a Choluteca, etc. Almost half of these truck terminals do not have space to accommodate trucks or do not operate as truck terminals. Concentration of truck terminals in the center of Comayagüela causes the traffic congestion around this area. The biggest truck terminal can accommodate more than 50 trucks, as shown in Table 5.11.1.

Table 5.11.1 Big Truck Terminal in Study Area

No. of Terminal	Name of Company	Capacity	Address
133	Distribuidora Leyde	53	Barrio La Granja Contiguo a Sempe
140	Cervecería Hondureña, S.A.	52	Carretera al Sur, El Tizatillo
141	Embotelladora La Reyna	41	Carretera al Batallón124
124	Transportes Aliados	24	Salida al Sur Frente A Gasolinera TEXACO
81	Transportes Estrada	23	Km 3, Carretera Olancho
106	Larach y Cia No.3	22	Blvd.del Norte, Entrada Col. 3 de Mayo
1	Sea Land Service Inc.	20	Edif. Palmira, Segundo Nivel

CHAPTER 6

EXISTING TRANSPORTATION PROBLEMS

CHAPTER 6 EXISTING TRANSPORTATION PROBLEMS

6.1 Existing Transportation Problems in the Study Area

In recent years Honduran population and business activities are concentrating more and more in the capital city Tegucigalpa and surrounding area, causing great increases in traffic volume. However, transportation facilities have not been improved enough to accommodate this increasing volume. Therefore, the phenomena of traffic congestion has appeared in several places within the area. Especially, severe congestion can be observed in the central area of Tegucigalpa and Comayagüela and at some intersections. Such congestion makes the following negative impact on the inhabitants;

- Time loss
- Air pollution
- Noise
- Traffic accidents
- Inefficient operation of public transportation

Such negative impact needs to be removed as much as possible through mitigating traffic congestion. In order to mitigate the traffic congestion, at first, the existing transportation problems should be examined.

Generally speaking, the objective area can be divided into two areas from their characteristics of structural formulation, one is the area in the center of Tegucigalpa and Comayagüela, where the central business district (CBD) of the study area is located and the other is the area outside of this CBD. In the following, the transportation problems are examined by area.

6.1.1 Problems in the CBD

Some parts of the CBD area retain the old urban structure dating to the era of Spanish reign, where the streets were constructed for the convenience of carriages. Therefore, not all of roads are fitted for the use of automobiles. As a result, various transportation problems come out of characteristics of its structure.

(1) Roads

<u>Tegucigalpa</u>
Characteristics of the Road situation in this area is as follows:

- Most Road width is less than 5m with pedestrian walkways of 0.5 to 1.5m.
- All the Avenida (East-West Roads) and Calles (North-South Roads) are regulated as one-way Roads.
- Avenida 6, Avenida 5 and Avenida de Cervantes are three major Roads along the east-west axis with much traffic (4,000 - 8,000 vehicles per day).
- The widths of Calles except those in the western part (Calles 2, 3, 4 and 5) are less than 3m. Some of the wides width Roads are utilized as taxi stands of "Collectives" (taxis which have fixed destinations).
- Many large-size buses pass on the narrow roads.

• Many people gather around the central park for the purpose of shopping, relaxing, business, etc.

The transportation problems in this area are summarized as follows; The Roads in this area are in no way comfortable spaces for vehicles or pedestrians. There is much traffic and many pedestrians on the narrow Roads: therefore, cars and pedestrians hinder each other's flow of movement. In addition, the passing of large buses is an obstruction to traffic flow, since at some corners these large buses can not turn smoothly. It is concluded that the number of vehicles already exceeds road capacity. It is necessary to widen roads or restrict the traffic volume to mitigate the traffic congestion in this area.

Comayagüela
Characteristics of this area is as follows:

• Many offices are located in this area.
• A large market is located in the northwestern area.
• Many venders do business on the roads around this market, especially on Avenidad 6, which is the main north-south roads. Therefore, it is nearly impossible for vehicles to pass along this section.
• Except for the area around the market, there are not so many pedestrians.
• Avenidas 1, 2, 4, 6 and Calles 9,10,11 are main roads connecting with the center area of Tegucigalpa and other areas.
• The is much traffic on the north-south roads (called "Avenida"), however, traffic volume is less on the west- east roads (called "Calle") except Calles 9, 10, 11.
• All the roads except Avenida 4 and Avenida 6 are designated as one- way roads.
• There are 22 taxi stands. Most of them are placed on Calles, where the traffic volume is smaller than on Avenidas

The transportation problems in this area occur from the occupation of the road by venders and insufficient main west-east roads and bridges to connect the west side with the east side in the study area. Especially, the existing traffic volume can not be accommodated by only Puente Juan Ramón Molina. Therefore, It is necessary to take countermeasures for strengthening the east-west roads and constructing new bridges near Puente Juan Ramón Molina. In addition, in order to reduce the traffic congestion on Avenida 6 (Main north-south road), some venders are recommended to transfer other places. Although the structure of Avenidad 6 is very good (4 lane road), the road space is not used efficiently for vehicles.

(2) Bridges

The Study area is basically divided into three parts by the Choluteca River and the Chiquito River. Therefore, bridges crossing these two rivers have an important role in this area. The conditions of these bridges as follows;

• Three bridges , Puente Carias, Puente Soberania and Puente Mallol, connect the center of Tegucigalpa and the center of Comayagüela. The combined width of car lanes on these bridges is from 5.3 to 8.5m, with sidewalks on both sides from 1.6m to 2.0m in width. Although the one-way system is adopted on almost all streets within the CBD, these three bridges are two-way. Traffic volume of these bridges is 6,000 vehicles per day on Puente Carias, 12,000 on Puente Soberania, and 20,000 on Puente Mallol. Traffic volume is not large on Puente Carias due to the

congestion of Avenida 6 in Comayagüela. If venders are cleared, much more traffic would use this bridge. In any case, comparing the traffic volume crossing these 3 bridges with their the capacity, the traffic volume already exceeds the capacity. It is necessary to construct a new bridge to handle the increasing traffic in the future.

- The center of Tegucigalpa and the other area of Tegucigalpa are separated by the Chiquito River. These two areas are connected by 4 bridges, that is, Puente la Isla, Puente la Hoya, Puente San Rafael and Puente Guanacaste. All these bridges are two-way.The traffic volume on Puente Guanacaste is 21,000 vehicles per day and on the theree other bridges is about 8,000 each. Traffic volume of Puente Guanacaste is already over its capacity. On the three other bridges, traffic volume reaches their limit of capacity, judging from their width. In the future, some countermeasures are necessary for handling the increasing traffic volume.

- Puente Chile connects the center of Tegucigalpa with the northeastern part of Comayagüela (Cerro Grande, Olancho, etc.). Although this bridge is considered to be two lanes, the actual width is four lanes. Since traffic volume on this volume is about 5,000 vehicles at the moment, it is important to induce the traffic between the center of Tegucigalpa and the northwestern part of Comayagüela to use this bridge.

(3) Exclusive Pedestrian Road

The area around Plaza Francisco Morazán is the center of the governmental administration and commercial and business activities in Tegucigalpa. In addition, this area also serves for recreation and relaxation of the citizens. Therefore, although the road capacity is highly insufficient, the road section of Avenidad Miguel Paz Barahona from the intersection of Calle 4 (Calle el T) to Calle 7 (Calle Hipolito Matute) is designated as an exclusively pedestrian road. Naturally, the key places around here are the Plaza Francisco Morazán in front of Iglesia Catedral and the shopping area next to Iglesia los Dolores. As a result, this area is always crowded with people who turn out for shopping, business, relaxing, etc. At the moment the pedestrian movement is hindered by the heavy traffic volume, therefore, it is necessary to introduce the some measures to make pedestrians much more relaxed.

(4) Bus

Buses often cause various traffic problems in this area. The existing bus situation is described below;

- There exist several roads with a right-of-way of 6 meters. In such narrow roads, buses can not pass the other buses and vehicles stopped or parked on the roads. This is one of the causes of traffic congestion.
- All existing bus routes pass through the CBD. According to the survey result, at the 5 selected bus terminals within the CBD, about 3,600 buses per day are arriving and departing, and the number of passengers getting on and off is about 53,900 persons per day. Moreover, classifying the traffic flow by hour, though they tend to concentrate at the morning and evening peak hours, many buses are operating all day long.
- Some road sections have more than 30 bus routes heading for the CBD.
- Most of the existing operated buses are second-hand large buses mainly imported from the United States. Since these large size buses are running on crowded narrow roads, the running speed of buses is very slow. In addition, the narrow widths of the intersections make turning of buses much more difficult.

Almost all the present bus routes pass through the CBD. The existing bus route system passing through the CBD is recommended to be altered, if necessary, together with the construction of the large scale bus terminal for urban buses. In addition, in order to make the operation of the public transportation more efficient, the introduction of exclusive bus and taxi lanes in the CBD area is also recommended. Moreover, it is necessary to promote to change the large bus into the regular size bus.

(5) Parking

In the CBD area there are about 200 parking lots, of which the total capacity is 5,500 vehicles. According to the parking survey, not all these parking lots are fully used, and at some, less than half of the capacity is in use all day long. On the contrary, there are high numbers of vehicles parked on the roads within the CBD. This illegal parking should be strictly controlled to induce these vehicles to use the parking lots.

(6) Taxi

In Tegucigalpa there are two ways that taxis operate. One is a route taxi like a bus called "Collective", and the other is a typical single-customer taxi. Neither operation style is officially classified, but depends up on the situation of the moment. For example, if a taxi picks up passengers at a taxi stand, this taxi therefore operates as a route taxi, heading toward the fixed destination picking up passengers along the way until it becomes full (five persons). At present there are 19 taxi stands in the center of Tegucigalpa and 22 in Comayagüela. These taxi stands are installed on wider streets in the CBD area. Some of them are installed along the major roads stretching from the center of the city to the suburban area. At the moment the taxi stands have not caused severe traffic congestion, however, some problems could occur when the traffic volume increases in the future, because they occupy some part of the road space.

Typical single-customer taxis are waiting for passengers at places like hotels, where passengers tend to gather. Upon picking up passengers, they head to the destination after negotiating the fee. In some cases taxis zigzag along the Road looking for passengers, which obstructs smooth flow of vehicles.

6.1.2 Problems Outside CBD

(1) Roads

Outside of the CBD area, most road width is wider than that in the CBD area, however, the number of four-lane roads are limited; that is, Boulevard Suyapa, Boulevard Fuerzas Amadas, Boulevard Morazán, Boulevard Miraflores, Boulevard Communidad Europea, Boulevard Santa Fé and Boulevard José Cealio del Valle. All these roads take on a role as major trunk roads in the study area. The traffic volume of these roads range from about 20,000 to 45,000, therefore, these roads are crowded during the peak hours because many commuters use these roads from the outskirts to the center of the city. Especially, since Calle 9 - Boulevard Santa Fé is the only road from the western part of the study area to the city center and Boulevard Comunidad Europea is the main road from the center to the south, severe congestion of these two routes occurred throughout the day. Other congested roads are Boulevard Morazán and Boulevard Miraflores, because along these roads business activities are developing rapidly. It is concluded that except

Boulevard Santa Fé and Boulevard Comunidad Europea, new road construction or improvement of the existing roads is not considered necessary for some time, even considering the increment of the future traffic demand. However, it is important to construct or improve roads connecting the Anillo Periferico (outer ring road under construction) with existing main radial roads.

(2) Bridge

Outside the CBD, Puente Juan Ramón Molina, Puente Prado and Puente San Jose are important. Among these bridges, Puente Prado is one-way (one lane from east to west). The traffic volumes are 21,000, 15,000 and 17,000 vehicles per day, respectively. The traffic volume is already over capacity; therefore, construction of a new bridge is indispensable. However, even if a new bridge is constructed, traffic congestion could not be mitigated unless the unfavorable configuration of the intersections located near these bridges is improved. These intersections are explained below.

(3) Intersection

There are some intersections where configuration is unfavorable, the traffic signals are not installed, and the lane markings and stop lines are not drawn. Around these intersections, it is difficult for drivers to drive in an ordinary manner as the traffic volume increases. Therefore, severe congestion and traffic accidents occur at these intersections.

(4) Bus

The problems of buses outside the CBD are as follows;

• Population is increasing in the suburban areas as a result of recent housing development. Most people commute by bus to workplaces in the center of the city. During peak hours a number of buses are standing in long queues at every bus stop. Therefore, congestion is always observed around bus stops.
• Comparing with the CBD area, the influence of random stops by buses is not as great; however, in some places the bus stops are installed directly across from each other at the same point on the road. This causes congestion, because the following vehicles can not pass buses when buses are stopping at both sides at the same time.
• The number of passengers getting on and off at starting points and terminal points of the bus route outside CBD is small. Moreover, since the distances of present bus routes are very long, it takes one or two hours one way. Such a small number of passengers at bus stops near terminal bus stops and long bus routes are inefficient from the viewpoint of bus operation.
• Many bus routes concentrate on the road connecting the CBD with Carrizal direction and Flor Del Campo direction outside the CBD. Some countermeasures are necessary in order to make the bus operation more efficient on this road.

(5) Parking

Cars parking on the roads are observed in some places like in the CBD area. However, due to the wider road width compared with that in the CBD area, the car parking here does not cause severe congestion in the main roads at the moment.

6.1.3 Whole Objective Area

The following points are made for the whole study area from the viewpoint of the traffic management and road maintenance.

• At many intersections, especially along the secondary roads passing through the housing area near the CBD, there are no signs indicating which road has the right-of-way. At these intersections the potencial for traffic accidents is very high.

• Guide signs have recently been installed here and there in the study area . Most of them were donated by the private companies for advertisement. Some of them need to reinforce their supporting poles, as they are liable to be damaged by winds.

• Lane marks and stop marks are almost totally defaced except in some road section of Avenidad Cervantes (near Puente San Rafael). Therefore, in most roads the traffic flow is not orderly and the road capacity is not used properly.

• Some of the roads within the study area have not had sufficient maintenance work, with many pits found here and there. In addition, weeds, garbage, pebbles, etc. on both sides of the roads make the road width narrow, and have deteriorated the roads efficiency.

CHAPTER 7

URGENT PROJECTS

CHAPTER 7   URGENT PROJECTS

7.1 Introduction of Urgent Project

7.1.1 Necessity of Urgent Project

The target year of the Master Plan is 2010, however, projects listed in the Master Plan as shown in Chapter 10 are planned to be completed by the following term designated by its urgency and/or construction cost;

Short Term	:	Projects to be completed by 2000
Middle Term	:	Projects to be completed by 2005
Long Term	:	Projects to be completed by 2010

In the Study Area there are several critical places required for some urgent relief measures for mitigating congestion. At these places a considerable effect on the decrease of the traffic congestion can be expected with relatively simple works and small amount of cost. Therefore, the necessary urgent projects were selected before formulating the Master Plan.

7.1.2 Criteria of Selection

The urgent projects are defined in the following three conditions;

(1)   Construction works are simple and can be finished for a short time
(2)   Construction cost is not so high
(3)   Project benefit is large

Judging from these three conditions, the above-mentioned countermeasures can be categorized as shown in Table 7.1.1. Each project was evaluated from the criteria of "Term", "Cost" and "Effect". These criteria are set qualitatively as shown below;

Term	"Very Short"	Within 1 year
	"Short"	1 to 5 years
	"Medium"	5 to 10 Years
	"Long"	More than 10 years
Cost	" Low"	Possible to be implemented by municipality itself
	"High"	Necessary foreign loan and/or donation
Effect	"Small"	Useful for keeping the traffic rule or maintaining the traffic order
	"Large"	Mitigate the traffic congestion

As a result, the projects related to the installment of traffic signals and the improvement of the configuration at congested intersections were selected for the urgent measures, since "Term" is short, "Cost" is low and "Effect" is large.
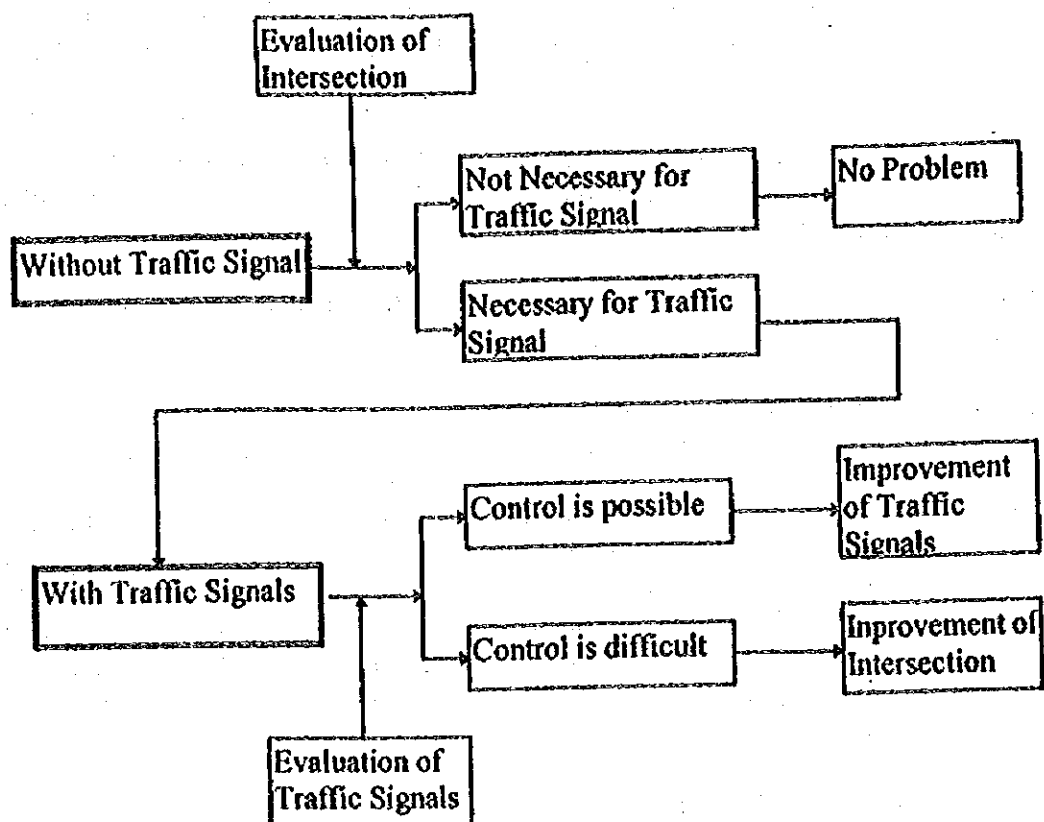
Table 7.1.1 Comparison of Countermeasures

Countermeasures	Term	Cost	Effect
Change of Urban Structure			
- Transfer of administrative organization, business offices, etc.	Long	High	Large
- Establishment of urban subcenters	Long	High	Large
Construction of Transportation Facilities			
- Construction of new roads	Long	High	Large
- Construction of new bridges	Long	High	Large
Improvement of Transportation Facilities			
- Improvement of roads	Short/Medium	High	Large
- Improvement of intersections	Very Short	Low	Large
Introduction of Traffic Management			
- Installment of traffic signals	Very Short	Low	Large
- Installment of traffic signs	Short	Low	Small
- Drawing lane marks and stop lines	Short	Low	Small
- Control of on-road parking	Medium	Low	Small
Improvement of Public Transportation			
- Construction of urban and interurban bus centers	Medium	High	Large
- Introduction of bus exclusive lanes	Medium	Low	Large
- Operation of small-sized buses	Medium	High	Large
- Improvement of bus stops	Short	Low	Small
- Improvement of taxi stands	Medium	Low	Small

7.2 Selection of Urgent Projects

7.2.1 Process of Selection for Urgent Project

The next step is to select the project places to be implemented urgent projects. The evaluation of selecting places is done for intersections according to the process shown in Fig. 7.2.1, that is, at first, the intersections without traffic signals were examined whether the traffic signal should be installed or not, then, when it is judged that the traffic congestion can not be mitigated even by installing the traffic signals, the intersections were examined whether the configuration should be changed or not.

Evaluation of Intersection

Without Traffic Signal

Not Necessary for Traffic Signal → No Problem

Necessary for Traffic Signal

With Traffic Signals

Control is possible → Improvement of Traffic Signals

Control is difficult → Inprovement of Intersection

Evaluation of Traffic Signals

Fig. 7.2.1   Process of   Selecting Places Necessary for Urgent Projects

7.2.2 Evaluation of Urgent Projects

1)   Evaluation of intersections without traffic signals

According to the analysis of the intersection survey (see Table 4.1.1), the following intersections are considered to be installed the traffic signal, judging from their traffic volume and saturation degree (See Appendix 9.1 for the traffic volume by direction at each intersection and Table 5.7.1 for the saturation degree);

(1) Intersection of Boulevard Comunidad Europea and the road to Puente el Prado (Intersection Survey Point No. 1)

This intersection is located on Boulevard Comunidad Europea, the trunk road connecting the CBD with the southern part of the Study area. The traffic volume inflowing at this intersection is 2,899 vehicles during peak hours, therefore, the congestion can be observed during peak hours, however, since Puente el Prado is one-way bridge from east to west, the traffic congestion is not severe during off-peak hours.

(2) Intersection of Boulevard José Cecilio del Valle   and Calle Golan (Intersection Survey Point 5)

The traffic volume inflowing at this intersection is 2,906 vehicles during the peak hours. Since this intersection is located just out of the CBD, most vehicles began to accelerate their speed around this intersection, especially on the Boulevard José Ceciliodel Valle. In addition, the sight distance is not sufficient for the vehicles ascending the slop from the Puente San José through Calle Golan. Therefore, this intersection has a high possibility of occurring traffic accidents. Moreover, even at the daytime there are many traffic passing this intersection. Although the traffic policemen control the traffic when the traffic volume becomes heavy, it is not sufficient to handle the existing traffic.

(3) Intersection of Subida al Estudio Nacional and the circular road of the National Stadium (Survey Point 6)

The traffic volume inflowing this intersection reaches 2,371 vehicles during the peak hours. Since the configuration of this intersection is awfully bad, the intersection capacity is very small. In addition, since the Subida al Estadio Nacional (the road from Puente Juan Ramón to the national stadium) is one of the major roads connecting west with east, the traffic volume is always heavy. At this moment the traffic control by the traffic policemen is considered to reach the limit to handle the traffic. Therefore, the installment of the traffic signal is desired. However, considering the heavy existing traffic volume, only the installment of the traffic signal is not sufficient. Therefore, the improvement of configulation is also recommended, because the acending right-turn curve from Puente Juan Ramón is too sharp.

(4) Five intersections located on Calle 9 in the center of Comayagüela
(Intersection Survey points 15,16,17, 18 and 22)

Calle 9 is the road with two lanes and the width of 8m (two-way road). This Calle is the most important road from west to east in the Study area, however, many Avenidas cross this Calle, that is, there are 4 other intersections with the traffic signals, therefore, the total number of intersection on this Calle are 9. Since the traffic volume during the peak hours reaches about 1,500 vehicles, the traffic congestion can be observed at these intersections. The length of this Calle is 600 m and the average interval between intersection is 75 m. In addition, the left turn is prohibited, therefore, almost more than half vehicles are passing straight. Concurrently, if the traffic signals will be installed, the coordinated signal system is desired to be adopted.

For the above intersections of 1) to 4), the necessity of the traffic signals was re-examined from the viewpoint of urgency and effect. As a results, the following intersections were judged not to be necessary urgently. The reasons are as follows;

Five (5) intersections on Calle 9 in the center of Comayagüela

The congestion at these intersections comes from the traffic bottleneck at the intersection of Subida al Estudio Nacional and the circular road of national stadium. At this moment the traffic volume of this intersection is over its capacity. If this intersection will be thoroughly expanded or a new road connecting east with west will be constructed , the congestion on Calle 9 will mitigate. Therefore, the installation of the traffic signals at these intersections are desired to be reexamined after the some measures are implemented for dissolving the above bottleneck, that is, intersection of Subida al Estudio Nacional and the circular road of the

National Stadium.

Intersection of Boulevard Comunidad Europea and Puente el Prado

The traffic signal at this intersection is desired to be installed together with the construction of Puente el Prado. Since Puente el Prado is very old, the new bridge becomes necessary soon. In addition, the configuration of this intersection is also fairly bad. Therefore, the installation of traffic signal at this intersection is recommended to be implemented together with the construction of new Puente el Prado and improvement of unfavorable configuration. Moreover, this is justified from the viewpoint that the traffic volume is not so heavy during off-peak hours.

From the above examination, at the following two intersections the traffic signals are recommended to be installed;

• Intersection of Boulevard Jose Cecilio del Valle and Calle Golan (Survey Point 5)
• Intersection of Subida al Estudio Nacional and the circular road of the National stadium (Survey Point 6)

2) Evaluation of intersection with traffic signal

   (1) Intersection of Boulevard Comunidad Europea, Puente Verde 24 Calle Zona Guacerique and Calle Golan (Intersection Survey Point No.3)

      According to the analysis of the results of the intersection survey, the intersection of Boulevard Comunidad Europea, Puente Verde 24 Calle Zona Guacerique and Calle Golan in front of Instituto Hondureno de Seguridad Social (Intersection Survey Point No.3) is identified from among intersections with traffic signals to be necessary to be improved from the viewpoint of the traffic volume during the peak hours and the high saturation degree. At this intersection the Puente Verde 24 Calle Zona Guacerique and Calle Golan do not cross the Boulevard Comunidad Europea at the same point, therefore, the vehicles running between the Puente Verde and the Calle Golan can not cross the Boulevard Comunidad Europea smoothly. If these two roads are connect with the Boulevard Comunidad Europea at simple " + " shape, the capacity of this intersection can increase much more and the control of the traffic could become much easy.

   (2) Intersection of Avenida Cabanãs and Boulevard Santa Fé
      (Intersection Survey Point 20)

      According to the results of the intersection survey, the traffic volume at this intersection on Boulevard Santa Fé was about 35,000 vehicles per day. Therefore, The saturation degree also indicated more than 1.0 during the peak hours. Judging from these heavy traffic volume, the capacity of this intersection is already not sufficient for accommodating the existing traffic volume. Therefore, it is necessary to be improved as soon as possible.

From the above examination, the above two intersections are judged to be necessary for changing the configuration.

3) Grade Separation of Boulevard Miraflores and Boulevard Fuerzas Armadaz

(1) Grade Separation of Boulevard Miraflores and Boulevard Fuerzas Armadaz (Intersection survey was not conducted)

On the section of Boulevard Miraflores near the grade separation with Boulevard Fuerzas Armadaz, there are many redundant traffic, because there is no left-turn ramp way to the Colonia Kennedy direction on Boulevard Miraflores, which forced to turn right to the central area and go back to the Kennedy direction after U-turn somewhere on Boulevard Miraflores. Therefore, by constructing the ramp way to the Kennedy direction, these redundant traffic can be eliminated.

From the above examination, it is recommended to construct the lamp way at the grade separation of Boulevard Miraflores and Boulevard Fuerzas Armadaz.

7.2.3 Selected Urgent Projects

As a result, the following projects are recommended as projects to be implemented urgently "Urgent Project". The locations of the above urgent projects are shown in Fig. 7.2.2. These designs are included in Drawing.

(1) Improvement of Configuration and Installation of Traffic Signal
   ① Intersection of Subida al Estadio Nacuional and its circular roadthe circular road (Project-1)

(2) Improvement of Configulation
   ② Intersection of Avenida Cabanãs and Boulevard Santa Fé (Project-2)
   ③ Intersection of Boulevard Comunidad Europea, Puente Verde 24 Calle Zona Guacerique and Calle Golan (Project-3)

(3) Installation of Traffic Signals
   ④ Intersection of Boulevard Jose Cecilio del Valle and Calle Golan (Project-4)

(4) Construction of the Ramp Way
   ⑤ Grade Separation of Boulevard Miraflores and Boulevard Fuerzas Armadaz (Project-5)

7.2.4 Positioning Selected Urgent Project from the viewpoint of the Master Plan

The above-mentioned five urgent projects were selected mainly with a purpose of decreasing the existing awful traffic congestion as much as possible. However, the first four urgent projects listed in Section 7.2.3 are indispensable from the viewpoint of the long term Master Plan (See Chapter 10 in more detailed) because the selected intersections to implement these projects are located on the objective roads to be improved in the Master Plan. Therefore, the design of these urgent projects is desirable for conforming to the design of the related roads as much as possible, lest the costs of the urgent projects should overlap the costs required in the Master Plan. On the other

hand, the above project-5 has the different characteristics from the above four urgent projects because any project to related to this ramp is not planned in the Master Plan. However, after the southeastern section of Anillo Periférico is completed in the near future, many traffic are expected to pass through in the middle of the largest residential area, Colonia Kennedy, to Colonia Vista Hermosa, Colonia La Joya, etc., if there is no a left-turn ramp to the direction of Colonia Kennedy on the Boulevard Fuerzas Armadas. Therefore, the left-turn ramp at this point is necessary. Since this project cost is not so large (see in Chapter 10), this investment does not waste money.
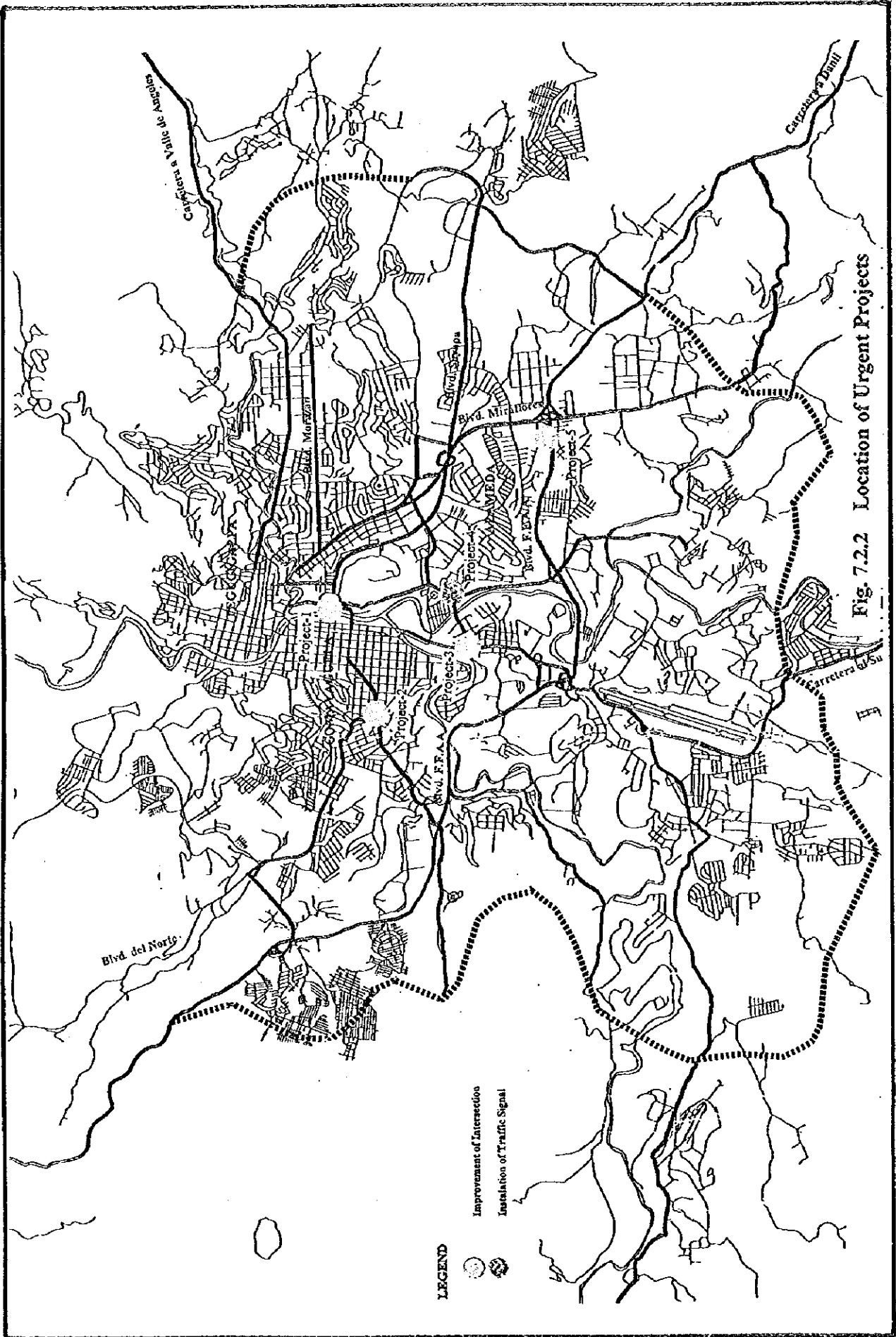
Fig. 7.2.2 Location of Urgent Projects

CHAPTER 8

SOCIOECONOMIC FRAMEWORK, LAND USE PLAN AND URBAN STRUCTURE

CHAPTER 8   SOCIOECONOMIC FRAMEWORK, LAND USE PLAN AND URBAN STRUCTURE

8.1   Existing Socioeconomic Situation

8.1.1   Introduction and Purpose.

The relationship of population, land, economics, and transportation in the development of a land use plan, and the relationships of other plans to it are demonstrated in Fig.8.1.1. The economy is central to these relationships. It furnishes support for the population, attracts or repels migrants, establishes the basic land use pattern, and contributes the tax base on which public services are provided. The local economy is determined by local resources and the resulting comparative advantage of location. Population, in addition to producing the economy, consumes resources in land and supporting infrastructure. Transportation links the various social and economic activities to one another. The quality of transportation can enhance or impede the working of the economy and the quality of social life. Distance is directly related to transportation costs, and people and economic activities seek locations that minimize such costs. The land use pattern and spatial structure of the city are the result of competition for advantageous location. This chapter analyzes the population, land, and economy of the study area and projects its future to determine the potentials and constraints for efficient and sustainable urban development.

Section 8.2 provides the recommended land use plan and its policy variants. A land use plan should provide guidance for future urban growth, its direction, amount, intensity, and land use characteristics that are economically and environmentally sustainable. It attempts to gain economic efficiency by minimizing transportation and infrastructure costs; protecting, if not enhancing, the environment; and guiding economic and development policy to gain balance with the resources available for the period of the plan. Plans for transportation, water supply and distribution, sewers, schools, and other public services follow the land use plan and together constitute an urban plan. These plans build on the spatial distribution of economic activities and population represented by land use. Land use as the site for human activity generates trips; establishes water demand; and determines the volumes for human and solid waste collection.   In the topographic conditions of the study area, suitable land for urban use is in short supply. With growing demand and decreasing supply, the value of land will increase. The land use plan should anticipate this trend, and with market forces, guide and accelerate future urban development toward more intense and specialized land uses appropriate to the specialization of the economy.

For the purposes of this study, planning for the study area ends with the land use and transportation plans. Official mechanisms for continued planning are presently not sufficiently developed for the coordination of the various agencies of the central, metropolitan, and local governments to make and carry out an urban plan. There are insufficient resources and staffing, but more importantly for the sustained development of the study area, there is a lack of organization and regular dialogue among the separate authorities responsible for the study area. Water, sewer, electricity, and the environment are separate national organization concerns.
Solid waste and transportation are metropolitan concerns. Many plans for these jurisdictions, and for these functions, were made without reference to a land use plan. There are separate plans for water, sewers, solid waste, and now transportation. These plans, conceived separately, can not be integrated nor related to programmed budgets. They compete for resources without guidance of a comprehensive system of priorities.

```
Population          Land              Economy           Transportation
                                                        Analyses

Number         Capability (Can      Composition
               build on land)
               Capacity
Characteristics Absorption         Characteristics
  Social Type   Attraction           Type
  Location      (Type, Access)       Location
  Density                            Density
  Trips                              Trips

Requirements                        Requirements
  Land,                               Land,
  Location,                           Location,
  Trips                               Trips

Policy Guidance  Land Assignment    Policy Guidance
                   Residential
                   Economic

Other Plans:     Land Use Plan                        Trips: Origins,
  Water, Sewers,                                      Destinations, and
  Electricity, Hospitals,                             Routes
  Schools, Recreation,
  Projects, Financing,
  Controls,                                           Transportation
  Organization                                        Plan
```

Fig. 8.1.1   Development of Land Use Plan and Relation
to Transport Plan and Other Plan

Seven separate government bodies plan and build social and pensioner housing without coordinated reference to location and the consumption of scarce urban land. The land use plan of 1975 has not been reviewed or brought to date since its publication, yet its use continues to guide zoning and land use decisions. Many of those decisions are inappropriate for present, and especially future, conditions. Land-use controls for implementing plans are out-dated and inadequate. For these reasons, this chapter concludes with an overview of the need for a national urban policy and an improved planning process for coordinated policy guidance. A national urban policy is needed to link urban development with national development and to induce an appropriate distribution of the urban population among the nation's cities. A focused and comprehensive planning process is needed for informed and coordinated policy decisions and implementing budgets.

8.1.2 Overview of the Central District.

The central business district (CBD) is in the same location as in colonial times, north of where the Rio Canquito joins the Rio Grande Choluteca. It extends throughout the level areas by the hills on the Tegucigalpa side and similarly throughout the level area in Comayagüela southward from the mouth of the Rio Canquito along the banks of the Rio Grande Choluteca. On the map, the CBD has the shape of an inverted L as it extends eastward above the Rio Canquito. With the coming of the automobile, more modern and upscale retail centers have emerged on the Tegucigalpa side along the major roads outside the central area. These new centers include road-oriented retailers and services which require larger sites for their operations—auto dealers, large equipment sellers, and supermarkets. As the modern economy expands, much of the existing, traditional land uses— typically one and two storey buildings—will be replaced by buildings of greater floor area and land-use extent. As the demand for central land increases, the price of central land will increase to accelerate the replacement of existing land uses and building types.

Following an earlier Spanish pattern of protective, walled homes closely enclosing the streets and organic pedestrian pathways of least topographic resistance, its narrow streets now limit bus and auto movement. Central area parking is a problem. The limited capacities of the colonial street in the CBD, sufficient for horses and mules, are reduced by parked cars. The narrow sidewalks, and in some areas walkway impediments, force pedestrians into the streets reducing lane capacities further. Although the most visible, transportation is only one of many problems facing the city. Future population growth and limits to useable land to accommodate growth, provision of safe water, disposal of human and solid waste, lack of effective systems for planning and municipal finance, among others, pose serious health and environmental problems now and in the future. Upstream deforestation is silting the principal water supply to the west of the city. Three dams for water supply may have to be built by or shortly after the year 2000 and the watersheds protected from development. Solid waste disposal sites poses an environmental difficulty. Until recent years, the method of disposal was open dumping. The existing land fill site will soon be filled and new sites are difficult to locate without polluting rivers and streams. Some sewers are located in the river beds, are broken and discharging sewage. Additions to electricity involve the expensive transport of fuel over mountain roads.

8.1.3 Economic Situation and Social Life in Study Area

A considerable proportion of the inhabitants of the city are poor, unemployed, or under-employed and work more than 45 hours a week to achieve the median income of 771 Lempira, or US $7.71, a month. Table 8.1.1 shows the monthly income distribution for October 1994 and the hours per week normally worked to earn the monthly amount. More than 50 % worked more than 45 hours per week. 5 % of the working population normally works less than 36 hours a week. People working less than 36 hours a week earning more than 100 and less than 500 Lempiras amounted to 2.6% of the total. 30 % worked 36 to 44 hours a week. The center of this distribution, 18 %, earned 500 to 1,500 Lempira a month. The majority worked more than 45 hours a week and the center of this distribution earned 250 to 1,000 Lempira a week. SECPLAN estimates an unemployment rate of 5 %, an additional 2 % as unemployed but not declaring being out of work, and 20 % under - employed. Alternative estimates place unemployment as high as 20 %.

While the cost of living is slightly lower in the study area compared to the rest of the country, an estimated 20 % of households in March 1993 were living in extreme poverty, earning less than needed to purchase the necessary basics of the Honduran diet. Another 27 % were poor; affording a basic nutritional diet, but not other basics such as safe water. 47 % fell below the Honduran line of poverty, while 48 % are above that poverty line.

These low levels of income have multiple consequences in addition to individual distress. Municipal revenues in the study area are insufficient for the provision of municipal services and annual budgets have to be augmented by the central government. There is a reluctance to recover public costs. Segments of the population are provided subsidies for transportation, electricity, water, and solid waste disposal. Housing and housing conditions for the majority of inhabitants of the colonias in the Central District are poor and environmentally inadequate. Many are informal settlements, built on sites to which the owners do not hold title and without construction permits. Streets in many of the informal colonias are unpaved and only wide enough for one automobile to travel. Some might prove difficult for fire protection and these hillside settlements are at risk during the two dry seasons. According to the 1988 Census, 15 % of the 102,573 study area households were without water. Just more than half had a piped connection to the household. The residents in areas without water purchase it for drinking, bathing, and washing from truck vendors or take water from the rivers and streams. Not connected to the city sewer system, the residents of these informal areas use latrines and septic pits. Many of these drain into the streams below. Solid waste is collected at the base of the hills or burnt. These areas, nonetheless, are supplied schools and teachers.

8.1.4   Trend of Population

Between 1945 and 1988, the population of Honduras increased from 1.4 million persons to 4.4 million. While the population of the world doubled in that time, Honduran population tripled. The 1995 population of Honduras is 5.5 million persons and growing at an estimated annual rate of 2.8 %. While the gross birth rate has decreased from 51.5 per 1,000 women since 1945 to 34.1 per 1,000 today, the gross death rate dropped from 24.3 per 1,000 in 1945 to 6.0 per 1,000 today.

The resulting rate of population growth, births over deaths, is now almost the same as in 1945. The mid-Fifties through the mid-Eighties experienced growth rates of more than 3 %.

Table 8.1.1 Distribution of Income and Hours Normally Worked per Week

Monthly Earnings in Lempira	Monthly Income Reported Employees				Hours Normally Worked Per Week					
					1 - 35		36 - 44		45 and More	
	Number	Per Cent	Excluded Per Cent	Cumulative Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Not Declared	18,774	6.69%	Excluded		3,669	1.31%	5,108	1.82%	7,671	2.73%
Less than 100	4,019	1.43%	1.54%	1.54%	1,861	0.66%	176	0.06%	1,465	0.52%
101 - 250	24,152	8.61%	9.23%	10.76%	3,674	1.31%	4,103	1.46%	13,901	4.96%
251 - 500	48,380	17.25%	18.48%	29.25%	3,732	1.33%	12,481	4.45%	28,355	10.11%
501 - 750	53,711	19.15%	20.52%	49.77%	772	0.28%	18,665	6.65%	30,377	10.83%
751 - 1,000	50,945	18.16%	19.46%	69.23%	2,577	0.92%	18,297	6.52%	27,974	9.97%
1001 - 1,500	32,793	11.69%	12.53%	81.76%	487	0.17%	14,300	5.10%	15,707	5.60%
1501 - 2,000	18,617	6.64%	7.11%	88.87%	517	0.18%	7,720	2.75%	9,288	3.31%
2,001 - 2,500	6,434	2.29%	2.46%	91.33%	108	0.04%	2,410	0.86%	3,577	1.28%
2501 - 3,000	6,470	2.31%	2.47%	93.80%	79	0.03%	2,163	0.77%	4,049	1.44%
3,001 - 4,000	5,877	2.10%	2.25%	96.05%	228	0.08%	2,171	0.77%	3,046	1.09%
4001 - 5,000	2,962	1.06%	1.13%	97.18%	0	0.00%	602	0.21%	2,360	0.84%
5,001 - 7,500	2,341	0.83%	0.89%	98.07%	0	0.00%	602	0.21%	1,283	0.46%
7,501 - 10,000	2,787	0.99%	1.06%	99.14%	137	0.05%	774	0.28%	1,876	0.67%
10,001 - +	2,261	0.81%	0.86%	100.00%		0.00%		0.00%	2,261	0.81%
Total	280,523	100.00%	100.00%		17,841	6.35%	89,572	31.93%	153,190	54.61%

Source: Ministerio de Planificacion, Coordinacion y Presupuesto, Programa de Encuesta de Hogares, Octubre 1994, July 1995.
Note: The central errors of the distributions are highlighted. The median income for the total is 771 Lempira a month. This equate to US $ of 7.71 per month, or a median annual income of US $ 95.52. Class intervals below 2,001 - 2,500 Lempira are larger than those above the line.

The study area more than shared in that growth through migration and grew from 1950 to the mid-Eighties at an even greater average annual rate of 4.2 to 4.4 %. The 1995 population is, by various estimates, between 675,000 and 778,000 people. Table 8.1.2 shows the projections used in this study. The Honduras projections were obtained by SECPLAN, assisted by the US Census Bureau, using a component cohort survival method. This study did not use similar cohort survival projections made by SECPLAN alone for the study area, since, although the mechanics of computer computation are simple, the technique works best for large populations, developed countries, and stable demographic conditions. With smaller populations, slight deviations year to year in the number of women having babies distort the children-to-women ratios and slight changes in the local economy and resulting shifts in migration distort net migration ratios. Below the national level, where net migration estimates are less controlled, the technique is especially prone to error (see Appendix 8 or further detail).

Table 8.1.2   Projected Population And Growth Rates (1995 - 2010)

Year	National Population	Study Area Population
1995	5,462,795	674,920
1996	5,608,275	686,551
1997	5,754,542	698,382
1998	5,901,239	710,417
1999	6,048,156	722,660
2000	6,194,926	735,113
2001	6,341,717	747,781
2002	6,488,792	760,668
2003	6,635,533	773,776
2004	6,781,849	787,110
2005	6,927,291	800,674
2006	7,072,313	814,472
2007	7,217,359	828,505
2008	7,362,066	842,786
2009	7,506,058	857,309
2010	7,648,997	872,083

The projections for the study area calculated the share of Honduran population for this area since the 1950 census, used a logistic curve (from among six curves calculated) to project shares, and applied these projections to the Honduran cohort survival projections to obtain the results by year presented in Table 8.1.2. The study area projections are believed superior to other projections for the area since the method subsumes migration and assumptions of the number of children per

women. Appendix 8 elaborates the methods of projection and evaluates existing projections for the study area. Actual population figures may be influenced by government policy.

Fig. 8.1.2 graphs theses projections and those for the economically active population of Honduras and the study area, as determined in Appendix 8.

Based on these projections, Table 8.1.3 presents the number of workers, population workers, per average household size, and number of households, 1995 to 2010. Together with the economic base information, these data are used for land use projection (below). The estimates of the table assume an unemployment rate of 6 % and a constant ratio between workers, and the economically active population, as projected in Appendix 8 (See also Table 8.1.6).

Table 8.1.3 Number of Workers, Population per Worker, Average Household Size, and Number of Households in Study Area (1995 to 2010)

Year:	1995	2000	2005	2010
Total Workers *	194,321	229,078	276,245	305,860
Population per Worker	3.47	3.36	3.13	3.13
Average Household Size (Persons per Household)	4.47	4.36	4.13	4.13
Households	150,880	176,540	209,309	231,723

* See Table 7.1.8, Total Workers excludes government and non-classified workers

8.1.5 Economic Base and Employment

An understanding of local economic specialization, strengths, and ways to assess economic impacts is useful in planning a development policy for sustained urban development. The economic base technique identifies those sectors of the economy that supply goods and services that meet non-local demand and serve as stimulants to local economic growth. These sectors provide the "economic base," or basic employment, of the local economy. Those remaining sectors that serve only the local economy are termed "service" or "local" economic activities. Earnings from outside the region are spent within the region and provide employment in local economic activities, such as schools, local government, and retail stores, which provide the basic employees and themselves local goods and services. The economic base multiplier is the ratio of local employees to basic employees. It varies by different economies, but is assumed invariant with time for a particular economy. If the base employment increases by 10 %, then the total local employment also increases by 10 %. This assumed invariance derives from existing resources and the location and comparative advantages of the local economy. Basic and local employment can both occur within one economic activity. Basic employment is the proportion of employees that meet external economic demand for the goods and services of the firm.

Economic base studies can identify areas of over-dependence in the local economy and suggest areas for strengthening where there is insufficient economic activity to meet local demand.
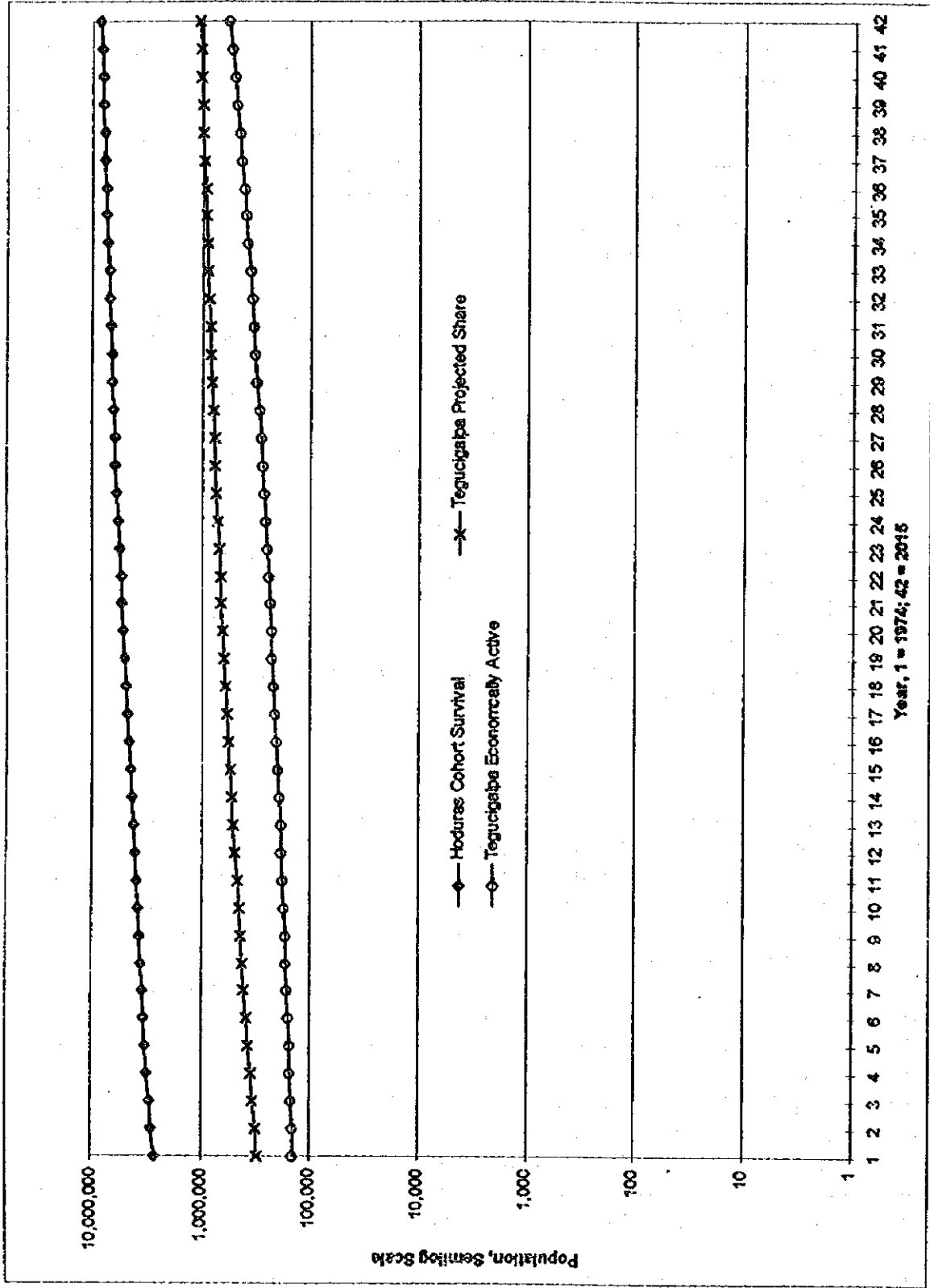
Fig.8.1.2 Honduras and Tegucigalpa Population and Tegucigalpa
Economically Active Population

8 – 8

Projections of basic employment can be used to project total future employment with the technique, and with demographic assumptions, the total future population. Because economic data is predictable only in the short term, employment impact analysis is the best use of the technique. Given the base multiplier, additions or subtractions to the total number of jobs can be estimated. If, for example, 1,000 basic jobs were introduced into the local economy and the base multiplier was 2.5, then the total number of new jobs would be 3,500. On this basis, an analist can estimate local increases in earnings, sales, tax revenues, housing and infrastructure demand, school populations, land use demand, among other things.

There are three different methods for determining the economic base as substitutes for actual surveys of firms: classification, minimum requirements, and the location quotient. Each technique by its various means attempts to identify those portions of an activity that exports or serves external demand. Because of limitations of data, the method used in this study was the location quotient. A location quotient is the local percentage of employees of an activity divided by the national percentage of employees of that same activity. If the local percentage is equal to that of the national percentage, the location quotient value is one. If it is more than one the local share of employees exceeds expectation, the national percentage. The excess over a value of one is the estimate of basic employees for that economic activity. If the quotient is equal to or less than one, the local employment share is equal to or less than national share expectation and is assumed to satisfy only local demand.

The data used for the economic base analysis are taken from the SECPLAN series, Programa De Encuesta De Hogares, October 1994, which were re-coded and cross-tabulated to obtain finer distinctions of the kinds of economic activity, as explained in Appendix 8. Table 8.1.4 and 8.1.5 presents the employment structure, location quotients, basic employment, and results of the analysis. Although overly large, the data are in the numbers of the expanded SECPLAN sample to maintain relative relationships of central government and the study area. The base multiplier equals 1.593.

The location quotient analysis revealed economic specialization in Finance, Insurance and Real Estate (representing more than half of the national number of employees in this category); General and Heavy Construction (more than half of the construction workers in the republic work within the study area); Retail Trade in Building Materials; Electricity and Utilities; Transportation Services; Wholesale Trade; and All Other Services.

The largest basic employers are All Other Services (20,969, for the unadjusted data shown), Other Retail (19,583); Finance Insurance, and Real Estate (11,309); Special Construction Trades (7,267) and Types 1 and 2 manufacturing (6,402 and 9,105). Government and University; All Other Services; and Finance, Insurance, and Real Estate represent the specialized economic core of the city. All Other Retail could be included in this group, but although a large employer, it generates more local workers than basic workers. Table 8.1.5 shows the relative importance of the economic categories.

Type 1 Manufacturing; consisting of textiles, wood products, masonry, plumbing, electrical, and related products; barely yields basic employment relative to the total number of employees (36,548) in this category. The location quotient just exceeds one. Type 2 Manufacturing; printing, chemicals, minerals, food and beverage, ceramics, leather goods, tobacco and related products; yields in contrast a significant location quotient and the larger number of basic employees. The

Table 8.1.4 Employment, Economic Structure, and Economic Base of The Central District: 1994

Economic Activity	Central District Number	Per Cent	National Number	Per Cent	Location Quotient	Employment Basic	Non-basic	Comments
Agriculture, Forestry, and Fishing	2,727	0.97%	672,768	37.91%	0.026	-	-	Agriculture and mining are
Production	2,645	0.94%	670,090	37.76%	0.025	2,645	0	always classed basic since they.
Services	83	0.03%	2,678	0.15%	0.196	83	0	are extractive industries
Mining	0	0.00%	1,235	0.07%	0.000	0	0	
Construction	25,435	9.07%	92,348	5.20%	1.742	-	-	
General and Heavy	6,700	2.39%	13,958	0.79%	3.037	4,658	2,042	A Specialization
Special Trades	18,735	6.68%	78,389	4.42%	1.512	7,267	11,468	
Manufacturing	62,877	22.41%	323,805	18.25%	1.228			
All Type 1 *	36,548	13.03%	206,051	11.61%	1.122	6,402	30,146	
All Type 2 **	26,330	9.39%	117,744	6.63%	1.415	9,105	17,225	
Transportation and Utilities	16,655	5.94%	51,895	2.92%	2.030	-	-	
Trucking and Warehousing	9,504	3.39%	35,546	2.00%	1.692	4,304	5,200	
Transportation Services	3,876	1.38%	9,119	0.51%	2.699	2,542	1,334	A Specialization
Electricity and Utilities	3,274	1.17%	7,230	0.41%	2.865	2,216	1,058	Indicates only better services
Wholesale Trade	1,704	0.61%	5,156	0.29%	2.091	950	754	A Specialization
Retail Trade	61,537	21.94%	283,509	15.97%	1.373	-	-	
Building Materials	560	0.20%	561	0.03%	6.317	478	82	A specialization
All Other Retail	60,977	21.74%	282,948	15.94%	1.363	19,583	41,394	A significant basic employer
Finance, Insurance, Real Estate	15,525	5.53%	28,821	1.62%	3.408	11,309	4,216	A significant specialization
Services	53,429	19.05%	180,229	10.16%	1.875	-	-	
All Other Services	34,203	12.19%	90,458	5.10%	2.392	20,969	13,234	A significant specialization
Business Services	1,231	0.44%	25,038	1.41%	0.311	0	1,231	Possible classification error
Domestic Services	17,995	6.41%	64,734	3.65%	1.759	0	17,995	Classed local by convention
Government	40,094	14.29%	129,876	7.32%	1.953	-	-	National government would be basic.
Non-Classifiable Establishments ***)	539	0.19%	1,344	0.08%	-	-	-	
Total Employed (As reported *)**	**280,523**	**100.00%**	**1,774,713**	**100.00%**	**1.000**	**92,511**	**147,379**	**Base Multiplier = 1.593**

Source: Ministerio de Planificacion, Coordinacion, y Presupuesto, Programa de Encuesta de Hogares, Octobre 1994, July 1995—as derived from three cross-tabulated tables

* Textiles, wood products, masonry, plumbing, mechanical, electrical, and related categories. Finer break-out was not possible.
** Printing, chemicals, minerals, food and beverage, ceramics, leather goods, tobacco, and related categories. Finer break-outs were not possible.
*** The population data is believed to overestimate proportionately employed workers and total population as a result of sample expansion on an overly high estimated population base.

⁶ See note 4.

Table 8.1.5 Relative Importance of Economic Categories
in the Central District Economy

Economic Activity	Employment		Comments
	Basic	Local	
Agriculture, Forestry, and Fishing			
Production	2.86%	0.00%	Only by Classification
Services	0.09%	0.00%	Only by Classification
Mining	0.00%	0.00%	Only by Classification
Construction			
General and Heavy	5.04%	1.39%	Supports more than own category
Special Trades	7.86%	7.78%	
Manufacturing			
All Type 1 *	6.92%	20.45%	Supports less than own category
All Type 2 **	9.84%	11.69%	Supports less than own category
Transportation and Utilities			
Trucking and Warehousing	4.65%	3.53%	Supports more than own category
Transportation Services	2.75%	0.91%	Supports more than own category, but insignificant number
Utilities	2.40%	0.72%	Capitol is more developed than other parts of country, plus national government
Wholesale Trade	1.03%	0.51%	Supports more than own category, but insignificant number
Retail Trade			
Building Materials	0.52%	0.06%	Supports more than own category, but insignificant number
All Other Retail	21.17%	28.09%	Supports less than own category
Finance, Insurance, Real Estate	12.22%	2.86%	Supports more than own category
Services			
All Other Services	22.67%	8.98%	Supports more than own category
Business Services	0.00%	0.84%	
Domestic Services	0.00%	12.21%	
Total Basic Employment	100.00%	100.00%	

composition of firms in both Type 1 and 2 Manufacturing are "footloose" industries, attracted by a large market (12 % of the Honduran population) and cheap labor. The concentration of transportation service may provide these activities an additional competitive advantage in distribution, if the goods are consumed within Honduras. Otherwise, cheap labor is found everywhere in Honduras and there is little other competitive advantage for a Type 1 manufacturing location in the study area. It was the policy of the 1975 plan to move manufacturing to Amarateca, 25 kilometers northwest of the study area. This is still a valid policy in regards to Type 2 manufacturing (see Land Use, below) and one that should be extended to locate manufacturing to other cities, especially San Pedro Sula.

The areas of specialization are the areas to emphasize in the further development of the study area: government, finance and related areas, and the National University. The location quotients show agriculture below national expectation, and therefore, an area of activity for possible expansion. Poultry production may be an area to improve the local economy, particularly since the study area provides a large market and has the components for production (space, feed grain access, and experience) within the urban area in the flood plains of the Northern Rio Grande Choluteca. Animal production on the high grass slopes and tree crops on the slopes, rivers, and streams throughout the city are other possible areas to increase urban agriculture. The Forestry Law does not permit development within 150 meters of rivers and streams. Those areas within 150 meters and occupied by informal housing can be reclaimed for tree crops. Informal residential areas found by the land capability analysis to be at risk from land slides could also be replaced by tree crops. Tree crops are strategic to the protection of the river and stream areas. Since they would yield income, those responsible for them are more than likely to protect the trees and the areas in which they are located.

Table 8.1.6 shows the totals by year of basic and local employees. The projection of basic and local employment assumes an invariant 38.56 % basic workers and 61.44 % local workers. Unemployment is assumed at a constant 6 %. Derivation of the economically active population is explained in Appendix 8. These data are used for land use projection, below.

Table 8.1.6 Economically Active Population, the Number Employed, and Basic Employment, 1995 to 2010

(Unit:Persons)

| Year | Economically | | Employment Category * | | |
	Active	Employed	Basic	Local	Total
1995	245,099	230,393	75,979	121,042	197,021
2000	288,938	271,602	89,569	142,692	232,261
2005	348,431	327,525	108,011	172,073	280,084
2010	433,675	407,655	134,436	214,170	348,607

* Excludes government, and unclassified

8.1.6 Existing and Future Land Use Amounts

Table 8.1.7 shows the land use of the nearly 120-square-kilometer urbanized area of the Central District in October 1995. The category "Open" refers to undeveloped land, rivers and streams, steep slopes, and forest. The residential category includes all population densities and multiple family dwellings. Most residential development consists of small, separate or attached, single family dwellings. The average residential density is high, at 196 persons per hectare. The public

category excludes military reservations, as does measurement of the total urban area, but includes schools, hospitals government buildings and activities, parks, and recreation. The commercial category makes no distinction among commercial types and includes strip and wholesaling commercial development, along with central and neighborhood commercial development. Industry is under-represented, due to the extensive occurrence of small manufactures located in homes. As the table shows, the residential category is the largest user of land, followed by commercial, public, and industry. The amount of open land, 57.64 %, appears extensive, but very little of it can be built upon. A land capability analysis that mapped undeveloped land by soils, slope (greater than 30 %), susceptibility to landslides, and environmental constraints, such as distance from rivers and streams locations in watershed and military reserves, determined 1,423 hectares with in the existing city as usable for urban development.

Table 8.1.7 Existing Land Use for The Central District Urbanized Area, 1995*

Land Use	Open	Residential	Public	Commer-cial	Industrial	Total	Net Area
Square Meters	68,532,518	34,412,382	5,393,400	9,865,500	696,600	118,900,400	50,367,882
Hectares	6,853	3,441	539	987	70	11,890	5,037
Square Kilometers	68.5	34.4	5.4	9.9	0.7	118.9	50.4
Percent	57.64%	28.94%	4.54%	8.30%	0.59%	100.00%	42.36%

* The urbanized area is different from the officially designated Urban Area.

Table 8.1.8 presents the number of employees by land use category 1995 to 2010. Assuming constant relationships of worker by economic activity to the square meters of land use by category and of population to the square meters of public land, there are 7.99 m^2 of public land used per person, 69.14 m^2 commercial land used per commercial worker, and 13.49 m^2 land used per manufacturing worker. The amount of land for non-residential uses in 2015 is almost equal to the amount of total developed land in 1995. Table 8.1.9 provides estimates of the area of land required for non-residential uses at the end of each five year period, 1995 to 2010. Assuming the 1995 average population density constant for each year (as a first planning approximation), Table 8.1.10 provides an estimate of the total residential land and the total non-residential land required for the projected populations in five year increments, 1995 to 2010. Table 8.1.10 also provides the increment of land required for each five year period, the total new land required, and the deficit of land available for urban development. The amount of presently available, safely buildable land will be consumed shortly after the year 2005.

8.1.7   Opportunities and Constraints for Land Use Planning, an Appraisal of Population, Economics, and Land

As Table 8.1.10 shows, there is little suitable land on which to expand the city at an analytically assumed constant 1995 density to the level of population projected. The non-residential land required by 2010 nearly exceeds the amount of available land, and not all of that land is suitable

Table 8.1.8 Population and Population of Workers by
Land Use Classification, 1995 to 2010

(Unit:Persons)

Year	1995	2000	2005	2010
Public *	674,920	735,113	800,674	872,083
Commercial	142,679	168,199	202,832	214,486
Industry	51,642	60,878	73,413	91,374
Total Workers	194,321	229,078	276,245	305,860

* Total population

Table 8.1.9 Total Non-Residential Land Use Requirements
by Land Use Category (1995 to 2010)

(Unit:m²)

Year:	1995	2000	2005	2010
Public *	5,393,400	6,151,296	6,902,959	7,639,551
Commercial	9,865,500	11,630,082	14,024,743	14,830,563
Industry	696,600	821,197	990,283	1,232,556
Total	15,957,495	18,604,575	21,919,990	23,704,681

* Based on total   population

Table 8.1.10 Total Land Required and Land Available, 1995 to 2010

(Unit:Hectare)

Year	1995	2000	2005	2010
Total Residential Land	3,441	3,927	4,407	4,878
Total Non-Residential Land	1,596	1,860	2,192	2,370
Total Hectare	5,039	5,788	6,599	7,248
Added Total Land Requirement by Year		749	811	649
Added Non-Residential Land by Year		265	332	178
Added Residential Land, Average 196		484	480	470

for industrial and commercial uses. Population densities can be increased in new areas for development. Only time and the land market can raise densities in existing areas. Even then, population densities can not be raised sufficiently, and desirably, to accommodate the projected population for the land available. The capacity of existing infrastructure distribution networks and services, primarily water, sewers, and solid waste disposal, may not be suitable for increased densities. Additionally, there are settled areas at risk of landslide or encroaching rivers and streams at distances less than the 150 meters required by the Forestry Law. Programs for the removal of the inhabitants of these areas should provide areas for relocation, which would decrease the land available for the projected population. The technical scarcity of suitable land for urban development poses policy issues that can only be resolved by decision makers. Some of these involve decisions concerning the land use plan; others follow the land use plan. These are, together with recommendations, the following.

(1) Location of New Airport. The area around Laguna Pedregal provides 380 residential hectares for new development. There are two competing uses for this land, a new

international airport and the residential and other uses proposed in this report. Spanish investors investigated the Laguna Pedregal site and decided not to invest because Pedregal did not have sufficient land for 747 class aircraft on potential for expansion. They also found development for an airport at Pedregal would be too expensive. A 1979 JICA-financed feasibility study for a new airport compared two sites, Laguna Pedregal and Talanga 57 kilometers east of the city on the highway to Olancho, with improvement of Toncontin. The report concluded that a new airport was preferred to Toncontin, but not financially viable under the airport tariff structures. It would be economically viable with an EIRR of 13.8 % at 1979 prices. The Pedregal site has problems of morning and afternoon fog and an opposing mountain in the approach way. There are also environmental problems related to the treatment of the lake and wetland. The report stated:

"It is strongly recommended that the New Tegucigalpa Airport be constructed at Talanga for completion in 1986 to replace the existing Toncontin Airport as a metropolitan gateway, as the latter suffers from serious aircraft operational and environmental problems."

The report considered other alternative airport sites; among them, the existing military airport at Comayagua. The Comayagua site was found too distant. Subsequent studies have found it involves substantial supportive infrastructure costs in road and other improvements. The existing safety problems of Toncontin Airport remain unresolved. These are proximity of residential area, unacceptable noise levels, difficulties of approach way. Extension of the Toncontin runway would not solve these problems. Toncontin should be closed and the land sold for other public investment. Toncontin would provide 59 hectares for residential or commercial re-use.

This study recommends the use of the Pedregal site for residential, truck terminal, and regional park uses, the abandonment of Toncontin, and the construction of a new airport at Talanga. Talanga has no aeronautical problems, is within reasonable travel time from Tegucigalpa, involves less roadway improvement, presents little environmental risk, and would be unlikely to be surrounded by future residential population. With scarcity of suitable land in the study area, Pedregal land is necessary for accomodation of the future urban population. Along with increased residential areas, Laguna Pedregal site utilization proposals would aid the reduction of inner city traffic congestion through the provision of an inter-city truck terminal. The truck terminal would allow existing terminal space to be vacated for other uses. It would intercept truck traffic from San Pedro Sula for the re-assembly of shipments and transfer of goods to smaller trucks for distribution in the Central District or other destinations. The site would also serve the assembly of small lots for shipment from Tegucigalpa as a shipper benefit. Located between San Pedro Sula and the new outer ring, distributor road, the proposed terminal would minimize the number of large trucks and trailers penetrating the city, as well as relieve traffic congestion, reduce collective travel times, and prevent further destruction of urban streets from heavy truck loads. Travel times for delivery would be minimized by use of the outer distributor road with penetration of the city only where pick-up and deliveries were to be made. The terminal would provide warehousing, truck repair and services, weigh-station for the control of axle weights, overnight accommodations for truck drivers and other travelers, restaurants and other facilities. It could be combined with a terminal for inter-city buses. It

could be financed and operated by private parties and fees collected for truck regulation and public use.

(2) Permissible Densities. Population Densities above 200 persons a hectare yield little space for family living and are considered elsewhere in the world as high. Standards of living will increase as household sizes decrease and incomes increase. There will be an increased demand for larger living spaces. The projections of Table 8.1.10 are based on population density, not the number of households. With projected decreasing average size of household, the actual demand for residential land will be greater than the amount projected at an average 196 persons a hectare. Decision makers will have to establish a density policy by sub-area together with information of water and sewer distribution system capacities. For the purposes of the transportation plan, this study accommodated the projected population by increasing densities above 200 persons a hectare, as necessary, and at the expense of other land uses on the assumption of market intensification.

(3) Ciudad Mateo. Ciudad Mateo, a large residential development west of the airport along the Guacerique River, is located in the watershed of the principal water source for the city. Initiated without environmental clearances, the project was stopped with 2,000 of the planned 5,000 dwellings completed. This study recommends that the 2,000 completed units be allowed occupancy, provided a sewage treatment and filtration plant be installed along with a separate water treatment plant for the site, appropriate stream embankment treatment to halt erosion and siltation, and restoration of the remainder of the site for agriculture and forest use.

(4) Military Reserve Resettlement. The military reservation west of the airport on the Guacerique River protects the watershed on the southern slope to the river. There is an area of 109 hectare that is not part of the watershed, sloping in the opposite direction to the south on the road to Las Posas, that could be developed for civilian purposes. Additionally, there is a military area of 200 hectares contiguous to the eastern edge of the airport to the Rio Grande Choluteca, which could be used for civilian residences with the closing of the Toncontin airport, since military security would not then be needed for the airport. This study recommends initiation of discussions by Metroplan for the abandonment of these areas for civilian re-use.

(5) Government, Social and Pension Housing, and Existing Squatter Settlements. Different agencies of the central government are constructing social and pensioner housing in locations in non-uniform densities. These developments, while politically popular, incur unnecessary real and social costs. They incur social costs in the future development of the capital city in the land they consume. They bear real costs in the full construction of housing. The alternative approaches of sites and services and core housing with land tenure would be cheaper ways to meet government housing objectives. Money saved by these means could be invested instead in the improvement of existing informal communities which house the majority of occupants in the capital. Many of these communities are without water, sewers, or fire protection. Pensioner housing can and should be located elsewhere in other communities to save land in the study area for productive activities that yield tax revenues. The study recommends Metroplan initiate discussions with the seven separate housing agencies to change present practices and programs to reduce public costs and to save urban land.

(6) Water, Sewer and Solid Waste Program Extensions. Existing plans for water and sewer facilities and distribution were made without a current land use plan. The plan for water supply may additionally overestimate population and the demand for water and schedule premature construction of new water-supply facilities. This study recommends that SANAA and the solid waste service review the proposed land use plan and provide technical corrections through the coordinating offices of Metroplan. Metroplan should initiate discussions.

(7) Squatter Removal Study and Resettlement Plan. A considerable number of existing barrios and colonias are on unstable lands or occupy land contiguous to rivers and streams as found in the land capability analysis and land use survey. Many of the problems of these areas can be controlled by techniques of soil stabilization and selective relocation of the inhabitants. There should be a survey and plan to determine which areas are a greatest risk or most critical, even with ameliorating improvements, to the safety of the inhabitants and to the quality of the water quality. This study and plan should identify housing structurally beyond safe habitation and prepare a plan for relocation. Among other things, streets should be assessed for the entrance of fire equipment and widened where necessary. International donors can be approached for financing assistance, both for the study and its implementation. This study recommends that Metroplan explore these possibilities and seek funding.

(8) Constraining Commercial Land Supply. The central business district is sufficient in size in extent and land for central retail, banking and finance, and services activities should be provided in the land use plan. Instead, development should be directed to increase floor area ratios and a greater number of multi-storey buildings. This would reduce the projected 2010 summed increment of commercial land from 1,291 hectare to 998 hectare. The appropriate governments should restrict the size of the central area to its present extent. This study recommends that Metroplan proceed in drafting controls and negotiating commitment to this feature of the land use plan.

(9) Movement of Non-Essential Government Offices and Concentration of Government Activity. Many government activities are inessential to the daily conduct of government as opposed to others which require frequent interdepartmental communication. These activities can be relocated out of the capital to gain space and housing in the CBD and to stimulate local economies elsewhere. Certain other national government activities are scattered across the city. These can be relocated in the national government area, which with proper design, is of sufficient size to house most functions requiring close daily contact. This would also reduce automobile and bus trips, especially to the CBD, by concentrating government activity to the south. This study recommends Metroplan initiate discussions with central and other government authorities for the implementation of a relocation plan.

(10) Growth Controls. With a growing population and a scarcity of land for development, this study recommends measures to contain and control growth, considering that after the year 2000, the land becomes deficit for the housing and urban activities. The results of the study show that in 2015 about 1,732 ha will be deficit. These measures include relocation of non-essential government activities, the construction of pensioner housing elsewhere, relocation and re-use of the airport, release of military lands for civilian use, containing the

central business district to its present site, and prohibiting additions to the amount of industrial land. As shown in Table 8.1.11, prohibiting additions to industrial land, but allowing changes in manufacturer, would gain 285 hectares of land from Type 1 industry, 340 more hectares from Type 2 industry, and 625 from Type 1 and 2 together. This would reduce the deficit of land to projected population for 2015 from 2,752 hectares to 2,467 hectares. Other proposed policy choices, as Table 8.1.11 shows, could reduce the deficit to 1,000 hectare or less. The remaining deficit then might be absorbed by increasing population densities in the new developments and the concentration of central government offices. Alternatively, stable steep slopes can be planned for informal settlements as sites and services projects. The control of industrial growth can be achieved by not issuing permits for new manufacturing sites and by promoting a national urban development policy.

**Table 8.1.11   Possible Reductions in 2015 Land Deficit
by Policy Choices**

Industrial				Associated	Total	Deficit
Industry Type	Direct Land Used	Worker Residential	Non-basic Residential	Public Land	Hectare Saved	Remaining - 1,732
Type 2	38.2	144.4	79.5	22.6	284.7	-1447
Type 1	53.0	200.4	55.9	31.4	340.7	-1,107
Total	91.2	344.8	135.5	54.0	625.4	-1,107
Constrained Extent Central Business District Land					293.75	-813
Less Toncontin Airport					60	-753
Less Military Land Adjacent to Airport					62	-691
Less Western Military Land, Non-Watershed					109	-582

8.1.8   National Urban Policy and Planning System

There is presently no national urban policy for urban specialization and the direction of migration of population related to national development. An urban development policy would determine the competitive advantage for each of the settlements in the Honduran system of cities and seek to maximize those advantages and the national economy while minimizing infrastructure investment. The policy would provide budget priorities to allocate national funds to implement strategies for urban development. These strategies might employ such devices, or mix of devices, as secondary city development, new towns, labor intensive agriculture, emphasis on designated growth centers to create jobs and to absorb population, growth controls for other cities, and sites and services settlements. Strategic investments in one part of the country could absorb excess labor from another. A beginning national urban policy could control growth in the Central District and simultaneously promote metropolitan San Pedro Sula and its rail and coastal links as an industrial region. San Pedro has extensive level land for industrial expansion and access to the major port of Honduras. It is also better positioned for the planned absorption of population.

This land use plan creates the opportunity to initiate an ongoing urban planning process. A plan with a 20 year horizon is only indicative of future possibilities and limitations. In anticipating the future, the land use plan has greatest value in giving general directions for development and in providing sufficient time to identify and prepare more immediate plans and projects linked to the project cycle and annual budgets. Preparation of more immediate plans and projects to implement

the longer range plan, should be for the period of five to seven years from the present. These should be rolling plans, advancing one to two years in their time horizon each year. Repetition of this planning process will keep current information of the growth of the city so that plans and budget programs can be adjusted to development need. By looking ahead five to seven years, projects can be identified in advance for project preparation and use of the project cycle: project identification, pre-feasibility study, feasibility study, final construction design, and implementation. This planning process also includes analyses of municipal finance, the tax structure, and budget making and priority.

Equally, if not more important, the process should involve all agencies involved in the development of the Central District—Metroplan, water and sewers (SANAA), the cleaning service (Departamento Limpieza), the environmental agency (SEDA), the transit authority, public works, SECPLAN, SECOPT, and so on—to coordinate information, plans, technical requirements, priorities, and budgets. These interests should meet regularly as a committee advisory to the political authorities who must make choices about priorities and implementing budgets. Staffing can be small and shared, since they are building incrementally on an existing plan and gaining information on a yearly, if not daily, basis. Land use information could be collected yearly and conditions of streets and other infrastructure gathered for operations and maintenance programs. In this way, and in cost savings gained in anticipation of urban needs and problems, the planning agency could pay for itself.

8.2   Future Land Use

8.2.1   Past Urban Development of the Study Area

1)   Historic Development of the Study Area

By the beginning of the 17th century, Tegucigalpa had only an extension of 9 blocks from east to west and 3 blocks from north to south. The city of Tegucigalpa expanded along with gold and silver exploitation which continued until the 1930's. On the other hand, Comayagüela, a small Indian village, grew together with Tegucigalpa as its bread basket. With the growth of Tegucigalpa, in 1938 these two merged to form a single city. Tegucigalpa and Comayagüela continued to develop despite the end of the exploitation of gold and silver, the first economic activity that brought wealth to the city in 1950. The city was not adversely affected because by that time all the governmental and political functions as well as the commercial and other economic activities had already concentrated here; therefore there was no economic loss to the city's economy.

However, the deterioration of the world economies and the political instability of neighboring countries has hindered growth of the Honduran economy since the 1970's. Nevertheless, Tegucigalpa being Honduras' most important city, it continues to attract population from the rest of the country. In addition, the agglomeration and concentration of the central governmental offices and other economic   activities have proceeded further.

Together with the beginning of the urban sprawl and the motorization around the end of 1970's, the existing major roads such as Boulevard Fuerzas Armadas, Boulevard Morazán, etc. were constructed. The completion of these roads caused the development of the large scale of housing

area on the surrounding hills, and as a result, the traffic volume has been increasing more and more.

This tendency continues even now. Because of the city's mountainous terrain, growth has not developed in the form of the concentric circles, but rather along the principal radial roads to the outskirts of the city. Such a process of urbanization caused sprawling of the built-up area and residential area and deepened traffic problems by the rapid increase of traffic demand. Therefore, it is urgent new urban planning realize a more favorable living environment under orderly arrangement, integration and internationalization of the urban functions, as opposed to urban planning which permits urban sprawl area.

2) Present Urban Structure and Direction of Development

In the study area almost all governmental organizations such as the Legislative Palace, Ministry of Health, Ministry of Administrative Management, Ministry of Defense, the City Hall, etc., as well as commercial and other business activities are housed in the central part of Tegucigalpa (area between the Choluteca and Chiquito Rivers, not including the center of Comayagüela). In this sense, this city is said to formulate a uni-polar structure; however, nowadays the private commercial activities gradually tend to locate along Boulevard Morazán, Boulevard Miraflores and Boulevard Suyapa.

On the other hand, population is also rapidly moving away from the central area to sprawl over the hillsides located in the outskirts of the city. Although manufacturing factories are few, economic activities such as distribution and construction materials yards are concentrating into the areas near Santa Fé, the airport, etc. The future direction of development is considered to promote further dispersion of governmental functions and suburban location of restaurants and other entertainment facilities as well as sprawl of housing area in order to avoid the traffic jams in the central area. The present situation and the future direction of the urban structure is summarized as follows;

① Population and its Distribution

- Since the habitable sites around the central area have already been developed as the residential area, the possibility of increasing population around there is very slight. However, if the houses, which are now almost all two-story at the most, become high-rise, more population can be accommodated in the area with solid ground.

- The old residential districts called "Barrio" or "Colonia" in the Study Area had been already formulated. Nowadays, the new residential districts are developing under the name of "Ciudad" or "Residencia". Together with the construction of principal roads, these new residential areas have been developed along these roads, especially, Boulevard Suyapa, Carretera del Sur, Boulevard Fuerzas Armadas. Colonia Kennedy, Ciudad Lempira, Colonia Cerro Grande, Colonia Centro America Oeste, etc. can be mentioned as the relatively new residential areas.

- Recently, considering the future use of the outer ring road (Anillo Priférico, now under construction), new residential areas are being developed or planned. These include Ciudad Lempira, Ciudad Mateo, La Fuente, Arturo Quezada, La Canada, Residencial Honduras,

Prados Universitarios Centro America, etc. In the case of a large-scale housing project undertaking now under way in Ciudad Mateo, the river that serves as a source of drinking water for Tegucigalpa flows below its construction site, therefore, there is concern about water contamination by sewage after completion of the project.

② Administrative and Business Activities and their Distribution

• More than 20 governmental organizations are located in the central area of Tegucigalpa; therefore, this area formulates a specialized area for central governmental functions. However, since the Presidential Palace has been moved out of the center, it is necessary to promote the transfer of other governmental organizations.

• Business and commercial offices are also concentrated in the central area. In the Central area of Comayagüela (market area) these offices are also concentrated. Therefore, the central areas of Tegucigalpa and Comayagüela formulate the Central Business District (CBD) in the study area. The northern part of Comayagüela (south to the Tiburcio Carias Andino Bridge) is a very active area, gathering many street stalls and venders who contribute to traffic congestion in that area.

• There is almost no capacity for accommodating new private offices in the CBD area. Since 1980, new business offices have been established along Boulevard Morazán, Boulevard Suyapa, Boulevard Miraflores, etc.

• Nowadays, with the spread of motorization, many restaurants and amusement centers have begun to be located out of the CBD area, especially, along Boulevard Suyapa around the area of Colonia Almeda.

• In the future, due to the deterioration of traffic conditions in the central area, the administrative organizations and the business offices will move out to the surrounding area. Since the municipal authorities consider to preserve the central area in Tegucigalpa as the historical, cultural and sightseeing places, restaurants and shopping centers will remain in the central area.

• With the population increment of the suburban areas, commercial activities selling convenience goods are spreading towards suburbs. At the moment, in Colonia Kennedy a large-scale daily goods market is being formulated. However, modernized stores selling durable goods, high grade quality goods, fashion articles, etc., remain in the CBD or along Boulevard Morazán.

• Businesses such as distribution terminals, construction material suppliers, warehouses, etc. will continue their development around the airport area or along Boulevard Santa Fé and Carretera del Norte.

• Many small-scall factories are scattered here and there in the study area. However, a new industrial area is being developed by the municipality at Amarateca along Carretera del Norte. After the completion of this development, the location of factories would be restrained in the city area.

• Considering the strong connection between Tegucigalpa and San Pedro Sula, whichi is developing rapidly as an industrial base in recent years, the commodity flow between these two areas is increasing. As a result, many heavy trucks and long trailers enter into the Tegucigalpa city area. To prevent the entrance of these large trucks to the city, distribution centers will have to be built in the outskirts of Tegucigalpa, especially along Carretera del Norte for the purpose of transshipment.

• Along Boulevard Santa Fé many small factories, offices, stores, and houses, are chaotically located. It is desired that more orderly placement can be arranged.

③ Traffic

• In the central area the streets are composed as a "grid system". Since streets were built for passing carriages and not for motor vehicles, these streets do not have sufficient width for the two-way traffic. Therefore, the one-way system is adopted for almost all streets in the central area.

• In the central area of Tegucigalpa the east-west streets are main roads, such as Avenida Maximo Jeréz leading to Avenida La Paz (from west to east), Avenida Cristobal Colón (from east to west) and Avenida Miguel de Cervantes (from east to west). In the central area of Comayagüela, the north-south streets are main roads such as Avenida 6 leading to Puente Carias (two-way), Avenida 4 leading to Puente Soberania (two ways), Avenida 1 leading to Puente Mallol (from south to north), and Avenida 2 (from north to south). Traffic volume on all these streets is already over their capacity, especially during the peak hours; and traffic jams are chronic.

• The central areas of Tegucigalpa and Comayagüela are separated by the Choluteca River. The central and southern area of Tegucigalpa are also separated by the Chiquito River. The former are connected by four bridges: Chile, Carias, Soberania, and Mallol, and the latter are connected by La Isla, La Hoya, San Rafael, and Guanacaste bridges. All these bridges are two-way, but their capacity are not enough to accommodate the existing traffic. In addition, the configuration of roads connecting with these bridges are not in good condition.

• The radial roads extending from the central area to the suburban areas are: Avenida La Paz, Boulevard Morazán, Boulevard Suyapa, Boulevard Miraflores, Boulevard Comunidad Europea, and Boulevard Santa Fé with four lanes. Since sections of these roads which are in the surrounding areas have been improved, the traffic congestion in the suburban areas is not so severe at the moment even in the peak hours. If housing areas are developed in the suburban areas in the future, the traffic congestion will become much more severe.

• The outer ring road (Anillo Periférico) is now under construction. At the moment the development of residential areas around it has just started or is planned, being conscious of the completion of this outer ring road. If the study area continues to develop hereafter under the existing uni-polar urban structure, the present problems relating to traffic congestion will become much worse on the principal roads connecting the CBD with the suburban residential areas.

- As mentioned before, the city of San Pedro Sula, 240 km from Tegucigalpa, has been developing the manufacturing industry as a tax-free zone. In recent years the commodity flow between San Pedro Sula and Tegucigalpa, the largest consumption area in Honduras, has been increasing greatly. Most of these commodities are transported by large trucks or trailers. It is not desirable that these large trucks enter into the city . Therefore, it is requested that a truck terminal or distribution center be constructed near the entrance of the city on the Carretera del Norte and in order to prohibit entrance of large trucks into the study area.

- The Toncontin International Airport, located in Tegucigalpa, is the largest and most important international traffic generation and attraction point. However, at the moment there are not many international flights leaving or arriving at this airport. In addition, the arrival or departure time does not coincide with the peak hours. Therefore, access problems to the airport have not appeared up to this point. However, if in the future the number of arrivals and departures increase and the traffic congestion becomes chronic on the airport access road, access to the airport will emerge as one of the big traffic problems. Especially, this situation will become a severe problem if there is any intention to attract foreign tourists by converting the central area of Tegucigalpa into a historic, cultural and tourist area.

- Within the study area, basic transportation service has many problems. It is necessary to reexamine bus operation from the viewpoint of its role in public transportation system.

- Most interurban buses come into the city center, causing traffic congestion in the CBD area. It is desired that interurban bus terminals be established near the city border.

- If the population continues to increase hereafter, it is anticipated that even the areas which are assumed uninhabitable due to conditions of terrain, etc., will proceed to develop as a residential area. In this case since this development occurs far away from the transportation axes, inefficiency in transportation will become more of a problem.

④ Others

- Through the residential development in the surrounding hilly areas, many green zones have disappeared. In addition, it is pointed out that water purification and sewerage disposal facilities are not sufficient. From the environmental point of view, it is desired that disorderly development be strictly controlled in these areas.

- The Presidential Palace, once located downtown, was moved to the present location on Boulevard Fuerzas Armadas (1992). It is expected that more than 20 governmental offices remaining in the CBD area will be transferred to this same condition in the near future.

Fig. 8.2.1 shows the present urban structure of the study area and direction of development.

8.2.2 Future Urban Structural Pattern of Urban Structure

1) Objective of Future Urban Structure on the Study Area

Reviewing various urban structural patterns throughout the world according to their size, type, density, transportation network, etc., many urban structural patterns can be found: grid pattern, multiple center pattern, cluster pattern, linear pattern, ring pattern, etc. To determine the future Tegucigalpa urban structure, the above patterns are examined on the basis of the existing urban structure and future direction of the development. The following objective was set to examine the future urban structure of the study area.

<<Objectives of Future Urban Structure>>

① To reformulate the present single-core urban structure into a multi-core structure
② To preserve historic, cultural and tourist areas and buildings in the central area of Tegucigalpa
③ To transfer the central governmental functions in the central area of Tegucigalpa to the governmental area outside the CBD
④ To regulate the new location of business offices   in the central area of Tegucigalpa
⑤ To formulate on efficient transportation network connecting the core areas with residential areas
⑥ To strengthen the urban transportation axes connecting the central area and core areas
⑦ To establish the efficient operation of public transportation

2) Examination of Alternatives of Urban Structural Pattern

The four typical urban structural patterns shown in Fig. 8.2.2 were examined as applicable patterns for the study area.

The outline of these four urban structural patterns can be summarized as follows;

(1) Ring pattern

The built-up area extends concentrically from the central area of Tegucigalpa towards the south part of Tegucigalpa, crossing Chiquito River. A surface-oriented pattern rather than linear.

(2) Linear pattern

The built-up area extends linearly along the principal radial roads from the powerful CBD area. The decentralization of the urban functions does not take place.
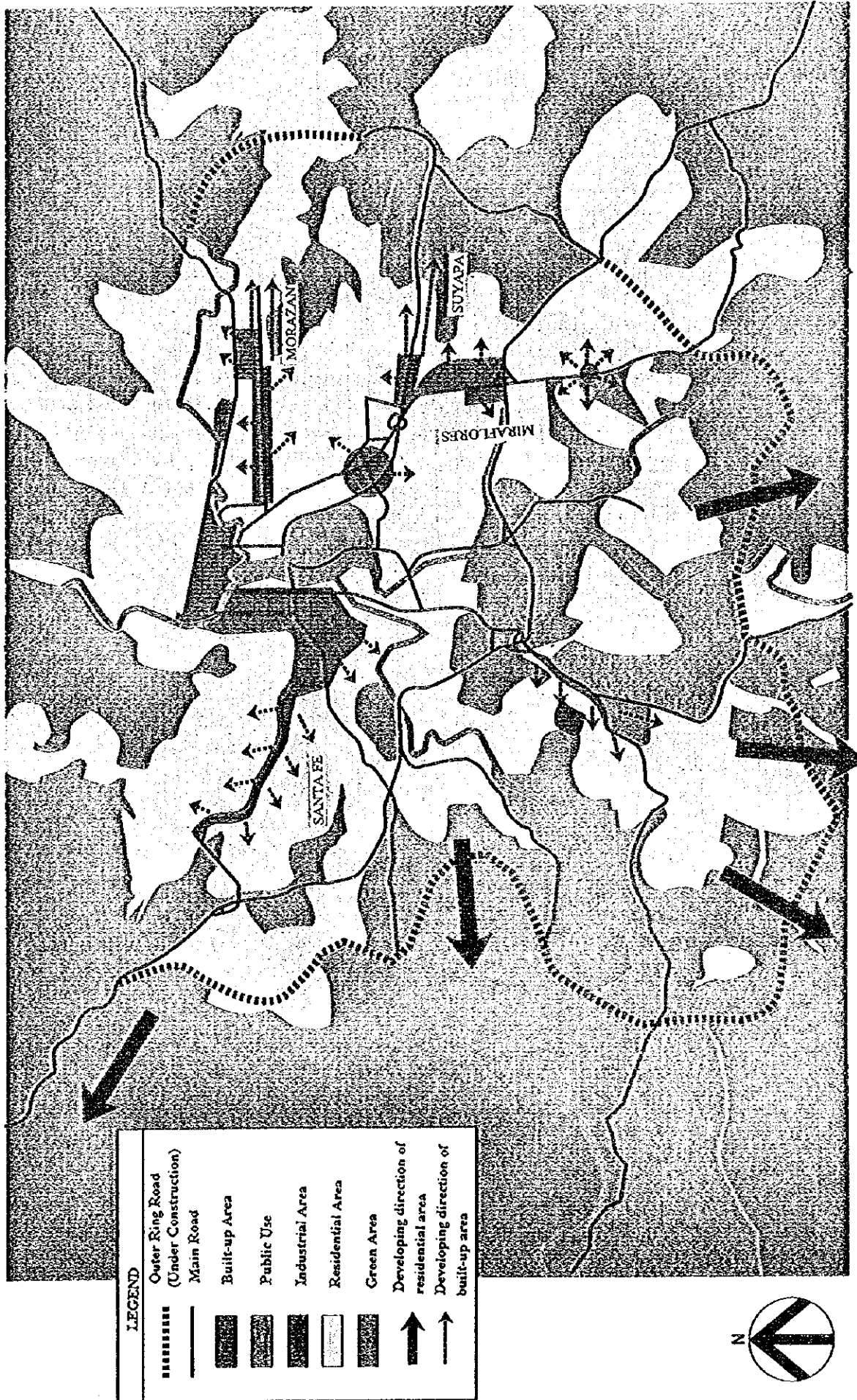
Fig. 8.2.1 Present Urban Structure and Development Direction

(3) Multiple nuclei decentralized pattern

The central area of the city does not over develop since the urban functions are decentralized to the multiple nuclei located away from the central area. The central area and multiple nuclei are connected firmly to each other. The built-up area does not form the conurbation, but extends just to the circumference of the central area and the nuclei areas. This pattern can solve various problems occurring in the uni-centric city through decentralizing the urban functions.

(4) Linear and multiple nuclei pattern

The present central area remains as a central nucleus as it is and the transferable urban functions are decentralized to the multiple nuclei, but not so large as in the above multiple nuclei decentralization pattern. Each nucleus is connected with the central area by strong transportation axes and the built-up areas develop along these. This pattern lays stress on the stepwise improvement of transportation axes and development of nuclei. Therefore, the pattern can be said to lie between the above patterns (2) and (3).
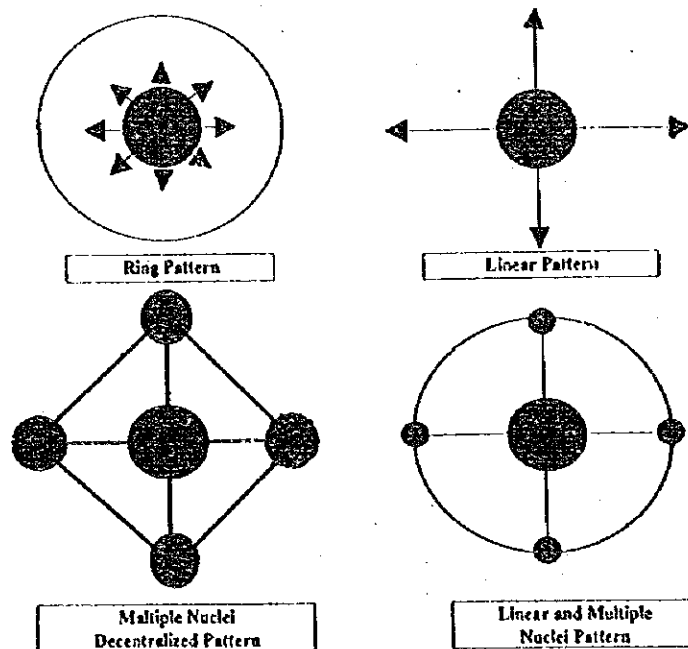

Ring Pattern

Linear Pattern

Multiple Nuclei
Decentralized Pattern

Linear and Multiple
Nuclei Pattern

Fig. 8.2.2   Alternative Urban Structural Patterns

3)   Selection of the Future Urban Structural Pattern

To get an applicable urban structure for the urban problems of the study area, the above four urban structural patterns were examined. Before the examination, the following conditions for selecting the future Tegucigalpa urban structural pattern had been set as a premise;

① To utilize the existing transportation infrastructures effectively

② To promote decentralization to distribute urban functions outside of the CBD.
③ To follow the existing plans and policies by the governmental authority
④ To preserve open spaces or green areas in good condition

Through the examination of the above-mentioned four development patterns, the linear and multiple pattern was selected as the most applicable pattern. The results are summarized as follows;

(1) Ring pattern

Considering the mountainous topography of Tegucigalpa, it is difficult physically for the built-up area to extend concentrically. Even if the built-up area could be expanded concentrically, the central area would become even more overcrowded since the city would continue to develop along a uni-centric structure. Since restaurants, shopping plazas, the Plaza Francisco Morazán, etc., remain as places of recreation and relaxation for the citizens, the congestion within the central area would become much more severe, because expanding the road width by demolishing the old buildings within the central area of Tegucigalpa is not allowed. Moreover, since in this uni-centric urban structure, the job opportunity in the suburban area is not expanded outside of the CBD, the congestion of principal roads would become much more severe by heavy commuting traffic. In addition, in the near future unhindered movement between the central area and the airport will become difficult because of heavy congestion on airport access roads.

(2) Linear pattern

Compared with the ring pattern, the built-up area in this pattern is formulated linearly along the principal transportation axes (major radial roads) within the city. It can be said that the development of Tegucigalpa has taken place in this way until now. As a result, the overcrowded situation in the central area continues and the principal transportation axes toward the CBD have become highly congested, because the housing areas become more and more isolated from the CBD area along the transportation axes. In this pattern the introduction of mass transit system is desired.

(3) Multiple nuclei decentralized pattern

This pattern drastically distributes the urban functions into multiple nuclei, which would basically solve the problems occurring in the single-core city. Therefore, in order to accommodate many urban functions in these nuclei, it is necessary for these nuclei to have grown up to some large scale, or these nuclei can not accommodate the large agglomeration of various urban activities. In addition, a sufficient transportation network connecting among nuclei should be provided. Judging from the existing scale and financial conditions of the study area, the realization of this pattern is difficult.

(4) Linear and multiple nuclei pattern

This pattern aims to moderately distribute urban functions by fostering medium-scale nuclei on the principal transportation axes, leaving the necessary urban activities in the CBD area,