4 LAND USE AND TRANSPORT DEVELOPMENT SCENARIO

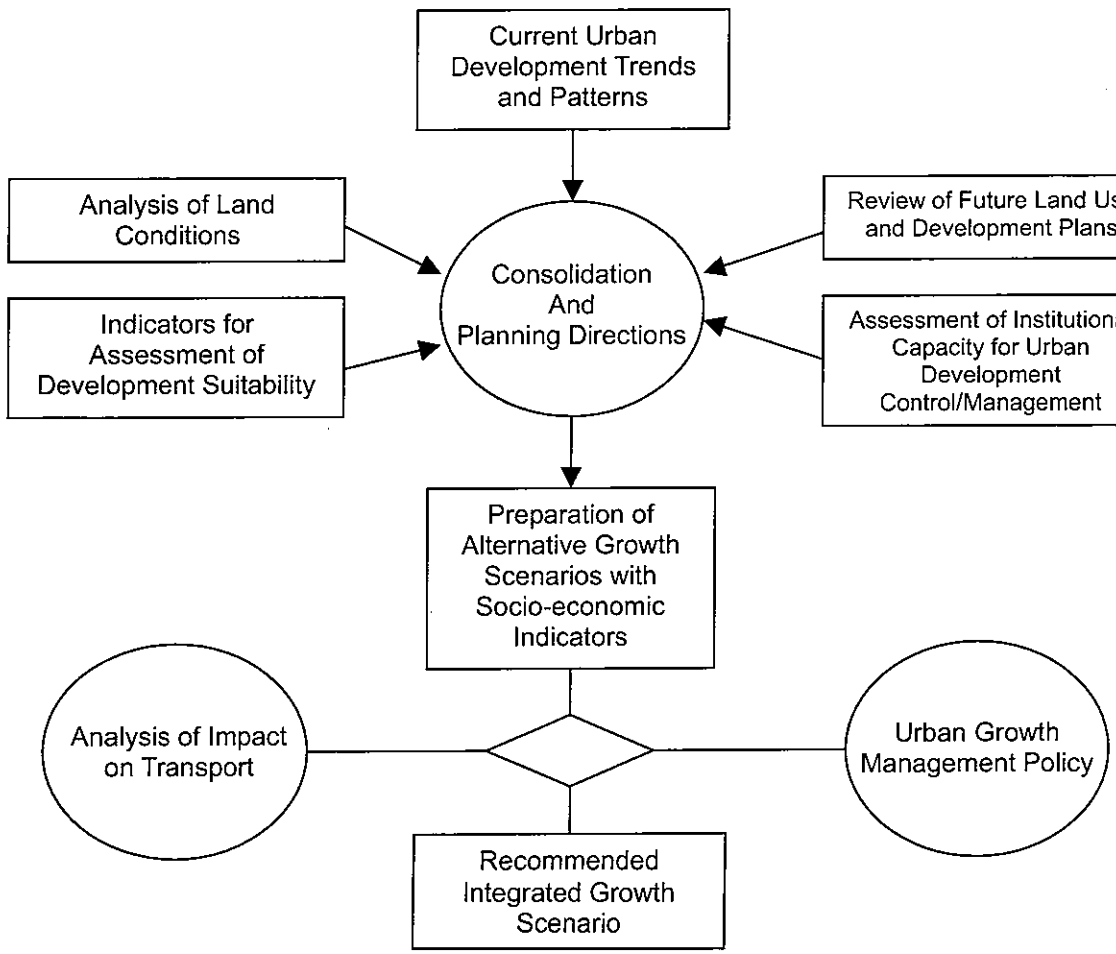
1) Methodology

Urban development and land-use patterns are affected by three main factors, namely: (1) availability of transport infrastructure and services, (2) enforcement of land use control and other regulatory arrangements to regulate urban development, and (3) availability of lands with good natural conditions suitable for development.

Development takes place in areas where accessibility to needed services is ensured and physical and environmental conditions fit development agendas. At the same time, market forces are regulated by city planning and development controls to achieve a most effective use of the entire urban land and space. Interaction between the two determines actual development patterns wherein the transport network plays a critical role in determining urban structure and promoting land use in urban areas. Thus, the core planning issue is how to provide a transport network taking into account development conditions, potentials, planned land use, and envisioned urban environment. The transport sector is one of the most critical and influential factors in managing urban growth and space.

To provide a realistic planning base in formulating the Transport Master Plan, an analysis was made to assess alternative scenarios on the future urban growth of the study area. Major factors considered in this exercise included current urban development trends, land conditions, existing Urban Master Plan, institutional capacity to control urban development, and impact of the transport sector on urban development and vice versa (see Figure 4.1).

Figure 4.1 Analytical Framework for Urban Growth Management



Source: Study Team

2) Current Urban Development Trend

The study area was broadly classified into six types comprising:

(a) Inner Core: A relatively small area with very high population density both in day and night time, including districts 1, 3, 4, 5, 6, 10, 11, and Phu Nhuan (44 km^2, 1.8 million population and population density of 408 persons/ha).

(b) Inner Fringe: Fast developing fringes of the inner core but without provision of adequate infrastructure, including districts 8, Binh Thanh, Tan Binh, Go Vap (98 km^2, 1.7 billion, 176 persons/ha).

(c) Emerging Periphery: Newly developing areas surrounding the inner fringe with sprawling and ribbon development along a number of arterial roads, including districts 12, Thu Duc, Binh Chanh, (605 km^2, 1.2 million, 19 persons/ha).

(d) Suburban Area: Moderately fast developing semi-urbanized area including Hoc Mon and Nha Be districts in HCMC and Thuan An and Di An districts in the adjoining province of Binh Duong (321 km^2 0.8 million, 14 persons/ha).

(e) Satellite Urban Area: Provincial centers with urban accumulation including Thu Dau Mot, Bien Hoa and Tan An districts in adjoining provinces (321 km^2, 1.5 million, 24 persons/ha).

(f) Rural Area: Slowly developing agricultural and forest areas (2,840 km^2, 1.5 million, 5 persons/ha).

Development is particularly significant in the following areas and directions where many buildings are illegally constructed or do not comply with their original plans (see Figure 4.2):

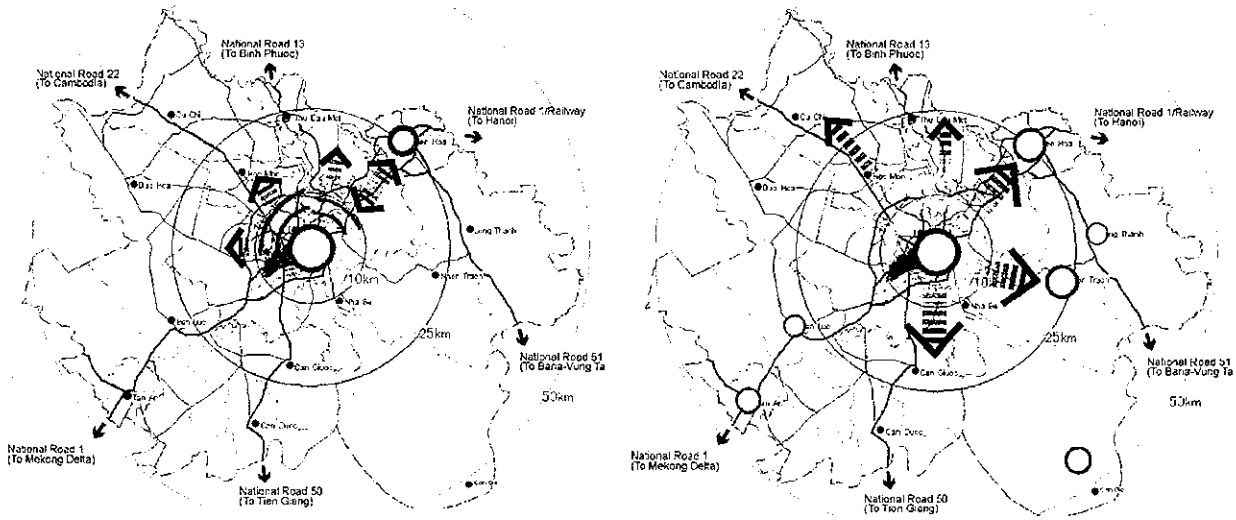
- Inner fringe and emerging peripheries including Tan Binh, Go Vap.
- Northeast direction between HCMC and Bien Hoa including the area along Ha Noi Highway such as Thu Duc, 2, 9, Thuan An, and Di An districts.
- Northwest direction mainly in District 12 and adjoining areas.
- West direction along National Highway 1A, in Binh Chanh and adjoining areas.

3) Development Direction of Urban Master Plan

The main reasons for the difference in urban development directions between those intended in the Urban Master Plan and the current trend are primarily the following: (1) market forces were not factored in the former, (2) land development conditions were not sufficiently incorporated in the land-use plan, and (3) institutions that control developments were not effective. Development directions expected in the Urban Master Plan are towards the northeast, south, southeast, and northwest (see Figure 4.2).

Figure 4.2 Urban Development Directions

Current **Master Plan**

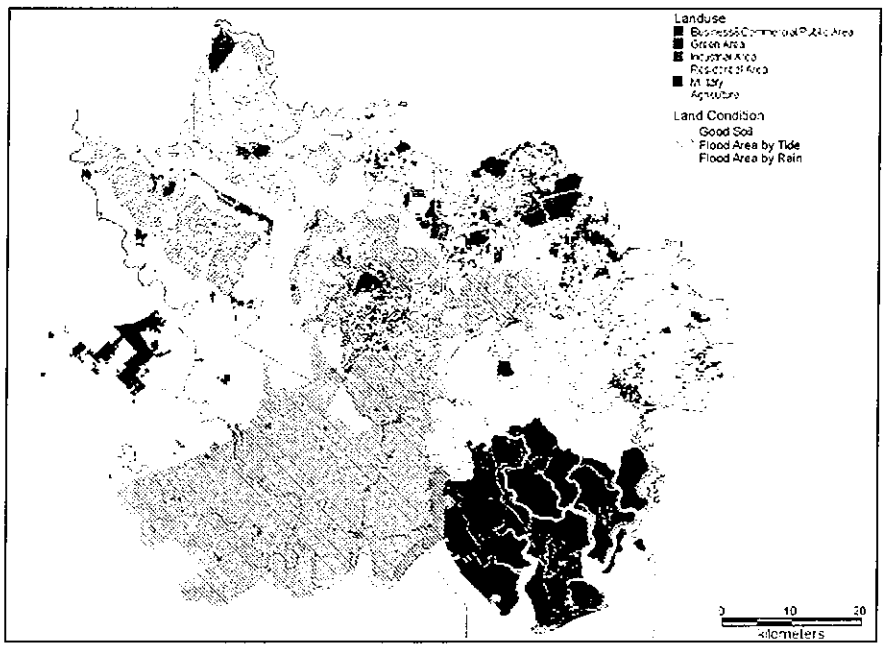


Source: Study Team

4) Assessment of Land Conditions

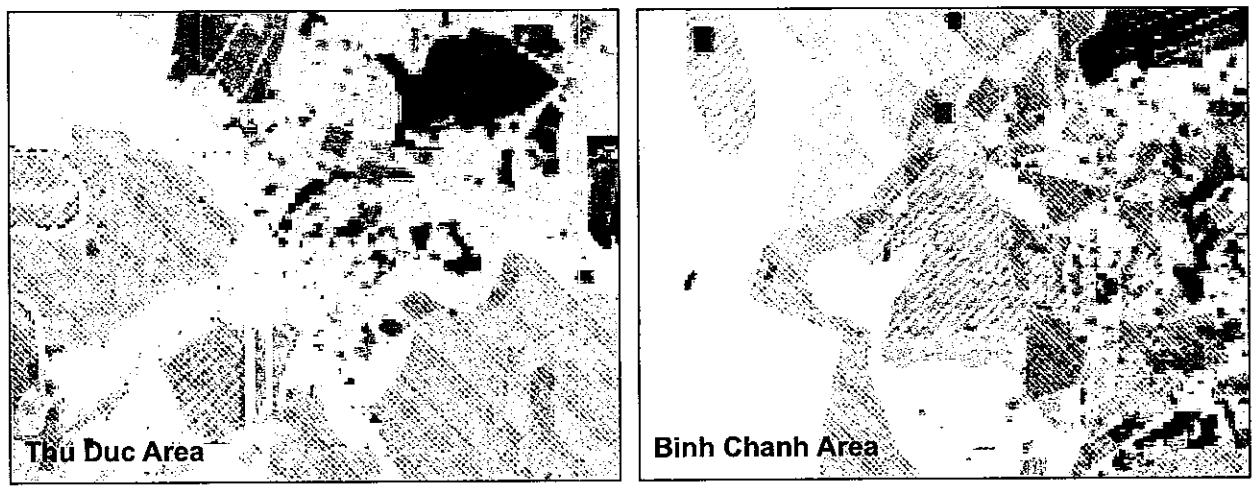
Conditions which affect urban development include natural conditions such as soil and flooding due to rainfall and tide, accessibility to the city center and availability of utilities such as water supply, drainage, land price, etc. An overlay of land condition on existing land use indicates that there is a significant difference in land condition between quickly urbanizing areas and others. Urbanization has been taking place mostly in areas where land conditions are good, little affected by flooding, and with good soil (see Figures 4.3 and 4.4). Development conditions and potentials were assessed by area using existing geographic information system (GIS) maps and other information to reflect the estimated future land-use patterns and socio-economic conditions.

Figure 4.3 Land Conditions



Source: Prepared by Study Team based on existing data.

Figure 4.4 Comparison of Land Conditions and Current Land Uses



Source: UPI & prepared by Study Team based on existing data.

5) Future Socio-economic Framework

The socio-economic framework for 2020 was worked out on the basis of existing government plans as well as the analysis made by the Study Team (see Table 4.1). This framework provides a basis for estimating the distribution of these parameters in the study area.

Table 4.1 Future Socio-economic Framework for 2020

Indicators	2002			2020			Growth Rate(%/year)		
	HCMC	Province	Study Area Total	HCMC	Province	Study Area Total	HCMC	Province	Study Area Total
Area (km^2)	2,093	3,097	5,191	2,093	3,09	5,191	-	-	-
No. of Households (000)	1,335	593	1,928	2,778	972	3,750	4.2	2.8	3.8
Population (000)	5,409	2,244	7,653	10,000	3,500	13,500	3.5	2.5	3.2
Average HH member	4.1	3.8	4.0	3.6	3.6	3.6	-	-	-
No. of Students (000)[1]	1,187	445	1,632	1,865	565	2,430	2.5	1.3	2.2
(% to Population)	(21.9)	(19.8)	(21.3)	(18.6)	(16.1)	(18.0)	-	-	-
Elementary (000)	438	212	650	564	230	794	1.4	0.5	1.1
Middle (JH) (000)	306	161	467	495	203	698	2.7	1.3	2.3
Secondary (SH) (000)	156	63	219	280	115	395	3.3	3.4	3.3
College/Univ. (000)	287	9	296	526	17	543	3.4	3.6	3.4
No. of Workers (000)	2,370	990	3,360	5,400	1,890	7,290	4.7	3.7	4.4
(% per Population)	(43.8)	(44.1)	(43.9)	(54.0)	(54.0)	(54.0)	-	-	-
Employment structure (%)	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-
Primary	4.7	16.6	8.2	1.0	10.0	3.3	-	-	-
Secondary	32.6	36.0	33.6	32.0	40.0	34.1	-	-	-
Tertiary	62.7	47.4	58.2	67.0	50.0	62.6	-	-	-
Veh. Ownership (% to HH)							-	-	-
Car	1.7	1.4	1.6	19.2	17.4	18.7	-	-	-
Motorcycle	92.6	88	91.2	76.4	77.7	76.7	-	-	-
- More than 1	58.8	41	53.4	58.0	59.2	58.3	-	-	-
- One	33.8	47	37.8	18.4	18.5	18.4	-	-	-
Bicycle Only	4.4	10	6.0	2.7	3.2	2.8	-	-	-
Non-motorized Vehicle	1.3	1	1.3	1.7	1.7	1.7	-	-	-

Source: HOUTRANS HIS

[1] Student structure is from 2001 statistics.

6) Comparison of Alternative Scenarios

The three scenarios prepared are as follows:

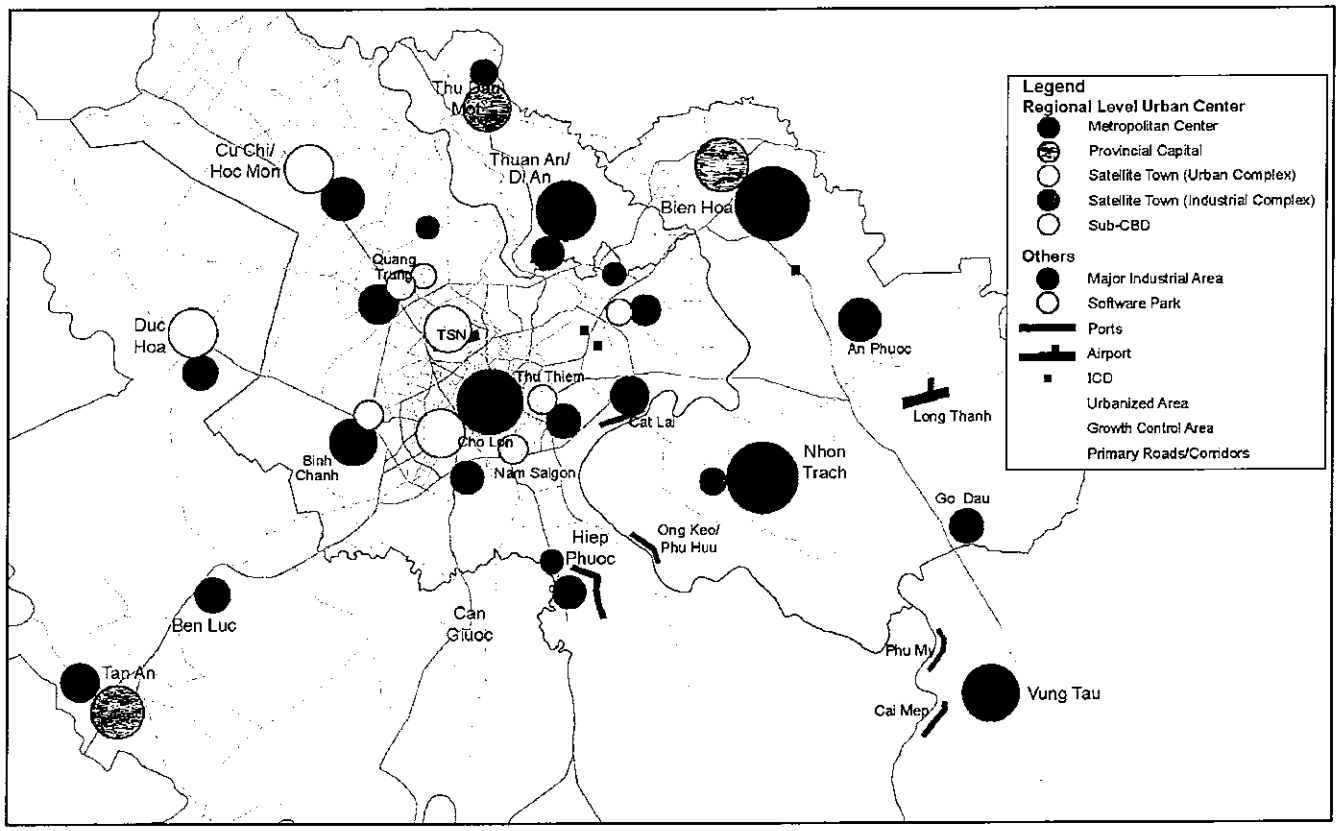
(1) **Monocentric Urban Growth:** Current trends will continue. Concentration in the city center will slow down. Development towards the outer areas will accelerate particularly along major corridors where development conditions are favorable. Planned development will be insignificant.

(2) **Polycentric Urban Growth:** While high concentration in the existing city center will remain, development of new centers in the outer areas will take place as planned in the Urban Master Plan without much influence from land conditions.

(3) **Third Scenario:** This scenario assumes that urban areas will grow basically in accordance with trends, although the planned development in the outer areas and strategic locations will be promoted.

(4) **Fourth Scenario:** Together with concerned agencies, the above three scenarios were assessed both from the transport and urban development viewpoints to determine their appropriateness and feasibility. Then, the third scenario was further modified taking into consideration the very high population density in the city center, the location of industrial estates/areas, and the development of new CBDs and satellite towns to device the fourth scenario, which is the scenario recommended in further planning the transport network (see Figure 4.5, Table 4.2, and Figure 4.6).

Figure 4.5 Proposed Future Metropolitan Structure of the Study Area



Source: Study Team

Table 4.2 Fourth Scenario Population Framework

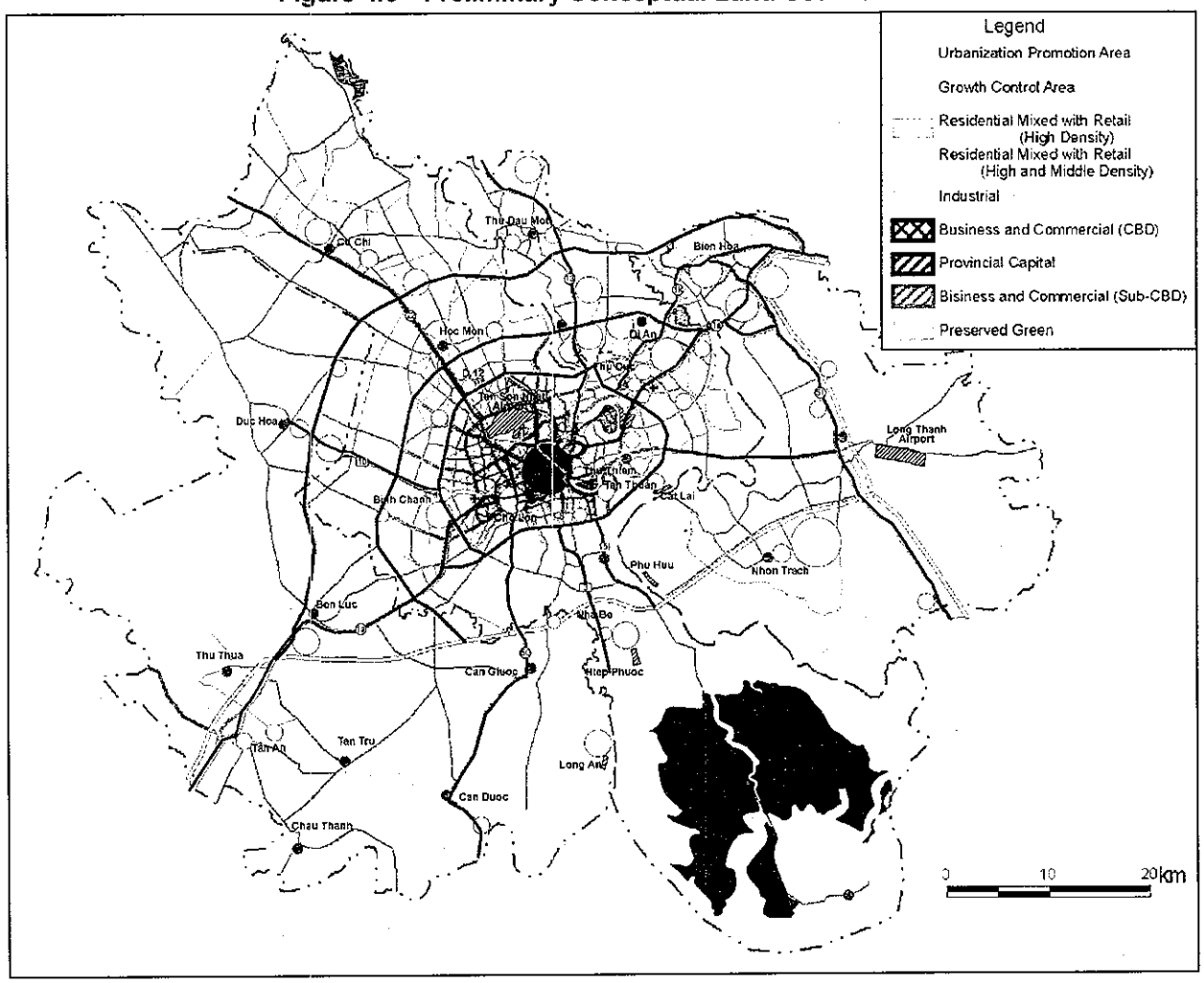
		Population in 2020 (000)		Day/Night Ratio	Population Density[1] (per./ha)	
		Night	Day[2]		Night	Day[2]
HCMC	Inner Core	1,691	2,898	1.71	403	690
	Inner Fringe	2,899	1,929	0.67	313	208
	Emerging Peripheral	3,904	3,517	0.90	71	64
	Suburban	584	652	1.12	32	36
	Rural	922	1,004	1.09	10	11
	Subtotal	**10,000**	**10,000**	**1.00**	**57**	**57**
Surrounding Provinces	Satellite Urban	1,194	1,137	0.95	38	37
	Suburban	516	520	1.01	37	37
	Rural	1,791	1,843	1.03	7	7
	Subtotal	**3,500**	**3,500**	**1.00**	**12**	**12**
Study Area Total		**13,500**	**13,500**	**1.00**	**29**	**29**

Source: Study Team

[1] Population density was calculated based on land area but excluding river areas.

[2] Daytime population includes number of workers at workplace, students at school place, the unemployed, housewives, etc.

Figure 4.6 Preliminary Conceptual Land Use Plan



Source: Study Team

5 TRANSPORT DEMAND FORECAST

1) Methodology

The conventional four-step model using JICA STRADA[1](System for Traffic Demand Analysis) was adopted for the demand forecast. The steps are: (1) Trip Generation and Attraction Model – to estimate the number of trips generated by and attracted to each zone; (2) Trip Distribution Model – to estimate the number of trips traveling between zones; (3) Modal Share Model – to estimate the number of trips made using different transport modes; and (4) Traffic Assignment Model – to estimate the number of trips on the transport network by different transport modes (see Figure 5.1). To analyze traffic, the study area was divided into 265 zones.[2]

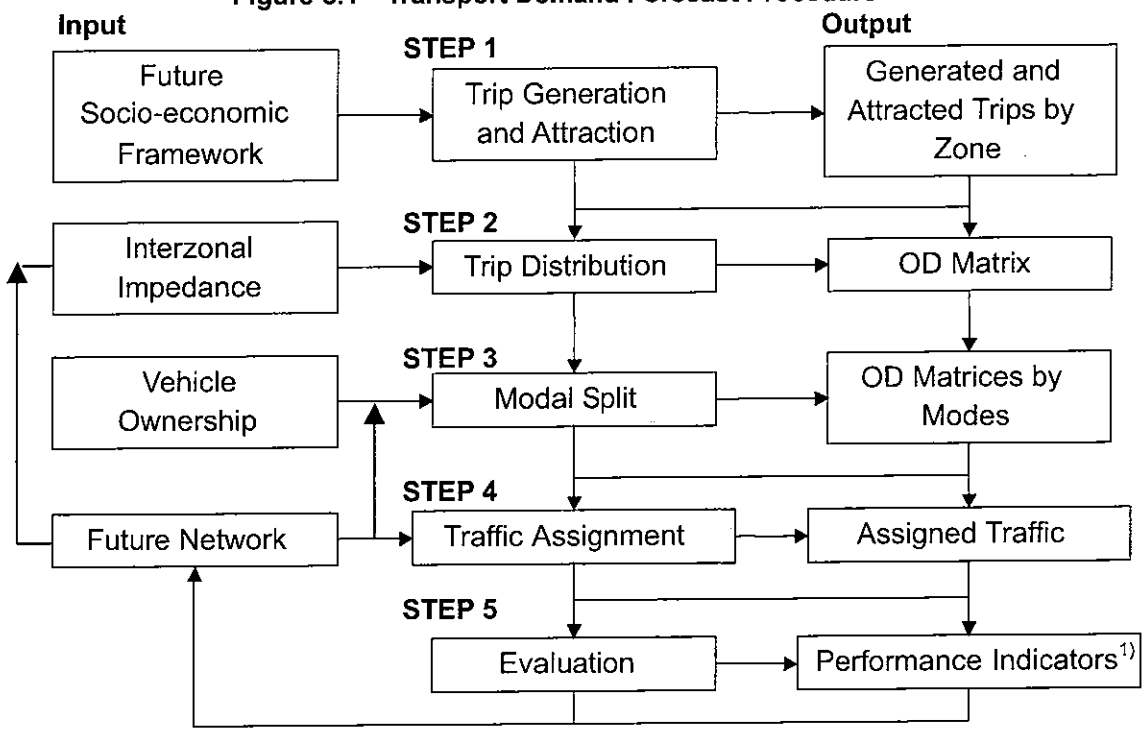
In model building and application, considerations were given to the following:

(1) Multilayer Model: To facilitate testing the urban growth scenario in an interactive way wherein land-use pattern and traffic impacts can be easily analyzed, a simplified model was built and used, while a more detailed one was used for the full-scale network analysis.

(2) Calibration of Model: The model was calibrated to such extent that the traffic estimate using the model could explain the current traffic characteristics.

(3) Analysis of Motorcycle PCU: While motorcycle traffic is critical in network analysis, a supplementary study was made to determine a more realistic PCU figure to be applied in the study area.

Figure 5.1 Transport Demand Forecast Procedure



Source: Study Team

1) Adopting capacity restraint assignment procedure involving volume capacity ratioV/CR,, travel speed, etc.

[1] JICA STRADA is a computer software developed by JICA for application in transport demand analysis and assignment.

[2] The zoning system used for HCMC was basically the same as that used in the 1996 study conducted by the MVA, a traffic and transportation consultancy, to allow comparisons.

2) Future Traffic Demand

Future traffic demand was forecast in detail on the basis of the Fourth Scenario, using the second layer model. The results are briefly as follows:

(1) Total Demand: The 22 million trips/day (2002) including walk trips will increase to 41 million trips/day (2020) of which 36 million trips will be motorized.

(2) Generation and Attraction: While traffic generating sources will be decentralized according to the fourth urban growth scenario, a high concentration of traffic will remain in the city center (see Figure 5.2).

(3) Traffic Distribution: Concentration of traffic generating sources in relatively narrow areas will lead to short travel length. Average trip length of existing traffic is 6.6km which is estimated to increase to 9km in the study area, while that of Manila with about 10 million population is about 11km. Nevertheless, increase in traffic demand between the city center and the outer areas will be more notable, especially towards the northeast, northwest, and west (see Tables 5.1 and 5.2, and Figures 5.3 and 5.4).

Table 5.1 Distribution of Future Demand, 2020

000trips/day

Area		CBD	East		North		West		South		Out side	Total
			Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer		
CBD		2,933	699	52	950	94	651	88	740	39	11	6,257
East	Inner	699	2,954	331	758	88	117	19	269	14	36	5,285
	Outer	52	331	2,792	150	20	4	2	39	5	46	3,440
North	Inner	950	758	150	3,604	323	472	41	216	9	33	6,555
	Outer	94	88	20	323	2,812	37	9	17	13	67	3,480
West	Inner	651	117	4	472	37	1,543	270	209	32	11	3,347
	Outer	88	19	2	41	9	270	2,508	51	96	21	3,103
South	Inner	740	269	39	216	17	209	51	1,185	128	9	2,861
	Outer	39	14	5	9	13	32	96	128	977	22	1,335
Outside		11	36	46	33	67	11	21	9	22	10	266
Total		6,257	5,285	3,440	6,555	3,480	3,347	3,103	2,861	1,335	266	35,929

Source: Study Team

Table 5.2 Growth of Distributed Demand, 2002 and 2020

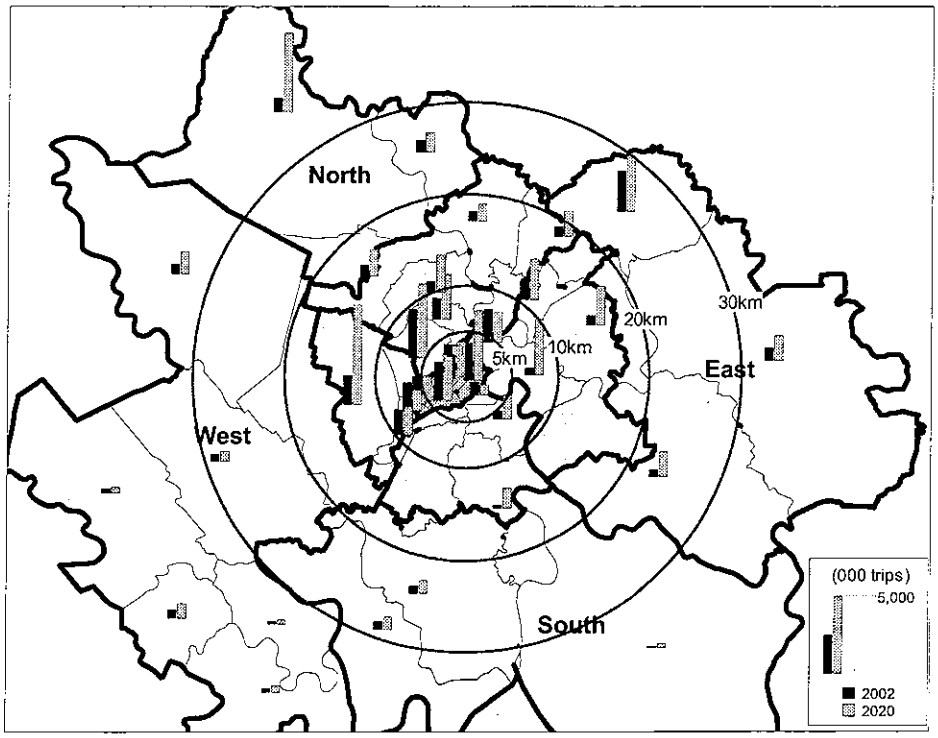
Ratio of 2020/2002

Area		CBD	East		North		West		South		Out side	Total
			Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer		
CBD		1.1	2.1	2.4	1.8	3.4	1.8	3.3	1.7	2.2	0.4	1.4
East	Inner	2.1	1.9	8.5	3.0	8.8	4.7	9.5	6.0	7.0	1.7	2.3
	Outer	2.4	8.5	1.5	8.8	10.0	2.0	-	13.0	5.0	2.7	1.8
North	Inner	1.8	3.0	8.8	1.5	3.9	3.0	8.2	4.2	9.0	1.6	1.8
	Outer	3.4	8.8	10.0	3.9	3.0	7.4	9.0	8.5	6.5	4.2	3.2
West	Inner	1.8	4.7	2.0	3.0	7.4	1.7	4.0	2.9	5.3	1.4	2.1
	Outer	3.3	9.5	-	8.2	9.0	4.0	1.7	4.6	5.6	5.3	1.9
South	Inner	1.7	6.0	13.0	4.2	8.5	2.9	4.6	1.1	4.6	1.0	1.6
	Outer	2.2	7.0	5.0	9.0	6.5	5.3	5.6	4.6	1.5	4.4	1.8
Outside		0.4	1.7	2.7	1.6	4.2	1.4	5.3	1.0	4.4	0.4	1.7
Total		1.4	2.3	1.8	1.8	3.2	2.1	1.9	1.6	1.8	1.7	1.9

Source: Study Team

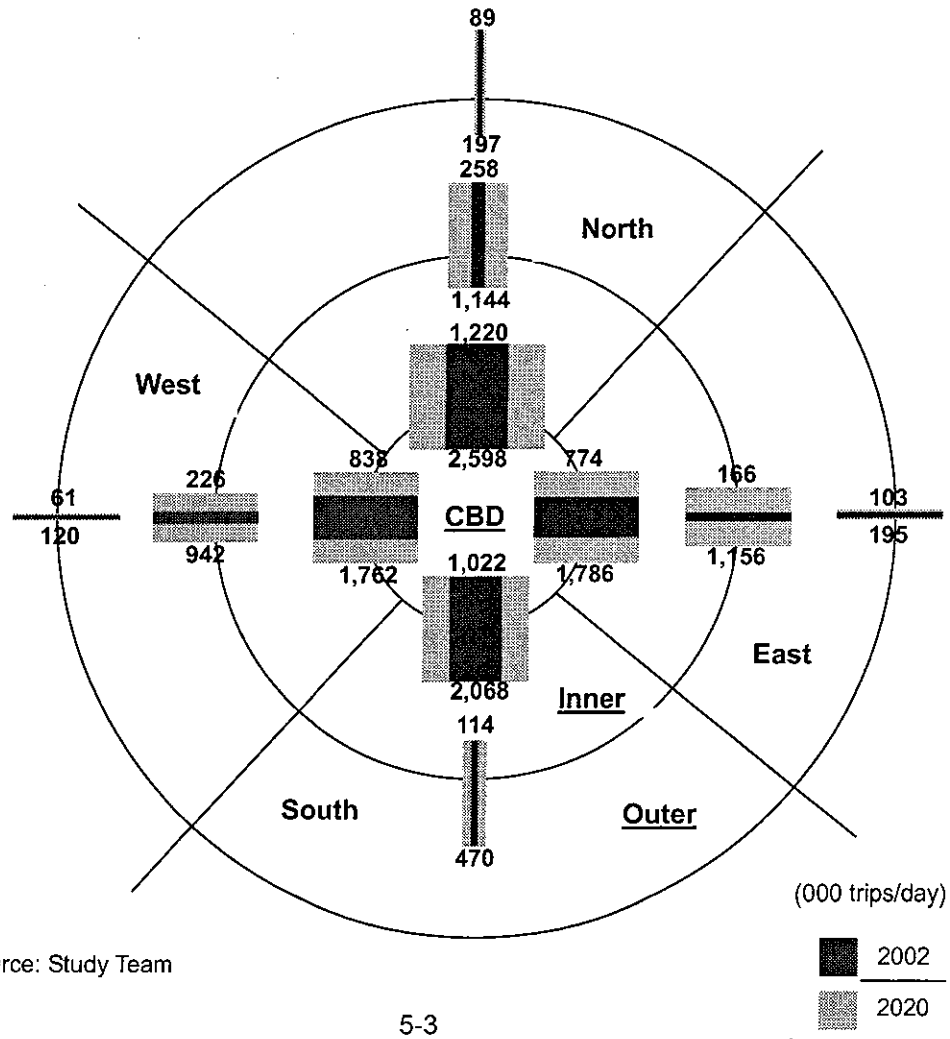
[3] Including volume/capacity ratio (V/CR), travel speed, etc.

Figure 5.2 Generated and Attracted Trips, 2002 and 2020



Source: Study Team

Figure 5.3 Growth of Demand by Direction, 2002-2020



Source: Study Team

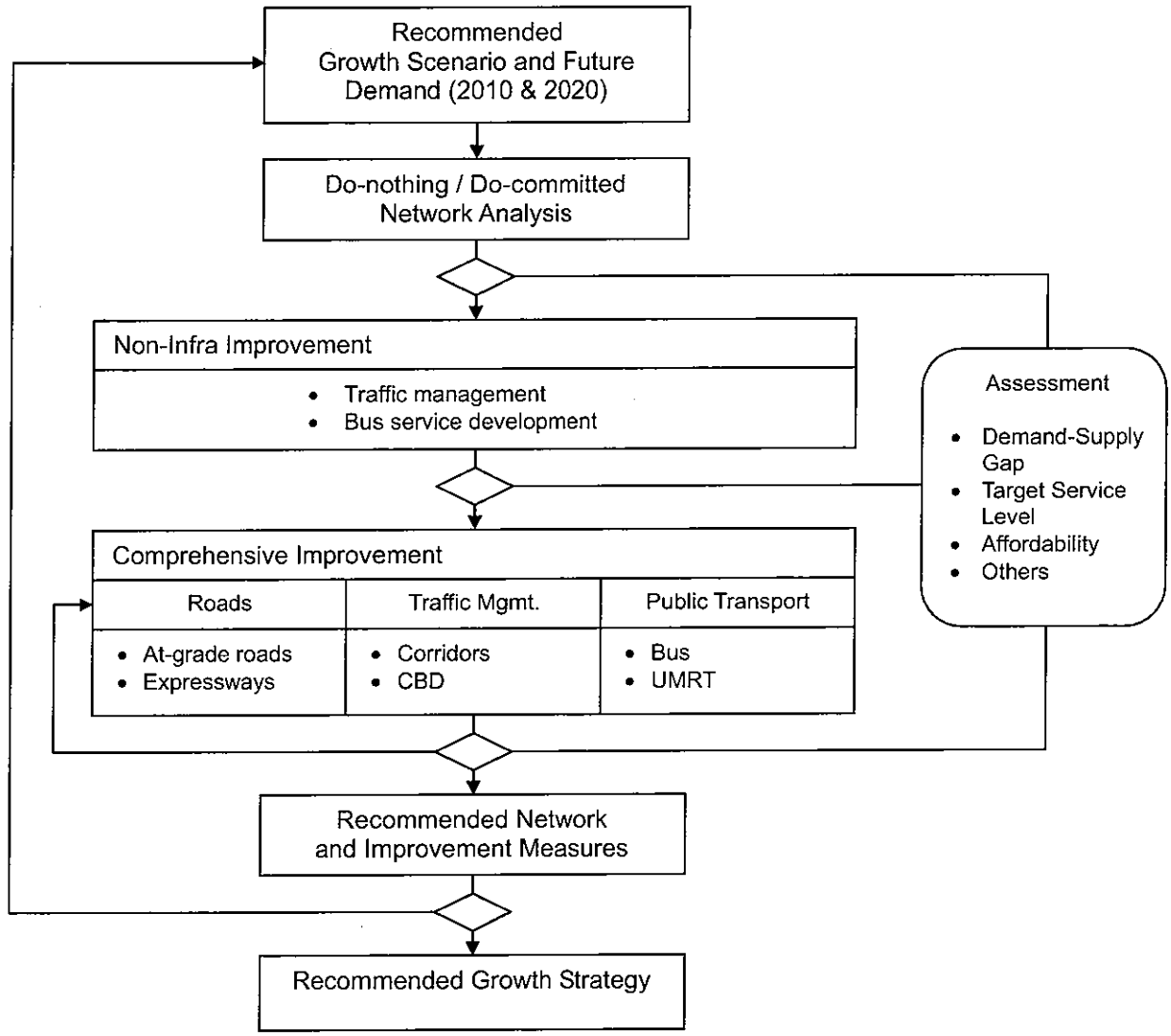
Figure 5.4 Trip Distribution, 2002 and 2020

Source: Study Team

6 FORMULATION OF LONG-TERM TRANSPORT NETWORK

The recommended growth scenario gives an orientation that is premised on an integrated transport network structure with future land use. Based on that, a detailed planning work was undertaken to further elaborate the transport network. This was done by first assigning future traffic demand on the "Do-nothing" and "Do-committed" networks[1] to assess the demand-supply gap. Afterwards, alternative network plans were prepared and tested to devise the most appropriate network, hewing closely to a realistic future traffic situation. The performance of the alternative networks was evaluated at city-wide level as well as by corridor and classified area.[2]

Figure 6.1 Network Analysis/Planning Framework



Source: Study Team

[1] The "Do-nothing" network refers to the existing network without any addition in the future, while the "Do-committed" network includes the completion of ongoing and committed projects

[2] A total of eight corridors in the CBD and 4 areas alongside each corridor (32 classified areas).

1) Analysis of "Do-nothing" and "Do-committed" Network

Traffic Situation under "Do-nothing" Scenario: The existing road network can no longer accommodate the expected future traffic demand which will be about 2.4 times more than now (see Table 6.1). Traffic congestion will worsen from a volume/capacity ratio (V/CR) of 0.7 to 2.1 and travel speed will decrease (from 23.8kph to 11.4kph) and the costs of transport will increase dramatically (8.8 times). Congestion will spread all over the study area and the people can travel only half way within an hour's travel time (see Table 6.1 and Figure 6.2).

Traffic Situation under "Do-committed" Scenario: Even if ongoing projects with a total investment cost of US$ 333 million will be completed,[3] the traffic situation in the future will only slightly improve (see Table 6.1 and Figure 6.2).

Impact on Household Expenditure: According to the HIS, in 2002 an average household spent about 17% of household earnings (VND 2.6 million/month) on transport. If the traffic situation will not improve, in 2020 each household must spend 24% of its monthly earnings (about VND million) on transport.

Impact on Environment: The negative impacts of congestion and poor transport services on society will cut across all aspects. Economic competitiveness will reduce, livability will deteriorate, safety will be threatened, and air pollution will worsen, and in all of these, the poor will be the worst affected. The total emission of nitrogen oxide (NOx) will increase by more than seven times if nothing is done, while that of carbon dioxide (CO_2) by about six times between 2002 and 2020 (see Table 6.2).

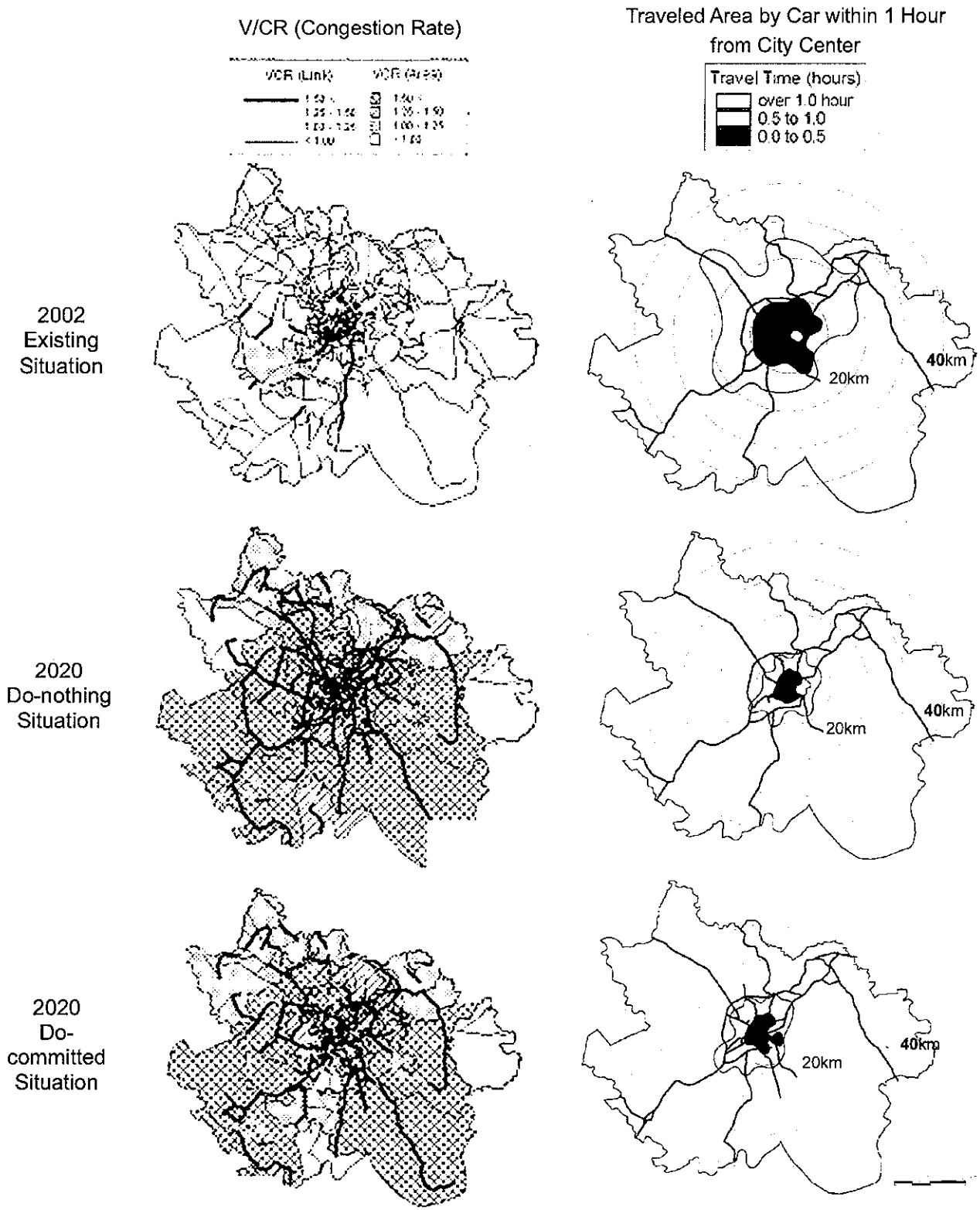
Table 6.1 Impact on Traffic of Do-nothing and Do-committed Networks

		2002	2020		*Ratio 2020/2002*	
			Do Nothing[1)]	Do Committed[1)]	*Do Nothing*	*Do Committed*
Traffic Demand (mil. PCU)		3.1	7.3	7.3	*2.4*	*2.4*
Traffic Load	PCU-km (mil.)	26.9	77.2	77.8	*2.9*	*2.9*
	PCU-hrs (mil.)	1.1	6.7	5.9	*6.1*	*5.4*
Travel Features	Ave. Travel Speed (kph)	23.8	11.4	13.3	*0.5*	*0.6*
	Ave. V/C Ratio	0.7	2.1	1.8	*3.0*	*2.6*
Transport Cost (mil US$)	VOC	2.6	11.0	10.2	*4.2*	*3.9*
	Passenger Time Cost	4.7	53.6	46.0	*11.4*	*9.8*
	Total	7.3	64.6	56.2	*8.8*	*7.7*
Air Quality	NOx (ton/day)	17.0	124.4	123.5	*7.3*	*7.3*
	CO_2 (ton/day)	1,858	11,484	10,891	*6.2*	*5.9*

Source: Study Team
[1)] Assumed modal share (%) of M/C, car, bus: 50/20/30. Average occupancy: M/C - 1.3, car - 1.9, bus - 36.

[3] See Chapter 6.2 for ongoing/committed projects.

Figure 6.2 Assignment of Future Traffic Demand on Do-committed Network



Source: Study Team
[1] It was assumed that travel will be by car.

2) Scenario for Analysis

While the transport network structure was studied in an integral manner with future land use and urban structure, the performance of the transport network was expected to be affected by traffic composition and control. For this reason, various scenarios were tested to assess their impact on network performance (see Table 6.2). The results are as follows (see Figure 6.3):

(1) The most critical factor which will affect infrastructure capacity and performance will be the quantity of buses in operation and the quality of their services as well as the traffic volume of cars. An efficient bus system and control of car traffic will be an important policy to avoid excessive investments in infrastructure.

(2) At-grade roads alone cannot meet future traffic demand. It is also likely that construction of at-grade roads in already urbanized areas will be constrained by land acquisition and resettlement which will increasingly become more difficult. Especially to improve accessibility to the CBD and along key corridors, development of segregated urban rail and elevated expressways will become necessary.

(3) The above results were derived based on the assumption that bus would share 30% of total demand. This means if the current low modal share of bus would continue in the future the requirement for infrastructure would be enormous. Moreover, infrastructure alone would hardly improve the situation.

It is important to note that the requirement for increased infrastructure capacity is greatly related to how it is used. Particularly important points are the development of an efficient public transport, demand control, and monitoring of vehicle traffic based on an adequately planned network.

Table 6.2 Description of Different Scenarios

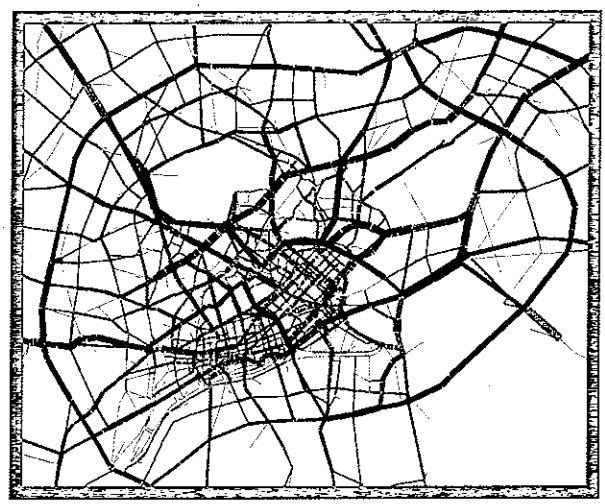
Strategy		Description	Modal Policy		
			Mode	Share (%)	Average Occupancy
Base Scenario	A	At-grade Road Only	Motorcycle	50	1.3
	B	At-grade Road + Urban Expressway[1] + UMRT[2]	Car	20	1.9
			Bus/Rail	30	36
Alternative Scenario	1	Present Modal Share[3]	Motorcycle	90	1.3
			Car	5	1.9
			Bus	5	36
	2	Trend Modal Share[3]	Motorcycle	65	1.3
			Car	25	1.9
			Bus/Rail	10	36
	3	Strong Bus Improvement[3]	Motorcycle	30	1.3
			Car	20	1.9
			Bus/Rail	50	50
	4	Increase in Car Usage[3]	Motorcycle	40	1.3
			Car	30	1.9
			Bus/Rail	30	36

Source: Study Team
[1] Toll fee on urban expressway: 15,000VND/ride; on interregional expressway: 1,000VND/km.
[2] Fare on UMRT: 5,000VND/ride +500VND/km.
[3] Network is the same as that under Base Scenario B.

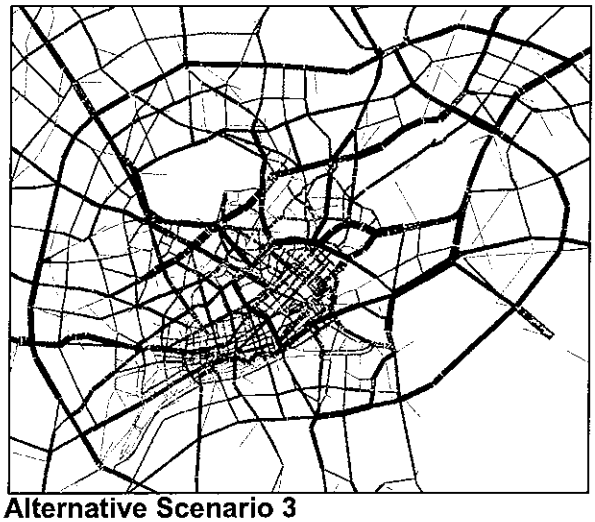
Figure 6.3 Traffic Assignment on Future Network by Scenario [1)]

Base Scenario (A)

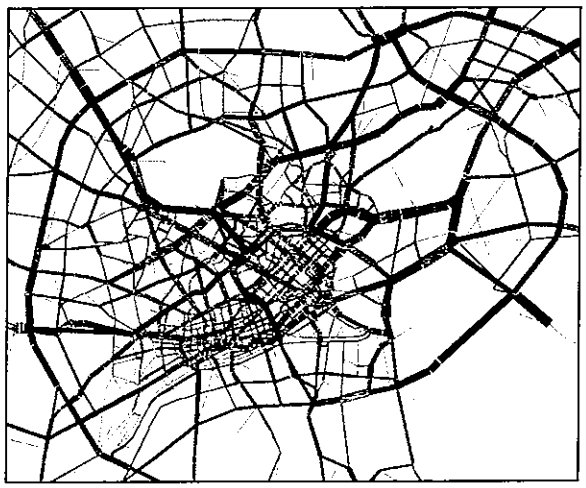
Base Scenario (B)



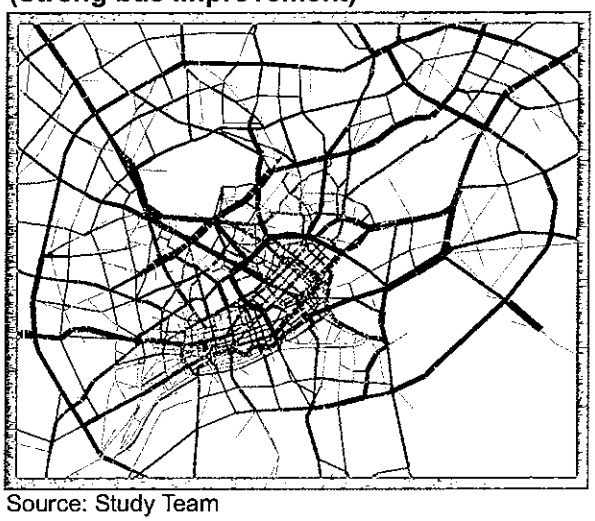
Alternative Scenario 1
(Present modal share)



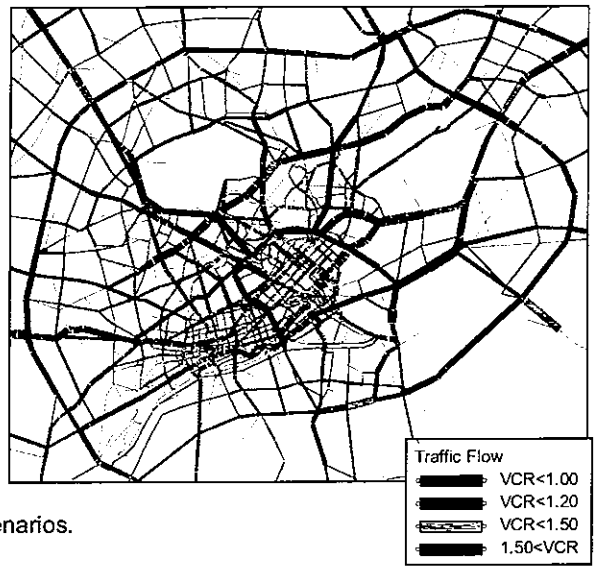
Alternative Scenario 2
(Trend modal share)



Alternative Scenario 3
(Strong bus improvement)



Alternative Scenario 4
(Increased car use)



Source: Study Team

[1)] Refer to Table 6.2 for further description of alternative scenarios.

3) Recommended Future Urban Transport Network

Based on the analysis of a series of alternative scenarios including modal share as well as network configuration, a future transport network was formulated. In this network, the following were assumed to be guaranteed through adequate policy intervention: (a) public transport will share 50% of the total demand; (b) buses will be operated efficiently with high load factor; (c) car use will be limited to more or less 20% of total traffic demand; (d) basic traffic management and maintenance will be practiced adequately; and (e) there are no serious traffic bottleneck in the network.

The Master Plan network will be composed of roads, including at-grade primary and secondary roads, and elevated urban expressways, as well as mass transit systems including urban rail and busway. The Master Plan network will be a total of 703km of new roads covering 238km of primary roads, 419km of secondary roads, 46km of urban expressways, and 138km of mass transit lines (see Table 6.3 and Figure 6.4). In the study area, there are a number of important inter-city transport projects which were considered in network planning, particularly the Vietnam Railway (VR) line between Hoa Hung and Bien Hoa and an inter-city expressway (see Table 6.4).

Table 6.3 Roads and UMRT Development by 2020

Area	Infrastructure		2002 (km)	M/P Project		2020 (km)	Increase	
				Widen-ing[1)]	New		km	*Ratio 2020/2002*
HCMC	Road	Primary	206	113	128	476	271	*2.3*
		Secondary	309	213	251	647	338	*2.1*
		Urban EXP.	-	-	46	46	46	-
	UMRT		-	-	106	106	106	-
Adjoining Provinces	Road	Primary	185	27	110	295	110	*1.6*
		Secondary	297	172	168	569	272	*1.9*
	UMRT		-	-	32	32	32	-
Study Area Total	Road	Primary	391	140	238	771	380	*2.0*
		Secondary	606	385	419	1,216	610	*2.0*
		Urban EXP.	-	-	46	46	46	-
	UMRT		-	-	138	138	138	-

Source: Study Team

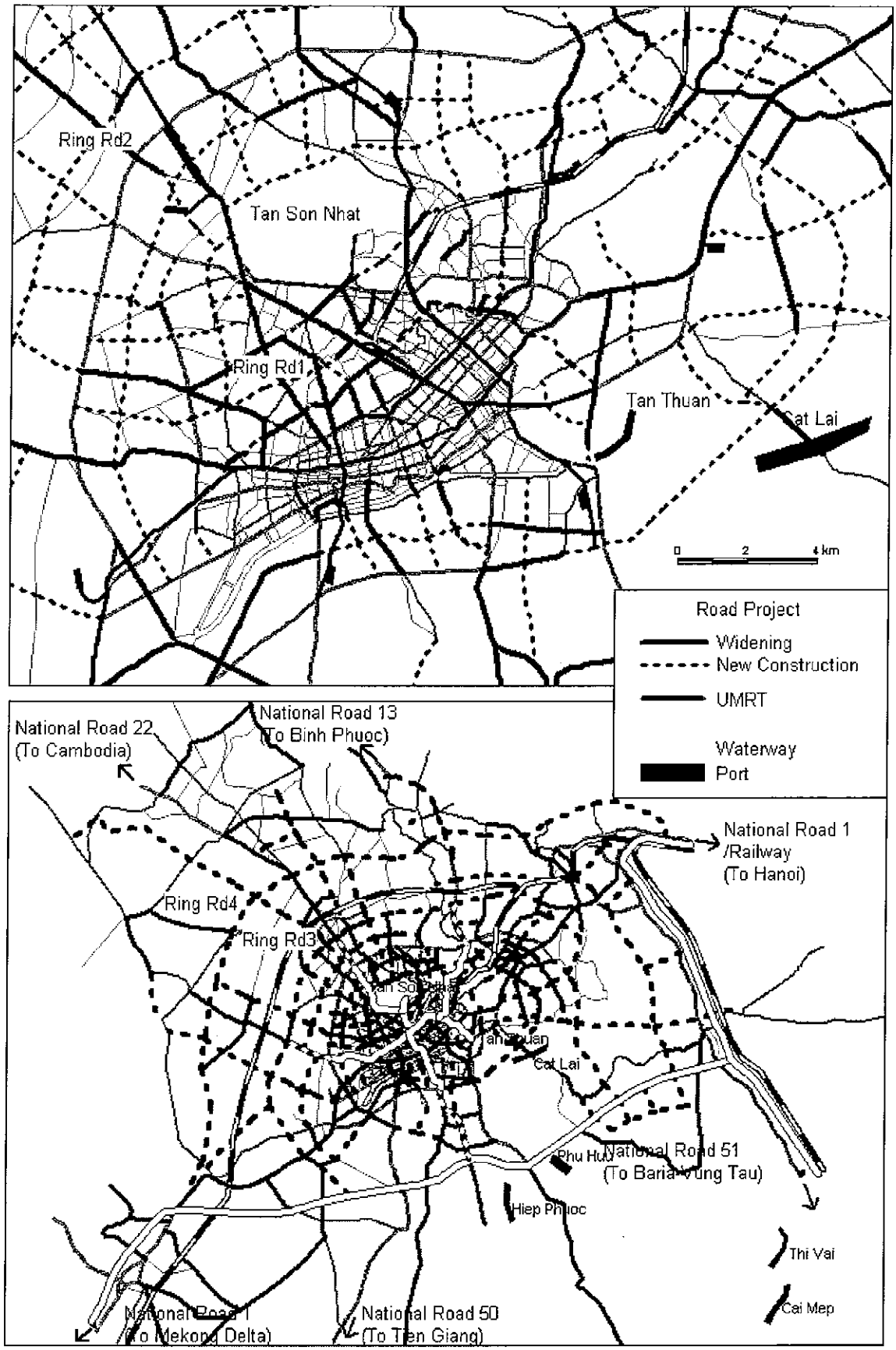
[1)] Includes roads reclassified and upgraded from a lower to a higher category due to widening.

Table 6.4 Inter-city Transport Projects Related to Master Plan

Sector	Project	Planned By
Road	1. My Tho - Nhon Trach Expressway (127km)	HOUTRANS
	2. Bien Hoa - Vung Tau Expressway (81km)	MOT Project
Railway	1. Hoa Hung - Bin Trieu Section: Elevated, double track	MOT Project
	2. Vung Tau Line: Construction (Bien Hoa - Vung Tau)	MOT Project
	3. Mekong Delta Line: Construction (An Binh - Tan Kien - My Tho - Can Tho)	MOT Project
	4. ASEAN Railway: Construction (Di An - Loc Ninh, Tan Thoi Hiep - Trang Bang)	MOT Project
Port	1. Thi Vai, Cai Mep (Thi Vai River)	MOT Project
	2. Hiep Phuoc (Soai Rap River)	MOT Project
	3. Cat Lai (Dong Nai River)	MOT Project
Airport	1. Long Thanh (Dong Nai)	MOT Project

Source: Study Team

Figure 6.4 Master Plan Network, 2020



Source: Study Team

4) Performance of Master Plan Network

The likely traffic conditions and transport situation when the Master Plan network would be completed was simulated using the model. While total demand will increase from 3.1 million PCU-trip[4] to 7.3 million or 2.4 times between 2002 and 2020, PCU-km and PCU-hours will increase 2.8 times and 2.5 times, respectively. This means people will have to travel longer and spend more time traveling. Overall traffic congestion level will increase from 0.7 to 0.9, but average travel speed is expected to increase due to network improvement and development of high-standard roads such as urban expressways and ring roads (see Table 6.5 and Figure 6.5). With this improved network, the distance people can reach from the city center (PC hall) will also lengthen (see Figure 6.5).

Overall transport cost of the users will increase by 3.7 times due to increase in demand, travel distance, and travel time. However, the impact on household expenditure will slightly improve. The percentage of transport expenditure of an average household in 2002 was estimated to be 17% according to the HIS and this will become 16% in 2020 when the Master Plan network is completed. This means that a household that spent about VND 440,000 a month for transport in 2002 will spend about VND 1.3 million in 2020.

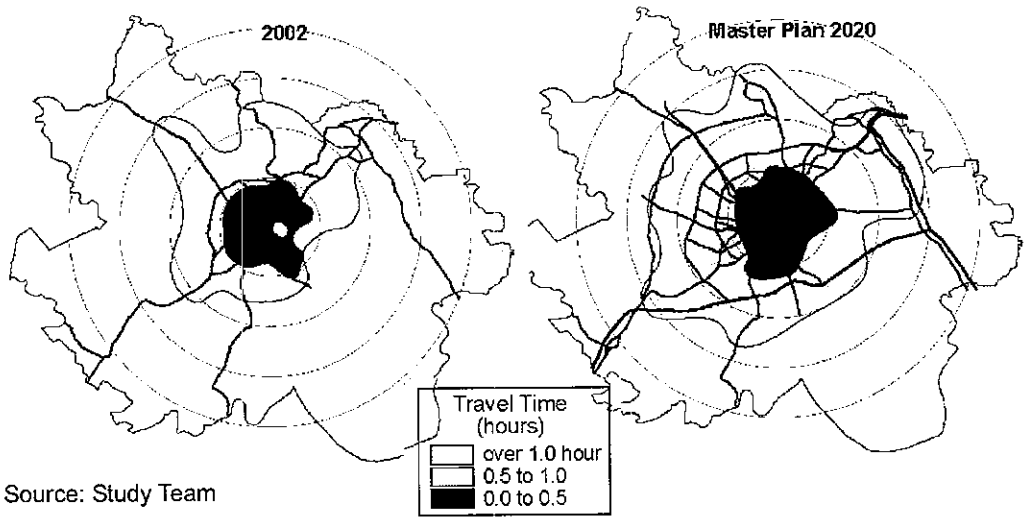
Table 6.5 Comparison of Alternative Network Performance

		2002	2020[1)]	*Ratio 2020/2002*
Traffic Demand (mil. PCU)		3.1	7.3	*2.4*
Traffic Load	PCU-km (mil.)	26.9	75.6	*2.8*
	PCU-hrs (mil.)	1.1	2.7	*2.5*
Travel Features	Ave. Travel Speed (kph)	23.8	28.4	*1.2*
	Ave. V/C Ratio	0.7	0.9	*1.3*
Transport Cost (mil US$)	VOC	2.6	6.2	*1.6*
	Passenger Time Cost	4.7	20.9	*4.4*
	Total	7.3	27.1	*3.7*

Source: Study Team

[1)] Assumed modal share (%) of M/C, car, bus: 50/20/30. Average occupancy: M/C - 1.3, car - 1.9, bus - 36. Toll fee on urban expressway: 15,000VND/ride; on interregional expressway: 1,000VND/km. Fare on UMRT: 10,000VND/ride.

Figure 6.5 Impact of Recommended Network on Future Travel Coverage (Travelled Area by Car within One Hour)



Source: Study Team

[4] It was assumed that traffic would be composed of 50% of motorcycle, 20% of car, and 30% of bus with an average load factor of 1.3, 1.9, and 36 passengers for motorcycle, car and bus, respectively.

With the implementation of the Master Plan network, the availability of roads will improve. At city level, the total length will double, although the length per population will increase by 10% only. At district level, the availability of roads will vary significantly by area depending on the urban growth strategy that will be taken. Nonetheless, the roads are expected to increase in all the districts (see Table 6.6).

Table 6.6 Road Availability by District, 2002 and 2020

		District	Road Length (km)[1]		Road Availability[1]						Growth (2020/2002)			
					% to Area		Length/pop. (km/mil.)				Length	% to Area	Length to population	
							2002		2020[2]					
			2002	2020[2]	2002	2020[2]	Day Time	Night Time	Day Time	Night Time			Day Time	Night Time
HCMC	Inner Core	District 1	23	31	8.2	10.8	55	102	34	144	1.3	1.3	0.6	1.4
		District 3	19	23	9.4	10.8	64	85	47	117	1.2	1.1	0.7	1.4
		District 4	3	6	2.0	3.9	20	16	48	35	1.9	1.9	2.4	2.2
		District 5	16	17	9.8	11.9	50	76	33	85	1.1	1.2	0.7	1.1
		District 6	13	25	4.8	9.0	46	48	92	91	1.9	1.9	2.0	1.9
		District 10	11	16	5.0	7.0	40	46	44	79	1.4	1.4	1.1	1.7
		District 11	16	16	6.0	7.7	76	66	103	71	1.0	1.3	1.4	1.1
		Phu Nhuan	7	9	3.4	5.4	44	37	73	51	1.4	1.6	1.7	1.4
	Inner Fringe	District 8	14	32	0.9	4.3	49	39	100	79	2.3	4.8	2.0	2.0
		Binh Thanh	16	35	3.0	5.5	43	38	102	67	2.2	1.8	2.4	1.8
		Tan Binh	33	60	1.7	4.6	54	49	80	51	1.8	2.7	1.5	1.0
		Go Vap	16	38	1.8	5.3	53	46	82	48	2.3	3.0	1.6	1.0
	Emerging Peripheral	Thu Duc	17	54	0.8	3.5	61	74	104	104	3.2	4.4	1.7	1.4
		District 12	33	61	1.5	3.3	182	168	153	103	1.8	2.2	0.8	0.6
		Binh Chanh	79	204	0.4	1.6	214	206	192	141	2.6	4.3	0.9	0.7
		District 2	11	48	0.4	4.2	118	102	71	74	4.3	10.6	0.6	0.7
		District 7	20	35	1.5	3.0	148	170	102	125	1.7	2.0	0.7	0.7
		District 9	6	67	0.2	2.2	51	41	120	163	10.3	12.5	2.4	4.0
	Sub-urban	Hoc Mon	16	59	0.3	1.1	90	77	192	131	3.6	3.5	2.1	1.7
		Nha Be	5	42	0.1	0.9	87	71	127	307	8.7	12.0	1.5	4.3
	Rural	Cu Chi	80	185	0.3	0.7	333	311	200	223	2.3	2.3	0.6	0.7
		Can Gio	58	58	0.1	0.2	998	955	994	627	1.0	1.8	1.0	0.7
Adjoining Provinces	Satellite Urban	Thu Dau Mot	40	57	0.8	1.4	265	258	236	228	1.4	1.8	0.9	0.9
		Bien Hoa	51	102	0.8	1.4	100	101	154	138	2.0	1.8	1.5	1.4
		Tan An	27	27	0.5	0.5	227	229	131	135	1.0	1.0	0.6	0.6
	Sub-urban	Thuan An	33	76	0.9	2.0	260	261	388	354	2.3	2.3	1.5	1.4
		Di An	21	40	0.8	2.0	165	184	121	133	1.9	2.5	0.7	0.7
	Rural	Long Thanh	88	113	0.2	0.3	492	435	364	377	1.3	1.6	0.7	0.9
		Nhon Trach	11	86	0.0	0.3	96	100	249	285	7.5	22.2	2.6	2.9
		Can Giuoc	39	71	0.2	0.6	269	247	376	349	1.8	3.0	1.4	1.4
		Can Duoc	22	27	0.1	0.2	137	130	138	120	1.3	1.5	1.0	0.9
		Chau Thanh	16	49	0.1	0.4	175	155	475	398	3.1	4.5	2.7	2.6
		Thu Thua	20	23	0.1	0.1	239	230	236	216	1.1	1.2	1.0	0.9
		Ben Luc	40	65	0.2	0.3	324	310	451	425	1.6	1.8	1.4	1.4
		Duc Hoa	74	113	0.2	0.4	397	373	335	377	1.5	2.0	0.8	1.0
		Tan Tru	0	14	0.0	0.2	0	0	201	189	-	-	-	-
Study Area Total			**997**	**1,988**	**0.3**	**0.9**	**130**	**130**	**147**	**147**	**2.0**	**2.5**	**1.1**	**1.1**

Source Study Team

[1] Primary/secondary roads only; from HOUTRANS GIS.

[2] HOUTRANS Master Plan.

The impact on air quality will also be significant. While the total emission will increase even with the implementation of the Master Plan because of the expected significant growth of the urban system, the negative impact will be much greater if the Master Plan is not implemented. The share of public transport is thus very critical.

Table 6.7 Impact on Air Quality

Pollutant	2002	2020			Reduction	
		Do Nothing Do Committed	Master Plan		PT=50%	PT=10%
			PT=50%	PT=10%		
Nox	17	124	61	102	63	62
CO_2	1,858	11,000	4,020	7,330	6,980	3,670

Source Study Team

7 DEVELOPMENT AND PROMOTION OF PUBLIC TRANSPORT SERVICES

1) The Road to Year 2020

At the same time as the trip market expands from 19 million to 26 million in 2010 and 36 million in 2020, the plan is for buses to capture 25% share (up from less than 2%, at present) by 2010 and 30% by 2020.

It is an ambitious goal – more difficult than current efforts to inject 1,318 new buses – and one which may push current subsidies to dangerous levels. One necessary, but insufficient, condition to get there is to reorganize existing small operators into fewer, and better-managed, fleet operators.

If the bus leasing program fails, th-e share of public transport in HCMC would remain low. Trips on private modes of transport – cars (much higher than at present) and motorcycles (lower, but still a sizeable share) – would dominate the picture. Traffic congestion would be inevitable, since HCMC would not be able to afford the required investments in new roads to match demand.

To avoid the latter fate and achieve the vision of a public-transport-oriented city, HCMC has to adopt a coherent long-term strategy.

2) Sector Structure and Strategies

There are three basic choices or policy regimes for public transport development, viz,: (a) through a monopoly, either by a public agency or a private entity; (b) regulated competition of several operators; and (c) free-market deregulated transport regime.

The third path is a non-starter under present conditions in HCMC. It is also equivalent to a private-transport-oriented urban transport strategy. The demand for public transport market is weak, and will remain so, unless government intervenes. Private bus operators have no access to capital for expansion, or the wherewithal to transform themselves to a different business model. However, the strategy represents a "no-pain-no-gain" alternative to HCMC.

Public transport development by a public sector monopoly, or by a few large private operators, complemented by small operators on secondary and feeder lines, under a regulated competition regime offer the most promise. However, they differ in their risk-reward profile. The second path – controlled competition regime – entails painful adjustments in the short term but minor pains afterwards. The public monopoly option postpones the pain, but could lead to runaway fiscal deficits.

HCMC has chosen to take the middle path. To succeed, it will have to be supported by reforms in both the public and private sectors. The public transport market should be viewed – in regulatory terms – as comprising two complementary markets: Tier 1 and Tier 2. The first category would refer to trunk or primary bus routes, to be served by large fleet operators[1] who will be protected from competition. After 2010, when the operators shall have gotten their full bearings and when subsidy winded down, competition *for*, rather

[1] Seven is proposed as maximum, to relate to the 7 definable transport corridors. Actual number can be less.

than *in*, the market shall be introduced. On the other hand, Tier 2 will comprise feeder routes and zones of responsibility, where small, individual operators under the umbrella of a cooperative shall be franchised.

Table 7.1 outlines how the bus mode should evolve under the preferred strategy.

Table 7.1 Evolution of Bus Transit in HCMC

Aspects of Bus Operations	Short Term	Medium Term	Long Term
Industry Structure	Consolidation of small cooperatives, and formation of 3-4 large-fleet companies	Entry of 3 new large-fleet operators, possibly by splitting existing ones, and relocation of affected small operators to feeder routes	Possible addition of another fleet operator, depending on circumstances
Regulatory Body	MOCPT with reinforced staff	MOCPT	Autonomous body, with appreciation of commercial culture
Procurement of Buses	Decided by government and parceled out to operators	Quantity, type, and supplier to be decided by operators under general specifications by the regulatory body	Quantity, type, and supplier to be decided by operators under general specifications by the regulatory body
Ticketing	Printed, issued and controlled by MOCPT	Printed, issued and controlled by MOCPT	Use of smart card or RFID for ticketing, acceptable across all operators, including rail transit
Fares	Flat, at ₫1,000 and set below cost. Raise to ₫2,000. Introduce transfer schemes	Adopt distance-related or zonal, adjusted periodically to approximate cost.	Same as in medium-term. However, introduce transfer schemes, with use of smart card.
Method of Paying Operating Subsidy	Paid out according to standard cost per bus-trip	Paid out according to bus-space-kilometer (bus-seat-km)	Suitable mix based on both production and passengers attracted
Market Entry	Route licensing via service contracts of 1-year tenor.	Franchising for specific corridors, with 3-5-year tenor, renewable depending on performance	Franchising, with tendering, among the established fleet operators, 3-5-year tenor
Route Planning	Initiated by MOCPT, results allocated to operators	Tier 1 routes set by gov't; Tier 2 routes shared by operators and government	Tier 1 routes set by gov't; Tier 2 routes shared by operators and government
Service Type and Scheduling	Largely specified by MOCPT Mainly regular and basic bus	Minimum specifications from government, but details left to operators Air-con and premium services	Minimum specifications from government, but details left to operators Diversity of services, at discretion of operators
Passenger Information	Principally by government	Principally, by government	Principally, by government since coordinated with e.g. rail and other modes
ITS Applications	Use of cellular phones	Radio communication	Smart card, GPS for bus location & spacing, traffic signal priority, passenger information in vehicles and at stops, internet information RFID technology

Source: Study Team

3) Mass Transit Development Opportunity and Strategy

Mass transit has often been associated with rail transit systems. However, capacity on a single transport corridor is not always the determining factor since urban public transport by nature has to cover an area rather than a corridor. .

There are several factors why HCMC should avoid premature commitment to rail transit. First is the huge investment, most of which requires scarce foreign exchange. With few exceptions, they require continuing subsidy – and therefore a burden on public coffers. Second is the risk that comes from putting a fixed guideway that can not be relocated if passenger demand fails to materialize. Third is the evolving pattern of urban development.

To minimize the risk, HCMC has to nurture the emergence of mass transit corridors out of existing bus routes. This is done by identifying a core set of bus routes that can grow into the mass transit corridors of the future. The two (UMRT-candidate) corridors should be developed first as busways – either with dedicated or bus priority lanes. Feeder lines and station developments should be implemented to boost passenger volumes on these lines. If and when the volume approaches the upper limits of a bus rapid transit system, then a conversion into the second stage (a rail mode) could be entertained. This represents a low-risk and low investment strategy, which also preserve future ROWs for mass transit.

A second strategy is to do land banking or land conservation. Because of the agglomeration effects of mass transit, the land closer to the lines, or those within walking distance from stations, become very valuable. HCMC should start the process of: (a) acquiring those lands intended for transit stations, or (b) initiating discussions with current owners or leaseholders for a possible expropriation or joint-venture arrangement. These preparations would ensure than development gains from mass transit can be recaptured to subsidize operations.

HCMC should learn from the experiences of cities in other countries, in particular other Asian cities, in developing and constructing their mass transit systems. Success as well as failures and mistakes should be studied, especially the cases in Bangkok, Manila, Singapore, and Kuala Lumpur. It should also resolve the many issues – technical, financial, operational, and legal – attendant to a mass transit project. The key components of the development strategy are as follows:

Market Segmentation and Industry Restructuring: The creation of Tier 1 and Tier 2 markets, as alluded to earlier.

Service Improvements: Through the redesign of the bus route network to improve coverage and support the market segmentation, application of bus-priority/bus-only lanes on primary corridors to improve journey times and reliability of schedules, new types of services (express, more comfortable vehicles, etc.), higher frequencies of service, construction of bus shops, and passenger interchange facilities.

Public Sector Reforms: These shall include the streamlining of the regulatory system to be more market-friendly and market-sensitive, leveling the playing field between government and private operators and between domestic and foreign investors, the future transformation of the Management and Operation Center of Public Passenger Transport (MOCPT) into an impartial transport regulatory and planning body.

Government Support: In the form of technical assistance in fostering a modern and commercial system of fleet management, calibration of operating subsidy with performance, conversion of subsidy into fare subsidy to workers, provision of common-user facilities (e.g. passenger interchange stations, bus stops, bus shelters, passenger information system, and on-street signals), equality of private and government operators in the allocation of buses under the bus leasing program.

4) Supplementary Public Transport Services

Para-transit is the term used by more developed countries to describe intermediate forms of public transport. In the Asian context, supplementary transport carries different labels – lambro in Vietnam, jeepneys in the Philippines, *tuk-tuk* in Thailand.

Their capacity is generally below 15 passengers, and they are converted from standard model vehicles to assume a distinctly local profile. As a business, they are, in the ideal case, described as privately owned, single proprietorship, family-managed, small enterprises. However, there are also many examples of exploitation and Mafia-type control especially in deregulated environments. For HCMC, the long-term direction is to accept and monitor para-transit – by legalizing and regulating xe oms and by giving lambro and bon banh a new lease on life in Tier 2 market.

Another type of public transport service that caters to a special but small market segment in HCMC is the river ferry that connects Thu Tiem to the city center. For interurban trips, especially to the southern delta regions, large boats and high-speed (hydrofoil) boats provide alternative services to provincial buses.

In all cases, para-transit and ferry services should be made integral members of a family of public transport modes.

5) Need for More Attention to NMV and Walking

While efficiency of motorized traffic is being attended to, importance should also be given to bicycling and walking which were once the major transport modes in the study area and which still have a great potential in many situations, provided an adequate environment is available. They are also very critical modes for accessing the public transport network.

8 TRANSPORT MASTER PLAN

1) Role and Components of the Transport Master Plan

The Transport Master Plan up to 2020 for HCMC not only depicts what the city should be by year 2020, but also lays down the path towards that future with the transport sector as the main driver. A set of coherent strategies is formulated to make the journey from the present to the future in a logical and sustainable manner.

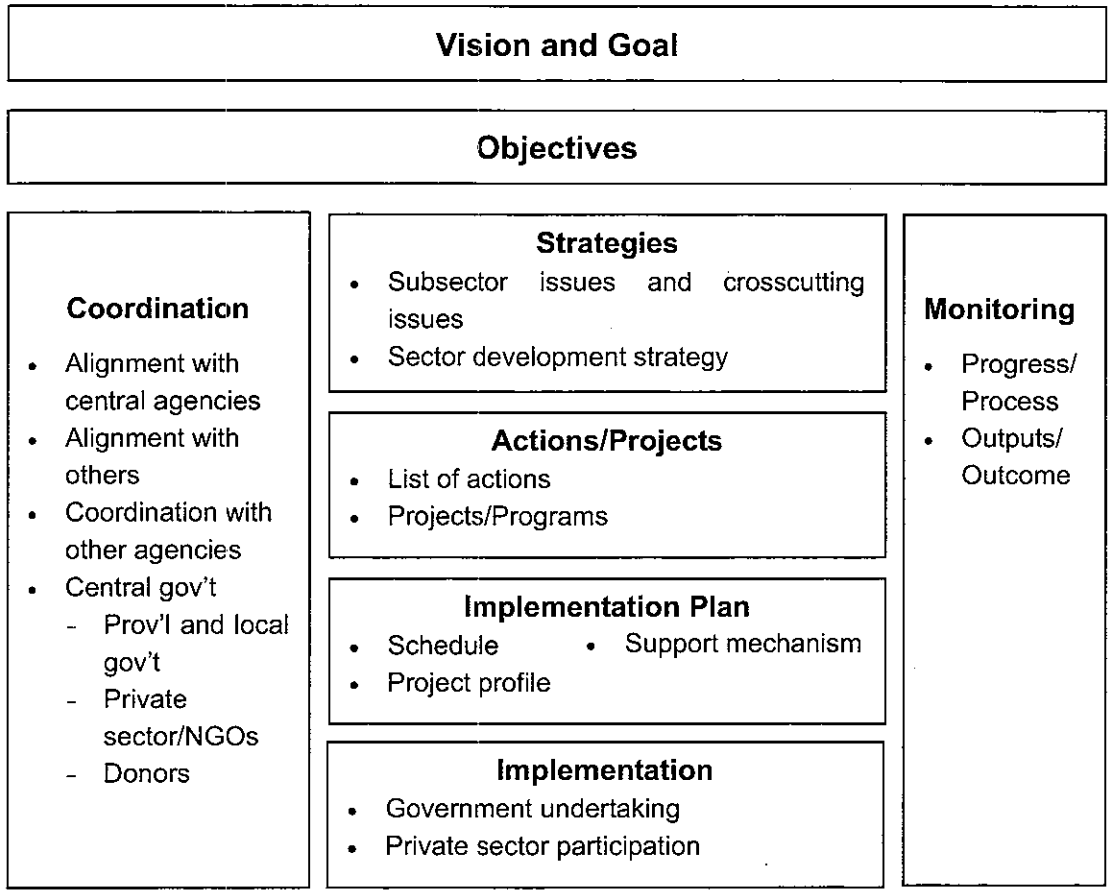
The Transport Master Plan comprises a long-term structural plan, a five-year short-term action plan, and a 10-year medium-term investment plan. The long-term plan provides overall development direction, the short-term plan includes definite projects/programs for implementation, and the medium-term plan provides a bridge to ensure consistency between the two. Necessarily, the Master Plan needs to be revisited periodically, at least every five years for refinements/adjustments and to reflect major changes in conditions and policies.

Although the Master Plan is usually de-composed into a set of projects and programs with intended implementation schedules, the projects are subject to further planning and feasibility studies, especially those that require large investments. Inclusion in the Master Plan is not a guarantee of subsequent implementation, but carries a *prima facie* justification. Therefore, the Transport Master Plan should be considered as a shared vision, a common agenda, among various stakeholders that should guide the development of the sector, address critical issues, promote coordination of subsector policies, and dictate priorities in resource allocation. It is also contemplated in the study that the Transport Master Plan should be workable and usable not only for officials and professionals but also for a wider range of stakeholders including ordinary people. This will facilitate their participation in planning and implementation.

(a) Structure of the Master Plan: The Master Plan lays down the procedures in the implementation of concrete actions in achieving long-term objectives. A potential lack of continuity and relationship between long-term objectives and project/action plan implementation has been noted. The Master Plan's framework is hierarchical: from the future basic objective (Vision), detailed objectives (Basic Objective), basic direction to achieve objectives (Strategy), action to implement strategies (Projects/Programs), to the implementation plan covering measures for project implementation (Modality). This process must be provided with working and coordination mechanisms to ensure effective implementation in a coordinated and participatory manner (see Figure 8.1).

(b) Monitoring of and Coordination for the Master Plan: Progress in the realization of the Master Plan should be assessed and measured along the way. This means regular monitoring by the government, as well as by various stakeholders, on how the Master Plan is unfolding in reality. This necessitates the preparation of a set of performance indicators to represent progress and status. Public involvement in transport planning and policy formation is expected to become a hallmark of Vietnam's governance, as the public gets to share more of the costs of services and infrastructure development, and is made to adjust commuting lifestyles in exchange for better mobility, improved accessibility, and safer travels.

Figure 8.1 Structure and Components of the Transport Master Plan



Source: Study Team

(c) Transport Master Plan and Urban Master Plan: HCMC's M/P 2020 is an official document approved by the Prime Minister. By its very nature, it does not fully incorporate the transport sector's development plan and strategies. Nevertheless, one cannot stand alone without the other. Especially for large cities, the two should be considered as "wheels of a motorcycle". Land use drives travel demand; conversely, transport shapes land uses and property developments. The basic urban structure will follow the contours of the primary transport network. Effective management of urban growth will therefore require coordinated interventions on transport and land use. The locations and timing of such transport infrastructure as primary roads, mass transit routes, and major transport terminals (e.g. international ports and airports, etc.) should be part and parcel of M/P 2020. Hence, the Transport Master Plan should also be given the *imprimatur* of the Prime Minister as the twin document of M/P 2020. Accordingly, mechanisms for harmonizing the transport and urban planning process should be established.

2) Vision and Goal

A bleak future can be expected for the study area, unless some strategic interventions are made along the way. Free-wheeling use of motorcycles and road space may still be tolerable for a small city, but not tenable in a conurbation of more than 10 million people with heightened expectations, active social lives, and diversified activities. An aging urban population will also demand a different quality of transport services. The HCMC of the future should be livable as well as globally competitive and attractive for industries, leading Vietnam's international trade, and the transport sector must be designed to make that possible.

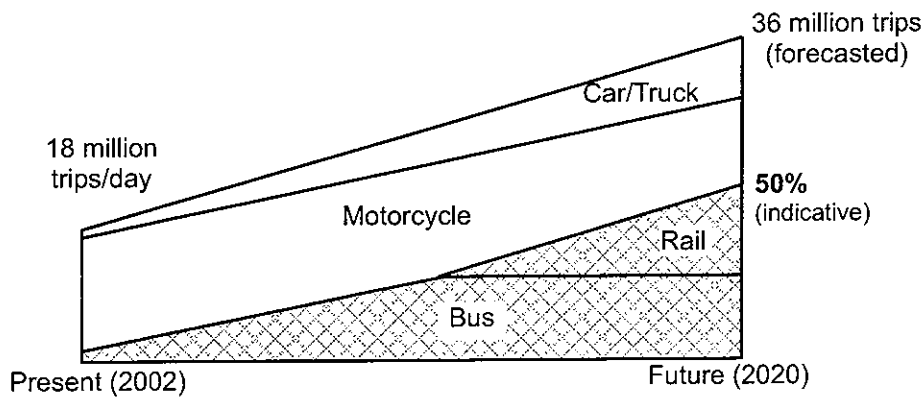
The overall goal of urban transport is the following:

"Ensure mobility and accessibility to urban services that are vital for the people and the society by providing a transport system characterized by safety, amenity, and equity and sustained by an efficient public transport system"

A combination of supply-type and demand-type of strategies is required to alter, radically, the modal shares of transport along the lines of the conceptual diagram shown below.

It should be noted that the modal shift is indicative. If the 50% share for public transport is not attainable, the resulting plan would overestimate the requirement for bus-rail capacity, but under-estimate vehicular volume on roads, thereby affecting the feasibility of many road projects.

Figure 8.2 Indicative Target for Modal Share in 2020



Source: Study Team

3) Objectives and Strategies

The overall goal has been restated into seven specific objectives and strategies, as follows:

A. Promotion of Social Understanding on Present and Future Urban Transport

Without even mentioning the current disorder and traffic behavior on roads, no policy and project would work effectively unless a wide and profound understanding of transport problems, issues and future directions is shared by the society.

To achieve this objective the following five strategies are suggested:

A1 Conduct of consecutive transport campaigns

A2 Expansion of transport education

A3 Strengthening of transport studies

A4 Implementation of Policy Test Project

A5 Information disclosure

B. Management of Sustainable Urban Growth and Development

How to define a vision of the future is highly important in the study area because a fast increasing population and economy will have huge impact on the urban development and the people's life. The transport sector must be a critical part of urban growth and management. To achieve this objective, the following five strategies are suggested:

B1 Policy coordination within metropolitan area

B2 Integration of City M/P and Transport M/P

B3 Development of systematic road network

B4 Promotion of Integrated urban and transport development

B5 Guidance for ideal urban development

C. Promotion and Development of Attractive Public Transport

Without public transport, the city's future is unthinkable. Future transport must be provided with sufficient quantity and quality. Attractive public transport system is the only solution which both city authorities and the people expect.

C1 Development of mass transit system

C2 Development of bus transport system

C3 Exploitation of para-transit and non-motorized vehicles (NMVs)

C4 Exploitation of water transport system

C5 Promotion of public transport use and expansion of services

D. Effective Management of Traffic and Demand

Infrastructure is costly and requires proper maintenance and management. Capacities of infrastructure are largely dependent on how it is operated. The importance of traffic management is not only for the efficiency of traffic but also for the safety, amenity and environment of the people and society. To ensure smooth traffic as well as share in a more equitable manner the cost and benefit of traffic and transport among stakeholders, various demand management measures are also to be introduced.

D1 Establishment of comprehensive management system for motorized vehicles

D2 Strengthening of traffic regulation & management

D3 Effective response to freight transport

D4 Establishment of parking policy

D5 Introduction of TDM (traffic demand management)

E. Comprehensive Development of Transport Space and Environment

Transport infrastructure provides important public space for the use of traffic, comprising different modes including walking, and various urban services and activities. Transport space is a contributory factor to attractive urban space and environment as well as disaster control. For this, it is also important to design and develop transport infrastructure and services comprehensively to enhance the quality of urban areas and activities.

E1 Management of transport corridors

E2 Improvement of transport environment for pedestrian and bicycle users

E3 Redistribution of transport space & improvement of traffic environment in city center

E4 Alleviation of air pollution

E5 Establishment of district transport development strategy

F. Enhancement of Traffic Safety

The people and the city are in danger due to increasing traffic accidents. The current condition of traffic safety in the city is unacceptable and a great threat to the city's future sustainability. The safety issue is a priority at national government level, too.

F1 Establishment of traffic safety audit system

F2 Elimination of traffic accident black spots

F3 Improvement of licensing & vehicle inspection system

F4 Strengthening of traffic enforcement system

F5 Strengthening of first aid system

G. Strengthening of Transport Sector Administration and Management Capacity

The tasks to be accomplished for the city's present and future are enormous and require a more comprehensive and coordinated approach involving a wider range of players. The role of the city authorities to lead the process is very important.

G1 Reform of transport-related organizations

G2 Promotion of private sector participation

G3 Improvement of Infrastructure development & management system

G4 Strengthening of planning capacity

G5 Securing of development fund

4) Actions

A total of 105 actions were worked out to implement 35 strategies (see Table 8.1).

Table 8.1 Proposed Strategies and Actions of HOUTRANS

Objective	Strategy	Actions
A. Promotion of social understanding on present and future urban transport problems and issues at	A1 Conduct of consecutive transport campaigns	A11:Identification of stakeholders on key transport policies (traffic safety, bus promotion)
		A12:Establishment of implementation system in coordination with NGOs, civic groups and communities
		A13:Campaign on key policies and its monitoring
	A2 Expansion of transport education	A21:Traffic safety education at primary/secondary schools
		A22:Traffic safety campaign at community level
		A23:Expansion of traffic education to drivers
	A3 Strengthening of transport studies	A31:Strengthening of Transport Science Society of Vietnam (TSSV) and its activities
		A32:Strengthening of transport study in colleges and research institutes
		A33:Holding of domestic and international symposia and seminars on transport issues
	A4 Implementation of Policy Test Project	A41:Extension of policy test project (bus corridor development)
		A42:Conduct of Policy Test Project on TDM (D53)
		A43:Model program on integrated urban & transport development (B43)
	A5 Information disclosure	A51:Establishment of transport information system
		A52:Establishment and operation of website
		A53:Publicity through mass media
B. Management of sustainable urban growth and development	B1 Policy coordination within metropolitan area	B11:Establishment of Metropolitan Transport Conference (tentative)
		B12:Integration of planning between regional and urban transport
		B13:Integration of spatial planning between HCMC and adjoining provinces
	B2 Integration of city M/P and transport M/P	B21:Establishment of urban planning system
		B22:Integration of city M/P and transport M/P
		B23:Institutionalization of integrated M/P
	B3 Development of systematic road network	B31:Establishment of hierarchical road system
		B32:Strategic development of arterial road system (RRs, expressways, primary and secondary roads)
		B33:Establishment of effective development method for road projects
	B4 Promotion of integrated urban & transport development	B41:Establishment of development method
		B42:Integrated urban development with mass transit development
		B43:Conduct of pilot projects (A43)
	B5 Guidance for ideal urban development	B51:Improvement of development permission system
		B52:Introduction of traffic impact assessment
		B53:Establishment of method to improve residential environment in high-density built-up area

(Continuation of Table 8.1)

Objective	Strategy	Actions
C. Promotion and development of attractive public transport	C1 Development of mass transit system	C11:Formulation of long-term mass transit development plan
		C12:Establishment of modal policy
		C13:Establishment of development method of mass transit system
	C2 Development Bus transport system	C21:Establishment of bus operating business system
		C22:Development of bus corridors
		C23:Strengthening of bus operation and management capacity
	C3 Exploitation of para-transit and NMVs	C31:Establishment of management system
		C32:Improvement of supporting infrastructure/facilities
		C33:Supporting system for small-scale operators/drivers
	C4 Exploitation of water transport system	C41:Actual condition survey and database development
		C42:Improvement of water transport infrastructures and river environment
		C43:Promotion of water transport for local and tourism transport
	C5 Promotion of public transport use and expansion of services	C51:Formulation of subsidiary policy for public transport users
		C52:Expansion of bus services for students and workers
		C53:Introduction of new services
D. Effective Management of Traffic and Demand	D1 Establishment of comprehensive management system for motorized vehicles	D11:Improvement of vehicle registry system and introduction of information technology (IT)
		D12:Review of registration fee and user charges
		D13:Adjustment of production quantity
	D2 Strengthening of traffic regulation & management	D21:Improvement of traffic regulation and management
		D22:Strengthening of capacity of traffic enforcers (training system)
		D23:Strengthening of coordination with communities & NGOs
	D3 Effective response to freight transport	D31:Actual condition survey and database preparation
		D32:Formulation of measures for port-related transport
		D33:Formulation of measures on overloaded trucks
	D4 Establishment of parking policy	D41:Conduct of actual condition survey and database preparation
		D42:Establishment of provision mechanism for parking space
		D43:Establishment of policy on parking fee
	D5 Introduction of TDM	D51:Specification of TDM measures
		D52:Establishment of organizational setup for implementation of TDM
		D53:Conduct of Policy Test Project on TDM (A42)
E. Comprehensive development of transport space and environment	E1 Management of transport corridors	E11:Preparation of planning manual
		E12:Regulation of roadside use and development
		E13:Establishment of corridor management system
	E2 Improvement of transport environment for pedestrian and bicycle users	E21:Actual condition survey and database preparation
		E22:Formulation of Green Network Plan
		E23:Specification for facility and design standards
	E3 Redistribution of transport space & improvement of traffic environment in city center	E31:Transport system planning for the city center
		E32:Establishment of transport management system for the city center
		E33:Pilot project on transport management in the city center

(Continuation of Table 8.1)

Objective	Strategy	Actions
	E4 Alleviation of air pollution	E41:Establishment of environmental guidelines
		E42:Formulation of measures to reduce air pollution sources
		E43:Improvement of fuel quality
	E5 Establishment of district transport development strategy	E51:Establishment of District Transport Plan
		E52:Development and management system for intradistrict transport infrastructures
		E53:Establishment of provision system for intradistrict transport services
F. Enhancement of traffic safety	F1 Establishment of traffic safety audit system	F11: Preparation of guidelines
		F12:Human resource development for audit system operation
		F13:Establishment of Traffic Safety Audit System
	F2 Improvement of traffic accident black spots	F21:Establishment of traffic accident database
		F22:Identification of black spots and improvement guideline preparation
		F23:Improvement and monitoring of black spots
	F3 Improvement of licensing & vehicle inspection system	F31:Conduct of actual condition survey
		F32:Improvement of licensing system
		F33:Improvement of vehicle inspection system
	F4 Strengthening of traffic enforcement system	F41:Improvement of enforcement skills
		F42:Strengthening of penalty and fine systems
		F43:Strengthening of coordination with NGOs and NPOs
	F5 Strengthening of first aid system	F51:Conduct of actual condition survey
		F52:Strengthening of emergency contact and communication system
		F53:Strengthening of transport and receiving system for emergency patients by emergency care service
G. Strengthening of transport sector administration and management capacity	G1 Reform of transport-related organizations	G11:Implementation of institutional reform
		G12:Conduct of personnel training program
		G13:Introduction of IT
	G2 Promotion of private sector participation	G21:Improvement of competitive conditions
		G22:Expansion of project area for private sector
		G23:Establishment of support system for private sector
	G3 Improvement of Infrastructure development & management system	G31:Establishment of public-private partnership (PPP) scheme
		G32:Expansion of maintenance system
		G33:Fostering of local consulting firms and construction industry
	G4 Strengthening of planning capacity	G41:Conduct of transport surveys and update of Karte
		G42:Fostering of transport planners
		G43:Review of planning and design standards
	G5 Securing of development fund	G51:Dissemination of user's pay principle
		G52:Expansion of public funding capacity
		G53:Effective use of ODA

Source: Study Team

5) Master Plan Projects

Master Plan Transport Network: The transport network worked out in the preceding chapter was the basis for formulating the projects described in this section (refer to Figure 8.3).

Composition of Master Plan Projects: The Master Plan projects were worked out based on the network study and the identified actions to form the main packages of projects and programs for implementation. The Master Plan projects cover infrastructure, transport and traffic operation and management, institutional development, integrated urban development, and so on. In this section, the selected projects are mainly of the infrastructure type because the required financial resource is large. The Master Plan includes both ongoing/committed projects and new ones.

Total Estimated Costs: The estimated total costs of the Maser Plan projects/programs will is about US$ 14 billion (refer to Table 8.2).

Committed Infrastructure Projects: Committed infrastructure projects, including ongoing projects in the study area, are mainly roads (refer to Table 8.3 and Figure 8.4). They are deemed as essentially unalterable under the Master Plan.

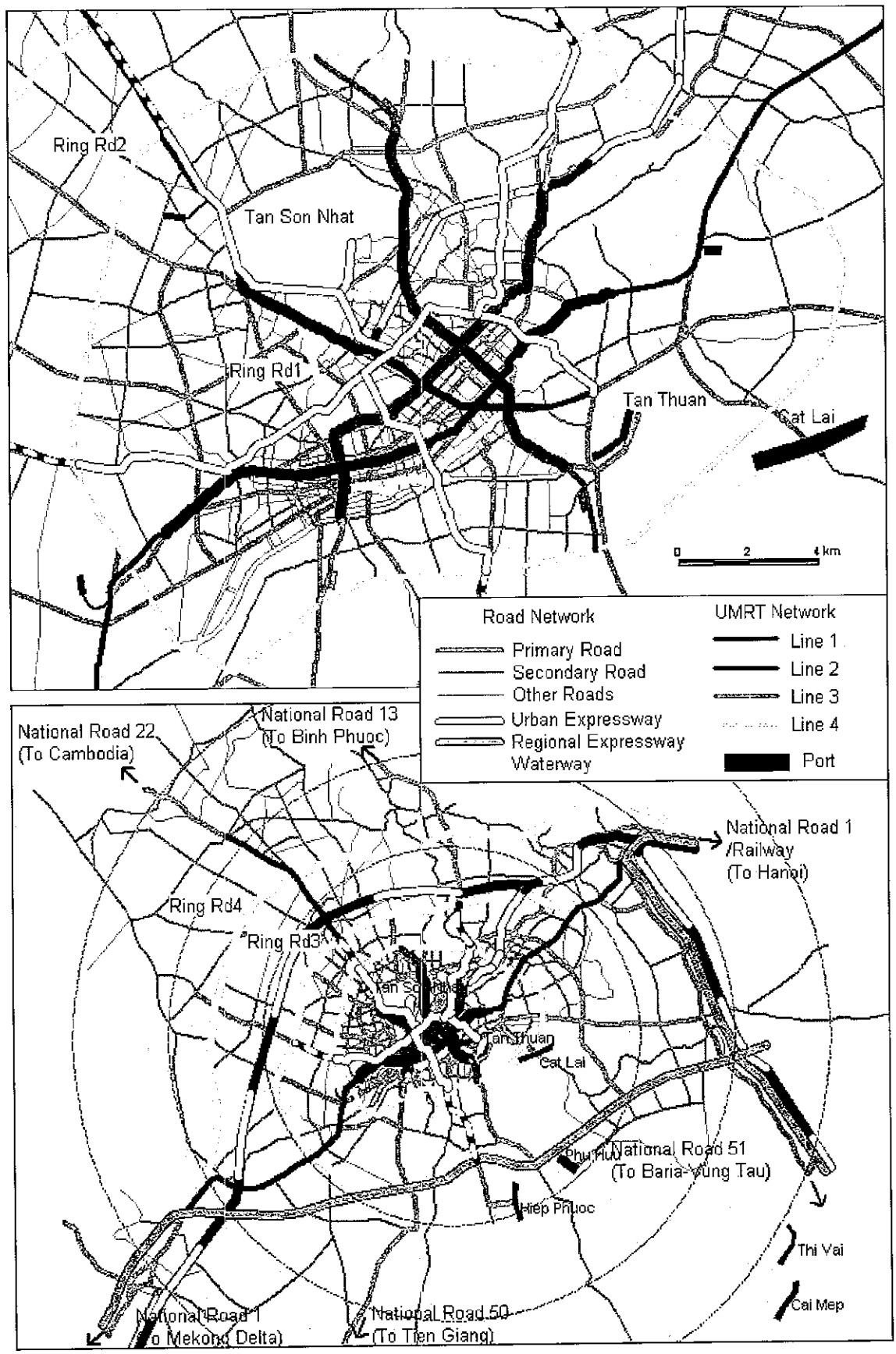
New Projects Proposed in the HOUTRANS: Major projects/programs proposed in the study are broadly categorized into four groups: roads, traffic management, public transport development, and transport environment program. A total of 16 projects were prepared (refer to Table 8.4).

Table 8.2 Summary of Major Master Plan Projects

Category		Cost		
		VND bil.	US$ mil.	%
A. Ongoing and Committed Projects		12,570	811	5.8
B. New Projects	1) Roads	143,825	9,279	66.0
	2) Traffic Management	2,480	160	1.1
	3) Public Transport	53,553	3,455	24.5
	4) Transport Environment	5,580	360	2.6
Total		218,008	14,065	100.0

Source: Study Team

Figure 8.3 Transport Master Plan Network



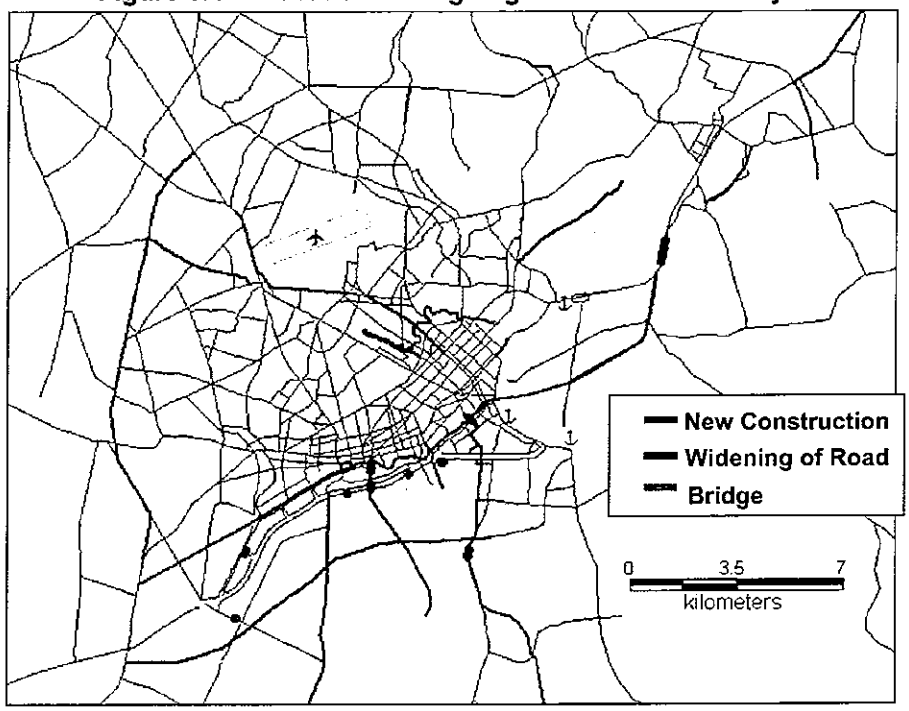
Source: Study Team

Table 8.3 Ongoing and Committed Projects

Project Name	Length (km)	Type of Work[1)]	No. of Lanes	Cost (US$ mil.)	Period	Funding Source	Status
1 Prolonged Chanh Hung	3.1	W	2	1.8	2002-2004	City budget	On-going
2 Mat Bridge	0.0	N	2	0.5	2003-2004	City budget	On-going
3 Ba To Bridge	0.0	N	2	0.4	2003-2003	City budget	On-going
4 Kenh Ngang No.3 Bridge	0.2	N	2	3.9	2003-2004	City budget	On-going
5 Hiep An 1 Bridge	0.1	N	2	1.7	2003-2004	City budget	On-going
6 Road to High-Tech IP	2.2	N	4	5.6	2003-2005	City budget	On-going
7 Nhi Tien Duong 2 Bridge	0.2	N	4	4.5	2001-2003	City budget	On-going
8 Rach Ong Bridge	0.2	I	2	0.9	2003-2003	City budget	On-going
9 Road from Binh Thuan St., to Hiep Phuoc IP	8.4	W	2	9.9	2001-2003	City budget	On-going
10 Prolonged Nguyen Tri Phuong road Bridge	3.7	W	3	14.2	2000-2003	Grant&city bud.	On-going
11 Nguyen Van Cu road Bridge	7.5	W	2-4	17.4	2003-2006	City budget	On-going
12 Upgrading and widening Cong Hoa St.	3.1	W	6	8.1	2001-2003	City budget	On-going
13 Ong Lanh Bridge and Khanh Hoi St.	1.3	W	4-6	7.4	2000-2003	Grant&city bud.	On-going
14 Road extending to Binh Thuan St.	3.6	W	4	17.7	2000-2004	City budget	On-going
15 Improvement of Nhieu Loc-Thi Nghe Road	7.5	W	2-4	8.2	2003-2004	City budget	On-going
16 Long Kieng Bridge	0.3	N	2	2.7	2003-2005	City budget	On-going
17 Rach Dia Bridge	0.3	N	2	2.7	2003-2005	City budget	On-going
18 Truong Chinh St.	2.2	W	10	23.7	2003-2004	City budget	On-going
19 Nguyen Oanh St.	0.7	W	4	0.9	2003-2004	City budget	On-going
20 Provincial Road No.55	2.7	W	2	0.6	2003-2004	City budget	On-going
21 Nguyen Van Troi-NKKN	4.5	W	6	53.6	2004-2005	City budget	Committed
22 Provincial No. 13 (NH1 - Ba Queo)	3.8	W	6	5.6	2004-2005	City budget	Committed
23 Intersection at Ong Lanh Bridge-Dist. 4	0.3	W	4	2.3	2004-2004	City budget	Committed
24 Intersection at Kenh Te Bridge-Dist. 4	0.5	N	4	3.3	2004-2004	City budget	Committed
25 Intersection at Kenh Te Bridge-Dist. 7	0.6	N	4	3.1	2004-2004	City budget	Committed
26 Construction of East-West Highway	21.4	N	6-12	458.0	n.a.	ODA	On-going
27 Cach Mang Thang Tam (An Duong - Cong Hoa)	4.5	W	8	34.3	n.a.	n.a.	On-going
28 Rach Chiec Bridge	0.7	N	10	11.9	n.a.	n.a.	On-going
29 NH1 An Suong-An Lac BOT Project	n.a.	W	8	0.1	n.a.	BOT	On-going
30 Tan An Bypass	n.a.	N	n.a.	n.a.	2003-2007	BOT	Committed
31 NH50 HCMC-Go Cong Section	47.0	W	n.a.	n.a.	2004-2005	MOT&city bud.	Committed
32 Binh Trieu 2 Bridge-NH13	n.a.	N	n.a.	22.7	2004-2005	City budget	Completed
33 Widening of Nguyen Huu Canh	n.a.	W	n.a.	20.5	2004-2006	n.a.	Completed
34 Widening of Duong Binh Quoi	n.a.	W	n.a.	n.a.	n.a.	n.a.	Committed
35 Widening of Nguyen Van Linh	n.a.	W	n.a.	n.a.	n.a.	n.a.	Committed
Total	**130.6**			**748.1**			

Source: TUPWS-HCMC, MOT
1) N : new construction, W : widening

Figure 8.4 Location of Ongoing and Committed Projects



Source: TUPWS-HCMC, MOT

Table 8.4 Ongoing and Proposed Major Projects in the Master Plan

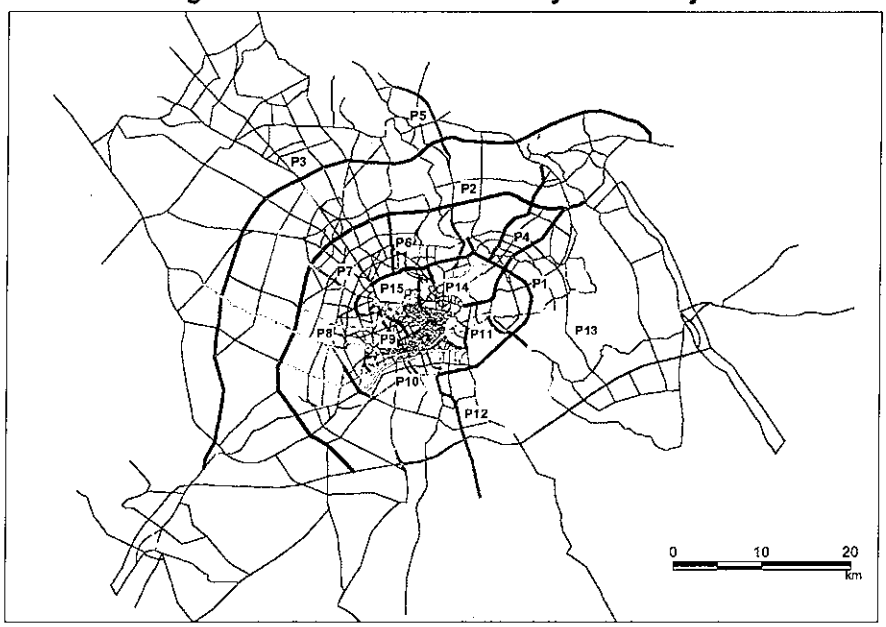
Project / Program		Description (Action)[1)]	Estimated Cost (US$ mil.)
Road	(1) Primary	38 roads with 382km (B3, D3)	3,361
	(2) Secondary	A total of 757km (B3)	2,656
	(3) Urban Expressway	7sections with 26km (B3)	1,861
	(4) Flyover	53 locations (B3)	1,401
Traffic Management	(5) Capacity Building	Training, equipment, etc. (A1, D2)	10
	(6) CBD Traffic Management	Traffic signals, parking, pedestrian path, transit mall etc. (A1, A42, D2, D4, D5, E2, E3)	100
	(7) Bus Corridor Management	Channelization, pavement, bus facilities, road space reorganization, etc. (A41, C22, D3, E1)	50
Public Transport	(8) Urban Rail	4 routes with 82km (C1)	2,850
	(9) Busway	3 routes with 57km (C1)	173
	(10) Bus System Modernization	Bus fleet, management system (A1, C2, C3, C5)	222
	(11) Transit Terminal	UMRT, inter-city bus etc. (A43, B4, C1, C2)	200
	(12) Urban Water Transport	Terminal, vessels (C4)	10
Transport Environment	(13) Local Traffic Improvement	Traffic management, facilities, pavement, feeder transport etc. (E5, G5)	300
	(14) Green Network	Pedestrian path, street lighting, trees, street furniture etc. (E2, E3)	20
	(15) Air Quality Improvement	Monitoring facilities vehicle inspection etc. (E4)	20
	(16) Traffic safety	Campaign, drivers education (A1, A2, A41, F1, F2, F3 F4, F5)	20
Total			13,254

Source: Study Team
[1)] Symbols in parentheses are the actions shown in Table 8.1.

(1) Primary Roads

Primary roads will form the backbone of the urban areas. Projects comprise construction and improvement of three ring roads, widening of existing primary roads, and construction of new roads. (B3, D3)

Figure 8.5 Location of Primary Road Projects



Source: Study Team

Figure 8.6 Typical Cross-section of Primary Roads (Urban Area)

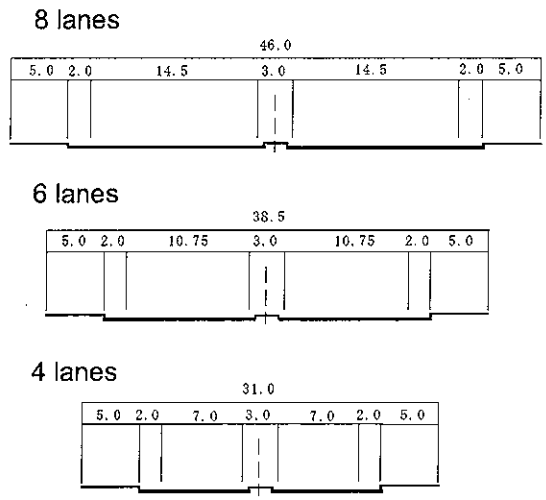


Table 8.5 List of Primary Road Projects

Code	Name	Length (km)	Type of Work[1)]	No. of Lanes	Project Cost (US$ mil.)		
					Total	ROW	Const.
P1	Ring Road No.2- East & Southwest Section	30.1	N/W	6	889	158	741
P2	Ring Road No.3 (Binh Chanh - Di An)	59.0	N	4	240	49	191
P3	Ring Road No.4 (Ben Luc - Thu Dau Mot)	80.2	N	4	315	99	216
P4	NH1-East Corridor Package	32.9	N/W	6-10	272	121	151
P5	NH13 Corridor Package	19.9	N/W	4-6	107	58	49
P6	Improvement of Nguyen Kiem	17.4	N/W	4-6	176	134	42
P7	NH22 Corridor Package	13.7	N/W	4-10	137	98	39
P8	PR10 Corridor Package	36.4	N/W	4-6	212	94	118
P9	Improvement of Au Co	8.7	N/W	4	97	83	14
P10	NH50 Corridor Package	7.2	N/W	4	79	51	28
P11	Road Development in Thu Tiem Area	8.0	N/W	4-6	106	27	79
P12	Improvement of Road to Hiep Phuoc IP	15.6	N/W	4	63	15	48
P13	PR20 Corridor Package	21.9	N	6	181	13	168
P14	Northern East-West Road Package (1)	16.6	N/W	8	285	196	89
P15	Northern East-West Road Package (2)	14.7	N	6	192	104	88
TOTAL		**382.3**			**3,360**	**1,302**	**2,058**

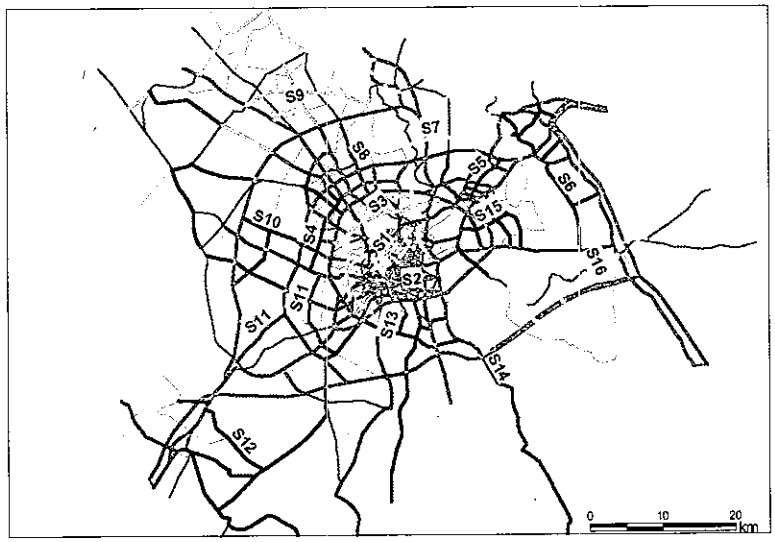
Source: Study Team

[1)] N: new construction, W: widening

(2) Secondary Roads

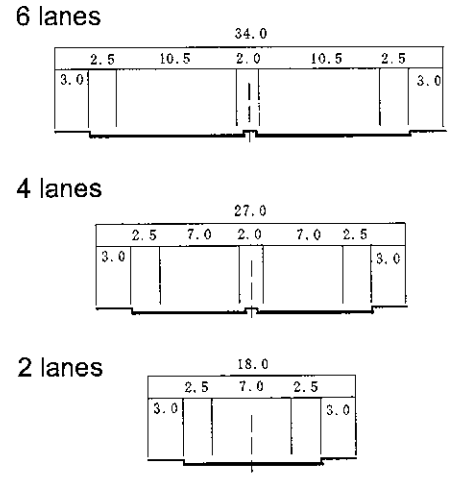
Secondary roads articulate the primary road network to provide a basic network on which urban development can take place. Most of the secondary road projects are widening of existing roads. (B3)

Figure 8.7 Location of Secondary Road Projects



Source: Study Team

Figure 8.8 Typical Cross-section of Secondary Roads (Urban Area)



Source: Study Team

Table 8.6 List of Secondary Road Projects

Code	Name	Length (km)	Type of Work[1)]	No. of Lanes	Project Cost (US$ mil.)		
					Total	ROW	Const.
S1	North Inner Core Area Package	43.5	N/W	2-8	530	427	103
S2	South Inner Core Area Package	25.3	N/W	2-6	278	108	170
S3	Inner Fringe Area Package (inside HN1)	44.7	N/W	4-6	227	114	113
S4	Inner Fringe Area Package (outside HN1)	46.6	N/W	4	166	40	126
S5	NH1 East Corridor Package (Peripheral Area	46.4	N/W	4-6	163	41	122
S6	NH1 East Corridor Package (Outer Area)	34.7	N/W	4	90	24	66
S7	NH13 Corridor Package (Outer Area)	38.8	N/W	4-6	84	50	34
S8	NH22 Corridor Package (Peripheral Area)	36.5	N/W	4	93	22	71
S9	NH22 Corridor Package (Outer Area)	89.5	N/W	4	99	18	81
S10	PR10 Corridor Package (Outer Area)	53.9	N/W	4-6	94	25	69
S11	NH1 West Corridor Package (Peripheral Area)	40.6	N/W	2-8	102	29	73
S12	NH1 West Corridor Package (Outer Area)	90.6	W	2-4	123	34	89
S13	PR15 Corridor Package (Peripheral Area)	50.8	N/W	2-6	238	42	196
S14	PR15 Corridor Package (Outer Area)	42.3	W	6	128	24	104
S15	PR20 Corridor Package (Peripheral Area)	81.2	N/W	2-8	90	13	77
S16	PR20 Corridor Package (Outer Area)	37.5	N/W	2-4	152	47	105
TOTAL		**802.9**			**2,656**	**1,057**	**1,599**

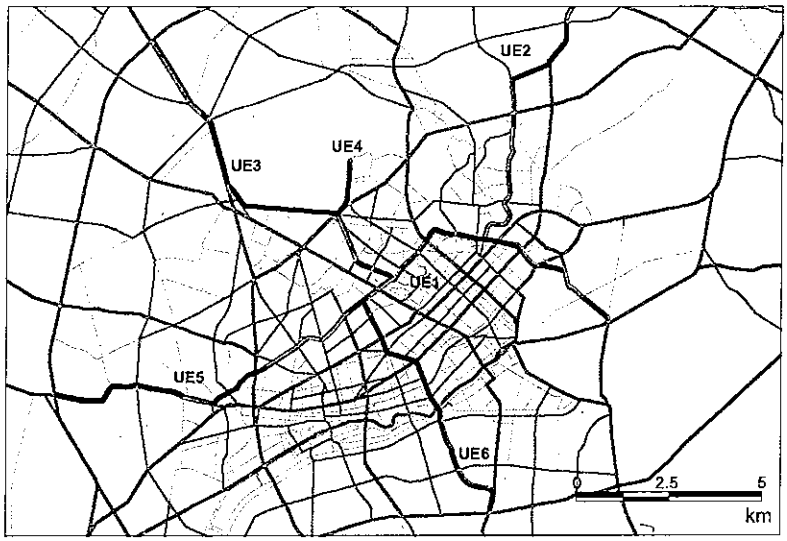
Source: Study Team

[1)] N: new construction, W: widening

(3) Urban Expressways

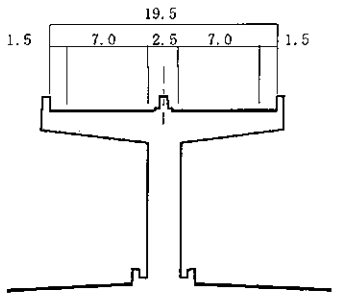
Urban expressways intend to strengthen accessibility to/from a strong city enter. Generated traffic will be absorbed quickly at the periphery of the CBD and dispersed to the other areas without pressuring radial corridors which have been and will also be congested in the future. This urban expressway network was designed in a way that it will facilitate the future implementation of traffic demand management (TDM) in the CBD. (B3)

Figure 8.9 Location of Urban Expressway Projects



Source: Study Team

Figure 8.10 Typical Cross-section of Urban Expressways



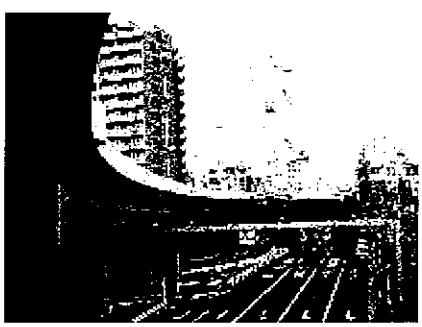
Source: Study Team

Table 8.7 List of Urban Expressway Projects

Code	Name	Length (km)	Type of Work	No. of Lanes	Project Cost (US$ mil.)		
					Total	ROW	Const.
UE1	Inner Ring Line	12.2	N	4	506	0	506
UE2	Binh Duong (NH13) Branch	9.3	N	4	368	0	368
UE3	Hoc Mon (NH22) Branch	10.1	N	4	396	0	396
UE4	Airport Extension	1.5	N	4	68	0	68
UE5	An Lac (NH1) Branch	9.6	N	4	377	0	377
UE6	Saigon South Brach	3.6	N	4	146	0	146
TOTAL		**46.3**			**1,861**	**0**	**1,861**

Source: Study Team

Photo 8.1 Urban Expressways in Asian Cities



Tokyo

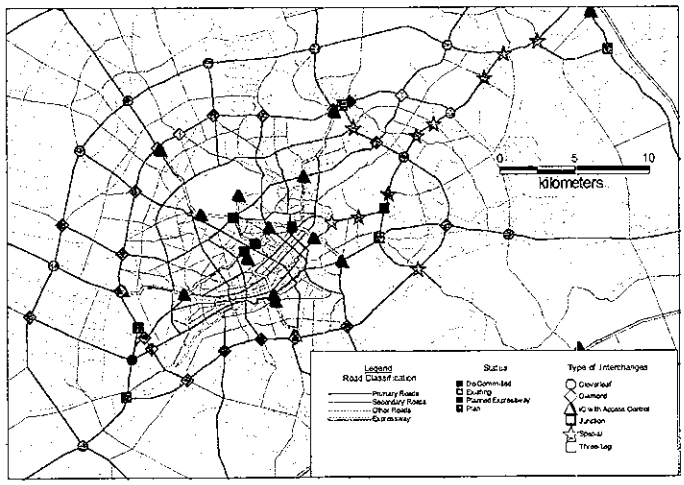
Osaka

Seoul

(4) Flyovers and Interchanges

More flyovers and interchanges will be needed to make the network function efficiently. A total of 58 different types of interchange will be constructed. (B3)

Figure 8.11 Location of Flyover and Interchange Projects (Urban Area)



Source: Study Team

Table 8.8 Estimated Cost of Flyovers/Interchanges

Interchange type	No.	Estimated Cost (US$ mil.)		
		Const	ROW	Total
1. Clover	14	483	243	726
2. Three-leg	12	152	125	277
3. Diamond	18	186	62	248
4. Special	9	114	36	150
Total	53	935	466	1,401

Source: Study Team

(5) Traffic Management Capacity Improvement

Traffic engineering and management are relatively new fields in Vietnam and there are few experts in these fields. The lack of know-how in traffic engineering, for example, can be seen in the unoptimized use of existing road facilities. Meanwhile, the Traffic Police and the youth volunteers do not receive enough training in traffic management. Traffic can be more efficient and safe if knowledge of traffic engineering and management is applied.

This program requires the recognition of the need for scientific approaches and competent staff in traffic operation and management. Priority action will be on short-term capacity improvements in the key areas of operation and management.

Project Subcomponents

(a) Establishment of Traffic Police training program (enforcement of traffic laws, traffic management, accident investigation, and public campaign). (A2, D2)

(b) Expansion of technical staff capacity at Traffic Police headquarter with mid-term target of operating advanced traffic control system. (D22)

(c) Establishment of training programs for traffic engineers that cover a broad range of techniques and skills, with short-term emphasis on intersection design, signal operation, and roadway space reallocation for vehicle flow separation. (D21, D22)

(d) Application of suitable traffic software to assist traffic management. (D22)

(e) Technical assistance in areas where policemen lack experience. (D22)

(f) Update of traffic police training curriculum at police schools. (D22)

(g) Continuation of community involvement in traffic management. (D23)

(6) CBD Traffic Management

Economic activities in the CBD of HCMC will continue to grow and become more active in the future. If no measures are taken, widespread heavy traffic congestion will be inevitable with the concentration of more people and goods to the CBD as evidenced by the experience of other Asian mega cities. Expansion of road network in the CBD is not only very difficult due to resettlement and high cost, but also not effective as the new space will quickly be occupied by the ever-increasing number of vehicles. Fundamental change is required in the transport system to sustain growth while maintaining mobility and a livable environment.

Project Subcomponents

(a) Implementation of intensive and comprehensive traffic management measures for the CBD in consideration with other related projects such as bus corridor management, green network development, etc. (C22, D2, E2, E3)

(b) Establishment of parking policy and development of public parking facilities using private sector capacities. (D4)

(c) Establishment of TDM policy and measures to regulate CBD traffic effectively. (A42, D5)

(d) Promotion of walking and use of public transport. (A1, E2)

(7) Bus Corridor Management

This project intends to designate specific corridors where bus transport must be given priority to promote city-wide public transport services. The selected corridors include future UMRT routes so that the investments to be made over the years can cultivate public transport demand and develop the corridors in stages to realize ultimate UMRT corridor efficiently. The focus of traffic management will be placed on the traffic condition improvement of major corridors in the study area. The congestion at bottlenecks along the corridors will be eased and traffic safety will be enhanced through the application of various traffic improvement measures. Bus priority measures must be introduced in accordance with the increase in bus traffic demand.

Project Subcomponents

A. Within Ring Road No.2 (See Figure 8.12)

(a) Restructuring of road spaces for the provision of bus priority measures including exclusive lanes and priority lanes. (A41, C22, E1)

(b) Introduction of efficient traffic control and management system on the corridor to ensure implementation of bus priority measures. (D2, D3)

(c) Improvement of bus transport facilities such as bus stops, pedestrian bridges, kiosks, information boards, etc. to provide comfort and safety to bus users. (C22)

(d) Development of a pedestrian network and bicycle paths to provide better amenity to public transport users and nonmotorized vehicle users. (E3)

(e) Strict enforcement of traffic rules, in particular, enforcement of controls on curb parking and encroachment into bus exclusive lanes and so forth. (D2)

B. Outside Ring Road No.2 (See Figure 8.12)

(a) Improvement of infrastructures critical for current traffic operations and feasible for implementation, including pavement maintenance, roadway widening within right of way, signalization, etc. (C22)

(b) Application of traffic engineering measures in midblock and at junctions through pavement markings, signs, median barriers, intersection modifications, and designation of two-wheeled vehicle lanes, wherever appropriate. (D2)

(c) Support for bus operations to build a transit-friendly corridor, providing accessible bus stops and passenger transfer facilities. (C22)

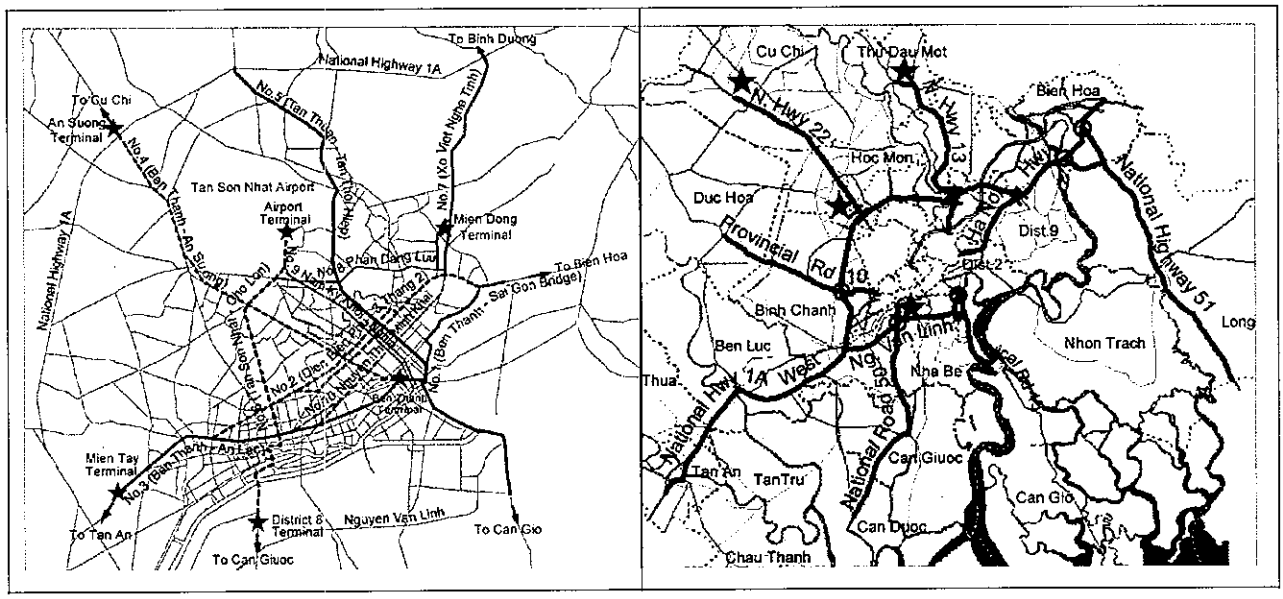
(d) Provision of gateway amenities with landscaping, sidewalks, streetlights, and road cleaning. (E2, E3)

(e) Spot improvements targeting individual corridors with management schemes tailored for unique conditions in each corridor. (C22)

(f) Strict enforcement of traffic rules and regulations focusing on congested sections. (D2)

Figure 8.12 Proposed Bus Corridors

Within Ring Road No.2 **Outside Ring Road No.2**

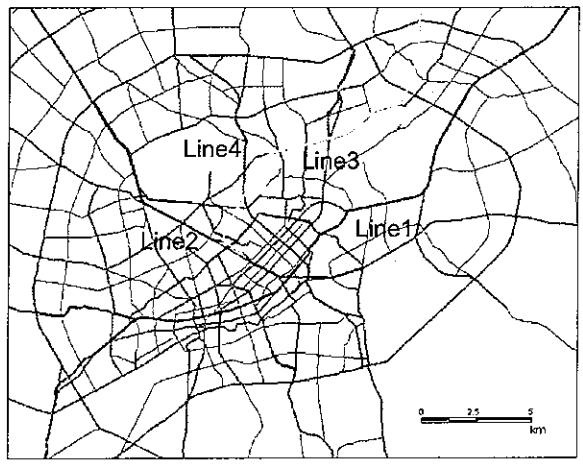


Source: Study Team

(8) Urban Mass Rapid Transit (UMRT)

The UMRT network will form the backbone of the public transport system in the future. The UMRT is composed of urban rail where public transport demand is high and busways where the demand is moderate. With this network the city center can be provided with reliable services. In the city center, the system will be located underground.

Figure 8.13 UMRT Network



Source: Study Team

Table 8.9 List of UMRT Projects

Code	Section	System[1]	Length (km)	Route[2]	Length by Type[3] (km)			Capital Cost[4] (US$ mil.)		
					UG	EL	AG	Total	ROW	Const.
UR1	**Line 1** (Thu Duc - Ben Thanh - Cho Lon- An Lac)	Rail / D	26.6	U	4.3	11.3	11.0	952	13	939
	(Thu Duc - Bien Hoa, An Lac - Tan An)	Busway	39.4	S	-	-	39.4	130	10	120
	Sub-total	-	66.0	-	4.3	11.3	50.4	1,082	23	1,059
UR2	**Line 2:** (Thu Tiem - Ben Thanh - Ba Queo - Hoc Mon)	Rail / D	16.3	U	4.2	4.1	8.0	627	33	594
	(Hoc Mon - Cu Chi)	Busway	17.2	S	-	-	17.2	57	4	52
	Sub-total	-	33.5	-	4.2	4.1	25.2	684	37	646
UR3	**Line 3:** (Binh Phuoc - Mien Dong - 3/2 - Cho Lon - Dist.8)	Rail / D	19.8	U	-	13.6	6.2	612	35	577
UR4	**Line 4:** (Dist.12 - Go Vap - Phu Nhuan - Dist.4 - Saigon South)	Rail / D	18.9	U	-	12.2	6.7	660	8	652
	Rail Total		81.6	-	8.5	41.2	31.9	2,850	88	2,762
	Busway Total		56.6	-	-	-	56.6	187	14	173
	UMRT Total		**138.2**	-	**8.5**	**41.2**	**88.5**	**3,037**	**102**	**2,935**

Source: Study Team

[1] D: Double Track

[2] U: urban, S: suburban

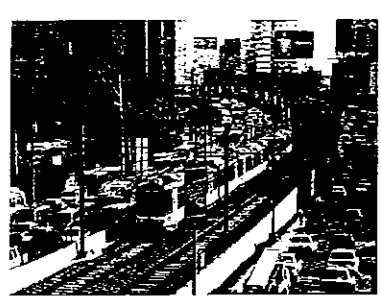
[3] UG: underground, EL: elevated, AG: at-grade

[4] Cost for rail includes capital cost of infrastructure, E&M, depot, and rolling stocks. Cost of busway does not include bus fleets.

Photo 8.2 Urban Rails in Asian Cities

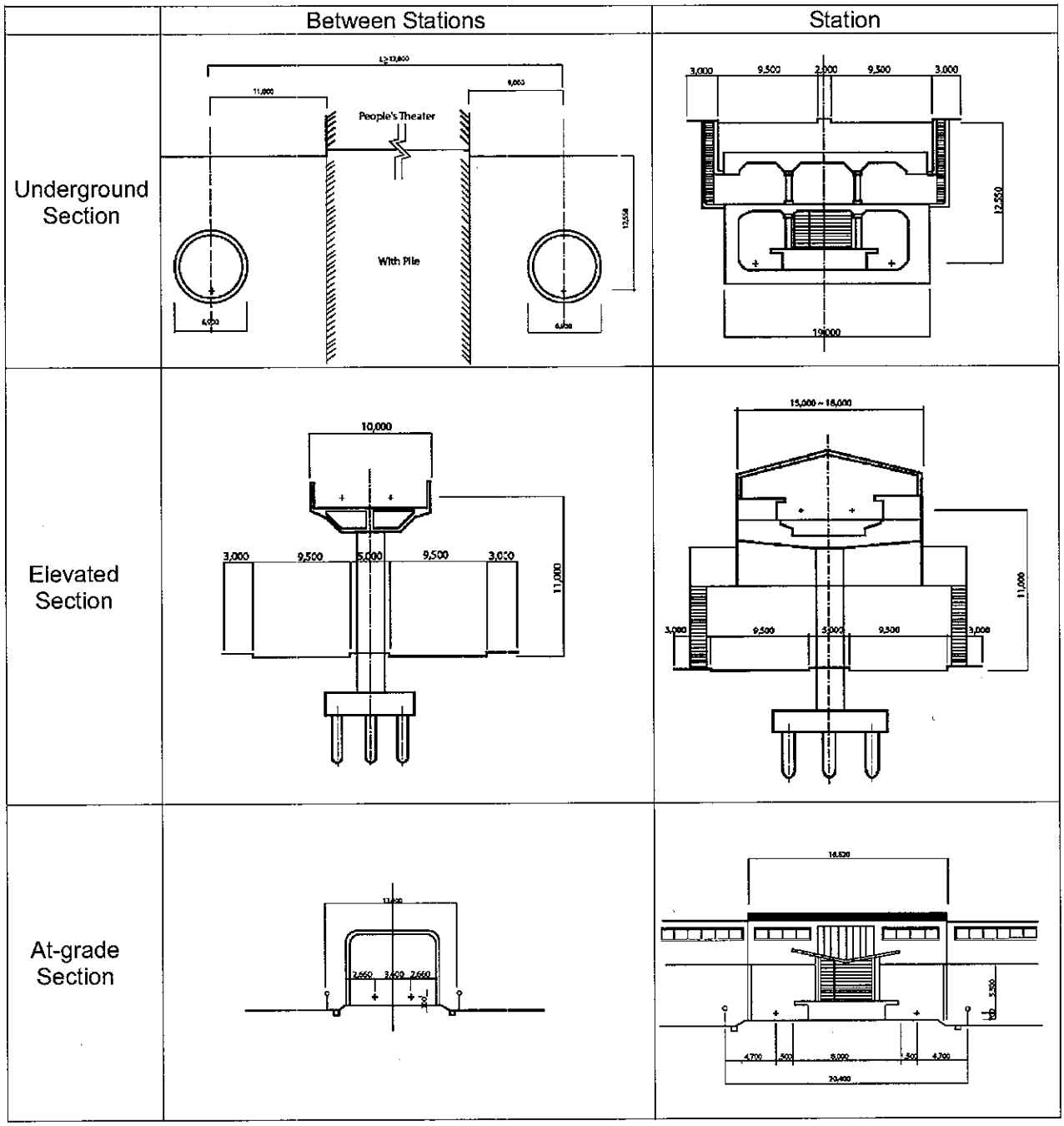
Bangkok

Singapore



Manila

Figure 8.14 Typical Cross-section of Underground, Elevated and At-grade Rail Section



Source: Study Team

Table 8.10 Necessary Width of Land for Railway Structure

	Width (m)	
	Between Stations	Station
Underground Section	10m+2m[1)]	20m+2m
Elevated Section	10m+1m (3 m on the road)	17m+1m (3m on the road)
At-grade Section	10m	15m

Source: Study Team

[1)] Adding the space of construction to the width of structure.

Busways are a critical transport system that can sustain a high target level of bus demand and services in the study area. While urban rail system is costly and when the demand is not yet sufficient to require urban rail, there are many corridors where busways can serve the demand at a much lower cost.

While the initial stage of urban rail can be provided with bus priority measures including busways, there is a need to provide a high-capacity bus system on future urban rail corridors where their outer sections will continuously be busways.

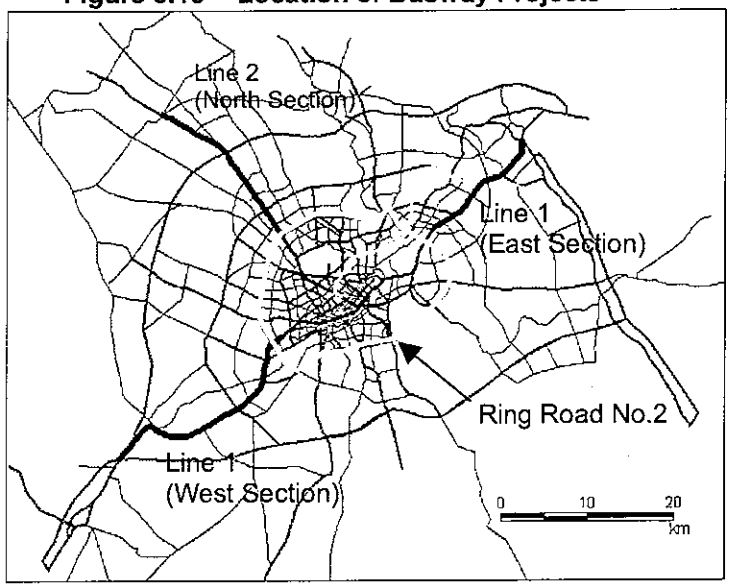
Project Subcomponents (C1, C2)

(a) Segregation of road space for the exclusive use of buses and development of necessary infrastructure.

(b) Development of bus facilities in conjunction with the rail transit development plan.

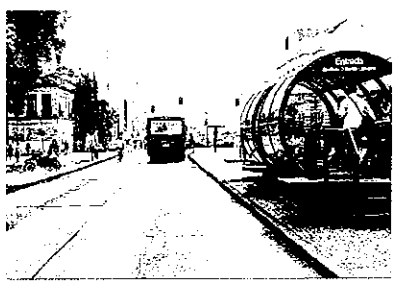
(c) Establishment of operation and management system of busways integrated with overall bus operation and management system based on active private sector participation.

Figure 8.15 Location of Busway Projects

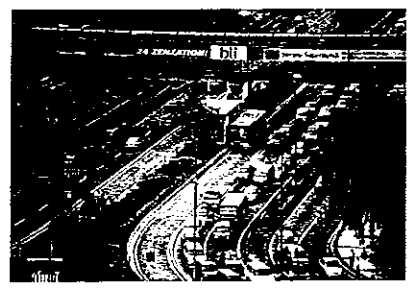


Source: Study Team

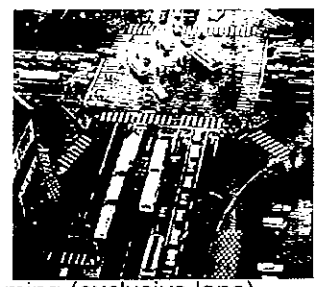
Photo 8.3 Busways in Other Cities



Curitiba



Jakarta



Kunming (exclusive lane)

Source: Taken by the Study Team

(9) Bus System Modernization Program

This builds on the current Model Bus scheme of the city (which focuses on fleet expansion), and broadens it toward the creation of modern forms of managing and operating the bus fleet. Based on the experiences of other cities, actual operations are better accomplished by the private sector, rather than by the government. However, because of the current sluggish demand for buses as well as the unfavorable business climate (fares below bus operating costs, government regulatory policy, etc.) private investors are not likely to enter the urban bus transit business soon. To avoid the proverbial "chicken or egg" situation, the government has to take the lead. With the bus leasing program as the leverage, in conjunction with an external technical advisory assistance, a modern bus sector can be fostered.

Project Subcomponents

The public transport strategy for HCMC entails three to five large bus fleet companies operating in exclusive transport corridors. These companies are expected to manage 500 to 1,000 standard buses each, eventually. However, no existing operator in HCMC has the track record nor the resources to handle such a task. The external advisory assistance is meant to assist in the formation of large fleet operators, assist these companies in adapting modern transit practices, and advise the government on policy reforms conducive for long-term private sector participation. This project is intended to accomplish the following:

(a) Definition in more detail of the set of bus routes to be included in each corridor and assignable to one of the bus operators. (C22)

(b) Determination of demand on those routes and the forces that will push growth in demand. (C23)

(c) Determination of appropriate mix of bus services and fleet to meet this demand up to year 2010. Required number of bus fleets was estimated. (C23)

(d) Conduct of engineering studies for depot sites, and other transit infrastructure such as bus sheds/stops,and ticketing systems. (C23)

(e) Design of the organization and staffing model, including modern IT-enabled management systems, in providing these bus services. (C21)

(f) Provision of financial management advice to large fleet operators. (C23)

(g) Conduct of economic analysis from the point of view of the government. (C21)

(h) Preparation of business or promotional materials to convince private investors to take over and assume a bigger role in the management of bus system. (C21, G21)

(i) Provision of technical assistance to MOCPT, Saigon PTC, and the other fleet operators in the performance of their respective roles. (C21)

(10) Transit Terminals

As public transport services expand and are provided in different modes and services, transit terminals increasingly become important in providing smooth transfer and transport. Inter-city bus terminals and UMRT transit terminals must be given special attention.

Project Subcomponents

(a) Improvement of existing bus terminals at present locations. (C22)

(b) Relocation of four bus terminals (Mien Dong, Mien Tay, Can Giouc, and Binh Phuoc) after 2010 to outer areas in integration with UMRT. (C11)

(c) Development of bus terminals and interchange facilities along UMRT. (C11)

Photo 8.4 Example of Transit Terminal

Akashi, Japan

(11) Urban Waterway Transport Development

A medium-term development program for waterways has already been formulated by the TDSI, focusing on interurban passenger and tourist transport. It needs to be reviewed in light of this Master Plan, the decisions on port relocations, and the implications on the logistics of industries in the area. It is unlikely for water transport to be significant in the intra-urban passenger markets, except for ferry services across the Saigon River. It will, however, remain important on interurban or regional transport of passenger and goods to the south (i.e. Can Gio, Can Giouc, and Vung Tau).

Project Subcomponents

(a) Upgrade of ferry boats and terminal facilities at Thu Thiem, Cat Lai, and Can Gio together with access roads. (C41, C42)

(b) Introduction of water-bus system along Ben Nghe River and Doi Canal in District 8. (C41, C43)

(c) Development of tourism-oriented water boats and berthing facilities on existing wharf of Bach Dang Port area. (C41, 43)

(d) Development of passenger terminals and cargo ports: Cargo ports (starting with Newport, Bason shipyard, Nha Rong) are planned to be relocated outside of the city center before 2008, while passenger terminals for interprovincial transport to the south are to be redeveloped closer to the city center. (C41, C42)

(e) Establishment of institution for planning/regulation: With the existence of 25 ports managed by 15 companies belonging to 10 different government agencies, it would be necessary to orchestrate the planning, phasing of relocation, and redevelopment of a Saigon port system. (C41, C42)

(f) Implementation of civil works improvements (dredging, channeling, shoring of embankments, clearing of unwanted structures on river banks) on key sections of the waterway as well as installation of navigation aids for safety. (C41, C42)

(12) Local Traffic Improvement

While the Master Plan network attends to the improvement of transport infrastructure and services at the city level, it is also important to look into transport services at the district level, because a significant portion of the transport demands is met within districts, especially in outer areas. While the overall assessment of the trips is affirmative except for a few, the people's assessment of specific areas is rather negative, especially safety followed by roads, travel conditions, and public transport services (see Table 8.11). Since conditions and concerns of the people vary by district and even by narrower traffic zone, the measures to be taken differ from each other. However, a common approach to district-level transport improvement is to employ the issue comprehensively as a component of overall urban and community development and improvement. (E5)

Table 8.11 Assessment of Local Traffic Conditions by District

		District	% to Demand			Assessment (%: V.Good & Good / Bad & V.Bad)					% of Bad Trips[1]		
			Intra-district		Inter-district						Intra-district		Inter-district
			Intra-zone	Intra-zone		Travel Condition	Safety	Walking Condition	Road Condition	PT Service	Intra-zone	Intra-zone	
HCMC	Inner Core	District 1	22	36	42	8 / 37	5 / 76	25 / 29	9 / 46	10 / 34	2	2	5
		District 3	24	29	47	5 / 61	2 / 88	25 / 39	2 / 72	12 / 44	3	6	11
		District 4	20	26	55	8 / 42	5 / 69	22 / 25	6 / 49	11 / 44	3	2	4
		District 5	24	31	45	13 / 36	4 / 69	25 / 25	8 / 47	10 / 46	2	3	7
		District 6	17	46	37	11 / 45	16 / 54	29 / 27	11 / 44	21 / 28	1	2	2
		District 10	17	26	57	4 / 46	12 / 53	17 / 33	12 / 40	16 / 43	1	2	6
		District 11	23	25	52	20 / 26	6 / 75	38 / 20	10 / 40	12 / 36	1	3	8
		Phu Nhuan	22	19	59	17 / 29	10 / 77	31 / 28	14 / 39	18 / 33	1	2	3
	Inner Fringe	District 8	28	26	45	16 / 35	17 / 65	37 / 20	16 / 42	21 / 31	1	1	2
		Binh Thanh	24	31	45	12 / 40	4 / 80	23 / 31	9 / 49	11 / 41	2	5	8
		Tan Binh	29	31	40	10 / 49	12 / 64	41 / 22	6 / 58	15 / 40	1	2	7
		Go Vap	31	27	42	14 / 32	9 / 72	28 / 24	9 / 40	14 / 34	1	2	6
	Emerging Peripheral	Thu Duc	49	29	22	10 / 45	6 / 70	27 / 23	10 / 57	11 / 35	3	5	7
		District 12	58	11	31	6 / 52	2 / 87	21 / 33	5 / 61	13 / 49	8	17	14
		Binh Chanh	38	26	36	12 / 41	18 / 62	35 / 20	16 / 46	23 / 35	1	3	6
		District 2	58	10	32	7 / 43	9 / 60	32 / 20	10 / 47	14 / 49	3	4	12
		District 7	32	32	36	9 / 30	4 / 64	34 / 18	7 / 38	6 / 42	1	2	5
		District 9	53	13	33	12 / 37	2 / 82	32 / 10	11 / 46	10 / 50	1	4	9
	Sub-urban	Hoc Mon	38	23	39	11 / 46	5 / 73	35 / 20	10 / 50	11 / 46	1	3	13
		Nha Be	42	25	33	22 / 20	3 / 62	32 / 14	23 / 30	12 / 37	2	4	7
	Rural	Cu Chi	63	23	14	15 / 36	7 / 64	37 / 23	15 / 39	11 / 56	1	1	7
		Can Gio	84	0	16	29 / 21	9 / 58	41 / 15	30 / 31	15 / 45	1	0	9
Adjoining Provinces	Satellite Urban	Thu Dau Mot	68	27	5	19 / 27	13 / 58	44 / 14	21 / 33	7 / 48	1	2	10
		Bien Hoa	63	32	5	7 / 52	5 / 73	22 / 26	7 / 53	7 / 50	2	6	13
		Tan An	88	1	11	15 / 42	14 / 62	32 / 24	17 / 42	22 / 43	4	13	8
	Sub-urban	Thuan An	68	12	21	2 / 33	10 / 71	25 / 16	5 / 62	25 / 16	3	3	11
		Di An	76	11	13	6 / 49	3 / 79	31 / 16	13 / 53	12 / 43	3	0	4
	Rural	Long Thanh	81	10	9	7 / 61	14 / 77	25 / 26	4 / 73	1 / 67	5	3	5
		Nhon Trach	90	5	5	17 / 26	3 / 81	50 / 9	6 / 43	17 / 33	2	3	17
		Can Giuoc	70	14	17	15 / 37	19 / 56	37 / 23	12 / 46	20 / 44	9	1	9
		Can Duoc	84	7	9	14 / 38	14 / 67	44 / 19	13 / 56	14 / 40	6	2	12
		Chau Thanh	70	4	26	20 / 29	22 / 53	36 / 25	24 / 33	24 / 39	8	10	4
		Thu Thua	82	7	11	19 / 46	20 / 54	46 / 15	15 / 42	28 / 27	2	37	8
		Ben Luc	70	12	18	14 / 38	15 / 59	36 / 20	16 / 40	28 / 33	3	6	8
		Duc Hoa	79	11	9	21 / 42	13 / 59	40 / 22	15 / 49	21 / 30	8	6	1
		Tan Tru	94	-	6	15 / 60	34 / 42	44 / 32	17 / 50	27 / 28	9	-	0
Study Area Total			**44**	**24**	**32**	**12 / 41**	**9 / 69**	**31 / 24**	**10 / 48**	**14 / 40**	**3**	**3**	**7**

Source: HOUTRANS HIS

[1] Rate of trips which were assessed as "bad" or "very bad" from HIS.

(13) Green Network Development

Walking is the most basic mode of transportation. When a dominant use of public transport is realized, public transport passengers will desire a convenient and safe access to bus stops and rail transit stations. The walking environment should be improved for those passengers as well as tourists especially in the urban core where business and tourism destinations concentrate. Bicycling is another popular mode for short-distance trips. Altogether, walking and bicycling account for a fourth of the trips within the city center. Both walking and bicycling are considered environment-friendly transport modes in terms of energy consumption and environmental conservation.

The project intends to develop pedestrian and bicycling networks in the urban core to enhance the separation of pedestrians, bicycles, and motor vehicles. Improvement of street amenities and development of green spaces and recreation facilities are included to create a pleasant, safe, and green city center.

Project Subcomponents

(a) Identification of network for inclusion in the city Master Plan. (E21, E22)

(b) Preparation of standards to improve sidewalk. (E21, E23)

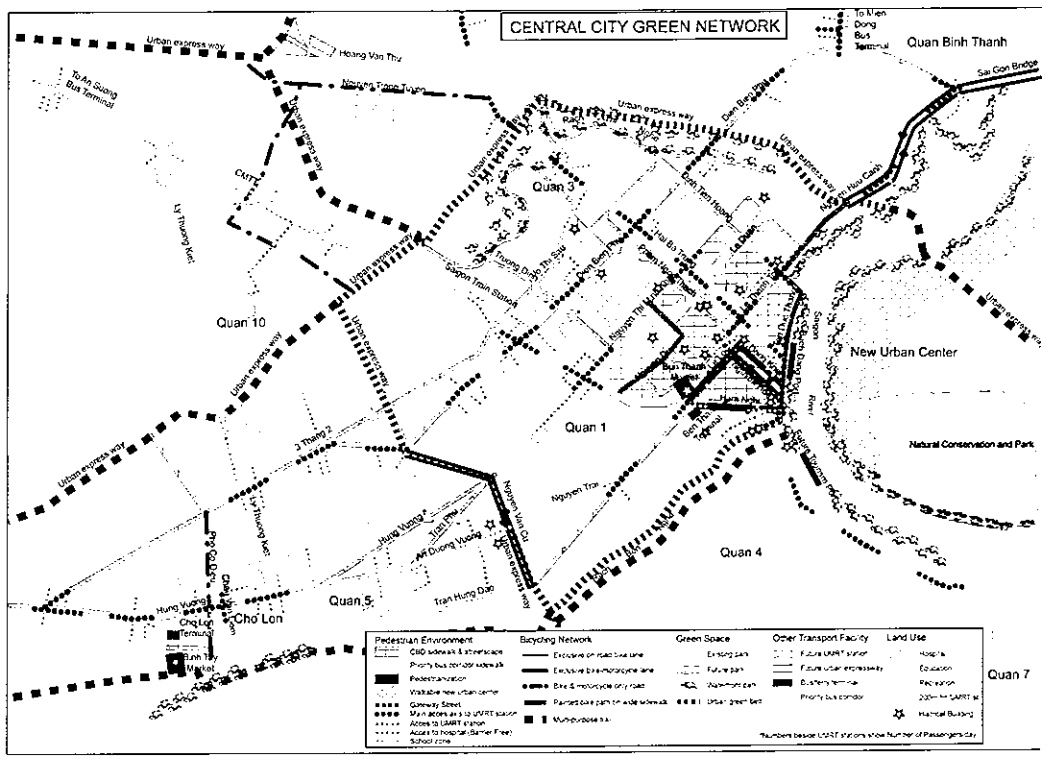
(c) Development of bicycle network including bicycle path, lane, and parking. (E2)

(d) Beautification of waterfront along Saigon River and canals for leisure outings. (E2)

(e) Promotion of street amenity such as guide-map boards, public toilets, benches, rest spots, and landscaping. (E22)

(f) Assurance of safety through provision of lights and patrols. (E22)

Figure 8.16 Proposed Green Network in Urban Core Area



Source: Study Team

(14) Air Quality Improvement

This project aims to reduce air pollution in the short/medium term and to keep the ambient air quality levels within Vietnam's environmental standards for the long term. Reduction of pollution loads originating from motor vehicles will not only result in better air quality and reduced health risks to the population of HCMC, but will also have an added benefit of fuel and energy saving. Regulations thus need to be developed.

Project Subcomponents

(a) Control of emission from vehicles. (E41, E42)

(b) Improvement of fuel quality. (E43)

(c) Water spray and road sweeping. (E42)

(d) Control of emissions with focus on PM from current plants and other key industries and SO2 from power plants. (E42)

(15) Traffic Safety Improvement

The traffic accident rate in HCMC has been steadily increasing and has reached an alarming level. In order to reduce the number of traffic accidents, various engineering, enforcement, and education programs shall be planned, coordinated, and implemented consecutively and comprehensively.

Project Subcomponents

(a) Revival of computerized accident database. (F21)

(b) Formulation of multiyear traffic accident reduction program. (F2)

(c) Strict enforcement of traffic rules. (D21)

(d) Education and campaign. (A2)

(e) Infrastructure improvement. (F23)

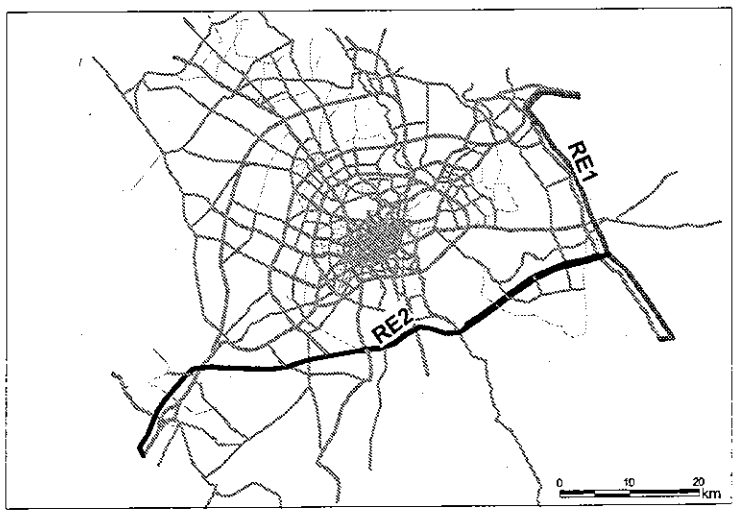
Photo 8.5 Traffic Situation in HCMC

Source: Taken by the Study Team

(16) Regional Expressways

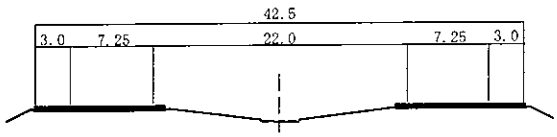
In the study area, large-scale industrial zones will be developed mainly in the suburban areas while the existing international ports will be moved away from the city center to the periphery, such as in Hiep Phuoc area and Thi Vai-Cai Mep area (outside the study area). Regional expressways are proposed in order to connect these major industrial areas and ports, avoid intermixing the inter-city with through traffic, and link the economies of the surrounding provinces with HCMC. Thus, an at-grade structure for the regional expressways with four lanes is envisaged.

Figure 8.17 Location of Regional Expressways



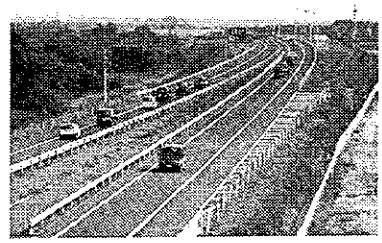
Source: Study Team

Figure 8.18 Typical Cross-section of Regional Expressways



Source: Study Team

Photo 8.4 Example of Regional Expressway



Hokkaido, Japan

Table 8.12 List of Regional Expressway Projects

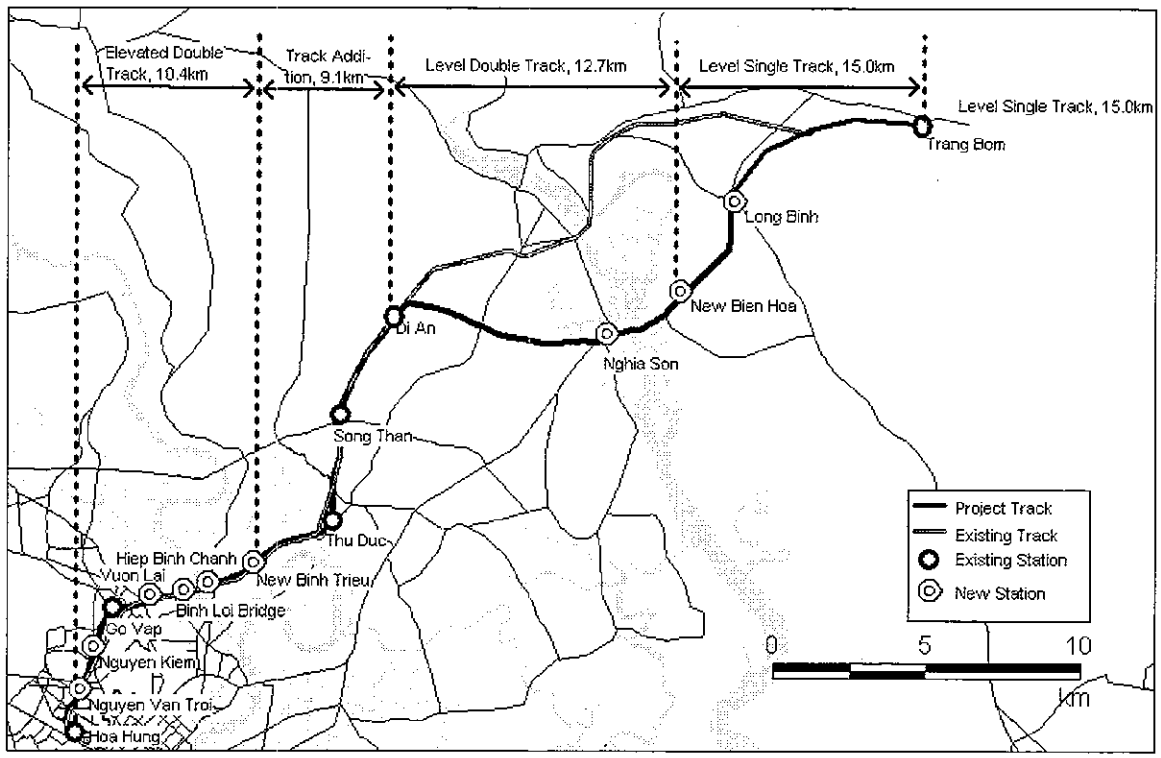
Code	Name	Length (km)	Type of Work	No. of Lanes	Project Cost (US$ mil)		
					Total	ROW	Const.
RE1	Bien Hoa - Vung Tau	80.5 [1)]	N	4	186	44	142
RE2	My Tho - Nhon Trach	126.6 [1)]	N	4	721	99	622
TOTAL		**207.1**			**907**	**143**	**764**

Source: Study Team
[1)] Including outside of the study area.

(17) Regional Railway

There are plans to develop VR lines in the study area including the upgrading of existing lines and the development of new ones, such as Bien Hoa-Vung Tau Line and Mekong Delta Line linking to Can Tho and others, to provide links to new international ports. Priority is given to the upgrading of Hoa Hung-Trang Bom section of the existing line. This line serves the HCMC-Bien Hoa corridor. Since the section has high urban traffic demand and crosses with UMRT lines (Line 1, Line 2 and Line 3), it can provide additional commuter services.

Figure 8.19 Location of Hoa Hung-Trang Bom Section



Source: Study Team

(18) Other Regional Transport Projects in the Study Area

Other major regional transport projects currently being planned include the relocation of the existing ports such as Saigon Port, New Port, Ben Nghe Port, and Ba Son Shipyard located along the Saigon River. The development of new ports, including Hiep Phuoc Port (Soai Rap River), Cat Lai Port (Dong Nai River), Thi Vai General Port and Cai Mep International Port (Thi Vai River), On Keo and Phu Huu Ports, is concurrently planned. As they are to be relocated, the urban transport network must be adjusted to provide adequate access to the ports and at the same time avoid negative impact on the ports.

The relocation of Tan Son Nhat International Airport to Long Thanh area is also in the long-term plan.

6) Investment Plan

The overall investment requirement is US$ 13.2 billion as shown below with the breakdown of costs excluding the cost for ongoing and committed projects.

Table 8.13 Overall Investment Plan

Component		Cost (US$ mil.)	Implementation Period	
			-2010	2011 -2020
Road	Primary Roads (382km)	3,361	■	■
	Secondary Roads (803km)	2,656	■	■
	Urban Expressway (46km)	1,861		■
	Sub-total	7,878		
UMRT	Line 1 (66km, Urban Rail+Busway)	1,082	■	■
	Line 2 (33km, Urban Rail+Busway)	684		■
	Line 3 (20km, Urban Rail)	612		■
	Line 4 (19km, Urban Rail)	660		■
	Sub-total	3,023		
Other Projects	Flyovers (53 locations)	1,401	■	■
	Transport Terminals	200	■	■
	Bus Corridor Management	50	■	
	Bus System Modernization	222	■	
	Local Traffic Improvement	300	■	
	CBD Traffic Management	100		■
	Pedestrian/Green Network Development	20	■	
	Traffic Safety Improvement	20	■	■
	Air Quality Improvement	20	■	■
	Urban Waterway Transport	10	■	
	Traffic Management Capacity Improvement	10		
	Sub-total	2,353		
Total[1)]		13,254	4,299	8,955

Source: Study Team

[1)] Excluding ongoing/committed projects.