8.4 Major Master Plan Projects

1) Portfolio of Projects

The proposed draft Master Plan is not a hodgepodge of projects, but is composed of separable but complementary projects categorized under the following headings:

- Infrastructure
- Operation and management
- Institutional development
- Integrated urban development
- Combination of the above

The projects and programs within each category are chosen for their synergy, which means that their collective impacts are greater than the sum of their individual effects.

2) Committed Projects

Committed road projects, including ongoing projects in the study area, are listed in Table 8.4.1. They are deemed as essentially unalterable under the draft Master Plan. A number of improvement projects and construction of new roads and bridges are to be implemented.

Table 8.4.1 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

3) Proposed Road Projects

This category of road projects covers primary and secondary arterial roads, as well as urban and regional expressways (refer to Chapter 6.6 Recommended Network). An arterial road network consisting of at-grade primary and secondary roads will form the most basic framework for guiding an orderly urban development. These networks will also be an important space for future development of viaducts or underground structures for expressways and railways, thus they deserve one of the highest priorities in the Master Plan.

In the Master Plan, road development projects are further categorized into a package of project components by corridor and by area that mutually enhance each other. Each road project component proposed in the Master Plan is described below.

(1) Typical Cross-section

Based on the Vietnamese standard (22 TCN-273-01), the typical cross-section was set for urban and rural roads as shown in Figure 8.4.1. However, the median width was assumed to be 5.0m for the at-grade road where the elevated urban expressway or the elevated UMRT is planned. In setting the cross-section of other roads in the Master Plan, the cross-section of the connecting roads, and not the traffic volume, was considered to ensure continuity.

(2) Primary Road Projects

The existing primary road network should be expanded to cover and integrate the fast growing outer areas. For that reason, the projects include not only the widening of existing roads but also construction of new ones. The development of primary roads here is very crucial, as they should have at least 4-8 lanes with an adequate curbside traffic control system (refer to Table 8.4.2 and Figure 8.4.2).

P1 Project: This project aims to complete Ring Road No.2 (RR2) and consists of two new sections and the widening of Nguyen Van Linh. The east section diverges from NH1 at east side of Saigon River and connects to Nguyen Van Linh through Phu My Bridge. The southwest section connects NH1 and Nguyen Van Linh directly through Phu Dinh Bridge.

P2 Project: This project is Ring Road No.3 (RR3), which avoids the area along NH1 where rapid development is expected. RR3 starts from the regional expressway to the west side of Dong Nai River on NH1.

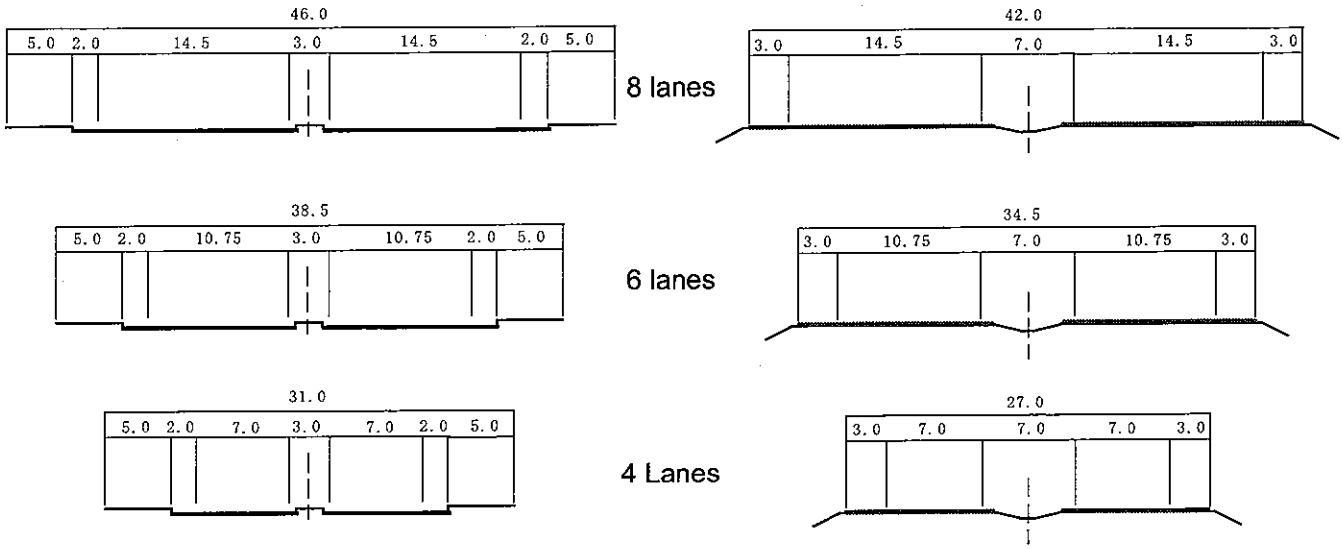
P3 Project: This project is Ring Road No.4 (RR4), which connects satellite towns directly with each other. RR4 diverges from the regional expressway at Thanh Duc in Long An province, passes through Duc Hoa and Cu Chi, and merges with NH13 in Thu Dau Mot.

P4 Project: This project is composed of the widening of NH1 and NH1K where HCMC and Bien Hoa are connected. The NH1 section is from Saigon Bridge to NH51, and the NH1K section is from the ring road up to Dong Nai River.

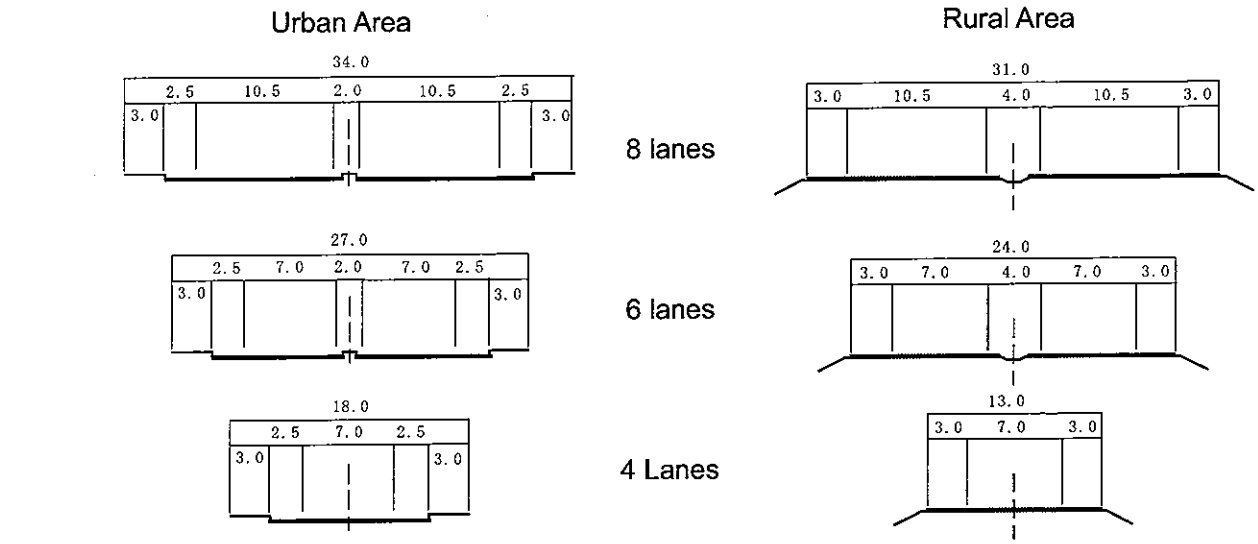
P5 Project: This project is composed of the widening and the construction of a new bypass of NH13, which consist of three sections. The section for widening is from the merging point of NH13 and the urban expressway up to the ring road. The two bypass sections toward the east side of NH13 are from RR2 to RR3 and in Thu Dau Mot.

Figure 8.4.1 Typical Cross-section in the Master Plan

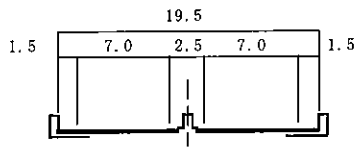
Primary Road



Secondary Road



Urban Expressway



Source: Study Team

P6 Project: This project involves the widening of the primary road, which connects the center of HCMC to PR16. It is composed of sections Phan Dinh Phung-Nguyen Kiem and Le Duc Tho-PR10 (Nguyen Oanh-RR3).

P7 Project: This project consists of the widening of the primary road extending northwestward. It consists of the widening of Cach Mang Thang Tam from 3 Thang 2 to Cong Hoa, as well as the construction of the section that connects Cach Mang Thang Tam and Le Trong Tan and the extension of Le Trong Tan from NH1 to RR3.

P8 Project: This project is the widening of the primary road extending toward the direction of Thu Duc. It consists of three routes: the widening of Hoa Binh and its extension from P9 Project to RR3, the widening of Ba Hom and PR10 from Hong Vuong to PR9, and the construction the east-west road extension from NH1 to RR3.

P9 Project: This covers the primary road of the south-north axis in HCMC that avoids the urbanized area around Cho Lon on west side. It starts from the intersection of Au Co and Cach Mang Thang Tam via Au Co-Lac Long Quan-Phu Tho up to Phan Van Khoe.

P10 Project: This project is located in the southern part of Cho Lon and consists of primary roads of the south-north axis. It is involves the construction of the P9 Project extension to link with Nguyen Van Linh from the east-west road, the widening of Chanh Hung from the east-west road to Nguyen Van Linh, which is part of Do-committed Project No.10, and the widening of NH50 in the vicinity of Tan Kim, Long An province.

P11 Project: This project is a primary road which connects Thu Thiem District with districts 7 and Binh Thanh. It starts from Nguyen Huu Canh to Nguyen Tat Thanh and includes two bridges across Saigon River.

P12 Project: This project involves the widening of Hiep Phuoc road from Nguyen Van Linh to Hiep Phuoc Port, which is part of Do-committed Project No.9.

P13 Project: This project is a primary road connecting HCMC and Long Thanh. It starts from the east-west road via District 9 to NH51 and needs a large-scale bridge over Dong Nai River.

P14 Project: The project is a primary road that crosses the center of the ring road in the direction of the east and the west via the extension of NH1K. The route initially runs parallel with the VR track, then shifts direction passing through Hoang Van Thu before finally reaching Au Co.

P15 Project: This project is a primary road that crosses the east-west direction to make up the transport network in the northern area of the airport.

(3) Secondary Roads

The primary road network will be complemented by a set of secondary roads composed of: (1) existing roads which are readily available, (2) existing roads that needs improvement, and (3) new roads, including missing links. The secondary road project is proposed where urban development is expected and transport capacity is not enough to accommodate the future traffic demand (refer to Table 8.4.3 and Figure 8.4.3).

S1 Project: This project will develop the secondary road network north of the inner core. This area is already urbanized. However, its road network is composed of many alleys and

cannot accommodate the traffic demand in the future. Therefore, the widening of 26km of roads and the construction of 27km more are planned.

S2 Project: This project will develop the secondary road network south of the inner core between the east-west road and the ring road. It covers the area along the ring road where urban development is expected in the future. This project which is along the east-west road is in a similar situation as the S1 Project.

S3 Project: This project will develop the secondary road network between the ring road and the inner core. It is located in the area where urban development is expected to advance rapidly in the future, and is thought to have high priority.

S4 Project: The project area is enclosed by the ring road, RR3, NH22, and PR10. It has high priority, being in a similar situation as the S3 Project.

S5 Project: The project area, enclosed by the ring road, RR3, NH1, and NH13, is planned to be an industrial area. Thus, the project is in an area where further development is expected to advance in the future. Some factories are already located here.

S6 Project: This project is located along NH51 in Bien Hoa and Long Thanh. This is a region where development is expected in the future, although large-scale development is not yet scheduled.

S7 Project: This project will develop the secondary road network in the area enclosed by RR3, Dong Nai and Saigon River north of the study area.

S8 Project: This project is located between the ring road and RR4 along NH22. Because a subcenter is planned in the project area, it is expected that further development will advance in the future.

S9 Project: This project will develop the secondary road that centers on Cu Chi which is planned as a satellite town. It is located northwest of the study area from RR4.

S10 Project: This project will develop the secondary road network that centers on Duc Hoa which is planned as a satellite town. It is located west of the study area from RR3.

S11 Project: This project is located southwest of the study area between RR4 and the ring road-regional expressway. NH1 passes through the project area. Further development is expected along NH1 in the future.

S12 Project: This project is located mainly in the centers of Long An province including Tan An which is a provincial center. The project involves the widening of roads that connect district centers with primary roads.

S13 Project: This project will develop the secondary road network south of the study area and starts from the ring road to the south. Further development is expected along the ring road in the future.

S14 Project: This project involves the improvement of PR15 from the regional expressway to Can Gio.

S15 Project: This project is located east of HCMC. Development along NH1 and access road to Cat Lai Port is expected.

S16 Project: The project will develop the secondary road network in Nhon Trach area

which is planned as a large-scale industrial zone. Development is expected between HCMC, which is a large consumption area in Vietnam, and the Thi Vai-Cai Mep region where the international ports are located.

Table 8.4.2 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	899	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**			**3,361**	**1,302**	**1,966**

Source: Study Team
[1)] N: new construction, W: widening

Table 8.4.3 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

Figure 8.4.2 Location of Primary Road Projects

Source: Study Team

Figure 8.4.3 Location of Secondary Road Projects

Source: Study Team

(4) Urban Expressways

Urban expressways will play an important role in the most urbanized sections of the study area in relieving traffic congestions on at-grade primary and secondary roads caused mainly by private transport modes such as cars and trucks. An elevated structure for urban expressways with four lanes surrounding the city core and stretching its branch routes to connect with major radial transport corridors and ring roads is proposed to shift heavy through traffic between the city center and suburban areas. This has also the advantage of utilizing the vertical spaces above the existing roads, where widening is rather difficult due to resettlement and expropriation issues (refer to Table 8.4.4 and Figure 8.4.4).

UE1 Route: It is an incomplete ring route, which starts from the east-west road in Thu Them, crosses over Saigon River to the northeast, passes north of Thi Nghe Canal to avoid the urbanized area, goes south to Nguyen Van Cu via Ly Thai To, and connects with the east-west road again. The route is expected to absorb and disperse traffic from/to the city center as well as protect its landscape with its historical landmarks. Interchanges are proposed in five locations where diverge/merge the route from/ to east-west road, and crossing with Nguyen Huu Canh, Phan Dinh Phung, and Le Hong Phong taking into account the connection between the interchange and junction as well the connection to at-grade roads.

UE2-6 Routes: It consists of five subroutes connected with the primary roads of NH13, NH22, PR10, and Hiep Phuoc road (Code: P12) and the airport extension. These subroutes are radial roads where the UE1 route and the ring road are connected and connect directly the EE1-a Route and the suburbs. UE2-6 routes that separate traffic from at-grade roads and fulfill the function of leading to the city center or suburbs efficiently are expected. The locations of interchanges are planned to the connection with the ring road and the middle point by one place excluding Hiep Phuoc road respectively.

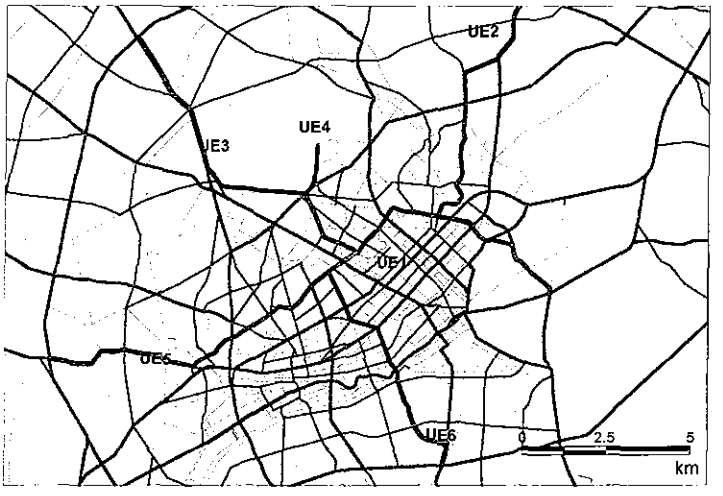
Table 8.4.4 List of Urban Expressway Projects

Code	Name	Length (km)	Type of Work	No. of Lanes	Project Cost (US$ mil.)		
					Total	ROW[1)]	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 Branh	3.6	N	4	146	0	146
TOTAL		**46.3**			**1,861**	**0**	**1,861**

Source: Study Team

[1)] ROW cost is considered in the at-grade secondary road projects.

Figure 8.4.4 Location of Urban Expressways



Source: Study Team

4) Proposed UMRT Project

(1) Basic Concept

The UMRT Project is meant to provide a high-capacity mass transit service on heavily congested transport corridors connecting the city center and suburban areas.

It would be designed using the best of both rail and busway technologies to reduce the initial capital cost and dovetail with growing passenger demand. The load profile along a line is usually uneven and begins to taper off at the suburban fringe. Thus, rail at those sections would not be economical. On the other hand, demand on the inner sections of the line closer to the city center could be so high as to exceed bus capacities. Hence, demand forecast will be crucial in determining the transition from bus to rail and the corresponding line lengths. Aside from economics, the bus-rail combination also reserves in advance the ROWs for future rail extension. Thus, the radius of curvature for the busway should take into account the more stringent standards required by rail (vertical and horizontal) curves. Furthermore, as the first system to be introduced in HCMC, the UMRT would influence subsequent standards for other urban railway lines in terms of track gauge, electrical system, signaling system, station plaza, and the like. Otherwise, maintenance and integration would become major headaches.

(2) Route Alignment Plan

The final alignment as well as length shall be determined during the feasibility study. Investigation indicates that ROWs will be difficult within a distance of 7km from the city center. Elevated or underground tracks would therefore be the preferred option within this boundary. On the other hand, the conservation of the historical city center would suggest an underground route. Beyond the 7-km limit, at-grade tracks appear to be feasible except for some grade separation at major road crossings (refer to Table 8.4.5).

The transition through sections – from underground to elevated – would create a portal of about 12m x 450m. For safety reason, this portal would require land space that can be easily procured. A probable site is a government-owned property in the vicinity of Saigon Station, the police department, zoo, etc.

The description of the proposed UMRT alignment of each line is as follows (refer to Figure 8.4.5):

Line 1 (R1): The east-west route will traverse the inner core and connect with the satellite towns of Bien Hoa in Dong Nai province and Tan An in Long province (both are located along NH1) with a total route length about 66km. Line 1 will be composed of rail in the inner core and busway in the suburban area. A railway section is envisaged between the emerging suburban centers of Thu Duc and An Lac with a length of 27km passing through Saigon (Ben Thanh) and Cho Lon, taking the major transport corridors of Hanoi Highway, Nguyen Huu Chanh, Le Thanh Ton, Le Loi, Tran Hung Dao, An Duong, Vuong, and Hung Vuong. Two busway sections will extend the railway towards the satellite towns of Bien Hoa (15km) and Tan An (25km).

Line 2 (R2): This route with a length of 34km will follow the north-south NH22 corridor where traffic demand is high, starting from the new urban center of Thu Thiem through Ben Thanh and Ba Queo and connecting to the emerging suburban centers of Hoc Mon and Cu Chi. Line 2 will also be composed of rail in the inner core and busway in the suburban area. A railway section with a route length of 16km is envisaged starting from Thu Thiem and ending at Hoc Mon, traversing the major transport corridors of Canh Mang Thang Tam, and Truong Chinh. A busway will extend from Hoc Mon up to Cu Chi (17km).

Line3 (R3): A 20km elevated rail system will connect major areas along the transport corridors of NH13, Dien Bien Phu, Ly Thai Tho, 3/2, and Ly Thuong Kiet and connect to District 8 through Cho Lon.

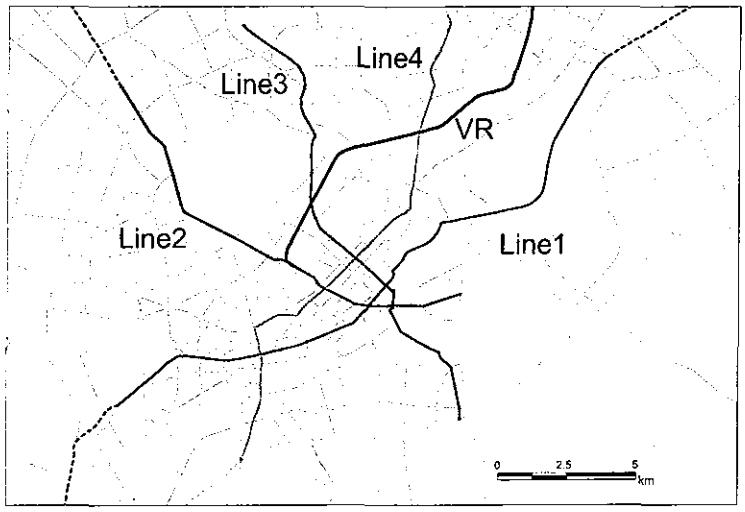
Line4 (R4): This north-south line with a route length of 19km will connect the city center with Hoc Mon and Saigon South. The structure of the entire line will be elevated.

Table 8.4.5 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 of rail includes capital cost of infrastructure, E&M, depot, and rolling stocks. Cost of busway does not include bus fleets.

Figure 8.4.5 Location of UMRT Lines



Source: Study Team

(3) Impact of Railway Structures on Road Dimensions

The required clearances for the railway section are shown on Table 8.4.6. Accordingly, an underground railway line would still require road widening or improvement if the supervening road has less than four lanes. Underground stations would also call for a widening of a 4-lane road, if the sidewalk is narrow.

The elevated section would need space of about 3 meters for the pier of the viaducts. Thus, the underlying road may need to be widened to accommodate the pier on the center median and maintain its lane capacity.

On the at-grade sections, the station can be located over the track or on both sides of the track, and connected by pedestrian decks. (These concepts are illustrated in Figure 8.4.6)

Table 8.4.6 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.

(4) Operational Integration of VR and UMRT

VR caters primarily to regional and interurban transport, and is not currently designed to serve intraurban trips. Its infrastructure is single track and un-electrified. Conceivably, it could introduce regional commuter services by doubling its track and adopting electrification. The electric car trains can be interleaved with the diesel-powered, long distance trains through proper scheduling.

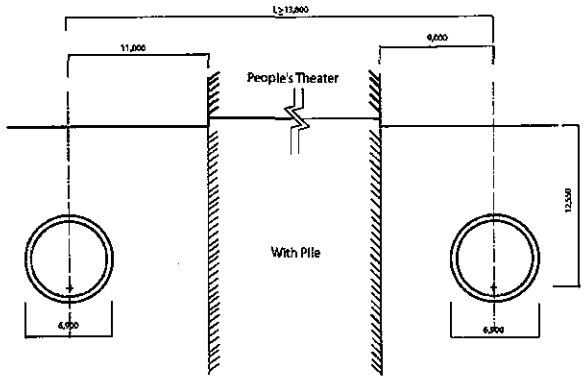
The feasibility study on the UMRT should attempt to harmonize the plans of VR with the overall transport requirements. VR is contemplating on extending its existing line inside the city area westward of HCMC from Saigon Station. While this plan involves doubling of tracks, the intention is for long-distance freight and passenger service only. It could,

however, harmonize with the preceding commuter train service if the freight trains are stopped outside the city.

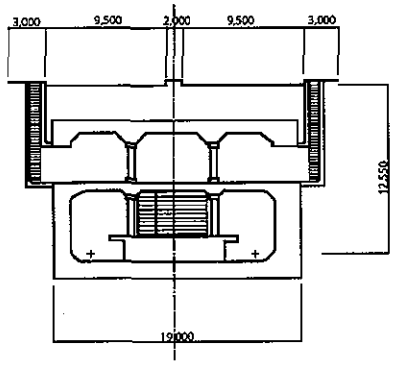
VR has a land asset that may be worth redeveloping into a prime transport hub. It has a centrally located station, a depot, and a locomotive workshop adjacent to Saigon Station.

Figure 8.4.6 Typical Cross-section of Underground, Elevated and At-grade Rail Sections

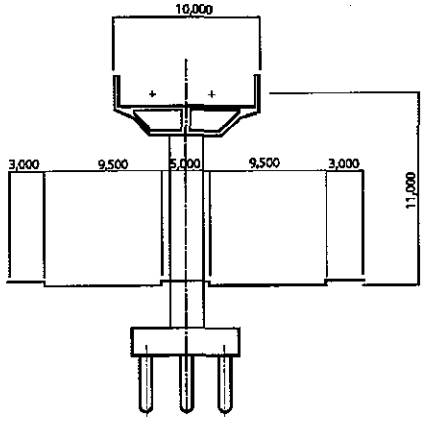
Underground Section between Stations



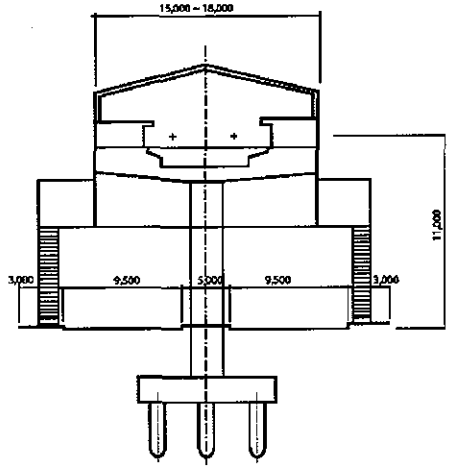
Underground Station



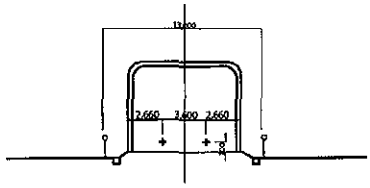
Elevated Section between Stations



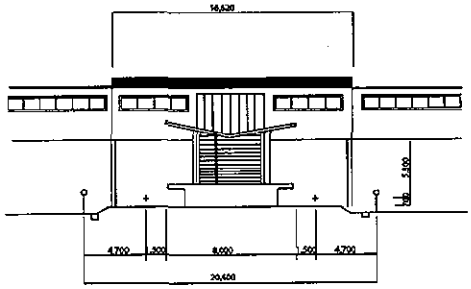
Elevated Station



At-grade Section between Stations



At-grade Station



Source: Study Team

5) Proposed Flyovers and Interchanges

a) Outline: At-grade intersections with high traffic volumes cause delay to traffic flow. This situation produces cost in terms of waiting time, vehicle operation, etc. An introduction of grade separations, such as interchanges and flyovers, to separate the traffic flow can reduce these costs. The project intends to introduce grade separation on existing and possible intersections where the traffic situation is critical.

b) Subcomponents: The project consists of the following subcomponents:

Phase I (2004-2010): Existing and possible critical intersections should be further studied and the introduction of grade separation should be planned and implemented.

Phase II (2010-2020): Continuous planning and implementation will be conducted especially for the future road network.

There is various types of interchanges such as clover, three-leg, diamond, etc. This should be further studied in considering the situation of affected areas.

c) Project Location: Fifty-eight (58) intersections mainly on primary roads are identified *for grade separation.*

d) Estimated Cost: Total cost for the development of flyovers and interchanges is estimated at US$ 1,401 million. This includes the cost of construction, land acquisition, *and compensation.*

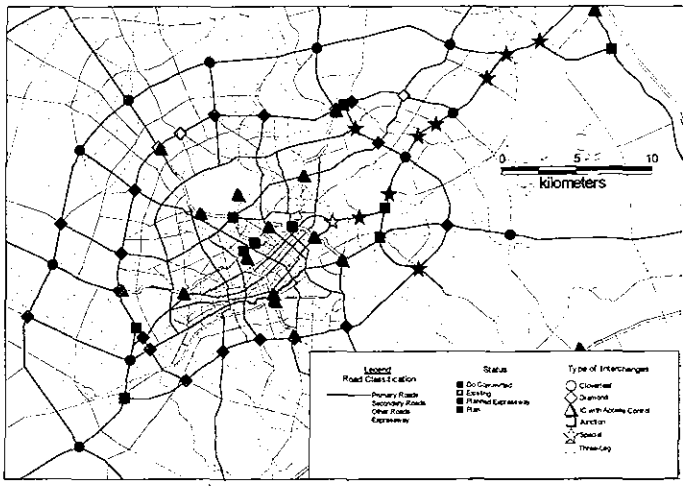
Table 8.4.7 Cost of Development of Flyovers and Interchanges

Interchange Type	No.	Estimated Cost (US$ million)		
		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

e) Implementing Agency: MOT, TUPWS, and Provincial Transport Department, depending on the jurisdiction of the roads.

Figure 8.4.7 Locations of Flyovers and Interchanges



Source: Study Team

6) Proposed Public Transport Terminals

(1) Inter-city Bus Terminal Improvement and Relocation

a) Outline: A large-scale transport facility like an inter-city bus terminal should be developed in planning the future land use, urban structure, and urban transport system. The objective of this project is to improve the conditions of inter-city bus terminals and traffic circulation around bus terminals, as well as to attract passengers to use the bus.

b) Subcomponents: The project consists of the following three phases:

Phase I (2004-2005): Improvement/expansion of inter-city bus terminal at present locations: An improvement/expansion plan of Mien Tay, An Suong, and Can Giuoc bus terminals at their present respective locations already exists. An improvement/expansion work will be conducted as soon as possible in this phase.

Phase II (2015-2017): Study/planning on relocation of inter-city bus terminal: Study on finding suitable land/area along NH1A and RR, and planning for four bus terminals at a new location will be implemented.

Phase III (2017-2020): Construction of interprovincial bus terminal: Four bus terminals (Mien Dong, Mien Tay, Can Giuoc, and Binh Phuoc) will be constructed.

The critical factor is the presence of many interprovincial bus operators who do not use bus terminals and collect passengers by themselves. This activity should be strictly controlled. It is also recommended that an advisory committee that will consist of the TUPWS, district and provincial governments, representative of residents, and bus operators should be convened.

c) Project Location: Phase I: Mien Tay, An Suong, and Can Giuoc, Phase II and III: 4 new terminals around RR2 and NH1A.

d) Estimated Cost: About US$ 200 million.

e) Implementing Agency: TUPWS and Provincial Transport Department.

(2) UMRT Transit Terminals

a) Outline: The development of a bus transit terminal at UMRT stations (urban rail and busway) will not only increase the convenience of UMRT passengers taking the bus for feeder transport but also to attract more passengers for both the UMRT and ordinary buses. This will also contribute in mitigating traffic congestion.

b) Subcomponents: The project consists of the following two phases:

Phase I (2007-2010): Development of bus terminals on UMRT Line 1: Bus transit terminals will be developed at four busway stations located mainly in undeveloped areas along UMRT Line 1 from Ben Thanh to Bien Hoa.

Phase II (2015-2020): Development of bus transit terminals at UMRT Lines 1, 2, 3, and 4: Bus terminals will be developed at about 50 stations and/or busway stations located mainly in undeveloped areas along the remaining section of UMRT Line 1, along the entire route of UMRT Lines 2, 3 and 4, and the two railway-busway connection points of UMRT Lines 1 and 2.

The critical factor is that the district plan, district transport plan, and feeder bus network plan will greatly affect this plan and the implementation of a bus terminal. Cooperation of residents around bus stations will also be needed for the project to succeed. It is also recommended that an advisory committee consisting of the TUPWS, the district and provincial governments, representative of residents, and bus operators should be convened.

c) Project Location: Major stations of UMRT Lines 1-4.

d) Estimated Cost: Phase 1: US$ 2.8M for construction and US$ 5.8M for land acquisition and compensation, Phase 2: US$ 42.8M for construction and US$ 31M for land acquisition and compensation.

e) Implementing Agency: TUPWS and Provincial Transport Department.

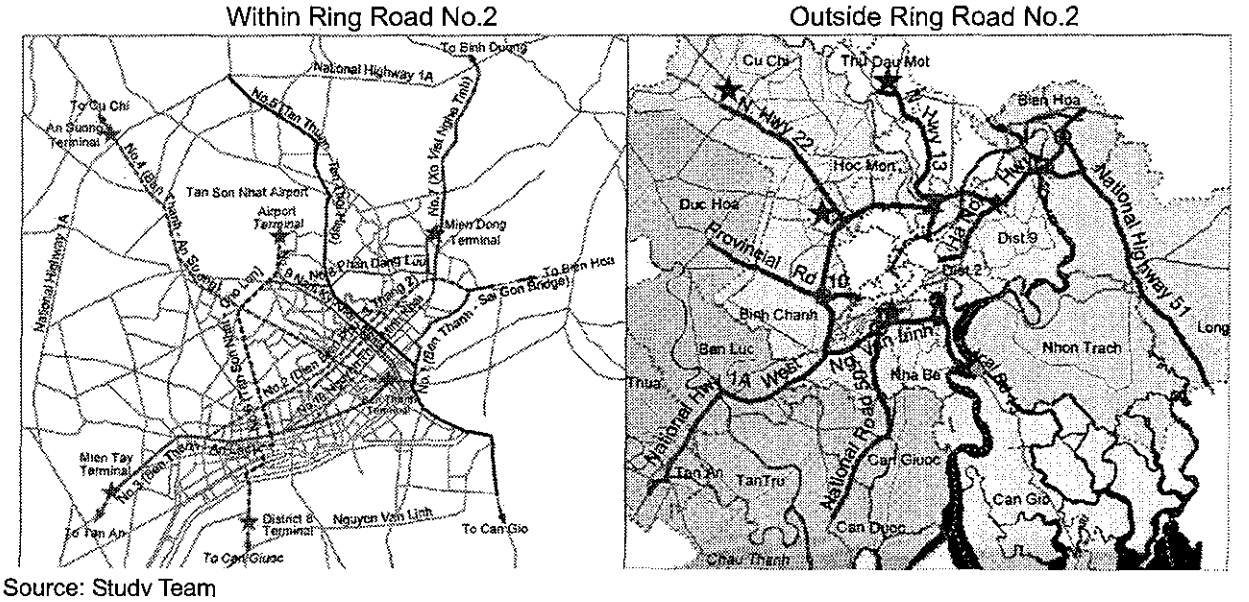
7) Proposed Bus Corridor Management

a) Outline: This project intends to improve traffic management on the city's primary bus corridors and designate corridor sections where bus transport must be given priority. Twenty (20) corridors were selected for their significance in the road network and bus service, 10 inside the city center and 10 outside. Bus corridors identified within the city center are the public transport axes of the city carrying frequent bus operations. Bus corridors outside the city center are the primary roads serving suburban centers and provincial districts.

Among them there are roads planned for the future UMRT lines (inside RR2) and mid-road busways (outside RR2). The notion is to develop corridors in stages in order to cultivate public transport demand required by the high-capacity rail transit system.

Focus will be on the traffic operating environment in major corridors. Traffic flow reorganization, bottleneck mitigation, and traffic safety improvement will be enhanced through the application of various improvement measures. Bus priority measures will be introduced in accordance with bus traffic demand that can be realized within the short term.

Figure 8.4.8 Proposed Bus Corridors



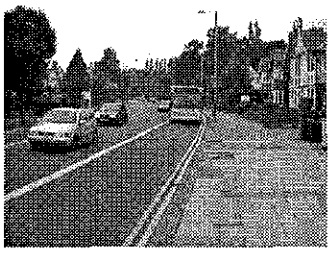
Source: Study Team

b) Subcomponents: Bus corridors inside the city center and those outside differ in road functions and traffic features. The bus corridors within have frequent bus services and heavy volume of personal vehicles inclusive of cars, motorcycles, and bicycles. The corridors outside generally have less bus services and lower passenger demand due to lower density in the suburban and rural areas. Truck traffic is much heavier on some of inter-city corridors.

(a) Reallocation of road space, including designation of bus priority: The predominant two-wheeled vehicles on the roads of HCMC impose disruptive impact, at the same time are vulnerable to potential accidents with the four-wheels. At present, few urban bus corridors have lane designation by vehicle type. Separating two-wheeled from four-wheeled vehicles shall be the basic corridor management, not only to increase road throughput but also to improve safety.

Designating bus priority operation via bus priority lanes and exclusive lanes shall be integrated into road space reallocation. Reserving road space for transit vehicles promotes public transport and could attract motorists to buses, should supporting policies and measures be implemented altogether.

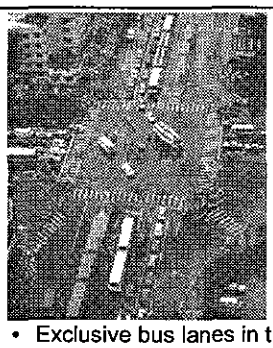
Figure 8.4.9 Example of Bus Priority Lanes

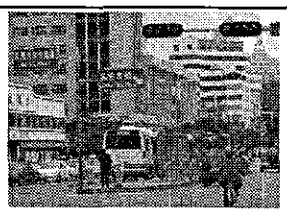


Leicester (England) introduced a 4.5km bus priority lane over a 6km route in 1997, under the objective of promoting bus transit with high quality service to and from the city center.

- Continuous inbound bus lane (towards the city center);
- Outbound bus lane provided at critical locations;
- Red paint applied on bus lanes;
- Minor junction improvements;
- Park & Ride facility;
- Taxies and bicycles allowed to use bus lane;
- $2.2 million project cost.

Results: Morning peak hour vehicle traffic into the city experienced a reduction of 17%. Bus trip time was cut from 23 minutes to 18 minutes. The reduced peak hour vehicle traffic and faster and reliable bus travel are the successful outcomes of the project.





Kunming (China) opened China's first bus exclusive lane in 1999 over a 5km route in the city center.

- Exclusive bus lanes in the middle of carriageway;
- Bus stations located after intersections and designed to accommodate six buses;
- General traffic lanes narrowed down to 2.8-3m;
- Truck ban (daytime);
- Intersection improvements;
- $900,000 project cost and 3-month roadway space reconfiguration.

Results: Both bus travel time and ridership experienced significant improvements. Peak hour bus operating speed increased from 10km/hr to 15km/hr and ridership grew 21% over 2 years. The public is highly supportive of bus priority and as a result the second 10km bus lanes opened in 2002.

Source: Study Team

(b) Traffic engineering and regulation: Applications of traffic engineering measures consist of pavement markings, signs, median barriers, intersection geometric modifications, and delineators. Some measures were utilized in the implementation of the Policy Test Project such as double stop lines, center point marks, two-step left turn for bicycles, and bus lane markings. Detailed description of applicable measures on bus corridors are provided in the section in Bus Corridor Management Program in Chapter 9.

In the past few years, the city started to undertake some traffic regulations, i.e.

conversion to one-way, segregation of two-wheeled from four-wheeled vehicles, and curbside parking ban. Some are on an ad-hoc basis and enforcement of bans is rather weak. Because consistency and continuation of traffic regulations raise road user attention, a unified set of regulations can lead to better observance of traffic rules and schemes.

(c) Improvement of bus facilities and corridor amenities: Convenient access and comfortable waiting at stops have appealing effects on transit users. While the city center's bus corridors have overall good provision of stop facilities, little is done on most of the corridors outside the city center. In addition, access condition to bus transfer nodes and terminals are not user-friendly. Facility improvement includes the provision of stop pad at the minimum as well as route map and schedule, shelter, bench, and lighting.

Street amenities are also valuable to transit promotion. As proposed in the Master Plan Green Network Project, all sidewalks along the bus corridors should be cleared up for pedestrians including transit users. When UMRT stations are developed in the mid term, a continuous sidewalk is considered a prerequisite for station development.

Gateway image should be established on the major inter-city corridors as well, with landscaping, sidewalk, streetlight, road cleaning, and rest area.

(d) Road maintenance and integration with land-use development: Maintenance responsibilities among the jurisdictions and SOE maintenance companies assigned need to be clarified. Maintenance schedules for pavements, markings, signages, and traffic signals should be established to ensure good operating condition.

A large portion of the bus corridors, both inside and outside the city center, are constrained by limited roadway space. As the city pursues opportunities in urban redevelopment or road widening, bus priority measures ought to be integrated into the planning and design process.

c) Estimated Cost: About US$ 50 million.

d) Implementing Agency: TUPWS.

8) Other Proposed Projects

(1) Bus System Modernization

a) Outline: This builds on the current model bus scheme of the city (which focuses on fleet expansion) and broadens it towards the creation of modern forms of managing and operating the bus fleet. Based on the experiences of other cities, bus operation is 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.

b) 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:

- Define in more detail the set of bus routes to be included in each corridor, and assignable to one of the bus operators;
- Determine demand on those routes, and the forces that will push growth in demand;
- Determine the appropriate mix of bus services and fleet to meet this demand to year 2010. Required number of bus fleets are estimated;
- Conduct engineering studies for depot sites, and other transit infrastructure such as bus sheds/stops, and ticketing systems;
- Design the organization and staffing model, including modern IT-enabled management systems, in providing these bus services;
- Provide financial management advice to the large fleet operators;
- Conduct economic analysis from the point of view of the government;
- Prepare business or promotional materials to convince private investors to take over and assume a bigger role in the management of bus system; and,
- Provide technical assistance to the MOCPT, Saigon PTC, and the other fleet operators in the performance of their respective roles.

c) Estimated Cost: Cost[1] of new bus fleets and others are estimated as follows:

- Up to 2005: US$ 40 million for 1,318 new buses.
- 2005-2010: US$ 209 million for additional fleets, US$ 0.6 million for bus stops, US$ 6.3 million for interest subsidy, and US$ 5.8 million for operating subsidy.

d) Implementing Agency: TUPWS, MOCPT, bus operators.

(2) Local Traffic and Transport Improvement

a) Outline: 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 service at the district level, because a significant portion of the transport demands is met within the 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.

[1] Assumed unit prices of bus fleets are: US$ 50,000 for large bus (80 pax), US$ 40,000 for medium bus (40 pax), US$ 30,000 for mini bus (20 pax).

b) Estimated Cost: About US$ 300 million.

c) Implementing Agency: HCMC and provincial TUPWS.

(3) CBD Traffic Management (TDM)

a) Outline: The central business district of HCMC is the economic powerhouse for the southern Vietnam and even for the country. It offers a desirable business environment and a large pool of supporting resources including human resources. It is foreseeable that in the coming years its role will be far more influential as economic development intensifies. Understandably, as an outcome of business growth, concentration of people and movement of goods to and within CBD will be inevitable. Such has been evidenced in other Asian mega cities, often resulting in congested road transport systems.

The Master Plan stresses that the city should undertake road improvements to clear up bottlenecks in order to facilitate movements in and out of the CBD. It also recognizes that such efforts will be fairly limited. Expansion of road network to accommodate future demand will become increasingly challenging due to its disruption in the development plan, resettlement impact, and development cost.

Furthermore, building roads is not always an effective solution, even under the assumption of little financial constraint. More supply of new road space induces vehicle travel demand, inviting ever increasing motor vehicles onto the new road space.

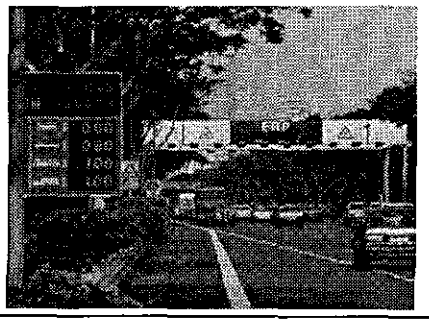
Under this context, the Master Plan recommends fundamental changes to road management. Strengthening traffic management, along with road development, makes better use of roads, maintains high mobility and urban amenities, and ultimately fosters the stronghold of HCMC's CBD into the future.

b) Subcomponents: The project consists of the following subcomponents:

(a) **Traffic demand management (TDM):** Uncontrolled use of private vehicles (cars, trucks, and motorcycles) in the CBD will result in heavy congestion, which is detrimental not only to economic and social activities but also to the environment. TDM schemes can restrain travel demand of low-occupancy motor vehicles. Limiting vehicle access and road pricing are two typical measures.

The road pricing concept has been applied in other cities. It promotes those using roads often to pay in proportion to usage and sets a financial restraint on vehicle users. Applicable measures for the consideration of HCMC could come in two basic forms – area-based charge and corridor-based charge. Revenues generated from user charges could be earmarked as funding for road and public transport development.

Figure 8.4.10 Congestion Pricing in Singapore



Singapore is well known for its CBD congestion pricing. It is a dynamic pricing scheme with price varying by time.

Pricing is higher during peak periods and lower or non-existent during uncongested periods.

Charges are deducted from a stored-value SMART card that motorists insert into an electronic in-vehicle device. Each time the motorist travels under the screen line, charge is automatically deducted from the SMART card.

Source: Study Team

When introducing TDM, all stakeholders must have a common understanding of TDM objectives, and TDM schemes must also be accompanied by alternative transportation or other remedies.

(b) **Parking policy development**: Car parking is not a serious problem in the CBD at the moment; however, motorcycle parking has spread over CBD sidewalks. Under the trends of vehicle ownership increase and new high-density development, parking will quickly become a touchy issue. It is about time to establish a parking policy. Practical development strategies and management practices will help alleviate the impact of parking within the CBD.

- On-street Parking: On-street parking policy first tackles the spill-over situation of motorcycle parking through the combination of two actions. First, on major retail and tourism streets, motorcycle parking shall be prohibited and sidewalks will be returned to pedestrians regardless of the width of sidewalk. Second, roads and sidewalks in close proximity to the above streets, where less pedestrian traffic is observed, can be designated as parking area. The city should soon identify and establish roads that permit or prohibit on-street parking within the CBD. The TMU of the TUPWS has been considering a parking plan for District 1 and this is an encouraging move. For the roads allowing on-street parking, it is important to charge parking fees comparable with, or even higher than, garage parking fees in the same area. Otherwise, drivers would crowd the streets instead of using garage parking.
- Off-street Parking: The off-street parking plan should be in the context of land-use development. Identifying and reserving land for public parking structures is a component of the city's land-use plan. The private sector is perceived to have a significant role in developing parking structures through public-private partnership, as experienced by both developed and developing cities.
- Parking requirement for land-use development: A parking provision shall be established and incorporated into the review process of land development. Such requirement needs to differentiate parking rates according to the trip generation and attraction nature of the proposed land use.

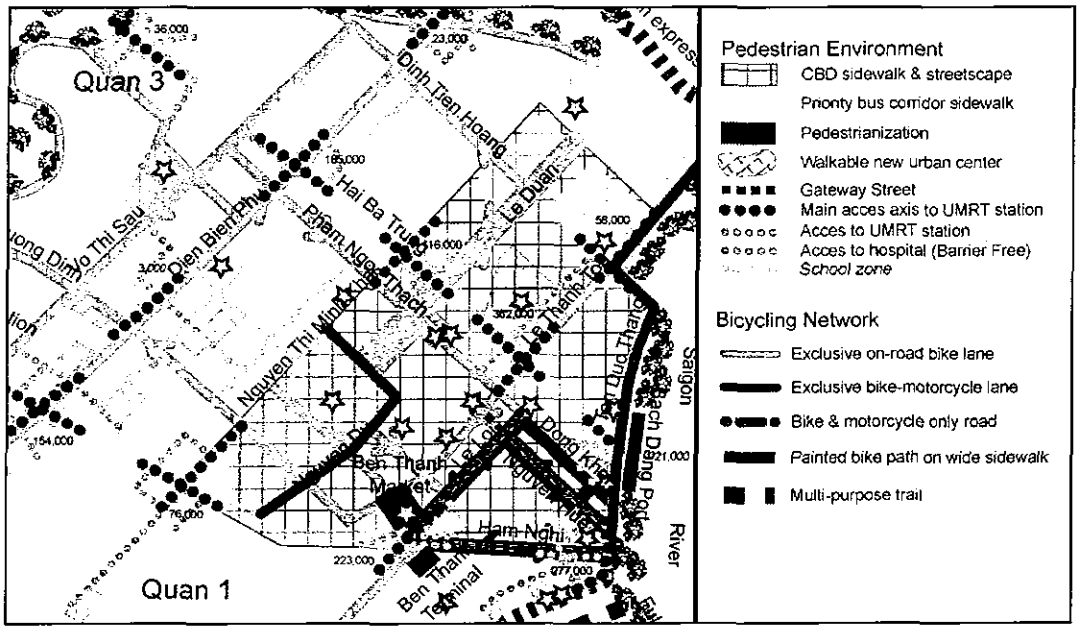
(c) **Promotion of public transport and non-motorized transport**: Good public transport services, via bus and urban rail, can meet the travel demand into the CBD with higher capacity and less road space. Walking and bicycling also share the travel demand into the CBD but without negative impact on air quality. Collectively, these alternatives mitigate the impact of restrictive measures on private vehicles.

These measures would be most effective if combined with user charges and vehicle access restriction. The Master Plan projects on Bus Modernization Program and Green Network Development outline actions for the CBD, including:

- Bus priority measures on primary bus routes in and out of the CBD (shown as solid blue lines in Figure 8.4.11);
- UMRT lines and stations within the CBD (stations shown as circles), and connecting sidewalks from surrounding streets (dotted lines);
- CBD pedestrian environment, including pedestrianization; and,
- Designation of bicycling routes, as illustrated by green lines.

c) Project Location: The CBD under the study is surrounded by Cach Mang Thang Tam, Nguyen Thi Minh Khai, Ton Duc Thang, and Saigon River.

Figure 8.4.11 CBD Walking and Bicycling Network



Source: Study Team

d) Estimated Cost: About US$ 100 million.

e) Implementing Agency: TUPWS, APD, and Department of Traffic Police.

(4) Pedestrian/Green Network Development

a) Outline: Walking and bicycling are the non-motorized modes of urban transport in HCMC, making up over a quarter of all internal trips within the city center. Supporting walking and bicycling during the Master Plan implementation not only meets existing and future transport demand, but also brings in livability and offers environmental benefits. Both walking and bicycling are considered environment-friendly in terms of energy consumption and environmental conservation.

Likewise, transit users need convenient and safe walking access to bus stops and rail transit stations as the city develops better public transport service. A good walking environment is essential to transit development. Bicycling will remain a short-distance transport means.

The project area is the urban center of HCMC where commercial, administrative, tourism, and recreational activities concentrate. The project targets to develop pedestrian and bicycling networks in order to enhance the safe separation of pedestrians and bicycles from motorized vehicles. Improvements of street amenities and recreational green space are also considered to create a pleasant and green city center.

b) Subcomponents: The formation of a green network is based upon the existing and planned land use, road network, and public transport plans. Network design should stress accessibility to major activities, consider road conditions, interact with public transport plans, and beautify city streets and the waterfront.

(a) **Pedestrian environment**: Improvement of pedestrian environment initially concentrates on the CBD and the city's primary public transport corridors. Such corridors, inclusive of bus priority corridors and planned urban rail transit lines, draw significant amount of walking trips.

- Promotion of a walkable CBD: Sidewalks in the central area are constantly being occupied and their conditions vary from section to section even on the same road. The Master Plan calls for sidewalks for pedestrians, not for parking. Existing sidewalks within the CBD should be retrofitted to provide smooth walk throughout. Designating areas and streets for parking is equally critical; otherwise vehicles will find *their ways back to the sidewalks for lack of parking space.*
- Pedestrianization: Dong Khoi Street, Ben Thanh Market, and Binh Tay Market shall be pedestrianized on weekends and holidays immediately, with permanent pedestrianization towards the mid term. Bus stops need to be relocated to accessible locations at Binh Tay, pedestrian crossing should be facilitated at Ben Thanh Market, and parking organized outside pedestrian zones.
- Access to bus priority corridors and UMRT stations: Sidewalks along the city center's bus corridors (refer to the Mater Plan project of Bus Corridor Management) ought to give priority to bus passengers. Bus stops will be improved, along with shelter, lighting, and trash disposal. In the city center, walking will be the dominate access to rail transit stations along the future UMRT lines. Some of the stations are projected to serve passengers above 100,000, even up to 220,000 on a daily basis.
- Walkable new urban centers: When the opportunity comes to develop the Thu Thiem *area, the concept of a walkable new center could be explored to provide the city with* waterfront boulevards and parks.

(b) **Bicycling network**: The formation of a bicycle network relies upon road conditions in the project area, such as level of congestion, bus and truck operation, road width, and ROW availability. Beyond the short term, bicycling facilities need to be incorporated into urban road development as appropriate. The bicycling network is defined into four types as follows.

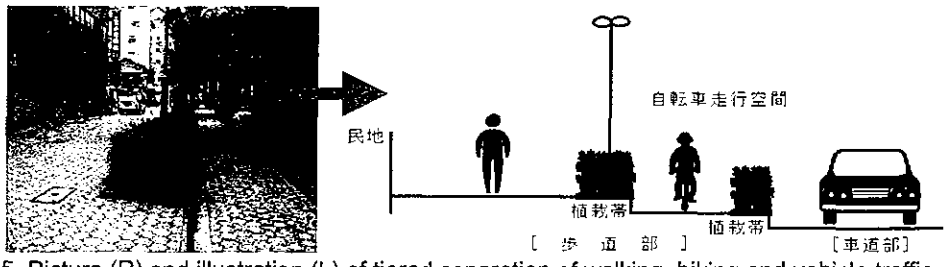
- Exclusive on-road bike lane: Such bike lane separates bicyclists from pedestrians and motor vehicles and provides comfortable bicycle rides. It is often about 1.5-2m wide and could be a painted lane with edge markings or delineators. Focuses are to (1) form a CBD bicycling network on the streets with adequate space and less traffic; and (2) establish bike paths on bus priority corridors where one-way traffic operates (refer to Bus Corridor Management. For example, the bike path on Dien Bien Phu and Vo Thi Sau). *Signs and markings on existing on-road bike lanes should be improved.*
- Exclusive bicycle-motorcycle lane: This type follows the present motorcycle-bicycle lane designation on Le Loi and Ham Nghi within the city center. With limited road space, mixing bicycles with motorcycles is deemed safer than mixing with general traffic. Actions include utilizing existing bicycle-motorcycle lanes; prohibiting parking in the lane and enforcing parking ban; establishing new bicycle-motorcycle lane on Ng Huu Canh and connecting with Ha Noi Highway's bicycle-motorcycle lane (per Bus Corridor Management in the Short-term Action Plan).
- Bicycle-motorcycle only road: The designation of this road aims to restrict bicycles

from accessing parallel major bus corridors where road space is tight. It uses adjacent neighborhood streets to provide bicycling trips to activity centers in lieu of bus corridors.

- Painted bike path on wide sidewalk: This type of path only applies to roads with light vehicular and pedestrian traffic and a wide sidewalk (above 4.5m wide). It mainly serves the purpose of filling gaps in the network with underutilized sidewalks. Signs, color pavement, and markings need to be applied to distinguish the path from the rest of the sidewalk.
- Multi-purpose trail: Multi-purpose recreational trails make use of canals, arroyos, and space below the planned urban expressways. Trails shall be gradually constructed along Thi Nghe and Ben Nghe arroyos and under elevated urban expressways for jogging and bicycling.

Figure 8.4.12 Bicycle Routes in Japan

1. Painted bike route on sidewalk | 2. Roadside bike parking | 3. Shared use of sidewalk | 4. Recreational path



5. Picture (R) and illustration (L) of tiered separation of walking, biking and vehicle traffic

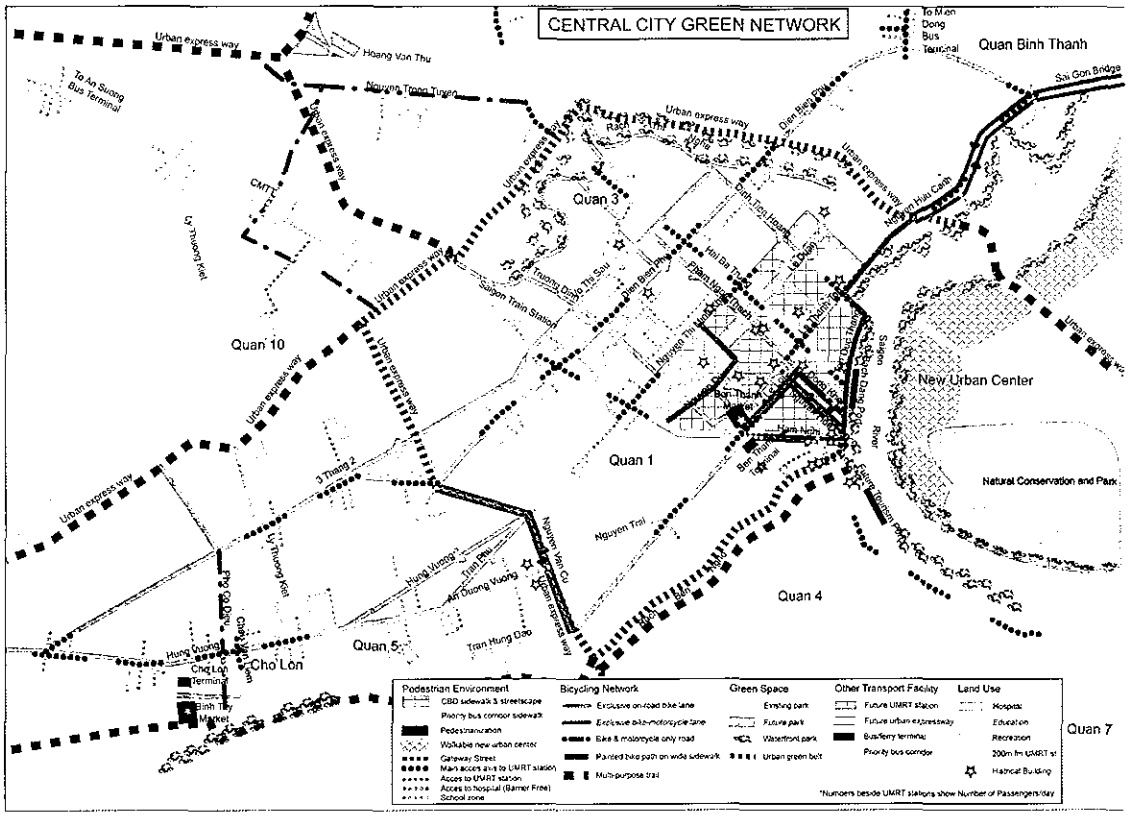
Source: Ministry of Land, Infrastructure and Transportation, Japan

Supporting facilities and traffic rules on bicycling are the inseparable elements of network development, inclusive of bike lockers at activity centers and transit stations, signs and markings, pamphlets on traffic rules and bicycle facilities, and maintenance of pavements and facilities.

(c) **Street amenities and green space**: Street amenities build pleasant streetscape and enhance the city's livability, which in turn increase residents' quality of life and attract business locators. Amenities commonly refer to street trees and plants, bus stops, street signs, and guide map, street lights, trash disposal, and public toilets and utility fixtures. Improvement of street amenities should start with the CBD area, city center bus corridors, and the city's gateways.

Green space brings nature to the densely populated urban center and fulfills the city's recreational needs. It also benefits the urban environment by mitigating motor vehicle emissions. Enhancing waterfront parks along Saigon River and Thi Nghe Arroyo takes advantage of waterway scenery in the core area.

Figure 8.4.13 City Center's Green Network



Source: Study Team

d) Project Location: Area within District 1 and some areas in districts 3, 5, and 10.

e) Estimated Cost: US$ 20 million.

f) Implementing Agency: TUPWS.

(5) Traffic Safety Improvement

a) Outline: Traffic accidents in the HCM metropolitan area have been steadily increasing. In the city alone, fatalities resulting from traffic accidents almost doubled from 1996 to 2001. In order to reduce the number of traffic accidents, various traffic safety planning, infrastructure engineering, enforcement, and education programs should be planned, coordinated, and implemented in an integrated and comprehensive manner.

Actions for short-term implementation are detailed in the subsequent chapter on Short-term Action Plan (refer to Traffic Safety Improvement Section). Highlights are provided below.

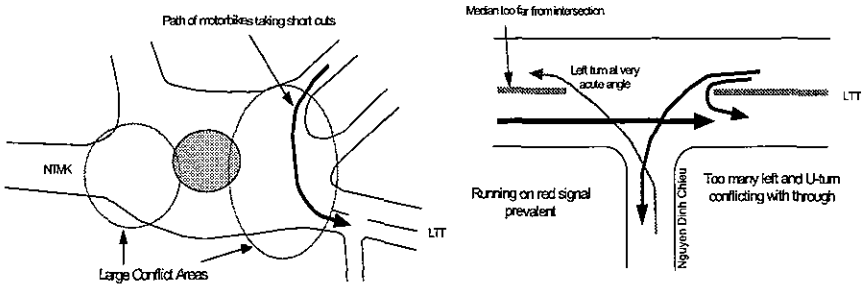
b) Subcomponents: This project has the following subcomponents:

(a) **Revival of Computerized Accident Database**: The availability of reliable data on accidents is key to understanding how the transportation system works. There must be wholehearted commitment to improve traffic accident investigation, reporting, and analysis. The accident database initiated a few years ago must be revived. Complete reporting of traffic accidents and better use of accident records will prove very useful in planning remedial and preventive measures.

(b) **Formulation of multi-year traffic accident reduction program:** Once a reliable database becomes available and the analysis of accident records is possible, a multi-year accident reduction program should be prepared with realistic and clear *indicators such as number of fatalities or accident rate per vehicle-kilometer.*

(c) **Infrastructure improvement:** Improvement of infrastructure is especially necessary at black spots where traffic accidents often occur. Records show that many accidents *occurred at large roundabouts or irregularly shaped intersections in HCMC. The* analysis of accident records and the improvement of facilities at these locations are urgently needed. Typical examples of intersection problems are shown below. The Short-term Action Plan in Chapter 9 selected 19 critical black spots and proposed corresponding mitigation actions.

Figure 8.4.14 Common Conflicts by Type of Intersection

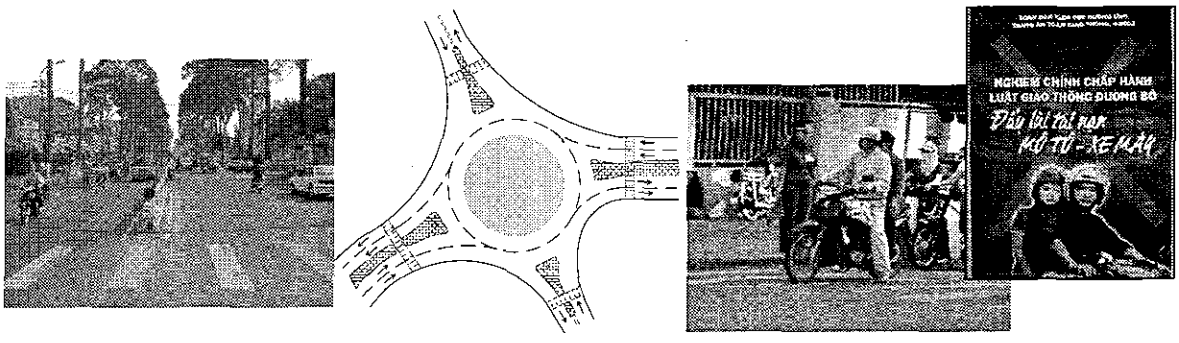


1). Conflict at roundabouts 2). Conflict at T-intersections

Source: Study Team

Traffic safety audit should be institutionalized in the design process of new roads, bridges, and other traffic facilities. Safety audits, conducted by independent experts, help detect potential safety deficiencies in the engineering design. The mitigation of such defects could limit or even eliminate accident-prone elements in the built infrastructure.

Figure 8.4.15 Example of Improvements



Source: Study Team

(d) **Strict enforcement of traffic rules:** The current traffic situation in the study area requires considerable enhancement of people's safety awareness. While committed *safety education over the years will benefit society, strict enforcement* of traffic rules is probably the most prompt and effective approach in dealing with traffic violations,

especially excessive speeding, drunk driving, and driving on the opposite travel lane.

(e) **Education and campaign:** Since the number one cause of traffic accidents is human error, it is a must to establish a concrete mechanism to educate drivers and other road users. The education program will be conducted in many ways, for instance, safety education oriented towards school children and communities, safety education at the time of application and renewal of driver's license, and safety campaign through the media.

c) Project Location: Depending on the component actions, the project will be implemented at various locations i.e. accident-prone spots, schools, and community centers. The media campaign will use both broadcast (TV and radio) and print.

d) Estimated Cost: A total of about US$ 10 million including the improvement of black spots, accident database, education, and enforcement.

e) Implementing Agency: Department of Traffic Police, Department of Traffic Safety, TUPWS and youth volunteers.

(6) Air Quality Improvement

a) Outline: Air quality in HCMC is becoming an environment and health concern. Motor vehicle emission is the largest source of air pollution followed by industries. Ambient monitoring has consistently shown that emission levels along major roads exceed the national standards.

The HCMC and the national governments have undertaken actions to redress the impact of motorization and industrial development. Key measures include establishment of air quality standards and in-use vehicle emission standards by the national government; ODA projects for ambient monitoring through the UNDP and the ADB; prohibition of lead gasoline sale in Vietnam in 2001; and decision to convert oil-fired power plants to gas-fired plants in 2005.

Challenges lie ahead for HCMC. At the current pace of motorization, it is estimated that vehicle emission in 2010 will be at least twice as high as the 2000 level. Hence, this project maps out actions to reduce air pollution for the short and medium terms and to achieve air quality conformity to the Vietnam environment standard.

b) Subcomponents: This project includes:

(a) **Strengthening of regulation on vehicle emission:** Actions on regulating vehicle emission range from updating of emission standards for new vehicle, enforcement of emission standards for in-use vehicle, expansion of vehicle inspection and maintenance (I/M) program to continuation of roadside inspection. Of these, the improvement of I/M shall be given high priority.

The city requires four-wheeled vehicles to undergo regular inspections. The TUPWS is the designated agency carrying out inspections. However, motorcycles, the largest source of vehicle emissions in HCMC, are not required to take any regular safety and emission inspection once registered. For the time being, detection of gross emitters relies on random roadside inspection by the Traffic Police. Because motorcycle is likely to remain a dominant means of urban transport in the next 20 years, mitigating

its emissions through preventative I/M program is indispensable to air quality improvement.

Introducing motorcycles into the I/M program would require a large-scale operation. The city could consider decentralization of inspection functions from the TUPWS and the involvement of the private sector, which could relieve the city from capital investment on equipment. Private investment will be returned through user charges on inspection services. The city would regulate operators through training and monitoring.

(b) **Expansion of ambient monitoring and staff capacity:** Under the urbanization trend, the developing fringe areas will receive an increasing volume of vehicle traffic. Meanwhile, the inner city will further densify. All these necessitate an expanded air quality monitoring program across the built-up areas.

The city's DONRE is responsible for air quality monitoring and analysis. Its capacity has improved during the implementation of the UNDP and ADB projects. However, many functions are yet to be formalized and strengthened, including regular reporting, air quality prediction, and enforcement of environment regulations for industries. Continual enhancement of technical skills through training is important in order to meet the increasing needs on air quality monitoring and control.

(c) **Improvement of fuel and vehicle quality:** Fuel and vehicle features directly impact the polluting characteristics of vehicle emission. However, fuel refinement and motor vehicle manufacturing are nation-based industries linked to the global market. Most of the policies and actions on fuels and vehicles fit within the administration of Vietnam's national government.

A number of small-scale actions are considered within the authority of the HCMC government. Alternative transportation fuels have lately been explored in both developed and developing cities. HCMC could initiate small-scale experiments of compressed natural gas (CNG) and liquefied petroleum gas (LPG) and assess their applicability in HCMC, such as in taxis and bus fleets.

(d) **Water spraying of roads:** Street dust comes from many sources: vehicle emission, construction, and industrial emission. Maintaining a clean road network through water spraying and road sweeping reduces the chance of dust inhalation and also enhances streetscape. There are few cleaning vehicles available in the city and districts as of now. Supplying additional cleaning vehicles and setting up fixed cleaning schedules for roads of different classifications are feasible actions for the short term.

c) Estimated Cost: Total is about US$ 20 million including emission inspection system, road sweeping, water spray equipment, and expansion of monitoring station.

d) Implementing Agency: TUPWS and DOSTE, central government.

(7) Urban Waterway Transport Development

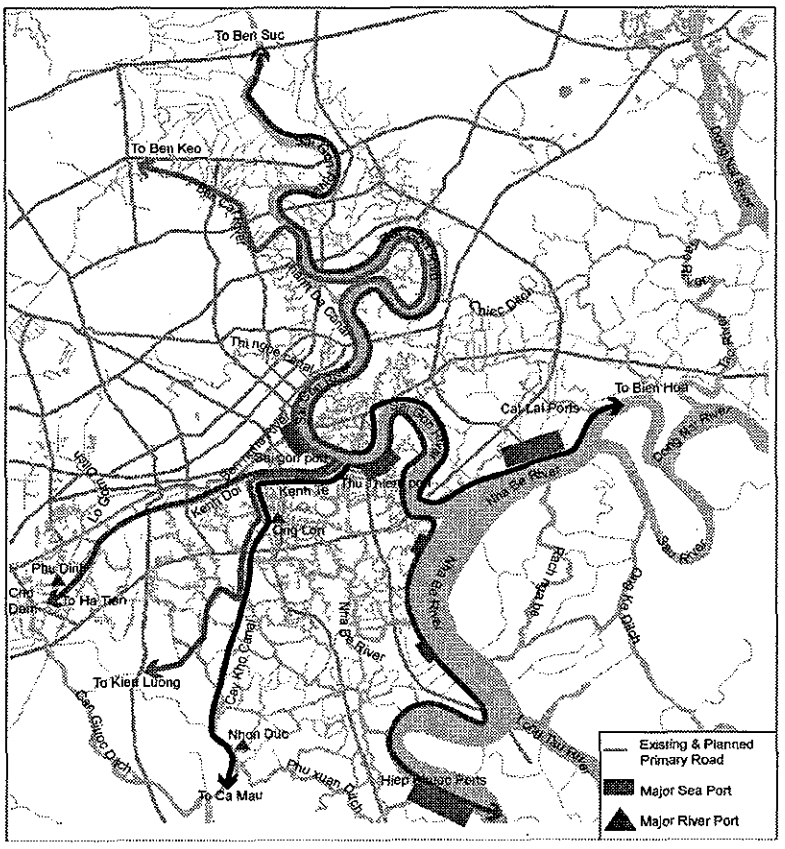
a) Outline: The extensive waterway network in HCMC has been the artery of goods movements and has provided passenger transport means in areas where roads and bridges have not desirably developed.

It would take substantial time and investment to build up the road and public transport

infrastructures proposed by the Master Plan. Besides the major road network towards the south will not be as dense as the road network in the other directions due to the deltaic features of the area as illustrated in the figure below. There are plenty of opportunities to utilize this natural transportation resource and to serve niches in travel demand.

According to the baseline studies from the TUWPS and the TDSI, the waterway outlook appears to differ in terms of passenger and freight transport. In the HCMC statistics of 2002, waterway goods movements presented a strong growth pattern since 1995. On the contrary, passengers transported over waterways have declined during the same period. The HOUTRANS' inland waterway survey (refer to Table 8.4.8) confirmed this.

Figure 8.4.16 Orientation of Major Waterways



Source: Study Team

(a) **Freight transport outlook:** Inland waterway transport will continue to grow at pace with economic activities in the region. Its advantages of low costs and accessibility to the corners in the delta offer competitiveness over road-based freight transport. As illustrated in the table below, barges will be the major vessels for inland waterway, mainly transporting agriculture goods in bulk, forest and construction products to the seaports as well as local markets in the region. Seaborne freight will be ever-promising and will gain most of the development, as the city becomes closely connected to the global market.

(b) **Passenger transport outlook:** When good roads become available, passengers will understandably prefer faster bus services to water transport. Therefore, it is unlikely for water transport to be significant in the urban market, except for ferry and tourism services in the city center. It will, however, remain important in inter-city and regional

transport of passengers to the south where roads are and will be less developed, including Can Gio, Can Giouc and Vung Tau.

Table 8.4.8 Current Inland Waterway Traffic by Vessel

Survey Section	Seaship	Barge	Oil Tanker	Passenger Ship	Nonmotorized Boat	Total Counts
Saigon River (Saigon Port-Thanh Da)	1%	82%	0%	3%	15%	152
Dong Nai River (Dong Nai- Nha Be)	1%	89%	5%	4%	1%	281
Nha Be River (City-Tinh)	0%	96%	2%	0%	2%	253
Cay Kho (City-Mien Tay)	0%	92%	0%	0%	8%	214
Cho Dem (City-Tinh)	0%	99%	1%	0%	0%	181

Source: Study Team
Note: Survey was conducted in 2003 over a 14-hour span (6:00-20:00).

b) Subcomponents: The Master Plan waterway project is thus formulated upon this outlook. The actions fall into two categories, freight transport and passenger transport.

(a) **Waterway improvements:** As said above, waterway will continue to be a crucial freight transport means in the metropolitan area. The Master Plan puts priorities on the waterways providing connections to existing and future seaports and to the Mekong Delta, as listed in the figure below.

For the rivers linking to new seaports, the growing number of smaller ships and barges will count on these channels to ship goods from ports to the city and the region upon seaport relocation. Maintaining good operational conditions is of high importance.

Table 8.4.9 Improvements on Waterway Network

Orientation	Waterway Route	To Region	Future Role and Improvement	Priority
Interprovincial waterway	1).Saigon-Ca Mau, 2).Saigon-Kien Luong, 3).Saigon – Ha Tien	Mekong Delta (South)	1. Good condition. 2. Critical for freight into the Mekong Delta. 3. Dredging at shallow sections. 4. Support for inter-city passenger transport development with better ships and terminals.	Medium
Interprovincial waterway	1).Saigon-Ben Keo, 2).Saigon-Bien Hoa, 3).Saigon-Ben Suc	Northern region	1. Natural condition limits large capacity transport. 2. Relying on good roadway network in this area for goods and people movements.	Low
City waterway to seaports	Saigon-Nha Be-Soai Rap-Vung Tau-Thi Vai	HCMC	1. Crucial connection from the city to Hiep Phuoc and Cat Lai seaports. 2. Stable waterway condition. 3. Improvement of sharp turning radius and dredging to ensure large ship movement.	High
City waterway to the south	Branches of the rivers to seaports.	HCMC	1. Freight operation to supplement gap in road network. 2. Exploring waterbus to serve communities.	Medium
City center waterway	1).Te-Doi canal, 2).Ben Nghe canal, 3).Canal no. 1/2/3, 4).Lo Gom canal, 5).Thi Nghe canal, 6).Thanh Da canal, 7).Saigon river along inner city	HCMC	1. Clearing banks and cleaning canals and arroyos. 2. Developing waterbus system after clean-up. 3. Integrating into urban redevelopment and involving private sector operation in waterbus.	Medium

Source: Study Team

(b) **Seaport improvements:** The HCMC government has foreseen development constraints on the existing seaports and has made the decision of relocating them. Saigon Port, Ben Nghe Port, and Ba Son Shipyard on the Saigon River are planned to be transferred to Hiep Phuoc on Soai Rap River and Cat Lai at the junction of Nha Be River and Dong Nai River, both of which will be the lead seaports upon completion.

From the perspective of port development, the Master Plan considers the relocation vital in forging the strong position of HCMC seaports by 2010 and the many years to come. The JICA Seaport Development Study of South Vietnam also examined the relocation issue in view of shipping trends and deemed that relocation would accommodate increasing numbers of large-sized ships. In addition, new port areas could provide adequate land of lower values for supporting facilities and services required by port operation, including terminal yards, warehouses, logistic and trade industries, and access roads to the highway network.

From the perspective of urban transport improvement, the relocation of ports out of the city center would divert high-volume truck traffic out of the most congested areas and allow low-clearance bridges to be built. Outside the city center where port traffic impact is less severe, the existing well-developed freight ports, such as Tan Thuan Port, could remain and be strengthened.

In addition to the task of preparing a relocation timetable, the city government shall commit to the improvement of operational efficiency at existing ports, both in terms of hardware (facility) and software (management). Actions consist of promoting IT for a paperless service, improving port statistics and reporting, and prioritizing road construction to fit the timetable of seaport development.

(c) **Passenger transport:** Actions for passenger transport targets inter-city service, urban ferry, intracity waterbus and tourist-oriented water transport. Facility improvement and connection to bus services are the key areas of passenger transport development.

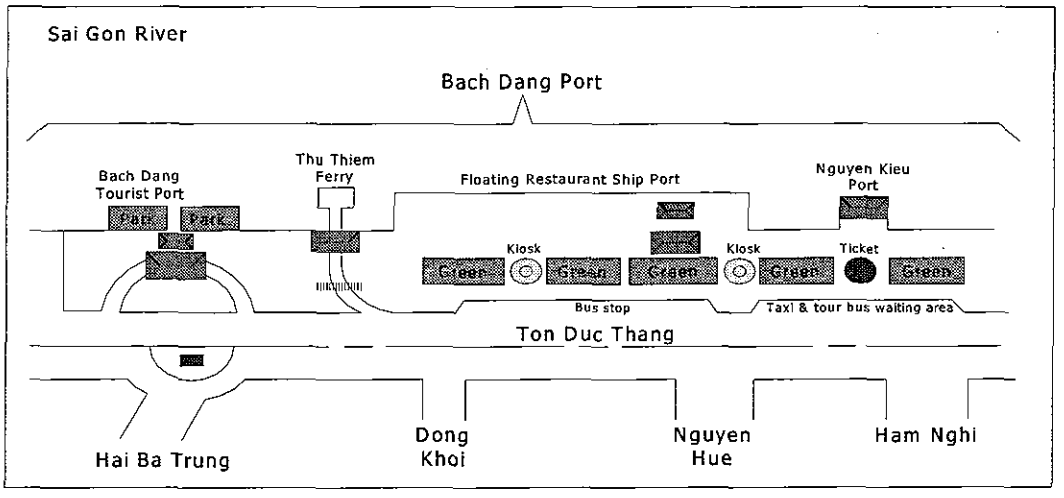
- Inter-city service: Inter-city service to the south will have opportunities in the high-speed services by hydrofoils and low-fare services by motorboats. Routes served by high-speed ships will attain most of the growth momentum. In particular, the demand on routes to Vung Tau and Can Tho is projected by the TDSI study to reach 10% a year up to 2010. The low-end market with motorboats provides low-fare services to merchants and laborers at a travel range of about 100km. Providing amenities and convenient transfers to bus routes at terminals would be adequate.
- Urban ferry: Major ferry routes at Thu Thiem, Cat Lai, Ben Khanh, and Can Gio have undergone consistent growth in the recent years. In the short and mid terms, existing ferry routes will remain viable options for river transport. Quality ferry ships, comfortable waiting areas, and convenient transfers to land transportation will be the actions to support growth in river transport.
- Water-bus: As the city clears up informal structures along riverbanks and cleans up water conditions, water bus services could be introduced as an alternative to bus services along the Ben Nghe Canal and Doi Canal.
- Tourism facilities: Waterway transport catering to tourists will continue growth in two market segments, one is for local sightseeing and the other for international cruise

ships. The central location of the Bach Dang Port is of high value for being a hub of local tourism operations. Short-term improvements have two components:

Renewal of Nguyen Kieu Port and Bach Dang Tourist Port: The existing wharves need to be consolidated and expanded, with better linkage to the waiting and ticketing facilities. Also, the waiting room at Nguyen Kieu Port should be renovated.

Provision of public transport service at Bach Dang Port: At present, there is no public transport service in the terminal. A roadside space of 2.5m is proposed to be provided as a transfer area to public transport, as shown below. This widening will accommodate two to three buses and a loading area for taxis and tour buses. Both will be sheltered and provided with passenger amenities.

Figure 8.4.17 Proposed Bus Terminal at Bach Dang Port



Source: Study Team

Located between the regional cruise hubs in Hong Kong and Singapore, HCMC has the advantage of being a stopover for cruise ships. The current Nha Rong Port within the Saigon Port area handles both cruise ships and cargoes and there are no passenger amenities. Tourism transport demands high-quality services. Emphasis will be on building an upscale tourist terminal and river tour facilities, such as "hop-on" stations, as well as incorporating it into the city's tourism development plan.

(d) **Institution and regulation:** Management of passenger waterway services and ports is fragmented at this stage. The existing 25 ports belong to 15 companies under 10 different government agencies. Such organizational arrangement yields little benefits for growth potentials in waterway transport. It is a necessity to consolidate management agencies and orchestrate the operation, planning and redevelopment of waterway transport in a holistic approach. Also, the growing number of traffic accidents on waterways would require actions on regulations and enforcement.

c) **Estimated Cost:** Total is about US$ 10 million including improvement and construction of new passenger ports and terminals (US$ 4 million), water bus service (US$ 2 million), and relocation of small local ports to fringe areas (US$ 4 million).

d) **Implementing Agency:** TUPWS and MOT, port and ferry administration and waterway management agency.

(8) Traffic Management Capacity Improvement

a) Outline: The HCM metropolitan area will soon embark on road development following the completion of the Master Plan. Building roads is important; managing traffic on the built roads is even more in order to achieve productive use of road infrastructure and safe traffic operation. Traffic management functions in HCMC are shared by the Traffic Police and the Department of Transportation and Public Works. In reality, urban traffic engineering and management are relatively new skills in Vietnam and there are few experts in the fields. The existing traffic management capacity is rather weak both in terms of technical skills and staffing. Good traffic management requires a capable team of transport planners, engineers, and traffic police from the involved agencies to carry out traffic studies, engineering designs, and enforcement. The traffic management capacity improvement project is designed to strengthen knowledge and skills in traffic management from the short to the long term.

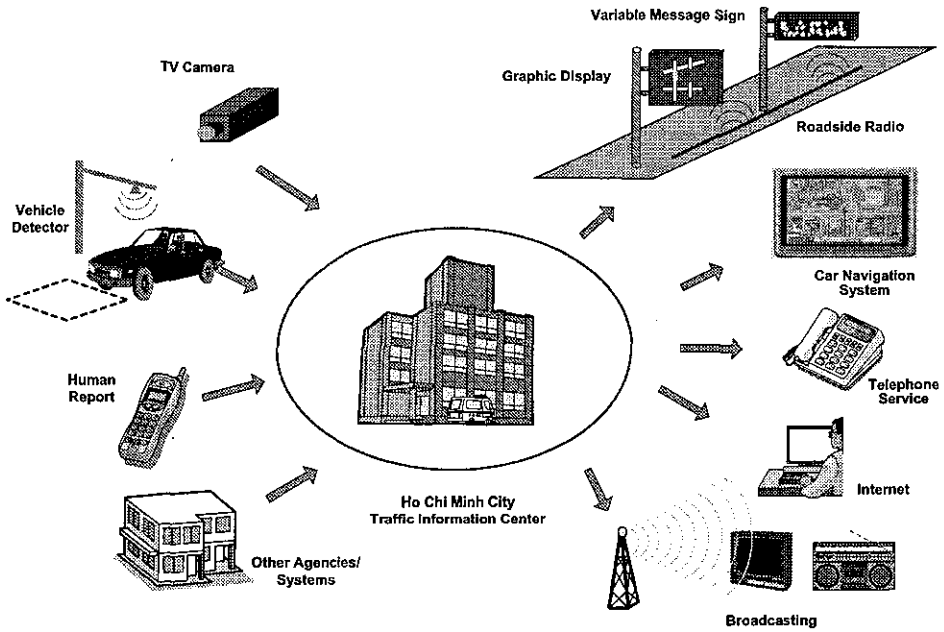
b) Subcomponents: The project targets staff concerned with the city's transportation and traffic engineering, traffic management, and traffic law enforcement.

(a) **Establishment of Traffic Police training programs:** Policing traffic in HCMC is essential to maintaining the order on urban roads particularly in the absence of sophisticated traffic control techniques and equipment. Training for the Traffic Police aims to provide practical knowledge and skills that are most useful for day-to-day operations. Training elements include professional appreciation, knowledge of traffic laws and legislation, enforcement, prosecution procedure, traffic control, and surveillance.

- Profession appreciation: Appreciation of responsibilities and upholding of morals are fundamental to Traffic Police performance. Their diligence and fairness in traffic control will gain the respect of road users and thus exert impact on the voluntary observance of traffic rules.
- Traffic laws and legislation: This training targets reinforcement of laws and regulations, orientation of new traffic rules, and clarification of sanctions.
- Enforcement and prosecution procedures: Proper following of enforcement procedures ensures effective discipline on the road users violating traffic rules. Understanding road user physiology is an inseparable part of this training.
- Traffic control and surveillance: Introducing basic traffic engineering concepts and measures to Traffic Police will assist in their performance in traffic control. Traffic surveillance, on the other hand, will allow them to detect violations of traffic regulations, for example, excessive speeding, drunk driving, and driving in the opposite traffic lane.

(b) **Expansion of technical staff capacity at Traffic Police headquarter:** Manual management of traffic operations can no longer keep up with the requirement of an expanding road network and the growing traffic. The city has recognized this trend and is in the process of implementing two control systems. One is the installation of a CCTV system at 20 locations funded by the French government; and the other is the WB project on corridor-based signal synchronization in six districts. Upon implementation, computerized traffic control is anticipated to expand citywide in steps.

Figure 8.4.18 Future Traffic Control Center of HCMC



Source: Study Team

It is important to build a core team of technical professionals at the police headquarter who are literate with advanced traffic control systems. Staff in this field would need substantial training to understand technologies, and more importantly, to be capable of utilizing and modifying technology in response to changes in traffic pattern. Hands-on experience with traffic software shall be emphasized at the headquarter.

The headquarter capacity improvement should be phased into short, mid and long terms through two channels: staff recruitment and advanced training programs, with the latter possibly pursuing ODA technical assistance.

(c) **Strengthening capacity of the city's traffic engineers:** The TMU under the TUPWS is responsible for planning and designing traffic management schemes, while the Public Lighting Company is responsible for their implementation. In recent years, several traffic flow management schemes were introduced. Nonetheless, the concept of traffic management and the broad range of measures associated wit it have not been fully understood and opportunities in roadway utilization improvement are yet to be worked on. For example, road space reconfiguration to accommodate bus priority lanes is a low-cost approach and access control and multiphased signal could smooth out traffic conflicts in critically congested areas.

The traffic engineer capacity improvement emphasizes training in the areas of design techniques and application of traffic analysis software. The city's transportation planners would also be given participation in such training.

(d) **Continuation of community involvement:** This program aims to mobilize the community for traffic management. In HCMC, youth volunteers have been playing a substantial role in road traffic management. The city should encourage their involvement with better training and pay to the participants. However, as the economy grows, this pool will decline in search of better employment opportunities. Other community initiatives could be explored in the long run. One option is to involve

retirees for traffic management at the neighborhood level, such as school zones and neighborhood roads.

(e) **Update of Traffic Police training curriculum at police schools:** This is a short-term investment with long-term benefits. The Traffic Police, both in the city and districts, are required to graduate from the city's Police High School or Police University. While this practice ensures general professional training to the police force, the field of traffic police training has yet to be updated and strengthened. Within the short term, a review of the existing programs will be conducted and basic traffic management and engineering methods introduced.

c) Estimated Cost: Total cost is about US$ 10 million including the training program for the Traffic Police (US$ 2 million), facility improvement (US$ 3 million), training program for traffic engineers (US$ 3 million), equipment for traffic study (US$ 2 million).

d) Implementing Agency: Department of Traffic Police and TUPWS.

9) Regional Transport Infrastructures

(1) Regional Expressway

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 of 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 movements, and link the economies of the surrounding provinces with HCMC. Thus, an at-grade structure for the regional expressway with four lanes is envisaged (refer to Table 8.4.10 and Figure 8.4.19-20):

RE1 Route: This will run parallel to NH51 and connect Bien Hoa (NH1, major industrial zones) and Vung Tau (planned international ports). The location of proposed interchanges will be in three locations connecting with Bien Hoa area, Vung Tau area, and PR20.

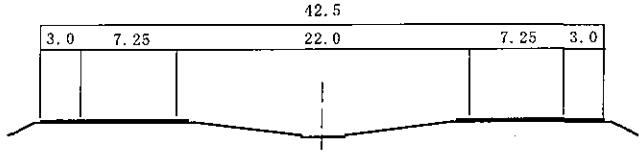
RE2 Route: This will pass through the southern part of the study area, connecting the Mekong delta with Vung Tau and passing through Hiep Phuoc Port and Hiep Phuoc and Nhon Trach industrial zones. The proposed location of interchanges is set at eight sites, which consist of four areas (My Tho, Tan An, Nhon Trach industrial zone, and Hiep Phuoc Port and industrial zone) and four crossings (NH1, RR3, NH50, and PR15). The connection to Ong Keo-Phu Huu area's planned port was assumed without setting up an interchange in the service road, because it was considered that majority of the handled port freight is for Nhon Trach industrial zone, and the distance in both areas is short.

Table 8.4.10 List of Regional Expressway Projects

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

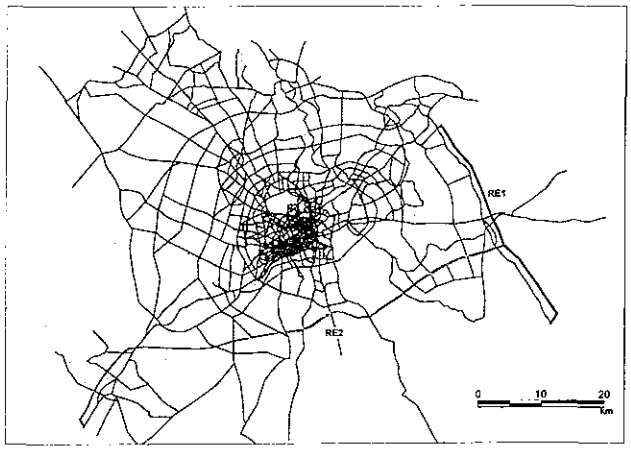
Source: Study Team
[1)] Including outside the study area.

Figure 8.4.19 Typical Cross-section of Proposed Regional Expressways



Source: Study Team

Figure 8.4.20 Location of Regional Expressways



Source: Study Team

(2) Regional Railway

As for rail transport, in order to develop an extensive inter-city rail network, the following projects have been proposed by the VR and the MOT:

- Hoa Hung – Trang Bom Line
- Bien Hoa – Vung Tau Line
- An Binh – Tan Kien – My Tho – Can Tho Line
- Tan Thoi Hiep – Trang Bang Line
- Di An – Loc Ninh Line
- Branch lines to Hiep Phuoc and Cat Lai (for freight transport)

(3) Airport

The construction of a new international airport was proposed for Long Thanh District of Dong Nai province located about 30km from HCMC's urban center. The reason for this is that the capacity of the existing Tan Son Nhat International Airport will no longer be expanded due to the limited airport area, although the international terminal building is *being expanded under a JBIC loan.*

(4) Seaports

The existing major ports, such as Saigon Port, New Port, Ben Nghe Port, and Ba Son Shipyard, located along the Saigon River in the center of HCMC have been suggested to be transferred outside the city center. The specific relocation program and schedule are being discussed. The following new port development projects were proposed, partly to accommodate the function of existing ports in HCMC:

- Hiep Phuoc Port (Soai Rap River)

- Cat Lai Port (Dong Nai River)
- *Thi Vai General Port (Thi Vai River)*
- Cai Mep International Container Port (Thi Vai River)
- On Keo/Phu Huu Ports

10) Investment Summary

Table 8.4.11 summarizes the investment required to accomplish the proposed projects in the Master Plan for urban transport development. An aggregate amount of US$ 14 billion will be required if all of the projects will be implemented within the time frame indicated.

Table 8.4.11 Investment Summary of Master Plan

Project	Amount (km)	Cost (US$ million)	Remarks
A. Ongoing/Committed			
1) Road and Bridge Projects by City/MOT	131	290	Local Budget/BOT
2) East-west Highway	22	458	JBIC
3) Urban Transport Improvement Project	-	23	WB (HCMC only)
4) Bus Improvement Project	1,318 buses	40	Local Budget
TOTAL (A)	-	**811**	
B. Proposed Projects			
1) Primary Roads	382	**3,361**	
2) Secondary Roads	757	**2,656**	
3) Urban Expressways	46	**1,861**	
4) UMRT (Urban Mass Rapid Transit)			
i) Urban Rail	82	2,850	
ii) Busway	57	173	
Subtotal	138	**3,023**	
5) Flyovers and Interchanges	58 ICs	**1,401**	
6) Public Transport Terminals			
i) Inter-city Bus terminals	7St.	80	
ii) UMRT Transit Terminals	4+50St.	120	
Subtotal		**200**	
7) Bus Corridor Management		**50**	
8) Other Master Plan Components			
(1) Bus System Modernization Program	-	222	
(2) Local Traffic and Transport Improvement	-	300	
(3) CBD TDM	-	100	
(4) Pedestrian/Green Network Development	-	20	
(5) Traffic Safety Improvement	-	20	
(6) Air Quality Improvement	-	20	
(7) Urban Waterway Transport Development	-	10	
(8)Traffic Management Capacity Improvement	-	10	
Subtotal		**702**	
TOTAL (B)		**13,254**	
TOTAL (A + B)	-	**14,065**	

Source: Study Team

8.5 Evaluation of the Master Plan

1) Methodology

Economic evaluation was done by comparing project benefits and costs, both expressed in terms of economic prices over project life. However, it was difficult to translate benefits and costs into economic prices. In this study, the estimate of the benefits was limited only to time saving and reduction of operating costs. Although the expected benefits are extensive, many are intangible and difficult to quantify (see Table 8.5.1). The first benefit was estimated by comparing the change in passenger-hour with and without the project. On the other hand, the second benefit was measured in terms of the change in vehicle-kilometer and vehicle-hour with and without the project. The procedure taken in making the economic evaluation is outlined in Figure 8.5.1.

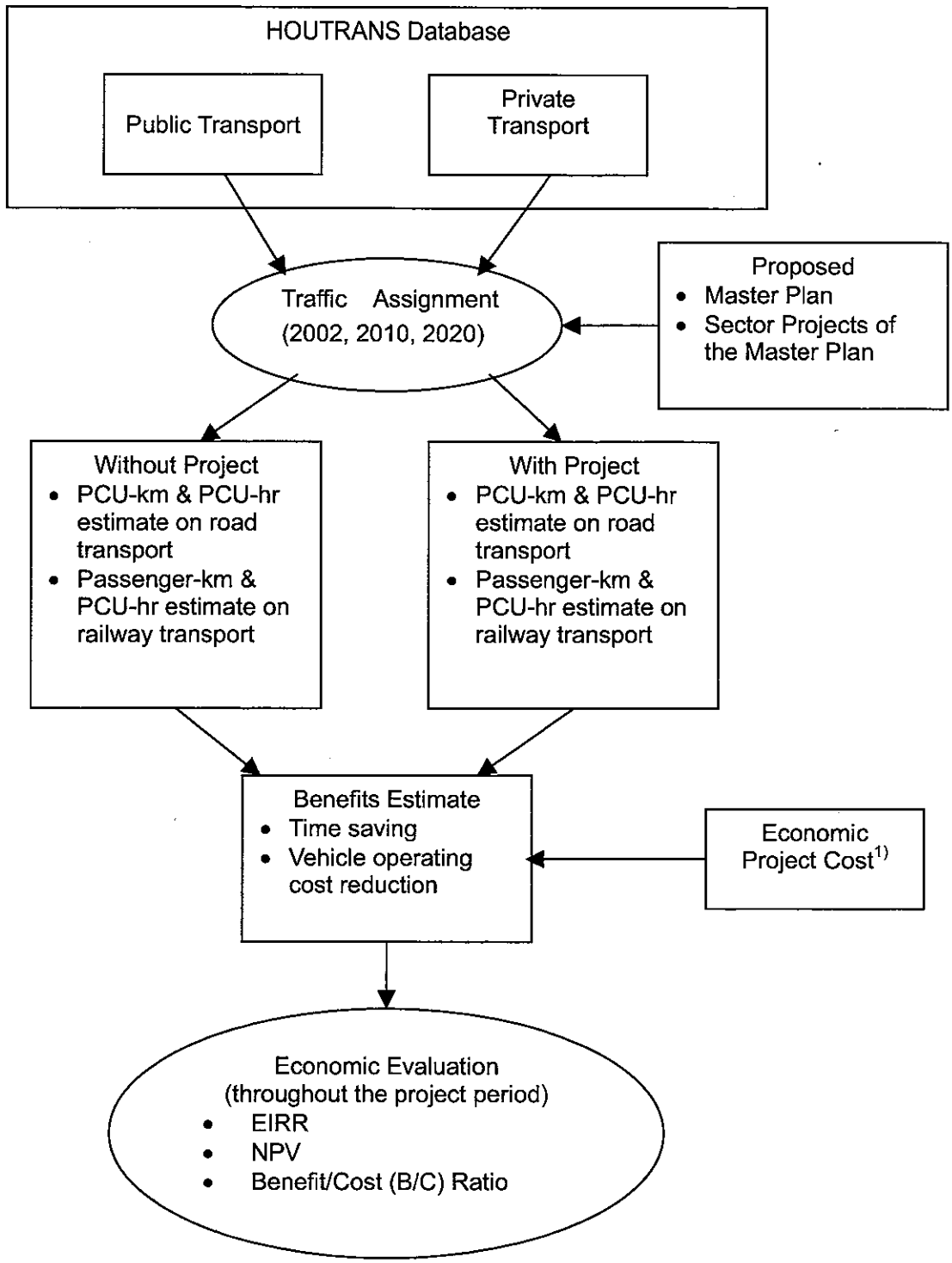
Table 8.5.1 Expected Benefits from the Projects

Benefit Type	Project Facility User	Other Transport User	Non-transport Activity/Society
Less travel time	vv	vv	-
Reduced vehicle operating cost	-	vv	-
Improved reliability	vv	-	-
Enhanced traffic safety	v	v	-
Reduced air pollution and noise	v	v	vv
Increased land value	-	-	vv
Increased job opportunities	-	-	vv

Source: Study Team
Note: vv: significant positive effect, v: expected positive effect.

Financial evaluation was done by comparing project revenues and expenditures expressed in terms of market value to derive the financial internal rate of return (FIRR).

Figure 8.5.1 Procedure for Economic Evaluation



Source: Study Team

[1)] For the Master Plan, economic cost was estimated form its financial cost by multiplying 0.5 with land-related cost and 0.85 with the remaining cost (the same as HCMC East-West Road).

In order to evaluate the projects comprehensively, a set of evaluation criteria was prepared with regard to the aspects such as (a) urban planning/development, (b) transport development, and (c) relevance to GOJ's ODA scheme (refer to Table 8.5.6). The criteria were applied to each of the Master Plan components as much as possible. Although this process was qualitative, it gave an objective result on the ranking of the projects relative to each other.

Table 8.5.2 Criteria of Project Evaluation

Evaluation Item		Rank	Explanation	Criteria
1.Collaboration with Urban Planning/ Development	1) Growth Management Strategy	A	Transport infrastructures (M/P corridor) and transport services to lead desirable urban growth, and their supporting policies.	• Consistency with urban M/P
		B	Those with some impact on desirable urban growth management.	
		C	Those which are not in line with above directions, (e.g. transport development in the direction not indicated in M/P).	
	2) Formulation of Desirable Urban Area	A	Transport infrastructure and services, which formulate corridors and network indicated in 1)-A and promote desirable urban area, and these supporting policies. (e.g. adequate secondary roads, feeder transport services, and special development measures).	• Consistency with urban M/P • Matching with land-use plan
		B	Those with some impact on desirable urban area.	
		C	Those without any contribution (e.g. infrastructure development not consistent with urban development objectives).	
	3) Improvement of Accessibility to Urban Services	A	• Ensure accessibility to specific facilities and services within acceptable extent (time, safety, comfort) • Ensure accessibility of both private and public modes	• Urban level: total travel time and distribution along each major corridor by purpose • District level: Travel time within district and distribution of urban facilities
		B	Certain level of accessibility (especially to public transport) is ensured, while accessibility is less than acceptable extent.	
		C	No improvement of accessibility.	
2.Transport Development	1) Compliance with Master Plan Network& Network Integration	A	Included in M/P network with high importance (with large traffic volume).	• Comparison with M/P network and evaluation of importance (traffic volume and EIRR)
		B	Included in M/P network but with relatively lower importance.	
		C	Not included in M/P network.	
	2) EIRR	A	Economically significant with more than 20% EIRR. Public transport users will get much more benefit.	• Economic analysis
		B	Economically feasible with 10-19% EIRR. (In case EIRR is less than 15%, breakdown of beneficiaries shall be reviewed.)	
		C	Economically unfeasible with less than 10% EIRR.	
	3) Cost Recovery	A	Most likely to recover cost (e.g. 50% of initial investment and operating cost) by generating profits.	• Financial analysis
		B	With certain revenue generation.	
		C	No cost recovery.	
	4) Operation and Management	A	With sufficient capacity for O&M.	• Administrative and institutional framework • Assessment of implementation experience
		B	With some capacity for O&M.	
		C	With little capacity for O&M.	
	5) Technical/ Engineering	A	No difficulties to implement technically.	• Existing system and capacity • Assessment of implementation experience • Difficulty in engineering
		B	With some difficulty that can be solved.	
		C	No sustainability of the project due to serious problems.	

(Continuation of Table 8.5.6)

Evaluation Item		Rank	Explanation	Criteria
3.Social/ Environment	1) Land Acquisition/ Resettlement	A	No problem	・Required area for land acquisition, resettlement scale, and amount of compensation ・Capacity of government agency ・Availability of poverty reduction measures
		B	With some resettlement that can be settled	
		C	Critical bottleneck for project implementation, especially with much negative impact on poverty	
	2) Impact on Poverty Reduction	A	Benefit for poverty group	・Analysis of breakdown of project benefit
		B	Some benefit for poverty group	
		C	Non benefit for poverty group	
	3) Improvement of Air Quality	A	Much improvement	・Total amount and distribution of pollutants by source
		B	Some improvement with countermeasures	
		C	No improvement	
4.Institution and Policy	1) Priority of GOV	A	Already approved as committed project with concrete measures and funding	
		B	Already approved as committed project, without concrete measures	
		C	Not approved	
	2) Interagency Coordination	A	No interagency conflict	・Existing institutional and administrative framework ・Priority of the agencies ・Past examples
		B	With some conflict but not disturbing project implementation	
		C	Difficulty both in intuitions and implementation	
	3) Impact on Institutional Improvement	A	Positive impact on institutional development that can be replicated in other cases	・Detail of implementation method and probability for institutionalization
		B	Positive impact is expected but limited	
		C	No impact	
6.Total Evaluation		Further consideration, discussion with Vietnamese side about priority, and finalization of the evaluation criteria.		

Source: Study Team
Note: Item which are not correspondent to each criteria will not be assessed as neutral item.

2) Economic Evaluation

Economic evaluation was conducted for the entire Master Plan and each of the proposed projects, wherein three (3) economic internal rates of return (EIRRs) are shown. One represents the situation where the project is implemented alone on the Do-Committed network, and the other situation is where the project is implemented together with all other proposed projects. The last figure is their average. If the proposed project shows a high EIRR in the former case and a relatively low EIRR in the latter case, the project is highly dependent on other projects. In the urban area, the difference between the two tends to be larger, while it is smaller in the rural area. This is the synergy effect of a well-articulated network and is one of the criteria in preparing the implementation schedule and in forming project packages.

- In general, the primary road projects as well as busway projects show high EIRRs. Relatively low EIRRs for railway projects are attributed to the high project cost and to the assumed tolls.
- The entire Master Plan has been proven highly feasible with an EIRR at 37%.

Table 8.5.3 Results of Economic Evaluation

Project	Length (km)	Cost (US$ million)	EIRR (%)		
			A[1]	B[2]	Ave.
Primary Road					
P1: Ring Road No.2 - East & Southwest Section	31	889	34.5	18.0	26.3
P2: Ring Road No.3 (Binh Chanh - Di An)	59	240	67.3	23.5	45.4
P3: Ring Road No.4 (Ben Luc - Thu Dau Mot)	80	315	55.9	15.3	35.6
P4: NH1-East Corridor Package	33	272	76.4	23.2	49.8
P5: NH13 Corridor Package	20	107	52.1	23.0	37.6
P6: Improvement of Nguyen Kiem	17	176	56.5	22.7	39.6
P7: NH22 Corridor Package	14	137	78.7	26.9	52.8
P8: PR10 Corridor Package	36	212	74.8	43.2	59.0
P9: Improvement of Au Co	9	97	81.0	35.9	58.5
P10: NH50 Corridor Package	7	79	63.4	20.1	41.8
P11: Road Development in Thu Tiem Area	8	116	78.2	37.7	58.0
P12: Improvement of Road to Hiep Phuoc IP	16	63	74.8	47.4	61.1
P13: PR20 Corridor Package	22	181	71.6	21.5	46.6
P14: Northern East-west Road Package (1)	17	285	63.4	32.6	48.0
P15: Northern East-west Road Package (2)	15	192	50.3	14.1	32.2
Secondary Road					
S1: North Inner Core Area Package	44	530	39.7	17.5	28.6
S2: South Inner Core Area Package	25	278	37.5	7.4	22.5
S3: Inner Fringe Area Package (inside HN1)	45	227	57.1	18.4	37.2
S4: Inner Fringe Area Package (outside HN1)	47	166	69.2	29.1	49.2
S5: NH1 East Corridor Package (Peripheral Area)	46	163	66.8	31.1	49.0
S6: NH1 East Corridor - Outer Area)	35	90	75.9	29.7	52.8
S7: NH13 Corridor Package (Outer Area)	39	84	86.2	35.6	60.9
S8: NH22 Corridor Package (Peripheral Area)	37	93	58.8	36.8	47.8
S9: NH22 Corridor Package (Outer Area)	90	99	72.2	50.4	61.3
S10: PR10 Corridor Package (Outer Area)	54	94	69.0	37.2	53.1
S11: NH1 West Corridor Package (Peripheral Area)	41	102	58.5	29.4	44.0
S12: NH1 West Corridor Package (Outer Area)	91	123	64.0	38.7	51.4
S13: PR15 Corridor Package (Peripheral Area)	51	238	63.4	39.2	51.3
S14: PR15 Corridor Package (Outer Area)	42	128	37.0	33.5	35.3
S15: PR20 Corridor Package (Peripheral Area)	81	90	58.1	44.8	51.5
S16: PR20 Corridor Package (Outer Area)	38	152	53.7	23.9	38.8
Expressway					
UE1-5: Urban - Inner Ring Line and 5 Branches [3]	26	1861	21.8	9.0	15.4
UMRT [4]					
UR1: Line 1 (Bien Hoa – Ben Thanh- Cho Lon – Tan An)	66	1,082	26.3	10.1	18.2
UR2: Line 2 (Thu Thiem – Ben Thanh – Hoc Mon – Cu Chi)	34	684	29.9	16.4	23.2
UR3: Line 3 (Binh Phuoc – 3/2 – Cho Lon – Dist.8)	20	612	26.4	11.0	18.7
UR4: Line 4 (Dist.12 – Phu Nhuan – Dist.4 – Saigon South)	19	660	32.7	13.0	22.9
Other Projects	-	3,164	-	-	-
Total (Master Plan)	-	**14,065**	-	-	**36.8**

Source: Study Team
1) The benefit is the difference of the savings in VOC and TTC between the cases "Do Committed" and "Do Committed plus Project".
2) The benefit is the difference of the savings in VOC and TTC between the cases "Master Plan" and "Master Plan minus Project".
3) Toll rate at VND15,000.
4) Fare at VND10,000.

3) Financial Evaluation of Selected Projects

Among the component projects of the Master Plan, the urban expressway (UE1-5) and urban railway (UR1-4) projects are expected to generate revenues. The urban railway and busway projects (UR1-4) were combined into one single project for this financial evaluation because at this Master Plan stage only a gross assessment could be made in the absence of operational details which will be established in the feasibility study stage.

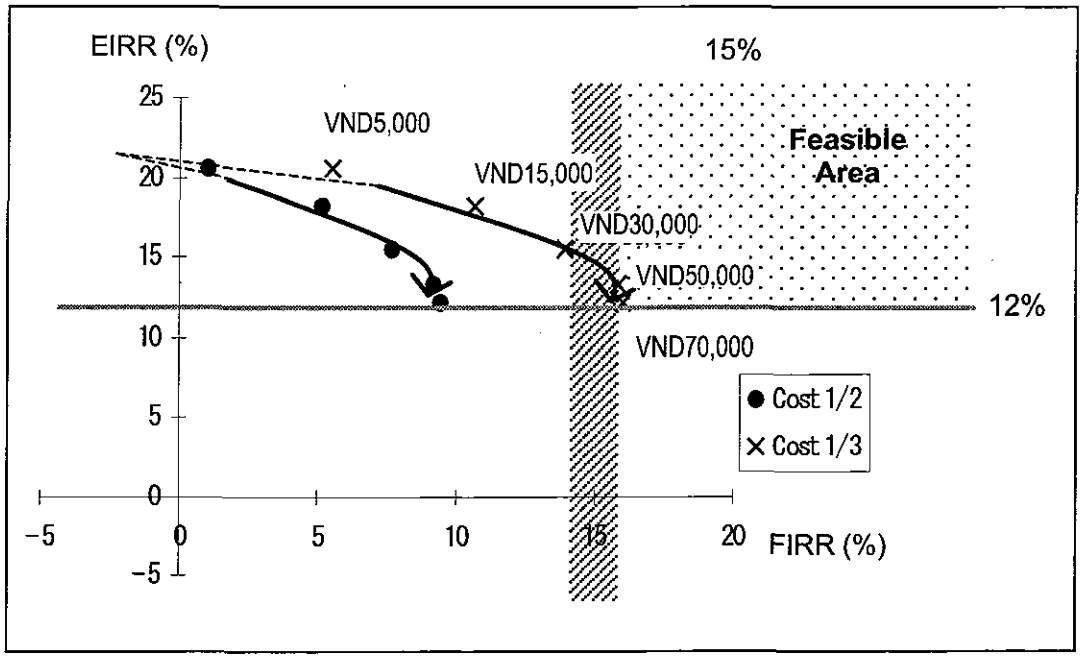
Urban Expressway: The economic and financial viability of the project showed changes according to the toll rate which strongly influences travel demand. The analysis showed that if toll rate would increase, the EIRR would decrease gradually because some users would be priced out of the expressway. However, the revenue of the project would increase up to a certain inflection point. Figure 8.5.2 shows this revenue-toll rate relationship. The cost of the proposed expressway is high due to its elevated structure, and thus the project will not become financially feasible unless the government shares a major part of the capital investment (approximately two thirds of the total cost). However, the economic feasibility of the project is affirmative, showing on EIRR of over 12% until the toll rate goes up to about VND 70,000 (approx. US$ 5).

Railway/Busway: The interrelationship between the EIRR and the FIRR was also analyzed for the UMRT project as shown in Figure 8.5.3. The analysis showed that the economic viability of the project would be quite robust, with an EIRR exceeding 12% over a wide range of fare levels up to about VND 25,000 (flat). The FIRR itself would reach its peak at a fare level of about VND 10,000-15,000. However, its financial viability would be very low unless the government would be prepared to subsidize up to two thirds of the total investment cost. This is the same conclusion as that of the urban expressway project, although it should be investigated further in detail in the feasibility study stage.

4) Overall Assessment

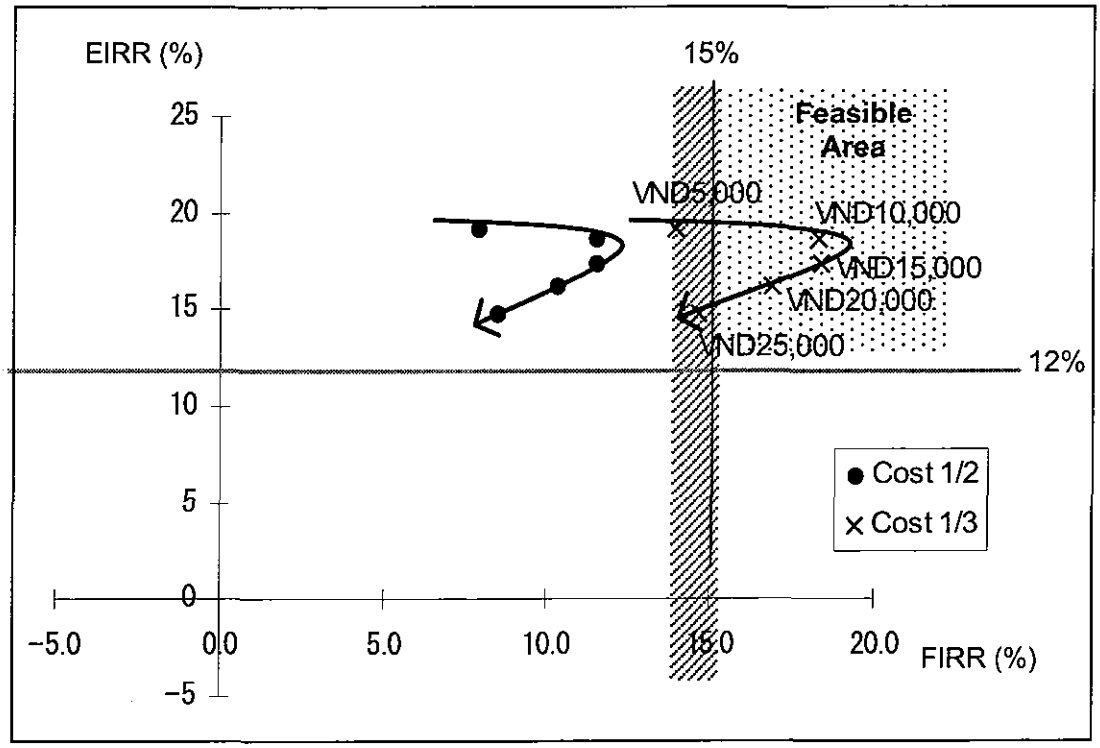
Finally, the projects listed in the Master Plan were assessed comprehensively to determine their overall priority among the projects (see Table 8.5.4).

Figure 8.5.2 Implication of EIRR and FIRR in the Urban Expressway Project



Source: Study Team
Note: Economic benefit and revenue were estimated as the average of the two cases.

Figure 8.5.3 Implication of EIRR and FIRR in the UMRT Project (UR1 –4)



Source: Study Team
Note: Economic benefit and revenue were estimated as the average of the two cases.

Table 8.5.4 Evaluation of Master Plan Projects

Project Component	Assessment [1]														
	Urban Planning/ Development			Transport Development					Social/ Environment			Policy/ Institution			
	Matching with Growth Mgnt.	Promoting Development if Good Urban Area	Improvement of Accessibility to Urban Services	Compliance with Master Plan Network & Network Integration	Economic Viability	Cost-Recovery	Operation & Management	Technical/Engineering Difficulties	Land Acquisition/ Resettlement	Positive Impact on Urban Poverty	Improvement of Air Quality	Priority of GOV	Interagency Coordination	Impact on Institutional Improvement	Judgment of HOUTRANS
(1) ROAD															
1) Primary Roads															
P1 Ring Road No.2- East & Southwest Section	A	A	B	A	A	-	A	B	A	B	B	A	A	B	A
P2 Ring Road No.3 (Binh Chanh - Di An)	A	A	B	A	A	-	A	A	A	B	B	B	A	B	B
P3 Ring Road No.4 (Ben Luc - Thu Dau Mot)	A	A	B	A	A	-	A	A	A	B	B	B	A	B	B
P4 NH1-East Corridor Package	A	A	B	B	A	-	A	A	B	B	B	A	A	B	A
P5 NH13 Corridor Package	A	A	B	B	A	-	A	A	B	B	B	A	A	B	B
P6 Improvement of Nguyen Kiem	B	B	A	B	A	-	A	A	C	B	B	B	A	B	B
P7 NH22 Corridor Package	A	A	B	B	A	-	A	A	B	B	B	A	A	B	A
P8 PR10 Corridor Package	A	A	B	A	A	-	A	A	B	B	B	A	A	B	A
P9 Improvement of Au Co	B	B	A	B	A	-	A	A	C	B	B	B	A	B	A
P10 NH50 Corridor Package	A	A	B	B	A	-	A	A	B	B	B	A	A	B	A
P11 Road Development in Thu Tiem Area	A	A	A	A	A	-	A	B	B	B	B	A	A	B	A
P12 Improvement of Road to Hiep Phuoc IP	A	A	B	A	A	-	A	A	B	B	B	A	A	B	A
P13 PR20 Corridor Package	*A*	*B*	*B*	*B*	*A*	-	*A*	*B*	*B*	*B*	*B*	*A*	*A*	*B*	*B*
P14 Northern East-west Roads Package (1)	B	A	A	B	A	-	A	A	C	B	B	B	A	B	A
P15 Northern East-west Roads Package (2)	B	A	A	B	A	-	A	A	C	B	B	B	A	B	B
2) Secondary Road															
S1 North Inner Core Area Package	B	A	A	B	A	-	A	A	C	B	B	A	A	B	A
S2 South Inner Core Area Package	B	A	A	B	A	-	A	A	B	B	B	A	A	B	A
S3 Inner Fringe Area Package (inside HN1)	B	A	A	B	A	-	A	A	C	B	B	A	A	B	A
S4 Inner Fringe Area Package (outside HN1)	B	A	A	B	A	-	A	A	A	B	B	A	A	B	B
S5 NH1 East Corridor Package (Peripheral Area)	A	A	A	A	A	-	A	A	B	B	B	A	A	B	A
S6 NH1 East Corridor Package (Outer Area)	B	A	A	A	A	-	A	A	B	B	B	B	B	B	B
S7 NH13 Corridor Package (Outer Area)	B	A	A	A	A	-	A	A	B	B	B	B	B	B	A
S8 NH22 Corridor Package (Peripheral Area)	A	A	A	A	A	-	A	A	B	B	B	A	A	B	A
S9 NH22 Corridor Package (Outer Area)	B	A	A	B	A	-	A	A	A	B	B	B	B	B	B
S10 PR10 Corridor Package (Outer Area)	*B*	*A*	*A*	*B*	*A*	-	*A*	*A*	*A*	*B*	*B*	*B*	*B*	*B*	*B*
S11 NH1 West Corridor Package (Peripheral Area)	A	A	A	B	A	-	A	A	A	B	B	A	A	B	B
S12 NH1 West Corridor Package (Outer Area)	B	A	A	B	A	-	A	A	A	B	B	B	B	B	A
S13 PR15 Corridor Package (Peripheral Area)	A	A	A	B	A	-	A	A	A	B	B	A	A	B	A
S14 PR15 Corridor Package (Outer Area)	B	A	A	B	A	-	A	A	A	B	B	B	B	B	B
S15 PR20 Corridor Package (Peripheral Area)	A	A	A	B	A	-	A	A	A	B	B	B	A	B	A
S16 PR20 Corridor Package (Outer Area)	B	A	A	B	A	-	A	A	A	B	B	B	B	B	B
3) Urban Expressway															
UE1 Inner Ring Line	A	B	B	A	B	B	B	B	A	B	B	A	B	A	A
UE2 Binh Duong (NH13) Branch	A	B	B	A	B	B	B	B	A	B	B	A	B	A	A
UE3 Hoc Mon (NH22) Brabch	A	B	B	A	B	B	B	B	A	B	B	A	B	A	A
UE4 Airport Extension	A	B	B	A	B	B	B	B	A	B	B	A	B	A	A
UE5 An Lac (NH1) Branch	A	B	B	A	B	B	B	B	A	B	B	A	B	A	A
UE6 Saigon South Branch	*A*	*B*	*B*	*A*	*B*	*B*	*B*	*B*	*A*	*B*	*B*	*A*	*B*	*A*	*A*
(2) UMRT (Urban Rail + Busway)															
UR1 Line 1 (Bien Hoa-Ben Thanh-Cho Lon-Tan An)	A	A	B	A	B	B	C	C	B	A	A	A	C	A	A
UR2 Line 2 (Thu Thiem-Ben Thanh-Hoc Mon-Cu Chi)	A	A	B	A	A	B	C	C	B	A	A	A	C	A	A
UR3 Line 3 (Binh Phuoc-3/2-Cho Lon-Dist.8)	A	A	B	A	B	B	C	B	C	A	A	B	C	A	B
UR4 Line 4 (Dist.12-Phu Nhuan-Dist.4-Saigon South)	A	A	B	A	A	B	C	B	C	A	A	B	C	A	B
(3) Flyovers and Interchages	A	B	A	A	-	-	B	B	B	B	A	B	B	A	A
(4) Transport Terminals	A	A	A	A	-	B	B	B	B	A	A	B	B	A	A
(5) Bus Corridor Management	A	A	A	A	-	-	B	B	B	A	A	A	C	A	A
(6) Other Project Components															
1) Bus System Modernization Program	A	A	A	A	-	B	B	B	B	A	A	A	B	A	A
2) Local Traffic and Transport Improvement	A	A	A	A	-	-	B	B	B	A	A	A	C	A	A
3) CBD Traffic Management	A	B	B	A	-	A	B	B	-	B	A	B	C	A	B
4) Pedestrian/Green Network Development	B	B	A	A	-	-	B	B	-	B	A	B	C	A	B
5) Traffic Safety Improvement	B	B	A	B	-	-	B	B	-	B	B	A	B	A	A
6) Air Quality Improvement	-	-	-	-	-	-	B	B	-	B	A	A	C	A	A
7) Urban Waterway System Development	B	B	A	A	-	B	B	B	-	B	B	A	B	A	B
8) Traffic Management Capacity Improvement	-	-	-	-	-	-	-	-	-	-	-	B	B	A	A

Source: Study Team
[1] rating of each aspect is defined in Table 8.5.6

8.6 Investment Plan

The proposed projects were categorized into two implementation stages on the basis of the overall project evaluation (see Tables 8.6.1 to 8.6.3).

Table 8.6.1 Investment Schedule for Road Projects

Project Name		Length (km)	Type of Work	Estimated Cost (USD mil.)	Implementation Period	
					-2010	2011-2020
1) Primary Roads						
P1-a	Ring Road No.2 - Southwest Section	5.1	W	164		
P1-b	Ring Road No.2 - East Section	22.6	N	718		
P1-c	Ring Road No.2 - Nguyen Van Linh Section	2.3	W	17		
P2	Ring Road No.3 (Binh Chanh - Di An)	59.0	N/W	240		
P3	Ring Road No.4 (Ben Luc - Thu Dau Mot)	80.0	N	315		
P4-a	Hanoi highway - NH1 Widening	20.0	W	202		
P4-b	NH1K Widening	13.4	W	70		
P5-a	NH13 - Thu Dau Mot Bypass	12.0	N	70		
P5-b	NH13 - Thuan An Bypass	4.5	N	22		
P5-c	NH13 - Thu Duc Sectoion Widening	3.4	W	14		
P6-a	Widening of PR16 (Hoc Mon - Go Vap Section)	7.0	N/W	68		
P6-b	Phan Van Tri Extension	2.1	N	26		
P6-c	Widening of Nguyen Kiem - Phan Dinh	3.7	W	53		
P6-d	Widening of Hai Ba Trung	0.2	W	8		
P6-e	Widening of Hai Puy Giap	4.4	W	21		
P7-a	Widening of Truong Chinh	2.4	W	28		
P7-b	Widening of Cach Mang Thang Tam	6.2	W	87		
P7-c	Widening of PR13	5.1	N	22		
P8-a	Widening of PR10	21.4	W	142		
P8-b	North PR10	7.6	N	34		
P8-c	South PR10	7.4	N	34		
P9-a	Widening of Au Co	5.4	W	51		
P9-b	Widening of Nguyen Tri Phuong	3.4	N/W	46		
P10-a	Tung Thien Vuong	0.8	W	11		
P10-b	An Duong Vuong Ext.	1.1	N	20		
P10-c	Nguyen Tri Phuong Extension	2.4	N	6		
P10-d	Widening of NH50	2.9	W	42		
P11-a	Tran Nao and Bridge	2.3	N/W	60		
P11-b	Widening of Lien Tinh	5.6	W	44		
P11-c	Tan Thuan Bridge Expansion	0.1	N	3		
P12	Hiep Phuoc Highway (PR34)	15.6	N/W	63		
P13-a	Long Thanh Highway - East Section	9.0	N	66		
P13-b	Long Thanh Highway - West Section	12.8	N	115		
P14-a	Widening of Kha Van Can	4.5	W	46		
P14-b	Widening of Luong Ngoc Quyen	6.7	W	163		
P14-c	Widening of Hoang Van Thu	2.8	W	35		
P14-d	Widening of Toai Ngoc Hau	2.5	W	41		
P15	North East-west Roads	14.7	W	192		
	Sub-total	**382.4**		**3,268**	**2,004**	**1,264**
2) Secondary Roads						
S1	North Inner Core Area Package	43.5	N/W	530		
S2	South Inner Core Area Package	25.3	N/W	278		
S3	Inner Fringe Area Package (inside HN1)	44.7	N/W	227		
S4	Inner Fringe Area Package (outside HN1)	46.6	N/W	166		
S5	NH1 East Corridor Package (Peripheral Area)	46.4	N/W	163		
S6	NH1 East Corridor Package (Outer Area)	34.7	N/W	90		
S7	NH13 Corridor Package (Outer Area)	38.8	N/W	84		
S8	NH22 Corridor Package (Peripheral Area)	36.5	N/W	93		
S9	NH22 Corridor Package (Outer Area)	89.5	N/W	99		
S10	PR10 Corridor Package (Outer Area)	53.9	N/W	94		
S11	NH1 West Corridor Package (Peripheral Area)	40.6	N/W	102		
S12	NH1 West Corridor Package (Outer Area)	90.6	W	123		
S13	PR15 Corridor Package (Peripheral Area)	50.8	N/W	238		
S14	PR15 Corridor Package (Outer Area)	42.3	W	128		
S15	PR20 Corridor Package (Peripheral Area)	81.2	N/W	90		
S16	PR20 Corridor Package (Outer Area)	37.5	N/W	152		
	Sub-total	**803.0**		**2,656**	**798**	**1,856**
3) Urban Expressway						
UE1	Inner Ring Line	12.2	N	506		
UE2	Binh Duong (NH13) Line	9.3	N	368		
UE3	Hoc Mon (NH22) Line	10.1	N	396		
UE4	Airport Extension	1.5	N	68		
UE5	An Lac (NH1) Line	9.6	N	377		
UE6	Saigon South Line	3.6	N	146		
	Sub-total	**46.3**		**1,861**	**0**	**1,777**
4) Regional Expressway						
RE1	Regional Expressway (Bien Hoa - Vung Tau)	80.5	N	186		
RE2	Regional Expressway (My Tho - Nhon Trach)	126.6	N	721		
	Sub-total	**207.1**		**907**	**590**	**317**
	Road Total	**1,438.8**		**8,692.0**	**3,392**	**5,214**

Source: Study Team
[1] N: new construction, W: widening.

Table 8.6.2 Investment Schedule for UMRT Projects

	Project Name	Length (km)	Route [1]	Type [2]	Implementation Period	
					-10	11-20
R1	Line 1 (Rail: Thu Duc - An Lac)	26.6	U	UG/EL/AG		
	Line 1 (Busway: Bien Hoa - Thu Duc, An Lac - Tan An)	39.4	S	AG		
R2	Line 2 (Rail: Thu Thiem - Ben Thanh - Hoc Mon)	16.3	U	UG/EL/AG		
	Line 2 (Busway: Hopc Mon - Cu Chi)	17.2	S	AG		
R3	Line 3 (Rail: Binh Phuoc - Cho Lon - Dist.8)	19.8	U	EL/AG		
R4	Line 4 (Rail: Dist.12 - Phu Nhuan - Saigon South)	18.9	U	EL/AG		
	UMRTTotal	**138.2**			**65**	**2,973**

Source: Study Team

[1] U: urban, S: suburban.

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

Table 8.6.3 Investment Schedule for Other Project Components

	Cost (US$ million)	Implementation Period	
		-2010	2011-2020
A. Flyovers and Interchanges	1,401		
B. Transport Terminals	200		
C. Bus Corridor Management	50		
Other Master Plan Components			
1) Bus System Modernization Program	222		
2) Local Traffic and Transport Improvement	300		
3) CBD Traffic Management	100		
4) Pedestrian/Green Network Development	20		
5) Traffic Safety Improvement	20		
6) Air Quality Improvement	20		
7) Urban Ferry & Waterway System	10		
8) Traffic Management capacity Improvement	10		
Subtotal	**2,353**	4,299	8,955

Source: Study Team

9 SHORT-TERM ACTION PLAN

9.1 Plan Formulation

1) Approach

The Short-term Action Plan (STAP) encompasses solutions to the current urban transport problems and lays the foundation for the long-term development plan. It sets out tasks that could and should be done over the next five years and which should be consistent with the long-term strategies of the Master Plan. The criteria in selecting the short-term actions are as follows:

- Those which address urgent problems concerning road-based public transport;
- Those which do not require substantial financial resources other than the funds already mobilized or committed;
- Those which can be implemented within existing agencies and institutions of the city or national government; and,
- Those which clear obstacles and pave the path for the smooth realization of medium- and long-term plans.

With the present as a starting point, the Short-term Action Plan follows up on the ongoing Bus Modernization Project. It identifies the tasks necessary to ensure the effective deployment of 1,318 new buses and seeks traffic management measures on major bus corridors to achieve demand shift from private transport to public transport modes. Road safety improvement is also detailed in the form of actionable steps in support of bus operation and traffic management.

2) Components of Short-term Action Plan

The Master Plan defines the three components of the Short-term Action Plan: bus modernization, bus corridor management, and traffic safety improvement. Under these components, the following four focus issues are elaborated and concrete measures feasible for short-term implementation are proposed:

- Resolving the problems being encountered by the Bus Modernization Project;
- Redesigning the public transport route network beyond the routes selected for the Model Bus Project, in order to widen coverage, improve commuter access, widen the types of bus service offerings, and identify new routes for operators displaced by the Model Bus scheme;
- Managing primary bus corridors within the city and the metropolitan area through traffic engineering and bus priority measures to achieve safe and efficient operating environment for general traffic and bus services as well as road conditions supportive of transit promotion; and,
- Redressing the city's critical accident-prone locations to mitigate the current unsafe traffic situation.

3) Overall Structure of the Plan

As said in the beginning, the selected Short-term Action Plan components are not stand-alone actions. Bus transport development is the core of the plan. Bus corridor management and traffic safety improvement support bus transport operations and redress current undesirable road and traffic conditions.

More importantly, the Short-term Action Plan is part of the comprehensive Master Plan and responds to the objectives and actions of the latter. The relationship of the action components and their connection to the Master Plan are summarized in Table 9.1.1.

Table 9.1.1 Structure of Short-term Action Plan

Short-term Action Plan Component	Bus Modernization	Bus Corridor Management	Traffic Safety Improvement
M/P Strategy	• Development of bus transport system (C2) • Promotion of public transport use and expansion of services (C5)	• Management of transport corridors (E1)	• Enhancement of traffic safety (F)
M/P Action	• Establishment of bus operating business system (C21) • Strengthening of bus operation and management capacity (C23) • Formulation of subsidiary policy for public transport users (C51)	• Development of bus corridors (C22) • Establishment of corridor management system (E13)	• Establishment of accident database (F21) • Improvement of black spots (F22) • Improvement of *enforcement* (F41)
Short-term Measure	• Reform of bus industry • Bus route restructuring • Bus-related facility improvement	• Better utilization of existing road infrastructure through traffic engineering • Implementation of bus priority measures • Enforcement of traffic regulations	• Accident analysis • Infrastructure improvement • Enforcement • Increase of people's safety awareness
Monitoring Indicators	*Objective Indicators* • No. of passengers • Productivity of bus operation • Subsidy amount *Subjective Indicator* • Assessment of users	*Objective Indicators* • Travel time/speed • No. of illegal parking/ activities • No. of signalized intersections *Subjective Indicator* • Assessment of users	*Objective Indicators* • Traffic accident rate • % of driver's license holders • Increase in safety awareness of the people *Subjective indicator* • Assessment of users

Source: Study Team

9.2 Profile of the Plan Components

1) Bus Modernization Program

The only way for HCMC to avoid horrible traffic congestion in the future is for a large portion of the total daily trips to be carried on buses, rather than on motorcycles and cars. By a combination of "carrot and stick" measures, bus services have to be made attractive and private modes of transport discouraged through physical and fiscal means.

This program intends to raise the modal share of public transport from less than 2% to about 30% in the medium-term period as part of the overall plan to transform HCMC into a thriving public-transport-oriented metropolis. The program is divided into two phases.

Phase 1 involves the replacement of old fleet with 1,318 new, higher-capacity, and more comfortable vehicles; the distribution of these buses to operators under a lease-purchase scheme; the restructuring of 30 small bus entities into three to five large efficiently managed operators; and the redesign of the bus route network.

Phase 2 entails reforms in the public sector that will give operators opportunities to become efficient and to expand their fleet to meet growing demand; assistance to operators in modernizing their management and operating practices; implementation of bus priority and bus-only schemes on key corridors; and encouragement of major private investments into the bus sector.

2) Bus Corridor Management Program

The improvement of the operating environment on primary bus corridors is the pressing task that the city has to carry on immediately even under constrained road infrastructure and funding conditions. Better management of primary bus corridors enhances safety and capacity, not necessarily leading to large amount of spending and lengthy process of implementation. It is also the basis for building up ridership on key passenger routes in the city and the metropolitan area.

Actions for the short-term endorse priority to bus transport while ensuring efficient operation of other traffic types. Schemes of bus priority, traffic flow management, traffic engineering, maintenance, and enforcement are applied to the city center and interprovincial bus corridors with tailored measures for individual corridors.

Key measures proposed for short-term actions consist of the separation of vehicle modes, bus priority, traffic engineering, and traffic regulation.

Vehicle separation involves the reorganization of traffic flow in areas with a grid-type road network and the establishment of respective lanes for four-wheeled and two-wheeled vehicles, as well as buses as road conditions improve. The bus priority scheme designates roads prioritizing buses and lanes exclusively for buses as well as promoting amenities at stops and transfer facilities. Traffic engineering schemes apply suitable measures for mid-blocks and intersections using traffic signals, geometric modifications, signs and pavement parking, etc. Traffic regulation unifies and expands those already in practice to support bus priority schemes.

3) Traffic Safety Improvement Program

Traffic accidents have profound socio-economic impact as they result in traffic congestion, loss of personal productivity, and health care cost which are all borne by the society. In HCMC, road-based traffic accidents have steadily increased. The accident rate already ranks high compared with that of other Southeast Asian cities. Immediate redressing of traffic safety problems in HCMC could limit, if not avoid, such grave personal, social, and economic consequences.

Opportunities exist to improve traffic safety and road infrastructure. Many of the preventive measures can be undertaken at marginal costs within a short time, including road safety planning, elimination of black spots, enforcement, and education.

High priority should be given to the revival of the computerized accident database and the elimination of accident-prone locations. Accurate accident data directs attention to traffic safety and assists the formulation of remedial and preventive solutions. In eliminating accident-prone locations, common traffic engineering measures, such as use of median barriers, signalization, and geometry modification, are implemented.

It should be borne in mind that traffic safety improvement, while critical for the short term, requires long-term commitment especially in the areas of traffic police enforcement and road user education.