6 EVALUATION OF PROJECT SECTIONS

6.1 Introduction

The main objective of this chapter is to evaluate the North-South Expressway projects (with other expressway projects) by applying scientific methods. This chapter also aims to discuss the implementation schedule and funding strategies as a result of the evaluation.

In VITRANSS 2, all the proposed projects of the six transport subsectors, which are road, rail, port & shipping, inland waterway, aviation, and logistics, were evaluated using multi-criteria analysis that allows projects to be evaluated holistically. The criteria used for project evaluation are presented in Table 6.1.1. These include demand, economic feasibility, financial feasibility, network composition, impacts on natural environment, maturity or progress, and consistency with Upper Plan or National Development Policy.

Table 6.1.1 Multi-criteria Analysis for Project Evaluation

Criteria		Indicator	No. of Categories
1	Demand	(ton-km + pax-km)/km	5
2	Economic feasibility	EIRR	5
3	Financial feasibility	FIRR or Demand/Cost	5
4	Network Composition	5: North-South National Highway	5
		4: National Highway (excluding above)	
		3: Main Provincial Road	
		2-1: Minor Roads	
5	Natural Environmental Impact	% of Length passing Restricted Area	5
6	Maturity/Progress	9: DD (completed)	9
		8: DD (ongoing)	
		7: FS (completed)	
		6: FS (ongoing	
		5: Pre-FS (completed)	
		4: Pre-FS (ongoing)	
		3: MP	
		2: Idea	
		1: No Progress	
7	Consistency with Upper Plan or National Development Policy	3: Listed in Formal Plan	3
		2: Seemingly Consistent	
		1: Unknown/ Inconsistent	

Source: VITRANSS 2 Study Team

Multi-criteria analysis was used only on the non-committed projects, while committed projects are assumed to be part of the Master Plan already. Please refer to Chapter 8 of the VITRANSS 2 Main Report for details of the evaluation methodology, and key assumptions on the calculation of economic benefits, among others.

The following sections explains the methodologies and results of cost estimation and economic & financial evaluation as well as the result of multi-criteria analysis.

6.2 Estimated Costs

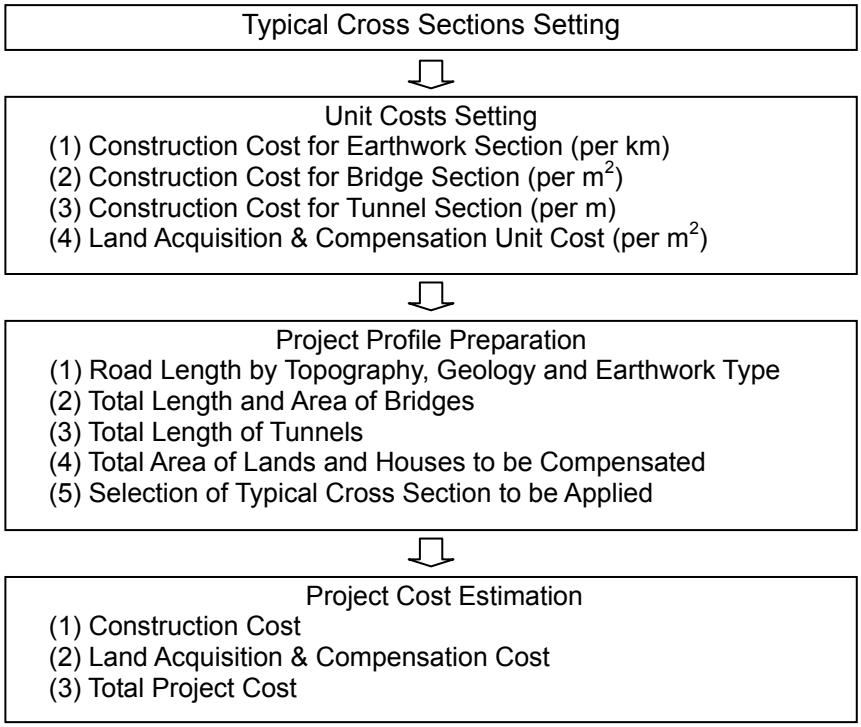
1) Introduction

Project cost estimation is a significantly important factor in road development planning since it is a basic element of economic and financial analysis and a key consideration of project fund sources. Several road development plans have been formulated and proposed by various related agencies in charge of development and management of roads in Vietnam. However, in many of such plans, detailed development scopes of projects are not clearly mentioned and thus, the basis of cost estimation remains unclear. The medium and long-term plans should be revised to take into account changes in social and economic conditions. However, in case the detailed methodology of cost estimation is not clear, it is difficult to revise or modify the estimation. Consequently, it sometimes causes inefficient discussions on the overall road network development plans, which based on the project costs estimated in the past, even after a period during which material prices or labor costs changed significantly. In order to cater the above-mentioned issues, a simple and clear cost estimation system for road network development which would be easily applied to update costs was proposed in VITRANSS2.

2) Method of Development of Standard Cost Estimation System

Figure 6.2.1 shows the proposed flow of standard cost estimation for road network development proposed.

Figure 6.2.1 Flowchart of Standard Cost Estimation for Road Network Development



Source: VITRANSS 2 Study Team

Table 6.2.1 Results of the Cost Estimation of Expressway Projects

Project Code	Section	Length (km)				Construction Cost (Mil USD)[1]				Land Acquisition / Compensation Cost (Mil USD)	Economic Cost (Mil USD)	Financial Cost (Mil USD)
		Total	Earth work	Bridge	Tunnel	Total	Earth work	Bridge	Tunnel			
H01	Ninh Binh–Thanh Hoa	75	73	0.20	2.00	745	643	15	88	22	767.6	827.6
H02	Thanh Hoa–Vinh	140	124	2.90	13.60	1,927	1,115	215	597	41	1,968.4	2,128.0
H03	Vinh–Ha Tinh	20	19	1.40	0.00	181	112	69	0	6	187.0	201.5
H04	Ha Tinh–Quang Tri	277	265	3.10	9.00	2,368	1,879	153	336	82	2,449.9	2,641.2
H05	Quang Tri–Hue	73	71	1.60	0.00	640	560	79	0	22	661.2	711.9
H06	Hue–Da Nang	105	78	3.30	23.40	1,609	573	163	874	31	1,640.5	1,778.0
H07	Quang Ngai–Quy Nhon	150	135	1.10	13.60	1,610	1,048	54	508	44	1,654.6	1,787.8
H08	Quy Nhon–Nha Trang	240	199	4.20	37.00	3,061	1,472	208	1,381	71	3,132.1	3,390.1
H09	Nha Trang–Phan Thiet	280	266	1.50	12.60	2,597	2,052	74	470	83	2,679.5	2,890.2
H10	Long Thanh–Nhon Trach–Ben Luc	45	42	3.15	0.00	672	516	156	0	13	685.1	738.6
H11	Doan Hung–Hoa Lac–Pho Chau	457	444	9.14	4.00	4,333	3,731	452	149	135	4,467.8	4,813.1
H12	Ngoc Hoi–Chon Thanh–Rach Gia	864	847	17.28	0.00	7,151	6,297	855	0	255	7,407.0	7,974.4
H13	Thai Nguyen–Cho Moi	28	27	0.56	0.00	230	203	28	0	8	238.6	256.9
H14	Hoa Lac–Hoa Binh	26	25	0.52	0.00	191	165	26	0	8	198.8	214.0
H15	Bac Ninh–Ha Long	136	133	2.72	0.00	1,463	1,328	135	0	40	1,502.8	1,618.8
H16	Ninh Binh–Hai Phong–Quang Ninh	160	157	3.20	0.00	1,058	900	158	0	47	1,105.4	1,189.4
H17	Hong Linh–Huong Son	34	33	0.68	0.00	270	237	34	0	10	280.5	302.0
H18	Cam Lo–Lao Bao	70	69	1.40	0.00	629	559	69	0	21	649.3	699.1
H19	Quy Nhon–Pleiku	160	157	3.20	0.00	1,453	1,294	158	0	47	1,499.9	1,615.1
H20	Dau Giay–Da Lat	189	183	3.78	2.00	1,681	1,419	187	75	56	1,736.8	1,871.0
H21	Bien Hoa–Vung Tau	76	74	1.52	0.00	624	549	75	0	22	646.9	696.5
H22	HCMC–Thu Dau Mot–Chon Thanh	69	68	1.38	0.00	904	836	68	0	20	924.7	996.3
H23	HCMC – Moc Bai	55	54	1.10	0.00	365	311	54	0	16	381.5	410.5
H24	Soc Trang–Can Tho–Chau Doc	200	196	4.00	0.00	1,279	1,081	198	0	59	1,338.0	1,439.6
H25	Ha Tien–Rach Gia–Bac Lieu	225	221	4.50	0.00	1,439	1,216	223	0	67	1,505.2	1,619.5
H26	Can Tho–Ca Mau	150	147	3.00	0.00	1,586	1,437	148	0	44	1,630.0	1,755.7
H27	Quang Ngai–Dak To	170	161	3.40	6.00	1,872	1,480	168	224	50	1,922.6	2,073.6
H28	Nha Trang–Da Lat	80	72	1.60	6.00	960	657	79	224	24	983.9	1,062.5
H29	Da Nang–Ngoc Hoi	250	239	5.00	6.00	2,796	2,325	247	224	74	2,870.0	3,094.2
H30	Ring Road No.4 in Ha Noi	90	82	8.00	0.00	1,206	612	593	0	48	1,253.7	1,350.5
H31	Ring Road No.5 in Ha Noi	320	314	6.40	0.00	2,236	1,919	317	0	170	2,405.7	2,583.2
H32	Ring Road No.3 in HCMC	83	76	6.64	0.00	1,095	767	328	0	44	1,139.5	1,226.9
CH01	Cau Gie Ninh Binh	-	-	-	-	-	-	-	-	-	-	452.4[2]
CH02	Danang–Quang Ngai	-	-	-	-	-	-	-	-	-	-	1,048.2[2]
CH03	Phan Thiet–Dau Giay	100	97	0.90	2.40	902	768	45	90	30	931.4	1,003.8
CH04	HCMC–Long Thanh–Dau Giay	-	-	-	-	-	-	-	-	-	-	1,110.8[2]
CH05	HCMC–Trung Luong	-	-	-	-	-	-	-	-	-	-	776.5[2]
CH06	Trung Luong–My Thuan–Can Tho	92	86	6.44	0.00	1,373	1,055	318	0	27	1,400.7	1,510.0
CH07	Lang Son–Bac Giang–Bac Ninh	130	127	2.60	0.00	1,054	926	129	0	38	1,092.6	1,176.3
CH08	Ha Noi–Hai Phong	-	-	-	-	-	-	-	-	-	-	1,441.2[2]
CH09	Ha Noi–Lao Cai	-	-	-	-	-	-	-	-	-	-	1,218.7[2]
CH10	Ha Noi–Thai Nguyen	-	-	-	-	-	-	-	-	-	-	248.2[2]
CH11	Lang–Hoa Lac	-	-	-	-	-	-	-	-	-	-	450.0[2]
CH12	Ha Long–Mong Cai	128	125	2.56	0.00	1,127	1,001	127	0	38	1,165.3	1,254.7

Source: VITRANSS 2 Study Team

Note:

[1] Construction Cost includes Direcct Construction Cost, Indirect Construction Cost, Engineering Cost/Project Management Cost/Other Cost, Contingency and Value Added Tax.

[2] Based on the cost estimation by Vietnam Government

6.3 Economic Analysis

Economic evaluation was carried out using the following assumptions:

(i) Each project will be open for service by 2020;

(ii) Evaluation period is 30 years from 2020 to 2049;

(iii) Project cost was newly estimated by the VITRANSS 2 Study Team using the latest cost information, and assumed to be reimbursed 10% by 2016, 30% by 2017, 30% by 2018, and 30% by 2019;

(iv) Annual operating cost would be 5% of project cost;

(v) Toll rate is assumed at US 5 cents/PCU/km after comparison with selected countries;

(vi) Annual average growth rate of traffic would be 4.9% (the same as the overall growth rate of traffic by 2020–2030).

Economic benefits were generated from the savings from vehicle operating cost (VOC) and passenger time cost.

The results of the economic analysis are presented in Table 6.3.1 and Figure 6.3.1. Some of the North-South Expressway sections and sub-urban sections around HCMC show EIRRs of more than 12%. This means that these sections are economically feasible. Other sections, including the HCMC route sections, show lower EIRRs.

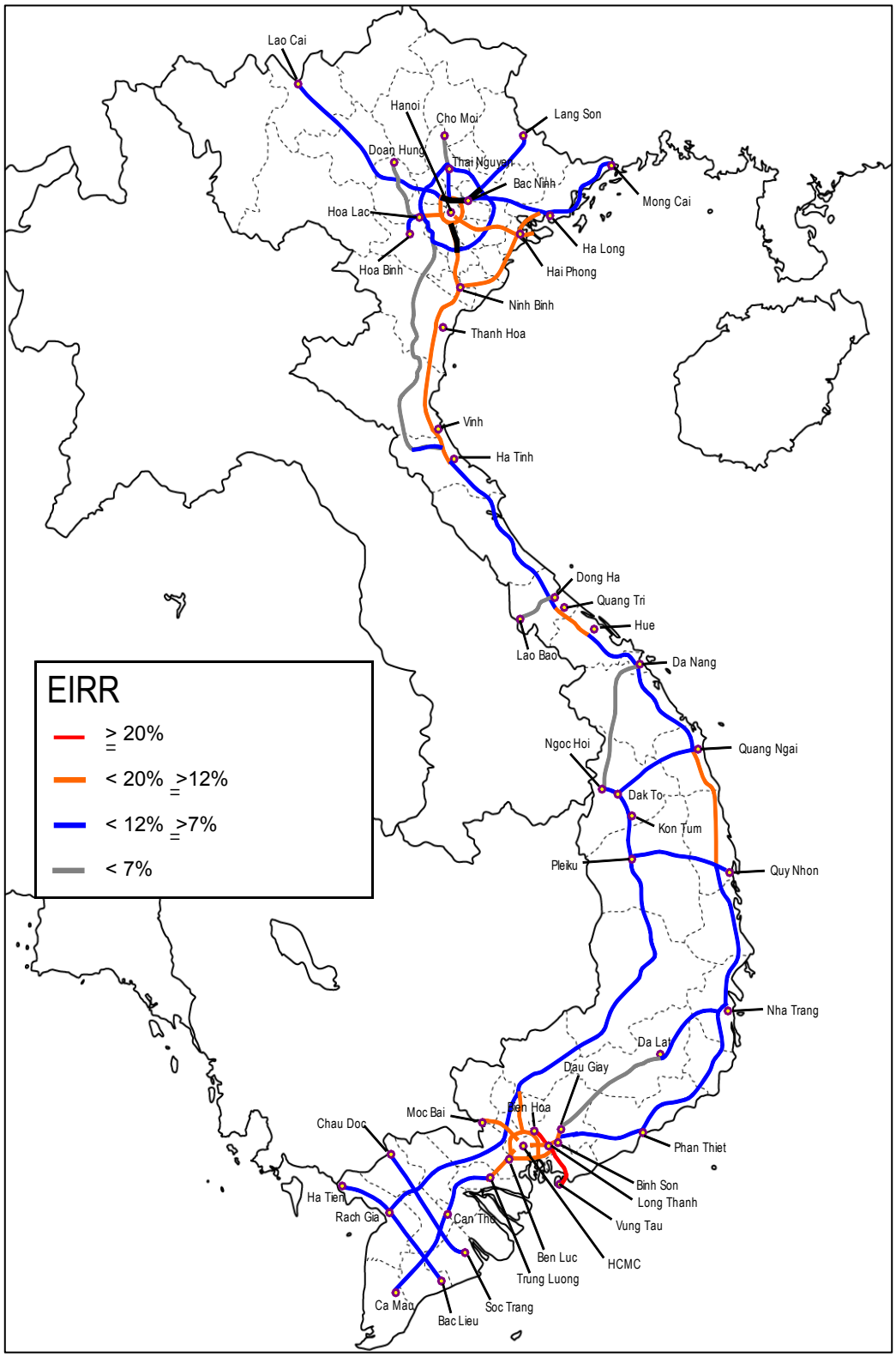
Based on the economic analysis, it is concluded that the expressway development plan should be trimmed down into a less ambitious and more practical arrangement at least in the short to medium term up to 2020.

Table 6.3.1 Preliminary Economic Evaluation Results of MOT's Expressway Projects

Project Code	Section	Distance (km)	V/C Ratio	PCUs (000/day)	Benefit (USD 1000/day)			Benefit (USD 000/day/km)	Economic Cost (USD mil/km)	E-IRR (%)
					VOC	TTC	Total			
H01	Ninh Binh–Thanh Hoa	75	0.66	80.1	61.2	116.5	177.7	2.4	10.2	15.3
H02	Thanh Hoa–Vinh	140	0.47	57.2	0.6	169.2	169.8	1.2	14.1	12.1
H03	Vinh–Ha Tinh	20	0.56	45.7	1.2	30.5	31.6	1.6	9.3	17.0
H04	Ha Tinh–Quang Tri	277	0.47	38.3	7.3	143.2	150.5	0.5	8.8	9.9
H05	Quang Tri–Hue	73	0.51	41.2	4.8	56.2	61.0	0.8	9.1	12.5
H06	Hue–Da Nang	105	0.46	37.5	1.7	86.8	88.5	0.8	15.6	10.3
H07	Quang Ngai–Quy Nhon	150	0.44	35.6	5.4	142.9	148.3	1.0	11.0	10.3
H08	Quy Nhon–Nha Trang	240	0.45	36.4	6.2	156.6	162.8	0.7	13.1	8.9
H09	Nha Trang–Phan Thiet	280	0.29	23.7	22.0	100.2	122.2	0.4	9.6	8.0
H10	Long Thanh–Nhon Trach–Ben Luc	45	0.25	30.2	-24.4	124.4	100.1	2.2	15.2	15.9
H11	Doan Hung–Hoa Lac–Pho Chau	457	0.03	2.4	-34.6	260.5	225.9	0.5	9.8	6.3
H12	Ngoc Hoi–Chon Thanh–Rach Gia	864	0.20	16.0	-12.2	479.5	467.3	0.5	8.6	7.4
H13	Thai Nguyen–Cho Moi	28	0.18	14.7	1.6	10.7	12.3	0.4	8.5	5.8
H14	Hoa Lac–Hoa Binh	26	0.11	8.5	-2.2	13.9	11.7	0.4	7.6	7.3
H15	Bac Ninh–Ha Long	136	0.06	6.8	-25.8	140.1	114.2	0.8	11.1	8.9
H16	Ninh Binh–Hai Phong–Quang Ninh	160	0.15	11.8	-28.3	189.0	160.6	1.0	6.9	13.5
H17	Hong Linh–Huong Son	34	0.06	4.7	-3.0	19.9	17.0	0.5	8.3	7.4
H18	Cam Lo–Lao Bao	70	0.04	2.9	-4.5	30.3	25.8	0.4	9.3	4.9
H19	Quy Nhon–Pleiku	160	0.01	0.6	-35.8	146.8	111.0	0.7	9.4	8.9
H20	Dau Giay– Da Lat	189	0.20	16.0	10.9	69.9	80.7	0.4	9.2	5.2
H21	Bien Hoa–Vung Tau	76	0.61	74.8	38.5	319.5	358.0	4.7	8.5	24.4
H22	HCMC–Thu Dau Mot–Chon Thanh	69	0.36	44.3	-4.4	84.8	80.4	1.2	13.4	12.2
H23	HCMC–Moc Bai	55	0.46	37.1	-10.7	69.9	59.2	1.1	6.9	16.4
H24	Soc Trang–Can Tho–Chau Doc	200	0.04	3.6	-29.3	142.4	113.1	0.6	6.7	9.7
H25	Ha Tien–Rach Gia–Bac Lieu	225	0.03	2.1	-50.4	201.0	150.6	0.7	6.7	10.9
H26	Can Tho–Ca Mau	150	0.27	22.1	-28.3	159.2	131.0	0.9	10.9	9.3
H27	Quang Ngai–Dak To	170	0.00	0.1	-60.7	184.7	124.1	0.7	11.3	8.3
H28	Nha Trang–Da Lat	80	0.31	25.4	1.2	41.0	42.2	0.5	12.3	7.8
H29	Da Nang–Ngoc Hoi	250	0.16	13.3	-1.2	72.9	71.7	0.3	11.5	1.8
H30	Ring Road No.4 in Ha Noi	90	0.06	7.7	-38.4	298.3	259.9	2.9	13.9	14.5
H31	Ring Road No.5 in Ha Noi	320	0.09	10.4	-9.4	262.2	252.7	0.8	7.5	7.9
H32	Ring Road No.3 in HCMC	83	0.39	47.2	-13.8	187.3	173.5	2.1	13.7	13.7
CH01	Cau Gie–Ninh Binh	50	0.60	73.3	46.2	104.3	150.5	3.0	8.1	18.1
CH02	Da Nang–Quang Ngai	131	0.33	39.6	2.3	110.2	112.6	0.9	7.2	11.3
CH03	Phan Thiet–Dau Giiay	100	0.49	39.6	10.5	68.2	78.7	0.8	17.7	11.9
CH04	HCMC–Long Thanh–Dau Giay	55	0.92	74.9	61.6	224.2	285.8	5.2	18.2	15.5
CH05	HCMC- Trung Luong	40	0.84	67.8	22.4	167.4	189.7	4.7	17.5	15.1
CH06	Trung Luong–My Thuan–Can Tho	92	0.32	39.1	-15.3	120.3	105.0	1.1	15.2	11.3
CH07	Lang Son–Bac Giang–Bac Ninh	130	0.03	2.6	-42.1	164.9	122.8	0.9	8.4	11.8
CH08	Ha Noi–Hai Phong	105	0.41	33.7	-27.6	196.3	168.7	1.6	12.4	12.0
CH09	Ha Noi–Lao Cai	264	0.11	9.0	-32.0	208.9	176.9	0.7	4.2	11.7
CH10	Ha Noi–Thai Nguyen	62	0.23	18.7	-1.9	37.8	35.9	0.6	3.6	11.5
CH11	Lang–Hoa Lac	30	0.18	14.7	-18.6	109.5	90.9	3.0	13.5	15.0
CH12	Ha Long–Mong Cai	128	0.10	8.5	-9.0	88.3	79.4	0.6	9.1	8.0

Source: VITRANSS 2 Study Team.
Note: V/C ratio, PCUs and benefit are as of 2030. Urban traffic was taken into consideration for calculating EIRRs (see VITRANSS 2 Final Report Chapter 8)

Figure 6.3.1 Expressway Projects with Estimated EIRRs



Source: VITRANSS 2 Study Team.

6.4 Financial Analysis

Based on the same assumptions made in the economic evaluation, a financial analysis was conducted for the candidate expressway projects. Assumed toll rates for 2030 are USD 0.05, 0.15, and 0.145 per vehicle-kilometer for car, bus, and truck, respectively. These correspond to about 10% of the expected time cost savings of car and bus users. The toll rate of truck was assumed to be the same as that of bus. These rates vary in proportion to the per-capita GRDP estimated for each year.

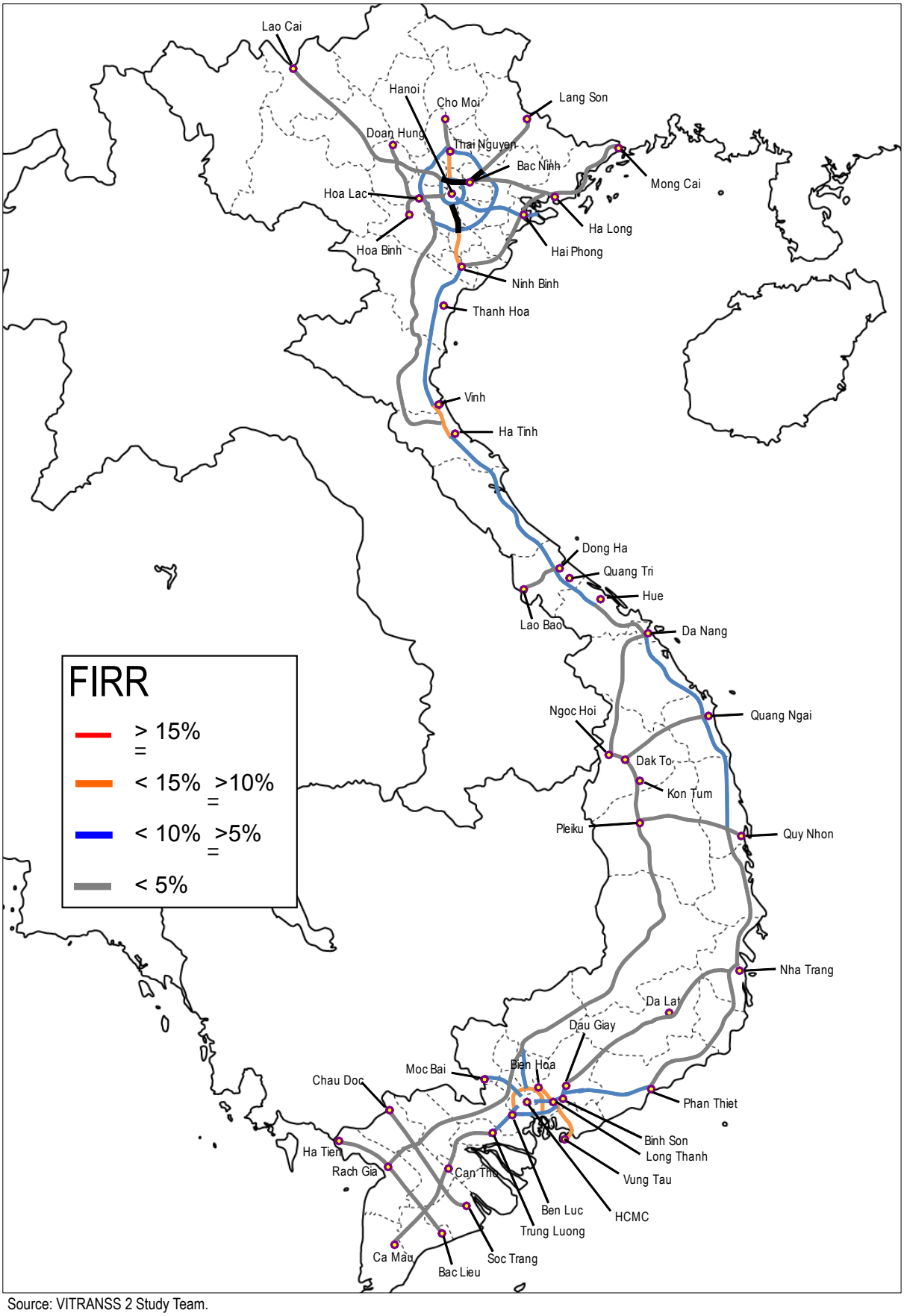
The results are presented in Table 6.4.1 and Figure 6.4.1. There is no project which shows an FIRR of more than 15%, suggesting the difficulty for BOT arrangements. However, there are many projects that could be implemented by PPP scheme, judging from the FIRRs calculated. The further investigation is necessary.

Table 6.4.1 Preliminary Financial Evaluation Results of MOT's Expressway Projects

Project Code	Section	Distance (km)	V/C Ratio	No of Vehicles			Project Cost (USD mil/km)	FIRR (%)
				Car	Bus	Truck		
H01	Ninh Binh–Thanh Hoa	75	0.66	8,984	104,241	25,554	11.0	8.3
H02	Thanh Hoa–Vinh	140	0.47	7,748	71,349	17,826	15.2	6.5
H03	Vinh–Ha Tinh	20	0.56	5,772	48,952	14,626	10.1	12.6
H04	Ha Tinh–Quang Tri	277	0.47	4,951	34,684	12,367	9.5	5.2
H05	Quang Tri–Hue	73	0.51	4,905	34,762	13,578	9.8	7.5
H06	Hue–Da Nang	105	0.46	5,038	41,315	11,847	16.9	3.5
H07	Quang Ngai–Quy Nhon	150	0.44	4,537	37,399	11,374	11.9	5.2
H08	Quy Nhon–Nha Trang	240	0.45	4,534	39,688	11,633	14.1	3.9
H09	Nha Trang–Phan Thiet	280	0.29	2,037	17,084	8,180	10.3	2.6
H10	Long Thanh–Nhon Trach–Ben Luc	45	0.25	9,230	109,519	5,354	16.4	5.4
H11	Doan Hung–Hoa Lac–Pho Chau	457	0.03	567	3,898	614	10.5	-
H12	Ngoc Hoi–Chon Thanh–Rach Gia	864	0.20	2,312	22,936	4,850	9.2	1.9
H13	Thai Nguyen–Cho Moi	28	0.18	1,206	16,113	4,955	9.2	1.9
H14	Hoa Lac–Hoa Binh	26	0.11	2,365	13,997	2,082	8.2	-0.6
H15	Bac Ninh–Ha Long	136	0.06	2,046	17,473	1,415	11.9	-2.9
H16	Ninh Binh–Hai Phong–Quang Ninh	160	0.15	2,768	30,044	2,790	7.4	1.0
H17	Hong Linh–Huong Son	34	0.06	1,112	12,070	1,121	8.9	-2.4
H18	Cam Lo–Lao Bao	70	0.04	686	7,446	691	10.0	-
H19	Quy Nhon–Pleiku	160	0.01	310	878	104	10.1	-
H20	Dau Giay–Da Lat	189	0.20	1,291	17,214	5,388	9.9	2.6
H21	Bien Hoa–Vung Tau	76	0.61	17,271	182,910	17,981	9.2	13.4
H22	HCMC–Thu Dau Mot–Chon Thanh	69	0.36	6,483	80,214	12,924	13.4	6.3
H23	HCMC–Moc Bai	55	0.46	9,218	84,862	8,810	7.5	8.2
H24	Soc Trang–Can Tho–Chau Doc	200	0.04	1,314	8,646	694	7.2	-3.2
H25	Ha Tien–Rach Gia–Bac Lieu	225	0.03	1,084	3,919	297	7.2	-
H26	Can Tho–Ca Mau	150	0.27	6,518	49,482	4,848	11.7	2.0
H27	Quang Ngai–Dak To	170	0.00	94	0	0	12.2	-
H28	Nha Trang–Da Lat	80	0.31	2,828	35,979	8,023	13.3	2.5
H29	Da Nang–Ngoc Hoi	250	0.16	2,064	14,507	4,085	12.4	-1.3
H30	Ring Road No.4 in Ha Noi	90	0.06	1,726	14,532	1,982	15.0	8.0
H31	Ring Road No.5 in Ha Noi	320	0.09	1,626	13,989	3,132	8.1	6.3
H32	Ring Road No.3 in HCMC	83	0.39	7,217	98,407	13,270	14.8	10.9
CH01	Cau Gie–Ninh Binh	50	0.60	9,197	105,584	22,729	9.0	12.6
CH02	Da Nang–Quang Ngai	131	0.33	5,272	43,861	12,535	8.0	8.0
CH03	Phan Thiet–Dau Giay	100	0.37	3,090	30,712	10,023	19.1	6.8
CH04	HCMC–Long Thanh–Dau Giay	55	0.92	11,473	155,016	21,085	20.2	8.8
CH05	HCMC–Trung Luong	40	0.84	14,575	174,812	16,481	19.4	8.6
CH06	Trung Luong–My Thuan–Can Tho	92	0.32	8,334	82,955	10,004	16.4	2.8
CH07	Lang Son–Bac Giang–Bac Ninh	130	0.03	1,378	5,887	312	9.0	-3.8
CH08	Ha Noi–Hai Phong	105	0.41	7,587	78,925	8,251	13.7	5.9
CH09	Ha Noi–Lao Cai	264	0.11	2,136	23,826	2,100	4.6	2.6
CH10	Ha Noi–Thai Nguyen	62	0.23	2,923	29,056	5,490	4.0	10.1
CH11	Lang–Hoa Lac	30	0.18	4,061	35,776	3,288	15.0	3.4
CH12	Ha Long–Mong Cai	128	0.10	1,761	12,755	2,347	9.8	0.5

Source: VITRANSS 2 Study Team.
Note: V/C ratio and number of vehicles are as of 2030. Urban traffic was taken into consideration for calculating FIRRs (see Chapter 8).

Figure 6.4.1 Expressway Projects with Estimated FIRRs



Source: VITRANSS 2 Study Team.

6.5 Strategic Environmental Assessment

Strategic Environmental Assessment (SEA) was conducted for the North-South Expressway in relation to the overall transport development strategy of the VITRANSS 2 up to the year 2030.

The significant environmental and social issues to be considered and the relevant mitigation measures were identified through SEA. Most social and environmental issues are quite similar to those of ordinary roads. This project has significant national strategic importance because it links two major urban centers in Vietnam: Hanoi and Ho Chi Minh City.

The following mitigation measures for environmental issues can be applied.

(a) Land Acquisition: Selecting alignment that minimizes such impacts as resettlement and acquisition of farm land.

Planning and implementing appropriate land acquisition plan and resettlement/ rehabilitation plan through public participation.

Installing grievance mechanism to monitor and address social issues.

(b) Impacts on Natural Ecosystems: Selecting alignment or structure that avoids or minimizes impact on natural ecosystems, especially the section of alignment that passes though the buffer zone of Bach Ma National Park, Phong Dien Natural Reserve and Han Dam ecotourism, flyovers and bridges should be considered in design period.

(c) Landslide and Flooding: Proposed technical mitigation measures in the North-South expressway will be the same as proposed technical mitigate measures in the road sector.

(d) Economic and Social Conditions: Cultural heritage: Selecting alignment or structure that avoids or minimizes impacts on culturally important sites or sceneries; Aesthetic design of flyovers and bridges.

(e) Air pollution and Greenhouse Gases: Proposed technical mitigation measures in the North-South expressway will be the same proposed technical mitigation measurements in the road sector.

(f) Noise Pollution and Vibration: For expressways, the following additional solutions may be used:

(i) Building buffer space between transport line and residential area. This solution is popularly applied in constructing high-speed roads and expressways in Japan and other developed countries. The main purpose of this buffer zone is to reduce traffic noise which cause environmental problems in residential areas. The width of buffer zone is around 10 to 20 m depending on the type of road surface and transport volume. The buffer zone is usually built along main transport roads and expressways with four or more lanes.

(ii) Planting trees and installing noise retaining signs, pavements, and bicycle lines inside buffer zones. The buffer zone is provided to reduce noise and dispersion of transport vehicle emission and restrict vibration transmittance.

6.6 Prioritization of Project Sections

The results of the multi-criteria analysis using the five indices are presented in Table 6.6.1. Basically, projects that earned a score of 5 are considered as Master Plan projects and are targeted to be implemented by 2020. Projects that earned a score of 4 are prioritized to be implemented after 2020.

Table 6.6.1 Comprehensive Evaluation of Expressway Projects

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Economic	Financial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
H01	Ninh Binh–Thanh Hoa Expressway (75 km)	827.6	15.3	5	5	4	5	5	6	3	5
H02	Thanh Hoa–Vinh Expressway (140 km)	2128.0	12.1	5	4	3	5	5	6	3	5
H03	Vinh–Ha Tinh Expressway (20 km)	201.5	17.0	5	5	5	5	5	6	3	5
H04	Ha Tinh–Quang Tri Expressway (277 km)	2641.2	9.9	4	3	3	5	5	3	2	3
H05	Quang Tri–Hue Expressway (73 km)	711.9	12.5	5	4	3	5	5	3	3	4
H06	Hue–Da Nang Expressway (105 km)	1778.0	10.3	4	3	2	5	5	7	3	4
H07	Quang Ngai–Quy Nhon Expressway (150 km)	1787.8	10.3	4	3	3	5	5	6	2	3
H08	Quy Nhon–Nha Trang Expressway (240 km)	3390.1	8.9	4	3	2	5	5	3	2	3
H09	Nha Trang–Phan Thiet Expressway (280 km)	2890.2	8.0	3	3	2	5	5	5	3	3
H10	Long Thanh–Nhon Trach–Ben Luc Expressway (45 km)	738.6	15.9	4	5	3	5	5	8	3	5
H11	Doan Hung–Hoa Lac–Pho Chau Expressway (457 km)	4813.1	6.3	1	3	1	4	5	3	2	2
H13	Thai Nguyen–Cho Moi Expressway (28 km)	256.9	5.8	3	3	2	4	5	3	2	3
H14	Hoa Lac–Hoa Binh Expressway (26 km)	214.0	7.3	2	3	1	4	5	6	2	3
H16	Ninh Binh–Hai Phong–Quang Ninh Expressway (160 km)	1189.4	13.5	3	4	2	4	5	3	2	3
H17	Hong Linh–Huong Son Expressway (34 km)	302.0	7.4	1	3	1	4	5	3	2	2
H18	Cam Lo–Lao Bao Expressway (70 km)	699.1	4.9	1	3	1	4	5	3	2	2
H20	Dau Giay–Da Lat Expressway (189 km)	1871.0	5.2	3	3	2	4	5	6	3	3
H21	Bien Hoa–Vung Tau Expressway (76 km)	696.5	24.4	5	5	5	5	5	7	3	5
H22	HCMC–Thu Dau Mot–Chon Thanh Expressway (69 km)	996.3	12.2	5	4	3	4	5	3	2	4
H23	HCMC–Moc Bai Expressway (55 km)	410.5	16.4	4	5	4	4	5	3	2	4
H24	Soc Trang–Can Tho–Chau Doc Expressway (200 km)	1439.6	9.7	2	3	1	4	5	3	2	2
H25	Ha Tien–Rach Gia–Bac Lieu Expressway (225 km)	1619.5	10.9	1	3	1	4	5	3	2	2
H26	Can Tho–Ca Mau Expressway (150 km)	1755.7	9.3	3	3	2	5	5	3	2	3
H27	Quang Ngai–Dak To Expressway (170 km)	2073.6	8.3	1	3	1	4	5	1	1	1
H28	Nha Trang–Da Lat Expressway (80 km)	1062.5	7.8	2	3	2	4	1	1	1	1
H29	Da Nang–Ngoc Hoi Expressway (250 km)	3094.2	1.8	1	2	1	4	3	1	1	1
H30	Ring Road No.4 in Ha Noi (90 km)	1350.5	14.5	4	4	4	5	5	6	3	5
H31	Ring Road No.5 in Ha Noi (320 km)	2583.2	7.9	2	3	3	5	5	6	1	3
H32	Ring Road No.3 in HCMC (83 km)	1226.9	13.7	5	4	4	5	5	6	3	5

Source: VITRANSS 2 Study Team.

7 IMPLEMENTATION STRATEGIES

7.1 Implementation Schedule

1) Current Implementation status of the North-South Expressway

At present, many sections of the North-South Expressway have been undergoing various stages of development including feasibility study preparation, detailed design, and construction (see Table 7.1.1 and Figure 7.1.1). While feasibility studies are currently being prepared or already completed for many sections, the preparation of detailed design is still limited.

Table 7.1.1 Current Status of the North-South Expressway

Code[1]		Section	Length (km)	Status
NS-Code	VITRANSS 2			
NS01	H30	Ring Road No.4 in Ha Noi	90	F/S is ongoing (by TEDI)
NS02	CH01	Cau Gie–Ninh Binh	50	Under construction
NS03	H01	Ninh Binh–Thanh Hoa	75	F/S implementation (by VNCC) is approved by Prime Minister
NS04	H02	Thanh Hoa–Vinh	140	F/S implementation (by VNCC) is on application process
NS05	H03	Vinh–Ha Tinh	20	Pre F/S is completed (by TEDI)
NS06	H04	Ha Tinh–Quang Tri	277	No information
NS07	H05	Quang Tri–Hue	73	Cam Lo-Tuy Loan section: F/S implementation (by BT company) is on application process.
NS08	H06	Hue–Da Nang	105	
NS09	CH02	Da Nang–Quang Ngai	131	D/D is going to be implemented (by WB) Funding by WB and JICA is expected
NS10	H07	Quang Ngai–Quy Nhon	150	Pre F/S is ongoing (by TEDI)
NS11	H08	Quy Nhon–Nha Trang	240	No information
NS12	H09	Nha Trang–Phan Thiet	280	F/S is ongoing by a local consultant under MOD
NS13	CH03	Phan Thiet–Dau Giay	100	F/S is ongoing (by BITEXCO)
NS14	CH04	HCMC–Long Thanh–Dau Giay	55	D/D is ongoing (by ADB)
NS15	H33	Ring Road No.3 in HCMC	83	F/S is ongoing (by TEDI-S)
NS16	H10	Long Thanh–Nhon Trach–Ben Luc	45	F/S completed (by JETRO), F/S ongoing (by TEDI-S), PPTA Is ongoing (by ADB), D/D is going to be implemented (EOI was submitted by ADB) Funding by ADB and JICA is under consideration
NS17	CH05	HCMC–Trung Luong	40	Under construction
NS18	CH06	Trung Luong–My Thuan–Can Tho	92	F/S is completed (by VIDB) (Trung Luong–My Thuan: BOT by VIDB is expected) (My Thuan–Can Tho: ODA is expected)

Source: Worked out by the study team based on various information
[1] VITRANSS 2 Codes correspond to those in project list

2) Proposed Implementation Schedule

Considering the results of the assessment and prioritization based on multi-criteria analysis (see chapter 6) as well as the current implementation status, VITRANSS 2 proposed an implementation schedule of the Vietnam Expressway network including the North-South Expressway (see Figure 7.1.1 and Table 7.1.2).

The feasibility of the implementation schedule should take into account some key considerations relating to finance, laws/institutions, environment and resettlement among others. The proposed schedule should be able to provide a good step-by-step scheme.

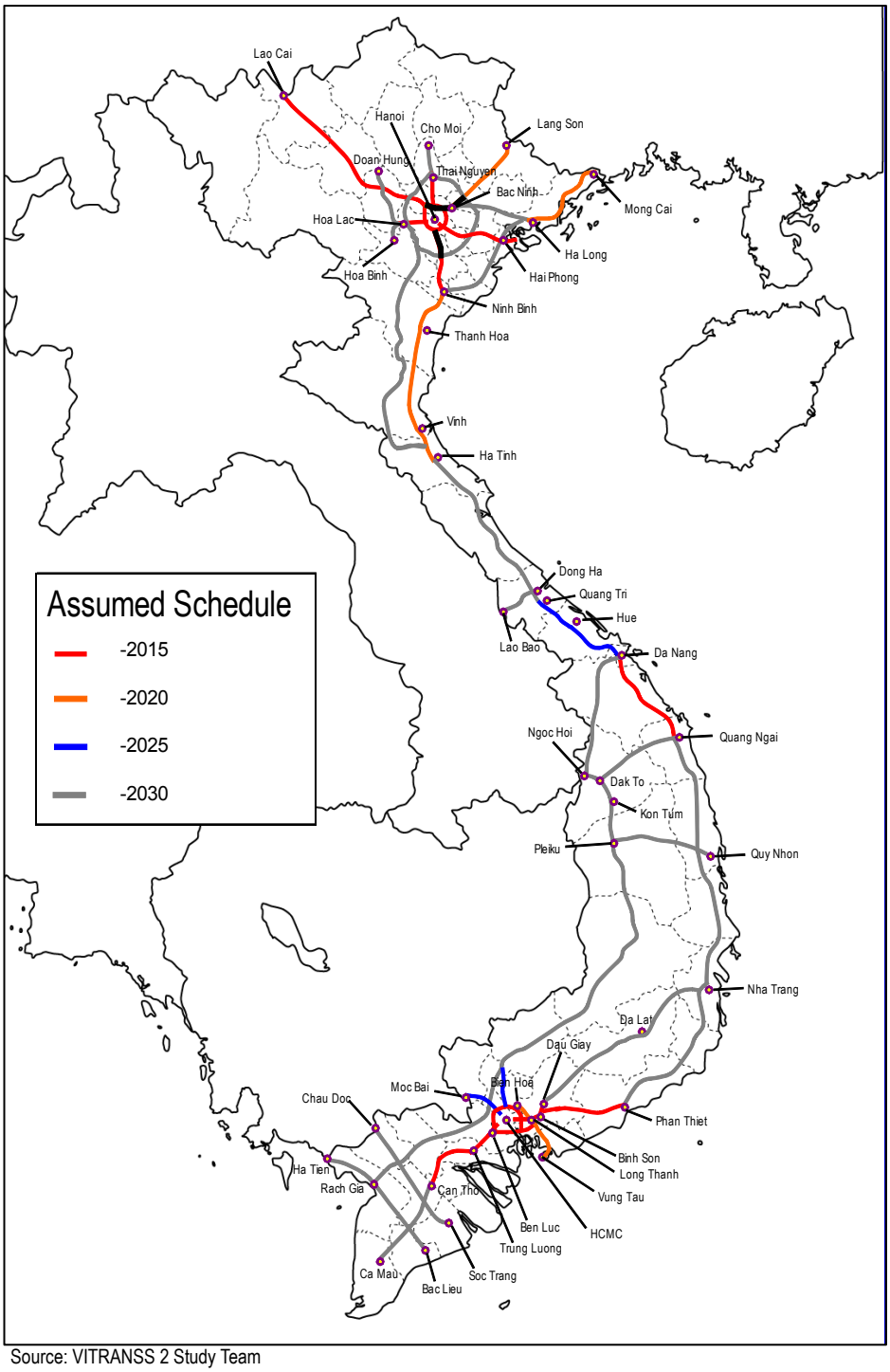
The basic development orientations of the North-South Expressway is summarized as follows:

(i) Construction should be implemented from three regional centers, namely Hanoi, Danang and HCMC (Current situation follows this orientation).

(ii) The development target for priority sections should be set as 2020 and for the whole section as 2030.

(iii) The development of other sections should be coordinated with the North-South Expressway.

Figure 7.1.1 Implementation Schedule of Vietnam



Source: VITRANSS 2 Study Team

Table 7.1.2 Implementation Schedule of Vietnam Expressway Network

Code	Project	km	Cost (mil. USD)	Evaluation	Schedule		
					2011-2020	2020-2030	Original Schedul
CH01	Cau Gie – Ninh Binh Expressway (50km)	50	452.4	-			06-10
CH02	Da Nang – Quang Ngai Expressway (131km)	131	1048.2	-			-20
CH03	Phan Thiet – Dau Giay Expressway (100km)	100	1003.8	-			-15
CH04	HCMC – Long Thanh – Dau Giay Expressway (55km)	55	1110.8	-			08-12
CH05	HCMC- Trung Luong Expressway (40km)	40	776.5	-			04-09
CH06	Trung Luong – My Thuan – Can Tho Expressway (92km)	92	1510.0	-			-10
CH07	Lang Son – Bac Giang – Bac Ninh Expressway (130km)	130	1176.3	-			11-14
CH08	Ha Noi – Hai Phong Expressway (105km)	105	1441.2	-			08-11
CH09	Ha Noi – Lao Cai Expressway (264km)	264	1218.7	-			09-12
CH10	Ha Noi – Thai Nguyen Expressway (62km)	62	248.2	-			05-10
CH11	Lang – Hoa Lac Expressway (30km)	30	450.0	-			06-09
CH12	Ha Long – Mong Cai Expressway (128km)	128	1254.7	-			12-15
H01	Ninh Binh – Thanh Hoa Expressway (75km)	75	827.6	5			-20
H02	Thanh Hoa – Vinh Expressway (140km)	140	2128.0	5			-20
H03	Vinh – Ha Tinh Expressway (20km)	20	201.5	5			-20
H04	Ha Tinh – Quang Tri Expressway (277km)	277	2641.2	3			-20
H05	Quang Tri – Hue Expressway (73km)	73	711.9	4			-20
H06	Hue – Da Nang Expressway (105km)	105	1778.0	4			-20
H07	Quang Ngai – Quy Nhon Expressway (150km)	150	1787.8	3			-20
H08	Quy Nhon – Nha Trang Expressway (240km)	240	3390.1	3			20-
H09	Nha Trang – Phan Thiet Expressway (280km)	280	2890.2	3			20-
H10	Long Thanh – Nhon Trach – Ben Luc Expressway (45km)	45	738.6	5			-20
H11	Doan Hung – Hoa Lac – Pho Chau Expressway (457km)	457	4813.1	2			20-
H12	Ngoc Hoi – Chon Thanh – Rach Gia Expressway (864km)	864	7974.4	3			20-
H13	Thai Nguyen – Cho Moi Expressway (28km)	28	256.9	3			20-
H14	Hoa Lac – Hoa Binh Expressway (26km)	26	214.0	3			20-
H15	Bac Ninh – Ha Long Expressway (136km)	136	1618.8	3			-20
H16	Ninh Binh – Hai Phong – Quang Ninh Expressway (160km)	160	1189.4	3			20-
H17	Hong Linh – Huong Son Expressway (34km)	34	302.0	2			20-
H18	Cam Lo – Lao Bao Expressway (70km)	70	699.1	2			20-
H19	Quy Nhon – Pleiku Expressway (160km)	160	1615.1	2			20-
H20	Dau Giay – Da Lat Expressway (189km)	189	1871.0	3			20
H21	Bien Hoa – Vung Tau Expressway (76km)	76	696.5	5			-20
H22	HCMC – Thu Dau Mot – Chon Thanh Expressway (69km)	69	996.3	4			-
H23	HCMC – Moc Bai Expressway (55km)	55	410.5	4			-
H24	Soc Trang – Can Tho – Chau Doc Expreesway (200km)	200	1439.6	2			20-
H25	Ha Tien – Rach Gia – Bac Lieu Expressway (225km)	225	1619.5	2			20-
H27	Quang Ngai – Dak To Expressway (170km)	170	2073.6	1			-
H28	Nha Trang – Da Lat Expressway (80km)	80	1062.5	1			-
H29	Da Nang – Ngoc Hoi Expressway (250km)	250	3094.2	1			-
H30	Ring Road No.4 in Ha Noi (90km)	90	1350.5	5			-
H31	Ring Road No.5 in Ha Noi (320km)	320	2583.2	3			-
H32	Ring Road No.3 in HCMC (83km)	83	1226.9	5			-20
Total Cost up to 2020 (Master Plan) (mil. USD)			19927.2				

Source: VITRANSS 2 Study Team
Note: The projects with blue color are part of North-South Expressway

7.2 General Strategy based on Market Development Phase

1) General Strategy for Each Phase

Growth of expressway network in Vietnam could be defined as a growth of expressway service market. The characteristics of each phase vary as the required expertise and resources also vary for the development in each phase.

The period up to 2030 could be defined as the Introduction and Growth phase. The general strategy should be formulated based on the different characteristics of each phase of the expressway network development.

The general implementation strategy based on the market development phase should include the following:

(i) Utilizing low cost and long-term concessional finance as much as possible for the development of expressway network until the country's per capita income would reach the threshold graduation level for the concessional financing.

(ii) Establishing a strong network development and management system for the formation of total expressway network in order to materialize the aggressive network development plan.

(iii) Filling financial viability gaps by extending public funding support to improve the viability of marginally profitable sections and at the same time to leverage various resources of private sector.

(iv) Establishing independent and efficient market-based expressway service providers on the regional basis.

7.3 Funding Strategies

1) Investment Requirement

The investment requirements for the development of the entire expressway network are approximately US$66 billion. Around US$12 billion (18% of the total investment requirements) already have committed funding sources. The remaining US$54 billion should be procured from various financing sources in order to materialize the development of North-South Expressway Network.

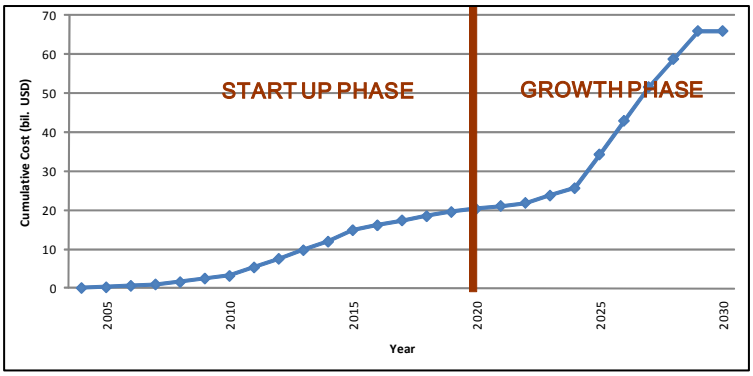
Table 7.3.1 Investment Requirement up to 2030

Status	Length (km)		Investment (US$ million)	
1. Committed Sections	1,187	19%	11,691	18%
2. Planned Sections	5,147	81%	54,202	82%
Total	6,334	100%	65,893	100%

Source: VITRANSS 2 Study Team

Figure 7.3.1 shows the cumulative investment requirements over next 20 years based on the proposed development schedule of the North-South Expressway master plan. Around US$11.7 billion is already committed. This is expected to gradually reach US$25.0 billion in the next 15 years with an average annual increment of about US$1.0 billion.

Figure 7.3.1 Cumulative Investment Requirement



Source: VITRANSS 2 Study Team

2) Available Funding Sources

An assessment of availability of public funding including ODA funds for the entire transport sector was assessed under VITRANSS 2. Assuming medium economic growth scenario, it was confirmed that the budget envelop would be sufficient to cover both the capital and recurrent expenditures of the VITRANSS 2 proposal up to 2020.

(a) **State Budget can not be a Major Source of Funding:** In general, the average annual investment of GOV for the road sector is approximately US$0.6 billion while the average annual investment requirement of the North-South Expressway master plan of VITRANSS 2 is around US$1.0 to 2.0 billion up to 2020. This figure is two to three times as much as the past envelop of GOV for the entire road sector. The state budget available (state budget and state credit combined exclusive of ODA and bond issue) for MOT in transportation sector from 2001 to 2005 averaged US$0.32 billion annually (40% of the total investment). It is clear that state budget alone is not sufficient to finance the annual requirement of the North-South Expressway master plan.

(b) **Private Money can not be a Major Financing Source:** Private money could only contribute a small portion (3.1% of the 2001–2005 transport sector investment) since it would take a long time, possibly more than a decade, to establish a proper institutional, legal and regulatory framework that provides for large volume of private sector investment in infrastructure development. It would also take time to build up successful track record to facilitate financial closure of project financing.

(c) **Bond Issue cannot be a Major Means to Finance Expressway Development:** Bond issuance (27% of the 2001–2005 transport sector investment) may not be a promising source of funding since interest level and maturity are heavily regulated by the Ministry of Finance (MOF).

(d) **GOV Needs to Leverage the use of ODA Funding for Expressway Development:** ODA can be a major source of financing for the expressway development in terms of both cost and volume (25% of the 2001–2005 transport sector investment). GOV, however, will need to leverage ODA funding because there is a certain threshold level of per capita income for GOV to enjoy the privilege of donor soft loan and the per capita income level of Vietnam is likely to exceed this threshold level in the next 10 years.

3) Financing Issues

The following issues should be considered in formulating the funding strategy for the North-South Expressway Master Plan of VITRANSS 2:

(a) Only a Few Expressway Sections could Self-finance its Initial Investment through Toll Revenues

Based on the financial evaluation of each section of the North-South Expressway only five (5) sections have exceeded the FIRR of 15%. This means that majority of the North-South Expressway network development will need some sort of public support.

This issue of financial viability is closely related to the problem which the Vietnam Expressway Corporation (VEC) is currently facing. The VEC is obliged to self-finance the development and operation of the sections with the privilege of utilizing ODA funds and proceeds from government guaranteed bonds. However, it is apparent that some of the sections would need viability gap funding support from GOV in the initial investment. But, on the contrary, VEC is obliged to make full repayment of the ODA loan which VEC uses for construction of expressway sections. It is very likely that if this full repayment obligation rule continues VEC would face financial difficulty in the near future.

(b) Further Facilitation of Private Sector Participation, especially of Experienced International Players, in Financing the Development of Expressways is Necessary

The private sector needs firm commitment from the GOV for the implementation of public-private partnerships (PPP) and the establishment of a transparent investment and market environment and framework. These will help in making private investment profitable, robust and foreseeable. To promote a better environment for greater private sector participation, the GOV with the concerted efforts of the Ministry of Planning and Investment (MPI) and the World Bank, has started the formulation of a financing framework for PPP projects in Vietnam with viability gap financing mechanisms.

(c) Need to Facilitate Fund Procurement from the Capital Market

Considering the country's low credit rating, the depth of funding procurement from the international capital market may not be expected, however GOV could improve the conditions at bond issue including enhancement of credit worthiness of the bond issuers.

(d) Need to Leverage Utilization of ODA Fund for the Development of Expressways with PPP

Although ODA funding can be a suitable source of financing for the expressway development, its availability is limited in terms of country's borrowing limit and competition for funds with other sectors. Therefore, GOV needs to leverage its utilization of ODA funding by integrating it with PPP format. The effect of utilizing ODA funding could be leveraged in multi-fold.

(e) Need to Promote User Pay Principle and Earmarking of Funds for the Development of Expressways

The National Assembly recently passed the Road Traffic Law (resolution Nr. 23/2008/QH 12), which became effective in July 2009. The law establishes a road maintenance fund consisting of road user charges and supplemented by annual budget allocations. The law also instructs the government to decide on specific sources of the funds. An inter-agency group, headed by an MOT Vice Minister, is formulating the detailed content of the fund including the fund sources and utilization. This approach should be expanded to secure funding for the development of expressways.

4) Funding Strategies

Only a few expressway sections of the North-South Expressway master plan can recover initial investment through toll revenue. Majority of the network needs to be developed by using public funding and partially by utilizing private sector funds.

(1) Leveraging ODA Funding

So far VEC has been able to mobilize US$2,065 million of ODA and IFI funding[1] for the development of several sections of expressway.

To leverage the ODA funding one way is for VEC to concession out the completed section of ODA for O&M concession to potential investors so that VEC could recoup a part of initial cost of construction through up front concession fee payment by the concessionaire.

Another option is to use ODA funds to construct the VEC portion of expressway while the private investor will construct other portion and let them operate and maintain the entire section of the expressway. This is called PPP option. The VEC could enjoy a revenue sharing with the PPP concessionaire to repay the ODA loan which is on-lent to VEC through the MOF. However, as described earlier, very few sections are financially sustainable such that the VEC and/or the concessionaire would need viability gap funding support from the GOV. Funding support is needed by the VEC in order for it to avoid the risk of bankruptcy and obtain robust financial viability.

(2) Creating a Mechanism for GOV to Extend Support to the VEC

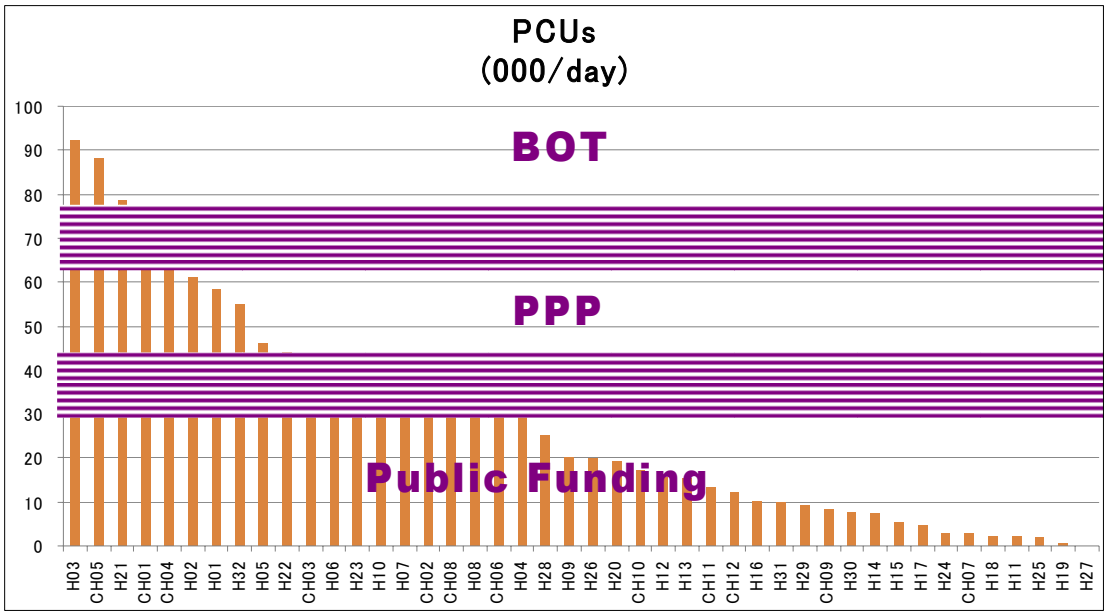
[1] Corporate Brochure of VEC

Based on the results of the cash flow analysis conducted, majority of the expressway sections are not financially sustainable including some sections already assigned to the VEC for development. This would seem more obvious when the expressway network development approaches the final stage such as the development of the west side of North-South Route and of Central Region. If the VEC continues its business with the current premise of "VEC is to finance everything", then the VEC will likely face the risk of huge debt accumulation and bankruptcy. It could face a situation similar to that of the Japan Public Highway Corporation (JH, the former entity of three privatized NEXCOs in Japan) in the later stage of expressway network development.

Therefore, when required, the VEC should have a mechanism in which GOV could extend its financial support to VEC as stipulated in the Prime Minister Decision No.1202/QD-TTg.

Figure 7.3.2 shows traffic level forecast for each section of the expressway network by type of possible funding. The level of forecast traffic (PCUs/day) directly relates to the level of revenue, therefore, relates also to suitable financing modality for each section.

Figure 7.3.2 Traffic Forecast for Each Section



Source: VITRANSS 2 Study Team

(3) Detaching Repayment Obligation for ODA Funding from the VEC

Currently, the VEC has signed on-lending agreement with the MOF regarding the loans with the Asian Development Bank (ADB) and Japan International Cooperation Agency (JICA) in which VEC's repayment obligation is based on with the original loan agreement. This means that VEC would need to repay everything. In future on-lending for the sections with low financial viability and for some PPP options, the VEC should detach or reduce its repayment obligation as currently practiced so as to avoid the risk of bankruptcy. Details of institutional improvement of the VEC will be further discussed in the next section.

(4) Establishing a Mechanism for Viability Gap Funding Support by GOV using ODA Fund

As discussed in the earlier section, GOV is now preparing the PPP Financing Framework

to cope with the financial viability gap issue of the potentially profitable expressway sections. A mechanism should be established to use ODA fund as viability gap funding for implementing a PPP option for expressway sections with marginal financial viability. This will facilitate participation of both private sector and public entities.

(5) Contingent Financial Support Mechanism by GOV

Besides the financial support for individual project, the VEC may need a mechanism and/or legal arrangement for contingent financial support from the GOV if the VEC faces sudden and considerable fund shortage during its operation. Equity injection by GOV as practiced by Japan Public Highway Corporation could be one option. Extending ordinary or subordinated government loan could be another option.

7.4 Institutional and Organizational Issues

1) Current Status – Expressway Administration

(1) Expressway Master Plan

The master plan of Vietnam Expressway network by 2020 and the vision after 2020 was approved by Prime Minister Decision No. 1734 /QD-TTg, December 1st, 2008. The final Decision states as follows:

(i) The high priority is given to the North-South routes which links big cities (Hanoi–Da Nang–HCMC), and routes that connect with some main sea ports.

(ii) Mechanism to mobilize investment budget are as follows:

- State budget under the form of government loans or government guarantee for investment loan from donors, issuing construction bonds, etc.
- Budget arranged by investors themselves under the PPP forms of BOT, Build-Transfer-Operate (BTO), Build-Transfer (BT), or state and private sector cooperation, etc.

(iii) In cooperation with the MPI and MOF, MOT will prepare a good mechanism to mobilize budget for expressway development with inclination of encouraging all internal and external economic sectors´ involvement in expressway investment.

(iv) MOT will be the organization which will manage and monitor the investment, construction and operation of the entire expressway network.

(v) MOT will also take responsibility in establishing a suitable model for management of investment, construction, operation and exploitation of the whole expressway network. MOT will also give support for the development of VEC to become a leading firm in investment and development of expressways in Vietnam.

In summary, a role of VRA (GRA) with regards to expressway and governmental agency responsible for administration of expressway sector is still not clear.

(2) Major Stakeholders of the Expressway

The major stakeholders of the Expressway are as follows:

(i) **Policy Makers:** MOT with MPI for investment license, MOF for approval of toll rate and Local Governments for implementer of land acquisition and at the same time grantor of investment license for small projects.

(ii) **Administrator/Regulator:** Currently MOT but there is a proposal on establishing Vietnam Expressway Administration which shall function as the administrator/regulator for the expressway market. Toll rate is regulated by MOF.

(iii) **Investors for Expressway Development:** within the legal framework of the Expressway Master Plan anybody could become an investor of expressway development as far as the investment approval is obtained. Currently there are investors which utilize public funding such as VEC, Project Management Unit (PMU) My Thuan and other PMUs, and the investors such as VINACONEX, VIDIFI, IDICO-BIDV-Song Da which uses financial resources of its own mobilization.

(iv) **Contractors:** Most of the large Vietnamese contractors and construction enterprises are currently active in forging joint ventures with Chinese and Korean contractors. Other foreign players have also participated in the bidding.

(v) **Financiers:** Vietnamese commercial banks such as BIDV, VDB, VCB, INCOM Bank, Agribank are active. No foreign commercial banks are active so far.

(vi) **Donors:** ADB, JICA and the World Bank are major fund providers for the on-going expressway developments.

(vii) **Consultants:** Most international consulting firms including those of Japan together with large domestic consulting and design firms are active in supporting the investors.

2) Current Status of PPPs

In the Urban and Infrastructure Department of MPI, the PPP Program Development Office has been established to lead the Program with staff from MPI, MOF and sector agencies.

A draft PPP financing framework with (i) detailed administrative rules, procedures and guidance required to implement PPPs, and (ii) transparent Viability Gap Funding Mechanism (VGFM) to provide financial support to make well-prepared PPPs financially viable, has been presented in November 2009 to the major stakeholders for comments. Formal submission of the PPP financing framework to the GOV is scheduled by March 2010 for the Prime Minister's decision by September 2010.

Simultaneous preparation of selected pilot PPP project for competitive bidding through World Bank lending operation in 2010 is in progress to test the workability of the proposed PPP financing framework.

3) Issues

The following are the critical institutional and organizational issues related to the expressway:

(i) Administration, regulation and responsible organization regarding development, O&M and management of expressway are not clearly defined in the current legal, regulatory and institutional framework of the road sector in Vietnam.

(ii) There exists a conflict between MOT and MOC in the jurisdiction of national highway/expressway and urban highway.

(iii) There exists a conflict between GRA and VEC in terms of administration/planning of expressway

(iv) There is no consolidated system and nationwide organization for quality control of construction and O&M for expressway nor for procurement of required human resources and expertise

(v) Existing toll related regulations, including Circular 90 which controls the profitability of O&M concession, are becoming impediments for private sector participation.

(vi) Existing BOT related regulations are rigidly defined and not enabling variety of PPP options to improve profitability of the private sector

(vii) There exists a confusion regarding concession granting route as both central and local government could become a concession grantor of expressway project.

4) Way Forward

The following are possible directions regarding institutional and organizational aspects for expressway development in Vietnam:

(a) Establishment of a Legal, Regulatory and Institutional Framework which Clearly Defines Administration and Provision of Expressway Services Regarding Development, Operation, Maintenance and Management

A legal, regulatory and institutional framework should be established as soon as possible to clearly position expressway as a part of the overall transport framework in Vietnam. Related regulations regarding toll and other aspects of expressway should be amended in order to remove impediments and facilitate private sector participation for the development of expressway business.

(b) Establishment of a Public Financial Support System for the Development and O&M of Expressway for Marginally Profitable and Low Profitable Expressway Sections

GOV needs to clearly express its recognition that only a few expressway sections can sufficiently recover its initial investment. Therefore it is essential to establish a public financial support system which would work effectively for both public and private entities. The PPP financing framework could be a base system for this. However, a mechanism should be instituted in order for GOV to be effective in developing a total expressway network as soon as possible in the most efficient manner.

(c) Establishment of a Strong Market based Management System of the Entire North-South Expressway Network

In order to materialize the aggressive expressway network development plan, the project needs a competent manager who could manage and control the development process and O&M to meet with sufficient quality level based on the market tested expertise.

Since the volume of private sector financial resources which could be tapped in the near future for expressway development is limited, there is a need to have a strong manager for the control of public funding so that its effective allocation including state budget, ODA funds and proceeds procured from the financial markets become possible. One potential direction could be reforming the existing VEC to be the manager of both network development and public fund allocation based on a nationwide expressway network management system and with a strong control on the provision of viability gap funding. Under such arrangement, the VEC needs to be monitored for funding by both the MPI and the MOF, and for network development and management by the MOT.

8 REVIEW OF THE FEASIBILITY STUDY ON THE WESTERN MISSING LINK OF THE EAST-WEST HIGHWAY

8.1 Introduction

1) Background of the Review

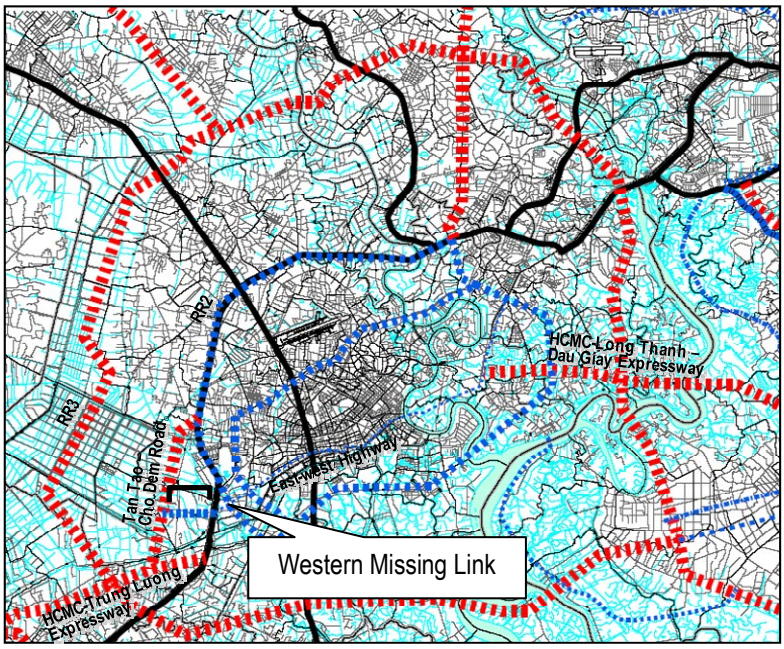
The Prime Minister approved the master plan on the development of transport and communications infrastructure in Ho Chi Minh City by 2020 and vision after 2020 in Decision No. 101/QD-TTg dated 22 January 2008. In recent years, HCMC has planned to pool a large amount of money from different sources/donors to invest and develop the city's transport and communications infrastructure in addition to the ongoing constructions of ring roads 1 and 2, as well as the North–South Expressway and the East–West Highway.

The East-West Highway was approved by the Prime Minister in Decision No. 101/Qd-TTg dated 22 January 2007. It connects the Hanoi Expressway (at Cat Lai intersection) and NH1A through Thu Thiem tunnel–Ben Chuong Road–Ham Tu–An Lac. This is an important road for HCMC and its neighboring areas and is being constructed with a JICA loan. The NH1A-Ben Chuong section is already open and the remaining section includes Thu Thiem tunnel which is expected to be completed by the first half of 2011.

On the other hand, the Tan Tao-Cho Dem road is now under construction. It will connect Ring Road No. 2 and the HCMC-Trung Luong Expressway. When the East-West Highway is opened, traffic volume is expected to increase at the NH1A interchange.

To address the increasing traffic demand at the NH1A interchange and Binh Thuan intersection, there is a plan to extend the East-West Highway up to Tan Tao-Cho Dem road. This section is referred to as the "western missing link," which is expected to further extend up to Ring Road 3, thereby linking HCMC to Vietnam's western and southwestern provinces.

Figure 8.1.1 Location of Western Missing Link of the East-West Highway



Source: VITRANSS 2 Study Team

2) Scope of the FS Review

VITRANSS 2 reviewed the TEDI feasibility study to confirm the necessity of the western missing link and evaluate the appropriateness and accuracy of various important components such as the following:

(a) **Technical Design:** The review of the technical design covered natural conditions including soft soil measurement, road alignment and bridge structure based on applied road design standard, as well as types and connectivity of interchanges/intersections and other road facilities. Highway design standards, such as on road alignment, interchanges, and bridges/structures, applied to the East–West Highway was adopted. The VITRANSS 2 Study Team therefore considered the Western Missing Link as an extension of the East-West Highway.

(b) **Traffic Forecast:** Based on the traffic study done in VITRANSS 2, traffic demand was forecast for the western missing link. The traffic forecast review was done using the future road network around HCMC. Basically, traffic demand forecast includes traffic volume for each direction at the NH1A interchange, which is the starting point, and at Tan Kien interchange, which is the ending point, based on updated VITRANSS 2 data.

(c) **Cost Estimates:** Total construction cost is composed of the quantities of each item and costs of each material and machine/labor. The Study Team checked the scope of the western missing link project; and based on design engineering, materials quantity, and unit prices, the cost estimates were checked.

(d) **Economic Analysis:** Based on the updated traffic forecast and construction cost mentioned above. the Study Team reviewed the project's economic effectiveness and feasibility.

(e) **Environmental Impact:** In December 2009, TEDI submitted an environmental impact assessment (EIA) report to My Thuan PMU. The VITRANSS 2 Study Team reviewed this report especially the impact of land acquisition.

3) Documents Received and Reviewed

The following documents of feasibility study have been submitted to Study Team.

(a) **Project Title:** Construction of Connecting Road from East-West Highway to Ho Chi Minh City–Trung Luong Expressway

(b) **Implementation Agency:** My Thuan Project Management Unit (PMU My Thuan)

(c) **Consultant:** Transport Engineering Design Incorporated (TEDI)

Table 8.1.1 Received Documents

Document		Vietnamese	English
Volume 1	Project Interpretation	○	○
Volume 2	Basic Design	○	○
Volume 3	Profile of Hydrologic and Draining Calculation	○	○
Volume 4	Interpretation of Soft Soil Treatment	○	○
Volume 5	Total Investment	-	-
Volume 6.1	Appendix of Legal Document	○	-
Volume 6.2	Appendix of Structure Calculating Tables	○	-
	EIA Report	-	○

Souse: VITRANSS 2 Study Team

8.2 Traffic Demand Forecast

1) TEDI Forecast

(1) Methodology

The methodology to forecast demand which TEDI adopted for the feasibility study can be summarized as follows:

(i) Based on to the HOUTRANS (JICA, 2004), the conventional four-step model was used. This comprises trip generation/attraction, trip distribution, modal split, and traffic assignment using JICA STRADA. The methodology was basically an update of the HOUTRANS models. However, the values of model parameters are not shown in the report; and

(ii) Traffic surveys such as traffic count and roadside OD interview were not conducted. This implies the possibility of insufficient calibration of the models.

(2) Results

The traffic forecast for the western missing link of the East-West Highway is shown in Table 8.2.1.

Table 8.2.1 Traffic Volume Forecast for the Western Missing Link

Year	Traffic Volume (000PCUs/day)
2015	18,349
2020	22,370
2025	24,789
2030	27,204
2035	29,274

Source: Calculated by VITRANSS2 Study Team based on TEDI report.

2) VITRANSS 2 Forecast

(1) Methodology

The VITRANSS 2 Study Team updated the demand forecast for the western missing link of the East-West Highway Its outline can be summarized as follows:

(i) As the basis of the review, interprovincial traffic demand was taken from VITRANSS 2 OD (origin-destination) matrices. VITRANSS2's 2008 data was estimated using the results of the traffic count survey conducted at provincial boundaries;

(ii) For intraprovincial traffic which may form part of the highway traffic demand and was excluded from VITRANSS 2 interprovincial OD, trip generation/attraction and distribution models were developed and applied to Ho Chi Minh City. The socio-economic framework is consistent with VITRANSS 2's original models;

(iii) The above two OD tables were combined by vehicle type. This procedure was iterated for the years 2020 and 2030; and,

(iv) The "base network" was formed in consideration of ongoing and committed road projects and government plans. Traffic was then assigned to this network under "with" and "without" western missing link project scenarios.

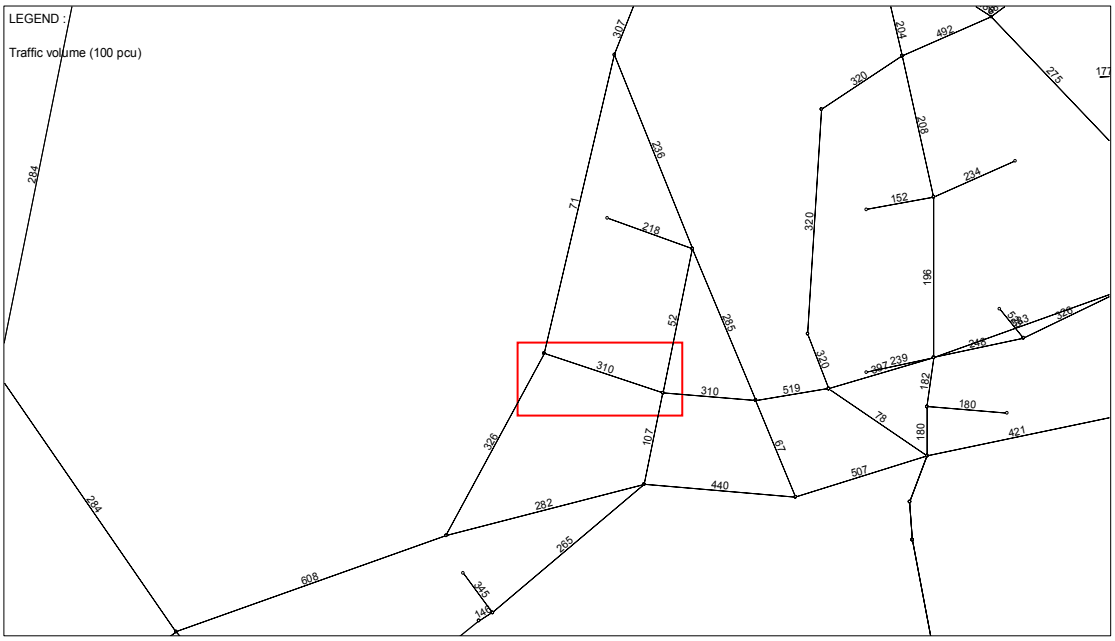
(2) Results

The traffic volume forecast for the western missing link is 31 and 49 thousand PCUs/day for 2020 and 2030, respectively, as shown in figures 8.2.1 and 8.2.2. This is substantially larger than TEDI's forecast by 38% and 80% for 2020 and 2030, respectively. Although further investigation may be needed, TEDI's forecast could well be underestimated.

Figures 8.2.1 and 8.2.2 illustrate the forecast on directional traffic flows on the eastern and western intersections at both ends of the missing link for 2020 and 2030

Figure 8.2.1 Traffic Volume Forecast around the Western Missing Link, 2020

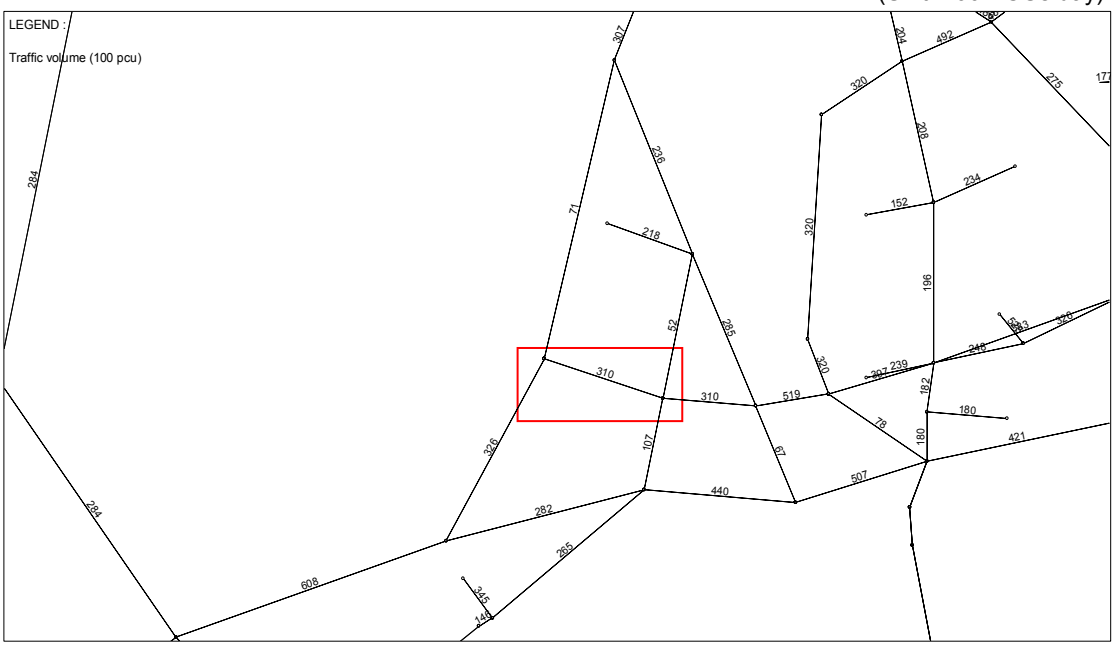
(Unit: 100 PCUs/day)



Source: VITRANSS 2 Study Team

Figure 8.2.2 Traffic Volume Forecast around the Western Missing Link, 2030

(Unit: 100 PCUs/day)



Source: VITRANSS 2 Study Team

8.3 Natural Condition Surveys

The FS report done by TEDI merely provided an outline of the following surveys of the natural conditions prevailing in the project area, without details of the conducted survey and investigations.

8.4 Engineering Work

1) Highway Design

The same regulations and standards/criteria applied to the East-west Highway were used. The design speed of the main carriageway is 60km/h and 40 km/h for frontage road according with TCXDVN 104:2007.

2) Interchange/Intersection Design

Two interchanges were proposed: one to connect with NH1A and another with Tan Tao–Cho Dem road (at Tan Kiem).

The NH1A interchange is the starting point of the western missing link and connects it to the East-West Highway. Land acquisition and a connecting ramp between the East–West Highway and NH1A were completed on the East–West Highway project. However, a connecting ramp between the western missing link and NH1A is not completed yet, and the construction of two loop ramps should be included in East-West Highway project.

The Tan Kiem interchange is the ending point of the western missing link and connects it to the Tan Tao–Cho Dem Road. Phase 1 of Tan Tao–Cho Dem Road is scheduled to be completed in February 2010. Phase 2 is to expand the width and includes the frontage road. The feasibility study proposed an interchange in Phase 1. Traffic from/to the east on Tan Tao interchange will use three lanes, two of which will be for traffic from the east-side. On the basic design drawing, the Phase 1 and final phase plans for the interchange differ. In the detailed design stage, the configuration of the interchange should be clarified including cost.

3) Design of Road Links

In the project section, four (4) local roads are linked to the western missing link (see Table 8.4.1).

Table 8.4.1 Existing Roads Crossing the Western Missing Link

Name of Road	Station	Category of Road	Expansion Plan (m)
Khuant Van Buc	km0+513.60	Local road	Expand width to 20
Cay Bang	Km0+714.09	Inter village road	Expand width to 20
Rach Cai Trung	Km1+310.26	Inter village road	Expand width to 20
Nguyen Cuu Phu	Km1+946.35	Inter city road	Expand width to 40

Source: F/S report by TEDI/PMU My Thuan

Of these roads, Khuat Van Buc, Cay Bang, and Rach Cai Trung will be accessed from the highway through at-grade intersections. Although traffic flow on the main road will increase, access from/to the southern and northern sides will be blocked off by the western missing link, which means the surrounding areas will be split. Some alternative measures should be considered to avoid such occurrence.

4) Bridge Design

The bridge design was reviewed using the following documents: main design report, structure calculation appendix, and drawings.

While the FS report does not provide a comparison of nor a justification for the bridge structures selected for three sites, the VITRANSS 2 Study Team deemed the length of

Hung Nhon Bridge as sufficient, that of Cai Trung as possible to be shortened, while that of Tan Kien Interchange Bridge as requiring verification because the shape of the interchange between the initial stage and the final stage differs.

5) Other Structural Designs

The main design report and drawings on the drainage system were made available to the VITRANSS 2 Study Team. Drawings of the box-retaining wall and miscellaneous documents were also reviewed.

6) Utilities Relocation Plan

The relocation of utilities is mainly necessary at the crossing points with local roads, and the process is not serious. However, public utility culverts are planned to accommodate power and street light lines, as well as communication cables. Also, instead of wood piles, concrete or steel piles should be applied to the foundation of the vertical and horizontal tunnels. Moreover, the size of manholes and the location of cable pipes should be reconsidered.

7) Design of Electrical Facilities

The layout of street lights should be rearranged to consider the landscape and their effectiveness. Also, light posts should be placed outside of the loop ramps to secure unobstructed sight distance.

8) ITS Design

Intelligent transport systems are not described in the feasibility study of the western missing link. For the East-West Highway, an electric toll collection (ETC) system is planned at the Thu Thiem tunnel. This project road is not an expressway in accordance with TCXDVN 104:2007; the main road will be designed as an urban road with a design speed of 60 km/h.

The VITRANSS 2 Study Team understands that particular ITS technologies will not be used on urban roads; however, appropriate traffic signs and signals should be installed, the designs of which are included in the feasibility study.

9) Construction Plan

The overall construction schedule is estimated at 30 months. However, the first 18 months will be spent only on soft-ground treatment. The VITRANSS 2 Study Team thinks that if construction simultaneously occurs from the two ends of the route, the construction schedule can be shortened.

8.5 Environmental Considerations

1) EIA Status in Vietnam

In December 2009, the draft EIA report for the Western Missing Link Project was submitted to VITRANSS 2 Study Team for its review. At that time, it was not yet submitted to the Department of Natural Resources and Environment in HCMC (DONRE–HCMC). The results of the EIA review are described below.

The Draft EIA report is made by adequate manner in accordance with Vietnamese laws and regulations on EIA. The Project implementing body is able to finalize the Report.

2) Rewriting of EIA

The F/S report on the Project was submitted to VITRANSS 2 Study Team from the viewpoints of traffic demand forecast and transport engineering. From the results of theses reviews, the forecasted traffic volume and the design of the Project are modified. The main points of design modification are as follows:

(i) Setting two phases such as Phase 1: 4 lanes, and Phase 2: 8lanes

(ii) Design modification of the route in western part

3) Laws and Regulations

In accordance with Vietnamese regulation, the necessity of the establishment of EIA is as follows:

(a) **Case A: New Project with no EIA Report:** It is compulsory to make an EIA report which must be approved by DONRE-HCMC before the project is implemented.

(b) **Case B: Project with Approved EIA Report:** If the project has not been implemented within two years after the EIA was approved, it is necessary to update the EIA report and revisit the baseline environment.

(c) **Case C: Project with Approved EIA Report but Revised Design:** It is necessary to send an explanatory document to DONRE-HCMC to get their advice on applying for an environmental permit. If the design was substantially changed, the EIA report must be revised as well.

The western missing link is a Case A project, so it is necessary to make an EIA report in accordance with Vietnamese Laws/ Regulations and to submit it to DONRE-HCMC.

4) JICA's Environmental Guideline

In March 2004, JICA issued environmental and social guidelines (http://www.jica.go.jp/english/publications/jbic_archive/environmental_guidelines/pdf/guide.pdf).

JICA implements cooperation activities in accordance with these guidelines, and JICA encourages recipient governments by conducting cooperation activities to implement appropriate measures in view of environmental and social considerations. At the same time, JICA supports the examination of its guidelines. If the Vietnamese government wishes to obtain Japanese assistance to implement the western missing link project, it has to follow these guidelines.

5) Comments to the Existing Draft EIA Report

(1) Submission and Approval of EIA Report

It is necessary to submit the final EIA report to DONRE–HCMC, and to get their approval.

(2) Explanation of the Illustrative List of Sensitive Areas

Areas in and around the project area sensitive to development or use and designated by national or related local government units as critical areas, such as below, should be clearly shown. The expected environmental impacts from the project, necessary countermeasures, and a monitoring plan should also be discussed.

(i) Wetlands;
(ii) Areas for indigenous peoples;
(iii) Cultural heritage sites;
(iv) Areas for consideration as national parks or protected areas; and,
(v) Other areas deemed requiring careful consideration.

(3) Detailed Explanation of Natural and Social Environment

The following sensitive natural and social environment should also be illustrated.

(i) Primary forests or natural forests in tropical areas
(ii) Habitats with important ecological value, such as wetlands and tidal flats
(iii) Habitats of rare species requiring protection under domestic legislation, international treaties
(iv) Areas in danger of large-scale salt accumulation or soil erosion
(v) Areas with unique archeological, historical or cultural value
(vi) Areas inhabited by ethnic minorities, indigenous peoples or nomadic peoples with traditional ways of life and other areas with special social value

(4) Preparation of the Resettlement Action Plan (RAP)

One of the most significant impacts caused by the implementation of the project is resettlement. A proper implementation of compensation for affected people will minimize such impact. Toward this end, the VITRANSS 2 Study Team reviewed the draft Resettlement Action Plan (RAP) submitted by My Thuan PMU by end January, 2010, The Team believes the legal and policy framework for land acquisition and resettlement for the draft RAP report is well prepared and that it took into account all RAP regulations, as well as implementation and monitoring requirements, in Vietnam into account and those necessary to obtain Japanese assistance. It will be enough to obtain a certification from relevant authorities. However, since the VITRANSS 2 Study Team modified the project's traffic demand forecast and transport design, some RAP items related to design should also be revised.

(5) Discussion of Alternatives

JICA guidelines require a discussion of alternatives; therefore, the Vietnamese government should compare three or four alternatives relating to route and design. A justification for the selected alternative for the project should also be done.

(6) Conduct of Public Consultation on the Modified Project Design

The VITRANSS 2 Study Team modified the project in terms of traffic volume forecast and transport design. With the modifications, meetings with related stakeholders, such as administrative bodies, local residents, NGOs, etc., should be held, and the results of meetings should be reported in the final EIA.

(7) Detailed Explanation of Air Pollution Forecast and Countermeasures

In the existing draft EIA report, air pollution is forecast following Vietnamese standards but it includes some uncertain factors. The following should therefore be shown in accordance with JICA guidelines:

(i) Applied forecast formula;
(ii) Applied forecast conditions;
(iii) Forecast for the project area and its vicinity;
(iv) Forecast values in sensitive points, such as residents nearest to the project boundary, as well as schools, hospitals, places of worship, public facilities, and cultural heritage sites in the project area;
(v) Detailed countermeasures for areas that do not meet environmental standards and the cost of such countermeasures; and,
(vi) List and layout of monitoring stations during construction and operating stages

(8) Detailed Explanation of Noise/ Vibration Forecast and Countermeasures

The followings should be illustrated in accordance with JICA guidelines.

(i) Forecasts for the project area and its vicinity;
(ii) Forecast values and distance from project boundary at sensitive points, such as residents nearest to the project boundary, as well as schools, hospitals, religious facilities, public facilities, and cultural heritage sites in the project area;
(iii) Detailed countermeasures for areas that do not meet environmental standards and cost of such countermeasures; and,
(iv) List and layout of monitoring stations during construction and operating stages

(9) Additional of the Environmental Items for Forecast

Since the global warming issue was not discussed in the existing EIA, the revised EIA should tackle it.

(10) Implementation of Additional Investigations on Existing Natural Conditions

The existing EIA described the results of investigations on the existing natural conditions, such as air quality, noise/ vibration, and soil, in the rainy season only and excludes the investigation on flora and fauna biodiversity. Therefore, the following investigation should be implemented:

(i) Air quality, noise/ vibration, and soil condition in the dry season, and
(ii) Flora and fauna in both rainy and dry seasons

(11) Planning of the Detailed Construction Plan and Environmental Management Plan (EMP)

The significant impacts to be expected from project implementation are resettlement, air pollution, and noise/ vibration, which can be resolved by the implementation of a proper environmental management plan (EMP). The following should therefore be explained in the construction plan:

(i) Kinds and number of (total, at peak day/ hour) construction materials and vehicles;

(ii) Entry route to the site by construction vehicles;

(iii) Location and entry route to borrow pits, quarry sites, and disposal areas, if any;

(iv) Existing and future capacity of the public final disposal area, if used;

(v) Location of temporary road and stockyards for construction materials; and,

(vi) Location of, number of laborers in, and ways to dispose of wastewater/ solid waste generated from labor quarters

8.6 Operation and Maintenance Plan

The operation and maintenance (O&M) plan is not described in the feasibility design. This project road is the western extension of the East-West Highway to Tan Tao–Cho Dem road. However, the implementation agency is different from that of the East–West Highway which is the HCMC PMU, while for the western missing link, it is the My Thuan PMU.

After the completion of both roads, the O&M of both roads should be integrated under one agency. This should be discussed together by both PMUs.

8.7 Cost Estimates

The project cost is summarized in the main report and is shown in the table below. The cost was calculated using an exchange rate of VND18,500=USD1. Compared with the unit costs used in the Master Plan for this project, the unit costs used in the FS were higher, resulting in higher construction costs. Probably, the construction costs estimated in the FS report can be reduced. Regarding construction cost by phase, the shares are almost the same as those estimated in the Master Plan for this project, i.e., ____% for Phase 1 and ___% for Phase 2. However, in the FS, the share of Phase 1 construction cost to the total construction cost is lower than that of Phase 2.

Table 8.7.1 Summary of Project Cost for Recommended Alternative

Items	Phase 1	Phase 2	Total
Total	53,281,212	58,555,984	111,837,196
Construction Cost	33,171,738	45,498,045	78,669,783
Management and Consulting	3,317,174	4,549,804	7,866,978
Land Acquisition	9,050,585	0	9,050,585
Contingency	7,741,715	8,508,134	16,249,849
Ratio by Construction Cost	42%	58%	

Source: F/S report by TEDI/PMU My Thuan

8.8 Utility Relocation Plan

Since the alignment of the western missing link will traverse mainly paddy fields and ponds, and intersected by local roads, the relocation of utilities is not serious. Therefore, there are no descriptions about the relocation plan. However, culverts for public utilities were planned to accommodate electric and streetlight lines as well as communication cables. And, these will be constructed in the final stage. Meanwhile, there is no mention of the alignment crossing public utilities in the initial stage.

8.9 Electrical Facility Design

The details on the light poles that are 25 m in height are unclear; such height seems too high. There is no calculation to justify the requirement for such height. The plan seems to be to install the light poles on the median but it is unclear on how many lamps each pole will have.

The drawings provided in the layout plan should show the types of lighting fixtures. The intervals for the light poles are planned at 30–40 m, as indicated in the main report, while it is at 35 m intervals in the drawings. The layout should be rearranged to consider the landscape and effectiveness, especially at the intersection of Nguyen Cuu Phu Road and Cai Trung Bridge. The light poles are planned to be inside of the loop ramps at the Tan Kien interchange. To secure clear sight distance, these light poles should be placed outside of the loop ramps. In Drawing No. DLDT-CT-TR-040, the light poles at the loop ramp are missing.

8.10 Construction Plan

The possibility of organizing two construction groups each working on each end of the route to speed up construction should be studied. However, in the construction plan of the main report, one construction group was planned to work from one end.

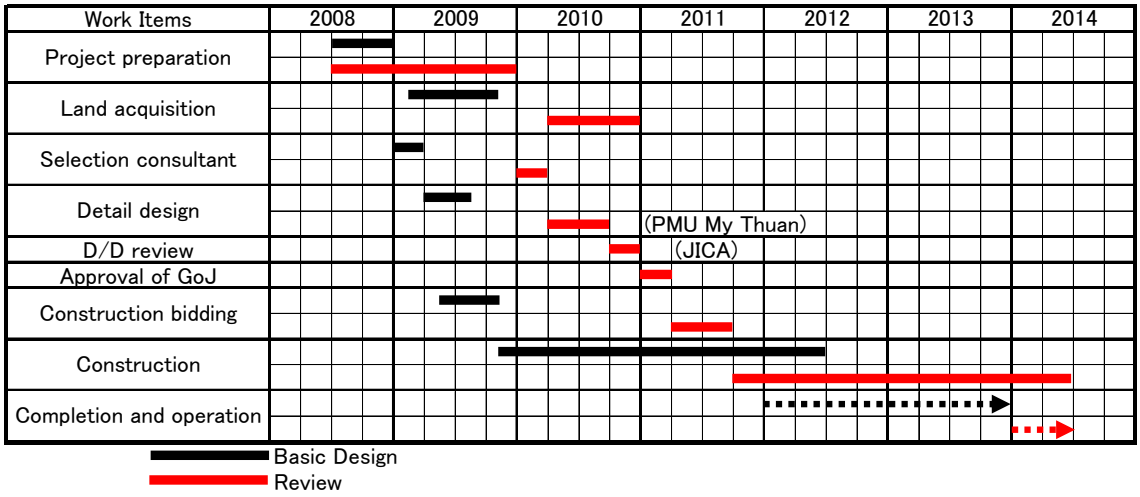
The construction period for the initial stage is estimated at 30 months. The soft-ground treatment is estimated at 18 months at the least. Other works start after 18 months. The time span for treating the soft ground is unclear. If 18 months is required, other soft-ground treatment should be considered. And, the bridge construction should start earlier. If so, the construction schedule can be shortened.

8.11 Implementation Plan

With the basic design, the implementation program is proposed, as shown in Figure 8.11.1 (black line), to be completed by the middle of 2012. However, the original schedule is already delayed because project preparation did not finish by end-2009.

If the project budget will be loaned from JICA, JICA can usually support a SAPROF (Special Assistance for Project Formation) after JICA's fact-finding mission makes a decision on a project's viability. Detailed design and construction can start after the SAPROF results are approved. However, this procedure will take a long of time. Alternatively, the Vietnamese government can carry out a detailed design using its own budget and getting local consultants, while JICA can support by providing the detailed design review. This procedure will take a shorter time.

Figure 8.11.1 Implementation Plan



Source: VITRANSS 2 Study Team

8.12 Economic Analysis

The methodology adopted by TEDI in carrying out the economic analysis of the project can be summarized as follows:

(i) Economic cost was assumed at 85% of the financial cost;

(ii) Economic benefit was taken from savings in vehicle operating cost (VOC) and passenger/goods time cost, as well as the reduction in traffic accidents. Except for VOC saving, however, no detail is shown in the report; and,

(iii) The methodology appears to be generally sound except for the lack of details as mentioned above.

(iv) The study calculated the project's EIRR at 12.3% (benefit–cost ratio at 1.02).

8.13 Conclusion and Recommendations

1) Conclusion

Based on the review of available documents, it can be concluded that the quality of the FS report for the western missing link which was prepared in 2009 is high.

The East–West Highway connects the Eastern Hanoi Expressway (Cat Lai intersection) to NH1A in the west, which is one of the important trunk roads in the east–west direction in the HCMC metropolitan area. However, since the highway ends on NH1A in the west, most of the traffic uses NH1A. When the traffic moving southwest is diverted to the HCMC–Trung Luong Expressway via NH1A, the traffic volume on NH1A will increase dramatically. If the western missing link is connected to the Tan Tao–Cho Dem road, the traffic volume on NH1A will significantly decrease. It can be concluded that the western missing link will be quite effective and is even recommended to extend farther up to Ring Road No.3. The implementing agency and the consultant should carry out the detailed design based on the review to facilitate appropriate implementation of the project.

2) Recommendations

The recommendations of the VITRANSS 2 Study Team are as follows:

(a) **NH1 Interchange:** The construction of the East-West Highway was completed including a clover-type interchange connecting the highway and NH1A. However, the connection between the western missing link and NH1A by a loop lump was not considered in the feasibility study. In detailed design stage, this loop lump connection must be taken into consideration.

(b) **Tan Tao–Cho Dem Interchange:** Phase 1 of the interchange was designed in the feasibility study. Based on the updated traffic volume forecast for the western missing link and the Tan Tao-Cho Dem road, Phase 2 of this interchange must be prepared.

(c) **Project Scale:** Two alternatives were proposed in the feasibility study. The VITRANSS 2 Study Team recommends the alternative with six (3+3) lanes of main road and four (2+2) lanes of frontage road (similar to the East-West Highway).

(d) **Smooth Implementation:** The Tan Tao-Cho Dem road is scheduled to be opened in early 2010. Hence, road works for the western missing link must start soon. It is further recommended to:

  (i) Move to the detailed design stage using the current ADB technical assistance loan to accelerate the implementation of the design phase;

  (ii) Use JICA/ODA loan for the construction of the project for faster procurement and construction and,

  (iii) Pay more attention to land acquisition to prevent unnecessary delays.

(e) **Items to be Included in Detailed Design:** The following items should be included in the scope of the detailed design:

  (i) Study selected interchange for the Tan Tao–Cho Dem road based on the updated traffic demand forecast;

  (ii) Update the project cost using the latest market prices and include the cost of utilities relocation, electrical facilities, foundation improvement, and O&M

  (iii) Update the overall implementation plan for faster construction

9 REVIEW OF THE FEASIBILITY STUDIES ON THE EASTERN MISSING LINK OF THE EAST-WEST HIGHWAY

9.1 Introduction

1) Background

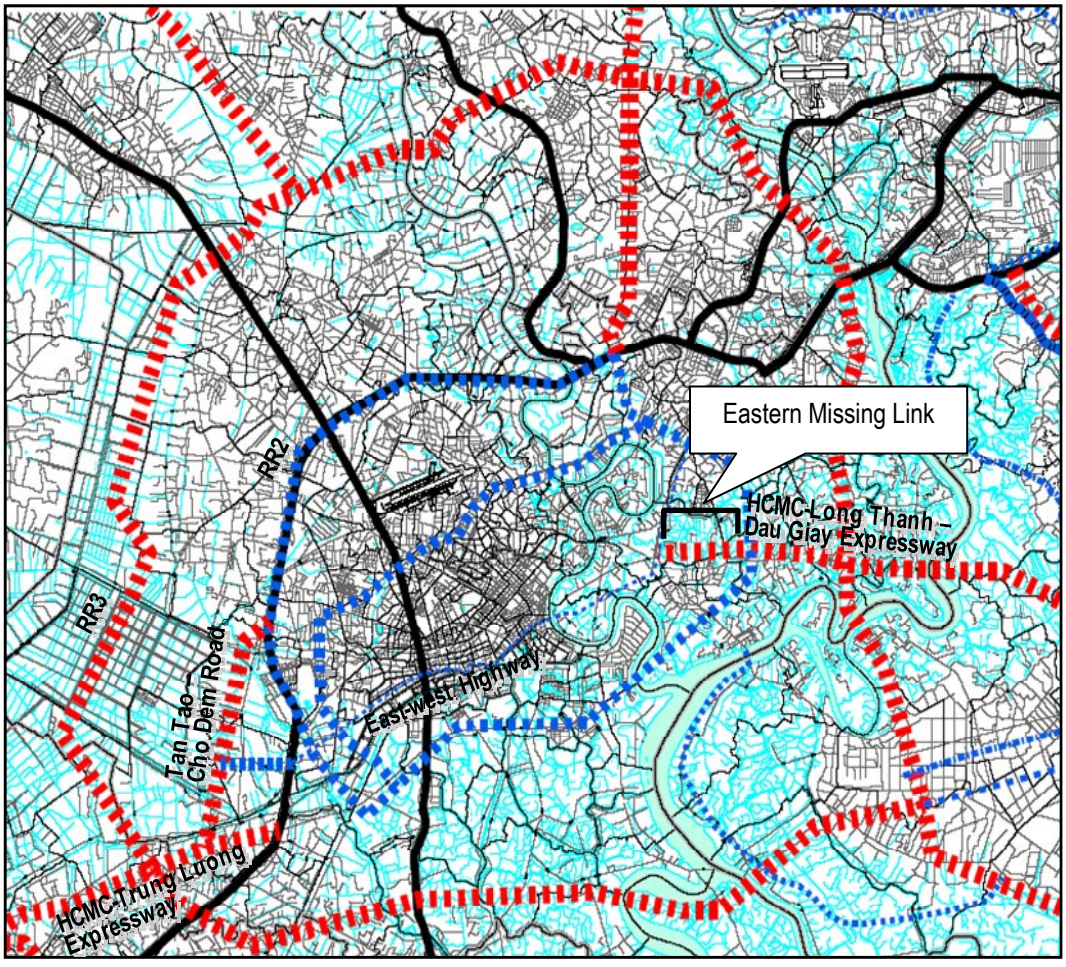
It was agreed, between MOT and JICA, that the JICA Study Team (the Study Team) carry out review of the existing feasibility study of the following projects in order to move them forward smoothly:

Section from the intersection of NH1A and East-West Highway to Tan Tao–Cho Dem road (approx. 3 km), which is labeled the western missing link; and.

Section between Km0+000–Km4+000, from An Phu intersection to Ring Road No. 2RR2 interchange on the Ho Chi Minh–Long Thanh–Dau Giay Expressway (the HLDE), which is identified as the eastern missing link.

While the preceding chapter explains the results of the review on the feasibility study on the western missing link, this chapter reports on the results for the eastern missing link.

Figure 9.1.1 Location of Eastern Missing Link of the East-West Highway



Source: VITRANSS 2 Study Team

2) Scope of the FS Review

The items reviewed by the VITRANSS 2 Study Team based on the documents received from the Vietnam Expressway Corporation (VEC) are listed in Table 9.1.1.

Table 9.1.1 Components of the FS Report Subjected to Review

No.	Study Item	Check	FS 2009	FS 2007
01	Legal Basis	Yes	List provided by TEDI South	Yes
02	Traffic Demand Forecast	Yes	No	Yes
03	Natural Condition Survey	Yes	Partially Yes	Yes
04	Expressway Designs	Yes	Only Drawings	Yes
05	Interchanges/Intersections Designs	Yes	Only Drawings	Yes
06	Linking Roads Designs	Yes	Only Drawings	Yes
07	Bridges Designs	Yes	Only Drawings	Yes
08	Pavement Design	Yes	Only Drawings	Yes
09	Drainage Design	Yes	Only Drawings	Yes
10	Soft-ground Treatment	Yes	Only Drawings	Yes
11	Other Structural Designs	Yes	Only Drawings	Yes
12	Traffic Safety Facilities	Yes	Only Drawings	Yes
13	Utilities Relocation Planning	Yes	Only Drawings	Yes
14	Electrical Facilities Designs	Yes	Only Drawings	Yes
15	ITS Facilities Designs	Yes	No	Yes
16	Construction Planning	Yes	No	Yes
17	Environmental Considerations	Yes	EIA Report No RAP Report	EIA Report
18	Operation and maintenance (O&M) Planning	Yes	No	Yes
19	Drawings	Yes	Yes	No
20	Quantities Take-off	No	No	No
21	Cost estimate	Yes	Yes	Yes
22	Implementation Program	Yes	No	Yes
23	Economic and Financial Analysis	Yes	No	Yes

Source: VITRANSS 2 Study Team

3) Documents Received and Reviewed

The latest FS report was prepared by TEDI South and submitted to DOT-HCMC in May 2009 (see Table 9.1.2 for the composition of the 2009 FS report). However, there were no design reports prepared in 2009. Instead, the 2007 FS report was used for the review, among other documents provided to the Team in January 2010.

Table 9.1.2 Documents Received and Reviewed by the VITRANSS 2 Study Team

Volume	Part	Section	Report Title	Received
1	---		Geological Investigation Report	Yes (Vietnamese)
2	---		Topographic Survey Report	Yes (Vietnamese)
3	---		Hydrological Investigation Report	No
4	1		General Report	---
		1.1	Commentary	No
		1.2	Appendices	---
			(1) Letters	Yes
			(2) Total Investment Cost	Yes (Vietnamese)
	2		Basic Design Report	
		1	Commentary	No
		2	Drawings	
			2.1 An Phu Interchange	Yes (English)
			2.2 Alignment, Drainage	Yes (English)
			2.3 Bridges	Yes (English)

Source: VITRANSS 2 Study Team

9.2 Summary Results of the Review

1) Original Scope of Works

As shown in the Tables 9.2.1, the VITRANSS 2 Study Team received some parts of the 2009 FS report and the design report of the 2007 FS.

In summary, the 2007 FS report is generally acceptable; however, several items should be updated in the detailed design stage.

Table 9.2.1 Summary Results of the FS Review

No.	Study Item	Evaluation	Required Update
00	General		
00-1	Design Report	2009 Report is Not Available 2007 Report is Acceptable	Update the design report from FR 2007.
00-2	Document Style		Refer to Decision 48-2008-QD-TTg.
00-3	Design Standards	Not Acceptable	Update the design standards and relevant regulations.
01	Legal Basis	Generally acceptable	Include Decision 48-2008-QD-TTg for "General Guidance on Preparation of Feasibility Study Reports for Project Using Official Development Assistance Capital of the Group of Five Banks"
02	Traffic Demand Forecast	Not Acceptable	Update the traffic demand including directional traffic volume for interchange design.
03	Natural Condition Survey		
03-1	Topographic Survey	Generally acceptable	Conduct detailed survey with updated layout of An Phu IC.
03-2	(Additional topographic survey)		Conduct topographic survey of potential relocation area of Lien Tinh Lo 25 is needed.
03-3	Geological Survey		Conduct detailed survey with updated layout of An Phu IC.
04	Expressway Designs		
04-1	Typical Cross Section	Not Acceptable	Typical cross sections of the stage construction should be considered and be clearly explained.
04-2	Horizontal Alignment	Not Acceptable	Clarify connection method to RR2 Interchange.
04-3	Vertical Alignment	Not Acceptable	Vertical curve too small. Increase radius of vertical cure to direable level.
05	Interchanges/Intersections Designs		
05-1	An Phu Interchange	Not Acceptable	Select type of An Phu Interchange in accordance with updated traffic demand forecast
05-2	Do Xuan Hop Intersection	Not Acceptable	Update to meet the stage construction plan
05-3	Ring Road 2 Interchange	Need Clarification	Connection with Ring Road 2 is not clear.
06	Linking Roads Designs		
06-1	Lien Tinh Lo 25	Not Acceptable	Relocate intersection of Lien Tinh Lo 25.
07	Bridges Designs		
07-1	Stage Construction	Not Acceptable	Study the stage construction of bridge.
07-2	Depth of Pile Foundation	Acceptable	Length of pile foundation should be updated.
08	Pavement Design		
08-1	Design Traffic Volume	Not Acceptable	Indicate design traffic volume.
08-2	Pavement Design	Not Acceptable	Update pavement design in accordance with updated design traffic volume.
09	Drainage Design		
09-1	Catchment Area	Not Acceptable	Indicate hydrological design areas.
09-2	Hydraulic calculation	Not Acceptable	Indicate hydraulic calculation of each drainage facility.
10	Soft-ground Treatment		
10-1	Selection of Countermeasure	Generally Acceptable	Update with comparison study including vaccume

No.	Study Item	Evaluation	Required Update
			consolidation method.
11	Other Structural Designs	No SA/PA, O&M Building located.	Not Applicable
12	Traffic Safety Facilities		
12-1	Throughway	Acceptable	
12-2	Connection Road	Not Acceptable	Include traffic safety facilities for intersection/interchanges.
13	Utilities Relocation Planning	Not Acceptable	Include the outline of existing utilities and their relocation plan.
14	Electrical Facilities Designs	Not Acceptable	Include the outline of existing electrical utilities and their relocation plan.
15	ITS Facilities Designs	Not Acceptable	Include the ITES facilities planning and design.
16	Construction Planning	Not Acceptable	Stage construction should be considered and be clearly explained.
17	Environmental Considerations		
17-1	Natural Environment	Generally Acceptable	Update with 1) Revised layout of An Phu Interchange, 2) Relocation of intersection of Lien Tinh Lo 25, with reference to JICA Guideline
17-2	Social Environment	Not Acceptable	Prepare RAP report
18	Operation and maintenance (O&M) Planning	Not Acceptable	Operation of KM0-4 should be further discussed among the stakeholder.
19	Drawings		
19-1	Volume Arrangement	Not Acceptable	All drawings should be in one volume.
19-2	Project Location Map	Not Acceptable	Include Project Location Map
20	Quantities Take-off	Not Acceptable	Prepare Quantity Calculation Report with updated design
21	Cost estimate	Not Acceptable	Prepare Quantity Calculation Report with updated design
22	Implementation Program	Not Acceptable	Update the implementation program in consultation with VEC taking into account of practical schedule.
23	Economic and Financial Analysis	Not Acceptable	Update with the updated cost and implementation program

Source: VITRANSS 2 Study Team

2) Additional Scope of Works

The original scope of the review was the section between An Phu intersection (Km0+000) up to the border of ongoing construction works (Km4+000). The eastern missing link was assumed to connect to the present design at the embankment section at Km4+000.

However, during discussions with the VEC, it was requested that the section up to Ring Road 2 Interchange be included in the review, and the VITRANSS 2 Study Team agreed to it.

9.3 Traffic Demand Forecast

1) TEDI South Forecast

(1) Methodology

The methodology to forecast traffic demand which TEDI South adopted for the feasibility study can be summarized as follows:

Traffic volume on road was forecasted by the following formulae:

$$Y_t = Y_0 (1 + \alpha\varepsilon)^t$$

where:

Y_t : traffic volume for year t.

Y_0 : observed traffic volume of the first year.

α: GDP growth rate.

ε: elasticity factor against GDP growth rate.

t : time (years)

For both national and regional economic growth, low, medium and high assumptions were considered in the light of MPI strategy and development targets of SFEZ (Southern Focal Economic Zone). Then, using the elasticity of traffic demand against GDP growth rates obtained from past statistics, traffic growth rates were estimated separately for cargo and passenger traffic.

Before applying the formulae above, present traffic volume and its OD were analyzed based on the traffic count and OD interview survey conducted in 2005 at 5 stations along NH1. The future conversion rate from existing national roads to the expressway was assumed considering the OD patterns by vehicle type.

Although the forecast was conducted carefully and in detail, the possible structural changes in traffic movement due to the construction of the proposed expressways are not systematically reflected in the forecast.

(2) Result

The forecast result for the eastern missing link is shown in Table 9.3.1.

Table 9.3.1 Forecasted Traffic Volume on Eastern Missing Link

Year	Traffic Volume (PCUs/day)
2010	41,241
2015	48,818
2020	73,005
2025	105,629
2030	149,245

Source: FS for HCM-LT-DG Expressway (TEDI South)
Note: Traffic to/from the proposed Long Thanh Airport is not included.

2) VITRANSS 2 Forecast

(1) Methodology

The VITRANSS 2 Study Team updated the demand forecast for the eastern missing link of the East-West Highway. Its outline can be summarized as follows:

As the basis of the study, inter-provincial traffic demand was taken from the VITRANSS 2 and organized into OD matrices. 2008 figures were estimated using the results of the traffic count survey conducted at provincial boundaries;

For intra-provincial traffic which may form part of the highway traffic demand and was excluded from VITRANSS 2 inter-provincial OD, trip generation/attraction and distribution models were developed and applied to Ho Chi Minh CityHCMC. The socio-economic framework is consistent with VITRANSS 2's original models;

The above two OD tables were combined by vehicle type. This procedure was iterated for the years 2020 and 2030; and,

The "base network" was formed in consideration of ongoing and committed road projects and government plans. Traffic was then assigned to the network under three scenarios with different completion years for interchanges including a scenario wherein the project is not implemented (see Table 9.3.2)

Table 9.3.2 Options on Traffic Demand Forecast

Case No.	Time of Opening	
	An Phu IC	RR2 IC
1	2015 - 2020	2015 - 2020
2	2015 - 2020	2020 - 2030
3	2020 - 2030	2015 - 2020

Source: VITRANSS2 Study Team

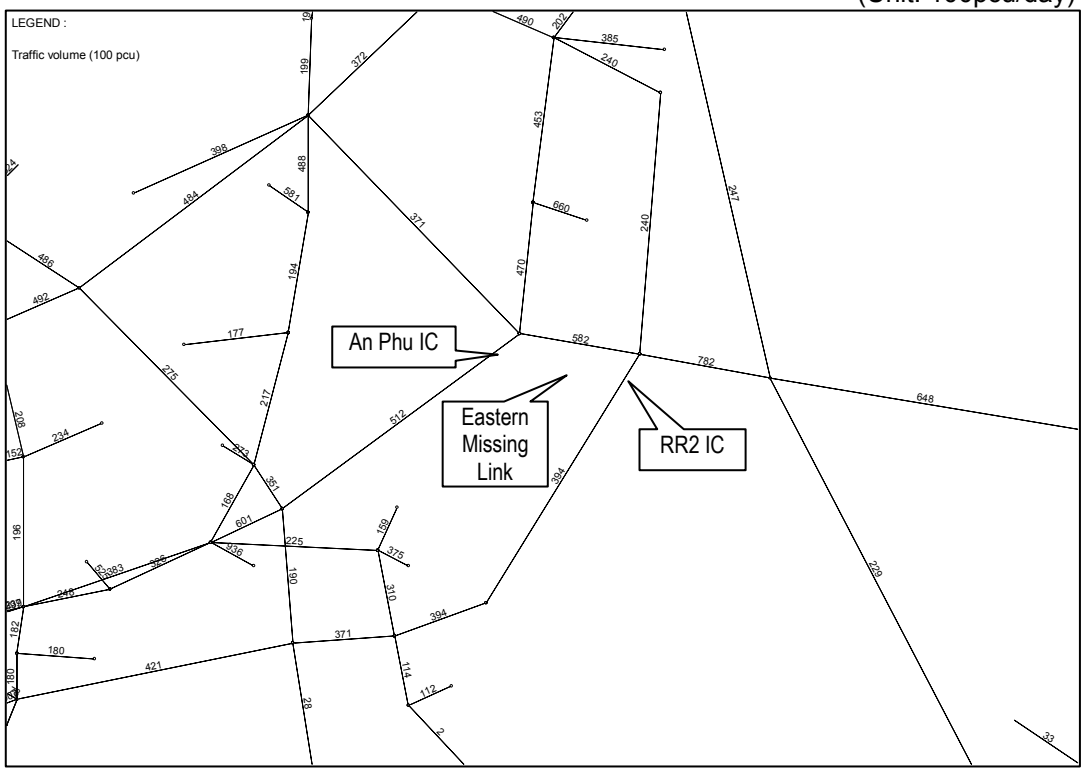
(2) Results

The traffic volume forecast for the eastern missing link by 2020 is 58, 53, and 27 thousand PCUs/day for Case 1, Case 2, and Case 3, respectively, as shown in Figure 9.3.1 to Figure 9.3.3. Obviously, the completion period of An Phu interchange affects the traffic volume on the eastern missing link., Traffic demand by 2030 is estimated to be 81 thousand PCUs/day, as shown in Figure 9.4.4. For Case 1, traffic forecast is substantially smaller than the forecast of TEDI South by 21% and 46% for 2020 and 2030, respectively.

Although further investigation may be needed in the future, the forecast of TEDI South would well be an overestimate.

Figure 9.3.1 Forecasted Traffic Volume around the Eastern Missing Link, Case 1, 2020

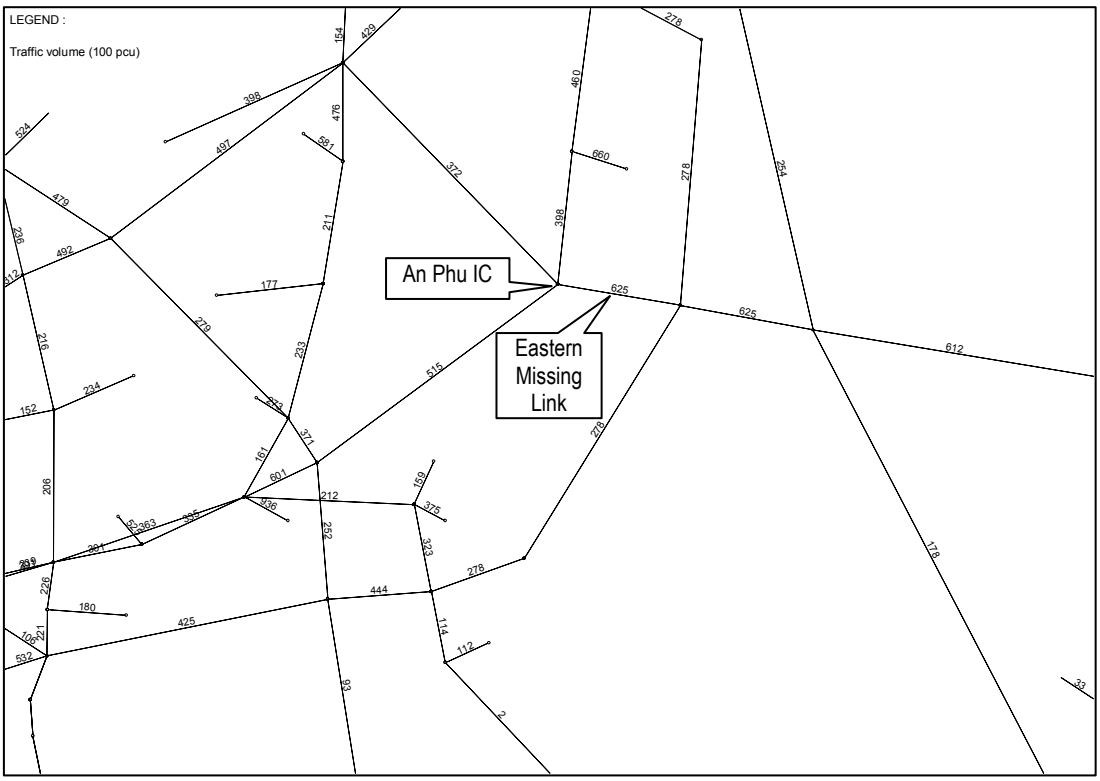
(Unit: 100pcu/day)



Source: VITRANSS 2 Study Team

Figure 9.3.2 Forecasted Traffic Volume around the Eastern Missing Link, Case 2, 2020

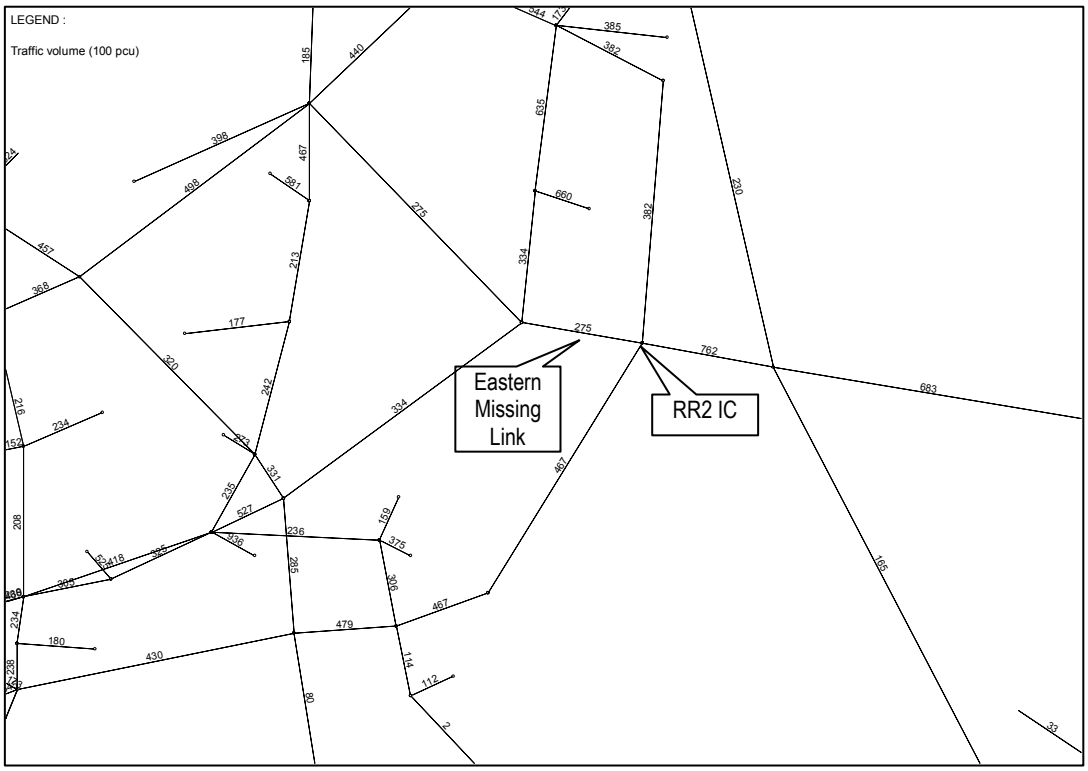
(Unit: 100 pcu/day)



Source: VITRANSS 2 Study Team

Figure 9.3.3 Forecasted Traffic Volume around the Eastern Missing Link, Case 3, 2020

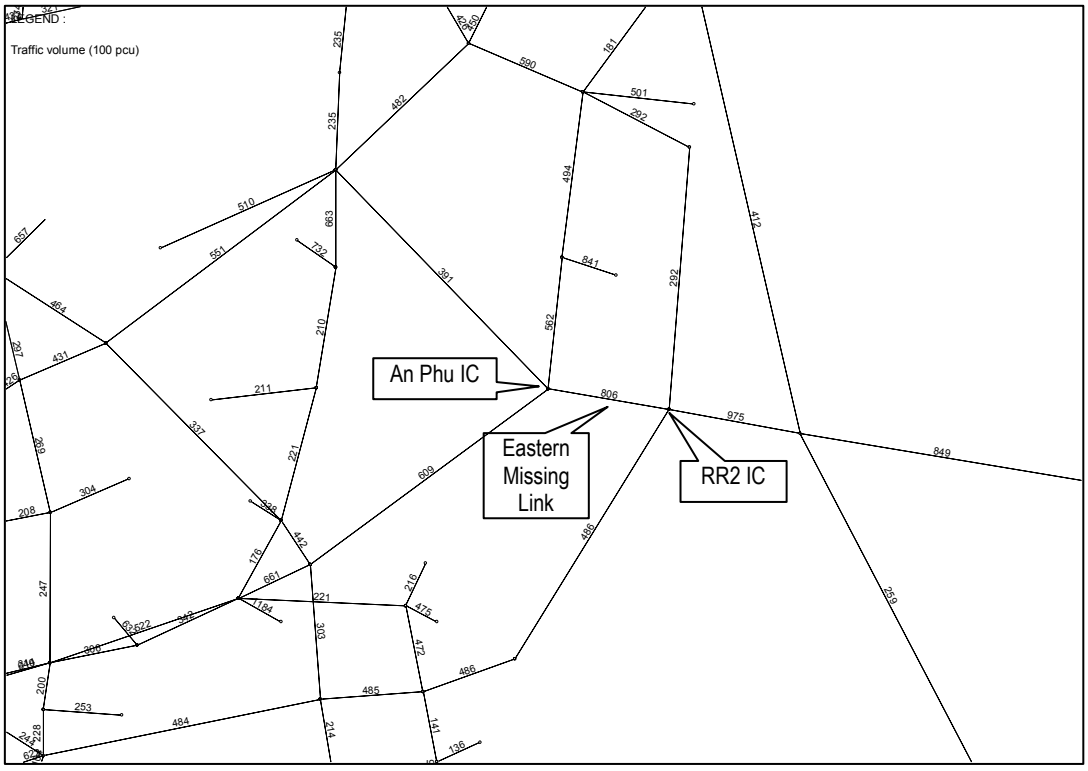
(Unit: 100 pcu/day)



Source: VITRANSS 2 Study Team

Figure 9.3.4 Forecasted Traffic Volume around the Eastern Missing Link, 2030

(Unit: 100 pcu/day)



Source: VITRANSS 2 Study Team

9.4 Natural Condition Surveys

1) Topographic Surveys

The topographic surveys included in the 2009 FS (see Table 9.4.1) were carried out based on the updated national coordinates system (VN2000 Center meridian 105 degree 45 minutes). The comments of the VITRANSS 2 Study Team on the surveys and report are listed in Table 9.4.2.

Table 9.4.1 Comments on the Topographic Survey

No.	Study Item
TS-00	Generally well prepared. English translation needed.
TS-01	Add plan of the control point survey.
TS-02	Add plan of the Ah Phu I/C area.
TS-03	Add Planimetric survey for potential relocation road area for Lien Tinh Lo 25 Street
TS-04	Add survey centerline of existing roads
TS-05	Cross section of existing roads should indicate location of nearest house walls
TS-06	Position of cross section survey should indicate in the plan
TS-07	Cross section of KM0+0820 is not correct No indication of dike structure
TS-08	Cross section of KM1+235 is not correct No indication of dike structure
TS-09	Cross section of KM1+938 is not correct No indication of dike structure
TS-10	Cross section of KM2+427 is not correct No indication of dike structure
TS-11	Cross section of KM2+558 is not correct No indication of dike structure
TS-12	Cross section of KM3+875 is not correct No indication of dike structure
TS-13	Add Profile of Do Xuan Hop Street
TS-14	Add Utility Survey

Source: VITRANSS2 Study Team

2) Geological Survey

Although the 2009 FS report was provided, it was in Vietnamese and had to be translated. Due to time constraints, the 2007 FS report on the geological conditions in the project area was reviewed. The 2007 FS report covers all relevant items except for those at the exact location of the An Phu interchange. However, it was accepted that geological investigation can be carried out after the type of interchange is decided. A translation of the 2009 FS report to English is necessary.

3) Hydrological Survey

The 2009 FS report on the results of the hydrological survey was not provided by VEC. Therefore, the 2007 FS report was reviewed. The purpose of the hydrological survey is two-fold: (i) to determine the design flood level (DFL) for road construction, and (ii) to determine the design water volume for hydraulic structures/facilities. With the nature of hydrology in the project area, the design parameters could be similar with those used for the East–West Highway and Ho Chi Minh–Dau Giay Expressway.

9.5 Engineering Work

1) Highway Designs

(1) Design Standards

The latest technical standards listed in the table below were used to review the existing FS reports for 2009. “TCXDVN104-2007: Urban Road Specifications for Design” was issued through Decision No. 22/2007/QD-BXD dated 30 June 2007. For the 2007 FS report, “TCXD104-1983: Specifications for Urban Road, Square” was used since it was the latest standards at the time the FS was carried out.

Table 9.5.1 Design Standards Used in the Review

No.	Design Standards	Remarks
1	TCXDVN104-2007	KM0+000 – KM4+000
2	TCVN5729-2007	RR2 Interchange

Source: VITRANSS 2 Study Team

(2) Road Classification

The FS2007 report described that An Phu–Ring Road 2 (RR2) section is urban road – Main Road Grade I, calculated velocity 100km/h, and agreed by MOT by the letter No. 4997/BGTVT-KHÑT dated 21/8/2006.

In TCXDVN104-2007, road classification and hierarchy have been further developed and specified. Considering the expected function and the location, in accordance with Article 6 of TCXDVN, it is proposed that section between An Phu and RR2 should be classified as “Urban Expressway”, with full access control, without interruption by traffic signal, connecting the HCMC–Long Thanh–Dau Giay Expressway (HLD Expressway) which would carry the largest traffic in the country.

(3) Number of Lanes Required between An Phu Interchange and RR2 Interchange

TCXDVN104-2007 stipulated the method of determining number of lane as follows:

(i) Design Annual Vehicle Volume (Nan) between An Phu Interchange and RR2 Interchange for 2020-2030 is forecasted.

(ii) Design Hourly Vehicle Volume (Nyc) is calculated with the ration of 0.12-0.14 of Nan, in accordance with Article 5.2.3.

(iii) Traffic Possibility Factor (Z) is 0.70-0.80 in accordance with Article 6.2.3.

(iv) Highest Traffic Possibility (Ptt) is 1800 pcu/hour/lane in accordance with Article 5.4.1.

(v) Number of lanes required was calculated as shown in Table 9.5.2.

Table 9.5.2 Number of Lanes Required on Throughway between An Phu Interchange and RR2 Interchange

Year		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
NAN		58,200	60,200	62,100	64,200	66,300	68,500	70,800	73,100	75,500	78,000	80,600
NYC(1)	0.12	7,000	7,200	7,500	7,700	8,000	8,200	8,500	8,800	9,100	9,400	9,700
NYC(2)	0.14	8,100	8,400	8,700	9,000	9,300	9,600	9,900	10,200	10,600	10,900	11,300
Z(1)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Z(2)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
PTT	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
NLX-0.12-0.7		6	6	6	6	6	7	7	7	7	7	8
NLX-0.12-0.8		5	5	5	5	6	6	6	6	6	7	7
NLX-0.14-0.7		6	7	7	7	7	8	8	8	8	9	9
NLX-0.14-0.8		6	6	6	6	6	7	7	7	7	8	8

Source: VITRANSS 2 Study Team

In terms of traffic demand, it is proposed to build dual 3-lane, total 6-lane, expressway for the throughway between An Phu Interchange and RR2 Interchange in Phase 1.However, the distance of the throughway is 3.3 km only, and it is two (2) minutes to pass the section when the travelling speed is 100 km/hr.

Considering An Phu Interchange and RR2 Interchange are developed for 8-lane throughway interchanges, it is strongly recommended to develop this 3.3km section as dual 4-lane, total 8-lane road in Phase 1.

2) Intersection Designs

(1) General

There are two (2) major intersections in the project, which is An Phu intersection and RR2 junction. Those intersections are the first class ones located, along the East gateway of HCM City in the country.

Smooth traffic operations of those intersections are significantly important for national socio-economic development in general, and for the SFEZ in particular, so that long-term investment plan will be appropriately developed with step-wise approach.

In accordance with TCXDVN104-2007 Article 12.5, “grade-separated intersection” should be applied to those intersections.

(2) Design of An Phu Intersection

(a) **Design Standards**: “TCXDVN104-2007: Urban Road Specifications for Design”, issued by Decision No. 22/2007/QD-BXD dated 30 June 2007, is the basic design standards.

For design of the grade-separated intersection, said interchange, “TCVN5729-2007: Expressway Specifications for Design” was referred practically where stipulation of “12.8 Grade-separated intersection” of TCXDVN104 is not sufficiently applicable.

(b) **Classification of Crossing Roads**: As described in TCXDVN104-2007, the section between An Phu and RR2 of the HLD Expressway is classified as Urban Expressway, and the East-West Highway is classified as Urban Main Road.

In accordance with TCXDVN104-2007 Article 12.5.1, the An Phu Interchange shall be a combination of at-grade intersection and grade-separated intersection.

(c) **Design Traffic Volume**: In accordance with TCXDVN104-2007 Article 5.2.1, traffic volume in 2030 should be referred for the traffic planning of the urban expressway

In accordance with TCXDVN104-2007 Article 5.2.3, Design Hourly Vehicle Volume is calculated with the ration of 0.12-0.14 of Design Annual Vehicle.

Roughly, 1,000 PCU/hour is capacity of at-grade intersection; the following major traffic direction of the An Phu Interchange should be studied.

Table 9.5.3 Major Traffic Direction at An Phu Interchange (2030)

Direction		TTB - LTB	TTT - LTB	HNR - LTB	LTB - TTB	LTB - TTT	LTB - HNR	TTB - HNR	TTB - TTT	TTT - HNR	TTT - TTB	HNR - TTT	HNR - TTB
(Ramp Name)		(A) Thruway	(B)	(C) Thruway	(D)	(E)	(F)			Thruway		Thruway	
NAN		11,400	15,500	11,900	13,800	18,800	9,300	5,500	1,500	11,200	1,300	12,600	5,700
NYC(1)	0.12	1,368	1,860	1,428	1,656	2,256	1,116	660	180	1,344	156	1,512	684
NYC(2)	0.14	1,596	2,170	1,666	1,932	2,632	1,302	770	210	1,568	182	1,764	798
Major Intersection (>1,000 PCU/hr)		Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes	No

TTB: Thu Thiem Bridge, LTB: Long Thanh Bridge, TTT: Thu Thiem Tunnel, HNR: Hanoi Road,
NAN: Design Annual Daily Traffic Volume (PCU/day),
NYC: Design Hourly Traffic Volume (PCU/hr)

Source: VITRANSS2 Study Team

(d) **Alternatives of Intersection Type**: Six (6) types of intersection, including five (5) types of grade-separated intersection, and one at-grade intersection, were prepared for the alternative study.

Table 9.5.4 Six (6) Types of Intersection at An Phu Interchange

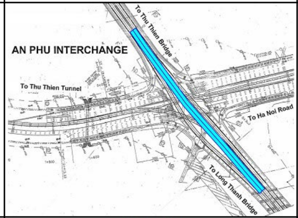
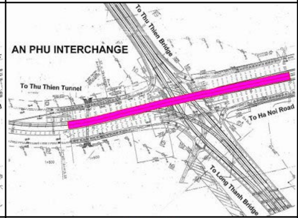
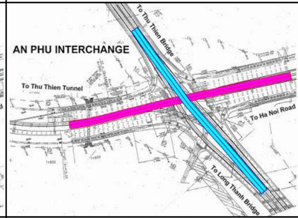
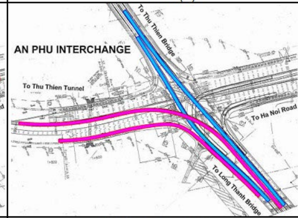
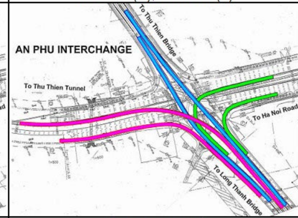
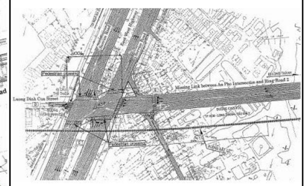
No.	Code	Type	Level	Description
1	FO-1	Flyover	1	Ground level
			2	HLDE over EWH
2	FO-2	Flyover	1	Ground level
			2	EWH over HLDE
3	FO-3	Flyover	1	Ground level
			2	EWH over ground traffic
			3	HLDE over EWH
4	JCT-1	Junction	1	Ground level
			2	TTB-LTB(A), TTT-LTB(B), LTB-TTB(D)
			3	LTB – TTT(E)
5	JCT-2	Junction	1	Ground level
			2	TTB-LTB(A), TTT-LTB(B), HNR-LTB(C), LTB-HNR(F)
			3	LTB-TTB(D), LTB-TTT(E)
6	AG	At-grade	1	At-grade

TTB: Thu Thiem Bridge (Luong Dinh Cua Street); TTT: Thu Thiem Tunnel (EW Highway-South); HNR: Ha Noi Road (EW Highway-North); LTB: Long Thanh Bridge (HLD Expressway); HLD: Luong Dinh Cua Street – HLD Expressway; EWH: East-West Highway.

Source: VITRANSS2 Study Team

(e) **Preliminary Comparison Study of Intersection Type:** Preliminary comparison study of the intersection type was carried out as shown in Table 9.5.5.

Table 9.5.5 Preliminary Comparison Study of Intersection Type at An Phu IC (2030)

No.	Item		FO-1	FO-2	FO-3	JCT-1	JCT-2	AG
1	Structure Type		Flyover	Flyover	Flyover	Junction	Junction	At-grade
2	Level Arrangement	1	Ground level	Ground level	Ground level	Ground level	Ground level	Ground level
		2	HLDE over EWH	EWH over HLDE	EWH over ground traffic	TTB-LTB(A), TTT-LTB(B), LTB-TTB(D),	TTB-LTB(A), TTT-LTB(B), HNR-LTB(C), LTB-HNR(F)	---
		3	---	---	HLDE over EWH	LTB – TTT(E)	LTB-TTB(D), LTB-TTT(E)	---
3	Layout							
4	Traffic Flow	LTB-TTT (18,800)	At-grade	At-grade	At-grade	Grade-separated	Grade-separated	At-grade
		TTT-LTB (15,500)	At-grade	At-grade	At-grade	Grade-separated	Grade-separated	At-grade
		LTB-TTB (13,800)	Grade-separated	At-grade	Grade-separated	Grade-separated	Grade-separated	At-grade
		HNR-TTT (12,600)	At-grade	Grade-separated	Grade-separated	At-grade	At-grade	At-grade
		HNR-LTB (11,900)	At-grade	At-grade	At-grade	At-grade	Grade-separated	At-grade
		TTB-LTB (11,400)	Grade-separated	At-grade	Grade-separated	Grade-separated	Grade-separated	At-grade
		TTT-HNR (11,200)	At-grade	Grade-separated	Grade-separated	At-grade	At-grade	At-grade
		LTB-HNR (9,300)	At-grade	At-grade	At-grade	At-grade	Grade-separated	At-grade
5	Major Structures		Ramp-B Bridge: L=617m Ramp-C Bridge: 592m	East-West Highway Bridge: L=500m	Ramp-B Bridge: L=617m Ramp-C Bridge: L=592m EWH Bridge: L=500m	Ramp-A Bridge: L=1282m Ramp-B Bridge: L=617m Ramp-D Bridge: L=200m Ramp-E Bridge: L=500m	Ramp-A Bridge: L=592m Ramp-B Bridge: L=1282m Ramp-C Bridge: L=300m Ramp-D Bridge: L=617m Ramp-E Bridge: L=1282m Ramp-F Bridge: L=200m	None
6	Construction Cost		1,700 MJPY (100)	1,000 MJPY (59)	3,500 MJPY (206)	3,500 MJPY (206)	5,500 JPY (324)	200 MJPY (12)
7	Construction Period		20 Months	20 Months	30 Months	30Months	30 Months	10 Months
8	Constructability		Good	Good	Good	Normal	Normal	Good
9	Required Land Acquisition		Small or no additional from At-grade option.	Small or no additional from At-grade option.	Small or no additional from At-grade option.	Further survey needed.	Further survey needed.	Baseline.
10	Merit		Traffic of TTB-LTB is much improved.	Traffic of TTT-HNR is much improved.	Traffic of TTB-LTB is much improved. Traffic of TTT-HNR is much improved.	Major traffic demand(TTT-LTB) are grade-separated.	Major traffic demand(TTT-LTB, LTB-HNR) are grade-separated.	Cheap and simple construction.
11	Demerit		Major traffic demand(TTT-LTB) are not grade-separated.	Major traffic demand(TTT-LTB) are not grade-separated.	Major traffic demand(TTT-LTB) are not grade-separated.	Three (3) layer structure is costly and require long construction period.	Three (3) layer structure is costly and require long construction period.	Would cause much traffic congestion.
12	Other Considerations		Difficult for future development.	Difficult for future development.	Difficult for future development.	Future development can be considered.	Too much investment at initial stage.	Future development is possible.
13	Recommendation		Recommended when future development is considered.	Not recommended.	Not recommended.	Most recommended	Recommended if budget is available.	If no budget, this option can be recommended.
Rank			**4**	**5**	**6**	**1**	**2**	**3**

Source: VITRANSS2 Study Team

(f) **Selected Intersection Type at An Phu Intersection:** Considering balance of traffic service and scale of initial investment, JCT-1 is the most recommended option for An Phu Interchange. Alignment, horizontal and vertical, should consider the future development plan of said rampways between Long Thanh Bridge and Hanoi Road.

(3) Design of RR2 Intersection

(a) **Design Standards:** "TCVN5729-2007: Expressway Specifications for Design" is the basic design standards.

(b) **Classification of Crossing Roads:** This is an intersection of the HLD Expressway (classified as Urban Expressway) and the RR2 (classified as Urban Expressway and Urban Main Road). In accordance with TCXDVN104-2007 Article 12.5.1, the intersection between HLDE and RR2 Interchange shall be full grade-separated.

(c) **Design Traffic Volume** As shown in Table 9.5.6, turning traffic between RR2 and HLD is major flow direction other than traffic on throughway. This turning path should be shorter for better services.

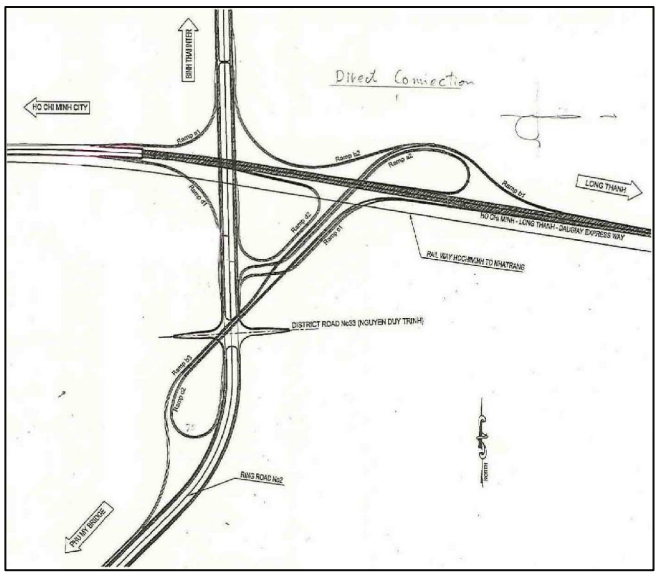
Table 9.5.6 Major Traffic Direction at RR2 Interchange (2030)

Direction		LTB - TTB	HNR - TTB	PMB - TTB	TTB - LTB	HNR - LTB	PMB - LTB	HNR - PMB	TTB - PMB	LTB - PMB	PMB - HNR	TTB - HNR	LTB - PMB
(Ramp Name)		Thruway	(A1)	(A2)	Thruway	(B1)	(B2)	Thruway	(C1)	(C2)	Thruway	(D1)	(D2)
NAN		35,700	1,000	5,200	32,000	5,100	9,500	9,100	5,800	10,500	8,400	1,000	4,700
NYC(1)	0.12	4,284	120	624	3,840	612	1,140	1,092	696	1,260	1,008	120	564
NYC(2)	0.14	4,998	140	728	4,480	714	1,330	1,274	812	1,470	1,176	140	658
Major Intersection (>1,000 PCU/hr)		Yes	No	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No

Source: VITRANSS 2 Study Team

(d) **Review of Previous Studies:** There are some real-estate developments at the neighbouring areas; it might be strict design constraint for the interchange planning. In the previous studies, IC layout avoiding the land development was prepared as shown in Figure 9.5.3.

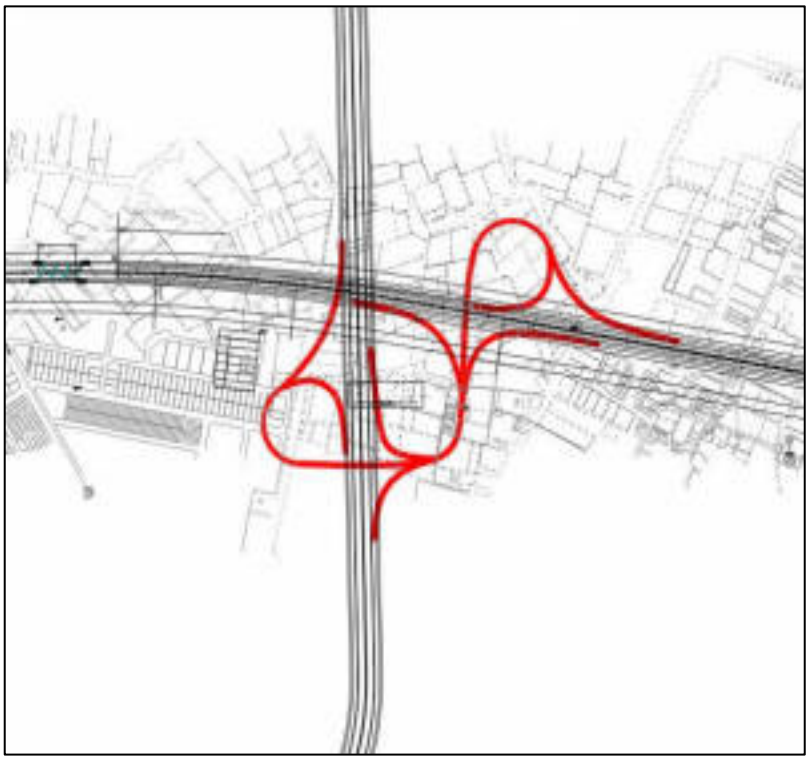
Figure 9.5.1 Interchange Layout (Modified Double Trumpet Type) in Previous Stage for RR2 Interchange



Source: ADB TA(No.2374-VIE) Design Report

It is proposed that "Standard Double Trumpet Type" has very much advantage, not only for the construction cost in short time but also VOC[1] and VTT[2] saving for long term, if some land is available for the construction works.

Figure 9.5.2 Land Development Plan near RR2 Interchange



Source: VITRANS2 Study Team

[1] VOC: Vehicle Operation Cost
[2] VTT: Vehicle Traveling Time

(e) **Alternatives of Intersection Type:** Five (5) types of intersection, including four (4) types of grade-separated, and one temporary at-grade, direct connection were compared in terms of traffic operation aspect.

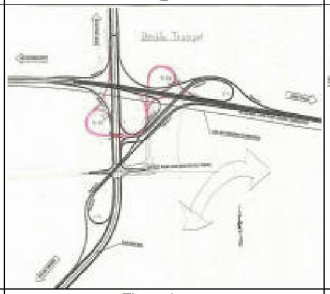
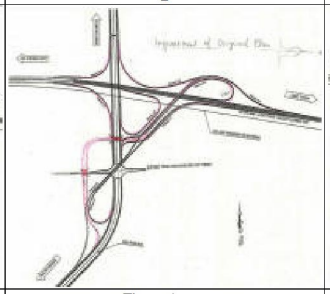
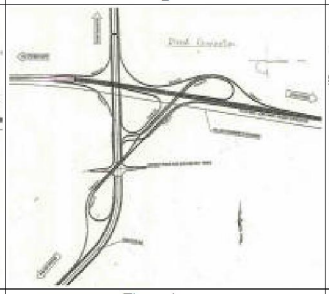
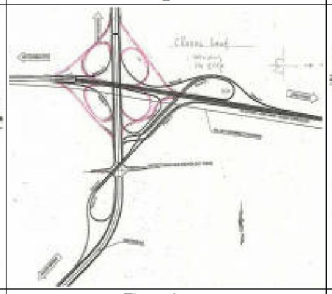
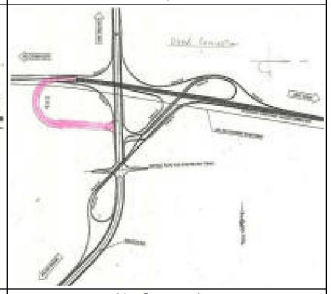
Table 9.5.7 Five (5) Types of Intersection at RR2 Interchange

No.	Code	Type	Description
1	DT-1	Double Trumpet	Typical layout of double trumpet interchange.
2	DT-2	Double Trumpet	Layout with shorter bridge length of the loop on RR2.
3	DT-3	Double Trumpet	Layout with consideration on land-use constraint.
4	FC-1	Full Clover	Reference only
5	AG	At-grade	Temporary direct connection

Source: VITRANSS 2 Study Team

(f) **Preliminary Comparison Study of Intersection Type:** Preliminary comparisons of the RR2 Interchange in 2030, was carried out as shown in Table 9.5.8.

Table 9.5.8 Preliminary Overall Comparison of Five (5) Types of Intersection at RR2 IC

No.	Item		DT-1	DT-2	DT-3	FC-1	Direct
1	IC Type		Standard Double Trumpet	Modified Double Trumpet (1)	Modified Double Trumpet (2)	Full Cloverleaf	Direct Connection (Tentative)
2	Level Arrangement		2	2	2	2	1
3	Layout						
4	Traffic Flow	LTB-TTB (35,700)	Throughway	Throughway	Throughway	Throughway	No Connection
		TTB-LTB (32,000)	Throughway	Throughway	Throughway	Throughway	No Connection
		LTB-PMB (10,500)	Short	Long	Long	Short (Weaving)	Short
		PMB-LTB (9,500)	Short	Short	Short	Short	Short
		HNR-PMB(9,100)	Throughway	Throughway	Throughway	Throughway	Throughway
		PMB-HNR (8,400)	Throughway	Throughway	Throughway	Throughway	Throughway
5	Major Structures		Ramp-A1 Bridge: L=580m Ramp-A2 Bridge: L=330m Ramp-B Bridge: L=200m Ramp-C Bridge: L=110m Ramp-D Bridge: L=110m	Ramp-a2 Bridge: L=207+80m Ramp-b1 Bridge: L=275m Ramp-b3-revised Bridge: L=120m Ramp-c1-revised Bridge: L=320+120+120m Ramp-c2-revised Bridge: L=120+120+120m Ramp-d2 Bridge: L= 160+46m	Ramp-a2 Bridge: L=207+80m Ramp-b1 Bridge: L=275m Ramp-b3 Bridge: L=380+130+150m Ramp-c1 Bridge: L=320m Ramp-c2 Bridge: L=150+130+350+120m Ramp-d2 Bridge: L=160+46m	Ramp-1 Loop Bridge: L=160m x4 Ramp-2 Widening Bridge: L=200m x4 Ramp-3 Outer Bridge: L=160m x4	None
6	Construction Cost		3,000 MJPY (100)	3,600 MJPY (120)	6,600 MJPY (2,200)	3,000 MJPY (100)	200 MJPY (7)
7	Construction Period		24 Months	24 Months	24 Months	24 Months	12 Months
8	Constructability		Speed change lanes to HLDE are elevated structure. Considerable construction coordination is required with ongoing PK1A works. All brides can be concrete ones.	All brides can be concrete ones.	Some bridges should be steel superstructures because of long-span structures are required.	All brides can be concrete ones.	Good
9	Required Land Acquisition		Loop on RR2 occupies residential development area.	Loop on RR2 should further study the land requirement.	Avoid the land development area.	Loop on RR2 occupies residential development area.	Direct connection route should be further studied.
10	Merit		Simple and compact	Rather economic solution	No adverse effect to land development	(Reference only)	Temporary works
11	Demerit		Adverse effect to land development			Dangerous traffic operation	
12	Other Considerations					Traffic "weaving on viaduct" is dangerous for heavy traffic road and not recommendable.	This is not permanent solution.
13	Recommendation		If land is negotiable, this option is the most recommendable.	If land is negotiable some parts only, this option is the most recommendable.	If land is NOT negotiable, this option is the most recommendable.		
Rank			**1**	**2**	**3**	**5**	**4**

Source: VITRANSS2 Study Team

(g) **Selected Intersection Type at RR2 Intersection:** If land developer could accept the DT-1 layout, this is the most recommendable. Availability of the land should be confirmed before selection of the interchange type.

3) Designs of Connecting Roads

There are two (2) major linking roads between An Phu and RR2 as follows:

(1) Inter Provincial No.25 (LTL25)

At present An Phu intersection, there are five (5) legs including Inter Provincial No. 25 (LTL25). For the improvement of the An Phu intersection, LTL25 should be relocated not adversely effect to the stagnation traffic at the intersection. It is proposed to relocate LTL east wards about 200m, then connect to the frontage road of the HLD Expressway.

(2) Don Xuan Hop Street

Don Xuan Hop Street cross the HLD Expressway at KM3+200. In FS2007, a simple thruway flyover bridge was planned, on the other hand, in FS2009, roundabout intersection was planned under the flyover. In order to provide U-turn location for the traffic on the frontage road, the roundabout intersection is reasonable.

4) Bridge Designs

Designed bridge types in FS2007 and FS2009 were standard type in Vietnam except some long span bridges at the An Phu and RR2 intersections.

Attention should be paid to the followings:

(i) Construction method of An Phu Interchange. The work should be carried out under the traffic-running on the East-West Highway.

(ii) Addition to the above, three (3) layer rampway requires construction works with highly elevated condition, more than 20m above the ground level.

(iii) All speed change lanes of the RR2 Interchange are located at the viaduct section. Appropriate coordination should be made timely with ongoing projects.

As the results, temporary erection method at the intersections should be much paid attention for construction work planning.

5) Drainage Designs

FS2007 has good drainage design. However, the design should be updated in accordance with the above.

6) Utilities Relocation Plan

Utilities relocation plan is not covered in FS2007. The design should be updated in accordance with the above.

Utilities relocation has several stakeholders and the coordination would take much time. “Stakeholder list” should be prepared in the detailed design stage.

7) Designs of Electrical Facilities

FS2007 has good electrical design. However, the design should be updated in accordance with the above.

8) ITS Designs

There is no ITS facilities design for the section between An Phu and RR2. Traffic management for this section would belong to HCMC traffic management governance. Appropriate coordination should be made in the detailed design stage.

9) Construction Planning

Construction planning of FS2007 is simple one, not covering the elevated structure as mentioned above.

Grade-separated intersection should be applied as described above. Careful construction planning should be carried out in the detailed design, especially (i) elevated structures, and (ii) traffic regulation of the East-West Highway and RR2, those have heavy traffic day and night, during the construction.

9.6 Environmental Considerations

The Environmental Impact Assessment (EIA) Report for the Eastern Missing Link (the Connection Road Project between East- West Highway and HCMC─Long Thanh─Dau Giay Expressway) was reviewed by VITRANSS 2 Study Team. The result of EIA review is as follows:

1) EIA Status in Vietnam

The EIA report was submitted in August 2008 by the project implementing body (HCMC and PMU East–West Highway Project), and approved in October 2008 by Department of Natural Resources and Environment in HCMC (DONRE–HCMC).

The VITRANSS 2 Study Team is of the opinion that the draft EIA report, which was reviewed by the My Thuan PMU, was adequately done in accordance with Vietnamese laws and regulations on EIA, as follows:

(i) Case A: For a new project that has not made EIA yet, it is compulsory to make a new EIA report. EIA report must be approved by DONRE-HCMC before a project is implemented.
(ii) Case B: For a project that was already approved the EIA report, if that project has not been implemented for two (2) years after the EIA approval date, it is necessary to prepare an additional EIA report and re-monitor the baseline environment.
(iii) Case C: For a project that was already approved the EIA report but changes its design, it is necessary to send an explanation document to DONRE-HCMC to obtain their direction about the procedures to register environmental permission. If such design has a major modification, an additional EIA report it must be prepared.

The project can be classified under Case B or C. In Case C, the necessary procedure should be implemented. However, the proposed change, like the modification proposed by the VITRANSS 2 Study Team, is deemed small and has minimal impact on the environment. Thus, it is not necessary to notify DONRE-HCMC to prepare an additional EIA.

In Case B, data for the EIA report were collected around May or April 2008. It is necessary to prepare an additional EIA report and re-monitor the baseline environment. It seems that the GOV intends to immediately implement the project, hence, it may be classified under Case C. It is not necessary have an additional EIA report in accordance with Vietnamese laws/ regulations on EIA.

2) JICA´s Environmental Guideline

In March 2004, JICA issued environmental and social guidelines (http://www.jica.go.jp/english/publications/jbic_archive/environmental_guidelines/pdf/guide.pdf).

JICA Implements cooperation activities in accordance with the guidelines, and JICA encourages the recipient governments by conducting cooperation activities to implement appropriate measures in view of environmental and social considerations. At the same time, JICA supports the examination of its guidelines. If GOV wishes to obtain Japanese assistance to implement the Project, it has to follow the JICA Guidelines.

3) Comments on the Draft EIA Report

(1) Submission and Approval of Final EIA Report

As mentioned above, an additional EIA report is not required by Vietnamese laws and regulations. However it is better to submit one to DONRE–HCMC, and obtain their approval.

(2) Explanation of the Illustrative List of Sensitive Areas

Areas in and around the project area sensitive to development or use and designated by national or related local government units as critical areas, such as below, should be clearly shown. The expected environmental impacts from the project, necessary countermeasures, and a monitoring plan should also be discussed.

(i) Wetlands;
(ii) Areas for indigenous peoples;
(iii) Cultural heritage sites;
(iv) Areas for consideration as national parks or protected areas; and,
(v) Other areas deemed requiring careful consideration

(3) Detailed Explanation of Natural and Social Environment

The following sensitive natural and social environment should also be illustrated.

(i) Primary forests or natural forests in tropical areas;
(ii) Habitats with important ecological value, such as wetlands and tidal flats;
(iii) Habitats of rare species requiring protection under domestic legislation and/or international treaties;
(iv) Areas in danger of large-scale salt accumulation or soil erosion;
(v) Areas with unique archeological, historical or cultural value; and,
(vi) Areas inhabited by indigenous peoples or nomadic societies with traditional ways of life and other areas with special social value

(4) Preparation of the Resettlement Action Plan (RAP)

One of the most significant impacts caused by the implementation of the project is resettlement. A proper implementation of the compensation to affect people will minimize such impact. Up to the end of December 2009, the detailed planning is not exhibited. The RAP is indispensable to obtain Japanese assistance, therefore, the GOV should prepare it as soon as possible.

(5) Discussion of Alternatives

JICA guidelines require a discussion of alternatives; therefore, the Vietnamese government should compare three or four alternatives relating to route and design. A justification for the selected alternative for the project should also be done.

(6) Conduct of Public Consultation on the Modified Project Design

The VITRANSS2 Study Team modified the project in terms of traffic volume forecast and transport design. With the modifications, meetings with related stakeholders, such as administrative bodies, local residents, NGOs, etc., should be held, and the results of meetings should be reported in the final EIA.

(7) Detailed Explanation of Air Pollution Forecast and Countermeasures

In the existing EIA report, air pollution is forecasted following Vietnamese standards, but includes some uncertain factors. The following should therefore be shown in accordance with JICA guidelines.

(i) Applied forecast formula;

(ii) Applied forecast conditions;

(iii) Forecast for the project area and its vicinity;

(iv) Forecast values in sensitive points, such as residents nearest to the project boundary, as well as schools, hospitals, places of worship, public facilities, and cultural heritage sites in the project area;

(v) Detailed countermeasures for areas that do not meet environmental standards and the cost of such countermeasures; and,

(vi) List and layout of monitoring stations during construction and operating stages

(8) Detailed Explanation of Noise/ Vibration Forecast and Countermeasures

The followings should be illustrated in accordance with JICA Guidelines.

(i) Forecast for the project area and its vicinity;

(ii) Forecast values and distance from project boundary at sensitive points, such as residents nearest to the project boundary, as well as schools, hospitals, places of worship, public facilities, and cultural heritage sites in the project area;

(iii) Detailed countermeasures for areas that do not meet environmental standards and the cost of such countermeasures; and,

(iv) List and layout of monitoring stations during construction and operating stages

(9) Additional Environmental Items for Forecast

Since the global warming issue was not discussed in the existing EIA, the revised EIA should tackle it.

(10) Implementation of Additional Investigations on Existing Natural Conditions

The existing EIA describes the results of investigations on the existing natural conditions, such as air quality, noise/ vibration, and soil, in the rainy season only and excludes the investigation on flora and fauna biodiversity. Therefore, the following investigations should be undertaken.

(i) Air quality, noise/ vibration, and soil condition at dry season

(ii) Flora and fauna at rainy and dry seasons

(11) Planning of the Detail Construction Plan and Environmental Management Plan (EMP)

The significant impacts to be expected from project implementation are resettlement, air pollution, and noise/ vibration, which can be resolved by the implementation of a proper EMP. The following should therefore be explained.

(i) Types and number of (total, at peak day/ hour) construction materials and vehicles;

(ii) Entry route to the site by construction vehicles;

(iii) Location and entry route to borrow pits, quarry sites, and disposal areas, if any;

(iv) Existing and future capacity of the public final disposal area, if used;

(v) Location of temporary road and stockyards for construction materials; and,

(vi) Location of, number of laborers in, and ways to dispose of wastewater/ solid waste generated from labor quarters

(12) Institutional Arrangements

The implementing body of the project was People Committee of HCMC (HCMC-PC), so the existing EIA was prepared by HCMC-PC. After that, the implementation functions were transferred to the Vietnam Expressway Cooperation (VEC). Therefore, the existing institutional setting for implementation organization system for the Project, especially for EMP, should be rewritten.

9.7 O&M Plan

1) Traffic Management Plan

There was not study on traffic management between An Phu Interchange and RR2 Interchange. Traffic control especially for motorcycles (less than 175cc) at the An Phu Interchange should be carefully carried out in order to guide those vehicles that are not allowed to enter the expressway.

2) O&M Plan

As of March 2010, only draft Operation and Maintenance (O&M) Guideline exists for the expressway in Vietnam.

During the detailed design, the institutional arrangements for operation and maintenance should be studied.

It seems that the section between An Phu and RR2 belong to HCMC traffic management. This is different from the HLD Expressway which is under VEC. Coordination of traffic operation between HCMC and VEC should be planned during the detailed design.

9.8 Cost Estimates

1) Proposed Contract Packaging

It is proposed to divide the section as follows:

Table 9.8.1 Proposed Contract Packaging

No.	Contract Package	Location	Description
1	7A	KM0+000 – KM0+700 (700m)	An Phu IC and connection to thruway section.
2	7B	KM0+700 – KM4+000 (3,300m)	Thruway Section
3	7C	KM4+000 – KM5+300 (1,300m)	RR2 IC with speed-change lanes.

Source: VITRANSS2 Study Team

2) Rough Cost Estimate

Rough cost estimate for the above contract package, in accordance with the above recommended options, is as follows:

Table 9.8.2 Rough Cost Estimate of the Project

No.	Contract Package	Location	Rough Cost (Million JPY)	Remarks
1	7A	KM0+000 – KM0+700 (700m)	3,500	
2	7B	KM0+700 – KM4+000 (3,300m)	5,000	1,500 MJYP/km
3	7C	KM4+000 – KM5+300 (1,300m)	3,000	
		Total	11,500	

Source: VITRANSS2 Study Team

It should be noted that the above is rough estimate level without clear planning and design. Land acquisition cost is NOT considered.

9.9 Implementation Program

1) Application of Stage Construction

"Stage Construction Method" is an option of infrastructure development. This option minimizes initial cost in order to meet available budget, and subsequently continues development on a phase-wise basis in accordance with actual demand. This development is widely applied worldwide. The investors, including the governmental body, can optimize the investment priority by using this method.

2) Proposed Stage Construction Method

Considering the results of the updated traffic demand forecast, the following stage construction method is proposed:

(a) Phase 1:

- Build An Phu Interchange without considering the HSR and LRT.
- Rampway alignments should consider the future development in Phase 2.
- Complete dual 4-lane, total 8-lane throughway between An Phu Interchange and RR2 Interchange.
- Complete RR2 Interchange as ultimate development.

(b) Phase 2:

- Build rampways between Long Thanh Bridge and Hanoi Road, for both directions.
- LTL25B Intersection will be built as grade-separated structure.

Table 9.9.1 Proposed Stage Construction Method

	FS2007		FS2009	VITRANSS 2 Review	
	Phase 1	Phase 2		Phase 1	Phase 2
An Phu Intersection	At-grade	Grade-separated	Grade-separated	Grade-separated	Complete LTB-HNR rampways
HSR	---	Considered	Considered	Not Considered	
LRT	---	Considered	Considered	Not Considered	
Nos of lane of Rampway	---	2	2	2	
Nos of lane of Thruway	4	8	8	8	
Thruway Tapered Section	---	---	---	200m to 6-lane	
LTL25 Intersection	Present location	Present location	Present location	To be relocated	
Luong Dinh Cua Street	Not Considered	Urban Arterial	Urban Arterial	Urban Arterial	
LTL25B Intersection	Not Considered	Grade-separated	Grade-separated	Not Considered	Grade-separated
Nos of lane of Thruway (KM0+700-KM4+000)	4	8	8	8	Frontage roads
HSR	Not Considered	Considered	Considered	Not Considered	Considered
LRT	Not Considered	Considered	Considered	Not Considered	Considered
Frontage Road	Not Considered	Considered	Considered	Not Considered	Considered
RR2 Intersection	At-grade	Grade-separated	Not Considered	Grade-separated	Completed in Phase 1

Source: VITRANSS2 Study Team

3) Proposed Implementation Program

Implementation program for this section can be as follows:

Table 9.9.2 Implementation Program

No.	Task	Duration (Month)	Period
1	Detailed Design	9	Apr 2010 – Dec 2010
2	Bidding	12	Jan 2011 – Dec 2011
3	Construction	36	Jan 2012 – Dec 2014
4	Expressway Open	-	Jan 2015

Source: VITRANSS 2 Study Team

As of March 2010, ongoing HLDE section is scheduled to open to the public early 2014.

However, considering the above possible implementation program, it is strongly recommended:

(i) Suspend some parts of ongoing PK1A work for the section related to RR2 Interchange section,

(ii) Complete design of RR2 Interchange as soon as possible,

(iii) Issue variation order to PK1A Contractor for appropriate deduction of works for the section of RR2 Interchange,

(iv) Procure contractor for the contract package PK7C: RR2 Interchange Works,

(v) Design and construction of contract packages PK7A and PK7B.

9.10 Economic and Financial Analysis

1) Analysis by TEDI South

In the study by TEDI South, the socio-economic benefits of the project were only qualitatively discussed. A quantitative economic evaluation was seemingly not conducted. With regard to financial evaluation, an FIRR on equity was calculated at 9.8%. This assumes low-interest loan from ADB at 53% and government subsidy of 40%. Although there is a statement that a separate document "Financial Analysis" has been prepared, this document was not provided to the VITRANSS 2 Study Team.

2) Analysis by VITRANSS 2

(1) Economic Evaluation

Economic evaluation was carried out under the following assumptions:

(i) The project would be open for service in 2015;

(ii) Evaluation period is 20 years from 2015 to 2034. Residual value of road facilities was taken into account;

(iii) Project cost was newly estimated by the VITRANSS 2 Study Team using the latest cost information, and assumed to be reimbursed 10% in 2010, 20% in 2011, 20% in 2012, 20% in 2013, and 30% in 2014;

(iv) Annual operating cost would be 5% of project cost;

(v) Toll was assumed at US 5 cents/pcu/km after comparison with selected overseas countries;

Economic benefits were generated from the savings from VOC and passenger time cost under three scenarios mentioned in Chapter 9.3

Results are presented in Table 9.10.1. The project was evaluated as economically feasible.

Table 9.10.1 EIRRs of the Project by Case

Case	Time of Opening		EIRR (%)
	An Phu IC	An Phu IC	
1	2015 - 2020	2015 - 2020	26
2	2015 - 2020	2015 - 2020	23
3	2020 - 2030	2020 - 2030	25

Source: VITRANSS 2 Study Team

(2) Financial Evaluation

Based on the same assumptions made in the economic evaluation, a financial analysis was conducted for the candidate expressway projects. The assumed toll rates was US$ 5 cents per PCU-km.

The results are presented in Table 9.10.2. The calculated FIRRs were very low due to the high investment requirements. The project is apparently not financially viable.

Table 9.10.2 FIRRs of the Project by Case

Case	Time of Opening		FIRR (%)
	An Phu IC	An Phu IC	
1	2015 - 2020	2015 - 2020	1
2	2015 - 2020	2015 - 2020	4
3	2020 - 2030	2020 - 2030	Cannot calculate

Source: VITRANSS 2 Study Team

9.11 Conclusion and Recommendations

1) Conclusion

The review concludes that the 2007 FS report was prepared with high quality. The contents were generally well prepared except following items:

(i) Traffic demand forecast
(ii) Utilities relocation planning
(iii) Electrical facilities planning
(iv) ITS facilities planning
(v) Operation and maintenance (O&M) planning

On the other hand, the feasibility study carried out in 2009 has not been completed yet. No design report is available. The planning policy in 2009 seems different from that of FS2007. There is no firm ground of the planning, i.e. type of An Phu Interchange, typical cross section of the expressway, stage construction method.

2) Recommendations

The recommendations of the VITRANSS 2 Study Team are as follows:

(a) **FS Report of 2007 should be Used as for the Project Implementation:** For the smooth implementation of the construction of the missing link section, the approved FS2007, which is comprehensively studied and prepared in good quality, should be used as the basic FS report, with some modifications described below.

(b) **Construct RR2 Interchange in Phase 1:** In the FS report of 2007, it was concluded that RR2 Interchange should be built in Phase 2. However, RR2 Interchange should be built in Phase 1 because the following reasons:

  (i) Construction of the RR2 is proceeding well. The Phu My Bridge has already opened to the public, and now the South Saigon (District 7) to An Phu (District 9) was directly connected.
  (ii) As shown in the updated directional traffic demand forecast, majority of the traffic from the Southwest Vietnam (Mekong Region) use RR2 detouring the HCMC center and then divert eastwards to Long Thanh.
  (iii) Construction of KM0–KM4 will take around three (3) years, and it would be one year later than present ongoing HLDE section. It is strongly recommended RR2 should connect to the HLDE when the HLDE open to the public.
  (iv) Traffic capacity of RR2 Interchange should be verified in the detailed design stage against the updated design traffic volume.

(c) **Apply Stage Construction Method:** In the FS report of 2007, 4-lane construction in Phase 1 is concluded. This stage construction method is reasonable to realize the expressway open to the public timely. Timing of Phase 2 should be studied in the detailed design stage. Considering the results of the updated traffic demand forecast, the revised stage construction method is proposed by VITRANSS 2 (See Chap 9.9).

(d) **Include some Items in the Detailed Design:** The following should be included in the scope of the detailed design:

  (i) Study and selection of the type of An Phu Interchange based on the updated traffic

demand forecast,

(ii) Update of the project cost with latest market price, including the cost of the following items:

- Utilities relocation cost
- Electrical facilities cost
- ITS facilities cost
- O&M cost

(iii) Update of the overall implementation program for the Ho Chi Minh–Long Thanh–Dau Giay Expressway and preparation of a separate implementation program of the fastest construction of this section.

(iv) Preparation of land acquisition should be given sufficient attention in order to prevent unnecessary delay in implementation.

10 CONCLUSION AND RECOMMENDATIONS

The major conclusion of this study includes the following:

(i) In the current expressway planning, different methodologies of different levels are used in Vietnam;

(ii) Planning standard was developed for the route selection, facility planning and cost estimate, in order to apply a consistent planning methodology for the North-South Expressway development;

(iii) Planning controls were identified on the scale of 1/50,000 UTM based digital map, from Ninh Binh to Da Nang and Quang Ngai to Phan Thiet with consideration of the above planning standard;

(iv) Route alignment was developed in accordance with the planning standard;

(v) Interchange planning was carried out in accordance with its planning standard;

(vi) All expressway sections were evaluated comprehensively from various perspectives and implementation strategies were identified; and

(vii) The feasibility studies of two missing links around HCMC were reviewed and the future orientation was indicated.

The recommendations are summarized as follows:

(i) Apply the planning standard in order to reduce overall life-cycle cost of the North-South Expressway for the national benefit of Vietnam;

(ii) Establish official planning standard and use it widely and consistently used in expressway planning in Vietnam;

(iii) Incorporate lessons learned from design and construction practice in the subsequent process of the development of expressway development;

(iv) Conduct further studies for the implementation strategies, especially regarding funding and institutions for the sustainable implementation of North-South Expressway; and

(v) Implement the missing links based on the recommendations of the reviews for ensuring fine network connectivity of North-South Expressway.