6.3 Operation and Maintenance (O&M) Plan

6.3.1 Laws and Administrative Decisions Relevant to O&M of Expressway in Vietnam

6.3.1.1. Laws and Administrative Decisions Relevant to O&M of Expressways

Details of the 'Laws and Administrative Decisions on the Expressways' O&M are shown in Table 6.52. At present the "Temporary Regulation on the Maintenance of HCMC (Ho Chi Minh City)-Trung Luong Expressway" (hereinafter referred to as "The Temporary O&M Regulation") is the only regulation in effect, covering the entire scope of the expressway's O&M, which had been prepared in time with the commencement service of HCMC-Trung Luong Expressway. The Temporary O&M Regulation was drafted based on both Japanese and South Korean standards and was promulgated as a Ministry of Transport (MOT) Directive on February 17, 2011.

MOT is in the process of establishing a unified expressway O&M standard that is applicable to the entire expressways throughout the country. At present, JICA is implementing "The Project for Strengthening Operation and Maintenance for Expressway in Vietnam[4]" from 2012 to 2013 to support the standardization of the expressway's O&M. This is in cooperation with the assigned counterparts of the Vietnam Expressway Management Office (VEMO) of the Directorate for Roads of Vietnam (DRVN) through drafting of the O&M manuals.

Table 6.52. Laws and Administrative Decisions Relevant to the Expressways' O&M

No	Date	Type/Organization/No. of Doc.			Title
1)	Nov. 13, 2008	Law		23 / 2008 / QH2	Road Traffic Law
2)	Jan. 4, 2010	Report	PMU My Thuan	15/PMU MY-TCB	Approval of the Plan for Temporary Management of HCMC-Trung Luong Expressway (Phase 1) (adjusted, supplemented to Report 5196/PMUMT-TCB dated December 25, 2009)
3)	Jan. 20, 2010	Decision	MOT	181/QD-B GTVT	Approval of the Plan for Management Organization, Temporary Operation of HCMC-Trung Luong Expressway
4)	Jan. 21, 2010	Decision	MOT	195/QD-B GTVT	Temporary Regulation on Management and Operation of Ho Chi Minh City-Trung Luong Expressway
5)	Feb. 17, 2011	Decision	MOT	266/Qd-B GTVT	Temporary Regulation on the Maintenance of Ho Chi Minh City-Trung Luong Expressway

Source: Quotes from the "Project Formation Study on the Operation and Maintenance of Expressway in Vietnam"; The Ministry of Economy, Trade and Industry of Japan, March 2010, P 3-17"

6.3.1.2. Administrative Decisions Relevant to Toll Fee and Charge

(1) Administrative Decisions Relevant to Toll Fee and Charge

Details of the administrative decisions relevant to the toll fee and charge for using HCMC-Trung Luong Expressway and toll roads/toll bridges in Vietnam are shown in Table 6.53. The most important document, among others is the "Guiding the Regime on Collection, Payment, Management and Use of Road Toll" which concerns the collection, payment,

[4] Draft O&M manuals deals with pavement, bridges, electrical facilities (not including ITS component), traffic management and traffic control (not including ITS component). The draft O&M manual has been prepared for the "Project for Strengthening Operation and Maintenance for Expressway in Vietnam". On-the-job training and pilot implementation using the draft manuals will be carried out. Feedback and lessons learned from its pilot implementation are to be incorporated in materializing O&M manuals by MOT/DRVN.

management and use of toll fees and charges. It was issued by the circular of the Ministry of Finance on September 7, 2004. Consequently, all matters concerning the toll fee for all toll roads/toll bridges in Vietnam are governed by this circular. The outline of this circular is shown in Table 6.54.

Table 6.53. Administrative Decisions Relevant to Toll Fee and Charge

No	Date	Type/Organization/No. of Doc.			Title
Relevant to HCMC-Trung Luong Expressway					
1)	Jul. 28, 2009	Report	MOF	77/BC-BTC	Regarding the concession of toll collection rights of the Ho Chi Minh-Trung Luong Expressway to banks for the investment and development of Vietnam
2)	Aug. 15, 2011		MOT	4895/BGTVT-TC	BIDV's request for scheme and concession contract for toll collection rights of the HCM City-Trung Luong Expressway.
3)	Sep. 21, 2011	Address	MOPI	6321/BKHĐT-CSTĐĐT	Scheme and contract for concession of HCM-Trung Luong Expressway project
Relevant to Toll Road/Toll Bridges in Vietnam					
4)	Aug. 16, 1997	Circular	MOF	53/TC/TCT	Guideline procedures for collection, payment and management of fees for ensuring inland waterway traffic, order and safety
5)	Jun. 3, 2002	Decree	GOV	57/2002/ND-CP	Detailing the implementation of ordinances on charges and fees
6)	Jul. 29, 2004	Circular	MOF	76/2004/TT-BTC	Instruction for collection, remittance, management and usage of fees and charges in road transportation
7)	Sep. 7, 2004	Circular	MOF	90/2004/TT-BTC	Guiding the regime on collection, payment, management, and use of road toll
8)	Jul. 28, 2010	Decision	DRVN	1270/QD-TCDBVN	Promulgation of “Regulations for authorization of power and responsibility of DRVN in the management of investment into repairs conducted in the National Highway system”, with the usage of economic road fund and revenues collectible from ferry fee
9)	Apr. 28, 2011	Resolution	HCMC People’s Committee	03/2011/NQ-HDND	Adjustment of road charges for toll gates at Binh Trieu 2 Bridge

Source: JICA Survey Team

Table 6.54. Outline of the Circular "Guiding the Regime on Collection, Payment, Management, and Use of Road Toll", Sept. 7th, 2004

Items	Details
Outline	■ The Ministry of Finance has notified the general toll collection scheme applicable to all toll roads, payment, management and use in Vietnam。 ■ Contents of this notice is composed of five parts, i) General Provisions, ii) Toll road fee by types of road, iii) Updating and management of road charge table and its use, and toll collection, iv) Toll road operator's responsibility and manner of penalizing the violation, v) deployment and implementation of toll fee system. Toll fee tables attached.
Main Points of Toll Collection	■ Toll fee rates charged at toll gate of government-invested toll roads are universal, and toll fee rates are defined by the toll rate table attached to the Circular. ■ Toll rate for passenger cars with less than 12 seats is 10,000 VND per vehicle ■ Minimum distance of two adjacent toll gates shall be more than 70 km. ■ Toll rates of toll roads invested by private funds such as BOT shall not exceed twice the toll rate of toll roads invested by the state budget. ■ Before road operators remit the collected money from the toll fees to the national treasury, road operators can subtract the amount of the defined ration (%) from the collected money in which its detailed definition is as follows. ■ Road operators can subtract 20% of the collected money. ■ 5% of the collected money will be remitted to Vietnam Road Administration (VRA) for investment for the modernization of toll collection technology, and the remaining 15% is to be used for toll collection work

Source: Quotes from "Project Formation Study on the Operation and Maintenance of Expressway in Vietnam" The Ministry of Economy, Trade and Industry of Japan, March, 2010, P13 - P 17

(2) Toll Fee Revision Procedures

No rules and procedures for toll rate revision are given in the above mentioned "Guiding the Regime on Collection, Payment, Management, and Use of Road Toll". As a matter of fact, the road operator (Cuu Long CIPM as mentioned below) of HCMC-Trung Luong Expressway has been collecting the toll fee in accordance with the Circular (14/2012/TT-BTC), which became effective on February 7, 2012. However, in response to the criticism that the toll rate of vehicle category five (lorry) is expensive, Cuu Long CIPM (Cuu Long Corporation for Investment, Development and Project Management for Transportation Infrastructure) has revised the rate from VND 8,000 /km to VND 6,000 /km on August 31, 2012, in accordance with the rate revision procedures shown in Table 6.55. Since the responsible organization of this expressway project is MOT, the project cost shall be reimbursed to the government. Therefore, the rate revision mandates the approval of the Prime Minister. On the other hand, the Vietnam Expressway Corporation (VEC) is capacitated to undergo its own rate revision without resorting to revision procedures for the Cau Gie-Ninh Binh Expressway. Unlike Cuu Long CIPM, VEC is the responsible organization of this project. VEC needs to redeem the project cost by itself. [5]

[5] Regulated by the document Prime Minister's Decision/1202/QD-TTg/Sep. 10, 2007.

Table 6.55. Outline of the Circular "Guiding the Regime on Collection, Payment, Management, and Use of Road Toll", September 7, 2004

Step	Procedure	Type/Date/ No. of Doc.		Title
Decision of initial toll rate	Determine the toll rate	Circular	2012/Feb. 7 14/2012?TT-BTC	Stipulating the rates and collection, remittance, management and use of road tolls for the Ho Chi Minh City-Trung Luong Expressway.
Rate revision Step 1	MOT applies the rate revision to MOF	Recommended official letter	2012/June 28 5040/BGTVT-TC	In response to the request of MOT specified in the Official Letter No. 5040/BGTVT-TC dated June 28, 2012 regarding the toll bridge on National Highway No.1, section Binh Chanh-Trung Luong, and the applicable toll rate revision on HCM-Trung Luong Expressway, the Government Vice Minister Hoang Trung Hai agrees, on behalf of the Prime Minister
Step 2	Application of rate revision to the Office of the Prime Minister, submitted by MOF	n/a	n/a	n/a
Step 3	Approval of the rate revision from the Office of the Prime Minister	Opinion of the government office	2012/July 17 5244/VPCP-KTTH	Addition of trade promotion activities from the last six months of 2012
Step 4	MOF issues the approval letter of the rate revision to MOT	Circular	2012/August 31 143/2012/TT-BTC	Modification of Circular 14/2012/TT-BTC dated July 2, 2012 for the Financial Regulation Mode for Toll Rates, Payment, Management Fee and the Use of Collected Money From Ho Chi Minh-Trung Luong Tolls

Source: JICA Survey Team (based on the interview with Cuu Long CIPM on September 25, 2012)

6.3.1.3. Legislation of ITS

The legislation concerning ITS is shown in Table 6.56.

Table 6.56. Legislation of ITS

Number and Date Issued	Contents	
	Item	Description
MOT Decision 2530/BGTVT-KHCN	CCTV Monitoring	Digital IP Camera with pan-tilt and zoom functions (PTZ Camera)
	Vehicle Detection	Image recognition type detector (traffic detection, traffic volume and traffic flow speed (VDS) function)
	Type of ETC System (Road-to-vehicle communication for ETC)	Passive RFID type
MOF Circular No.90/2004/TT-BTC	Toll Charging Principle (Access Control) for Highway	Open system
	Toll Rate Principle for Highway	Flat tariff system
TCCS 01: 2008/VRA	Semi-automatic Toll Collection	Barcode ticket system
TCVN 4054:2005	CCTV Camera	CCTV camera installation height shall be 4.75 m or more at the road typical section, and 4.00 mm at tunnel section, in accordance with the limit construction clearance.

Source: JICA Survey Team

6.3.2 Principal Policy Concerning the Expressways' O&M in Vietnam

6.3.2.1. O&M Standard

(1) Temporary O&M Regulation

The O&M works of expressways is divided into three major fields - road maintenance, traffic management and toll collection. The regulations applied in these three fields are stipulated in "The Temporary O&M Regulation" as shown in Table 6.57.

Table 6.57. Contents of "The Temporary O&M Regulation"

Categories	Items	Details	Work Field
Technical Direction for O&M	1) Traffic Management	Expressway inspection and patrol Traffic count	Traffic Management
	2) Cleaning	Cleaning median strip, traffic signs and guard rails Plant trimming and grass cutting Cleaning accident sites Cleaning and removing obstacles	Road Maintenance
Guidelines of Maintenance for Embankment and Bridge	1) Technical criteria for the evaluation of drainage system, embankment and pavement	Inspection and evaluation of the condition of embankment, pavement and drainage Inspection and evaluation of the conditions of auxiliary construction works Technical criteria employed in evaluating the auxiliary construction works	Road Maintenance
	2) Inspection and evaluation of the condition of culverts, bridges and other construction works	Inspection and evaluation of the condition of bridge and other construction works Technical criteria employed in evaluating the quality of bridges and other works	Road Maintenance
	3) Maintenance works for embankment and drainage system	Damages on embankment and drainage system Routine, periodic and emergency maintenance for embankment and drainage system	Road Maintenance
	4) Maintenance works for asphalt concrete pavement	Damages on asphalt concrete pavement Routine, periodic and emergency maintenance for asphalt concrete pavement	Road Maintenance
	5) Maintenance of cement concrete pavement	Damages on cement concrete pavement Routine, periodic and emergency maintenance for cement concrete pavement	Road Maintenance
	6) Maintenance of auxiliary works	Damages on auxiliary construction works Routine, periodic and emergency maintenance for auxiliary construction works	Road Maintenance
	7) Maintenance and repair for structural parts	Damages on structure works Routine, periodic and emergency maintenance for structure works	Road Maintenance
	8) Technical guidelines for maintenance and repair of other technical infrastructure works	Damages on technical infrastructure works Routine, periodic and emergency maintenance for technical infrastructure works Maintenance of lighting system	Road Maintenance
	9) Repair of damages to accessories caused by vehicles:		Traffic Management
	10) Work safety and traffic management during maintenance	Work safety in expressway management Traffic safety assurance in expressway maintenance	Traffic Management
	11) Labor safety and traffic	Labor safety during maintenance works /	Traffic

	safety assurance during maintenance of works	Assurance of traffic safety during maintenance works	Management
Technical Norms for O&M	1) Basis for the development of standards for O&M	—	—
	2) Some applicable regulations	—	—
	3) Standards for management and inspection works	Technical standards for management and inspection works Composition of management and inspection works	—
	4) Standards for maintenance and repair of road, bridges and the other Works	General provisions Contents of technical standards	—

Source: "Temporary Regulation on the Maintenance of HCMC-Trung Luong Expressway, Decision, Minister of Transport, February 17, 2011"

(2) Contents Required for the O&M Regulation

"The Temporary O&M Regulation" is supposed to cover all aspects of inspection, repair, cleaning and traffic management engaged in the O&M works, as shown in Table 6.57. However, frequency and organizational setup necessary for work systems for each item are hardly described. Also, there is no concrete description about the contents of works.[6] "The New O&M Regulation"was developed on the existing "The Temporary O&M Regulation". It is assumed to supplement the contents of roads/facilities maintenance, traffic control and management, inclusive of emergency countermeasures. A description on toll fee collection system shall be added. Contents needed to be dealt with by the proposed "The New O&M Regulation" are shown in Table 6.58. The contents are comparatively shown with the standards and manuals prepared by one of the Japanese expressway companies. Consequently, the whole set of technical manuals, to be prepared by "The Project for Strengthening Operation and Maintenance for Expressways in Vietnam", which was mentioned in the Chapter 6.3.1.1 will, eventually cover all of the items described in Table 6.58.

Table 6.58. Contents to be Dealt With by The New O&M Regulation

Work Field	Items	Standards/Manuals Maintained by a Japanese Expressway Companies	Needed Descriptions for O&M Regulation
Road Maintenance	Inspection	Road Inspection Manual	Frequency, system, and content of inspection
		Bridge and Structure Inspection Manual	-ditto-
	Maintenance Plan	Road Maintenance and Repair Manual	Concrete measures of maintenance
		Bridge and Structure Maintenance and Repair Manual	-ditto-
	Supervision	Construction Supervision Manual	Concrete measure of supervision
Traffic Management	Traffic Regulation	Traffic Patrolling Manual	Concrete measure of patrol
		Traffic Regulation Procedure Manual	Traffic management and control on, regulating the lanes
	Wireless	Wireless Communication Manual	Maintenance and operation method of equipment
Toll Collection	Toll Collection Works	Toll Collection Works Manual	Concrete means of toll collection
	Toll Collection Machines	Toll Collection Machines Maintenance Manual	Maintenance and operation method of equipment

[6] Quotes from "Project Formation Study on the Operation and Maintenance of Expressway in Vietnam" The Ministry of Economy, Trade and Industry of Japan, March 2010, P3-38"

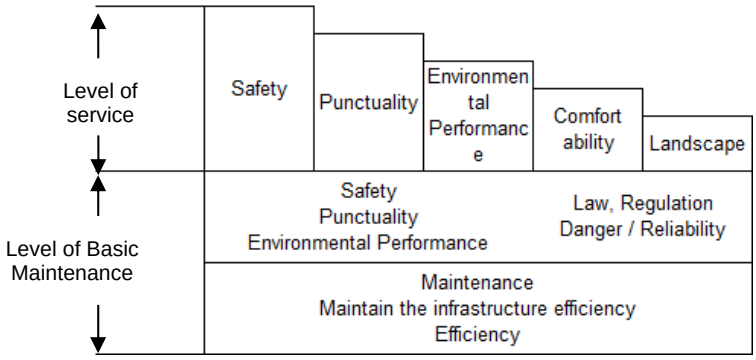
Emergency Countermeasures	Traffic Accident	Traffic Accident Countermeasure Manual	Role and content of work of each organization
		Traffic Accident Countermeasure Manual During Maintenance Works	-ditto-
	Emergency	Traffic regulation for natural disaster, abnormal weather, etc.	Traffic regulation standard value and content of work
Standards and Manuals to be established (Besides the above O&M Regulation)			
Specification of Works	—	Specifications for road maintenance works	Specifications based on contract standard
		Specification for facilities maintenance works	-ditto-
Design Standards	Design Manual	Expressway, pavement, drainage etc.	Design manual for the entire expressway
		Bridge, culvert, tunnel etc.	-ditto-
		Auxiliary facilities (traffic safety, traffic management)	-ditto-
		Facilities (building, electrical, communication)	-ditto-
		Planting	-ditto-

Source: JICA Survey Team

6.3.2.2. Basic Policy of Expressways' O&M

(1) Functionalities and Performance of Expressways Demanded by the Society

The expressway administrator shall take into account the "level of basic maintenance" and "level of service" during its conduct of O&M works. The "level of basic maintenance" defines a role that the expressway shall deliver in response to the society, namely to constitute basic performance. On the other hand, "level of service" is a target to be pursued by each expressway operator to maintain a suitable service performance level. Figure 6.56 shows the relation between "level of basic maintenance" and "level of service". However, there are no clear boundaries between the two. Generally, these two are combined to determine the "level of service". In this JICA Survey, the "level of service" means that both policies are combined.



Source: "Expressway Maintenance Technique" Central Japan Highway Engineering Company, December 2008, P11

Figure 6.56. Social Responsibility of Expressways

(2) Standard Functional Performance for Expressways

"Level of service" is largely defined by its road structure and road surface conditions, which are largely determined by inspection frequency, traffic volume, traffic quality and the occurrence of traffic accidents. Therefore, "level of service" is divided into five performance

categories such as safety, punctuality, environmental performance, comfort ability and landscape amenity of the expressway. Performance indicators together with designated norms in each category are shown in Table 6.59.

Table 6.59. Performance Indicators and Designated Norms

Performance Categories	Performance Indicators	Example of Setting Indicators
Safety	Driving at a specified range of speed, and safe arrival to the destination.	・ Number of traffic accidents, traffic accident ratio
		・ Pavement evaluation criteria: Rutting depth (25 mm),Skid resistance (0.25), Longitudinal profile (8 mprofiel 90(PrI)), Cracking ratio (20%), and size of pothole (D =20 cm)
Punctuality	Savings in traveling time, and ensuring the convenience for road users	・ Vehicle speed is secured at 80 km/h during normal hours ・ Vehicle speed is secured at 60 km/h during peak hours
		・ Reducing the hours of congestion
Environmental Performance	Mitigating harmful impacts caused by operating the expressway.	・ Impacts of noise, vibration, light, and bad or dour (impacts on air, the soil, and water) shall be mitigated.
		・ Reduction of pollutant emissions by the road traffic
		・ Reduction of noise from the road traffic.
Comfort ability	Extent of driving comfort ability	・ Reducing the stressperceivet by the road users ・ Reducing negative impacts on the drivers and passengers.
		・ IRI as the indicator
Landscape Amenity	Enjoying the convenience and happiness of the expressway by residents around the expressway and the expressway users	・ Evaluation of road users
		・ Perception yfrom residents adjacent to the expressway

Source: "Expressway Maintenance Technique" Central Japan Highway Engineering Company, December 2008, P 12 - P 13

(3) Measures to Keep the Operation Ratio of the Expressway

In general, "level of service", shown in Table 6.59, shall be determined by taking account of securing safety, punctuality, environmental performance, comfort ability and landscape amenity. On the other hand, to ensure the stable function of the expressway, it is necessary to enhance its operation ratio[7] or decrease the period of road closure. In order to increase the operation ratio (i.e. to reduce the expressway's closed time) of the expressway as much as possible, it is necessary to keep a condition for securing safety, punctuality, environmental performance, comfortability and landscape amenity. Risks of reducing the operation ratio versus necessary concrete countermeasures are shown in Table 6.60. The operation ratio of the expressway will be increased in accordance with the road operator's practice of O&M works by the designated "level of service". "Level of service" is finally determined by considering the measures to increase the operation ratio and by securing safety, travel, environmental performance, comfort, and landscape amenity in each expressway.

[7] Operation ratio=(total operating hours per year – hours of road closure)/ total hours per year

Table 6.60. Causes of Reduced Operation Ratio Versus Countermeasures

Items	Causes of Road Closure	Countermeasures
Expressway Closure by Natural Disaster	Expressway is physically damaged due to meteorological conditions, preventing a safe drive.	· Advance detection and repair of damages. · Strengthen sufficient patroling and urgent repair capacity.
	Preventive closure of expressways due to meteorological conditions. Avoid risks of high speed driving.	· Installation of the real-time weather data collection system. Building a weather monitoring system.
Expressway Closure by Traffic Accident	Lane closure due to occurrence of multiple accidents at one time	· Create an emergency setup to be prepared for traffic accident.
	Lane closure due to incidences of rolling heavy vehicles, scattered loads occupying a strip of pavement space.	· -ditto-
	Lane closure due to spill of inflammable, hazardous or toxic substances	· Since different treating/neutralizing/processing methods are applicable to respective substances of different chemical nature, a prior exercise with established knowledge based on hazardous/poisonous/toxic/inflammable materials is demanded.
Influence on Traffic by Traffic Congestion	—	· Comprehension on real-time of emergence of congestion sections · Prepare a manual on traffic management and control method in response to the traffic congestion alert
Influence on Traffic by Defective Construction	—	· Improve quality control during construction supervision, thereby ensuring reduced incidences of road defects and damages.

Source: JICA Survey Team

6.3.3 O&M Execution Method of TL-MT Expressway

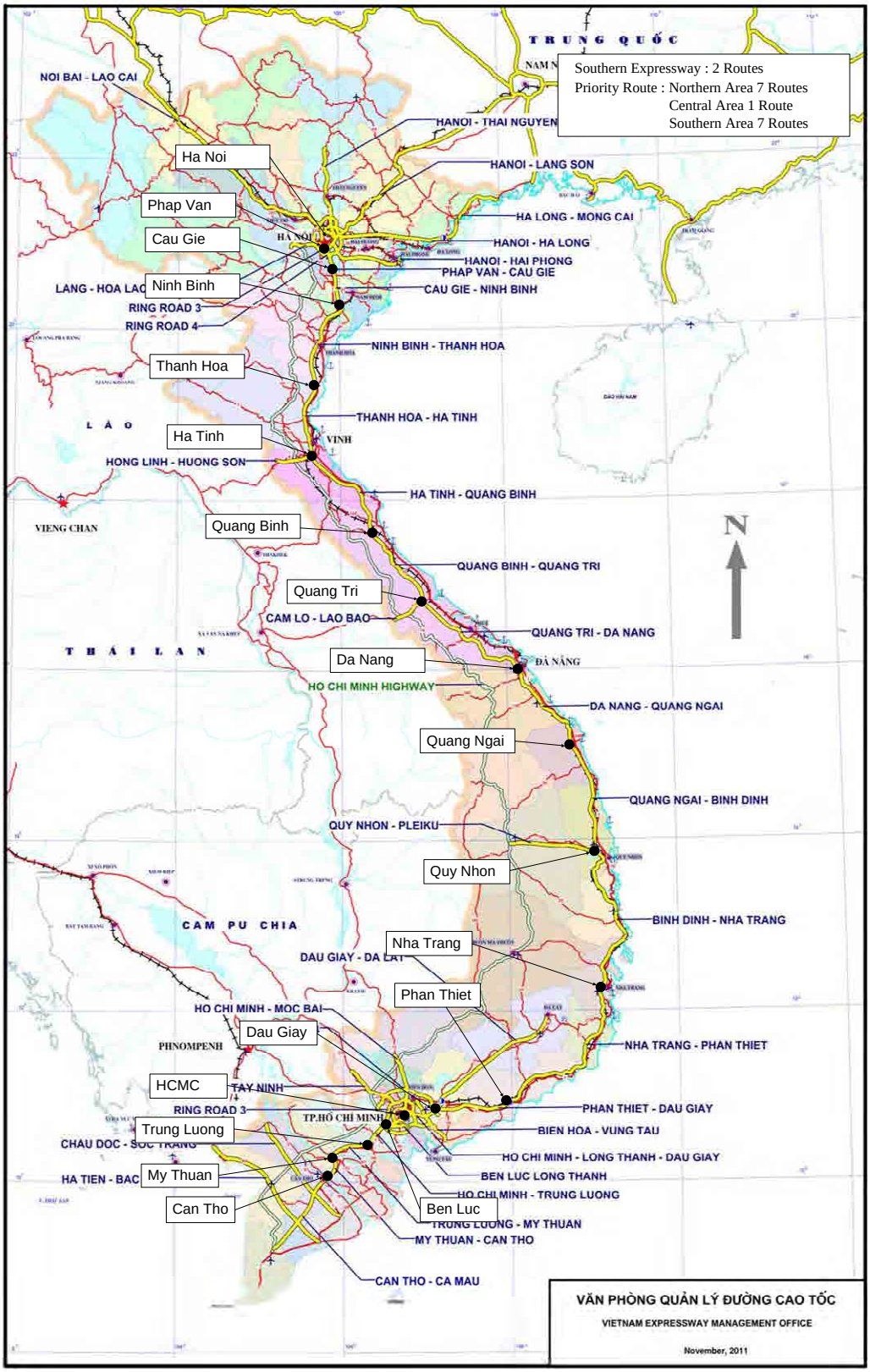
6.3.3.1 Progress of Expressway Projects in Vietnam

To explore possible means of O&M implementation suitable to the TL-MT Expressway, implementation manner and modality of the O&M of other ongoing expressway projects in Vietnam are comparatively examined. The progress status of each expressway project is shown in Table 6.61, with their geographical location shown in Figure 6.57. Many South Korean and Chinese companies are seen to participate in the design works of ongoing projects, henceforth, it is inferred that the different countries' design concept and standards are expected to be reflected in those works. Therefore, it is necessary to consider systems integrity among the preceding and succeeding sections in O&M works, particularly with ITS operation. The HCMC-Trung Luong Expressway is the first expressway of its kind to put into service in Vietnam. This serves as a good reference for considering the O&M implementation plan of the TL-MT Expressway. The following section has given consideration to O&M works being implemented in the HCMC-Trung Luong Expressway.

Table 6.61. Progress of Expressway Projects

No	Name of Expressways	Length (km)	Project Cost (USD million)	Implementing Agency	Finance	Current Status	Remarks
0	Phap Van–Cau Gie (Widening)	30	n/a	N/A	n/a	F/S	
1	Cau Gi–Ninh Binh	50	n/a	N/A	SB, CB	Open 2012	A Chinese institute in Guangxi executed its D/D
2	Ninh Binh–Thanh Hoa	121	1,400	SB Requested	PPP	F/S	Vietnamese cement company VIETTEL is implementing its F/S.
3	Thanh Hoa–Ha Tinh	97	n/a	n/a	n/a	F/S	
4	Ha Tinh–Quang Binh	145	n/a	n/a	n/a	Pre-F/S	
5	Quang Binh–Quang Tri	117	n/a	n/a	n/a	Pre-F/S	
6	Quang Tri–Da Nang	182	n/a	n/a	n/a	Pre-F/S	
7	Da Nang–Quang Ngai	130	1,258	PMU85 or VEC	WB/ JICA	D/D	
8	Quang Ngai–Binh Dinh	170	n/a	n/a	n/a	Pre-F/S	
9	Binh Dinh–Nha Trang	215	n/a	n/a	n/a	Pre-F/S	
10	Nha Trang–Phan Thiet	226	n/a	n/a	n/a	Pre-F/S	
11	Phan Thiet–Dau Giay	98	803	SB Requested	PPP	F/S	BITEXCO is implementing its F/S.
12	Dau Giay–Long Thanh	43	932	VEC	ADB/ JICA	U/C	
13	Long Thanh–Ben Luc	58	1,212	VEC	ADB/ JICA	D/D	Under D/D
14	Ben Luc–Trung Luong	37	n/a	n/a	SB	Service Commenced at Feb.,2012	South Korea has lent USD 30 million for ITS, and KEC to execute the D/D
15	Trung Luong-My Thuan–Can Tho	92	n/a	n/a	BOT PPP	D/D PPP F/S	TL-MT is the target section of JICA PPP Study

Note: F/S = Feasibility Study, Pre-F/S = Pre-Feasibility Study, D/D = Detailed Design, SB = State Budget, CB = Construction Bond, ODA = Official Development Assistance, U/C = Under Construction, BOT = Build-Operation-Transfer, PMU = Project Management Unit
Source: JICA Survey Team



Source: ADB

Figure 6.57. Expressway Networks in Vietnam

6.3.3.2 Actual O&M Conditions of the HCMC-Trung Luong Expressway

(1) Outline of Route

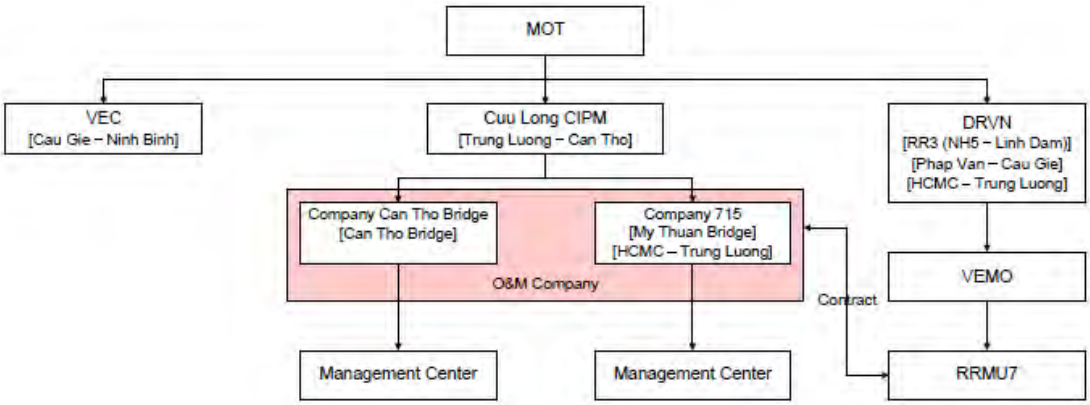
The HCMC-Trung Luong Expressway was developed based on the MOT Decision No. 1286/QD-TTg 12/06/2004. It started its operation on February 3, 2010. Expressway length is 39.8 km, with length of access roads to interchange at 22.1 km. Service roads have been installed on both sides of the expressway with a 61.85 km total length.[8]

(2) Organization for O&M

1) Outline of O&M Organization

The HCMC-Trung Luong Expressway, which PMU My Thuan (Project Management Unit of My Thuan) took charge of construction, was operated as a free expressway since its commencement of service on February 3, 2010. During the two years defect liability period, from February 2010 to February 2012, O&M works for this expressway are borne by the firm Cuu Long CIPM, which PMU My Thuan transformed as a responsible organization. The Expressway Management Center is a division of Cuu Long CIPM which has taken responsibility for the expressway's O&M works. Road maintenance works and rescue operation for traffic accidents are undertaken by specialized companies (outsourced companies) where the expressway police reside.

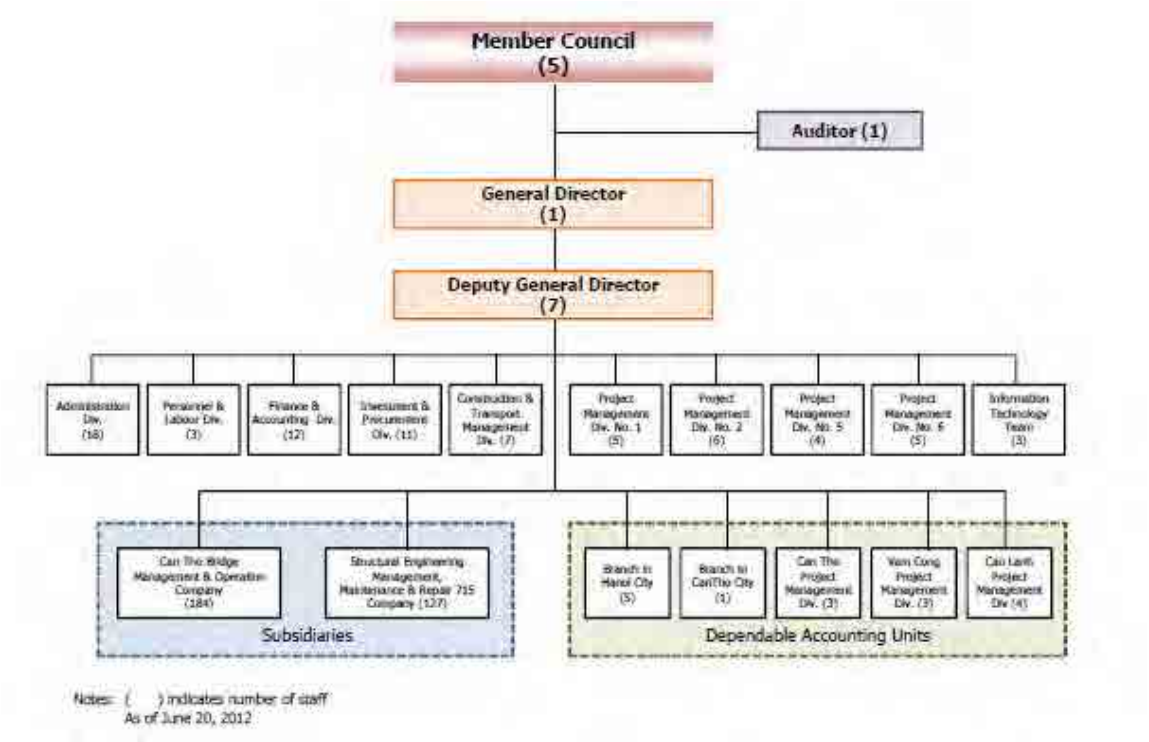
After the expiry of defect liability period (from February 25, 2012), Cuu Long CIPM has become responsible for the operation of the HCMC-Trung Luong Expressway. In addition, Company 715, a subsidiary company, undertakes the expressway's traffic management, control and toll collection. The Expressway Management Center continues to provide a venue for field work, where specialized outsourced companies carry out the traffic management works, such as traffic accident rescue works as stipulated by the contract, and traffic police is engaged in reinforcing countermeasures against traffic accidents. On the other hand, the responsibility for maintenance is transferred to RRMU7 (Regional Road Maintenance Unit No.7) under DRVN. Therefore, DRVN has become the implementing organization. Actual maintenance works for roads, structures and facilities in the field are undertaken by Company 715 residing at the Expressway Management Center under contract with RRMU7/DRVN. Figure 6.58 and Figure 6.59 show the Expressway Organizations in Vietnam and Organization Chart of Cuu Long CIPM respectively.



Source: JICA Survey Team

Figure 6.58. Expressway O&M Organizations in Vietnam

[8] Starting Point: Cho Dem intersection, Binh Chanh District - Ho. Ho Chi Minh, Ending Point: Than Cuu Nghia interchange, Chau Thanh district-Tien Giang province, HCMC - Ben Luc: 11km, Ben Luc - Tan An: 15km, Tan An-Than Cuu Nghia: 14km, Tan Tao-Cho Dem link: 9.6 km, Cho Dem - Binh Thuan link:3.7 km, The linking road between Than Cuu Nghia Interchange with Provincial Expressway 878 and NH1: 6.5 km



Source: JICA Survey Team

Figure 6.59. Organizational Chart of Cuu Long CIPM

2) O&M Responsible/Implementing Organizations

Table 6.62 describes the outlines and roles of Cuu Long CIPM, Company 715 and Expressway Management Center as O&M responsible/implementing organizations.

Table 6.62. Functions of O&M Entities for HCMC-Trung Luong Expressway

Name of the Entity	Organization and Roles	Outline
Cuu Long CIPM	Organization	Director General, Deputy Director General, i) Administration Office, ii) Personnel Div., iii) Finance & Accounting Div., iv) Investment Division, v) Construction Management Div., vii) Project Management Office (future), No. of Staff (102 persons (70% of which are technical staff))
	Roles	Preparation of O&M plan, management of O&M budget and works etc.
Company 715	Organization	N/A
	Roles	Road and bridge maintenance and toll collection works for the national highways, My Thuan Bridge, and Can Tho Bridge
Expressway Management Center	Organization	Director, Deputy Director, i) Administration and accounting (4 persons), ii) Road inspection (6 persons), iii) Office cleaning and cooking (3 persons), iv) Driver (4 persons) No. of Staff (total: 19 persons, included technical staff: 7 persons)
	Roles	Road maintenance works and traffic patrolling by Expressway Management Center (Toll collection by Company 715. Other works such as rescue, ambulance, and firefighting are undertaken by outsourced companies)

Source: JICA Survey Team (based on the interview conducted with Cuu Long CIPM on February 22, 2012)

3) Outsourced Companies

All the three major expressway O&M works namely, i) roads and facilities maintenance, ii) traffic management and control, and iii) toll collection, are basically undertaken by the outsourced companies as described in Table 6.63.

Table 6.63. Outsourced Companies Engaged in Three Work Fields (HCMC-Trung Luong)

Work Category	Kind of Works	Items	Outline of Outsourced Companies
Roads and Facilities Maintenance			
Road Maintenance	Road Maintenance	Name	Direct operation by Expressway Management Center
		Location	Site office located near Ben Luc IC
	Road Inspection	Name	Direct operation by Expressway Management Center
		Location	Head office of Expressway Management Center
	Asset Management	Name	Direct operation by Expressway Management Center
		Location	Concurrently at the time of traffic patrol
Facilities Maintenance	Electric, Lighting	Name	Direct operation by Expressway Management Center
		Location	Head office of Expressway Management Center
Traffic Management and Control			
Traffic Management	Traffic Patrolling	Name	Direct operation by Expressway Management Center
		Location	Site office located near Ben Luc IC
	Traffic Control	Name	Traffic control system does not exist because information from road users are forwarded to the traffic patroller directly.
		Location	
Emergency Works	Ambulance	Name	Doctors are dispatched from Transportation Hospital of HCMC
		Location	Site office near Ben Luc IC, Ambulance is deployed
	Rescue	Name	Sai Gon Rescue Company
		Location	Site office located near Ben Luc IC
	Fire Engine	Name	Local fire station
		Location	Dispatch from local fire station, whichever is the nearest to the accident site
Toll Collection			
Toll Collection	Toll Collection	Name	Direct operation by Company 715
		Location	Each toll office
Traffic Police			
Traffic Police	Expressway Police	Name	Traffic police by the central government (Traffic Police Force of Road and Railway, Traffic Police Department)
		Location	Head office of Expressway Management Center
	Local Police	Name	Respective local police
		Location	Respective local police offices dispatched to each site of incidence and accident.

Source: JICA Survey Team (based on the interview conducted with Cuu Long CIPM on February 22, 2012)

(3) Actual O&M Works

Road damages on HCMC-Trung Luong expressway have been repaired by the contractor during the defect liability period.[9] Other O&M works have been carried out by Expressway Management Center and outsourcing companies. In addition, after the expiry of the defects liability period, entire O&M works are borne by Company 715, Expressway Management Center and the outsourced companies as described in Subsection (2) 1), Chapter 6.3.3.2. Table 6.64 describes implementing organizations and their detailed works under each work category in three work fields.

[9] Though the defect liability period of HCMC-Trung Luong Expressway was terminated, pavement damages will continuously be repaired by the contractor.

Table 6.64. Actual O&M Works (HCMC-Trung Luong)

Work Category	Implementing Organization	Actual Works
Roads and Facilities Maintenance		
Road Inspection	Expressway Management Center	■ Number of staff: 6 persons (2 teams), all members are engineers. ■ Number of vehicles: 5 pick-ups ■ Frequency of inspection: 1 time/day ■ Organization units of inspection: 1 unit for roads and 1 unit for bridges ■ Items of inspection: pavement, signs, guardrail, painting, delineator, drains, planting, ROW etc. ■ Results of inspection: When damage is found, the maintenance plan (priority, scale of repairing works, repairing cost etc.) is prepared. Note: Inspection technique needs improvement.
Maintenance Plan	N/A	■ N/A
Routine Maintenance	Expressway Management Center	■ Number of vehicles: 1 sweeper, 1 watering, 2 trucks ■ Kind of works: repairing, cleaning, grass cutting etc.
Periodic Maintenance	N/A	■ Not yet done so far. (It is expected to address to such items which require stringent level of maintenance as bridge bearing, expansion joints, pavement etc...)
Emergency Works	Expressway Management Center	■ Road maintenance team carry out the repairing work for damages that demand urgent repair based on the results of the inspection.
Machine, equipment, and material of works	Outsourcing	■ The guardrail and the traffic regulation equipment etc. for the routine maintenance works are to be stored at the Expressway Management Center.
Traffic Management and Control		
Traffic Patrolling	Expressway Management Center	■ Number of staff: 15 persons (3 shift) ■ Number of vehicles: 3 pick-ups ■ Frequency of patrolling: 6 times/shift, 24 hours a day ■ Way of patrolling: Traffic accident report is forwarded to the mobile phone of traffic patroller from road users where they rush to the accident site.
Traffic Patrolling by Expressway Police	Expressway Police	■ Number of staff: 20 persons (2 leaders, 18 staff, 6 persons/shift) ■ Number of vehicles: 2 minibuses, 1 truck, 1 patrolling car ■ Frequency of patrolling: 6 times/shift, 24 hours a day ■ Way of patrolling: The traffic accident report is received by the traffic patroller and they rush to the accident site.
Traffic Accidents Countermeasures	Expressway Police Local police and Expressway Management Center	■ Works are carried out according to "the Temporary O&M Regulation" ■ Procedure of accident report; i) road users call the traffic patroller by mobile phone, ii) traffic patroller orders to mobilize the traffic police and local police, iii) if necessary, traffic patroller mobilizes by contract the following, a) ambulance to facilitate the injured people, b) rescue (towing car), c) fire engine (nearest fire station of each accident) ■ Countermeasures against traffic accidents (local police has responsibilities to handle the accidents); i) police instructs the traffic regulation to keep the smooth traffic flow, ii) the patroller immediately takes measures to ensure traffic safety, iii) pay attention in putting warning signs to restrict the lanes and secure the traffic flow as soon as the accident happens, iv) if necessary, coordinate with the local police to close the road.(note: there are no results that have done the road closed so far.). v) Patroller informs to the center the site situation. (Note: patroller supports the traffic police in these activities.)
Inspection and Investigation of Traffic Accidents	Local Police	■ A criminal identification officer from the local police participates in investigation at the traffic accident site.

Preparation of Traffic Accident Report	Expressway Police and Expressway Management Center	■ Local police prepares the official traffic accident report including date, place, causes, persons and vehicles involved, casualties etc. ■ Traffic patrollers also prepare traffic accident reports describing road damage and repair cost etc. Cuu Long CIPM head office keeps records of monthly traffic accident reports from the center, and analyzes them.
Overloaded Vehicle Regulation	Expressway Police and Expressway Management Center	■ Axle load scales are installed at the outside lane of toll gates at both ends, i.e. at HCMC IC and at Trung Luong IC. ■ Only heavy vehicles are subjected to Axle loads measurement using these scales.
Toll Collection		
Toll Collection	Company 715	■ Toll collection was commenced on February 25, 2012 ■ Closed system is adopted, and drivers receive the IC card at the entrance (Automatic card issuing machines with push-button system are installed) and manually pay toll fees at exits.
Traffic Data		
Traffic Volume	—	■ N/A
Traffic Accidents *since the opening of the expressway	—	■ Frequency of rescue mobilization: 7750 times (Of which, incidences of flat tire: 2917, and engine trouble: 4833) ■ Traffic accidents: 130 accidents (death: 21 persons, injury: 20 persons) ■ Traffic violation:10199, Speeding: 8093
Current status of ITS Development		
Traffic Control System	Cuu Long CIPM	■ Schedule: D/D completed on March 2012, bidding process starts April 2012, contractor selection started July 2012, construction work commenced on July 2012 to be completed by the end of 2013, and ITS service commencement at the beginning of 2014 ■ Finance Source: South Korea Loan
TCC for Expressways in Southern Area	Cuu Long CIPM	■ Location: Area No. 20, Binh Chanh District, HCMC (southern new urban development area) ■ Land for the building: land acquisition is completed ■ Schedule: to be constructed simultaneously with the above-mentioned traffic control system.

Source: JICA Survey Team (based on the interview conducted with Cuu Long CIPM on February 22, 2012)

6.3.3.3 O&M Plan for TL-MT Expressway

(1) O&M Implementing Organization

1) Responsible Organization At Each Development Stage

Responsible organizations at each development stage of the expressway and ITS regarding the HCMC-Trung Luong-My Thuan Expressway are shown in Table 6.65. Cuu Long CIPM takes charge of the HCMC-Trung Luong Expressway by the reason that PMU My Thuan constructed it. Responsible organizations for the TL-MT Expressway may be changed in accordance with the new O&M method to be employed in the future. Assuming that O&M works will be undertaken by the O&M concessionaire of the PPP scheme, Table 6.65 is prepared.

Table 6.65. Responsible Organizations of the HCMC-Trung Luong-My Thuan Expressway Project

Development Stage	Expressway		ITS[10]					
			TCS/ETC[11]		TMS[12]		Southern TM Center (Building)[13]	Equipment for TMS
	HCMC-TL	TL – MT	HCMC-TL	TL - MT	HCMC-TL	TL - MT	Regional	HCMC-TL
Basic Design	PMU My Thuan	BEDC	BEDC	CIPM	PMU My Thuan	PMU My Thuan	PMU My Thuan	PMU My Thuan
Detailed Design		BEDC & CIPM						
Construction /Installation	PMU My Thuan	(ODA portion: CIPM PPP portion: SPC)[14]	BEDC	(SPC)	CIPM	(SPC)	CIPM	CIPM
O&M	Operation: CIPM Maintenance: DRVN	(SPC)	CIPM	(SPC)	(CIPM)	(SPC)	(CIPM)	(CIPM)

Note: ( ) shows the future plans. Without ( ) shows the works that are already implemented or underway.
Source: JICA Survey Team

2) O&M Implementation Plan

An O&M implementation plan suitable for the TL-MT Expressway will be examined taking into account the present O&M implementation state for the HCMC-Trung Luong Expressway. If the PPP scheme is adopted to develop the TL-MT Expressway, an O&M concession scheme in implementing O&M is proposed as one of the advantageous options. The following two options listed below are considered for the O&M concession scheme. The configuration of the two proposed O&M concession schemes are shown in Figure 6.60.

Option-1: Consignment System: A SPC (Joint Venture Company), composed of the Cuu Long CIPM and a Japanese expressway company, is to undertake O&M works based on the consignment contract with MOT. A Japanese expressway company with O&M know-how will be transferred and will implement the O&M works. Investment from SPC is recovered by the commissioned contract from MOT.

Option-2: Concession System: A SPC (Joint Venture Company) composed of the Cuu Long CIPM and a Japanese expressway company is to acquire the O&M concession rights from the

[10] ITS: Intelligent Transport Systems

[11] TCS: Toll Collection System, ETC: Electric Toll Collection System

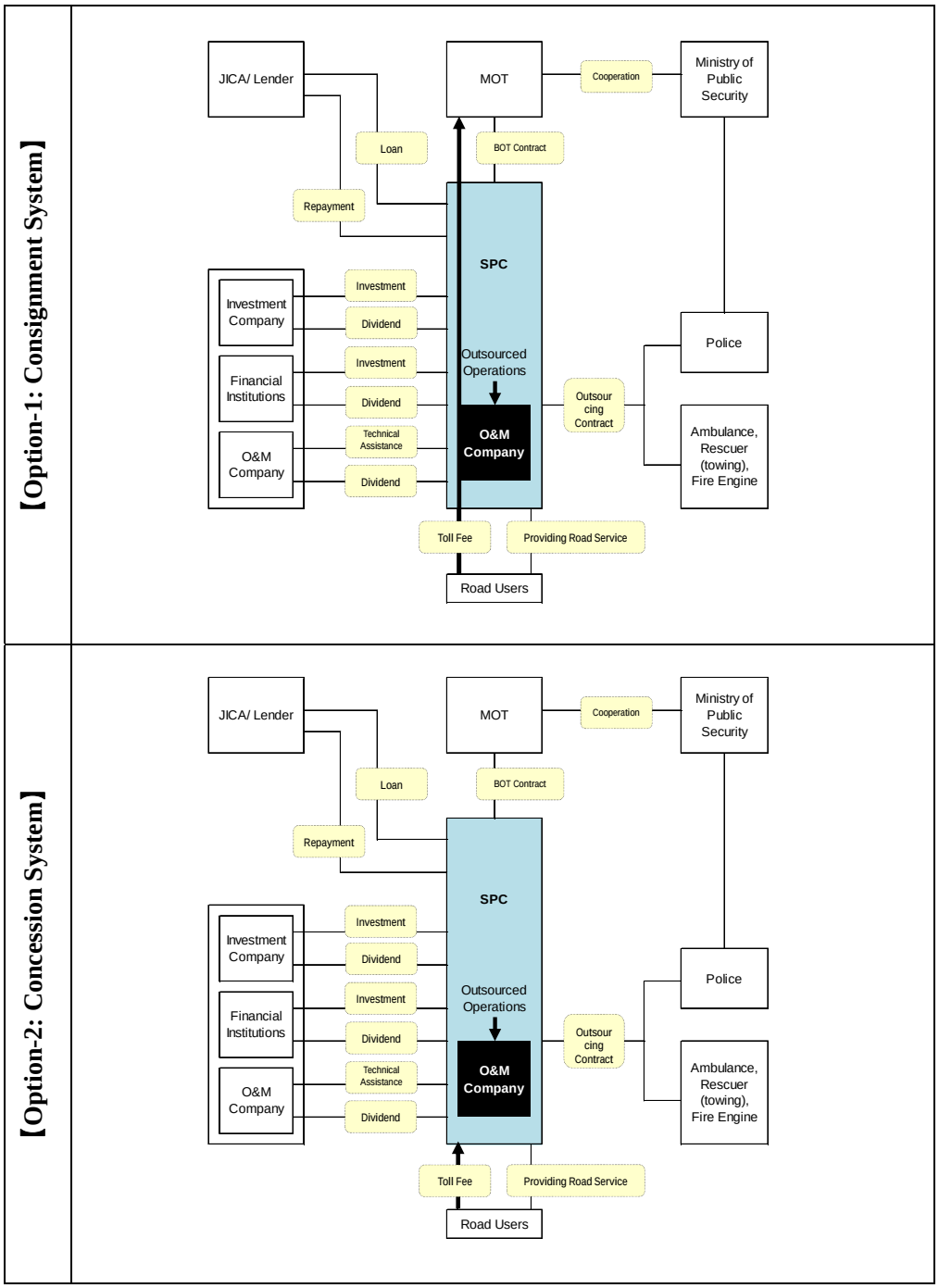
[12] Detailed design for TMS (Traffic Management System), Southern Traffic Management Center (building and traffic control facilities) for HCMC-Trung Luong-My Thuan Expressway had been done by South Korean fund, and ITS (VMS, CCTV, VDS) for HCMC-Trung Luong Expressway is being developed by the South Korean fund). Moreover, both countries have signed a memorandum of understanding to implement ITS development of Trung Luong-My Thuan Expressway by the South Korean fund continuously after the completion of the construction of ITS in HCMC-Trung Luong Expressway in 2014. Therefore, if the O&M concession of Trung Luong-My Thuan Expressway is not realized, ITS for this expressway will be developed also with the support of the South Korean fund. (South Korean fund: EDCF (Economic Development Cooperation Fund))

[13] Daeyeong Ubitec (South Korean company) has done its "Consulting Service on the ITS Project for HCMC – Trung Luong Expressway" based on the contract with Cuu Long CIPM, and the study report was submitted on October 2011.

[14] ITS development for the Trung Luong-My Thuan Expressway has assumed the PPP scheme.

MOT. A Japanese expressway company with O&M know-how will be transferred and will implement the O&M works. Principally, the investment from SPC will be recovered by toll revenue, and SPC will bear the traffic demand risk.

It is assumed that SPC itself will not perform O&M works. Outsourced O&M companies will implement both Option-1 and Option-2 methods.



Source: JICA Survey Team

Figure 6.60. O&M Concession Methods

In comparing the above two proposals, Option-1: Consignment System has an advantage

because SPC wants to avoid the traffic demand risk. However, in order to improve the SPC's profitability, it is important to make an effort to increase the toll revenues collected from road users. Though SPC will adopt Option-1: Consignment System for risk avoidance, SPC will subtract the amount of O&M cost, ITS development cost, etc. before reimbursing the toll revenue to the state treasury. It is desirable to adopt a compromise option between Option-1 and Option-2.

(2) Basic Policy of Implementing O&M for HCMC-Trung Luong-My Thuan Expressway

1) Assumption of the Traffic Condition when HCMC-Trung Luong-My Thuan Expressway Is Put into Service

O&M basic policy is governed by the designated "level of service". However, the service level depends on the traffic condition. In order to set the targeted "level of service" for the TL-MT Expressway, a reference is made to the current state of traffic and the occurrence of traffic accidents of the HCMC-Trung Luong Expressway from its service beginning to date as shown in Table 6.66.

Table 6.66. Traffic Condition of HCMC-Trung Luong Expressway

Section	**HCMC-Trung Luong**		
Name of IC	**HCMC-Ben Luc**	**Ben Luc-Tan An**	**Tan An-Than Cuu Nghia**
Traffic Volume (year 2011)	n/a (v/day)	n/a (v/day)	n/a (v/day)
	· Traffic is counted manually at the point (10+200 km) for three days every month. According to the survey, the traffic is about 20,000 v/day and the seasonal traffic change is not significant.		
Traffic Accidents (year 2011)	n/a (accidents)	n/a (accidents)	n/a (accidents)
	· Around 6,700 traffic accidents (including wrecked vehicle) occurred, with 18 deaths and dozens injured. Majority of the accidents occurred at night. Accident types include tire explosion, over-speeding vehicles, violating correct spacing regulations, and drivers falling asleep. There were 165 incidences of cars crashes on median strips, guard rails and road sides.		

Source: JICA Survey Team (based on the documents from Expressway Management Center)

In assuming the traffic conditions for the TL-MT Expressway when it is put into service, the forecast traffic volume study of the HCMC-Trung Luong-My Thuan Expressway that was conducted by the JICA Survey is shown in Table 6.67.

Table 6.67. Traffic Demand Forecast of HCMC-Tung Luong-Can Tho Expressway

Forecasted Year	**Traffic Volume (PCU/day)**								
	HCMC-Trung Luong			**Trung Luong-My Thuan**			**2nd My Thuan Br**	**My Thuan-Can Tho**	
	HCMC - Ben Luc	**Ben Luc -Tan An**	**Tan An - Than Cuu Nghia**	**Than Cuu Nghia-Cai Lay**	**Cai Lay -Cai Be**	**Cai Be-An thai Trung**	**An thai -Trung Tan Phu**	**Tan Phu -Hoa Phu**	**Hoa Phu-Tra Va**
2015	n/a	n/a	n/a	17,200	9,700	7,500	—	—	—
2020	n/a	n/a	n/a	31,300	22,700	21,300	23,200	12,600	12,300
2025	n/a	n/a	n/a	44,300	34,100	33,500	33,300	20,600	18,800
2030	n/a	n/a	n/a	56,100	41,500	40,900	41,600	28,800	24,900
2040	n/a	n/a	n/a	131,000	106,900	96,700	61,000	45,800	30,200
2050	n/a	n/a	n/a	197,600	168,500	158,000	115,000	97,300	62,200

Source: JICA Survey Team

2) Basic Policy of Implementing O&M for the TL-MT Expressway

O&M basic policy of expressways is governed by the designated "level of service, which then is set by the traffic situation when it is in operation as mentioned above. Determining what "level of service" at present and at forecast time is most critical, since it should most rationally be set by considering the traffic situation of the HCMC-Trung Luong Expressway at present and what "level of service" will be set from the forecasted traffic situation of the TL-MT Expressway in the future. However, there is no concrete stipulation on setting the "level of service" in the Temporary O&M Regulations. Also, there is no explicit statement regarding the present "level of service" in O&M of the HCMC-Trung Luong Expressway. Expecting the possible standards of "level of service" that is going to be shown in the upcoming The New O&M Regulation, it is possible to set the "level of service" of the HCMC-Trung Luong-My Thuan Expressway by discussing it with the O&M implementing agency. Targeted "level of service" at disaggregated level will then be materialized through dialogs with relevant officers as shown in Table 6.68. Moreover, this "level of service" serves as principles of the O&M implementation plan for the TL-MT Expressway which will be described in the succeeding chapter.

Table 6.68. "Level of Service" of HCMC-Trung Luong-My Thuan Expressway

Kind of Performance	Example of Setting Performance Indicators	"Level of Service"	
		HCMC-TL	TL-MT
Safety	・ Number of traffic accidents, traffic accident ratio	n/a	n/a
	・ Pavement evaluation parameters: Rutting depth (25 mm), Skid resistance (0.25), longitudinal profile (8 mprofiel 90 (PrI)), cracking ration (20%), size of pothole (D=20 cm)	n/a	n/a
Punctuality	・ Vehicle speed is secured at 80 km/h during normal hours ・ Vehicle speed is secured at 60 km/h during peak hours ・ How to reduce the congestion hours	n/a	n/a
Environmental Performance	・ Noise, vibration, light, and bad odor (The influence on air, soil, and water is considered).	n/a	n/a
	・ Reducing the amount of pollutant emissions by the road traffic.	n/a	n/a
	・ Mitigating noise from the road traffic.	n/a	n/a
Comfort ability	・ Stress perceived by the road user under reduced comfortability ・ Adverse impacts on driving operation.	n/a	n/a
	・ IRI serves a quantative indicator	n/a	n/a
Landscape	・ Aesthetic value perceived by the road users	n/a	n/a
	・ Perception by the residents around expressway	n/a	n/a

Note: "Level of service" will be decided after the discussions with the O&M implementing agency which will be designated in the future.
Source: JICA Survey Team

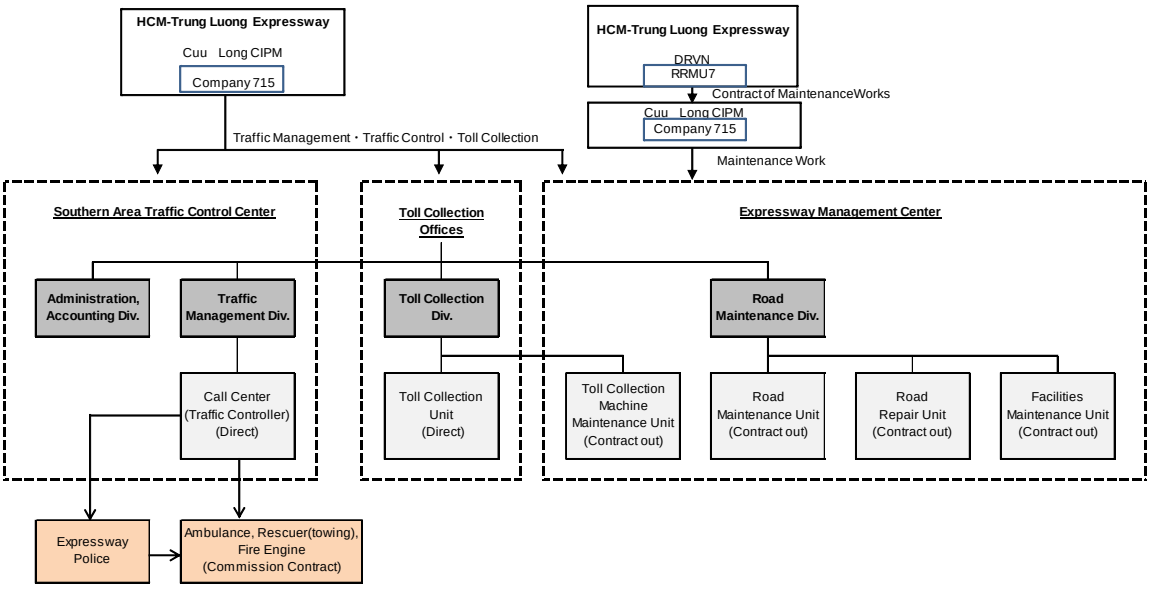
(3) O&M Implementation Policy

The "level of service" to be adopted for the TL-MT Expressway has not been determined so far as described in Subsection (2) 2), Chapter 6.3.3.3. Therefore, necessary setups to launch O&M implementation are presented in the succeeding sections. Organization structure, personnel, equipment, machinery and facilities, etc. for the TL-MT Expressway are proposed with reference to the current state of HCMC-Trung Luong Expressway.

(4) Organization and Personnel Plan of O&M

At present, the Southern Area Traffic Management Center as one of the ITS facilities is under construction by Cuu Long CIPM (location is at the southern new city development area; No. 20, Binh Chanh District in Ho Chi Minh City). Its construction schedule is as follows; i) completion of the detailed design in March 2012, ii) commencement of the bidding procedure in August 2012, iii) commencement of construction in 2012, and iv) commencement of operation in 2014. At the Southern Area Traffic Management Center, staffs from traffic management and control division are stationed in the area. Core staffs of the organization over the entire expressway management works are also stationed. On the other hand, staffs for toll collection works are stationed at offices located near each toll gate. Staffs for road maintenance works are stationed in the existing Expressway Management Center that is located near Than Cuu Nghia toll gate.

Figure 6.61 shows the O&M implementation structure plan for HCMC-Trung Luong Expressway.

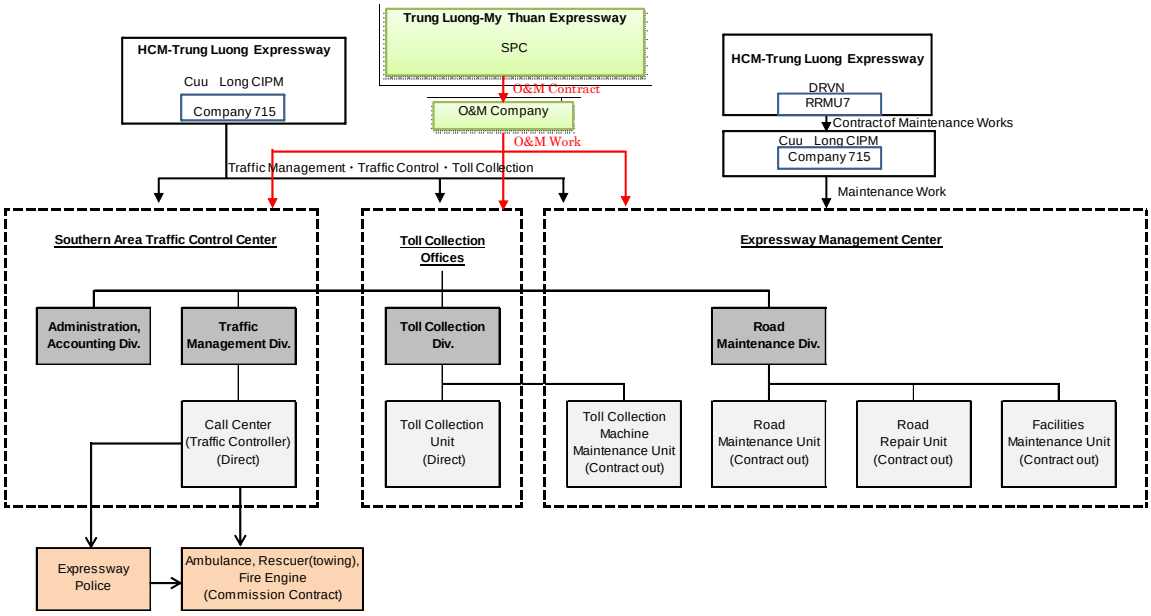


Source: JICA Survey Team

Figure 6.61. O&M Implementation Structure Plan for HCMC-Trung Luong Expressway

1) Organization Chart

The O&M company that will be outsourced from SPC is in charge of the entire O&M works for TL–MT Expressway. For efficient implementation of O&M, it is recommended to utilize the Southern Area Traffic Management Center which is planned to be established for the HCMC-Trung Luong Expressway and the existing Expressway Management Center. Accordingly, the O&M company that will be outsourced for the TL-MT Expressway is assumed to implement the O&M through the organizational structure shown in Figure 6.62.



Source: JICA Survey Team

Figure 6.62. Proposed O&M Implementation Structure for the TL-MT Expressway

2) Personnel and Staffing

The existing Expressway Management Center was established to implement the O&M works of the HCMC-Trung Luong Expressway. Currently, there are 19 personell and staff that are assigned at the center. All O&M works are consigned to outside sources. The staff undertaking O&M works consists of only five personnel stationed at the call center (traffic control division), who receives calls from expressway users. The organization and staffing needed for the O&M company that will be outsourced from SPC for the TL-MT Expressway is shown in Table 6.69 (with reference to the above-mentioned staffing). Since there are no standards in delegating the right staff to be engaged in traffic management and control stationed at the Expressway Management Center, it is expected that this issue shall be stipulated in the upcoming “The New O&M Regulation”.

Table 6.69. Proposed Numbers of Staff at the Expressway Management Center

Org.	No.	Division/Unit	No. of Staff		Remarks
			HCMC-TL Expressway (at present)	TL-MT Expressway	
Expressway Management Center (O&M company outsourced from SPC)	**1**	Director	1	1	—
	2	Deputy Director	0	1	
	3	Administration & Accounting	4	4	
	4	Traffic Management	8	8	including drivers
	5	Toll Collection	0	2	
	6	Road & Facilities Maintenance	3	3	
	7	Others	3	3	staff for office cleaning
		Sub-Total	**19**	**22**	
		person/ km	**0.48**	**0.41**	HCM-TL=39.8 km TL-MT=54.3 km
Outsourcing	**1**	Road Maintenance	n/a	n/a	road maintenance company
	2	Facilities Maintenance	n/a	n/a	facilities maintenance company
	3	Traffic Patrol	n/a	n/a	specialized company
	4	Emergency Countermeasures	n/a	n/a	ambulance, rescue car, fire engine
	5	Toll Collection	n/a	120	direct operation
		Sub-Total	n/a	120+α	
		person/ km	n/a	n/a	
Total			n/a	n/a	
person/ km			n/a	n/a	

Note: HCMC-Trung Luong=39.8 km, Trung Luong-My Thuan=54.3 km

Source: JICA Survey Team

(5) Facilities, Equipment and Material Plan for O&M

1) O&M Office

As described in Subsection (4) 1), Chapter 6.3.1.3, the administration and finance division, and traffic control and management division in the O&M organization of the HCMC-Trung Luong Expressway will be located in the Southern Area Traffic Management Center.[15] The toll collection Division will be located in offices to be built next to the toll gates of each interchange. The outline of existing building of the Expressway Management Center is shown in Table 6.70. The existing building will mostly be used by the road and facility maintenance division. Therefore, it is not necessary to construct a new building for O&M works for the TL-MT Expressway.

Table 6.70. Outline of the Existing Expressway Management Center

Items	Contents
Name of Organization	Expressway Management Center (One of the divisions of Cuu Long CIPM)
Location	Located at near the Than Cuu Nghia Toll Gate
Land Area	5,000 m^2
Building Area	3 buildings (2 buildings for office, 1 building for dormitory and dinning for staff)
Layout of Facilities	Expressway police station including office, and material storage space.
Completion Year	February 3, 2010
Construction Cost	Around VND 7 billion

Source: JICA Survey Team

[15] Daeyeong Ubitec (South Korea) is executing its "Consulting Service on the ITS Project for HCMC-Trung Luong Expressway" by the contract with Cuu Long CIPM. IC/R, submitted in October 2011.

2) Telecommunication System

Currently, communications between the Expressway Management Center and road patrol vehicles use wireless recievers, while communications between the Expressway Management Center and road users are done by public landlines and mobile phones. However, in case of emergencies such as traffic accidents, etc., it is necessary to report the case from the site to the responsible organizations promptly. Therefore, it is necessary to set up a wireless communication system for establishing communication among patrol cars on or near the traffic accident site, the Expressway Management Center and the Southern Area Traffic Management Center. Such telecommunication system will be dealt with under the chapter on ITS facilities.

3) Vehicle and Machines

Since all works for O&M in the Expressway Management Center are executed by outsourced contractors of the HCMC-Trung Luong Expressway at present, they provide all vehicles and machines necessary for O&M works. Therefore, the Expressway Management Center does not need to own vehicles and machines to do O&M works. However, if SPC and the outsourced O&M companies will carry out O&M works for the TL-MT Expressway, the O&M organization should generally have its own vehicles and machines for road maintenance works and traffic management works, especially for emergency countermeasures. Vehicles and machines that should be always owned in it are shown in Table 6.71.

Table 6.71. Proposed Vehicle and Machines to be Owned by the O&M Company

Category	Kind of Works	Vehicle	Unit	Quantity	Remarks
Road Maintenance	Road Cleaning	Sweeper	Vehicle	1	
	Road Cleaning	Watering truck	Vehicle	1	
	All-Purpose Car	Unimog	Vehicle	1	
	Truck	Track with crane	Vehicle	2	
Traffic Management	Traffic Patrol	Patrol car	Vehicle	4	
	Traffic Regulation	Track with sign	Vehicle	4	
	Traffic Regulation	Equipment regulation	set	1	
	Contact Vehicle	Passenger car	Vehicle	4	
Total				**17**	

Source: JICA Survey Team

4) Equipment and Materials

In the HCMC-Trung Luong Expressway, equipment and materials needed for road maintenance works are basically procured or rented by the Expressway Management Center as needed. However for urgent incidents such as disaster, serious traffic accidents etc., it is necessary to keep some equipment and materials, etc. at the site of the Expressway Management Center.

(6) Assumed O&M Works

In the three major fields of O&M works (road maintenance, traffic management, toll collection), details of each work are assumed and shown below, with reference to the work contents for Japanese expressways.

1) Road Maintenance Works

Concrete road maintenance works of the TL-MT Expressway are shown in Table 6.72.

Table 6.72. Assumed Road Maintenance Works

Kind of Work	Details
Road Inspection	・ Regular inspection of pavement and structures, especially bridges which are needed to be regularly inspected (It is important to inspect visually the substructure of the bridge.) ・ Grasp damage situation by the inspection results ・ Preparing the maintenance and repair plan for damage of road and bridge based on the inspection results
Routine Maintenance	・ Regular cleaning of pavement, sign, road illumination, bridge accessory, drainage, etc. ・ Cutting the grass at median strip and road side, and trimming trees
Periodic Maintenance	・ Pavement overlay, replacing the waterproof of bridge slabs, and expansion joints of bridges, etc.
Emergency Works	・ Repair and mending works for damaged road by traffic accidents and natural disasters ・ Repair road damages by emergency works through prioritizing securing the traffic flow, ex-post mending works are planned with budget allocation, followed by implementing mending works.
Rehabilitation Works	・ When the extent and severity of damages is escalating, rehabilitation works are planned for extending the life of roads and structures.
Re-Construction Works	・ When the extent and severity of damages escalate due to increased traffic and aging, large-scale improvement works are needed to maintain the roads and structures from functioning properly. ・ Widening (lane increase), bridge replacement, bridge strengthening, pavement improvement, soft ground countermeasure etc.

Source: JICA Survey Team

2) Traffic Control

Traffic management works and responsibilites shared between expressway administrator and expressway police for TL-MT Expressway are shown in Table 6.73.

Table 6.73. Assumed Traffic Management Works and Shared Responsibilities

Category	Kind of Works	Details	
		Expressway Administrator	**Expressway Police**
Works at normal time	Traffic Patrolling	・ To monitor the traffic flow on the expressway, the traffic patrol staff patrols regularly specified sections of the highway for 24hours. ・ The main works are picking up fallen objects and detecting road damages, rescuing disabled cars, etc. on the expressway. To achieve the mission, it is important to build a system that enables information on the expressway that can be collected real-time from CCTVs, vehicle detectors, and meteorological observation devices excluding patrol.	・ Does traffic patrols like road administrator. ・ The main works are surveillance of traffic flow and enforcement of traffic regulations for violators.
Works in emergency (traffic accident processing	Traffic Management	・ Priotize first the security and safety of traffic on the expressway, and restrict traffic by setting up regulation signs. ・ If the expressway is closed, it is necessary tocooperate with the	・ Same as left

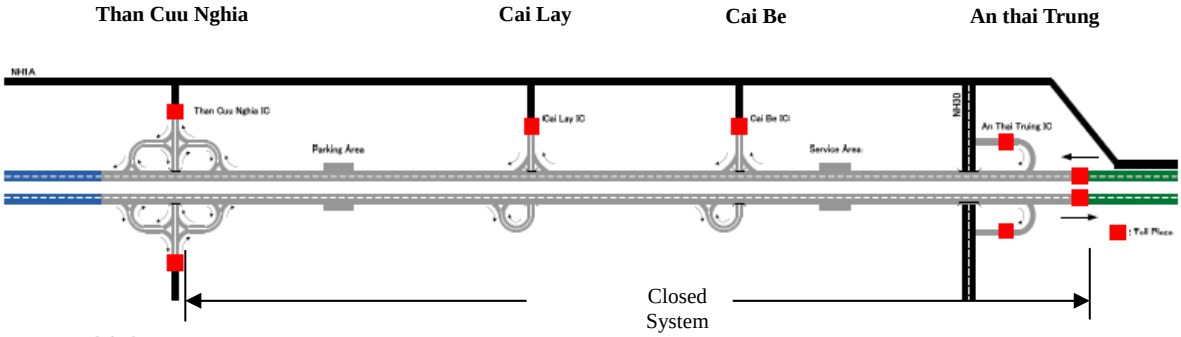
		local police. ・ Detailed work situation should be reported to the Expressway Management Center.	
	Traffic Accident Countermeasure	・ Urgent repair of the road and facilities caused by the traffic accident shall be done. ・ Real repair work is separately done later.	・ The local police are responsible for handling the traffic accidents, with the assistance of the road administrator. ・ Securing traffic flow, regulation of traffic, rescuing people and vehicles involved in accidents, and the investigation of accidents
	Ambulance, fire engine, and rescue car (towing)	・ Supports the local police	・ If necessary, they shall request ambulances for transport of the injured, fire engines, rescue cars (towing car).
	Preparation Accident Report	・ The traffic patrol member also originally makes accident records, where it is reported to Cuu Long CIPM every month. ・ Cuu Long CIPM keeps the accident record and analyzes them.	・ A formal accident record is prepared. (date, place, parties concerned, related vehicle, cause etc. are described in the record.) Inspector from local police station participates to investigate the cause of accident.
Traffic management center		・ Traffic controllers from the expressway administrator are resided round the clock in the office, and traffic information is collected and is transmitted to the responsible organizations based on the collected information. ・ Traffic information is provided to the road users.	・ Expressway police is the responsible organization for traffic regulation. ・ Traffic controllers from expressway police also reside round the clock at the office, and give directions to responsible organizations based on the collected information.
Overloaded vehicle regulation		・ Expressway administrator assists the expressway police in carrying out duties regarding traffic regulation against overloaded vehicles by using the weigh bridges.	・ Expressway police is the responsible organization for traffic regulation of overloaded vehicles.

Source: JICA Survey Team

3) Toll Collection

a) Toll Collection System and Layout of Toll Gates[16]

A closed system will be adopted in the toll collection system of the TL-MT Expressway as well as the HCMC-Trung Luong Expressway. The locations where the toll gates are installed along the expressway are shown in Figure 6.63.



Source: JICA Survey Team

Figure 6.63. Toll Collection System and Location of Toll Gates on the TL-MT Expressway

b) Toll Collection Works

Toll collection works of the TL-MT Expressway will be executed in compliance with the Circular by MOF (90/2004/TT-BTC: Guiding the Regime on Collection, Payment, Management and Use of Road Toll, September 7, 2004). An outline of the assumed main toll collection works are shown in Table 6.74.

Table 6.74. Assumed Toll Collection Works

Items	Details
Toll Collection Works	・ Collection of toll fees from expressway users ・ A protocol for keeping the collected money and remittance procedure ・ Collation of the amount of money collected and the number of vehicles passed (fraud prevention)

Source: JICA Survey Team

[16] Regarding the toll collection system to be employed at HCMC-Trung Luong Expressway, MOT is inquiring the Office of the Prime Minister and the decision has yet to be shown. In this study, a closed system is assumed based on the detailed design done by BEDC. If the open system will be adopted, the toll gates will be installed at every 70 km or more apart according to the regulation of "Guiding the Regime on Collection, Payment, Management, and Use of Road Toll" by MOF.

6.3.4 International Transportation System

Currently, every deliberation about the ITS at all points is being carried out toward the current ITS standards in Vietnam. However, the expressway service of the ITS is not yet being implemented. In order to propose the planning of the ITS for the TL-MT expressway, the proposed ITS standards by JICA, Vietnamese regulation and the existing plan of ITS were surveyed by the JICA Survey Team. So far, ITS standard has not been established in Vietnam. Early establishment of the ITS standard is expected by the cooperation between JICA and MOT.

The outline of ITS system for the TL–MT Expressway proposed by the JICA Survey Team is summarized bellow:

- Toll Collection System

  This system has three types of the systems which are manual, semi-automatic and automatic. Active-DSRC has been adopted for automatic types, same as in Japan,

- CCTV Monitoring System

  The abnormal conditions and traffic incidents on the expressway must be visually confirmed in road management office. CCTV monitoring will be installed at merging and diverging points from interchanges and toll plazas where vehicles decrease their speed.

- Vehicle Detection System

  This system is necessary to measure the ratio of traffic volume and large vehicles on the expressway accurately. Thus, CCTV camera and image reorganization processor must be located between interchanges.

- Heavy Truck Control System

  The system is necessary to control overloaded vehicles and protect the expressway especially at bridge sections and pavement in conformity with the Vietnamese Standard 22TCN307-2006 “Vehicle General Specification for Safety”. One lane for overload vehicle detection is installed at each entrance toll gate.

- Variable Message Sign System

  This system provides real time visual information for road users such as road and traffic conditions, traffic incidents, traffic congestion, weather conditions and other information on the expressway. Thus, one roadside facility system is installed at ingress and egress sections on the expressway.

- Mobile Radio System

  This system is useful to contact the road management office for road management information when on the expressway.

- Meteorological Monitoring System

  This system measures weather conditions. Road operators take appropriate countermeasures such as road closure and speed limit in bad weather condition, and provide warning information to drivers.

- Traffic Management System (TMS)

  This system governs the whole system, encourages data exchange between the systems in order to realize their functions fully and achieve the overall objectives of the traffic control system.

- Communication Network System

  This system provides fiber optic cables of which, network configuration is applied to flattened ring topology. The roadside equipment on the expressway is connected by this

network.

- Electrical Power Suuply System

  All ITS equipment is fed by this power facility from the substation located near interchanges.

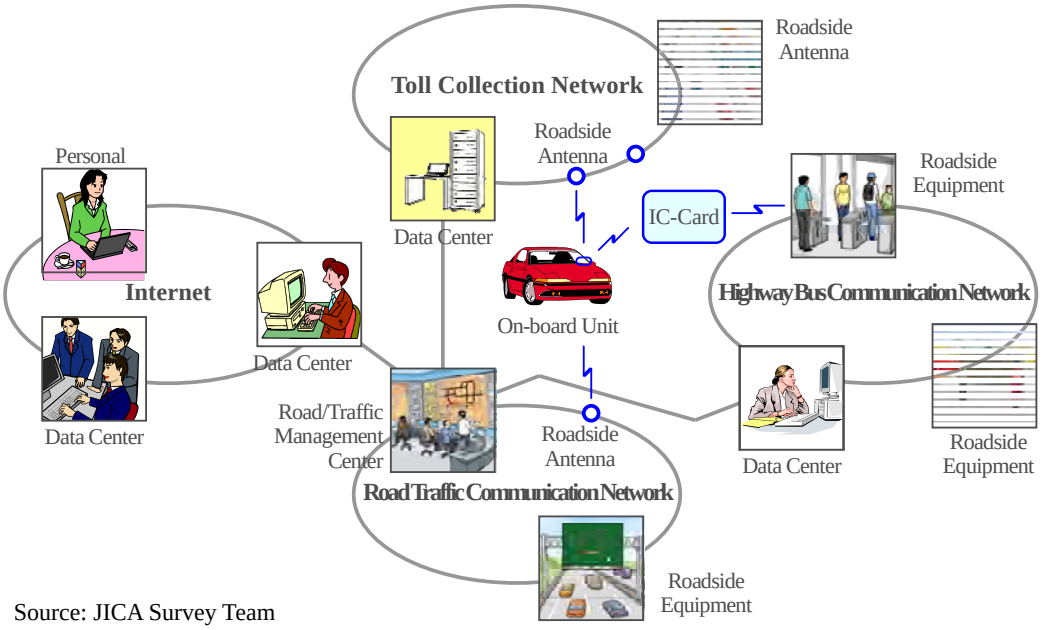
The list of the proposed ITS is shown in Table 6.75.

Table 6.75. Legislation of ITS

Proposed ITS function	Proposed specification	Proposed position	Total Quantity	Unit
Toll Collection	Hybrid system that is composed with ETC(Active-DSRC), WIM and Manual.	Toll gate	10	sets
CCTV Monitoring	PTZ type of CCTV camera	Congestion-prone sections(Merging and Diverging sections) and Toll gate	8	sets
Vehicle Detection	Image recognition type and PTZ type of CCTV camera	Between ICs	10	sets
Heavy Truck Control	WIM(Weigh-In-Motion) type of Vehicle detection	Entrance Tollgate	6	sets
Variable Message Sign	LED display board type of variable message sign board	At upstream of each ON and OFF Ramp	20	sets
Mobile radio	Mobile type of VHF radio	Road Management Office, Repeater station, Toll Office, Maintenance vehicle	22	sets
Meteorological monitoring	Anemometer, Thermometer, Rainfall Gauge	Road Management Office	1	sets
Traffic Management	Traffic management, Facility management and other server	Road Management Office	1	sets
Communication Network	Gigabit/10Gigabit Ethernet with Resilient Packet Ring (RPR) having fail-over function upon Optical fiber communication network	Road Management Office, Repeater station, Toll Office, Parking area, Service area and Road side	1	sets
Electrical power facility	Commercial Power Supply(CPS), more than 40kVA Diesel Engine Generator(DEG), more than 40kVA Uninterruptible Power Supply(UPS), more than 40kVA	Toll office, Road management office and Traffic control center	19	sets

6.3.4.1. Introduction of ITS

ITS makes it possible for people, vehicles and roads to receive and transmit information to each other by utilizing the most advanced information and communication technology available. It also offers road safety, smoothen traffic flow by reducing traffic congestion and accident, and introduce mechanisms that contributes to environmental conservation.



Source: JICA Survey Team

Figure 6.64. ITS Network

ITS of the expressway includes traffic information/control system, electronic toll collection (ETC) system, communication system and so on. ITS offers wide and various services toward

road administrators, road users, public transport operators, cargo forwarders and so on. Also, it utilizes the expressway effectively and safely, as well as promotes a new model of cultural and industrial system.

ITS should be planned according to connectivity, compatibility, and unified management system for utilizing expressway operations. It requires research regarding the ITS of other neighboring expressways, present implementation situations, laws, and regulations. After considering all of these, the introduction of ITS will be be planned.

ITS is composed of the Toll Collection System (TCS) and the TMS. In this JICA Survey, the ITS Plan for the TL-MT expressway is considered respectively.

TCS consists of the following works which are carried out:

a) To set up toll gate arrangement

b) To examine toll collection

c) To examine the system configuration

d) To estimate the system costs

TMS consists of the following works which are carried out.

a) To examine the system operation policy
b) To examine the system configuration
c) To examine the location plan
d) To estimate the system costs
e) To examine TCCs
f) To examine other facilities

6.3.4.2. Existing ITS Plan

The JICA Survey Team surveyed the existing ITS Plan as shown below.

a) Study for supporting ITS standards and operation plan development in Vietnam by JICA
b) ITS Plan for HCMC - Dau Giay Expressway
c) ITS Plan for HCMC - Trung Luong Expressway
d) Previous planning of ITS for TL-MT Expressway
e) TCC plan in South Vietnam

(1) Study for Supporting ITS Standards and Operations Plan Development in Vietnam by JICA

In 2008, JICA started the ITS Master Plan which aims to assist in establishing an effective management and operation of the ITS scheme for highways and intercity-expressways. In 2010, JICA has completed the 'Study for Supporting Its Standards and Operation Plan Development in Vietnam' for the purpose of establishing ITS standards and getting an authorization from the Vietnamese government in 2015.

JICA standard defined an implementation plan for ITS, and a service level of expressway operation. Then, it presents the needed frameworks for effective expressway operation using ITS. These plans are based on the premise that the framework for expressway operation using ITS was created in advance and that several issues are addressed. JICA worked on figuring out the issues and finally documented the draft ITS standards.

This standard was made from an objective and neutral standpoint, free from the intentions of individual organizations/firms that have relations with the expressway construction in Vietnam. Also, the discussions were conducted in such a manner as to involve the

policies/candidate being discussed regarding ongoing expressway construction projects, and the results in the above table were reasoned out. The proposed ITS standards are shown in the Table 6.76 and Table6.77.

(2) ITS Plan for HCMC-Dau Giay Expressway

ITS implementation plan for this expressway was completed up to the detailed design, and is in the process of bidding. This plan progresses most among the expressways around HCMC. Therefore, it is difficult to disregard this ITS plan because the other ITS implementation plan may secure the interchangeability of the system. This ITS plan described in the detailed design is also shown in the Table 6.76 and Table6.77.

(3) ITS Plan for HCMC - Trung Luong Expressway

In the TMS plan for this expressway, the basic design has been completed and has shifted to the next step. The plan is not a detailed design, but is called FEED (Front End Engineering Design). At the current state, Dae Yeoung Ubitec from Korea has just submitted the inception report (IC/R) to Cuu Luong CIPM. This ITS plan described in this IC/R is shown in the Table 6.76 and Table6.77.

(4) Previous planning of ITS for TL-MT Expressway

TMS for the TL-MT expressway by TEDI-South which is the Vietnamese consultant company has carried out the basic design previously in June 2010. The JICA Survey Team has reviewed its basic design. This ITS plan described in the basic design is shown in the Table 6.76 and Table6.77.

(5) Traffic Control Center (TCC) Plan in South Vietnam

In Vietnam, as for the traffic control of the expressway, integrated management is conducted at three TCCs located in each principal city. These centers are located in Ha Noi, Da Nang and HCMC.

The TCC for HCMC has been planned by PMU-MT (currently, Cuu Lung CIPM) under MOT. The JICA Survey Team acquired information about TCC from Cuu Lung CIPM, as follows:

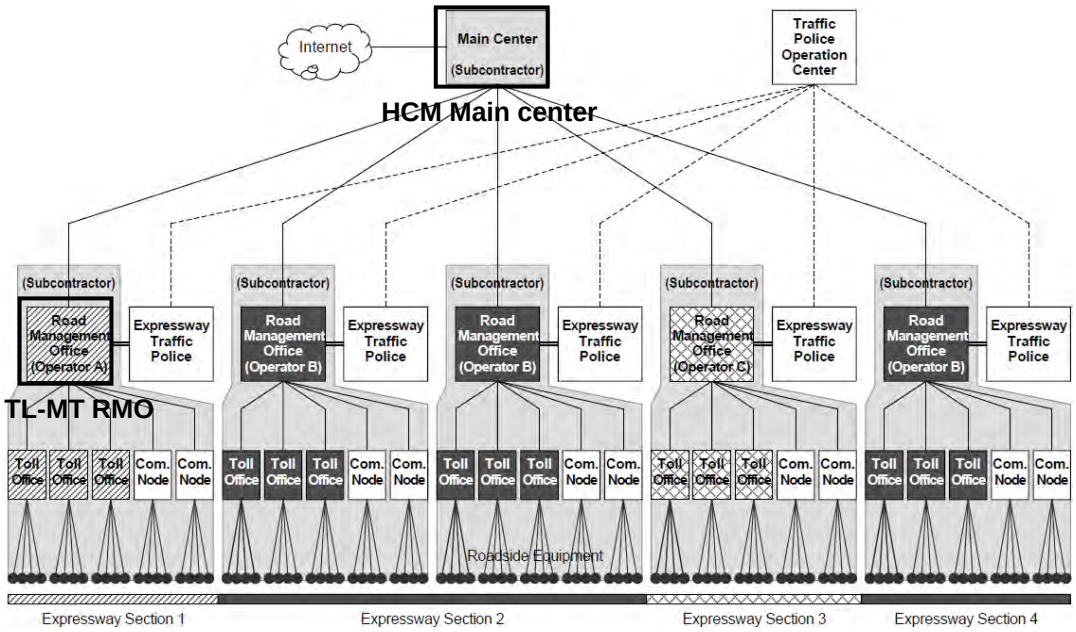
a) There is a construction plan for TCC HCMC.

b) There is no plan regarding the ITS related facilities for TCC HCMC at present.

c) The TCC is under construction at Than Cuu Nghia IC on the TL-MT Expressway. This will be the TCC for HCMC–Trung Luong–My Thuan Expressway in the future.

d) There is no plan for the introduction of ITS equipment at the TCCs at present.

According to the proposed ITS standards by JICA, TCC (main center) is in charge of traffic monitoring, traffic control and traffic information dissemination. The road management office (RMO) should be in charge of the daily patrol check and have the role of emergency response. It means the traffic information collected in each ITS facility is integrated at the main center.



Source: JICA Survey Team

Figure 6.65. Hierarchical Traffic Control and Management in Vietnam

Therefore, the data type, interface, and equipment specifications of ITS facilities in the TL-MT expressway should be adjusted into the specification planned by the main center.

Table 6.76. Summary for Existing Planned TCS

Toll collection method	Regulation and Standard		Current situation for each expressway			
	Vietnamese regulation	JICA propoed ITS standard	Trung Luong-My Thuan	Ho Chi Minh-Trung Luong	Ho Chi Minh-Dau Giay	New Ntional Highway No.3
			Basic design is completed (Jun.2010)	Inception report of FEED is completed (Oct.2011)	Constructing (at present)	Updating Basic design (at present)
Semi-automatic	Barcode ticket system (TCCS 01: 2008/VRA)	Touch & Go system	One stopping (using one-trip ticket or Non-stopping (commutation ticket, prepaid, priority car, etc)	No information	Touch & Go system	Barcode ticket system
ETC	Passive RFID (MOT Decision 2530/BGTVT-KHCN)	Active-DSRC	No information	Passive-DSRC	Active-DSRC	Active-DSRC
Remark	Passive-RFID's system in the road management office might become something wrong by the overload in case of toll collection between different toll administrative sections.	----	Waiting for DOST (Department Science and Technology) of MOT decision.	Passive-DSRC, but Waiting for DOST (Department Science and Technology) of MOT decision.	Touch&Go/Manual is low cost and the easyly maintenance. Active-DSRC has a large data capacity and the communication area can widely transmit by highspeed.	Active-DSRC has High accuracy, reliability , shared use, capability of 2-piece type OBU, capability of prepayment method.

Source: JICA Survey Team

Table 6.77. Summary for Existing Planned TMS

ITS facilites	Item	Regulation and Standard		Current situation for each expressway			
		Vietnamese regulation	JICA propoed ITS standard	Trung Luong-My Thuan	Ho Chi Minh-Trung Luong	Ho Chi Minh-Dau Giay	New Ntional Highway No.3
				Basic design is completed (Jun.2010)	Inception report of FEED is completed (Oct.2011)	Constructing (at present)	Updating Basic design (at present)
CCTV Monitoring	Systems	Digital IP Camera with high resolution	CCTV PTZ (Pan-Tilit-Zoom) camera	No information	No information	No information	CCTV PTZ (Pan-Tilit-Zoom) camera
	Location plan	no informaion	2km intervals	Toll gate, Along the expressway	2km intervals Areas needed to be monitored	Toll gate, Merging and Diverging sections on expressway	2km intervals
Vehicle Detection	Systems	Image recognition type	Loop-coil type or Ultrasonic type or Image recognition type	Loop-coil type or Ultrasonic type	Image recognition type	Ultrasonic type	Image recognition type
	Location plan	No information	Congestion-prone sections	Some locations needed to be monitored, Entrance & Exit	2km intervals	2km intervals	One each for every lane between ICs & ISs.
Heavy Truck Control	Systems	WIM	Axle Load Scale and CCTV Monitoring and Vehicle Detector	No plan to arrange	No information	No information	Weight-In-Montion type sensor and Vehicle detector and Lane monitoring camera and Automatic number plate recognition camera
	Location plan	Entrance Toll gates	Exit Toll gates	No plan to arrange	No information	Entrance Toll gates	Toll gates (Entrance/Exit)
Vatriable Message Sign	Systems	No information	LED display board	No information	LED display board	No information	LED display board
	Location plan	No information	Tollgates, Junctions, Diverging sections, Barrier tollgates, Exits & Entrance Between ICs	Toll gate and Interchange(Exits/Entrance)	Toll gate and Interchange(Exits/Entrance)	Toll gate and Interchange(Exits/Entrance)	Interchange(Exits/Entrance)
Mobile radio	Systems	Radio communication for patrol: UHF band (3 channels, available of VHF band as well)	VHF or UHF radio communication system	No information	No information	VHF(150MHz) radio communication system	VHF or UHF radio communication system
	Location plan	No information	Road Management Office, Radio Communication Base Station	No information	No information	Road Management Office, Main Tranffic centre	Traffic Management Center

Source: JICA Survey Team

6.3.4.3. Proposal for Planning of TCS

This base plan consists of the planning of a TCS, which includes a tariff rate system, vehicle classification, toll gate arrangement and toll collection. The base plan has already been made for the tariff rate and vehicle classification. The TCS base plan is shown in Table 6.78 below.

Table 6.78. Base Plan of TCS

No.	Item	Plan
1	Toll charging principle	Closed system
2	Toll rate principle	Distance based rate
3	Vehicle classification	As specified by MOF Circular No.90
4	Toll collection method	Manual, semi-automatic and automatic (ETC)
5	Number of toll plaza	5 (Main line: 1, Interchanges: 4)
6	Opening year	2017

Source: JICA Survey Team

Vehicle classification for expressway payment shall basically follow the requirements of the MOF Circular mentioned above. The classification of vehicle is defined in accordance with the number of seats and type of vehicle as shown in Table 6.79.

Table 6.79. Vehicle Classification in Vietnam

Ordinal Number	The Categories of the Vehicle	Applicable for the Project
1	Two wheelers, three wheelers, mopeds and the like	
2	Lambretta, rudimentary trucks, tractors	
3	Cars of under 12 seats, trucks of a tonnage of under 2 tons and mass transit buses	O
4	Cars of between 12 and 30 seats, trucks of a tonnage of between 2 tons and under 4 tons	O
5	Cars of 31 seats or more; trucks of a tonnage of between 4 and under 10 tons	O
6	Trucks of a tonnage of between 10 and under 18 tons and 20ft-container lorries	O
7	Trucks of a tonnage of 18 tons or over and 40 ft-container lorries	O

Source: 90/2004/TT-BTC, MOF, VN

Visible recognition by toll collector will be necessary due to the difficulty in automatic judgment of vehicle classification defined as seat capacity, vehicle length, load capacity and/or number of axles. In addition, automatic vehicle category recognition using license number plate information is also impossible, since the existing numbering system is not designed on the basis of vehicle classification.

6.3.4.4. Tollgate Arrangement

Toll plazas on the TL-MT Expressway is shown in Table 6.80.

Table 6.80. Toll Plazas on TL-MT Expressway

No.	Location	Number of Toll Plazas
1	Than Cuu Nghia IC	2
2	Cai Lay IC	1
3	Cai Be IC	1
4	An Thai Truing IC	2
5	Mainline in My Thuan	1

Source: JICA Survey Team

The number of toll lanes shall be calculated based on Vietnamese ITS standard

(TCVN5729:1997). Consequently, the number of toll lanes for the TL-MT Expressway has already been calculated by Korean Consultants International and TEDI-South according to their report entitled, Calculation of Toll Plaza Traffic Lane in August 2011.

However, the traffic demand adopted in this calculation report is the traffic that TEDI-South investigated in 2008, while the traffic demand that the JICA Survey Team adopted have different values.

Moreover, the estimated opening year is different as well. This calculation report mentioned that the opening year of the TL-MT Expressway will be in 2016. At present, the opening year is calculated to be 2017.

Therefore, the number of toll lanes is reviewed based on the current condition and information obtained by the JICA Survey Team, enumerated below, including the base condition of this review:

(1) Minimum Number of Toll Lanes

1) At mainline

The toll plaza on mainline should be designed so that each direction (inbound/outbound) has a minimum of three lanes according to TCVN5729:1997.

- The expressway shall be used only by cars. In this case, TCVN5729:1997 has specified that each direction requires a minimum of two lanes.
- The number of lanes at toll plaza should be 1.5 times more than that on the expressway.

2) At interchange

The toll plaza on interchange should have at least two toll lanes in order to pass vehicles when one of them fails or is under maintenance according to TCVN5729:1997.

(2) Annual Average Daily Traffic (AADT)

According to TCVN5729:1997, the necessary number of lane shall be calculated in scope of the next ten years. Therefore, the number should meet the traffic demand of 2027 as the AADT.

From the JICA Survey Team, the traffic demands of 2020 and 2030 are calculated for AADT. By using these estimations, the traffic demand in 2027 would be calculated by interpolation method. These numbers are calculated on the assumption that this expressway extends to Can Tho.

Table 6.81. AADT in 2027 (veh/day)

Year	Than Cuu Nghia IC	Cai Lay IC	Cai Be IC	An Thai Truing IC	Mainline in My Thuan
2020	25000	6300	1300	8300	15500
2027	**34030**	**13300**	**5080**	**14880**	**26840**
2030	37900	16300	6700	17700	31700

Note: This traffic volume is at the entrance/exit of the expressway (ramp-ways) and forecasted based on the same scenario as Table 6.3.

Source: JICA Survey Team

An Thai Truing IC will be removed in the future because another IC will be constructed in order to connect to the new expressway near An Thai Truing IC. At the time this IC is removed, the expressway will not be extended yet to Can Tho. Therefore, the estimated AADT at Thai Truing IC is modified as follows:

Table 6.82. AADT of An Thai Trung IC (veh/day)

Year	An Thai Truing IC
2020	3310
2027	**6527**
2030	7991

Source: JICA Survey Team

(3) Design Hourly Volume (DHV)

Generally, the 30th highest hourly traffic volume is supposed to be the target traffic level for figuring out the necessary number of lanes. In TCVN5729:1997, N_k, which is the same as DHV, is calculated as follows:

$$N_k = K \times N_{tb\ nam}$$

Where:
K: the 30th highest hourly volume of the year, expressed as a percentage of AADT
$N_{tb\ nam}$: AADT calculated by each direction

The K factor to be applied should be 0.1. (K=0.1). This value has been applied in former report*1.

(4) Directional Design Hourly Volume (DDHV)

DHV (N_k) is defined for the calculation of the number of lanes for each direction. However, the above-mentioned AADT is the total traffic volume including both directions. Therefore, DHV should be recalculated in accordance with the directional distribution factor.

Meanwhile, DDHV, which is calculated from DHV with the directional distribution factor, is calculated as follows:

$$DDHV = D \times DHV$$

Where, D: a proportion of peak hour traffic in direction

D factor to be applied should be 0.51.. This value had been applied in the former report*1.

*1: "Trung Luong-My Thuan Expresswawy Construction Investment Project, Calculation of Toll Plaza Traffic Lane"

Table 6.83. DDHV in 2027 (veh/hr)

Year	Than Cuu Nghia IC	Cai Lay IC	Cai Be IC	An Thai Truing IC	Mainline in My Thuan
2027	1736	679	260	333	1369

Source: JICA Survey Team

(5) The Capacity of Toll Lane

In the case of manually operated closed TCS, the processing capacity of the toll gate lane is defined by TCVN5729:1997.

Table 6.84. Maximum Capacity of Toll Lane (veh/hr)

For Closed Toll Collection System	Maximum Capacity of Toll Lane
Entrance of toll gate	650
Exit of toll gate	350

Source: TCVN5729:1997

(6) Toll Lane for ETC

The volume of on-board-unit (OBU) equipped vehicles which use ETC is needed in order to estimate the necessary number of ETC lanes. At present, there is no plan to distribute ETC equipment. Each direction should have a minimum of one exclusive ETC lane. Therefore, in order to cope with increased traffic in the future and reduce construction costs, the ETC lane in one direction at each toll plaza will be for one lane only.

(7) Toll Lane for WIM

In general, oversized vehicles on expressways causes damage of the road and traffic accident. Oversized vehicles should not be allowed to pass the expressway. Therefore, oversized vehicles should be observed at entrance toll plazas by using weight in motion (WIM) system that is to be installed in the plan. The WIM lane will be planned for one exclusive lane per direction.

According to TCVN5729:1997, the right most lane ofentrance toll plaza is defined to observe the oversize vehicle.

(8) Computation of Number of Toll Lanes

The required number of toll lanes is computed by means of dividing the traffic volume to several toll lanes without thinking of ETC. Based on the above table, the toll lane capacity at the gate entrance is 650 veh/hr while that at the exit is 350 veh/hr.

Also, the number of toll lanes shown in Tables 6.85 and 6.86 are computed in accordance with the toll plaza standard, TCVN5729:1997.

Table 6.85. Number of Lanes at Entrance Toll

Toll Collection Method	Manual	ETC	WIM	Total
Than Cuu Nghia IC	3	1	1	5
Cai Ley IC	2	1	1	4
Cai Be IC	1	1	1	3
An Thai Truing IC	1	1	1	3
Mainline in My Thuan	3	1	1	5

Source: JICA Survey Team

Table 6.86. Number of Lanes at Exit Toll

Toll Collection Method	Manual	ETC		Total
Than Cuu Nghia IC	5	1	-	6
Cai Ley IC	2	1	-	3
Cai Be IC	1	1	-	2
An Thai Truing IC	1	1	-	2
Mainline in My Thuan	4	1	-	5

Source: JICA Survey Team

(9) Review of Previous Computation of the Number of Toll Lanes

The former computation of the number of toll lanes by TEDI-South and Korean consultants is shown in Tables 6.87 and 6.88.

Table 6.87. Number of Lanes at Entrance Toll (Former Calculation)

Toll Collection Method	Manual	ETC	WIM	Total
Cai Ley IC	1	1	1	3
Cai Be IC	1	1	1	3
An Thai Truing IC (North)	1	1	1	3
An Thai Truing IC (South)	1	1	1	3
Mainline in My Thuan	2	1	1	4

Source: Calculation of Toll Plaza Traffic Lane

Table 6.88. Number of Lanes at Exit Toll (Former Calculation)

Toll Collection Method	Manual	ETC		Total
Cai Ley IC	2	1	-	3
Cai Be IC	1	1	-	2
An Thai Truing IC (North)	2	1	-	3
An Thai Truing IC (South)	1	1	-	2
Mainline in My Thuan	4	1	-	5

Source: Calculation of Toll Plaza Traffic Lane

6.3.4.5. Toll Collection Method

The toll collection method is divided into three types, i.e., manual, semi-automatic and automatic. They are generally defined as follows:

(1) Manual (Including Semi-automatic) Toll Collection Subsystem

Manual toll collection includes semi-automatic, because both require manpower in toll booths. This involves manually collecting toll fees and issuing ticket by tollgate staffs.

In the semi-automatic toll collection, the toll payment is made using an IC issued by toll collection staff without cash transaction, (traffic inspector is required). The semi-automatic toll collection system on the TL-MT Expressway would be a one-stop toll payment and transaction using barcode ticket system for ticketing.

The manual toll collection subsystem is composed of equipment listed in Table 6.89.

Table 6.89. Equipment List for Manual Toll Collection Subsystem

Installing location	Equipment	Qty.	Unit	Remark
Toll Gates	Vehicle Detector	26	Set	
	Lane Server	26	Set	
	Barcode Reader	26	Set	
	Lane Control Panel	26	Set	
	Automatic Lane Barrier	26	Set	
	Lane Traffic Light	26	Set	
	Alarm Horn and Lamp	26	Set	
	Lane Camera	26	Set	
	Toll Fare Display	26	Set	
	Automatic License Plate Number Recognition Camera (ALPR)	26	Set	
	Manual Lane Barrier	26	Set	
	Canopy Traffic Light	26	Set	
	Toll Booth Facilities	26	Set	
	LAN Network Facilities	26	Set	
	Internal Telephone	26	Set	
	Overall Camera	10	Set	
Office Equipment	Toll Management Server	5	Set	
	Monitoring Camera	10	Set	
	Camera Monitoring Equipment	5	Set	
	Monitoring Computer	25	Set	
	Computer for selling periodic tickets	5	Set	
	Computer for accounting	5	Set	
	Internal Telephone	15	Set	
	LAN Network Facilities	5	Set	

Source: JICA Survey Team

(2) Automatic Toll Collection (ETC) Subsystem

The automatic (electronic) toll collection (ETC) allows drivers to automatically pay toll without stopping the vehicle on a tollgate by utilizing wireless communications between an OBU and road side antenna. Road-to-vehicle communication methods are needed to adjust the existing system that has been adopted by neighboring expressways.The Ho Chi Minh-Dau Giay Expressway has already decided to adopt an active-DSRC, and is now under tender processing.

On the other hand, The Ho Chi Minh-Trung Luong Expressway is planning to adopt a passive-DSRC at the process of the basic design. Also, according to TEDI-South's study of the basic design plan, they are planning to use RF-TAG for the TL-MT Expressway.

Table 6.90. ETC in the South-North Expressway, Vietnam

Plan	TL-MT	HCMC-Trung Luong	HCMCh-Dau Giay
Basic Design	RF-TAG *1	Passive-DSRC *2	Active-DSRC
Detail Design	Not start	Not start	Active-DSRC

Source: *1: Trung Luong-My Thuan Expressway Construction Investment Project, *2: JICA Proposed ITS standards

However, MOT decision is awaited for these plans to determine which standard of ITS in Vietnam should be adopted. JICA also has recommended the use of active-DSRC to MOT. Moreover, the HCMC-Dau Giay, and HCMC-Trung Luong and TL-MT are one continuous

expressway. Therefore, it is necessary for this one expressway to secure continuity and implement common operation modes. In consideration of these facts, the JICA Survey Team recommended to adopt an active-DSRC for the TL-MT Expressway.

Equipment for the ETC subsystem is listed in Table 6.91.

Table 6.91. Equipment List for the ETC Subsystem

Installing location	Equipment	QTY.	Unit	Remark
Toll Gates	Vehicle Detector	10	Set	
	Lane Server	10	Set	
	Barcode Reader	10	Set	
	Lane Control Panel	10	Set	
	Automatic Lane Barrier	10	Set	
	Lane Traffic Light	10	Set	
	Alarm Horn and Lamp	10	Set	
	Lane Camera	10	Set	
	Toll Fare Display	10	Set	
	Automatic License Plate Number Recognition Camera (ALPR)	10	Set	
	Manual Lane Barrier	10	Set	
	Canopy Traffic Light	10	Set	
	Toll Booth Facilities	10	Set	
	LAN Network Facilities	10	Set	
	Internal Telephone	10	Set	
	Roadside Antenna	10	Set	
	Entry Card Issuer	10	Set	
	Lane Server for ETC	10	Set	
	Roadside Controller	10	Set	
Office Equipment	Toll Management Server	5	Set	
	Monitoring Camera	10	Set	
	Camera Monitoring Equipment	5	Set	
	Monitoring Computer	25	Set	
	Computer for selling periodic ticket	5	Set	
	Computer for accounting	5	Set	
	Internal Telephone	15	Set	
	LAN Network Facilities	5	Set	
	Toll Management Server	5	Set	
	IC Card / OBU Registration Terminal	5	Set	
	IC Card Reader/Writer	5	Set	
	IC Card	300,000	Pic.	
	On-Board Unit	50,000	Pic.	

Source: JICA Survey Team

6.3.4.6. Proposal for Planning of Traffic Management System (TMS)

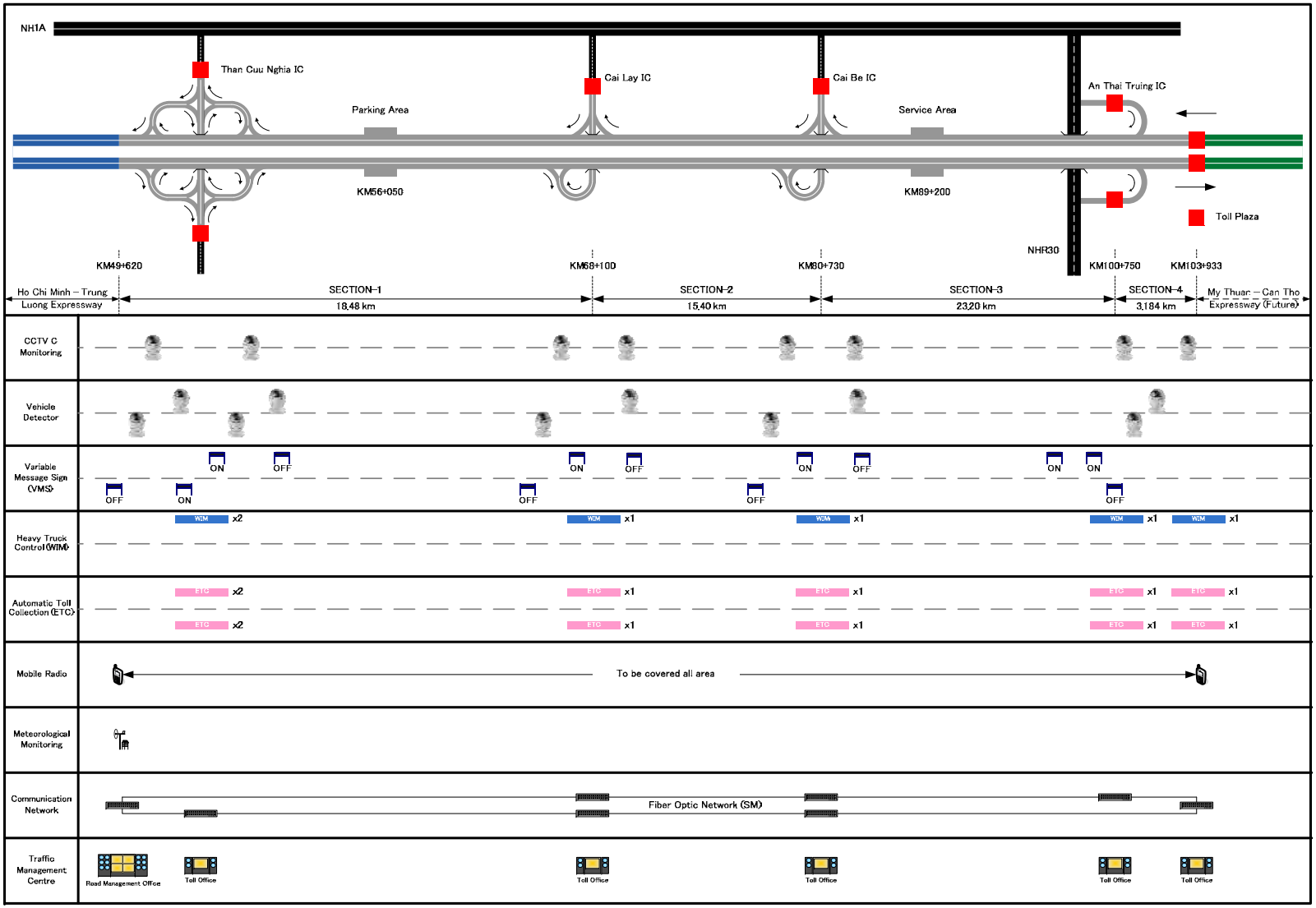
TMS comprises Data Acquisition System, Information Dissemination System, Traffic Control Center System, Communication System and Electrical Facility.

TMS should be planned in consideration of the compatibility with ITS standards and plans of other expressways. Considering the abovementioned requirements, the TMS plan for the TL-MT Expressway is proposed in Table 6.92 below, with each ITS facility explained in the following sections.

Table 6.92. Proposal for Planning of TMS

ITS facilities	Vietnamese regulation	TMS Plan for Trung Luong - My Thuan Expressway	
		Previous Plan	Proposed Plan
CCTV Monitoring	PTZ (Pan-Tilit-Zoom) camera type	No Information	PTZ camera type
		Toll gate, Along the expressway	Congestion-prone sections(Merging and Diverging sections) and Toll gate
Vehicle Detection	Image recognition type	Loop-coil type or Ultrasonic type	Image recognition type
		Some locations needed to be monitored, Entrance & Exit	Between ICs
Heavy Truck Control	WIM	No plan to arrange	WIM type
	Entrance Tollgate		Entrance Tollgate
Variable Message Sign	LED display board	No Information	LED display board
		Toll gate and Interchange(Exits/Entrance)	At upstream of each ON and OFF Ramp
Mobile radio		No plan to arrange	VHF radio communication system
			Road Management Office, Repeater station, Toll Office, Maintenance vehicle

Source: JICA Survey Team



Source: JICA Survey Team

Figure 6.66. Proposal for the Location Plan of the TMS

6.3.4.7. Data Acquisition System

The Data Acquisition System consists of two functions, traffic volume measurement and meteorological observation. The traffic volume measurement will be explained below, while the meteorological observation will be illustrated in Section 6.3.4.11.

It is essential to continuously measure traffic volume and ratio of that of a large-sized vehicle. Traffic volume measurement includes four functions listed below:

a) To measure traffic volume as a whole;

b) To measure the ratio of large-sized vehicle;

c) To calculate average velocity; and

d) To measure the rate of occupancy of the expressway (To detect congestion).

There is little necessity to calculate the average velocity, detect congestion, and disseminate information to drivers because of traffic volume at the opening year. Therefore, at the beginning of the ITS introduction and in consideration of cost reduction, the JICA Survey Team recommends one traffic volume measurement facility at each section which will measure the traffic volume and the ratio of large-sized vehicles. As a future plan, the interval of CCTV shall be condensed in order to detect congestion in accordance with the increase in traffic.

Based on these traffic control system requirements, the following subsystem shall be introduced on this expressway.

Table 6.93. Measuring Traffic Using Data Acquisition System

No.	Subsystem for Measuring traffic
1	CCTV monitoring subsystem
2	Vehicle detection subsystem
3	Heavy truck control subsystem

Source: JICA Survey Team

6.3.4.8. CCTV Monitoring Subsystem

In order to visually detect abnormal conditions and traffic incidents on the expressway from the road management office, a CCTV monitoring subsystem is proposed.

(1) Proposed System Operation Policy

The method of CCTV monitoring of the expressway is classified into 'full monitoring' and 'partial monitoring'.

Table 6.94. Comparison of CCTV Monitoring Methods on Expressway

	Full Monitoring	Partial Monitoring
Monitoring Section	Very good	Good
Number of Cameras	A lot	A few
Cost	Not cost effective	Cost effective
Maintenance	Costly, depending on the number of cameras installed	Less cost because of fewer cameras that are installed
Number of Observers at the Traffic Control Center	Many persons are required to cover all sections that are being monitored	Fewer persons required because of the limited area that is being monitored
Number of Monitor Screens at the Traffic Control Center	A lot	A few

Source: JICA Survey Team

The objectives of CCTV camera are to detect abnormal conditions, traffic accidents, and congestion on the expressway.

a) To detect abnormal condition on the expressway

An external condition affects the expressway in many cases. Also, nobody can predict where such situation happens. Therefore, CCTV monitoring for the whole expressway is needed.

Although, it can be said that the rate of these occurrences is extremely low because the expressway is structured exclusively from other external environments.

b) To detect traffic accident and congestion

It is important to detect traffic accident and congestion in order to prevent other road users from causing multiple accidents and to avoid prolonged congestion. The detection should be prompt and accurate for road operation in order to respond quickly to traffic accidents and enable immediate dissemination of information using VMS.

In general, the merging point at IC is the most accident prone area. Therefore, a CCTV camera shall be installed at this point.

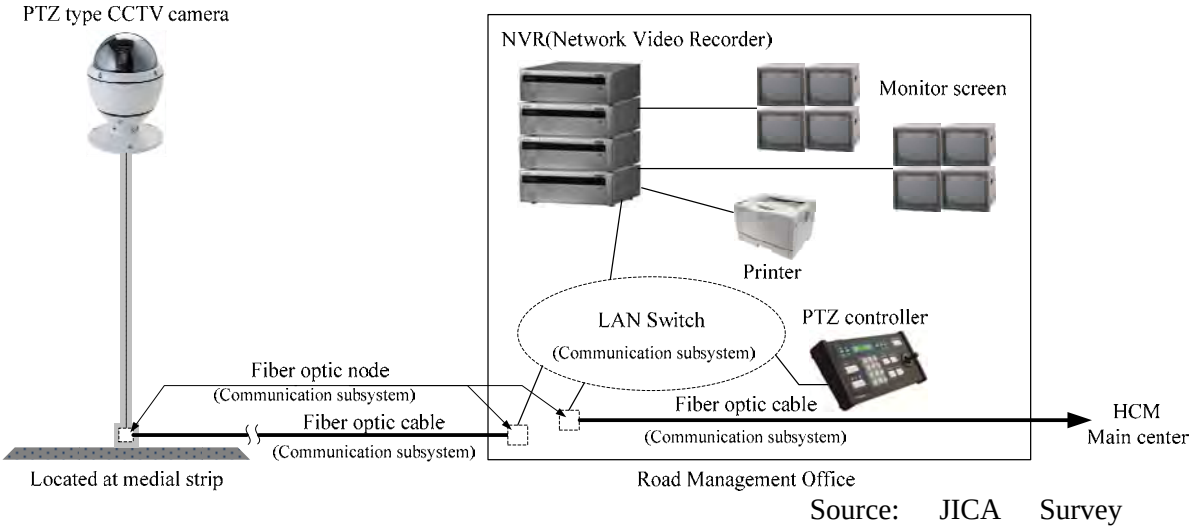
Areas other than the merging point shall be considered. The widest distance between ICs is between Cai Be IC and An Tai Tung IC, which is 23.20 km. If an accident happens between them, emergency vehicles such as police, ambulance, fire engine, and rescue may come from either the Cai Be IC or An Tai Tung IC. It will take around 8.7 minutes to reach the spot if in case the vehicles drive at 80 km/h. In short, emergency vehicles can arrive on the spot within 10 minutes on the condition that accident reports are done by cellphones on the expressway.

c) Conclusion

As a conclusion, CCTV shall monitor accident-prone bottleneck areas such as merging and diverging points. The CCTV shall detect incidents without maneuvering complicated camera works such as pan and zoom for this type of camera. Other accidents that may happen at tother areas shall be detected by patrolling vehicles.

(2) System Configuration

The CCTV monitoring subsystem is composed of equipment which are located along roadsides and at the road management office.



Source: JICA Survey

Figure 6.67. Configuration of CCTV Monitoring Subsystem

MOT Decision No.2530/BGTVT-KHCN recommended a digital internet protocol (IP) type camera and not analog cameras. Furthermore, it is recommended that PTZ (Pan-Tilt-Zoom)

types which are used in vehicle detection subsystem are to be used as image recognition type. Thus, the JICA Survey Team proposed PTZ type CCTP cameras on this expressway.

The Road Management Office (RMO) is equipped with PTZ (camera) controller, NVR (Network Video Recorder), monitoring screens and printers.

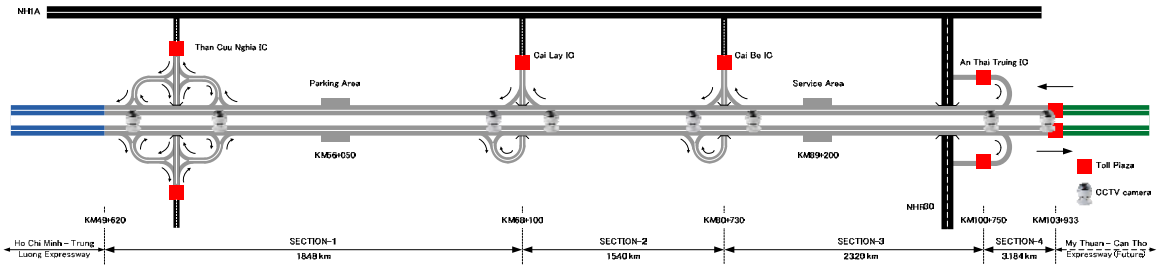
CCTV camera image from roadside shall be transmitted to RMO through a fiber optic cable network. MPEG-4 format shall be applied as standard digital video encoding protocol to reduce the network traffic of transmission system.

Considering the future expandability to transfer video images on this expressway to the HCMC Main Center, NVR as a CCTV controller and recorder device will be deployed to secure the inter-operability and also to reduce the network traffic.

(3) Location Plan

According to the system operation policy, CCTV cameras shall be installed at accident prone bottleneck areas (merging and diverging area). Also, it shall be located where it can detect traffic accidents without complicated operations of camera features such as panning and zooming.

Therefore, CCTV cameras will be installed at merging and diverging points of ICs and toll plazas (where vehicles decrease their speed.)



Source: JICA Survey Team

Figure 6.68. Location of CCTV Monitoring Subsystem

Also, from the previous plan by TEDI-South, CCTV monitoring subsystem was planned to monitor hazardous areas such as merging and diverging points.

According to the above plan, the equipment list of CCTV monitoring subsystem is proposed in Table 6.95 a follows.

Table 6.95. Equipment List of CCTV Monitoring Subsystem

Installing Location	Equipment	QTY.	Unit	Remark
Roadside Equipment	PTZ type CCTV camera	8	Set	
	Camera foundation	8	Set	
Office Equipment	NVR	1	Set	
	PTZ camera controller	1	Set	
	Monitoring screen	1	Set	

Source: JICA Survey Team

(4) Recommendations

a) The cost of CCTV camera is expected to be reduced in the future. Also, in terms of effectiveness and improvement of expressway operation and management, CCTV cameras will be installed more on expressways, service areas, parking areas and each toll plaza.

b) The planning of CCTV monitoring subsystem for HCMC-TL Expressway was proposed for the location plan with a 2 km interval along the expressway in order to cover and

monitor the whole stretch of the expressway. However, this operation policy of HCMC-TL Expressway also will follow that of the TL-MT expressway. Therefore, the JICA Survey Team disregarded the policy and recommended only limited areas to be installed with monitoring system.

c) The JICA Survey Team could not survey the saturation level of cellphone and the coverage area of each cell phone company in Vietnam. These should be done in the process of the detailed design.

6.3.4.9. Vehicle Detection Subsystem

In order to measure traffic volume and ratio of large-sized vehicles on the expressway for planning for future road widening or asphalt repair, a vehicle detection subsystem is proposed.

(1) System Operation Policy

Generally, vehicle detection subsystem is to be installed to detect and process data on traffic volume for large-sized vehicle traffic, time occupancy rate and vehicle average speed for the purpose of the following objectives listed in Table 6.96.

Table 6.96. Main Objectives of Vehicle Detection Subsystem

Item	Main Objectives
Traffic Volume	To be used as statistics for planning of future road widening
Large-sized Vehicle Traffic (Vehicle Length)	To be used as statistics for planning of future structure and pavement repair
Time Occupancy Rate	To detect traffic congestion and incident from time occupancy rate
Vehicle Average Speed	To provide travel time information to the drivers

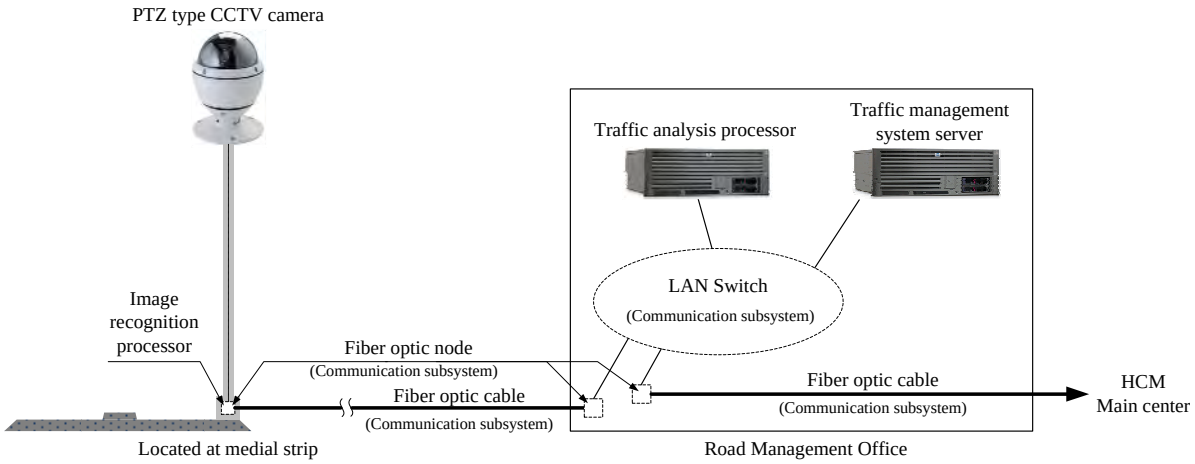
Source: JICA Survey Team

Vehicle detection subsystem is proposed introducing the purpose of detecting traffic volume and the large-sized vehicle traffic between interchanges on the expressway in consideration of saving the initial costs. As a future plan, it would be expanded to detect traffic congestion, traffic incidents and vehicle average speed on the entire expressway.

Vehicle detection subsystem shall detect vehicles, measure and calculate the required traffic data separately for each lane. Unit duration of detection, measurement and calculation shall be within one minute. All data shall be periodically transmitted to the traffic analysis processor and traffic management system server installed at RMOs through the fiber optic cable network, which will then be transferred to HCMC Main Center in the future. The transmitted data shall be processed, stored, retrieved in the server and monitored on display. This system must have an overall detection accuracy of 97 % or better in vehicle counting for any types of vehicles expected to pass the expressway.

(2) System Configuration

MOT Decision No.2530/BGTVT-KHCN recommends a digital IP type camera instead of analog camera for vehicle detection system. Furthermore, image recognition type seems to be the recommended method, and Pan-Tilt-Zoom (PTZ) type as camera for that method. Thus, the JICA Survey Team proposed image recognition type and PTZ type camera for this expressway. Configuration of vehicle detection subsystem is shown in Figure 6.69 below.

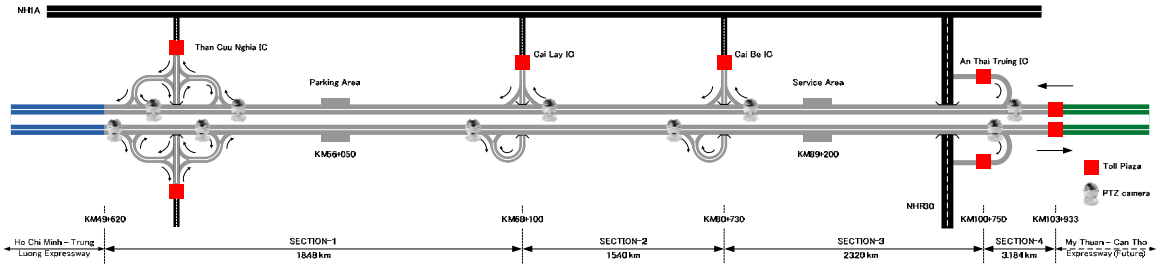


Source: JICA Survey Team

Figure 6.69. Configuration of Vehicle Detection Subsystem

(3) Location Plan

According to the system operation policy, PTZ type CCTV cameras and image reorganization processor will be located between the ICs. The location plan is shown in Figure 6.70 below.



Source: JICA Survey Team

Figure 6.70. Location of Vehicle Detection Subsystem

According to above plan, the equipment list for the vehicle detection subsystem is proposed in Table 6.97 as follows.

Table 6.97. Equipment List of Vehicle Detection Subsystem

Installing Location	Equipment	QTY.	Unit	Remark
Roadside Equipment	PTZ type CCTV camera	10	Set	
	Image recognition processor	10	Set	
	Camera foundation	10	Set	
Office Equipment	Traffic analysis processor	1	Set	
	Traffic management system server	1	Set	

Source: JICA Survey Team

6.3.4.10. Heavy Truck Control Subsystem

In order to control over-loaded vehicles and protect the expressway especially at bridge section and pavement, in conformity with the Vietnamese Standard 22TCN307-2006 “Vehicle General Specification for Safety”, a heavy truck control subsystem is proposed.

(1) System Operation Policy

Heavy vehicles cause damages on the structure and pavement. Vehicles with illegal weight are not allowed to enter public roads as regulated by Circular 07/2010/TT-BGTVT and shall be penalised according to Decree 34/2010/ND-CP.

Allowable maximum vehicle weight in Vietnam is listed in Table 6.98 as follows:

Table 6.98. Allowable Maximum Vehicle Weight

Allowable Maximum Vehicle Weight (Axial Load)	
Single axle	10 t
Double axle	11 t (d < 1.0) 16 t (1.0 ≤ d <3.0) 18 t (d ≥ 3.0) d: Axle space (m)
Triple axle	21 t (d ≤ 1.3) 24 t (d > 1.3) d: Nearest axle space (m)

Source: JICA Survey Team

Heavy truck control subsystem should be installed in order to control the over-loaded vehicle and prevent damage on the expressway. Also, it is expected to play the role of a deterrent which prevent over-loaded vehicles from entering the expressway at the first place by showing that this system can detect such vehicle.

(2) System Configuration

Heavy truck control subsystem is composed of the following functions;

a) To measure axle weight of vehicle and calculate total weight automatically;

b) If the measured axle weight or total weight of the vehicles exceeds the allowable maximum weight, the lane camera temporally records a video image;,

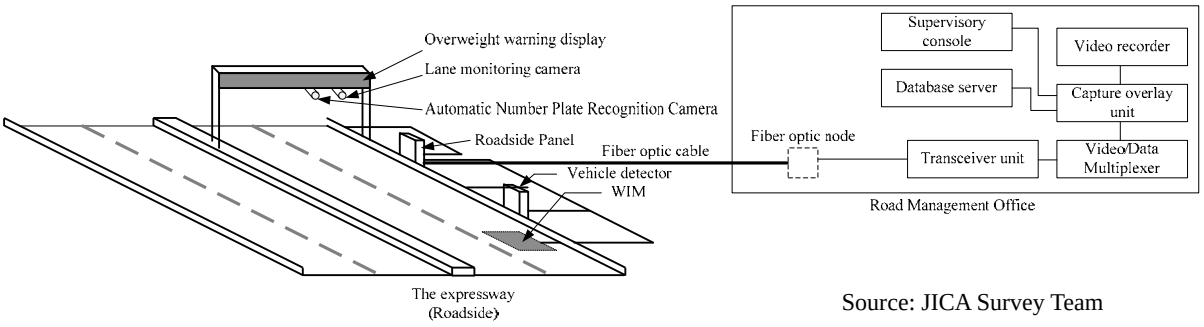
c) If overloaded, the automatic number plate recognition (ANPR) camera records the plate number as well;

d) The video image and plate number recorded at roadside are promptly sent to the nearest RMO or toll office. Also, warning alarms and messages are provided to the traffic inspector,

e) Overload vehicles are not allowed to enter the expressway through the tollgate and the traffic inspector, (This will however be included in the future plan.); and

f) The system accumulates records for statistics.

Weigh-in-motion (WIM) type sensors for measuring vehicle weight should be used for this expressway. This is because of its advantage that vehicles need not stop on the sensor in order to be weighed as this causes inconvenience to the traffic flow. Heavy truck control subsystem consists of WIM, vehicle detector, lane monitoring camera, ANPR, overweight warning display and roadside panel as roadside equipment, and WIM center unit, supervisory console and database server as office equipment.



Source: JICA Survey Team

Figure 6.71. Configuration of Heavy Truck Control Subsystem

WIM shall measure the axle weight of vehicles, and the roadside panel shall calculate the total weight of vehicles. If the measured axle weight or total weight of vehicles exceeds the preset threshold, an overweight warning display alerts the truck driver. Lane monitoring

cameras shall be installed to monitor and temporarily store video images of passing vehicles. ANPR shall have functions to recognize and memorize the plate number of heavy trucks automatically when the vehicle detector senses passing overloaded vehicles. The data collected at the roadside are sent to RMO through the fiber optic cable network, which will be monitored and stored by RMO equipment.

(3) Location Plan

TCVN5729:1997 specifies that overloaded vehicle detection shall be conducted at the rightmost lane of the entrance toll gate. In order to reduce the initial construction cost, WIM shall be installed at one lane of each entrance tollgate.

The location plan of heavy truck control subsystem is proposed in Table 6.99 below.

Table 6.99. Location of the Heavy Truck Control System

No.	Location (Entrance Tollgate)	Nos.	Nos.	Location (Entrance Tollgate)	Nos.
1	Than Cuu Nghia IC	2	4	An Thai Truing IC	1
2	Cai Lay IC	1	5	Mainline My Thuan	1
3	Cai Be IC	1		Total	6

Source: JICA Survey Team

According to the above plan, the equipment list for this subsystem shall be as proposed in Table 6.100 below

Table 6.100. Equipment List for Heavy Truck Control Subsystem

Installing Location	Equipment	QTY.	Unit	Remark
Roadside Equipment	WIM	6	Set	
	Vehicle detector	6	Set	
	Lane monitoring camera	6	Set	
	Automatic number plate recognition camera (ANPR),	6	Set	
	Overweight warning display	6	Set	
	Roadside panel	6	Set	
Office Equipment	WIM center unit	1	Set	
	Supervisory console	1	Set	
	Database server	1	Set	

Source: JICA Survey Team

(4) Recommendations

JICA recommended to MOT that a heavy truck control subsystem shall be installed at exit toll gates because the present system does not show how overloaded vehicles can return without entering the expressway at the entrance toll gate. Moreover, according to the JICA proposal, overloaded vehicle should be penalized at the exit toll gate.

However, it is possible to collect penalty from overloaded vehicles at the entrance by using heavy track control subsystem. Such vehicles can go through the expressway. In short, the overloaded vehicle may be allowed to run on the expressway on condition of paying a penalty. Such system can be installed at the entrance.

Moreover, the heavy truck control subsystem shall be installed at the entrance toll gate in order to avoid congestion at the exit because the capacity of the entrance toll gate is twice as many as the exit toll gate. It is a concern that if this system is installed at the exit toll gate, the capacity will deteriorate resulting in more congestion.

The JICA Survey Team considered the location plan on the condition of allowing over-loaded vehicles to run the expressway. However, the method to return over-loaded vehicles without

entering the expressway should be considered as soon as possible.

6.3.4.11. Meteorological Monitoring Subsystem

Meteorological monitoring subsystem is one of the indispensable systems to measure weather conditions, in order to determine appropriate countermeasures to be taken such as road closure, reduction of speed limit during bad weather conditions, and provision of warning information to drivers. Table 6.101 shows the criteria of traffic regulation under bad weather condition in Japan.

Table 6.101. Criteria on Traffic Regulation (Japan)

Cause of Disaster	Operation by Highway Operator		
	Special Patrol	Alert Operation	Emergency Operation
		Speed Control Lower the regulartory speed (ex. to 50km/h)	Roadway Closure
Earthquake	Subject to Earthquake Inspection Manual	Over 50 gal	Over 80 gal, or Actual damage confirmed
Heavy Rain	Accumulated Rain between 100mm and 150mm	Accumulated Rain > 150mm, or Hourly Rain > 30mm	Accumulated Rain > 300mm, or Hourly Rain > 50mm after Accumulated Rain reaches 220mm
Strong Wind	—	Storm Warning Issued	Maximum Wind Speed > 25m/s
Tsunami	—	Tsunami Warning Issued	Major Tsunami Warning Issued
Dense Fog	—	Visibility between 50m and 100m	Visibility less than 50m
Others	—	Disasters probable	Closure judged to be necessary

Source: JICA Survey Team

(1) System Operation Policy

There have been no huge earthquakes during the past ten thousand years in Vietnam. South Vietnam is located in a subtropical zone. Therefore, seismometers and road temperature measurements for detecting ice roads is not necessary. Necessary meteorological sensors include anemometers, thermometers, rainfall gauges and visibility meters.

Table 6.102. Meteorological Monitoring Items and Required Sensors

Item	Purpose	Required Sensor	Necessity
Wind Velocity & Wind Direction	To measure and process **Instantaneous and Average Wind Velocity and Direction**	Anemometer	○
Air Temperature	To measure **Air Temperature** for general purpose	Thermometer	○
Road Temperature	To mainly detect **Ice Road**	Road Surface Thermometer	×
Rainfall	To measure and process **Hourly Rain** and **Accumulated Rain**	Rainfall Gauge	○
Visibility	To detect **Dense Fog**	Visibility Meter	○

Source: JICA Survey Team

(2) System Configuration

According to the above plan, the equipment list for this subsystem is proposed in Table 6.103 as follows:

Table 6.103. Equipment List for the Meteorological Monitoring Subsystem

Installing Location	Equipment	QTY.	Unit	Remark
Outside Equipment	Anemometer	1	Set	
	Thermometer	1	Set	
	Rainfall Gauge	1	Set	
Office Equipment	Visibility Meter	1	Set	
	Data Logger	1	Set	

Source: JICA Survey Team

(3) Location Plan

Meteorological sensors shall be installed at 50 km mesh-intervals in order to detect extreme weather conditions at limited areas. This expressway is about 50 km long. Therefore, the meteorological sensor shall be installed at the RMO of this expressway.

6.3.4.12. Information Dissemination System

This system disseminates information by means of internet notice assignment, car navigation system, radio broadcasting, etc. However, in order to offer safety to road users, more information should be provided to them. The system is planned to provide visual information to road users directly. Thus, a variable message sign (VMS) subsystem is proposed. Also, this system should disseminate the information to road operators, road inspectors, road maintenance services, road patrols, etc. to manage the expressway's road O&M. This information dissemination system will be the dedicated communication system. This is because this system should not be affected by power companies and telephone service companies, such as service level and service suspension (planned blackout). Thus, mobile radio subsystem such as the dedicated communication system is proposed.

6.3.4.13. VMS Subsystem

A VMS system shall provide real time visual information to road users such as road and traffic conditions, traffic incidents, traffic congestion, weather conditions and other information that is happening on the expressway.

(1) System Operation Policy

VMS is classified by the following installation position and information displayed in Table 6.104 below.

Table 6.104. VMS Classification

Item	Objective	Necessity
VMS for Ingress	● To inform the road, traffic and weather conditions on highway to drivers who intend to use the highway in advance and allow them to determine whether to use the highway.	○
VMS for Egress	● To promptly inform road closure to drivers who are on highway, when highway is closed due to an accident or other reasons and have them exit from the interchange. ● To inform drivers of the road conditions on highway ahead of them and advise them to drive carefully.	○
Toll Gate & Barrier VMS	● To inform drivers of the road conditions on highway ahead of them.	△ (Future)
Travel Time VMS	● To inform travel time from VMS point to major destinations.	△ (Future)
Graphic Information VMS	● To inform congestion on highway to make drivers select most suitable route.	△ (Future)

Source: JICA Survey Team

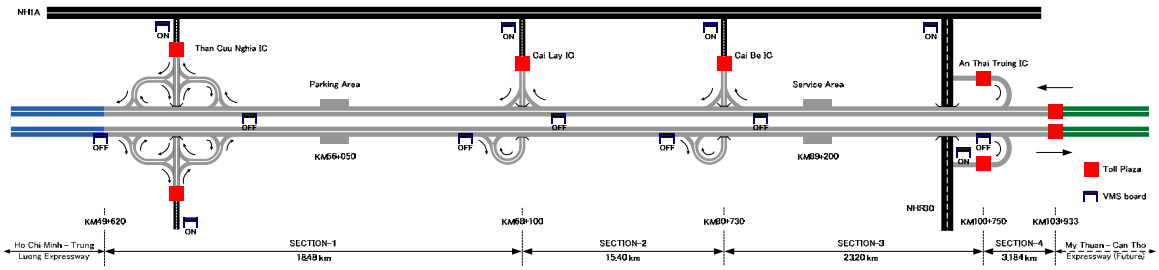
VMS provides the driver with real-time information to know the movement that is happening on the expressway in order to prompt them to drive more carefully, get on the ramp or get off the expressway. VMS shall be installed at certain intervals and shall provide adequate information to the attention of call users. The information should be provided before the vehicle enters the speed reduction lane in order to allow them to solve whether they should get on or off the expressway. The drivers need information on the expressway on ordinary road to solve whether they should enter the expressway. Moreover, VMS installed both at speed reduction lane and on ordinary road can instruct drivers to drive more carefully. Therefore, in consideration of cost reduction, VMS whose purpose is only to call people's attention shall not be introduced at present.

(2) System Configuration

The information board of VMS shall be composed of Light Emitting Diode (LED) displays. The information provided on this display is generated from the VMS Indication Data Set (such as breakdown of vehicle, traffic accidents, left obstacles, natural disasters, rainfall, strong wind, fog and other occurrences) which is transmitted from the Traffic Event Data Server in the traffic control center.

(3) Location Plan

At the time of road opening, one roadside facility at ingress and egress sections on the expressway shall be installed with VMS to show the traffic information.



Source: JICA Survey Team

Figure 6.72. Location of VMS Devices

The location plan of vehicle detector is shown in Table 6.105 below.

Table 6.105. Location of VMS

No.	Location	Nos.	No.	Location	Nos.
1	Than Cuu Nghia IC	7	4	An Thai Truing IC	2
2	Cai Lay IC	4	5	My Thuan IC	2
3	Cai Be IC	4		Total	20

Source: JICA Survey Team

In the future, at the toll gate and congestion-prone sections such as merging and diverging sections, VMS should be installed depending upon the increase of traffic volume.
According to the above plan, the equipment list for this subsystem is proposed in Table 6.106 as follows:

Table 6.106. Equipment List for VMS Subsystem

Installing Location	Equipment	QTY.	Unit	Remark
Roadside Equipment	Variable Message Sign Board	13	Sets	
	VMS Controller	13	Sets	
	VMS Support Gate incl. Foundation	13	Sets	
Office Equipment	VMS Center Controller	1	Set	

Source: JICA Survey Team

6.3.4.14. Mobile Radio Subsystem

(1) System Operation Policy

The following are minimum overall functions and requirements of the mobile radio communication subsystem:

a) Quality of communication indicated by S/N ratio measured with standard modulation shall be better than 25 dB. The standard modulation is defined as shift of 1.75 kHz against the input signal of 1 kHz.

b) One-to-one, one-to-many communications shall be possible.

c) ID data shall be automatically transmitted whenever call is made.

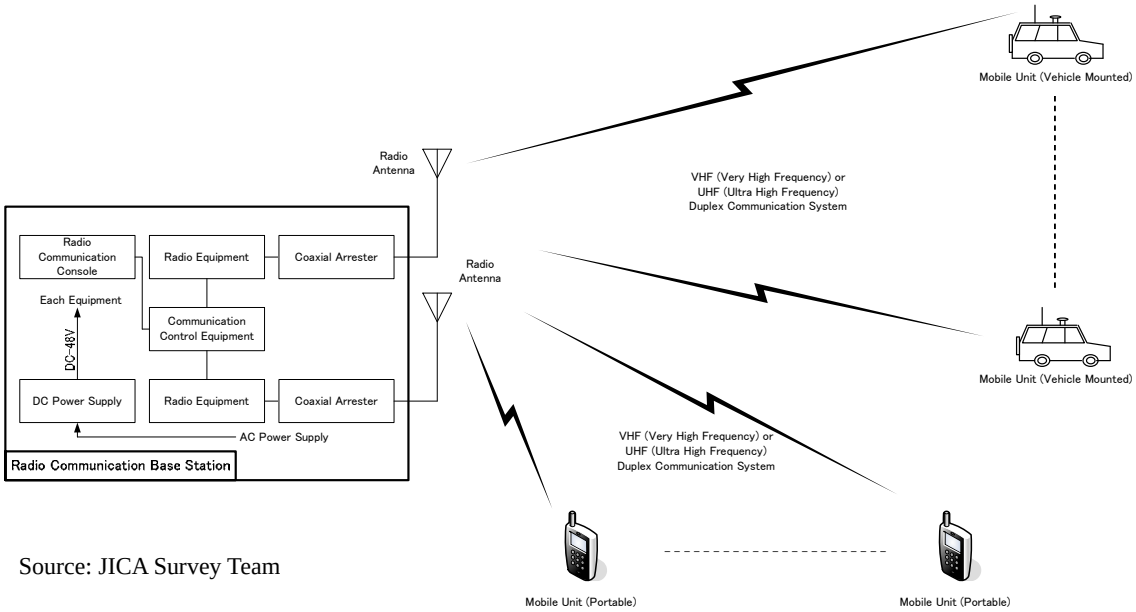
d) Mobile units both vehicle mounted type and portable type shall be equipped with GPS and the system has a vehicle tracking function.

e) Portable units shall be rain proof.

(2) System Configuration

The radio communication base station consists of radio equipment (transmitter and receiver), antenna, coaxial arrester, communication control equipment and radio communication console. Two sets of transmitters and receivers shall be installed as a hot standby system.

The radio communication console equipped with microphone shall have such functions to select and communicate with any mobile unit or mobile unit group to preset, select transmitter and receiver (No.1/No.2) to be used, track vehicle location, and log operation record through the communication control equipment. The yagi-type antenna will be used to transmit radio effectively. The coaxial arrester shall be installed to protect the equipment from lightning surge. The power supply of every equipment shall be made from DC power supply with battery having enough capacity to supply power until the emergency generator starts.



Source: JICA Survey Team

Figure 6.73. Mobile Radio Communication System Configuration

Both vehicle mounted type and portable type mobile units with battery charger shall be provided. The mobile unit shall be compact in size and lightweight, in consideration of its usability.

(3) Location Plan

The system will consist of one radio communication base station at the RMO, 20 vehicles equipped with mobile units, and 40 portable mobile units. Additional base station may be required to cover the entire highway.

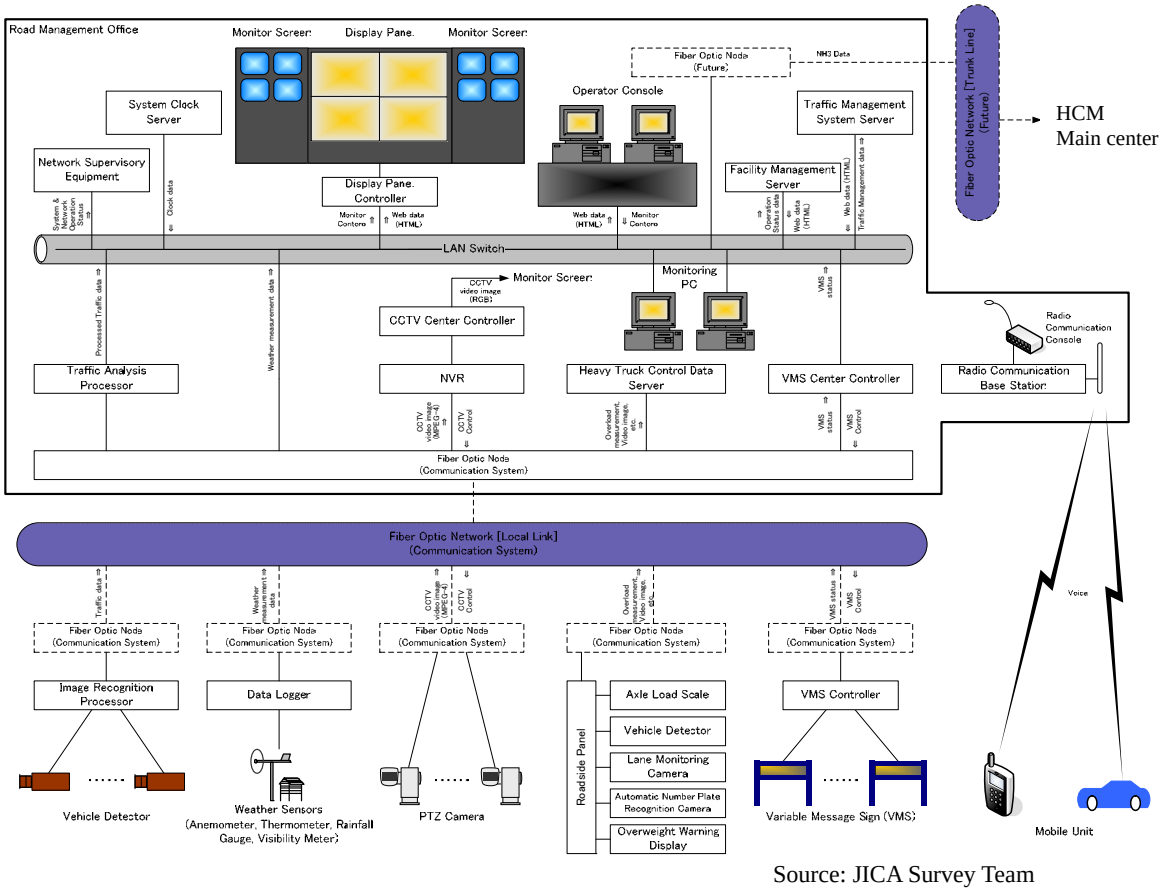
Table 6.107. Equipment List for Mobile Radio Subsystem

Installing Location	Equipment	Qty.	Unit	Remark
Office Equipment	Radio Equipment	1	Set	
	Communication Control Equipment	1	Set	
	Radio Communication Console	1	Set	
	Radio Antenna	1	Set	
	Coaxial Arrester and Cable	1	Set	
Mobile Unit	Mounted on the each vehicle type	20	Sets	
	Portable type	40	Sets	
Repeater Station Equipment at Cai Be Toll office	Repeater Equipment	1	Set	
	Radio Tower and Antenna	1	Set	
	Coaxial Arrester and Cable	1	Set	
	Diesel Engine Generator	1	Set	

Source: JICA Survey Team

6.3.4.15. Traffic Control Center System

Various kinds of information obtained from the roadside facilities are mentioned in this chapter, which are then integrated and processed in the traffic control system for the provision of comprehensive traffic control information to the road user. The proposed system is shown in Figure 6.74 below.



Source: JICA Survey Team

Figure 6.74. Proposed Traffic Control Center System

Cuu Long CIPM has a construction plan of the HCM Main Center, but does not have an introduction plan of the ITS. On the other hand, the Maintenance Office (O&M Office) is under construction near the Than Cuu Nghia IC. This center is located at the center of HCM-TL-MT Expressway, where it can function as the RMO. Therefore, the JICA Survey Team shall make a plan for the traffic control center system be temporary allocated to RMO until the HCM Main Center is constructed. Moreover, this system shall be designed to minimize change when the system is connected with the HCM Main Center in the future.

6.3.4.16. Traffic Management Subsystem

(1) System Operation Policy

The proposed traffic control system consists of many components related to data acquisition system and data dissemination system. The traffic management subsystem governs the whole system, encourages data exchange between systems in order to realize their functions fully and achieve the overall objectives of the traffic control system. The system shall have the following basic functions:

a) To manage and integrate all information regarding road and traffic conditions, incidents and expressway operation;

b) To manage the all information related to operation status of each system component;

c) To display and share the information mentioned above among operators;

d) To process, store and record the necessary data for effective expressway operation;

e) To disseminate the information by converting appropriate data to the operators in the RMO or other places; and

f) To synchronize all clocks used among each system.

(2) System Configuration

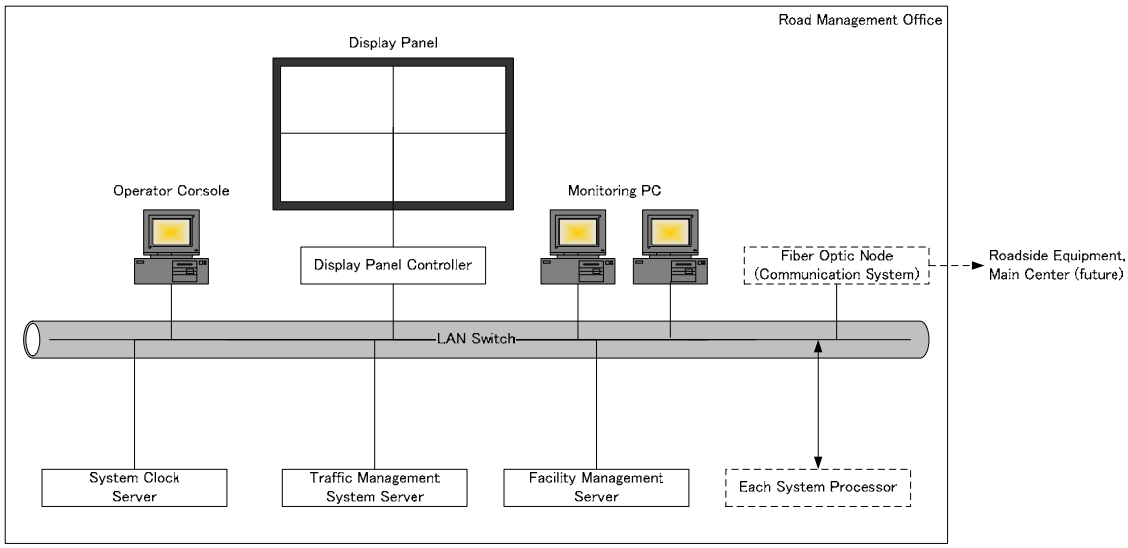
The traffic management subsystem consists of the traffic management server, facility management server, display panel, etc.

Table 6.108. Equipment List for Traffic Management System

No.	System Component	Nos.	Nos.	System Component	Nos.
1	Traffic management server	1	7	LAN Network Facilities	1
2	Facility management server	1	8	Furniture (Air conditioning system, firefighting system, etc.)	1
3	Display panel and controller	1			
4	System clock server	1			
5	Operator console	1			
6	Monitoring computer	2			

Source: JICA Survey Team

The traffic management server is the central part of the traffic management subsystem. It collects, processes, stores, records and displays the information regarding road and traffic conditions, incidents, and expressway operation. The facility management server monitors the operation status of each system facility. The display panel and controller are used for the purpose of sharing traffic information among the personnel. The screen shows the information of the current traffic condition, facility operation status and any other information on the image of expressway map.



JICA Survey Team

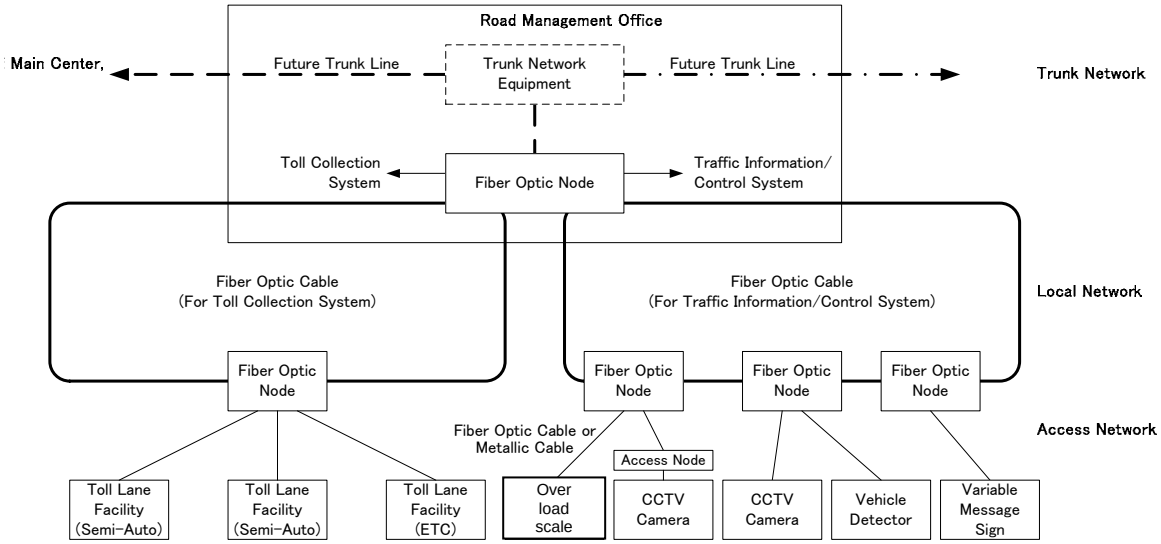
Figure 6.75. Traffic Management System Configuration

(3) Location Plan

According to the consideration given in the previous chapter, the traffic management subsystem shall be installed at RMO temporarily.

6.3.4.17. Communication Network System

As well as the power supply system, structure and hierarchy of communication system for connecting CCTV camera must be considered to secure the total network reliability. The roadside equipment on the TL-MT expressway such as CCTV camera, VMS, vehicle detector (CCTV camera) is connected by fiber optic cable of which, the network configuration is applied to the flattened ring topology.



Source: JICA Survey Team

Figure 6.76. Communication Network System

Through a Gigabit/10 Gigabit ethernet with resilient packet ring (RPR) having fail-over function, it can guarantee the connectivity even if one communication node or fiber optic cable is down. Therefore, this RPR type will be employed as the communication system of this expressway. The communication system should not be functioning in case two or more communication node fail which may be caused by a wide area blackout. Avoiding whole network failure and securing the data transmission reliability, the CCTV camera network must be separately configured with other ITS facilities by using a 1:1 access node connection with fiber optic node (FON). Also, this network topology should be a doubling structure by using redundancy technique.

According to the above plan, the equipment list for this subsystem is proposed in Table 6.109 as follows:

Table 6.109. Equipment List for Communication Network System

Installing Location	Equipment	QTY.	Unit	Remark
Fiber Optic System	Fiber Optic Node	12	sets	
	Access Node	120	sets	
	Fiber Optic Cable	121	km	
	Fiber Optic Termination	12	sets	
	Closure	198	sets	
	PVC Pipe	186	km	
	Hand hole	528	pcs	
	Supervisory Equipment	1	Set	
Others	Main PBX	1	set	
	Telephone Set	90	sets	

Source: JICA Survey Team

6.3.4.18. Electrical Power Facility

(1) Power Supply Policy

In this JICA Survey, the power supply from commercial power to the ITS equipment along the main road is not considered. This is because there is no ITS equipment installed along the main road according to the present plan.

All ITS equipment should be fed by a commercial power from the substation located near ICs. The equipment and capacity of the substation should be planned in consideration of the toll offices below.

Table 6.110. Power Supply Points

No.	Location	Nos.	Location
1	Toll office in Than Cuu Nghia IC	4	Toll office in An Thai Truing IC
2	Toll office in Cai Lay IC	5	Toll office in My Thuan
3	Toll office in Cai Be IC		

Source: JICA Survey Team

(2) Type of Power Supply

Supplying power for ITS equipment needs to be considered to maintain the normal operating condition of the equipment (commercial power supply) and emergency condition (commercial power black-out). The ITS equipment must operate even during power interruption of high voltage distribution lines and maintenance work of the power supply equipment.

Therefore, the power load demands for these ITS facilities and required back-up power supply facilities such as diesel engine generator (DEG) and uninterruptible power supply (UPS) are planned to be installed at toll offices, RMO and traffic control center.

These power supply systems will be applied to the ITS facilities listed in Table 6.111 as follows:

Table 6.111. Type of Power Supply for ITS Facilities

ITS facility		Name of System/Equipment	CPS	DEG	UPS
Classification	Location				
TCS	Roadside equipment	Manual toll collection	Y	Y	Y
		Automatic toll collection	Y	Y	Y
	Office equipment	Manual toll collection	Y	Y	Y
		Automatic toll collection	Y	Y	Y
TMS	Roadside equipment	CCTV monitoring	Y	-	-
		Vehicle detection	Y	-	-
		Heavy truck control	Y	-	-
		Variable message sign	Y	-	-
	Office equipment	CCTV monitoring	Y	-	-
		Vehicle detection	Y	-	-
		Heavy truck control	Y	-	-
		Variable message sign	Y	-	-
		Meteorological monitoring	Y	Y	Y
		Mobile radio	Y	Y	Y
Traffic center control system	Office equipment	Traffic management	Y	Y	Y
Communication network	Roadside equipment	Network equipment	Y	-	-
	Office equipment	Network equipment	Y	Y	Y

NOTE;

Y: Yes, for supplied by each system, Blank: Not applied to the system

CPS: Commercial Power Supply, DEG: Diesel Engine Generator, UPS: Uninterruptible Power System

Source: JICA Survey Team

(3) Demand Load and Power Capacity

The high voltage (22 kV) power substation of the RMO and toll office comes from the power company. On the other hand, power used for the ITS facility shall be supplied through commercial power. The capacity of the transformer in the substation is decided by the total consumption of electricity at each facility.

In this JICA Survey, a basic specification of the ITS facility and the system are selected. However, it was difficult to estimate the total power consumption by the equipment of all systems during this survey period. Also, the demand maximum power for this expressway can be estimated in comparison with the ITS plan for the NH3 project where the system component is almost the same.

According to this estimation, the maximum consumption of the substation to be allocated to the toll office is 40 kVA, and the maximum dissipation of substation disposed to RMO is 200 kVA.

The demand load of this expressway is shown in Table 6.112 below.

Table 6.112. Demand Load

No.	Location	CPS	DEG	UPS
1	Toll office in Than Cuu Nghia IC	40 kVA	40 kVA	40 kVA
2	Toll office in Cai Lay IC	40 kVA	40 kVA	40 kVA
3	Toll office in Cai Be IC	40 kVA	40 kVA	40 kVA
4	Toll office in An Thai Truing IC	40 kVA	40 kVA	40 kVA
5	Toll office in My Thuan	40 kVA	40 kVA	40 kVA
6	Road management office	200 kVA	100 kVA	80 kVA

Source: JICA Survey Team

Considering the cost-effectiveness, the demand load should be estimated strictly, and the capacity of the substation should be decided in the next detailed design.

(4) System Configuration

According to the above plan, the equipment list for electrical power facility is proposed in Table 6.113 as follows:

Table 6.113. Equipment List for Electrical Power Facility

Type	Equipment	Qty.	Unit
CPS	Transformer and Panel (50 kVA)	5	Sets
	Transformer and Panel (100 kVA)	2	Sets
DEG	Engine Generator (40 kVA) with Control Panel and Fuel Tank	5	Sets
	Engine Generator (100 kVA) with Control Panel and Fuel Tank	1	Set
UPS	3-phase 400 V, 40 kVA	5	Sets
	3-phase 400 V, 80 kVA	1	Set
Other	Power line	60	km

Source: JICA Survey Team

6.3.4.19. O&M for ITS Facility

(1) O&M

After completion of the ITS facility, the O&M works will be essential to ensure that the ITS facility and system equipment continue to function as designed. The maintenance works are proposed in Table 6.114 as follows:

Table 6.114. Essential Maintenance Works for Operation of ITS Facility

Work Item	Occasion/Activity
Inspection	Periodically by staff
Cleansing of CCTV camera, display of VMS	Periodically by staff
Simple repair and adjustment	As required by staff
Difficult repair	Procurement of spare parts and outsourcing
Appurtenant facilities	As required by staff

Source: JICA Survey Team

As outlined above, equipment for ITS facility can generally be maintained through a periodic inspection program. It is also essential to remove the dust from the CCTV camera and display VMS periodically to secure an accurate monitoring and disseminating information.

The O&M of ITS facility is conducted using two methods namely, ITS staff and/or outsourcing. Generally, ITS staff will have daily inspection for the ITS facility. The outsourcing manufacturer will have maintenance and service in case of a breakdown in the ITS facility.

Simple repair and adjustment such as replacement of spare parts and calibration of equipment of each equipment can be undertaken by the assigned ITS staff as required. However, more difficult equipment repairs are likely to be assigned to the manufacturers concerned or shall be made by ITS staffs through procurement of the required spare parts from the manufacturers. This highlights the importance of initial training programs for ITS staffs which should be undertaken during and immediately after the construction.

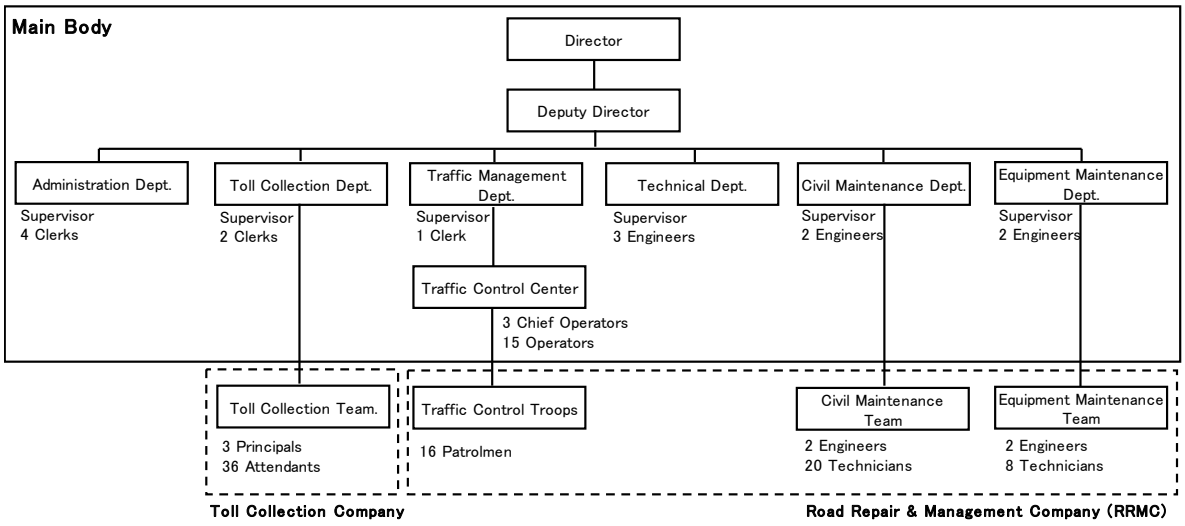
The routine inspection of the outsourcing manufacturer is proposed as shown in Table 6.115 below.

Table 6.115. Routine Inspection of the Outsourcing Manufacturer

Item			Frequency	Remark
1	TMS	CCTV monitoring subsystem	Once per half a year	
2		Vehicle detection subsystem	Once per half a year	
3		Heavy truck control subsystem	Once per month	
4		Variable message sign subsystem	Once per year	
5		Meteorological monitoring subsystem	Once per year	
6		Mobile radio subsystem	Once per year	
7	TCS	Manual Toll collection subsystem	Once per month	
8		Automatic Toll collection subsystem	Once per month	
9	Traffic control system	Traffic management subsystem	Once per half a year	
10		Communication network system	Once per half a year	
11		Electrical power facility	Once per year	

Source: JICA Survey Team

For further information, the current maintenance and operation frame of the ITS facility along NH3 are shown in Figure 6.77 below. The draft operation framework for the TL-MT Expressway is referred to Figure 6.62 and Table 6.69.



Source: JICA Survey Team

Figure 6.77. O&M Framework for ITS Facility in NH3 (example)

6.3.5 O&M Cost

6.3.5.1. Initial O&M Cost

(1) Vehicle and Machines Cost

The O&M works for the TL-MT Expressway is assumed to be conducted in the same manner as the HCMC-Trung Luong Expressway. Therefore, the effective deployment of equipment and facilities used for the O&M works of the HCMC-Trung Luong Expressway will be considered. For example, it is not necessary to build a new operation office by considering the joint usage of the existing Expressway Management Center and the Southern Traffic Management Center that is under construction. Therefore, the initial O&M cost of the TL-MT Expressway only includes the purchase for vehicles, equipment, and facilities for the required O&M works. Vehicles and machines required by the road operator for road maintenance works, traffic management works and emergency works are mentioned in Table 6.71. The computed initial O&M cost of vehicles and machines for the TL-MT Expressway are shown in Table 6.116.

Table 6.116. Required Vehicles and Machines Cost for O&M Works

Category	Kind of Works	Vehicle	Unit	Quantity	Cost (JPY million)	Remarks
Road Maintenance	Road Cleaning	Sweeper	Vehicle	1	—	
	Road Cleaning	Watering truck	Vehicle	1	—	
	All-Purpose Car	Unimog	Vehicle	1	—	
	Truck	Track with crane	Vehicle	2	—	
Traffic Management	Traffic Patrol	Patrol car	Vehicle	4	—	
	Traffic Regulation	Track with sign	Vehicle	4	—	
	Traffic Regulation	Equipment regulation	set	1	—	
	Contact Vehicle	Passenger car	Vehicle	4	—	
Total				**17**	**about 200 (VND 53 billion)**	Refer to the Japanese case.

Source: JICA Survey Team

(2) ITS Facilities Cost

The initial cost for the ITS facilities were estimated based on the following conditions:

a) Costs are based on 2011 prices;

b) Rough order of magnitude (ROM) cost information from major international manufacturers;

c) Contract price information from past projects;

d) Contract price information from other related projects;

e) Consultant's internal cost estimates;

f) Contingencies and government tax are not included; and

g) Costs for creation of new organization and preparation (civil and structural works, etc.) are not included.

The introduction of operating expenses for the ITS facility calculated is USD 27.0 million and VND 182.9 billion. Tables 6.117 to 6.121 summarize the cost estimates.

Table 6.117. Summary of Cost Estimates for ITS

No.	Item	Total	
		USD	VND
1	Traffic Management System (TMS)		
1.1	CCTV Monitoring subsystem	287,022	832,320,853
1.2	Vehicle Detection subsystem	191,753	2,211,909,284
1.3	Variable Message Sign subsystem	2,241,693	5,133,898,258
1.4	Wireless Radio subsystem	633,437	431,661,103
1.5	Meteorological Monitoring subsystem	96,957	222,010,973
1.6	Traffic Management Center system	3,028,567	11,826,172,866
1.7	Other	1,565,520	0
1.8	Installation work, Shipping & Transportation	1,619,858	3,098,696,001
	Traffic Management System Total :	9,664,807	23,756,669,338
No.	Item	Subtotal	
		USD	VND
2	Toll Collection System (TCS)		
2.1	Toll Gate for Manual	884,844	2,279,237,214
2.2	Toll Plaza Office for Manual	1,589,100	5,382,638,570
2.3	Toll Gate for ETC	774,109	1,743,770,400
2.4	Toll Plaza Office for ETC	6,462,724	11,842,120,190
2.5	Other	1,016,400	0
2.6	Installation work, Shipping & Transportation	2,427,695	3,187,164,957
	Toll Collection System Total :	13,154,872	24,434,931,331
No.	Item	Subtotal	
		USD	VND
3	Communication Network System		
3.1	Communication Network System	2,530,465	21,953,963,141
3.2	Other	402,600	0
3.3	Installation work, Shipping & Transportation	632,617	3,293,094,472
	Communication Network System Total :	3,565,682	25,247,057,613
No.	Item	Subtotal	
		USD	VND
4	Electrical Facility		
4.1	Power Supply Facility	0	26,761,263,022
4.2	Electrical Facility	126,822	68,400,649,490
4.3	Other	397,320	0
4.4	Installation work, Shipping & Transportation	31,707	14,274,286,877
	Electrics Facility Total :	555,849	109,436,199,389

Source: JICA Survey Team

Table 6.118. Summary of Cost Estimates for TMS

No.	Item	Description	Unit	Q'ty	Unit Price		Total	
				Total	USD	VND	USD	VND
1	**Traffic Management System (TMS)**							
1.1	**CCTV Monitoring system**						**287,022**	**832,320,853**
1.1.1	**Roadside Equipment**							
(1)	CCTV Camera	PTZ Camera with Pole 10m	set	**5**	8,226	18,835,053	41,130	94,175,265
(2)	Camera Foundation	IP Encoder (MPEG-2) type	set	**5**	0	7,934,080	0	39,670,400
1.1.2	**Center Equipment**							
(1)	NVR		set	**1**	675	1,545,600	675	1,545,600
(2)	CCTV center Controller	Video switcher, Controller, Video recorder	set	**1**	235,697	539,693,350	235,697	539,693,350
(3)	Monitoring screen	LCD 20inch or larger for each Sec. and IC	set	**4**	2,380	5,448,673	9,520	21,794,692
(4)	CCTV Operator Console		set	**1**	0	135,441,546	0	135,441,546
1.2	**Vehicle Detection system**						**191,753**	**2,211,909,284**
1.2.1	**Roadside Equipment**							
(1)	Traffic Detector	CCTV camera	set	**8**	1,170	2,679,040	9,360	21,432,320
(2)	Image Recognize Processor		set	**8**	3,645	8,346,240	29,160	66,769,920
(3)	Traffic Detector Pole and others		set	**8**	0	221,604,693	0	1,772,837,544
1.2.2	**Center Equipment**							
(1)	Traffic Analysis Processing Server		set	**1**	153,233	350,869,500	153,233	350,869,500
1.3	**Variable Message Sign system**						**2,241,693**	**5,133,898,258**
1.3.1	**Roadside Equipment**							
(1)	Variable Message Sign Board	High intensity LED	set	**13**	117,882	269,992,842	1,532,466	3,509,906,946
(2)	VMS Controller		set	**13**	29,436	67,402,503	382,668	876,232,539
(3)	VMS Support Gate incl. Foundation		set	**13**	8,804	20,160,119	114,452	262,081,547
1.3.2	**Center Equipment**							
(1)	VMS Center Controller		set	**1**	212,107	485,677,226	212,107	485,677,226
1.4	**Wireless Radio system**						**633,437**	**431,661,103**
1.4.1	**Base Station Equipment**							
(1)	Radio Equipment	VHF or UHF band	set	**1**	188,517	431,661,103	188,517	431,661,103
(2)	Communication Control Equipment		set	**1**	Including above			)
(3)	Radio Communication Console	Inc. Microphone	set	**1**				)
(4)	Radio Antenna	Yagi type antenna	set	**2**				)
(5)	Coaxial Arrester & Cable		set	**1**				)
1.4.2	**Mobile Equipment**							
(1)	Mobile Unit	Vehicle Mounted	set	**20**	3,928	0	78,560	0
(2)	Mobile Unit	Portable	set	**40**	2,644	0	105,760	0
1.4.3	**Repeater Station Equipment**							
(1)	Repeater Equipment	VHF or UHF band	set	**1**	130,000	0	130,000	0
(2)	Radio Tower and Antenna	Tower height 40m, Yagi type antenna	set	**1**	65,000	0	65,000	0
(3)	Coaxial Arrester & Cable		set	**1**	12,600	0	12,600	0
(4)	Diesel Engine Generator	50 kVA	set	**1**	53,000	0	53,000	0
1.5	**Meteorological Monitoring system**						**96,957**	**222,010,973**
1.5.1	**Outside Equipment**							
(1)	Anemometer	Aero-vane type	set	**1**	23,590	54,016,123	23,590	54,016,123
(2)	Thermometer	Platinum resistance thermometer	set	**1**	Including above			)
(3)	Rainfall Gauge	Tipping bucket type	set	**1**				)
(4)	Visibility Meter	Light wave scattering type	set	**1**	38,016	87,048,192	38,016	87,048,192
(5)	Data Logger		set	**1**	35,351	80,946,658	35,351	80,946,658
1.6	**Traffic Management Center system**						**3,028,567**	**11,826,172,866**
(1)	Traffic Management Server		set	**1**	1,414,111	3,237,999,604	1,414,111	3,237,999,604
(2)	Facility Management Server		set	**1**	1,178,414	2,698,306,254	1,178,414	2,698,306,254
(3)	Display Panel & Controller	50 inch LCD x 8 multi screen	set	**1**	282,809	647,569,182	282,809	647,569,182
(4)	System Clock Server	NTP or SNTP	set	**1**	94,292	215,906,719	94,292	215,906,719
(5)	Operator Console		set	**1**	58,941	134,962,781	58,941	134,962,781
(6)	Monitoring PC		set	**2**	0	135,441,546	0	270,883,092
(7)	LAN Network Facilities		set	**1**	0	540,161,234	0	540,161,234
(8)	Furniture	Air conditioning system, Fire fighting system, etc.	set	**1**	0	4,080,384,000	0	4,080,384,000
1.7	**Other**						**1,565,520**	**0**
(1)	Spare parts and Maintenance tools		lot	1	708,840	0	708,840	0
(2)	Commissioning test, making manual brochure, other		lot	1	566,280	0	566,280	0
(3)	Training		lot	1	290,400	0	290,400	0
1.8	**Installation work, Shipping & Transportation**						**1,619,858**	**3,098,696,001**
(1)	Installation work	15% of Total Equipment cost	lot	1	971,914	3,098,696,001	971,915	3,098,696,001
(2)	Shipping & Transportation	10% of Total Equipment cost	lot	1	647,943	0	647,943	0
						Traffic Management System Total :	**9,664,807**	**23,756,669,338**

Source: JICA Survey Team

Table 6.119. Summary of Cost Estimates for TCS

No.	Item	Description	Unit	Q'ty	Unit Price		Subtotal	
				Total	USD	VND	USD	VND
2	**Toll Collection System (TCS)**							
2.1	**Toll Gate for Manual**						**884,844**	**2,279,237,214**
(1)	Vehicle Detector	Inductive loop detector or equivalent	set	**26**	934	2,138,121	24,284	55,591,146
(2)	Lane Server		set	**26**	4,334	9,923,494	112,684	258,010,844
(3)	Barcode Reader		set	**26**	662	1,515,183	17,212	39,394,758
(4)	Lane Control Panel		set	**26**	5,950	13,623,042	154,700	354,199,092
(5)	Automatic Lane Barrier		set	**26**	7,733	17,706,146	201,058	460,359,796
(6)	Lane Traffic Light	Traffic Signal Sign	set	**26**	1,360	3,114,693	35,360	80,982,018
(7)	Alarm Horn and Lamp		set	**26**	84	193,138	2,184	5,021,588
(8)	Lane Camera	CCD color camera	set	**26**	1,699	3,889,966	44,174	101,139,116
(9)	Toll Fare Display	LED type or equivalent	set	**26**	2,719	6,226,666	70,694	161,893,316
(10)	Automatic License Plate Number Recognition Camera (ALPR)	Infrared type	set	**26**	4,759	10,897,346	123,734	283,330,996
(11)	Manual Lane Barrier		set	**26**	765	1,751,845	19,890	45,547,970
(12)	Canopy Traffic Light	Indication Lamp	set	**26**	1,105	2,529,838	28,730	65,775,788
(13)	Toll Booth Facilities	UPS, Air Conditioner, Exhaust Gas Diffuser, etc.	set	**26**	1,275	2,918,835	33,150	75,889,710
(14)	LAN Network Facilities		set	**26**	0	5,848,550	0	152,062,300
(15)	Internal Telephone		set	**26**	0	3,889,966	0	101,139,116
(16)	Overall Camera		set	**10**	1,699	3,889,966	16,990	38,899,660
2.2	**Toll Plaza Office for Manual**						**1,589,100**	**5,382,638,570**
(1)	Toll Management Server	Toll Data Management	set	**5**	288,929	661,582,581	1,444,645	3,307,912,905
(2)	Monitoring Camera	Inspection Data Management	set	**10**	1,699	3,889,966	16,990	38,899,660
(3)	Camera Monitoring Equipment	Switcher, Multiplexer, Terminal, Recorder, etc.	set	**5**	25,493	58,373,974	127,465	291,869,870
(4)	Monitoring Computer		set	**25**	0	40,885,448	0	1,022,136,200
(5)	Computer for selling periodic ticket		set	**5**	0	40,885,448	0	204,427,240
(6)	Computer for accounting	with Printer	set	**5**	0	70,073,795	0	350,368,975
(7)	Internal Telephone		set	**15**	0	4,651,638	0	69,774,570
(8)	LAN Network Facilities		set	**5**	0	19,449,830	0	97,249,150
2.3	**Toll Gate for ETC**						**774,109**	**1,743,770,400**
(1)	Vehicle Detector	Inductive loop detector or equivalent	set	**10**	934	2,138,121	9,340	21,381,210
(2)	Lane Server		set	**10**	4,334	9,923,494	43,340	99,234,940
(3)	Barcode Reader		set	**10**	662	1,515,183	6,620	15,151,830
(4)	Lane Control Panel		set	**10**	5,950	13,623,042	59,500	136,230,420
(5)	Automatic Lane Barrier		set	**10**	7,733	17,706,146	77,330	177,061,460
(6)	Lane Traffic Light	Traffic Signal Sign	set	**10**	1,360	3,114,693	13,600	31,146,930
(7)	Alarm Horn and Lamp		set	**10**	84	193,138	840	1,931,380
(8)	Lane Camera	CCD color camera	set	**10**	1,699	3,889,966	16,990	38,899,660
(9)	Toll Fare Display	LED type or equivalent	set	**10**	2,719	6,226,666	27,190	62,266,660
(10)	Automatic License Plate Number Recognition Camera (ALPR)	Infrared type	set	**10**	4,759	10,897,346	47,590	108,973,460
(11)	Manual Lane Barrier		set	**10**	765	1,751,845	7,650	17,518,450
(12)	Canopy Traffic Light	Indication Lamp	set	**10**	1,105	2,529,838	11,050	25,298,380
(13)	Toll Booth Facilities	UPS, Air Conditioner, Exhaust Gas Diffuser, etc.	set	**10**	1,275	2,918,835	12,750	29,188,350
(14)	LAN Network Facilities		set	**10**	0	5,848,550	0	58,485,500
(15)	Internal Telephone		set	**10**	0	3,889,966	0	38,899,660
(16)	Roadside Antenna	ETC	set	**10**	30,000	50,919,000	300,000	509,190,000
(17)	Entry Card Issuer	ETC	set	**10**	1,136	5,723,440	11,358	57,234,400
(18)	Lane Server for ETC	ETC	set	**10**	2,896	14,594,771	28,961	145,947,710
(19)	Roadside Controller	ETC	set	**10**	10,000	16,973,000	100,000	169,730,000
2.4	**Toll Plaza Office for ETC**						**6,462,724**	**11,842,120,190**
(1)	Toll Management Server	Toll Data Management	set	**5**	288,929	661,582,581	1,444,645	3,307,912,905
(2)	Monitoring Camera		set	**10**	1,699	3,889,966	16,990	38,899,660
(3)	Camera Monitoring Equipment	Switcher, Multiplexer, Terminal, Recorder, etc.	set	**5**	25,493	58,373,974	127,465	291,869,870
(4)	Monitoring Computer		set	**25**	0	40,885,448	0	1,022,136,200
(5)	Computer for selling periodic ticket		set	**5**	0	40,885,448	0	204,427,240
(6)	Computer for accounting	with Printer	set	**5**	0	70,073,795	0	350,368,975
(7)	Internal Telephone		set	**15**	0	4,651,638	0	69,774,570
(8)	LAN Network Facilities		set	**5**	0	19,449,830	0	97,249,150
(9)	Toll Management Server	ETC	set	**5**	96,536	486,492,360	482,681	2,432,461,800
(10)	IC Card / OBU Registration Terminal	ETC	set	**5**	1,193	6,009,612	5,963	30,048,060
(11)	IC Card Reader/Writer	ETC	set	**5**	20,196	46,244,352	100,980	231,221,760
(12)	IC Card	ETC	set	**300,000**	2.78	2,793	834,000	837,900,000
(13)	On-Board Unit	ETC	set	**50,000**	69	58,557	3,450,000	2,927,850,000
2.5	**Other**						**1,016,400**	**0**
(1)	Spare parts and Maintenance tools		lot	1	476,520	0	476,520	0
(2)	Commissioning test, making manual brochure, other		lot	1	381,480	0	381,480	0
(3)	Training		lot	1	158,400	0	158,400	0
2.6	**Installation work, Shipping & Transportation**						**2,427,695**	**3,187,164,957**
(1)	Installation work	15% of Total Equipment cost	lot	1	1,456,617	3,187,164,956	1,456,617	3,187,164,957
(2)	Shipping & Transportation	10% of Total Equipment cost	lot	1	971,078	0	971,078	0
						Toll Collection System Total :	**13,154,872**	**24,434,931,331**

Source: JICA Survey Team

Table 6.120. Summary of Cost Estimates for Communication Network System

No.	Item	Description	Unit	Q'ty	Unit Price		Subtotal	
				Total	USD	VND	USD	VND
3	**Communication Network System**							
3.1	**Communication Network System**						**2,530,465**	**21,953,963,141**
3.1.1	**Fiber Optic system**							
(1)	Fiber Optic Node	STM-4, Gigabit/10Gigabit Ethernet or more	set	**12**	35,351	80,946,658	424,212	971,359,896
(2)	Access Node	Media Converter	set	**120**	2,285	5,231,052	274,200	627,726,240
(3)	Fiber Optic Cable	SM-100C	km	**121**	10,605	24,283,725	1,278,200	2,926,868,807
(4)	Fiber Optic Termination		set	**12**	5,915	13,544,155	70,980	162,529,860
(5)	Closure		set	**198**	653	1,496,141	129,294	296,235,918
(6)	PVC Pipe	φ110	km	**186**	0	66,945,500	0	12,451,863,000
(7)	Hand hole	1.2m x 1.2m, H=1.2m	pc	**528**	0	6,229,386	0	3,289,115,808
(8)	Supervisory Equipment		set	**1**	117,882	269,922,842	117,882	269,922,842
3.1.2	**Others**							
(1)	Main PBX	IP-PBX with Console	set	**1**	235,697	539,693,350	235,697	539,693,350
(2)	Telephone Set	IP-TEL	set	**90**	0	4,651,638	0	418,647,420
3.2	**Other**						**402,600**	**0**
(1)	Spare parts and Maintenance tools		lot	1	179,520	0	179,520	0
(2)	Commissioning test, making manual brochure, other		lot	1	143,880	0	143,880	0
(3)	Training		lot	1	79,200	0	79,200	0
3.3	**Installation work, Shipping & Transportation**						**632,617**	**3,293,094,472**
(1)	Installation work	15% of Total Equipment cost	lot	1	379,570	3,293,094,471	379,570	3,293,094,472
(2)	Shipping & Transportation	10% of Total Equipment cost	lot	1	253,047	0	253,047	0
						Communication Network System Total :	**3,565,682**	**25,247,057,613**

Source: JICA Survey Team

Table 6.121. Summary of Cost Estimates for Electrical Facility

No.	Item	Description	Unit	Q'ty	Unit Price		Subtotal	
				Total	USD	VND	USD	VND
4	**Electrical Facility**							
4.1	**Power Supply Facility**						**0**	**26,761,263,022**
(1)	Transformer and Panel (50kVA)	22kV, 40 kVA, Compact package type	set	5	0	727,411,550	0	3,637,057,750
(2)	Transformer and Panel (100kVA)	22kV, 40 kVA, Compact package type	set	2	0	944,830,416	0	1,889,660,832
(3)	Power line 22kV	Connecting the cable line from Power company	km	60	0	353,909,074	0	21,234,544,440
4.2	**Electrical Facility**						**126,822**	**68,400,649,490**
(1)	Engine Generator (40kVA)	400V 3-phase, 40kVA with Fuel Tank (2000 litters)	set	5	11,000	655,160,000	55,000	3,275,800,000
(2)	Engine Generator (100kVA)	400V 3-phase, 40kVA with Fuel Tank (2000 litters)	set	1	11,000	984,500,000	11,000	984,500,000
(3)	UPS	3-phase 400V, 40kVA	set	5	0	641,681,700	0	3,208,408,500
(4)	UPS	3-phase 400V, 80kVA	set	1	0	1,452,011,000	0	1,452,011,000
(5)	DC Power supply (3kVA)	3kVA	set	1	60,822	0	60,822	0
(6)	Low voltage cable	600V XLPE	km	90	0	660,888,111	0	59,479,929,990
4.3	**Other**						**397,320**	**0**
(1)	Spare parts and Maintenance tools		lot	1	220,440	0	220,440	0
(2)	Commissioning test, making manual brochure, other		lot	1	176,880	0	176,880	0
4.4	**Installation work, Shipping & Transportation**						**31,707**	**14,274,286,877**
(1)	Installation work	15% of Total Equipment cost	lot	1	19,023	14,274,286,877	19,024	14,274,286,877
(2)	Shipping & Transportation	10% of Total Equipment cost	lot	1	12,682	0	12,683	0
						Electrics Facility Total :	**555,849**	**109,436,199,389**

Source: JICA Survey Team

6.3.5.2. Annual O&M Cost

(1) O&M Cost for Expressway

The estimated annual O&M cost of the TL-MT Expressway covers a duration of 35 years from its commencement. There is no available standard reference for administrative and maintenance costs for roads and bridges in Vietnam. Hence, the results from the F/S of the TL-MT Expressway Project have been used as reference in comparison with the results from five other studies, namely: i) the results of the F/S of HCMC-Trung Luong Expressway Project; ii) actual O&M costs of the HCMC-Trung Luong Expressway; iii) O&M costs of

Lach Huyen Port Development Project (D/D of Road and Bridge); iv) the actual O&M costs of ordinary roads and long bridges in Vietnam; and (v) actual O&M costs of expressways in Japan.

1) Calculation Result from the F/S of Trung Luong-My Thuan Expressway Project

a) Calculation Standard for Road Maintenance Cost

The calculation standard of cost for maintenance and pavement is established only for national highway as shown in Tables 6.122 and 6.123, respectively in Vietnam. However, calculation standard for expressway is not available in Vietnam so far.[17]

Table 6.122. Calculation Standard for Road Maintenance Cost

Type of Works	Cost for Road Maintenance	Cost for Bridge Maintenance
Annual Maintenance	0.55% of road construction cost	0.1% of bridge construction cost
Repair (every 5 years)	5.1% of road construction cost	1% of bridge construction cost
Major Repair (every 15 years)	42% of road construction cost	2% of bridge construction cost

Source: Hearing from DRVN

Table 6.123. Calculation Standard for Pavement Repair Work

Layer of Pavement	Period (year)		Rate of Maintenance Cost and Previous Capital (previous capital)		
	Major Repair	Repair	Major Repair	Repair	Regular Repair
Asphalt Concrete	15	5	42	5.1	0.55
Ballast Mixed Asphalt	12	4	48.7	7.9	0.98
Asphalt	10	4	49.6	8.7	1.92
Ballast	5	3	53.1	9	1.6
Aggregate	5	3	55	10	1.8
Cement Concrete	25	8	34.2	4.1	0.32

Source: Technical Norm TCVN 211-93 ; pp 782, 783

b) Calculation Result from the F/S of Trung Luong-My Thuan Expressway Project

The O&M cost of the TL-MT Expressway Project based on the F/S has two components, namely the maintenance cost and the operation/management cost. These components were calculated taking into accounts of the annual increments and referring the above mentioned calculation methods. The maintenance cost and operation/management cost components covering 35 years concession period was calculated separately by fixing their initial cost at the first year of operation as shown in Tables 6.124 and 6.125. Then, the maintenance cost and the operation/management cost are aggregated and converted for each km per year as shown in Table 6.126.

[17] Based on the interview with Maintenance Dept. of DRVN

Table 6.124. Calculation Result of Maintenance Cost (Cost Unified at the Opening Year)

Kind of Works	Year (Unit: VND billion)									
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Routine	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75
Periodic					56.59					56.59
	2024	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Routine	12.75	12.75	12.75	12.75	19.125	19.125	19.125	19.125	19.125	19.125
Periodic					56.59					56.59
	2034	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**
	21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Routine	19.125	19.125	19.125	19.125	19.125	19.125	19.125	19.125	19.125	19.125
Periodic					56.59					56.59
	2044	**2045**	**2046**	**2047**	**2048**	**Total**	**—**	**—**	**—**	**—**
	31	**32**	**33**	**34**	**35**		**—**	**—**	**—**	**—**
Routine	19.125	19.125	19.125	19.125	19.125	**580.125**	**—**	**—**	**—**	**—**
Periodic					56.59	**396.13**	**—**	**—**	**—**	**—**

Note: Excluding inflation
Source: JICA Survey Team

Table 6.125. Calculation Result of Operation/Management Cost (Cost Unified at the Opening Year)

Kind of Works	Year (Unit: VND billion)									
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
O&M	73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42
Ratio of Periodic			29%					32%		
Periodic			21.292					23.494		
	2024	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
O&M	73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42
Ratio of Periodic			30%					15%		
Periodic			22.026					11.013		
	2034	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**
	21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
O&M	73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42
Ratio of Periodic			20%					20%		
Periodic			14.684					14.684		
	2044	**2045**	**2046**	**2047**	**2048**	**Total**	**—**	**—**	**—**	**—**
	31	**32**	**33**	**34**	**35**		**—**	**—**	**—**	**—**
O&M	73.42	73.42	73.42	73.42	73.42	**2,569.70**	**—**	**—**	**—**	**—**
Ratio of Periodic			20%				**—**	**—**	**—**	**—**
Periodic			14.684			**121.877**	**—**	**—**	**—**	**—**

Note: Excluding inflation
Source: JICA Survey Team

Table 6.126. O&M Cost of Trung Luong-My Thuan Expressway

Items	Type of Works	Unit	Cost	Remarks
Maintenance Cost	Routine	VND billion	580.125	
-ditto	Periodic	VND billion	396.13	
O&M Cost	Routine	VND billion	2,569.70	
-ditto	Periodic	VND billion	121.877	
Total		VND billion	**3,667.83**	Road Length = 54.3 km
Unit Cost		VND billion/km/year	**1.93**	
		USD/km/year	**92,654**	(VND 1 billion=USD 48,008.8)

Source: JICA Survey Team

2) Various Cases with O&M Cost

a) Case-1: Calculation Result from the F/S of HCMC-Trung Luong Expressway Project

The maintenance cost estimated in the F/S of the HCMC-Trung Luong Expressway Project was calculated similarly using the above-mentioned method, with the annually increasing rate. Then, the maintenance cost, which covers 35 years, was calculated with a fixed initial cost at the first year. Results are then converted for each km per year as shown in Table 6.127.

Table 6.127. O&M Cost of HCMC-Trung Luong Expressway

Items	Type of Works	Unit	Cost	Remarks
Maintenance Cost	Routine	VND billion	389,507	
-ditto	Periodic	VND billion	391,010	
O&M Cost	Routine	VND billion	**—**	not included
-ditto	Periodic	VND billion	**—**	not included
Total		VND billion	**780,517**	39.8 km
Unit Cost		VND billion/km/year	**1,048**	
		USD/km/year	**50,298**	(VND 1 billion=USD 48,008.8)

Source: JICA Survey Team

b) Case-2: Actual O&M Cost of HCMC-Trung Luong Expressway

The actual O&M cost of the HCMC-Trung Luong Expressway was calculated as surveyed by Cuu Long CIPM and is shown in Table 6.128. The total O&M cost is about VND 8 billion/month during the defects liability period. On the other hand, the Cuu Long CIPM is requesting MOT to allocate a commensurate sum of VND 10 billion/month for O&M cost after the expiry of defects liability period.

Table 6.128. Actual O&M Cost of HCMC-Trung Luong Expressway

No	Items	Type of Contract	Cost (VND million)	Remarks
1	**Road Maintenance**	commission	500	For routine maintenance only
2	**Traffic patrol**	-ditto-	n/a	
3	**Ambulance**	-ditto-	n/a	
4	**Rescuer**	-ditto-	n/a	
5	**Electricity**	-ditto-	n/a	
6	**Police**	compensation	n/a	
7	**over head**		n/a	
	Total		**8,000**	
	VND million/km/year		**2,412**	

Source: JICA Survey Team (based on the interview with Cuu Long CIPM on October 21, 2011)

c) Case-3: Calculation by Applying the O&M cost of the Lach Huyen Port Development Project (D/D of Road and Bridge Portion)

The calculation result of applying the O&M cost of Lach Huyen Port Development Project

(D/D of Road and Bridge Portion) to the maintenance cost converted for the length of the TL-MT Expressway is shown in Table 6.129.[18] In addition, this maintenance cost includes the operation and management cost of the organization, or also called as the the daily management.

Table 6.129. O&M Cost Using the Unit Cost of Lach Huyen Port Development Project (D/D of Road and Bridge Portion)

Items	Type of Works	Unit	Cost	Remarks
Maintenance Cost	Routine	VND billion	1,202,871	Calculated by using the unit Price of O&M of Lach Huyen Project multiplied by its length (54.3 km)
-ditto-	Periodic	VND billion	1,421,597	
O&M Cost	Routine	VND billion	**—**	Included in the maintenance cost
-ditto-	Periodic	VND billion	**—**	-ditto-
Total		VND billion	**2,624,468**	Road Length =54.3 km
Unit Cost		VND billion/km/year	**1,384**	
		USD /km/year	**66,297**	(VND 1 billion= USD 48,000)

Source: JICA Survey Team

d) Case-4: Actual O&M Cost of Ordinary Roads and Long Bridges in Vietnam

The actual O&M costs of ordinary roads and bridges in Vietnam are shown in Table 6.130.

Table 6.130. Actual O&M Cost of Other Roads and Bridges in Vietnam (2010)

Type of Works	Name of Roads / Bridges	O&M Cost (/km/year)		Remarks
		VND million	USD	
Routine	National Highway No. 3	**10-20**	**480-960**	
	Phap Van–Cau Gie Expressway (four lanes)	**40-100**	**1,920-4,800**	
	Bai Chay Bridge (903 m)	**12,624**	**606,063**	VND 11.4 billion / bridge/year
	Can Tho Bridge (2,750 m+15,850 m =18,600 m)	**1,027**	**49,305**	VND 19.1 billion/ bridge/year
	My Thuan Bridge (1,535 m)	**7,948**	**381,573**	VND 12.2 billion/ bridge/year
Periodic	National Highway No. 3	**200-300**	**9,601-14,402**	

Source: JICA Survey Team (based on the interview with DRVN in August 2011)

e) Case-5: Actual O&M Cost of Expressways in Japan

The actual O&M expenditures by the Japanese expressway operating entities are shown in Table 6.131.

Table 6.131. Actual O&M Expenditures of Expressways in Japan

Kind of Road	Organi Zation	O&M Cost (/km/year)		Breakdown of O&M Expenditures		
		JPY million	USD thousand	Maintenance	Traffic Manage	Toll Collection
Expressway	NEXCO	**50-70**	**625-875**	High-Standard	High-Standard	Implemented
Fee Expressway	MLIT	**40**	**500**	Mid-Standard	Low-Standard	Not implemented
National Highway	MLIT	**10**	**125**	Low-Standard	Low-Standard	Not implemented

Note: assumed exchange rate is JPY 80=USD 1; MLIT: Ministry of Land, Infrastructure, Transport and Tourism, NEXCO: Nippon Expressway Company Limited
Source: JICA Survey Team

[18] This cost was calculated based on the results of the actual values of road maintenance works at various road management agencies for national highways in Vietnam

The comparison of O&M costs for ordinary highways and expressways has led to the following observations:

- The O&M cost of national highways in Vietnam was calculated about to about JPY 1 million/km/year. This is about 10% of the O&M cost of national highways managed by MLIT in Japan.
- The O&M cost of expressways was assumed to be about JPY 50-70 million/km/year by the Japanese expressway companies, such as NEXCO. Since the O&M cost of Vietnam is about 10% of that in Japan, O&M cost of expressways in Vietnam could be assumed to be about JPY 5-7 million/km/year.

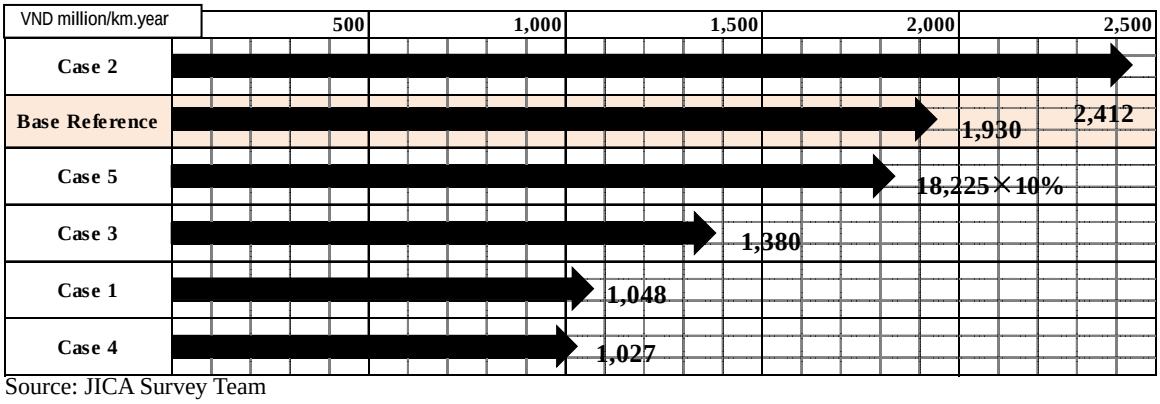
3) Verification of the Calculation Results with the F/S of the TL-MT Expressway Project

The calculation results from the F/S of TL-MT Expressway and the five above-mentioned cases are comparatively shown in Table 6.132 and Figure 6.78

Table 6.132. Comparison Between O&M Cost of Trung Luong-My Thuan Expressway and Five Other Cases

Case No.	Cases Compared	Cost (/km/year)		Remarks
		VND	USD	
Base Reference	Calculation result from the F/S of Trung Luong-My Thuan Expressway Project	**1.93**	**92,654**	
Case-1	Calculation result from the F/S of the HCMC-Trung Luong Expressway Project	**1,048**	**50,298**	Operation cost is not included.
Case-2	Actual O&M Cost of the HCMC-Trung Luong Expressway	**2,412**	**115,797**	Periodic maintenance cost is not included.
Case-3	Calculation result by applying the O&M cost of the Lach Huyen Port Development Project (Road and Bridge Portion)	**1,380**	**66,252**	O&M cost of ordinary national highways
Case-4	Actual O&M cost of ordinary roads and long bridges in Vietnam	**1,027**	**49,305**	Actual O&M expenditures of the Can Tho Bridge
Case-5	Actual O&M expenditures of expressways in Japan	**18,225 (1,823)**	**875,000 (87,500)**	( ): 10% of the Japanese O&M costs

Source: JICA Survey Team



Source: JICA Survey Team

Figure 6.78. Comparison of O&M Cost of Trung Luong-My Thuan Expressway and Five Other Cases

As shown above, the calculated amount of VND 1,930 million (USD 92,654 = JPY 7,142,320) /km/year of the TL-MT Expressway is somewhat less than the actual O&M cost of

the HCMC-Trung Luong Expressway. The TL-MT Expressway costs almost the same with the assumed O&M cost of the expressway companies of Japan, and exceed about 40% from the actual O&M cost of ordinary roads and long bridges in Vietnam. Therefore, the calculated amount is judged to be generally appropriate.

(2) ITS Cost for Expressway

1) Cost for Staff Training

The training cost was already estimated in the former initial cost table (Summary of Cost Estimate). The training is for each ITS facility. However, this estimation does not include man-month assignments of ITS expert from the contractor who has the necessary experience in doing such activities. The training is necessary to be executed regularly.

2) Cost for Operation and Maintenance of ITS

The O&M cost is proposed with the assumed conditions shown in Table 6.133.

Table 6.133. Conditions of Cost Estimation for Operation and Maintenance of ITS Facility

No.	Item	Condition for estimated cost
1	Annual repair cost of equipment	1.0% of the total equipment cost
2	Annual maintenance cost of equipment	0.5% of the total equipment cost
3	Other communication fees (includes internet for database system)	Including the O&M cost in Table 6.125
4	Personnel expenses (monthly salary of staff)	Including the O&M cost in Table 6.125
5	Replacement cycle	13 years interval (based on the actual replacement cycle of ETC in Japan)

Source: JICA Survey Team

The annual O&M cost for ITS facilities (excluding other communication fees and personnel expenses) is proposed as shown in Table 6.134.

Table 6.134. Annual Operation and Maintenance Cost for ITS facility

No.	Item		Cost		
			USD million	VND billion	Total VND billion
1	Repair cost (equipment)	USD 22.0 million x 1.0% VND 159.1 billionx 1.0%	0.22	1.6	6.1
2	Maintenance cost (equipment)	USD 22.0 million x 0.5% VND 159.1 billion x 0.5%	0.11	0.8	3.1
3	Other communication fee	Including the O&M cost in table 6.125			
4	Personnel expenses	Including the O&M cost in table 6.125			
5	Replacement of ITS equipment	Equipment cost x 100%	25.5	198.8	721.2
Total Cost of Annual O&M for ITS			0.33	2.4	9.2
Total Cost of Periodical Replacement per 13 years			25.5	198.8	721.2

Source: JICA Survey Team

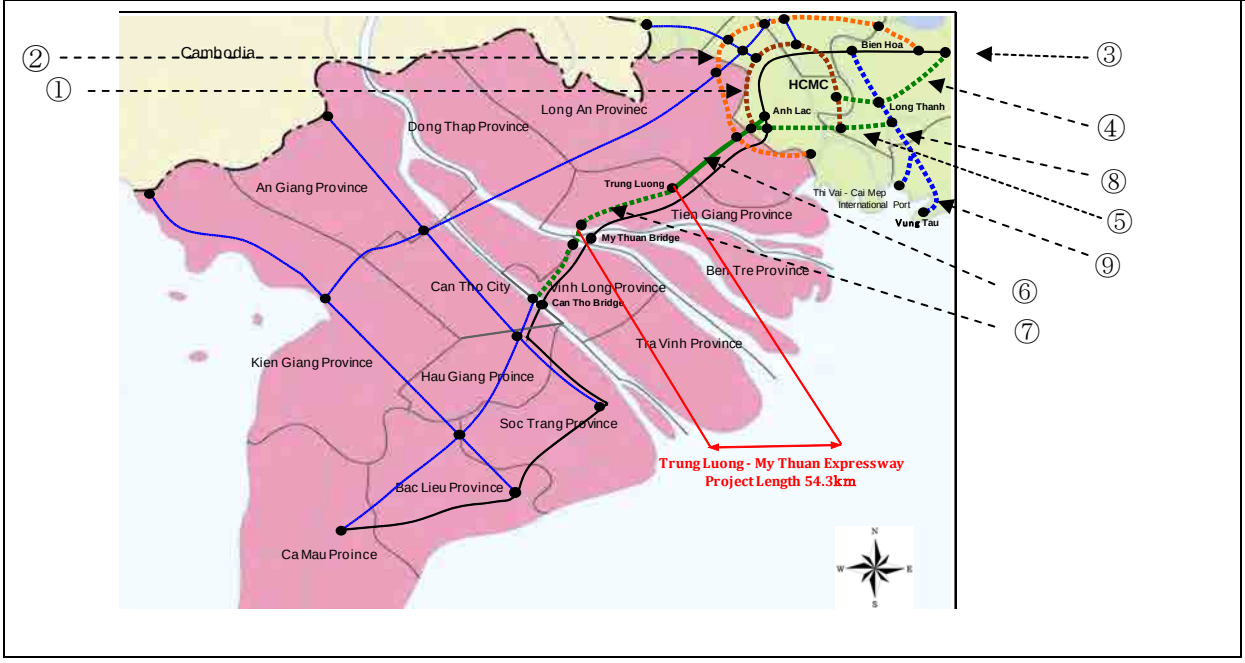
6.3.6 Proposal of Regional Expressways O&M Implementation

6.3.6.1 Planned Expressway Network around HCMC Area

The currently planned expressway network around HCMC is shown in Table 6.135 and Figure 6.79.

Table 6.135. Planned Expressway Network around HCMC

Classification	No	Expressway Name	Length (km)	Project Cost (USD million)	Impl. Organ	Finance Source	Progress	Remarks
Inter urban	①	HCMC, Ring Road No. 3	91	5,300	n/a	n/a	F/S	
	②	HCMC, Ring Road No. 4	148		n/a	n/a	F/S	
Inter city	③	Phan Thiet–Dau Giay	98	803	SB Reques-ted	PPP	F/S	A Vietnamese enterprise of BITEXCO implements the F/S.
	④	Dau Giay–Long Thanh–HCM	51	932	VEC	JICA/ ADB	U/C	
	⑤	Long Thanh–Ben Luc	58	1,212	VEC	JICA/ ADB	D/D	Under PQ for consultant and contractor selection. A South Korean consultant has applied.
	⑥	HCMC–Ben Luc–Trung Luong	40	440	CL CIPM	SB	Open	South Korea has lent USD 30 million loan for ITS, and KEC executes the D/D
	⑦	Trung Luong-My Thuan–Can Tho	92	1270	CL CIPM	BOT PPP	D/D F/S	Target section of JICA PPP Study (Trung Luong-My Thuan)
	⑧	Bien Hoa–Long Thanh–Phu My	38	500	BVEC	BOT/ PPP	F/S	Target section of JICA PPP Study
	⑨	Phu My– Vung Tau	31	440	CL CIPM	ODA	F/S	Target section of JICA PPP Study (Phase 2: financial source from ODA)
Total (km)			**647**					



Source: JICA Survey Team

6.3.6.2 Necessity of Regional Expressway O&M Implementation

(1) Necessity for Expressway Operation

At present, it is a common practice in Vietnam for individual O&M expressway operators established under the principal's policy of expressway to undertake O&M on their own respective expressway sections. However, many inconveniences are perceived by road users as they encounter different modalities of O&M implementation in short distances along the expressway. Toll gates in the main line are installed by each O&M operator, and road users will be forced to stop at each toll gate. As a result, road users are unable to drive continuously at high speeds along expressways, thus sacrificing comfortable driving. Moreover, since expressway users often intend to make long trips, long distance traffic information is necessary. However, if the exchange of information among expressway operators is not done, further information on connecting expressways will not be provided to the users. Consequently, a wide area for O&M implementation is preferable for operational efficiency of O&M works as well as from the viewpoint of improving the service to the road users.

(2) Necessity for Road/Facilities Maintenance

Since the traveling speed of vehicles on expressways is very fast, most expressway O&M works are mechanized to secure the safety and work efficiency of workers, such as introducing specialized vehicles for road cleaning and for traffic regulation. Therefore, it is also preferred, in terms of work efficiency and economy, that a single O&M operator undertake O&M works through the deployment of a centralized maintenance equipment. Thus, inefficient and expensive machines equipped for short intervals will be avoided. It will also enable a single operator to centrally manage the service levels and provide a uniform service to road users.

6.3.6.3 Proposal of Regional Expressways O&M Implementation Around HCMC

(1) Use of the Southern Traffic Management Center

Cuu Long CIPM plans to establish ITS, such as VMS (variable message sign), CCTV (closed-circuit television traffic monitoring cameras), and VDS (vehicle detectors system), at the HCMC-Trung Luong Expressway by 2014. This ITS development plan also includes the construction of the Southern Traffic Management Center for expressways to be located at the Southern New Town Development Area (at Area No. 20, Binh Chanh District), HCMC. This center that is under construction and located in the suburbs of HCMC has a capacity to deal with the expressway's traffic around HCMC. In addition, the administrative and financial division and traffic management division of the Expressway Management Center will be stationed at this center. Therefore, it is possible to use this center as a traffic control office for the entire expressway length of 650 km in the Greater HCMC Area. (Note: In case of intercity expressways in Japan, one traffic management center of NEXCO conducts traffic control for about 1,000 km length of expressways.)

(2) Significance of a Wide Area O&M Implementation in the Pursuit of Operational Efficiency

Currently, Cuu Long CIPM provides the operation works for the HCMC-Trung Luong Expressway based on the received operation rights. It also undertakes the expressway's maintenance works through a consignment contract with DRVN. Also, the Cuu Long CIPM will be a major investor in the SPC for O&M concession of the TL-MT Expressway, which is the extended section of the HCMC-Trung Luong Expressway. Therefore, in order to obtain the economies of scale, SPC jointly with Cuu Long CIPM shall undertake an integrated O&M work for the HCMC-TL-MT Expressway. This will contribute to improving the profitability of SPC's business. Moreover, in the pursuit of the O&M economies of scale, it is recommended that a single SPC shall undertake the O&M works of the entire 650 km length

expressway in the Greater HCMC area. The geographical coverage is shown in Table 6.135 and Figure 6.79. Thereby, the establishment of the integrated O&M system is preferable not only for the profitability of SPC business, and also for the convenience of the expressway users.

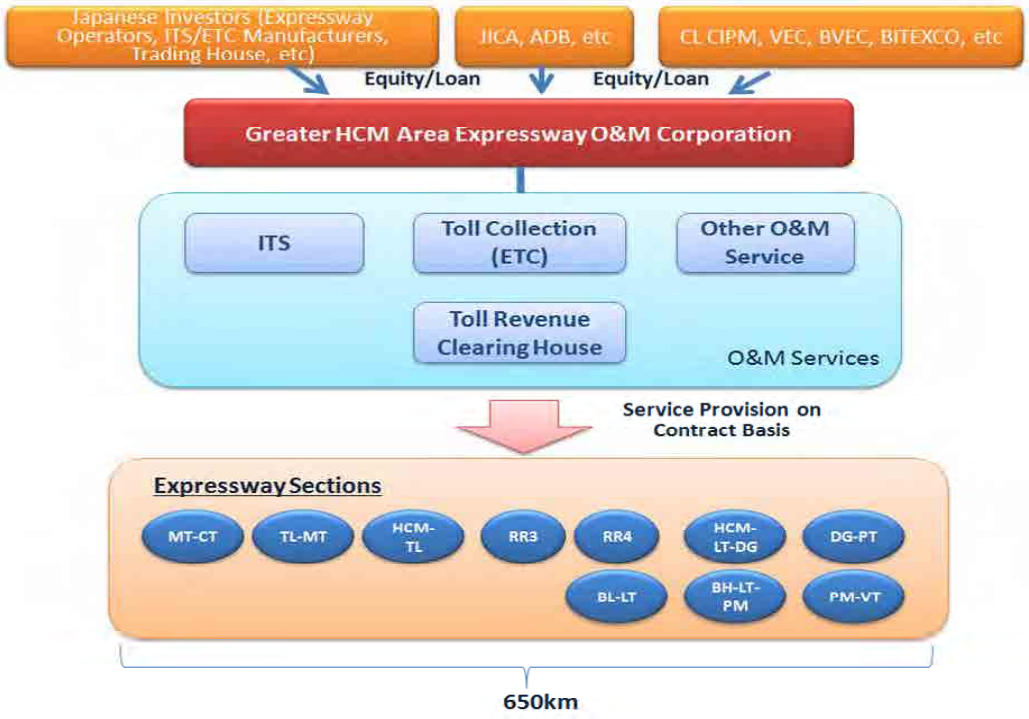


Figure 6.79. Proposed Integrated O&M System for Greater Ho Chi Minh Regional Expressway Network

6.4 Environmental and Social Considerations

6.4.1 Relevant Law and Regulations

(1) Laws and Regulations Relating to EIA

1) Preface

According to the Vietnamese Law on Environmental Protection (Law No. 52, new LEP), the environmental impact assessment (EIA) for development projects is compulsory at present. Decree No. 29/2011/ND-CP has provided the type and kind of projects which requires the preparation of an EIA report.[19] Also, No. 23 of Appendix II of Decree No. 29/2011/ND-CP requires the preparation of the EIA report for all highway construction projects. Accordingly, the implementation of an EIA was followed by the preparation of its EIA Report in 2008 for "The Project of Trung Luong–My Thuan–Can Tho Expressway Construction Investment According to BOT Form". The TL–MT Expressway Project forms a part of the section of the said expressway construction.

2) Laws and Regulation System

In order to manage and minimize the negative impacts on the natural and social environment of the implementation of various development projects as well as to promote positive impacts, the Government of Vietnam (GOV) has established the environmental related law system. The basic and principle environmental law, namely the Law on Environmental Protection (LEP), has been issued in December 1993. This law was amended to the new LEP in 2005, which mentions the following:

a) Identifies the responsibilities of the state center, provinces, organizations and individuals to prevent and remedy the environmental deterioration and pollution, and carry out specified environmental protection functions;

b) Provides for the development of environmental standards and submission of EIA reports on new and existing facilities;

c) Provides for responsible parties to pay compensation for environmental damage;

d) Establishes the right of individuals and organizations to petition for the enforcement of environmental regulations;

e) Calls for civil and criminal penalties for violations; and

f) Encourages international environmental cooperation.

Based on the LEP, the EIA for major development projects including theTL–MT Expressway Project is compulsory at present in Vietnam. In order to implement the LEP, the GOV has issued Decree No. 175/CP in October 1994, providing the guidance for the implementation of EIA. The LEP and Decree No. 175/CP made EIA procedures compulsory in order to obtain approval for the commencement of major development projects. After the enforcement of the LEP and Decree No. 175/CP, several regulatory documents were issued by government agencies to support the implementation of EIA procedures. Major documents which regulate the implementation of EIA and environmental protection, including the LEP and Decree No. 175/CP, are summarized in Table 6.136.

[19] Clause 1 of Article 12 of Decree No. stipulated that "Subjects required of preparation of report on environmental impact assessment are provided at Appendix II of this Decree".

Table 6.136. Laws and Regulations Concerning EIA and Environmental Protection in Vietnam

No	Law/Regulation	Date	Contents
1	Law NO. 52, Order No. 29/2005/L-CTN (amended LEP from LEP of 1993)	Nov. 2005	Vietnamese Basic Environmental Protection Law (New LEP, 2005)
2	Decree No. 175/CP	18 Oct. 1994	Providing Guidance for the Implementation of the Law on Environmental Protection. Appendix I.2 (THE CONTENT FOR DETAILED ENVIRONMENT IMPACT ASSESSMENT REPORT)
3	Decree No. 143/2004/NS-CP(*)	12 Jul. 2004	Amending and supplementing Article 14 of the Government's Decree No. 175/CP 1994 which guides the Implementation of the Law on Environmental Protection.
4	Decree No. 80/2006/ND-CP(*)	09 Aug. 2006	Detailed stipulation and implementing instruction of some articles of the Law on Environment Protection. Amended to Decree 29/2011/ND-CP
5	Decree No. 21/2008/ND-CP(*)	28 Feb. 2008	Amending and supplementing a number of articles of the Government's Decree No. 80/2006/ND-CP of 9 August 2006 detailing and guiding the implementation of a number of articles of the Law on Environmental Protection.
6	Decree No. 29/2011/ND-CP(*)	18 Apr. 2011	Provision of the Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA), Environmental Protection Commitment (EPC)
7	Circular 26/2011/TT-BTNMT	18 Jul. 2011	Detailed guide of SEA, EIA and EPC (Follow Decree No. 29/2011/ND-CP)
8	Circular NO. 08/2006/ TT-BTNMT	08 Sept. 2006	Guidelines to Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) and Environmental Protection Commitment (EPC)
9	Decree No. 81/2006/ND-CP(*)	Aug. 2006	On sanctioning of administrative violation in the domain of Environmental Protection
10	Circular No. 490/1998/TT-BKHCNMT(*)	Apr. 1998	Circular on appraisal of EIA report for investment projects
11	Circular No. 05/2008/TT-BTNMT	2008	Guidelines for the making and appraising EIA reports on Investment projects
12	Decree No. 16/2005/ND-CP	07 Feb. 2005	Regulation on construction investment projects
13	Decree No. 197/2004/ ND-CP	*03, Dec. 2004*	Compensation, assistance and resettlement when the state revokes land （Land acquisition）
14	Circular No. 116/2004/TT-BTC	07 Dec. 2004	Instructions to carry out the Decree NO. 197/2004/ ND-CP of the government regarding compensation, assistance and resettlement when the state revokes land
15	Circular No. 13/2006/ TT-BTNMT	Sept. 2006	Guidelines on the organization and function of SEA/EIA appraisal committee
16	Circular No. 715/MTg	Apr. 1995	Guidelines for the making and appraising EIA reports on foreign investment projects
17	Decision No.1806/QD-MTg	Dec. 1994	Concerning the organization and activities of the EIA reports appraisal committee and the granting of environmental permits
18	Decision No. 229/QD/TDC	Mar. 1995	Concerning the issuance of the Vietnamese Environmental Quality Standards
19	Decision No. 29/1999/ QĐ-BXD	1999	Regulation on environmental protection in construction sector
20	Sector standard No. 22/TCN-242-98	1998	Guidelines for EIA in the feasibility study and design of transport construction projects which contain requirements for development of EIA for road infrastructure and inland waterways
21	No. 51/2001/QH10	Nov. 2003	Land law (amended)
22	No. 16/2003/QH11	Nov. 2003	Law on Construction
23	Decree No. 109/2003/ND-CP	Sept. 2003	Protection and sustainable development for wetlands
24	Decree No.149/2004/ND-CP	Jul. 2004	Agreement on digging, development, use of water resources, and wastewater discharge to water sources
25	Circular No. 12/2006/TT-BTNMT	2006	Circular on construction management
26	Decree No. 12/2009/NĐ-CP	Dec. 2009	Management of construction investment projects

Source: JICA Survey Team

The following decrees describe the major EIA concerned laws and regulations mentioned in Table 6.136:

Decree No. 175/CP

*This text contains rules to implement the provisions of the Environmental Protection Act recently approved by the National Assembly. It spells out tasks of various authorities including the Ministry of Science, Technology and Environment, which is responsible for the integrated state management on environmental protection and for organization of direct activities of environmental protection, the People's Committees of provinces and cities under the central government, and state offices and "mass associations of people". **The decree also provides for the assessment of environmental impacts. Article 10 defines the scope for assessing environmental impact. Article 13 prescribes the contents of a dossier for appraising a report of assessment on environmental impact.** In case of necessity, an appraising council shall be set up at the central level by the Ministry of Science, Technology and Environment and by the chairmen of the People's Committees of the provinces and cities under Central Government for Appraising Councils at the provincial level. Remaining articles regulate various matters including the import and export of discharged substances containing toxic elements or pathogenic microbes possibly causing environmental pollution are prohibited.*

Decree NO. 80/2006/ND-CP

*This decree implements a number of articles of the LEP. In particular the ones regarding the following topics: environmental standards; strategic environmental assessment; **environmental impact assessment** and environmental protection commitments; environmental-friendly production service establishments and products; hazardous waste management; and disclosure of environmental information and data. The authority in charge of formulating national environmental standards and guiding the implementation of this decree shall be the Ministry of Natural Resources and Environment. **Projects which shall require an environmental impact assessment report are listed in Appendix I of this decree.***

Decree NO. 21/2008/ND-CP

This decree amends Decree No. 80/2006/ND-CP detailing and guiding the implementation of a number of articles of the Law on Environment Protection. The decree makes the following amendments: amends and supplements Article 4 on the conversion of technical standards into environmental technical regulations; amends and supplements Article 5 on responsibilities, order and procedures for the formulation, promulgation and stipulation of application of environmental technical regulations; amends and supplements Clause 1 of Article 6 on projects necessitating EIA reports; adds Article 6a on the consultation of commune, ward or township people's committees and community representatives in the process of making EIA reports; amends and supplements Article 11 on the appraisal and approval of EIA reports; amends Point b, Clause 1 of Article 13; amends and supplements Article 17, and adds articles 17a, 17b and 17c on the registration and certification of written environmental protection commitments, appraisal and approval of EIA reports, etc.; adds Article 21a on provisions on the discharge of waste into the sea; amends Article 22 and adds Article 23a on responsibilities of the ministries.

Besides the laws and regulations mentioned above, there are also several important regulatory documents relating to environmental considerations in the decision making process of transport projects. Among the laws and regulations, the Vietnamese Standards for the Environment applied in the EIA for transport projects are as follows:

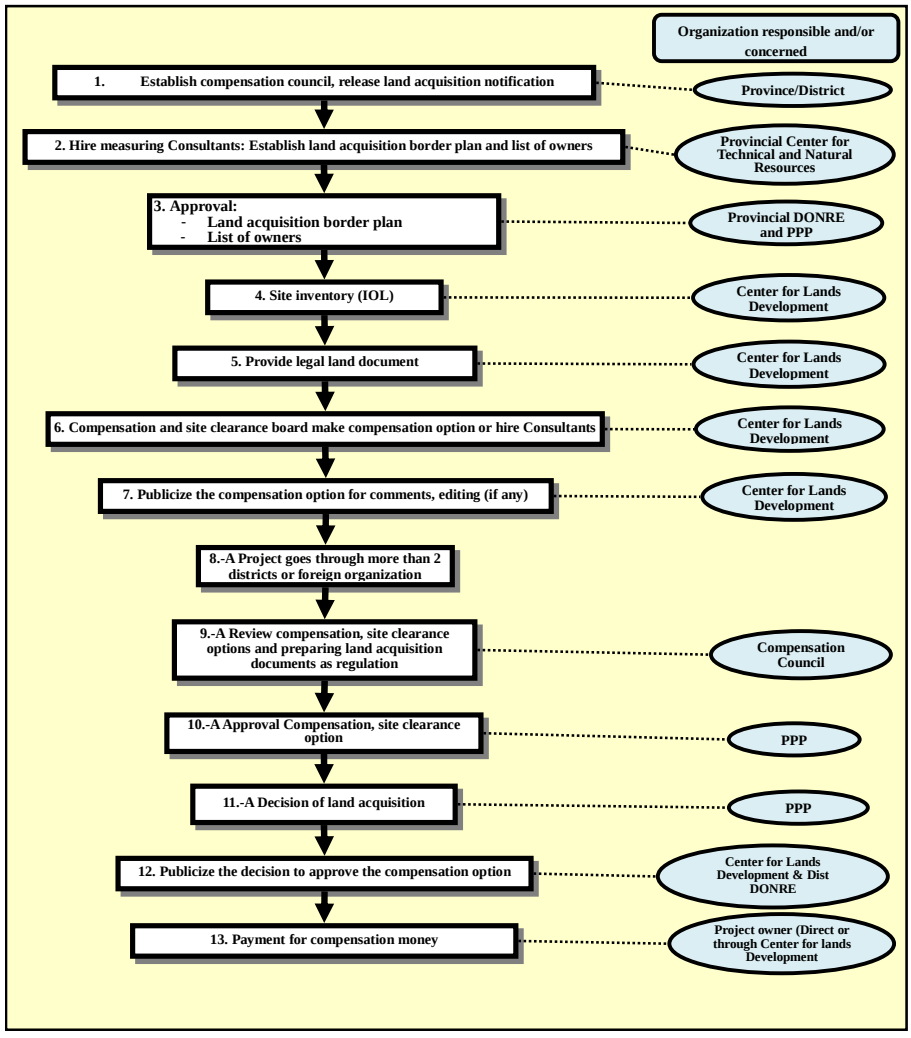
- Ambient Air Quality Standard (TCVN 5937-1995),
- Surface Water Quality Standard (TCVN 5942-1995),
- Acoustic Standard (TCVN 5949-1998),
- Industrial Effluent Standard (TCVN 5945-2005),
- Permissible Nose Level for vehicles (TCVN 5948-1999), and

- Vibration and Shock Standards created by Construction and Industry (TCVN 6962-2001).

The Vietnamese Standards for the Environment was published by the former Ministry of Science, Technology and Environment (MOSTE) in 1995, 2000, and 2001. It was later revised by MOSTE and the Ministry of Natural Resources and Environment (MONRE) in 2003 and 2005, which applies to all socioeconomic activities in the territory of Vietnam. The environmental standards include acceptable limits of many air, water, and soil, and noise parameters. The list of biophysical parameters is broad enough such that most monitoring programs can employ the standards as metrics of evaluation. It should be noted that there are some exceptions like sediment and other standards that do not yet exist in Vietnam. In these cases, it is a common practice for ODA projects to use the standards from other countries or international organizations.

(2) Laws and Regulations Relating to Land Acquisition

Land acquisition in the project area is one of the key issues for the smooth implementation of the project. Of course, the EIA report describes the issues of land acquisition, resettlement, compensation, etc. according to the Vietnamese EIA related regulations. It should be noted that land acquisition, resettlement, compensation, and so on are to be implemented by the so called compensation council established in the relevant provincial level of the People's Committee according to the competent laws and regulations. Figure 6.80 shows the outline of process for land acquisition, while Table 6.137 shows the laws and regulations that support the said procedures.



Source: JICA Survey Team

Figure 6.80. Process for Land Acquisition

Table 6.137. Major Laws and Regulations Concerning Procedures of Land Acquisition

NO.	Law/Regulation	Date	Contents
1	Decree No 197/2004/ND-CP	03 Dec. 2004	Compensation, support and resettlement when government recovers the land.
2	No. 51/2001/QH10	Nov. 2003	Land law (amended)
3	Decree No 84/2007/ND-CP	25 May 2007	Additionally, stipulating the grant of land use right certificates, recovery of land, exercise of land use rights, order and procedures for compensation, support and resettlement upon land recovery by the State, and settlement of land related complaints.
4	Decree No 69/2009/ND-CP	13 Aug. 2009	Additionally, providing land use plan, land prices, land recovery, compensation, support and resettlement Supplement regulation on land using plan, land price, land acquisition, compensation, assistance and resettlement
5	Circular No 14/2009/TT-BTNMT	01 Oct. 2009	Detailing the compensation, support, resettlement, order, and procedures for land recovery, allocation and lease. Details the regulation on compensation, assistance, resettlement and order, procedures for land acquisition, allocation, and lease.
6	Decree No. 181/2004/ND-CP	29 Oct. 2004	On the implementation of the Land Law
7	Decree No. 17/2006/ND-CP	27 Jan. 2006	Amending and supplementing a number of articles of the Decrees guiding the implementation of the Land Law and Decree No. 187/2004/ND-CP on the transformation of state companies into joint-stock companies.
8	Decree No. 188/2004/ND-CP	16 Nov. 2004	On methods of determining land prices and assorted land price brackets

Source: JICA Survey Team

The following decrees describe the outline of major land acquisition concerned laws and regulations above mentioned:

Decree No 197/2004/ND-CP

The decree consists of 51 articles divided into seven chapters. It provides for the compensation, support and resettlement when land is recovered by the state for defence and security purposes, for national interests, public interests and economic development purposes. The decree provides for compensation for different types of land use (agricultural land, residential land, etc.) and defines the cases in which land is recovered without compensation. It also provides for compensation for property (this includes also churches, historical relics, pagodas, cultivated plants and reared animals, etc.). The decree prescribes relocation support and resettlement arrangements. International agreements which Vietnam has signed will apply even if the provisions contained are different from those of this decree.

This decree replaces various decrees and all previous regulations on compensation, support and resettlement when land is recovered by the state which are in contrast with the provisions of this decree (Article 50).

Decree No. 181/2004/ND-CP

This decree prescribes the implementation of the Land Law of 2003. It deals with the following matters: land price determining methods, price brackets for assorted land categories; land use levy and land rent collection; compensation, support, resettlement when the state recovers land for use of defence or security purposes, for national interests, public interests, economic development; land inspection; sanctioning of administrative violations. The decree consists of 186 articles divided into 14 chapters as follows: General provisions (I); System of land management organizations and land management and use service organizations (II); Land use planning, plans (III); Land assignment, land lease, land use purpose change, land recovery, land requisition (IV); Land use right registration, cadastral dossier compilation and management, land use right certificate granting, land statistics and inventory (V); Land use rights in real estate market (VI); Agricultural land use regime (VII); Non-agricultural land use regime (VIII); Management and putting of unused land to use (IX); Rights and obligations of land users (X); Land management and use order and administrative

procedures (XI); Settlement of land-related disputes, complaints (XII); Direction and handling of land-related law violations by managers (XIII); Implementation provisions (XIV). Chapter XI consists of two sections: 1, Administrative procedures generally applied when land users exercise their rights and perform their obligations; 2, Order and administrative procedures in land management. Chapter XIII is divided into four sections: 1, Principles for handling of violations, disciplinary forms and material liability-handling measures applicable to managers; 2, Violation acts, forms of violation handling applicable to managers; 3, Competence, order for disciplining managers; 4, Detection and handling of cases of violation of land legislation.

Decree No 84/2007/ND-CP

This Decree makes provision for the grant of land use right certificates, house ownership and residential land use right certificates; exercise of land user rights; recovery of land and land related compensation and support; procedures for land recovery, compensation, support and resettlement upon land recovery by the state for defence and security purposes, economic development, etc.; and for the settlement of land-related complaints. This decree shall apply to all agencies, organizations and individuals involved in land administration and land use, and to agencies performing the function of state management of land.

Decree No 69/2009/ND-CP

This decree provides for land use planning and plans; land recovery, compensation, support and resettlement in case of land recovery by the state; land prices and land rent rates; order of, and procedures for land recovery, allocation and lease; issuance of certificates of land use rights and ownership of house and other assets attached to land, and land use duration extension; and for land development funds.
The decree specifies the contents of land use planning at the national, provincial, district and commune level. The planning shall cover: determination of areas of land for agricultural purposes and identification of areas for wet rice cultivation, protection forests, special-use forests and nature reserves; determination of areas of land for non-agricultural purposes and identification of areas for urban development, disposal and landfill of hazardous wastes, industrial parks, etc.; the making of planning maps; and solutions for implementing the land use planning.

Circular No 14/2009/TT-BTNMT

This circular addresses a number of provisions of various decrees specified in the text concerning land compensation, resettlement and support, and defining orders and procedures for land recovery, allocation and lease.

6.4.2 Review of Existing EIA and Verification of Consistency with JICA's Guideline

The TL–MT Expressway forms a part of the section of the Trung Luong–My Thuan–Can Tho Expressway. Therefore, the EIA for "The Project of Trung Luong–My Thuan–Can Tho Expressway Construction Investment According to BOT Form" had originally been implemented by BIDV Expressway Development Company (BEDC). The EIA report had been prepared based on the aforementioned EIA, and was approved on October 27, 2008 (Decision No. 2140/QD- BTNMT) by MONRE. The approval of the EIA report is also applicable to the TL–MT Expressway construction.

As mentioned in Section 6.4.1: Relevant Law and Regulations, the processes, procedures and contents of EIA are prescribed by many related laws and regulations in Vietnam. The EIA report for the Trung Luong–My Thuan–Can Tho Expressway construction project was prepared following certain EIA related laws and regulations. The JICA Guidelines stipulates that: *"JICA confirms that projects comply with the laws or standards related to the environment and local communities in the central and local governments of host countries; it*

also confirms that projects conform to those governments' policies and plans on the environment and local communities"(2.6 Laws, Regulations and Standards of Reference).

The EIA Report for "The Project of Trung Luong–My Thuan–Can Tho Expressway Construction" mentioned above has been prepared according to the relevant laws, regulations and procedures of GOV, and has been approved by MONRE. The EIA report is composed of an introduction, nine chapters, conclusions and recommendations, and satisfies the requirements of the laws and regulations in Vietnam. Table 6.138 shows the contents of the EIA report comparing the requirements of those by the Circular No.08/2006/TT-BTNMT.

Table 6.138. Contents of EIA Report

EIA Report for the Project	Requirement by Circular No.08/2006
Introduction (7 pages)	Introduction
Chapter 1: Project Brief Description (42 pages)	Chapter 1 Brief Description of the Project
Chapter 2: Current Conditions of Natural Environment and Socio-Economic (70 pages)	Chapter 2: Natural Environmental and Socio-Economic Conditions
Chapter 3 : Environmental Impact Assessment (66 pages)	Chapter 3: Environmental Impact Assessment
Chapter 4: Mitigation Measures for Adverse Impacts Prevention and Dealing with Environment (31 pages)	Chapter 4: Measures to Reduce Harmful Impacts, Prevent and Cope with Environmental Incidents
Chapter 5: Commitment for Implementation of Environmental Protection Measures (7 pages)	Chapter 5: Commitment of Implementing Measures for Protection the Environment
Chapter 6: Environment Treatment Works, Environmental Supervision and Management Program (13 pages)	Chapter 6: Environmental Treatment Constructions and Environmental Management and Monitoring Program
Chapter 7: Cost Estimation for Environmental Management Facilities (5 pages)	Chapter 7: Budget Estimation of Environmental Construction
Chapter 8: Public Consultations (7 pages)	Chapter 8: Public Consultations
Chapter 9: References of Data and Assessment Methods (5 pages)	Chapter 9: Guidance on Source of Statistic, Data and Assessment Method
Conclusions and Recommendations (3 pages)	Conclusions and Recommendations

Source: JICA Survey Team

Regarding the EIA report, the JICA Guidelines for Environmental and Social Considerations (April 2010) requires several conditions to be met. Table 6.139 shows the results of review of the EIA report referring to the JICA Guidelines for Environmental and Social Considerations. Table 6.139 compares the Vietnamese laws and regulation, the JICA Guidelines, and the EIA Report.

Table 6.139. Comparison of Contents of the EIA Report

No.	Item	Vietnamese Law/regulation(Note1)	JICA Guidelines (April 2010)	EIA Report(Note2)
1	Category of Project	Mandatory reporting of environmental impact assessment under current law, Decree No. 80/2006/ND-CP,	Category A projects Prepare reports on environmental impact assessment in accordance with host country. Resettlement Action Plan (RAP). Planning for environmental monitoring	The Project had EIA report under law in the time the report was written.
2	EIA Procedures	LEP, Decree No. 175/CP, Decree No. 80/2006/ND-CP, Decree No. 21/2008/ND-CP, etc.	When assessment procedures already exist in host countries, and projects are subject to such procedures, project proponents etc. must officially finish those procedures and obtain the approval of the government of the host country. (Appendix 2. EIA Report for Category A Projects)	Many EIA related laws and regulations prescribe the procedures of EIA. The EIA Report has been approved by MONRE in October 2008.
3	Language		EIA reports (which may be referred to differently in different systems) must be written in the official language or in a language widely used in the country in which the project is to be implemented. When explaining projects to local residents, written materials must be provided in a language and form understandable to them. (Appendix 2. EIA Report for Category A Projects)	The EIA Report has been prepared in both Vietnamese and English.
4	Disclosure of information about the approved EIA report	Provided by Decree No.29/2011/ND-CP, Article 22, Decree No. 80/2006/ND-CP, etc.	EIA reports are required to be made available to the local residents of the country in which the project is to be implemented. The EIA reports are required to be available at all times for perusal by project stakeholders such as local residents and copying must be permitted. (Appendix 2. EIA Report for Category A Projects)	According to the laws and regulations, the EIA Report will be disclosed to the public as required.
5	Public consultations in EIA report		In preparing EIA reports, consultations with stakeholders, such as local residents, must take place after sufficient information has been disclosed. Records of such consultations must be prepared. (Appendix 2. EIA Report for Category A Projects)	Chapter 8 of the EIA Report mentions the "Public Consultations".
6	Public consultations in the Project stage	Decree No 197/2004/ND-CP, Decree No. 181/2004/ND-CP, Decree No 84/2007/ND-CP, etc.	Consultations with relevant stakeholders, such as local residents, should take place if necessary throughout the preparation and implementation stages of a project. Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared (Appendix 2. EIA Report for Category A Projects)	Public consultations or public meetings in the project stage are to be conducted in accordance with the Vietnamese laws and regulations by the compensation councils established in People's Committee.
7	Items to be covered	LEP, Decree No. 175/CP, Decree No. 80/2006/ND-CP, Decree No. 21/2008/ND-CP, etc.	It is desirable that EIA reports cover the items enumerated in the following. - Executive summary - Policy, legal, and administrative framework - Project description - Baseline data - Environmental impacts - Analysis of alternatives - Environmental Management Plan (EMP) - Consultation (Appendix 2. EIA Report for Category A Projects)	All the items enumerated in the JICA Guidelines are examined in the EIA Report according to the contents mentioned in Table 6.138.

Details of Items				
8	Basic information	Collecting all geographic, geological, hydrology, and meteorological information. Current status of the quality of environmental components must have: • Description of environmental components impacted directly by project. • Clear indication of measurements and analysis at the time of the EIA. • Review of air pollution, water, soil and sediment should be evaluated against standards, technical environmental regulations.	The impacts to be assessed with regard to environment that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora.	In the report, all geographic, geological, hydrology, and meteorological data, and other natural environmental information in the project area were collected.
9	EIA	The impact assessment in the phases of preparation, construction and operation must be made for activities during these periods and must include the following: ● Analyze and evaluate the advantages and	In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable	In the report, impacts from project to environment were assessed in each phase of project. And the measures to minimize environmental pollution

No.	Item	Vietnamese Law/regulation(Note1)	JICA Guidelines (April 2010)	EIA Report(Note2)
		disadvantages of each plan on the project site (if any) to the environment ● Effects of ground clearance and resettlement (if any). Where the clearance operation, migration and resettlement is done in stages, this should continue to be fully evaluated in the corresponding period ● Impact due to change of scope of the project (if any). ● During the construction, operation and other phases (if any) of the project, to clarify the operation of the project, and on that basis, assess the impact of project activities under impact of each source. For each source, the following must be studied: Subject and scope of impact, severity of impact, impact probability, and resilience of the affected object. Note to clarify: ● Impacts related to waste. ● Impacts that are not related to waste	extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project	were taken. Proposed environmental monitoring plan periodically during construction to operation of the project.
10	Social environment	*Clarification of economic conditions:* Economic data such as economic activity, occupation, income of the affected households, etc.,.in the project area and in adjacent areas affected by the project: *Clarification of Social conditions:* Social conditions such as population, ethnic characteristics (if a region of ethnic minorities), location, name of cultural, social, religious beliefs, historical areas, residential areas, urban areas and others, of the project area and adjacent areas affected by the project.	Data and information concerning the social environment should include the following: Migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety.	Information on economic development, culture, society were collected includes full information on economy, culture, transport, agriculture, forestry and fisheries in the project area. The report also assesses the immediate and long-term positive and negative impacts of the project to the economic problems in the local society in every phase of the project.
11	Land acquisition, Resettlement	Effects of ground clearance, resettlement (if any). Where the clearance operation, migration and resettlement are done in stages, these should continue to be fully evaluated in the corresponding periods.	Projects must comply with the laws, ordinances, and standards related to environmental and social considerations established by the governments that have jurisdiction over project sites (including both national and local governments). They must also conform to the environmental and social consideration policies and plans of the governments that have such jurisdiction. For projects that will result in large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12,	The report put forth statistics of the interim clearance area and the number of people affected by the clearance of the project. In conducting the EIA report, the investor has carried out consultancy work open for comments from the community residents in the area affected by the project. In the report, the plan presented for resettlement compensation is very simple.

(Note1): LEP, Decree No.175/CP, Circular No.80/2006/TT-BTNMT, Circular No.26/2011/ND-CP, Decree No.29/2011/ND-CP, etc.

(Note2): EIA Report for Trung Luong – My Thuan – Can Tho Expressway Construction Project

Source: JICA Survey Team

The result of the review of the EIA report referring to the JICA Guidelines for Environmental and Social Considerations shows that the EIA Report complies with the requirements of the JICA Guidelines basically.

6.4.3 Recommendation for Supplemental Study for the Existing EIA and to Draw Up RAP in Accordance with JICA's Guideline

(1) Current Status of the EIA Report

Complying with the EIA related laws and regulations in Vietnam, the EIA report for "the Project of Trung Luong–My Thuan–Can Tho Expressway Construction Investment According to BOT Form" has been prepared based on the result of the EIA study which was implemented according to the F/S of the Project conducted at the same time in 2008. The report was approved by MONRE through legitimate procedures on October 27, 2008 (Decision No. 2140/QD- BTNMT).[20] This means that more than 3 years have passed since the EIA report was approved. The validity of the EIA report after the approval should be verified.

Regarding this problem, Clause 3 of Article 12 of Decree No. 29/2011/ND-CP stipulates the terms of the conditions of the EIA report after the approval as follows:

3. The report on environmental impact assessment has to be refurbished in the following cases:
a) Change of project implementation location;

b) Failure to implement the project within thirty-six (36) months from the time of issuance of the decision approving the report on environmental impact assessment;

c) Change of the size, capacity or technology that increases the degree of negative impacts on environment or affected scope caused by this change.

(Clause 3 of Article 12 of Decree No. 29/2011/ND-CP)

MONRE verbally answered JET's inquiries on the above matters by a letter through BEDC. However, JET did not receive a formal reply from MONRE. In these situations, MONRE's position as well as that of BEDC's on the matter are as follows:

1) Although it has been more than thirty-six (36) months as of December 2011 since the EIA Report was approved by MONRE without implementation of construction work of the Project, the EIA Report is still valid due to the reasons below. Therefore, BEDC need not to implement supplementary or additional EIA from 36 months after the approval of the report onward.
    a) The project location is not changed from that of mentioned in the EIA Report. The TL-MT Expressway is the part of the section of Trung Luong–My Thuan–Can Tho Expressway studied in the EIA report mentioned above.
    b) In order to implement the Trung Luong–My Thuan Expressway Construction, the investment company, BEDC, has been assigned by the Prime Minister on 8 February 2010 (Decision No. 229/QD-TTG). The BEDC has commenced the preparatory works such as selection of consultant for surveys, technical detailed design and capital budgeting activities for the project. In addition, the People's Committee of Tien Giang Province, which is the responsible organization for land acquisition and resettlement, has established the compensation council for the project for compensation, supporting, and resettlement activities. These activities which already have taken by BEDC and the concerned organizations can be recognized that the TL-MT Expressway Project has already started.
    c) As mentioned above, the EIA study was conducted according to the contents of the F/S on this project. Comparing the contents of the F/S, it is considered that there are no drastic changes in size, capacity or technology from the EIA stage which might

[20] Decision: Re: Approving Environmental Impact Assessment (EIA) Report for "Trung Luong – My Thuan – Can Tho Expressway Project in BOT scheme (Phase 1)"

increase the degree of negative impacts on environment or affected scope caused by these changes.

2) Considering and referring to the conditions of the EIA report and the current environmental laws and regulations, the TL-MT Expressway Project is not in the case of refurbishing its EIA Report. However, the designs of some interchanges included in the TL-MT Expressway Construction Project are to be changed from those of the F/S stage. As of December 2011, the design changes of the interchanges have not yet been completed. Therefore, the degrees of negative impacts on the environment that might be caused by these design changes are not yet clear at present. The effects on the environment by the design change of interchanges should be examined after the design changes of the interchanges are completed. The necessity of implementation of supplementary or additional EIA should be considered after the examination of impacts on the environment caused by the design changes.

3) After the situation mentioned above, the BOT concession on the Project was transferred to Cuu Long CIPM by MOT. Considering this situation, the validity of the existing EIA Report as of September 2012, once approved by MONRE, has been confirmed. In response to the inquiry regarding the validity of the existing EIA Report by MOT, MONRE replied through a letter that the EIA Report was still valid as shown below. (Document No. 638/TD dated 31st August 2012).

ENVIRONMENT ADMINISTRATION
DEPARTMENT OF ENVIRONMENT APPRAISAL & IMPACT ASSESSMENT

SOCIALIST REPUBLIC OF VIETNAM
Independence – Freedom – Happiness

No.: 638/TĐ

Subject: EIA Report of Trung Luong – My Thuan – Can Tho Expressway project.

Ha Noi, 31st, August 2012

To: Cuu Long Corporation for Investment, Development and Project Management of Infrastructure (Cuu Long CIPM).

This refers to your letter dated August 13th, 2012 (Ref.: 2939/CIPM-QLDA2) regarding the validity of EIA Report of Trung Luong – My Thuan – Can Tho Expressway project (herein after called the project), our opinions are as follows:

1. The EIA Report of the project (stage No. 1) was approved by the Ministry of Natural Resource and Environment (MONRE) at the Decision No. 2140/QĐ-TNMT dated October 27, 2008. The scope of the EIA Report approved is the first stage of the project with 04 lanes.

2. As the current regulations of environment protection, the approval Decision of the EIA Report as a basis to allow carrying out the the project by Line agency. In the case of the project is transferred from BIDV Expressway Development Coporation (BEDC) to Cuu Long CIPM as your above letter, the Decision of EIA Report of the project (for the first stage) has been still valid when there is no other adjusted decision.

3. Cuu Long CIPM is requested to seriously implement the method for environment protection in the project's EIA Report approved. In the case, there are changes of the project (scope, scale, alignment route, the items, design, construction method, etc.), please obey the regulations of environment impact assessment of the current law.

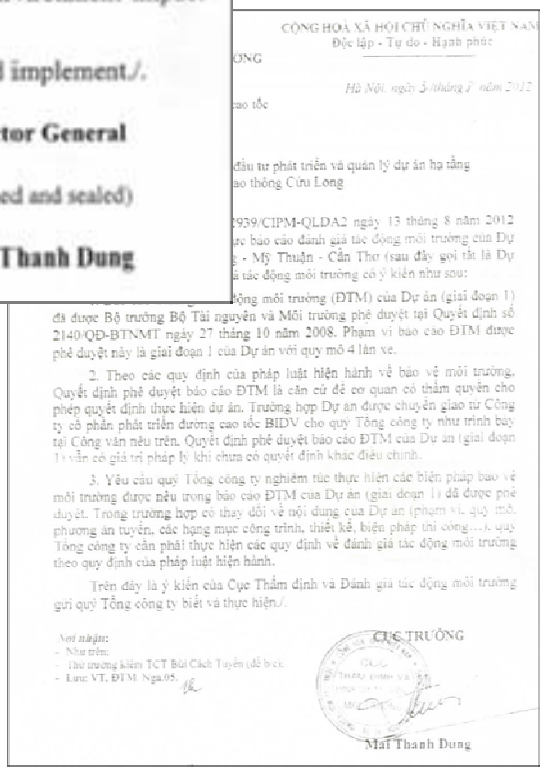
The above is our opinions give you to acknowledge and implement./.

Director General

(Signed and sealed)

Mai Thanh Dung

CC:
- As above;
- Mr. Bui Cach Tuyen – Deputy Minister;
- Save: Adm, DTM.



CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

ÔNG

Hà Nội, ngày 31 tháng 8 năm 2012

tao tốc

đầu tư phát triển và quản lý dự án hạ tầng
ao thông Cửu Long

2939/CIPM-QLDA2 ngày 13 tháng 8 năm 2012
ực báo cáo đánh giá tác động môi trường của Dự
g - Mỹ Thuận - Cần Thơ (sau đây gọi tắt là Dự
á tác động môi trường có ý kiến như sau:

động môi trường (ĐTM) của Dự án (giai đoạn 1)
đã được Bộ trưởng Bộ Tài nguyên và Môi trường phê duyệt tại Quyết định số 2140/QĐ-BTNMT ngày 27 tháng 10 năm 2008. Phạm vi báo cáo ĐTM được phê duyệt này là giai đoạn 1 của Dự án với quy mô 4 làn xe.

2. Theo các quy định của pháp luật hiện hành về bảo vệ môi trường, Quyết định phê duyệt báo cáo ĐTM là căn cứ để cơ quan có thẩm quyền cho phép quyết định thực hiện dự án. Trường hợp Dự án được chuyển giao từ Công ty cổ phần phát triển đường cao tốc BIDV cho quý Tổng công ty như trình bày tại Công văn nêu trên, Quyết định phê duyệt báo cáo ĐTM của Dự án (giai đoạn 1) vẫn có giá trị pháp lý khi chưa có quyết định khác điều chỉnh.

3. Yêu cầu quý Tổng công ty nghiêm túc thực hiện các biện pháp bảo vệ môi trường được nêu trong báo cáo ĐTM của Dự án (giai đoạn 1) đã được phê duyệt. Trường hợp có thay đổi về nội dung của Dự án (phạm vi, quy mô, phương án tuyến, các hạng mục công trình, thiết kế, biện pháp thi công...), quý Tổng công ty cần phải thực hiện các quy định về đánh giá tác động môi trường theo quy định của pháp luật hiện hành.

Trên đây là ý kiến của Cục Thẩm định và Đánh giá tác động môi trường gửi quý Tổng công ty biết và thực hiện./.

Nơi nhận:
- Như trên;
- Thứ trưởng Bùi Cách Tuyến (để b/c);
- Lưu: VT, ĐTM, Nga.05.

CỤC TRƯỞNG

Mai Thanh Dung

(2) Land Acquisition and Resettlement in the EIA Report

The approval letter of the EIA report aforementioned (No. 2140/QD-BTNMT) provides three supplementary items as follows:

Article 1: *Approve the content of EIA Report of the "Trung Luong–My Thuan–Can Tho Expressway Project in BOT scheme (Phase 1)" at Tien Giang, Vinh Long and Dong Thap Provinces (TL-MT-CT Expressway Project) of BIDV Expressway Development Company (BEDC) which was passed by the Appraisal Council on June 30, 2008.* ***This approved report excludes the contents of EIA for operation of underground water, operation of soil and sand supplying for the TL-MT-CT Expressway Project, either resettlement of affected households by the TL-MT-CT Expressway Project.*** *(Article 1 of DECIDES)*

The approval of EIA Report is one of the critical conditions for the owner of the project to commence the TL-MT-CT Expressway Project. On the other hand, the series of activities of land acquisition, compensation, support and resettlement will be implemented by the People's Committee. The People's Committee is the responsible organization assigned by the GOV for land acquisition, compensation, support and resettlement. It is considered that this is the reason why the approval of the EIA report excludes the resettlement of affected households.

Regarding the other two items, the measurements for operation of groundwater, and operation of soil and sand supply should be dealt with under the scheme of Environmental Protection Commitment[21] (EPC), and not in the scheme of EIA according to the Vietnamese Environmental Regulations.

Besides the operation of groundwater and of soil and sand supply, Chapter 5 of the EIA report ("Commitment for Implementation of Environmental Protection Measures") mentioned other items to be dealt with the EPC scheme as follows:

Pre-Construction Phase:

- ✓ Land acquisition and resettlement in Tien Giang Province,
- ✓ Breaking of houses to be resettled for clearance,

Construction Phase:

- ✓ Air and noise pollution to habitants area along the channel caused by operating construction equipment, as well as soil and rock materials transfer,
- ✓ Collapse, erosion, flood and other issues caused by water flow,
- ✓ Safety and cleanliness of worker camps and construction areas,
- ✓ Solid waste caused by construction and life activities
- ✓ Change in hydrography and pollution on surface water (at locations where there are bridge constructions),
- ✓ Transmission of disease from workers to local people,

Operation Phase:

- ✓ Encroaching traffic safety corridor,
- ✓ Air, noise, solid waste, and vibration pollution by traffic activities along the route,
- ✓ Traffic accident risks,
- ✓ Environmental risks on the route.

Besides the above mentioned, BEDC is now requesting to return the BOT concession

[21] Environmental Protection Commitment (EPC) is the Vietnamese environmental authorization and compliance system together with Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA). All pollution generators must be authorized through EIA or EPC under their environmental protection measures to comply with environmental protection requirements. Pollution sources are classified into the category of EIA or EPC according to their scale, type, and location. EIA projects are required to be approved by MONRE or DONRE, and EPC projects are required to be registered to district level DONRE.

on the Project to MOT. In case MOT approves, a new project implementation body will be assigned. In this case, the effectiveness of the EIA report should be confirmed.

(3) Current Status of Land Acquisition and Resettlement

The activities relating to land acquisition, compensation, support for resettlement were being implemented by the compensation council established under the provincial People's Committee. However, the compensation council stopped its activities after the BOT concession on the Project was transferred to Cuu Long CIPM from BEDC.

The following summarizes the current situations of land acquisition, compensation, and support for resettlement conducted by Provincial People' Committee (PPC) of Tien Giang and the four District Level People' Committees (DPCs) as of September 2012.

a. Current situation of compensation council

DOT is now requesting the resumption of activities related to land acquisition, resettlement and compensation from MOT, which are under the RAP. However, DOT has not heard any information on the resumption yet from MOT at present since the scheme of investment of the Project has not been finalized.

Activities under the RAP have been suspended since September 2011. Before the suspension, DOT submitted the compensation cost including the costs of land acquisition, resettlement and support prepared by land development centers to Tien Giang PPC for approval. The cost has not yet been approved as of September 2012. After the approval by the PPC, DOT will restart its activities. Once the activities have restarted, the DOT will re-examine the compensation costs tahat were already submitted to the PPC. DOT shall then implement compensation according to the procedures provided.

b. Re-examination of the existing RAP

There is no additional information on RAP after the suspension of activities of DOT after September 2011. Table 6.140 summarizes the results of re-examining the data and information concerning RAP as of September 2012.

As mentioned, land acquisition, compensation, support and resettlement are to be implemented by the compensation council under PPC.

Table 6.140 also summarizes the progress of the acquisition, compensation, support and resettlement implemented by the Tien Giang PPC and four DPCs as of the beginning of December 2011.

Table 6.140. Summary of Land Acquisition and Resettlement (Updated September 2012)

	Item				
A	**GENERAL INFORMATION**				
1	Road length	About 54 km			
2	Province(s)	Tien Giang Province			
3	Activities of Tien Giang Provincial People's Committee/Provincial level Compensation Council up to December, 2011	• Establish the district level compensation council: June 2010 • Sent the notices of land acquisition to households: June to August 2010 • Published land border for compensation: August to October 2010 • Land measurement: October 2010 to February 2011 • Established the Compensation Council direction: Decision No. 1368/QD-UBND, 22 April 2011 • Site inventory: December 2010 to May 2011 (21/23 communes) • Prepared the compensation option (Sept 2011)			
4	District	**Chau Thanh**	**Tan Phuoc**	**Cai Lay**	**Cai Be**
5	Formal name of agency *(which is responsible for land acquisition and compensations activities)*	Center of lands development	Center of lands development	Center of lands development	Center of lands development
		Organization under the district level People's Committee. Each district level Compensation, Support and Resettlement Council has been established under the Center of Lands Development of each district.			

	Item				
6	Legal basis of Establishment of compensation council	Decision No. 3444/QĐ-UBND	Decision No. 576/QĐ-UBND	Decision No. 9967/QĐ-UBND	Decision No. 4118/QĐ-UBND (17/01/2011)
7	Communes affected by the Project	Tam Hiep Long Dinh Nhi Binh Diem Hy	Phuoc Lap	Tan Phu Tan Hoi Nhi My *(not finish)* Tan Binh Binh Phu Phu Nhuan My Thanh Nam	My Hoi Hau My Phu Hau Thanh Hoa Khanh Hoa Hung *(not finish)* Thien Tri My Duc Dong My Duc Tay An Thoi Dong An Thoi Trung An Huu
8	Number of communes affected by the Project	4	1	7	12
9	Areas of land acquisition (ha)	76	18.9	120.231 (Excluding Nhi My commune)	248.2 (Excluding Hoa Hung commune)
		378.6 ha Total (ha): Width of land acquisition areas: Average 70 m (35 m from the center line)			
10	Number of household affected by the Project	320	99	869	1,068
		Total: 2,356 (excluding households located in the areas of intersections of Than Cuu Nghia, Cai Lay and Cai Be)			
11	Number of persons to be affected	No data[22]	320	4,345	5,417
12	Current status of defining of border of land acquisition (as of end of November 2011)	Area of Than Cuu Nghia intersection is not finished	Finished	Area of Cai Lay intersection is not finished	Intersections of Area of Cai Be and An Thoi Trung are not finished
13	Resettlement plan according to Vietnamese Laws/Regulations	Not commenced to prepare a plan	No households required resettlement	Preparing the RAPs	Preparing the RAPs
14	Contents of Resettlement Plan	To be complied with Vietnamese regulations	Not implement *(No households required resettlement)*	3,23 ha 168 land lots VND 38.1 billion	6.6 ha
15	Number of households with 100% clearance	45 (Excluding households in the area of Than Cuu Nghia intersection)	26	199 *(141 households have moved to resettlement areas. Excluding households of the area of* Cai lay intersection*)*	296 *(Excluding households of the areas of* Cai Be *intersection)*
16	Number of peoples need to be resettled	No data	104	995	1,513
17	Measuring land	4/4 communes	1/1 communes	6/7 communes	11/12 communes
		Total: 21/24 communes			
18	Site inventory (Making up of IOL: *land, house, construction, crop...*)	2/4 communes	1/1 communes, 99/99 household (Feb, 2011)	6/7 communes	11/12 communes; 1,068 households

[22] *Site inventory for four communes in Chau Thanh has not been finished, so the number of persons to be resettled has not been determine yet.*

	Item				
		Total: 2,110/2,356 households			
19	Total money for land acquisition, compensation, support and resettlement (Billion VND)	179.8	60.7	393.4 (as of Nov. 2010)	1,544.4
		Total: 1,933.5			
20	Number of households which have enough eligibility for compensation, support and resettlement	Not finished	26 (104 peoples)	128 (6/7 communes)	237 (1,196 persons) (11/12 communes)
		Total: 335 + No. of households in Chau Thanh			
21	Consultation with local stakeholders – *Content of 1st meeting*	Meeting (19 Mar, 2011) *Inform to implement TL-MT expressway project*	Meeting (13 Aug, 2011) *Inform to implement TL-MT expressway project*	Issue notice for land acquisition *(Letter No 25/TB-UBND, 30 Aug 2010)*	Issue notice for land acquisition *(Letter No 1389/UBND-CN, 20Aug 2010)*
	Consultation with local stakeholders – *Frequency of the meeting with stakeholder during procedure of land acquisition and compensation*	At least 3 times	At least 3 times	At least 3 times	At least 3 times
21	Site survey for price of land acquisition	Not conducted	Finished	Not conducted	Finished for farm land Residential land not yet surveyed
B	**LAND ACQUISITION AND RAP**				
22	RAPs according to WB's OP 4.12	Not prepared	Not prepared *(No households required resettlement)*	Not prepared	Not prepared
23	Construction schedule of resettlement areas	Not yet implemented (as of Dec. 2011)			
24	Approval of compensation price (by district level compensation council)	Not yet implemented (as of Dec. 2011)			
25	Approval of compensation price (Tieng Giang Province compensation council)	Not yet implemented (as of Dec. 2011)			
26	Inform compensation price to households to get their opinions	Not yet implemented (as of Dec. 2011)			
27	Review of compensation price	Not yet implemented (as of Dec. 2011)			
28	Final approval by People's committee	Not yet implemented (as of Dec. 2011)			

(Prepare based on hearings from provincial and district level compensation councils)

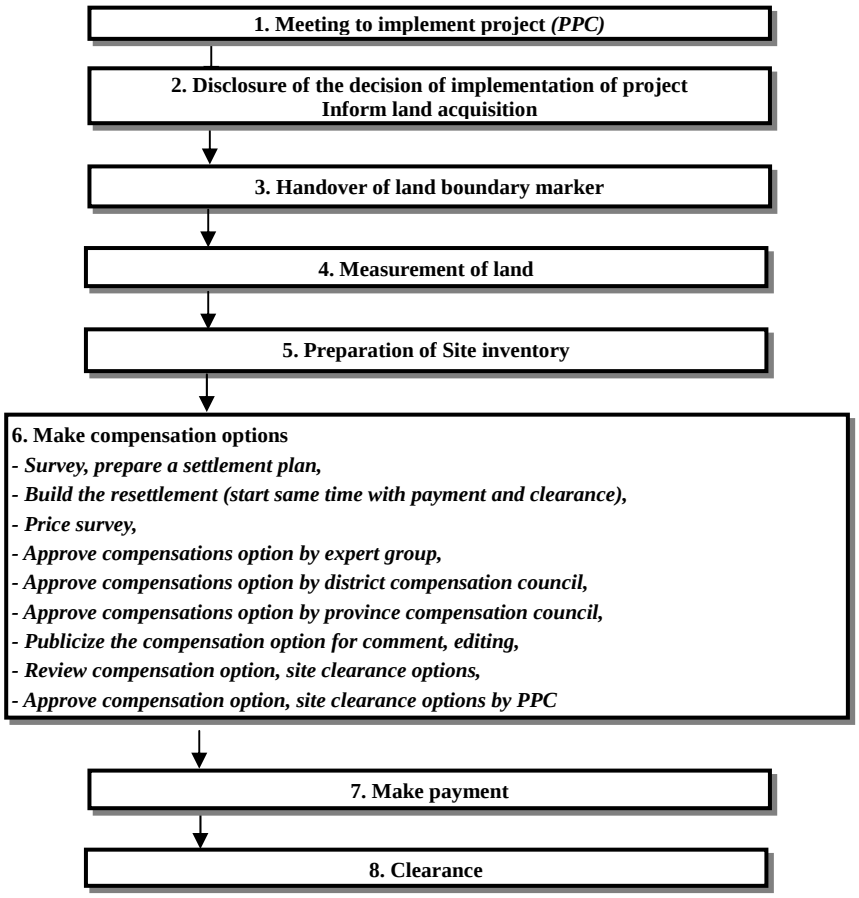
Source: JICA Survey Team

In relation with compensation, resettlement and support activities, the following were confirmed after the resumption of the Project in September 2012:

- There are no changes of status in land acquisition and compensation activities from September 2011. The Tien Giang PPC had been issued with the decision to stop all activities of the TL-MT Expressway Project from September 2011. Until September

2012, DOT and four districts compensation council have not received any official decisions from Tien Giang PPC or MOT to restart the compensation and RAP activities for the TL-MT Expressway Project.

- Basically, there have been no changes in data and information mentioned in Table 6.140. Only a few data were corrected.
- According to the Table 6.140, the RAPs in the four concerned districts had not been completed as of December 2011. No RAP activities have yet been implemented since September 2011. When the project restarts, Steps 5 to 8 of the compensation and RAP procedures will be conducted again (see Figure 6.80).
- According to Table 6.140, borders of land acquisition for the four intersections, namely Than Cuu Nghia, Cai Lay, Cai Be and An Thoi Trung, were not defined. The borders of these intersections should be defined and the procedures for land acquisition should be completed.
- When the project restarts, not all steps of land acquisition and compensation procedures will be repeated. The compensation and RAP activities will be continued from Step 5 (refer Figure 6.81).



Source: JICA Survey Team

Figure 6.81. Procedure of Land Acquisition and Compensation (Compliant with Vietnamese Laws and Regulations)

(4) Problems Existing in Land Acquisition, Compensation, Support and Resettlement

As shown in the Table 6.140, the provincial and district level councils of land acquisition, compensation, support and resettlement are implementing the land acquisition and resettlement related activities. It should be noted that due to the reason that the private ownership of land is not permitted in Vietnam, the word "land acquisition" does not mean purchasing of land by the project owner but "expropriation of land". The owner of the project has an obligation to compensate the land use right owned by the households living in the project areas and to support the resettlement. At present, the procedure of land acquisition shown in Figure 6.81 is approaching Stage 10-A. With the progress of land acquisition, following problems have arisen:

BOX

JICA's Guidelines for Environmental and Social Considerations (April 2010) stipulates that "For projects that will result in large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12, Annex A".

OP 4.12 prescribes the World Bank's procedures for management and compensation for project affected households subject to involuntary resettlement and identified when a Resettlement Action Plan (RAP) is required to be prepared.

OP 4.12 prescribes that the contents of a RAP should cover the following minimum elements:

(a) a census survey of displaced persons and valuation of assets;
(b) description of compensation and other resettlement assistance to be provided;
(c) consultations with displaced people about acceptable alternatives;
(d) institutional responsibility for implementation and procedures for grievance redress;
(e) arrangements for monitoring and implementation; and
(f) a timetable and budget.

a) Prices of land acquisition were studied and calculated by each district level compensation council. Some of the suggested prices for compensation seemed to be impractical.

b) The suggested prices for compensation are different from each district. For example, the price of compensation in Tan Phuoc District is VND 30,000 /m^2; while that of Chau Than district is 100,000 VND/m^2. Article 14 of Decree No. 188/2004/ND-CP requires that the difference of compensation prices between districts should not exceed 20%.

c) Criteria for the application of supporting livelihood change or alternative residential housing are not clear.

d) Although there are no households in Tan Phuoc District which is required to be resettled, the Chau Thanh district has not yet finished the preparation of its resettlement inventory.

e) The criteria to determine the eligibility[23] of households are not clear. (Clauses 1, 2, and 3 of Article 18 of Circular 14/2009/TT-BTNMT)

f) It is considered that the prices of compensation for house, buildings, trees and crops are lower than its actual

g) The compensation prices were studied and calculated by the center of lands development in each district, but were not informed to the eligible households. The current compensation prices are not formally finalized and approved.

h) The land acquisition cost mentioned in Table 6.140 excludes those of the additional areas caused by the design changes.

i) With the exception of Tan Phuoc District, the three other districts are now preparing their resettlement plans according to the Vietnamese laws and regulations. It should be noted that the procedures and form of the resettlement plan now being prepared by the three districts differ from that of the World Bank's OP 4.12.

6.4.4 Additional Examination in Reducing Environmental Impacts

As mentioned above, the environmental impacts caused by implementation of the Project and the measures for reducing these impacts are mentioned in the existing EIA Report which was conducted and prepared in accordance with the Vietnamese laws and regulations. However, it has been four years since the existing EIA report was approved by MONRE. In addition, there are a few points which necessarily conform to JICA Guidelines and WB OP 4.12. This section summarizes the environmental items to be examined in the future considering the JICA Guidelines and WB OP 4.12.

(1) Items Additionally Examined

Table 6.141 summarizes the items of environmental impacts and mitigation measures which are mentioned in the EIA teport.

[23] Determination of eligibility: definition of displaced persons and criteria for determining their eligibility for compensation and other resettlement assistance, including relevant cut-off dates

Table 6.141. Items of Environmental Impacts and Mitigation Measures

No.	Environmental Item	Mitigation Measures Mentioned in the Existing EIA Report	Proposed Measures by the Project
Social Environment			
1	Involuntary resettlement	【Pre-construction】 - Presentation of information to related organizations on project plan, progress of construction work, land clearance, resettlement - Implementation of preparatory works such as compensation by local committees - Consultation with affected peoples (presentation of information on project plan, compensation policy, procedures, etc.) - Surveys of current situations of living and livelihood of affected persons. Presentation of information on land to be resettled. Implementation of supporting activities for resettlement - Compensation for land acquisition according to Vietnamese laws and regulations	Preparation of RAPs which include WB OP4.12.
2	Local economy	-	Examination of necessity of impact mitigation measures. Proposal of mitigation measures if necessary.
3	Land use/agricultural land	-	Examination of necessity of impact mitigation measures. Proposal of mitigation measures if necessary.
4	Social infrastructures and services	-	Examination of necessity of impact mitigation measures. Proposal of mitigation measures if necessary.
5	Living and livelihood	【Pre-construction】 - Implementation of vocational training to affected persons who need to change their livelihood by the project owner and local government.	Review of supporting measures by the draft RAP to be prepared. Presentation of new measures as required.
6	Misdistribution of benefit and damage	-	Examination of necessity of impact mitigation measures. Proposal of mitigation measures if necessary.
7	Local conflict of interests	-	Examination of necessity of impact mitigation measures. Proposal of mitigation measures if necessary.
8	Water rights	-	Examination of necessity of impact mitigation measures. Proposal of mitigation measures if necessary.
9	Sanitation	【Construction phase】	-

No.	Environmental Item	Mitigation Measures Mentioned in the Existing EIA Report	Proposed Measures by the Project
		- Installation of portable toilets within the construction sites - Waste disposal and treatment by waste disposal experts	
10	Hazards (risk), infectious diseases	【Construction phase】 - Installation of portable toilets within the construction sites Waste disposal and treatment by waste disposal experts	-
11	Accidents	【Construction phase】 Installation of traffic signal, placement of persons for traffic control, installation of temporary construction roads, and bridge by the project owner Setting up of light for night work for prevention of collisions	-
Natural Environment			
12	Topography and geographical features	【Pre-Construction】 Implementation of detailed design of bridges based on the legal regulations to minimize erosion	-
13	Ground water	-	Examination of necessity of impact mitigation measures. Proposal of mitigation measures if necessary.
14	Landscape	-	Examination of necessity of impact mitigation measures. Proposal of mitigation measures if necessary.
Pollution			
15	Air pollution	【Construction phase】 Implementation of periodical water spraying and installation of a 3 m-high fence for prevention of scattering and defusing of dust and air pollutants. -Daily cleaning of construction site to keep control of site sanitation -Transportation of construction machineries and construction materials in non-dried condition. Water spraying on temporary construction roads or construction site 4 or 5 times per day 【Operation phase】 -Application of combustion technologies which minimize air pollution. -Regular confirmation of pollution sources according to TCVN5937:2005 -Preparation of posters to improve and raise environmental awareness. -Avoidance of abrupts change in speed at intersections near the residential area -Tree-planting along the route to prevent air pollution	Proposal of additional mitigation measures, if the forecast to be conducted based on a newly traffic demand would require additional mitigation measures.
16	Water pollution	【Construction phase】 - Storage of construction materials in appropriate places to prevent oil spill to	-

No.	Environmental Item	Mitigation Measures Mentioned in the Existing EIA Report	Proposed Measures by the Project
		rivers, and installation of wastewater treatment facilities Appropriate collection and storage of wastes, and regulatory supervising and control	
17	Soil contamination	【Construction phase】 - Confirmation of the plan of collection and transportation of earth and sand required by the implementation of earth work such as embankment work	-
18	Waste	【Construction phase】 - Reuse of wastes such as brick, sand, etc. 【Operation phase】 Appropriate disposal and treatment of construction debris by waste disposal expert	-
19	Noise and vibration	【Operation phase】 -Use of low-noise (less than 83 dBA) machine/equipment in residential areas. Prohibition of night shift works near residential areas -TCVN5459-1998 shall be followed for the use of machines and equipment which generates noise and vibration. Schedules should be adjusted for the use of machines and equipment which generates noise and vibration to minimize impacts. 【Operation phase】 -Regular monitoring of noise and vibration along the expressway, and installation of signs and alarm whistles, etc. -Installation of glass-window in the affected areas by noise -Installation of roadside trees in 6-8 m intervals to reduce impact of noise -Implementation of regular maintenance of road surface to reduce noise generated caused by friction between tires and road surface -Installation of signals and use of alarm whistle in densely populated areas.	Proposal of additional mitigation measures, if the forecast to be conducted based on a newly traffic demand would require additional mitigation measures.
20	Traffic jam	- Utilization of rivers located in target areas for transportation of materials Implementation of traffic control in collaboration with the local Transportation bureau to prevent accidents in rivers.	-

Source: JICA Survey Team

(2) Comparison of Existing EIA Report with WB OP4.12

Table 6.142 gives the comparison of information on land acquisition and resettlement mentioned in the existing EIA report and items required in the WB OP4.12. Table 6.143 shows the comparison of the current status of resettlement plan and the required issues mentioned in the WB OP 4.12. Considering these comparison tables, the RAP shall be prepared in order to implement land acquisitions and compensations by the compensation councils of provinces and districts.

Table 6.142. Comparison of Contents of OP4.12 and Existing EIA Report

	Items Covered by the Resettlement Plan, Annex A of WB OP 4.12	Description/Consideration in Approved EIA Report
1	*Description of the project*	Yes
2	*Potential impacts*	Yes
3	*Objectives*. (The main objectives of the resettlement program.)	Yes
4	*Socioeconomic studies*	Yes
5	*Legal framework.*	Yes
6	*Institutional framework*	Yes
7	*Eligibility*	Yes
8	*Valuation of and compensation for losses.*	Yes
9	*Resettlement measures*	Yes
10	*Site selection, site preparation, and relocation.*	Yes
11	*Housing, infrastructure, and social services*.	Yes
12	*Environmental protection and management*.	Yes
13	*Community participation.*	Yes（Not sufficient）
14	*Integration with host populations*.	Yes（Not sufficient）
15	*Grievance procedures*	No
16	*Organizational responsibilities*	No
17	*Implementation schedule*	No
18	*Costs and budget*	Yes
19	*Monitoring and evaluation.*	Yes

Source: JICA Survey Team

Table 6.143. Comparison of Contents of OP4.12 and EIA Report

No.	Issues to be Included in the Draft Resettlement Action Plan	Current Status
a	A census survey of displaced persons and valuation of assets	Number of affected households and number of households required for resettlement were surveyed. Affected properties were also surveyed in November 2011. Data must be updated.
b	Descriptions of compensation and other resettlement assistance to be provided	Descriptions were based on the information from compensation councils of districts and local areas.
c	Consultations with displaced people about acceptable alternatives	Necessity of implementation of consultation will be proposed to the project owner as required.
d	Institutional responsibility for implementation and procedures for grievance redress	Procedure for implementation of resettlement was established. Grievance redress system should be re-examined.
e	Arrangements for monitoring and implementation	There is an existing monitoring process.
f	Timetable and budget	Resettlement schedule should be confirmed.

Source: JICA Survey Team

(3) Resettlement

Resettlement is included in the compensation options in Vietnam. The compensation options

are to be discussed after the approval of compensation costs by the PPC as mentioned above. At present, the compensation costs have not been approved by the PPC. Therefore, there are no current activities concerning resettlement. The following show the items and issues confirmed in this study term in Vietnam:

1) Number of Households/Persons

In Vietnam, the compensation for RAP is made for each household, or by household unit, based on the laws and regulations. In the Tien Giang Province, the main decision which prescribes the compensation is Clause c) of Article 26 of Decision No. 36/2009/QD-UBND. DOT does not grasp the populations which require involuntary resettlement. The number of persons will be confirmed at DPC. Table 6.140 shows the results of survey by DPCs.

2) Displaced Area (New Resettlement Area)

New resettlement areas are to be selected by the DPCs. The procedures for identifying the new resettlement areas are as follows:

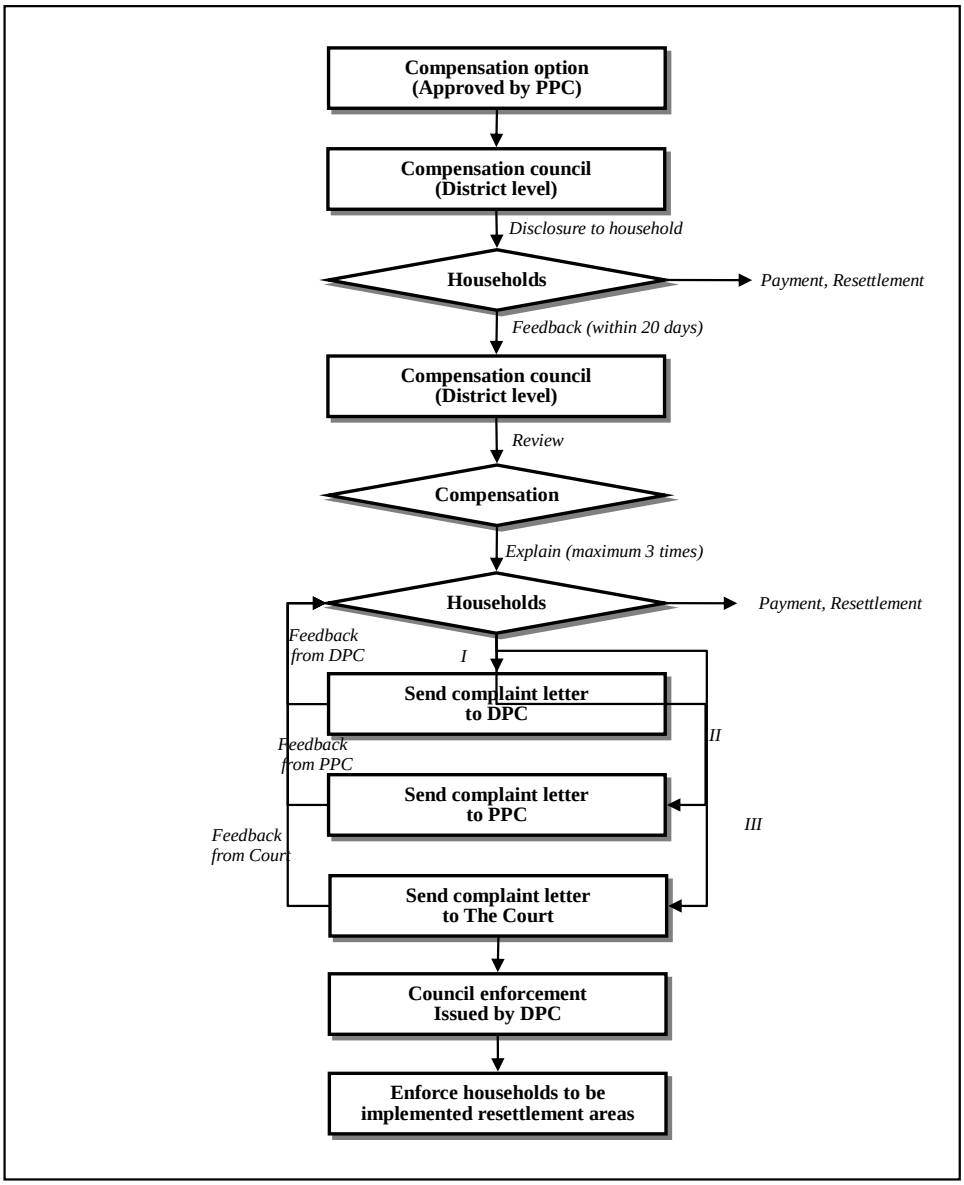
i) Determination of the size of resettlement areas,
ii) Determination of the locations of resettlement areas,
iii) Determination of costs of resettlement areas, and
iv) Source of funds

3) Stakeholder Meeting

There are two kinds of stakeholder (SH) meetings. The first kind will be held when the project has started. In this SH meeting, the DPCs will announce to SHs the start of the project and explain the contents of the project. These kind of SH meetings will be held once in each district. As for the TL-MT Expressway Project, SH meetings were already held in each district.

The second kind will be held after the approval of compensation costs by the PPC. In these kind of SH meetings, DPCs will inform the SHs about the compensation options such as compensation price, resettlement, support, etc. If households have opinions and grievances against the compensation options, the SHs may submit their opinions and grievances to DPCs within 20 days after the SH meeting. If the number of households who disagree with the compensation options is less than 10% of the total eligible households to be compensated, the DPCs will discuss with each household who has disagreed to reach agreements.

In case the number of households who disagree with the compensation options is more than 10% of total eligible households to be compensated, SH meetings will be held at least three times to discuss the contents of compensation options. If the households do not reach an agreement with DPCs after the third SH meeting, SHs who did not reach agreements may submit their complaint letter to DPC and PPC. DPCs consider the letters to solve the problems. Figure 6.82 shows the procedure for grievance redress.



Source: JICA Survey Team

Figure 6.82. Grievance Redress Procedure

4) Measures to Illegal Residents

Illegal residents will also receive compensations except for land costs. Illegal residents can attend the SH meeting and express their opinions on the compensation, resettlement, etc. They can also move to resettlement area districts that have been provided if they wish.

(4) Existence of Cultural Heritage

At the planning stage of the Project, the DOT held a joint meeting with related agencies to discuss the appropriateness of the Project. In this meeting, the Department of Culture confirmed that there are no cultural heritages existing along the planned route of the expressway.

(5) Residential Areas of Ethnic Minorities

There are no villages and colonies of ethnic minorities in the Tien Giang Province.

(6) Environmental Management System in the Mekong Delta Area

The TL-MT Expressway Project will be implemented in the Tien Giang Province of the Mekong Delta area where a rich ecological system exists. Considering the natural environmental conditions of the project area, the impacts on the environment caused by the implementation of the Project should be managed to secure the Mekong Delta area.

The Mekong Delta Environment Department (MED), under MONRE, which is located in Cần Thơ City, is the responsible agency for the management of the environmental issues in the Mekong Delta area. Although MED manages and controls the environmental issues in the area such as management and control of pollution sources, monitoring of water quality and ambient quality, there are no management systems or activities which focus on the TL-MT Expressway Project.

Aside from MED, there are also a few agencies or organizations that handle environmental management in the Tien Giang Province. Such are the Department of Science and Technology of Tien Giang Province (DOST); Department of Natural Resources and Environment of Tien Giang Province (DONRE); and Department of Agriculture and Rural Development of Tien Giang Province (DARD). These agencies also do not have special management systems or actions which focus on the implementation of the TL-MT Expressway Project, as well as managing and controlling the potential impacts caused by the implementation of the Project at present.

(7) Changes in Natural and Social Conditions In and Around the Project Areas After the Approval of the Existing EIA Report

The existing EIA report mentioned that there are no biological preservation areas in the Project. Existing in the area are 153 kinds of fishes, 19 kinds of shrimps, 12 kinds of rodents, a few kinds of frogs and snakes. The commonly found trees are acacia and eucalyptus.

Although the existing EIA Report mentioned that there are no rare and endangered species in the area, there are several flora and fauna which are susceptible to change in environment, as shown in Tables 6.144 and 6.145, respectively.

Table 6.144. Sensitive Plant Species

Sensitive Plant Species	*Notes on Sensitivity of Species*
Dipterocarpus Alatus	Known to be found in the Plain of Reeds (Pham, 1992) and maybe found in unused lands. The species is ranked as "endangered" according to the 2012 IUCN red list. Construction should avoid damaging these trees or transplant them.
Hopea Odorata	Known to be found in the Plain of Reeds (Pham, 1992) and maybe found in unused lands. The species is ranked as "vulnerable" according to the 2012 IUCN Red List. Construction should avoid damaging these trees or transplant them.
Hemisorghum Mekongense	Known to be found in scattered populations on dunes and along canals in the Mekong Delta. The species is ranked as "vulnerable" according to the Vietnam Red Data Book (2007). Construction should avoid damaging these trees or transplant them.
Oryza Rufipogon	Taxonomically close to cultivated rice. Known to occur in many wetlands of the Mekong Delta. The species is ranked as "vulnerable" according to the Vietnam Red Data Book (2007). Construction should avoid damaging these trees or transplant them.
Mimosa Pigra	Very endangering invasive species. Their seeds may be already contained in the sand used as construction material. Easy to disperse by the implementation of the project, including transporting their seeds from one place to another. Workers should be informed about this species to avoid or reduce its dispersal.
Eichhornia Crassipes	Found along water courses. Easy to disperse by the implementation of the project, including transporting individuals from one to another place. Workers should be informed about this species to avoid or reduce its dispersal.

Source: JICA Survey Team

Table 6.145. Sensitive Animal Species

Sensitive Animal Species	*Notes on Sensitivity of Species*
Cynopterus Brachyotis (Lesser short-nosed fruit bat)	Known to be found in the Mekong Delta and can possibly be found in the project area. The species is ranked as "vulnerable" according to the Vietnam Red Data Book (2007). Construction may threat their habitat and disturb (including noise) them. At the latter part of the project, higher density and faster speed of traffic on the completed expressway may interfere their flight path and, thus, may threaten their lives. This may occur to other bats and birds. No means of anticipation is known.
Catlocarpio Siamensis *(*Giant carp)	Known as a rare and economically valuable species found in the Mekong River. The species moves to the flooded area in the Mekong Delta. The species is ranked as "endangered" according to the Vietnam Red Data Book (2007) and "cirtically endangered" in the 2012 IUCN Red List. Construction may damage their habitat. It would be necessary to consult with the local communities to define their real habitat and avoid destroying their swimming path and habitat. Workers should know about this species to avoid harming or killing them.
Pangasianodon Gigas *(Mekong giant catfish)*	Known as a rare and economically valuable species found in the Lower Mekong River. The species moves to floodeds area in the Mekong Delta. The species is ranked as "vulnerable" according to the Vietnam Red Data Book (2007) and "cirtically endangered" in the 2012 IUCN Red List. Construction may damage their habitat. It would be necessary to consult with the local communities to define their real habitat and avoid destroying their swimming path and habitat. Workers should know about this species to avoid harming or killing them.
Hypostomus Punctatus (Glass-cleaning fish)	An invasive species occupying many water courses which used to be the habitat for the local aquatic species in the Mekong Delta. Efforts have been made to reduce its invasion. Workers should know how to prevent its dispersal.
Pomacea Cananiculata (Apple snail)	An invasive species causing heavy damage to agricultural crops in the Mekong Delta. Efforts have been made to reduce its invasion. Workers should know how to prevent its dispersal.

Source: JICA Survey Team

- The natural environment in the Project area forms a man-made agricultural ecosystem, and is not so sensitive to the changes in the environment. There have been no remarkable environmental changes in the Project area in recent years.
- There is a possibility that the ambience will be affected by the increase in the number of vehicles in the future. Impacts caused by the increase of number of vehicles will be examined in (9) of this section.
- The economy of this area largely depends on agriculture and aquaculture (accounting for more than 80% of GDP). In the past 4 years, the economy of this area has not undergone any significant changes.
- There have been no remarkable changes in the social conditions (education, health care service, and culture) in the Project area.

(8) Collection and Transportation of Earth and Sand for Construction Work

Although the EIA Report has already examined this matter, the details of the collection and transportation of earth and sand will be dealt within the scheme of EPC as mentioned in the approval letter of the report (Decision No.2140/QD-BTNMT). The details will be examined and determined after the selection of construction contractors. Due to the reason that the greater part of the Project area is composed agricultural lands and soft ground, earth and soil collected outside of the Project area will be transported to the construction sites. The outline of contents examined in the EIA Report is shown below.

a. Type of earth and sand, and place of collection

- Sand：To be collected from seven places of the Tieng River, Hau River (Vinh Long, Cao Lanh, Tra Vinh, Hau Giang 1, Hau Giang 2, Đai ngai, Tra ech)
- Soil for embankment：To be collected from five soil collection sites (Km. 8 of Provincial Road No. 62, Dong Hoa, Tam Phuoc, Phuoc Thai, Nhon trach)
- Rock：To be collected from five mining areas (Coto, Hoa An, Binh An, Phuoc Hoa, Nui Dinh)

b. Transportation

The EIA Report examined two transportation methods, namely transportation by land routes and transportation via watercourses. In order to avoid traffic congestion along the national road 1A and to reduce consumption of gases by vehicles, which cause air pollution, the use of watercourses, via the Tien River, Hau River, and connecting canals, were recommended. The concrete transportation routes were also examined.

(9) Forecast of Air Quality

In the existing EIA report, the air quality, noise and vibration along the expressway route, which will be caused by the operation of the expressway, were predicted in future based on the traffic demands calculated at the time of the F/S of the Project.

With the review of the traffic demand at the time of the F/S, a forecast on air quality along the Expressway route was newly conducted based on the latest traffic demand. The following show the results of the new forecast of air quality.

a. Traffic Volume

For the basis of the calculation of forecast of air quality, the JICA Survey Team studied the traffic demand, and the updated their forecast as shown in Table 6.146.

Table 6.146. Updated Traffic Demand Forecast

(Unit: Vehicle/day)

Section	Vehicle Type	Year		
		2020	2025	2030
TL-Cai Lay	Car <12 seats	6,902	11,328	16,464
	Small Bus <12 seats	242	288	535
	Medium Bus <12-30 seats	3,229	4,436	5,127
	Heavy Bus >31 seats	1,465	2,186	2,468
	Truck < 2 t	1,551	1,725	2,640
	Truck 2-4 t	2,036	2,819	3,500
	Truck 4-10 t	1,536	2,127	2,641
	Truck 10-18 t, +20 feet	895	1,059	1,398
	Truck >18 t, +40 feet	259	255	396
	Total	**18,115**	**26,223**	**35,169**
Cai Lay - Cai Be	Car <12 seats	4,512	7,068	11,321
	Small Bus <12 seats	36	55	314
	Medium Bus <12-30 seats	2,791	3,992	4,370
	Heavy Bus >31 seats	1,333	1,788	2,145
	Truck < 2 t	1,091	1,148	1,705
	Truck 2-4 t	1,521	2,351	2,792
	Truck 4-10 t	1,147	1,774	2,106
	Truck 10-18 t, +20 feet	438	676	972
	Truck >18 t, +40 feet	110	122	144
	Total	**12,979**	**18,974**	**25,869**
Cai Be - My Thuan	Car <12 seats	4,206	6,870	10,535
	Small Bus <12 seats	5	39	183
	Medium Bus <12-30 seats	2,679	3,881	4,342
	Heavy Bus >31 seats	1,289	1,788	2,143
	Truck < 2 t	1,073	1,236	1,613
	Truck 2-4 t	1,447	2,222	2,724
	Truck 4-10 t	1,092	1,676	2,055
	Truck 10-18 t, +20 feet	353	674	969
	Truck >18 t, +40 feet	69	108	128
	Total	**12,213**	**18,494**	**24,692**

Source: JICA Study Team

b. Forecast of Air Quality

i) Formula

Sutton's Formula as used in predicting air quality, as follows:

$$\mathbf{C} = 0{,}8 \times \alpha \times n \times \frac{\exp\left[-\frac{(z+h)^2}{2 \times S_z^2}\right] + \exp\left[-\frac{(z-h)^2}{2 \times S_z^2}\right]}{S_z \times U}$$

Where:

C: Concentration of gas ($\mu g/m^3$)

α : Pollution coefficients

n: Vehicle traffic in a day

z: Height of the point forecasted (m)

h: The difference in height between the road and the surrounding land (m)

U: Wind speed (m/s)

S_z: Vertical diffusion coefficient

Diffusion coefficient S_z is a function of the distance, x, depending on atmospheric stability, to be calculated by the following formula:

$$S_z = 0{,}53*x^{0,73}$$

Where: x is the distance from the center line to the point predicted (m)

ii) Air pollution coefficient

In addition to Sutton's Formula, the air pollution coefficient of vehicles presented by WHO was applied for the calculation as shown in Table 6.147

Table 6.147. Air Pollution Coefficient of Vehicle

Pollutant	Dust	SO_2	CO	NO_2	HC
Pollution coefficients (*Kg/100 km)*	0.07	2.05	7.72	1.19	0.83

Source: WHO

c. Results of Forecast

Parameters predicted are dust, SO_2, CO, NOx (as NO_2), and hydrocarbons. The forecasts are for the years 2020, 2025 and 2030, while the points of forecasts are distances of 20-130 m from the center of the expressway. Comparing the Vietnamese ambient air quality standards for the parameters above, the concentrations of all parameters predicted except that of NOx are lower than the national regulations (QCVN[24]) at all points and years. However, it is predicted that the concentrations of NOx will exceed the National Technical Regulation on Ambient Air Quality at several points and years, especially at the sections of Trung Luong–Cai Lay and Cai Lay–Cai Be, at distances within 100 m from the center of the expressway. Measures to reduce the impacts caused by vehicle emissions such as tree-planting along the expressway, periodical air quality monitoring, and improvement of combustion technology of vehicles should be examined.

The results of the forecast are shown in **Appendix A4**.

[24] QCVN 05:2009/BTNMT (National Technical Regulation on Ambient Air Quality), QCVN 06:2009/BTNMT (National Technical Regulation on Hazardous Substance).

CHAPTER 7 ECONOMIC EVALUATION OF PROJECT

(1) Purpose of Economic Evaluation

The purpose of economic evaluation is to assess the socio-economic validity of the project.

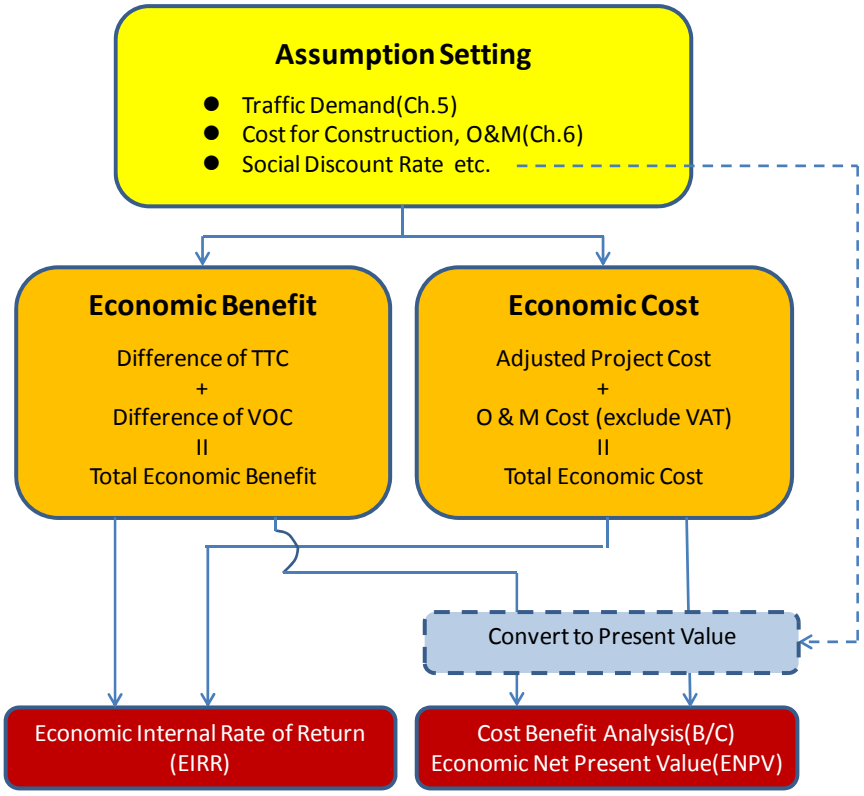
(2) Method of Economic Analysis

1) Basic Concept of Economic Analysis

Economic analysis is done by calculating the economic benefits and costs of "with" and "without" project.[25]

2) Flow of Economic Analysis

As Figure 7.1 shows, the first step in economic analysis is to set the assumptions. Secondly, the JICA Survey Team calculated the economic benefits and costs of the Project. By utilizing these economic benefits and costs, economic internal rate of return (EIRR) is calculated. Also by converting these economic benefits and costs into present value, benefit-cost ratio (B/C) and economic net present value (ENPV) are calculated.



Source: JICA Survey Team

Figure 7.1. Flow of Economic Analysis

3) Methodology for Calculation of Economic Benefit

As economic benefits, the shortening of travel time, reduction of traveling costs, reduction of traffic accidents, improvement of comfortability of driving, utilization of alternative road in case of disaster, shortening of arrival time of emergency vehicle, and increment of production, employment and income are expected. In this economic analysis, the shortening of the travel

[25] The methodology of this economic analysis refers to "Cost Benefit Analysis Manual" published by Ministry of Land, Infrastructure, Transport and Tourism of Japan in 2008.

time cost (TTC) and vehicle operating cost (VOC), which can be measured with a certain accuracy and can be converted to monetary values, are utilized for the calculation of economic benefits.

a. Benefit for Reduction of TTC

The benefit of reduction of TTC is calculated by the TTC without the new road minus the TTC with the new road, as follows:

Benefit of Reduction of TTC ＝（TTC without New Road）－（TTC with New Road）

The TTC is calculated by multiplying the unit TTC with traveling time and traffic volume, as follows:

TTC（VND）＝Unit TTC（VND/vehicle/time）×Travel Time（hour）×Traffic（vehicle）

b. Benefit for Reduction of VOC

The benefit of reduction of VOC is calculated by the VOC without the new road minus the VOC with the new road.

Benefit of Reduction of VOC＝（VOC without New Road）－（VOC with New Road）

The VOC is calculated by multiplying the unit VOC with traveling distance and traffic volume.

VOC（VND）＝Unit VOC（VND/vehicle/km）×Traveling Distance（km）×Traffic Volume（vehicle）

4) Calculation Method of Economic Cost

The project costs include construction cost for road (including land acquisition) and operation and maintenance (O&M) costs. Ideally, the economic cost should be calculated by shadow price which reflects the social value of goods and services in the country; however, actual calculation of shadow price is difficult. Therefore, the standard conversion factor (SCF) is used to convert the nominal cost to economic costs. In this economic analysis, 0.85 is used as SCF, which is commonly used in infrastructure projects in Vietnam.

(3) Assumption of Economic Analysis

1) Common Assumptions

Common assumptions for the economic analysis is shown in Table 7.1.

Table 7.1. Common Assumptions

Item	Assumption	Remarks
Social Discount Rate	12%	Refer to ADB (1997) Guideline for Economic Analysis for Project
Project Period	30 years（O&M period）	
Price Standard Year	2011	Inflation during project period is taken into account

Source：JICA Survey Team

2) Assumption of Economic Benefits

a. Traffic Demand

Traffic demand is based on Chapter 5.

b. Unit TTC

The JICA Survey Team used the unit TTC that was set in the study on the "Socialist Republic of Viet Nam PPTA For HCMC–Long Thanh–Dau Giay Expressway" done by ADB in 2007 for this economic analysis. The original data was converted to year 2011 prices using price index.

Table 7.2. Unit TTC (VND/vehicle/hour)

Type of Vehicles	Unit TTC
Car <12 seats (Car + Taxi)	55,450
Small Bus <12 seats	28,700
Medium Bus <12-30 seats	65,700
Heavy Bus >31 seats (Large Bus)	136,600
Truck < 2 ton (Pickup)	43,900
Truck 2 - 4 tons (2 axle)	43,900
Truck 4 - 10 tons (2 axle)	43,900
Truck 10 - 18 tons (3 axle)	82,100
Truck >18 ton (container)	144,700

Source:：JICA Survey Team

c. Unit VOC

The JICA Survey Team used VOC that was set in the "Study on the Second My Thuan Bridge Construction Project Final Report done by Ministry of Economic, Trade, and Industry (METI)" in 2007. The original data was converted to year 2011 prices using price index.

Table 7.3. Unit VOC

(VND/Vehicle/km)

Speed (km/hour)		below 10	10～20	20～30	30～40	40～50	50～60	60～70	70～80	80～90	90～100	100 and over
Types of vehicles	Car <12 seats (Car + Taxi)	6,912	4,198	2,748	2,249	1,960	1,842	1,862	1,779	2,005	2,139	2,281
	Small Bus <12 seats	9,210	10,352	3,907	3,069	2,642	2,518	2,560	2,508	2,878	3,138	3,422
	Medium Bus <12-30 seats	9,210	10,352	3,907	3,069	2,642	2,518	2,560	2,508	2,878	3,138	3,422
	Heavy Bus >31 seats (Large Bus)	9,210	10,352	3,907	3,069	2,642	2,518	2,560	2,508	2,878	3,138	3,422
	Truck < 2 ton (Pickup)	17,881	10,946	7,388	5,600	4,761	4,434	4,357	4,081	4,735	5,159	5,621
	Truck 2 - 4 tons (2 axle)	17,881	10,946	7,388	5,600	4,761	4,434	4,357	4,081	4,735	5,159	5,621
	Truck 4 - 10 tons (2 axle)	17,881	10,946	7,388	5,600	4,761	4,434	4,357	4,081	4,735	5,159	5,621
	Truck 10 - 18 tons (3 axle)	17,881	10,946	7,388	5,600	4,761	4,434	4,357	4,081	4,735	5,159	5,621
	Truck >18 ton (container)	17,881	10,946	7,388	5,600	4,761	4,434	4,357	4,081	4,735	5,159	5,621

Source: JICA Survey Team

3) Assumption of Economic Cost

Construction and O&M costs for the TL-MT Expressway are shown in Section 8.3.1(3). In order to calculate economic cost for construction, the value-added tax (VAT) is subtracted, and then SCF of 0.85 is multiplied for the local component of the construction costs. For the calculation of economic costs of O&M, the VAT is subtracted from O&M costs. Table 7.4 shows the comparison between financial and economic costs.

Table 7.4. Comparison between Financial and Economic Costs

(VND billion)

Year	Financial Cost	Economic Cost
2012	1,154	977
2013	1,835	1,567
2014	4,840	3,966
2015	4,928	4,037
2016	7,455	6,158
Total	20,212	16,704

Source: JICA Survey Team

(4) Results of the Economic Analysis

1) Results of the Economic Analysis

Table 7.5 shows the results of the economic analysis. The EIRR is 15% which is higher than the social discount rate of 12%. The B/C is more than 1.0 and ENPV is positive. The result of the economic analysis showed that this project gives high socio-economic benefit to the society.

Table 7.5. Results of the Economic Analysis

Indicator	Result	Remarks
Economic Internal Rate of Return(EIRR)	15%	Higher than social discount rate (12%)
Benefit-Cost Ratio (B/C)	1.4	Higher than 1.0
Economic Net Present Value (ENPV)	VND 4,800 billion	Positive

Source: JICA Survey Team

The calculation method for each indicator is as follows:

B/C =(Present Value (PV) of Economic Benefit)÷ （PV of Economic Costs）

ENPV=（PV of Economic Benefit） －（PV of Economic Cost）

EIRR =（Discount rate which makes economic benefit (PV) zero）

2) Results of the Sensitivity Analysis

Table 7.6 shows how the results of the economic analysis are affected when economic benefit, cost of facility, and O&M cost either increase or decrease. The results showed that the impact

of those changes gives limited impact on the results of the economic analysis.

Table 7.6. Results of the Sensitivity Analysis

		EIRR（%）	B/C	ENPV（VND billion）
	Base Case	14.6%	1.41	4,769
Economic Benefit	10% Increase	15.4%	1.55	6,423
	10% Decrease	13.8%	1.26	3,116
Cost of Investment	10% Increase	13.9%	1.29	3,669
	10% Decrease	15.5%	1.55	5,870
Cost of O&M	10% Increase	14.6%	1.40	4,693
	10% Decrease	14.7%	1.41	4,845

Source: JICA Survey Team

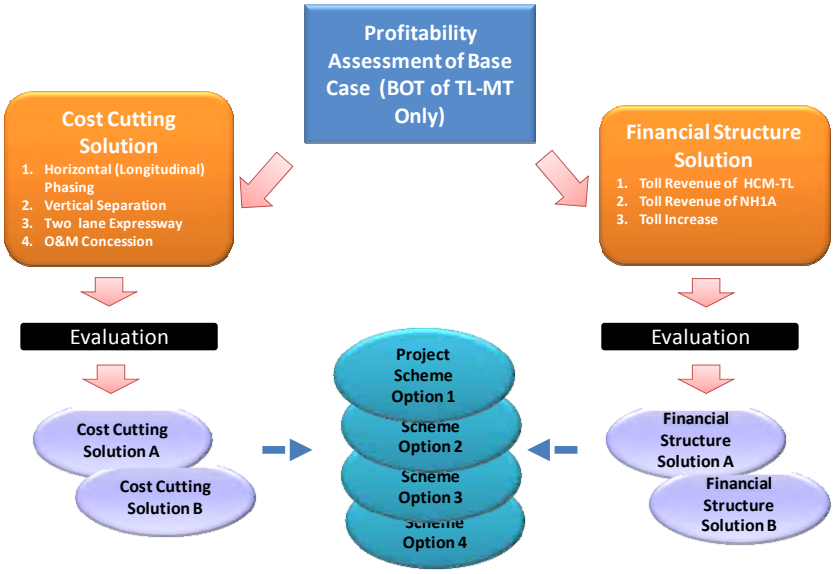
CHAPTER 8 PROJECT SCOPE AND PROJECT SCHEME

8.1 Recommendation for Project Scope

8.1.1 Preconditions

Figure 8.1 illustrates the basic concept and flow chart for the identification of the project scope and scheme. The JICA Survey Team started with the internal rate of return for the project (Project IRR) for the base case, where the revenue comes only from the toll of TL–MT Expressway, excluding those from the toll plaza at National Highway 1A (NH1A). It is confirmed that the profitability of the base case is not sufficient for private sector investment and, therefore, government support is needed.

The next step is to propose cost-cutting and revenue-increasing solutions and analyze their impact to the Project IRR. Through this analysis for the project scope, the combination of various solutions to improve the Project IRR for a feasible public-private partnership (PPP) structure is evaluated.



Source: JICA Survey Team

Figure 8.1. Concept Map for Project Scopes and Schemes

8.1.2 Assessment of Use of Toll Collection Right for HCMC and Trung Luong Section

In BEDC's report[26] on the F/S for the TL-MT Expressway, a Project IRR of 9.6% is expected, including revenues from toll plazas at NH1A. However, when the JICA Survey Team reviewed the F/S, especially the traffic volume forecasting and engineering aspects of the construction, there was an observed significant deterioration in the Project IRR to 5.6%, when revenues from toll plazas at NH1A are included, or 4.3% for base case when revenues from toll plazas at NH1A are excluded.

Considering the current financial market situation in Vietnam, including inflation, interest rate, etc., the JICA Survey Team assumed a 15% hurdle rate[27] which justifies the investment

[26] Transport Engineering Design Incorporated (TEDI), "Construction Investment of Trung Luong – My Thuan Expressway Project, Stage: Study for Construction Investment" (2010).

[27] The "hurdle rate" in this JICA Survey should be considered as a simple preliminary approximation because the due diligence and the risk analysis will be conducted only at the latter phase of the JICA Survey. The initial hurdle rate should be modified in accordance with the result of risk analysis and understood to be an approximate value with a range of several

rationale for the Project. In other words, the government must implement additional measures in order to achieve a Project IRR of 15%, or the Project may not attract any private investors and, thus, cannot be included in the PPP program of the government.

There are two major reasons for the deterioration of the Project IRR, compared to BEDC's F/S report, as follows:

- Increase in initial investment cost for the construction of the expressway because of the softsoil treatment at the Mekong Delta area. The engineering team of the JICA Survey Team reviewed the design for the construction and decided to proceed with the more prudent scheme/structure.
- Decrease in the traffic volume forecasting because JICA Survey Team conducted traffic analysis using traffic network forecasting software called STRADA. The forecasted traffic volume at the TL–MT Expressway decreased to less than half of that of BEDC's F/S report. (See Table 5.28 for the result of traffic demand forecast)

8.1.3 Preliminary Assessment of Project Profitability for TL–MT Section

(1) Cost Reduction Solution

In order to improve the project profitability, initial cost cutting is proposed as one of the effective solutions. Four solutions are established for the evaluation and selection of the most appropriate solution as shown below.

Solution 1: Horizontal Phasing (Trung Luong-Cai Lay Section or Trung Luong-Cai Be Section)

Solution 2: Vertical Phasing (asphalt concrete pavement only)

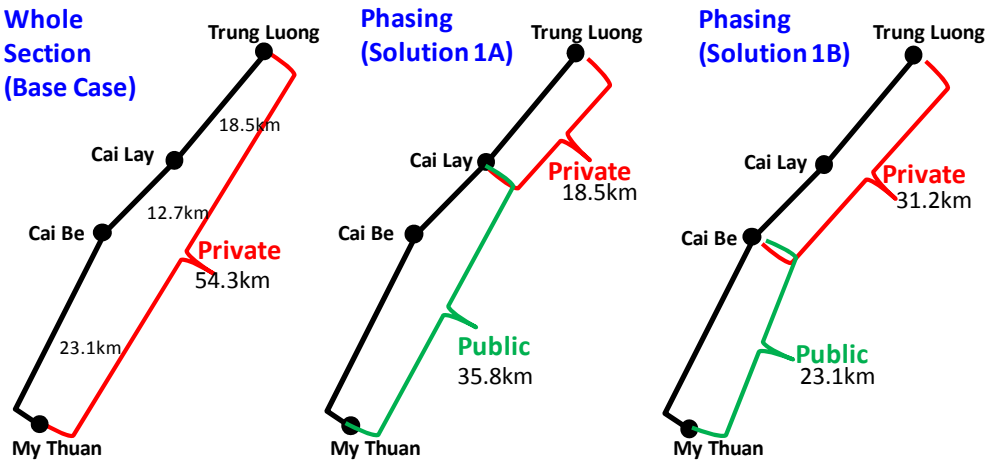
Solution 3: Two-lane Expressway

Solution 4: O&M Concession

1) Solution 1: Horizontal Phasing (Trung Luong-Cai Lay Section or Trung Luong-Cai Be Section)

This solution is able to adjust cost-sharing between public and private by phasing at either Cai Lay or Cai Be interchange. Reasonable balance of the cost sharing is required for BOT/PPP scheme. In the case of phasing at Cai Lay Interchange, the initial construction cost can be reduced to 35% of the whole section cost; and in the case of phasing at Cai Be Interchange, it can be reduced to 60%. Both phasing plans are necessary to utilize a large amount of much needed capital from the public. The different horizontal phasing plans are as shown in Figure 8.2.

percentage points either way. It should be also mentioned not to overstress the hurdle rate. For example, a hurdle rate of 15% does not necessarily mean to decline the investment if the expected return of the project is only 13%, nor will it mean the automatical approval if it is 18%.

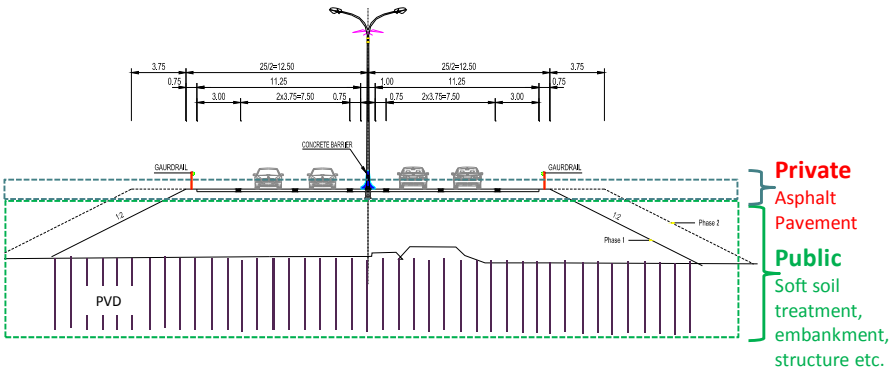


Source: JICA Survey Team

Figure 8.2. Horizontal Phasing Plan

2) Solution 2: Vertical Phasing (only asphalt concrete pavement)

This solution is to construct only the asphalt concrete pavement by private funding and other civil works such as soft soil treatment, embankment and structures (culverts and bridges) by public funding. Initial cost of private investment can be reduced to 9% of the total construction cost. However, utilization of a large amount of investment from the public is required and defects liability of damages on asphalt concrete pavement during construction and operation phase will be complicated and subject to disputes. The vertical phasing plan is as shown in Figure 8.3.



Source: JICA Survey Team

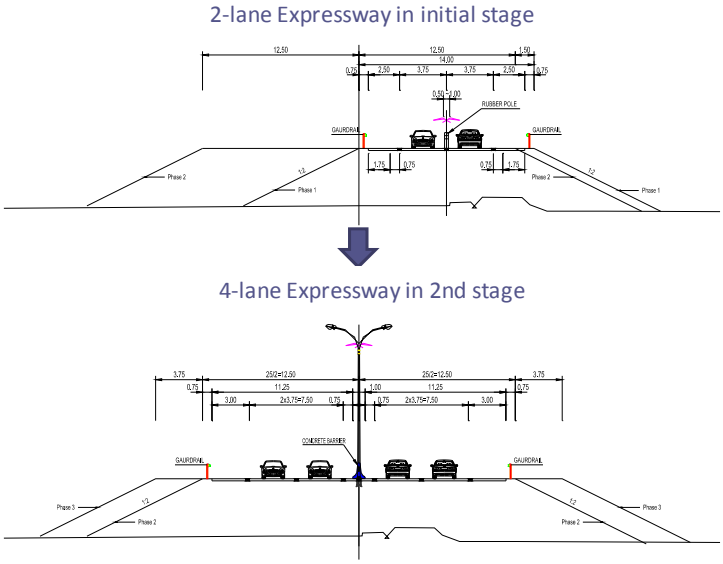
Figure 8.3. Vertical Phasing Plan

3) Solution 3: Two-lane Expressway

This solution is only effective in reducing the initial construction cost. However, there are many conditions such as i) traffic volume must be under 14,000 vehicles/day (flat terrain, according to Japan Road Structure Ordinance), ii) total investment cost must be economical, iii) safety and high-speed traffic must be secured, and iv) geographical features and the road structure must be appropriate for the staged construction.

In the Trung Luong–My Thuan section, the projected traffic volume at traffic opening in 2017 reaches only 13,790 vehicles/day (see Table 6.3 in Chapter 6.1.3). Therefore, it does not meet the traffic demand requirement for the case of a two-lane expressway.

Figure 8.4 shows the phased construction plan for the initial two-lane expressway.

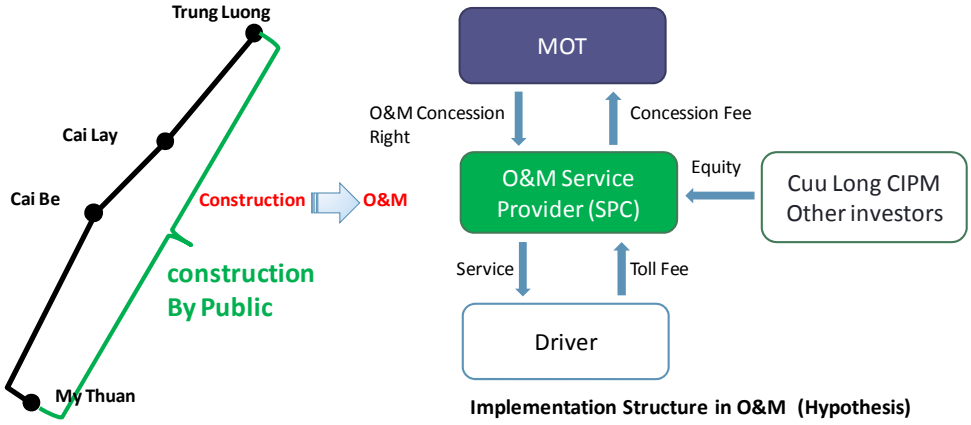


Source: JICA Survey Team

Figure 8.4. Phased Construction Plan by Initial Two-Lane Expressway

4) Solution 4: O&M Concession

This solution is to construct the whole section by public funding, and a special purpose company (SPC) will purchase O&M concession rights from the government and operate as O&M service provider. Although it has the potential to achieve a lower life cycle cost by the use of efficient and appropriate service by private sector, a large initial investment cost by the public sector is required. Figure 8.5 shows the O&M concession plan.



Source: JICA Survey Team

Figure 8.5. O&M Concession Plan

Table 8.1 summarizes the evaluation on cost reduction solutions from the aspects of safety, technical, and cost reduction from the viewpoints of public and private sectors.

Table8.1. Evaluation of Cost Reduction Solutions

Cost Reduction Solution	Evaluation			Comprehensive Evaluation and Reasons	
	Safety Drive/ Service Level Aspect	Technical Aspect	Ratio of Construction Cost of Private Sector against Total Construction Cost		
Base Case (Trung Luong-My Thuan BOT)	○	○	X 100%	X	High investment cost for private sector
Solution 1A: Horizontal Phasing (Trung Luong-Cai Lay Section)	○	○	◎ 35%	○	-Much lower investment cost -Reasonable balance of cost sharing between public and private sectors
Solution 1B: Horizontal Phasing (Trung Luong-Cai Be Section)	○	○	○ 60%	○	-Lower investment cost -Reasonable balance of cost sharing between public and private sectors
Solution 2: Vertical Phasing (only asphalt concrete pavement)	○	X	◎ 9%	X	-Unbalanced cost sharing between public and private sectors -Complicated liability for defects
Solution 3: Two-lane Exp.	X	X	○ 66%	X	-Does not meet traffic demand -Does not ensure traffic safety
Solution 4: O&M Concession	○	○	◎ 0%	△	-Unbalanced cost-sharing between public and private -Potentially lower life cycle cost for GoV

Source: JICA Survey Team

Note: ◎: Good ○: Better △: Worse X:Worst

Finally, two solutions, namely Solution 1A: Horizontal Phasing (TL-Cai Lay Section) and Solution 1B: Horizontal Phasing (TL-Cai Be Section) are selected as cost reduction solutions for further evaluation of project profitability.

Table 8.2 shows the outline of the private sector's investment portion in the two solutions mentioned above.

Table8.2. Outline of Private Sector's Investment Portion in the Two Cost Reduction Solutions

	Trung Luong – Cay Lay	Cai Lay – Cai Be	Cai Be – My Thuan	Length for private sector portion (km)	Investment Cost for Private Sector Portion (VND billion)
Base Case	Private	Private	Private	54.3	25,736
Solution 1A	Private	Private	Public	33.9	15,919
Solution 1B	Private	Public	Public	18.5	8,891

Source: JICA Survey Team

Table 8.3 shows that project profitability improves by horizontal phasing. However, the Project IRR is 8.4% even in the case of Solution 1B (scope of construction is limited between Trung Luon-Cai Lay), which is still has insufficient profitability for PPP/BOT scheme. As an

assumption, private companies are assumed to receive toll incomes only from the section between Trung Luong-My Thuan for the base case, Solution 1A and IB.

Table8.3. Project Profitability of the Two Cost Reduction Solutions

Horizontal Phasing Solutions	Project IRR
Base Case（Trung Luong-Cai Lay-Cai Be-My Thuan）	3.5%
Solution 1A (Trung Luong-Cai Lay-Cai Be）	5.6%
Solution 1B (Trung Luong-Cai Lay）	8.4%

Source: JICA Survey Team

(2) Financial Structure Solutions

In the previous section, the JICA Survey Team analyzed the cost-cutting solutions to improve the Project IRR. In this section, the solutions to increase the revenue will be analyzed, or in other words, this section will seek other supplemental revenue sources as an alternative way to improve the Project IRR. If the profitability is too low for PPP to attract private investment, it is often recommended for the government to provide cash subsidy to the project. But, sometimes it seems more practical to request toll revenues from MOT rather than cash subsidy from MOF.

1) Toll collection rights of HCMC-Trung Luong Expressway

In this sub-section, the JICA Survey Team will consider the possibility of seeking for collection rights of HCMC-Trung Luong Expressway to improve the profitability of this project.

a) Current status of the toll collection rights of HCMC-Trung Luong Expressway

The HCMC-Trung Luong Expressway (39.8 km) was opened in February 2010 as the first expressway in Vietnam. The toll collection started in February 2012 after two years being toll-free. The toll collection rights of the expressway was originally granted to BEDC at the concession fee of VND 9,157 billion with a 20 year concession period. However, the toll collection right was returned to the government when BEDC returned the BOT concession of TL–MT Expressway in November 2011. Today, the Cuu Long CIPM operates the HCMC-Trung Luong Expressway on a fee-basis (7% of toll revenue), while MOT and the Directorate for Roads of Viet Nam (DRVN) provide maintenance services from the state budget.

b) Impact of the toll revenue of HCMC-Trung Luong Expressway to the Project IRR.

Today, the government temporarily holds the toll collection rights of HCMC-Trung Luong Expressway. According to the MOT Notice dated 13 April 2012 (SO193/TB-BGTVT), “Conclusion of the Minister of Transport at the meeting, regarding the mode of raising capital of Cuu Long CIPM Trung Luong-My Thuan Highway Project”, it was decided to ask the Prime Minister for permission to use the toll revenue from HCMC-Trung Luong Expressway, and two toll plazas at NH1A at Can Tho and My Thuan Bridges from 2012-2015 to carry out land clearance and contribute to the state capital for the project.

At the same time, it was also decided to prepare a report to the Prime Minister allowing the sale of toll collection rights to use HCMC-Trung Luong Expressway to increase the charter capital for Cuu Long CIPM. Today, it is considered the flexible utilization of the toll collection rights for HCMC-Trung Luong Expressway to construct TL–MT Expressway. It is understood that a special mechanism applies to the TL-MT Expressway Project based on the Prime Minister’s approval, which means that the BOT law is no longer applicable to the project; hence, PPP law is not applicable either.

In this context, the MOT requested Cuu Long CIPM to consider the efficient use of the toll rights of HCMC–Trung Luong Expressway for the construction of the TL–MT Expressway. Therefore, it is reasonable for the JICA Survey Team to consider the possible financial structure by integrating the toll revenue of HCMC-Trung Luong Expressway as one of the solutions to improve the Project IRR.

The assumption for the cashflow projection is that the cashflow from HCMC–Trung Luong Expressway, after deferral of payment of concession fee of VND 9,157 billion with a 20 year linear amortisation at 0% interest rate, the Project IRR of the base case will improve from 3.5% to 4.9%.

2) Impact of toll revenues from two toll plazas at My Thuan and Can Tho Bridges

As mentioned above, the toll collection rights of NH1A and the two toll plazas at My Thuan and Can Tho Bridges may be granted to Cuu Long CIPM for the construction of TL–MT Expressway. If it is granted to the project SPC, the Project IRR will improve from 3.5% to 4.9%.

8.1.4 Analysis of Cost Reduction Solution and Financial Structure Solution

In Section 8.1.3, the cost-cutting solution by reducing the project scope was analyzed. The result was that this solution was insufficient because the significant reduction of BOT construction from Trung Luong–My Thuan to Trung Luong–Cai Lay will improve the Project IRR from 3.5% to only 8.4%, which is far below the hurdle rate of 15%. The project is not BOT-feasible because it does not attract private investment. On the other hand, the financial solutions by increasing the revenue sources was also analyzed. These were also insufficient because the Project IRR improved from 3.5% to only 4.9%. It is not sufficient to materialize the BOT project from either solution.

In conclusion, either the cost-cutting solutions or the financial solution by increasing the revenue sources alone is insufficient to improve the Project IRR to achieve the hurdle rate for a feasible BOT project. Therefore, the combination of these solutions is considered in the next sub-chapter.

8.2 Setting of Project Scheme Options

As discussed in Section 8.1, the initial investments and O&M costs for the Trung Luong-My Thuan Section cannot be recovered through the toll revenues from that section by itself. Also, the cost reduction and financial structure solutions mentioned in Section 8.1.4 alone cannot improve the profitability of the project to the level of a self-sustained BOT project.

Therefore, the combination of cost reduction solution and financial structure solution are discussed below. Table 8.4 shows the six project scheme options which combined the cost reduction solution and the financial structure solution. Initially, Options 1-4 were prepared by the JICA Survey Team, while Options 5 and 6 are added by request from Cuu Long CIPM.

Table8.4. Options Combined Cost Reduction Solution and Financial Structure Solution

Solution / Options	Section Constructed by SPC (BOT)	Sections which Toll Revenue goes to SPC	Gov't Support
Base Case	Trung Luong-My Thuan	Trung Luong- My Thuan	
Option 1	Trung Luong-Cai Be	Trung Luong-My Thuan My Thuan Bridge and Can Tho Bridge	Land Acquisition Construction of Cai Be-My Thuan
Option 2	Trung Luong-My Thuan	Trung Luong-My Thuan HCMC-Trung Luong My Thuan Bridge and Can Tho Bridge	Land Acquisition
Option 3	Trung Luong-Cai Be		Land Acquisition, Construction of Cai Be-My Thuan
Option 4	Trung Luong-Cai Lay		Land Acquisition, Construction of Cai Lay-My Thuan
Option 5	same as Option 4	Excluding HCMC-Trung Luong from Option 4	same as Option 4
Option 6		Option 4 + toll plaza at Km1953+200	

Source: JICA Survey Team

Figure 8.6 shows the Project Scheme Option 1. In Option 1, a private enterprise (Special Purpose Company: SPC) will construct the Trung Luong-Cai Be and while the GoV will construct Cai Be-My Thuan. The toll revenues from the Trung Luong-My Thuan, My Thuan Bridge, and Can Tho Bridge will proceed to the SPC as income.

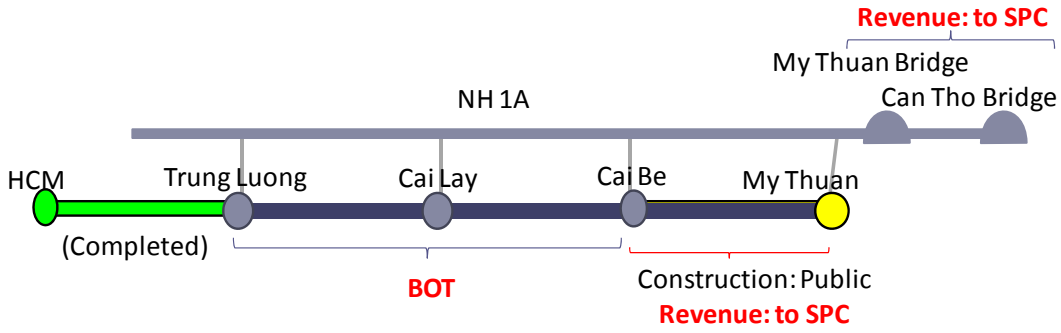


Figure 8.6. Option 1

Figure 8.7 shows the Project Scheme Option 2. In Option 2, the SPC will construct Trung Luong-My Thuan Section. The toll revenues from Trung Luong-My Thuan, HCMC-Trung Luong, My Thuan Bridge, and Can Tho Bridge will proceeds to the SPC as income.

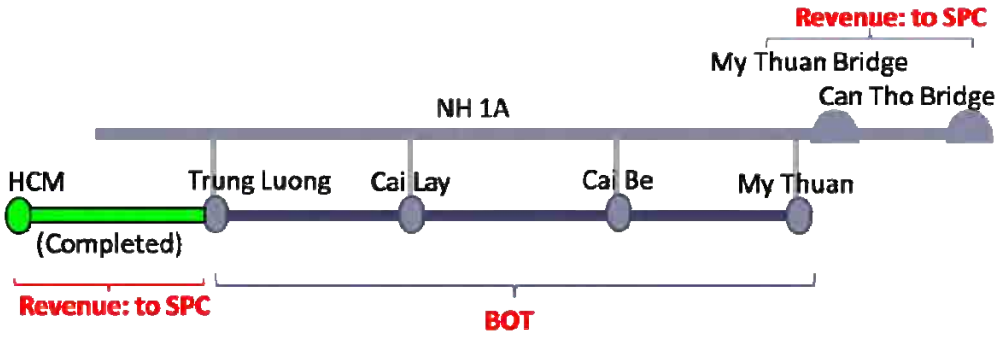


Figure 8.7. Option 2

Figure 8.8 shows the Project Scheme Option 3. In Option 3, the SPC will construct Trung Luong–Cai Be while the GoV will construct Cai Be-My Thuan. The toll revenues from Trung Luong - My Thuan, HCMC – Trung Luong, My Thuan Bridge, and Can Tho Bridge will proceed to the SPC as income.

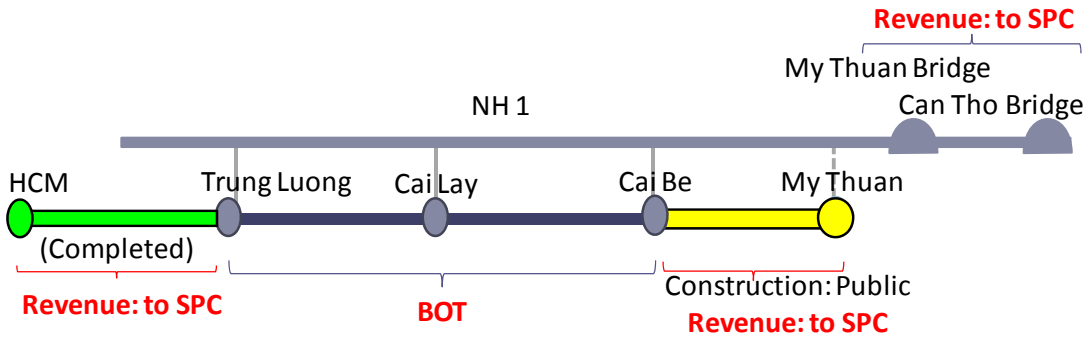


Figure 8.8. Option 3

Figure 8.9 shows Project Scheme Option 4. In Option 4, the SPC will contruct Trung Luong–Cai Lay while the GoV will construct Cai Lay-My Thuan. The toll revenues from Trung Luong-My Thuan, HCMC–Trung Luong, My Thuan Bridge, and Can Tho Bridge will proceed to the SPC as income.

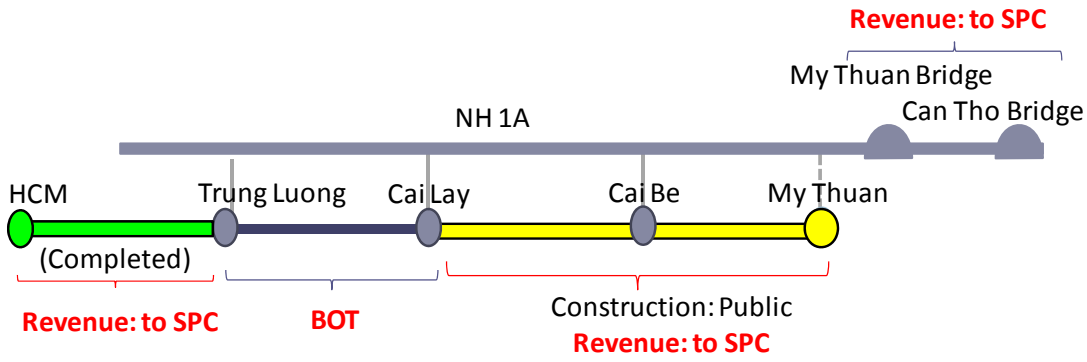


Figure 8.9. Option 4

Figure 8.10 shows Project Scheme Option 5, which was added by Cuu Long CIPM as a variation of Option 4. In Option 5, construction will be the same as in Option 4, in which SPC will construct Trung Luong–Cai Lay while the GoV will construct Cai Lay-My Thuan. However, the toll revenues going to SPC will exclude HCMC–Trung Luong portion, only the toll revenues from Trung Luong–My Thuan, My Thuan Bridge and Can Tho Bridge will proceed to SPC as income.

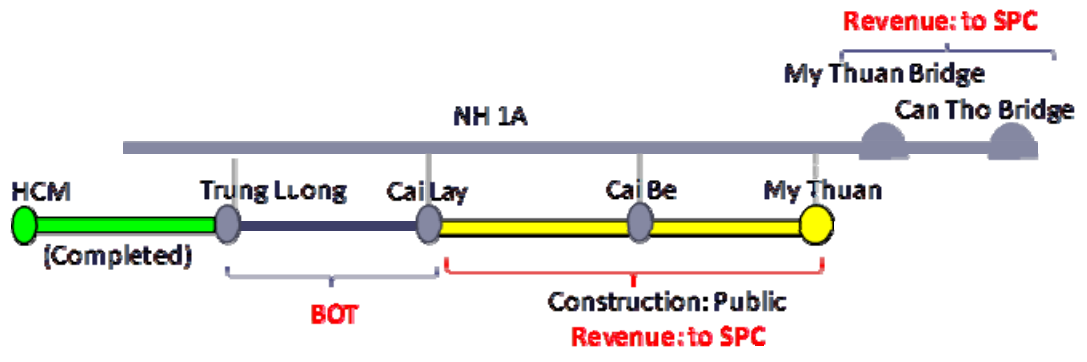


Figure 8.10. Option 5

Figure 8.11 shows Project Scheme Option 6, which was also added by Cuu Long CIPM as another variation of option 4. In Option 6, construction will be the same as in Option 4, in which SPC will construct Trung Luong–Cai Lay and the GoV will construct Cai Lay-My Thuan. The toll revenue from the toll plaza at Km1953+200 will be added to the toll revenues in Option 4, which will proceed to SPC as income.

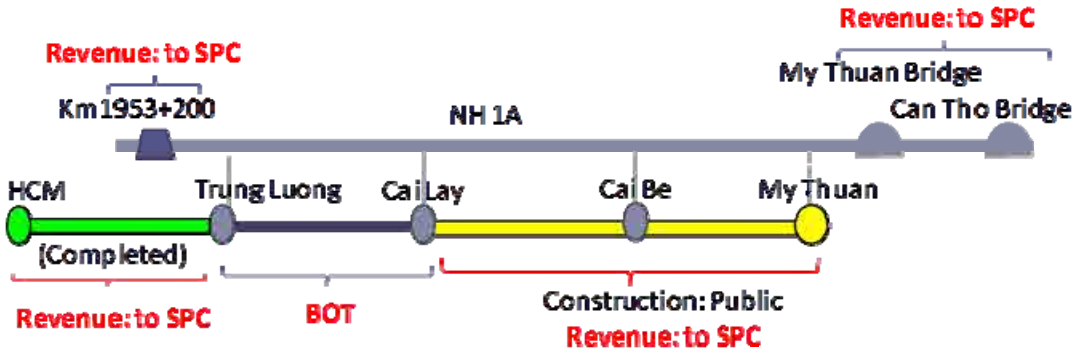


Figure 8.11. Option 6

8.3 Evaluation of Project Scheme Options

The results of evaluation for the six project scheme options from the viewpoint of finance and risks are shown below.

8.3.1 Financial Analysis

(1) Purpose

The purpose of the financial analysis is to evaluate the six project scheme options which was set up in Section 8.2 and to see if each option is feasible as PPP project.

Since most of the assumptions among the six options are the same with the base case, the assumptions and results of the base case will be explained. The assumptions and results of each project scheme option by comparing with the base case will also be explained.

(2) Analytical Method

The JICA Survey Team analyzed the financial situation of private enterprise (SPC) by simulating financial projections through financial modeling. Specifically, financial statements was simulated during the project period based on certain assumptions. Based on the results of the financial simulation, the profitability of the project was evaluated by calculating the Project IRR.

(3) Assumptions for Base Case

The assumptions for the financial analysis are shown below in the following order: 1) project scope, 2) project schedule, 3) usage of finance and financial resources, 4) project costs, 5) project incomes, and 6) inflation ratio.

1) Project Scope of Base Case

The assumed project scope of Base Case is shown in Table 8.5

Table8.5. Assumed Project Scope of Base Case

Items	Scope
Section for Construction	Trung Luong-My Thuan
Section for Operation and Maintenance	Trung Luong-My Thuan
Sections which the toll revenues are to be the income of the SPC	Trung Luong-My Thuan, My Thuan Bridge, Can Tho Bridge

Source: JICA Survey Team

2) Project Schedule

The assumed project schedule of this financial analysis is shown in Table 8.6.

Table8.6. Project Schedule and Base Year of Price

Project Timeline and	Period/Year
Construction period	2012-2016（5 years）
Start year of operation (start collecting toll)	2017
Last year of operation	2047（30 years after the start of operation）
Base year of price	2011

Source: JICA Survey Team

The base year for price for this financial analysis is set at 2011. This is because most of the engineering works were conducted in 2011 and the prices and conditions for procurement for road construction were based on 2011 prices.

Table 8.7 shows the schedule for the other projects which might affect the demand projection for the project

Table8.7. Project Schedule for other Projects which might affect Demand Projection for the Project

Project Timeline and	Period/Year
Start year of operation for HCMC Highway (Cao Lanh and Vam Cong Bridges)	2017
Start year of operation for My Thuan–Can Tho	2020
Completion of Southern Bridge (Co Chiem and Dai Nghai)	2030

Source: JICA Survey Team

3) Usage of finance and financial resources

The usage of finance and financial resources are discussed below.

a) Financing Plan

Table 8.8 shows the assumed usage of finance and financial resources. This financial analysis assumes that 30% of the initial investment costs are financed by equity through private

investors and 70% and interest during construction (IDC) is through project finance. The JICA Survey Team assumed the investors will consist of Japanese and Vietnamese enterprises.[28]

Table8.8. Assumed Usage of Finance and Financial Resources

Financial Demand	Amount (VND billion)	Financial Supply	Amount (VND billion)	%
Initial Investment	25,736	Debt	18,015 + IDC	70% + IDC
		Equity	7,721	30%
Total	25,736 + IDC	Total	25,736 + IDC	100%

IDC: Interest During Construction

b) Purpose of Financing

The initial investment costs to build the Trung Luong–My Thuan section are shown in Table 8.9.

Table8.9. Initial Investment Cost for Trung Luong-My Thuan Section

Items		Amount of Investment (VND billion)
Local Portion	Construction[29]	9,680
	Land acquisition	2,267
	Others	981
	VAT	1,569
Foreign Portion (JPY)	Construction	5,135
	Others	580
Price contingency (inflation)		5,010
Total		25,222

Source: JICA Survey Team

*In Chapter 6, the JICA Survey Team discussed the real prices in 2011. But in the financial analysis of this chapter, the JICA Survey Team take into consideration the effect of price escalation.
*Cost of land acquisition (VND 2,267 billion) is assumed to be borne by the Vietnamese government and those are not included in this table.
*Costs of establishing and operating (during construction) SPC are included in "Others".
*The Costs described above is based on the price in basic year (2011).

28 Anticipating the future traffic increase, we seek the possibility of expanding the expressway from four lanes to six lanes. Land acquisition will be conducted for six lanes from the initial phase but the construction expansion will take place only when there is sufficient increase in traffic (expected in 2030). This expansion cost will be financed by the cash flow from the project and no debt financing will be considered. On the other hand, it should be mentioned that the year 2030 is approximately half way of the thirty years of BOT concession period. In financial terms, it would seem to be difficult to recover the expansion cost only for the remaining period. Due to the expansion works, the duration of the facilities in the expressway will be also expanded. The benefit from the expanded duration will continue after the BOT concession period when the government takes over all the expressway facilities. Therefore, the benefit after the concession period should be compensated to SPC either by subsidy or extension of the concession period.

29 For the expressway with a length of 54.3 km, the total project cost is estimated at VND 28,398 billion, which has an average construction cost of VND 523 billion/km (USD 25 million/km). A recent survey suggests that the construction cost for expressways in Vietnam is more expensive compared to other countries, with USD 6 million/km in China and USD 8 million/km in the USA. However, we should consider the soft soil conditions in the Mekong Delta. It is not reasonable to simply compare the average construction cost without considering the special treatment needed for the specific land conditions.

On the other hand, there is another criticism in the Vietnamese media for the expressway. Defects have been reported along the pavement in the HCMC-Trung Luong section since the commencement of operations in February 2012, due to insufficient implementation of initial construction works. Considering both complaints, we will carefully examine the reasonable construction cost for the effective and efficient use of the fund.

c) Loan Conditions

For the purpose of cashflow projection, the preliminary loan conditions are assumed as shown in Table 8.10. The actual loan conditions will be decided in coordination with the concerned parties; therefore, it needs to be discussed continuously.

Table8.10. Outline of Loan Condition

Items	Conditions
Interest rate	3%
Loan period	25 years
Grace period	5 years
Upfront fee	0.3% of loan amount
Repayment method	
Foreign exchange risk	35% of annual interest and repayment[30]

Source: JICA Survey Team

4) Project Costs

The costs of the project for this financial analysis are categorized by: a) Cost of Operation and Maintenance and b) Tax. The overview these costs and its basis for calculation are described below by each category.

a) Costs for Operation and Maintenance

The O&M annual costs for the TL – MT section are shown in Table 8.11. Please see Section 6.3 for the bases and details of the cost estimation.

Table8.11. Annual Operation and Maintenance Cost for Trung Luong-My Thuan Section

Items	Costs（VND billion/year）	Remarks
Maintenance	13	Maintenance costs for the raod facilities
Operation and Management	73	Operation costs for toll plaza, etc.
ITS related cost	9	Maintenance costs for ITS
	721	Replacement of ITS equipment each 13 years
SPC Operation	41	Labor cost, office management, etc.

Source: JICA Survey Team

*This financial simulation assumes that HCM-Trung Luong, Km. 953+200, My Thuan Bridge are to be operated by the existing operators and out of scope for private company.

*The Costs described above is based on the price in basic year (2011).

*For the maintenance cost, the JICA Survey Team counted not only the annual payment but also the periodic refurbishment of the facilities every five to ten years, which is reflected on the financial simulation.

[30] Although foreign exchange rate of Vietnamese Don has been low since Lehman Shock, Don has been relatively stable after Foreign Exchange Stabilization Policy, based on Resolution II, was introduced in 2011. Since it is extremely difficult to project future foreign exchange rates and since there is no formal view on foreign exchange risk premium from Ministry of Finance, foreign exchange risk cost is set by referring to neighboring countries' experience. For example, in the case of Indonesia, 5.02% would be added onto the original interest rate when Indonesian government sub-loan ODA to local government in Rupia. Since Indonesian government only charge 0.35% when they sub-loan in foreign currency, 4.67% would be the risk premium for foreign exchange. In the study, those neighboring country's experiences are referred to. Since actual foreign exchange risk occurs when it is repaid, 35% risk premium was added on to the annual interest and principal payment. This is the same level as the 4.67% risk premium that is added on to the remaining balance of loan (like the case of Indonesia).

b) Costs for Tax

Enterprise income tax and VAT are the major taxes for this project. The outlines of these taxes are shown below.

Enterprise Income Tax

The corporate income tax and its possible preferential treatment for these projects are shown in Table 8.12. Since the preferential treatments listed in No. 3 and 4 of the Table 8.12 are usually approved by the authority, it is assumed that the preferential treatment of corporate income tax shall be approved in the financial simulation.

Table8.12. Outline of Enterprise Income Tax

No.	Related Provisions	Laws and Regulation
1	Standard tax rate: 25%	Law on Enterprise Income Tax[31]10.1
2	Maximum carry forward: 5 years	Law on Enterprise Income Tax 16.1
3	Newly set up enterprises under investment project (development of the State's infrastructure works of special importance) are entitled to a tax rate of 10% for fifteen years. (Tax rate incentives specified in this Article is counted from the first year an enterprise has turnover.)	Law on Enterprise Income Tax 13.1 and 13.6
4	Newly set up enterprises under investment projects (development of the State's infrastructure works of special importance) are entitled to tax exemption for no more than four years and a 50% reduction of payable tax amounts for no more than nine subsequent years.	Law on Enterprise Income Tax 14.1-3
5	With respect to an investment project in the form of BOT, the duration of use of fixed assets shall be fixed from the date of commissioning of the fixed assets up until termination of the project.	Circular guiding regime on management, use and calculation of depreciation of fixed assets（12.1）[32]

Source: JICA Survey Team

*As a result of the abovementioned tax preference, the rate for enterprise tax would be 0% for the first 4 years of operation, 12.5% from year 5 to 13, 10% from year 14 to 15, 25% from year 16.

[31] Law on Enterprise Income Tax (No. 14/2008/QH12)

[32] Circular guiding regime on management, use and calculation of depreciation of fixed assets (No. 203-2009-TT-BTC). Maximal duration of use of road for non-BOT project is 20 years based on the above-mentioned circular.

Value Added Tax (VAT)

The outline of VAT with regards to this project is shown in Table 8.13.

Table8.13. Outline of VAT regarding the Project

No.	Outline	Laws/Regulations
1	Standard tax rate: 10%	Law on VAT[33]8.3
2	Toll tariff is taxable and tax is already included in the toll tariff	Law on VAT 7.1 j etc.
3	VAT is payable to the government after deducting the SPC's VAT paid together with O&M cost or other expenses.	
4	O&M cost is taxable. Assumed taxable O&M cost as 70% of total O&M cost.[34]	
5	Foreign portion of initial investment is not taxed; however, local portion is taxed.	Based on interview with Cuu Long CIPM

Source: JICA Survey Team

5) Project Income

Income for this project comes from toll fees from the Trung Luong-My Thuan Section.

a) The linkage with Traffic Demand Forecast

As mentioned earlier, the cashflow projection of this project automatically refers to the output of traffic network demand forecasting software "STRADA" as its database (6,720 cases x 10 vehicle types x 16 plots). The detail of the traffic conditions and other cases are explained in the traffic forecast section of this report.

The STRADA forecasting years include 2011, 2015, 2020, 2030, 2040 and 2050. The cashflow projection is estimated using linear method for each year between STRADA forecasting years. It is true that there are some cases where linear estimation is not appropriate. However, linear estimation is assumed to avoid complications for the calculation in the spreadsheet model.

b) Highway Toll Tariff Setting

For the expressway tariff, the per kilometer and per vehicle type was applied because each tariff is different in accordance with the travel distance and vehicle type. This includes VND 1,000/km/pcu, VND 1,300/km/pcu, VND 1,600/km/pcu, VND 2,000/km/pcu, and VND 3,000/km/pcu (price of 2011) in the STRADA forecasting. Among these cases, it is reasonable to assume VND 1,000/km/pcu because the neighboring expressway of HCMC–Trung Luong started its operation in February 2012 with such tariff price.

In the STRADA forecasting, the tariff is treated as an inflation adjusted price of 2011. However, it is not practical in Vietnam to assume that the tariff changes every year. In this cashflow projection, the tariff is assumed to increase 30% every five years under inflation adjustment mechanism as stipulated in the MOF decree (Document No.77 / BC-BTC).

6) Inflation Rate

The inflation for the foreign portion is assumed as 0% as most of the foreign portion is assumed to be procured in Japan.

[33] LAW ON VALUE-ADDED TAX No. 13/2008/QH12

[34] TEDI (Transport Engineering Design Incorporated) is using same ratio (70%).

As for Vietnam, the average annual inflation rate from 2002 to 2011 is 9.6%. It rose steeply to 23.1% in 2008 when high commodity prices was observed and the worldwide financial crisis started in the USA. Also, an inflation of 19.6% was observed in 2011. Under such conditions, it is difficult to reasonably estimate the future inflation rate for the Vietnamese economy and therefore, assumptions were systematically allocated to avoid any unintended manipulation in the cash flow projection. In practice, the estimation of Economic Intelligence Unit of 8.4% is referred from 2012 to 2015 because these provide the longest inflation forecast free of charge among other reputable organizations. After 2015, the inflation will be gradually reduced every five years until it converges to 6.5% after 2026 as shown in the table below.

Table8.14. Assumed Inflation Ratio in the Financial Analysis

Period	Inflation rate	Remarks
2012 – 2015	8.4%	Projection by Economic Intelligence Unit
2016 – 2020	7.5%	Assumed to decrease every 5 years
2021 – 2025	7.0%	
2026 – 2030	6.5%	
2031 – 2035	6.5%	
2036 – 2040	6.5%	
2041 – 2045	6.5%	
2046 – 2050	6.5%	

Source：Economic Intelligence Unit during 2012 to 2015, later is assumed by JICA Survey Team

The above inflation assumption is only applicable to capital expenditure (CAPEX) of the initial construction of the expressway and future expansion from four lanes to six and annual expenses such as O&M costs. For the revenue, the toll tariff is not assumed to be influenced by the inflation assumption.

It is reasonable to consider that toll tariff should be adjusted every year by reflecting the inflation, but not in Vietnamese practice because toll tariff is somehow considered as public utility such as electricity and water. Therefore, it is assumed that the toll tariff will be increased only every five years by 30%[35] as stipulated in the Document No.77 / BC-BTC MOF on 28 July 2009.

(4) Result of Financial Analysis for Base Case and its Evaluation

As a result of the financial analysis based on the assumptions shown in (3), the Project IRR for base case was estimated as 3.5%. Project IRR dropped by a large amount compared to the one in F/S done by BEDC. Considering the current condition of the financial market in Vietnam and on-lending rate for soft loans, the required hurdle rate for Project IRR is given as 15%. Thus, it becomes clear that the profitability of this project is extremely low. It is difficult to conduct the base case as a PPP project.

(5) Financial Analysis for Project Scheme Options

Since the base case cannot be sustainable from a financial point of view, five project scheme options were assumed, which will improve the profitability of the project in Chapter 8.2. Specifically, six options were set by reducing the scope of construction and increasing the income resources for SPC.

The results of financial analysis for the six options are as follows;

[35] It is equivalent to 5.4% CAGR. Some people may claim that it is insufficient compared to the annual inflation, but others are still afraid that MOF cannot raise the tariff because of strong resistance from the public.

a) Setting Up Options for the Scope of Private Company and Range of Income Resources

As Table 8.15 shows, Option 1 is the case that a part of construction (Cai Be–My Thuan section) is shortened from the base case. Option 2 is where the toll collection rights of the additional sections (HCMC-Trung Luong, My Thuan Bridge, Can Tho Bridge) are given to SPC. Option 3 is the case that a part of construction (Cai Be – My Thuan section) is shortened from Option 2. Option 4 is where a large portion of construction (Cai Lay–My Thuan section) is shortened from Option 2. Furthermore, as requested by Cuu Long CIPM, Option 5 excludes HCMC–Trung Luong from Option4. Option 6 is the case that adds the toll collection rights of national road (Km 1953+200) to Option 4 and deleting that right of HCMC–Trung Luong from Option 4.

Table8.15. Options for Road Sections that SPC constructs and collects Toll Tariff

Option \ Section		HCM - Trung Luong	Trung Luong - Cai Lay	Cai Lay- Cai Be	Cai Be - My Thuan	My Thuan ＋ Can Tho bridge	Km1953+ 200
Base Case	Construction						
	Tariff Income						
Option1	Construction						
	Tariff Income						
Option2	Construction						
	Tariff Income						
Option 3	Construction						
	Tariff Income						
Option 4	Construction						
	Tariff Income						
Option 5	Construction						
	Tariff Income						
Option 6	Construction						
	Tariff Income						

*The area surrounded by the thick-bordered table (Trung Luong-My Thuan） is the section which private or public sector will construct in relation to this project.

*The colored part shows the section which private sector will construct (upper side), and collect toll tariff as their income (lower side).

Source: JICA Survey Team

b) Assumption for Project Scheme Options

As mentioned before, Options 1, 3, 4, 5 and 6 are assumed to be shortening the section to be constructed by SPC. Table 8.17 shows the assumptions of initial investment, operational expenditure (OPEX) and incomes for each option. Since the scope of O&M is same among options (Trung Luong-My Thuan), the O&M costs are also the same among options.

Table8.16. Assumptions of Initial Investment, O&M Costs, and Income (VND billion)

	Base Case	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Initial Investment	25,222	15,630	25,222	15,630	8,715	8,715	8,715
OPEX (first year of operation)	230	230	230	230	230	230	230
Toll Income (First year of operation)	372	372	755	755	755	606	883

Source: JICA Survey Team
* OPEX includes O&M, maintenance and SPC operating costs. For the detail, please refer Chapter 6.3 where all costs are denominated before price escalation

Options 2, 3, 4, 5 and 6 assumes that the toll collection rights of HCMC–Trung Luong (excluding option 5), My Thuan Bridge, and Can Tho Bridge (Km 1953+200 for Option 6 only) are given to SPC. The outline of each income resources are shown below.

Toll Income from HCMC-Trung Luong Section

The cash flow (toll revenue – O&M costs) that was assumed from HCMC–Trung Luong is given to the SPC as one of the options. Currently, toll collection operation is conducted by Cuu Long CIMP as assigned by the MOT.[36]. The collected tariff is transferred to the State Bank of Vietnam. For the estimation of future cashflow of the HCMC–Trung Luong section, the projection in the F/S provided by BEDC was used.[37]

Toll Income from My Thuan Bridge and Can Tho Bridge

The toll income from My Thuan Bridge and Can Tho Bridge are assumed as the sourece of income of SPC. The operation at both bridges have already started and the toll rate mechanisms are different from that of ordinal highway. It is best to follow the specific toll rate mechanisms of each bridge; however, the rate of ordinal highway was used as the base and multiplied it by 10 for My Thuan Bridge and by 15 for Can Tho Bridge in order to utilize the result of traffic demand forecast through STRADA.

c) Result of Financial Analysis for Project Scheme Options

The results of financial analysis for each option are shown in Table 8.18. For reference purposes, the scenario of toll increase to VND 1300/km (price of 2012, to be increased 30% every 5 years) was compared.

[36] Concession right of Trung Luong-My Thuan section was returned to MOT from BEDC at the end of 2011. Cuu Long CIPM is currently promoting the construction of aforementioned section on behalf of MOT.

[37] ”Construction Investment of Trung Luong–My Thuan Expressway Project - Stage: Study for construction investment - Volume 1 : Study Report, June 2010”. We believe that this cashflow projection is prudent, with an estimate of 22,600 vehicles in HCMC-Ben Luc Section in 2012 (cf. 27,000 vehicles observed in March 2012), compared with TEDI’s extremely optimistic traffic volume estimate of 67,000 vehicles for the same condition.

Table8.17. Results of the Financial Analysis for Various Options

Options	Project IRR	
	VND 1,000/km	VND 1,300/km (reference)
Base Case	3.5%	5.1%
Option 1	7.2%	9.6%
Option 2	6.2%	7.6%
Option 3	8.9%	11.0%
Option 4	12.8%	14.9%
Option 5	10.4%	12.7%
Option 6	13.7%	15.8%

Source: JICA Survey Team

d) Evaluation for the Result of Financial Analysis for Various Options

As a result of financial analysis for project scheme options, it became clear that the profitability of all options would be improved. However, the Project IRRs of Options 1 to 5 are still less than the 15% hurdle rate for private investors to make equity investment and the level of profitability is not enough to prosecute as a PPP project.

On the other hand, the Project IRR of Option 6 is over 15% when tariff is VND 1300/km, which is the hurdle rate for private investor to possibly join. Even so, private sector investors are generally acting in a prudent manner as far as investments are concerned with the current financial situation being affected by the public debt crisis in Europe. It is not enough for the investor to decide solely by considering the hurdle rate. There are also risks for traffic demand or tariff increase (regulatory risk) and so on, the level of profitability is not enough for the private investors to participate in the project.

It is also requested by Vietnam authority to examine the cashflow projection by deferring the construction and find-out the appropriate timing to be BOT/PPP-viable by anticipating the future increase in traffic demand. Such approach is often observed in the economic analysis. However, it is not suitable for the financial analysis for the private-sector investors. In the economic analysis where no inflation is assumed while the traffic demand increases in accordance with the nation's economic growth, there certainly exists the mathematical solution when Economic IRR exceeds its criteria of 12%. But, it is not the case for the financial analysis where significant changes are assumed not only the economic growth, but also the inflation and the exchange rate.

(6) Alternative Scheme (O&M)

As mentioned above, even shortening the scope of private company's construction and expanding the rights of toll tariff collection, enough profitability cannot be expected. Therefore, the PPP scheme was studied beside the BOT modality. The following is the result of O&M option (Option 7).

1) Scope of Option 7

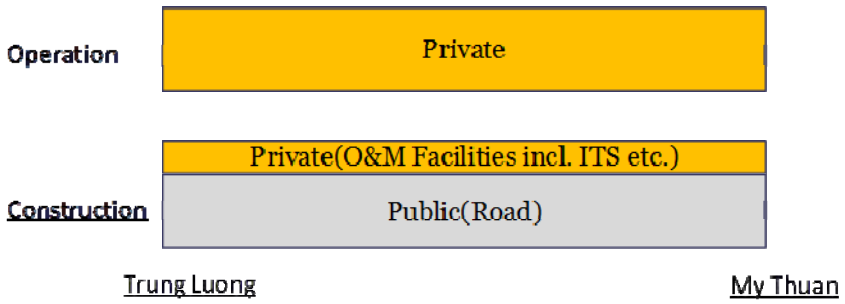
Expressway between Trung Luong–My Thuan is constructed by GoV except O&M facilities such as ITS and toll gate. Private company will construct O&M facilities and do the operation and maintenance work. The scope of work for private company for Option 7 is shown in Table 8.18.

Table8.18. Scope of Work for Private Company

Item	Scope of Work
Investment	ITS facility, toll gate, Control building and maintenance vehicle between Trung Luong-My Thuan
Operation and Maintenance	Operation and maintenance and toll collection between Trung Luong-My Thuan

Source: JICA Survey Team

Figure 8.12 shows the scope of work between public and private sectors for Option 7.

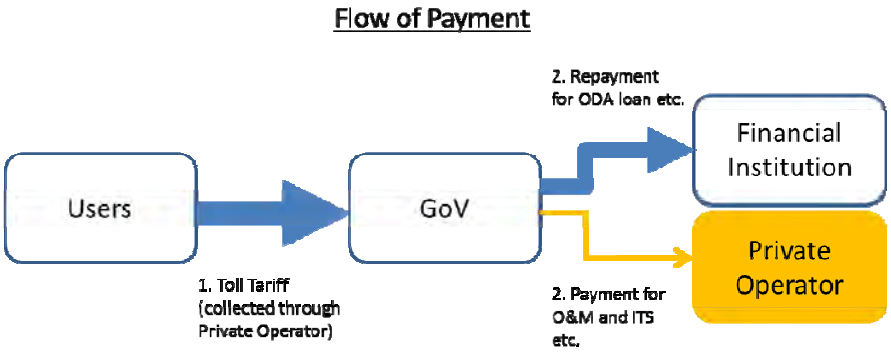


Source: JICA Survey Team

Figure 8.12. Image of Scope of Work between Public and Private Participation for Option 7

2) Flow of Tariff Income

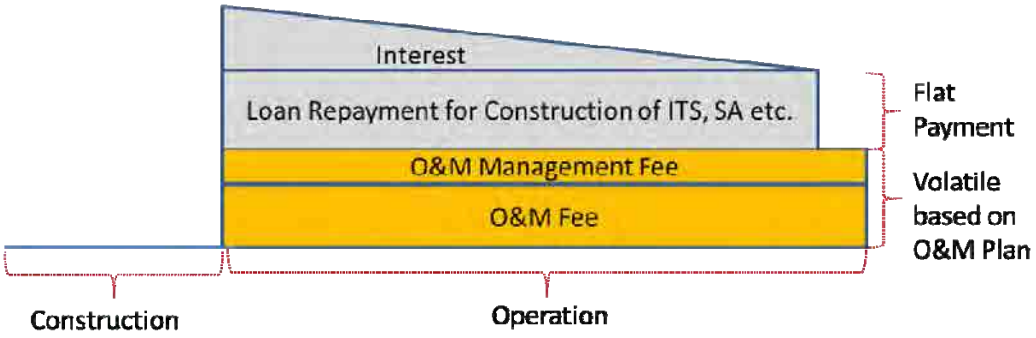
Tariff income is collected by private company, and is then transferred to GOV. The GOV will then pay the private company the amount for initial investment such as ITS by installment payment (including installment charge). Also, the GOV will pay the private company O&M costs which includes the O&M management charge. Figure 8.13 shows image of flow of payment.



Source: JICA Survey Team

Figure 8.13. Image of Flow of Payment for Option 7

Figure 8.14 shows the image of payment to the private company.



Source: JICA Survey Team

Figure 8.14. Image of Payment to Private Company for Option 7

3) Assumption of Financial Analysis for Option 7

Table 8.19 shows the initial investment and O&M cost for private company in case of Option 7. Also, the initial investment for the public sector is shown in Table 8.20.

Table8.19. Initial Investment and O&M Cost for Private Company in case of Option 7

	Items	Costs (VND billion)	Remarks
Initial Investment	ITS	734	Including Traffic Management System, Toll Collection System, Communication Network System, Electrics Facility
	Toll Gate, Control Office	171	
	Maintenance Vehicle	53	
	Total	957	
Operation and Maintenance Cost	O&M Cost		Same as Table 8.16
	O&M Management Charge		21% of O&M Costs
	Installment Charge		1% of Remaining Balance of Installment

Source: JICA Survey Team

Table8.20. Initial Investment for Public Sector in case of Option 7

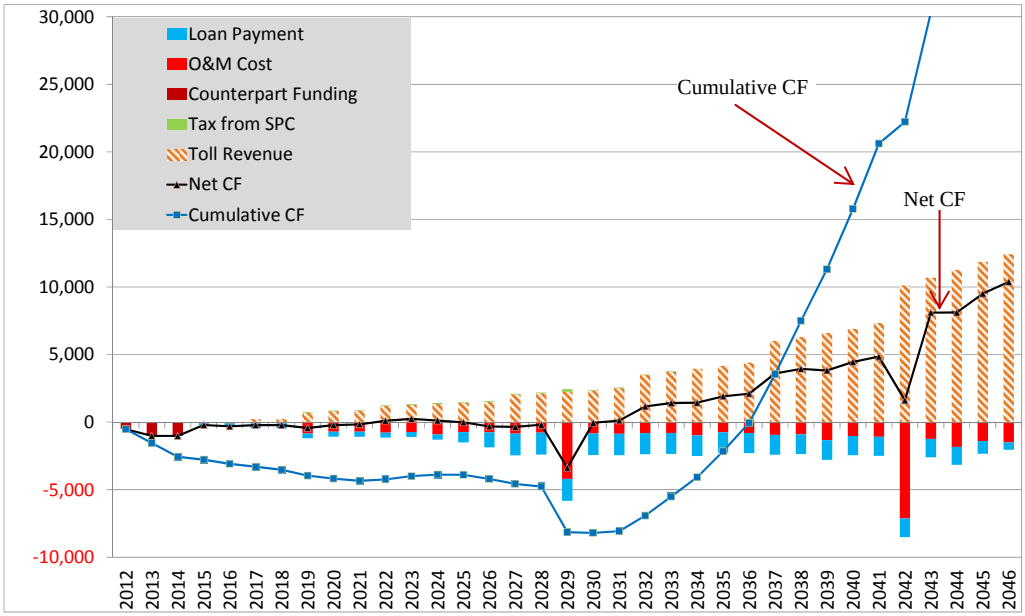
	Items	Cost (VND billion)	Remarks
Initial Investment	ROW	2,267	
	Construction	14,580	
	Other	774	
	VAT	1,569	
	Total	19,190	

Source: JICA Survey Team

4) Result of Financial Analysis for Option 7

Based on the above-mentioned assumption, Project IRR is calculated as 15%. This Project IRR depends on the amount of O&M management and installment charges which the GOV would pay periodically to private company. Therefore, if the expenditure of the GOV increases, Project IRR would also be higher.

Figure 8.15 shows cash flow of the GOV for Option 7. Net cash flow will continue to be positive except for the first several years. After year 2030, the net cash flow of the project is expected to be large. (Excluding year 2029 when replacement of ITS is planned)[38]



Source: JICA Survey Team

Figure 8.15. Income and Expenditure of GOV for Option 7

5) Comparison between Option 4&5 and Option 7

Table 8.21 shows the comparison of net government expenditure between the combined Options 4 and 5 with Option 7 from the viewpoint of value for money (VFM) by subtracting the total government expenditure from total government income for the whole lifecycle. The result shows that the GOV can save about VND 1.7 trillion by applying Option 7 compared to Option 4 and 5.

Table8.21. Comparison of the Government of Vietnam's Net Income of the Combined Options 4 and 5 with Option 7

(Present Value, VDN Bil)

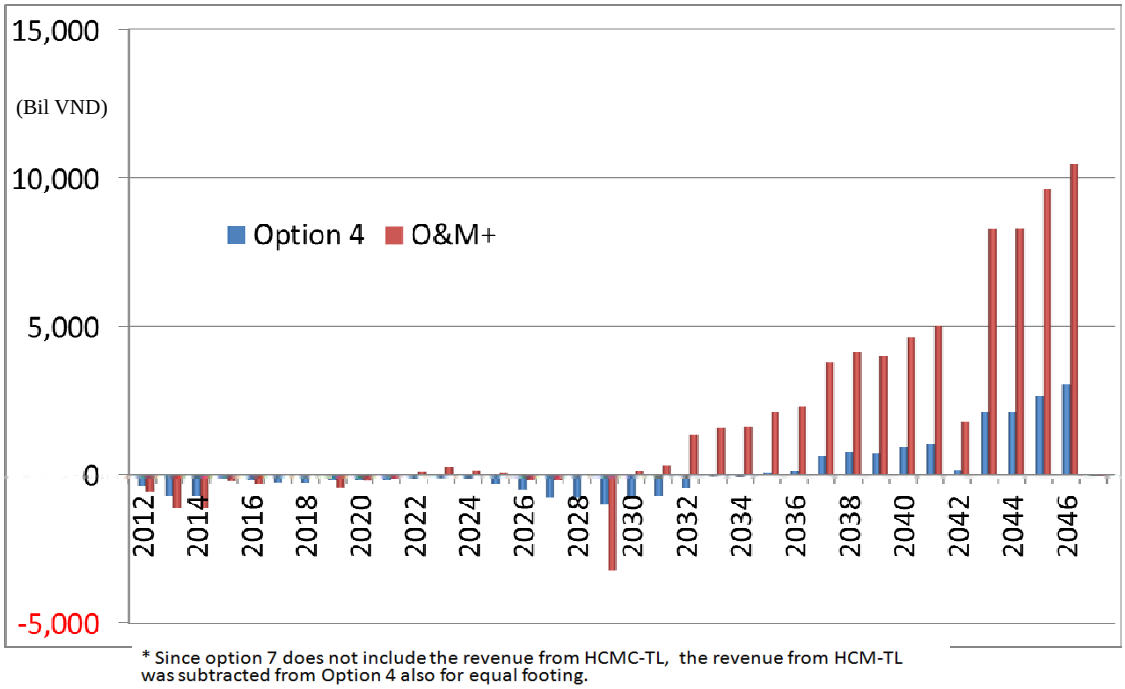
Items		(I) Option 4*&5	(II) Option 7
Inflow	Toll Revenue	0	8,287
	Tax from SPC (VAT + Income Tax)	1,290	174
	Total (A)	1,290	8,461
Outflow	Land Acquisition etc.	1,394	2,150
	Loan payment	2,589	3,732
	O&M cost	0	3,584
	Total (B)	3,983	9,466
Net Cash Flow (A) - (B)		**-2,693**	**-1,006**
Difference (II)-(I)			**1,687**

Discount Rate = 12%,

Source: JICA Survey Team

*Since Option 7 does not include the revenue from HCMC-Trung Luong, the revenue from HCMC-Trung Luong was subtracted from Option 4 for equal footing.

Figure 8.16 shows the net income of the GOV for the whole lifecycle for the combined Options 4 and 5 and Option 7. Option 7 is expected to have higher net income than the combined Options 4 and 5 especially at the latter half of the project cycle.



Source: JICA Survey Team

Figure 8.16. Comparison of the Government of Vietnam's Net Income of the Combined Options 4 and 5 with Option 7

6) GOV's Cashflow for Option 7 in Life Cycle

Table 8.22 shows the cash inflow and outflow of the GOV for Option 7.

Table8.22. GOV's Cash Inflow and Outflow for Option 7

(VND Bil)

	Toll Revenue	Tax from SPC	Counterpart Funding	O&M Cost	Loan Payment	Net CF	Cumulative CF
2012	0	0	-496	0	-26	-522	-522
2013	0	0	-992	0	-27	-1,019	-1,541
2014	0	0	-996	0	-26	-1,022	-2,563
2015	0	0	-96	0	-120	-216	-2,779
2016	0	0	-96	0	-213	-309	-3,088
2017	234	0	-96	0	-355	-217	-3,305
2018	234	0	-96	0	-360	-222	-3,528
2019	716	49	0	-831	-366	-433	-3,960
2020	810	46	0	-707	-366	-218	-4,178
2021	867	45	0	-710	-366	-164	-4,342
2022	1,201	47	0	-779	-366	102	-4,240
2023	1,275	60	0	-721	-373	242	-3,998
2024	1,349	63	0	-907	-392	113	-3,885
2025	1,423	57	0	-738	-754	-12	-3,898
2026	1,498	56	0	-748	-1,120	-314	-4,211
2027	2,045	58	0	-844	-1,616	-356	-4,567
2028	2,143	53	0	-774	-1,618	-196	-4,763
2029	2,241	201	0	-4,196	-1,622	-3,376	-8,140
2030	2,339	52	0	-837	-1,604	-51	-8,191
2031	2,513	51	0	-860	-1,586	118	-8,073
2032	3,493	39	0	-808	-1,567	1,157	-6,916
2033	3,719	39	0	-799	-1,549	1,409	-5,507
2034	3,946	0	0	-978	-1,531	1,436	-4,071
2035	4,172	0	0	-747	-1,512	1,913	-2,158
2036	4,398	0	0	-795	-1,494	2,109	-49
2037	6,012	0	0	-934	-1,476	3,602	3,553
2038	6,306	0	0	-902	-1,458	3,946	7,499
2039	6,600	0	0	-1,341	-1,439	3,820	11,320
2040	6,894	0	0	-1,023	-1,421	4,450	15,770
2041	7,339	0	0	-1,090	-1,403	4,847	20,617
2042	10,119	0	0	-7,129	-1,384	1,606	22,223
2043	10,698	0	0	-1,236	-1,360	8,102	30,326
2044	11,276	0	0	-1,837	-1,322	8,117	38,443
2045	11,855	0	0	-1,402	-942	9,511	47,954
2046	12,433	0	0	-1,493	-558	10,382	58,337
2047	0	0	0	0	-43	-43	58,293
2048	0	0	0	0	-22	-22	58,271

Source: JICA Survey Team

8.3.2 Private Sector's Perspective and Risk Analysis

The risks referring to the four options described above were analyzed. The analysis of the project risk has been determined based on interviews (with private sector investors, lawyers, commercial banks, government institutions and Cuu Long CIPM) and brainstorming with specialists of engineering, environment and finance in the JICA Survey Team.

At this section, the risk assessment and risk allocation are analyzed for each risk.

Appropriate risk allocation is needed for private investment. Therefore, the risk allocation was examined by considering the cause of each risk and comparing which organization, either the government or the private investor, would be better equipped to control the risk. The result and the reason of the risk allocation are listed in Table 8.23.

(1) Risks on Project Plan, Construction and O&M

1) Land Acquisition Risk: High, Allocated to GOV（risk assessment, risk allocation）

In Vietnam, the ownership of land belongs to GOV. Therefore, the land use right is given to the citizens. The land acquisition cost means the cost of acquisition of the land use right and resettlement. Either option requires land acquisition and it is estimated that 455 households will be resettled which will make it difficult for the Provincial People's Committee to acquire all the necessary land use rights. In fact, other highway projects in Vietnam have been delayed because of the time extension required for the negotiation to acquire land use rights. Therefore, the land acquisition risk for the Project is assessed as high risk.

- Action to Manage the Risk: Confirm that GOV will bear all costs relating to land use rights acquisition including resettlement during the negotiation between the GOV and the private investor. Private investor will discuss with MOT the detailed schedule for the delay risk and share the schedule with the Provincial People's Committee for agreement. This schedule should be included in the BOT/PPP contract as a part of the GOV responsibility. Furthermore, certain milestones should be prepared to check the progress and these milestones should be monitored periodically.
- Procedure to Cover the Risk: Loss relating to delay will commence after the establishment of SPC, personnel arrangemen,t and equity contribution. The calculation method for the loss caused by the delay for acquisition of land use rights and the means of compensation should be written in the BOT/PPP contract.

2) Budget Preparation: High, Allocated to GOV

For land acquisition, high budget measures are expected and the uncertainty of delays in procedure and budget preparation for the expected amount is high.

- Action to Manage the Risk: Share information on a regular basis per the status of budget preparation. For government funding, appropriation of the cash flow of the existing HCMC–Trung Luong toll road or government guaranteed commercial loan may be considered as an option.
- Procedure to Cover the Risk: Add the budget preparation for land acquisition as a conditional precedent in the EPC contract and the Loan Agreement to prevent delays and suspension during construction. It should also be written down that the GOV will compensate the cost of developing the project if the budget preparation does not meet the time limit of each BOT/PPP contract.

3) Environment and Social Risk: Medium, Allocated to GOV

In Vietnam, EIA and RAP will be approved after the review of MONRE. For this case, EIA has already been approved, but there are still other processes necessary to meet the guidelines of each financial institution if ODA or other foreign finance is considered. A lot of time and effort will be required to meet the necessary resettlement plan and other conditions due to household relocations and others. Therefore, it is considered that there is medium risk even if there are already research specialists assisting in making of the RAP.

- Action to Manage the Risk: Assistance from specialists in planning such as environmental and social research is expected, and plans in accordance with the guidelines of GOV and other financial institutions will be elaborated. As an investor, it is necessary to regularly meet with the planning team to monitor the timing of the approval and contents of the plan.
- Procedure to Cover the Risk: Add the environmental approval as a conditional precedent in the EPC contract and the Loan Agreement to prevent negative influence to the construction and financing.

4) Technical Risk: Medium, Allocated to Private

The project site is located in wetlands. Therefore, remedial measures for soft ground are necessary and better construction management is required in the technical aspect. Also, if the road quality is not unsatisfactory after completion, additional costs and loss due to road repair works and traffic restrictions will occur.

- Action to Manage the Risk: Select a well-experienced engineering company.
- Procedure to Cover the Risk: Receive defects liability provisions from the engineering company

5) Construction Completion Risk: Medium, Allocated to Private

The project site is located in wetlands. Therefore, remedial measures for soft ground are necessary, which will make the risk to be assessed as medium. Option 4 is expected to have the lowest risk due to the shortest construction site when comparing all four options.

- Action to Manage the Risk: Select a well-experienced EPC contractor.
- Procedure to Cover the Risk: Receive defects liability provisions from the EPC contractor.

6) O&M Risk: Medium, Allocated to Private

The O&M organizational structure of this project is expected to establish the O&M service SPC, or to outsource O&M service to other companies through the SPC. O&M service could be a fixed business that has already been established, but it is also assumed that the increase in the amount of traffic will increase the frequency of maintenance and repair work. Therefore, it is recommended for the participation of a company with relevant know-how and expertise to achieve appropriate cost management and optimal maintenance planning. Also, uncertainty will remain even if a survey on road quality of the section built by GOV has been done before the SPC takes over all the remaining road sections as there are concerns of risks of unforeseen repair costs or additional maintenance work required. In addition, when the SPC returns the

road asset to GOV after the concession period, road quality must be kept above the level that would have been determined in the BOT/PPP contract. Considering the above, the risk is assessed as medium.

- Action to Manage the Risk: Selection of a well-experienced road construction EPC contractor by the GOV is necessary. Additionally, conduct an appropriate third party survey on road quality before transferring the road assets based on the O&M contract. It is a must to bring a company with experience and know-how of toll road O&M.
- Procedure to Cover the Risk: Determine that the SPC is exempt from the defects liability of the highway between the GOV and SPC on the O&M contract. Also, specify the compensation to the SPC if the road quality is insufficient at the time of delivery. Project participation of Japanese or other foreign toll road companies will be requested. The GOV will pay according to the performance of the company with regard to road availability and service quality which will be set in the Key Performance Indicator (KPI).

7) Interface Risk: High, Allocated to GOV

In either option of the Project, timing of construction and contractors will vary between each section and the interface risks of the road quality, connection section, and ITS system is high. Also, the construction of the BOT section shall commence only after a set of prescribed milestones on the implementation of the ODA-financed sections are achieved despite any government guarantees. The interface risk of Option 4 is considered the highest as it has the longest road sections to be built by GOV compared with other options.

- Action to Manage the Risk: Select a well-experienced engineering company and EPC contractor for the government-funded construction site. In addition, the construction timing should be as close as possible between the government and private construction sites. The government and private components shall each mandate an independent certifier or verifier which will check the construction progress to be monitored individually and objectively.
- Procedure to Cover the Risk: Clarify the calculation method for the loss caused by the delay of completion at the construction the GOV is liable and describe the specific way of compensation by GOV, such as Liquidated Damages in the BOT/PPP contract.

(2) Risks on Financing the Project

1) Sponsor Risk: High, Allocated to GOV(in aspect of securing investors and project implementation)

For this project, the difficulty of allowing private investment has been apparent from the early stage of the research due to the situation that BEDC (BIDV is the major shareholder), which was the original entitiled company, gave up the concession right after the start of the survey. Also, a survey on toll road construction projects in Vietnam was conducted but there were no such projects funded by foreign private capital. It is necessary for the project to have a sponsor: 1) with strong financial constitution and ability to finance both high level capital expense and working capital; 2) who has expertise in toll road project management (as O&M, Construction management, etc.); and 3) that can pursue long-term profitability from the perspective of infrastructure investment. If a company does not meet all the requirements alone, it should form a consortium and share its role to operate the project. However, all companies should have a certain level of credit in order to continue to operate the project over a long period of time. Also, it is considered that the Project IRR will not reach the level to attract investors without any support from GOV. Therefore, it is assessed that sponsor risk is

high.

- Action to Manage the Risk: Appropriate preliminary survey on major items such as construction cost and demand forecast is essential for the sponsor's decision to participate in the project. Also, there should be enough time for discussions on government support, incentives and guarantees to settle the conditions for the investment in advance and should withdraw commitment from GOV about the contents in order to attract the sponsors to enter into the Project. Also, if more than one sponsor joins the Project, the sponsors should agree on the roles, power balance and investment conditions in advance at the shareholders agreement.
- Procedure to Cover the Risk: Conduct a preliminary survey by an expert with experience and know-how of toll road construction and O&M, collect reliable data on project cost estimation and demand forecasts at the early stage of the project, and provide them to potential sponsors. At the same time, improve the investment environment to attract the interest of sponsors. Also, limit the turnover of sponsors in the initial stage of the project in order to stabilize the project management.

2) Finance Arrangement Risk: High, Allocated to GOV

The JICA Survey Team conducted market sounding to local and foreign banks which may be potential lenders, but were very cautious about lending such large amounts in the current economic situation in Vietnam. There is also a concern about the uncertainty of the cash flow to cover the necessary debt-service-coverage ratio in the current level of Project IRR (without government support). Currently, financial institutions are not willing to lend to project finance base in which banks take certain project revenue risks. For local banks, the loan amount for each project is limited in accordance with the laws which the government has established, and it is actually difficult for them to participate in large projects (which was one of the reason why BIDV gave up the project). Also, it is assumed there will be several bank covenants in the Loan Agreement due to high cash flow volatility risks such as demand and exchange rate risks. Government support and guarantee are highly recommended to cover such risks. Funding is difficult at the present situation which makes the finance arrangement risk high.

- Action to Manage the Risk: Adequate amount of private finance is required based on the current financial environment in Vietnam. In order to raise project finance, a certain level of project revenue will be required which will be secured by government support such as injection of public funds, investment incentives and government guarantee. Also, discuss in advance the lender's security package for various risks and determine the main contents before the establishment of the SPC at the commitment stage of government support, incentives and guarantees with both GOV and investors taking part.
- Procedure to Cover the Risk: Improve the project IRR by increasing public construction and reducing private funding. Converting the scheme to O&M concession scheme which is a privatization of public construction may also be a plan to reduce the risk of the project. To raise funds from private financial institutions, providing government guarantee may encourage ECAs to issue insurance which will allow private banks to issue long term and low interest rate financing. On the other hand, determine the definition of Termination and Compensation Regime due to default by SPC, GOV and force majeure in the BOT/PPP contract. Specifically, in the event of default by SPC, the GOV will buy out the assets using their fair market value, and in case of force majeure, the GOV will buy out the assets by paying for the outstanding debt balance plus an amount to cover the assumed return to the investor at the time of Loan Agreement.

3) Interest Rate Risk: Low, Allocated to Private (Allocated to GOV when floating rate)

The debt financing for the Project is based on Japanese Yen Loan and the interest rate is assumed to be fixed. Therefore, there will be low interest rate risk, provided that the Project will be exposed to exchange rate risk. However, if local financing had been selected and interest rate becomes floating, the local interest rate will still remain at around 10%, which would be very high. Although the high level interest rate in the current policy has a calming effect to inflation, the government has currently declined the interest rate for five consecutive months to prevent the deceleration of economic growth. It is hard to forecast the interest rate outlook due to frequent changes in interest rates by the government which will make the interest rate risk high.

- Action to Manage the Risk: Set the interest at a fixed rate in the Loan Agreement.
- Procedure to Cover the Risk: Since there is no interest swap market in Vietnam, in case of floating rate-based lending, government compensation under situation of interest rate deviation for a certain level from the assumption should be written in the BOT/PPP contract.

4) Currency Exchange Rate Risk: High, Risk Shared

In the Project, the income currency will be in VND, and considering that the debt will be in JPY, the currency exchange rate risk will be high. Especially, the devaluation of VND against JPY over the last 20 years is 7% average annually, and it is a high risk for Japanese investors. In addition, the devaluation of VND that happened in 2011 is considered to be unstable. Although the SBV and the GOV are focused in stabilizing the currency exchange rate, it is still a concern to possible investors. Certain government guarantees will be requested for a long-term JPY-financed project, in particular like this Project.

- Action to Manage the Risk: It is hard to prevent the depreciation of VND. Investors will need to investigate past statistics and include the risk premium to the financial model. Although currency exchange rate risk can be reduced by using VND funding, funding costs will relatively rise which makes it difficult for investors to decide.
- Procedure to Cover the Risk: It is possible to hedge the currency exchange rate risk by categorizing the risk as one of the fee adjustment factor, but it is not a realistic solution. Compensation by the GOV when there is a currency exchange rate deviation for a certain level from the assumption must be determined in the GGU which will provide mutual benefit to both the government and the private sector by sharing a certain level of risk..

5) Inflation Risk: High, Risk Shared

Inflation rate of Vietnam is 11.75% in 2010 and 18.68 % in 2011. This high level inflation is expected to continue.

(Source: IMF-World Economic Outlook (April 2012)

- Action to Manage the Risk: Inflation rate is highly influenced by the interest rate policy of the government which the private sector cannot control. Therefore, a certain level of government support is highly recommended in order to attract foreign capital.
- Procedure to Cover the Risk: It is possible to hedge the inflation rate risk by categorizing the risk as one of the fee adjustment factor. Additionally, introduce a mechanism to accelerate the toll fee revision schedule when there is an O&M cost deviation for a certain level from the assumption from the initial schedule.

(3) Revenue Risks on the Toll Road Project

1) Demand Risk: High, Risk Shared

Estimation of the demand is difficult because of the need of demand forecasts to have multiple sections in either option. Therefore, the demand risk is high and government guarantee is strongly required.

- Action to Manage the Risk: Conduct research focusing on the demand. Improve the estimation accuracy by examining demand and time values of similar overseas highway projects.
- Procedure to Cover the Risk: The GOV will issue a minimum revenue guarantee. Initially, the GOV and private sector will both agree on the revenue projection level. Both sectors will set a minimum revenue level to cover the debt service and a maximum revenue level to reach the investor's return level. When the actual revenue is lower than the minimum revenue level, the GOV will compensate the shortfall. On the other hand, when the actual revenue exceeds the maximum revenue level, the excess revenue will be shared between the GOV and private sector. The payment method between the GOV and private sector, and the calculation of surplus or deficit shall be specified in the BOT/PPP contract.

2) Toll Fee Risk: High, Allocated to GOV

In this Project, fee adjustment scenario will be confirmed and agreed in the BOT/PPP contract, but the certainty of the adjustment is not enough because government approval will be needed for every fee level adjustment. If the fee adjustment is delayed and the cost increases, it is obvious that considerable adverse effects will happen to the project return. In addition, toll fee in Vietnam tends to be lower than the international standard. Therefore, if there is no guarantee for this risk, the toll fee risk will be assessed as high because it will be considered that the fee adjustment will not be done as agreed in the BOT/PPP contract.

- Action to Manage the Risk: Confirm in advance that the counterpart for the contract will be the MOT and also confirm the mechanism of the fee adjustment. Determine the fee adjustment formula and schedule in the BOT/PPP contract.
- Procedure to Cover the Risk: Confirmation that the GOV will issue a guarantee for fee adjustment. This is one of the important contents to determine in the GGU because MOF is in-charge of the fee adjustment approval.

3) Network Risk: Low, Allocated to GOV

This Project is the extension of the existing HCM–Trung Luong toll road section and is expected to dissolve the bottleneck effect on roads. The network risk is low because the Project is expected to receive revenues from the existing Km. 953+200 and My Thuan Bridge. However, if the government has plans for alternative roads or transportation, the risk may rise.

- Action to Manage the Risk: Discuss the network scenario with the government in advance, and check the influence to the Project.
- Procedure to Cover the Risk: Agree on the network scenario which may affect the Project and include in the BOT/PPP contract. In addition, determine in the contract if the GOV will compensate for any loss caused by changes in the network scenario during the concession period.

(4) External Factor Risks

1) Currency Conversion, Remittance Risk: High, Allocated to GOV

For the past few years, the balance of foreign reserves has continued to decline and the government has embarked on a currency exchange regulation. In recent cases, it has been reported that the stand of the GOV was it will only guarantee the currency exchange amount up to 30% of the sale from each project. This is a major concern among foreign investors because this issue is directly linked to debt service of foreign currency loans and in collecting the dividend. Although there is a view that this will be a provisional policy, ongoing monitoring is still necessary. Furthermore, in order to attract foreign capital, unlimited currency conversion guarantee from the government is recommended.

- Action to Manage the Risk: Principal confirmation on the mechanism of currency exchange, determination of the exchange rate and the maximum amount through advance discussions with SBV and MOF.
- Procedure to Cover the Risk: Determine government guarantee for currency exchange with no limit in the GGU.

2) Law, Policy Change Risk: Medium, Allocated to GOV

Case-by-case correspondence by PM approval is frequent in Vietnam. It is written in Article 24 Law which supplements the BOT law that the counterpart of the contract (MOT for this Project) will be the unified window for contract negotiations. It seems that the aim is to strengthen the system of responsibility of government agencies and reduce the dependence on the PM. Although this improvement itself can be appraised well, the risk will be considered as medium due to the instance when the ministry-in-charge could not manage its project efficiently and eventually has contact the PM for their decision.

- Action to Manage the Risk: Determine in the contract that if there is a negative impact from any change of the law in the future, the SPC will be excluded and vice-versa.
- Procedure to Cover the Risk: Same as above.

3) Political, Accident, Disaster Risk: Low, Risk Shared

There are multiple uncertainties (declining balance of foreign reserves, high amount of foreign debt, devaluation of VND, etc.) in the fundamentals of Vietnamese economics. However, the risk is assessed as low because there are no special concerns in the aspect of politics. Yet, continuous monitoring is required to know whether the economic management of the country will improve.

- Action to Manage the Risk: It is difficult to reduce this risk.
- Procedure to Cover the Risk: Secure a government guarantee for the GOV to take over from the SPC if an unrecoverable situation such as force majeure happens within the period determined in advance. Insurance by IFI/ECA will also be an effective option.

The project risk allocation is outlined in Table 8.23.

Table8.23. Overall Picture of the Project Risk Allocation

○ : Risk taken ultimately
△ : Risk taken until a certain level

Medium Risk
High Risk

	Risk	Allocation		Reason of allocation, comments
		GOV	Private	
Risks on Project Plan, Construction and O&M	Land Acquisition Risk	○		Provincial People's Committee will be responsible for land acquisition
	Budget Preparation	○		GOV responsible for budget preparation
	Environment and Social Risk	○		Private cannot control schedule for government approval
	Technical Risk		○	Private will choose the engineering company
	Construction Completion Risk		○	Private will choose the EPC contractor
	O&M Risk		○	Private will manage the O&M
	Interface Risk	○		Most of the sector will be constructed by GOV and Private will have no control
Risks on Financing the Project	Sponsor Risk	(○)		GOV support expected for investment structure
	Finance Arrangement Risk	○	△	Private investor will prepare the financial planning, but support/guarantee from GOV such as land acquisition, minimum traffic guarantee, termination payment, currency conversion guarantee, currency exchange rate guarantee and so on will be necessary to stabilize the cash flow
	Interest Rate Risk	(○)	○	The SPC is expected to receive the debt directly
	Currency Exchange Rate Risk	○	△	There had been a devaluation last year, and GOV should be responsible for the exchange rate
	Inflation Risk	○	△	Influenced by GOV interest policy
Revenue Risks on the Toll Road Project	Demand Risk	○	△	Expected to change by GOV policy
	Toll Fee Risk	○		Controlled by GOV policy
	Network Risk	○		Controlled by GOV policy
External Factor Risks	Currency Conversion, Remittance Risk	○		Controlled by GOV policy
	Law, Policy Change Risk	○		Controlled by GOV policy
	Political, Accident, Disaster Risk	○	○	No way to control. Sharing risk will be appropriate

Source: JICA Survey Team

(5) Market Sounding

Based on the abovementioned risks, the JICA Survey Team interviewed private financial institutions, which have offices in Vietnam, and leading domestic companies participating in private road construction projects to conduct a study of their interest in participating in this Project.

For private financial institutions, the JICA Survey Team visited BIDV, which is the leading domestic bank and the major shareholder of BEDC, three major Japanese banks and two foreign banks (Citibank and ANZ Bank). All of them expressed that the calming of the international financial market caused by the Europian financial crisis after 2010 made a significant impact on the financial market in Vietnam. It had been also confirmed that it is difficult to raise new loans from abroad combined with the deterioration of economic conditions in Vietnam at present. Practically, new loans from Europian banks which are in the midst of the Europian crisis seem to have stopped.

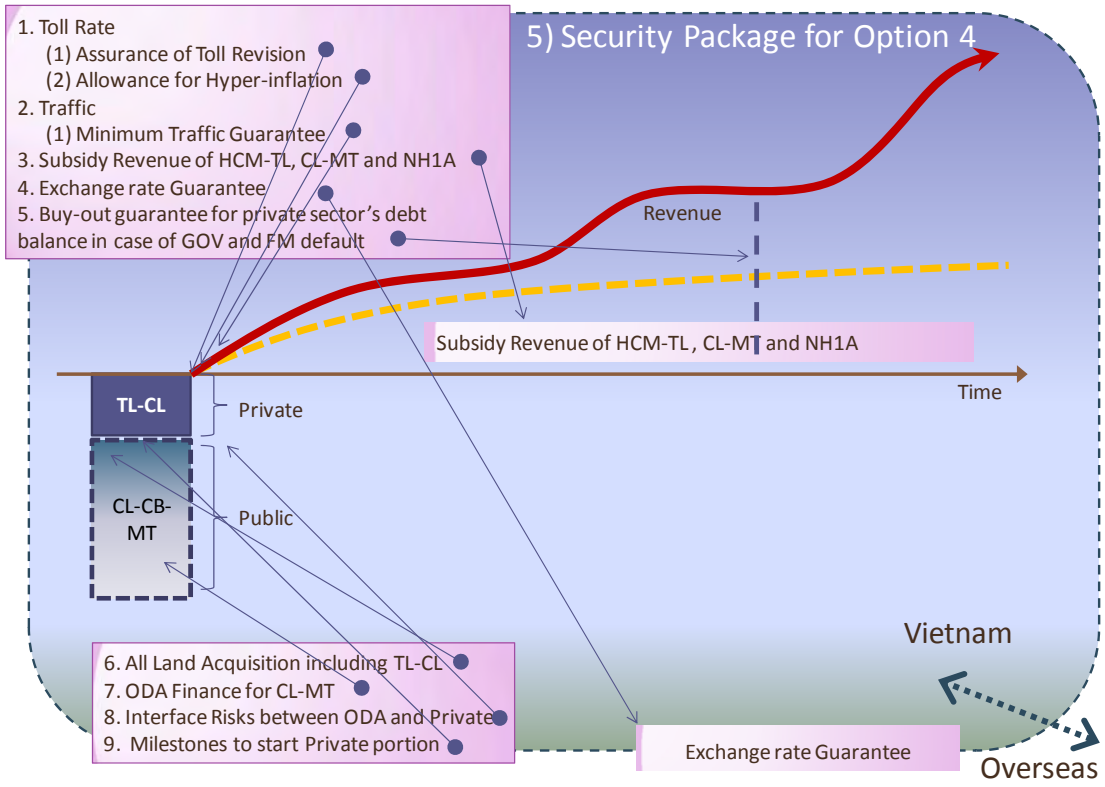
The JICA Survey Team also assessed their presence or absence of interest by providing an overview of the Project, but there was no company interested in participating in the project finance base lending due to the present poor financial environment and poor profitability of large-scale projects. However, some banks have mentioned the possibility of ECA insurance/guarantee-backed commercial loans with government guarantee issuance.

On the other hand, the JICA Survey Team visited domestic companies participating in road construction projects with private finance (VIDIFI, IDICO, and Vinaconex) and a company considering joining such projects (Bitexco) to conduct a study of their interest in participating in this particular project. Many projects have not been able to achieve smooth implementation due to the practical difficulties of funding and lack of foresight of business profitability, although initially, they felt the project to be an attractive investment. For companies with a construction section in their group, it can be interpreted that they are participating in those projects for the incentive of participating in the construction work primarily as a contractor and to gain benefit from the investment at the same time. It is estimated that for some projects, they are only passively participating due to instructions from the government. Also, although they affirm the importance of the projects they have been participating in, they all consider that the BOT scheme which the government intends is not realistic to be achieved. Some companies are thinking that this project may be the same and none of them showed active interest to participate in this project.

As a result, there were no companies that evaluated the project as an investment for private financial institutions and domestic companies.

(6) Outline of Security Package for Combined Options 4 and 5 (Tentative)

Figure 8.17 summarizes the major risks and their hedging measures for Options 4 and 5. In order to secure the project profitability calculated for the combined Options 4 and 5 in the previous section, there is a need to build up a very complex security package composed of more than 10 kinds of risk hedging measures backed up by various government guarantees.



Source: JICA Survey Team

Figure 8.17. Outline of Security Package of Combined Options 4 and 5 (Tentative)

(7) Results of Analysis and Recommendation for the Project Scheme

Based on the financial analysis, profitability of Options 4 and 5 would exceed the 15% hurdle rate of the Project IRR, in which the Trung Luong-Cai Lay section is financed by the private

sector, while the Cai Lay-Cai Be-My Thuan section is publicly funded, while both sections would be operated and maintained by the private sector in an integrated manner. This option is called a Horizontal (Longitudinal) Separation PPP. Risk analysis was conducted for the combined Options 4 and 5 from the viewpoint of private sector investors and the necessary government support and their conditions to hedge those risks were examined.

The following are the results of the assessment of the combined Options 4 and 5:

(i) In implementing the combined option, various project risks are expected, and to minimize the risks, a complex security package must be structured involving more than 10 kinds of government guarantees and supports in order to secure the calculated profitability. Out of those required government guarantees and support, several items (ie. 100% guarantee of foreign currency conversion[39],, buyout guarantee of project in case of termination by government default and Force Majeure default[40], minimum traffic guarantee[41], etc.) have already been discussed between the private investors and GOV in other investment projects. However, the GOV has reportedly been reluctant in accepting those conditions. The feasibility of accomplishing this kind of complex security package is supposedly difficult.

(ii) The TL-MT Expressway would be a green field project and the newly constructed expressway section for which risk of traffic forecast is large and duration is long, thus it is difficult to be assumed by the private investor. Therefore, the volume of cash flow generated from the project would accompany a large uncertainty. In addition, contents of the security package, which is to function as a safety net for securing the calculated profitability, could be complex and tangled, so that it is considered very risky from the viewpoint of the private sector to make an investment of over USD 1,200 million (for construction of the Trung Luong-My Thuan section) under the abovementioned environment with high uncertainty.

(iii) In order to encourage private sector investment, the GOV should shoulder about 2/3 of the total project cost and let the private sector receive all the revenue including those from toll collection from HCMC-Trung Luong Expressway and NH1A,. Thus, most of the financial benefits which the government would have enjoyed otherwise, would flow out to the private sector. Although construction risks and O&M service provision risk becomes less, there would be very small merit for structuring the project into a full-fledged PPP expressway project considering the extent of cost and risk assumption of the Vietnamese government.

Based on the abovementioned assessment of the combined Options 4 and 5, the following direction of the study is proposed at this moment:

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[39] Prime Minister's Official Letter (Official Letter 1604/TTg-KTN of PM, September 12, 2011) approves the limit of foreign currency conversion guarantee upto 30% of revenue after deduction of expenses for BOT thermal power project. According to a Vietnam-based international law firm, it was mentioned by a government officer during a meeting for GGU negotiation of non-thermal power project that this limit of guarantee would apply to infrastructure projects other than thermal power project. MOIT (Ministry of Industry and Trade) is said to be studying relaxing the conditions for this regulation for thermal power projects.

[40] There is unverified information that during the negotiation for the Lach Huyen Container Terminal Project, the North Vietnamese government side has refused the request made by the investor side about the buy- out condition for the project in case of contract termination caused by the Vietnamese government and Force Majeure.

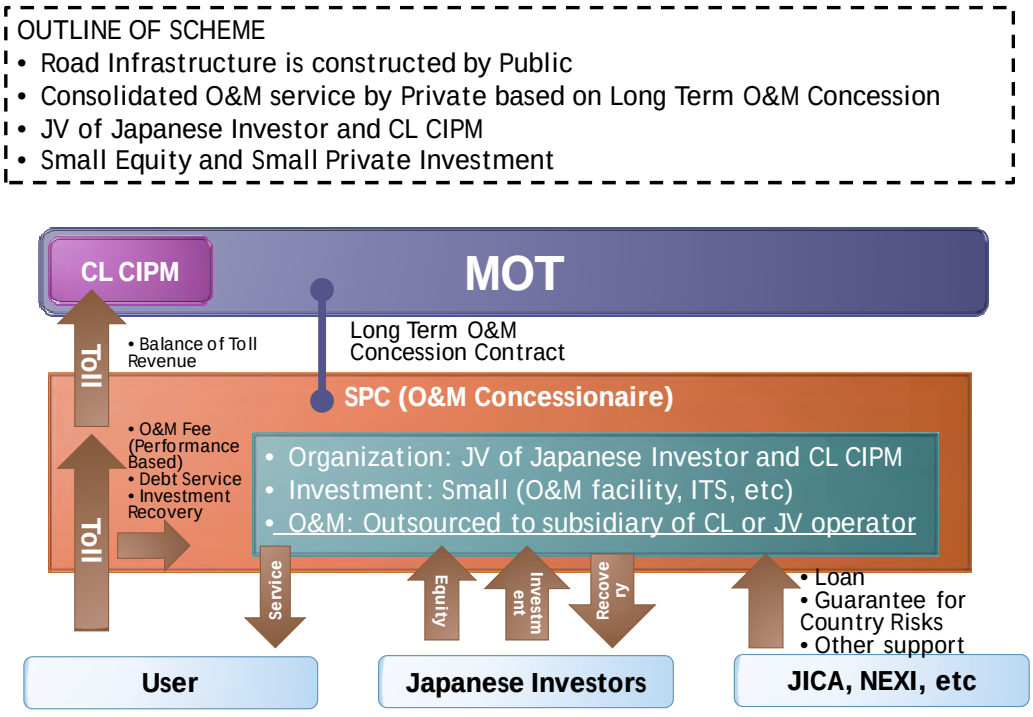
[41] There are no existing concrete examples in Vietnam, but it does not seem likely that Vietnamese government could accept this kind of traffic (revenue) guarantee considering the result of a number of meetings with Ministry of Finance that Consultant had in the past. Many investors from oversea expressed opinions that even if the government approves this kind of guarantee mechanism, its effectiveness would be questionable.

The TL-MT Expressway construction cost is relatively high due to soft soil treatment together with the far lower forecasted level of future traffic,and the slow recovery of such a large investment. Hence, the adoption of a full-fledged PPP structure for the project would not satisfy economic rationality of either public or private sector, thus the project feasibility seems small. It is recommended that the GOV would seek public funding route for the construction of TL-MT Expressway utilizing ODA and other public funds as much as possible which have low financing cost and longer maturity matched to a very long economic life of the expressway assets. Also, the GOV should seek other possibilities of structuring a PPP project format with limited degree of private sector participation on the basis of constructed expressway assets.

(8) Risk Assessment of O&M Concession Option

As discussed earlier, it is difficult for the private sector to invest in the combined Options 4 and 5, which involve horizontal separation of the expressway with privately- and publicly-funded portions. In order to seek the abovementioned direction with limited investment by the private sector, the viability of the O&M Concession Option is analyzed in terms of project risks in a similar manner applied to the financial analysis of Option 7 in the previous section. This option is structured based on project scheme in which the entire section of TL-MT Expressway is constructed using public funds including donor funds, while the private investor will only provide additional investments for O&M-related facilities including ITS facility.

Figure 8.18 shows the outline of the O&M Concession Option. As the majority of the entire expressway is constructed using public funds with a small investment of O&M facilities by the private sector, O&M service would be provided by an SPC established by the investor including toll collection and ITS services on a performance-based contract. The private investor will deduct form the revenue the performance-based O&M fee and necessary recovery cost of investment including debt service payment. The, is the private investor will pay the balance to the government possibly through Cuu Long CIPM.



Source: JICA Survey Team

Figure 8.18. O&M Concession Scheme Option

Project risk assessment is conducted on the basis of the above O&M Concession Scheme. The result is shown in Table 8.24.

In Option 7 as compared with Options 4 and 5, the risks are recognized as difficult for the private investor to assume such as land acquisition risk, interface risk with public funded section (horizontal separation), traffic risk, toll increased risk, and inflation risk. These risks could be avoided while some other risks can be mitigated and managed from the private investor's perspective.

Table 8.24 compares the project risks of the combined Options 4 and 5 with Option 7.

Table8.24. Overall Picture of the Project Risk Allocation

Risks of Option 4, 5 Case	Risk of Option 7 Case
• Land Acquisition Risk	
• Technical Risk	• Technical Risk(↓)
• Construction Completion Risk	• Construction Completion Risk(↓)
• O&M Risk	• O&M Risk
• Section Interface Risk	
• Sponsor Risk	• Sponsor Risk
• Finance Arrangement Risk	• Finance Arrangement Risk(↓)
• Interest Rate Risk	• Interest Rate Risk (↓)
• Traffic Demand Risk	
• Toll Increase Risk/Inflation Risk	
• Foreign Exchange Risk	• Foreign Exchange Risk (↓)
• Change-in-Law Risk	• Change-in-Law Risk

Source: JICA Survey Team

(9) Comprehensive Comparative Assessment of Options 4 and 5 and Option 7

Comprehensive comparative assessment is conducted in terms of profitability and project risks. As shown in the Figure 8.19, Option 7 has better profitability and risk management as compared with the combined Options 4 and 5. Thus, Option 7 is recommended for project implementation.

Evaluation Criteria	Target	Indicator	Option 4*&5	Option 7	
1. Profitability	GoV	NPV	-2,693	-1,006 ◎	NPV(Net Present Value)=Gov't life-cycle cash flow(IN) – Gov't life-cycle cash flow (OUT)
		VFM	-	1,687 ◎	VFM(Value for Money) =NPV(O&M+α) -NPV(Option 4)
	Private	PIRR	10.4% ○	15% ◎	PIRR(Project Internal Rate of Return) of "Option 7" will be changed based on the amount of annual payment from Gov't to Private.
2. Risk (Private)		VGF	**High**	**Non**	
		Land Acquisition	**High**	**Non**	
		Construction Completion	**Med**	**Non**	
		Section Interface	**High**	**Non**	
		Finance	**High**	↓	
		Traffic Demand	**High**	**Non**	
		Private Investment	**High**	↓	
		Complex SP	**High**	↓	
3. Overall Evaluation			×	◎	

* Since option 7 does not include the revenue from HCMC-TL, the revenue from HCM-TL was subtracted from Option 4 also for equal footing.

Source: JICA Survey Team

Figure 8.19. Coprehensive Comparative Assessment between Options 4 and 5 and Option 7

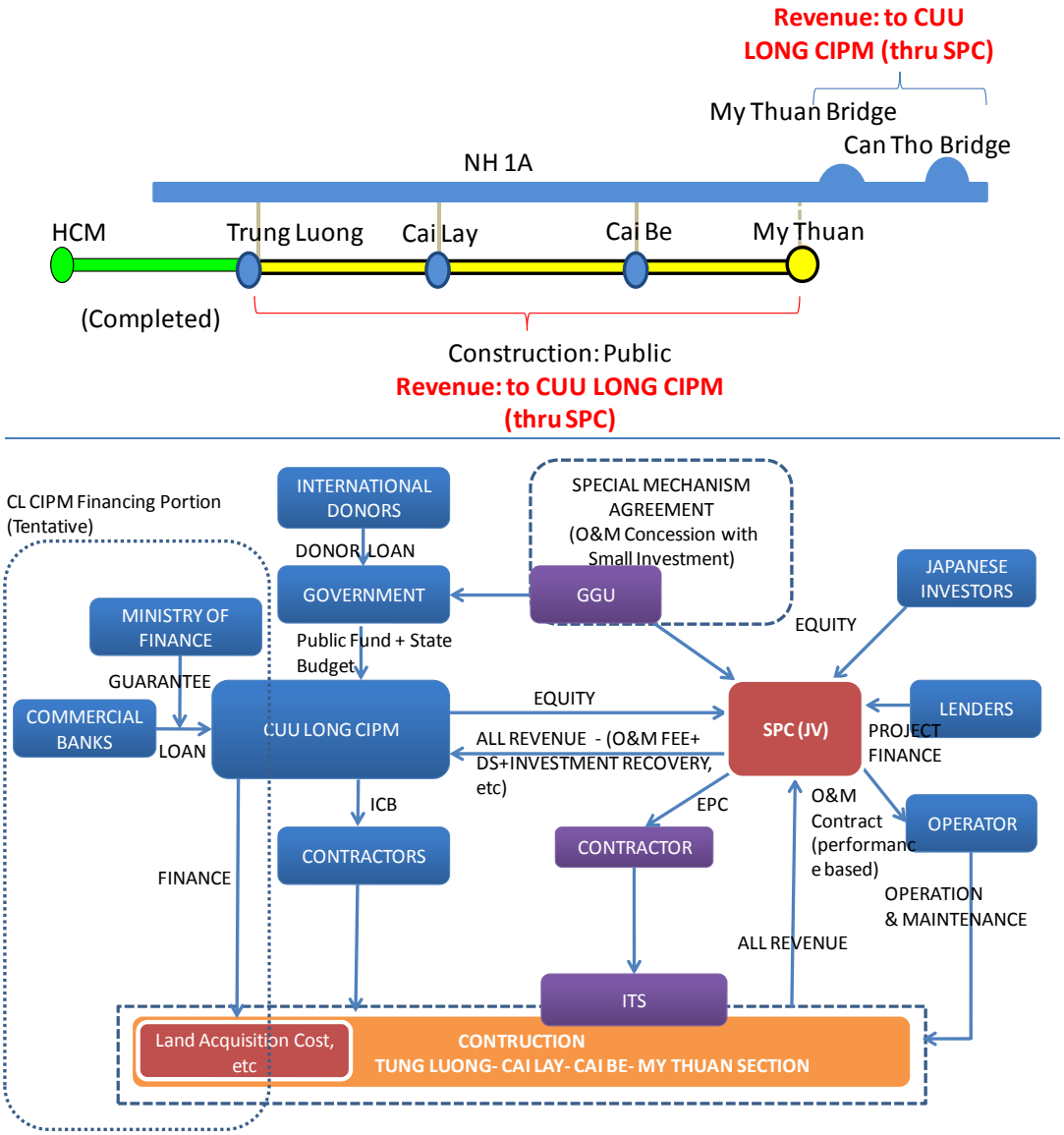
8.4 Proposal of O&M Concession Scheme

8.4.1 Proposed Project Structure

The proposed project structure is shown in Figure 8.20. As discussed in the previous section, the expressway facility of the entire Trung Luong-My Thuan section (infrastructure portion) will be constructed by using public funds. These include donor funds by Cuu Long CIPM as a PMU of MOT who manages and completes the construction, with the private investor making additional parallel investment on O&M related facilities including ITS facility. The expressway facilities will be completed at the same time as with the opening of the entire expressway.

The SPC will be established as a joint-venture company between a Japanese investor and Cuu Long CIPM. The SPC will hold the implementation rights of a long term O&M concession (15 years of operation) on a performance-based contract (KPI indicators, please refer to Chapter 10 "Project Assessment") to be entered into with MOT. The SPC will also provide O&M services for TL-MT Expressway. Special mechanism based on the Prime Minister's approval is assumed as a legal basis for project implementation.

It is assumed that in consideration of the current situation of fund deficiency in the government, procurement and land acquisition funds will be acquired by Cuu Long CIPM through the utilization of the cash flow potential of exisiting revenue from HCMC-Trung Luong Expressway.



Source: JICA Survey Team

Figure 8.20. Proposed Project Scheme (Option 7)

Basic risk allocation between the public and private investors is shown in Table 8.25.

Table8.25. Basic Risk Allocation of Proposed O&M Concession Scheme

Role/Risk Allocation			Proposed O&M Concession Scheme
Construction	Infrastructure		Public
	Pavement/Ancillary Facilities		Public
	Private Investment (&M Facility, ITS, etc)		Yes
O&M	Toll Collection		Public (Contracted to Private)
	Operation and Maintenance		Long Term Concession
RiskAllocation	Defect of Road Infrastructure		Public
	Defect of Private Investment		Private (ROW is Public)
	O&M Risk		Private (Performance Based)
	Traffic Risk		Public
	Toll Collection Method		Public (Contracted to Private)
	Cost Recovery Method	O&M Cost	Fixed (Performance Based)
		Investment Recovery	Fixed
		Debt Service	Fixed
	Concession Fee by Private		No

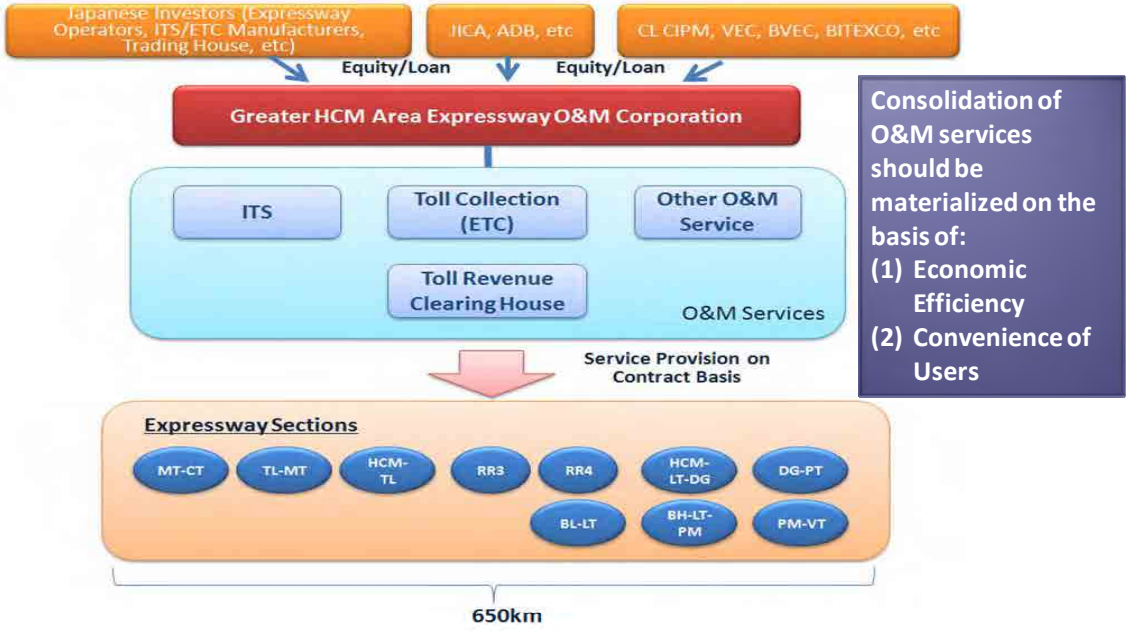
: Private Risk

Source: JICA Survey Team

As proposed in Section 6.3.6 of Chapter 6, this the O&M Concession Scheme has a potential for expansion and integration of O&M services in the future.

At present, the Cuu Long CIPM will have a right of O&M provision for HCMC-Trung Luong Expressway, and will become one of the major investors for TL-MT Expressway, which is an extension of HCMC-Trung Luong Expressway. Under this circumstance, it could contribute to the improvement of project profitability of SPC by attaining scale merit of O&M services if SPC, together with Cuu Long CIPM, could provide O&M services in an integrated manner. Furthermore, if O&M services of various expressway sections in the Greater Ho Chi Minh Region, having about 650 km in total length, will be integrated and provided by a single entity and/or SPC in the future, a large economic efficiency could be attained. It is also possible that it can improve project profitability at each section and provide convenience to all expressway users in the network through having a common ETC system and less toll gates on the main expressway section.

The proposed scheme of the integrated O&M system for the Greater Ho Chi Minh Expressway Network is shown in Figure 8.21.



Source: JICA Survey Team
(Reposted from Figure 6.79.Draft Proposal of Integrated O&M System for the Greater Ho Chi Minh Expressway Network)

Figure 8.21. Integrated O&M System for Greater Ho Chi Minh Expressway Network

8.4.2 Implementation Plan

(1) Implementaion Organization

As discussed earlier, the O&M Concession Option is recommended as the most appropriate project scheme. This section proposes the organizations during the implementation (construction) stage based on the recommended scheme.

The O&M Concession Option splits the construction work into two parts: O&M related facilities work and expressway infrastructure work. An SPC will finance and build the O&M related facilities including ITS work and then will undertake O&M of the project. The GOV will finance and build the expressway infrastructure work using public and donor fund.

The implementation setup for the O&M Portion is shown in Figure 8.21. The SPC enters into a concession agreement with MOT for construction of the O&M related facilities work and operation & maintenance of the entire expressway. The SPC will split the work into two working packages: design/supervision and construction. It will contract the former work to consultants and the latter work to an O&M related facilities contractor with contract conditions similar to EPC contract in an integrated manner.

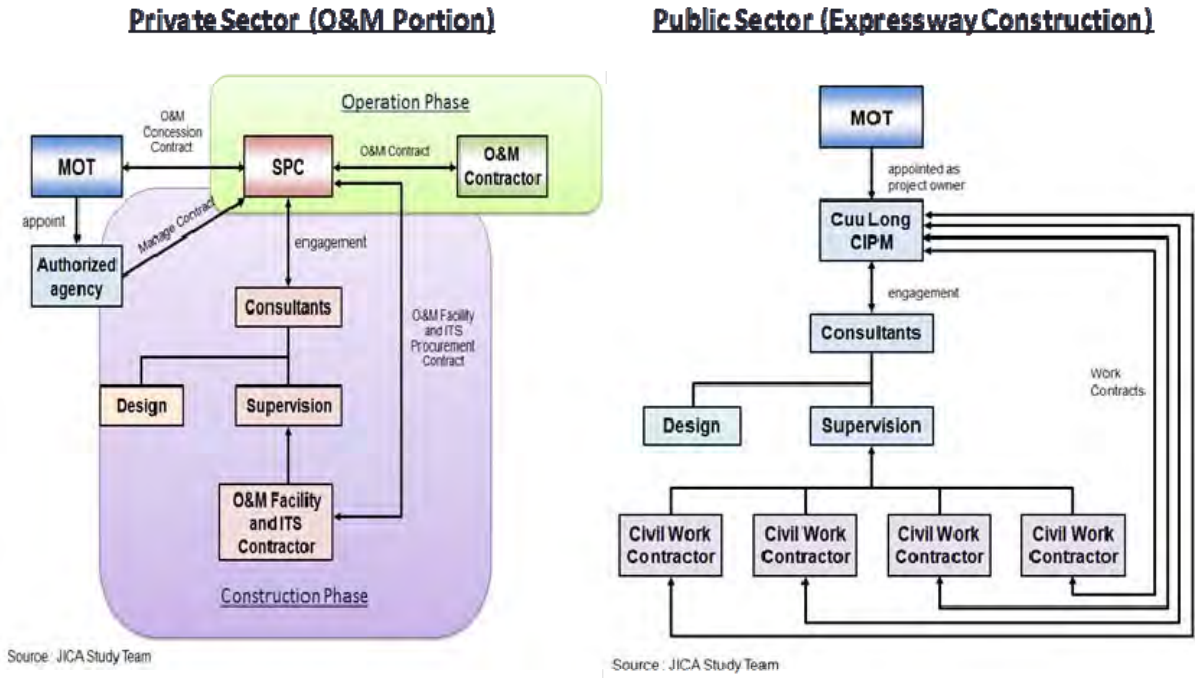
The GoV regulations call for an authorized agency to oversee the performance of the SPC. For this purpose, the MOT will appoint an appropriate entity as a contract manager to check for the SPC's compliance with the concession agreement. This management setup is effective in removing discretionary power from the O&M-related facilities contractor as the shareholder of the SPC could otherwise be construed as having conflicts of interest.

The implementation setup for the expressway infrastructure portion is also shown in Figure 8.21. The MOT has appointed Cuu Long CIPM to act as the project owner for managing the design and construction of the expressway infrastructure works. Cuu Long CIPM will engage with consultants for the design and supervision. All contracts for the infrastructure works will be placed by Cuu Long CIPM. The consultant will design the civil work and supervise the

civil work contractors. The consultant will also assist Cuu Long CIPM to solicit the bid, evaluate the offers, and select the winning bidder. This is a usual practice used in ODA-funded projects.

Prior to this JICA Survey, potential candidates as equity investors to SPC are assumed to be Marubeni and Nippon Koei, which are the members of this JICA Survey. However, as O&M Concession Scheme is proposed in the JICA Survey, it is concluded that either party could become equity investors to the project since either has experience and track record on O&M service provision for expressway projects. Results of the market sounding to existing Japanese expressway operators revealed that their positive intention to participate in the project based on the proposed O&M Concession Scheme could not be identified.

In order to continuously solicit support from the Japanese government (including donor's private sector loan) and investment from Japan to implement this project, it would be necessary to step forward to conduct sounding for intention to participate as either investor or operator to Japanese expressway operators; Japanese companies who have experience in expressway operations overseas including Japanese general contractors, manufacturers of O&M-related equipment and facilities (including ITS and ETC equipment); and other expressway business-related companies.



Source: JICA Survey Team

Figure 8.21. Project Implementation Setup (O&M Concession Option)

(2) Implementation Schedule

The general implementation schedule is shown in Table 8.26 in case the O&M concession and O&M facilities construction for the Trung Luong–My Thuan section are conducted as private investment, while construction of the expressway itself is conducted through public funding.

However this implementation schedule shows the general schedule as a private investment for O&M option, while a detailed study is necessary.

Table8.26. General Project Implementation Schedule

No.	Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
100	Detailed Design										
A	(BOT/PPP Scheme) O&M Concession (+ Construction of O&M Facilities)										
A100	JICA PPP Survey			Project Finance							
A200	SPC Setup (including BOT Contract, GGU)										
A300	Procurement of Consultant										
A400	Detailed Design for O&M Facilities										
A500	Procurement of Contractor										
A600	Construction of O&M Facilities										
A700	Procurement and Training of O&M Company										
A800	Open to the Public										
B	(Public Funding) Construction for Trung Luong - My Thuan Section excluding O&M Facilities										
B100	Land Acquisition & Resettlement										
B200	Preparatory Survey										
B300	Loan Agreement										
B400	Procurement of Consultant										
B500	Review of Detailed Design										
B600	Procurement of Contractor										
B700	Construction of Phase-1 (4 Lanes)										
B800	Open to the Public										

Note) This implementation schedule is shown as the general project schedule, and further detailed study is necessary
Source: JICA Survey Team

1) General Milestones for O&M Concession and O&M Facilities Construction as Private Investment

The general milestones of the O&M concession and O&M facilities construction for the Trung Luong–My Thuan section are shown in Table 8.27, assuming these are conducted through private investment.

Table8.27. General Milestones for O&M Concession and O&M Facilities Construction as Private Investment

Event / Milestone	Time / Period
SPC Setup, Contract for O&M Concession	Up to end of Dec 2013
Contract for Project Finance	Dec 2013
Procurement of Consultant	January 2014 to December 2014
Detailed Design for O&M Facilities	January 2015 to December 2015
Procurement of Contractor	January 2016 to December 2016
Construction of O&M Facilities	January 2017 to December 2018
Procurement and Training of O&M Company	January 2017 to December 2018
Open to the Public	January 2019

Source: JICA Survey Team

2) General Milestones for Construction of Expressway excluding O&M Facilities

The general milestones of expressway construction excluding O&M facilities for the Trung Luong–My Thuan section are shown in Table 8.28, assuming it is conducted through public funding.

Table8.28. General Milestones for Construction of Expressway excluding O&M Facilities through Public Funding

Event / Milestone	Time / Period
Land Acquisition and Resettlement	Up to end of Dec 2013
Preparatory Survey for using Public Fund	April 2013 to December 2013
Loan Agreement for Public Fund	End of Dec 2013
Procurement of Consultant	January 2014 to September 2104
Review of Detailed Design	October 2014 to March 2015
Procurement of Contractor	April 2015 to December 2015
Construction	January 2016 to December 2018
Open to the Public	January 2019

Source: JICA Survey Team

CHAPTER 9 SECURITY PACKAGE

9.1 Overview of the Security Package

A security package is the totality of various arrangements to ensure the protection of loans by 1) strengthening the sustainability of the SPC operation by properly allocating risks between the parties related to the project and 2) setting collateral against the forecast and estimation of the SPC. In this report, "security package" is defined as a whole of the 1st layer and 2nd layer arrangements written below. The details of each arrangement will be proposed in the next sections.

Layer 1: Arrangements to maintain the sustainability of the SPC operation

Government guarantee, government grant, sponsor support, and provisions in related contracts (e.g., EPC contract, O&M contract, toll collection outsourcing agreement, currency conversion agreement, insurance, etc.) will be included in this layer. These elements will be the fundamental countermeasures to ensure the payment of principal and interest to the lenders because an SPC will operate and generate cash flow under these contracts. Generally, all the basic details of government support should be considered and agreed before the establishment of the SPC.

Each item written in the sections below will be determined mainly in major project related contracts, but those contract documents will also be subject to lender's due diligence. Moreover, it should be considered and agreed during the period from the establishment of the SPC to the actual lending of these items.

Sponsor support such as sponsor loan and obligations to make capital contribution may be settled before the establishment of the SPC as shareholders' agreement. However, lenders may request the commitment of capital contribution or construction completion guarantee which will be coursed through shareholders for loan origination.

In addition, these arrangements differ in each project, and it is intended to have certain flexibility.

Layer 2: Arrangements for lenders to manage the project assets

In cases of poor performance or default of the SPC, the lenders should have the right to manage the project assets of the SPC. Setting collateral to the SPC share, securities over the relevant project contracts, onshore/offshore account securities, and setting collateral on fixed assets will be included in this layer. Approval by the State Bank of Vietnam (SBV), account management methods and arrangements such as compliance matters of SPC which will be written in the loan agreement should also be determined besides setting collateral on assets in the arrangements for lenders to manage the project assets.

Generally, these arrangements will be agreed during the loan origination.

Table9.1. Layer 1: Arrangements for Ensuring Business Continuity of SPC

Item	Contract	Description	Notes/Issues
Government Guarantee			
Currency Exchange	GGU	The SPC's right to exchange the full amount of VND revenue to JPY and/or USD.	The GOV will only guarantee the currency exchange amount up to 30% of the sales of each project due to the lack of foreign exchange reserves. The GOV keeps a decisive policy in recent contract negotiations on this subject and intends foreign currency funding by the market without government guarantees.
Overseas Remittance	GGU/PPP Contract	The SPC's right for overseas remittance.	
Prevent Nationalization	GGU/PPP Contract	To prevent the nationalization of SPC's assets. Total amount will be compensated in case of nationalization.	
Additional Non-taxability	GGU/PPP Contract	SPC will not be affected by adverse tax changes and will enjoy the benefit of favourable tax changes.	
Change of Law	GGU/PPP Contract	SPC will enjoy the benefit of favourable changes of law and will receive compensation in case of adverse tax changes.	
Development of Utility Infrastructure	GGU/PPP Contract	Basic utility infrastructure such as water and electricity must be available at the project site.	
Fulfillment of Contractual Obligations by the State-owned Entities	GGU/PPP Contract	SPC may enjoy benefits from state-owned entities based on various contracts. The SPC will receive compensation if the state-owned entity and/or the government do not fulfill the contractual obligation.	The government has a restraint policy on this kind of guarantees.
Minimum Revenue Guarantee	GGU/PPP Contract	The government will guarantee the minimum level of revenue. The amount of minimum revenue guarantee shall be at the level that is manageable to SPC without any additional capital injection. Also, maximum level should be set and the excess amount shall be shared with the government.	
Guarantee for Project Acquisition	GGU/PPP Contract	For any occasion of breach of contract by the government or in the event of force majeure, if the issue is not settled within the period that has been agreed in advance, the government will	There are similar clauses in the contracts of other existing infrastructure projects in Vietnam.

		acquire the project.	
Complementary Support from the Government	GGU/PPP Contract	There may be cases that government support is required to reduce risks such as currency exchange rate risk, inflation risk, etc.	Discussion with the government is required.
Sponsor Support			
Provision of Working Capital	Sponsor Guarantee, Bank Guarantee, etc.	Usually, senior lenders will provide working capital facilities if needed. However, when senior lenders have no capability to provide such facilities, sponsors may provide loan instead.	
Complementary Support from Sponsors	Sponsor Guarantee, Bank Guarantee, etc.	There may be cases that sponsor support is required to reduce risks such as currency exchange rate risk, inflation risk, etc.	Discussion with the sponsors is required.

*Above statement is a modification of the general methods to match the current situation. Optimal approach and wordings for each actual case should be considered.

Source: JICA Study Team

Table9.2. Layer 2: Arrangements for the Management of SPC-owned Assets by Lenders

Item	Contract	Description	Notes/Issues
Cash Control Mechanism			
Registration of Foreign Loan	Registration with the State Bank of Vietnam (SBV)	Foreign loan over 12 months must be registered with SBV. It is required when executing collateral aboard.	
Currency Conversion	Currency Conversion Agreement	Determine the currency conversion mechanism using onshore bank account to convert VND to JPY and/or USD.	It is necessary to monitor continuously the movements regarding the decision of the Prime Minister which limits the currency conversion guarantee amount up to 30% of the revenue.
Onshore Security Agent	Agent Agreement	The security agent will create security over domestic assets on behalf of the lenders. Usually onshore bank becomes the agent.	Contract modification and/or new registration may be required in case of change of lenders during the composition of financing.
Offshore Security Trust	Offshore Security Trustee Agreement	The offshore security trustee will create security over offshore assets on behalf of the lenders. Usually offshore bank participating in the loan becomes the offshore security trustee, but other offshore bank which is not a lender may play the roll by giving certain incentives.	Discussion with the lenders is required.
Cash Flow Waterfall	Loan Agreement	Determine the cash flow waterfall in the loan agreement. It should define the priority	

		order of the appropriation of cash flow to each project account and the details of uses of funds for each account.	
Debt Service Reserved Account (DSRA)	Loan Agreement	Open an offshore debt service reserved account. Cash will be appropriated in advance to the account other than subordinated project accounts such as account for dividends.	
Financial Covenants	Loan Agreement	Determine the numerical target of debt service coverage ratio (DSCR) and debt equity ratio in the loan agreement. If the SPC does not meet these targets, the lender may force to stop dividend payments or may declare SPC in default.	
Shareholder Loan to be Subordinated	Intercreditor Agreement	Shareholder loan should be subordinated against senior loan.	
Collateral			
Collateralization	Registration	Registration with the National Register of Security Interests is required to define the priority order of the collateral in Vietnam.	
Collateral for the Shares of the SPC	Collateral Agreement between Lenders and Shareholders	The right of the lender to retain the ownership of the stock in case of SPC's default.	The government approval is required besides the SPC approval and the waiver of sponsors for lenders to retain the stock in Vietnam. It is impossible to obtain the approval in advance, so the problem will exist until the actual execution. The issue becomes more obvious especially when state owned entity is involved or there is any issue against the government.
Collateral for Facilities and Equipment	Collateral Agreement with the SPC	The right of the lender to retain the ownership of the facilities and equipment for the project operation in case of SPC's default.	Related facilities and equipment are limited to toll road projects.
Collateral for Land Use Rights	Collateral Agreement with the SPC	The right of the lender to retain the land use rights for continuous project operation through the project term in case of SPC's default.	It is against the law for foreign entity to set collateral on land. There have been exceptions in major past projects, but recently, the government has changed the policy and does not allow such exceptions. The main purpose in setting collateral on land is to prevent the transfer of land use rights to third parties for toll road projects.
Collateral for Major Contracts	Collateral Agreement	Collateral settings for major contracts. For toll road projects, toll collection outsourcing agreement will also be	

		important for cash flow retention.	
Step-in Rights	Collateral Agreement	The right for the lender to step in and control the SPC operation in case of SPC's default and/or poor performance.	Practically, most lenders will hesitate to step in because they do not want to take the responsibility of the project operation. In addition, the authorities may only approve the legal entity of the SPC, so the step-in rights may become invalid. Direct agreement with details of step-in process is generally signed between the government and the lenders in order to maintain the effectiveness of the step-in rights.

* Above statement is a modification of the general methods to match the current situation. Optimal approach and wordings for each actual case should be considered.

Source: JICA Study team

9.2 Outline of Terms and Conditions

A term sheet is a table of the list of main topics on contract targets, methods, terms, etc. It is often used for mutual understanding and agreement on major items of the general framework and basic conditions of the contract between parties before the official signing of the contract. Below is an outline of a draft term sheet.

Table9.3. Draft Term Sheet

	Provision	Particulars
1	Parties	- MOT (or 100% MOT owned company) as owner of the Road (***MOT***) - JVC as operator (Joint Venture Consortium: ***JVC***)
2	Term	[15 years] from the date of commencement. Expected commencement date is [*].
3	Purpose	MOT wishes to engage JVC to operate, maintain, repair, and collect toll fees on the expressway from Trung Luong to My Thuan (the ***Road***).
4	Conditions Precedent to Commencement of the O&M Agreement	- payment of security deposit by MOT [see Item 10 below]; - final approval on the completion of the construction of the Road, including confirmation that any maintenance work required to bring the already operating sections of the Road to the required standards under the O&M Agreement has been completed, as verified by an Independent Engineer appointed by the JVC.
5	Liquidated Damages	Payment of liquidated damages by MOT to JVC at a rate of [*] per day in the case of delay for any reason on the expected commencement date.
6	Payments	- JVC will be paid a fixed price per month (indexed and exclusive of VAT) as payment for performance of its operation and maintenance obligations under the O&M Agreement (***O&M Payments***). - JVC will collect all toll fees for the expressway from Trung Luong to My Thuan ([*] with approximately ( ) km of road) and a total of [*] toll booths. All toll fees collected from HCMC to Trung Luong section of the expressway will also be paid directly into an account nominated by the JVC. Within [15] days after the end of each month, the JVC will deduct and pay the O&M Payment for the relevant month [and any other payments due to JVC under the O&M Agreement] from the collected toll fees including the toll fees for the HCMC to Trung Luong section (***Total Monthly Toll Fees***) to its own account before transferring the remainder to an account nominated by the MOT (or topping up the security deposit to its required amount in the case of a failure of MOT to do so). - MOT accepts all exchange rate risk under the O&M Agreement and the amount JVC deducts from the monthly toll fees as payment of its O&M Payment will be an amount in VND such that upon conversion at its bank JVC receives a minimum of USD [*] (indexed).
7	Ramp-up Fee	[JVC must do everything necessary to enable it to commence performance of the services on

	Provision	Particulars
		and from the date of commencement. In consideration of JVC performing its obligation, MOT must pay JVC a ramp-up fee of USD [*] not later than six (6) months prior to the expected commencement date. This ramp-up fee is the only fee to which JVC is entitled in respect of its obligations under the O&M Agreement which must be carried out prior to the date of commencement.]
8	Indexation	All amounts payable to JVC by MOT under the O&M Agreement shall be indexed annually at [*].
9	Authorisations	MOT accepts all risk for, and will procure issuance of, all authorisations required to be obtained by JVC or its subcontractors to perform its obligations under the O&M Agreement including authorisation to charge the O&M Payment [and Ramp-up Fee] in USD, to receive termination payment in USD, and for the JVC to open an offshore account.
10	[Security Deposit]	Six (6) months prior to the expected commencement date, MOT will provide an unconditional, on demand and irrevocable undertaking in favour of JVC from a financial institution reasonably acceptable to JVC with a minimum short term credit rating of at least [A-(S&P)] for an amount in USD equivalent to [one year] of O&M Payments for the duration of the O&M Agreement. This amount can be drawn down by JVC in any of the following cases] / Other payments payable to the JVC under the O&M Agreement which can be deducted from the Total Monthly Toll Fees include: - to cover any difference between the toll fees received in any month and the monthly O&M Payment; - to cover any difference between the fixed USD amount of O&M Payment under the O&M Agreement and the actual USD amount received following conversion of the O&M Payment for the relevant month (if the toll fees in the relevant month are insufficient to cover such difference); - to cover any liquidated damages amounts owing to JVC as a result of a delay in the expected commencement date; - to cover any additional costs of operation and maintenance in excess of the O&M Expenses Cap; - to cover any costs arising from an unfavourable change in law affecting JVC or its investors; - to cover any costs arising from a Government Event. [MOT is required to maintain/reinstate this amount within thirty (30) days after any drawing down done on the security. JVC will be entitled to use the funds, otherwise it is payable to MOT from receipt of toll fees to top up the Security Deposit in the event MOT fails to do so within the time required.]
11	Construction Defects	JVC shall not be responsible for repair and maintenance arising from any defects in the construction of the Road (including any costs incurred for such repair and maintenance which shall be at the sole expense of MOT). JVC may, in its sole discretion, decide to draw down on the Security Deposit/deduct an amount from the Total Monthly Toll Fees in order to fund such repair and maintenance costs but JVC shall not be obligated to continue the operation and maintenance of the Road unless and until it receives the necessary additional funds from MOT.
12	O&M Expenses Cap	JVC shall only be required to spend up to the equivalent of USD [*] (calculated using the exchange rate published by [*]) per month on operation and maintenance of the Road (***O&M Expenses Cap***). Any additional maintenance costs required above this cap shall be at the sole expense of MOT. JVC may, in its sole discretion, decide to draw down on the Security Deposit/deduct any amount from the Total Monthly Toll Fees in order to fund such additional maintenance but JVC shall not be obligated to continue operation and maintenance of the Road unless and until it receives the necessary additional funds from MOT.
13	Scope of Services	JVC shall be responsible for the following Core Services [*for example*]: - maintaining the pavement (concrete surfaces); - maintaining the drainage (kerbing and gutters, catch, berm and table drains, inlet and outlet batter drains, drainage pits, underground drainage, detention and sedimentation basins, and subsoil drains); - maintaining the road furnishings (road markings, non-pavement delineators, signposting (regulatory and warning; direction and guide), guard fencing, noise barriers, motorway lighting); - maintaining the roadside and median (batters, median areas, retaining walls, fences,

	Provision	Particulars
		roadside landscaping); - maintaining the bridges (superstructure, substructure); - maintaining the buildings such as the control centre (structure, plumbing, electrical, and firefighting equipment); - operating and conducting [electronic] toll collection booths including road side equipment; - maintaining communication cables; - conducting electronic traffic management; and - conducting miscellaneous activities (including hazardous chemical and material spills, road surface cleaning, litter and rubbish collection, and control of noxious weeds). Additional services include [*for example*]: - repair of the surface of the motorway; - major repairs and replacements (i.e., those that do not otherwise fall within the Core Services); - improvement and expansion (i.e., modification or upgrading of the motorway that do not otherwise fall within Core Services); and - repair of any damage to the motorway arising from an activity permitted by the MOT and undertaken by MOT or under its direction.
14	Changes in Scope	MOT and JVC will agree on two "margins" which will be applied to changes in services (one for additions and a lesser one for omissions). The margins will include all overhead and indirect costs and a profit margin. Both parties must agree to any changes in scope.
15	Key Performance Indicators	Key performance indicators [*for example*]: - lane availability; - incident response; - routine and periodic inspections; - road condition; and - landscaping.
16	Monthly Reporting	JVC must, no later than two [2] business days after the end of each month, give MOT a monthly report including details with respect to the previous month including: - the progress of the Services; - the progress of any major repairs or replacement performed and the impact on traffic conditions; - safety and accident statistics for the Road; and - toll fees collected.
17	Forecast and Budget	JVC must prepare and provide to MOT not later than forty [40] business days prior to the end of each calendar year during the Term: - a yearly forecast and recommended program for major repairs and replacements and improvement and expansion to be undertaken by JVC (or its subcontractors) in the next financial year; and - a five [5] years program of expected major repairs and replacements and improvements and expansion.
18	Sub-contracting	JVC may subcontract all or part of the work under the O&M Agreement without the consent of MOT. However, by subcontracting all or any part of the work under the O&M Agreement, JVC is not relieved from any liability or obligation under the O&M Agreement.
19	Access	Not later than six [6] months prior to the expected commencement date and for the Term MOT will provide JVC and its subcontractors including access to the Road and any other area necessary to allow JVC and its subcontractors to perform the Services.
20	Change in Law	MOT accepts all risk for change in law and will indemnify JVC and its investors for any loss [etc] arising from any unfavourable change in law (including a change in tax).
21	Events of Default	Events of Default by JVC are defined to be: - a material breach of a contractual obligation (except to the extent caused by MOT or a force majeure event); - a suspension of Services without cause; - an event of insolvency occurs in relation to JVC.

	Provision	Particulars
		Events of Default by MOT are defined to be: - a material breach of a contractual obligation (except to the extent caused by JVC or a force majeure event); - a failure to provide or maintain security in accordance with the O&M Agreement/a failure to pay on a monthly basis all toll fees collected for the HCMC to Trung Luong section of the expressway directly to the account nominated by the JVC within five [5] days after the end of the relevant month; - a failure to make payment of any amounts due and payable within ten [10] business days of service of a written demand; and - a Government Event.
22	Government Event	To include events such as: - act of war in Vietnam territory; - nationalisation of the Services prior to the end of the Term; - revocation or failure to issue or renew any Government Authorisations by any government body; - any change in law unfavourable to JVC or its investors not compensated under the change in law regime in the O&M Agreement; - any failure by a government body to enforce an arbitral award or the MOT to honor an arbitral award rendered under any Project agreement; and - discovery of any unexploded ordnance or contamination on/under the Road. MOT to indemnify JVC, its investors and its subcontractors against any additional cost, loss or damage suffered arising from a Government Event, including costs incurred for taking steps to mitigate the effects of the Government Event.
23	Termination	The O&M Agreement will be terminated earlier of: - the end of the Term; - termination of the O&M Agreement for an Event of Default; and - termination of O&M Agreement in the case of a force majeure event that wholly or partly prevents MOT, JVC, or its subcontractors from exercising their rights or performing their obligations under the O&M Agreement (or in the case of the subcontractors, under the relevant contract with JVC) for more than ninety [90] days (only exercisable by JVC) (***Extended Force Majeure Event***). In the case of termination of the O&M Agreement at the end of the Term, JVC agrees to transfer all its assets relating to operation, maintenance, and collection of tolls of the Road to MOT free of charge. [*This transfer will be subject to transition and final handover provisions.*] [In the case of a JVC Event of Default, MOT has the right (but no obligation) to step-in (upon reasonable notice, unless in an emergency) and remedy events of default of JVC at JVC's expense. In case of termination by MOT for the JVC Event of Default, JVC must transfer all its assets relating to operation, maintenance, and collection of tolls of the Road to MOT. MOT shall pay a termination payment of USD [*] (indexed) as payment for the transferred assets payable in USD into an offshore bank account nominated by JVC.] In case of termination by JVC for MOT Event of Default or Extended Force Majeure Event, JVC will transfer all its assets relating to operation, maintenance, and collection of tolls of the Road to MOT and will be entitled to a termination payment of [USD [*] (indexed)] / [USD [*] (indexed) multiplied by the number of remaining years of the Term under the O&M Agreement] as payment for the assets transferred and costs associated with such early termination, payable in USD into an offshore bank account nominated by JVC. The sole and exclusive remedies available for termination of the O&M Agreement shall be those set out above as appropriate to the relevant circumstances.
24	Liability Cap	JVC's liability to MOT under or arising from the O&M Agreement is limited to an amount equal to (in aggregate) twelve [12] months of scheduled future O&M Payments (calculated at the time of the claim).
25	Governing Law	Vietnamese Law
26	Dispute Resolution	Singapore International Arbitration Centre [SIAC] in Singapore
27	Waiver of Sovereign	To the extent that MOT may be or may hereafter become entitled, in any jurisdiction, to claim for itself or its property, assets or revenues immunity (whether by reason of

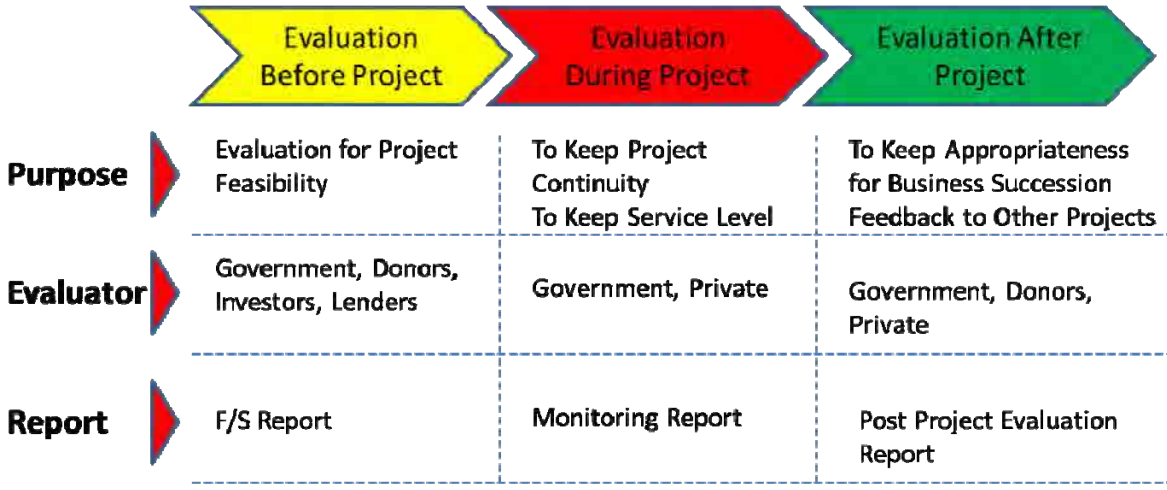
	Provision	Particulars
	Immunity	sovereignty or otherwise) in respect of its obligations under the O&M Agreement from service of process, suit, jurisdiction, or any court judgement, order, award, attachment (before or after judgement or award), set-off, execution of a judgement or other legal process, and to the extent that in any such jurisdiction there may be attributed to MOT or the State of Vietnam or any of its property, assets or revenues such an immunity (whether or not claimed), MOT on behalf of itself, the Government and the State of Vietnam hereby expressly agrees not to claim and hereby expressly waives such immunity to the fullest extent permitted by the laws of such jurisdiction.

Source: JICA Study Team

CHAPTER 10 OVERALL EVALUATION

10.1 Cycle of Project Evaluation

Project evaluation for PPP project is generally done before implementation of the project, during execution of the project, and after completion of the project. Figure 10.1 shows the cycle of project evaluation. This report is equivalent to the evaluation before implementation of the project. This chapter shows the results of the project evaluation for Option 7 which is assessed as the most feasible scheme.



Source: JICA Study Team

Figure 10.1. Project Evaluation Cycle

10.2 Indicators for Project Evaluation

Table 10.1 shows the indicators for project evaluation from the technical, economical/financial, socio-environmental, and institutional prospects. Indicators are set for before implementation of the project, during execution of the project, and after completion of the project.

Table10.1. Indicators for Project Evaluation

Evaluation Items	Before Project	During Project	After Project
Technical	● Appropriateness of plan, design, and mechanical equipment ● Appropriateness of construction method ● Appropriateness of O&M	● To see if the condition of the Road and O&M satisfied the Key Performance Indicator (KPI) stipulated in the contracts[42]	● Appropriateness of asset handover to government ● Appropriateness of O&M manual
Economical/ Financial	● EIRR（If it is higher than Social Discount Rate at 12%） ● Project IRR (If it is higher than the hurdle rate at 15%) ● Value for Money (VFM)（If it is positive）	● Profitability: Return on Assets (ROA) (e.g., Higher than 1.2?） ● Liquidity: Current Ratio (e.g., Higher than 1.1?） ● Stability：Capital Ratio (e.g., Higher than 20?)	● EIRR（If it is higher than Social Discount Rate at 12%） ● Project IRR (If it is higher than the hurdle rate at 15%) ● VFM（If it is positive）
Socio-environmental	● Compatibility to the environmental and social consideration manual	● Compatibility to the environmental and social consideration manual	● Compatibility to the environmental and social consideration manual
Institutional	● Consistency with PPP related laws and regulations ● Clearness and appropriateness of the organizational structure and role allocation for government, PMU, and private company ● Clearness and validity of risk allocation and mitigation method of risks	● Appropriateness of management for amendment of laws and regulations ● Appropriateness of management for the changes in organizational structure ● Appropriateness of risk management	● Consistency with PPP related laws and regulations ● Appropriateness of the organizational structure of the government after asset handover ● Clearness of risk allocation at the end of project

Source: JICA Study Team

[42] According to the interview conducted with Cuu Long CIPM, there is no KPI for toll road in Vietnam. KPI for toll road is in the process of preparation.

10.3 Results of the Project Evaluation before the Project

Table 10.2 shows the results of the project evaluation before project execution.

Table10.2. Results of the Project Evaluation before Project Execution

Evaluation Items	Evaluation Indicators before Project Execution	Results of the Evaluation	
Technical	● Appropriateness of plan, design, and mechanical equipment ● Appropriateness of construction method ● Appropriateness of O&M	○	● Appropriate plan, design, and construction method for soft ground are taken. ● Issues on integrity of the Intelligent Transportation System (ITS) equipment between HCM-TL ITS remain. ● O&M plan is appropriate.
Economical/ Financial	● EIRR（If it is higher than Social Discount Rate at 12%） ● Project IRR (If it is higher than hurdle rate at 15%) ● VFM（If it is positive）	◎	● EIRR is 15% which is higher than the social discount rate. This Project is viable in terms of socioeconomic point of view. ● Project IRR is 15% and financial feasibility is high. ● Option 7 saved government spending in large amount as compared to Option 5.
Socio-environmental	● Compatibility to an environmental and social consideration manual	○	● The proposed plan is based on environmental and social consideration manual. ● There is a possibility of protests on land acquisition.
Institutional	● Consistency with PPP related laws and regulations ● Clearness and appropriateness of organizational structure and role allocation for government, PMU, and private company ● Clearness and validity of risk allocation and mitigation method of risks	△	● Since Option 7 is not an ordinal PPP scheme, it does not exactly fit the existing PPP related laws and regulations. However, there is a certain possibility that it will be approved based on special mechanism. ● Private sector will not shoulder demand risk, which makes it easier for them to participate in the Project. However, risks such as delay of payment from government, lack of integrity on the interface between public and private construction portion.

Source: JICA Study Team

The proposed Project (Option 7) is economically and financially feasible. However, the project scheme is not an ordinal PPP scheme. Therefore, its approval as a special mechanism would depend on the decision of the prime minister. In terms of the technical points of view, the characteristics of this Project such as the soft ground were very well considered in the plan and design; however, the integrity of the ITS equipment remains an issue of concern. From the view point of risks such as delay of payment from the government and lack of integrity on the interface between public and private construction are high concerned. Those risks would affect the possibility of the participation of private sector in this Project. Also, the plan and design are based on environmental and social consideration guideline; however, there is a possibility to encounter the resistance to land acquisition.

As overall evaluation, there is a possibility for the Project to be feasible although there are some issues that need to be addressed.

10.4 Benefits that Each Stakeholder will Receive from the Project

Table 10.3 is the summary of the benefits that each stakeholder will receive from this Project. The results of the study showed that the GoV, investors, donors, and users will receive benefits from this Project.

Table10.3. Benefits of Each Stakeholder

Stakeholders		General Benefit of Project	Specific Benefit of Proposed Scheme (Comparison between Option 4 and 7)		
			Financial Impact	Risk	Overall Evaluation
GoV		◎：To achieve policy goal with socio-economic development	◎：Gov't can get higher financial benefit (NPV increase -2,693 ⇒-1,006bil VND)	△：GoV will shoulder Demand Risk	○：GoV will shoulder demand risk and GoV's debt Increase; however, high income will cover those.
Investor	Local	○：To have more business chance	◎：Project IRR of Option 7 is higher than that of Option 4(10%⇒15%)	◎：Demand risk would be exempted	◎：Financial return increase. Also, able to get rid of demand risk.
	International	○：To have more business chance	◎：Same as above	◎：Same as above	◎：same as above
Donors (Lenders)		◎：To achieve policy of donors	◎：Minimum DSCR of Option 7 is better than 5 (-1.9⇒1.7)	◎：Default risk of SPC would be reduced	◎：Business of SPC will be more stable and less chance of bankruptcy
Users		◎：to Reduce travel time and costs	○：Since total cost can be reduced by Option 7, tariff increase would be hold low.	NA	○：Possibility to enjoy lower tariff

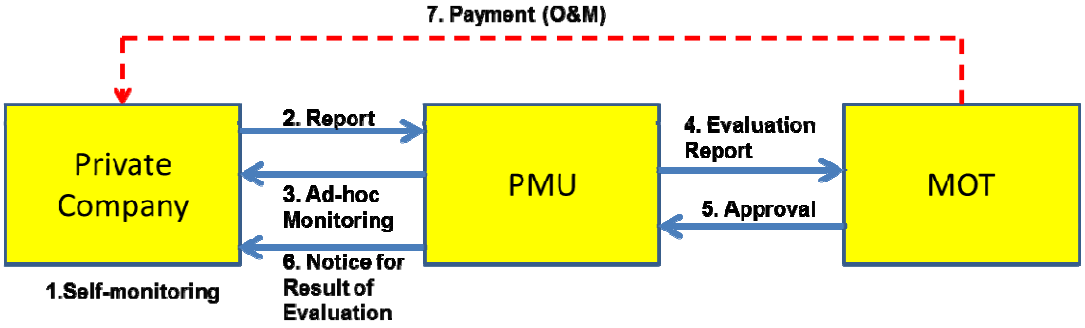
Source: JICA Study Team

10.5 Example of a Monitoring Method during Project Period

Figure10.2 shows an example of a monitoring method during project period. Basically, daily monitoring would be done by a private company (1), and the private company will prepare a monitoring report and submit to PMU (2). Generally, various reports such as monthly report, semi-annual report, and annual report should be prepared. The PMU would conduct periodical and ad-hoc monitoring to check the validity of the monitoring report prepared by the private company (3). The results of the evaluation conducted by PMU would be reported to MOT (4). If the result of the evaluation is approved by MOT, the private company will be notified (5)(6). MOT would pay the fee for O&M. (7)[43]. If the results of the monitoring concluded that the service from the private company does not satisfy the required service level based on the

[43] Beside O&M fee, the costs for maintenance facility such as ITS need to be paid to private company; however, those fees would not be a target for performance based payment since the ownership of the facility would be transferred to public right after completion of construction and installment. Private company has a responsibility for indemnity. Also, it is more realistic that tariff collection would be done by private company, and private company would transfer the toll tariff after subtracting the necessary O&M costs and installment, detailed performance mechanism needs to be concerned when draft contract is prepared in order to make performance based payment effective.

contract, the amount of payment to the private company should be deducted based on the formula stipulated in the contract.



Source: JICA Study Team

Figure 10.2. Example of Monitoring during Project Period

The abovementioned monitoring can be done based on the Key Performance Indicator (KPI) which shall be set when the contract is made. Table 10.4 is an example of a KPI which is part of the KPIs for "safety". Currently, there is no KPI for O&M in Vietnam but it is expected to be developed in the near future.

Table10.4. Example of KPI

Kind of Performance	Key Performance Indicators	Level of Service	
		HCMC - TL	TL - MT
Safety	Number of traffic accidents, Traffic accident ratio	TBD	TBD
	Pavement evaluation condition: Rutting depth (25 mm), Skid resistance (0.25), longitudinal profile (PrI 90 cm/km by 8 m profile), cracking ratio (20%), size of pothole (D = 20 cm)	TDB	TBD

Source: JICA Study Team

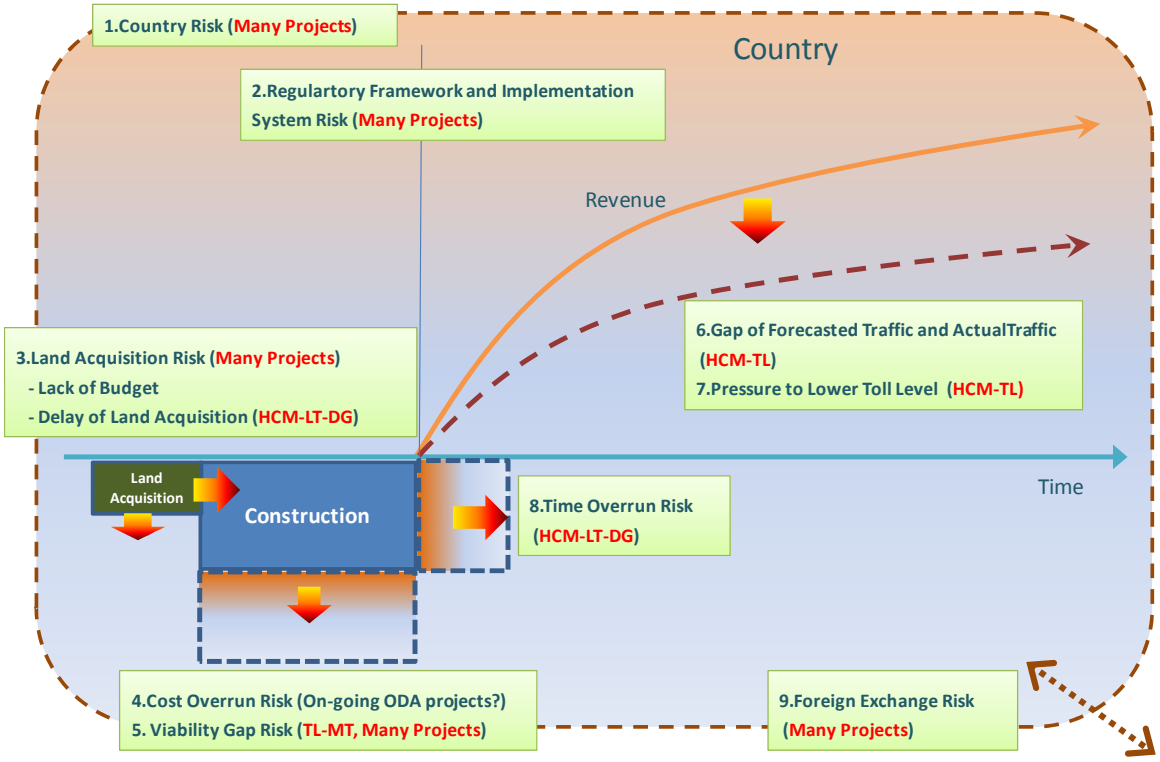
CHAPTER 11 RECOMMENDATION ON INVESTMENT PROMOTION MEASURES FOR VIETNAM EXPRESSWAY PROJECTS

11.1 Proposal on Investment Promotion Measures

11.1.1 Existing Project Risks in the Expressway Sector of Vietnam

There are various project risks already existing in the expressway sector of Vietnam as illustrated in the following figure, for which private sector investors throughout the world recognize as critical and need some kind of risk mitigation measures.

The risks are i) financial viability gap recognized in many expressway projects, ii) delay in the completion of expressway construction due to land acquisition, iii) delay in land acquisition due to deficiency of fund and budget allocation for land acquisition cost, iv) gap between forecasted traffic level and actual traffic, v) forced toll decrease of already opened expressway due to protest and complaint from trucking association, vi) capping on the limit of government guarantee on foreign currency conversion, and so on.



Source: JICA Study Team

Figure 11.1. Existing Project Risks in the Expressway Sector of Vietnam

11.1.2 Risk Management Measures for Existing Risks

(1) Country Risks of Vietnam

There are various country risks in Vietnam which includes risks associated with regulatory framework and implementation and administrative capacity of materializing private sector participation in expressway projects. However, in the area of financing, low rating of foreign

currency borrowing of Vietnam (rated as B2, speculative in Moody's). Based on a number of interviews with foreign commercial banks, their basic recognition is that uncovered Vietnamese risk could not be taken in the foreign currency lending. If they are to extend lending in foreign currency, the condition is that i) guarantee by MOF, ii) 100% foreign exchange guarantee, and iii) risk cover of ECAs must be obtained (e.g, SMBC lending to Hanoi Hai Phong Expressway Project, although it is said to be a special case). Even for Petro Vietnam with sufficient foreign currency revenue, the foreign commercial banks would take uncovered country risk of up to three to five years in foreign currency lending. As such, it seems unlikely for the foreign commercial banks to extend foreign currency lending to privately financed expressway projects in Vietnam.

In terms of mitigating this kind of country risk in financing aspects, available options are to use financing such as the private sector loan of donors and international financial institutions which could cope with such risks in Vietnam.

(2) Accuracy of Traffic Forecast and Network Risk

First of all, the traffic forecast of green field expressway would involve risk associated with the accuracy of traffic forecast as illustrated in Figure 11.2. This is a result of the study conducted by Standard & Poor's in 2005, collecting 104 samples (concession based expressway, tunnel, and bridge projects) and surveyed the difference between the traffic forecast level by the original F/S and actual materialized traffic level. As a result, the average difference of the 104 samples was 0.77 with standard deviation of 0.26, explaining that the traffic is likely to be overestimated by about 23%. Together with this kind of forecast accuracy risk, there is also network risk as described below.

Conservative base case is usually to be set on the basis of analyzing these network elements and connection conditions, and analyze possible down side cases of the network risk.

If it is difficult to control network risks of this kind, government guarantee for compensation of down side risk may be necessary. Furthermore, if it is difficult to set guarantee and contract conditions for each network risk element properly, mechanism of minimum revenue guarantee may be needed.

In this kind of situation, the issue of country risk is important because even if Vietnamese government agrees to extend the abovementioned minimum revenue guarantee mechanism, private sector investor would tend to question about effectiveness of such guarantee. Moreover, securing fund source for such guarantee as the government has difficulty in allocating state budget for land acquisition cost, which is a prerequisite for donor fund procurement, thus, the mechanism itself is not likely to work as proposed.

To solve this problem, it is necessary to structure a project scheme which could simultaneously solve the problem by proposing how to secure the funding for potential compensation payment of the minimum revenue guarantee mechanism.

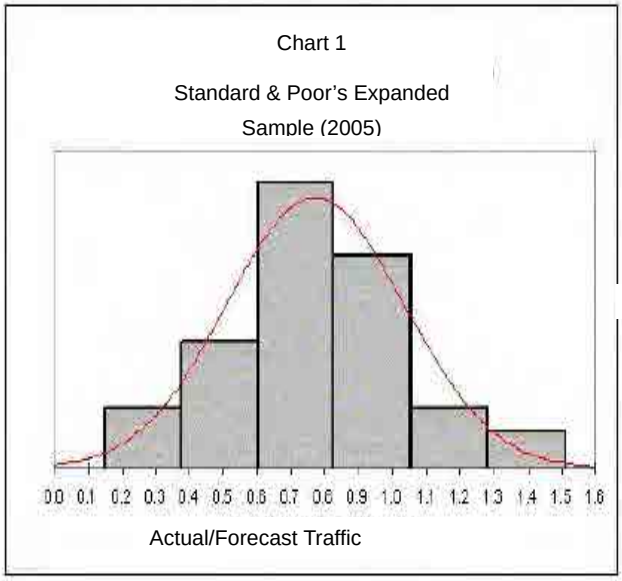
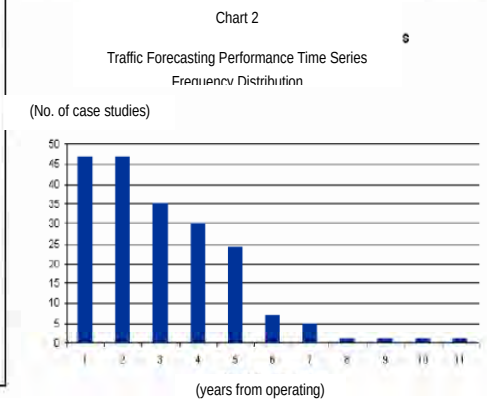


Table 1

Forecast Performance Distribution Statistics For Years 1-5

Years from opening	Mean	Standard deviation
Year 1	0.77	0.26
Year 2	0.78	0.23
Year 3	0.79	0.22
Year 4	0.80	0.24
Year 5	0.79	0.25



Source: Traffic Forecasting Risk Study, Update 2005: Through Ramp-Up And Beyond, Standard and Poor's, August 25, 2005 (104 concession based road, tunnel and bridge)

Figure 11.2. Accuracy of Traffic Forecast for Green Field Concession Based Expressway Projects

(3) Land Acquisition Risk

These are the following three types of risks for land acquisition:

① Fund Deficiency Risk

② Budget Allocation Risk

③ Delay Risk in Land Acquisition Procedure

As regards to the land acquisition risk in Vietnam, the fund deficiency risk is being materialized as allocation of budget as a prerequisite for donor fund procurement (the local portion: counterpart fund) is facing difficulty and becoming a significant obstacle for project implementation. This could be an obstacle for privately financed project since this Project, in similar manner, is assuming the procurement of the donor fund.

In the same manner as the proposal on source of funding for the risk cover as mentioned above, it is necessary to propose proper methodology on how to procure fund source for this land acquisition cost to move the process forward.

Naturally, financing of this funding must be done directly by the government. At present, possible method would be such method as issuance of JBIC guaranteed Samurai bond by GOV in the Japanese market (the GATE scheme), co-financing with donor funds which could cope with financing of land acquisition cost and so on.

Budget allocation risk could be technically avoided if the budget allocation is linked with the funds to be procured in the abovementioned process. However, it is worthwhile to examine if other issues exist in relation to budget allocation risks.

For private investor, delay risk in land acquisition process must be separated and isolated

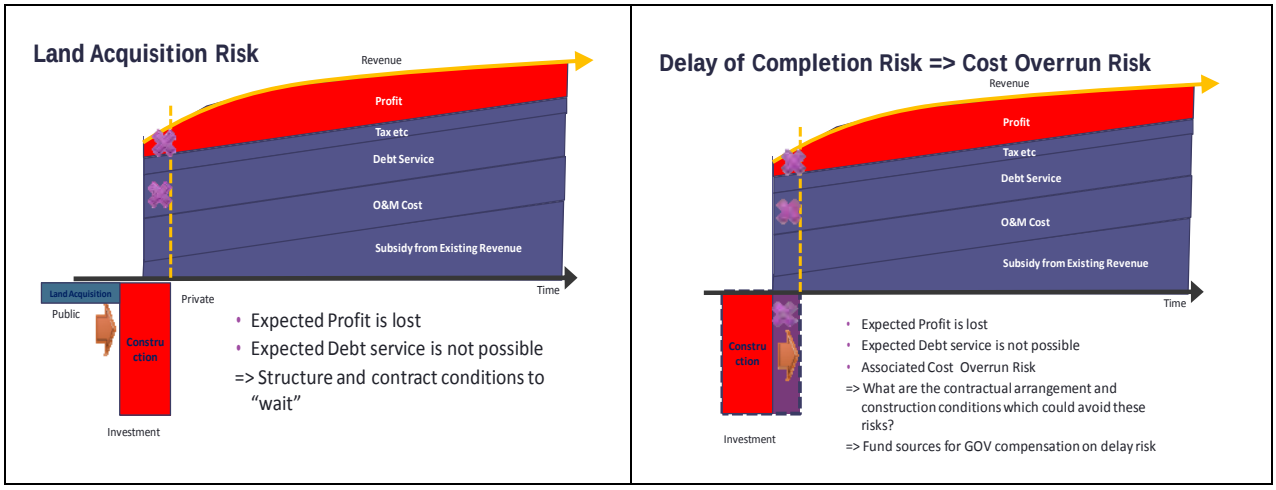
from the completion of the expressway construction. Therefore, consideration on the project structure and contract conditions are necessary such as making the completion of land acquisition as prerequisite for investment, MOU with exit option for private investor and the like.

(4) Cost Overrun Risk

Cost overrun risk (increase of construction cost) is generally recognized as a risk for private sector investor. It is considered important for private sector investor to manage this risk since such risk is actually occurring in on-going construction of a number of expressway sections funded by ODA funds. Ultimate control of this risk is considered very difficult since it is closely related with the capability of country's inflation management. However, it should be critical to verify the existence of contractors who would accept fixed price, date certain, lump sum, turn key contract condition, strict conditions of prequalifying contractors, cost management, and compensation mechanism by government based on super inflation clause.

(5) Time Overrun Risk

Time overrun risks (delay and completion risks) occur due to land acquisition and insufficient capacity of contractor and are actually occurring in many on-going constructions of expressway sections. If the risk occurs due to government causes, it is necessary for the Vietnamese government to procure funding to cover compensation of such risk. It has been generally practiced in Vietnam in the past to cover such risk by extending the length of concession period, but it is not essentially appreciated and recognized as an effective measure in covering such risk. Therefore, it is essential to propose simultaneously the method of fund procurement for the back up funding.



Source: JICA Study Team

Figure 11.3. Land Acquisition Risk and Time Overrun (Delay in Completion) Risk

(6) Interface Risk of Public Funded Section

If the project scheme is structured with simultaneous opening of public funded section, private sector investor may face such risks as i) delay in donor fund procurement process, ii) delay in completion => back up funding by government for compensation, and iii) difficulty in reflecting intentions and specifications to the donor funded section in terms of facility and functions. Especially for time overrun risks which are already occurring in the on-going construction of donor funded expressway sections, it may be necessary to secure the back up

funding for government compensation, thus, in parallel, a simultaneous proposal of fund procurement may be necessary.

11.1.3 Problems Hindering Private Sector Investment

At present, the problem which is hindering private sector investment in the expressway sector is the fact that the Vietnamese government is reluctant to extend risk coverage and mitigation measures which have been tested effective in the experienced foreign markets. Moreover, it includes the associated government guarantee and undertaking to those risks which are already occurring in the expressway sector of Vietnam due to fund deficiency in the government. Therefore, even if the Vietnamese government tries hard to solicit private sector investment (especially from oversea) in the Vietnamese expressway projects, the government would naturally end up having no private sector investment in the expressway projects especially from overseas.

11.1.4 Proposal of Private Sector Investment Promotion Measures

(1) Proposal of Three Promotion Measures

To solve this problem and to facilitate the investment in the expressway sector of Vietnam, the following three measures are proposed:

(i) Limited assumption of project risks by private sector;
(ii) Simultaneous proposal of market tested risk covering measures together with back up funding for risk coverage; and
(iii) Application of "waiting room approach".

1) Promotion Measure 1: Limited risk assumption by private sector

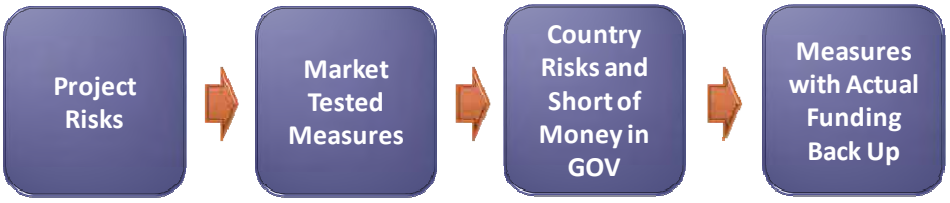
There is no rationale to invite private sector investment by involving huge sacrifice and cost for such expressway section which has low traffic demand level and with large network risk that needs excessive viability gap support from the government. Therefore, construction and traffic risk should be assumed by the government and then allow the private sector to use the completed expressway facility with limited degree of risk assumption (such as small investment and risk of business performance), and solicit private sector participation. Under the above mentioned circumstances, this kind of approach is logical and reasonable with higher value for money to the government as a result. Representative example of this approach is the O&M Concession Scheme proposed at this time.

2) Promotion Measure 2: Simultaneous proposal of market tested risk covering measure together with back up funding for risk coverage

As mentioned earlier, there are specific project risks which are commonly recognized in the expressway sector throughout the world. These includes methodologies for covering and mitigating those project risks which have been already tested in many experienced markets and conducted and proven to be effective to solicit the private sector investment in expressway projects. The problem in Vietnam is that because of its low country risk rating together with deficiency of funding in the government, even if the government is to extend promise and guarantee to the private sector investor, it may not be workable and effective (especially to private sector investor and to international lender) without back up funding support.

Therefore, it is necessary as illustrated in the following figure that when structuring a project scheme mechanism for project risk coverage with back up funding should be simultaneously

proposed by the investor.



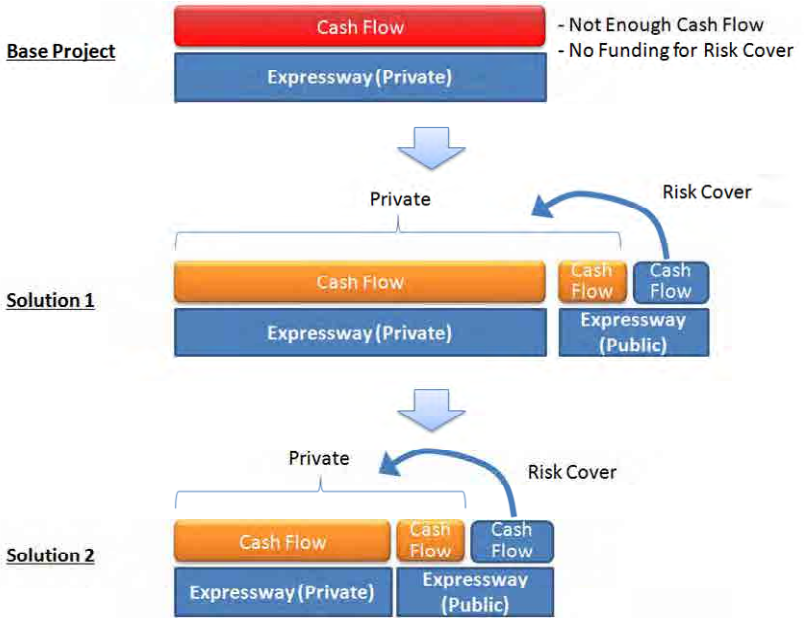
Source: JICA Study Team

Figure 11.4. Formulation Procedure for Promotion Measure 2

As shown in Figure 11.5, when profitability of base case of the project is assessed to be lower than the expected level of private sector investor, total profitability could be improved by letting the private sector enjoy additional revenue form neighbouring expressway section which is to be funded and constructed by the public sector as viability gap funding. In this case, simply filling the gap to attain the expected profitability is not enough. There would remain various project risks to be covered for securing sustainability of the project which is an essential issue to be considered. Many of such risk coverage measures require government guarantee, however, because of low country risk rating together with fund deficiency in the government, appropriate risk coverage measures have not been accepted by the government. This is the most critical problem which the Vietnamese expressway sector is now facing.

To this end, proposal of appropriate risk coverage measures with government guarantee need back up funding on the government side. An example of the methodology to solve this problem is illustrated in Figure 11.5. Particularly, additional expressway section is to be funded and constructed by the government and a part of the revenue generated from that section is to be pooled into a fund (or a bank account). When actual risk occurs, the money pooled in the fund would be used to pay associated compensation agreed beforehand in the project contract.

If the original project (Base Case) has a neighbouring expressway section, that section could be utilized as described above. If not, the original expressway section could be divided appropriately so that one divided portion is subject to private sector investment while the other portion is to be partly used for revenue generation for profitability improvement of the private sector investment and partly used for pooling its revenue into the fund.



Source: JICA Study Team

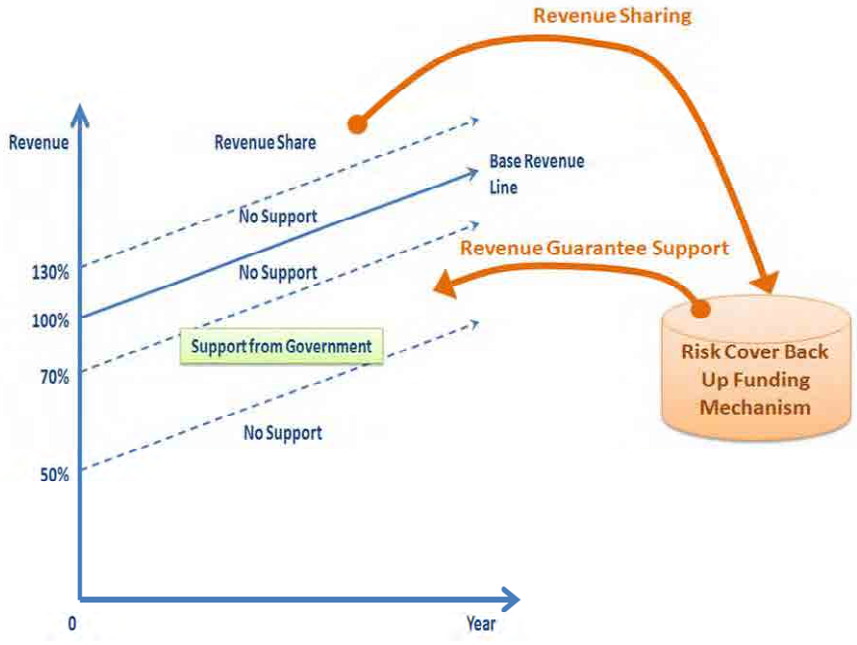
Figure 11.5. Securing Back Up Funding for Risk Coverage in Structuring Project Scheme

The most critical problem of green field expressway project is that the accuracy of traffic forecast is uncertain and at the same time ramp up risk of traffic growth exists. There is no private sector investor who would take such risk without risk coverage throughout the world. In addition, there exists the risk of toll increase in the long run.

Shown in Figure 11.6. is the mechanism of minimum revenue guarantee which is one of the risk mitigation measures for this risk which has been practiced and proven effective. In this mechanism, base revenue line is to be determined on the basis of conservative traffic forecast. If the revenue decreases by 30% from the base line government, compensation is to be made for the deficient portion, whereas, if the revenue increases by 30% from the base revenue line, the surplus portion would be shared between the investor and the government based on pre-agreed rule in the contract. Many experienced countries have adopted this mechanism and have been successful in facilitating the private sector investment in the expressway sector.

To apply this mechanism in Vietnam the effectiveness of government guarantee is an issue. When the country risk rating is speculative and fund deficiency exists inside the government to secure budget for the government guarantee, it is likely that not only the equity investor but also financiers to provide loan will be willing to examine the possibility of such lending based on the government guarantee.

Therefore, it is necessary to propose the methodology for procuring the back up funding when this minimum revenue guarantee mechanism is to be applied in Vietnam for it to work effectively. This is the methodology mentioned earlier in which a part of revenue from the public funded section is to be pooled in the revenue stability fund and will be used for compensation payment of the minimum revenue guarantee.



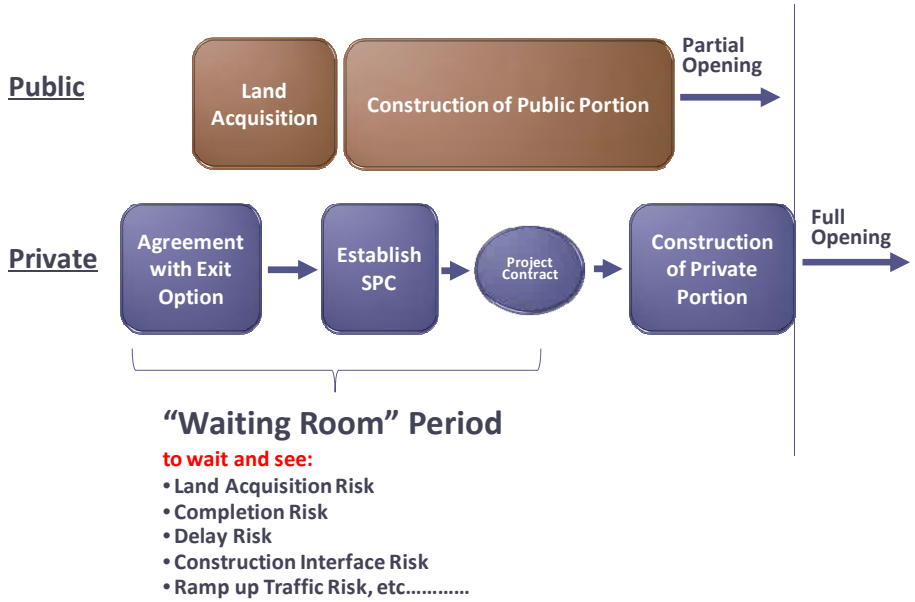
Source: JICA Study Team

Figure 11.6. Minimum Revenue Guarantee Mechanism and Establishment of Risk Coverage Fund (Revenue Stability Fund)

3) Promotion Measure 3: Application of "Waiting Room Approach"

Most of the project risks for a green field expressway project which private investor is unable to take are the risks of not generating cash flow from the expected time of the opening due to delay in land acquisition and construction, and the traffic not reaching the projected level or not ramping up as expected. If the private sector investor would wait and witness the occurrence of those project risks and taking the risks after confirming that it would be minimal in the initial phase, management of such project risks would be possible.

This third promotion measure is tentatively called as "Waiting Room Approach". As illustrated in Figure 11.7., the investment could adopt a wait-and-see approach ("grace period" of risk taking). For example, land acquisition and construction of the public funded section could be commenced preceding the private sector investment. Consequently, the private sector investor could wait and see and assess those project risks in the initial phase. Moreover, if the tentative MOU based agreement could lead to the effectivity of the official project contract after confirming that those project risks are avoidable or manageable and would have minimal effect on the project, then the investor could establish an SPC and commence construction.



Source: JICA Study Team

Figure 11.7. Example of "Waiting Room Approach"

11.2 Analysis for the Financing Structure of Land Acquisition by GOV

(1) Background of this Analysis

On August 16, 2012, the Interim Report Presentation was held at the meeting with the MOT, chaired by Mr Dong, Vice-Minister of MOT. In this meeting, after the presentations made by the JICA Study Team, Mr. Dong requested to work on this analysis, i.e., the efficient financing is the crucial issue for the GoV to undertake its responsibility for the land acquisition of the expressway.

In the report, the JICA Study Team recommended to particularly introduce the international donor loan scheme for the construction of TL–MT Expressway. However, it was estimated at approximately USD 8 billion, mostly for the costs related to the land acquisition and GoV has to prepare the counterpart fund requested as stated in the donor loan procedure. It was requested with the JICA Study Team, in coorperation with Cuu Long CIPM, to seek for the efficient financing structure of the counterpart fund.

The background of this analysis is summarized in the notice by MOT (No.499/TB-BGTVT) dated August 27, 2012 as shown below:

> 3. For financing options:
>
> - (omitted)
> - JICA Study Team is suggested to study more financing options in the following directions:
>   + (omitted)
>   + Cuu Long CIPM will seek for funding via concessionary commercial lending sources (OCR, etc.) and local funding resources (other investors will be involved in a joint venture with Cuu Long CIPM). <u>All sources of funding shall be minimally equivalent to the counterpart funds.</u> The remaining funds will be mobilized by the government via ODA loan (ADB and/or JICA).

Source: MOT Notice (No.499/TB-BGTVT) dated August 27, 2012 in Hanoi
English translation by Cuu Long CIPM、underlined by JICA Study Team

(2) Build and Transfer (BT) Scheme Proposed by Cuu Long CIPM

In response to the notice by MOT, Cuu Long CIPM proposed the introduction of BT scheme to replace the donor loan in the Option 4 structure recommended by the JICA Study Team.

- Besides the ODA scheme for the remaining portion of the project, prepare BT scheme, in which SPC will invest by BT scheme and the government will repay money to SPC (like the Deo Ca Tunnel Project).

Source: Letter by Cuu Long CIPM to JICA / Office for Private Sector Partnership dated September 4, 2012 (No.3293/CIPM-DT)

Unlike the BOT scheme, SPC does not undertake the operational risk, which consists mostly of the traffic volume risk in BT scheme.

It was popular in the BT scheme in Vietnam that the development right is granted in the surrounding area to compensate the immediate transfer of the expressway to the government after construction. However, after the fall of the Lehman Brothers, which triggered the global financial crisis in 2008, the development rights became no longer attractive and the deferred payment by the GoV for the construction costs was mostly replaced with BT transactions. As refered in Cuu Long CIPM's letter, the "Deo Car Tunnel Project" was also a BT structure with deferred payment.

The advantage of private sector investors in the BT scheme with deferred payment is to avoid the traffic volume risk from the fixed amount payment by the GoV. On the other hand, the advantage of GoV is to defer the payment of the total project cost including the land acquisition in the future, which can be mostly covered by the toll revenue of the expressway. Unlike the donor loan, no initial payment such as "counterpart funding" is required.

In the BT scheme proposed by Cuu Long CIPM, there is no need for GoV to prepare the counterpart fund of approximately USD 8 billion, but it is necessary to find private sector investor(s) who is willing to invest in the Cai Lay –My Thuan section with a total project cost of USD 530 billion. However, it seems quite difficult in the current global financial environment.

(3) Borrowing from Banks in Vietnam

The credit ratings for GoV are quite severe as BB-(S&P) and (Moody's) and it seems difficult to borrow from international commercial banks under the current financial market, which is damaged by the European public debt crisis. It is also confirmed by market sounding to Japanese banks in Vietnam that the credit exposure is limited to the subsidiaries of large Japanese corporate and local portions are marginal even with sovereign guarantee. It is difficult to structure a project financing, including land acquisition cost without the credit enhancement by Export Credit Agency (ECA) of developed countries.

In this context, the JICA Study Team studies idea of borrowings from the local banks. Generally, the local banks seem to have an advantage for the land acquisition finance because the transaction is carried by local currency, unlike the imported construction materials. Moreover, there is no notion of country risk of GoV for the local banks in Vietnam. The JICA Study Team may expect that the land acquisition finance guaranteed by GoV is a suitable transaction for local banks. On the other hand, it is often said that the bankers in project finance are generally prudent in transactions with their own country to avoid political intervention. Therefore, the JICA Study Team approached local banks by indicating the specific transaction of "Deo Car Tunnel Project", which was mentioned in the previous sub-chapter as bench mark of the proposed transaction.

■ Travel time reduced to 1/4 Car Pass Tunnel
The construction of Car Pass Tunnel, with a total project cost of USD 750 million is expected to start in the fourth quarter of 2012. The tunnel will be constructed both by Build, Operate, and Transfer (BOT) and Build and Transfer (BT) schemes by connecting Phu Yen and Khanh Hoa.
The investor, Car Pass Investment, plans to start construction in 2012 and complete it in 2016, by reducing half of the distance and one-fourth of the travel time.
In July, Car Pass Investment and VietinBank agreed to finance the land acquisition and resettlement and the project financing was completed. The highlight of the financing in November 2011 is that Car Pass Investment signed an agreement with French Credit Agricole Corporate and Investment Bank (CA-CIB) and Societe Generale for approximately USD 800 million. Two banks will provide financing for the whole project, including both BOT and BT schemes.
Recently, with the support of MOF, it agreed with Goldman Sachs for the financing of approximately USD 250 million of the BT section of the project. Goldman Sachs requested credit enhancement to MIGA of the World Bank group.

Source: Extracted from Dau Tu, August 31, 2012, page 28

The JICA Study Team approached the leading banks in the national financial market, such as VietinBank, Vietcombank, and Ho Chi Minh City Finance and Investment State-owned Company (HFIC) for the potential land acquisition financing. Vietinbank expressed positive view and requested to arrange a meeting with MOT/Cuu Long CIPM while Vietcombank maintained prudent view on the file to analyze the feasibility of the project.

HFIC was established in 2010 by transforming Ho Chi Minh City Investment Fund for Urban Development (HIFU), which received financial contribution from international donors such as the World Bank, Asian Development Bank, L'Agence Française de Développement as well as French investment banks such as Calyon and Société Générale. HFIC provides both equity and debt financing to infrastructure projects. As for the equity, the geographical targets of the projects are Ho Chi Minh City and its surrounding provinces. But, as for the debt financing, its internal rules are limited within Ho Chi Minh City only and excluded the surrounding provinces. Therefore, our potential land acquisition for TL–MT Expressway is not eligible because its location is outside of Ho Chi Minh City.

(4) JBIC Guarantee Program for Bond Issue in Tokyo Market

JBIC has launched its new program "Guarantee and Acquisition toward Tokyo market Enhancement" (GATE) to support foreign government for the issuance of Samurai bonds, in which a Japanese yen bond in Tokyo financial market was issued by non-Japanese entities. It is worth considering this program for the fund raising of GoV because of the large availability of financing in the bond issue.

1. The Japan Bank for International Cooperation (JBIC President & CEO: Hiroshi Watanabe) has decided to launch a new facility for supporting Samurai bonds issuance. The new "Guarantee and Acquisition toward Tokyo market Enhancement (GATE)" facility will enable JBIC to acquire Samurai bonds where appropriate, in addition to providing partial guarantees for Samurai bond issues. The GATE facility will thereby support foreign governments and government agencies to raise funds in the Tokyo market.

Source: Extracted from JBIC website (http://www.jbic.go.jp/en/about/press/2010/0415-01/index.html)

Since its launch in 2010, there were only a few track records for the GATE program because it requires bond issue denominated in Japanese yen, which has been a strong currency in the global market. The debt amount in local currency may increase in due course if there is a devaluation of local currency against Japanese yen. However, the GATE is still an active program and in June 2012, JBIC announced the bond issue of JPY 80 billion (USD 1 billion) by the United States of Mexico.

In our interview, JBIC expressed their intension to consider the GATE program application if there is an official request by GoV. However, some technical modification should be needed for the land acquisition of TL-MT Expressway because the GATE program is designed for general purpose financing needs and untied to any project.

Therefore, we would like to introduce the GATE program in the MOT meeting as one of the most probable financing alternatives. However, anticipating the time consuming procedure among the ministries in GoV, it seems to be difficult that the fund from the GATE program will be available in the near future.

CHAPTER 12 CONCLUSIONS AND RECOMMENDATIONS

12.1 Conclusions

This JICA Survey was carried out in order to evaluate the private investment possibility for the Project by confirmation of private investment environment, examination of demarcation between public scope and private scope, financial structure analysis, risk analysis, technical verification, and environmental and social considerations, proposal of government supports menu, market sounding study, and then propose the suitable BOT/PPP scheme.

Conclusions of the JICA Survey based on the engineering and investment assessment are presented below:

12.1.1 Results of the Engineering Assessment

Traffic demand forecast was updated based on the supplemental traffic surveys (traffic count and OD surveys) and referred to other studies. As a result, the updated traffic demand forecast was estimated at approximately half of that of BEDC's F/S.

Engineering design review for detailed design of the expressway was carried out from the viewpoints of safety improvement and reduction of construction cost, and several design options were proposed. As a result, the construction cost can be reduced to VND 1,292 billion in total.

Project cost was updated and estimated at VND 25,222 billion (about JPY 100 billion) including the construction cost, initial O&M and ITS facilities cost, establishment cost of SPC, land acquisition cost, physical and price contingency, which were increased by about 50% as compared with that of BEDC's F/S.

The O&M plan of the TL-MT Expressway including implementation structure plan, organization, staffing, and vehicle of expressway management center, etc., is prepared by referring to the actual O&M works of HCM-TL Expressway. As for ITS plan, it is proposed by referring to the ITS standards of JICA, etc. Furthermore, Greater HCM Area Expressway O&M Corporation is recommended to be established to cover O&M for expressways in Southern Vietnam taking into account the economic efficiency and convenience of users in terms of O&M services.

The EIA for the Project had been originally implemented by BEDC, and the EIA report was approved on October 27, 2008 (Decision No. 2140/QD- BTNMT) by MONRE. In the JICA Survey, the validity of the existing EIA report and its compliance with the requirements of the JICA Guidelines for Environmental and Social Considerations was confirmed basically. Regarding land acquisition and resettlement, the status and progress of activities by the compensation council under the Provincial Level People's Committee was also confirmed.

12.1.2 Results of the Investment Assessment

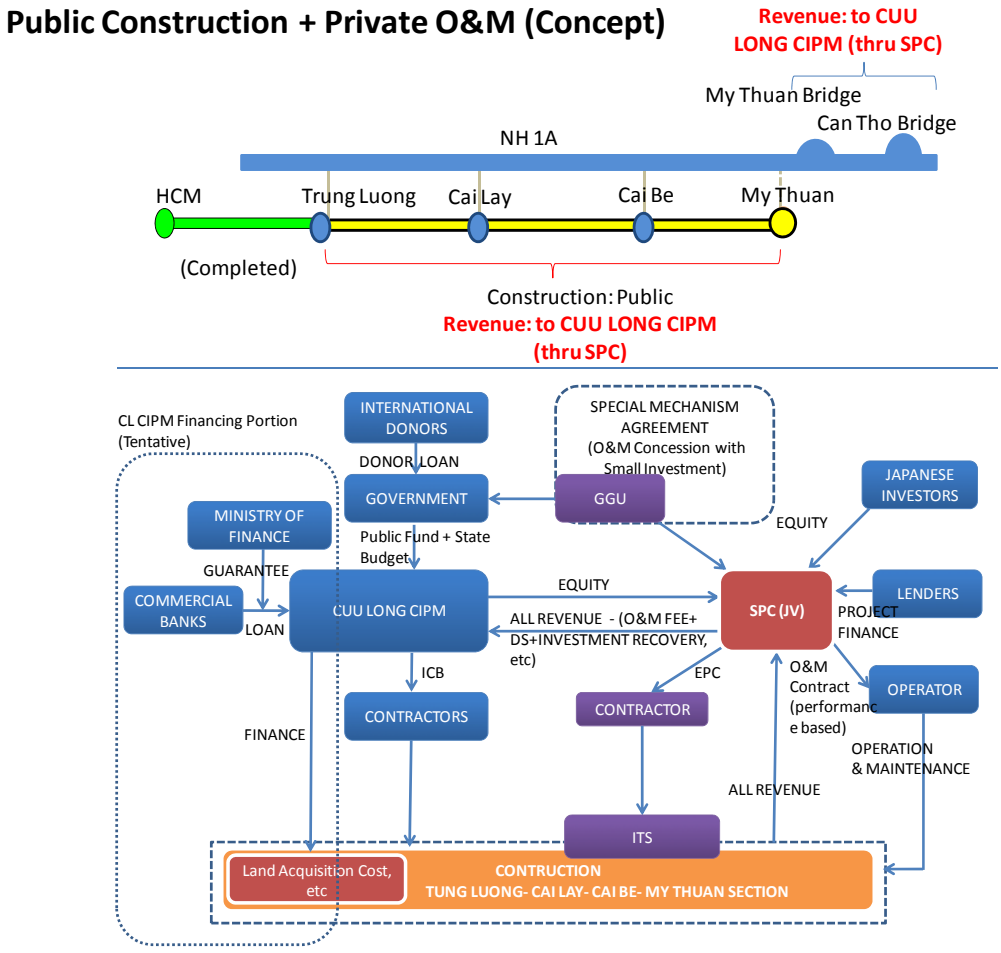
The EIRR of this Project is calculated at 15% which exceeded the social discount rate of 12%, and proven to have sufficient socioeconomic benefits for its implementation.

Since the Project IRR of this Project in case of stand alone BOT project without any government support is calculated at 3.4%, which is very low and not financially feasible by itself. Therefore, six project scheme options were set in view of both cost reduction and revenue increase. As a result of the option assessment, a project scheme option with the TL-Cai Lay and the Cai Lay-MT sections funded and constructed by the public sector with all the revenue from both sections and those of the toll gates on NH1A (Can Tho Bridge and My Thuan Bridge) are to be employed by the SPC. Moreover, the land acquisition to be conducted by the government could have Project IRR of 12.8% at the initial toll level of VND 1000/km/pcu and 14.9% at the initial toll level of VND 1300/km/pcu, which are about the

expected level of private sector investment.

Risk analysis is conducted for the above project scheme which revealed that the financial burden of the government could be more than two-thirds of the total project cost with some critical project risks. These projects risks such as interface risk between the private funded and public funded section, are totally assumed to be very difficult to structure into a security package that could satisfy both the private investor and financier.

Based on the above, an O&M concession scheme is proposed in which risk assumption by the private sector is limited and the required investment amount is small. As illustrated below, in this project scheme, the entire infrastructure portion of the expressway is to be constructed by the public including land acquisition. In the said infrastructure portion, the private sector will make additional investment on O&M related facilities and conduct an O&M service provision for the entire expressway using its own expertise and resources.



Source: JICA Study Team
Reposted (Figure 8.12 Proposed Project Scheme (Option 7))

This proposal has the following advantages: (1) possibility of private sector investment is assumed high as the risk allocation is appropriate, (2) financial burden for Vietnamese government for the project life cycle is relatively smaller and could also lead to reinforcement of financial strength with CL CIPM, (3) could bring fair and considerable benefit to all related stakeholders, and (4) could become a stepping stone to materialize future integration of O&M functions of different expressway sections of the Greater Ho Chi Minh Region, and make possible the establishment of an integrated expressway O&M organization in the future. Moreover, this would ultimately seek for both economic efficiency and convenience of the

expressway users.

Stakeholders		General Benefit of Project	Specific Benefit of Proposed Scheme (Comparison between Option 4 and 7)		
			Financial Impact	Risk	Overall Evaluation
GoV		◎：To achieve policy goal with socio-economic development	◎：Gov't can get higher financial benefit (NPV increase -2,693 ⇒-1,006bil VND)	△：GoV will shoulder Demand Risk	○：GoV will shoulder demand risk and GoV's debt Increase; however, high income will cover those.
Investor	Local	○：To have more business chance	◎：Project IRR of Option 7 is higher than that of Option 4(10%⇒15%)	◎：Demand risk would be exempted	◎：Financial return increase. Also, able to get rid of demand risk.
	International	○：To have more business chance	◎：Same as above	◎：Same as above	◎：same as above
Donors (Lenders)		◎：To achieve policy of donors	◎：Minimum DSCR of Option 7 is better than 5 (-1.9⇒1.7)	◎：Default risk of SPC would be reduced	◎：Business of SPC will be more stable and less chance of bankruptcy
Users		◎：to Reduce travel time and costs	○：Since total cost can be reduced by Option 7, tariff increase would be hold low.	NA	○：Possibility to enjoy lower tariff

Source: JICA Study Team
Reposted (Table 10.3 Benefits of Each Stakeholders)

12.2 Recommendations

The following recommendations are made for project implementation.

12.2.1 Construction by Public Fund and Detachment of Its Liability from Cuu Long CIPM

The Vietnamese government will fund and construct the entire expressway utilizing both state budget and donor funds. However, liability and repayment obligation of those funds must be separated from CL CIPM.

12.2.2 Financing of Counterpart Fund

Borrowing from commercial bank is the most realistic approach for procuring the counterpart fund for donor funding. In addition, it could be possible to procure counterpart fund by selling future cash flow value of the revenues from HCM-TL Section, MT Bridge, and CT Bridge. However, it seems unclear to find investors in the current market who could assume the risk of significant uncertainty on the forecast of future traffic demand of these sections.

Table12.1. Financing of Counterpart Fund

	BT	Banks/Bond in Vietnam	Sales of CF from ExpWay	GATE by JBIC
Description	To replace public section by BT, which requires no counterpart fund.	To borrow loan from Vietinbank, Viecombank etc. by using the same structure as "Deo Car Tunnel" project.	To sell future cash flow of existing express way and toll plaza	To issue *Samurai Bond(*)* with the guarantee by JBIC.
Guarantee by GoV	yes (deferred payment by GoV)	yes (to be negotiated with banks)	Conditional Guarantee (ex. Min revenue)	yes
forex risk	no	no	no	yes
available funds	limited to Project	to be negotiated with banks	estimated future cashflow from existing express way and toll plaza	large enough for bond issue (US$1 ~ 10bil)
cost of debt	relatively high	slightly higher than VND bond by Gov	High because of traffic demand risk	Low because of JBIC guarantee
Challenges	No prospective investors for BT project	No significant issues because "Deo Car Tunnel" project materialized recently.	No prospective investors	Negotiation between MOF and MOT may take some time???
Feasibility	Difficult	High	Difficult	relatively high in long-term

(*) *Samurai Bond* is a JPY bond at Tokyo market by non-Japanese issuer.
See detail at JIBC web site (http://www.jbic.go.jp/en/about/press/2010/0415-01/index.html)

Source: JICA Study Team

12.2.3 Recommendations on the Investment Promotion Measures for VN Expressway

There are various project risks already existing in the expressway sector of Vietnam, together with its low sovereign rating risk and current fund deficiency in the government. Despite these disadvantageous conditions, the Vietnamese government has been reluctant to extend sufficient support and risk covering measures to the Project, thus, its aim to invite and materialize private sector investment from overseas in the expressway sector has been unsuccessful.

To solve this problem and to facilitate the investment in the expressway sector of Vietnam, the following three measures are proposed:

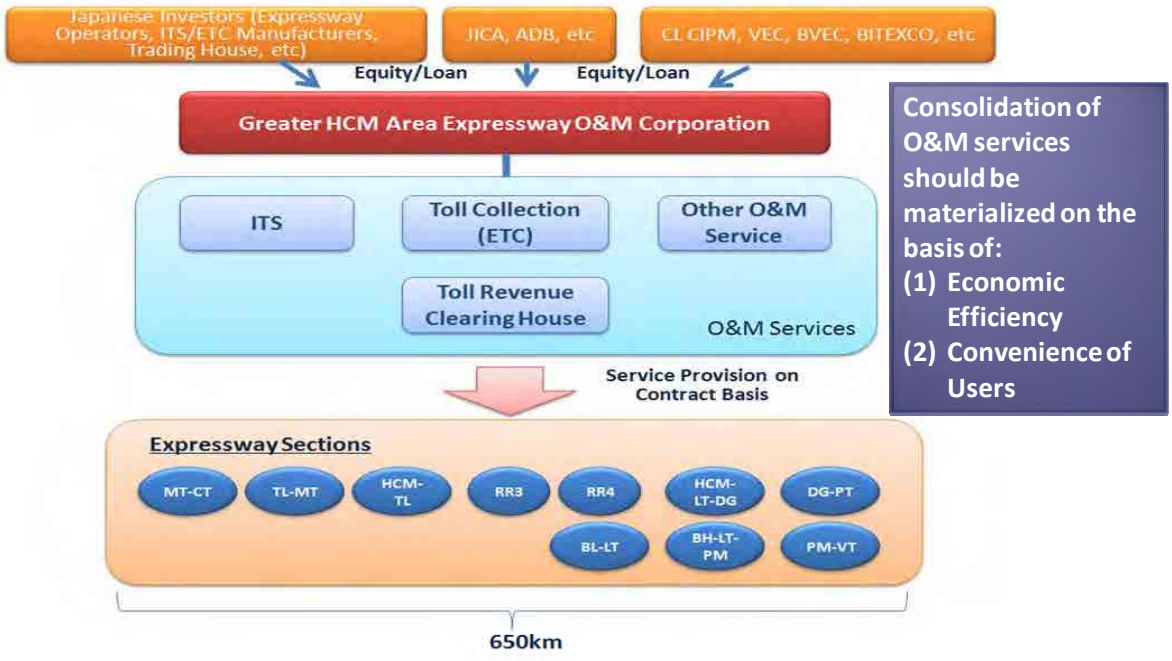
1) Limited assumption of project risks by private sector: Expressway facilities are to be constructed by the public side and the private sector will conduct O&M activities using the facilities possibly with small investment requirement by the private sector;

2) Simultaneous proposal of market tested risk covering measures together with back up funding for the risk coverage; and

3) Application of the "Waiting Room Approach": By commencing the construction of the expressway section of the public side first which precedes the construction of the private side, the private side could "wait and see" and verify the occurrence of major project risks, then could start its investment and construction.

12.2.4 Establishment of the Integrated O&M System for Greater Ho Chi Minh Regional Expressway Network

The Vietnamese government is continuously looking for a potential investor from Japan for this Project on the basis of cooperation with the Japanese government, and as a representative case of the PPP project using Japanese donor fund. Also, it aims to materialize the "Integrated O&M System for Greater Ho Chi Minh Regional Expressway Network" on the basis of a Vietnamese-Japanese strategic partnership.



Source: JICA Study Team
Reposted (Figure 6.79.Draft Proposal of Integrated O&M System for the Greater Ho Chi Minh Expressway Network)