5.2.11. Frontage Road and Service Road

The frontage road connected with existing roads are planned to be provided at the left and right side of the expressway.

The frontage road is 5 m (1-lane) wide, and the standard for rural roads (class-A) is applied.
The service road for the construction of expressway is planned utilizing the national highway, the provincial highway, the existing local road and the planned frontage road.

5.2.12. Traffic Safety Facilities

The traffic signs such as regulatory signs, warning signs and guide signs are planned to be installed on the throughways and rampways.
The road markings are planned to be provided on the throughways and rampways, and at the toll gate section.
The guard rails are planned to be provided at the shoulders and median strips of throughways and rampways.
The fences (barbed wire fence) are planned to be installed at the exterior edge of the road way along a necessary section

5.2.13. Lighting

The lighting system is planned to be provide for large bridges, interchanges, tollgates, rest areas/service stations and operating/ maintenance centers at expressways.

5.2.14. tems to be Forwarded to the Detailed Design Stage

It proposes to improve the items to improve safety and comfort for the detailed design though it satisfies with the design standard as a result of reviewing.
Items to be forwarded to highway design at detailed design stage of Phase 1 are shown in Table 5.2.14-1

Table 5.2.14-1 Item to be forwarded to highway design at detail design Stage

Item			Suggestion
1	Alignment of Main Road	Horizontal Alignment	Short curve length between clothoid curve is not smooth handling. This causes drivers to commit mistakes by driving on a smaller radius than the actual radius.
			Horizontal alignment between km22+000 and km23+000 is Clothoid:A=1342m(L=300m)-R=6000m(L=18m)-clothoid: A=1342m (L=300m),and between km25+000 and km26+000 is Clothoid:A=935m(L=250m)-R=3500m(L=20m)-clothoid: A=1342m (L=300m) . It is better to replace the clothoid to a larger curve with a radius of say 10000 m
		Vertical	Level and small gradient section are not preferable for road surface drainage

Item			Suggestion
		Alignment	Vertical alignment between km 5+143~km5+630, km15+610~ km16+230, and km18+340~km19+650,km21+430~km22+570, km23+650~km24+850,km26+580~km27+430,km35+470~km36+270 ,km37+280~37+690 , km41+630~km42+180,km It is better to change gradient to a value higher than 0.3%.
			Big gradient and small Vertical curve radius of Interchange section is not preferable considering traffic safety
			Vertical alignment between km29+100~km30+630(Nhon Trach IC) .Gradient is 3% and vertical curve radius(凸) is 1200m. It is better to change to smaller gradient (2%) and to larger vertical radius (23000m) considering sight distance at rampway terminal as recommended in TCVN5729-1197(7.6) .
2	Cross Section of Main Rroad	Median Strip	Taper length of width of median strip from 3m to 1m is too short.
			Width of median strip change from 1m(normal section) to 3m at the of flyover location. It is better to enlarge the taper length considering smooth handling. *AASHTO standard stipulates L≧75m (L=0.625x12okm/hx1m)
		Vertical Clearance	Vertical clearance does not satisfy the height of trailer loaded with shipping container
			Vertical clearance adopted is 4.75 m based on TCVN5729-1997. It is better to change said clearance to 5.0~5.1 m considering the height of loaded shipping container.
3	Interchange	Speed change lane	Parallel type of speed change lane does not match with the driver's usual practice in case of two-lane rampways.
			Parallel type of speed change lane is adopted for acceleration and deceleration lanes. It is better to adopt direct connecting type or additional lane type for two-lane rampway for both lanes considering traffic safety.
4	Drainage	Road surface	Drainage side ditch is installed at the safety line(marginal strip) of median at the superelevated section . It is dangerous to install the side ditch for the traffic passing inner lane.
			It is better to install side ditch within the wide median strip (W=3m).

Source: JICA Study Team

5.2.15. Outline of Proposed Design for Highway Planning

The proposal for highway planning in order to improve traffic demand, traffic management and maintenance work are summarized in Table 5.2.15-1. The detail of proposals for each items are described in section 5.2.16.

Table 5.2.15-1 Ploposal for Highway Planning of F/S

No.	Proposal
1	Providing additional Interchange between Bien Hoa IC and Long Thanh JCT The area between Bien Hoa-Long thanh JCT is densely inhabited and industrial zones exist And interval of Bien Hoa IC and Long Thanh JCT is 17.8 km, which is the longest in this project.Therefore additional Interchange is proposed to improve traffic demand.
2	Upgrading of Road Standard to Expressway for the section between Phu My JCT and NH51 Intersection (connecting Cai Mep-Thi Bai port) This is the section of National Highway of 100km/h and non-toll road. And it is permitted to pass the motorbike in the shoulder separated by gird rail and the shoulder is connected with crossing road at the intersection in Phase1. Then, it is proposed to upgrade the standard to expressway of 120km/h which is same as Bien Hoa IC and Phu My JCT considering the mobility, access and safety. Moreover, it is proposed to modify the connection method at Phu My JCT from rampway method to main road method in Phase 2. It will be necessary that Phu My JCT change to four branch type structure of Phu My JCT considering the connection of HCMC Ring Road 4 in the future.
3	Providing Temporary Nhon Trach IC Nonh Trach JCT is connecting with Bien Hoa-Vung Tau Expressway and Ben Luc-Long Thanh Expressway and it will be constructed in Phase 2 of Ben Luc-Long Thanh Expressway project. In other words, Non Trach JCT is not constructed at the Bien Hoa -Vung Tau Expressway construction. Therefore it is proposed to construct temporary IC instead of JCT for improvement of the traffic demand, the traffic management, and maintenance.
4	Providing Temporary Phu My SA Phu My SA is planned between Non Trach JCT and Phu My JCT. It is forecasted that traffic volume utilizing Phu My SA is not many in Phase 2 of project. Therefore it is proposed to construct temporary SA providing minimum service such as parking space and toilet only

Source: JICA Study Team

It is defined that Junction is the facility connect expressway and expressway, and Interchange is the facility connect expressway and general road (National Road and Provincial Road, etc).

5.2.16. Details of Proposal for Each Items

(1) Providing additional Interchange between Bien Hoa IC and Long Thanh JCT

There is the tendency of number of industrial zone between Bien Hoa IC and Long Thanh JCT increases in recent years. It is estimated that the traffic volume originated industrial zone to sea ports such as Cai Mep-Thi Vai port will be increased.

The Bien Hoa-Vung Tau Railway is planned in the east side of the BHVT Expressway and parallel to it in the future. Therefore study of additional study was carried out considering said railway.

1) Selection of Optimum Location for Additional Interchange

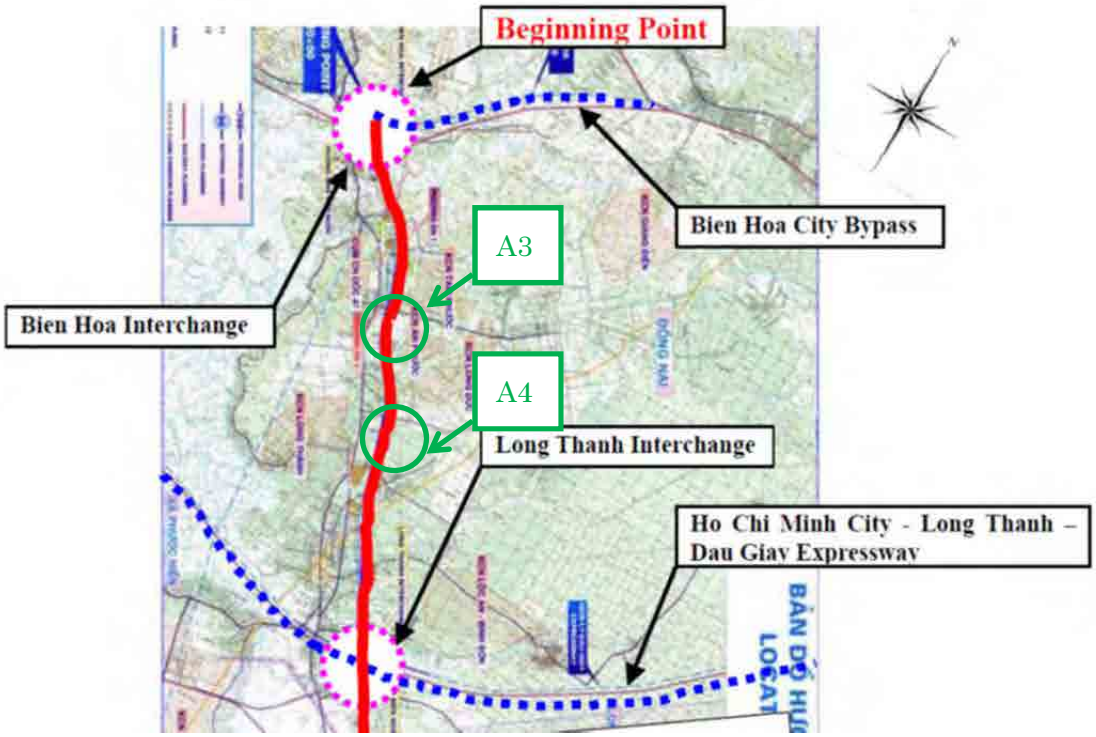
The comparative study for the first selection was made for below two places by a general trumpet type.

The location map of additional IC is shown in Figure 5.2.16-1.

A3(km9+500): The connecting road is Thai Lan-Trang Bom Road which is 2 way 2 lane, connecting NH51 and NH1A, and accessibility from those roads is high.
The connecting road crosses over expressway by flyover.
And it is not safe of traffic at the intersection with connecting road and rampway which is located bottom of flyover
The rampway passes expressway over by flyover, and the cost of construction is high.
As for the under passing method of rampway, the depressed part becomes deeper than the river and natural drainage system cannot be applied.

A4(km10+150):

The connecting road is Long Duc Community Road which is 2 way 4 lane, connecting to Long Duc Industrial Zone. But it will be extend to Provincial Road 769 which connect to NH1A in the future.
The connecting road crosses under expressway by box-culvert.
And it is safe of traffic at the intersection with connecting road and rampway which is flat.
The rampway passes expressway under by box-culvert , and the cost of construction is low .

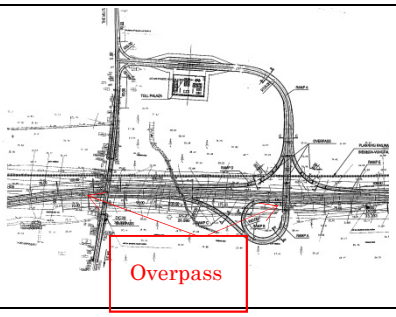
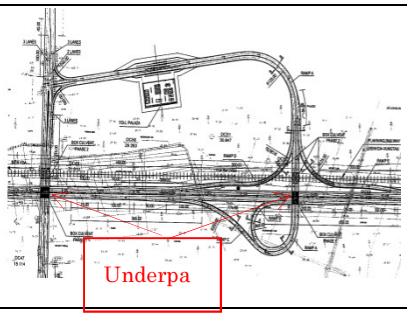


Source: JICA Study Team

Figure 5.2.16-1 Location of Additional IC (Alternatives of A3 and A4)

A4 was selected as the optimum place based on the comparative study as shown in Table 5.2.16-1.

Table 5.2.16-1 Comparative of A3 and A4

Alternative	A3（km6+650）	A4 (km10+150)
Access Road	Thai Lan-Trang Bom Road	Long Duc Community Road
Layout (Trumpet Type)		
Accessibility to NH51 and NH1A	○ (Direct connection to NH1A)	△ (Indirect connection to NH1A)
Traffic safety at ntersection with rampway	X (Flyover of connecting road)	○ (Flat alignment of connecting road)
Construction Cost	X (Flyover of rampway)	○ (Box Culvert of rampway)
Evaluation		Recommend

Source: JICA Study Team

2) Selection of Optimum Type of Interchange

The comparative study of the trumpet type (A4-1) and the partial cloverleaf type (A4-2) was made for the selected location of A4.

A4-1: Trumpet Type

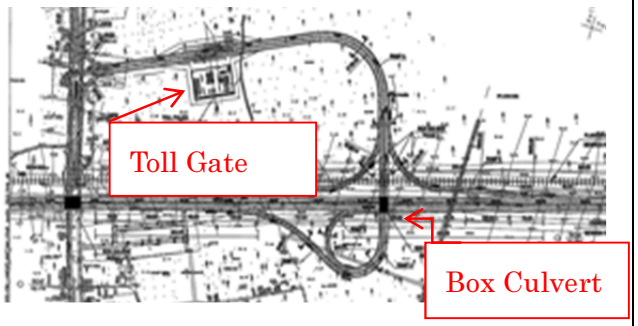
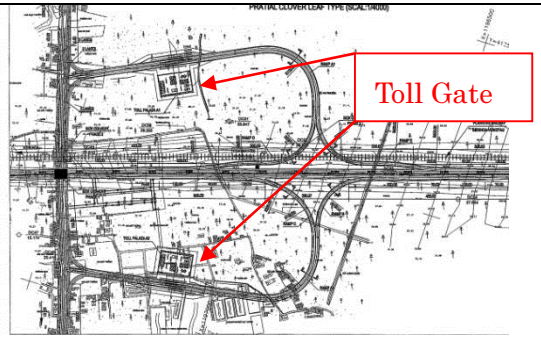
The crossing with the expressway and the rampway is underpass by Box-Culvert. It is necessary to lower the vertical alignment of rampway in consideration of crossing with railway in the future.

A4-2: Partial cloverleaf Type

There is no crossing with expressway and rampway. It is necessary to lower the vertical alignment of rampway in consideration of crossing with railway in the future.

A4-1(Long Duc IC) was selected as optimum interchange as shown in Table 5.2.16-2.

Table 5.2.16-2 COMPARATIVE STUDY OF TYPE OF INTERCHANGE

ALTANATIVE	IC A4-1	IC A4-2
Type of IC	Trumpet	Partial Cloverleaf
Layout of IC		
Ramp alignment	R min.=60m	R min.=125m
Ramp Length	2 lane:900m, 4 alne:1300m	2 lane:800m, 4 alne:2600m
Structure Length	Box Culvert:33m	
Land Area	8.4ha	11.1ha
No.of Toll Gate	1	2
No.of Intersection	1	2
Construction Cost	△	△
Land Acquisition Cost	○	X
Total Cost	○	X
Evaluation	Recommend	

Source: JICA Study Team

3) Basic Design of Long Duc IC

The basic design of A4-1 (hereafter, it was called Long Duc IC) was executed based on the topographical survey conducted in this preparatory survey.

It is necessary the drainage pipe to lead the rain water from the depressed point of rampway to river.

Moreover, the formation height of expressway was elevated 2m in order to prevent deep excavation for the drainage pipe considering vertical alignment of rampway crossing expressway.

The drawings based on the above mentioned design standards were as follows.

- Plan (S=1/4000):
- Profile (H=1/5000,V=1/500): Main Road ,rampway
- Typical Cross Section (S=1/100): Embankment , Cutting
- Details: Slope Protection, Intersection

The design standard of TCVN5729(1997) and TCVN4054(2005) were applied for basic design of interchange. The result of the basic design is summarized as shown in Table 5.2.16-3.

Table 5.2.16-3 Summary of Result of Basic Design of Long Duc IC

Item			Standard	Designed Value
Expressway			V=120km/h	
Connection Road(Long Duc Com.Road)			V=60km/h	
IC Type			Trumpet	
Rampway Design Speed			V=60～35km/h	V=40km/h
No.of lanes			1 way 2 lane、2 way 4 lane、2way 6 lane	
Alignment	Main Road (km9+500～km10+800)	Horizontal	Rmin.=650m(1000m) *Interchange Section Rmin.=2000m(1500m)	A=1107～R=∞
		Vertical	i max=4% *Interchange Section i max=2%(3%)	i=0.4%～-0.3%、
			VCR(凸)=12000 VCR(凹)=5000 *Interchange Section VCR(凸)=Rmin.=45000m VCR(凹)=Rmin.=23000m	VCR(凸)=12000
	Rampway	Horizontal	Rmin.=60m、	Rmin,=60m
		Vertical	imax.=7%	imax.=4.5%

Item			Standard	Designed Value
			VCRmin.(凸)=1000m(700m)、VCRmin.(凹)=700m(450m)	VCRmin.(凸)=1400mVCRmin.(凹)=1440m
Earth work	Embankment Slope:		1:1.5	1:1.5
	Cutting Slope:		1:1.0 (Stone Pitching	1:1.0
Structure			Box Culvert:10.5x5.0, 8.75x5.0x2	
Pavement(ranpway)			t=57cm(Asphalt Concrete)	
Drainage			Drainage Pipe (D1.5m):Setting from depressed point of rampway to river(km9+275)	

Source: JICA Study Team

The photos for the connecting road of Long Duc Community Road and the signboard of Long Duc industrial Zone which are constructed along this road are shown below.

Picture 5.2.16-1 Long Duc Community Road

Picture 5.2.16-2 Signboard of Long Duc Industrial Zone

4) Estimated Project Cost of Long Duc IC

The estimated project cost (construction cost and land acquisition cost) of Long Duc IC was calculated based on the above mentioned drawings. The project cost of Long Duc IC is shown in Table 5.2.16-4.

Table 5.2.16-4 Project Cost of Long Duc IC (A4-1)

Item		Cost: million VND
Construction Cost (A)	Sub total	195,072
	1. Embankment, Pavement, Traffic Control and Miscellaneous	152,545
	2.Toll gate	42,527
Land Acquisition Cost (B)		12,921
Other Cost (consulting services, project management cost etc) (C)		23,166
Physical Contingency (D)		23,116
Project Cost (A+B+C+D)		254,275

Note: excluding price contingency

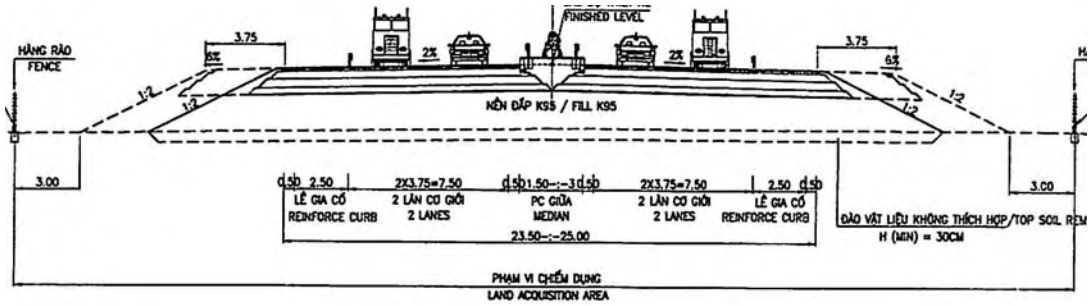
Source: JICA Study Team

(2) Upgrading of road standard to expressway for the section between Phu My JCT and NH51 Intersection (connecting Cai Mep-Thi Bai port)

1) Modification of Cross Section

The components of cross section of the national highway in Phase1 consist of 1.5m of median strip, 0.5m of marginal strip,7.5m of carriageway, 2.5m of shoulder and 0.5m protection of shoulder (earth shoulder), and in total 23.5m. The guard rail is installed outside of the carriageway and it is permitted to pass motorbike within the shoulder. And the shoulder is planned to be connected with the local road.

The typical cross section of the national highway is shown in Figure 5.2.16-2.



Source: BVEC F/S

Figure 5.2.16-2 Typical Cross Section of National Road

It is dangerous for the traffic of main road because without the shoulder located outside of the carriage way. And it causes of reduction of the traffic capacity of the main road in case of temporary stopping.

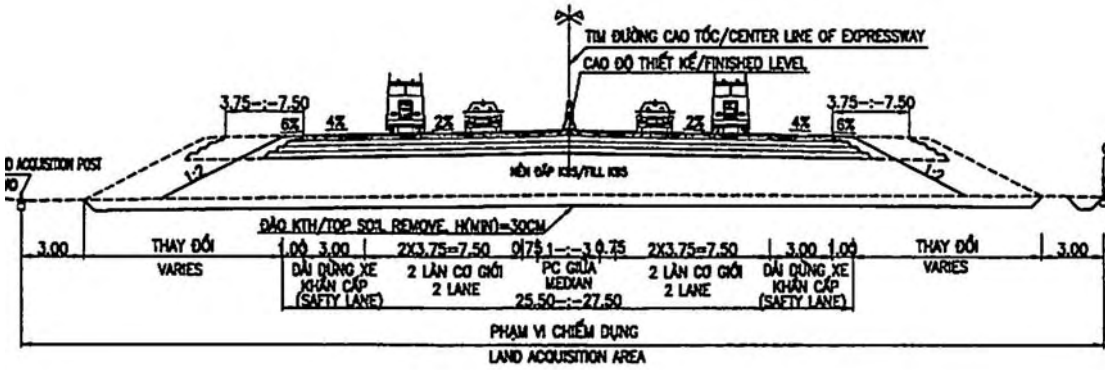
It is proposed to change to typical cross section to the expressway by upgrading to expressway standard.

The components of cross section of expressway in Phase1 consist of 1.0m of median strip, 0.75m of marginal strip,7.5m of carriageway, 3.0m of shoulder and 1.0m protection of shoulder (earth shoulder), and in total 25.5m.

The traveling time becomes short because of the design speed changes to 120km/h.

The traffic safety is improved because it is not permitted to pass motorbike and to be connected with the local road.

The typical cross section of the national highway is shown in Figure 5.2.16-3.



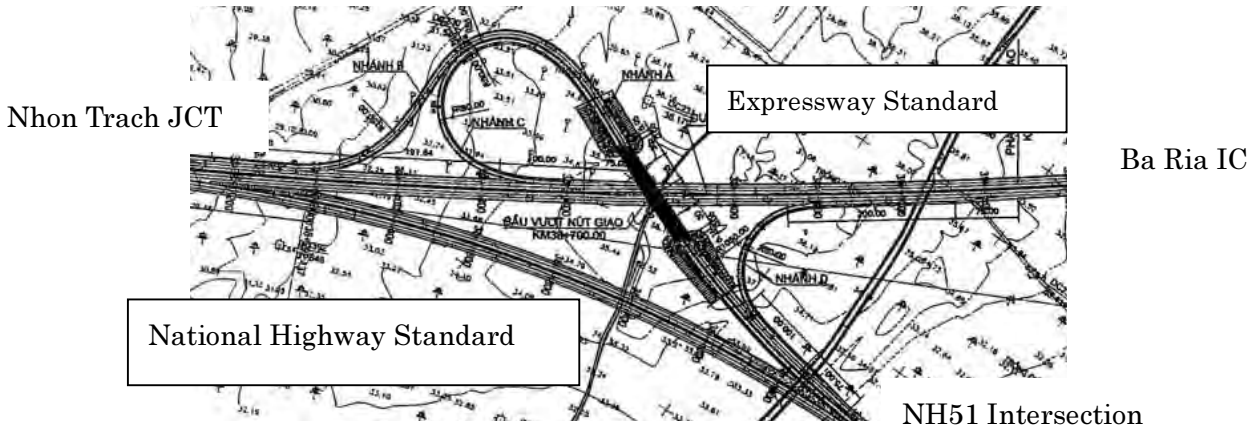
Source: JICA Study Team

Figure 5.2.16-3 Typical Cross Section of Expressway

The minimum horizontal curve radius is 1050m, the maximum vertical gradient is 3% .These value are satisfied the geometric standard. But it is required to change super elevation from 2% to 6%.

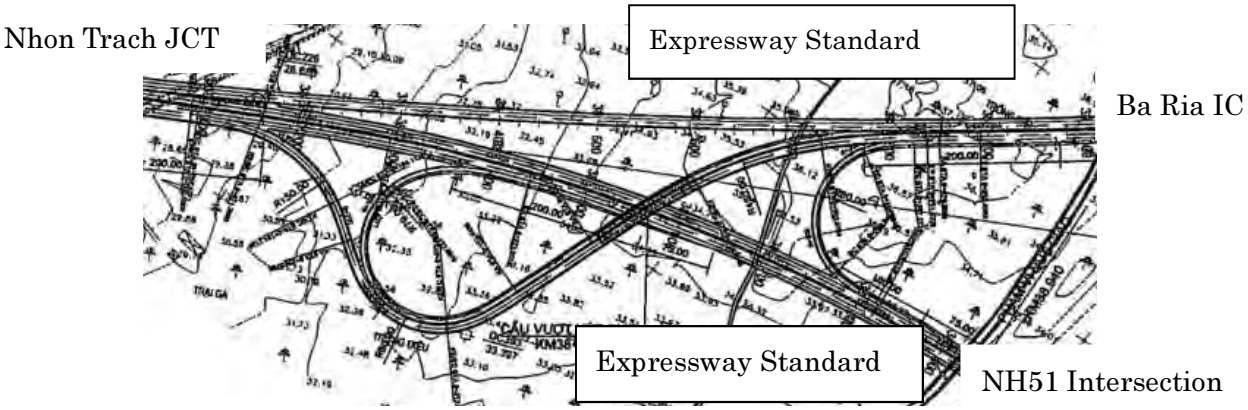
2) Modification of Junction Type

It is estimated that the major traffic is both direction between Nhon Trach JCT and NH51 itersection (access to Cai Mep- Thi Vai port) based on the result of forecasted traffic volume. Therefore it is not preferable that the traffic from NH51 intersection passes the rampway with small horizontal radius(125m) and big gradient (4%) of type of Phu My IC in BVEC F/S.
By this reason, it is proposed to modify the connection method at Phu My JCT from rampway method to main road method in Phase 2.
The layout of Phu My IC of BVEC F/S (Option A) and the layout of proposed Phu My JCT (Option B) are shown in Figure 5.2.16-4 and Figure 5.2.16-5.



Source: JICA Study Team

Figure 5.2.16-4 Layout of Phu My IC of F/S



Source: JICA Study Team

Figure 5.2.16-5 Layout of proposed Phu My JCT

It will be necessary that Phu My JCT change to 4 legs type from 3 legs type considering additional connection of HCMC Ring Road 4 in the future.

3) Additional Cost for upgrading to Expressway

Construction cost consists of modification of cross section which is cost for widening of roadway and for additional flyover ,and modification of JCT type. Additional land acquisition is not originated because widening is within the Right of Way of Phase1.

Additional project cost for upgrading to expressway is shown in Table 5.2.16-5.

Table 5.2.16-5 Additional project cost for upgrading to expressway

Item		Cost :million VND
Construction Cost (A)	Sub total	41,086
	1.Earthwork, Pavement 2.Flyover	16,086 25,000
Land Acquisition Coast (B)		0
Other Cost (consulting services, project management cost etc) (C)		4,666
Physical Contingency (D)		4,575
Project Cost (A+B+C+D)		50,327

Note: excluding price contingency

Source: JICA Study Team

(3) Providing Temporary Nhon Trach IC

1) Alternative Study of Nhon Trach IC

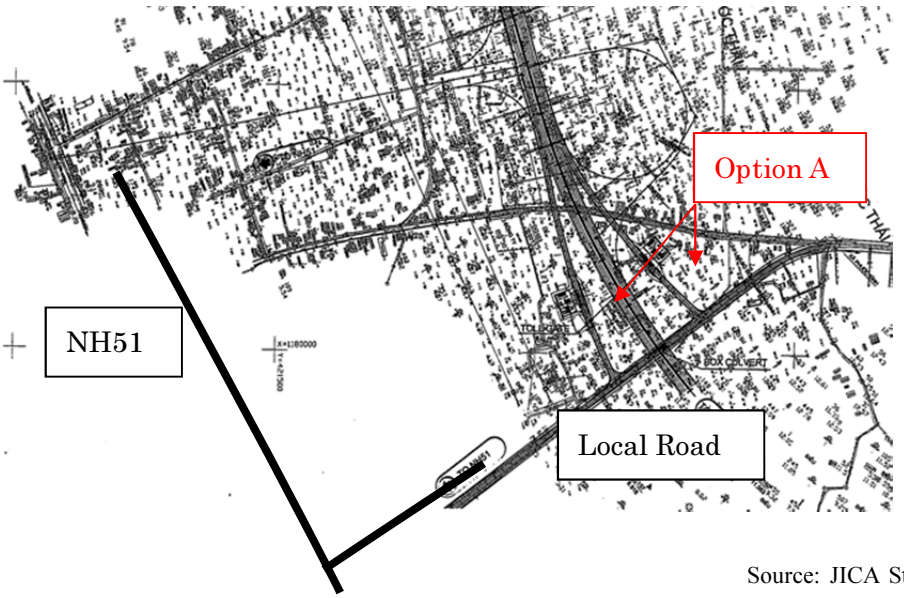
Nhon Trach JCT will be constructed in 2017 as phase 2 of Ben Luc –Long Thanh Expressway project. But it is feared the delay of the completion of construction of Ben Luc-Long Thanh Expressway including Nhon Trach JCT.

Therefore it is proposed providing of temporary Nhon Trach IC connecting with BHVT Expressway and NH51.

The alternative study of Nhon Trach IC was carried out for two options in case of half interchange providing only for the north. The option A is half diamond type connecting with local road case of small traffic volume and the option B is partial trumpet type (utilizing some part of completion trumpet type) connecting with NH51 in case of big traffic volume.The toll gate is installed for both options.

As a result, it is possible to improve the traffic demand, and traffic management and maintenance work.

The layout of option A and option B are shown in Figure 5.2.16-6 and Figure 5.2.16-7, respectively.



Source: JICA Study Team

Figure 5.2.16-6 Layout of Half Diamond Type

Source: JICA Study Team

Figure 5.2.16-7 Layout of Partial Trumpet Type

2) Construction Cost of Alternatives

Additional project cost for providing rampway for maintenance is shown in Table 5.2.16-6.

Table 5.2.16-6 Additional project cost of Temporary Nhon Trach IC

Item			Cost :millionVND
Option A	Construction Cost (A)	Sub total	89,639
		1.Earthwork, Pavement, Box Culvert 2. Flyover 3. Toll Gate	25,848 0 63,791
	Land Acquisition Coast (B)		0
	Other Cost (consulting services, project management cost etc) (C)		10,179
	Physical Contingency (D)		9,982
	Project Cost (A+B+C+D)		109,800
Option B	Construction Cost (A)	Sub total	187,730
		1.Earthwork, Pavement, Box Culvert 2. Flyover 3. Toll Gate	89,689 34,250 63,791
	Land Acquisition Coast (B)		0
	Other Cost (consulting services, project management cost etc) (C)		21,319
	Physical Contingency (D)		20,905
	Project Cost (A+B+C+D)		229,954

Note: excluding price contingency

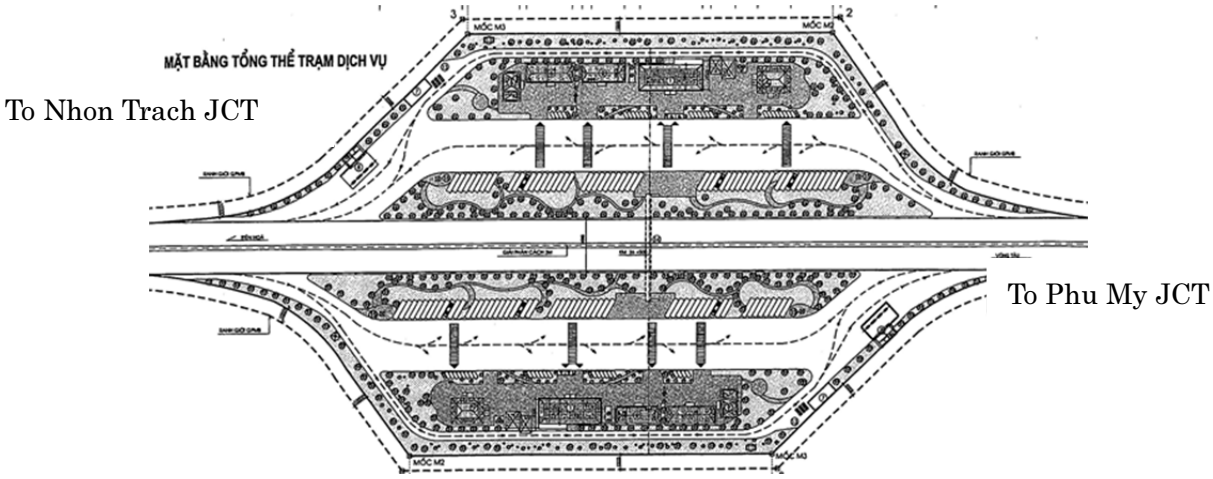
Source: JICA Study Team

(4) Providing Temporary Phu My SA

Phu My SA was planned between Nhon Trach JCT and Phu My JCT which is provided parking lot, restaurant, hotel, gas station and toilet in original BVEC F/S. But it is estimated small traffic volume which use Phu My SA in Phase1. Therefore it is proposed temporary SA which is provided only parking lot and toilet in Phase 1.

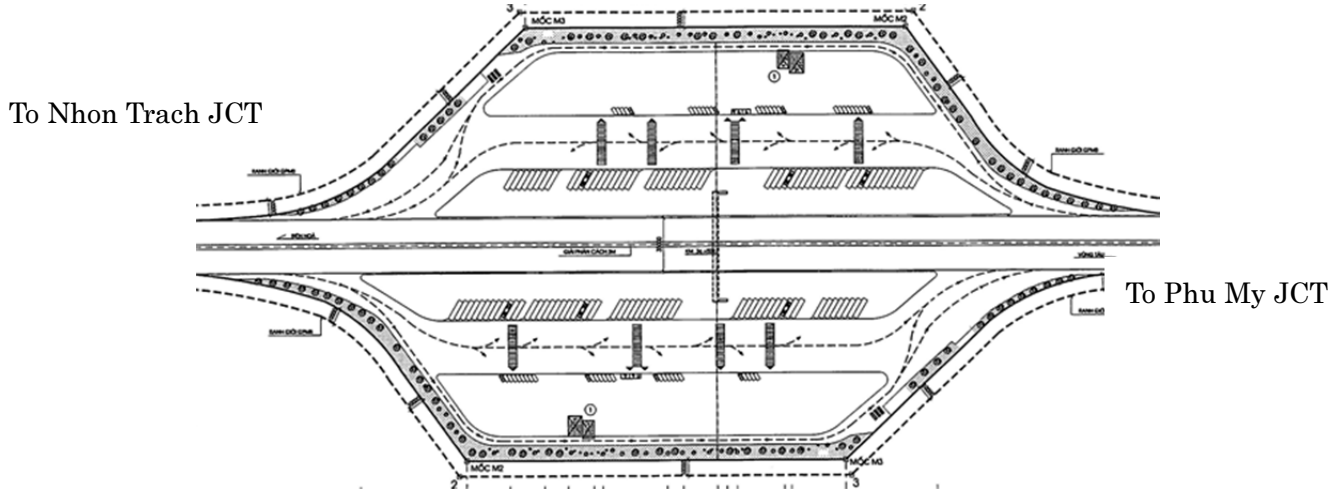
Accordingly, the initial investment cost can be saved VND93,847 million. Finally, this proposal was adopted by BVEC and reflected in the latest F/S (ctober 2012).

The layout of SA of BVEC F/S as option A (with facilities) and temporary SA (without facilities as option B are shown in Figure 5.2.16-8 and Figure 5.2.16-9.



Source: BVEC F/S

Figure 5.2.16-8 Layout of F/S Phu My SA(Option A)



Source: JICA Study Team

Figure 5.2.16-9 Layout of Temporary Phu My SA(Option B)

Drawings of these proposals are included in the appendix of the interim report which title is "DRAWINGS FOR PROPOSED DESIGN".

5.2.17. Bridge Planning and Design

(1) Review for Cost Saving and Design Improvement

The BHVT Expressway is designed with a high standard such as the highway geometric design for travel speed of as high as 120 km/h and the high road embankment to withstand a 100 year probability flood. Also, the Expressway needs dozens of bridges to cross with other highways and railways by grade separation as well as to pass over rivers and water channels. In consequence, the bridge construction cost is expected relatively high in this project. Especially, there is a 6 km long elevated expressway bridge planned to cross the center of an urbanization promoting area to the north of Vung Tau and that shall plus increase the project construction cost. In this context, if saving of bridge construction cost is possible by reviewing design, it will contribute significant to the project economy. Furthermore, through a process of eliminating redundant design of bridges, it is expected for the bridge design itself to be improved toward a more rational design to fit site condition.

It is noted that various bridge illustrations are presented in this report for explanation but these illustrations are for reference only not based on design analysis.

Technical design proposals on bridge were made in this study based on the bridge design in BVEC F/S listed in Table 5.2.17-1.

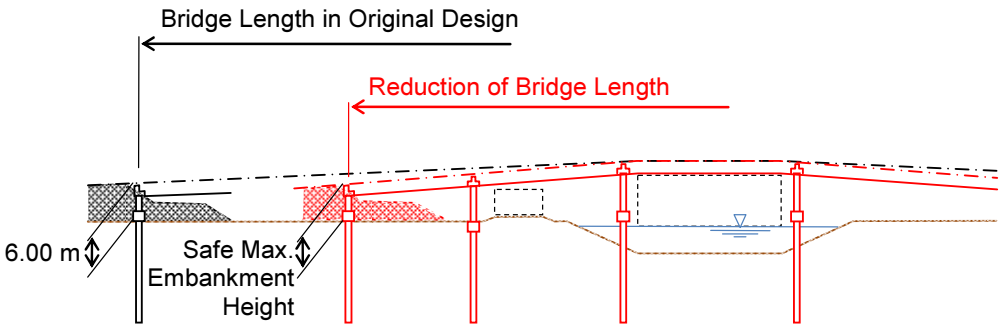
Table 5.2.17-1 List of Bridge in BVEC F/S

No	Bridge name	Item	Location	Dimension			Bridge structure			Province
				Bridge length (m)	Span arrangement (m)	Bridge (Underpass) width (m)	Superstructure	Substructure		
								Foundation	Pile length (m)	
1	Song Buong	Bridges on the expressway	KM2+558.0	99.2	3x33	23.5	I girder	D1000	12.0	Dong Nai province
2	Nuoc Trong	Bridges on the expressway	KM8+600.0	42.15	2x21	23.5	I girder	400x400	17.0	
3	Suoi Phen	Bridges on the expressway	KM12+628.0	33.1	1x33	23.5	I girder	D1000	33.0	
4	Quan Thu	Bridges on the expressway	KM14+119.0	63.2	3x21	23.5	I girder	400x400	29.0	
5	Da Vang	Bridges on the expressway	KM20+024.0	33.1	1x33	23.5	I girder	D1000	31.0	
6	Suoi Ca	Bridges on the expressway	KM22+848.0	99.2	3x33	23.5	I girder	D1000	33.0	
7	Suoi Nhum	Bridges on the expressway	KM37+450.0	198.5	39.15+3x40+39.15	23.5	ST girder	D1000	18.5	Ba Ria - Vung Tau
8	Tam Phuoc 1	Overpass	KM4+446.0	132.25	4x33	11	I girder	D1000	40.0	
9	Tam Phuoc 2	Overpass	KM5+035.0	168.45	8x21	26	Slab girder	D1000	40.0	
10	Sy Quan Luc Quan 2	Overpass	KM6+148.0	228.42	39.15+3x40+30+39.15	11	Super T	D1000	44.0	
11	Nha may	Overpass	KM11+124.0	268.42	39.15+2x40+30+2x40+39.15	6.5	Super T	400x400	33.0	Dong Nai province
12	Nong truong Binh Son	Overpass	KM16+231.0	165.3	5x33	6.5	I girder	400x400	33.0	
13	Bau Can	Overpass	KM24+124.0	297.5	9x33	6.5	I girder	D1000	36.0	
14	Ngang Duong	Overpass	KM26+907.0	228.42	39.15+2x40+30+40+39.15	6.5	Super T	D1000	36.0	
15	Cho Tan Hiep	Overpass	KM28+044.0	231.4	7x33	6.5	I girder	D1000	35.0	
16	Hac Dich 1	Overpass	KM34+209.0	132.25	4x33	11	I girder	D1000	28.0	
17	Hac Dich 2	Overpass	KM36+120.0	165.3	5x33	11	I girder	D1000	28.0	Ba Ria - Vung Tau
18	Km0+123	Underpass	KM+123.2	23		4.5		Shallow footing		Dong Nai province
19	Km1+554	Underpass	KM1+554.0	33		4.0		Shallow footing		
20	Km3+650	Underpass	KM3+650.0	33		4.0		Shallow footing		
21	Km7+250	Underpass	KM7+250.0	33		4.0		Shallow footing		
22	KCN Long Đuc	Underpass	KM9+452.0	33		7.0		Shallow footing		
23	Binh Son	Underpass	KM14+264.0	42		11.0		Shallow footing		
24	Go Bao May	Underpass	KM17+948.0	44		7.0		Shallow footing		
25	Đa Vang 1	Underpass	KM20+005.0	40.5		4.0		Shallow footing		
26	Đa Vang 2	Underpass	KM20+032.0	40.5		4.0		Shallow footing		
27	Suoi Ca 1	Underpass	KM22+847.0	43.8		4.0		Shallow footing		
28	Suoi Ca 2	Underpass	KM22+929.0	43.8		4.0		Shallow footing		
29	Thai Thien	Underpass	KM31+040.0	34.8		4.0		Shallow footing		
30	Km33+170	Underpass	KM33+170.0	32.5		7.0		Shallow footing		
31	Hoa Hung - Trang Bom	Bridge over railway	KM+680.0	358.4	39.15+7x40+39.15	23.5	Super T	D1000	15.0	Dong Nai province
32	Bien Hoa - Vung Tau	Bridge over railway	KM30+320.0	1154.4	39.15+11x40+30+15x40+39.15	23.5	Super T	D1000	35.0	
33	Bridge on expressway	Bien Hoa Interchanges	KM+0.0	355.4	39.15+37+6x40+39.15	18.0	Super T	D1000	15.0	
	Bridge on ramp 1 over river Quan			84.25	4x21	9.0	I girder	D1000	15.0	
	Bridge on ramp 2 over river Quan			84.25	4x21	9.0	I girder	D1000	15.0	
34	Bridge on expressway	Long Thanh - Dau Giay Interchanges	KM16+600.0	842.4	39.15+3x30+40+32.5+2x35.75+10x40+3x30+40+39.15	30.0	Super T	D1000	35.0	Dong Nai province
	Bridge N01 over river Bung Mon			63.2	3x21	18.0	I girder	D1000	40.0	
	Bridge N02 over river Bung Mon			63.2	3x21	25.0	I girder	D1000	40.0	
	Bridge on ramp 6			63.15	3x21	9.0	I girder	D1000	40.0	
	Bridge on ramp 7			72.15	3x24	9.0	I girder	D1000	40.0	
	Bridge on ramp 8			90.15	3x30	9.0	I girder	D1000	35.0	
	Bridge overpass LT-DG expressway			198.35	6x33	16.0	I girder	D1000	40.0	
	Bridge on LT-DG expressway (widening)			72	3x24	2x7.5	I girder	D100	35.0	
35	Overpass No 1 (Phu My IC)	Bridges overpass expressway	KM38+700.0	130.1	30+2x35+30	16.0	Hollow slab	D1000	45.0	Ba Ria - Vung Tau province
36	Overpass No 2 to Cai Mep - Thi Vai port	Bridges overpass expressway	KM40+050.0	59.1	13+33+13	8.0	Hollow slab	400x400	23.5	
37	Overpass No 3 (NH.51 IC)	Bridges overpass expressway	KM46+340.0	165.1	30+3x35+30	18.5	Hollow slab	D1000	41.0	

Source: BVEC F/S

(2) Reduction of Bridge Length

The difference of road construction cost between earth embankment road accompanied by soft ground treatment and elevated road supported by bridge is estimated approximately at 75 million VND/m vs. 890 million VND/m, while land acquisition cost and value added tax are not included. Thus, the shorter the bridge length is, the more saves the road construction cost. See 5.2.17-1 below.



Source: JICA Study Team

Figure 5.2.17-1 Reduction of Bridge Length

For reduction of bridge length, it is suggested to examine the following design conditions:

1) Confirmation of Roadway, Railway and Waterway Traffic Clearances

Confirm roadway, railway and waterway traffic clearances (width and height) required for intersection with the Expressway.

2) Confirmation of Flood Water Level and Breadth for Water Channels

For where the BHVT Expressway crosses over rivers or water channels, figure out design flood water level and breadth based on design rainwater runoff.

3) Lowering of Geometric Profile Elevation

Examine the geometric profile elevations of bridge sections if which can be lowered, as a matter of course, within the geometric design limits for the design travel speed of 120 km/h as well as after reserving the water traffic and flood clearances required at rivers and water channels.

The profile elevations can be lowered also by reducing bridge span length and consequently girder depth.

4) Road Maximum Embankment Height

In general, road embankment will be the highest at bridge abutments, that is, the higher the road embankment is possible, the shorter the bridge length can be designed.
The maximum embankment height will be evaluated by investigating:

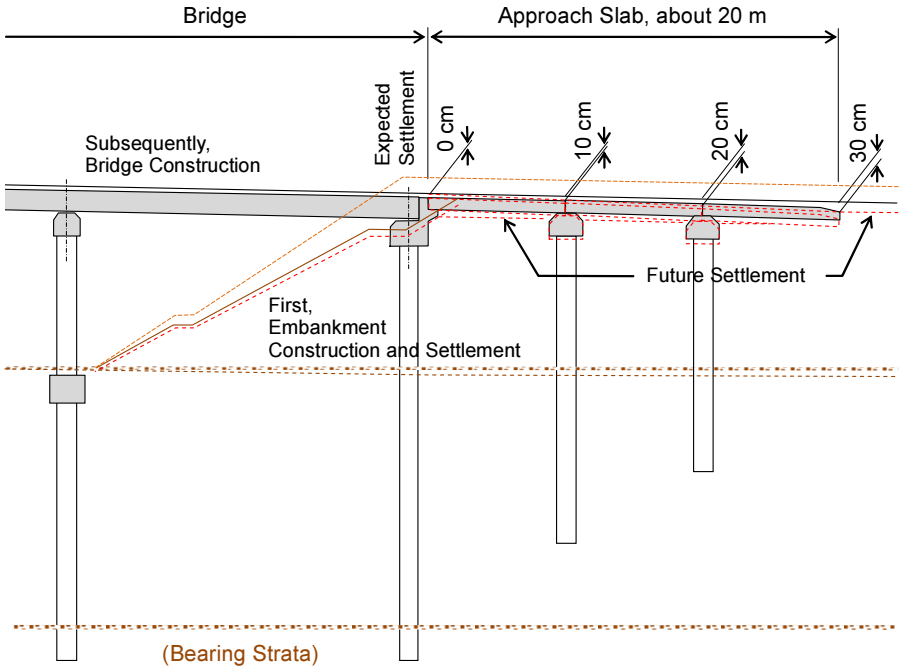
- Consolidation settlement of soft ground and its required preloading time - based on the acceptable future residual consolidation settlement of 30 cm for embankment and 10 cm behind bridges in highway construction according to the Vietnamese highway design standard, and
- Safety of embankment against sliding.

Evaluation for Embankment on Soft Ground

According to TEDI, a Vietnamese consultant who prepared the original design of the BHVT Expressway, bridge segments were extended in general until the embankment height did not exceed 6 m concerning with consolidation settlement of soft ground. However, after field reconnaissance and review of the soil boring data given in the original design, the JICA engineer has come to a moderately optimistic view on the ground settlement problem. That is, the soil boring data shows that soft soils are seen only at rivers or low drainage basins and their deposit are not so deep. Therefore, just a little higher embankment, for instance 7 to 8 m but probably not exceeding 10 m, may be constructible in most places of the Expressway.
The possible maximum embankment height is now under evaluation in TEDI to accept the residual consolidation settlement of up to 30 cm using current soil boring data, on the request of the JICA engineer assuming a road embankment construction period of 18 months and the PVD minimum spacing of 1.1 m.

(3) Approach Slab behind Abutment

Consolidation settlement of ground is inevitable in embankment road, but bridge section in general will not sink down if supported by piles. To alleviate the difference in level on the road surface caused by different ground settlement between embankment and bridge, approach slab is a useful technique executable at relatively small cost. Figure 5.2.17-2 is a sample design proposed for the embankment-bridge interface.



Source: JICA Study Team

Figure 5.2.17-2 Sample Design of Embankment-Bridge Interface

(4) More Compact Design for Overpass Bridges

The BHVT Expressway crosses many local roads and highways by grade separation with a clearance of 4.75 m including the grade separations in interchanges. In addition, there is a future railway plan on which the BHVT Expressway shall pass over with a clearance of 6.55 m. Consequently, there are numerous overpass bridges designed along the BHVT Expressway. Reviewing these overpass bridge designs, the JICA engineer found that there was still room for improvement and construction cost saving in the original design and design changes were recommended as noted below.

1) Reduction of Bridge Length

As mentioned above in paragraph 5.2.17 (2) 4), the original design determined the bridge length by employing a criteria for the embankment height at abutments not to be higher than 6 m, but that is considered overly on the safe side focusing on the worst soft ground condition throughout the Expressway length to apply longer bridges uniformly everywhere. If higher embankment is proved constructible in other locations, bridges can be reduced to save construction cost.

2) Recommendation of Shorter Span Bridge Girder and Cast-insitu Construction Method

- Precast Girder in Original Design

The original design apparently employed two main bridge girder types, PC (Prestressed Concrete) I girder of 30 to 35 m span length or PC super- girder of 35 to 40 m span length, and both the types are of pre-casting method which needs erection work. It is probably because such girder types of such span ranges have recently become widely used in highway bridge construction in Vietnam and therefore a lot of design samples thereof were available now. These girder types were also adopted to overpass bridges without any change.

- Recommendation of Shorter Span Girder by Cast-insitu Construction Method

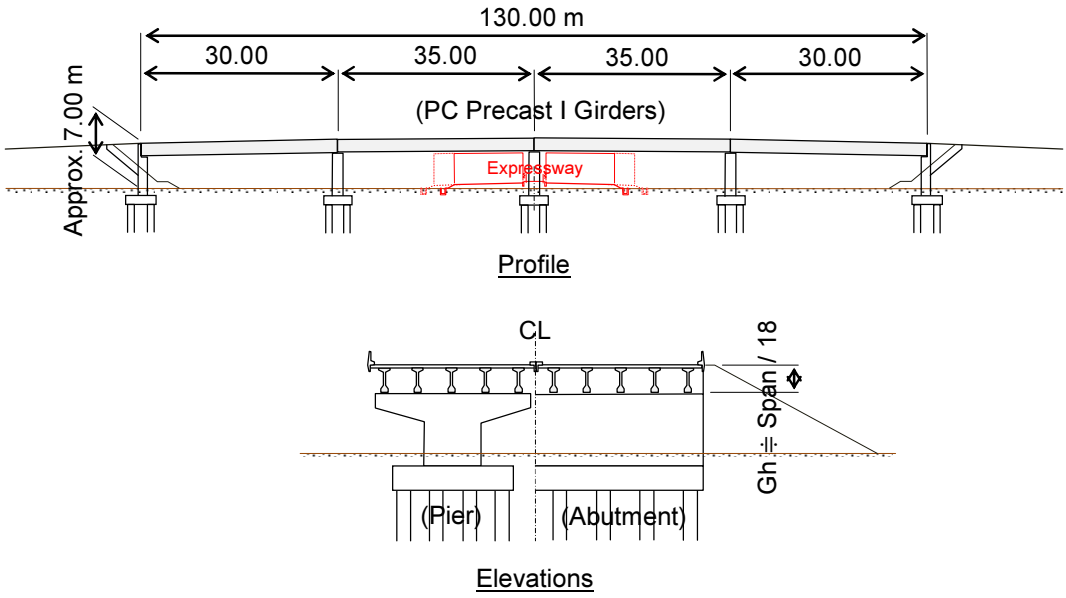
However, the JICA engineer has a different perspective on the overpass bridge design to suggest a girder structure of shorter span length and by cast-insitu construction method. It is recommended to place a pier column on the median strip of the BHVT Expressway in order to shorten the bridge span length, reduce the girder depth, and consequently lower the overpass profile elevations. For construction of overpass bridge girders, cast-insitu construction method is recommended rather than pre-casting/erection method of the original design from economic advantage of the cast-insitu construction method and the site condition favorable for the method for landscape is flat with no obstruction so that it is easy to place false-work in the field.

3) Recommendation of Compact Abutment on Embankment Top

As regards sequence of a bridge construction, embankment construction should precede bridge construction and construction of abutments should be begun after the ground settlement of the adjoining embankment has adequately advanced, because the ground settlement around abutments occurred after completion of bridge will be a cause of bridge damage in the future. Considering this point, a high-walled abutment adopted in the original design will not be profitable, because the construction of this type abutment involves deep excavation of the embankment once completed.

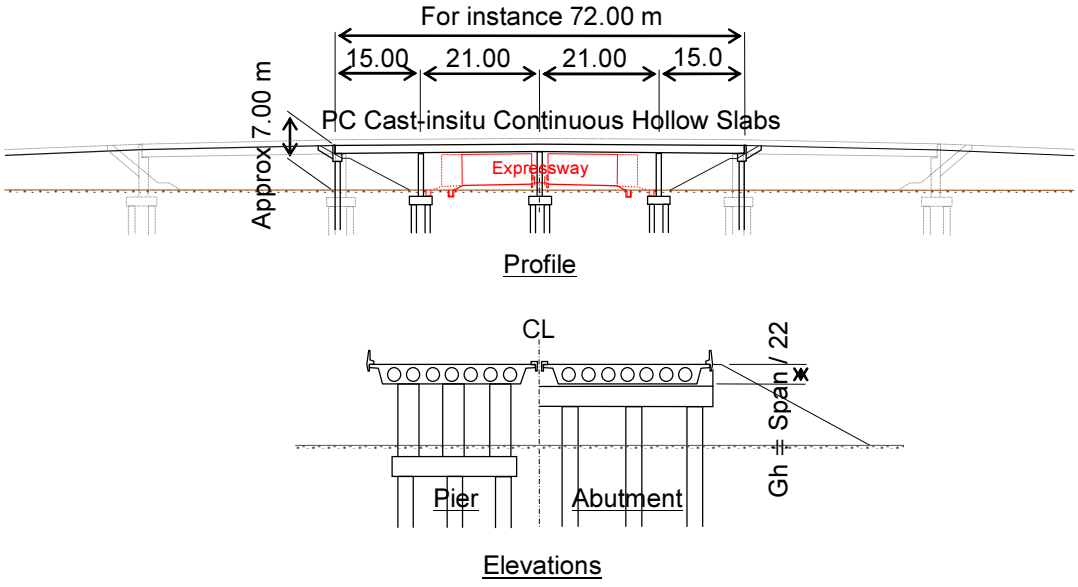
Therefore, as an alternative, another type abutment, compact in size, constructed on top of the completed embankment, and supported by piles, is recommended. It is because a compact size abutment for itself will be less costly in construction compared with that of the original design, as well as it is expected to improve the bridge side appearance as a whole by creating a triangular space with a diagonal line of embankment in front of abutment and a parallel bridge girder lines.

Figure 5.2.17-3 below traces the side view of a typical overpass bridge included in the original design, and then, Figure 5.2.17-4 presents an alternative design proposed for overpass bridges by the JICA engineer based on the above technical discussions.



Source: JICA Study Team

Figure 5.2.17-3 Typical Overpass Bridge in Original Design



Source: JICA Study Team

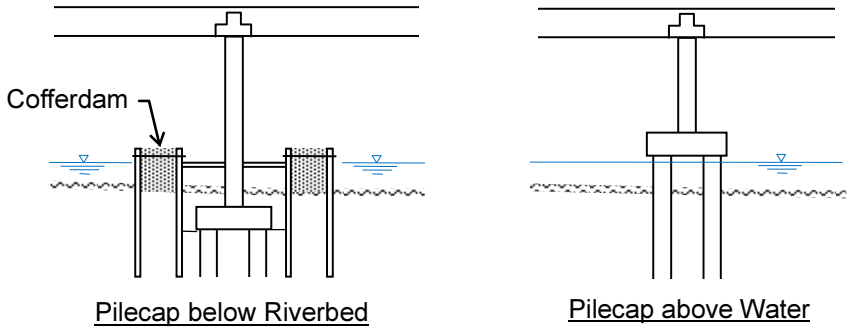
Figure 5.2.17-4 Alternative Design Proposed for Overpass Bridge

In the original design shown in Figure 5.2.17-3 the embankment height at abutment is measured at about 7 m which is actually higher than the highest embankment of 6 m suggested by TEDI. While, in the alternative design as shown in Figure 5.2.17-4, the embankment height

can be kept low at about 7 m the same as that of the original design by reducing the span length and girder height and in consequence lowering the road profile elevations, although abutments are relocated to shorten the bridge length.

(5) Pilecap above Water

In design of river bridges, to save the cost of temporary cofferdam for foundation construction, it is advised to raise the position of pilecap above water level. See Figure 5.2.17-5 below.



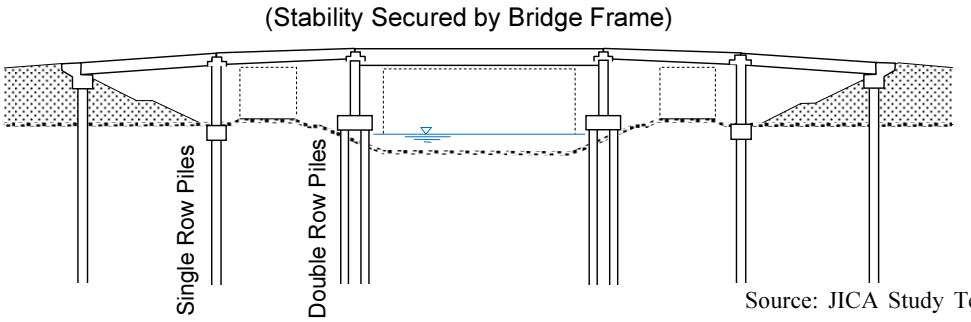
Source: JICA Study Team

Figure 5.2.17-5 Position of Pile cap

(6) Single Row Piles

The original design adopted bored RC piles of diameter 1.00 m for bridge foundation and the pile of such a size has relatively high capacity. In case this size of pile supports shorter span bridges, the number of piles in double row layout may provide excess capacity, and therefore, in such a case, the fewer number of piles in single row layout is recommended.

A bridge pier supported by single row piles is at risk of leaning in bridge direction for it stands alone during construction, but after connecting all spans each other with girders, the stability of a bridge is secured by a total bridge structural frame. See Figure 5.2.17-6 below.



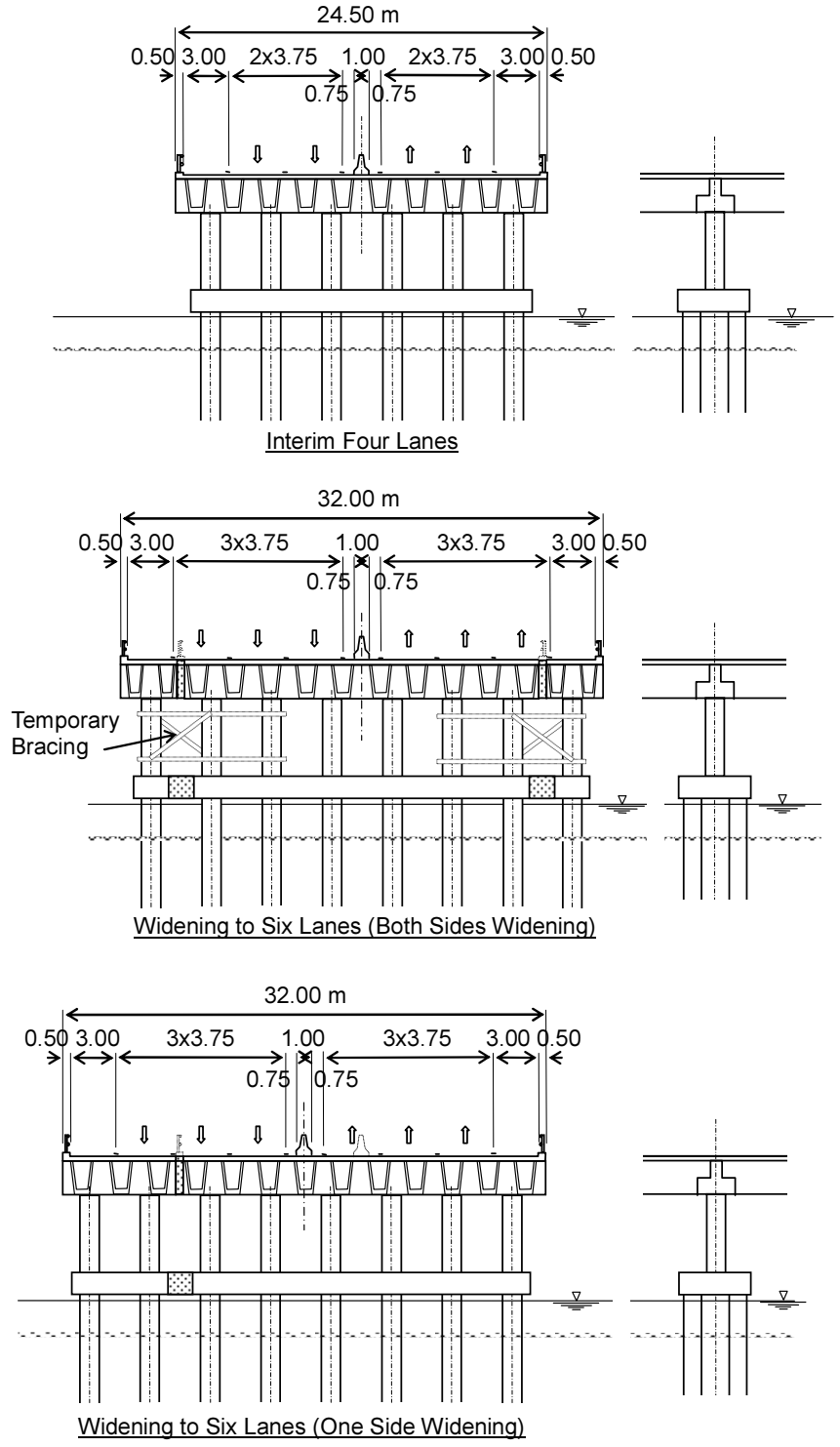
Source: JICA Study Team

Figure 5.2.17-6 Stability of Bridge Secured by Bridge Structural Frame

(7) Bridge Widening Method

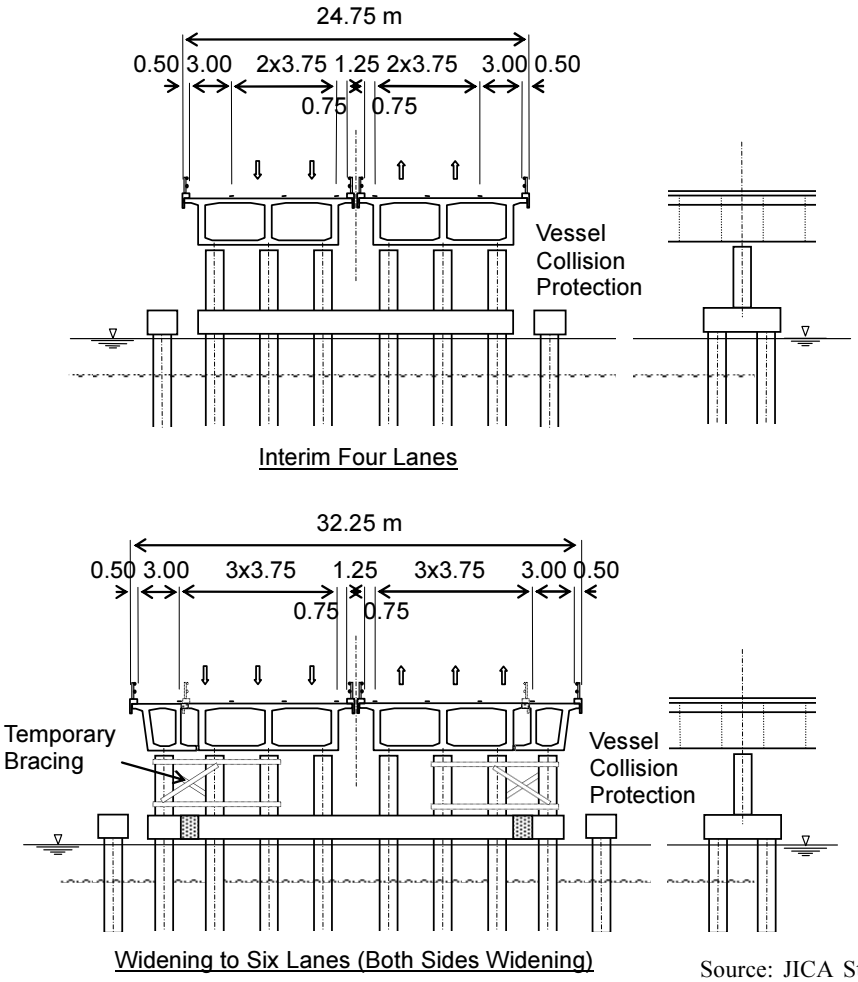
It is scheduled that the BHVT Expressway in the initial phase will be constructed with 4 lanes and be widened to 6 lanes in the future according to increase of traffic volume. At that time, bridges also need to be widened to 6 lanes.

In fact, there have been some highway projects which proposed to construct 6 lanes bridges from the initial phase of 4 lanes road service considering technical difficulty of bridge widening in the future. However, this BHVT Expressway project proposed to construct bridges with only 4 lanes in the initial phase in order to curb the initial construction cost. Therefore, the bridge design needs consideration for the future widening construction. Here are some bridge widening methods introduced in Figures 5.2.17-7 and 5.2.17-8 below.



Source: JICA Study Team

Figure 5.2.17-7 Bridge Widening Method for Precast Girder



Source: JICA Study Team

Figure 5.2.17-8 Widening Method for Cast-insitu or Segmental Box Girder Bridge

Symmetrical widening can maintain the initial position of the road center line also after widened, but this method needs to carry out widening construction on each side of bridge as well as temporary bracing may be required during construction to hold a narrow widening structure of only 3.75 m. While, one-sided widening is economical for one time widening construction but the position of the road center line will shift after widened. The shift of road center line on the widened bridge needs to be adjusted on the approach road.

Technical Notes for Bridge Widening

The followings are common technical essentials for bridge widening construction:

- ✓ The time for connecting the two bridges, filling of a gap between the old and new bridges, should be as delayed as possible.

- ✓ Use of low-shrinkage concrete for the new bridge construction will reduce the internal force redistribution between the two bridges.
- ✓ Optimization of prestressing design of the new bridge can improve the stress states in both the old and new bridges.
- ✓ Settlements of piers of the new bridge must be strictly controlled after connecting the two bridges.

(8) Actual Design Changes after Review

As described in this report, the JICA engineer has presented various improvement proposals for better design and reduction of construction cost of bridges. However, through discussions with TEDI and then with BVEC, the Vietnamese side indicated a policy to accept the reduction of bridge length but not to accept the alteration of span lengths and bridge structural types.

In consequence, the review of bridge design ended up with only reduction of bridge length in comparison with constructible embankment height as shown in Table 5.2.17-2. Other proposals which were not adopted in the BVEC F/S are to be reviewed at detailed design stage.

Table 5.2.17-2 List of Updated Bridge with Design in BVEC F/S (Oct. 2012)

No	Bridge name	Item	Location	Original Design		Proposed Design		Bridge structure			Province
				Bridge length (m)	Span arrangement (m)	Bridge length (m)	Span arrangement (m)	Superstructure	Substructure		
									Foundation	Pile length (m)	
1	Song Buong	Bridges on the expressway	KM2+558.0	99.2	3x33			I girder	D1000	12.0	
2	Nuoc Trong	Bridges on the expressway	KM8+600.0	42.15	2x21			I girder	400x400	17.0	
3	Suoi Phen	Bridges on the expressway	KM12+628.0	33.1	1x33			I girder	D1000	33.0	Dong Nai
4	Quan Thu	Bridges on the expressway	KM14+119.0	63.2	3x21	no change	no change	I girder	400x400	29.0	
5	Da Vang	Bridges on the expressway	KM20+024.0	33.1	1x33			I girder	D1000	31.0	
6	Suoi Ca	Bridges on the expressway	KM22+848.0	99.2	3x33			I girder	D1000	33.0	
7	Suoi Nhum	Bridges on the expressway	KM37+450.0	198.5	39.15+3x40+39.15			ST girder	D1000	18.5	Ba Ria - Vung Tau
8	Tam Phuoc 1	Overpass	KM4+446.0	132.25	4x33	66.15	2x33	I girder	D1000	40.0	
9	Tam Phuoc 2	Overpass	KM5+035.0	168.45	8x21	66.25	12+2x21+12	Slab girder	D1000	40.0	
10	Sy Quan Luc Quan 2	Overpass	KM6+148.0	228.42	39.15+3x40+30+ 39.15	92.50	39.15+30+23.15	Super T	D1000	44.0	
11	Nha may	Overpass	KM11+124.0	268.42	39.15+2x40+30+2x40+39.15	92.50	39.15+30+23.15	Super T	400x400	33.0	
12	Nong truong Binh Son	Overpass	KM16+231.0	165.3	5x33	90.20	33+24+33	I girder	400x400	33.0	Dong Nai
13	Bau Can	Overpass	KM24+124.0	297.5	9x33	99.20	3x33	I girder	D1000	36.0	
14	Ngang Duong	Overpass	KM26+907.0	228.42	39.15+2x40+30+40+39.15	128.40	29.15+40+30+29.15	Super T	D1000	36.0	
15	Cho Tan Hiep	Overpass	KM28+044.0	231.4	7x33	132.25	4x33	I girder	D1000	35.0	
16	Hac Dich 1	Overpass	KM34+209.0	132.25	4x33	66.15	2x33	I girder	D1000	28.0	
17	Hac Dich 2	Overpass	KM36+120.0	165.3	5x33	48.15	2x24	I girder	D1000	28.0	Ba Ria - Vung Tau
18	Km0+123	Underpass	KM+123.2	23					Shallow footing		
19	Km1+554	Underpass	KM1+554.0	33					Shallow footing		
20	Km3+650	Underpass	KM3+650.0	33					Shallow footing		
21	Km7+250	Underpass	KM7+250.0	33					Shallow footing		
22	KCN Long Duc	Underpass	KM9+452.0	33					Shallow footing		
23	Binh Son	Underpass	KM14+264.0	42					Shallow footing		
24	Go Bao May	Underpass	KM17+948.0	44		no change	no change		Shallow footing		Dong Nai
25	Da Vang 1	Underpass	KM20+005.0	40.5					Shallow footing		
26	Da Vang 2	Underpass	KM20+032.0	40.5					Shallow footing		
27	Suoi Ca 1	Underpass	KM22+847.0	43.8					Shallow footing		
28	Suoi Ca 2	Underpass	KM22+929.0	43.8					Shallow footing		
29	Thai Thien	Underpass	KM31+040.0	34.8					Shallow footing		
30	Km33+170	Underpass	KM33+170.0	32.5					Shallow footing		
31	Hoa Hung - Trang Bom	Bridge over railway	KM+680.0	358.4	39.15+7x40+39.15	no change	no change	Super T	D1000	15.0	
32	Bien Hoa - Vung Tau	Bridge over railway	KM30+320.0	1148.4	39.15+11x40+30+15x40+39.15	no change	no change	Super T	D1000	35.0	Dong Nai
33	Bridge on expressway	Bien Hoa Interchanges	KM+0.0	355.4	39.15+37+6x40+ 39.15	275.4	36.15+5x40+39.15	Super T	D1000	15.0	
	Bridge on ramp 1 over river Quan			84.25	4x21	no change	no change	I girder	D1000	15.0	
	Bridge on ramp 2 over river Quan			84.25	4x21	no change	no change	I girder	D1000	15.0	
34	Bridge N01 over river Bung Mon	Long Thanh - Dau Giay Interchanges	KM16+600.0	63.2	3x21	Changing design of interchange option	Changing design of interchange option	I girder	D1000	40.0	Dong Nai
	Bridge N02 over river Bung Mon			63.2	3x21			I girder	D1000	40.0	
	Bridge on ramp 6			63.15	3x21			I girder	D1000	40.0	
	Bridge on ramp 7			72.15	3x24			I girder	D1000	40.0	
	Bridge on ramp 8			90.15	3x30			I girder	D1000	35.0	
	Bridge overpass LT-DG expressway			198.35	6x33			I girder	D1000	40.0	
	Bridge on LT-DG expressway (widening)			72	3x24			I girder	D100	35.0	
35	Overpass No 1 (Phu My IC)	Bridges overpass expressway	KM38+700.0	130.1	30+2x35+30	no change	no change	Hollow slab	D1000	45.0	
36	Overpass No 2 to Cai Mep - Thi Vai port	Bridges overpass expressway	KM40+050.0	59.1	13+33+13	no change	no change	Hollow slab	400x400	23.5	Ba Ria - Vung Tau
37	Overpass No 3 (NH.51 IC)	Bridges overpass expressway	KM46+340.0	165.1	30+3x35+30	no change	no change	Hollow slab	D1000	41.0	

Source:JICA Study Team

5.2.18. Soft Soil Treatment

(1) Outline of the Geographical and Geological Conditions

1) Geographical condition

Geographical condition can be roughly divided into the following 2 sections in the whole of Phase1 and Phase2 sections. The expressway alignment of the former part passes through almost high elevation area, and the ground condition is rather good. In the latter part, there is the section in which the soft clay layer (N value is 0 to 4) deposit 10 to 20m thickness.

- From The Start Point (KM0+00) to The intersection of the BHVT Expressway and NH51

The planned route passes through many low hills of upturned bowl shape, high terrain compared to cannal in the area. The route bypasses small residential areas, the area of industrial crops such as rubber, cashew, eucalyptus, some rice fields and field crops. For the road linked to Cai Mep – Thi Vai Port, the route passes closely to the foot of Ong Trinh mountain with terrain higher than that of the whole route (passing through the area of quarries).

- From Phu My to the end point

The connection section to Cai Mep-Thi Vai, the route runs closely to Ong Trinh Mountain, a higher terrain than the other section (through stone mines).
From NH55 to the route end is the coastal area, low terrain (mangrove), and lower than the tidal level of channel system, thus it will get flooded when tide appears.

2) The geotechnical investigation results

The geotechnical investigation was carried out from Jan/2011 to Apr/2011 for the F/S design of this project. In this report, the review and study was conducted referring to the reports shown as Table5.2.18-1.

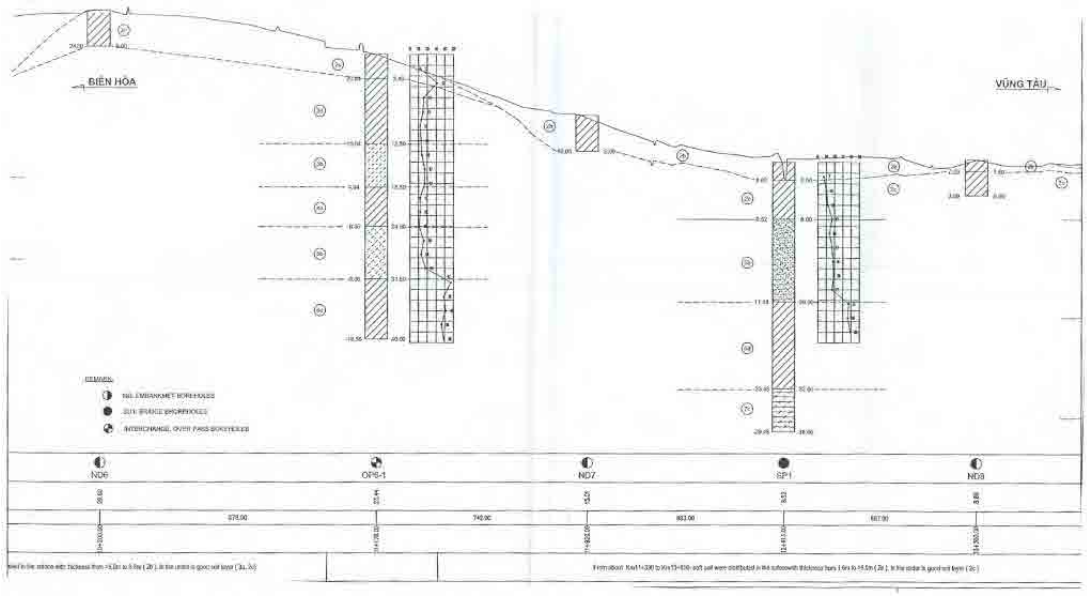
Table 5.2.18-1 Geotechnical Investigation Reports

No.	Document Name	Section
Volume II-1-Book1	Report on Soil Investigation For Road Section	KM0+000-KM37+000
Volume II-1-Book2	Report on Soil Investigation For Road and Culvert Section	KM0+000-KM37+000
Volume II-1-Book3a	Report on Soil Investigation For Roadbed Section	KM56+540-KM68+540
Volume II-1-Book4	Report on Soil Investigation For Road, Over pass and Interchange Branch Connection	PHU MY - NH51
Volume II-2-Book2	Report on Soil Investigation For Bridges access river	KM37+00-KM56+00

Volume II-3-Book2	Report on Soil Investigation For Overpasses	KM37+00-KM56+00
Volume II-4-Book2	Report on Soil Investigation For Interchanges	KM37+00-KM56+00

Source: JICA Study Team

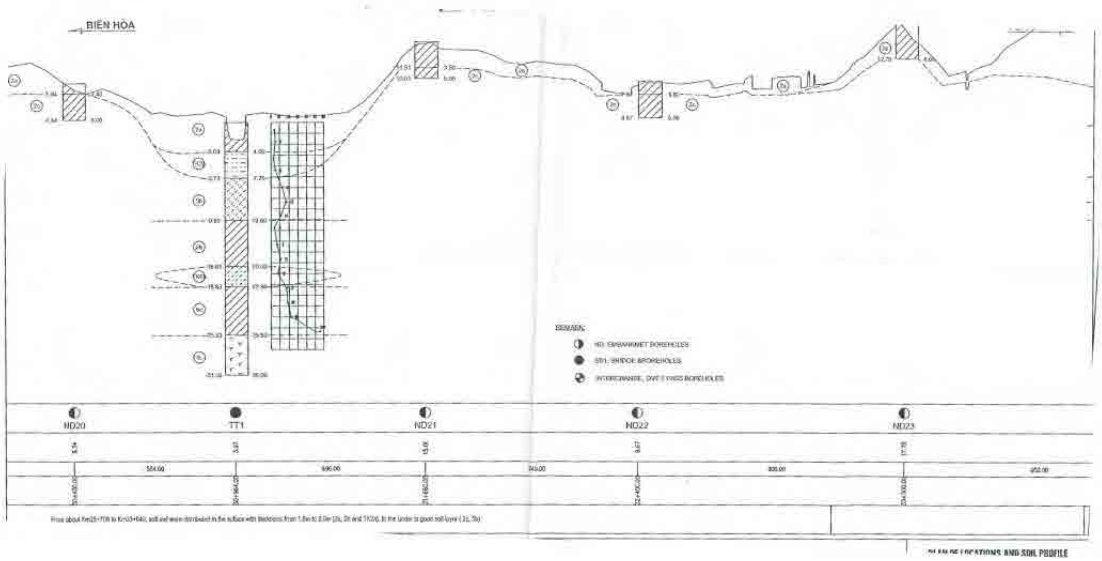
The representative geotechnical condition in the Phase1 section is shown below. Figure 5.2.18-1 shows the geotechnical condition around KM+10. The soil layers in this section consist of rather high strength fine grain soil and rather high density sand layer, and there is no soft soil layers. The many part of the planned expressway passes on such as the ground condition.



Source: Soil investigation report(Volume II-1-Book1)

Figure 5.2.18-1 Geotechnical Condition(Km10～Km13.5)

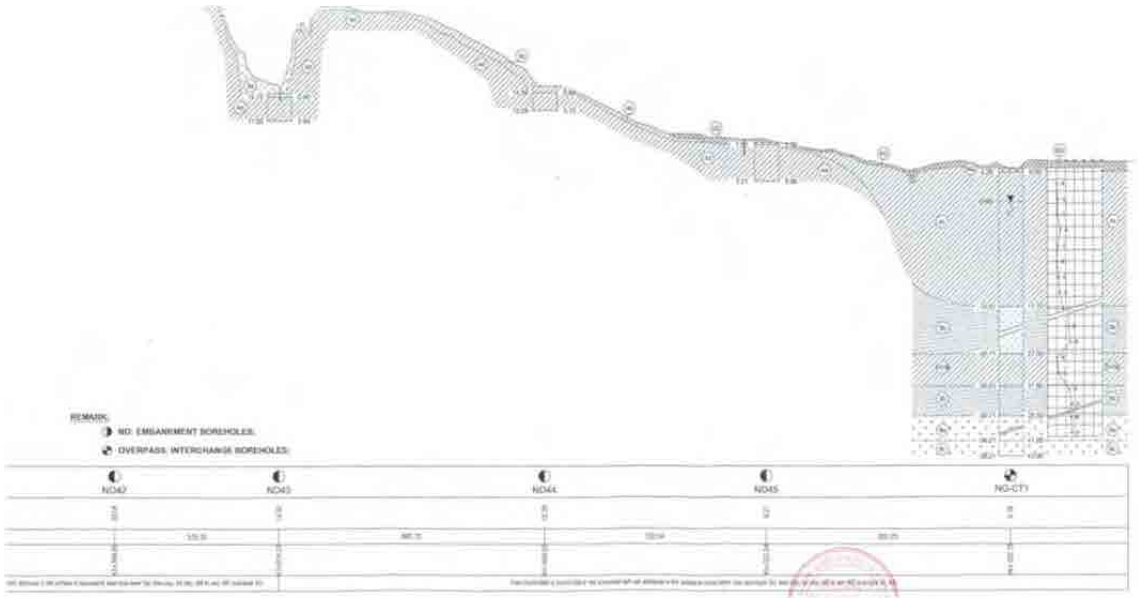
Figure5.2.18-1 shows that the example of soft soil deposit section at old drowned valley, the soft soil section like this can be found in spots in the expressway alignment. In these sections, the sand drain method was applied as soft soil treatment.



Source: Soil investigation report(Volume II-1-Book1)

Figure 5.2.18-2 Geotechnical condition (Km30.5~Km33.5)

Figure5.2.18-3 shows the geotechnical condition in Phu My to the intersection of NH51 and this road. The planned road passes through or near the hills and mountains, and almost all the route passes on the shallow rock ground. The deep deposited soil is around the NH51 intersection, but the layer is fine grained soil of which N values is about 10. Thus, The ground condition is good for construction and the soft soil treatment was not planned for this road.



Source: Soil investigation report(Volume II-1-Book4)

Figure 5.2.18-3 Geotechnical condition(Phu-My to the intersection of NH51(Km43.5~Km46.5)

(2) Review of The F/S, outline of the design

1) The Design Standards

There is no description about the design standards in the BVEC F/S report. But According to the hearing survey from TEDI corporation, the referred design standards were confirmed as shown in Table5.2.18-2. These standards are generally used for the expressway and embankment design in Viet Nam.

Table 5.2.18-2 The design Standards

No.	Standard
TCVN 5729-1997	Expressway - Requirement for design
TCVN 4054-05	Highway - Specification for design
22TCN211-06	Flexible pavement design
22TCN262-2000	Standard for investigation and design of embankment on soft ground

Source: JICA Study Team

2) The Design Criteria

The design criteria is in conformity with the above standards and it is shown in table5.2.18-3.

Table 5.2.18-3 The Design Criteria

		許容値	Remarks
Stability	During Construction	Safety factor F/S≧1.2	Bishop method
	During Operation	Safety factor F/S≧1.4	〃
Settlement	Embankment section	Residual Settlment Sr≦30cm	Consolidation settlment analysis
	Near box culvert	Residual Settlment Sr≦20cm	〃
	Abutment backfill area	Residual Settlment Sr≦10cm	〃

Source: JICA Study Team

3) The Study Conditions

The study conditions were determined referring to the investigation results (borehole logs and laboratory test results).

4) Outline of the study method

There were not enough description of the study method in the F/S report. According to the hearing survey from the design engineer, stability analysis and consolidation analysis was carried out and then the necessity of soft soil treatment was determined.

Division of the sections was conducted considering the thickness of the soft soil layer and height of the embankment, the representative calculation models of each sections was made

and the calculation was carried out. Selecting the appropriate countermeasure method was carried out according to these calculation results and the table as shown in Table5.2.18-4

Table 5.2.18-4 The Alternatives of the soft soil treatment

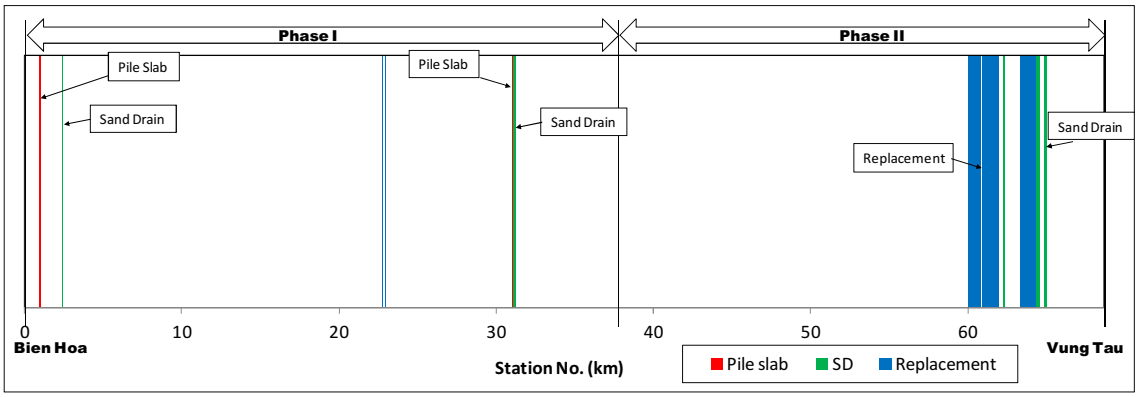
method	outline	the criteria for selecting
Soil replacement	The method to excavate soft and weak soil layer cause instability and settlement and to replace for good condition soil material.	Earth replacement is only applicable to the sub-grade where the depth of bottom layer of soft soil is less than 3.0m.
PVD method (Prefabricated Vertical Drain Method)	To install prefabricated drainage material into the ground at regular intervals. This countermeasure promote to discharge the pore water and occurrence of consolidation settlement.	PVD is only applicable to the embankment where its height is less than 4.0m and the depth of bottom layer of soft soil is less than 15.m or the subsidence is smaller than 1.5m.
Sand drain method (Sand Drain Method)	To install sand pile into the ground by the specific machine. This countermeasure promote to discharge the pore water and occurrence of consolidation settlement.	SD is only applicable to the embankment where its height is over 4.0m and the depth of bottom layer of soft soil is more than 15.0m or the subsidence is more than 1.5m.
Geo-Textile Method	The geo textile material is made from the steel or high polymer material in the factory. The material is allocated in the embankment bed and inner of the embankment in order to improve soil shear strength and keep the embankment stability.	The intensified geo-textile (woven) is used to strengthen the sub-grade after applying these above-mentioned measures but the stable coefficient during the construction period is not reachable.
RC Piled Slab	Driving concrete piles into the ground and constructing concrete pile slab above these piles. The slab support the load of the embankment.	For near abutment section, this countermeasure is applicated in case residual settlement cannot be reduced within allowable value or the embankment stability cannot be kept with above countermeasures.
U-retaining wall with Concrete pile	Constructing U-retaining wall with piles. The structure support the load of the embankment.	This method is applicated for high embankment section and over 25m soft soil depositting section.

Source:JICA Study Team

5) Outline of the design

The design was carried out in accordance with above mentioned method.

The applied alternatives of each section is shown in Figure5.2.18-4 and Table5.2.18-5. This figure shows that the total length of the soft soil treatment section is short in the whole section and there is a section in which SD and Replacement is continuously applied in near Vung Tau area. The typical cross sections of each methods are made as shown in Figure5.2.18-4.



Source:JICA Study Team

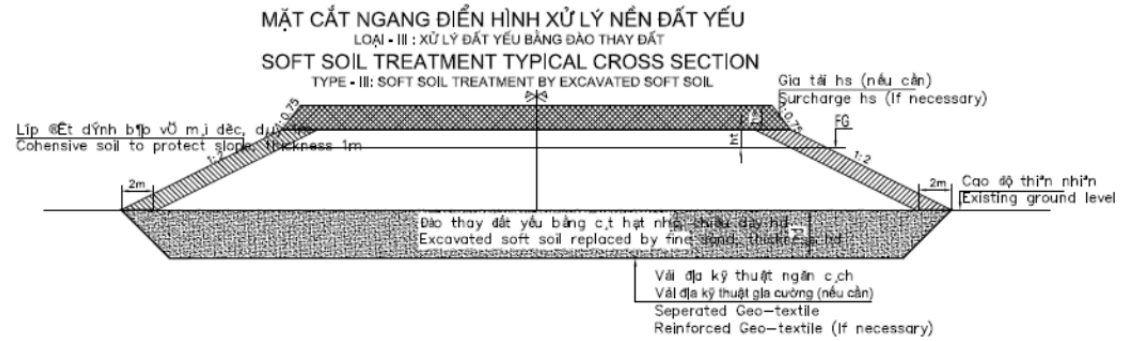
Figure 5.2.18-4 Applied Soft soil treatment method

Table 5.2.18-5 The results of the study for soft soil treatment (FS)

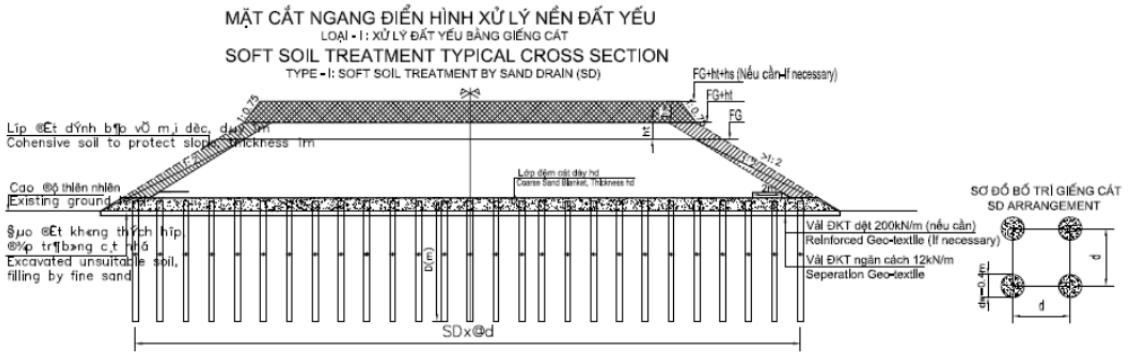
bien hoa - vung tau expressway project
Feasibility stage
summary of soft soil treatment design

No	Station		Distance	Calculation of cross - section			Without treatment				Soft soil treatment content																				Results of treatment				
											Treatment by SD or Replacement			Height of surchar. (m)	Thick. Of sand blanket (m)	Filling											Berm		Reinfor. Geotex. 200kN/m (layer)	Factor of safety affter complete Fs	U (%)	Resi. Sett. (cm)	Rate of Sett. (cm/year)	Compensated Sett. (m)
																Stage 1			Stage 2			Stage 3+4			Total of construc. Time (days)								
				Thick. of stiff soil layer (m)	Thick. of soft soil layers (m)	Height of EM (m)	Factor safety Fs	Con. Sett. Sc (m)	Total. Sett. S (m)	Sett. Within 15 years affter pavemet (m)	SD	Spacing (m)	Depth (m)			H1 (m)	Rate of filling (cm/day)	Waiting time (day)	H2 (m)	Rate of filling (cm/day)	Waiting time (day)	H3 (m)	Rate of filling (cm/day)	Waiting time (days)		B (m)	H (m)							
1	Km00+900.00 -	Km00+930.00	30.0								Load Relief Slab																							
2	Km00+930.00 -	Km01+065.00	135.0		10.5	4.6	1.760	0.34	0.41		Filling waiting time 360 day																							
3	Km01+065.00 -	Km01+635.00	570.0		11.5	5.2	1.59	0.31	0.37		Filling waiting time 360 day																							
4	Km02+403.00 -	Km02+503.00	100.0		9.0	5.0	1.260	0.26	0.31		SD	2.0	9.0		0.6		5	90							194			1	1.500		0.10		0.21
5	Km22+784.00 -	Km22+834.00	50.0		18.5	5.5	1.160	0.15	0.18		Replacement		3.0																1.880				
6	Km22+943.00	Km22+993.00	50.0		18.5	5.5	1.160	0.15	0.18		Replacement		3.0																1.880				
7	Km31+025.00 -	Km31+055.00	30.0								Load Relief Slab																							
8	Km31+055.00 -	Km31+275.00	220.0		7.7	4.5	1.140	0.35	0.42		SD	2.0	7.7		0.6		5	90							184			1	1.440		0.23		0.20
9	Km60+082.00 -	Km60+350.00	268.0		3.0	4.7		0.07	0.08		Replacement		3.0																				
10	Km60+350.00 -	Km60+650.00	300.0		3.0	3.0		0.05	0.06		Replacement		3.0																				
11	Km60+650.00 -	Km60+830.00	180.0		3.0	6.0		0.08	0.09		Replacement		3.0																				
12	Km60+929.00 -	Km61+100.00	171.0		3.0	4.7		0.07	0.08		Replacement		3.0																				
13	Km61+100.00 -	Km61+355.00	255.0		4.4	2.5		0.23	0.28		Replacement		3.0																				
14	Km61+355.00 -	Km61+550.00	195.0		5.4	4.4		0.14	0.17		Replacement		4.0																				
15	Km61+575.00 -	Km61+700.00	125.0		5.4	4.4		0.14	0.17		Replacement		4.0																				
16	Km61+700.00 -	Km62+000.00	300.0		3.5	2.5		0.23	0.28		Replacement		3.0																				
17	Km62+250.00 -	Km62+383.00	133.0		9.0	4.6		1.70	2.04		SD	1.60	9.0		0.6	4.00	5	90	FG+Hg+0.7	5	60				274			4	1.496	95.6	0.07		2.00
18	Km63+300.00 -	Km64+167.00	867.0		4.5	2.0		0.14	0.17		Replacement		3.0																				
19	Km64+167.00 -	Km64+355.00	188.0		4.0	4.0		0.15	0.18		Replacement		3.0																				
20	Km64+355.00 -	Km64+550.00	195.0		9.0	6.0		1.99	2.39		SD	1.6	9.0		0.6	4.00	5	90	FG+Hg+0.5	5	60				304			6	1.414	96.5	0.07		2.30
21	Km64+835.00 -	Km65+050.00	215.0		9.0	5.5		1.91	2.29		SD	1.6	9.0		0.6	4.00	5	90	FG+Hg+0.6	5	60				296			6	1.536	96.2	0.07		2.20

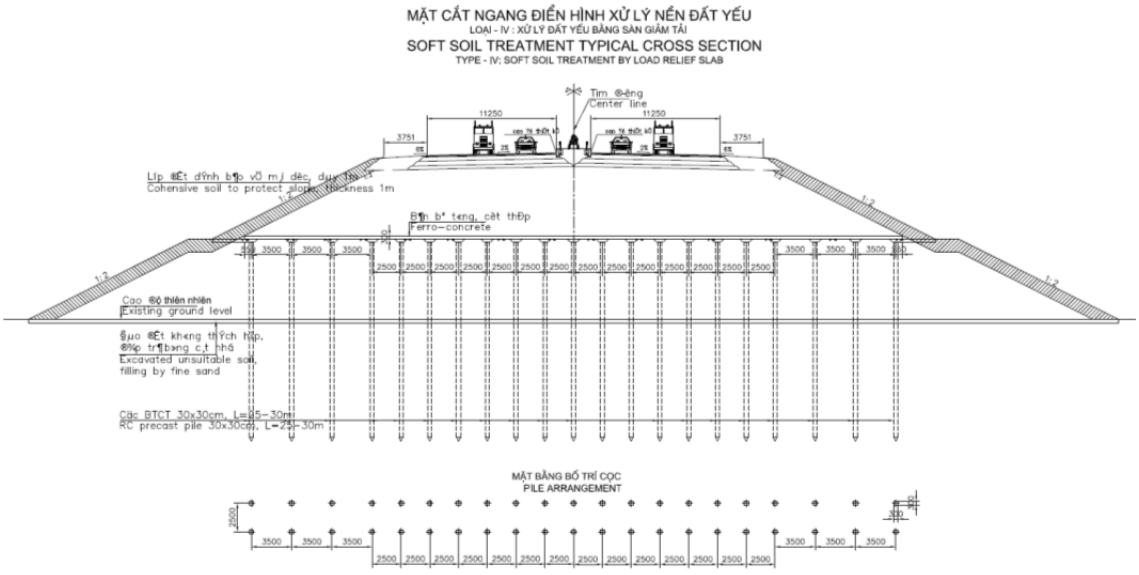
Source: BVEC F/S



(a) Soil replacement



(b) Sand drain method



(c)Pile Slab method

Source: BVEC F/S

Figure 5.2.18-5 Soft soil treatment drawings

(3) The evaluation for the F/S design

The estimation of the geotechnical condition and the outline of the design for Phase1 were mentioned above.

Geotechnical investigation were carried out with about 70 points of Borehole survey in the total length of 47km section. The elevation of the planned expressway is rather high and the geotechnical condition is relatively good. The estimation of the geotechnical condition was done reasonably in the F/S according to the soil investigation results.

The study method of the soft soil treatment method such as consolidation and settlement analysis is in conformity with generally using method in Vietnam. But there are not enough reasonably criteria to select SD or others in the method of selecting alternatives, the selection policy lacks rationality.

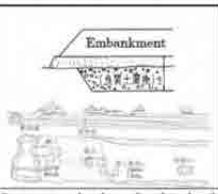
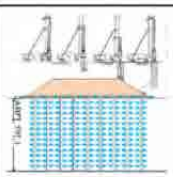
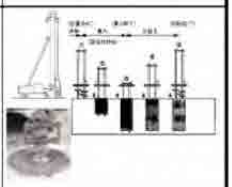
Surcharge embankment, allocation of the clay layer for the slope surface protection and geotextile are shown properly in the design drawings of the sand drain method and soil replacement. About the pile slab method, concrete slab is allocated not on the existing ground surface but on the same level as first step of the embankment. In this design, there are some disadvantages such as consolidation occuring, lateral movement of the abutment and void occurring under the slab. Generally the slab is allocated on the existing ground surface. Thus modifying the design of the slab allocated level is strongly recommended.

(4) proposing modifying design

1) Outline

As described above, the selection policy of the alternatives lacks rationality. In this study, preliminaly comparing alternatives was considered as shown in Table5.2.18-6, and the additional study of PVD method application was carried out for the section applied SD method. Consolidation settlement and Stability analysis were conducted to estimate the applicability of the PVD method.

Table 5.2.18-6 Comparing alternatives

	Solutions	Soil Replacement	PVD	SD	Deep cement mixing column (DCM)
general description	*Concept draw (or photo)*				
	description	To excavate and replace soft and weak soil layer cause instability. Generally, this method can be applied in case as follows: the thickness of replacement is rather thin (within about 3m), there is little construction problem (for example, to deal with underground water is easy)	To install prefabricated drainage material into the ground at regular intervals. This countermeasure promote to discharge the pore water and occurrence of consolidation settlement.	To install sand pile into the ground by the specific machine. This countermeasure promote to discharge the pore water and occurrence of consolidation settlement.	To add and mix the cement material into the ground by the specific machine in order to increase bearing capacity. The bearing capacity of created column will be improved as about 0.2-1.0Mpa.
Technical Issues	*Consolidation Settlement*	Controlled by soil replacement thickness	High	High	Low
	Residual Settlement	Controlled by soil replacement thickness	Controlled by spacing of PVD and Surchage period	Controlled by SD spacing and Surchage period	Controlled by length of pile
	Stability	Increase Factor of Safety due to replacement with firmer soil	Increase Factor of Safety due to increase in soil strength during consolidation	Increase Factor of Safety due to increase in soil strength during consolidation	Increase Factor of Safety due to High load bearing capacity of DCM columns
Economic Issues	*Maintenance Cost*	Low	High	High	Low
	Construction Cost	Depend on replacement depth	Low	Low	high
Other Related Issues	*Construction Period*	Moderate – Depend on equipment used, material supply and surcharge time	Longest - depend on surcharge time	Longest - depend on surcharge time	Fast– Depend on equipment used.
	Long Term Performance	Good	Moderate	Moderate	Good
	Right of Way	In area of roadbed occupancy	Need large area for counter weight when deep soft soil, high embankment	Need large areas for counter weight when deep soft soil, high embankment	No need area for counter weight.
	Local Experience in Construction	Good – Mainly earthwork	Moderate	Moderate	Little used
	Use in Vietnamese Road project before	Many	Many	Many	Little
	Market Supply	No problem, mainly fine sand	No problem, except sand mat supply	Need a big quantity medium sand to make sand drain and sand mat layer	No problem, except import of construction equipment
	Likelihood of Usage	Suitable solution for thin soft clay deposit	Attractive method with low cost but requiring long construction period	Attractive method with low cost but requiring long construction period	Attractive method with high cost and requiring experience in construction management, need more tests: pilot test, shear test, bearing capacity test etc...

Source: JICA Study Team

2) Study Conditions

Study conditions were basically determined in conformity with the existing F/S study. For the PVD applicability study, spacing of the PVD was determined to be 1.1m as minimum spacing of Viet Nam experience, and the maximum waiting period was 540days (1.5years).

3) Results of the study

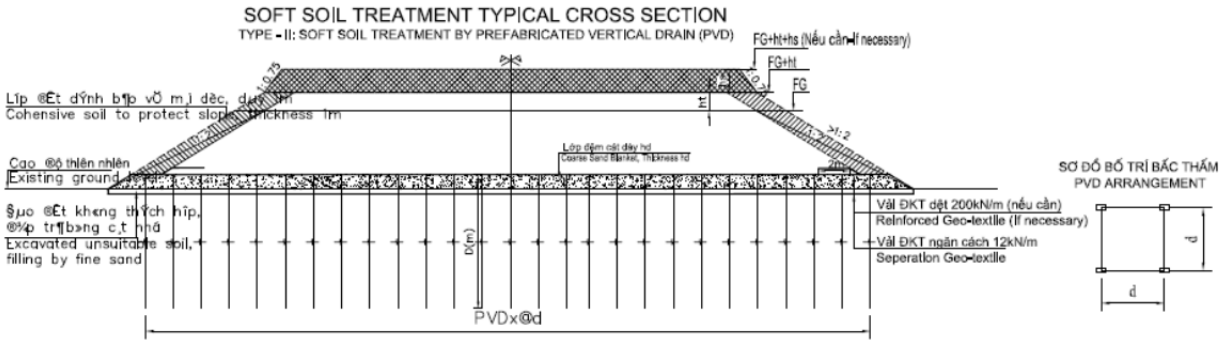
Table5.2.18-7 shows that the PVD can be applicable for all the section for which SD is applied in the F/S design according to the calculation results. It becomes clear that the PVD spacing is shorter and the waiting time is longer than in case of SD application. But the residual settlement can be reduce within 30cm. Thus the method was determined to be applicable for these sections. The cost and quantity of this treatment method were estimated separately, and it has became obvious that the cost of PVD is lower than of SD. Therefore the design change is strongly reccomended.

Table 5.2.18-7 Study Results

Station No.	Sand Drain			Prefablicated Vertical Drain			Results
	Spacing (m)	Period (day)	Residual Settlement (cm)	Spacing (m)	Period (day)	Residual Settlement (cm)	
Km02+403 -Km02+503	2.0	194	10	1.1	288	11	PVD Applicable
Km31+055 -Km31+275	2.0	184	23	1.1	298	21	PVD Applicable

Source: JICA Study Team

The typical crosssection drawing of the PVD method is as shown in Figure5.2.18-6. The componet items are almost same as of SD method, but the drain material is only change.



(d)PVD method

Source: JICA Study Team

Figure 5.2.18-6 Proposed modified treatment method

(5) The Problems of F/S design and The Proposal of Additional Study

The BVEC F/S design is conducted almost reasonably as described above. Meanwhile there is some problem to conduct the detailed design as followings

1) The Additional Soil Investigation

The soil investigation was conducted with about 70 points of borehole surveys in the whole phase 1 section (47km). The borehole survey was carried out by 1 or 2 points per 1km. This planned road passes on relatively good soil condition ground, but there are some section in which soft soil layer deposits. Thus the additional borehole survey is required for D/D considering this matter. The Vietnamese standards of expressway construction regulate the quantity of the survey for especially soft soil sections as 1 borehole each of 75m and add 2 boreholes both side from centerline by each of 150m. Therefore the additional boreholes are required as shown in below Table5.2.18-8.

Table 5.2.18-8 Additional borehole survey for D/D

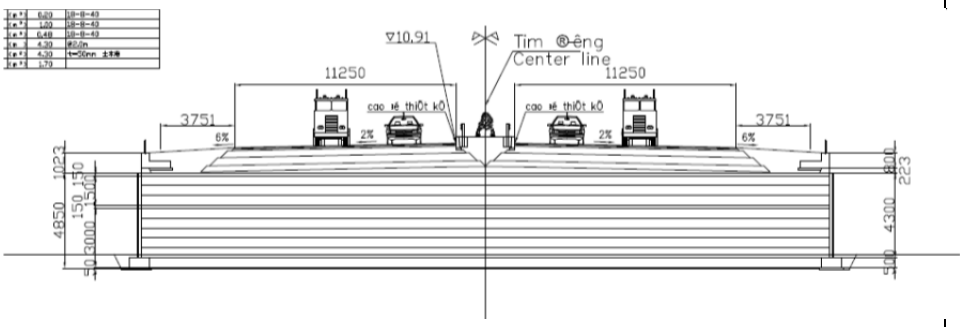
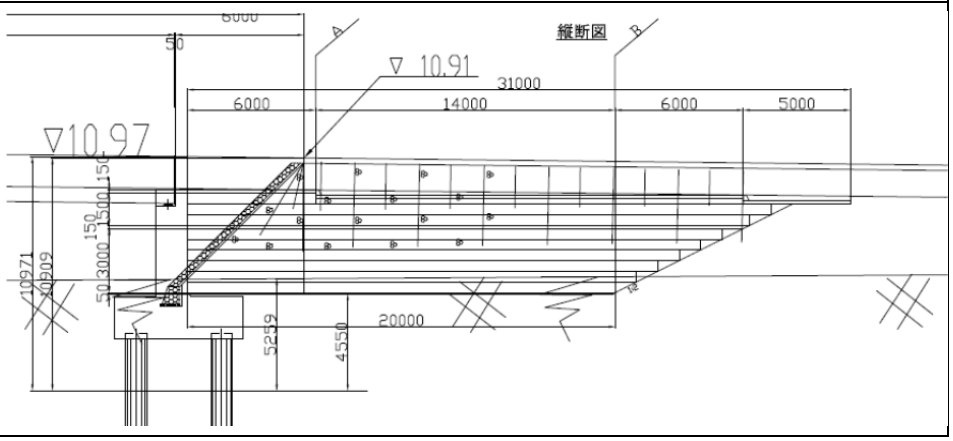
Section	Station No.	length (m)	existing num. of boreholes（num）	additional borehole num (num）	remarks
Phase1	KM00+900 -KM01+635	735m	1	19	temporary assumed depth of boreholes is 15m
	KM02+403 -KM02+503	100m	0	4	temporary assumed depth of boreholes is 15m
	KM31+025 -KM31+275	250m	0	8	temporary assumed depth of boreholes is 15m

Source: JICA Study Team

2) The proposal of additional study on alternatives

In the soft soil section, the Vietnamese standards regulate that the residual settlement near abutment section is within 10cm which is smaller than 30cm in general embankment sections. As a results of this regulation and the study, pile slab method are applied for some section in F/S design. Pile slab method is general method for soft ground in Vietnam. Meanwhile the method have some problems such as requiring high cost, the possibility occuring uneven settlement on border and structural health of slab in the ground. Thus its contemplated that the study of the other alternatives are beneficial for improving the design.

For example, the deep cement mixing method and the extra light weight fill method can be proposed as the alternatives, there are many experiences of these method application in other countries. Its strongly recommended to study these alternatives in the D/D. Figure5.2.18-7 shows the extra light weight fill method as one sample of the alternatives.

The sample of proposed alternatives	
Outline	The expanded polystyrene (EPS) civil construction method is a light-weight embankment method using EPS blocks as fill material. The method was developed as a measure for ground subsidence in Oslo, Norway in 1972.
	【 Merit】
	➢ Easy to construction It is able to construct 200m^3 fill per day (1party with 5 persons). Thus this method is often used for urgent post-disaster restoration. ➢ Advantageous effect of the method The method have the advantage to have the ability of reducing settlement and keeping the stability of embankment.
	【 weak point】
	➢ high cost of the materials ➢ floating force of the block ➢ melting by the oil
Typical Cross section	
Typical longitudinal drawing	

Source:JICA Study Team

Figure 5.2.18-7 Outline of the EPS method

5.2.19. Accessory of Road

(1)-1 Electronic facility

1) Lighting facility

Lighting facility refers to MOT standard of Vietnam, such as TCVN2010, TCXDVN2004, TCVN2005, 2001, 1989, TCN2006, and ISO standard: CIE115 (1995). It is installed at the place where vehicle speed changes by concentration and the dispersion of the vehicle, the point of origin and destination, Interchange, Bridges, service station, control center and Operation office. Moreover it is settled at median strip in order to consider maintain and widen traffic lanes in near future.

<Reference>Installation standard of other expressways

Expressways	Installation standard
HCMC- Trung Luong Expressway	Installed at Interchange, 500m before and after tollgate, Urbanization, a part of viaduct.
Japanese Expressways	- The section influenced by the lighting of the building, roadside and heavy traffic - The section where traffic is congested remarkably by night - The section where fog is easy to be generated, and special climatic condition - The section where linear, and road width, shoulder width are special Interchange, Junction, toll gate area, Service area, Parking area, bus stop, Long bridge

Source:JICA Study Team

(1)-2 Power reception and distribution

Power reception and distribution is installed at 13 places thought to be the need in electric preservation.
In addition, it depends on the Electric Toll Collection (hereinafter ETC) introduction to use "uninterruptive power supply facilities" (UPS) to feed electric power to ETC replaced by a generator. UPS has been already introduced into Vietnam.
Furthermore, the generator for emergency is established at the important facilities installed a traffic control system or toll collection system, to feed electric to UPS in the case of an emergency.

(1)-3 Telecommunication System

A telecommunication system is a system communicating with Closed-Circuit Television(hereinafter CCTV) camera system or an variable message sign board other terminal equipment, and it is necessary an optical fiber communication cable. It prefers to be settled the cable at median strip for maintenance and traffic lane widening in near future.

(2) Building facilities plan

Building facilities include 4 facilities, an operation center, a maintenance office, a tollgate and a service station. It is not include out-sourcing ETC service company office and the service station company office.

1) Operation Center

Operation Center is planned at and intermediate location on the entire expressway included the length of phase 2 on the F/S, referred to Table 5.2.19-1.

Table 5.2.19-1 Operation Center Plan

Item	Contents
Location	1 location（st.37+000）
Area	Land for acquisition:57,316㎡, Site area:33,000㎡
Staff	80 People
Facilities	Office:1,870㎡, Service house:2,700㎡, Vehicle parking and Storage:180㎡, Culture house:450㎡, Parking: 72㎡
Equipment	<Common Space> Transformer station, Wastewater treatment station, pumping station, PC and LAN system, printer <Road Control Center> Closed television system, Control equipment, Data storage equipment

Source: BVEC F/S

2) Maintenance Office

Major function of the maintenance office is to undertake routine maintenance, such as cleaning and inspection activities, in compliance with the O&M service plan.

Maintenance office is planned at an intermediate location of the entire expressway at phase 1 stage. The proposed location of the maintenance office will facilitate access from the whole stretch of the expressway (see Table 5.2.19-2).

Table 5.2.19-2 Maintenance Office Plan

Items	Contents
Location	1 location（st.16+000）
Area	Land for acquisition:13,700㎡, Site Area: 5,900㎡
Staff	33 People
Facilities	Office: 484㎡, Worker's dormitory:700㎡, Vehicle parking and Storage: 113㎡, Canteen: 260㎡

Equipment	Transformer station, Wastewater treatment station, pumping station, PC and LAN system, printer

Source: BVEC F/S

3) Service Station

Service station is planned at an intermediate location of the entire expressway including phase 2 (see Table 5.2.19-3).

Table 5.2.19-3 Service station Plan

Items	Contents
Location	1 location on both sides (st.36+000)
Area	Land for acquisition:130,490㎡, Site area: 92,220㎡
Staff	130 people (includes staff in hotel, shop and gas station)
Equipment	Service house, hotel, toilets, supermarket, office, O&M station and gas station

Source: BVEC F/S

(3) Vehicle Allocation for O&M

O&M vehicles allocate and operate shown in Table 5.2.19-4 for the traffic patrol, inspection, quick repair and so on.

Cost for O&M vehicle is estimated based on “Consulting Services for Updating and Finalizing the Feasibility Study Report for Da Nang-QuangNgnai Expressway Construction Project” by WB.

Table 5.2.19-4 Vehicle Allocation for O&M

Vehicle	Operation center	Maintenance office	Traffic Operation Unit	Road Maintenance Unit	ITS Maintenance	Toll collection gate	Ramp	Total
Superintendent Car	3	1						4
Staff Car	2	1				1	3	7
Patrol Car			3	1	1			5
Road Maintenance car				2	2			4
Sweeper				1				1
Water Sprinkler				1				1
Sign Truck				1	1			2
Truck				1	1			2
Wrecker Truck			1					1
Cargo Truck				1				1
Aerial Platform Tuck				1	1			2
Fire Fighting Car			1					1
Ambulance Car			1					1
Total	5	2	6	9	6	1	3	32

Source: JICA Pre-F/S

5.3. Construction Planning

5.3.1. Documents / Information Received

In the BVEC F/S report, the survey of construction material supply is described in Chapter 7, and its main content is supply capacity and quality of materials at the sand pit and quarry site. Construction packaging, implementation program, and construction organization are described in Chapter 14. However, construction planning was not described in detail.

5.3.2. Contract Packaging

(1) Contract Packaging in the F/S

The contract packaging was divided into seven packages in the F/S considering the following comments of the Preliminary F/S :

- Equal work volume and cost at each package
- The contractor's ability and capacity
- Approach from existing road system
- Location of interchange
- Administrative boundaries
- Separating supporting management and operation facilities from civil work

Table 5.3.2-1 Contract Packaging (BVEC F/S)

Package	Work	Section（length）	Major Work Items	Construction Cost（billion VND）
1	Civil work(1)	Km0+000-Km6 (6.0km)	Bien Hoa IC, Soft soil treatment	951 (JPY3.6billion)
2	Civil work (2)	Km6+000-Km15+800 (9.8km)	-	866 (JPY3.3billion)
3	Civil work (3)	Km15+800 - Km19+000 (3.2km)	Long Thanh JCT	768 (JPY2.9billion)
4	Civil work (4)	Km19+000 - Km29+000 (10km)	-	888 (JPY3.4billion)
5	Civil work (5)	Km29+000 - Km37+600 (8.6km)	Soft soil treatment	1,344 (JPY5.1billion)
6	Civil work (6)	Km37+600 - Km46+800 (9.2km)	Access Road of National Highway Class II	852 (JPY3.2billion)
7	O&M Facilities	Km0+000-Km46+800 (46.8km)	ITS, Toll Gates, O&M Buildings, Facilities of Service Station	919 (JPY3.5billion)

Note: Contingencies (price and physical) are not included in the construction cost.

Source: BVEC F/S

(2) Review of the Contract Packaging

The study team reviewed the contract packaging for civil works and other works, and found that it was basically appropriate plan. Since work items of the package-7 includes several different kinds of works such as ITS facilities and building works, further division to building works, ITS work and O&M equipment Packages 7, 8, and 9 is recommended. Updated contract packaging is shown in table 5.3.2-2 based on the updated construction cost described in chapter 5.5.

Table 5.3.2-2 Updated Contract Packaging

Package	Work	Section（length）	Major Work Items	Construction Cost（billion VND）
1	Civil work(1)	Km0+000-Km6 (6.0km)	Bien Hoa IC, Soft soil treatment	961 (JPY3.65billion)
2	Civil work (2)	Km6+000-Km15+800 (9.8km)	-	869 (JPY3.30billion)
3	Civil work (3)	Km15+800 - Km19+000 (3.2km)	Long Thanh JCT	776 (JPY2.95billion)
4	Civil work (4)	Km19+000 - Km29+000 (10km)	-	891 (JPY3.39billion)
5	Civil work (5)	Km29+000 - Km37+600 (8.6km)	Soft soil treatment	1,427 (JPY5.42billion)
6	Civil work (6)	Km37+600 - Km46+800 (9.2km)	Access Road of National Highway Class II	870 (JPY3.31billion)
7	Building work	Km0+000-Km46+800 (46.8km)	Toll Gates, O&M Buildings	289 (JPY1.10billion)
8	ITS	Km0+000-Km46+800 (46.8km)	ITS, Electric Facilities	159 (JPY0.61billion)
9	O&M	Km0+000-Km46+800	Initial O&M Facilities (vehicles)	139 (JPY0.53billion)

	Equipment	(46.8km)		

Note: Contingencies (price and physical) are not included in the construction cost.

Source: JICA Study Team

5.3.3. Construction Plan

(1) Outline of Construction Plan in the F/S

Expressway and Interchange Work: The investigation of filling material, pavement materials, sand for soft soil treatment, and stone for bridge structures were executed in the BVEC F/S for the supply of required construction materials. And, the outline of the preparation work, temporary and ancillary works, and the safety equipment and facilities are described with regards to the construction of the expressway. As for the construction of connection road, the necessity of considerations on traffic management, obstacles and environment are also described. However, it was noted that these issues should be studied in detail at the detailed design stage.

Bridge Work: The basic construction method of foundation, pier, superstructure was described in the BVEC F/S report. Furthermore, the procedure of bridge construction work was described in the drawings of the BVEC F/S report.

(2) Review on the Construction Plan

Major work items in phase-1 are excavation, embankment, soft soil treatment and bridge works. The longest length of bridge is 1,148.4m which overpass railway at Km30+320 and its type of bridge is super-tee girder (pre-tension PC girder) and diameter 1.0m bored pile foundation. There is no bridges with longer span than 40m. This is common bridges in Vietnam. As for soft soil treatment, replacement method is generally applied since soil condition is good in general, and PVD method is limited to use for high embankment of approach bridge section.

Table 5.3.3-1 shows quantities of major work items by each package. Outline of building, ITS and O&M facilities works is referred to Chapter 5.4.

Table 5.3.3-1 Quantities of major work items by each package in Phase 1

Major Item	Unit	Phase-1 (Initial Stage 4-lane)						Total
		Bien Hoa - Phu My - NH51 Section						
		Package-1	Package-2	Package-3	Package-4	Package-5	Package-6	
		KM0+000 - KM6+000	Km6+000 - Km15+800	Km15+800 - Km19+000	Km19+000 - Km29+000	Km29+000 - Km37+600	Km37+600 - Km46+800	
Excavation	m^3	160,672	215,666	137,846	220,067	174,769	445,101	1,354,121
Rock Excavation	m^3	19,272	31,477	10,278	32,119	19,782	0	112,928
Embankment	m^3	511,412	607,962	478,742	620,370	449,146	409,578	3,077,211
thruway	m^3	302,619	494,277	270,362	504,364	378,144	369,877	2,319,643
interchange	m^3	139,190	0	136,308	0	0	37,444	312,943
frontage road	m^3	69,603	113,685	72,072	116,005	71,002	2,258	444,626
PVD	m	45,180	0	0	0	80,300	0	125,480
Asphalt Concrete Pavement	m^2	227,668	344,168	202,588	351,192	335,641	219,623	1,680,881
thruway	m^2	130,262	212,761	95,299	217,103	191,744	193,150	1,040,319
interchange	m^2	16,953	0	54,105	0	0	14,700	85,758
frontage road (bituminous surface	m^2	80,454	131,408	53,184	134,089	143,897	11,773	554,804
Bridge : total length	m	1,113.9	323.5	712.4	492.2	1,461.2	354.3	4,457.5
on the expressway	m	457.6	138.5	126.4	132.3	1,346.9	165.1	2,366.8
interchange	m	523.9	0.0	495.8	0.0	0.0	0.0	1,019.7
overpass	m	132.4	185.0	90.2	359.9	114.3	189.2	1,071.0

Source: JICA Study Team

From the above general review result, a point of construction plan in phase 1 is procurement and transportation of filling material with approximately 3 million m^3. It is confirmed that the location and reserve of sand pit was investigated and transportation length was considered in the cost estimate in the BVEC F/S. required quantity of filling material each package, transportation distance to the site and the location and the reserve quantity are summarized in Table 5.3.3-2 and the location map of the sand pit is shown in Figure 5.3.3-1.

As for the transportation of filling material to the site from the sand pit, National Highway No.51 is useful up to near construction site, then the material can be transported to the site by using existing local roads. It is required to investigate the supply capacity per day in the detailed design stage.

Table 5.3.3-2 Conditions of Embankment Work

	Package 1	Package 2	Package 3	Package 4	Package 5	Package 6
Qty of Embankment (m^3)	511,412	607,962	478,742	620,370	449,146	409,578
Quarry Site	TAN CANG	TAN CANG	TAN CANG	TAN CANG	SUOI LUP	SUOI LUP
Reserve (m^3)	2,820,965				2,300,000	
Transportation Distance to the Site (km)	6.00	10.78	17.28	23.88	19.80	14.20

Source: JICA Study Team

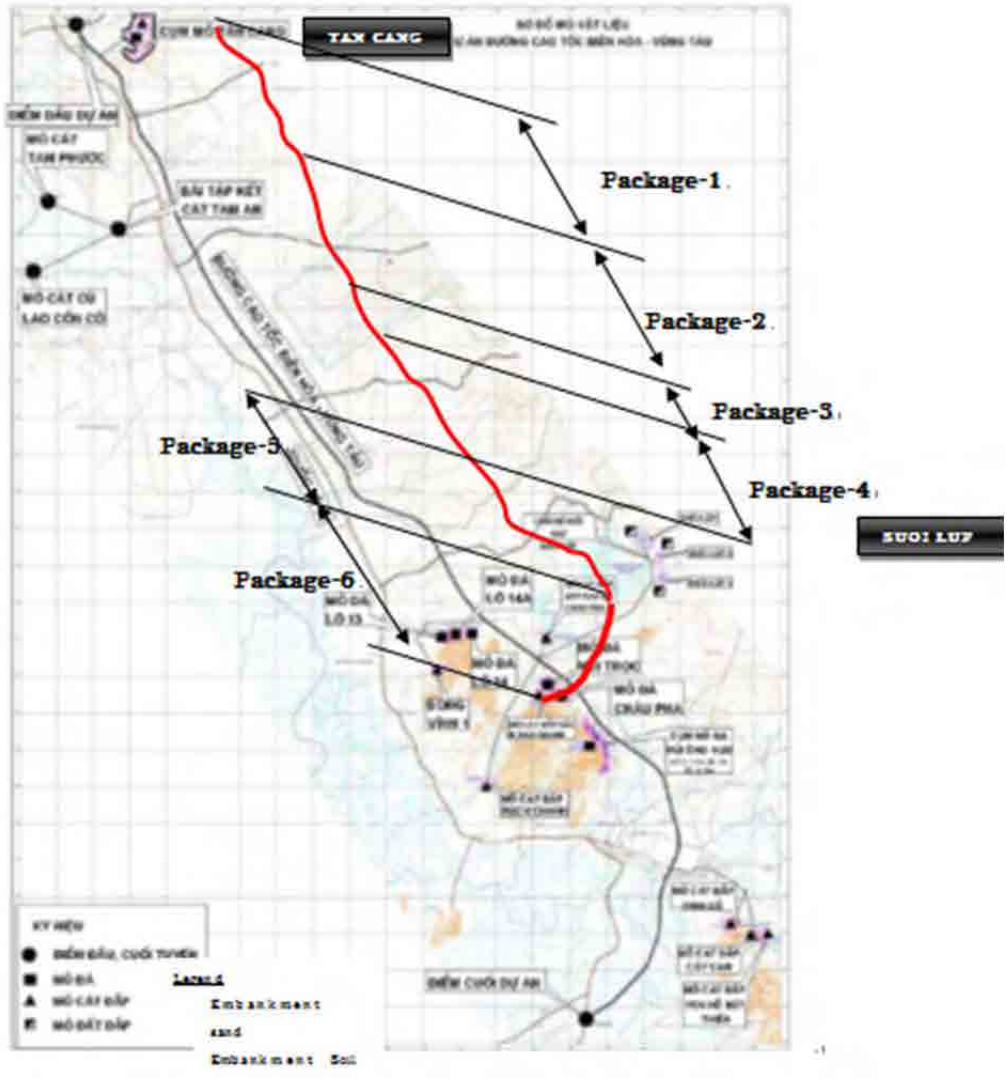


Figure 5.3.3-1 Location map of sand pit and quarry site along BHVT Expressway

5.3.4. Construction Schedule

(1) Construction Period in the F/S

Construction period was estimated at 48 months without detail study of the construction planning, and it is mentioned that its detail would be studied in the detailed design stage.

(2) Review of Construction Schedule

In this Study, the construction period was reviewed and estimated at 36 months from the basis of the actual construction schedule in other expressway construction project in Southern Vietnam. The general project schedule and standard construction schedule are shown in Table 5.3.4-1 and 5.3.4-2 respectively.

The major schedule until completion of the work is as follows:

- Land Acquisition and Resettlement : middle of 2014 – end of 2016 (30 months)
- Detailed Design : beginning of 2015 – middle of 2016 (18 months)
- Procurement of Contractors :
  middle of 2016 – end of 2016 (6 months for civil works)
  beginning of 2018 – middle of 2018 (6 months for building and O&M facilities)
- Construction Works and Construction Supervision : beginning of 2017 – end of 2019 (36 months)
- Traffic open: beginning of 2020

Table 5.3.4-1 General Project Schedule of Phase

ACTIVITIES	DURATION (Months)	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019
		6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12
Land Acquisition and Resettlement	18						
Detailed Design	12						
Procurement of Contractors (Civil)	6						
Procurement of Contractors (O&M Works)	6						
Construction Supervision	36						
Construction Works	36						
Open to the Public							

Source: JICA Study Team

Table 5.3.4-2 Standard Construction Schedule

ACTIVITIES	DURATION (Months)	CY 2017												CY 2018												CY 2019											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1. Construction Work																																					
(1)Civil Work Cost	36																																				
1) Earth work	26																																				
2) Soft soil treatment	24																																				
3) Pavement	9																																				
4) Drainage	12																																				
5) Road Facilities	3																																				
6) Bridges on the Expressway/Interchange	27																																				
7) Overpass/Underpass	27																																				
(2) O&M Work																																					
1) Building Work	18																																				
2) Electrical and Communication Facility Work	18																																				
3) Initial O&M Equipment	6																																				

Source: JICA Study Team

5.4. O&M Plan

(1) Purpose of O&M

It becomes very important to manage the appropriate road maintenance at a good time to cross the road structure taken over to future generation for more than 100 years. In addition, it should be conducted the crisis control correspondence such as car trouble, a traffic accident, the disaster promptly for 365 days for 24 hours to promote safety, relief, and comfortable to the user.

(2) Scope of O&M

O&M is divided into four categories: toll collection, traffic patrol, inspection and asset management, and cleaning, planting, or maintenance work as followed Table 5.3.4-1.

Table 5.3.4-1 O&M service

No	Categories	Contents
1	Toll Collection	Toll Collection, Traffic regulation at IC
2	Traffic Patrol	Traffic patrol, Traffic control Inspection and the control of the overloading vehicles Primary correspondence to traffic accidents or disaster
3	Inspection and asset management	Daily and Periodical Inspection, Management, and Improvement work of road and ITS facilities
4	Cleaning, Planting, and Maintenance work	Cleaning, Planting, Traffic regulation, Repairing Inspection and repair O&M vehicles

Source: JICA Study Team

5.4.1. The Applied Standards

The following documents and standards and interview to related organizations are referred to this report.

Bien Hoa - Vung Tau Expressway final report, TEDI, 2011/10
Bien Hoa - Vung Tau Expressway final report, JICA, 2011/6
Temporary Manual on O&M Management for HCMC – Trung Loung Expressway, TEDI
Feasibility Study Report of Danag – Quang Nghai Expressway project, TEDI, 2011/10

5.4.2. Examination of O&M Standard

Future traffic demand forecast result shows sectional average of about 30,000 pcu in 2017 and increases steeply traffic after 2017. Moreover, large share of heavy vehicles in the traffic is also forecasted because of the connection of BHVT Expressway to international sea port, large-scale industrial park and urban areas. The deterioration level of road structures is anticipated to be more serious than ordinary expressways.

On the basis of above traffic condition, the study team proposed to introduce O&M service level as shown in Table 5.4.2-1 based on "Temporary Manual on O&M Management for HCM-Trung Loung Expressway".

In addition, this report mentions about frequency, the system and a service standard in Japanese example, because there is not mention enough about frequency, the systems such as cleaning, inspection and repair works. Furthermore, it is necessary to provide every stage in 4 provisional traffic lanes and completion 6/8 traffic lanes.

Table 5.4.2-1 The Standard of Temporary Manual

Items	Categories	Contents
Inspection	Type of Inspection	As stipulated in Draft Manual
Repair Work	Plan and Frequency	As stipulated in Draft Manual
Cleaning	Plan and Frequency	Items are stipulated in Draft Manual No frequency value and detail method
Traffic Control	Traffic Control Frequency and Organization system	Items are stipulated in Draft Manual No Detail method
ITS	Periodic Service and Measures against hindrance	As stipulated in Draft Manual

Source: Preliminary Survey

On the basis of above traffic condition, the study team proposed to introduce O&M service level as 50,000pcu/day in Japanese expressways.

This service level is applicable for 10 years after opening the road to traffic, and the service level shall be reviewed based on prevailing traffic conditions after 10 years. The required O&M service level for ITS equipment inspection depends on the traffic condition.

■ Suggestion on O&M Standard

O&M service level as proposed in previous part is based on Japanese O&M current practices. However, BHVT Expressway is expected to be implemented using private financing and as such increased incentive to maintain safety levels, O&M standard and service level shall be considered. Long-term transition from frequency-based O&M service level to performance-based O&M service level shall be taken into account.

This transition to performance-based service level takes into consideration future impact of O&M activities build and technical innovations in ensuring sound business operation of the O&M Company. Furthermore, the quality standard should be shift to the performance based regulation from frequency based regulation.

■ Frequency based regulation:

Frequency based regulation is stated clearly as type of method, the number of workers, or frequency.

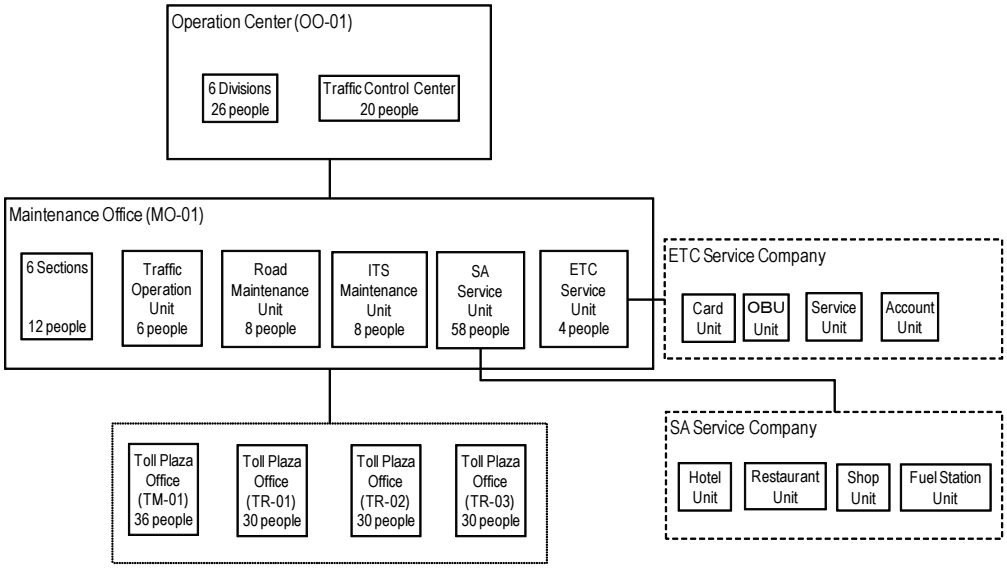
■ Performance based regulation:

Performance based regulation is the rule to adopt the performance that was shown in the contract.

5.4.3. Organization Plan

Operation center, maintenance offices, and toll plaza office are located at this route to conduct O&M works.

Operation center supervises two maintenance office (located each phase), and takes responsibility for traffic control at this route. Maintenance Office controls road maintenance, and toll plaza office deals with toll collection and customer service.



Source: JICA Study Team

Figure 5.4.3-1 O&M Organizations

(1) Operation Center

Operation Center mainly divided into standard 6 divisions and traffic control center.

1) Standard 6 divisions

Standard 6 divisions are composed of general affairs division, administration division, toll management division, engineering division, and road maintenance division.

Table 5.4.3-1 Organization of the Operation Center

	Director General	Deputy Director General	Manger	Staff	Total
	1	2			3
General Affairs Division			1	5	6
Administration Division			1	2	3
Toll Management Division			1	2	3
Engineering Division			1	2	3
Road Maintenance Division			1	2	3
ITS Maintenance Division			1	2	3
Total	1	2	6	15	24

Source: BVEC F/S

Table 5.4.3-2 The Duties of Operation Center

Organization	Duties work
General Affairs Division	General affairs, Personnel affairs, the accounting, advertising
Administration Division	The real estate acquisition, traffic management
Toll Management Division	Toll collection, customer service
Engineering Division	Budgeting, Asset management, disaster management
Road Maintenance Division	Planning and execution of Maintenance work, inspection of pavement or bridge, Improvement work
ITS Maintenance Division	Planning and execution of inspection of ITS facilities and Improvement work

Source: BVEC F/S

2) Traffic Control center

Traffic control center manages traffic control to affect smooth traffic. This proposal is examined independent use each other although integration of traffic system is efficient in order to control and exchange traffic information with other expressway.

(2) Maintenance Office

Maintenance Office is to undertake routine maintenance such as cleaning and inspection activities, in compliance with the O&M service plan. On the other hand, ETC Service Unit and Service Station Unit are assumed to be outsourced for the purpose of the efficiency of duties and rationalization.

Table 5.4.3-3 Organization of Maintenance Office

	Director General	Deputy Director General	Manger	Staff	Total
	1	2			3
General Affairs Section			1	2	3
Administration Section			1	6	7
Toll Management Section			1	4	5
Engineering Section			1	2	3
Road Maintenance Section			1	8	9
ITS Maintenance Section			1	8	9
Service Station Section			1	4	5
計	1	2	7	34	44

Source: BVEC F/S

Table 5.4.3-4 The Duties of Maintenance Office

Sections	Duties Work
General Affairs Section	General affairs, Personnel affairs, the accounting, advertising
Administration Section	The real estate acquisition, traffic management
Toll Management Section	Toll collection, customer service
Engineering Section	Budgeting, Asset management, disaster management
Road Maintenance Section	Planning and execution of Maintenance work, inspection of pavement or bridge, Improvement wor
ITS Maintenance Section	Planning and execution of inspection of ITS facilities and Improvement work
Service Station Section	Service management at Service Station

Source: JICA Study Team

1) ETC Service Unit

Service work for ETC cards is assumed to be outsourced. Therefore, only management personnel are proposed for assignment on different ETC service units such as card, On Board Unit (hereinafter OBU), service, and accountant sections.

2) Service Station Unit

The Service Station Unit is comprised of a restaurant, a shop, a gas stand, and a hotel. This unit is assumed to be outsourced. It is held adjustment with other organizations, budgeting and KPI management in the office.

3) Toll Collection Unit

Toll Collection Unit is divided into toll collection and affairs, which is to collect and analyze toll collection data. There are two toll gates on thruway in three booths, two toll gates on ramp in three booths.

Table 5.4.3-5 Organization of Toll Collection Gate

Location	Section	Chief	Officer	Collector	Security	Total
Thruway	Office Staff	3	6			9
	Collector	3		18	6	27
Lamp	Office Staff	3	6			9
	Collector	3		12	6	21
Total		12	12	30	12	66

Source: JICA Study Team

Table 5.4.3-6 The Duties of Toll Collection Gate

Section	Duties
Office Staff	ETC and cash handling, Collecting and Analysis data
Collector	Ticket in the booth, traffic guidance, Traffic regulation at IC

Source: JICA Study Team

5.4.4. O&M Standard

(1) Cleaning

Cleaning is conducted appropriate work considering traffic, a large vehicle mixture rate and local condition (See Table 5.4.4-1).

Table 5.4.4-1 The Standard of Cleaning

Items	frequency	Organization system
Thruway (machine)	3times / week	1party(2person)×2.5hour/times
Thruway (Manual)	Over once / year	1party(2person)×3hour/times
Service Station	Once / 5 years	1party(5person)×2hour/times
Interchange	Once / 2 days	1party(1person)×1hour/times
Drainage System	Once / year	1party(2person)×1.5day/times

Source: The Preliminary Survey

Reference: Cleaning Frequency on Japanese expressway

Traffic Volume (Vehicles/day)	Cleaning A		Cleaning B
	Roadside(left)	Roadside(right)	
25,000～50,000	Once/2days	Once/week	Once/Week
50,000～70,000	Once/a day	Once/Week	Once/Week
Over 70,000	Over once/a day	Over Once/Week	Over Once/Week

Cleaning A: cleaning by sweeper

Cleaning B: cleaning manually

Service Area twice / month

Interchange twice / month

Drainage twice / year

(2) Inspection of Road Structure

The frequency of inspection for road structure as followed Table 5.4.4-2.

Table 5.4.4-2 Frequency of Inspection of Road Structure

Item	Frequency	Organization System
Daily Inspection	3 times / week	1 party(2person) / time
Periodical Inspection	Over once / year	1 party(2person) / 3 days
Detailed Inspection	Once / 5years	1 party(5person) / 24 days

Source: JICA Study Team

(3) Inspection of ITS facilities

The frequency of inspection for ITS facilities is adopted Expressway standard in Japan as followed Table 5.4.4-3.

Table 5.4.4-3 Frequency of Inspection of ITS facilities

Items	Frequency	Organization system
Vehicle Detection System	Once / year	1 party(2person) / time
Weight in Motion	Once / year	1 party(2person) / time
CCTV Camera system	Once / 6 months	1 party(2person) / time
Weather Observation system	Once / 6 months	1 party(2person) / time
Mobile Radio Communication System	Once / year	1 party(2person) / time
Variable Message Sign	Once / year	1 party(2person) / time
Traffic Control System	Once / 6 months	1 party(2person) / time
Toll Collection System (ETC)	Once / month Once / year	1 party(2person) / time

Source: JICA Study Team

(4) Improvement Works

Improvement works include improving pothole, land subsidence, rutting, planting and bridge slab, and replacement of joint.

(5) O&M Materials and Equipments

O&M Materials and Equipments, as shown Table 5.4.4-4, should be prepared to use quick repair as finding out by daily traffic patrol. These equipments keep in the storage at Maintenance Office and filling up all the time.

The cost is decided with reference of ”Consulting Services for Updating and Finalizing the Feasibility Study Report for Da Nang – Quang Ngnai Expressway Construction Project” by WB and interview results from F/S contractor.

Table 5.4.4-4 O&M Materials and Equipments

Items		規格
Temporary Regulation	Regulation Sign	No Basement
	Rubber cone	
Pavement Repair	Asphalt Mixture	20Kg
Prevention for disaster	Sandbag	48cm×62cm
	Sandy Soil	
	Polyethylene Sheet	#3000, 10m×10m
	Timber Stake	□4.5cm×60cm
	Pine Stake	φ15cm×150cm
Countermeasure of Traffic Accident	Oil Mat	100 seets
	Oil Adsorption Materials	Perlite

Source: The Prelimiary Survey

5.4.5. Traffic Patrol

The expressway becomes the structure to secure an efficient and comfortable traffic flow on the expressway by restricting entrance and exit of the tollgate. It is important to control traffic condition appropriately by collecting and offering traffic information. Service Standard of traffic patrol refers to Japanese expressways as shown Table 5.4.5-1.

Because of difference of rout of traffic patrol as opening phase 2, frequency and organization system of traffic patrol should be examined.

Table 5.4.5-1 Service Standard of Traffic Patrol

Items	Frequency	Organization System
Traffic Patrol	10 times / day	1 party (2 persons)/ 3 shift・24 hours

Source: The Preliminary Survey

5.4.6. Toll Collection

Toll collection System is divided into automatic collection system by ETC and manual collection system, which is manned collection type and prepaid type.

The introduction of the automatic collection system in heavy traffic contributes to the reduction of the expense of toll collection and to improve the tollgate traffic congestion.

However, it is necessary to consider construction and maintenance cost as introducing ETC system. Furthermore, toll collection system and toll table are should be update because of difference of the contents of toll collection between phase 1 and 2.

(1) Toll System

Toll system is divided into per-distance rate system and flat rate system as shown Table 5.4.6-1. Because this expressway is planned to connect with HCM- Long Tanh- Dau Giay expressway and Ben Luc- Long Than expressway, the appropriate toll system is the per-distance rate system. Therefore, integrating toll system should be coordinated with the other management companies.

Table 5.4.6-1 Comparison of toll system in Expressway

Categories	Contents	Note
Per-Distance Rate System	Per-Distance Rate System is a system in which a toll rate is calculated and collected depending on the distance between entry in an interchange and exit to another interchange. This system sum up overhead cost (terminal charge) and variable cost (the charge depending on distance).	
Flat Rate System	Flat Rate System sets a constant rate regardless of the mileage. Because it is a flat rate, rate receipt is easy. But the burden on short-range user grows big.	The degree of the short-range users is unidentified

Source: JICA Study Team

■Vehicle Classification

Although vehicle classification of toll system includes trailer, large freight car, standard car, compact car, toll system in this study is selected into 2 categories as large and standard car in terms of efficiency of toll collection.

■Type of Discount

There is discount system for users of large freight car and standard car in Japan. The discount system for large freight car is a system to pay on credit for each month. The mileage service for standard car is a system to have points using free of charge to improve service and usage. For the time being, the discount system is not adopted.

(2) Extent of Toll Charging

Closed Toll System: Tolls are charged to all users of the expressway. The toll road is physically designed so that no users may escape from paying the toll. Bike is banned on this expressway.

(3) Toll Collection Method

Toll gates on both exit and entrance: This arrangement is a system which installs tollgates on both sides of on-ramps and off-ramps. Generally, a ticket is issued for identification at the entrance, and payment of the toll charge at exit based on the information.

(4) Setting of Toll Collection Booth

Toll collection booth is set, as followed Table 5.4.6-2, including the section of phase 1 and phase 2. The number of toll collection booth should be reconsidered practically in the future in traffic volume and the processing capacity per hour of the ETC gate.
It is taken into account backup at the time of the facilities trouble in exit ETC lane.

Table 5.4.6-2 Toll Collection System Plan

Location		Contents
Toll Plaza on Main (2) Sta.1+200 Sta.65+250	In (4)	ETC Gate : 2 lanes One-Stop Gate: 1 lane
	Out (7)	ETC: 3 lanes One-Stop Gate: 3 lanes
Toll Plaza on Lamp (4) Sta.16+600 Sta.29+500 Sta.45+250 Sta.53+700	In (3)	ETC: 1 lane One-Stop Gate: 1 lane
	Out (4)	ETC: 2 lane One-Stop Gate: 1 lane

Source: JICA Study Team

5.4.7. ITS System

The more traditional type of expressways normally has controlled access only at toll gates to maintain efficient and fast traffic flow. Therefore it is important to collect and provide traffic information using by ITS system.
ITS system is divided into 4 systems which are Data Collection System, Traffic Information Provision System, Traffic Control System and Toll Collection System as followed Table 5.4.7-1. Furthermore, those systems are delivered by optical fiber cable.

Table 5.4.7-1 ITS system Plan

Categories	Items	Location
Data Collection System	Emergency Telephone System	No install
	Traffic Volume Measuring System	Both sides for every interchange interval
	CCTV Camera System	One each at origin and destination One at every 2Km
	Weighing In Motion System	No install
	Weather Observation System	One at Maintenance Office
	Mobile Radio Communication System	65 sets
Traffic Information Provision System	Variable Message Sign	One each at merging section on Interchange and thruway
Traffic Control System		1 set
Toll Collection System		ETC method

Source: JICA Study Team

(1) Data Collection System

1) Emergency Telephone System

Emergency Telephone System is installed on shoulder to receive the report of traffic accident or road condition by driver

The spread of Mobile phones advances in the Vietnam, and further mobile phone diffusion rate is anticipated in the service five years later. Using mobile phone is the most useful to collect condition of traffic accident or other information, therefore Emergency Telephone System is not installed.

On the other hand, it is necessary to inform the accurate positional information and emergency telephone number to an expressway user.

It is effective to install kilometer post-indication (positional information) in the 100m pitch, and users communicate with operation center by mobile phone. It is called “road emergency dial" in Japan.

【Reference】Emergency Telephone System of Other Expressways

Expressways	Contents
HCMC- Trung Luong Expressway	Not install
Japanese Expressways	Both sides for every 2 Km The mobile phone spread of Japan is 92%, and the future directionality is uncertain.

2) Traffic Volume Measuring System

Traffic Volume Measuring device is installed one each lane for every interchange section to collect traffic volume and velocity automatically, to estimate future traffic volume and to analyze traffic congestion and traffic accident.

In addition, the kind of traffic volume Measuring device is selected Loop coil installed in Vietnam national road (see Table 5.4.7-2).

When traffic volume increases in the future, it should be installed thruway, interchange and junction for much more data.

Table 5.4.7-2 Type of Traffic Volume Measuring System

Type	Ultrasonic	Loop Coil	CCTV Camera
Outline	Measure the size of the car, speed, number	Measure the size of the car, speed, number by Loop Coil in pavement	Recognized by the image analysis processing with the camera
Pros	・Cheep ・easy to maintain	・High accuracy	・easy to share surveillance camera ・many kind of function
Cons	・Low accuracy	・Need to road regulation for maintenance work	・Expensive ・Low accuracy
assessment	△	○	×

Source: JICA Study Team

3) CCTV Camera System

The CCTV camera installs in every 2 Km, one each at merging and branching section, and one each at origin-destination to be necessary to grasp the situation of a traffic congestion and the accident.

It should be used to monitor traffic condition in CCTV because it is not install a traffic measurement system in the 2km pitch at first

4) Wight In Motion System

Weight in Motion System is a vehicle weight measurement system to prevent the overloading such as large vehicles. Because many long bridges and consecutive viaducts do not exist in Phase1, this system is not installed at first.

It is desirable to install it when this system will be installed at Phase2.

The site (vacant land) necessary for facilities setting shall consider it more at first. Because it is predicted that a mixture rate of the large car is high in the future as an industrial road in this expressway.

This system should be installed wide lane in tollgate for large size vehicle in each tollgate, and an organization locates patrols measuring discovery and the weight of the overloading vehicle.

5) Weather Observation System

Weather Observation System is the system to observe precipitation and the wind velocity. Because there are few changes of the topography influencing the weather, this system is set in only the maintenance office.

6) Mobile Radio Communication System

Mobile Radio Communication System collects and provides the on-site information for an accident and the traffic jam in quickness and accuracy.

This system is set on the road management vehicles and a number of the maintenance officer as followed Table 5.4.7-3.

Table 5.4.7-3 Volume of Mobile Radio Communication System

Items	Volume	Remark
O&M vehicles	32	BVEC F/S
Maintenance officer	33	Final Report
Total	65	

Source: JICA Study Team

(2) Traffic Information Provision System

1) Variable Message Sign

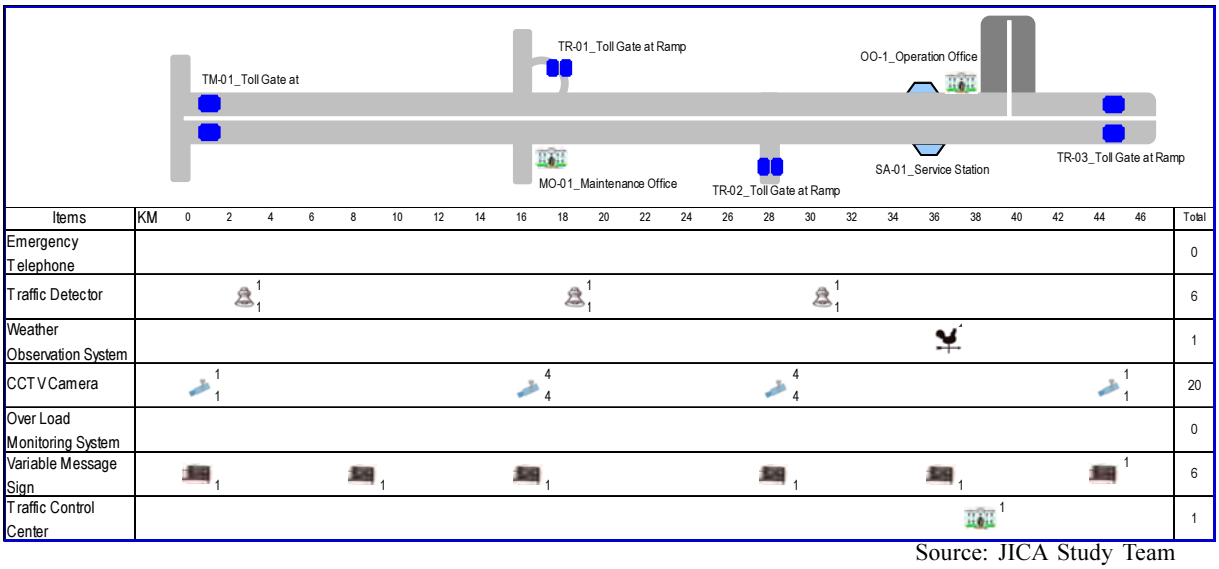
Variable Message Sign shares the information such as the regulation situation, traffic congestion, the traffic accident or the road-surface condition. This information obtains from CCTV camera, Traffic Volume Measuring System and Weather Observation System. Variable Message Sign is installed one each at merging section on Interchange, and tollgates at origin-destination of Phase1.

(3) Traffic Control System

The traffic control system manages unified traffic center processing collection system and offer system dealing with a member of collected phenomenon automatically including traffic congestion and the weather information. In addition, the operation center should be installed to perform central control. The traffic control system manages a collection and provision system as followed Figure 5.4.7.-1.

Because the networking with other routes is uncertain in the investigation, this system introduces independently. After networking of expressways, it is effective and important to integrate traffic information of these expressways.

Furthermore, it is planned by other routes installed a lot of CCTV cameras as acquisition means of the vehicle information, but it is necessary to examine initial and maintenance cost adequately.



Source: JICA Study Team

Figure 5.4.7-1 Traffic Control System

(4) Toll Collection System

Toll Collection System is divided into the manned collection method and the automated collection method. The manned collection method includes the one-stop type (toll collector provides ticket at entrance gate and receive toll at exit) and the non-stop type (toll collector check monthly ticket at the gate). The automated toll collection method (ETC) includes the OBU type and pre-paid IC card type.

The communication method of the ETC has active Dedicated Short Range Communication (hereinafter DSRC) method, passive DSRC method and an infrared Ray method. In the view of future traffic to increase, active DSRC should be introduced.

In addition to that, it is necessary to consider the jointly operative nature to be able to exchange information, because it is prevented from entailing enormous costs at the time of update

Table 5.4.7-4 Toll Collection System

Items	Contents
Location	Toll Plazas on Main: Sta.1+2000,Sta.65+250（15,090㎡) Toll Plazas on Lamp: Sta.16+6000, Sta.29+500,Sta. 45+250, Sta.53+700(14,350㎡)
Communication method	Active DSRC, Passive DSRC, infrared Ray method

Source: JICA Study Team

5.4.8. Annual Cost for O&M Works

An annual expense for O&M work is estimated as shown Table 5.4.8-1 and Table 5.4.8-2

This report is not including urgent road repairrment and restoration work because of disaster, therefore it is need adjustment and agreement for grant with Vietnam government.

Table 5.4.8-1 Annual O&M Work and Cost Breakdown

Item			Labor Cost	Machine Fuel	Material Cost	Others
Patrol			○	○		
Toll Collection			○	○		
Cleaning	Expressway	Machine	○	○	○	
		Mannual	○	○	○	
	Drainage		○	○	○	
	IC/JCT		○	○	○	
	SA/PA		○	○	○	
Road Maintenance	Inspection	Routine	○	○		
		Periodic	○	○		
		Detailed	○	○		
		Vehicle	○		○	
	Repair	Pavement	○	○	○	
		Slope	○	○	○	
		Bridge	○	○	○	
	Improvement	Pavement	○	○	○	
		Slope	○	○	○	
		Bridge	○	○	○	
ITS facilities	Inspection	Routine	○	○		
		Periodic	○	○		
		Detailed	○	○		
		Vehicle	○		○	
	Repair	CCTV camera	○	○	○	
		ETC system	○	○	○	
		VMS	○	○	○	
	Improvement	CCTV camera	○	○	○	
		ETC system	○	○	○	
		VMS	○	○	○	
	Facility Maintenance (Utilities Cost)	Operation Center	○			○
		Maintenance Office	○			○
		Toll gate	○			○

Source: JICA Study Team

Table 5.4.8-2 Inspection, repairmen and improvement schedulel

Items \ Year	1-5	6-10	11-15	16-20	21-25	26-30
Cleaning						
Repair work						
Traffic Patrol						
Toll Collection						
Road Inspection						
Bridge Improvement						
Pavement Improvement						
Facility Improvement						
ITS Renewal						
O&M Vehicle Renewal						

Source: JICA Study Team

(1) Labor Cost

1) Amount Calculation

O&M activities on the BHVT Expressway will be conducted by an O&M Company, therefore unit cost for each work item is not prepared, instead, the number of workers in each class, from Company Director to site worker, is examined, and labor cost is calculated by applying unit labor cost for each class to the corresponding number of workers.

2) Unit Price

The unit price is decided with reference to the WB Report "Consulting Services for Updating and Finalizing the Feasibility Study Report for Da Nang-QuangNgnai Expressway Construction Project" and interview results from F/S contractor.

(2) Cost for Machine and Fuel

1) Amount Calculation

The ownership of any machine including vehicles required for each type of O&M work are with SPC, and the necessary costs during operation period be borne by the O&M company are only for fuel and insurance.

2) Unit Price

The unit price is decided with reference to the WB Report "Consulting Services for Updating and Finalizing the Feasibility Study Report for Da Nang-QuangNgnai Expressway Construction Project" and interview results from F/S contractor.

(3) Cost for Materials

1) Amount Calculation

The cost in the project is applied the unit material cost per Km in Japan and cost of vehicle maintenance, average cost per vehicle in Japan is applied as well.

Also, vehicle requires renewal, and the period of renewal should be 10 years. ITS facilities excluding power supply facility and optical fiber cable renew each 15 years.

2) Unit Price

The unit price is decided with reference to the WB Report "Consulting Services for Updating and Finalizing the Feasibility Study Report for Da Nang-QuangNgnai Expressway Construction Project" and interview results from F/S contractor.

Vehicles replace each 10 years depending on Vietnam condition. Furthermore the accident processing burden by unidentified causer of traffic accident is not include it for lack of data this time.

(4) Other Cost (heating, lighting, and water)

The Cost for heating, lighting and water are verified based on interview with F/S contractor.

5.5. Project Cost (Base cost of 2012 Price)

5.5.1. Documents / Information Received

Total investment cost is described in Chapter 17 of the F/S report. The latest F/S was that which was submitted to BVEC from the F/S Consultant (TEDI) in February 2012 when the JICA Study was started. After that, the revised F/S was prepared in October 2012 taking into considerations of design change of Long Thanh Junction (changes from overpass over HCM-Long Thanh – Dau Giay expressway to underpass) which was officially approved by MOT, and some designs such as shorten bridge lengths and application of PVD instead of Sand Drain proposed by JICA study team. In this revised F/S, the unit price of cost estimate was also updated to one as of the 2nd quarter of 2012 from the 4th quarter of 2011, and this is the latest F/S as of Interim Report.

The cost estimates of the above two F/S is summarized in Table 5.5.1-1 and 5.5.1-2, respectively. The cost of phase-1 covers the section beginning at Bien Hoa to Phu My intersection, and the access road from Phu My IC to NH51 intersection. Phase-2 cost includes the section from Phu My IC to the ending point at Vung Tau. Phase 1 has the widening cost from 4 lanes to 6 or 8 lanes.

Table 5.5.1-1 Project Cost in the BVEC F/S (Feb. 2012)

(unit: billion VND)

No.	Category	Description	Project Cost			
			Phase1		Phase 2	Total
			Initial (4-lane)	Widening (6,8-lane)		
I	Construction cost and Equipment cost	Construction and Equipment	7,358 (JPY27.5billion)	975 (JPY 3.6 billion)	6,946 (JPY 25.9 billion)	15,279 (JPY 57.0 billion)
II	Project Management, Consulting Services, Other Cost	-	883 (JPY 3.3 billion	117 (JPY 0.4 billion)	833 (JPY 3.1 billion)	1,833 (JPY 6.8 billion)
III	Contingency	Price Contingency 24.8%, Physical contingency 10%	2,868 (JPY 10.7 billion)	380 (JPY 1.4 billion)	2,707 (JPY 10.1 billion)	5,955 (JPY 22.2 billion)
IV	Land Acquisition and Resettlement	Incl. contingency of 10%	2,078 (JPY 7.8 billion)	0 (0)	865 (JPY 3.2 billion)	2,943 (JPY 11.0 billion)
Total (excl. interest during construction)			13,187 (JPY 49.2 billion)	1,472 (JPY 5.5 billion)	11,351 (JPY 42.4 billion)	26,010 (JPY 97.1 billion)

Note 1: time of cost estimate is the 4th of quarter of 2011
Note 2: exchange rate 1JPY=267.97VND (State bank of Vietnam on 30 Dec. 2011)

Source: BVEC F/S

Table 5.5.1-2 Project Cost in the BVEC F/S (October 2012)

(unit: billion VND)

No.	Category	Description	Project Cost			
			Phase1		Phase 2	Total
			Initial (4-lane)	Widening (6,8-lane)		
I	Construction cost and Equipment cost	Construction and Equipment	6,589 (JPY 25.1 billion)	986 (JPY 3.7 billion)	7,030 (JPY 26.7 billion)	14,605 (JPY 55.5 billion)
II	Project Management, Consulting Services, Other Cost	-	791 (JPY 3.0 billion)	117 (JPY 0.4 billion)	844 (JPY 3.2 billion)	1,751 (JPY 6.7 billion)
III	Contingency	Price Contingency 18%, Physical contingency 10%	2,066 (JPY 7.9 billion)	306 (JPY 1.2 billion)	2,205 (JPY 8.4 billion)	4,577 (JPY 17.4 billion)
IV	Land Acquisition and Resettlement	Incl. contingency of 10%	2,084 (JPY 7.9 billion)	0 (0)	865 (JPY 3.3 billion)	2,949 (JPY 11.2 billion)
Total (excl. interest during construction)			11,530 (JPY 43.8 billion)	1,409 (JPY 5.4 billion)	10,943 (JPY 41.6 billion)	23,882 (JPY 90.8 billion)

Note 1: time of cost estimate is the 2nd quarter of 2012
Note 2: exchange rate 1JPY=263.00VND (State bank of Vietnam on 29th June, 2012)

Source: BVEC F/S

The main reasons of change of the project cost in BVEC F/S are update of unit price (increase VND394billlion) and design change (decrease VND1,068billion), and the rate of price contingency is changed from 24.8% to 18%. The amount of change and its reason are summarized in Table 5.5.1-3.

Table 5.5.1-3 Comparison of the Project Cost of BVEC F/S between the 4th quarter of 2011 and the 2nd quarter of 2012

(unit: billion VND)

No.	Category	Dec. 2011 (4th quarter of 2011) <A>	Oct. 2012 (the 2nd quarter of 2012) <B>	Difference <B>-<A>	Mani reason of the difference
I	Construction cost and Equipment cost	15,279	14,605	-674	Update of unit price(price escalation):+394 Design change(Long Thanh JCT, shorten bridge, soft soil treatment):-1,068
II	Project Management, Consulting Services, Other Cost	1,833	1,751	-82	According to reduction of construction cost
III	Contingency	5,955	4,577	-1,378	The rate of price contingency from 24.8% to 18%
IV	Land Acquisition and Resettlement	2,943	2,949	+6	Slight increase due to design change
Total (excl. interest during construction)		26,010	23,882	-2,128	

Source: BVEC F/S

The cost estimate of the BVEC F/S is appropriately prepared in accordance with the Vietnam's law and regulations. In the JICA study, the project cost was reviewed and updated based on the proposed expressway route, section divisions, and implementation schedule and considering adaption of the BOT/PPP Scheme.

It is noted that the project cost (base cost as of 2012 price) here is excluded price contingency cost and interest during construction, and the project cost including such costs is described in chapter of financial analysis.

As for the project cost (base cost as of 2012 price) of phase 2 section where is assumed as implementation by ODA, it was preliminary reviewed and updated for economical and financial analysis for whole section of BHVT expressway. The result is referred to Chapter 6.1.2(2).

5.5.2. Law and Regulations on Cost Estimate

The main laws and regulations related to the estimate of construction cost is listed in Table 5.5.2-1. The JICA Study Team confirmed that the latest law and regulations were applied to the cost estimate of BVEC F/S.

Table 5.5.2-1 Related Law and Regulations

Item	Related Law and Regulations
Cost Estimate Standard	Circular No.04/2010/TT-BXD dated on 25 June 2010 issued by MOC
Norm of Construction Cost Estimate	Decision No.957/2009/QD-BXD dated on 29 September 2009 issued by MOC Decision No.1019/2010/QD-BXD dated on 16 November 2010 issued by MOC

Item	Related Law and Regulations
	Norm No.1776/2007/BXD-VP dated on 16 August 2007 issued by MOC Norm No.38/2005/QD-BXD and No.37/2005/QD-BXD dated on 2 November 2005 issued by MOC
Unit Cost	The unit cost of construction works of Dong Nai Province – Construction investigation component, construction component, installation component The unit cost of basic repair works of Dong Nai Province The tarifF/S of construction machines of Dong Nai Province The unit cost of construction works of Ba Ria-Vung Tau Province – Construction investigation component, construction component, installation component Land cost by all types in Dong Nai Province in 2012 Land cost by all types in Ba Ria～Vung Tau Province in 2012 Material cost information in Dong Nai Province in 2012 Material cost information in Ba Ria～Vung Tau Province in 2012

Source: BVEC F/S

5.5.3. Project Cost Structure for BOT/PPP Scheme

Basic structure of construction cost is based on Circular No.04/2010/TT-BXD. The cost structure is updated to conform and be consistent with a BOT/PPP Scheme. The proposed cost structure is as shown in Table 5.5.3-1.

In addition to the cost items in the Circular 04/2010/TT-BXD, the following cost items are considered in this study.

Costs during construction stage:

- HIV prevention program cost
- Environmental monitoring cost
- Feasibility study cost
- SPC establishment cost

Costs during operational stage:

- O&M cost
- SPC Operation cost
- Environmental monitoring cost

Table 5.5.3-1 Project Cost Structure

Cost Estimation Items			
A Construction Phase	1 Construction Cost		Sum{(1)~(5)}
		(1) Civil Work Cost	Sum{a)~b)}
		a) Expressway	Sum{1)~5)}
		1) Earth work	
		2) Soft soil treatment	
		3) Pavement	
		4) Road Facilities	
		5) Drainage	
		b) Structure	Sum{6)~7)}
		6) Bridges on the Expressway/Interchange	
		7) Overpass/Underpass	
		(2) O&M Work	Sum{1)~3)}
		1) Building Work	
		2) ITS, Electrical and Communication Facility Work	
		3) Initial O&M Equipment	
		(3) All Risk Insurance Premium	(1)+(2)*1.0%
		(4) HIV Prevention Program	(1)*0.1%
		(5) Environmental Monitoring	
	2 Engineering Cost		Sum{(6)~(8)}
		(6) Feasibility Study	
		(7) Detailed Design	1*4.0%
		(8) Procurement and Construction Supervision Service	1*3.0%
	3 SPC Establishment Cost	(9) Establishment and Initial SPC Operation	
	4 Contingency	(10) Price Contingency	Sum{(1)~(9)}*rate%
		(11) Physical Contingency	Sum{(1)~(10)}*10%
	5 Value Added Tax (VAT)	(12) Value Added Tax (VAT)	Sum{(1)~(11)}*10%
	6 Project Management Cost	(13) Project Management	1*0.356%
	7 Other Cost	(14) Others	1*4.0%
	8 Land Acquisition/ Compensation Cost	(15) Land Acquisition/Compensation	
	9 Contingency	(16) Price Contingency	Sum{(13)~(15)}*rate%
		(17) Physical Contingency	Sum{(13)~(16)}*10%
B Operation Phase	10 O&M Cost	(18) Operation and maintenance cost	
	11 SPC Operation Cost	(19) SPC Operation	
	12 Environmental Monitoring	(20) Environmental Monitoring during concession	
	13 Contingency	(21) Price Contingency	Sum{(18)~(20)}*rate%
		(22) Physical Contingency	Sum{(18)~(21)}*10%
	14 Value Added Tax (VAT)	(23) Value Added Tax (VAT)	Sum{{(18)~(22)}*10%

Source: JICA Study Team

5.5.4. Methodology of Cost Estimate

(1) Construction Cost

According to the Circular 04/2010/TT-BXD, cost-based estimate is basically applied as the methodology. The basic methodology for cost estimate in this study is based on the general unit cost (GUC). The GUC consists of direct cost (material, labor, and equipment), other direct costs, and indirect costs. Construction cost is computed based on the GUC and the estimated quantity.
For other items relating to the construction cost, all risk insurance premium is considered at 1.0% of construction cost. In addition, the costs for update of Environmantal Assessment (hereinafter EA)/Environmental Management Plan (hereinafter EMP), preparation of RAP, environmental monitoring, and internal and external monitoring for land acquisition/resettlement are estimated.

(2) Engineering Cost

Detailed design cost and construction supervision cost are estimated at 4.0% and 3.0% of construction cost, respectively. In addition, actual cost of F/S by BVEC is considered.

(3) Establishment Cost of SPC

Under the BOT/PPP Scheme, Investor's due diligence cost, SPC advisory cost (legal, financial) are estimated at approximately VND 137.5billion as table below. This cost is required for only phase 1 section where is assumed as the BOT/PPP scheme.

Table 5.5.4-1 SPC Establishment Cost

	Item	Cost (million VND)
i)	Legal fees for BOT and Loan/collateral agreements.	55,000
ii)	Financial Advisory fees for Project Implementation Plan, cashflow projection and negotiation with banks	27,500
iii)	Office rent	8,250
iv)	Personnel expenses	13,750
v)	Corporate registration fee	8,250
vi)	General consultation fees in relation to the Project	8,250
vii)	Inauguration and promotion fees	11,000
viii)	Other expenses	5,500
	Total	137,500

Source: JICA Study Team

(4) Project Management Cost and Other Cost

Project management cost and other costs (disarming of UXOs, audit, appraisal etc.) incurred during construction stage are estimated based on Circular No.04/2010/TT-BXD.

(5) Land acquisition and Compensation Cost

The cost with the conditions of the land acquisition and resettlement is described in section 7.2.11.

(6) O&M Cost

Operation and maintenance cost for toll collection and road maintenance etc, is described in section 5.5.7.

(7) SPC Operation Cost

Operation cost of SPC is described in section 5.5.7.

(8) Environmental Monitoring Cost

Environmental monitoring cost during operation is described in section 5.5.7.

5.5.5. Conditions of Construction Cost Estimate

(1) Time reference of Cost Estimate

The unit price of the cost estimate is as of the 2nd quarter of 2012.

(2) Currency

Since the financing for the project is assumed to be sourced from PSIF, JPY is used for the foreign currency and VND is used for local currency.

(3) Exchange Rate

Following exchange rates are used (29th June 2012 at State Bank of Vietnam):

1 JPY = 263.00VND

1 US$ = 20,943VND = 79.63 JPY

(4) Classification Condition of Currency

Table 5.5.5-1 shows the classification condition of currency in this Study

Table 5.5.5-1 Classification Condition of Currency

Item	Classification
A. Construction Stage	
1 Construction Cost	
(1) Civil Work Cost	Divided into F/C and L/C taking accounts of procurement of Labour, material and equipment
(2) Equipment Cost	Divided into F/C and L/C taking accounts of procurement of Labour, material and equipment
(3) All Risk Insurance Premium	F/C assuming insurance at contractor's home country
(4) HIV Prevention Program Cost	Divided into F/C and L/C based on assumption of employment of international NGO
(5) Environmental Monitoring Cost	L/C cost
2 Engineering Cost	
(6) Feasibility Study Cost	L/C cost
(7) Detailed Design Cost	Divided into F/S and L/C assuming procurement of international consultant
(8) Construction Supervision Cost	Divided into F/S and L/C assuming procurement of international consultant
3 SPC Establishment Cost	
(9) SPC Establishment Cost	Divided into F/C and L/C taking accounts of SPC jointed by Japanese and Local Investors
4 Contingency	
(10) Price Contingency for items (1) - (9)	according to classification of items (1)-(9)
(11) Physical Contingency for items (1) - (10)	according to classification of items (1)-(10)
5 Value Added Tax for items (1) - (11)	
(12) Value Added Tax	according to classification of items (1)-(11)
6 Project Management Cost	
(13) Project Management Cost	L/C cost
7 Other Cost	
(14) Other Cost	L/C cost
8 Land Acquisition and Resettlement	
(15) Land Acquisition and Resettlement	L/C cost
9	
(16) Price Contingency for items (13) - (15)	according to classification of items (13) - (15)
(17) Physical Contingency for items (13) - (16)	according to classification of items (13) - (16)
B. Operation Stage	
10 Operation and Maintenance Cost	
(18) Operation and Maintenance Cost	Divided into F/C and L/C
11 SPC Operation Cost	
(19) SPC Operation Cost	Divided into F/C and L/C
12 Environmental Monitoring Cost	
(20) Environmental Monitoring Cost	L/C cost
13 Contingency for (18) - (20)	
(21) Price Contingency for (18) - (20)	according to classification of items (18) - (20)
(22) Physical Contingency for (18) - (21)	according to classification of items (18) - (21)
14 Value Added Tax for (18)-(22)	
(23) Value Added Tax	according to classification of items (18)-(22)

Source: JICA Study Team

(5) Price Escalation Rate

Price escalation rate is described in Section 3.4.2(3)7).

(6) Physical Contingency Rate

Physical contingency rate applied is same 10% as that of BVEC F/S.

(7) Value Added Tax (VAT)

VAT 10% is taxed on local currency portion. For foreign currency portion, however, 10% of taxes is considered because of other taxes such as import tax.

(8) Value of Estimated Cost

The project cost (base cost of 2012 price) is estimated by the 2012 present value. The project cost that considers the future escalation is summarized in Section 3.4.2(3)4)b).

5.5.6. Updated Project Cost (Base Cost of 2012 Price) at Preparation and Construction Stage

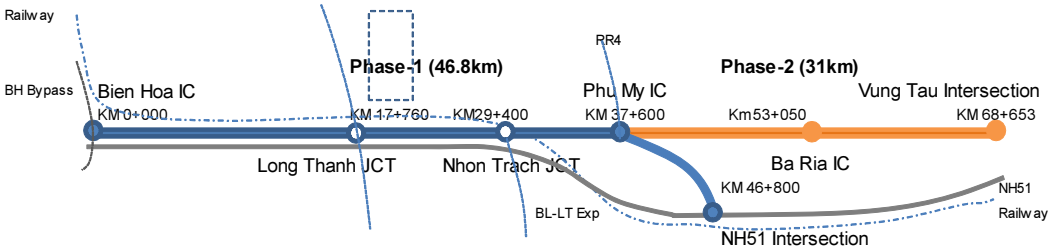
(1) Project Cost (Base Cost of 2012 Price)

Project Cost (Base Cost of 2012 Price) at Preparation and Construction Stage is shown in Table 5.5.6-1 and the cost by sections is summarized in Figure 5.5.6-1.

Table 5.5.6-1 Project Cost (Base Cost of 2012 Price)

Item	Phase-1 (initial stage only)		
	FC Portion (million JPY)	LC Portion (billion VND)	Combined into VND (billion VND)
Project Cost (Base Cost 2012 Price)	**6,357.8**	**8,846.5**	**10,518.6**
1. Construction Cost	**4,197.1**	**4,698.1**	**5,802.0**
(1) Civil Work Cost	**3,188.2**	**4,357.7**	**5,196.2**
1) Earth work	257.6	609.8	677.6
2) Soft soil treatment	10.4	24.6	27.4
3) Pavement	688.3	1,629.2	1,810.2
4) Drainage	46.4	109.9	122.1
5) Road Facilities	718.4	440.9	629.8
6) Bridges on the Expressway/Interchange	1,127.0	1,185.6	1,482.0
7) Overpass/Underpass	340.0	357.6	447.0
(2) O&M Work	**963.5**	**275.3**	**528.7**
1) Building Work	98.9	234.1	260.1
2) Electrical and Communication Facility Work	436.2	28.7	143.4
3) Initial O&M Equipment	428.3	12.5	125.2
(3) All Risk Insurance Premium	41.5	46.3	57.2
(4) HIV Prevention Program	4.0	4.2	5.2
(5) Environmental Monitoring	0.0	14.7	14.7
2. Engineering Cost	**772.1**	**217.8**	**420.9**
(6) Feasibility Study	0.0	14.8	14.8
(7) Detailed Design	441.2	116.0	232.1
(8) Procurement and Construction Supervision Service	330.9	87.0	174.1
3. SPC Establishment Cost	**285.2**	**50.0**	**125.0**
(9) Establishment and Initial SPC Operation	285.2	50.0	125.0
4. Contingency	**525.4**	**496.6**	**634.8**
(10) Price Contingency of item (1)-(9)	0.0	0.0	0.0
(11) Physical Contingency of item (1)-(10)	525.4	496.6	634.8
5. Value Added Tax (VAT) on item (1)-(11)	**578.0**	**546.3**	**698.3**
(12) Value Added Tax (VAT)	578.0	546.3	698.3
6. Project Management Cost	**0.0**	**22.7**	**22.7**
(13) Project Management	0.0	22.7	22.7
7. Others	**0.0**	**331.4**	**331.4**
(14) Others (audit, appraisal cost etc)	0.0	331.4	331.4
Others (Disarming mine & UXOs)	0.0	0.0	0.0
8. Land Acquisition/Compensation Cost	**0.0**	**2,225.5**	**2,225.5**
(15) Land Acquisition/Compensation	0.0	2,225.5	2,225.5
9. Contingency	**0.0**	**258.0**	**258.0**
(16) Price Contingency of item (13)-(15)	0.0	0.0	0.0
(17) Physical Contingency of item (13)-(16)	0.0	258.0	258.0

Source: JICA Study Team



Unit:billion VND

Phase	Phase-1				Phase-2		
Section	BH-LT	LT-NT	NH-PM	PM-NH51	PM-BR	BR-VT	Total
Project Cost by Section	3,730	2,637	2,403	1,748	2,590	6,643	19,751
Project Cost by Phase	10,518				9,233		19,751

Note: - Not included widening cost, price contingency, loan interest
- 1JPY=263VND State Bank of Vietnam at end of June 2012

(for reference) Unit:million JPY

Section	BH-LT	LT-NT	NH-PM	PM-NH51	PM-BR	BR-VT	Total
Project Cost by Section	14,183	10,027	9,137	6,646	9,848	25,259	75,099
Project Cost by Phase	39,992				35,106		75,099

Note: Details of phase-2 cost is referred to section 6.1.3.

Source: JICA StudyTeam

Figure 5.5.6-1 Project Cost（Base Cost of 2012 Price）by Sections

(2) Annual Disbursement Schedule

Annual disbursement schedule is shown in Table 5.5.6-2. Annual fund requirement is estimated based on the construction schedule as shown in Section 5.3.4.

Table 5.5.6-2 Annual Disbursement Schedule

Phase1	2014		2015		2016		2017		2018		2019	
	F/C (million JPY)	L/C (billion VND)	F/C (million JPY)	L/C (billion VND)	F/C (million JPY)	L/C (billion VND)	F/C (million JPY)	L/C (billion VND)	F/C (million JPY)	L/C (billion VND)	F/C (million JPY)	L/C (billion VND)
Amount	0.0	428	579	998	147	906	756	931	1,113	1,278	2,659	2,771

Note: excl. contingency（price& physical）, VAT, IDC

Source: JICA Study Team

(3) Comparison with the BVEC F/S

Project cost of Phase 1 in this study is estimated at VND10,518 billion compared with VND10,410 billion (excluding price escalation) in the BVEC F/S. There is only 1.0% increase comparing with the cost from BVEC F/S. The main reasons of the increased cost are due to SPC establishment cost and land acquisition/Resettlement cost. Table5.5.6-3 summarizes the comparison of the cost with BVEC F/S and reasons of change.

Table 5.5.6-3 Comparison of Project Cost between JICA Study and BVEC F/S

(unit: billion VND)

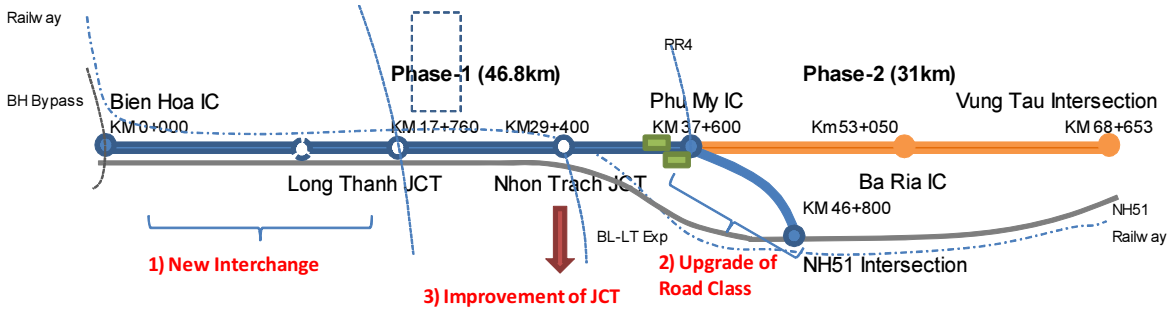
No.	Item	BVEC F/S (2012 Q2) <A>	JICA Study (2012 Q2) <B>	Difference <B>-<A>	Main reason of Difference
I	Construction and Equipment Cost	6,589	6,382	-207	(+)addition of All Risk Insurance Premium、HIV prevention program、Environmental monitoring (-)Optimization of ITS System
II	Project Management, Engineering, Other costs	791	955	164	(+)Addition of SPC establishment cost、BVEC F/S cost
III	Physical Contingency	946	956	164	
IV	Land Acquisition/Resettlement	2,084	2,226	332	(+)update of unit price (application of market price)
Total		10,410	10,518	317	

Note: the cost of 2012 price excl. price contingency

Source: JICA Study Team

(4) Cost of Option of Proposed Designs

The cost including land acquisition/resettlement for proposed design changes on plan/design of the expressway as mentioned in section 5.2.14 is shown in Figure 5.5.6-2.



No.	Options of Design Change	Project Cost (billion VND)
1)	Additional Interchange between Bien Hoa IC and Long Thanh JCT (Long Duc IC)	+254.3
2)	Upgrading road classification for section of Phu My IC - NH51 Intersection	+50.3
3)	Temporary IC (in case of delay of Ben Luc - Long Thanh Expressway Project) - half diamond type connecting with local road - partial trumpet type connecting with NH51	 +109.8 +230.0

Source: JICA Study Team

Figure 5.5.6-2 Cost of Proposed Design Changes

5.5.7. Updated Project Cost (Base Cost of 2012 Price) at Operation Stage

(1) Operation and Maintenance Cost

O&M cost is estimated based on the O&M plan mentioned in Section 5.4.8, and the result of the cost estimate is shown in Table 5.5.7-1. O&M cost is accumulated at VND2,600billion during 30 years of operation phase.

Table 5.5.7-1 O&M Cost

<< Phase1 >>

Unit: Million VND

Year	Labor	Material Cost				Vehicle Maintenance	Machine Cost				Electricity & Water	Consumable Equipment	ITS Renewal	O&M Vehicle Renewal	Total
		Cpeaning & Repair	Bridge Improvement	Pavement Improvement	Facility Improvement		Patrol, Inspection, Cpeaning & Repair	Bridge Improvement	Pavement Improvement	Facility Improvement					
2017	11,285	656				4,981	3,404				29,104	177			49,607
2018	11,285	656				4,981	3,404				29,104	177			49,607
2019	11,285	656				4,981	3,404				29,104	177			49,607
2020	11,285	656				4,981	3,404				29,104	177			49,607
2021	11,285	656				4,981	3,404				29,104	177			49,607
2022	11,285	656				4,981	3,404				29,104	177			49,607
2023	11,285	656				4,981	3,404				29,104	177			49,607
2024	11,285	656				4,981	3,404				29,104	177			49,607
2025	11,285	656			4,501	4,981	3,404			237	29,104	177			54,345
2026	11,285	656			4,501	4,981	3,404			237	29,104	177			54,345
2027	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177		160,124	246,086
2028	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2029	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2030	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2031	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177	54,743		140,706
2032	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2033	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2034	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2035	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2036	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2037	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177		160,124	246,086
2038	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2039	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2040	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2041	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2042	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2043	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2044	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2045	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
2046	11,285	656	7,149	18,718	4,501	4,981	3,404	5,365	386	237	29,104	177			85,963
														Total	2,599,790
														Km Cost	1,852

Note: the Cost is as of 2012 price

Source: JICA Study Team

(2) SPC OperationCost

The annual operation cost of SPC after traffic open is estimated at VND 49 billion including personnel expense, rental office, car operation cost etc.

(3) Environmental Monitoring Cost

The annual cost of Environmental monitoring is estimated at VND910 million. The environmental monitoring will be carried out only two years after start of operation of the expressway.

6. Project Viability of Phase 2 Section (from Phu My to Vung Tau)

6.1. Development Plan of BHVT Expressway Project

6.1.1. Existing Study to be reviewed

BVEC F/S includes study results of phase 2 section. JICA study team preliminary reviewed the phase 2 section based on the BVEC F/S.

6.1.2. Outline of Phase 2 Section

(1) Preliminary Review of the Existing BVEC F/S

The Phase 2 section consists of the expressway section which is between Phu My JCT and Vung Tau intersection connecting to Vung Tau Seaside Road, the urban road section which is between said Vung Tau intersection and NH51 intersection in Vung Tau City.

The route of phase 2 is located in Ba Ria – Vung Tau Province, and it goes across Ba Ria city toward south-east direction from Phu My JCT, then turn toward south direction and reach to Vung Tau city. The route goes across wide mouth of a river before Vung Tau city. There are some issues exist relating to technical and local master plan to be considered.

Ba Ria IC which is connected with Ba Ria Ring Road is planned in the expressway section. The continuance viaduct which is 6.5km long is planned to avoid the community severance in Ba Ria urban area. And the long bridges are planned acrossing two rivers in wetland respectively. Accordingly, the cost per kilometer is higher than phase 1 section in F/S.

The review for Phase 2 section was executed focusing on a basic matter by the pre-F/S level based on the BVEC F/S. The following item is recommended to review in the next study.

1) Review of route Alignment

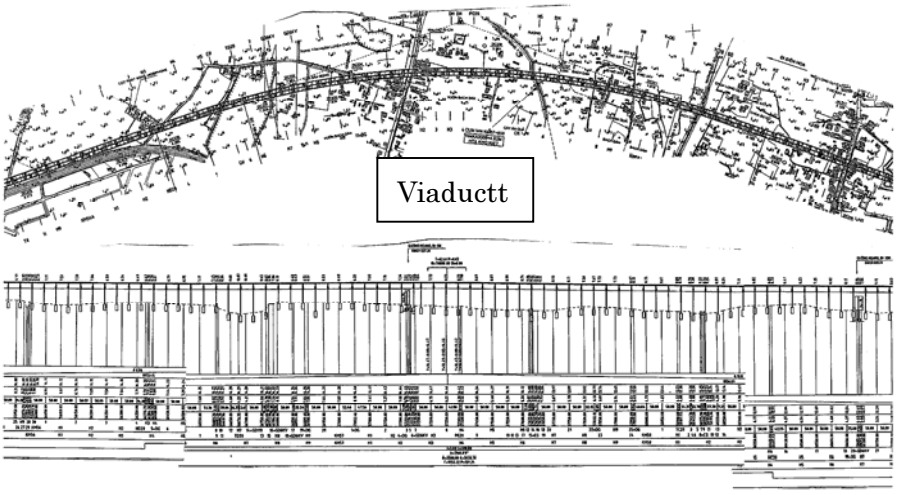
The route alignment of the section of urban area of Ba Ria city is planned near the existing road and crossing over 3 roundabouts. And continuance viaduct of 6.5km long is planned to avoid the community severance of Ba Ria city in BVEC F/S. The construction cost of this viaduct is estimated at VND331 billion and it occupies about 50% of total construction cost of phase 2 section (VND657.5 billion).

At the process of route selection, it is questionable that other route alternatives which is the route passing far away of center of city and connect to the expressway by access road. That is general policy for selection of the route.

Therefore, it is recommended to study that route alignment change to outer side of existing road and overpass by bridge or box culvert at crossing point with local roads in order to reduce the viaduct length and the construction cost.

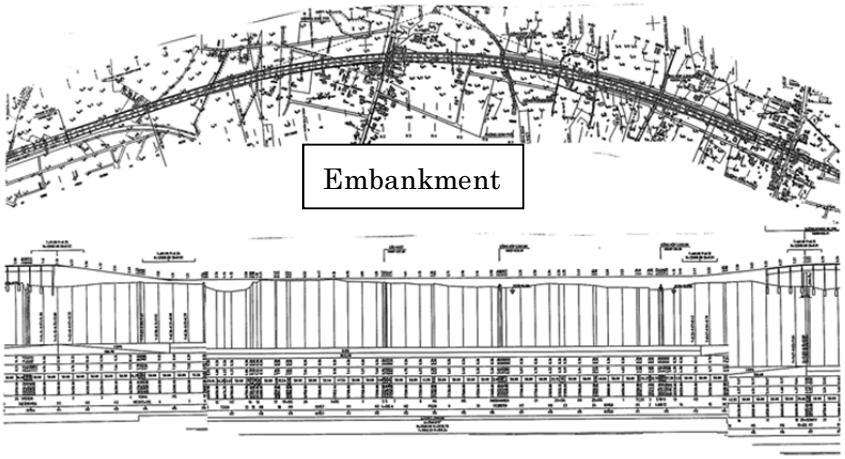
2) Study of modification from viaduct to embankment

When the above route alignment can is not changed, it is recommended to modify from viaduct to embankment with crossing by flyover and box-culvert in order to reduce the construction cost.
The plan and profile of section of BVEC F/S and revised section of embankment are shown in Figure 6.1.2-1.and Figure 6.1.2-2.



Source: BVEC F/S

Figure 6.1.2-1 Plan and Profile of Viaduct Section in BVEC F/S



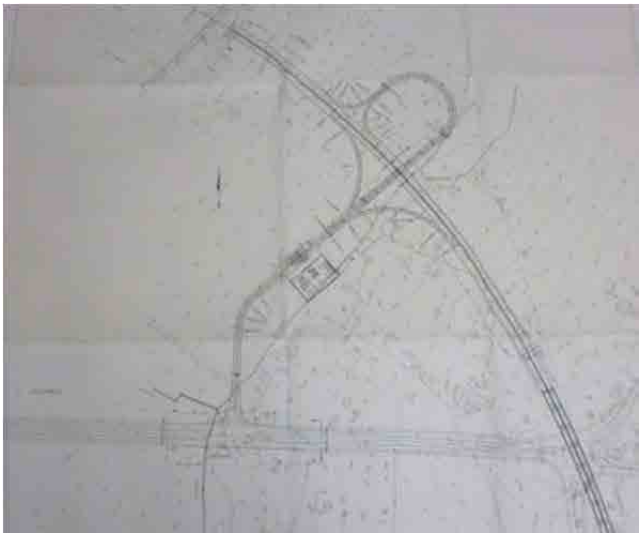
Source: JICA Study Team

Figure 6.1.2-2 Plan and Profile of Embankment Section

As for above 1) and 2), it is necessary to discuss with people's committee of the province at the next study (preparatory study).

3) Review of Ba Ria IC

Ba Ria IC is planned trumpet type with the compound loop alignment consist of curve and straight line in BVEC F/S as shown in Figure 6.1.2-3.
Therefore, it is recommended to change to the loop alignment with simple curve and transition curve same as other ICs of BVEC F/S in order to improve the traffic safety and transition of superelevation.



Source: BVEC F/S

Figure 6.1.2-3 Plan of Ba Ria IC

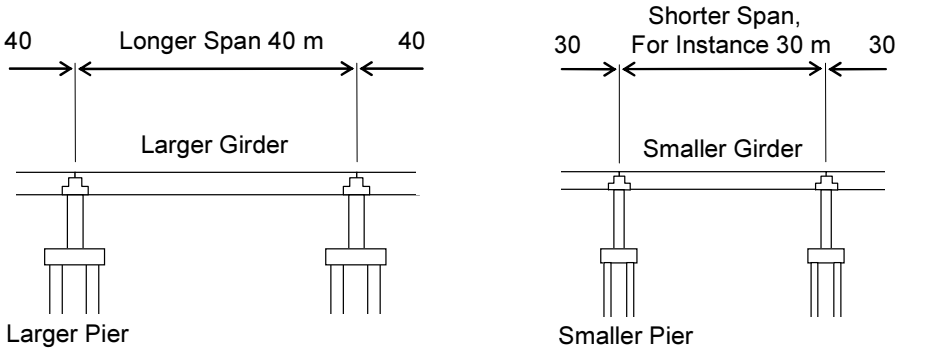
4) Shorten of the Bridge Length

Shorten of the overpass bridge over the expressway was reviewed. After review, five (5) overpass bridges can be shorten the bridge length and the cost reduction was reflected to the preliminary updated cost.

5) Cost-Efficient Span Length for Multiple Span Bridges

Along the BHVT Expressway, there are quite a number of multiple span bridges including a 6 km long viaduct bridge and in the original design which are designed with a standardized structure of 40 m long super T girders supported by bored RC piles of 1.00 m in diameter. The construction cost of such a long multiple span bridge is considerably costly, so that there is a possibility to save cost by alternative design with a different combination of span length and foundation piles.
From the above viewpoint, a cost comparison study is suggested between the original design of 40 m long super T girders with diameter 1.00 m bored RC piles and an alternative design of assuming, for instance, 30 m long I girders with a side 0.40 m precast RC piles. However, if driving construction of precast piles is considered difficult for construction noise problem as in the case of the viaduct construction adjacent to urban area, bored RC piles will be adopted also for the alternative design. For both the original and alternative designs, the girder size and the number of piles per pier should be optimally assumed based on structural analysis as

minimum size and numbers. That is, which is less costly, the original design: large sized structures but decreased number of spans/piers or the alternative design: small sized structures but increased number of spans/piers? See Figure 6.1.2-4 below.



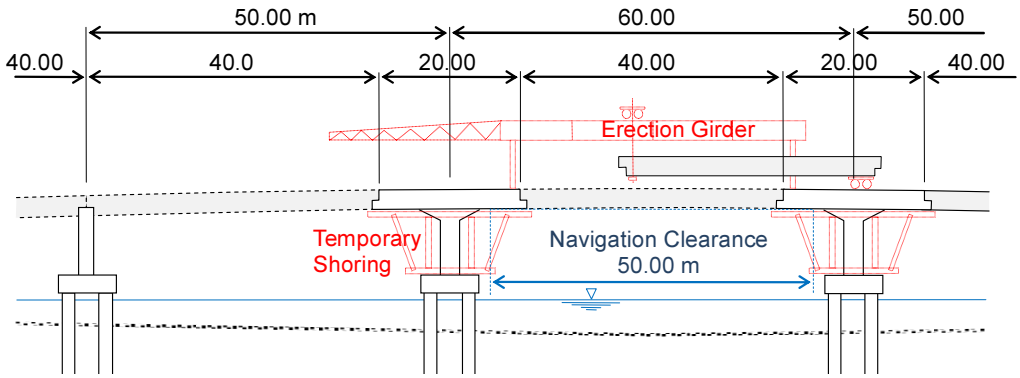
Source: JICA Study Team

Figure 6.1.2-4 Comparison for Cost-Efficient Span Length

6) Gerber Beam Bridge to cross Navigational Water

The BHVT Expressway crosses a wide water channel at the mouth of a river before Vung Tau City, and for where the original design adopted a cantilever PC box girder bridge with a center span of 90 m to pass over the 50 m wide water navigation clearance.

However, the center span length of 90 m is believed to be overdesigned to cross a 50 m wide clearance, and therefore, as an alternative, a center span length of about 60 m is suggested including clear zone on either side. A 60 m long precast girder may be too large and heavy to transport and erect it by crane. And so, studying a bridge type suitable for the span range of 60 m and the construction method on water channel, a Gerber beam structure is recommended as profiled in Figure 6.1.2-5. The pier head of the recommended Gerber beam can be constructed in situ on temporary shoring, and a suspension girder, a precast PC girder the same as those used for side spans, can be erected by erection girder as shown in the figure.



Source: JICA Study Team

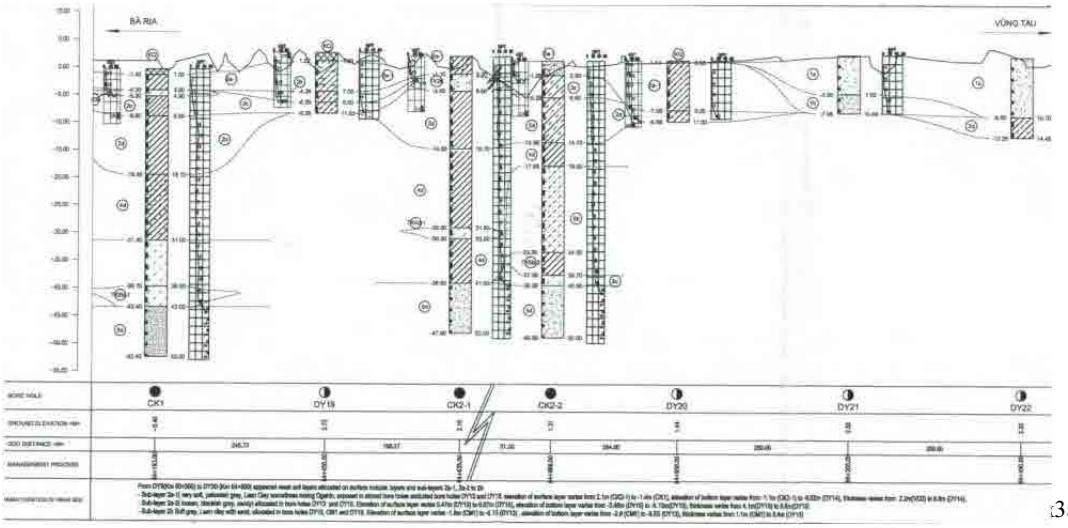
Figure 6.1.2-5 Gerber Beam Bridge on Navigational Water

There is an existing bridge on the same river mouth in a few hundred meters downstream from the planned expressway bridge, and that bridge is also built with a Gerber beam structure on its center span.

7) Soft Soil Treatment Method

(i) Outline of the geological and geotechnical conditions

About the condition of phase2 section from NH55 to the route end is the coastal area, low terrain (mangrove), and lower than the tidal level of channel system, thus it will get flooded when tide appears. There are some sections in which soft soil layer (SPT N=0~4) deposit. Figure6.1.2-6 shows the geological condition which is the worst in the planned expressway near Vung Tau City. The soil condition is rather complicated, and there are partly soft clay layer which N value is under 4. Thus these sections require a careful consideration for constructing embankment on the ground. Sand Drain method is applied for the sections in F/S design.



3a)

Figure 6.1.2-6 Geotechnical condition（Km64～Km65.5）

(ii) Outline of the BVEC F/S Design

The design standards, design and study conditions are as same as Phase1 section as described in section5.2.17.

(iii) Outline of the study

The study method is as same as Phase1, and the results are shown in Table 6.1.2-1. The drawings of the countermeasures are same as Phase 1 as shown in Section 5.2.17 and Figure 5.2.18-5.

Table 6.1.2-1 Applied soft soil treatment measures in Phase2

Station			Distance (m)	Thick. oF/Soft soil layers (m)	Height of EM (m)	Total. Sett. S (m)	Treatment by SD or Replacement		
							SD	Spacing (m)	Depth (m)
Km60+082.00	-	Km60+350.00	268.0	3.0	4.7	0.08	Replacement		3.0
Km60+350.00	-	Km60+650.00	300.0	3.0	3.0	0.06	Replacement		3.0
Km60+650.00	-	Km60+830.00	180.0	3.0	6.0	0.09	Replacement		3.0
Km60+929.00	-	Km61+100.00	171.0	3.0	4.7	0.08	Replacement		3.0
Km61+100.00	-	Km61+355.00	255.0	4.4	2.5	0.28	Replacement		3.0
Km61+355.00	-	Km61+550.00	195.0	5.4	4.4	0.17	Replacement		4.0
Km61+575.00	-	Km61+700.00	125.0	5.4	4.4	0.17	Replacement		4.0
Km61+700.00	-	Km62+000.00	300.0	3.5	2.5	0.28	Replacement		3.0
Km62+250.00	-	Km62+383.00	133.0	9.0	4.6	2.04	SD	1.60	9.0
Km63+300.00	-	Km64+167.00	867.0	4.5	2.0	0.17	Replacement		3.0
Km64+167.00	-	Km64+355.00	188.0	4.0	4.0	0.18	Replacement		3.0
Km64+355.00	-	Km64+550.00	195.0	9.0	6.0	2.39	SD	1.6	9.0
Km64+835.00	-	Km65+050.00	215.0	9.0	5.5	2.29	SD	1.6	9.0

Source: JICA Study Team

(iv) Estimation of the BVEC F/S Design and Proposal of Modified Design

Estimation of the BVEC F/S design for Phase 2 is same as for described at section 5.2.17 for Phase 1. The applied standards, study condition and method are reasonable as the design in Vietnam, but the selection policy lacks enough rationality. Therefore the additional study of PVD applicability was conducted. The study condition was same as the study for Phase 1.

The study results are shown in Table 6.1.2-2, the PVD is determined to be applicable for the sections applied Sand Drain method in the F/S design. It becomes clear that the PVD spacing is shorter and the waiting time is longer than in case of Sand Drain application. But the residual settlement can be reduce within 30cm. Thus the method

was determined to be applicable for these sections. The cost and quantity of this treatment method were estimated separately as same as for Phase1, and it has became obvious that the cost of PVD is lower than of Sand Drain. Therefore the design change is strongly reccomended.

Table 6.1.2-2 The study results

Station No.	Sand Drain			Prefablicated Vertical Drain			Remarks
	Spacing (m)	Period (day)	Residual Settlement (cm)	Spacing (m)	Period (day)	Results Residual Settlement (cm)	
Km62+250 -Km62+383	1.6	274	7	1.1	304	22	PVD applicable
Km64+355 -Km64+550	1.6	304	7	1.1	310	18	PVD applicable
Km64+835 -Km65+050	1.6	296	7	1.1	308	23	PVD applicable

Source: JICA Study Team

(v) The Problems of BVEC F/S design and The Proposal of Additional Study

The BVEC F/S design is conducted almost reasonably as described above. Meanwhile there is some problem to conduct the detailed design as followings

(vi) The Additional Soil Investigation

The soil investigation was conducted with about 85 points of borehole surveys in the whole phase 2 section (30km). The borehole survey was carried out by about 3 points per 1km. This planned road passes on relatively good soil condition ground, but there are some section in which soft soil layer deposits. Thus the additional borehole survey is required for D/D considering this matter. The Vietnamese standards of expressway construction regulate the quantity of the survey for especially soft soil sections as 1 borehole each of 75m and add 2 boreholes both side from centerline by each of 150m. Especially in the Phase 2 section, the depth of many boreholes were under 10m and lack enough investigation length. Therefore the additional boreholes are required as shown in below Table6.1.2-3.

Table 6.1.2-3 Additional borehole survey for D/D

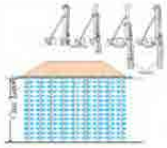
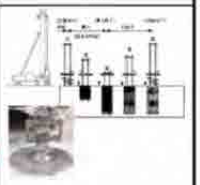
Section	Station No.	length (m)	existing num. of boreholes （num）	additional borehole num (num)	remarks
Phase2	KM60+082 -KM65+050	3490m	12	72	➢ Length is except the bridge length ➢ temporary assumed depth of boreholes is 20m

Source:JICA Study Team

(vii) The proposal of additional study on alternatives

The soil conditions in the Phase 2 are rather complicated according to the investigation results. Thus there are possibilities that it will be obvious that there are sections in which soft soil deposit deeper than expected and in which PVD cannot be applied due to difficulties of installation after the additional investigation. Therefore the additional study of alternatives includes VCM (Application for the Expressway begins in Vietnam) is required. Table 6.1.2-4 shows the example alternatives of the countermeasures.

Table 6.1.2-4 The study alternatives

	Solutions	Soil Replacement	PVD	SD	Vacuum consolidation method	Deep cement mixing column (DCM)
general description	*Concept draw (or photo)*					
	description	To excavate and replace soft and weak soil layer cause instability. Generally, this method can be applied in case as follows; the thickness of replacement is rather thin (within about 3m), there is little construction problem (for example, to deal with underground water is easy)	To install prefabricated drainage material into the ground at regular intervals. This countermeasure promote to discharge the pore water and occurrence of consolidation settlement.	To install sand pile into the ground by the specific machine. This countermeasure promote to discharge the pore water and occurrence of consolidation settlement.	To install prefabricated drainage material into the ground at regular intervals. To connect the vacuum pump to the head of PVD, and then to allocate membrane sheet to cover on the PVD heads. This countermeasure promote to discharge the pore water and occurrence of consolidation settlement by decreasing the drainage length and pumping the water.	To add and mix the cement material into the ground by the specific machine in order to increase bearing capacity. The bearing capacity of created column will be improved as about 0.2-1 (Mpa).
Technical Issues	*Consolidation Settlement*	Controlled by soil replacement thickness	High	High	High	Low
	Residual Settlement	Controlled by soil replacement thickness	Controlled by spacing of PVD and Surcharge period	Controlled by SD spacing and Surcharge period	Controlled by spacing of PVD, Vacuum Surcharge period and waiting period	Controlled by length of pile
	Stability	Increase Factor of Safety due to replacement with firmer soil	Increase Factor of Safety due to increase in soil strength during consolidation	Increase Factor of Safety due to increase in soil strength during consolidation	Increase Factor of Safety due to increase in soil strength during consolidation	Increase Factor of Safety due to High load bearing capacity of DCM columns
Economic Issues	*Maintenance Cost*	Low	High	High	Low	Low
	Construction Cost	Depend on replacement depth	Low	Low	Moderate	high
Other Related Issues	*Construction Period*	Moderate – Depend on equipment used, material supply and surcharge time	Longest - depend on surcharge time	Longest - depend on surcharge time	Moderate	Fast– Depend on equipment used
	Long Term Performance	Good	Moderate	Moderate	Moderate	Good
	Right of Way	In area of crudfied occupancy	Need large area for counter weight when deep soft soil, high embankment	Need large areas for counter weight when deep soft soil, high embankment	Need large areas for counter weight when deep soft soil, high embankment	No need area for counter weight
	Local Experience in Construction	Good – Mainly earthwork	Moderate	Moderate	beginning application for expressway project in Viet Nam	Little used
	Use in Vietnamese Road project before	Many	Many	Many	relatively little	Little
	Market Supply	No problem, mainly fine sand	No problem, except sand mat supply	Need a big quantity medium sand to make sand drain and sand mat layer	No problem, except sand mat supply	No problem, except import of construction equipment
	Likelihood of Usage	Suitable solution for thin soft clay deposit	Attractive method with low cost but requiring long construction period	Attractive method with low cost but requiring long construction period	Attractive method with relatively low cost and relatively fast construction. Careful consideration of geotechnical condition are required.	Attractive method with high cost and requiring experience in construction management, need more tests: pilot test, shear test, bearing capacity test etc...

Source: JICA Study Team

(2) Preliminary Review of Project Cost (Base Cost of 2012 Price) for Phase 2

As mentioned in section 5.5, the project cost was preliminary reviewed and updated. The same conditions of the cost estimate as phase 1 is applied.

1） Project Cost at Preparation and Construction Stage

Project cost (base cost of 2012 price) at preparation and construction stage is shown in Table 6.1.2-5.

Table 6.1.2-5 Project Cost (Base Cost of 2012 Price) for Phase-2

Item	Phase-2		
	FC Portion (million JPY)	LC Portion (billion VND)	Combined into VND (billion VND)
Project Cost (Base Cost 2012 Price)	**6,992.6**	**7,394.5**	**9,233.6**
1. Construction Cost	**4,929.6**	**5,086.1**	**6,382.6**
(1) Civil Work Cost	**4,175.9**	**4,879.3**	**5,977.5**
1) Earth work	85.4	202.2	224.6
2) Soft soil treatment	46.5	110.0	122.2
3) Pavement	336.7	797.0	885.6
4) Drainage	9.8	23.2	25.8
5) Road Facilities	325.8	200.0	285.6
6) Bridges on the Expressway/Interchange	3,248.0	3,416.9	4,271.1
7) Overpass/Underpass	123.6	130.0	162.6
(2) O&M Work	**700.5**	**142.1**	**326.3**
1) Building Work	48.1	113.9	126.5
2) Electrical and Communication Facility Work	249.6	16.4	82.1
3) Initial O&M Equipment	402.7	11.8	117.7
(3) All Risk Insurance Premium	48.8	50.2	63.0
(4) HIV Prevention Program	4.5	4.8	6.0
(5) Environmental Monitoring	0.0	9.7	9.7
2. Engineering Cost	**849.4**	**233.2**	**456.6**
(6) Feasibility Study	0.0	9.8	9.8
(7) Detailed Design	485.4	127.7	255.3
(8) Procurement and Construction Supervision Service	364.0	95.7	191.5
3. SPC Establishment Cost	**0.0**	**0.0**	**0.0**
(9) Establishment and Initial SPC Operation	0.0	0.0	0.0
4. Contingency	**577.9**	**531.9**	**683.9**
(10) Price Contingency of item (1)-(9)	0.0	0.0	0.0
(11) Physical Contingency of item (1)-(10)	577.9	531.9	683.9
5. Value Added Tax (VAT) on item (1)-(11)	**635.7**	**585.1**	**752.3**
(12) Value Added Tax (VAT)	635.7	585.1	752.3
6. Project Management Cost	**0.0**	**25.0**	**25.0**
(13) Project Management	0.0	25.0	25.0
7. Others	**0.0**	**274.2**	**274.2**
(14) Others (audit, appraisal cost etc)	0.0	274.2	274.2
Others (Disarming mine & UXOs)	0.0	0.0	0.0
8. Land Acquisition/Compensation Cost	**0.0**	**571.9**	**571.9**
(15) Land Acquisition/Compensation	0.0	571.9	571.9
9. Contingency	**0.0**	**87.1**	**87.1**
(16) Price Contingency of item (13)-(15)	0.0	0.0	0.0
(17) Physical Contingency of item (13)-(16)	0.0	87.1	87.1

Note: the cost is as of 2012 price excl. price escallation

Source: JICA Study Team

2) Annual Disbursement Schedule

Annual disbursement schedule for phase 2 section is shown in Table 6.1.2-6. Annual fund requirement is estimated based on the same construction period as phase 1 section, namely 36 months, and traffic open year is set at 2020.

Table 6.1.2-6 Annual Disbursement Schedule for Phase2 Section

Phase 1	2014		2015		2016		2017		2018		2019	
	F/C (million JPY)	L/C (billion VND)	F/C (million JPY)	L/C (billion VND)	F/C (million JPY)	L/C (billion VND)	F/C (million JPY)	L/C (billion VND)	F/C (million JPY)	L/C (billion VND)	F/C (million JPY)	L/C (billion VND)
Amount	81	144	324	310	81	285	1,354	1,471	1,794	1,894	2,146	2,007

Note: excl. contingency (price & physical), VAT, IDC

Source: JICA Study Team

3） Project Cost (Base Cost of 2012 Price) at Operation Stage

i) Operation and Maintenance Cost

O&M cost is estimated based on the O&M plan mentioned in Section 5.4.8, and the result of the cost estimate is shown in Table 6.1.2-7. O&M cost is accumulated at VND1,849billion during 30 years of operation phase.

Table 6.1.2-7 O&M Cost

<< Phase2 >>

Unit: Million VND

Year	Labor	Material Cost				Vehicle Maintenance	Machine Cost				Electricity & Water	Consumable Equipment	ITS Renewal	O&M Vehicle Renewal	Total
		Cpeaning & Repair	Bridge Improvement	Pavement Improvement	Facility Improvement		Patrol, Inspection, Cpeaning & Repair	Bridge Improvement	Pavement Improvement	Facility Improvement					
2017	7,800	435				4,853	2,255				19,278	177			34,797
2018	7,800	435				4,853	2,255				19,278	177			34,797
2019	7,800	435				4,853	2,255				19,278	177			34,797
2020	7,800	435				4,853	2,255				19,278	177			34,797
2021	7,800	435				4,853	2,255				19,278	177			34,797
2022	7,800	435				4,853	2,255				19,278	177			34,797
2023	7,800	435				4,853	2,255				19,278	177			34,797
2024	7,800	435				4,853	2,255				19,278	177			34,797
2025	7,800	435			3,098	4,853	2,255			163	19,278	177			38,058
2026	7,800	435			3,098	4,853	2,255			163	19,278	177			38,058
2027	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177		145,752	204,754
2028	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2029	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2030	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2031	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177	23,037		82,039
2032	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2033	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2034	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2035	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2036	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2037	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177		145,752	204,754
2038	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2039	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2040	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2041	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2042	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2043	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2044	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2045	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
2046	7,800	435	4,736	12,399	3,098	4,853	2,255	3,553	256	163	19,278	177			59,002
														Total	1,849,068
														Km Cost	1,988

Source: JICA Study Team

ii） Environmental Monitoring Cost

The annual cost of environmental monitoring is estimated at VND603million. The environmental monitoring will be carried out only two years after start of operation of the expressway.

6.2. Confirmation of the methods of survey and review necessary for implementation of Phase 2 Section

6.2.1. Technical Aspect

The contents of technical aspect for the preparatory survey of Phase 2 Section are as follows.

(1) Confirmation of Traffic Demand Forecast

Traffic demand forecast will be confirmed based on the result of JICA PPP Survey.

(2) Confirmation of relation to Regional Development Plan

The outline of a regional development plan in Baria Vung Tau province and the relation with BHVT expressway will be confirmed. The meeting with related regional government shall be held if necessary.

(3) Alternative Study of Expressway Plan

Based on the confirmation of demand forecast and the relation with the regional development plan in Baria Vung Tau province for the result of BVEC F/S, the alternative study will be conducted. Alternative study would be conducted for 1) route selection, and for 2) principal structure selection (embankment or bridge). The study for shape of Baria IC will be also conducted.

(4) Review of Preliminary Design

The review for the preliminary design of BVEC F/S will be conducted. And necessary natural condition survey for the review of preliminary design will be carried out.

(5) Preliminary Construction Plan

The preliminary construction plan to reflect the review of design will be examined based on the result of BVEC F/S.

(6) Preliminary Project Cost Estimate

The preliminary cost estimate to reflect the review of design will be examined based on the result of BVEC F/S.

(7) Procurement Plan

The procurement plan based on the Japanese yen loan will be planned.

(8) Discussion and Adjustment with Related Organization of Phase 1 Project

Discussion and adjustment with related organization of Phase 1 Project which would be carried out by private investment will be conducted closely.

Draft Scope of Works for the preparatory survey for BHVT Expressway (Phase 2 Section: Nhon Trach - Vung Tau Section) is proposed as appendix 2 in case of Japanese yen loan.

7. Study for Environmental and Social Considerations

7.1. Laws and Regulations relating to Environmental and Social Considerations

7.1.1. Relevant Environmental Regulations

In Vietnam, Environmental and Social Considerations for development project such as a construction of highway is to be conducted in the scheme of Environmental Impact Assessment (EIA) system.

According to the Vietnamese Law on Environmental Protection (Law NO. 52, new LEP), EIA for development projects is compulsory at present. Decree No. 29/2011/ND-CP has provided the type and the kind of projects which are required preparation of EIA Report.[18] No. 23 of Appendix II of Decree No. 29/2011/ND-CP mentions necessity of preparation of the EIA Report for all highway construction projects. Accordingly, implementation of EIA was followed by preparation of the EIA Report in 2011 for "Bien Hoa-Vung Tau Expressway Project".

1) Laws and Regulation System of EIA in Vietnam

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

a) Identifies the responsibilities of the state center, provinces, organizations and individuals to prevent and remedy environmental deterioration and pollution and carry out specified environmental protection functions;
b) Provides for the development of environmental standards and submission of environmental impact assessment 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 enforcement of environmental regulations;
e) Calls for civil and criminal penalties for violations; and
f) Encourages international environmental co-operation.

Based on the LEP, EIA for major development projects including the BHVT Expressway Project is compulsory at present in Vietnam. In order to implement the LEP, the GOV has issued the Decree No. 175/CP on October 1994 providing guidance for the implementation of EIA. The

[18] Clause 1 of Article 12 of Decree No. 29 stipulated that "Subjects required of preparation of report on environmental impact assessment are provided at Appendix II of this Decree".

LEP and the Decree No. 175/CP made EIA procedures compulsory to obtain approval for major development projects. After the enforcement of the LEP and the Decree No. 175/CP, several regulatory documents were issued by governmental agencies to support the implementation of EIA procedures. Major documents which regulate implementation of EIA and environmental protection including the LEP and the Decree No. 175/CP are summarized in the table below:

Table 7.1.1-1 Major 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, 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.	07,	Regulation on Construction Investment projects

No	Law/Regulation	Date	Contents
	16/2005/ND-CP	Feb. 2005	
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 to 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 Study Team

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, Vietnamese Standards for the Environment (TCVN) applied for the EIA for transport projects are shown below:

- National technical regulation on Ambient Air Quality ((QCVN 05:2009/ BTNMT),
- National Technical Regulation on Noise (QCVN 26:2010/ BTNMT),
- National Technical Regulation on Vibration (QCVN 27:2010/ BTNMT),

- National Technical Regulation on Surface Water Quality (QCVN 08:2008/ BTNMT),
- National technical regulation on Groundwater Quality (QCVN 09:2008/ BTNMT),
- National Technical Regulation on the allowable limits of heavy metals in the soils (QCVN 03:2008/ BTNMT),
- Permissible Nose Level for vehicles (TCVN 5948-1999),
- Vibration and Shock Standards created by Construction and Industry (TCVN 6962-2001)

Vietnamese Standards for the Environment were published by the former Ministry of Science, Technology and Environment (hereinafter MOSTE) in 1995, 2000, 2001, and by MOSTE and MONRE in 2003 and 2005 applied to all socio-economic activities in territory of Vietnam. The environmental standards include acceptable limits of many air, water, and soil and noise parameters. Although 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 – for example, sediment and some other standards do not yet exist in Vietnam. In these cases, it is common practice for ODA projects to use standards from other countries or international organizations.

7.1.2. Status of Implementation of Strategic Environmental Assessment with the Project

In Vietnam, SEA is required for socio-economic development plan according to Decree No. 29/2011/ND-CP. Type of socio-economic plan which are required SEA is also provided by Appendix 1 of Decree No. 29/2011/ND-CP. Part A of Appendix 1 of Decree No. 29/2011/ND-CP prescribes that the strategy and development of transportation sector of national level should be included in the integrated SEA report. In the Provincial level, national level development plan such as BHVT Expressway Project is included in the maspter plan to be prepared by Provinces. Therefore, implementation of SEA for strategic plans, 5 year plans and longer plans comprehends the national level development plan such as BHVT Expressway Project. As a result, SEA repart is to be prepared including both national level and indivisual local level development plans. Responsible organization for implementation of SEA is Department of Planning and Investment under Provincial People's Committee (hereinafter PPC). Provincial Department of Natural Resource and Environment (hereinafter DONRE) supports Department of Planning and Investment by providing data and information such as environmental monitoring data which are required for implementation of SEA.

MONRE has a responsibility for evaluation of SEA report and making comments with the report in the process of implementation of SEA. In the procedure of SEA, MONRE's approval is not required different from that of EIA. Provincial level DONRE evaluates SEA of local level master plan.

Following the summary of statuses of implementation of SEA concerning BHVT Expressway Project in Provinces of Ba Ria Vung Tau and Dong Nai.

(1) Ba Ria Vung Tau Province

Socio-Economic development plans of 2006 – 2015 and 2020 of Ba Ria Vung Tau Province including BHVT Expressway Project had been prepared. These development plans were approved by Decision No. 15/2007/QD-TTg on 27th January 2007. Although, MPI agreed that the SEA is to be implemented later at that time, the SEA is not yet implemented up to now due to the reason that master plans were frequently reviewed by the Province according to the change of socio economic conditions. After the confirmation of data of master plans, direction of development and objectives of development, consultans of implementation of SEA are to be selected by Department of Planning and Investment through PPC.

Apart from the Provincial level SEA, MPI already has submitted the SEA report for development plan in southern important economic zones, 11 Provinces including Ba Ria Vung Tau Province, to MONRE. The SEA for southern important economic zones serves as a reference for the implementation of Provincial level SEA.

(2) Dong Nai Province

Department of Planning and Investment has already submitted the SEA report of socio-economic development plan of 2010 – 2020 in Dong Nai Province to MONRE. This SEA report was approved by MONRE by Decision No. 73/2008/QD-TTg on 4th June 2008. Although there were no official standards to regulate the form of SEA report at that time, the procedure of preparation, approval and management methods for socio-economic development plan has been prescribed by Decree No. 92/2006/ND-CP issued on September 2006. Based on this Decree, all master plans are obliged to review the contents in every 5 years. Department of Planning and Investment in Dong Nai Province were ordered to select consultans to prepare SEA report by PPC. The Department of Planning and Investment is now finalizing the SEA report reflecting the comments by Provincial evaluation committee as of August 2012. The finalized SEA report is to be submitted to MONRE.

7.2. Summary of Approved EIA Report

The EIA for the project in BHVT Expressway was implemented in 2011 for Phase 1 section. The EIA Report for the Phase 1 section, which has been prepared in official procedures in accordance with relevant laws and regulations in Vietnam based on the implementation of EIA, was approved by MONRE with the decision No. 306/QD-BTNMT dated 15th March 2012 (Specifying approval

for EIA Report of BHVT Expressway Construction project (Phase 1)) as enclosed in Attachment 1.

As for the validity of EIA Report, clause 3 of Article 12 of Decree No. 29/2011/ND-CP stipulates the terms of the conditions of 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)*

Due to the reasons that the project location is not changed from that of mentioned in the EIA Report and there are no drastic changes of the design and the technical methods to be applied at present, the approval is to be valid until 14 March 2015 at the time of 36 months after the approval. According to the precedent similar projects in Vietnam, EIA Report is valid if the land acquisition activities are started before 36 months after the approval of EIA Report even if actual construction activities are not yet started.

The form of existing EIA Report complys with that of required by Vietnames environmental laws and regulations consisting of “Overview”, “6 chapters and “Conclusion, Recommendation and Commitment”. Following shows the comparison of the contens of existing EIA Report and those that are prescribed in Circular No. 08/2006/TT-BTNMT.

Table 7.2-1 Comparison of Contents of EIA Report

No.	Item	Vietnamese Law/regulation(Note1)	JICA Guidelines (April 2010)	EIA Report	Measures in this Study
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 EIA Report has prepared according to the Vietnames laws and regulations	
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 approved on March 2012 by MONRE.	
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 using 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	According to the laws and regulations, the EIA Report is to be disclosed to the public as required. Disclosure of the EIA Report to the stakeholders was no	Confirmed by additional RAP study

No.	Item	Vietnamese Law/regulation(Note1)	JICA Guidelines (April 2010)	EIA Report	Measures in this Study
			Report for Category A Projects)	confirmed at present.	
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 6 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 according to the Vietnamese laws and regulations by the compensation councils established in People's Committee. Chapter 6 of the EIA Report mentions the "Public Consultations" which were conducted according to Vietnamese lawsand regulations.	
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	All the items enumerated in the JICA Guidelines are examined except "Alternative analysis" in the EIA Report according to the contents mentioned in Table 6.4-4.	

No.	Item	Vietnamese Law/regulation(Note1)	JICA Guidelines (April 2010)	EIA Report	Measures in this Study
			-Environmental impacts -Analysis of alternatives -Environmental Management Plan (EMP) -Consultation (Appendix 2. EIA Report for Category A Projects)	Concerning "Alternative analysis", technical studies including the environmental aspects on road length and horizontal hight of the route, bridges, interchanges, etc. were implemented.	
Details of Items					
8	Basic information	- Collecting all information of geographic, geological, hydrology, meteorological. - Current status of the quality of environmental components must be: • 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 data of geographic, geological, hydrology, meteorological, and other natural environmental information in the project area were collected.	

No.	Item	Vietnamese Law/regulation(Note1)	JICA Guidelines (April 2010)	EIA Report	Measures in this Study
9	Environmental prediction/Evaluation	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 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 leveling the project (if any). ● During the construction phase, operation phase 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	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 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	In the report, impacts from project to environment were assessed in each phase of project. And the measures to minimize environmental pollution were taken. Proposed environmental monitoring plan periodically during construction to operation of the project. Impacts on air quality until 2030 were predicted based on the trafficvolume estimated in F/S. In case estimated traffic volume changes in the JICA study, additional prediction based on the newly estimated traffic volume is required.	Environmental impacts caused by change of design changes have been studied by the additional survey. Air quality along the roat has been also predicted based on the newly estimated traffic volume.

No.	Item	Vietnamese Law/regulation(Note1)	JICA Guidelines (April 2010)	EIA Report	Measures in this Study
		under impact of each source. For each source followings must be studied: Subject and scope of impact, severity of impact, impact probability, resilience of the affected object. Note to clarify: ● Impacts related to waste. ● Impacts that are not related to waste			
10	Environmental Management Plan (EMP)	Duties to be implemented by project owner to minimize negative impacts on the environment caused by implementation of the project including below: ● List of facilities to be constructed for reducing negative impacts on the environment ● Environmental management plan and monitoring plan	Appropriate follow-up plans and systems, such as monitoring plans and environmental management plans, must be prepared; the costs of implementing such plans and systems, and the financial methods to fund such costs, must be determined. Plans for projects with particularly large potential adverse impacts must be accompanied by detailed environmental management plans. Environmental Management Plan (EMP): This describes mitigation, monitoring, and institutional measures to be taken during construction and operation in order to eliminate adverse impacts, offset them, or reduce them to acceptable levels.	Followings were described in the EIA Report to mitigate/reduce the negative environmental impacts during preparation stage, construction stage and operating stage.	
11	Social environment	● *Clarification of economic conditions:* Economic data such as economic activity, occupation,	Data and information concerning the social environment should include following: migration of population and involuntary resettlement, local economy such as employment	Information on economic development, culture, society were collected includes full information on economy,	

No.	Item	Vietnamese Law/regulation(Note1)	JICA Guidelines (April 2010)	EIA Report	Measures in this Study
		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.	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.	culture, transport, agriculture, forestry and fisheries in the project area. The report also assesses the immediate and long-term impacts of project to the economic problems in local society in every phase of the project include positive and negative.	
12	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	According to Vietnasmese laws and regulations (Decree No. 11/2010/ND-CP, Additional Document No. 1665/TTg-CN 2006 October, Decree No. 69/2009/ND-CP, etc.), the report put forth statistics interim clearance area and the number of people affected by the clearance of the project. According to Vietnames laws and regulations, activities	As mentioned left, activities of land acquisition and resettlement are being implemented based on Vietnamese laws and regulations. Insufficient issues in the EIA report were supplementary studied by the additional RAP survey.

No.	Item	Vietnamese Law/regulation(Note1)	JICA Guidelines (April 2010)	EIA Report	Measures in this Study
			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,	concerning land clearance, land acquisition, resettlement are to be conducted by PPC of the project site (Provinces of Dong Nai and Va Ria Vung Tau). These activities by PPCs are not yet started as of October 2012. Therefore, RAP of the Project is not yet prepared at present.	

Source: JICA Study Team

7.2.1. Summary of Approved EIA Report

The Phase 1 of BHVT Expressway project may be classified as Caregory A project according to the JICA Guidelines. The summary of the approved EIA report is describe according to the requirements in the JICA Guidelines.

(1) Project Area and Proposed Alignment

BHVT Expressway locates in the east of existing NH51 with the route length approximately 77.6Km in total. The route is divided into two phases according to the phases of investment as shown below:

i) Phase 1: From Bien Hoa to Phu My Interchange including access road between Phu My Interchange and Cai Mep/ Thi Vai International Ports (approximately 46km), and

ii) Phase 2: From Phu My Interchange to Vung Tau Interchange (approximately 31km).

Table 7.2.1-1 hows the administrative information of the Project area (Phase 1 only).

Table 7.2.1-1 Administrative Information of the Project Area in Phase 1

Province	Dong Nai		Ba Ria – Vung Tau	
District	Long Thanh		Tan Tanh	Long Dien
Commune	Phuoc Tan	Loc An	Hac Dich	Tan Phuoc
	Tam Phuoc	Long An	Toc Tien	
	An Phuoc	Long Phuoc	TT Phu My	
	Long Duc	Phuoc Thai		
	TT Long Thanh	Tan Hiep		
		Phuoc Binh		

Source: JICA Study Team

(2) Environmental Condition in the Project Area[19]

1) Climate

The project area locates at the equator, and belongs to the tropical monsoon climate. May to November is classified as the rainy season while December to April is classified as the dry season. Average monthly rainfall at the rainy season in 2010 was 235mm though it was 71mm in the dry season. Average monthly rainfall in 2010 was 146mm. 90% of annual rainfall is obtained at the rainy season. Average humidity is 78% though there is small difference at the season. Average temperature is 27.0 Celsius; 38.3 Celsius at the highest temperature and 13.2 Celsius at the lowest temperature.

2) Topography and Geology

[19] Socio-economic conditionis described in the preparation of Resettlement Action Plan part namely Sectiion 7.3, and therefore this section does not describe it.

There is no precipitous cut in the project area, and terrain slope to the coastal area, typical feature at the Southern Vietnam, is observed. Topography in the project area is relatively homogenous, and the features outlined in Table 7.2.1-2 are observed.

Table 7.2.1-2 Topographical Features

	Location	Features
1	Starting point - Ba Ria Town	This is hill zone with dome shape at less than 100m of above sea level though it is still higher than the Phase 2 section. There is a feature that topography in this area slopes horizontally, and therefore, a drainage network is not affected by corrosion.
2	Branch to Cai Mep – Thi Vai Port	Above sea level in this area is higher than the other sections of the alignment since the alignment in this area passes the base of Thi Vai mountain, Toc Tien mountain and Ong Trinh mountain. Although there is an area with 300m of above sea level in this section, corrosion is observed.
3	Ba Ria Town – Ending point	Above sea level in this section is relatively low. This area has a feature to be affected by flood since slope is not only the direction to the coastal area. The land use at the ending point is pound for cultivating shrimps and salt fields.

Source : JICA Study Team based on EIA Report（BVEC, 2011）

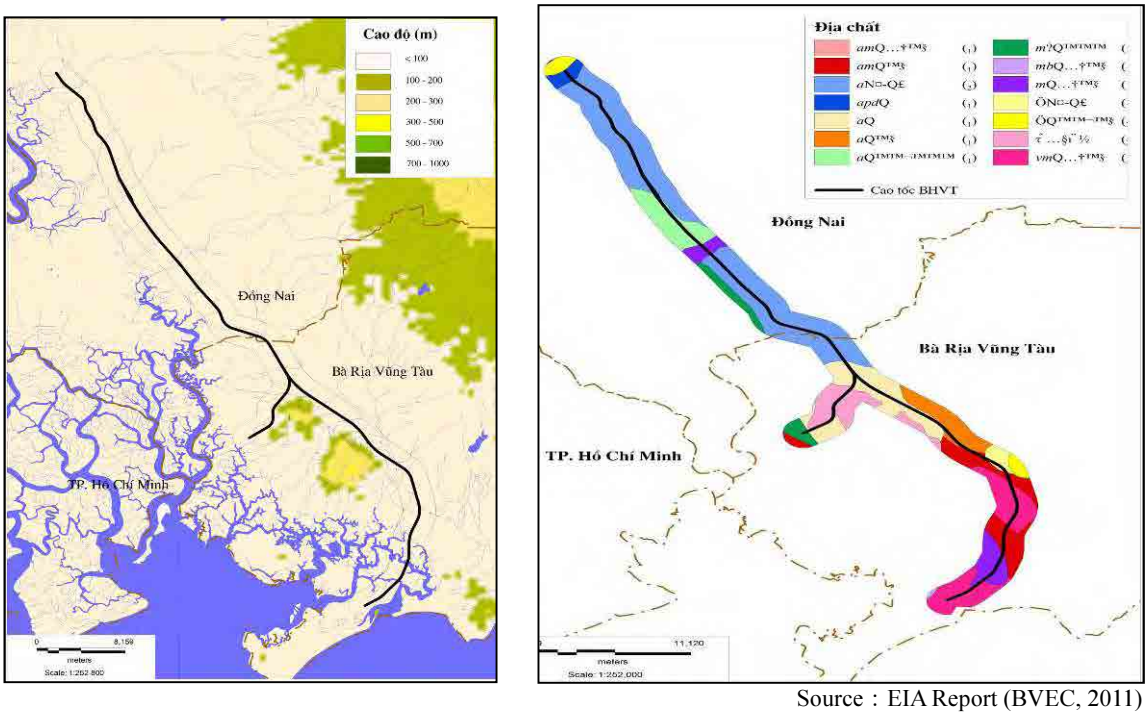
Geology at the project area has features on the layer as outlined in Table 7.2.1-3

Table 7.2.1-3 Geological Features

	Layers	Features
1	Backfill/Agriculture/Clay/Grinded Sand/Rubble layer	This is the layer with 1.5 to 2.0m thickness.
2	T1 Layer (Sandy plastic clay)	This later locates just beneath the backfill layer at 5.4 to 18.5m depth with 7.5m thickness.
3	T2 Layer (Sand and relatively hard condition)	This layer generally stretches over the project area, and locates at 3.0 to 10.5m depth. The thickness of this layer is about 8.5m.
4	1a Layer (Plastic clay)	This layer is observed at some points in the project area, and locates 2.5 to 2.7m depth. The thickness is about 4.5m.
5	1b Layer (Clay roam layer/soft plastic condition)	This layer is observed at some points in the project area, and locates 3.5m depth. The thickness is about 3.5m.

	Layers	Features
6	1 Layer (Clay/relatively hard plastic condition)	This layer generally starches over the project area, and locates 3.0 to 8.4m depth. The thickness is about 5.5m.
7	2 Layer (Clay/hard plastic condition)	This layer generally starches over the project area, and locates 1.7 to 8.8m depth. The thickness is about 5.0m.
8	3 Layer (Relatively rough sand)	This layer generally starches over the project area, and locates 6.0 to 1.5m depth. The thickness is about 13.5m.

Source: JICA Study Team based on EIA Report (BVEC, 2011)



Source：EIA Report (BVEC, 2011)

Figure 7.2.1-1 Topography and Geology in the Project Area

(3) Natural Reserve

Government of Vietnam ratifies several international treaties such as The Ramar Convention, UNESCO World Heritage Convention, UNESCO Man and Biosphere Programme (hereinafter MBA), ASEAN Declaration on Heritage Parks, etc. Domestic regulations such as Decree No. 109/2003 and Circular No. 18/2004 also designates 10 coastal marsh areas as high value of biology to be reserved based on the standard of wetland conservation area. As for the Phase 1 of Bien Hoa Vung Tau Expressway project, protected area does not exist around the project area though Can Gio mangrove area recoded as Boisphere Reserve Area in MBA locates 3km from the project area.

(4) Fauna and Flora

1) Flora

The natural environment surrounding the project area is the planted forest since the natural forest is already disappeared. Therefore, protected species stipulated in the red list issued by MONRE in 2007 are not observed around the project area. Table 7.2.1-4 outlines the major flora in the project area.

Table 7.2.1-4 Major Flora in the Project Area

Category	Species
Perennial Plant (Urban Area)	Khaya senegalensis, Terminalia catappa, Acacia spp, Cassia spp, etc.
Perennial Plant (Rural Area)	Artocarpus heterophyllus, Melia azedarach, Cocos nucifera, Mangifera indica, Bambusa spp, etc.
Annual Plant	Oryza sativa, Zea mays, Dioscorea esculenta var. Fasciculata, etc.

Source : JICA Study Team based on EIA Report（BVEC, 2011）

2) Fauna

Same as flora, protected species stipulated in the red list of issued by MONRE in 2007 are not observed. Table 7.2.1-5 outlines the major fauna in the project area.

Table 7.2.1-5 Major Fauna in the Project Area

Category	Species
Bird	Dicrurus, Dicaeum, Egetta garzetta, Ardeidae, Turnix, etc.
Mammal	Virerricula indica, Viverra zibetha, Mus musculus, Rattus flavipectus, etc.
Reptilian/ Amphibian	Calotes mystaceus, Holopbarachus rugulosus, Polypedates lencomystax, Kaloula pulchra, Limnonectes limnocharis, Physignathus cocincinus, etc.

Source : JICA Study Team based on EIA Report（BVEC, 2011）

(5) Other Environmental Condition

Measurement of items listed in Table 7.2.1-6 was conducted at the points in Figure 7.2.1-2 during the EIA study. Environmental condition is outlined below.

Source : JICA Study Team based on EIA Report (BVEC, 2011)

Figure 7.2.1-2 Measurement Point in EIA Study

Table 7.2.1-6 Measurement Items

Point	Measurement Items	Point	Measurement Items
1	Air quality, Noise and vibration, Surface water quality, Sediment, Plankton	8	Air quality, Noise and vibration, groundwater quality, Soil
2	Surface water quality, Sediment, Plankton	9	Air quality, Noise and vibration, Groundwater quality, Soil
3	Air quality, Noise and vibration, Plankton	10	Surface water quality, Sediment, Plankton
4	Surface water quality, Sediment, Plankton	11	Air quality, Noise and vibration
5	Air quality, Noise and vibration, Surface water quality, Sediment, Groundwater quality, Soil, Plankton	12	Surface water quality, Sediment, Plankton
6	Air quality, Noise and vibration, Surface water quality, Sediment, Plankton	13	Air quality, Noise and vibration
7	Surface water quality, Sediment, Plankton	14	Air quality, Noise and vibration, Groundwater quality, Soil

Source：EIA Report（BVEC, 2011）

1) Air Quality

Air quality measurement on TSP, PM10, CO, NOx, SOx and weather was conducted for 24 hours at 9 points. Measurement results show that air quality almost satisfies the national standard.

2) Surface Water Quality

Surface water quality measurement on water temperature, pH, turbidity, conductivity, TSS, DO, COD, BOD, NH4, heavy metal, oil, E. Coli, Coli form was conducted at 7 points. Water at the measurement point No. 12 is used for drinking water, and water quality satisfies the national standard. However, the level of E. Coli at the most of other measurement points exceeds the national standard. In addition, Coli form, DO and Fe level at some measurement points exceed the national standard. Living condition, production activity at factories and drainage network are considered as one of reasons on water contamination in this area.

3) Groundwater Quality

Water quality measurement on water temperature, pH, DO, hardness, COD, TSS, Cd, Pb, Zn, Mg, As, Fe, Hg, Coli form, E. Coli was conducted at 4 points. Heavy metal and E. Coli level at most of measurement points exceed the national standard. Penetration of contaminated surface water to groundwater is considered as one of reasons for contamination.

4) Noise and Vibration

Noise measurement was conducted for 16 hours continuously at 9 points. Although measured noise level at 2 points (No.11 and No. 11) exceed the national standard, its reason is considered as heavy traffic and road construction. As for vibration, measurement was conducted at 9 points for 16 hours continuously. Vibration level at all measurement points is within the national standard.

(6) Impact Assessment and Countermeasures

Impact assessment and countermeasures examined in the approved EIA report are outlines in Table 7.2.1-7

Table 7.2.1-7 Potential Impact and Prposed Mitigation Measures in the Approved EIA Report

Environmental Item	Potential Impact	Proposed Mitigation Measures	Responsibility
1. Prior to Construction			
1-1. Natural Environment			
Air Quality	a) Dust may be generated due to demolishing house b) TSP level may increase to 1.3 times (dry season) and 3.9 times (rainy season) higher than the national standard due to leveling activity. Increasing air pollutant due to leveling activity will be continued for 18 months especially at the sunny day in November to April.	**Mitigation measures for a)** - Water the demolishing area in sunny day - Cover the demolishing area **Mitigation measures for b)** - Water at least two times a day	Contractor
Noise and Vibration	a) Noise and vibration may be generated due to demolishing house (expecting 3 to 5 days impact within 45m from the work area) b) Noise and vibration may be generated due to leveling (expecting 1 week impact within 198m from the work area)	**Mitigation measures for a)** - Prohibit night time working - Use equipments with sound-muffling **Mitigation measures for b)** - Prohibit night time working - Restrict number of equipments to be used in the same time	Contractor
1-2. Social Environment			
Land Acquisition	Resettlement and land acquisition from 813 households (757 households from Dong Nai province and 56 households from Ba Ria Vung Tau province) is expected.	- Prepare land acquisition plan in accordance with relevant regulations - Implement appropriate compensation - Provide necessary assistance such as vocational training	Resettlement Committee in a district
Other Acquisition/ Relocation	Relocation o f 81 graves in total and 117 transmission line poles (91 poles in Dong Nai province and 26 poles in Ba Ria Vung Tau province) are expected.	- Notice grave relocation in advance, providing appropriate compensation and conducting appropriate religious/cultural ceremony - Relocate transmission line poles after setting new poles	Resettlement Committee in a district

Environmental Item	Potential Impact	Proposed Mitigation Measures	Responsibility
Impact to Irrigation	Impact to irrigation system due to construction of river or channels is expected.	- Divert water flow by installing temporal drainage before construction, and modify to the original water flow after construction	Contractor
Wastes	Wastes such as wood, concrete or mortar due to demolishing houses may be generated.	- Segregate wastes properly - Dispose wastes at designated place - Reuse waste wood	Contractor
1. Construction			
1-1. Natural Environment			
Air Quality	a) TSP level may increase 1.3 times (the dry season) and 3.8 times (the rainy season) than the national standard due to excavation for bridge abutment and bridge pier. b) Increasing of air pollutant level related to excavation work may be observed at the sunny dry day for 32 months especially from November to April. In terms of bridge abutment construction, air pollutant level may be increased for 12 to 24 months.	- Use vehicle satisfying the national standards - Limit the roads where construction vehicle uses - Control vehicles at the entrance - Watering - Sweep around the construction sites - Cover accumulated soil with appropriate material such as nylon in case accumulated soil is more than $20m^3$	Contractor

Environmental Item	Potential Impact	Proposed Mitigation Measures	Responsibility
Water Quality	a) If water is discharged directly from construction yard (i.e. office and/or accommodation camp) without proper treatment, BOD_5 and TSS level will exceed the national standard. TSS level will be 437.5-906 against the standard level 120, Total Coliform level will be $0.6.10^{7}$ - $0.6.10^{10}$against the standard level 5 b) COD, Oil and SS to be discharged from construction vehicle maintenance will be within the national standard though some of parameters in discharged water from vehicle washing may not satisfy the national standard. c) Although TSS or turbidity at the downstream area may be temporary increased due to bridge construction, impact to irrigation for agriculture is considered as small. d) There is a possibility of groundwater contamination in case that contaminated surface water flows into groundwater due to excavation for bridge abutment.	**Mitigation measures for a)** - Limit the construction sites to avoid soil effluence from the construction sites - Use the geotexitle method to avoid soil effluence from the construction sites - Stop construction work during rain time - Install temporal drainage system to collect rain water (temporal drainage system is filled back when construction is completed.) - Prohibit to dispose wasted soil including bentonite to non-designated places - Conduct regular monitoring of flood around the construction sites **Mitigation measures for c) and d)** - Prohibit to dispose of wastes to rivers - Clean the construction sites by collect wastes flowing to rovers after daily construction work	Contractor
Wastes	Although estimation of generated waste amount is difficult, it may not be big amount based on the previous examples.	- Accumulate solid wastes and non-hazardous wastes at the designated place away from the residential area or water area - Segregate living wastes generated from the construction yard	Contractor

Environmental Item	Potential Impact	Proposed Mitigation Measures	Responsibility
Noise and Vibration	[Noise] a) Noise generated from construction of road, bridge, interchange, facilities and others exceeds the national standard (QCVN 26:2010/BTNMT: 70dBA in 6 to 21 hour, and 50dBA in 21 to 6 hours), and the national standard level will be satisfied 2km away from the construction sites. [Vibration] a) Vibration may be generated by operation of construction equipments and activities. b) Vibration at 5m from the construction sites will satisfy the national standard 75dBA from 6 to 21 hours and Basic level from 21 to 6 hours stipulated in QCVN 27:2010/BTNMT.	- Use vehicle and equipments satisfying the standard - Prohibit to conduct construction activities generating noise around the sensitive area in the night time - Maintain vehicles and equipments regularly - Provide education to construction workers (i.e. stop engine during not operation) - Limit vehicle speed around the construction sites (e.g. 5km/hour) - Use vehicle and equipments with less noise	Contractor
Soil	a) There is a possibility that rain water from the construction sites flows into the residential area near the construction sites since the topography of residential area is lower than the construction sites	- Establish temporal drainage facilities - Accumulate soil at appropriate place	Contractor
Fauna, Flora, Biodiversity	a) There is no protected species in the project area. However, soil corrosion may be enhanced due to tree removal for land acquisition. b) Although the project area does not have any protected species, balance of existing fauna and flora may be disturbed due to noise generated from construction activities.	- Prohibit tree removal at not designated area to avoid unnecessary tree removal - Provide education on fauna, flora and relevant regulations to construction workers - Prohibit illegal hunting or tree removal around the construction sites	Contractor
1-2. Social Environment			

Environmental Item	Potential Impact	Proposed Mitigation Measures	Responsibility
Social Infrastructure	a) Temporary traffic jam and increasing air pollutant due to temporal traffic jam are expected. b) Road condition around the construction sites may be degraded due to traffic of construction vehicles.	- Prohibit to use the existing road as temporary yard for construction material or waste - Put a signboard near the construction sites to show distance to the construction yard - Arrange a security person for traffic control - Obtain permission from local authorizes for using road during construction - Limit vehicle speed at the local roads (e.g. 15km/hour) - Collect rock falls from construction vehicles - Limit honking - Limit to use local roads during the congested time zone (e.g. from 6 to 8 in the morning, and from 4 to 6 in the evening)	Contractor
Infectious Disease	Risk of epidemic infection may be temporarily increased due to influx of construction works from other areas.	- Cooperate with local authorities and communities - Employee local people	Contractor
Sanitation	Sanitation condition may be temporarily worsened due to operation of construction yard and worker's accommodation.	-	Contractor
Accident	Risk of accidents related to construction activities may be increased.	-	Contractor
Conflict	There is a risk of conflict between construction works and peripheral people of the construction sites due to complain on living condition.	-	Contractor

Environmental Item	Potential Impact	Proposed Mitigation Measures	Responsibility
Cultural Heritage	a) Construction activities may affect religious ceremony since religious facilities such as temple and pagoda locate close to the project site. b) The project area locates in the Oc Eo cultural area, and there is a possibility of finding antiques at this area though they are not yet found.	**Mitigation measures for a)** - Mitigate traffic jam (refer mitigation measures of Social Infrastructure in 1-2) - Cooperate with local authorities and communities - Employ local people **Mitigation measures for b)** - Stop construction activities and inform local authorities in case antiques are found	Contractor
2. Operation			
2-1. Natural Environment			
Air Quality	a) TSP level at 5m from the road in the dry season may be within the national standard though it may be 1.4 to 1.8 times higher than the national standard at the rainy season. TSP level in the rainy season may be within the national standard at 31 to 47m from the road. b) There is a possibility of offensive odor due to wastes generated from facility operation. c) There is a possibility of heat emission from facility operation.	**Mitigation measures for a)** - There is no clear description on mitigation measures for air quality of traffic at the operation stage. However, similar mitigation measures proposed for the construction activities may also be applied. **Mitigation measures for b)** - Treat and manage wastes properly **Mitigation measures for c)** - Enhance greening	Implementing Agency
Water Quality	There is a risk of water quality degradation due to effluence of contaminated water including oil and heavy metals from road and facilities	- Clean bridge surface every 10 days - Install drainage system in the bridge to avoid effluent water from a bridge to river - Install wastewater treatment facility and discharge wastewater after treatment	Implementing Agency
Wastes	Domestic and oil-based wastes may be generated due to facility operation.	- Manage wastes properly - Implement 3R - Dispose hazardous wastes according to the regulation (Circular No. 12/2011/TT-BTNMT)	Implementing Agency

Environmental Item	Potential Impact	Proposed Mitigation Measures	Responsibility
Noise	a) Noise due to traffic may be within the national standard. b) In case emergency generator is used during electricity shortage, noise level may exceed the national standard.	- Set a generator in sound proofing booth - Maintain a generator properly	Implementing Agency
Hydrology	Although there is a possibility of impact to hydrology, serious impact is not expected since such potential impact is examined in a design.	-	Implementing Agency
Soil	a) At walls not reinforced basalt of the land, rain water and groundwater export road will create a deep erosion ditch. Degraded land and the risk of flooding will occur. b) There is a possibility of laterization at the area of fertile basalt. c) There is a possibility of soil pollution due to solid wastes generated from facility operation.	**Migration measures for a)** - For the section with basalt hills passed through by the route, design liquid manure pit on foot slope and water drainage lines at places where flow in the rainy season is higher than lines not directly flow into road surface and collect water on road - Design rip-rap from bottom up to at least 0.3m above the highest natural water and design rip-rap from bottom up to at least 0.3m above the highest natural water **Mitigation measures for b)** - Install drainage system at the both sides of road to maintain ground water at appropriate level **Mitigation measures for c)** - Collect wastes in accordance with the regulation (Circular No. 12/2011/TT-BTNMT) - Treat wastewater by installing purification equipments	Implementing Agency
2-2. Social Environment			

Environmental Item	Potential Impact	Proposed Mitigation Measures	Responsibility
Local Living Environment	There is a possibility to worsening living condition due to influx of construction workers from outside.	- Apply a standard/regulation about construction worker (i.e. prohibit alcohol intake, employ local people, etc.) - Implement activities of awareness enhancement on public health by cooperation with NGOs and local authorities	Implementing Agency
Land Division	There is a possibility of agriculture division	- Provide substitute agricultural land by consulting with local authorities	Implementing Agency

Source: JICA Study Team based on EIA Report (BVEC, 2011)

(7) Environmental Management and Monitoring Plan

1) Environmental Monitoring

There are possibilities that some negative environmental impacts arise caused by the implementation of the project. In order to avoid and/or minimize the impacts, implementation of environmental monitoring is required.

a) Objectives of the Environmental Monitoring

- Check the accuracy of the forecasts and make appropriate adjustments,
- Ensure mitigation measures to be implemented in stages of the Project and control their effectiveness,
- Detect unforeseen impacts and,
- Propose mitigation measures for these impacts.

b) Monitoring Items

Monitoring items includes:

- Air quality: the monitoring of air quality including:,
  - ✧ Monitor concentration of air pollutants at the construction sites and surrounding residential areas affected by the Project
  - ✧ Monitor meteorological parameters affecting the dispersion of pollutants
  - ✧ Assess and forecast the increase of volume of air pollutants from the Project's activities to propose additional mitigation measures
- Noise, vibration: the monitoring of noise and vibration includes:
  - ✧ Monitor noise, vibration at the construction sites and surrounding residential areas affected by the Project
  - ✧ Assess and forecast the increase of level of noise, vibration from the Project's activities to propose additional mitigation measures
- Surface water quality: the monitoring of surface water quality includes:
  - ✧ Monitor concentration of pollutants in water environment and water bodies receiving wastewater from the Project's activities;
  - ✧ Assess and forecast the increase of volume of water pollutants to propose additional mitigation measures.
- Groundwater quality: the monitoring of groundwater quality includes:
  - ✧ Monitor concentration of groundwater pollutants

- ✧ Assess and forecast the increase of pollutants to propose additional mitigation measures.

- Soil quality: the monitoring of soil quality includes
  - ✧ Monitor concentration of pollutants in agricultural land of the project area
  - ✧ Assess and forecast the increase of soil pollutants to propose additional mitigation measures.
- Sediment quality: the monitoring of sediment quality includes:
  - ✧ Monitor concentration of sediment pollutants of the project area
  - ✧ Assess and forecast the increase of sediment pollutants to propose additional mitigation measures
- Other monitoring (sliding, landslide, waste transport and dumping)
  - ✧ Monitor sliding, landslide, subsidence caused by construction activities
  - ✧ Monitor waste transportation and dumping at right locations

Propose additional mitigation measures in case of necessity.

2) Monitoring of Wastewater Quality

During construction phase, surface water quality will be affected by wastewater discharge from domestic activities at worker camps and construction facilities such as site batching plants. To prevent this impact monitoring of wastewater from these sources need to be conducted.

The water quality of wastewater shall be surveyed at discharge points, which shall be selected based on actual conditions. One monitoring sample shall be collected at each construction package.

Survey methods: Sampling and analysis shall be basically carried out based on the standard method for sampling and laboratory work required by MONRE with the calibration of equipment. Sampling location shall be marked by using GPS.

Survey volume: The parameters to be measured or analyzed shall include temperature, pH, BOD, COD, DO, SS, NH_4^+,Total Nitrogen (TN), Total Phosphorous (TP), Oil and greaseLubricant, Coliform.

Frequency of monitoring: Every 6 months (through construction phase, 2 years after operation)

The environmental monitoring programs, which were prepared in accordance with above, are shown in Attachment 3 in JICA form.

3) Contractor's Site Environmental Monitoring Plan (EMP)

a) Framework of Contractor's EMP

In order to conduct an environmental m,anagement plan in the stages of preparation, construction and operation, the environmental management plan (EMP) was studied in the EIA Report for Phase1 section. The EMP should include followings:

- Establish a management program on implementing measures to mitigate environmental impacts approved by environment management unit and transformed into terms in the Project's specifications;
- Ensure proper management of wastes, prompt respond to environmental incidents and urgent solutions to environmental incidents;
- Continuously collection information about changes in environmental quality during project implementation to detect adverse environmental impacts timely and propose measures to prevent and reduce environmental pollution in accordance with Vietnamese Standards 2001, 2002; Vietnamese Standards 2008, 2009, 2010 and FAO ISO 9000.

Prior to commencement of construction, the Contractor will be required to submit an Site Environmental Management Plan (Site EMP) to project supervision consultant (hereinafter PSC) based on the Contractor's actual construction methodologies, work program, and management of construction activities and management of the workforce during construction. The site EMP Implementation Plan shall demonstrate compliance with Vietnamese environmental requirements, the mitigation measures set down in the specifications for Contractors and The WB environmental policies. The content of the Contractor's EMP shall be in line with the project specific EMP and shall be enhanced by the Contractor's works practices, implementation procedures and program. The Plan shall be certified and, approved by PSC.

The Contractor's EMP Implementation Plan shall provide details such as commitment to environmental protection by the Contractor's Project Management Team; methodology of implementing the project EMP; detailed designs and installation of pollution control facilities (e.g. drainage channel, settling tank, temporary noise barrier, etc); environmental control mechanism; detailed earthworks management plans and site operation plans outlining the measures that are proposed to minimize, mitigate and manage the effects, for the duration of the construction works.

Based on above, the EMPs were prepared for 37 places/points along the Phase1 section in the EIA Report.Table 7.2.1-8 summarizes the outline of the EMP.

Table 7.2.1-8 Outline of Environmental Management Plan in Phase 1 Section

Location	Description	Activities generating impacts	Environmental impacts	Mitigation measures	Environmental treatment works	Person-in-charge
37 points (Start point: Km0+000, Km0+900, Km2+558, Km3+200, Km3+500, Km3+600, Km4+400, Km4+650, Km4+850, Km5+600, Km5+900, Km6+100, Km7+200, Km8+700, Km8+955, Km9+700, Km11+178, Km11+700, Km13+050, Km14+350, Km14+400, Km15+100, Km16+200, Km20+400, Km21+000, Km21+300, Km24+100, Km25+650, Km28+050, Km29+070, Km29+700, Km31+200, Km37+400, Km37+800, Km38+000, Operating station, toll station, maintenance station and service station, End point)	Description of status/situations of each location (Population, geographical condition, existence of commune, facility, etc.)	• Construction activities • Transportation of construction materials • Earth work • Road operation • Etc.	• Relocation, resettlement • Health impact due to dust pollution • Wastes generation • Traffic safety risk • Division of agricultural land • Pollution from organic substances and microorganisms • Pollution from dirt due to rainwater runoff • Etc.	• Implementation of RAP • Control dust emission, noise sources • Arrange warning signs • Collect and process waste spillage • Select the most optimal construction methods and rescue plans • Control solid waste, wastewater generated on site • Create ditches for collecting rainwater runoff • Clean up road surface • Etc.	• Baffles • Garbage bins • Hazardous waste containers • Mobile toilets • Drains • Etc. (Details were specified in the EIA Report)	• BVEC • PMU • Construction unit • Environmental unit • Environmental supervisor • Etc.

Source: JICA Study Team based on EIA Report (BVEC, 2011)

b) Structure of implementation of EMP

(i) Stages of preparation and construction

Table 7.2.1-9 shows the role and the responsibility of organizations for the implementation of the environmental management plan in the stages of preparation and construction.

Table 7.2.1-9 Roles and Responsibilities of Environmental Management Organizations in the Preparation and Construction Phase

Organization	Role/Responsibility
Owner of project	- Issue assignments to units under its management. - Receive and solve periodical management & monitoring report of PMU
PMU/SPC	- Sign contracts with the contractors and the Supervisor - Organize, appoint departments in charge of environment to be responsible for environmental issues of the Project. - Formulate environmental management plan and environmental monitoring program - Provide funds for environmental management and monitoring activities in the preparation and construction stage of the Project - Receive periodical report of environmental consult, and submit periodically report to BVEC, DONREs of Dong Nai and Ba Ria-Vung Tau provinces and MONRE
Environmental unit (To be established in SPC)	- Directly monitor environmental management and monitoring activities - Inspect construction activities to ensure the implementation unit fulfill responsibilities assigned in related documents on measures to mitigate environmental impacts. In case of not fulfilling requirements, the environmental unit directly reports the Project Director who is authorized to postpone the work of the implementation unit - Review and analyze environmental management report during the construction - Support and coordinate with the Supervisor
Construction unit	- Be responsible for full implementation of environmental protection measures stated in the assignments of the Owner and the approved EIA report - Be under the management of the Supervisor; adjust or strengthen measures at request of the Supervisor and environmental unit
Environmental Supervisor	- Manage the implementation of environmental mitigation measures of the construction units stated in writing by the Owner - Directly inform the construction units any potential environmental issues that may obstruct the Project schedule - Internal monitoring of resettlement/compensation - Report environmental-related issues periodically to the Owner and Environmental unit
Environmental	- Monitor environment

Organization	Role/Responsibility
Consultant	- Directly report monitoring results to the environmental unit - Perform additional measurements as required

Source: JICA Study Team based on EIA Report (BVEC, 2011)

(ii) After Operation

Table 7.2.1-10 summarizes the role and the responsibility of organizations for the implementation of the environmental management plan after the operation.

Table 7.2.1-10 Roles and responsibilities of environmental management organizations in the Operation Phase

Organization	Role/Responsibility
Owner of project	- Handover all environmental management results in the preparation and construction phase of the Project certified by MOT, DONRE of Dong Nai and Ba Ria-Bung Tau provinces to the Project exploiting unit
Project exploiting unit	- Receive environmental management results in the preparation and construction stage of the Project certified by MOT, DONREs of Dong Nai and Ba Ria - Bung Tau provinces - Sign contracts with the environmental consultant - Assign officer in charge of environment to be responsible for environmental issues of the Project - Provide funds for environmental management and monitoring activities in the operation phase of the Project - Receive periodical report of officer in charge of environment, environmental consultant and periodically report MONRE, DONRE of Dong Nai and Ba Ria-Vung Tau provinces every six month during the warranty period
Officer in charge of environment	- Receive the environmental monitoring results of the Consultant - Report the Project exploiting unit on monitoring results
Environmental Consultant	- Monitor environment - Directly report monitoring results to the officer in charge of environment of the Project exploiting unit - Perform additional measurements as required

Source: JICA Study Team based on EIA Report (BVEC, 2011)

4) Cost Estimate of Environmental Protection Activities

As mentioned above, EMP is to be conducted by the ownwe of the Project. Following summarizes the costs and thoses contents of Phase 1 section as of May 2011 mentioned in the existing EIA Report.

Table 7.2.1-11 Total Costs for Environmental Protection Activities

(Unit:VND)

Environmental Activity	Preparation	Operation	Total	Table No.
Environmental treatment works	3,255,000,000	3,500,000	**3,258,500,000**	
Environmental management	4,641,000,000	766,500,000	**5,407,500,000**	
Environmental monitoring program(Note1)	2,867,990,000	883,960,000	**3,751,950,000**	
Total	**10,763,990,000**	**1,653,960,000**	**12,417,950,000**	

(Note1): Cost of environmental monitoring program for 24 months after the commencement of operation.

Source: JICA Study Team based on EIA Report (BVEC, 2011)

Table 7.2.1-12 Cost Estimate for Environmental Treatment Works

(Detailes of Table 7.2.1-11)

Phase/Items		VND
I	Preparation phase	34,000,000
Dust handling equipment		
II	Construction phase	3,221,000,000
Mud baffle, Dust handling equipment, Temporary retention pit (Area for aggregate washing, concrete mixing, concrete mixer washing, Area for vehicles washing, material storage, Areage for storage of vehicles, solvents, resin, paint and wood preservatives, At dining areas, canteen), Water collection ditch & tank (Water collection ditch, Water collection tank), Mobile toilets, Mobile garbage bins, Hazardous waste container		
III	Operation phase	3,500,000
Dust handling equipment		
Environmental Treatment Works Total		**3,258,500,000**

Source: JICA Study Team based on EIA Report (BVEC, 2011)

Table 7.2.1-13 Cost Estimate for Environmental Management (Details of Table 7.2.1-11)

Phase/Items		VND
I	Preparation phase	21,000,000
Environmental management, Others (5%)		
II	Construction phase	4,620,000,000
Environmental management, Package-based management, Computer, Digital camera, Others (5%)		
III	Operation phase	766,500,000
Environmental management, Computer, others (5%)		
Environmental Management Total		**5,407,500,000**

Source: JICA Study Team based on EIA Report (BVEC, 2011)

Table 7.2.1-14 Cost Estimate for Environmental Monitoring Program (Details of Table 7.2.1-11)

Phase	Monitoring Item	Cost (VND)[1]
I. Preparation phase	▪ Air quality ▪ Noise and vibration ▪ Surface water quality ▪ Sediment quality ▪ Groundwater quality ▪ Soil quality ▪ Others (5%)	**312,350,000**
II. Construction phase	▪ Air quality ▪ Noise and vibration ▪ Surface water quality ▪ Sediment quality ▪ Groundwater quality ▪ Soil quality ▪ Sliding, landslide, subsidence[2] ▪ Soil dumping[3] ▪ Others (5%)	**2,555,640,000**
III.Operation phase (For 24 months)	▪ Air quality ▪ Noise and vibration ▪ Surface water quality	**883,960,000**

Phase	Monitoring Item	Cost (VND)(1)
	▪ Sediment quality ▪ Groundwater quality ▪ Soil quality ▪ Others (5%)	
Environmental Monitoring Total		**3,751,950,000**

Note:
(1): Total costs are exclusive of VAT and contingent costs.
(2): Costs for monitoring sliding, landslide, subsidence are included in the Project's construction monitoring.
Source: JICA Study Team based on EIA Report (BVEC, 2011)

5) Report

According to the roles and responsibilities of the concerned organizations mentioned above, environmental management plan including environmental monitoring are to be implemented. Organizational/institutional structures of preparation of the report are shown below:

(i) Preparation and Construction Phases

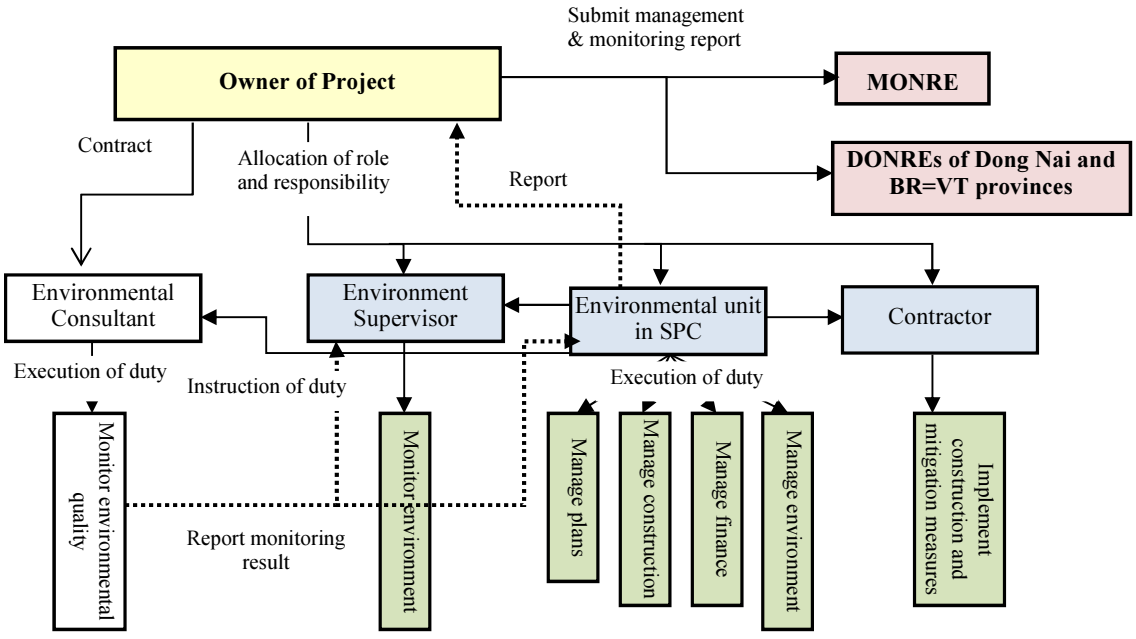


Figure 7.2.1-3 Structures of environmental management in the preparation and construction phase of the Project

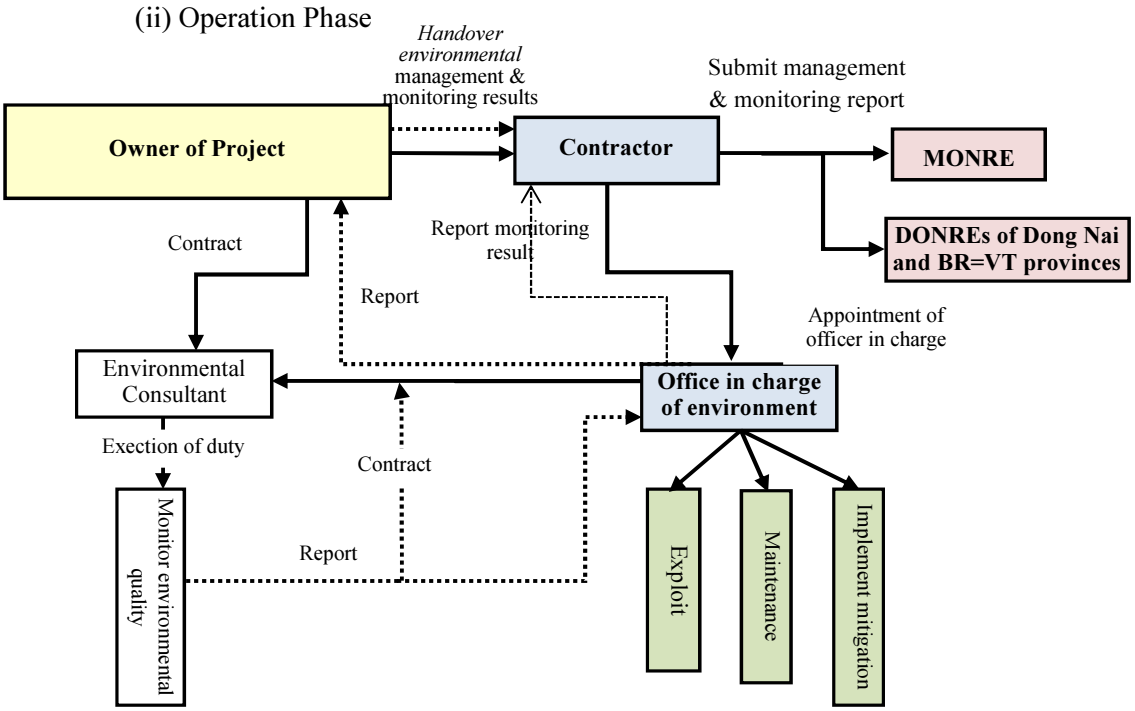


Figure 7.2.1-4 Environmental management structure in the operation stage of the Project

(8) Public Consultation

The EIA relevant regulations in Vietnam request a project implementing agency to receive comments on the draft EIA report from relevant local agencies by sending the draft EIA to them. According to such requirement, the draft EIA report for the Phase 1 section of Bien Hoa Vung Tau project was sent to relevant local authorities in 12 affected communes for asking their comments. Comments from the relevant local authorities are outlined in Table 7.2.1-15 and Table 7.2.1-16.

Table 7.2.1-15 Comments from Commune People's Committee

	Comments to Potential Impacts to be caused by Project Implementation	Comments to Mitigation Measures	Recommendation for Project Implementing Agency
1	Minimization of dust, noise and flood is necessary.	Necessary actions for flood is necessary to be added.	Conduct a study on flood is recommended.

	Comments to Potential Impacts to be caused by Project Implementation	**Comments to Mitigation Measures**	**Recommendation for Project Implementing Agency**
2	Dust in the sunny day and soil condition as well as flood at the rainy day are necessary to be considered.	There is no objection to mitigation measures proposed in the EIA report.	Minimize construction accidents and pick up speed of construction activities are recommended.
3	Impact to natural environment and regional economy will not be expected.	Implement construction in accordance with Vietnamese regulations and secure traffic modes for local people are necessary.	Followings are recommended: − Implement a project contributing for regional economy − Start operation as soon as possible
4	Generation of dust, noise and vibration is concerned.	Implement mitigation measures proposed EIA report is necessary.	Followings are recommended: − Become shortened the construction period − Implement construction activities according to the construction plan
5	Regional economy during the construction period is concerned.	Minimize impact to regional economy is necessary.	Followings are recommended: − Implement resettlement effectively − Provide necessary support to those who are requested resettlement
6	Immiseration due to land acquisition is concerned.		Implement a project contributing for regional economy is recommended.
7			Construct a viaduct at the populated area is recommended.
8	Stone fall during the construction period is concerned.	Implement mitigation measures proposed in the EIA report and appropriate supervision of construction activities are necessary.	Implement construction activities according to the construction plan is recommended.
9	Agree with the contents in	Environmental consideration	Followings are recommended:

	Comments to Potential Impacts to be caused by Project Implementation	Comments to Mitigation Measures	Recommendation for Project Implementing Agency
	the EIA report	during the construction period such as watering and attention to a pedestrian is necessary.	− Start operation as soon as possible − Avoid unnecessary land acquisition − Consult with local people in case conflict/problem with local people is occurred

Source: JICA Study Team based on the EIA Report (BVEC, 2011)

Table 7.2.1-16 Comments from Fatherland Front Committees at Communes

	Comments to Potential Impacts to be caused by Project Implementation	Comments to Mitigation Measures	Recommendation for Project Implementing Agency
1	Dust in the sunny day and soil condition as well as flood at the rainy day are necessary to be considered.	There is no objection to mitigation measures proposed in the EIA report.	Minimize construction accidents and pick up speed of construction activities are recommended.
2	Large amount of tree removal due to construction activities is concerned.	Try to narrow ROW and avoid unnecessary land acquisition is necessary.	Secure safety for construction workers, avoid any impacts to local people and provide compensation according to relevant regulations are recommended.
3	Impact to natural environment and regional economy will not be expected.	Implement construction in accordance with Vietnamese regulations and secure traffic modes for local people are necessary.	Followings are recommended: − Implement a project contributing for regional economy − Start operation as soon as possible
4	A risk of flood and impact to agriculture land are concerned.	Construction bridges will be necessary.	Project is recommended to start as soon as possible to mitigate traffic jam at NH51.
5	Generation of dust, noise and vibration is concerned.		Modify the alignment in order to avoid populated area is recommended.
6	Immiseration due to land acquisition is concerned.		Implement a project contributing for regional economy is recommended.
7	Stone fall during the construction period is concerned.	Implement mitigation measures proposed in the EIA report and appropriate supervision of	Implement construction activities according to the construction plan is

		construction activities are necessary.	recommended.

Source: JICA Study Team based on the EIA Report (BVEC, 2011)

Although hearings from the Peoples Committee and the Fatherland Front Committees at Communes were conducted as mentioned above, public consultations, including the consultation with local residence, were not yet implementaed in the stage of EIA.
In addition to receiving comments from relevant local authorities, interview to 212 affected household were conducted at the 12 affected communes in the project area in the process of EIA study. The interview result showed that all interviewees knew the project, and the majority of interviewees 83% of them agreed on the project. Although interviewees had positive opinion to land acquisition, some of them concerned about compensation amount. In addition, some of interviewees requested the project implementing agency to finalize ROW, so that, PAPs could stabilize their livelihood. These opinions are to be solved through the procedures of public consultation according to the Vietnamese lawas and regulations which related to land acquisition and compensation.

7.2.2. Review of Approved EIA Report Using JICA Checklist

The purpose of review of the approved EIA Report is to assess the conformability of the EIA Report to JICA Guidelines and legal regulations in Vietnam, and to conduct environmental impacts assessment caused by the design changes after the former F/S.

In order to accomplish above purpose, category 7 of environmental checklists of JICA for road sector has been used together with the relevant legal frameworks and environmental standards in Vietnam, principles of EIA good practice, and knowledge of the project and its typical impacts and their mitigation. Following shows the results of the review.

Table 7.2.2-1 JICA Environmental Check List (Category 7: Road Sector)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
1 Approval / Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been officially completed? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) Y (b) Y (c) Y (d) Y	(a) The EIA report was prepared in accordance with regulations in Vietnam regarding EIA process (Decree no. 29/2011/NĐ-CP of Vietnam Government dated 18th April 2011 on Regulations on Strategic Environmental Evaluation, Environmental Impact Assessment and Environmental Protection Commitments. Circular No. 26/2011/TT-BTNMT dated 18th July, 2011 of Ministry of Natural Resources and Environment for the Guidelines on Strategic Environmental Evaluation, Environmental Impact Assessment and Environmental Protection Commitments.) (b) Approved by MONRE by Decision No. 306/QD-BTNMT (Specifying approval for EIA Report of Bien Hoa – Vung Tau Expressway Construction project (Phase 1)) dated 15th March 2012) (c) Article 1 of Decision No. 306/QD-BTNMT (Approval document) provided that "The project's scope excludes exploitation of groundwater, construction materials, land fill materials for this project and land acquisition, resident relocation activities". These issues shall be dealt with by PPCs and Contractors after selection of Contractors by under the scheme of EPC. (d) No additional approvals except the approval of EIA Report mentioned above are required at present. In the construction phase, approvals for quarry, mining, installation of batcher plant, etc. are required. Contractors are requested to apply to Engineer/Owner for approvals of above mentioned facilities. Approvals are to be issued by local authorities including DONRE under the EPC scheme.
	(2) Explanation to the Public	(a) Are contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? (b) Are proper responses made to comments from	(a) Y (b) N	(a) Summary of the EIA report was sent to People's Committee and Fatherland Front Committees of 21 communes/wards in the project-affected area for their comments. In addition, interview with 212 households as representatives for Project impacted households were carried out. However, the interview focused on the socio-economic condition of the interviewees and their understanding of the project. 100% the interviewees knew the project information, of which 83.3% agreed with the

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
		the public and regulatory authorities?		project and 16.7% s had no idea. (b) Hearings from Public were conducted focusing mainly on socio-economic in the target area and understanding of the contents of the Project. In the public consultation, consultations with local authorities and stakeholders were insufficient. Discussions/meetings with affected peoples by the Project and authorities at all levels including communes/wards, districts and province should be organized. Contents of meetings were explanation and discussion concerning 1) Project plan, 2) Environmental impacts with the Project implementation, 3) Measures to avoid/minimize negative impacts caused by the Project implementation, and 4) Comments and opinions from the participants. Discussion record should be prepared and comments and opinion should be refrected to EIA report.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) N	(a) There are alternatives of alignments, intersections for the highway. Alternative of the project have been examined in feasibility study with social and environmental considerations in order to minimized impacts to sensitive areas, residential areas, and land acquisition. The EIA Report describes alternatives limited to issues above mentioned. Other alternatives such as selection of road alignment should be described.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
2 Mitigation Measures	(1)Air Quality	(a) Is there a possibility that air pollutants emitted from various sources, such as vehicle traffic will affect ambient air quality? Does ambient air quality comply with the country's ambient air quality standards? (b) Does ambient air quality comply with the country's air quality standards? Are any mitigating measures taken?	(a) Y (b) Y	(a) Increased vehicle traffic circulating on the highway will cause impacts to air quality such as dust and NO_2, SO_2, CO and THC from fuel combustion. The prediction using the traffic volume of F/S showed that until the year 2035 concentration of pollutants except some items will be within the standard of QCVN05:2009/BTNMT and QCVN 06:2009/BTNMT. (see below) (b) The prediction showed that in the year 2035 concentration of CO, NO_2, SO_2 and HC in both dry and rainy season from the distance of 5m from the expressway edge will be within the standard of QCVN05:2009/BTNMT and QCVN 06:2009/BTNMT. However, dust concentration rainy season will exceed the permissible level of QCVN05:2009/BTNMT. The most impacted area is section from Long Thanh – Dau Giay Expressway to Ben Luc–Long Thanh Expressway, dust concentration (TSP) only reach the permissible level at the distance of 47m. Main mitigation measures are as follows: Use of gasoline and diesel with low sulfur content (S = 0.05%) (QCVN 1:2007/BKHCN); ; green trees at operation and service stations; regular repair of road surface; and prohibition of vehicles which do not comply with the Vietnamese Air Emission Standard
	(2)Water Quality	(a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? (b) Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater? (c) Do effluents from various facilities, such as parking areas/service areas comply with the country's effluent standards and ambient water	(a) N (b) N (c) Y	(a) To prepare the ground for the construction of the project, cut down trees and transporting rock leveling operation is inevitable. However, the topography in the project area is rather flat, effects by soil runoff from the bare lands resulting from earthmoving activities is temporary and minor and only takes place in the construction phase. Further examinations of countermeasures such as drainage system to prone to soil erosion site, planting to road sides, recovery of vegetation after construction, etc. are necessary. (b) If surface runoff from roads flowing through the area that have heavy metal, oils and grease, etc. surface runoff will carry heavy metals and oils and greases into the soil, surface water, but the impact is minor.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
		quality standards? Is there a possibility that the effluents will cause areas not to comply with the country's ambient water quality standards?		The following measures shall be implemented: • Clean up road surface: Clean up road and bridge surface every 10 day to collect dust, dirt. Thus, pollution in the runoff water from the first rain is little. After the first rain, runoff of rainfall in the last 10 days will no longer or little remained; Design surface water collection system: Build water collection system on bridge surface not let runoff down the surface flow. Wastewater is collected into holes at two bridge ends to self-absorbed (c) There is possibility of impacts of wastewater from facilities such as parking areas/service areas. Mitigation measures: wastewater will be classified, processed wastewater at the sources. Domestic wastewater will be treated through septic tanks before being discharged into water sources. Group is oily wastewater, will be treated through separate oil tank and then flow into the common drainage system. The EIA report describes in details wastewater treatment facilities. Effluents shall comply with standards and treated wastewater shall meet standard of QCVN 14:2008/BTNMT.
	(3)Wastes	(a) Are wastes generated from the project facilities, such as parking areas/service areas, properly treated and disposed of in accordance with the country's regulations?	(a) Y	(a) Operation of works for the management and exploitation (service stations, operation stations, operation and maintenance station) during operation of the Project is the source arising of wastes: solid waste, hazardous solid waste (oil cloth) Mitigation measures mentioned in the EIA Report includes • Collect and store temporarily all oil, oily cloth in separate container with a lid at safe positions with cover, fire prevention equipments in vehicle repair station; • Quickly transport oily waste for treatment; Register hazardous waste source authorities; sign contracts with hazardous waste Carriers and processing units licensed on hazardous waste management in accordance with Circular No. 12/2011/TT-BTNMT dated 14 April 2011 of Ministry of Natural Resources and Environment stipulating hazardous waste management for transportation and treatment of the project's oily waste.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
	(4)Noise and Vibration	(a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards?	(a) N	(a) Noise level is predicted to exceed allowable limit of QCVN 26:2010/BTNMT at distance 50m. Vibration level in the worst case in the operation phase is predicted at 65.5 dB with vehicle speed of about 60km/h. When the vehicle speed increases every 10 km/h, increased vibration levels 3dB. Prediction of vibration decrease with distance. Compare vibration level at distance of 5m from the road edge with TCVN 7210:2002, vibration from vehicle operation in 2035 will be within the limit. The EIA report does not describe mitigation measures for exceeding noise level such as noise control barriers, requirements on noise for vehicles circulating on the expressway, not setting up new sensitive noise along the expressway, and developing a traffic noise monitoring network. Further examination for mitigation measures with noise and vibration, such as installation of sound insulation wall/room, limitation of use of construction vehicles, limitation of working time, etc. are needed based on additionally predicted noise and vibration using newly estimated traffic volume.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The project site is not located in protected areas designated by the country's laws or international treaties and conventions. The project area is mainly agricultural land and small area of residential land. In the Project area, the EIA Report confirmed there is no rare and high biological value or preserved species (Chapter 2 of EIA Report). Mangroves with high biological value is Thi Vai located 1.5km from the project route. Although the biosphere reserve area of Can Gio mangrove is located neareast to the Project route of about 3km, impacts on the bioshere area caused by the project is considered quit small considering the distance from project site and bioshere reserve area. (see Chapter 7.2.5(9)Prediction of Air Quality)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? (e) Is there a possibility that installation of roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (nonnative invasive) species and pests? Are adequate measures for preventing such impacts considered? (f) In cases the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?	(a)N (b)N (c)Y (d)Y (e)Y (f)N	(a) The project site is not located in protected areas designated by the country's laws or international treaties and conventions. The project area is mainly agricultural land and small area of residential land. In the Project area, there is no rare and high biological value or preserved species. Mangroves with high biological value is Thi Vai located 1.5km from the project route. The biosphere reserve area of Can Gio mangrove is located neareast to the Project route of about 3km. (see Chapter 7.2.5(9) Prediction of Air Quality) (b)(Same as above) (c) Major impacts on ecosystem caused by the implementation of the Project is that of on aquatic ecosystem in construction phase. The EIA Report proposed measures to minimize land run-off, water/wastewater flow out and discharge, change of topographic conditions, etc. (d) There are not likely impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock Mitigation measures in the EIA in case of these impacts: • Maintain and restore trees, vegetations in the construction area and safety corridor of the expressway. • Manage waste from cut trees and branches properly. • Propaganda and educate workers on protection of natural environment and wildlife and implement mitigation measures for impacts on biological resources (e) These impacts are not expected. The project site is not located in protected areas designated by the country's laws or international treaties and conventions. The project area is mainly agricultural land and small area of residential land. In the Project area, there is no rare and high biological value or preserved species. Mangroves with high biological value is Thi Vai located 1.5km from the project route. The biosphere reserve area of Can Gio mangrove is located neareast to the Project route of about 3km. (f) There will be no such impact because the surrounding area is agricultural or

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
				residential land.
	(3) Hydrology	(a) Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	(a)N	(a) There will be no such impacts because there is no structure which can affect surface or ground water quality. Bridges or curvets will be built at rivers or canals and have no impact on surface water.
	(4) Topography and Geology	(a) Is there any soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? (b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	(a) Y (b) Y (c) Y	(a) The EIA Report mentioned following measures: - The impact due to erosion and corrosion from the walls not reinforced: The lands along the mountains (the expressway passes close to the foot of Thi Vai mountain, Toc Tien mountain and Ong Trinh mountain) were directly affected. At walls not reinforced basalt of the land, rain water and groundwater export road will create a deep erosion ditch. Degraded land and the risk of flooding will occur. Potentially impact occurs year around because of rain and groundwater which is exposed due to digging, - Properly design ditch: for the section with basalt hills passed through by the route, design ditch on foot slope and water drainage lines at places where flow in the rainy season is higher than lines not directly flow into road surface and collect water on road. For the places mentioned above, following countermeasures were proposed: ● Proper drainage system, concrete, rock gabions or walls in downstream, careful

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
				stockpiling of topsoil in suitable locations, ● Drainage system, concrete, rock gabions or walls, careful stockpiling of topsoil in suitable locations, ● Replanting trees to ensure interception of rainwater and deceleration of surface runoff after construction works - Reinforce lower part of bridges: at bridges, design rip-rap from bottom up to at least 0.3m above the highest water level, and continue reinforcing plants to the top or rip-rap to the top. (b) The EIA Report proposed the countermeasures of application of construction methods to minimize soil run-off from embankment, excavation together with the installation of baffles to prevent soil run-off. As for soil/construction materials collection sites, disposal sites of excavation soil, following measures were proposed: ● Spoils from the works will only be disposed of in selected locations approved by local authorities, ● The locations of spoils disposal sites will be specified by the contractor in the site-specific EMP before the beginning of construction activities. (c) (same as above)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?	(a)Y (b)N (c)N (d)Y (e)N (f)N (g)Y (h)Y (i)N (j)N	(a) Alternatives to minimize land acquisition impact were examined. However, there was no description such examination in the EIA report. (b) There was no description about compensation and resettlement in the EIA report. Necessary examination should be done in the couse of RAP preparation. (c) same as above (d) Accoding to the Vietnamese regulations, compensastion is necessary to be provided before relocation. However, there was no description in the EIA report. Appropriate schedule of land acquisition should be examined in the course of RAP preparation. (e) Vietnamese regulations request to prepare it.Although it shall be a part of EIA report, there was no description in the EIA report.

Cate gory	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
		(d) Are the compensations going to be paid prior to the resettlement? (e) Are the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?		(f) RAP is not prepared. Necessary measures for vulnerable groups shoul be examined in RAP. (g) Vietnamease regulations stipulate a procedure of grievance redress. Thus, agreement with affected people is considered as obtained prior to resettlement though a function/effectiveness of grievance redress is not sure. Appropriate grievance redress should be examined in the process of RAP preparation by examining Vietnamese regulations. (h) The organization for impolementing land acquisition will be organized though budget arrangement is considered as difficult by referring to the other projects. The organizational framework should be confirmed during prearpation of RAP. (i) Monitoring for land acquisition is not yet prepared, and it shold be examined in the process of RAP prearpation (j) The EIA report did not include grievance redrss since it was out of scope for EIA. Since Decree No. 84/2007/ND-CP stipulates grievance redress, necessary procedure should be examined in RAP.
	(2) Living and Livelihood	(a) Where roads are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts? (b) Is there any possibility that the project will adversely affect the living conditions of the inhabitants other than the target population? Are	(a)Y (b)Y (c)Y (d)N (e)N (f)N	(a) The purpose of implementing the project is to improve regional infrastructure, and therefore it does not impact the existing transportation mode. Although the project requires land acquisition, compensation and support for livelihood stablizaation, potential impacts and mitigation measures were examined in th Chapters 2 and 3 in the EIA report. More specifically, necessary compensation and assistance should be provided by PPC based on Vietnamese regulations and RAP. (b) The Chapters 2 and 3 in the EIA report examined potential social impacts such as agriculture loss, loss of inome, relocation of graves, school and electric poles, which should be examined more detail in RAP. (c) There is a risk of infectious disease due to influx of construction workder from outside the project area. Although such risk was examined in RAP, it should be

Cate gory	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
		adequate measures considered to reduce the impacts, if necessary? (c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? (d) Is there any possibility that the project will adversely affect road traffic in the surrounding areas (e.g., increase of traffic congestion and traffic accidents)? (e) Is there any possibility that roads will impede the movement of inhabitants? (f) Is there any possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?		examined in detail in the course of RAP preparation. (d) The project is implemented to improve regional infrastructure. (e) There is a possibility that the project will impede the movement of inhabitants. However, such impact will be minimized by installing viaduct or culvert to cross the road. (f) Impact os sun shading and radio interfence will be negrigble since the bridge is not so high and buffer zone will be arranged at some area.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a)Y	(a) The survey prior to the selection of alignments, it was confirmed that there are no are archaeological, historical and religious heritage sites within the project site. In case of finding the local archeological, historical, cultural, and religious heritage during construction, the following measures shall be applied: – The construction activities shall be suspended to avoid damage, – Coordinate with the authorities: After suspension, inform local authorities, including district's PP and Department of Culture, Sports & Tourism to propose optimal construction plan.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a)Y	(a) Do not have negative impact to the local landscape except Lake Stream Nhum in Tan Thanh district, Ba Ria - Vung Tau. Lake Stream Nhum's area is about 16 hectares, this is one of the sources of water storage and supply of water for domestic activities of industrial zone and residential area of Phu My - My Xuan, Phuoc Hoa. Recent

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
				meeting between BVEC and PPC of Vung province agreed that the lake will be designed as "eco-lake" not for the purpose of supplying water (Eco-tourism resource). For selection of the alignment, impacts on the environment caused by alignments were examined as shown Table 7. 2.5-5.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(a)Y (b)Y	(a) The EIA Report confirmed several ethnic minority groups other than Kinh people which were majority in the areas (1 – 5% of total population of the project area). There living conditions are almost same as the Kinh group's one (EIA Report). If their life styles are disturbed by the implementation of the Project, IPP will be examined. This examination is to be conducted through the process of RAP preparation. (b) Rights of land and resources of ethnic minorities are to be secured as well as the people who are affected by the Project. This examination is to be conducted through the process of RAP preparation.
4 Social Environment	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures being taken to ensure	(a)Y (b)Y (c)Y (d)Y	(a) All laws in Vietnam, national and local will be complied with by the project - Strictly observe Vietnamese Standard TCVN 3255:1986 – Explosion safety and Vietnamese Standard TCVN 3254:1989 - Fire safety - Construction Law by the National Assembly of the Republic of Vietnam socialist XI, 4th dated 26 November 2003; - Road Traffic Law by the National Assembly of the Republic of Vietnam socialist dated 13 November 2008 - Law 84/2007/QH11Amending and Supplementing Article 73 of labor code in 1994 dated 04 February 2007 (b) The project contract will include all provisions for safety considerations for individuals involved in the project (to be dealt with EPC): - Installation of signaling system - Installation of Lighting on the expressway - Installation of Protection handrail - Installation of Steel mesh fence Management of hazardous materials will be collected into separate barrels placed in

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
		that security guards involved in the project not to violate safety of other individuals involved, or local residents?		the fuel store. The entire store will be placed on a impervious cement floor, with pent roof, surrounded by edges and fenced for protection; equipped with fire facilities All measures in the EIA report area not described sufficiently within a scope of an EIA, it is necessary that health and safety plan be prepared by construction contractor and approved before commencement of construction work. The plan shall describe compulsory safety measures, HIV/AIDS issues, and training program. (c) As mentioned above, formulation of a safety and health program, implementation of health training program, etc. are dealt with EPC scheme. Details are to be determined in the environmental management plan (EMP). (d)Same as above, this matter is to be specified in contract documents of security guards.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a)Y (b)Y (c)	(a) Dust and exhaust gases arising mainly from digging activities, construction equipments and transportation. The dust concentrations exceed regulation from 2.3 to 2.5 times. Mitigation measures includes: regular spray water; covering temporary soil yards and materials during transportation; using vehicles satisfying emission standards. Noise and vibration emitted from construction activities and the noise level reaches the permissible level at the distance from 53 m; From the edge of road of 5m, the vibration level is in the permissible level. Mitigation measures include regular maintenance of vehicles and equipment; using vehicles, construction equipment with low vibration levels; and complying regulation on noise level for night working and at sensitive areas Wastewater are discharged from concrete mixing plants , domestic activities and from maintenance and fuel supply stations: Arise from tents in the field. Mitigation measures include water reuse; wastewater facilities; mobile toilet on construction sites.

Cate gory	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
				Wastes including solid waste from construction, domestic activities and hazardous wastes. Mitigation measures include proper management of all types of wastes; disposal of non-hazardous waste at the district's landfill; and disposal of hazardous waste by registered competent companies. (b) The mitigation measures in EIA include - Mitigate impacts of encroachment and clearing, - Protect wildlife animals by educational program and rules to prohibit wildlife hunting. (c) The mitigation measures in EIA include - Prevent the risk of road traffic congestion and un-safety - Mitigate impacts of worker influx - Mitigate risks of obstructing trading activities and services - Prevent impacts on cultural and religious activities Further examination shall be conducted under the scheme of EPC concerning management of temporary residential houses and safety program for workers.
	(2)Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent	(a)Y (b)Y (c)Y (d)Y	(a) Project owner will implement environmental monitoring in construction and operation phase. Environmental monitoring program is used to ensure that any impacts of the project includes those predicted and the additional impacts identified during construction will be controlled, feasibility of mitigation measures to be strengthened and all community complaints will be addressed effectively. The environmental monitoring in the project area complies with provisions of laws and specifications as follows: - Law on Environmental Protection 2005, legal documents related to the Project's EIA; - Vietnamese Standards 1998, 2001, 2002; Vietnamese Standards 2008, 2009 and FAO – ISO 9000; - Circular 10/2007/TT-BTNMT dated 22 October 2007 of MONRE guiding quality

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
		to the regulatory authorities?		insurance and control in environmental monitoring (b) The EIA Report mentioned following monitoring program: **Pre-construction stage** - Air quality: 9 locations; monitor one time for 24 hours, every 2 hour - Noise, vibration: 9 locations; Monitor one time for 16 hours (6am ÷ 10pm). Every two hour for a period, measure 3 times in each period - Surface water environment: 10 locations; Monitor in one period, measure 2 times in each period - Sediment quality: 10 locations; Monitor one time - Groundwater quality: 7 locations; Monitor one time - Soil quality: 7 locations; Monitor one time **Construction stage** - Air quality: 9 locations; Monitor for 48 months, one time every 3 month. Each time within 24 hours, every two hour for a period - Noise, vibration: 9 locations; Monitor for 48 months, one time every 3 month. Each time within 16 hours (6am ÷ 10pm), every two hour for a period, measure 3 times in each period. - Surface water environment: 10 locations; Monitor for 48 months, one time every 3 month, every two hour for a period - Sediment quality: 10 locations; Monitor for 48 months, one time every 3 month - Groundwater quality: 7 locations; Monitor for 48 months, one time every 3 month - Soil quality: 7 locations; Monitor for 48 months, one time every 3 month - Sliding, landslide, subsidence: Along the route; Monitor within 48 months of construction. - Soil dumping: 15 locations; Monitor within 48 months of construction. **Operation stage** - Air quality: 6 locations; Monitor for 24 months, one time every 06 month. Each time within 24 hours, every two hour for a period

Cate gory	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
				- Noise, vibration: 6 locations; Monitor for 24 months, one time every 06 month. Each time within 16 hours (6am-10pm), every two hour for a period, measure 3 times in each period. - Surface water environment: 6 locations; Monitor for 24 months, one period every 06 month, measure 1 times in each period. - Sediment quality: 6 locations; Monitor for 24 months, one time every 06 month - Groundwater quality: 4 locations; Monitor for 24 months, one time every 06 month - Soil quality: 4 locations; Monitor for 24 months, one time every 06 month (c) Details are described in Chapter 7.4.7 “Environmental Management Plan”. (d) (Same as above)

Source: JICA Study Team

7.2.3. Study Appropach on Additional Study based on Review Results of Approved EIA Report

(1) Items Additionaly Studied

The review result in Table 7.2.2-1shows that items except alternative exmamination, resettlement, livelihood rehabilitation, ethinic minorities and indigenous people satisifies JICA Guidelines. Although public consultation was conducted in the process of EIA study, only limited persons were consulted. Thus, public consultation was additionally conducted in this study. As for resettlement, livelihood rehabilitation, ethinic minorities and indigenous people, they were studied in RAP study as described the study result in Section 7.2.5. Examination of potential impact to Thi Vai Mangrove forest, locating 1.5km from the project area, and Can Gio mangrove Boisphere Reserve Area, locaing 3km from the project area, was not enough in the approved EIA report, and therefore, additional examination of potential was conducted though potential impact is considered as minor. In addition, aquatic ecosystem was also examined in this study since it was not examined sufficiently in the approved EIA report.

As for the prediction of air quality after operation, prediction has been conducted again by using re-estimated traffic volume which was estimated in this study. Results of re-prediction showed that all the pollutants, including the concentration of dust, predicted were not exceed the Vietnamese air quality standards, and confirmed the appropriatness of air quality prevention measures mentioned in the EIA report. Re-prediction of noise and vibration based on the newly estimated traffic volume were not conducted in this study. Therefore, additional predictions based on the newly estimated traffic volume are required. In case results of additional predictions do not meet the Vietnamese standards, reexamination of mitigation measures such as installation of soundproof wall, setting up of standards in sensitive areas and traffic regulations, is needed.

(2) Approaches on Additional Study

Approaches on additional study items identified in (1) above are explained in Table 7.2.3-1.

Table 7.2.3-1 Additional Study Items and Study Approaches

	Additional Study Items	Study Approaches
1	Alernative Examination	Alternative examination was described in the F/S report though it was not descried in the approved EIA reort, thus, alternative examination in the previous studied was reviewed. In addition, with/without project was additionaly examined in this study since it was not examined in the approved EIA report.
2	Public Consultation	Community leaders near the project area, NGOs and DONRE staff were invited to public consultation meeting conducted in the process of RAP, and exaplanation not only land acquisition issues but also potential impact and proposed mitigation measures was done.

3	Land Acquisition, Livelihood Stablization	Impact due to land acquisition was examined in the process of field survey (i.e. census, inventory of loss and socio-economic survey) for preparation of RAP.
4	Ethnic Minorities, Indigenous People	Ditto
5	Examination of Impact at Protected Area	Examination of available information and interview to academic persons were conducted.
6	Examination of Impact to Aquatic Ecosystem	Examination of available information and interview to academic persons were conducted.

Source: JICA Study Team

7.2.4. Outline of Design Changes

Environmenta assessment in the existing EIA Report was implemented based on the results of F/S conducted in 2010. A few design changes have been proposed by the JICA Study after the F/S. In case that the design changes have a possibility to affect serious environmental impacts , additional considerations on the environmental impacts are required.

(1) Change of Interchange Type

At following two places, change of types of interchange are proposed.

i)Interchange of Hochiminh-Long Thanh-Dau Giay（Km 16+800）

ii）Interchange of Ben Luc – Long Thanh（Km 19+500）

(2) Additional Construction of Interchange

Between Km6+150 to Km9+450, JICA Study Team examined and compared 3 plans of new-construction interchange

(3) Re-study of Traffic Demand

Together with the design changes, prediction of traffic demand was also reviewed in this study.

Based on the designchanges and change of traffic demand, additional studiews have been conducted in this JICA Study. Results of the additional study are shown in the next section “7.2.5. Results of Additional Study”.

7.2.5. Results of Additional Study

(1) Public Consultation Meetings

By inviting commune leaders near the project area, NGOs and relevant local authorities such as DONRE to publc consultation meetings for RAP study, summary of the approved EIA and results of additional study were explained. Opinion obtained participants is enclosed in Attachment 2.

(2) Examination of With and Without cases of the Project

Following is the summary of the examination of the environmental and the social impacts caused by with and without cases of the Project.

Table 7.2.5-1 Examination of With and Without of Project

No.	Evaluation item	Without Project	With Project
1	Regional economy and development	A major link connecting regional economic development with the national highway network will be missing	The expressway will reduce the burden of traffic for NH 51 and reduce the duration of carriage of goods to the port, increasing cargo capacity and passenger from Ho Chi Minh City to the Cai Mep-Thi Vai port and vice versa. The highway is also prerequisite for the development of industrial zones, urban areas in the region, helps to improve transport infrastructure and is one key factor to form the Long Thanh international airport as well as other transport hubs.
2	Socio-environment	No change	There will be impacts in the project area such as involuntary resettlement, loss of agricultural land and residential land. Some temporary impacts during construction phase are expected on the people in surrounding area such as dust, noise, wastes, risk of infectious diseases.
3	Natural environment	No change	There will be local and temporary impacts including loss of vegetation cover, soil erosion on rivers/canals, change of hydrological conditions
4	Pollution	Generation of pollutants from vehicles will not be reduced (The highway with high speed will emit less pollution load than that of on normal roads with lower speed and lower quality of road surface.) Traffic jam on the NH51 will not be reduced.	There will be temporary pollution by construction activities, including water pollution due to excavation and cutting as well as wastewater discharge from worker's camp; waste in the construction stage, including excavated soil, domestic waste from workers' camps; dust, noise and vibration by heavy equipment and vehicles. In operation phase, there will be environmental impacts such as surface runoff from roads and from service stations. The highway with high speed will emit less pollution load than that of on normal roads with lower speed and lower quality of road surface.

Source: JICA Study Team

As shown above, it is considered that the implementation of the Project may bring about great benefits to the local economy. On the other hand, the implementation of the Project also causes some negative impacts mainly on natural and social environment comparing non-implementation of the Project. However thses predicted negative impacts on the environment can be avoided and reduced by the measures proposed in the existing EIA Report. Therefore, promotion of the Project together with the implementation of environmental protection measures is considered to be appropriate.

(3) Examination of Alternatives in Alignment in the Previous Studies

Feasibility Study (F/S) of this Project is conducted by Transport Engineering Design Incorporated (TEDI) on 2011. In addition to the F/S, VITRANSS2 conducted by JICA on 2010 and Reviewing the Infrastructure Study conducted by JICA on 2011 examined this Project. Thus, alternative examinations conducted by the previous projects are summarized below:

Table 7.2.5-2 Alternative Examinations at the Previous Studies

	VITRANSS 2	Reviewing Infrastructure	TEDI F/S
Examination Result	There is no alternative examination.	There is no alternative examination. However, this study concluded implementing BHVT project is necessary because increasing of traffic volume at NH51, development of industrial zones and Cai Mep Thi Vai ports.	This study examines optimum alignment by avoiding resettlement and examining land use plans. In addition, alternatives were examined around Km3+800, Km11+900-Km17+300 and Km33+000.

Source：Prepared by JICA Study Team based on VITRANSS2（JICA, 2010）, Reviewing Infrastructure (JICA, 2010), F/S Report (TEDI, 2011)

Summary of alternatives examined in the TEDI F/S is shown below:

(4) Km3+800

Following two alternatives were examined because Da Vien Thien Binh water treatment plant project which is under construction and sewage system and school construction which are under planning might be impacted due to implementing BHVT project according to the relevant master plans and land use maps.

Table 7.2.5-3 Alternative Examinations at Km3+800

	Study Items	Alternative 1	Alternative 2
1	Alignment	- Based on the existing master plan/land use map - Passing BHVT alignment in the water treatment plant which is under construction	- Avoid water treatment plant area, and connect to KM 6+632 of the Alternative 1 after crossing the road to Tam Phuoc industrial area
2	Feature of Alignment	Difficult to coordinate with Bien Hoa – Vung Tau Railway project	Easy to coordinate with Bien Hoa – Vung Tau Railway project
3	Accordance with land use plan	Accordance with the local land use plan	Different from the local land use plan, and passing through the planning area for school construction
4	Necessity of Land Acquisition	Necessary of land acquisition in the Tam Phuoc industrial area	Necessary of land acquisition at few households
5	Traffic Safety	BHVT alignment passes close to the industrial area. Thus, arrangement such as installing gate is necessary.	Necessary to install flyover to access to the industrial area since the proposed BHVT alignment is away from the industrial area
6	Total Length of Alignment	21.7m shorter than the Alternative 2	Longer than the Alternative 1
7	Natural environment	The area is flat. The land use is mainly bare land with wild grass. No canal or river exists in the area Environmental impacts will be dust, noise and impacts on soil. No impact on surface water and ecosystem is expected	The area is flat. The land use is mainly bare land with wild grass and small area of residential land. No canal or river exists in the area Due to longer length of alignment, amount of excavated soil will higher but inconsiderable. The environmental impact is similar to the alternative 1's
Evaluation		-	Optimum

Source: JICA Study Team based on BVEC F/S Report (2011)

(5) From Km11+900 to Km17+300

Following two alternatives were examined to avoid cemetery area and Bien Hoa – Vung Tau Railway project.

Figure 7.2.5-1 Alternatives at Km11+900-Km17+300

Table 7.2.5-4 Alternative Examinations at Km11+900-Km17+300

	Study Item	Alternative 1	Alternative 2
1	Feature of Alignment	Running in parallel to Bien Hoa – Vung Tau Railway project	- Prioritized Bien Hoa – Vung Tau Railway project - BHVT alignment will be curved due to avoid cemetery area 02 cemeteries at - Km14+600 and Km15+200
2	Natural environment	The area is flat, mainly rubber plantations and perennial land and residential area. The expressway pass through water bodies including Phen stream, Ong Que stream, Lang stream, Ong Buong river. Environmental impacts will be dust, noise; impacts on soil, surface water, and aquatic ecosystem.	Same as alternative 1
3	Others		Obtaining favorable comments from the District PC at Long Thanh district
Evaluation		Optimum	

Source: JICA Study Team based on BVEC F/S Report (2011)

(6) Suoi Nhum Lake

Following three alternatives were examined since the proposed BHVT alignment might pass through the Suoi Nhum Lake which is used reservoir by the local people.

The letter 405/UBND-VP of PPC of Ba Ria – Vung Tau province to MOT stated that the Suoi Nhum lake will not be used for domestic water use. According the Province's plan the lake will be used as landscape lake. Suoi Nhum reservoir only ensures domestic water supply to around 2011- 2013 due to disqualified water because the reservior is located in the development part of Phu My new urban area and directly affected by domestic wastewater of this urban area. - After 2011-2013, Suoi Nhum reservoir becomes a landscape lake; the water supplied to Toc Tien water plant shall be taken from Song Ray reservoir or Chau Pha reservoir.

Table 7.2.5-5 Alternative Examination at Suoi Nhum Lake

	Study Item	Alternative 1	Alternative 2	Alternative 3
1	Alignment	Passing through the Suoi Nhum Lake	Avoiding to pass the lower part of the Suoi Nhum Lake	Avoiding to pass the upper part of the Suoi Nhum Lake
2	Necessity of Land Acquisition		- Necessary of land acquisition at a part of cement factory at Km 41+000 Passing through the planned urban area at Phu My (Km37+500 - Km40+000)	- Necessary of land acquisition at a part of brick factory at Km33+000 - Passing through the planned industrial area at Phu My (Km36+800-Km37+100)、planned urban area (Km37+100 – Km37+500)、resort area (Km37+500 – Km40+500)
3	Alignment Length		5km longer than the Alternative 1	Same as the Alternative 1
4	Natural environment	A bridge over Suoi Nhum lake will be built Main environmental impacts will be impacts on soil; impacts on surface water, and aquatic ecosystem due to construction activities on the lake such as drilling of bored pile.	The expressway is located on land and the construction does not directly impact the Suoi Nhum river Main environmental impacts will be impacts on soil. Water quality of Suoi Nhum lake and its aquatic ecosystem is potentially affected by run-off of domestic wastewater and wastewater from the construction.	Same as alternative 2
Evaluation		Optimum	-	-

Source: JICA Study Team based on BVEC F/S Report (2011)

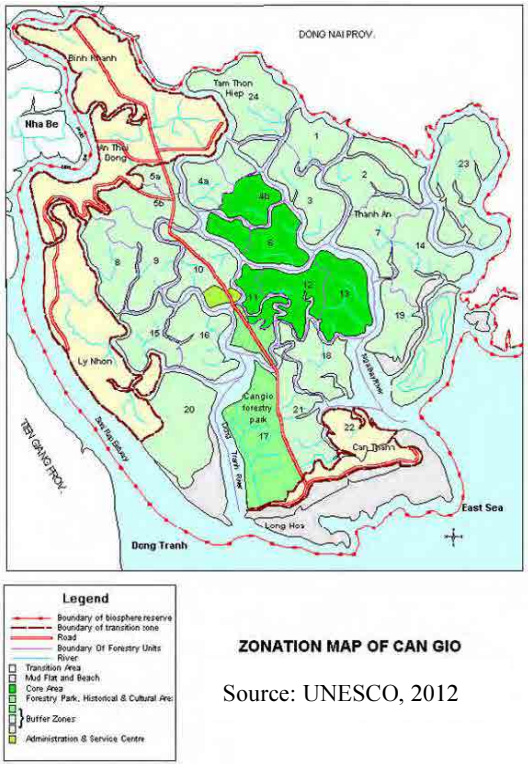
The Bien Hoa – Vung Tau expressway alignment is basically consistent with the local land use planning of Dong Nai province and Ba Ria – Vung Tau province. Besides, at some sections passing through Dong Nai province, there are adjustment to ensure favorable conditions for arranging the corridor of Bien Hoa – Vung Tau railway and road; avoid impacts on sensitive areas (pagodas and shrines); minimize land clearance; as well as suitable to the actual condition along the alignment.

Examination of alternatives above shows that there are no or minor differences in terms of environmental impacts between alternatives. All mitigation measures for environmental impacts of alternatives were already described in the approved EIA report

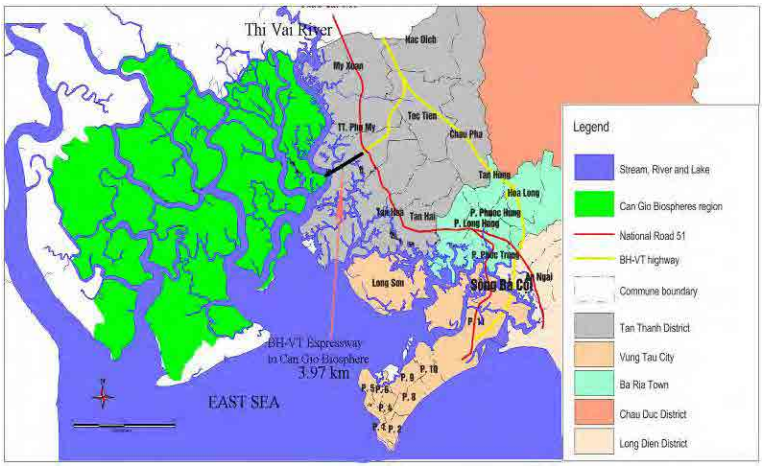
(7) Impacts on Can Gio Biosphere Reserve

Along the Phase2 section, there locates Can Gio Mangrove Biosphere area which is considered one of the most important mangrove forest regions in Vietnam. Although Can Gio Mangrove Biosphere Reserve is not included in the Project area, careful attention should be paid to avoid and/or to minimize potential serious impacts caused by the implementation of the BH-VT Expressway Project.

As shown the figure below, the closest distance from Can Gio Biosphere (sub-zone 23) to the expressway (the ending point) is around 4 km. This biosphere reserve is located in the coastal district of southeast of Ho Chi Minh City. It covers 75,740 hectares and is dominated by mangroves, including both salt water and brackish water species. The mangroves in Can Gio have a high biodiversity with more than 200 species of fauna and 52 species of flora. It has become one of the most extensive sites of rehabilitated mangroves in the world and it is regarded as the "green lungs" of the city. Considering these situations, the impact of the Project on the Biosphere Reserve were assessed.



Source: UNESCO, 2012



Source: JICA Study Team

Figure 7.2.5-2 Location of Can Gio Mangro Biosphere Reserve and BH-VT Expressway

As mentioned above, since the Can Gio Mangrove Biosphere Reserve locates more than at a distance of 4 km from the Project area, the activities of Project likely to exert no direct physical impacts on the environment of the Can Gio Mangrove Biosphere Reserve. Potential and possible impacts, which will generate caused by the implementation of the Project, on the Can Gio Mangrove Biosphere Reserve are assessed below:

- Noise and vibration

  ■The highest noise level of 80–90 dBA is caused by heavy equipment such as stake hammers, trucks, which exceeds standard (70 dBA from 6:00 to 21:00) from 10 to 25 dBA. However, at distance over 2,000m the noise level is lower than the standard. Similarly, vibration at a distance of 5m from sources satisfy the allowable limit for vibration level.

- Air quality

  ■Calculations in the EIA report show that at the road edge air quality parameters including NO_2, SO_2, HC, and CO are within the allowable limit of *QCVN 05 & 06:2009/BTNMT* except TSP. TSP concentration in rainy season exceed the allowable limit but lower than the limit at distance of more than 50m.

- Water quality

  ■The water quality of Thi Vai river exerts direct influence on the Can Gio Mangrove Biosphere Reserve. There is no canal network connecting from the area around ending point of the expressway to the Thi Vai river at present. Therefore wastewater and solid waste from construction activities and domestic activities will not impact on surface water quality of Thi Vai river and Can Gio Biosphere Reserve.

- Impacts on water bird

  ■The result from baseline data and filed surveys conducted on May 2012 showed that most of bird species in the Project area are grass birds, belonging to Sylviidae, Turdidae families and Passeriformes order. No rare species in the Vietnam Red Book was recorded in the project area. The most preferable area for water bird feeding is Suoi Nhum lake but in the survey just a few individual water birds like Japanese Pond Heron, Little Egret were found at present at the lake. The reasons for this phenomenon are as follows:

- Water birds of Can Gio Biosphere Reserve inhabit areas such as tidal areas, shrimp ponds, etc. along the coast. These areas provide abundant food resources for water birds and are found around the reserve. In addition, water birds can easily find resting place on mangrove trees nearby during daytime. Meanwhile, the lands in the project areas are mainly agricultural land, residential land and some area of rubber farms, which do not provide food sources for water birds.
- The habitats in the project area are suible for grass birds such as Sparrow, Tailor Birds, etc. which live in human-impacted areas and are commonly found in agricultural habitats of other places in Vietnam.
- Construction of the expressway will cause local, temporary and insignificant impacts on the avifauna of the project area. During construction of the project, the birds can easily move to ajacent areas where there are similar habitats.

Assessment of the potential and possible impacts above, which are caused by the implementation of the Project, shows that the impacts of the Project on Can Gio biosphere reserve is inconsiderable.

(8) Aquatic Ecosystem

Althogh there are no rare species listed in IUCN's red list or Vietnam's red book, variety of aquatic organisims inhabit in the project area. Although the approved EIA Report confirms aquatic organisms in the area together with studies of measures for water pollution mitigation, the study focusing on conservation of aquatic organisms was limited. Followings are the summary of additional survey on impacts and conservation of aquatic organisms:

Aquatic organisms which are potentially affected cinfirmed in the existing EIA Report

- Phytoplankton: Confirmed 78 species in Suoi Nhum (majority: green algae group),
- Zooplankton: 47 species were confirmed (Protozoa, Copepoda, etc.),
- Zoobenthics: 37 species were confirmed (Polychaeta, Mollusca Gastropoda, etc.),
- Fish: 52 species of wild fish and freshwater fish of native fish species were recorded (Major species: Carp)

The direct and indirect negative impacts of the expressway construction on an aquatic system can be grouped into following three general categories:

- Destruction of aquatic habitat (resulting in the elimination of aquatic habitat and their replacement with non-natural habitat): There is no permanent destruction of habitats due to the expressway construction since culverts (round and box culverts) and bridges shall be set up.

- Fragmentation of aquatic habitat (resulting in the loss of habitat integrity through the creation of barriers to species and ecological processes): During construction phase, small canal can be filled up with excavated soil or by service road. Filling up canals, ponds, stream areas for road construction which would change local hydrology.

- Degradation of habitat (resulting from disturbance of resident species, contamination with pollutants)

Measures to avoid or mitigate negative impacts on aquatic organism

- Do not fill up canals and ponds without consultation with local authorities, people and environmental agencies,

- Proper treatment of all types of domestic and industrial wastewater to comply with the Vietnam Standards/Technical Regulations for Effluents prior discharge into the surrounding environment,

- Dispose domestic, industrial and hazardous solid wastes into the surrounding canals, ponds, forests is prohibited. Proper domestic and hazardous solid waste management is recommended,

- Process soil with bentonite and spilled bentonite: Do not release to surrounding environment including soil, water environment and ecosystem soil with bentonite and spilled bentonite. Soil with bentonite arisen when drilling holes will be collected and buried into these pits. Spilled bentonite and a part of soil with bentonite will be moved to temporary yard near the area for construction of foundation, piers within the scope of site clearance for drainage. Transport this type of waste to landfills under the agreement with the local authorities.

- Provide temporary or permanent drainage to protect sites susceptible to erosion. Stabilize downstream slopes on rivers and streams prone to erosion problems. Protect sensitive surface/erosion prone sites with vegetation and replace removed trees to ensure interception of rainwater and deceleration of surface runoff as soon as possible after construction works.

- Mitigation for loss of vegetation cover: minimize the clearing of vegetation for construction activities and borrow areas. Re-vegetate embankment slopes and road cuts.

- Basically, measures mentioned above were studied in the existing EIA Report from a viewpoint of prevention of water quality. These measures are also to be implemented from a viewpoint of conservation of aquatic organisms.

(9) Re-Prediction of Air Quality along the Expressway

Although the existing EIA Report has forecasted the future air quality along the BH-VT Expressway taking into account the traffic volumes studied at the time of F/S, air qualities along the Expressway until 2030 has been re-predicted according to the following reasons:

1) The re-prediction shall be conducted based on updated traffic demand forecast studied by JICA Study Team (2012),
2) The approved EIA report did not consider integrated impacts from other air pollution sources. The re-prediction shall take into account; (i) pollution generated on the BH-VT Expressway, (ii) pollution generated from surrounding emission sources, and (iii) background pollution as well.
3) The approved EIA report did not calculate air quality at intersections where the vehicle volumes are remarkably higher than that of other sections of the expressway. The assessment shall calculate air quality at intersections with Hochiminh-Long Thanh-Dau Giay expressway and Ben Luc – Long Thanh expressway.

Considering above, the calculation of prediction of air quality of specific point can be calculated as follows:

(Air quality of specific point) = (Concentration taking into account integrated pollution sources: to be calculated) + (Background concentration)

1) Point/section and time of calculation

Concentrations of air quality parameters without background concentrations at 2018, 2020, 2025 and 2030 were calculated.

a) Point/section

i) Bien Hoa city ÷ Long Thanh - Dau Giay Expressway

ii) Long Thanh-Dau Giay Interchange

iii) Long Thanh-Dau Giay IC ÷ Ben Luc-Long Thanh IC

iv) Ben Luc - Long Thanh Interchange

v) Ben Luc - Long Thanh Interchange ÷ Phu My

vi) Phu My ÷ Cat Lai port

For each point, concentration of the points of 5m, 10m, 25m, 50m, 100m, 150m and 200m from the edge of the Expressway are calculated respectively.

b) Calculation year

Concentrations of air quality parameters without background concentrations at 2018, 2020, 2025 and 2030 were calculated.

2) Formula used for calculation

In order to calculate the concentration of air pollutants of the Expressway in operation stage, a Gauss emission prediction model which is applied commonly in highway project in Vietnam is used shown below:

$$C = \frac{0.8E.\left\{\exp\left[\frac{-(z+h)^2}{2\sigma_z^2}\right] + \exp\left[\frac{-(z-h)^2}{2\sigma_z^2}\right]\right\}}{\sigma_z.u}$$

Where :

C: concentration of pollutant (μg/m^3)

E: pollutant loading from emission source (μg/m.s)

z: height of emission point (m)

h: height of road surface from the surrounding ground *(m)*

u: average wind speed (m/s)

σ_z*: diffusion coefficient of pollutant in direction z (m).*

Thus, the total loading is the sum of loading emitted from vehicles and dust rolling from the expressway.

3) Traffic Volume

Traffic volumes newly forecasted by JICA Study Team in 2013 were used for the calculation. Table below shows the traffic volume forecasted by JICA Study Team.

Table 7.2.5-6 Forecast of traffic volume on the expressway

No.	Section/Location	Number of Vehicles per day (vehicle/day)							
		2018		2020		2025		2030	
		Car/Bus	Truck	Car/Bus	Truck	Car/Bus	Truck	Car/Bus	Truck
1	Bien Hoa city - Long Thanh - Dau Giay Expressway	22,444	1,823	20,900	1,010	23,539	3,531	38,303	12,656
2	Long Thanh-Dau Giay Interchange	55,966	8,008	71,667	6,952	79,168	18,265	112,694	40,991
3	Long Thanh-Dau Giay IC - Ben Luc-Long Thanh IC	25,241	1,707	22,866	1,826	35,801	4,423	48,341	10,079
4	Ben Luc-Long Thanh Interchange	45,261	3,174	31,336	2,139	67,954	9,755	86,295	13,509
5	Ben Luc - Long Thanh Interchange - Phu My	25,241	1,707	23,012	2,139	40,253	9,272	52,122	10,633
6	Phu My - Cat Lai port	16,820	241	12,798	0	26,823	1,178	35,500	4,288

Source: JICA Study Team

4) Result of Calculation

a) Background concentration

The concentration of pollutant in ambient air at specific point can be calculated by summing up the background concentration of the pollutant and the concentration of

pollutant from integrated pollution sources. Table 7.2.5-7 gives the average background concentrations of pollutants measured by TEDI in the course of EIA Study on 2011.

Table 7.2.5-7 Background Concentration

No.	Section	Concentration (μg/m^3)				
		TSP	SO_2	NO_2	CO	HC
1.	Bien Hoa city ÷ Long Thanh - Dau Giay	120	163	104	2,787	-
2.	Long Thanh-Dau Giay Interchange	113	180	114	3,764	-
3.	Long Thanh-Dau Giay IC ÷ Ben Luc-Long	123	156	98	2,873	-
4.	Ben Luc-Long Thanh Interchange	159	176	111	3,816	-
5.	Ben Luc - Long Thanh Interchange ÷ Phu	81	98	138	86	-
6.	Phu My ÷ Cat Lai port	161	206	109	71	-
	QCVN 05:2009/BTNMT	300	350	7.2.5-620	30,000	5,000

Source：JST re-calculate based on EIAReport

b) Concentration of Pollutant discharged

With the increase of traffic volume by year, the amount of exhaust gases from vehicles increase. This means that the calculation result of the year of 2030 will show the most polluted case. Table 7.2.5-8 summarizes the concentrations of pollutants to be discharged without the background concentration in 2030.

Table 7.2.5-8 Concentration of Pollutants Discharged from Ve hicle in 2030 (Without background concentration)

No.	Parameter	Season	Concentration by distance from the edge of the expressway (μg/m^3)							QCVN05, 06:2009/BTNMT
			5m	10m	25m	50m	100m	150m	200m	
1.	**Bien Hoa city ÷ Long Thanh - Dau Giay Expressway**									
	TSP	Dry	24.8	22.5	17.4	12.9	8.8	6.8	5.6	300
		Rainy	37.9	34.3	26.6	19.6	13.4	10.4	8.6	
	SO_2	Dry	0.1	0.1	0.1	0.0	0.0	0.0	0.0	350
		Rainy	0.1	0.1	0.1	0.1	0.0	0.0	0.0	
	NO_2	Dry	20.2	18.2	14.2	10.5	7.1	5.5	4.6	200
		Rainy	30.8	27.8	21.6	15.9	10.8	8.4	7.0	
	CO	Dry	110.4	99.8	77.5	57.2	38.9	30.2	25.0	30,000
		Rainy	168.3	152.2	118.1	87.3	59.4	46.1	38.2	
	HC	Dry	12.2	11.0	8.6	6.3	4.3	3.3	2.8	5,000
		Rainy	18.6	16.8	13.1	9.7	6.6	5.1	4.2	
2.	**Long Thanh-Dau Giay Interchange**									
	TSP	Dry	48.2	44.9	39.3	32.8	24.4	19.6	16.5	300
		Rainy	73.6	68.5	60.0	50.0	37.2	29.9	25.1	
	SO_2	Dry	0.1	0.1	0.1	0.1	0.1	0.1	0.1	350
		Rainy	0.2	0.2	0.2	0.2	0.1	0.1	0.1	
	NO_2	Dry	39.3	36.7	32.1	26.8	19.9	16.0	13.4	200
		Rainy	60.0	55.9	48.9	40.8	30.4	24.4	20.5	
	CO	Dry	216.8	201.9	176.8	147.4	109.7	88.0	74.1	30,000
		Rainy	330.6	308.0	269.6	224.9	167.4	134.2	113.0	
	HC	Dry	23.8	22.2	19.4	16.2	12.0	9.7	8.1	5,000
		Rainy	36.3	33.8	29.6	24.7	18.4	14.7	12.4	
3.	**Long Thanh-Dau Giay IC ÷ Ben Luc-Long Thanh IC**									

No.	Parameter	Season	Concentration by distance from the edge of the expressway (μg/m³)							QCVN05, 06:2009/BTNMT
			5m	10m	25m	50m	100m	150m	200m	
	TSP	Dry	28.0	25.4	19.7	14.5	9.9	7.7	6.4	300
		Rainy	42.8	38.7	30.0	22.2	15.1	11.7	9.7	
	SO_2	Dry	0.1	0.1	0.1	0.0	0.0	0.0	0.0	350
		Rainy	0.1	0.1	0.1	0.1	0.0	0.0	0.0	
	NO_2	Dry	22.3	20.2	15.7	11.6	7.9	6.1	5.1	200
		Rainy	34.0	30.8	23.9	17.6	12.0	9.3	7.7	
	CO	Dry	118.6	107.3	83.3	61.5	41.8	32.5	26.9	30,000
		Rainy	181.0	163.7	127.0	93.8	63.8	49.6	41.1	
	HC	Dry	13.6	12.3	9.5	7.0	4.8	3.7	3.1	5,000
		Rainy	20.7	18.7	14.5	10.7	7.3	5.7	4.7	
4.	**Ben Luc - Long Thanh Interchange**									
	TSP	Dry	34.6	33.8	29.3	23.1	16.3	12.8	10.7	300
		Rainy	52.7	51.6	44.7	35.2	24.8	19.5	16.3	
	SO_2	Dry	0.1	0.1	0.1	0.1	0.0	0.0	0.0	350
		Rainy	0.1	0.1	0.1	0.1	0.1	0.1	0.0	
	NO_2	Dry	27.2	26.6	23.1	18.2	12.8	10.1	8.4	200
		Rainy	41.5	40.6	35.2	27.7	19.6	15.4	12.8	
	CO	Dry	142.6	139.4	121.0	95.2	67.2	52.8	44.0	30,000
		Rainy	217.5	212.7	184.5	145.2	102.4	80.5	67.1	
	HC	Dry	16.6	16.2	14.1	11.1	7.8	6.1	5.1	5,000
		Rainy	25.3	24.7	21.5	16.9	11.9	9.4	7.8	
5.	**Ben Luc - Long Thanh Interchange ÷ Phu My**									
	TSP	Dry	30.1	27.2	21.1	15.6	10.6	8.2	6.8	300
		Rainy	45.9	41.5	32.2	23.8	16.2	12.6	10.4	
	SO_2	Dry	0.1	0.1	0.1	0.0	0.0	0.0	0.0	350
		Rainy	0.1	0.1	0.1	0.1	0.0	0.0	0.0	
	NO_2	Dry	23.9	21.6	16.8	12.4	8.4	6.6	5.4	200
		Rainy	36.5	33.0	25.6	18.9	12.9	10.0	8.3	
	CO	Dry	127.1	115.0	89.2	65.9	44.8	34.8	28.8	30,000
		Rainy	193.9	175.3	136.1	100.5	68.4	53.1	44.0	
	HC	Dry	14.6	13.2	10.2	7.5	5.1	4.0	3.3	5,000
		Rainy	22.2	20.1	15.6	11.5	7.8	6.1	5.0	
6.	**Phu My ÷ Cat Lai port**									
	TSP	Dry	18.9	17.1	13.2	9.8	6.6	5.2	4.3	300
		Rainy	28.8	26.0	20.2	14.9	10.1	7.9	6.5	
	SO_2	Dry	0.1	0.0	0.0	0.0	0.0	0.0	0.0	350
		Rainy	0.1	0.1	0.1	0.0	0.0	0.0	0.0	
	NO_2	Dry	14.7	13.3	10.3	7.6	5.2	4.0	3.3	200
		Rainy	22.4	20.3	15.8	11.6	7.9	6.1	5.1	
	CO	Dry	76.2	68.9	53.5	39.5	26.9	20.9	17.3	30,000
		Rainy	116.3	105.1	81.6	60.3	41.0	31.8	26.4	
	HC	Dry	9.0	8.1	6.3	4.7	3.2	2.5	2.0	5,000
		Rainy	13.7	12.4	9.6	7.1	4.8	3.8	3.1	

Source: JICA Study Team

5) Prediction of air quality along the Expressway

As mentioned above, the concentrations of pollutants in air along the expressway can be calculated as total of background concentration and concentration of pollutants discharged from vehicles. Table 7.2.5-9 summarizes the prediction of air quality along the expressway in 2030. The rightest column in the Table gives Vietnamese ambient air quality standards (QCVN No.05/2009/BTNMT) and maximum permissible concentration of hazardous

substances in ambient air (QCVN No. 06/2009/BTNMT). Attachment 4 shows the predicted concentration of pollutants in 2015, 2020 and 2025.

Table 7.2.5-9 Summary of Prediction of Air Quality along the Expressway in 2030

No.	Parameter	Season	Concentration by distance from the edge of the expressway (μg/m³)							QCVN05, 06:2009/BTNMT
			5m	10m	25m	50m	100m	150m	200m	
1.	**Bien Hoa city ÷ Long Thanh - Dau Giay Expressway**									
	TSP	Dry	145	142	137	133	129	127	125	300
		Rainy	158	154	146	139	133	130	128	
	SO_2	Dry	163	163	163	163	163	163	163	350
		Rainy	163	163	163	163	163	163	163	
	NO_2	Dry	124	122	118	115	111	110	109	200
		Rainy	135	132	126	120	115	113	111	
	CO	Dry	2,897	2,887	2,864	2,844	2,826	2,817	2,812	30,000
		Rainy	2,955	2,939	2,905	2,874	2,846	2,833	2,825	
	HC	Dry	12	11	9	6	4	3	3	5,000
		Rainy	19	17	13	10	7	5	4	
2.	**Long Thanh-Dau Giay Interchange**									
	TSP	Dry	161	158	152	146	137	133	129	300
		Rainy	187	182	173	163	150	143	138	
	SO_2	Dry	180	180	180	180	180	180	180	350
		Rainy	180	180	180	180	180	180	180	
	NO_2	Dry	153	151	146	141	134	130	127	200
		Rainy	174	170	163	155	144	138	135	
	CO	Dry	3,981	3,966	3,941	3,911	3,874	3,852	3,838	30,000
		Rainy	4,095	4,072	4,034	3,989	3,931	3,898	3,877	
	HC	Dry	24	22	19	16	12	10	8	5,000
		Rainy	36	34	30	25	18	15	12	
3.	**Long Thanh-Dau Giay IC ÷ Ben Luc-Long Thanh IC**									
	TSP	Dry	151	149	143	138	133	131	130	300
		Rainy	166	162	153	146	138	135	133	
	SO_2	Dry	156	156	156	156	156	156	156	350
		Rainy	156	156	156	156	156	156	156	
	NO_2	Dry	121	119	114	110	106	104	103	200
		Rainy	132	129	122	116	110	108	106	
	CO	Dry	2,991	2,980	2,956	2,934	2,915	2,905	2,900	30,000
		Rainy	3,054	3,036	3,000	2,967	2,936	2,922	2,914	
	HC	Dry	14	12	10	7	5	4	3	5,000
		Rainy	21	19	15	11	7	6	5	
4.	**Ben Luc - Long Thanh Interchange**									
	TSP	Dry	194	193	188	182	175	172	170	300
		Rainy	212	211	204	194	184	179	175	
	SO_2	Dry	176	176	176	176	176	176	176	350
		Rainy	176	176	176	176	176	176	176	
	NO_2	Dry	138	138	134	129	124	121	119	200
		Rainy	153	152	146	139	131	126	124	
	CO	Dry	3,959	3,955	3,937	3,911	3,883	3,869	3,860	30,000
		Rainy	4,034	4,029	4,000	3,961	3,918	3,896	3,883	
	HC	Dry	17	16	14	11	8	6	5	5,000
		Rainy	25	25	21	17	12	9	8	
5.	**Ben Luc - Long Thanh Interchange ÷ Phu My**									
	TSP	Dry	111	109	102	97	92	90	88	300
		Rainy	127	123	114	105	98	94	92	
	SO_2	Dry	98	98	98	98	98	98	98	350
		Rainy	98	98	98	98	98	98	98	
	NO_2	Dry	162	160	155	151	147	145	144	200
		Rainy	175	171	164	157	151	148	147	
	CO	Dry	213	201	175	152	130	120	115	30,000

No.	Parameter	Season	Concentration by distance from the edge of the expressway (μg/m³)							QCVN05, 06:2009/BTNMT
			5m	10m	25m	50m	100m	150m	200m	
		Rainy	280	261	222	186	154	139	130	
	HC	Dry	15	13	10	8	5	4	3	5,000
		Rainy	22	20	16	12	8	6	5	
	Phu My ÷ Cat Lai port									
6.	TSP	Dry	179	178	174	170	167	166	165	300
		Rainy	189	187	181	175	171	168	167	
	SO_2	Dry	206	206	206	206	206	206	206	350
		Rainy	206	206	206	206	206	206	206	
	NO_2	Dry	123	122	119	116	114	113	112	200
		Rainy	131	129	124	120	116	115	114	
	CO	Dry	147	140	124	111	98	92	88	30,000
		Rainy	187	176	153	131	112	103	97	
	HC	Dry	9	8	6	5	3	2	2	5,000
		Rainy	14	12	10	7	5	4	3	

Source: JICA Study Team

6) Evaluation

From the result above, predicted air quality along the expressway in 2030 have the following characteristics:

- Status of current background concentrations show that all of the pollutants concentration show lower value than Vietnamese air quality standards (QCVN) and air quality in the project area are kept in good condition.

- Air pollution contributed by the expressway is much lower than that of background concentration of pollutants and air quality standard (QCVN 05 and 06:2009/BTNMT). Therefore, the impact of pollutants discharged from vehicle on the air quality is not so much. Even the concentration of 5m point from the edge of road, where the largest impact is expected, is less than the Vietnamese standards in 2030 through all seasons.

- The approved EIA Report recommends following measures to be taken to prevent and reduce the air pollution and the noise in the phases of construction and operation.
  - Use of the construction vehicles which satisfy the discharge standards of pollutants (Decision No. 249/2005/QD-TTg），
  - Regulation of moving areas of the construction vehicles,
  - Covering of loads on the construction vehicles to prevent dust scattering,
  - Clearning of road surfacefor the construction vehicle,
  - Monitoring of dust level in neighboring residential areas,
  - Water spray on road surface to prevent scattering of dust from road surface,
  - Use of the construction vehicles which satisfy the noise standards,
  - Measures for prevention of noise from generators during power failure at toll gates and interchanges,
    - ✧ Installation of generator in soundproof room,

- ✧ Installation of soundproof wall during the period of installation of generator,
- ✧ Regular checking and/or inspection, and proper mentenance of generator.

Since the predicted ambient air quality along the expressway satisfy standards (QCVN 05 and 06:2009/BTNMT), mitigation measures for air pollution control in operation phase proposed in the Approved EIA report and section 5.6 are appropriate.

(10) Resuts of Additional Survey for Design Change

As mentioned in "7.2.4 Outline of Design Changes", changes of type of interchange at two interchange and newly construction of one interchange were planned in this study. Five plans in HCM-LT-DG IC, and 2 plans in BL-NT-LT IC were studied. Considering the impacts of traffic, environment and costs in total, one plan was recommended respectively. As for the construction of new interchange, one plan was recommended among three plans considering the impacts on the environment, traffic, costs, etc. Table below summarizes results of examinations of plans.

Design changes of IC in the section of HCM-LT-DG, and examination of environmental impacts

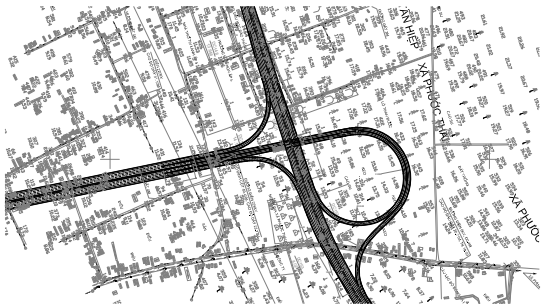
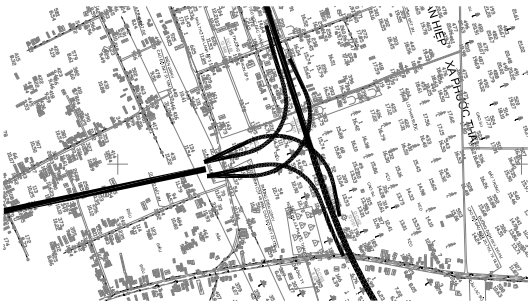
Table 7.2.5-10 Alternatives of Interchange HCM-LT-DG expressway at Km 16+800

Alternatives	Alternative 1A	Alternative 1B	Alternative 1C	Alternative 2A	Alternative 2B
Description of alternatives	The intersection is asterisk, located on Bien Hoa - Vung Tau expressway (passing through Long Thanh - Dau Giay expressway).	The intersection is double asterisk, located on Bien Hoa-Vung Tau expressway (passing through Long Thanh - Dau Giay expressway).	The intersection is asterisk, located on Bien Hoa - Vung Tau expressway (passing through Long Thanh - Dau Giay expressway).	The intersection is double asterisk, located on LT – DG expressway (passing through Long Thanh - Dau Giay expressway). The railway goes closely and parallel with BH-VT	The intersection is double asterisk, located on LT – DG expressway (passing through Long Thanh - Dau Giay expressway). The railway does not go closely and parallel with BH-VT
Bridge area	**03 bridges/26.400m2** (400*39.5+200*39.5+90*3*10)	**03 bridges/40.800m2** (900*39.5+250*19+50*10)	**7 bridges/43.528m2** 854*39.5+(210+75)*19+(78+69+96)*10+75*26	**06 bridge/91.000m2** (1400*39.5+620*19+380*2*10+200*39.5+250*2*10+90*2*19)	**04 bridge/77.950m2** (1400*39.5+250*4*10+250*19+200*39.5)
Land area	88.6ha	47ha	47ha	50ha	50ha
Impact on Long An resettlement site	5.3ha	2.6ha	No impact	No impact	1.2ha
Impact on planned Long An reservoir	1.79 ha	0.82 ha	1.71 ha	0.76 ha	1.55 ha
Conditions for traffic organization	Not sufficient KC for flow mixing the interchange HCM-LT-DG with NH 51 (~150m) resulting in unsafe transportation	Sufficient KC for flow mixing the interchange HCM-LT-DG with NH 51 (~800m)	Sufficient KC for flow mixing the interchange HCM-LT-DG with NH 51 (~800m)	Sufficient KC for flow mixing the interchange HCM-LT-DG with NH 51 (~800m)	Sufficient KC for flow mixing the interchange HCM-LT-DG with NH 51 (~800m)
Organization of fee collection	Not convenient for fee collection	Convenient for fee collection	Convenient for fee collection	Convenient for fee collection	Convenient for fee collection
Impact on TP. HCM – LT – DG expressway project	Not much impact	Not much impact	Not much impact	Much impact. Project adjustment is needed	Much impact. Project adjustment is needed
Estimated constructi	882 billion VND	990 billion VND	1,066 billion VND	2,058 billion VND	1,855 billion VND

Alternatives	Alternative 1A	Alternative 1B	Alternative 1C	Alternative 2A	Alternative 2B
on cost					
Environmental impacts	Environmental impacts will be dust, noise; impacts on soil, surface water, and aquatic ecosystem.	Same as alternative 1A	Same as alternative 1A	Same as alternative 1A	Same as alternative 1A but more impacts of noise, dust as the interchange is close to the existing residential area
Recommendation	-	-	Recommended	-	-

Source: JICA Study Team based on report of TEDI (2012)

Table 7.2.5-11 IC with BL – NT – LT Expressway Km19+581.11

Alternatives	Alternative 1	Alternative 2
Description of alternatives	The intersection is Trumpet-shaped; the overpass is on Bien Hoa – Vung Tau expressway, length of the overpass is estimated 100m. 	The intersection is Y-shaped; the length of two overpasses is estimated 210+400=610m 
Land area	Empty intersection, easy for land clearance withsmall	More land and construction volume are required.
Construction cost	Lower construction cost	Higher construction cost
Natural condition	The intersection is flat, planting acacia and rubber trees;	Same as alternative 1
Environmental	Environmental impacts will be dust, noise; impacts on	
Recommendation	Recommended	-

Source: JICA Study Team based on F/S report of TEDI (2012)

Table 7.2.5-12 Additional Interchange

Alternatives	**1 : IC A3 Km6+150**	**2 : IC A4-1 Km9+450**	**3 : IC A4-2 Km9+450**
Type of IC	Trumpet	Trumpet	Partial Cloverleaf
Ramp Crossing	Flyover (Overpass)	Box Culvert (Underpass)	Box Culvert (Underpass)
Ramp Alignment	R min.=60m	R min.=60m	R min.=100m
Ramp Length	2 lane: 900m 4 lane:1300m	2 lane: 800m 4 lane:1250m	2 lane: 860m 4 lane:1700m
Structure Length	Bridge:740m	Box Culvert:80m	Box Culvert:40m
Land Area	30ha	24ha	46ha
No.of Toll Gate	1	1	2
No.of Intersection (Connection Road)	1	1	2
Construction Cost	High	Low	Low
Land Cost	Low	Low	High
O/M Cost	Low	Low	High
Improvement of Connection Road	High	Low	Low
Total Cost		Lowest	
Natural condition	Agricultural land and rubber trees, residential area concentrated along the road Thai Lan – Trang Bom A small canal crosses the expressway at Km 6+350	Agricultural land rubber trees, residential area are distributed sparsely near community road of Long Duc commune	Same as alternative A4-1
Recommendation	-	Recommended	-

Source: JICA Study Team

7.2.6. Environmental Countermeasures for Additional Survey

Aboves are contents of the additional survey and their results. Followin summarizes the necessity of environmental countermeasures which are not discussed in the existing EIA Report.

Table 7.2.6-1 Environmental Countermeasures for Additional Survey

	Items of Additional Survey	Countermeasures	Reason
1	Design change of interchange	No	Impacts on the environment (type and degree) will not increase comparing the original design
2	Additional interchange	No	There are no remarkable differences between additionalone and planned one
3	Prediction of air quality basedonnewly estimated traffic volume	No	Results of the prediction shows that theenvironmenta impacts will not increased.
4	Avoidan/reduction of negative impacts on aquatic organisim	No	Detaiked study mentioned in 「7.2.5 Resultof Additional Survey (4) Aquatic Ecosystem」 is required.

Source: JICA Study Team

7.2.7. Additional Issues to Environmenta Management Plan

The approved EIA Report covers all the basic environmental management plan (EMP), the implementation of the EMP is implemented on the project owner's responsibility after selection of contractors in actual under the scheme of EPC[1]. EPC is the system of registration/certificate between contractors and DONRE. It is necessary to confirm the contents of EPCs which reflect comments and opinions presented by stakeholders in stakeholder meetings.

7.2.8. Review of the Project Using JICA Checklist

Table 7.2.8-1 shows the result of review of EIA Report based on the results of approved EIA Report and the results of additional study,

[1] 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.

Table 7.2.8-1 JICA Environmental Check List (Including Result of Additional Survey) (Category 7: Road Sector)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) ave EIA reports been officially completed? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) Y (b) Y (c) Y (d) Y	(a) The EIA report was prepared in accordance with regulations in Vietnam regarding EIA process (Decree no. 29/2011/NĐ-CP of Vietnam Government dated 18th April 2011 on Regulations on Strategic Environmental Evaluation, Environmental Impact Assessment and Environmental Protection Commitments. Circular No. 26/2011/TT-BTNMT dated 18th July, 2011 of Ministry of Natural Resources and Environment for the Guidelines on Strategic Environmental Evaluation, Environmental Impact Assessment and Environmental Protection Commitments.) (b) Approved by MONRE by Decision No. 306/QD-BTNMT (Specifying approval for EIA Report of Bien Hoa – Vung Tau Expressway Construction project (Phase 1)) dated 15th March 2012) (c) Article 1 of Decision No. 306/QD-BTNMT (Approval document) provided that "The project's scope excludes exploitation of groundwater, construction materials, land fill materials for this project and land acquisition, resident relocation activities". These issues shall be dealt with by PPCs and Contractors after selection of Contractors by under the scheme of EPC. (d) No additional approvals except the approval of EIA Report mentioned above are required at present. In the construction phase, approvals for quarry, mining, installation of batcher plant, etc. are required. Contractors are requested to apply to Engineer/Owner for approvals of above mentioned facilities. Approvals are to be issued by local authorities including DONRE under the EPC scheme.
	(2) Explanation to the Public	(a) Are contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? (b) Are proper responses made to comments from the public and regulatory authorities?	(a) Y (b) N	(a) Summary of the EIA report was sent to People's Committee and Fatherland Front Committees of 21 communes/wards in the project-affected area for their comments. In addition, interview with 212 households as representatives for Project impacted households were carried out. However, the interview focused on the socio-economic condition of the interviewees and their understanding of the project. 100% the interviewees knew the project information, of which 83.3% agreed with the project and 16.7% s had no idea.

Cate gory	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
				(b) Hearings from Public conducted in this study were conducted focusing mainly on socio-economic in the target area and understanding of the contents of the Project. Further consultation between the local authorities and the stakeholders are needed. Design of the Project was conducted in considering stakeholders' comments through following means: discussions/meetings with authorities at all levels including communes/wards, districts and province. The design took into account of comments from official letters of relevant agencies including PPC, Department of Transportation, Department of Construction of Dong Nai province; PPC, Department of Transportation, Department of Agriculture & Rural Development, Long Dien District People's Committee of Ba Ria-Vung Tau province; Nam Con Son gas pipeline company; TP. HCMC - Long Thanh - Dau Giay construction project. Consultation with local peoples was also made especially during alignment surveys to avoid impacts to sensitive areas. Besides above mentioned in the EIA Report, additional Public Meetings were implemented in 5 communes in Than Thanh Prefecture in Ba Ria Vung Tau Province and, 2 communes in Bien Hoa City and 9 communes in Long Thanh Prefecture in Dong Nai Province, 16 communes in total. Contents of meetings were explanation and discussion concerning 1) Project plan, 2) Environmental impacts with the Project implementation, 3) Measures to avoid/minimize negative impacts caused by the Project implementation, and 4) Comments and opinions from the participants. Number of comments and opinions presented from participants were 110, and they were classified into 33 items shown in Appendix.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) N	(a) There are alternatives of alignments, intersections for the highway. Alternative of the project have been examined in feasibility study with social and environmental considerations in order to minimized impacts to sensitive areas, residential areas, and land acquisition. The EIA Report describes alternatives limited to issues above mentioned. Results of F/S are summarized in 7.2.5.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
2 Mitigation Measures	(1)Air Quality	(a) Is there a possibility that air pollutants emitted from various sources, such as vehicle traffic will affect ambient air quality? Does ambient air quality comply with the country's ambient air quality standards? (b) Does ambient air quality comply with the country's air quality standards? Are any mitigating measures taken?	(a) Y (b) Y	(a) Increased vehicle traffic circulating on the highway will cause impacts to air quality such as dust and NO_2, SO_2, CO and THC from fuel combustion. The prediction using the traffic volume of F/S showed that until the year 2035 concentration of pollutants except some items will be within the standard of QCVN05:2009/BTNMT and QCVN 06:2009/BTNMT. (see below) Predictions of air quality were additionally conducted using newly estimated traffic volume after F/S. Results of new prediction shows concentrations of pollutants satisfy the Vietnamese air quality standards of QCVN No. 05/06/2009/BTNMT. (See (b) below) (b) Contents of additional prediction of air quality are as follows: Prediction year: 2018, 2020, 2025, 2030 Prediction place: 6 places along the expressway between Bien Hoa City to Cai Lai port Prediction point: 5m, 25m, 50m 100m, 150m and 200m from the edge of road at the places mentioned above Prediction pollutant: TSP, SO_2, NO_2, CO, HC Result of prediction: Predicted values show that the concentrations of all pollutants satisfy QCVN No. 05/06/2009/BTNMT at all predicted places and points. It was confirmed that mitigation measures mentioned in the EIA Report were appropriate. Main mitigation measures mentioned in the EIA Report are as follows: Use of gasoline and diesel with low sulfur content (S = 0.05%) (QCVN 1:2007/BKHCN); ; green trees at operation and service stations; regular repair of road surface; and prohibition of vehicles which do not comply with the Vietnamese Air Emission Standard
	(2)Water Quality	(a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? (b) Is there a possibility that surface runoff from roads	(a) N (b) N (c) Y	(a) To prepare the ground for the construction of the project, cut down trees and transporting rock leveling operation is inevitable. However, the topography in the project area is rather flat, effects by soil runoff from the bare lands resulting from earthmoving activities is temporary and minor and only takes place in the construction phase. Further examinations of countermeasures such as drainage system to prone to

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
		will contaminate water sources, such as groundwater? (c) Do effluents from various facilities, such as parking areas/service areas comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will cause areas not to comply with the country's ambient water quality standards?		soil erosion site, planting to road sides, recovery of vegetation after construction, etc. are necessary(See 7.2.5). (b) If surface runoff from roads flowing through the area that have heavy metal, oils and grease, etc. surface runoff will carry heavy metals and oils and greases into the soil, surface water, but the impact is minor. The following measures shall be implemented: • Clean up road surface: Clean up road and bridge surface every 10 day to collect dust, dirt. Thus, pollution in the runoff water from the first rain is little. After the first rain, runoff of rainfall in the last 10 days will no longer or little remained; Design surface water collection system: Build water collection system on bridge surface not let runoff down the surface flow. Wastewater is collected into holes at two bridge ends to self-absorbed. Although the EIA Report has already mentioned the countermeasures such as drainage system to prone to soil erosion site etc., details are to be dealt with in the scheme of EPC. In the JICA Study, change of type of two interchanges and construction of one interchange in one place. Environmental impacts caused by the change of type of interchanges are considered same as those of original designed ones, and impacts on environment by newly planned interchange is considered same as other planned interchanges in quality and degree. Therefore, it is considered mitigation measures to reduce/mitigate the environmental impacts for the design change shall be applied those of mentioned in the EIA Report. (c) There is possibility of impacts of wastewater from facilities such as parking areas/service areas. Mitigation measures: wastewater will be classified, processed wastewater at the sources. Domestic wastewater will be treated through septic tanks before being discharged into water sources. Group is oily wastewater, will be treated through separate oil tank and then flow into the common drainage system. The EIA report

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
				describes in details wastewater treatment facilities. Effluents shall comply with standards and treated wastewater shall meet standard of QCVN 14:2008/BTNMT.
	(3)Wastes	(a) Are wastes generated from the project facilities, such as parking areas/service areas, properly treated and disposed of in accordance with the country's regulations?	(a) Y	(a) Operation of works for the management and exploitation (service stations, operation stations, operation and maintenance station) during operation of the Project is the source arising of wastes: solid waste, hazardous solid waste (oil cloth) Mitigation measures mentioned in the EIA Report includes • Collect and store temporarily all oil, oily cloth in separate container with a lid at safe positions with cover, fire prevention equipments in vehicle repair station; • Quickly transport oily waste for treatment; Register hazardous waste source authorities; sign contracts with hazardous waste Carriers and processing units licensed on hazardous waste management in accordance with Circular No. 12/2011/TT-BTNMT dated 14 April 2011 of Ministry of Natural Resources and Environment stipulating hazardous waste management for transportation and treatment of the project's oily waste.
	(4)Noise and Vibration	(a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards?	(a) N	(a) Noise level is predicted to exceed allowable limit of QCVN 26:2010/BTNMT at distance 50m. Vibration level in the worst case in the operation phase is predicted at 65.5 dB with vehicle speed of about 60km/h. When the vehicle speed increases every 10 km/h, increased vibration levels 3dB. Prediction of vibration decrease with distance. Compare vibration level at distance of 5m from the road edge with TCVN 7210:2002, vibration from vehicle operation in 2035 will be within the limit. Although the EIA report described mitigation measures for exceeding noise level in construction stage such as noise control barriers, requirements on noise for vehicles circulating on the expressway, detailed examination on noise and vibration after operation were not conducted except developing of traffic noise monitoring network. In this study, predictions of noise and vibration based on newly estimated traffic

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
				volume were not implemented. Therefor in case noise and vibration were predicted to exceed Vietnamese standards, Additional examinations of mitigation measures such as noise control barriers, requirements on noise for vehicles circulating, setting up new sensitive noise standards along the expressway are to be conducted. limitation of use of construction vehicles, limitation of working time, etc. are needed based on additionally predicted noise and vibration using newly estimated traffic volume.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The project site is not located in protected areas designated by the country's laws or international treaties and conventions. The project area is mainly agricultural land and small area of residential land. In the Project area, the EIA Report confirmed there is no rare and high biological value or preserved species (Chapter 2 of EIA Report). Mangroves with high biological value is Thi Vai located 1.5km from the project route. Although the biosphere reserve area of Can Gio mangrove is located neareast to the Project route of about 3km, impacts on the bioshere area caused by the project is considered quit small considering the distance from project site and bioshere reserve area. (see Chapter 7.2.5(9) Prediction of Air Quality) Still more, although newly planned interchange require the additional land acquisition (Km 9+450, 24ha), the land subject to land acquisition belongs to the planned areas of the Project. As mentioned there are no protected areas along the planned expressway.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?	(a)N (b)N (c)Y (d)Y (e)Y (f)N	(a) The project site is not located in protected areas designated by the country's laws or international treaties and conventions. The project area is mainly agricultural land and small area of residential land. In the Project area, there is no rare and high biological value or preserved species. Mangroves with high biological value is Thi Vai located 1.5km from the project route. The biosphere reserve area of Can Gio mangrove is located neareast to the Project route of about 3km. (see Chapter 7.2.5(9) Prediction of Air Quality) (b)(Same as above) (c) Althogh there are no rare species listed in IUCN's red list or Vietnam's red book,

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
		(d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? (e) Is there a possibility that installation of roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (nonnative invasive) species and pests? Are adequate measures for preventing such impacts considered? (f) In cases the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?		variety of aquatic organisims inhabit in the project area. Impacts on aquatic organism and the measures to reduce and mitigate those impacts were examined in this study (See 7.2.5). (d) There are not likely impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock Mitigation measures in the EIA in case of these impacts: • Maintain and restore trees, vegetations in the construction area and safety corridor of the expressway. • Manage waste from cut trees and branches properly. • Propaganda and educate workers on protection of natural environment and wildlife and implement mitigation measures for impacts on biological resources (e) These impacts are not expected. The project site is not located in protected areas designated by the country's laws or international treaties and conventions. The project area is mainly agricultural land and small area of residential land. In the Project area, there is no rare and high biological value or preserved species. Mangroves with high biological value is Thi Vai located 1.5km from the project route. The biosphere reserve area of Can Gio mangrove is located neareast to the Project route of about 3km. (f) There will be no such impact because the surrounding area is agricultural or residential land.
3 Natural Environment	(3) Hydrology	(a) Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	(a)N	(a) There will be no such impacts because there is no structure which can affect surface or ground water quality. Bridges or curvets will be built at rivers or canals and have no impact on surface water. There will be no special environmental impacts in case of design changes of type of interchanges and additional construction of new interchange as mentioned in “2. Mitigation Measures” in this checklist.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
	(4) Topography and Geology	(a) Is there any soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? (b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	(a) Y (b) Y (c) Y	(a) The EIA Report mentioned following measures: - The impact due to erosion and corrosion from the walls not reinforced: The lands along the mountains (the expressway passes close to the foot of Thi Vai mountain, Toc Tien mountain and Ong Trinh mountain) were directly affected. At walls not reinforced basalt of the land, rain water and groundwater export road will create a deep erosion ditch. Degraded land and the risk of flooding will occur. Potentially impact occurs year around because of rain and groundwater which is exposed due to digging, - Properly design ditch: for the section with basalt hills passed through by the route, design ditch on foot slope and water drainage lines at places where flow in the rainy season is higher than lines not directly flow into road surface and collect water on road. For the places mentioned above, following countermeasures were proposed: ● Proper drainage system, concrete, rock gabions or walls in downstream, careful stockpiling of topsoil in suitable locations, ● Drainage system, concrete, rock gabions or walls, careful stockpiling of topsoil in suitable locations, ● Replanting trees to ensure interception of rainwater and deceleration of surface runoff after construction works - Reinforce lower part of bridges: at bridges, design rip-rap from bottom up to at least 0.3m above the highest water level, and continue reinforcing plants to the top or rip-rap to the top. (b) The EIA Report proposed the countermeasures of application of construction methods to minimize soil run-off from embankment, excavation together with the installation of baffles to prevent soil run-off. As for soil/construction materials collection sites, disposal sites of excavation soil, following measures were proposed: ● Spoils from the works will only be disposed of in selected locations approved by local authorities, ● The locations of spoils disposal sites will be specified by the contractor in the site-specific EMP before the beginning of construction activities.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
				(c) (same as above)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Are the compensations going to be paid prior to the resettlement? (e) Are the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?	(a)Y (b)N (c)N (d)Y (e)N (f)N (g)Y (h)Y (i)N (j)N	(a) Alternatives to minimize land acquisition impact were examined. However, there was no description such examination in the EIA report. These issues were confirmed through the additional RAP survey. (See “Results of Additional Study (1) Public Consultation Meetings”) (b) There was no description about compensation and resettlement in the EIA report. These issues were confirmed through the additional RAP survey. (See “Results of Additional Study (1) Public Consultation Meetings”) (c) same as above (d) Accoding to the Vietnamese regulations, compensastion is necessary to be provided before relocation. However, there was no description in the EIA report. (See “Results of Additional Study (1) Public Consultation Meetings”) (e) Although compensation policies shall be a part of EIA report, there was no description in the EIA report. Activities of compensation will start afterward according to the Vietnamese lawas and regulations. Basic policy is specified in these laws and regulations.I (f) RAP is not prepared. (g) Vietnamease regulations stipulate a procedure of grievance redress. Thus, agreement with affected people is considered as obtained prior to resettlement though a function/effectiveness of grievance redress is not sure. Appropriate grievance redress should be examined in the process of RAP preparation by examining Vietnamese regulations. (h) The organization for impolementing land acquisition will be organized though budget arrangement is considered as difficult by referring to the other projects. The organizational framework should be confirmed during prearpation of RAP. (i) Monitoring for land acquisition is not yet prepared, and it shold be examined in the process of RAP prearpation

Cate gory	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
		(i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?		(j) The EIA report did not include grievance redrss since it was out of scope for EIA. Since Decree No. 84/2007/ND-CP stipulates grievance redress, necessary procedure should be examined in RAP.
	(2) Living and Livelihood	(a) Where roads are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts? (b) Is there any possibility that the project will adversely affect the living conditions of the inhabitants other than the target population? Are adequate measures considered to reduce the impacts, if necessary? (c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? (d) Is there any possibility that the project will adversely affect road traffic in the surrounding areas (e.g., increase of traffic congestion and traffic accidents)? (e) Is there any possibility that roads will impede the movement of inhabitants? (f) Is there any possibility that structures associated with roads (such as bridges) will cause a sun shading and radio	(a)Y (b)Y (c)Y (d)N (e)N (f)N	(a) The purpose of implementing the project is to improve regional infrastructure, and therefore it does not impact the existing transportation mode. Although the project requires land acquisition, compensation and support for livelihood stablizaation, potential impacts and mitigation measures were examined in th Chapters 2 and 3 in the EIA report. More specifically, necessary compensation and assistance should be provided by PPC based on Vietnamese regulations and RAP. (b) The Chapters 2 and 3 in the EIA report examined potential social impacts such as agriculture loss, loss of inome, relocation of graves, school and electric poles, which should be examined more detail in RAP. (c) There is a risk of infectious disease due to influx of construction workder from outside the project area. Although such risk was examined in RAP, it should be examined in detail in the course of RAP preparation. (d) The project is implemented to improve regional infrastructure. (e) There is a possibility that the project will impede the movement of inhabitants. However, such impact will be minimized by installing viaduct or culvert to cross the road. (f) Impact os sun shading and radio interfence will be negrigble since the bridge is not so high and buffer zone will be arranged at some area.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
		interference?		
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a)Y	(a) The survey prior to the selection of alignments, it was confirmed that there are no are archaeological, historical and religious heritage sites within the project site. In case of finding the local archeological, historical, cultural, and religious heritage during construction, the following measures shall be applied: – The construction activities shall be suspended to avoid damage, – Coordinate with the authorities: After suspension, inform local authorities, including district's PP and Department of Culture, Sports & Tourism to propose optimal construction plan.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a)Y	(a) Do not have negative impact to the local landscape except Lake Stream Nhum in Tan Thanh district, Ba Ria - Vung Tau. Lake Stream Nhum's area is about 16 hectares, this is one of the sources of water storage and supply of water for domestic activities of industrial zone and residential area of Phu My - My Xuan, Phuoc Hoa. Recent meeting between BVEC and PPC of Vung province agreed that the lake will be designed as "eco-lake" not for the purpose of supplying water (Eco-tourism resource). For selection of the alignment, impacts on the environment caused by alignments were examined as shown Table 7. 2.5-5.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(a)Y (b)Y	(a) The EIA Report confirmed several ethnic minority groups other than Kinh people which were majority in the areas (1 – 5% of total population of the project area). There living conditions are almost same as the Kinh group's one (EIA Report). If their life styles are disturbed by the implementation of the Project, IPP will be examined. This examination is to be conducted through the process of RAP preparation. (b) Rights of land and resources of ethnic minorities are to be secured as well as the people who are affected by the Project. This examination is to be conducted through the process of RAP preparation.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
4 Social Environment	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures being taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a)Y (b)Y (c)Y (d)Y	(a) All laws in Vietnam, national and local will be complied with by the project - Strictly observe Vietnamese Standard TCVN 3255:1986 – Explosion safety and Vietnamese Standard TCVN 3254:1989 - Fire safety - Construction Law by the National Assembly of the Republic of Vietnam socialist XI, 4th dated 26 November 2003; - Road Traffic Law by the National Assembly of the Republic of Vietnam socialist dated 13 November 2008 - Law 84/2007/QH11Amending and Supplementing Article 73 of labor code in 1994 dated 04 February 2007 (b) The project contract will include all provisions for safety considerations for individuals involved in the project (to be dealt with EPC): - Installation of signaling system - Installation of Lighting on the expressway - Installation of Protection handrail - Installation of Steel mesh fence Management of hazardous materials will be collected into separate barrels placed in the fuel store. The entire store will be placed on a impervious cement floor, with pent roof, surrounded by edges and fenced for protection; equipped with fire facilities All measures in the EIA report area not described sufficiently within a scope of an EIA, it is necessary that health and safety plan be prepared by construction contractor and approved before commencement of construction work. The plan shall describe compulsory safety measures, HIV/AIDS issues, and training program. (c) As mentioned above, formulation of a safety and health program, implementation of health training program, etc. are dealt with EPC scheme. Details are to be determined in the environmental management plan (EMP). (d)Same as above, this matter is to be specified in contract documents of security guards.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a)Y (b)Y (c)	(a) Dust and exhaust gases arising mainly from digging activities, construction equipments and transportation. The dust concentrations exceed regulation from 2.3 to 2.5 times. Mitigation measures includes: regular spray water; covering temporary soil yards and materials during transportation; using vehicles satisfying emission standards. Noise and vibration emitted from construction activities and the noise level reaches the permissible level at the distance from 53 m; From the edge of road of 5m, the vibration level is in the permissible level. Mitigation measures include regular maintenance of vehicles and equipment; using vehicles, construction equipment with low vibration levels; and complying regulation on noise level for night working and at sensitive areas Wastewater are discharged from concrete mixing plants , domestic activities and from maintenance and fuel supply stations: Arise from tents in the field. Mitigation measures include water reuse; wastewater facilities; mobile toilet on construction sites. Wastes including solid waste from construction, domestic activities and hazardous wastes. Mitigation measures include proper management of all types of wastes; disposal of non-hazardous waste at the district's landfill; and disposal of hazardous waste by registered competent companies. (b) The mitigation measures in EIA include - Mitigate impacts of encroachment and clearing, - Protect wildlife animals by educational program and rules to prohibit wildlife hunting. (c) The mitigation measures in EIA include - Prevent the risk of road traffic congestion and un-safety

Cate gory	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
				- Mitigate impacts of worker influx - Mitigate risks of obstructing trading activities and services - Prevent impacts on cultural and religious activities Further examination shall be conducted under the scheme of EPC concerning management of temporary residential houses and safety program for workers.
	(2)Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a)Y (b)Y (c)Y (d)Y	(a) Project owner will implement environmental monitoring in construction and operation phase. Environmental monitoring program is used to ensure that any impacts of the project includes those predicted and the additional impacts identified during construction will be controlled, feasibility of mitigation measures to be strengthened and all community complaints will be addressed effectively. The environmental monitoring in the project area complies with provisions of laws and specifications as follows: - Law on Environmental Protection 2005, legal documents related to the Project's EIA; - Vietnamese Standards 1998, 2001, 2002; Vietnamese Standards 2008, 2009 and FAO – ISO 9000; - Circular 10/2007/TT-BTNMT dated 22 October 2007 of MONRE guiding quality insurance and control in environmental monitoring (b) The EIA Report mentioned following monitoring program: **Pre-construction stage** - Air quality: 9 locations; monitor one time for 24 hours, every 2 hour - Noise, vibration: 9 locations; Monitor one time for 16 hours (6am ÷ 10pm). Every two hour for a period, measure 3 times in each period - Surface water environment: 10 locations; Monitor in one period, measure 2 times in each period - Sediment quality: 10 locations; Monitor one time - Groundwater quality: 7 locations; Monitor one time - Soil quality: 7 locations; Monitor one time

Cate gory	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, basis, Mitigation measures, etc. of Yes/No)
				Construction stage - Air quality: 9 locations; Monitor for 48 months, one time every 3 month. Each time within 24 hours, every two hour for a period - Noise, vibration: 9 locations; Monitor for 48 months, one time every 3 month. Each time within 16 hours (6am ÷ 10pm), every two hour for a period, measure 3 times in each period. - Surface water environment: 10 locations; Monitor for 48 months, one time every 3 month, every two hour for a period - Sediment quality: 10 locations; Monitor for 48 months, one time every 3 month - Groundwater quality: 7 locations; Monitor for 48 months, one time every 3 month - Soil quality: 7 locations; Monitor for 48 months, one time every 3 month - Sliding, landslide, subsidence: Along the route; Monitor within 48 months of construction. - Soil dumping: 15 locations; Monitor within 48 months of construction. **Operation stage** - Air quality: 6 locations; Monitor for 24 months, one time every 06 month. Each time within 24 hours, every two hour for a period - Noise, vibration: 6 locations; Monitor for 24 months, one time every 06 month. Each time within 16 hours (6am-10pm), every two hour for a period, measure 3 times in each period. - Surface water environment: 6 locations; Monitor for 24 months, one period every 06 month, measure 1 times in each period. - Sediment quality: 6 locations; Monitor for 24 months, one time every 06 month - Groundwater quality: 4 locations; Monitor for 24 months, one time every 06 month - Soil quality: 4 locations; Monitor for 24 months, one time every 06 month (c) Details are described in Chapter 7.2 “Environmental Management Plan”. (d) (Same as above)

7.3. Support for Preparation of Resettlement Action Plan (RAP) at Phase 1 Section

Environmental and social considerations in the study of BHVTau Expressway Phase 1 Section are conducted according to JICA Guidelines. JICA Guidelines request a project implementing agency to prepareRAP if large scale involuntary resettlement[20] will be caused. BHVT Phase 1 may cause more than 200 people of resettlement, and therefore preparation of RAP is indispensable under JICA Guidelines.

This chapter is prepared based on the RAP for BHVT Phase 1, which is enclosed in the Attachment 5. RAP enclosed as Attachment 5 is necessary to be approved by MOT as the supervision ministry, the donor agency and relevant local authorities such as PPC. In the process of supporting preparation of RAP, households survey such as census, Inventory of Loss (hereinafter IOL) and socio-economic survey (hereinafter SES) was conducted in this study in order to examine land acquisition impact. Survey contents and area are shown in Section 7.3.6 for the alignment section and Section 7.3.7 for interchange section respectively.

7.3.1. Relevant Regulations

Vietnam has systematic legislation on land acquisition and compensation as the center on the Land Law 2003. Table 7.3.1-1 shows the major regulations of land acquisition and compensation at national level.

[20] World Bank safeguard policy, OP4.12 for Involuntary Resettlement, requests a project containing 200 people of displacement to prepare RAP. Based on this concept, a project requesting more than 200 people of displacement is regarded as large scale resettlement.

Table 7.3.1-1 Major National Regulations on Land Acquisition and Compensation

Law	Description
Land Law (effective 1 July 2004)	Stipulate land use and land use right
Decree No. 197/2004/ND-CP (03 December 2004)	Stipulate compensation, assistance and resettlement when land is recovered by the State
Decree No. 84/2007/ND-CP (25 May 2007)	Supplementary stipulate the issue of land use rights certificates (LURC), land acquisition, land use right implementation, procedure of compensation, and assistance on land recovery by the state
Decree No. 69/2009/ND-CP (13 August 2009)	Amendment to Decree No. 197/2004/ND-CP

Source: JICA Study Team

Each province issues its own regulation based on the national regulations on land acquisition and compensation. Provincial regulations in the study area are outlined in the Table 7.3.1-2.

Table 7.3.1-2 Major Provincial Regulations on Land Acquisition and Compensation

Law	Description
Decision No. 25/2012/QD-UBND (3 April 2012)	Issued by People's Committee of Dong Nai on compensation, assistance and resettlement
Decision No. 13/2010/QD-UBND (1 April 2010)	Issued by Peopl's Committee of Ba Ria Vung Tau on compensation, assistance and resettlement
Decision No. 52/2010/QD-UBND (02 / 11/2010)	Amending some articles of Decision No. 13/2010/QD-UBND

Source: JICA Study Team

7.3.2. Consistency between Vietnamese Regulations and JICA Guidelines

Table 7.3.2-1 shown the difference of land acquisition and compensation policy in Vietnamese regulations and JICA Guidelines. Alghouth Vietnamese regulation have recently tendencies to close to the concept of donor policies on land acquisition and compensation, there are still some gaps.

Table 7.3.2-1 Difference between Vietnamese Regulations and JICA Guidelines

Items	Vietnamese Regulations	JICA Guidelines	Gaps	Measure to Differences
1. Entitlement	The land users satisfy the following conditions (Article 10 & 19 of Decree No.197/2004/ND-CP, Article 44, 45 & 46 of Decree No. 84/2007/ND-CP, Article 14 of Decree No.69/2009/ND-DP) - Those who have a certificate of land use or equivalent documents - Those who are not illegal squatters, not have a certificate of land use or equivalent documents, but having documents on occupied land issued by commune level People's Committee - Owners of structures constructed accordingly to regulations As for the eligibility of non-title holders, Provincial People's Committee shall consider to provide support for non-title holders[21].(Decree 69/2009, Art.14) b) Other structures attached to land, which are built after July 1, 2004 but, at the time of building, run against	People who will be requested resettlement or whose livelihood means will be affected by a project. (JICA Guidelines p20)	There is no significant difference except illegal occupants.	Compensation to illegal structures shall be provided in replacement cost.

[21] Art 18 of Decree No.197/2004 also says that "Houses, other works attached to land, which are built after the land use plannings and plans are publicized and without permission of competent State bodies, shall not be compensated."

Items	Vietnamese Regulations	JICA Guidelines	Gaps	Measure to Differences
	the land use purpose determined in the approved land use planning and plan, shall not be compensated. (Art. 18 of Decree No. 197/2004)			
2. Support for socially vulnerable people	There is no clear description about specific support for socially vulnerable people, but necessary support is provided by considering local situation in addition to livelihood rehabilitation. (Decree 69/2009, Art. 23)	Appropriate consideration must be given to vulnerable social groups, such as women, children, the elderly, the poor, and ethnic minorities. (JICA Guidelines p19)	There is no significant difference.	-
3. Assistance for restoration and improvement of living standard	a) Support for life and production stabilization, job-change training and job creation are provided in case of agriculture land acquisition (Decree 69/2009, Art.17). b) Provincial people's committee shall decide other supports to persons whose land will be acquired based on the local custom (Decree 69/2009, Art. 23).	Host countries must make efforts to enable people affected by projects and to improve their standard of living, income opportunities, and production levels or at least restore these to pre-project level. (JICA Guidelines p20)	There is no significant difference.	-
4. Compensation based on full replacement cost	a) When land price for compensation stipulated in a provincial decision is not close to the market price, a provincial people's committee shall re-examine appropriate land price (Decree No.	Prior compensation, at full replacement cost, must be provided as much as possible. (JICA Guidelines p20)	There is no significant difference in case land price is re-examined by reflecting market price.	Compensation shall be provided in full replacement cost, and market price survey is necessary to be conducted in order to evaluate the market price of land and structure in the project area.

Items	Vietnamese Regulations	JICA Guidelines	Gaps	Measure to Differences
	69/2009 Art. 11). b) Compensation for land is basically provided by substitute land with same land use. In case substitute land is not available, compensation equal to the value of land use rights calculated based on land prices at the time of land recovery decision will be paid (Decree No. 69/2009, Art.14).			
5. Public participation into planning and implementation of resettlement plan	There is no clear description about public participation into planning and implementation of resettlement plan. However, it is stipulated to ask public opinion to the prepared resettlement plan at each stage (Decree 69/2009, Section 4).	Appropriate participation by the people affected and their communities must be promoted in planning, implementation and monitoring of involuntary resettlement plans and measures against the loss of their means of livelihood. (JICA Guidelines p20)	Although approach of public participation is different, public participation is ensured.	Holding public consultation in the process of RAP preparation is necessary.
6. Grievance redress mechanism	The following procedure is applied (Decree No. 84/2007/ND-CP, Art.63) a) In case land acquisition decision is issued by a district people's committee, grievance can be raised to a district people's committee within 90 days after decision issued. If lodged grievance is not solved within 30 days, it can be appealed to a provincial people's	Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. (JICA Guidelines p30)	There is no significant gap.	For more convenient access to PAPs, first contact to lodge grievance shall be a commune people's committee.

Items	Vietnamese Regulations	JICA Guidelines	Gaps	Measure to Differences
	committee or the court. b) In case land acquisition decision is issued by a provincial people's committee, grievance shall be lodged to a provincial people's committee within 30 days of decision issued, and the lodged grievance shall be settled within the due duration.			
7. Stakeholder Meeting	a) Prepared compensation plan is disclosed to public at a certain period at commune level people's committee. b) Prepared compensation plan is also sent to PAPs by an official letter (Decree No. 69/2009/ND-CP Art. 31)	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. (JICA Guidelines, p20)	Timing and approach of stakeholder meeting is different.	Public consultation meeting by targeting all PAPs in order to have opinion from PAPs on land acquisition and compensation is necessary to be held in the process of RAP preparation.
8. Monitoring	Monitoring is not clearly requested.	Appropriate follow-up plans and systems, such as monitoring plans and environmental management plans, must be prepared; and costs of implementing such plans and systems, and financial methods to fund such costs, must be determined. (JICA Guidelines, p18)	Establishment of clear monitoring system is different.	Establishing practical monitoring system is necessary.
9. Contents of RAP[22]	- Name and address of affected people - Area and category of acquired land	- Project description - Potential impacts - Objectives - Socioeconomic	Significant differences are to describe; a) compensation	Preparation of RAP to satisfy donor requirement is necessary.

[22] Decree No. 69/2009 for the Vietnamese regulation and World Bank Safeguard Policy OP4.12 Annex A for JICA Guidelines are referred.

Items	Vietnamese Regulations	JICA Guidelines	Gaps	Measure to Differences
	- Justification of compensation calculation - Compensation amount - Resettlement - Necessary arrangement for resettlement - Resettlement implementation	studies - Legal framework - Institutional framework - Eligibility - Valuation of and compensation for losses - Resettlement measures - Site selection, site preparation, and relocation - Housing, infrastructure, and social services - Environmental protection and management - Community participation - Integration with host populations - Grievance procedures - Organizational responsibilities - Implementation schedule - Cost and budget - Monitoring and evaluation	policy b) grievance procedures c) monitoring system d) socioeconomic study	

Source: JICA Study Team

7.3.3. Principle of Compensation

The Vietnamese regulation (Decree No. 13/2006/ND-CP on Issurance of Regulation on Management and Utilization ofODA) stipulates to follow regulation on the ODA the GoV singed in case there is a difference between the Vietnamese regulations and the interational code on ODA signed by the GoV. There is a difference between the Vientamese regulations on land acquisition/compenation and JICA Guidelines as swhon in Table 7.3.2-1. Thus, the project implementing agency will apply for the following general principles and will implement compensation in accodance with Table 7.3.4-1 by consulting with relevant ministries and local authorities in order to supplement items which are not mandatory in Vietnamese legislation on land acquisition.

(a) Land and property acquisition shall be avoided or minimized as much as possible by examining all possible alternatives from engineering as well as environmental and social viewpoints.
(b) PAPs shall be meaningfully consulted in appropriate timing in order to reflect their opinions and preferences on resettlement plans and options, whereby their participation for planning and implementing of resettlement plan shall be promoted.
(c) Compensation shall be provided in timely manner based on the agreement with PAPs, and will be completed before the date of evacuation.
(d) Compensation on loss of assets shall be provided with replacement cost in order to compensate for their livelihoods, standards of living, or income opportunities, or at least to restore them to their pre-project levels.
(e) All PAPs living, working, doing business in the project area at the time of census begin will have entitlement of compensation and/or assistance.
(f) All affected people will be eligible for compensation and rehabilitation assistance, irrespective of tenure status.
(g) Necessary institutional arrangement shall be ensured for preparation and implementation of resettlement in timely manner.
(h) Adequate financial arrangement shall be ensured and enforced within the time frame to cover the cost of land acquisition, resettlement, and rehabilitation.
(i) Appropriate mechanisms for monitoring, reporting, and evaluation shall be developed and ensured within the resettlement management system.
(j) Appropriate mechanism for grievance shall be established.

7.3.4. Eligibility and Entitlement for Compensation and Assistance

People who are living or whose assets are locating in the project area[23] at the time of cut-off date[24] are eligible for compensation and/or assistance to their loss to be caused by the project implementation though those who arrive after the cut-off date are not entitled. Based on the definition of cut-off date by the World Bank, cut-off date for this project is the day of provincial decisions on land acquisition is officially publicized. Identified PAPs are basically classified into the following categories according to the World Bank Safeguard Policy, OP4.12 for Involuntary Resettlement, and compensation and/or assistance will be entitled based on the legal

[23] Project area is the target area of land acquisition.
[24] According to the definition in the Involuntary Resettlement Sourcebook (World Bank, 2004), "cut-off date is the date of census begins. The cut-off date could also be the date the project area was delineated, prior to the census, provided that there has been an affected public dissemination of information on the area delineated, and systematic and continuous dissemination subsequent to the delineation to prevent further population influx". In the case of projects in Vietnam, cut-off date is also defined as the date when a local authority such as PPC or DPC officially announces land acquisition by a decision.

status. The land acquisition decision is not yet issued by the concerned PPCs at the time of this study period, and therfore situation of decision issurance and setting cut-off date are necessary to be confired at the next study stage (i.e. D/D stage). The following criteria to define or categorize eligibility are also applied for this project.

(i) Those who have formal legal rights to land (including customary and traditional rights recognized under the laws of the country)
(ii) those who do not have formal legal rights to land at the time census begins, but have a claim to such land or assets, provided that such claims are recognized under the law of the country
(iii) those who have no recognizable legal right or claim to the land they are occupying

The project implementing agency will provide compensation and assistance based on the eligibility and entitlement stipulated in Table 7.3.4-1 by consulting with relevant ministries and local authorities.

Table 7.3.4-1 Entitlement Matrix

Loss Type	Application	Entitled Person	Compensation Policy	Implementation Issues
1. Loss of Productive Land				
Permanent Marginal Loss	- Land on the project Right of Way - Land is still economically viable for use or meets the expected personal yield	- Owners with Land Use Right Certificate (LURC), People without LURC: - Those who are in the process of acquiring LURC, - Those who are eligible to acquire LURC.	Cash compensation for acquired land at full replacement cost	- Classification and measurement will be determined by the District Compensation Committee (DCC) and concurred with by the affected household during the detailed measurement survey or DMS. - Affected households to be notified at least 4 months prior to the date that the land will actually be acquired by the Project
Permanent Severe Loss	- Land on the project Right of Way - Land is no longer viable for continued use or does not meet the expected personal yield, therefore the entire property to be acquired.	- Owners with LURC, People without LURC: - Those who are in the process of acquiring LURC, - Those who are eligible to acquire LURC	- Cash compensation at replacement cost (free from transaction costs) for the entire land, or land-for-land of equivalent productive value and with secure tenure. - Entitled to take part in the income restoration program	- Classification and measurement will be determined by the District Compensation Committee (DCC) and concurred with by the affected household during the detailed measurement survey or DMS. - Affected households to be notified at least 4 months prior to the date that the land will actually be acquired by the Project
2. Loss of Residential/Commercial Land				
Permanent Marginal Loss	- Land on the project Right of Way - Land is still viable for use and house not	- Owners with LURC, People without LURC: - Those who are in the process of acquiring	- Cash compensation at replacement cost (100% value- no deduction for depreciation or salvageable materials).	- Classification and measurement will be determined by the DCC and concurred with by the affected household during the DMS

Loss Type	Application	Entitled Person	Compensation Policy	Implementation Issues
	requiring relocation	LURC, - Those who are eligible to acquire LURC		
Permanent Severe Loss	no or insufficient remaining land for viable use	- Owners with LURC, People without LURC: - Those who are in the process of acquiring LURC, - Those who are eligible to acquire LURC	- Cash compensation at replacement cost (free from taxes and transaction costs) for the entire land, or land-for-land of similar attributes with secure tenure. - Affected households have the option to (i) purchase a land plot in resettlement sites by paying land use levies but not to pay for infrastructure fees OR (ii) receive resettlement allowance (equals to the infrastructure fees) if they do not want to move to resettlement sites. [25]	- Classification and measurement will be determined by the DCC and concurred with by the affected household during the DMS - Affected household to be notified at least 6 months prior to the date that the land will actually be acquired by the Project
Permanent Marginal or Sever Loss		Households living with relatives/friends on same land or were permitted to build houses by local officials on commune land. (Note: assumption is that	- For marginal loss, for the portion to be acquired permanently no compensation for land but will be allowed to use remaining land. - For severe loss, for landless households, assistance thru provision of land-for-land of	- Affected household to be notified at least 6 months prior to the date that the land will actually be acquired by the Project

[25] In addition to cash compensation, affected households have two options.

Loss Type	Application	Entitled Person	Compensation Policy	Implementation Issues
		these households are landless. The type of assistance will be determined during DMS.)	similar attributes with secure tenure at no cost to landless households. The size of land will not be less than 40 m^2	
3. Loss of Structures (Residential/Commercial)				
Permanent Marginal Loss	- Affected structures on the project Right of Way - Unaffected portion of the structure is still viable for use and require no relocation	Owners of the structures with or without acceptable proof of ownership over the land; with or without building permit	- Cash compensation at replacement cost (i.e., no depreciation and no deduction for salvage materials) for the affected portion. - Repair allowance not less than 20% of replacement cost of the affected portion or equivalent to the actual cost of repair.	Classification and measurement will be determined by the DCC and concurred with by the affected household during the DMS
Permanent Severe Loss	- Affected structures on the project Right of Way - A structure is no longer viable for continued use and the entire structure is to be acquired	Owners of the structures with or without acceptable proof of ownership over the land; with or without building permit	- Cash compensation based on current market prices of materials and labor without depreciation or deductions for salvaged building materials for the entire structure. - Materials transport allowance as per regulation of PPCs. - For relocating households, renting house allowance for 6 months will be provided.	Classification and measurement will be determined by the DCC and concurred with by the affected household during the DMS
4. Loss of Secondary Structures (kitchen, latrine, etc)				

Loss Type	Application	Entitled Person	Compensation Policy	Implementation Issues
Loss of, or damage to, assets	Affected structures on the project Right of Way	Owners of the structures with or without acceptable proof of ownership over the land; with or without building permit	Cash compensation based on current market prices of materials and labor without depreciation or deductions for salvaged building materials	Classification and measurement will be determined by the DCC and concurred with by the affected household during the DMS
5. Loss of Cultivated Products (Crops and trees, aquaculture products)				
Loss of, or damage to, products	Cultivated products in the project Right of Way	Owners regardless of tenure status and beneficiaries of the land	- Annual crops and aquaculture products equivalent to current market value of crops/aquaculture products at the time of compensation; - For perennial crops trees, cash compensation at replacement cost equivalent to current market value given the type, age and productive value (future production) at the time of compensation. - Timber trees based on diameter at breast height at current market value	Classification and measurement will be determined by the DCC and concurred with by the affected household during the DMS
6. Affected Public Properties				
Loss of, or damage to, properties	Affected public structures (i.e. infrastructure, social service, etc)	Owners of affected properties	- Cash compensation to cover the cost of restoring the facilities	Classification and measurement will be determined by the DCC and concurred with by the affected organization during the DMS
7. Affected Community Properties				

Loss Type	Application	Entitled Person	Compensation Policy	Implementation Issues
Loss of, or damage to, assets	Affected community structures (i.e. community irrigation system, etc)	Affected Communities	- Cash compensation to cover the cost of restoring the facilities	Classification and measurement will be determined by the DCC and concurred with by the affected organization during the DMS
8. Affected Graves				
Loss of, or damage to, assets	Affected graves	Grave owners	- All costs of excavation, relocation and reburial will be reimbursed in cash to the affected households	Classification and measurement will be determined by the DCC and concurred with by the affected commune during the DMS
9. Loss of Livelihood				
Loss of Income/ Livelihood	Severe impacts due to loss of 20% or more of their total productive land and income sources	- Owners with LURC, - People without LURC including:: Those who are in the process of acquiring LURC, Those who are eligible to acquire LURC Affected households with lease agreement over the affected land Share croppers, agricultural labors and employees	- Transition subsistence allowance equivalent to 30 kg of rice per person for 6 to 36 months. - All affected households are eligible to take part in the income restoration program conducted by local authorities regardless of tenure status. - Every displaced households affected by loss of productive land, irrespective of the degree of impact, will be provided with additional assistance equivalent to 1.5 times the compensation amount.	The eligible households will be determined by the DCC and concurred with by the local authorities.
Loss of Income/	Severe impacts on shops	Relocating shop (owners)	- For registered businesses, the	The eligible households will be

Loss Type	Application	Entitled Person	Compensation Policy	Implementation Issues
Livelihood		regardless of tenure status and employees	business disruption allowances equivalent to 30% of annual net income will be applied. - For non-registered kiosk owners, the business disruption allowances equivalent to 50% of business disruption allowances of registered businesses will be applied. - If stand-alone shops (commercial only, not house-cum-shops), materials transport allowance equivalent to the actual cost of relocation expenses (labor, transport) - Employees who are affected by residential/commercial land acquisition, public land or land of enterprises: Allowance equivalent to the minimum salary as per the provincial regulations to affected employees during the transition period for a maximum of 6 months	determined by the DCC and concurred with by the local authorities.
10. Temporal Loss during the Construction[26]				
Loss of land and	Temporal Loss due to	Owners of land and	- Compensation for rental fee for	- Classification and measurement will

[26] The Contractor is the sole responsible party on this compensation.

Loss Type	Application	Entitled Person	Compensation Policy	Implementation Issues
structure	construction activities	structures	the area of the temporal use duration but this rental fee shall be more than net income that can be generated by this temporal use land; - Restoration of the land within 3 months after use. BVEC will request the contractors if they fails to restore the affected land within 3 months after end of use. - Affected non-land assets cause during construction will be paid at replacement cost by the Contractor - BVEC will request the contractors to pay full replacement cost if contractor fails to pay affected non-land assets and does not restore the affected land within 3 months after end of use.	be determined by the DCC and concurred with by the affected household during the DMS
11. Additional Support to Vulnerable Groups				
Loss of Land and Non-Land Assets		- Households living or working in the project Right of Way - Affected households categorized as: (i) female headed	- Allowance for households as per Government regulation (social policy households, heroic mothers, wounded, dead soldiers): Cash allowance from 10 Million to 20 Million per	- Additional assistance needs to be studied

Loss Type	Application	Entitled Person	Compensation Policy	Implementation Issues
		households with dependents, (ii) households with disabled persons, (iii) households falling under the current MOLISA benchmark poverty line, (iv) children and elderly households who are with no other means of support, and (v) landless households, are regarded as vulnerable groups.	household depending specific cases. - For other vulnerable household: cash allowance of 10 million per household. - Entitled to take part the income restoration program	
12. Unforeseen adverse impacts				
	The unforeseen impacts will be identified through special survey by the DCC as per request from impacted population. The entitlements will be approved by Dong Nai and Ba Ria Vung Tau PCs and concurred by the Donors	Households or persons affected by any unforeseen impact identified during implementation of the RAP	- Entitlements will be determined as per the resettlement policy framework	- The unforeseen impacts and affected persons will be identified with due care as per policy framework and proposed to the PPC and the Donors for approval including quantity of losses, their owners and the entitlements.

Source: JICA Study Team

7.3.5. Socio-Economic Baseline Information of the Study Area

BHVT Phase 1 locates in Dong Nai and Ba Ria Vung Tau provinces in the southeast Vietnam, and Table 7.3.5-1 shows the study area which is also same as the project affected area.

Table 7.3.5-1 Study Area

Province	Dong Nai			Ba Ria Vung Tau
District/City	Bine Hoa	Long Thanh		Tan Thanh
Commune	Phuoc Tan	An Phuoc	Long An	Hac Dich
	Tam Phuoc	Lon Duc	Long Phuoc	Toc Tien
		Thi trn Long Thnh	Phuoc Thai	Thi tran Phu My
		Loc An	Tan Hiep	Tan Phoc
			Phuoc Binh	My Xuan

Source: JICA Study Team

Table 7.3.5-2 shows general demographic inforation of the study area based on the available latest provincial statisitc data.

Table 7.3.5-2 General Demography of the Study Area

Province	District	Commune	Population (persons)	No. of households (HHs)	No. of ethnic minority HHs
Dong Nai	Long Thanh	An Phuoc	23,924	5,788	11
		Long Duc	9,473	2,306	11
		Phuoc Binh	12,053	2,993	159
		Long An	15,183	3,620	10
		Long Phuoc	17,153	3,807	10
		Phuoc Thai	23,577	4,487	153
		Tan Hiep	10,591	2,443	113
		Loc An	5,982	1,500	9
		Long Thanh Town	29,028	6,962	152
	Bien Hoa	Phuoc Tan	39.325	8739	-
		Tam Phuoc	35,708	7935	-
Ba Ria-Vung Tau	Tan Thanh	Hac Dich	12,799	3,197	146
		Tan Phuoc	11,355	2,631	10
		Toc Tien	5,883	1,224	15
		My Xuan	26,600	6,884	22
		Phu My Town	21,636	5,911	12

Source: JICA Study Team based on the provincial statistic data in 2011

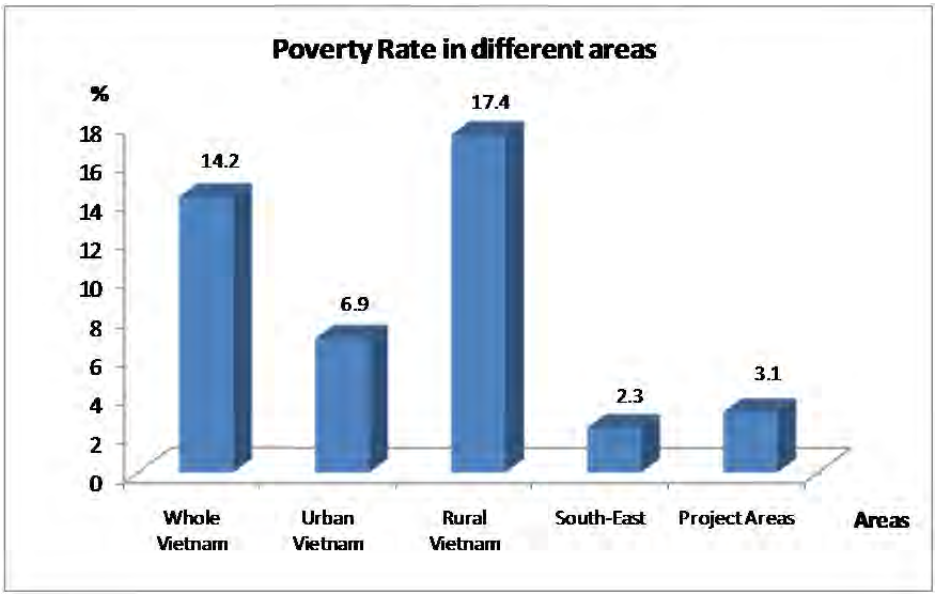
GDP of Dong Nai province in 2011 was 96,820 villion VND though it was 150,968 villion VND in Ba Ria Vung Tau province in 2011. As for GDP per capita in 2011, it was 36.6 million VND in Dong Nai province despite of 120 million VND in Ba Ria Vung Tau province. Main component of GDP at each province is shown in Table 7.3.5-3.

Table 7.3.5-3 Main Components of GDP in Dong Nai and Ba Ria Vung Tau provinces

	Dong Nai	Ba Ria Vung Tau
Industry and Construction	57.30%	83.47%
Service	35.2%	10.24%
Agriculture	7.5%	6.29%

Source: JICA Study Team based on Census at each province in 2011

The poverty line in Vietnam from 2011 to 2015 is defined at monthly VND500,000 per person in the urban area and monthly VND400,000 per person in the rural area. According to the Census report in 2010, 14.2% of Vietnamese were under the povery line.
Dong Nai and Ba Ria Vung Tau provices defined their own poverty lines; monthly VND 850,000 per person in the urban area and VND 650,000 per person in the rural area in the case of Dong Nai province, and VND 900,000 per person in the urban area and VND 700,000 per person in the rural area in the case of Ba Ria Vung Tau province. As the following figure show, people in Dong Nai and Ba Ria Vung Tau under the povery line is smaller than the national average.

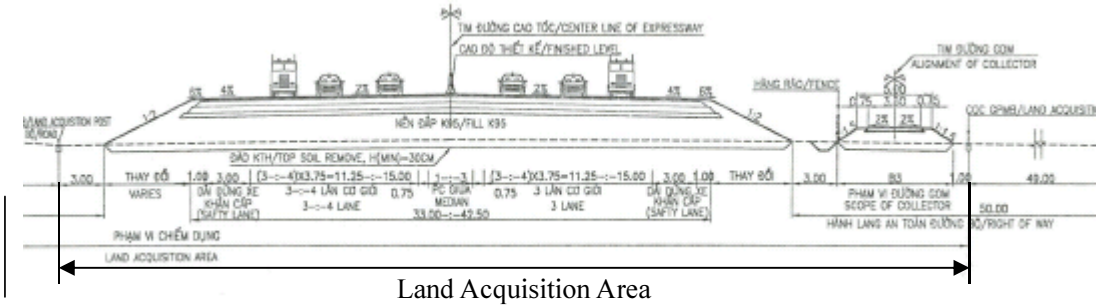


Source: JICA Study Team based on the Census Report at Dong Nai and Ba Ria Vung Tau Provin ces in 2010

Figure 7.3.5-1 Comparision of Poverty Situation

7.3.6. Impact of Land Acquisition at the Alignment Section

The BHVT Phase 1 section (i.e. starting point at Bien Hoa to the ending point at connection at NH 51, total 46km) is planned to construct at 4 lanes first, and will be expanded to 6 or 8 lane accordingly. However, land acquisition is instructed to be conducted at the area of 6 or 8 lane according to Minister Decision No. 161/TB-BGTVT dated 31st May, 2011. Thus, this RAP targets the land acquisition area at 6 or 8 lanes in the Phase 1 section of BHVT Expressway include the right of way (RoW) varies from 33.0 m - 42.5 m width, embankments, safety corridor and the service roads. The following figure shows the land acquisition area which is also the target area of this RAP.



Source: JICA Study Team

Figure 7.3.6-1 Land Acquisition Arera

Census, IOL, SES and perception survey shown in Table 7.3.5-1 were conducted in the land acquisition area shown in Table 7.3.5-1 in the entire affected area shown in Section 7.3.6.
In addition to the above land acquisiton area, necessary land acquisition area at Long Duc IC and Long Thanh IC were separetely studied. The survey result at the of Long Duc and Long Than IC sections is explained separtely at Section 7.3.7.

Table 7.3.6-1 Survey Contents

	Survey Period	Sample Number	Survey Method
Census	May to Aug., 2012	1,012 HHs	Direct interview by using questionnaire form
IOL	May to Aug., 212	1,012 HHs	Direct interview by using questionnaire form
SES	May to Aug., 2012	332 HHs[27]	Direct interview by using questionnaire form
Perception	May to Aug., 2012	1,012 HHs	Direct interview by using questionnaire form

As shown in Section 7.3.6-(2), total number of affected households whose agriculture and/or residential land will be affected by the project is estimated as 1,499. Among 487 households who were not interviewed in this study, 390 housheds were considred as living outside the study area and 97 housholds were not identified the actual land owers from the existing records. These households are necessary to be confired during Detailed Measurement Survey(hereinafter DMS) to be conducted in accordance with the Vietnamese regulation at the time of D/D stage. However, the project implementing agenc is requested to consult with 390 households (i.e. not interviewed and living outside the project area) and collect their houosehold profile if BHVT Phase 1 is implemented with financial support from Japanese government, and will submit collected data to JICA prior to appraisal of the loan agreement.

(1) Affected Land

Nearly 270 hectares (ha) including about 227 ha of private users will be acquired. Table 7.3.6-2 shows the summary of affected land.

[27] Total sample number both of the alignment section and IC section

Table 7.3.6-2 Land Use in the Land Acquisition Area

(Unit: m^2)

District/communes		Residential	Agriculture	Non-agriculture	Public land	Others	Total
I. Tan Thanh District							
1	My Xuan	320	27,254		596		28,169
2	Hac Dich	2,245	204,144	2,868			209,257
3	Toc Tien	2,485	260,535	29,915	39,367		332,302
4	Phu My	1,581	57,170	15,569	24,150		98,470
5	Tan Phuoc	6,231	127,492	9,243	33,391		176,357
	Sub total	**12,862**	**676,595**	**57,595**	**97,503**	**-**	**844,555**
II. Bien Hoa City							
1	Phuoc Tan	16,328	200,764	7,999	1,647	1,050	227,787
2	Tam Phuoc	2,473	107,980	990	18,691	-	130,134
	Sub total	**18,801**	**308,744**	**8,989**	**20,337**	**1,050**	**357,921**
III. Long Thanh district							
1	An Phuoc	4,260	97,541	741	105,185	3,064	210,791
2	Long Duc	1,457	77,096	-	79,296	10,551	168,400
3	Long Thanh Town	701	14,314	-	-	-	15,015
4	Loc An	1,087	76,523	-	15,342	137	93,089
5	Long An	3,735	192,306	3,547	100,413	2,467	302,468
6	Long Phuoc	2,877	252,698	-	10,567	13,210	279,352
7	Tan Hiep	4,866	44,411		15,308		64,585
8	Phuoc Binh	930	230,055		1,183	1,961	234,129
9	Phuoc Thai	3,225	128,919		2,830	12,625	147,599
	Sub Total	**23,138**	**1,113,863**	**4,288**	**330,123**	**44,015**	**1,515,427**
	Total	**54,800**	**2,099,202**	**70,872**	**447,963**	**45,065**	**2,717,903**

Source: JICA Study Team

(2) Affected Households and Organization

1,499 (i.e. total number of affected households whose agriculture and/or residential land will be affected[28]) households in total will be affected, of which, 310 households are from Tan Than district in Ba Ria Vung Tau province though the remaining 1,189 households are form districts in Dong Nai province.

[28] If a household whose agriculture land and residential land will be affected, such household is counted into the category of agriculture land and residential land separately.

Regarding organization, 23 organizations[29] in total will be affected. Of those organizations, 9 are state-owned or private companies doing business. However, the impacts on land and assets on land will not lead to the interruption of production or business activities of these companies. The other 14 affected organizations are schools (3 in Tan Phuoc commune), religion organizations (2 catholic units and 1 pagoda) and public works such as electricity, communication, communal medical station, irrigation.

Table 7.3.6-3 Summary of Affected Households and Organizations

No.	Location	Length (Km)	Total Number of HHs	Organizations	Total Land Affected (sq.m.) *	No. of HH Losing 20% productive Land	Viability of Residential Land	
							Viable. Can Move Back	Not Viable. Need to Relocate to new Plot
I. Ba Ria Vung Tau								
	Tan Thanh District							
1	My Xuan	0.6	21		28,169	6	-	-
2	Hac Dich	2.6	66	-	209,257	45	23	6
3	Toc Tien	3.55	79	4	332,302	9	14	13
4	Phu My	2.25	47	1	98,470	32	3	6
5	Tan Phuoc	3.7	97	5	176,357	78	25	29
	Sub Total	**12.7**	**310**	**10**	**844,555**	**170**	**65**	**54**
II	**Dong Nai**							
	Bien Hoa City							
1	Phuoc Tan	3.5	362	0	227,787	63	98	84
2	Tam Phuoc	2.6	96	3	120,134	21	19	10
	Sub Total	**6.1**	**458**	**3**	**347,921**	**84**	**117**	**94**
	Long Thanh district							
1	An Phuoc	3.4	57	2	210,791	29	19	5
2	Long Duc	3.2	78	1	168,400	25	28	3
3	Loc An	1.4	50	2	93,089	15	25	-
4	Long Thanh Town	0.4	31	-	15,015	6	7	-
5	Long An	4.9	132	2	302,468	64	37	6

[29] Organization is defined as state-owned or private company, school, religious groups in this study.

No.	Location	Length (Km)	Total Number of HHs	Organizations	Total Land Affected (sq.m.) *	No. of HH Losing 20% productive Land	Viability of Residential Land	
							Viable. Can Move Back	Not Viable. Need to Relocate to new Plot
6	Long Phuoc	5.5	156	2	279,352	78	31	-
7	Tan Hiep	1.2	54	1	64,585	16	25	8
8	Phuoc Thai	3.2	132	-	147,599	44	41	11
9	Phuoc Binh	4.8	41	-	234,129	76	29	5
	Sub Total	**28**	**731**	**10**	1,515,427	**353**	**242**	**38**
	Total	**46.8**	**1,499**	**23**	**2,717,903**	**607**	**424**	**186**

Source: JICA Study Team

Table 7.3.6-4 Details of Affected Household at Impact-Wise

Impact	Impact to Residential Structure	Impact to Agriculture Land	Impact to Land and Secondary Stricture	Total
Number of Affected HHs	610 HHs	678 HHs[30]	211 HHs	1,499HHs

Source : JICA Study Team

Table 7.3.6-5 Details of Affected Households Affected More Than 20% of Agriculture Land

Impact	HHs with land-based income	HHs with other main income source	Total
Number of Affected HHs	467 HHs	140 HHs	607 HHs

Source : JICA Study Team

(3) Impact to Structures

1) Impact to Houses

A total of 610 affected houses (i.e. total number of affected households both of total affect and partial affect), mostly category 4, were identified during the IOL, 186 of these houses will be totally affected. The total area of affected houses is nearly 55,000 m^2. A house of category 4 is a 1-storey house with cement floor, brick/wood walls, and corrugated sheets with wooden

[30] Total number of affected household losing more than 20% of agriculture land

frame for roofing. Category 5 of house is made of poor materials (bamboo and earth floor). Category 1-3 types are made of permanent materials. Table 7.3.6-6 shows impact on houses.

Table 7.3.6-6 Impacts on Various Types of Houses

Type of House	Affected house		Totally Affected house	
	No. of Houses	Area (sq.m)	No. of Houses	Area (sq.m)
Category 1	-	-	-	-
Category 2	1	373	-	-
Category 3	13.8	2,328	3	360
Category 4	588	51,217	183	21,960
Category 5	7	1015.3	-	-
Total	**610**	**54,934**	**186**	**22,320**

Source: JICA Study Team

In addition, 49 houses in the public land on ROW were also confirmed. Details are explained in Section 7.3.6(6).

2) Impact to Secondary Structures

Table 7.3.6-7 shows secondary structures identified in the project area.

Table 7.3.6-7 Other structures

No.	Type of Structures/Fixed Assets	Unit	Quantity
1	House Fence	m	2,580
2	Separate Kitchen	m^2	1,229
3	Toilet & Bathroom	m^2	655
4	Storage	m^2	889
5	Farm House	m^2	4,037
6	Animal Shed	m^2	26,145
7	Well	no.	143
8	Water tank	m^3	60
9	Irrigation Borewells	m	662
10	Tubewell for Drinking water	no.	21
11	Yard	m^2	633
12	Workshops	m^2	5,746
13	Graves	no.	165
14	Others	m^2	25,605

Source: JICA Study Team

3) Impact to Trees and Crops

The types of crops and trees identified during the survey are shown in the following tables. Crops are raised in agriculture land, and trees in both agriculture land and residential land. The main types of crops including paddy rice (40,768 m^2), cassava, taro (30,240 m^2) and maize (14,112 m^2); Table 7.3.6-8 outlines impact on crops and aquaculture.

Table 7.3.6-8 Impacts on Crops and aquaculture

No.	Type	Unit	Quantity
1	Rice	m^2	40,768
2	Maize	m^2	14,112
3	Ground nut & vegetables	m^2	5,040
4	Cassava, taro, sweet potato	m^2	30,240
5	Fish pond	m^2	8,624

Source: JICA Study Team

Three categories of trees (i.e. fruit tree, industrial tree and timber tree) were mainly identified in the project area. Main types of fruit trees to be affected were jack fruit, banana and rambutan while rubber and cashew are major industrial trees in the project area. Cajuput plantation was also popular type of cultivation for the affected people as used for paper making and construction. Table 7.3.6-9 outlines impact to other trees.

Table 7.3.6-9 Impacts on Trees

No.	Type of trees	Quantity	Unit
I	**Fruit tree**		
1	Avocado	129	Tree
2	Lanzones (Bon Bon)	1,247	Tree
3	Orange, pomelon	5,265	Tree
4	Areca	594	Tree
5	Lemon	567	Tree
6	Rambutan	11,543	Tree
7	Banana	24,527	Tree
8	Yellow mombin	54	Tree
9	Local lichee	1,843	Tree
10	Papaya	211	Tree
11	Coconut	2,624	Tree
12	Plum	1,755	Tree

No.	Type of trees	Quantity	Unit
13	Custard-apple	2,822	Tree
14	Mangosteen	1,148	Tree
15	Tamarin	146	Tree
16	Jackfruit	16,315	Tree
17	Longan	8,654	Tree
18	Guava	1,614	Tree
19	Mandarine	416	Tree
20	Durian	7,114	Tree
21	Barbados cherry	151	Tree
22	Pine apple	24,750	m2
23	Milk fruit	101	Tree
24	Mango	6,376	Tree
25	Others	6,713	Tree
II	**Industrial trees**		
1	Rubber	270,522	Tree
2	Cashew	23,674	Tree
3	Pepper	720	Tree
4	Others (coffee;	40,023	Tree
5	**Timber wood**		
6	Lagerstroemia speciosa	342	Tree
7	Dipterocarpus	133,716	Tree
8	Bamboo	14,171	Tree
9	Cajuput	7,971,966	Tree
10	Others (Eucalyptus, Acacia..)	120,873	Tree
IV	**Others**	13,598	Tree

Source: JICA Study Team

(4) Impact to Business

35 small scale businesses (independent shop) in total were identified. 15 shops were total loss though 20 shops were partial loss. As for registration status, 12 shops were registered though 23 shops were non-registered shop. These small shops were run by a family without hiring employees.

Table 7.3.6-10 Affected Business

(Unit: No.)

	Total Loss	Partial Loss	Registered	Non-Registered
Affected Shops	15	30	12	23
Total	35		35	

Source: JICA Study Team

(5) Impact to Community Assets

Community assets shown in Table 7.3.6-11 were identified in the project area. The identified community assets might need relocation.

Table 7.3.6-11 Impacts on Community Assets

Category of Affected Assets	Affected No.	Affected Area	Location
High voltage electric pole	2		Long Phuoc district, Dong Nai
	1		Long Thanh district, Dong Nai
	2		Tan Thanh district, Dong Nai
Brick fence of pumping station			Bien Hoa city, Dong Nai
Medical station	1		Tan Thanh distrct, Ba Ria Vung Tau
Primary school	1		Tan Than district, Ba Ria Vung Tau
Church		22,600 m^2	Bien Hoa city, Dong Nai

Source: JICA Study Team

(6) Tenure Status at the Alignment Section

The population census shows that 1,439 households had land use rights certificates (hereinafter LURC) or eligible to have LURC for their residential and agricultural land. About 11 households were squatters to the private land, according to Commune People's Committee (hereinafter CPC).

There were 49 houses (same as 49 households) in the public land; 40 houses were permitted to live in the public area from the authorities managing the public land and 9 houses were livening without any permission. As for 40 houses with permission to live, 18 households in Tan Hiep commune (Long Thanh district) used land belonging to Binh Minh Leprosy Center since 1973, 10 households in Long Thanh used the land owned by Ho Chi Minh City Department of Health, other households used the land of Dong Nai rubber company and Youth Education Center of Dong Nai. Table 7.3.6-12 shows tenure status confirmed at census, and Table 7.3.6-13 shows living status of households in the public land. 49 households living in the public land has eligibility to be compensated for their structure and receive assistance of IRP according to the entitlement matrix in Table 7.3.4-1.

Table 7.3.6-12 Tenure Status

	Holding LURC or equivalent status	**Living private land without permission**	**Living public land with permission**	**Living public land without permission**	**Total**
No. of Affected Households (HH)	1,439HHs	11HHs	40HHs	9HHs	1,499HHs

Source: JICA Study Team

Table 7.3.6-13 Living Status of Households in Public Land

Province	With Permission	Without Permission	Total
Dong Nai	40 HHs	7 HHs	47 HHs
Ba Ria Vung Tau	0 HH	2 HHs	2 HHs
Total	40 HHs	9 HHs	49 HHs

Source: JICA Study Team

(7) Impact to Vulnerable at the Alignment Section

236 households considered as vulnerable group were identified in the project area as shown in Table 7.3.6-14 below.

Table 7.3.6-14 Vulnerable group in the project area

District / Vulnerable group	Bien Hoa	Long Thanh	Tan Thanh	Total
1. Ethnic minorities	3	15	2	**20**
2. Social policy	10	47	15	**72**
3. Poor	7	17	7	**31**
4.Others	24	71	18	**113**
Total	**44**	**150**	**42**	**236**

Source: JICA Study Team

1) Ethnic Minorities

In Vietnam, the Kinh is considered as the majority, accounting for approximately 86%. The Kinh is also predominant in the project area, and 20 households of different ethnic origin are also living. They were the Hoa (10 households), the Nung (5 households) and the Tay (5 households) though there is no significant difference among these ethnicities according to the ethnic minority data. Although ethnic groups except the Kinh are regarded as the minority, 15 households identified by the survey have been living as a part of the Kinh community without any discrimination or socio-economic behind.

2) Other Vulnerable Groups

The SES and IOL identified 31 poor households in the affected area and 55 households who were considered by Ministry of Labor, Invalids and Social Assistance (MOLISA) as "social policy households"[31]. Apart from the poor and female-headed households, there were 18 households who were headed by disabled members, children and elderly.

[31] These households have household members who are invalids, who have heroic mothers, martyrs, and those who made contribution to the revolution

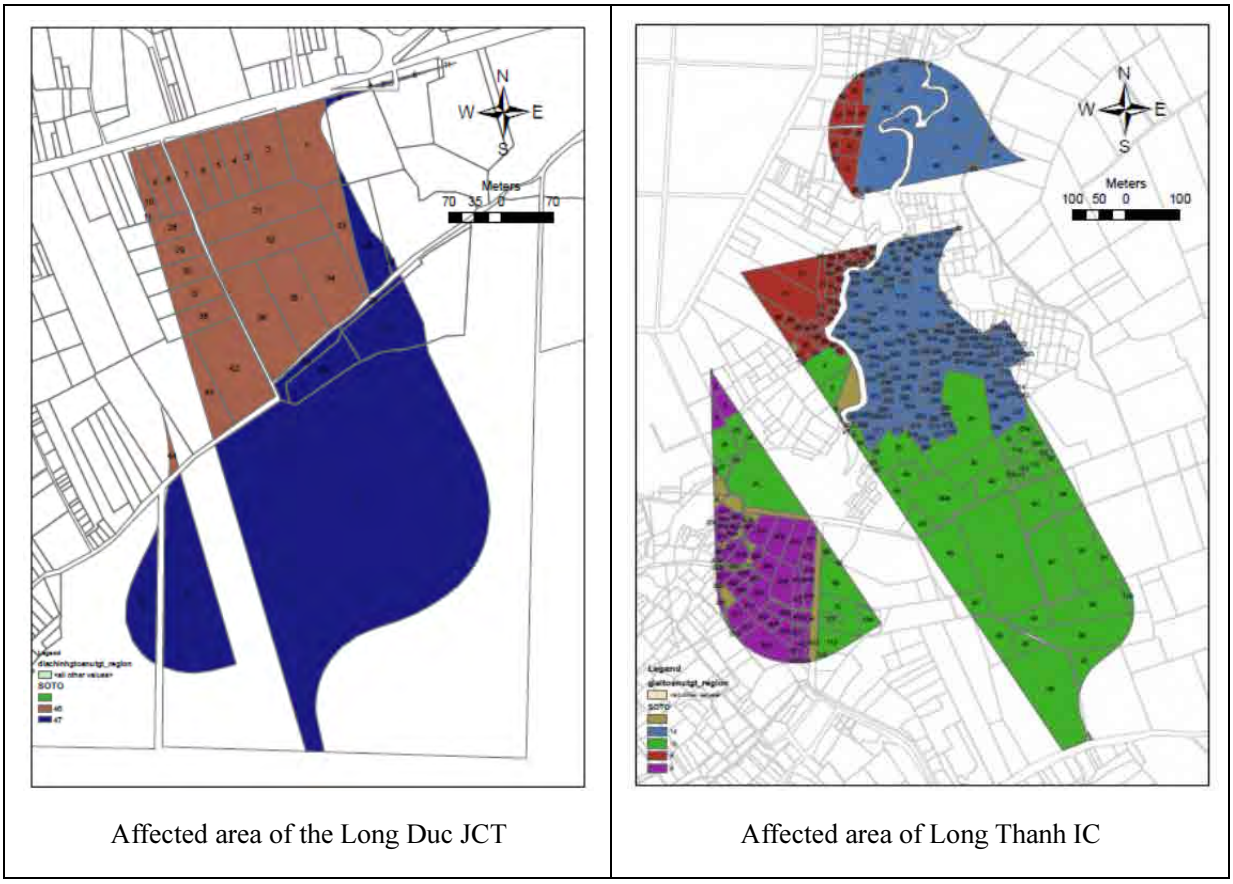
7.3.7. Impact of Land Acquisition at the IC Section

The necessary land acquisition area at Long Duc IC and Long Thanh IC was separately studied based on the latest design provided by F/S consultant. Location of these interchanges is shown below.

Table 7.3.7-1 Location of survey area

District	Commune	Subject	Location
Long Thanh	An Phuoc	Long Duc JTC	Km 9 + 450
	Long An	Long Thanh IC	Km 16 + 800

Source: JICA Study Team



Affected area of the Long Duc JCT

Affected area of Long Thanh IC

Source: JICA Study Team

Figure 7.3.7-1 Affected Area at the Interchange Section

Table 7.3.7-2 Study Contents

Study Area	Contents	Census	IOL	SES	Perception
Long Duc IC and Long Thanh IC	Period	Aug., 2012	Aug., 2012	Aug., 2012	Aug., 2012
	Sample No.	113HHs	113HHs	20HHs	113HHs
	Study Method	Interview with	Interview with	Interview with	Interview with

Study Area	Contents	Census	IOL	SES	Perception
		questionnaire form	questionnaire form	questionnaire form	questionnaire form

Source: JICA Study Team

(1) Affected Land

Approx. 55 hectares (ha) in total including about approx. 52 ha of private users will be acquired. Table 7.3.7-3 shows the summary of affected land.

Table 7.3.7-3 Impacts on Different Types of Land

Commune		Residential (m^2)	Agriculture (m^2)	Non-agricultural (m^2)	Others (m^2)	Total (m^2)
1	Long An	86,377	293,649	8,967	18,208	407,201
2	An Phuoc	26,529	83,029	6,319	0.00	115,877
TOTAL		**112,906**	**376,678**	**15,286**	**18,208**	**523,078**

Source: JICA Study Team

(2) Affected Households and Organization

113 households in total[32] was confirmed as PAPs as shown in Table 7.3.7-4.

Table 7.3.7-4 Summary Scope of Land Acquisition and Resettlement Impacts

	Location	Total Number of HHs	Total Land Affected (sq.m.) *	No. of HH Losing 20% productive Land	Viability of Residential Land	
					Viable. Can Move Back	Not Viable. Need to Relocate to new Plot
1	Long An commune	88	43.60	69	11	18
2	An Phuoc commune	26	11.14	18	1	5
	Total	**113**	**54.74**	**105**	**12**	**23**

Source: JICA Study Team

(3) Impact to Structures

1) Impact to House

It was found by IOL that 66 houses in total might be affected due to project implementation, and most of affected house was classified into Category 4. Total affected house area was assumed as in 8283 m^2 Long Thanh IC and 752m^2 in Long Duc IC.

[32] Among 113 households, 24 households in Long Than IC and 10 households in Long Duc IC locates in the overlapped area between the alignment and IC ROW. Those households are counted for as PAPs for the alignment section and IC section respectively.

Table 7.3.7-5 Summary of Affected Houses

Type of House	No. of Houses	Partially Affected (sq.m)	No. of Houses	Totally Affected (sq.m)
Long Thanh IC.				
Category 4	9	947.00	15	1,578.00
Category 5			30	6,706.00
Total	9	**947.00**	**45**	**8,284.00**
Long Duc JCT				
Category 4	4	**448.00**	5	562.00
Category 5			3	190.00
Total	4	**448.00**	8	**752.00**

Source:JICA Study Team

2) Impact to Secondary Structure

On secondary structures or fixed assets owned by households such as toilets, fences, water supply system, electricity, and phone lines and meters were identified during the inventory of losses survey.

Table 7.3.7-6 outlines impact to secondary structures.

Table 7.3.7-6 Summary of Impact to Secondary Structures

No.	Item	Unit	Long An	An Phuoc
1	House Fence	m	1,200	-
2	Separate Kitchen	m^2	111	15.00
3	Toilet & Bathroom	m^2	100	5.00
4	Animal Shed	m^2	86	24.00
5	Well	No.	20	4.00
6	Water tank	m^3	10	-
7	Tubewell for Drinking water	No.	231	45.00
8	Workshops	m^2	5,976	120.00
9	Electricity poles (low voltage)	No.	58	15.00

Source: JICA Study Team

3) Impact to Tree and Crop

Table 7.3.7-7 shows the trees and crops identified in the project area. It was found that no crop might be impact though agriculture land was recorded on the cadastral map. As for the affected trees, most of them was fruit trees and industrial trees planted on garden land.

Table 7.3.7-7 Impact to Tree and Crop

No.	Type of Tree and Crop	Unit	Long An	An Phuoc
I	**Fruit tree**			
1	Avocado	Tree	12	5
2	Lanzones (Bon Bon)	Tree	11	8
3	Orange, pomelon	Tree	125	43
4	Areca	Tree	32	15
5	Lemon	Tree	58	27
6	Rambutan	Tree	181	58
7	Banana	Tree	88	39
8	Yellow mombin	Tree	29	15
9	Local lichee	Tree	28	14
10	Papaya	Tree	37	11
11	Coconut	Tree	180	23
12	Plum	Tree	39	8
13	Custard-apple	Tree	45	21
14	Mangosteen	Tree	134	32
15	Tamarin	Tree	23	9
16	Jackfruit	Tree	76	23
17	Longan	Tree	145	46
18	Guava	Tree	54	17
19	Mandarine	Tree	45	12
20	Durian	Tree	87	14
21	Barbados cherry	Tree	55	28
22	Pine apple	m^2	324	98
23	Milk fruit	Tree	25	8
24	Mango	Tree	157	45
25	Others	Tree	99	43
II	**Industrial trees**			
1	Rubber	Tree	135	58
2	Cashew	Tree	435	84
III	**Timber wood**			
1	Lagerstromia speciosa	Tree	23	9
2	Dipterocarpus	Tree	54	18

No.	Type of Tree and Crop	Unit	Long An	An Phuoc
3	Bamboo	Tree	432	125
4	Cajuput	Tree	9,832	3,546
5	Others (Eucalyptus, Acacia..)	Tree	1,547	879
IV	**Others**	Tree	**241**	**124**
	Total		**12,129**	**4,701**

Source: JICA Study Team

(4) Impact to Business

Business including small scale shops was not confirmed in the project area.

(5) Impact to Community Asset

Community assets were not confirmed.

(6) Land Tenure Status at IC Section

All PAPs who were interviewed had Land Use Right Certificate: LURC) or eligible to have LURC for their residential and agricultural land.

(7) Impact to Vulnerable Groups at IC Section

Households classified into vulnerable groups were not confirmed.

7.3.8. Socio-Economic Features of PAPs at Alignment and IC Sections

Major socio-economic factures of PAPs are summarized in Table 7.3.8-1.

Table 7.3.8-1 Socio-Economic Feactures of PAPs

Item	Condition
Poverty Condition	Most of PAPs are above the poverty line defined by each province.
Sanitary	More than 90% of PAPs use well-origin water and approx. 9% of PAPs use tap water. In addition, more than 80% of PAPs use toilet with septic tank.
Literacy	More than 70% of PAPs completed secondary school though approx. 1% was illiterate.
Income Source	80% of main income source was wage worker, following agriculture 50%, husbandry 40% and business 20% (multiple answer).
Income	The biggest part of PAPs were income range between 1 million to 2 million (approx. 30%), following 2 million VND to 3 million VND (approx. 20%).

Source: JICA Study Team

7.3.9. Income Restoration Program

(1) Expected Number of Income Restoration Program Beneficiarie

Income restoration program (hereinafter IRP) is proposed to be entitied for the affected persons who will lose more than 20% of their land, displaced persons and vulnrable households with the purpose of improement of livelihood of affected persons or at least rehabilitate their income source at pre-project level. The number of beneficiales of IRP in the alignment section is estimated as 1,029 households against 1,499 of the total affected households as shown in Table 7.3.9-1.

Table 7.3.9-1 Beneficialies of IRP at the Alignemnt Section

Location	Total affected households	Relocated HHs	HHs with loss more than 20%[33]	Vulnerable HHs	Total IRP Beneficial[34]
Tan Thanh District	310	54	170	42	266
Long Thanh District	731	38	353	150	541
Bien Hoa City	458	94	84	44	222
Total	1,499	186	607	236	1,029

Source: JICA Study Team

85 out of 105 households whose main income source is land-base are entitled to be IRP beneficieis at IC section.

Table 7.3.9-2 IRP Beneficiary at IC Section

Location	HHs losing more than 20% land (without relocation)	HHs losing more than 20% land (without relocation)	Vulnerable Group	Total No. of IRP Beneficiary
Long An commune	69	18	-	87
An Phuoc commune	13	5	-	18
Total	82	23	-	105

Soure: JICA Study Team

(2) On Program (IRP) and Expected Number of IRP Beneficiarie

IRP shall be implemented with the following princples.

(a) Improvement or rehabilitation of livelihood shall be at least secured by providing appropriate compensation such as land for land or cash in replacement cost as per the compensation policy.

(b) Vocational training in the national or provincial educational scheme shall be provided as per the request of PAPs

[33] Among 607 severely affected households who lose more than 20% of land, 467 HHs have land-based income. 275 HHs lose 20%-70% of productive land, and 192 HHs lose more than70% of productive land.
[34] One household can be fall into more than one of the three categories.

(c) Other vocational training scheme (i.e. training couse in a vocational school) shall be used effectively in case national or provincial educational scheme is not enogh.
(d) Employment opportunities related to the project shall be preferentially provided to PAPs according to their capability
(e) Employment opportunities at the existing or newly planned industrial area near the project area shall be enhanced through support from provincial or district people's committees in case income source will be lost[35]
(f) Technical advice for establishing business scheme shall be provided
(g) Technical advice for systemtic/effective agricultural management shall be provided
(h) Technical advice for increasing productivity with the remaining land

The following approach to IRP was examined based on the principles and good practices around the project area. The project implementing agency will examined detailed implementing framework and IRP at the RAP updating stage (i.e. D/D stage) based on the IRP approach examined in this study, analyzing prospect and capability of IRP beneficiaries and confirming available/suitable vocational programs relevant local authorities providing.

Table 7.3.9-3 Approach to IRP

Activities	Preparation Activities	Budget
- Establishing small scale business of agriculture - Establishing small scale business of non-agriculture	- Initial assessmet of AP's need - Examine detailed IRP - Consultation with relevant authorities - Organize a management board - Implement a pilot program - Examine a result of pilot program - Implement IRP - Monitoring and evaluation	- Pooled in a Management Board by allocation from loan (not directly providing to PAPs)

Source: JICA Study Team

(3) Preparation and Implementation of IRP

Table 7.3.9-4 outlines responsibility of relevant parties for preparation and impelentation of IRP.

[35] It was confirmed through the interview to the industrial parks near the study area that there would be an opportunity for PAPs to be hired if they could work as a long-term staff since the industrial parks need such staff. Coordination including appropriate vocational training/capacity building of PAPs among relevant parties might be necessary.

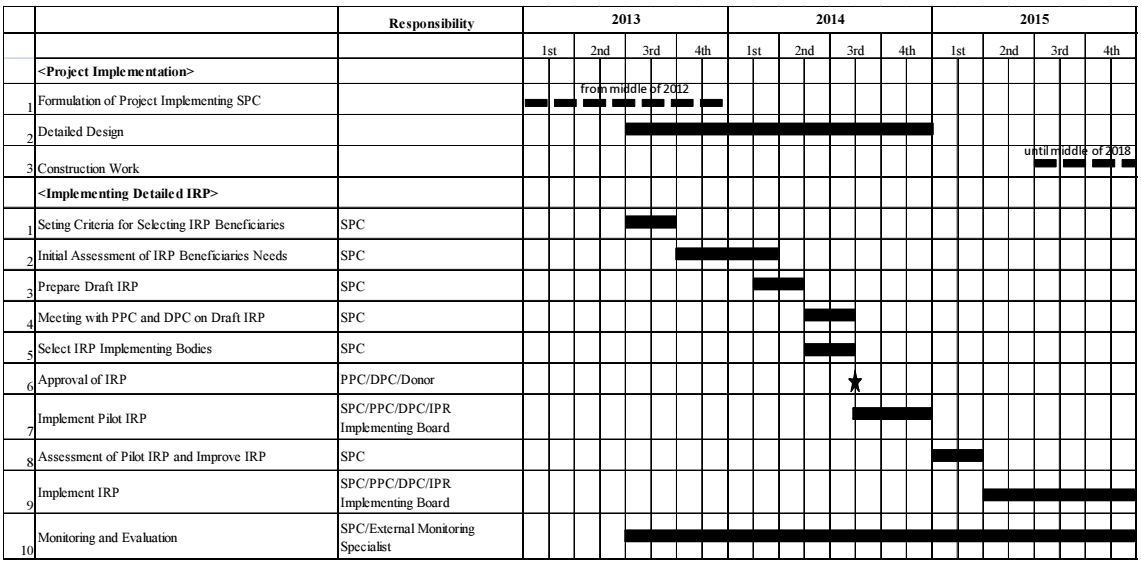
Table 7.3.9-4 Responsibility of Relevant Parties for Prepation and Implentatio of IRP

	Relevant Parties	Responsiblities
1	Project Implementing Agency (BVEC/ SPEC)	- Preparation of detailed IRP and obtain approval of detailed IRP from relevant authorites - Supervision of implmenting detailed IRP - Report implementing progress of detailed IRP to relevant authorities
2	Provincial People's Committee (PPC)	- Supervision of implemeitng detailed IRP in each province
3	District People's Committee (DPC)	- Supervision of implementing detailed IRP in the jurisdiction - Report progress of IRP implementation to the project implemeting agency
4	District Management Board of IRP	- Implementing detailed IRP - Support needs-analysis of IRP beneficiaries
5	Commune People's Committee (CPC)	- Supervision of IRP implementaiton in the jurisdiction

Source：JICA Study Team

Procedure of prepartion of detailed IRP is shown below. Preparation and implementation schedule is shown in Figure 7.3.9-1 Implenting IRP needs experts. The draft Term of Reference (hereinafter TOR) for IRP experts are enclosed in RAP at Attachment 5, and BVEC or SPC will hire qalified experts by referring the attached TOR.

1) Set criteria to select IRP beneficiaries
2) Conduct needs-analysis of IRP beneficiaries during or after DMS
3) Preparation of IRP and estimation of necessary budget
4) Hold meeting with PPC and DPC on implementing IRP
5) Select IRP implementing agency such as vocational training center, agricultural training center
6) Implement pilot　IRP targeting socially vulnerable groups and a part of IRP beneficiaries
7) Examine the result of the pilot IRP
8) Implement IRP targeting remaining IRP beneficiaries
9) Evaluation of IRP by monitoring (i.e. evaluation by internal and external monitoring)



Source：JICA Study Team

Figure 7.3.9-1 Draft Schedule of Preparation and Implementation of Detailed IPR

7.3.10. Relocation Options

Those whose remaining residential land or residential structure is not viable have an option to move to relocation sites where BVEC or SPC and local authorities will prepare.

Relocation sites are not yet prepared since the project is not yet approved by the Government. However, BVEC plans to use the currently available residential sites or planning residential sites as relocation sites. By considering PAPs convenience, existing or planning residential sites where locate in the same commune of the project area selected as candidate relocation sites. When the project is approved by the Government, detailed plan including development of new residential sites or using available residential sites will be examined with local authorities. Table 7.3.10-1 shows details of each candidate site.

Table 7.3.10-1 Candidate Relocation Sites

	Potential Relocation Sites	Commune/ Town	District	Province	Land Area	No. of land plot	No. of available plot for BHVT project	Information
1	Long An Residential Site	Long An	Long Thanh	Dong Nai	27.4 ha	300	50	The RS was constructed in 2009-2011 for relocating HHs of HCM –LT - DG Expressway project. Currently, 80% of land plots in this residential site were settled by relocated HHs of HLD project. However, according to the Vice Chairman of Long Thanh PC, approx. 50 plots are still available for BHVT project if required. Distance to the project area：200m Surrounding condition：Rubber plantation, rice field, residential area Infrastructure condition：Already arranged water, electricity, road, drainage
2	Tan Hiep Residential Site	Long Thanh	Long Thanh	Dong Nai	10 ha	160	50	This is the new development project, and the project document is being prepared by the Center for Planning, under management of Dong Nai Provincial Department of Construction. The project documents will be completed in the end of 2012 including EIA report and resettlement plan, and construction can be started in 2013. Distance to the project area：3km Surrounding condition：Rubber plantation, rice field, residential area Infrastructure condition：Not arranged yet
3	Long Duc Residential Site	Dong Duc	Long Thanh	Dong Nai	50.87 ha; Stage 1: 22.12		Stage 1: 200	This is the new development project. The project document (including EIA and

	Potential Relocation Sites	Commune/ Town	District	Province	Land Area	No. of land plot	No. of available plot for BHVT project	Information
					ha; Stage 2: 28.75 ha			Resettlement Plan) was prepared and submitted to Dong Nai PPC for approval. According to the proposed plan, this residential site will be divided into 2 stages: the first stage will cover 22.12 ha; with 541 land plots, the second stage will cover remain allocated area. BVEC is the investor of this residential site. The first stage will be implemented in 2013-2014 to provide residential land for relocated HHs of the Expansion National road No. 51 project and BHVT expressway project. Distance to the project area：2km Surrounding condition：Rubber plantation Infrastructure condition：Not arranged yet
1	My Xuan Residential Site	My Xuan		Ba Ria Vung Tau	26.5 ha	-	40	The area of this residential site is 26.5 ha and, 80% of this site is already occupied. This site is still available for about 40 HHs in Tan Thanh district who may be relocated by the BHVT expressway project. Distance to the project area：2km Surrounding condition：Residential area Infrastructure condition：Already arranged water, electricity, road, drainage
2	Phu My Residential Site	Phu My		Ba Ria Vung Tau	110 ha	5000 land plots or apartments	100	A site of 110 ha is planning for affected HHs from the Urban area of Phu My also can receive relocating HHs from BHVT project. According to document No. 7659/UB.XD of PPC Ba Ria Vung Tau dated 23 December 2011, PPC agreed on the location of the resettlement sites in Phu My Town. Based

	Potential Relocation Sites	Commune/ Town	District	Province	Land Area	No. of land plot	No. of available plot for BHVT project	Information
								on this document, Tan Thanh PC has prepared the master plan for this area. The RS can be home of 20,000 persons (4904 houses or apartments), with the average area of land is 45 m2/person. Distance to the project area：4km Surrounding condition：Residential area Infrastructure condition：Not arranged yet

Source: JICA Study Team

7.3.11. Grievance Redress

(1) Grievance Redress Procedure

All PAPs are entitled to complain and express their grievances about the result of land acquisition and resettlement including compensation, if it is not agreeable, at the entire procedure of land acquisition and resettlement including compensation payment. Decree No. 84/2007/ND-CP ensures grievance procedure as explaied, but the stipulated procedure does not necessarily secure convenience for PAPs to claim since the first contact under the stipulated procedure is District People's Committee (DPC). In order to secure the accessible grievance procedure for PAPs, contacting the nearest local authority such as commune people's committee might be practical rather than lodging to DPC or PPC. Thus, Commune People's Committee (CPC) shall be the contact window throughout the project implementation.

1) Decision on land acquisiton is issued by DPC
   (i) Complaint from PAPs are to be lodged verbally or in written form with CPC. The chairperson of CPC will assign land administartion officer at CPC level to meet the PAP who raise complaint, and the officer will have a meeting with the PAP to ask and clarify complaint. CPC will have a reasonable attempt to settle a complaint through personal interivew or community consultaiton within 90 days after the district decision is issued. If PAP does not satisfy with the answer/approach provided by CPC to settle complaint, they will loadge the complaint.
   (ii) PAPs who still have any objections to the answer/approach provided by CPC or Decision on land acquisition issued by the DPC can raise their grievance to DPC within 90 days after the district decision of land acquisition is issued. A DPC officer is assigned to contact PAP who lodged complaint to clarify problems and other needs, and the lodged complain related to Decesion on land acquisition is to be handled by DONRE though a complaint related to compensation and resettlement issue is to be handed by District Compensation and Site Clearance Committee (DCC) composed of vice chaiperson of DPC, representativeds of all related departments in DPC, representatives from PAPs and media.
   (iii) District inspector will invesigate and review the lodged complaint, and results of the investigation will be discussed at DCC. Based on the discussion at DCC, DPC will make a decision within 30 days or 45 days in case of complecated complaint after loged a claim to DPC. A decision will be disclosed as well as informed to PAP lodged the complaint in written form.
   (iv) In case the grievance is not settled within 30day, it will be handed in the Provincial People's Committee (PPC) or in the court.

The complaint is to be raised to the administration office in PPC, and the administration office will assign a relevant department to investigate the case. PPC will make a decision based on an investigation result, which will be disclosed.

2) Decision on land acquisiton is issued by PPC

(i) PAPs who have any objections to the decision of land acquisition issued by the Provincial People's Committee can raise their grievance to the provincial people's committee within 30 days after the provincial decision of land acquisition is issued.

(ii) Raised grievance shall be settled within a time stipulated in the Law of Complaints and Denunciation. The solution shall be disclosed as well as informed to a person raised the grievance in writing.

(iii) A grievance will be handed in the court in case it is not settled within 45days after issuing the provincial decision.

In addition to (i) to (iii) above, CPC is the contact througout the project peirod in order to support PAPs on grievance redress.

(2) Procedure to be Contact for CPC on Grievance Redress

DPC or PPC is the authority of handling grievance redress according to the Vietnamese regulation, and there is procedure of contact on grievance redress at CPC level. Thus, BVEC/SPC as the project implementing agency will consult with CPC to obtain permission on grievance redress procedure before starting internal monitoring. Then, grievance redress procedure will be explained to PAPs at the time of public consultation in the process of RAP updating at the D/D stage.

7.3.12. Implementation Framework

(1) Implementing Process

Procedure of compensation in full replacement cost in the Vietnamese legal framework is shown in the Figure 7.3.12-1.

The official land acquisition procedure begins when the land acquisition notice is issued as described. In parallel with the official land acquisition procedure, BVEC/SPC as the implementing agency conducts household survey (i.e. census, inventory of asset loss and socio-economic survey) and replacement cost survey at the time of the F/Sin the case of donor agency funding project. RAP is prepared based on these survey results, and public consultation meetings are organized to explain the overall of RAP to PAPs and concerned local authorities. RAP is finalized by reflecting comments at consultation meetings, and is approved by the

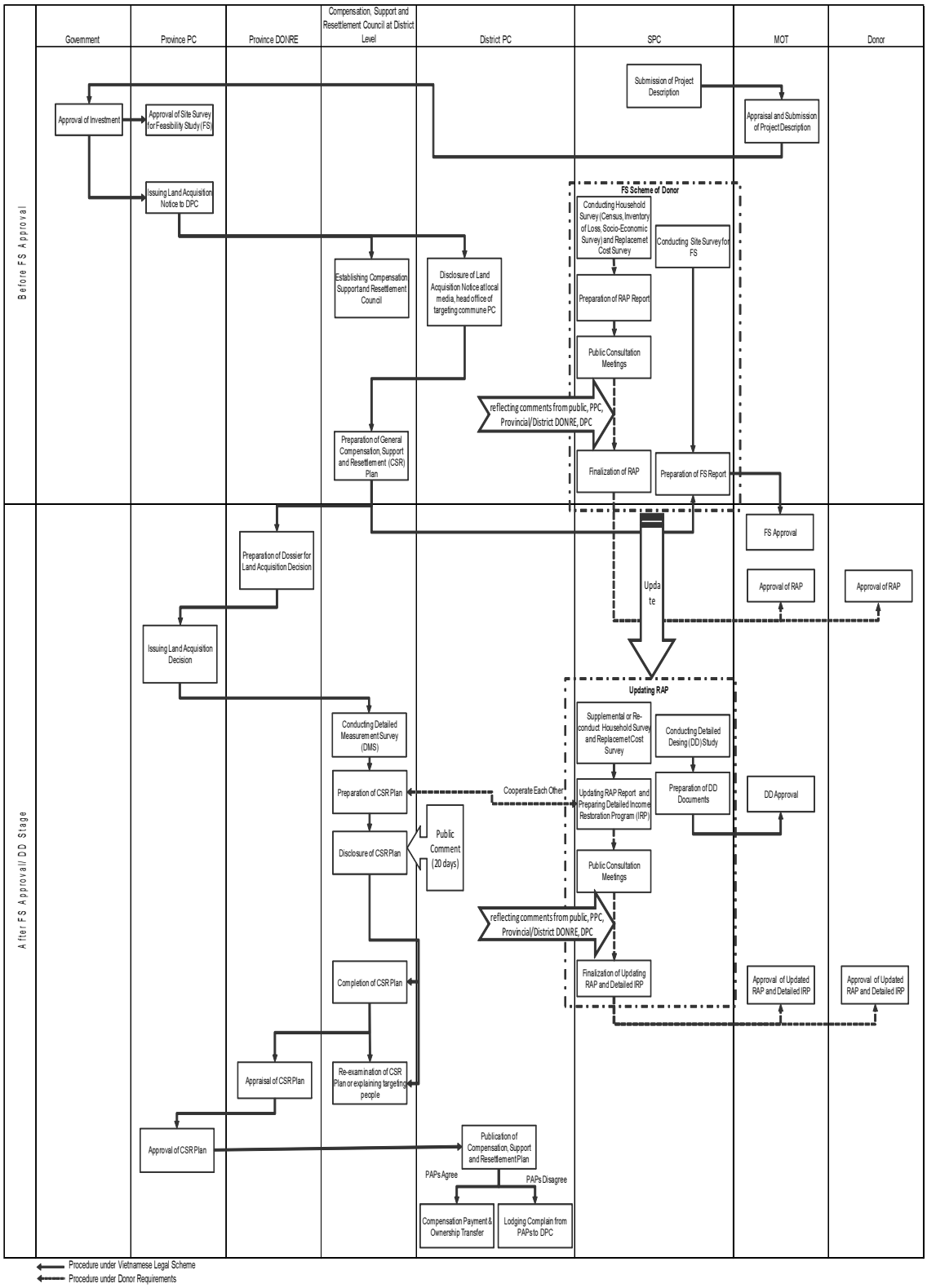
donor agency and the jurisdiction ministry. The draft TOR for replacmenet cost survey is enclosed in RAP of Attachment 5.

When the detailed design (D/D) starts, BVEC/SPC updates the RAP which is prepared at the time of F/S if there is modification of the engineering design. In the process of RAP updating, supplemental household interview survey will be conducted to the modified parts if modified parts are small and time lag between F/S and D/D is short (i.e. less than 2 years)[36]. However, if design modification is significant and time lag between F/S and D/D is more than 2 years, household survey will be re-conducted to obtain fresh information.

As for the methodology of supplemental or re-conducting household interview survey, the scheme of DMS to be conducted by the compensation, support and resettlement council will be utilized. Since collecting information which is not requested under Vietnamese regulations by the council is difficult, BVEC/SPC has a responsibility to collect necessary information to update RAP. Through a series process, the finalized updated RAP is approved by the donor agency and the jurisdiction ministry. In addition, detailed IRP is necessary to be approved by the donor agency and relevant authorities.

Land acquisition decisions are issued by PPC at the time of D/D stage, and compensation, support and resettlement plan containing land acquisition area, compensation amount, resettlement arrangement, relocation of graves, etc stipulated in the Decree No. 69/2009/ND-CP is prepared by the compensation, support and resettlement council based on the result of DMS. The compensation, support and resettlement plan is disclosed for public hearing, and is finalized by reflecting public comments. The final compensation, support and resettlement plan is approved by PPC, which is disclosed to public and also informed its outline to PAPs in the official letter. If the PAPs agree the contents of compensation, support and resettlement plan, land use right certificate is transferred. In case PAPs disagree, complaints are filed to the DPC. The contents between compensation, support and resettlement plan and updated RAP shall be coherent.

[36] The World Bank Involuntary Resettlement Sourcebook (World Bank, 2004) says “If acquisition of land does not occur for at least 2 years after gathering of baseline date, the date can usually be updated.” From this description, it is considered that gathered census data will be valid for 2 years.



Source: JICA Study Team based on Decree No. 69/2009/ND-CP and Previous Donor Funding Projects

Figure 7.3.12-1 Land Acquisition Procedure in Replacement Cost Compensation

(2) Implementing Organizations

The following key institutions (i.e. the project owner, local authorities, mass organizations etc.) are to be involved into RAP implementation. SPC will be established prior to implementing the Phase 1 section as a project implementing agency. When SPC is established, all responsibilities of BVEC will be handed over to SPC. Responsibility of each entity for implementing land acquisition is summarized below, and Section 7.3.9 shows responsibility of each entity for implementing detailed IRP.

1) BVEC/ SPC

BVEC is established for operate and manage BHVT expressway as the project executing agency, and is responsible for realization of the BHVT Expressway including land acquisition and resettlement in accordance with the approved RAP.

The department of land acquisition in BVEC has direct responsibility and day-to-day management oversight for implementing all aspects pertained to the Expressway's works including planning, programming, budgeting, design, implementation, monitoring, evaluation, ensuring overall project's coordination and supervision of resettlement activities and coordination/liaison with the donor agency. Key responsibilities are summarized below.

- Updating Detailed Measurement Survey (DMS) information in collaboration with the People's Committees at various levels and the Compensation, Assistance and Resettlement Boards of the provinces and districts and preparation of Compensation Plans for each commune or section. Where the number of displaced persons exceed by more than 10% compared to that identified at the time of the draft RAP, the compensation plan would be submitted to the donor for reference;
- Secure the budget for implementing the RAP, ensuring that funds for resettlement (i.e., compensation and all other entitlements) are available in a timely manner and in sufficient amounts;
- Assist local authorities, District Compensation Committees and GRCs in resolving grievances and complaints of the affected households.
- Contract a professional appraiser to conduct Replacement Cost Survey (RCS) to establish prevalent market prices for different types/categories of affected assets and if the rates thus established are found to be higher than those established by the provincial authorities, submit the findings of the RCS to the province for upward revision of the rates to ensure that all compensation is paid at replacement cost.
- Supervise and monitor the preparation, updating, and implementation of the RAP.

- Contract an experienced External Monitoring Agency to conduct independent monitoring of resettlement implementation, and for post implementation evaluation.
- Prepare quarterly progress reports on RAP implementation and submit to the donor, investors and relevant authorities. This includes resettlement audit (payment and allowances to DPs, cost of development of relocation sites, cost of income restoration programs, external monitoring, administrative costs, and use of contingencies).
- Responsible for preparation of Resettlement Completion Report for submission to the donor, investors and relevant authorities.

2) Provincial People's Committee and its relevant Departments

The responsibilities of Provincial People's Committee of Dong Nai and Ba Ria – Vung Tau and theirs lower administrative levels are guidance as in the Decree 197/2004 and Decrees 84/2007 and 69/2009 related to implementing compensation and resettlement.

PPC of Dong Nai and Ba Ria - Vung Tau will be overall responsible for resettlement activities within its administrative jurisdiction. The main responsibilities of the PPC include:

- Establish District Compensation and Site Clearance Committee (DCSCC) prior to appraisal;
- Establish GRCs at the PC, district and commune levels to ensure participation of CBOs, NGOs, and other civil society organizations and representatives of the DPs;
- Review and approve findings of the RCS and revise unit costs, where necessary, for private and public assets adversely affected by the Project to reflect replacement cost;
- Approve on land recovery for the project and compensation plans for each affected household;
- Provide guidance for updating and implementing RAP.
- Provide guidance for the outstanding issues in the phase of RAP implementation.
- Department of Environment and Natural Resources: to review dossier applying for land recovery and submit to the PPC for its approval
- Departments of construction, finance and DONRE: responsible for review the compensation and resettlement plans for each household and then submit to the PPC of Dong Nai and Ba Ria - Vung Tau for its approval.

3) District People's Committee (hereinafter DPC)

Major responsibilities of DCC are the followings:

- Establish and supervise District Compensation and Site Clearance Committee (DCC)
- Establish other relevant organizations and implement land acquisition in accordance with land acquisition regulations
- Arrangement of relevant authorities on preparation relocation sites by instruction from PPC
- Make an arrangement to issue LURC and residential certificate for relocation households
- Handle grievance redress raised by PAPs
- Confirmation of compensation payment

4) District Compensation and Site Clearance Committees (DCC)

The District Compensation and Site Clearance Committees (DCC), which is headed by the Leader of DPCs, will include the heads of the Finance Department; the Natural Resources and Environment Department; Transport Department; Agriculture Department; Chair of affected communes and BVEC, in addition to the representatives of the provincial Farmers' Association, Women's Union; and affected households in that province. The responsibilities of DPC are clearly described in the Decrees 197/2004 and 84/2008.

5) District Land Fund Development Center (hereinafter LFDC)

Major responsibilities of the LFDC are the following:

- Coordinate, supervise and manage resettlement activities that will be done by Commune People's Committees.
- Updating of the IOL data through the conduct of the DMS;
- Coordinate with BVEC to prepare the Updated RAP for endorsement to the PPC;
- Implementation of the RAP;
- Organize, plan and carry out resettlement activities in the district on behalf of the DPC and under the guidance of the PPC and request of BVEC;
- Assist in the identification and allocation of land for eligible affected households;

- Assist DPs by providing logistic support and documentation of purchase of private agricultural land, where necessary;
- Along with the CPC, assist LFDC in the timely delivery of compensation payment and other entitlements to affected households; and
- Assist in the resolution of grievances;

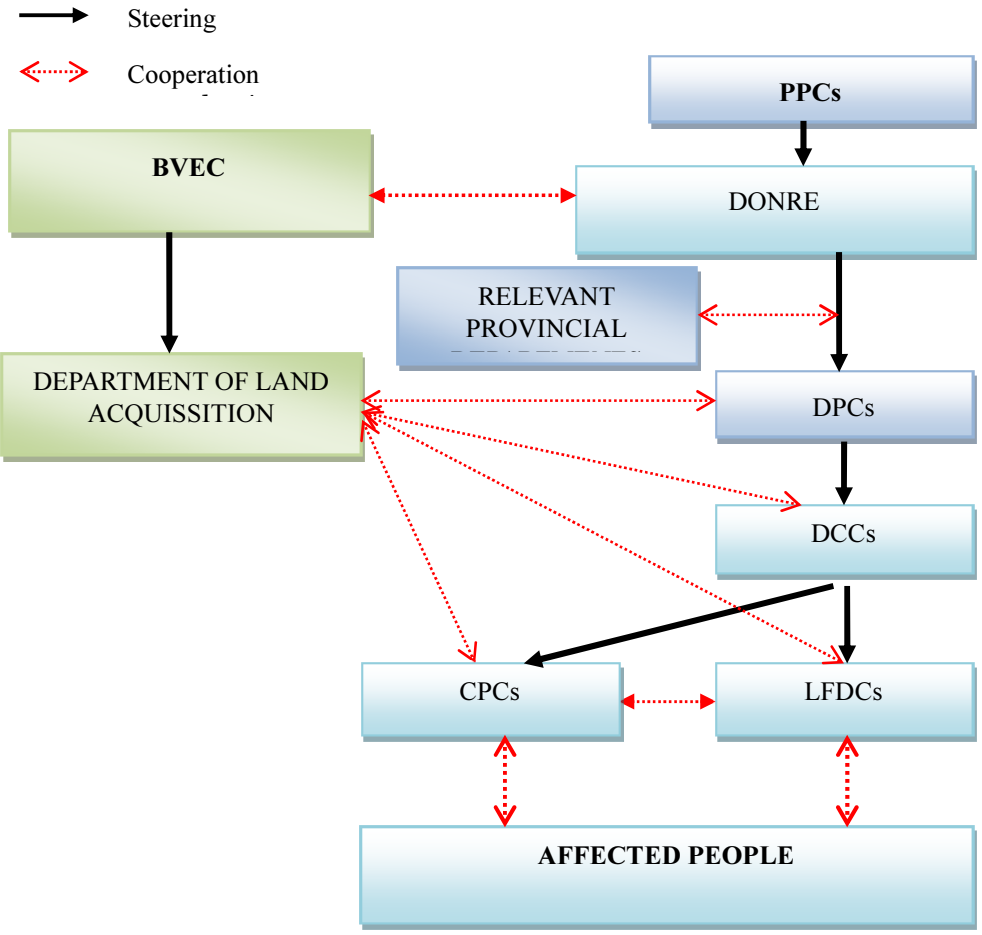
Additionally, LFDC will work closely with the Detailed Design consultant to ensure that all the data collected during DMS and for socio-economic surveys are as required for efficient resettlement planning and implementation, and for livelihood restoration programs.

6) Commune People's Committee (CPC)

The CPC will assist the DCSCC in their resettlement tasks. Specifically, the CPC will be responsible for the following:

- Assign Commune officials to assist the DCC in the updating cadastral map and the RAP and implementation of resettlement activities;
- Identify replacement land for affected households;
- Sign the DMS/Agreement Compensation Forms along with the affected households;
- Corporate with BVEC and DCC in organizing consultation and participation of displaced persons
- Contact window of grievance redress throughout the project implementation period as well as assist in the resolution of grievances; and,
- Actively participate in all resettlement activities and concerns.

The following figure shows the structure of relevant entities.



Source: JICA Study Team

Figure 7.3.12-2 Structure of Relevant Entities

7.3.13. Summary of Project Prospect Survey

Survey to confirm prospect of PAPs' to BHVT Phase1 was conducted targeting all PAPs in parallel with census since understanding prospects or concerns of PAPs is important to examine compensation policy. Results of the survey is outlined below, and detailed results are shown in the Census report enclosed in Attachment 6. BVEC updates RAP and prepares IRP at the time of D/D by consulting with relevant authorities and reflecting comments obtained at perception survey and public consultation meetings.

Table 7.3.13-1 Summary of PAP's Prospect to the Project

	Survey Item	Major Opinion
1	Benefit from by the Project	Approx. 52% of PAPs at the alignment section did not see any benefit from the project though 14% of PAPs saw any benefits. As for JCT/IC section, approx. 46% of PAPs did not expect any benefits from the project.
2	Kinds of Benefit	Approx. 60% out of 14% of PAPs who expected any benefits from the project considered the project would contribute for the economic development at the entire Vietnam. Approx. 30% of PAPs expected mitigation of traffic jam, and 20% expected job opportunities. As for JCT/IC, 86% of PAP expecting any benefits from the project considered economic development at the entire Vietnam following 64% of PAPs expecting regional development.
3	Impact by the Project	40% of PAPs in the alignment section concerned loss of income source or productive land, and 20% of PAPs concerned distance of working place after relocation. As for JCT/IC section, most of people concerned noise during the construction phase (approx. 86%). In addition, PAPs concerned community diversion or air pollution during the construction phase.
4	Compensation Method for Impact to Land	PAPs in the alignment section requested compensation cost in replacement cost, which is also same as JCT/IC section.
5	Compensation Method for Impact to Structure	70% of PAPs in Tan Thanh district, 50% of PAPs in Long Thanh district and Bien Hoa city in the alignment section requested compensation in replacement cost. On the other hand, 40% of PAPs in Long Than district and Bien Hoa city and 20% of Tan Thanh district requested compensation in alternative land. There is a minority opinion that compensation should be done in the provincial rate. As for JCT/IC, most of PAPs requested compensation in replacement cost.
6	Income Restoration Program	The majority of PAP in the alignment section at Tanh Than district requested establishment of small scale business model (45%) though providing loan to PAPs was the major opinion in Long Thanh district (33%). In the alignment section at Bien Hoa city, there were many opinion requesting establishing small scale business model and providing vocational training. As for JCT/IC section, similar result was observed.

Source: JICA Study Team

7.3.14. Public Consultation Meetings

Public consultation Meetings (hereinafter PCMs) offer opportunities for people to participate in the process of the project design, development and its implementation. In the process of preparing EIA by BVEC on 2011, project information was disclosed to the limited stakeholders in a written form according to the procedure stipulated in the Vietnamese regulation. In addition to disclosure in a written form, interview was conducted to the selected 212 households (i.e. 10 households at all affected communes, 21 comments in total) in the project area according to requirements in Decision No. 14/QD-BGTVT dated 6th January 2011.

i) enhancement of understanding of project,
ii) enhancement of understanding of RAP framework including land acquisition impact, compensation policy, grievance redress procedure and expected schedule of land acquisition, and
iii) reflecting PAP's comments to RAP. In addition, outline of the approved EIA and study result of additional environmental study was also explained.

1) Target Area

16 PCMs in total were organized at commune-wise.

2) Stakeholder Identification

Target invitees to the PCMs were PAPs identified in the latest drawing of the project alignment and official cadastral map. Since the PCMs also played a role to disclose the approved EIA and findings of additional environmental study, representatives of the surrounding communes and NGOs were also invited.

3) Method of Information Dissemination

Announcement of PCMs to target invitees were done by commune PCs based on the invitee list prepared by JICA Study Team, which was the traditional method to notify PCMs to target invitees in Vietnam. F/S of this project was not yet approved at the time of this survey period. Therefore, the handout explaining project scope, land acquisition scope and principle of donor policy on land acquisition was distributed to participants as enclosed in the RAP of Attachment 5.

4) Schedule of PCMs

PCMs were organized at the following schedule.

Table 7.3.14-1 PCMs for Draft RAP

	Commune/Town	District/City	Province	Date	Participants
1	Tam Phuoc	Bien Hoa	Dong Nai	18th Oct., 2012	Total 46 people: - 32 PAPs in total including 15 women - 2 people from Commune PC - 3 people from Mass organizations - 4 leaders from communes near the project area - Project implementing agency side (BVEC 2 people, Consultant 3 people)
2	Hac Dich	Tan Thanh	Ba Ria Vung Tau	24th Oct., 2012	Total 72 people: - 60 PAPs in total including 13 women - 2 people from Commune PC - 3 people from Mass organizations - 3 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 3 people)
3	Toc Tien	Tan Thanh	Ba Ria Vung Tau	25th Oct., 2012	Total 27 people: - 16 PAPs in total including 6 women - 2 people from Commune PC - 3 people from Mass organizations - 2 leaders from communes near the project area - Project implementing agency side (BVEC 2 people, Consultant 3 people)

	Commune/Town	District/City	Province	Date	Participants
4	Phuoc Tan	Bien Hoa	Dong Nai	26th Oct. 2012	Total 88 people: - 74 PAPs in total including 8 women - 2 people from Commune PC - 4 people from Mass organizations - 3 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 3 people)
5	Phu My	Tan Thanh	Ba Ria Vung Tau	1st Nov., 2012	Total 29 people: - 17 PAPs in total including 6 women - 1 person from Commune PC - 1 person from District DONRE - 3 people from Mass organizations - 3 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 3 people)
6	My Xuan	Tan Thanh	Ba Ria Vung Tau	1st Nov., 2012	Total 18 people: - 8 PAPs in total including 3 women - 1 person from Commune PC - 2 people from Mass organizations - 3 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 3 people)

	Commune/Town	District/City	Province	Date	Participants
7	Tan Phuoc	Tan Thanh	Ba Ria Vung Tau	2nd Nov., 2012	Total 47 people: - 35 PAPs in total including 17 women - 2 people from Commune PC - 3 people from Mass organizations - 2 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 3 people)
8	Long An	Long Thanh	Dong Nai	9th Nov., 2012	Total 58 people: - 44 PAPs in total including 13 women - 2 people from Commune PC - 4 people from Mass organizations - 4 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 3 people)
9	Long Thanh	Long Thanh	Dong Nai	9th Nov., 2012	Total 18 people: - 10 PAPs in total including 3 women - 1 person from Commune PC - 2 people from Mass organizations - 2 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 2 people)

	Commune/Town	District/City	Province	Date	Participants
10	Loc An	Long Thanh	Dong Nai	10th Nov., 2012	Total 39 people: - 27 PAPs in total including 10 women - 2 people from Commune PC - 2 people from Mass organizations - 3 leaders from communes near the project area - 1 person from NGOs - Project implementing agency side (BVEC 1 person, Consultant 2 people)
11	Phuoc Binh	Long Thanh	Dong Nai	15th Nov., 2012	Total 55 people: - 42 PAPs in total including 10 women - 2 people from Commune PC - 4 people from Mass organizations - 3 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 3 people)
12	Phuoc Thai	Long Thanh	Dong Nai	15th Nov., 2012	Total 59 people: - 48 PAPs in total including 20 women - 1 person from Commune PC - 3 people from Mass organizations - 4 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 2 people)

	Commune/Town	District/City	Province	Date	Participants
13	Long Duc	Long Thanh	Dong Nai	16th Nov., 2012	Total 53 people: - 42 PAPs in total including 10 women - 2 people from Commune PC - 2 people from Mass organizations - 3 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 3 people)
14	Tan Hiep	Long Thanh	Dong Nai	16th Nov., 2012	Total 44 people: - 32 PAPs in total including 12 women - 2 people from Commune PC - 2 people from Mass organizations - 4 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 2 people)
15	Long Phuoc	Long Thanh	Dong Nai	17th Nov., 2012	Total 68 people: - 56 PAPs in total including 17 women - 2 people from Commune PC - 2 people from Mass organizations - 4 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 3 people)

	Commune/Town	District/City	Province	Date	Participants
16	An Phuoc	Long Thanh	Dong Nai	30th Nov., 2012	Total 33 people: - 23 PAPs in total including 8 women - 1 person from Commune PC - 2 people from Mass organizations - 3 leaders from communes near the project area - Project implementing agency side (BVEC 1 person, Consultant 3 people)

Source: JICA Study Team

5) Results of PCM for Scoping

During the discussions in the PCMs, the main issues raised were compensation rate and exact/detailed location of the project area/alignment. Other important issues were the assistance for livelihood rehabilitation, relocation sites, securing accessibility to the other side of the expressway. Major discussion points are enclosed in RAP in Attachment 5.

7.3.15. Compensation Cost

Compensation was estimated in replacement cost based on the results of census, inventory of loss, socioeconomic survey and market value survey conducted from May to July 2012 by the valuation team of Dong Nai Valuation Corporation. Members of the valuation team were authorized valuers by Dong Nai PPC. The cost for the allowances and resettlement assistance included the items described in the entitlement matrix. There were some differences in level of allowances in Dong Nai and Ba Ria Vung Tau provinces. Then, the higher levels were used to calculate the allowances. Necessary budget for compensation and assistance shall be prepared by BVEC or the government in timely manner. Comparison of unit price between market value and PPC rate is enclosed in the replacement cost survey report attached in RAP of Attachment 5. Compensation cost in Table 7.3.15-1 includes necessary cost for all PAPs not interviewed in this RAP study and cost for expert to implement IRP.

Table 7.3.15-1 Estimated Compensation Cost at the Alignment Section

No.	Items	Quantity	Total (VND)	USD
I	**Compensation for Land**	**m^2**		
1	Residential	54,800	40,496,483,500	**1,944,609**
2	Agricultural	2,099,202	462,706,920,000	**22,218,820**
3	Non-agricultural	69,291	16,232,426,000	**779,468**
4	Other	40,308	2,703,916,800	**129,840**
	Total I		**522,139,746,300**	**25,072,737**
II	**Compensation for house**	**m^2**		**-**
1	Category 1	-	-	**-**
2	Category 2	373	1,417,400,000	**68,062**
3	Category 3	2,328	7,226,550,000	**347,013**
4	Category 4	51,217	122,921,916,000	**5,902,613**
5	Category 5	1,015	1,218,360,000	**58,505**
	Total II	**54,934**	**132,784,226,000**	**6,376,193**
III	**Compensation for secondary structures & public works**			**-**
1	**Total III**		**24,951,408,300**	**1,198,147**
IV	**Compensation for crops and trees**			**-**

No.	Items	Quantity	Total (VND)	USD
	Total IV		**446,092,864,000**	**21,421,026**
V	**Allowances/ Assistance**			**-**
1	**For Impact on Residential Land**		**5,334,000,000**	**256,134**
1.1	*Relocation within the province*	186 HHs	1,116,000,000	**53,589**
1.2	House Repairing Cost	424 HHs	2,544,000,000	**122,161**
1.3	House Renting Allowance	186 HHs	1,674,000,000	**80,384**
2	**Impact on Agricultural Land**			**-**
	Allowance for Living/		**378,278,160,000**	**18,164,618**
2.1	*Production Stabilization*		5,959,440,000	**286,168**
2.2	*Assistance for changing job*		366,714,720,000	**17,609,350**
2.3	*Vocational Training*	934 persons	5,604,000,000	**269,100**
3	**Other Allowances**		**11,497,000,000**	**552,077**
3.1	Business interruption Allowance	23 HH non-registered	23,000,000	**1,104**
		12 HH registered	120,000,000	**5,762**
3.2	Incentive Bonus	1499HHs	8,994,000,000	**431,885**
3.3	Allowance for Vulnerable group	236 HHs	2,360,000,000	**113,325**
	TOTAL V		**395,109,160,000**	**18,972,829**
VI	**Income restoration program**			**-**
	Total VI	**498 HHs**	**12,604,000,000**	**605,234**
VII	**Resettlement sites development**			**-**
	Total VII	**200 land plots**	**30,000,000,000**	**1,440,576**
	TOTAL I-VII		**1,563,681,404,600**	**75,086,742**
VIII	Implementation cost (2% of total I-VII)	2%	31,273,628,092	**1,501,735**
IX	Contingency (10% of total I-VII)	10%	156,368,140,460	**7,508,674**
X	External monitoring		1,500,000,000	**72,029**
XI	Replacement cost survey		1,000,000,000	**48,019**
	TOTAL OF RESETTLEMENT BUDGET		**1,753,823,173,152**	**84,217,199**

Source: JICA Study Team

Table 7.3.15-2 Estimated Compensation Cost at IC Section

No.	Item	Long Thanh IC		Long Duc IC	
		VND (1,000)	USD	VND (1,000)	USD
I	Land	107,118,815	5,143,761	42,436,930	2,037,788
II	Main Structures	14,107,200	677,417	2,652,000	127,347
III	Second Structures	9,361,595	449,536	480,660	23,081
IV	Crops and Trees	1,324,602	63,606	401,514	19,280
V	Allowances	55,313,427	2,656,107	15,515,571	745,045
VII	**Income restoration program**	**1,830,000**	**87,875**	**490,000**	**23,529**
	TOTAL I-VII	**189,055,639**	**9,078,302**	**61,976,675**	**2,976,070**
VIII	Contingency (10% of total I-VII)	18,905,564	907,830	6,197,668	297,607
IX	Implementation cost (2%)	3,781,113	181,566	1,239,534	59,521
	TOTAL	**211,742,316**	**10,167,698**	**69,413,876**	**3,333,198**

Source: JICA Study Team

7.3.16. Land Acquisition Schedule

BVEC/SPC needs to obtain approval from the jurisdiction ministry, the donor and relevant authorities such as PPC, and RAP prepared at the time of F/S is updated during the D/D stage. Updated RAP is also necessary to be approved by the jurisdiction ministry, the donor and relevant authorities such as PPC. Construction of the Project is planned to be started from the middle of 2015. Based on this condition and the latest project implementing schedule as of March 2013, the tentative land acquisition schedule including responsibility of each relevant authority is presented in Table 7.3.16−1.

Table 7.3.16-1 Tentative Land Acquisition Schedule of Phase 1

		Responsibility	2013				2014				2015			
			1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
	<Project Implementation>													
1	Project Approval (to be approved in 2012)													
2	Formulation of Project Implementing SPC		from middle of 2012											
3	Detailed Design													
4	Construction Work												until middle of 2018	
	<Land Acquisition & Resettlement>													
1	**Updating RAP**													
1-1	Census	SPC												
1-2	Updating Inventory of Asset Loss	SPC												
1-3	Updating Socio-Economic Survey	SPC												
1-4	Replacement Cost Survey	SPC												
1-5	Data Analysis and Report Preparation	SPC												
1-6	Public Consultation Meeting	SPC												
1-7	Approval of Updated RAP	MOT												
2	**Offical Procedure under Vietnamese Regulation**													
2-1	Preparation of Comprehensive Comensation, Support and Resettlemnet Plan	SPC/DONRE												
2-2	Approval of Comensation, Support and Resettlemnet Plan	SPC/District People's Committee												
2-3	Issuing a Land Acquisition Decision (cut-off date)	Provincial People's Committee												
2-4	Sending Land Acquisition Decision to PAPs	District People's Committee												
2-5	Conducting Detailed Measurement Survey	District People's Committee												
2-6	Preparation of Detailed Compensation Suport and Resettlement Plan (Detailed Plan)	District People's Committee												
2-7	Disclosure of assessment result	District People's Committee												
2-8	Collection of Public Comments	District People's Committee												
2-9	Revision of Detailed Plan	District People's Committee												
2-10	Approval of Detailed Plan	District People's Committee												
2-11	Disclosure of Detailed Pla	District People's Committee												
2-12	Sending Land Acquisiton Decision to PAPs	District People's Committee												
2-13	Compensation Payment	District People's Committee												
3	**Transferring Ownership & Evacuation**													
	<Monitoring>													
	Internal Monitoring	SPC												
	External Monitoring	SPC												

Source: JICA Study Team

7.3.17. Monitoring for Land Acquisition

Monitoring is necessary to be conducted during and after land acquisition to confirm; i) progress of land acquisition according to RAP, ii) verification of proposed measures in RAP and iii) necessity of further measures of land acquisition which is not foreseeable at the time of RAP preparation. Monitoring will be conducted by the project implementing agency (i.e. SPC Management in BHVT Phase 1) as the internal monitoring and independent professional entity hired by SPC Management as the external monitoring.

(1) Internal Monitoring

Internal monitoring is the activity that SPC Management confirms progress of land acquisition and resettlement in accordance to the policies and schedule prepared in RAP from the available data to be provided by the commune/district people's committees.

1) Monitoring Indicators

The monitoring responsible department in SPC collects necessary information on the following indicators every month from concerned people's committees.

a) Compensation and assistance are properly provided in accordance with the approved RAP, with no discrimination according to gender, vulnerability, or any other factor;
b) Affected households are paid their compensation and other entitlements as per approved updated RAP, ensuring that all entitlements are delivered as planned and agreed, including compensation in cash or in kind, allowances, replacement land, resettlement sites developed and people moved onto them;
c) Income restoration programs designed and delivered including modifications in the programs and provision of additional cash and in-kind assistance to the participating affected households as and when necessary;
d) Public information, public consultation and grievance redress procedures are followed as described in the approved RAP;
e) Livelihood and living standard of affected persons are restored/re-established. Special attention given to severely affected and vulnerable households.
f) Affected public facilities and infrastructure are restored promptly; and
g) The transition between resettlement and commencement of civil works is smooth and that sites are not handed over for civil works until affected households have been satisfactorily compensated and resettled.

2) Monitoring Methodology

The monitoirng responsible department in SPC will collect information and data of resettlement progress and any concerned issues monthly from concerned people's committees. The collected information and data of resettlement progress and any concerned issues will be compiled in the developed database system, and will also be reported to SPC Management monthly.

3) Monitoring Timing

Internal monitoring will be implemented from the land acquisition process starts until completion of site clearance.

(2) External Monitoring

The general objective of independent monitoring is; (i) to provide an independent periodic review and assessment, (ii) to assess achievement of resettlement objectives, (iii) to assess changes in living standards and livelihoods, (iv) to assess restoration and/or improvement of economic and social base of the affected people, (v) to assess effectiveness and sustainability of entitlement, (vi) to identify the need for further mitigation measures, and (vii) to identify strategic lessons for future policy formulation and planning. The draft TOR for external monitoring is enclosed in RAP of Attachment 5.

1) Monitoring Indicators

The monitoring responsible department in SPC collects necessary information on the following indicators every month from concerned people's committees.

a) Compensation and assistance are properly provided in accordance with the approved RAP, with no discrimination according to gender, vulnerability, or any other factor;
b) Affected households are paid their compensation and other entitlements as per approved updated RAP, ensuring that all entitlements are delivered as planned and agreed, including compensation in cash or in kind, allowances, replacement land, resettlement sites developed and people moved onto them;
c) Income restoration programs designed and delivered including modifications in the programs and provision of additional cash and in-kind assistance to the participating affected households as and when necessary;
d) Public information, public consultation and grievance redress procedures are followed as described in the approved RAP;
e) Livelihood and living standard of affected persons are restored/re-established. Special attention given to severely affected and vulnerable households.
f) Affected public facilities and infrastructure are restored promptly; and
g) The transition between resettlement and commencement of civil works is smooth and that sites are not handed over for civil works until affected households have been satisfactorily compensated and resettled.

2) Monitoring Methodology

SPC Management will hire a professional personnel or firms in the third party position to conduct independent monitoring. The monitoring will be conducted with the following methodologies;

(a) Reviewing the collected/existing information and data such as household survey results

in RAP and internal monitoring report

(b) Reviwing the result of detailed measurement survey (DMS)[37] including the process of DMS to evaluate whether DMS is conducted in transparent manner and appropriately

(c) Interview to key informats

(d) Conduting focus group discussion or consultation meeting in affected communes

(e) Interview to PAPs (at least 10% of all PAPs and 20% of severly affected PAPs)

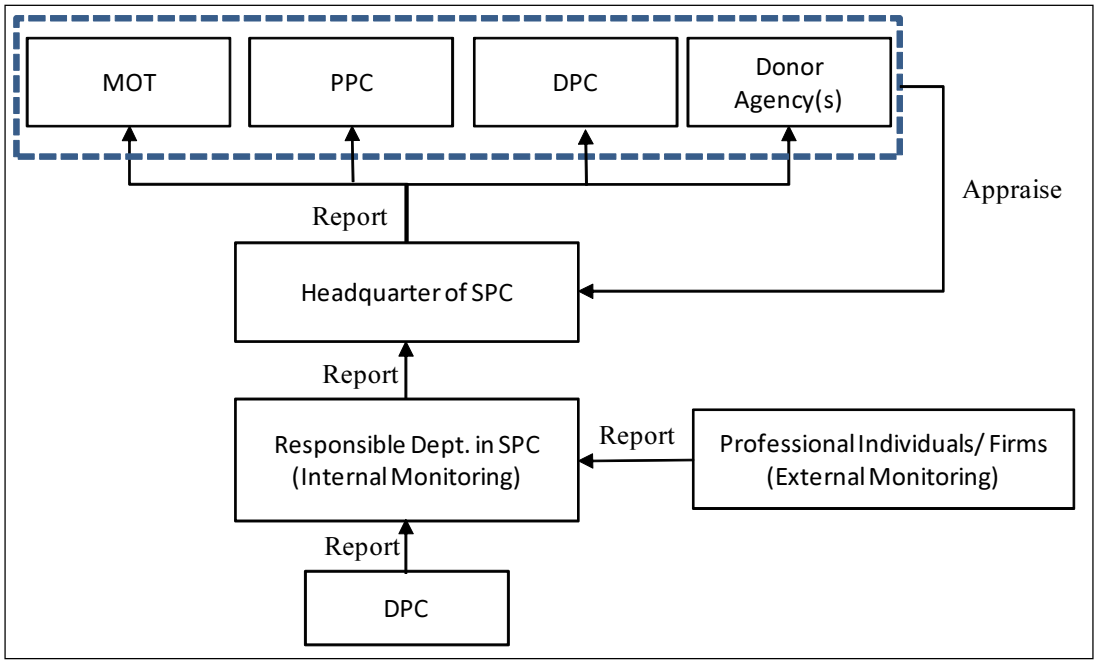
3) Monitoring Timing

External monitoring will be implemented from the official procedure of land acquisition starts (i.e. announcement of land acquisition from PPC) until 6 to 12 months following completion of the resettlement. Monitoring frequency will be quarterly basis during land acquisition and biannual basis at post-land acquisition period.

(3) Reporting

Internal and external monitoring results will be compiled by the responsible department in SPC, and compiled report of monitoring result will be submitted to SPC Management. The monitoring report is submitted from SPC Management to MOT, PPC, DPC and donor agency(s) quarterly for their appraisal. The overall monitoring structure is shown in Figure 7.3.17-1. The sample of monitoring form and monitroing report form are encosed in the RAP of Attachment 5.

[37] DMS is a part of official procedure of land acquisition in Vietnam, and is conducted by the council for compensation, support and resettlement, which is established in a district when land acquisition decision is issued by the provincial people's committee. Figure 7.3.12-1 shows the flow of RAP preparation including DMS.



Source: JICA Study Team

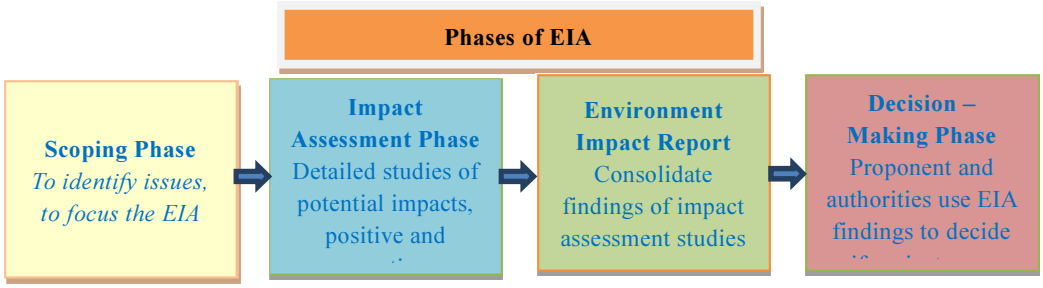
Figure 7.3.17-1 Structure of Monitoring Reporting

7.4. Preparation of TOR for Implementation of EIA for Phase 2 Section

7.4.1. Preface

1) Purpose of scoping

In general, scoping is defined as ""Scoping" means choosing alternatives for analysis, a range of significant and potentially significant impacts, and study methods" (JICA Guidelines for Environmental and Social Considerations). Scoping can be ranked as a first phase in the procedures/process of EIA as shown the figure below:



Source: JICA Study Team

Figure 7.4.1-1 Scoping phase in an EIA process

As shown above, scoping is a phase throughout in which the issues and the public concerns need to be identified in order that the relevant issues can be evaluated by technical experts on environmental impact assessment for the next stage (impact assessment phase) of the environmental impact assessment.

The main purpose of scoping in the course of EIA is to provide information to the competent authorities, stakeholders regarding the overview of Construction of BHVT Expressway Project phase 2 to help them understand the characteristics of the Project from which they can be provided a range of suitable idea relevant to the implementation of EIA.

The scoping of this study covers the following purposes:

- To provide an overview information of the Project,
- To consider existing sources of data/information,
- To present an overview of the regional environment, and
- To identify potential impacts associated with the Project.

Consultation with stakeholders will be discussed separately in other section.

7.4.2. Target Area for Scoping

The area of scoping in this study covers the BHVT Expressway phase 2 as shown below:

- Phu My- Vung Tau section (Km 39 +000 - Km68 +670): construction of expressway with 4 lanes for about 29. 7km length

7.4.3. Legal basis for Implementation of EIA

The major legal documents related with requirement in environmental impact assessment in Vietnam are indicated as follows:

- Law on Environment Protection No. 52/2005/QH11 dated November 29th, 2005 of Vietnamese Parliament.
- Decree No. 29/2011/NĐ-CP dated 18/04/2011 regulating the strategic environment assessment, environmental impact assessment, commitments on environmental protection
- Circular No. 26/2011/TT-BTNMT dated 18/07/2011 of Ministry of Natural Resources and Environment for the Guidelines on detailing some articles of Decree No. 29/2011/ND-CP dated 04/18/2011 of Vietnamese Government about strategic environmental assessment, environmental impact assessment and environmental commitment.
- JICA Guidelines and the World Bank's Safeguard Policies such as Op. 4.01 - Environmental Impact Assessment is refereed as international standards for this study.

7.4.4. Methods for the scoping

In this study, the scoping was carried out applying the methods summarized in the table below

Table 7.4.4-1 Methodology for Scoping

Method	Contents
Baseline studies	Readily available data and local knowledge shall be required for scoping. Once key issues have been identified, the need for further in-depth studies can be clearly identified and any additional data collection initiated. Data on environmental conditions and quality in the approved EIA report for phase 1 is useful for this study.
Checklist	A range of criteria shall be used to scope potential impacts for phase 2. The criteria in the form of checklist is based on environmental checklist of JICA for road section, relevant legal frameworks and environmental standards in Vietnam, principles of EIA good practice, and knowledge of the project and its typical impacts and their mitigation. Experience from similar project in Vietnam such as HCM-Long Thanh-Dau Giay expressway project and Ben Luc–Long Thanh expressway project shall be applied for this study.
Matrix	Listing activities along the horizontal axis and environmental parameters along the vertical axis. In this way the impacts of both individual components of projects as well as major alternatives can be compared.
Site reconnaissance	All types of landscape and local land use shall be inspected to evaluate the prediction of potential impacts and effectiveness of proposed mitigation measures. Special attention shall be paid to sensitive areas.

Method	Contents
Public consultation	Interview key persons and local people to grasp public opinions regarding environmental impacts and mitigations.

Source : JICA Study Team

7.4.5. Description of Environmental Conditions in the Project Area

(1) Natural conditions

1) Topographical and geomorphological features

BHVT Expressway is located in relatively homogeneous terrain without sharp separation and split. The terrain is gradually sloping to the sea, which is typical in the Southeast region. (to be added)

(2) Meteorological conditions

The project area belongs to the tropical monsoon climate equatorial, sunny, windy and there is no winter. This climate has high temperatures all year round with two distinct seasons (rainy and dry seasons). Climate is less volatile, less a disaster, with the weather not too cold or too hot, little storm.

Yearly average of air temperature is 27.0oC. Difference of temperature between the hottest and the coldest months is approximately 3 to 4oC, and daily difference of temperature is as high as 9.2oC.

- Absolutely high temperature: 38.3oC.
- Absolutely low temperature: 13.2oC.

Average rainfall in a year is 1.642mm. Rainy days in a year is 103 days. The rainy season lasts from May to November accounting for 93% of the total rainfall in a year. Rainfall increases from start season to mid-season, reaching a maximum in September. Dry season lasts from December to April of next year. The average rainfall of every month is about 5 - 61mm. Total rainfall during the months of low rainfall is only about 6.2% of total rainfall of a year. February have the lowest rainfall.

Prevailing wind direction in the area changes seasonal. The wind direction is West to Southwest from April to September. The wind blows from East to Southeast from January to April. Average annual wind speed is 1.8 m/s. The strongest wind speed usually occurs in August, reaching up to 25m/s.

Yearly average humidity is 78%. Wet periods coincide with the rainy season (from May to November) with an average humidity 78-84%, the biggest humidity is from August to October. Dry period is first of the winter months (from December to April of next year) with an average humidity of 68-75%.

Yearly average of sunny hours: 2650.3 hours, all months of the year have the average number of sunshine hours per month over 160 hours. Sunny period focused on December to May of next year, with average hours of sunshine per month over 230 hours.

(3) Hydrological features

1) Regional hydrological regime

For rivers and streams in the project area, basin is not large, the flow depends heavily on rainfall in the basin; main bed of rivers and streams is small; Surface runoff in the area near main bed is common. All rivers, streams flow in the northeast – southwest and pour into Dong Nai river. Therefore, hydrological regime of rivers and streams in the area along the route is of hydrological features of Dong Nai River.

The dry season of Dong Nai river basin lasts from November to April of the next year, the rainfall only account for 20% of annual rainfall. The rainy season lasts from May to October, the rainfall only accounts for 80% of annual rainfall, mainly in August and September with flood in many regions in Dong Nai. The hydrological regime of Dong Nai river basically depends on rain regime and tidal features from the East. The average flow module throughout the basin is about 25 l/s.km2, but this value is different among rivers. The capacity of Dong Nai river in the rainy season in Bien Hoa after Tri An reservoir has been built is from 1,500 to 1,800 m3/s, then water level on Dong Nai river in Dong Nai bridge is about 2 □ 2.2 m; the capacity in the dry season is from 230 to 300 m3/s with the water level in Dong Nai bridge of -1.5□ -2 m. Operation of reservoir such as Tri An, Dau Tieng has much influence on the river flow. During 2001-2010, when many reservoirs are being built and put in operation such as Phuoc Hoa, Thac Mo, Dai Ninh, Da Mi, Dong Nai 3, 4, 6, 8, and Ham Thuan, etc; the flow features in downstream of Sai Gon – Dong Nai river system are changed. Currently, the flow rate of Dong Nai river in the dry season is low, self-cleaning and dilution of pollutants is very low; so the river is easily polluted. This situation becomes more serious after Phuoc Hoa irrigation reservoir is put in use. Dong Nai river in the project area is affected by semidiurnal tide (tide rises twice a day). The sections near estuary into Dong Nai river of rivers and streams are influenced by tides.

The end route is strongly affected by tide through tidal canal, typically Cua Lap canal – Co May river, corresponding to Co May bridge on NH51. Tidal rivers in this area are small with quite large bed due to influence of strong tides; river water is very salty; water level is up and down one or two times a day with amplitude from 1.5m to over 2.0m.

2) Flooding in the Project area

According to hydrological investigations along the route, flooding only occurs at locations along rivers and streams. Other positions are not be flooded due to high terrain. With high terrain, the project area should not be flooded in the whole region. Flooding only occurs in areas along rivers and streams; in which the years with highest flood were 1996, 2008 and 2009.

(4) Ecosystem

1) Non-living resources

i) Land resources

Land is rich and fertile, formed mainly on basalt, ancient alluvial layer and new one as alluvial soil.

- Soil formed on basalt has high fertility, distributed mainly in the first half of the route. The soil is suitable for short and long-term industrial trees such as rubber, cashew, coffee and pepper, etc.
- Soil formed on ancient alluvial layer is interspersed with basalt and along the route. The soil has low fertility, suitable for short-term trees such as bean; fruit trees and long-term industrial trees such as cashew, etc.
- Soil formed on new alluvial layer as alluvial soil, is mainly distributed along rivers, streams, and reservoirs along the route and tidal land. The beginning part has good quality, suitable for crops such as cereals, vegetables, fruits, etc; the end part is salty and exploited for aquaculture and salt production.

ii) Water resources

The surface water in the project area is provided from rivers and streams: Buong, Ca, Dinh, etc. It starts in the province and flows into Dong Nai river and Thi Vai river. In general, these rivers and streams are small, the parts near the sea are salty. The flow distribution is unequal in both space and time; so some areas are flooded and the others are seriously drought. In dry season, some rivers and streams are completely depleted or have very low flow rate; which cause big disadvantages in the provision of water for production, living and disputes in the exploitation and use of water resources.
Downstream of the rivers is strongly affected by tides and salt-water intrusion. Thus, agricultural water is complicated, many areas are seriously in shortage of water causing many cultivated areas uncultivated.
Static water reserve of Dong Nai is 793,379m3/ day, in which, capacity reserve (reserve of static gravity) is 789,689m3/day and elastic volume is 3691m3/day. Static water reserve of Ba Ria – Vung Tau is lower, about 70,000m3/day and night. This is the underground water supplied for agriculture, industry and daily life. Although the underground water reserve is abundant, it is distributed unequally. At the areas near the sea, underground water of shallow layer is usually salty in dry season that requires high exploitation demand. Hence, the underground water should be exploited reasonably.
Suoi Nhum reservoir is one of artificial reservoirs mainly used for irrigation for trees and living. Main chemical composition of the reservoir water is sodium bicarbonate with low mineralization (about 0.1-0.2g/l), very light-salted. Suoi Nhum reservoir is being

exploited with the capacity of 10,000m3/ day and night and expected to increase the capacity to 20,000m3/ day and night.

2) Living resources

Along the project route, there is no longer natural flora. They are replaced by artificial ecosystems. Natural types only exist in the form of grassland, coppice alternated in the artificial vegetation. There is no rare species recorded in Vietnam Red Book. The mangrove with high biological value is Thi Vai that is nearest to the project route of 1.5 km. Biosphere reserve area of Can Gio mangrove is 4 km from the project route.

(5) Environmental quality

Environmental quality in the project area was surveyed in October 2010 by TEDI and result is presented as follows:

1) Quality of air, noise and vibration

16 locations were selected for surveying quality of air environment including dust (TSP and PM10), toxic gases (CO, NO2, SO2) and noise, vibration:

i) Comparison with Vietnamese standard QCVN 05:2009/BTNMT:

- Concentration of toxic gas (CO, SO2, NO2) is less than permissible level;
- In general, total suspended particulate (TSP) and dust PM10 on average 24 hours at all measurement points are less than permissible level. However, at point KK14 (the end point), TSP concentration on average 1 hour is 1.23 time higher than permissible level.
- Thus, air quality in the project area is quite fresh without dust pollution and toxic gases (except for intersection with NH51). According to DONRE of Ba Ria Vung Tau province the reason for high TSP is that measurement was conducted during implementation of expansion of NH 51, that caused dust in surrounding environment.

ii) Noise: Compared to permissible level under Vietnamese Standard QCVN 26:2010/BTNMT, noise level at some points as intersection with provincial road 328, intersection with NH55 and the end point of the branch line connecting Phu My – NH51 is higher than permissible level. Causes of noise pollution are large traffic flow and road repair.

iii) Vibration: Compared to permissible level under Vietnamese Standard 7210:2002, vibration level in the project area is lower than permissible level. Thus, the project area has no vibration pollution from traffic activities.

2) Surface water quality and sediment quality

i) Surface water quality

a) For Suoi Nhum reservoir, the available water is used for living activities; compared to Vietnamese Standard QCVN08:2008/BTNMT, type A2, it can be found that:

- Physio-chemical factors: pH indicators and concentration of TSS of analyzed samples are within the limit of permissible level;
- Biochemical factors: concentration of DO, BOD and COD are within the limit of permissible level;
- Heavy metals: concentration of heavy metals are within the limit of permissible level;
- Oil content at all locations are within the limit of permissible level;
- Microbiological factors (Total Coliform, E.coli): E.Coli and Coliform are within the limit of permissible level.

b) For the remaining rivers and streams; compared to Vietnamese Standard QCVN 08:2008/BTNMT, type B1, it can be found that:

- Physio-chemical factors: pH indicators of analyzed samples are within the limit of permissible level; Concentration of TSS at Song Buong bridge, Quan Tre bridge, Giao Keo 1 bridge and Dinh Vuong river bridge are 2.8-3.6 time higher than standards;
- Biochemical factors: Concentration of DO exceeds lower limit of Vietnamese Standard QCVN 08:2008. Concentration of BOD and COD are within the limit of permissible level;
- Heavy metals: Except for Fe whose concentration is 1.1-5.9 time higher than permissible level at Suoi Cai bridge, Co May bridge, Cay Khe bridge; the concentration of other metals are within the limit of permissible level;
- Oil content at all locations are within the limit of permissible levels.
- Microbiological factors (Total Coliform, E.coli): Most of rivers are contaminated with E.Coli. Suoit Quan bridge, Nuoc Trong bridge, Quan Tre bridge, Suoi Cai bridge and Cay Khe 1 bridge are contaminated with Coliform.
- Water pollution at rivers in the project areas due to E.Coli, Coliform reflect domestic wastewater treatment and economic activities in the project area. The rivers in the area get direct discharge of all wastes of communities living along the rivers. TSS contamination reflects water state of rivers when the water flow washes muddy soil on two river sides in the rainy season. Fe contamination may be due to production activities of industrial areas in the area.

ii) Sediment quality

a) Compared to Standard FAO ISO 9000, contents of heavy metals in sediment at rivers and streams are within limit of permissible level.

3) Groundwater quality

10 locations were selected for surveying quality of underground water. The results were compared to Vietnamese Standard QCVN 09:2008/BTNMT:

i) Physio-chemical factors: pH indicators, hardness and TSS of analyzed samples are within the limit of permissible level;

ii) Biochemical factors: concentration of COD is lower than permissible level;

iii) Heavy metals: its concentration is lower than permissible level;

iv) Microbiological factors: Except for groundwater in Tam Phuoc commune that is not contaminated with microorganisms; groundwater in Phuoc Tan, Hoa Long communes and Ward 12 in Vung Tau city is contaminated by E.coli and Coliform. The remaining samples are contaminated by Coliform (3-22 times).

4) Soil quality

10 locations were selected for survey, sampling of soil quality. The results compared to Vietnamese Standard QCVN 03:2008/BTNMT, contents of heavy metals in soils in the project area are lower than permissible level.

7.4.6. Scoping

(1) Positive impacts

The BHVT Expressway project has great significance in the development of Vietnam transport systems, especially in economic areas of the South and the Mekong River Delta (MRD). The project will contribute important role in the industrialization and modernization of the country in the next decade as well as create good conditions for poverty alleviation and the socio-economic development in the provinces.

In addition, the formation of the expressway will be the key impetus to force and maintain growth rate, the role and position of the region compared to the country. This road was built to reduce the burden of traffic for NH 51. It will reduce the duration of carriage of goods to the port, increasing cargo capacity and passenger from HCMC to the port and vice versa. The formation of the highway is also prerequisite for the development of industrial zones, urban areas in the region, helps to improve transport infrastructure and is one key factor to form the Long Thanh international airport as well as other transport hubs.

(2) Potential environmental impacts due to the implementation of the Project

To evaluate all the problems that may arise when any projects are implemented, the potential impacts are assembled in the form of matrix of impacts. The matrix of impacts will give an

overview of the activities of the project, the environmental factors which will be affected by each activity and the level of their impact on the environment.
Table below summarizes the results of the scoping for Phase 2 of the Project.

Table 7.4.6-1 Results of Scoping

NO.	Item	Evaluation				Reasons
		Before		After		
		Posi	Nega	Posi	Nega	
Social environment						
1.	Involuntary Resettlement	D	A	D	B	Before operation：Preparation stage（Before construction)） (-)Removals and/or expropriations are expected due to that there exist residential area, agricultural land, vacant land along the proposed route After operation： (-)There are possibilities of difficulty of restoring livelihood and living conditions after resettlement.
2.	Daily life of people in surrounding areas	D	B	B	B	Before operation：Construction stage (-)Some temporary impacts are expected on the people in surrounding area due to dust, noise and vibration caused by the construction activities. After operation (+) Increase life of convenience with the operation of the expressway (-)There is a possibility of ambient air contamination by exhaust gas from moving vehicles on the Expressway
3.	Local economy such as employment and livelihood, etc.	B	B	B	B	Before operation：Construction stage (-)Small sized shops and stalls operating near construction sites are require temporary movement during construction period. There is a possibility of reduction of earning of farmers by expropriations. There is a possibility for fisherman to be hindered the fishery by the construction activities. (+)Employment opportunity might be increased due to the project implementation. On the other hand, commercial activities of local people is likely affected After operation： (+) To be activated local economy by operation of the expressway (-)There are possibilities for persons of involuntary resettlement of difficulties to earn living, to continue present job. Etc. at the resettled areas.
4.	Land Use	B	B	A	D	Before operation： (-)Disappearance and/or move of agricultural land or small sized business by land expropriation (+) Promotion of rise of land prices, development of local economy After operation： (-)There is a possibility of occurrence of effects on agricultural facilities such as irrigation facility. Countermeasures to prevent problems such as installation of irrigation canal are to be taken. (+) Promotion of rise of land prices, development of local economy
5.	Physical community division	D	C	D	C	Before operation, After operation (-)There is possibly that there will be temporary embankments and service roads and the expressway sections which would cause community division.

NO.	Item	Evaluation				Reasons
6.	Existing social infrastructures and services	D	B	B	D	Before operation：Construction stage (-)There is a possibility of inconvenience of access to public facilities, welfare facility, hospital, etc. by the implementation of construction. There is also a possibility of cutting off of drainage network for agriculture or agricultural land. Preliminary survey showed that some social sites are located along the expressway. Further investigation is required to fully identify the social infrastructure and propose suitable mitigations After operation: (+) Operation of the expressway could cause improvement of access to hospital and/or public facilities.
7.	The poor, indigenous and ethnic people	D	B	D	B	Before operation：Construction stage (-)There is a possibility for the poor, indigenous and ethnic people who move to the new resettlement areas have difficulty to earn livelihood. After operation： (-)There is a possibility for the poor, indigenous and ethnic people who move to the new resettlement areas have difficulty to earn livelihood. (+) Increase of employment opportunity with the implementation of the project. There are no residence areas of ethnic minorities.
8.	Misdistribution of benefit and damage	B	B	B	B	Before operation：Construction stage (+) The benefits and the damages caused by the construction are to be distributed as a whole. (-)Although involuntary resettlement will be compensated according to the laws of Vietnam, satisfactions of resettled peoples are not necessarily uniform. After operation： (+) Number of beneficiary will be increase by activated local economy (-)There is a possibility to occur difference of economic effect between the areas of near interchanges and other areas.
9.	Local conflict of interests	C	D	D	C	Before operation： (-)There is a possibility to occur local conflict of interests in case compensation of land and house is unequal. Degree of the conflict is unclear. After operation： (-)There is a possibility to occur the gap between persons who required the resettlement and persons who enjoy the benefit of the construction of the expressway. Degree of the gap is unclear.
10.	Water Usage or Water Rights and Rights of Common	D	B	D	D	Before operation：Construction stage (-)There are possibilities that the construction of expressway change or divide watercourses located in the Project area. These might affect water use, water rights and rights of common in the Project area. It is necessary to investigate the current conditions of irrigation, fisheries. After operation：

NO.	Item	Evaluation				Reasons
						(-)Impacts on hydrological conditions caused by the construction activity is limited. Hydrological conditions changed by the construction activities are restored to same conditions.
11.	Sanitation	D	B	D	D	Before operation：Construction stage (-)Some negative impacts on the local sanitary condition are expected, due to the mobilization of construction work force and/ or workers' site camps, excavation, transportation of excavation soil, although the expected impacts will be temporary during the construction stage.
12.	Hazards (Risk), Infectious diseases(HIV/AID etc.)	D	B	D	D	Before operation：Construction stage (-)Increment of risks are probably expected on infectious diseases among the construction work force and/ or in the workers' site camps, although the risk increment will be temporary during the construction stage.
13.	Agricultural land	D	B	D	B	Before operation： (-)Decrease of arable land due to expropriation After operation： (-)Decrease of harvest due to decrease of arable land area
14.	Cultural Heritage	C	C	C	C	Before operation, After operation： (-)Preliminary survey showed that some religious sites (pagodas and shrines) are located along the expressway. The project area is located in the area of Oc Eo culture and few antiques and relics have been discovered in Dong Nai and Ba Ria-Vung Tau province. Further investigation on cultural heritage is required and mitigation measures in case of heritage sites shall be proposed.
Natural Environment						
15.	Topography and Geographical features	D	B	D	B	Before operation：Construction stage (-)Activities of excavation, gathering of soil and embankment have a possibility to transform landform and/or cause land erosion. Measures for soft soil are to be taken. After operation: (-)Activities of excavation, gathering of soil and embankment have a possibility to transform landform and/or cause land erosion.
16.	Soil Erosion	D	B	D	D	Before operation：Construction stage (-)There is a risk of soil erosion due to construction on rivers/canals, cutting and embankment. Planned route does not pass areas of mountain and near mountain where easily to be eroded.
17.	Groundwater	D	D	D	D	Before operation：Construction stage (-)There is a risk of recession of groundwater level due to construction activities such as bentonite slurry used for construction of bored piles. But the impact is minor and negligible
18.	Hydrological situation	D	D	D	D	Before operation：Construction stage (-)It is expected that there is no impact on hydrological conditions with installation of permanent or temporary curvets to maintain water flows in and around the Project area.
19.	Flora, Fauna	D	C	D	C	Before operation, After operation：

NO.	Item	Evaluation				Reasons
	and Biodiversity					(-)The project area is agricultural land and residential land. It seems that there is no rare species listed in IUCN's Red list and Red data book of Vietnam. However, further confirmation is necessary.
20.	Meteorology	D	D	D	D	Before operation, After operation : (-)It is not expected that the Project will cause the significant change on the regional meteorological condition.
21.	Landscape	D	B	D	B	Before operation : Construction stage (-)There are no appearance preservation areas in the project area, but the landscape will be changed in a certain extent due to presence of the expressway. After operation : (-)Landscape will be changed in a certain extent due to presence of the expressway.
22.	Global Warming	D	B	B	D	Before operation : Construction stage (-)Construction activities generate the green house effect gases. Countermeasurement or construction techniques to reduce the generation or exhaust of the greenhouse effect gases are to be applied. After operation : (+) The project will reduce impacts to the environment in comparison with the non-project situation because circulation of vehicle on the expressway with high speed will emit less pollution load than that of on normal roads with lower speed and lower quality of road surface.
Pollution, Disaster, Accident						
23.	Air Pollution	D	B	D	B	Before operation : Construction stage (-)Although some negative impacts on air quality are expected due to operation of heavy equipment/ vehicles as well as traffic jam incidental to construction works, the expected impacts will be temporary during the construction stage. Increased vehicle traffic circulating on the expressway during operation phase will cause impacts to air quality such as dust and NO_2, SO_2, CO and THC from fuel combustion After operation : (-)Increased vehicle traffic circulating on the expressway during operation phase will cause impacts to air quality such as dust and NO_2, SO_2, CO and THC from fuel combustion in case of no exhaust gas control
24.	Water Pollution	D	B	D	B	Before operation : Construction stage (-)There is a risk of temporary water pollution due to excavation and cutting as well as wastewater discharge from worker's camp during construction. After operation : (-)In operation phase, there is a risk of surface runoff from roads and from service stations flowing through the area that have heavy metal, oils and grease, etc.
25.	Soil Contaminatio	D	B	D	B	Before operation : Construction stage (-)Soil will be impacted by oil/grease leakage from operation of heavy

NO.	Item	Evaluation				Reasons
	n					equipment and vehicles during construction. After operation： (-)In operation phase surface runoff from roads and from service stations flowing through the area that have heavy metal, oils and grease, etc. surface runoff will carry heavy metals and oils and greases into soil
26.	Waste	D	B	D	B	Before operation：Construction stage (-)There is a possibility that the construction work generates the construction waste such as excavation soil, construction demolish, waste from workers' camps, etc. in the construction stage After operation： (-)Dumping of wastes from moving vehicles is expected.
27.	Noise and Vibration	D	B	D	B	Before operation：Construction stage (-)Temporary impact of noise and vibration due to operation of heavy equipment and vehicles during construction are expected. Techniques and methods to reduce them are to be taken/applied. After operation： (-)Moving vehicles generate noise and vibration
28.	Ground Subsidence	D	D	D	D	Before operation, After operation： There is no activity which causes ground subsidence.
29.	Offensive Odor	D	D	D	D	Before operation：Construction stage Workers toilets and waste collection areas installed during construction period may become source of offensive odor. Sources of offensive order are temporary and area-limited.
30	Accidents	D	B	D	B	Before operation：Construction stage (-)There is a risk of accidents during construction work and transportation of heavy vehicles. After operation： (-)There is a risk of accidents resulting in injury or death, or collisions to domestic animals by moving vehicles.
A:: Serious impact is expected B: Some impact is expected C: Extent of impact is unknown. Further examination would be necessary. Impact may become clear as study progresses. D：No or negligible impact is expected. Further examination is unnecessary in the environmental study.						

Source：JICA Study Team

Table above identifies the content and extent of the environmental information to be focused in the process of the EIA. Based on the scoping table above, items of the potential negative impacts were assessed in IEE level study. Table below summarizes IEE level study:

Table 7.4.6-2 Summary of IEE Level Study

No.	Item	Current Situation	Potential Effects and Mitigation	Further Studies and Assessments
1	Involuntary Resettlement	Number of households and population in Phase 2 section: Household: 167,800, Population: 654,200	1,060 households, land owner and land user, are to be affected in Phase 2 section. Number of resettlement households is to be 120, and part of 99 residential lands is to be affected. Number of involuntary resettlement is not clear at present.	Details of involuntary resettlement including census is to be conducted in additional study.
2	Daily life of people in surrounding areas	Most of the project area is agricultural land. Most of the residents work on agriculture or small scaled business.	Conditions of area of Phase 2 are same as that of Phase 1 in general. There are possibilities that the implementation of the project brings about variety of socio environmental impacts such as; loss of agricultural land, loss and reduction of means of life, removal and/or movement of grave, school, utility pole, etc. Countermeasures applied to Phase 1 project are applicable.	Ranges and decrees of potential impacts mentioned left are confirmed in the additional survey. Countermeasures are examined referring those of Phase 1 taken.
3	Local economy such as employment and livelihood, etc.	Most of the residents work on agriculture or small scaled business.	Employment opportunity might be increased due to the project implementation. On the other hand, commercial activities of local people is likely affected	Additional survey on livelihood of affected people, number of employee, occupation, etc. is to conduct. Status of population and socio economic conditions are to be surveyed and evaluated based on latest information.
4	Land Use and agricultural land	Land use in the study area, including industrial land, agricultural land, and residential land. Through the survey showed that most routes go through areas of farmland and land for industrial crops, and salt field near the end of the	The impact will occur in the pre-construction phase. Baseline of land use and households affected by the project shall be conducted in consultation with stakeholders. The Investor needs to well apply the clearance - resettlement policy in accordance with local conditions and relevant policies and adequately implement compensation policies by the price at the time of the inventory as well as other supports such as support, support in career transition training, etc.	The assessment of land use shall include: - Number of affected households; - The area of each type of soil lost in whole or in part; - The number of crops and industrial crops will be lost and the existing building will be lost by the construction project. Environmental impact assessment report

		The densely populated areas along NH51 routes and local roads		shall clarify clearance methods and resettlement policy which will be applied.
	Physical community division	No physical community division at present	There are possibility of physical community division by temporary embankment, construction of construction road, and road alignment. Situation is to be improved by construction of cross roads.	Confirm the possibility of physical community division (place and degree) by the additional survey
5	Existing social infrastructures and services	Most of the area is agricultural land. There exist houses, small shops, salt pans and shrimp farming ponds.	Details of hospital, school, graveyard, utility pole, salt pan, etc. are not clear at present. Potential negative impact include: - The loss of land and infrastructure - Reducing traffic back and forth, reducing business to close temporarily because the road will be temporarily divided - Damage of income and employment - Divide the administrative boundaries - Relocation of graves scattered on the route - Impact on public health due to air pollution, water pollution, noise. Most of the other impacts are assessed as moderate level, local and temporary in construction phase and these effects can be overcome except for some effects such as relocation of graves, loss of land, proper compensation and resettlement, and management of workers and hygienic condition at construction sites.	Existing social infrastructure and services are to be surveyed in the additional survey. Through the survey, the details of livelihood of peoples, employment conditions, occupations, etc. are to be surveyed as well as evaluation of status of population and socio economic conditions based on collected data.
6	The poor, indigenous and ethnic people	A few ethnic peoples are living among Kinh people who have an absolute majority in the area. The ethnic peoples living in the area do not formulate their communities. They are living mingled among Kinh people, and	There is possibility to be the subject of resettlement.	The actual situation of the poor, indigenous and ethnic people is clarified through the additional survey.

		their life style is same as Kinh people.		
7	Misdistributi on of benefit and damage	No special problems	If the RAP and compensation is not properly implemented, there is a possibility of misdistribution of benefit and damage in pre-construction phase.	The activity of RAP is to implement by the compensation committees under PPCs. Through the additional survey, the policy, contents and procedures of the RAP are clarified.
8	Local conflict of interests	No special problems	Local conflict of interests due to project implementation is expected such as unequal or improper compensation for loss of land and houses	Hearings from local people are to be conducted in the additional survey. Reflecting the opinion of local people, proper RAP is to implement.
9	Water Usage or Water Rights and Rights of Common	No special problems	There are possibilities that the construction of expressway change or divide watercourses located in the Project area. These might affect water use, water rights and rights of common in the Project area. It is necessary to investigate the current conditions of irrigation, fisheries.	Current conditions of irrigation and fishery in the area are investigated in the additional survey.
10	Sanitation and Hazards (Risk), Infectious diseases	No special problems	Some negative impacts on the local sanitary condition are expected, due to the mobilization of construction work force and/ or workers' site camps, although the expected impacts will be temporary during the construction stage. Increment of risks are probably expected on infectious diseases among the construction work force and/ or in the workers' site camps, although the risk increment will be temporary during the construction stage.	Number of the mobilization of construction workers and the places of site of camps are investigated in the additional survey. Countermeasures are to be examined referring to Phase 1 case.
11	Cultural Heritage	Preliminary survey showed that some religious sites (pagodas and shrines) are located along the expressway. The project area is located in the area of Oc Eo culture and few antiques and relics have been discovered in	In case finding of cultural heritages and religious sites in the area, following measures are required. • Protect religious sites with awareness campaign for workers, installation of fencing and barriers if necessary. • Not locate construction camps within 500 meters from cultural resources. • Adhere to accepted international practice and all applicable	Further investigation on cultural heritage is required and mitigation measures are to be proposed in case of finding of cultural heritage sites, religious sites, etc.

		Dong Nai and Ba Ria-Vung Tau province.	historic and cultural preservation requirements of the Government of Vietnam Although archaeological and cultural heritage has been not discovered so far, in case of finding these heritages during construction process project owner as well as project contractor will suspend construction in order to avoid violate and notify for authorities of the local including district-level People's Committees and the Department of Culture and tourism immediately so that to propose optimal execution plan. A cultural heritage protection plan including the necessary mitigation and budget had been prepared and approved by concerned provincial-level and central government level representatives of the Ministry of Culture, Information, Sport and Tourism. Trial excavation and excavation of underground cultural relics according the Cultural relics report shall be carried out prior to commencement of construction	
12	Topography and Geographical features		The topography in the project area is rather flat. Construction activities of the expressway such as excavation for land clearance, collection of earth and sand, embankment, etc will cause impacts on topography and geographical features. Construction method for soft soil and other construction methods which prevent transformer of topography and geographical features are applied.	Topography and geographical features are confirmed in the additional survey.
13	Soil Erosion		There is a risk of soil erosion due to construction on rivers/canals, cutting and embankment. Construction methods which prevent soil erosion are to be applied same as Phase 1. Planned route does not pass the areas prone to soil erosion such as mountain and near mountain.	Examine the places of potential risk of soil erosion and construction methods for these areas in the additional survey.
14	Flora, Fauna and Biodiversity	Biodiversity along the route is not high because natural forests disappeared and replaced by planted vegetation and urban ecosystems. There is no rare and high	The potential impacts due to project activities affect ecosystems of area: loss of vegetation cover, degradation of natural environment such as water bodies due to wastes and wastewater, disturbance of noise, lose or narrowing of habitat. Major measures for prevention of ecosystem are: • Prohibition of unnecessary cutting of trees and bush,	Survey to fully describe ecological characteristics in the area shall be conducted, which include Terrestrial and aquatic ecosystems. The survey should assess and identify: Location and description of habitat

		biological value or preserved species. Thi Vai mangrove forest and Can Gio biosphere are located 8.5km and 8km from the project route.	• Reduction of amount of pollutants discharged to the environment in construction and operation stages • Application of proper construction methos • Propaganda on protection of natural environment and biodiversity.	characteristics; Record the important and key plants, animals in the survey area; Record of the density of animal and plant species; Record of vegetation cover ; Develop list of species of flora and fauna present in the survey area. Assess the value of the component of ecological system in research area
	Landscape		Landscape will be changed in a certain extent due to presence of the expressway.	Reexamine the alignment from the viewpoint oflandscape
16	Air Pollution, Dust, Climate	The route will pass through or parallel with some residential areas. Air quality in the project area is quite fresh without dust pollution and toxic gases	Activities of the project will affect air environment during construction of the project including dust and other gas CO_2, HC, SOx, NOx, CO from construction activities and operation of vehicles transporting construction materials, Additionally during the project goes into operation, due to increased motor vehicle traffic will occur air pollution, thereby adversely affecting people's health. Reducing dust and emissions by using motor vehicles of good condition and regularly maintaining machinery and equipment, and regularly watering roads.	The EIA report should assess all activities that occur during construction and operation of the project and the emission sources and impacts of air pollutants Baseline data on dust and emissions (CO, SO_2, NO_2, PM10, TSP) shall be measured for comparison with air quality in construction and operation of the project. The evaluation should also assess the radius of influence and quantitatively determine the direction the region affected by dust and emissions. Additionally, future air quality along the route is to be predicted using the estimated traffic volume after the operation. The EIA report shall propose mitigation measures corresponding to each impact. The mitigation measures must be feasible and consistent with the actual conditions of construction and operation of projects.

17	Water Pollution	The project route passes over some flows such as Dinh river, Cua Lap canal connecting Co May river, Cay Khe river with waterway in operation (mostly small boats and ships). Other rivers/canals have no waterway activities. From measurement of surface water quality, concentration of TSS at Song Dinh bridge and Giao Keo 1 bridge bare 2-3.5 times higher than standards. Most of rivers were contaminated with E.Coli. and total coliform. All other measured parameters were within the standards	The construction activities may cause temporary surface water pollution such as sludge from waste dumps, domestic wastewater from camps, water drips from digging and drilling mud, wastewater from site batching plants. These contaminating sources cause surface water polluted resulting degradation of aquatic life. Construction activities may temporarily change or block water flow on streams and rivers. Earthworks can be extended flooding during the rainy season that cause problems for irrigation and drainage. Mitigation measures shall include collection and treatment of all wastes and wastewaters from sources, provision of mobile toilets, cleaning up all soil and mud after every construction works. Temporary curvets and drainage system shall be installed to avoid inundation and blockage of water flows.	The Environmental Impact Assessment will need to assess the impacts all activities of project that will affect surface water quality and hydrological conditions. The evaluation should quantitatively determine the load and concentration of the wastewater type and volume of wastes. Negative impacts on aquatic ecosystem such as phytoplankton, zooplankton, benthos, and fish shall be evaluated. EIA report shall propose corresponding mitigation measures appropriate to each impact as well as suitable with conditions to actual construction.
18	Soil Contaminatio n and Waste	Soil in the project area is rich and fertile, formed mainly on basalt, ancient alluvial layer and new one as alluvial soil. Land use is mainly agricultural land and residential land, and salt ponds near the end point of the alignment. Measurement of soil quality showed that contents of heavy metals in soil samples at all 3 locations were lower than permissible level.	Wastes in the preparatory phase generates from demolishing homes, cutting trees and preparing ground for construction site. Waste arise in construction phase is the waste of excess materials, gravelly soil from digging, material spillage. The volume of these wastes is not high but very hard to treat. Besides, solid waste from domestic activities of workers are easily biodegradable substances causing odor and environmental pollution. The process of operation project, sanitary solid waste arising from service stations primarily and waste from machinery and equipment. All waste after collection shall be transported and treated by units which have legal function of collection and treatment of wastes. Hazardous waste should be managed and processed in accordance with relevant regulations such asDecree No. 59 / 2007/ND-CP	Environmental impact assessment need to identify the components, sources and quantity of all waste sources, especially hazardous waste. Assess the potential effects that makes land pollution and propose appropriate mitigation measures Waste management must be based on the classification system on the principles of reduce, reuse and recycle and give the provisions of the law of Vietnam on the management of non-hazardous wastes and hazardous wastes.

19	Noise and Vibration	Noise level measured at Intersection with the road to Tan Hiep commune was 70.5 dBA, slightly higher than permissible level. Noise and vibration levels of all other sampling points were lower than permissible level.	Noise level in pre-construction phase is considered intermittent, only appear when operating noisy equipment such as cutting trees, bulldozers, excavators. Noise levels during construction is inevitable for all construction projects. According to assessment of the same projects, the source of noise from this process mostly beyond the prescribed limits therefore measures consistent with the actual construction are required. Vibration levels during construction phase is considered as minor to moderate only occur temporarily during construction mainly occur locally, During operational phase vibrations impacts will occur permanently, but vibrations level is considered insignificant. The noise should be controlled by contractor by the way to comply with regulations on construction organization: do not use machinery, transport vehicles with noise> 70dBA or activities can generate noise> 70dBA, near the sensitive area should not construction at night from 21:00PM to 6:00PM and need to have walls to prevent noise at this places; contractor should also fully equipped labor protection for workers. Noise/vibration control measures after operation are: installation of soundproof wall at the places where have potential to exceed standards, establishment of monitoring system, and regulations of vehicles (speed, time, type of vehicle, etc),	Requirements for monitoring of noise and vibration will be implemented around the entire project before construction and it will be baseline for the noise and vibration impact assessment in construction phase and operation phase. The noise and vibration assessment will be based on predictive models to evaluate impacts at the various distances from the construction site. Assessment of vibration and noise level should be detailed assessment for sensitive objects near the project area, such as pagodas, temples, schools. Mitigation measures shall be proposed for each source of noise, vibration generated during construction and operation of projects.
20	Transportation	The road network of the project area is quite completed, including NH 1A, NH55, NH56, etc, provincial roads No. 79, and local roads (connecting districts and communes). Moreover, it also connects with local roads in industrial zones and in rubber	During construction, activity of transportation will cause environmental pollution by emissions, noise and vibration, they can also cause impact on the environment and people's life in the routes use' for transporting material due to increase of traffic on the roads and damage of roads Mitigation measures shall include lights and board signs to limit the scope of construction area, traffic management guidance to ensure avoid traffic jams, avoidance of encroachment of path or spills to the surrounding area.	Assessment of impact of transportation shall examine and evaluate all transportation modes and routes used for the transportation of raw materials to control environmental impacts to air, noise, vibration. From this assessment mitigation measures to avoid traffic jams and traffic accidents shall be proposed in consultation with local

		forests.	To ensure traffic safety, compliance with regulations on traffic safety shall be strictly applied for all workers and drivers, such as prohibition of drinking and drug. Coordinating with local police to control traffic during construction at intersection is also one of effective measures to reduce the tragic accident.	people and authorities.
21	Environmental risk		The risk in the process of building project including mine explosion, fire and explosion accidents at work, traffic accidents, oil leakage. But the impact has been assessed as low probability and can be prevented. A plan to prevent and respond to incidents will be planned accordingly and implemented during the survey and construction of project.	Environmental impact assessment need shall identify potential impacts and evaluate all the causes occur incidents and assess the impact of each incident and propose mitigation measures in all three phases of the project Emergency response plan shall be prepared, which consists of all preventive and response measures for risks. Role and contacts of all relevant parties shall be described in the plan.

Source: JICA Study Team

7.4.7. Framework of Environmental Management and Monitoring

(1) Environmental Monitoring

Implementing the Phase 2 may have potential impact to environment as outlined in Table 7.4.6-2. In order to avoid or minimize the identified potential impacts, appropriate environmental monitoring is necessary to be conducted. This section shows the framework of environmental management and monitoring since the project scheme of the Phase 2 is under examination. Once the project scheme is decided, environmental management and monitoring plan shall be developed at the next study stage (i.e. D/D stage) based on this framework.

1) Objectives of Environmental Monitoring

- Check the accuracy of the forecasts and make appropriate adjustments,
- Ensure mitigation measures to be implemented in stages of the Project and control their effectiveness,
- Detect unforeseen impacts and,
- Propose mitigation measures for these impacts.

2) Monitoring Items

Monitoring items includes:

- Air quality: the monitoring of air quality including:,
  - ✧ Monitor concentration of air pollutants at the construction sites and surrounding residential areas affected by the Project
  - ✧ Monitor meteorological parameters affecting the dispersion of pollutants
  - ✧ Assess and forecast the increase of volume of air pollutants from the Project's activities to propose additional mitigation measures
- Noise, vibration: the monitoring of noise and vibration includes:
  - ✧ Monitor noise, vibration at the construction sites and surrounding residential areas affected by the Project
  - ✧ Assess and forecast the increase of level of noise, vibration from the Project's activities to propose additional mitigation measures
- Surface water quality: the monitoring of surface water quality includes:
  - ✧ Monitor concentration of pollutants in water environment and water bodies receiving wastewater from the Project's activities;
  - ✧ Assess and forecast the increase of volume of water pollutants to propose additional mitigation measures.
- Groundwater quality: the monitoring of groundwater quality includes:
  - ✧ Monitor concentration of groundwater pollutants
  - ✧ Assess and forecast the increase of pollutants to propose additional mitigation measures.
- Soil quality: the monitoring of soil quality includes
  - ✧ Monitor concentration of pollutants in agricultural land of the project area
  - ✧ Assess and forecast the increase of soil pollutants to propose additional mitigation measures.

- Sediment quality: the monitoring of sediment quality includes:
  - ✧ Monitor concentration of sediment pollutants of the project area
  - ✧ Assess and forecast the increase of sediment pollutants to propose additional mitigation measures
- Other monitoring (sliding, landslide, waste transport and dumping)
  - ✧ Monitor sliding, landslide, subsidence caused by construction activities
  - ✧ Monitor waste transportation and dumping at right locations

Propose additional mitigation measures in case of necessity.

3) Monitoring of Wastewater Quality

During construction phase, surface water quality will be affected by wastewater discharge from domestic activities at worker camps and construction facilities such as site batching plants. To prevent this impact monitoring of wastewater from these sources need to be conducted.

The water quality of wastewater shall be surveyed at discharge points, which shall be selected based on actual conditions. One monitoring sample shall be collected at each construction package.

Survey methods: Sampling and analysis shall be basically carried out based on the standard method for sampling and laboratory work required by MONRE with the calibration of equipment. Sampling location shall be marked by using GPS.

Survey volume: The parameters to be measured or analyzed shall include temperature, pH, BOD, COD, DO, SS, NH_4^+,Total Nitrogen (TN), Total Phosphorous (TP), Oil and greaseLubricant, Coliform.

Frequency of monitoring: Every 6 months (through construction phase, 2 years after operation)

(2) Contractor's Site Environmental Monitoring Plan (EMP)

1) Framework of Contractor's EMP

Prior to commencement of construction, the Contractor will be required to submit an Site Environmental Management Plan (Site EMP) to the project supervision consultant (PSC) based on the Contractor's actual construction methodologies, work program, and management of construction activities and management of the workforce during construction. The site EMP Implementation Plan shall demonstrate compliance with Vietnamese environmental requirements, the mitigation measures set down in the specifications for Contractors and policies of donor agencies. The content of the Contractor's EMP shall be in line with the project specific EMP and shall be enhanced by the Contractor's works practices, implementation procedures and program. The Plan shall be certified and, approved by PSC.

The Contractor's EMP Implementation Plan shall provide details such as commitment to environmental protection by the Contractor's Project Management Team; methodology of implementing the project EMP; detailed designs and installation of pollution control facilities (e.g. drainage channel, settling tank, temporary noise barrier, etc); environmental control mechanism; detailed earthworks management plans and site operation plans outlining the measures that are proposed to minimize, mitigate and manage the effects, for the duration of the construction works. The Contractor's EMP for the Phase 2 also needs to include the followings same as the Phase 1:

- Establish a management program on implementing measures to mitigate environmental impacts approved by environment management unit and transformed into terms in the Project's specifications;
- Ensure proper management of wastes, prompt respond to environmental incidents and urgent solutions to environmental incidents;
- Continuously collection information about changes in environmental quality during project implementation to detect adverse environmental impacts timely and propose measures to prevent and reduce environmental pollution in accordance with Vietnamese Standards 2001, 2002; Vietnamese Standards 2008, 2009, 2010 and FAO ISO 9000.

2) Structure of implementation of EMP

i) Stages of preparation and construction

Table 7.4.7-1 shows the role and the responsibility of organizations for the implementation of the environmental management plan in the stages of preparation and construction.

Table 7.4.7-1 Roles and Responsibilities of Environmental Management Organizations in the Preparation and Construction Phase

Organization	Role/Responsibility
Project implementing agency	- Issue assignments to units under its management. - Receive and solve periodical management & monitoring report of PMU
PMU/SPC	- Sign contracts with the contractors and the Supervisor - Organize, appoint departments in charge of environment to be responsible for environmental issues of the Project. - Formulate environmental management plan and environmental monitoring program - Provide funds for environmental management and monitoring activities in the preparation and construction stage of the Project - Receive periodical report of environmental consult, and submit periodically report to the headquarter of the project implementing agency, DONREs of Ba Ria-Vung Tau province and MONRE
Environmental unit (To be	- Directly monitor environmental management and monitoring activities - Inspect construction activities to ensure the implementation unit fulfill

Organization	Role/Responsibility
established in SPC)	responsibilities assigned in related documents on measures to mitigate environmental impacts. In case of not fulfilling requirements, the environmental unit directly reports the Project Director who is authorized to postpone the work of the implementation unit - Review and analyze environmental management report during the construction - Support and coordinate with the Supervisor
Construction unit	- Be responsible for full implementation of environmental protection measures stated in the assignments of the Owner and the approved EIA report - Be under the management of the Supervisor; adjust or strengthen measures at request of the Supervisor and environmental unit
Environmental Supervisor	- Manage the implementation of environmental mitigation measures of the construction units stated in writing by the Owner - Directly inform the construction units any potential environmental issues that may obstruct the Project schedule - Internal monitoring of resettlement/compensation - Report environmental-related issues periodically to the Owner and Environmental unit
Environmental Consultant	- Monitor environment - Directly report monitoring results to the environmental unit - Perform additional measurements as required

ii) After Operation

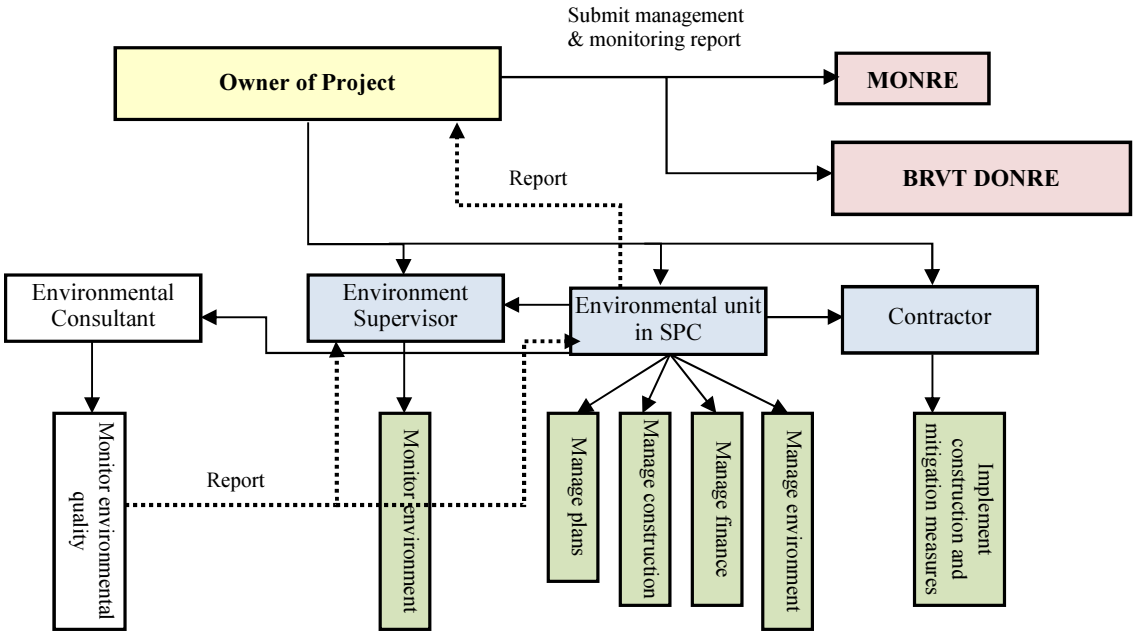
Table 7.4.7-2 summarizes the role and the responsibility of organizations for the implementation of the environmental management plan after the operation.

Table 7.4.7-2 Roles and Responsibilities of Environmental Management Organizations in the Operation Phase

Organization	Role/Responsibility
Project impending agency	- Handover all environmental management results in the preparation and construction phase of the Project certified by MOT, DONRE of Ba Ria-Bung Tau province to the Project exploiting unit
Project exploiting unit	- Receive environmental management results in the preparation and construction stage of the Project certified by MOT, DONRE of Ba Ria - Bung Tau province - Sign contracts with the environmental consultant - Assign officer in charge of environment to be responsible for environmental issues of the Project - Provide funds for environmental management and monitoring activities in the operation phase of the Project - Receive periodical report of officer in charge of environment, environmental consultant and periodically report MONRE, DONRE of Ba Ria-Vung Tau province every six month during the warranty period
Officer in charge of environment	- Receive the environmental monitoring results of the Consultant - Report the Project exploiting unit on monitoring results
Environmental Consultant	- Monitor environment - Directly report monitoring results to the officer in charge of environment of the Project exploiting unit - Perform additional measurements as required

iii) Report

According to the roles and responsibilities of the concerned organizations mentioned above, environmental management plan including environmental monitoring are to be implemented. Organizational/institutional structures of preparation of the report are shown below:



Source: JICA Study Team

Figure 7.4.7-1 Structures of Environmental Management

(3) Draft TOR for Phase 2

The main purpose of environmental impact assessment is; (1) to evaluate potential environmental impacts both positive and negative and (2) to propose countermeasures in order to avoid and/or minimize the potential negative impacts at level an acceptable levels and to increase the positive effects. Therefore, the EIA Report shall mention details of environmental management plan and environmental monitoring plan for the Project.

Although the procedures and process of implementation of EIA, and the contents of EIA Report shall be comply with the Vietnamese laws and regulations basically, the project proponent is also required to follow the policy/guideline of donor agencies in case that the phase 2 of BHVT Expressway Project is implemented by financial support by donor agencies.

These TOR are prepared following the scoping of phase 2 section of BHVT Expressway Project. Therefore, the Consultant who implements the EIA for phase 2 section of BHVT Expressway Project shall conduct another scoping again referring to the results of the scoping carried out in this report.

Considering above, the EIA to be implemented shall cover followings major six (6) work items:

Table 7.4.7-3 Major Work Items included in EIA

No.	Work Item
(1)	Legislative and Regulatory Considerations
(2)	Description of the Project
(3)	Description of natural and socio-economic conditions of the Project
(4)	Identification of Potential Impacts and Proposal of Mitigation Measures
(5)	Environmental management plan and monitoring plan
(6)	Community consultation

Source: JICA Study Team

Details of the work items are given in "(1) Scope of Works" below.

1) Scope of Works

(i) Legislative and Regulatory Considerations

Outline the legal and technical basis, standards and regulations for EIA implementation including Vietnam standards, national technical regulations of Vietnam, international standards, other standards to be used in the EIA of the Project. Major legal documents which support the EIA are shown below:

a) Law on Environment Protection No. 52/2005/QH11 dated November 29th, 2005 of Vietnamese Parliament.

b) Decree No. 29/2011/NĐ-CP dated 18/04/2011 regulating the strategic environment assessment, environmental impact assessment, commitments on environmental protection.

c) Circular No. 26/2011/TT-BTNMT dated 18/07/2011 of Ministry of Natural Resources and Environment for the Guidelines on detailing some articles of Decree No. 29/2011/ND-CP dated 04/18/2011 of Vietnamese Government about strategic environmental assessment, environmental impact assessment and environmental commitment.

d) JICA Guidelines and the World Bank's Safeguard Policies such as Op. 4.01 - Environmental Impact Assessment is refereed as international standards.

(ii) Description of the Project

Provide a comprehensive description of the project including the use of maps about the location of the project, the map about design of the project. Consulting environmental impact assessment should coordinate with the Design Consultant so that:

a) Determining the scope of the project, amount of items will be constructed in the whole project and give the main activities of the project, construction measure

b) Tracking design changes to assess accurately the impact will be have as well as the

effects that may arise due to changing the design,

c) Monitor and update progress of the project.

3) Description of natural and socio-economic conditions of the Project

The Consultant will plan and carry out field surveys to collect data and information in the Project area. Consultants also suggest the location and number of samples, the environmental parameters that need monitoring. The sampling and analysis should follow the standards of Vietnam (TCVN and QCVN).

Based on surveyed data and information, Environmental Consultant will describe, analyze and evaluate the environmental status in the project area including:

- Physical Environment
- Biological Environment
- Socio-economic and cultural constraints

a) Physical Environment

- Detailed description of existing meteorological, hydrological and geological conditions in the region and in particular a description of the river system and canals will be affected by the project.
- Review the existing water quality of any rivers, ponds and streams in the project area and the system is particularly rivers, streams, ponds go through the proposed highway. Parameters are measured, analyzed according to the parameters of surface water regulations.
- Assessment of the actual status of air quality, noise levels, vibration, soil quality, ground water in the project area to establish a baseline for monitoring change as the project goes into construction and operation
- The parameters to be measured for analysis of surface water, air, noise, vibration, groundwater, soil, including proposals parameters are as follows:

Table 7.4.7-4 Environmental Parameters for Baseline Survey

No.	Parameters	Number/Frequency of sample	Reference Standards
1	- **Air quality monitoring** Microclimate conditions (wind speed, temperature, humidity), PM10, TSP, CO, NO_2, SO_2	The number of samples is 8 times /site, every 2 hours for each parameter 16 hours (from 6 a.m. to 10 p.m.) for each site	QCVN 05:2009/BTNMT
2	- **Noise monitoring** L_{eq}, L_{10}, L_{90}	Measurements were conducted continuously for 16 hours (from 6am to 10pm) every two hour, each time measures 3 periods, each period is measured continuously for 10 minutes	QCVN 26: 2010/BTNMT
3	- **Vibration monitoring** L_{veq}, L_{eq}	Measurement frequency: continuously for 16 hours (from 6am to 10pm) every two hour, each time measures 3 periods, each period is measured continuously for 5 minutes	QCVN 27: 2010/BTNMT
4	- **Surface water quality monitoring** Temperature, pH, turbidity, conductivity, total suspended solids (TSS), DO, COD, BOD_5, NH_4^+, heavy metals (Cd, Cu, Zn, Ni, Fe, Mn, Pb, Hg, As) oil, E. Coli, Coliform	The number of samples is 2 samples/site	QCVN 08:2008/BTNMT
5	- **Ground water monitoring** Temperature, pH, turbidity, conductivity, DO, hardness ($CaCO_3$), COD, total solids (TSS), Cd, Pb, Zn, Mn, As, Fe,Hg, Coliform, E.coli	The number of samples is 1 sample/site	QCVN 09:2008/BTNMT
6	- **Soil quality monitoring** Cu, Pb, Zn, Fe, Cd, As, Hg	The number of samples is 1 sample/site	QCVN 03:2008/BTNMT
7	- **Sediment quality monitoring** Cu, Pb, Zn, Fe, Cd, As, Hg	The number of samples is 1 sample/site	Standard FAO ISO 9000

Source: JICA Study Team

- Sampling and analyzing methods shall follow the standards listed in the reference standards mentioned in the table above.
- Locations of monitoring for air, noise, vibration, surface water, groundwater, soil are shown in Attachment 7.
- Note:

  The sampling points and timing shall be expressed using codes, these shall be illustrated on the map. The measurement points, sampling points must be directly affected by the activities of the Project. Measurement, sampling and analysis shall

comply with the procedures and regulations on monitoring and analyzing environmental measurements. Sampling and analysis must be completed and certified by the units with functions as prescribed by relevant regulations.

b) Biological environment

- A detailed description of the flora and fauna (terrestrial and aquatic) in the existing Project area, especially protected and endangered species and/or rare species (if available). These data need to be included in the survey:

Terrestrial ecosystem

- Collecting data relevant to the Project area such as maps, flora and fauna and other environmental factors on the route. Surface limited to radius of about 500m along the highway.
- Assess and identify in each survey area:
  - Location and description of habitat characteristics;
  - Record of the plants, animals and disseminate important in the survey area.
  - Record of the density of animal and plant species,
  - Record of vegetation cover.
  - Interviewing to people about the presence of animals, current of land use, and operation of agriculture, aquaculture and other activities of local people.
  - Develop list of species of flora and fauna in the survey area.

Water ecosystems including freshwater ecosystems and saltwater ecosystems

- Every ecosystem needs to perform analysis of phytoplankton, zooplankton, benthos, and fish. Every ecosystem needs assessment done by collecting the following information:
  - Phytoplankton and Zooplankton
    + Species composition
    + Characteristic number and the most dominant species
    + Indexes of algae
    + The diversity
  - Benthos
    + Characteristic species composition
    + Characteristic number and the most dominant species
    + The value diversity
  - Fish
    + Structure species composition
    + Structure of amount

+ Value the diversity of invertebrates

- Preliminary assessment of natural protected areas near the highway as the Mangroves of Thi Vai, the biosphere reserve Can Gio mangrove forest. The distance from project to the Mangroves of Thi Vai is about 1.5 km and the biosphere reserve Can Gio mangrove is about 4km. Aquatic biodiversity of Cua Lap river which connects to the sea shall be studied in the EIA.

c) Socio-economic and cultural

Items of assessment of economic activities to be affected in and around the Project area by the Project are occupations, incomes of households, etc. Details of the social survey area are as follows:

Table 7.4.7-5 Communes/wards Included in the Project Area

Province	**Dong Nai**	**Ba Ria – Vung Tau**			
District	Long Thanh	Tan Thanh	Ba Ria Township	Long Dien	Vung Tau City
Commune	Phuoc Tan Tam Phuoc An Phuoc Long Duc Long Thanh town Loc An Long Phuoc Phuoc Thai Tan Hiep Phuoc Binh	Hac Dich Toc Tiên Châu Pha Tân Phước Phu My town	Hoa Long Long Toàn ward	Long Dien town An Ngai	Ward 12

Source: JICA Study Team

- A detailed assessment of living conditions of residents, number of employees and current business for households affected by the project and especially need to interest and full statistics the number of affected households. The evaluation will be compared with the current situation. Identifying effects has significant role in supporting relocation and resettlement arrangement for affected households and employment issues.
- Assessment about cultural and historical works, religion, creed, residential quarter, urban and other related works in the project area and adjacent areas affected by the project; the health sector, culture, education, living standard, the poverty rate in the local area may be affected by the project.

(iv) Identification of potential impacts and proposal of mitigation measures

Based on the existing socio-economic and natural environmental conditions, the overall assessment of impacts on the environment need to be conducted (both positive and negative impacts). Based on these impacts assessed, appropriate measures to avoid or minimize the

negative impacts shall be determined. Mitigation measures must be applicable in the actual conditions of the Project. Assessment needs to be done in the context of the Project area and specific construction sites.

The evaluation of environmental impacts should be implemented in the stages of the Project including: pre-construction (compensation-clearance and resettlement), construction phase, and operation phase of the Project. Each impact must be assessed concretely and specifically. Quantitative impacts shall be assessed by comparing with the current standards and regulations as needed.

The report of EIA shall propose mitigation measures avoid or minimize negative impacts. When mitigation measures were expected which can not eliminate sufficiently the disadvantage effects, alternative measures which avoid or minimize the negative impacts shall be proposed. Together with the propose of mitigation measures, evaluation of the effectiveness of proposed measures shall be conducted.

EIA report shall cover the assessment of following major items:

a) Land and land use

- The assessment of land use along the route will include the investigation of basic and detailed statistics about:
  + Number of affected households/peoples;
  + The area of each type of soil lost in whole or in part;
  + The losses of amount of industrial crops, and losses of properties.
- Assess the impact on economic development – social
- To put forward policy for site clearance compensation and appropriate resettlement

b) Community and socio-economic development

- Determine the impact and assess impact level of the Project to community and social development
- Propose appropriate mitigation measures for each impact.

c) Archaeology and cultural heritage

- Confirmation of existing archeology and cultural heritage in and around the Project area.
- Propose preventive in design process including alignment and mitigation measures during construction and operation phases

d) Ecology and biodiversity

- Identify components of plants species, animals, the area of natural ecosystems affected
- Assessing the potential environmental impacts on ecosystems and biodiversity. The assessment shall include Cua lap estuarine area which connects to the sea.

- Identification of appropriate mitigation measures

e) Noise and vibration

- Identify sources of noise and vibration, evaluate the level of noise and vibration with distance of 5m, 10m, 25mand 50m from construction area and from vehicles in operation phase (for noise), and 5m, 10m, 15m (for vibration) based on spread model.
- Evaluate and determine noise and vibration levels affecting to sensitive objects near the project area, such as pagodas, temples, hospitals, schools, etc.
- Identify the control measures to minimize noise and vibration

f) Air quality, dust and climate issues

- Determination of the sources of dust and emissions (SO2, NO2, CO, TSP), and quantitative assessment of load and the concentration of dust sources and emissions.
- To propose appropriate measures to minimize each impacts

g) Wastewater management, surface water quality and hydrology

- Identification and assessment of type, volume, load, and concentration of wastewater generated caused by the implementation of the Project
- Assessment of impacts to the surface waters caused by the wastewater generated with implementation of the Project. Assessment of water quality both waste waters and surface waters comparing with current standards and regulations.
- Propose appropriate measures to minimize to each impacts source

h) Soil pollution and waste management

- Identification of the components, generation sources and quantity of wastesincluding hazardous waste.
- Give the provisions of the law of Vietnam on the management of non-hazardous wastes and hazardous wastes.
- Propose for mitigation measures including handling and transportation methods
- Requirements for disposal areas shall be described

i) Transportation

- Assess the impacts on the local society and the socio-economic of the Project area caused by the Project.
- Propose appropriate mitigation measures for each impact.

j) Environmental risks

- Identify potential impacts and evaluate all the causes occur incidents and assess the impact of each incident to the environment and society in all three phases of the project;
- Propose mitigation measures appropriate to each incident based on the lessons of practical experience;

- Provide standards and regulations of the concerned parties on apply control of incidents
- Propose emergency response plan for the risks.

(v) Environmental management plan and monitoring plan

Prepare a plan for environmental management to implement the measures to reduce the adverse effects in pre-construction phase, construction phase and operation phase of the Project. Environmental management plan is prepared based on the basis of synthesis of the EIA report prescribed by Vietnamese regulations and MONRE including:

- The activities of the project,
- The environmental impact,
- The works and measures for environmental protection,
- Funds for implementation of works, environmental protection measures,
- Time to implementation and completion,
- Responsibility for implementation organization,
- Responsibility for monitoring.

Prepare a plan to monitor the waste and other the associated impacts during preparation, construction and operation of project as:

- Monitoring of wastes: need to monitor flow/total emissions and specific parameters for the Project's waste according to standards, current regulations of Vietnam.
- Monitoring of ambient environment: only monitor pollution specific parameters for project according to standards. Monitoring frequency is every three months in construction phase and every six months in the operation phase. The monitoring points must be indicated on the diagram with specific annotations clear and geographical coordinates according to current standards. Parameters: air quality, noise and vibration, surface water, ground water, soil, sediment.
- Monitoring of other factors: erosion, sliding, land subsidence; river bank erosion, stream; sedimentation of rivers, streams, lake, change of surface water, groundwater intrusion enter saltwater intrusion alum, and the impacts to those natural and economic - social with appropriate frequency to monitor the spatial variation and timing of these factors (in the case necessary if any).

(vi) Community consultation

Consultant will conduct consultations under Article 14 - Decree No. 29/2011/ND-CP dated 18/4/2011 to progress after the first draft EIA and EMP are completed. During the public consultation, Environmental Consultant should coordinate with the design consultants and directly carried out to ask the opinions of all affected households in the wards /communes in

the project area. At the same time environmental Consultant will hold dialogue with the authorities of ward / commune and non-governmental organizations in the project area.

Besides, stakeholder meetings at commune levels with broad public participation shall be organized. Participants of meetings included project affected people and key person who know the area well, representatives of People Committees and Fatherland Committees, Youth Unions, Women's Unions, Environmental and natural resources department of districts. Content of the meetings shall consist of project information, environmental impacts and mitigation measures, and people's comments/opinions. Handout of the presentation and summary of the EIA report shall be provided to participants. Minute of the meetings shall be recorded and the comments/opinions shall be reflected in the EIA report.

According to the JICA Guidelines, community consultation shall be conducted twice during the period of the scoping and the preparation of draft report as shown the schedule below.

2) Schedule and Output

It will take 8 months to implement the EIA after the conclusion of the contract. Tentative schedule is shown below.

Table 7.4.7-6 Tentative Schedule for the Implementation of Phase 2 Section

	Month	Month1	Month2	Month3	Month4	Month5	Month6	Month7	Month8
	Conclusion of Contract	☆							
1	Data collection	■	■	■	■	■			
2	Inception report	■							
3	Acceptance of Outline of EIA report and Work Plan		☆						
4	Conducting survey on socio-economic conditions and environmental		■	■	■	■			
5	Draft of EIA Report + EMP			■	■	■	■		
6	Stakeholder meetings to collect opinions of relevant agencies and local		■	■			■	■	
7	Final EIA Report + EMP (including Summary Report, appendices, community consultancy report)							■	■

Source: JICA Study Team

The Contractor shall submit outputs shown in Table 7.4.7-7 below:

Table 7.4.7-7 Output Submission

	Report	No. of reports		Submission Timing
		Vietnamese	English	
1	Inception Report	2	2	(See Schedule above)
2	Outline of EIA report and Work Plan	2	2	(See Schedule above)
3	Draft EIA Report and EMP	2	2	(See Schedule above)
4	Final EIA Report + EMP (including Summary Report, appendices, community consultancy report)	4	4	(See Schedule above)

Source: JICA Study Team

3) Data Assurance

The consultant shall provide a laboratory equipped with necessary equipment and facilities for sampling, analysis of environmental parameters. The consultant should be certified by national or international certificate like VILAS or ISO 17025. All analytical equipment shall be calibrated before analysis based on the procedures instructed by the certification mentioned above.

The processes of analysis, such as the date of analysis, name of the chemist, equipment settings and conditions shall be properly recorded. If it becomes necessary, submission of such records, and re-analyze dubious results is required.

Raw data including field records, photos and input data in modeling shall be properly reserved and checked if necessary.

4) Personnel, Role and Responsibility of the Works

EIA implementation is scheduled to be 8 months depending on the progress of detail design work and the time for approval. The recommended personnel of the group are presented the following table. However, Consultant can assess the requirement for personnel for the proposal.

Table 7.4.7-8 Expert for Implementation of EIA

No.	Personnel	Number of people	Working months
1	Expert of Environmental Impact Assessment/ team leader	1 person x 8 months	8
2	Environmental expert (air, quality of water, soil environment, ecology, hydrogeology)	4 persons x 8 months	32
3	Social Expert/ Environmental Economist	1 person x 8 months	8
4	Expert oF/Site survey, community consultation	4 persons x 2 months	8
5	Administrative staff, document controller, interpreter	1 person x 8 months	8

Source: JICA Study Team

Note: *All the cost relevant to the adjustment and completion of Consultant's output products up to the required*

standards shall be included in the cost for consultancy service.

The requirements for Consultant are: The EIA shall be conducted by suitable experts and necessary field surveyors under the supervision of the employer. The finalization of the organization shall be discussed with the employer after the identification of capability of each expert/surveyor and included in the work plan before the EIA study. The personnel is preliminarily recommended as follows:

(i) To experience on preparation of EIA report in accordance with the instruction of JICA and Vietnam regulation.

(ii) To know well familiar with Vietnamese legal framework, especially ones on the environment

(iii) To know well situation of project area, information on the local socio-economic conditions.

(iv) Team leaders shall be post – graduate specified on environmental management, have at least 10 years of experience on environmental impact assessment (EIA), at least 8 years of working on EIA preparation and working for four (4) ODA projects as a team leader of which a project are funded by JBIC/JICA, ADB or World Bank. He/she must be fluency in reading, writing, and speaking English. He/she has responsible for overall survey activities and reporting works. He/she experiences on preparation of Environmental impact assessment for construction highway projects.

(v) The experts proposed must have professional and have excellent English.

Environmental Experts has at least four (4) years working experience and working for two (2) ODA projects as a environmental expert of which a project are funded by JBIC/JICA, ADB or World Bank. They must have experience on preparing environmental impact assessment for projects related to highway construction is an advantage. Bachelor of environmental science or environmental management is the minimum required, those with higher degree are preferred. Computer skill are essential, including word processing and excel. He/she must be fluency in reading, writing, and speaking English.

Proposed measurement points and potential sensitive sites along the Phase 2 section are enclosed in Attachment 7 and 8 respectively.

7.5. Support for Preparation of Resettlement Policy Framework at the Phase 2 Section (including Sub-Contract Work)

The study level of the Phase 2 is not matured compared with the Phase 1, and the implementation scheme is not yet decided. Thus, Policy Framework is prepared as a basis for preparing RAP in the next study stage. This section is the summary of Resettlement Policy Framework (hereinafterRPF) for Phase 2 enclosed in Attachment 9.

7.5.1. Socio-Economic Baseline Information at Phase 2 Section

The Phase 2 locates at Ba Ria Vung Tau province, the southern Vietnam. Table 7.5.1-1 shows the study area of the Phase 2.

Table 7.5.1-1 Study Area[38]

No.	Commune	District
1	Toc Tien	Tan Thanh
2	Chau Pha	
3	Hoa Long	Baria provincial town
4	Long Toan	
5	Long Dien	Long Dien
6	An Ngai	
7	Ward 12	Vung Tau City
Total	**7 Communes**	**4 Districts**

Source：JICA Study Team

Total population at Ba Ria Vung Tau province in 2011 is 1,027,266 persons with the rate of 49.98% of male (513,395 persons) and 50.02% of femal (513,831 pesons). In the case of GDP in Ba Ria Vung Tau pronvice in 2011, industry and construction section accounts for 82.6%, following 11.9% of the service section and 5.5% of agriculture/forestry/fishery section. Table 7.5.1-2 shows population infomraiton of Phase 2 based on the provincial statistic data.

[38] Administrative unit in Vietnam is divided into three main categories; commune, district and province (city in the case of Hanoi and Ho Chi Minh)

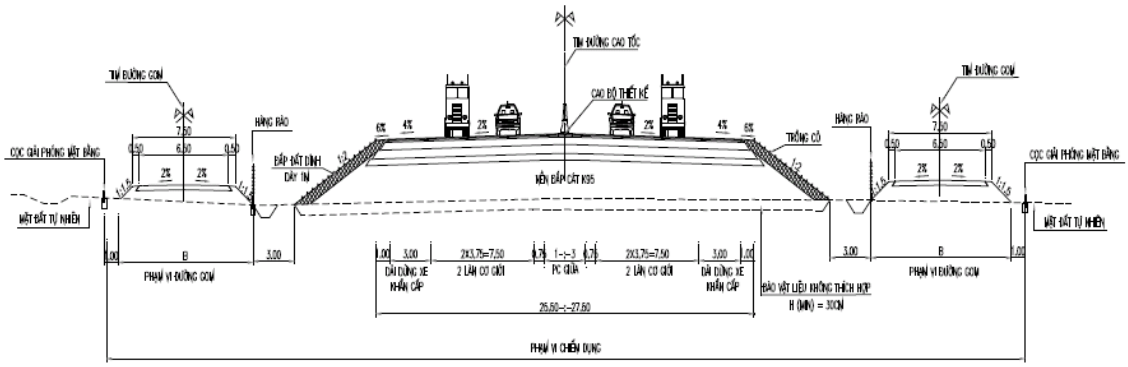
Table 7.5.1-2 Population of Phase 2

	District	Population (Persons)	Area (Km^2)	Density (Persons/km^2)	Number of	Monthly Income per person
1	Tan Thanh	130,172	338.2	385	3.9Persons/Household	1.695 million VND
2	Baria town	96,178	91.5	1,051		
3	Long Dien	127,099	77.5	1640		
4	Vung tau City	300,781	150	2005		

Source：JICA Study Team based on the provincial statistic data in Ba Ria Vung Tau province in 2010

7.5.2. Examination of Impact due to Land Acquisition

The Phase 2 is planned to be implemented with 4 lanes, and land acquisiton is also planned to be conducted by the width of 4 lanes. Land acquisiiton of 4 lanes area includes 25.5 – 27.5m of road, embankment/cutting, 3m of buffer zone, 7.5m of service road, embankennt/cutting of service road and 1m of bufferzone as shown in the Figure 7.5.2.-1. In addition to examination of land acquisition impact at the alignemnt section, land acquisition impact at the Phu My IC is also included.



Land Acquisition Area

Source: JICA Study Team

Figure 7.5.2-1 Land Acquisition Area at the Alignment Section

Preliminary examination of land acquisition impact at the Phase 2 was conducted based on the analysis of available secondary data such as provincial statistic data, land use map and cadastral map, and findings through the site reconnaissance. The result of preliminary examination is shown in the following sections.

(1) Land Use

Preliminary survey for the Phase 2 found that 90% of the affected area might be mainly perennial land, crop and forest land. As for the affected residential land, it accounts for 4% to

the total affected land and mainly located in the Ba Ria town. Table 7.5.2-1 shows the land use at the affected area.

Table 7.5.2-1 Land Use at the Study Area

	Land Use	Area (m2)	Ratio
1	Residential	50,761	4%
2	Agriculture	1,163,632	94%
2.1	Cultivated	1,030,732	83 %
2.2	Aquaculture	49,500	4%
2.3	Salt	83,400	7%
3	Non-Agriculture	29,308	2%
	Total	**1,243,700**	**100%**

Souce: JICA Study Team

(2) Project Affected Households

1,060 households in total including 120 households of resettlement and 99 households of partial land acquisition are assumed to be affected by the project implementation, based on the available cadastral map. As is often the case with land owners/users, land owners/users tend to occupy more than one plot. Therefore, there is a possibility that the number of affected households might be decreased though it is necessary to be confirmed at the census in the next study. Table 7.5.2-2 shows the number of affected households and land acquisition area at commune-wise.

Table 7.5.2-2 Potential Impact of Land Acquistion at Commune-Wise

No.	Communes	Length (Km)	Total Number of AHs	No. of relocating HHs	Total Land Affected (sq.m.) *
1	Toc Tien	7.1	192	12	304,250
2	Chau Pha	4.9	116	3	201,890
3	Hoa Long	9	407	65	373,150
4	Long Toan	1.3	65	17	49,790
5	Long Dien	2.5	85	20	97,450
6	An Ngai	1.3	24	3	48,500
7	Ward 12	5	170	0	168,670
	7 communes	**31.1**	**1060**	**120**	**1,243,700**

Souce: JICA Study Team

(3) Impact to Socialy Vulnerable Groups

Statistic data shows that the ethnic minority groups are habitat in the project area though the majority in this area is the Kinh. The rate of the ethnic minority groups in the project area is less than 1.5% in total. The highest distribution of ethnic minority groups is found in Chau Pha

commune and Toc TIen commune accounting for 1.5% and 1.2% respectively. An interview to the relevant authorities of ethnic minority groups indicates that living and socio-economic condition of the ethnic minority groups in the project area does not have any difference with the Kinh.

7.5.3. Relevant Regulations

Although the applied regulations in the Phase 2 are same as the Phase 1, Table 7.5.3-1 shows the relevant regulations at the national and provincial revel.

Table 7.5.3-1 Major National Regulations on Land Acquisition and Compensation

Regulations	Description
Land Law (effective 1 July 2004)	Stipulate land use and land use right
Decree No. 197/2004/ND-CP (3 December 2004)	Stipulate compensation, assistance and resettlement when land is recovered by the State
Decree No. 84/2007/ND-CP (25 May 2007)	Supplementary stipulate the issue of land use rights certificates (LURC), land acquisition, land use right implementation, procedure of compensation, and assistance on land recovery by the state
Decree No. 69/2009/ND-CP (13 August 2009)	Amendment to Decree No. 197/2004/ND-CP

Source: JICA Study Team

Table 7.5.3-2 Major Provincial Regulations on Land Acquisition and Compensation

Regulations	Description
Decision No. 13/2010/QD-UBND (1 April 2010)	Issued by Peopl's Committee of Ba Ria Vung Tau on compensation, assistance and resettlement
Decision No. 52/2010/QD-UBND (02 / 11/2010)	Amending some articles of Decision No. 13/2010/QD-UBND

Source: JICA Study Team

7.5.4. Consistency between Vietnamese Regulations and Policies of International Donor Agencies

Confirmation of difference between JICA Guidelines and Vietnamese regulations is necessary since this is the study undertaken by JICA, and the confirmation result is same as the Table 7.3.2-1 in the Section 7.3.2. Although the implantation scheme of Phase 2 is under examination, an implantation agency for the Phase 2 is requested to satisfy the requirements of donor policies

on land acquisition and compensation in case that the Phase 2 is implemented as a donor agency funding project.

As described in the Section 7.5.14, policies on land acquisition and compensation among international donor agencies such as World Bank, ADB and JICA have similar understandings. Thus, confirmation results shown in the Table 7.3.2-1 of the Section 7.3.2 is regarded as the general difference between donor agencies and Vietnamese regulations. Once the Phase 2 decided to be implemented as a donor agency funding project, examination of difference between policies of a funding agency and the latest Vietnamese regulations are indispensable.

7.5.5. Principle of Compensation Policy

The principle of compensation policy is the basic approach or vision to examine effective compensation and assistance policy. Therefore, the principle of compensation policy shall be common any kinds of projects requesting land acquisition and resettlement regardless of characteristics of PAPs since the policy will be established to compensate for the loss caused by project implementation. The following principle shall be applied for the Phase 2 section which is also to be applied at the Phase 1 section.

(a) Land and property acquisition shall be avoided or minimized as much as possible by examining all possible alternatives from engineering as well as environmental and social viewpoints.
(b) PAPs shall be meaningfully consulted in appropriate timing in order to reflect their opinions and preferences on resettlement plans and options, whereby their participation for planning and implementing of resettlement plan shall be promoted.
(c) Compensation shall be provided in timely manner based on the agreement with PAPs, and will be completed before the date of evacuation.
(d) Compensation on loss of assets shall be provided with replacement cost in order to compensate for their livelihoods, standards of living, or income opportunities, or at least to restore them to their pre-project levels.
(e) All PAPs living, working, doing business in the project area at the time of census begin will have entitlement of compensation and/or assistance.
(f) All affected people will be eligible for compensation and rehabilitation assistance, irrespective of tenure status.
(g) Necessary institutional arrangement shall be ensured for preparation and implementation of resettlement in timely manner.
(h) Adequate financial arrangement shall be ensured and enforced within the time frame to cover the cost of land acquisition, resettlement, and rehabilitation.

(i) Appropriate mechanisms for monitoring, reporting, and evaluation shall be developed and ensured within the resettlement management system.
(j) Appropriate mechanism for grievance shall be established.

7.5.6. Eligibility and Entitlement for Compensation and Assistance

In the case of donor agency funding project, cut-off date is the criteria to define eligibility of comensation and assistance. As for Vietnam, the date of a decision on land acquisition issuance is the criteria, and is considered as same role as cut-off date.

Under this circumstance, same as the Phase 1 section, people who are living or whose assets are locating in the project area[39] at the time of issuance of land acqisition decision are eligible for compensation and/or assistance to their loss to be caused by the project implementation though those who arrive after issance of land acquisition decision are not entitled.

Identified PAPs are basically classified into the following categories according to the World Bank Safeguard Policy, OP4.12 for Involuntary Resettlement, and compensation and/or assistance will be entitled based on the legal status. The following criteria to define or categorize eligibility are also applied for this project.

(i) Those who have formal legal rights to land (including customary and traditional rights recognized under the laws of the country)
(ii) those who do not have formal legal rights to land at the time census begins, but have a claim to such land or assets, provided that such claims are recognized under the law of the country
(iii) those who have no recognizable legal right or claim to the land they are occupying

Entitlment for compensation and assitance for the Phase 2 section shall be examined by consdiering characteristics of PAPs when land acquisiton scope is found. However, it shall not be diverted from what the Phase 1 section applies since these 2 projects are related each other and located in the same area.

7.5.7. Income Restoration Plan

An appropriate policy or framework to rehabilitate of livelihood of PAPs who might be impacted shall be examined carefully as a part of compensation/assistance. Detailed income restoration plan shall be prepared by confirming demands of PAPs through the socio-economic or prospect studies to be conducted at the next study stage by referring IRP prepared for the Phase 1 section. However, general principles for preparing income restoration plan are proposed at this study level:

[39] Project area is the target area of land acquisition.

(a) Provinde necessary compensation such as land for land or cash in replacement cost as per the compensation policy to resotrate livelihood of PAPs at pre-project level

(b) Use the existing vocational training effectively

(c) Provinde appropriate and continous job opportunitites

(d) Provinde necessary assistance of business scheme in which PAPs can work independently

(e) Provinde necessary technical assistance/guidance to use the remianing cultivated land in case of partial land acquisition at cultiated land

Preliminary IRP at this study level is shown below:

(a) Vocational training in the national or provincial educational scheme such as establishing small/middle scale business schme or systematic agricultural management shall be provided as per the request of PAPs

(b) Additional vocational training program shall be prepared cooperated with NGOs if existing provincial deucational scheme is not enough

(c) Necessary support to establish financial scheme for small/middle scale business scheme such as establish foundation by utilizing compenation cost shall be provided/

(d) Employment opportunities related to the project shall be preferentially provided to PAPs according to their capability

(e) Employment opportunities at the existing or newly planned industrial area near the project area shall be enhanced through support from provincial or district people's committees in case income source will be lost[40]

7.5.8. Grievance Redress Mechanism

The purpose of establishing grievance redress mechanism is to lodge complaints related to the project implementation in a convenience way for PAPs and to settle lodged complaints effectively by involving relevant parties including representatives of PAPs. Therefore, general principles of grievance redress mechanism established for the Phase 1 section should also be applied for the Phase 2 section since it was prepared by ensuring effectiveness and convenience of PAPs. However, there is a possibility of difference on the project scheme, characteristics of PAPs and local authorizes in the case of the Phase 2, the mechanism for the Phase 1 shall be modified to be suitable for the Phase 2 section based on the survey results (i.e. census, inventory of loss, socio-economic survey) as well as interview to local authorizes.

[40] It was confirmed through the interview to the industrial parks near the study area that there would be an opportunity for PAPs to be hired if they could work as a long-term staff since the industrial parks need such staff. Coordination including appropriate vocational training/capacity building of PAPs among relevant parties might be necessary.

7.5.9. Implementation Organization

There is a possibility that implementation organization for the Phase 2 is different from the Phase 1 since the Phase 2 has a possibility to apply another project scheme. Organization structure and responsibility of each entity on land acquisition is generally applied for every project in Vietnam as shown in Table 7.5.9-1 though the project scheme is different, and such structure/responsibility is also applied for the Phase 2.

Table 7.5.9-1 Organization and Responsibility on Land Acquisition

Organization	Major Responsibility
Project Implementing Agency	− Prepare and update RAP in case of donor funded-projects − Implement replacement cost survey − Secure budget for land acquisition and implementing RAP − Supervision of implementing RAP − Conduct internal and external monitoring − Report monitoring results to relevant authorities
Provncial People's Commitee (PPC)	- Establish DCC - Review the replacement cost survey result, and adjust official rate for compensation in accordance with approval of Rap by relevant authorities - Approve of Compensation, Support and Resettlement Plan at each affected household - Provide advice and guidance for updating and implementing RAP - Provide advice and guidance for difficult issues for implementing RAP - Settle grievance redress raised by PAPs
District People's Commitee (DPC)	- Establish and supervise DCC - Establish other relevant organizations to conduct land acquisition and implement land acquisition according to relevant national regulations - Coordinate with relevant authorities on preparation of resettlement sites according to guidance from PPC - Implement necessary procedure for issuing LURC or residence certificate for replacement households - Settle grievance redress raised by PAPs - Confirm compensation amount to be paid to PAPs
District Compensation and Site Clearlance Commitee (DCC)	- Prepare Compensation, Support and Resettlement Plan according to national regulations - Review DMS results and confirm land tenure status - Conduct payment of compensation amount to PAPs
District Land Fund Development Center (LFDC)	- Conduct DMS - Support for updating RAP to be prepared by the project implementing agency and support for requesting approval of updated RAP by PPC - Implement RAP - Make and a plan of resettlement activities on behalf of DPC as per the guidance of PPC or request from the project implementing agency - Support to select resettlement candidate sites

	- Support PAPs on administration procedure of purchasing agriculture land - Support to settle grievance redress
Commune People's Commitee (CPC)	- Appoint a staff from commune to support DCC for updatig RAP and cadastral map - Select resettlement candidate sites in case of providing resettlement sites to PAPs - Assist the project implementing agency and DCC to organize consultation meetings with PAPs - To be a contact window of grievance redress throughout the project period and support settlement of grievance raised by PAPs - Support all activities related to land acquisition and resettlement

Source: JICA Study Team

7.5.10. Estimation of Compensation Cost

Table 7.5.10-1 shows the compensation cost which is estimated based on the result of preliminary impact examination and market price collected near the study area. Comparision between PPC rate and unit price set with the concept of market price is enclosed in RPF of Attachment 9, and the approach of unit price collection is explained below. In the process of RAP preapration, replacement cost survey is necessary to be conducted to obtain the latest market price in the study area.

(1) Land

In the case of agriculture and residential land, the result of market value survey at Ba Ria Vung Tau province conducted in May to July 2012 for the Phase 1 was used. As for the commercial land, the result of market value survey conducted in July 2012 for HCM-LT-DG expressway project was referred. With respect to salt-making and aquaculture land, unit price was set by adjusting PPC rate.

(2) Structure

The result of market value survey at Ba Ria Vung Tau province conducted in May to July 2012 for the Phase 1 was used.

(3) Trees/Crops

The result of market value survey conducted in July 2012 for the Phase 1 was used since the location did not necessailiy affect the tree/crop price in Vietnam.

Table 7.5.10-1 Estimated Compensation Cost

(Unit:1,000VND)

No.	Items	Quantity	Unit	Rate	Total (VND)	Notes
I	**Compensation for Land**					
1	Residential land	50,761	m2	1,140,000	**57,867,105,104**	
2	Agricultural land					
	Agricultural land within residential area	206,146	m2	450,000	**92,765,909,268**	
	Agricultural land far away from residential area	824,586	m2	120,000	**98,950,303,219**	
	Aquaculture land	49,500	m2	160,000	**7,920,000,000**	
	Salt-making land	83,400	m2	160,000	**13,344,000,000**	
3	Non-agricultural	29,308	m2	200,000	**5,861,529,160**	
	Total I				**276,708,846,752**	
I	**Compensation for house and structures**		**m2**		**-**	
1	Category 1	-				
2	Category 2	-				
3	Category 3	2,150	m2	2,900,000	**6,235,000,000**	
4	Category 4	6,998	m2	2,400,000	**16,794,400,000**	
5	Category 5					
	Total II				**23,029,400,000**	
III	**Compensation for secondary structures & public works**					
	Constructed graves	65	No.	7,900,000	**513,500,000**	
	Low-voltage poles	45	No.	20,000,000	**900,000,000**	
	Total III				**1,413,500,000**	
IV	**Compensation for crops and trees**				**-**	
1	Annual crop	488,054	m2	3,000	**1,464,162,750**	
2	Trees	909,210	Tree	134,000	**121,834,173,500**	Average of rates for dominant cultivated trees in the areas: Cashew, Pomelo, coffee, Eucalyptus, Acacia, cajuput and Sonneretia
	Total IV				**123,298,336,250**	
V	**Allowances/ Assistance**				**-**	
1	*Relocation within the province*	120	HH	4,000,000	**480,000,000**	6 mil/HH (relocated within province but outside district) with minimum 3 mil/HH and maximum 7 mil/HH

No.	Items	Quantity	Unit	Rate	Total (VND)	Notes
2	House Repairing Cost	99	HH	6,000,000	**594,000,000**	House repairing cost in case of house/structure is partially affected
3	House Renting Allowance	120	HH	9,000,000	**1,080,000,000**	1.5 mil/HH/month (in 6 months)
	Allowance for Living/					
4	*Production Stabilization*	*795*	*Person*	3,600,000	**2,862,000,000**	Estimated as 15% of total number of DPs
5	*Assistance for changing job*	1,163,632	m2	180,000	**209,453,818,536**	1.5 times of agricultural land price as regulated by PPC
6	*Vocational Training*	318	person	6,000,000	**1,908,000,000**	*Estimation of 2 persons in labour age/HH*
7	Business interruption Allowance	**53**	**HH**	5,000,000	**265,000,000**	Estimated as 5% of total number of HHs
8	Incentive Bonus	1060	HH	6,000,000	**6,360,000,000**	
9	Allowance for Vulnerable group	106	HH	10,000,000	**1,060,000,000**	Estimated as 10% of total number of HHs
	TOTAL V				**224,062,818,536**	
VI	**Income restoration program**	265	HH	20,000,000	**5,300,000,000**	Estimated as 25% of total number of HHs
	Total VI					
VII	**Resettlement sites development**	120	Plot	**150,000,000**	**18,000,000,000**	
VIII	TOTAL I-VI				**653,812,901,537**	
IX	Implementation cost (2% of total I-VI)	2%			**13,076,258,031**	
X	Contingency (10% of total I-VII)	10%			**65,381,290,154**	
XI	External monitoring				**1,000,000,000**	
XII	Replacement cost survey				**500,000,000**	
	TOTAL OF RESETTLEMENT BUDGET				**751,770,449,722**	

Source：JICA Study Team

7.5.11. Tentative Land Acquisition Schedule

Tentative schedule for preparing RAP and land acquisition is shown in the Table 7.5.11-1 based on the implementing schedule proposed by JICA Study Team.

Table 7.5.11-1 Tentative Schedule of RAP Preparation and Land Acquisition

		Responsibility	2013				2014				2015				2016				2017			
			1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
	<Project Implementation>																					
1	Preparatory Survey																					
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	<Monitoring>																					
	Internal Monitoring	Project Implementing Agency																				
	External Monitoring	Project Implementing Agency																				

Source: JICA Study Team

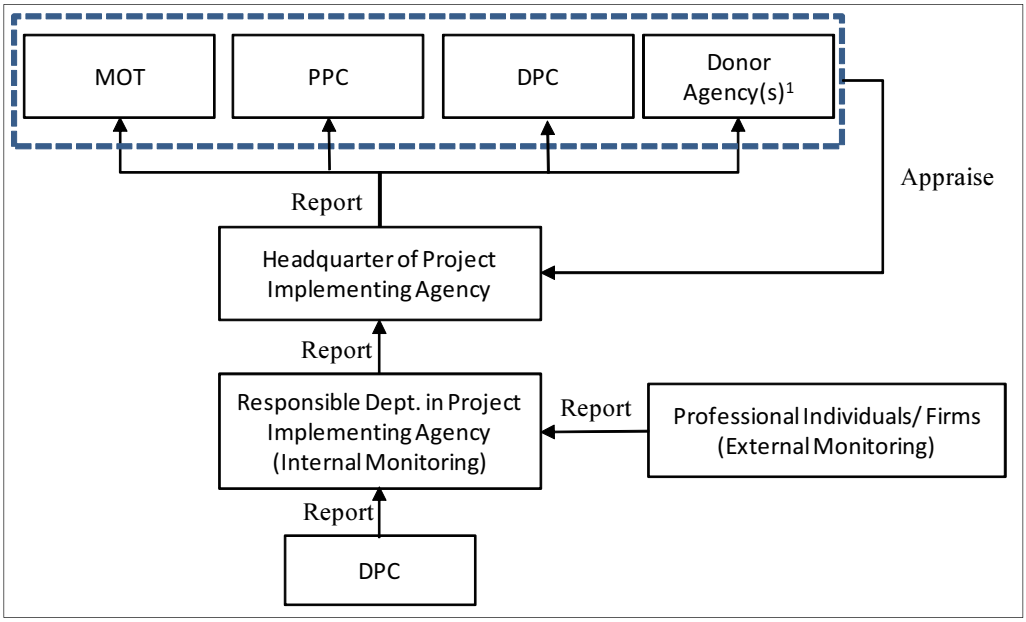
7.5.12. Monitoring

Monitoring structure to be applied is same between Phase 1 and Phase 2 even though the project scheme is diferent, and implementing internal monitoring and external monitoring (i.e. monitoring to be done by the external expert(s)) is necessary. Outline of internal and external monitoring is presented in Table 7.5.12-1 and structure of reporting is presented in Figure 7.5.12-1 respectively.

Table 7.5.12-1 Outline of Internal and External Monitoring

Item	Internal Monitoring	External Monitoring
Purpose	Confirm and examine whether land acquisition is implemented in accordance with RAP or not from available data by the project implementing agency self	Confirm and examine whether land acquisition is implemented in accordance with RAP or not from available data and interview with relevant parties by independent expert (s)
Confirmation Items	a) Progress of land acquisition and land tenure transfer b) Implementation of RAP c) Implementation of IRP d) Raised grievance and its settlement methods e) Restoration of infrastructure affected by project implementation	a) Progress of land acquisition and land tenure transfer b) Gap of compensation policy between RAP and actual situation c) Appropriateness of grievance redress mechanism and settlement methods of raised grievance d) Appropriateness of IRP and living condition of PAPs e) Participation of PAPs to RAP preparation and updating
Monitoring Approach	- Establish data based of land acquisition progress based on report to be done by DPC monthly - Report land acquisition progress in document from the project implementing agency to relevant authorities	Collect information through the following methods and report to the project implementing agency: - Review relevant reports (internal monitoring reports, DMS results, etc.) - Interview with relevant authorities on land acquisition, key persons and some of PAPs - Organize public consultation meetings or focus group discussion at the project affected communes
Monitoring Frequency	To be conducted monthly from issuance of land acquisition decision by PPC until completion of land tenure transfer	- To be conducted from insurance of land acquisition decision until 6-13 months after completion of land acquisition. - To be conducted quarterly during implementing land acquisition and 6 months after completion of land acquisition
Executor	Project implementing agency	Independent expert(s)

Source: JICA Study Team



Remark 1: Reporting to the donor agency is necessary in case of donor funded-project

Source: JICA Study Team

Figure 7.5.12-1 Structure of Reporting

7.5.13. Strategy of Enhancement of Public Participation to Preparation of RAP from the Early Stage of Project Formulation

Vietnamese regulations stipulate to organization public consultation meetings in the process of preparation of Compensation, Support and Resettlement Plan at the time of D/D stage as explained in Section 7.3.12. In this case, public participation through public consultation meetings is realized at the later part of project formulation. In order to implement the project smoothly and effectively for project beneficiaries including PAPs, however, participation of PAPs at the early stage of project formulation is necessary.

Utilize the existing structure is considered as the most effective way to enhance PAPs within the current regal framework in Vietnam, and the following approaches will support to voice PAP's opinion/comments to the project from the early stage of project formulation and preparation of land acquisition/ resettlement plan.

1) Utilize Public Consultation Meetings in EIA：

There is a tendency that EIA study is conducted during the F/S stage in Vietnam. Then, public consultation meetings will be organized at the beginning (i.e. scoping stage) and the last stage (i.e. draft report preparation) of EIA study to explain the project outline and expected impact to natural and social environment by targeting wide range of stakeholders including PAPs. Preliminary land acquisition will be available at this stage, which can be

disclosed to attendants for opinion exchanging. So that, land acquisition/resettlement plan reflecting PAP's opinion/comment is possible.

2) Utilize Household Survey：

The framework of Compensation, Support and Resettlement Plan is prepared during the F/S stage, according to the Vietnamese regulations, but is approved by the supervision ministry without disclosing to public. Then, to ensure public participation will be enhanced by asking comments to the framework of Compensation, Support and Resettlement Plan from leaders/key persons of the affected communes though it is not requested by the Vietnamese regulation.

Direct communication is consider to help people's understanding than communication in document. Thus, the project implementing agency is requested to organize a meeting with leaders/key persons of the affected communes by inviting relevant local authorizes.

7.5.14. Draft Terms of Reference for Preparation of RAP at Phase 2 Section

(1) Requirements of Donor on Land Acquisition

In the case that Phase 2 section is going to be implemented by donor agency funding, a project implementing agency is requested to fulfill a donor policy. Donors such as World Bank, ADB and JICA request to prepare RAP in case a project requests more than 200 persons of resettlement. Required items to be covered in RAP among WB, ADB and JICA are similar, and Table 7.5.14-1 shows items to be covered in RAP at a donor agency funding project. This section is the summary of the draft TOR for preparation of RAP for Phase 2 section enclosed in RPF of Attachment 9.

Table 7.5.14-1 Contents of RAP to be Prepared based on OP 4.12

	Items to be Covered in RAP	Contents to be Described
1	Legal and institutional framework of land acquisition and resettlement	i) Legal framework, gaps between the legal framework of the recipient country and donor policies, ii) Proposal to solve identified gaps
2	Project description and necessity of resettlement	i) Project component, ii) Alternative analysis to minimize impact of land acquisition/resettlement
3	Result of socio-economic survey	i) Result of census, inventory of loss, and socio-economic survey
4	Policy for compensation and livelihood rehabilitation	i) Eligibility and entitlement of compensation and rehabilitation assistance, ii) Reasons not to provide alternative land if providing land is impossible, iii) Procedure of compensation in full replacement cost and relevant authorities,

		iv) Contents of rehabilitation assistance
5	Site selection, site preparation, and relocation	i) Selection of alternative site, plan for site preparation, ii) Assessment of environmental impacts, examination of mitigation measurement and environmental management plan for relocation
6	Grievance mechanism, responsibility of relevant authorities	i) Examination of appropriate grievance mechanism (i.e. applying for the existing mechanism, or establishing new mechanism)
7	Responsibility of relevant authorities in land acquisition and resettlement	i) Responsibility of each relevant authority ii) Evaluation of capability of responsible authority and any measures for capacity improvement
8	Practical schedule of land acquisition, compensation payment, resettlement	i) Practical schedule of land acquisition, compensation and resettlement including arrangement of relocation site
9	Budget arrangement	i) Examination of necessary amount in replacement cost at each item ii) Preparation of budget arrangement and payment schedule
10	Monitoring and evaluation	i) Plan of internal monitoring ii) Plan of external monitoring iii) Preparation of monitoring forms, input, output and indicators for outcomes iv) Examination of evaluation methods
11	Plan of public participation to preparation of RAP	i) Exanimation of strategies for enhancement of public participation for RAP preparation and implementation

(2) Approach to Prepare RAP

As RAP preparation flow in Figure 7.3.12-1 in Section 7.3.12 shows, RAP is tended to be preliminary prepared in the feasibility study phase by conducting necessary household surveys (i.e. census, inventory of loss and socio-economic survey) and replacement cost survey and organizing public consultation meetings to explain the framework of RAP in the case of donor agency funding projects.

Based on the preliminary impact assessment to be described in Section 7.4.6, Table 7.5.14-2 shows the scope of household surveys and public consultation meetings.

Table 7.5.14-2 Contents of Household Surveys and Public Consultation Meetings

	Survey Type	Survey Items	Target
1	Population Census	[Individual] - Name of title-holder of affected land and property - Family structure - Ethnic group - Monthly/annual income and income source - Prospect to the project/compensation program [Business Owner] - Business type - Monthly/annual net income - Number of employees - Average monthly/annual salary of employees - Prospect to the project/compensation program [Employee/Worker losing/decreasing income source][41] - Employment type - Family structure - Monthly/annual income - Main and secondary income and income source of a household - Prospect to the project/compensation program	All PAPs (100% survey)
2	Inventor of Asset Loss	[Individual Property: Land] - Land use of affected land - Tenure status of affected land - Size and degree of affected part in the target land [Individual Property: Structure and Crops] - Tenure status of affected structure - Purpose/use of affected structure - Size and decree of affected part in the target structure - Number and kinds of affected agricultural properties (e.g. crops, trees, etc), age and diameter of affected tree - Expected yield amount from the affected agricultural property [Community Property: Land] - Legal or customary status of affected land - Size and decree of affected part in the target land - Land use of the target land [Community Property: Structure] - Legal or customary status of affected structure	All PAPs (100% survey)

[41] Permission to interview employees was necessary to be obtained from an employer though it was sometimes not available. Therefore, interviewing all PAPs who might lose or decrease their income source was impossible.

	Survey Type	Survey Items	Target
		- Size and decree of affected part in the target structure - Purpose/use of the affected structure	
3	Socio-Economic Survey	- Holding property at household - Average expenditure at each commodity category - Health issue (e.g. health insurance and health condition) - Accessibility of public service - Subsidiary from the government or local authority - Saving and indebt condition	25% of PAPs (covering all socio-economic category of PAPs)
4	Public Consultation Meetings	- Explaining framework of RAP - 1 meeting per 1 affected commune (total 7 meetings will be organized)	All PAPs (100% of survey)

Source: JICA Study Team

Source Book Planning and Implementation in Development Project (World Bank, 2004) in order to confirm the latest market price for estimating compensation cost in replacement cost.

(3) Tentative Schedule for RAP Study

Table 7.5.14-3 shows the tentative schedule for RAP study based on the project schedule proposed by JICA Study Team.

Table 7.5.14-3 Tentative Schedule for RAP Study

		Responsibility	2013				2014				2015				2016				2017			
			1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
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	Internal Monitoring	Project Implementing Agency																				
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Source: JICA Study Team

Appendix

APPENDIX 1.

Social Republic of Vietnam

Office of Prime Minister

Hanoi

[DATE]

_____

_____

Re : **GOVERNMENT GUARANTEE UNDERTAKING** *(Partial Draft)*

Gentlemen:

This confirms that the obligations of the Social Republic of Vietnam ("SRV") regarding *government supports* through the [Ministry of Transport ("MOT")] under the Project Agreement ("PA") dated [●] between the MOT and [●] carry the full faith and credit of the Social Republic of Vietnam and that the Social Republic of Vietnam directly, irrevocably and unconditionally ensure that the [MOT] shall perform at all times its obligations as stipulated and contemplated under the PA as they fall due until all obligations under the same have been fulfilled.

The government's obligations regarding government supports specified in the PA include at least the following items:

(1) To acquire the land and provide it to SPC for free

(2) To construct supporting facilities at the side of GoV, including (i) elevating HCM-LT-DG, (ii) expressway at LT JCT, (iii) an access road between BH-VT expressway and NH51 at NT JCT and (iv) overpass bridges across the expressway in BOT section

(3) To revise in the project scope from the original plan, including (i) upgrading the access road from Phu My IC to NH51, to toll road level, and (ii) extending the public section in Phase 2 to Nhon Trach - Vung Tau.

(4) To increase the toll rate from VD1,000/km to VD1,500/km in 2012.

(5) To construct and operate the Phase 2 (public work section) at the side of GoV

(6) To transfer the net revenue (gross revenue – OM costs) from the Phase 2 operation

(7) Not to open competing public projects (inter-port road including Phuc An bridge and BH-VT railway) before 2030

In this connection, the Social Republic of Vietnam hereby represents and warrants that:

1. It has the power to issue this partial Government Guarantee Undertaking ("GGU") and to exercise its rights and perform its obligations hereunder and all actions required to authorize the execution by the Office of Prime Minister ("OPM") of this GGU and the performance by it of its obligations hereunder has been duly undertaken;

2. The obligations expressed to be assumed by the Social Republic of Vietnam in this GGU are, under the laws of the Vietnam, direct, unconditional, legal, valid and binding obligations of the Social Republic of Vietnam enforceable against it in accordance with the terms hereof;

3. The execution, delivery and performance of this GGU do not and will not (i) violate the Constitution or any other laws of the Social Republic of Vietnam; (ii) conflict with, or result in the breach of any agreement or instrument to which the Social Republic of Vietnam is a party or by which its property is bound including such international agreements signed by the Social Republic of Vietnam or any subdivision thereof with international institutions and organizations; or (iii) constitute a default or event that, with the passing of time or giving notice or other condition, would constitute a default under any such agreement or instrument including such international agreements signed by the Social Republic of Vietnam or any subdivision thereof with international institutions and organizations;

4. All acts, conditions and things required by the laws and the Constitution of the Social Republic of Vietnam to be done, fulfilled, obtained or performed, including, without limitation, all consents, licenses, permits, approvals, certificates and registrations by or with any governmental agency or any other authority in the Social Republic of Vietnam in order to enable the Social Republic of Vietnam to issue, exercise its rights and perform its obligations hereunder and to make this GGU admissible in evidence in the Social Republic of Vietnam have been done, fulfilled, obtained and performed;

5. The execution, delivery and performance by the Social Republic of Vietnam of this GGU are private and commercial acts (and not governmental acts), and thus, subject to civil and commercial law. In this connection, the Social Republic of Vietnam consents to be sued in respect of obligations under this GGU and waives

and agrees not to claim any immunity from suit, execution or attachment (whether in aid of execution, before judgment or otherwise) or other legal processes in respect of its obligations under this GGU, provided, that this waiver will not apply to: (a) property of the consular or diplomatic mission of the Social Republic of Vietnam; (b) property of a military character and under the control of a military authority or defense agency; and (c) property located in the Social Republic of Vietnam and dedicated solely to public or governmental use (as distinguished from patrimonial property or property dedicated to commercial use);

6. All litigations resulting from this GGU shall be governed by the applicable laws of the Social Republic of Vietnam, however, any arbitration shall be under the [●] in [●]; and

7. The undersigned signatory was duly authorized and has full powers to execute this GGU for and on behalf of the Social Republic of Vietnam.

Very truly yours,

SOCIAL REPUBLIC OF VIETNAM

By:

Secretary of Office of Prime Minister

Appendix 2

DRAFT TERMS OF REFERENCE FOR "THE PREPARATORY SURVEY FOR BIEN HOA – VUNG TAU EXPRESSWAY PROJECT (PHASE-2: NHON TRACH – VUNG TAU SECTION)"

I. BACKGROUND AND OBJECTIVES OF THE PREPARATORY SURVEY

Road plays an important role in the transportation system in Vietnam. According to transport statistics on different transport modes (road, railway, inland water transport, coastal service, air service) in 2008, road transportation accounts for 72.9% of all freight transport and 91.7% of all passenger transport. However, existing road network is not sufficient to accommodate rapid increase in traffic volume, generated by the recent economic growth in the country. The government of Vietnam (GOV) gives priority transport infrastructure development as the most important subject in "the 9th social economic development 5-year plan (2011-2015)". According, development projects on large-scale transport infrastructures such as airports, seaports, expressway, urban railways, have been implemented.

As for the expressway, "Expressway Development Plan (master plan)" established by Ministry of Transport (MOT) was approved by the Prime Minister (PM) in December 2008. In the master plan, implementation plan of 39 sections (5,873 km in total) of expressways were established, while 2,235 km of 5,873 km were planned to be completed before 2020.

The southern part of Vietnam, the subject area of the Project, is a booming area of the country where the country's economic center Ho Chi Minh City and its suburban industrial parks are located, but the infrastructure development sufficient to support such rapid progress is still behind.

GOV is reinforcing their effort to construct more expressways, with the high priority put on construction of the north-south expressway that runs through the country. Planned to be 3,236 km in total length, this north-south expressway will connect Hanoi and Can Tho along National highway No. 1, and the section connecting major cities such as Hanoi, Ho Chi Minh and Da Nang is particularly regarded highly important.

In accordance with the present status and development policy for the transport infrastructure development mentioned above, Japan International Cooperation Agency (JICA) conducted "The Comprehensive Study on the Sustainable Development of Transport System in Vietnam (VITRANSS 2)"(November 2007 – May 2010) to support the development of the overall transport sector master plan covering all transportation sectors in Vietnam. For the expressway

development sector, VITRANSS 2 supported the formulation of "North-South Expressway master plan". Consequently, its preliminary feasibility study was carried out.

As a result of the preliminary feasibility study by VITRANSS 2, necessary budget for the development of North-South Expressway network was estimated to be about USD 66 billion. Projects for implementation which has been approved by GOV are estimated to be about USD 12 billion and most of the required funding needs support from ODA of Japanese government, WB, ADB and so on. The rest of the USD 54 billion should be secured from various financial sources. Since it is difficult for the project to be subsidized only by the public funds from GOV and ODAs, it is strongly expected to mobilize private sector investment.

For the introduction of private sector investment, it is necessary to study the case of 100% private investment (Build-Operate-Transfer or BOT) and public-private-partnership (PPP) investment. VITRANSS 2 suggested the possibility of implementing many projects through PPP, and emphasized that further detailed study is necessary in order to materialize a concrete business model of PPP and its practical implementation process.

On the other hand, requests have been made from GOV and project implementing organizations for provision of supports to the survey on the Bien Hoa - Vung Tau Expressway (BHVT Expressway). In particular, there is a high industrial intensification along the BHVT Expressway, with many industrial parks located in the area. This expressway will also form an expressway network together with an expressway linking Ho Chi Minh - Long Thanh - Dau Giay Expressway, which is currently under construction, and Ben Luc – Long Thanh Expressway, the Ho Chi Minh Ring Road No. 3 and 4 and is therefore expected to play the most important role in boosting up the national economic growth. Considering this, this project has a high necessity.

The Feasibility Study on Private Investment in Highway Projects in Southern Vietnam (the Preliminary Survey) was conducted in June 2011 and the BHVT Expressway project was identified as one of projects with high priorities for investment.

In March 2013, the Preparatory Survey on Bien Hoa – Vung Tau Expressway Project in Vietnam (the PPP Survey) was conducted with the scope including (1) formulation of the project implementation plan, (2) survey and review on project viability and profitability improvement, (3) implementation of basic design with improvement of project profitability taken into consideration, and (4) survey on environmental and social considerations; and the optimal overall implementation plan was formulated and a private participation scheme for Japanese and Vietnamese stakeholders was proposed, in order for promoting consensus building among all the stakeholders.

The PPP Survey put top priority on promotion of project viability of Phase 1 Section (Bien Hoa – Long Thanh – Nhon Trach) using the private investment scheme. As for Phase 2

Section (Nhon Trach – Vung Tau including Phu My – NH51 intersection towards Cai Mep Thi Vai port), the project realization with private investment was evaluated to be difficult and it was proposed to be developed as a public works by GOV using Japanese ODA funds.

Therefore, the Preparatory Survey for Bien Hoa - Vung Tau Expressway (Phase 2 Section) will be studied in order to realize early implementation for the whole Section of BHVT Expressway.

II. OBJECTIVES OF THE PROJECT

To construct the Bien Hoa – Vung Tau Expressway (Phase 2 Section)

III. SCOPE OF THE PROJECT

1. Project Site

The Project site is Nhon Trach – Vun Tau, Phase 2 Section for BHVT Expressway, Vietnam, as shown in Figure 1.

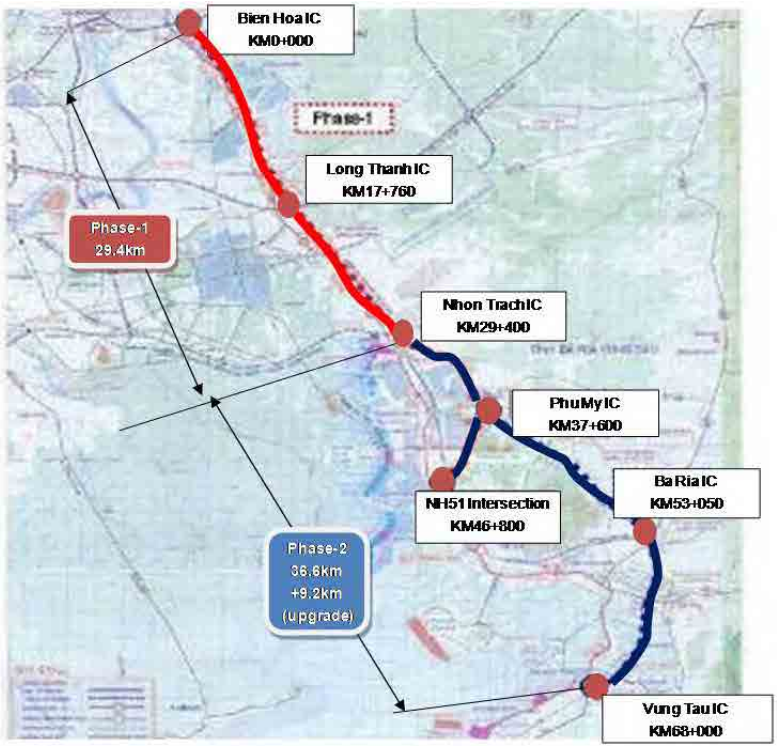

Figure 1 Location of BHVT Expressway and Phasing Plan

2. Outline of the Project

Outline of the Project is as follows.

Section	Nhon Trach IC to Vung Tau IC and Phu My – NH51 intersection (BHVT Expressway Phase 2 Section)
Stage	Construction
Road standard	Expressway Class A
Design speed	120km/h
Road Length	36.6km + 9.2km (upgrade)
No. of lanes	4

3. Project Cost

Total Project cost (Phase 2) as 2012 is approximately 13,379billion VND (50.9billion JPY) which is an estimate presented by the PPP Survey.

4. Implementation Agency

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

Supervisory Organization: Ministry of Transport (MOT)

5. Schedule

The tentative Project Schedule of Phase 2 section is as follows.

Preparatory Survey Period: 9 months (May 2013 – January 2014)

Commencement of Construction: 2017

Put into operation: 2020

6. Environmental and Social Aspects

JICA's Guideline for Environmental and Social Consideration (April 2010) shall be applied. Due to considerations shall be made to minimize impact on environment and project affected persons. An environmental and social impact assessment will be carried out in the Survey in accordance with JICA's Guideline.

IV. SCOPE OF THE PREPARATORY SURVEY

1. Objectives of the Survey

In order to assist the project formation for the Bien Hoa – Vung Tau Expressway (Phase-2 Section), this survey aims to complement the F/S and EIA by reviewing and updating the validity of the implementation from the viewpoints of scope, work methodology and project implementation schedule, on the basis of a Japanese ODA loan.

2. Scope of the Survey

The Preparatory Survey will cover the following items for confirming viabilities and implementation of the Project.

1) Confirm of Background and Necessity of the Project
2) Traffic Demand Forecast
3) Alternative Study of Expressway Plan
4) Review of Preliminary Design
5) Preliminary Construction Planning
6) Preliminary Project Cost Estimate
7) Operation and Maintenance Plan
8) Implementation Structure and Program
9) Procurement Plan
10) Economic Analysis
11) Environmental and Social Considerations
12) Notes on the Project Implementation
13) Discussion and adjustment with related organization of Phase 1 Project

3. Desirable Specialists for the Preparatory Survey

JICA will dispatch a survey team to carry out the Preparatory Survey. The team consists of the following specialists.

- Team Leader / Expressway Planner
- Highway Design Specialist
- Traffic Demand Forecasting Specialist
- Urban Planning Specialist
- Bridge Design Specialist
- Soft Soil Treatment Specialist
- Construction Planning / Cost Estimation Specialist
- Expressway Operation and Maintenance Specialist
- Environmental Specialist

V. SCHEDULE OF THE PREPARATORY SURVEY

The tentative schedule of the Preparatory Survey is described below. The schedule may be subject to change during the preparation and the course of the Survey.

May 2013 -Mobilization of Survey Team & Commencement of the Survey

May 2013	-Submission of Inception Report
August 2013	-Submission of Interim Report
November 2013	-Submission of Draft Final Report
January 2014	-Submission of Final Report

VI. DELIVERABLES

JICA will prepare and submit following reports in English (and Vietnamese for 1. and 4.) to Cuu Long CIPM.

1. Inception Report
   5 copies will be submitted at the commencement of the first work period in Vietnam.
2. Interim Report
   5 copies will be submitted 4 months after the commencement of the Preparatory Survey.
3. Draft Final Report
   5 copies will be submitted 7 months after the commencement of the Preparatory Survey.
4. Final Report
   5 copies will be submitted 9 months after the commencement of the Preparatory Survey.

VII. UNDERTAKINGS

The Cuu Long CIPM shall act as the counterpart to the survey team and also as the coordinating body with other organization concerned with the smooth implementation of the Preparatory Survey.

The Cuu long CIPM shall provide the survey team with the following items in cooperation with other organizations concerned:

1) Data and information related to the Preparatory Survey;
2) Appropriate members of Cuu Long CIPM who act as counterparts to the team;
3) Support the survey team to take advantage of the physical facilities, office services that are now available in Cuu Long CIPM.

VIII. CONSULTATION

JICA and Cuu Long CIPM shall consult with each other in respect of any matter that may arise from or in connection with the Preparatory Survey.