Chapter 4 Project Implementation Plan

4.1 Equipment/materials procurement plan

4.1.1 Equipment/materials

(1) Basic policy

Among the materials required for railway construction, study team will locally procure those available in Vietnam including import items as far as possible from view point of reduction in construction cost, except those that will not potentially be obtainable in the specified period of time in consideration of quality, delivery time and market prices, which will be procured from Japan or third countries.

(2) Present state of procurement of equipment/material

Study team indicates the state of procurement of the following equipment/materials required for the project.

Table 4.1.1 Plan of equipment/materials procurement

Equipment/materials	Source of procurement			Remarks
	Vietnam	Japan	Third countries	
Steel frame	△(only processing)		○	
Reinforcing bar	○			
Cement	○			
Aggregate	○			Gravel, etc.
Admixture	○			High-performance water reducing agent, AE water reducing agent
Asphalt mixture	○			
Framework material	○			Locally available
Viaduct girder	○	○		PC girder, steel girder
Truss pole, steel pipe pole	△(only processing)		○	Import, processing is partly possible in Vietnam.
Rail (50N, 60)		○	○	From Japan, etc.
Optical cable (SM)		○	○	
Power cable	○			
Signaling cable		○	○	
Insulator		○	○	
Trolley wire		○	○	
PC sleeper	○	○		vibration-free
Turnout		○		Simple turnout, scissors
Raw concrete	○			
Rail fastening device		○	○	
Ballast	○			
Sand/soil (improved soil, ballast)	○			
Steel sheet pile	△			
H steel	△			
I steel	△			
Wire gauze	○			Weld wire gauze, etc.
PC material	○		○	PC steel wire, joint, etc.
Support		○	○	Rubber support

Equipment/materials	Source of procurement			Remarks
	Vietnam	Japan	Third countries	
Earth retaining support material	○			Strut, wale It is used by processing usually H steel, etc.
Wooden sheet pile	○			
Waterproof agent	○			
Secondary concrete product	○			Concrete trough, etc.
Discharge pipe	○			Polyvinyl chloride pipe, etc.
Scaffolding board, support material	○			Unit section, cramp, etc.
Decking plate	○			
Safety material	○			Fence barricade, color cone, etc.
Grouting material	○			
Sound insulating wall	○		○	
Entry prevention track fence	○			
Covering plate	△	○	○	Not sure the availability in Vietnam.

Source: JICA Study Team

4.1.2 Construction machine

(1) Basic policy

General-purpose construction machines will be procured in Vietnam as far as possible, when they are locally available. However, large-size and special machines, which will significantly influence construction work and construction schedule in case of malfunction, will be procured from Japan.

(2) Present state of procurement of construction machines

Study team indicates the situation of procurement of main construction material required in the construction plan in the following.

Table 4.1.2 Plan of equipment/materials procurement (draft)

Construction machines	Source of procurement			Remarks
	Vietnam	Japan	Third countries	
Pile driver	○	○		In case of special machine, procured from abroad.
Auger for bore pile	○			
Tower crane	○			
Mobile crane	○			
Road roller	○			
Concrete pump car	○			
Bulldozer	○			
Machine drill	○			
Shield machine		○	△	
Grader	○			
Dump truck	○			
Concrete breaker	○			
Compactor	○			
Concrete mixer car	○			
Generator	○			
Air compressor	○			
Rough terrain crane	○			Depends on capacity, but available in Hanoi and Ho Chi Minh city.
Crawler crane	○			
Back hoe	○			
Silent piler		○	△	It seems available only in Japan and not sure availability in third countries.
All-round machine drill	○			
Earthy drill	△	○	○	Not sure the availability in Vietnam.
Welding machine	○			
Submerged pump	○			
Lighting apparatus	○			
Vibration roller	○			
Tamper, rammer	○			

Source: JICA Study Team

4.2 Project cost estimation

4.2.1 Overview

Using a cost estimation support system, the cost of project is estimated separately for the cost of the main construction works, consultation, land acquisition, reserve fund, and other expenses. The costs of materials, devices, and construction that can be procured locally are calculated based on Vietnamese dong (VND), and imported materials and devices are calculated based on Japanese yen (JPY).

The values of the “Tokyo market (the JPY-dollar rate)/central exchange rate (b)/monthly average” (March 2012) released by the Bank of Japan are adopted for the calculations of foreign currencies (JPY-dollar rate). The values from the latest available date before FF in the inter-bank average exchange rate of the State Bank of Vietnam (as of 27th of April 2012) are adopted for calculations of domestic currency (the VND/USD rate).

Exchange rate: US$1 = 82.4 JPY, US$1 = 20,828 VND, 1 JPY = 252.8 VND

4.2.2 Share of public and private procurement

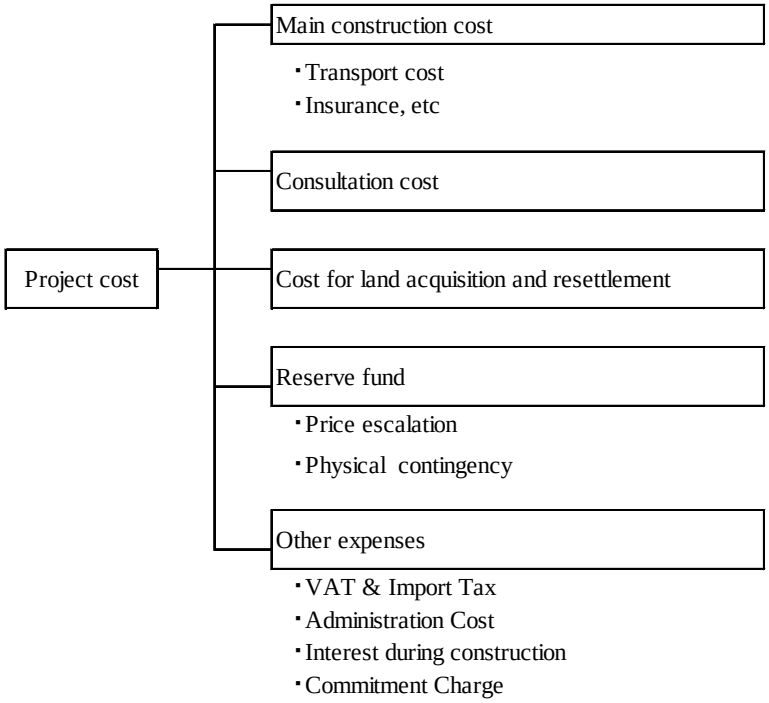
According to PPP scheme proposed in this survey, study team has proposed that private sector shall supply rolling stock and AFC. The reason is as follows.

- As for construction and maintenance of facilities of overground parts, it is appropriate to be performed by package as an infrastructure. Infrastructure refers to the civil structure, the station building built as the appurtenance of it, the track structure, substation, the transmission equipment, the signal device, and the train operation control center.
- Signal system including Automatic Train Stop, Automatic Train Operation, Interlocking device, Automatic Train Protection, CBTC system, Signal cables and Platform gates should be maintained by the package when considering about safety. Normally, as signal systems are closely related with the rails and turnouts which are generally prepared by the government, they shall be indivisible.
- Under current plan, signal systems are not unified in the railway tracks approved by Hanoi city. Moreover, the train operation control centers are planned to be installed for each railway line. According to feasibility study about establishment of the Hanoi Urban Rail Corporation (tentative name), research to integrate the train operation control centers of each line in the future has been proceeding so that the whole service information of train operation control can be obtained and the operation control effectively can be conducted. Hanoi city can hold the signal equipment, like other lines, by integration of the train operation control centers. In this case, the design specifications at the time of renewal of the system can be unified. It is not necessary to set the staff of the train operation control center corresponding to each line. As the result, total cost can be reduced.
- Meanwhile, rolling stock is business facility which passengers get on directly and stay comparatively long in. Rolling stock shall be procured by private sector in order to satisfy passenger's needs. When the obstacle and accident of the equipment occur, the facility can be separated from train operation control system above ground.
- Similarly, AFC device is also business facility. Furthermore, since it does not link directly to safety of train operation, it shall be procured by private sector.

4.2.3 Breakdown of the project cost

The breakdown of the project cost includes the main construction cost, consultation cost, cost for land acquisition and relocation, reserve fund, and other expenses. The breakdown includes portions based on foreign currencies and domestic currency. The main construction cost includes construction of elevated or underground structures in urban areas, interior work in stations, construction of tracks, electrical work, construction of train depots, etc. The consultation cost includes investigation, design, documents for ordering construction, the construction supervision cost, etc.

The breakdown of the project cost is shown in Fig. 4.2.1.



Source: JICA Study Team

Figure 4.2.1 Breakdown of the project cost

4.2.4 Quantity of construction and breakdown of operation cost

(1) Quantity of procurement package

The procurement package is divided into five portions by considering about the experiences of managing the installation of new railroads in Japan in addition to referring to plans of constructing other lines in Hanoi and similar projects in Asia. Packages 1, 2, and 3 are associated with civil engineering and construction work and the construction of train depots. Package 4 is associated with the construction of electrical facilities. Package 5 is for procuring rolling stocks and AFC devices.

1) Plan 1 (for elevated tracks in urban areas)

Table 4.2.1 Package 1 Civil engineering work in urban areas

Category	Unit	Quantity	
		Phase 1	Phase 2
1. Construction of elevated bridges			
-Rigid frame, elevated bridges in stations	m	875	
-Elevated bridges in general sections	m	2,970	
-Special bridges	No.	3	
-Sections with embankment	m	200	
2. Construction of tracks			
-Construction of elastic directly fastened track	m (single line)	11,560	
-Turnout (number 12)	No.	2	
3. Construction work			
-Construction of station building	LS	1	
-Interior work of stations	LS	1	
-Lighting installation	LS	1	
4. Equipment fitting work			
-Elevator	No.	5	
-Escalator	No.	15	
-Air conditioning system and water	LS	1	
-Power distribution room	No.	5	
-Platform screen door (PSD)	Platform	10	
-Lighting equipment	LS	1	
-Firefighting equipment	LS	1	
5. Construction of entrance/exit	LS	1	
6. Reconstruction of roads	LS	1	

Source: JICA Study Team

Table 4.2.2 Package 2 Civil engineering work in the suburbs

Category	Unit	Quantity	
		Phase 1	Phase 2
1. Overbridges, bridges, and special bridges	No.	9	25
2. Special bridges	No.	3	4
3. Foundation improvement work in general sections	m2	124,800	472,000
4. Construction of elevated bridges (at entry/exit of train depots)			
-Elevated bridges	m	1,900	0
-Sections with embankment	m	400	0
5. Construction of tracks			
-Construction of elastic directly fastened track	m (single line)	1,040	1,620
-Construction of ballast tracks	m	15,200	47,880
-Turnout (scissors number 12)	No.	4	4
-Turnout (single-swing number 12)	No.	12	0
6. Construction work			
-Construction of stations on bridges	LS	1	1
-Interior work of stations	LS	1	1
-Lighting installation	LS	1	1
7. Installation of electrical facilities			
-Elevator	No.	9	12
-Escalator	No.	10	14
-Air conditioning system and water supply/wastewater system	LS	1	1
-Power distribution room	No.	5	7
-Platform screen door (PSD)	Platform	10	14
-Fire-fighting equipment	LS	1	1
8. Construction of entrance/exit	LS	1	1
9. Reconstruction of roads	LS	1	1

Source: JICA Study Team

Table 4.2.3 Package 3 Construction of train depots

Category	Unit	Quantity	
		Phase 1	Phase 2
1. Construction of roads	LS	1	0
2. Preparation work	ha	17	0
3. Reinforcement of foundation	ha	17	0
4. Construction of tracks			
-Construction of ballast tracks	m (single line)	10,200	0
-Turnout (number 8)	No.	43	0
5. Construction of buildings			
-Building for inspecting trains	LS	1	0
-Offices	LS	1	0
-Warehouse for materials	LS	1	0
6. Construction of facilities			
-Power distribution room	No.	2	0
7. Exterior work	LS	1	0
8. Depot facilities	LS	1	1
9. Maintenance car	LS	1	1

Source: JICA Study Team

Table 4.2.4 Package 4 Electrical and mechanical work

Category	Unit	Quantity	
		Phase 1	Phase 2
1. Railroad substation			
-Railroad substation (receiving power, ancillary, DC)	No.	2	1
-Railroad substation (ancillary, DC)	No	0	2
-Railroad substation (DC)	No	1	1
-Switching station	No.	1	0
-Electric power dispatch	LS	1	0
2. Signaling equipment			
-Train operation control (ATS)/central	No.	1	0
-CBTC	LS	1	1
-Electronic interlocking device	Station	3	1
-Train operation control (ATS)/station	No.	3	1
-ATP (on the ground)	LS	1	1
-ATO (on the ground)	LS	1	1
-ATO (on a train)	LS	11	4
-Track circuit system (for backup)	LS	1	1
3. Communication system			
-Compound digital train radio (main unit)	No.	1	0
-Compound digital train radio (extension unit)	No.	6	5
-Station communication system (telephone, broadcasting in stations, theft alarm, guides for passengers, etc.)	No.	11	7
-Optical transmission device	Station	3	3
-Telephone switchboard	No.	3	3
-CCTV system	No.	11	7
-Information communication network system	LS	1	1
4. Electric power line			
-Special high voltage wire, high voltage wire	LS	1	1
-Feeder messenger railroad wire (including supporting structures)	LS	1	1
5. Communication wire			
-Copper cables for communications	LS	1	1
-LCX cable	LS	1	1
-SM optical cable	LS	1	1

Source: JICA Study Team

Table 4.2.5 Package 5 Rolling stocks and AFC devices

Category	Unit	Quantity	
		Phase 1	Phase 2
1. Rolling stocks			
-Rolling stock	No.	44	46
-Spare parts for maintenance	LS	1	1
-Train maintenance facilities	LS	1	1
2. AFC devices			
-Transport calculation system	No.	1	0
-Station server	No.	10	7
-Ticketing gate	No.	80	56
-Ticket vending machine, ticket office machine	LS	1	1
- Add value machine	LS	1	1

Source: JICA Study Team

2) Plan 2 (underground portions in urban areas)

Table 4.2.6 Package 1 Civil engineering work in urban areas

Category	Unit	Quantity	
		Phase 1	Phase 2
1. Underground work			
-Cut-and-cover work at stations	m	1,460	
-Shield tunneling	m	3,280	
-Cut-and-cover work in general portions	m	610	
-Ditches	m	510	
2. Construction of tracks			
-Construction of elastic directly fastened track	m	12,760	
-Turnout (number 12)	No.	2	
3. Construction work			
-Interior work of stations	LS	1	
-Lighting installation	LS	1	
4. Installation of electrical facilities			
-Elevator	No.	14	
-Escalator	No.	25	
-Air conditioning system and water supply/wastewater system	LS	1	
-Power distribution room	Station	5	
-Platform Screen Door	Platform	10	
-Fire-fighting system	LS	1	
5. Construction of entrance/exit	LS	1	
6. Reconstruction of roads	LS	1	

Source: JICA Study Team

*Contents of Packages 2 to 5 of the Plan 1 for the Plan 2 are similar with those of the Plan 1.

(2) Breakdown of costs based on domestic and foreign currencies

Using the prepared project plan, costs are calculated by construction categories based on the experience of constructing new lines in Japan while referring to the urban railways construction plan that is now in progress in Hanoi and similar project cases in Asia. Procurement of equipment and materials and the labor cost for construction are divided into a domestically supplied portion and imported portion based on the following conditions to take into account of price escalation.

1) Civil engineering work

Various infrastructures have been constructed in Vietnam, and there are many records of building road structures such as bridges. Since VNR has a record of constructing railroad structures, materials and construction machines can be obtained in Vietnam. If underground structures are to be constructed in urban areas, however, tunnel boring machines and tunnel engineers must be obtained from overseas in addition to some construction machines depending on the selection of retaining walls. Thus, the ratio of foreign currency is set at about 10% in the portion of general civil engineering and about 60% in the portion of shield engineering.

2) Construction of tracks

Rails and railway sleepers can be locally obtained in Vietnam, since railways are already operating in Vietnam. Because this project is proposing environmentally friendly railway tracks, such as reduced vibration through the use of heavy rails and elastic directly fastened tracks, however, these parts and turnouts are to be purchased overseas. The ratio of foreign currencies is set at 50% to 80% because some aspects, such as ballast and installation workers, are locally obtained.

3) Construction of train depot

Construction of train depot is expected to involve preparation work, track installation, and construction work. The details of construction are diverse in Vietnam as well, including common construction methods and track installation work. Therefore, the ratio of foreign currencies in the portion of general civil engineering and construction work is set at approximately 10%, while the ratio is set at 50% to 70% for the construction of tracks.

4) Electric facilities and related aspects

Referring to the ratio of domestic and foreign currencies in the unit construction price for the F/S investigation in Line 2, the ratio of foreign currencies is set at 90% for the construction of railroad substations and electric wire work because the materials for electric cables and installation workers can be locally obtained. Local procurement for other construction, mostly system devices, is difficult; thus, the ratio of foreign currencies is set at 95% to ensure the quality of the installation.

5) Cost for design and supervision, reserve fund

About two-thirds of these costs are calculated based on foreign currencies.

Table 4.2.7 Construction cost of phase 1 [elevated-ground plan]

FC & Total: million JPY
LC: million VND

Item		Total		
		FC	LC	Total
A. ELIGIBLE PORTION				
Ⅰ)	Procurement / Construction	76,600	43,540,364	248,855
	Civil	10,100	17,970,160	81,193
	Track	6,231	1,033,915	10,321
	Depot	8,536	5,966,732	32,142
	Electricity	37,845	609,008	40,254
	Maintenance car	2,487	0	2,487
	Base cost for JICA financing	65,198	25,579,814	166,397
	Price escalation	7,755	15,887,199	70,608
	Physical contingency	3,648	2,073,351	11,850
Ⅱ)	Consulting services	5,370	180,536	6,085
	Base cost	4,613	108,160	5,041
	Price escalation	501	63,779	754
	Physical contingency	256	8,597	290
Total (Ⅰ+Ⅱ)		81,971	43,720,900	254,940
Ⅲ)	PSIF portion	14,829	0	14,829
	Rolling stock	9,342	0	9,342
	AFC	2,998	0	2,998
	Price escalation	1,783	0	1,783
	Physical contingency	706	0	706
Total (Ⅰ+Ⅱ+Ⅲ)		96,800	43,720,900	269,769
B. NON ELIGIBLE PORTION				
a	Land Acquisition	0	67,575	267
	Base cost	0	51,600	204
	Price escalation	0	12,757	50
	Physical contingency	0	3,218	13
b	Administration cost	0	6,825,624	27,004
c	VAT	0	6,825,624	27,004
d	Import Tax	0	749,655	2,966
Total (a+b+c+d)		0	14,468,478	57,240
TOTAL (A+B)		96,800	58,189,378	327,009
C. Interest during Construction		2,080	0	2,080
	Interest during Construction(Const.)	1,519	0	1,519
	Interest during Construction (Consul.)	2	0	2
	Interest during Construction (PSIF)	559	0	559
D. Commitment Charge		2,308	0	2,308
GRAND TOTAL (A+B+C+D)		101,188	58,189,378	331,397
E. JICA ODA Finance portion incl. IDC (A-Ⅰ + A-Ⅱ + C+ D)		85,800	43,720,900	258,769
JICA PSIF portion incl. IDC (A-Ⅲ + C)		15,388	0	15,388

*Besides the above table, 1 billion yen of JICA PSIF portion are added up as a part of cost for preparation of inauguration.

*Automatic Fare Collection devices and rolling stocks will be procured by railway operation contractor (private SPC).

(Excluding) cost of excessive soil improvement, approach road to depot, cost of equipment reinforcement and repair works in EVN substations, and cost of constructing station plazas.

Source: JICA Study Team

Table 4.2.8 Construction cost of phase 1 [underground-ground plan]

FC & Total: million JPY

LC: million VND

Item		Total		
		FC	LC	Total
A. ELIGIBLE PORTION				
Ⅰ)	Procurement / Construction	110,382	61,863,610	355,128
	Civil downtown	29,399	17,265,176	97,704
	Civil suburb	4,391	7,774,712	35,149
	Track	6,262	1,028,387	10,330
	Depot	8,536	5,966,732	32,142
	Electricity	40,488	640,270	43,021
	Maintenance car	2,487	0	2,487
	Base cost for JICA financing	91,562	32,675,276	220,832
	Price escalation	13,564	26,242,448	117,385
	Physical contingency	5,256	2,945,886	16,911
Ⅱ)	Consulting services	7,388	268,940	8,452
	Base cost	6,215	146,176	6,793
	Price escalation	821	109,958	1,256
	Physical contingency	352	12,807	402
Total (Ⅰ+Ⅱ)		117,770	62,132,551	363,580
Ⅲ)	PSIF portion	15,066	0	15,066
	Rolling stock	9,342	0	9,342
	AFC	2,998	0	2,998
	Price escalation	2,009	0	2,009
	Physical contingency	717	0	717
Total (Ⅰ+Ⅱ+Ⅲ)		132,836	62,132,551	378,646
B. NON ELIGIBLE PORTION				
a	Land Acquisition	0	67,575	267
	Base cost	0	51,600	204
	Price escalation	0	12,757	50
	Physical contingency	0	3,218	13
b	Administration cost	0	9,577,685	37,891
c	VAT	0	9,577,685	37,891
d	Import Tax	0	761,650	3,013
Total (a+b+c+d)		0	19,984,595	79,063
TOTAL (A+B)		132,836	82,117,146	457,709
C. Interest during Construction		3,046	0	3,046
	Interest during Construction(Const.)	2,474	0	2,474
	Interest during Construction (Consul.)	3	0	3
	Interest during Construction (PSIF)	568	0	568
D. Commitment Charge		4,027	0	4,027
GRAND TOTAL (A+B+C+D)		139,909	82,117,146	464,782
E. JICA ODA Finance portion incl. IDC (A-Ⅰ + A-Ⅱ + C+ D)		124,275	62,132,551	370,085
JICA PSIF portion incl. IDC (A-Ⅲ + C)		15,634	0	15,634

*Besides the above table, 1 billion yen of JICA PSIF portion are added up as a part of cost for preparation of inauguration.

*Automatic Fare Collection devices and rolling stocks will be procured by railway operation contractor (private SPC).

(Excluding) cost of excessive soil improvement, approach road to depot, cost of equipment reinforcement and repair works in EVN substations, and cost of constructing station plazas.

Source: JICA Study Team

Table 4.2.9 Construction cost of phase 2

FC & Total: million JPY
LC: million VND

Item		Total		
		FC	LC	Total
A. ELIGIBLE PORTION				
Ⅰ)	Procurement / Construction	63,024	38,455,669	215,163
	Civil	4,548	9,122,198	40,638
	Track	8,408	1,753,751	15,346
	Electricity	32,576	560,898	34,795
	Maintenance car	552	0	552
	Base cost for JICA financing	46,083	11,436,847	91,330
	Price escalation	13,940	25,187,600	113,587
	Physical contingency	3,001	1,831,222	10,246
Ⅱ)	Consulting services	3,480	191,335	4,237
	Base cost	2,582	59,904	2,819
	Price escalation	733	122,320	1,217
	Physical contingency	166	9,111	202
Total (Ⅰ+Ⅱ)		66,505	38,647,005	219,400
Ⅲ)	PSIF portion	11,419	0	11,419
	Rolling stock	7,752	0	7,752
	AFC	617	0	617
	Price escalation	2,506	0	2,506
	Physical contingency	544	0	544
Total (Ⅰ+Ⅱ+Ⅲ)		77,924	38,647,005	230,819
B. NON ELIGIBLE PORTION				
a	Land Acquisition	0	0	0
	Base cost	0	0	0
	Price escalation	0	0	0
	Physical contingency	0	0	0
b	Administration cost	0	5,834,353	23,082
c	VAT	0	5,834,353	23,082
d	Import Tax	0	577,269	2,284
Total (a+b+c+d)		0	12,245,975	48,448
TOTAL (A+B)		77,924	50,892,980	279,267
C. Interest during Construction		1,050	0	1,050
	Interest during Construction(Const.)	618	0	618
	Interest during Construction (Consul.)	1	0	1
	Interest during Construction (PSIF)	431	0	431
D. Commitment Charge		1,100	0	1,100
GRAND TOTAL (A+B+C+D)		80,074	50,892,980	281,418
E. JICA ODA Finance portion incl. IDC (A-Ⅰ + A-Ⅱ + C+ D)		68,224	38,647,005	221,120
JICA PSIF portion incl. IDC (A-Ⅲ + C)		11,850	0	11,850

*Automatic Fare Collection devices and rolling stocks will be procured by railway operation contractor (private SPC).

(Excluding) cost of excessive soil improvement, approach road to depot, cost of equipment reinforcement and repair works in EVN substations, and cost of constructing station plazas.

Source: JICA Study Team

4.3 Alleviating the government debt burden

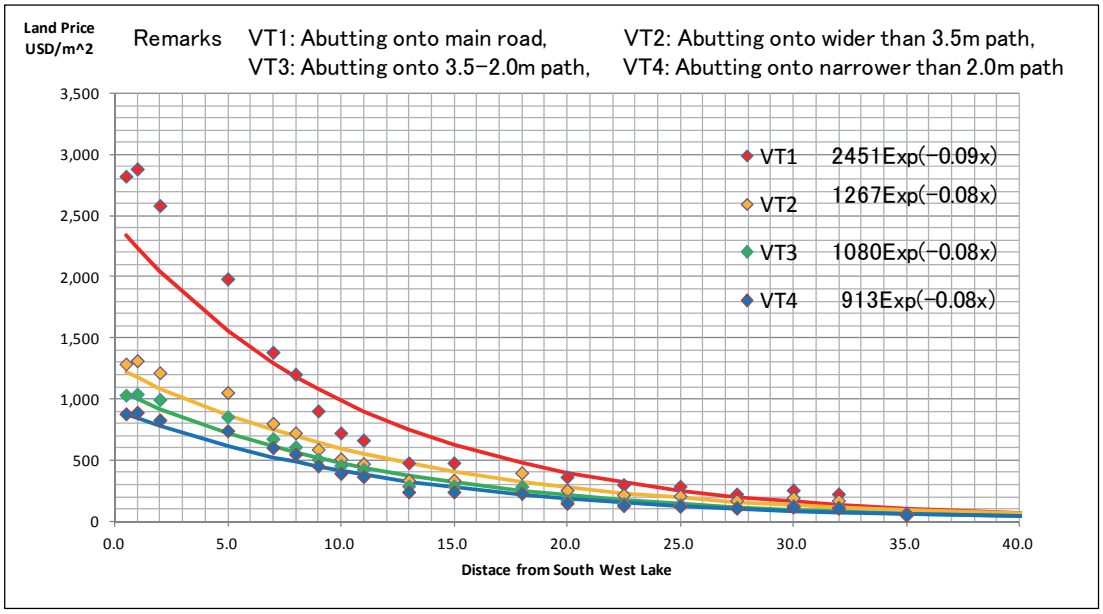
While there is concern that adoption of a scheme that requires the project to be entirely government funded could increase Vietnam's government debt, adoption by the Vietnamese government of certain strategies that have been tried and tested in Japan and other countries will allow the burden of government debt to be alleviated. These strategies are described below.

4.3.1 Rise in land prices along Hanoi Line 5 and diversion of betterment gains into project

(1) Trends in land prices along Hanoi Line 5

1) Land prices at present

Figure 4.3.1 below shows land prices along Hanoi Line 5 in 2010. The horizontal axis represents distance westward along the line from the center of Hanoi, and the vertical axis shows the price of land. VT1-VT4 indicate the width of road on which land abuts. Land prices decrease exponentially according to distance from the city center. If the functional equation is known, then the price of land in suburban areas can be calculated from the price of land in central urban areas and the distance from the city center. The functional equation obtained by the least-squares method from actual data is represented in the graph by VT1-VT4.



Source: Regulated Price List 2011- issued by HPC under Decision 89/2001 QD-UBND on December 28, 2010.

Figure 4.3.1 Land price trends along Hanoi Line 5 in 2010

2) Line-side land prices

Study team considers the price of a 38 km^2 strip of land measuring 1 km in width and 38 km in length from the city center. It is assumed to be VT4 land abutting on a narrower than 2.0 m path. The land price may be obtained by integrating the price for VT4 from 0 to 38 km, yielding a result of USD 10 billion. Dividing this figure by the area (38 km^2) gives an average land price of USD 270/m^2. Reading this against the graph shows this to be the average land price at a point around 14 km from the city center. The area benefiting from railway construction is assumed to extend a total of 2 km (1 km each side of the railway), which covers an area of 82 km^2. The total value of this land is USD 20 billion. Imposing a land price tax of 0.5% on this land would generate USD 100 million of tax revenue for the government, which is around three times the annual operating cost of Line 5.

3) Rise in land prices due to railway

Using the functional equation, it is possible to calculate the total value of land in the event that travel time to the city center is reduced. If travel time is halved, the rate of reduction in the functional equation is one half, and the total value of land obtained by integrating this is doubled.

(This does not mean that the price of land doubles at each point. If travel time is halved, the land price at the 40 km point becomes that at the 20 km point, the price at the 20 km point becomes that at the 10 km point, and the price at the 10 km point becomes that at the 5 km point. The total value of land along the entire length of the line obtained by integrating the resulting new land price curve is thus doubled.) If the line opens, travel times along the line to the city center will definitely be at least halved from what they are present. Assuming travel times are halved, the total increase in land prices over an area extending 2 km in width and 38 km in length is estimated to be USD 20 billion. This amount is approximately three times the total cost of construction estimated in this chapter. A mechanism for channeling an amount equivalent to this increase in the price of land into covering the cost of railway construction is therefore required. Below study team describes examples of how increases in land prices resulting from railway construction and the associated betterment gains have been used to fund construction.

(2) Means of diverting betterment gains into railway projects and past cases

1) Appropriation based on taxation measures such as increased revenue portion of fixed assets tax

The price of land of which the utilization value is enhanced due to the development of railways will rise. This process is shown in Figure 4.3.1, but the total amount of the estimated increase within a certain range that will benefit from development will be able to cover all the project costs sufficiently, and if a mechanism that can allocate this to railway development is reflected in the tax system, it will be possible to recoup government funds at an early stage. Profits from a rise in land prices in a usual situation are enjoyed only by land owners, and do not materialize immediately. As the convenience of land is enhanced by the development of railways, etc., the form of land use changes; for example, agricultural land changes to residential land, this is passed on to a rise in land prices, and until profits are realized, investment and time is required for the development of the environment, including infrastructure. Using this project as an opportunity, the development of land beside the railway should be promoted, and in tandem with this, the government should assess and evaluate land price trends in a study of criteria for the assignment of development rights and transaction cases, and also impose an appropriate fixed asset tax. This will enable the profits generated by rising land prices to be returned to public works project expenses. Furthermore, based on the assumption of an increase in future fixed asset tax revenues, it will also be possible to issue credits for railway development. This is called tax increment finance (TIF), and it is a method of raising funds to appropriate as transfer infrastructure development funds through bond issuance by government institutions that is secured by the increase in fixed asset tax revenues in peripheral areas resulting from infrastructure development. This is a system in which the total appraisal amount of fixed assets taxes within a specific area designated by a local government is decided, bonds are issued where the amount of difference from the appraisal amount resulting from subsequent development is designated as funds with secured redemption, and infrastructure is developed with these funds. Overseas, this system has been used in the United States in San Francisco and Los Angeles (the Red Line Phase 1). In addition, in regard to LRT development in recent years in the United States, there have been cases where local governments have raised the consumption tax rate based on ordinances and appropriated the funds for development expenditure.

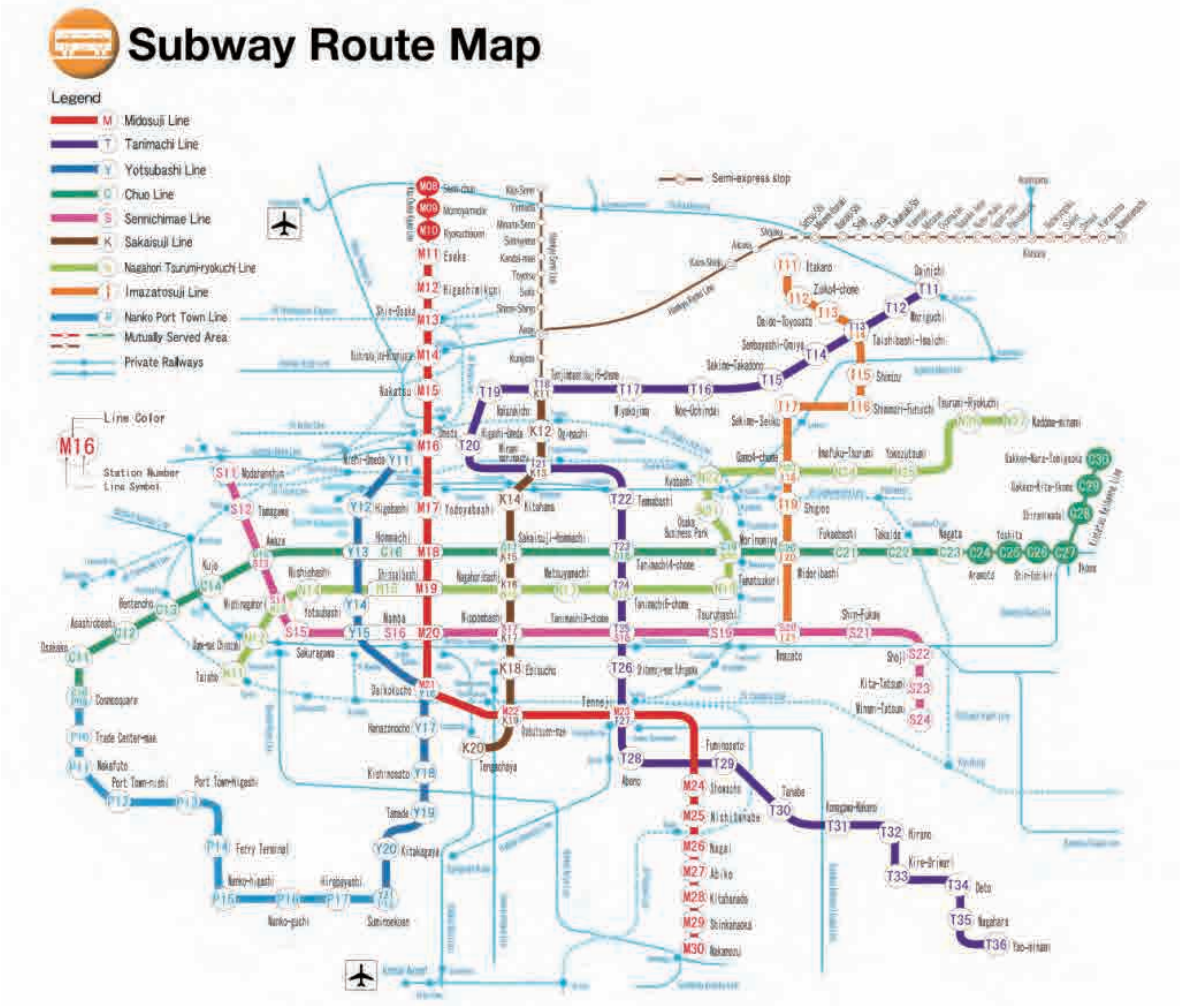
2) Use of beneficiary-pays scheme under urban planning law

This approach requires owners of land alongside the line to bear part of the cost of construction under a beneficiary-pays scheme provided for under urban planning law. One example of such a scheme is that employed in Osaka, described below, where one quarter of the cost of the project concerned was financed by raising funds, weighted according to grade of station, from landowners and leaseholders located near stations.

<Example of Midosuji subway line on the Osaka Municipal Subway>

In Japan before the Second World War, in addition to the capital, Tokyo, a subway was also built and operated in Osaka, which is Japan’s second largest city after Tokyo. While Tokyo’s subway was funded, built and run by private-sector companies, in the case of Osaka, the City of Osaka, which is the body that implements city planning, built the subway as a city planning project and also operated it. Line 1 of the Osaka Municipal Subway (now the Midosuji Line) was

opened from Umeda Station (provisional name) to Shinsaibashi Station in 1933 as Japan's first publicly operated subway line. This line links Osaka City's major shopping districts of Umeda, Namba and Tennoji, and since it opened it has been used by many passengers as a main traffic route in Osaka. Even now, this line is the only one with over 1 million passengers among the nine lines that the Osaka Municipal Transportation Bureau operates.



Source: Osaka Municipal Transportation Bureau website

Figure 4.3.2 Map of Osaka Municipal Subway

When building this line, the City of Osaka asked owners of land along the railway line to pay part of the construction costs, based on the user-pays principle in the City Planning Law. The details regarding the beneficiary charge under the City Planning Law of the time are shown below, and even in the current City Planning Law the same provisions are followed.

- ○ When the competent minister acknowledges it is necessary, it is permitted to make people who will significantly benefit from a city planning project bear all or part of the costs required for the city planning project.
- ○ The upper limit of the cost burden shall be the profit received from a city planning project.
- ○ The details of the cost burden are stipulated in an Imperial Ordinance.

As regards the reasons for using this system, the opinion of the City of Osaka is shown below.

> If a high-speed railway is opened, citizens will receive the benefit of this comfortable mass transit system, business activities will become invigorated, and they will enjoy direct and indirect benefits. Land near stops will become substantially developed, business districts and commercial districts will be formed, and land owners will receive large profits from a rise in land prices.
> Therefore, as in the case of city planning projects such as roads and water and sewer services, in regard to urban railway construction as well, it has been decided that land owners who will receive more profits than other citizens will have to pay part of the construction costs as a beneficiary charge.
> (Source: 50-Year History of Construction of Osaka Municipal Subway)

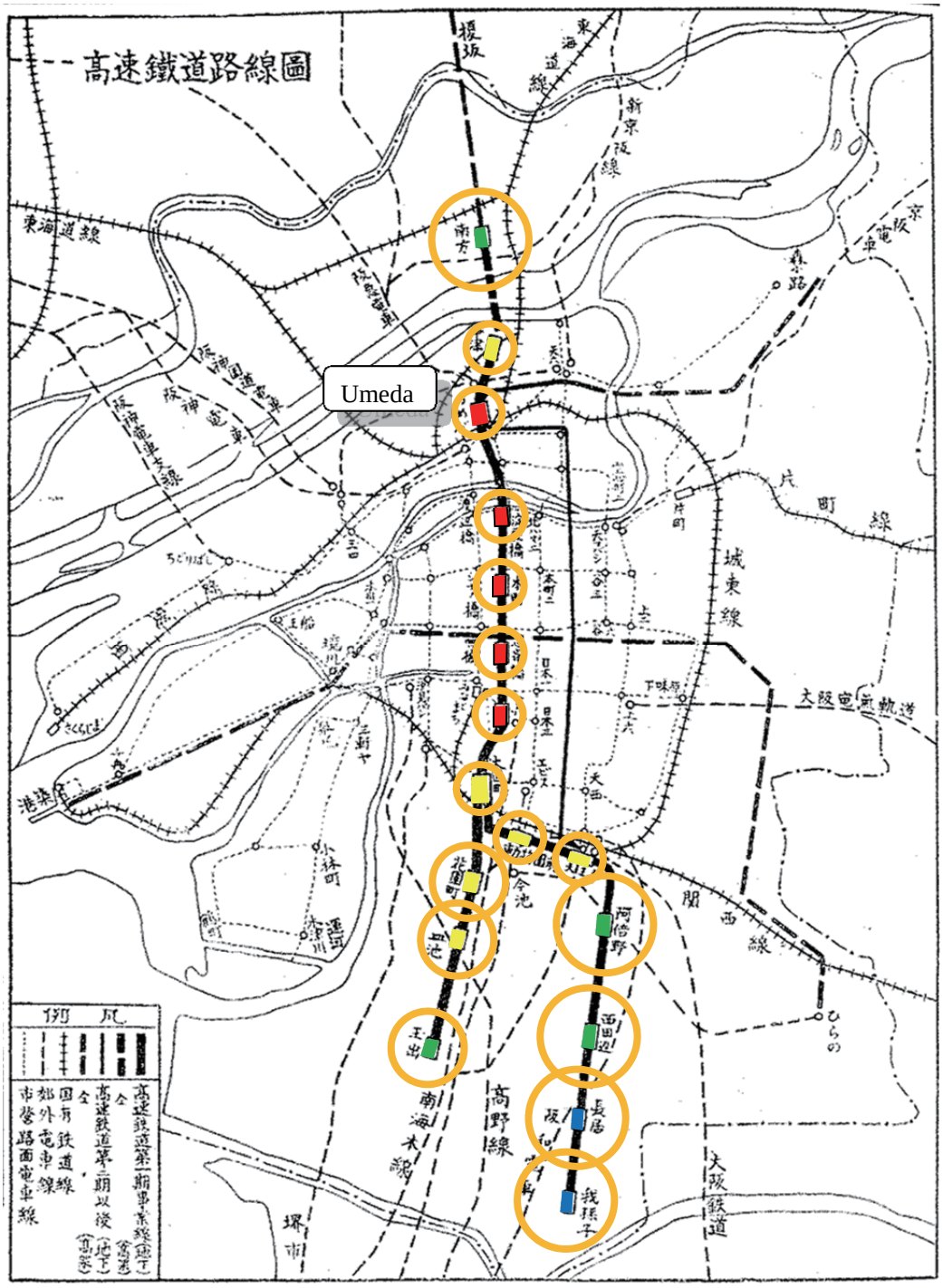
The details of beneficiary charges are prescribed below in the Ordinance of the Ministry of Home Affairs titled “Matters Concerning Beneficiary Burdens for Osaka City Planning Projects Involving High-Speed Rail Development”.

Table 4.3.1 Beneficiary charges for Osaka Municipal Subway No. 1 Line (Midosuji Line)

Total burden	A quarter of project costs
Bearer	Owners, pledgees and farming right holders, etc. of land subject to land tax within the following range from each entrance and exit of stations City-center stations Within 200 ken (about 360 m) Suburban stationsWithin 300 ken (about 550 m) or Within 400 ken (about 730 m)
Burden method	Weightings are applied below according to the station grade and divided by the total burden Grade A station vicinity 10 Grade B station vicinity 6 Grade C station vicinity 5 Grade D station vicinity 3

Source: The Ordinance of the Ministry of Home Affairs titled “Matters Concerning Beneficiary Burdens for Osaka City Planning Projects Involving High-Speed Rail Development”

A rough range of requested burden charges and station grades are shown in the figure below. The orange circles show the rough range of beneficiary charges requested, while Grade A stations are shown in red, Grade B stations in yellow, Grade C stations in green, and Grade D stations in blue.



Source: “Progress of 70 Years of Construction of Osaka Municipal Subway”

Figure 4.3.3 Rough range of requested beneficiary charges and station grades

3) New station development using the benefit principle system based on applications by developers, etc.

The convenience of railway infrastructure varies considerably according to the existence or absence of stations and location factors for people living along the railway line and developers. Therefore, developers and other parties that want to establish stations bear the burden of station construction financing, and adopting these development plans and linked station plans is beneficial for both railway operators and developers.

In the future, if the necessity to establish new stations arises, when developers that already own land along the railway lines and local residents want to establish a station, the condition imposed on developers and local residents is that they will have to bear the majority or all of the development costs for the station, the square in front of the station and access roads. This will result in the realization of urban development that improves access and convenience for developers and local residents.

Owing to the introduction of this measure, developers will be able to increase development profits based on urban development that is integrated with railway infrastructure, and the government will enjoy the advantage of being able to reduce its burden of the infrastructure portion such as station construction. This kind of measure is called the benefit principle system.

① Station development based on this system

In the suburban district of Line 5, there are projects for which applications were approved and considered during the former Ha Tay province period, but in the case of the post-merger Hanoi City government, there are also projects that have been left unapproved. In the future, the projects themselves may also be suspended, and it is uncertain whether there is demand for railway use.

In regard to the establishment of stations on this line, 17 stations are planned along the entire line, but not all of them will be established with government funds and in the case of Phase 2, in particular, study team proposes development based on the introduction of this benefit principle system. Alternatively, it would be possible to develop the area where there is railway demand because it is urbanized even at present, such as in Quoc Oai, and only the center of the area where large-scale development such as the high-tech park at Hoa Lac is progressing with government funds; for other stations, adopting the kind of method that attracts requests for stations to be established is also conceivable.

Along Line 5, with regard to stations where development based on the benefit principle is conceivable, there is Station 8 in the case of Phase 1 and there are all stations for Phase 2. As the areas around these stations are areas where development is planned, it likely that there will be attempts at cooperation with developers. Moreover, this method does not apply only to development projects that are currently planned but also to development projects that will be newly planned going forward. If parties planning development that emerge going forward are prepared to bear the burden of funding for railway infrastructure and related facilities (squares in front of stations and peripheral roads, etc.), the government could grant development rights, and by reflecting this in urban plans, urban development that integrates the administration and developers will be enabled.

② Development costs for new stations

If study team adds up the establishment of two separate platforms facing each other with two sets of tracks running between in the form of stations that are installed in the 20m width of the Thang Long Highway median, the construction of station buildings on bridges and Thang Long Highway overbridges, and electrical equipment costs, this comes to about USD30-35 million. Moreover, if a square in front of the station is developed, USD5-7 million (excluding the cost of land acquisition) will be required.

Table 4.3.2 Candidate stations for station development based on the benefit principle

No	Station Name (provisional)	Km approx.	Form of structure	Explanation
<Phase 1>				
St.8	Tay Mo	10K 500M	Elevated	This is the station that should be established when Line 6 is developed in the future.
<Phase 2>				
St.11	Song Phuong	14K 600M	On ground	Development project in progress.
St.12	Quoc Oai	20K 500M	On ground	Built-up area
St.13	West Quoc Oai	23K 700M	On ground	Built-up area
St.14	Hoa Lac	31K 800M	On ground	Development of high-tech park is progressing.
St.15	Tien Xuan	34K 700M	On ground	Hanoi National University is planned.
St.16	Trai Moi	36K 700M	On ground	Development as resort area is in progress.
St.17	Ba Vi	38K 300M	On ground	Development of Vietnam National Village for ethnic minorities is progressing.

Source: JICA Study Team

③ Applicable entity for financial burden

The benefit principle system is a development method of which there are many examples in Japan as well, and the kind of entities in Table 4.3.3 that would likely enjoy the benefit of profits from the development of new stations could bear the cost.

Table 4.3.3 Applicable entities assumed to bear new station development costs

Applicable Entity	Explanation
Developer	Suburban land beside railway Line 5 has already been sold to a private-sector developer, but many development projects have not been approved. It is likely that profits from a rise in land prices caused by the establishment of new stations will be enjoyed to the maximum. Development is already progressing, but incentives according to the contribution of funds aimed at promoting projects where construction is delayed and projects in which sales are in a slump will work.
Large-scale facilities	There are a certain number of citizens that cannot ride motorbikes or drive cars, and large-scale facilities such as a corporate park, university, hospital or tourist facility that are intended to capture usage demand from these groups would enhance the convenience of users. It is likely that the cost of a plan intended to differentiate facilities would be borne. A railway entity as well would likely benefit from the number of people using the railway on a daily basis, and as this would become a stable source of fare income, facilities located in (transferred to) suburban areas in particular should be considered even if the burden amount is small. Wide-ranging linkage, including feeder transportation from in front of the stations, can be expected.

Source: JICA Study Team

4) Adoption of developer burden charge based on negotiation between parties

This is a system where the land owners in surrounding areas bear part of the construction costs as a developer burden charge, in advance of the development of a railway. In the case of Yokohama City described later, one quarter of the initial project costs was apportioned according to the respective amount of benefit for the land.

<Example of Minato Mirai Line>

The City of Yokohama is located 30-40 km south of the city center of Tokyo. At present, it is the city with the highest population among the cities, towns and villages of Japan, and it is an international port city that has the Port of Yokohama, which is a representative port of Japan.

The Minato Mirai district, which borders the Port of Yokohama, was previously a district with shipyards, freight stations, and wharves, but it underwent urban redevelopment from the 1980s, and it has now become a neo-futuristic town that has offices, commercial facilities, housing, and tourist spots.

The Yokohama Minato Mirai Railway 21 line (usually called the Minato Mirai line) is a line that was constructed fully underground to link the built-up area that includes Yokohama Station, the central station in Yokohama City, and the Yokohama municipal offices with the Minato Mirai district, and it opened in 2004.

Among the six stations on the Minato Mirai line, the stations located in the Minato Mirai district are Shintakashima Station and Minato Mirai Station.

Source: Yokohama Minato Mirai Railway Company website

Figure 4.3.4 Map of Minato Mirai line

When this line was constructed, owners of land in the vicinity of Minato Mirai Station were asked to pay a developer burden charge, based on the rationale that part of the development profits from a rise in land prices caused by the development of the railway would be allocated to the railway construction costs, and these charges were allocated to construction project expenses.

Table 4.3.4 Developer burden charge for Minato Mirai line

Total burden	A quarter of initial project costs (about 50 billion yen)
Bearer	Owners of land in the vicinity of Minato Mirai Station (including Mitsubishi Estate, Urban Renaissance Agency, City of Yokohama, and Mitsubishi Heavy Industries)
Burden method	The burden amount was established based on the amount required to maintain profitability in terms of railway management in proportion to the amount of benefit derived by the respective land.

Source: (Compiled from “Railway Development and Development of Cities beside Railway Lines” (Shunji Takatsu, 2008))

When levying developer burden charges, as no clear legislation has been established regarding returning development profits to railway businesses, negotiations were conducted with applicable local land owners and leaseholders, with the aim of charging 50 billion yen.

According to “Railway Development and Development of Cities beside Railway Lines” (Shunji Takatsu, 2008), when interviews were conducted with the developers of Minato Mirai Station, the response obtained was that “as there is a benefit, a certain degree of burden cannot be helped”.

On the other hand, there was no initial plan for Shintakashima Station, but it was decided to establish the burden based on the “Petition for a Station System”, where developers bear the entire station establishment cost (about 20 billion yen), and the construction work plan was altered. Consequently, the ultimate funding framework was as shown in the table below.

Table 4.3.5 Funding framework for Minato Mirai line

Capital	27 billion yen	• City of Yokohama, Kanagawa Prefecture, railway company, real estate companies, and banks made contributions
Developer burden charge	74 billion yen	• Minato Mirai Station vicinity developer burden charge • Burden charge associated with construction of Shintakashima Station
Railway and transportation system funds	About 129 billion yen	• Payment of compensation for transferred facilities • Central government and Kanagawa Prefecture subsidize interest payments
Borrowings, etc.	About 27 billion yen	• City of Yokohama provides compensation for losses
Total	About 257 billion yen	

Source: City of Yokohama data

5) Internalization by railway operator of land price gains from line-side development to alleviate cost of investment in railway development (for reference)

For reference purposes, study team describes below a method by which a railway operator recoups and repays part of the cost of railway development that cannot be covered solely from railway business revenues by using the profits generated by engaging in other business (such as development of line-side real estate) at the same time as developing a railway.

As urban areas spread and the population grew from the beginning of the 20th century, Japan’s private railway operators themselves increasingly turned to developing real estate alongside lines in the suburbs. Actively engaging in developing quality housing alongside their own lines served to increase the line-side residential populations that provided the regular passengers who used their lines, while at the same time the development of shops and everyday conveniences near major stations acting as nodes for feeder transport provided by affiliated bus and taxi services absorbed consumer demand. The result of this was to increase the value of line-side real estate, the gains from which were enjoyed by the railway operators themselves. These gains were used, along with the increase in fare revenues also generated, to help recoup prior investment in railway development. There also emerged cases of real estate companies with major development plans engaging in railway development through affiliates in order to enhance transportation access in areas undergoing development. (Examples of such projects include Kita-Osaka Tochi’s Kita-Osaka Electric Railway, Garden City’s Meguro-Kamata Electric Railway, and Hakone Tochi’s Tamako Railway.)

After World War II, conurbation growth accelerated further, driven in part by the severe housing shortage, as the Japanese economy moved beyond recovery and into a period of high growth. Private railway operators that had to invest in expanding transportation capacity to alleviate the consequent serious congestion often found that the authorities were slow to approve their proposed fare revisions, as the authorities saw this as one way to help curb prices at a time when the economy was experiencing inflationary pressure. To counter this, operators tended to depend on profits generated by their real estate operations, which accounted for an increasing proportion of their overall businesses, and development projects increased in size. The massively increasing scale of investment required to develop railways to keep pace with large-scale

development made it increasingly unfeasible for railway-affiliated capital to continue to exclusively buy up line-side land outright ahead of railway development, as a consequence of which alternative approaches were adopted. These included the formation of associations with line-side landowners and leaseholders to engage in land readjustment projects under urban city plans (e.g., the Tokyu Den-en-toshi Line) and the securing of land and development of infrastructure for the construction of new lines undertaken in concert with public sector "new town" development projects (e.g., Kita-Osaka Kyuko Railway, Osaka Prefectural Urban Development's Semboku Rapid Railway, and Chiba Newtown Railway). A system of public subsidies was also put in place.

However, the Japanese economy then entered a period of stable growth followed by deflation after the collapse of the bubble economy. Demographic growth also stagnated as the birth rate fell and the population aged. Under these conditions, it became apparent that the stock of real estate hitherto developed through prior investment was turning toxic due to the length of time required from development to payback and the application of market value accounting, making this business model no longer viable in today's Japan.

In the case of the present project, the evidence to date indicates that the railway operator not have the scope to newly acquire large-scale development rights for development of real estate along the line. However, some projects that had been approved or were being considered when the province of Ha Tay was still in existence have been unapproved by the Hanoi City government following Ha Tay's merger with Hanoi. There is also a possibility that future projects may be suspended even after being approved. Absorption of betterment gains in the form of acquisition of development rights by the development division of Hanoi City (i.e., the railway operator) itself when re-granting development rights is thus one strategy that could be considered.

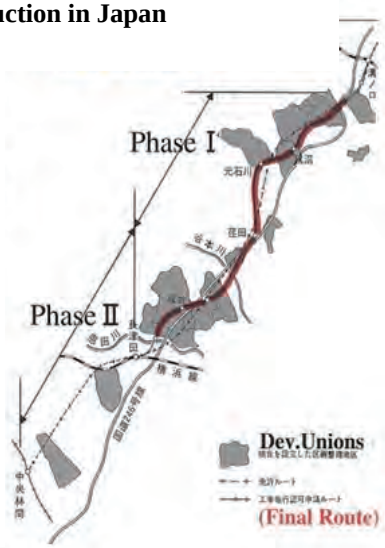
The community development example which was combined with the railroad new line construction in Japan

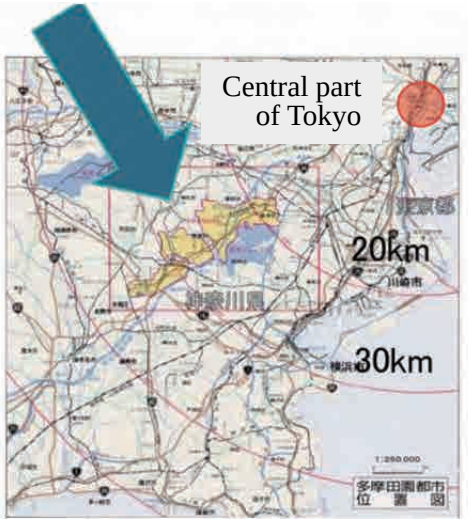
The "Tama Denen Toshi" development by Tokyu Corp.

Based on the land purchased like precedence of a private sector development company (Tokyu), it was carried out the urban development of the railroad wayside with the union system with which a landowner participates.

Gross development area is 5000ha and 540,000 overall populations on 2003 (moving-in start in 1961).

The number of railroad users is about 450,000 people (the south of Kajigaya, in the 2010 fiscal year/the one-day average).





Source: "Thirty-Five Year History of the Development of Tama Garden City," TOKYU CORPORATION, 1988

Figure 4.3.5 Example of regional development integrated with new railway line development in Japan

4.3.2 Sharing of Line 2 rolling stock inspection and repair facilities and inspection personnel

(1) Summary

Facilities operated by the same business are normally consolidated to enhance project effects. Shared use of Line 2 sheds by Line 5 rolling stock was considered as a means of improving work efficiency and limiting construction costs. Line 5 is scheduled to have 90 cars when Phase 2 opens, and only around 24 cars will be overhauled per year on average under current rolling stock inspection and repair plans. However, the maintenance center currently planned for development will be capable of overhauling at least 200 cars per year, which is the same capacity as that of inspection and repair facilities on other lines. Investing in facilities that other lines have thus appears to represent an excessive level of capital investment.

Specifically, while St 1 on Line 5 and St 5 on Line 2 are planned as connecting stations, it is proposed that a new non-service connecting line be built as shown in Figure 4.3.6. This would allow Line 5 rolling stock to be moved at night to the Line 2 shed, where overhaul work could be performed under contract for an outsourcing fee to cover costs, thereby allowing capital investment and asset holdings to be minimized and keeping down the number of employees required.

Study team understands that the number of cars on Line 2 will at most be 192. The total number of cars including Line 5 will therefore be 282. If repairs and inspections are performed to the same extent as on Line 5, the number of cars undergoing overhaul will average around 72 per year, which will present no problems at all from the point of view of facility capacity.

Additionally, as even rolling stock used on lines with different voltages and other standards can be towed to inspection and repair facilities by locomotives for inspection and repair provided that the lines are connected, sharing of rolling stock inspection and repair facilities with lines such as Lines 6 and 8 in the future would also not be impossible. Conversely, then, another option could be to overhaul other lines' rolling stock at the Line 5 maintenance center for an outsourcing fee that would then be used to keep down Line 5's running costs. Even if overhauling work is outsourced, 10-day and 3-month inspections conducted routinely to maintain service safety and car washing would still be performed at the Line 5 depot.

(2) Study findings

1) Potential for reduction of car shed facilities and inspection personnel

Outsourcing of overhaul work will render unnecessary overhaul track, wheel lathe track, various equipment and facilities used for overhauls, overhaul yards, and other such equipment, reducing equipment installation costs by approximately USD 24 million. Additionally, the number of personnel required to perform overhaul work will be reducible by 5 when Phase 1 is opened and by 10 when Phase 2 is opened.

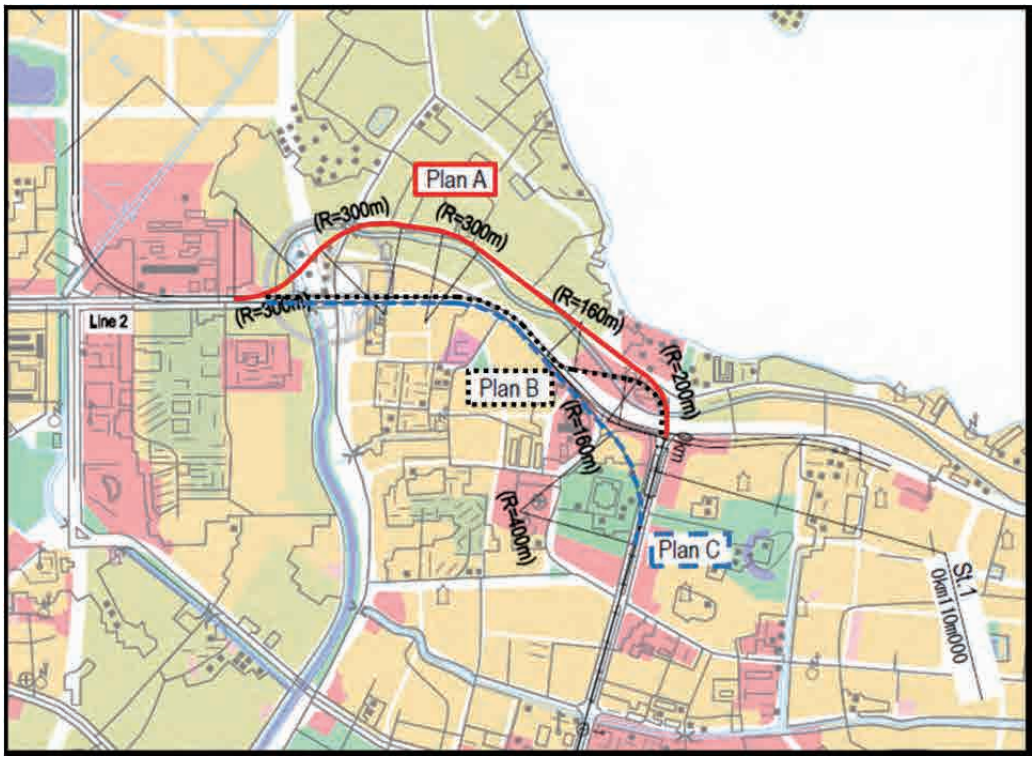
Note: A separate fee will need to be paid by the Line 5 rail operation contractor to the Line 2 rail operator for outsourced work.

2) Cost of construction of connecting line

The existence of issues such as the problem of compulsory land purchases mean that further study will be required. As Table 4.3.6 shows, however, a connecting line can be built for approximately USD 40 million under Plan B. In such case, securing storage track and car inspection and washing space on the terminal side of St 10 on Line 5 as shown in Figure 4.3.8 would allow reductions in expenditure on construction of shed entry/exit track (2.3 km) and excessive shed construction (by USD 460 million).

Source: JICA Study Team

Figure 4.3.6 Overview of Line 5 and Line 2 routes



Source: JICA Study Team

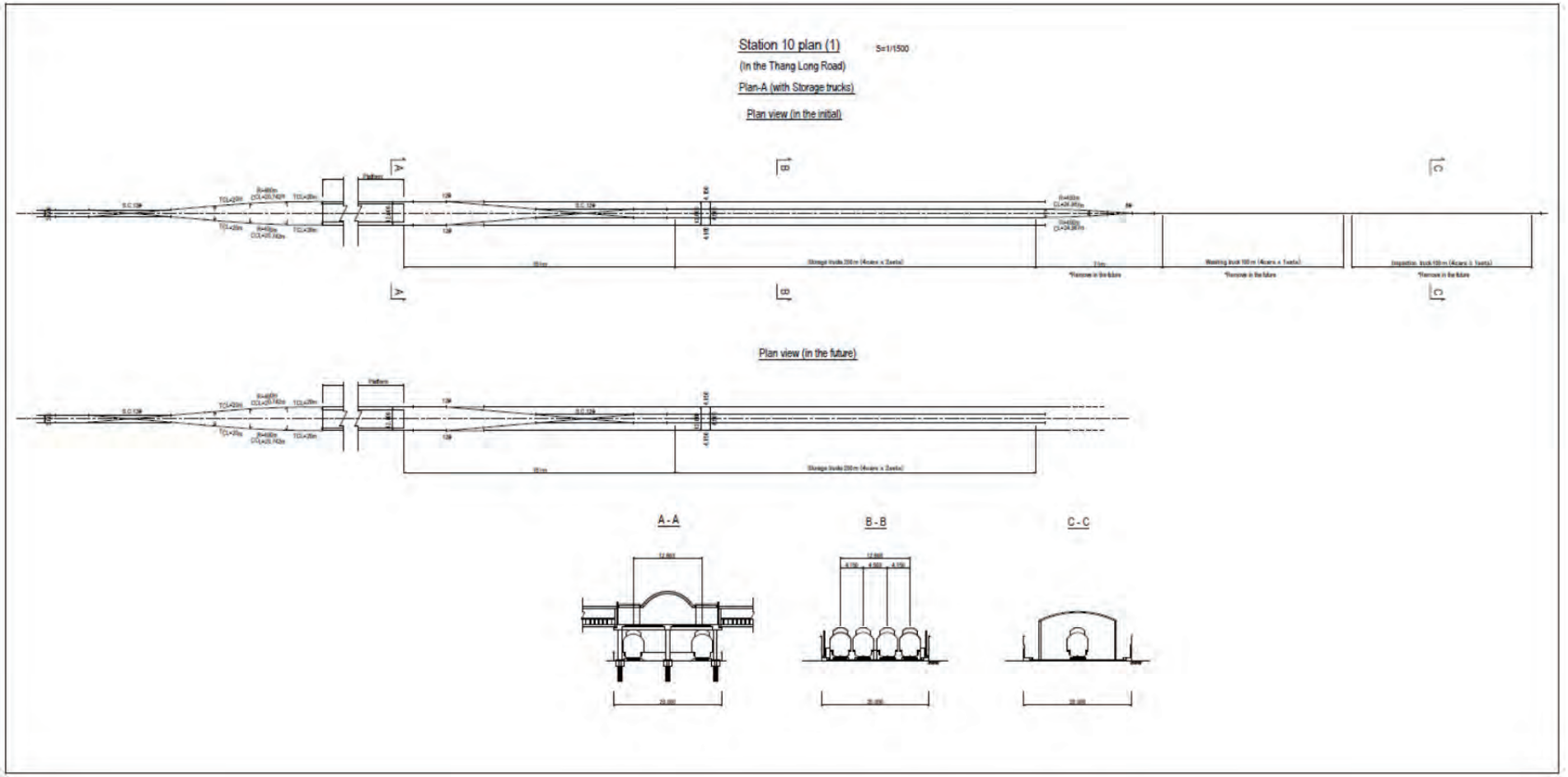
Figure 4.3.7 Suggested methods of connecting Line 5 and Line 2

Table 4.3.6 Suggested methods of connecting Lines 5 and 2

Proposal	Summary	Construction method	Length (m)	Approx. construction cost (USD m)
Plan A	Connection running north from St 1, under Line 2, and along a line beneath a road	Shield	1,830	130
Plan B	Connection running north from St 1, under Line 2, and then connecting immediately with Line 2	Shield	550	40
Plan C	Connection with Line 2 branching from the terminal side of St 1	Excavation	700	90

(Excluding price escalation)

Source: JICA Study Team



Source: JICA Study Team

Figure 4.3.8 Plan of Line 5 storage track for when shared use of Line 2 depot is available

4.4 Construction schedule (see attachment 1)

4.4.1 Basic concept

In Vietnam, there is not the PPP project which reached to the bidding as of the end time of May, 2012. As for the railroad, it is not adopted even as a pilot project candidate. In the first half of the 2012 fiscal year, MOT has entrusted F/S survey of Line.5 to the local consultant. It is assumed that industrialization is examined based on these survey results.

In the Decision No.78/2010/ND-CP, in Vietnam, in the case of ODA, the candidate for a loan of construction fund is specified as each ministry people's committee. Therefore, construction of Line.5 is assumed to maintain the railroad facilities by scheme of separating infrastructure and operation as PPP scheme which is used with ODA together. However, the enforcement authority of infrastructure railroad construction may be transferred to HPC from MOT. Moreover, ODA may be subleased to HPC from Ministry of Finance of Vietnam. The possibility that the MOT will construct by oneself cannot be denied, either.

Procurement of the project fund concerning the railroad facility, such as rolling stock and AFC device, which shall be supplied by private sector, is outsourced to railway operation contractor (private SPC).

4.4.2 Process to implementation of project

This survey is the proposal which utilized the PPP scheme. If the proposal is not selected by the Vietnamese government as a pilot issue, the proposed contents such as ratio of public funds do not suit the PPP pilot law (Decision 71/2010). It is assumed to be approved by national assembly after MOT explains to national assembly. According to ‘Resolution on Projects and Works of National Importance to be Submitted to the National Assembly for Decision on Their investment (No.66/2006/QH11) ’, which is resolution about national assembly to national project investment, if total project cost exceed 20 thousand billion VND (79,100 million YEN), the procedure of national assembly is required under any cases (Refer to table.4.3.1).

Process of approval and permission before inauguration is shown in table.4.4.2. As the preparation in Vietnam to be completed before the LA contract, the project needs to be approved in the local F/S inspection, followed by adoption as a PPP project as a combined yen-loan project of the Ministry of Planning and Investment (MPI) and approved for EIA.

Table 4.4.1 Domestic investment project which needs approval of national assembly

Article 2. Projects or works which satisfy one of the following five criteria shall be considered projects or works of national importance:

1. Having an investment capital of VND 20 thousand billion or more each, for projects or works with state capital representing thirty per cent or more of their capital.
2. Projects or works which greatly affect the environment or have latent potential to seriously affect the environment, including:

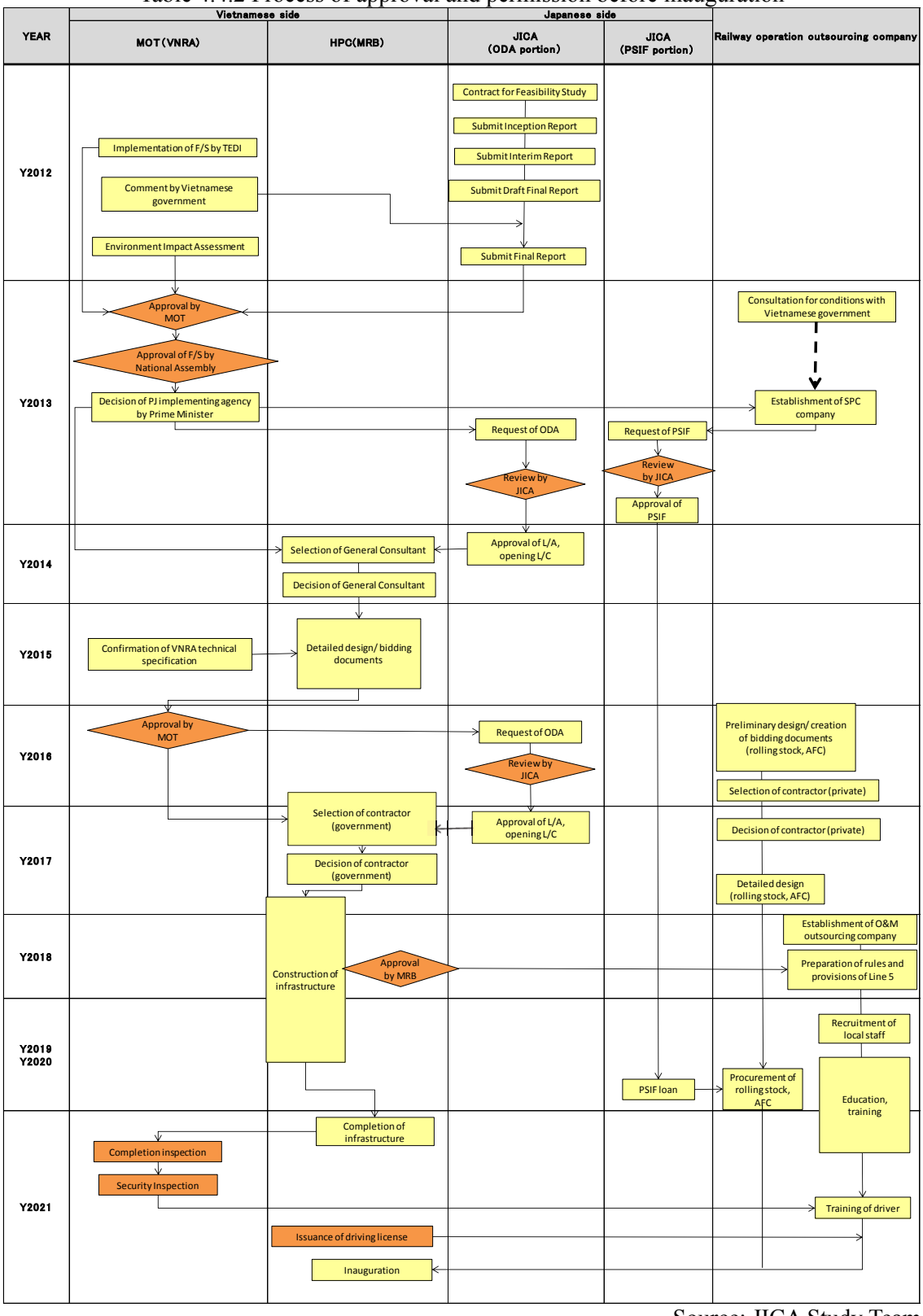
a/ Nuclear power plants;

b/ Land-using investment projects requiring change of the use purpose of headwater protective forest land of two hundred hectares or more; of wave-breaking or sea-encroaching protective forest land of five hundred hectares or more; of special-use forest land of two hundred hectares or more, except forest land areas belonging to national parks or nature conservation zones; or of production forest land of one thousand hectares or more.

3. Projects or works requiring relocation and resettlement of twenty thousand people or more in mountain areas or fifty thousand people or more in other areas.
4. Investment projects or works in geographical areas of special national defense or security significance or areas where exist national relics of special historical-cultural significance.
5. Projects or works subject to particular mechanisms or policies which should be decided by the National Assembly.

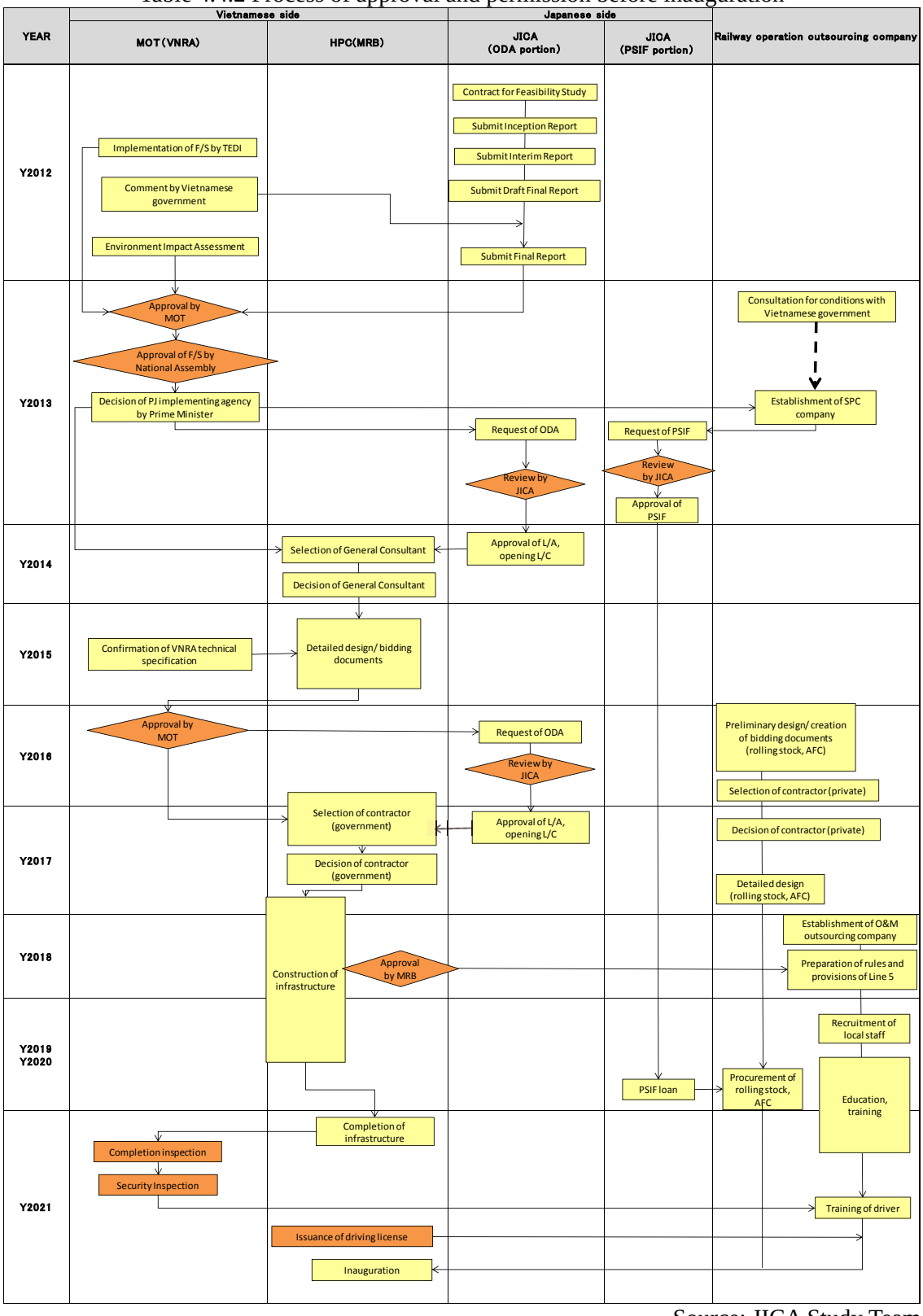
Source:No.66/2006/QH11

Table 4.4.2 Process of approval and permission before inauguration



Source: JICA Study Team

Table 4.4.2 Process of approval and permission before inauguration



Source: JICA Study Team

4.4.3 Construction schedule after completion of preparation by Vietnam

The construction schedule from the completion of preparation in Vietnam to the start of operations is stated below, and the railway business is expected to open in July 2021, 42 months after the start of construction (In case of underground structure in urban area, construction period is assumed as 60 months).

The timing of the opening after Phase 2 is to be determined based on the increase in demand after starting the operation of Phase 1 and development of nearby lines. However, the expected timing to open operations of Phase 2 is at least 24 months after the start of construction.

Selection of consultants by the client	: 10 months
Investigation and detailed designs	: 20 months
Selection of contractors	: 15 months
Preparation of documents for bidding and agreement of JICA	: 3 months
Bidding period	: 2 months
Bid evaluation	: 2 months
Contract negotiation	: 2 months
Agreement of JICA on the bid result	: 1 month
Agreement of JICA on the selected contractors	: 1 month
Acquisition of yen loan and loan certificate	: 1 month
Phase 1 construction	: 42 months

4.4.4 Completion inspection and security inspection (2 months)

The constructed railroad facilities shall be handed over to the Hanoi city after the following procedures: inspection of compliance with laws and regulations in Vietnam; inspection of performance and functions, such as tracks, signaling systems, and wires; and inspection of communications between trains and ground facilities; security inspections including current collection test by actual train cars and running test by trains running in service lines to verify running comfort and safety.

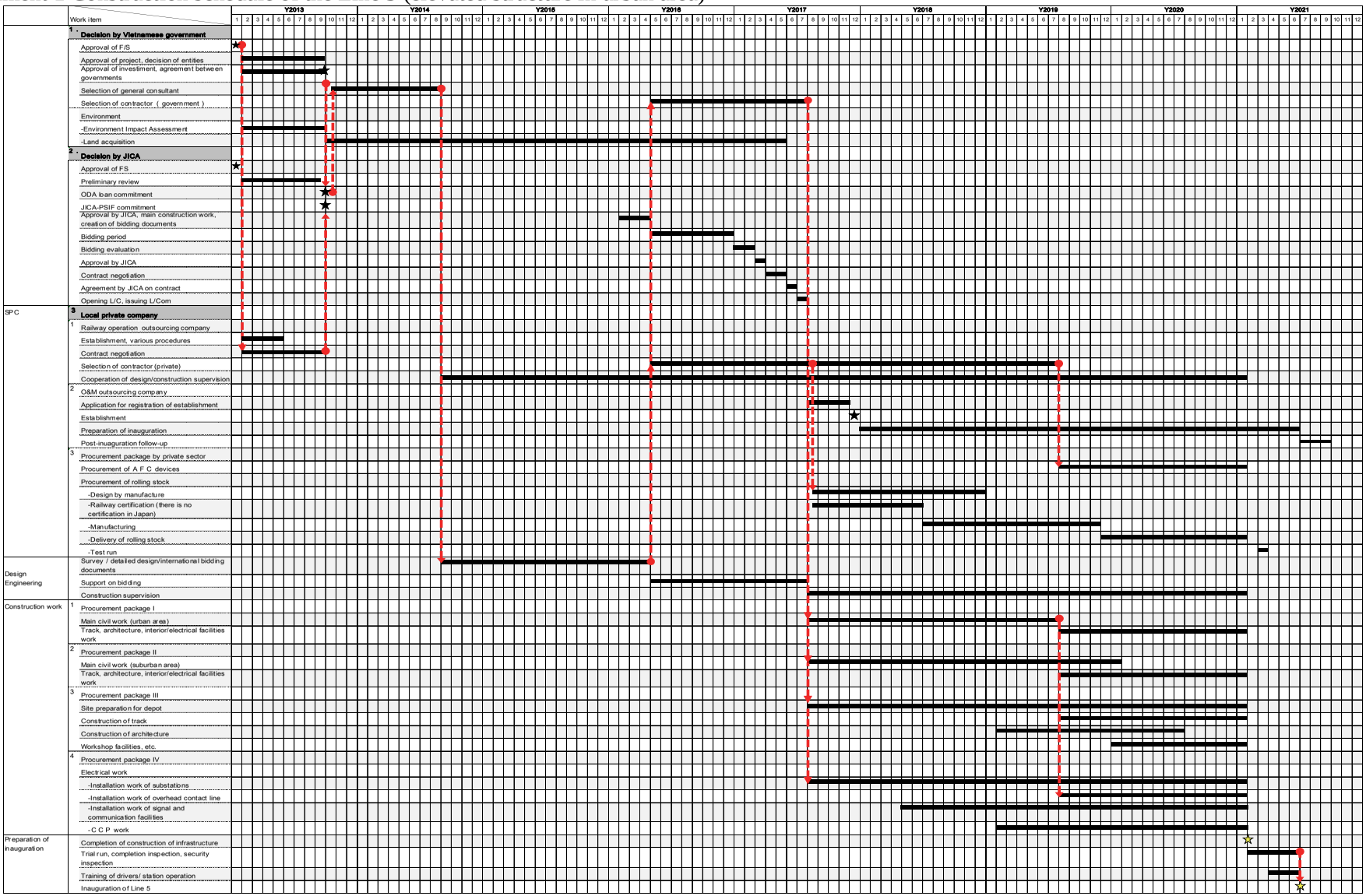
Table 4.4.3 List of inspection upon completion and safety (example)

Contents of inspection		
Completion inspection	Power transformation and distribution system	Substation
	Distribution line	Distribution line
	Electric cables (generators)	Feeder line, contact line, generators
	Civil engineering facilities and operation safety systems	Railroad tracks, stations, (tunnels), fire-fighting facilities Block equipment, interlocking device Centralized traffic control system, automatic train control device
Security inspection		Civil engineering section Electricity section Rolling stock section Operation section

*The words between brackets indicate facilities used in underground structures.

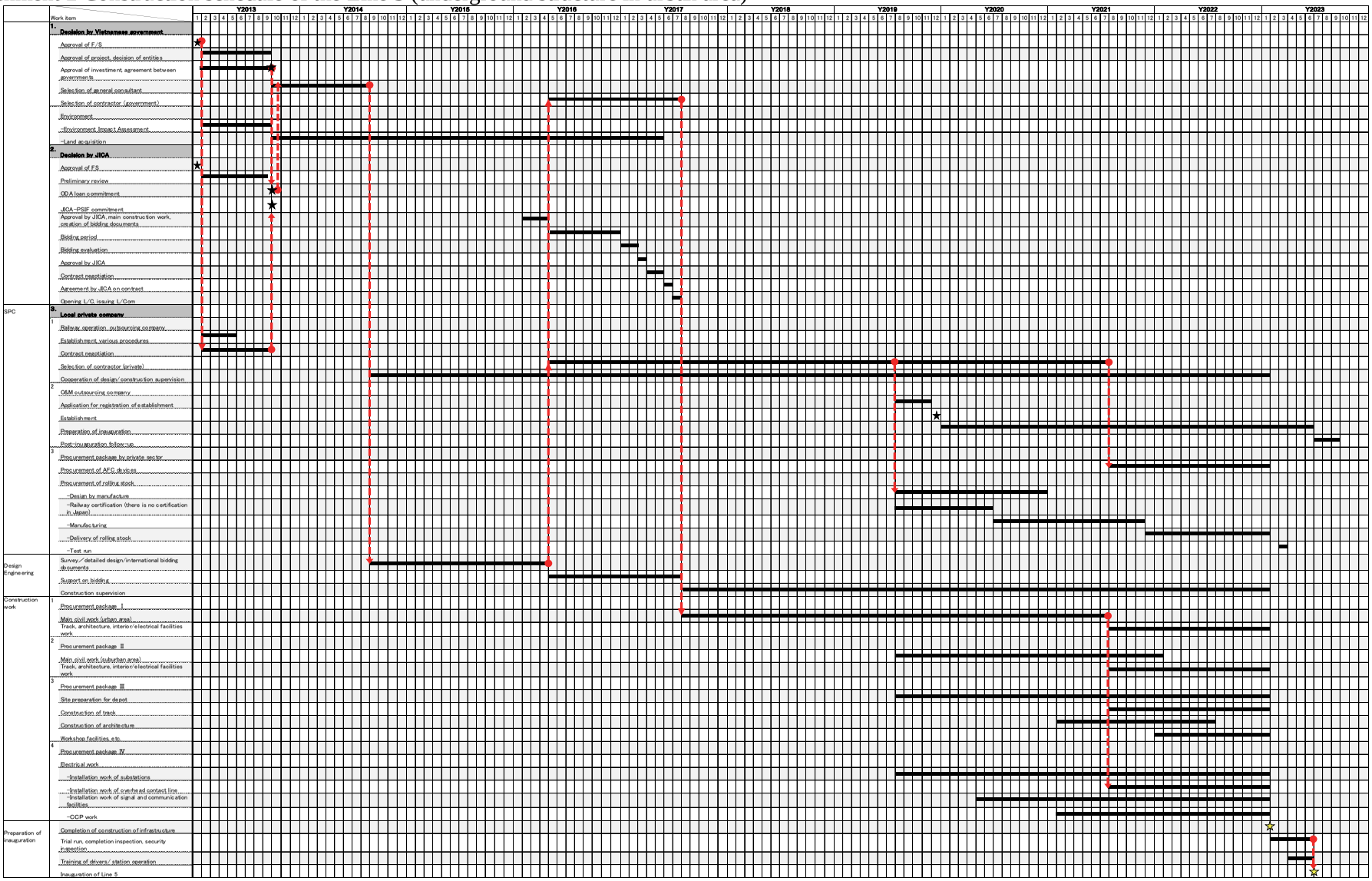
Source: JICA Study Team

Attachment 1 Construction schedule of the Line 5 (elevated structure in urban area)



Source: JICA Study Team

Attachment 2 Construction schedule of the Line 5 (underground structure in urban area)



Source: JICA Study Team

Attachment 3 Construction cost of Phase 1 (elevated structure in urban area): Japanese yen loan

Annual Fund Requirement

Base Year for Cost Estimation: Sep, 2012 — FC & Total: million JPY
Exchange Rates: VND = Yen 0.003956 — LC : million VND
Price Escalation: FC: 1.6% LC: 7.3%
Physical Contingency 5%
Physical Contingency for Consultant 5%

Item	Total			2013			2014			2015			2016			2017			2018			2019			2020			2021		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. ELIGIBLE PORTION																														
Ⅰ) Procurement / Construction	76,600	43,540,364	248,855	0	0	0	0	0	0	0	0	0	0	0	0	6,376	4,503,239	24,192	15,636	11,598,693	61,522	22,991	12,612,942	72,890	27,999	13,612,339	81,852	3,598	1,213,151	8,398
Civil	10,100	17,970,160	81,193	0	0	0	0	0	0	0	0	0	0	0	0	1,202	2,139,305	9,666	2,886	5,134,331	23,198	2,886	5,134,331	23,198	2,886	5,134,331	23,198	240	427,861	1,933
Track	6,231	1,033,915	10,321	0	0	0	0	0	0	0	0	0	0	0	0	742	123,085	1,229	1,780	295,404	2,949	1,780	295,404	2,949	1,780	295,404	2,949	148	24,617	246
Depot	8,536	5,966,732	32,142	0	0	0	0	0	0	0	0	0	0	0	0	1,016	710,325	3,826	2,439	1,704,780	9,183	2,439	1,704,780	9,183	2,439	1,704,780	9,183	203	142,065	765
Electricity	37,845	609,008	40,254	0	0	0	0	0	0	0	0	0	0	0	0	2,649	42,631	2,818	6,434	103,531	6,843	12,489	200,973	13,284	15,138	243,603	16,102	1,135	18,270	1,208
Maintenance car	2,487	0	2,487	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,243	0	1,243	1,243	0	1,243
Base cost for JICA financing	65,198	25,579,814	166,397	0	0	0	0	0	0	0	0	0	0	0	0	5,609	3,015,346	17,539	13,538	7,238,047	42,174	19,593	7,335,489	48,614	23,486	7,378,119	52,675	2,971	612,813	5,395
Price escalation	7,755	15,887,199	70,608	0	0	0	0	0	0	0	0	0	0	0	0	463	1,273,454	5,501	1,353	3,808,327	16,419	2,303	4,676,837	20,805	3,180	5,586,013	25,279	456	542,569	2,603
Physical contingency	3,648	2,073,351	11,850	0	0	0	0	0	0	0	0	0	0	0	0	304	214,440	1,152	745	552,319	2,930	1,095	600,616	3,471	1,333	648,207	3,898	171	57,769	400
Ⅱ) Consulting services	5,370	180,536	6,085	0	0	0	95	2,476	104	289	7,970	320	293	8,551	327	639	19,690	717	1,135	36,921	1,281	1,153	39,616	1,310	1,172	42,508	1,340	595	22,805	685
Base cost	4,613	108,160	5,041	0	0	0	87	2,048	95	262	6,144	286	262	6,144	286	562	13,184	614	983	23,040	1,074	983	23,040	1,074	983	23,040	1,074	491	11,520	537
Price escalation	501	63,779	754	0	0	0	3	310	4	13	1,446	19	17	2,000	25	46	5,568	68	98	12,123	146	115	14,689	174	133	17,444	202	75	10,200	116
Physical contingency	256	8,597	290	0	0	0	5	118	5	14	380	15	14	407	16	30	938	34	54	1,758	61	55	1,886	62	56	2,024	64	28	1,086	33
Total (Ⅰ + Ⅱ)	81,971	43,720,900	254,940	0	0	0	95	2,476	104	289	7,970	320	293	8,551	327	7,016	4,522,929	24,909	16,771	11,635,614	62,803	24,144	12,652,558	74,200	29,171	13,654,846	83,192	4,193	1,235,957	9,083
B. NON ELIGIBLE PORTION																														
a Procurement / Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost for JICA financing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b Land Acquisition	0	67,575	267	0	3,964	16	0	17,012	67	0	18,254	72	0	19,587	77	0	8,757	35	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	51,600	204	0	3,518	14	0	14,073	56	0	14,073	56	0	14,073	56	0	5,864	23	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	12,757	50	0	257	1	0	2,130	8	0	3,312	13	0	4,581	18	0	2,476	10	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	3,218	13	0	189	1	0	810	3	0	869	3	0	933	4	0	417	2	0	0	0	0	0	0	0	0	0	0	0	0
c Administration cost	0	6,450,796	25,521	0	396	2	0	4,342	17	0	9,917	39	0	10,225	40	0	630,500	2,494	0	1,587,465	6,280	0	1,875,536	7,420	0	2,102,825	8,319	0	229,591	908
d VAT	0	6,450,796	25,521	0	396	2	0	4,342	17	0	9,917	39	0	10,225	40	0	630,500	2,494	0	1,587,465	6,280	0	1,875,536	7,420	0	2,102,825	8,319	0	229,591	908
e Import Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (a+b+c+d+e)	0	12,969,167	51,309	0	4,757	19	0	25,696	102	0	38,088	151	0	40,037	158	0	1,269,756	5,023	0	3,174,930	12,561	0	3,751,072	14,840	0	4,205,649	16,638	0	459,182	1,817
TOTAL (A+B)	81,971	56,690,067	306,249	0	4,757	19	95	28,172	206	289	46,057	471	293	48,588	485	7,016	5,792,685	29,933	16,771	14,810,544	75,364	24,144	16,403,630	89,040	29,171	17,860,496	99,831	4,193	1,695,138	10,900
C. Interest during Construction	1,521	0	1,521	0	0	0	0	0	0	0	0	0	0	0	0	49	0	49	172	0	172	318	0	318	483	0	483	500	0	500
Interest during Construction(Const.)	1,519	0	1,519	0	0	0	0	0	0	0	0	0	0	0	0	48	0	48	172	0	172	318	0	318	482	0	482	500	0	500
Interest during Construction (Consul.)	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
D. Commitment Charge	2,308	0	2,308	256	0	256	256	0	256	256	0	256	256	0	256	256	0	256	256	0	256	256	0	256	256	0	256	256	0	256
GRAND TOTAL (A+B+C+D)	85,800	56,690,067	310,078	256	4,757	275	351	28,172	463	545	46,057	727	550	48,588	742	7,321	5,792,685	30,238	17,199	14,810,544	75,792	24,718	16,403,630	89,615	29,910	17,860,496	100,570	4,950	1,695,138	11,657
E. JICA finance portion incl. IDC (A + C + D)	85,800	43,720,900	258,769	256	0	256	351	2,476	361	545	7,970	577	550	8,551	584	7,321	4,522,929	25,214	17,199	11,635,614	63,232	24,718	12,652,558	74,775	29,910	13,654,846	83,931	4,950	1,235,957	9,840

Administration Cost = 10%
VAT= 10% of the expenditure in local currency of the eligible portion
Import Tax= 0%

Source: JICA Study Team

Attachment 4 Construction cost of Phase 1 (elevated structure in urban area): Rolling stocks and AFC devices

Annual Fund Requirement

Base Year for Cost Estimation: Sep, 2012 FC & Total: million JPY
Exchange Rates VND = Yen 0.00395621 LC : million VND
Price Escalation: FC: 1.6% LC: 7.3%
Physical Contingency 5%
Physical Contingency for Consultant 5%

Item	Total			2013			2014			2015			2016			2017			2018			2019			2020			2021		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. ELIGIBLE PORTION																														
Ⅰ) Procurement / Construction	14,829	0	14,829	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,356	0	7,356	7,473	0	7,473
Rolling stock	9,342	0	9,342	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,671	0	4,671	4,671	0	4,671
AFC	2,998	0	2,998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,499	0	1,499	1,499	0	1,499
Base cost for JICA financing	12,340	0	12,340	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,170	0	6,170	6,170	0	6,170
Price escalation	1,783	0	1,783	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	835	0	835	948	0	948
Physical contingency	706	0	706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	350	0	350	356	0	356
Ⅱ) Consulting services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (Ⅰ + Ⅱ)	14,829	0	14,829	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,356	0	7,356	7,473	0	7,473
B. NON ELIGIBLE PORTION																														
a Procurement / Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost for JICA financing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c Administration cost	0	374,828	1,483	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	185,926	736	0	188,901	747
d VAT	0	374,828	1,483	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	185,926	736	0	188,901	747
e Import Tax	0	749,655	2,966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	371,853	1,471	0	377,802	1,495
Total (a+b+c+d+e)	0	1,499,310	5,932	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	743,705	2,942	0	755,605	2,989
TOTAL (A+B)	14,829	1,499,310	20,761	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,356	743,705	10,298	7,473	755,605	10,463
C. Interest during Construction	559	0	559	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	184	0	184	375	0	375
Interest during Construction(Const.)	559	0	559	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	184	0	184	375	0	375
Interest during Construction (Consul.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Commitment Charge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL (A+B+C+D)	15,388	1,499,310	21,320	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,540	743,705	10,482	7,849	755,605	10,838
E. JICA finance portion incl. IDC (A + C + D)	15,388	0	15,388	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,540	0	7,540	7,849	0	7,849

Administration Cost = 10%
VAT= 10% of the expenditure in local currency of the eligible portion
Import Tax= 20%

*Besides the above table, 1 billion yen of JICA PSIF portion are added up as a part of cost for preparation of inauguration.

Source: JICA Study Team

Attachment 5 Construction cost of Phase 1 (underground structure in urban area): Japanese yen loan

Annual Fund Requirement

Base Year for Cost Estimation: Sep, 2012 — FC & Total: million JPY
Exchange Rates: VND = Yen 0.003956213 — LC : million VND
Price Escalation: FC: 1.6% LC: 7.3%
Physical Contingency: 5%
Physical Contingency for Consultant: 5%

Item	Total			2013			2014			2015			2016			2017			2018			2019			2020			2021			2022			2023		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. ELIGIBLE PORTION																																				
I) Procurement / Construction	110,382	61,863,610	355,128	0	0	0	0	0	0	0	0	0	0	0	0	2,532	1,953,372	10,260	6,173	5,030,324	26,074	12,278	8,497,917	45,898	21,114	13,778,018	75,623	29,299	14,986,614	88,589	34,785	16,175,839	98,780	4,201	1,441,525	9,904
Civil downtown	29,399	17,265,176	97,704	0	0	0	0	0	0	0	0	0	0	0	0	2,227	1,307,968	7,402	5,345	3,139,123	17,764	5,345	3,139,123	17,764	5,345	3,139,123	17,764	5,345	3,139,123	17,764	5,345	3,139,123	17,764	445	261,594	1,480
Civil suburb	4,391	7,774,712	35,149	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	523	925,561	4,184	1,255	2,221,346	10,043	1,255	2,221,346	10,043	1,255	2,221,346	10,043	105	185,112	837
Track	6,262	1,028,387	10,330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	745	122,427	1,230	1,789	293,825	2,951	1,789	293,825	2,951	1,789	293,825	2,951	149	24,485	246
Depot	8,536	5,966,732	32,142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,016	710,325	3,826	2,439	1,704,780	9,183	2,439	1,704,780	9,183	2,439	1,704,780	9,183	203	142,065	765
Electricity	40,489	640,270	43,021	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,834	44,819	3,011	6,883	108,846	7,314	13,361	211,289	14,197	16,195	256,108	17,208	1,215	19,208	1,291
Maintenance car	2,487	0	2,487	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,243	0	1,243	1,243	0	1,243
Base cost for JICA financing	91,962	32,675,276	220,837	0	0	0	0	0	0	0	0	0	0	0	0	2,227	1,307,968	7,402	5,345	3,139,123	17,764	10,464	4,942,255	30,016	17,711	7,467,930	47,255	24,189	7,570,364	54,139	28,266	7,615,182	58,393	3,365	632,464	5,862
Price escalation	13,564	26,242,448	117,385	0	0	0	0	0	0	0	0	0	0	0	0	184	552,387	2,369	534	1,651,662	7,068	1,220	3,151,000	13,696	2,398	5,654,002	24,766	3,715	6,702,602	30,232	4,863	7,790,379	35,683	641	740,417	3,570
Physical contingency	5,256	2,945,886	16,911	0	0	0	0	0	0	0	0	0	0	0	0	121	93,018	489	294	239,539	1,242	585	404,663	2,186	1,065	699,096	3,601	1,395	713,648	4,213	1,656	770,278	4,704	200	68,644	472
II) Consulting services	7,388	268,940	8,452	0	0	0	118	3,095	130	360	9,962	399	365	10,689	408	433	13,381	486	528	17,230	596	856	29,492	972	1,324	48,176	1,514	1,345	51,692	1,549	1,366	55,466	1,586	694	29,757	812
Base cost	6,215	146,176	6,793	0	0	0	109	2,560	119	327	7,680	357	327	7,680	357	381	8,960	416	457	10,752	500	729	17,152	797	1,110	26,112	1,213	1,110	26,112	1,213	1,110	26,112	1,213	555	13,056	607
Price escalation	821	109,958	1,256	0	0	0	4	387	5	16	1,808	23	21	2,500	31	31	3,784	46	46	5,657	68	86	10,935	129	150	19,770	229	170	23,119	262	191	26,713	297	106	15,284	166
Physical contingency	352	12,807	402	0	0	0	6	147	6	17	474	19	17	509	19	21	637	23	25	820	28	41	1,404	46	63	2,294	72	64	2,462	74	65	2,641	76	33	1,417	39
Total (I + II)	117,770	62,132,551	363,580	0	0	0	118	3,095	130	360	9,962	399	365	10,689	408	2,965	1,966,753	10,746	6,701	5,047,553	26,670	13,134	8,527,409	46,870	22,438	13,826,194	77,137	30,643	15,038,307	90,138	36,151	16,231,305	100,366	4,895	1,471,283	10,716
B. NON ELIGIBLE PORTION																																				
a Procurement / Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost for JICA financing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b Land Acquisition	0	67,575	267	0	3,968	16	0	17,012	67	0	18,254	72	0	19,587	77	0	8,757	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	51,600	204	0	3,518	14	0	14,073	56	0	14,073	56	0	14,073	56	0	5,864	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	12,757	50	0	257	1	0	2,130	8	0	3,312	13	0	4,581	18	0	2,476	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	3,218	13	0	189	1	0	810	3	0	869	3	0	933	4	0	417	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c Administration cost	0	9,196,860	36,385	0	396	2	0	4,993	20	0	11,910	47	0	12,262	49	0	272,490	1,078	0	674,142	2,667	0	1,184,721	4,687	0	1,949,770	7,714	0	2,278,390	9,014	0	2,536,917	10,037	0	270,868	1,072
d VAT	0	9,196,860	36,385	0	396	2	0	4,993	20	0	11,910	47	0	12,262	49	0	272,490	1,078	0	674,142	2,667	0	1,184,721	4,687	0	1,949,770	7,714	0	2,278,390	9,014	0	2,536,917	10,037	0	270,868	1,072
e Import Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (a+b+c+d+e)	0	18,461,294	73,037	0	4,757	19	0	26,998	107	0	42,075	166	0	44,111	175	0	553,737	2,191	0	1,348,283	5,334	0	2,369,442	9,374	0	3,899,540	15,427	0	4,556,781	18,028	0	5,073,835	20,073	0	541,736	2,143
TOTAL (A+B)	117,770	80,593,845	436,617	0	4,757	19	118	30,092	237	360	52,037	565	365	54,800	582	2,965	2,520,490	12,936	6,701	6,395,837	32,005	13,134	10,896,851	56,244	22,438	17,725,734	92,564	30,643	19,595,088	108,166	36,151	21,305,140	120,439	4,895	2,013,019	12,859
C. Interest during Construction	2,478	0	2,478	0	0	0	0	0	0	0	0	0	0	0	0	21	0	21	73	0	73	165	0	165	317	0	317	495	0	495	693	0	693	715	0	715
Interest during Construction(Const.)	2,474	0	2,474	0	0	0	0	0	0	0	0	0	0	0	0	21	0	21	73	0	73	165	0	165	316	0	316	494	0	494	693	0	693	714	0	714
Interest during Construction (Consul.)	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	0	1
D. Commitment Charge	4,027	0	4,027	366	0	366	366	0	366	366	0	366	366	0	366	366	0	366	366	0	366	366	0	366	366	0	366	366	0	366	366	0	366	366	0	366
GRAND TOTAL (A+B+C+D)	124,275	80,593,845	443,121	366	4,757	385	484	30,092	603	726	52,037	932	731	54,800	948	3,351	2,520,490	13,323	7,140	6,395,837	32,444	13,665	10,896,851	56,775	23,120	17,725,734	93,247	31,504	19,595,088	109,026	37,211	21,305,140	121,498	5,976	2,013,019	13,940
E. JICA finance portion incl. IDC (A + C + D)	124,275	62,132,551	370,085	366	0	366	484	3,095	496	726	9,962	765	731	10,689	774	3,351	1,966,753	11,132	7,140	5,047,553	27,109	13,665	8,527,409	47,401	23,120	13,826,194	77,820	31,504	15,038,307	90,999	37,211	16,231,305	101,425	5,976	1,471,283	11,797

Administration Cost = 10%
VAT= 10% of the expenditure in local currency of the eligible portion
Import Tax= 0%

Source: JICA Study Team

Attachment 6 Construction cost of Phase 1 (underground structure in urban area): Rolling stocks and AFC devices

Annual Fund Requirement

Base Year for Cost Estimation: Sep, 2012 — FC & Total: million JPY
Exchange Rates: VND = Yen 0.003956 — LC : million VND
Price Escalation: FC: 1.6% LC: 7.3%
Physical Contingency: 5%
Physical Contingency for Consultant: 5%

Item	Total			2013			2014			2015			2016			2017			2018			2019			2020			2021			2022		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. ELIGIBLE PORTION																																	
Ⅰ) Procurement / Construction	15,066	0	15,066	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,473	0	7,473	7,593	0	7,593
Rolling stock	9,342	0	9,342	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,671	0	4,671	4,671	0	4,671
AFC	2,998	0	2,998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,499	0	1,499	1,499	0	1,499
Base cost for JICA financing	12,340	0	12,340	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,170	0	6,170	6,170	0	6,170
Price escalation	2,009	0	2,009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	948	0	948	1,061	0	1,061
Physical contingency	717	0	717	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	356	0	356	362	0	362
Ⅱ) Consulting services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (Ⅰ+Ⅱ)	15,066	0	15,066	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,473	0	7,473	7,593	0	7,593
B. NON ELIGIBLE PORTION																																	
a Procurement / Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost for JICA financing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c Administration cost	0	380,825	1,507	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	188,901	747	0	191,924	759
d VAT	0	380,825	1,507	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	188,901	747	0	191,924	759
e Import Tax	0	761,650	3,013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	377,802	1,495	0	383,847	1,519
Total (a+b+c+d+e)	0	1,523,299	6,026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	755,605	2,989	0	767,694	3,037
TOTAL (A+B)	15,066	1,523,299	21,093	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,473	755,605	10,463	7,593	767,694	10,630
C. Interest during Construction	568	0	568	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	187	0	187	381	0	381
Interest during Construction(Const.)	568	0	568	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	187	0	187	381	0	381
Interest during Construction (Consul.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Commitment Charge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL (A+B+C+D)	15,634	1,523,299	21,661	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,660	755,605	10,649	7,974	767,694	11,011
E. JICA finance portion incl. IDC (A + C + D)	15,634	0	15,634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,660	0	7,660	7,974	0	7,974

Administration Cost = 10%
VAT= 10% of the expenditure in local currency of the eligible portion
Import Tax= 20%

*Besides the above table, 1 billion yen of JICA PSIF portion are added up as a part of cost for preparation of inauguration.

Source: JICA Study Team

Attachment 7 Construction cost of Phase 2: Japanese yen loan

Annual Fund Requirement

Base Year for Cost Estimation: Sep, 2012 — FC & Total: million JPY
Exchange Rates: VND = Yen 0.003956213 — LC : million VND
Price Escalation: FC: 1.6% LC: 7.3%
Physical Contingency 5%
Physical Contingency for Consultant 5%

Item	Total			2025			2026			2027			2028			2029		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. ELIGIBLE PORTION																		
Ⅰ) Procurement / Construction	63,024	38,455,669	215,163	0	0	0	0	0	0	0	0	0	21,997	18,174,264	93,898	41,027	20,281,405	121,265
Civil	4,548	9,122,198	40,638	0	0	0	0	0	0	0	0	0	2,274	4,561,099	20,319	2,274	4,561,099	20,319
Track	8,408	1,753,751	15,346	0	0	0	0	0	0	0	0	0	4,204	876,875	7,673	4,204	876,875	7,673
Electricity	32,576	560,898	34,795	0	0	0	0	0	0	0	0	0	9,773	168,269	10,438	22,803	392,629	24,356
Maintenance car	552	0	552	0	0	0	0	0	0	0	0	0	0	0	0	552	0	552
Base cost for JICA financing	46,083	11,436,847	91,330	0	0	0	0	0	0	0	0	0	16,251	5,606,244	38,430	29,833	5,830,603	52,900
Price escalation	13,940	25,187,600	113,587	0	0	0	0	0	0	0	0	0	4,699	11,702,579	50,997	9,241	13,485,021	62,591
Physical contingency	3,001	1,831,222	10,246	0	0	0	0	0	0	0	0	0	1,047	865,441	4,471	1,954	965,781	5,775
Ⅱ) Consulting services	3,480	191,335	4,237	342	16,123	406	347	17,300	416	353	18,562	426	1,210	67,222	1,476	1,229	72,129	1,514
Base cost	2,582	59,904	2,819	265	6,144	289	265	6,144	289	265	6,144	289	894	20,736	976	894	20,736	976
Price escalation	733	122,320	1,217	61	9,211	97	66	10,332	107	71	11,535	117	258	43,285	430	277	47,958	467
Physical contingency	166	9,111	202	16	768	19	17	824	20	17	884	20	58	3,201	70	59	3,435	72
Total (Ⅰ + Ⅱ)	66,505	38,647,005	219,400	342	16,123	406	347	17,300	416	353	18,562	426	23,207	18,241,486	95,374	42,256	20,353,534	122,779
B. NON ELIGIBLE PORTION																		
a Procurement / Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost for JICA financing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c Administration cost	0	5,545,718	21,940	0	10,251	41	0	10,507	42	0	10,773	43	0	2,410,733	9,537	0	3,103,455	12,278
d VAT	0	5,545,718	21,940	0	10,251	41	0	10,507	42	0	10,773	43	0	2,410,733	9,537	0	3,103,455	12,278
e Import Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (a+b+c+d+e)	0	11,091,436	43,880	0	20,501	81	0	21,013	83	0	21,547	85	0	4,821,465	19,075	0	6,206,910	24,556
TOTAL (A+B)	66,505	49,738,441	263,280	342	36,624	487	347	38,313	499	353	40,109	511	23,207	23,062,951	114,448	42,256	26,560,444	147,335
C. Interest during Construction	619	0	619	0	0	0	0	0	0	0	0	0	188	0	188	431	0	431
Interest during Construction(Const.)	618	0	618	0	0	0	0	0	0	0	0	0	188	0	188	431	0	431
Interest during Construction (Consul.)	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Commitment Charge	1,100	0	1,100	220	0	220	220	0	220	220	0	220	220	0	220	220	0	220
GRAND TOTAL (A+B+C+D)	68,224	49,738,441	265,000	562	36,624	707	567	38,313	719	573	40,109	732	23,615	23,062,951	114,857	42,908	26,560,444	147,986
E. JICA finance portion incl. IDC (A + C + D)	68,224	38,647,005	221,120	562	16,123	626	567	17,300	636	573	18,562	646	23,615	18,241,486	95,782	42,908	20,353,534	123,430

Administration Cost = 10%
VAT= 10% of the expenditure in local currency of the eligible portion
Import Tax= 0%

Source: JICA Study Team

Attachment 8 Construction cost of Phase 2: Rolling stocks and AFC devices

Annual Fund Requirement

Base Year for Cost Estimation: Sep, 2012 — FC & Total: million JPY
Exchange Rates: VND = Yen 0.003956 — LC : million VND
Price Escalation: FC: 1.6% LC: 7.3%
Physical Contingency: 5%
Physical Contingency for Consultant: 5%

Item	Total			2025			2026			2027			2028			2029		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. ELIGIBLE PORTION																		
Ⅰ) Procurement / Construction	11,419	0	11,419	0	0	0	0	0	0	0	0	0	5,664	0	5,664	5,755	0	5,755
Rolling stock	7,752	0	7,752	0	0	0	0	0	0	0	0	0	3,876	0	3,876	3,876	0	3,876
AFC	617	0	617	0	0	0	0	0	0	0	0	0	309	0	309	309	0	309
Base cost for JICA financing	8,369	0	8,369	0	0	0	0	0	0	0	0	0	4,185	0	4,185	4,185	0	4,185
Price escalation	2,506	0	2,506	0	0	0	0	0	0	0	0	0	1,210	0	1,210	1,296	0	1,296
Physical contingency	544	0	544	0	0	0	0	0	0	0	0	0	270	0	270	274	0	274
Ⅱ) Consulting services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (Ⅰ + Ⅱ)	11,419	0	11,419	0	0	0	0	0	0	0	0	0	5,664	0	5,664	5,755	0	5,755
B. NON ELIGIBLE PORTION																		
a Procurement / Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost for JICA financing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c Administration cost	0	288,635	1,142	0	0	0	0	0	0	0	0	0	0	143,172	566	0	145,463	575
d VAT	0	288,635	1,142	0	0	0	0	0	0	0	0	0	0	143,172	566	0	145,463	575
e Import Tax	0	577,269	2,284	0	0	0	0	0	0	0	0	0	0	286,344	1,133	0	290,925	1,151
Total (a+b+c+d+e)	0	1,154,538	4,568	0	0	0	0	0	0	0	0	0	0	572,688	2,266	0	581,851	2,302
TOTAL (A+B)	11,419	1,154,538	15,987	0	0	0	0	0	0	0	0	0	5,664	572,688	7,930	5,755	581,851	8,057
C. Interest during Construction	431	0	431	0	0	0	0	0	0	0	0	0	142	0	142	289	0	289
Interest during Construction(Const.)	431	0	431	0	0	0	0	0	0	0	0	0	142	0	142	289	0	289
Interest during Construction (Consul.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Commitment Charge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL (A+B+C+D)	11,850	1,154,538	16,417	0	0	0	0	0	0	0	0	0	5,806	572,688	8,071	6,044	581,851	8,346
E. JICA finance portion incl. IDC (A + C + D)	11,850	0	11,850	0	0	0	0	0	0	0	0	0	5,806	0	5,806	6,044	0	6,044

Administration Cost = 10%
VAT= 10% of the expenditure in local currency of the eligible portion
Import Tax= 20%

Source: JICA Study Team

Chapter 5 Economic and Financial Analysis

5.1 Formulation of fare levels

(1) Rationale regarding setting and collecting fares

In this report, study team proposes a business model that separates the rail operation contractor (Private SPC), which is involved in operating the railway, from the railway operator (Vietnam government), which owns the infrastructure. Study team assumes that the railway operator will be Vietnam government, a public entity, and that the rail operation contractor (Private SPC) will be a private-sector entity. As the setting of fares, which will form the basis of revenues, has a direct connection with policy measures such as the promotion of the use of public transport, study team believes that it is the public entity that should bear the fare revenue risk. In that case, all fare revenues will be received by the public entity.

(2) Setting fare levels

As mentioned above, from the viewpoint of Hanoi City's urban policies and transport policies, it is assumed that the Vietnamese government will attempt to set appropriate fares and shift to a mean of transport that stimulates demand and is well used. Here, in regard to the level of fares, study team has set the average fare at USD0.50, which takes into account bus fares in Hanoi City, as described in "2.4 Assumptions for demand estimates".

Regarding current bus fares, as of 2012 the fare from the city center up to a distance of 25 km is a fixed amount of VND3,000 (due to be raised to VND5,000 from October 2012). This is equivalent to roughly USD0.24, but in view of the fact that the number of operating kilometers on Line 5 will extend for more than 30 km, including suburban areas, and in view of the level of consumer prices in Vietnam, an average fare of USD0.50 appears reasonable compared to bus fares.

As study team also mentioned in "2.4 Assumptions for demand estimates", study team will restate fare levels and per capita GDP in major Asian countries as one basis for setting fares. In Singapore, which aims to regulate car traffic volume and promote the use of public transport, urban railway fares have been politically kept low relative to per capita GDP.

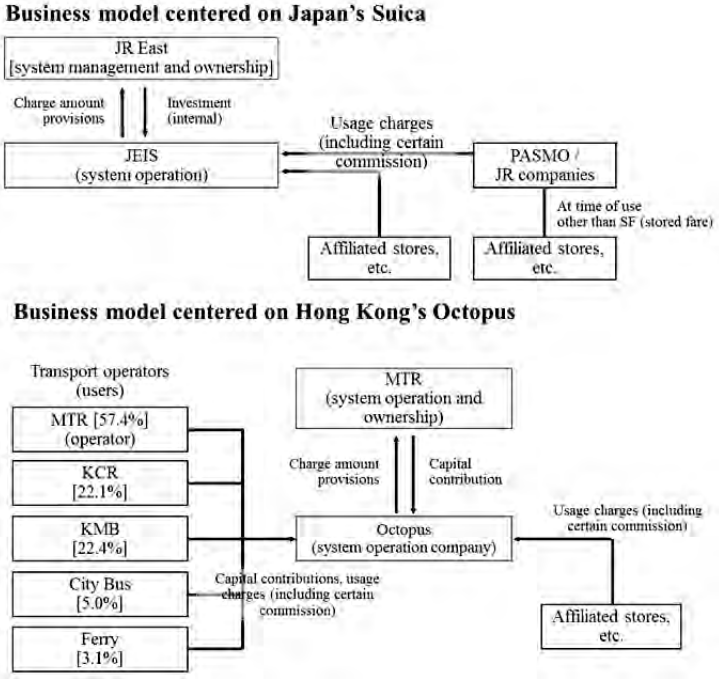
Table 5.1.1 Fare levels of urban transport organizations in major Asian countries

	Hong Kong	South Korea (Seoul)	Singapore	Thailand (Bangkok)	Indonesia (Jakarta)	Vietnam (Hanoi)
[1] Average fare level (median price, USD)	1.95	1.05	1.04	0.75	0.37	0.50 (price to be set)
[2] Per capita GDP (USD/person)	31,500	20,600	43,100	4,990	9,896	1,900
Index ([1]/[2])	0.006 %	0.005 %	0.002 %	0.015 %	0.0037%	0.026%

Source: JICA Study Team

(3) Consideration of fare collection method

In general, in countries with developed transport infrastructure, cities have introduced fare collection systems based on passenger tickets that utilize non-contact IC cards (referred to as IC tickets hereafter). This system is highly convenient for passengers in that it is possible to use various public transport organizations with a single card and the cards can be reissued if they are lost. For railway operator as well, this is a system with many advantages such as the reliable receipt of fares and resulting cost reductions. In the case of Hanoi Line 5 as well, it seems appropriate to take into account the receipt of fares based on IC tickets from the start of operation.



Source: JICA Study Team

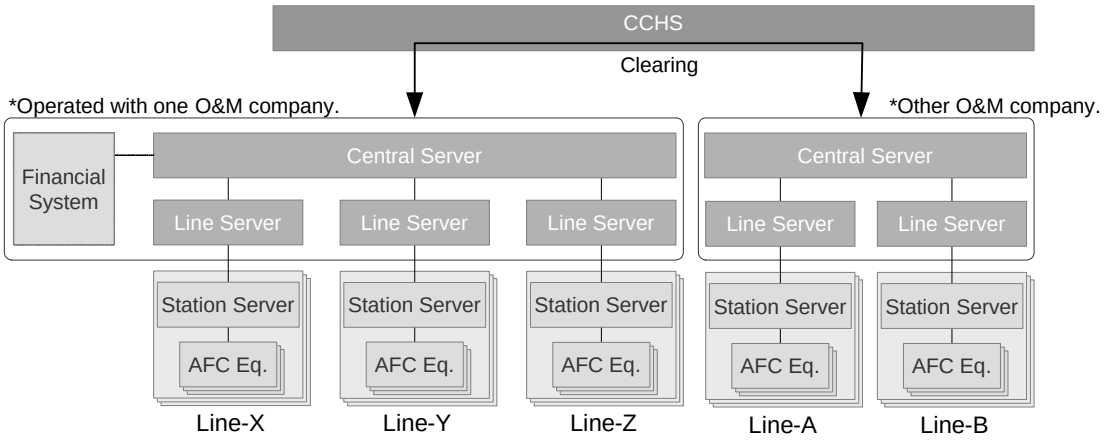
Figure 5.1.1 Ticketing operator business model based on transport IC cards

In Japan, railway companies directly issue and manage cards and operate fare collection systems on their own account. In Hong Kong and Singapore, however, there are business models in which railway companies and transport authorities have established specialist companies that issue and manage cards, and these companies operate the systems.

In Japan, several railway operators have issued their own respective IC tickets. However, as several railway operators have standardized non-contact IC card systems and data formats, a service enabling the common use of a single IC ticket anywhere in Japan has been realized. In the case of Hanoi and Ho Chi Minh as well, where different countries are involved in each railway line, it would be desirable for the railway operator (Vietnam government) to decide in advance to introduce IC tickets based on a uniform standard. Study team assumes that the introduction of a system that would be necessary for the standardization of IC tickets is not within the scope of this project. Nevertheless, it would be desirable to hold discussions with relevant organizations and carry out technical investigations in advance so that the standardization of IC tickets can be addressed without any hindrances.

(4) Rationale for introduction of AFC system on other Hanoi lines

In regard to the introduction of an AFC system on other Hanoi lines, details are being considered by the Hanoi Metropolitan Railway's O&M Organization Establishment Assistance SAPI (Special Assistance for Project Implementation), which is being promoted in tandem with the consideration of this project. SAPI has proposed a mechanism to integrate the AFC systems for several Hanoi lines at the level of a high-order system and to mutually use transport IC cards with unified specifications on several lines. As a result of this, passengers will be able to use a single transport IC card freely on several lines, as in the case of Japan, and convenience associated with changing trains, etc. will be enhanced. Furthermore, complex settlement of fares between the operators of each line will be reliably carried out under a secure environment based on a top-level CCHS (Central Clearing House System). These mechanisms are in agreement with the state of the AFC system assumed in this project, and moves to develop specifics in relation to the abovementioned business model and commercialization are expected.



Source: SAPI Team

Figure 5.1.2 Illustration of high-order AFC system to realize specifications integrated with other lines

5.2 Economic and financial evaluation of project

(1) Economic evaluation of project

Here, study team conducts an economic evaluation associated with the implementation of this project.

Economic evaluation will be computed with an Economic Internal Rate of Return (EIRR) by the following formulas.

$$0 = \sum_{t=1}^{n} (Bt-Ct)/(1+EIRR)_{t-1}$$ (n: Analysis period, Bt: Benefit of each year, Ct: Cost of each year)

"Benefit of each year" mentioned in the above formula consists of the following elements:

(i) Time reduction value based on shift from motorbike travel to railway transport

(ii) Fuel cost reduction value

(iii) CO2 emission reduction value

(iv) Effect of industry attraction in industry-related analysis

"Cost of each year" consists of the "Initial Investment" and the "Renewal Investment" which were examined in Chapter 4.

When studying Economic evaluation of project, the influence of price escalation and Taxes (VAT, import duties) are eliminated.

The analysis period is from the investment start time which is added up in economic analysis until the time when yen loan repayment of principal and interest of Phase 2 is completed.

1) “Benefit of each year”

(i) Time reduction value based on shift from motorbike travel to railway transport

The development of this project will result in the shortening of travel time, as users will transfer from motorbikes to the railway. Here, study team has converted the time reduction effect to monetary value by multiplying the quantity of reduction in travel time by a time unit price (personnel cost). When estimating the quantity of reduction in travel time, study team set the burden ratio from 2021 to 2029 at 5% for the neighboring section and 10% for the other section. In addition, from 2030 onward, study team set the rate at 10% for the neighboring section and 15% for the other section. The speed when travelling by motorbike or car has been set at 20 km/hour for the inner-city area of St. 1–St. 5 and 40 km/hour for the suburban area of St. 5-St. 17.

In regard to the time unit price, study team has used the average value of the annual total pay burden (total annual payout per employee including base salary, allowances, social insurance premiums, overtime and bonuses, and excluding retirement allowances) for manufacturing industry workers and for non-manufacturing industry personnel in Vietnam, based on JETRO’s Survey of Japanese-Affiliated Firms in Asia and Oceania (FY2011 Survey).

Table 5.2.1 Time reduction value based on shift from travel by motorbike etc. to railway travel

Year	St.1～St.17(hour)			Time reduction effect	Annual Total
	Train	Motorbike	Difference	million-JPY/day	million-JPY/year
2021	20,023	34,709	-14,686	2.31	842
2022	20,357	35,244	-14,887	2.34	853
2023	20,695	35,785	-15,090	2.37	865
2024	21,035	36,331	-15,296	2.40	877
2025	21,377	36,880	-15,503	2.43	889
2026	21,719	37,429	-15,710	2.47	901
2027	22,061	37,978	-15,917	2.50	912
2028	22,400	38,523	-16,123	2.53	924
2029	22,736	39,063	-16,327	2.56	936
2030	35,261	60,818	-25,557	4.01	1,465
2031	35,372	61,001	-25,629	4.02	1,469
2032	35,483	61,184	-25,700	4.04	1,473
2033	35,595	61,367	-25,772	4.05	1,477
2034	35,707	61,551	-25,845	4.06	1,481
2035	35,819	61,736	-25,917	4.07	1,486
2036	35,931	61,920	-25,989	4.08	1,490
2037	36,043	62,105	-26,062	4.09	1,494
2038	36,156	62,291	-26,135	4.10	1,498
2039	36,269	62,477	-26,208	4.12	1,502
2040	36,382	62,663	-26,281	4.13	1,506
2041	36,496	62,850	-26,354	4.14	1,511
2042	36,610	63,038	-26,428	4.15	1,515
2043	36,725	63,227	-26,502	4.16	1,519
2044	36,840	63,416	-26,576	4.17	1,523
2045	36,956	63,606	-26,650	4.19	1,528
2046	37,071	63,796	-26,724	4.20	1,532
2047	37,187	63,987	-26,799	4.21	1,536
2048	37,304	64,178	-26,874	4.22	1,540
2049	37,421	64,370	-26,949	4.23	1,545
2050	37,538	64,563	-27,025	4.24	1,549
2051	37,625	64,700	-27,075	4.25	1,552
2052	37,712	64,838	-27,126	4.26	1,555
2053	37,800	64,976	-27,177	4.27	1,558
2054	37,887	65,115	-27,228	4.28	1,561
2055	37,975	65,254	-27,279	4.28	1,564
2056	38,063	65,393	-27,330	4.29	1,567
2057	38,151	65,532	-27,381	4.30	1,570
2058	38,240	65,672	-27,432	4.31	1,573
2059	38,328	65,812	-27,484	4.32	1,575
2060	38,417	65,952	-27,535	4.32	1,578
2061	38,506	66,093	-27,587	4.33	1,581
2062	38,595	66,234	-27,639	4.34	1,584
2063	38,685	66,375	-27,690	4.35	1,587
2064	38,774	66,517	-27,742	4.36	1,590

Source: JICA Study Team

(ii) Fuel cost reduction value

As a result of the development of this project, users will transfer from motorbikes and so forth to the railway, and to that extent, it will be possible to reduce gasoline consumption. Study team has calculated the fuel cost reduction value based on travelling distance by motorbike etc. ÷ fuel consumption of motorbike and so on (20 km/liter) x gasoline cost (VND22,900/liter: 2012).

(iii) CO2 emission reduction value

Here, study team has calculated the CO2 emission reduction value based on motorbike travelling distance ÷ motorbike fuel consumption x CO2 emission volume per liter of gasoline. CO2 emission volume per liter of gasoline was set at 2.3kg-CO2/liter by using Ministry of Land, Infrastructure, Transport and Tourism data. In addition, study team used JPY10,600 (price in 2006) as the unit load converted into monetary value per ton of CO2 emission volume (Source: Technical Guidelines of Cost-Benefit Analysis for Public Works Projects (Common Edition)).

Table 5.2.2 Fuel cost reduction value and CO2 emission reduction value

Year	Motorbike Travel km	CO2 reduction	CO2 reduction(value)	Total Annual CO2 reduction	Gasoline cost reduction	Total Gasoline cost reduction
	St.1～St.17	(kg-CO2)	million-JPY/day	million-JPY/year	JPY/day	million-JPY/year
2021	1,061,355	122,056	1.29	472	4,807,793	1,755
2022	1,086,702	124,971	1.32	484	4,922,611	1,797
2023	1,112,705	127,961	1.36	495	5,040,403	1,840
2024	1,139,316	131,021	1.39	507	5,160,947	1,884
2025	1,166,475	134,145	1.42	519	5,283,973	1,929
2026	1,194,111	137,323	1.46	531	5,409,160	1,974
2027	1,222,143	140,546	1.49	544	5,536,140	2,021
2028	1,250,478	143,805	1.52	556	5,664,494	2,068
2029	1,279,014	147,087	1.56	569	5,793,759	2,115
2030	1,995,640	229,499	2.43	888	9,039,976	3,300
2031	2,002,830	230,325	2.44	891	9,072,547	3,311
2032	2,010,039	231,154	2.45	894	9,105,202	3,323
2033	2,017,267	231,986	2.46	898	9,137,943	3,335
2034	2,024,513	232,819	2.47	901	9,170,768	3,347
2035	2,031,778	233,655	2.48	904	9,203,679	3,359
2036	2,039,062	234,492	2.49	907	9,236,674	3,371
2037	2,046,365	235,332	2.49	910	9,269,754	3,383
2038	2,053,686	236,174	2.50	914	9,302,918	3,396
2039	2,061,026	237,018	2.51	917	9,336,168	3,408
2040	2,068,385	237,864	2.52	920	9,369,502	3,420
2041	2,073,990	238,509	2.53	923	9,394,890	3,429
2042	2,079,609	239,155	2.54	925	9,420,346	3,438
2043	2,085,244	239,803	2.54	928	9,445,872	3,448
2044	2,090,895	240,453	2.55	930	9,471,467	3,457
2045	2,096,560	241,104	2.56	933	9,497,131	3,466
2046	2,102,241	241,758	2.56	935	9,522,865	3,476
2047	2,107,937	242,413	2.57	938	9,548,669	3,485
2048	2,113,649	243,070	2.58	940	9,574,542	3,495
2049	2,119,376	243,728	2.58	943	9,600,486	3,504
2050	2,125,119	244,389	2.59	946	9,626,500	3,514
2051	2,130,877	245,051	2.60	948	9,652,584	3,523
2052	2,136,651	245,715	2.60	951	9,678,739	3,533
2053	2,142,441	246,381	2.61	953	9,704,965	3,542
2054	2,142,441	247,048	2.62	956	9,731,262	3,552
2055	2,142,441	247,718	2.63	958	9,757,630	3,562
2056	2,142,441	248,389	2.63	961	9,784,070	3,571
2057	2,142,441	249,062	2.64	964	9,810,581	3,581
2058	2,142,441	249,737	2.65	966	9,837,164	3,591
2059	2,142,441	250,414	2.65	969	9,863,820	3,600
2060	2,142,441	251,092	2.66	971	9,890,547	3,610
2061	2,142,441	251,772	2.67	974	9,917,347	3,620
2062	2,142,441	252,455	2.68	977	9,944,219	3,630
2063	2,142,441	253,139	2.68	979	9,971,165	3,639
2064	2,142,441	253,825	2.69	982	9,998,183	3,649

Source: JICA Study Team

(iv) Effect of industry attraction in industry-related analysis

In the case of infrastructure projects associated with large-scale investments, demand is generated through the development of infrastructure, and there is the effect of stimulation to regional economies in terms of economic effects and employment effects.

In regards to Line 5, the amount of investment in infrastructure and equipment will have ripple effects on Vietnam's regional economies and the economies of related countries via construction and procurement. In general, the economic ripple effects relating to investment are calculated by using industry-related tables, and are disbursed by public entities as consideration for the value added of economic entities that receive construction and procurement. While the value added becomes the profits of the entities concerned (companies) and the salaries of employees, the raw materials and services required to generate the value added are paid to other entities, and the value added portion similarly belongs to the companies concerned and their employees. As this cycle will be repeated, if study team designates the ratio of value added as V, cumulative demand when the amount of investment is 1, can be reduced to 1 / (1-V).

In general, as the ratio of value added is 20-30%, 1÷0.7=1.4, and if study team combines the initial investment amount (1.0), the economic ripple effect becomes 2～3(1.4+1.0=2.4) times. As the lower the ratio of value added of the country concerned is (the higher the cost ratio is), the greater the degree of ripple will be, the ripple effect will increase. In regard to Hanoi Line 5 as well, study team can anticipate an effect of around 2.4 times relative to the development cost of 304.9 billion yen (the influence of price escalation and Taxes (VAT, import duties) are eliminated.) for all sections (St. 1-St. 17).

2) “Cost of each year”

The costs of each year consist of "initial investment" and "replacement investment." "Initial Investment" is private investment (Rolling stocks + AFC devices) +ODA investment (except Rolling stocks and AFC devices). The investment of Phase 1will be added up during 2017 and 2020.This is a period of top four years which involves the largest investment in Phase 1 from 2013 to 2021. Similarly, the investment of Phase 2 will be added up during 2028 and 2029.

When study team calculates “Cost of each year,” the influence of price escalation and Taxes (VAT, import duties) are eliminated.

Table 5.2.3 Cost of each year (Unit: million JPY, excluding price escalation and taxes)

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Rollingstock＋AFC							6,640	6,806					
ODA	181	281	482	482	19,279	45,717	52,582	56,957	6,761				403
Renual Investment													
Total Investment	181	281	482	482	19,279	45,717	59,222	63,763	6,761	0	0	0	403

Year	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Rollingstock＋AFC			4,504	4,616										
ODA	403	403	41,556	56,861										
Renual Investment	2,338	2,199	550	0	5,851	6,151	1,649	1,649	808	5,157	3,473	550	2,495	7,500
Total Investment	2,741	2,602	46,610	61,477	5,851	6,151	1,649	1,649	808	5,157	3,473	550	2,495	7,500

Year	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
Rollingstock＋AFC														
ODA														
Renual Investment	6,789	7,419	7,319	7,319	7,319	7,491	7,319	7,319	7,319	7,577	7,577	6,939	6,939	6,939
Total Investment	6,789	7,419	7,319	7,319	7,319	7,491	7,319	7,319	7,319	7,577	7,577	6,939	6,939	6,939

Year	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064
Rollingstock＋AFC											
ODA											
Renual Investment	6,939	6,939	6,939	6,939	6,939	6,939	7,111	6,939	6,939	6,939	6,939
Total Investment	6,939	6,939	6,939	6,939	6,939	6,939	7,111	6,939	6,939	6,939	6,939

Source: JICA Study Team

3) The computation result of EIRR (economic internal rate of return)

"The computation period of EIRR" is 48 years until 2064 when the yen loan repayment of principal and interest of Phase 2 will end from 2017 when cost appropriation mentioned in above 2) starts.

The calculated economic internal rate of return (EIRR) was 10.90%. This is slightly lower than the 12% stipulated in the “Guideline for Preparing Performance Evaluation Reports for Public Sector Operations,” the standard of the Asian Development Bank for adoption projects. As the benefits of this project, reduction in traffic congestion, traffic noise, and traffic accidents is expected but not calculated as benefits since inclusion of the value is difficult. Considering the benefits, it is assumed that EIRR is improved more; therefore, the implementation of this project is evaluated as economically effective.

Table 5.2.4 The computation data of EIRR (Unit: million JPY)

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Time reduction effect									842	853	865	877	889	901
CO2 reduction effect									472	484	495	507	519	531
Gasoline cost reduction effect									1,755	1,797	1,840	1,884	1,929	1,974
Production Inducement effect					2,452	4,904	7,356	9,808	9,808	9,808	9,808	9,808	9,808	9,808
Rollingstock＋AFC+ODA					-49,042	-49,042	-49,042	-49,042						
Replacement investment	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,338
Total	0	0	0	0	-46,590	-44,138	-41,686	-39,234	12,877	12,942	13,008	13,076	13,145	10,876
Year	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Time reduction effect	912	924	936	1,465	1,469	1,473	1,477	1,481	1,486	1,490	1,494	1,498	1,502	1,506
CO2 reduction effect	544	556	569	888	891	894	898	901	904	907	910	914	917	920
Gasoline cost reduction effect	2,021	2,068	2,115	3,300	3,311	3,323	3,335	3,347	3,359	3,371	3,383	3,396	3,408	3,420
Production Inducement effect	9,808	12,527	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246
Rollingstock＋AFC+ODA		-54,372	-54,372											
Replacement investment	-2,199	-550	0	-5,851	-6,151	-1,649	-1,649	-808	-5,157	-3,473	-550	-2,495	-7,500	-6,789
Total	11,086	-38,847	-35,507	15,047	14,766	19,288	19,307	20,167	15,837	17,541	20,484	18,558	13,573	14,303
Year	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Time reduction effect	1,511	1,515	1,519	1,523	1,528	1,532	1,536	1,540	1,545	1,549	1,552	1,555	1,558	1,561
CO2 reduction effect	923	925	928	930	933	935	938	940	943	946	948	951	953	956
Gasoline cost reduction effect	3,429	3,438	3,448	3,457	3,466	3,476	3,485	3,495	3,504	3,514	3,523	3,533	3,542	3,552
Production Inducement effect	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246
Rollingstock＋AFC+ODA														
Replacement investment	-7,419	-7,319	-7,319	-7,319	-7,491	-7,319	-7,319	-7,319	-7,577	-7,577	-6,939	-6,939	-6,939	-6,939
Total	13,689	13,805	13,821	13,837	13,681	13,870	13,886	13,902	13,660	13,677	14,330	14,345	14,360	14,375
Year	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064				
Time reduction effect	1,564	1,567	1,570	1,573	1,575	1,578	1,581	1,584	1,587	1,590				
CO2 reduction effect	958	961	964	966	969	971	974	977	979	982				
Gasoline cost reduction effect	3,562	3,571	3,581	3,591	3,600	3,610	3,620	3,630	3,639	3,649				
Production Inducement effect	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246	15,246				
Rollingstock＋AFC+ODA														
Replacement investment	-6,939	-6,939	-6,939	-6,939	-6,939	-7,111	-6,939	-6,939	-6,939	-6,939				
Total	14,390	14,405	14,420	14,436	14,451	14,294	14,482	14,497	14,513	14,528				

Source: JICA Study Team

(2) Financial evaluation of project

Here, study team conducts a financial evaluation associated with the implementation of this project.

Financial evaluation will be computed with a Financial Internal Rate of Return (FIRR) by the following formulas.

$$0 = \sum_{t=1}^{n} (\text{Revenue} - \text{Investment cost} - \text{Expense})_t / (1+\text{FIRR})^{t-1}$$

In "a basic case (Ph1+Ph2: elevated in the city center)", FIRR (financial internal rate of return) of the government side will be computed in the following processes.

1) The precondition for FIRR (financial internal rate of return) computation

- The income (market price) computed based on the demand forecasting calculated in Chapter 2 was used for the "Revenue."
- "The computation period of EIRR" is 48 years until 2064 when the yen loan repayment of principal and interest of Phase 2 will end from 2017 when cost appropriation starts.
- “Investment cost” is considered as the project investment cost (market price) excluding rolling stocks and AFC devices, which the government side set.
- The following items of expenditure (market price) are considered as "Expense":
  - ✓ The amount of ODA repayment of principal and interest
  - ✓ Cost after transferring O&M
  - ✓ Service fee
  - ✓ Replacement investment
  - ✓ Pre-opening expenses

2) The computation result of FIRR (Financial Internal Rate of Return)

FIRR was computed on the basis of the precondition of 1). However, FIRR did not become a positive value. It was difficult to balance "investment and expense" with "fare revenue" since railway operation requires the installation of large equipment and planned replacement of facilities which involve large amount of expense with viewpoint of ensuring safety. Measures for improvement include increasing demand by promoting the use of public transportation as a policy and implementing measures to reduce the financial burden of the government.

Table 5.2.5 The computation data of FIRR (Unit:million-JPY)

Year			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Revenue		Fare Revenue	0	0	0	0	0	0	0	0	4,665	5,549	6,600	7,849	9,336	11,104
Total Cost	Capital Cost	ODA investment	0	0	0	0	−64,692	−64,692	−64,692	−64,692	0	0	0	0	0	0
	Variable Cost	ODA repayment of principal and interest	0	0	0	0	0	0	0	0	0	0	−9,143	−9,126	−9,109	−9,091
		Service Fee	0	0	0	0	0	0	0	0	−6,479	−6,496	−6,478	−6,457	−6,403	−1,944
		Pre-opening expenses	0	−142	−203	−212	−268	−655	−694	−3,012	0	0	0	0	0	0
		Cost after O&M change of jurisdiction	0	0	0	0	0	0	0	0	0	0	0	0	0	−3,143
		Replacement investment	0	0	0	0	0	0	0	0	0	0	0	0	0	−3,350
Revenue－Total Cost			0	−142	−203	−212	−64,961	−65,348	−65,386	−67,704	−1,814	−947	−9,021	−7,734	−6,175	−6,423
Year			2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Revenue		Fare Revenue	13,207	15,709	18,684	22,223	22,996	23,796	24,624	25,481	26,368	27,285	28,235	29,217	30,234	31,286
Total Cost	Capital Cost	ODA investment	0	−49,813	−49,813	0	0	0	0	0	0	0	0	0	0	0
	Variable Cost	ODA repayment of principal and interest	−9,074	−9,057	−9,040	−9,022	−9,005	−8,988	−8,971	−8,953	−16,749	−16,717	−16,685	−16,653	−16,621	−16,589
		Service Fee	−1,944	−1,944	−3,440	−3,440	−3,440	−3,440	−3,440	−3,440	−3,440	−1,497	−1,497	−1,497	−1,497	−1,497
		Pre-opening expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Cost after O&M change of jurisdiction	−3,302	−3,471	−3,652	−6,494	−6,644	−6,799	−6,958	−7,123	−7,292	−7,466	−7,645	−7,830	−8,020	−8,217
		Replacement investment	−2,790	−709	0	−7,786	−8,934	−2,221	−2,234	−1,790	−7,791	−5,083	−763	−3,482	−10,533	−9,592
Revenue－Total Cost			−3,902	−49,285	−47,261	−4,520	−5,027	2,349	3,021	4,175	−8,904	−3,477	1,644	−245	−6,437	−4,608
Year			2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Revenue		Fare Revenue	32,155	33,048	33,966	34,909	35,879	36,876	37,900	38,953	40,035	41,147	42,290	43,464	44,672	45,913
Total Cost	Capital Cost	ODA investment	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Variable Cost	ODA repayment of principal and interest	−16,557	−16,525	−16,493	−16,461	−16,429	−16,397	−16,365	−16,333	−16,301	−16,269	−16,237	−16,205	−7,548	−7,533
		Service Fee	−1,497	−1,497	−1,497	0	0	0	0	0	0	0	0	0	0	0
		Pre-opening expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Cost after O&M change of jurisdiction	−8,363	−8,514	−8,668	−8,826	−8,988	−9,154	−9,325	−9,499	−9,678	−9,861	−10,049	−10,242	−10,440	−10,642
		Replacement investment	−12,737	−12,304	−12,372	−12,441	−13,460	−12,585	−12,660	−12,737	−14,385	−14,505	−10,550	−10,574	−10,599	−10,624
Revenue－Total Cost			−6,999	−5,791	−5,063	−2,819	−2,998	−1,261	−450	384	−329	512	5,453	6,443	16,086	17,114
Year			2055	2056	2057	2058	2059	2060	2061	2062	2063	2064				
Revenue		Fare Revenue	47,188	48,499	49,846	51,231	52,654	54,116	55,619	57,164	58,752	60,384				
Total Cost	Capital Cost	ODA investment	0	0	0	0	0	0	0	0	0	0				
	Variable Cost	ODA repayment of principal and interest	−7,518	−7,503	−7,489	−7,474	−7,459	−7,444	−7,430	−7,415	−7,400	−7,385				
		Service Fee	0	0	0	0	0	0	0	0	0	0				
		Pre-opening expenses	0	0	0	0	0	0	0	0	0	0				
		Cost after O&M change of jurisdiction	−10,849	−11,062	−11,280	−11,503	−11,732	−11,967	−12,208	−12,454	−12,707	−12,966				
		Replacement investment	−10,650	−10,676	−10,703	−10,731	−10,760	−12,162	−10,819	−10,849	−10,881	−10,913				
Revenue－Total Cost			18,171	19,257	20,374	21,522	22,703	22,543	25,163	26,446	27,764	29,120				

Source: JICA Study Team

Chapter 6 Environmental and Social Considerations

In Vietnam, Article 3 of Environmental Protection Law (52/2005-/QH11) stipulates that an environmental impact evaluation by Strategic Environmental Assessment (SEA) shall be made prior to the execution of Environmental Impact Assessment (EIA) in accordance with the nature of the project. However, according to the decree (29/2011-/ND-CD) providing detailed regulations on SEA, SEA shall not be applied to this project. (This project is not categorized as a strategic large-scale national project.)

On the other hand, according to detailed execution regulations of the Law on Environmental Protection (21/08/ND-CP), the procedure of EIA is indispensable for the construction of subways longer than 500m and elevated railways (without extension provisions). At the next stage of investigation, preparation of EIA report and RAP shall be included in the scope. In preparation of EIA report and RAP, reference shall be made to the investigation result (Initial Environmental Assessment -IEE-) and Resettlement Policy Framework (RPF) of this report.

In this report, IEE has been made in accordance with the Japan International Cooperative Agency (JICA) Environmental and Social Considerations Guidelines (April, 2010) for examination of various aspects of environmental and social impacts of the project. At the same time, RPF plan has been drafted based on the project plan so far studied.

6.1 Making of Draft IEE Report

6.1.1. Confirmation of the Status of the Environmental Society as the Basis of Examination

The status of the environmental society was confirmed in accordance with JICA Environmental and Social Considerations on those aspects, such as land utilization, natural environment and etc. by referring to the existing data, executing the field survey and other means.

As to several items, the descriptions are made separately for the following 2 routes with different features which are divided at the crossing point with Ring Road No.3.

- Urban Route : From St.1 to the crossing point with Ring Road 3 (from Van Cao Street to Tran Duy Hung Street)
- Suburban Route: From the crossing point with Ring Road 3 to St.12 (Thang Long Highway)

(1) Air Pollution

- Urban Route

Existing data for urban route are provided in EIA report of Line-2 and Line-3. The corresponding results at the crossing points with the project are provided in Table 6.1.1.

Table 6.1.1 Air Pollution Investigation Results

Measuring Point	TSP ($\mu g/m^3$)	CO ($\mu g/m^3$)	SO2 ($\mu g/m^3$)	NO2 ($\mu g/m^3$)	HC ($\mu g/m^3$)
Ba Dinh	65	580	173	98	205
Daewoo Hotel	68	910	270	290	140
TCVN5937-2005	300	30,000	350	200	-
TCVN5938-2005	-	-	-	-	5,000

Source: excerpted from “Line-2 EIA Report 2007” for Ba Dinh and “Line-3 EIA Report 2010” for Daewoo Hotel

The levels of air pollution at Ba Dihn (close to St.1 of the project) and at Daewoo Hotel (close to St.2 of the project) are lower than the old standards of Vietnam TCVN.

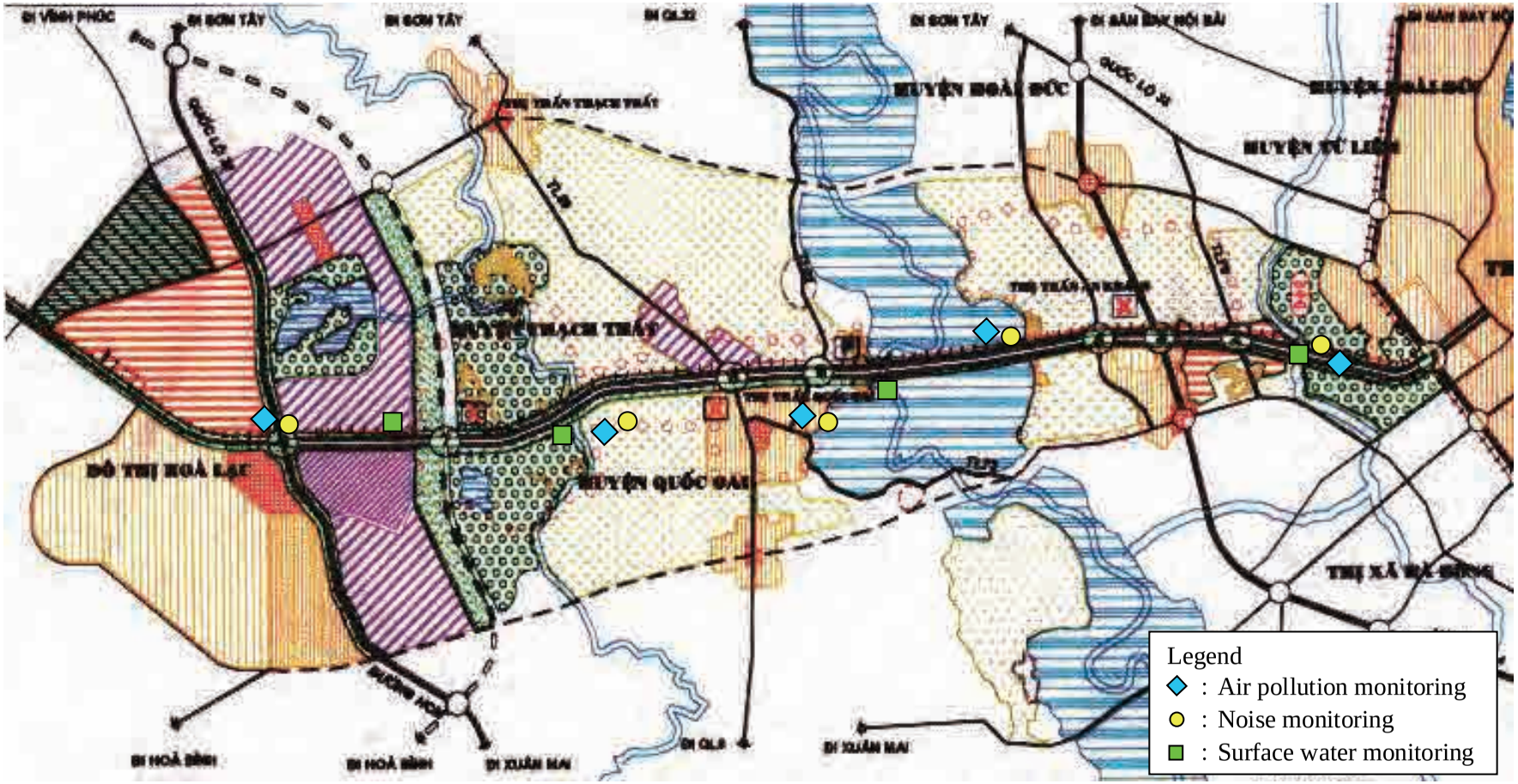
・Suburban Route

The existing data for the suburban route are provided as monitoring results at several points in Than Long Highway, which are mentioned below.

Point 1: at spot of 7km350m from the project (4,200m from the entrance gate of Mi Dihn National Stadium.
Point 2: at spot of 14km850m from the project (tại đê tả sông Đáy 11k580m)
Point 3: at spot of 18km850m from the project (tại đê hữu sông Đáy 15k700m)
Point 4: at spot of 25.850 from the project (22km200m)
Point 5: at spot of 32km from the project (crossing with QL21A)

Km in parenthesis shows the kilo post figures in Than Long Highway.

Monitoring points are shown in Fig. 6.1.1. All the sources of the monitoring data are in “Thang Long Highway Monitoring Results 2011”.

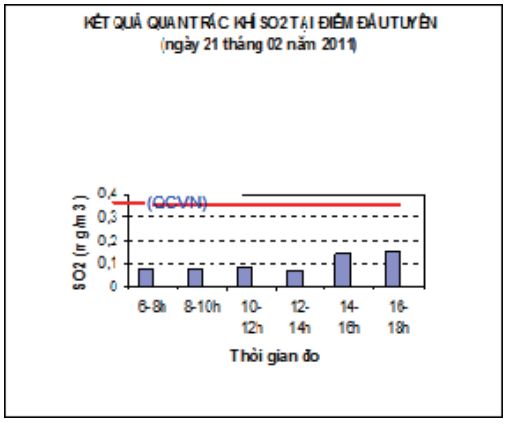


Source: Thang Long Highway Monitoring Results 2011

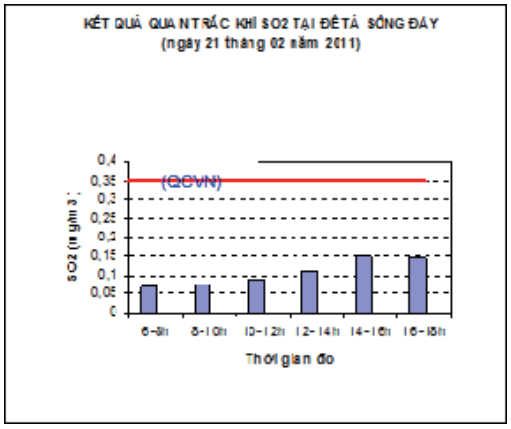
Figure 6.1.1 Thang Long Highway Monitoring Points

・Sulfur Di-oxide (SO2)

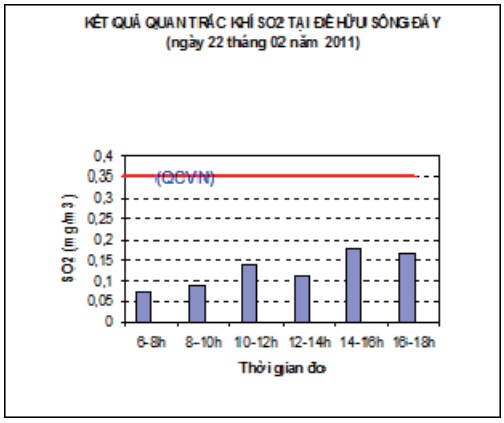
Investigation results of Sulfur Di-oxide are shown in Figure 6.1.2. At any of the investigation points, the levels of SO2 are far below the Environmental Standards of Vietnam (QCVN).



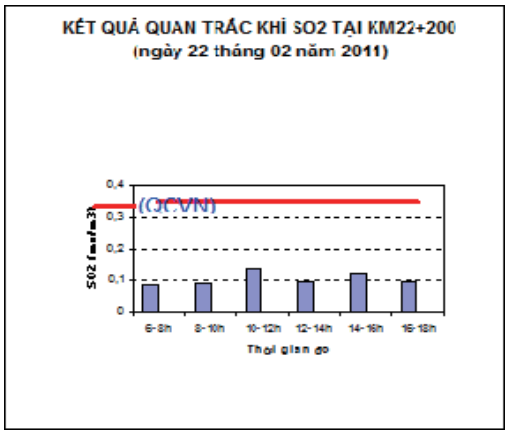
Point 1



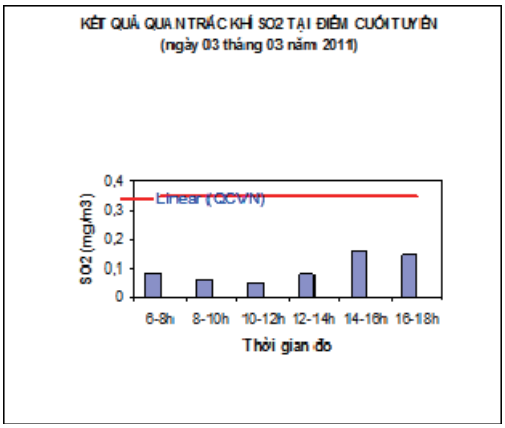
Point 2



Point 3



Point 4



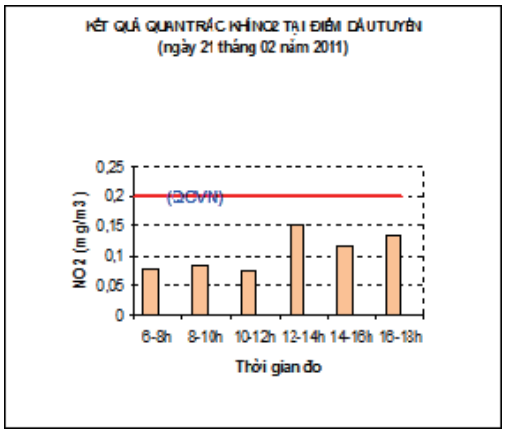
Point 5

Source： Thang Long Highway Monitoring Results 2011

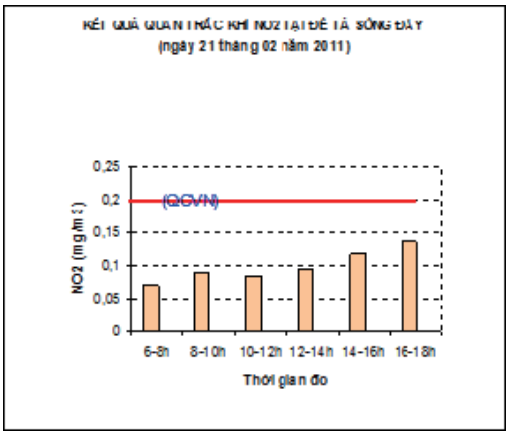
Figure 6.1.2 Sulfur Di-oxide Investigation Results

・Nitrogen Di-oxide(NO2)

Investigation results are shown in Figure 6.1.3. At any of the investigation points, the levels of nitrogen di-oxide are below the Environmental Standards of Vietnam (QCVN).



Point 1



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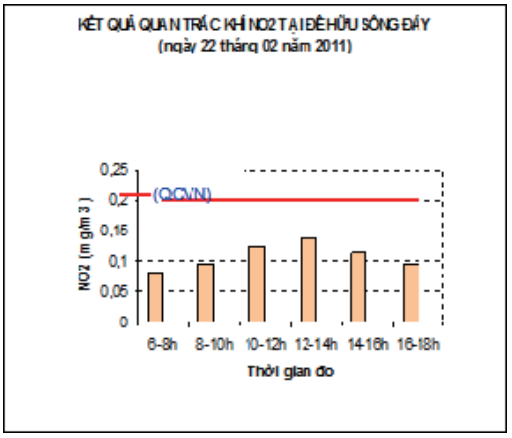

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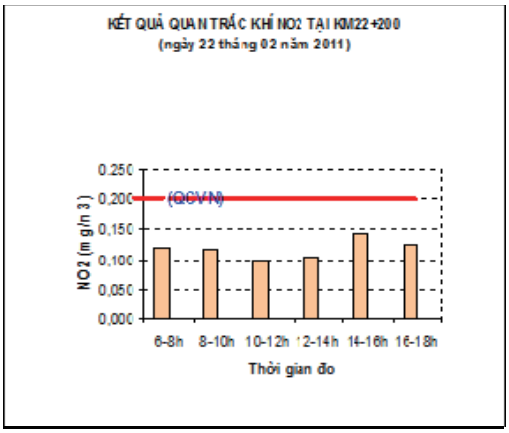

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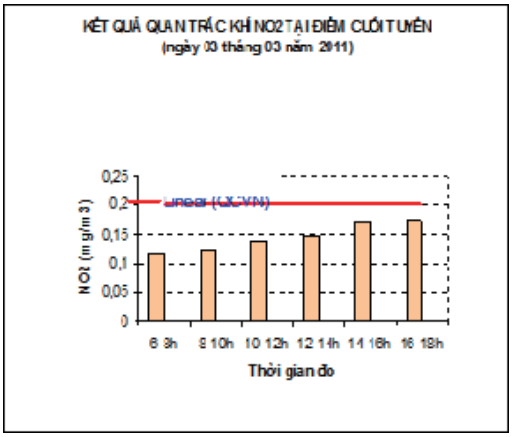


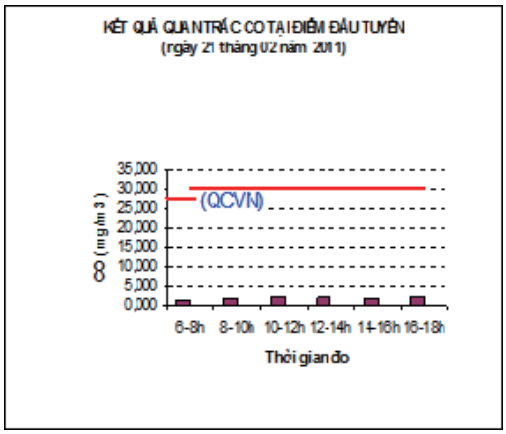
Point 5

Source：Thang Lon Highway Monitoring Results 2011

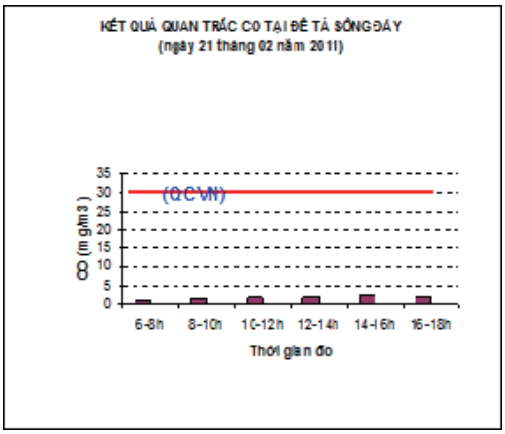
Figure 6.1.3 Nitrogen Di-oxide Investigation Results

・Carbon Mono-oxide (CO)

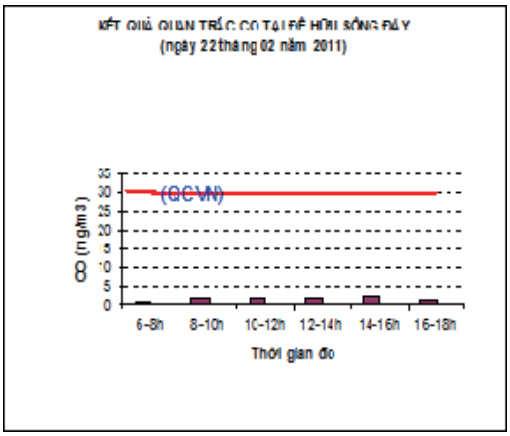
Investigation results of carbon mono-oxide are shown in Figure 6.1.4. At any of investigation points, the levels of carbon mono-oxide are far below the Environmental Standards of Vietnam (QCVN).



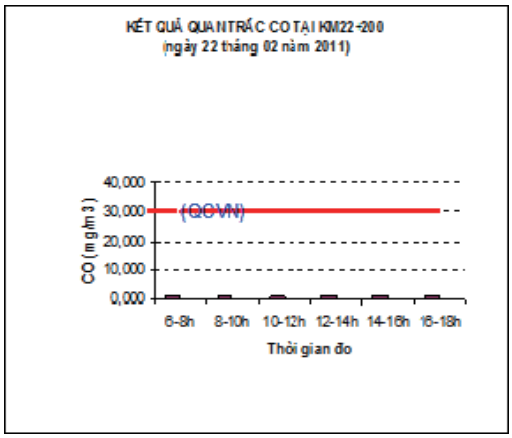
Point 1



Point 2



Point 3



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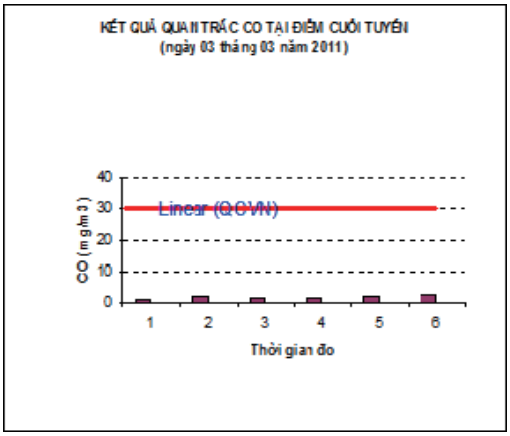


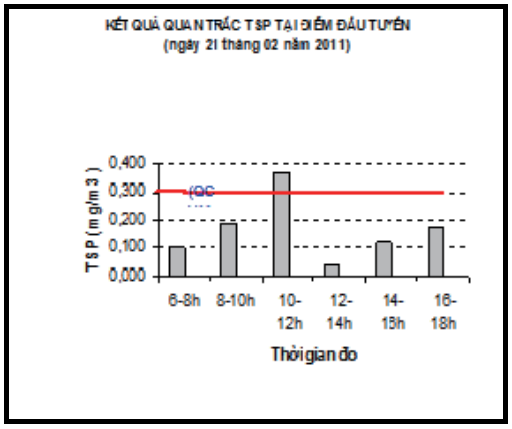
Point 5

Source： Than Long Highway Monitoring Results 2011

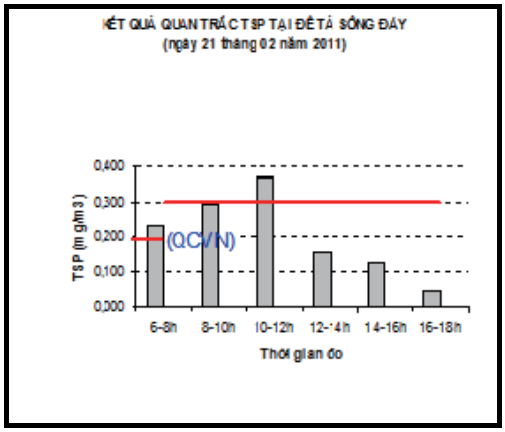
Figure 6.1.4 Carbon Mono-oxide Investigation Results

・Total Suspended Particles (TSP)

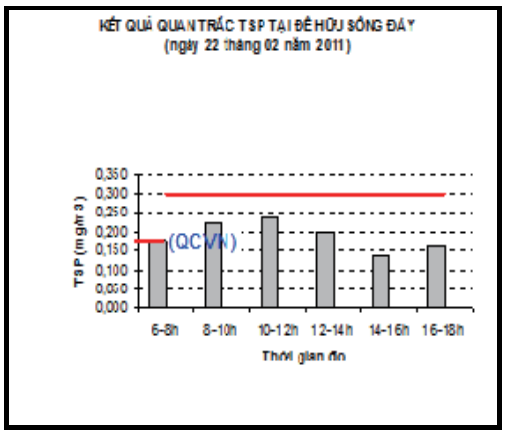
Investigation results of total suspended particles are shown in Figure 6.1.5. At 3 points out of 5, the levels of total suspended particles are above the Environmental Standards of Vietnam (QCVN). At point 5, its level is far above the standard due to the construction work of Thang Long Highway extension.



Point 1



Point 2



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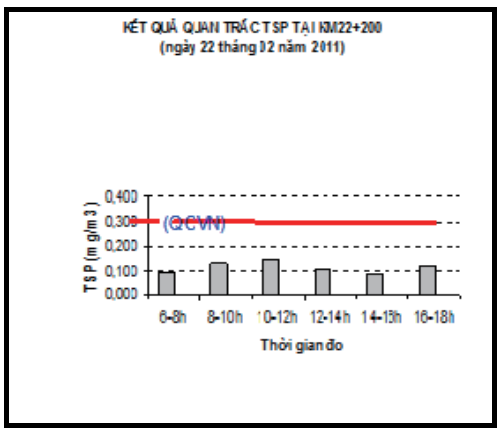

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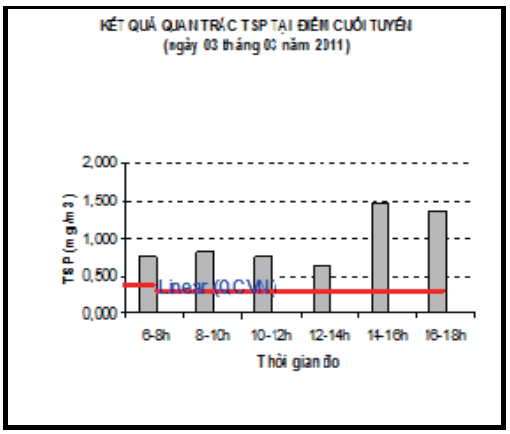


Point 5

Source : Than Long Highway Monitoring Results 2011

Figure 6.1.5 Total Suspended Particles Investigation Results

(2) Water Pollution

Existing data of water pollution along the railway are provided in the Thang Long Highway Monitoring Results 2011 and summarized in Table 6.1.2. Monitoring points are shown in Fig. 6.1.1.

Table 6.1.2 Monitoring Results of the rivers

No.	River	Monitoring Point	pH	DO (mg/l)	SS (mg/l)	BOD5 (mg/l)	OIL (mg/l)	Coliform
1	Sông Nhuệ	AM Upstream - AM	6.67	2.45	55	21.8	0.11	4600
		Spot on the route - AM	6.81	2.26	69	22.5	0.12	4900
		Downstream -AM	6.48	2.07	49	23.4	0.12	4900
		PM Upstream - PM	6.68	2.15	53	19.8	0.11	4500
		Spot on the route– PM	6.80	2.08	65	21.3	0.11	4700
		Downstream - PM	6.51	2.12	50	22.0	0.10	4900
2	Sông Đáy	Upstream - AM	7.02	1.7	53	91.5	0.16	220,000
		Spot on the route - AM	6.97	2.1	58	106.8	0.16	240,000
		Downstream -AM	6.89	1.9	55	112.5	0.16	240,000
		Upstream - PM	6.98	1.8	49	94.3	0.16	190,000
		Spot on the route - PM	7.01	2.0	52	102.4	0.16	200,000
		Downstream - PM	6.97	1.8	51	109.7	0.16	190,000
3	Sông Tích	Upstream - AM	7.20	2.7	26	10.7	0.12	780
		Spot on the route - AM	6.75	2.43	27	11.2	0.12	780
		Downstream - AM	6.83	2.51	27	11.5	0.12	780
		Upstream -PM	6.98	2.71	25	10.8	0.12	780
		Spot on the route -PM	6.84	2.56	26	10.2	0.12	780
		Downstream - PM	6.75	2.53	25	11.1	0.12	790
4	Sông Vực Giang 1	Upstream -AM	6.81	2.81	22	9.9	0.13	110
		Spot on the route - AM	6.78	2.27	36	10.5	0.14	78
		Downstream- AM	6.70	2.36	33	11.4	0.14	78
		Upstream - PM	6.79	2.79	20	9.7	0.13	90
		Spot on the route -PM	6.76	2.18	34	10.2	0.13	85
		Downstream - PM	6.70	2.22	34	11.7	0.14	80
QCVN 08:2008/BTNMT (A2)			6～8.5	≥ 5	30	6	0.02	5,000
QCVN 08:2008/BTNMT (B1)			5.5～9	≥ 4	50	15	0.1	7,500

Source: Thang Long Highway Monitoring Results 2011

QCVNs in the table are classified as follows.

A2: qualified (1) for daily life water after proper treatment, (2) for protection of water creatures, and (3) for B1, B2 and other purposes.

B1: to be used for irrigation and other purposes requiring same level of quality, and for other purposes of B2.

At any of the monitoring points, pH and DO satisfy the Environmental Standards of Vietnam (QCVN), but as to SS, BOD and OIL, the monitored levels tend to be above the standards, showing the water pollution caused by the human sewage and wastes etc.

In the meantime, excessively high coliform level at point 2 is due to direct influence of the private residences nearby.

(3) Waste

Along both urban and suburban routes, discarded waste can be seen in a great number. In Vietnam, waste disposal is an issue. Along the urban route, street cleaning is done at night, but along the suburban route, illegally dumped waste remains on the street.

(4) Soil Pollution

The median strips above which the project is planned have been already transformed. However, excessive spray of pesticides often causes soil pollution in Vietnam.

(5) Noise and Vibration

・Urban Route

Existing data of noise provided by Line-2 and Line-3 EIA Reports are shown in Table 6.1.3

Table 6.1.3 Noise on the Urban Route

Measuring Point	Time	Leq dB(A)	LAmax dB(A)	L50 dB(A)	TCVN 5949-1998
Ba Dinh	Daytime (6h-18h)	70.3	80.4	66.0	60
	Night (18h-22h)	60.6	68.8	55.9	55
Daewoo Hotel	Daytime (6h-18h)	73.8	85.3	70.6	60
	Night (18h-22h)	69.3	81.3	65.8	55

Source: excerpted from Ba Dinh “Line-2 EIA Report 2007”
and Daewoo Hotel “Line-3 EIA Report 2010”

Index values Leq at Ba Dihn (close to St.1 of the project) and Daewoo Hotel (close to St.2 of the project) are far above the standards of Vietnam TCVN in both day and night time zones.

In the urban route, the results of the site survey confirm chronically noisy environment due to heavy traffic volume and frequent use of horns.

Investigation results of vibrations for Line-2 and Line-3 are shown in Table 6.1.4.

Table 6.1.4 Investigation of vibration in urban route

Measuring Point	Leq Daytime	TCVN 7210-2002
Ba Dinh	0.0057 m/s2	0.030m/s^2
Daewoo Hotel	48.8 dB	60 dB

Source: excerpted from Ba Dinh “Line-2 EIA Report 2007”
and Daewoo Hotel “Line-3 EIA Report 2010”

It is confirmed that vibrations measured are well below the Standards of Vietnam (TCVN) and that no problem exists on vibrations.

・ Suburban Route

Existing data as to vibrations are provided in the monitoring results of Thang Long Highway 2011 (equivalent noise level during 8h – 18h) and are shown in Table 6.1.5. (Refer to the monitoring points shown in Fig. 6.1.1.)

Table 6.1.5 Noise Monitoring Results

Measuring Point	LAeq (dBA)	TCVN 5949-1998
Point 1: at 7km350m (4km200m on Thang Long Highway)	73.5	75
Point 2: at 14km730m (11km580m on Thang Long Highway)	73.0	75
Point 3: at 18km850m (15km700m on Thang Long Highway)	74.3	75
Point 4: at 25km350m (11km200m on Thang Long Highway)	72.7	75
Point 5: at 32km (QL21A crossing)	74.4	75

Source: Thang Long Highway Monitoring Results 2011

At any point of measuring, the levels are below the Environmental Standards of Vietnam, but very close to the standards due to the large number of lanes, high speed and low speed, and fast speed driving of motor cars.

(6) Ground Subsidence

The median strips of the highway above which the project is planned have been already transformed. However, as the city of Hanoi is built on alluvial formation or diluvial formation geologically made of deposition brought by the Red River and featured with high underground water level, examination on the land subsidence risk shall be made by detailed boring survey if the alternative plan of the underground railway of the urban route be chosen.

(7) Offensive Odors

Along the urban route, offensive odors associated with living, partly by discarded waste and drainage channels can be smelled, which, however, do not entail any environmental concern.

(8) Bottom Sediment

From the results as derived in (2) water pollution investigation, various hazardous materials coming from factory effluent and dumped wastes are supposed to be contained in the bottom sediment of the rivers. In case of future river work being done in the project, prior investigation on the bottom sediment shall be carried out.

(9) Sanctuary

The median strips above which the project is planned have been already transformed. In addition, the planned train depot including its connecting line section does not involve any sanctuary designated by Vietnamese Laws or International Treaties.

(10) Ecosystem

Urban route: In the median strips above which the project is planned, only artificial vegetation is observed. Also, the strips are located in between the highways. Therefore, almost no impact on the ecosystem is expected.

Suburban route: In the median strips above which the project is planned, only bare ground or artificial vegetation is observed. Also, the strips are located in between the highways. Therefore, almost no impact on ecosystem is expected. In addition, the area of the planned train depot and the connecting line section to the train depot is now utilized artificially as rice fields and farm lands, and therefore no impact on ecosystem is expected.

(11) Hydrological Phenomena

Urban route: The median strips above which the project is planned have been already transformed, but in the urban area, because many floods take place in the rainy season and the underground water level is high in the area as described in the preceding section of

ground subsidence, thorough study shall be carried out on the underground water level by detail boring investigation in case the alternative underground plan is adopted for the project.

Suburban route: There are number of irrigation ponds alongside of the planned route, but none is located either on the median strips to be transformed or on the planned train depot.

(12) Topography and Geographic Features

Urban route: Made of alluvial and diluvial layers with rather flat topography. Geographic features consist of rather loose sand layer and clay layer.

Suburban route: Similar to that of the urban route, but geological features consist mainly of clay layer. The existence of karst formation was found partly in the construction of Thang Long Highway. The area of the planned train depot is flat and now used as rice fields and farm lands.

(13) Involuntary Resettlement

Urban route: No involuntary resettlement is foreseen due to non-existence of dwelling on the median strips above which the project is planned.

Suburban route: No involuntary resettlement is foreseen due to non-existence of dwelling on the road median strips above which the project is planned. However, the connecting line section to the planned train depot passes partly through lands of several factories and may possibly incur relocation of several factory buildings and compensation thereof.

(14) Life and Living

Urban route: Although there are many commercial facilities surrounding the route, no life and living facilities are on the median strips above which the project is planned.

Suburban route: No life and living facilities are on the median strips above which the project is planned. The area of the planned train depot is used as rice fields and farm lands and several factories exist on its connecting line section.

(15) Cultural Heritage

In both urban and suburban routes, the median strips have been already transformed and do not involve any cultural heritage designated in Vietnamese Laws or International Treaties.
No cultural heritage exists in the area of the planned train depot.

(16) Landscape

Urban route: Urban landscapes with clusters of buildings are formed.

Suburban route: Many undeveloped areas remain in the surroundings of Thang Long Highway that give wide view alongside of the highway.

(17) Ethnic Minority and Indigenous People

In the process of our site survey, neither ethnic minorities nor indigenous people are confirmed to inhabit alongside of either the urban or suburban route.

(18) Work Environment

Urban route: The road median strips are not utilized, but the lands surrounding the highway are utilized as mainly commercial activity zones.

Suburban route: the median strips above which the project is planned are not utilized, but factories are scattered and a number of street vendors are seen alongside of the highway.

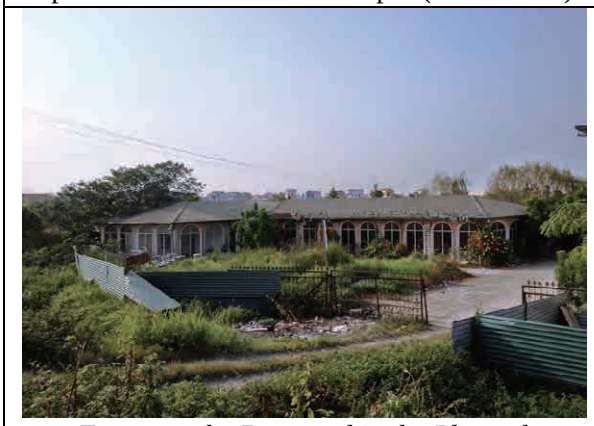
The photos taken at the site survey are shown in Table 6.1.6 and those of planned train depot area in Table 6.1.7.

Table 6.1.6 Photos along the Planned Railway

 Spot of St.2 (Urban Route)	 Spot of St.8 (Residence Under Construction)
 Spot of St.3 (Urban Route)	 Spot of St.8 (Suburban Route)
 Spot of St.4 (Urban Route)	 Spot of St.9 (River Crossing)
 Spot of St.5 (Commercial Zone)	 Spot St.10 (Street Vendors)

Source: JICA Study Team

Table 6.1.7 Photos of the Area of the Planned Train Depot

 Spot of the Planned Train Depot (Rice Fields)	 Spot of the Planned Train Depot (Farm Land)
 Factory to be Removed in the Planned Connecting Line Section	 Factory Adjacent to the Planned Connecting Line Section

Source: JICA Study Team

6.1.2 Confirmation of the System and Organization of Environmental and Social Considerations in Vietnam

(1) Laws, Decrees and Standards Related to Environmental Considerations (Environmental Impact Assessment, Disclosure of Information, Etc.)

1) Major Laws, Etc. Related to Environmental Considerations

The environmental standards, the provisions of EIA, environmental protection and waste management, and the regulations of environmental protection are stipulated in the Law on Environmental Protection amended in 2005.

In addition, with regard to national strategic projects, SEA shall be carried out prior to EIA.

a. 52/2005/QH11 : Law on Environmental Protection
   Law on Environmental Protection (LEP) in Vietnam
b. 80/2006/NĐ-CP : Decree on Providing Guidance for the Implementation of the Law on Environmental Protection
   Decree providing details and guidelines for the execution of the above a.
c. 21/2008/NĐ-CP : Decree on amending and supplementing several articles in the Decree No.80/2006/NĐ-CP dated on 9th of August, 2006 by the Government on detailed stipulation and instructions on some Articles of the Law on Environmental Protection
   Supplements (revisions) to the above b.
d. 05/2008/TT-BTNMT : Circular of Ministry of Natural Resources and Environment guiding strategic environmental assessment, EIA and environmental protection commitment
   Circular providing technical guidelines (execution details) for SEA and EIA.
e. 29/2011/ND-CP : Decree of the Government regulating strategic environmental assessment, EIA and environmental protection commitment
   Decree adding the procedure regulations for SEA and EIA.
f. 26/2011/TT-BTNMT : Decree of the Ministry of Natural Resources and Environment regulating details for several articles in Decree No. 29/2011/ ND-CP dated on 18/4/2011

regulating strategic environmental assessment, EIA and environmental protection commitment
Decree of MONRE providing details of above e.

The environmental assessment shall be carried out in accordance with the related laws, decrees, circulars and regulations as above mentioned.
Execution content (summary) stipulated in the Law on Environmental Protection and related regulations are shown in Table 6.1.8.

Table 6.1.8 Outline of EIA Execution Regulations

	Summary
Projects subject to SEA and EIA	Mainly vital national projects and those that involve big risk of giving adverse impact on environment. As to the railway related projects, railway constructions of 50km or more, any of the elevated railway constructions and bridge constructions of 200m or more are designated. If an underground plan is chosen for the project, provisions of "underground railway construction of 500m or more" and if the execution of the project is accompanied by a large number of inhabitant resettlement, the provisions of "transport facility construction accompanied by inhabitant resettlement of 1,000 or more" are applied to the project on the size conditions. 【Article 18 of the Law on Environmental Protection and Decree No. 29/2011/ND-CP】
Timing for Execution	・At the same time of feasibility study report of the project 【Article 19 of Law on Environmental Protection】 ・Investment, construction or development permits are issued only after the approval of the environmental impact assessment report. 【Article 22 of Law of Environmental Protection】
Content	1. Detail description of the project 2. Status of environment, vulnerability to environmental impacts and assessment of environmental carrying capacity 3. Assessment of environmental impacts, affected environmental and social factors and risk of accidents 4. Methods of mitigation, prevention of environmental accidents and countermeasures thereof. 5. Official commitment to the environmental protection measures during construction and in operation. 6. Environmental management and auditing plan 7. Budget for environmental protection. 8. Public opinions representing communes and inhabitants cooperatives at the project construction sites. 9. Presentation of assessment figures and data, etc. 【Article 20 of Law on Environmental Protection】
Review Committee and Approval Authority	The assessment documents are checked by a review committee or by a party providing reviewing services. Review and approval organizations are classified in the following 3 categories. 1) Projects decided and/or approved by the national parliament, the government or the prime minister and those involving several industrial sectors and multiple provincial governments. 【Review and approval organization】: Consisting of project approval authorities, local government organizations at the project construction sites specializing in environmental matters, and specialist on environment. 【Establishing responsibility】: MONRE 2) Projects authorized by the central government other than above 1)

	【Review and approval organization】: Consisting of project approval authorities, local government organizations at the project construction sites 【Establishing responsibility】: the central government ministry or agency in charge of authorizing the project. 3) Projects authorized by a local people committee on the provincial level 【Review and approval organization】: Consisting of the local people's committee, provincial level organization specializing in environmental matters, and specialists on environment. 【Establishing responsibility】: the local people's committee Each agency of establishing responsibility for the projects of above 3 categories shall study the document and produce a decision within 15 working days after receipt of the document. 【Law on Environmental Protection】
Time limit of review	EIA review result shall be made within 45 days after receipt of complete and effective documents. 【Decree No.29/2011/ND-CP】
Rights of Organizations, Inhabitants Cooperatives and Private Persons etc.	Organizations, inhabitants cooperatives and private persons are endowed with rights to submit petitions to the agencies of establishing responsibility. The agencies shall be responsible for studying the requests and petitions fully before producing conclusions and decisions. 【Article 21 of Law on Environmental Protection】
Disclosure and consultation	The environment protective measures shall be posted in public at the site of project execution. 【Law on Environmental Protection】

Source: JICA Study Team

2) National Standards Related to Environment

In Vietnam, the environmental index values (TCVN) are given as standards of Vietnam, but nowadays the environmental standards (QCVN) with enforcement factors are renewed and applied to many environmental items. The main regulations related to the project are listed hereunder.

a. TCVN 7210:2010 : Vibration caused by means of road transport – Environmental allowable limits in public and residential areas.
b. QCVN 03:2008/BTNMT : The National Technical Standards for the allowable limits on heavy metals in land;
c. QCVN 08:2008/BTNMT : The National Technical Standards for surface water quality;
d. QCVN 09:2008/BTNMT : The National Technical Standards for underground water quality;
e. QCVN 05:2009/BTNMT : The National Technical Standards for surrounding atmosphere quality;
f. QCVN 26:2010/BTNMT : The National Technical Standards for noise;
g. QCVN 27:2010/BTNMT - The National Technical Standards for vibration;
h. QCVN 24:2009/BTNMT - The National Technical Standards for industrial waste water;

Other regulations related to the inhabitant resettlement are described in detail in 6.2.1 analysis of legal framework with regard to the inhabitant resettlement.

3) Deviation from the JICA Environmental Guidelines

As mentioned in the preceding part of the report, the laws and regulations of environmental and social considerations are well established and there are no deficiencies as compared with the JICA guidelines. However, the following shall be considered additionally in the course of further study EIA procedure.

・addition of an alternative plan to be studied specified in the JICA guideline

・confirmation of due execution by related agencies as stipulated
・participation by the representative of inhabitants in the review committee
・execution of “public hearings” which are to be held “if necessary” in the law

(2) Roles of Related Parties

Based on the study of the laws listed in 1) and the hearings with our counterpart and etc. the roles of parties related to the environmental and social considerations are summarized in Table 6.1.9

Table 6.1.9 Agencies related to EIA

Name of Agency	Role/Responsibility
MONRE	・Appraisal and approval agency of EIA ・Responsible for the procedures related to LEP ・Providing environmental monitoring data
MOT	・MOT or VNRA is the agency in charge of EIA procedure
DONRE	Environment Protection Department belonging to Hanoi People’s Committee ・Providing environmental monitoring data ・Execution of on-site inspection against violation activities
Related district	・Contact for LEP related matters in the district under guidance of DONRE ・Assistance for stakeholders’ meetings if necessary

Source: JICA Study Team

6.1.3 Execution of Scoping

Based on the investigation results so far made and on the final proposal set forth in “3.1.2 The study of the railway route”, the scoping plan is summarized in Table 6.1.10. The scoping is made with reference to the stipulations on the railway project of JICA environmental guidelines regarding the environmental items during construction and in operation respectively to be examined. The predictions derived by the investigation are to be examined in detail in the further investigations in the future.

Table 6.1.10 Scoping Plan

Environment Items		Environmental Predictions		Results of Scoping
		During Construction	In Operation	
Measures Against Pollution				
1	Air Pollution	B-	B+	During Construction: Dust will be spread around construction sites by construction machinery and construction vehicles. In Operation: Air pollution is expected to be reduced by easing traffic jams.
2	Water Pollution	B-	B-	During Construction: Water pollution is foreseen at construction sites by using heavy construction machinery and vehicles, and by drainage from the workers camps In Operation: Water pollution may possibly be caused by drainage from the train depot.
3	Soil Pollution	C-	D	During Construction: The area of planned train depot is now used for agricultural field and may involve the risk of spreading polluted soil when large scale excavation is carried out in the area. In Operation: No activities are foreseen to cause soil pollution.

4	Waste	B-	B-	During Construction: Construction wastes such as construction waste soil coming from excavation of foundations and construction waste materials will be generated. In Operation: Wastes may possibly be generated in the stations and the train depot.
5	Noise/Vibration	B-	A-	During construction: Noise and vibration impacts will be caused by using construction machinery and construction vehicles. In Operation: Noise and vibration will be generated by train traffic.
6	Land Subsidence	C-	D	During Construction: Land subsidence may take place if the construction is accompanied by large scale excavation work. In Operation: No activities are foreseen to cause land subsidence.
7	Offensive Odor	D	D	No activities are foreseen to generate offensive odor.
8	Bottom Sediment	C-	D	During Construction: The impacts examinations are necessary when the bridge constructions over the crossing rivers are carried out. In Operation: No activities are foreseen to affect bottom sediment of the rivers.
Natural environment				
9	Sanctuary	D	D	No sanctuaries exist alongside of the project and its vicinity.
10	Topography and Geological Features	C-	D	During Construction: The study of karst formations scattered alongside of Thang Long Highway is necessary if the nature of construction work require such study. In Operation: No activities are foreseen to affect the topography and geological features.
11	Underground Water	C-	D	During Construction: Impacts to the underground water may possibly be seen when the construction is accompanied by large scale excavation work. In Operation: No activities are foreseen to affect underground water.
12	Hydrological Phenomena	C-	D	During Construction: The study of impacts to hydrological phenomena is necessary when construction of bridge foundation is carried out in the crossing rivers. In Operation: No activities are foreseen to affect hydrological phenomena.
13	Ecosystem	D	D	The level of nature is low in the planned area and its vicinity without any impacts on ecosystem.
14	Climate	D	D	No activities are foreseen to affect climate.
15	Global Warming	C-	C+	During Construction: The construction may possibly affect global warming temporally

				by operation of construction machinery and construction vehicles and by using wooden frame for concrete work. In Operation: The reduction of traffic jams contributes to prevention of global warming by offsetting the negative impact of using electricity for the railway operation.
Social environment				
16	Involuntary Inhabitant Resettlement	B-	D	Involuntary resettlement is not involved in the project because of the fact that the construction of railway is planned above the existing road median strips. The construction of planned train depot and the connecting line section to the train depot involves transformation of farm lands and may be accompanied by the possibility of involuntary inhabitant resettlement.
17	Poverty Group	C-	C+	During Construction: Existence of poverty group is not confirmed in the project area and its vicinity, but detail investigation is required for the train depot area and connecting line section to the train depot involving land acquisition. In Operation: The railway facilitates the poverty group without motorized vehicles to move long distance easily and smoothly
18	Ethnic Minority and Indigenous People	D	D	Neither ethnic minority nor indigenous people are confirmed to inhabit the project area and its vicinity.
19	Local Economy, such as Employment and Living Means	B-	C+	The employment opportunities are increased by the construction work and operation of the railway, but in the train depot area and the connecting line section to the train depot, impact on local economy is to be foreseen because there exists a factory and farm lands
20	Utilization of Land and Local Resources	D	D	Most of the project is planned over the road median strips with the train depot being constructed in rice fields and corn fields and therefore no impacts are foreseen in those aspects.
21	Water Use	D	C-	Most of the project is planned over the road median strips and no impact to the water use is expected, but the impacts examination is necessary if the train depot need large quantity of water to be pumped up from underground.
22	Existing Social Infrastructure and Service	B-	B+	During Construction: The social services around construction sites may possibly affected by execution of construction work and traffic of construction vehicles. In Operation: Positive impact to the social infrastructure is expected by upgrading the new railway.

23	Social Structure, such as Society Related Capital , and Decision Making Organization etc.	D	D	The upgrading of railway is decided through appropriate consultation between the Vietnamese Government and Hanoi City.
24	Imbalanced Existence of Damage and Benefit	C-	C-	Most of the project is planned over the road median strips and no impact is expected in this respect, but the detail investigation shall be carried out for the area of planned train depot and the connecting line section to the train depot.
25	Conflict of Interests within the Construc-tion Area	C-	C-	Most of the project is planned over the road median strips and no impact is expected in this respect, but the detail investigation shall be carried out for the area of planned train depot and the connecting line section to the train depot.
26	Cultural Heritage	D	D	No cultural heritage exists in the project area.
27	Landscape	B-	A-	During Construction: Temporary influence to landscape is expected in execution of construction work. In Operation: New elevated railway and piers influence the landscape in the urban route.
28	Infectious Diseases, such as HIV/AIDS, etc.	B-	B-	The study on the risk by influx of new labor forces is necessary because
29	Work Environment	B	B	Work environment for construction and railway operation workers shall be upgraded.
Others				
30	Accidents	B-	D	During Construction: Accidents may possibly be increased due to the traffic of construction vehicles. In Operation: Accident due to the operation of railway is almost impossible to occur.

A+/-: Significant positive/negative impact is expected.
B+/-: Positive/negative impact is expected to some extent.
C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)
D: No impact is expected.

Source: JICA Study Team

6.1.4 Comparison examination of alternative plans

1) Comparison examination of the alternative plan

The comparison examination is made on several alternative plans including zero option from the viewpoint of environmental and social considerations.

・Estimated plans

Plan-A　Non execution of the project (zero option)

Plan-B　Execution of the project

There are two plans for execution of the project as mentioned in 3.1.4 Types of Structures (elevated/ground/underground). As to the details of the examination, refer to 3.1.2 examination on route plans.

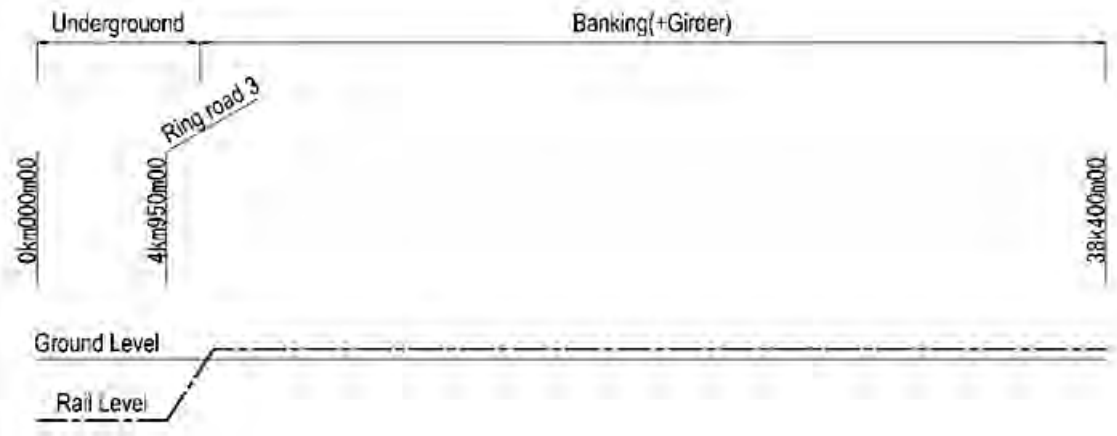
・B-1 Elevated – Banking plan (the final plan of FS)

・B-2 Underground – Banking plan (alternative at the earlier planning stage)

Each portion from the starting point to Ring road 3 is to be constructed in form ①elevated and ②underground and route after the point is on the banking. Each plan is shown in Fig. 6.1.6 and 6.1.7 respectively.

Source: JICA Study Team

Figure 6.1.6 Elevated – Banking plan



Source: JICA Study Team

Figure 6.1.7 Underground – Banking plan

Firstly, the comparison examination on Plan-A (Non execution of the project) and Plan-B (Execution of the project) from the viewpoint of environmental and social considerations is shown in Table 6.1.11

Table 6.1.11 Comparison Examination from the Viewpoint of Environmental and Social Considerations (1)

Plan	Main Merit	Main Demerit
Plan-A Non Execution of the Project	No new environmental problems are generated due to the non-execution of the project associated with land transformation.	The traffic congestions in the center of Hanoi aggravate air pollution, noise and vibration problems of the city, which may possibly entail slowdown of economic activities.
Plan-B Execution of the Project	By easing traffic jams in the city center, air quality and improvement of noise level is foreseen. In addition, economic effects are expected through creation of new employment by upgrading the railway.	Along with the construction of the new railway, the new environmental problems predicted to be generated as described in Table 6.1.5 Scoping Plan.

Source: JICA Study Team

By taking into consideration the present problems of air pollution and noise level in Hanoi, the risks involved in the construction of the new railway as per description in the above table is smaller in comparison with the risks involved in the case of non-execution of the project.

Table 6.1.12 Comparison Examination from the Viewpoint of Environmental and Social Considerations (2)

Plan	Main Merit	Main Demerit
Plan B-1	In comparison with underground plan (B-2), impacts to underground water and land subsidence are smaller and safety in the construction work is more certain.	Noise level is generated by train traffic and landscape is affected by elevated bridges within the city.
Plan B-2	In comparison with the elevated plan (B-1), almost no impact to noise level and landscape is expected.	Construction of underground structure possibly causes disturbance in underground water flow and land subsidence. And if the construction of underground stations is done with open cut method, it may influence local traffic conditions and safety due to traffic restriction during the construction.

Source: JICA Study Team

In comparison of the elevated plan and the underground plan, the noise/landscape matters trade off with the underground water/land subsidence matters. The underground plan entails huge spending on environmental measures for underground water disturbance and land subsidence problems with wide area being influenced by them. In conclusion, the elevated plan finally adopted in the FS is considered to be more feasible on the basis of environmental and social considerations.

In the meantime, as to the laying position of the railway tracks, no other alternatives have been studied in comparison, because as described in 3.1.1 Basic Considerations on Railway Route, the plan was already made in accordance with the master plan of Hanoi City on the existing highway so that it may not incur any involuntary inhabitant resettlement.

6.1.5 Examination on Mitigations (Avoidance/Minimization/Compensation)

With regard to the items that are considered to carry environmental impacts and are rated A-, B- and C- by the scoping, the mitigations (avoidance, minimization and compensation) are summarized in Table 6.1.13

Table 6.1.13 Reduction/Mitigation against Influenced Items

No.	Environmental Items	Mitigation	Executant
1	Air Pollution	During Construction: Proper preventive and escaping measures against dust spreading, such as temporary enclosure of the construction sites, water spray at the sites and surroundings and washing construction vehicles and providing protective covers on the vehicles.	Contractor
2	Water Pollution	During Construction: Drainage from the construction sites and workers' camps are settled and primary treated without releasing directly to the outside to meet the water drainage standards of Vietnam and to prevent water pollution. In Operation: The drainage from the train depot is treated properly, such as absorption of oil residual with mats and so on to meet the water drainage standards of Vietnam and to prevent water pollution.	During Construction: Contractor In Operation: Railway operator
3	Soil Pollution	During Construction: At the time of excavation work for foundation construction, soil survey is carried out as required. In case of soil being found polluted, proper measures are taken to prevent the spreading of pollution in accordance with composition of pollution materials.	To be examined at the stage of detail designing.
4	Waste	During Construction: Examination is made to reuse construction waste soil to the maximum extent including using it positively to other business activities. The construction waste materials are sorted, collected, reused and minimized as a general rule, however, in case of the waste being disposed outside, such disposal is done properly by an authorized specialist in accordance with the regulations of Vietnam. In Operation: Waste coming out from the operation is disposed properly by an authorized specialist in accordance with the regulations of Vietnam.	During Construction: The measure is examined at the stage of detail designing. Execution by a contractor. In Operation: Railway operator
5	Noise/Vibration	During Construction: Preventive measures against noise/vibration during construction, such as temporary enclosure around the construction sites and use of low noise/vibration construction machinery are taken at the sites. In Operation: Long rails and sound barriers shall be installed alongside of the railway, and noise reduction ballast shall be provided (for elevated railway bridge sections) to reduce the noise of operation. With regard to preventive measure against vibration, long rails and low spring track system using solid bed track with resilient ties shall be adopted (for elevated railway bridge sections.) In addition, the places where such measures are taken are examined at the time of detail designing.	During Construction: contractor In Operation: The sound barriers and track structure are examined at the stage of detail designing.

No.	Environmental Items	Mitigation	Executant
6	Land Subsidence	During Construction: In case of large scale excavation being carried out, the cofferdam of high rigidity is installed to prevent or minimize land subsidence.	The measure is examined at the stage of detail designing. Execution by a contractor.
8	Bottom Sediment	During Construction: Proper survey of bottom sediment is made, as necessary, at the time of excavating river bed. In case hazardous material being found in the survey, preventive measures are taken against proliferation, such as installation of prevention screen and proper treatment and disposal of excavated soil, etc.	The measure is examined at the stage of detail designing. Execution by a contractor.
10	Topology and Geological Features	During Construction: The soil survey is carried out at the time of detail designing. In case existence of karst formation being found to disturb the construction work, foundation structures are examined accordingly.	The measure is examined at the stage of detail designing. Execution by a contractor.
11	Underground Water	During Construction: In case of large scale excavation being carried out, the cofferdam of high rigidity is installed to prevent underground water level from lowering.	The measure is examined at the stage of detail designing. Execution by a contractor.
12	Hydrological Phenomena	During Construction: In case of bridge piers being constructed in the crossing rivers, proper measures are examined at the time of detail designing to prevent disturbance in the flow of rivers.	The measure is examined at the stage of detail designing. Execution by a contractor.
15	Global Warming	During Construction: Construction machinery with proper exhaust gas disposer is actively used. And also, proper maintenance and checking is made for the machinery. Wooden concrete frames of reusable materials or reused materials are used.	Contractor
16	Involuntary Inhabitant Resettlement	During Construction: At the time of future studying detail plan, considerations are to be made to minimize possibility of involuntary inhabitant resettlement.	To be examined at the stage of detail designing.
19	Local Economy, such as Employment and Living Means	During Construction: At the time of future studying detail plan, considerations are to be made to minimize impact on the local economy associated with land acquisitions.	To be examined at the stage of detail designing.
22	Existing Infrastructure and Service	During Construction: The construction execution plan is made with consideration to prevent construction vehicles concentration.	Contractor

No.	Environmental Items	Mitigation	Executant
27	Landscape	During Construction: Temporary enclosures are installed at the construction yards with image-up paintings, if necessary. In Operation: Landscaping, such as planting trees, is examined at the time of detail designing, and the design taking landscape into consideration is positively adopted to the extent of it being practicable.	During Construction: The measure is examined at the stage of detail designing. Execution by a contractor. In Operation: The railway operator examines the matter from the designing stage.
28	Infectious Diseases such as HIV/AIDS etc.	During Construction and In Operation: Health and hygiene consideration and guidance on contagious deceases for the workers are made as well as routine checkups to prevent infection and proliferation.	During Construction: contractor In Operation: the railway operator
29	Work Environment	During Construction: Routine safety training is carried out to prevent accident at the construction sites. In Operation: Routine safety training is carried out for the employees.	During Construction: contractor In Operation: the railway operator

Source: JICA Study Team

6.1.6 Examination of Environmental Management and Monitoring Plan

1) Environmental Management Plan

As the project involves elevated railway, it falls into the project category being subject to EIA. And therefore, the EIA report of the project is made in accordance with the regulations in Vietnam on EIA and JICA environmental guidelines at the later stage of investigation of the project. EIA report shall contain description of the environmental management plan.

TOR of EIA to be executed in the next stage of investigation is drafted as follows.

a) Streamlining of the Project Contents

In order to investigate burdens to the environment in detail, the contents of the project are to be thoroughly examined with regard to the items described below.

・Type of structure in the urban route

If the alternative underground plan is chosen, influenced items are to be reconsidered.

・Horizontal alignment of St.2～St.3

In case of widening of the median strips being impossible, the horizontal alignment of the railway is shifted to the west green belt and the matter of the involuntary inhabitant resettlement is necessary to be examined.

・Location , size and contents of the train depot

In case of the train depot being located at a place different from the master plan, new assessment is necessary to be made. The impact assessment is necessary in accordance with the equipment to be installed in the train depot.

・Crossing rivers

In case the crossing rivers being different from the master plan, new assessment is necessary on new rivers and bottom sediment thereof.

・Excavation method

In case of larger volume of excavation being made, new assessment is necessary on underground water and ground subsidence.

b) Review of existing documents and information

Collection and review of available existing documents and information on social and natural environment is to be made. The existing documents are supposed to be available as most recent EIA report for other projects and investigation results of MONRE and DONRE of Hanoi City.

c) Site survey

Additional information that is not covered by the existing documents review b) is to be obtained through site survey. The contents of the site survey are mentioned in Table 6.1.14.

Table 6.1.14 Draft Proposal for the Site Survey

Environmental Item	Items to be Investigated	Place of Survey	Contents of Survey	Remarks
Air Pollution	SO2、CO、NOX、TSP、PM10	Surroundings of the construction yards	As per the methods specified in the Standards of Vietnam QVVN05:2009/BTNMT	
Water Pollution	pH, SS, oil, coliform bacteria group	Rivers into which the drainage from the project is released.	As per the methods specified in the Standards of Vietnam QVVN08:2008/BTNMT	
Soil Pollution	Heavy Metals	The places where large volume of excavation is planned.	As per the methods specified in the Standards of Vietnam QVVN03:2008/BTNMT	As necessary
Noise/Vibration	Environmental Noise and Vibration	Surroundings of the construction yards	Noise: As per the methods specified in the Standards of Vietnam QVVN26:2010/BTNMT Vibration: As per the methods specified in the Standards of Vietnam QVVN27:2009/BTNMT	
Underground Water	Underground Water Level, pH and Coliform Bacteria Group	The surroundings of the places where large volume of excavation is planned.	Underground water level: observation by boring Underground water quality: As per the methods specified in the Standards of Vietnam QVVN09:2008/BTNMT	As necessary
Bottom Sediment	pH, Heavy Metals	At sites where transformations within the rivers are planned	As per the methods specified in the Standards of Vietnam QVVN03:2008/BTNMT	As necessary

Source: JICA Study Team

d) Stakeholders' meetings

The stakeholders' meetings are stipulated in Article 15 of 29/2011/ND-CP. The regulations of the meetings are mentioned as follows.

(1) The project proponents submit a request for consultation and the outline of EIA report to the people's committee of the communes and the representatives from the area to be influenced by the execution of the project, and solicit their comments on the project.

(2) As necessary, the people's committee of the commune hold explanatory meeting for the community and organizations to be directly influenced by the project execution. In such case, the project proponents are also invited to the meeting.

(3) The meeting held as per the preceding paragraph (2) is recorded and documented.

(4) The people's committee of the commune gives its response within 15days after receipt of the letter of request of the project proponents. In case of the response being not given within the deadline, the project is regarded as being approved by the committee.

(5) Any comments obtained in the process is reflected in the EIA report and the meeting record is attached in full to the EIA report.

Up until today, no stakeholders' meeting has been held for the project due to the reason that

the project stays at the IEE stage. In the future, a stakeholders' meeting (explanatory meeting) must be held two times (at the stage of scoping and at the time of making final draft) in accordance with the JICA Environmental Guidelines and the regulations of Vietnam. Upon maturity of the project, the project would better be presented to the local people's committee with request for the meeting before EIA.

e) Environmental management plan

Environmental management plan included in the EIA is drafted as follows.

(a) Management system.

(b) Organizations related to the designing, and role and responsibility of each organization.

(c) Design work execution plan and items necessary to be considered to properly reflect the requests and comments from EIA, DONRE, inhabitants and etc., in the design.

(d) Necessary items to be considered in order to duly execute the minimization and mitigation measures as specified.

(e) System and method of monitoring supervision.

2) Monitoring Plan

Monitoring plan at the time of project execution is mentioned in Table 6.1.15. Monitoring is carried out for items that are predicted to carry large impacts with uncertainty remaining as to the contents of the predictions and the protective measures. The table needs to be reviewed at the later stage of EIA execution and detail designing, and substantiated accordingly.

Table 6.1.15 Draft of Monitoring Plan

Environmental Item	Items to be Investigated	Monitoring Point	Frequency and Content	Responsible Organization
【During Construction】				
Air Pollution	SPM	Surroundings of the Construction yards	Once per month during construction. To confirm that the level satisfies the standards of Vietnam (QCVN) without any complaints from inhabitants.	Contractor
Waste	Waste Management	Construction Sites	Periodically during construction. To confirm recycling, treatment and disposal of construction waste material in reporting (manifest).	Contractor
Water Pollution	pH, SS, Oil, Coliform Bacteria Group	Drainage Outpost	Once per month during construction. To confirm that the level satisfies the standards of Vietnam (QCVN) without any complaints from inhabitants.	Contractor

Environmental Item	Items to be Investigated	Monitoring Point	Frequency and Content	Responsible Organization
Noise/Vibration	Noise and Vibration Generated by Construction Work	Surroundings of the Construction Yards	Once per month during construction. To confirm that the level satisfies the standards of Vietnam (QCVN) without any complaints from inhabitants.	Contractor
Involuntary Inhabitant Resettlement	Status of Land Acquisition	Places of incurring Inhabitant Resettlement	Periodically till the end of land acquisitions. To confirm the due execution of land acquisitions in due course	Railway operator and external monitoring organization on inhabitant resettlement (EMA)
Local Economy, such as Employment and Living Means	Status of restoration of living standards	Places of incurring adverse effects in employment and living standards	Periodically till the end of restoration of living standards. To confirm implementation of living standards restoration in due course	Railway operator and EMA
【In Operation】				
Water Pollution	pH, SS, Oil, Coliform Bacteria Group	Drainage Outpost	Once per month. To confirm that the level satisfies the standards of Vietnam (QCVN) without any complaints from inhabitants.	Railway Operator
Noise/Vibration	Noise and Vibration Generated by the Railway Operation.	In the Vicinity of the Facilities Subject to Protective Measures Along the Railway.	Once per month. To confirm that the level satisfies the standards of Vietnam (QCVN) without any complaints from inhabitants.	Railway Operator

Source: JICA Study Team

6.2 Making of RPF Draft

As described in 6.1 IEE report draft, this project shall develop a railway along the existing median strip of the road. For this reason, there shall be no direct inhabitant resettlement in the construction of housing and main line railway station. However, there shall be an exception for the train depot and connecting line section to where factories and farmlands are located.

6.2.1 Analysis of Legal Framework with Regard to Inhabitant Resettlement

1) Laws and Regulations and etc., with Regard to Inhabitant Resettlement etc.

・Legal System in Vietnam

The Law on Land coming into force in 1933 in Vietnam as amended in 2003 generally provides for land administration and land acquisition in a concrete manner.

a. 13-2003-QH11：Law on Land

The Law provides for land expropriation and compensation for inhabitant resettlement.

b.17/2006/ND-CP：amending Decree 181/2004/ND-CP,197/2004/ND-CP and other decrees

Addition and amendment to the Law stipulates resettlement and compensation thereof.

c. 123/2007/ND-CP

The guideline for execution of b.

d. 84/2007/ND-CP

Supplement to the Law with regard to land expropriation by the Government, compensation, procedure for resettlement, and dispute settlement of land-use rights.

e. 69/2009/ND-CP

Supplement to the Law with regard to land utilization plans, land value, land acquisition, compensation, support and resettlement.

・System in Hanoi City

Decrees of Hanoi city on land is prepared in accordance with the Law on Land of Vietnam

a. 108/2009/QD-UBND

Decree of Hanoi People's Committee with regard to inhabitant resettlement within the city. Support and resettlement regulations are provided for.

b. 32/2010/QD-UBND

Decree of Hanoi People's Committee with regard to expenses for executing building compensation.

2) JICA's Policy on Involuntary Resettlement

JICA's policy on involuntary inhabitant resettlement is described as follows.

I. Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.
II. When, after such an examination, avoidance is proved unfeasible, effective measures to minimize impact and to compensate for losses are to be taken.
III. People who must be resettled are to be compensated and supported to improve their standards of living, income opportunities, and production levels, or at least to restore these to pre-project levels.
IV. Compensation must be provided at full replacement cost as much as possible.
V. Compensation and support otherwise must be provided prior to the physical resettlement.
VI. For projects that will result in large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12.
VII. In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.
VIII. Appropriate participation by affected people and their communities must be promoted in the planning, implementation, and monitoring of resettlement action plans and measures

to prevent the loss of their means of livelihood.

IX. Appropriate and accessible grievance mechanisms must be established for the affected people and their communities.

As JICA declares that the JICA guidelines on environmental and social considerations are compatible with the safeguard policy of the World Bank without any major deviation, the JICA guidelines on inhabitant resettlement are well supplemented by the World Bank OP 4.12 stipulations, some of which are mentioned hereunder.

X. Upon identification of the need for involuntary resettlement in a project, a census is carried out at earliest possible stage to the persons who will be affected by the project to determine who will be eligible for assistance, and to discourage influx of people ineligible for assistance.

XI. Persons eligible for compensation and assistance are those who have formal legal rights to land, those who have a claim to such land or assets--provided that such claims are recognized under the laws of the country and those who have no recognizable legal right or claim to the land they are occupying.

XII. Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.

XIII. The displaced persons are provided assistance during relocation.

XIV. Particular attention is paid to the needs of vulnerable groups among those displaced, especially those below the poverty line, the landless, the elderly, women and children, indigenous peoples, ethnic minorities.

XV. A resettlement plan (summary) is prepared for projects involving resettlement of less than 200 inhabitants and land expropriations.

In addition to the above main principles, examinations on the inhabitant resettlement plan, organization for execution, monitoring/evaluation mechanism, execution schedule and detail financial plan are required.

3) Deviations from JICA Environmental Guidelines

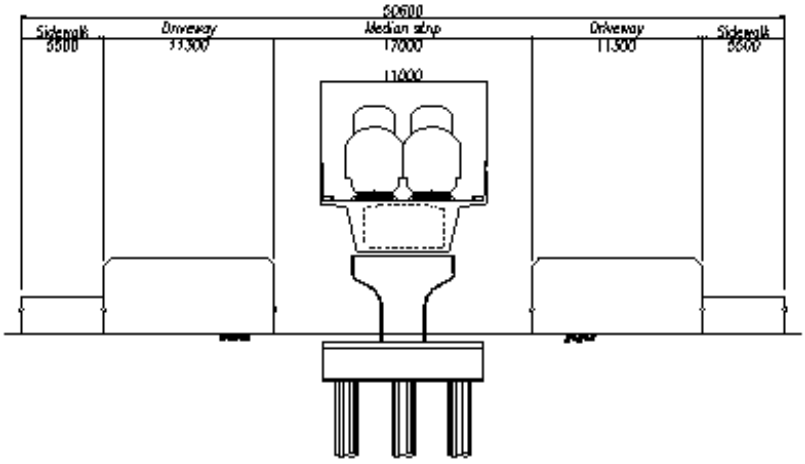
The laws in Vietnam related involuntary inhabitant resettlement and the Law on Land amended in 2003 provide for the main principles and related regulations on the issue. And in addition, the detail execution regulations (108/2009/QD-UBND) established by Hanoi City where the project is implemented set forth the rules and procedures on compensations, restorations of living and grievance settlements as described in the JICA guidelines.

However, as a few actual cases exist after the regulations were put into force and due execution remains uncertain, following points are to be confirmed case by case at the stage of making RAP and physical execution.

- Compensation for irregular inhabitants (the definition is unclear in land administration laws and circulars of Hanoi City)
- Confirmation on due execution (the procedures that are assigned to People's Committees of districts and communes are to be confirmed on their authenticity .)
- Supervision on execution schedule (in case of Nhat Tan Bridge project, more than 2 years were spent for the settlement)

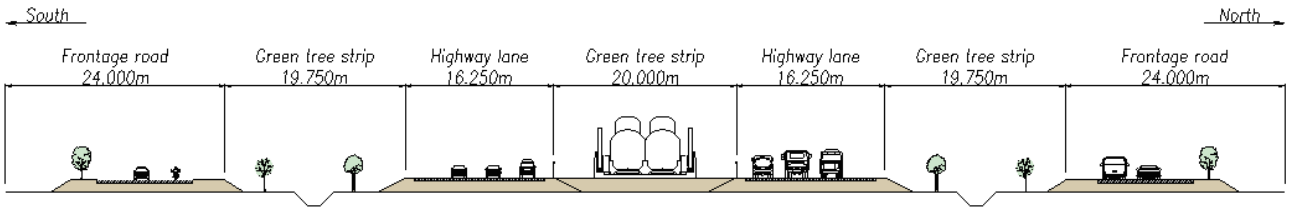
6.2.2 Project Objectives and Inevitability of Involuntary Resettlement

As shown in Fig. 6.2.1 and Fig. 6.2.2 as well as in Fig. 3.4.3 and Fig. 3.4.4. of "3.4 Civil Construction Work Plan", the railway of the project is planned to be built above the median strips of the existing highway in the public domain for the urban and the suburban routes in accordance with the master plan of Hanoi City. In urban route, the elevated railway bridge is 11m wide in general and 17m at the stations, which are both within the width of the highway. In the suburban route, the railway is built on the embankment of 10.4m bottom width in general and 20m at the stations, which are both within the width of the median strips. Therefore, land acquisition and inhabitant resettlement as a result of this construction will not occur. (As to details of the structure, reference is made to "3.4 Civil Construction Work Plan").



Source: JICA Study Team

Fig. 6.2.1 Cross section of the highway above which the railway is built in the urban route



Source: JICA Study Team

Figure 6.2.2 Cross section of the highway above which the railway is built in the suburban route

On the other hand, as shown in Fig. 6.2.3, land acquisition is required in Hoai Duc District, connecting line to the train depot and main railway is required for the land acquisition to develop. In accordance with the master plan of Hanoi City, the planned train depot will be on farm land and the connecting line section to the depot is planned so that it will avoid dwelling areas, but land acquisition will be required.

* Location names in Fig. are Commune names (pertinent to train depot and connecting line only are listed)

Source: JICA Study Team

Figure 6.2.3 Planned Location of Train Depot and Connecting line to the Train Depot

As shown in Table 6.1.7, at present the land for the planned train depot has currently no inhabitant. However, the site is currently used as rice fields and farmlands. Therefore project affected persons (PAPs) are unavoidable. In the connecting line section, the plan is made to be away from inhabitants and the land is used mainly for rice fields and farm lands same as the train depot. However, between the main line and 200m radius curvature to the train depot, there is a factory, of which a portion is subject to removal, manufacturing signage among other products. In conclusion, no direct involuntary inhabitant resettlement is involved, but resettlement plan including compensation for the acquisition of farm lands and for the factory based on the degree of its facility alteration is required.

Scope of acquisition

- Subject area: Hoai Duc District
- Land for the train depot: 172,000m^2
- Land for the connecting line section: 25,300m^2
- Number of dwellings subject to inhabitant resettlement: None as far as direct alteration of houses are concerned, except for one business premise (factory facility) located in the connecting line section.
- Number of dwellings subject to partial land acquisition not accompanied by resettlement: To be investigated at the later stage. The possibility of involving indirect inhabitant resettlement is to be studied as a part of socio-economic investigation at the time of making RAP.

Seven locations are planned power transformer stations, but these are designed to be built under the elevated highway or in the public domain of the highway. No land acquisition is foreseen.

6.2.3 Reason for Not Being Able to Prepare Inhabitant Resettlement Plan

As mentioned in 6.2.2 Project Objectives and Inevitability of Involuntary Inhabitant Resettlement, no inhabitant resettlement plan shall be prepared as the railway shall be built within the premises of an existing highway.

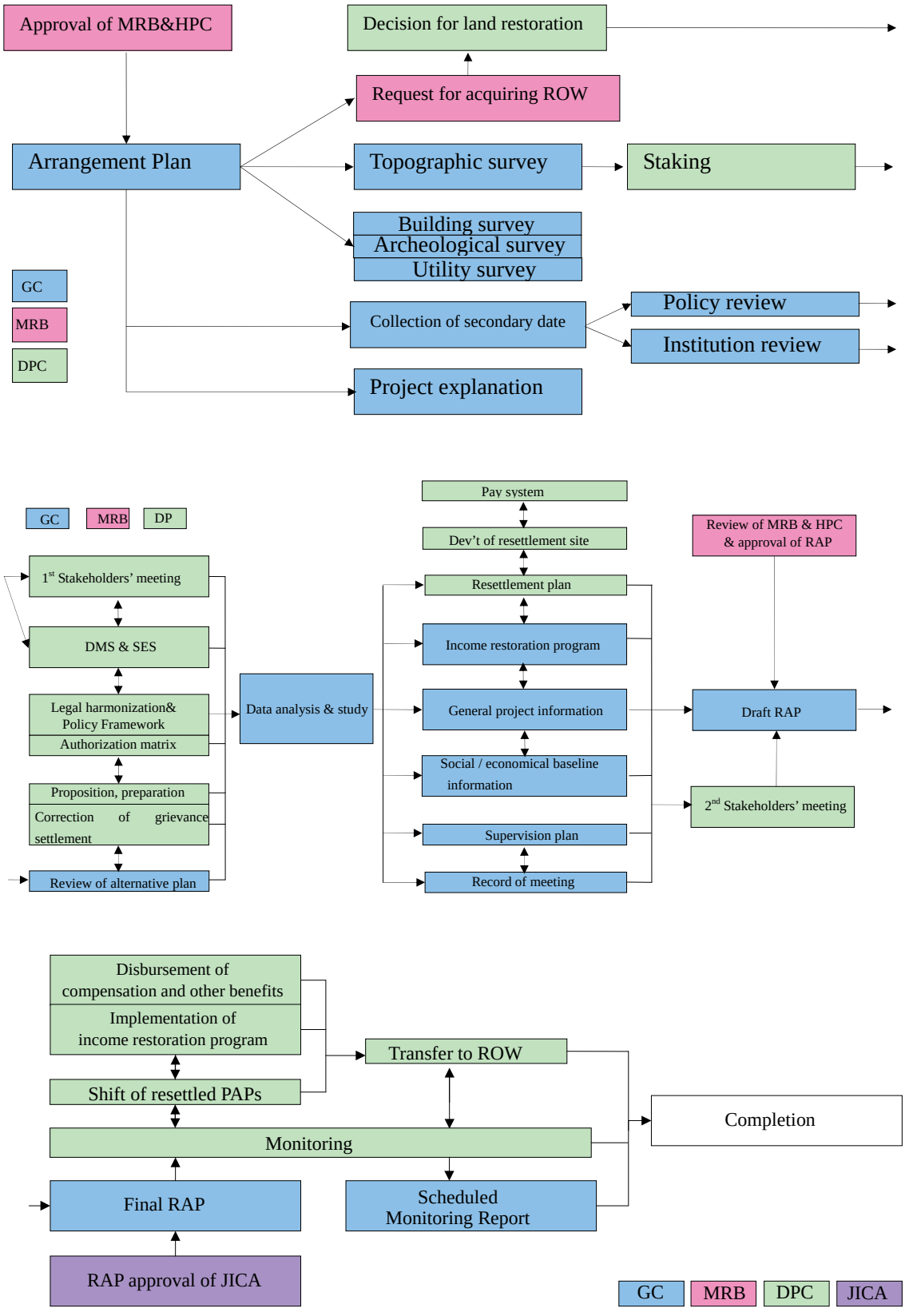
6.2.4 Making of Resettlement Action Plan and its Approval

In Hanoi City, Vietnam, the inhabitant resettlement procedure is carried out in accordance with the Law on Land 13-2003-QH11 and Hanoi People's Committee Decree 108/2009/QD-UBND that stipulates specific execution regulations of the Law on Land.

As mentioned in 6.2.2. Project Objectives and Inevitability of Involuntary Inhabitant Resettlement, land acquisition for the train depot and the connecting line section to the train depot is required. Therefore, an involuntary inhabitant resettlement plan shall be made. At this moment, no transformations of dwellings are foreseen, but a substantial socio-economic investigation shall be made at later stage at the time of preparing RAP so that an involuntary inhabitant resettlement plan may be made involving necessity of inhabitant resettlement and compensation for transformation of business premises (factory facilities).
The TOR for such investigation is mentioned below.

- Establishment of responsible organization : Request for establishing DCSRC (District Compensation, Support and Resettlement Committee) and CCSRC （Commune Compensation, Support and Resettlement Committee）in charge of contacts with HPC concerning involuntary inhabitant resettlement.
- Execution of socio-economic investigation : Investigations on population census, property and land, household and living, repurchase pricing, needs for living means restoration planning and etc.
- Preparation of CSRP（CSR Plan）: Resettlement plan shall be prepared by DCSRC, CCSRC

Based on the hearings from MRB in charge of foregoing Line-2 and from Line-2 GC, procedure for making RAP and approval process shall be per Fig. 6.2.4.



Source: Line-2 Document made by Line-2 GC being modified by JICA Study Team

Figure 6.2.4 RAP Flowchart

6.2.5 Estimated Number of Inhabitant Resettlement

Results of Investigation on land use situation at Hoai Duc District influenced by the land acquisition for the planned train depot and the connecting line section to the train depot are mentioned in the following Table 6.2.l.（as to the locations of the communes subject to the investigation, refer to Fig. 6.2.3）

Table 6.2.1 Situation of Influenced Locations

№	Commune	Railway Extension	Transformed Area	Altered Dwellings	Principal Land Use
1	Song Phuong	2.2km	25,300m^2	None, but 1 facility in the factory area is to be removed. (refer to the table 6.1.7)	Factory area (facility), rice fields, farm land (banana, tomato and etc.) Tombs, though small in number, exist within farm lands)
2	Tien Yen	172,000m^2 for the train depot		None	Rice fields
3	Dac So			None	Rice fields and farm lands (corn)
4	Yen So			None	Rice fields

Source: JICA Study Team

As shown in the above table, no dwellings are to be altered in the planned construction site. However, land acquisition (rice fields and farm lands) of 20,000m^2 will be required in the 4 concerned communes. As shown in Table 6.1.7, a factory facility exists in the connecting line section to the train depot, which currently is most probably not used. A hearing shall be held at the time of socio-environmental study to confirm if only removal of a part of the factory is enough for settlement. In addition, factories and tombs exist in the vicinity of the connecting line section to the train depot, thorough consideration shall be made in establishing detail ROW to avoid disturbances involved as much as possible.

6.2.6 Eligibility for Compensation Against Lost Property and Support for Reconstruction of Living Means

Article 42 of the Law on Land stipulates that those who hold Land Use licenses (as per Article 50 of the Law on Land) or are qualified to obtain the licenses are eligible for the right of compensation in case that the lands of their use are expropriated by the government. In addition, those who have been using the lands before enforcement of the Land Law or have been using the lands without finishing appropriate assignment procedure are also eligible for compensation in special cases as per Decision 108/2009/QD-UBND of Hanoi People's Committee.

As mentioned in "6.2.5 Estimated Number of Inhabitant Resettlement", none of the dwellings are to be altered in the Project, but lands totaling 200,000m^2 (mainly rice fields and farm lands) are subject to compensation. A concrete socio-economic study on living is to be carried out at the time of preparing RAP, based on which the qualified people such as land owners, lessees, merchants, factories employees and unlawful occupants) are to be identified as PAPs eligible to compensations and supports.

6.2.7 Study of the Compensation Procedure Based on the Complete Compensation of the Repurchase Cost for the Lost Property

If the government of Vietnam expropriates lands for public interest, compensation against lost property is made as per stipulations in the law. The same procedure under the Law on Land shall be followed for the Project.

The following three types of compensations are mentioned in the law (Article 42 of the Law on Land)

・Provision of new housing
・Provision of new land for living
・Provision of monetary compensation to purchase new housing

The following Decision 108/2009/QD-UBND of Hanoi People's Committee stipulates the amount of compensation.

(1) Compensation

1) Housing: 100% of the cost as per the latest housing price list issued by Hanoi People's Committee.
2) Business premises: Compensation amount for construction cost shall be calculated in the consultative meeting.

However, removal only, unaccompanied by resettlement, shall be compensated in accordance with the following formula.

・Compensation amount = Present appraised value + (New construction cost - present appraised value) * 60%

(2) Support related to the resettlement

Relocation cost support of 3,000,000VND/owner for owners of housing relocated within the city shall be provided. For relocations outside of the city 5,000,000VND/owner shall be provided.

Resettlement locations are studied by DCSRC and CSRC. In principle, the housing areas prepared by the Government are to be recommended to the people, or else they will select the resettlement locations by themselves.

In addition, the Decision 108/2009/QD-UBND also stipulates provision of support for temporary leasing of housings, and thus, sufficient compensations are provided.

Moreover, in accordance with Article 55 of the Law on Land the value of lands is appraised and published every year by the People's Committees and Municipal Governments of Major Cities. The values published annually by the Hanoi City People's Committee shall be used for the Project.

6.2.8 Measures to reconstruct the living of eligible persons to improve the household and living standards, or at least to restore them to pre-project levels.

The support policy is stipulated in Chapter 4 of the Decree 108/2009/QD-UBND of Hanoi People's Committee as follows. The support by CSRC shall be provided for the Project in accordance with the regulations of Hanoi City.

(1) Support for stability of living and production

1) Farm lands

In case of 30% - 70% of farm lands are acquired without resettlement, support is provided for 6 months to stabilize the living, and in case the acquisition involves resettlement, support is provided for 24 months.

The monthly amount of such support is calculated and set as equivalent to average price of 30kg rice published by Hanoi City at the time of the support.

2) Business premises

In case that commercial and production activities are stopped, 30% of the annual income after tax for preceding 3 years average is supported. The employees are eligible to temporary unemployment allowance for 6 months.

(2) Support for change of jobs

For those who are unable to maintain farming, support is provided for change of jobs. The amount of support is 5 times of the farm lands acquired in proportion of the land areas.

6.2.9 Authorities of organizations in charge of grievance settlement, and procedure of complaint settlement

Grievance settlement with regard to inhabitant resettlement is described in Chapter 8 of the Decision 108/2009/QD-UBND of Hanoi People's Committee/

- Those who are regarded PAPs may file complaint to Commune People's Committee
- Hanoi People's Committee is responsible for the settlement of the filed grievance.
- The grievance settlement organizations are staged below.

1.CCSRC → 2.DCSRC → 3.HPC → 4.District Court

（In case that settlement is not made within 30 days of receiving the grievance, the steps are taken as above mentioned.）

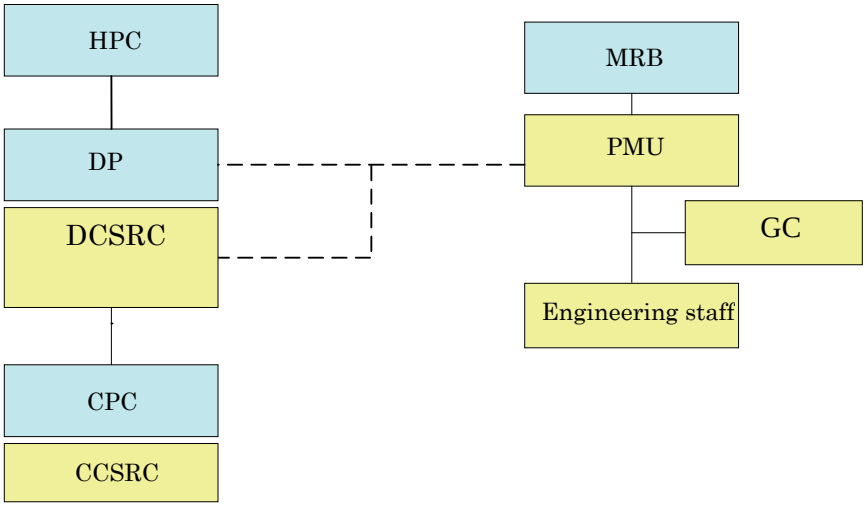
In the case of the Project, the grievance settlement shall be arranged in Hoai Duc District in accordance with the rules mentioned above

In the meantime, for Line-2 Project, the EMA (External Monitoring Agency) under contract with MRB is in charge of external monitoring and follow up of the grievance settlement. It is necessary for the Project to establish the same type of organization at an early stage of the project execution so that the procedure of inhabitant resettlement may be taken smoothly.

6.2.10 Responsible Party in Charge of Inhabitant Resettlement

HPC is designated in the decree 17/2006/ND-CP and the Circular 108/2009/QD-UBND as the party responsible for inhabitant resettlement in Hanoi city. HPC instructs the implementation area (District, Commune) of the project execution to set up the CSRC, the corresponding agency responsible for inhabitant resettlement.

As a result of the hearings from MRB in charge of the foregoing Hanoi Line-2 project and Line-2 GC, the responsible parties (implementation organization) for the Project are thought to be as per attached Fig. 6.2.5



Source: Line-2 RAP document modified by the investigation team

Figure 6.2.5 Related Parties for Inhabitant Resettlement

As shown in the above, DCSRC (District Compensation, Support, Resettlement Committee) is set up on the district level and CCSRC (Commune Compensation, Support, Resettlement Committee) is set up on the commune level and each provide correspondence for compensation/resettlement in their respective jurisdictions. Decision 108/2009/QD-UBND by the Hanoi People's Committee stipulates that it is compulsory for the CCSRC to hold public hearing for PAPs within the commune and disseminate the project information from early stage of the project.

6.2.11 Time schedule of execution of the physical resettlement after the payment of compensation for the lost property

It is uncertain at this moment whether inhabitant resettlement is involved or not, but the time schedule of execution from land acquisition to resettlement is estimated to be 3 years and 8 months as per "Chapter 4, Appendix 1, The Construction Schedule of Line No.5"

The time schedule corresponds to the period from the approval of EIA and of the Project under PPP to the start of construction work. In order to finish the inhabitant resettlement smoothly within this time schedule, ROW shall be determined at the early stage and request for setting up CSRC shall be made to HPC as early as possible.

6.2.12 Cost and Financial Source

The costs related to the inhabitant resettlement shall be calculated and determined based on the socio-economic study at the time of preparing RAP. The approximate costs related to the inhabitant resettlement at this stage of investigation are estimated in Table 6.2.2.

Table 6.2.2 Approximate Costs Related to the Resettlement

Expense Item	Unit	Rate (VND)	Quantity	Amount (Million VND)
I Compensation for lost lands				
・Farm lands	m^2	2,850,000 [1)]	20,000	57,000
II Compensation for lost structures				
・Business premises	m^2	2,663,503 [2)]	700	1,864
III Compensation of lost crops				
(Approx. 0.5% of the lands compensation) [3)]	set		1	200
IV Support				
(Approx. 10% of the farm lands compensation) [3)]	set		1	5,700
V Sum Total				**64,764**
VI Administration cost (9% of the sum total) [3)]	set		1	5,829
VII Other expenses				
・Physical provisions (15% of the sum total) [3)]	set		1	9,715
・Other provisions (15% of the sum total) [3)]	set		1	9,715
・Inclusive Sum				**90,023**

1) As per Regulated Price List 2011- issued by HPC under Decision 89/2001 QD-UBND on 28 Dec.2010
2) As per Decision 32/2010/QD-UBND
3) Estimation based on Line-2 RAP

Source: JICA Study Team

6.2.13 Monitoring System by Execution Agency and by Independent Agency

The Decision 108/2009/QD-UNBD stipulates obligation of supervision of CSRC execution laid by the Hanoi People's Committee. In Line-2 Project, an External Monitoring Agency (EMA) is hired by MRB in charge of the monitoring the execution. It is advisable for the Project to establish similar system under the guidance of MRB, in which the monitoring is carried out regularly, and to enable advancing the procedure of inhabitant resettlement smoothly.

Monitoring formulas of inhabitant resettlement are drafted in Table 6.2.3.

Table 6.2.3 List of Monitoring Formulas for Inhabitants Resettlement (Draft)

Resettlement Activities	Planned Total	Unit	Progress in Quantity			Progress in %		Expected Date of Completion	Responsible Organization
			During the Quarter	Till the Last Quarter	Up to the Quarter	Till the Last Quarter	Up to the Quarter		
Preparation of RAP									MRB
Employment of Consultants		Man-month							
Implementation of Census Survey (including Socioeconomic Survey)									
Approval of RAP			Date of Approval:						
Finalization of PAPs List		No. of PAPs							
Progress of Compensation Payment		No. of HHs							
Lot 1		No. of HHs							
Lot 2		No. of HHs							
Lot 3		No. of HHs							
Lot 4		No. of HHs							
Progress of Land Acquisition (All Lots)		ha							
Lot 1		ha							
Lot 2		ha							
Lot 3		ha							
Lot 4		ha							
Progress of Asset Replacement (All Lots)		No. of HHs							
Lot 1		No. of HHs							
Lot 2		No. of HHs							
Lot 3		No. of HHs							
Lot 4		ha							
Progress of Relocation of People (All Lots)		No. of HHs							
Lot 1		No. of HHs							
Lot 2		No. of HHs							
Lot 3		No. of HHs							
Lot 4		ha							

Source: JICA Study Team

6.2.14 Measures to Secure Inhabitant Participation in the Process from Resettlement Plan Preparation to its Implementation

The Decision 108/2009/QD of Hanoi People's Committee stipulated that CCSRC on the commune level is designated as the contact organization in charge of inhabitants resettlement as mentioned in "6.2.10 Responsible Party in charge of Inhabitant Resettlement", holds public hearings at the early stage of the process, and secures the opportunities of inhabitants' participation in the process. But, as the actual cases in the concerned region do not provide sufficient information and leave many uncertainties, the monitoring by EMA is indispensable for the Project as mentioned in "6.2.13 Monitoring System by Execution Agency and by Independent Agency".

6.3 Drafting the Check List

With reference to the environmental check list of JICA environmental guidelines (8. Railway), the check list of the project planned in this report are drafted as follows.

Table 6.3.1 Environmental Check List

Environmental Items		Items to be Checked	Yes: Y No: N	Specific Environmental and Social Considerations
1 Approval and Explanation				
1	EIA and Environmental Approval	(a) Has the EIA report been made? (b) Has the EIA report been approved? (c) Is the approval of EIA report accompanied by any collateral conditions? If so, are they to be fulfilled? (d) Has the project obtained other approval(s) with regard to environment of the local administrative agencies in charge, if necessary, in addition to the above?	(a)N (b)N (c)N (d)N	(a) (b) (c) In September of 2012, VNRA, the counterpart, placed an order for the EIA work, and an EIA report is prepared as follows. ・ Contractor: Scientific Technological Center for Environmental Protection in Transportation ・ Work period : until end of January, 2013 (d) No additional approval is required for the project other than that of EIA.
2	Explanation to the Local Stakeholders	(a) Have the contents of the project as well as environmental impacts been explained properly to the local stakeholders including disclosure of information and obtained their understandings? (b) Has the project taken into consideration the opinions of local people and others to reflect them in the project contents?	(a)N (b)N	(a) In accordance with JICA Environmental Guidelines and regulations in Vietnam, the stakeholders meetings are to held two times (at the stage of preparing scoping plan and at the time of preparing the final draft) in the process of making EIA. Prior to that stage, request is to be made to the counterpart to hold the project explanatory meeting. The timing of the meeting is set at a proper time in accordance with the project maturity. (b) It is necessary to hold Stakeholders' meetings at an early time and make the detail project plan reflecting the opinions of local stakeholders.
3	Study of Alternative Plans	(a) Are multiple number of alternative plans studied (including items with regard to environmental and social considerations)?	(a)Y	(a) In urban route, the alternative plan of underground was studied along with environmental and social considerations. (Refer to 6.1.4 for the details.)
2 Measures Against Pollution				
1	Water Quality	(a) Is the water quality of the downstream degraded due to soil runoff from exposed surface soil such as embankment and cut earth and others?	(a)N (b)N	(a) For the sake of safe operation of the railway, no structure is designed to cause soil runoff, but as there are several embanking and cut earth portions in the

Environmental Items		Items to be Checked	Yes: Y No: N	Specific Environmental and Social Considerations
		(b) Does the drainage from the stations and the train depot comply with the allowable drainage standards of Vietnam, and are there any areas so degraded that the water quality does not satisfy the environmental standards and others?		project, specific measures are to be considered and adopted at the time of working out the detail plan in the future. (b) As penalty is imposed against discharging polluted drainage in Vietnam, the equipment in the train depot is to be considered that the drainage from the train depot complies with the drainage standards in Vietnam.
2	Waste	(a) Are the wastes from the stations and the train depot properly treated and disposed to comply with the regulations in Vietnam?	(a)Y	(a) The measures of treating and disposing wastes from the stations and the train depot properly to comply with the regulations in Vietnam are to be considered and adopted at the time of working out the detail plan in the future.
3	Noise/Vibration	(a) Do the noise and vibration from the railway operation comply with the standards in Vietnam?	(a)N	(a) As no standards exist as to the railway noise and vibration, it is necessary to study the protective measures, such as installation of sound barriers, referring to the Japanese standards of 60dB at daytime and 55dB at night.
4	Land Subsidence	(a) Is there any risk of land subsidence due to pump up of large quantity of underground water (especially in case of the underground railway)?	(a)N	(a) The elevated + banking railway plan adopted in the final FS is not accompanied with any risk of land subsidence, but if large volume of underground water is used in the train depot for washing the trains in the future, the measures are considered to prevent land subsidence.
3 Natural environment				
1	Sanctuary	(a) Does the project site occupy any sanctuaries designated by the laws of Vietnam or by the international treaties? Does the project give any impacts to such sanctuaries?	(a)N	(a) No sanctuary designated by the laws of Vietnam or by the international treaties exists in the vicinity of the project site.
2	Ecosystem	(a) Does the site include primeval forests, tropical natural forests, ecologically important habitats, such as coral reef, mangrove coast, tideland and others? (b) Does the site include habitats of endangered	(a)N (b)N (c)N (d)N (e)N	(a), (b), (c), (f): No ecological problem is foreseen for the project due to the reason that the construction of the railway is planned above the median strips that is already developed and transformed. The train depot is planned on the farm lands

Environmental Items		Items to be Checked	Yes: Y No: N	Specific Environmental and Social Considerations
		creatures protected by the laws of Vietnam or by the international treaties? (c) If there exists any concern of causing large impact to the ecosystem, are any mitigation measures to be taken to minimize such impact? (d) Is any counter measures considered against blocking moving routes of wild animals and cattle, breaking up habitats, and traffic accidents to animals? (e) With the construction of the railway, does any concern arise as to forest destruction, illegal hunting, desertification, drying up of wetland associated with land development? (f) If the railway is constructed in the wildlife area, is there any concern to destroy natural environment to a great extent by development of the new area?	(f)N	and others utilized artificially with low grade of nature, and does not involve any concern ecologically. (d) The construction of the railway in the suburban route are planned on the embankment of the median strips of the existing highway. As the barriers are installed around the track for the safety of the railway operation, no impacts are foreseen as to blocking moving routes of wild animals. (e) The construction area of the project has very little ecosystem factors, and therefore almost no impact of the project execution is expected on the ecosystem.
3	Hydrological Phenomena	(a) Does any possibility exist for the transformation of topology or construction of structures such as tunnels and others to influence the flows of surface water and underground water?	(a)N	(a) As neither large scale transformation of topology nor tunnel construction of is planned, no hydrological impact stemming from structures is expected. However, in case of subsequent river bridge pier construction or the pumping of a large volume of underground water at the train depot, it is necessary to examine the impact on the surface and underground water.
4	Topology and Geological Features	(a) Are the countermeasures in the construction method considered for executing the work in the places of adverse geological features, where land destructions or landslides may take place? (b) Are there any anxiety of land destructions or landslides by execution of the embankment and earth cutting work? Are any proper countermeasures considered to prevent the land fallings and landslides?	(a)Y (b)N (c)Y	(a) The karst formations were found in part during the construction of Thang Long Highway. They are not susceptible to landslides, but consideration is required to be made on the matter at the time of establishing the construction plan. (b) Large scale embanking and earth cutting which may cause land fallings or landslides are not planned. (c) Large scale embanking and, earth cutting structure, and sand dumping area are not planned, but

Environmental Items		Items to be Checked	Yes: Y No: N	Specific Environmental and Social Considerations
		(c) Do soil runoffs take place at the places of embanking, earth cutting, soil dumping and soil collection?		countermeasures to prevent soil runoff need to be studied during the design stage.
4 Social Environment				
1	Involuntary Resettlement	(a) Does the project entail any involuntary inhabitant resettlement in its execution? (b) Is proper explanation scheduled for the inhabitants to be resettled on compensation and reconstruction of living measures in advance of the resettlement? (c) Is the investigation made with regard to inhabitant resettlement, and is the inhabitant resettlement plan established as to compensation of new purchase cost and restoration of living infrastructure after the resettlement (d) Is the payment of compensation to be made in advance of the resettlement? (e) Is the compensation policy documented? (f) Are proper considerations included for the socially weak people, such as women, children, senior persons, persons in poverty, ethnic minorities, and indigenous people and others? (g) Is the agreement made with inhabitants in advance of the resettlement? (h) Is the system established to execute inhabitant resettlement properly? Is it given full capability and budget for the due execution of the resettlement? (i) Is the monitoring of impacts of resettlement planned? (j) Is the system established to cope with grievance settlement?	(a)Y (b)Y (c)Y (d)Y (e)N (f)N (g)Y (h)N (i)N (j)Y	(a) In planning the railway route (3.1), efforts have been made not to involve direct transformation of living places, but involuntary inhabitant resettlement may take place by acquisition of farm lands in the area of planned train depot and the connecting line section to the train depot. (b) The explanation to the inhabitants is obligatory in accordance with the regulations set forth in the Law on Land and related decrees and circulars. The explanatory meeting is to be held in the future after establishing a resettlement plan. (c) In accordance with the regulations set forth in the Law on Land and related decrees and circulars, the investigation on the inhabitant resettlement is made and the resettlement plan is established including compensation for new purchase cost and restoration of living infrastructure after the resettlement (d) The payment of compensation is to be made in advance of the resettlement. It is also important to establish an implementation system to facilitate such payment without any delay. (e) The compensation policy is established in the Law on Land and related decrees, circulars and decisions. (f) In the future, based on the investigation on social and economic factors etc., requests are necessary to be placed to the related departments asking their due considerations on socially weak people. (g) In accordance with the regulations set forth in the Law on Land and related decrees and circulars, the project is executed under cooperation with related

Environmental Items		Items to be Checked	Yes: Y No: N	Specific Environmental and Social Considerations
				departments in order for the agreement with affected inhabitants to be made in advance of the resettlement. (h)(i) The monitoring by EMA is necessary as the capabilities of execution by Hanoi City (District & Commune) in charge of inhabitant resettlement are uncertain ,. (j) The grievance settlement system is established in the regulations set forth in the Law on Land and related decrees and circulars.
2	Life and Living	(a) Does the new railway give any impacts on the existing transport means and living of persons engaged therein? In addition, does it entail a large scale alteration of land use and living means, unemployment etc.? Is the mitigation against such social impacts involved in the project planning? (b) Does the project involve any adverse impacts on the living of inhabitants or others? Are the mitigation measures considered to minimize such impacts as required? (c) Does the influx of people from other areas involve the risk of inviting deceases (including infectious deceases, HIV and etc.)? Are the considerations made with regard to proper public health as necessary. (d) Does the project give any adverse impacts on the traffic conditions (aggravated traffic jams, increase of traffic accidents and etc.) surrounding the project sites? (e) Does the railway give disturbances against the inhabitants moving? (f) Does any sunshine blocking or radio disturbance take place?	(a)Y (b)N (c)Y (d)Y,N (e)Y (f)N	(a) Commuting buses run in the area of the planned railway project. In the future, the request is to be made to the related departments asking the creation of the bus networks centering around the railway stations. As large scale alterations are expected with regard to the land use and living means in the area of the train depot, the concrete care is to be made thereon. (b) No adverse impact is expected on the living of inhabitants in other respects. (c) AS the influx of workers from other area increases the risk of infectious deceases like HIV and etc., considerations and countermeasures are necessary to be made on the public health before the execution stage of the project. (d) As the worsening of the traffic jams around the construction sites by construction vehicles are foreseen, the considerations are necessary to be made on equalization of the construction work. In the stage of the operation, the project will contribute to easing the traffic jams.. (e) The railway is constructed above the median strips both in the urban route and in the suburban route, no disturbances are foreseen in the inhabitant movement,

Environmental Items		Items to be Checked	Yes: Y No: N	Specific Environmental and Social Considerations
				but study is to be carried out for improving traffic roads and associated facilities because it is possible for inhabitant movement to be affected by construction of the train depot and the connecting line section to the train depot.. (f) As the height of the elevated railway in the urban route is same as or lower than the surrounding buildings and constructed above the median strips of the existing highway, no sunshine blocking or radio disturbance will take place.
3	Cultural Heritage	(a) Is any possibility of the project damaging archeological, historical, cultural or religious heritages? If so, are considerations made to protect them in accordance with the regulations of the country concerned?	(a)N	(a) No cultural heritage exists in the project area and its surroundings.
4	Landscape	(a) If any landscapes be subject to special considerations, are the necessary countermeasures to be taken to mitigate the adverse or any impacts to the landscapes.	(a)Y	(a) The consciousness of landscapes is high in Hanoi and the construction of the elevated railway bridge in the urban route gives big impacts to the landscapes. Thus, the measures, such as adoption of the design respecting the landscapes at the planning stage of the project.
5	Ethnic Minority and Indigenous People	(a) Are considerations made to mitigate impacts on the ethnic minorities and indigenous people? (b) Are special rights of ethnic minorities and indigenous people respected with regard to the lands and natural resources?	(a)N (b)N	(a),(b) Neither ethnic minorities nor indigenous people are confirmed to inhabit in the project area.
6	Work Environment	(a) Are the laws followed with regard to the country's work environment in the project? (b) Are the hardware safety measures such as safety means and equipment preventing accidents at work and managing hazardous materials and etc. taken into consideration for the project related people? (c) Are the software measures such as establishment of	(a)Y (b)Y (c)Y (d)Y	(a)(b)(c)(d) It is necessary for the project proponent to oblige the contractor to execute the work properly in accordance with the laws on the work environment of Vietnam.

Environmental Items		Items to be Checked	Yes: Y No: N	Specific Environmental and Social Considerations
		safety and health care plan, execution of safety training (including traffic safety and public health) for the construction workers and etc. are taken into consideration for the project related persons. (d) Are the proper measures to be taken to prevent the security staff from violating the safety of the project related people and the local inhabitants?		
5 Others				
1	Impacts During Construction	(a) Are the mitigation measures prepared against pollutions (noise, vibration, polluted water, dust, exhaust gases, wastes and etc.) during construction? (b) Does the construction give adverse impacts to the natural environment (ecosystem)? If so, are the mitigation measures prepared against them? (c) Does the construction give adverse impacts to the social environment? If so, are the mitigation measures prepared against them. (d) Does the construction cause traffic jams? If so, are the mitigation measures prepared against them.	(a)Y (b)N (c)Y (d)Y	(a) In order to mitigate the pollutions during construction, the considerations on the due implementation of minimization and mitigation measures as described in Table 6.1.13 are necessary to be made from the project planning stage. (b) The project is planned to be constructed above the median strips of the highway, no impact to ecosystem is expected during construction. As the planned area of the train depot is now artificially used as farm lands and the grade of nature is low, no impact to ecosystem is expected. (c)(d) As adverse impacts to social environment, such as temporary traffic jams during construction and etc., the considerations on due implementation of minimization and mitigation measures as described in Table 6.1.13 are necessary to be made from the project planning stage.
2	Monitoring	(a) Is the monitoring planned and executed by the project proponent with regard to the affected environmental items as described above? (b) Are the monitoring plan considered to be appropriate with regard to the items monitored, method, frequency and etc.? (c) Is the monitoring system (organization, manning,	(a)Y (b)Y (c)Y (d)N	(a)(b)(c)(d) The monitoring plan described in Table 6.1.5 shall be examined again at the time of conducting EIA in the future in accordance with degree of the impacts, and shall be substantiated more detail accordingly.

Environmental Items		Items to be Checked	Yes: Y No: N	Specific Environmental and Social Considerations
		equipment and apparatus, budget and etc. and their continuity)? (d) Are the reporting method, frequency and etc. of the project proponent to the related administrative bodies stipulated?		
6 Precautions				
Reference to Other Environmental Checklist		(a) If necessary, a check list of forestation shall be referred to additionally on the relevant items and is evaluated accordingly (such as in case the project being accompanied by large scale of logging and etc.). (b) If necessary, a check list of transmission, transformation and distribution shall be referred to additionally on the relevant items and is evaluated accordingly, (such as in case the project being accompanied by the construction of transmission lines, transformer stations and distribution stations and etc.)	(a)N (b)N	(a) No large scale logging is involved in the project. (b) The power transmission is assigned to the electric power company. The transformer stations are planned to be built in the public domain.
Precaution on the Use of the Environmental checklist		(a) If necessary, the environmental impacts beyond the border and global environmental issues (such as in case the project involving elements of waste disposal beyond the border, acid rain, destruction of ozone layer, global warming)shall be confirmed.	(a)Y	(a) The considerations against the global warming shall be taken into account such as using specific materials suitable to that effect.

Source: JICA Study Team