

Socialist Republic of Vietnam  
Ho Chi Minh City People's Committee (HCMC PC)  
Ho Chi Minh City Management Authority for Urban Railways (MAUR)

**Special Assistance for  
Project Impementation (SAPI)  
for Ho Chi Minh City Urban Railway Project  
(Ben Thanh – Suoi Tien Section (Line 1))  
(Improvement of Intermodal Station Access)**

**Final Report**

**Part III: Intermodal Facility Development**

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# PREFACE

The output of the “Special Assistance for Project Implementation (SAPI) for Ho Chi Minh City Urban Railway Project (Ben Thanh – Suoi Tien Section (Line 1))”, is organized into the following reports (see table below), each providing detailed findings on specific subjects.

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## **ABBREVIATIONS**

BRT	Bus Rapid Transit
CBD	Central Business District
CII	Ho Chi Minh City Infrastructure Investment Joint Stock Company
CP	Contract package
DC	Direct current
DOC	Department of Construction
DOT	Department of Transport
DPA	Department of Planning and Architecture
DPI	Department of Planning and Investment
EIA	Environmental Impact Assessment
GIS	Geographical Information System
GMS	Greater Mekong Sub-region
HCMC	Ho Chi Minh City
HIS	Household Interview Survey
HOUTRANS	The Study on Urban Transport Master Plan and Feasibility Study in Ho Chi Minh Metropolitan Area
HW	Highway
IEE	Initial Environmental Examination
IP	Industrial Park
IRR	Internal Rate of Return
ITS	Intelligent Transport Systems
JICA	Japan International Cooperation Agency
MAUR	Management Authority for Urban Railways
LRT	Light Rapid Transit
M/P	Master Plan
MOC	Ministry of Construction
MOCPT	Management and Operation Center for Public Transportation
MONRE	Ministry of Natural Resources and Environment
NJPT	NJPT Association – General Consultants for the UMRT Line 1 Project
OD	Origin-Destination
ODA	Official Development Assistance
O&M	Operations & Maintenance



PPP	Public Private Partnership
RAP	Resettlement Action Plan
SAPI	Special Assistance for Project Implementation
SAMCO	Saigon Transportation Mechanical Corporation
SEA	Strategic Environmental Assessment
STEP	Special Terms for Economic Partnership
STRASYA	Standard Urban Railway System for Asia.
TOD	Transit Oriented Development
UCCI	Urban – Civil Works Construction Investment Management Authority of HCMC
UMRT	Urban Mass Rapid Transit
VND	Vietnamese Dong
VNU-HCM	Vietnam National University - Ho Chi Minh City

## **Part III: Intermodal Facility Development**

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## 9 CONCEPT PLAN OF INTERMODAL FACILITIES

### 9.1 Estimation of Demand for Facilities

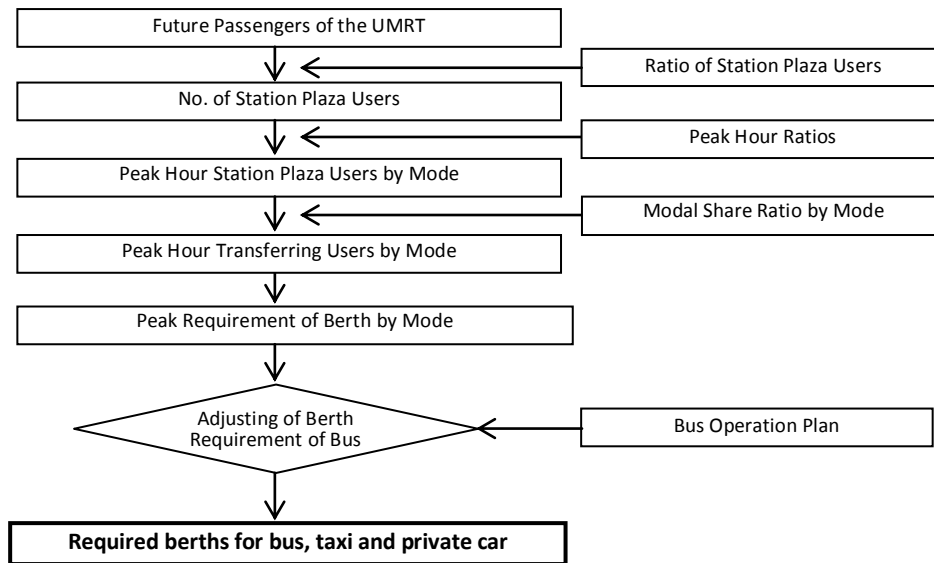
#### 1) Estimation of Capacity of Station Plazas and Bus Stops

##### (1) Methodology

Capacity of station plazas and bus stops are estimated based on "the Station Plaza Estimation 1998 in Japan". Future passenger demand in 2040 is applied as the basis for the estimation. Besides, in the case of station areas where bus stop facilities are applied as temporary facilities until the development of future station plazas, the future passenger demand in 2020 is applied. In addition, the number of bus berths and bus parking are adjusted to meet the proposed bus operation plan.

##### (2) Estimation Flow

The estimation flow for the capacity of station plazas and bus stops is shown in Figure 9.1.1. For the concept planning of intermodal facilities, the peak requirements of berths by transport mode are applied.



Source: Study Team

**Figure 9.1.1 - Estimation Flow for the Capacity of Station Plazas and Bus Stops**

### (3) Estimation Result

Estimation results for station plazas/bus stops and the proposed facility plan for each station area are summarized as shown in Table 9.1.1.

**Table 9.1.1 – Required Number of Berths for the Station Plazas and Bus Stops**

	Station	Future Passengers (pax/day)		Development Orientation			Target year for Estimation	Requirements of Berth								
								Bus Berth		Bus Parking	Taxi Berth		Taxi Pool	Private Car Berth	Motorcycle Taxi	
		2020	2040	Layout	Facility Type	Phasing		Boarding	Alighting		Boarding	Alighting			Boa ding	alig ting
1	Ben Thanh	180,000	355,000	-	Bus terminal		2040	8	3	Space-	1	2	15	-	1	1
2	Opera House	52,000	192,000	-	Road side stop		2040	2	1	-	1	1	7	-	1	1
3	Ba Son	29,000	88,000	-	Road side stop		2040	1	1	-	1	1	4	2	1	1
4	Van Thanh Park	13,000	30,000	North	Station plaza		2040	1	-	-	1	1	3	2	1	1
5	Tan Cang	44,000	77,000	North	Station plaza		2040	8	1	6	1	1	3	2	1	1
6	Thao Dien	29,000	101,000	North	Open space/ road side stop		2040	4	-	5	1	1	3	2	1	1
				South	Station Plaza		2040	2	1	8	1	1	3	2	1	1
7	An Phu	7,000	15,000	North	Road side stop		2040	-	-	-	1	1	-	2	1	1
				South	Roadside stop		2040	2	-	-	1	1	2	2	1	1
8	Rach Chiec	37,000	102,000	West	Road side stop		2040	3	-	-	1	1	2	2	1	1
				East	Separated bus stop	Temporary	2020	-	1	-	1	1	2	2	1	1
					Station plaza	Future	2040	2	1	5	1	1	4	2	1	1
9	Phuoc Long	29,000	64,000	West	Station plaza		2040	2	1	8	1	1	2	2	1	1
				East	Road side stop		2040	-	-	-	1	1	3	2	1	1
10	Binh Thai	37,000	73,000	West	Road side stop		2040	2	1	5	1	1	3	2	1	1
				East	Road side stop		2040	1	1		1	1	-	2	1	1
11	Thu Duc	43,000	65,000	West	Road side stop	Temporary	2020	2	1	10	1	1	2	2	1	1
					Station plaza	Future	2040	3	1	5	1	1	2	2	1	1
				East	Road side stop	Temporary	2020	-	-	-	1	1	2	2	1	1
					Station plaza	Future	2040	3	1	5	1	1	2	2	1	1
12	High-tech Park	24,000	26,000	West	Road side stop		2040	-	-	-	1	1	-	2	1	1
				East	Station Plaza		2040	1	1	2	1	1	2	2	1	1
13	Suoi Tien	19,000	21,000	West	Road side stop	Temporary	2020	2	-	2	1	1	2	2	1	1
					Station Plaza	Future	2040	2	-	2	1	1	2	2	1	1
				East	Station plaza	Future	2040	1	1	3	1	1	-	2	1	1
14	Suoi Tien Terminal	54,000	81,000	East	Station Plaza		2040	4	2	6	1	1	3	2	1	1

Source: Study Team

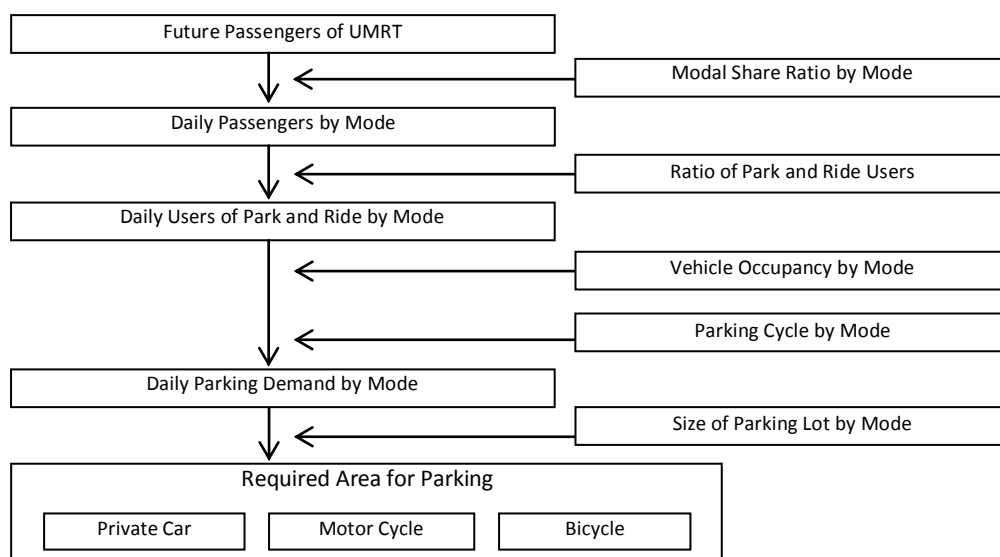
## 2) Estimation of Parking Demand and the Concept for the Parking Plan

### (1) Methodology

Parking demands of private cars, motorcycles and bicycles are estimated based on the future UMRT passenger demand. In the estimation, UMRT passenger demand in 2020 and 2040 are applied.

### (2) Estimation Flow

The estimation flow for the requirements of parking is shown in Figure 9.1.2.



Source: Study Team

**Figure 9.1.2 - Flow of Estimation for the Capacity of Parking**

### (3) Estimation Factor

The estimation factor for parking is shown in Table 9.1.2.

**Table 9.1.2 - Estimation Factors for Parking**

	Ratio of Park and Ride Use	Vehicle Occupancy (person/vehicle)	Parking Cycle (cycle/day)	Size of Parking Lot (m <sup>2</sup> /lot) (Including passage)
Private Car	57%	1.79	1.5	18.0
Motorcycle	57%	1.24	1.5	2.5
Bicycle	100%	1.23	1.5	2.5

Source: Study Team

### (4) Estimated Parking Demand

Estimation results of parking for each station area are summarized in Table 9.1.3 and Table 9.1.4.

**Table 9.1.3 – Required Capacity of Parking in 2020**

No.	Station	Passengers (2020) (pax/day)	Parking demand (lot)		Required Area of Parking (m <sup>2</sup> )	
			Private Car	M/C and Bicycle	Private Car	M/C and Bicycle
1	Ben Thanh	180,000	0	16	-	40
2	Opera House	52,000	0	71	-	180
3	Ba Son	29,000	0	75	-	190
4	Van Thanh Park	13,000	41	1,304	740	3,270
5	Tan Cang	44,000	94	3,028	1,690	7,570
6	Thao Dien	29,000	68	1,615	1,220	4,040
7	An Phu	7,000	23	876	410	2,190
8	Rach Chiec	37,000	79	2,551	1,420	6,380
9	Phuoc Long	29,000	84	1,918	1,510	4,790
10	Binh Thai	37,000	95	2,639	1,710	6,600
11	Thu Duc	43,000	124	2,717	2,230	6,800
12	High-tech Park	24,000	77	1,578	1,390	3,950
13	Suoi Tien	19,000	63	1,434	1,130	3,590
14	Suoi Tien Terminal	54,000	213	3,004	3,830	7,510

Source: Study Team

**Table 9.1.4 – Required Capacity of Parking in 2040**

No.	Station	Passengers (2040) (pax/day)	Parking demand (lot)		Required Area of Parking (m <sup>2</sup> )	
			Private Car	M/C and Bicycle	Private Car	M/C and Bicycle
1	Ben Thanh	355,000	0	109	-	270
2	Opera House	192,000	0	72	-	180
3	Ba Son	88,000	0	41	-	100
4	Van Thanh Park	30,000	93	2,975	1,670	7,440
5	Tan Cang	77,000	164	5,761	2,950	14,400
6	Thao Dien	101,000	236	5,497	4,250	13,740
7	An Phu	15,000	48	1,890	860	4,730
8	Rach Chiec	102,000	217	6,970	3,910	17,420
9	Phuoc Long	64,000	184	4,106	3,310	10,260
10	Binh Thai	73,000	187	5,435	3,370	13,590
11	Thu Duc	65,000	187	4,018	3,370	10,050
12	High-tech Park	26,000	83	1,709	1,490	4,280
13	Suoi Tien	21,000	70	1,580	1,260	3,950
14	Suoi Tien Terminal	81,000	319	4,521	5,740	11,300

Source: Study Team

As a reference, examples of parking for bicycles and motorcycles at railway stations in Japan are summarized in Table 9.1.5.

**Table 9.1.5 - Examples of Parking for Bicycles and Motorcycles in Japan**

Station	Passengers (pax/day)	Bicycle and M/C Parking	
		Administrator	Parking Lot
Musashi-kosugi station of JR and Tokyu railway in Kawasaki city	297,000	Railway company	2,175
		Municipality	4,304
		Private	1,350
		Total	7,829
Aobadai station of Tokyu railway in Yokohama city	110,000	Railway company	1,483
		Municipality	967
		Total	2,450

Source: Study Team based on the website of Musashi-kosugi Life and Navitime

#### (5) Concept for Planning for Public Parking

Development of public parking in the station area is aimed at the following:

- To promote Park and Ride for UMRT usage
- To secure pedestrian space by encouraging the use of public parking spaces

The concept for the planning of public parking is shown as follows:

##### (a) M/C and Bicycle Parking

- **Parking location:** Public M/C parking is planned in existing public land such as the ground floor of UMRT stations, under the viaduct space of the UMRT and in the green area of the Hanoi Highway. In addition, the distance of M/C parking from UMRT stations should not exceed 200 m in consideration of convenience for the Park and Ride user.
- **Parking capacity:** The capacity of public M/C parking is based on the availability of land, estimated parking demand and the requirements that parking should not exceed a distance of 200 m from UMRT stations. Regarding the capacity shortage toward the estimated demand, it is expected that private parking will be developed to cover the shortage.

##### (b) Car Parking

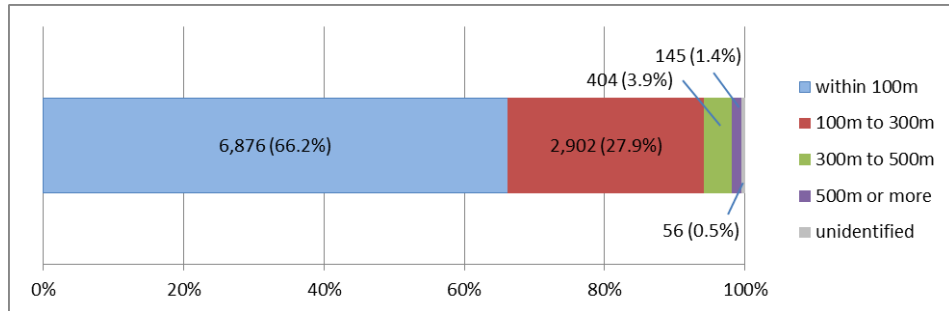
Public car parking upon UMRT opening is not planned from the viewpoint of the promotion of feeder bus usage and the priority of park and ride with the motorcycle. However, private car usage will increase in the future in Vietnam, so that development of public car parking in UMRT station areas is proposed as future development in the urban development area which can secure enough space for car parking.



Reference for appropriate distance between parking and station

(a) Distance between parking and railway station in Japan

94.1 % of parking surrounding the railway station is located within 300 m of the station.



Source: Survey of the Current Situation of Illegally Parked Bicycle in Station Area in 2012, Cabinet Office of Japan

**Figure 9.1.3 - Distance between Parking and Railway Stations in Japan**

(b) Bicycle parking in Musashi-kosugi station area in Japan

Most of the bicycle parking is located within 300 m of the station.



Source: Study Team

**Figure 9.1.4 - Bicycle Parking in the Musashi-kosugi Station Area in Japan**

(c) Guideline of Parking in Germany

In Nordrhein-Westfalen province in Germany, a bicycle parking project with 118 locations directly connecting to railway station called the Radstation 100 have been carried out since 1996. The guideline for parking planning regulates the development of parking in the station building as a general rule. In case of no space for parking in the station building, parking shall be developed within 200 meters from the station.

## 9.2 Supplemental Studies for Intermodal Facilities

### 1) Proposed Motorbike Parking System

In order to attract passengers to use the HCMC UMRT Line 1 especially those users who will access the station via motorbikes, a safe, convenient and seamless parking system integrated with the fare payment system of the HCMC UMRT Line 1 is necessary.

The proposed motorbike parking system should be a paperless, cashless system which will utilize the same smartcards that will be used in the fare payment system of the UMRT Line 1 and will also be remotely manageable.

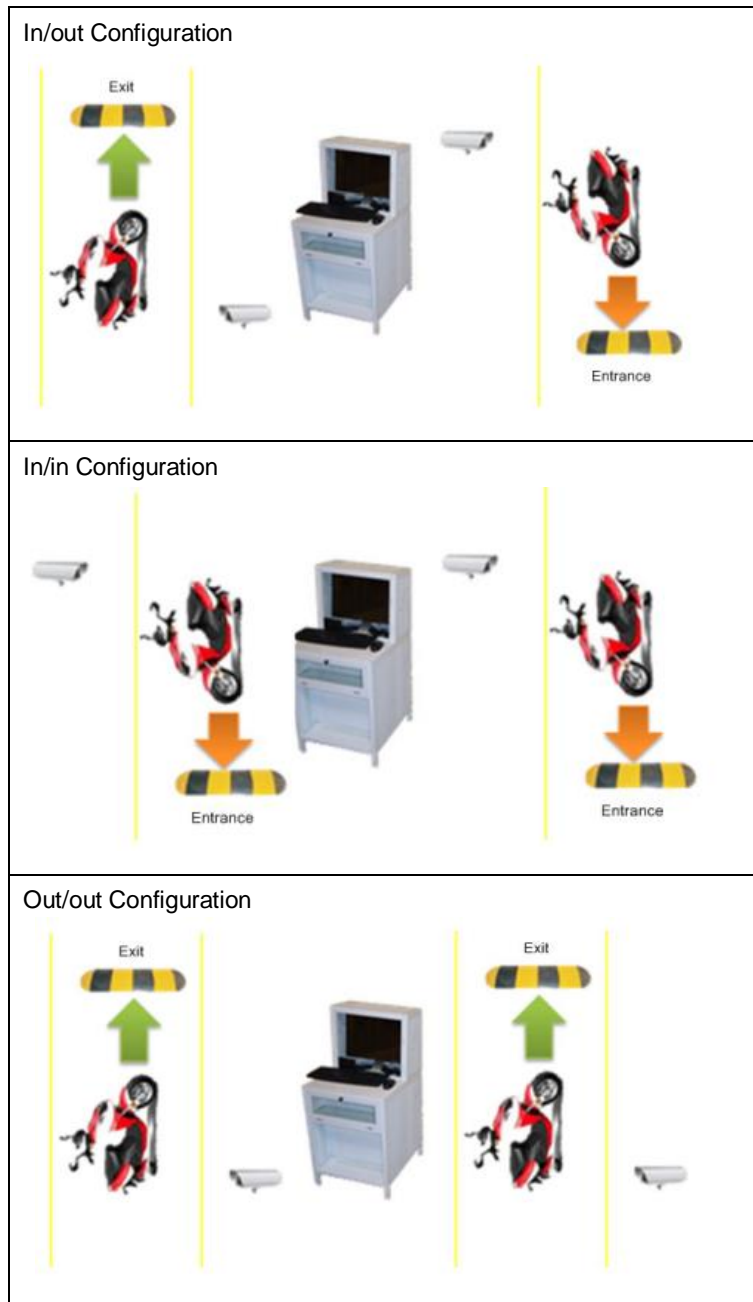
#### (1) Parking System Description

One gate for the motorbike parking system covers two lanes and the lanes can be configured as in/out, in/in or out/out (Figure 9.2.1 shows the different configurations) and consists of the following equipment:

- Computer and monitor
- Two smartcard readers
- Two IP cameras
- Cabinet and other hardware
- Parking management software

The equipment for each gate should be connected by a LAN network and connected to a central parking server which can be remotely managed via the Internet or a Virtual Private Network (VPN) connection. For backup purposes, in case of failure of the main equipment, portable terminals with a camera and a built in smartcard reader should also be provided. Regarding payment options, there should be various options available for the user including prepaid single usage, monthly pass and etc. The parking system should also be able to produce reports on each station on the conditions of the parking facility including the following indicators:

- Number of motorbikes in the parking facility
- Traffic flow during any period of time
- Revenue



Source: Study Team

Figure 9.2.1 - Different Configurations of the Motorcycle Parking System

## (2) Parking System Process

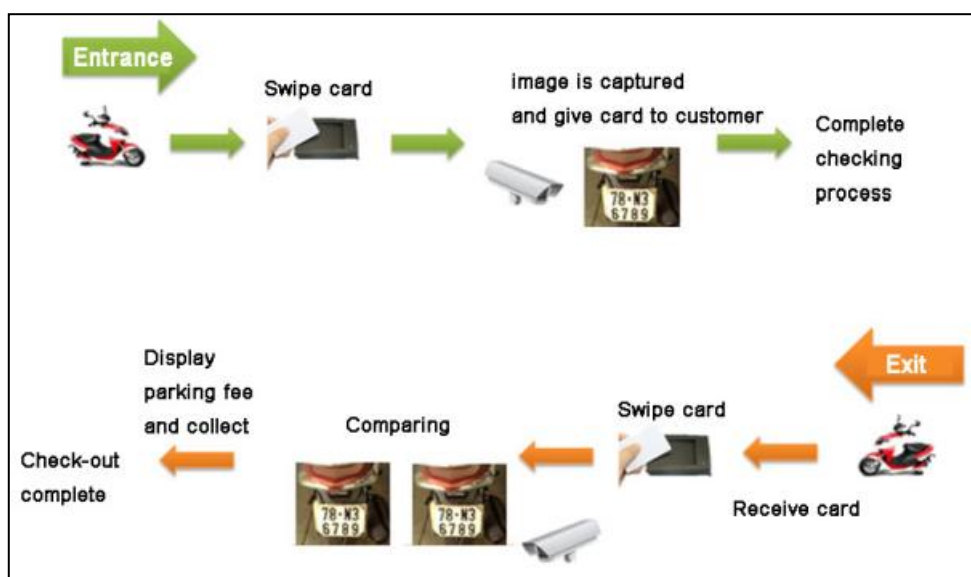
For entering the motorbike parking facility, the process should be as follows:

- User enters the parking facility gate
- User gives the smartcard to the parking gate operator who places the smartcard in front of the reader
- An image of the license plate of the motorbike is captured via the IP camera and the information extracted from the image of the license plate is written onto the smartcard
- Smartcard is handed back to the user
- User enters the parking facility

For exiting the motorbike parking facility, the process should be as follows:

- User enters the parking facility gate
- User gives the smartcard to the parking gate operator
- Parking gate operator places the smartcard in front of the reader
- The image of the license plate is captured via the IP camera and is compared with the information read from the smartcard
- The parking fee is displayed
- The parking operator collects the parking fee from the user
- The user exists the parking facility

The parking system flow is shown in Figure 9.2.2.



Source: Study Team

**Figure 9.2.2 - Motorcycle Parking System Flow Diagram**

### (3) Issues Regarding Payment Integration with the HCMC UMRT Line 1 Smartcard

With regards to the integration of the payment system of the motorbike parking system with the fare payment system of the HCMC UMRT Line 1 smartcard system, there are a number of issues which need to be addressed at the technical design stage.

The operator of the HCMC UMRT Line 1 smartcard system must define the specifications and security policy of the smartcard system in order for the motorbike parking system integrator to develop the appropriate interfacing software that will enable the HCMC UMRT Line 1 smartcard to be used for payment for motorbike parking. In addition, the operator of the HCMC UMRT Line 1 smartcard and the motorbike parking system integrator must work with the provider of the smartcard technology to obtain the necessary software development kits and related hardware.

### (4) Cost Estimates

The following is a cost estimate of the proposed parking system provided by a local vendor. It is proposed that 3 parking areas in each station are established (except for Van Thanh Park and Tan Cang station) for the 10 elevated stations between Van Thanh Park and Suoi Tien on the HCMC UMRT Line 1. It is estimated that the parking system will cost around US\$1,000,000 and the cost breakdown is shown in Table 9.2.1 and 9.2.2.

**Table 9.2.1 - Construction Cost of the Motorbike Parking System**

No	Station	No. of Parking Area	Location	No. of Unit of Parking System	Construction Cost (USD)
4	Van Thanh Park	2	1. Station	3	18,000
			2. Viaduct		
5	Tan Cang	2	1. Station	4	28,800
			2. Viaduct		
6	Thao Dien	3	1. Station	3	18,000
			2. Viaduct		
			3. On ground		
7	An Phu	3	1. Station	5	34,800
			2. Viaduct		
			3. On ground		
8	Rach Chiec	3	1. Station	4	24,000
			2. Viaduct		
			3. On ground		
9	Phuoc Long	3	1. Station	4	26,400
			2. Viaduct		
			3. On ground		
10	Binh Thai	3	1. Station	4	26,400
			2. Viaduct		
			3. On ground		
11	Thu Duc	3	1. Station	4	25,400
			2. Viaduct		
			3. On ground		
12	High-Tech Park	3	1. Station	3	18,000
			2. Viaduct		
			3. On ground		
13	Suoi Tien	3	1. Station	4	26,400
			2. Viaduct		
			3. On ground		
	Total	28		38	246,200

Source: Study Team

**Table 9.2.2 - Overall Cost of the Motorcycle Parking System**

Item		Unit Cost (USD)	Quantity (unit)	Cost (USD)	Remarks
Construction of M/C parking system			38	246,200	
System development and others					
1	Parking lot parking CMS software license (Enterprise version)	500	28	14,000	Linking parking lot to the Central Station for management
2	CCTV system for security purpose (average cost per site)	10,000	28	280,000	The CCTV for local security surveillance with recording option
3	Portable Parking Terminal	2,000	38	76,000	For backing up (must have)
4	Card Initially Format and Personalization Cost			42,000	
5	Card Printer			21,000	
6	Study phase: Interface with the Metro Automatic Fare Collection System (AFC)			50,000	Communicating, meeting and agreement
7	Specification for Integration			20,000	Communicating, meeting and agreement
8	AFC Software Development Kit			70,000	Depending on the supporting level from AFC
9	Develop software interfacing software			50,000	
	Sub total			623,000	
Initial Construction Cost				869,200	
Contingency				130,800	15% of Initial Construction Cost
Total				1,000,000	
O&M Cost per year				131,640	

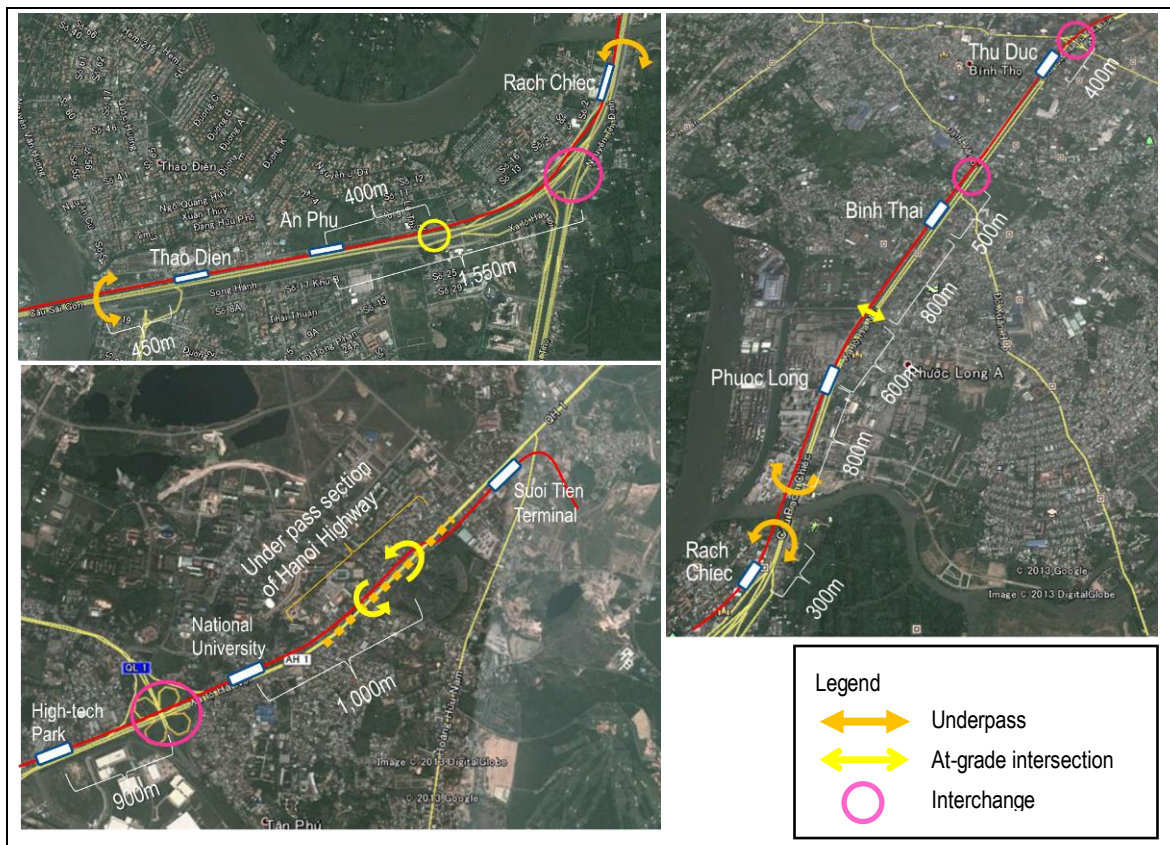
Source: Study Team



2) Improvement of Accessibility (Supplemental Study of the U-Turn Flyover Bridge)

(1) Issue on Accessibility for the UMRT Station in the Viaduct Section

As mentioned in Section 4.1 3) on the Planning Issues Regarding the Condition of the Station Areas, accessibility to the UMRT stations in the viaduct section from Thao Dien to Suoi Tien is interfered by the Hanoi Highway running parallel to the UMRT Line 1. According to the current plan of the Hanoi Highway, the number of crossing points is quite limited. Three underpasses, three at-grade intersections and four interchanges are planned in a length of 13 km as shown in Figure 9.2.3. This issue will affect the accessibility of UMRT passengers who use feeder buses and private vehicles to access the UMRT stations. To address this issue, applicability of a U-turn flyover bridge is studied in this section.



**Figure 9.2.3 - Crossing Point of the Hanoi Highway**



## (2) Necessity of the U-turn Flyover Bridge

In general, the advantages of the U-turn flyover bridge for station area development are expected as follows:

- To reduce traffic congestion and accidents in crossing the highway
- To improve accessibility for feeder buses and private vehicles
- To connect urban areas on both sides of the highway

The necessity of the U-turn flyover bridge for the UMRT Line 1 is evaluated from the two viewpoints of effectiveness for the improvement of traffic safety for all vehicles and for the accessibility of the proposed bus routes.

As the result of the evaluation, the U-turn flyover bridge will effectively improve the accessibility in the An Phu station area as shown in Table 9.2.3. For three station areas of Phuoc Long, High-tech Park and Suoi Tien, a smaller effectiveness was recognized. However, the length of the carriageway of a U-turn bridge that is required will be at least 500 m. So it is not effective from the viewpoint of shorting the time required to cross the Hanoi Highway.

**Table 9.2.3 - Necessity of the U-Turn Flyover Bridge**

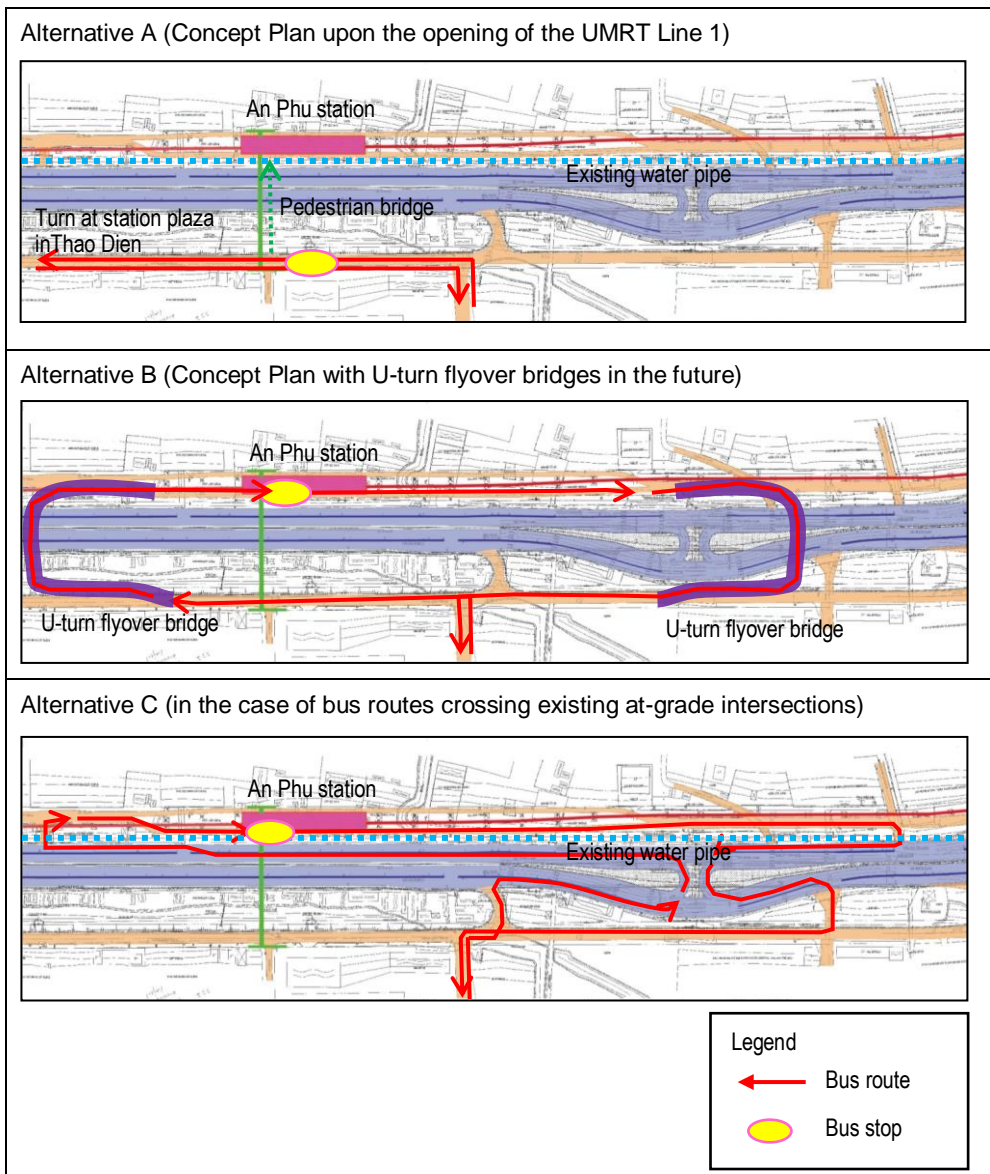
Station	Closest Crossing and the Distance from the UMRT Station	Across of Proposed Bus Route  W=with W/O=without	Evaluation of Effectiveness		Necessity of the U-turn Bridge
			Traffic Safety for all Vehicles	Accessibility for Feeder Buses	
6. Thao Dien	Underpass/450m	W/O	X	X	X
7. An Phu	At-grade intersection/400m	W/O	O	Δ	O
8. Rach Chiec	Underpass/300m	W	X	X	X
9. Phuoc Long	Underpass/800m At-grade intersection/600m	W	Δ	X	Δ
10. Binh Thai	Interchange/500m	W	X	X	X
11. Thu Duc	Interchange/400m	W	X	X	X
12. High Tech Park	Interchange/900m	W/O	X	Δ	Δ
13. Suoi Tien	Interchange/800m At-grade intersection in underpass section of Hanoi highway)/1,000m	W/O	X	Δ	Δ

Source: Study team

Note: O: Effective, Δ: Fair, X: No Effective

(3) Alternatives of the Concept Plan for U-turn Flyover Bridges at An Phu Station

Although the necessity of U-turn flyover bridges at An Phu station is proposed, there is difficulty in the construction due to the existing old water pipe running close to the Hanoi Highway and the UMRT Line 1. For this reason, development of U-turn flyover bridges is proposed as future development with the relocation of the existing water pipe line. As the concept plan of the intermodal facility upon the opening of the UMRT Line 1, the south side bus stop on the service road without a U-turn flyover bridge is proposed. (Alternative A as shown in Figure 9.2.4).



Source: Study Team

**Figure 9.2.4 - Alternatives of the Concept Plan of Intermodal Facilities Development in the An Phu Station Area**

### 3) Upgrading of Pedestrian Bridges

As mentioned in Section 4.1 3) on the Planning Issues Regarding the Condition of the Station Areas, the barrier free concept is not sufficiently considered in the existing plan of pedestrian bridges at UMRT stations. In addition, ease of walkability of the pedestrian bridge with a length of 100-150 m is one of the important factors for the convenience of UMRT usage. As the measure of upgrading of the pedestrian bridge in terms of the barrier free concept and walkability, the following items are considered in general. In this section, applicability of these items is studied.

- Widening
- Moving walkways
- Escalators and Elevators

#### (1) Widening and Moving Walkways

For the applicability of widening and installing moving walkways on the pedestrian bridges, the service level of the pedestrian bridges for the existing plan is evaluated as shown in Table 9.2.4. According to the Guideline of Sidewalks from the Ministry of Transport in Japan, the service level is categorized into the following:

- Service Level A: Free flow with less than 27 persons/width/minutes
- Service Level B: Restricted flow with less than 51 persons/width/minutes

$$\text{*Pedestrian flow in peak hour} = \text{Peak hour passenger} / \text{width (m)} / 60 \text{ (min)}$$

As a result of the evaluation, the pedestrian bridge at Rach Chiec station is judged as having service level B of restricted flow. In addition, the bridge length of 156 m is the longest among all of the elevated stations on the UMRT Line 1. Therefore, the improvement of capacity is proposed.

**Table 9.2.4 - Evaluation of the Capacities of the Existing Pedestrian Bridge Plan**

	Station	Passengers in 2040 (pax/day)	Coverage		Passengers from each direction	Peak hour passenger (pax/hour)	Demand on pedestrian bridge	Existing plan of Pedestrian Bridge		Service Level
				Share				Width (m)	Pedestrian flow in peak hour (per/ width/ min)	
6	Thao Dien	101,000	North	48.5%	48,985	3,968	O	3.0	23.4	A
			South	51.5%	52,015	4,213				
7	An Phu	15,000	North	17.0%	2,550	207	O	3.0	5.6	A
			South	83.0%	12,450	1,008				
8	Rach Chiec	102,000	West	14.2%	14,484	1,173	O	3.0	39.4	<b>B</b>
			East	85.8%	87,516	<b>7,089</b>				
9	Phuoc Long	64,000	West	27.2%	17,408	1,410	O	3.0	21.0	A
			East	72.8%	46,592	3,774				
10	Binh Thai	73,000	West	74.7%	54,531	4,417	O	3.0	8.3	A
			East	25.3%	18,469	1,496				
11	Thu Duc	65,000	West	48.0%	31,200	2,527	O	3.0	15.2	A
			East	52.0%	33,800	2,738				
12	High-Tech Park	26,000	West	35.6%	9,256	750	O	3.0	7.5	A
			East	64.4%	16,744	1,356				
13	Suoi Tien	21,000	West	79.5%	16,695	1,352	O	3	1.9	A
			East	20.5%	4,305	349				

Source: Study Team

As a measure for the improvement of capacities on the pedestrian bridge at Rach Chiec station, three options with the widening and installation of moving walkways are proposed and evaluated from the viewpoints of effectiveness and cost as shown in Table 9.2.5.

In the evaluation, pedestrian flow in the peak hour of the moving walkway is estimated at 1.5 times the normal passage without the moving walkway.

Based on the evaluation, Option 3 with only widening is proposed due to the highest improvement rate. In addition, Options 1 and 2 will be additionally required with the maintenance cost.

**Table 9.2.5 - Upgrading of Pedestrian Bridge at Rach Chiec Station**

Item		Existing Plan	Upgrading of Pedestrian Bridge		
			Option-1	Option-2	Option-3 (Proposed)
Widening	Width	3.0m	5.8m (+2.8m)	4.4m (+1.4m)	4.4m (+1.4m)
	Additional Construction cost (million VND)	-	22,182	11,091	11,091
Moving walkway (w=800mm, inc. bridge reinforcement)	Type	-	Two way	One way	-
	Additional Construction cost (million VND)	-	34,400	13,890	-
Total Additional Cost (million VND)		-	56,582	24,981	11,091
Pedestrian flow in peak hour (person/ width/ min)		39.4	17.9	24.6	26.9
Service Level		B	A	A	A
Improvement Rate (Decreasing of flow/ Cost (bil VND)			0.38	0.59	1.12

Source: Study Team

## (2) Escalators and Elevators

For the barrier free concept, escalators and elevators are helpful equipment. However, physical land space surrounding the entrance of the pedestrian bridges is limited. For this reason, installation of additional escalators and elevators into the existing plan of the pedestrian bridge is proposed for the station area which has available space such as the station plaza and on-ground parking under the pedestrian bridge.

(3) Proposed Upgrading of Pedestrian Bridges

Proposed upgrading of the pedestrian bridge is summarized in Table 9.2.6.

**Table 9.2.6 - Summary of Upgrading the Pedestrian Bridges**

Station	Upgrading Item			
	Widening	Moving Walkway	Escalator	Elevator
5. Tan Cang	X	X	X	O (station plaza)
6. Thao Dien	X	X	O (station plaza)	O (station plaza)
7. An Phu	X	X	X	O (parking)
8. Rach Chiec	O (+1.4m)	X	O (station plaza)	O (parking)
9. Phuoc Long	X	X	X	O (parking)
10. Binh Thai	X	X	X	O (parking)
11. Thu Duc	X	X	X	O (station plaza)
12. High-Tech Park	X	X	X	O (station plaza)
13. Suoi Tien	X	X	X	O (station plaza)

Source: Study Team

#### 4) Intermodal Transfer Information Display System

To provide for smooth and convenient transfers from the HCMC UMRT Line 1 to feeder buses, the installation of information display systems at the station plazas of the UMRT stations which have feeder bus lines is proposed.

##### *Concept of the Information Displays*

The information display systems will have two functions, they will display the departure times and schedules of the feeder bus lines to improve the intermodal transfer experience and in addition, the information display systems will also be capable of displaying advertising, thus providing a source of revenue for the transportation operator. Also, all information displays should be connected online to a central location to provide for the easy updating of information (bus information, digital advertising) and also for the easy monitoring of malfunctions of the information display hardware.

In addition, the information display system should have capabilities of tracking the location of buses via GPS and displaying real-time bus information.

Table 9.2.7 shows the required number of information displays to be installed for this proposal. A total of 18 information displays are proposed to be installed in 12 station plazas of UMRT stations.

**Table 9.2.7 - Required Number of Information Displays**

	<b>UMRT Station Plaza</b>	<b>Number of Information Displays</b>
1	Tan Cang	4
2	Thao Dien (North)	2
3	Thao Dien (South)	1
4	An Phu (South)	1
5	Phuoc Long (East)	1
6	Binh Thai (West)	1
7	Thu Duc (West)	2
8	High-Tech Park (East)	1
9	Suoi Tien (North)	1
10	Suoi Tien (South)	1
12	Suoi Tien Terminal	3
	<b>Total</b>	<b>18</b>

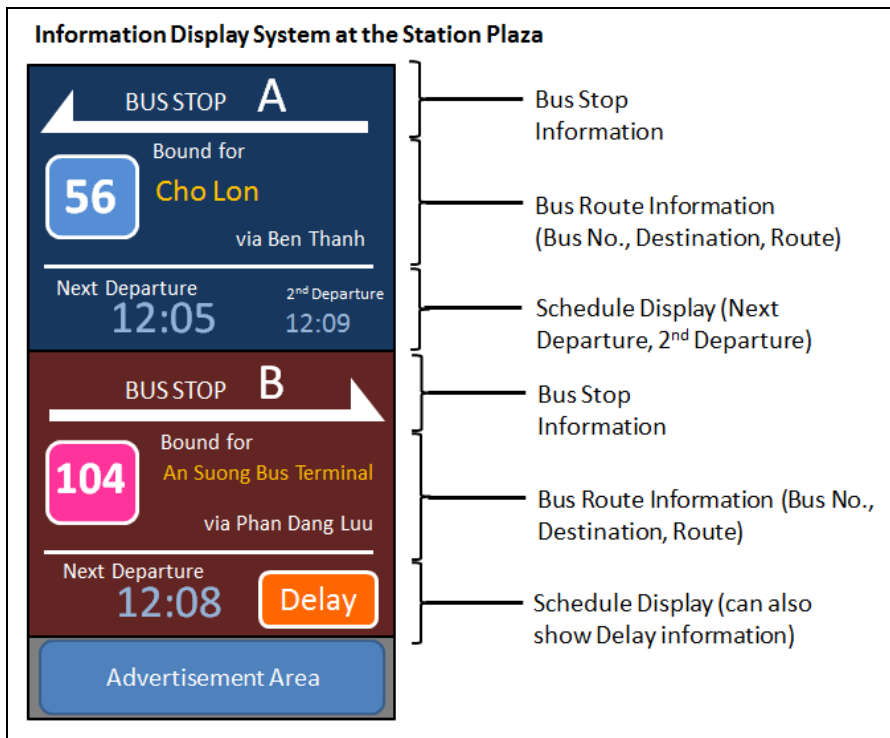
Source: Study Team

### *Visualization of the Information Displays*

Figure 9.2.5 shows a visualization of the proposed information display system at the UMRT station plazas. The information display system should utilize commercial use large sized LCD displays (60 inch or greater) and should be capable of displaying three rows of information. The departure point for all feeder bus lines will be at the station plazas, so the top row should display the next departing feeder bus line and the middle row should display the 2<sup>nd</sup> departing feeder bus line. The bottom row should be reserved for digital advertising.

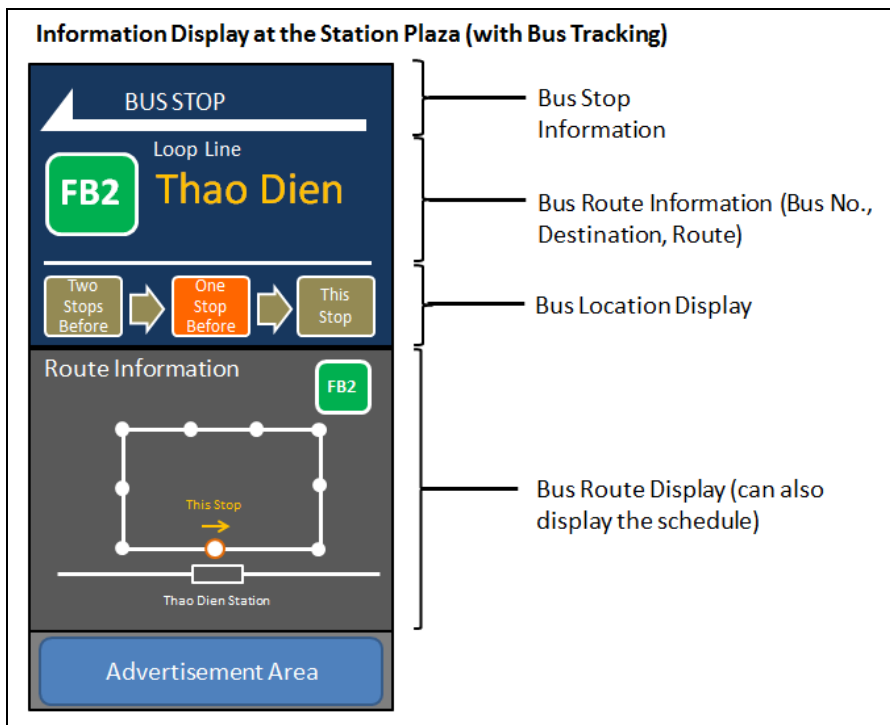
Figure 9.2.6 shows a visualization of the bus location tracking capabilities of the information display system. In the case where the information displays are installed at bus stops along the feeder bus lines, using bus location tracking technology utilizing GPS, passengers can be informed of where the bus is and when the bus will arrive at the bus stop.





Source: Study Team

**Figure 9.2.5 - Information Display System Example at the UMRT Station Plazas**



Source: Study Team

**Figure 9.2.6 – Information Display Example with Bus Location Tracking**

### *Functions of the Information Display System*

Table 9.2.8 shows the options, implementation cost and running cost for the functions of the information display system. Option 1 is the most expensive scheme as it implements bus location tracking for all feeder buses and for buses originating from Tan Cang and Suoi Tien Terminal stations. In this case, every single feeder bus and buses originating from Tan Cang and Suoi Tien Terminal stations would have GPS devices equipped. With bus location tracking, the information displays at the station plazas can display real-time bus operating information such as delays or changes in the bus timetables.

Option 2 is the second most expensive scheme. Unlike Option 1, bus location tracking is only enabled on the bus lines that require it. In this case, it is assumed that 50 buses will be equipped with the GPS devices. In this case, only the bus routes that are equipped with bus location tracking are able to display real-time bus operating information on the information displays at the station plazas.

Option 3 is the least expensive scheme. In this case, bus location tracking is not implemented and static bus timetables and departure times are displayed on the information displays at the station plazas. Due to the online connection of the information displays, the static bus timetable contents can be updated in real-time from a central location.

**Table 9.2.8 - Implementation Options for the Information Display System**

Exchange Rate: US\$1 = JPY 103.9

	Outline of the Functions	Bus Tracking	Connectivity of the Information Displays	Operations	Maintenance	Expandability	Cost Estimates
Option 1	<p><u>Bus Tracking System</u></p> <ul style="list-style-type: none"> <li>- All of the buses to be equipped with GPS devices for location tracking (547 buses)*</li> <li>- Information displays to show location and information of buses</li> </ul> <p><u>Information Display System</u></p> <ul style="list-style-type: none"> <li>- Installation of information displays at 18 station plazas</li> <li>- All of the information displays to be connected through an online system and bus information/location and digital advertising to be delivered on a real-time basis</li> </ul>	All Bus Lines	All information displays to be connected online to a central location	<ul style="list-style-type: none"> <li>- All of the information displays are connected online, so it is easy to change and update the information regarding the bus information and advertising</li> <li>- Able to display changes in the bus schedule or delays based on the real-time bus tracking information</li> </ul>	<ul style="list-style-type: none"> <li>- Easy to maintain contents and monitor for malfunction due to connected online system</li> </ul>	<ul style="list-style-type: none"> <li>- All buses equipped with GPS devices, so it is easy to expand the information displays to bus stops along the bus routes</li> <li>- Easy to display bus route changes</li> </ul>	<p><u>Excluding Suoi Tien Terminal Implementation Cost</u></p> <p>283 million yen (US\$2.7 million)</p> <p><u>Running Cost</u></p> <p>26.1 million yen (US\$251,000)</p> <p><u>Suoi Tien Terminal Only Implementation Cost</u></p> <p>13.1 million yen (US\$126,000)</p> <p><u>Running Cost</u></p> <p>0.1 million yen (US\$962)</p>
Option 2	<p><u>Bus Tracking System</u></p> <ul style="list-style-type: none"> <li>- Buses on certain bus lines will be equipped with GPS devices for location tracking (50 buses)**</li> <li>- Information displays to show location and information of the buses that have the GPS devices</li> </ul> <p><u>Information Display System</u></p> <ul style="list-style-type: none"> <li>- Installation of information displays at 18 station plazas</li> <li>- All of the information displays to be connected through an online system and bus information/location and digital advertising to be delivered on a real-time basis</li> </ul>	Certain Bus Lines	All information displays to be connected online to a central location	<ul style="list-style-type: none"> <li>- All of the information displays are connected online, so it is easy to change and update the information regarding the bus information and advertising</li> <li>- Able to display changes in the bus schedule or delays based on the real-time bus tracking information for the buses equipped with the bus tracking equipment</li> </ul>	<ul style="list-style-type: none"> <li>- Easy to maintain contents and monitor for malfunction due to connected online system</li> </ul>	<ul style="list-style-type: none"> <li>- For the installation of information displays to bus routes along bus routes, GPS devices may need to be installed on buses for the corresponding bus routes</li> <li>- Easy to increase the number of information displays</li> </ul>	<p><u>Excluding Suoi Tien Terminal Implementation Cost</u></p> <p>169.7 million yen (US\$1.6 million)</p> <p><u>Running Cost</u></p> <p>18.5 million yen (US\$178,000)</p> <p><u>Suoi Tien Terminal Only Implementation Cost</u></p> <p>13.1 million yen (US\$126,000)</p> <p><u>Running Cost</u></p> <p>0.1 million yen (US\$962)</p>
Option 3	<p><u>No Bus Tracking System</u></p> <p><u>Information Display System</u></p> <ul style="list-style-type: none"> <li>- Installation of information displays at 18 station plazas</li> <li>- All of the information displays to be connected through an online system and bus information and digital advertising to be delivered on a real-time basis</li> </ul>	Not Available	All information displays to be connected online to a central location	<ul style="list-style-type: none"> <li>- All of the information displays are connected online, so it is easy to change and update the information regarding the bus information and advertising</li> <li>- No bus tracking, so real-time changes in the bus schedule or delay information will not be displayed</li> </ul>	<ul style="list-style-type: none"> <li>- Easy to maintain contents and monitor for malfunction due to connected online system</li> </ul>	<ul style="list-style-type: none"> <li>- System can be upgraded to track buses</li> <li>- Easy to increase the number of information displays</li> </ul>	<p><u>Excluding Suoi Tien Terminal Implementation Cost</u></p> <p>110.6 million yen (US\$1.0 million)</p> <p><u>Running Cost</u></p> <p>17.8 million yen (US\$171,000)</p> <p><u>Suoi Tien Terminal Only Implementation Cost</u></p> <p>13.1 million yen (US\$126,000)</p> <p><u>Running Cost</u></p> <p>0.1 million yen (US\$962)</p>
Note:	<p>*The required number of GPS devices for the feeder bus lines, buses originating from Tan Cang and buses originating from Suoi Tien Terminal</p> <p>**Assumed number of GPS devices on certain bus lines to be equipped with GPS devices</p>						

*Recommendations from the Study Team*

Based on the three options listed, the Study Team recommends the implementation of Option 3 as this is the least expensive scheme and displaying static bus timetable and departure information on the information displays at the station plazas is sufficient to provide a convenient intermodal transfer experience for UMRT passengers. Based on future needs and demands, the system can be expanded in the future to include bus location tracking for a number of bus lines as outlined in Option 2 or to provide bus location tracking for all bus lines as outlined in Option 1. In addition, in the future, with the implementation of bus location tracking, information displays can be installed at bus stops along the bus routes to improve the transit experience for passengers boarding buses outside of the station plazas.

### 9.3 Concept Plan of the Intermodal Facilities

#### 1) Summary of the Concept Plan of the Intermodal Facilities

The concept plan of intermodal facilities for each station area is summarized in Table 9.3.1. Proposed facilities are categorized into three types of development phases as follows:

- Phase I: completion by the UMRT opening in 2018
- Phase II: completion by 2020
- Phase III: completion after 2020

**Table 9.3.1 - Summary of the Concept Plan of the Intermodal Facilities**

No.	Station	Layout	Proposed Intermodal Facility																			
			Station Plaza			Bus Stop/Taxi Stop/Motorcycle Stop			Parking						Upgrade and extension of pedestrian bridge			Improvement of Access road and pedestrian space				
									Car			MC/ bicycle										
I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III					
<b>A. CBD Zone</b>																						
1	Ben Thanh	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	●	-		
2	Opera House	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	●	-		
3	Ba Son	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	●	-		
4	Van Thanh Park	North	-	●	-	-	-	-	-	-	●	-	-	-	-	-	-	-	●	-	●	
5	Tan Cang	North	●	-	-	-	-	-	-	-	●	-	-	-	●	-	-	-	●	-	-	
		South	-	-	●	-	-	-	-	-	-	●	-	-	●	-	-	-	●	-	-	-
<b>B. Development Zone in District 2</b>																						
6	Thao Dien	North	●	-	-	●	-	-	-	-	-	-	-	●	-	-	-	-	-	-	●	
		South	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●
7	An Phu	North	-	-	-	●	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	
		South	-	-	-	●	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-
<b>C. Existing Urbanized Zone</b>																						
8	Rach Chiec	West	-	-	-	●	-	-	-	-	-	-	●	-	-	-	●	-	-	-	●	
		East	-	-	●	●	-	-	-	-	-	●	●	-	-	-	-	-	-	-	-	-
9	Phuoc Long	West	-	●	-	-	-	-	-	-	-	-	●	-	-	-	●	●	-	-	-	●
		East	-	-	-	●	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-
10	Binh Thai	West	-	-	-	●	-	-	-	-	-	-	●	-	-	-	●	-	-	-	-	
		East	-	-	-	●	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-
11	Thu Duc	West	-	-	●	●	-	-	-	-	●	●	-	-	-	●	-	●	-	-	-	
		East	-	-	●	●	-	-	-	-	-	●	●	-	●	-	-	-	-	-	-	-
<b>D. University and High-tech Park Zone</b>																						
12	High-tech Park	West	-	-	-	●	-	-	-	-	-	-	●	-	-	-	●	-	-	-	-	
		East	●	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-
13	Suoi Tien	West	-	-	●	●	-	-	-	-	-	-	●	-	-	-	●	●	●	-	-	-
		East	-	●	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-
14	Suoi Tien Terminal	East	●	-	-	-	-	-	●	-	-	●	-	-	-	-	-	-	-	-	-	

Source: Study Team

## 2) Concept Plans in the CBD Zone (Ben Thanh to Tan Cang)

### (1) Regional Vision and Strategies for Intermodal Facility Development

**Regional Vision:** Renovation for advanced and attractive pedestrian space and cityscape to suit the core center of HCMC

**Development Strategy:**

- Renovation of major streets as attractive and comfortable pedestrian corridors
- Create a cityscape and green space considering the historical and cultural facilities
- Formulate an underground pedestrian network to connect the UMRT station with commercial buildings
- Establish eco-friendly transport institutions (restriction of private vehicles, rental electric bicycle network, etc.)

### (2) Concept Plan in the Ben Thanh Station Area

#### a) Development Concept

- Formulation of an underground pedestrian network connecting with the UMRT stations, underground bus terminal, underground parking, underground mall and commercial buildings
- Renovation for comfortable pedestrian spaces on the ground
- Formulation of a rental bicycle network in the city center

#### b) Design Concept

- **Bus stops:** Install required bus facilities into the underground bus terminal
- **Pedestrian space:** Alteration of the layout of station entrances to meet the on-ground renovation plan
- **Transit space and parking:** Assumption that taxi space, motorcycle taxi space, parking for private cars and bicycles will be secured by private facilities and commercial buildings

### (3) Concept Plan in the Opera House Station Area

#### a) Development Concept

- Formulation of an underground pedestrian network connecting with the UMRT station and commercial buildings
- Renovation of pedestrian spaces taking into consideration the historical landscape such as the Opera House and People's Committee Office

b) Design Concept

- **Pedestrian space**: Renovation of Le Loi Street to a pedestrian corridor after the construction of the UMRT
- Development of open space and low-rise planting to secure the historical landscape of the Opera House and the People's Committee Office
- Alteration of the layout of station entrances to meet the on-ground renovation plan
- **Transit space and parking**: Assumption that taxi space, motorcycle taxi space, parking for private cars and bicycles will be secured by private facilities and commercial buildings

(4) Concept Plan in the Ba Son Station Area

a) Development Concept

- Formulate a transit core for the waterfront urban area along the Saigon River
- Create an underground pedestrian space connecting with the urban redevelopment area along the new corridor as an extension of Le Loi street

b) Design Concept

- **Pedestrian space**: Widen underground pedestrian crossing Ton Duc Tang Street for the development of an underground pedestrian corridor connecting the future urban redevelopment along Le Loi street
- **Transit space and parking**: Assumption that taxi space, motorcycle taxi space, parking for private cars and bicycles will be secured by private facilities and commercial buildings



Source: Study Team

**Figure 9.3.1 - Layout Plan of the Intermodal Facility for the Ba Son Station Area**

(5) Concept Plan in the Van Thanh Station Area

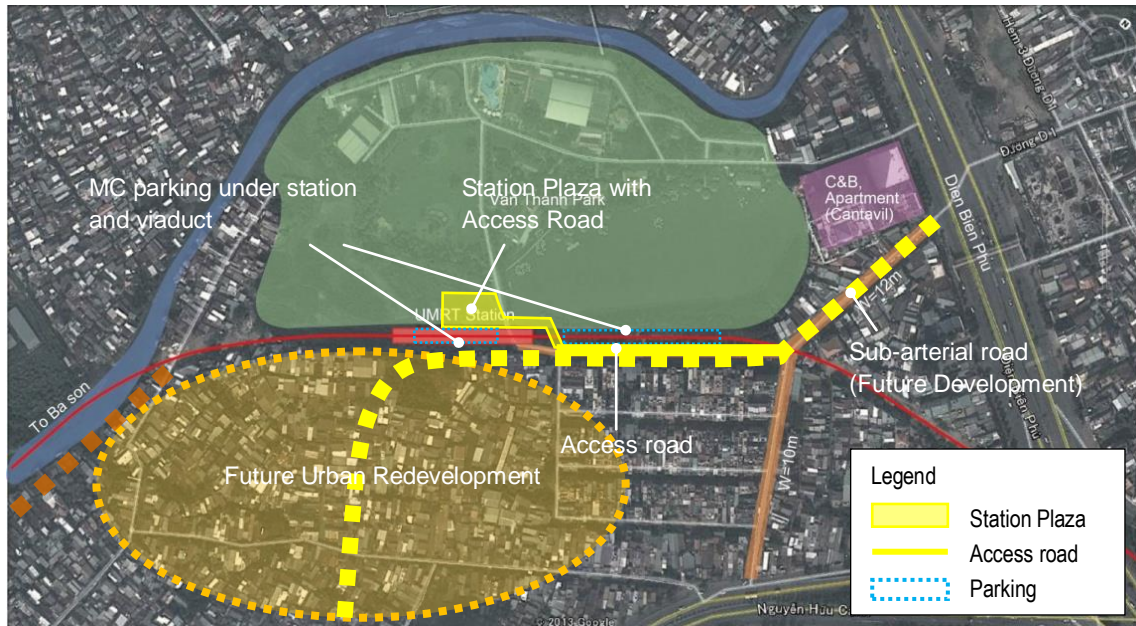
a) Development Concept

- Formulation of an integrated urban space that is in harmony with Van Thanh Park
- Formulation of an urban transit centre to be a core of future urban redevelopment in the surrounding area in the south of the station

b) Concept of Layout and Design

- **Station plaza:** A station plaza with an area of 4,400 m<sup>2</sup> is proposed to be located in the existing public park and pond to secure a safe transit space not only for the UMRT users but also for park visitors. The plaza is to be installed with a bus berth for tour buses although there are no plans for feeder bus services. Regarding the structure of the station plaza, the foundation with pillars is proposed in the same area as the foundation of the station building. In addition, an underground culvert is to be installed to conserve the existing water flow between the pond and canal.
- **Parking:** Public motorcycle parking with a total capacity of 1,039 lots is laid out on the ground floor of the station and under the viaduct. The distance is within 200 m of the entrance of the UMRT station.
- Public car parking is not proposed in consideration of the unexpected park and ride usage due to the walkable and small station coverage and the poor existing road conditions. However it is expected that car parking will be developed by the private sector in the future urban redevelopment.
- **Access road:** Improvement of an existing street by widening the street to a 16 m width along the railway is proposed to secure the safety of pedestrians. The widening doesn't require extra land recovery due to the usage of the right-of-way of the railway. A passage with a 6 m width in the south of the station is proposed to access the motorcycle parking and maintenance room in the station building.
- A sub arterial road with a 25 m width connecting with Dien Bien Phu Street and Ngyuen Huu Canh Street is already designated in the Zoning Plan of Binh Thanh District. The sub arterial road will be the main access road to Van Thanh Park station in the future.
- **Station facility:** The location of the elevator in the station building is proposed to shift to the north side of the station stairs to secure accessibility between the ticket gate and Van Thanh Park.





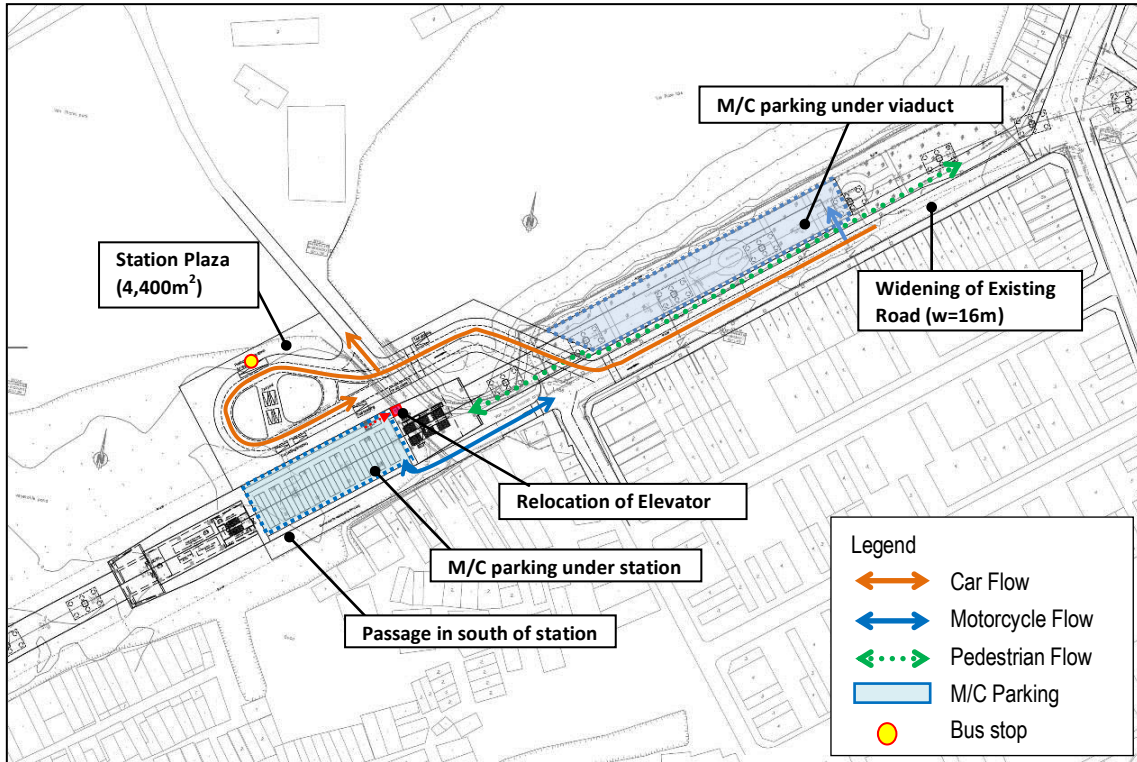
Source: Study Team

**Figure 9.3.2 - Layout Plan of the Van Thanh Station Area**

**Table 9.3.2 - Specification of Intermodal Facilities for the Van Thanh Station Area**

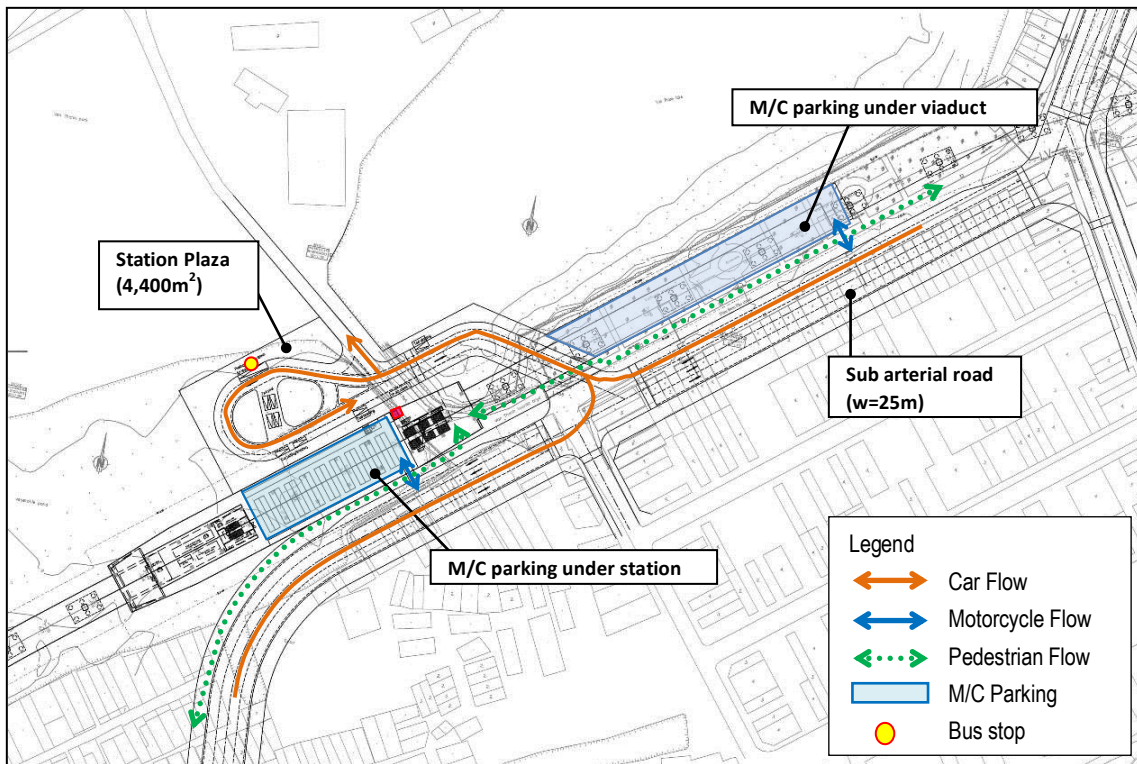
Item		Capacity/No. of Berths	Size	Development Phase	B/D in SAPI study	Remarks
Station Plaza	North station plaza	Bus stop: 1 (for tour bus) Taxi berth (boarding:1, alighting:1) Taxi waiting: 3 Private car space: 2 M/C taxi space: 1 Including access road (w=20m, l= 80m) Installing underground culvert	4,400m <sup>2</sup>	Phase II	✓	Need land recovery
Parking	M/C parking under station	M/C and bicycle: 443 lots	1,110m <sup>2</sup>	Phase I	✓	
	M/C parking under viaduct	M/C and bicycle: 596 lots	1,640m <sup>2</sup>	Phase I	✓	
Access Road	Widening of existing street along railway	W=16m, Length=200m	3,200m <sup>2</sup>	Phase I	✓	
	Passage in south of station	W=6m, Length=120m	720m <sup>2</sup>	Phase I	✓	
	Sub arterial road	W=25m	-	Phase III		Future development
Others	Relocation of an elevator in station building	Relocate to north side of escalator	-	-		Propose to station design

Source: Study Team



Source: Study Team

**Figure 9.3.3 - Concept Plan of the Van Thanh Station Area (Phase I and II)**



Source: Study Team

**Figure 9.3.4 - Concept Plan of Van Thanh Station Area (in the future)**



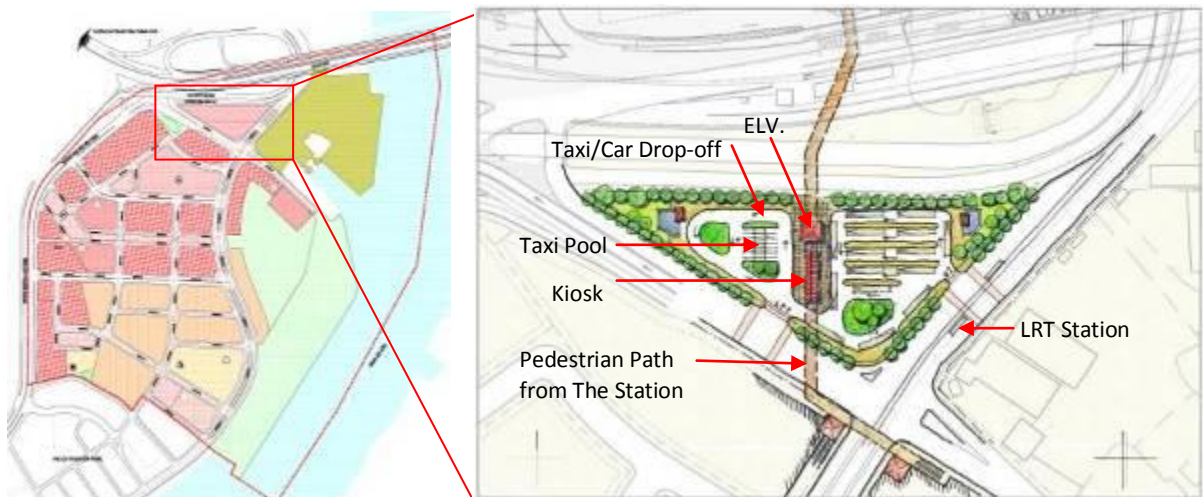
(6) Concept Plan in the Tan Cang Station Area

a) Development Concept

- Formulation of an eastern transit hub of the CBD zone, connecting with the UMRT line
- Formulation of a bus terminal to access the city center in the pre-opening of the UMRT Line 1

b) Comparison with Alternatives of the Station Plaza

According to the approved Zoning Plan on the expanded CBD area, a station plaza with a bus terminal and taxi pool with an area of 1.0 ha is already designated in existing industrial area to the south of the Saigon Bridge as shown in Figure 9.3.5. However, the military owns the land in the Tan Cang Area so that the city authority does not fully control the area's development according to the approved zoning plan. The Tan Cang station area is required to be a transit hub with a bus terminal for 10 bus routes in the pre-opening of the UMRT Line 1 in 2018. Nevertheless, the development schedule of the area's development in the military's land is quite unclear.



Source: The Study Team based on the Zoning Plan on the Expanded CBD Area

**Figure 9.3.5 - Station Plaza of Tan Cang Station Based on the Approved Zoning Plan**

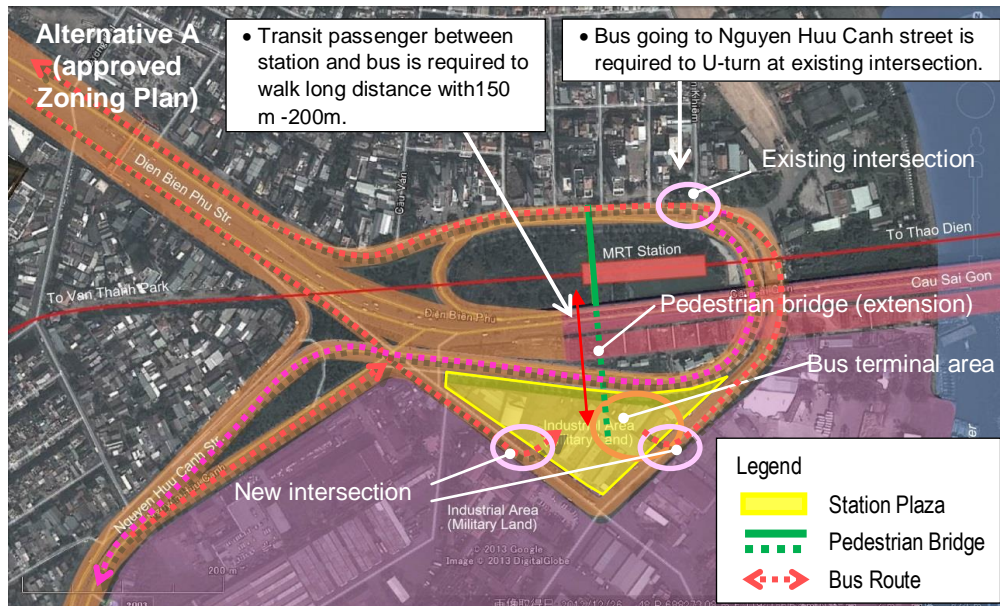
For this reason, two alternatives for the station plaza of Tan Cang station are proposed and are compared from the viewpoint of smoothness of bus operations and passenger convenience as shown in Table 9.3.3, Figure 9.3.6 and Figure 9.3.7.

As a result of this comparison, Alternative B of the station plaza in the existing green area on the north side of the station is proposed for the pre-opening of the UMRT Line 1 in 2018. However, Alternative A will be required for the transit space for future urban development in the military land. So, Alternative A is also proposed as the south station plaza for the future.

**Table 9.3.3 - Comparison of Alternatives A and B**

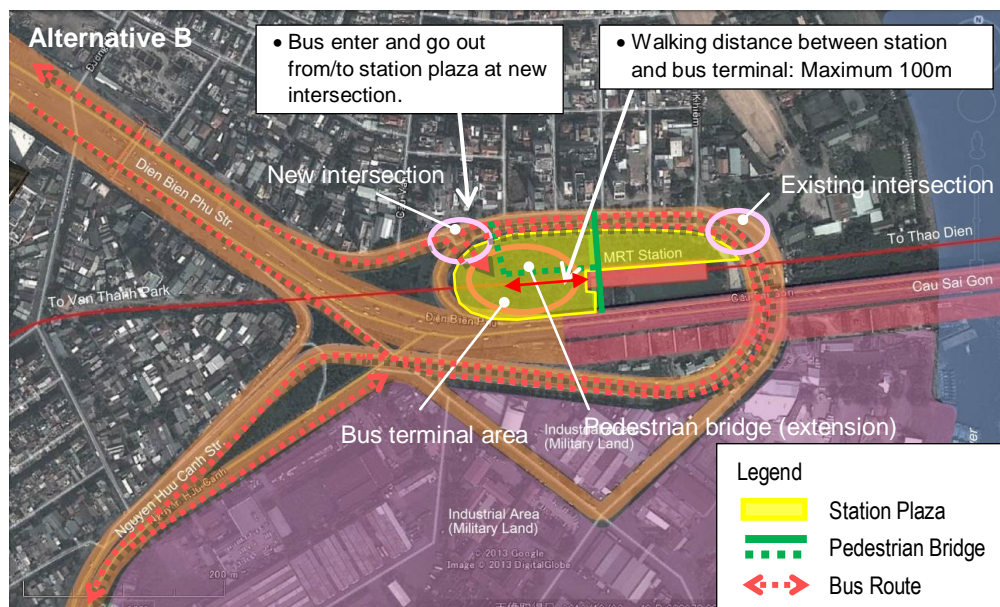
Items	Alternative A (Current Plan)	Alternative B (Proposed)
Smoothness of bus operations	Bus starting from the station plaza to Nguyen Huu Canh street is required U-turn at the existing intersection on Dien Bien Phu Street. It will affect smooth bus operations.	Buses enter and go out to/from the station plaza at new the intersection. All buses are smoothly operated without a U-turn on the arterial road.
Passenger convenience	Transit passengers between the station and bus are required to walk long distances, 150 m- 200 m.	Walking distance between the station and bus terminal is reduced to a maximum of 100 m.

Source: Study Team



Source: Study Team

**Figure 9.3.6 - Approved Station Plaza Plan in the Tan Cang Station Area (Alternative A)**



Source: Study Team

**Figure 9.3.7 - Proposed Station Plaza in the Tan Cang Station Area (Alternative B)**

b) Concept of Layout and Design

The concept of layout and design of intermodal facilities in the Tan Cang station area is explained as below and specification of the proposed intermodal facilities is summarized as shown in Table 9.3.4.

- **Station plaza:** A station plaza with an area of 13,000 m<sup>2</sup> is proposed at the space of the existing green area to the north of the station and under the viaduct. It consists of a bus terminal area, pedestrian circular space and taxi and car space. Each area is separated to reduce the traffic conflict within the station plaza. A bus alighting berth is located east of the station gate for the convenience of transiting and eight bus boarding berths are laid out in the station plaza and along Dien Bien Phu Street. Taxi berths and private car berths are laid out near the station entrance for the users' accessibility and safety.
- The south station plaza with an area of 10,000 m<sup>2</sup> on the approved zoning plan is proposed as the future intermodal facility facing with urban development area in the military land. It consists of taxi space, bus parking and transit space for the LRT.
- **Parking:** Motorcycle parking is laid out on the ground floor of the station and under the viaduct of the new Saigon Bridge. The gate is located at the intersection on Dien Bien Phu Street in order for safe access by the controlled traffic signal.
- Public car parking is not proposed in consideration of the unexpected park and ride usage due to the short distance to the city center and for the reduction of private cars entering into station area as much as possible. However, it is expected that car parking will be developed in the surrounding areas by the private sector in the future.
- **Pedestrian bridge:** Upgrading of the pedestrian bridge is proposed to secure the accessibility and to implement the barrier-free concept. The upgrading includes the west side extension to access the bus terminal zone and the north-west urban area. It is installed with elevators at the major access points.
- The south side extension of the pedestrian bridge is proposed to connect to the south station plaza in the future.
- **Access road:** Improvement of two intersections at Dien Bien Phu Street are proposed to secure safety in the entering and exiting to/from the bus terminal zone and taxi/car zone. It includes the installation of a traffic signal system.
- **Commercial facility:** Tenant space for retail shops and a supermarket in the ground floor of the station building is proposed for the convenience of transiting passengers. It is located at the center space between the station gate and the motorcycle parking.





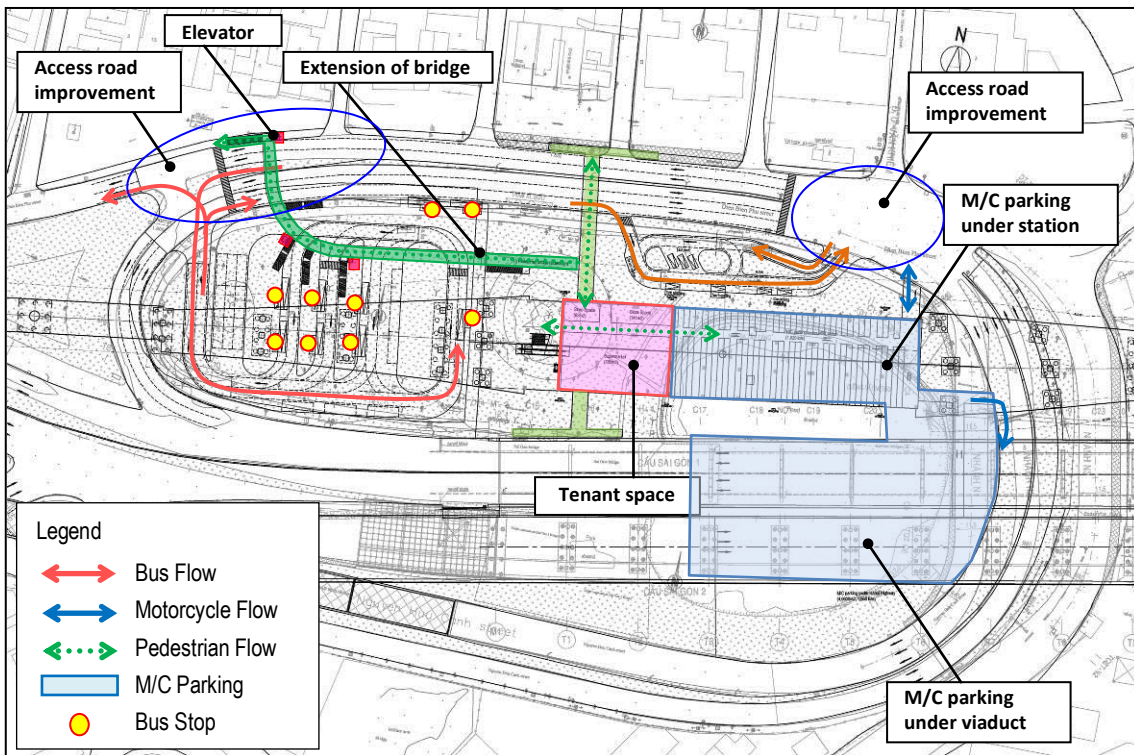
Source: Study Team

**Figure 9.3.8 - Layout Plan of the Tan Cang Station Area**

**Table 9.3.4 - Specification of Intermodal Facilities at the Tan Cang Station Area**

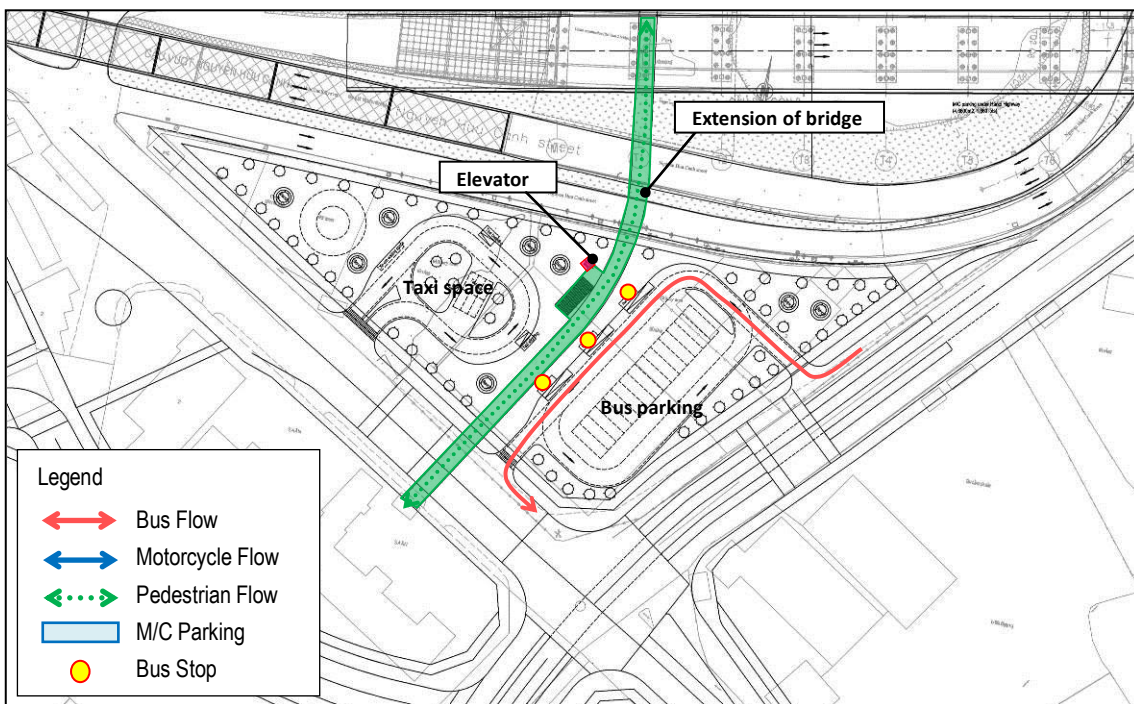
Item		Capacity/No. of Berths	Quantity	Development Phase	Remarks
Station Plaza	North station plaza	Bus berth (boarding:8, alighting:1) Bus parking:15 Taxi berth (boarding:1, alighting1) Taxi waiting: 3 Private car berth: 2 Motorcycle taxi berth: 1	13,000m <sup>2</sup>	Phase I	
	South station plaza	Transit space for LRT Bus parking:16 Taxi berth (boarding:1, alighting1) Taxi waiting: 6 Motorcycle taxi berth: 1	10,000m <sup>2</sup>	Phase III	
Parking	M/C parking under station	M/C and bicycle: 1,450 lots	3,900m <sup>2</sup>	Phase I	
	M/C parking under highway	M/C and bicycle: 1,832 lots	4,650m <sup>2</sup>	Phase I	
Pedestrian bridge	Northern extension of pedestrian bridge	Bridge extension (140 m), additional stair (5units), elevator (3)	1	Phase I	
	Northern extension of pedestrian bridge	Bridge extension (140 m), additional stair (5units), elevator (3)	1	Phase III	
Access road	Improvement intersection on Dien Bien Phu str.	W=25m, Length=100m, install traffic signal	2,500m <sup>2</sup>	Phase I	
Commercial facility	Store on ground floor of station building	Supermarket, café, etc.	1,000 m <sup>2</sup>	Phase I	

Source: Study Team



Source: Study Team

**Figure 9.3.9 - Concept Plan of the Tan Cang Station Area (upon UMRT opening)**



Source: Study Team

**Figure 9.3.10 - South Station Plaza at Tan Cang Station (in the future)**

### 3) Concept Plans in Development Zone in District 2 (Thao Dien to An Phu)

#### (1) Regional Vision and Strategies for Intermodal Facility Development

**Regional Vision:** Propose a new lifestyle with high ecology and health awareness like a developed city

**Development Strategy:**

- Create a safe and comfortable road space to promote a new transport style by public transport with bicycles
- Create an attractive space by connecting and integrating commercial development and the UMRT stations

#### (2) Concept Plan in the Thao Dien Station Area

##### a) Development Concept

- Formulation of an attractive UMRT station area through collaboration with private commercial developers
- Improvement of the road environment for a new transport style with the bicycle and UMRT

##### b) Concept of Layout and Design

The concept of layout and design of intermodal facilities in the Thao Dien station area is explained as below and specification of the proposed intermodal facilities is summarized as shown in Table 9.3.5.

- **Station Plaza:** The north plaza with an area of 1,500 m<sup>2</sup> and the south station plaza with an area of 4,700 m<sup>2</sup> are proposed. The north plaza consists of an open space with benches, a monument and greenery and excludes transit spaces. The south station plaza is laid out in the green zone of the Hanoi Highway. It includes the bus berth, bus parking, taxi berth, private car berth and the motorcycle taxi space. The bus berth and parking is used for feeder bus operations in the southern urban area.
- **Bus Stop:** For two feeder bus routes operated in the northern urban area, bus stops are set up on Quoc Huong Street and the service road and bus parking is laid out under the viaduct.
- **Taxi/ Car space:** The taxi berth, private car berth and motorcycle taxi space are laid out on the service road to the north of the station.
- **Parking:** Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed. These parking lots are laid out in consideration with keeping the distance within 200 m from the station entrance.



- Public car parking is not proposed in consideration of the unexpected park and ride usage due to the short distance to the city center. It is expected that public car parking will be developed under the viaduct and on the green area on the west side of the south station plaza in the future.
- **Pedestrian bridge:** A pedestrian bridge with a length of 150m to cross the Hanoi Highway was originally planned to connect between the UMRT station and both sides of the urban areas. However, only the extension of the pedestrian bridge is proposed to access to the south station plaza. The extension includes the installation of elevators and escalators. Extensions of the pedestrian bridge to commercial developments in the north of station were already planned by the private developer.
- **Commercial facility:** Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.
- **Access Road:** For the comfort and safety of bicycle users, improvement of the existing road in the north urban area is proposed as future development.



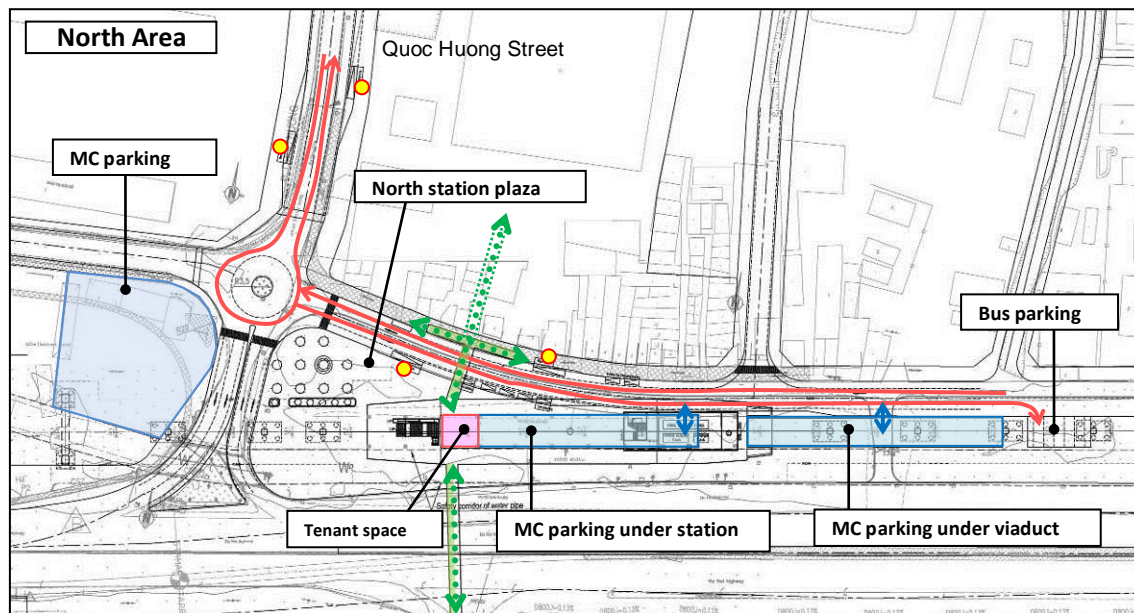
Source: Study Team

**Figure 9.3.11 - Layout Plan of the Thao Dien Station Area**

**Table 9.3.5 - Specification of Intermodal Facilities of the Thao Dien Station Area**

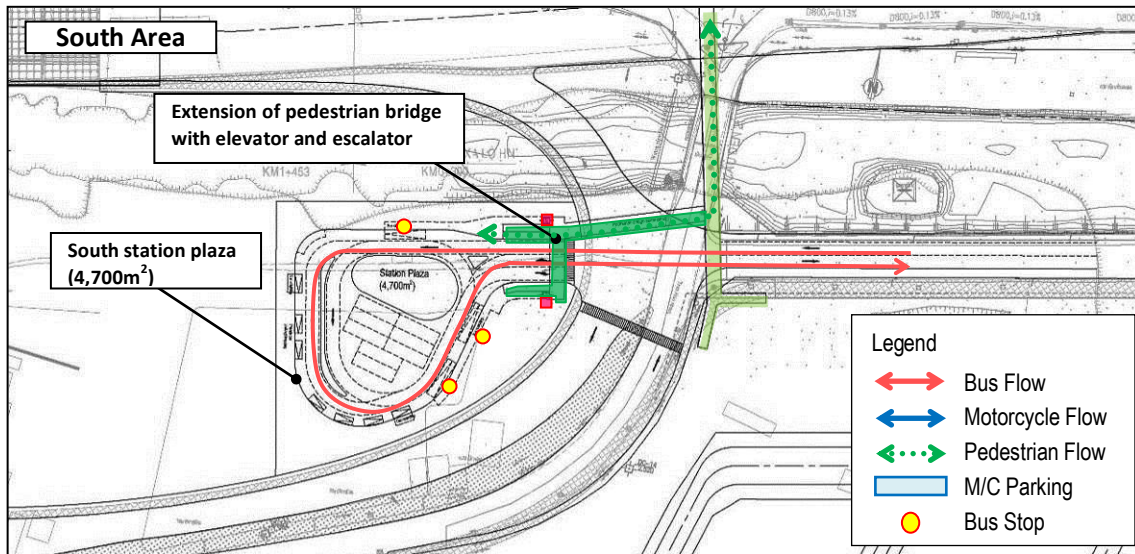
Item		Capacity/No. of Berths	Quantity	Development Phase	B/D in SAPI study
Station Plaza	North Station Plaza	Open space with landscape	1,500m <sup>2</sup>	Phase I	✓
	South Station Plaza	Bus berth (boarding: 2, alighting: 1) Bus parking: 8 Taxi berth (boarding: 1, alighting: 1) Taxi waiting: 3 M/C taxi space: 1 Private car space: 2	4,700m <sup>2</sup>	Phase I	✓
Bus Stop	North bus stop on Quoc Huong str.	2 bus stops (both side)	1	Phase I	✓
	North bus stop on service road	2 bus stops (both side)	1	Phase I	✓
	Bus parking under viaduct	5 lots	200m <sup>2</sup>	Phase I	✓
Taxi/ car Space	North taxi and car space on service road	Taxi boarding: 1 Taxi alighting: 1 Taxi waiting: 3 Private car waiting: 2	1	Phase I	✓
Parking	M/C parking under station	M/C and bicycle: 337 lots	900m <sup>2</sup>	Phase I	✓
	M/C parking under viaduct	M/C and bicycle: 328 lots	940m <sup>2</sup>	Phase I	✓
	North on-ground M/C parking	M/C and bicycle: 970 lots	2,610m <sup>2</sup>	Phase I	✓
Pedestrian bridge	Extension of pedestrian bridge	Bridge extension (60m), additional stair with escalator, elevator (2unit)	1	Phase I	✓
Commercial facility	Tenant space in station		150m <sup>2</sup>	Phase I	✓
Access road	Improvement existing road for bicycle lane	W=3m, Length=4 km	12,000m <sup>2</sup>	Phase III	

Source: Study Team



Source: Study Team

**Figure 9.3.12 - Concept Plan of the Thao Dien Station Area (upon UMRT opening)**



Source: Study Team

**Figure 9.3.13 - Concept Plan of the Thao Dien Station Area (upon UMRT opening)**

(3) Concept Plan in the An Phu Station Area

a) Development Concept

- Formulation of an attractive UMRT station area through the collaboration with private commercial development
- Improvement of the road environment for a new transport style with the bicycle and UMRT

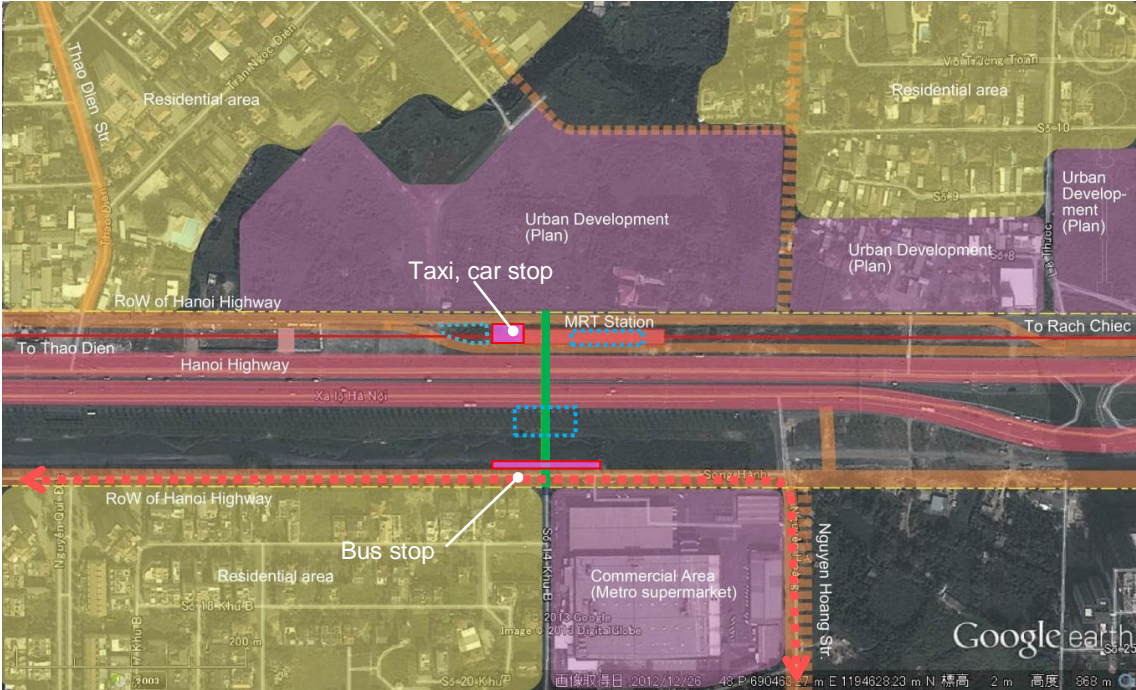
b) Concept of Layout and Design

Concept of layout and design of the intermodal facilities in the An Phu station area is explained as below and specification of the proposed intermodal facilities is summarized as shown in Table 9.3.6.

- **Bus Stop:** Separated bus stops in the south connecting with the service road are proposed for the proposed feeder bus operation. It includes separated spaces with an area of 650 m<sup>2</sup> in the green area of the Hanoi Highway. In addition, the taxi berth, private car berth and motorcycle taxi space are laid out on the service road.
- **Taxi/ Car space:** The taxi and car space under the viaduct with an area of 850 m<sup>2</sup> is proposed. It includes a taxi berth, private car berth and motorcycle taxi space.
- **Parking:** Three motorcycle parking lots under the station, under the viaduct and in the green area to the south of the station are proposed. These parking lots are laid out in consideration with keeping the distance within 200 m from the station entrance.

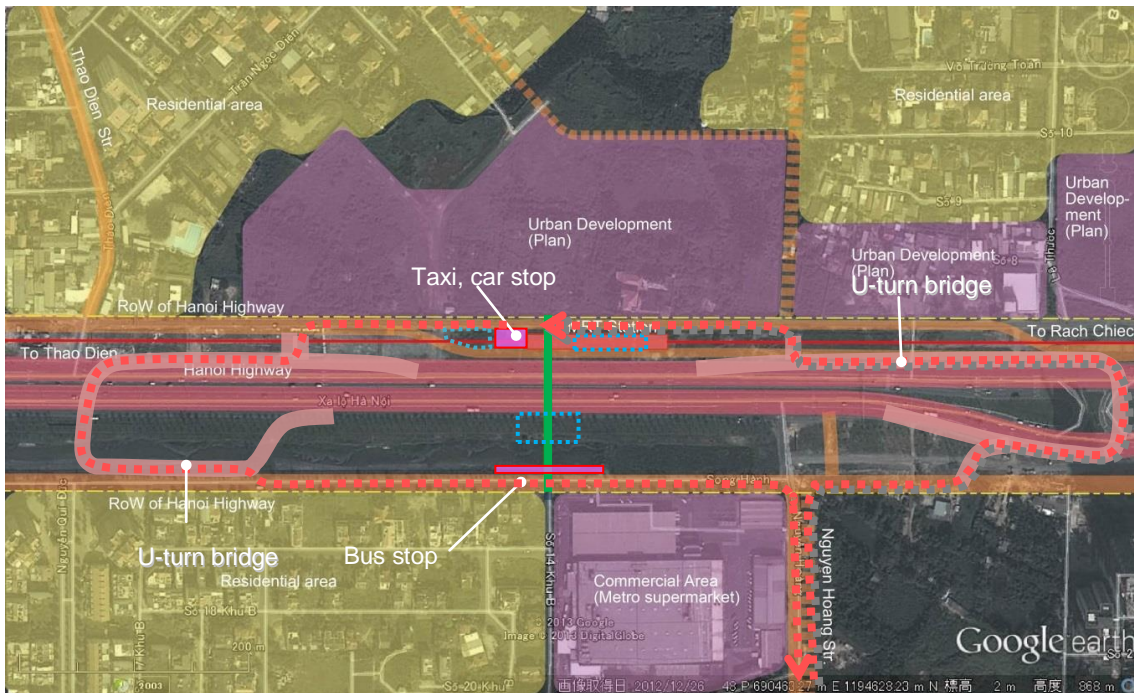


- **Pedestrian bridge:** Upgrading of the pedestrian bridge is proposed to access the proposed southern bus stop and the motorcycle parking. The upgrading includes additional stairs and installation of an elevator for the barrier-free concept.
- **Commercial facility:** Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.
- **Access Road:** As a future facility, a U-turn bridge on the Hanoi Highway is proposed to improve north-south accessibility. For the comfort and safety of bicycle users, development of executive bicycle lanes in the north urban development area is proposed.



Source: Study Team

Figure 9.3.14 - Layout Plan of the An Phu Station Area (upon UMRT opening)



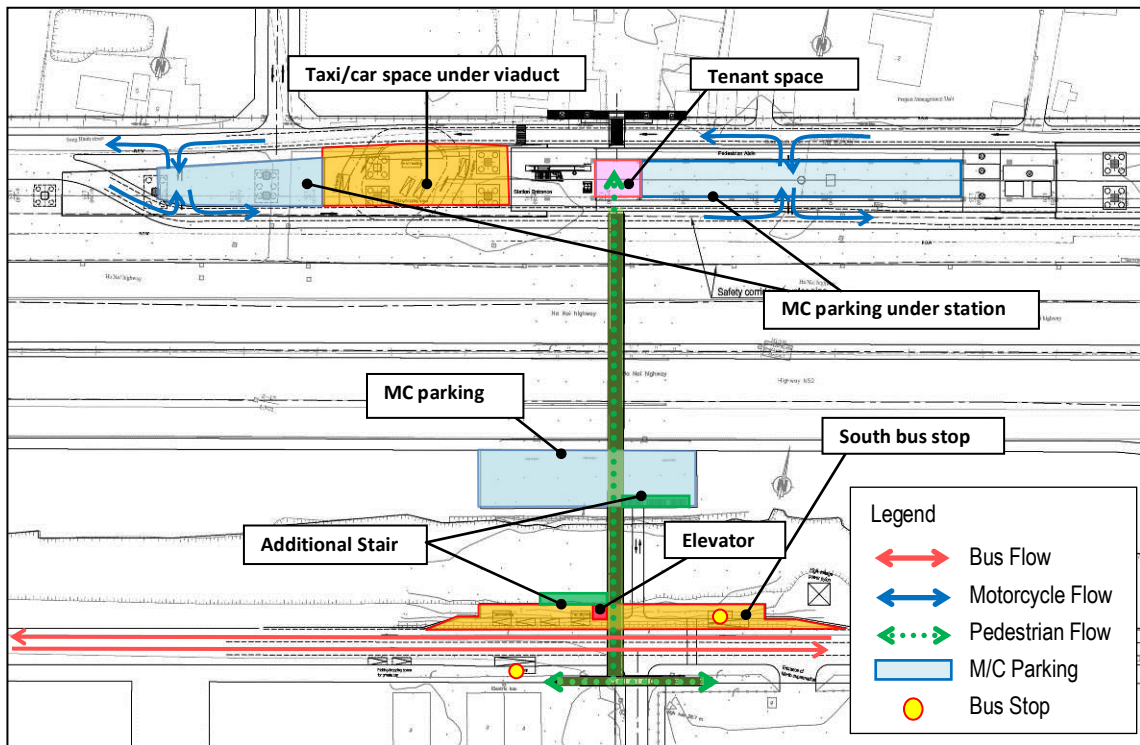
Source: Study Team

**Figure 9.3.15 - Future Plan of the An Phu Station Area (in the future)**

**Table 9.3.6 - Specification of Intermodal Facilities at the An Phu Station Area**

Item		Capacity/No. of Berths	Quantity	Development Phase	B/D in SAPI study
Bus stop	South bus stops on service road	Bus stop: 2 (both side) Taxi berth (boarding:1, alighting1) Taxi waiting: 2 Private car space: 2 M/C waiting space: 1	650m <sup>2</sup>	Phase I	✓
	Taxi/ car space under viaduct	Taxi berth (boarding:1, alighting1) Private car waiting: 2 Motorcycle taxi space: 1	850m <sup>2</sup>	Phase I	✓
Parking	M/C parking under station	M/C and bicycle: 448 lots	1,030m <sup>2</sup>	Phase I	✓
	M/C parking under viaduct	M/C and bicycle: 190 lots	530m <sup>2</sup>	Phase I	✓
	South M/C parking	M/C and bicycle: 315 lots	890m <sup>2</sup>	Phase I	✓
Pedestrian bridge	Upgraded pedestrian bridge	Additional stair, elevator (1unit)	1	Phase I	✓
Commercial facility	Tenant space in station		150m <sup>2</sup>	Phase I	✓
Access road	U-turn bridge	W=8m, l=310m, one-way	2	Phase III	

Source: Study Team



Source: Study Team

**Figure 9.3.16 - Concept Plan of the An Phu Station Area (upon UMRT opening)**

4) Concept Plan in the Existing Urbanized Zone (Rach Chiec to Thu Duc)

(1) Regional Vision and Strategies for Intermodal Facility Development

**Regional Vision:** Create a living environment with high convenience for commuting residents

**Development Strategy:**

- Development of station plazas for the smooth operation of feeder buses
- Promotion of urban development in the nearby station area
- Public service facilities (day-care facilities for children, administrative window services)
- Create amenity and event spaces by using open space, parks and greenery
- Develop park and ride facilities

(2) Concept Plan in the Rach Chiec Station Area

a) Development Concept

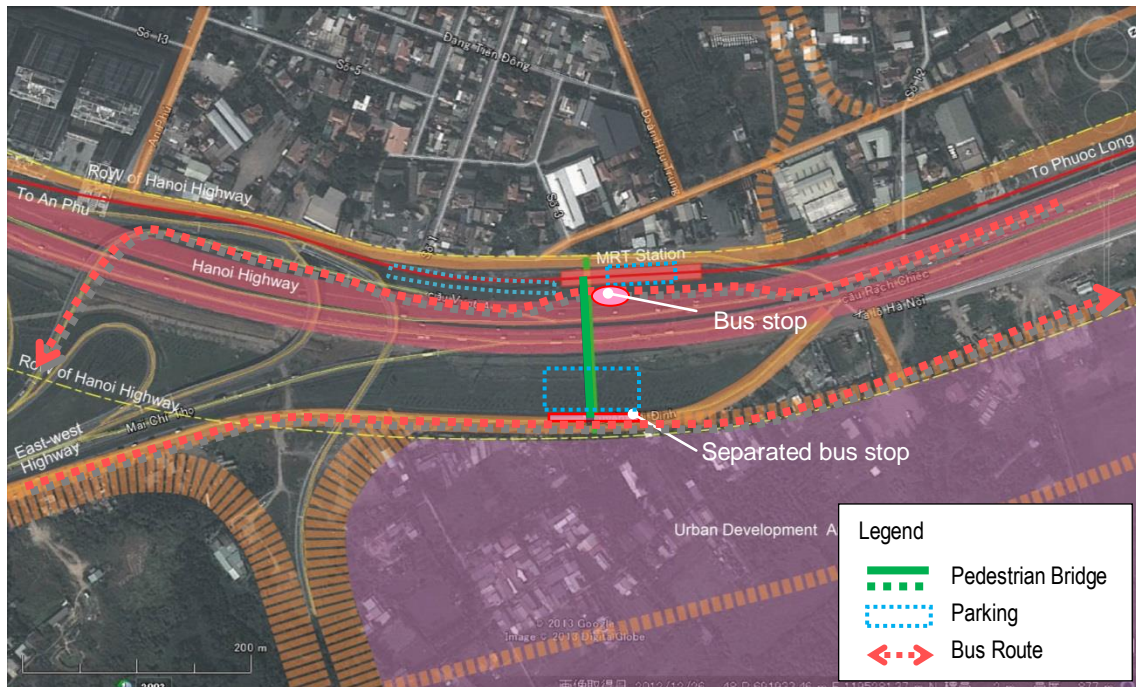
- Formulation of an integrated new urban area (sports city) in collaboration with the public transport system
- Promotion of park and ride usage in the future urban development area
- Improvement of the road environment for a new transport style with the bicycle and UMRT

b) Concept of Layout and Design

The concept of layout and design of intermodal facilities in the Rach Chiec station area is explained as below and the specification of the proposed intermodal facilities is summarized as shown in Table 9.3.7.

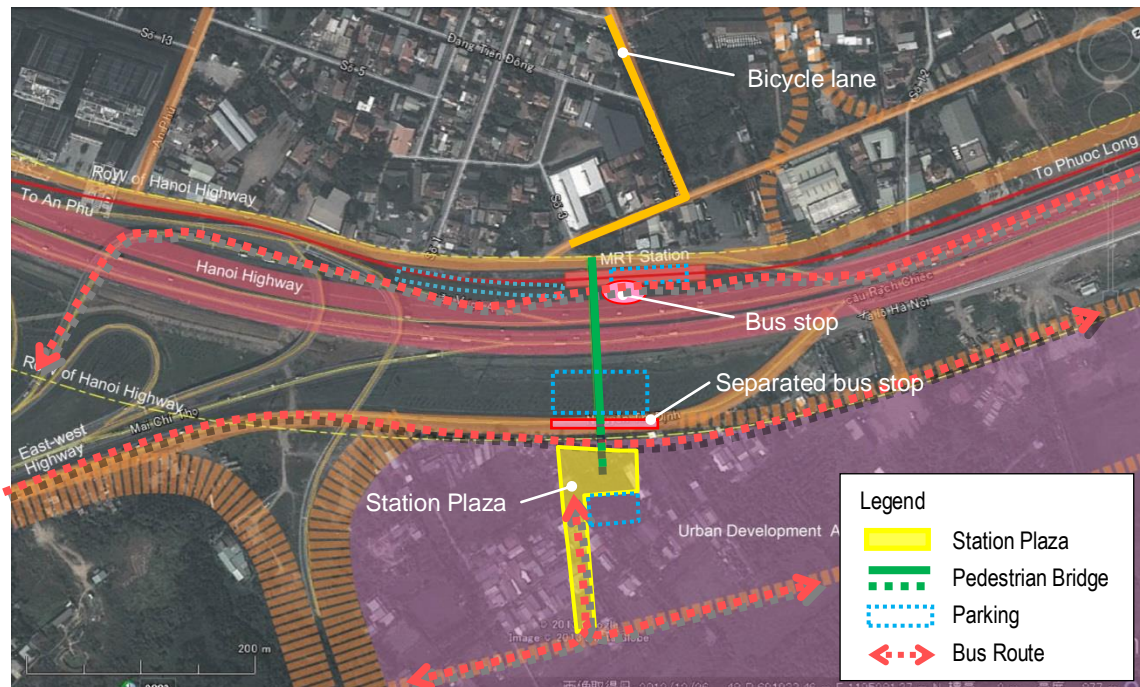
- **Bus Stop:** The bus stops on the east side of the station building with an area of 2,730 m<sup>2</sup> and the separated bus stops with an area of 1,550m<sup>2</sup> in the green area of Hanoi Highway are proposed in consideration of the land availability by the time of the UMRT opening. These two bus stops serve both the existing bus and BRT. For the protection of the existing water pipe, a part of the approach road for the bus stops on the east side of station with the existing water pipe is a structure with a slab bridge.
- **Taxi/ Car space:** The taxi berth, private car berth and motorcycle taxi space are laid out on the service road to the north of the station.
- **Station Plaza:** As a future plan, the east station plaza with an area of 4,800m<sup>2</sup> is proposed for the integrated urban development in the eastern area (sports city). The plaza consists of transit spaces and open space.
- **Parking:** Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed. These parking lots are laid out in consideration with keeping the distance within 200 m from the station entrance.
- As a future plan, car parking in the nearby east station plaza is proposed to promote park and ride in the eastern urban development area.
- **Pedestrian bridge:** Upgrading of the pedestrian bridge is proposed to improve the capacity and to access the proposed separated bus stop in the east and the motorcycle parking. The upgrading includes widening, additional stairs and installation of an elevator to meet the barrier-free concept.
- As a future plan, extension of the pedestrian bridge is proposed to access to the eastern station plaza and the eastern urban development area.
- **Commercial facility:** Tenant space for retail shops and cafes in the ground floor of the station building is proposed for the convenience of transit passengers.
- **Access Road:** For the comfort and safety of bicycle users, improvement of the existing road in the western urban area is proposed.





Source: Study Team

**Figure 9.3.17 - Layout Plan of the Rach Chiec Station Area (upon UMRT opening)**



Source: Study Team

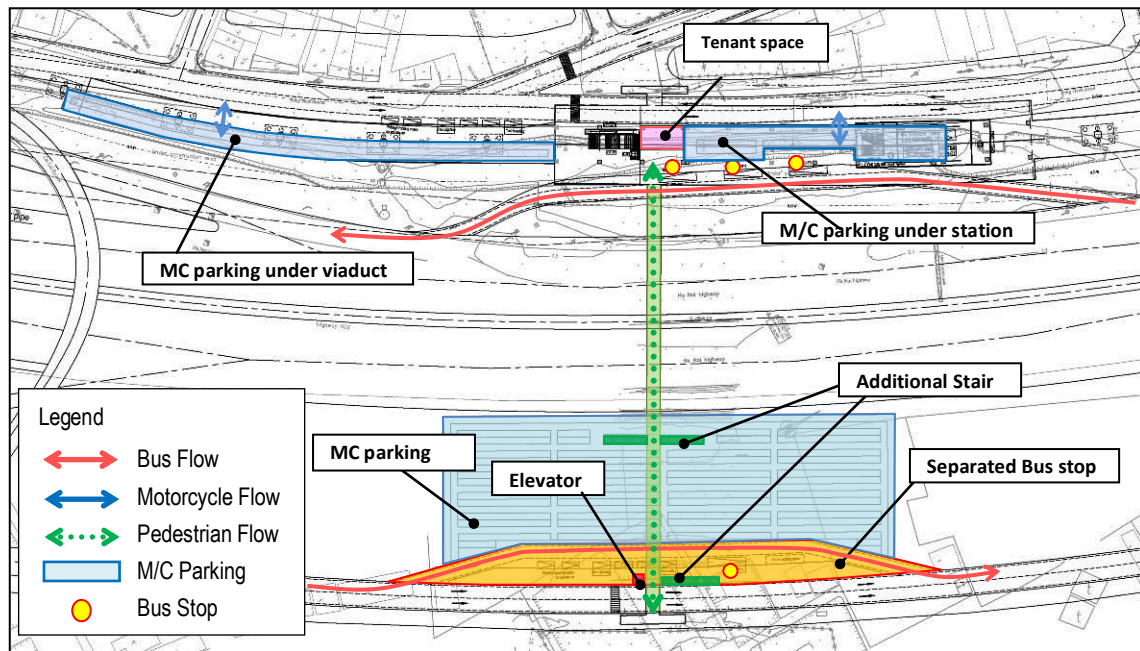
**Figure 9.3.18 - Layout Plan of the Rach Chiec Station Area (in the future)**



**Table 9.3.7 - Specification of Intermodal Facilities at the Rach Chiec Station Area**

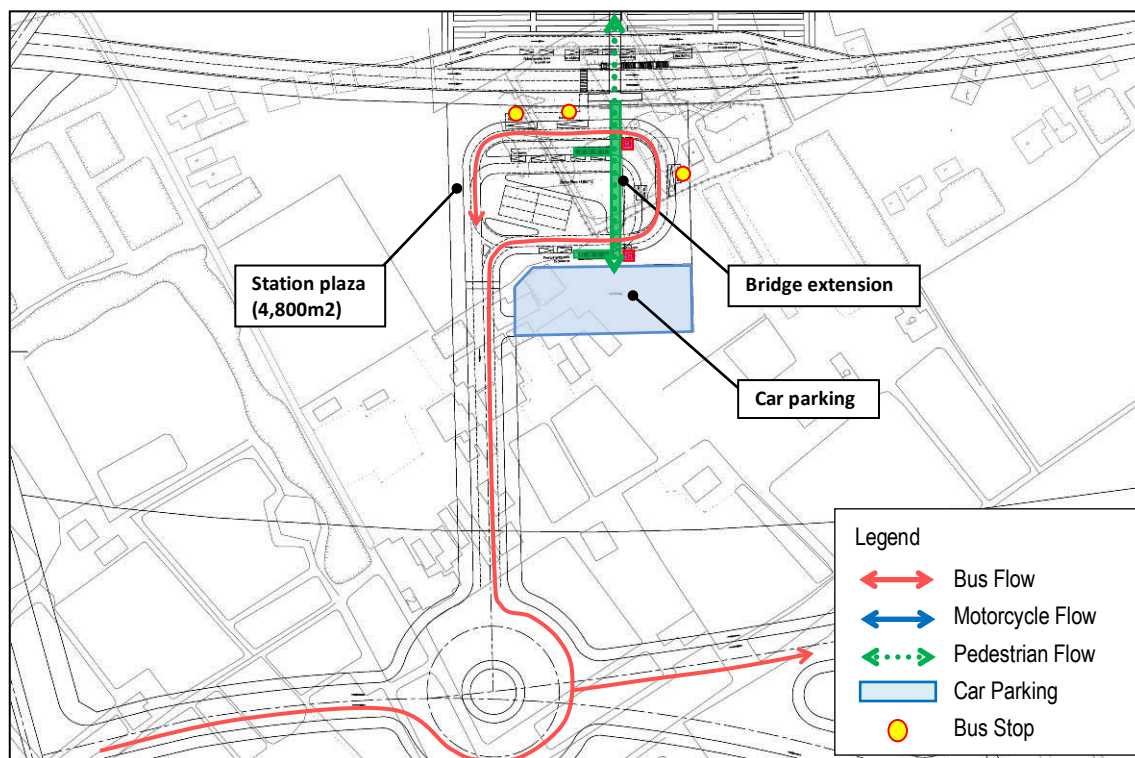
Item		Capacity/No. of Berths	Quantity	Development Phase	B/D in SAPI study
Station plaza	East Station Plaza	Bus berth (boarding:2, alighting:1) Taxi berth (boarding:1, alighting:1) Taxi parking: 4 Private car berth: 2 M/C taxi space: 1	4,800m <sup>2</sup>	Phase III	
Bus stops	East bus stop in station	Bus boarding (feeder bus: 1, BRT:2) Service road connecting with Highway	2,730m <sup>2</sup>	Phase I	✓
	East separated bus stop	Bus alighting: 1 Taxi berth (boarding:1, alighting:1) Taxi waiting: 2 Private car space: 2 M/C taxi space: 1	1,550m <sup>2</sup>	Phase I	✓
Taxi/car space	West taxi/ car space on service road	Taxi berth (boarding:1, alighting:1) Taxi waiting: 2 Private car space: 2 Motorcycle taxi space: 2	1	Phase I	✓
Parking	M/C parking under station	M/C and bicycle: 253 lots	730m <sup>2</sup>	Phase I	✓
	M/C parking under viaduct	M/C and bicycle: 381 lots	900m <sup>2</sup>	Phase I	✓
	East M/C parking	M/C and bicycle: 1,945 lots	4,920m <sup>2</sup>	Phase I	✓
	East parking	Private car: 80 lots	1,450m <sup>2</sup>	Phase III	✓
Pedestrian bridge	Upgraded pedestrian bridge	Widening (4.4m), Additional stair (3unit), elevator (1unit)	1	Phase I	✓
	Extension pedestrian bridge	Bridge extension (55m), additional stair (2units), elevator (2units)	1	Phase III	
Commercial facility	Tenant space in station		90m <sup>2</sup>	Phase I	✓
Access road	Access road for station plaza	width: 22m, length: 120m	2,700m <sup>2</sup>	Phase III	
	Improvement existing road for bicycle lane	Width:3m, length:500m	1,500m <sup>2</sup>	Phase III	

Source: Study Team



Source: Study Team

**Figure 9.3.19 - Concept Plan of the Rach Chiec Station Area (upon UMRT opening)**



Source: Study Team

**Figure 9.3.20 - Future Plan of the Rach Chiec Station Area (in the Future)**

(3) Concept Plan in the Phuoc Long Station Area

a) Development Concept

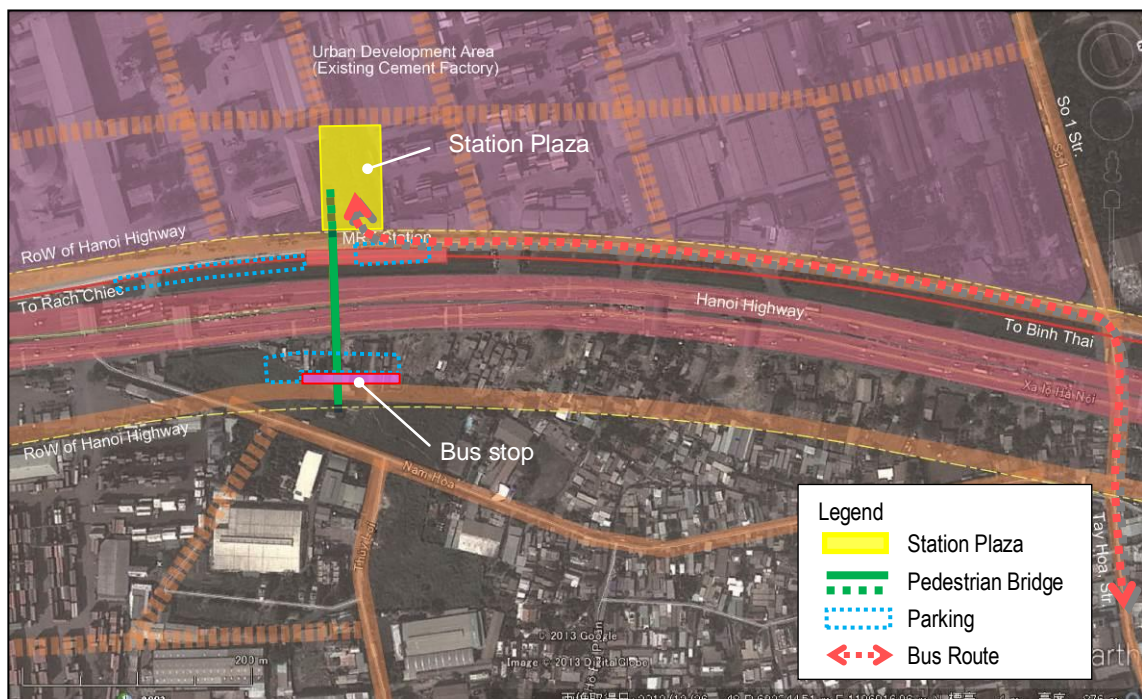
- Formulation of an integrated new urban area in collaboration with the public transport system
- Promotion of park and ride usage for residents in the existing urban area to the east

b) Concept of Layout and Design

Concept of layout and design of intermodal facilities in the Phuoc Long station area is explained as below and specification of the proposed intermodal facilities is summarized as shown in Table 9.3.8.

- **Station Plaza:** The west station plaza with an area of 4,300m<sup>2</sup> is proposed for integrated urban development in the current factory area. The plaza consists of transit spaces, bus parking and open space and is connected with the station and commercial building by extension of the pedestrian bridge.
- **Bus stop:** As temporary development until the development of the west station plaza, the bus stop and taxi stop on the service road and bus parking under the viaduct are proposed.

- **Taxi/ Car Space:** On the east side, taxi and car space on the service road is proposed. The space with an area of 500m<sup>2</sup> in the green area of the Hanoi Highway includes a taxi berth, private car berth and motorcycle taxi space stops.
- **Parking:** Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed. These parking lots are laid out in consideration with keeping the distance within 200m from the station entrance.
- **Pedestrian bridge:** Upgrading of the pedestrian bridge is proposed to access the proposed east taxi and car space and motorcycle parking lot. The upgrading includes additional stairs and installation of an elevator to meet the barrier-free concept.
- Extension of the pedestrian bridge is proposed to access the west station plaza and the west urban development area.
- **Commercial facility:** Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.



Source: Study Team

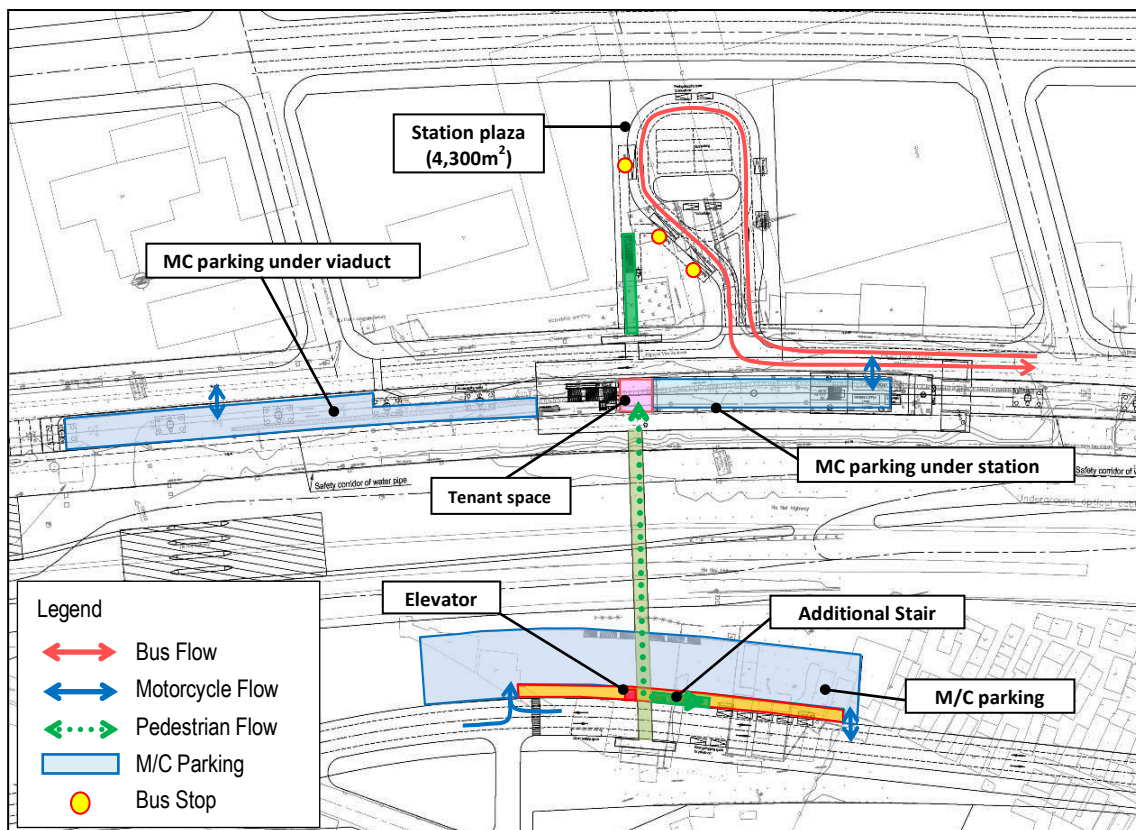
**Figure 9.3.21 - Layout Plan of the Phuoc Long Station Area (Phase II)**



**Table 9.3.8 - Specification of Intermodal Facilities at the Phuoc Long Station Area**

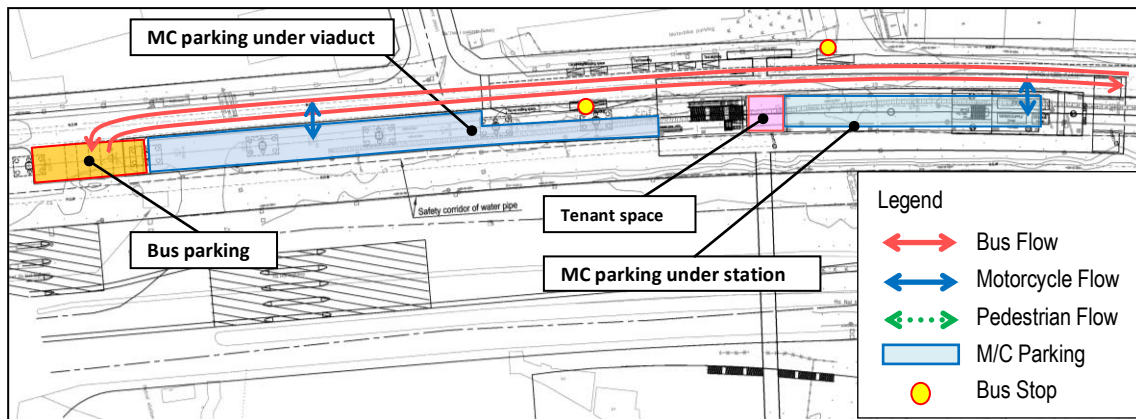
Item		Capacity/No. of Berths	Quantity	Development phase	B/D in SAPI study
Station Plaza	West Station Plaza	Bus berth (boarding:2, alighting:1) Taxi berth (boarding:1, alighting:1) Taxi parking: 2 Private car berth: 2	4,300m <sup>2</sup>	Phase II	✓
Bus stop	West bus/taxi space on service road (temporary development)	Bus stop (boarding:1, alighting:1) Taxi berth (boarding:1, alighting:1) Private car berth: 2 Motorcycle taxi space: 1	1	Phase I	✓
Taxi/car space	East taxi/car stops	Taxi berth (boarding:1, alighting:1) Taxi waiting: 3 Private car berth: 2 Motorcycle taxi space: 1	450m <sup>2</sup>	Phase I	✓
Parking	M/C parking under station	M/C and bicycle: 368 lots	960m <sup>2</sup>	Phase I	✓
	M/C parking under viaduct	M/C and bicycle: 545 lots	1,420m <sup>2</sup>	Phase I	✓
	East M/C parking	M/C and bicycle: 1,045 lots	2,660m <sup>2</sup>	Phase I	✓
Pedestrian bridge	Updated pedestrian bridge	Additional stair (3), elevator (1)	1	Phase I	✓
	Extension pedestrian bridge	Bridge extension (20 m), additional stair (1), elevator (1)	1	Phase II	✓
Commercial facility	Tenant space in station		150m <sup>2</sup>	Phase I	✓

Source: Study Team



Source: Study Team

**Figure 9.3.22 - Concept Plan of the Phuoc Long Station Area (Phase II)**



Source: Study Team

**Figure 9.3.23 - Temporary Development Plan in the Phuoc Long Station Area (upon UMRT opening)**

(4) Concept Plan in the Binh Thai Station Area

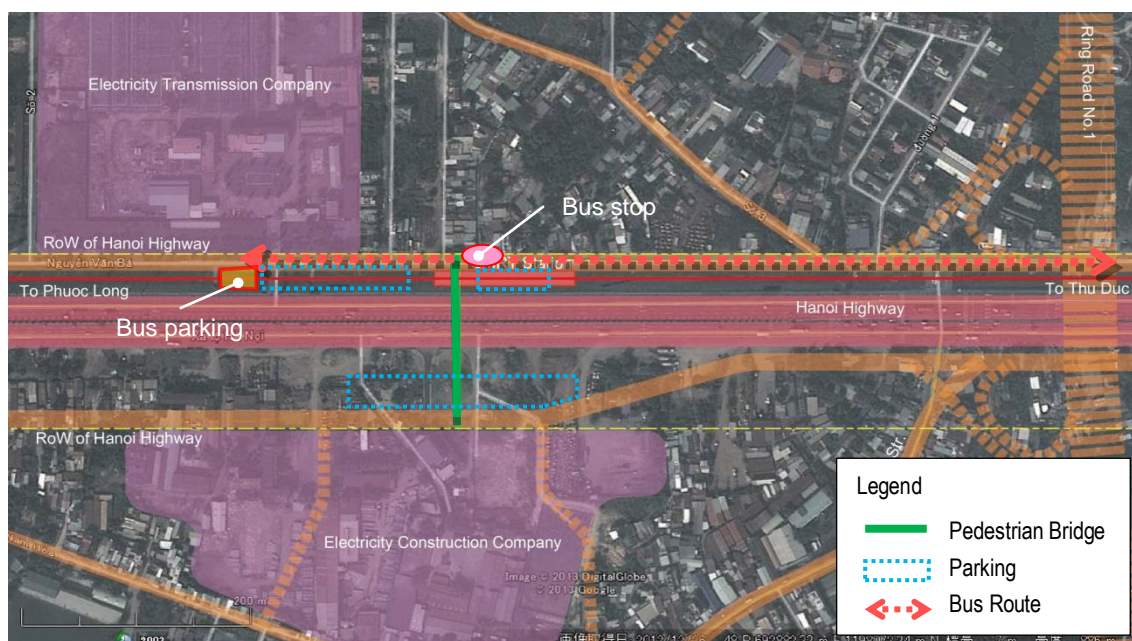
a) Development Concept

- Promotion of park and ride usage for residents in the existing urban area

b) Concept of Layout and Design

The concept of layout and design of intermodal facilities in the Binh Thai station area is explained as below and the specification of the proposed intermodal facilities is summarized as shown in Table 9.3.9.

- **Bus Stop:** Bus stops on the western service roads are proposed in consideration of the limited land availability. For feeder bus operation, bus turning and parking space under the viaduct is proposed.
- **Taxi/car space:** Taxi and car space on the service road is proposed for both sides of the Hanoi Highway. It includes a taxi berth, private car berth and motorcycle taxi stopping spaces.
- **Parking:** Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed. These parking lots are laid out in consideration with keeping the distance within 200m from the station entrance.
- **Pedestrian bridge:** Upgrading of the pedestrian bridge is proposed to access the proposed eastern taxi and car space and motorcycle parking lot. The upgrading includes additional stairs and the installation of an elevator to meet the barrier-free concept.
- **Commercial facility:** Tenant space for retail shops and cafes in the ground floor of the station building is proposed for the convenience of transit passengers.



Source: Study Team

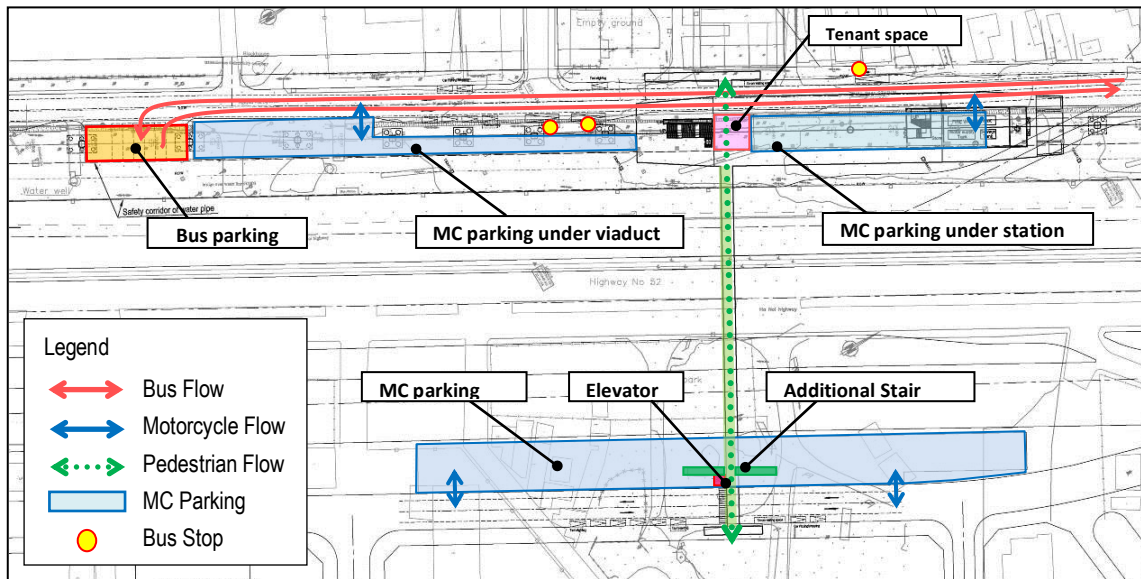
**Figure 9.3.24 - Layout Plan of the Binh Thai Station Area**

**Table 9.3.9 - Specification of Intermodal Facilities at the Binh Thai Station Area**

Item		Capacity/No. of Berths	Quantity	Development Phase	B/D in SAPI study
Bus stop	West roadside stop	Bus stop (boarding:2, alighting:1) Taxi berth (boarding:1, alighting:1) Taxi waiting space:3 Private car space: 2 Motorcycle taxi space: 1	1	Phase I	✓
	Bus parking under viaduct	5 lots	450m <sup>2</sup>	Phase I	✓
Taxi/car space	East roadside stop	Taxi berth: 2 (boarding:1, alighting:1) Taxi waiting space:4 Private car berth: 2 Motorcycle taxi space: 1	1	Phase I	✓
Parking	M/C parking under station	M/C and bicycle: 370 lots	960m <sup>2</sup>	Phase I	✓
	M/C parking under viaduct	M/C and bicycle: 549 lots	1,320m <sup>2</sup>	Phase I	✓
	East M/C parking	M/C and bicycle: 1,204 lots	2,720m <sup>2</sup>	Phase I	✓
Pedestrian bridge	Upgraded pedestrian bridge	Additional stair (2), elevator (1)	1	Phase I	✓
Commercial facility	Tenant space in station		150m <sup>2</sup>	Phase I	✓

Source: Study Team





Source: Study Team

**Figure 9.3.25 - Concept Plan of the Binh Thai Station Area**

(5) Concept Plan in the Thu Duc Station Area

a) Development Concept

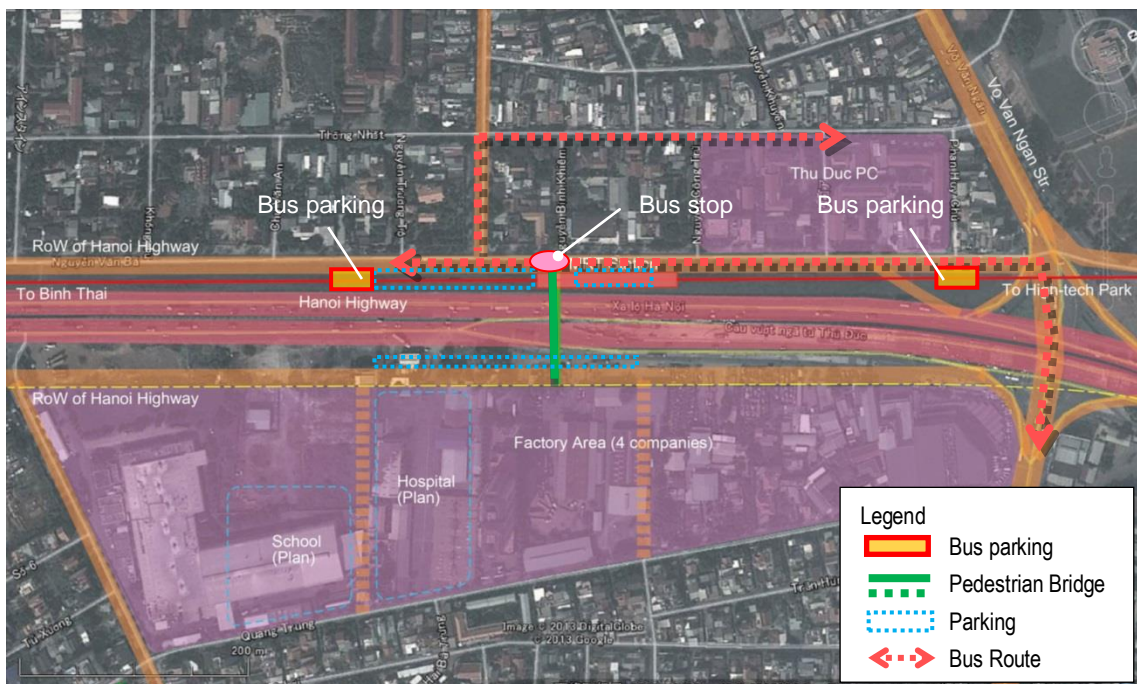
- Redevelopment of the urban center of the Thu Duc District in collaboration with the UMRT station
- Promotion of park and ride usage for residents in the surrounding urban area

b) Concept of Layout and Design

The concept of the layout and design of intermodal facilities in the Thu Duc station area is explained as below and the specification of the proposed intermodal facilities are summarized as shown in Table 9.3.10.

- **Bus Stop:** The road side bus stops on both the service roads for the UMRT opening are proposed in consideration of the limited land availability. For feeder bus operations, two bus parking spaces under the viaduct are proposed in the north and south of the station.
- **Station Plaza:** As a future plan, the west station plaza with an area of 4,300m<sup>2</sup> and the east station plaza with an area of 4,700m<sup>2</sup> with the access road are proposed for the operation of the feeder bus service. The west station plaza is laid out in the existing business area and the east station plaza is laid out in the current factory area. Both proposals aim that these station plazas will be a core facility in the integrated urban redevelopment.

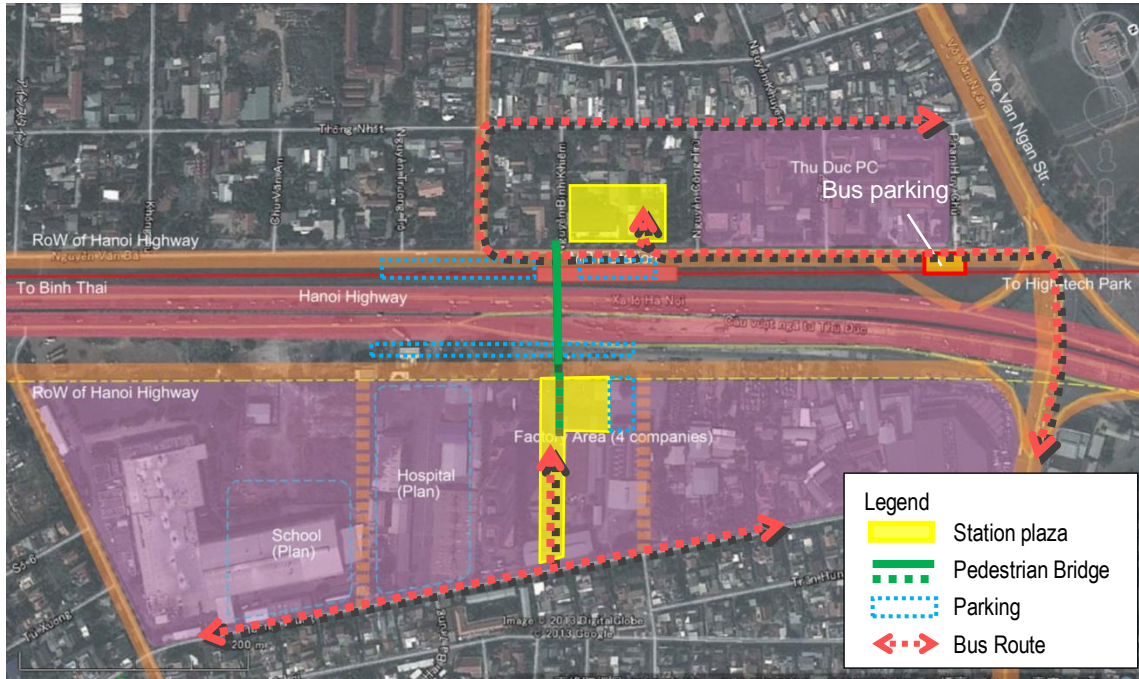
- **Parking:** Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed. These parking lots are laid out in consideration with keeping the distance within 200m from the station entrance.
- For the promotion of park and ride for UMRT usage, car parking is proposed to be laid out in at the eastside connection with the east station plaza in the future.
- **Pedestrian bridge:** Upgrading of the pedestrian bridge is proposed to access the proposed east taxi and car space and the motorcycle parking lot. The upgrading excludes the elevator due to limited space in the green area. Installation of the elevator is proposed in the future extension for the east station plaza.
- Future extension of the pedestrian bridge with an elevator is proposed to access the east station plaza and the surrounding urban development area.
- **Commercial facility:** Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.



Source: Study Team

Figure 9.3.26 - Layout Plan of the Thu Duc Station Area (upon UMRT opening)





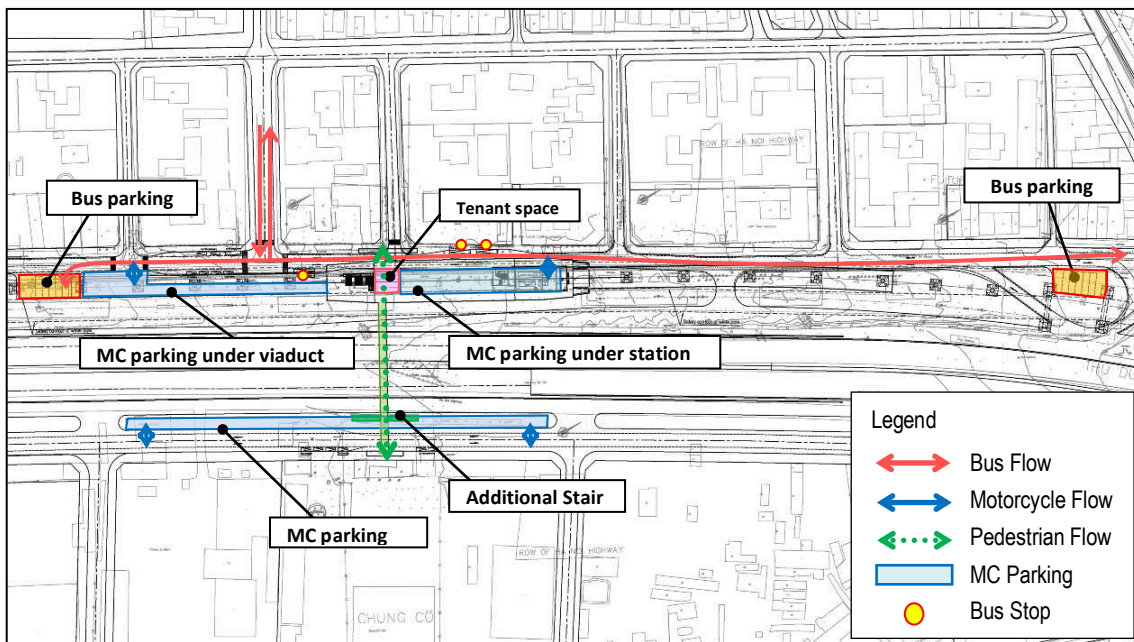
Source: Study Team

Figure 9.3.27 - Layout Plan of the Thu Duc Station Area (in the future)

**Table 9.3.10 - Specification of Intermodal Facilities at the Thu Duc Station Area**

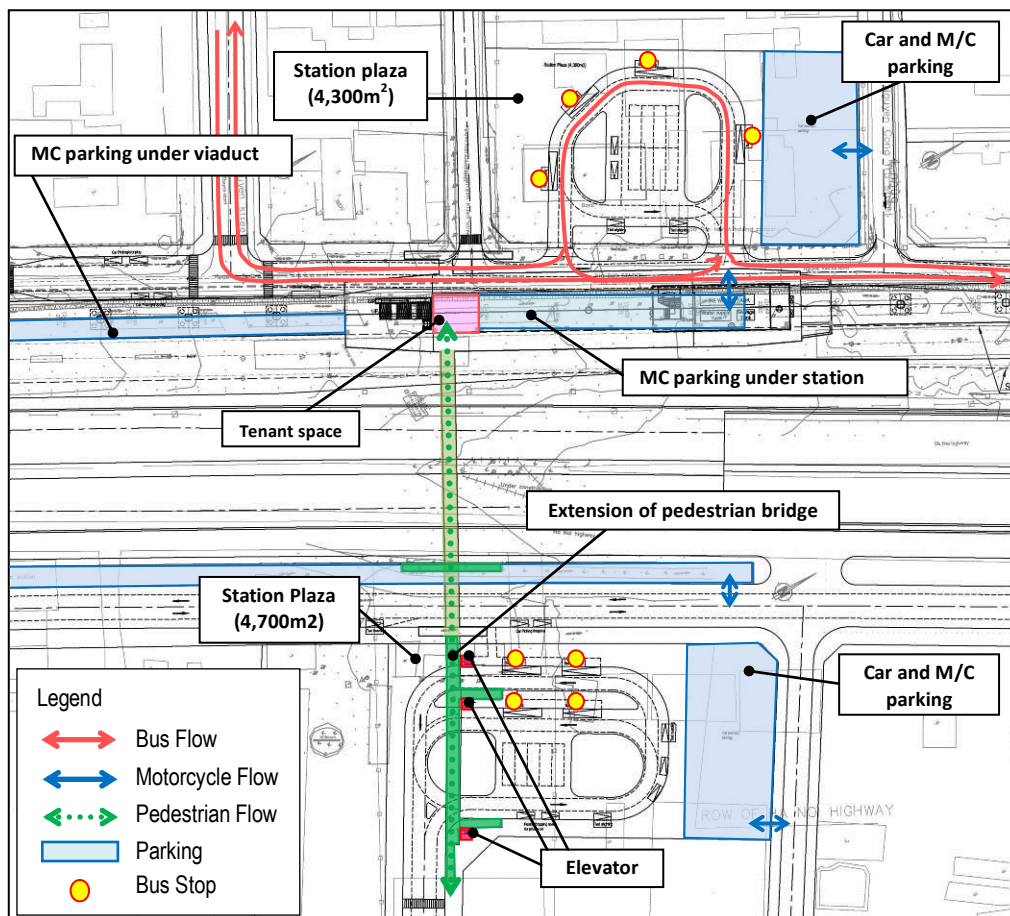
Item		Capacity/No. of Berths	Quantity	Development Phase	B/D in SAPI study
Station Plaza	West Station Plaza	Bus berth (boarding:3, alighting:1) Bus parking: 8 Taxi berth (boarding:1, alighting1) Taxi waiting space: 2 Private car berth: 2 Motorcycle taxi space: 1	4,300m <sup>2</sup>	Phase III	
	East Station Plaza	Bus berth (boarding:3, alighting:1) Bus parking: 5 Taxi berth (boarding:1, alighting1) Taxi waiting: 2 Private car berth: 2	4,700m <sup>2</sup>	Phase III	
Bus stop	West road side stops	Bus stop: 3 Taxi berth (boarding:1, alighting1) Taxi waiting: 2 Private car berth: 2 Motorcycle taxi space: 1	1	Phase I	✓
	East road side stops	Taxi berth (boarding:1, alighting1) Taxi waiting: 2 Private car berth: 2 Motorcycle taxi space: 1	1	Phase I	✓
	North bus parking under viaduct	5lots	420m <sup>2</sup>	Phase I	✓
	South bus parking under viaduct	5lots	400m <sup>2</sup>	Phase I	✓
Parking	M/C parking under station	M/C and bicycle: 337 lots	900m <sup>2</sup>	Phase I	✓
	M/C Parking under viaduct	M/C and bicycle: 448 lots	1,050m <sup>2</sup>	Phase I	✓
	East M/C parking	M/C and bicycle: 454 lots	1,430m <sup>2</sup>	Phase I	✓
	West parking	Car: 60 lots, M/C: 160lots	1,500m <sup>2</sup>	Phase III	✓
	East parking	Car: 60 lots, M/C: 120lots	1,350m <sup>2</sup>	Phase III	✓
Pedestrian bridge	Upgraded pedestrian bridge	Additional stair (2)	1	Phase I	✓
	Extension of pedestrian bridge	Bridge extension (60m), additional stair (3), elevator (3)	1	Phase III	✓
Commercial facility	Tenant space in station		150m <sup>2</sup>	Phase I	✓
Access road	Access road for east station plaza	W=22m, l=110m	2,450m <sup>2</sup>	Phase III	

Source: Study Team



Source: Study Team

Figure 9.3.28 - Concept Plan of the Thu Duc Station Area (upon UMRT opening)



Source: Study Team

Figure 9.3.29 - Concept Plan of the Thu Duc Station Area (in the future)

## 5) Concept Plan in the University and High-Tech Park Zone

### (1) Regional Vision and Strategies for Intermodal Facility Development

**Regional Vision:** Create an integrated new urban space for academia and industry linkage, youth activities and for tourism

**Development Strategy:**

- Create an exclusive public transport network for university students and workers in the high-tech park
- Set public services in the station to promote academia and industry linkage activities (display space, employment information center, etc)
- Setting up convenience facilities for students and workers (restaurants, cafés and convenience stores)
- Upgrade amusement area to secure weekend passengers

### (2) Concept Plan in the High-Tech Park Station Area

#### a) Development Concept

- Formulation of an integrated commercial and business area in collaboration with the public transport system
- Formulation of a transport hub to promote UMRT commuting for the High-Tech Park workers

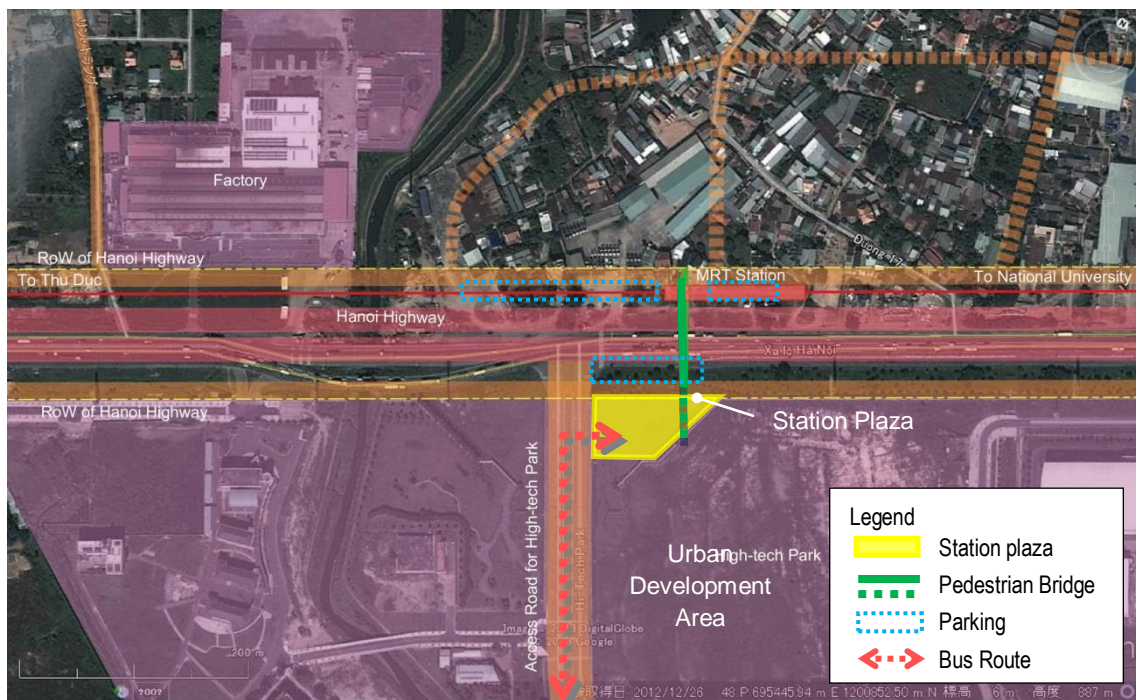
#### b) Concept of Layout and Design

The concept of layout and design of intermodal facilities in the High-Tech Park station area is explained as below and the specification of the proposed intermodal facilities is summarized as shown in Table 9.3.11.

- **Station Plaza:** The east station plaza with an area of 5,000m<sup>2</sup> is proposed to be located at the existing green area in the entrance of the High-Tech Park. The station plaza consists of transit spaces, bus parking and open spaces. It is connected with the station and private commercial building by an extension of the pedestrian bridge.
- **Taxi/car space:** Taxi and car space on the service road is proposed on the west side of the Hanoi Highway. It includes a taxi berth, private car berth and motorcycle taxi stopping space.
- **Parking:** Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed. These parking lots are laid out in consideration with keeping the distance within 200 m from the station entrance. Regarding car parking, it is expected that the public car parking will be developed in the urban development area in the High-Tech Park.



- **Pedestrian bridge:** Upgrading of the pedestrian bridge is proposed to access to the east motorcycle parking lot. The upgrading includes an additional set of stairs and installation of an elevator to meet the barrier-free concept.
- Extension of the pedestrian bridge with an elevator is proposed to access the east station plaza and the surrounding urban development area.
- **Commercial facility:** Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.



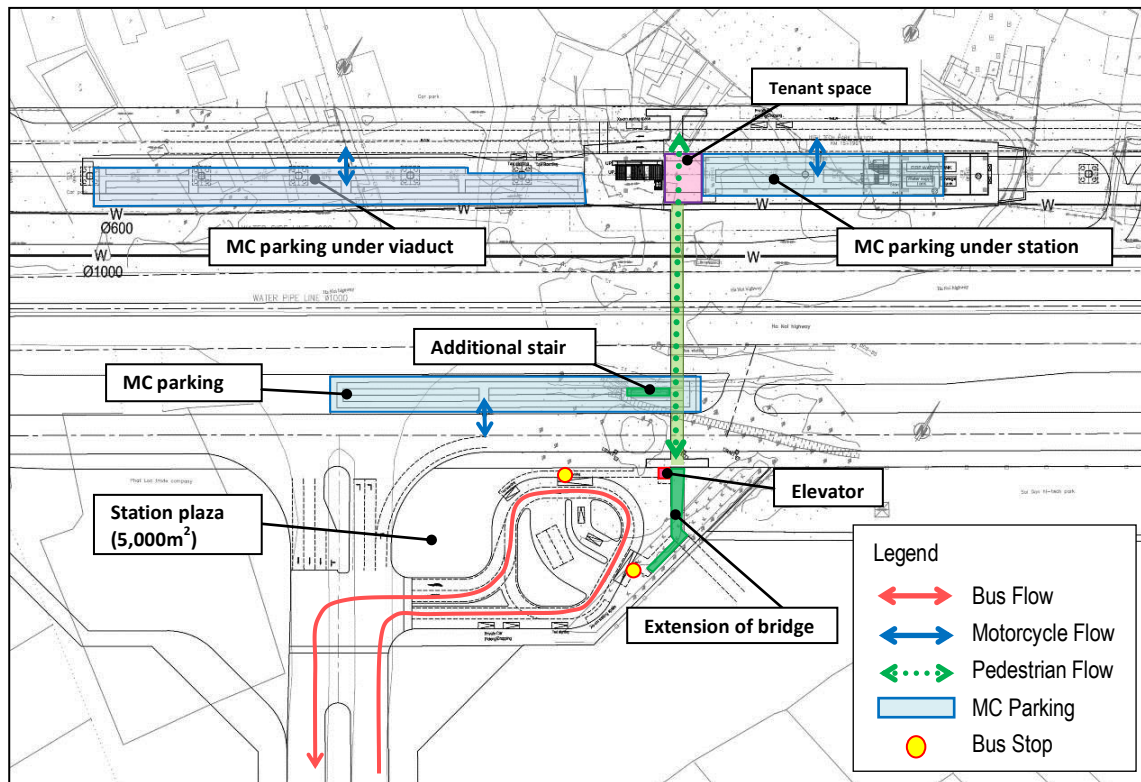
Source: Study Team

Figure 9.3.30 - Layout Plan of the High-Tech Park Station Area (upon UMRT opening)

**Table 9.3.11 - Specification of Intermodal Facilities of the High-Tech Park Station Area**

Item	Capacity/No. of Berths	Quantity	Development phase	B/D in SAPI study	
Station Plaza	Bus berth (boarding:1, alighting:1) Bus parking: 2 Taxi berth (boarding:1, alighting:1) Taxi waiting: 2 Private car berth: 2 M/C taxi waiting space: 1	5,000m <sup>2</sup>	Phase I	✓	
Taxi/car space	Taxi berth (boarding:1, alighting:1) Private car berth: 2 Motorcycle taxi berth: 1	1	Phase I	✓	
Parking	M/C parking under station	M/C and bicycle: 337 lots	900m <sup>2</sup>	Phase I	✓
	M/C Parking under viaduct	M/C and bicycle: 390 lots	1,210m <sup>2</sup>	Phase I	✓
	East M/C parking	M/C and bicycle: 555 lots	1,430m <sup>2</sup>	Phase I	✓
Pedestrian bridge	Upgrading of pedestrian bridge	Additional stair	1	Phase I	✓
	Extension of pedestrian bridge to commercial facilities	Bridge extension (25m), additional stair (1) elevator (1)	1	Phase I	✓
Commercial facility	Tenant space in station	150m <sup>2</sup>	Phase I	✓	

Source: Study Team



Source: Study Team

**Figure 9.3.31 - Concept Plan of the High-Tech Park Station Area**

(3) Concept Plan in the Suoi Tien Station Area

a) Development Concept

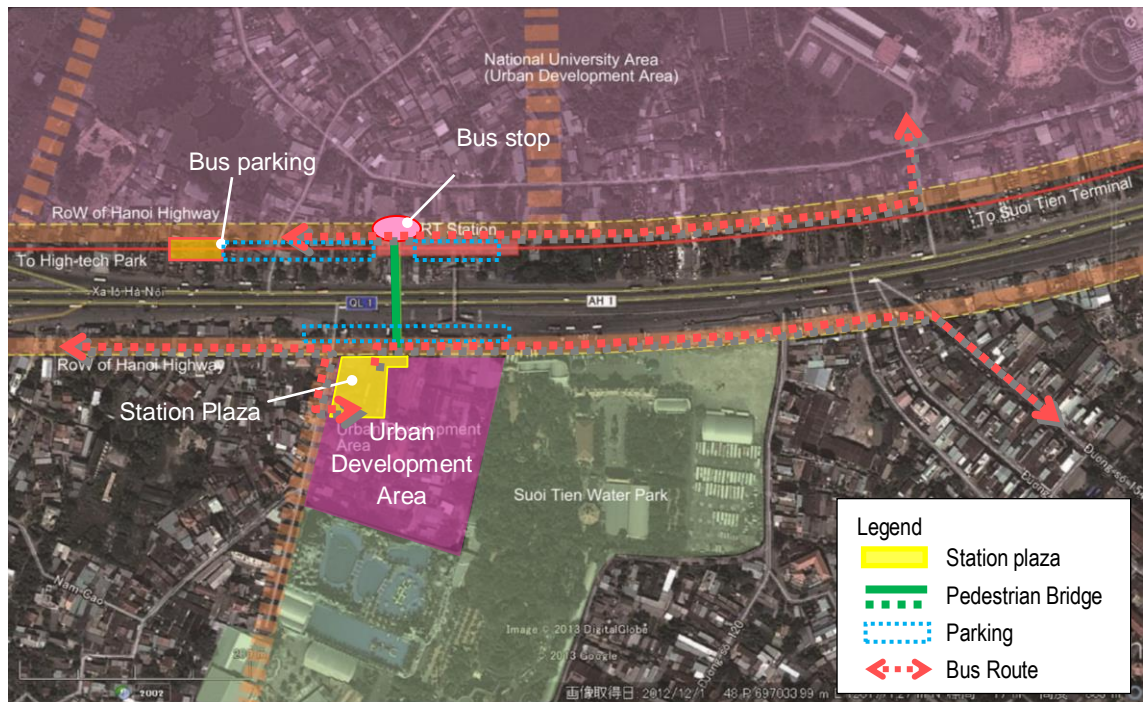
- Formulation of a transport hub and activity space to promote UMRT commuting to university students
- Formulation of an integrated tourism area in collaboration with the expansion development of the amusement park

b) Concept of Layout and Design

The concept of layout and design of intermodal facilities in the Suoi Tien station area is explained as below and the specification of the proposed intermodal facilities is summarized as shown in Table 9.3.12.

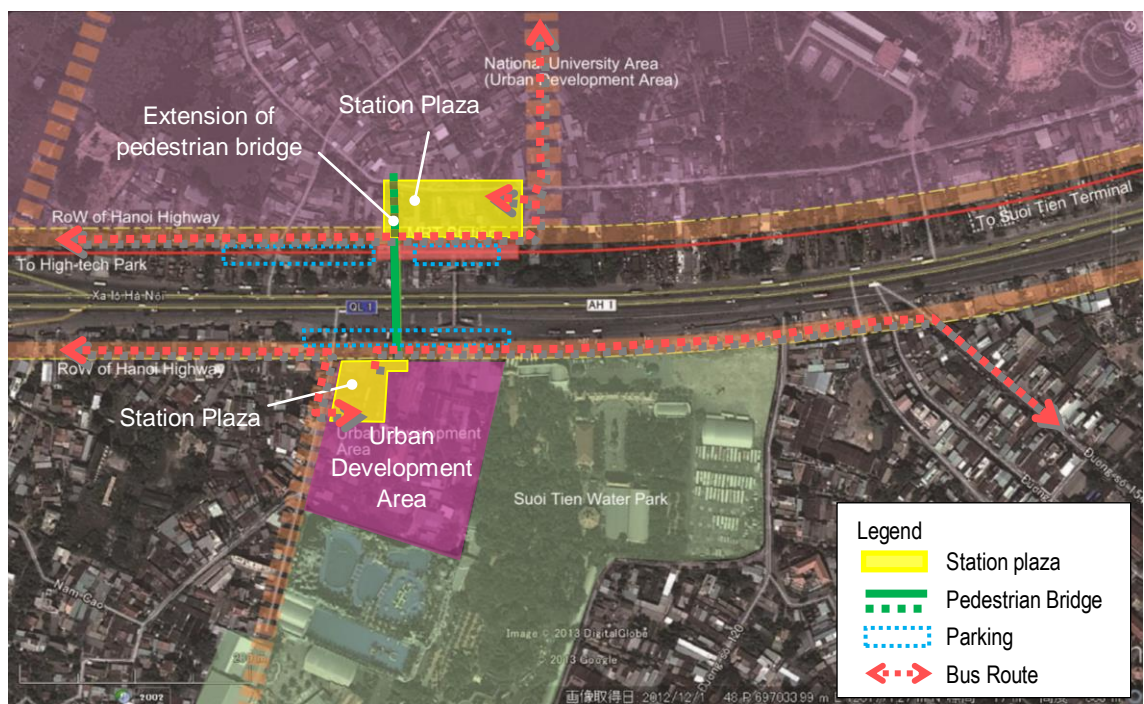
- **Station Plaza:** The east station plaza with an area of 3,000m<sup>2</sup> is proposed to be located at the urban development area of Suoi Tien Park. The plaza consists of transit spaces, bus parking and open spaces.
- As a future development plan, the west station plaza with an area of 6,700m<sup>2</sup> is proposed to be located at the urban development area of Suoi Tien. The plaza consists of transit spaces, bus parking and open spaces and is connected with the station by an extension of the pedestrian bridge.
- **Bus Stop:** The west roadside bus stops on the service road and the bus parking under the viaduct are proposed in consideration of the land availability on the west side of the existing urban area until the opening of the UMRT.
- **Parking:** Three motorcycle parking lots under the station, under the viaduct and in the green area to the east of the station are proposed. These parking lots are laid out in consideration with keeping the distance within 200m from the station entrance.
- **Pedestrian bridge:** Upgrading of the pedestrian bridge is proposed to access to the east motorcycle parking lot. The upgrading includes additional stairs. Installation of an elevator as the Phase II development is proposed to be located in the east station plaza.
- Extension of the pedestrian bridge with an elevator is proposed to access to the west station plaza and the surrounding urban development area.
- **Commercial facility:** Tenant space for retail shops and cafes on the ground floor of the station building is proposed for the convenience of transit passengers.





Source: Study Team

**Figure 9.3.32 - Layout Plan of the Suoi Tien Station Area (Phase II)**



Source: Study Team

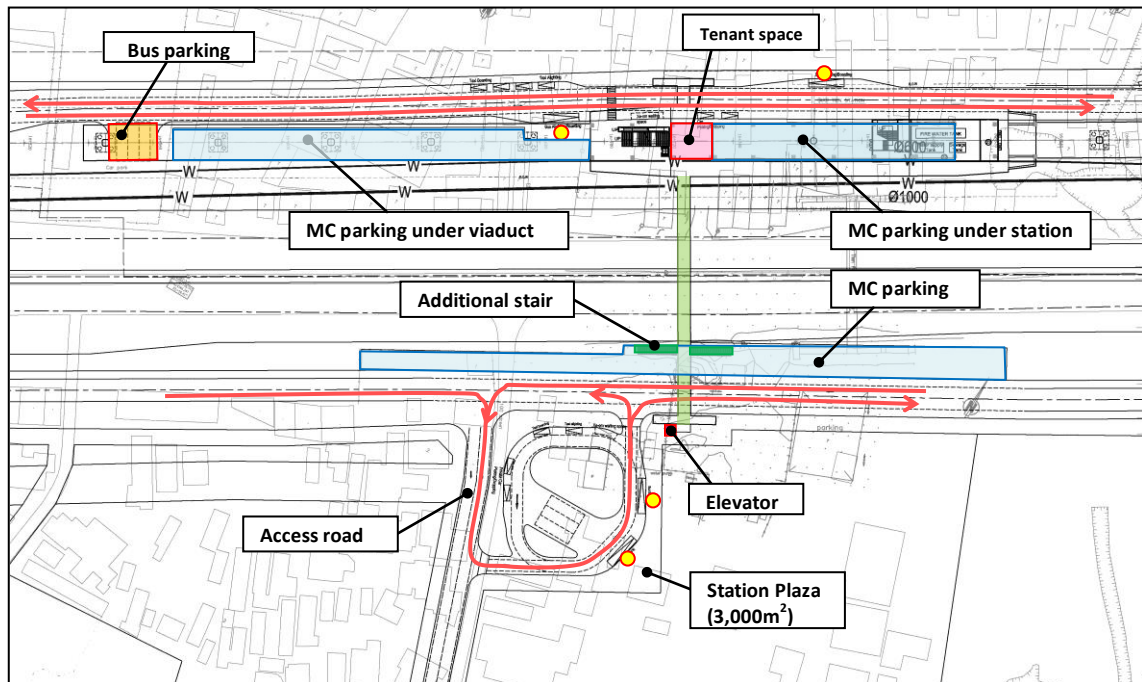
**Figure 9.3.33 - Layout Plan of the Suoi Tien Station Area (in the future)**



**Table 9.3.12 - Specification of Intermodal Facilities at the Suoi Tien Station Area**

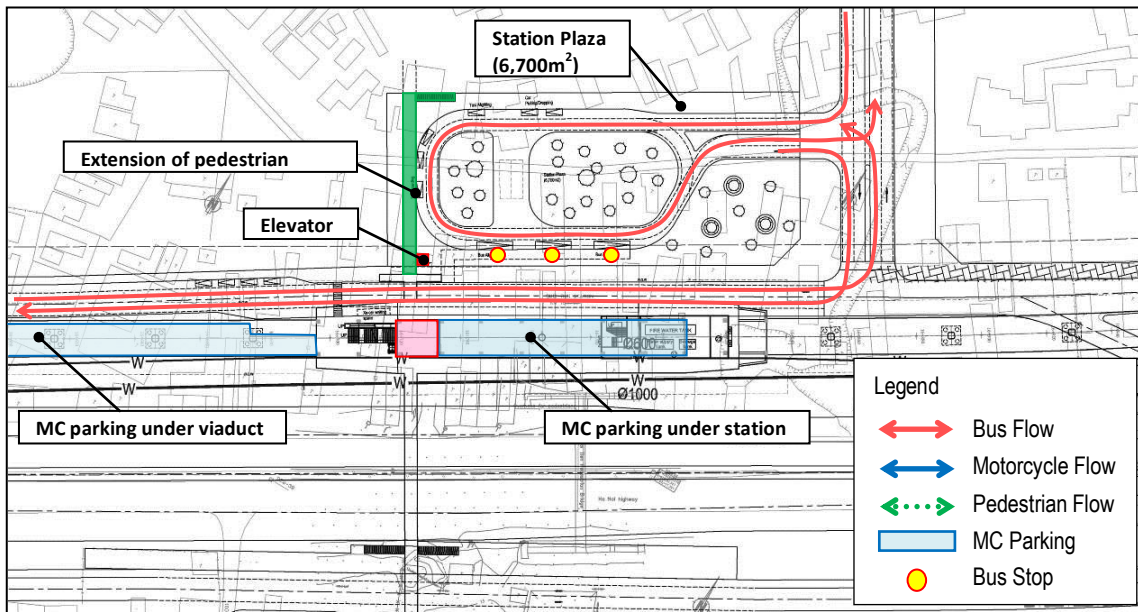
Item		Capacity/No. of Berths	Quantity	Development Phase	B/D in SAPI study
Station Plaza	West Station Plaza	Bus berth (boarding:2, alighting:1) Bus parking: 2 Taxi berth (boarding:1, alighting:1) Taxi waiting: 2 Private car berth: 2 Motorcycle taxi waiting space: 1	6,700m <sup>2</sup>	Phase III	
	East Station Plaza	Bus berth (boarding:1, alighting:1) Bus parking: 3 Taxi berth (boarding:1, alighting:1) Private car berth: 2 Motorcycle taxi waiting space: 1	3,000m <sup>2</sup>	Phase II	✓
Bus stop	West road side stops	Bus stop: 2 Taxi berth (boarding:1, alighting:1) Taxi waiting: 2 Private car berth: 2 Motorcycle taxi space: 1	1	Phase I	✓
	Bus parking under viaduct	3 lots	200m <sup>2</sup>	Phase I	✓
Parking	M/C parking under station	M/C and bicycle: 337 lots	900m <sup>2</sup>	Phase I	✓
	Parking under viaduct	M/C and bicycle: 384 lots	1,210m <sup>2</sup>	Phase I	✓
	East M/C parking	M/C and bicycle: 663 lots	1,780m <sup>2</sup>	Phase I	✓
Pedestrian bridge	Upgraded pedestrian bridge	Additional stair (2unit)	1	Phase I	✓
	Elevator	Elevator (1unit)	1	Phase II	✓
	Extension pedestrian bridge	Extension bridge (m), additional stair (1unit), elevator (1unit)	1	Phase III	
Commercial facility	Tenant space in station		150m <sup>2</sup>	Phase I	✓
Access road	Access road for east station plaza	W=17m, L=60m	1,050m <sup>2</sup>	Phase II	✓

Source: Study Team



Source: Study Team

**Figure 9.3.34 - Concept Plan of the Suoi Tien Station Area (Phase II)**



Source: Study Team

**Figure 9.3.35 - Concept Plan of the Suoi Tien Station Area (Phase III)**

(4) Concept Plan in the Suoi Tien Terminal Station Area

a) Development Concept

- Formulation of a north urban transport hub integrated with the UMRT and BRT network

b) Concept of Intermodal Facilities Plan

The layout and design of intermodal facilities in Suoi Tien Terminal station will be studied in the JICA-PPP project. For this Study, the technical requirements of intermodal facilities are shown in Table 9.3.13.

**Table 9.3.13 - Requirements of Intermodal Facilities in the Suoi Tien Terminal Station Area**

Item		Capacity/No. of Berths	Quantity	Development phase	Remarks
Station Plaza	West Station Plaza	Bus berth: (boarding:4, alighting:2) Bus parking: 6 Taxi berth (boarding:1, alighting1) Taxi waiting: 3 Private car berth: 2 Motorcycle taxi berth: 1	6,700m <sup>2</sup>	Phase II	
Parking	M/C parking	M/C and bicycle:3,000 lots	7,500m <sup>2</sup>	Phase I	
	Car parking	Private Car: 213 lots	3,900m <sup>2</sup>	Phase I	

Source: Study Team

## **9.4 Land Acquisition for Intermodal Facilities**

### **1) Target Facilities of Land Acquisition**

Due to the limitations of land availability along the UMRT Line 1, most of the intermodal facilities are proposed to be located on the existing public land such as the right of way of the of the UMRT Line 1 and the Hanoi Highway. However, the following proposed facilities require the land acquisition procedure in order to be located outside of the right of way because of the land limitations as mentioned above.

- Station plaza at Van Thanh Park station
- Station plaza at Phuoc Long Station
- Station plaza at High-Tech Park station
- Station plaza and access road at Suoi Tien station

### **2) Measures of Land Acquisition for Intermodal Facilities**

Considering the current conditions of the land management and urban development projects in these station areas, two kinds of measures are proposed as follows:

#### **a) Changing of the Land Administrator on the Existing Public Land (Van Thanh Park, High-Tech Park)**

Currently, the public land where the development of a station plaza is proposed in Van Thanh Park is managed by the Saigon Tourist Holding Company. In the same way, the High-Tech Park area is managed by the Saigon High-Tech Park Management Board. For the development of these two station plazas using ODA funds, it is required to change the administrator of the land of the target areas. Although the development unit for the proposed intermodal facilities is not fixed yet, regarding the land administrator, among the MAUR and DOT, the DOT is the appropriate land administrator for the station plaza from the viewpoint of O&M. Therefore changing of the land administrator is proposed as follows:

- Station plaza at Van Thanh Park: Change from the Saigon Tourist Holding Company to DOT
- Station plaza at High-Tech Park: Change from the High-Tech Park Management Board to DOT

#### **b) Land Recovery in the Urban Development Project Area (Phuoc Long, Suoi Tien)**

In the Phuoc Long station area and the Suoi Tien station area, the proposed station plazas are located in the urban development project area. In the Phuoc Long area, a cement factory owns the land use right at present. Before the implementation of the urban development project, the land use right will be conceded to the private developer through the HCMC PC. For the land acquisition of the station plaza, the HCMC PC must recover the target land with compensation.

Similarly, in the Suoi Tien station area, the Suoi Tien Water Park Company is carrying out the land clearance for their urban development project with an area of 2.0 ha. For the development of the station plaza, the HCMC PC must recover the land use right with compensation after the completion of the acquisition of the private land. Therefore, land recovery by the HCMC PC is proposed as follows:

- Station plaza at Phuoc Long: Land recovery by the HCMC PC
- Station plaza and access road at Suoi Tien: Land recovery by HCMC PC

The targeted land area and the acquisition measures are summarized as shown in Table 9.4.1.

**Table 9.4.1 - Range and Area of Land Type to be Secured**

District	Station	Type of Facilities	Area (m <sup>2</sup> )	Measure of Acquisition
Binh Thanh	Van Thanh Park	Station Plaza	4,400	Changing of administrator to DOT
Thu Duc	Phuoc Long	Station Plaza	4,300	Land recovery by HCMC PC
District 9	High-tech Park	Station Plaza	5,000	Changing of administrator to DOT
	Suoi Tien	Station Plaza	3,000	Land recovery by HCMC PC
		Access road	1,050	Land recovery by HCMC PC

Source: Study Team

### 3) Cost Estimation for Land Recovery

Land recovery costs for the proposed intermodal facilities at Phuoc Long station and Suoi Tien station are estimated as shown in Tables 9.4.2 and 9.4.3.

Conditions of the estimation are as follows:

- **Item of compensation**: The compensation aims at only the land for the proposed intermodal facility without other items such as existing structures, businesses and resettlement. The existing structure and business will be compensated or demolished by the private developer before the land recovery by the HCMC PC. So, compensation items other than land should be excluded in the estimation.
- **Land price**: The land price is estimated using the official land price of the Decision of Land Price List of Thu Duc District and District No. 9 (60/2013/QD-UBND issued on 26 Dec 2013). As the land price of the target land, the official land price along the Hanoi Highway is applied.

**Table 9.4.2 - Compensation Expenditure of Land Recovery at Phuoc Long Station**

Item	Category	Unit	Volume	Unit Price (000 VND)	Amount (mil VND)
<b>I</b>	<b>Compensation</b>	<b>m<sup>2</sup></b>	<b>4,300</b>		<b>18,920</b>
1	Non-agricultural land	m <sup>2</sup>	4,300		
	Residential land	m <sup>2</sup>	-		
	Production and business land	m <sup>2</sup>	4,300	4,400	18,920
2	Agricultural land	m <sup>2</sup>	-		
<b>II</b>	<b>Expenditure for land recovery</b>		-		-
<b>III</b>	<b>Contingency (10%)</b>				<b>1,892</b>
	<b>Total expenditure of land recovery</b>				<b>20,812</b>

Source : Study Team

**Table 9.4.3 - Compensation Expenditure of Land Recovery at Suoi Tien Station**

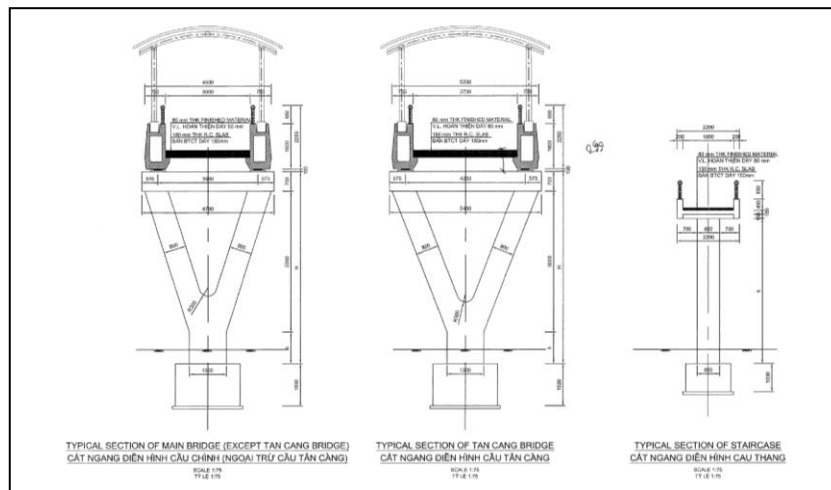
Item	Category	Unit	Volume	Unit Price (000 VND)	Amount (mil VND)
<b>I</b>	<b>Compensation</b>	<b>m<sup>2</sup></b>	<b>4,050</b>		<b>13,365</b>
1	Non-agricultural land	m <sup>2</sup>	4,050		
	Residential land	m <sup>2</sup>	4,050	3,300	13,365
	Production and business land	m <sup>2</sup>	-		
2	Agricultural land	m <sup>2</sup>	-		
<b>II</b>	<b>Expenditure for land recovery operation</b>		-		-
<b>III</b>	<b>Contingency (10%)</b>				<b>1,337</b>
	<b>Total expenditure of land recovery</b>				<b>14,702</b>

Source : Study Team

## 9.5 Proposal for the Detailed Design of Pedestrian Bridges for CP2

### 1) Technical Issue on the Proposed Upgrading of Pedestrian Bridges

According to the Pre-Design of Construction Package No. 2 of the UMRT Line 1 Project, the structure design of the main bridge of the pedestrian bridge applies the integral structure combined with the side wall as shown in Figure 9.5.1. In this structure, the side wall is one of the primary structure components, any cutting and opening of the side wall for the connection of additional facilities in the section of the bridge is impossible. Regarding the extension bridge connecting with at the tips of the main bridge, this can be connected without affecting the main bridge. Although additional stairs and additional bridges are proposed by the SAPI study (herein after New Package), these are necessities to improve the convenience for the UMRT user. For the realization of these pedestrian bridges, further technical countermeasures for the connection issue are needed in the Detail Design work.



Source: MAUR

**Figure 9.5.1 - Current Structure Design of the Pedestrian Bridge of Pre-Design of Construction Package No. 2**

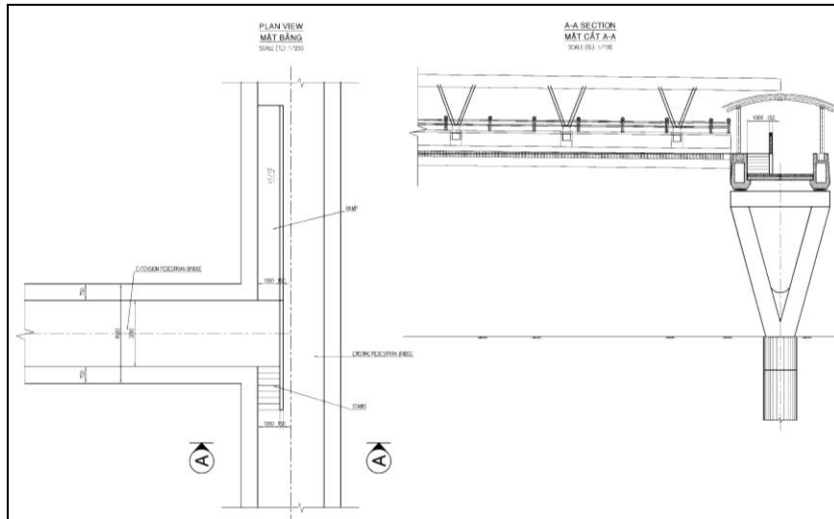
### 2) Alternatives of the Technical Countermeasure

As the technical countermeasure for the issue on the bridge connection, four alternatives are proposed as follows:

#### **Option A: Base Design with the Current Proposed Design of CP2**

Option A applies the current structure design of the main bridge with the integral structure. However, this structure cannot accept any cutting and opening of the side wall in the section of the main bridge. So, for the connection with the proposed additional stairs and extension, the setting up of small stairs and slope to across over the side wall at the connection with the main bridge is required and installing a pillar supporting these proposed additional facilities (see Figure 9.5.2). Although this connecting measure doesn't

affect the main bridge’s structure, it will make inconveniences for the pedestrians because of the unnecessary need of going up and down on the small stairs. In addition, the space of the small stairs and slope will create a bottleneck on the main bridge.

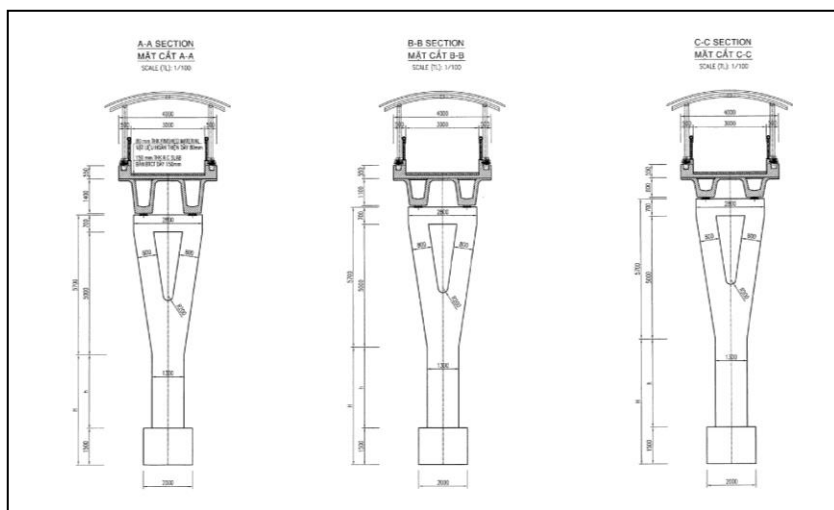


Source: Study Team

**Figure 9.5.2 - Basic Design for the Connection with the Main Bridge (Option A)**

**Option B: Modification of the Structure Design of the Main Bridge**

Option B applies the girder type RC slab for the main bridge’s structure. In this structure, the side wall is structurally separated from the main bridge. So the proposed additional stairs and additional bridge with the supporting pillar can be connected to the main bridge without changes in the floor level like in Option A. However, applying this structure will require extra work and procedures for the major modification of the structure design of CP2.

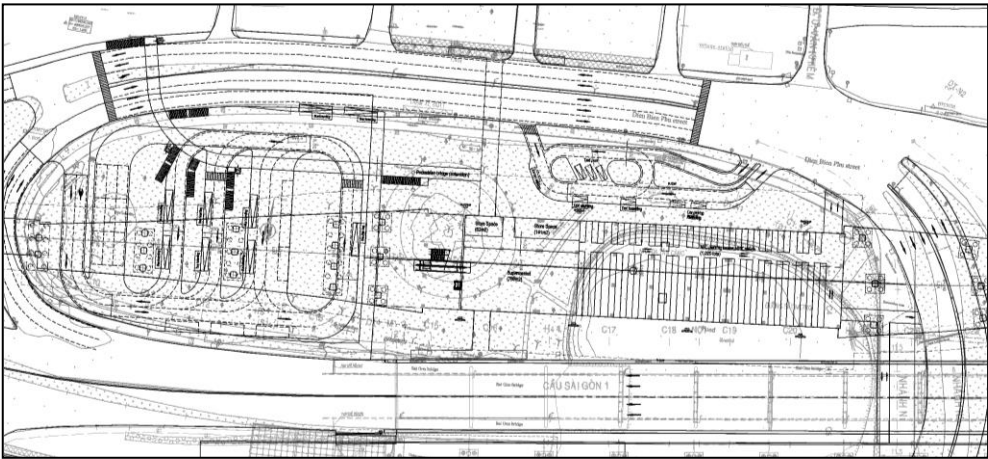


Source: Study Team

**Figure 9.5.3 - Structure Design of Main Bridge with Girder Type RC Slab (Option B)**

**Option C: Re-sharing of Scope of Works of the CP2 and the New Package**

Option C applies the current structure design of the main bridge with the integral structure. In addition, it requires re-sharing of the target section of the main bridge among CP2 and the New Package. In this alternative, CP2 covers between station and the connection point of the main bridge. The new package covers the remaining section of the main bridge and the proposed additional facilities. By installing supporting pillars at the connection point, both sections of the main bridge of CP2 and the New Package can be structurally separated. However, this re-sharing requires the modification of the scope of work of CP2 and the New Package and the procedure for diverting the budget from CP2 to the New Package. In particular, major modification in Tan Cang station is required, because the proposed additional bridge connects at the section close to the station gate (see Figure 9.5.4). In addition, if construction of the new package is delayed, the main bridge will be a dead end in the opening stage of the UMRT.



Source: Study Team

**Figure 9.5.4 - Concept Plan of Tan Cang Station**

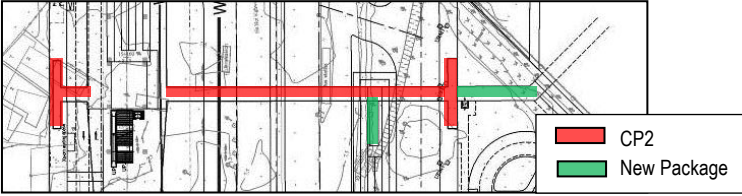

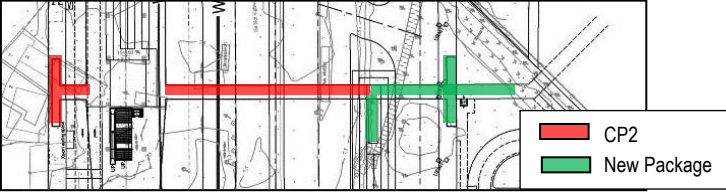
**Option D: Separating of the Main Bridge Structure in CP2**

Option D applies to structurally separate into two sections of the main bridge at the connection with the additional stairs and bridge extension. The structure design of the separated main bridges applies with the original pre-design with the integral structure. In addition, it is required to install additional pillars to support the main bridge at the connection point. In this case, this separation shall be done in the design stage of CP2. Therefore, it is not necessary to adjust the scope of work as in Option C. Besides, in Option D, smooth connections between the main bridge and additional facilities can be made.

Issues and advantages of these alternatives are summarized in Table 9.5.1 and 9.5.2.

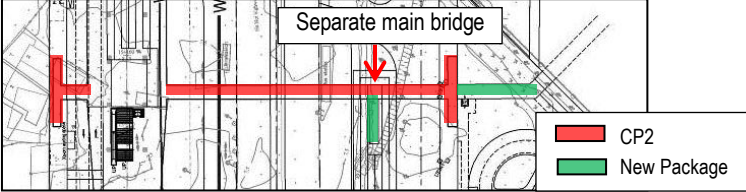


**Table 9.5.1 - Alternatives of the Technical Countermeasure (1/2)**

	Scope of Work and Technical Countermeasure		Issues/Advantages
	CP2	New Package Proposed by SAPI	
Option A Base Design with the Current Proposed Design	<ul style="list-style-type: none"> <li>• <b>Target facilities:</b> Main bridge and the side stairs at both tips (original scope of work)</li> <li>• <b>Bridge structure:</b> Integral structure combining with the side wall (see Figure 9.4.1)</li> <li>• <b>Countermeasure:</b> No need for major modifications</li> <li>• Prepare to receive additional stairs and extension of the main bridge of the New Package</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Target facilities:</b> Additional stairs, extension of the main bridge, elevators and escalators (proposed scope of work)</li> <li>• <b>Countermeasure:</b> Install pillar at the connection point of additional stairs and extension bridge, to not affect the structure of the main bridge</li> <li>• Install small stairs and slope to across over the side wall at the connection with the main bridge (see Figure 9.4.2)</li> </ul>	<p><b>Issues</b></p> <ul style="list-style-type: none"> <li>• Make narrow section of the main bridge at the connection</li> <li>• Inconvenience for the pedestrians at the connection with the main bridge and additional stairs</li> </ul> <p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Design work and construction CP2 doesn't need to wait for the New Package.</li> </ul>
<p><b>Scope of Work of CP2 and the New Package (e.g., High-Tech Park station)</b></p>  <p style="text-align: right;"> <span style="color: red;">█</span> CP2  <span style="color: green;">█</span> New Package         </p>			
Option B Modify the Structure Design of the Main Bridge	<ul style="list-style-type: none"> <li>• <b>Target facilities:</b> Same as Option A</li> <li>• <b>Bridge structure:</b> Girder type RC slab with side wall (see Figure 9.4.3)</li> <li>• <b>Countermeasure:</b> Modify main bridge structure design</li> <li>• Prepare to receive additional stairs and extension of the main bridge of the New Package</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Target facilities:</b> Same as Option A</li> <li>• <b>Countermeasure:</b> Install pillar at the connection point of the additional stairs and extension bridge, to not affect the structure of the main bridge</li> </ul>	<p><b>Issues</b></p> <ul style="list-style-type: none"> <li>• Need extra work and procedures for the major modification of the structure design of CP2</li> </ul> <p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Smooth connection between the main bridge and the additional stairs and the bridge</li> </ul>
<p><b>Scope of Work of CP2 and the New Package (e.g., High-Tech Park station)</b></p>  <p style="text-align: right;"> <span style="color: red;">█</span> CP2  <span style="color: green;">█</span> New Package         </p>			
Option C Re-sharing of the Scope of Work of CP2 and the New Package	<ul style="list-style-type: none"> <li>• <b>Target facilities:</b> A part of the section of the original bridge between the station to the affected connection point</li> <li>• <b>Bridge structure:</b> Same as in Option A</li> <li>• <b>Consideration:</b> Install pillar under the connection point</li> <li>• Prepare to connect with the extension of the main bridge of the New Package</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Target facilities:</b> Current proposed facilities and a part of the section of the main bridge</li> <li>• <b>Countermeasure:</b> Apply integral structure for the main bridge (same as CP2)</li> <li>• Install pillar at the connection point to keep integral structure with the additional stairs and extension.</li> </ul>	<p><b>Issues</b></p> <ul style="list-style-type: none"> <li>• Need extra work and procedures to reduce the scope of work of CP2 and reduce the budget of CP2</li> <li>• Increase construction cost of the New Package (approx. 5.0 mil USD)</li> <li>• In Tan Cang, most of the section of the main bridge have to be developed by the New Package</li> <li>• If the new package is delayed, the main bridge will be a dead end in the opening stage of the UMRT</li> </ul> <p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Smooth connection between the main bridge and the additional stairs and bridge</li> </ul>
<p><b>Scope of Work of CP2 and the New Package (e.g., High-Tech Park station)</b></p>  <p style="text-align: right;"> <span style="color: red;">█</span> CP2  <span style="color: green;">█</span> New Package         </p>			

Source: Study Team

**Table 9.5.2 - Alternatives of the Technical Countermeasure (2/2)**

	Scope of Work and Technical Countermeasure		Issues/Advantages
	CP2	New Package Proposed by SAPI	
Option D Separation of the Main Bridge Structure in CP2	<ul style="list-style-type: none"> <li>• <b>Target facilities:</b> Same as in Option A</li> <li>• <b>Bridge structure:</b> Same as in Option A</li> <li>• <b>Countermeasure:</b> Separate two sections of the main bridge at the connection with additional facilities</li> <li>• Install additional pillar to support the main bridge at the connection point</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Target facilities:</b> Same as in Option A</li> <li>• <b>Countermeasure:</b> Install pillar at the connection point of the additional stairs and extension bridge to not affect the structure of the main bridge</li> </ul>	<p><b>Issues</b></p> <ul style="list-style-type: none"> <li>• The design modification of CP2 is needed</li> </ul> <p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Smooth connection between the main bridge and the additional stairs and bridge</li> </ul>
<p><b>Scope of Work of CP2 and the New Package (e.g., High-tech Park station)</b></p> 			

Source: Study Team

3) Proposed Considerations of the Detailed Design of CP2

In the SAPI study, Option D is proposed as the basic design for the pedestrian bridge from the viewpoint of pedestrian convenience and less of an extra modification of CP2.

The cost estimation in Chapter 9.6 and implementation plan in Chapter 10 are studied based on Option D.

For the detailed design of CP2, considerations to modify the structure design of the main bridge are proposed as follows.

- The main bridge shall be structurally separated at the connection with the additional stairs and extension of the bridge proposed by the SAPI study.
- For the separation, an additional pillar shall be installed to support the separated main bridges at the connection point.

## 9.6 Cost Estimation for the Intermodal Facility Development

### 1) Summary of the Construction Costs

The estimation of the construction cost of the intermodal facility development for HCMC UMRT Line 1 is conducted based on the Concept Plan of Station Area Development as shown in Chapter 9.

The estimated construction costs of intermodal facilities are summarized as follows.

The breakdown of the construction costs in the following tables is indicated in “Appendix C: Breakdown of Cost Estimation”.

**Table 9.6.1 - Construction Cost of Intermodal Facilities (Phase 1)**

Exchange Rate: 1 JPY = 202.46 VND

	Station	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in mil. JPY
1	Ben Thanh	0.0	0.0	0.0
2	Opera House	0.0	0.0	0.0
3	Ba Son	0.0	0.0	0.0
4	Van Thanh Park	15.2	11,097.3	70.0
5	Tan Cang	92.6	82,973.6	502.4
6	Thao Dien	64.4	44,772.0	285.5
7	An Phu	38.3	29,376.2	183.4
8	Rach Chiec	111.4	103,463.8	622.2
9	Phuoc Long	30.3	19,118.0	124.7
10	Binh Thai	30.5	19,516.8	126.9
11	Thu Duc	34.3	14,215.1	104.5
12	High-Tech Park	43.5	36,046.5	221.6
13	Suoi Tien	32.6	11,536.8	89.6
14	Suoi Tien Terminal	0.0	0.0	0.0
	<b>Total</b>	<b>493.1</b>	<b>372,116.1</b>	<b>2,330.8</b>

Source: Study Team

**Table 9.6.2 - Construction Cost of Intermodal Facilities (Phase 2)**

Exchange Rate: 1 JPY = 202.46 VND

	Station	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in mil. JPY
1	Ben Thanh	0.0	0.0	0.0
2	Opera House	0.0	0.0	0.0
3	Ba Son	0.0	0.0	0.0
4	Van Thanh Park	28.3	46,290.7	257.0
5	Tan Cang	0.0	0.0	0.0
6	Thao Dien	0.0	0.0	0.0
7	An Phu	0.0	0.0	0.0
8	Rach Chiec	0.0	0.0	0.0
9	Phuoc Long	10.1	13,228.8	75.5
10	Binh Thai	0.0	0.0	0.0
11	Thu Duc	0.0	0.0	0.0
12	High-Tech Park	0.0	0.0	0.0
13	Suoi Tien	13.8	23,179.2	128.3
14	Suoi Tien Terminal	0.0	0.0	0.0
	<b>Total</b>	<b>52.2</b>	<b>82,698.7</b>	<b>460.8</b>

Source: Study Team

**Table 9.6.3 - Construction Cost of Intermodal Facilities (Total of Phase 1 & 2)**

Exchange Rate: 1 JPY = 202.46 VND

	Station	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in mil. JPY
1	Ben Thanh	0.0	0.0	0.0
2	Opera House	0.0	0.0	0.0
3	Ba Son	0.0	0.0	0.0
4	Van Thanh Park	43.5	57,388.0	327.0
5	Tan Cang	92.6	82,973.6	502.4
6	Thao Dien	64.4	44,772.0	285.5
7	An Phu	38.3	29,376.2	183.4
8	Rach Chiec	111.4	103,463.8	622.2
9	Phuoc Long	40.4	32,346.8	200.2
10	Binh Thai	30.5	19,516.8	126.9

	Station	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in mil. JPY
11	Thu Duc	34.3	14,215.1	104.5
12	High-Tech Park	43.5	36,046.5	221.6
13	Suoi Tien	46.4	34,716.0	217.9
14	Suoi Tien Terminal	0.0	0.0	0.0
	Total	545.3	454,814.8	2,791.6

Source: Study Team

**Table 9.6.4 - Breakdown of the Project Cost for Intermodal Facility Development (Total in mil. JPY)**

Exchange Rate: 1 JPY = 202.46 VND

<Phase 1> (1/2)	Earth works	Sub-base and Base courses	Pavement	Landscape	Traffic safety	Drainage system	Pedestrian Bridge	OVER PASS PIPE SUPPLY WATER BRIDGES	Stairs structures	REINFORCED CONCRETE PILE SLAB
1. Ben Thanh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. Opera House	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. Ba son	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. Van Thanh Park	6.7	3.3	20.6	0.7	4.7	0.0				0.0
5. Tan Cang	7.6	8.2	35.1	12.8	11.8	9.2	188.7		93.4	4.3
6. Thao Dien	6.1	5.0	14.3	11.2	6.5	6.7	76.7		54.0	
7. An Phu	2.7	2.3	4.4	1.1	4.9				25.9	90.1
8. Rach Chiec	5.0	4.9	13.9	0.1	10.2	2.1		399.1	35.0	
9. Phuoc Long	1.0	0.7	2.1	0.0	3.3	0.0	0.0		50.1	
10. Binh Thai	3.2	2.9	6.6		4.8				18.4	
11. Thu Duc	1.9	1.4	3.9		7.3				15.6	
12. High-Tech Park	3.6	3.7	10.5	3.6	10.2	2.5	95.7		21.5	
13. Suoi Tien	1.2	0.9	2.6	0.0	2.7	0.0			17.1	
14. Suoi Tien Terminal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total*	38.9	33.3	114.0	29.5	66.4	20.5	361.1	399.1	330.9	94.4

SPECIAL ASSISTANCE FOR PROJECT IMPLEMENTATION (SAPI)  
 FOR HO CHI MINH CITY URBAN RAILWAY PROJECT (BEN THANH – SUOI TIEN SECTION (LINE 1))  
**Final Report**

<b>&lt;Phase 1&gt; (2/2)</b>	RETAINING WALL	Roof structures for vehicle parking	Fence	Pedestrian cover roof	Taxi stop	Bus stop	Lighting	Traffic Signal for Vehicle	Ticketing System in Parking	Total
1. Ben Thanh										
2. Opera House										
3. Ba son										
4. Van Thanh Park	0.0	9.2	4.7		0.0	0.0	11.8		8.4	70.1
5. Tan Cang			5.8			33.0	80.6	0.7	11.2	502.4
6. Thao Dien		23.5	6.9	9.1		23.7	33.5		8.4	285.6
7. An Phu		8.1	5.5			8.7	15.9		13.8	183.4
8. Rach Chiec		40.1	10.0			0.5	41.0	0.0	11.2	573.2
9. Phuoc Long		10.5	6.0			8.7	31.1		11.2	124.7
10. Binh Thai		30.4	7.3			7.9	34.1		11.2	126.8
11. Thu Duc		17.0	10.9			14.7	20.5		11.2	104.5
12. High-Tech Park		18.6	8.5			8.2	26.6		8.4	221.6
13. Suoi Tien		6.9	5.4			15.0	26.5		11.2	89.5
14. Suoi Tien Terminal										
Total*	0.0	164.3	71.0	9.1	0.0	120.5	321.6	0.7	106.2	2,281.6

<b>&lt;Phase 2&gt; (1/2)</b>	Earth works	Sub-base and Base courses	Pavement	Landscape	Traffic safety	Drainage system	Pedestrian Bridge	OVER PASS PIPE SUPPLY WATER BRIDGES	Stairs structures	REINFORCED CONCRETE PILE SLAB
1. Ben Thanh										
2. Opera House										
3. Ba son										
4. Van Thanh Park	3.4	1.0	2.7	0.7	6.2	2.1				214.7
5. Tan Cang										
6. Thao Dien										
7. An Phu										
8. Rach Chiec										
9. Phuoc Long	1.5	1.1	6.3	2.0	2.5	2.6	23.7		11.1	
10. Binh Thai										
11. Thu Duc										
12. High-Tech Park										
13. Suoi Tien	2.1	3.2	7.8	2.9	5.4	3.0			12.8	
14. Suoi Tien Terminal										
Total*	7.0	5.3	16.8	5.6	14.1	7.7	23.7	0.0	23.9	214.7

<Phase 2> (2/2)	RETAINING WALL	Roof structures for vehicle parking	Fence	Pedestrian cover roof	Taxi stop	Bus stop	Lighting	Traffic Signal for Vehicle	Ticketing System in Parking	Total
1. Ben Thanh										
2. Opera House										
3. Ba son										
4. Van Thanh Park	22.8	0.0	0.0		1.1	0.7	1.5		0.0	256.9
5. Tan Cang										0.0
6. Thao Dien										0.0
7. An Phu										0.0
8. Rach Chiec										0.0
9. Phuoc Long		18.4	3.8			0.5	1.8			75.3
10. Binh Thai										0.0
11. Thu Duc										0.0
12. High-Tech Park										0.0
13. Suoi Tien		11.2	77.9			0.4	1.5			128.3
14. Suoi Tien Terminal										
Total*	22.8	29.6	81.7	0.0	1.1	1.6	4.8	0.0	0.0	460.5

Source: Study Team

## 2) Assumptions for the Cost Estimation

The major conditions for the construction cost estimate are defined as follows:

1) Base Year for Cost Estimate: March 2014

2) Exchange Rate:

US\$ 1 = ¥ 103.9, US\$ 1 = VND 21,036

Reference: General Guidelines for the 1st batch (Fact Finding Mission) of FY 2014 Japanese ODA Loan Projects (JICA for Vietnam)

3) Currencies:

Japanese Yen (JPY) for Foreign Currency Portion

Including:

1) Services, material, labor, equipment operation prices imported from abroad



2) Overhead & Profit of Indirect Cost

Vietnamese Dong (VND) for Local Currency Portion

Including:

- 1) Services, material, labor, equipment operation prices procured domestically

4) Direct Construction Cost

i) Material Prices:

Material prices are defined based on:

- Announcement of construction and interior decoration materials on 3/2014 in Ho Chi Minh City by Department of Construction and
- Several quotations from material suppliers

ii) Labor Prices:

Based on the following Decrees, the Labor Prices for Vietnamese for construction are defined:

- Decree No. 205/2004/NĐ-CP dated 14/12/2004 by Government to stipulate system of salary grades, salary tables and allowances of state-owned companies (Formula & Factors)
- Decree No. 182/2013/ND-CP dated November 14, 2013 of the Government stipulating region-based minimum wage levels for laborers working for companies, enterprises, cooperatives, cooperative groups, farms, households, individuals and agencies, organizations employing laborers (Minimum Labor wage to be applied for Decree No.205/2004)

iii) Equipment Operation Prices:

Equipment Operation Prices of Vietnamese Machineries are estimated based on

- Circular No.06/2010/TT-BXD dated 26 May 2010 by Ministry of Construction on guidance of establishing method for construction machineries shift and equipment

iv) Process Costs:

Because most of the construction work items for Intermodal Facilities are typical & common construction works in Vietnam, the Vietnamese Norms are mainly applied for the construction cost estimation.

Based on the surveyed Material, Labor and Equipment Operation Costs, the Process Costs (Cost for a specified construction work item per unit) are estimated based on the following Vietnamese Norms.

- Declarations No.1776/BXD-VP dated 16 August 2007,
- No.1091/BXD-VP dated 26 December 2011
- No. 1172/QĐ-BXD dated 26 December 2012
- Declaration No.1777/BXD-VP dated 16 August 2007, and
- Declaration No. 1173/QĐ-BXD dated 26 December 2012

5) Indirect Construction Costs:

- a) Common Temporary Cost: 8.6% of Direct Construction Cost
- b) Site Management Cost: 14.4% of the sum of Direct Construction Cost and Common Temporary Cost
- c) Overhead & Profit: 15.0% of the sum of Direct Construction Cost, Common Temporary cost and Site Management Cost

The above percentages are defined based on the following assumptions;

- The construction works will be conducted based on the Contractor selected by International competitive bidding.
- Because the scale of the construction works is relatively small, the percentages of Indirect Construction Costs are higher than the percentages applied for the packages under the UMRT Line 1 project.

## 10 IMPLEMENTATION PLAN FOR INTERMODAL FACILITIES

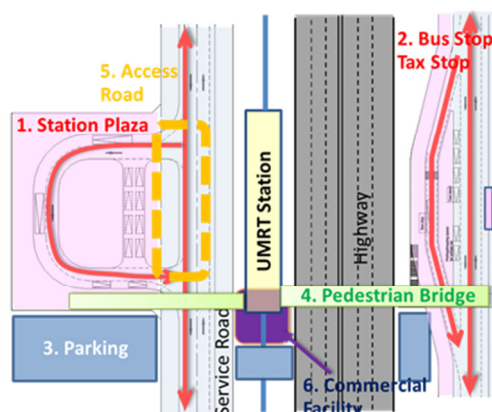
### 10.1 Project Implementation Scheme and the O&M System

The Management Authority for Urban Railways (MAUR), under the Ho Chi Minh City People's Committee (HCMC PC) has been assigned as the Project Owner of the "Ho Chi Minh City Urban Railway Project (Ben Thanh – Suoi Tien Section (Line 1))." The intermodal facilities, such as station plazas, bus stops/taxi stops, parking spaces, access roads and commercial facilities are not included in the HCMC UMRT Line 1 Project. Intermodal facilities have two functions: one as a station related facility and another as a road transport related facility. Therefore, it is necessary to clarify the demarcation of responsibility between the MAUR and the Department of Transportation (DOT) regarding the construction and operations and maintenance (O&M) for intermodal facility development.

#### 1) Project Owner of the Intermodal Facilities

The components of intermodal facility development are divided into 6 items as follows:

1. Station plaza
2. Bus stop, taxi stop
3. Parking
4. Pedestrian bridge
5. Access road
6. Commercial facility



The various tasks related to these facilities and the responsible agencies are presented in the following table.

**Table 10.1.1 - The Tasks to Develop, Operate and Maintain the Intermodal Facilities**

Items of Intermodal Facilities		Tasks (Responsible Organization)			
		Urban Planning	Land Acquisition	Design and Construction	O&M
1. Station plaza	Station plaza in Van Thanh Park	Designate in the zoning plan (DPA)	○ (HCMC PC)	<ul style="list-style-type: none"> <li>Pavement and marking</li> <li>Storm water drainage</li> <li>Lighting, planting and shelter for waiting space</li> </ul> (To be determined)	<ul style="list-style-type: none"> <li>Maintenance and repair of facilities</li> <li>Payment of electricity</li> </ul> (DOT)
	Station plaza in the public land (Tan Cang, Thao Dien, High-Tech Park)		-		
	Station plaza in the urban development project in Phase II		○ In UD project (HCMC PC)		
2. Bus stop, taxi stop	Separated bus stops and taxi stops in the ROW of the Hanoi Highway	Designate in the zoning plan (DPA)	-	<ul style="list-style-type: none"> <li>Pavement and marking</li> <li>Storm water drainage</li> <li>Lighting, planting and shelter for waiting space</li> </ul> (To be determined)	<ul style="list-style-type: none"> <li>Maintenance and repair of facilities</li> <li>Payment of electricity</li> </ul> (DOT)
	Road side bus stops and taxi stops on the service road of the Hanoi Highway	-	-		
3. Parking	Motorcycle parking under the station	-	-	<ul style="list-style-type: none"> <li>Pavement and marking</li> <li>Storm water drainage</li> <li>Lighting and fences</li> <li>Toll booths</li> </ul> (To be determined)	<ul style="list-style-type: none"> <li>Maintenance and repair of facilities</li> <li>Payment of electricity</li> <li>Ticketing</li> </ul> (MAUR)
	Parking under the viaduct	-	-		
	Parking in the ROW of the Hanoi Highway	Designate in the zoning plan (DPA)	-		
4. Pedestrian Bridge	Construction in Phase I	-	-	<ul style="list-style-type: none"> <li>Foundation and structure of bridge</li> <li>Elevator, escalator, lighting</li> </ul> (To be determined)	<ul style="list-style-type: none"> <li>Maintenance and repair of facilities</li> <li>Payment of electricity</li> </ul> (MAUR)
	Extension in the urban development project in Phase II	-	○ In UD project (HCMC PC)		
5. Access road	Access road in the public land (Van Thanh Park, Tan Cang)	-	-	<ul style="list-style-type: none"> <li>Pavement and marking</li> <li>Storm water drainage</li> <li>Lighting and planting</li> </ul> (To be determined)	<ul style="list-style-type: none"> <li>Maintenance and repair of facilities</li> <li>Payment of electricity</li> </ul> (MAUR)
	Access road with land acquisition	Designate in the zoning plan (DPA)	○ (HCMC PC)		
6. Commercial facility	Retail store, cafe and other services under the station	-	-	<ul style="list-style-type: none"> <li>Wall of compartment</li> <li>(Interior, store furniture and equipment will be installed by tenant)</li> </ul> (To be determined)	<ul style="list-style-type: none"> <li>Maintenance and repair of facilities</li> <li>Rental management</li> </ul> (MAUR)

Note: \*Phase I: Intermodal facility development in the ROW of the Hanoi Highway, Phase II: Intermodal facility development that requires some land acquisition

Source: Study Team

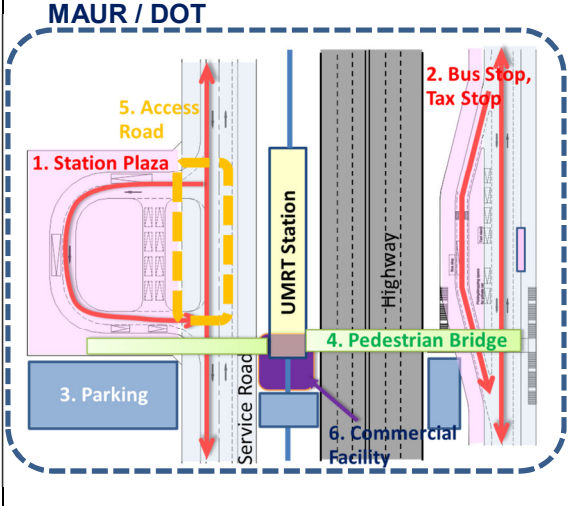
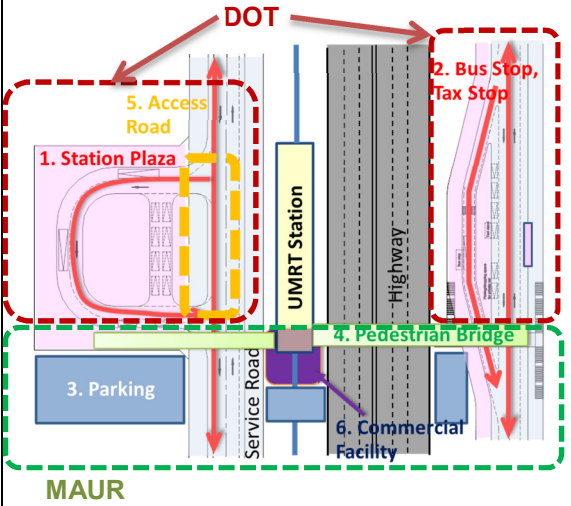
For the design and construction of the above intermodal facilities, because they are both road related facilities and railway related facilities, either the DOT or MAUR can be the project owner. Specifically, there are three options.

**Table 10.1.2 - Project Owner Options**

Project Owner	All MAUR	All DOT	MAUR & DOT
	Option 1	Option 2	Option 3
Explanation	MAUR is the project owner of all the intermodal facilities	DOT is the project owner of all the intermodal facilities	MAUR is the project owner of facilities within the Line 1 project boundary, namely, parking, pedestrian bridge and service facilities. DOT is the project owner of the rest.
Coordination with the Line 1 Project	Good coordination can be secured because MAUR will be in charge of both.	Extra effort will be necessary to secure coordination between MAUR and DOT during both the design and construction stages.	Extra effort will be necessary to secure coordination between MAUR and DOT during both the design and construction stages. However, the coordination effort will be less compared to Option 2 because MAUR will be the project owner of the parking spaces and pedestrian bridge.
Coordination with other transport modes	Coordination between MAUR and DOT will be required.	Good coordination can be secured because DOT has extensive experience with transport related facilities development.	Coordination can be secured because DOT has experience with transport related facilities development.
Implementation Schedule	Quick, because it may be possible to include the construction into the Line 1 Project.	Slow, because it will be necessary to establish a new Project and a new Loan Agreement.	(The same as in the left)
O&M	Transfer procedure is required after the completion of the intermodal facility development.		Project owner and the agency responsible for O&M are same. The transfer procedure is not required.

Source: Study Team

**Table 10.1.3 - Allocated Roles in the Construction Stage for the Project Owner Options**

One Project Owner (by MAUR or DOT)	Multiple Project Owners (by MAUR and DOT)
Option 1 and 2	Option 3
<p>Either MAUR or DOT has responsibility for all the components shown below.</p>  <p>The diagram for Option 1 and 2 shows a cross-section of the intermodal facility. A dashed blue box labeled 'MAUR / DOT' encompasses all components: 1. Station Plaza (pink), 2. Bus Stop, Taxi Stop (red), 3. Parking (blue), 4. Pedestrian Bridge (green), 5. Access Road (yellow), and 6. Commercial Facility (purple). The central elements include the UMRT Station, Service Road, and Highway.</p>	<p><b>Responsibility of MAUR:</b> 3. Parking, 4. Pedestrian Bridge and 6. Commercial Facility  <b>Responsibility of DOT:</b> 1. Station Plaza, 2. Bus Stop and Taxi Stop and 5. Access Road</p>  <p>The diagram for Option 3 shows the same cross-section. A dashed red box labeled 'DOT' encompasses components 1, 2, and 5. A dashed green box labeled 'MAUR' encompasses components 3, 4, and 6. The central elements (UMRT Station, Service Road, Highway) are shared.</p>

Source: Study Team

As shown in the above comparison, assigning MAUR to be the project owner of all the intermodal facilities is the most efficient in terms of coordination with the HCMC UMRT Line 1 and the implementation schedule. There may be some challenges regarding coordination with other transport modes; however, this can be overcome by ensuring the DOT's engagement during the design and construction stage.

For this reason, it is recommended to assign MAUR to be the project owner of all the intermodal facilities.

## 2) Project Implementation Scheme

**Options for the Project Implementation Scheme:** For the implementation scheme for intermodal facility development, two options are examined: 1) Option 1 "New construction package under the current loan (HCMC UMRT Line 1 Project)" requiring an additional loan for the new package at the 3<sup>rd</sup> L/A of the Line 1 Project, and Option 2 "New construction package under a new loan (New Project)", as shown in Table 10.1.4. MAUR will be the project owner for "New construction package under a new loan".

**Table 10.1.4 - Options and Brief Explanations for the Project Implementation Schemes**

Option	Fund Source	Project Owner	Contractor	Assumed Timing for Completion	Remarks
1. New construction package under the current loan	Funds of an additional L/A for the HCMC Line UMRT 1 Project	MAUR	The contractor awarded in tendering	Jul. 2018	Construction will be conducted in the new construction package to be funded in an additional loan at the 3 <sup>rd</sup> L/A of the Line 1 Project*.
2. New construction package under a new loan	New ODA by JICA	MAUR	The contractor awarded in tendering	Dec. 2019	New loan will be established for the construction.

Note: \* 3<sup>rd</sup> L/A is assumed to be signed at the end of financial year 2014 (March 2015)

Source: Study Team

**Project Implementation Schedule:** The schedule of intermodal facility development is divided into 2 phases:

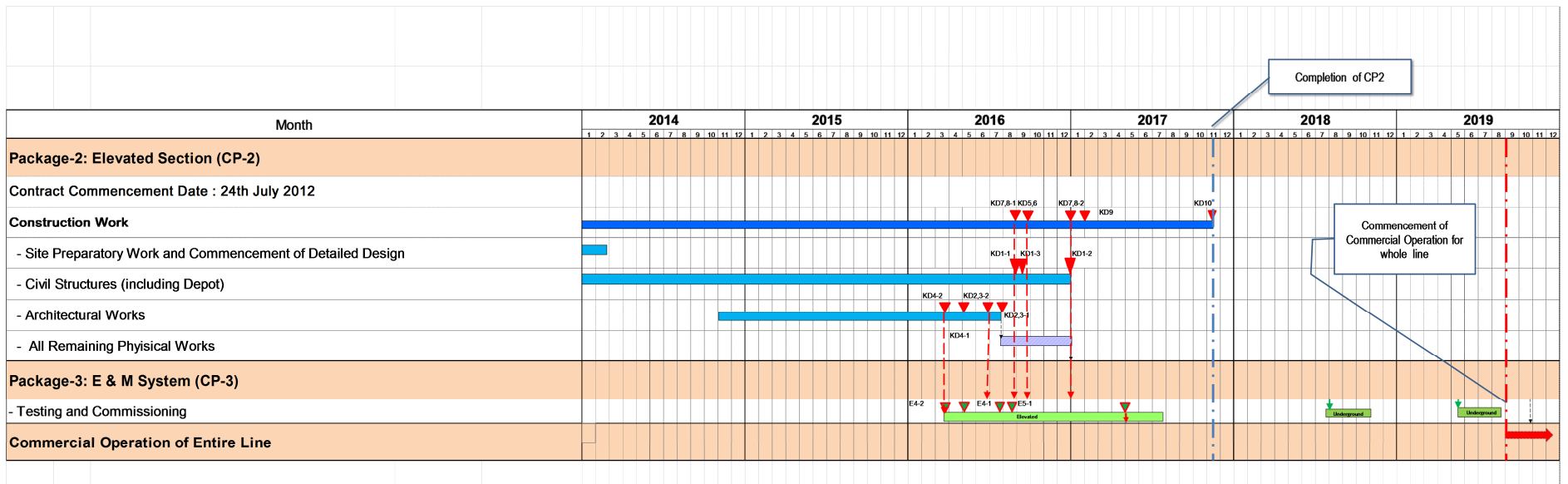
Phase 1: Intermodal Facility Development in the ROW of the Hanoi Highway

Phase 2: Intermodal Facility Development that requires some land acquisition

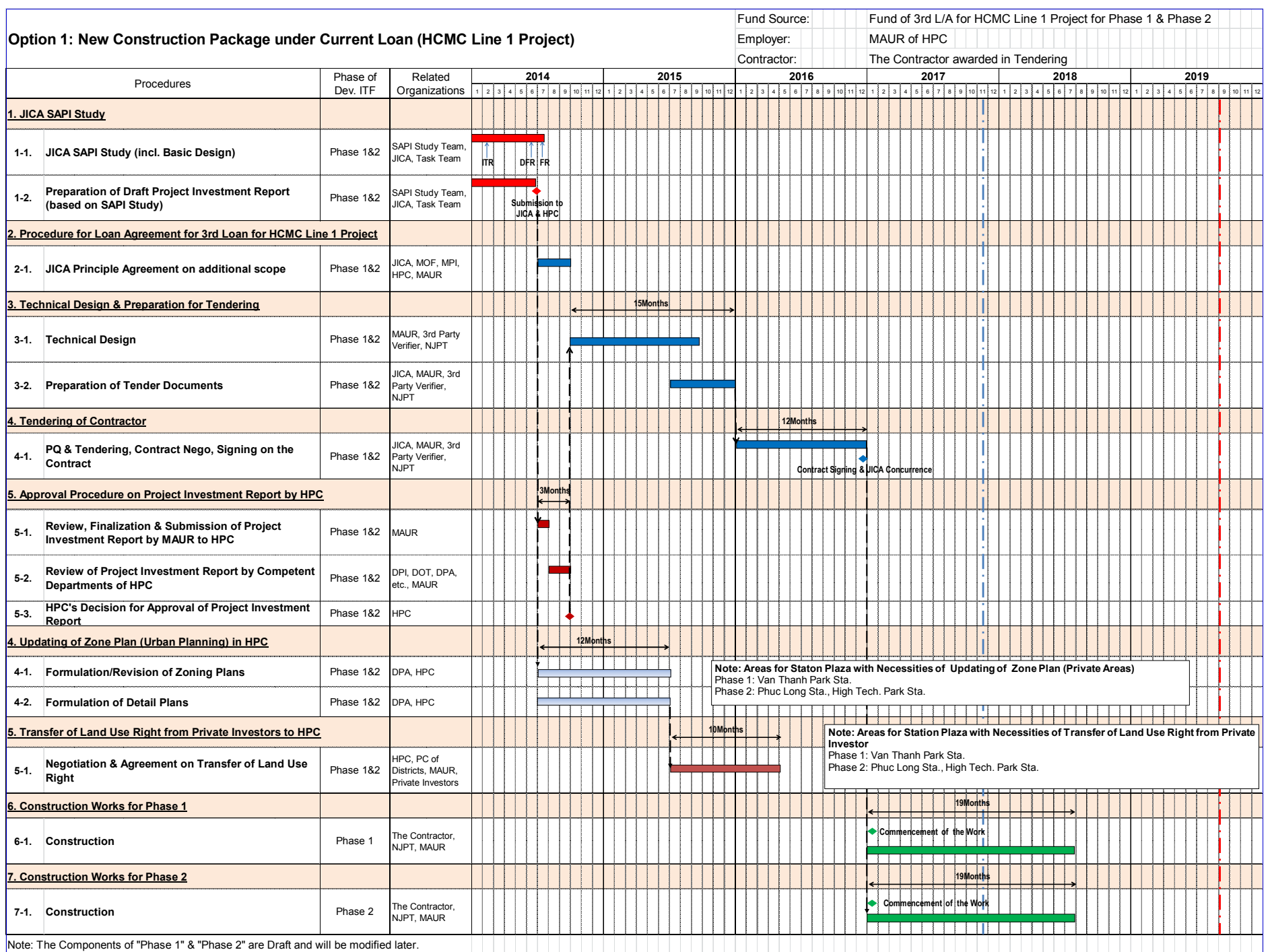
A bar chart schedules the planned detailed design and construction including the procurement procedure based on the implementation schedule of the HCMC UMRT Line 1 Project. In this schedule, crucial construction work and a work schedule of other activities besides construction, such as updating the Zone Plan (Urban Planning) in the HCMC PC and the transfer of land use rights from private investors to the HCMC PC, are examined. The assumed project implementation schedule for each option is shown in Figure 10.1.6, Figure 10.1.7 and Figure 10.1.8.



**Table 10.1.5 - Implementation Schedule of Package 2 (CP-2) and Package 3 (CP-3)**



**Table 10.1.6 - Implementation Schedule on "Option 1: New Construction Package under Current Loan (HCMC Line 1 Project)"**



**Table 10.1.7 - Implementation Schedule on "Option 2: New Construction Package under a New Loan (New Project under MAUR)"**

Option 2: New Construction Package under New Loan (New Project under MAUR)			2014												2015												2016												2017												2018												2019																							
Procedures	Phase of Dev. ITF	Related Organizations	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12												
<b>1. JICA SAPI Study</b>																																																																																						
1-1. JICA SAPI Study (incl. Basic Design)	Phase 1&2	SAPI Study Team, JICA, Task Team	ITR												DFR												FR																																																											
1-2. Preparation of Draft Investment Report (based on SAPI Study)	Phase 1&2	SAPI Study Team, JICA, Task Team													Submission to JICA & HPC																																																																							
<b>2. Procedure for Loan Agreement for New Project</b>															15Months																																																																							
2-1. Application for Long List of ODA Project	Phase 1&2	MAUR, DPI, HPC, MPI																																																																																				
2-2. Application for Short List of ODA Project	Phase 1&2	MPI																																																																																				
2-3. JICA FF Mission	Phase 1&2	JICA, MOF, MPI, HPC, MAUR													EN																																																																							
2-4. JICA Appraisal Mission	Phase 1&2	JICA, MOF, MPI, HPC, MAUR													L/A																																																																							
<b>3. Procurement of the Consultant</b>															10 Months																																																																							
3-1. Procurement of the Consultant	Phase 1&2	MAUR																																																																																				
<b>4. Technical Design &amp; Preparation for Tendering</b>																											15Months																																																											
4-1. Technical Design	Phase 1&2	MAUR, 3rd Party Verifier, The Consultant																																																																																				
4-2. Preparation of Tender Documents	Phase 1&2	JICA, MAUR, 3rd Party Verifier, The Consultant																																																																																				
<b>5. Tendering of Contractor</b>																																							12Months																																															
5-1. PQ & Tendering, Contract Nego, Signing on the Contract	Phase 1&2	JICA, MAUR, 3rd Party Verifier, The Consultant																																																																																				
<b>6. Approval Procedure on Investment Report by HPC</b>			3Months																																																																																			
6-1. Review, Finalization & Submission of Investment Report by MAUR to HPC	Phase 1&2	MAUR																																																																																				
6-2. Review of Investment Report by Competent Departments of HPC	Phase 1&2	DPI, DOT, DPA, etc., MAUR																																																																																				
6-3. HPC's Decision for Approval of Investment Report	Phase 1&2	HPC																																																																																				
<b>7. Updating of Zone Plan (Urban Planning) in HPC</b>			12Months																																																																																			
7-1. Formulation/Revision of Zoning Plans	Phase 1&2	DPA, HPC																																																																																				
7-2. Formulation of Detail Plans	Phase 1&2	DPA, HPC																																																																																				
<b>8. Transfer of Land Use Right from Private Investors to HPC</b>															10Months																																																																							
8-1. Negotiation & Agreement on Transfer of Land Use Right	Phase 1&2	HPC, MAUR, Private Investors																																																																																				
<b>9. Construction Works for Phase 1</b>																																																			19Months																																			
9-1. Construction	Phase 1	The Contractor, The Consultant, MAUR																																																																																				
<b>10. Construction Works for Phase 2</b>																																																															19Months																							
10-1. Construction	Phase 2	The Contractor, The Consultant, MAUR																																																																																				

Note: The Components of "Phase 1" & "Phase 2" are Draft and will be modified later.

**Proposed Project Implementation Scheme:** Table 10.1.8 analyses the key issues, and considers the advantages and disadvantages to each scheme.

**Table 10.1.8 - Advantages and Disadvantages of the Project Implementation Scheme Options**

Option	Advantages	Disadvantages
1. New construction package under the current loan	<ul style="list-style-type: none"> <li>- Because the budget will be procured under the Current Loan (Line 1 Project), the necessary duration is shorter than Option 2 in which the new loan will be planned.</li> <li>- The current consultant (NJPT) can deal with the detailed design and construction supervision, so it is the suitable option to coordinate the technical design and construction works between the CP2 Contractor and the new Contractor for “Intermodal Facilities”.</li> <li>- Assumed completion timing is Jul. 2018, and the Intermodal Facilities will be available when the commercial operation of Line 1 will be commenced (as of Sep. 2019).</li> </ul>	<ul style="list-style-type: none"> <li>- New Construction Package shall be procured under the STEP Conditions and limited to Japanese firms as the Prime Contractor, so competitive bidding with several bidders is not expected because of the small scale contract.</li> </ul>
2. New construction package under a new loan	<ul style="list-style-type: none"> <li>- In case that the New Loan will be general untied (not STEP), it is expected that many firms would bid to this package from Vietnam and also from other countries.</li> </ul>	<ul style="list-style-type: none"> <li>- Because several procedures for the procurement of the New Loan are required, a long duration for the construction and completion of the Intermodal Facilities is necessary</li> <li>- The careful coordination of the design and construction works between the CP2 Contractor and the Contractor for “Intermodal Facilities” is required for the smooth implementation of the project</li> <li>- Assumed completion is Dec. 2019 which is later than the commencement of commercial operation of the UMRT Line 1 at Sep. 2019</li> </ul>

Source: Study Team

### 3) O&M for the Intermodal Facilities

**Agencies Responsible for Operating the Intermodal Facilities:** The agencies responsible for operating and managing the various items of the intermodal facilities will be the ones having the most important responsibility for the sustainable implementation, as shown below and in Table 10.1.9.

#### 1. Station plaza:

- MAUR: operates activities at station plazas, including passenger information displays and ensuring the safety and security for passengers.
- DOT: responsible for maintaining the station plaza facilities, excluding station related equipment operated by other agencies

- MOCPT: coordinates with MAUR to provide passenger information related bus services to/from stations.
- 2. Bus stop, taxi stop
  - DOT & MOCPT: responsible for maintaining the bus stops and taxi stops.
- 3. Parking
  - MAUR: responsible for operating and maintaining the parking facility.
- 4. Pedestrian bridge
  - MAUR: responsible for maintaining the pedestrian bridge.
- 5. Access road
  - DOT: responsible for maintaining the access road.
  - Traffic Police: manages the operation and maintenance of traffic signals.
- 6. Commercial facility
  - MAUR: manages the tenant businesses at the commercial spaces in the stations

**Table 10.1.9 - Demarcation of Responsibilities of O&M for the Intermodal Facilities**

ITF Component	Main Agency	Related Agency	Layout Image of the ITF Component
1. Station plaza	- DOT	- MAUR - MOCPT	
2. Bus stop, taxi stop	- DOT - MOCPT		
3. Parking	- MAUR		
4. Pedestrian Bridge	- MAUR		
5. Access road	- DOT	- Traffic Police	
6. Commercial facility	- MAUR		

Source: Study Team

#### 4) Summary of the Project Schemes for Intermodal Facility Development

Based on the options of the project implementation scheme, 2 alternatives are compared with regards to the schedule, coordination and O&M in Table 10.1.10. In conclusion, it seems that Option 1 is the best option to smoothly and quickly develop the intermodal facilities for the HCMC UMRT Line 1.

**Table 10.1.10 - Comparative Assessment of the Project Schemes**

Option	Option 1: New construction package under the current loan	Option 2: New construction package under a new loan
<b>Project Owner</b>	<b>MAUR</b>	<b>MAUR</b>
Schedule	Intermodal facilities will be available when the commercial operation of the HCMC UMRT Line 1 is commenced.	Assumed completion of intermodal facilities will be Dec. 2019 (It will not be ready in time for the HCMC UMRT Line 1 opening).
Coordination	Coordination can be shortened compared to the alternatives of "All DOT" and "MAUR and DOT" even if coordination with the DOT will be required for the facilities related to road transport.	(Same as in the left)
O&M	Transfer procedure is required after the completion of the intermodal facility development.	(Same as in the left)

Source: Study Team

## 10.2 Required Consulting Services for Project Implementation

Contents and man-months (M/M) of the necessary consulting services (detailed design and construction management) are examined as below.

### 1) Scope of the Consulting Services

After approval of the Project Investment Report by the HCMC PC, the Project Implementation Agency will select the qualified Consultant firm who is able to execute the engineering detailed design (D/D) and construction supervision (C/S). The scope of the D/D includes technical design, cost estimate and preparation of tender documents such as drawings, conditions of contract and technical specifications etc. The consultant will also assist the Project Implementation Agency in the evaluation of the technical proposal and contract negotiation during the tendering stage. During the construction stage, the Consultant will supervise the construction work, especially in terms of quality, cost, progress and safety control and will issue the Taking-Over Certificate for hand-over from the Contractor to the Project Implementation Agency. After 24 months of the defect liability period, the Consultant will inspect any defects and its repair by the Contractor, then his consulting services will be fully completed.

### 2) Implementation Structure for the Consulting Services

The selection of the Consultant firm is different between Option 1 and Option 2 as described in Chapter 10.1. In the Option 1, the current consultant of the UMRT Line 1 Project (NJPT) can deal in the services as an addendum consulting service. In Option 2, however, the consultant firm should be newly procured under the new loan. The period of each service is the same between Option 1 and 2 as shown in Table 10.2.1.

**Table 10.2.1 - Consultant Firm and Period of Each Service**

Option	Detailed Design (D/D) Including Preparation of Tender Documents	Assistant to Tendering and Contract Negotiation	Construction Supervision (C/S) Including Defect Liability (D.L) Inspection
1: New construction package under the current loan (additional loan)	Implemented by: NJPT Period of the Service: 15 months	Implemented by: NJPT Period of the Service: 12 months	Implemented by: NJPT Period of the C/S Service: 19 months Period of the D.L: 24 months
2: New construction package under new loan	Implemented by: Newly procured consultant Period of the Service: 15 months	Implemented by: Newly procured consultant Period of the Service: 12 months	Implemented by: Newly procured consultant Period of the C/S Service: 19 months Period of the D.L: 24 months

Source: Study Team

As for staffing of the Consultant, taking into accounts the project scale and degree of difficulty, it should optimize the positions and the number of expatriate engineers and local engineers from the viewpoint of quality assurance and the economic aspects.

The required positions and M/M for each stage are proposed as follows:

Detailed Design and Assistance to the Tendering Stage

1.	Expatriate Engineer	Qty	Unit
1)	Team Leader/Station Plaza Designer	12.0	M/M
2)	Electrical Equipment Engineer	2.0	M/M
3)	Contract Documents Specialist	3.0	M/M
2.	Local Engineer		
1)	Civil Engineer (Structural Engineer)	10.5	M/M
2)	Pavement Engineer	2.0	M/M
3)	Soft Soil Treatment Engineer	2.0	M/M
4)	Drainage Engineer	2.0	M/M
5)	Architect Engineer	3.0	M/M
6)	Electrical Equipment Engineer	3.0	M/M
7)	Cost Estimator	4.0	M/M
8)	CAD Operator (1)	8.0	M/M
9)	CAD Operator (2)	3.0	M/M
10)	CAD Operator (3)	3.0	M/M



Construction Supervision and Defect Liability Inspection

1.	Expatriate Engineer	Qty	Unit
1)	Project Manager (Civil Engineer)	8.0	M/M
2)	Resident Engineer (Civil Engineer)	18.0	M/M
3)	Electrical Equipment Engineer	4.0	M/M
2.	Local Engineer		
1)	Structural Engineer	9.0	M/M
2)	Highway Engineer/Pavement Engineer	9.0	M/M
3)	Material Engineer	11.0	M/M
4)	Soft Soil Treatment Engineer	5.0	M/M
5)	Electrical Equipment Engineer	4.0	M/M
6)	Quantity Surveyor	19.0	M/M
7)	Inspector (1)	19.0	M/M
8)	Inspector (2)	19.0	M/M
9)	Inspector (3)	8.0	M/M
10)	Inspector (4)	8.0	M/M

### 3) Cost Estimate of the Consulting Services

The cost of the consulting services is estimated at each stage and for the Japanese and Vietnamese currencies as shown in Table 10.2.2.

**Table 10.2.2 - Cost Estimate of Consulting Services**

Item	JPY Portion	VND Portion	Remarks
Detailed Design and Assistance to the Tendering Stage			
1. Remuneration <sup>*1/</sup>			
Expatriate Engineer	44,048,000	0	
Local Engineer	0	1,434,500,000	
2. Investigation	0	575,312,000	Supplemental soil investigation and topographic survey
3. Other Items	11,141,100	1,398,000,000	Supporting staff, airfare, office rental fee <sup>*2/</sup> , per diem and accommodation etc.
Sub-Total (1)	55,189,100	3,407,812,000	
Construction Supervision and Defect Liability Inspection			
1. Remuneration <sup>*1/</sup>			
Expatriate Engineer	75,432,200	0	
Local Engineer	0	3,315,000,000	
2. Other Items	18,161,100	2,014,000,000	Supporting staff, airfare, office rental fee, per diem and accommodation etc.
Sub-Total (2)	93,593,300	5,329,000,000	
Total (1) + (2)	148,782,400	8,736,812,000	

Source: Study Team

\*1/ The Billing Rate refers to the “General Guidelines for the 1st batch (Fact Finding Mission) of FY 2014 Japanese ODA Loan Projects”.

\*2/ Office space during tendering stage (12 months) is assumed to be provided by the Project Implementation Agency free of charge.

### 10.3 Project Cost

#### 1) Summary of Project Cost

The Project Implementation Scheme is one of the fundamental conditions for the estimation of the Project Cost.

For the following two options of the Project Implementation Scheme described in Table 10.1.4, the Project Cost estimation was conducted.

Option 1: New construction package under the current loan

Option 2: New construction package under a new loan

The items of the Project Cost for the above two options are tabulated as follows:

- 1) Construction Base Cost (estimated as of 2014)
- 2) Price Escalation of Construction Cost
- 3) Physical Contingency of Construction Cost
- 4) Design, Tendering and Supervision Cost
- 5) Interest during Construction
- 6) Project Administration Cost of the Employer
- 7) Tax and VAT
- 8) Land Acquisition & Compensation Cost
- 9) Front End Fee

The estimated Project Costs are summarized as follows.

The breakdowns of the Project Costs in the following tables are indicated in “Appendix C: Breakdown of Cost Estimation”.

It is observed that the Project Cost of Option 2 is about 3% higher than that of Option 1 because of the difference in Price Escalation caused by the difference of the Implementation Schedule.

**Table 10.3.1 - Project Cost of Development of Intermodal Facilities (Option 1)**

	Item	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in JPY (mil. JPY)
<b>I.</b>	<b><u>Eligible Portion</u></b>	<b><u>766.0</u></b>	<b><u>567,811.1</u></b>	<b><u>3,570.4</u></b>
<b>1.</b>	<b>Construction Cost</b>	<b>598.0</b>	<b>557,596.0</b>	<b>3,351.9</b>
	<b>1-1. Construction Base Cost (as of 2014)</b>	<b>545.3</b>	<b>454,814.8</b>	<b>2,791.6</b>
	Phase 1:	493.1	372,116.1	2,330.8
	Phase 2:	52.2	82,698.7	460.8
	<b>1-2. Price Escalation of Construction Cost</b>	<b>24.2</b>	<b>76,229.1</b>	<b>400.7</b>
	Phase 1:	21.9	62,368.4	330.0
	Phase 2:	2.3	13,860.7	70.7
	<b>1-3. Physical Contingency</b>	<b>28.5</b>	<b>26,552.1</b>	<b>159.6</b>
	Phase 1:	25.8	21,724.2	133.1
	Phase 2:	2.7	4,827.9	26.5
<b>2.</b>	<b>Design, Tendering and Supervision Cost</b>	<b>161.3</b>	<b>10,215.1</b>	<b>211.8</b>
<b>3.</b>	<b>Interest during Construction</b>	<b>6.7</b>	<b>0.0</b>	<b>6.7</b>
<b>II.</b>	<b><u>Counterpart Funds</u></b>	<b><u>42.6</u></b>	<b><u>145,969.3</u></b>	<b><u>763.5</u></b>
<b>1.</b>	<b>Project Administration Cost of the Employer</b>	<b>0.0</b>	<b>33,931.3</b>	<b>167.6</b>
<b>2.</b>	<b>Tax and VAT</b>	<b>0.0</b>	<b>75,595.2</b>	<b>373.3</b>
<b>3.</b>	<b>Land Acquisition &amp; Compensation Cost</b>	<b>0.0</b>	<b>36,442.8</b>	<b>180.0</b>
<b>4.</b>	<b>Front end Fee</b>	<b>42.6</b>	<b>0.0</b>	<b>42.6</b>
	<b><u>TOTAL (I. + II.)</u></b>	<b><u>808.6</u></b>	<b><u>713,780.4</u></b>	<b><u>4,333.9</u></b>

Source: Study Team

**Table 10.3.2 - Project Cost of Development of Intermodal Facilities (Option 2)**

	Item	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in JPY (mil. JPY)
<b>I.</b>	<b><u>Eligible Portion</u></b>	<b><u>774.1</u></b>	<b><u>588,873.1</u></b>	<b><u>3,682.5</u></b>
<b>1.</b>	<b>Construction Cost</b>	<b>604.1</b>	<b>578,252.2</b>	<b>3,460.1</b>
	<b>1-1. Construction Base Cost (as of 2014)</b>	<b>545.3</b>	<b>454,814.8</b>	<b>2,791.6</b>
	Phase 1:	493.1	372,116.1	2,330.8
	Phase 2:	52.2	82,698.7	460.8
	<b>1-2. Price Escalation of Construction Cost</b>	<b>30.1</b>	<b>95,901.6</b>	<b>503.8</b>
	Phase 1:	27.3	78,463.9	414.9
	Phase 2:	2.8	17,437.7	88.9
	<b>1-3. Physical Contingency</b>	<b>28.7</b>	<b>27,535.8</b>	<b>164.7</b>
	Phase 1:	26.0	22,529.0	137.2
	Phase 2:	2.7	5,006.8	27.5
<b>2.</b>	<b>Design, Tendering and Supervision Cost</b>	<b>163.1</b>	<b>10,620.9</b>	<b>215.5</b>
<b>3.</b>	<b>Interest during Construction</b>	<b>6.9</b>	<b>0.0</b>	<b>6.9</b>
<b>II.</b>	<b><u>Counterpart Funds</u></b>	<b><u>44.4</u></b>	<b><u>149,361.4</u></b>	<b><u>782.0</u></b>
<b>1.</b>	<b>Project Administration Cost of the Employer</b>	<b>0.0</b>	<b>35,026.6</b>	<b>173.0</b>
<b>2.</b>	<b>Tax and VAT</b>	<b>0.0</b>	<b>77,892.0</b>	<b>384.6</b>
<b>3.</b>	<b>Land Acquisition &amp; Compensation Cost</b>	<b>0.0</b>	<b>36,442.8</b>	<b>180.0</b>
<b>4.</b>	<b>Front end Fee</b>	<b>44.4</b>	<b>0.0</b>	<b>44.4</b>
	<b><u>TOTAL (I. + II.)</u></b>	<b><u>818.5</u></b>	<b><u>738,234.5</u></b>	<b><u>4,464.5</u></b>

Source: Study Team

**Table 10.3.3 - Comparison, Project Cost of Development of Intermodal Facilities (Option 1 & Option 2)**

	Item	Amounts, Equivalent Total in JPY (mil. JPY)			Ratio Option-2/ Option-1
		Option-1	Option-2	Balance: Option-2 - Option-1	
<b>I.</b>	<b><u>Eligible Portion</u></b>	<b><u>3,570.4</u></b>	<b><u>3,682.5</u></b>	<b><u>112.1</u></b>	<b><u>103.14%</u></b>
<b>1.</b>	<b>Construction Cost</b>	<b>3,351.9</b>	<b>3,460.1</b>	<b>108.2</b>	<b>103.23%</b>
	<b>1-1. Construction Base Cost (as of 2014)</b>	<b>2,791.6</b>	<b>2,791.6</b>	<b>0.0</b>	<b>100.00%</b>
	Phase 1:	2,330.8	2,330.8	0.0	100.00%
	Phase 2:	460.8	460.8	0.0	100.00%
	<b>1-2. Price Escalation of Construction Cost</b>	<b>400.7</b>	<b>503.8</b>	<b>103.1</b>	<b>125.73%</b>
	Phase 1:	330.0	414.9	84.9	125.73%
	Phase 2:	70.7	88.9	18.2	125.74%
	<b>1-3. Physical Contingency</b>	<b>159.6</b>	<b>164.7</b>	<b>5.1</b>	<b>103.20%</b>
	Phase 1:	133.1	137.2	4.1	103.08%
	Phase 2:	26.5	27.5	1.0	103.77%
<b>2.</b>	<b>Design, Tendering and Supervision Cost</b>	<b>211.8</b>	<b>215.5</b>	<b>3.7</b>	<b>101.75%</b>
<b>3.</b>	<b>Interest during Construction</b>	<b>6.7</b>	<b>6.9</b>	<b>0.2</b>	<b>102.99%</b>
<b>II.</b>	<b><u>Counterpart Funds</u></b>	<b><u>763.5</u></b>	<b><u>782.0</u></b>	<b><u>18.5</u></b>	<b><u>102.42%</u></b>
<b>1.</b>	<b>Project Administration Cost of the Employer</b>	<b>167.6</b>	<b>173.0</b>	<b>5.4</b>	<b>103.22%</b>
<b>2.</b>	<b>Tax and VAT</b>	<b>373.3</b>	<b>384.6</b>	<b>11.3</b>	<b>103.03%</b>
<b>3.</b>	<b>Land Acquisition &amp; Compensation Cost</b>	<b>180.0</b>	<b>180.0</b>	<b>0.0</b>	<b>100.00%</b>
<b>4.</b>	<b>Front end Fee</b>	<b>42.6</b>	<b>44.4</b>	<b>1.8</b>	<b>104.23%</b>
	<b><u>TOTAL (I. + II.)</u></b>	<b><u>4,333.9</u></b>	<b><u>4,464.5</u></b>	<b><u>130.6</u></b>	<b><u>103.01%</u></b>

Source: Study Team

## 2) Conditions of Project Cost Estimation

The major conditions for the Project Cost Estimation are defined as follows:

- 1) Base Year for Cost Estimate: March 2014
- 2) Exchange Rate: US\$ 1 = ¥ 103.9, US\$ 1 = VND 21,036
- 3) Currencies:
  - Japanese Yen (JPY) for the Foreign Currency Portion
  - Vietnamese Dong (VND) for the Local Currency Portion
- 4) Price Escalation Rate:
  - Foreign Currency Component (JPY Portion) at 1.3% per year
  - Local Currency Component (VND Portion) at 4.7% per year
- 5) Physical Contingency:
  - 5 % (to be determined based on the accuracy of project planning, design and cost estimation)
- 6) Interest during Construction:
  - 0.20% for “Construction” and 0.01% for “Design, Tendering and Supervision”
- 7) Project Administration Cost of the Employer:
  - 5% of “Construction Cost” in VND
- 8) Tax and VAT:
  - a) Import Tax 3% and VAT 10% of the expenditure in foreign currency of procurement/construction
  - b) VAT 10% of the expenditure in local currency of procurement/construction
  - c) Tax on Consulting Services 15% of the expenditure of C/S
- 9) Land Acquisition & Compensation Cost:
  - It is assumed that no compensation costs will occur in both Phase 1 and Phase 2.
- 10) Front end fee:
  - 0.20% for the amount of I. Eligible Portion

Note:     \* The conditions from 1) to 3) are same with the conditions for Construction Cost Estimation described in Section 9.5 of Chapter 9.  
          \* The all conditions from 1) to 10) above are defined based on “General Guidelines for the 1st batch (Fact Finding Mission) of FY 2014 Japanese ODA Loan Projects (JICA for Vietnam)”.



### 3) Assumed Timing of Tendering and Tender Plan Price

As the part of the project approval process by the HCMC PC, the "Tender Plan Price" shall be prepared and submitted by the competent organization to the HCMC PC for its approval.

The Tender Plan Price is the target price in Tendering and the lowest bid price submitted by Tenderer shall not exceed it.

As the reference, the Tender Plan Prices for the two options are assumed based on the estimated Construction Cost in the following.

The Construction Cost of the Intermodal Facilities is estimated as of March 2014, and the timing of the Tendering is scheduled as follows:

Option 1: 2016

Option 2: 2017 to 2018

To estimate the Tender Plan Price, the price escalation from 2014 to the timing of Tendering shall be added to the Construction Cost as of 2014.

The Price Escalation Rates applied for the Project Cost estimate are as follows and the same rates are applied for the estimation of Tender Plan Prices.

Foreign Currency Component (JPY Portion)	1.3% per year
Local Currency Component (VND Portion)	4.7% per year

**Option 1: New construction package under the current loan**

The figures for the Construction Cost of Option 1 are summarized as follows:

Item	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in Mil. JPY
<b>1. Construction Cost</b>	<b>598.0</b>	<b>557,596.0</b>	<b>3,351.9</b>
1-1. Construction Cost (Base Cost as of 2014)	545.3	454,814.8	2,791.6
1-2. Price Escalation of Construction Cost	24.2	76,229.1	400.7
1-3. Physical Contingency of Construction Cost	28.5	26,552.1	159.6

By applying the escalation rates to the Construction Cost (Base Cost as of 2014), the figures for the price escalation from 2014 to 2016 are estimated as follows:

Item	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in Mil. JPY
i. Construction Cost (Base Cost as of 2014)	545.3	454,814.8	2,791.6
ii. Price Escalation during 2015	7.1	21,376.3	112.7
Total Above	552.4	476,191.1	2,904.3

The assumed Tender Price of Option 1 is summarized as follows:

Item	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in Mil. JPY
<b>Base Tender Plan Price</b>	<b>552.4</b>	<b>476,191.1</b>	<b>2,904.3</b>
<b>Contingencies</b>	<b>45.6</b>	<b>81,404.9</b>	<b>447.6</b>
<b>Total Tender Plan Price</b>	<b>598.0</b>	<b>557,596.0</b>	<b>3,351.9</b>

**Option 2: New construction package under a new loan**

The figures for the Construction Cost of Option 2 are summarized as follows:

Item	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in Mil. JPY
<b>1. Construction Cost</b>	<b>604.1</b>	<b>578,252.2</b>	<b>3,460.1</b>
1-1. Construction Cost (Base Cost as of 2014)	545.3	454,814.8	2,791.6
1-2. Price Escalation of Construction Cost	30.1	95,901.6	503.8
1-3. Physical Contingency of Construction Cost	28.7	27,535.8	164.7

By applying the escalation rates to the Construction Cost (Base Cost as of 2014), the figures for the price escalation from 2014 to 2017 are estimated as follows:

Item	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in Mil. JPY
i. Construction Cost (Base Cost as of 2014)	545.3	454,814.8	2,791.6
ii-1 Price Escalation during 2015	7.1	21,376.3	112.7
ii-2 Price Escalation during 2016	7.2	22,381.0	117.7
<b>Total Above</b>	<b>559.6</b>	<b>498,572.1</b>	<b>3,022.0</b>

The assumed Tender Price of Option 2 is summarized as follows:

Item	F.C.C. (mil. JPY)	L.C.C. (mil. VND)	Equivalent Total in Mil. JPY
<b>Base Tender Plan Price</b>	<b>559.6</b>	<b>498,572.1</b>	<b>3,022.0</b>
<b>Contingencies</b>	<b>44.5</b>	<b>79,680.1</b>	<b>438.1</b>
<b>Total Tender Plan Price</b>	<b>604.1</b>	<b>578,252.2</b>	<b>3,460.1</b>

## **11 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS**

### **11.1 Required Tasks on Environmental and Social Considerations for ITF Development in Station Areas**

The development of intermodal facilities in the station areas proposed by the SAPI Study for HCMC UMRT Line 1 may cause some environmental and/or social impacts. For instance, it may need to acquire some lots of land and remove some people for the development of infrastructure such as station plazas, parking lots, etc.

The tasks on environmental and social considerations for the development of the proposed intermodal facilities (ITF) shall be conducted based on the "JICA Guidelines for Environmental and Social Considerations (April 2010)". Environmental baseline surveys and socio-economic surveys are conducted to grasp current natural and socio-economic conditions of the areas surrounding the planned stations. Then, development projects for each planned station area are categorized (into category A, B, or C) according to the extent of environmental and social impacts, taking into account the scale of the project, the site condition, etc.

According to the result of the categorization, the environmental and social considerations studies at the EIA level are carried out for Category A projects and the ones at the IEE level will be carried out for Category B projects.

For Category A projects, local stakeholder consultation meetings will be conducted. Measures to avoid or mitigate adverse impacts caused by the projects will be recommended and monitoring plans will be drafted. Measures to avoid or mitigate the impact on current bus operators will be considered (e.g., assistance in the change of jobs and re-education of bus drivers who may leave the bus companies due to the integration and abolition of bus routes and the reorganization of the bus operators, etc.).

Resettlement Action Plans (RAP) will be drafted for the projects which causes the large-scale involuntary resettlement of residents (exceeding 200 persons). For the others, an Abbreviated Resettlement Action Plan (ARAP) will be drafted.

Figure 11.1.1 shows the work flow of the tasks on the Environmental and Social Considerations planned for the SAPI Study.

SPECIAL ASSISTANCE FOR PROJECT IMPLEMENTATION (SAPI)  
 FOR HO CHI MINH CITY URBAN RAILWAY PROJECT (BEN THANH – SUOI TIEN SECTION (LINE 1))  
**Final Report**

Year	Month	Environmental Considerations	Social Considerations	Stakeholder Consultation Meeting	Notification	Report
2013	8	<b>(1) Preparation:</b> Review existing documents. Field reconnaissance survey. Making work plan. Making TOR for hiring local consultants. Selection of local consultants.				IC/R
	9	<b>(2) Confirmation of current natural conditions and site specific</b>	<b>(3) Confirmation of current socio-economic conditions</b>			
	10				Scope of the surveys covers 14 stations. Outputs of the surveys are the station profiles	
	11					
	12					
2014	1	<b>(4) Screening / Categorization of projects</b>			Following inputs are required: (1) Concept Design (for station area development ); and (2) Basic Design (for intermodal facility)	IT/R
	2	<b>(5) Baseline environmental survey</b>	<b>(6) Socio-economic survey</b>			
	3	<b>(8) Preparation of EIA / IEE reports (draft)</b>	<b>(9) Formulation of RAPs / ARAPs (draft)</b>	<b>(7) Stakeholder Consultation Meetings (First round)</b>		
	4					
	5	<b>(11) Preparation of EIA / IEE reports (final draft)</b>	<b>(12) Formulation of RAPs / ARAPs (final draft)</b>	<b>(10) Stakeholder Consultation Meetings (Second round)</b>		DF/R
		<b>(13) Preparation of environmental checklist</b>				
	6					DF/R

**Figure 11.1.1 - Work Flow for the Tasks on Environmental and Social Considerations in the SAPI Study**

## **11.2 Environmental and Socio-Economic Surveys**

### **1) Confirmation of Current Natural Conditions and Site Specifics**

Current natural conditions of the areas surrounding the planned 14 stations of the HCMC UMRT Line 1 were confirmed based on existing data/information and field reconnaissance surveys. The main factors (in the area within 300 m from the station) including the following were confirmed.

- Topographic characteristics, land elevation, etc.
- Meteorological data (rainfall, sunshine, evaporation, etc.)
- Drainage system/sewage system/river system
- Road network, road area ratio
- Green space/area, landscape
- Land use situation, residential condition, outline of ecosystems
- Landmarks, outstanding structures (markets, schools, hospital, government offices, temples, churches, relics, high voltage electric power cables, high voltage electric power poles, etc.)
- Environmentally sensitive structures/areas
- Data on air quality, noise, vibration, groundwater quality, surface water quality, etc.
- Flooding, drainage condition
- Others

### **2) Confirmation of Current Socio-Economic Conditions**

Current socio-economic conditions of the communes and areas surrounding the planned 14 stations of the HCMC UMRT Line 1 were confirmed, based on existing data/information and field reconnaissance surveys. The main factors (in the area within 300 m from the station) confirmed by this survey include the following:

- Communes, districts (within a 500 m range and within a 1000 m range from the station)
- Population density
- Commune demography (population, number of households (HH), household size, HH income, etc.)
- HH living conditions (electricity, piped water, toilet, sewage, internet, etc.)
- Major economic activities, occupations, means of livelihood

### 3) Screening/Categorization of Development Projects

ITF (intermodal facilities) development plans proposed by the SAPI Study for each station and the extent of the anticipated impacts were examined.

According to the *JICA Guidelines for Environmental and Social Considerations (April 2010)* (“JICA Guidelines”, Section 2.2, page 12, and Appendix 3), “...the proposed projects are classified as Category A if they are likely to have significant adverse impacts on the environment and society. Projects with complicated or unprecedented impacts that are difficult to assess, or projects with a wide range of impacts or irreversible impacts, are also classified as Category A...” If the project is classified as Category A, the project proponent is requested to submit an EIA report (Section 3.2.1, page 21).

Besides, Appendix II of *Decree 21/2011/ND-CP* issued by the Government of Vietnam (GoV) on April 18, 2011 shows a list of 146 projects which are required to prepare and submit an EIA report, including the following projects:

- Project to build technical infrastructure of urban centers and residential areas, with an area of 5 ha or larger (Project Group No. 3)
- Project to build works with basements, with a depth of 10 m or deeper (Project Group No.15)
- Project to build car terminals, with an area of 5 ha or larger (Project Group No. 29)
- Project involving relocation and resettlement, for 300 households or more (Project Group No. 143)

ITF development plans proposed by the SAPI Study were categorized based on the station profiles (i.e., results of confirmation on the current natural conditions and socio-economic conditions of the station areas) and the preliminary assessment of impacts that may be caused by the development plans. Development plans were then re-categorized according to the result of discussions with the Vietnam counterpart agencies (through the task team meetings) and key persons of the project-affected communes.

Regarding social considerations, JICA Guidelines (Appendix 1, Page 30) states that: “... for projects that will result in large-scale involuntary resettlement, RAPs must be prepared and made available to the public”. In addition, the key principles of JICA policy on involuntary resettlement are complemented by the World Bank (WB) Safeguard Policy OP 4.12, since it is stated in JICA Guidelines that “JICA confirms that projects do not deviate significantly from the World Bank’s Safeguard Policies”. Accordingly, preparation of an abbreviated resettlement plan (hereinafter referred to as “ARAP”) is required for projects that entail land acquisition or involuntary resettlement of fewer than 200 people.

### 4) Baseline Environmental Survey

The local consultant (CBD, Center of Biodiversity and Development of Southern Institute of Ecology) was entrusted to carry out the baseline environmental survey at the stations where the ITF development plan is classified as Category A. The following baseline data

were collected, and used to assess the current quality of environment, and for the environmental monitoring during the project implementation in the future.

(a) Air quality

- NO<sub>2</sub>, SO<sub>2</sub>, CO, SPM, THC, and microclimate condition (wind speed, temperature, humidity) shall be measured.
- 3 period (1 hour/period) during 1 day for each site.

(b) Noise level

- Laeq, L10, L90 are the main parameters.
- During 24 hours for each site.

(c) Vibration level

- Lp (L10) is the main parameter.
- During 24 hours for each site.

(d) Ground water survey (if the project is to cause impacts to groundwater)

- The parameters include pH, Hardness (CaCo<sub>3</sub>), Color, EC, TDS, COD, Total Coliform, Total P, Total N, NO<sub>3</sub><sup>-</sup>, NH<sub>4</sub><sup>+</sup>, heavy metals (Cu, Zn, Cd, Pb, Hg, As, Cr, Ni).
- The sampling survey shall be conducted one time for each site.

5) Socio-Economic Survey

The local consultant (CBD) was also entrusted to carry out the socio-economic survey to collect socio-economic data of households in the affected areas of the stations where the ITF development plan is categorized as Category A.

About 80% of households, business entities, etc. in the areas within about 100m from the selected stations were subject to the survey.



### 11.3 Environmental Scoping

This section describes the environmental scoping which aims to identify potential impacts and significant impacts that may be caused by the projects to develop the intermodal facilities in the station areas of the HCMC UMRT Line 1. This environmental scoping aims to identify the matters which should be included in the Terms of Reference (TOR) for the Environmental Impact Assessment (EIA) to be conducted relating to the development of the intermodal facilities.

#### 1) Environmental Scoping Method

Scoping is generally known as a process for determining the issues to be addressed, the information to be collected, and the analysis required to assess the environmental impacts of a project. In this SAPI Study, the environmental scoping is carried out by applying the method which involves 3 basic steps as follows:

- (1) *Identifying the environmental indicators*: Existing documents, such as the EIA report of the HCMC UMRT Line 1, are referred to as sources of information to grasp the characteristics of the areas around the planned stations. In addition, field reconnaissance surveys and hearings to several key persons (local residents and staff of commune people's committees) are carried out to grasp the natural and socio-economic characteristics of the areas around the planned stations.
- (2) *Examining the development scenario and identifying the range of activities that will be involved in the project*: Reports made by other members of the SAPI Study Team are referred to grasp the planned intermodal facilities and feeder bus routes for each of the UMRT stations. Factors, structures, and activities which may cause impacts to natural environment and local society during the stages of pre-construction (design), construction, and operation, are identified and listed up.
- (3) *Identifying the environmental issues*: This step takes inventory of the potential impacts which are likely to arise, without considering the magnitude or importance of the impacts. The Scoping Checklist attached in the “*Manual on Environmental Considerations for Transportation Technical Cooperation – Railway*” (issued in 2004 by the Japan Transport Cooperation Association and Japan Railway Technical Service) is referred to as an inventory of the potential impacts. The next following step is aimed at eliminating or excluding these potential impacts which are considered irrelevant or unimportant, in order to produce a list of the possible significant impacts which are considered important and relevant for study in detail in the EIA. The list of significant impacts is prepared based on the matters considered important by communities in the vicinity of the stations, and by responsible agencies and experts.

## 2) Scoping Checklist of Potential Impacts that may be caused by the Project

Table 11.3.1 shows all potential impacts likely caused by the development of intermodal facilities for an UMRT station.

**Table 11.3.1 - Scoping Checklist for the Development of Intermodal Facilities**

Potential Impact		Description of Impact
<b>Socio-Economic Environment</b>		
1	Involuntary resettlement	The project to construct the station plaza, parking area, bus pool, access road, etc. may need to acquire some lots of land, and may cause the need for involuntary resettlement.
2	Local economy such as employment and livelihood	During the construction phase, business activities around the work sites may be disturbed temporarily. After the completion of construction works, business activities around the stations may become more active, and it may lead to the improvement of livelihoods and living standards of residents living around the stations.
3	Land use and utilization of local resources	Land use pattern surrounding the stations may significantly change. Residential lands may be developed to urbanized land with higher population density and more active business activities.
4	Existing social infrastructure and services	The intermodal facilities and feeder bus routes may contribute to the improvement of local residents' accessibility. The pedestrian decks may help people to cross the Hanoi Highway from one side to the other.
5	Misdistribution of benefits and damages	The development of UMRT stations and its intermodal facilities may cause unequal distribution of development benefits, by increasing income disparities among the groups of land owners/users near or far from the station.
6	Cultural heritage	The construction of the intermodal facilities and the operation of feeder buses may cause adverse impacts to the existing cultural, historical sites and establishments if any.
<b>Natural Environment</b>		
7	Soil erosion	During the construction phase of station plazas, parking areas, etc., surface soil may be washed away by rain. Exposure of loose soil to rain water may increase turbidity in the run-off, especially during the rainy season.
8	Hydrological situation	Construction of station plazas, parking areas, etc. may cause the changes in water flow, water level, etc. of the nearby water bodies.
9	Flora, fauna and biodiversity	Contaminated drainage, dust, noise, vibration, etc. generated from the construction activities may cause impacts on fauna and flora systems around the park/green areas such as Van Thanh Park.
10	Landscape	The newly-established intermodal facilities may cause visual impacts on the scenery of the vicinities, especially in Van Thanh Park.
<b>Pollution</b>		
11	Air pollution	During the construction phase, the operation of construction machineries and transportation vehicles may generate air pollutants and cause adverse impacts to ambient air quality. During the operation phase, the increased traffic volume around the station may generate more air pollutants to the ambient air.
12	Water pollution	Contaminated drainage from the construction activities may pollute surface water quality around the project areas.
13	Waste (including waste soil)	During the construction phase, generated solid wastes, hazardous wastes, etc. from the work sites may cause adverse impacts to the adjacent water bodies. During the operation phase, waste from the public facilities/areas around the stations including garbage, rubbish, and floor sweepings etc. are the main sources of pollutants.
14	Noise and vibration	During the construction phase, impacts of noise and vibration may be caused from construction vehicles, concrete mixing plants, earthmoving equipment, etc. During the operation phase, increased traffic volume around the station, and the feeder buses may cause excessive noise to

Potential Impact		Description of Impact
		the sensitive spots along its route if any.
15	Accidents, traffic congestion	Traffic congestion may happen temporarily by the construction machines/vehicles around the work sites during the construction phase. Traffic flow may be increased, and traffic congestion and accidents may happen on the roads around the station plaza, parking areas, etc., during the operation phase.
16	Sunshine shading	The elevated structures such as pedestrian decks may cause impacts to the surrounding establishments and lands in terms of sunshine shading.

### 3) Environmental Scoping for Each Station of the HCMC UMRT Line 1

Components of the ITF development plans were confirmed based on the concept plans of intermodal facilities proposed by the SAPI Study.

Based on the above-mentioned Scoping Checklist, impacts that may be caused by the development of intermodal facilities for each planned station, during the pre-construction phase, construction phase, and operation phase are described as follows (Tables 11.3.2 to 11.3.11).

**Table 11.3.2 - Results of Scoping for the Development of Intermodal Facilities in the Station  
Area of Van Thanh Park Station**

Impact		Rating	Description
<b>Socio-Economic Environment</b>			
1	Involuntary resettlement	-	A station plaza (4,300 m <sup>2</sup> ) is planned in a green space of the park. The road under the railway viaduct is to be widened to improve accessibility to the station. Car and motorbike parking lots are planned under the railway viaduct. Acquisition of residential land is not required for these facilities' development.
2	Local economy such as employment and livelihood	C+	Positive impacts on local economy are anticipated. Business activities in and around Van Thanh Park would be developed after the station is brought into operation.
3	Land use and utilization of local resources	C+	Urban development in the residential area in the southern side of the station would be accelerated. The need to widen the roads to access to the station would be heightened.
4	Existing social infrastructure and services	-	There is no any outstanding social infrastructures and services around the project area.
5	Misdistribution of benefits and damages	C	People living close to the station plaza may have benefits from the differences in land price, business opportunity, accessibility to the station, etc.
6	Cultural heritage	-	No any cultural heritage is confirmed in the area adjacent to the planned station plaza, parking area, etc.
<b>Natural Environment</b>			
7	Soil erosion	-	The intermodal facilities are planned at grade, and large-scaled soil reclamation or civil work is not expected during construction phase.
8	Hydrological situation	B	The development of the station plaza may cause obstruction to the water flow between Van Thanh Lake and Van Thanh Canal.
9	Flora, fauna and biodiversity	B	The project area is urbanized and there is no report on the existing of valuable flora or fauna in/around the project area. However, the ecosystem of Van Thanh Park should be studied in further detail.
10	Landscape	B	The station plaza and the parking lots may cause some adverse impact to the beautiful landscape of Van Thanh Park. However, it is not significant in comparison with such kind of impact caused by the elevated viaduct/station.
<b>Pollution</b>			
11	Air pollution	A	During the operation phase, increased traffic flow around the station may cause adverse impact to ambient air quality of Van Thanh Park and the adjacent residential areas.
12	Water pollution	A	Waste water from construction activities and discharged water from the station plaza, parking areas, etc. may cause deterioration of water quality of the vicinities.
13	Waste (including waste soil)	A	Solid wastes and sewage from the construction sites and from the station plaza, parking areas, etc. may cause adverse impacts to the adjacent water bodies.
14	Noise and vibration	A	Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause adverse impacts to localities.
15	Accidents, traffic congestion	A	Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause more traffic congestion and accidents to localities.
16	Sunshine shading	-	The station plaza and other intermodal facilities are planned at grade and will not cause sunshine shading to its surrounding.

Note A: serious negative impact is expected;

B: negative impact is expected to some extent;

C: extent of impact is unknown, further study is needed;

- : limited impact/negligible impact

**Table 11.3.3 - Results of Scoping for the Development of Intermodal Facilities in the Station Area of Tan Cang Station**

Impact		Rating	Description
<b>Socio-Economic Environment</b>			
1	Involuntary resettlement	-	A station plaza (12,200 m <sup>2</sup> ) is proposed in the open space of the interchange and under the railway viaduct. Motorbike parking lots are planned under the railway/road viaduct. These land lots are managed by the HCMC PC, thus acquisition of residential land is not required.
2	Local economy such as employment and livelihood	B+	Positive impacts on the local economy are anticipated. Business activities in the area in the north of the station (Ward 25, Binh Thanh District) would be developed after the station is brought into operation.
3	Land use and utilization of local resources	C+	Urban development in the area in the north of the station would be accelerated.
4	Existing social infrastructure and services	-	There are no any outstanding social infrastructure and services near the project area.
5	Misdistribution of benefits and damages	C	People living close to the station may have benefits from the differences in land price, business opportunities and accessibility to the station, etc.
6	Cultural heritage	-	No cultural heritage is confirmed in the area adjacent to the planned station plaza, parking area, etc.
<b>Natural Environment</b>			
7	Soil erosion	-	The intermodal facilities are planned at grade, and large-scaled soil reclamation or civil works is not expected during the construction phase.
8	Hydrological situation	B	The small pond under the railway/road viaduct would disappear. However, except for the Saigon River (in the east), there is no outstanding surface water flow located near the station plaza, parking areas, etc.
9	Flora, fauna and biodiversity	-	The project area is urbanized and there is no report on existing valuable flora or fauna in/around the project area.
10	Landscape	-	The project area is urbanized and there is no beautiful landscape around the project site.
<b>Pollution</b>			
11	Air pollution	B	Ambient air quality at the project area has been already deteriorated. On the roads near the project site, especially near the Saigon Bridge, there are heavy traffic flows around-the-clock. Results of an air quality monitoring survey carried out in 2007 at Hang Xanh Roundabout near the project site show that concentrations of SPM (dust), NO <sub>2</sub> , etc. had already exceeded the permitted standard. The development of intermodal facilities at Tan Cang Station may lead to increased traffic flow and make the ambient air quality worse. However, impacts caused by these intermodal facilities are considered insignificant in comparison with the current degrading ambient air quality.
12	Water pollution	B	Wastewater from construction activities may cause deterioration of the water quality in the vicinities temporarily during the construction phase.
13	Waste (including waste soil)	B	Solid wastes and sewage from the construction sites and from the station plaza, parking areas, etc. may cause adverse impacts to localities.
14	Noise and vibration	B	Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause more adverse impacts to localities.
15	Accidents, traffic congestion	A	Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause more traffic congestion and accidents to localities.
16	Sunshine shading	-	The station plaza and other intermodal facilities are planned at grade and will not cause sunshine shading to its surroundings.

Note A: serious negative impact is expected;

B: negative impact is expected to some extent;

C: extent of impact is unknown, further study is needed;

- : limited impact/negligible impact



**Table 11.3.5 - Results of Scoping for the Development of Intermodal Facilities in the Station Area of An Phu Station**

Impact		Rating	Description
<b>Socio-Economic Environment</b>			
1	Involuntary resettlement	-	Only small scale intermodal facilities are planned at An Phu Station (car stops and motorbike parking areas under the railway viaduct, and bus stop, car stops, motorbike parking area on the southern side of the Hanoi Highway). These intermodal facilities are planned within the ROW of the Hanoi Highway therefore development of these facilities does not require acquisition of residential land.
2	Local economy such as employment and livelihood	C+	Positive impacts on the local economy are anticipated. Business activities in the areas around the station would be developed after the station is brought into operation.
3	Land use and utilization of local resources	C+	Urban development in the area in the south of the station would be accelerated.
4	Existing social infrastructure and services	-	There are no outstanding social infrastructure and services near the project area.
5	Misdistribution of benefits and damages	C	People living close to the station may have benefits from the differences in land price, business opportunities, accessibility to the station, etc.
6	Cultural heritage	-	No cultural heritage is confirmed in the area adjacent to the planned station.
<b>Natural Environment</b>			
7	Soil erosion	-	Small-scale at grade intermodal facilities are planned, and would not cause soil erosion.
8	Hydrological situation	B	Two small ditches are found near the planned station. However, impacts that may be caused by the proposed intermodal facilities at this station to these ditches are expected to be insignificant. Rainwater runs naturally into these ditches and flows to the Saigon River which is located about 1-2 km from the project site to the north/west.
9	Flora, fauna and biodiversity	-	The project area is urbanized and there is no report on existing valuable flora or fauna in/around the project area.
10	Landscape	-	The project area is urbanized and there is no beautiful landscape around the project site.
<b>Pollution</b>			
11	Air pollution	B	Traffic flow on the Hanoi Highway is heavy around-the-clock. Ambient air quality at the project area has already been deteriorated. The development of the small-scale bus/car stops and the motorbike parking areas may cause only limited impact to the current degrading ambient air quality.
12	Water pollution	B	Wastewater from construction activities may temporarily cause deterioration of water quality of the vicinities during the construction phase.
13	Waste (including waste soil)	B	Solid wastes and sewage from the construction sites and from the parking areas, etc. may cause adverse impacts to localities.
14	Noise and vibration	B	Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more adverse impacts to localities.
15	Accidents, traffic congestion	A	Construction machinery (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more traffic congestion and accidents to localities.
16	Sunshine shading	-	The intermodal facilities are planned at grade and will not cause sunshine shading to its surrounding.

Note A: serious negative impact is expected; B: negative impact is expected to some extent;  
 C: extent of impact is unknown, further study is needed; - : limited impact/negligible impact

**Table 11.3.6 - Results of Scoping for the Development of Intermodal Facilities in the Station  
Area of Rach Chiec Station**

Impact		Rating	Description
<b>Socio-Economic Environment</b>			
1	Involuntary resettlement	-	Only small scale intermodal facilities are planned at Rach Chiec Station (car stops and motorbike parking areas under the railway viaduct, and bus stops, car stops, motorbike parking area on the eastern side of the Hanoi Highway). These intermodal facilities are planned within the ROW of the Hanoi Highway therefore development of these facilities does not require acquisition of residential land.
2	Local economy such as employment and livelihood	C+	Positive impacts on the local economy are anticipated. Business activities in the areas around the station would be developed after the station is brought into operation.
3	Land use and utilization of local resources	C+	Urban development in the area around the station would be accelerated.
4	Existing social infrastructure and services	-	There are no outstanding social infrastructure and services near the project area.
5	Misdistribution of benefits and damages	C	People living close to the station may have benefits from the differences in land price, business opportunities, accessibility to the station, etc.
6	Cultural heritage	-	A church (Thien Than Parish) is found to be about 100 m to the south-west of the station and may not be affected significantly by the proposed intermodal facilities.
<b>Natural Environment</b>			
7	Soil erosion	-	Small-scale at grade intermodal facilities are planned, and would not cause soil erosion.
8	Hydrological situation	-	No surface water body is found near the planned station. Rainwater runs naturally into the ditches, small canals, and flows to the Saigon River which is located about 0.6 km from the project site to the west.
9	Flora, fauna and biodiversity	-	The project area is urbanized and there is no report on existing valuable flora or fauna in/around the project area.
10	Landscape	-	The project area is urbanized and there is no beautiful landscape around the project site.
<b>Pollution</b>			
11	Air pollution	B	Traffic flow on the Hanoi Highway is heavy around-the-clock. Ambient air quality at the project area has already been deteriorated. The development of small-scale bus/car stops and the motorbike parking areas may cause only limited impact to the current degrading ambient air quality.
12	Water pollution	B	Wastewater from construction activities may temporarily cause adverse impact to the vicinity during the construction phase.
13	Waste (including waste soil)	B	Solid wastes and sewage from the construction sites and from the parking areas, etc. may cause adverse impacts to localities.
14	Noise and vibration	B	Construction machinery (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more adverse impacts to localities.
15	Accidents, traffic congestion	A	Construction machinery (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more traffic congestion and accidents to localities.
16	Sunshine shading	-	The intermodal facilities are planned at grade and will not cause sunshine shading to its surrounding.

Note A: serious negative impact is expected;

B: negative impact is expected to some extent;

C: extent of impact is unknown, further study is needed;

- : limited impact/negligible impact



**Table 11.3.7 - Results of Scoping for the Development of Intermodal Facilities in the Station Area of Phuoc Long Station**

Impact		Rating	Description
<b>Socio-Economic Environment</b>			
1	Involuntary resettlement	-	Only small scale intermodal facilities are planned at Phuoc Long Station (motorbike parking areas under the railway viaduct, and bus stops, car stops, motorbike parking area on the eastern side of the Hanoi Highway). These intermodal facilities are planned within the ROW of the Hanoi Highway, therefore development of these facilities does not require acquisition of residential land.
2	Local economy such as employment and livelihood	C+	Positive impacts on local economy are anticipated. Business activities in the areas around the station would be developed after the station is brought into operation.
3	Land use and utilization of local resources	C+	Urban development in the area around the station would be accelerated.
4	Existing social infrastructure and services	-	There is no outstanding social infrastructure and services near the project area.
5	Misdistribution of benefits and damages	C	People living close to the station may have benefits from the differences in land price, business opportunities, accessibility to the station, etc.
6	Cultural heritage	B	A church (Saint Giuse Parish) and a temple (Phu Tho Temple) are found about 250 m to the north-west of the station, and may not be affected significantly by the proposed intermodal facilities.
<b>Natural Environment</b>			
7	Soil erosion	-	Small-scale at grade intermodal facilities are planned and would not cause soil erosion.
8	Hydrological situation	-	No surface water body is found near the planned station. Rainwater runs naturally into the ditches, small canals, and flows to Rach Dao Canal which is located about 0.3 km from the project site to the west.
9	Flora, fauna and biodiversity	-	The project area is urbanized and there is no report on existing valuable flora or fauna in/around the project area.
10	Landscape	-	The project area is urbanized and there is no beautiful landscape around the project site.
<b>Pollution</b>			
11	Air pollution	B	Traffic flow on the Hanoi Highway is heavy around-the-clock. Ambient air quality at the project area has already been deteriorated. The development of the small-scale bus/car stops and the motorbike parking areas may cause only limited impact to the current degrading ambient air quality.
12	Water pollution	B	Wastewater from construction activities may temporarily cause adverse impact to the vicinities during the construction phase.
13	Waste (including waste soil)	B	Solid wastes and sewage from the construction sites and from the parking areas, etc. may cause adverse impacts to localities.
14	Noise and vibration	B	Construction machinery (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more adverse impacts to localities.
15	Accidents, traffic congestion	A	Construction machinery (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more traffic congestion and accidents to localities.
16	Sunshine shading	-	The intermodal facilities are planned at grade and will not cause sunshine shading to its surrounding.

Note A: serious negative impact is expected;

B: negative impact is expected to some extent;

C: extent of impact is unknown, further study is needed;

- : limited impact/negligible impact

**Table 11.3.8 - Results of Scoping for the Development of Intermodal Facilities in the Station  
Area of Binh Thai Station**

Impact		Rating	Description
<b>Socio-Economic Environment</b>			
1	Involuntary resettlement	-	Only small scale intermodal facilities are planned at Binh Thai Station (bus parking, motorbike parking areas under the railway viaduct, and bus stops, car stops, motorbike parking area on the eastern side of the Hanoi Highway). These intermodal facilities are planned within the ROW of the Hanoi Highway therefore development of these facilities does not require acquisition of residential land.
2	Local economy such as employment and livelihood	C+	Positive impacts on the local economy are anticipated. Business activities in the areas around the station would be developed after the station is brought into operation.
3	Land use and utilization of local resources	C+	Urban development in the area around the station would be accelerated.
4	Existing social infrastructure and services	-	There are no outstanding social infrastructure and services near the project area.
5	Misdistribution of benefits and damages	C	People living close to the station may have benefits from the differences in land price, business opportunities, accessibility to the station, etc.
6	Cultural heritage	B	A temple (Quang Liem Temple) is found about 120 m to the north-east of the station, and may not be affected significantly by the proposed intermodal facilities.
<b>Natural Environment</b>			
7	Soil erosion	-	Small-scale at grade intermodal facilities are planned and would not cause soil erosion.
8	Hydrological situation	-	No outstanding surface water body is found near the planned station. Rainwater runs naturally into the ditches, small canals, and flows to the Saigon River which is located about 2 km from the project site to the west.
9	Flora, fauna and biodiversity	-	The project area is urbanized and there is no report on existing valuable flora or fauna in/around the project area.
10	Landscape	-	The project area is urbanized and there is no beautiful landscape around the project site.
<b>Pollution</b>			
11	Air pollution	B	Traffic flow on the Hanoi Highway is heavy around-the-clock. Ambient air quality at the project area has already been deteriorated. The development of small-scale bus/car stops and the motorbike parking areas may cause only limited impact to the current degrading ambient air quality.
12	Water pollution	B	Wastewater from construction activities may temporarily cause adverse impact to the vicinities during the construction phase.
13	Waste (including waste soil)	B	Solid wastes and sewage from the construction sites and from the parking areas, etc. may cause adverse impacts to localities.
14	Noise and vibration	B	Construction machinery (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more adverse impacts to localities.
15	Accidents, traffic congestion	A	Construction machinery (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more traffic congestion and accidents to localities.
16	Sunshine shading	-	The intermodal facilities are planned at grade and will not cause sunshine shading to its surrounding.

Note A: serious negative impact is expected;

B: negative impact is expected to some extent;

C: extent of impact is unknown, further study is needed;

- : limited impact/negligible impact

**Table 11.3.9 - Results of Scoping for the Development of Intermodal Facilities in the Station Area of Thu Duc Station**

Impact		Rating	Description
<b>Socio-Economic Environment</b>			
1	Involuntary resettlement	-	Only small-scale intermodal facilities are planned at Thu Duc Station (motorbike parking areas under the railway viaduct, and bus stops, car stops, motorbike parking area on the eastern side of the Hanoi Highway). These intermodal facilities are planned within the ROW of the Hanoi Highway therefore development of these facilities does not require acquisition of residential land.
2	Local economy such as employment and livelihood	C+	Positive impacts on the local economy are anticipated. Business activities in the areas around the station would be developed after the station is brought into operation.
3	Land use and utilization of local resources	C+	Urban development in the area around the station would be accelerated.
4	Existing social infrastructure and services	B	Binh Tho Secondary School is located about 180 m to the west of the station. In addition, there are several schools, kindergartens, clinics, etc. located about 300~400 m from the station to the west. Measures to prevent traffic accidents to students going to school would be considered when the station is brought into operation.
5	Misdistribution of benefits and damages	C	People living close to the station may have benefits from the differences in land price, business opportunity, accessibility to the station, etc.
6	Cultural heritage	-	No religious establishments are found within the range of 300 m from the project area.
<b>Natural Environment</b>			
7	Soil erosion	-	Small-scaled at grade intermodal facilities are planned and would not cause soil erosion.
8	Hydrological situation	-	No surface water body is found near the planned station. Rainwater runs naturally into the ditches, small canals, and flows to the Saigon River which is located about 3 km from the project site to the south-west.
9	Flora, fauna and biodiversity	-	The project area is urbanized and there is no report on existing valuable flora or fauna in/around the project area.
10	Landscape	-	The project area is urbanized and there is no beautiful landscape around the project site.
<b>Pollution</b>			
11	Air pollution	B	Traffic flow on the Hanoi Highway is heavy around-the-clock. Ambient air quality at the project area has already been deteriorated. The development of small-scaled bus/car stops and the motorbike parking areas may cause only limited impact to the current degrading ambient air quality.
12	Water pollution	B	Wastewater from construction activities may temporarily cause adverse impact to the vicinity during the construction phase.
13	Waste (including waste soil)	B	Solid wastes and sewage from the construction sites and from the parking areas, etc. may cause adverse impacts to localities.
14	Noise and vibration	B	Construction machinery (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more adverse impacts to localities.
15	Accidents, traffic congestion	A	Construction machinery (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more traffic congestion and accidents to localities.
16	Sunshine shading	-	The intermodal facilities are planned at grade and will not cause sunshine shading to its surrounding.

Note A: serious negative impact is expected;

B: negative impact is expected to some extent;

C: extent of impact is unknown, further study is needed;

- : limited impact/negligible impact



**Table 11.3.11 - Results of Scoping for the Development of Intermodal Facilities in the Station Area of Suoi Tien Station**

Impact		Rating	Description
<b>Socio-Economic Environment</b>			
1	Involuntary resettlement	-	Only small-scaled intermodal facilities are planned at Suoi Tien Station (motorbike parking areas under the railway viaduct, and bus stops, car stops, motorbike parking area on the eastern side of National Highway AH1). These intermodal facilities are planned within the ROW of AH1, therefore development of these facilities does not require acquisition of residential land.
2	Local economy such as employment and livelihood	C+	Positive impacts on the local economy are anticipated. Accessibility to the universities and amusement park (Suoi Tien Park) would be improved after the station is brought into operation.
3	Land use and utilization of local resources	C+	Urban development in the area around the station would be accelerated.
4	Existing social infrastructure and services	C+	Land on the northern side of the station is reserved for the HCMC National University Project. A number of universities had already been moved from the city center to this area. On the southern side of AH1 there is Suoi Tien Park, a famous amusement site in HCMC. Accessibility to these universities and park would be improved when the station is brought into operation.
5	Misdistribution of benefits and damages	-	Land around the station is planned to be developed for universities and the amusement park. Misdistribution of benefits and damages is not expected.
6	Cultural heritage	-	No religious establishment is found within the range of 300 m from the project area.
<b>Natural Environment</b>			
7	Soil erosion	-	Small-scaled at grade intermodal facilities are planned, and would not cause soil erosion.
8	Hydrological situation	-	There is a small stream in Suoi Tien Park to the east of the planned station. Rainwater runs naturally into the ditches, stream, and flows to Dong Nai River which is located about 5 km from the project site to the east.
9	Flora, fauna and biodiversity	-	The project area is urbanized and there is no report on existing valuable flora or fauna in/around the project area.
10	Landscape	-	The project area is urbanized and there is no beautiful landscape around the project site.
<b>Pollution</b>			
11	Air pollution	B	Traffic flow on the Hanoi Highway is heavy around-the-clock. Ambient air quality at the project area has already been deteriorated. The development of the small-scale bus/car stops and the motorbike parking areas may cause only limited impact to the current degrading ambient air quality.
12	Water pollution	B	Wastewater from construction activities may temporarily cause adverse impact to the vicinity during the construction phase.
13	Waste (including waste soil)	B	Solid waste and sewage from the construction sites and from the parking areas, etc. may cause adverse impacts to localities.
14	Noise and vibration	B	Construction machinery (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more adverse impacts to localities.
15	Accidents, traffic congestion	A	Construction machinery (during the construction phase), and increased traffic flow in-and-out the parking areas (in the operation phase) may cause more traffic congestion and accidents to localities.
16	Sunshine shading	-	The intermodal facilities are planned at grade and will not cause sunshine shading to its surrounding.

Note A: serious negative impact is expected; B: negative impact is expected to some extent;  
 C: extent of impact is unknown, further study is needed; - : limited impact/negligible impact

#### 4) Summarized Result of Environmental Scoping

Table 11.3.12 shows the summarized result of the environmental scoping for the development of intermodal facilities in the station areas of HCMC UMRT Line 1.

**Table 11.3.12 - Summary of the Results from the Environmental Scoping**

Station Number		1	2	3	4	5	6	7	8	9	10
Station Name		Van Thanh Park	Tan Cang	Thao Dien	An Phu	Rach Chiec	Phuoc Long	Binh Thai	Thu Duc	High-Tech Park	Suoi Tien
<b>Socio-Economic Environment</b>											
1	Involuntary resettlement	-	-	-	-	-	-	-	-	-	-
2	Local economy such as employment and livelihood	C+	B+	B+	C+	C+	C+	C+	C+	C+	C+
3	Land use and utilization of local resources	C+	C+	C+	C+	C+	C+	C+	C+	C+	C+
4	Existing social infrastructure and services	-	-	-	-	-	-	-	B	-	C+
5	Misdistribution of benefits and damages	C	C	C	C	C	C	C	C	C	-
6	Cultural heritage	-	-	-	-	-	B	B	-	-	-
<b>Natural Environment</b>											
7	Soil erosion	-	-	-	-	-	-	-	-	-	-
8	Hydrological situation	B	B	B	B	-	-	-	-	-	-
9	Flora, fauna and biodiversity	B	-	-	-	-	-	-	-	-	-
10	Landscape	B	-	-	-	-	-	-	-	-	-
<b>Pollution</b>											
11	Air pollution	A	B	B	B	B	B	B	B	B	B
12	Water pollution	A	B	B	B	B	B	B	B	B	B
13	Waste (including waste soil)	A	B	B	B	B	B	B	B	B	B
14	Noise and vibration	A	B	B	B	B	B	B	B	B	B
15	Accidents, traffic congestion	A	A	A	A	A	A	A	A	A	A
16	Sunshine shading	-	-	-	-	-	-	-	-	-	-

Note A: serious negative impact is expected;

B: negative impact is expected to some extent;

C: extent of impact is unknown, further study is needed;

- : limited impact/negligible impact

Based on the result of the environmental scoping, it is concluded that an EIA-level environmental impact assessment is necessary for the development of intermodal facilities at Van Thanh Park Station, while an IEE-level impact assessment is required for the remaining stations.

Accordingly, an EIA report was prepared by the SAPI Study Team for ITF development planned in the station area of Van Thanh Park Station. In addition, a draft IEE report was also prepared by the Study Team which describes the IEE-level environmental assessment for the ITF development planned at the other 9 station areas of HCMC UMRT Line 1.

Regarding issues on land acquisition and resettlement, the result of the environmental scoping shows that acquisition of private residential land is not required for the development of ITF in the target station areas. Most of the intermodal facilities are

proposed to be located on the existing public land such as the right of way of the UMRT Line 1 and the Hanoi Highway. However, for Van Thanh Park Station, Phuoc Long Station, High-Tech Park Station, and Suoi Tien Park Station, the development of ITF would require the particular land acquisition procedure for transferring the land use right from companies to the City (as described in Section 9.3).

Since the acquisition of private residential land is not required for the ITF development, it is concluded that resettlement of people would not occur and there is no need to formulate any RAP or ARAP for the Project.

## **11.4 EIA for ITF Development Planned for Van Thanh Park Station**

As described in the previous section, it is concluded that ITF development planned for Van Thanh Park Station may cause significant adverse impact to Van Thanh Park and its surrounding residential area, and an EIA study is considered necessary for ITF development planned for this station. During the SAPI Study, a baseline environmental survey and a socio-economic survey were carried out, and a draft EIA report was prepared for the ITF development planned for Van Thanh Park Station. This report has contents in line with the JICA Guidelines and Vietnam regulations on EIA. The following sections describe the outline of this report.

### **1) ITF Development Planned for Van Thanh Park Station**

The station plaza for Van Thanh Park Station is planned in a public green land in Van Thanh Park. The park is managed by the Saigontourist Holding Company. Two parking lots for motorbikes are planned under the viaduct of the railway and the station. Another parking lot for motorbikes is planned in an open public land in the western area of the station.

#### **a) Development concept**

- Formulation of an integrated urban space with Van Thanh Park
- Formulation of an urban transit center to be the core of a future urban redevelopment in the southern surrounding area

#### **b) Concept of the layout and design**

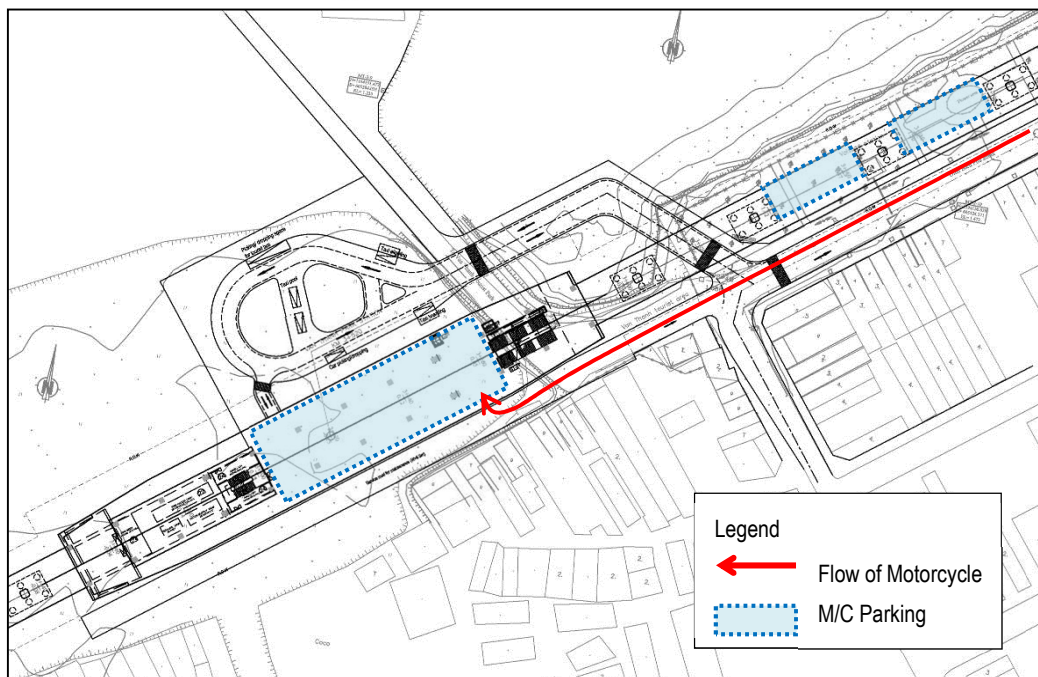
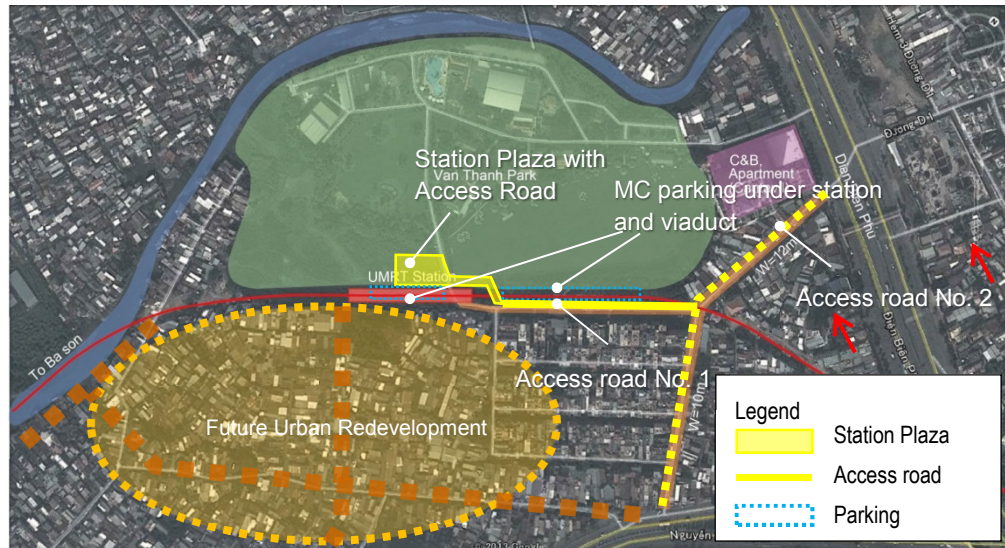
- Station plaza: A station plaza with an area of 4,300 m<sup>2</sup> is proposed to be located in the existing public park to formulate integrated urban space with the public park and promote the convenience for park visitors. The plaza will be installed with a bus berth for tour bus, although there are no plans for feeder bus services.
- Parking: MC parking lots are designed on the ground floor of the station and under the viaduct.
- Public car parking is not proposed in consideration of the unexpected park-and-ride use due to the walkable and small station coverage and the poor existing road condition. However it is expected that car parking will be developed by the private sector in the future urban redevelopment.
- Access road: Widening and improvement of the existing road along the railway is proposed to secure safety for pedestrians (Access Road No. 1). The northern side of the road under the railway viaduct, which is within the ROW of the railway, will be widened, and therefore, additional land acquisition is not required. In Phase 3 (after 2020), the existing street (Access Road No.2) which connects the station area with Dien Bien Phu Street and Nguyen Huu Canh Street should also be widened and improved to secure safety for pedestrians and to smooth traffic.
- Station facility: Location of an elevator in the station building should be adjusted by shifting to the north side of the station stairs to secure accessibility between the



ticket gate and the public park.

- Options for future development: Expansion of intermodal facilities is expected in the area to the south of the station for future urban redevelopment. The ground floor of the station would be modified as a corridor for pedestrians to move between two sides of the station.

Figure 11.4.1 shows the concept plan of ITF development for Van Thanh Park Station.



Source: Study Team

**Figure 11.4.1 - Concept Plan of ITF Development for Van Thanh Park Station**

c) Specification of the Proposed ITF for Van Thanh Park Station

**Table 11.4.1 - Specification of Intermodal Facilities for Van Thanh Park Station**

Item	Capacity/No. of Berths	Size		Development Phase	Remarks
Station Plaza	Bus berth for tour bus: 1 Taxi berth: 2 (boarding:1, alighting:1) Taxi pool: 2 Private car berth: 2 Motorcycle taxi berth: 2 Access road (width: 14 m, length: 80 m)	4,300m <sup>2</sup>		Phase II : completion by 2020	Need land acquisition
Parking	M/C parking under station	M/C and bicycle: 390 lots	1,370m <sup>2</sup>	Phase I: completion by the UMRT and opening in 2018	
	M/C parking under viaduct	M/C and bicycle: 200 lots	700m <sup>2</sup>	Phase I: completion by the UMRT and opening in 2018	
Access Road	Widening of an existing street along the railway	W=15m, Length=200m	1,500m <sup>2</sup>	Phase I: completion by the UMRT and opening in 2018	
	Widening of an existing street	W=20m, Length=400m	8,000m <sup>2</sup>	Phase III: completion after 2020	Need land acquisition
Others	Relocation of an elevator in station building	Relocate to north side of escalator	-	-	Propose to station design

Source: Study Team

Estimated traffic volume in the peak hour at a road accessing to Van Thanh Park Station (from Dien Bien Phu Street and Nguyen Huu Canh Street) in 2020 and 2040 are as follows.

**Table 11.4.2 - Predicted Traffic Volume at Access Road 1 to Van Thanh Park Station**

Unit: cars, at peak hour

	Motorbike	Car	Taxi	Motorbike Taxi	Total
2020 Year	618	23	13	6	660
2040 Year	1409	52	31	12	1504

Source: Study Team

d) Current Natural Conditions of the Project Site - Results of the Baseline Environmental Survey

In addition, according to results of the baseline environmental survey carried out by the SAPI Study Team in May 2014, the current natural conditions of the station area are as follows.

Table 11.4.3 and Table 11.4.4 show results of air quality monitoring at two sites near Van Thanh Park Station. Figure 11.4.2 shows locations of the two monitoring sites.

Monitoring results show that all concentrations of air pollutants are lower than the allowable concentrations stated by the Vietnamese Standards on Ambient Air Quality QCVN 05:2013.



**Figure 11.4.2 - Location of Monitoring Sites of Air Pollution, Noise and Vibration**

**Table 11.4.3 - Air Quality at the Site near the Residential Area (A1)**

No.	Parameters	Unit	Sampling Time			Ambient Air Quality Standard (average 1 hour)
			7:30 – 8:30 AM	9:30 – 10:30 AM	10:00 – 11:00 PM	
1	SPM	( $\mu\text{g}/\text{m}^3$ )	170	190	120	300 <sup>Note 1)</sup>
2	SO <sub>2</sub>	( $\mu\text{g}/\text{m}^3$ )	17	19	15	350 <sup>Note 1)</sup>
3	NO <sub>2</sub>	( $\mu\text{g}/\text{m}^3$ )	11	17	23	200 <sup>Note 1)</sup>
4	CO	( $\mu\text{g}/\text{m}^3$ )	3,500	4,000	3,800	30,000 <sup>Note 1)</sup>
5	THC	( $\mu\text{g}/\text{m}^3$ )	<10	15	<10	5,000 <sup>Note 2)</sup>
6	Temperature	( <sup>o</sup> C)	31.7	34.7	29.6	-
7	Humidity	(%)	61.9	54.4	78.1	-
8	Wind speed	(m/s)	1.86 – 2.55	1.45 – 2.37	1.25 – 2.16	-

Note: 1) QCVN 05:2013/BTNMT: National Technical Regulation on ambient air quality  
2) QCVN 06:2009/BTNMT : National Technical Regulation on hazardous substances in ambient air.

**Table 11.4.4 - Air Quality at the Site near the Planned Station Plaza (A2)**

No.	Parameters	Unit	Sampling Time			Ambient Air Quality Standard (average 1 hour)
			7:30 – 8:30 AM	9:30 – 10:30 AM	10:00 -11:00 PM	
1	SPM	( $\mu\text{g}/\text{m}^3$ )	130	100	80	300 <sup>Note 1)</sup>
2	SO <sub>2</sub>	( $\mu\text{g}/\text{m}^3$ )	13	16	12	350 <sup>Note 1)</sup>
3	NO <sub>2</sub>	( $\mu\text{g}/\text{m}^3$ )	17	15	24	200 <sup>Note 1)</sup>
4	CO	( $\text{mg}/\text{m}^3$ )	2,700	3,700	3,200	30,000 <sup>Note 1)</sup>
5	THC	( $\mu\text{g}/\text{m}^3$ )	<10	<10	<10	5,000 <sup>Note 2)</sup>
6	Temperature	( <sup>o</sup> C)	30,9	33,7	29,7	-
7	Humidity	(%)	65,2	59,6	76,7	-
8	Wind speed	(m/s)	1,32 – 2,18	1,43 – 1,94	1,75 – 2,89	-

Note: 1) QCVN 05:2013/BTNMT: National Technical Regulation on ambient air quality  
2) QCVN 06:2009/BTNMT : National Technical Regulation on hazardous substances in ambient air.

Monitoring results of vibration and noise level are shown in Table 11.4.5, Table 11.4.6 and Table 11.4.7.

**Table 11.4.5 - Results of Noise Level at Monitoring Sites, Leq, 24h, L10, L90**

No.	Location	Noise Level (dBA)		
		Leq,24h	L10	L90
1	A1	67.3	69.0	49.0
2	A2	51.4	54.2	45.9

**Table 11.4.6 - Results of Noise Level at Monitoring Sites, Leq**

No.	Location	Noise Level, Leq (dBA)	
		6AM ~ 9PM	9PM ~ 6AM
1	A1	67.0	68.0
2	A2	52.0	50.3
<i>Maximum permitted noise level</i> <sup>Note 1)</sup>		70	55

Note: (1).Maximum permitted noise level - National Technical Regulation on Noise (QCVN 26 :2010)

**Table 11.4.7 - Results of Vibration Level at Monitoring Sites**

No.	Location	Acceleration (dB), L <sub>10</sub>	
		6AM ~ 9PM	9PM ~ 6AM
1	A1	25.5	33.9
2	A2	36.5	39.4
<i>Maximum permitted level</i> <sup>Note 2)</sup>		75	<i>Baseline level</i>

Note: (2). National Technical Regulation on Vibration (QCVN 27:2010)

A1. At nearest residential area (down main wind direction)

A2. At the planned Van Thanh Park Station

At site A2, the noise levels were lower than the permitted noise level (QCVN 26:2010) at all the measuring times. Vibration levels of all measuring times were also lower than the permitted level (QCVN 27:2010).

At site A1, noise levels measured from 9PM to 6AM were higher than the permitted level (QCVN 26:2010). At that time, there were noises from various noise sources such as TV, radio, motorbike, dog, cock, etc.

Vibration levels of all measuring times were lower than the permitted level (QCVN 27:2010)

e) Current Socio-Economic Conditions of the Project Site - Results of the Socio-Economic Survey

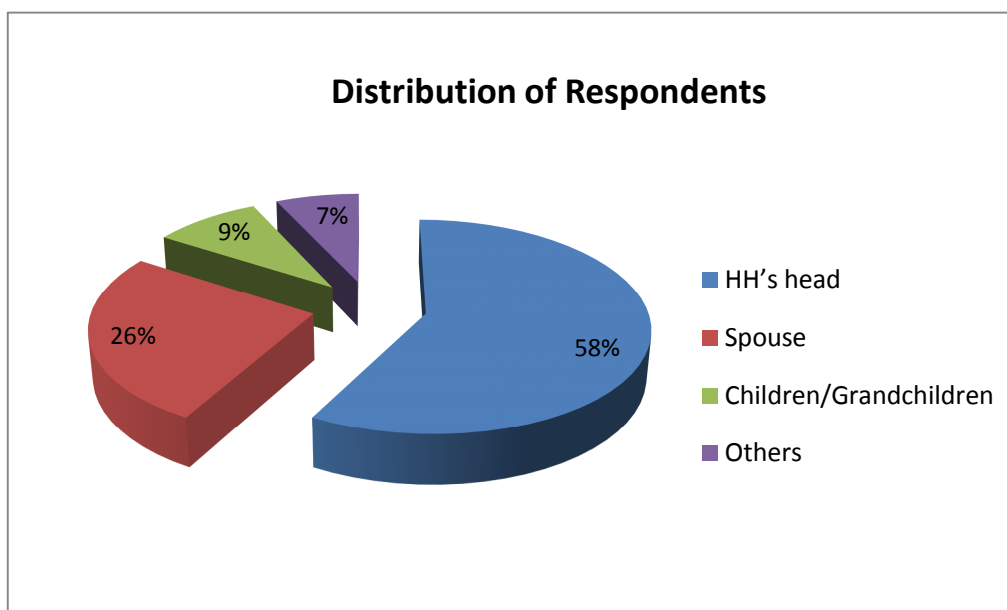
In addition, according to the results of the socio-economic survey carried out by the SAPI Study Team in May 2014, the current socio-economic conditions of the station area are as follows.



### (1) Number of Households and Respondents

One hundred (100) households (with 511 household members) in Ward 22, Binh Thanh District of Ho Chi Minh City were interviewed during the socio-economic survey in May 2014. Among interviewed households, 97% have a household registration book (in other words they are permanent inhabitants in HCMC).

A large number of interviewed persons are head of households (58%), whereas their spouse is represented for about 26% of total interviewees. It is estimated that 9% of interviewees are children of the households meanwhile another 7% of them are the household's relatives (Figure 11.4.3).

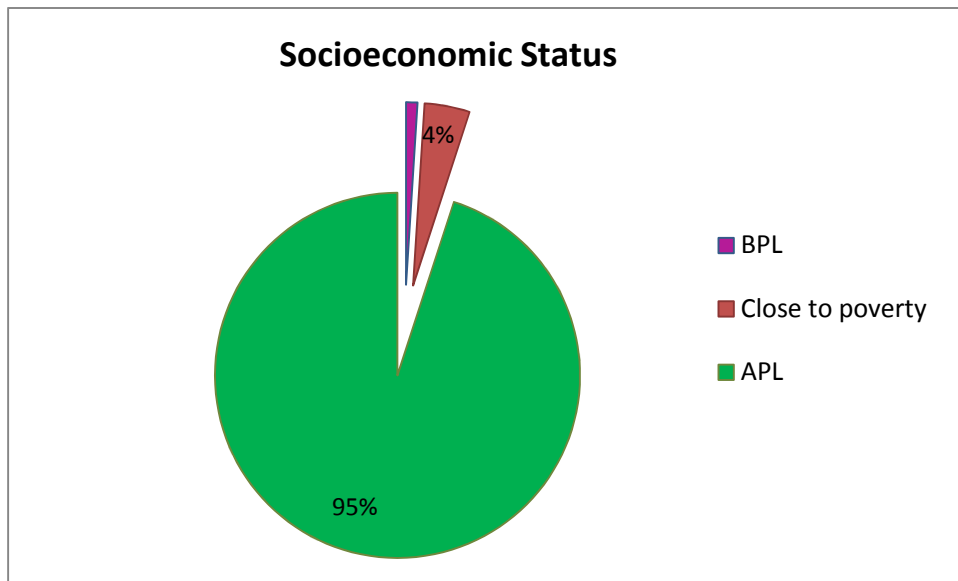


Source: Socio-economic survey, SAPI Study

**Figure 11.4.3 - Distribution of Respondents in the Interview**

### (2) Socioeconomic Status of the Interviewed Households

A majority of interviewed households (95%) in the project areas are living above the poverty line (PL) according to HCMC's standard. However, about 4% of the respondents are living close to the poverty line meanwhile merely 1% of interviewed households is reported to live below the PL (Figure 11.4.4).



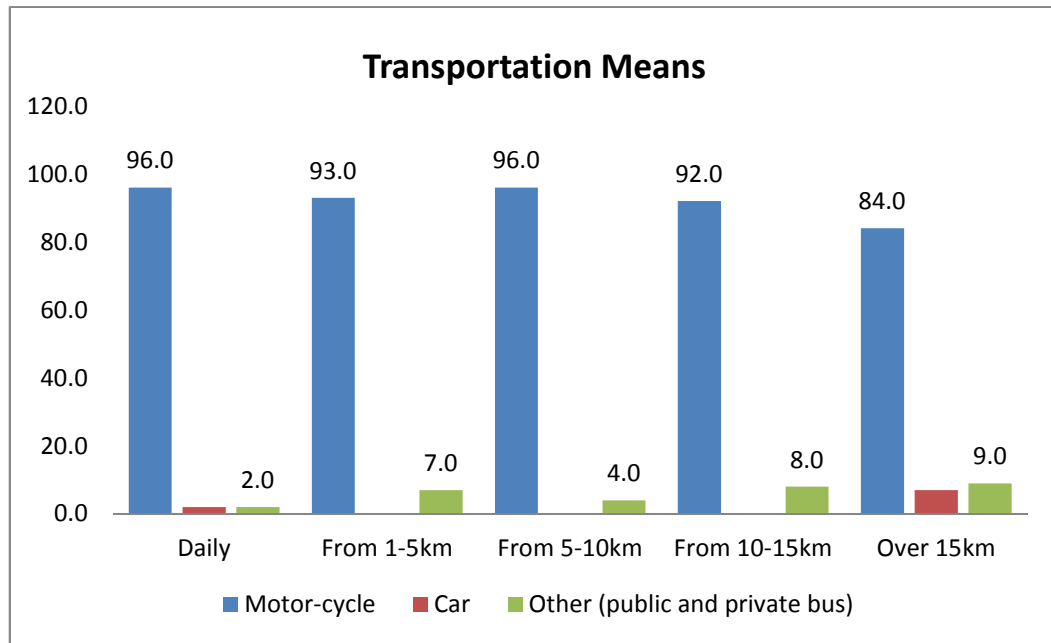
Source: Socio-Economic survey, SAPI Study

**Figure 11.4.4 - Socio-Economic Status of the Surveyed Households**

### (3) Living Conditions

- Source of water: 100% of surveyed households have connections to piped water. The clean water source is supplied by the Thu Duc Water Company following the previous SAPI Study (Van Thanh Station Profile). However, some households (8 of 100 sampled households) reported to be lacked of water at some months a year, especially during the dry season from April to June.
- Electricity: Although 100% of the surveyed households are connected to the national electricity grid, about 8% of them could not use electricity regularly, especially in May and June since the system is usually overloaded during the summer season.
- Sanitation conditions: 94% of the surveyed households are using connected septic-tank toilets. In comparison with other areas of Ward 22, this proportion is much higher. However, there are a remaining 5% of the households that still use pit latrine toilets and another 1% that uses an unconnected septic tank type.
- Solid Waste Collection: Solid waste is all collected but mainly by the HCMC Urban Sanitation Company. It is reported by the interviewees that since the monthly fee for garbage collection is reasonable, most of the inhabitants are using this service instead of throwing garbage rashly.
- Transportation of Households: The majority of interviewed households are using scooter/motorcycles for transportation (96%). There are total 246 motorcycles used by the 100 surveyed households. It means that each household uses more than 2 motorcycles for daily transportation. There are 2 households who own private cars and other 2 have trucks for daily carrying commodities.

Motorbikes are mainly used for the trip going to a destination within a 15 km range. However, about 9% of interviewees said that they usually use bus (private and public) for trips going to destinations farther than 15 km, whereas another 7% of them use their private cars (Figure 11.4.5).



Source: Socio-Economic survey, SAPI Study

**Figure 11.4.5 - Transportation Vehicles Usage by Households**

(4) How Local Residents think about the Benefits from the Project

Table 11.4.8 illustrates interviewees' opinions on benefits from the project implementation. 87% the interviewees said that they think the project will bring benefits to the local community. Only 1% of them think that the project would not bring any benefit to them. The other 12% of interviewees said that they do not know anything about this project and can not give any comment.

**Table 11.4.8 - Interviewees' Opinions about Benefits from the Project**

Do you think the project brings you any benefits?	Number of Answers	Percentage
Yes	87	87.0
No	1	1.0
Don't know	12	12.0
Total	100	100.0

Source: Socio-economic survey, SAPI Study

Majority of the interviewees said they expect that the project will help improve the current transportation system in the area (86%) meanwhile fostering the safety in transportation (76%) and reducing traffic jams (71%) which often occur in the area, especially in rush



hours. Besides, about half (41%) of the interviewees expect that their income from business/service activities will increase when the station is operated (Table 11.4.9).

**Table 11.4.9 - Expectations of Residents on the Benefits of the Project**

No	Benefits expected from the project	Frequency	Percentage
1	Service activities from the station	41	41.0
2	Better transportation	87	87.0
3	Safety in transportation	76	76.0
4	Reduce traffic jam	71	71.0
5	Reduce transportation cost	60	60.0

Source: Socio-economic survey, SAPI Study

(5) How local residents think about the adverse impacts from the project

A large number of interviewees (83%) considered that “air pollution during construction” would be the adverse impact of the project that they are concerned about. Besides, 53 interviewees (53%) said that “daily activities will be affected during construction”. The other 24% of the interviewees (24%) worry that their business activities would be affected during the construction period. Generally, environmental issues are more concerned by local people rather than social issues. Table 11.4.10 describes how interviewees are concerned about the adverse impacts of the project.

**Table 11.4.10 - Adverse Impacts Concerned by Interviewees**

No	Impacts from the project	Frequency	Percentage
1	Air pollution during construction of the project	83	83.0
2	Noise during the construction period	79	79.0
3	House shaking during the construction period	47	47.0
4	Destruction of natural scenery	35	35.0
5	Flow of migrants to the area	37	37.0
6	Social ills increasing	27	27.0
7	Business activities will be affected during construction period	24	24.0
8	Daily activities will be affected during construction of the project	53	53.0

Source: Socio-economic survey, SAPI Study

(6) Interviewees’ Comments on Impact Mitigation Measures

As described in Table 12.4.11, a number of interviewees (40%) had no comments about impact mitigation measures, since they believed that the project management unit should have proper impact mitigation measures. However, 20% of interviewees suggested that construction works should not be done at night time so that local people can take rest after a tired working day.

While 15% of interviewees said that the contractor should fence around the construction sites by corrugated iron sheets to prevent dust and noise, the other 6% of interviewees

raised a request to use grid fences because they think that corrugated iron sheets prevent fresh air from coming to their house.

**Table 11.4.11 - Recommendations to Improve the Project's Impacts**

No	Reccommendation to improve project's impacts	N	Percentage
1	Wash the road after conveying construction materials	7	7.0
2	Fence the construction areas to prevent dust and noise	15	15.0
3	No construction at night time	20	20.0
4	Replacing corrugated iron sheet fence by B40 grid fence	6	6.0
5	Compensation for house damages	7	7.0
6	Complete construction as early as possible	5	5.0
7	No comments	40	40.0

Source: Socio-economic survey, SAPI Study

#### (7) Interviewees' Willingness to use the Railway

Almost all interviewees said that they support the project since they strongly believe that the railway will bring them with more benefits rather than adverse impacts. 80% of interviewees said that they will use the railway when it is brought into operation.

Among interviewees who want to use the railway in the future, nearly a half of them (44%) said that the favorable fare should be from 10,000 to 15,000 VND per trip (one way ticket). Only 1% of them said that the favorable fare should be more than 25,000 VND/trip (Table 11.4.12).

**Table 11.4.12 - Expected Fare of the Urban Railway**

Expected fare/trip for using the urban railway	Number of Answers	Percentage
Less than 10,000 VND	24	26.4
Over 10,000 – 15,000 VND	40	44.0
Over 15,000 – 20,000 VND	18	19.8
Over 20,000 – 25,000 VND	8	8.8
More than 25,000 VND	1	1.1
Total	91	100.0

Source: Socio-economic survey, SAPI Study

#### (8) Conclusion

- Van Thanh Park station is located in the territory of Ward 22 which is characterized by a high population density and popular business/service activities of Binh Thanh District, Ho Chi Minh City. For interviewed households, business/service activities generate the highest income compared with other economic activities.
- Only a few number (1%) of interviewed households are living under the poverty line. Average monthly income of interviewed households is quite high: 20.5 million VND/month. While some households have very low income (3 million VND/month), some have extremely high income (about 200 million VND/month).

- Monthly expenditures of interviewed households are mainly for food (44%) and education (23%) and local residents spend only 4% of household income for health care services. Monthly expenditure is estimated at about more than half of monthly income. Thus, local people seem to have stable savings for their life.
- In general, local residents said that they support the project, and they think that the project will help in increasing business opportunities (41%), reducing traffic jams (71%), improving current transportation systems (87%). However, most of interviewees said that they worry about environmental impacts which may be caused by the project, especially air pollution and noise.

f) Environmental Impact Assessment

Table 11.4.13 shows the identified environmental items that should be concerned in the ITF development plan for Van Thanh Park Station, referring to the JICA Environmental Checklist (Railway Sector).

**Table 11.4.13 - Environmental Checklist for ITF Development Plan at Van Thanh Park Station (as of May 2014)**

Major Checked Items	Check Results
<b>1: Permits, Explanation</b>	
<b>(1) EIA and environmental permits</b>	
(a) Have EIA reports been already prepared in official process?	(a, b) EIA report for UMRT Line 1 has been prepared by a consultant entrusted by the Ho Chi Minh City PC, and it has been approved in November 2006 by MONRE (Ministry of Natural Resources and Environment).
(b) Have EIA reports been approved by authorities of the host country's government?	(c) A draft EIA report was prepared by the SAPI Study Team in May 2014 for the ITF development plan proposed by the SAPI Study Team. This draft EIA report may be updated and used as an EIA report to be approved by Vietnamese competent authority during the formal approval process for the project implementation.
(c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?	(d) Generally in Vietnam, only the submission and approval of the EIA report is required for a development project. There is no requirement for obtaining other environmental permits.
(d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	
<b>(2) Explanation to the local</b>	

Major Checked Items	Check Results
stakeholders	
<p>(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders?</p> <p>(b) Have the comments from the stakeholders (such as local residents) been reflected to the project design?</p>	<p>(a) Two rounds of local stakeholder consultation meetings were organized in the affected commune (first meeting was organized on May 6, 2014, and the second one was organized on May 13, 2014) in Ward 22 of Binh Thanh District. Details about the meetings are described in Section 12.7.</p> <p>(b) Comments raised in the local stakeholder meetings were described in the draft EIA report, and reflected in the proposed ITF development plan at Van Thanh Park Station.</p>
(3) Examination of alternatives	
<p>(a) Have alternative plans of the project been examined with social and environmental considerations?</p>	<p>(a) In the SAPI Study, alternatives of without-the-project (zero option) and with-the-project were examined. Environmental and social considerations are taken into account in the examination of these alternatives.</p>
<b>2: Pollution control</b>	
(1) Water quality	
<p>(a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas?</p> <p>(b) Do effluents from the station plaza and the parking lots comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will cause areas not to comply with the country's ambient water quality standards?</p>	<p>(a) In the project site, there will be no cutting or filling that expose topsoil during the construction phase. Therefore, it is anticipated that possibility of topsoil runoff will be negligible. However, waste water from construction activities may cause deterioration of water quality of the vicinities.</p> <p>In construction phase, waste water generated from construction sites should not be discharged directly to drainage system or surrounding surface water bodies. Waste water should be settled and preliminarily treated before discharged, in accordance with Vietnam standards on waste water.</p> <p>Contractors should make a sanitation management plan for construction sites, and duly implement this plan. Particularly, sanitary facilities (trash bins, toilets, etc.) should be appropriately placed at construction sites, and staff in charge of sanitary management should be deployed appropriately at every construction site, etc.</p> <p>(b) In operation phase, runoff rain water from the station plaza and the parking lots would cause deterioration of water quality of the surroundings. However, this impact is predicted insignificant.</p> <p>In the operation phase, solid waste and dust in the station plaza, parking lots, and access roads should be properly collected and treated. Works of the company who is entrusted to collect, treat, and dispose solid wastes generated from the station plaza, parking lots, etc. should be followed up to ensure that it is properly carried out in accordance with HCM City regulations.</p>

Major Checked Items	Check Results																																																																																									
<p>(2) Waste</p> <p>Are waste generated from the station plaza and parking lots, properly treated and disposed of in accordance with the country's regulations?</p>	<p>a) During construction phase, solid waste and sewage from the construction sites may cause adverse impacts to the adjacent water bodies.</p> <p>Contractors should bear efforts to reduce construction debris, and solid waste, and to separately collect, re-use this waste.</p> <p>Unusable construction waste, garbage generated from worker camps, and waste soils should be properly collected, treated, and disposed by authorized company in accordance with HCM City regulations.</p> <p>b) In operation phase, solid wastes and sewage from the station plaza, parking areas, etc. may cause adverse impacts to the adjacent water bodies.</p> <p>Waste generated from the station plaza and parking lots should also be properly collected, treated, and disposed by the authorized company in accordance with Ho Chi Minh City regulations.</p> <p>In addition, works of the company who is entrusted to collect, treat, and dispose solid wastes generated from the station plaza, parking lots, etc. should be followed up to ensure that it is properly carried out in accordance with HCMC regulations.</p>																																																																																									
<p>(3) Air quality</p>	<p>(a) Is there a possibility that air pollutants emitted from the project related sources, such as vehicles traffic will affect ambient air quality? Does ambient air quality comply with the country's air quality standards? Are any mitigating measures taken?</p> <p>In the construction phase, air pollutants emitted from construction machinery, materials transportation vehicles, etc. may cause deterioration of ambient air quality of the vicinities.</p> <p>Contractors should implement measures to reduce impacts of dust and exhaust gases, such as: build temporary walls around the construction sites; use construction equipment and vehicles which comply with the latest regulations on exhaust gas control; periodically inspect and maintain construction equipment and vehicles; periodically clean and water the project sites; use cover sheets for trucks carrying soil; etc.</p> <p>During the operation phase, increased traffic flow around the station may cause adverse impact to ambient air quality of Van Thanh Park and the adjacent residential areas.</p> <p>Concentrations of air pollutants predicted in 2020 and 2040 at a road assessing to the station are as follows (see detailed description in the draft EIA report).</p> <p style="text-align: center;"><b>Predicted air pollutant concentrations in 2020 and 2040</b></p> <p style="text-align: right;">(unit: <math>\mu\text{g}/\text{m}^3</math>)</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Distance (m)</th> <th colspan="4">2020</th> <th colspan="4">2040</th> </tr> <tr> <th>SO<sub>2</sub></th> <th>NO<sub>2</sub></th> <th>CO</th> <th>SPM</th> <th>SO<sub>2</sub></th> <th>NO<sub>2</sub></th> <th>CO</th> <th>SPM</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>182.4</td> <td>158.5</td> <td>14,390</td> <td>476.1</td> <td>210.3</td> <td>187.4</td> <td>17,657</td> <td>518.0</td> </tr> <tr> <td>20</td> <td>176.4</td> <td>150.0</td> <td>13,682</td> <td>467.0</td> <td>196.5</td> <td>174.7</td> <td>16,042</td> <td>497.3</td> </tr> <tr> <td>30</td> <td>173.1</td> <td>144.6</td> <td>13,299</td> <td>462.1</td> <td>189.1</td> <td>166.7</td> <td>15,167</td> <td>486.0</td> </tr> <tr> <td>40</td> <td>171.1</td> <td>141.0</td> <td>13,060</td> <td>459.0</td> <td>184.4</td> <td>161.1</td> <td>14,624</td> <td>479.1</td> </tr> <tr> <td>50</td> <td>169.7</td> <td>138.3</td> <td>12,895</td> <td>456.9</td> <td>181.2</td> <td>156.9</td> <td>14,247</td> <td>474.2</td> </tr> <tr> <td>70</td> <td>167.8</td> <td>134.4</td> <td>12,674</td> <td>454.0</td> <td>176.9</td> <td>150.8</td> <td>13,744</td> <td>467.8</td> </tr> <tr> <td>100</td> <td>166.0</td> <td>130.3</td> <td>12,465</td> <td>451.4</td> <td>172.8</td> <td>144.1</td> <td>13,265</td> <td>461.6</td> </tr> <tr> <td>QCVN 05:2013/BTNMT</td> <td>350</td> <td>200</td> <td>30,000</td> <td>300</td> <td>350</td> <td>200</td> <td>30,000</td> <td>300</td> </tr> </tbody> </table> <p>Concentrations of SPM predicted in both years of 2020 and 2040 exceed the allowable air quality standard (QCVN 05:2013/BTNMT). Besides, predicted concentrations of SO<sub>2</sub>, NO<sub>2</sub>, CO in 2020 and 2040 are below the allowable air</p>	Distance (m)	2020				2040				SO <sub>2</sub>	NO <sub>2</sub>	CO	SPM	SO <sub>2</sub>	NO <sub>2</sub>	CO	SPM	10	182.4	158.5	14,390	476.1	210.3	187.4	17,657	518.0	20	176.4	150.0	13,682	467.0	196.5	174.7	16,042	497.3	30	173.1	144.6	13,299	462.1	189.1	166.7	15,167	486.0	40	171.1	141.0	13,060	459.0	184.4	161.1	14,624	479.1	50	169.7	138.3	12,895	456.9	181.2	156.9	14,247	474.2	70	167.8	134.4	12,674	454.0	176.9	150.8	13,744	467.8	100	166.0	130.3	12,465	451.4	172.8	144.1	13,265	461.6	QCVN 05:2013/BTNMT	350	200	30,000	300	350	200	30,000	300
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Major Checked Items	Check Results
	<p>quality standard.</p> <p>In the operation phase, trees should be planted along the access roads to mitigate the impact of air pollutants generated by vehicles.</p>
(4) Noise and vibration	
(a) Do noise and vibrations from the station plaza and parking lots (in construction phase and in operation phase) comply with the country's standards?	<p>(a) In construction phase, noise and vibration will be generated from the operation of construction machinery, trucks, etc.</p> <p>Contractors should bear efforts to reduce noise from the construction sites by installing the temporary walls around the construction sites, using construction machinery and vehicles which reduces noise and vibration. Construction machinery and vehicles should be periodically inspected and maintained to be able to use in best condition. Operation of vehicles should be properly managed to avoid concentration of vehicles at a same time and in the same place. Operators of construction machinery and drivers of vehicles transporting equipment and materials should be instructed and trained appropriately.</p> <p>b) In the operation phase, houses located near by the station may be affected by noise and vibration generated by the vehicles accessing to the station. Impact of noise generated from vehicles assessing to the station should be mitigated by planting trees along the access roads.</p>
(5) Ground subsidence	
(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) Development of small-scaled station plaza and parking lots is predicted not cause impact to groundwater.
<b>3: Natural environment</b>	
(1) Protected areas	
(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) In the areas around the project site, there is not any protected areas designated by Vietnam laws or international treaties and conventions.
(2) Ecosystem	
(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?	(a) The project is sited in the center of a highly-urbanized metropolitan city, where there is not any primeval forest, tropical rain forest, ecologically valuable habitat.
(b) Does the project site encompass the	(b) The project site does not encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions

Major Checked Items	Check Results
<p>protected habitats of endangered species designated by the country's laws or international treaties and conventions?</p> <p>(c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?</p> <p>(d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock?</p> <p>(e) Is there a possibility that installation of station and shopping mall will have impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered?</p> <p>(f) In cases the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?</p>	<p>(c) The project site is located in a densely-populated urban center which is not suitable for valuable species to inhabitant.</p> <p>(d) The project site is located in a densely-populated urban center which is not suitable for a migration route of wild animals and domestic animals.</p> <p>(e) The project site is located in a densely-populated urban center where there is no large green area for wild animals to inhabitant. Impact to ecosystem is negligible.</p> <p>(f) The development of small-scaled station plaza and parking lots is predicted not cause significant impact to natural environment.                      However, the ecosystem of Van Thanh Park should be studied in further detail.                      If it appears the need to remove some trees for the Project, contractors should co-work with Saigontourist Holding Company to appropriately remove and replant these trees.</p>
<p>3) Hydrology</p>	
<p>(a) Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and</p>	<p>(a) The station plaza is planned in a low submerged area between Van Thanh Lake and Van Thanh Canal. The construction and existing of the station plaza may cause obstruction to the water flow between the lake and the canal. The drainage system around the station plaza should be properly designed to ensure the water flow in-and-out the lake. In the detail design stage, it needs to carry out a further survey on the water flows between Van Thanh Lake and Van Thanh Canal, to get appropriate information necessary for designing the</p>

Major Checked Items	Check Results
groundwater flows?	foundation of the station plaza, in order to ensure that the water flow here will not be obstructed by the station plaza.
<b>(4) Topography and geology</b>	
(a) Is there a soft ground near the project site that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed?  (b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides?  (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	(a) The project is sited in the flat area, therefore occurrence of slope failure or landslide is not expected.  (b) The project is sited in the flat area, therefore occurrence of slope failure or landslide is not expected.  (c) Soil runoff from the construction site may be expected. It needs to introduce appropriate measures to prevent this soil runoff.
<b>4: Social environment</b>	
<b>(1) Resettlement</b>	
(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?  (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?  (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on	(a) The ITF development at Van Thanh Park Station will use only two lots of open public lands where are usually submerged and there is not any house, store, shop, etc. Land acquisition and resettlement are not required for the proposed development plan.



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Major Checked Items	Check Results
<p>socioeconomic studies on resettlement?</p> <p>(d) Are the compensations going to be paid prior to the resettlement?</p> <p>(e) Are the compensation policies prepared in document?</p> <p>(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?</p> <p>(g) Are agreements with the affected people obtained prior to resettlement?</p> <p>(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?</p> <p>(i) Are any plans developed to monitor the impacts of resettlement?</p> <p>(j) Is the grievance redress mechanism established?</p>	
(2) Living and livelihood	
<p>(a) Where railways are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are</p>	<p>(a) The development plan has an aim to contribute to the smooth transfer between the railway and other transportation means. Therefore, basically the plan will not cause adverse impacts to existing means of transportation. In addition, houses, stores and shops are not found to exist in the project site, thus alteration of existing land uses, changes in sources of livelihood, or unemployment, etc. are not expected.</p> <p>(b) The plan is expected to contribute to improve citizen's accessibility to Van Thanh Park. Adverse impact to inhabitants other than residents living near the station is not anticipated.</p> <p>(c) During construction phase, it is anticipated that a number of temporary construction workers will come to the project site. Therefore, it needs to carry out sanitary health education to workers, and measures to prevent the spread of infectious diseases such as HIV/AIDS.</p>

Major Checked Items	Check Results
<p>adequate measures considered for preventing these impacts?</p> <p>(b) Is there any possibility that the project will adversely affect the living conditions of inhabitants other than the affected inhabitants? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>(c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary?</p> <p>(d) Is there any possibility that the project will adversely affect road traffic in the surrounding areas (e.g., by causing increases in traffic congestion and traffic accidents)?</p> <p>(e) Is there any possibility that the station plaza and parking lots will impede the movement of inhabitants?</p> <p>(f) Is there any possibility that structures associated with station and shopping mall will cause a sun shading and radio interference?</p> <p>(g) Misdistribution of benefit and damage</p>	<p>d) During construction phase, a part of the roads around the project site may be temporarily blocked and cause traffic congestion at some sections. In addition, accidents accompanied with excavation works, construction machinery, etc. may occur.</p> <p>During the construction phase, a construction vehicle operation plan should be appropriately made, and routes for construction vehicles should be properly planned to avoid the concentration of machinery and vehicles in limited roads.</p> <p>Drivers of vehicles bringing equipment and materials should be properly trained to ensure that they observe the driving rules, driving routes, etc.</p> <p>In the operation phase, in order to ensure easy accessibility to the station and safety of pedestrians, the road network around the station should be improved, including the widening of these roads' pedestrian roadsides.</p> <p>(e) The station plaza and parking lots are expected not cause impedance to traffic and movement of people. The road approach to the park in the north of the station plaza will be maintained.</p> <p>In the operation phase, positive impacts such as improvement of accessibility to the park are expected after the roads around the station are improved.</p> <p>(f) The proposed ITF are low-rise facilities, and will not cause impacts of sun shading or radio interference.</p> <p>(g) People living close to the station plaza, parking lots, etc. may have benefits from the differences in land price, business opportunity, accessibility to the station, etc.</p> <p>The road network around the station should be improved to reduce the gap between the areas near the station and the ones far from the station.</p>
(3) Heritage	
(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and	(a) There is not any archeological, historical, cultural, or religious heritage found around Van Thanh Park Station.

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Major Checked Items	Check Results
religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	
(4) Landscape	
(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	<p>(a) The station plaza and the parking lots may cause some adverse impact to the landscape of Van Thanh Park. However, it is not significant in comparison with such kind of impact caused by the elevated viaduct/station. There are no trees found in the submerged low land to be used for the station plaza and in the area in the west of the station where a parking lot is planned.</p> <p>The open space around the station plaza should be properly designed, and tree planting and grassing should be implemented in order to be harmonized with the surrounding landscape.</p>
(5) Ethnic Minorities and Indigenous Peoples	
<p>(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?</p> <p>(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?</p>	<p>The Project is sited in the center of the urban area, and impact to culture and lifestyle of ethnic minorities and indigenous peoples is not expected.</p>
(6) Working conditions	
<p>(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?</p> <p>(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?</p> <p>(c) Are intangible measures being planned and implemented for</p>	<p>(a) Contractors should be obligated to perform construction works in accordance with Vietnam laws and regulations on the working environment. Besides, it needs to monitor the contractors' work to ensure their compliance with Vietnam laws and regulations on the working environment. The method of monitoring, identification of organization in charge of monitoring, and its feasibility should be examined in detail in the next coming studies.</p>

Major Checked Items	Check Results
<p>individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?</p> <p>(d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?</p>	
<b>5: Others</b>	
(1) Impacts during construction	
<p>(a) If the construction activities might cause traffic congestion, are adequate measures considered to reduce such impacts?</p> <p>(b) Is there the need to remove the existing facilities on the ground or underground (such as electric pole, water supply pipe, sewage pipe, telephone cable)?</p>	<p>(a) In the construction phase, it is expected that traffic congestion will be increased, and levels of air pollution, noise, vibration will also temporarily rise. Therefore, it needs to take measures to mitigate these impacts.</p> <p>(b) It seems that there is are no public facilities such as electric poles, water supply pipes, sewage pipes, telephone cables, etc. existing in the area planned for the station plaza.</p>
(2) Monitoring	
<p>(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?</p> <p>(b) What are the items, methods and frequencies of the monitoring program?</p> <p>(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to</p>	<p>A draft EIA report which includes an environmental monitoring program was prepared by the SAPI Study Team in May 2014. A monitoring program for air pollution, noise, and vibration is described in this draft EIA report.</p>

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Major Checked Items	Check Results
sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	
<b>6: Note</b>	
(1) Reference to Checklist of Other Sectors	
(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation). (b) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	(a) Not available  (b) Not available
(2) Note on Using Environmental Checklist	
(a) If necessary, the impacts to trans boundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as trans boundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) Not available

g) Environmental Management Program (EMP)

A draft Environmental Management Program was formulated as a part of the draft EIA Report to ensure the environmental commitments made at the EIA study are implemented in an efficient and effective manner. The main purpose of the EMP are as follows.

- To check environmental impacts and control the implementation of environment protection measures.
- To propose supplementary methods to minimize the adverse impacts on the environment that have not been previously predicted.

The project executing agency is responsible to implement the project in an environmentally responsible manner. A project supervision consultant (PSU) would be employed by the executing agency to supervise the EMP implementation and periodically organize environmental monitoring.

The contractors shall implement necessary preventive and mitigation measures to ensure environmental protection during pre-construction and construction phases. Details of organizations and their responsibilities are described as follows

**Table 11.4.14 - Roles and Responsibilities for Implementing the EMP**

Organization	Responsibilities
Project executing agency	<ul style="list-style-type: none"> <li>- Prepare contractual requirements and ensure that contractors follow the EMP</li> <li>- Ensure that construction contractors implement mitigation measures via environmental protection provisions in construction contracts</li> <li>- Provide DONRE, MONRE and JICA monitoring reports related to EMP implementation</li> <li>- Inform local authorities and communities on the status of the project and EMP implementation</li> <li>- Coordinate with relevant parties in solving complaints from local people and authorities</li> </ul>
Design Consultants	<ul style="list-style-type: none"> <li>- Conduct design for the intermodal facilities with consideration for proper drainage systems, plants and green areas for noise and dust reduction, and harmonization of the structure with the surrounding environment</li> </ul>
Project Supervision Consultant (PSC)	<ul style="list-style-type: none"> <li>- Conduct environmental monitoring for three phases of the project</li> <li>- Recommend additional mitigation measures during the construction stage, if necessary</li> <li>- Conduct monitoring of the contractor’s environmental performance with regard to implementation of EMP provisions and prepare quarterly monitoring reports</li> <li>- Undertake regular spot inspections to ensure that the contractor is following the EMP, and advise the Project Director in case of any failures in the implementation</li> <li>- Coordinate activities with the contractor and the project executing agency</li> </ul>
Contractors	<ul style="list-style-type: none"> <li>- Implement environmental mitigation and preventive measures as described in the EIA report as well as additional measures as necessary or as required by the project executing agency/PSC</li> <li>- Undertake regular site inspections to ensure best practices are used</li> <li>- Document and address comments or complaints from the local residents.</li> </ul>
Management unit of the station plaza and intermodal facilities	<ul style="list-style-type: none"> <li>- Operate and maintain properly the station plaza and intermodal facilities</li> <li>- Ensure environmental protection measures such as measures for controlling wastewater quality, traffic management</li> </ul>

Source: Study Team

Table 11.4.15 indicates the details how various measures are implemented and which organization is responsible for the tasks.

**Table 11.4.15 - Mitigation Measures, Responsibilities in the Environmental Management Program (EMP)**

Environmental Issues	Objectives	Mitigation Measures	Indicator	Implementation Responsibility	Monitoring/Supervision
<b>Pre-construction Phase</b>					
1) Gathering of baseline data	Ensure that environmental monitoring is done	Conduct environmental monitoring according to the Environmental Monitoring Plan	Air quality Noise level Vibration level	Environmental consultant	PSC
2) Design of station plaza and parking lots	Minimize impacts on the landscape	Conduct a detailed design in consideration of the surrounding environment	The intermodal facilities are designed in harmonization with the residential area and green area of the Park	Design consultant	MAUR
<b>Construction Phase</b>					
3) Environmental monitoring	Ensure that environmental monitoring is done	Conduct environmental monitoring according to the Environmental Monitoring Plan. Compare the result with baseline monitoring	Air quality Noise level Vibration level	Environmental consultant	PSC
4) Air pollution	Minimize air pollution and dust caused by construction vehicles and machinery, ensure that air quality parameters remain below permitted levels (QCVN 05:2009/BTNMT)	Prevent and mitigate dust and air pollution by watering and covering sand, limiting vehicles' speed, establishing temporary walls/sheets, etc.	Visual blowing dust on site NO <sub>2</sub> , SO <sub>2</sub> , CO, THC, TSP, Micro-Climate	Contractor	PSC, DONRE
5) Impacts of noise	Ensure that noise level does not exceed allowed limits (QCVN 26:2010/BTNMT)	Prevent and reduce the noise level by noise walls/boards, prohibiting works during the night time, limiting activities of vehicles in peak hours	L <sub>eq</sub> , L <sub>10</sub> , L <sub>90</sub>	Contractor	PSC, DONRE
6) Impacts of solid waste	Ensure handling of solid waste and hazardous materials is in accordance with Decree 59/2007/ND-CP (solid waste management), Decree 23/2006/QĐ-BTNMT and Circulation 12/2006/TT-BTNMT (hazardous waste management)	Properly collect and treat solid wastes from construction and domestic activities Careful handling of hazardous materials and prevent any accidental spills Contract with a competent company to transport and treat the waste.	Visible cleanliness on site  Presence of appropriate fuel storage facilities that will prevent contamination in case of spills or leaks.  Permits for transport and handling of hazardous wastes	Contractor	PSC, DONRE
7) Impacts of wastewaters	Avoid water and soil pollution from wastewaters Ensure that wastewater quality does not exceed allowed limits (QCVN 40:2011/BTNMT)	Collect and treat wastewater by the drainage system with separation of sediment Prevent fuel leaking Provide hygiene toilets on site	Visible cleanliness on site Presence of facilities for trapping sediment  Presence of appropriate fuel storage facilities.	Contractor	PSC, DONRE
8) Impacts on traffic	Ensure traffic safety and minimize disturbance to the vehicular traffic and pedestrians	Limit operations of vehicles in peak hours Installing warning and guide signs Arrange flagmen when necessary	Number of traffic jams Number of construction-related traffic accidents	Contractor	PSC
9) Risks and incidents	Minimize health and safety risks to communities and workers	Provide training on occupational health and safety for workers	Presence of personal protective equipment, safety facilities for working	Contractor	PSC



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Environmental Issues	Objectives	Mitigation Measures	Indicator	Implementation Responsibility	Monitoring/Supervision
	Minimize the risk of accidents	Create hygienic sanitation on site Provide first aid equipment, personal protective equipment Implement safety measures such as the fencing of excavation sites, guardrails, etc. Implement fire prevention and firefighting measures Conduct inspection regularly	in hazardous conditions, equipment for emergency cases, etc. Number of accidents		
<b>Operation Phase</b>					
10) Environmental monitoring	Ensure that environmental monitoring is done	Conduct environmental monitoring according to the Environmental Monitoring Plan Compare the result with baseline monitoring	Air quality Noise level	Environmental consultant	MAUR/PSC
11) Impacts of noise	Ensure that the noise level does not exceed allowed limits (QCVN 26:2010/BTNMT)	Provide plants and green areas Limit speed of vehicles Regulate vehicle stream	Number of traffic jams and accidents	Management unit of the station and intermodal facilities	MAUR/PSC, DONRE
12) Impact of solid waste and wastewater	Ensure management of waste is in accordance with Decree 59/2007/ND-CP	Properly collect, segregate, and treat solid waste Operate and maintain sewage system Avoid oil and grease contamination such as car washing	Visible cleanliness of the station and intermodal facilities	Management unit of the station and intermodal facilities	MAUR/PSC, DONRE
13) Impacts on landscape	Minimize impacts in the surrounding landscape	Provide and maintain plants and green areas Properly maintain the station and other intermodal facilities in good condition	Visible cleanliness and outlook of the station and intermodal facilities	Management unit of the station and intermodal facilities	MAUR/PSC
14) Risks and incidents	Minimize risks of incident in the station and other intermodal facilities	Prepare emergency response plans Provide safety training, firefighting equipment Check safety conditions of electrical devices regularly	Presence of equipment for emergency cases Number of accidents	Management unit of the station and intermodal facilities	MAUR/PSC

Source: Study Team

h) Environmental Monitoring Plan (EMoP)

Table 11.4.16 describes items to be monitored, as well as its indicators, frequency, and sites, during the design phase, construction phase, and operation phase. However, contents of this table shall be reviewed and revised during the stages of detail design.

**Table 11.4.16 - Environmental Monitoring Plan**

Item	Indicators	Frequency			Site
		Design Phase	Construction Phase	Operation Phase	
Air ambient	SPM, CO, NO <sub>2</sub> , SO <sub>2</sub> , Carbohydrates, microclimate parameters	1 time 1 day/time	4 times/year 1 day/time (during all construction phase)	4 times/year 1 day/time (during 2 years)	to be defined in F/S
Noise and vibration	Leq, L10, L90	1 time 1 day/time	4 times/year 1 day/time (during all construction phase)	4 times/year 1 day/time (during 2 years)	to be defined in F/S

## **11.5 Local Stakeholders Consultation Meetings**

According to Vietnam's laws and regulations on environmental assessment, after the EIA report is drafted, the project's owner should send a summary of the draft EIA report to the people's committees of the project-affected communes/wards and representatives of project-affected communities/organizations and request their comments. Comments obtained from project-affected communes/wards and communities/organizations should be described in the EIA report (Law on Environmental Protection, Article 20, and Decree 21/2008/ND-CP, Article 1-4). Methods in carrying out this consultation are stated as follows (Decree 29/2011/ND-CP, Article 15).

- The project owner sends a written request for consultation and a document outlining the main project items, environmental issues, and measures to mitigate environmental impacts to people's committees (PCs) of communes, wards or townships where the project is to be implemented and representatives of communities and organizations directly affected by the project;
- Request the above-mentioned PCs and representatives of communities and organizations to give comments on the document sent.
- In case of necessity, the commune-level PCs shall organize a dialogue with the project owner and representatives of organizations and communities directly affected by the project.
- After receiving the written request for consultation, within 15 working days, the commune-level PCs shall reply to the project owner in writing and publicize such reply. Past this time limit, if a consulted PC fails to send a written reply to the project owner, it is regarded as agreeing with the project owner's investment plan.

Thus, the consultation with project-affected people is not strictly obligatory for the project owner during the EIA preparation process in accordance with Vietnam's laws and regulations. However, in this SAPI Study, two rounds of local stakeholder consultation meetings were organized in the affected commune (Ward 22 of Binh Thanh District) adjacent to Van Thanh Park Station, in accordance to JICA Guidelines for Environmental and Social Considerations (April 2010, Section 2-4).

## 1) First Round of the Local Stakeholder Consultation Meeting

The first round of the consultation meeting was organized on May 6, 2014 in Ward 22 of Binh Thanh District (i.e., the commune affected by the ITF development at Van Thanh Park Station). Table 11.5.1 describes the outline of the meeting.

**Table 11.5.1 - Outline of the First Round of the Local Stakeholder Consultation Meeting**

Date	May 06, 2014	
Venue	Meeting room in the Office of Ward 22 PC, Binh Thanh District, HCMC	
Participants	Ward 22 PC staff (2 persons), representatives of residents (4 persons), representatives of local mass organizations (6 persons)	
Objective	To explain and consult with key persons of the affected communes about the proposed projects, the predicted impacts, result of the project categorization, result of the environmental scoping, the project alternatives being examined.	
	Comments raised by participants	Answers from consultant, ward PC
	<p>(1) Will the proposed ITF development cause changes to the landscape of Van Thanh Lake?</p> <p>(2) According to explanation, there will be 3 underground stations. So, where is the location of the beginning point of the elevated section?</p> <p>(3) How will the residential area in the east of the station be developed?</p> <p>(4) According to explanation, the Road No. 2 is planned to be widened to 19~22m. But, this road width may be not appropriate. We suggest that a road linking Van Thanh Park Station with Xo Viet Nghe Tinh Street (Ward 21) should be developed to mitigate traffic congestion during the peak hour.</p>	<p>(1) We are informed that HCMC PC has plans to preserve Van Thanh Lake as its current condition, and its landscape may be improved further in the future.</p> <p>(2) The railway is planned underground in the center of the City, and the section next to Ba Son Station (Km 1+587) including Van Thanh Park Station will be elevated.</p> <p>(3) This question is out of the SAPI Study's scope. However, we know that HCMC PC has plan to develop this area as a part of the expanded city center.</p> <p>(4) We also know that HCMC PC has plan to widen this road to make it easy to access to the station area from Điện Biên Phủ Street, and Nguyễn Hữu Cảnh Street.</p>
	<p>(1) What are the predicted impacts by the project to the houses near the project area?</p> <p>(2) Is there assessment on the impact of ground subsidence to residents' houses? For instance, if there happens to be damage to the house due to ground subsidence caused by the construction works, will residents be compensated?</p>	<p>(1) The station plaza is planned in a soft ground area. Construction work on soft ground may generate vibration during short time. Besides, construction works may also generate air pollutants and noise. However, these impacts are considered not significant, since the station plaza is small scale. Landscape of Van Thanh Park would be affected to some extent due to the elevated viaduct and station.</p> <p>(2) According to the EIA Report for the UMRT Line 1 (approved in November 2006 by MONRE), if resident's house is damaged by ground subsidence, the damage will be investigated and compared with the house condition before construction, and residents will be compensated properly. If your house is damaged by ground subsidence, please report it to the ward PC through the commune representatives. The ward PC will request the contractor to come to your house, to inspect damage, and prepare documents necessary for the compensation.</p>

Conclusion by the representative of the ward PC:  
 The road network around the railway station should be improved with more widened roads, to improve accessibility to the station. Traffic jam is often happened at the intersection between Điện Biên Phủ Street and the road accessing to Van Thanh Park Station. This road should be properly widened before the commencement of railway operation.  
 Residents of Ward 22 hope that the project will be completed soon, so that traffic congestion will be reduced and the landscape of local area will be improved. The ward PC will make more effort to inform people about the need to push forward the project to construct the first metro railway of the city.

## 2) Second Round of the Local Stakeholder Consultation Meeting

The second round of consultation meeting was organized on May 13, 2014 in Ward 22 of Binh Thanh District.

Table 11.5.2 describes the outlines of meeting.

**Table 11.5.2 - Outline of the Second Round of the Local Stakeholder Consultation Meeting**

Date	May 13, 2014	
Venue	Meeting room in the Office of Ward 22 PC, Binh Thanh District, HCMC	
Participants	Residents (48 persons) Ward 22 PC staff (2 persons), representatives of residents (3 persons), representatives of the local mass organizations (10 persons). In total 63 persons	
Objective	<ul style="list-style-type: none"> <li>- To dismiss information about the proposed ITF development planned at Van Thanh Par Station</li> <li>- To explain about the result of environmental impact assessment for the ITF development planned at Van Thanh Park Station.</li> <li>- To consult with local stakeholders about the predicted impacts, result of the environmental scoping, the proposed impact mitigation measures, etc.</li> </ul>	
	Comments raised by participants	Answers from consultant, ward PC
	(1) According to result of environmental baseline survey, all concentrations of air pollutants in Van Thanh Park are lower than the allowable national standards. But, what will be (what are predicted air pollutant concentrations) after completion of the project? (2) Ground in Van Thanh Park is soft and easy to be subsided. It needs to apply proper construction technique to prevent affect to residents' houses. (3) It need to apply modern technique to operate the railway and the station. Outdated technique should not be used. (4) Modern metro railway operation technique should be transferred to Vietnamese side for its sustainability.	(1) Predicted impacts caused by the project are described in the EIA Report. Measures to mitigate impacts of noise, air pollution, etc. are also described in this report.  (2) We will describe your comment in our report. (3) The railway will be operated with modern technique transferred from Japan.  (4) We will describe your comment in our report.
	Issues on land acquisition and compensation for UMRT Line 1 (1) Environmental issues	Consultant's answers: The SAPI Study has scope cover only the development of intermodal facilities in the station

<ul style="list-style-type: none"> <li>- Residents' houses are damaged by ground subsidence caused by the metro railway construction work?</li> <li>- In Blocks 65, 66, the electric power system is affected by the construction work</li> <li>- In Block 61, a drainage culvert was damaged.</li> <li>- Noise caused by the pile driving work during all day time and night time is very unpleasant and unbearable to residents.</li> <li>- In Blocks 51, 52, 53, 54, 55, construction vehicles caused strong vibration, damage of drainage culverts, and disturbance to residents' life.</li> <li>- In Block 61, works to construct the foundation of the railway viaduct are done at the location very close to residents' houses, and it may cause damage or collapse to residents' houses</li> <li>- Construction vehicles usually park around the construction site, and deteriorate traffic and public order.</li> <li>- Heavy loaded trucks usually run on local roads and cause damage to these roads, disturb resident's movement.</li> <li>- Construction works generate a lot of dust. Dust prevent measures are not appropriate.</li> </ul> <p>(2) Issues on society</p> <ul style="list-style-type: none"> <li>- Social evils such as drug using, theft, etc. are increasing in the town.</li> <li>- Sanitary environment is deteriorated. Excrement can be found at everywhere around the construction site.</li> <li>- Local roads should be widened.</li> <li>- Construction plan should be carefully prepared to improving sustainability of the project.</li> </ul>	<p>areas. Therefore, issues on the impacts caused by construction works for the railway/station are not covered by the SAPI Study. However, we will describe your comments in our reports which will be submitted to MAUR and it may request the contractor to carry out counter measures. As an urgent necessary action, we suggest that the ward PC should have a meeting with the contractor and instruct the contractor to carry out correction measures, mitigation measures, etc., based on residents' comments.</p> <p>In the EIA Report approved by MONRE in 2006, there are statements on measures to solve environmental problems happened during the construction phase. The ward PC will take important role in collecting residents' complaints, and report them to the contractor.</p> <p>Representative of the ward PC          &lt;Regarding to issues on environment&gt;          Resident should report to the ward PC as soon as possible about the identified damage of the houses, residential structures, etc. The ward PC will carry out survey and make application for request compensation in accordance with the relevant regulations.</p> <p>&lt;Regarding to social issues&gt;</p> <ul style="list-style-type: none"> <li>- The ward will request the police department, civil guard teams to intensify guard around the project area.</li> <li>- Residents should promptly report to the ward PC, police department, civil guard teams when they see any suspicious thing.</li> <li>- If resident does not agree with district's decision on compensation issues, he/she can address complaint to city PC, or raise a lawsuit to the court in accordance with the law.</li> </ul>
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### 3) Conclusion

The following conclusion is made based on results of the two local stakeholder consultation meetings.

- Local stakeholders (local residents, mass organizations, local authority) in Ward 22 near Van Thanh Park Station understand that the metro railway construction project and the development of intermodal facilities for the station will bring a lot of socio-economic benefits to the locality, and have no opposition to the project.
- Local residents are worrying about the adverse impacts, especially impacts of noise, dust, vibration, caused by the on-going construction works of the railway. It seems that these impacts are excessive and unbearable to residents. This bad practice should be considered as a lesson-learned for the future project, and should be avoided when constructing the intermodal facilities for the station.
- Local stakeholders agreed with the consultant on the impact mitigation measures as proposed in the draft EIA report.

## 11.6 IEE for ITF Development Planned in the 9 Station Areas of the HCMC UMRT Line 1

This section described the result of impact assessment for the proposed ITF in the station areas of Tan Cang Station, Thao Dien Station, An Phu Station, Rach Chiec Station, Phuoc Long Station, Binh Thai Station, Thu Duc Station, High-tech Park Station, and Suoi Tien Station.

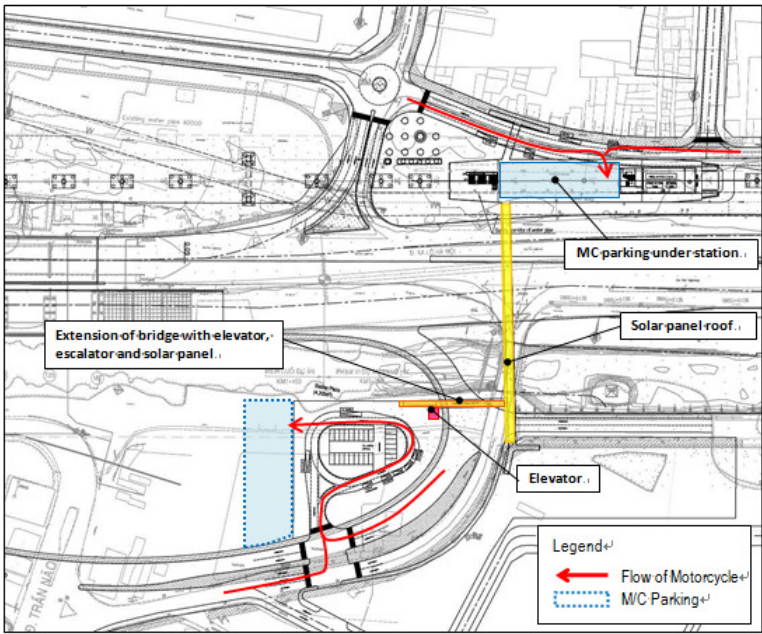
**Table 11.6.1 - Impact Assessment for ITF Development in the Station Area of Tan Cang Station**

	<p><b>Outline of development plan:</b> A station plaza (12,200 m<sup>2</sup>) is proposed in the open space of the interchange and under the railway viaduct. Motorbike parking lots are planned under the railway/road viaduct and under the bridge. These land lots are managed by HCMC PC, thus acquisition of residential land is not required.</p>
<p><b>Current natural and socio-economic conditions:</b> Average land elevation is 1.4m. Submergence occurs frequently by high tide during October~December. Traffic flows are heavy around-the-clock on the adjacent roads. Ambient air quality has been already deteriorated. There is no densely-populated area found within 300m range from the station.</p>	
<p><b>Predicted potential impacts:</b></p>	<p><b>Proposed major impact mitigation measures</b></p>
<p><b>Air pollution:</b> Impacts caused by the construction and operation of the proposed intermodal facilities are considered insignificant in comparison with the current degrading ambient air quality.</p>	<p>Contractors should implement measures to reduce impacts of dust and exhausted gases, such as: build temporary walls around the construction sites; use construction equipment and vehicles which comply with the latest regulations on exhaust gas control; periodically inspect and maintain construction equipment and vehicles; periodically clean and water the project sites; use cover sheets for trucks carrying soil; etc</p>
<p><b>Water pollution:</b> Wastewater from construction activities may temporarily cause deterioration of water quality of the vicinities.</p>	<p>In construction phase, waste water generated from construction sites should not be discharged directly to drainage system or surrounding surface water bodies. Waste water should be settled and preliminarily treated before discharged, in accordance with Vietnam standards on waste water.</p>
<p><b>Wastes:</b> Solid wastes and sewage from the construction sites and from the station plaza, parking areas, etc. may cause adverse impacts to localities.</p>	<p>Waste generated from the station plaza and parking lots should also be properly collected, treated, and disposed by authorized company in accordance with Ho Chi Minh City regulations.</p>
<p><b>Noise and vibration:</b> Construction machinery and transportation vehicles (during the</p>	<p>Contractors should bear efforts to reduce noise from the construction sites by installing the temporary walls around the construction sites, using construction</p>



<p>construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause more adverse impacts to localities.</p>	<p>machinery and vehicles which reduces noise and vibration. Construction machinery and vehicles should be periodically inspected and maintained to be able to use in best condition.</p>
<p><b>Accidents, traffic congestion:</b>                  Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause more traffic congestion and accidents to localities.</p>	<p>During construction phase, construction vehicle operation plan should be appropriately made, and routes for construction vehicles should be properly planned to avoid concentration of machinery and vehicles in limited roads.</p> <p>Drivers of vehicles bringing equipment and materials should be properly trained to ensure that they observe the driving rules, driving routes, etc.</p> <p>In operation phase, in order to ensure easy accessibility to the station and safety of pedestrians, the road network around the station should be improved, including the widening of these roads' pedestrian roadsides.</p>

**Table 11.6.2 - Impact Assessment for ITF Development in the Station Area of Thao Dien Station**

	<p><b>Outline of development plan:</b></p> <p>A station plaza (4,200 m<sup>2</sup>) is proposed in the open space in the south of Thao Dien Station, near the intersection between Tran Nao Street and Song Hanh Street. A motorbike parking lot (1,100 m<sup>2</sup>) is planned under the railway viaduct. Another motorbike parking lot (1,400 m<sup>2</sup>) is planned beside the station plaza. These intermodal facilities are planned within ROW of Hanoi Highway, or in public land managed by HCMC PC. Therefore, development of these facilities does not require acquisition of residential land.</p>
<p><b>Current natural and socio-economic conditions:</b></p> <p>Average land elevation is 1.61m. Submergence occurs frequently by high tide during October~December. Traffic flows are heavy around-the-clock on Hanoi Highway. Ambient air quality has been already deteriorated. There is a complex high-rise building (Thao Dien Pearl, 33 storey) located near the station. However, there is no densely-populated area found within 300m range from the station.</p>	
<p><b>Predicted potential impacts:</b></p> <p><b>Air pollution:</b>                  Impacts caused by the construction and operation of the proposed intermodal facilities are considered insignificant in comparison with the current degrading ambient air quality.</p>	<p><b>Proposed major impact mitigation measures</b></p> <p>Contractors should implement measures to reduce impacts of dust and exhausted gases, such as: build temporary walls around the construction sites; use construction equipment and vehicles which comply with the latest regulations on exhaust gas control; periodically inspect and maintain construction equipment and vehicles; periodically clean and water the project sites; use cover sheets</p>

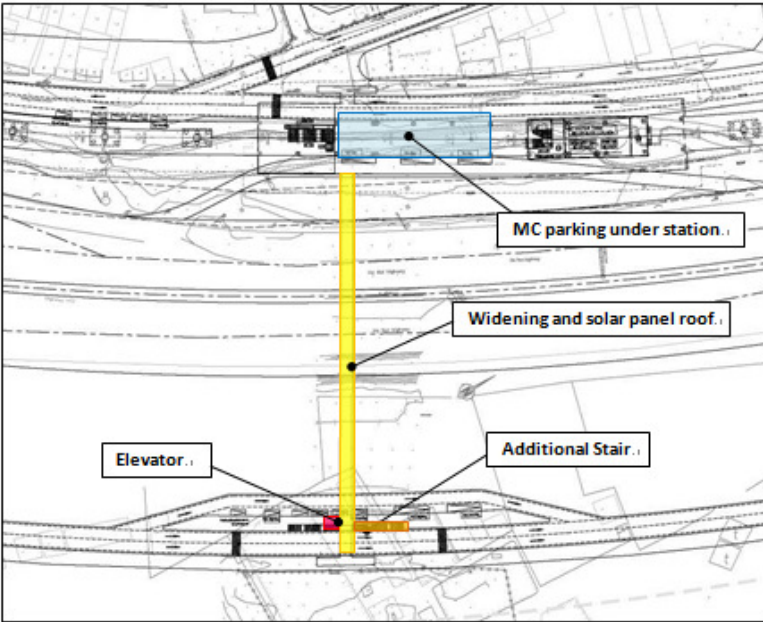
	for trucks carrying soil; etc
<p><b>Water pollution:</b> Wastewater from construction activities may temporarily cause deterioration of water quality of the vicinities.</p>	<p>In construction phase, waste water generated from construction sites should not be discharged directly to drainage system or surrounding surface water bodies. Waste water should be settled and preliminarily treated before discharged, in accordance with Vietnam standards on waste water.</p>
<p><b>Wastes:</b> Solid wastes and sewage from the construction sites and from the station plaza, parking areas, etc. may cause adverse impacts to localities.</p>	<p>Waste generated from the station plaza and parking lots should also be properly collected, treated, and disposed by authorized company in accordance with Ho Chi Minh City regulations.</p>
<p><b>Noise and vibration:</b> Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause more adverse impacts to localities.</p>	<p>Contractors should bear efforts to reduce noise from the construction sites by installing the temporary walls around the construction sites, using construction machinery and vehicles which reduces noise and vibration. Construction machinery and vehicles should be periodically inspected and maintained to be able to use in best condition.</p>
<p><b>Accidents, traffic congestion:</b> Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause more traffic congestion and accidents to localities.</p>	<p>During construction phase, construction vehicle operation plan should be appropriately made, and routes for construction vehicles should be properly planned to avoid concentration of machinery and vehicles in limited roads.</p> <p>Drivers of vehicles bringing equipment and materials should be properly trained to ensure that they observe the driving rules, driving routes, etc.</p> <p>In operation phase, in order to ensure easy accessibility to the station plaza and safety of pedestrians, the road network around the station plaza should be improved, including the widening of these roads' pedestrian roadsides.</p>

**Table 11.6.3 - Impact Assessment for ITF Development in the Station Area of An Phu Station**

	<p><b>Outline of development plan:</b>                  Only small scale intermodal facilities are planned at An Phu Station (car stop and motorbike parking areas under the railway viaduct, and bus stop, car stop, motorbike parking area on the southern side of Hanoi Highway). These intermodal facilities are planned within ROW of Hanoi Highway, therefore development of these facilities does not require acquisition of residential land..</p>
<p><b>Current natural and socio-economic conditions:</b>                  Average land elevation is 1.4m. However, submergence does not occur frequently. Traffic flows are heavy around-the-clock on Hanoi Highway. Ambient air quality has been already deteriorated. There is a relatively-populated area found within 300m range from the station in the south.</p>	
<p><b>Predicted potential impacts:</b></p>	<p><b>Proposed major impact mitigation measures</b></p>
<p><b>Air pollution:</b>                  Traffic flow on Hanoi Highway is heavy around-the-clock. Ambient air quality at the project area has been already deteriorated. The development of the small-scaled bus/car stops and the motorbike parking areas may cause only limited impact to the current degrading ambient air quality.</p>	<p>In operation phase, the following measures are recommended to mitigate impact of air pollution:                  - Planting trees along the access roads to mitigate impact of air pollutants generated by vehicles.                  - Periodically cleaning and watering the roads                  - Applying regulations to limit vehicles which exhausts excessive pollutants or scatters wastes/dust on the road during transportation.</p>
<p><b>Water pollution:</b>                  Wastewater from construction activities may temporarily cause deterioration of water quality of the vicinities.</p>	<p>In construction phase, waste water generated from construction sites should not be discharged directly to drainage system or surrounding surface water bodies. Waste water should be settled and preliminarily treated before discharged, in accordance with Vietnam standards on waste water.</p>
<p><b>Wastes:</b>                  Solid wastes and sewage from the construction sites and from the parking areas, etc. may cause adverse impacts to localities.</p>	<p>Waste generated from the station plaza and parking lots should also be properly collected, treated, and disposed by authorized company in accordance with Ho Chi Minh City regulations.</p>
<p><b>Noise and vibration:</b>                  Construction machinery and transportation vehicles during the construction phase may cause more adverse impacts to localities.</p>	<p>Contractors should bear efforts to reduce noise from the construction sites by installing the temporary walls around the construction sites, using construction machinery and vehicles which reduces noise and vibration. Construction machinery and vehicles should be periodically inspected and maintained to be able to use in best condition.</p>
<p><b>Accidents, traffic congestion:</b>                  Construction machinery and transportation vehicles (during the construction phase), and increased</p>	<p>During construction phase, construction vehicle operation plan should be appropriately made, and routes for construction vehicles should be properly planned to avoid concentration of machinery and</p>

<p>traffic flow in-and-out the parking lots (in the operation phase) may cause more traffic congestion and accidents to localities.</p>	<p>vehicles in limited roads. Drivers of vehicles bringing equipment and materials should be properly trained to ensure that they observe the driving rules, driving routes, etc.</p>
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**Table 11.6.4 - Impact Assessment for ITF Development in the Station Area of Rach Chiec Station**

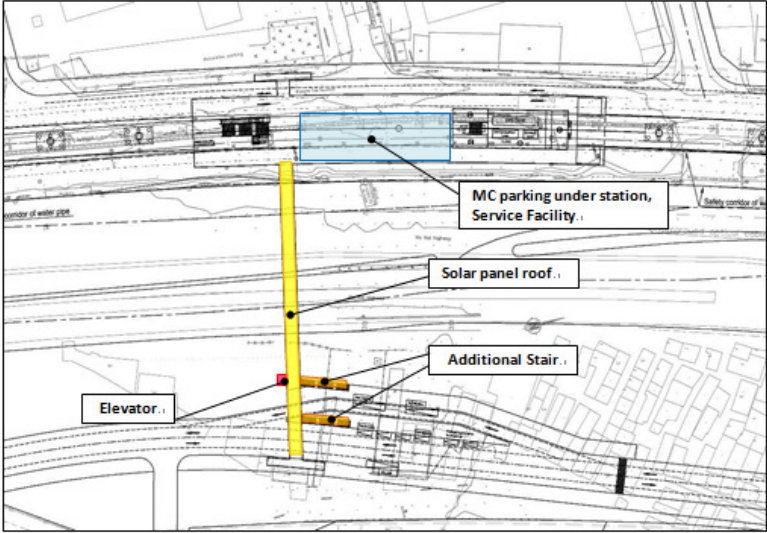
	<p><b>Outline of development plan:</b> Only small scale intermodal facilities are planned at Rach Chiec Station (car stop and motorbike parking areas under the railway viaduct, and bus stop, car stop, motorbike parking area on the eastern side of Hanoi Highway). These intermodal facilities are planned within ROW of Hanoi Highway, therefore development of these facilities does not require acquisition of residential land.</p>
<p><b>Current natural and socio-economic conditions:</b> Average land elevation is 1.4m. The area is flooded sometime after heavy rain, especially in the areas around Cat Lai Round-About. Traffic flows are heavy around-the-clock on the adjacent roads. Ambient air quality has been already deteriorated. Within 300m range from the station in the west and in the east, there are two densely-populated areas.</p>	
<b>Predicted potential impacts:</b>	<b>Proposed major impact mitigation measures</b>
<p><b>Air pollution:</b> Traffic flow on Hanoi Highway is heavy around-the-clock. Ambient air quality at the project area has been already deteriorated. The development of the small-scaled bus/car stops and the motorbike parking areas may cause only limited impact to the current degrading ambient air quality.</p>	<p>In operation phase, the following measures are recommended to mitigate impact of air pollution:</p> <ul style="list-style-type: none"> <li>- Planting trees along the access roads to mitigate impact of air pollutants generated by vehicles.</li> <li>- Periodically cleaning and watering the roads</li> <li>- Applying regulations to limit vehicles which exhausts excessive pollutants or scatters wastes/dust on the road during transportation.</li> </ul>
<p><b>Water pollution:</b> Wastewater from construction activities may temporarily cause deterioration of water quality of the vicinities.</p>	<p>In construction phase, waste water generated from construction sites should not be discharged directly to drainage system or surrounding surface water bodies. Waste water should be settled and preliminarily treated before discharged, in accordance with Vietnam standards on waste water.</p>
<p><b>Wastes:</b> Solid wastes and sewage from the construction sites and from the parking areas, etc. may cause adverse impacts to localities.</p>	<p>Waste generated from the station plaza and parking lots should also be properly collected, treated, and disposed by authorized company in accordance with Ho Chi Minh City regulations.</p>
<p><b>Noise and vibration:</b></p>	<p>Contractors should bear efforts to reduce noise</p>



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<p>Construction machinery and transportation vehicles during the construction phase may cause more adverse impacts to localities.</p>	<p>from the construction sites by installing the temporary walls around the construction sites, using construction machinery and vehicles which reduces noise and vibration. Construction machinery and vehicles should be periodically inspected and maintained to be able to use in best condition.</p>
<p><b>Accidents, traffic congestion:</b>                  Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the parking lots (in the operation phase) may cause more traffic congestion and accidents to localities.</p>	<p>During construction phase, construction vehicle operation plan should be appropriately made, and routes for construction vehicles should be properly planned to avoid concentration of machinery and vehicles in limited roads.                  Drivers of vehicles bringing equipment and materials should be properly trained to ensure that they observe the driving rules, driving routes, etc.</p>

**Table 11.6.5 - Impact Assessment for ITF Development in the Station Area of Phuoc Long Station**

 <p>The diagram is a site plan of the Phuoc Long Station area. It shows a railway viaduct at the top. Below it, a blue rectangular area is labeled 'MC parking under station, Service Facility'. Further south, a yellow vertical line is labeled 'Solar panel roof'. To the right of this line, a red square is labeled 'Additional Stair'. To the left of the solar panel roof line, a red square is labeled 'Elevator'. The plan also shows surrounding roads and building footprints.</p>	<p><b>Outline of development plan:</b>                  Only small scale intermodal facilities are planned at Phuoc Long Station (motorbike parking areas under the railway viaduct, and bus stop, car stop, motorbike parking area on the eastern side of Hanoi Highway). These intermodal facilities are planned within ROW of Hanoi Highway, therefore development of these facilities does not require acquisition of residential land.</p>
<p><b>Current natural and socio-economic conditions:</b>                  Average land elevation is 1.4m. However, there is no flood caused by high tide or rain water recorded in the area. Traffic flows are heavy around-the-clock on the adjacent roads. Ambient air quality has been already deteriorated. Within 300m range from the station in the north-east, there is a small populated area.</p>	
<p><b>Predicted potential impacts:</b></p>	<p><b>Proposed major impact mitigation measures</b></p>
<p><b>Air pollution:</b>                  Traffic flow on Hanoi Highway is heavy around-the-clock. Ambient air quality at the project area has been already deteriorated. The development of the small-scaled bus/car stops and the motorbike parking areas may cause only limited impact to the current degrading ambient air quality.</p>	<p>In operation phase, the following measures are recommended to mitigate impact of air pollution:                  - Planting trees along the access roads to mitigate impact of air pollutants generated by vehicles.                  - Periodically cleaning and watering the roads                  - Applying regulations to limit vehicles which exhausts excessive pollutants or scatters wastes/dust on the road during transportation.</p>
<p><b>Water pollution:</b>                  Wastewater from construction activities may temporarily cause deterioration of water quality of the vicinities.</p>	<p>In construction phase, waste water generated from construction sites should not be discharged directly to drainage system or surrounding surface water bodies. Waste water should be settled and</p>

	preliminarily treated before discharged, in accordance with Vietnam standards on waste water.
<b>Wastes:</b> Solid wastes and sewage from the construction sites and from the parking areas, etc. may cause adverse impacts to localities.	Waste generated from the station plaza and parking lots should also be properly collected, treated, and disposed by authorized company in accordance with Ho Chi Minh City regulations.
<b>Noise and vibration:</b> Construction machinery and transportation vehicles during the construction phase may cause more adverse impacts to localities.	Contractors should bear efforts to reduce noise from the construction sites by installing the temporary walls around the construction sites, using construction machinery and vehicles which reduces noise and vibration. Construction machinery and vehicles should be periodically inspected and maintained to be able to use in best condition.
<b>Accidents, traffic congestion:</b> Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the parking lots (in the operation phase) may cause more traffic congestion and accidents to localities.	During construction phase, construction vehicle operation plan should be appropriately made, and routes for construction vehicles should be properly planned to avoid concentration of machinery and vehicles in limited roads.  Drivers of vehicles bringing equipment and materials should be properly trained to ensure that they observe the driving rules, driving routes, etc.

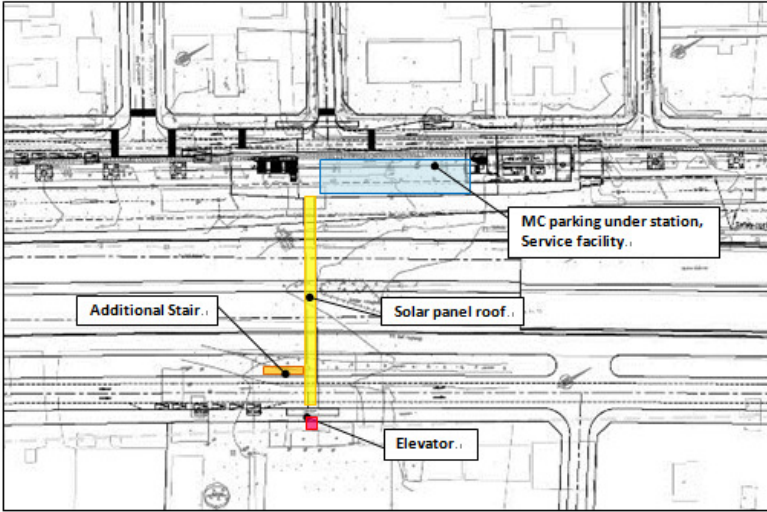
**Table 11.6.6 - Impact Assessment for ITF Development in the Station Area of Binh Thai Station**

	<p><b>Outline of development plan:</b></p> <p>Only small scale intermodal facilities are planned at Binh Thai Station (bus parking, motorbike parking areas under the railway viaduct, and bus stop, car stop, motorbike parking area on the eastern side of Hanoi Highway). These intermodal facilities are planned within ROW of Hanoi Highway, therefore development of these facilities does not require acquisition of residential land.</p>
<p><b>Current natural and socio-economic conditions:</b></p> <p>Average land elevation is 5.9m. There is no flood caused by high tide recorded in the area. However, the area is usually flooded after heavy rain due to the lack of appropriate sluice system of discharge. Traffic flows are heavy around-the-clock on the adjacent roads. Ambient air quality has been already deteriorated. Within 300m range from the station, there is a small populated area in the north.</p>	
<b>Predicted potential impacts:</b>	<b>Proposed major impact mitigation measures</b>
<p><b>Air pollution:</b></p> <p>Traffic flow on Hanoi Highway is heavy around-the-clock. Ambient air quality at</p>	<p>In operation phase, the following measures are recommended to mitigate impact of air pollution:</p> <ul style="list-style-type: none"> <li>- Planting trees along the access roads to mitigate</li> </ul>

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<p>the project area has been already deteriorated. The development of the small-scaled bus/car stops and the motorbike parking areas may cause only limited impact to the current degrading ambient air quality.</p>	<p>impact of air pollutants generated by vehicles.                  - Periodically cleaning and watering the roads                  - Applying regulations to limit vehicles which exhausts excessive pollutants or scatters wastes/dust on the road during transportation.</p>
<p><b>Water pollution:</b>                  Wastewater from construction activities may temporarily cause deterioration of water quality of the vicinities.</p>	<p>In construction phase, waste water generated from construction sites should not be discharged directly to drainage system or surrounding surface water bodies. Waste water should be settled and preliminarily treated before discharged, in accordance with Vietnam standards on waste water.</p>
<p><b>Wastes:</b>                  Solid wastes and sewage from the construction sites and from the parking areas, etc. may cause adverse impacts to localities.</p>	<p>Waste generated from the station plaza and parking lots should also be properly collected, treated, and disposed by authorized company in accordance with Ho Chi Minh City regulations.</p>
<p><b>Noise and vibration:</b>                  Construction machinery and transportation vehicles during the construction phase may cause more adverse impacts to localities.</p>	<p>Contractors should bear efforts to reduce noise from the construction sites by installing the temporary walls around the construction sites, using construction machinery and vehicles which reduces noise and vibration. Construction machinery and vehicles should be periodically inspected and maintained to be able to use in best condition.</p>
<p><b>Accidents, traffic congestion:</b>                  Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the parking lots (in the operation phase) may cause more traffic congestion and accidents to localities.</p>	<p>During construction phase, construction vehicle operation plan should be appropriately made, and routes for construction vehicles should be properly planned to avoid concentration of machinery and vehicles in limited roads.                  Drivers of vehicles bringing equipment and materials should be properly trained to ensure that they observe the driving rules, driving routes, etc.</p>

**Table 11.6.7 - Impact Assessment for ITF Development in the Station Area of Thu Duc Station**

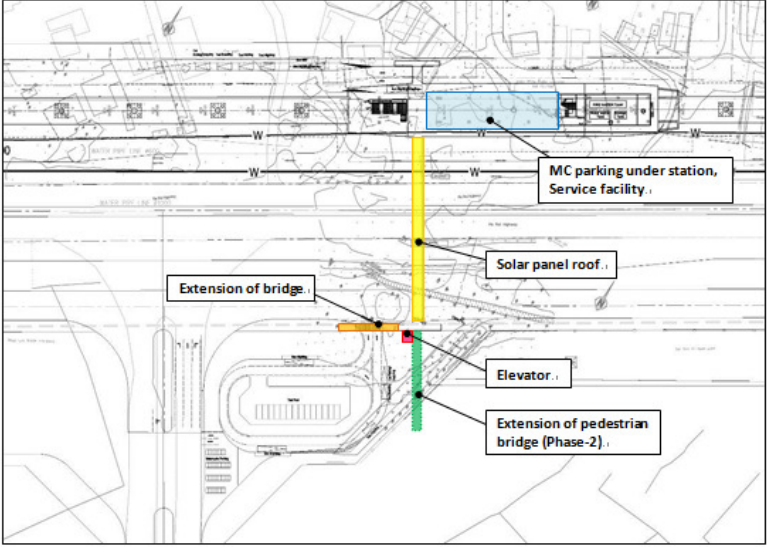
	<p><b>Outline of development plan:</b> Only small-scaled intermodal facilities are planned at Thu Duc Station (motorbike parking areas under the railway viaduct, and bus stop, car stop, motorbike parking area on the eastern side of Hanoi Highway). These intermodal facilities are planned within ROW of Hanoi Highway, therefore development of these facilities does not require acquisition of residential land.</p>
<p><b>Current natural and socio-economic conditions:</b> Average land elevation is 22.7m. There is no flood caused by high tide or heavy rains recorded in the area. Traffic flows are heavy around-the-clock on the adjacent roads. Ambient air quality has been already deteriorated. Within 300m range from the station, there is a relatively-populated area in the west.</p>	
<p><b>Predicted potential impacts:</b></p>	<p><b>Proposed major impact mitigation measures</b></p>
<p><b>Air pollution:</b> Traffic flow on Hanoi Highway is heavy around-the-clock. Ambient air quality at the project area has been already deteriorated. The development of the small-scaled bus/car stops and the motorbike parking areas may cause only limited impact to the current degrading ambient air quality.</p>	<p>In operation phase, the following measures are recommended to mitigate impact of air pollution: - Planting trees along the access roads to mitigate impact of air pollutants generated by vehicles. - Periodically cleaning and watering the roads - Applying regulations to limit vehicles which exhausts excessive pollutants or scatters wastes/dust on the road during transportation.</p>
<p><b>Water pollution:</b> Wastewater from construction activities may temporarily cause deterioration of water quality of the vicinities.</p>	<p>In construction phase, waste water generated from construction sites should not be discharged directly to drainage system or surrounding surface water bodies. Waste water should be settled and preliminarily treated before discharged, in accordance with Vietnam standards on waste water.</p>
<p><b>Wastes:</b> Solid wastes and sewage from the construction sites and from the parking areas, etc. may cause adverse impacts to localities.</p>	<p>Waste generated from the station plaza and parking lots should also be properly collected, treated, and disposed by authorized company in accordance with Ho Chi Minh City regulations.</p>
<p><b>Noise and vibration:</b> Construction machinery and transportation vehicles during the construction phase may cause more adverse impacts to localities.</p>	<p>Contractors should bear efforts to reduce noise from the construction sites by installing the temporary walls around the construction sites, using construction machinery and vehicles which reduces noise and vibration. Construction machinery and vehicles should be periodically inspected and maintained to be able to use in best condition.</p>
<p><b>Accidents, traffic congestion:</b> Construction machinery and transportation vehicles (during the</p>	<p>During construction phase, construction vehicle operation plan should be appropriately made, and routes for construction vehicles should be properly</p>



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<p>construction phase), and increased traffic flow in-and-out the parking lots (in the operation phase) may cause more traffic congestion and accidents to localities.</p>	<p>planned to avoid concentration of machinery and vehicles in limited roads.                  Drivers of vehicles bringing equipment and materials should be properly trained to ensure that they observe the driving rules, driving routes, etc.</p>
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**Table 11.6.8 - Impact Assessment for ITF Development in the Station Area of High-Tech Park Station**

	<p><b>Outline of development plan:</b>                  A station plaza (3,500m<sup>2</sup>, on the eastern site of Hanoi Highway) is planned in addition to several small-scaled intermodal facilities at High-tech Park Station (motorbike parking areas under the railway viaduct, and bus stop, car stop, motorbike parking area on eastern side of Hanoi Highway). The station plaza is planned in an open area in front of the High-tech Park. Other intermodal facilities are planned within ROW of Hanoi Highway. Development of these facilities does not require acquisition of residential land.</p>
<p><b>Current natural and socio-economic conditions:</b>                  Average land elevation is 7.4m. There is no flood recorded in the area. Traffic flows are heavy around-the-clock on the adjacent roads. Ambient air quality has been already deteriorated. Within 300m range from the station, there is a densely-populated area in the west.</p>	
<p><b>Predicted potential impacts:</b></p>	<p><b>Proposed major impact mitigation measures</b></p>
<p><b>Air pollution:</b>                  Impacts caused by the construction and operation of the proposed intermodal facilities are considered insignificant in comparison with the current degrading ambient air quality.</p>	<p>Contractors should implement measures to reduce impacts of dust and exhausted gases, such as: build temporary walls around the construction sites; use construction equipment and vehicles which comply with the latest regulations on exhaust gas control; periodically inspect and maintain construction equipment and vehicles; periodically clean and water the project sites; use cover sheets for trucks carrying soil; etc</p>
<p><b>Water pollution:</b>                  Wastewater from construction activities may temporarily cause deterioration of water quality of the vicinities.</p>	<p>In construction phase, waste water generated from construction sites should not be discharged directly to drainage system or surrounding surface water bodies. Waste water should be settled and preliminarily treated before discharged, in accordance with Vietnam standards on waste water.</p>
<p><b>Wastes:</b>                  Solid wastes and sewage from the construction sites and from the station</p>	<p>Waste generated from the station plaza and parking lots should also be properly collected, treated, and disposed by authorized company in accordance</p>

plaza, parking areas, etc. may cause adverse impacts to localities.	with Ho Chi Minh City regulations.
<b>Noise and vibration:</b> Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause more adverse impacts to localities.	Contractors should bear efforts to reduce noise from the construction sites by installing the temporary walls around the construction sites, using construction machinery and vehicles which reduces noise and vibration. Construction machinery and vehicles should be periodically inspected and maintained to be able to use in best condition.
<b>Accidents, traffic congestion:</b> Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause more traffic congestion and accidents to localities.	During construction phase, construction vehicle operation plan should be appropriately made, and routes for construction vehicles should be properly planned to avoid concentration of machinery and vehicles in limited roads.  Drivers of vehicles bringing equipment and materials should be properly trained to ensure that they observe the driving rules, driving routes, etc.  In operation phase, in order to ensure easy accessibility to the station plaza and safety of pedestrians, the road network on western side of the station plaza should be improved, including the widening of these roads' pedestrian roadsides.

**Table 11.6.9 - Impact Assessment for ITF Development in the Station Area of Suoi Tien Station**

	<p><b>Outline of development plan:</b></p> <p>Until Phase 2, only small-scaled intermodal facilities are planned at Suoi Tien Station (motorbike parking areas under the railway viaduct, and bus stop, car stop, motorbike parking area on the eastern side of Nation Highway AH1). These intermodal facilities are planned within ROW of AH1, therefore development of these facilities does not require acquisition of residential land.</p>
<p><b>Current natural and socio-economic conditions:</b></p> <p>Average land elevation is 16.4m. There is no flood recorded in the area. Traffic flows are heavy around-the-clock on the adjacent roads. Ambient air quality has been already deteriorated. Within 300m range from the station, there is a relatively-populated area in the west.</p>	
<b>Predicted potential impacts:</b>	<b>Proposed major impact mitigation measures</b>
<p><b>Air pollution:</b></p> <p>Impacts caused by the construction and operation of the proposed intermodal facilities are considered insignificant in comparison with the current degrading ambient air quality.</p>	<p>Contractors should implement measures to reduce impacts of dust and exhausted gases, such as: build temporary walls around the construction sites; use construction equipment and vehicles which comply with the latest regulations on exhaust gas control; periodically inspect and maintain construction equipment and vehicles; periodically clean and water the project sites; use cover sheets for trucks carrying soil; etc</p>

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<p><b>Water pollution:</b>                  Wastewater from construction activities may temporarily cause deterioration of water quality of the vicinities.</p>	<p>In construction phase, waste water generated from construction sites should not be discharged directly to drainage system or surrounding surface water bodies. Waste water should be settled and preliminarily treated before discharged, in accordance with Vietnam standards on waste water.</p>
<p><b>Wastes:</b>                  Solid wastes and sewage from the construction sites and from the station plaza, parking areas, etc. may cause adverse impacts to localities.</p>	<p>Waste generated from the station plaza and parking lots should also be properly collected, treated, and disposed by authorized company in accordance with Ho Chi Minh City regulations.</p>
<p><b>Noise and vibration:</b>                  Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause more adverse impacts to localities.</p>	<p>Contractors should bear efforts to reduce noise from the construction sites by installing the temporary walls around the construction sites, using construction machinery and vehicles which reduces noise and vibration. Construction machinery and vehicles should be periodically inspected and maintained to be able to use in best condition.</p>
<p><b>Accidents, traffic congestion:</b>                  Construction machinery and transportation vehicles (during the construction phase), and increased traffic flow in-and-out the station plaza (in the operation phase) may cause more traffic congestion and accidents to localities.</p>	<p>During construction phase, construction vehicle operation plan should be appropriately made, and routes for construction vehicles should be properly planned to avoid concentration of machinery and vehicles in limited roads.                  Drivers of vehicles bringing equipment and materials should be properly trained to ensure that they observe the driving rules, driving routes, etc.                  In operation phase, in order to ensure easy accessibility to the station plaza and safety of pedestrians, the road network around the station plaza should be improved, including the widening of these roads' pedestrian roadsides.</p>

## 12 PROJECT EVALUATION

### 12.1 Economic Evaluation on Intermodal Facility Development

The economic evaluation is to determine whether a proposed public infrastructure project deserves an investment of public monies. The concept is to analyze if the return on a project is worth the investment from the viewpoint of the national economy based on the standpoint of the government. In this section, the project of intermodal facility (ITF) development proposed in Chapter 13 is evaluated to ascertain its economic viability based on the Economic Internal Rate of Return (EIRR) estimate by comparing the economic costs and benefits over the life of the project.

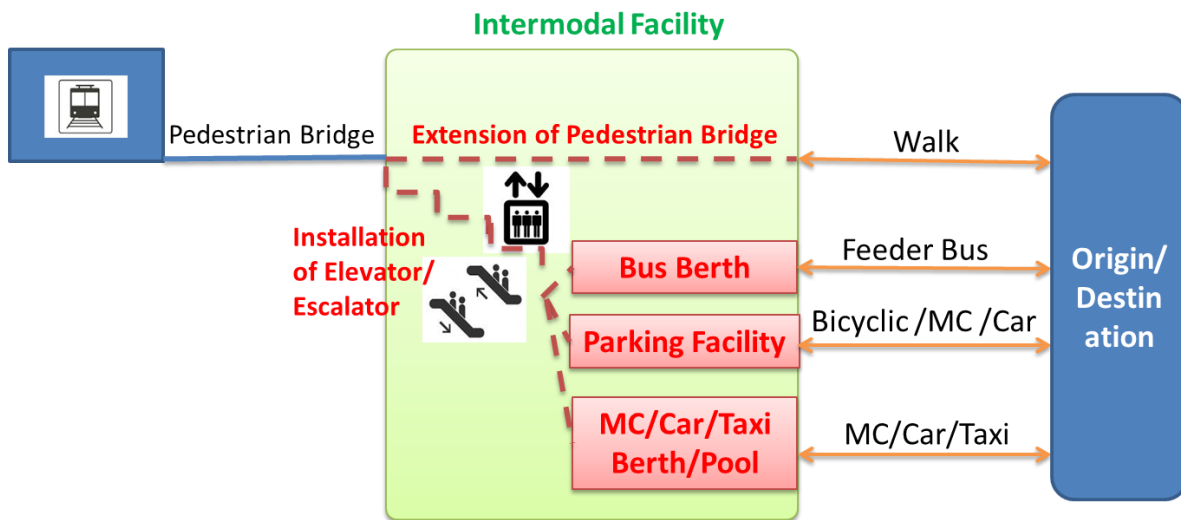
#### 1) Evaluation Method for Intermodal Facility Development

Methodology: The economic evaluation is conducted by following the prevailing method of cost-benefit analysis, in which the project costs and benefits are measured in economic price and compared through the project life. Basic assumptions are indicated as follows.

Economic Benefit Item to be analyzed: Economic benefit of the project is defined as the savings of Travel Time Costs (TTC) attributable to the project and Willingness to Pay (WTP) for the service improvement by the ITFs. TTC saving is the benefit directly provided to railway passengers and also comparatively easy to quantify. In addition to the time saving, the ITFs will improve safety, comfort and accessibility for disabled and elderly people at the station areas. However, it is not easy to measure the amount of such kind of benefits in quantities and therefore WTP is also selected as the benefit in terms of the safety, comfort and better accessibility of ITFs, which is generally used in Japan as well, although the amount is much smaller than TTC saving. The benefit is estimated using the "with-and without" comparison focusing on railway passenger behavior at the intermodal facility as well as their satisfaction of the facilities.

Passenger Behavior at the Intermodal Facilities: As mentioned above, the major economic benefit of the project is the TTC saving estimated based on the transfer behavior to the other transport modes at the intermodal facility. Passenger transfer behaviors are summarized in Figure 12.1.1 Development of intermodal facilities such as the extension of the pedestrian bridge, installation of elevators and escalators, provision of bus berths, taxi/car berths and pools and parking facilities is assumed to reduce the travel time of railway passengers. In this analysis, specifically, the following time savings are considered.

- 1) Car, motorcycle and bicycle parking: 3 minutes per person will be reduced because of the shortened distance from parking spaces to stations.
- 2) Facilities for pedestrians: 2 minutes per person will be reduced due to the pedestrian bridge, elevators and escalators.
- 3) Station Plaza: 3 minutes per person will be reduced since waiting time for bus stopping in front of a station is saved by development of bus berths.



Source: Study Team

**Figure 12.1.1 - Patterns of Railway Passenger Behavior at the Intermodal Facility**

Willingness to Pay of station users: As explained above, WTP for the development of the station plaza is considered as another benefit. In case of Japan, the rate of the WTP is set at 20 yen per person per one time. Based on the rate, 315 VND per person was estimated by comparing the average monthly income between Japan and Vietnam. The benefit includes improvements to safety, comfort and accessibility of facilities at the station areas.

Economic Cost Item to be analyzed: Economic cost is defined as a net consumption of goods and services for the implementation of the project. In order to estimate this economic cost of the project, the initial cost and the O&M cost in financial prices presented in Chapter 10 (10.3) of this report need to be converted to economic prices.

In this analysis, all the costs are classified into the items of 1) tradable goods, 2) non-tradable goods and 3) transfer items. It is assumed that tradable goods are equivalent to the foreign currency portion, and the aggregation of non-traded goods stands for the local currency portion. Transfer items mean the portion of taxes, which should be excluded from the economic price.

Items such as import duties cause a price differential between the domestic market and international market. The standard conversion factor is an index which converts domestic prices to border prices by adjustment of the distortion of domestic prices. The economic prices of the whole portion of non-tradable goods are assumed to be obtained by applying the standard conversion factor (SCF).

The SCF is estimated based on the value of imports, exports and taxes. According to the statistical data regarding foreign trade and governmental revenues in Vietnam and to compensate unclear figures on trading such as custom rates, the SCF for this project is assumed to be 0.86 as the conservative figure referring to the various feasibility studies conducted in Vietnam.

Other Assumptions:

In addition to the above-mentioned assumptions, the following are assumed in this analysis. Regarding the Project Implementation Scheme, two options are presented in Chapter 10 and determination of the scheme is under discussion. Therefore, in this section, Option 1 was temporarily adopted for economic analysis.

(1) Construction Period

Construction of ITFs is divided into two phases. Construction period of Phase 1 is five years from 2014 to 2018 including the design and tendering period and that of Phase 2 is two years from 2017 to 2018.

(2) Period of Analysis

The period of analysis is thirty years which includes the operations period from 2019 to 2048 after the completion of Phase 1. The operation period of Phase 2 is from 2019 to 2048.

(3) Project Life

The durable life of a transportation project is usually very long, namely 50 to 60 years if it is properly maintained. On the other hand, the economic project life is considered much shorter than the physical life, that is, around 30 years because the facility soon becomes outdated and uneconomical due to rapid innovation. Therefore the project life of the project is defined as 30 years and residual value was not considered

(4) Indicators of Economic Viability

The following three indicators were calculated for the economic evaluation of this project:

- + B/C (Benefit Cost Ratio)
- + Net Present Value (NPV)
- + EIRR (Economic Internal Rate of Return)

(5) Social Discount Rate:

As the opportunity cost of capital, 12% per annum was assumed as the social discount rate.

(6) Annual Maintenance Cost

As for the O&M cost of ITFs, 1% of construction cost of the project per year was assumed. US\$131,640 per year estimated in Chapter 9 was assumed for the O&M cost of the MC/bike and car parking as the financial cost.

(7) Exchange Rate

US\$1.00 = VND 21,036 on April 2014 was applied.

## 2) Economic Cost

**Construction Cost:** An initial estimate of project cost is discussed in Chapter 10 of this report. Table 12.1.1 summarizes the financial and economic costs of the intermodal facilities. The total economic cost is US\$32,072,000 which was converted from the financial cost by applying the SCF of 0.86. The investment schedule of the construction cost is presented in Table 12.1.2.

**Table 12.1.1 - Project Cost in Financial and Economic Prices**

Unit: 1,000 US\$

Item	Financial Price	Economic Price
<b>I Eligible Portion</b>	34,363	29,067
<b>1. Construction Cost</b>	32,261	27,191
<b>1-1. Construction Cost (Base Cost as of 2014)</b>	26,868	23,842
Phase 1:	22,433	19,959
Phase 2:	4,435	3,884
<b>1-2. Price Escalation of Construction Cost</b>	3,857	3,349
Phase 1:	3,176	2,760
Phase 2:	680	589
<b>1-3. Physical Contingency of Construction Cost</b>	1,536	0
Phase 1:	1,281	0
Phase 2:	255	0
<b>2. Design, Tendering and Supervision Cost</b>	2,038	1,876
Design, Tender Preparation & Tendering	740	681
Construction Supervision	1,298	1,194
<b>3. Interest during Construction</b>	64	0
<b>II. Counterpart Funds</b>	7,348	3,006
<b>1. Project Administration Cost of the Employer</b>	1,613	1,169
<b>2. Tax and VAT</b>	3,593	0
For Construction	3,398	0
For Construction Supervision	194	0
<b>3. Land Acquisition &amp; Compensation Cost</b>	1,732	1,490
<b>4. Front End Fee</b>	410	346
<b>Total</b>	41,711	32,072

Source: Study Team

**Table 12.1.2 - Investment Schedule in Economic Prices**

Unit: 1,000 US\$

Year	Phase 1	Phase 2
2014	347	0
2015	2,305	0
2016	409	0
2017	15,255	2,782
2018	9,227	1,691
2019	58	0

Source: Study Team

**O&M Expenses:** The O&M cost for intermodal facilities is shown in the following table. As explained above, the cost for the all of the ITFs and cost for parking is included in the O&M cost. The O&M cost for parking was converted into economic prices from the financial price by applying the SCF of 0.86.

**Table 12.1.3 - O&M Expenses for Intermodal Facilities per Year**

Unit: 1,000 US\$/year

Item	Phase 1	Phase 2
ITFs	389.23	44.73
Parking Facilities	113.20	-

Source: Study Team

### 3) Economic Benefit

**Value of Time (VOT):** The savings in passenger time cost is the main source of the economic benefit of this project. The following table presents the unit value of time estimated from the results of the Traffic Survey in this study.

**Table 12.1.4 - Unit Value of Time (VOT)**

Unit: US\$/hour

Year	VOT
2014 (current)	1.52
2018	1.77
2019	1.83
2020	1.90
2025	2.31
2040	4.22

Source: Study Team

**Estimation of Economic Benefits:** As explained in the previous section, economic benefits are composed of TTC saving and WTP for the development of the station plaza. With regards to TTC saving, the aggregated travel time cost was estimated by applying the above unit cost to the result of traffic demand by travel mode and summing the TTC. Economic benefits in terms of time savings is the difference of the aggregated costs between the "with project" case and the "without project" case. On the other hand, WTP was calculated based on the unit price of VND 315 per person and the number of station plaza users. The following table shows the economic benefits in the benchmark years.



**Table 12.1.5 - Economic Benefits in the Benchmark Years**

Year	Benefit from the Station Plaza		TTC Savings by Parking	TTC Savings by Pedestrian Bridge	Total
	WTP	Waiting Time Savings			
2019	764	1,002	1,659	344	3,769
2020	1,066	1,480	2,562	510	5,618
2040	2,143	9,808	11,610	3,661	27,222

Note: Benefit in 2019 was calculated based on traffic demand in 2018 and 2020.

Source: Study Team

#### 4) Cost Benefit Flow and EIRR

The following table shows the economic cash flow over the project period for calculating the economic internal rate of return (EIRR). The threshold value to judge the economic feasibility of a project is 12% in Vietnam. EIRR is 20.7%, which proved to be feasible from an economic viewpoint.

**Table 12.1.6 - Cash Flow of Economic Cost and Benefits**

Unit: 1,000 US\$

Year		Cost			Benefit	Net Cash Flow
		Investment Cost	O&M Cost	Total	Total	
	2014	347	0	347	0	-347
	2015	2,305	0	2,305	0	-2,305
	2016	409	0	409	0	-409
	2017	18,037	0	18,037	0	-18,037
0	2018	10,918	0	10,918	0	-10,918
1	2019	58	434	492	3,769	3,277
2	2020	0	434	434	5,618	5,184
3	2021	0	434	434	6,211	5,777
4	2022	0	434	434	6,866	6,432
5	2023	0	434	434	7,590	7,156
6	2024	0	434	434	8,391	7,957
7	2025	0	434	434	9,276	8,842
8	2026	0	434	434	9,966	9,532
9	2027	0	434	434	10,708	10,274
10	2028	0	434	434	11,505	11,071
11	2029	0	434	434	12,361	11,927
12	2030	0	434	434	13,280	12,847
13	2031	0	434	434	14,269	13,835
14	2032	0	434	434	15,330	14,897
15	2033	0	434	434	16,471	16,037
16	2034	0	434	434	17,697	17,263
17	2035	0	434	434	19,014	18,580
18	2036	0	434	434	20,429	19,995
19	2037	0	434	434	21,949	21,515
20	2038	0	434	434	23,582	23,148
21	2039	0	434	434	25,337	24,903
22	2040	0	434	434	27,222	26,788
23	2041	0	434	434	27,222	26,788
24	2042	0	434	434	27,222	26,788
25	2043	0	434	434	27,222	26,788
26	2044	0	434	434	27,222	26,788
27	2045	0	434	434	27,222	26,788
28	2046	0	434	434	27,222	26,788
29	2047	0	434	434	27,222	26,788
30	2048	0	434	434	27,222	26,788
Total		31,600	32,074	13,019	45,093	524,615
PV@12%		20,055	20,126	1,983	22,109	49,041

Source: Study Team

**Table 12.1.7 - Summary of the Cost Benefit Analysis**

Indicator	Value
EIRR	20.7%
B/C (at discounted rate of 12%)	2.22
NPV (1,000 US\$ at discounted rate of 12%)	26,932

Source: Study Team

5) **Sensitivity Analysis**

The sensitivity analysis was made by changing the projected cost and benefits. The range of changing the cost is between -10% and +20% and that of changing the benefits is between -20% and +10%.

The following table shows the result of the sensitivity analysis. The EIRR is still over 15% even in the worst case in which the cost increases by 20% and the benefit decreases by 20%.

**Table 12.1.8 - Sensitive Analysis by Changing the Cost and Benefits**

Changes in total cost \ Changes in total benefits	Changes in total cost				
	-10%	0%	+5%	+10%	+20%
+10%	23.5%	22.0%	21.3%	20.7%	19.6%
0%	22.1%	20.7%	20.0%	19.5%	18.4%
-5%	21.4%	20.0%	19.4%	18.8%	17.8%
-10%	20.7%	19.3%	18.7%	18.2%	17.2%
-20%	19.2%	17.9%	17.3%	16.8%	15.8%

Source: Study Team

## **12.2 Financial Evaluation for Intermodal Facility Development**

### **1) Methodology and Assumptions**

This section conducts a cash flow analysis to evaluate the project's financial viability. ITF development is expected to promote private investment in station areas and commercial facilities will be developed in the areas. Therefore it could be assumed that the collection of tenant fees from private companies is a major source of revenue of the operational company of the ITFs. In addition, parking fees will be counted as revenue. The evaluation indicator is the Financial Internal Rate of Return (FIRR) estimated by cash flow based on the revenues and financial costs of the ITFs. The following are basic assumptions of this analysis.

#### Basic Assumptions

Most assumptions are the same as those of the economic evaluation presented in 13.1 of this chapter. The difference is that cost and revenue are estimated in financial prices.

##### **(1) Construction Period**

Construction of ITFs is divided into two phases. Construction period of Phase 1 is five years from 2014 to 2018 including the design and tendering period and that of Phase 2 is two years from 2017 to 2018.

##### **(2) Period of Analysis**

The period of analysis is thirty years which includes the operational period from 2019 to 2048 after the completion of Phase 1. The operational period of Phase 2 is also from 2019 to 2048.

##### **(3) Social Discount Rate:**

As the opportunity cost of capital, 12% per annum was assumed as the social discount rate.

##### **(4) Project Cost**

As mentioned above, the project cost is composed of the construction cost and O&M cost. Construction cost for this analysis is summarized in the following table.

**Table 12.2.1 - Financial Cost of Construction**

Unit: 1,000 US\$

Item	Financial Price
<b>I Eligible Portion</b>	34,363
<b>1. Construction Cost</b>	32,261
<b>1-1. Construction Cost (Base Cost as of 2014)</b>	26,868
Phase 1:	22,433
Phase 2:	4,435
<b>1-2. Price Escalation of Construction Cost</b>	3,857
Phase 1:	3,176
Phase 2:	680
<b>1-3. Physical Contingency of Construction Cost</b>	1,536
Phase 1:	1,281
Phase 2:	255
<b>2. Design, Tendering and Supervision Cost</b>	2,038
Design, Tender Preparation & Tendering	740
Construction Supervision	1,298
<b>3. Interest during Construction</b>	64
<b>II. Counterpart Funds</b>	7,348
<b>1. Project Administration Cost of the Employer</b>	1,613
<b>2. Tax and VAT</b>	3,593
For Construction	3,398
For Construction Supervision	194
<b>3. Land Acquisition &amp; Compensation Cost</b>	1,732
<b>4. Front End Fee</b>	410
<b>Total</b>	41,711

Source: Study Team

Regarding the O&M cost per year, 1% of the construction cost of the project for all of the ITFs and US\$131,640 for the parking system were assumed.

#### (5) Revenue

As explained above, revenue comes from two sources: i) tenant fees and ii) parking fees.

##### i) Tenant fees

The unit price of the monthly tenant fee is set as US\$30/m<sup>2</sup> based on information on the current average price from real estate. The unit price is assumed to be kept at the same rate in the future. Occupancy rate is assumed to be 90%.

##### ii) Parking fees

Parking fees are set as follows based on the regulation of parking fees in Ho Chi Minh City (Decision No. 32/2012/QD-UBND) and WTP from the result of the Traffic Survey in this study. Table 12.2.2 summarizes the fees by traffic mode.

**Table 12.2.2 - Parking Fee by Mode**

Unit: VND

	City Center	Suburbs
Motorcycle	5,000	3,000
Bicycle	2,000	1,000
Car	6,0000	45,000

Note: Rate for the city center is applied to Van Than Park and Tan Cang stations.

Source: Study Team

Total revenue in benchmark years is presented in the following table.

**Table 12.2.3 - Total Revenues**

Unit: 1,000 US\$

	Parking Fees	Tenant Fees
2018	3.12	1,588
2020	8.46	1,588
2040	12.16	1,588

Source: Study Team

(6) Exchange Rate

US\$1.00 = VND 21,036 on April 2014 was applied.

2) Evaluation Result

The cash flow analysis show that the FIRR is -3.1% and the project is not financially feasible when the construction cost is included. This is because revenue from fees is not large enough compared with a large amount of the project cost. Therefore, from the financial point of view, public money should be utilized for the construction of ITFs. However, total revenue is much larger than the O&M cost as shown in Table 12.2.4

**Table 12.2.4 - Comparison of O&M Costs and Revenues**

Unit: 1,000 US\$

	O&M Cost	Revenues		
		Parking Fees	Tenant Fees	Total
2018	548	3.12	1,588	1591.12
2019	548	5.06	1,588	1593.06
2020	548	8.46	1,588	1596.46
2040	548	12.16	1,588	1600.16

Source: Study Team

## 12.3 Project Effects along the HCMC UMRT Line 1 Corridor

### 1) Project Effects from the Macro Perspective Analysis

The effects of development of intermodal facilities are thought to include positive impacts on road transport along the HCMC UMRT Line 1 corridor in addition to direct effects for station users which are defined as beneficiaries in 12.1. In particular, the project is assumed to contribute to improvements in accessibility or mitigation of traffic congestion and thus it would be desirable to conduct an economic analysis of the project which is a kind of transport project from the macro perspective of traffic improvement.

### 2) Methodology and Assumptions

Cost-benefit analysis is conducted to determine the economic feasibility of the project which is the same method of economic evaluation carried out in 12.1 of this chapter. In this case, the project includes both ITFs and feeder bus development which are expected to increase the ridership of railway passengers. Assumptions are basically the same as the economic evaluation in 12.1 but the difference from the analysis conducted above is the definition of project cost and economic benefit.

#### Cost

In addition to the project cost of ITFs presented in 12.1, the project cost of the feeder bus development is included since this case assumes that the feeder bus is a part of the project. For this analysis, the financial cost of the feeder bus was converted to economic prices using the SCF which was defined as 0.86 in 12.1. The following tables indicate the financial and economic costs of the ITFs and feeder bus development. The O&M cost was estimated based on the actual cost of existing bus routes.

**Table 12.3.1 - Total Financial and Economic Cost of Feeder Bus Development**

Unit: 1,000 US\$

Items	Financial Cost	Economic Cost
Capital Cost (Bus vehicles and bus stops)	48,683	46,709
Renewal Cost	50,788	49,370
O&M Cost	361,024	329,291
Total	460,495	425,371

Source: Study Team

**Table 12.3.2 - Investment Cost by Item**

Unit: 1,000 US\$

Item	Financial Price	Economic Price
<b>I Eligible Portion</b>	34,363	29,067
<b>1. Construction Cost</b>	32,261	27,191
<b>1-1. Construction Cost (Base Cost as of 2014)</b>	26,868	23,842
Phase 1:	22,433	19,959
Phase 2:	4,435	3,884
<b>1-2. Price Escalation of Construction Cost</b>	3,857	3,349
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Construction Supervision	1,298	1,194
<b>3. Interest during Construction</b>	64	0
<b>II. Counterpart Funds</b>	7,348	3,006
<b>1. Project Administration Cost of the Employer</b>	1,613	1,169
<b>2. Tax and VAT</b>	3,593	0
For Construction	3,398	0
For Construction Supervision	194	0
<b>3. Land Acquisition &amp; Compensation Cost</b>	1,732	1,490
<b>4. Front End Fee</b>	410	346
<b>Total</b>	41,711	32,072

Source: Study Team

### Benefit

In this analysis, the TTC and VOC savings are considered as benefits on the assumption that the project contributes to an improvement of accessibility in the targeted areas as transport projects usually do. The VOC unit used in this analysis was computed based on the VOC unit estimated in JICA's "Study for the Formulation of High Speed Railway Projects on Hanoi–Vinh and Ho Chi Minh–Nha Trang Sections (NSHSR)" and the PCU calculated from the Traffic Survey of this study. The TTC for this analysis was estimated by using the Value of Time calculated in JICA's "Comprehensive Study on the Sustainable Development of Transport System in Vietnam (VITRANSS 2)" and the PCU computed in this study.



**Table 12.3.3 - Unit of VOC by Vehicle Type (Economic Price)**

Unit: US\$/1000km/PCU

Speed (km/h)	Standard Bus	Motorcycle	Bike Taxi	Car	Taxi	Small Truck
5	609	565	3,551	562	1,570	536
10	360	334	1,823	323	825	297
20	233	214	956	200	449	176
30	193	173	657	158	323	133
40	170	151	519	137	259	115
50	171	141	434	126	222	104
60	185	141	383	124	203	100
70	206	145	351	126	192	97
80	229	152	331	131	188	99
90	250	164	320	139	188	104

Source: Study Team and NSHSR Study Team

**Table 12.3.4 - Unit of TTC by Vehicle Type in 2014 (Economic Price)**

Unit: US\$/hour/PCU

	Public	Motorcycle	Car	Truck	LRT
TTC	11.93	13.27	5.17	2.03	11.93

Source: Study Team and Vitranss 2 Study Team

**Table 12.3.5 - Total VOC and TTC Comparison by With and Without Cases in Benchmark Years**

Unit: 1,000 US\$

	2018		2020		2040	
	With	Without	With	Without	With	Without
VOC	3,023,165	3,027,624	3,545,386	3,548,763	9,470,927	9,486,006
TTC	4,093,458	4,100,918	4,863,837	4,868,944	43,955,289	43,993,551

Source: Study Team

**Table 12.3.6 - Total Benefits in the Benchmark Years**

Unit: 1,000 US\$

	2018	2020	2040
VOC Saving	4,459	3,377	15,079
TTC Saving	7,460	5,107	38,262
Total Benefit	13,937	10,504	55,381

Source: Study Team

### Other Assumptions

#### (1) Construction Period

Construction of ITFs is divided into two phases. The construction period of Phase 1 is five years from 2014 to 2018 including the design and tendering period and that of Phase 2 is two years from 2017 to 2018. Regarding the feeder bus development, the project will start in 2017 and the operation is assumed to commence in 2018 as per Chapter 9. However, the ITF development project is scheduled to start operations in 2019 and this analysis focuses on the impact from the ITF development. Therefore, the operation of feeder bus is assumed to start in 2019 in this sub-section.

#### (2) Period of Analysis

The period of analysis is thirty years which includes the operations period from 2019 to 2048 after completion of Phase 1. The operations period of Phase 2 is from 2019 to 2048.

#### 3) Evaluation Result

The following table shows the economic cash flow over the project period for calculating the economic internal rate of return (EIRR). The EIRR is 12.6% and B/C is 1.03 which reveals that the project is economically feasible from the macro perspective of road traffic condition improvement.

**Table 12.3.7 - Cash Flow of the Economic Cost and Benefits**

Unit: 1,000 US\$

Year	Cost						Benefit	Net Cash Flow
	Investment Cost		Renewal Cost	O&M Cost		Total	Total	
	ITFs	Feeder bus	Feeder bus	ITFs	Feeder bus			
2014	347	0	0	0	0	347	0	-347
2015	2,305	0	0	0	0	2,305	0	-2,305
2016	409	0	0	0	0	409	0	-409
2017	18,037	10,317	0	0	0	28,354	0	-28,354
2018	10,918	0	0	0	4,869	15,787	0	-15,787
1 2019	58	0	0	434	4,869	5,361	10,056	4,695
2 2020	0	4,375	0	434	7,764	12,572	8,484	-4,089
3 2021	0	0	0	434	7,764	8,198	9,301	1,103
4 2022	0	0	0	434	7,764	8,198	10,196	1,999
5 2023	0	0	0	434	7,764	8,198	11,178	2,980
6 2024	0	0	0	434	7,764	8,198	12,254	4,057
7 2025	0	5,039	0	434	8,833	14,306	13,434	-872
8 2026	0	0	0	434	8,833	9,267	14,728	5,460
9 2027	0	0	0	434	8,833	9,267	16,146	6,879
10 2028	0	0	0	434	8,833	9,267	17,700	8,433
11 2029	0	0	0	434	8,833	9,267	19,404	10,137
12 2030	0	6,442	10,317	434	10,191	27,384	21,273	-6,111
13 2031	0	0	0	434	10,191	10,625	23,321	12,696
14 2032	0	0	4,375	434	10,191	15,000	25,567	10,567
15 2033	0	0	0	434	10,191	10,625	28,028	17,404
16 2034	0	0	0	434	10,191	10,625	30,727	20,102
17 2035	0	8,506	0	434	11,929	20,869	33,686	12,816
18 2036	0	0	0	434	11,929	12,363	36,929	24,566
19 2037	0	0	5,039	434	11,929	17,402	40,485	23,083
20 2038	0	0	0	434	11,929	12,363	44,383	32,020
21 2039	0	0	0	434	11,929	12,363	48,656	36,293
22 2040	0	12,030	0	434	15,746	28,210	53,341	25,131
23 2041	0	0	0	434	15,746	16,180	53,341	37,161
24 2042	0	0	16,759	434	15,746	32,939	53,341	20,402
25 2043	0	0	0	434	15,746	16,180	53,341	37,161
26 2044	0	0	4,375	434	15,746	20,555	53,341	32,786
27 2045	0	0	0	434	15,746	16,180	53,341	37,161
28 2046	0	0	0	434	15,746	16,180	53,341	37,161
29 2047	0	0	8,506	434	15,746	24,686	53,341	28,655
30 2048	0	0	0	434	15,746	16,180	53,341	37,161
Total	32,074	46,709	49,370	13,019	345,038	486,209	956,006	469,797
PV@12%	20,126	12,034	3,280	1,983	42,941	80,364	83,132	2,767

Source: Study Team

**Table 12.3.8 - Summary of the Cost Benefit Analysis**

Indicator	Value
EIRR	12.6%
B/C (at discounted rate of 12%)	1.03
NPV (1,000 US\$ at discounted rate of 12%)	2,767

Source: Study Team

#### 4) Conclusion

This analysis aimed to evaluate the rationality of the investment in the project from the macro perspective of the road traffic condition improvement along the HCMC UMRT Line 1 corridor on the assumption that beneficiaries are extended to local people living along HCMC UMRT Line 1 corridor in addition to railway station users. The result of the analysis shows that the project deserves public investment even though the additional cost of the feeder bus development is required. Therefore it would be fair to say that the intermodal development project is expected to generate a larger impact with economic rationality if it is planned integrated with the feeder bus development.