

The Project on Integrated UMRT and Urban Development for Hanoi in Vietnam

FINAL REPORT

Summary



January 2011



ALMEC Corporation

Nippon Koei Co., Ltd



H A N O I

Japan International Cooperation Agency
Hanoi People's Committee

**THE PROJECT
ON INTEGRATED UMRT
AND URBAN DEVELOPMENT FOR
HANOI
IN THE SOCIALIST REPUBLIC OF
VIETNAM**

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1 US\$ = 19,738 VND

PREFACE

In response to the request from the Government of the Socialist Republic of Vietnam, the Government of Japan decided to conduct the Project on Integrated UMRT and Urban Development for Hanoi in Vietnam and entrusted to the project to the Japan International Cooperation Agency (JICA).

JICA dispatched a team to Vietnam between February 2009 and January 2011, which was headed by Dr. IWATA Shizuo of ALMEC Corporation and consisted of ALMEC Corporation and Nippon Koei Co., Ltd.

In the cooperation with the Vietnamese counterparts, the Team conducted the study. It also held a series of discussions with the relevant officials of the Government of Vietnam. Upon returning to Japan, the Team duly finalized the project and delivered this report.

I hope that this report will contribute to the sustainable urban development integrated UMRT of Hanoi Capital City and to the enhancement of friendly relations between the two countries.

Finally, I wish to express my sincere appreciation to the officials of the Government of Vietnam for their close cooperation.

January 2011

Kiyofumi KONISHI
Director General,
Economic Infrastructure Department,
Japan International Cooperation Agency

January 2011

Kiyofumi KONISHI
Director General,
Economic Infrastructure Department,
Japan International Cooperation Agency
Tokyo, Japan

Subject: Letter of Transmittal

Dear Sir,

We are pleased to formally submit herewith the final report of the Project on Integrated UMRT and Urban Development for Hanoi in Vietnam.

This report compiles the results of the project which was undertaken both in Vietnam and Japan from February 2009 to January 2011 by the Team comprising ALMEC Corporation and Nippon Koei Co. Ltd.

We owe a lot to many people for the accomplishment of this report. First, we would like to express our sincere appreciation and deep gratitude to all those who extended their extensive assistance and cooperation to the Team, in particular Hanoi People's Committee, Departments of Hanoi People's Committee, railway developers of UMRT Line1 and Line2.

We also acknowledge the officials of your agency for their support and valuable advice in the course of the Project.

We hope the report would contribute to the sustainable urban development integrated UMRT of Hanoi Capital City.

Very truly yours,

IWATA Shizuo
Team Leader
Project on Integrated UMRT and Urban Development for Hanoi in Vietnam
(HAIMUD)

Location Map of UMRT Lines in Hanoi City



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ABBREVIATIONS

AQ	Ancient Quarter
B/C	Benefit per Cost
BCR	Building Coverage Ratio
BIDV	Bank of Investment and Development of Vietnam
BRT	Bus Rapid Transit
CAT	City Air Terminal
CBD	Central Business District
DOC	Department of Construction
DOCST	Department of Culture, Sports and Tourism
DOF	Department of Finance
DONRE	Department of Natural Resource and Environment
DOT	Department of Transport
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
FAR	Floor Area Ratio
F/S	Feasibility Study
GOV	Government of Vietnam
HAIDEP	The Comprehensive Urban Development Programme in Hanoi Capital City of the Socialist Republic of Vietnam
HAPI	Hanoi Authority for Planning and Investment
HAUPA	Hanoi Authority for Urban Planning and Architecture
HPC	Hanoi People's Committee
HRB	Hanoi Metropolitan Rail Transport Project Board
IEE	Initial Environmental Examination
IRR	Internal Rate of Return
ITF	Intermodal Transfer Facility
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
KTT	<i>Khu Tap Te</i> (public apartment complex)
LEP	Law on Environmental Protection
LR	Land Readjustment
MOC	Ministry of Construction
MOCST	Ministry of Culture, Sports and Tourism
MOF	Ministry of Finance
MONRE	Ministry of Natural Resource and Environment
MOT	Ministry of Transport
MPI	Ministry of Planning and Investment
NGO	Nongovernmental Organization
NH	National Highway
NPV	Net Present Value
ODA	Official Development Assistance
PFI	Private Finance Initiative
PMU	Project Management Unit
PPP	Public-Private Partnership
PTA	Public Transport Authority
ROW	Right of Way
RR	Ring Road
SAD	Special Assessment District
SEA	Strategic Environmental Assessment
SEDP	Socio-Economic Development Plan
SOE	State-Owned Enterprise
TEDI	Transport Engineering Design Inc.
TIF	Tax Incremental Financing
TRAMOC	Hanoi Transport Management and Operation Center
TOD	Transit-Oriented Development
UMRT	Urban Mass Rail Transit
UR	Urban Redevelopment
VNR	Vietnam Railway Corporation

EXECUTIVE SUMMARY

1 INTRODUCTION

1) Background and Objectives

1. Hanoi, as the capital city of Vietnam, is embarking on the development of several urban mass rail transit (UMRT) lines that will mitigate future traffic congestion, re-shape its landscape, guide its future growth, and support its vision of a sustainable and “green” metropolis. However, Hanoi has no previous experience in handling a near-simultaneous implementation of several rail lines, much less a single metro project. Hence, this project is meant to assist the city in the complex preparation for these metro projects to ensure proper integration of these lines and among them, the existing road transportation system, and urban development.

2. This project intends to prepare concrete strategies and programs on the integrated development of the Phase 1 sections of the UMRT Line 1 and Line 2, which are already in the implementation pipeline, to maximize the benefits of both UMRT and urban development, thereby creating a new model for urban development in cities. The specific objectives of this project are as follows:

- (i) To formulate development plans and implementation strategies for UMRT station-related facilities, and
- (ii) To propose the development concept and framework for the adjoining areas of UMRT stations and areas along UMRT Line 1 and Line 2.

2) Coverage

3. This project covers the entire UMRT stations of Line 1 and Line 2, although the main focus are the stations for Phase 1 of both lines (see Table1.1 and Figure1.1).

4. It should be noted that in the feasibility study report for Phase 2 of Line 2, which was prepared by the HRB and TEDI-South, another station was added, i.e., the Kim Lien Station between Bach Khoa and Chua Boc stations.

5. The name of “Den Ngoc Son Station” of C9-Line2, which was used during most of the period of this JICA Project, was replaced to the name of “Hoan Kiem Lake Station”, based on the Chairman’s instruction at the Draft Final Report Steering Committee which was held on 22nd September 2010.

6. Based on the discussion conclusion by HPC and MOT on 17th November 2010, the location of Nam Cau Long Bien Station (V6) is selected to be located near to Hang Dau Station (C8), and Phung Hung Station (V7) was removed because this station is too near to Nam Cau Long Bien Station (V6). Finally, the total number of UMRT stations to 31.

Table 1 Profile of the Planned UMRT Stations

Name of UMRT Station		Feasibility Study ¹		JICA Project Team Proposal		Structure	Phase	Interchange with		
		Length (km)	Interval (km)	Length (km)	Interval (km)			VNR	UMRT	BRT
UMRT Line 1	V1. Yen Vien ²	0.0	0.0	0.0	-0.1	Ground	2			
	V2. Cau Duong ²	1.7	1.7	2.2	2.1	Elevated	2	●		
	V3. Duc Giang	3.7	2.0	3.6	1.5	Elevated	2			
	V4. Gia Lam ²	5.4	1.7	5.3	1.7	Ground	1	●		L4
	V5. Bac Cau Long Bien ²	6.8	1.4	6.9	1.6	Elevated	1			
	V6. Nam Cau Long Bien ²	8.8	2.0	9.4	2.5	Elevated	1		L2	
	V7. Phung Hung ²	9.7	4.1	10.0	0.6	Elevated	4			
	V8. Hanoi ²	10.9	1.2	11.4	1.4	Elevated	1	●	L3	●
	V9. C.V. Thong Nhat ²	12.5	1.6	12.9	1.5	Elevated	1		L2	●
	V10. B.V. Back Mai	13.4	0.9	13.8	0.9	Elevated	1			●
	V11. Phuong Liet	14.3	0.9	14.7	0.9	Elevated	1			●
	V12. Giap Bat ²	15.8	1.5	16.3	1.6	Elevated	1	●		L4/●
	V13. Hoang Liet ²	18.3	2.5	18.5	2.2	Elevated	2			
	V14. Van Dien	19.7	1.4	19.6	1.1	Elevated	2			
	V15. Vinh Quynh ²	21.1	1.4	21.0	1.4	Elevated	2			
	V16. Ngoc Hoi	23.7	2.8	23.8	2.8	Ground	2			
UMRT Line 2	C1. Nam Thang Long	0.0	0.0	0.0	0.0	Elevated	1			
	C2. Ngoai Giao Doan	0.9	0.9	0.9	0.9	Elevated	1			
	C3. Tay Ho Tay ²	2.1	1.2	1.7	0.8	Elevated	1		L4	
	C4. Bui	3.6	1.5	3.4	1.7	Underground	1			
	C5. Quang Ngua	5.2	1.6	5.1	1.7	Underground	1		L5	
	C6. Bach Thao	6.4	1.2	6.4	1.3	Underground	1			
	C7. Ho Tay	7.3	0.9	7.1	0.7	Underground	1			
	C8. Hang Dau	8.3	1.0	8.2	1.1	Underground	1	●	L1	
	C9. Hoan Kiem Lake ²	9.8	1.5	9.7	1.5	Underground	1			●
	C10. Tran Hung Dao	10.9	1.1	10.9	1.2	Underground	1		L3	●
	C11. Cau Den	11.8	0.9	11.9	1.0	Underground	2			●
	C12. Bach Khoa	13.0	1.2	13.1	1.2	Underground	2	●	L1	●
	C13. Kim Lien ²	-	-	13.8	0.7	Underground	2			
	C13. Chua Boc ²	14.4	1.4	14.6	0.8	Underground	2			
	C14. Nga Tu So	15.9	1.5	15.9	1.3	Underground	2			
C15. Thuong Dinh	16.8	0.9	16.8	0.9	Underground	2		L2A	L4	

¹ Sourced from the "Feasibility Study for Ha Noi Urban Railway Construction Line 1 (Section: Yen Vien – Ha Noi – Ngoc Hoi) 2008, and Line 2 (Section: Nam Thang Long – Tran Hung Dao)," HRB and TEDI South, 2008.

² Location of stations proposed to be adjusted by this JICA project, to which the Steering Committee agreed (see Draft Final Report Part 1 Chapter 4 for details).

Figure 1 Location of UMRT Network and Project Lines (Line 1 and Line 2)



Source: JICA Project Team

2 PROJECT RATIONALE

1) Introduction of TOD Concept to Promote Sustainable Urban Growth and Development

7. Hanoi has one of the highest urban densities in the world, i.e., 272 persons per hectare in the urbanized districts and 404 in the central Hoan Kiem district, compared with 86 in Paris, 62 in London, and 370 in Hong Kong. It is a kind of density normally associated with the new concept of urbanism called transit-oriented development (TOD), and explains the current short lengths (<7 km) of commuter trips. This has been an accidental twist in its development history, albeit advantageous. However, with increasing incomes and changing lifestyles, at the same time pushed by cramped conditions in the urban core and pulled by modern residential complexes emerging on the outskirts of Hanoi, there is a move toward suburban living.

8. The challenge for Hanoi is to revitalize the old districts into well-designed residential areas in close proximity to good public transportation and with convenient access to a mix of retail and personal services, as well as health and recreational facilities. Inner-city infill sites can offer an ideal setting to promote TOD, but this requires strong political commitment to establish a development-style enterprise that can perform land re-adjustment activities and rebuild around the planned UMRT stations which offer a focal point for communities whose immediate needs can be provided locally (see Table 2).

9. The UMRT is the key driver to the realization of TOD. A decision to implement the three rail lines and the bus rail transit (BRT) is a clear demonstration of the Hanoi People's Committee (HPC) to create a public-transportation-oriented city. The long-term direction is a public transportation system with three hierarchical components, viz.: (i) a high-capacity urban mass transit system composed of rail and BRT; (ii) an intermediate capacity system composed of primary and secondary bus routes; and, (iii) a supplementary system with small vehicles operated by the private sector. While the UMRT is expected to form the transportation backbone of the city, buses will remain to be the most important road-based public transportation mode even in the future, providing services in areas not covered by the UMRT or providing feeder services to it.

10. The TOD concept must and can be applied in different types of urban areas where different interventions become necessary (see Table 2).

Table 2 Urban Development Orientation for UMRT Corridors in Hanoi

Item	Urban Center	Urban Center Fringe	Suburban / Peri-urban
Development Concept	<ul style="list-style-type: none"> Attractive urban center environment and pedestrian-friendly Capital and international commercial/business and tourism center with convenient facilities 	<ul style="list-style-type: none"> Modern urban core /node formulation and pedestrian-friendly Competitive commercial/business urban cores with convenient facilities 	<ul style="list-style-type: none"> Attractive urban center environment and pedestrian-friendly Competitive commercial/business center with convenient facilities
Urban Form	Urban district development integrated with transit stations	Conurbation formed by urban core/node development thru improved transfers	Single urban-core development
Land Use & Density	Commercial/Business and high-density mixed-use development	Higher-density development along transit stations through commercial/business and mixed-use development	C+M and high-density mixed-use development in urban core with transit stations
Road network	High-density collector and distributor roads with pedestrian network	Medium-density arterial, collector, distributor road network	Not dense arterial, collector, distributor road network
Feeder Services	Walkway network linked with stations in combination with paratransit services	Linked services between intermodal transfer facilities (ITF) and other modes (bus, taxi, bike)	Feeder services by ITF and station-based bus services

Source: JICA Project Team

2) UMRT Transit Corridor Formulation and Integration

11. UMRT Line 1 and Line 2 have been set in Hanoi City where both lines cover various urban land uses from the CBD to suburban and rural areas. Different land uses at station areas require an adequate development approach to fit socio-economic activities and people's mobility, while the two lines are expected to encourage in formulating and managing a "UMRT Transit Corridor" development in an integrated manner.

12. Integration of different UMRT lines is critical in order to maximize the convenience of UMRT users and ridership. Because the integration of stations of different lines is crucial, this project places utmost attention to formulating adequate plans for the areas where different lines intersect.

13. The integration of the entire public transportation system—UMRT, BRT, and buses—in Hanoi is key to achieving a higher modal share. Without proper integration, the same total daily trips would end up merely being divided between the buses and UMRT with both rail and bus being worse off. With an integrated operation, the two modes can cover a wider area of the metropolis, with both benefiting from sharing a bigger market than if they compete with each other. Also, wider coverage improves accessibility and mobility of residents, and reduces cost and inconvenience at transfer points.

3) Opinions and Willingness of Citizens to Use UMRT

14. The Household Interview Survey and Facility User Survey were conducted from June to August 2009 in order to validate data on present trip characteristics and assess their probable shifts when the UMRT becomes operational. The former focused on residents, while the latter survey included non-residents (such as employees, customers, and students) who had their own reasons for being in the area. HIS had respondents within a 1000-meter radius of the stations, while the Facility User survey was limited to a 500-meter radius. The Household Interview Survey netted 2,056 households, with 6,059 samples, and the Facility User Interview Survey covered 257 facilities, with 1,325 samples. Major opinions about, expectations from, and willingness to use the UMRT are as follows:

- (a) **Increasing Concern with Motorcycle Use due to Worsening Air Quality and Traffic Safety:** In terms of transportation environment at present, most people use motorbikes rather than buses. Many are concerned about air pollution and traffic congestion. In addition, people who live east of Hanoi (Long Bien and Gia Lam districts) have fewer opportunities to go to urban centers because of the long distances and traffic congestion on the Chuong Duong Bridge.
- (b) **Willingness to Use UMRT:** More than 90% of interviewees expect to use the UMRT in the future. They perceived it as modern, convenient, and safe. Current motorbike users would prefer to walk to the stations.
- (c) **Easy Access to the UMRT:** The main reason for people shunning the UMRT is the attachment of people to motorbikes especially in providing direct access from home to destination and in relation to the inconvenience of transferring to other modes. Improved walkways and convenient transfer facilities would tend to overcome the negative factors.
- (d) **Improved Accessibility to the Ancient Quarter:** UMRT stations in the urban center, especially Hoan Kiem Lake Station, could become more popular as a destination in their own right. At present, many non-residents go the Ancient Quarter cultural

exposure it being a historic CBD and also for employment. Without as yet an operating UMRT, the public expectation is that it would be different from the current situation of the Nam Cau Long Bien Station where traffic congestion frequently occurs due to the nearby market and road intersections, resulting in general disorder.

- (e) **New Commercial/Socioeconomic Activity Centers at and around UMRT Stations:** Other popular stations, such as Hanoi, Gia Lam, and Giap Bat, appear to have the potential of pulling in more users due to their function as regional centers of urban services and transportation hub for other areas. Many more commuters from the surrounding areas of Hanoi and neighboring provinces will go to these stations, once more varied commercial services are provided. Thus, these stations could grow beyond their current function as transportation hubs to full-fledged commercial and business centers in suburban areas.
- (f) **Harmonization with Local Socioeconomy and Urban Design:** While there is an expectation and desire for new urban services to become available at and around the UMRT stations, there is also a preference for the nonconversion of present land uses. For example, many hospitals and universities are clustered around Bach Mai station; hence, walkways and parking improvements are expected to enhance these facilities. In the case of stations near West Lake, an open space is desired. Stations (such as Hoan Kiem Lake and C.V. Thong Nhat) near popular parks have to be designed to suit recreational activities.

4) UMRT Ridership and Modal Share

15. Taking into account the results of traffic demand analysis as well as of proposed concept plans for the UMRT and integrated urban development, the JICA Project Team re-adjusted and estimated the future ridership of the: (i) base case which was estimated based on HAIDEP (without integrated urban development), and (ii) with integrated urban development of station areas (see Table 3 and Table 4).

16. The total ridership with an integrated urban development was estimated taking account of new-road construction and new, land uses around station areas as proposed in the concept plans. Based on the results of the interview survey, most potential station users living within 500 m of stations would prefer to walk, and users beyond walking distances will use bus as a feeder service, that is, if walking and bus conditions will improve. So modal share will be converted from motorbikes at present to walking and public transportation in the future.

17. As for modal share to access UMRT Line 1 stations, walking and bus obtained more than 30% each. Accessibility by foot and convenience of buses and UMRT transfers are prioritized than the development of parking spaces, especially in the CBD. In the case of UMRT Line 2, since most of its stations will be located under trunk roads, interchanges with buses and other UMRT lines are priority concerns.

Table 3 Estimated Total Ridership and Modal Share of UMRT Line 1 in 2020 (without Phung Hung Station, V7)

UMRT Line1 Station		(a) Base Case	(b) With Integrated Urban Development							
			Total	by Mode						
				Walking	Bicycle	Motorbike	Car	Bus	VNR	UMRT
V1	Yen Vien	32,500	37,000	16,800	400	4,500	2,400	12,800	100	0
V2	Cau Duong	32,900	37,400	14,300	400	8,300	4,700	9,800	0	0
V3	Duc Giang	7,500	10,900	4,600	200	2,800	1,100	2,200	0	0
V4	Gia Lam	42,000	50,900	24,000	400	2,400	3,600	20,300	100	0
V5	Bac Cau Long Bien	3,900	4,600	2,100	200	400	200	1,800	0	0
V6	Nam Cau Long Bien	48,200	53,300	7,900	200	9,300	5,200	23,800	0	7,000
V7	Phung Hung	7,800	0	0	0	0	0	0	0	0
V8	Hanoi	44,100	57,100	24,100	100	7,700	3,200	10,400	1,700	9,800
V9	C.V. Thong Nhat	30,700	32,800	6,200	400	4,400	2,500	5,000	0	14,200
V10	B.V. Bach Mai	12,800	7,500	3,300	100	1,500	600	2,000	0	0
V11	Phuong Liet	100	4,200	1,100	100	1,000	300	1,800	0	0
V12	Giap Bat	18,100	20,400	9,000	300	1,500	600	9,000	0	0
V13	Hoang Liet	7,800	12,800	6,100	100	2,300	1,000	3,200	0	0
V14	Van Dien	600	11,300	3,300	200	2,500	1,100	4,200	0	0
V15	Vinh Quynh	18,600	15,900	3,700	400	2,200	1,700	7,800	0	0
V16	Ngoc Hoi	29,600	34,200	7,300	600	8,700	4,900	12,700	0	0
Total	(number)	337,200	390,200	134,600	3,900	59,900	33,000	126,200	2,000	30,500
	(%)	-	100.0	34.5	1.0	15.4	8.5	32.3	0.5	7.8

Note: Phung Hung Station (V7) was removed based on conclusion by HPC and MOT on 17th November 2010.

Source: JICA Project Team

Table 4 Estimated Total Ridership and Modal Share of UMRT Line 2 in 2020

UMRT Line 2 Station		Base Case	Case with Integrated Urban Development						
			Total	Mode					
				Walking	Bicycle	Motorbike	Car	Bus	UMRT
C1	Nam Thang Long	39,480	83,790	4,090	320	2,600	1,930	74,840	0
C2	Ngoai Giao Doan	3,890	8,440	5,310	470	1,680	940	40	0
C3	Tay Ho Tay	13,930	25,710	3,110	190	920	770	0	20,740
C4	Buoi	11,890	21,660	3,200	180	2,530	1,170	14,570	0
C5	Quan Ngua	10,470	16,790	2,360	350	2,260	1,530	3,700	6,590
C6	Bach Thao	5,970	11,680	3,450	380	2,500	1,310	4,040	0
C7	Ho Tay	6,130	10,620	1,670	460	1,850	820	5,810	0
C8	Hang Dau	36,100	71,720	2,140	270	1,160	590	32,010	35,550
C9	Hoan Kiem Lake	3,310	6,170	3,180	1,110	1,470	410	0	0
C10	Tran Hung Dao	11,310	19,420	2,220	670	970	360	11,410	3,790
C11	Cau Den	7,020	11,430	1,020	310	1,190	490	8,420	0
C12	Bach Khoa	13,170	24,300	1,840	360	1,620	770	2,770	16,950
C13	Kim Lien	4,600	8,260	3,660	730	2,190	730	950	0
C14	Chua Boc	4,610	7,450	2,720	470	2,290	1,540	440	0
C15	Nga Tu So	4,030	6,380	1,430	160	710	430	3,650	0
C16	Thuong Dinh	8,010	17,580	520	120	790	540	870	14,740
Total	(number)	317,800	351,410	41,910	6,550	26,740	14,340	163,520	98,350
	(%)	-	100.0	11.9	1.9	7.6	4.1	46.5	28.0

Source: JICA Project Team

3 LOCATIONS OF UMRT STATIONS AND THEIR ALIGNMENTS

18. All locations of the stations and some alignments were reviewed by several criteria in terms of appropriate formulation of station area development shown in below.

- (i) Effective transferability to promote ridership by smooth and convenient connection between Line 1 station and other UMRT Lines and stations
- (ii) Promotion of effective station area development to contribute to “Transit Oriented Development” maximizing opportunities for urban service development in the station area
- (iii) Mitigation of negative development impacts by station location

19. Taking into consideration of these criteria, JICA Project Team proposed appropriate station locations to maximize UMRT utilization and land value of station surrounding area. After prolonged discussion with stakeholders, some of station locations and alignments are readjusted from Feasibility Study, particularly as follows:

- (i) To preserve landscape of Long Bien Bridge and improve accessibility between Line 1 and Line 2 stations (Nam Cau Long Bien and Hang Dau) in Ancient Quarter, a new alignment which is 186m-north from the existing Long Bien Bridge. Nam Cau Long Bien Station (V6) is selected to be located near to Hang Dau Station (C8) for convenient accessibility between two stations and for future development potential of the Ancient Quarter.
- (ii) To improve accessibility between Line 1 (Hanoi) and Line3 stations, it is proposed to adjust station locations. It is also preferable to develop a new trunk road extending Tran Hung Dao Street toward west. It is proposed to preserve the original Hanoi Station by moving to another block and reuse as a cultural and historical facility.
- (iii) To mitigate negative impacts of cultural and environmental aspects to Ngoc Son Temple, HPC concluded to move to south-bound, after consultation with Ministry of Culture, Sports and Tourism and HRB. In addition, the original name was “Den Ngoc Son Station”, but it was renamed to “Hoan Kiem Lake Station”.

20. All locations of the stations and some alignments were reviewed using several criteria in terms of appropriate formulation of station area development shown in Table 5 and Table 6.

Table 5 Issues and Proposed Locations of 15 Stations of UMRT Line 1

UMRT L1 Station	Station Development Issues of Planned Location and Alignment			Interval		Length and direction for adjustment from F/S
	Effective Transferability	Promotion of Station Area Urban Development	Mitigation of Negative Development Impact	Original	Proposed	
V1. Yen Vien	--	Promotion of north side agriculture land utilization	Necessary village improvement in front of the station	0.0	-0.1	135 (e) / 5 (n)
V2. Cau Duong	--	--	--	1.7	2.1	260 (s)
V3. Duc Giang	--	--	--	2.0	1.5	--
V4. Gia Lam	--	--	--	1.7	1.7	45 (e)
V5. Bac Cau Long Bien	Planned road accessibility	Coordination with Ngoc Thuy New Town development	Conservation of Ancient Quarter and Long Bien Bridge	1.4	1.6	175 (n) / 140 (w)
V6. Nam Cau Long Bien	Connection with C8 (Hang Dau) Line 2 Station	Promotion of attractiveness of Ancient Quarter and Long Bien Bridge environment		2.0	2.5	90 (s) / 350 (w)
V7. Phung Hung	--	--	--	1.1	0.6	40 (s)
V8. Hanoi	Connection with Line3 Station	New Urban Core as one of Hanoi gateways	Appropriate conservation of present Hanoi Station	1.2	1.4	205 (s) / 30 (w)
V9. C.V.Thong Nhat	Connection with C12 (Bach)	Attractive open space as one	--	1.6	1.5	60 (s)

Source: JICA Project Team

UMRT L1 Station	Station Development Issues of Planned Location and Alignment			Interval		Length and direction for adjustment from F/S
	Effective Transferability	Promotion of Station Area Urban Development	Mitigation of Negative Development Impact	Original	Proposed	
	Khoa) Line 2 Station	of important intersections				
V10. B.V.Back Mai	--	--	--	0.9	0.9	--
V11. Phuong Liet	--	--	--	0.9	0.9	--
V12. Giap Bat	Connection with Phia Nam Bus Terminal	Harmonizing proposed new urban development (Doi Dam)	--	1.5	1.6	135 (s) / 65 (w)
V13. Hoang Liet	--	Harmonizing proposed new urban development	Keeping settlements in front of planned station at a distance	2.5	2.2	170 (n)
V14. Van Dien	--	--	--	1.4	1.1	--
V15. Vinh Quynh	--	Harmonizing proposed new urban development (Doi Dam)	Keeping villages in front of planned station at a distance	1.4	1.4	60 (s)
V16. Ngoc Hoi	Connection with High Speed Railway Station	(Harmonizing proposed new urban development)	--	2.8	2.8	--

Source: JICA Project Team

Note: (n) north, (s) south, (e) east, (w) west

Table 6 Issues and Proposed Locations of 16 Stations of UMRT Line 2

UMRT Line 2 Station	Station Development Issues of Planned Location and Alignment			Remarks Proposed	Interval		Length & direction for adjustment from F/S
	Effective Transferability	Promotion of Station Area Urban Dev't	Mitigation of Negative Development Impact		Original	Proposed	
C1. Nam Thang Long	Connection with proposed parking area	--	--	--	0.0	0.0	--
C2. Ngoai Giao Doan	--	Harmonizing planned new urban development	Integration with existing urban development plan	Coordination with urban development project (under construction)	1.0	0.9	--
C3. Tay Ho Tay	Connection with Line4 (BRT) station and proposed CAT	Harmonizing planned new urban development	Integration with existing urban development plan	Coordination with urban development project	0.9	0.8	100 (n)
C4. Bui	Connection with planned road intersection	--	--	--	1.6	1.7	--
C5. Quang Ngua	Connection with Line5 terminal station	--	--	Coordination with planned major road (Hoang Hoa Tham-Thuy Khe)	1.7	1.7	--
C6. Bach Thao	--	--	--		1.3	1.3	--
C7. Ho Tay	--	Issue of Central Political Facilities (presidential house)development plan	--		0.7	0.7	--
C8. Hang Dau	Connection with V6 (Nam Cau Long Bien)	Harmonizing Hang Dau Park development	--	--	1.1	1.1	--
C9. Hoan Kiem Lake	Connection with Bo Ho bus interchange	Harmonizing planned redevelopment in the Electricity Company	Minimize negative impacts on Ngoc Son Temple, Hoan Kiem Lake	--	1.5	1.5	60 (s)
C10. Tran Hung Dao	Connection with Line3 station	--	--	Feasibility Study of Phase2 has been implemented by HRB and TEDI-South. Kim Lien station is newly added.	1.0	1.2	--
C11. Cau Den	--	--	--		1.0	1.0	--
C12. Bach Khoa	Connection with Line 1 V9 (C.V.Thong Nhat)	--	--		1.2	1.2	--
C13. Kim Lien	--	Integration with urban redevelopment of Kim Lien KTT	--		-	0.7	--
C13. Chua Boc	--	--	--		1.4	0.8	200 (w)
C14. Nga Tu So	--	Harmonizing Market redevelopment project	--		1.5	1.3	--
C15. Thuong Dinh	Connection with Line 2A station	--	--		0.9	0.9	--

Source: JICA Project Team

Note: (n) north, (s) south, (e) east, (w) west

4 PROPOSED CONCEPT PLANS

21. The concept plan aims to propose the overall development orientation of station and station area development. It includes short- and long-term plans, thereby ensuring integrated development on several levels and at various phases. In the proposed concept plan for the UMRT, such plans are proposed for the 31 stations¹ (see Table 7), taking into account the following:

- (i) Physical development and improvement to secure accessibility to stations and smooth transfers between stations;
- (ii) Urban development and improvement to improve living conditions and promote potentials for socio-economic development and cultural preservation;
- (iii) Management and operation to integrate with other UMRT lines and public transportation services and operating systems; and,
- (iv) Zoning regulations to manage urban growth.

Table 7 Components of Integrated Development of Station Areas

Category	Component	Example of Facility and Service
1 Physical Development and Improvement	a. Access road improvement and development	<ul style="list-style-type: none"> • Access roads around stations (for bus, taxi, car, MC) • Distributor roads and community roads improvement (e.g., pavement, lighting, signboard, etc.)
	b. Intermodal transfer facility development	<ul style="list-style-type: none"> • Large/medium multipurpose facilities, inter-city bus terminals, city air terminals, stop stations only (bus, taxi, xe-om)
	c. Parking development	<ul style="list-style-type: none"> • Ground parking area, parking buildings, underground parking
	d. Walkway network development	<ul style="list-style-type: none"> • Sidewalks, pedestrian mall, footbridge, pedestrian deck, pedestrian underground, underpass
2 Urban Development and Improvement	a. Development of public amenities	<ul style="list-style-type: none"> • Open space for resting, waiting, toilet, police box, information booth, town symbol / landmark facilities
	b. Urban core activity development	<ul style="list-style-type: none"> • New business & commercial, cultural amenity node, public/administration service provision
	c. Commercial and business promotion	<ul style="list-style-type: none"> • New retail shops, civic service business • New hotel and amusement facilities • Office building including public services
	d. Housing and residential area development	<ul style="list-style-type: none"> • High-rise housing and condominiums • Medium and low-rise housing areas
	e. Living conditions area improvement	<ul style="list-style-type: none"> • Urban renewal by road and infrastructure • Area infrastructure and utilities improvement
3 Management & Operation	a. Transportation management	<ul style="list-style-type: none"> • Major feeder bus route services and bus stops • Area feeder (para-transit) vehicle services • Area traffic control and management
	b. Service improvement	<ul style="list-style-type: none"> • Common ticketing system • Design code of signboards
4 Zoning Regulations to Manage Urban Growth	a. Development control	<ul style="list-style-type: none"> • Natural hazard protection • Historical conservation • High-rise building construction • Underground development
	b. Consistency with land use plan	<ul style="list-style-type: none"> • Commercial and business • Residential / mixed use • Other uses (public, education, utility), Desirable density
	c. Urban design considerations	<ul style="list-style-type: none"> • Urban landmarks • Decent and harmony in design with existing area

Source: JICA Project Team

¹ Actual total number of stations is 31 stations. In the main text of this Final Report, the concept plan of Phung Hung Station (V7) is kept for reference, though this station is removed.

22. UMRT Line 1 and Line 2 will be operated covering various areas, such as the CBD most of which is built-up and urbanized, peri-urban areas which is becoming congested due to rapid urbanization, and suburban areas which lacks accessibility to urban services and where residents have poor mobility. In the CBD, it is expected that socio-economic activities around the station would be promoted, while in peri-urban areas, the expectation is reduced traffic congestion and more comfortable commute and daily activities. Railway development in suburban areas will have much effect on land use conversion from rural to urban, promotion of urban development activities, and promotion of settlements in new towns, among others.

23. The concept plans indicated development concepts, future land uses, and projects to embody integrated development. In addition, development phasing based on time and feasibility is proposed, so it would be easy to understand the minimum requirements for UMRT development and operation. Also included are recommended projects for integrated urban and UMRT development in station areas. The concept plans are proposed on the basis of the following hierarchy of urban center functions: (i) urban center core (CBD), (ii) sub center in urban center fringe, (iii) urban core in urban center fringe, (iv) key urban core in suburban/peri-urban area, and (v) urban core in suburban/ peri-urban area.

24. It is expected that the concept plans will be reflected in the new Hanoi City master plan. The development of a UMRT network will usher in a public-transportation-oriented city and promote urban development activities. But an integrated urban and UMRT development will play a significant role in the achievement of the vision for Hanoi City, which is “a compact city with water, green and culture,” as was proposed in HAIDEP.

5 INITIAL ENVIRONMENTAL EXAMINATION OF THE PROJECT

25. Results of the preliminary environmental scoping (shown in Table 8 and Table 9) done by the project should be reviewed and revised after discussions with stakeholders, relevant agencies, etc. Further, detailed scoping should be carried out for selected priority station areas after the relevant development plans have been formulated.

Table 8 Results of Environmental Examination of Line 1 Stations

Aspect	Station No. and Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
		Yen Vien	Cau Duong	Giang Cau	Duc Lam	Gia Lam	Bac Cau Longien	Long Cau	Hung Cau	Phung Hai Noi	Thong vien	Bach Mai	Phuong Liet	Giap Bat	Hoang Liet	Van Dien	Quynh Vinh	Ngoc Hol
1. Socio-economic Environment																		
a. Involuntary resettlement		A	B	B	A	A	A	A	A	A	B	B	B	B	B	-	B	
b. Local economy e.g., employment and livelihood		C	C	C	C	C	C	C	C	C	-	C	C	C	C	C	C	B
c. Land use and use of local resources		B	C	C	B	B	C	C	C	C	-	C	C	C	C	C	C	B
d. Split of communities		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C
e. Existing social infrastructures, services		-	-	C	C	-	A	C	C	-	C	-	-	-	-	-	-	
f. Poor, ethnic people		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
g. Maldistribution of benefits and damages		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	-
h. Cultural heritage		-	-	-	-	-	B	C	C	-	-	-	-	-	-	-	-	
i. Local conflicts of interests		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	-
j. Water use or water rights and rights of common		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
k. Sanitation		A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B
l. Hazards (risk), infectious diseases such as HIV/AIDS		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
2. Natural Environment																		
a. Topography and geography		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
b. Groundwater		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
c. Soil erosion		-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-
d. Hydrological situation		B	-	-	-	-	-	-	-	-	-	-	B	-	-	-	-	B
e. Coastal zone (mangroves, coral reefs, tidal flats, etc.)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
f. Flora, fauna and biodiversity		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
g. Meteorology		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
h. Landscape		-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	-	-
i. Global warming		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Pollution																		
a. Air pollution		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B
b. Water pollution		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B
c. Soil contamination		A	A	A	B	B	A	A	A	A	A	A	A	A	A	A	B	B
d. Waste (including waste soil)		A	A	A	B	B	A	A	A	A	A	A	A	A	A	A	B	B
e. Noise and vibration		B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
f. Ground subsidence		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
g. Offensive odor		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
h. Bottom sediment		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
i. Accidents, traffic congestion		B	B	B	B	B	B	B	A	A	A	A	A	A	A	A	B	B
j. Radio wave interference		B	B	B	B	B	B	B	A	B	A	B	B	B	B	B	-	-
k. Sunshine shading		-	B	B	-	A	A	A	A	A	A	A	B	B	B	B	-	-

Source: JICA Project Team

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 9 Results of Initial Environmental Examination of Line 2 Stations

Aspect	Station No. and Name															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Nam Thang Long	Ngocai Giao Doan	Tay Ho Tay	Buoi	Quan Ngua	Bach Thao	Ho Tay	Hang Dau	Ngoc Son	Tran Hung Dao	Cau Den	Bach Khoa	Kim Lien	Chua Boc	Nga Tu So	Thuong Dinh
1. Socio-economic Environment																
a. Involuntary resettlement	B	-	-	-	B	B	B	B	-	A	C	-	-	A	A	A
b. Local economy e.g., employment and livelihood	C	-	-	C	C	C	C	C	C	C	C	C	C	C	C	C
c. Land use and use of local resources	C	C	C	C	C	C	-	C	C	C	C	C	C	C	C	C
d. Split of communities	B	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
e. Existing social infrastructures and services	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
f. Poor, ethnic people	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
g. Maldistribution of benefits and damages	C	-	-	C	C	C	C	C	C	C	C	C	C	C	C	C
h. Cultural heritage	-	-	-	C	-	-	C	B	C	-	-	-	-	C	C	-
i. Local conflicts of interests	C	-	-	C	C	C	C	C	C	C	C	C	C	C	C	C
j. Water use or water rights and rights of common	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
k. Sanitation	B	-	-	B	B	B	B	B	B	B	B	B	C	B	B	B
l. Hazards (risk), infectious diseases such as HIV/AIDS	B	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B
2. Natural Environment																
a. Topography and geography	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
b. Groundwater	-	-	-	B	B	B	B	B	A	A	A	A	B	A	A	B
c. Soil erosion	-	-	C	B	B	B	B	B	A	A	A	A	B	B	B	B
d. Hydrological situation	-	-	-	-	-	-	-	-	A	-	-	B	-	-	-	-
e. Coastal zone (mangroves, coral reefs, tidal flats, etc.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
f. Flora, fauna and biodiversity	-	-	-	-	-	-	B	B	A	-	-	B	-	-	-	-
g. Meteorology	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
h. Landscape	C	C	-	-	-	-	B	B	B	-	-	-	-	-	-	-
i. Global warming	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Pollution																
a. Air pollution	B	B	B	B	B	B	A	A	A	A	A	B	B	B	B	B
b. Water pollution	B	B	B	B	A	A	A	A	A	A	A	A	B	A	A	B
c. Soil contamination	B	B	B	B	B	B	A	A	A	A	A	A	B	A	A	B
d. Waste (including waste soil)	B	B	B	A	A	A	A	A	A	A	A	A	A	A	A	B
e. Noise and vibration	B	-	-	B	B	B	B	B	B	B	B	B	B	B	B	B
f. Ground subsidence	-	-	-	B	A	A	A	A	A	A	A	B	B	A	A	B
g. Offensive odor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
h. Bottom sediment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
i. Accidents, traffic congestion	A	-	-	A	A	A	A	A	A	A	A	B	A	A	A	A
j. Radio wave interference	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
k. Sunshine shading	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: JICA Project Team

Note A: serious negative impact is expected;
C: extent of impact is unknown, further study is needed;

B: negative impact is expected to some extent;
- : limited impact/negligible impact

6 PROPOSED DETAILED PLANS

26. Detailed planning focuses on further studies of integrated station area development of Line 1 and Line 2, taking account of developing feasible projects and examining typical examples of integrated development. Specifically, detailed plans:

- (i) Consolidate proposed concept plans and prepare implementation measures and cost estimates;
- (ii) Develop plans in detail in terms of level of study scale (1:1,000) and project implementation (cost estimates, implementation measures and program); and,
- (iii) Examine applicable planning models and implementation methods of integrated station area development.

27. In January 2010, the Urban Planning Law was enforced. The spirit of the law is to regulate the urban planning system which plans, implements, and controls urban development activities through feasible approaches. Control of land use and urban development activities will be specified under the Zone Plan, which covers urban planning areas of neighboring administrative boundaries. In addition, new urban planning concepts such as urban design, strategic environmental assessment (SEA), public consultation, etc. are also applied in the system using specific methods and indicators.

28. In this project, in line with the trend of changes in the urban planning system of Vietnam, detailed planning was conducted for five (5) station areas for seven (7) stations: (i) Gia Lam Station of Line 1, (ii) Nam Cau Long Bien Station of Line 1 and Hang Dau Station of Line 2, (iii) Hanoi Station of Line 1, (iv) C.V. Thong Nhat Station of Line 1 and Bach Khoa Station of Line 2, and (v) Hoan Kiem Lake Station of Line 2. Priority stations were selected based on several criteria, such as (i) potential for urban development, (ii) accessibility to stations, (iii) interchange functions, and (iv) necessity of socio-environmental considerations, etc.

29. For detailed planning, the following were carefully considered: (i) to improve accessibility to stations and convenience of transfer to another UMRT line and public transportation, (ii) to promote socio-economic activities to maximize land potential around UMRT stations, (iii) to harmonize with local characteristics and values, and strengthen the respective local identities of UMRT stations, (iv) to propose appropriate implementation approaches and measures through which Hanoi City, the private sector, and the public can be motivated to participate. Financial analyses were also conducted of various project packages for each priority station area development which can be carried out through public-private partnership (PPP) schemes and/or assessed to be financially implementable with private sector participation.

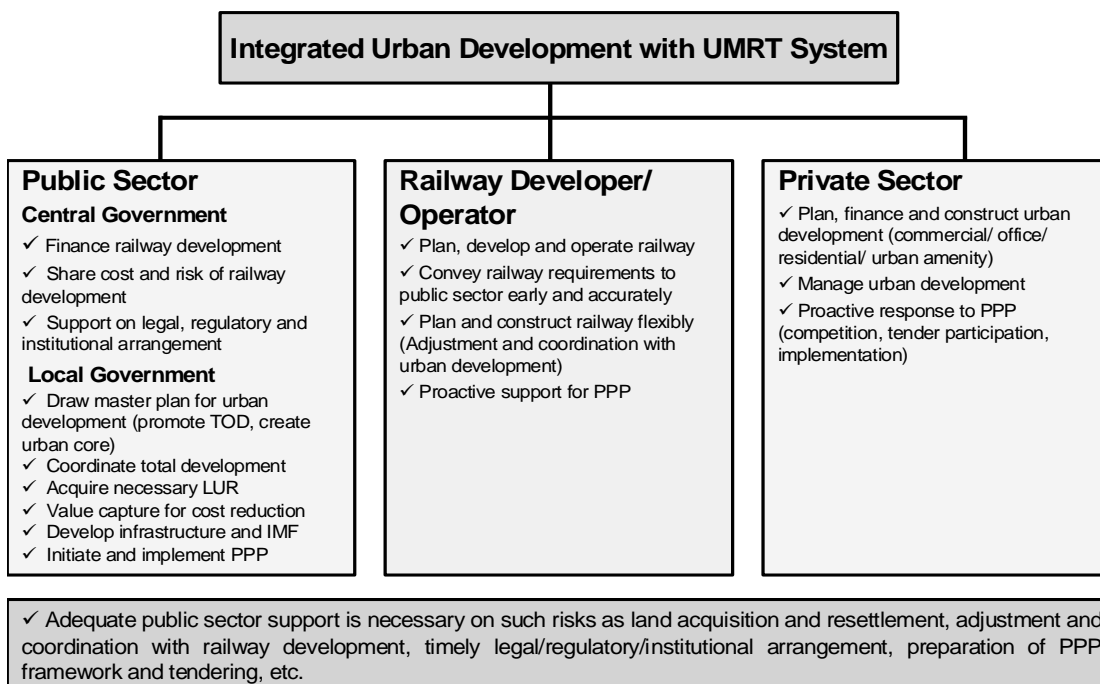
7 PROPOSED PROJECT IMPLEMENTATION MECHANISM

30. Based on a review of present conditions, appropriate implementation measures were proposed, which can be carried out under the present system, or using new approaches. As new legal and institutional mechanisms to implementing the proposed urban development that is integrated with UMRT systems, land readjustment and urban redevelopment systems are proposed in order to cope with complicated land-use rights conversion and resettlement issues in densely populated urban areas.

31. Project implementation mechanisms are proposed including phasing, project packaging, responsibility and risk sharing among major stakeholders (HPC, VNR, private sector and community) (see Figure 2), PPP schemes, and financing mechanisms. In addition, a coordination mechanism among public sector entities is essential. Integrated urban development with UMRT systems is more than a transportation development project which can promote urban and socio-economic development, as well as the preservation of culture and the environment. To implement a significant multisectoral project for Hanoi City, role sharing and coordination among public sector entities is inevitable. Furthermore, public participation, especially of the local community, should be promoted. With better understanding of the need to improve and preserve present conditions, and the future impact of an integrated UMRT and urban development, people will actively use and take advantage of the UMRT systems and the ensuing urban developments.

32. Preparation and implementation procedures are also proposed which include formulation of a zone plan, establishment of special zones and designation system, establishment of a Special Unit for Integrated Urban Development under the HPC, establishment of a project management unit (PMU) for each station area, and formulation of guidelines for the integrated urban development of UMRT station areas.

Figure 2 Responsibility and Risk Sharing among Major Stakeholders



Source: JICA Project Team

8 CONCLUSION, RECOMMENDATIONS AND NEXT STEPS

1) Conclusion

(1) UMRT Development and Integrated Urban Development to Facilitate the Transit-oriented Development of Hanoi City

33. This JICA project aims to propose a transit-oriented development (TOD) for Hanoi City by introducing conceptual planning for and methodologies of an urban development integrated with the development of UMRT systems in densely populated urban environments.

34. The concept of TOD, which introduces: (i) fast, frequent, reliable, and comfortable transit services; (ii) intensive and efficient land use along the UMRT corridor; (iii) hierarchical transportation mode; (iv) pedestrian- and UMRT-user-oriented urban development; and (v) structured UMRT corridor development, will generate the following benefits for Hanoi City.

35. The integrated urban development with UMRT systems based on this TOD concept, along with the growth in the number of UMRT lines in the future, will have significant effects on the urban structure of Hanoi City. The formation of multiple urban centers (sub-CBDs) along the UMRT corridors will bring about large and sustainable impact on the growth of Hanoi's urban economy by continuously integrating the urban development of more than a hundred UMRT station areas on the city's extensive UMRT network in the future, as experienced in Tokyo.

(2) Development Plan for 31 Station Areas for UMRT Line 1 and Line 2 to Promote Development of Structured UMRT Corridors

36. UMRT Line 1 and Line 2 will cover various areas, such as the CBD which is mostly built-up and urbanized, peri-urban areas which are rapidly urbanizing and becoming increasingly congested, and suburban areas where mobility and accessibility to urban services have been difficult. In the CBD, the UMRT is expected to promote socio-economic activities around the stations, and in peri-urban areas, it is expected to reduce traffic congestion and make commuting and daily activities comfortable for people. Railway development in suburban areas will have much effect on land-use conversion from rural to urban, promotion of urban development activities, promotion of settlements in new town, and others.

37. This JICA project proposed concept plans for 31 stations of UMRT Line 1 and Line 2. The plans indicate development concepts, future land use, and projects that will reflect an integrated development concept. In addition, development phasing based on time and feasibility is proposed to more easily understand the necessary projects toward UMRT development and operation, and recommended projects for integrated urban development at railway station vicinities.

38. It is expected that the concept plans for 31 stations will be reflected in the new Hanoi City Master Plan. The formulation of the UMRT network will enable the development of a public-transportation-oriented city and promote urban development activities. UMRT development will play a significant role in achieving the vision for Hanoi City, which is that of becoming "a compact city with water, green and culture," which was proposed in HAIDEP.

(3) Proposed Detailed Plans for Priority Station Area Developments deemed Implementable

39. In January 2010, the Urban Planning Law was enforced. The spirit of the law aims to regulate the urban planning system which plans, implements, and controls urban development activities with feasible approaches. Land use and urban development activities will be specified under the Zone Plan, which covers urban planning areas of neighboring administrative boundaries. In addition, new concepts for urban planning, such as urban design, Strategic Environmental Assessment (SEA), and public consultation, are also included in the system with specific methods and indicators.

40. In this project, in line with the trend of changes in the urban planning system of Vietnam, detailed planning was conducted covering five (5) station areas covering seven (7) stations: (i) Gia Lam Station of Line 1, (ii) Nam Cau Long Bien Station of Line 1 and Hang Dau Station of Line 2, (iii) Hanoi Station of Line 1, (iv) C.V. Thong Nhat Station of Line 1 and Bach Khoa Station of Line 2, and (v) Hoan Kiem Lake Station of Line 2. Priority stations were selected based on several criteria, such as: (i) potential for urban development, (ii) accessibility to station(s), (iii) interchange function, and (iv) necessity of socio-environmental consideration, etc.

41. For detailed planning, the following were carefully considered: (i) to improve accessibility to station(s) and convenience of transfer to another UMRT line and public transport, (ii) to promote socio-economic activities to maximize land potential around UMRT station(s), (iii) to harmonize with local characteristics and values, as well as promote the identity of each UMRT station, (iv) to propose appropriate implementation approaches and measures, in which Hanoi City, the private sector, and citizens can be motivated to involve themselves. Financial analyses were also conducted for various project packages for each priority station area development on the basis of public-private partnership (PPP) schemes and assessed to be financially implementable with private sector participation.

(4) Proposed Implementation Mechanisms deemed Feasible and Effective based on Participatory Approach and PPP

42. Based on a review of the present conditions, appropriate implementation measures were proposed, which can be implemented under the present system, or using new approaches. As new legal and institutional mechanisms to implement the proposed urban development integrated with UMRT systems, the land readjustment (LR) and urban redevelopment (UR) systems are proposed in order to cope with complicated land-use rights conversion and resettlement issues in densely populated urban areas.

43. Project implementation mechanisms include phasing, project packaging, responsibility and risk sharing among major stakeholders (HPC, VNR, private sector, and community), PPP schemes, and financing mechanism. In addition, coordination within the public sector is essential. Urban development integrated with UMRT systems is more than a transport development project which can promote urban development, socio-economic development, and preservation of culture and environment. To implement a significant multisectoral project for Hanoi City, role sharing and coordination in the public sector is inevitable. Furthermore, public participation, especially of the local community, should be promoted. With a better understanding of the need to improve present conditions and of the future impact of an integrated UMRT and urban development, people will actively use

and take advantage of the UMRT systems and associated urban development.

44. A preparation and implementation procedure is proposed which includes the formulation of a zone plan, establishment of special zones and designation systems, establishment of an Integrated Urban Development Project Management Department under the HPC, establishment of a project management unit (PMU) for each station area, and the formulation of guidelines on an integrated urban development in UMRT station areas.

2) Recommendations

(1) Establishment of a Special Unit on Integrated Urban Development

45. The impact of implementing a transit-oriented development and an integrated urban and UMRT development at station areas on the formation of Hanoi's urban structure and on the sustainability of the city's economic growth will be very significant for Hanoi City, as illustrated in the previous chapter. To effectively plan, implement, and manage such development, therefore, it is proposed that a special unit be established under the HPC to work on the integrated urban and UMRT development of all UMRT station areas in the future.

46. This special unit should coordinate with related departments, government bodies, and citizens, especially with VNR, HRB, and the future Public Transport Authority which are and will be responsible for developing and managing UMRT systems. The formation and involvement of this special unit should be concurrent with the construction of the UMRT system because coordinated planning and physical development are essential to achieving the integration of UMRT and urban development.

47. This special unit should be established as soon as possible together with the following institutional arrangements:

- (i) Formulation of zone plans to reflect the concept plans for integrated urban and UMRT development at UMRT station areas;
- (ii) Establishment of special zones and designation of each UMRT station area;
- (iii) Establishment of a PMU for each station area to implement integrated urban development and necessary PPP projects; and,
- (iv) Formulation of guidelines for integrated urban and UMRT development at UMRT station areas.

(2) Implementation of Minimum Development Projects

48. Minimum development projects refer to those which must be readily available when the UMRT lines commence operations to ensure smooth access to the stations through different types of transportation modes, especially walking and public transportation. Without these projects, users will encounter difficulties in accessing the stations.

49. After this JICA project, the Hanoi city government and railway implementation bodies (i.e., VNR and HRB) are encouraged to continue discussing and coordinating with each other to implement the proposed minimum projects (e.g., station entrance space, intermodal facility, station access roads, etc.) till the UMRT starts operation in 2017. The detailed design of UMRT Line 1 has been carried out. It has not been clarified whether

ODA would cover the construction of station-related facilities such as intermodal transfer facilities, parking spaces, and station access roads. For UMRT Line 2 for which the Hanoi city government is the implementing body, it is recommended that not only stations and railways be planned and constructed using ODA, but related facilities as well.

50. For the effective implementation of proposed projects in this JICA project, as proposed in Chapter 7 of Part II, coordination should be conducted as soon as possible. While these proposals, of which there are many, will be reflected in the new Hanoi City Master Plan which is under preparation, “the master plan for integrated UMRT and urban development” (tentative) should be planned and approved by the government as a legally binding plan. In this process, not only the Hanoi city government, but also local governments and private entities engaged in urban development, would be involved.

(3) Implementation of Pilot Projects

51. To establish effective implementation methods, such as land readjustment projects, urban redevelopment projects as well as financial mechanism including PPP scheme, the implementation of pilot projects for a selected station area is proposed. The proposed projects and station areas for piloting are as follows:

- i) Accessibility improvement with verification of small-scale land readjustment project: Cau Duong Station (V2), Duc Giang Station (V3), and Quan Ngua Station (V5), and
- ii) Intermodal transfer facility development and integrated urban development with verification of large-scale urban redevelopment and land readjustment projects: Nam Cau Long Bien Station (V6) and Hang Dau Station (C8), Hanoi Station (V8), C.V. Thong Nhat Station (V9) and Bach Khoa Station (C12), and Tay Ho Tay Station (C3)

52. Since each station area development package above covers various development elements and will offer essential experience in developing other station areas on the UMRT Line 1 and Line 2, only the minimum and short-term projects are proposed for implementation as pilot project packages.

53. Special zones should likewise be designated for this entire development and all possible resources should be tapped to implement this pilot project package which will include procurement of technical assistance and long-term, low-interest concessional finance from bilateral and multilateral financial institutions, as well as the preparation of possible PPP schemes to solicit the participation of national and international investors from Japan, USA, Europe, and other parts of Asia.

(4) Formulation of a Development Plan on Common Interline Transfer Facilities and Operating System

54. While five (5) UMRT lines have been planned, there are no authorities and integrated plans to integrate these UMRT lines. If nothing is done, there will be many physical barriers and inconveniences to users when transferring between lines. If there are common pedestrian underground paths and decks as interchanges, and passengers can use a common ticketing system for all UMRT lines (and bus also), passenger convenience will improve and ridership will dramatically increase.

55. At present, there is no agency that plans and coordinates these interline transfer facilities and operating systems, so railway developers should coordinate with each other to minimize unexpected barriers for users.

(5) Conduct of Detailed Social and Environmental Impact Assessment for Project Implementation

56. The assessment of social and environmental impacts should be carried out in further detail in the next development stages, especially after the construction plans for the station areas have been made. Appropriate measures to avoid or mitigate adverse impacts caused by the projects should be examined more closely.

57. Since the UMRT will be a new public transportation infrastructure in Hanoi City, it is necessary to pay attention to security and safety, especially in cases of emergency such as terrorism, accidents, and natural disasters such as flooding. The promotion of anticrime measures and evacuation plans should be done on a regular basis.

3) Next Steps

58. The next important step in pushing an integrated urban and UMRT development is to establish an appropriate organization that will lead and promote the concept in coordination with related organizations (i.e., MOT, VNR, HRB, HPC departments and districts, MOC, and other related project owners) and at two levels:

- (a) Decision-making level: similar to the HAIMUD Steering Committee, and
- (b) Project implementation level: PMU or an equivalent body to manage and implement the integrated projects.

59. The main activities for the next development phase comprises the following:

- i) Planning and implementation of intermodal facilities/ access roads which must be ready when UMRT lines open (Line 1 in 2017);
- ii) Planning and implementation of integrated urban development at and around UMRT stations;
- iii) Establishment of an appropriate institutional framework to implement the integrated urban development projects with the participation of the private sector and communities; and
- iv) Implementation of pilot projects to work out necessary arrangements and ensure the above projects can be effectively implemented.

60. One agency should be responsible for each activity not only to implement it, but also to coordinate it with other relevant agencies. The preliminarily proposed role sharing for implementation is shown in Table 8.1. It is recommended that the HPC should further coordinate and discuss these activities with the concerned agencies.

Table 8.1 Proposed Activities and Role Sharing (Preliminary)

	Activity	Main	Secondary	Coordination
A. Planning and Implementation of Intermodal Facilities/ Access Roads	1) Concept plans	HAUPA (PMU)	HRB, VNR	DOT, DOC, District
	2) Detailed plans	HAUPA (PMU)	HRB, VNR	DOT, DOC, District
	3) Integration with urban plans	HAUPA	MOC, DOC	District
	4) Engineering/ implementation plans	DOT (PMU)	HAUPA, District	HRB, VNR
	5) Implementation/ monitoring	DOT (PMU)	HAUPA, District	HRB, VNR
B Planning and Implementation of Integrated Urban Development	1) Concept plans	HAUPA (PMU)	District	DOT, DOC, HRB, VNR
	2) Detailed plans	HAUPA (PMU)	District	DOT, DOC, HRB, VNR
	3) Revision of district plans	HAUPA	District	DOT, DOC, HRB, VNR
	4) Project preparation	HAPI (PMU)	HAUPA	HRB, VNR
	5) Invitation for investments	HAPI (PMU)	HRB, VNR	HAUPA
	6) Implementation/ monitoring	HAUPA (PMU)	HAPI	District, DOT, DOC, HRB, VNR
C. Institutional Arrangement	1) Organizational set-up	HPC	MOT	HAPI, HAUPA, DOT, HRB, VNR
	2) Related regulations	HPC (PMU)	MOT, MOC	HAPI, HAUPA, DOT, HRB, VNR
	3) PPP framework	HPC (PMU)	MOT, MPI	HAPI, Private sector
D. Implementation of Pilot Projects	1) Selection of pilot projects	HPC	HRB, VNR	HAPI, HAUPA, DOT
	2) PP implementing organization	(PMU)	HPC	HAPI, HAUPA, DOT, HRB, VNR
	3) PP implementation/ monitoring	(PMU)	HPC	HAPI, HAUPA, DOT, HRB, VNR

Source: JICA Project Team

1. INTRODUCTION

1.1. Background and Objectives

1.1 Hanoi, as the capital city of Vietnam, is embarking on the development of several urban mass rail transit (UMRT) lines that will mitigate future traffic congestion, re-shape its landscape, guide its future growth, and support its vision of a sustainable and “green” metropolis. However, Hanoi has no previous experience in handling a near-simultaneous implementation of several rail lines, much less a single metro project. Hence, this project is meant to assist the city in the complex preparation for these metro projects to ensure proper integration of these lines and among them, the existing road transportation system, and urban development.

1.2 This project intends to prepare concrete strategies and programs on the integrated development of the UMRT Line 1 and Line 2, which are already in the implementation pipeline, to maximize the benefits of both UMRT and urban development, thereby creating a new model for urban development in cities. The specific objectives of this project are as follows:

- (i) To formulate development plans and implementation strategies for UMRT station-related facilities, and
- (ii) To propose the development concept and framework for the adjoining areas of UMRT stations and areas along UMRT Line 1 and Line 2.

1.2. Coverage

1.3 This project covers the entire UMRT stations of Line 1 and Line 2, although the main focus are the stations for Phase 1 of both lines (see Table1.1 and Figure1.1).

1.4 It should be noted that in the feasibility study report for Phase 2 of Line 2, which was prepared by the HRB and TEDI-South, another station was added, i.e., the Kim Lien Station between Bach Khoa and Chua Boc stations.

1.5 The name of “Den Ngoc Son Station” of C9-Line2, which was used during most of the period of this JICA Project, was replaced to the name of “Hoan Kiem Lake Station”, based on the Chairman’s instruction at the Draft Final Report Steering Committee which was held on 22nd September 2010.

1.6 Based on the discussion conclusion by HPC and MOT on 17th November 2010, the location of Nam Cau Long Bien Station (V6) is selected to be located near to Hang Dau Station (C8), and Phung Hung Station (V7) was removed because this station is too near to Nam Cau Long Bien Station (V6). Finally, the total number of UMRT stations to 31.

Table 1.1 Profile of the Planned UMRT Stations

Name of UMRT Station		Feasibility Study ¹		JICA Project Team Proposal		Structure	Phase	Interchange with		
		Length (km)	Interval (km)	Length (km)	Interval (km)			VNR	UMRT	BRT
UMRT Line 1	V1. Yen Vien ²	0.0	0.0	0.0	-0.1	Ground	2			
	V2. Cau Duong ²	1.7	1.7	2.2	2.1	Elevated	2	●		
	V3. Duc Giang	3.7	2.0	3.6	1.5	Elevated	2			
	V4. Gia Lam ²	5.4	1.7	5.3	1.7	Ground	1	●		L4
	V5. Bac Cau Long Bien ²	6.8	1.4	6.9	1.6	Elevated	1			
	V6. Nam Cau Long Bien ²	8.8	2.0	9.4	2.5	Elevated	1		L2	
	V7. Phung Hung ²	9.7	4.1	10.0	0.6	Elevated	4			
	V8. Hanoi ²	10.9	1.2	11.4	1.4	Elevated	1	●	L3	●
	V9. C.V. Thong Nhat ²	12.5	1.6	12.9	1.5	Elevated	1		L2	●
	V10. B.V. Back Mai	13.4	0.9	13.8	0.9	Elevated	1			●
	V11. Phuong Liet	14.3	0.9	14.7	0.9	Elevated	1			●
	V12. Giap Bat ²	15.8	1.5	16.3	1.6	Elevated	1	●		L4/●
	V13. Hoang Liet ²	18.3	2.5	18.5	2.2	Elevated	2			
	V14. Van Dien	19.7	1.4	19.6	1.1	Elevated	2			
	V15. Vinh Quynh ²	21.1	1.4	21.0	1.4	Elevated	2			
	V16. Ngoc Hoi	23.7	2.8	23.8	2.8	Ground	2			
UMRT Line 2	C1. Nam T. Long	0.0	0.0	0.0	0.0	Elevated	1			
	C2. Ngoai Giao Doan	0.9	0.9	0.9	0.9	Elevated	1			
	C3. Tay Ho Tay ²	2.1	1.2	1.7	0.8	Elevated	1		L4	
	C4. Bui	3.6	1.5	3.4	1.7	Underground	1			
	C5. Quang Ngua	5.2	1.6	5.1	1.7	Underground	1		L5	
	C6. Bach Thao	6.4	1.2	6.4	1.3	Underground	1			
	C7. Ho Tay	7.3	0.9	7.1	0.7	Underground	1			
	C8. Hang Dau	8.3	1.0	8.2	1.1	Underground	1	●	L1	
	C9. Hoan Kiem Lake ²	9.8	1.5	9.7	1.5	Underground	1			●
	C10. Tran Hung Dao	10.9	1.1	10.9	1.2	Underground	1		L3	●
	C11. Cau Den	11.8	0.9	11.9	1.0	Underground	2			●
	C12. Bach Khoa	13.0	1.2	13.1	1.2	Underground	2	●	L1	●
	C13. Kim Lien ²	-	-	13.8	0.7	Underground	2			
	C13. Chua Boc ²	14.4	1.4	14.6	0.8	Underground	2			
	C14. Nga Tu So	15.9	1.5	15.9	1.3	Underground	2			
C15. Thuong Dinh	16.8	0.9	16.8	0.9	Underground	2		L2A	L4	

¹ Sourced from the "Feasibility Study for Ha Noi Urban Railway Construction Line 1 (Section: Yen Vien – Ha Noi – Ngoc Hoi) 2008, and Line 2 (Section: Nam Thang Long – Tran Hung Dao)," HRB and TEDI South, 2008.

² Location of stations proposed to be adjusted by this JICA project, to which the Steering Committee agreed (see Final Report Part 1 Chapter 4 for details).

Figure 1.1 Location of UMRT Network and Project Lines (Line 1 and Line 2)



Source: JICA Project Team

1.3. Project Rationale

1) Introduction of TOD concept

1.7 Hanoi has one of the highest urban densities in the world, i.e., 272 persons per hectare in the urbanized districts and 404 in the central Hoan Kiem district, compared with 86 in Paris, 62 in London, and 370 in Hong Kong. It is a kind of density normally associated with the new concept of urbanism called transit-oriented development (TOD), and explains the current short lengths (<7 km) of commuter trips. This has been an accidental twist in its development history, albeit advantageous. However, with increasing incomes and changing lifestyles, at the same time pushed by cramped conditions in the urban core and pulled by modern residential complexes emerging on the outskirts of Hanoi, there is a move toward suburban living.

1.8 The challenge for Hanoi is to revitalize the old districts into well-designed residential areas in close proximity to good public transportation and with convenient access to a mix of retail and personal services, as well as health and recreational facilities. Inner-city infill sites can offer an ideal setting to promote TOD, but this requires strong political commitment to establish a development-style enterprise that can perform land re-adjustment activities and rebuild around the planned UMRT stations which offer a focal point for communities whose immediate needs can be provided locally.

1.9 The UMRT is the key driver to the realization of TOD. A decision to implement the three rail lines and the bus rail transit (BRT) is a clear demonstration of the Hanoi People's Committee (HPC) to create a public-transportation-oriented city. The long-term direction is a public transportation system with three hierarchical components, viz.: (i) a high-capacity urban mass transit system composed of rail and BRT; (ii) an intermediate capacity system composed of primary and secondary bus routes; and, (iii) a supplementary system with small vehicles operated by the private sector. While the UMRT is expected to form the transportation backbone of the city, buses will remain to be the most important road-based public transportation mode even in the future, providing services in areas not covered by the UMRT or providing feeder services to it.

1.10 The TOD concept must and can be applied in different types of urban areas where different interventions become necessary (see Table 1.2).

Table 1.2 Urban Development Orientation for UMRT Corridors in Hanoi

Item	Urban Center	Urban Center Fringe	Suburban / Peri-urban
Development Concept	<ul style="list-style-type: none"> Attractive urban center environment and pedestrian-friendly Capital and international commercial/business and tourism center with convenient facilities 	<ul style="list-style-type: none"> Modern urban core /node formulation and pedestrian-friendly Competitive commercial/business urban cores with convenient facilities 	<ul style="list-style-type: none"> Attractive urban center environment and pedestrian-friendly Competitive commercial/business center with convenient facilities
Urban Form	Urban district development integrated with transit stations	Conurbation formed by urban core/node development through improved transfers	Single urban-core development
Land Use & Density	Commercial/Business and high-density mixed-use development	Higher-density development along transit stations through commercial/business and mixed-use development	C+M and high-density mixed-use development in urban core with transit stations
Road network	High-density collector and distributor roads with pedestrian network	Medium-density arterial, collector, distributor road network	Not dense arterial, collector, distributor road network
Feeder Services	Walkway network linked with stations in combination with paratransit services	Linked services between intermodal transfer facilities (ITF) and other modes (bus, taxi, bike)	Feeder services by ITF and station-based bus services

Source: JICA Project Team

2) UMRT transit corridor formulation and integration

1.11 UMRT Line 1 and Line 2 have been set in Hanoi City where both lines cover various urban land uses from the CBD to suburban and rural areas. Different land uses at station areas require an adequate development approach to fit socio-economic activities and people's mobility, while the two lines are expected to encourage in formulating and managing a "UMRT Transit Corridor" development in an integrated manner.

1.12 Integration of different UMRT lines is critical in order to maximize the convenience of UMRT users and ridership. Because the integration of stations of different lines is crucial, this project places utmost attention to formulating adequate plans for the areas where different lines intersect.

1.13 The integration of the entire public transportation system—UMRT, BRT, and buses—in Hanoi is key to achieving a higher modal share. Without proper integration, the same total daily trips would end up merely being divided between the buses and UMRT with both rail and bus being worse off. With an integrated operation, the two modes can cover a wider area of the metropolis, with both benefiting from sharing a bigger market than if they compete with each other. Also, wider coverage improves accessibility and mobility of residents, and reduces cost and inconvenience at transfer points.

Figure 1.2 TOD Concept



Source: JICA Project Team

3) Opinions and Willingness of Citizens to Use UMRT

1.14 The Household Interview Survey and Facility User Survey were conducted from June to August 2009 in order to validate data on present trip characteristics and assess their probable shifts when the UMRT becomes operational. The former focused on residents, while the latter survey included non-residents (such as employees, customers, and students) who had their own reasons for being in the area. HIS had respondents within a 1000-meter radius of the stations, while the Facility User survey was limited to a 500-meter radius. The Household Interview Survey netted 2,056 households, with 6,059 samples, and the Facility User Interview Survey covered 257 facilities, with 1,325 samples. Major opinions about, expectations from, and willingness to use the UMRT are as follows:

- (a) **Increasing Concern with Motorcycle Use due to Worsening Air Quality and Traffic Safety:** In terms of transportation environment at present, most people use motorbikes rather than buses. Many are concerned about air pollution and traffic congestion. In addition, people who live east of Hanoi (Long Bien and Gia Lam districts) have fewer opportunities to go to urban centers because of the long

distances and traffic congestion on the Chuong Duong Bridge.

- (b) **Willingness to Use UMRT:** More than 90% of interviewees expect to use the UMRT in the future. They perceived it as modern, convenient, and safe. Current motorbike users would prefer to walk to the stations.
- (c) **Easy Access to the UMRT:** The main reason for people shunning the UMRT is the attachment of people to motorbikes especially in providing direct access from home to destination and in relation to the inconvenience of transferring to other modes. Improved walkways and convenient transfer facilities would tend to overcome the negative factors.
- (d) **Improved Accessibility to the Ancient Quarter:** UMRT stations in the urban center, especially Hoan Kiem Lake Station, could become more popular as a destination in their own right. At present, many non-residents go the Ancient Quarter cultural exposure it being a historic CBD and also for employment. Without as yet an operating UMRT, the public expectation is that it would be different from the current situation of the Nam Cau Long Bien Station where traffic congestion frequently occurs due to the nearby market and road intersections, resulting in general disorder.
- (e) **New Commercial/Socioeconomic Activity Centers at and around UMRT Stations:** Other popular stations, such as Hanoi, Gia Lam, and Giap Bat, appear to have the potential of pulling in more users due to their function as regional centers of urban services and transportation hub for other areas. Many more commuters from the surrounding areas of Hanoi and neighboring provinces will go to these stations, once more varied commercial services are provided. Thus, these stations could grow beyond their current function as transportation hubs to full-fledged commercial and business centers.
- (f) **Harmonization with Local Socio-economy and Urban Design:** While there is an expectation and desire for new urban services to become available at and around the UMRT stations, there is also a preference for the non-conversion of present land uses. For example, many hospitals and universities are clustered around Bach Mai station; hence, walkways and parking improvements are expected to enhance these facilities. In the case of stations near West Lake, an open space is desired. Stations (such as Hoan Kiem Lake and C.V. Thong Nhat) near popular parks have to be designed to suit recreational activities.

2. IMPACTS ON INTEGRATED DEVELOPMENT

2.1 Impacts of UMRT and integrated development are categorized from viewpoints of (i) transport improvement, (ii) socio-economic improvement and (iii) living condition and urban amenity improvement.

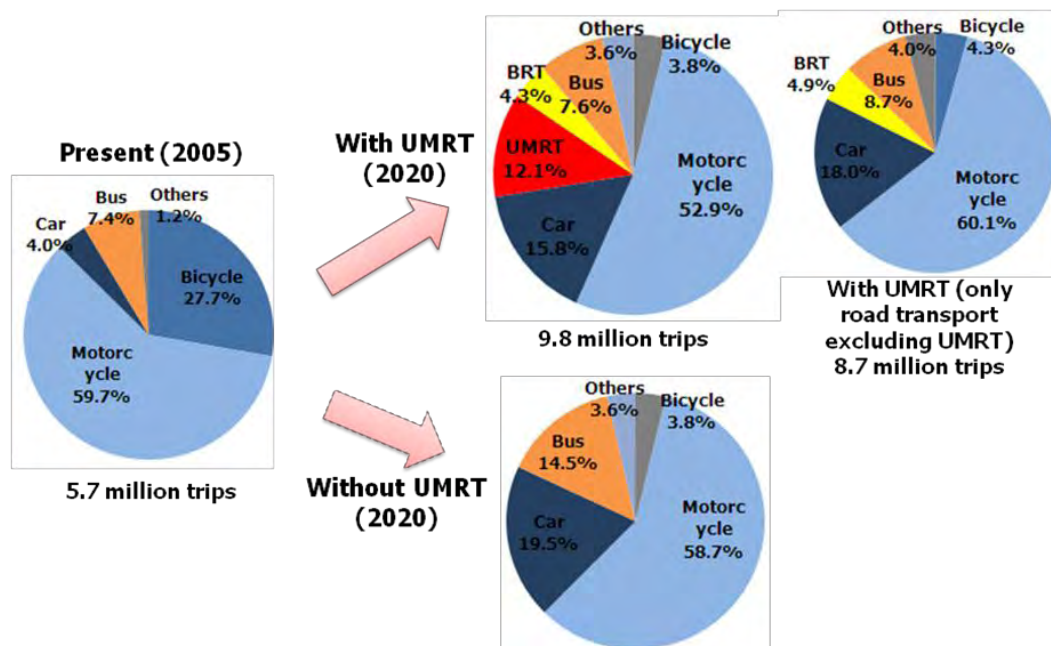
2.2 Direct impact of UMRT development is to increase ridership of UMRT lines. UMRT will diversify transport mode for citizens toward public transport oriented mode (see Figure 2.1). It is estimated app.12% of citizens (app. 1.2mil trips) will use UMRT as a main transport mode.

2.3 Taking into account the results of traffic demand analysis as well as of proposed concept plans for the UMRT and integrated urban development, the JICA Project Team re-adjusted and estimated the future ridership of the: (i) base case which was estimated based on HAIDEP (without integrated urban development), and (ii) with integrated urban development of station areas (see Table 2.2 and Table 2.3).

2.4 The total ridership with an integrated urban development was estimated taking account of new-road construction and new, land uses around station areas as proposed in the concept plans. Based on the results of the interview survey, most potential station users living within 500 m of stations would prefer to walk, and users beyond walking distances will use bus as a feeder service, that is, if walking and bus conditions will improve. So modal share will be converted from motorbikes at present to walking and public transportation in the future.

2.5 As for modal share to access UMRT Line 1 stations, walking and bus obtained more than 30% each. Accessibility by foot and convenience of buses and UMRT transfers are prioritized than the development of parking spaces, especially in the CBD. In the case of UMRT Line 2, since most of its stations will be located under trunk roads, interchanges with buses and other UMRT lines are priority concerns.

Figure 2.1 Change in Transport Mode Composition



Source: JICA Project Team

Table 2.2 Estimated Total Ridership and Modal Share of UMRT Line 1 in 2020 (without Phung Hung Station, V7)

UMRT Line1 Station		(a) Base Case	(b) With Integrated Urban Development							
			Total	by Mode						
				Walking	Bicycle	Motorbike	Car	Bus	VNR	UMRT
V1	Yen Vien	32,500	37,000	16,800	400	4,500	2,400	12,800	100	0
V2	Cau Duong	32,900	37,400	14,300	400	8,300	4,700	9,800	0	0
V3	Duc Giang	7,500	10,900	4,600	200	2,800	1,100	2,200	0	0
V4	Gia Lam	42,000	50,900	24,000	400	2,400	3,600	20,300	100	0
V5	Bac Cau Long Bien	3,900	4,600	2,100	200	400	200	1,800	0	0
V6	Nam Cau Long Bien	48,200	53,300	7,900	200	9,300	5,200	23,800	0	7,000
V7	Phung Hung	7,800	0	0	0	0	0	0	0	0
V8	Hanoi	44,100	57,100	24,100	100	7,700	3,200	10,400	1,700	9,800
V9	C.V. Thong Nhat	30,700	32,800	6,200	400	4,400	2,500	5,000	0	14,200
V10	B.V. Bach Mai	12,800	7,500	3,300	100	1,500	600	2,000	0	0
V11	Phuong Liet	100	4,200	1,100	100	1,000	300	1,800	0	0
V12	Giap Bat	18,100	20,400	9,000	300	1,500	600	9,000	0	0
V13	Hoang Liet	7,800	12,800	6,100	100	2,300	1,000	3,200	0	0
V14	Van Dien	600	11,300	3,300	200	2,500	1,100	4,200	0	0
V15	Vinh Quynh	18,600	15,900	3,700	400	2,200	1,700	7,800	0	0
V16	Ngoc Hoi	29,600	34,200	7,300	600	8,700	4,900	12,700	0	0
Total	(number)	337,200	390,200	134,600	3,900	59,900	33,000	126,200	2,000	30,500
	(%)	-	100.0	34.5	1.0	15.4	8.5	32.3	0.5	7.8

Note: Phung Hung Station (V7) was removed based on conclusion by HPC and MOT on 17th November 2010.

Source: JICA Project Team

Table 2.3 Estimated Total Ridership and Modal Share of UMRT Line 2 in 2020

UMRT Line 2 Station		Base Case	Case with Integrated Urban Development						
			Total	Mode					
				Walking	Bicycle	Motorbike	Car	Bus	UMRT
C1	Nam Thang Long	39,480	83,790	4,090	320	2,600	1,930	74,840	0
C2	Ngoai Giao Doan	3,890	8,440	5,310	470	1,680	940	40	0
C3	Tay Ho Tay	13,930	25,710	3,110	190	920	770	0	20,740
C4	Buoi	11,890	21,660	3,200	180	2,530	1,170	14,570	0
C5	Quan Nguva	10,470	16,790	2,360	350	2,260	1,530	3,700	6,590
C6	Bach Thao	5,970	11,680	3,450	380	2,500	1,310	4,040	0
C7	Ho Tay	6,130	10,620	1,670	460	1,850	820	5,810	0
C8	Hang Dau	36,100	71,720	2,140	270	1,160	590	32,010	35,550
C9	Hoan Kiem Lake	3,310	6,170	3,180	1,110	1,470	410	0	0
C10	Tran Hung Dao	11,310	19,420	2,220	670	970	360	11,410	3,790
C11	Cau Den	7,020	11,430	1,020	310	1,190	490	8,420	0
C12	Bach Khoa	13,170	24,300	1,840	360	1,620	770	2,770	16,950
C13	Kim Lien	4,600	8,260	3,660	730	2,190	730	950	0
C14	Chua Boc	4,610	7,450	2,720	470	2,290	1,540	440	0
C15	Nga Tu So	4,030	6,380	1,430	160	710	430	3,650	0
C16	Thuong Dinh	8,010	17,580	520	120	790	540	870	14,740
Total	(number)	317,800	351,410	41,910	6,550	26,740	14,340	163,520	98,350
	(%)	-	100.0	11.9	1.9	7.6	4.1	46.5	28.0

Source: JICA Project Team

2.6 Socio-economic impact will be increased if urban development opportunities will be increased around stations and along railways. In CBD, accessibility will be strengthened which most of areas will be covered within 500m-distance from stations, and development opportunities in existing CBD will be enhanced. In sub urban areas, new sub urban centers such as Tay Ho Tay, Gia Lam and Giap Bat will be newly formulated, and new town development will be promoted where are convenient for access to UMRT stations. Furthermore, it will be significant to increase new opportunities to develop urban ground space for economic activities integrated with subway development.

2.7 Distribution of settlement will be diversified thanks to UMRT development. Opportunities for settlements in suburban areas will be increased with improved accessibility and living environment through integrated urban development, while high population density will be reduced in CBD (see Table 2.3 and Figure 2.2).

2.8 Employment opportunities will be drastically increased and promoted not only in CBD but also in sub urban areas along UMRT lines, if integrated commercial and business development will be promoted. It is estimated app. 700,000 employees will work around UMRT stations of Line1 and Line2 (see Table 2.3 and Figure 2.3).

2.9 In addition to transport improvement and socio-economic development, living environment improvement is also expected through (i) improvement of road and infrastructure condition around the station, (ii) promotion of urban redevelopment projects in CBD, and (iii) promotion of new town projects in sub urban areas.

2.10 In the long run, an integrated UMRT and urban development will contribute to enhance overall urban environment and image through (i) reduction of air pollution, (ii) increase in openspace and greenery around the station, and (iii) creation of modern image around the station.

Figure 2.2 Example of Integrated Development in Sub-urban Area (Aobadai Station, Tokyu Denentoshi Line, Kanagawa, Japan)



Figure 2.3 Example of Integrated Development of Railway Yard (Shiodome National Railway yard area, Tokyo, Japan)



Table 2.3 Estimated Population and Employment of Station Area of 500m Radius

No.	Station area of 500m radius	Population			Number of Employment		
		Present	UMRT with integrated urban development		Present	UMRT with integrated urban development	
			Without	with		without	with
V1	Yen Vien	3,980	7,000	16,000	3,878	8,000	13,400
V2	Cau Duong	3,127	7,300	7,900	2,226	5,700	6,800
V3	Duc Giang	4,805	8,400	8,900	2,599	4,500	9,100
V4	Gia Lam	5,974	8,800	9,500	4,414	4,400	38,800
V5	Bac Cau Long Bien	4,119	4,700	4,700	2,499	2,400	5,000
V6	Nam Cau Long Bien	33,563	28,500	28,500	19,753	32,400	34,700
V7	Phung Hung	34,704	25,200	25,200	20,853	32,000	35,600
V8	Hanoi	31,561	23,600	23,600	21,161	24,800	49,100
V9	C.V. Thong Nhat	13,352	12,400	12,600	5,226	7,500	8,300
V10	B.V. Bach Mai	24,044	19,100	19,100	10,224	13,700	14,400
V11	Phuong Liet	21,999	21,200	21,200	9,239	9,600	11,100
V12	Giap Bat	6,128	14,200	15,000	2,493	4,100	45,300
V13	Hoang Liet	2,659	8,200	11,200	1,985	4,700	12,000
V14	Van Dien	4,520	9,900	11,900	2,461	12,700	15,900
V15	Vinh Quynh	420	3,600	10,400	738	1,200	23,700
V16	Ngoc Hoi	176	2,200	4,500	538	2,700	5,900
C1	Nam Thang Long	1,998	5,100	5,100	1,263	1,300	1,300
C2	Ngoai Giao Doan	410	6,600	6,600	306	41,600	45,700
C3	Tay Ho Tay	0	8,600	8,600	0	82,100	86,200
C4	Buoi	11,542	13,300	13,300	4,554	7,400	7,700
C5	Quan Ngua	21,411	13,500	13,800	6,205	6,000	7,200
C6	Bach Thao	12,925	17,900	17,900	7,329	6,800	7,200
C7	Ho Tay	10,286	13,500	13,500	8,445	9,000	9,500
C8	Hang Dau	31,374	24,400	24,400	22,350	25,100	27,000
C9	Hoan Kiem Lake	23,516	16,200	16,200	29,039	38,700	40,600
C10	Tran Hung Dao	23,681	17,100	17,100	33,531	48,800	53,300
C11	Cau Den	37,260	27,300	28,800	16,705	24,500	27,800
C12	Bach Khoa	19,092	14,300	14,400	9,030	11,600	12,600
C13	Kim Lien	41,233	17,900	17,900	12,631	9,300	9,300
C14	Chua Bac	30,189	27,000	28,200	10,980	14,300	19,000
C15	Nga Tu So	23,022	17,700	17,700	9,180	12,100	13,700
C16	Thuong Dinh	16,894	15,300	16,500	5,170	8,000	9,400
	Subtotal of Line 1	195,131	204,500	230,200	110,287	170,500	329,000
	Subtotal of Line 2	304,833	255,700	260,000	176,717	346,500	377,400
	Total of Line 1 & 2	499,963	460,200	490,200	287,004	517,000	706,400

Source: JICA Project Team

Figure 2.4 Distribution of Settlement of Station Areas of UMRT Line1 and Line2

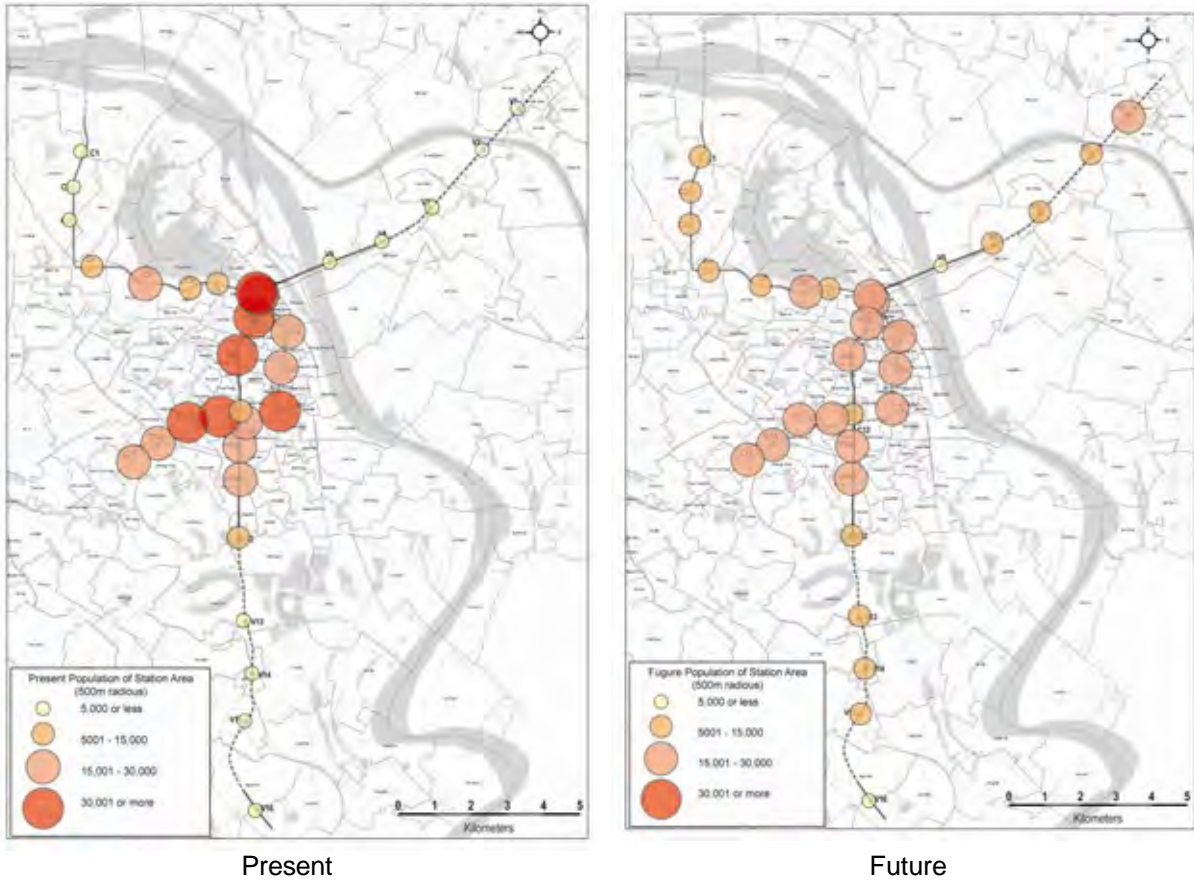
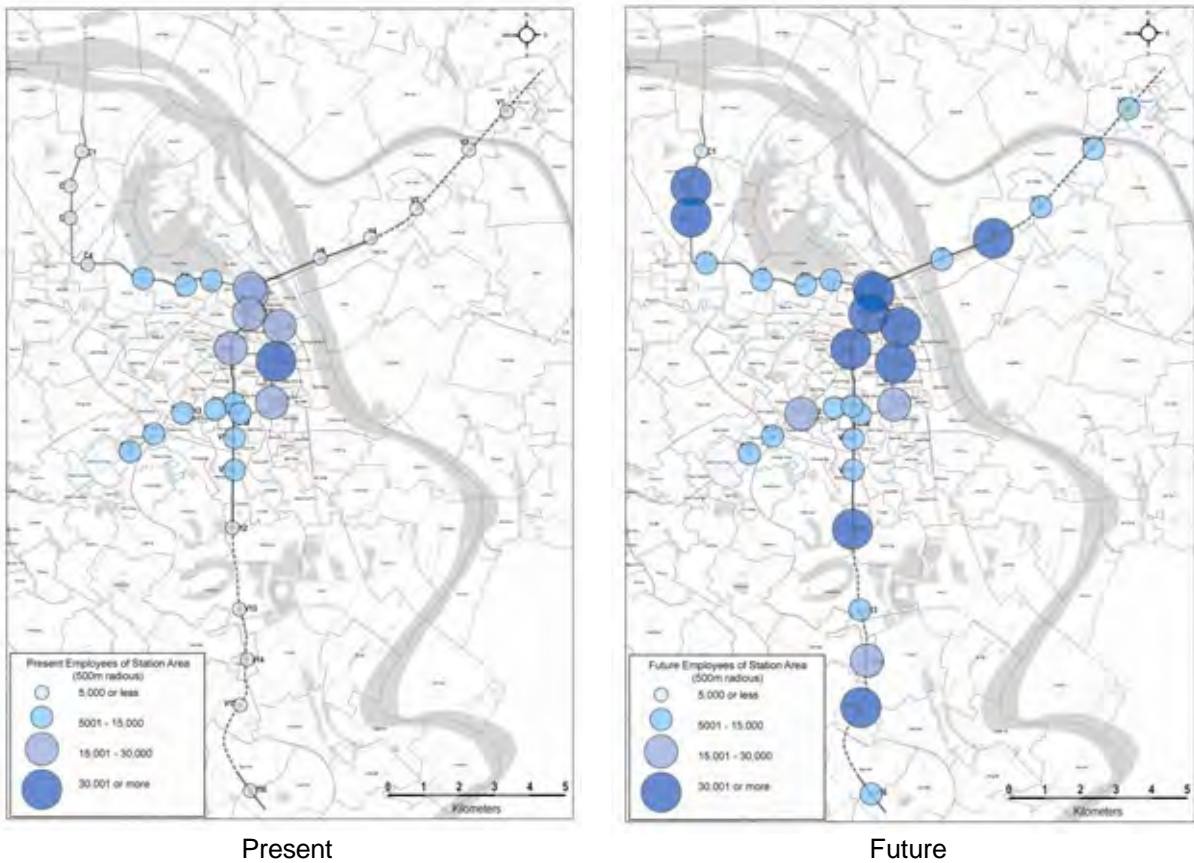


Figure 2.5 Distribution of Employment of Station Areas of UMRT Line1 and Line2



Source: JICA Project Team

3. LOCATIONS OF UMRT STATIONS AND THEIR ALIGNMENTS

3.1 All locations of the stations and some alignments were reviewed by several criteria in terms of appropriate formulation of station area development shown in below.

- (i) Effective transferability to promote ridership by smooth and convenient connection between Line 1 and Line 2 station and UMRT stations of other lines
- (ii) Promotion of effective station area development to contribute to “Transit Oriented Development” maximizing opportunities for urban service development in the station area
- (iii) Mitigation of negative development impacts by station location

3.2 Taking into consideration of these criteria, JICA Project Team proposed appropriate station locations to maximize UMRT utilization and land value of station surrounding area. After prolonged discussion with stakeholders, some of station locations and alignments are readjusted from Feasibility Study, particularly as follows:

- (i) To preserve landscape of Long Bien Bridge and improve accessibility between Line 1 and Line 2 stations (Nam Cau Long Bien and Hang Dau) in Ancient Quarter, a new alignment which is about 200m from the existing Long Bien Bridge. Steering Committee agreed on this proposal, and alignment has already been readjusted for Detailed Design of Phase1 of Line 1.
- (ii) To improve accessibility between Line 1 (Hanoi) and Line3 stations, it is proposed to adjust station locations. It is also preferable to develop a new trunk road extending Tran Hung Dao Street toward west. It is proposed to preserve the original Hanoi Station by moving to another block and reuse as a cultural and historical facility.
- (iii) To mitigate negative impacts of cultural and environmental aspects to Ngoc Son temple, it is proposed to move to south-bound, after consultation with Ministry of Culture, Sports and Tourism and HRB.

3.3 All locations of the stations and some alignments were reviewed using several criteria in terms of appropriate formulation of station area development shown in Table 3.1 and Table 3.2.

Table 3.1 Issues and Proposed Locations of 16 Stations of UMRT Line 1

UMRT L1 Station	Station Development Issues of Planned Location and Alignment			Interval		Length and direction for adjustment from F/S
	Effective Transferability	Promotion of Station Area Urban Development	Mitigation of Negative Development Impact	Original	Proposed	
V1. Yen Vien	--	Promotion of north side agriculture land utilization	Necessary village improvement in front of the station	0.0	-0.1	135 (e) / 5 (n)
V2. Cau Duong	--	--	--	1.7	2.1	260 (s)
V3. Duc Giang	--	--	--	2.0	1.5	--
V4. Gia Lam	--	--	--	1.7	1.7	45 (e)
V5. Bac Cau Long Bien	Planned road accessibility	Coordination with Ngoc Thuy New Town development	Conservation of Ancient Quarter and Long Bien Bridge	1.4	1.6	175 (n) / 140 (w)
V6. Nam Cau Long Bien	Connection with C8 (Hang Dau) Line 2 Station	Promotion of attractiveness of Ancient Quarter and Long Bien Bridge environment		2.0	2.5	90 (s) / 350 (w)
V7. Phung Hung	--	--	--	1.1	0.6	40 (s)
V8. Hanoi	Connection with Line3 Station	New Urban Core as one of Hanoi gateways	Appropriate conservation of present Hanoi Station	1.2	1.4	205 (s) / 30 (w)
V9. C.V.Thong Nhat	Connection with C12 (Bach Khoa) Line 2 Station	Attractive open space as one of important intersections	--	1.6	1.5	60 (s)
V10. B.V.Back Mai	--	--	--	0.9	0.9	--
V11. Phuong Liet	--	--	--	0.9	0.9	--

UMRT L1 Station	Station Development Issues of Planned Location and Alignment			Interval		Length and direction for adjustment from F/S
	Effective Transferability	Promotion of Station Area Urban Development	Mitigation of Negative Development Impact	Original	Proposed	
V12. Giap Bat	Connection with Phia Nam Bus Terminal	Harmonizing proposed new urban development (Doi Dam)	--	1.5	1.6	135 (s) / 65 (w)
V13. Hoang Liet	--	Harmonizing proposed new urban development	Keeping settlements in front of planned station at a distance	2.5	2.2	170 (n)
V14. Van Dien	--	--	--	1.4	1.1	--
V15. Vinh Quynh	--	Harmonizing proposed new urban development (Doi Dam)	Keeping villages in front of planned station at a distance	1.4	1.4	60 (s)
V16. Ngoc Hoi	Connection with VNR	--	--	2.8	2.8	--

Source: JICA Project Team

Note: (n) north, (s) south, (e) east, (w) west

Table 3.2 Issues and Proposed Locations of 16 Stations of UMRT Line 2

UMRT Line 2 Station	Station Development Issues of Planned Location and Alignment			Remarks Proposed	Interval		Length & direction for adjustment from F/S
	Effective Transferability	Promotion of Station Area Urban Dev't	Mitigation of Negative Development Impact		Original	Proposed	
C1. Nam Thang Long	Connection with proposed parking area	--	--	--	0.0	0.0	--
C2. Ngoai Giao Doan	--	Harmonizing planned new urban development	Integration with existing urban development plan	Coordination with urban development project (under construction)	1.0	0.9	--
C3. Tay Ho Tay	Connection with Line4 (BRT) station and proposed CAT	Harmonizing planned new urban development	Integration with existing urban development plan	Coordination with urban development project	0.9	0.8	100 (n)
C4. Bui	--	--	--	--	1.6	1.7	--
C5. Quan Ngua	Connection with Line5 terminal station	--	--	Coordination with planned major road (Hoang Hoa Tham-Thuy Khe)	1.7	1.7	--
C6. Bach Thao	--	--	--		1.3	1.3	--
C7. Ho Tay	--	Issue of Central Political Facilities (presidential house)development plan	--	--	0.7	0.7	--
C8. Hang Dau	Connection with V6 (Nam Cau Long Bien)	Promotion of attractiveness of Ancient Quarter and Long Bien Bridge environment	--	--	1.1	1.1	--
C9. Hoan Kiem Lake	Connection with Bo Ho bus interchange	Harmonizing planned redevelopment in the Electricity Company	Minimize negative impacts on Ngoc Son Temple, Hoan Kiem Lake	--	1.5	1.5	60 (s)
C10. Tran Hung Dao	Connection with Line3 station	--	--	Feasibility Study of Phase2 has been implemented by HRB and TEDI-South. Kim Lien station is newly added.	1.0	1.2	--
C11. Cau Den	--	--	--		1.0	1.0	--
C12. Bach Khoa	Connection with Line 1 V9 (C.V.Thong Nhat)	--	--		1.2	1.2	--
C13. Kim Lien	--	Integration with urban redevelopment of Kim Lien KTT	--		-	0.7	--
C13. Chua Boc	--	--	--		1.4	0.8	200 (w)
C14. Nga Tu So	--	Harmonizing Market redevelopment project	--	1.5	1.3	--	
C15. Thuong Dinh	Connection with Line 2A station	--	--	0.9	0.9	--	

Source: JICA Project Team

Note: (n) north, (s) south, (e) east, (w) west

4. PROPOSED CONCEPT PLANS

4.1. Objective and Contents of Concept Plans

4.1 The concept plan aims to propose the overall development orientation of station and station area development. It includes short- and long-term plans, thereby ensuring integrated development on several levels and at various phases. In the proposed concept plan for the UMRT, such plans are proposed for the 32 stations¹ (see Table 4.1), taking into account the following:

- (i) Physical development and improvement to secure accessibility to stations and smooth transfers between stations;
- (ii) Urban development and improvement to improve living conditions and promote potentials for socio-economic development and cultural preservation;
- (iii) Management and operation to integrate with other UMRT lines and public transportation services and operating systems; and,
- (iv) Zoning regulations to manage urban growth.

Table 4.1 Components of Integrated Development of Station Areas

Category	Component	Example of Facility and Service
1 Physical Development and Improvement	a. Access road improvement and development	<ul style="list-style-type: none"> • Access roads around stations (for bus, taxi, car, MC) • Distributor roads and community roads improvement (e.g., pavement, lighting, signboard, etc.)
	b. Intermodal transfer facility development	<ul style="list-style-type: none"> • Large/medium multipurpose facilities, inter-city bus terminals, city air terminals, stop stations only (bus, taxi, xe-om)
	c. Parking development	<ul style="list-style-type: none"> • Ground parking area, parking buildings, underground parking
	d. Walkway network development	<ul style="list-style-type: none"> • Sidewalks, pedestrian mall, footbridge, pedestrian deck, pedestrian underground, underpass
2 Urban Development and Improvement	a. Development of public amenities	<ul style="list-style-type: none"> • Open space for resting, waiting, toilet, police box, information booth, town symbol / landmark facilities
	b. Urban core activity development	<ul style="list-style-type: none"> • New business & commercial, cultural amenity node, public/administration service provision
	c. Commercial and business promotion	<ul style="list-style-type: none"> • New retail shops, civic service business • New hotel and amusement facilities • Office building including public services
	d. Housing and residential area development	<ul style="list-style-type: none"> • High-rise housing and condominiums • Medium and low-rise housing areas
	e. Living conditions area improvement	<ul style="list-style-type: none"> • Urban renewal by road and infrastructure • Area infrastructure and utilities improvement
3 Management & Operation	a. Transportation management	<ul style="list-style-type: none"> • Major feeder bus route services and bus stops • Area feeder (para-transit) vehicle services • Area traffic control and management
	b. Service improvement	<ul style="list-style-type: none"> • Common ticketing system • Design code of signboards
4 Zoning Regulations to Manage Urban Growth	a. Development control	<ul style="list-style-type: none"> • Natural hazard protection • Historical conservation • Building height control • Underground development
	b. Consistency with land use plan	<ul style="list-style-type: none"> • Commercial and business • Residential / mixed use • Other uses (public, education, utility), Desirable density
	c. Urban design considerations	<ul style="list-style-type: none"> • Urban landmarks • Decent and harmony in design with existing area

Source: JICA Project Team

¹ The concept plan of Phung Hung Station (V7) is kept for reference, though this station is removed. Actual station number in total is 31stations.

Figure4.1 Examples of Station Related Facilities in Japan





Station Building



Park & Ride Facility

Transfer Related Facility



Common Ticket for Public Transport



Automatic Ticket Gate



Bus Stop and Pedestrian Deck



Common Concourse

Source: JICA Project Team

4.2 UMRT Line 1 and Line 2 will be operated covering various areas, such as the CBD most of which is built-up and urbanized, peri-urban areas which is becoming congested due to rapid urbanization, and suburban areas which lacks accessibility to urban services and where residents have poor mobility. In the CBD, it is expected that socio-economic activities around the station would be promoted, while in peri-urban areas, the expectation is reduced traffic congestion and more comfortable commute and daily activities. Railway development in suburban areas will have much effect on land use conversion from rural to urban, promotion of urban development activities, and promotion of settlements in new towns, among others.

4.3 This JICA project proposed concept plans for 32 stations of the UMRT Line 1 and Line 2. The concept plans indicated development concepts, future land uses, and projects to embody integrated development. In addition, development phasing based on time and feasibility is proposed, so it would be easy to understand the minimum requirements for UMRT development and operation. Also included are recommended projects for integrated urban and UMRT development in station areas.

4.4 It is expected that the concept plans for the 32 stations will be reflected in the new Hanoi City master plan. The development of a UMRT network will usher in a public-transportation-oriented city and promote urban development activities. An integrated urban and UMRT development will play a significant role in the achievement of the vision for Hanoi City, which is “a compact city with water, green and culture,” as was proposed in HAIDEP.

4.5 After approval of the concept plans by the Steering Committee in May 2010, technical study has been continued by the Detailed Design of UMRT Line1- Phase1 Construction Project. Some readjustments by the Detailed Design and response of the HAIMUD project are as follows:

- i) In November 2010, it was concluded that (a) the station location of Nam Cau Long Bien (V6) is selected to be located near to Hang Dau Station (C8), and (b) Phung Hung Station (V7) was removed because it is too near to Nam Cau Long Bien Station (V6). The concept plan is kept as a reference in this report.
- ii) In December 2010, the railway alignment of UMRT Line1 from Nam Cau Long Bien Station to Ngoc Hoi was readjusted based on technical study of Detailed Design. It is noted that technical design including railway alignment should be referred the Detailed Design of UMRT Construction Project.

4.2. Concept Plans of Interchange Station Areas

4.2.1 Gia Lam and Extension of Line1/ bus terminal station area (Line1-V4)

4.6 Gia Lam station is important in two ways. (i) It will function as a gateway to Hanoi for interprovincial passenger train, and (ii) it will be a centre of fast growing Gia Lam urban areas. This implies that the station will be heavily used by intercity and urban travel passengers and urban development potentials at and around the station will significantly increase. In order to play a role of a city centre, the station and its surrounding areas need to be planned from more comprehensive viewpoint. To fulfill this dual role, the Gia Lam inter-city bus terminal should be relocated nearer to the station area, and the corresponding local road network built so as to integrate surrounding urban development of Ngoc Thuy New Town Project.

Table 4.2 Demand Outlook for Gia Lam Station Area (V4)

		Present	UMRT with integrated Urban Development	
			Without	With
Population of Station Area of radius 500m (persons)	Population	5,974	8,800	9,600
	Employment	4,414	4,400	38,800
	Student	1,908	1,600	1,700
Ridership (persons/day)		-	42,000	50,900

Source: JICA Project Team

4.7 Issues to be clarified of Gia Lam station area are as follows:

- i) Adjustment of approved road alignment of north (minimum): To improve accessibility to station from north, it is proposed to develop north ITF. It is necessary HAUPA and Long Bien District PC to readjust the road alignment of north, which has been already approved by Long Bien District Plan, on the north side.
- ii) Relocation of VNR property (long-term): For this area to emerge as one of the urban cores of Hanoi city on the fringes, VNR must decide on the conversion of this property and to relocate its current activities (mainly rolling stock factories and marshalling yard) elsewhere.
- iii) Landuse conversion (long-term): The predominant land use in the area surrounding Gia Lam Station has to be converted from “Industry” (under the Long Bien District Plan) to “Commercial and Business”.

Table 4.3 Project List of Gia Lam Station Area (V4)

Project			Scale		Construction Cost (000US\$)	Land acquisition		Implementation Body	Financial resource	
						Scale	Measure			
A Minimum development till opening	SF-IM-1	North Intermodal transfer facility	14,100	m2	761	9,731	14,100 m2	Land acquisition	VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-IM-2*	South Intermodal transfer facility	2,700	m2	146		2,700 m2		VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-SE-1	Station entrance space	6,900	m2	552		6,900 m2		VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-PD-1	North pedestrian deck	300	m2	780		-	-	VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-EV-1*	Elevator	2	No.	200		-	-	VNR	VNR
	SF-ES-1*	Escalator	1	No.	300		-	-	VNR	VNR
	PT-BS-1	Bus stop	2	No.	10		-	-	TRAMOC	HPC
	SF-PC-1	Pedestrian crossing	1	No.	10		-	-	HDOT	HPC
	SF-PC-2	Pedestrian crossing	1	No.	10		-	-	HDOT	HPC
	RD-NR-1	Distribution road development (w=36.0m) ²⁾	1,370	m	3,151		64,800 m2	Land acquisition	HDOT	HPC
	RD-NR-2*	Distribution road development (w=26.0m)	330	m	561		8,600 m2		HDOT	HPC
	RD-SW-1	Improvement of Sidewalk	820	m	221		-	-	HDOT	HPC
	RD-MA-1	Improvement of main access road	1,960	m	2,156		-	-	HDOT	HPC
	RD-MA-2	Improvement of main access road	320	m	352		-	-	HDOT	HPC
B Short-term (opening~3 years)	SF-CP-1	North car parking space	6,200	m2	248	1,214	6,200 m2	Land acquisition	HPC	HPC
	RD-NR-3	Distribution road development (w=36.0m) ²⁾	420	m	966		700 m2		HDOT	HPC
C Medium-term (3~5years)	UR-1	Redevelopment of VNR factories area ³⁾	20	ha		To be estimated	-	Land acquisition from SOE land	HPC/Private	VNR/Private
	SF-IM-3	South Intermodal transfer facility	8,000	m2	640		8,000 m2		VNR	VNR/HPC/Private
	SF-SE-2	South Station entrance space	6,500	m2	520		6,500 m2		VNR	VNR/HPC/Private
	SF-CP-2	South car parking space	5,000	m2	200		5,000 m2		HDOT	VNR/HPC/Private
	BT-1	New bus terminal development ⁴⁾	1.5	ha			15,000 m2	TRAMOC	HPC/Private	
	ND-1	Ngoc Thuy New Town development (Phase1) ⁵⁾	41	ha			41ha	LA/LR	Private	Private
D Long-term (5~10 years)	UR-2	Redevelopment of existing settlement of Gia Thuy Commune	9	ha		To be estimated	9ha	LA/LR	HPC/Private	HPC/Private
	UR-3	Redevelopment of Gia Lam Inter-city bus terminal	1.8	ha			-	-	TRAMOC/Private	HPC/Private
	UR-4	Redevelopment of existing settlement	8	ha			8ha	LA/LR	HPC/Private	HPC/Private
	ND-2	Ngoc Thuy New Town development (Phase2) ⁵⁾	73	ha			73ha	LA/LR	Private	Private

Source: JICA Project Team

Note:

SOE = State owned enterprise, La = Land Acquisition, LR = Land Readjustment

Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) It has not been discussed and agreed between VNR and HPC which will be an implementation body and a financial resource for ITF development. JICA Project Team recommends VNR will develop ITF as a station related facility development.

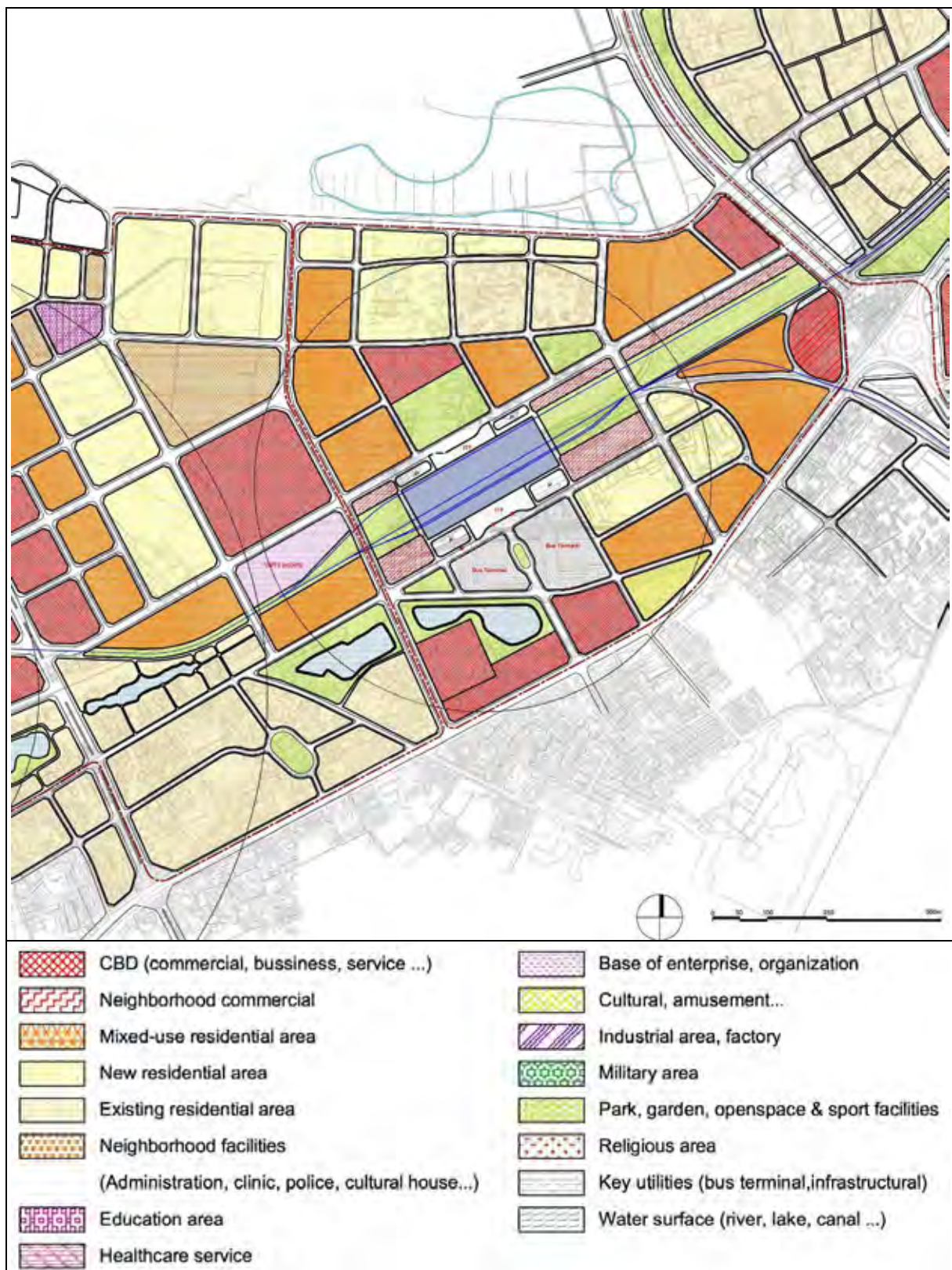
2) It is necessary to readjust the road alignment of District Plan with HAUPA.

3) It is necessary to consult with VNR for technical aspects and HAUPA for readjustment of District Plan.

4) It is necessary to consult with TRAMOC for relocation of bus terminal.

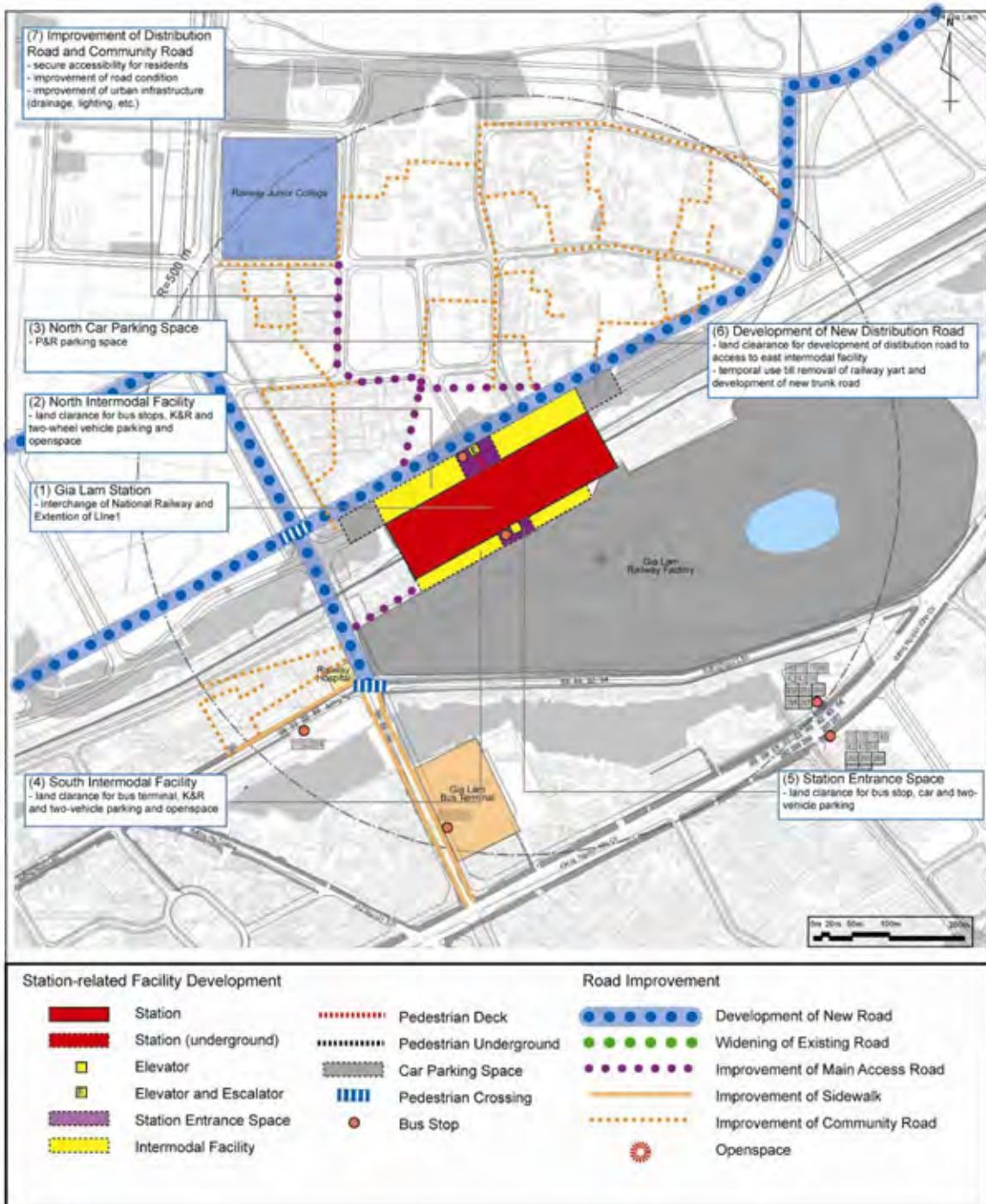
5) It is necessary to consult with HAUPA and developer to adjust road network and landuse of new town area.

Figure 4.2 Long-term Concept Plan of Gia Lam Station Area (V4)



Source: JICA Project Team

Figure 4.3 Short-term Concept Plan of Gia Lam Station Area (V4)



Source: JICA Project Team

4.2.2 Nam Cau Long Bien and Hang Dau station area (Line1-V6 and Line2-C8)

4.8 The station area of two stations is expected to formulate common gateway development as the northern gateway of the Historical Center of Hanoi, where convenient transfer facilities and attractive open space is proposed to be equipped. The role of these two stations is “the northern gateway to Ancient Quarter”. Historically there was a gate named “O Quan Chuong” which is remained at eastern side of Hang Chieu Street in Ancient Quarter.

4.9 These stations should be a new symbol of gateway of this area. On the other hand, utilizing opportunities for proposed arterial road development as a fringe road of Ancient Quarter in conjunction with Line1 trackage construction, urban redevelopment can be promoted along proposed new fringe road. This urban redevelopment is expected to encourage socio-economic activities by new urban services in Ancient Quarter, taking account of harmonized development with Ancient Quarter in terms of landscape and urban design. In addition, accessibility to Long Bien Bus Terminal needs to be improved for passengers’ convenience and safety.

Table 4.4 Demand Outlook for Nam Cau Long Bien Station Area (V6)

		Present	UMRT with integrated Urban Development	
			Without	With
Population of Station Area of radius 500m (persons)	Population	33,563	28,500	28,500
	Employment	19,753	32,400	34,700
	Student	7,032	6,700	6,700
Ridership (persons/day)		-	48,200	53,300

Source: JICA Project Team

Table 4.5 Demand Outlook of Hang Dau Station Area (C8)

		Present	UMRT with integrated Urban Development	
			Without	With
Population of Station Area of radius 500m (persons)	Population	31,374	24,000	24,400
	Employment	22,350	25,000	27,000
	Student	10,175	7,000	7,000
Ridership (persons/day)		-	57,000	71,700

Source: JICA Project Team

4.10 Issues to be clarified of Nam Cau Long Bien and Hang Dau station area are as follows:

- i) Adjustment of Red River alignment and station location (minimum): The proposed alignment and location which the railway bridge is 200m-north from Long Bien Bridge is differed from the ones of F/S (30m-north from Long Bien Bridge). It is necessary to make a consensus among stakeholders especially MOT and VNR and get an official approval of Prime Minister.
- ii) Road development under/along the elevated railway (minimum): When the elevated railway will be constructed, the space under the viaduct can be utilized to develop a trunk road. Phung Hung Street will be widened, and new road from the Water Tower to Yen Phu Street will be developed. The construction schedule of these roads should be the same as UMRT development, so it is necessary to coordinate with HAUPA and HDOT to get an approval of new road development.

- iii) Adjustment of plans of underground parking development and water tower redevelopment (minimum): To develop UMRT railway and stations (elevated and underground), it is necessary to adjust neighboring development plans. In case of underground parking development plan, it is necessary to readjust location of entrance, and plan pedestrian underground facility to access Hang Dau Station. In case of Water Tower, it is planned to redevelop it as a museum. Since road network around the tower will be reformed, surround space around the tower should be planned to secure safe access.
- iv) Urban redevelopment of Army related facilities (short & mid-term): The urban block of proposed station entrance space mostly belong to Army. It is necessary to discuss land owners and study its feasibility for urban redevelopment project related to station area development.
- v) Traffic management of Ancient Quarter (long-term): To create safe and conformable accessibility around the station, through traffic and parking should be strictly controlled or restricted. It is necessary to develop a traffic management plan of Ancient Quarter and Hoan Kiem Lake area of a city planning level.

Table 4.6 Project List of Nam Cau Long Bien (V6) and Hang Dau (C8) Station Area

Project			Scale		Construction Cost (000US\$)	Land acquisition		Implementa tion Body	Financial resource
						Scale	Measure		
A Minimum development till opening	SF-PD-1*	Pedestrian deck ²⁾	3,900	m	10,140	-	-	VNR/HRB ¹⁾	VNR/HPC ¹⁾
	SF-PU-1*	Pedestrian underground	1,500	m	9,000	-	-	HRB	HPC
	SF-EV-1*	Elevator	9	No.	900	-	-	VNR/HRB	VNR/HPC
	SF-ES-1*	Escalator	1	No.	300	-	-	VNR/HRB	VNR/HPC
	SF-BS-1	Bus Stop	5	No.	25	-	-	TRAMOC	HPC
	SF-PC-3	Improvement of crossing of Hang Thanh Str.	1	No.	10	-	-	TRAMOC	HPC
	SF-CP-1*	Underground parking development (planned)	32,800	m2	32,800	-	-	HDOT	Private
	RD-NR-1*	Development of new road under viaduct ³⁾	270	m	432	-	-	HDOT	HPC
	RD-WR-1*	Widening of Phung Hung Street	680	m	476	2,100 m2	Land acquisition	HDOT	HPC
	RD-MA-1	Improvement of main access road	10	m	1,000	-	-	HDOT	HPC
B Short-term (opening~3ye ars)	SF-SE-2	Station entrance space with sunkun garden	4,200	m2	25,200	4,200 m2	Land acquisition	HPC	HPC/Private
	SF-PC-1	Improvement of crossing of Quan Thanh Str.	1	No.	10	-	-	HDOT	HPC
	SF-PC-2	Improvement of crossing of Phung Hung Str.	1	No.	10	-	-	HDOT	HPC
	SF-EV-2	Elevator inside station entrance space	2	No.	200	-	-	HRB	HPC ³⁾
	SF-ES-2	Escalator inside station entrance space	2	No.	600	-	-	HRB	HPC ³⁾
	RD-MA-2	Improvement distribution road	500	m	550	-	-	HDOT	HPC
	RD-SW-1	Improvement of Sidewalk	9,800	m	2,646	-	-	HDOT	HPC
	RD-SW-2	Improvement of Sidewalk	850	m	230	-	-	HDOT	HPC
	RD-CR-1	Improvement of community road	15,900	m	6,678	-	-	HDOT	HPC
	LEI-1	Water Tower Park	4,000	m2		800 m2	Land acquisition	HPC	HPC
C Medium- term (3~5years)	SF-SE-1	Station entrance space of east of Nam Cau Long Bien Station	5,000	m2	30,000	5,000 m2	Land acquisition	HPC	HPC
	TM-1	Pedestrian network development	1,200	m		-	-	HDOT	HPC

Source: JICA Project Team

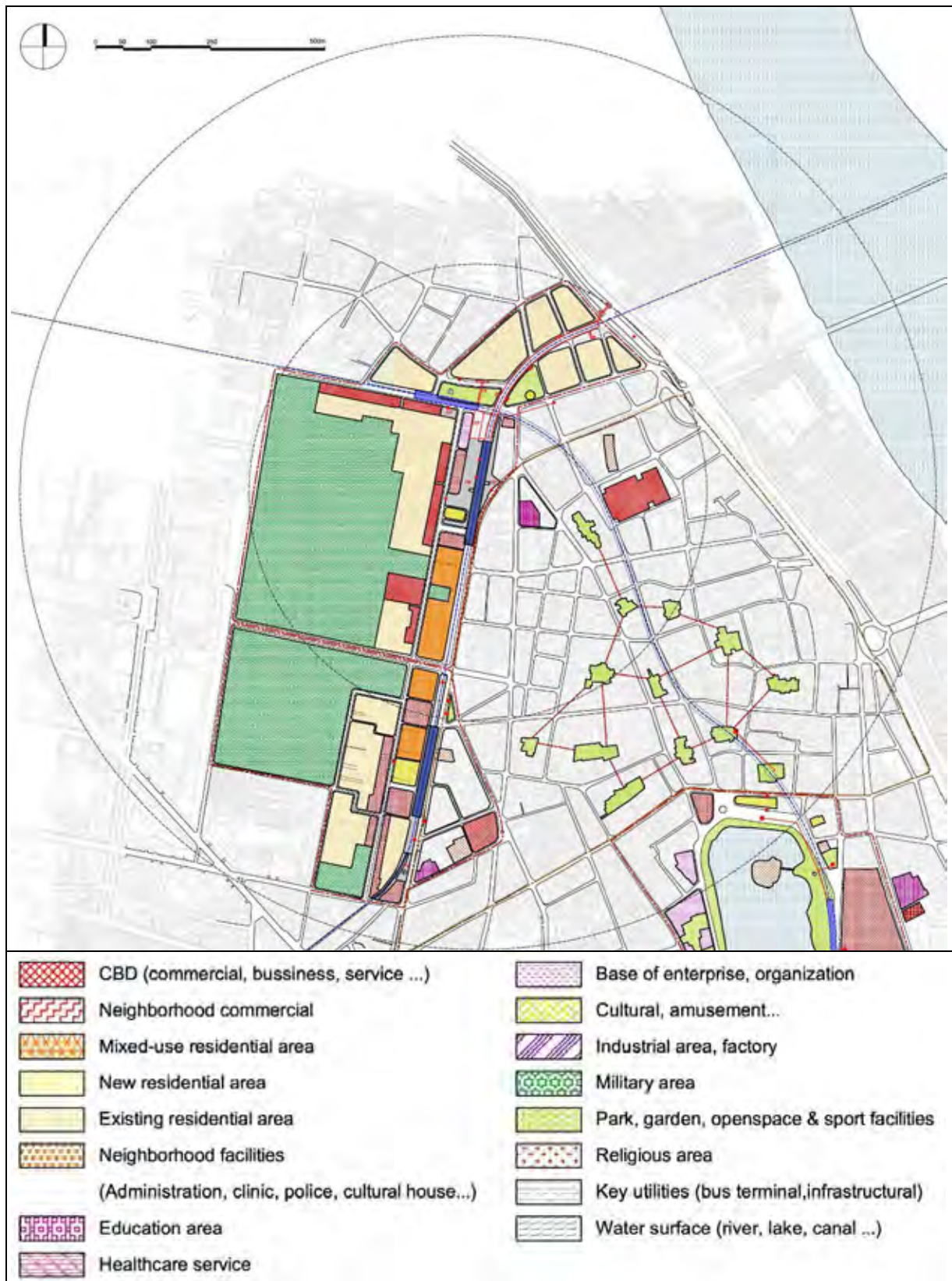
Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) It has not been discussed and agreed between VNR and HPC which will be an implementation body and a financial resource for ITF development. JICA Project Team recommends VNR will develop ITF as a station related facility development.

2) It is proposed to develop pedestrian deck under the viaduct from Nam Cau Long Bien Station to Long Bien Bus Terminal.

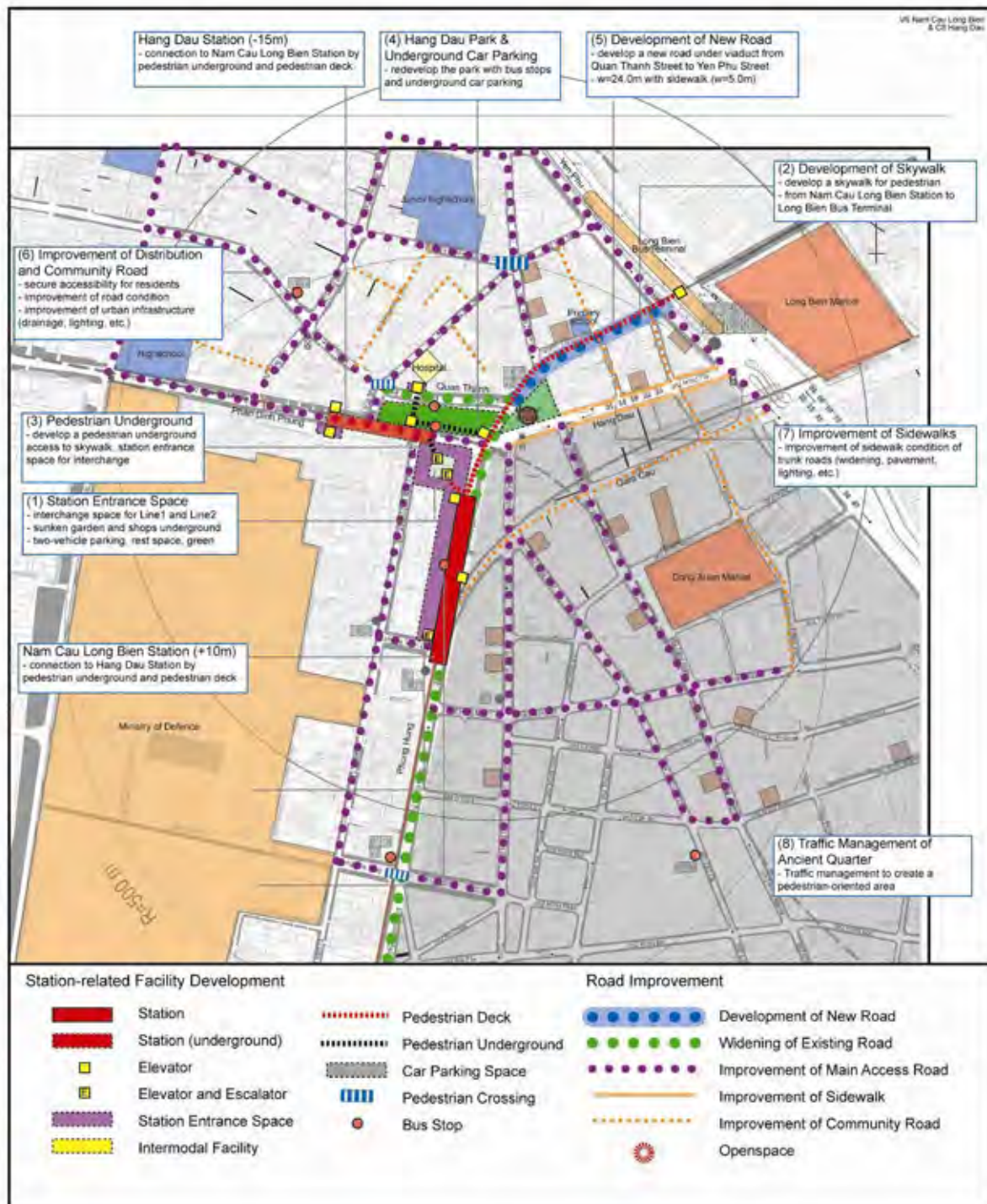
3) It is proposed to develop a new road under the viaduct from Quan Thanh Street to Yen Phu Street

Figure 4.4 Long-term Concept Plan of Nam Cau Long Bien (V6) and Hang Dau (C8) Station Area



Source: JICA Project Team

Figure 4.5 Short-term Projects of Nam Cau Long Bien (V6) and Hang Dau (C8) Station Area



Source: JICA Project Team

4.2.3 Hanoi and Line3 station area (Line1-V8)

4.11 Hanoi station is proposed to be located on the middle of the old marshalling yard of VNR to ensure connectivity to UMRT Line 03 station. The configuration of the station area shall follow the main urban axis of Le Duan Street (NH-1) and provide two gateways for both stations of Line1 and Line3. Ancillary roads, bus transfer facilities, and feeder bus services shall also be provided for smooth traffic flow in the area, aside from improved access to the station. The mixed-use non-rail urban re-development component would create a new urban node for Hanoi that is also in harmony with the historic French Quarter in terms of landscape and urban design. Station area development will promote urban redevelopment projects and living condition improvement projects of Dong Da District where high-dense residential areas are clustered.

4.12 The prioritized potential area for urban development is a property of VNR (app. 11ha). Extension of Tran Hung Dao Street is also a core project in short-term to achieve integration between east and west of railway. The main entrance of Hanoi Station will be developed both east of French Quarter and west of Dong Da District, which face different types of urban area. Intermodal facilities and station-related facilities should be developed inside of VNR owned land in short-term. Gradually, high-dense residential areas of Dong Da District will be improved and urban redevelopment projects will be promoted to develop commercial and business facilities and new residential areas with mid and high rise buildings.

Table 4.7 Demand Outlook for Hanoi Station Area (V8)

		Present	UMRT with integrated Urban Development	
			Without	With
Population of Station Area of radius 500m (persons)	Population	31,561	23,600	23,600
	Employment	21,161	24,800	49,100
	Student	7,464	5,100	5,100
Ridership (persons/day)		-	44,100	57,100

Source: JICA Project Team

4.13 Issues to be clarified of Hanoi station area are as follows:

- i) Adjustment of location of Tran Hung Dao Station of Line3 (short-term): The station of UMRT Line3 has been planned to locate at a place 300 meter away from the Hanoi station. As already mentioned, it is proposed that this station be relocated nearer to Line1 station with due consideration to technical aspects.
- ii) Extension of Tran Hung Dao Street to west (short-term): At present, connecting roads between west and east of National Railway are only two points: i) Hai Ba Trung Street – Nguyen Khuyen Street (400m north from station) and ii) Khan Thien Street (600m-south from station). Extension of Tran Hung Dao Street will contribute not only to improve traffic congestion around railway crossing, but also to integrate isolated areas from city center into one.
- iii) Preservation of architecture of existing Hanoi Station (short-term): Since the architecture of existing Hanoi Station is one of the historical heritages of Hanoi, which the design are combination of Russian and French styles, it is proposed to relocate it and reform as a public facility such as museum. This issue should be discussed and agreed among various stakeholders including HPC, VNR, related organizations including history, architecture, etc. It is also recommended to ask for opinions from citizens.

Table 4.8 Project List of Hanoi (V8) Station Area

Project		Scale		Construction Cost (000US\$)		Land acquisition		Implementati on Body	Financial resource	
						Scale	Measure			
A Minimum development till opening	SF-IM-1	West intermodal transfer facility	6,400	m2	346	11,472	-	-	VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-IM-2*	East intermodal transfer facility	8,000	m2	432		-	-	VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-SE-1	West station entrance space	3,600	m2	288		-	-	VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-SE-2*	East station entrance space	2,500	m2	200		-	-	VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-PD-1	West pedestrian deck	400	m2	1,040		-	-	VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-PD-2*	East pedestrian deck	1,700	m2	4,420		-	-	VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-EV-1*	Elevator	5	No.	500		-	-	VNR	VNR
	SF-ES-1*	Escalator	2	No.	600		-	-	VNR	VNR
	SF-BS-1	Bus Stop	6	No.	30		-	-	TRAMOC	HPC
	RD-NR-1	Development of new road (w=24m) ²⁾	830	m	1,328		19,900 m2	LA from SOE land and private	HDOT/ VNR	HPC/Private
	RD-NR-2	Development of new road (w=24m) ³⁾	430	m	688		10,300 m2		HDOT/ VNR	HPC/Private
	RD-WR-1	Widening of Le Duan Street (w=30m) ⁴⁾	950	m	665		11,400 m2		HDOT	HPC/Private
RD-MA-1	Improvement of main access road	850	m	935	-	-	HDOT	HPC/Private		
B Short-term (opening~3y ears)	SF-CP-1	North car parking space	8,000	m2	320	2,725	8,000 m2	(utilization of ROW)	VNR/Private	VNR/Private
	SF-CP-2	South car parking space	13,300	m2	532		13,300 m2		VNR/Private	VNR/Private
	SF-PC-1	Improvement of crossing of Nguyen Khuyen Street	1	No.	10		-	-	HDOT	HPC/Private
	SF-PC-2	Improvement of crossing of Nguyen Khuyen Street	1	No.	10		-	-	HDOT	HPC/Private
	SF-PC-3	Improvement of crossing of Le Duan Street	1	No.	10		-	-	HDOT	HPC/Private
	SF-PC-4	Improvement of crossing of Le Duan Street	1	No.	10		-	-	HDOT	HPC/Private
	SF-PC-5	Improvement of crossing of Le Duan Street	1	No.	10		-	-	HDOT	HPC/Private
	SF-PC-6	Improvement of crossing of Le Duan Street	1	No.	10		-	-	HDOT	HPC/Private
	RD-WR-2	Widening of Nguyen Khuyen Street	120	m	84		-	-	HDOT	HPC
	RD-SW-1	Improvement of Sidewalk	4,600	m	1,242		-	-	HDOT	HPC
	RD-CR-1	Improvement of Community Road	800	m	336		-	-	HDOT	HPC
	SF-OS-1	Openspace for community road	400	m2	22		-	-	HDOT	HPC/Private
	SF-OS-2	Openspace for community road	400	m2	22		-	-	HDOT	HPC/Private
	SF-OS-3	Openspace for community road	2,000	m2	108		-	-	HDOT	HPC/Private
UR-1	Urban redevelopment	4,100	m2		-	-	VNR	VNR/Private		

		of VNR yard land (Phase1: twin tower construction) ⁵⁾								
	UR-2	Urban redevelopment of VNR yard land (Phase2)	3.5	ha			3.5ha	LR/UR	VNR/HPC/private	VNR/Private
C Medium-term (3~5years)	SF-PU-1	Pedestrian underground ⁶⁾	2,100	m2	12,600		-	-	HRB/HDOT	HPC/Private
	RD-NR-3	Development of new road around Linh Quang Lake (w=24m)	580	m	928		11,000 m2	LA	HDOT	HPC/Private
	UR-3	Urban redevelopment of existing residential area	7.7	ha		-	7.8ha	LR/UR	VNR/HPC/private	Private
	LEI-1	Green and park development around Linh Quang Lake	5.8	ha			-	-	HPC	HPC/Private
	LEI-2	Redevelopment of Van Chuong KTT	4.4	ha			-	-	HPC/HUD	Private
D Long-term (5~10 years)	UR-4	Urban redevelopment of existing residential area	4.5	Ha			4.5ha	LR/UR	HPC/private	Private
	UR-5	Urban redevelopment of existing residential area	2.8	ha		-	2.8ha	LR/UR	HPC/private	Private

Source: JICA Project Team

Note: SOE = State owned enterprise, La = Land Acquisition, LR = Land Readjustment

Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) It has not been discussed and agreed between VNR and HPC which will be an implementation body and a financial resource for ITF development. JICA Project Team recommends VNR will develop ITF as a station related facility development.

2) It is proposed to utilize a land with no necessity of resettlement of local residents such as current VNR owned land for development of new west road.

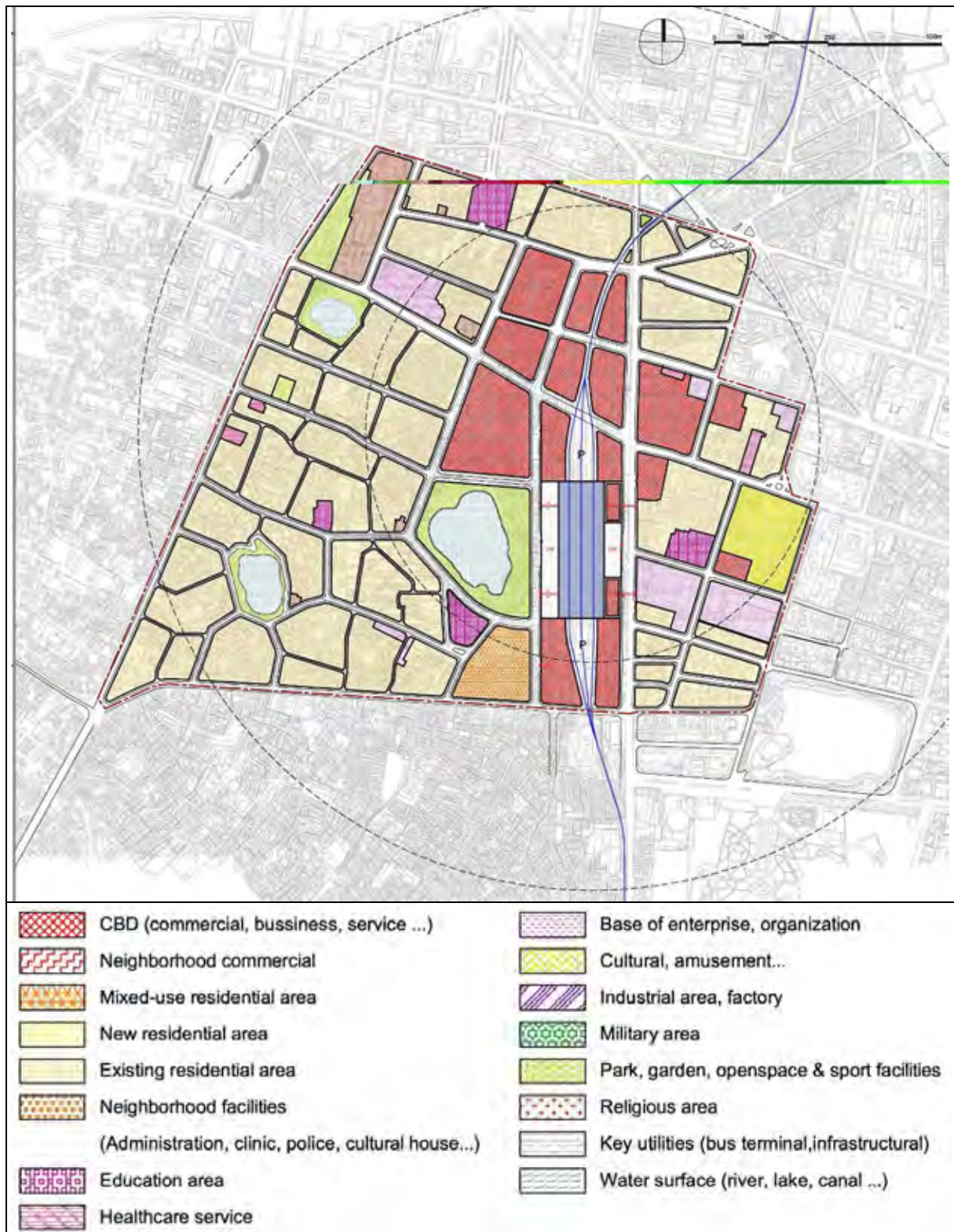
3) It is proposed to develop a new road to connect between Tran Hung Dao Street and Quoc Tu Giam Street

4) It is proposed to widen Le Duan Street with using VNR owned land.

5) In the Feasibility Study, It is planned to construct twin towers, which VNR Head Quarter will be located from 1F to 4F. The total floor will be 21st floor.

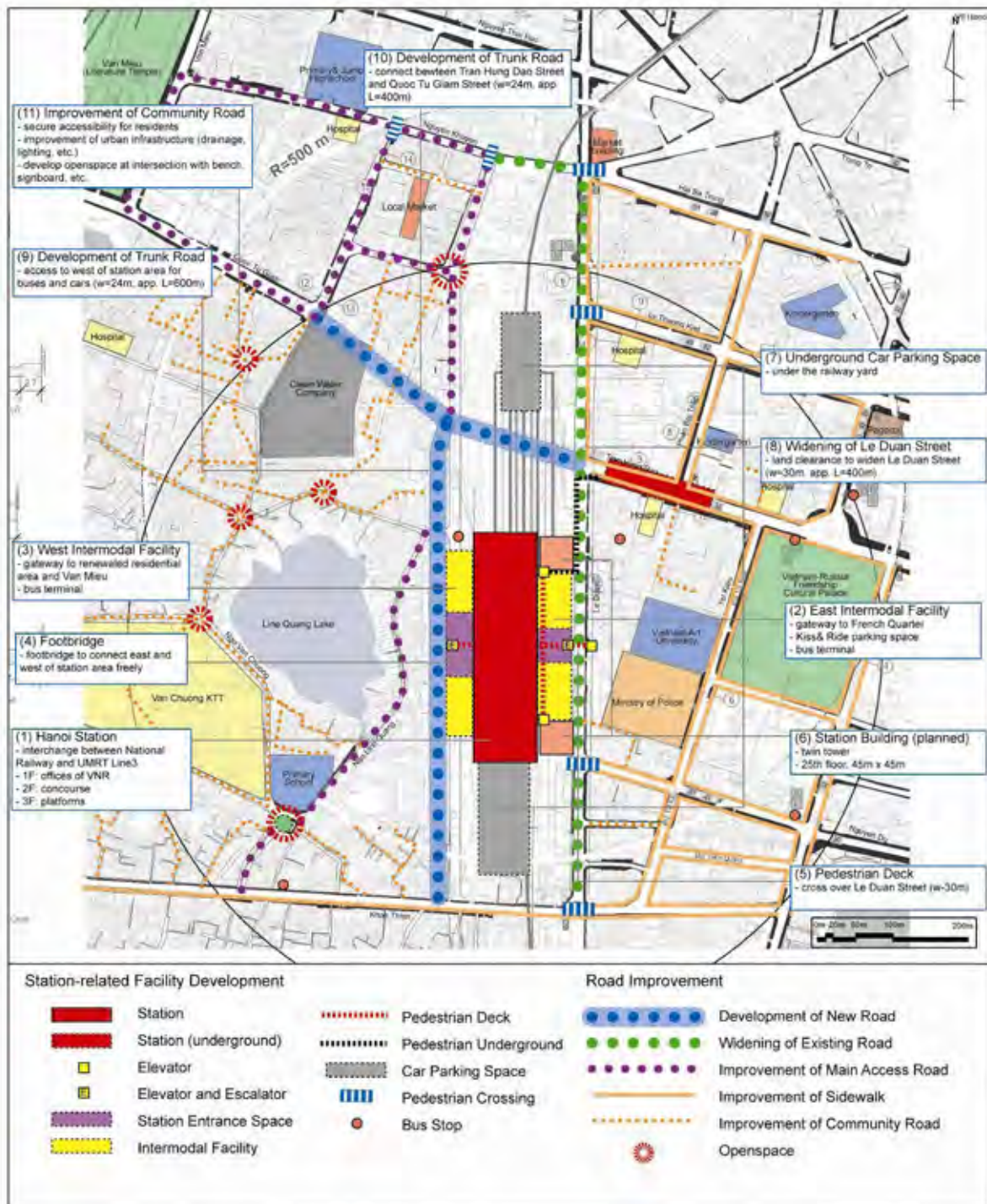
6) It is proposed to develop a pedestrian underground to connect to Line3 station underground.

Figure 4.6 Long-term Concept Plan of Hanoi Station Area (V8)



Source: JICA Project Team

Figure 4.7 Short-term Concept Plan of Hanoi Station Area (V8)



Source: JICA Project Team

4.2.4 C.V. Thong Nhat and Bach Khoa station area (Line1-V9 and Line2-C12)

4.14 This station area aims to be “a high-class educational and medical service area in harmony with natural environment”. Thanks to clustered urban facilities, especially universities, hospitals and parks, these two stations will be highly expected by not only potential railway users but also facility users including hospitals and universities and parks. In addition, this area is a south gateway of center of city, and major intersection with underpass is located.

4.15 For convenient accessibility to stations and urban facilities located south of Dai Co Viet Street, interchange facilities elevated and underground are significant. To attract railway users, facility users as well as residents, living condition improvement projects and urban redevelopment projects of hospitals and universities will contribute to improve image of station area with educational and medical service promotion area with nature.

Table 4.9 Demand Outlook for C.V. Thong Nhat Station Area (V9)

		Present	UMRT with integrated Urban Development	
			Without	With
Population of Station Area of radius 500m (persons)	Population	13,352	12,400	12,600
	Employment	5,226	7,500	8,300
	Student	9,279	11,000	11,200
Ridership (persons/day)		-	30,700	32,800

Source: JICA Project Team

Table 4.10 Demand Outlook for Bach Khoa Station Area (C12)

		Present	UMRT with integrated Urban Development	
			Without	With
Population of Station Area of radius 500m (persons)	Population	19,092	14,300	14,400
	Employment	9,030	11,600	12,600
	Student	17,741	31,000	31,200
Ridership (persons/day)		-	19,500	24,300

Source: JICA Project Team

4.16 Issues to be clarified of C.V. Thong Nhat and Bach Khoa station area are as follows:

- i) Connectivity with Line1 and Line2 station (short and long-term): To construct a safe and convenient interchange between two stations, it is necessary to develop pedestrian underground under railway alignment. The proposed pedestrian deck and skywalk of intersection is also a part of railway facility. So it is recommended these facilities will be designed and constructed in a short-term together with UMRT facilities of Line1-Phase1.
- ii) Land acquisition and relocation for urban renovation of residential area (long-term): Though it is a critical issue to improve living condition of high-dense residential area in Hanoi, there are no specific measures at present. Land acquisition and relocation should be integrated with station development process. For example, resettled households will be relocated to apartments near the station which are developed by the station area development project.

Table 4.11 Project List of C.V. Thong Nhat (V9) and Bach Khoa (C12) Station Area

	Project	Scale	Construction Cost (000US\$)	Land acquisition		Implementa tion Body	Financial resource				
				Scale	Measure						
Phase1 C.V. Thong Nhat	A Minimum developm ent till opening	SF-SE-1*	North station entrance space	1,800	m2	144	6,777	1,800	LA from public ¹⁾	HPC	HPC
		SF-SE-2	South station entrance space	1,350	m2	108		1,350	Land acquisition	HPC	HPC
		SF-PD-1	North pedestrian deck	700	m2	1,820		-	-	HPC	HPC
		SF-PD-2*	South pedestrian deck	600	m2	1,560		-	-	VNR	VNR
		SF-EV-1*	Elevator	3	No.	300		-	-	VNR	VNR
		SF-ES-1*	Escalator	1	No.	300		-	-	VNR	VNR
		SF-BS-1	Bus stop	1	No.	5		-	-	TRAMOC	HPC
		RD-WR-1*	Widening of Le Duan Str. (w=30m)	800	m	560		6,400	Land acquisition from park	HDOT	HPC
		RD-MA-1	Improvement of main access road	1,800	m	1,980		-	-	HDOT	HPC
	B Short-term (opening~3years)	SF-OS-1	Openspace for community road	1,800	m2	97	999	-	-	HDOT	HPC
		SF-OS-2	Openspace for community road	900	m2	49		-	-	HDOT	HPC
		SF-OS-3	Openspace for community road	1,200	m2	65		-	-	HDOT	HPC
		SF-OS-4	Openspace for community road	1,800	m2	97		-	-	HDOT	HPC
		SF-OS-5	Openspace for community road	400	m2	22		-	-	HDOT	HPC
		RD-SW-1	Improvement of sidewalk of trunk road	2,480	m	670		-	-	HDOT	HPC
Phase2 Bach Khoa	A Minimum	SF-EV-2	Elevator	2	No.	200	6,200	-	-	HRB	HPC
	B Short-term	SF-PU-1	Pedestrian underground	1,000	m2	6,000		-	-	HRB	HPC
C Medium-term (3~5years)	SF-PD-3	Circle-shaped pedestrian deck ³⁾	2,200	m2	5,720	5,920	-	-	HDOT	HPC	
		SF-EV-2	Elevator	2	No.		200	-	-	HDOT	HPC
	UR-1	Urban redevelopment of Phuong Lien Commune (Phase1) ⁴⁾	1.5	ha	-		1.5ha	LR/UR	HPC/ Private	Private	
	D Long-term (5~10 years)	UR-2	Urban redevelopment of Phuong Lien Commune (Phase2) ⁵⁾	5.9	ha		-	5.9ha	LR/UR	HPC/ Private	Private

Source: JICA Project Team

Note: SOE = State owned enterprise, La = Land Acquisition, LR = Land Readjustment

Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

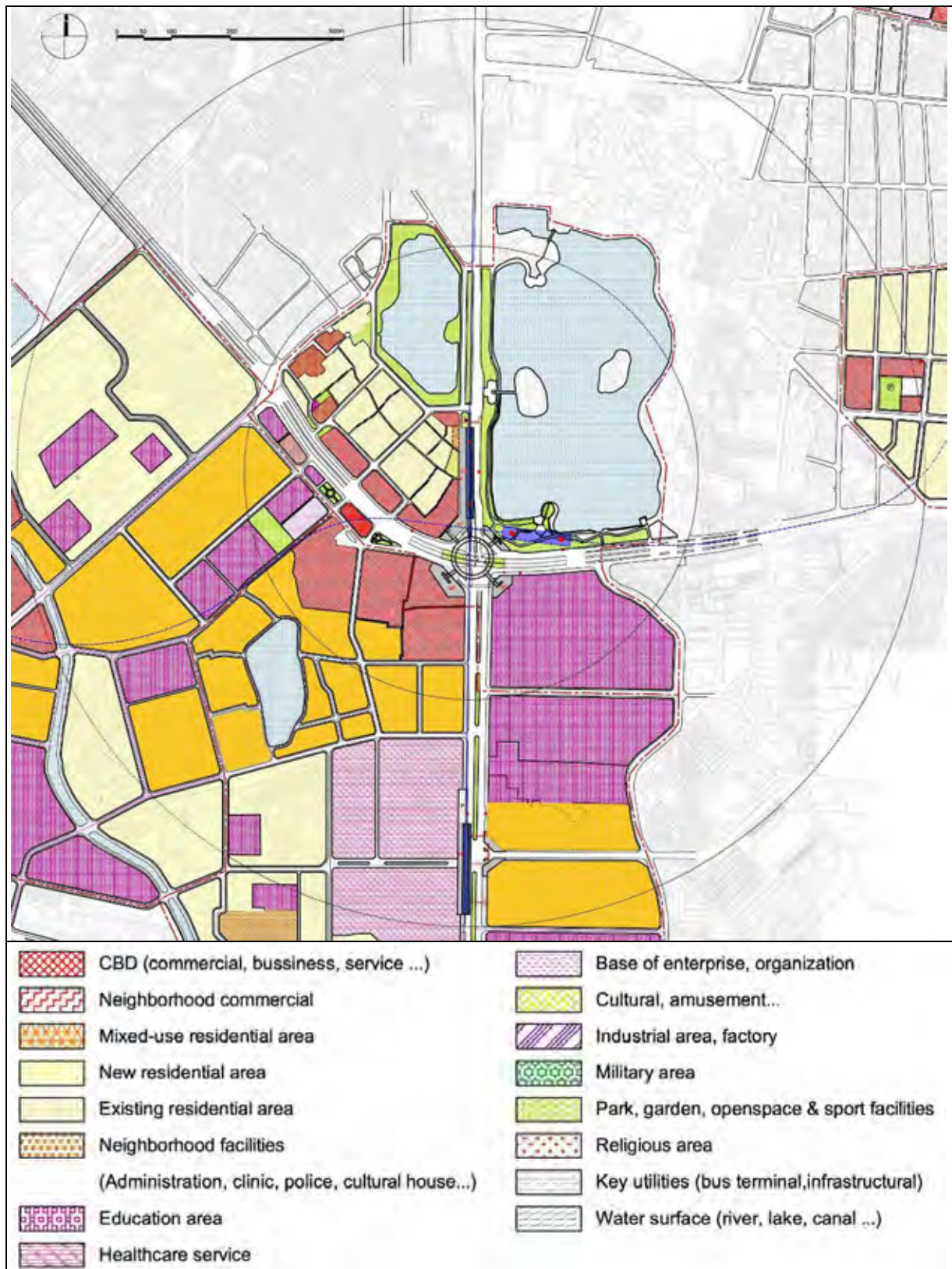
1) It is proposed to utilize the public land of Thong Nhat Park management office.

2) It is proposed to develop circle-shaped pedestrian deck of Phase2 of Line2 when Bach Khoa Station will be constructed.

3) It is proposed that the project area of phase 1 will cover neighboring block of C.V. Thong Nhat Station to develop commercial and public facilities.

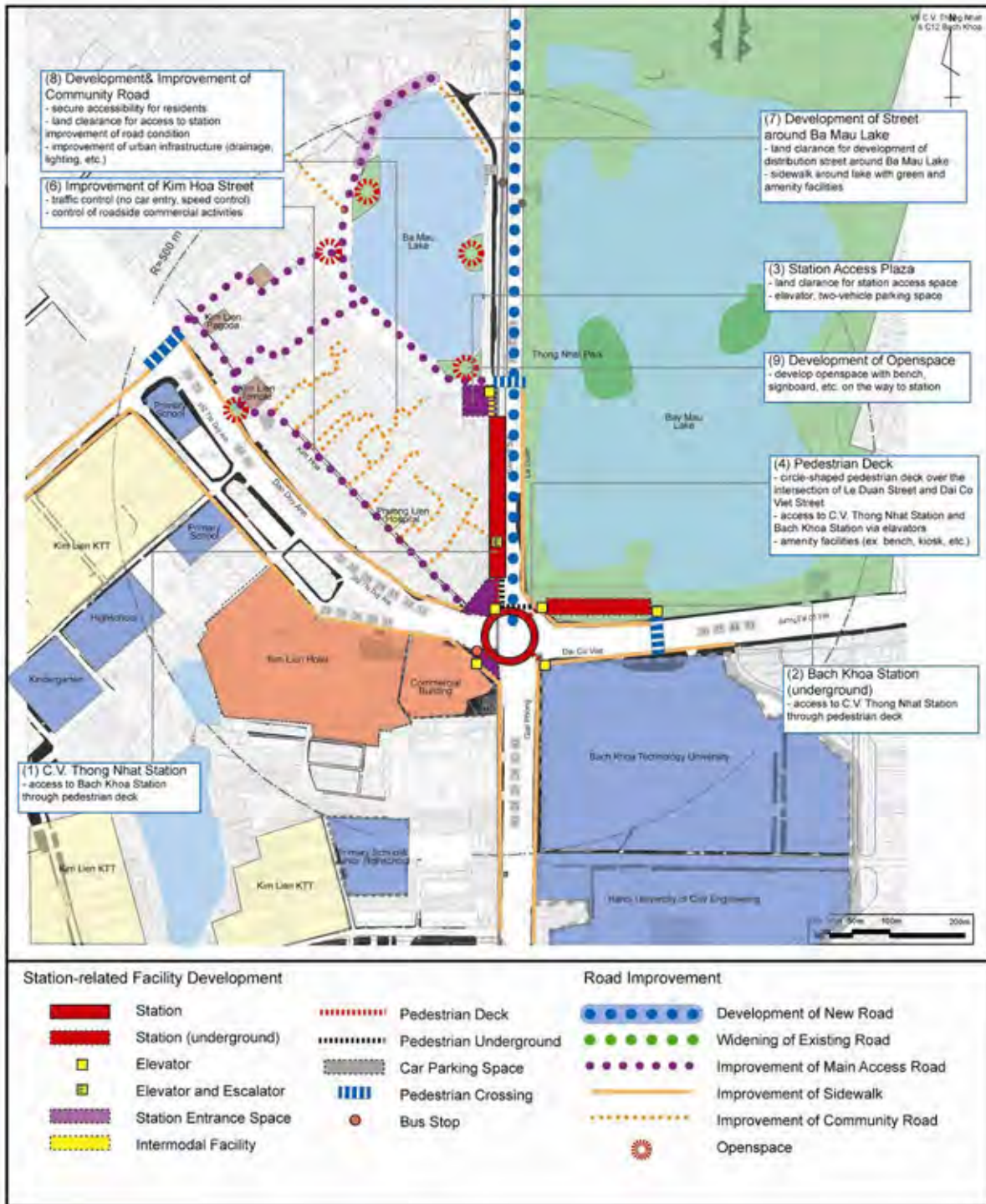
4) It is proposed that the project area of phase 2 will cover residential area of Phuong Lien Commune between Ba Mau Lake and Dao Duy Anh Str. to redevelop residential areas.

Figure 4.8 Long-term Concept Plan of C.V. Thong Nhat (V9) and Bach Khoa (C12) Station Area



Source: JICA Project Team

Figure 4.9 Short-term Concept Plan of C.V. Thong Nhat (V9) and Bach Khoa (C12) Station Area



Source: JICA Project Team

4.2.5 Giap Bat and bus terminal station area (Line1-V12)

4.17 The characteristics of Giap Bat Station will be “a southern gateway of Hanoi City with transport hub and urban service facilities in harmony with natural environment”. Creating a new urban core for district business and commercial activities will open up new opportunities for livelihood to residents around the station area. This would entail judicious exploitation of agricultural lands and hinterland ponds, as well as provision of urban block roads linking the station to the Dai Kim – Dinh Cong new town.

4.18 As a transport hub, the area can become an urban node (sub-CBD) for the Hoang Mai District at the southern fringes of central Hanoi. By proper design of the UMRT station layout with the Giap Bat inter-city bus terminal and other transport modes, the overall connectivity of the network improves and makes transfers convenient.

Table 4.12 Demand Outlook for Giap Bat Station Area (V12)

		Present	UMRT with integrated Urban Development	
			Without	With
Population of Station Area of radius 500m (persons)	Population	6,128	14,200	15,000
	Employment	2,493	4,000	45,300
	Student	902	1,800	1,900
Ridership (persons/day)		-	18,000	20,400

Source: JICA Project Team

4.19 Issues to be clarified of Giap Bat station area are as follows:

- i) Disposition of VNR property (short-term to long-term): As mentioned about station location, preferable location is to shift 150m-south from F/S in terms of integrated urban development. Technical feasibility for railway operation needs to be studied.
- ii) Possible redevelopment and relocation of Giap Bat Bus Terminal (long-term): At this moment, relocation of bus terminal has not been planned. It is necessary to consider if it will not be relocated, redevelopment of bus terminal into multi functional building including bus terminal and commercial facilities will be effective for service improvement. In case if it will be relocated, an urban redevelopment project will be conducted to utilize the land for commercial development.

Table 4.13 Project List of Giap Bat Station Area (V12)

Project			Scale		Construction Cost (000US\$)		Implementati on Body	Financial resource
A Minimum developme nt till opening	SF-SE-1*	Station entrance space of east of station	3,600	m2	288	10,299	VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-SE-2*	Station entrance space in bus terminal	1,750	m2	140		TRAMOC	HPC
	SF-SE-3	Station entrance space of south	750	m2	60		HPC	HPC
	SF-IM-1*	East Intermodal Facility	6,500	m2	351		VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-PD-1*	Pedestrian Deck	1,000	m2	2,600		VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-PD-2*	Pedestrian Deck	1,000	m2	2,600		VNR/HPC ¹⁾	VNR/HPC ¹⁾
	SF-EV-1*	Elevator	4	No	400		VNR	VNR
	SF-ES-1*	Escalator	1	No	300		VNR	VNR
	SF-BS-1	Bus Stop	4	No	20		TRAMOC	HPC
	SF-PC-1	Pedestrian Crossing	1	No	10		HDOT	HPC
	SF-PC-2	Pedestrian Crossing	1	No	10		HDOT	HPC
	RD-WR-1*	Widening of Giai Phong Street ²⁾	1,100	m	770		HDOT	HPC
	RD-MA-1	Improvement of Main Access Road	2,500	m	2,750		HDOT	HPC
B Short-term (opening~3 years)	SF-PD-3	Pedestrian Deck ⁴⁾	2,800	m2	7,280	8,023	VNR	HPC
	RD-SW-1	Improvement of Sidewalk	2,750	m	743		HDOT	HPC
	UR-1	Development of twin tower (planned) ³⁾	-	-	-		VNR	VNR/ Private
C Medium-term (3~5years)	UR-2	Redevelopment of VNR owned land	-				VNR/HPC/ Private	VNR/HPC/ Private
	UR-3	Development of station-front west park and Doi Dam Pond					MONRE/HP C	MONRE/HP C
D Long-term (5~10 years)	UR-4	Redevelopment of existing residential areas in Dinh Cong Commune					Private	Private
	UR-5	Redevelopment of the vacant land of bus terminal ⁵⁾					Private	Private

Source: JICA Project Team

Note: SOE = State owned enterprise, La = Land Acquisition, LR = Land Readjustment

Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) It has not been discussed and agreed between VNR and HPC which will be an implementation body and a financial resource for ITF development. JICA Project Team recommends VNR will develop ITF as a station related facility development.

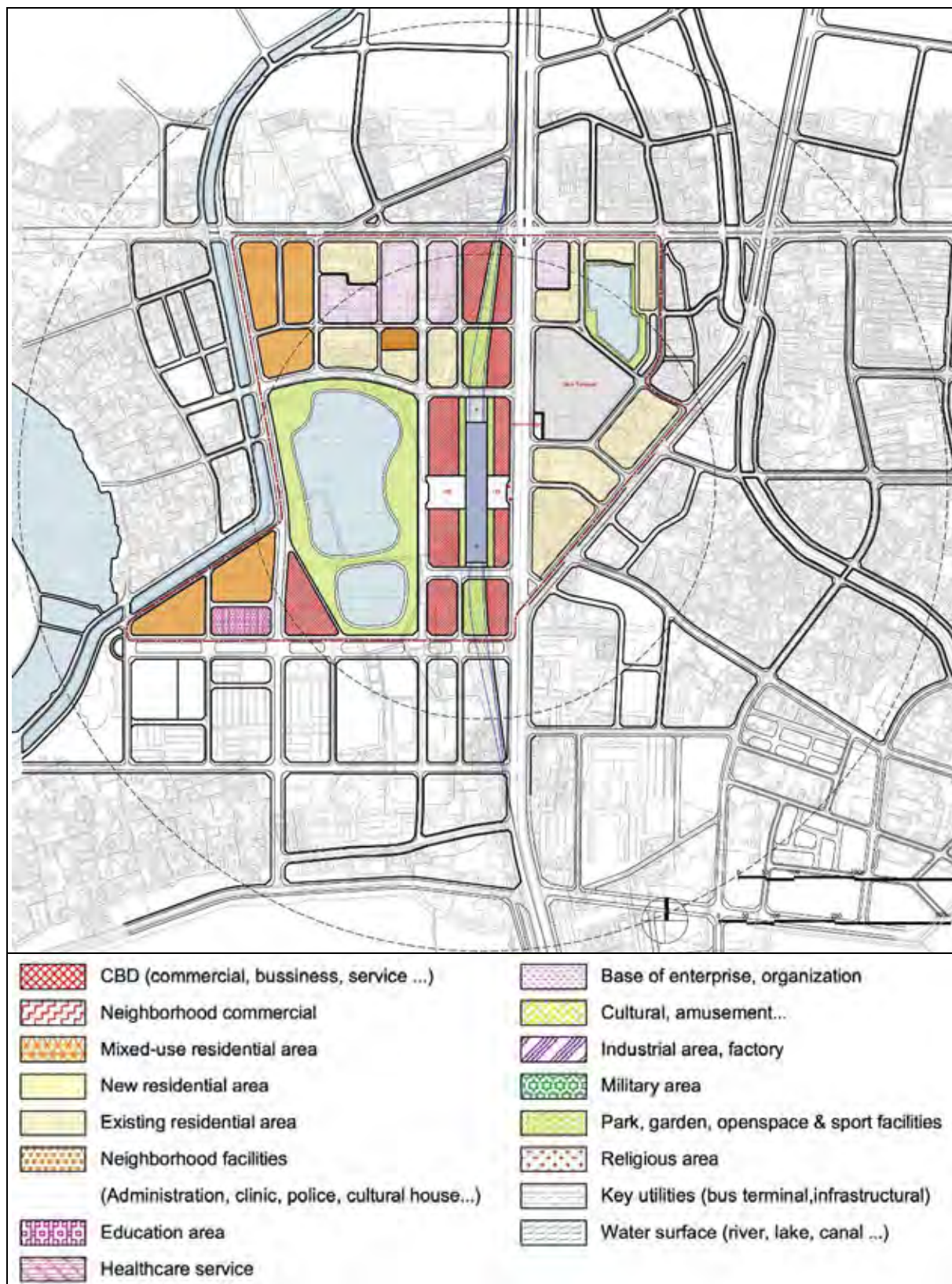
2) It is proposed to widen NH-1 under viaduct within ROW. Space under viaduct will be used for entrance space, parking space, etc. near station.

3) It is proposed that pedestrian deck to connect to twin tower will be developed together with twin tower construction.

4) It is planned to construct twin tower in the Feasibility Study.

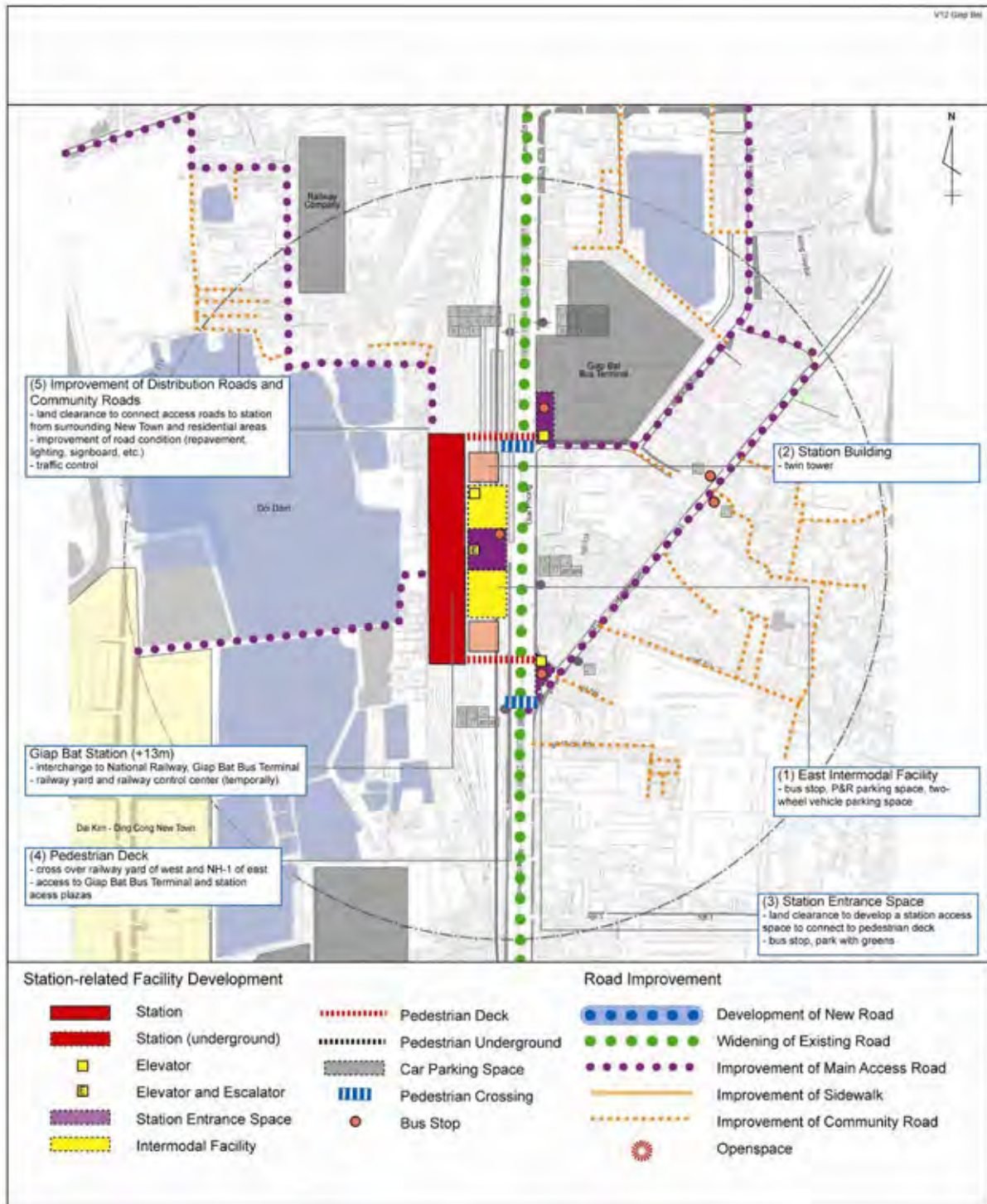
5) It is proposed to develop a new bus terminal in front of Hoang Liet Station (V13) and relocate Giap Bat Bus Terminal into Hoang Liet.

Figure 4.10 Long-term Concept Plan of Giap Bat Station Area (V12)



Source: JICA Project Team

Figure 4.11 Short-term Concept Plan of Giap Bat Station Area (V12)



Source: JICA Project Team

4.2.6 Tay Ho Tay and bus terminal/ CAT station area (Line2-C3)

4.20 The characteristics of Tay Ho Tay Station will be “a north-western gateway of Hanoi City with transport hub and high-class financial, commercial and business service facilities”. In long term, this station is expected to be connected to Noi Bai Airport via airport link train. Tay Ho Tay Financial Center will be a modern city center of Hanoi and this station will be an international and national gateway. Pedestrian network at elevated level will be formulated with pedestrian deck. So interchange station of Line2, Line4 (BRT) and Airport Train will be integrated with commercial and business facilities around the station.

Table 4.14 Demand Outlook of Tay Ho Tay Station Area (C3)

		Present	UMRT with integrated Urban Development	
			Without	With
Population of Station Area of radius 500m (persons)	Population	0	8,600	8,600
	Employment	0	82,000	86,200
	Student	0	1,700	1,700
Ridership (persons/day)		-	13,930	25,700

Source: JICA Project Team

4.21 Issues to be clarified of Tay Ho Tay station area are as follows:

- i) Coordination with Tay Ho Tay Financial Center Development Plan (short-term): As a core transport hub of Tay Ho Tay area, it is necessary to coordinate with Financial Center Development Plan for integrated accessibility and urban development. Since this station development will contribute to private developers, role sharing for planning and investment among HPC and private developers is indispensable.
- ii) Integration with BRT Station (long-term): It is recommended BRT Station will be located under viaduct and Tay Ho Tay Station for shortest transfer.
- iii) Development of Intra Bus Terminal and CAT (long-term): As a north-western gateway with transport hub, it is recommended to develop intra bus terminal and CAT in long-term. Short-term development plan will be integrated with long-term plan as well as urban development plan of surrounding area.

Table 4.15 Project List of Tay Ho Tay Station Area (C3)

Project			Scale		Construction Cost (000US\$)	Implementati on Body	Financial resource	
A Minimum development till opening	SF-SE-1*	East Station Entrance Space	8,700	m2	696	7,930	HRB/HPC ¹⁾	HPC ¹⁾
	SF-IM-1*	West Intermodal Facility	13,600	m2	734		HRB/HPC ¹⁾	HPC ¹⁾
	SF-PD-1*	Pedestrian Deck	1,300	m2	3,380		HRB	HPC
	SF-EV-1*	Elevator	3	No.	300		HRB	HPC
	SF-ES-1*	Escalator	2	No.	600		HRB	HPC
	SF-BS-1	Bus Stop	2	No.	10		TRAMOC	HPC
	RD-NR-1	Development of new road	3,000	m	5,100		HDOT	HPC
B Short-term (opening~3years)	SF-OS-1	Station Park	20,500	m2	1,107	2,127	HDONRE	HPC
	RD-NR-2	Development of new road around station park	600	m	1,020		HDOT	HPC
C Medium-term (3~5years)	UR-1	Tay Ho Tay Central Park development (planned) ²⁾				HPC	HPC	
D Long-term (5~10 years)	UR-2	Tay Ho Tay Financial Center development (planned) ³⁾				HPC/ Private	Private	

Source: JICA Project Team

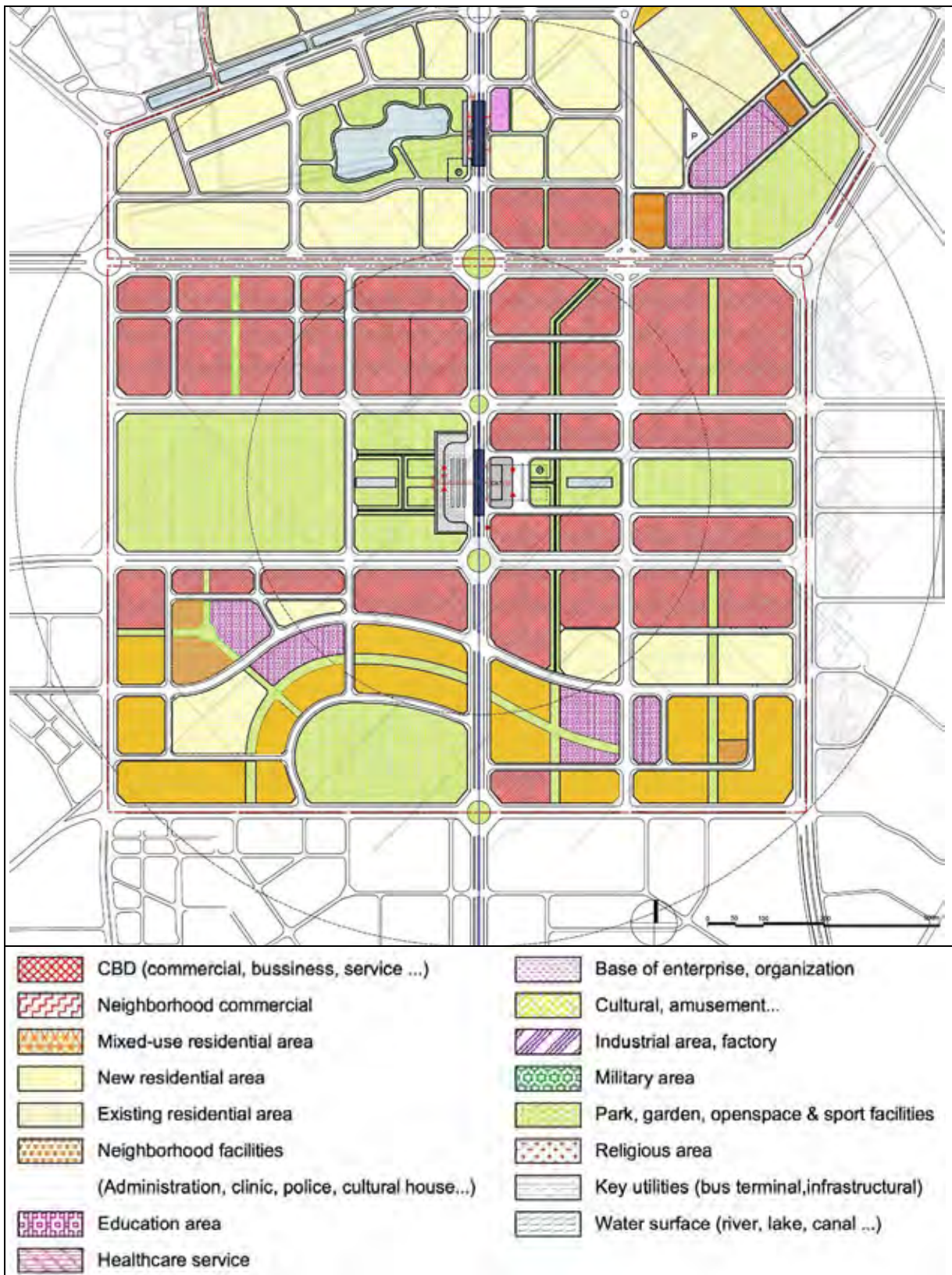
Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) JICA Project Team recommends HRB or HPC will develop station related facilities together with UMRT station development.

2) Tay Ho Tay Central Park development is a part of financial center development project.

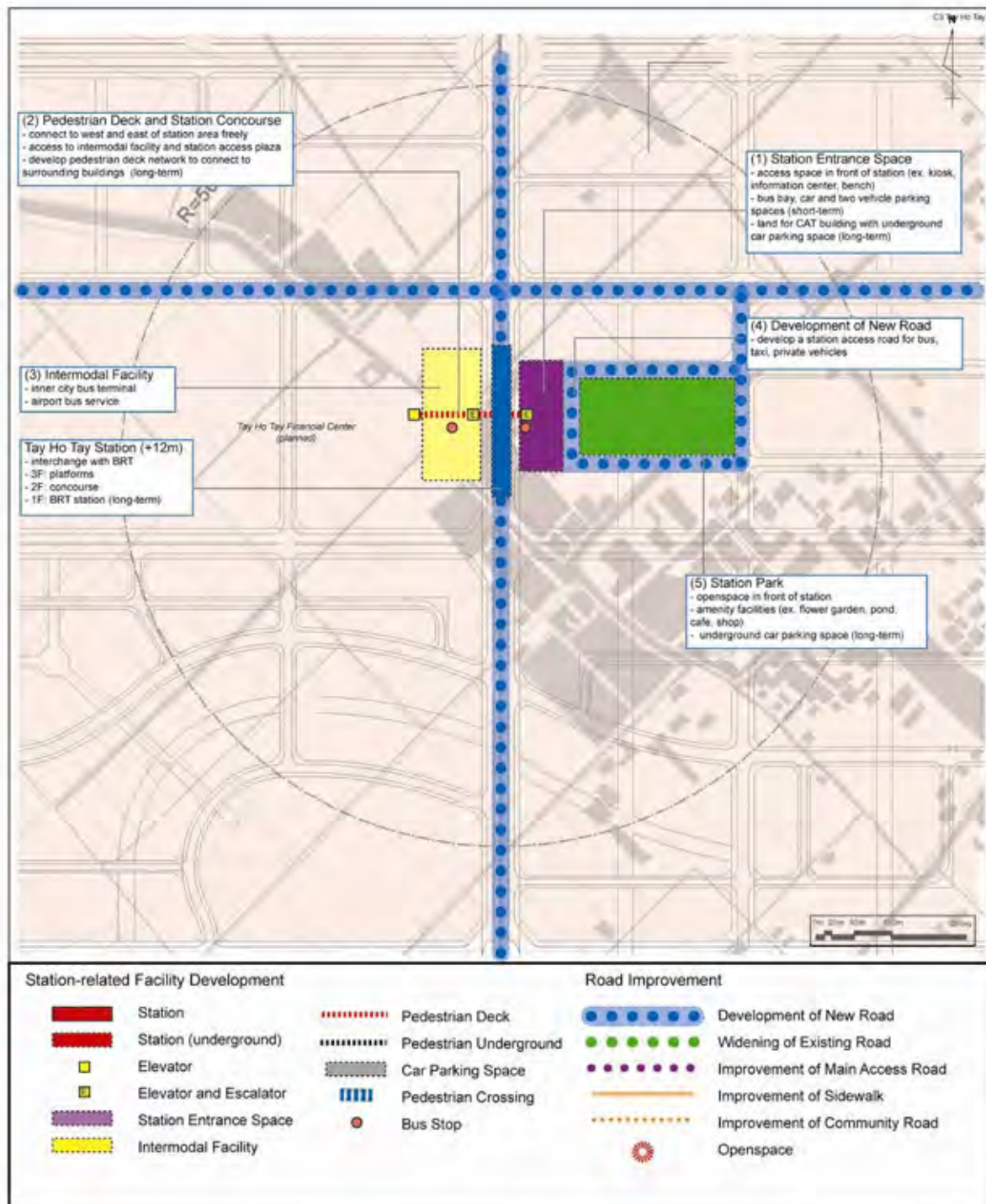
3) Tay Ho Tay Financial Center is planned and approved.

Figure 4.12 Long-term Concept Plan of Tay Ho Tay Station Area (C3)



Source: JICA Project Team

Figure 4.13 Short-term Concept Plan of Tay Ho Tay Station Area (C3)



Source: JICA Project Team

4.2.7 Quan Ngua station area (Line2-C5)

4.22 The terminal station of Quan Ngua Station of Line2 and station of Line5 could formulate an attractive place as one of the important urban nodes facing Ho Tay tourism and recreation waterfront area and Quan Ngua Stadium. There is a temple along Hoang Hoa Tham Street, so the waterfront area will be developed with not only modern commercial functions but also traditional atmosphere. Waterfront area should be used not for private buildings but for public use. Landscape need to be carefully designed to enjoy waterfront scenery for public citizens. The south of station area will be developed as a commercial district in conjunction with Kin Ma business district along Van Cao Street.

Table 4.16 Demand Outlook of Quan Ngua Station Area (C5)

		Present	UMRT with integrated Urban Development	
			Without	With
Population of Station Area of radius 500m (persons)	Population	21,411	14,000	14,000
	Employment	6,205	6,000	7,000
	Student	4,246	3,500	4,000
Ridership (persons/day)		-	10,470	16,790

Source: JICA Project Team

4.23 Issues to be clarified of Quan Ngua station area are as follows:

- i) Coordination with widened Hoang Hoa Tham Street (short-term): Alignment of Hoang Hoa Tham Street is nearly in parallel with UMRT Line2 underground. For effective construction and operation, alignment of subway and widened street will be well coordinated and designed.
- ii) Location of Line5 Station (long-term): Location of Line5 station should be located nearby Quan Ngua for convenient access and transfer for passengers.

Table 4.17 Project List of Quan Ngua Station Area (C5)

Project			Scale		Construction Cost (000US\$)	Implementati on Body	Financial Resource	
A Minimum development till opening	SF-SE-1	Station Entrance Space ²⁾	4,800	m2	384	47,459	HPC	HPC
	SF-PU-1*	Underground Pedestrian Plaza ²⁾	4,800	m2	28,800		HPC/HRB ¹⁾	HPC ¹⁾
	SF-PU-2*	Pedestrian Underground ³⁾	2,200	m2	13,200		HPC/HRB ¹⁾	HPC ¹⁾
	SF-EV-1*	Elevator	4	No.	400		HRB	HPC
	SF-BS-1	Bus Stop	7	No.	35		TRAMOC	HPC
	SF-PC-1	Pedestrian Crossing	1	No.	10		HDOT	HPC
	SF-PC-2	Pedestrian Crossing	1	No.	10		HDOT	HPC
	RD-NR-1	Development of New Road	500	m	1,100		HDOT	HPC
	RD-MA-1	Improvement of Main Access Road	1,500	m	1,650		HDOT	HPC
	RD-MA-2	Improvement of Main Access Road	1,300	m	1,430		HDOT	HPC
	RD-MA-3	Improvement of Main Access Road	400	m	440		HDOT	HPC
B Short-term (opening~3years)	SF-CP-1	Car parking Space in sports stadium ⁵⁾	4,500	m2	180	1,050	HDOT/ Private	HPC/ Private
	RD-WR-1	Widening of existing road inside sports stadium ⁴⁾	220	m	154		HDOT/ Private	HPC/ Private
	RD-SW-1	Improvement of Sidewalk	2,650	m	716		HDOT	HPC
C Medium-term (3~5years)	UR-1	Redevelopment for commercial and business district on south of station			-	Private	Private	
D Long-term (5~10 years)	UR-2	Waterfront tourism complex development in front of West Lake			-	Private	Private	

Source: JICA Project Team

Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

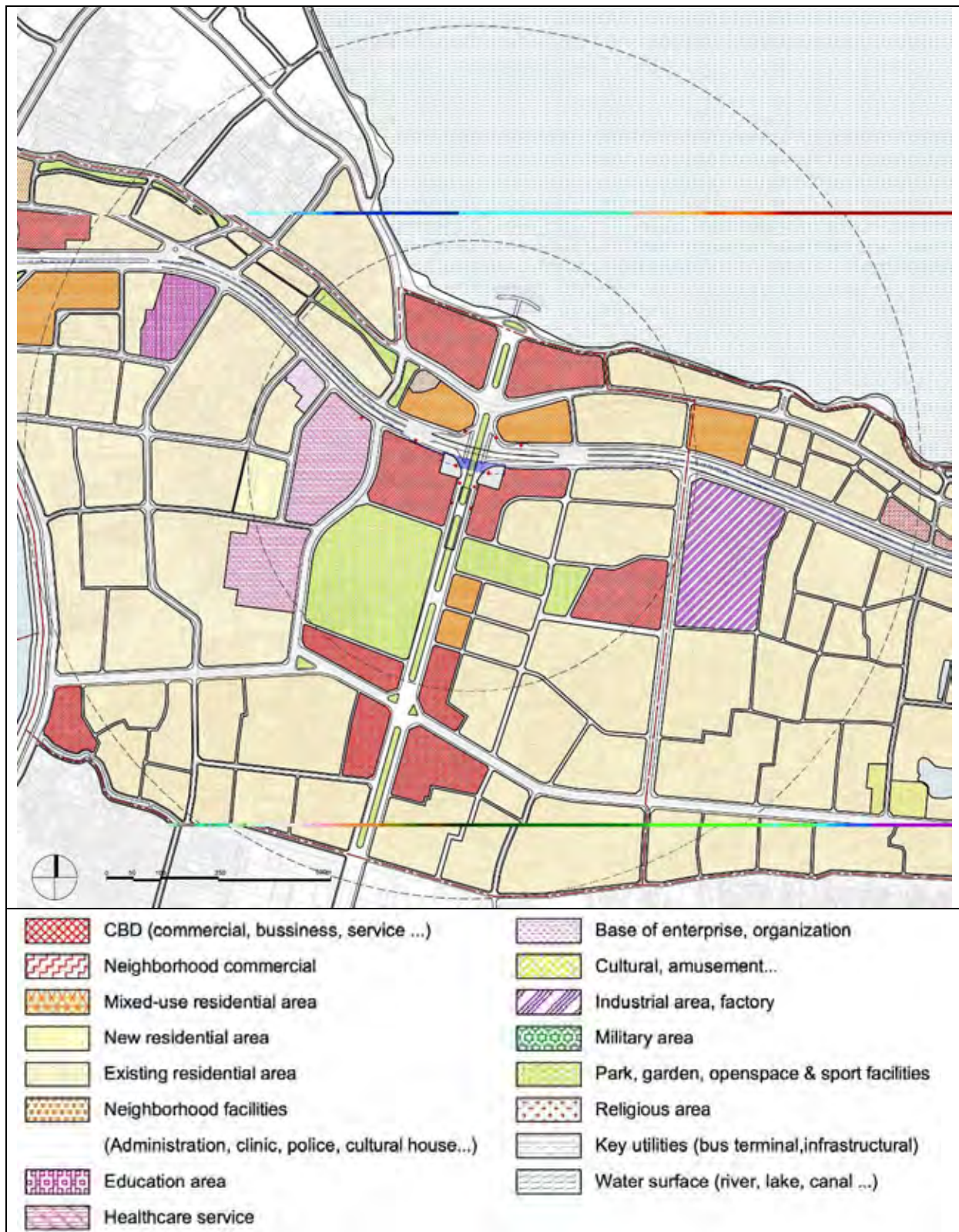
1) JICA Project Team recommends HRB or HPC will develop station related facilities together with UMRT station development.

2) It is proposed to develop underground pedestrian plaza under entrance space to connect UMRT Line2 and Line5.

3) It is proposed to connect pedestrian underground to cross trunk roads.

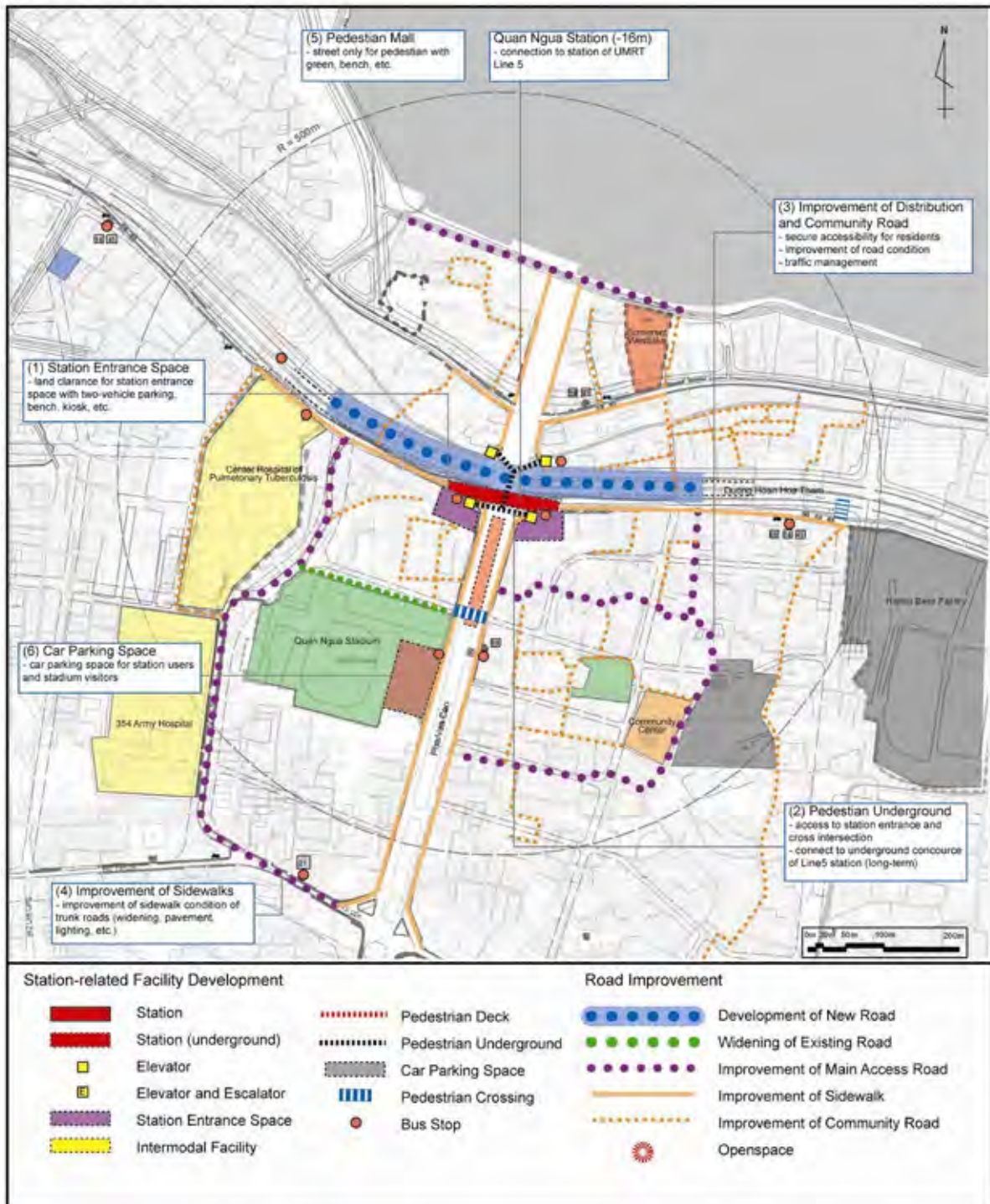
4) It is proposed to utilize car parking space and road in Quan Ngua stadium for station users.

Figure 4.14 Long-term Concept Plan of Quan Ngua Station Area (C3)



Source: JICA Project Team

Figure 4.15 Short-term Concept Plan of Quan Ngua Station Area (C5)



Source: JICA Project Team

4.2.8 Tran Hung Dao and Line3 station area (Line2-C10)

4.24 Tran Hung Dao station together with a station of Line3 could formulate an attractive place as one of the important urban nodes connecting with key urban facilities of Governments, business, universities and institutes, museums, etc in French Quarter. Key development issues are 1) to secure connectivity between two stations by setting properly the Line3 station in the proximity to the C10 station, and 2) to formulate attractive transportation node with convenient walkway and open space, taking account of the gateway of French Quarter area as a part of the City Center of Hanoi and where attractive spaces and buildings for commercial and business service are expected to develop in the vicinity to two stations.

Table 4.18 Demand Outlook of Tran Hung Dao Station Area (C10)

		Present	UMRT with integrated Urban Development	
			Without	With
Population of Station Area of radius 500m (persons)	Population	23,681	17,000	17,000
	Employment	33,531	48,800	53,300
	Student	11,431	11,600	11,600
Ridership (persons/day)		-	11,310	19,420

Source: JICA Project Team

4.25 Issues to be clarified of Tran Hung Dao station area are as follows:

- i) Location of Line3 Station (short to long-term): Location of Line3 station should be located nearby Tran Hung Dao Station for convenient access and transfer for passengers. Interchange facilities such as a common underground concourse should be planned in Phase1 of Line2 for effective construction and operation after operation of Line3.

Table 4.19 Project List of Tran Hung Dao Station Area (C10)

Project			Scale		Construction Cost (000US\$)		Implementation Body	Financial resource
A Minimum development till opening	SF-SE-1	Station Entrance Space ³⁾	6,400	m2	512	39,377	HPC/HRB ¹⁾	HPC ¹⁾
	SF-PU-1*	Underground Pedestrian Plaza ³⁾	6,400	m2	38,400		HPC/HRB ¹⁾	HPC ¹⁾
	SF-EV-1*	Elevator	4	No.	400		HRB	HPC
	SF-BS-1	Bus Stop	13	No.	65		TRAMOC	HPC
B Short-term (opening~3years)	RD-SW-1	Improvement of Sidewalk	10,700	m	2,889	2,889	HDOT	HPC

Source: JICA Project Team

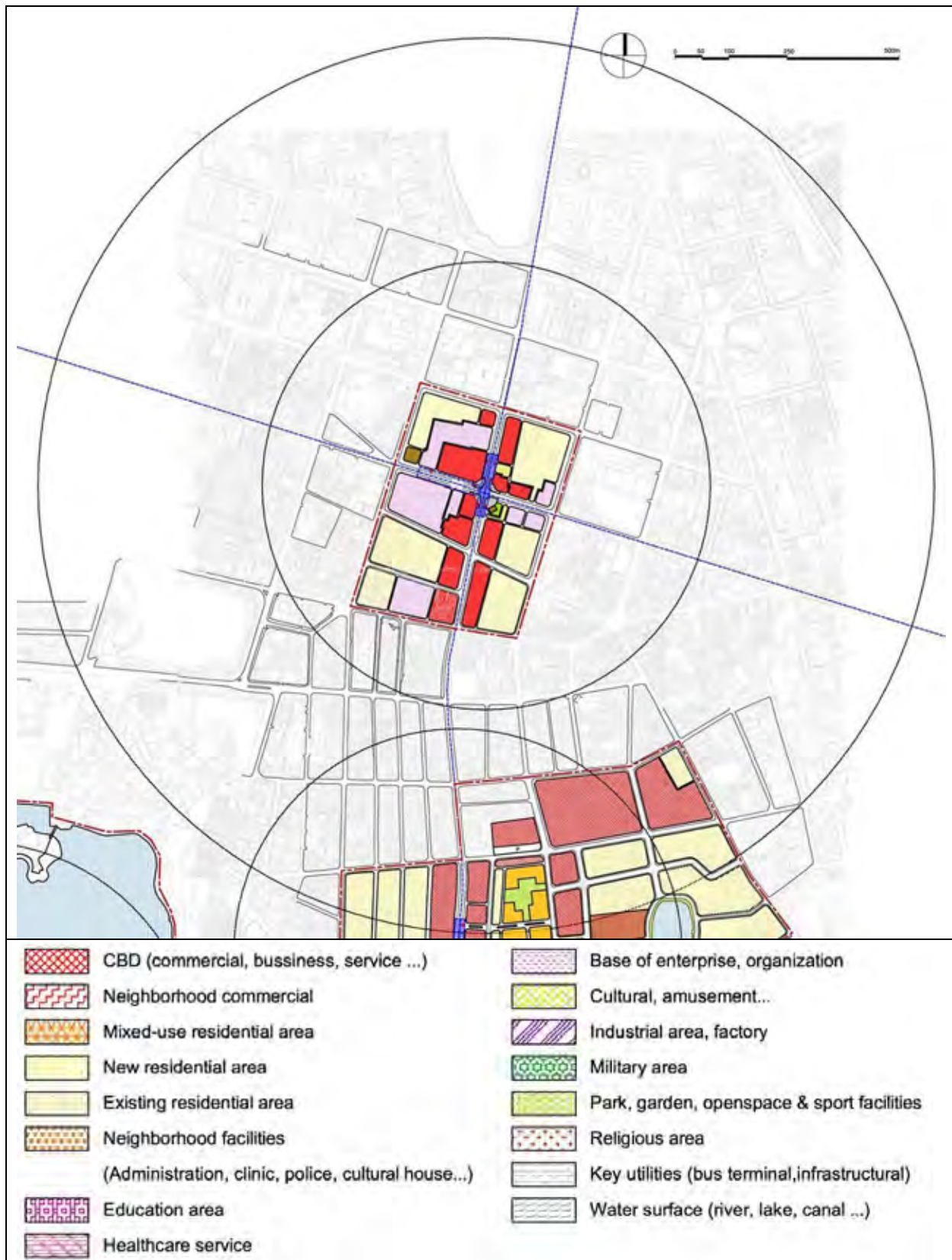
Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) JICA Project Team recommends HRB or HPC will develop station related facilities together with UMRT station development.

2) Station related facilities such as elevators, escalators will be constructed with the station facility.

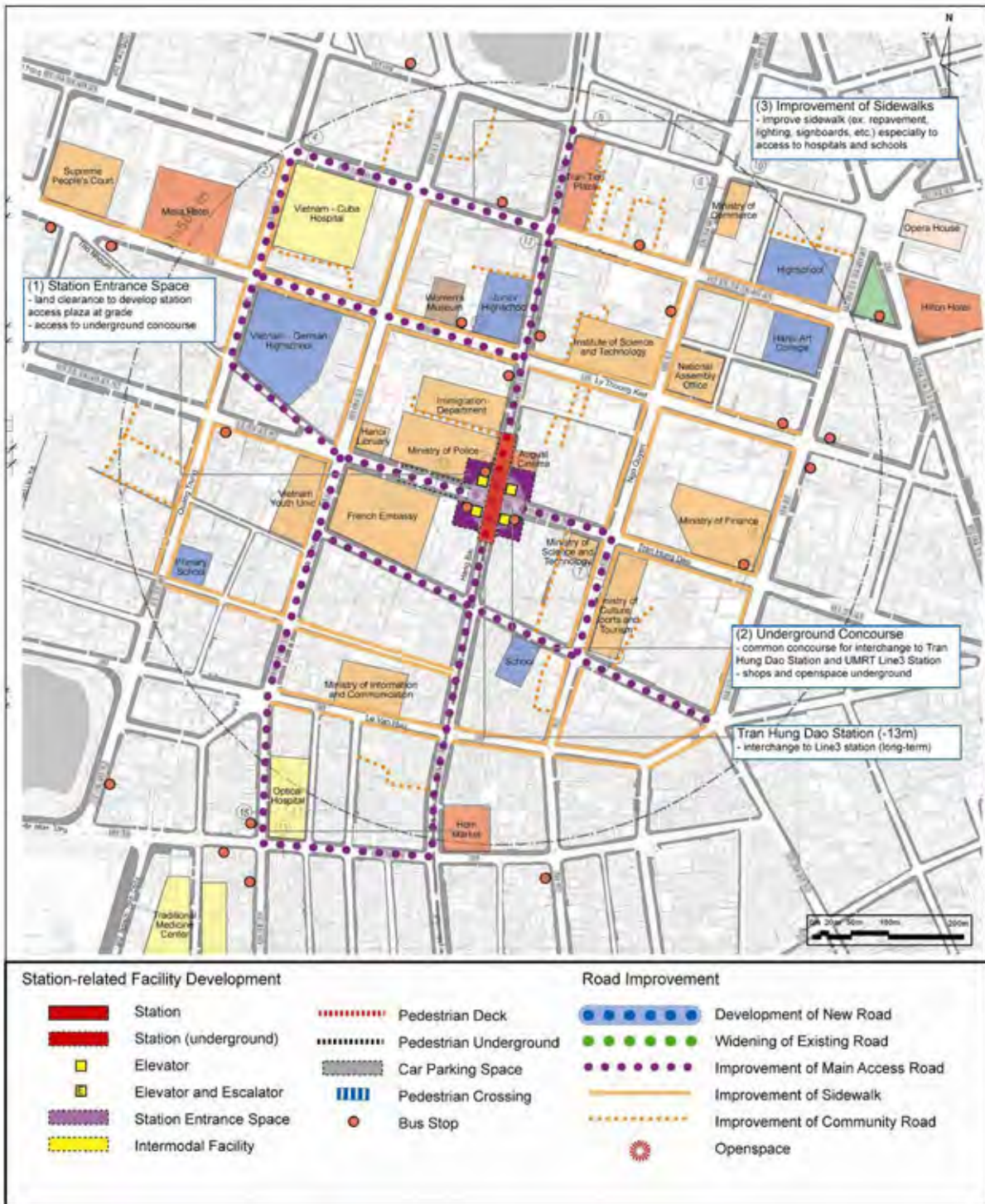
3) It is proposed to develop underground pedestrian plaza under entrance space to connect UMRT Line2 and Line3.

Figure 4.16 Long-term Concept Plan of Tran Hung Dao Station Area (C10)



Source: JICA Project Team

Figure 4.17 Short-term Concept Plan of Tran Hung Dao Station Area (C10)



Source: JICA Project Team

4.2.9 Thuong Dinh and Line2A station area (Line2-C16)

4.26 Thuong Dinh station will be a transport hub of south-west of Hanoi City, and have an important role as an interchange station of three UMRT railways. Integrated with urban redevelopment of existing factories and KTT, new commercial and business center will be formulated. Key development issues are 1) to secure connectivity between three stations by setting properly the Line2, Line 2A and Line4 stations, 2) to formulate attractive transportation node with convenient walkway and open space, and 3) to coordinate the plan of the flyover in the intersection and formulate appropriate design of the intersection including options in case of no-flyover or re-design of flyover accommodating BRT line stations on the Ring Road 2.5 in the proximity to other two UMRT stations.

Table 4.20 Demand Outlook of Thuong Dinh Station Area (C16)

		Present	UMRT with integrated Urban Development	
			Without	With
Population of Station Area of radius 500m (persons)	Population	16,894	15,300	16,500
	Employment	5,170	8,000	9,400
	Student	4,127	4,500	4,800
Ridership (persons/day)		-	8,010	17,580

Source: JICA Project Team

4.27 Issues to be clarified of Thuong Dinh station area are as follows:

- i) Adjustment of location of Line2A and Line4 Station (long-term): Location of Line2A and Line4 station should be located nearby Thuong Dinh Station for convenient access and transfer for passengers.
- ii) Coordination with urban redevelopment projects of existing factories (mid& long-term): It is planned that urban redevelopment projects will be individually conducted which factory areas will be converted into commercial and business districts. Since it is expected that this station area will be an integrated sub-urban center with commercial, educational and residential functions, it is recommended various types of urban facilities such as culture, education, health will be also developed.

Table 4.21 Project List of Thuong Dinh Station Area (C16)

Project			Scale		Construction Cost (000US\$)		Implementati on Body	Financial resource
A Minimum development till opening	SF-SE-1	Station Entrance Space ²⁾	4,800	m2	384	33,564	HPC/HRB ¹⁾	HPC ¹⁾
	SF-PU-1*	Underground Pedestrian Plaza ²⁾	4,800	m2	28,800		HPC/HRB ¹⁾	HPC ¹⁾
	SF-EV-1*	Elevator	4	No.	400		HRB	HPC
	SF-BS-1	Bus Stop	4	No.	20		TRAMOC	HPC
	RD-MA-1	Improvement of Main Access Road	3,600	m	3,960		HDOT	HPC
B Short-term (opening~3years)	RD-SW-1	Improvement of Sidewalks	2,720	m	734	734	HDOT	HPC
C Medium-term (3~5years)	UR-1	Redevelopment of Mechanical Company for commercial district (planned)					Private	Private
	UR-2	Redevelopment of Nga Tu So Market for commercial district (planned)					Private	Private
	UR-3	Redevelopment of mechanical Company on the west of To Lich River for commercial district (planned)					Private	Private
D Long-term (5~10 years)	UR-4	Redevelopment of Vinh Ho KTT					Private	Private

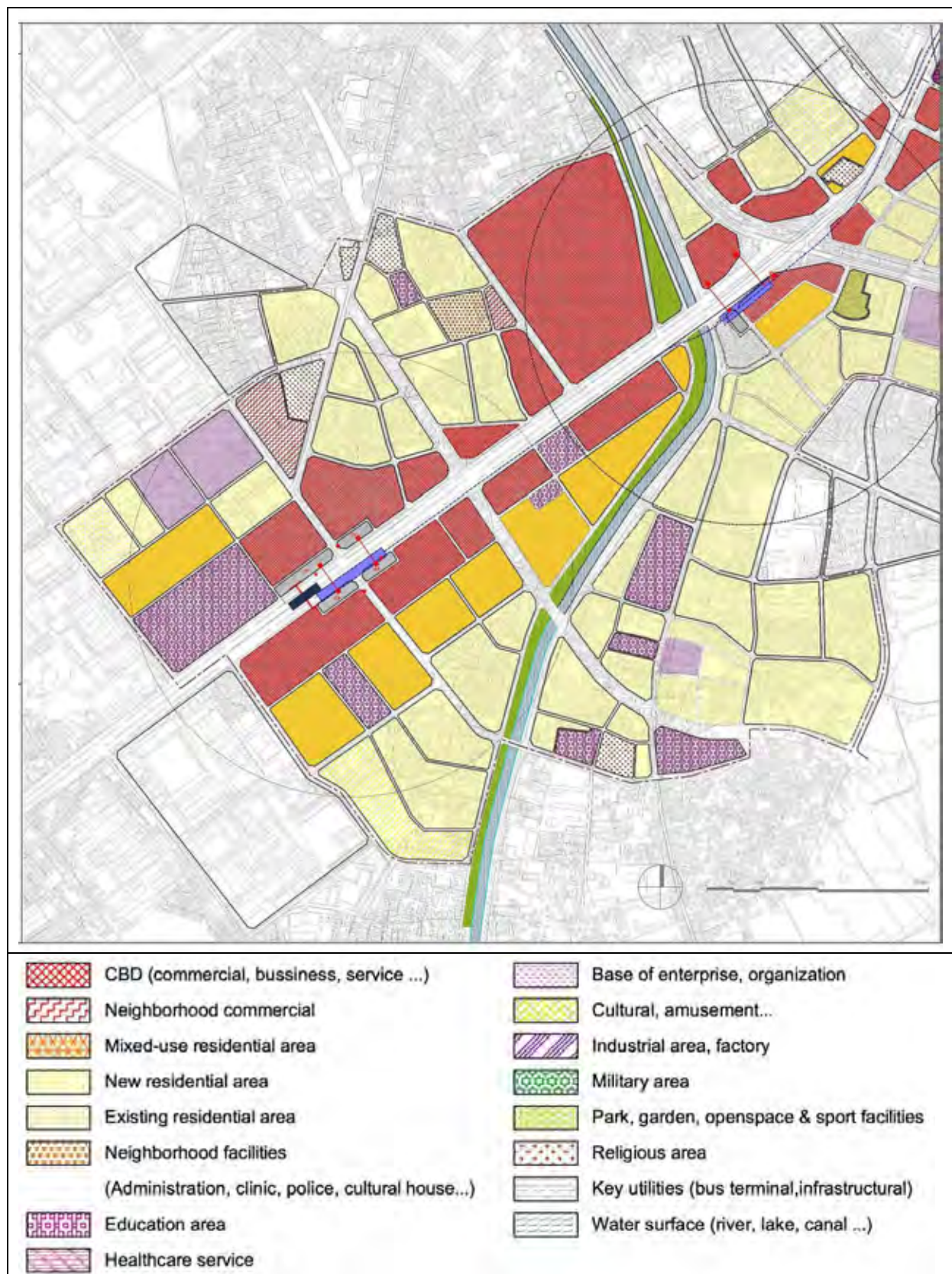
Source: JICA Project Team

Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) JICA Project Team recommends HRB or HPC will develop station related facilities together with UMRT station development.

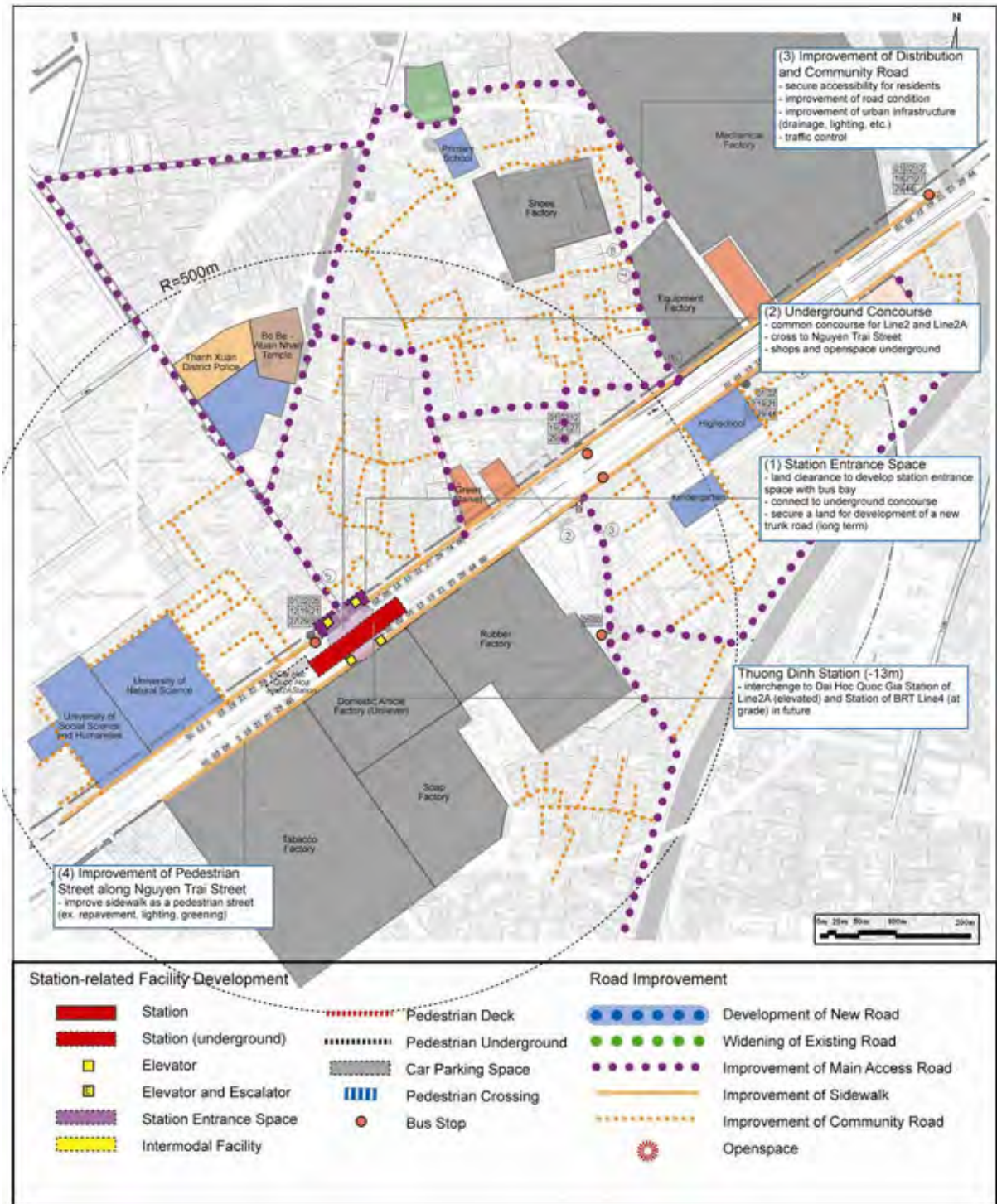
2) It is proposed to develop underground pedestrian plaza under entrance space to connect UMRT Line2 and Line3.

Figure 4.18 Long-term Concept Plan of Thuong Dinh Station Area (C16)



Source: JICA Project Team

Figure 4.19 Short-term Concept Plan of Thuong Dinh Station Area (C16)



Source: JICA Project Team