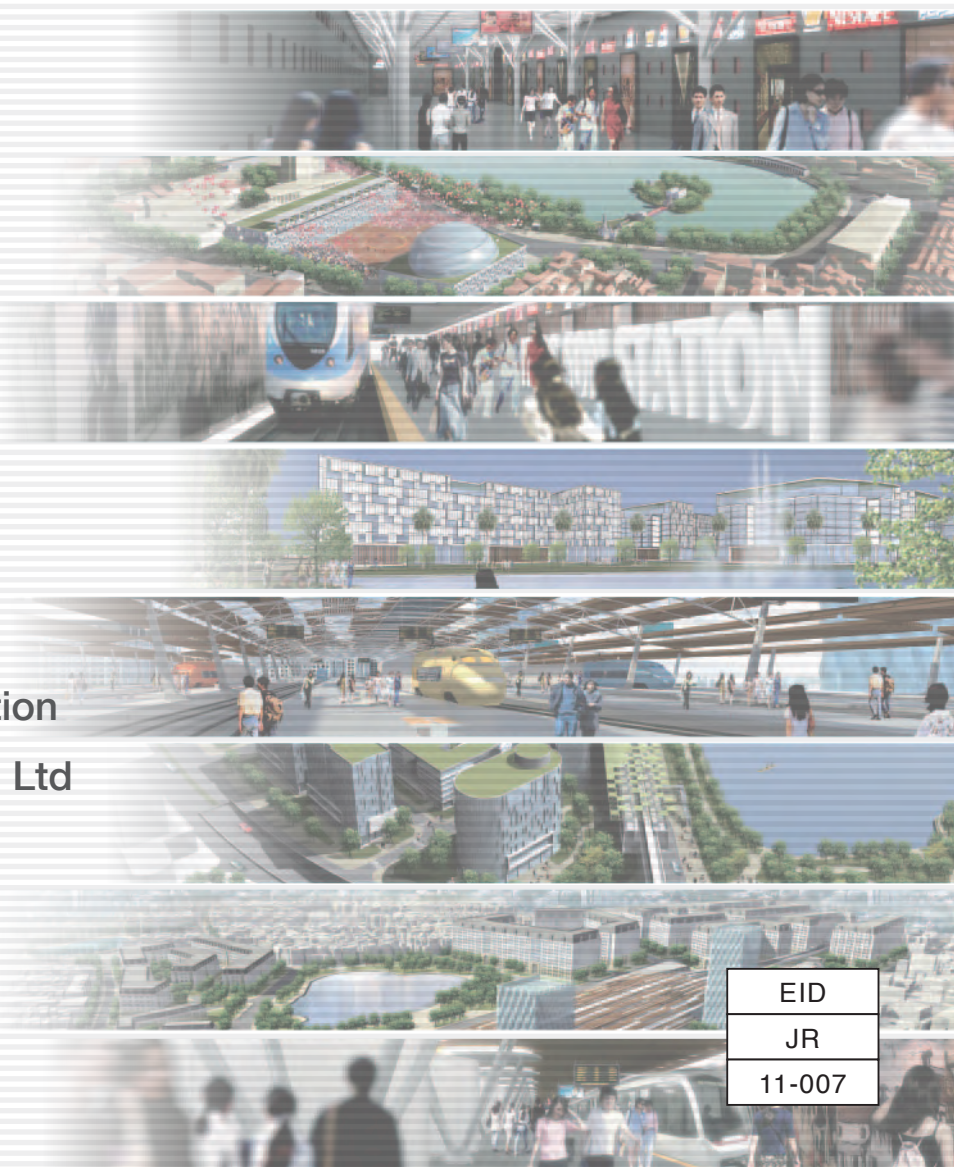


# The Project on Integrated UMRT and Urban Development for Hanoi in Vietnam

**FINAL REPORT**

## **Main Text Part I**

**Planning Direction and Concept Plan  
for Integrated UMRT and Urban Development for Hanoi**



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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**FINAL REPORT**

**PART I: PLANNING DIRECTION AND CONCEPT  
PLAN FOR INTEGRATED UMRT AND URBAN  
DEVELOPMENT FOR HANOI**

**January 2011**

**ALMEC Corporation  
Nippon Koei Co., Ltd**

Exchange Rate of September 2010

10,000 Vietnam Dong (VND)= 42.67 Yen

1 US Dollar (US\$) = 84.23 Yen

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
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

# 1 INTRODUCTION

## 1.1 Rationale of the Project

101 Hanoi, as the capital city of Vietnam, is embarking on the development of several mass rail transit lines that will mitigate future traffic congestion, re-shape its future landscape, and support its vision of a sustainable and “green” metropolis. Hanoi has no previous experience in handling the near simultaneous implementation of several rail lines, much less a single metro project. This project is meant to assist the City in the complex preparation for these projects to ensure proper integration between these lines as well as with the existing road transport system and urban development.

102 Bearing in mind that transportation infrastructure and services are the basic enablers of urban development – with their multiplier effects on land use, living conditions, environment, economic and social activities – it is not enough to simply provide an urban mass rapid transit (UMRT) system. The UMRT system for Hanoi needs to be competitive in its own right. And because of its huge cost, the benefits from the system need to be maximized also.

103 Without a pro-active approach, the introduction alone of a UMRT system will not automatically lead to a sustainable urban development or a public-transportation-based and compact urban area. It requires a corresponding effort to harmonize urban development and land use along the UMRT routes and influence areas<sup>1</sup>.

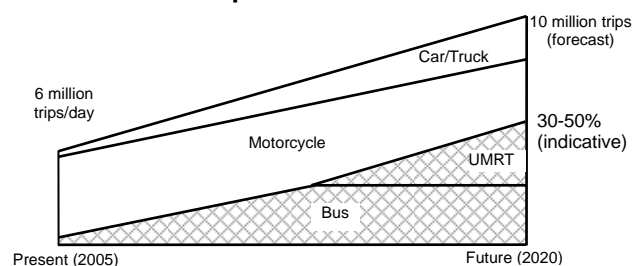
An integrated development will therefore benefit both the UMRT in terms of captured ridership, and urban development in terms of providing opportunities for an orderly spatial growth and a more dynamic socio-economic development.

104 Under such a perspective, the Vietnamese government requested the Japanese government to conduct this project entitled “The Project on Integrated UMRT and Urban Development for Hanoi in Vietnam.” In response to such request, JICA dispatched a Preparatory Project team, headed by Mr. Takeo Ochi, to Vietnam in September 2008 to discuss the draft Scope of Work (draft S/W) for the project. The Minutes of Meeting was then signed on 19 September 2008 and the Scope of Work on 3 December 2008.

## 1.2 Objectives and Project Area

105 The project intends to prepare concrete strategies and programs on the integrated development of the Phase 1 sections of the UMRT Line1 and Line2, 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 the project are as follows:

**Figure 1.1.1 Impact of UMRT on Urban Transportation Demand in Hanoi**



Source: HAIDEP

<sup>1</sup> The development of a public-transportation-based city was one of the key strategies elaborated and recommended in “The Study on Comprehensive Urban Development Program in Hanoi Capital City” (HAIDEP), which was conducted with technical assistance from JICA between 2004 and 2007.

- To formulate development plans and implementation strategies for UMRT station-related facilities, and
- To propose the development concept and framework for the adjoining areas of UMRT stations and areas along UMRT Line1 and Line2

106 The project covers the entire UMRT stations of Line1 and Line2, although the main focus will be the stations for Phase1 of both of lines (see Table 1.2.1). It should be noted that there are some changes of stations as follows:

- In the Feasibility Study Team on Phase2 of Line2, which has been implemented by HRB and TEDI-South, another station was subsequently added to Line 2, phase 2 - at Kim Lien (C13), between Bach Khoa (C12) and Chua Boc (C14).
- Phung Hung Station (V7) would be removed since it was too near to Nam Cau Long Bien Station (V6) and Hanoi Station (V8).

107 In total, there are 31 stations including 15 stations of Line1 and 16 stations of Line2. In this final report, station ID is following as shown in Table 1.2.1. The concept plan of Phung Hung Station (V7) is shown as an alternative for reference.

**Table 1.2.1 Profile of the Planned UMRT Stations**

Name of UMRT Station		Feasibility Study <sup>1)</sup>		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*	0.0	0.0	0.0	-0.1	Ground	2			
	V2. Cau Duong*	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*	5.4	1.7	5.3	1.7	Ground	1	●		L4
	V5. Bac Cau Long Bien*	6.8	1.4	6.9	1.6	Elevated	1			
	V6. Nam Cau Long Bien*	8.8	2.0	9.4	2.5	Elevated	1			L2
	V7. Phung Hung <sup>z</sup>	9.7	1.1	10.0	0.6	Elevated	1			
	V8. Hanoi*	10.9	1.2	11.4	2.0	Elevated	1	●	L3	●
	V9. C.V. Thong Nhat*	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*	15.8	1.5	16.3	1.6	Elevated	1	●		L4/●
	V13. Hoang Liet*	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*	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*	2.1	1.2	1.7	0.8	Elevated	1			L4
	C4. Bui	3.6	1.5	3.4	1.7	Underground	1			
	C5. Quang Nguoa	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**	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*	-	-	13.8	0.7	Underground	2			
	C14. Chua Boc*	14.4	1.4	14.6	0.8	Underground	2			
	C15. Nga Tu So	15.9	1.5	15.9	1.3	Underground	2			
	C16. Thuong Dinh	16.8	0.9	16.8	0.9	Underground	2			L2A L4

Note: Adjustment of location of stations with \* were proposed by the JICA Project Team, and agreed by the Steering Committee. See Chapter 4 of Part I in detail.

\*\* "Hoan Kiem Lake Station" (C9) was originally named "Den Ngoc Son Station" during JICA Project. Based on conclusion by HPC on the Steering Committee of Draft Final Report, the station was renamed to Hoan Kiem Lake Station.

Source: 1) Feasibility Study for Ha Noi Urban Railway Construction Line1 (Section: Yen Vien – Ha Noi – Ngoc Hoi) 2008, and Line2 (Section: Nam Thang Long – Tran Hung Dao) 2008

Figure 1.2.1 Location of UMRT Network and Project Lines (Line1 and Line2)



Note: JICA Project Team

### 1.3 Consultations with Stakeholders

108 Since there are various stakeholders which are related to railway, road and public transport, and urban development sectors. To identify issues and appropriate proposals, the project team had stakeholder meetings, working group meetings, and various discussions with relevant agencies (see Table 1.3.1 and Table 1.3.2).

**Table 1.3.1 Steering Committee and Working Group Meeting**

Name of Meeting	Participated Agency	Key Agenda	Date
1st Working Group Meeting	HAPI, HRB, HAUPA, DOC, DARD, DONRE, HDOT, DOF, MPI, MOF, MOC, MOT, VRA, VNR, MARD	- Presentation of Inception Report by JICA Project team - Discussion of key issues (alignment of Long Bien bridge, station location adjustment)	18 May 2009
1st Steering Committee Meeting on Inception Report	HPC, HAPI, HAUPA, DOC, MPI, MOF, MOT, MONRE, VRA, MARD	- Presentation of Inception Report by JICA Project team - Discussion of key issues (alignment of Long Bien bridge, station location adjustment)	05 June 2009
2 <sup>nd</sup> Steering Committee Meeting	HPC, MOF, MOC, HAUPA, DONRE, HRB, VNR-PMU	- Presentation and discussion on key issues of station location and alignment and criteria for selection of stations for Detailed Planning	15 October 2009
3rd Steering Committee Meeting	HPC, MOF, MOC, MOT, VNR, HDOF, HDOC, HDOT, HAPI, HAUPA, HDARD, HRB, HDONRE, VNR-PMU	- Presentation of planning approach and outlines of Concept Plans - Discussion of key issues (alignment of Red River crossing, location of Hoan Kiem Lake Station) - Proposal on selection of stations for detailed planning	16 December 2009
4th Steering Committee Meeting on Interim Report	HPC, MOF, MOC, MOT, VNR, HDOF, HDOC, HDOT, HAPI, HAUPA, HDARD, HRB, HDONRE, VNR-PMU	- Review of study progress and comments on the Interim Report - Discussions on the proposed sites for detailed planning	12 March 2010
5th Steering Committee Meeting on Draft Final Report	HPC, MPI, MOF, MOC, MOT, VNR, HDOF, HDOC, HDOT, HAPI, HAUPA, HDARD, HRB, HDONRE, VNR-PMU	- Presentation of main comments of the SC members and responses of the project team - Presentation of Draft Final Report by JICA Project team - Proposal on next steps - Discussion of DFR	22 September 2010
6th Steering Committee Meeting on Final Report	HPC, MPI, MOF, MOC, MOT, VNR, HDOF, HDOC, HDOT, HAPI, HAUPA, HDARD, HRB, HDONRE, VNR-PMU	- Presentation of progress after DFR S/C - Proposal on next steps - Discussion of FR and next steps	2 December 2010

Source: JICA Project Team

**Table 1.3.2 Consultation Meeting with Stakeholders**

Organization	Key Contact Person	Key Agenda	Date
Hanoi Metropolitan Rail Transport Project Board (HRB)	Dr. Luu Xuan Hung (Vice Director)	- Current status of UMRT Line 02 project - Confirmation of technical conditions	08 April 2009
VNR Consultant (TRICC)	Mr. Duong Dang Hai (Assistant Project Manager)	- Current status of UMRT Line 01 project - Confirmation of technical conditions	20 April 2009
Railway Projects Management Unit (RPMU-VNR)	Mr. Tran Van Luc (Director) Mr. Pham Hai Bang (Deputy Director)	- Current status of UMRT Line 01 project - Confirmation of technical conditions	22 April 2009

Organization	Key Contact Person	Key Agenda	Date
Hanoi Department of Transportation (HDOT)	Mr. Nguyen Hoang Hai (Deputy Director)	<ul style="list-style-type: none"> <li>- Current status of road project in conjunction with UMRT</li> <li>- Current status of bus network and project of bus reformation</li> </ul>	09 June 2009
Railway Projects Management Unit (RPMU-VNR)	Mr. Pham Hai Bang (Deputy Director)	<ul style="list-style-type: none"> <li>- Discussion of key issues (alignment of Long Bien bridge, station location adjustment)</li> <li>- Technical consideration of Hanoi station redevelopment</li> </ul>	12 June 2009
Viet Nam Urban Development Agency (MOC)	Dr. Do Tu Lan	<ul style="list-style-type: none"> <li>- Current status of urban development in Hanoi</li> <li>- Coordination of Urban Projects</li> </ul>	22 June 2009
TRAMOC	Mr. Nguyen Hoang Hai (Vice Director)	<ul style="list-style-type: none"> <li>- Discussion of key issues (alignment of Long Bien bridge, station location adjustment)</li> <li>- Technical consideration of bus route reformation</li> </ul>	30 June 2009
HDOT	Mr. Pham Hoang Tuan (Head of Planning & Investment Division)	<ul style="list-style-type: none"> <li>- Discussion of key issues of 31 stations</li> <li>- Technical considerations of station location</li> </ul>	20 August 2009
HAUPA	Mr. Pham Hoang Tuan (Head of Planning & Investment Division) and other experts	<ul style="list-style-type: none"> <li>- Discussion of key issues of 31 stations</li> </ul>	1 and 24 September 2009
HRB	Mr. Pham Van Son (Director), Mr. Ho Thanh Son (Deputy Head of Project No.2 Div.)	<ul style="list-style-type: none"> <li>- Proposal from HRB about station location and numbers of Phase2 of Line2</li> </ul>	6 November 2009
JKT (Detailed Design of Line 1) Team	Mr. Kiuchi, Mr. Iwamoto, Mr. Tsuchihashi and others	<ul style="list-style-type: none"> <li>- Confirmation of station location and alignment of Line1 of Phase1 stations</li> <li>- Discussion on transport analysis results</li> </ul>	18 January, 10 February, 4 March
VNR-RPMU	Mr. Pham Hai Bang and others	<ul style="list-style-type: none"> <li>- Discussion on the alignment and concerns of VNR for Detailed Design of Line1 of Phase1 stations</li> </ul>	24 February 2010
HRB	Mr. Pham Van Son (Director), Mr. Ho Thanh Son (Deputy Head of Project No.2 Div.)	<ul style="list-style-type: none"> <li>- Follow up discussion on Line 2 stations</li> </ul>	24 February 2010
ADB Mission	Mr. Alistair Knox and others	<ul style="list-style-type: none"> <li>- Discussion on the alignment and station locations of UMRT Line 3</li> </ul>	3 March 2010
HAUPA	Mr. Pham Hoang Tuan (Head of Planning & Investment Division) and other experts	<ul style="list-style-type: none"> <li>- Proposal and discussion on draft detailed plans</li> </ul>	9 March 2010
Ministry of Culture, Sports and Tourism, HRB	MOCST: Mr. Tran Dinh Thanh (Deputy Director of Heritage Management Department, Division of Culture Heritage) HRB: Mr. Luu Xuan Hung, Mr. Ho Thanh Son and others	<ul style="list-style-type: none"> <li>- Proposal on the location and concepts of Hoan Kiem Lake Station</li> <li>- Receiving comments from MOCST in terms of cultural and landscape preservation</li> </ul>	31 March 2010
JKT (Detailed Design of Line 1) Team	Mr. Kiuchi, Mr. Iwamoto, and others	<ul style="list-style-type: none"> <li>- Discussion on draft basic design of main stations</li> <li>- Confirmation of proposal related to ROW, station facilities, etc.</li> </ul>	14 April 2010
JKT (Detailed Design of Line 1) Team	Mr. Murasaki, Mr. Matsumoto	<ul style="list-style-type: none"> <li>- Discussion on transport analysis results</li> </ul>	28 April 2010
HRB	Mr. Ho Thanh Son (Deputy Head of Project No.2 Div.)	<ul style="list-style-type: none"> <li>- HRB's report on the result of official meeting on 28 April with HPC, HRB, HAUPA and HAPI on station locations of Phase2 of Line2 (Chua Boc, Nga Tu So and Thuong Dinh)</li> </ul>	28 April 2010
HAUPA	HAUPA, VNR-RPMU, JKT, Institute of Construction and Urban Planning, Ba Dinh District PC, Thanh Tri District PC	<ul style="list-style-type: none"> <li>- Discussion on remaining issues between HAUPA and VNR-RPMU, inviting relevant agencies.</li> <li>- HAUPA's request to VNR-RPMU for further consideration from both technical and socio-economic viewpoints.</li> </ul>	30 September 2010

Source: JICA Project Team

109 In the process of the JICA project, Steering Committee members issued official documents related to the project which approve reports, raise comments and issues on proposals, etc. Table 1.3.3 shows list of official documents.

**Table 1.3.3 Official Documents related to JICA Project**

Date	Agency	Document Title	Main Contents
13 May 2009	HPC	No. 2214/QD-UBND, Decision on Steering Committee and Working Group Establishment for the Project "Integrated UMRT and Urban Development for Hanoi" by JICA	Establishment of Steering Committee and Working Groups and lists of members
20 July 2009	HPC	No. 3664/QD-UBND, Decision on adjustment of members of Steering Committee and Working Group of the Project	Addition of HDOT, HDOF, Vietnam Railway Corporation to S/C members
15 September 2009	HAPI	No. 1069/BC-KH&DT, Report on regarding ratification of the inception report of the project	Report on collected documents related to UMRT lines by HAPI
29 December 2009	HPC	No. 453/TB-UBND, Announcement on endorsement of Inception Report	<u>Approval on Inception Report</u> by HPC, instruction on next steps and implementation of UMRT projects
13 April 2010	HRB	No. 168/BDA-DA2, Report on location of C9 (Hoan Kiem Lake) station	Letter from HRB to Ministry of Culture, Sports and Tourism to request comments on location of Alternative B (60m to the south from F/S) by MOCST
13 April 2010	HAPI	No. 1191/KHDT-HTQT, Report on comments for Inception Report of alignment and station location of Phase2 of Line2 (Tran Hung Dao – Thuong Dinh)	Letter from HAPI to HRB to provide comments on alignment and station location of Phase2 of Line2 of Inception Report of F/S
15 April 2010	HAUPA	No. 1083/QHKT-HTKT, Report on comments for Inception Report of alignment and station location of Phase2 of Line2 (Tran Hung Dao – Thuong Dinh)	Letter from HAUPA to HRB to provide comments on alignment and station location of Phase2 of Line2 of Inception Report of F/S
27 April 2010	HDOT	No. 1095/GTVT-KHDT, Report on comments for Inception Report of alignment and station location of Phase2 of Line2 (Tran Hung Dao – Thuong Dinh)	Letter from HDOT to HRB to provide comments on alignment and station location of Phase2 of Line2 of Inception Report of F/S
5 May 2010	HRB	No. 168/BDA-DA2, Report on regarding Inception Report of Project Hanoi Urban Railway Line2, section Tran Hung Dao – Thuong Dinh	Letter from HRB to HPC to submit the Inception Report of F/S of Phase2 of Line2 and to report proposed adjustment of alignment and station locations
20 May 2010	HPC	No. 153/TB-UBND, Announcement on conclusion by HPC Vice Chairman on approval of Interim Report	<u>Approval on Interim Report</u> by HPC, selection of stations of detailed planning, assignment of HAUPA to summarize conclusions of the S/C and exchange information for formulation of Hanoi City Master Plan
24 May 2010	MOCST	No. 1718/BVHTTDL-DSVH, Report on location change of C9 station	MOCST's agreement of proposal on alternative B location of Hoan Kiem Lake station and comments
2 June 2010	HRB	No. 33/BDA-DA2, Report on regarding asking for comments from MOCST for location of C9 (Hoan Kiem Lake) of Hanoi urban railway Line2	Report on agreement of C9 location by MOCST and responsibility of impact assessment during technical design period
11 Oct 2010	HPC	No. 368/TB-UBND, Announcement, Conclusion of Vice President of HPC at the Steering Committee Meeting on Draft Final Report	<u>Approval of Draft Final Report</u> , assignment of HAUPA and HAPI for coordination with relevant agencies, proposal on meeting between HPC and MOT
17 Nov 2010	HPC	No. 402/TB-UBND, Conclusion by Mr. Nguyen Van Khoi- Vice Chairman of Hanoi People's Committee and Mr. Le Manh Hung- Vice Minister of Transport in the Meeting on Yen Vien- Ngoc Hoi Urban Railway Line (UMRT Line1), Phase1	Conclusion of the meeting between HPC and MOT held on 12 Nov 2010 regarding to alignment and station locations of UMRT Line1 of Phase1
10 Dec 2010	HAPI	No. 1489/BC-KHDT, Reporting HAIMUD Steering Committee Meeting Results	<u>Basic approval of Final Report</u> and proposal on continuous support from JICA for HAIMUD phase2 implementation
20 Dec 2010	HPC Office	No. 6261/VP-GT, Finalizing HAIMUD Final Report	Basic agreement of comments from HAPI and request for submission of Final Report

Source: JICA Project Team

## **2 HANOI URBAN DEVELOPMENT CONTEXT AND UMRT PLANS**

### **2.1 Urban Development Orientation of Hanoi City**

#### **(1) City Urban Master Plan up to 2010 approved in 1998**

201 The urban master plan for the City up to 2020 was conceptualized sometime in 1998. Among its key features are the following:

- A city population of 2.8 million plus a rural population of 1.1 million by 2020, of which 2.5 million would be in the Hanoi area and the rest in the suburban and satellite towns;
- Accommodation of future population in three areas, namely the urban fringe along Ring Road 3, the northern parts of the Red River, and the satellite cities and urban chains in adjoining provinces;
- Reduction in the density of the urban core;
- Strengthening of the road network with four ring roads and additional bridges across the Red River;
- Raise the modal share of public transport to 30% by 2010, of which 5%-10% will be urban rail.

#### **(2) Proposed Orientation of HAIDEP in 2007**

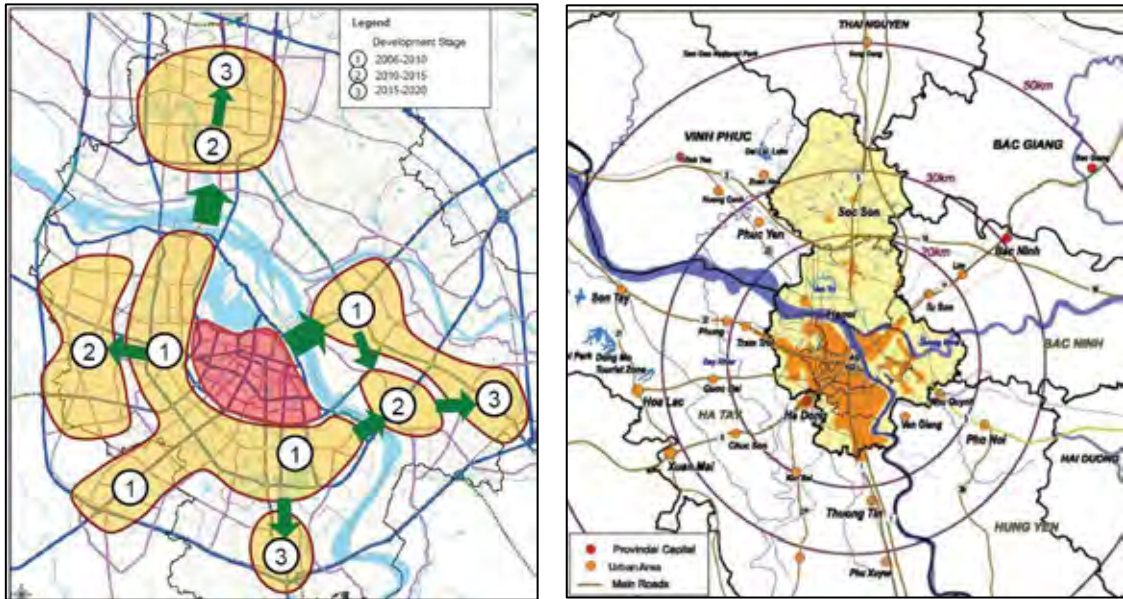
202 The Comprehensive Urban Development Program in Hanoi Capital City of the Socialist Republic of Vietnam, or HAIDEP, was conducted between December 2004 and March 2007 in order to update the spatial development plan of the 1998 Master Plan. HAIDEP envisaged a more compact metropolitan form and a larger population of 4.5m by 2020 – of which 3.9 million would be in the urbanized area. Of particular relevance to this Study are the following features of HAIDEP:

- A water-greenery-culture network that ties together the Red River and its tributaries, Ho Tay, Co Loa, the Ancient Quarter, and the French Quarter, as well as the regional green belts of the City;
- An urban mass rapid transit (UMRT) network that provides the city with a quality transport backbone that can be extended to adjoining urban sub-centers. The main urban centers and traffic-generating areas will be distributed in integration with the UMRT routes to improve accessibility and people's mobility. A comprehensive road network composed of radial and ring roads will improve traffic distribution within the urban areas and, at the same time, facilitate proper interface between urban and interprovincial transportation to avoid the entry of through traffic into the city center.
- Upgrade and revitalize existing built-up areas both in the city center and fringe areas, including the Ancient Quarter and the French Quarter, to improve living conditions, preserve and enhance the cultural heritage, and promote economic development. Existing urban areas must be constantly upgraded, for which the General Plan provides the orientation on the desirable land use and infrastructure development.
- Develop modern and competitive new urban centers to attract diversified, quality investments that will generate employment opportunities, and improve the people's accessibility to needed services. New urban centers will be developed in strategic locations to provide competitive space for business and commercial activities as the diversifying urban economy further grows and to provide employment opportunities within reasonable travel distances.



203 Figure 2.1.1 is a stylized presentation of where the urban expansion of Hanoi is heading in the future. Other observers of Hanoi’s developments foresee a Greater Hanoi of 15 million by 2020.

**Figure 2.1.1 Urban Development Directions of Hanoi**



Source: HAIDEP

**(3) Hanoi Capital Construction Master Plan up to 2030 with Vision 2050 (tentative)**

204 In August 2008, Ha Tay Province, Me Linh District in Vinh Phuc Province and 4 communes of Luong Son District, Hoa Binh Province were merged into the metropolitan area of Hanoi City. Hanoi’s total area increased to 3,344km<sup>2</sup> (2.6 times) divided into 29 subdivisions with the new population being 6.2 million (2 times).

205 MOC has prepared the “Hanoi Capital Construction Master Plan up to 2030 with Vision 2050”, which is based on the Hanoi Capital Regional Construction Master Plan approved in 2008. It is expected that this new Master Plan will be approved in October 2010 by the Prime Minister.

206 According to population forecast, maximum population will be 10.8 million in 2050 (see Table 2.1.1).

**Table 2.1.1 Population Forecast in the City Master Plan until 2030 (tentative)**

Item	2008	2020	2030	2050
Total (thousand)	6,350.0	7,318.8	9,135.5	10,733.0
Urban (thousand)	2,583.3	4,676.8	6,218.5	7,510.5
Rural (thousand)	3,766.7	2,642.0	2,917.0	3,223.0
Share of urban area (%)	40.7	63.9	68.1	70.0

Source: Hanoi Capital Construction Master Plan up to 2030 with Vision 2050 (Draft)

207 The keywords of the Vision are “Green”, “Civilization” and “Modernization”. There are nine (9) issues to be considered in the Master Plan: (i) improvement of transport system of city center, (ii) economic and social infrastructure development (especially for medical and educational needs), (iii) decongestion of overpopulation of city center, (iv) rationalization of population distribution, (v) preservation of the Ancient Quarter and cultural heritages, (vi) management of approved investment projects in line with the

Master Plan, (vii) flood control measures (river improvement), (viii) distribution of industrial parks for contribution of local economy, and ix) financing of construction investment and development of tools for urban management.

208 The proposed key features of urban structure are as following:

- Strengthening of the road network of ring roads and radial roads
- Five (5) independent satellite cities (Son Tay, Hoa Lac, Xuan Mai, Phu Xuyen and Soc Son)
- Environmental corridor along several rivers (including 10 rural villages and 3 eco towns)

## **2.2 Related Urban and Transport Plans and Projects**

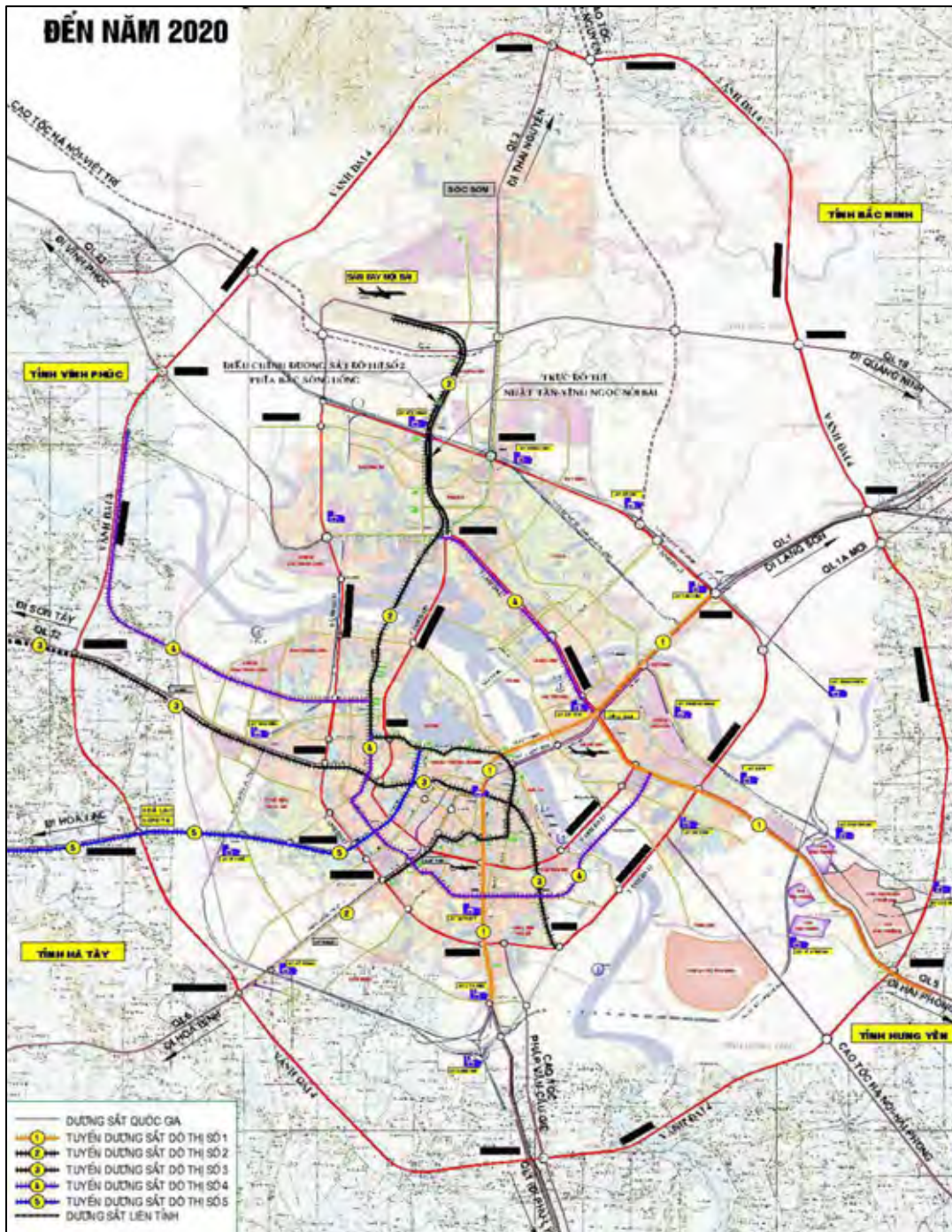
### **2.2.1 Urban Transport Master Plan**

209 The master plan for metropolitan Hanoi for 2020 (which was approved by the Prime Minister in 1998) envisaged a transport network with three ring roads as follows:

- (i) Ring Road 1 (RR1) is planned as two major urban roads: one running east-west (from Nguyen Khoai-Kim Lien-O Cho Dua-Cau Giay) and the other running along the right bank of Hong River (from Thang Long bridge to Vinh Tuy);
- (ii) Ring Road 2 (RR 2) follows Minh Khai down to Nga Tu Vong-Nga Tu So-Lang road-Cau Giay-Buoi-Lac Long Quan-Nhat Tan Dyke and crosses Hong River at the new Nhat Tan Bridge to Vinh Ngoc, Dong Hoi, Dong Tru, NH 5, and again crosses Hong River at Vinh Tuy new bridge and joins Minh Khai slope to form a circle. Half of the circle has taken shaped following the south bank of Hong River.
- (iii) Ring Road 3 (RR 3) starts from the north via Thang Long-Noi Bai-Mai Dich-Thanh Xuan-Phap Van-Thanh Tri Bridge-Sai Dong the rest of the section is overlapped with RR2 north. RR3 will initially play as an inter provincial road but will become a major artery of urban road in the near future, once Hanoi urban areas have expanded. At present, about a third of RR3 is open to traffic, which includes the section from Noi Bai-Thang Long Bridge-NH32-Tranduy Hung with the length of 23 km featuring 4 and 2 lanes for motorized and non-motorized vehicles, respectively.

210 The HAIDEP Master Plan proposed an integrated transportation system consisting of eight (8) radial and four (4) ring roads, and four (4) UMRT lines. And recently the transportation master plan for metropolitan Hanoi 2020 has been approved by the Prime Minister of which urban railway network has followed basically the previous master plan. The four UMRT lines in the master plan, and their possible extension to satellite cities, are shown on Figure 2.2.1.

Figure 2.2.1 UMRT Development Plan in the Transport Network Plan 2020



Source: Ministry of Transport

211 Rail projects have always fascinated Vietnamese planners and officials. Prior to HAIDEP, eight (8) metro rail lines with a total length of 143kms have been proposed by TEDI – for construction between 2003 and 2015. Since the submission of the HAIDEP outputs in 2007, intense interests from various quarters erupted that by 2009 the early implementation of all four rail lines was being talked about. Whereas in other developing cities, the development of one MRT line usually took a decade, Hanoi wants to complete all four lines over the same time period.



### 2.2.2 Current Progress of UMRT Development

212 The government – City and National - has lined up a number of mass transit projects – aside from UMRT Line1 and Line2. These include the following:

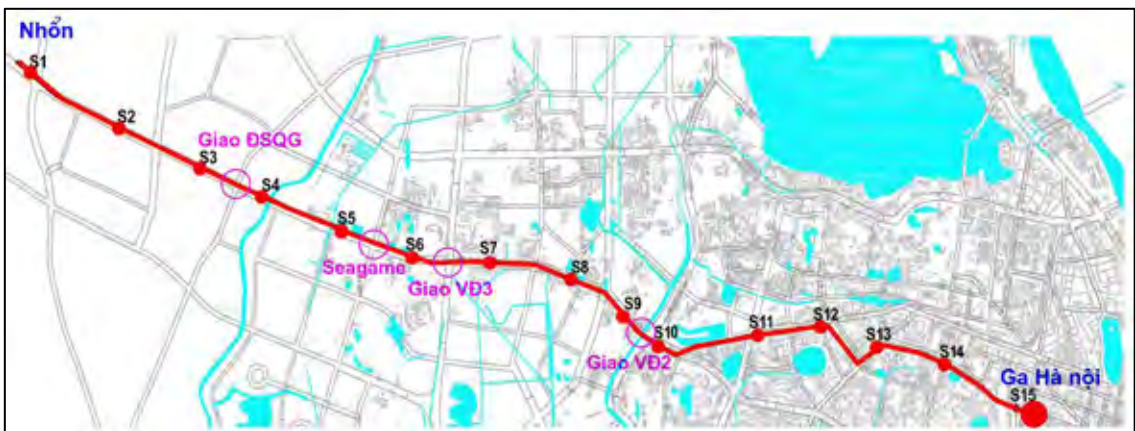
- UMRT Line2A - the so-called “China Line” is planned to cross and have a station near Station Thuong Dinh (C16) of Line2;
- UMRT Line3, the so-called “French Line”, is planned to cross Line1 near Station Hanoi (V8) and Line2 near Station Tran Hung Dao (C10);
- UMRT Line4 is planned to intersect Line1 at station Gia Lam (V4) and Line2 at stations Tay Ho Tay (C3) and Thuong Dinh (C16);
- UMRT Line 05 is planned to have a station for transfer at Station C5 of Line2;
- BRT project is planned to link at several points with Line1 (stations V10, V11, V12) and Line2 (stations C10, C11, C12, C16).

213 The Hanoi LRT Pilot Line project is the first of the UMRT lines to begin construction. The alignment generally tracks what HAIDEP labeled as UMRT Line3 (see Figure 2.2.2). The feasibility study for this project was conducted sometime in 2004 and 2005, with financing from the French government. A detailed design consulting team subsequently worked on the project in 2007. The line extends 12.5 kilometers from Hanoi Station in the city center to Nhon Depot west of the city. About 3 km in the city center will be underground, and the remaining 9.5 km will be elevated. The number of stations is anticipated to be 15. Total project cost is USD600m – 60% to be funded by a combination of tied and untied loans from France, and 40% from the Hanoi city government. Construction is expected to commence in 2009, and commercial service expected in 2013.



Voi Phuc - Cau Giay Interchange Station of Line 3

**Figure 2.2.2 Planned Alignment of UMRT Line3 (Nhon –Hanoi)**

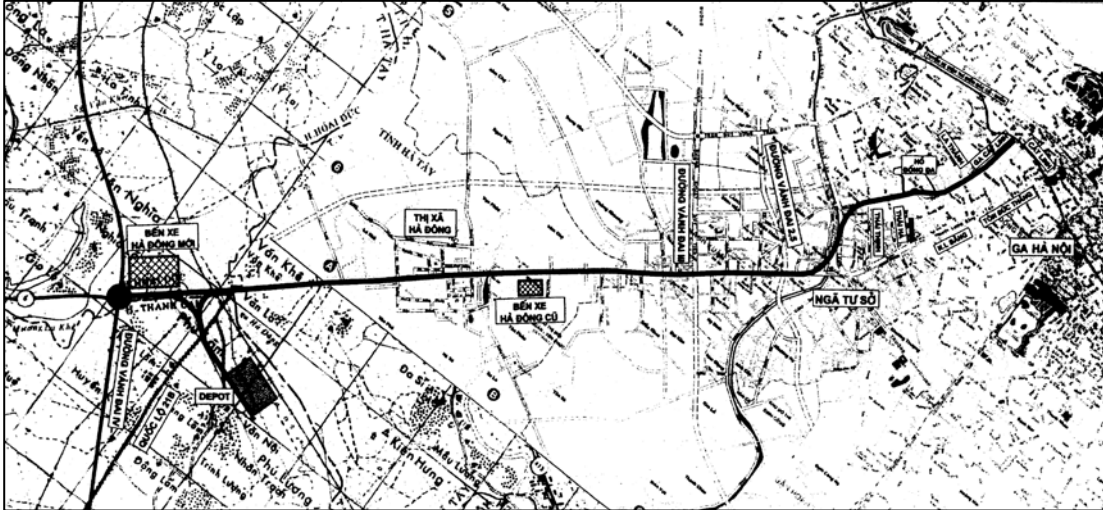


Source: Hanoi LRT Pilot Line Feasibility Study (Nhon –Hanoi) 2007

214 Phase I of UMRT Line 2A, extending 13.5-km from Cat Linh to Ha Dong, is being implemented by the Vietnam Railway Corporation (see Figure 2.2.3). Costing USD552

million, the project has secured a USD419 million loan from the Chinese government. Construction is scheduled to start in 2009 and be completed in 2013. Although the alignment follows the old VNR tracks for the most part, the project would entail some right-of-way clearing of about 400 buildings.

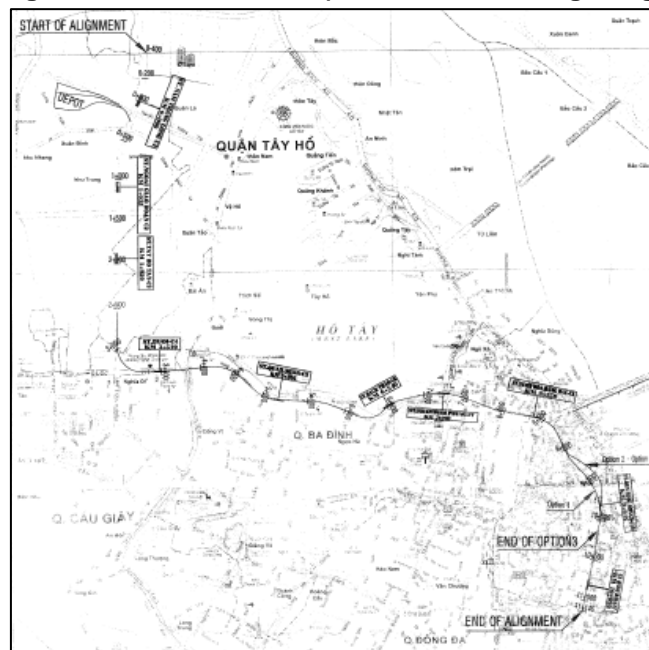
**Figure 2.2.3 Planned Alignment of UMRT 2A (Cat Linh – Ha Dong)**



Source: Hanoi Urban Railway Project (Ha Noi – Ha Dong) 2008

215 Phase I of UMRT Line2 is to be implemented by the Hanoi city government with funding from the Japan International Cooperation Agency (JICA). In June 2007, a SAPROF Team arrived in Hanoi to validate the 2006 pre-feasibility study and prepare the next step for the line's implementation. Detailed engineering is expected to commence by the 3rd quarter of 2009, and for construction to begin sometime in 2010. Phase 1A, from Tu Liem to Thuong Dinh, stretching 15.2 km, is targeted for completion in 2013 at an estimated cost of USD1,400 million, 85% of which would be sourced from JBIC. Stage 2, from South Thang Long Bridge to Ha Dong city, is to be completed in 2016. Construction of the remaining sections of the planned 41.5-km UMRT Line2 shall follow thereafter.

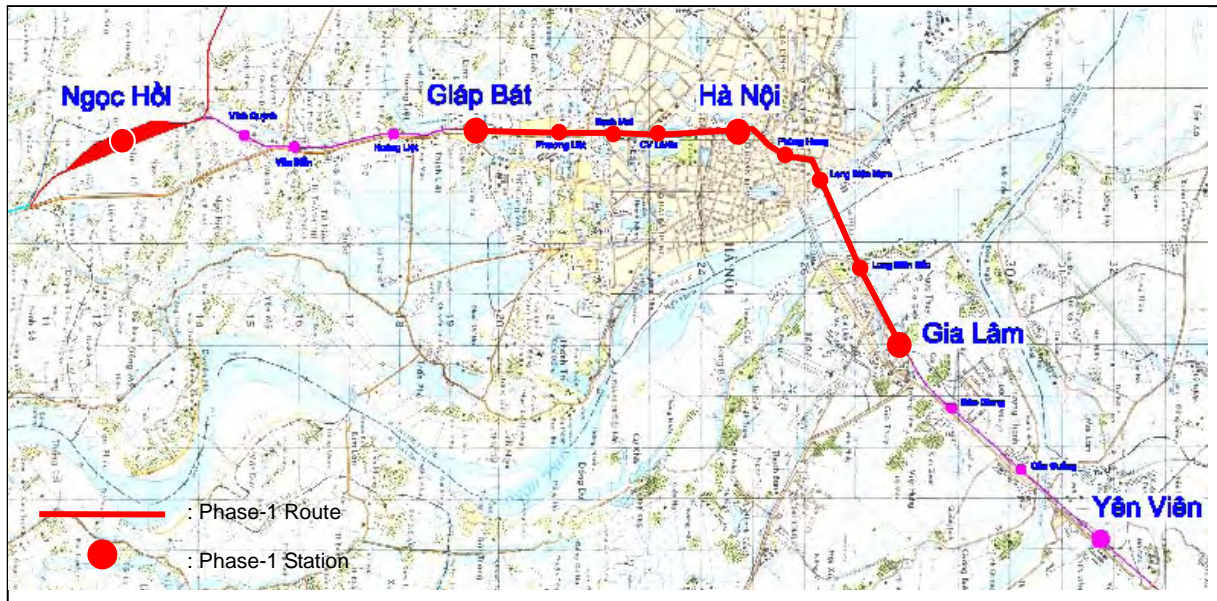
**Figure 2.2.4 Planned Alignment of UMRT Line2 (Phase1, Nam Thang Long – Tran Hung Dao)**



Source: Hanoi Urban Railway Construction Line 2 (Phase 1: Nam Thang Long – Tran Hung Dao) 2008

216 UMRT Line1 would connects from Ngoc Hoi station in Thanh Tri District to Yen Vien station in Gia Lam District with total length of 24 km, of which between Gia Lam and Giap Bat section of Phase1 with total length of 15.3 km (see Figure 2.2.5). The track infrastructure will be a mix of elevated and at-grade structures, with double track and new stations on the existing VNR track. The Japanese Government has already committed to support the construction of this line under Japan's ODA Yen loan scheme. Project cost will be 19.46 trillion VND, of which 13.972 trillion VND will be ODA Loan. Land acquisition between Ngoc Hoi and Yen Vien is about 125 ha. The consultant for Detailed Design and Tender Assistance has been implemented.

**Figure 2.2.5 Planned Alignment of UMRT Line1 (Yen Vien – Ngoc Hoi)**



Source: Hanoi Urban Railway Project (Ha Noi – Ha Dong) 2008

217 The Bus Rapid Transit (BRT) project of UMRT Line4 is estimated to cost USD99.88 million – USD84.12 m will come from IDA, USD11.76m from the government of Vietnam, and USD4.0 million from the Global Environment Facility Trust Fund. The project consists of 37 km of segregated bus lanes and 9 km of bus-priority lanes along the Giang Vo – Lang Ha and Giai Phong – Dai Co Viet corridors (including a city center connection, with bus priority in mixed traffic, 43 BRT stations, 1 BRT terminal, and 6 interchange stations) to be served by a fleet of 130 BRT vehicles. Start of construction is set to begin in October 2009 for the first line (Giang Vo-Lang Ha) between Ha Dong and Kim Ma. Operation is expected to commence in 2011. The BRT lines are shown in Figure 2.2.6.

**Figure 2.2.6 Planned Routes of BRT/ UMRT Line4**



Source: Draft Feasibility Study and Preliminary Designs- Volume 01 BRT Component 2006

218 The other infrastructure projects that would have an impact also on the patronage on the UMRT lines are as follows:

- Road project in Tay Ho Tay and Diplomat Quarter area (Line2: stations of Ngoai Giao Doan (C2) and Tay Ho Tay (C3));
- Road project along Hoang Hoa Tam road (Line2: stations of Quan Ngua (C5), Bach Thao (C6), and Ho Tay (C7));
- Extended Road project of Van Cao road (Line2: station of Bach Thao (C6));
- Road project of NH1-Hoang Mai (Line1);
- Ring road scheme (Line1:station of Ngoc Hoi (V16));
- Ring railway scheme (Line1:station of Ngoc Hoi (V16))

219 Several urban development plans and projects in Hanoi have been approved and implemented. Those that have direct and indirect impacts on UMRT Line1 and Line2 are shown in below:

- Viet Hung New Town development (on-going) (Line1/station of Cau Duong (V2), Duc Giang (V3));
- Thuong Thanh New Town development (planned) (Line1/station of Cau Duong (V2));
- Ngoc Thuy New Town development (planned) (Line1/station of Gia Lam (V4), Bac Cau Long Bien (V5));
- Phap Van-Tu Hiep New Town development (on-going) (Line1/station of Hoang Liet (V13));
- CIPUTRA housing complex development project (on-going) (Line2/station of Nam Thang Long (C1));
- Diplomat Quarter development project (Line2/station of Ngoai Giao Doan (C2));
- Tay Ho Tay Urban Development (New Financial Center) project (by Korean Consortium) (Line2/station of Ngoai Giao Doan (C3) and Line4 station)
- New Parliament Project at the site near Presidential House (Line2/station of Ho Tay (C7));
- Other single building projects

220 The preceding plans and projects are summarized on Table 2.2.1; with their locations plotted on Figure 2.2.7.



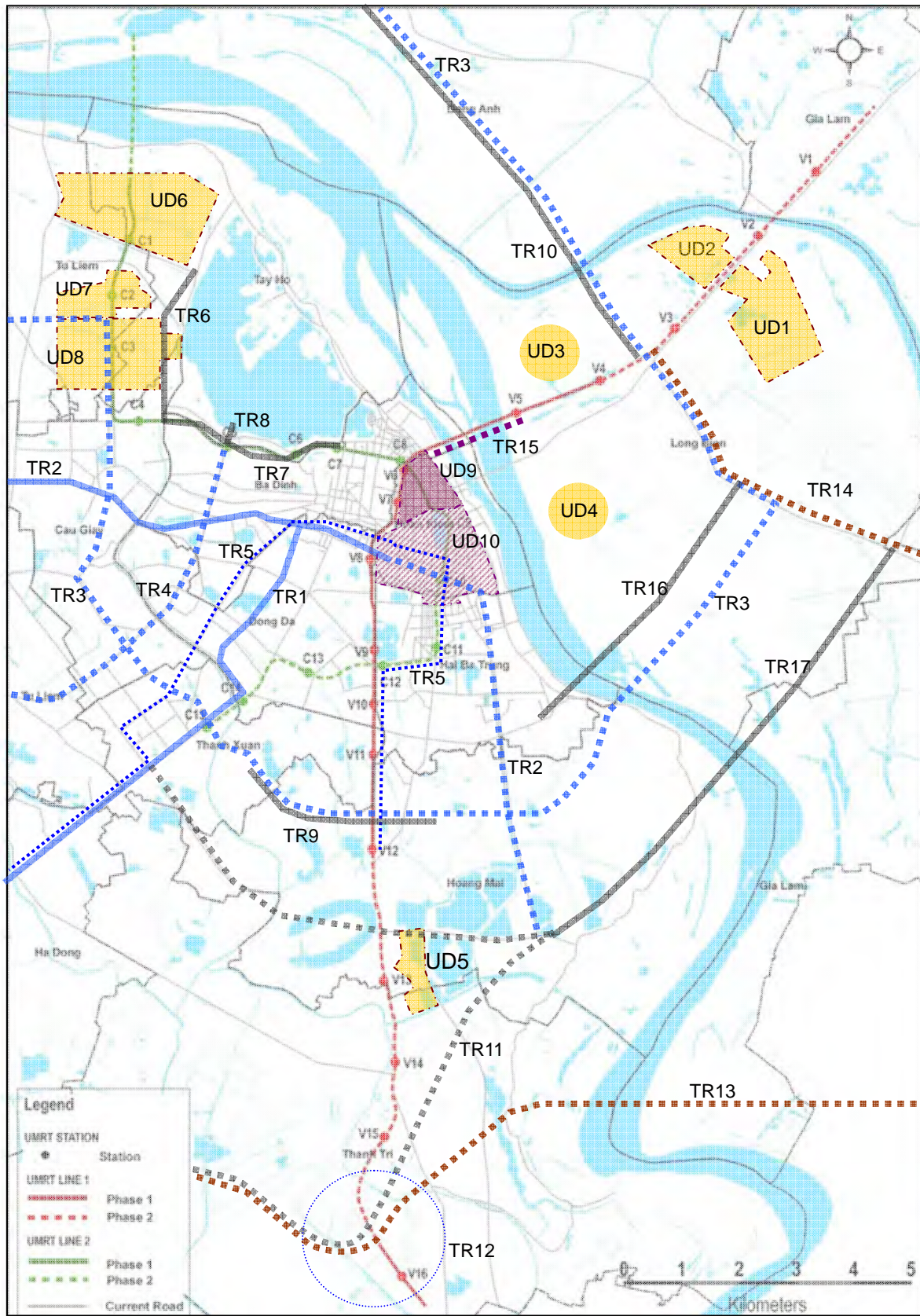
**Table 2.2.1 Summary of Plans/Projects Affecting UMRT Line1 and Line2**

Current Plans and Projects	Location vis-a-vis Line1 & Line2	Status	Items for Coordination		Affected Station
			Urban	Road & Transport	
<b>Road and Transportation (TR)</b>					
1.UMRT Line2A	Thanh Xuan, Dong Da, Ba Dinh	Feasibility Study (C)	--	Convenient transfer to Line 2 station	C16
2. UMRT Line3	Tu Liem, Cau Giay, Ba Dinh, Dong Da, Hai Ba Trung	Feasibility Study (F)	--	Convenient transfer to Lines 1 & 2 stations	V8, C10
3. UMRT Line4	Tu Liem, Cau Xay, Thanh Xuan	Plan	--	Convenient transfer to Line 2 stations	V15
4. UMRT Line5	Ho Tay, Ba Dinh	Plan (BOT)	--	Convenient transfer to Line 2 stations	C5
5. BRT	Thanh Xuan, Hoang Mai, Hai Ba Trung	Plan (WB)	--	Convenient transfer to Lines1 & 2 stations	C10, C11, C12, C16, V10, V11, 12
6. Road at Nghia Thanh	Ba Dinh	Approved Plan	--	-- (sub-structure)	--
7. Road along Hoang Hoa Tam road	Ba Dinh , Ho Tay	Approved Plan	--	Adjustment of passages of stations	C5, C6, C7
8. Van Cao Road Extension	Ho Tay	Approved Plan	--	Adjustment of passages of stations	C5
9. NH1-Hoang Mai road	Hang Mai	Approved Plan	--	Flyover bridge beyond NH1 and Line 1	--
10. Extension Road NH5	Long Bien, Dong Anh	Under construction	--	Trunk road to access road of station area	V3, V4
11. Ring Road 4	Thanh Tri	Plan	Road within expected station area dev.	Connection road to the road to Thanh Tri bride and NH1A	--
12. High-speed Railway	Thanh Tri, (Hoang Mai)	Preliminary Scheme	Railway within expected station area dev.	Reserved Area for HSR Station Area	V16 (V15, V14, V13, V12)
13. Ring Railway	Than Tri	Plan	Railway within expected station area development	Access road and walkway connection	--
14. UMRT Line1 Eastern	Long Bien, Gia Lam	Plan	--	Station capacity and function	V4
15. Long Bien Bride conservation	Long Bien, Hoan Kiem	Plan	Urban landscape conservation	Conservation and utilization of the bridge	V4, V5
16. Vinh Thuy Bridge/Access	Hai Ba Trung, Long Bien	Under construction	--	Trunk road to access road of station area	--
16. Thanh Tri Bridge/Access	Hoang Mai, GiaLam	Under construction	--	Trunk road to access road of station area	--
<b>Urban Development (UD)</b>					
1. Viet Hung New Town development	Long Bien	Under construction	Commercial and other urban service facilities	Access and feeder bus services to station	V2, V3
2. Thuong Thanh New Town development	Long Bien	Plan	Commercial and other urban service facilities	Access and feeder bus services to station	V2
3. Ngoc Thuy New Town development	Long Bien	Approved Plan	Commercial and other urban service facilities	Access and feeder bus services to station	V5
4. Bo De New Town development	Long Bien	Plan	--	Feeder bus services to station	V4, V5
5. Phap Van-Tu Hiep New Town development	Hoang Mai	Under construction	Commercial and other urban service facilities	Access and feeder bus services to station	V13
6. Nam Thang Long New Town(CIPUTRA)	Tay Ho	Under construction	Commercial and other urban service facilities	Urban trunk road construction with Line 2	C1
7. Diplomat Quarter Development	Tay Ho	Under construction	Commercial and other urban service facilities	Urban trunk road construction with Line 2	C2
8. Tay Ho Tay Urban Development	Tay Ho and Tu Liem	Approved Plan	New Government Center	Local road development	C3
9. Conservation of Ancient Quarter	Hoang Mai	Regulation	Historical town for conservation and renovation	Local road and traffic management	C8
10. Hoan Kiem/ French Quarter Development Control Area	Hoan Kiem, Hai Ba Trung	Regulation	Historical town for conservation and renovation	Local road and traffic management	V8, V9, C9, C10

Source: JICA Project Team based on various data sources



**Figure 2.2.7** Locations of Plans/Projects Affecting UMRT Line1 and Line2



Source: Prepared by JICA Project Team from various data sources

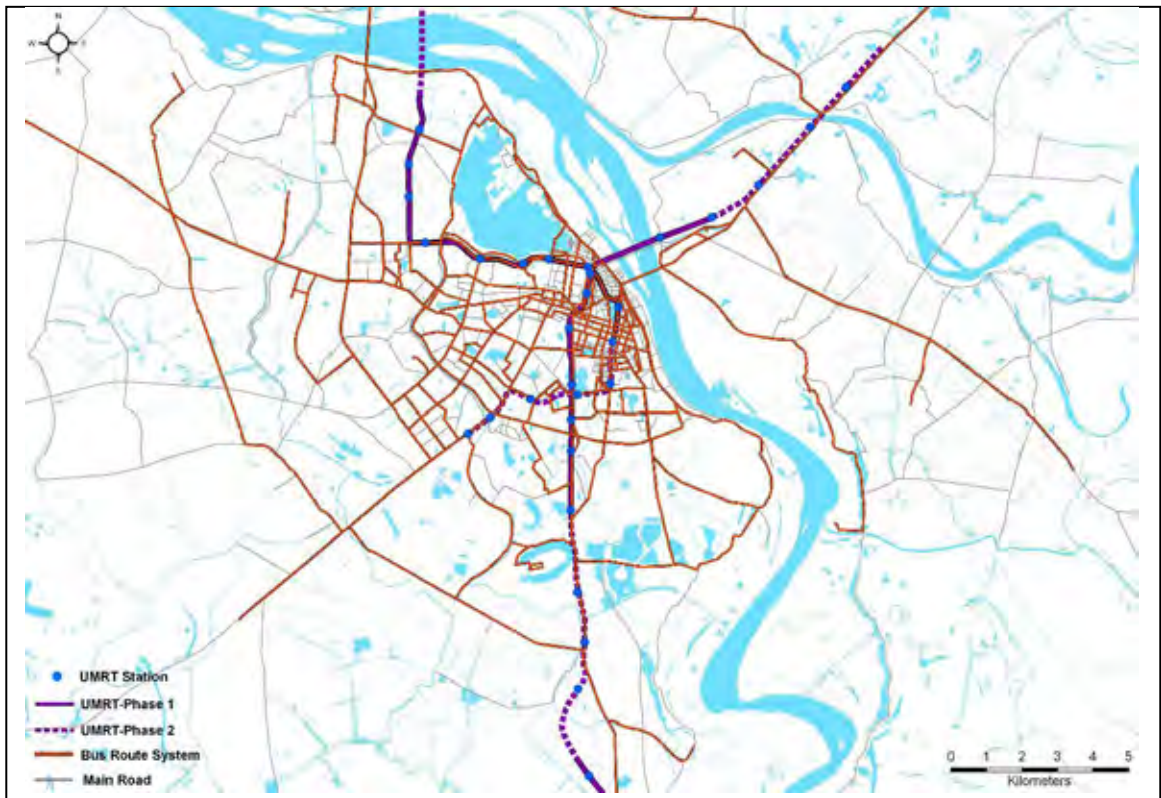


### 2.2.3 Development of Bus Transportation

221 The bus transport system of Hanoi started to pick up after 1992, when the government decided to promote its development. In 2002, the City introduced the ‘model bus service’ – signaling bigger public sector investments in urban bus transport. By 2008, total number of ridership on buses reached 402.5 million or about 110 thousand/day. Although considerably higher than 15 million passengers carried in 2001, it represented only less than 7% share of total daily trips. This was lower than originally targeted.

222 The bus route network consisted of 60 lines with an average length of 19.9 kilometers. It is served by 940 buses (big bus =309, medium = 452, small = 179). The service runs 16 hours a day, from 05:00 to 21:00, with headways ranging from 5 to 20 minutes. Buses generally stop only at designated locations which have a reasonable distance between them. Bus stops are, to a large extent, provided with functional shelters, have good passenger information in the form of route maps and timetables, and generate some income from advertising. Figure 2.2.8 shows the existing bus network in relation to UMRT Line1 and Line2.

**Figure 2.2.8 Current Bus Route Network in Hanoi**



Source: JICA Study Team

223 There are at present eight (8) major bus terminals in Hanoi, as shown in Table 2.2.2, Luong Yen terminal caters to buses and trucks. Opened in 2004, it is intended to replace Long Bien bus terminal. It should be noted that most of these terminals served both inter-city and intra-city buses – and to this extent, function also as transfer points. Generally, urban bus operations do not need terminals to wait for passengers.

**Table 2.2.2 Bus Terminals in Hanoi**

Terminal Name	Dominant Service Orientation	Area (sqm)	Bus Route		UMRT Connecting Station	
			Inter-city	Intra-city	Line1	Line2
1. Gia Lam	East and North bound	14,440	85	8	Gia Lam (V4)	--
2. Long Bien		(2,500)	na	13	Nam Cau Long Bien (V6)	Hang Dau (C8)
3. Tran Khanh Du	Intra-city only	(2,500)	--	8	--	--
4. Luong Yen	East, South, North	9,000	9	5	--	--
5. Ha Noi	Intra-city only	(3,000)	--	11	Hanoi (V8)	--
6. Kim Ma	Intra-city only	3,570	--	11	--	Line3
7. Giap Bat (Phia Nam)	South	26,400	110	12	Giap Bat (V12)	--
8. Hoang Quoc Viet	West and North	na	na	9	--	--
9. My Dinh	West, North, South	34,000	81	9	--	--
10. Ha Dong	West and South	4,000	60	9	--	Line 2A

Source: Hanoi Bus Map/TRAMOC 2009, (estimation), Inter-city (2005)

224 The bus fare system is based on a single trip fare from VND 3,000 to 5,000 and a monthly pass for frequent travelers. The monthly pass is discounted and comes in two different price classes: (i) priority passengers (i.e. pupils and students), and (ii) non-priority passengers. Passes are issued for three different travel options: valid on one, two, or all routes. Hence, there are six different types of monthly passes ranging from VND 25,000 to VND 80,000. The same tariff structure would likely be adopted for UMRT.

225 The bus operation is incurring a heavy financial burden on the City. In 2008, the subsidy amounted to VND423 billion, or about VND1,056 per passenger trip. Unless the bus system is reformed, the introduction of UMRT would likely raise the subsidy as the rail lines would siphon off passengers from the high ridership (and more lucrative) routes.

226 The bus routes that have substantial overlaps (>40% of the lengths coincide or are nearly parallel in most parts) with UMRT Line1 are as follows. The combined ridership on the five routes listed below averaged 142 thousand per day in 2008.

- Route 1: Long Bien – Ha Dong
- Route 3: BX Giap Bat – BX Gia Lam
- Route 8: Long Bien – Dong My
- Route 10: Long Bien – Tu Son
- Route 21: BX Giap Bat – BX Yen Nghia

227 On the other hand, the bus routes that coincide or are nearly parallel in most parts with UMRT Line2 are as shown below; their combined ridership averaged 27 thousand per day in 2008.

- Route 14: Bo Ho - Cổ Nhuế
- Route 44: Tran Khan Du – BX My Dinh

228 Table 2.2.3 lists the selected set of bus routes that are likely to be affected most by both UMRT Line1 and Line2. The bus routes with connections only to Line1 are shown

on Table 2.2.4, while those with connections only to Line2 are shown on Table 2.2.5. Re-structuring of the bus routes can wait until about 2013 when either UMRT Line1 or Line2 becomes operational.

**Table 2.2.3 Bus Routes with Connectivity to Both UMRT Line1 and Line2**

No.	Bus Route Name	Inbound	Outbound
1	Long Biên – Hà Đông	Crossing with Line 1 & Line 2 through Nam Long Bien station; Crossing with Line 1 through Phung Hung and crossing with line 2 through Nga Tu So and Thuong Dinh station.	Crossing with Line 1 & Line 2 through Nam Long Bien station; Crossing with Line 1 through Phung Hung; Tran Hung Dao and crossing with Line 2 through Nga Tu So and Thuong Dinh station.
8	Long Biên - Đông Mỹ	Crossing with Line 2 through Ngọc Sơn, Trần Hưng Đạo, Cầu Dền. Crossing with Line 1 through Bạch Mai, Giáp Bát, Hoàng Liệt, Văn Điển	Crossing with Line 2 through Ngọc Sơn, Trần Hưng Đạo, Cầu Dền. Crossing with Line 1 through Bạch Mai, Giáp Bát, Hoàng Liệt, Văn Điển
11	CV Thống Nhất - ĐH Nông Nghiệp I	Crossing with Line 2 through Trần Hưng Đạo. Crossing with Line 1 through Gia Lâm	Crossing with Line 1 through Gia Lâm, Hà Nội. Crossing with Line 2 through Ngọc Sơn, Trần Hưng Đạo
3	Bến xe Giáp Bát - Bến xe Gia Lâm	Crossing with Line 1 through Gia Lâm, Bách Khoa, Bạch Mai, Phương Liệt and Giáp Bát; Crossing with Line 2 through Trần Hưng Đạo.	Crossing with Line 1 through Gia Lâm, Giáp Bát, Bách Khoa, Bạch Mai, Phương Liệt and Giáp Bát; Crossing with Line 2 through Trần Hưng Đạo
12	Kim Mã – Văn Điển	Crossing with line 2 through Ngã Tư Sở. Crossing with Line 1 through Giáp Bát, Hoàng Liệt, Văn Điển	Crossing with Line 1 through Văn Điển, Hoàng Liệt, Giáp Bát. Crossing with Line 2 through Chùa Bộc
16	BX Giáp Bát - BX Mỹ Đình	Crossing with Line 1 through Giáp Bát, Phương Liệt. Crossing with Line 2 through Ngã Tư Sở	Crossing with Line 1 through Giáp Bát, Phương Liệt. Crossing with Line 2 through Ngã Tư Sở
18	Kim Mã - Long Biên - Kim Mã	Crossing with line 1 through Phùng Hưng, Nam Long Biên, ga Bạch Mai. Crossing with line 2 through Chùa Bộc	Crossing with line 1 through Phùng Hưng, Nam Long Biên, ga Bạch Mai. Crossing with line 2 through Chùa Bộc
21	BX Giáp Bát - BX Yên Nghĩa	Crossing with Line 1 through Giáp Bát - Phương Liệt-Bạch Mai (hospital). Crossing with Line 2 through Chùa Bộc, Ngã Tư Sở, Thượng Đình	Crossing with Line 1 through Giáp Bát - Phương Liệt-Bạch Mai (hospital). Crossing with Line 2 through Chùa Bộc, Ngã Tư Sở và Thượng Đình
22	BX Gia Lâm - TTVH Hà Đông	Crossing with Line 1 and Line 2 through Nam Long Biên Crossing with line 1 through Gia Lâm	Crossing with Line 1 and Line 2 through Nam Long Biên. Crossing with line 1 through Gia Lâm
23	Nguyễn Công Trứ - Văn Hồ - Long Biên - Nguyễn Công Trứ	Crossing with Line 1 and Line 2 through Nam Long Biên. Crossing with line 1 through Bạch Mai (hospital), Phùng Hưng. Crossing with line 2 through Chùa Bộc	Crossing with Line 1 and Line 2 through Nam Long Biên. Crossing with line 1 through Bạch Mai (hospital) Phùng Hưng. Crossing with line 2 through Chùa Bộc and Cầu Dền.
24	BX Lương Yên - Ngã Tư Sở - Cầu Giấy	Crossing with Line 2 through Ngã Tư Sở. Crossing with Line 1 through Bạch Mai, Phương Liệt	Crossing with Line 2 through Ngã Tư Sở. Crossing with Line 1 through Bạch Mai, Phương Liệt
25	Nam Thăng Long - Giáp Bát	Crossing with line 2 through Nam Thăng Long, buổi n Bách Khoa. Crossing with Line 1 through Bạch Mai (hospital), Phương Liệt và Giáp Bát	Crossing with Line 2 through Nam Thăng Long, buổi n Bách Khoa. Crossing with Line 1 through Bạch Mai (hospital), Phương Liệt và Giáp Bát
26	Mai Động - SVĐ Quốc Gia	Crossing with Line 1 through Bạch Mai. Crossing with Line 2 through Chùa Bộc	Crossing with Line 1 through Bạch mai. Crossing with Line 2 through Chùa Bộc
28	Bến xe Giáp Bát - Đông Ngạc	Crossing with Line 1 through Giáp Bát, Phương Liệt, Bạch Mai (hospital). Crossing with Line 2 through Chùa Bộc	Crossing with Line 1 through Giáp Bát, Phương Liệt, Bạch Mai (hospital). Crossing with Line 2 through Chùa Bộc
29	Bến xe Giáp Bát - Tân Lập	Crossing with Line 1 through Giáp Bát. Crossing with Line 2 through Ngã Tư Sở and ga Thượng Đình	Crossing with line 1 through Giáp Bát. Crossing with line 2 through Ngã Tư Sở and ga Thượng Đình
30	Mai Động - BX Mỹ Đình	Crossing with Line 1 through Hà Nội. Crossing with line 2 through Bưởi	Crossing with line 1 through Hà Nội. Crossing with line 2 through Bưởi
31	Bách Khoa - Đại Học Mỏ (Chèm)	Crossing with line 2 through Cầu Dền - Trần Hưng Đạo - Ngọc Sơn	Crossing with Line 1 and Line 2 through Nam Long Biên. Crossing with Line 2 through Đền Ngọc Sơn
35	Trần Khánh Dư - Thanh Tước	Crossing with Line 2 through Trần Hưng Đạo, Chùa Bộc. Crossing with Line 1 & 2 through Bách Khoa	Crossing with Line 2 through Trần Hưng Đạo, Chùa Bộc. Crossing with Line 1 & 2 through Bách Khoa
36	Yên Phụ - Bờ Hồ - Linh Đàm	Crossing with Lines 1 & 2 through Nam Long Biên. Crossing with line 2 through Trần Hưng Đạo. Crossing with line 1 through Giáp Bát	Crossing with Lines 1 & 2 through Nam Long Biên. Crossing with line 2 through Đền Ngọc Sơn - Trần Hưng Đạo. Crossing with Line 1 through Giáp Bát

No.	Bus Route Name	Inbound	Outbound
38	Bến xe Nam Thăng Long - Mai Động	Crossing with Line 2 through Bưởi - Cầu Dền - Trần Hưng Đạo. Crossing with Line 1 through Hà Nội	Crossing with Line 2 through Cầu Dền - Trần Hưng Đạo-Bưởi. Crossing with Line 1 through Hà Nội.
41	Nghi Tâm – BX Giáp Bát	Crossing with Lines 1 & 2 through Bách Khoa. Crossing with Line 1 through Bạch mai - Phương Liệt - Giáp Bát	Crossing with Lines 1 & 2 through Bách Khoa. Crossing with Line 1 through Bạch mai - Phương Liệt - Giáp Bát
44	Trần Khánh Dư – BX Mỹ Đình	Crossing with Lines 1 & 2 through Bách Khoa. Crossing with Line 2 through Chùa Bộc - Ngã Tư Sở - Thượng Đình	Crossing with Lines 1& 2 through Bách Khoa. Crossing with Line 2 through Chùa Bộc - Ngã Tư Sở - Thượng Đình
49	Trần Khánh Dư - KĐT Mỹ Đình II	Crossing with line 1 through Hà Nội. Crossing with line 2 through Trần Hưng Đạo	Crossing with line 1 through Hà Nội. Crossing with line 2 through Trần Hưng Đạo
51	Trần Khánh Dư - KĐT Trung Yên	Crossing with Line 2 through Chùa Bộc. Crossing with Lines 1& 2 through Bách Khoa	Crossing with Line 2 through Chùa Bộc. Crossing with Lines 1& 2 through Bách Khoa
52	CV Thống Nhất - BX Nước Ngầm	Crossing with Line 2 through Trần Hưng Đạo	Crossing with Line 1 through Hà Nội. Crossing with Line 2 through Trần Hưng Đạo

Source: Transport Survey, JICA Project Team

**Table 2.2.4 Bus Routes with Connectivity to UMRT Line1 Only**

No.	Bus Route Name	Inbound	Outbound
<b>URBAN BUS</b>			
4	Long Biên - Lĩnh Nam	Parallel in most parts with line 1	Parallel with line 1
6	BX Giáp Bát - Cầu Giẽ	Crossing with line 1 through Giáp Bát, Hoàng Liệt, Vĩnh Quỳnh.	Crossing with line 1 through Giáp Bát, Hoàng Liệt, Vĩnh Quỳnh.
10	Long Biên - Từ Sơn	Crossing with line 1 through Gia Lâm, Đức Giang, Cầu Đuống, Yên Viên	Crossing with line 1 through Gia Lâm, Đức Giang, Cầu Đuống, Yên Viên
15	Long Biên - Phố Nối	Crossing with line 1 through Cầu Đuống.	Crossing with line 1 through Cầu Đuống.
17	Long Biên - Nội Bài	Crossing with line 1 through Cầu Đuống	Crossing with line 1 through Cầu Đuống
32	Bến xe Giáp Bát - Nhón	Crossing with line 1 through Giải Phóng, Phương Liệt, Bạch mai, Bách Khoa, Hà Nội	Crossing with line 1 through Giải Phóng, Phương Liệt, Bạch mai, Bách Khoa, ga Hà Nội
34	Bến xe Mỹ Đình - Bến xe Gia Lâm	Crossing with line 1 through Gia Lâm	Crossing with line 1 through Gia Lâm
37	Bến xe Giáp Bát - Linh Đàm - Bến xe Hà Đông	Crossing with line 1 through Giáp Bát	Crossing with line 1 through Giáp Bát
39	Công viên Nghĩa Đô - BX Nước Ngầm	Crossing with line 1 through Hoàng Liệt, Văn Điển	Crossing with line 1 through Hoàng Liệt, Văn Điển
40	CV Thống Nhất - Như Quỳnh	Parallel with line 1	Parallel with line 1
42	BX Kim Ngưu - Đức Giang	Crossing with line 1 through Đức Giang	Crossing with line 1 through Đức Giang
43	Ga Hà Nội – TT Đông Anh	Crossing with line 1 through Hà Nội - Đức Giang - Cầu Đuống - Yên Viên	Crossing with line 1 through Hà Nội - Đức Giang - Cầu Đuống - Yên Viên
47	Long Biên - Bát Tràng	Parallel with line 1	Parallel with line 1
48	Trần Khánh Dư – Pháp Vân	Parallel with line 1	Parallel with line 1
54	Long Biên - Bắc Ninh	Crossing with line 1 through Cầu Đuống và ga Yên Viên	Crossing with line 1 through Cầu Đuống và ga Yên Viên
59	Đông Anh - ĐH Nông Nghiệp I	Crossing with line 1 through Cầu Đuống - Đức Giang	Crossing with line 1 through Cầu Đuống - Đức Giang
<b>REGIONAL BUS</b>			
202	Ha Noi - Hai Duong	Crossing with line 1 through North Long Bien and Gia Lam	Crossing with line 1 through North Long Bien and Gia Lam
203	Ha Noi - Bac Giang	Crossing with line 1 through North Long Bien, Gia Lam, Duc Giang, Cau Duong, Yen Vien	Crossing with line 1 through North Long Bien, Gia Lam, Duc Giang, Cau Duong, Yen Vien
204	Ha Noi - Bac Ninh	Crossing with line 1 through North Long Bien and Gia Lam	Crossing with line 1 through North Long Bien and Gia Lam
205	Luong Yen bus station - Hung Yen	Crossing with line 1 through North Long Bien and Gia Lam	Crossing with line 1 through North Long Bien and Gia Lam
206	Giap Bat bus station - Phu Ly	Crossing with line 1 through Giap Bat, Hoang Liet, Van Dien, Vinh Quynh	Crossing with line 1 through Giap Bat, Hoang Liet, Van Dien, Vinh Quynh
207	Ha Noi - Van Giang	Crossing with line 1 through Giap Bat, North Long Bien, Gia Lam	Crossing with line 1 through Giap Bat, North Long Bien, Gia Lam
209	Giap Bat - Hung Yen	Crossing with line 1 through Giap Bat, Hoang Liet, Van Dien, Vinh Quynh	Crossing with line 1 through Giap Bat, Hoang Liet, Van Dien, Vinh Quynh

Source: Transport Survey, JICA Project Team

**Table 2.2.5 Bus Routes with Connectivity to UMRT Line2 Only**

No.	Bus Route Name	Inbound	Outbound
5	Linh Đàm - Phú Diễn	Crossing with line 2 through Thượng Đình	Crossing with line 2 through Thượng Đình
7	BX Kim Mã - Sân bay Nội Bài	Crossing with line 2, through Bưởi	Crossing with line 2, through Bưởi
9	Bờ Hồ - Cầu Giấy - Bờ Hồ	Crossing with line 2 through Ngọc Sơn, Quận Ngựa	Crossing with line 2 through Trần Hưng Đạo, Ngọc Sơn.
13	BX Kim Mã - Cổ Nhuế	Parallel with line2	Parallel with line 2
14	Bờ Hồ - Cổ Nhuế	Crossing with line 2 through Bưởi, Bách Thảo, Hồ Tây, Nam Long Biên và Ngọc Sơn	Crossing with line 2 through Bưởi, Quận Ngựa, Bách Thảo, Hồ Tây, Nam Long Biên ,Ngọc Sơn
19	Trần Khánh Dư - BX Hà Đông	Crossing with line 2 through Ngã Tư Sở and Thượng Đình	Crossing with line 2 through Ngã Tư Sở and Thượng Đình
20	BX Kim Mã - Phùng	Parallel with line 2	Parallel with line 2
27	Bến xe Yên Nghĩa- Bến xe Nam Thăng Long	Crossing with line 2 through Thượng Đình and Ngã Tư Sở	Crossing with line 2 through Thượng Đình and Ngã Tư Sở
33	Mỹ Đình - Công Viên nước Hồ Tây	Crossing with line 2 through Bach thao	Crossing with line 2 through Bach thao
45	Trần Khánh Dư – Đông Ngạc	Crossing with line 2 through Hồ Tây - Bách Thảo - Bưởi	Crossing with line 2 through Bưởi - Quận Ngựa - Hồ Tây.
50	Long Biên - SVĐ Quốc Gia	Crossing with line 2 through Hồ Tây	Crossing with line 2 through Hồ Tây
53	Hoàng Quốc Việt - Đông Anh	Crossing with line 2 through Bưởi	Crossing with line 2 through Bưởi
55	BX Lương Yên - Long Biên - Cầu Giấy	Crossing with line 2 through Bưởi	Crossing with line 2 through Bưởi
58	Yên Phụ - TTTM Mê Linh Plaza	Crossing with line 2 through Nam Thăng Long	Crossing with line 2 through Nam Thăng Long
60	Nghĩa Do park - Nước Ngàm station	Crossing with line 2 through Bưởi, Thuong Dinh station	Crossing with line 2 through Bưởi, Thuong Dinh station

Source: Transport Survey, JICA Project Team

## 2.3 Opportunities for Integrated UMRT and Urban Development

### 2.3.1 Overview

229 The UMRT Line1 has 16 planned stations over 23.7 km from Yen Vien in Gia Lam District to Ngoc Hoi in Thanh Tri, passing through the city center of Hanoi. On the other hand, the UMRT Line2 has 15 planned stations in a 16.8-km route from Nam Thang Long in the north part of Tu Liem District to Thuong Dinh in the south part of Tu Liem. All the stations provide opportunities for Hanoi for various types of integrations. One obvious type of integration is achieving smooth interchange between modes of transport now and in the future. Another type is integration with other urban activities in the surrounding areas in the form of transit-oriented developments introduced in Section 2.4.2 of this Report.

230 Good stations do not happen by accidents. They are products of systematic planning and design. Station layouts have to be user-friendly, with facilities intuitively-understandable to boarding and alighting passengers. Movements between different floor levels should not be a major effort. The quality of station facilities is often associated with the quality of railway services.

231 The development of underground space is also a promising opportunity for Hanoi's urban and economic development particularly in the city center where building heights must be restricted. Underground space can be developed integrally with UMRT underground stations for commercial use (e.g. shopping) and public facilities (e.g. underground parking). With extensive development of underground air-conditioned walkways, destinations in the city center can be effectively and conveniently connected.

232 To maximize the benefits that can be derived from UMRT developments, a proven and successful approach is the adoption of an integrated urban development. At stations and terminals and in their adjoining areas, commercial and public facilities are integrally developed with transportation. When this occurs, the UMRT attracts higher patronage while the commercial/urban development benefits from good accessibility. This synergy is often so huge that many private companies in Japan have captured the external benefits for their own financial gains.

### 2.3.2 Multiplier Effects of UMRT

233 **Transport improvement:** The UMRT system is expected to have a multiplier effects on Hanoi. As a mass transport mode, it will provide high-level services between the suburban areas and the CBD, and guide the efficient expansion of urban areas. Because of the high land prices in the urban core, expansion to the suburbs is inevitable. With roads, the expansions tend to promote use of private cars; whereas, with UMRT the suburbanization enhances use of public transport. Within the urban core, UMRT provides travel unhampered by road congestion. When the four UMRT lines are completed, the UMRT system can serve 2.6 million passengers a day with an average trip length of 7.8 km per passenger.

234 **Catalyst for urban development:** Due to its agglomerative effects, UMRT becomes the catalyst for urban renewal at and around the stations and terminals. In-filling and intensification of land development within the urban core becomes possible as the traffic impact is mitigated by the presence of UMRT station within walking distance. Outside the city, new town developments around UMRT stations become attractive to

households because their access to the city is maintained while they are able to escape from the cramped conditions of the city. Examples of the latter are the land developments marked UD6, UD7, and UD8 in Figure 2.2.7.

235 **The great social equalizer:** The reliable and high-quality transportation services of UMRT are available to rich and poor alike. It is also affordable to the lower income households – who can get to work or school faster or almost at the same time as the wealthier car-owners. Those leaving far from the city center because of high land prices are not disadvantaged if their residents are near UMRT stations. Hence, the UMRT can be considered as an equalizer between rich and poor, and between households inside and outside the city.

236 **Economic impact:** The HAIDEP study estimated the net economic benefits from the four UMRT lines at USD2.1 billion as shown on Table 2.3.1 below.

**Table 2.3.1 Economic Benefits from UMRT**

Line	Length (km)	Financial Cost	Economic Evaluation		
			EIRR (%)	NPV (US\$ million)	B/C
UMRT Line 1	39	999	19.1	450.3	1.75
UMRT Line 2	75	2,522	14.6	772.5	1.54
UMRT Line 3	33	1,145	14.3	414.6	1.50
UMRT Line 4	53	365	21.5	880.8	3.31
All Lines	200	5,031	15.2	2,057.9	1.84

Source: HAIDEP

237 **Environmental impact:** One study put the expected savings from avoided fuel cost of the proposed UMRT system in Hanoi at USD1.1 billion. It is unclear what the assumptions were, but the general tenor cannot be disputed. Less fuel burned means less greenhouse gas emissions. In Bangkok, motorcycles - which are similar to Hanoi's – were found to generate 8.38 grams of hydrocarbons and 16.69 grams of carbon monoxide per km. Studies in other countries have shown that there is a strong inverse correlation between urban population density and energy consumption per capita, and that public transport promotes higher urban population densities (and therefore, less land required per capita) which leads to shorter travel distances and reduced fossil fuel consumption.

238 When commuters take the UMRT rather than drive in individual cars or motorcycles, everybody benefit from cleaner air. In net terms, travel on public transport reduces air pollution. There is also a corresponding reduction in demand for parking. Business establishments and city authorities saved money for every parking space that they don't have to build or maintain, aside from the important environmental benefits to not building parking, too. By not building parking, the utilization rate is reduced at which land surrounding the urban area is gobbled up.



## **2.4 Transit Oriented Development (TOD)**

### **2.4.1 Basic Concepts**

239 Hanoi has one of the highest urban densities in the world – 272 per hectare in the urbanized districts and 404 per hectare in the central Hoan Kiem district – compared to 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 advantageous feature was an accident of history. However, with increasing income and changing lifestyle, there is a move towards suburban living – pushed by cramped conditions in the urban core and pulled in by modern residential complexes emerging on the outskirts of Hanoi.

240 The challenge for Hanoi is to revitalize the old districts into well-designed dwellings in close proximity to good public transport and with convenient access to a mix of retail, personal services, health and recreational facilities. Inner city infill sites can offer an ideal setting to promote TOD but require a political commitment to establish a development style enterprise that can perform land re-adjustment activities and rebuild around UMRT stations. These stations offer a focal point for a community where immediate needs can be provided locally.

241 The urbanizing fringes of Hanoi offer the greatest potential for applying the TOD concept – because they are less hampered by existing land uses and ownership. These Greenfield or new sites can be planned and designed with a clear transit focus. To succeed, these Greenfield sites must be provided with high quality, fixed guideway public transport systems with regular connections to the CBD and other regional centers and other TOD nodes. This concept of urbanism seeks to bring together modern lifestyles, housing, and places of employment, retail activity and leisure time in a compact pedestrian-dominated neighborhood with linkages by transit to other points of interests in the greater Hanoi metropolitan region.

242 Some of the basic features for the new TOD community (aka “Transit Villages” or “Urban Villages”) are as follows:

- A market plaza around the rail station which is a focus point;
- A cafe, convenience retail store, child care facility, aged care facility, clinic, news stand, pharmacy and ATM;
- Office employment facilities around the main market plaza;
- The provision of mixed-use employment attached to dwellings within residential areas;
- A network of well lit and overlooked footpaths/cycle-ways connecting with the main plaza;
- The use of trees and buildings along all footpaths to give pedestrians and cyclists a feeling of intimacy and security.
- The provision of a network of natural walking trails and recreational areas around the TOD;
- A few short cul-de-sacs, within the residential TOD area, to accommodate young families with children;
- Full and ready access for people with disabilities and the elderly; and
- The provision of a park & ride facility near the station. This would accommodate patrons living beyond the TOD where no close alternative station site exists with an exclusive park & ride.

## 2.4.2 Role of UMRT in TOD

243 The UMRT is the key driver to the realization of TOD. A decision to implement the three rail lines and the BRT is a clear demonstration of the Hanoi Peoples Committee to create a public transit-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.

244 The TOD concept must and can be applied in different types of urban areas where different interventions become necessary (see Table 2.4.1).

**Table 2.4.1 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"> <li>• Attractive urban center environment and pedestrian-friendly</li> <li>• Capital and international commercial/business and tourism center with convenient facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Modern urban core /node formulation and pedestrian-friendly</li> <li>• Competitive commercial/business urban cores with convenient facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Attractive urban center environment and pedestrian-friendly</li> <li>• Competitive commercial/business center with convenient facilities</li> </ul>
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

245 The primary bus route network will initially form the backbone of the system and will thus fulfill the role of the future UMRT network. This is currently the situation in Hanoi, where buses provide high-capacity and high-speed service on the main roads. After the completion of the UMRT system, the primary bus network will connect to multimodal stations – a few of the routes would probably revert into feeder role for the rail, but not all. The secondary bus network will consist of feeder routes and local routes that are meant to widen the coverage. Buses on the secondary network will normally operate in mixed traffic, and accordingly, speed and service levels will be lower. This network will be operated by standard buses and smaller buses.

246 There are mainly three types of supplementary public transportation services in Hanoi today, namely: (i) the widespread and well-functioning taxi system; (ii) the unofficial but thriving motorcycle taxis (xe om); (iii) the traditional bicycle rickshaws (cyclo) now largely phased out, except for some tourist service.

247 Hence, as the city grows and the public transport carries more commuters, the UMRT network becomes necessary. Their entry would inevitably force a change in the role of buses – particularly on the densest corridor where UMRT operates. The re-organization of the bus system of Hanoi is one of the objectives of the World Bank-assisted BRT project for Hanoi. The city has already obtained USD250 thousand

grant to start the bus re-organization process. The minimum reform is the reformulation of the bus route network - once the UMRT becomes operational. The more fundamental – albeit, more painful reform – is the re-structuring of the urban transport industry to reduce or moderate the escalating level of subsidy. This would require improving the operating efficiency and performance of the bus enterprises – which may also entail a corresponding push towards some form of private sector participation.

### **2.4.3 Need for TOD-based Integrated Development**

248 It is axiomatic that the UMRT stations will be built. This is because they are covered by the project financing and the mandate of the rail implementing body. In the case of UMRT Line 1, it is the responsibility of VNR. In the case of the LRT Pilot, it is the responsibility of the Hanoi Metropolitan Rail Transport Project Board (HRB). The latter is expected to manage also the implementation of UMRT Line 2. On the other hand, the implementation of the BRT Project will be under Public Transport Authority (PTA) to be created by HDOT under the HPC; with the BRT operation to be let out by TRAMOC. None of these implementing bodies are authorized or mandated to pursue TOD.

249 Therefore, the ‘Transit Villages’ will not happen automatically, or emerge after the UMRT lines get built, because no one is responsible. Mere adoption of macro-economic policies – such as higher fuel prices, parking restrictions, building and land use controls - will not trigger the development of TODs. And yet, to the UMRT operators, the development of TODs is much to be desired as they lead to higher transit patronage. For urban managers and political leaders, on the other hand, TODs are crucial to the realization of Hanoi’s vision as a livable and green city.

250 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.

251 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.

252 There is therefore a need for integrated development plans around UMRT stations – to guide and coordinate the separate and independent actions of various stakeholders. This is the idea behind the JICA project – to formulate illustrative TOD plans for subsequent implementations (see Figure 2.4.1).

253 The integration of the entire public transport system – UMRT, BRT, and buses – of Hanoi is the key to achieving a higher modal share. Without proper integration, the same total daily trips would end up being divided between the buses and UMRT – with both rail and bus worse off. With integrated operation, the two modes can cover a wider area of the metropolis; both benefit by 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 2.4.1 TOD Concept



Source: JICA Project Team

### 2.4.3 Socio-Economic Impact by TOD-based Integrated Development

254 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.

255 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 2.4.2 and Figure 2.4.2).

256 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 2.4.2 and Figure 2.4.3).

257 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.

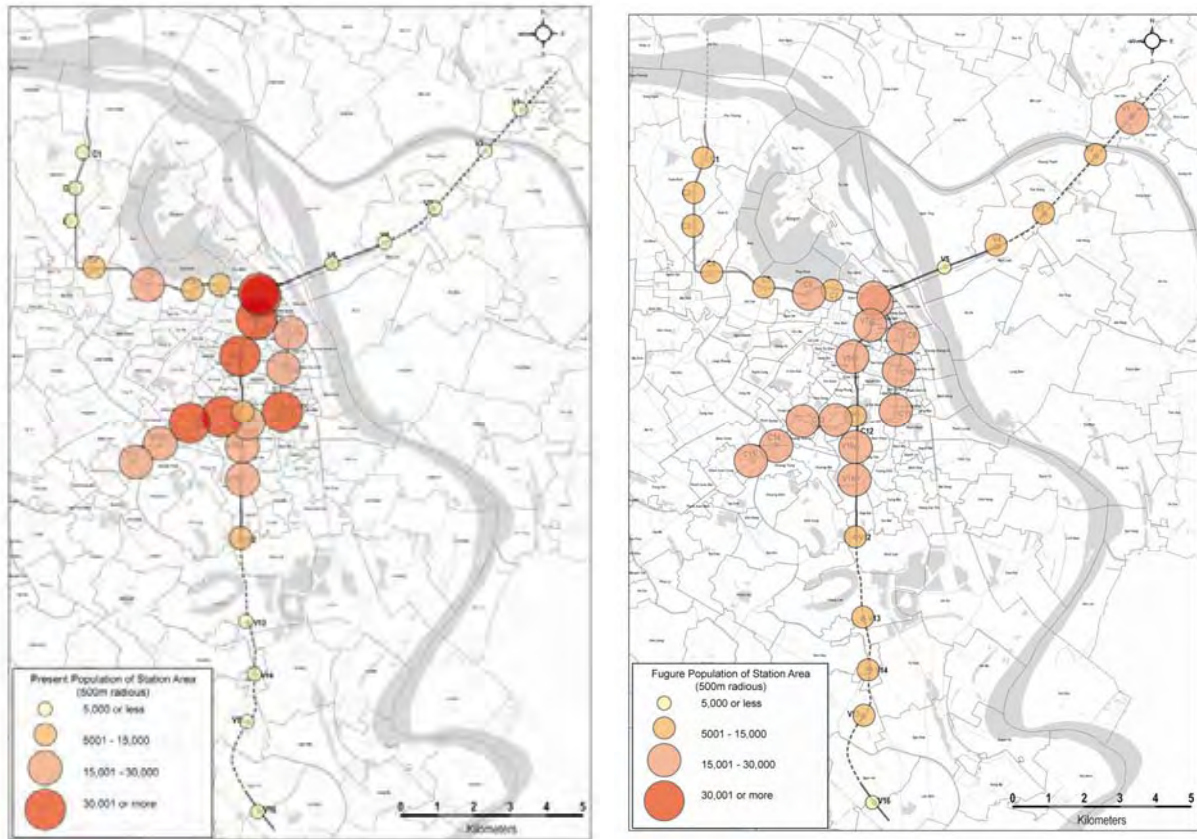
258 In the long run, an integrated UMRT and urban development will contribute to enhance overall urban environment and image through (i) reduction of air pollution, (ii) increase in openspace and greenery around the station, and (iii) creation of modern image around the station.

**Table 2.4.2 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

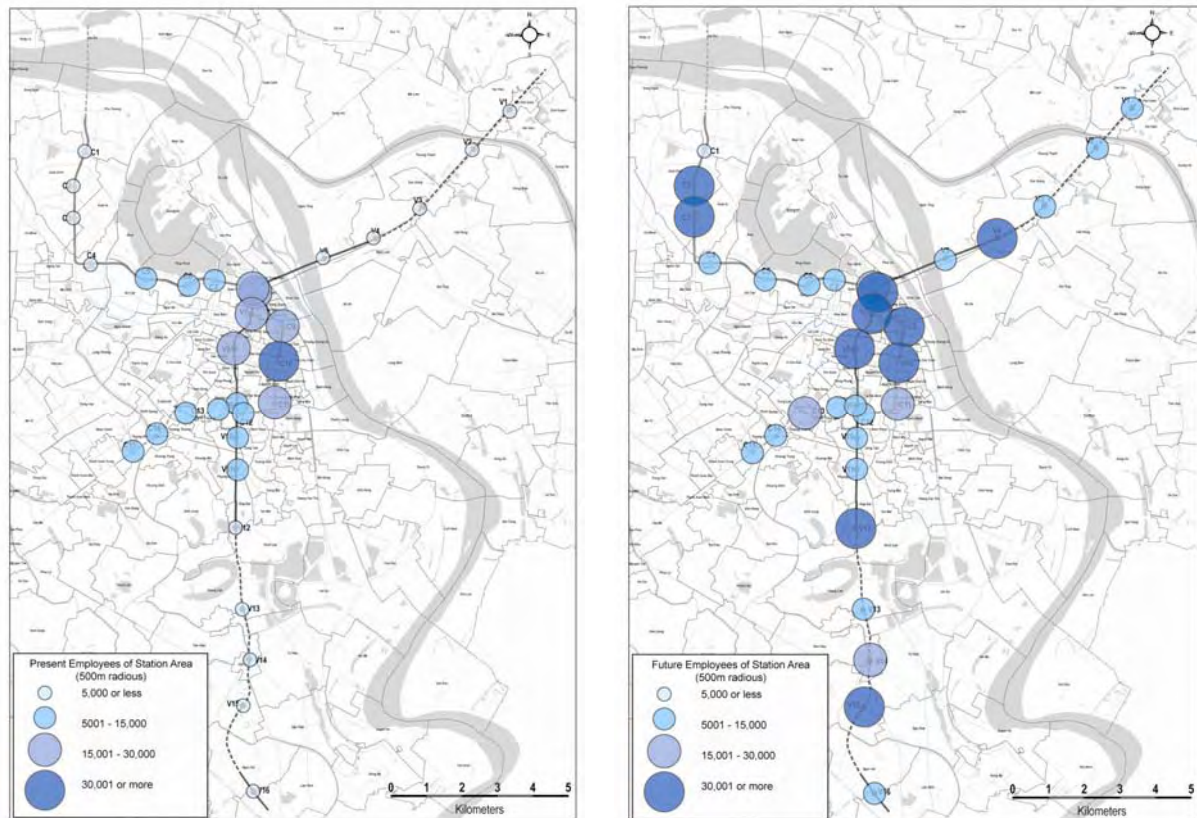
**Figure 2.4.2 Distribution of Settlement of Station Areas of UMRT Line1 and Line2**



Present

Future

**Figure 2.4.3 Distribution of Employment of Station Areas of UMRT Line1 and Line2**



Present

Future

Source: JICA Project Team



#### 2.4.4 Examples of TOD in Other Countries (see Figure 2.4.4)

259 **Denentoshi Line of Tokyu Corporation, Kanagawa, Japan** (see (1)): Tokyu Corporation was established in 1922. It has developed residential districts together with railway network expansion in south-west area of Tokyo. Nowadays, Tokyu Corporation operates various types of businesses such as (i) railway, (ii) real estate and housing development, (iii) commercial and retail business, (iv) hotel, tour and resort business, etc. Tokyu Denentoshi Line was developed as a bone structure of “Tama Denen Toshi” (Tama Garden City), which are suburban residential areas in conjunction with railway and bus network of Tokyu Group.

260 **Tama New Town, Tokyo, Japan** (see (2)): Tama New Town is a large residential development, straddling the municipalities of Hachioji, Tama, Inagi and Machida cities, in Tokyo, Japan. It was designed as a new town in 1965. It is approximately 14 kilometers long stretching east-west, and between 1 and 3 kilometers wide, located in an expanse of hills known as Tama Hills about 20 kilometers west of the center of the special wards of Tokyo.

261 **Tsukuba Express, Chiba, Saitama and Ibaraki, Japan** (see (3)): Tsukuba Express (TX in short) is operated from 2005. Total length is 58.3km, in 38 minutes, and maximum speed is 130km/h. There are 20 stations in total. To develop suburban areas, “Integrated Land Readjustment (LR) Projects” were implemented, which fulfill integrated development of railway, infrastructure and urban facilities.









262 **Shiodome National Railway yard area, Tokyo, Japan** (see (4)): In Japan, after privatization and separation of the Japanese National Railways in 1987, many national yards and NR owned facility areas were utilized for urban redevelopment. Since NR owned lands were located near to stations, there were abundant potentials for commercial and business development for railway users. Japan Railways, as a private railway developer and operator, actively promote urban redevelopment projects in cooperation with local governments to promote railway utilization as well as socio-economic development.

263 **Curitiba, Southern Brazil** (see (5)): Curitiba has a unique transportation system, developed locally and causing much interest worldwide. The popularity of Curitiba’s BRT has affected a modal shift from automobile travel to bus travel. In particular, 28 percent of BRT riders previously traveled by car. Compared to eight other Brazilian cities of its size, Curitiba’s Master Plan integrated transportation with land use planning, calling for a cultural, social, and economic transformation of the city. It limited central area growth, while encouraging commercial growth along the transport arteries radiating out from the city center.

264 **Pleasant Hill, suburb of San Francisco, California, USA** (see (6)): A 20-acre transit-oriented project at a suburban terminal of BART. Planned in 1991 and built with pedestrian-friendly tree-lined streets. A public plaza designed to be explored by children, one end of which is the town hall; another with shops and restaurants, and residential houses.

265 **Arabella Park, Munich, Germany** (see (7)): An attractive mixed-used, planned community, built around the eastern terminus of the U4 subway line. Cars are restricted to its periphery, thus making walking and cycling the modes of choice for circulating within the community. It has 10,000 full-time residents and 18,000 daytime workers. Modal share of public transit is 65%.

**Figure 2.4.4 Examples of TOD in Other Countries**

	
<p>(1) Aobadai Station, Tokyu Denentoshi Line, Kanagawa, Japan (left: before, right: present)</p>	
	
<p>(2) Tama New Town, Japan</p>	<p>(3) Ohtaka no Mori Station, Tsukuba Express, Japan</p>
	
<p>(4) Shiodome National Railway yard area, Tokyo, Japan (left: before, right: present)</p>	
	
<p>(5) Curitiba, Southern Brazil</p>	
	
<p>(6) Pleasant Hill, California</p>	<p>(7) Arabella Park, Munich</p>

Source: JICA Project Team from various sources





### 3 PLANNING CONSIDERATIONS FOR UMRT STATION AREAS

#### 3.1 Land Uses within the Influence Zones of Stations

301 Existing land uses for each of 31 stations<sup>1</sup>, within a range of 500m to 1000m radius, are varied and diverse – ranging from low-density rural to high-density urban characteristics. Figure 3.1.1 shows the changing land uses from one end of the Line 1 and Line 2 to the other ends – spanning suburban, urban and rural areas.

302 The differences in land uses among the stations of UMRT Line 1 become more apparent in Figure 3.1.2. It should be noted that around stations such as Yen Vien (V1), Cau Duon (V2), Van Dien (V14), Vinh Quynh (V15) and Ngoc Hoi (V16) - which are located in the suburbs - the predominant use is agricultural. On the other hand, institutional areas (government, security, health and welfare, educational, cultural) facilities are prominent land use near and around stations from Nam Cau Long Bien (V6) to Giap Bat (V12) – which are also located in urban or built up zones.

303 On the other hand, Figure 3.1.3 compares the land uses around the Line 2 stations. In general, the composition is similar to those of Line 1 stations. A major difference is the near absence of agricultural uses along Line 2.

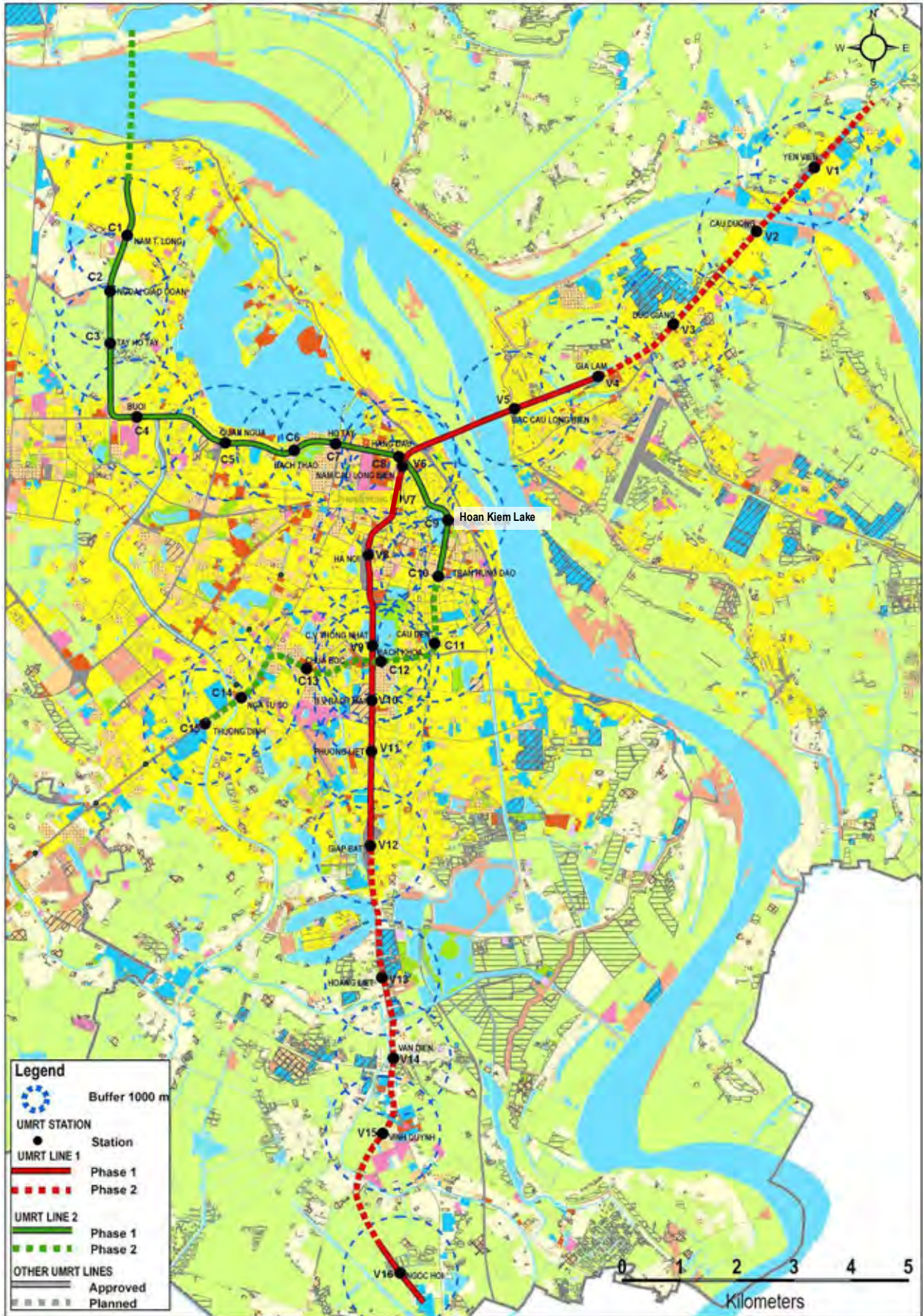
304 The two lines, therefore, offer contrasting opportunities for urban development. Because, stations along Line2 are surrounded by built-up areas, future developments would be of the re-development or urban renewal kind. Changes in land uses towards higher intensity would be slower – except when a single-owned large land area is available. Land owned by VNR belongs to this category. On the other hand, new large-scale urban developments are less constrained along Line 1, particularly in and around stations at the urban periphery. From a transit viewpoint, however, Line 2 will start commercial service with a higher base demand at the outset than Line 1. Demand on Line 1 will be of the future growths kind, and dependent on successful promotion of new urban developments.

305 As for population density (see Figure 3.1.4), the urban center and urban areas along railway around Long Bien and Gia Lam Districts are classified as high-density in 2003; but in 2020, the suburban areas of north and south and West of Ho Tay area will densify while those in the urban core, especially Hoan Kiem, Dong Da Districts, will decline. Though population is concentrated in particular areas of the urban core at present, this will decline by 2020 as population gets re-distributed on a city-wide scale.

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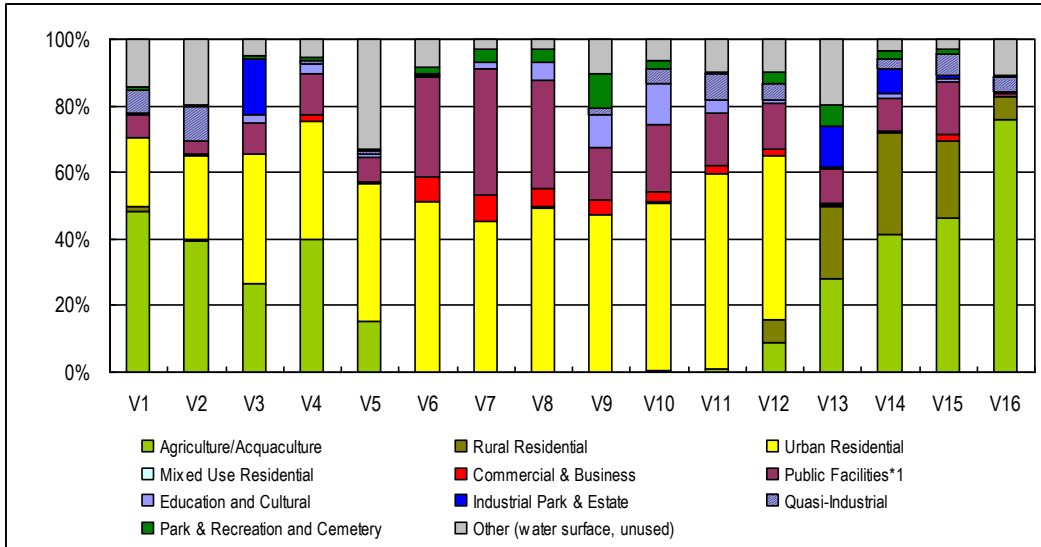
<sup>1</sup> As of March 2010, Draft Inception Report of Feasibility Study on Construction of Urban Railway Line2 Section Tran Hung Dao – Thuong Dinh was submitted. In this report, Kim Lien Station between Bach Khoa Station and Chua Boc Station was newly proposed. So in this Chapter, Kim Lien Station is not included, and Interview Survey was not implemented in this station area.

**Figure 3.1.1 Existing Land Use at Stations of UMRT Lines 1 and Line 2**



Source: JICA Project Team

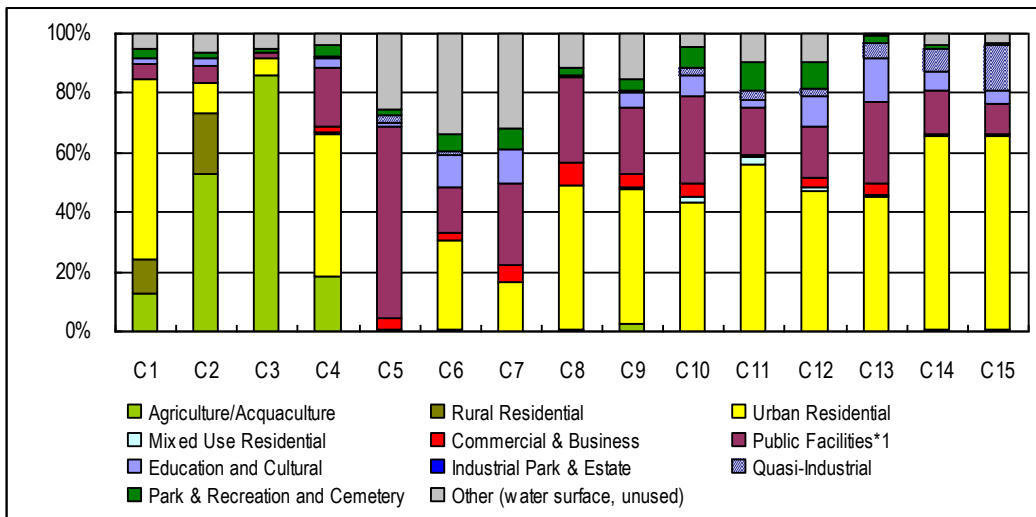
**Figure 3.1.2 Current Land Uses at Stations Areas of Line 1**



Source: JICA Project Team

Note: V1= Yen Vien, V2= Cau Duong, V3= Duc Giang, V4= Gia Lam, V5=, Bac Cau Long Bien, V6= Nam Cau Long Bien, 7= Phung Hung , V8= Hanoi, V9= C.V. Thong Nhat, V10= B.V. Bach Mai, V11= Phuong Liet, V12= Giap Bat, V13= Hoang Liet, V14= Van Dien, V15= Vinh Quyhn, V16= Ngoc Hoi

**Figure 3.1.3 Current Land Uses at Station Areas of Line 2**

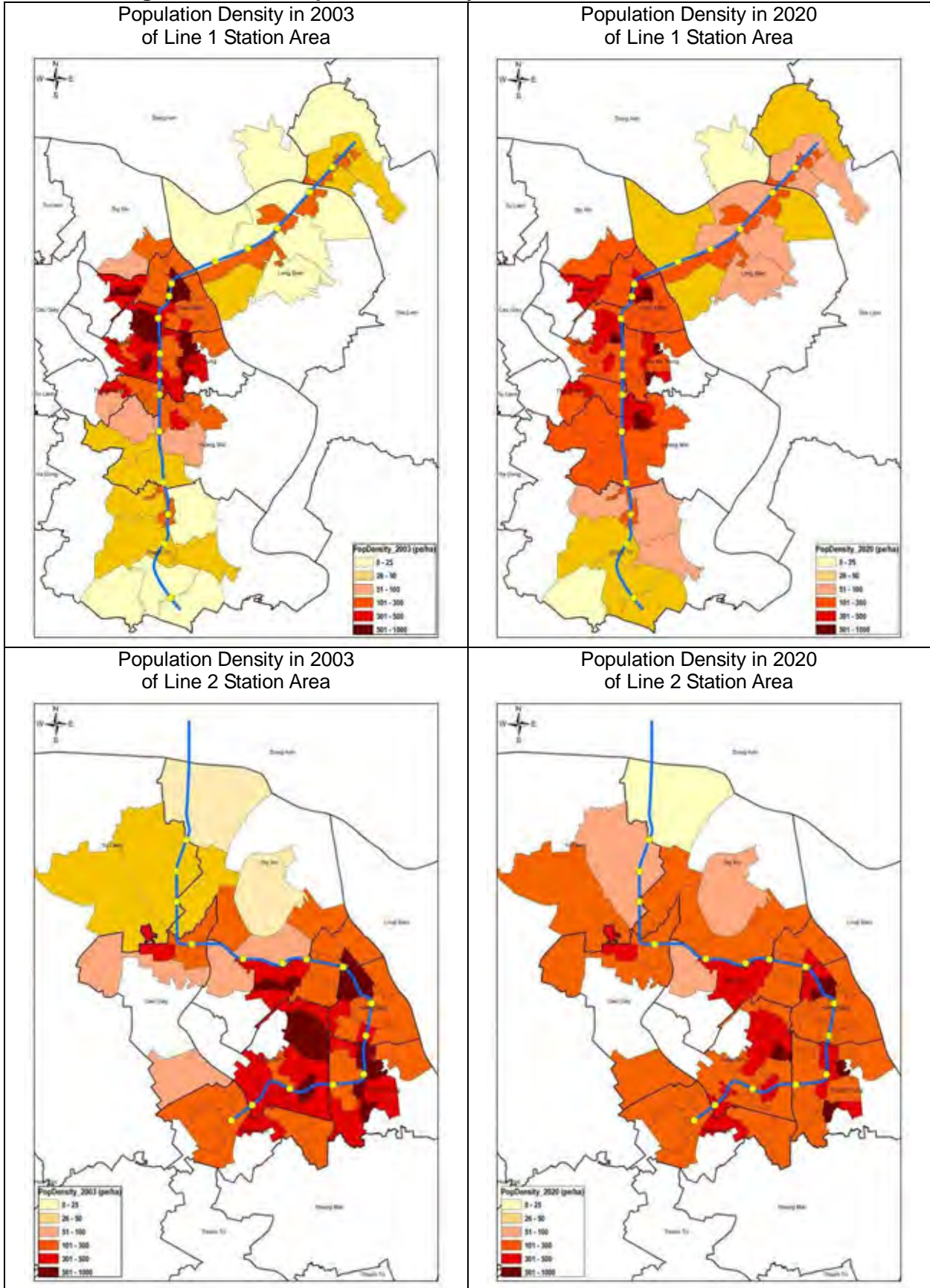


Source: JICA Project Team

Note: C1= Nam Thang Long, C2= Ngoai Giao Doan, C3= Tay Ho Tay, C4= Bui, C5= Quang Ngua, C6= Bach Thao, C7= Ho tay, C8= Hang Dau, C9= Hoan Kiem Lake, C10= Tran Hung Dau, C11= Cau Den, C12= Bach Khoa, C13= Chua Boc, C14= Nga Tu So, C15= Thuong Dinh



**Figure 3.1.4 Population Density of Station Areas in 2003 and 2020**



Source: HAIDEP

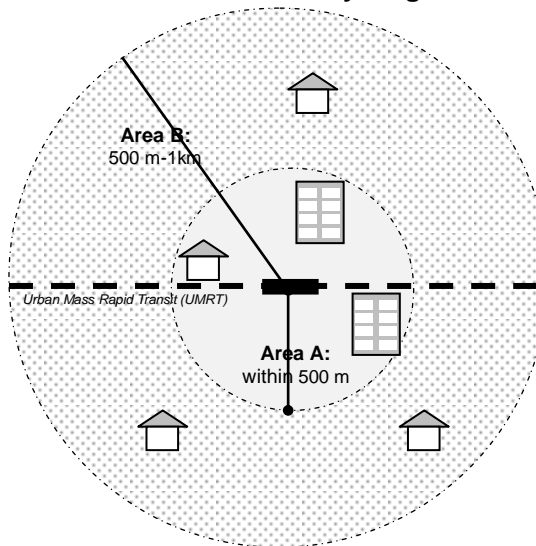
### 3.2 Present Trip Characteristics and Future Expectation of UMRT Influenced Area

#### 3.2.1 Outline of Survey

306 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 reasons to be there. The HIS had respondents within the 1000m radius of the stations, while the Facility User survey was limited to the 500m radius (see Figure 3.2.1).

307 The Household Interview Survey netted 2,056 households, with 6,059 samples in 31 stations (see Figure 3.2.2). Facility User Interview Survey covered 257 facilities (see Table 3.2.1), with 1,325 samples in 29 stations (Vinh Quynh and Ngoc Hoi station areas were excluded because current facilities are not clustered).

**Figure 3.2.1 Interview Survey Target Area**

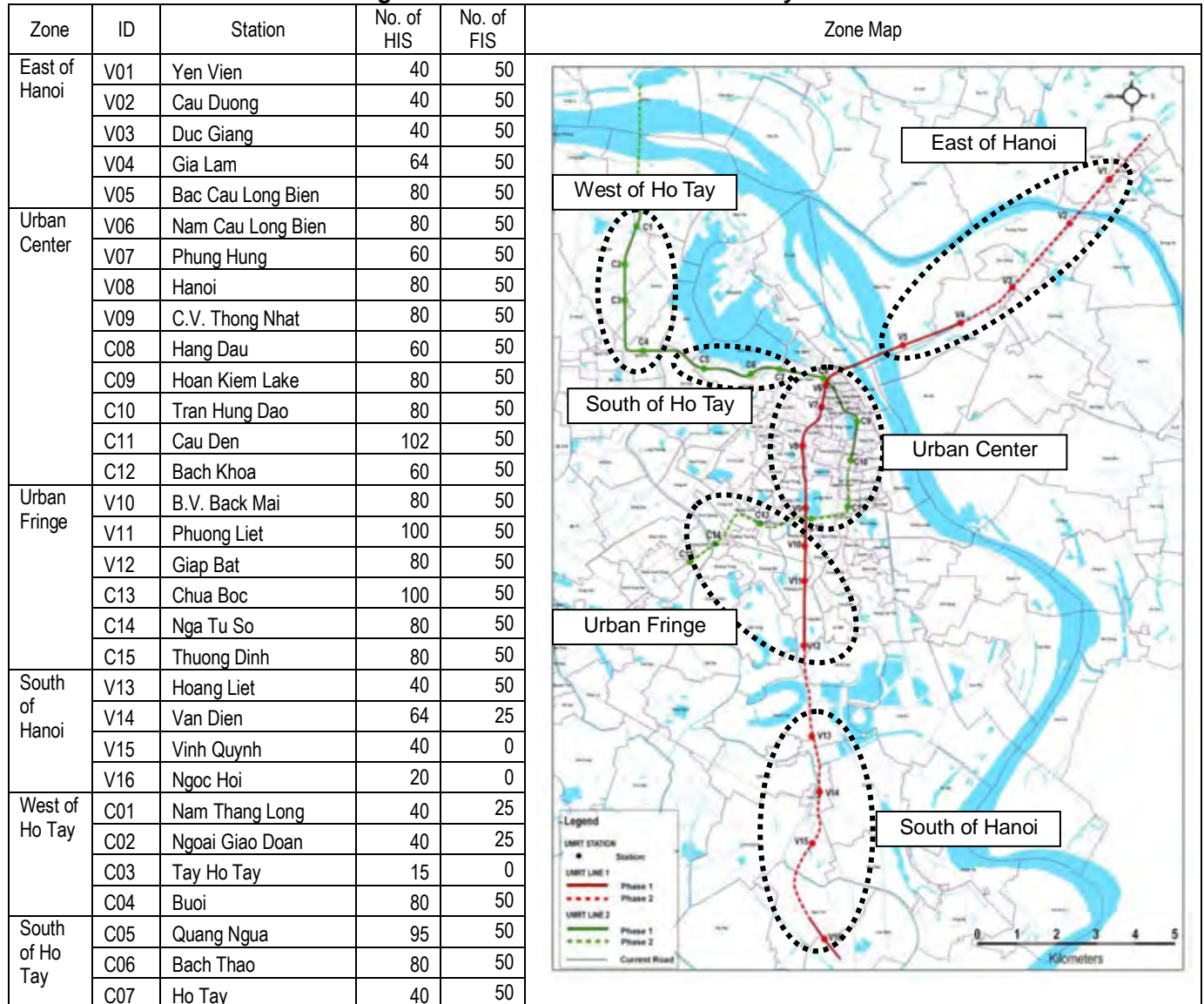


**Table 3.2.1 Types and Number of Facilities for Facility User Survey**

Type of Facility	Line 1	Line 2
Commercial	34	33
Industry	29	7
Administration	11	7
Education	29	38
Health	10	5
Park& openspace	3	10
Cultural& religious	3	14
Transport	7	1
Food& café	8	7
others	1	0
<b>Total</b>	<b>135</b>	<b>122</b>

Source: Household Interview Survey and Facility User Interview Survey, 2009, JICA Project Team

**Figure 3.2.2 Zone of Interview Survey Area**



Source: Household Interview Survey and Facility User Interview Survey, 2009, JICA Project Team

### 3.2.2 Present Trip Characteristics

#### (1) Destination, Mode and Purpose of Main Transport Trip

308 At present, more than half of trips are concentrated to Urban Center (see Table 3.2.3). “To work” trips are dominant in Hoan Kiem District, while “to school” trips are highest in Hai Ba Trung and Dong Da Districts where many schools and universities are located. Though “shopping” trip is dispersed across local residential districts, Hai Ba Trung and Hoan Kiem Districts are distinctively popular for shopping.

309 Long Bien and Gia Lam Districts are rather isolated and less dependent with the city center because of the natural barrier created by the Red River, where Chuong Duong Bridge and Long Bien Bridge are always crowded. Hoang Mai District is similarly untied to the city center, giving rise to self-contained new town developments.

310 In all areas, more than 50% of residents use motorbikes as a main transport mode, especially for commuting. Motorbike usage doesn’t depend on distance, and even

for short trips to the neighbor, people use it.

311 More than one-third of students in East of Hanoi, South of Hanoi and South of Ho Tay use bicycles. Though many citizens have upgraded from bicycles to motorbikes, students in suburban areas still use bicycles. Residents mostly walk 'to shop' since the destinations are around local areas.

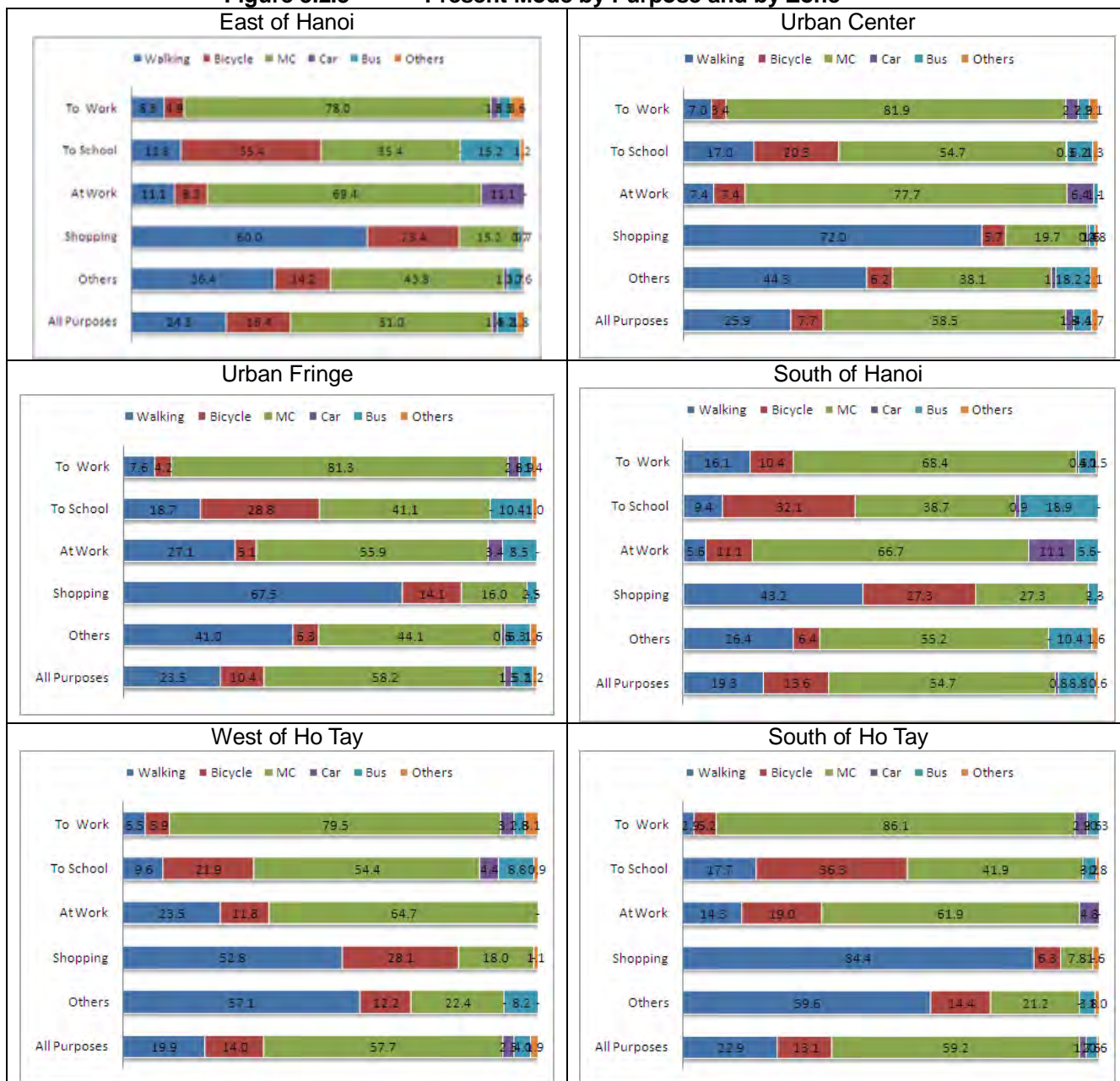
**Table 3.2.2 Present Destination of Main Trip by Purpose**

		To Work	To School	At Work	To shopping	Others	Total
Urban Center	Ba Dinh	11.8	8.7	13.4	12.9	11.6	11.8
	Hoan Kiem	15.8	10.7	27.7	14.2	14.7	15.5
	Hai Ba Trung	12.5	16.9	10.9	15.1	13.5	14.4
	Dong Da	16.5	18.0	14.3	13.3	12.3	15.9
Urban Fringe	Tay Ho	3.9	3.1	2.1	3.8	3.0	3.6
	Thanh Xuan	6.7	6.8	4.2	3.9	3.1	5.7
	Cau Giay	6.8	8.6	8.4	6.0	4.3	6.8
	Hoang Mai	6.1	6.6	2.9	3.9	5.3	5.8
	Long Bien	5.6	6.8	8.0	15.5	7.2	7.8
Rural	Soc Son	1.2	-	-	-	-	0.5
	Dong Anh	0.4	0.1	-	-	0.3	0.2
	Gia Lam	2.0	3.6	1.7	2.9	2.1	2.6
Suburban	Tu Liem	3.9	5.3	0.8	3.7	0.9	3.5
	Thanh Tri	4.3	3.6	2.9	4.6	3.5	4.2
Adjoining	Ha Dong	1.2	0.9	0.4	-	0.5	0.8
	Dan Phuong	0.0	-	-	-	0.2	0.1
	Hoai Duc	0.4	0.2	0.4	0.1	0.1	0.2
	Me Linh	0.1	-	-	-	-	0.0
Other province		0.8	0.2	1.7	-	0.7	0.6
<b>Total</b>		100.0	100.0	100.0	100.0	100.0	100.0

Source: Household Interview Survey and Facility User Interview Survey, 2009, JICA Project Team



**Figure 3.2.3 Present Mode by Purpose and by Zone**



Source: Household Interview Survey and Facility User Interview Survey, 2009, JICA Project Team

## (2) Present Destination by Purpose

312 At present, destination areas are clustered inside of the areas where citizen also live. More than half trips are shared inside of resident districts (see Table 3.2.3), an indicator of compact and mixed-used city blocks. But in the areas south of Hanoi, most of the residents go to Urban Center. The trips of residents in East and South of Hanoi are not widely distributed. Crossing the Red River, aside from the long distance to urban center from the south, hamper daily trips.

313 “To work” trips are highest at the Urban Center. Those in East of Hanoi, which is separated by the Red River, half of “To work” trips occur inside of Long Bien and Gia Lam Districts. Students go to schools at local districts or schools in Hai Ba Trung and Dong Da Districts. Students of South of Hanoi go to school in Urban Center. For shopping, most of residents buy commodities in local areas.

**Table 3.2.3 Destination District by Zone (All Purposes Trips)**

District (Destination)		Survey Zone (Origin)					All	
		East of Hanoi	Urban Center	Urban Fringe	South of Hanoi	West of Ho Tay		South of Ho Tay
Urban Center	Ba Dinh	3.2	11.8	8.4	11.6	12.2	48.5	11.8
	Hoan Kiem	8.7	31.1	16.3	23.2	3.5	8.3	15.5
	Hai Ba Trung	4.5	18.7	16.7	18.0	4.5	6.6	14.4
	Dong Da	4.3	14.3	21.7	7.9	8.6	10.3	15.9
Urban Fringe	Tay Ho	1.2	4.4	3.6	5.9	14.9	5.7	3.6
	Thanh Xuan	1.2	2.4	10.9	0.9	3.9	3.2	5.7
	Cau Giay	2.0	5.8	6.7	6.9	24.1	6.3	6.8
	Hoang Mai	1.3	3.5	5.8	5.3	1.8	3.8	5.8
	Long Bien	53.1	1.7	0.6	0.1	1.6	0.6	7.8
Rural	Soc Son	0.7	0.7	0.9	0.6	0.8	0.5	0.5
	Dong Anh	1.7	0.1	0.1	-	1.0	0.3	0.2
	Gia Lam	15.0	1.6	1.5	2.7	-	0.8	2.6
Suburban	Tu Liem	0.4	1.5	2.1	2.0	21.2	3.7	3.5
	Thanh Tri	0.5	0.3	0.8	11.9	0.4	0.2	4.2
Adjoining	Ha Dong	0.4	1.2	2.5	2.7	0.2	1.1	0.8
	Dan Phuong	-	0.1	0.2	-	-	-	0.1
	Hoai Duc	0.3	0.3	0.4	-	0.4	0.2	0.2
	Me Linh	-	-	-	-	0.2	-	0.0
Other province		1.5	0.4	0.6	0.4	0.6	0.2	0.6
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Household Interview Survey and Facility User Interview Survey, 2009, JICA Project Team

**Table 3.2.4 Destination District by Zone (To Work Trips)**

District (Destination)		Survey Zone (Origin)					All	
		East of Hanoi	Urban Center	Urban Fringe	South of Hanoi	West of Ho Tay		South of Ho Tay
Urban Center	Ba Dinh	5.0	15.0	15.1	15.3	17.1	31.8	11.8
	Hoan Kiem	14.7	22.5	22.1	22.4	5.2	12.2	15.8
	Hai Ba Trung	5.4	17.6	17.4	17.6	6.3	9.9	12.5
	Dong Da	9.0	11.0	11.2	10.6	11.5	13.7	16.5
Urban Fringe	Tay Ho	2.5	10.4	10.5	10.6	9.5	4.1	3.9
	Thanh Xuan	1.8	-	-	-	5.2	5.0	6.7
	Cau Giay	2.2	9.2	9.3	9.4	17.5	6.4	6.8
	Hoang Mai	1.8	1.2	1.2	1.2	2.4	6.1	6.1
	Long Bien	38.8	-	-	-	2.0	0.9	5.6
Rural	Soc Son	1.8	1.2	1.2	1.2	1.6	0.9	1.2
	Dong Anh	3.2	-	-	-	1.6	0.6	0.4
	Gia Lam	10.8	4.6	4.7	4.7	-	1.2	2.0
Suburban	Tu Liem	-	2.3	2.3	2.4	16.7	5.0	3.9
	Thanh Tri	0.4	-	-	-	0.8	0.3	4.3
Adjoining	Ha Dong	0.4	4.6	4.7	4.7	0.4	1.5	1.2
	Dan Phuong	-	-	-	-	-	-	0.0
	Hoai Duc	0.4	-	0.4	-	0.8	0.3	0.4
	Me Linh	-	-	-	-	0.4	-	0.1
Other province	1.8	0.3	-	-	1.2	0.3	0.8	
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Household Interview Survey and Facility User Interview Survey, 2009, JICA Project Team

**Table 3.2.5 Destination District by Zone (To School Trips)**

District (Destination)		Survey Zone (Origin)					All	
		East of Hanoi	Urban Center	Urban Fringe	South of Hanoi	West of Ho Tay		South of Ho Tay
Urban Center	Ba Dinh	2.0	10.0	10.1	13.5	3.5	48.4	8.7
	Hoan Kiem	2.7	28.7	19.6	37.8	0.9	1.6	10.7
	Hai Ba Trung	6.0	17.3	10.5	27.0	5.3	5.6	16.9
	Dong Da	1.3	16.3	23.4	8.1	11.5	9.7	18.0
Urban Fringe	Tay Ho	-	3.8	2.3	2.7	13.3	8.9	3.1
	Thanh Xuan	1.3	4.2	16.0	2.7	5.3	3.2	6.8
	Cau Giay	4.0	5.4	6.9	5.4	29.2	12.1	8.6
	Hoang Mai	1.3	5.2	2.1	-	2.7	2.4	6.6
	Long Bien	48.0	2.4	0.6	-	0.9	0.8	6.8
Rural	Soc Son	-	1.1	1.7	-	-	-	-
	Dong Anh	1.3	-	-	-	0.9	-	0.1
	Gia Lam	26.7	0.7	0.4	-	-	0.8	3.6
Suburban	Tu Liem	1.3	2.6	2.1	2.7	26.5	4.8	5.3
	Thanh Tri	2.0	0.7	1.1	-	-	-	3.6
Adjoining	Ha Dong	0.7	0.2	2.1	-	-	1.6	0.9
	Dan Phuong	-	0.2	-	-	-	-	-
	Hoai Duc	0.7	0.7	0.2	-	-	-	0.2
	Me Linh	-	-	-	-	-	-	-
Other province	0.7	0.7	0.8	-	-	-	0.2	
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Household Interview Survey and Facility User Interview Survey, 2009, JICA Project Team

**Table 3.2.6 Destination District by Zone (Shopping Trips)**

District (Destination)		Survey Zone (Origin)					All	
		East of Hanoi	Urban Center	Urban Fringe	South of Hanoi	West of Ho Tay		South of Ho Tay
Urban Center	Ba Dinh	0.7	15.1	1.8	-	7.8	85.2	11.8
	Hoan Kiem	0.7	39.8	4.4	-	1.1	-	15.5
	Hai Ba Trung	2.1	11.8	34.2	-	-	-	14.4
	Dong Da	-	24.2	21.1	-	-	1.6	15.9
Urban Fringe	Tay Ho	-	-	0.9	-	24.4	11.5	3.6
	Thanh Xuan	-	-	7.9	-	-	-	5.7
	Cau Giay	-	2.7	3.5	-	38.9	1.6	6.8
	Hoang Mai	-	2.7	21.1	12.2	-	-	5.8
	Long Bien	80.7	2.7	1.8	-	1.1	-	7.8
Rural	Soc Son	-	-	-	-	-	-	0.5
	Dong Anh	-	-	-	-	-	-	0.2
	Gia Lam	15.7	0.5	0.9	-	-	-	2.6
Suburban	Tu Liem	-	-	-	2.4	26.7	-	3.5
	Thanh Tri	-	-	-	85.4	-	-	4.2
Adjoining	Ha Dong	-	-	0.9	-	-	-	0.8
	Dan Phuong	-	-	-	-	-	-	0.1
	Hoai Duc	-	-	1.8	-	-	-	0.2
	Me Linh	-	-	-	-	-	-	0.0
Other province	-	0.5	-	-	-	-	-	0.6
<b>Total</b>		100.0	100.0	100.0	100.0	100.0	100.0	100.0

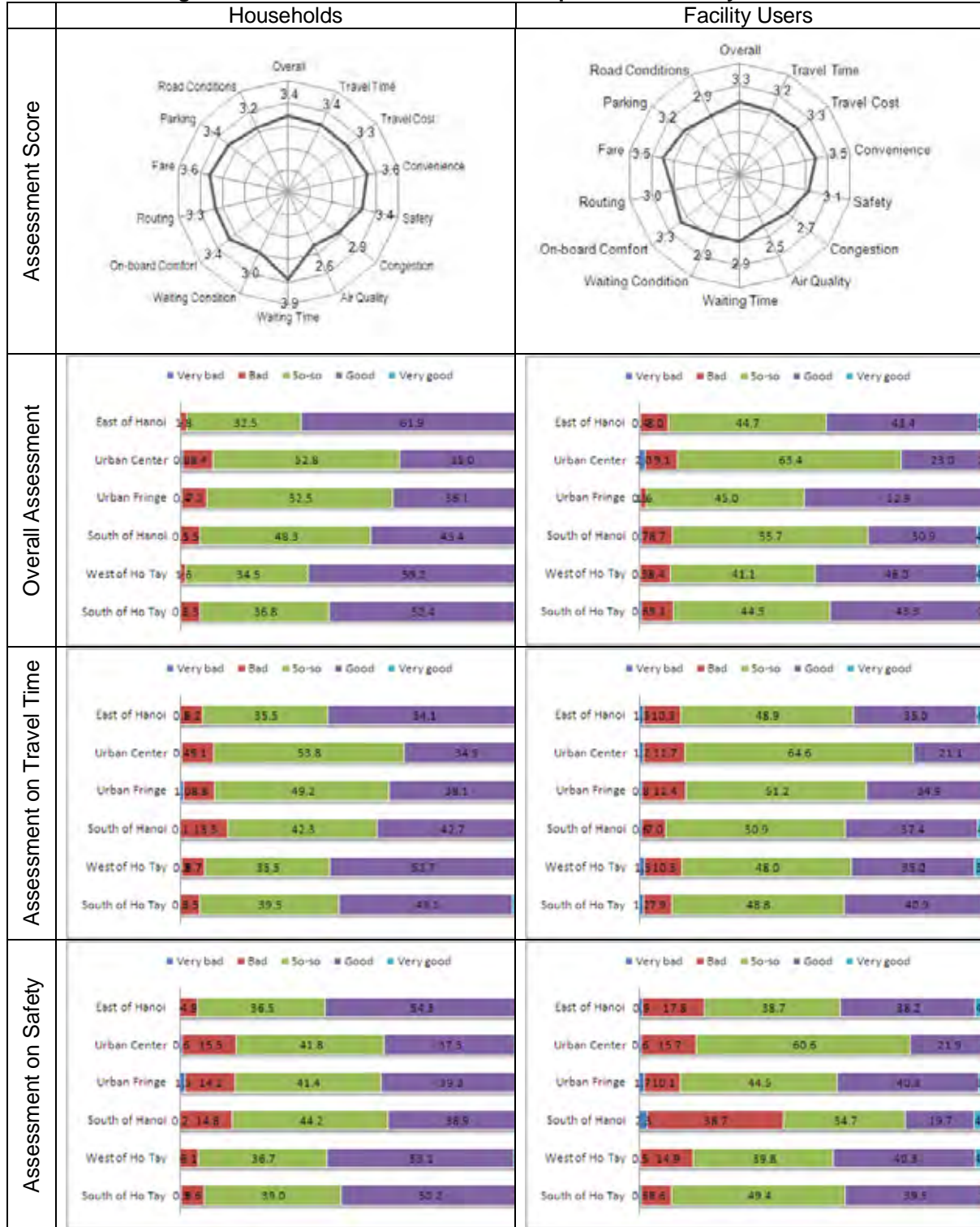
Source: Household Interview Survey and Facility User Interview Survey, 2009, JICA Project Team

### (3) Assessment of Transport Condition for the Main Trip

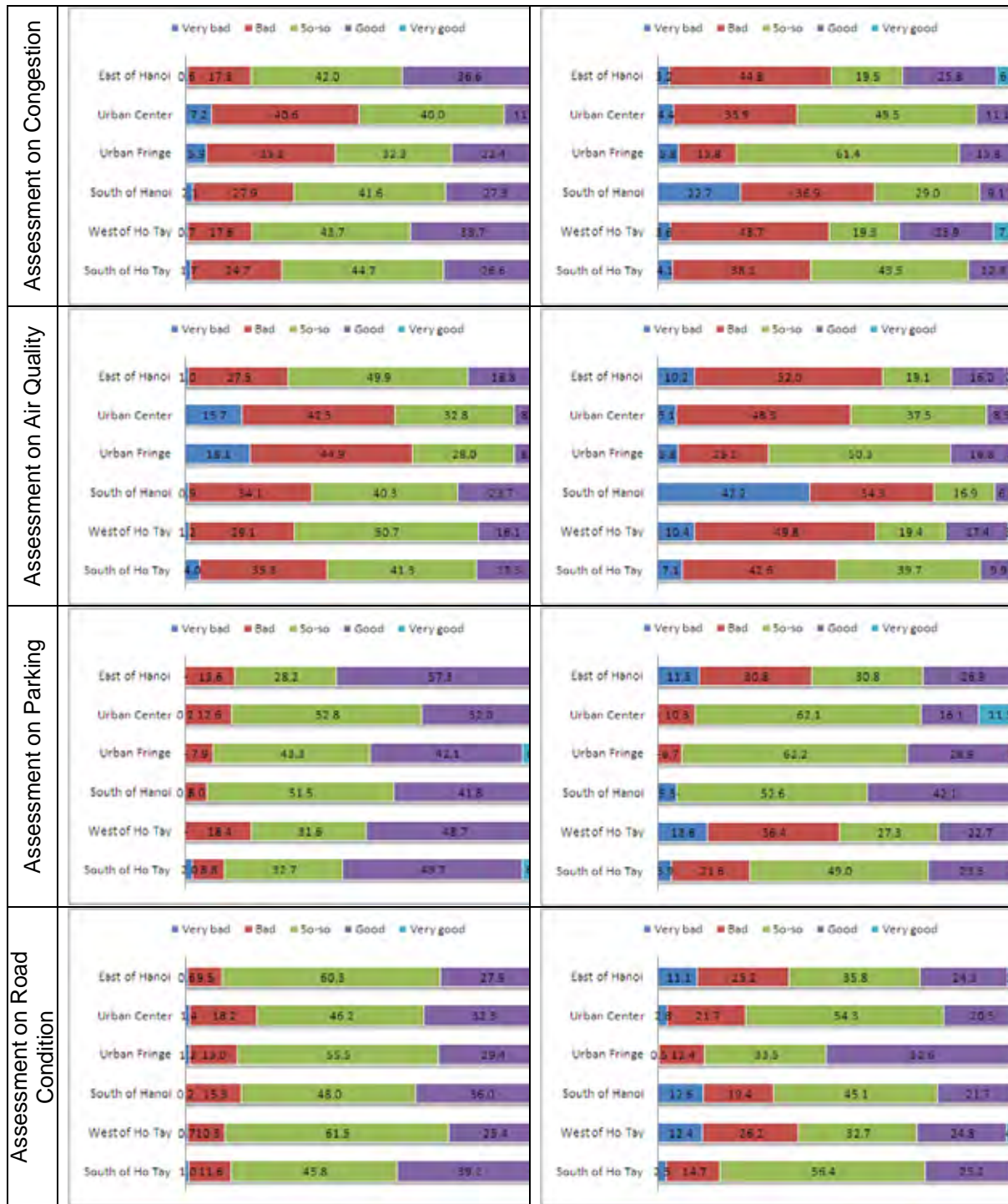
314 In general, facility users who commute or visit to facilities from other areas feel more dissatisfied with transport condition than households who live there (see Figure 3.2.3). The most unsatisfied items are “Air quality” and “Congestion”. In case of congestion, facility users in East of Hanoi and South of Hanoi feel traffic congestion more seriously than others. Households who live in Urban Center and Urban Fringe worry more about air quality, since many citizens congregate in this area at daytime. Parking and road conditions are bad in East of Hanoi, South of Hanoi and West of Ho Tay, where the corresponding urban infrastructure is still undeveloped.

315 It is said that transport infrastructure development is necessary in South of Hanoi and West of Ho Tay, while traffic management for reducing congestion and improving air quality is important in city-wide.

**Figure 3.2.4 Assessment of Transport Condition by Zone**







Source: Household Interview Survey and Facility User Interview Survey, 2009, JICA Project Team

#### (4) Assessment of Bus Condition

316 Only 4.9% of households and 8.3% of facility users use buses as their main transport mode. Most of citizens don't take buses at present (see Figure 3.2.4).

317 Reasons for dissatisfaction with current bus services include lack of punctuality, inconvenient bus route, and inconvenient access to bus stops. On the other hand, reasons for satisfaction include low fares, accessibility to bus stops, safety and comfort. Among all factors, punctuality was deemed most important in gaining public transport patronage.