

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
HANOI PEOPLE'S COMMITTEE (HPC)**

**Project for Studying the Implementation of
Integrated UMRT and Urban Development
for Hanoi in Vietnam**

Final Report

Main Text Part I: TOD Concept Plans

November 2015

**ALMEC Corporation
Oriental Consultants Global Co, Ltd.**

Exchange Rate used in the Report
USD 1 = JPY 118 = 21,416 VND
(Rate in May 2015)

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Abbreviation List

ADB	Asian Development Bank
AFC	Automatic Fare Collection
AFD	L'Agence Française de Développement
AGR	Annual Growth Ratio
AQ	Ancient Quarter
BPPT	Buss Public Passenger Transportation
BRT	Bus Rapid Transit
CBD	Central Business District
CNG	Compressed Natural Gas
CTF	Clean Technology Fund
DGT	Direction Générale du Trésor
DOC	Department of Construction
DONRE	Department of Natural Resource and Environment
DOT	Department of Transport
E/S	Engineering Service
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EV	Electric Vehicle
EVN	Viet-Nam Electricity
FAR	Floor Area Ratio
FFEM	Fonds Français pour l'Environnement Mondial
FQ	French Quarter
GIS	Geographic Information System
HAIDEP	The Comprehensive Urban Development Programme in Hanoi Capital City
HAIMUD	Project on Integrated UMRT and Urban Development for Hanoi
HAPI	Hanoi Authority for Planning and Investment
HAUPA	Hanoi Authority for Urban Planning and Architecture
HCMC	Ho Chi Minh City
HPC	Hanoi People's Committee
HUPI	Hanoi Urban Planning Institute
IEE	Initial Environment Examination
ITS	Intelligent Transport System
JBIC	Japan Bank for International Cooperation
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
JR	Japan Railway
KTT	KHU TẬP THỂ (Collective Apartment Area)
LR	Land Readjustment
LRT	Light Rail Transit
M/P	master plan
MLIT	Ministry of Land, Infrastructure and Transport
MOC	Ministry of Construction
MOCPT	Management and Operation Center of Public Transportation
MOP	Ministry of Police
MOT	Ministry of Transport
MPI	Ministry of Planning and Investment
MRB	Metropolitan Railway Bureau
MRT	Mass Rapid Transit
NH	National Highway
NMT	Non-Motorized Transport

NMV	Non-Motorized Vehicle
NPO	Non – Profit Organization
O&M	Operation and Management
OD	Origin and Destination
P&R	Park & Ride
PC	People's Committee
PIC	Project Implementation Consultant
PPP	Public–Private Partnership
PR	Province Road
PT	Person Trip
ROW	Right of Way
RR	Ring Road
SAPI	special assistance for project implementation
SEA	Strategic Environment Assessment
SMEs	Small / Medium size Enterprises
TA	Technical Assistance
TCCP	Tieu Chuan Cho Phep: the permissible air quality standard in Vietnam
TDM	Travel Demand Management
TEDI	Transport Engineering Design, Inc
TOD	Transit Oriented Development
TWG	Technical Working Group
TRAMOC	Hanoi Public Transport Management and Operation Center
TSP	Total Suspended Particulates
TUPWS	Transport and Urban Public Works Service
TX	Tsukuba Expressway
UMRT	Urban Mass Rapid Transit
UR	Urban Redevelopment
VND	Vietnam Dong
VNR	Vietnam Railways
WB	World Bank

1 INTRODUCTION

1.1 Background and Objectives

1.1 Traffic problems in Hanoi City have been worsening due to growing traffic demand associated with economic development. Traffic in Hanoi has now reached prohibitive levels of congestion, deteriorating traffic safety, causing air pollution, and others. To improve the situation, the Government of the Socialist Republic of Vietnam (hereinafter referred to as “GOV”) and Hanoi city have given priority to the construction of an efficient public transport system. In view of this, the Japan International Cooperation Agency (hereinafter referred to as “JICA”) and the GOV agreed to construct an Urban Mass Rapid Transit (UMRT) system in Hanoi. The development of two lines is currently ongoing based on the Loan Agreement on “Hanoi City Urban Railway Construction Project (Line 1)” (engineering service L/A signed in March 2008 and the 1st phase of Ngoc Hoi Complex L/A signed in March 2012) and the “Hanoi City Urban Railway Construction Project: Nam Thang Long – Tran Hung Dao Section (Line 2)” (1st phase L/A signed in March 2009).

1.2 To enhance the effects of the UMRT projects in terms of development, developing urban facilities at and around the stations is important for improving inter-modal connectivity. Government guidance on the development of specific areas along the UMRT lines will be critical because land prices will inevitably rise and uncontrolled development may occur after the completion of the UMRT projects. When they are properly developed, they will provide various opportunities for the GOV and Hanoi City to gain benefits from potential higher tax revenue in accordance with integrated urban redevelopment. Additional revenues can be utilized to fund other infrastructure projects around the stations. In this context, JICA conducted the “Project on Integrated UMRT and Urban Development for Hanoi in Vietnam” (HAIMUD) from 2009 to 2011 that led to the preparation of strategic plans on integrated area development centered on the UMRT system were prepared.

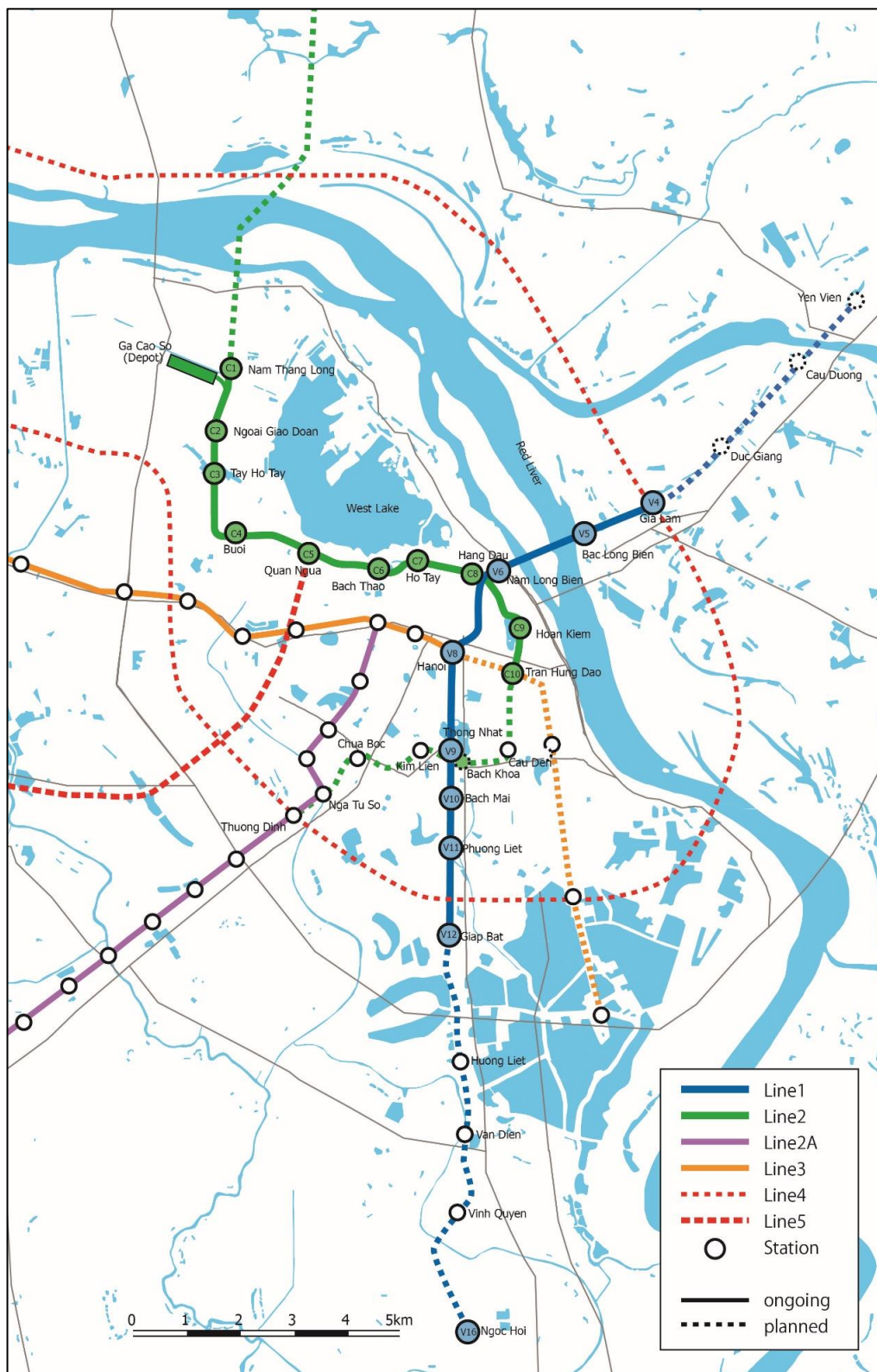
1.3 “The Project for Studying the Implementation of Integrated UMRT and Urban Development for Hanoi in Vietnam” (HAIMUD2) aims at assisting Hanoi City to formulate an appropriate implementation mechanism to successfully integrate the UMRT system with urban development and other transportation systems. It also aims at concretizing concept plans and realizing short-term projects proposed in HAIMUD.

1.4 Based on the conclusion of the second JCC meeting in December 2014, the objectives of the project were adjusted to conduct three pre-feasibility studies (pre-FS), instead of studying the feasibility of constructing facilities that would improve accessibility to one selected station, as per the original TOR. The specific objectives of HAIMUD2 were defined as follows:

- (i) Formulate concept plans including transport access improvement, integrated urban development and community improvement of all stations by reviewing HAIMUD and relevant plans and projects, to be used as inputs for the Zone Plan currently being prepared by Hanoi People’s Committee (HPC)
- (ii) Conduct the pre-feasibility studies including (a) Pre-F/S on a transport access improvement projects to ensure adequate access to UMRT stations, (b) Pre-F/S on underground parking development project of C10 Tran Hung Dao, and (c) Pre-F/S on TOD at Giap Bat (V12) Station Area,
- (iii) Make recommendations on the necessary improvement of the institutional framework for more effective implementation of the projects

1.5 The project area is the area along the phase 1 sections of the Hanoi UMRT Line 1 and Line 2 (See Figure 1.1.1).

Figure 1.1.1 Location of UMRT Line 1 and Line 2 in Hanoi City



Source: JICA Project Team

1.2 Approach of the Project

1.6 For effective implementation the project, a Joint Coordination Committee (JCC) and a Technical Working Group (TWG) were established for the purpose of the project. The JCC chairman is Mr. Nguyen Quoc Hung, the Vice-Chairman of Hanoi People’s Committee (HPC), and the TWG chairman is Mr. Tran Duc Hoat, Deputy Director of Hanoi Authority for Planning and Investment (HAPI).

Table 1.2.1 Member List of JCC

Agency	Name	Position	
City Government	HPC	Mr. Nguyen Quoc Hung	Vice Chairman, Hanoi People’s Committee
	HAPI	Mr. Tran Duc Hoat	Deputy Director
	HPC	Mr. Nguyen Van Thinh	Deputy Chief Officer
	DOF	Ms. LêThị Loan	Deputy Director
	HAUPA		
	DOT	Mr. Ngo Manh Tuan	Deputy Director
	DOC	Mr. Le Van Duc	Director
	DONRE	Mr. Nguyen Minh Muoi	Deputy Director
	HUPI	Mr. Le Vinh	Director
	MRB	Mr. Luu Xuan Hung	Deputy Director
Central Government	MPI		
	MOF		
	MOC	Mr. Do Viet Chien	Director, Department of Urban Development
	MONRE	Mr. Vu Sy Kien	Deputy Director, Department of Land Planning
	MOT		
	VNR	Mr. Ngo Trung Kien	Deputy Director, Investment Preparation Board

Table 1.2.2 Member List of TWG

Agency	Name	Position	
City Government	HAPI	Mr. Tran Duc Hoat	Deputy Director
		Ms. Nguyen Minh Thuan	Head of International Cooperation and Assistance Division
		Ms. Tran Thi Kim Dung	Deputy Head, Division of Urban Infrastructure
		Ms. Tran Thi To Uyen	Expert, Division of International Cooperation and Assistance
		Mr. Le Ngoc Minh	Expert, Division of International Cooperation and Assistance
	HPC	Ms. Phan Ngoc Diep	Expert
	DOF	Ms. Phan Thi Hien	Deputy Head, Division of Investment
		Mr. Vu TrungThanh	Deputy Head, Division of Urban Transport
	HAUPA	Mr. Dao Minh Tam	Deputy Head, Division of General Plan
		Mr. Nguyen ToanThang	Deputy Head, Division of Technical Infrastructure Plan
	DOT	Mr. Nguyen Chi Thanh	Deputy Head, Division of Appraisal
	DOC	Mr. Trinh Van Ly	Deputy Head, Division of Infrastructure Management on Environment and Underground Facilities
	DONRE	Mr. Pham Nhu Duong	Expert, Division of General Plan
	HUPI	Ms. Vu Tuyet Mai	Deputy Director, Center on Architecture and Planning No.5
		Mr. Nguyen QuocCuong	Expert, Center on Architecture and Planning No.5
MRB	Mr. Ho Thanh Son	Deputy Director, Project Management Board No.2	
Central Government	MPI		
	MOF		
	MOC	Mr. Pham Thanh Tung	Expert, Division of Urban Development
	MONRE	Ms. Le ThanhThuy	Expert, Department of Land
	MOT		
	VNR	Mr. Pham Hai Long	Expert, Investment Preparation Board
Ms. Nguyen Thi Minh Thuy		Expert, Investment Preparation Board	

Source: No. 2915/QĐ-UBND, May 29th 2014, Decision on on The establishment of Joint Coordination Committee and Working Group Members of Project for Studying the Implementation of Integrated UMRT and Urban Development for Hanoi in Vietnam (HAIMUD2), funded by JICA

1.7 The main counterpart was Hanoi Authority for Planning and Investment (HAPI), and the project office was set in Room 304 of HAPI, 16 Cat Linh, and necessary equipment and facilities were provided by HAPI.

1.8 Technical coordination and discussion were conducted mainly three sectors; (i) transport sector with Department of Transport and TRANSERCO, (ii) urban planning and development sector with Hanoi Authority for Urban Planning and Investment (HAUPA) and Hanoi Urban Planning Institute (HUPI), and (iii) UMRT construction projects related issues with MOT-PMU of UMRT Line1 and Metropolitan Railway Board (MRB) of UMRT Line2.

1.9 To achieve the objectives, the Project was implemented two phases shown in Figure 1.2.2.

- (i) Phase1 (March 2014 – December 2014): Review of HAIMUD and relevant plans and projects, conduct supplemental surveys, formulation of concept plans of all stations, elaboration of pre F/S
- (ii) Phase 2 (January 2015 – October 2015): Conduct pre F/S (transport access improvement, underground parking development, TOD of Giap Bat Station area), proposals on bus service improvement, proposal on implementation mechanism

1.10 In November 2014, the counterpart study tour in Japan was conducted inviting ten members of JCC and TWG. Main objectives of the tour were (i) to observe intermodal facilities of various types of stations, (ii) to observe integrated urban development with UMRT, (iii) to study and discuss necessary implementation measures and institutional arrangements to realize TOD in Hanoi City, and (iv) Participants could learn importance of TOD, role sharing among public and private sectors, necessity of public participation and understanding of citizens, etc. Experiences and lessons learned from the Study Tour are useful and will provide a good basis in conducting the Project as well as future TOD in Hanoi.

1.3 Coordination with Stakeholders

1.11 The 1st TWG was held on 11th April 2014 to introduce the objectives and approaches of the project. After receiving comments from relevant agencies, a draft Inception Report was revised and submitted to the JCC members.

1.12 The 1st JCC was held on 26th June 2014 at HPC, chaired by Mr. Nguyen Quoc Hung, the Vice-Chairman of HPC. The Inception Report was presented and approved by the JCC members. HAPI was assigned to coordinate with the JICA project team and provide necessary assistance to smoothly conduct the project.

1.13 On 13th August, the 1st Stakeholder Meeting was held with the TWG members (VNR, MRB, HAUPA, HUPI, DONRE, DOF, DOT, TRAMOC) and representatives of nine District People's Committee (DPC). The meeting was chaired by the TWG chairman. After the presentation of the UMRT projects of Line 1 and Line 2 by VNR and MRB, the JICA project team introduced the TOD approach of HAIMUD 2. A group discussion was also conducted by dividing the audience into 5 groups by cluster. HUPI acted as facilitator of the discussion.

1.14 On 1st October, the 2nd TWG Meeting was held by the JICA Project Team to report the main contents and proposals of the draft Interim Report. Two main issues were raised, related to legal and institutional arrangement, in addition to technical issues. These issues were mainly discussed among TWG members.

1.15 After several meetings with counterpart agencies, on 19th December, the 2nd JCC Meeting was held at HPC, chaired by Mr. Nguyen Quoc Hung, Vice-Chairman of HPC. The Interim Report was presented, and the following issues were discussed by the JCC:

- Basic orientation for the TOD concept was agreed.
- Four pre-feasibility studies were selected, namely: (a) access improvement project of all phase 1 stations of Line 1 and Line 2 except for V4 Gia Lam, V5 Long Bien Bac and V6 Long Bien Nam, as the station location had not been decided yet, (b) underground parking development project at C10 Tran Hung Dao Station, (c) TOD plan formulation project for V12 Giap Bat Station.
- It was proposed to draft TOD guideline for application of the TOD concept to urban planning and management, which will be applied to other UMRT Lines in Hanoi City.
- HAUPA and HUPI were assigned to integrate the TOD approach into the zone plan under preparation, in order to enhance the role of public transport and to promote landuse value.
- DOT was assigned to study the bus network to provide feeder bus services for UMRT, and to coordinate with relevant agencies to accelerate road development projects to ensure accessibility to the stations.
- It was agreed to extend the project implementation period.

1.16 Following the meeting, the Conclusion was issued on 26th December by HPC, and the Decision of project amendment was issued on 30th March 2015 by HPC.

1.17 On 27th January 2015, the 3rd TWG meeting was held to discuss objectives and outlines of TOD guideline.

1.18 On 26th August 2015, the 4th TWG meeting was held to discuss draft of Draft Final Report. Following issues were discussed and proposed by the TWG.

- DFR was basically agreed among TWG members. The official comments from TWG members which have not submitted yet would be submitted as soon as possible.
- TOD concept plans were elaborated, and TOD projects were carefully proposed in line with the draft Zone Plan. HAUPA and HUPI shall further study the proposed plans, and reflect them into the Zone Plan for approval.
- Proposed transport access projects of the pre-feasibility study were basically agreed, and proposed “TOD Area” definition would be further discussed among HAUPA, HUPI and relevant agencies. It was requested to indicate status of coordination with related plans and projects, necessity of land acquisition of private lands for access facilities for each station.
- Proposed TOD of Giap Bat Station Area of the pre-feasibility study would be further elaborated to be in line with General Plan and Zone Plan.
- The location of new UMRT bridge crossing the Red River at 75m-north from Long Bien Bridge was selected and agreed between MOT and HPC. For this, the concept plan and the facility development plan should show only the 75m option.

1.19 Based on the TWG meeting and individual meetings of relevant departments (HAUPA, MRB), the DFR was revised to submit to HPC for the final JCC.

1.20 The 3rd JCC Meeting for DFR was held on 8th October 2015 at HPC. The Draft Final Report was presented, and conclusion was made by Mr. Hung, Vice-Chairman of HPC as follows:

- JCC agreed to proposed TOD concepts, and necessity of promotion of UMRT development with integrated urban development for Hanoi City. Many JCC members have visited to Tokyo and studied success models of TOD. For example, new town development along UMRT by Tokyu Corporation will be a good model based on BT method to acquire the development right along UMRT, though it might be difficult to apply in Hanoi City at present but useful to study farther.
- The Final Report will be prepared based on the comments of JCC and submitted in November. Extension of the Project period till November 2015 is approved.
- HAUPA should update related Zone Plan in coordination with the proposals of the Project including Hanoi Station area where Nikken Sekkei has been engaged and to apply the proposed concept in formulating the plan.
- HUPI should apply proposed TOD to related Zone Plan and avail the land stock for subsequent.
- HAPI should study proposed project further and implement as a basis for future development project.
- DOT and DOC should elaborate proposed TOD plans and projects to reflect to relevant plans such as transport, utility and infrastructure.
- DONRE should identify landuse scheme and conduct Environment Impact Assessment (EIA).

1.21 In addition to official meetings, the JICA project team has conducted meetings with the TWG members to collect information and data, to discuss and to consolidate draft concept plans with the relevant agencies.

Table 1.3.1 List of Meetings of the Project

Date	Meeting/ Agency	Main Contents
4 th April	HAUPA	Progress of Zone Plan preparation
11th April	1st TWG	Introduction and discussion of draft ICR
14 th April	HUPI	Introduction of TOD concept in the draft Zone Plan by HUPI, Comments on draft ICR
15 th April	HAUPA	Comments on draft ICR
13 th June	DOT	Collecting information of relevant plans and projects related to DOT
26th June	1st JCC	Introduction and approval of draft ICR
1 st July	HAUPA	Collecting information of relevant plans and projects
21 st July	HUPI	Introduction and discussion of draft station area concept plans
13th August	1st Stakeholder Meeting	Introduction of TOD approach, group discussion
27 th August	HUPI	Introduction of HAIMUD2 to the director
9 th September	HUPI	Introduction of draft station area development plans and facility plans for comments
1st October	2nd TWG	Introduction and discussion of draft concept and facility plans of each station, proposals of candidate priority projects
8 th October	DOT	Comments on concept plans based on discussion of 2 nd TWG
2 nd October	DOC	Information of legal and institutional framework of underground development and tree cutting
2 nd October	MRB	Comments on concept plans based on discussion of 2 nd TWG
9 th October	DOC	Comments on concept plans based on discussion of 2 nd TWG
22 nd , 27 th , 30 th October	HAUPA & HUPI	Comments on concept plans based on discussion of 2 nd TWG
31 st October	DOCST	Introduction of HAMIDU2 and comments on concept plans related to cultural properties
10 th December	HAPI	Discussion on draft ITR and arrangement of the 2 nd JCC meeting
19 th December	2nd JCC	Introduction and approval of draft ICR, selection of pre FS
27 th January 2015	3rd TWG	Discussion on objectives and outlines of draft TOD guideline
10 th February	HUPI	Discussion of coordination between proposed TOD concept and facility plans of HAIMUD2 and draft Zone Plans
18 th March	FECON	Introduction of HAIMUD2 by JICA Project Team, introduction of preparation of feasibility study of underground parking development by FECON (Foundation Engineering & Underground Construction JSC.)
2 nd April	TRANSERCO	Introduction of TOD concept of Giap Bat Station including bus terminal redevelopment, discussion on possibility and interests of TRANSERCO for commercial and business operation
16 th April	Mekong Investment	Discussion on TOD concept and proposed implementation mechanism (role sharing between public and private sector, compensation and land acquisition, etc.)
17 th April	Consultation meeting on C6 Bach Thao of UMRT Line2 project	Discussion on technical issues related to C6 Bach Thao Station inviting residents, Thuy Khue and Tay Ho Ward PCs, HAUPA, MOT-VRA, HUPI, MRB, TEDI, HAIMUD2 team, GC of Line2 project
26th August	4th TWG	Discussion on draft DFR
27 th and 28 th August	HAUPA	Discussion on draft DFR for coordination with the draft Zone Plan
27 th August	MRB	Discussion on draft DFR for access improvement projects of Line2
8th October	3rd JCC	Introduction and approval of DFR

Source: JICA Project Team

2 OVERVIEW OF HANOI URBAN AND TRANSPORT DEVELOPMENT AND RELATED PLANS

2.1 Urban Development Characteristics

1) Current Urban structure and Landuse

2.1 In 2008, the administrative boundaries of Hanoi were extended to include the neighboring province of Ha Tay and 4 wards of Vinh Phuc and Hoa Binh provinces. The territory of the capital after expansion has reached 3,344 km² with a population of 6.4 million people in 2008, that has increased to 7.3 million people in 2014. The city is basically structured by a combination of radial and circumferential roads. Railway and waterway play a minor role in the structuration of the city.

(a) Existing Land use

2.2 Approximately 13.7% of the total area, i.e. 45,500 ha, are built-up, both in urban and rural areas. In particular, urban built-up areas in 10 urban districts cover about 18,000 ha, which accounts for 5.2% of the total area. Rural built-up areas, on the other hand, cover approximately 27,400 ha. Additionally, the land used for greeneries and ports occupy more than 720 ha, and the land used for universities and colleges is around 600 ha. Another 5,000 ha of the total land area are occupied by industrial parks.

(b) Green Space

2.3 The presence of green spaces in Hanoi is considered one of the most important features of the urban system. They encompass agricultural land, rivers, lakes, and the natural forests at Ba Vi, Soc Sown, and Huong Tich. The natural forests at Ba Vi, Soc Son, while agricultural land covers 56.6% of the city. More than 1,000 ha of agricultural land is converted into urban space annually. The natural forests are degraded because of illegal logging, which adversely impacts the habitat of many animal species. In addition, tourism developments have put great pressure on the natural landscape. Streets with greenery are rather concentrated in the old city center but rare in new urban areas.

2.4 The greenery coverage in the urban centre of Hanoi is low, especially when compared to international standards for a green capital city. Greenery is important because it helps absorb CO₂ and heat, filter dust, and regulate microclimate conditions. In addition, it also serves as infiltration areas for rainwater percolating into groundwater aquifers, which helps prevent or alleviate flooding. In spite of that, there are only 4.6 m² green spaces per capita in the centre of Hanoi (old Hanoi), which is much lower than the requirement for a green city. According to the Vietnam Construction Standard, the ratio for a special urban class like Hanoi should be 12 to 15 m² per capita in total, wherein parks with trees should be 7 to 9 m² per capita, botanical gardens 3.0 to 3.6 m² per capita, and the planted areas along the street 1.7 to 2.0 m² per capita.

(c) Water Environment

2.5 Hanoi water systems encompass the Da River system, the Red River system, other rivers such as Duong, Nhue, To Lich, Kim Nguu, and Lu and Se6t Rivers; Hanoi is also well known for having the largest lake and pond area in Vietnam, with about 111 lakes and ponds. However their total surface area has significantly shrunk, which affected the flood discharge

and drainage capacity of the city. This has also caused adverse impacts to the urban natural landscape and ecosystem

2.6 In addition, many places in Hanoi are heavily inundated during the rainy season. This issue has not been settled yet. One main cause of flooding is the conversion of large greenery spaces and agricultural lands into urban and industrial land. This led to an imbalance in the rainwater discharge capacity. The drainage system is also poor, in terms of the capacities of the drainage culverts and flow cross-sections. Improvement works are not sufficiently matching the demand.

(d) Air Quality and Noise Level

2.7 Air and noise pollution levels in Hanoi are also increasing. The air in the urban centre of Hanoi is heavily polluted by dust and noise. In regards to the TSP (Total Suspended Particulates) and the PM10 (particulate matter less than 10 micrometers), the average dust content is 1.5 to 3 times higher than the permissible standard (TCCP). At places where construction and repair activities are ongoing, dust concentration levels are 5 to 7 times higher than the allowable limit of TCCP.

2.8 The noise level also exceeds the 75 dBA- limit at many of the main streets, reaching 85 to 88 dBA. Emissions of pollutants, such as SO₂, NO₂, CO, Pb, CnHn, are also too heavy in some localities, mainly at large-scale interchanges, or in areas where coal and diesel are utilized in production. Air and noise pollution of the city is enhanced by two main pollution sources: the volume of vehicle traffic and the construction activities that are not strictly controlled.

Figure 2.1.1 Location of UMRT Line1 and Line2 in General Plan of Hanoi City

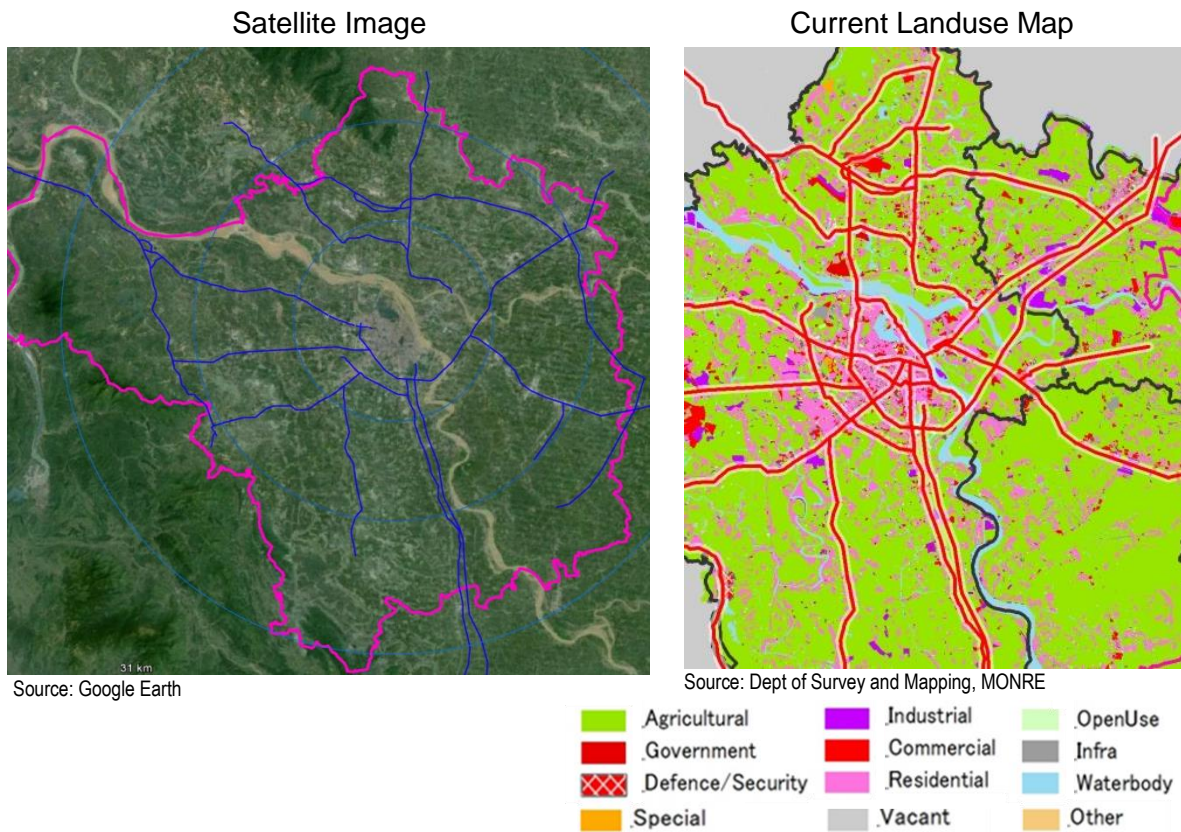
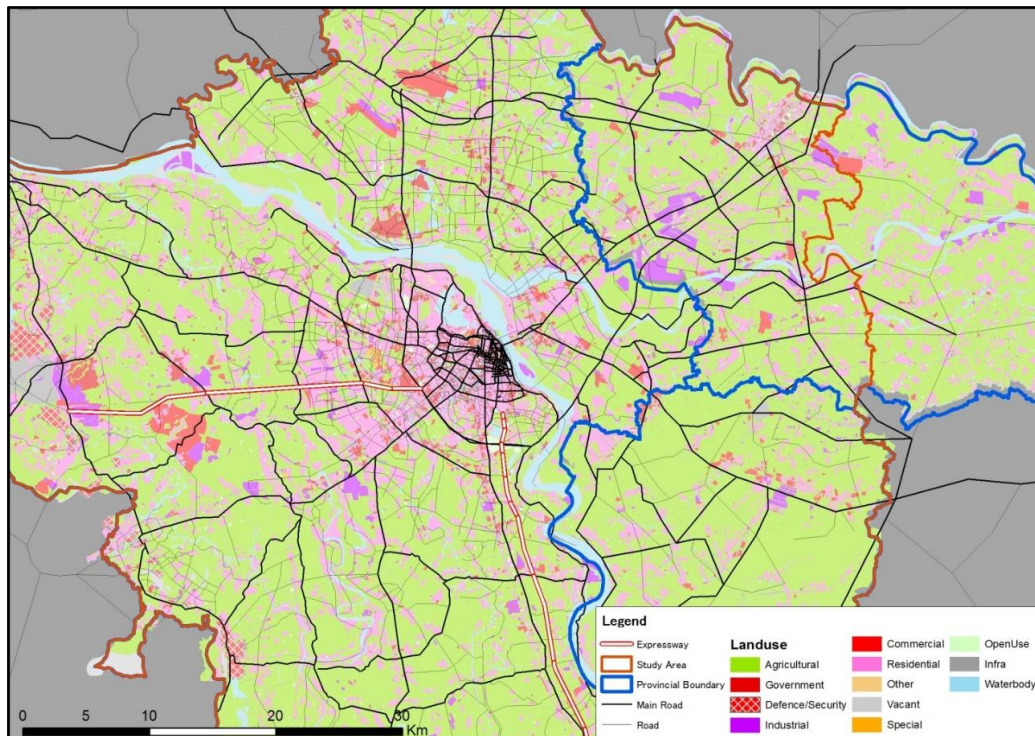


Figure 2.1.2 Landuse Conditions in the Study Area



Source: MONRE

(e) Population Growth Trend

2.9 Trends for population Growth are briefly described below :

- (i) The population growth is most significant in the inner cluster (3.6%/year between 2009 and 2013), followed by the outer cluster (2.0%/year) and the city centre (1.9%/year), and last by the far outer cluster (1.4%/year). Because of a high density of 276 persons/ha in the city centre, the population has started to increase in peri-urban areas. However, in spite of this high density, the population remains concentrated in the city centre.
- (ii) The highest population growth has been seen in HC-3 or Inner West (Cau Giay and Tu Liem), followed by HC-4 or Inner East (Long Bien and Gia Lam), HC-5 or Inner North (Dong Anh and others). Population growth is also relatively high in Bac Ninh, Ha Dong, Soc Son, and Hoang Mai areas.

2.10 The overall pattern of urban growth is more obvious when looking at the trend of population growth at the scale of wards (see Figure 2.1.3). The main findings are as follows:

- (i) Population density is extremely high in the city centre;
- (ii) However, the slope of the population growth rate in the city centre has been less and less steep, and even going down in some wards. On the other hand, the population has been growing fast in the peri-urban areas surrounding the city centre. Population growth rates are relatively higher along the main transport corridors, in almost all directions.
- (iii) Population growth is also high in some outer areas. This indicates that the demand for urban services is also growing in the outer areas.

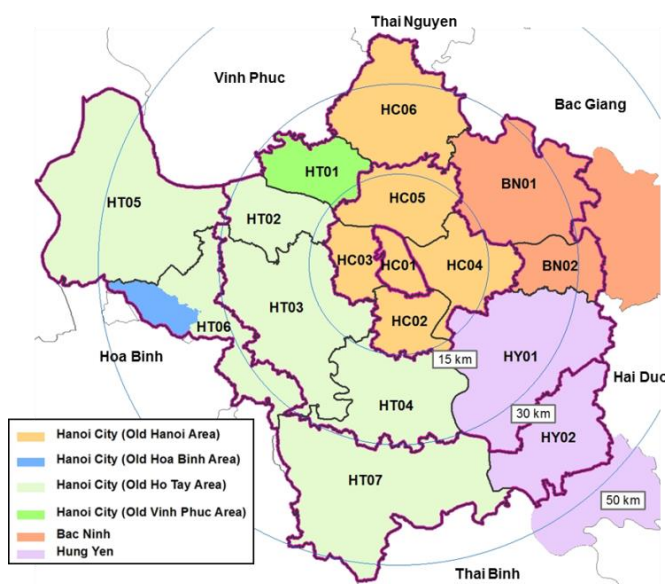
2.11 While population tends to move towards outer areas for affordable housing and better living environment, proper housing infrastructure is not sufficient to meet the demand in these areas, especially low- and medium-income population. Transport access has also become a constraint. De-densification of congested urban centres must be associated with the development of proper urban areas provided with necessary infrastructure services and access transport at affordable cost.

Table 2.1.1 Population Growth by Functional Cluster

Functional Cluster			Population(000) 2013	AGR (%/yr) 09-13	Density (no/ha) 2013
Central	HC-1	City Centre (Old Hanoi)	1,260	1.9	275.7
Inner Cluster (≅ 15 km>)	HC-2	Inner South (Old Hanoi)	844	2.7	91.7
	HC-3	Inner West (Old Hanoi)	754	5.1	91.2
	HC-4	Inner East (Old Hanoi)	519	3.2	33.5
	HC-5	Inner North (Old Hanoi)	374	2.9	22.1
	Sub Total			2,491	3.6
Outer Cluster (≅ 15 – 30 km)	HC-6	Outer North (Old Hanoi)	312	2.5	10.5
	HT-1	Outer North West (Old Hatay)	209	2.2	16.5
	HT-2	Outer West (Old Hatay)	256	1.7	20.4
	HT-3	Outer South West (Old Hatay)	938	2.5	22.5
	HT-4	Outer South (Old Hatay)	465	1.9	16.8
	BN-1	Outer North East (Bac Ninh)	623	2.9	19.2
	BN-2	Outer East (Bac Ninh)	155	1.7	13.7
	HY-1	Outer South East (Hung Yen)	636	0.6	14.8
Sub Total			3,594	2.0	17.0
Far Outer Cluster (≅ 30 – 50 km)	HT-5	Far Outer West (Old Hatay)	468	1.9	8.9
	HT-6	Far Outer South West (Old Hatay)	217	2.5	8.4
	HT-7	Far Outer South(Old Hatay)	512	1.2	9.8
	HY-2	Far Outer South East (Hung Yen)	252	0.3	10.8
	Sub Total			1,449	1.4
Study Area Total			8,795	2.3	21.0

Source: JICA Project Team

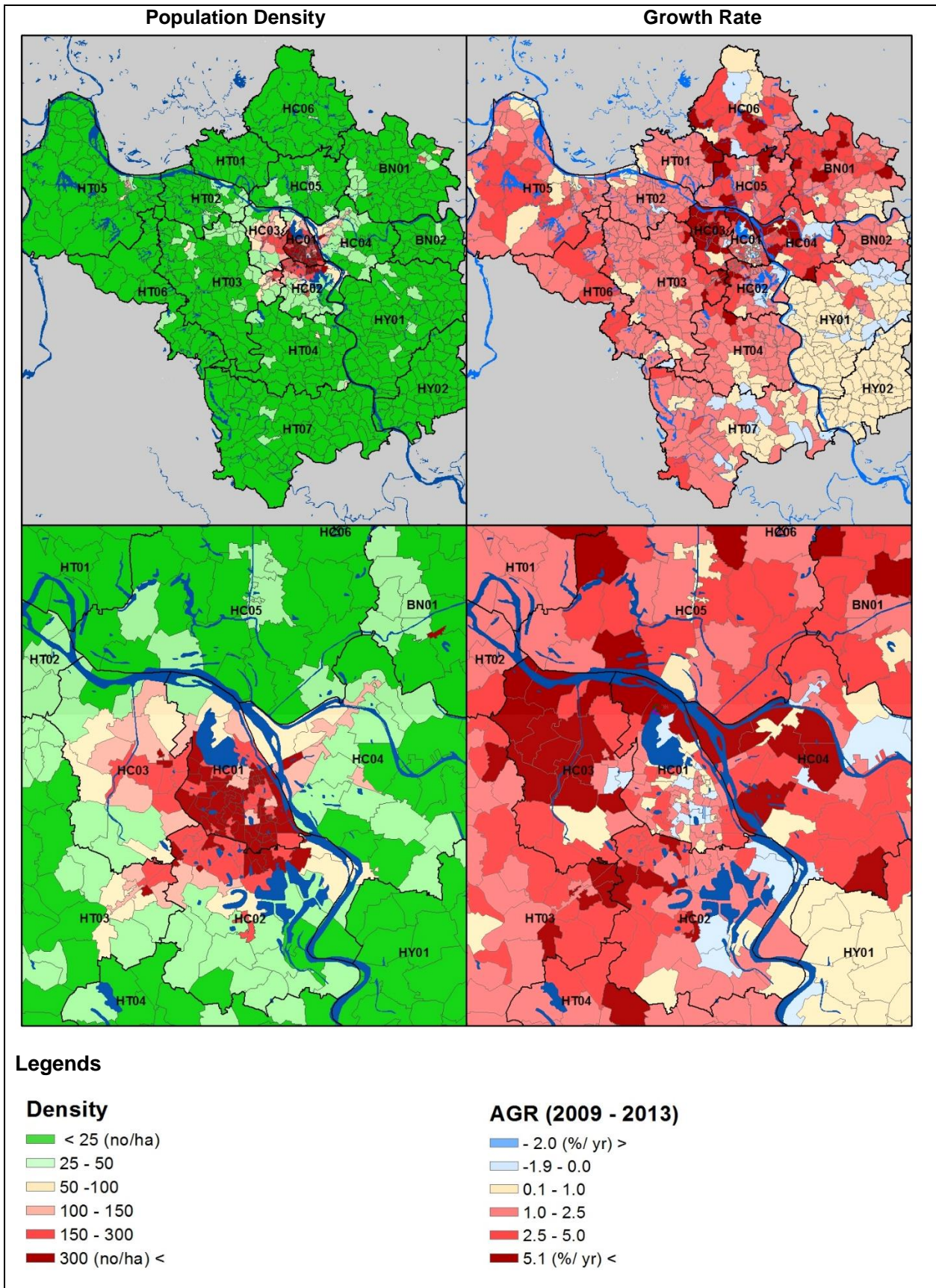
Classification for 1) functional cluster is as shown below;



Source: JICA Project Team

Group	Code	Urban Cluster	Area Include
Central	HC-1	City Centre	Ba Dinh, Hoan Kiem, Tay Ho, Dong Da, Hai Ba Trung
Inner Cluster	HC-2	Inner South	Hoang Mai, Thanh Juan, Thanh Tri
	HC-3	Inner West	Cau Giay, Tu Liem
	HC-4	Inner East	Long Bien, Gia Lam
	HC-5	Inner North	Dong Anh
	HC-6	Outer North	Soc Son
Outer Cluster	HT-1	Outer North West	Me Linh
	HT-2	Outer West	Part of Phuc Tho(14 Communes), Dan Phuong
	HT-3	Outer South West	Ha Dong, Hoai Duc, Part of Quoc Oai(16 Communes), Part of Thach That(14 Communes), Part of Chuong My(24 Communes)
	HT-4	Outer South	Thanh Oai, Part of Thuong Tin(28 Communes), Part of Phu Xuyen(5 Communes), Part of Ung Hoa(2 Communes), Part of My Duc(1 Communes)
	BN-1	Outer North East	Bac Ninh city, Yen Phong, Tien Du, Tu Son
	BN-2	Outer East	Thuan Thanh
	HY-1	Outer South East	Van Lam, Van Giang, Yen My, My Hao, Khoai Chau
	Far Outer Cluster	HT-5	Far Outer West
HT-6		Far Outer South West	Part of Quoc Oai(5 Communes), Part of Thach That(9 Communes), Part of Chuong My(8 Communes)
HT-7		Far Outer South	Part of Thuong Tin(1 Communes), Part of Phu Xuyen(23 Communes), Part of Ung Hoa(27 Communes), Part of My Duc(21 Communes)
HY-2		Far Outer South East	Kim Dong, An Tri

Figure 2.1.3 Population Density and Growth Rate by Commune in the Study Area



Source: JICA Project Team

2.2 Urban Transport Situation

1) Road Network and Facilities

2.12 Urban transport is almost entirely provided by a network of roads made of a combination of radial and ring (belt) roads (see Figure 2.2.1).

2.13 As of 2012, the total length of the road network in Hanoi was 7,365 km, whereas it was 6,240 km in 2005. 20 % of the entire network consists of main roads. There are also 7 radial roads and 3 belt roads. As for the railway network, its total length is 123.2 km, while the inland waterway is 80.7 km long. In the previous years, the total road length of Hanoi has only increased by 5 to 10 km per year. However, after Hanoi expanded, the overall road length surged up. It is expected to reach 7,400km by the end of 2015. However, the road area ratio is still low in Hanoi compared to other major cities. The roads are relatively densely developed in urban areas, but they are less developed in rural areas, making these areas difficult to access.

2.14 In addition to the development/improvement of radial roads, the development of a ring road system is impacting road transport in general and the gradual formation of new urban areas:

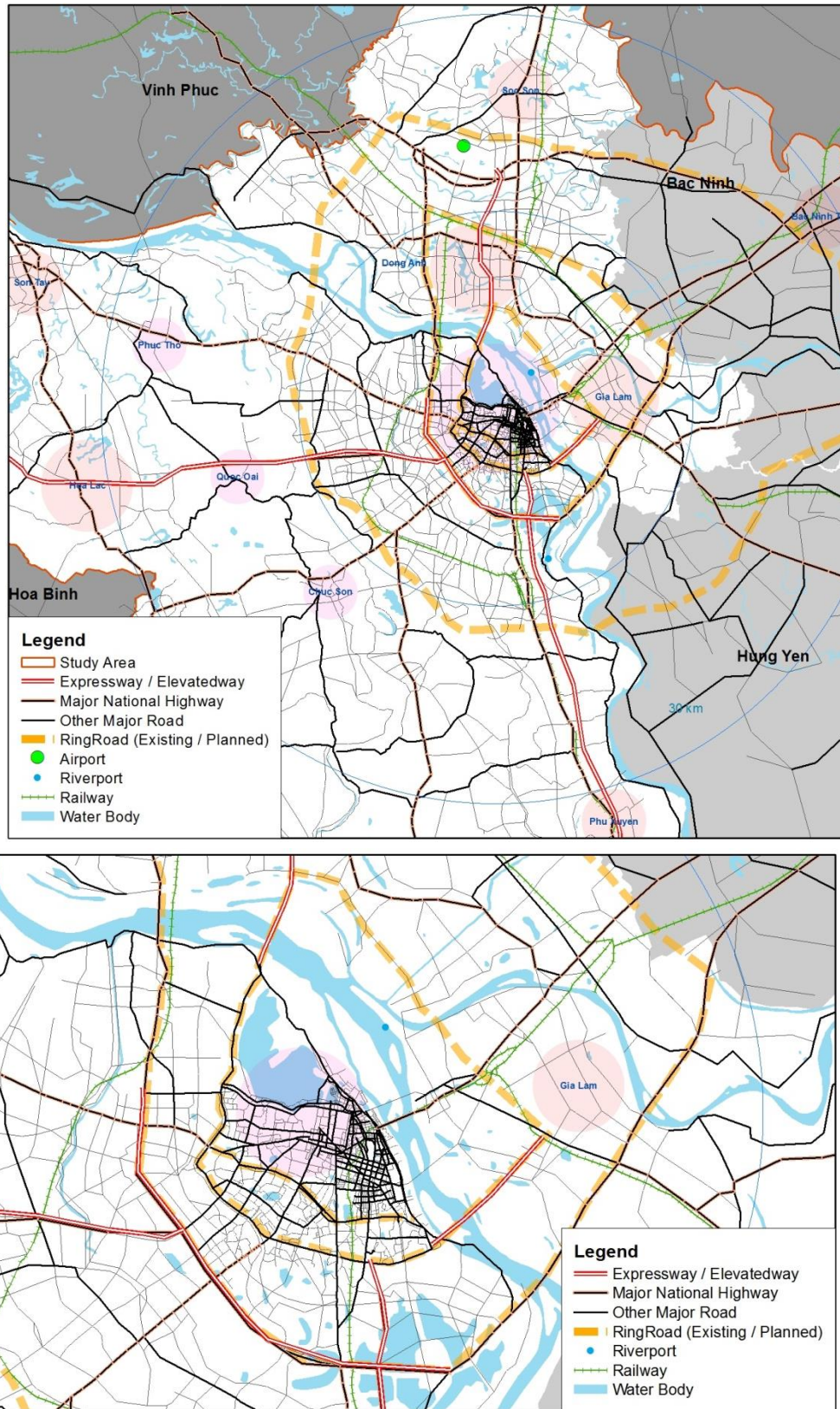
- (i) **Ring Road 1 (RR1):** RR1 is planned as two major urban roads - one running east-west (i.e. from Nguyen Khoai–Kim Lien–O Cho Dua–Cau Giay), and the other running along the right bank of the Red River. The rest of the section from Cau Giay to Red River overlaps with RR2 in the north.
- (ii) **Ring Road 2 (RR2):** RR2 has the following alignment: Minh Khai down to Nga Tu Vong–Nga Tu So–Lang road–Cau Giay – Buoï–Lac Long Quan–Nhat Tan Dyke, and it crosses Hong River at the proposed Nhat Tan Bridge. RR2 is being planned from Vinh Ngoc, Dong Hoi, Dong Tru, NH5, and again crosses Hong River at Vinh Tuy Bridge, and joins the Minh Khai slope to form a loop.
- (iii) **Ring Road 3 (RR3):** RR3 starts from the north via Thang Long–Noi, Bai–Mai, Dich–Thanh, Xuan–Phap, Van–Thanh, and Tri Bridge–Sai Dong. The rest of the section is part of PR3. The RR3 will initially planned to be a provincial road, but it will become a major artery of the urban road system in the near future. At present, some sections of RR3 are open to traffic, including the 23km- section from Noi Bai–Thang Long Bridge–NH32–Tran Duy Hung.
- (iv) **Proposed Ring Road 4 (RR4):** This RR will start from the south of Phuc Yen town, which crosses the Red River at Dai Mach Ward (the area between Hanoi and Phuc Yen town), and run in parallel to the outside part of Provincial Road 70 to Ha Dong town and along the north of Ngoc Hoi Station.

2.15 **Network of Local Roads:** Hanoi has a developed a street system in the central districts, including the central business district of Hoan Kiem, and the administrative district of Ba Dinh. However, in other urban districts, roads are often short and narrow. Among all the existing roads in the urban area, nearly 70% are less than 11 meter- wide, and there are many paths that are even less than 5 meter- wide. Moreover, the road network is exceptionally sparse; it covers only 7 % of the land area, which is low compared to almost 25% in many US cities, about 15% in most European cities, and 11% in Chinese's large cities.

2.16 Since there are very few public transport services available at new housing areas, as well as along less developed secondary arterial and local roads, most of the travel demand generated in these areas is met by mechanized (i.e. motorcycles) transport modes. They

mostly use the major arterial roads connected to the central area. This generates heavy traffic volumes on these major roads.

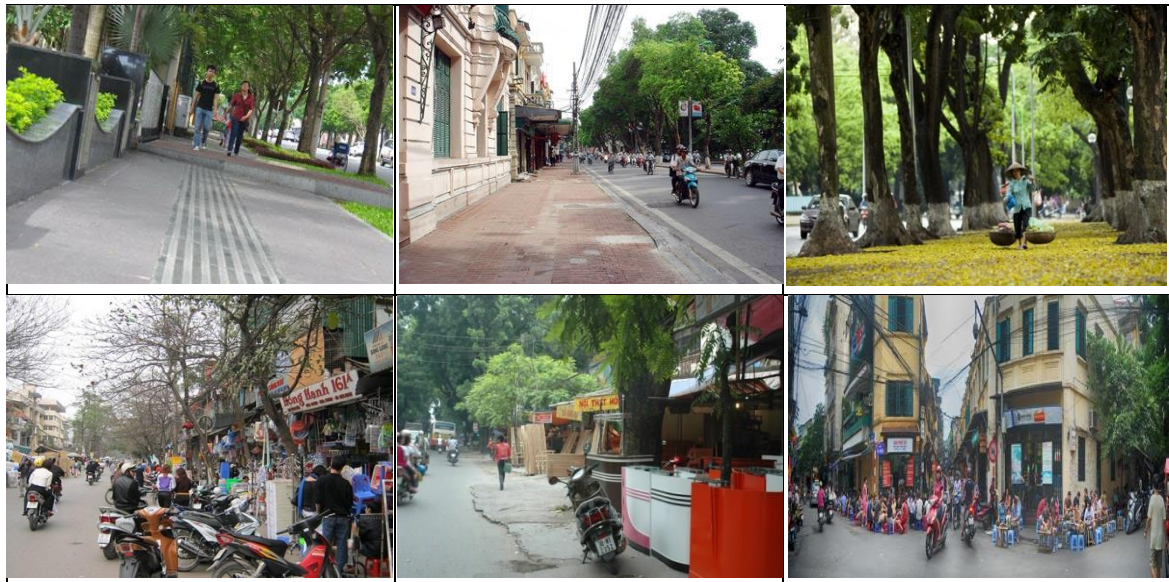
Figure 2.2.1 Current Urban Road Network in the Study Area (and City Centre)



Source: JICA Project Team

2.17 **Sidewalk:** Only the sidewalks located in the French quarter and in the new urban areas are wide enough for pedestrians. Sidewalks by the old streets of the ancient quarter and in the fringes Hanoi expansion are very small, narrow, and are usually occupied. In some of the smallest and narrowest streets, there are no sidewalks. This forces pedestrians to walk on the main road.

Figure 2.2.2 Sidewalks in the Streets of Hanoi



Source: Various sources from website and JICA Project Team

2.18 **Pedestrian Bridge and Underground Crossing:** There are 59 tunnels, 24 overpasses, and 18 pedestrian bridges city-wide. As planned in 2013, the Hanoi Department of Transportation will build 15 pedestrian bridges (7 are ongoing and 8 have yet to be built). Also planned are pedestrian overpasses through residential areas of Northern Thang Long Industrial Park. The governmental agency also has responsibility for designing and building bridges for pedestrians and/or motorcycle through the Northern Thang Long–Noi Bai area (Quang Minh Ward).

Figure 2.2.3 Pedestrian Overpasses



Although pedestrian bridges are installed at intersections with high vehicle density, some people still prefer to walk across the road to save time. Pedestrian bridges are often used by the younger generation, but are not used by the elderly due to the difficulties they experience when climbing the stairs.

Source: Various sources from website and JICA Project Team

Figure 2.2.4 Condition of Pedestrian and Vehicle Tunnels



Kim Lien Tunnel

Minh Khai Walkway

Source: Various sources from website and JICA Project Team

2.19 Many tunnels are not used for the right purposes. Pedestrians dislike going through tunnels, because some of them are designed inappropriately, while some lack lighting systems. For this reason, tunnels are often deteriorated or converted into gathering places for workers or homeless people. This causes public health issues.

2.20 In the inner-city, there are small bridges that cross small rivers, namely the Cau Giay, Hoa Muc, Yring Hoa, Cong Moc and Kim Nguu bridges. These bridges are narrow and short, and some of them, are old and need to be rebuilt such as Cong Moc, Kim Nguu, and Hoa Muc bridges. Moreover, some of the river sections in the city that these bridges cross, are heavily polluted.

2) Transport Terminals and Parking

2.21 Currently, the land for static traffic accounts for only 0.35% of built-up areas, accommodating close to 10% of the demand. Terminals, yards, and parking areas are shoddy, and unevenly distributed.

2.22 **Transport Terminals:** The current stations or terminals are located at the entry points or the gateways towards the inner city, including Nam Thang Long, Giap Bat, Gia Lam, Luong Yen, and My Dinh. The current stations or terminals are overloaded, small, and tight. It is, therefore, very messy and not properly planned. Hanoi is planning to construct 10 inter-provincial terminals, four inter-modal transport centers, and nine new intercity bus stations in Gia Lam, Dong Anh, Soc Son, Thanh Tri, and Ha Dong. Current bus stations, like Nam Thang Long, Giap Bat, Gia Lam, Luong Yen, and My Dinh, will remain to support the new ones. Also included in the plan is the renovation and construction of more than 80 new parking spots in the city, and in Dong Anh and Tu Liem districts.

Figure 2.2.5 Bus Stations in Hanoi



Source: JICA Project Team

2.23 **Parking Areas:** There are very few car parking areas in the inner city; the demand is far beyond the supply. Vehicles are forced to park in the roadway, which results in traffic congestion. Some roads, not including the main roads, have been utilized for parking at the central areas (i.e. Ly Thuong Kiet). Some intersections with relatively little traffic have also been used for this purpose.

2.24 Currently, the city has implemented a number of multi-level steel structure car parks in the inner city roads or in the apartment buildings of the new urban areas, such as those found in Nguyen Cong Tru Street, Dich Vong, and Cau Giay.

Figure 2.2.6 Car and Motorcycle Parking Areas



Source: JICA Project Team

3) Urban Transport Demand Characteristics

2.25 Traffic demand of Hanoi has increased significantly during the last decade, from 6.5 million trips/day (excluding walking and intra-zonal trip) in 2005 (HAIDEP) to 10.6 million in 2013 (see Table 2.2.1). Main characteristics are as follows:

- (i) “Motorcycle” shares 64% of the total demand. The number of trips was multiplied by 1.7 between 2005 and 2013.
- (ii) “Car” shares 5.4%, which represents an increase by 3.2 times over the same period;
- (iii) “Bus” was multiplied by 2.3 times over the same period, but it shares only 8.2% of the total demand
- (iv) “Bicycle” decreased but it still shares 19% of the total demand.

2.26 People tend to prefer private transport and have been gradually shifting to the use of Car, which is the main cause of worsening traffic congestions. Although bus is becoming more popular, its smooth operation is severely constrained because bus has to share the road space with private vehicles.

Table 2.2.1 Traffic Demand by Mode¹⁾ in the Study Area²⁾

		2005 (HAIDEP)		2013 (METROS)		Growth 2013/2005
		000	%	000	%	
Private	Bicycle	1,598	24.4	2,056	19.4	1.3
	MC	4,078	62.3	6,785	64.2	1.7
	Car	178	2.7	573	5.4	3.2
	Truck	21	0.3	117	1.1	5.6
Public	Taxi	57	0.9	167	1.6	2.9
	Bus	382	5.8	863	8.2	2.3
Others		231	3.5	10	0.1	0.0
Total		6,545	100	10,571	100	1.6

Source: JICA Project Team

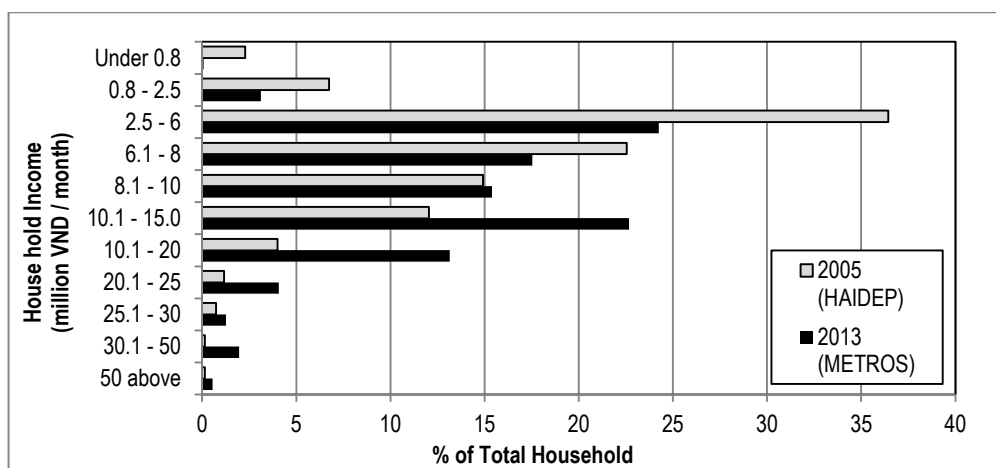
1) Excluding intra-zonal trips

2) For comparison, the covered area is limited to the former Hanoi City.

(a) Increase in Ownership of Cars and Motorcycles

2.27 A reason behind the increase in the ownership and use of private transport is that household average income has increased significantly during the last decade (see Figure 2.2.7).

Figure 2.2.7 Change in Household Income Distribution



Source: JICA Project Team

2.28 The pattern of vehicle ownership in the Study Area is roughly as follows (see Table 2.2.2).

- (i) 94.8% of households own motorcycles; 48% own two units and 15% own more than three.
- (ii) Bicycles are still owned by 67% of the households in the study area and by 57% of the former Hanoi (before expansion).
- (iii) Car ownership has been increasing from 1.7% of the households in 2005 to 5.5% in 2013 (for comparison the area has been limited to former Hanoi).

Table 2.2.2 Vehicle Ownership Pattern (%)

Vehicle Type	Former Hanoi		Study Area
	2005 (HAIDEP)	2013 (METROS)	2013 (METROS)
None	2.1	2.0	1.3
Bicycle	78.6	56.9	67.0
Motor Cycle	1	41.2	26.8
	2	31.3	48.1
	3 -	12.7	18.9
	Subtotal	85.2	93.9
Car	1.7	5.5	3.7
Other Vehicle	1.2	0.9	1.3

Source: HIS, JICA Project Team

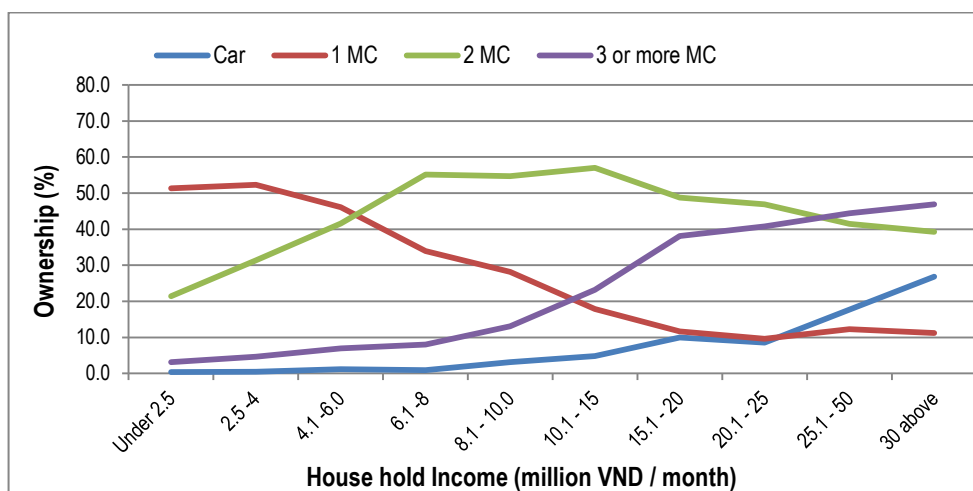
2.29 It is clear that car ownership starts to increase sharply when household income reaches VND 25-30 million/month. As household average income increases, more households own more than two motorcycles. For the income class of VND 4-6 million/month, 55% of households own two units, while for the income class of VND 15-20 million/month, 38% of households own more than three units (see Table 2.2.3 and Figure 2.2.8).

Table 2.2.3 Vehicle Ownership of Households by Income Class

Income Class (VND million / month)	Vehicle Ownership (%)			
	Car	Motorcycle		
		1	2	3 ≤
Below 2.5	0.4	51.3	21.4	3.1
2.5 - 4.0	0.5	52.3	31.4	4.6
4.1 - 6.0	1.2	46.1	41.6	6.9
6.1 - 8.0	0.9	34.0	55.2	8.0
8.1 - 10.0	3.1	28.2	54.7	13.1
10.1 - 15	4.8	17.8	57.0	23.2
15.1 - 20	10.0	11.6	48.8	38.1
20.1 - 25	8.6	9.6	46.9	40.8
25.1 - 50	17.6	12.3	41.5	44.4
30 above	26.8	11.2	39.3	46.9

Source: HS, JICA Project Team

Figure 2.2.8 Vehicle Ownership Pattern by Income Class



Source: JICA Project Team

(b) Traffic Demand by Trip Purpose and Travel Mode

2.30 The travel mode varies considerably depending on the travel purpose (see Table 2.2.4). Motorcycle is the most popular mode for trips “to work”, while bicycle, motorcycle and bus are used for trips “to school”. For “private” and “business” purposes, motorcycle is the most popular mode.

Table 2.2.4 Modal Share by Trip Purpose

Main Mode		Modal Share of Purpose by Mode (%)					
		To Work	To School	Private	Business	To Home	Total
Private	Bicycle	7.8	49.7	16.6	7.8	20.1	19.7
	MC	76.0	35.9	64.3	64.3	65.5	65.0
	Car	1.6	0.1	3.1	2.2	1.5	1.6
	Truck	1.6	0.1	0.2	7.9	1.0	1.0
Public	Taxi	8.2	0.8	5.2	11.6	4.8	5.3
	Bus	4.9	13.4	10.6	6.2	7.1	7.4
Total (excluding Walking)		100	100	100	100	100	100

Source: JICA Project Team

(c) Trip Length by Travel Mode

2.31 The average trip length and travel time differs depending on the travel mode (see Table 2.2.5). The main characteristics are as follows;

- (i) Bicycle is used mainly within 2 km distance (78.2 %) ;
- (ii) Motorcycle is mostly used within 10 km distance (86.7 %) ; the average trip length is 5 km and the travel time 19 minutes;
- (iii) The average trip length and travel time for cars are 9.1 km and 30 minutes, respectively;
- (iv) Taxi is used for similar purposes as car, but trips are usually longer.
- (v) Bus is used for relatively longer distances with an average trip length of 12 km and travel time of 41 minutes.

Table 2.2.5 Distribution of Demand by Trip Length and Mode

Main Mode		% by Trip Length						Average Trip Length (km)	Average Travel Time (min)
		Up to 1km	1km - 2km	2 km - 5km	5km - 10km	10 km - 20 km	20 km above		
Private	Bicycle	13.7	64.4	14.4	5.6	1.6	0.4	2.2	14.3
	MC	8.8	37.8	21.9	18.1	10.0	3.4	5.0	19.0
	Car	4.2	13.2	29.5	24.2	14.3	14.6	9.1	30.1
	Truck	2.0	17.6	12.9	16.6	19.1	31.7	13.7	50.4
Public	Taxi	5.1	11.5	21.7	29.7	15.8	16.2	9.9	37.8
	Bus	3.7	8.6	22.6	21.8	19.8	23.5	12.0	41.3

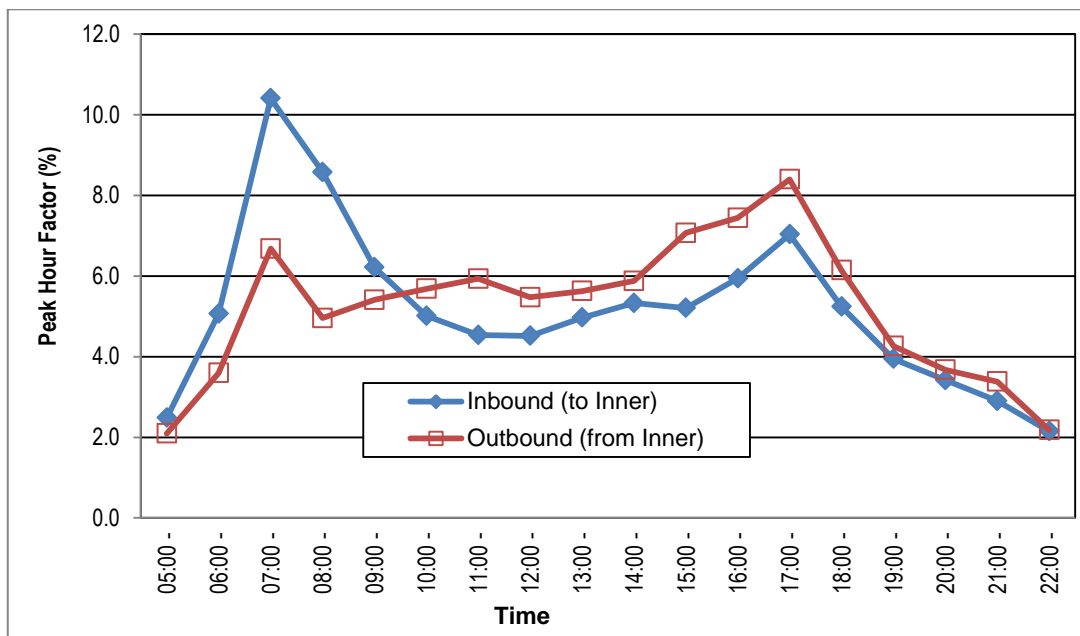
Source: JICA Project Team

(d) Traffic Distribution on Roads

2.32 Traffic conditions vary depending on the time of the day. In general, traffic distribution patterns are similar in the city center and in outer areas. There are two peak hours, one in the morning and one in evening. Main findings are as follows:

- (i) At the inner screen line stations¹⁾, the peak hour ratio (% of peak hour traffic volume to the traffic volume to the total daily traffic volume) is high. More than 10 % of inbound and 8% of outbound traffic in the morning and evening peak hours respectively. This indicates that a relatively high concentration of activities exist in the city centre (See Figure 2.2.9).

Figure 2.2.9 Hourly Distribution of Traffic Demand of Inner Screen Line Stations



Source: JICA Project Team

- (ii) In 2011, there were 246 locations in Hanoi where traffic congestion frequently occurred (News report 3/2011). Traffic congestion had decreased significantly in 2013. Although Hanoi still has 55 congestion points, this is 69 points less than in 2012, when there were 124 congestion points. The congestion time has also reduced significantly,

¹⁾ Specific location of survey stations are described in Chapter 4.

with no congestion time exceeding 30 minutes. One of the important reasons for this amelioration is the city’s completion and implementation of a series of major transport projects, specifically, the overpass bridges at intersections like Nguyen Chi Thanh–Kim Ma, Tran Khat Chan–Dai Co Viet, Yen Vi bridge, Gie bridge, Cat Linh–La Thanh–Thai Ha–Lang, and the pedestrian overpasses at North Thang Long Industrial Park.

- (iii) According to the results of a research team from the Ministry of Justice, the estimated economic cost caused by traffic congestions in Hanoi is 21,594 billion VND per year (including productivity losses, fuel consumption, environmental pollution, etc.). In addition, traffic congestion also causes social disturbances for the population, therefore hindering the economic and social development (New Hanoi, 2014).

Figure 2.2.10 Traffic Congestion on Hanoi’s Roads



Source: JICA Project Team

4) Public Transport Passenger

(a) Overview

2.33 Hanoi public transport has been better in the past. In the early 1900's, the capital of Vietnam was well-known for its tramway and trolley bus service. In 1960, the city started the bus service with 28 urban routes. In the early 1980's, the whole city had around 500 vehicles, carrying around 50 million passengers per year. Nevertheless, in the post *Doi Moi* period, public transport started to collapse. In 1997, the number of routes was reduced to 13, and the capacity fell to 7 million passengers per year.

2.34 Since 2000, with the support of the German cooperation CIM and the decentralized cooperation led by Ile de France Region, Hanoi urban transport management and operation centre, or TRAMOC (founded in 1998) carried out two international projects, namely Asiatrans and Ecotrans (co-funded by the European Union). During this time, bus operator companies have been reorganized through the TRANSERCO holding company (which is now the main bus operator in Hanoi).

Figure 2.2.11 Hanoi Tramway (1980) and Trolley Bus (1990), Bus (2014)



Source: Fotostream von manhhai,

2.35 Bus service in Hanoi experienced ups and downs in its history. During 1978-1990, the number of bus passengers was around 50 million /year (140,000/day). During 1991-2000, it decreased to around 10 million/year (28,000/day). Both bus and tram lost patronage in the beginning of 1990's. Through a strong initiative of the Government, the bus service was revived in 2002. The number of bus passengers increased from 50 million in 2002 to 285 million in 2004 and 500 million in 2013.

2.36 Nowadays, Hanoi does not have a tramway or trolley bus any longer, but a modern bus system. However, the has been facing various difficulties such as maintaining efficient and safe operation in congested mixed traffic, expansion of services, slow increase in patronage, amount of subsidies, etc. In spite of these, the development of efficient and effective public transport, especially a bus system, is a critical concern for the city to promote sustainable urban transport.

(b) Bus Route

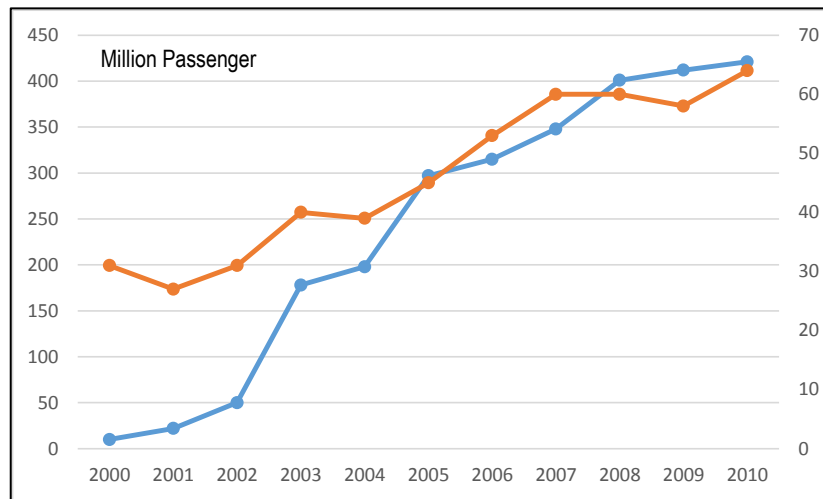
2.37 After expansion of the administrative boundaries, there were also noticeable expansions of the bus network for public transport of passengers. Hanoi now has 94 bus routes, 74 subsidized bus routes, 13 non-subsidized routes in the inner city, and 7 bus routes towards surrounding provinces. The entire city has a total of 76 original destinations for the bus routes.

Table 2.2.6 Bus Routes over the Years

Type of Bus Route	2008	2009	2010	2013	Current
Subsidized bus routes	n.a.	n.a.	n.a.	67	74
Non - subsidized bus routes	n.a.	n.a.	n.a.	12	13
Provincial bus routes	n.a.	n.a.	n.a.	7	7
Total	65	77	82	86	94

Source: Compiled from various sources

Figure 2.2.12 Bus Feet and Passenger Volume, 2000-2010



Source: JICA Project Team

(c) Bus Services

2.38 The year 2014 was chosen as a year of "Quality of service of TRANSERCO ", with the slogan "Customer is central". TRANSERCO continues to implement well-coordinated solutions, such as consolidating the activities of its "hot line", by setting up a Customer Care Center and putting it into operation on April 1, 2014. In 2014 and onwards, TRANSERCO will continue the transformation of the company under a multi-ownership model.

2.39 The new buses have been painted with 3 colors: white, yellow, and red. These buses are also provided with a driver’s cabin. In addition, they have been designed to accommodate the disabled. Additional equipment and technology were also installed such as, trip monitoring systems, LED electronic table systems, and cameras. The new units are 60-seater buses that meet the standards for urban transport, with new environmentally friendly engines that meet III Euro standards.

2.40 For the first 6 months of 2013, the TRANSERCO bus system has transported over 202.5 million passengers, accounting for over 90% of bus users in the city. Revenues reached 2,042 billion VND, equaling 110 % of the target revenue. This is also 10 % more than the previous year (same period in 2012).

Figure 2.2.13 New Buses with Driver's Cabin



Source: JICA Project Team

(d) Bus Stops

2.41 Along with the development of the bus routes and bus stops, bus shelter systems are also being developed every year.

- (i) In 2011, Hanoi had 1,200 bus stops and bus shelters.
- (ii) In 2012, Hanoi had 1,800 bus stops, but only 300 stops had shelters and roofs.
- (iii) Two bus interchanges have been built in Long Bien and Cau Giay, and this facility has contributed to an increase in passengers' comfort.

Figure 2.2.14 Bus Interchanges and Bus Shelters



Source: JICA Project Team

(e) Organization of Bus System Management

2.42 The Decision No.3385QD/PC-VT of the Ministry of Transportation (MOT) issued on December 23, 1996, provided comprehensive regulations on Bus Public Passenger Transportation (BPPT). In total, there are five entities involved in BPPT service delivery, as follows:

- (i) The Ministry of Transportation (MOT) is in charge of the approval of a BPPT project proposed by the Transport and Urban Public Works Service (TUPWS) or the Transport Department after written comments from the People’s Committee of the province or city concerned;
- (ii) The People’s Committee of a Province or a City can give instruction and guidance to BPPT operators, in regards to conformity with the laws, determining fare rates, opening and closing of bus routes, approving operation schedules, and regulating compensation for losses incurred;
- (iii) The TUPWS or Transport Department under each People’s Committee are fully accountable to the MOT and the Chairman of the People’s Committees of Provinces and Cities;
- (iv) The Management and Operation Center for Public Transportation (MOCPT) under each TUPWS or Transport Department are responsible for supervising the performance of contracts signed between the MOCPT and BPPT organizations, especially the implementation of the regulations on bus routes, operation schedules, service quality and fare levels;

2.43 In the case of Hanoi capital city, the Ministry of Planning and Investment (MPI), and the Hanoi Authority for Planning and Investment (HAPI) evaluate and authorize the capital investment of approved projects. In 2000, Hanoi only had three state-owned enterprises involved in small-scale transport services. In 2004, Hanoi established the TRANSERCO Corporation. At that time, TRANSERCO was one of the first four corporations of the city to pilot the switch to public transport operations under the parent company-subsidiary company. With 41 bus routes and 700 vehicles, TRANSERCO transported 285 million passengers in 2004.

(f) Difficulties Facing Bus Public Transport in Hanoi

2.44 The main difficulties faced by current bus transport operations include:

- (i) **Increase in Financial Burden for Bus Passengers of Priority Groups:** From May 1, 2014, fares were simultaneously increased. The monthly ticket for priority groups, mainly students, cost 55,000 VND per route, and the fare for more than 2 routes is 100,000 VND. The fare has been raised to 7,000 VND per trip for 25 to 30km- routes, and 9,000 VND per trip for over 30km- routes.

Table 2.2.7 Current Bus Fare

Type			VND/passenger
Single Trip Ticket			7,000, 8,000, 9000
Monthly Ticket	Priority (student)	One line	55,000
		All network	100,000
	Normal (non-priority)	One line	100,000
		All network	200,000

Source: TRANSERCO

- (ii) **Bus shelter system:** There are only about 17 % of all bus stops that have a small roof. There are also many stops occupied by Xe Om and peddlers. In 2011, out of the total 1,200 stops, 600 stops were occupied.
- (iii) **Lighting system:** In early 2014, out of the total 372 bus shelters across the city, only 103 stops had lighting systems. 269 shelters, or 72 %, had no lighting systems. The whole city had a total of 76 original destinations for the bus routes, but only 8 bus stops had lighting systems (e.g. Giap Bat bus station, Nuoc Ngam, My Dinh, Luong Yen, Yen Nghia, Southern Thang Long, and Son Tay), that were efficiently and consistently working. Recently, Hanoi has approved proposals from the Department of Transportation regarding power supply and installation of the lighting system bus shelters and at the end points of the bus routes.
- (iv) **Pressure on Bus Services:** There is tremendous pressure on drivers and assistant drivers during rush hours, because bus transport on some axes is overloaded to 140 to 200% of the capacity. According to the survey, there are 42 points that are regularly overloaded. A bus with 80 seats has to carry up to 160 passengers, or even 200 passengers, leaving insufficient space for all, even when standing. At peak hours, the drivers are stressed due to these conditions. This may cause a shift in the drivers' and their assistants' attitude, which can then result in poor service, and sometimes, conflicts with passengers.
- (v) **Traffic Congestions affecting Bus Operation:** To remedy traffic congestion, Hanoi and TRANSERCO have developed a plan with several stages to increase the transport capacity of buses. Under this plan, the bus system has to access all administrative centers of the districts, wards, towns and populated areas.

2.45 Daily bus users are mostly low-income laborers and students who come from the neighboring provinces. Bus transport is their only choice because they cannot afford to own a motorcycle. According TRANSERCO, the bus routes carry up to 200 % its capacity during the peak periods.

2.46 Most immigrants are poor laborers from other provinces. Hanoi has a high number of students from the provinces and this has resulted in the highest student population density in the country. In fact, in 2009, Hanoi had about 800,000 students, which accounted for 46 % of the total students in a country with 1,719,499 students.

Figure 2.2.15 Bus Traffic Congestions on Roads and Bus Stops



Source: Compiled by Project Team from various sources.

(g) Taxi

2.47 The main transport mode which complements public transport is the taxi. The modern taxi system appeared in Hanoi after 1994 with an initiative of the Department of Transport (DOT). The system provides transport services that utilize the telephone network and a radio signal control center. This new system was successful, and was soon followed by new operators on the market. Nowadays, Hanoi has an effective taxi system with a wide range of choices. It has fare accounting meters and many different types of vehicles to choose from, that range from small cars to 15-seaters.

2.48 Currently, the city has 107 registered taxi operators with a total of over 17,000 vehicles. Since 2012, Hanoi has temporarily stopped granting business licenses to taxi operators, but there are also about 2,000 taxis from other provinces that are operating in the city².

2.49 Currently, there is no reason for the Government to intervene in this activity except to impose general safety regulations and procedural requirements during registration, and the regular inspection of fare meters.³

Figure 2.2.16 Taxis in Hanoi



Source: JICA Project Team

² Taxi registered with other provinces outside Hanoi will be banned from operating in the capital city.

³ Regulations on organizations involved in transport business operations and management, and road transport support services are provided in Section 4 of Circular No. 18, dated August 16, 2013, by the Ministry of Transportation

(h) Xe Om

2.50 Xe Om appeared in Hanoi after the "Doi Moi" in 1989, leading to the downward trend of the bus service, and simultaneously, the upward trend of the use of motorcycle. There are no statistics on the number of Xe Om in Hanoi. The survey of households (interviews) conducted under HAIDEP (2006) indicated that trips by Xe Om amounting to approximately 74,000 trips per day, equivalent of 25% of bus passengers. This statistic is also 30% higher than taxi patronage.

2.51 Xe Om originally competed with bus services, but their role has changed to serve as a low-cost alternative to taxis, and to act as feeder systems at bus stops. This is functional in some parts of Hanoi that are not easily accessible. Xe Om may continue to operate in Hanoi for a long time, unless a radical policy change is introduced.

2.52 In the last two years, firms have started to provide professional Xe Om services. This was introduced following foreign models and Ho Chi Minh City's earlier experience (such as in Than Thien, Thanh Phat, Au Co, Binh An, Ha Thanh, etc.). Derived from the traditional form of Xe Om services, "professional" Xe Om have new utility services that can meet the increasingly diverse needs of consumers.

Figure 2.2.17 Taxi 'Xe Om' Services in Hanoi



Source: Compiled from various sources

(i) Cyclo

2.53 The cyclo is the oldest individual type of public transport in Hanoi. It still exists with the lambro (i.e. a small van), which is now all but extinct in the city. The cyclo fulfilled an important role, not only for passenger transportation, but also for the transportation of various household goods within enclaves with limited access. As late as 1993, cyclo ridership was higher than bus ridership. Since then, the number of cyclos has drastically been down as their market share has been taken over by Xe Om. The use of cyclos is now limited to the tourism industry and to traditional weddings. It is monitored through the registration numbers and service teams.

Figure 2.2.18 Cyclos in Hanoi



Source: Compiled from various sources

(j) Electric Bus

2.54 An electric bus has been operated since July 2010 as one mode of public transport in Hanoi. This initiative was a pilot project aimed at tourists visiting the city centre. The objective was twofold: reducing traffic and also protecting the environment in the area. The project was part of the activities implemented by Hoan Kiem District People's Committee for the 1000th anniversary of Thang Long (Hanoi).

2.55 In fact the bus is not only used by tourists but also by local people. It can carry seven people. The route is approximately 7km- long with 10 stations; it starts from a station on Dinh Tien Hoang Street and goes to the Ancient Quarter and Hoan Kiem Lake, then it goes back to Dinh Tien Hoang Street. Another project of electric bus around West Lake is under consideration.

Figure 2.2.19 EV Bus in Hanoi



Source: Compiled from various sources

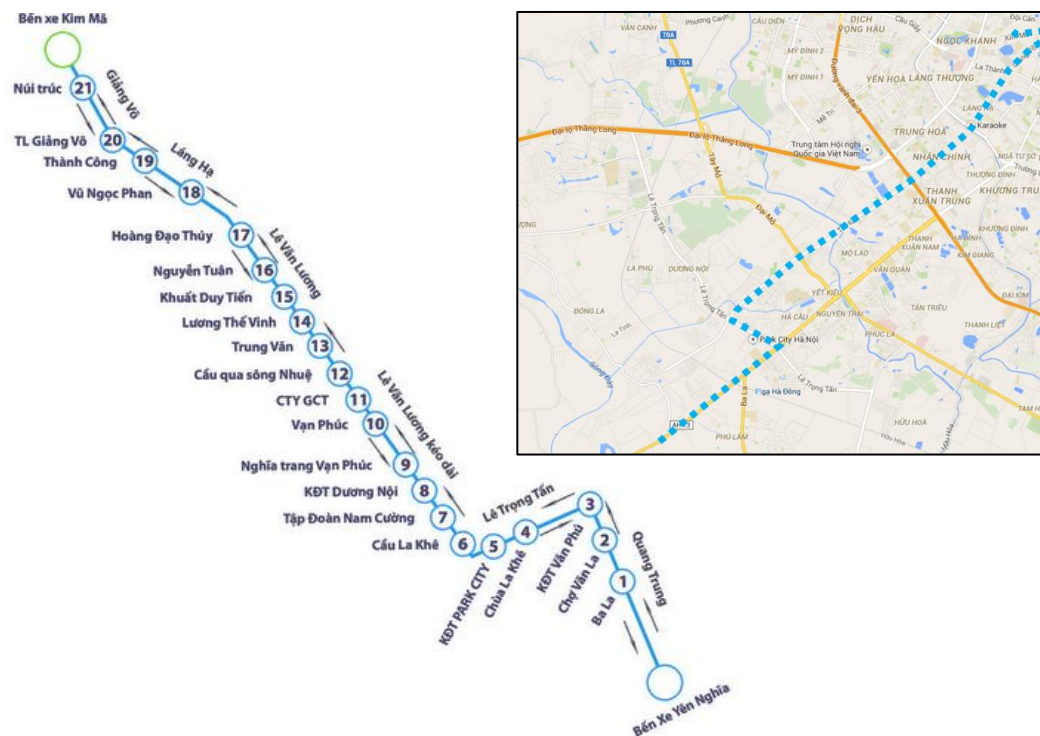
(k) Bus Rapid Transit (BRT)

2.56 The first BRT route in Hanoi will be the 14km- long section from Kim Ma to Yen Nghia. It is now under construction. Operation should start in the second quarter of 2015. The total investment for this project is USD49 million⁴. The project includes the construction of infrastructure, shelters and facilities. The typical shelter, along Le Van Luong Street, is 5m-wide and has a total area is 129 m². Similar shelters will be built on Giang Vo and Lang Ha Street. From Le Van Luong to Yen Nghia bus station, the BRT will not run on a separate lane.

2.57 The control center is being built at Kim Ma bus station. The expected operation speed of the BRT line should be 22 to 25 km per hour on average, which is faster than the average speed of a conventional bus (less than 15 km/hour). The entire BRT line on Kim Ma - Yen Nghia route, should take about 30 minutes, instead of more than an hour by conventional bus.

2.58 The BRT will run on 2 separate lanes, close to the median of the roads. Shelters for passengers are being placed on the median lane, near the intersections. They are equipped with ticket selling machines, card swipe machines, automatic ticket control machines, and a customer support desk with staff available. The passengers will use magnetic tickets that will be automatically checked before entering the shelters. Movement time of passengers will be reduced and optimized with the use of automatic systems to buy tickets, undergo ticket check, and card swipes, which will be done immediately upon entering shelters.

Figure 2.2.20 Location and Alignment of the First BRT Line (Kim Ma – Yen Nghia)



Source: Hanoi BRT, JICA Project Team

⁴ The project is funded by the World Bank while the clearance cost is shouldered by the Government.

Figure 2.2.21 On-going Construction of Kim Ma and Yen Nghia Bus Stations



The Control Center is under construction at Kim Ma bus station.

The last point of the project is Yen Nghia bus station (Ha Dong) under construction of ground treatment

Source: JICA Project Team

Figure 2.2.22 BRT Lanes and Model Shelters



Two-way BRT can run close to the median lane of the road.

Model Shelter for Hanoi BRT Project. This project is funded by the World Bank, and will be completed on the 2nd quarter of 2015. The buses for this project have doors on the left. It is 12 meters long and can seat up to 90 passengers.

Source: Compiled from various sources.

Figure 2.2.23 Roads with Unsegregated Traffic and BRT Shelter Construction



From Le Van Luong to Yen Nghia bus station, the BRT will run on mixed-traffic roads at Giang Vo, and Ba La, which are one-way streets, so traffic congestion is unlikely.

The first BRT model shelter being built at the crossroads of Hoang Minh Giam - Le Van Luong.

Source: Compiled from various sources

5) Traffic Management

(a) Overview

2.59 Traffic management is a noticeable weakness of Hanoi urban transport system. The basic 3Es, comprising Engineering, Education, and Enforcement, are poorly implemented. Infrastructure is not properly developed, operated, and maintained; most people are not aware of traffic rules for safety and possibilities of efficient travel by different modes of transport; even when they are aware of these rules and possibilities, they often ignore them. Therefore, enforcement of the rules is also lax and people responsible for enforcement lack proper skills and equipment. All these factors are so interrelated with each other that many efforts made have turned into a partial success only, or even a failure.

(b) Signal System

2.60 There were 2,150 nodes in 2013 in Hanoi (Vietnam Plus, 2013), but signal lights were installed at only 181 nodes because of the high installation costs. In 2014, the entire city had 260 traffic signal lights. All the light systems of the city and other districts are under the management of the Traffic Signal Control Team, and the Hanoi Police Department (248 lights), except for the light systems in the town of Son Tay that are managed separately. Out of the total, only 90 traffic light systems are connected to each other and are controlled by computers. This connection has been implemented in 2000 through a project funded by France. All traffic lights installed thereafter are operating independently, on a green–red mode fixed cycle.

2.61 As a pilot project, the Thang Long Highway Management Model and the Hanoi Highway Management Center will be built and established with ITS applications. The center will apply modern information technology in its managerial activities. The following applications will be implemented: (i) adopting the technology in counting and automatic sorting of transport vehicles, (ii) camera supervision systems, (iii) electronic bulletin boards, and (iv) oversized and overloaded vehicle controls.

Figure 2.2.24 Traffic Signaling Systems in Hanoi



Source: JICA Project Team

(c) Traffic Signal Control Project

2.62 Several routes have applied the 'Intelligent Transport System' (ITS) to reduce congestion, improve safety, and enhance operational efficiency. This can be achieved through traffic monitoring using cameras, automatic counting, and tracking of vehicles through images and traffic information dissemination on large electronic boards.

2.63 The ITS systems have been used effectively on-site, especially for the management and operation of: (i) the monitoring system on highway Cau Gie–Ninh Binh, (ii) traffic control camera system of Hanoi, (iii) control system for toll collection at stations in Hoang Mai and Bai Chay, and (iv) the system to handle violations of traffic safety order through images in Highway 1A Phap Van - Ninh Binh.

(d) Signs and Road Markings

2.64 The upgrades of the system of signs and road markings have been recently done to improve vehicular flow and reduce operational costs, especially for main routes and pattern routes. However, the signage system remains incomplete and incomprehensive. The signage systems on the roads managed by the Department of Transport are installed and managed by the urban traffic management unit. On the roads managed by the districts, every single urban traffic management unit controls the signage systems, which are poorly maintained due to lack of funding and professional approach.

Figure 2.2.25 Signs and Road Markings



Source: Compiled from various sources

2.65 The content of the signage, and its location, is often inappropriate. Many of the colored signs are old, unclear, or obscured by trees and others obstacles. There is a lack of coordination in the design, installation, and management of the traffic signage between the Department of Transportation, the Districts People's Committees, and the Traffic Police. Unscientific approaches to the design of traffic signs cause difficulties to commuters and pedestrians.

(e) Lane Separators

2.66 Recently, road safety barriers and rigid barriers have been installed to force traffic segregation. Some early results, however, revealed shortcomings, i.e. impediments for the movement of people and vehicles.

Figure 2.2.26 Various Types of Lane Separators



Source: JICA Project Team

(f) Traffic Safety

2.67 In 2013, there were 2,252 traffic-related accidents in Hanoi (a decrease by 8.8% compared to 2012), 323 fatalities (decreased by 5.6%) and 2,008 injuries (decreased by 4.2%). Although the number of traffic-related accidents has decreased, their severity has remained very high. Alarmingly, the most serious traffic accidents occurred in the suburban areas. “Black spots” for traffic accidents are in the districts of Thuong Tin, Phu Xuyen, Ung Hoa, Chuong My, Phuc Tho, and Ba Vi. The main causes include the following:

- (i) Low consciousness of traffic rules and dangers, and bad behaviours of drivers and pedestrians (e.g. driving under the influence of alcohol, driving on the wrong lanes of the road, driving without a helmet, etc.);
- (ii) Lack of enforcement of regulations against traffic rules violations by the police;
- (iii) Traffic and urban management is still deficient and ineffective;
- (iv) Roadway and sidewalk encroachment by vendors and road vehicles; and
- (v) Substandard quality of transport vehicles.

Figure 2.2.27 Accidents on Hanoi’s Roads



Source: Compiled from various sources

2.3 Hanoi Capital Construction Master Plan up to 2030 with Vision 2050

1) General

2.68 The Ministry of Construction has prepared the “Hanoi Capital Construction Master Plan up to 2030 with Vision to 2050” (hereafter referred to as the “General Plan”) based on the Hanoi Capital Regional Construction Master Plan approved in 2008. The Prime Minister approved this Master Plan on 26th July 2011.

2.69 The General Plan covers the metropolitan area of Hanoi City, including Ha Tay Province, Me Linh District in Vinh Phuc Province, four wards of Luong Son District and Hoa Binh Province which merged with Hanoi City in August 2008. Since then the total area has been 3,344km² (2.6 times larger than before expansion), divided into 29 subdivisions, and the new population has reached 6.2 million (2 times more).

2.70 The keywords of the General Plan’s Vision are “Green”, “Culture”, “Civilization” and “Modernization.” The main objectives include (i) the construction of a sustainable urban structure, (ii) the active development of overall space integrating natural, historical and cultural resources, and (iii) the achievement of efficient land use, modern infrastructure and sustainable environment. Sustainability is an important concept of the General Plan.

2.71 The General Plan describes the orientations for Spatial Development, based on nine strategies: (i) urban restructuring, (ii) strengthening traffic system development, (iii) developing a system of modern, active and effective urban centers, (iv) enhancing the City’s characteristics and unique image, (v) upgrading the old urban area, (vi) preventing and minimizing natural disasters and other catastrophes caused by humans, (vii) preserving and promoting relics’ values, (viii) strengthening urban management institutions and building urban management capacity effectively, and (ix) establishing and strengthening resources for urban development. Through these strategies, public transportation development is the major driver to connect the central urban area and satellite urban areas. The inner city area and peripheral areas are to be upgraded, and their population growth controlled.

2.72 In the General Plan, Hanoi Capital is planned to be restructured from a single pole to multi-pole structure with (i) central urban area, connecting with (ii) satellite urban areas, and (iii) other eco-towns in rural areas. UMRT Line 1 and Line 2 run basically through the central urban area.

2) Urban Structure and Population

2.73 Hanoi population was 6.4 million in 2008. According to the forecasts, it should reached 10.8 million in 2050 (see Table 2.3.1). The historic inner city will be depopulated by almost one third in the future and the expanded inner city area will also be depopulated. On the other hand, outer areas will absorb the increasing population in newly developed urban centres, satellite urban areas and townships.

Table 2.3.1 Population Forecast in Urban Area in the City Master Plan until 2030

Area Classification			Population (000)				AGR (%/yr)		
			2008	2020	2030	2050	2008-2020	2020-2030	
Central Urban	Inner Urban	Historic Inner City	1,203	919	800	800	-2.2	-1.4	
			182	150	130	130	-1.6	-1.4	
			292	200	176	176	-3.1	-1.3	
			244	200	170	170	-1.6	-1.6	
			392	300	255	255	-2.2	-1.6	
		94	69	69	69	-2.5	0.0		
		Expanded Inner City	965	809	856	991	-1.5	0.6	
			42	30	25	25	-2.7	-1.8	
			51	51	51	51	0.0	0.0	
			200	160	148	148	-1.8	-0.8	
			273	240	255	308	-1.1	0.6	
			219	180	135	135	-1.6	-2.8	
			170	133	220	274	-2.0	5.2	
		10	15	24	49	3.4	4.6		
	Sub-Total			2,168	1,728	1,656	1,791	-1.9	-0.4
	Newly Developed Area	Urban Chain in the east of belt 4 (from Nhue River to RR4)	678	744	1,250	1,685	0.8	5.3	
			143	146	350	585	0.1	9.2	
			535	598	900	1,100	0.9	4.2	
		Urban Chain in the North of Red River	691	1,277	1,700	1,970	5.3	2.9	
355			497	700	750	2.8	3.5		
163			300	450	549	5.2	4.1		
172			480	550	671	8.9	1.4		
Sub-Total			1,369	2,021	2,950	3,655	3.3	3.9	
Sub-Total			3,578	3,748	4,606	5,445	0.4	2.1	
Satellite Urban	Satellite urban (Son Tay, Hoa La, Xuan Mai, PhuXuyen, Soc Son)		355	722	1,377	1,787	6.1	6.7	
	Townships		186	206	235	279	0.9	1.3	
	Eco-Townships (3 townships)		90	101	116	135	0.9	1.4	
	Other townships (11 townships)		96	105	120	144	0.8	1.3	
Total			6,350	7,965	9,136	10,734	1.9	1.4	

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

2.74 UMRT Line1 and Line2 stations, after completion phase1, will run through the historic inner city, the expanded inner city, and the urban areas in the east of the Red River.

- Historic inner city (1.2mil in 2008 → 0.8mil in 2030): V6 Long Bien Nam, V8 Hanoi of Line1 and C7 Ho Tay, C8 Hang Dau, C9 Hoan Kiem Lake, C10 Tran Hung Dao of Line2
- Expanded inner city (0.97mil in 2008 → 0.86mil in 2030): V9 C.V. Thong Nhat, V10 Bach Mai, V11 Phuong Liet, V12 Giap Bat and C1 Nam Thang Long, C2 Ngoai Giao Doan, C3 Tay Ho Tay, C4 Bui
- Urban areas in the north of Red River (0.69mil in 2008 → 1.7mil in 2030): V5 Long Bien Bac, V4 Gia Lam of Line1

3) Development Orientation of Historic Inner City

2.75 The orientations for the future development of the historic inner city, including special areas, are stated below and summarized in Table 2.3.2.

- Population growth will be controlled in order to achieve depopulation from 1.2 million in 2008 to about 0.8 million in 2030;
- Restrictions will apply to the overall development. In order to maintain and promote historic urban values, improvements, new constructions, and rearrangement of usage functions will be regulated in the Ancient Quarter, French Quarter, West Lake area, Hoan Kiem Lake area, around Thang Long Ancient Citadel, etc.
- Restrictions will apply to buildings height and construction density ; renovation of the old quarter is planned as well as relocation of industrial zones;
- Cultural preservation of Thang Long and Trang An;
- Improvement of landscape and protection of eco-environment;
- Mixed-use of landuse with offices and services, commercial, financial, banking centers, etc.
- Upgrading the old urban centers

2.76 Inside the historic inner city, the Ancient Quarter (AQ), Hoan Kiem Lake area and the French Quarter (FQ) are strictly controlled with regulations. The first regulation for the AQ, No.70/BXD/KT-QH, was approved, by the Ministry of Construction on 30th March 1995, under “the Decision on planning approval for protection and development of Hanoi Old Quarter” and amended in compliance with the General Plan.

2.77 The AQ covers 82ha including 10 wards, 79 streets and 83 street plots⁵. One objective of the Plan is to preserve the traditional values (architecture, street landscape, commercial activities, etc.) and to reduce population density and environmental impacts. For this reason, roads developments are limited to underground constructions (except Tran Quang Khai and Tran Nhat Duat Street that should not affect directly any valuable amenities or relics). Similarly, restrictions apply to the construction of large commercial centers, new housing and any large-scale amenities because of the effects these would have in terms of population growth and density, pressure on transportation capacity and environmental impacts.

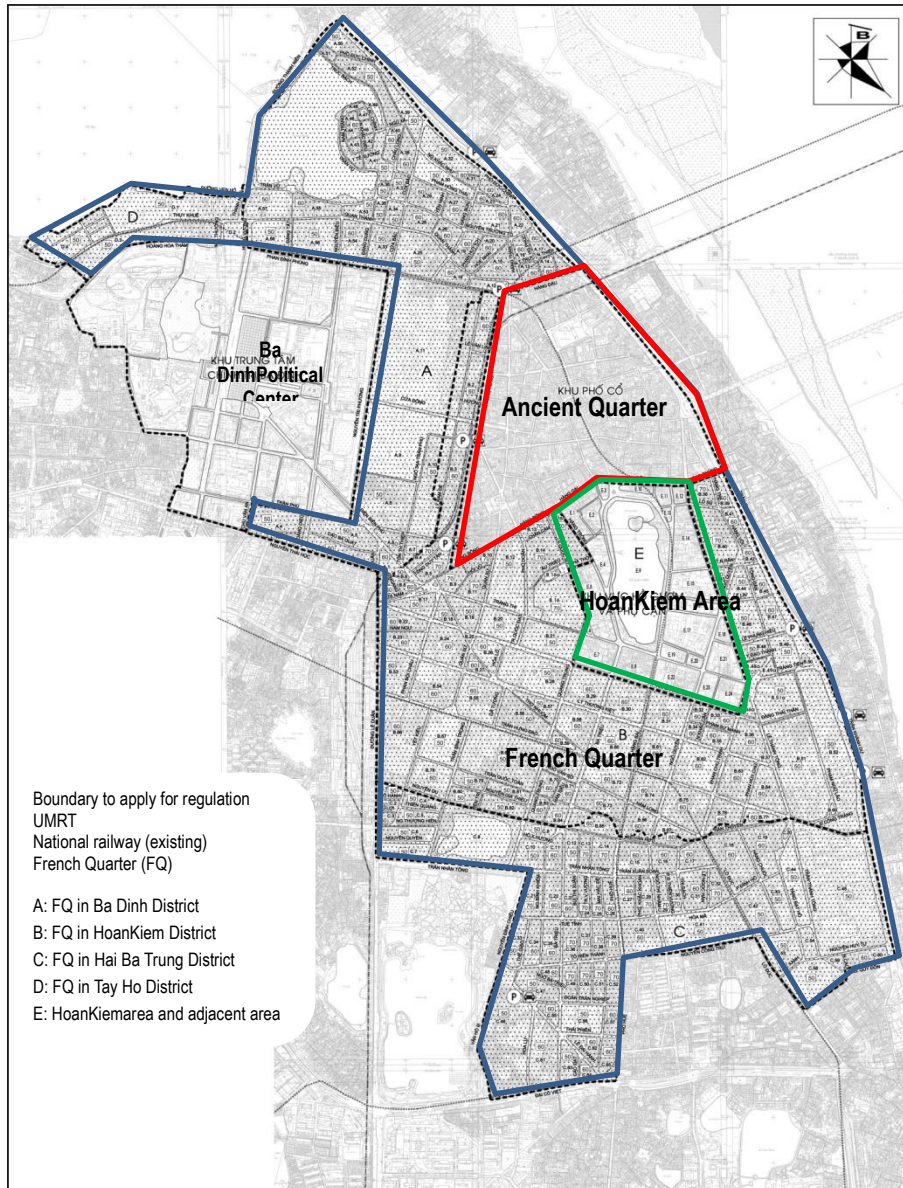
2.78 The FQ covers 517.68 ha, after excluding the AQ, Hoan Kiem area and adjacent areas, and Ba Dinh Politic Center in the south of Hoang Hoa Tham Street. The FQ is an old urban area that has been constructed following the “garden-city” model under the French domination in the end of the 19th century and in the beginning of the 20th century. The street network follows mostly the chessboard model with much greenery space, water surface, historic heritage and nice villas with typical architecture and gardens. Since the FQ is a conservation area, possibilities for renovation or retrofitting are limited. The main urban functions of the area include culture and historic heritage, housing, commercial services, finance, culture, health care, schools and other public functions. The regulation includes indicators to control the volume of constructions, including average construction height (4-6

⁵The borders of AQ are as follows; north borders to PhanDinhPhung Street, Hang Dau Street, east borders to Tran NhatDuat Street and Tran QuangKhai Street, west borders Phung Hung Street, south borders to Hang Thung Street, Cau Go Street, Hang Gai Street, Hang Bong Street

floors or 9 floors), construction density (under 70%), population density (230 people/ha), but these measures have not been approved yet.

2.79 Hoan Kiem Lake and Ngoc Son Temple heritages are certificated as one of national monuments by the Prime Minister, and Ministry of Culture, Sports and Tourism and Hanoi PC manage them strictly for preservation (“The Prime Minister Decision on Certification of Special National Monuments, No. 2383/QD-TTg, 9 December 2013”).

Figure 2.3.1 Boundary of the Ancient Quarter, Hoan Kiem Area, French Quarter



Source: Draft Regulation of French Quarter

Table 2.3.2 Characteristics and Policies of Special Areas in Historic Inner City of Hanoi related to UMRT Line 1 and Line 2 Stations

Special Areas (UMRT stations)	Characteristics and Policies
West Lake (C5, C6, C7)	<ul style="list-style-type: none"> - <u>Preservation of the lakeshore of West Lake</u> - <u>Preserving relics</u> together with natural ecosystem and cultural value. - <u>Creating and improving landscape</u> at West Lake's shore. - <u>Managing and controlling construction density and height</u> of surrounding residential areas. Increasing greenery density based on urban management regulation of this area. - <u>Encouraging maintenance of traditional villages</u>, residential areas attached with flower village, plants growing area such as Tu Lien, Nhat Tam, Nghi Tam - <u>Encouraging establishment of recreation and advanced tourism services</u> - <u>Improving regularly cultural relics</u> such as Chan Quoc Pagoda, Quan Thanh temple and other pagoda and temple system - <u>West Lake – Red River – Co Loa</u>: It is necessary to protect West Lake and the area surrounding West Lake, creating large green space for Hanoi center core urban area, protecting valuable architectural works: Tay Ho Temple, Tran Quoc Pagoda, Thanh Nien Road, traditional craft village, kumquat, peach and flower planting areas and other valuable architectural heritages. Protecting water front area.
Ba Dinh Political Center (C6, C7, C8)	<ul style="list-style-type: none"> - <u>State governmental head</u>: State offices of the Party, State, National Assembly and Government are concentrated; the place of head offices of Central Party, National Assembly and Government of Socialist Republic of Vietnam, ensuring the concentration and deserving the Capital - <u>Head offices of central ministries and agencies</u>: Existing head offices of ministries and agencies of ministerial level concentrating in 4 old inner districts have small and narrow area, which cannot meet the current demand of use and urban transport infrastructure. - <u>Relocation of government</u>: the Government to offer 2 new locations defined in the West of West Lake and Me Tri with about 30ha and Me Tri with about 70ha (expected for National Exhibition Fair Center).
Ancient Quarter (C8/V6)	<ul style="list-style-type: none"> - <u>Construction Control</u>: No developing new houses; restricting building height and landscape architecture for works adjacent to cultural, historic, revolutionary, architectural heritages. New construction works do not destroy the structure, scale, characteristics and spatial landscape of ancient quarter. No industry and storage development; Giving priority to mix – use - <u>Depopulation</u>: Reduction of population density; - <u>Preserving architectural values</u>: preserving value of houses and traditional living spaces; preserving and improving religious works and ancient houses; remaining specific characters of ancient quarter that is the connection of building-relics-business streets- daily activities; - <u>Maintaining traditional feature</u>: maintaining and promoting traditional space; maintaining typical features of ancient quarter - <u>Creation of walkable space</u>: Improvement of streets, lots; planning static traffic network and walking streets - <u>Urban design</u>: urban design should be concerned in the area: (1) <i>Spatial areas</i>: Dong Xuan Market area, Hang Gia Market area, Hang Dau flower area; (2) <i>Sites</i>: Thang Long Song Music and Dance Theatre, No. 48 Hang Ngang (Revolutionary historic relic, where Uncle Ho wrote Independence Declaration), Ancient house No. 38 Hang Dao, Dong Xuan Market, Hang Gia Market, Bach Ma Temple on Hang Buom Street (one of four temples of Thang Long Imperial city); (3) <i>Spatial lines</i>: pedestrian streets connected from Hang Ngang – Hang Dao – Hang Duong – Dong Xuan Market, street Hang Luoc – Cha Ca – Luong Van Can connecting Hang Dau flower garden and Sword Lake.
Hoan Kiem Lake (C9)	<ul style="list-style-type: none"> - <u>Relocation of City's government offices</u>: To focus leading political – administrative

Special Areas (UMRT stations)	Characteristics and Policies
	<p>head offices of the City such as City People's Committee, Party's Committee and some other agencies of the City. Political – Administrative Center of Hanoi in Hoan Kiem Lake area, relocate some agencies to plan and arrange some working head office. In this area, study to relocate some units and agencies to plan and arrange working head offices consistent to Capital's demand such as: Party's Committee, People's Committee, People's Council, National Fatherland Front. Detailed Plan of Hoan Kiem Lake area will be adjusted after this Master Plan.</p> <ul style="list-style-type: none"> - <u>Beautiful heart of capital</u>: Sword Lake is one of the most beautiful lakes in Hanoi and is the "heart" of the Capital. Sword Lake becomes a green space in the Capital, is the place of many public works and historic, cultural and architectural relics such as: Ly Thai To Statue park, Dong Kinh Nghia Thuc square; axis of Dinh Tien Hoang, Le Thai To; Trang Tien – Hang Khay; Hai Ba Trung; Nha Tho, etc. - <u>Preservation and restriction</u>: Preserving typical culture and landscape architecture of the area surrounding Sword Lake. Restricting new development and providing more facilities of high quality tourism services.
French Quarter (C10, V8)	<ul style="list-style-type: none"> - <u>Preservation</u>: Preserving urban structure and improving space, landscape, French architectural works, valuable colonial architecture. - <u>Depopulation</u>: Encouraging population density reduction - <u>Development control</u>: No infill development in green spaces; - <u>Strict construction control</u>: Strict control on permission; limiting of new dwelling development
Old Collective Quarters (V8, V9)	<ul style="list-style-type: none"> - <u>Redevelopment</u>: Redevelopment of old apartment without increasing population; supplementing and improving the functional uses of the residence - <u>Preservation and control in development control area</u>: The old apartment in the area within Ring road 2 (the development controlled area) are to be improved and renovated, limiting population development and do not construct high rise building that affect to space of the preservation area.
University (V10)	<ul style="list-style-type: none"> - <u>Relocation of universities</u>: Large universities are concentrates in Hai Ba Trung, Dong Da, Cau Giay; Hanoi national university, University of Civil Engineering, National Economics University, University of Trade, University of Transportation, Open University, University of Banking, University of Water Resources, University of Mining and Geology, University of Commerce are expected to be relocated out of Hanoi by 2015 - <u>New school construction</u>: It is proposed to locate in satellite urban such as Hoa Lac, Son Tay, Xuan Mai, Phu Xuyen, Chuc Son, Soc Son, etc
Heritages Preservation (C5, C6, C7, C8/V6, C9, C10)	<ul style="list-style-type: none"> - Preservation based on specific character of cultural region such as Ba Dinh political centre and the relic of Thang Long Royal citadel, ancient quarter, old quarter, and Ho Tay area relic - Controlling construction height and density and establishing regulation on architectural landscape management from belt 2 to center urban especially the area surrounding Royal Citadel, Ba Dinh square, Ancient quarter, French quarter, HoanKiem Lake, West Lake and some traditional villages such as Tay Ho, Ngoc Hoa flower villages, NguXa cooper village, Buoi village and religious relics in streets and residential areas

Source: Hanoi Capital Construction Master Plan up to 2030 with Vision2050

4) Development Orientations for Other Areas

2.80 Orientations of expanded inner city, where V9, V10, V11, V12, C1, C2, C3 and C4 will be located, are as follows :

- Constructing and developing new urban centers and urban areas to “reduce pressure” on the currently overloaded historic inner urban area, by absorbing the pressure; high-rise development with radial traffic lines and ring roads to create focal points for

the city; in the remaining area: controlling the buildings' height (the current construction density is very high, in many areas);

- Green/open space development: addressing the lack of green space, open space, especially parking lots; restricting new developments to avoid excessive density and pressure on infrastructure in this area.

2.81 Orientations for urban areas located in the North of Red River, where V5 and V4 will be located, are as follows:

- Developing an urban area of services and industries: developing commercial services, education, healthcare, hi-tech scientific research and application center, logistic center, etc., linked with industrial zones along NH-5;
- Developing a compact urban area: high-rise buildings along NH-5, land-use efficiency;
- Gia Lam Area: along NH-5, Vinh Tuy and Thuong Dinh Areas (transferring from Minh Khai and Thuong Dinh textile workshop cluster), etc.

2.82 Orientations for the urban chain in the east of the belt 4 (from Nhue River to Ring road 4) are as follows;

- Encouraging the development of high rise buildings: to reduce the overall construction density, leave space available for urban amenities, green space and open space.
- Controlling the height of high rise buildings: which creates a “wall effect” surrounding the inner area. High-rise and low-rise areas should be managed at a large scale to avoid the situation where projects of single houses interfere with the development of high-rise and low-rise buildings.
- TOD: Radial axes and large intersections structure the urban development; according to the TOD model, the development of high-rise buildings, should help create focal points for the urban space, and leave space for green space, green belt and green buffer zone by reducing the built environment.

2.83 Orientations for Me Linh – Dong Anh Urban Area, where Line2 Extension (phase3) should run, are as follows;

- Developing services and clean high-tech industrial sectors in the vicinities of Noi Bai airport, build an exhibition center, combine Thang Long and Me Linh flower fair with a center of science and technology specialized in flowers and plants.
- Developing Me Linh-Dong Anh urban based on the particular feature that is traditionally is a horticulture region. Thang Long-Noi Bai axis: creating urban scenery with spaces of flowers and bonsai.
- Development of Dong Anh area: international commercial transaction, high-tech industry, eco-tourism, entertainment, combined with preservation of Co Loa relics, Van Tri Lagoon; establishing the new sport center of Hanoi city (ASIAD), along with the exhibition center, Hanoi commercial center (EXPO); recreation & sport area of city; and a research and, education center, supporting about 550 thousand people
- New construction of mixed centers linking commerce with office services in Pham Hung, West of West Lake, Dong Anh Areas – EXPO exhibition center; logistic centers

of Regional and National level in Ngoc Hoi Head Station and Noi Bai International Airport, etc.

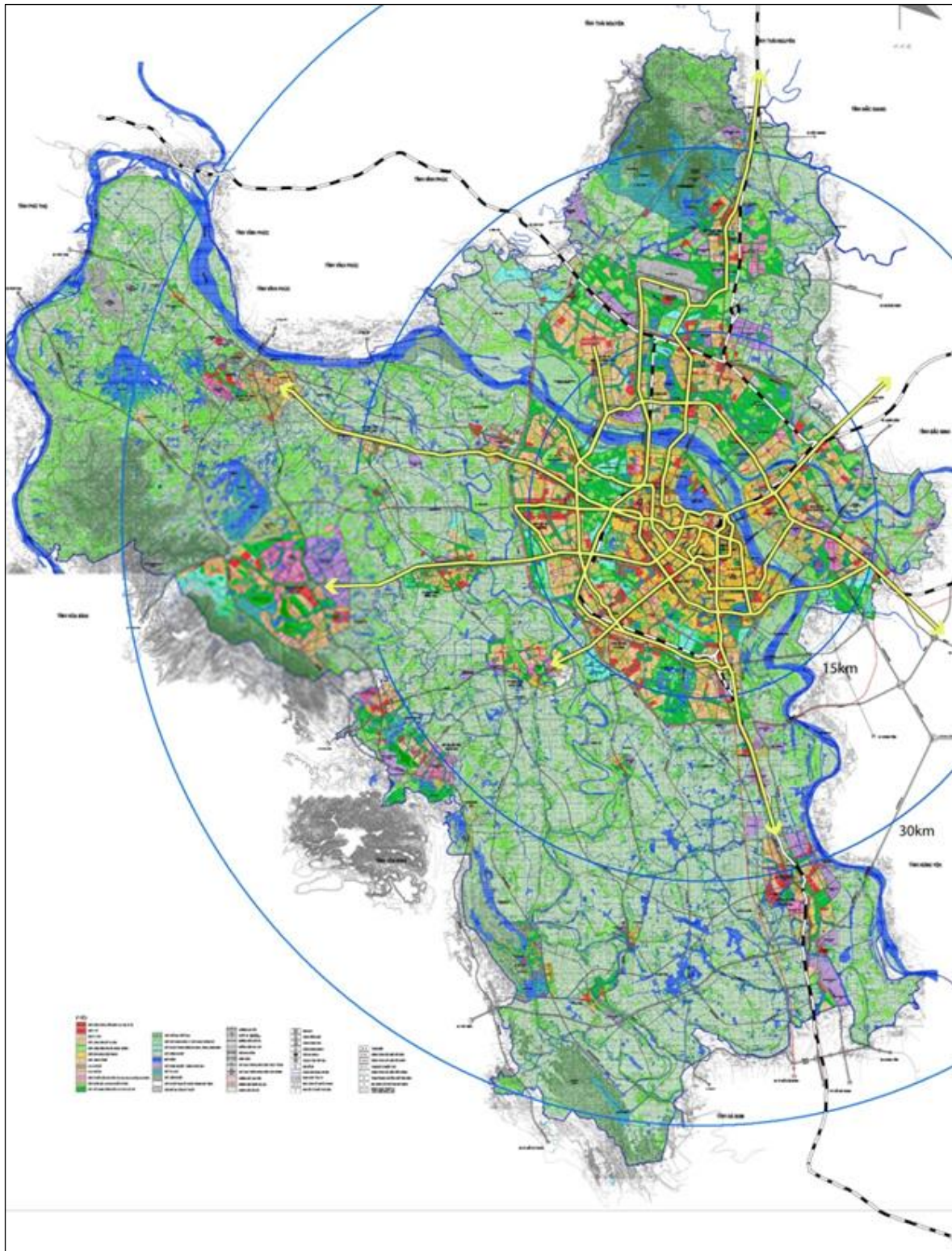
- Constructing park along Red River and Duong River, forming scenery axis towards West Lake.
- Constructing domestic taxi transport lines connecting Noi Bai international airline to the international commercial exchange center

5) TOD Concept

2.84 The basic concept of TOD is promoted in the General Plan in order to control urban public spaces as well as new construction projects for multi-function development and public transport promotion.

- New construction projects must comply with the overall urban structure and be developed along with synchronous infrastructure connection; they must comply with the master plan's orientations. The development of multi-use high-rise buildings is encouraged in new urban areas, in the surroundings of transport stations, and at all major transport connection centers (TOD).
- Promotion of TOD for urban development: Developing new modern urban projects in combination with new service and commercial centers, and historic and cultural space, transport with modern and synchronous technical infrastructure in an environmental friendly manner, organizing TOD models in centers connecting transportation means, giving priority to public transportation development.
- Public spaces must be built so as to create a diversified and modern image attractive to many people.
- Convenient connection with main transportation options, especially with the metro and bus stations. It is important to pay attention to bus stops for mass transit in urban areas to encourage TOD with adjacent high-density function.

Figure 2.3.2 Hanoi Capital Construction Master Plan



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

2.4 Progress of Zone Plan Formulation

2.85 After approval of the General Plan, the Zone Plan has been prepared by the HUPI. The Zone Plan under the Urban Planning Law is aimed to formulate zoning and specify indicators related to population, land, infrastructure, urban facility and landuse functions and Strategic Environmental Assessment (SEA), in compliance with the Article 29 of Urban Planning Law. It includes 11 types of maps and outputs.

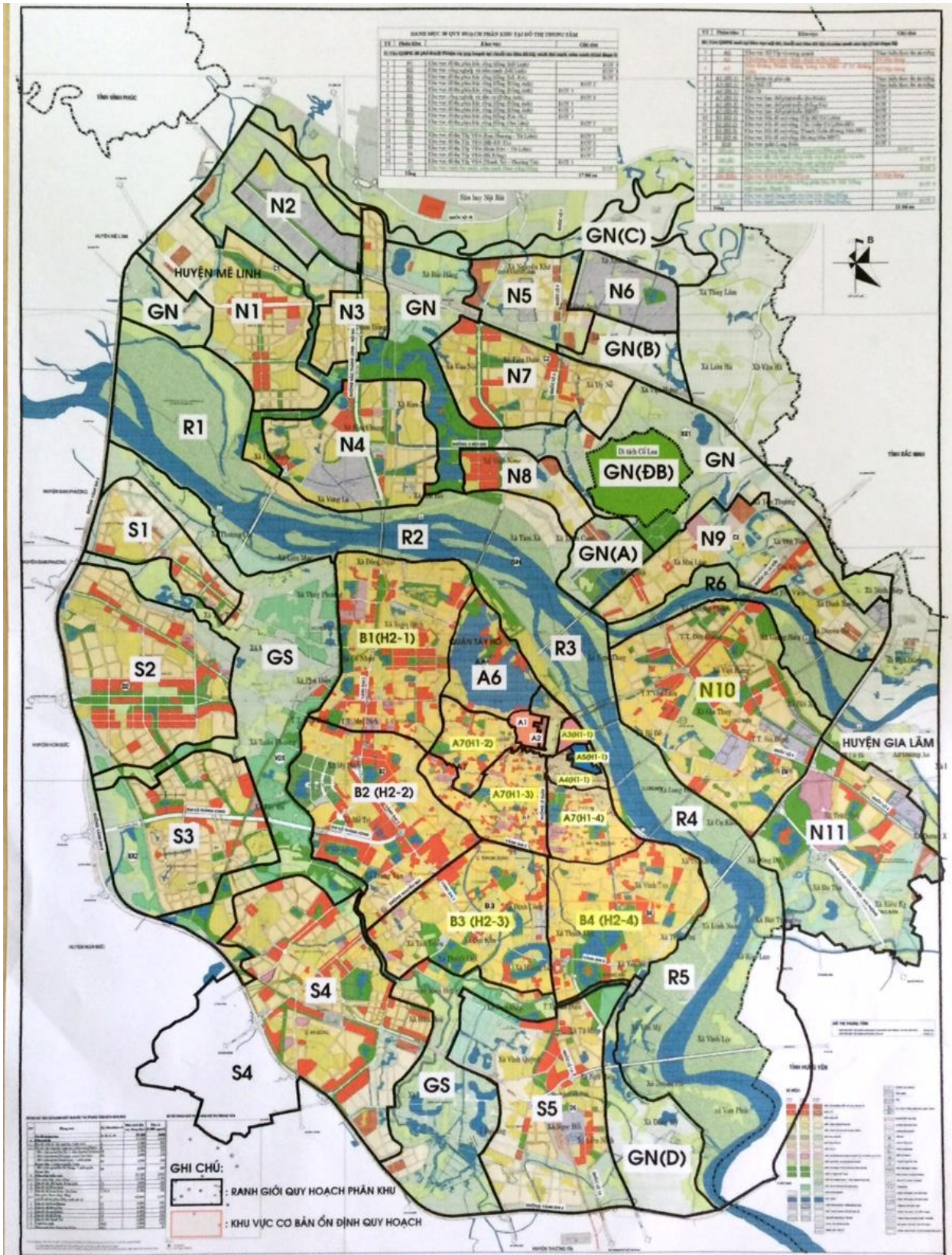
2.86 In the course of approval procedure, HUPI conducts public consultation meeting to get comments on draft Zone Plan from stakeholders. After the consultation, it is appraised by HAUPA and relevant agencies and is approved by the HPC. At present, Zone Plan A1, A2, A6, and N10 were approved by the HPC among the zones which affect the phase 1 section of UMRT Line 1 and Line 2.

Table 2.4.1 Outputs of Zone Plan

No.	Outputs of Zone Plan (Map code)		Scale
1	Location and Boundary (QH-01)		1/10,000 - 1/25,000
2	Existing Landscape, Architecture and Construction Land Assessment	Landscape and Architecture (QH-02A) Construction land (QH-02B)	1/2,000
3	Existing infrastructure and environment (QH-03)		1/2,000
4	Land Use	Structure plan (2 alternatives) (QH-04A) Layout plan (QH-04B)	1/5,000 or 1/10,000 1/2,000
5	Spatial architecture and landscape plan (QH-05)		1/2,000
6	Illustrations (QH-06)		1/2,000
7	Transport, redline, ROW (QH-07)		1/2,000
8	Infrastructure and Environment	Technical preparation (QH-08A) Water supply (QH-08B) Sewerage, Solid wastes management and Cemetery (QH-08C) Power supply, public lighting (QH-08D) EIA (QH-08E)	1/2,000
9	Utilities (QH-09)		1/2,000
10	Main text, Summary, materials for approval		
11	Draft submission letter, approval decision, construction plan management regulations		

Source: Information from HAUPA

Figure 2.4.1 Boundary of Zone Plan



Source: HAUPA

2.5 Other Related Regulations, Plans and Projects

2.87 Based on approved General Plan, subsector plans have been amended and prepared. In this year, “The Railway Master Plan of Vietnam” was approved.

2.88 “Hanoi City Transport Master Plan” has prepared by MOT and submitted to the Prime Minister for approval. In this plan, several UMRT alignments were changed from the approved General Plan. In case of UMRT Line2, it is proposed to be a ring-railway which a part of alignment is overlapped with planned UMRT Line4 between Thuong Dinh Station and Buoï Station. In HAIMUD2, these new proposals are not reflected.

2.89 HDOT has prepared “Hanoi City Parking Plan”, including proposals of underground parking projects. Some draft proposals such as underground parking of Quan Ngua Stadium near to C5 Quan Ngua Station, Ly Thu Truong Garden of C7 Ho Tay station are reflected and coordinate with HAIMUD2 proposals.

2.90 To review status of implementation of approved projects, “Mid-term Investment Plan of Hanoi City 2016-2020” was reviewed. Among list of projects, several projects which are affected to transport accessibility and/or integrated development are found (see Table 2.5.1). It is found that approved projects in Tay Ho Tay new development area are ongoing with budget, while other road projects in built-up areas have not been implemented with budget allocation yet.

Table 2.5.1 UMRT Line1 and Line2 Related Projects in the Mid-term Investment Plan

Project Name	Related Station
Construction of road No.1 to center of Tay Ho Tay new town	C1, C2, C3
Construction of Nguyen Hoang Ton road (section from Tay Ho PC to Pham Van Dong road)	C1, C2, C3
Construction of road No.5 to center of Tay Ho Tay new town	C1, C2, C3
Construction of road No.2 to center of Tay Ho Tay new town	C1, C2, C3
Innovate, upgrade, widen road section from Long Bien bridge - Bac Co - Vinh Thuy bridge	V6, C9, C10
Construction of Van Cao - Ho Tay road	C5
Bridge on Hoang Quoc Viet Street	C5
Construction of channel which also serves for pedestrian from Tran Nguyen Han street to Chuong Duong Do street	V6, C9, C10
Widen RR3, section from Mai Dich - Nam Thang Long	V11, V12

Source: Mid-term Investment Plan of Hanoi City, 2016-2020, HAPI

2.6 Current Status of UMRT Projects

1) General

2.91 Among 8 lines planned for the UMRT system, 4 lines are currently being in their first phase of construction, i.e. Line 1, Line 2, Line 2A and Line 3. After completion, the city center of the AQ, Hoan Kiem Lake and the FQ will be covered by a network of stations located within 1km- from each other (walking distance), and there will be possibilities to transfer between Line 1 and Line 3 at Hanoi Station, and between Line 1 and and Line 2 at Long Bien Nam Station and at Hang Dau Station.

2.92 At present, the approved UMRT network plan is composed of eight lines with a total route length of 318.6 km (See Table 2.6.1 and Figure 2.6.1). Out of the entire network, on-going lines include phase 1 sections of Line 1, Line 2, Line 3 and Line 2A.

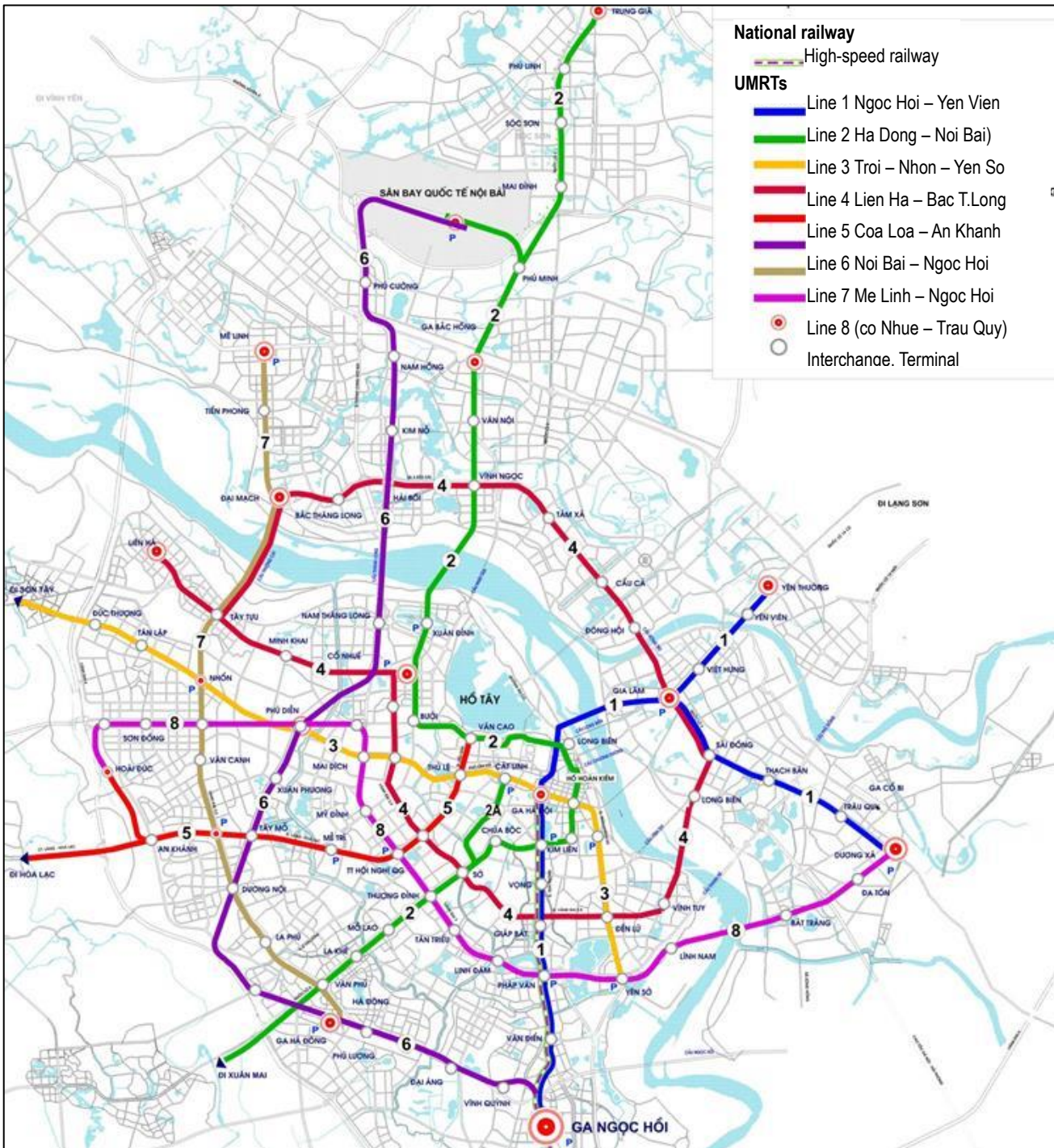
Table 2.6.1 Outline of Approved UMRT Lines in Hanoi

Name of Line	Route	Length (km)	Characteristics	Status and Target Year
UMRT Line 1	Ngoc Hoi – Ha Noi station – Yen Vien, Nhu Quynh	34.7	Serving outskirts in the northeast and south of Hanoi going through city center. VNR-MOT is the investor.	Phase 1 ongoing Year 2021
UMRT Line 2	Thach Loi - Noi Bai – city center - Thuong Dinh	50.0	Serving areas along belt 3 and the east of Red River and center out to the south area. MRB is the investor.	Phase 1 ongoing Year 2020- 2021
UMRT Line 2A	Cat Linh- Nga Tu So intersection – Ha Dong	13.0	On-going project, connecting city center of Ba Dinh district with the southwest of city. MOT is the investor.	Ongoing Year 2016
UMRT Line 3	Nhon - Hanoi station - Hoang Mai	26.0	Connect the west area with city center and the south of city. MRB is the investor.	Phase1 ongoing Year 2017
UMRT Line 4	Me Linh - Dong Anh - Sai Dong - Vinh Tuy/Hoang Mai – RR2.5- Co Nhue -Lien Ha	54.0	Initially, the rapid bus line, connected with line 1, 2, 3 and 5.	Planned
UMRT Line 5	Co Loa – South West Lake - Ngoc Khanh - Lang - Hoa Lac	25.6	Connect Hanoi city center with urban area along Lang - Hoa Lac corridor	Planned
UMRT Line 6	Noi Bai – Phu Dien – Ha Dong – Ngoc Hoi	43.2	Build on the basis of belt railway in the West	Planned
UMRT Line 7	Me Linh – Nhon new urban area, Van Canh, Duong Noi	35.7	Connect new urban chain in the East of RR4	Planned
UMRT Line 8	Mai Dich - RR3 - Linh Nam – Duong Xa	36.4	Connect urban chain in Ring Road3.	Planned

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

2.93 The following paragraphs provide brief information on the process of the on-going sections of Line 1, Line 2, Line 3 and Line 2A.

Figure 2.6.1 Currently Approved UMRT Network Plan



Source: General Construction Plan of Hanoi Capital City till 2030, July 2011

2) UMRT Line 1

2.94 The loan Agreement (L/A) of the engineering service for “Hanoi City Urban Railway Construction Project (Line 1)” was signed in March 2008 and the first phase of Ngoc Hoi Complex was agreed in March 2012. The phase 1 section is ongoing according to “the Decision No.3304/QD-BGTVT issued on 31st October 2008 by the Ministry of Transport, for the phase 1 section running from Gia Lam to Giap Bat and Ngoc Hoi.”

2.95 There are four packages in phase 1: (i) Group 1: Ngoc Hoi Complex (station and depot), (ii) Group 2: stations from Gia Lam to Giap Bat, as well as Detailed Master Plans (1/500 scale) of Gia Lam, Hanoi and Giap Bat stations, (iii) Group 3: Red River Railway Bridge, (iv) Group 4: mechanical and electrical works, station equipment and Automatic Fare Collection (AFC) system and (v) rolling stocks (see Table 2.6.2). The total length is 16.461km, including 8 elevated stations and 1 at-grade station (see Table 2.6.3).

Table 2.6.2 Contract Package of Phase1 of UMRT Line1

Contract Package		Contract Form	Component	Fund Source
P-1	Ngoc Hoi Station Complex	Construction	Station (at-grade: 1), Station Complex	JICA
P-2	Civil & Elevated Railway Structure	Construction	Civil Work, Elevated Railway Structure (8)	JICA
P-3	Red River Railway Bridge	Construction	Railway Bridge	JICA
P-4	Sig, Com, Electrification & Electric Power Supply	Design &Build	Supply & Installation of E&M systems (signal, communication, power), track work and depot equipment, etc.	JICA
P-5	Electric Multiple Unit	Design &Build	Rolling stock (27 trains x 3 car)	JICA

Source: JICA Project Team

2.96 So far, the package HURC1-101 for “Ground preparation and soil improvement of Ngoc Hoi complex” has only passed prequalification, but the remaining packages have not been approved yet.

2.97 In general, the overall schedule has been delayed, because of some uncertainties related to (i) location of new UMRT bridge crossing the Red River, as well as locations of Gia Lam, Long Bien Bac and Long Bien Nam stations, which will depend on the alignment of the new bridge, (ii) selection of gauge, either standard gauge in compliance with the Railway Law or narrow gauge as used by VNR, (iii) selection of signaling system, (iv) confirmation of transit conditions for international and long-distance railways to Hanoi Station of the city center.

Table 2.6.3 Station List of UMRT Line1

Phase	No.	Station Name	Km	Ward/Commune	District	Structure	Transfer line
Phase1	1	Gia Lam	5+884	Ngoc Thuy, Thuong Thanh, Gia Thuy	Long Bien	Elevated	Line4 (along NH-5), International, long-distance, HaiPhong Line
	2	Long Bien Bac	4+445	Ngoc Thuy	Long Bien	Elevated	-
	3	Long Bien Nam	2+005	Hang Ma	Hoan Kiem	Elevated	Line2 (C8 Hang Dau)
	4	Hanoi	0+000	Van Mieu, Kham Thien	Dong Da	Elevated	Line3, international, long-distance
	5	Cong Vien Thong Nhat	1+400	Trung Phung	Dong Da	Elevated	Line2 (Bach Khoa of phase2)
	6	Bach Mai	2+372	Phuong Mai	Dong Da	Elevated	-
	7	Phuong Liet	3+188	Phuong Liet	Thanh Xuan	Elevated	-
	8	Giap Bat	4+840	Giap Bat, Tinh Liet	Hoang Mai	Elevated	Line4 (along RR2.5), international, long-distance
	9	Ngoc Hoi (Complex)	12+632	Ngoc Hoi, Lien Ninh	Thanh Tri	At grade	Line6, international, long-distance
Phase2A	10	Hoang Liet	6+943	Hoang Liet	Hoang Mai	Elevated	-
	11	Van Dien	8+648	Van Dien town	Thanh Tri	Elevated	-
	12	Vinh Quynh	10+115	Vinh Quynh	Thanh Tri	Elevated	-
Phase2B	13	Duc Giang	7+513	Thuong Thanh	Long Bien	Elevated	-
	14	Cau Duong	9+377	Thuong Thanh	Long Bien	Elevated	-
	15	Yen Vien (Complex)	12+040	Yen Vien Ward and Yen Vien town	Gia Lam	At grade	cargo

Source: JICA Project Team

3) UMRT Line2

2.98 The first phase “Hanoi City Urban Railway Construction Project: Nam Thang Long – Tran Hung Dao Section (Line 2)” was approved with a L/A dated on March 2009. From March 2011, the Phase 1 project commenced based on the Consultant Service Contract between MRB of HPC.

2.99 The phase 1 section runs from Nam Thang Long Station to Tran Hung Dao Station (11.534km) ; it includes 3 elevated stations and 7 underground stations. The construction is ongoing. A depot will be located in the south-west of Nam Thang Long Station in Xuan Dinh Ward. The phase1 project consists of the five contract packages (see Table 2.6.4).

Table 2.6.4 Contract Package of Phase1 of UMRT Line2

Contract Package		Contract Form	Component	Fund source
CPA 001	Underground Civil 1 (5km)	Design& Build	3 Underground stations, Bored tunnel (3.9km), C&C tunnel (0.7km)	JICA
CPA 002	Underground Civil 2 (3.9km)	Design& Build	4 Underground stations, Bored tunnel (3.1km), C&C tunnel (0.3km)	JICA
CPA 003	Elevated Civil (2.6km)	Construction	3 Elevated stations, Viaduct section (2.2km)	JICA
CPA 004	E&M Systems with 5-years Maintenance	Design& Build	Supply & installation of E&M systems, tracks, rolling stock and 5-years maintenance	JICA
CPA 005	Depot Civil (17.5Ha)	Construction	Depot infrastructures, Depot buildings	JICA

Source: JICA Project Team

2.100 Most of the packages listed in the table above have passed prequalification except for CPA004, which is under prequalification process.

2.101 So far, the railway alignment (ROW, safety corridor, centerline) and the detailed plan of the depot have been approved for both elevated and underground sections. The station layout master plans (including stations ROW and exact locations of station structures) of stations of C1, C2, C3, C4, C7 and C8 which don't require land acquisition from households were already approved (see Table 2.6.5).

2.102 As for the stations that require land acquisition, namely C5, C6, C9, C10 stations, HAUPA requested the MRB to conduct public consultation meetings in compliance with the Urban Planning Law. Public consultation meetings were carried on 22nd May 2014. The MRB submitted draft station layout master plans of C5, C6, C9 and C10 to HAUPA for appraisal.

Table 2.6.5 Approval Procedure of the Phase 1 of the UMRT Line2

No	Name of Official Document	Authority	Date	Contents
1	Decision No.2054/QĐ-UBND on the approval of Line 2 project's Feasibility Study, section Nam Thang Long – Tran Hung Dao (Phase 1)	HPC	13 th November 2008	Approval of FS of Phase1 section
2	Loan Agreement (VNXVI-1) of Hanoi City Urban Railway Construction Project: Nam Thang Long –Tran Hung Dao Section (Line 2)	GOV- JICA	March 2009	Loan agreement between GOV and JICA
3	Consultant Service Contract No.HRB-L2-001 with Joint Venture Consultants of OC, KEI, TEC, PAD, ALM, TEDI, and TRICC	MRB- GC	13 th March 2011	Contract agreement between MRB and GC
4	Decision No.1259/QĐ-TTg, Approval of Prime Minister on General Plan for construction of Hanoi capital to 2030 and vision to 2050	MOC	26 th July 2011	Approval of Hanoi City General Plan including Line 2 route is from Soc Son - City center – Thuong Dinh
5	Decision No.2641/QĐ-UBND on the approval of Red Line for Urban Railway – Safety corridor for urban railway and centerline of elevated section from Km0-400 to Km2+450 of investment project for construction of UMRT Line 2, section Nam Thang Long – Tran Hung Dao, at 1/500 scale	HPC	14 th June 2012	Approval of ROW, safety corridor and center line of elevated section
6	On October 25 th 2012, HAUPA issued document No.3242/QHKT-P8+P7 on the agreement of Station Layout Plan and Preliminary architecture alternative for elevated stations namely C1, C2, C3	HAUPA	25 th October 2012	Agreement of station layout plan and preliminary architecture alternative of stations of elevated section
7	Decision No.2297/QĐ-UBND on the approval of Station Layout Plan for Underground section (from Km2+450 to Km11+133,77) at 1/500 scale	HPC	28 th March 2013	Approval of station layout plans of elevated section
8	Decision No.4856/QĐ-UBND on the approval of partly adjustment for detailed plan of Tay Ho Tay new town at 1/2000 scale – planning block No.01 which is for land use plan and transport plan	HPC	15 th August 2013	Approval to readjust to the approved detailed plans of Tay Ho Tay new town based on approved station layout plans of elevated section
9	Decision No.4858/QĐ-UBND on the approval of Detailed plan for Xuan Dinh Depot at 1/500 scale in the framework of Investment Project for UMRT Line 2, section Nam Thang Long – Tran Hung Dao	HPC	15 th August 2013	Approval of detailed plan of depot
10	Decision No.1910/QĐ-UBND on the approval of Station Layout Plan for underground stations namely C4, C7 and C8 at 1/500 scale	HPC	11 th April 2014	Approval of station layout plans of C4, C7, C8
11	Document No.677/DSDT-DA2 on the appraisal of approved station layout plan for underground stations namely C5, C6, C9 and C10	MRB	10 th July 2014	Request for appraisal of the station layout master plans of C5, C6, C9, C10 to HAUPA
12	Announcement No.3210/TTr-QHKT-P7 submitting to HPC for the approval of partly adjustment of detailed plan for areas in Ba Dinh and Hoan Kiem districts for the construction of underground stations namely C5 and C10, as well as the detailed plan for areas in Tay Ho district for construction of underground station C6 in the framework of Hanoi City Urban Railway Construction Line 2	HAUPA	14 th August 2014	Request for approval of the station layout master plans of C5, C6, C9, C10 to HPC

Source: JICA Project Team

2.103 The phase 1 project is under re-evaluation by the Ministry of Planning and Investment (MPI) due to the increase of the estimated cost. The target year for the operation of phase 1 section is 2020 or 2021.

2.104 The Feasibility Study of phase 2 section (from Cau Den to Thuong Dinh) was conducted by TEDI, and is now under appraisal. The phase 3 section is stated the General Plan, sketching from Nam Thang Long Station to Soc Son district toward the north of the Red River.

Table 2.6.6 Station List of UMRT Line2

Phase	No.	Station Name	Km	Ward/Commune	District	Structure	Transfer line
Phase1	1	C1-Nam Thang Long	0-023	Phu Thuong	Tay Ho	Elevated	-
	2	C2-Ngoai Giao Doan	1+135	Xuan Dinh	Bac Tu Liem	Elevated	-
	3	C3-Tay Ho Tay	1+890	Xuan La	Tay Ho	Elevated	-
	4	C4-Buoi	3+509.9	Nghia Do	Cau Giay	Underground	-
	5	C5-Quan Ngua	5+210.4	Thuy Khue, Lieu Giai	Tay Ho, Ba Dinh	Underground	Line5
	6	C6-Bach Thao	6+552.6	ThuyKhue	Tay Ho	Underground	-
	7	C7-Ho Tay	7+289.9	Thuy Khue, Ngoc Ha	Tay Ho, Ba Dinh	Underground	-
	8	C8-Hang Dau	8+399.3	Quan Thanh, Hang Ma	Ba Dinh, Hoan Kiem	Underground	Line1 (V6 Long Bien Nam)
	9	C9-Ho HoanKiem	9+864.6	Ly Thai To	Hoan Kiem	Underground	-
	10	C10-Tran Hung Dao	10+808.8	Hang Bai	Hoan Kiem	Underground	Line3 (phase2)
Phase2	11	C11-Cau Den	11+670	Ngo Thi Nham, Pho Hue	Hai Ba Trung	Underground	-
	12	C12-Bach Khoa	13+050	Le Dai Hanh	Hai Ba Trung	Underground	Line1 (V9 C.V. Thong Nhat)
	13	C13-Kim Lien	13+860	Kim Lien	Dong Da	Underground	-
	14	C14-Chua Boc	14+615	Trung Liet, Quang Trung	Dong Da	Underground	-
	15	C15-Nga Tu So	15+995	Khuong Trung	Thanh Xuan	Underground	-
	16	C16-Thuong Dinh	16+720	Thuong Dinh	Thanh Xuan	Underground	Line2A, Line4 (along RR2.5)

Source: JICA Project Team

4) UMRT Line 2A

2.105 The project was approved in October 2008, under the “Decision No. 3136/QD-BGTVT on approval of Cat Linh – Ha Dong Urban Railway Project and Documents attached with approval decision” by the MOT (see Table 2.6.7).

2.106 The total length is 13.021km, with 12 elevated stations (see Table 2.6.8). It is under construction and in the process of land acquisition (see Figure 2.6.2).

Table 2.6.7 Contract Package of UMRT Line 2A

Contract Package		Form	Component	Fund Source
P-1	Designing, Supplying Equipment and Material, and Construction	Engineering-Procurement-Construction (EPC)	Technical Design, Construction of Civil and Architectural Infrastructure, Supply & Installation of E&M Systems, Track and Rolling Stock	China

Source: JICA Project Team

Table 2.6.8 Station List of UMRT Line 2A

No.	Station Name	Km	Ward/Commune	District	Structure	Transfer line
1	Cat Linh	0-017.58	Cat Linh, O Cho Dua	Dong Da	Elevated	Line3
2	La Thanh	0+913.50	O Cho Dua	Dong Da	Elevated	
3	Thai Ha	1+816.00	Trung Liet	Dong Da	Elevated	
4	Lang	2+891.00	Thinh Quang	Dong Da	Elevated	
5	Dai hoc Quoc Gia	4+140.00	Thuong Dinh	Thanh Xuan	Elevated	Line2 (phase2), Line4
6	Vanh Dai 3	5+149.00	Thanh Xuan Trung	Thanh Xuan	Elevated	Line8
7	Thanh Xuan 3	6+629.00	Trung Van, Van Quan	Nam Tu Liem, Ha Dong	Elevated	
8	Ben xe Ha Dong	7+751.00	Van Quan	Ha Dong	Elevated	
9	Ha Dong	9+074.00	Ha Cau	Ha Dong	Elevated	
10	La Khe	10+184.00	Quang Trung	Ha Dong	Elevated	Line7
11	Van Khe	11+612.00	Quang Trung	Ha Dong	Elevated	
12	Ben xe Ha Dong moi	12+644.00	Yen Nghia	Ha Dong	Elevated	

Source: JICA Project Team

Figure 2.6.2 Photos of UMRT Line 2A Construction Sites



Source: JICA Project Team

5) UMRT Line 3

2.107 The project of phase 1 section was approved in April 2009, under the “Decision No. 1970/QĐ-UBND, 27th April 2009, Urban Railway Line3 Construction Project, section Nhon–Hanoi station” (see Table 2.6.9). The Project Implementation Consultant (PIC) is Systra.

2.108 The total length is 12.5km with 8 elevated stations and 4 underground stations. There are 9 construction packages consisting of 5 construction and 4 equipment packages (see Table 2.6.10). HPC has already approved the ROW and the station layout master plans. The elevated sections are under construction.

Table 2.6.9 Construction Package of Phase1 of UMRT Line3

Contract Package		Contract Form	Component	Fund Source
CP 1	Elevated line	Construction	Elevated Line (8.5 km)	EIB/AFD
CP 2	Elevated stations	Construction	Elevated Stations (8)	EIB/AFD
CP 3	Tunneling & underground stations	Construction	Underground Line (3.6 km), Underground Stations (4)	ADB
CP 4	Technical Infrastructure at Depot	Construction	Depot Site Preparation (15 ha)	AFD
CP 5	Depot buildings	Construction	Depot/Workshop Buildings	AFD
CP 6	Rail systems and Rolling Stock	Design &Build	RST, SIG, COM, Depot Equipment, OCC/SCADA, Power	DGT
CP 7	E&M systems	Design &Build	Ventilation, Lift & Escalator etc.	EIB/AFD
CP 8	E&M systems at depot	Design &Build	Track work for whole line & depot	ADB/AFD
CP 9	AFC equipment	Design &Build	Automatic Fare Collection	DGT

Note) EIB: European Investment Bank, AFD: L'Agence Française de Développement (French Agency for Development, DGT: Direction Générale du Trésor (French Agency for National Economic Policy)
 Source: JICA Project Team

Table 2.6.10 Station List of Phase 1 of UMRT Line3

No.	Station Name	Km	Ward/Commune	District	Structure	Transfer Line
1	Nhon terminal	10+146	Minh Khai	Bac Tu Liem	Elevated	-
2	Minh Khai	11+275	Phuc Dien	Bac Tu Liem	Elevated	-
3	PhuDien	12+260	Phuc Dien, Phu Dien	Bac Tu Liem	Elevated	-
4	CauDien	13+280	Phu Dien,Cau Dien	Bac Tu Liem, Nam Tu Liem	Elevated	-
5	Le DucTho	14+405	Mai Dich	Cau Giay	Elevated	-
6	National University	15+435	Dich Vong Hau	Cau Giay	Elevated	-
7	Chua Ha	16+660	Dich Vong	Cau Giay	Elevated	-
8	CauGiay Interchange	17+825	Lang Thuong	Dong Da	Elevated	-
9	Ngoc Khanh	18+985	Ngoc Khanh	Ba Dinh	Underground	Line5
10	Cat Linh	20+495	Cat Linh	Dong Da	Underground	Line2A
11	Van Mieu	21+380	Van Chuong	Dong Da	Underground	-
12	Hanoi	22+105	Cua Nam,Tr. Hung Dao	Hoan Kiem	Underground	Line1 (V8 Hanoi)

Source: JICA Project Team

2.109 In parallel, the French Development Agency (AFD) and the Fonds Français pour l'Environnement Mondial (FFEM) have financed since 2013 a Technical Assistance (TA) to "Support the Urban and Environmental Integration of Hanoi Pilot Metro Line ", i.e. UMRT Line 3 from Nhon Depot to Hanoi Train Station. The services have included a survey and the preparation of a feasibility study report for intermodal transport connectivity at two stations of UMRT Line 3, i.e. the underground station of Cau Giay and the elevated station of Ngoc Khanh.

2.110 The objectives are (i) to improve accessibility to both stations, and (ii) to ensure multimodality through good connectivity of the metro line with existing and future public transport system. Recommendations shall be formulated for basic standard equipment and appropriate design for public spaces around the stations (commercial equipment, parking areas, pedestrian path, feeder public transport lines, etc.). The main counterparts are TRAMOC, under the DOT, and MRB.

2.111 ADB has also been supporting accessibility and sustainability of UMRT Line 3 with another project approved in December 2014: “Strengthening Sustainable Urban Transport for Hanoi Metro Line 3 (Project No.40080-24)”. The overall amount of the project reaches nearly 60 million USD including a 4.2 million USD- ADB loan, about 50 million USD financed by the ADB Clean Development Technology Fund (CTF) and the remaining 5.8 million USD by the GOV as a counterpart.

2.112 The expected Project outputs are of similar nature as those of HAIMUD2, although the scope of the project, in term of radius around the stations, does not seem clearly defined yet. The Project outputs include: “(i) improved accessibility features in and around metro stations; (ii) integrated and innovative public transport services and measures connecting to metro stations; and (iii) support for transformational policies and regulatory measures to encourage modal shift to public transportation modes.”⁶ The project has effectively started in July 2015.

2.113 Based on the basic design of the stations that was previously completed in May 2015, the project team will work on their detail design, but also on plans for bus feeder services, “park-and-ride” facilities, and a comprehensive parking plan for the city to improve accessibility to the stations. Several multi-modal transport hubs shall be built starting from the fourth quarter of 2016, expectedly at (i) Nhon bus station, (ii) Cau Giay bus station, and (iii) Cat Linh railway station for a better connection with the Cat Linh – Ha Dong urban railway Project (UMRT Line 2A), and also with Hanoi Station where UMRT Line 3 will connect UMRT Line 1 as well as national railways and many city bus lines.

2.114 Recommendations related to the city bus network will aim at avoiding redundancy with UMRT lines; the detail design may lead to the decision of cancelling some existing bus lines. The detail design should also address the rising concern about the fare system that needs to be unified for the entire UMRT system.

2.115 In compliance with ADB’s Safeguard Policy Statement, Initial Environmental Examinations (IEE) has assessed the Project as Category B regarding the environmental aspect (no significant harm to any particularly sensitive ecosystem), Category C regarding involuntary resettlement (no land shall be acquired under the Project) and Category C regarding indigenous population.

⁶ Cf. Project data sheet at http://adb.org/projects/details?proj_id=40080-024&page=overview

3 APPROACH TO TOD IN UMRT DEVELOPMENT IN HANOI

3.1 Concept and Importance of Transit Oriented Development (TOD)

1) Concept of TOD

3.1 Transit-oriented development (TOD)¹ was initially conceived as a counter-approach to shift from an auto-oriented urban form to a rather compact one. Supposedly, TOD contributes to the creation of environmental-friendly societies, because the shift from private motorized transportation modes to public transportation causes a diminution of energy consumption and CO₂ emissions, therefore it should lead to “smart growth”. At the same time, it also reduces space occupancy per passenger, it should thus enable more efficient urban space usage.

3.2 Design principles of TOD, stated by Calthorpe, are to: (i) organize growth at a regional level for a compact and transit-supported development; (ii) locate commercial, housing, jobs, parks, and civic uses within walking distance of transit stops; (iii) create pedestrian-friendly street networks that directly connect local destinations; (iv) provide a mix of housing types, densities, and costs; (v) preserve a mix of housing types, densities, and costs; (vi) preserve sensitive habitat, riparian zones, and high-quality open space; (vii) make public spaces the focus of building orientation and neighborhood activity; (viii) and encourage infill and redevelopment along transit corridors within existing neighborhoods.

3.3 TOD refers to the design of a compact area for mixed residential and commercial uses designed to minimize the demand for private transport and to encourage transit ridership in public transportation modes, with stops located within walking distance from each other. TOD is essential not only to the successful operation of an UMRT system, but also to the smart growth of any urban area by fostering the socio-economic development in areas around UMRT stations. When adequately planned and implemented, TOD can bring about significant and positive impacts on urban traffic, land use, and the environment. Thus TOD is expected to create synergy in an integrated transport and urban development, establish new urban spaces, and generate activities in the influence areas of the UMRT lines. Successful TOD will lead to increased ridership and better satisfaction among UMRT users. At the same time, urban development opportunities at various levels of the UMRT’s influence areas are expected to increase.

3.4 In this context, the objectives of TOD are summarized specifically as follows:

- (i) TOD will affect the ridership of UMRT
- (ii) TOD will contribute to local economic development at and around the station areas
- (iii) TOD will contribute to enhancement of social and environmental condition in the influence area of UMRT (500 – 800 meter radius of station)

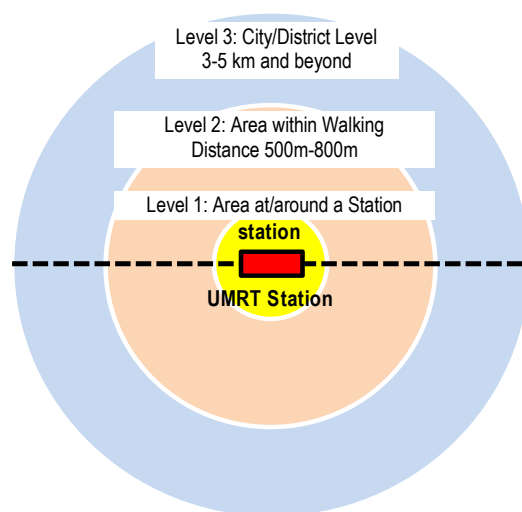
3.5 Key scopes of TOD are composed of three aspects; (i) transport access improvement (walking, bicycle, motorcycle, bus), (ii) integrated urban development promotion, and (iii) socio-environmental conditions improvement (resettlement, cultural values, etc.).

3.6 TOD affects urban areas at different spatial levels, depending on how TOD concepts are applied. The influence area of the UMRT system, with regard to the concept of TOD, can be roughly organized according to three levels (see Figure 3.1.1):

¹ Transit Oriented Development (TOD) was first used by Peter Calthorpe in his book “*The Next American Metropolis: Ecology, Community, and the American Dream*”, Princeton Architectural Press, 1993.

- (a) **Level 1 – Project Influence Area (Area at and around a UMRT Station):** As UMRT users access/egress to/from stations on foot, by bicycle, motorcycle, taxi, private car, bus, or other modes of transport, intermodal facilities are required for smooth transfer. The concentration of people at UMRT station and adjoining area generate opportunities for various types of urban development. When both take place in an integrated manner, the synergies are so significant that the station area becomes a driving force of local socio-economic development.
- (b) **Level 2 – Project Influence Area (Areas within Walking Distance to a UMRT Station):** When the UMRT will be operating, many people will access the stations on foot. In general, walking distance is defined as within 500–800 meters, although it varies depending on the walking environment and the physical condition of users. Walkability in the area is affected by the poor physical conditions of roads and sidewalks, lacking traffic management and safety measures, and few amenities such as trees and green spaces along the streets.
- (c) **Level 3 – Project Influence Area (City/District):** The influence area of UMRT can extend far beyond the Level 1 and Level 2 influence areas, especially if stations are properly connected to feeder transport services. Such services will be provided by different types of public and private transport modes including bus, taxi, bicycle, motorcycle, car, among others. Provision of adequate feeder services is critical to expand the catchment area of UMRT, especially as its network will be limited after completion of Phase 1.

Figure 3.1.1 UMRT Influence Areas

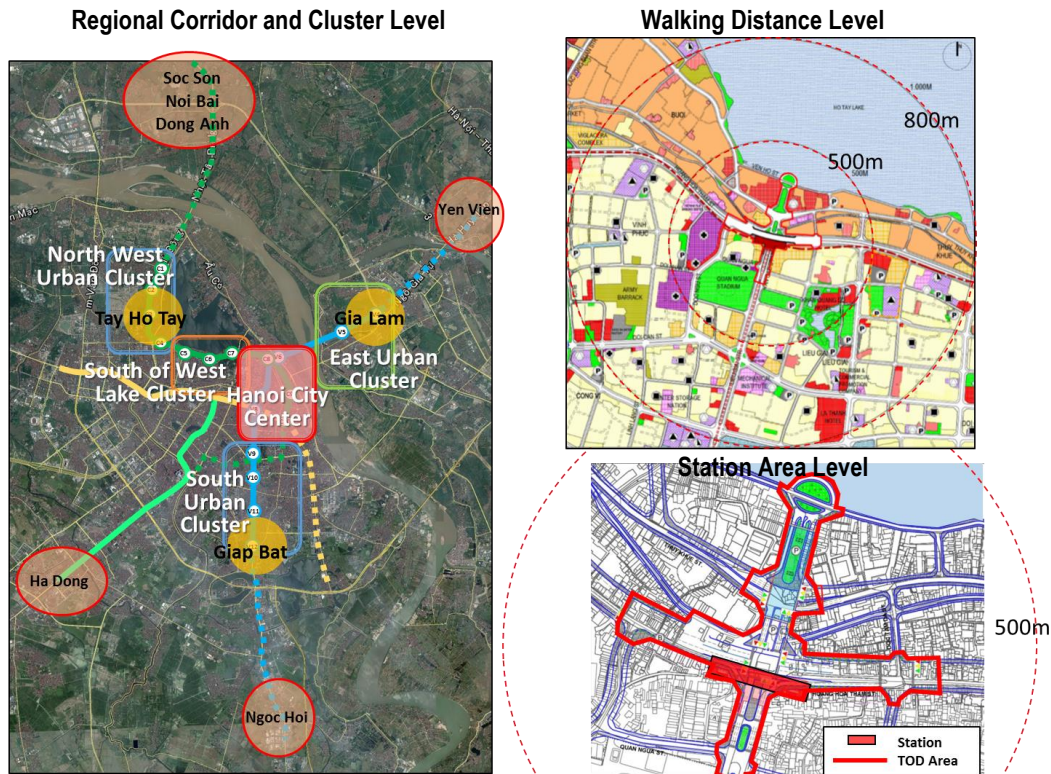


Source: JICA Project Team

3.7 In case of Hanoi City, UMRT can strengthen connectivity between city center and growth centers located in outer areas. For example, in the Phase 1 sections, Tay Ho Tay, Gia Lam and Giap Bat areas can be directly connected with UMRT. When the lines are extended, Soc Son, Noi Bai, Dong Anh in the north, Ngoc Hoi in the south will also be connected (see Figure 3.1.2).

3.8 This is one of the most important role and effect of UMRT to give opportunities for resettlement of the people living in the over-crowded city center to outer areas without losing accessibility to the city center. They can also have housing with better living environment when the resettlement areas are provided near or with good access to UMRT stations.

Figure 3.1.2 Target Areas for TOD Concept Plan Formulation of UMRT Line1 and Line2

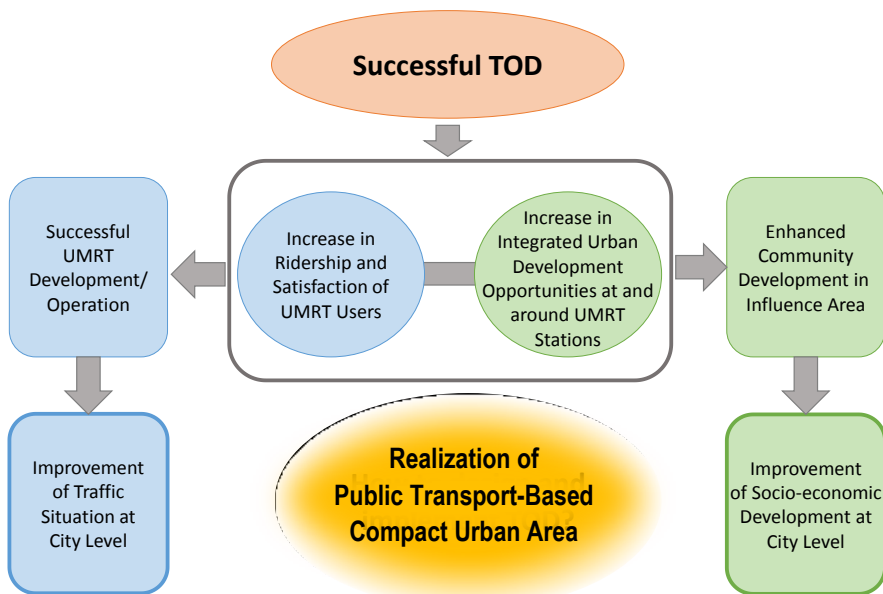


Source: JICA Project Team

2) Necessary Key Interventions for Successful TOD

3.9 TOD is meant to increase UMRT’s ridership and users’ satisfaction by providing improved access, promoted socio-economic development and environmental sustainability through integrated urban development in synergy in the influence areas of UMRT (see Figure 3.1.3). If TOD is implemented for all stations of a route, UMRT users will benefit from a seamless service and the effects of TOD will be multiplied. The ultimate objective of TOD is to form public transport-based compact urban areas with effective land use, environmental preservation, high mobility and accessibility and limited impacts of climate change.

Figure 3.1.3 Successful TOD and its impact

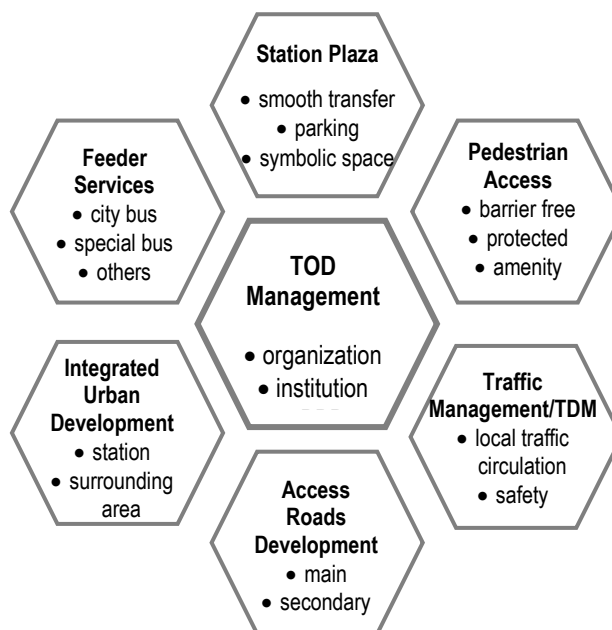


Source: JICA Project Team

3.10 The main interventions and their components to implement TOD are as follows (see Figure 3.1.4):

- (a) **Access Roads Development:** Stations must be provided with good access roads for pedestrians and vehicles including bicycle, motorcycle, car, taxi, bus, etc. to reach and depart to/from the stations.
- (b) **Station Plaza:** There must be space in front of the stations for easy access on foot, by bicycle, motorcycle, car, taxi, bus and so on. For this reason, adequate parking space and loading/unloading space facilities must be provided. Considering the local characteristics and needs, station plazas may also have to serve as a symbolic space for communities' activities.
- (c) **Pedestrian Access:** Walking is the most important mode of transport when accessing the UMRT stations. Although the demand for accessing the stations on foot varies from a station to another, it normally shares more than half of it. Therefore, the environment for pedestrian access must be improved in the most effective manner especially within walking distance of a station (more or less 800 meters or 10 minute- walk). Pedestrian-friendly measures include smooth walkways (at-grade, elevated, underground) without physical barrier and crisscross with vehicles, and with shade, trees and street furniture. Proper arrangements for the disabled, children and elderly are also necessary.
- (d) **Traffic Management/ Traffic Demand Management (TDM):** At and around the stations, different types of traffic concentrate, especially during peak hours. In order to regulate traffic flow at and around the stations, proper traffic management must be provided including, among others, traffic signals both for vehicles and pedestrians, safety facilities. Introduction of UMRT will also provide Hanoi City with an opportunity to introduce more drastic TDM such as care and motorcycle restraint in the city center.
- (e) **Feeder Services:** Feeder services to UMRT stations are important to expand the catchment areas of UMRT. In addition to connecting UMRT with existing city bus services at UMRT stations, there is an opportunity to provide special bus services. These should be more directly integrated with UMRT by introducing a common fare and common terminals. Such high-quality bus service should be extended beyond the Phase 1 section, and it should be operating until the next phases of UMRT are completed.
- (f) **Integrated Urban Development:** Integrated urban developments at and around UMRT stations is important because it will not only benefit UMRT users but also attract more users. It will also increase opportunities for new commercial developments or redevelopment because of improved accessibility for potential customers.
- (g) **TOD Management:** In order to handle the above-mentioned TOD components comprehensively, management is critical. Proper organization and inter-agency coordination mechanisms must be established, and necessary regulations and institutional arrangements must be prepared for funding and private sector involvement.

Figure 3.1.4 Main Components of TOD



Source: JICA Project Team

3) Expected Outputs and Outcome of TOD

3.11 In accordance with spatial levels of TOD, outputs and expected outcomes of TOD are differed in a hierarchical manner (see Table 3.1.1). Expected outputs of each spatial level should be coordinated with official plans, for example; (i) TOD direction at regional level is corresponded to General Plan, (ii) TOD concept plan at corridor and cluster level is corresponded to Zone Plan, (iii) TOD concept plan and project at 500-800 meter radius and station area are corresponded to Zone Plan and Detailed Plan.

Table 3.1.1 Expected Outputs and Outcome of TOD

Spatial Level of TOD	Outputs	Expected Outcome
TOD at regional level	<ul style="list-style-type: none"> TOD Direction 	<ul style="list-style-type: none"> Smart growth of urban area Enhancement of city-wide mobility of public transport New town development with good accessibility to CBD
TOD at corridor and cluster level	<ul style="list-style-type: none"> TOD Concept Plan 	<ul style="list-style-type: none"> Improvement of traffic circulation Increase in mobility and accessibility to urban service Increase in urban development opportunities integrated with high quality public transport (UMRT)
TOD at 500 – 800 meter radius area level	<ul style="list-style-type: none"> TOD Concept Plan Access improvement plan Integrated urban development plan TOD project list Implementation plan 	<ul style="list-style-type: none"> Improvement of local traffic conditions and environment for walking, bicycle and M/C users Enhancement of local socio-economic activities Promotion of effective landuse around UMRT station
TOD at station area level	<ul style="list-style-type: none"> TOD Facility Plan Basic Design of TOD facilities TOD project list Implementation plan 	<ul style="list-style-type: none"> Provision of facilities and services for smooth and safe intermodal transfer Creation of attractive space for socio-economic and cultural activities in the community Integrated urban development with efficient and high-dense landuse

Source: JICA Project Team