社会開発調査部報告書

JAPAN INTERNATIONAL COOPERATION AGENCY

HANOI PEOPLE'S COMMITTEE
SOCIALIST REPUBLIC OF VIET NAM

THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY

FINAL REPORT

APPENDIXES
VOLUME I

FEBRUARY 1995

NIPPON KOEI CO., LTD.
CTI ENGINEERING CO., LTD.

ESTIMATE OF PROJECT COST

Estimate of Base Cost	:	At 1994 Price Level
Currency Exchange Rate	:	US$ 1 = Dong 10,800 = Yen 100

LIST OF REPORTS

1. Executive Summary

2. Main Report

   Part I : Master Plan for Urban Drainage and Wastewater Disposal System in Hanoi City

   Part II : Feasibility Study on the To Lich River Basin Drainage Project

3. Appendix Vol. I

   (This Volume)

   A. Socio-economy
   B. City Development Plan
   C. Hydrology
   D. Drainage Plan

4. Appendix Vol. II

   E. Wastewater Disposal Plan
   F. Environment and Water Quality
   G. Construction Plan and Cost Estimate
   H. Economic Evaluation
   J. Geotechnical Investigation
   K. Topographic Survey
   L. Urgent Project - Basic Design Report

5. Data Book

ABBREVIATIONS

(1) Domestic Organizations

DCWSS	Design Company for Water Supply and Sanitation System
GDOMH	General Department of Meteorology and Hydrogy
HEC	Hanoi Environment Committee
HPC	Hanoi People's Committee
HSDC (or SDC)	Hanoi Sewerage and Drainage Company
HUPI (or UPI)	Hanoi Urban Planning Institute
HWSC (or WSC)	Hanoi Water Supply Company
INVESCo	Investment Company for the Development of Water Sector
IURP	Institute of Urban and Rural Planning of MOC
MOC	Ministry of Construction
MOSTE	Ministry of Science, Technology and Environment
MOWR	Ministry of Water Resources
SPC	State Planning Committee
TUPWS	Transport and Urban Public Works Service
URENCO	Hanoi Urban Environment Company
WASECO	Water and Sewerage Construction Organization

(2) International or Foreign Organizations

CIDA	Canadian International Development Agency
FINNIDA	Finnish International Development Agency
JICA	Japan International Cooperation Agency
SIDA	Swedish International Development Authority
OECF	Overseas Economic Cooperation Fund, Japan
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization

(3) Others

BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
DAWF	Daily Average Water Flow
DSF	Design Stormwater Flow
EIRR	Economic Internal Rate of Return
EL	Elevation above Mean Sea Level
GDP	Gross Domestic Product
GF	Groundwater Infiltration
HMWF	Hourly Maximum Water Flow
OM	Operation and Maintenance
SS	Suspended Solids
TN	Total Nitrogen
TP	Total Phosphorus

ABBREVIATIONS OF MEASUREMENT

Length

mm	=	millimeter
cm	=	centimeter
m	=	meter
km	=	kilometer
ft	=	foot
yd	=	yard

Area

cm^2	=	square centimeter
m^2	=	square meter
ha	=	hectare
km^2	=	square kilometer

Volume

cm^3	=	cubic centimeter
l	=	litre
kl	=	kilolitre
m^3	=	cubic meter
gal.	=	gallon

Weight

mg	=	milligram
g	=	gram
kg	=	kilogram
ton	=	metric ton
lb.	=	pound

Time

s	=	second
min	=	minute
h	=	hour
d	=	day
y	=	year

Electrical Measurement

V	=	Volt
A	=	Ampere
hz	=	Hertz (cycle)
Ghz	=	Gigahertz
W	=	Watt
kW	=	kilowatt
MW	=	Megawatt
GW	=	Gigawatt
pr	=	pair

Other Measures

%	=	percent
PS	=	horsepower
°	=	degree
'	=	minute
"	=	second
10^3	=	thousand
10^6	=	million
10^9	=	billion

Derived Measures

m^3/s	=	cubic meter per second
mg/l	=	milligram per litre
kWh	=	Kilowatthour
MWh	=	Megawatthour
GWh	=	Gigawatthour
kWh/y	=	kilowatthour per year
kVA	=	kilovolt ampere
lcd	=	litre per capita per day

Currency

US$	=	US Dollar
VND	=	Vietnamese Dong

THE STUDY
ON
URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM
IN
HANOI CITY

APPENDIX (A)

SOCIO – ECONOMY

FEBRUARY 1995

THE STUDY ON
URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM
IN
HANOI CITY

APPENDIX (A)
SOCIO-ECONOMY

Table of Contents

List of Tables

APPENDIX A SOCIO - ECONOMY

A study on the socio-economics of the country and the Study Area was conducted by collecting related information and data and through an interview survey carried out during December 1993. As explained in other parts of the report, we encountered difficulties in obtaining the necessary information during the survey period. However, the majority of key information has been collected thanks to the extensive efforts of our counterpart in the HSDC. The basis of these efforts are described below.

A1. NATIONAL ECONOMY

1.1 Population and GDP

The total population of the country is estimated at around 68.3 million (1992). During the period of 1979 - 1989, the population increased at an average rate of 2.1 % per year. About 80% of the population still live in rural areas, and 46% is classified as the labor force.

The Gross Domestic Product (GDP) of Viet Nam was estimated at 125,074 billion Dong at current prices (11.58 billion US dollars) in 1993. After the economic reform of 1989, the national economy grew at a steady growth rate of 6.8% per annum during 1989 - 1993. During the last 2 years, the economy attained a rather high growth rate of 8.1 % per annum.

Per - capita GDP in 1993 was estimated at 1,794,000 Dong (US$ 166)

The agriculture sector produces the highest share of GDP (30.9%), followed by the industrial sector (22.7%), trade sector (12.1%), tourism and housing sector (10.3%). The remaining 23.5% includes construction, transport and financial sectors. (The GDP and its historical trend are presented in Table A1.1)

1.2 Fiscal Budget, Trade, Exchange Rate and Inflation

Viet Nam has reduced its fiscal defecit from 7.0% of GDP in 1989 to 3.0% in 1992. However, revenue collection is still low, at 15.2% of GDP in 1992, and the defecit increased from 1,468 billion Dong in 1991 to 3,845 billion Dong in 1992. (State revenue and expenditure are presented in Table A1.2 and Table A1.3)

Merchandise exports have increased from 1,946 billion Dong in 1989 to 2,571 billion Dong in 1992, while imports have decreased from 2,565 billion Dong in 1989 to 2,508 billion Dong in 1992 attaining a trade net surplus in 1992. The main growth in exports was accounted to rice and crude petroleum. (Export and import statistics are presented in Table A1.4)

In 1989 the official exchange rate was unified and devalued. Since then the rate has been floated and continuously devalued. During the last two years the rate fluctuated within the range of 10,000 - 12,000 Dong per US$. (Historical exchange rates are summarized in Table A1.5)

Inflation during 1980s reached a high of more than 100% per annum. After the 1989 reform, the inflation rate slowed down to double digits (67.8% in 1990 and 67.7% in 1991), and further dropped to 17.6% in 1992. The estimated inflation rate in 1993 is 5.2%. (Retail price index is presented in Table A1.6)

A2. REGIONAL SOCIO - ECONOMY

2.1 Administrative Unit and Area

Administratively, Hanoi City consists of four urban districts (called "quan") and five suburban districts as presented below

	Total Area (km^2)	Study Area (km^2)
Urban districts		
(1) Dong Da	14.8	14.8
(2) Ba Dinh	11.7	10.9
(3) Hoan Kiem	4.2	3.5
(4) Hai Ba Trung	11.0	10.2
Sub - total	(41.7)	(39.4)
Suburban districts		
(1) Tu Liem	109.7	52.0
(2) Thanh Tri	99.9	35.1
(3) Gia Lam	175.7	-
(4) Dong Anh	184.2	-
(5) Soc Son	313.3	-
Sub - total (Hanoi City total)	(882.8)	(87.1)
Ha Toy Province	-	3.2
Total	924.5	129.7 *

* Excludes the Ho Tay lake (5.7 km^2)

The total area of Hanoi City is 924.5 km^2, which is equivalent to 0.3% of the national total. The objective area of this study covers basically 4 urban districts and 2 suburban districts of Hanoi City. The total Study Area is 135 km^2 including the Ho Tay lake.

The above districts are further divided into subdistricts (called "phuong or village"). In the project area, there are 84 subdistricts (belonging to the urban districts) and 38 subdistricts (belonging to the suburban districts).

The names of the subdistricts and area which is included in the Study Area are presented in Table A2.1, together with their populations.

(Characteristics of the districts)

Hoan Kiem district is the old center area of the city and a residential/ commercial area for the upper or middle income group. The houses are mainly one or two story buildings, most of which were constructed in the past. Infrastructure facilities are relatively well installed, but are not sufficient for the present demand, due to their deterioration and population increases.

<1 The Study Area includes one village belonging to Ha Dong Town in the Ha Tay Province, outside Hanoi City.

Hai Ba Trung, located in the south of Hoan Kiem, is a relatively low income residential area. The northern part of the district belongs to the old city, while the southern part is newly expanding. Infrastructure is poor, particularly in the southeastern part of the district. There are textile, garment, brewery, and construction material factories in the southern part.

Ba Dinh, located west of Hoan Kiem, is a district where various types of developments are underway. The northeastern part of the district is residential, with medium to high income. There are also industrial establishments in the northern area, close to Ho Tay lake. The southern area is newly developing as a residential area. The infrastructure of the district is new, but still not sufficient for the recent development.

Dong Da is the southwestern part of urban Hanoi and consists of residential and industrial areas. Many kinds of residential developments are being developed, including multistory

Buildings, and tourist accommodation (hotels, serviced apartments). Many factories producing shoes, bags and chemical products are located in the southwestern corner of the district. The infrastructure is inadequate for the present population.

Tu Liem, located west of Ba Dinh and Dong Da, is an agricultural area with some industrial establishments. However, this area is the most expanding area in Hanoi City and is considered the strategic development area for the Hanoi City 2010 plan.

Thanh Tri, located south of Hai Ba Trung and Dong Da, is also an agricultural area including fisheries. Due to the limitation of available land and the existence of ponds, development of this district is rather limited.

2.2 Population

The total population of Hanoi City was estimated at 2.1 million in 1992. The population increased at an average growth rate of 2.1% (corresponding to the national population) during the past decade 1979-1989.

The population of the Study Area is about 1.2 million and the population density is 93 persons per ha. Out of the total population of the Study Area, 79% live in the 4 urban districts where population density is as high as 241 persons per ha. This shows Hanoi City to be one of the most densely populated areas in the world. Among the 4 districts, Hoan Kiem district has the highest population density of 410 persons per ha. In the suburban districts the population densities are lower and within the range of 20 - 30 persons per ha.

The population growth rate in the Study Area during 1979-1989 was about 2.2% per annum, slightly higher than the whole city's average of 2.1%. During the recent 3 years (1989 - 1992), the growth rate went up to 4.0 % per annum in the Study Area, reflecting the recent economic development in the area. Among the 4 urban districts, Dong Da and Hai Ba Trung show relatively high growth rates of more than 3%, while Ba Dinh and Hoan Kiem record moderate or low growth rates. In the suburban districts, due to expansion of the urban area, particularly to the west, the

population of Tu Liem increased to the annual growth rate of 7.9%. The population growth in Thanh Tri, however remains in the moderate range of 1.8%.

Population of the Study Area.

District	Population (1992)	Pop. Density (persons/ha)	Growth Rate 1979-1989	1989-1992
Dong Da	334,360	225	2.9%	3.6%
Ba Dinh	186,460	172	2.1%	2.6%
Hoan Kiem	147,260	410	0.6%	1.2%
Hai Ba Trung	283,810	277	1.9%	4.1%*
(Urban Total)	(951,890)	(241)	(2.0%)	(3.1%)
Thanh Tri	81,090	23	1.9%	1.8%
Tu Liem	164,300	31	NA	7.9%
Ha Tay Prov	5,400	17	NA	2.5%
Total	1,202,680	93	2.2%	4.0%

* High increase due to the addition of one subdistrict from the Thanh Tri district. Without this effect the growth rate becomes 3.2%

The average size of households in Hanoi is about 4.3. In the urban districts, the average size reduces to 3.9 and in the suburban districts it is 4.5. The total number of households in the Study Area is estimated at about 280,000.

2.3 RGDP and Regional Economy

The Gross Domestic Product of Hanoi (RGDP) is estimated at 7,913 billion Dong (733 million US dollar) at current prices in 1993. This is approximately 6.3% of the national GDP. (RGDP of Hanoi City is presented in Table A2.2)

The regional economy of Hanoi has enjoyed a boom after the 1989 economic reform and the RGDP grew at the unprecedented pace of 11.8% per annum. Compared to the average national GDP growth rate of 6.8% during the same period, the Hanoi regional economy grew more than 70% higher.

GDP and RGDP Growth Rates (%.p.a)

	1989	1990	1991	1992	1993
GDP (Viet Nam)	7.8	4.8	6.0	8.3	8.0
RGDP (Hanoi City)	9.2	18.6	7.5	13.1	11.2

Per-capita GDP in Hanoi City is estimated at 3,548,000 Dong (US$ 328) in 1993. (The figure estimated by the National Statistics Office is US$ 565, taking into account the actual parity value of Dong).

In the RGDP, the agriculture sector shares only 6%, while the industry sector and the trade sector share 23% and 22%, respectively. The service sector, including finance and insurance, dominates 39% of RGDP. Compared to the components of the national GDP, the economy of Hanoi City shows comprehensive development and diversification, from agriculture to industry, trade, finance.

2.4 Employment

According to the national census conducted in 1989, the total population involved in economic activity in Hanoi City is 898,906 (or about 45% of the total population).

The agriculture sector still retains the largest share of 35.0% in total employment although its contribution to RGDP is less than 10%. The second largest sector is industry with a share of 34.7%.

The finance and commerce sector has a high share of 13.7%, followed by the science and culture sector at 9.3%, and the transport/communication sector at 4.4%.

Employment in Hanoi City (1989 census)

Sector	No. of Employed	%
Agriculture	314,971	35.0
Industry	311,800	34.7
Transport / Communication	39,197	4.4
Finance and Commerce	123,095	13.7
Science, Culture & Education	84,068	9.3
Others	25,775	2.9
Total	898,906	100

Rate of unemployment is estimated at 7.6% in Hanoi City. However, this figure might be greater if the under-employment in the rural area is taken into consideration.

2.5 Agriculture

As mentioned above, the agriculture sector is the most important sector in the regional economy, particularly in the Tu Liem and Thanh Tri districts, in terms of employment. Total agricultural land in the Study Area is about 4,800 ha, or 35%. The major crop is rice, supplemented by vegetables and cereals.

According to the interview survey, most farmers produce two-paddies in a year. The winter/spring paddy is planted during Dec/Jan - April/May, while the summer/autumn paddy is planted during June/July - Sept/Oct. Based on the estimated productivity of a paddy of 3.3 ton/ha, about 25,000 tons of paddy is being produced in the Study Area.

However, due to the problem of drainage, paddy production is always affected by flood in the Study Area. It is estimated that 1,900 - 2,400 ha of the land or 40 - 50% of the agricultural land is flooded annually.

Fishery is another important activity in the Study Area. In Tu Liem district there are several fish ponds, totaling about 2,200 ha. Most lakes in the project area are being used for fishery production. But the most important lake for fishery is the West lake with an area of 570 ha. The cultivated fish include tilapia, carp, and black carp. In the Study Area, about 5,000 tons of fish are harvested annually. This fish harvest is also affected by flood and water pollution in the region.

2.6 Tourism

With substantial potential, tourism in Hanoi is, and will become a more important industry in the regional economy. There are many kinds of tourism resources including lakes, and historical and cultural relics, with lakes playing an important role in the industry. (The West Lake, the Hoan Kiem Lake and the Thuy Le Lake are typical examples.)

In 1993, Hanoi had 51 state hotels, 8 foreign joint-venture hotels and 24 guesthouses totaling 2,580 rooms. The number of visitors was estimated at more than 450,000 in 1993, including 300,000 foreigners.

During the past 3 years (1990 - 1993) foreign visitors doubled, increasing at an average rate of 26 % per year, while revenue from the tourism sector showed a 5 times increase, with an average growth rate of 71% per year.

Number of Tourists in Hanoi and Tourism Revenue

Year	No. of Tourists Total	(Foreigners)	Revenue (billionDong)
1990	NA	(150,000)	80
1991	NA	(180,000)	105
1992	425,000	(260,000)	300
1993	450,000	(300,000)	400

Source: Hanoi City Plan 2010

If this trend continues, total visitors in Hanoi are expected to reach 1.5 million (including 1.0 million foreign tourists) in the year 2000 and 3.5 to 4.0 million (including 3 million foreign tourists) in 2010.

2.7 Health and Hygiene

The organization of health care extends from the central level to the local communities. The Ministry of Health is responsible for the central level, while district offices and village offices are responsible for the local level.

In Hanoi City, there are 25 hospitals (8,859 beds), 5 district health stations (300 beds), and 280 village health stations (2,825 beds). A list of major hospitals and medical institutions is presented in Table A2.3.

The number of medical facilities is sufficient in Hanoi, but the quality, including available equipment and medicine is insufficient, particularly in the rural areas. In addition, all medical waste is discharged directly into the common drainage system, causing serious damage to the environment.

Personal hygiene is well developed in Viet Nam, in comparison to most developing countries. Morbidity and mortality rates in the country indicate that its health status appears to be better or average in comparison to countries with similar income levels.

Life expectancy rates for females is 67 years, and for males 63 years. The infant mortality rate is 45 persons per 1,000. (Patterns of mortality and morbidity are presented in Table A2.4)

According to information from the Hanoi Center of Hygiene and Epidemiology under the Ministry of Health, water related diseases in Hanoi City are mainly diarrhoea and dysentery. Other diseases such as typhoid, cholera and poliomyelitis have seldom been recorded in recent years.

In Hanoi, during the last three years (1991 - 1993) the average numbers of patients recorded for diarrhoea and dysentery were 26,212 and 3,134, respectively. The actual number of patients is roughly 45 times larger than the recorded figures. Though it is not recorded in the official statistics, many people suffer from eye diseases. (Our interview survey indicates that 12.5% of the total population of sample households have suffered).

Patients of Water Related Diseases in Hanoi.

	1987	1988	1989	Average 87-89	1991	1992	1993	Average 91-93
Diarrhoea:	13,322	33,951	16,777	21,350	34,389	21,211	24,036	26,212
Dysentery:	14,638	13,004	4,870	10,837	5,824	1,879	1,698	3,134
Typhoid:	3	14	17	11	187	119	3	103
Cholera:	NA	NA	NA	NA	4	0	0	1
Poliomyelitis:	10	6	9	8	NA	NA	NA	NA

Source : Ministry of Health

2.8 Household Income and Expenditure.

According to the statistics prepared by the National Statistics Office, the average household income (in Hanoi) for government employees is 215,700 Dong per month, while farmers earned 99,250 Dong per month in 1993 (Refer to Table A2.5).

However, the result of the interview survey indicates a higher income distribution in the Study Area. The average monthly incomes estimated from the above results are 864,000 Dong (US$ 80) for urban residents and 797,000 Dong (US$ 74) for suburban residents.

Compared to the national statistics, these figures are considerably higher, but reflects the actual incomes of the households in the Study Area.

A3. ECONOMIC DEVELOPMENT PLAN

3.1 National Goals and Objectives

For the long term development of the country, a "strategy for socio-economic stabilization and development up to the year 2000" was prepared. Under this frame work, a five year plan covering the period of 1991 - 1995 was prepared by the State Planning Committee.

The objectives of the strategy until the year 2000 are:

(a) To meet the basic needs of the people and improve their material, cultural and intellectual life;

(b) To stabilize and develop the economy;

(c) To create significant social changes, especially democracy and justice, to ensure order, state discipline and social safety;

(d) To improve the capacity of research and implementation of scientific and technological innovation; and

(e) To firmly defend the independence, sovereignty and security of the home land

Major quantified objectives for the strategy 2000 are:

(a) The total population will reach 80 million in 2000. The population growth rate is to be reduced to less than 1.8 % per annum;

(b) Increase per-capita income (two-fold increase) during 1990 - 2000 (the expected GDP growth rate is 8 -9 % per year);

(c) Increase staple flood production to approximately 30 million tons in 2000.

(d) Increase electricity output 2.5 to 3 times higher than 1990.

(e) Increase exports 5 times higher than 1990.

3.2 Regional Economic Development Plan

Under the framework of the national development strategy, a development plan for Hanoi up to 2010 was prepared by the Hanoi Planning Committee. The plan is very aggressive and much more ambitious than the national plan.

According to the plan, the RGDP of Hanoi is projected to increase 13 - 14 % per year during the period of 1991 - 2000 and 15 % during the period of 2001 - 2010. The RGDP will be 6,142 million Dong (1989 prices) in 2000 and 24,568 million Dong (1989 prices) in 2010.

A drastic reduction in the population growth rate is anticipated in the 2010 projection. It is assumed that the population growth in Hanoi will reduce to about 1.3% per annum during 1991 - 2000 and 1.6 % during 2001 - 2010.

Using the above estimates, the per-capita income of Hanoi, will be 2,642,000 Dong (1989 prices) (US$ 1,382), in 2000 and 9,015,000 Dong (1989 prices) (US$ 4,715), in 2010.

The growth rates of the projected per-capita income are 11.9% during 1991 - 2000 and 13.1 % during 2001 - 2010.

Projected RGDP

	1990	2000	Growth rate (1991-2000)	2010	Growth rate (2001 2010)
(1) RGDP in Hanoi (million Dong)	1,755	6,142	13.3 %	24,568	14.9 %
(2) Population (Thousand)	2,052	2,324	1.3 %	2,725	1.6 %
(3) Per-capita RGDP (Thousand Dong)	855	2,642	11.9 %	9,015	13.1 %
(4) US$	447	1,382		4,715	

RGDP is estimated at 1989 prices
Exchange Rate of US$ = 1,912 Dong is applied (This exchange rate is applied to most national statistical data)
Source : Hanoi Development Plan 2010

In order to attain the above target, the required capital investment during the period of 1993 - 2010 is estimated at 67,000 billion Dong.

If about 20 % of RGDP is directed to the capital investment, about 70 % of the requirement, or 48,000 billion Dong will be secured. The remaining 30 % is to be acquired from other sources including foreign borrowing.

In the plan, the development of the industrial sector is given the highest priority and will take a 32% share of the RGDP and absorb 30% of the labour force in 2010.

3.3 Population Projection .

The population projection for the urban area of Hanoi City was made by Finnida for its water supply project up to 2010. This projection was authorized by the authority of Hanoi City in December 1993.

For the planning of sewerage and drainage in Hanoi City, the authorized population projection is to be applied in consistence with the water supply scheme.

Under this situation, the population projection of the Study Area is made in the following manner.

(a) In the urban area, the Finnida projection is applied in principle. Since the available population data covers only the population for the water supply district, the projection for each subdistrict is made by applying the estimated growth rate in consideration of the boundary of each subdistrict.

(b) In the suburban areas, the projection is made by applying different criteria.

- If the subdistrict is included in the water supply district (Finnida M/P), the same growth rate estimated by Finnida is applied.

- If the subdistrict is included in the development area of the Hanoi 2010 Development Plan, the target population density in 2010 is set in consideration of the future land use and present population density.

- For the other subdistricts, it is assumed that the past growth trend will continue up to the year 2000, and will gradually decrease by 10-20% toward the year 2010.

The results of the projection are summarized in the following table. Detailed projection by phuong is presented in Table A3.1.

In the urban area, the projected population growth is quite low for most of the subdistricts except Dong Da where potential land development is available and relatively high growth rates of 1.8-2.5 % per year are projected. This reflects the government policy to reduce the population growth of the urban area.

In the suburban area, the Tu Liem district is expected to enjoy the highest population growth at 3-5% per year, while the Thanh Tri district will retain a relatively low growth rate of 2% during the planning period.

PROJECTED POPULATION OF THE STUDY AREA

	GR 1992-2000	Population 2000	GR 2001-2005	Population 2005	GR 2006-2010	Population 2010
I. URBAN						
1. Dong Da	2.5	406,340	2.0	447,660	1.8	488,430
2. Ba Dinh	-0.1	185,220	0.1	186,350	0.8	194,640
3. Hoan Kiem	-0.7	139,780	-0.4	136,950	-0.3	135,020
4. Hai Ba Trung	0.0	284,570	-0.1	283,340	0.8	294,580
Urban Total	0.8	1,015,910	0.7	1,054,300	1.1	1,112,670
II. SUBURBAN						
5. Thanh Tri	2.3	97,240	2.3	109,000	2.4	122,490
6. Tu Liem	5.9	260,550	3.4	307,490	2.8	353,460
7. Ha Tay Province	2.6	6,630	2.3	7,440	2.1	8,250
Suburban Total	4.2	364,420	3.1	423,930	2.8	484,200
TOTAL	1.7	1,380,330	1.4	1,478,230	1.6	1,596,870

Note : GR = Growth rate per year

Table A1.1 VIET NAM NATIONAL ACCOUNT

	1988	1989	1990	1991	1992	1993 Est
	(At current prices)					
GDP (In billion of Dong)	13266	24308	38166	69959	101870	125074
Agriculture	5928	9841	14717	28551	35183	38666
Industry	2775	4568	7167	13515	23019	28402
Construction	352	872	1468	2328	3965	5715
Trade	1371	2995	5056	8833	12559	15095
Transport, portal service	275	599	1233	2652	4228	5116
Finance, insurance, banking			657	1026	1748	2318
Housing, tourism, hotels, repairs			3641	6034	9872	13460
Other material production	143	215	329	687	1045	1202
Science, health, education, etc.	2422	5218	3898	6333	10251	15100
	(At constant 1989 prices)					
GDP (In billion of Dong)	23893	25754	27014	28623	30988	33477
Agriculture, forestry	10041	10739	10898	11135	11832	12193
Industry	5140	4935	5058	5557	6256	6882
Construction	946	981	1027	1030	1125	1374
Trade	2896	3065	3226	3383	3589	3801
Transport, postal services	602	603	632	674	711	771
Finance, insurance, banking			469	571	713	757
Housing, tourism, hotels, repairs			2619	2899	3132	3419
Other material production	211	215	223	229	236	248
Growth Rate	6.5	7.8	4.9	6	8.3	8

Source: National Statistic Office

Table A1.2 Revenue of State Budget
(Billion Dong)

	1986	1989	1990	1991	1992
TOTAL	97.9	4,970.80	8,190	10,613	18,970
A. DOMESTIC REVENUE	83.7	3,898.90	6,249	10,083	18,400
I. Revenue from State Enterprises	60.4	2,392.30	4,337	7,339	12,960
Net revenue	56.9	1,616.90	3,285	5,716	8,686
Depreciation	0.9	71.3	247	239	1,900
Services and others	2.5	144	199	462	625
Tax on Commercial Export & Import		253.7	606	922	1,750
II. Revenue from non-State sectors	18.3	844.8	1,088	1,825	3,080
Tax on Industry and Trade	8.3	427.9	664	941	1,650
Tax on Agriculture	3.8	308.1	298	707	1,260
Tax on non-commercial Export and Import	6.2	108.7	126	177	170
III. Others	5	661.8	824	919	238
B. REVENUE FROM FOREIGN	14.2	1,071.90	1,860	530	570

Source: National Statistic Office

Table A1.3 Expenditure of State Budget
(Billion Dong)

	1986	1989	1990	1991	1992
TOTAL	120.8	6,671.20	9,285	12,081	22,815
I. Basic Construction Expenditure	43.1	2,208.20	2,123	2,315	5,710
II. Interest payments	1.1	707	905	1,218	2,100
III. Current Expenditure	76.6	3,756	6,257	8,728	15,005
Economic Service	14	361.3	523	784	1,659
Education, Training	7.5	493.4	664	1,127	2,172
Healthcare	3.3	206.1	362	636	1,219
Scientific Study	0.6	47.4	300	114	186
Social Service	6.8	442	755	1,278	2,245
Culture, Art, Sport	1.2	60.7	136	189	274
State management	5.4	450.3	657	1,290	1,706
Others	37.8	1,694.80	2,860	3,310	5,549

Source: National Statistics Office

Table A1.4 Foreign Trade

(US$ million)

	Total	Exports	Imports
1986	2,944.10	789.00	2,155.10
1987	3,309.30	854.20	2,455.10
1988	3,795.10	1,038.40	2,756.70
1989	4,511.80	1,946.00	2,565.80
1990	5,158.40	2,404.00	2,752.40
1991	4,361.20	2,087.00	2,274.20
1992	5,079.00	2,571.00	2,508.00

Source: National Statistics Office

Table A1.5 Exchange Rate (Dong/US$)

Year	End of the year	Average of the year
1987	368	NA
1988	3,000	NA
1989	4,000	NA
1990	6,500	5,595
1991	13,870	9,767
1992	10,680	11,307
1993	10,810	NA

Source : National Statistic Office

Table A1.6 Retail Price Index
(Rate of Change from Previous Year; in Percent)

Item	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GENERAL PRICE INDEX	125.2	169.5	195.4	149.5	161.9	191.6	487.2	316.7	310.9	76	87.8	87.7	17.7
Foodgrain and Foodstuff	133.8	152	182	155.1	155	191.6	553.2	338.6	354.6	73.3			
Foodgrain	121	146.8	152.8	134.4	162	288.3	254.2	435.9	405.6	54.8			
Foodstuff	138.5	152.6	185.6	157.3	152	181.8	591.6	309.9	341.7	81.1			
Other Consumer Goods	117.8	195.1	205.4	138.8	179.8	190.8	422.7	296.8	255.4	79.8			
Agr. Production Materials	131.8	127	194.3	119.7	139.3	204.4	650.8	303.2	353.1	95.9			

Source: National Statistic Office

Table A2.1 ADMINISTRATIVE UNIT AND POPULATION RELATED TO THE STUDY AREA

(HANOI CITY 4 URBAN DISTRICTS AND 2 SUBURBAN DISTRICTS)

Population in Hanoi Urban Area (Related to the Study Area)

District/Subdistrict	Area (ha)	1979 Population	1989 Population	1992 Population	Density p/ha	Growth 79-89	Growth 89-92	Average Growth
Dong Da District								
1. Van Mieu	23	10,817	11,160	11,288	490.8	0.3	0.4	0.4
2. Van Chuong	43	10,433	12,637	12,787	297.4	1.9	0.4	1.2
3. Cat Linh	46.2	11,370	12,424	13,126	284.1	0.9	1.8	1.4
4. Quoc Tu Giam	22.7	7,091	7,296	7,726	340.4	0.3	1.9	1.1
5. Hang Bot	27.8	11,607	13,366	14,313	514.9	1.4	2.3	1.9
6. O Cho Dua	84.5	10,274	14,445	17,356	205.4	3.5	6.3	4.9
7. Nam Dong	40.2	8,733	11,995	14,209	353.5	3.2	5.8	4.5
8. Quang Trung	50.2	5,849	8,852	9,475	188.7	4.2	2.3	3.3
9. Trung Liet	91.9	6,286	12,023	13,216	145.1	6.7	3.2	5
10. Tho Quan	24.2	10,852	11,870	12,338	509.8	0.9	1.3	1.1
11. Kham Thien	16	8,508	9,103	9,292	580.8	0.7	0.7	0.7
12. Trung Phung	24.1	9,598	10,811	11,104	460.7	1.2	0.1	0.7
13. Phuong Lien	34.3	9,274	10,473	11,636	339.2	1.2	3.6	2.4
14. Phuong Mai	43.9	N.A	10,978	12,478	284.2	N.A	4.4	4.4 **
15. Phuong Liet	65	8,729	9,322	11,256	173.2	0.7	6.5	3.6
16. Kim Lien	33.9	14,052	11,547	11,790	437.8	-1.9	0.7	-0.6
17. Trung Tu	74.3	7,062	12,362	13,056	175.7	5.8	1.8	3.8
18. Khuong Thuong	35.1	6,206	8,783	10,080	287.2	3.5	4.7	4.1
19. Nguyen Trai	42.5	11,838	17,253	21,082	496	3.8	6.9	5.4
20. Thinh Quang	38.3	10,194	12,963	14,321	373.9	2.4	3.4	2.9
21. Lang Ha	80.7	3,384	9,218	13,113	162.5	10.5	12.5	11.5
22. Lang Thuong	123	6,467	11,397	11,851	96.3	5.8	1.3	3.6
23. Thuong Dinh	35.8	4,782	9,879	10,195	284.8	7.5	1.1	4.3
24. Thanh Xuan	72	4,045	8,220	8,982	124.8	7.3	3	5.2
25. Kim Giang	44	N.A	5,675	6,978	158.6	N.A	7.1	7.1 **
26. Thanh Xuan Bac	146	N.A	17,429	20,987	143.7	N.A	6.4	6.4 **
Officials	123	21,392	NA	10,321	83.9	NA	NA	NA
Total District	1,484	218,843	291,481	334,356	225.3	2.9	3.6	3.2
Ba Dinh District								
27. Trung Truc	18.9	9,303	9,413	9,951	526.5	0.1	1.9	1
28. Dien Bien	134.2	8,711	9,662	10,868	81	1	4	2
29. Cau Giay	99	9,272	13,731	14,574	147.2	4	2	3
30. Ngoc Ha	99.2	10,760	12,836	13,741	138.5	1.8	2.3	2.1
31. Truc Bach	38.7	11,683	11,876	12,358	319.3	0.2	1.3	0.8
32. Yen Phu	95.5	11,041	13,054	13,911	145.7	1.7	2.1	1.9
33. Phuc Xa	50	10,262	11,647	12,316	246.3	1.3	1.9	1.6
34. Quan Thanh	56	9,106	9,748	10,670	190.5	0.7	3.1	1.9
35. Thuy Khue	51.5	10,101	11,050	12,195	236.8	0.9	3.3	2.1
36. Buoi	106	10,730	12,841	14,047	132.5	1.8	3	2.4
37. Giang Vo	53.5	9,844	13,324	14,349	268.2	3.1	2.5	2.8
38. Thanh Cong	63.6	5,646	14,796	16,332	256.8	10.1	3.3	6.7
39. Kim Ma	76	11,361	12,528	13,308	175.1	1	2	1.5
40. Doi Can	38	11,706	12,089	12,907	339.7	0.6	2.2	1.4
41. Cong Vi	136.7	11,162	16,747	18,474	135.1	4.1	3.3	3.7
Officials	52	NA	NA	3,728	71.7	NA	NA	NA
Total District	1169	150,644	185,342	203,729	174.3	2.1	2.6	2.3

District/Subdistrict	Area (ha)	1979 Population	1989 Population	1992 Population	Density p/ha	Growth 79-89	Growth 89-92	Average Growth
Hoan Kiem District								
42. Cua Nam	34.2	11,502	11,650	11,971	350	0.1	0.9	0.5
43. Tran Hung Dao	36	9,268	10,205	10,511	292	1	1	1
44. Hang Bai	29.4	8,234	8,982	9,348	318	0.9	1.3	1.1
45. Phan Chu Trinh	53.5	6,789	7,449	7,861	146.9	0.9	1.8	1.4
46. Ly Thai To	27.8	7,421	7,862	8,176	294.1	0.6	1.3	1
47. Trang Tien	7.4	6,092	6,380	6,612	893.5	0.5	1.2	0.9
48. Hang Bac	22	7,572	7,821	8,082	367.4	0.3	1.1	0.7
49. Hang Buom	13.2	10,164	10,899	11,186	847.4	0.7	0.9	0.8
50. Dong Xuan	12.6	10,543	11,499	11,936	947.3	0.9	1.3	1.1
51. Hang Dao	8	6,683	7,189	7,466	933.3	0.7	1.3	1
52. Hang Ma	21.7	8,225	8,162	8,520	392.6	-0.1	1.4	0.7
53. Hang Bo	7.3	9,064	8,988	9,222	1263.3	-0.1	0.9	0.4
54. Cua Dong	13.5	7,472	8,075	8,406	622.7	0.8	1.3	1.1
55. Hang Bong	14.8	7,724	7,861	8,278	559.3	0.2	1.7	1
56. Hang Gai	12	9,777	9,924	10,220	851.7	0.1	1	0.6
57. Hang Trong	37.6	8,794	9,075	9,471	251.9	0.1	2.3	1.2
58. Phuc Tan	36	6,647	8,851	9,302	258.4	2.9	1.7	2.3
59. Chuong Duong	30	10,401	12,092	12,441	414.7	1.5	1	1.3
Total District	417	153,575	162,955	171,001	410.1	0.6	1.2	0.9
Hai Ba Trung District								
60. Le Dai Hanh	83.6	11,604	12,706	13,807	165.2	0.9	2.8	1.9
61. Nguyen Du	29.3	8,426	8,701	9,438	322.1	0.3	2.7	1.5
62. Dong Nhan	21.7	9,065	9,767	10,262	472.9	0.7	1.7	1.2
63. Ngo Thi Nham	18.1	10,645	10,750	11,347	626.9	0.1	1.8	1
64. Pham Dinh Ho	23.5	7,316	7,467	8,128	345.9	0.2	2.9	2.5
65. Thanh Nhan	58.5	8,186	13,170	15,477	264.6	4.9	5.5	5.2
66. Quynh Loi	29	8,334	9,338	10,900	375.9	1.1	5.3	3.2
67. Bach Khoa	29	4,127	9,911	10,460	360.7	9.2	1.8	5.5
68. Dong Mac	17	10,157	7,911	8,658	509.3	-2.5	3.1	0.3
69. Thanh Luong	91.2	9,042	12,098	13,222	145	3	3	3
70. Bach Dang	54.4	11,133	12,881	14,172	260.5	1.5	3.2	2.4
71. Giap Bat	64.5	11,594	6,096	9,367	145.2	-6.2	15.4	4.6
72. Minh Khai	51	9,533	11,887	12,797	250.9	2.2	2.5	2.4
73. Bui Thi Xuan	16.5	9,873	9,676	10,463	634.1	-0.2	2.6	1.2
74. Ving Tuy	109	9,893	14,885	17,406	159.7	4.2	5.4	4.8
75. Quynh Mai	37.6	7,238	10,411	11,319	301	3.7	2.8	3.3
76. Tuong Mai	45.5	11,337	14,160	15,427	339.1	2.2	2.9	2.6
77. Dong Tam	18.8	6,658	11,409	12,076	642.3	5.5	1.9	3.7
78. Mai Dong	82.5	N.A	9,037	10,993	133.2	N.A	6.7	6.7 **
79. Cau Den	24	8,999	10,049	8,872	369.7	1.1	-4.1	-1.5
80. Bach Mai	29.5	12,625	13,287	14,505	491.7	0.5	3.1	1.8
81. Tan Mai	63.7	N.A	14,330	15,259	239.5	N.A	2.1	2.1 **
82. Truong Dinh	30	12,932	133,526	14,882	496.1	0.5	3.2	1.9
83. Pho Hue	20.1	12,184	12,708	13,578	675.5	0.4	2.2	1.3
84. Hoang Van Thu	60	N.A	N.A	7,557	126	N.A	N.A	N.A
Total District	1108	220,673	266,161	300,372	271.1	1.9	3.2	2.5
Urban Total	4178	743,735	905,939	1,009,458	241.6	2	3.1	2.4

II. Population in Hanoi Suburban (Related to the Study Area)

Quan / Phuong	Area (ha)	1979 Population	1989 Population	1992 Population	92 Density (p/ha)	Growth 79-89	Growth 89-92	Averag Growt
Thanh Tri District								
1. Van Dien	68.6	2,407	9,117	9,744	142.0	14.2	2.2	8.2
2. Khuong Dinh	240.4	4,460	6,707	7,103	29.5	4.2	1.9	3.1
3. Dinh Cong	239.4	4,346	5,472	5,723	23.9	2.3	1.5	1.9
4. Vinh Tuy	180.6	5,728	5,698	5,922	32.8	0	1.3	0.7
5. Thanh Tri	260.4	6,330	7,314	7,660	29.4	1.5	1.6	1.5
6. Tran Phu	357.9	4,019	4,374	4,591	12.8	0.9	1.6	1.3
7. Yen So	710.7	6,355	7,798	8,359	11.8	2.1	2.3	2.2
8. Tu Hiep	467.2	5,542	6,736	7,299	15.6	2	2.7	1.9
9. Thinh Liet	301.8	6,624	8,332	8,670	28.7	2.3	1.3	1.8
10. Thanh Liet	334.2	4,512	5,749	6,024	18.0	2.5	1.6	2.1
11. Dai Kim	250.4	5,037	5,565	5,894	23.5	1	1.9	1.5
12. Linh Nam	552.1	7,971	9,541	9,976	18.1	1.8	1.5	1.7
13. Tam Hiep	343.2	10,033	7,392	7,809	22.8	-3	1.8	-0.7
14. Tan Trieu	313.2	8,451	9,497	10,072	32.2	1.2	2	1.6
15. Hoang Liet	467.2	6,610	7,912	8,227	17.6	1.8	1.3	1.6
16. Yen My	498.4	3,634	3,615	3,748	7.5	0	1.2	0.6
Total district	5,585.70	92,059	110,819	116,821	20.9	1.9	1.8	1.8
Tu Liem District								
17. Nghia Do	132.7	6,018	15,967	10,319	83.4	10.2	-13.5	4.7
18. Cau Giay	94.4	NA	12,029	13,835	144.4	N.A	4.7	4.7*
19. Cau Dien	240.5	NA	11,358	8,350	34.7	N.A	-9.7	-9.7
20. Tu Lien	344	4,059	4,856	5,089	14.8	1.8	1.6	1.7
21. Quang An	188.2	3,982	5,045	4,651	24.7	2.4	-2.6	-0.1
22. Nhat Tan	299.6	4,537	5,237	6,350	21.2	1.5	6.6	4.1
23. Mai Dich	187.9	5,069	3,432	12,025	64.0	-3.8	40.2	10.8
24. Dich Vong	349.1	8,498	6,691	9,450	27.1	-2.4	12.2	0.1
25. My Dinh	460.6	6,179	6,741	7,505	16.3	0.9	3.6	2.3
26. Dong Nhac	366.4	7,459	6,602	14,554	39.7	-1.2	30.1	14.5
27. Xuan La	213.5	4,741	5,963	6,089	28.5	2.3	0.7	1.5
28. Xuan Dinh	557.5	8,200	10,447	12,570	22.5	2.6	6.4	4.5
29. Co Nhue	543.5	9,948	11,426	14,635	26.4	1.4	8.6	5
30. Yen Hoa	186	6,380	7,241	8,440	45.3	1.3	5.2	3.5
31. Trung Hoa	234.1	3,994	5,481	7,454	31.8	3.2	10.8	7
32. Trung Van	289.2	5,158	6,838	7,661	23.4	2.9	3.9	3.5
33. Nhan Chinh	254.3	5,219	6,494	7,900	31.1	2.2	6.8	4.5
34. Me Tri	706.6	8,702	11,593	12,632	17.9	2.9	2.9	2.9
35. Phu Thuong	609.5	6,168	7,816	8,567	14.1	2.4	3.1	2.8
36. Thuy Phuong	249	4,602	5,285	6,448	25.9	1.4	6.9	4.2
37. Nghia Tan	53.6	NA	NA	13,318	248.5	N.A	N.A	N.A
Total district	6,560.20	108,913	156,536	196,742	30.0	N.A	7.9	7.9 **
Ha Tay Province								
1. Van Yen	322.0	NA	5,007	5,400	16.7	NA	2.5	2.5
Total of Suburban	12,467.9	200,972	272,362	318,963	25.5	N.A	5.4	5.4 **
III Total population in the Project Area (I+II)	16,646	944,707	1,178,301	1,328,421	79,8	2.2 *	4.0	3.1

* Net growth rate is slightly lower than this because two subdistricts (Cau Giay and Cau Dien) are included into Tu Liem from 1989.

** Growth rate of 89 - 92 is applied.

Table A2.2 RGDP, Hanoi City (at 1989 fixed price)

	1988	1989	1990	1991	1992	1993
TOTAL	1,355,763	1,480,058	1,755,083	1,886,315	2,133,000	2,372,000
I. MATERIAL MANUFACTURING AREAS	961,057	1,015,895	1,160,290	1,156,463	1,348,260	
1. Industry	480,779	398,611	418,370	438,493	490,909	603,000
2. Basic Construction	79,545	74,269	90,907	68,109	76,069	111,000
3. Agriculture / Forestry	161,001	153,608	126,367	119,470	132,541	144,000
4. Transportation & Communication	79,784	73,703	76,725	78,789	99,812	
5. Trade *	146,637	302,667	423,887	425,693	521,067	1,498,000
6. Others	13,311	13,037	24,034	25,909	27,759	16,000
II. NON-MATER IAL MANUFACTURING AREAS	394,760	464,163	594,793	729,852	940,915	
Per-capita GDP (US$) **	364	388	442	470	517	565
GROWTH RATE OF RGDP	5.50%	9.20%	18.60%	7.50%	13.10%	11.20%

* Includes : 1) Housing, Public Service, Tour; 2) Science; 3) Education; 4) Health, Social Insurrance; 5) Finance State Insurrance, and 6) Others.

** US$ = 1,192 Dong (1989)

Table A2.3. List of Major Hospitals and Medical Institutes (Hanoi)

Name	Place	Responsible Org.
Hospitals		
1. Traditional Medicine Hospital	Hoe Nhai	Ministry of Health
2. Lung Hospital	Hoang Hoa Tham	-
3. Bach Mai Hospital	Kim Lien, Bach mai Phuong Mai	-
4. Children Hospital	Lang Thuong	-
5. Viet-Xo Friendship Hospital	Tran Khanh Du	-
6. Hospital K	Quan Su	-
7. Viet-German Hospital	Trang Thi	-
8. Hospital E	Co Nhue	-
9. Hospital 354	Doc Ngu	Army
10. Unit 11239 - Hospital KQ	Tuong Mai	-
11. Sanpolt Hospital	Tran Phu, Chu V. An Ng. Thai Hoc, Son Tay	HPC
12. Dong Da Hospital	Nam Dong	-
13. Vietnam - Cuba Hospital	Tran Hung Dao	-
14. Railways Hospital	Lang Thuong	Ministry of Transport
Medical Institutes		
1. Tranditional Medicine Institute	Ng. Binh Khiem	Ministry of Health
2. Institute of Epidemiology	Lo Duc	-
3. Institute of Eyes	Tran Nhan Tong	-
4. Institute of Mothers and Babies Protection	Trieu Quoc Dat Trang Thi	-

Source :

Table A2.4 Patterns of Mortality and Morbidity 1978 - 1988

	1978 (per 100,000)		1988 (per 100,000)	
Causes of Mortality	Rank	Rate	Rank	Rate
Tuberculoris	2	5	1	3.7
Malaria	1	7	2	2.7
Water Diarrhoe			3	1.9
Heart Diseases			4	1.4
Dengue	4	1	5	1.2
Bloody dysentery	3	2	6	1.2
Tetanus	5	0.8	7	1
Pneumonia			8	0.9
Rabies			9	0.8
Nutritional disorders			10	0.8
Causes of Morbidity				
Malaria	1	1241	1	2166
Watery Diarrhoea	2	835	2	1132
Bloody Diarrhoea	3	410	3	337
Respiratory infections	5	119	4	257
Dengue	4	218	5	196
Eye Infections			6	140
Tuberculosis	7	138	7	106
Pneumonia	8	77	8	88
Pepticulcers			9	73
Nutritional disorders			10	44

Source: Handbook of Medical and Health Statistics
Ministry of Health, 1989.

Table A2.5 (a). Income and Expenditure of Household in Hanoi City (Monthly)

Farm Family

(Dong)

	1990	1991	1993
I. INCOME	30,687	49,985	99,250
From collective economy	7,765	9,580	52,920
From farm	21,021	34,675	14,140
From others	1,892	5,730	4,460
II. EXPENDITURE	23,418	48,360	89,850
Food	14,893	36,800	53,490
Clothe	1,615	2,080	3,400
Household Goods	987	1,290	
Culture / Education	1,876	2,750	1,630
Accommodation	1,672	2,830	11,800
Healthcare	647	1,090	2,620
Credit	474	1,050	

Table A2.5 (b). Income and Expenditure of Household in Hanoi City (Monthly)

Government Employee Family

(Dong)

	1990	1991	1993
I. INCOME	49,198	83,667	215,700
Salary and bonus	22,250	42,758	112,800
Extra work	2,398	1,701	28,000
Subsidy	1,406	5,801	16,500
Production activities	1,561	843	5,900
Others from State	31,768	58,258	
II. EXPENDITURE	50,682	84,179	185,650
Food	35,863	67,857	114,805
Clothe	1,621	2,177	5,680
Household Goods	1,575	2,395	
Culture / Education	926	2,837	6,870
Healthcare	734	2,581	2,090
Accommodation	1,109	3,739	25,920
Others	6,766	1,767	25,150

Table A.3.1 POPULATION PROJECTION OF THE STUDY AREA

	Quan/ Phuong	Area (ha)	1,992 Population	*1 (%)	Study Area	Study Area Population	Growth -2000	2,000 Population	Growth -2005	2005 Population	Growth -2010	2010 Population
	URBAN AREA											
	Dong Da											
1	Van Mieu	23.0	11,288	100.0	23.0	11,288	0.30	11,562	0.28	11,725	0.20	11,842
2	Van Chuong	43.0	12,787	100.0	43.0	12,787	0.30	13,097	0.28	13,282	0.20	13,415
3	Cat Linh	46.2	13,126	100.0	46.2	13,126	2.30	15,745	1.07	16,605	1.02	17,470
4	Quoc Tu Giam	22.7	7,726	100.0	22.7	7,726	2.30	9,267	1.07	9,774	1.02	10,283
5	Hang Bot	27.8	14,313	100.0	27.8	14,313	2.30	17,169	1.07	18,107	1.02	19,050
6	O Cho Dua	84.5	17,356	100.0	84.5	17,356	1.12	18,973	0.11	19,078	2.51	21,596
7	Nam Dong	40.2	14,209	100.0	40.2	14,209	0.03	14,243	1.97	15,702	3.09	18,283
8	Quang Trung	50.2	9,475	100.0	50.2	9,475	0.03	9,498	1.97	10,471	3.09	12,192
9	Trung Liet	91.1	13,216	100.0	91.1	13,216	0.52	13,776	2.78	15,800	2.99	18,308
10	Tho Quan	24.2	12,338	100.0	24.2	12,338	0.30	12,637	0.28	12,815	0.20	12,944
11	Kham Tien	16.0	9,292	100.0	16.0	9,292	0.30	9,517	0.28	9,651	0.20	9,748
12	Trung Phung	24.1	11,104	100.0	24.1	11,104	0.30	11,373	0.28	11,533	0.20	11,649
13	Phuong Lien	34.3	11,636	100.0	34.3	11,636	0.30	11,918	0.28	12,086	0.20	12,207
14	Phuong Mai	43.9	12,478	100.0	43.9	12,478	0.15	12,629	2.60	14,358	2.96	16,612
15	Phuong Liet	65.0	11,256	100.0	65.0	11,256	6.50	18,629	7.73	27,031	4.31	33,381
16	Kim Lien	33.9	11,790	100.0	33.9	11,790	0.15	11,932	2.60	13,566	2.96	15,696
17	Trung Tu	74.3	13,056	100.0	74.3	13,056	0.03	13,087	1.97	14,428	3.09	16,800
18	Khuong Thuong	35.1	10,080	100.0	35.1	10,080	0.15	10,202	2.60	11,599	2.96	13,420
19	Nguyen Trai	42.5	21,082	100.0	42.5	21,082	6.24	34,215	2.21	38,167	0.73	39,580
20	Thinh Quang	38.3	14,321	100.0	38.3	14,321	1.31	15,892	3.94	19,280	3.23	22,601
21	Lang Ha	80.7	13,113	100.0	80.7	13,113	1.14	14,358	2.46	16,213	2.46	18,299
22	Lang Thuong	123.0	11,851	100.0	123.0	11,851	0.87	12,701	3.71	15,239	2.76	17,461
23	Thuong Dinh	35.8	10,195	100.0	35.8	10,195	0.87	10,927	0.66	11,292	0.95	11,839
24	Thang Xuan	72.0	8,982	100.0	72.0	8,982	5.43	13,712	0.97	14,390	1.34	15,380
25	Kim Giang	44.0	6,978	100.0	44.0	6,978	6.24	11,325	2.21	12,633	0.73	13,101
26	Thang Xuan B	146.0	20,987	100.0	146.0	20,987	10.79	47,638	1.97	52,519	0.91	54,953
	Officials*2	122.8	10,321	100.0	122.8	10,321	0.00	10,321	0.00	10,321	0.00	10,321
	Quan Total	**1464.6**	**334,356**	**84.2**	**1,464.6**	**334,356**	**2.47**	**406,343**	**1.96**	**447,665**	**1.76**	**488,429**
	Ba Dinh											
27	Trung Truc	18.9	9,951	100.0	18.9	9,951	-1.74	8,647	-1.59	7,981	-0.76	7,683
28	Dien Bien	134.2	10,868	100.0	134.2	10,868	0.35	11,176	0.51	11,464	1.06	12,085
29	Cau Giay	99.0	14,574	100.0	99.0	14,574	0.15	14,750	0.18	14,883	1.14	15,751
30	Ngoc Ha	99.2	13,741	100.0	99.2	13,741	2.10	16,226	1.52	17,498	1.30	18,665
31	Truc Bach	38.7	12,358	100.0	38.7	12,358	-1.74	10,739	-1.59	9,912	-0.76	9,541
32	Yen Phu	95.5	13,911	58.7	56.1	8,166	-0.93	7,578	2.18	8,440	0.07	8,470
33	Phuc Xa	50.0	12,316	6.4	3.2	788	-0.93	731	2.18	815	0.07	818
34	Quan Thanh	56.0	10,670	100.0	56.0	10,670	-0.81	9,998	-0.57	9,716	0.17	9,799
35	Thuy Khe	51.5	12,195	100.0	51.5	12,195	-3.42	9,232	-14.97	4,103	-12.94	2,052
36	Buoi	106.0	14,047	100.0	106.0	14,047	-0.26	13,757	-0.70	13,283	0.00	13,283
37	Giang Vo	53.5	14,349	100.0	53.5	14,349	0.18	14,557	-0.20	14,412	0.27	14,608
38	Thanh Cong	63.6	16,332	100.0	63.6	16,332	1.14	17,882	2.46	20,193	2.45	22,791
39	Kim Ma	76.0	13,308	100.0	76.0	13,308	0.18	13,501	-0.20	13,366	0.27	13,548
40	Doi Can	38.0	12,907	100.0	38.0	12,907	1.13	14,121	1.56	15,257	1.30	16,275
41	Cong Vi	136.7	18,474	100.0	136.7	18,474	0.08	18,593	2.75	21,294	3.71	25,548
	Officials*3	39.0	3,728	100.0	39.0	3,728	0.00	3,728	0.00	3,728	0.00	3,728
	Officials*4	13.0	0	100.0	13.0	0	0.00	00	0.00	0	0.00	0
	Quan Total	**1168.8**	**203,729**	**92.6**	**1,082.6**	**186,456**	**-0.08**	**185,216**	**0.12**	**186,345**	**0.88**	**194,642**
	Hoan Kiem											
42	Cua Nam	34.2	11,971	100.0	34.2	11,971	-0.67	11,344	-0.42	11,108	-0.20	10,997
43	Tran Hung Dai	36.0	10,511	100.0	36.0	10,511	-0.95	9,738	-0.47	9,512	-0.05	9,488
44	Hang Bai	29.4	9,348	100.0	29.4	9,348	-0.95	8,661	-0.47	8,459	-0.05	8,438
45	Phan Chu Trinh	53.5	7,861	100.0	53.5	7,861	-2.21	6,574	0.29	6,670	0.28	6,764
46	Ly Thai To	27.8	8,176	100.0	27.8	8,176	-0.41	7,912	-0.38	7,762	-0.34	7,631
47	Trang Tien	7.4	6,612	100.0	7.4	6,612	-0.95	6,126	-0.47	5,983	-0.05	5,968
48	Hang Bac	22.0	8,082	100.0	22.0	8,082	-0.41	7,821	-0.38	7,673	-0.34	7,544
49	Hang Buom	13.2	11,186	100.0	13.2	11,186	-0.95	10,364	-0.47	10,122	-0.42	9,912
50	Dong Xuan	12.6	11,936	100.0	12.6	11,936	-0.41	11,550	-0.47	11,281	-0.42	11,046
51	Hang Dao	8.0	7,466	100.0	8.0	7,466	-0.38	7,242	-0.47	7,073	-0.42	6,926
52	Hang Ma	21.7	8,520	100.0	21.7	8,520	-0.38	8,264	-0.47	8,072	-0.42	7,904
53	Hang Bo	7.3	9,222	100.0	7.3	9,222	-0.38	8,945	-0.47	8,737	-0.42	8,555
54	Cua Dong	13.5	8,406	100.0	13.5	8,406	-0.38	8,154	-0.47	7,964	-0.42	7,798

	Quan/ Xa	Area (ha)	1,992 Population	*1 (%)	Study Area	Study Area Population	Growth -2000	2,000 Population	Growth -2005	2005 Population	Growth -2010	2010 Population
55	Hang Bong	14.8	8,278	100.0	14.8	8,278	-0.41	8,010	-0.38	7,859	-0.34	7,727
56	Hang Gai	12.0	10,220	100.0	12.0	10,220	-0.38	9,913	-0.47	9,663	-0.42	9,481
57	Hang Trong	37.6	9,471	100.0	37.6	9,471	-0.41	9,165	-0.38	8,992	-0.34	8,840
58	Phuc Tan	36.0	9,302	0.0	0.0	0	-0.38	0	-0.47	0	-0.42	0
59	Chuong Duong	30.0	12,441	0.0	0.0	0	-0.41	0	-0.38	0	-0.34	0
	Quan Total	**417.0**	**171,001**	**84.2**	**351.0**	**147,264**	**-0.47**	**141,783**	**-0.49**	**139,959**	**-0.28**	**137,929**
	Quan Hai Ba Trung											
60	Le Dai Hang	83.6	13,807	100.0	83.6	13,807	-1.39	12,344	-1.12	11,668	-0.08	11,622
61	Nguyen Du	29.3	9,438	100.0	29.3	9,438	-0.95	8,744	-0.47	8,541	-0.05	8,519
62	Dong Nhan	21.7	10,262	100.0	21.7	10,262	-2.21	8,582	0.29	8,707	0.28	8,830
63	Ngo Thi Nham	18.1	11,347	100.0	18.1	11,347	-2.21	9,489	0.29	9,628	0.28	9,763
64	Pham Dinh Ho	23.5	8,128	100.0	23.5	8,128	-2.21	6,797	0.29	6,896	0.28	6,994
65	Thanh Nhan	58.5	15,477	100.0	58.5	15,477	-0.64	14,702	-2.87	12,710	0.26	12,876
66	Quynh Loi	29.0	10,900	100.0	29.0	10,900	-0.64	10,354	-2.87	8,951	0.26	9,068
67	Bach Khoa	29.0	10,460	100.0	29.0	10,460	-0.69	9,896	-1.06	9,383	-0.07	9,350
68	Dong Mac	17.0	8,658	100.0	17.0	8,658	-2.21	7,241	0.29	7,346	0.28	7,450
69	Thanh Luong	91.2	13,222	44.2	40.3	5,844	0.29	5,981	1.10	6,317	0.27	6,403
70	Bach Dang	54.4	14,172	35.2	19.1	4,989	-2.21	4,172	0.29	4,233	0.28	4,292
71	Giap Bat	64.5	9,367	100.0	64.5	9,367	3.30	12,145	1.71	13,220	2.24	14,768
72	Minh Khai	51.0	12,797	100.0	51.0	12,797	-0.64	12,156	-2.87	10,509	0.26	10,646
73	Bui Thi Xuan	16.5	10,463	100.0	16.5	10,463	-1.39	9,355	-1.12	8,842	-0.08	8,807
74	Vinh Tuy	109.0	17,406	100.0	109.0	17,406	0.12	17,574	0.24	17,786	0.31	18,063
75	Quynh Mai	37.6	11,319	100.0	37.6	11,319	-0.64	10,752	-2.87	9,295	0.26	9,417
76	Tuong Mai	45.5	15,427	100.0	45.5	15,427	3.03	19,588	2.97	22,675	2.00	25,035
77	Dong Tam	18.8	12,076	100.0	18.8	12,076	-0.69	11,425	-1.06	10,832	-0.07	10,795
78	Mai Dong	82.5	10,993	100.0	82.5	10,993	0.06	11,046	-0.11	10,985	0.33	11,168
79	Cau Den	24.0	8,872	100.0	24.0	8,872	-0.69	8,394	-1.06	7,958	-0.07	7,931
80	Bach Mai	29.5	14,505	100.0	29.5	14,505	0.78	15,435	-0.15	15,320	1.16	16,229
81	Tan Mai	63.7	15,259	100.0	63.7	15,259	3.90	20,723	0.54	21,288	1.71	23,172
82	Truong Dinh	30.0	14,882	100.0	30.0	14,882	2.91	18,721	2.49	21,170	2.56	24,023
83	Pho Hue	20.1	13,578	100.0	20.1	13,578	-2.21	11,355	0.29	11,521	0.28	11,683
84	Hoang Van Th	60.0	7,557	100.0	60.0	7,557	0.06	7,593	-0.11	7,552	0.33	7,677
	Quan Total	**1106.0**	**300,372**	**92.2**	**1,021.0**	**283,811**	**0.03**	**284,586**	**0.00**	**283,935**	**0.79**	**294,590**
	Urban Total	**4178.4**	**1,009,456**	**94.3**	**3940.0**	**951,080**	**0.84**	**1,017,909**	**0.74**	**1,056,391**	**1.08**	**1,114,661**

	Huyen/ Xa	Area (ha)	1992 Population	*1 (%)	Study Area	Study Area Population	Growth -2000	2000 Population	Growth -2005	2005 Population	Growth -2010	2010 Population
	SUBURBAN AREA											
	Thanh Tri											
1	*Tran Van Dien*	68.6	9,744	100.0	68.6	9,744	3.19	12,527	3.19	14,656	3.19	17,148
2	*Khuong Dinh*	240.4	7,103	100.0	240.4	7,103	2.97	8,977	2.97	10,392	2.97	12,029
3	*Dinh Cong*	239.4	5,723	100.0	239.4	5,723	4.18	7,941	4.18	9,746	4.18	11,960
4	*Vinh Tuy*	180.6	5,922	100.0	180.6	5,922	0.70	6,262	0.63	6,462	0.63	6,668
5	*Thanh Tri*	260.4	7,660	46.4	120.8	3,554	1.50	4,004	1.35	4,281	1.35	4,578
6	*Tran Phu*	357.9	4,591	39.4	141.0	1,809	1.30	2,006	1.17	2,126	1.17	2,253
7	*Yen So*	710.7	8,359	41.2	292.8	3,444	2.20	4,099	1.98	4,521	1.98	4,987
8	*Tu Hiep*	467.2	7,299	8.3	38.8	606	1.90	704	1.71	767	1.71	834
9	*Thinh Liet*	301.8	8,670	100.0	301.8	8,670	3.13	11,094	3.13	12,943	3.13	15,099
10	*Thanh Liet*	334.2	6,024	51.5	172.1	3,102	2.10	3,664	1.89	4,023	1.89	4,418
11	*Dai Kim*	250.4	5,894	100.0	250.4	5,894	1.50	6,640	1.35	7,100	1.35	7,592
12	*Linh Nam*	552.1	9,976	27.2	150.2	2,713	1.70	3,105	1.53	3,350	1.53	3,614
13	*Tam Hiep*	343.2	7,809	9.7	33.3	757	-0.70	716	-0.63	694	-0.63	672
14	*Tan Trieu*	313.2	10,072	100.0	313.2	10,072	2.45	12,224	2.45	13,797	2.45	15,572
15	*Hoang Liet*	467.2	8,227	100.0	467.2	8,227	1.60	9,341	1.44	10,033	1.44	10,777
16	*Yen Mai*	498.4	3,748	100.0	498.4	3,748	0.60	3,932	0.54	4,105	0.54	4,286
	Huyen Total	**5585.7**	**116,821**	**62.8**	**3509.0**	**61,069**	**2.30**	**87,235**	**2.31**	**108,995**	**2.36**	**132,487**
	Tu Liem											
17	*Tran Ngia Do*	132.7	10,319	100.0	132.7	10,319	11.63	24,882	4.32	30,741	0.28	31,174
18	*Tran Cau Giay*	94.4	13,635	100.0	94.4	13,635	11.63	32,878	4.32	40,620	0.28	41,192
19	*Tran Cau Dien*	240.5	8,350	53.7	129.1	4,484	8.4	8,549	6.72	11,834	10.33	19,346
20	*Tu Lien*	344.0	5,089	41.2	141.7	2,097	-0.93	1,946	2.18	2,167	0.07	2,175
21	*Quang An*	188.2	4,651	65.7	123.6	3,056	4.62	4,386	2.18	4,885	0.07	4,902
22	*Nhat Tan*	299.6	6,350	37.1	111.2	2,356	-2.36	1,946	0.00	1,946	0.00	1,946
23	*Mai Dich*	187.9	12,025	100.0	187.9	12,025	5.50	18,455	-7.91	12,223	0.00	12,223
24	*Dich Vong*	349.1	9,450	100.0	349.1	9,450	9.55	19,603	0.65	20,249	1.20	21,493
25	*My Dinh*	460.6	7,505	100.0	460.6	7,505	2.30	9,002	2.07	9,973	1.84	10,925
26	*Dong Nhac*	366.4	14,554	66.4	243.3	9,664	5.50	14,831	4.95	18,883	4.40	23,420
27	*Xuan La*	213.5	6,089	100.0	213.5	6,089	2.87	7,636	10.71	12,700	4.43	15,773
28	*Xuan Dinh*	557.5	12,570	100.0	557.5	12,570	4.50	17,876	4.05	21,801	3.60	26,018
29	*Co Nhue*	543.5	14,635	52.2	283.7	7,639	5.00	11,287	4.50	14,066	4.00	17,113
30	*Yen Hoa*	186.0	8,440	100.0	186.0	8,440	5.50	12,953	11.11	21,935	11.15	37,211
31	*Trung Hoa*	234.1	7,454	100.0	234.1	7,454	5.50	11,440	7.00	16,045	0.00	16,045
32	*Trung Van*	289.2	6,761	100.0	289.2	6,761	3.50	8,903	3.15	10,396	2.80	11,936
33	*Nhan Chinh*	254.3	7,900	100.0	254.3	7,900	0.28	8,079	1.44	8,677	-0.17	8,604
34	*Me Tri*	706.6	12,632	100.0	706.6	12,632	2.90	15,878	2.61	18,061	2.32	20,256
35	*Phu Thuong*	609.5	8,567	65.6	399.8	5,620	2.80	7,009	2.52	7,938	2.24	8,868
36	*Thuy Phuong*	249.0	6,448	20.0	49.8	1,290	4.20	1,792	3.78	2,158	3.36	2,545
37	*Ngai Tan*	53.6	13,318	100.0	53.6	13,318	6.00	21,227	-0.99	20,197	0.10	20,298
	Huyen Total	**6590.2**	**196,742**	**79.3**	**5,201.6**	**164,303**	**5.93**	**260,556**	**3.37**	**307,464**	**2.63**	**353,465**
	Ha Tay											
1	*Van Yen*	322.0	5,400	100.0	322.0	5,400	2.60	6,631	2.34	7,444	2.08	8,251
	Suburban Total	**12467.9**	**318963.0**	**72.4**	**9032.6**	**250,792**	**4.76**	**364,422**	**3.07**	**423,933**	**2.76**	**494,201**
	Study Area Total	**18646.3**	**1,328,421**	**77.9**	**12972.8**	**1,202,881**	**1.76**	**1,382,331**	**1.38**	**1,460,234**	**1.65**	**1,598,682**

Study Area Excluding Ho Tay (567 ha)

*1 Percentage of the area inside the study area
*2 Bach Mai Airbase
*3 Government and military area
*4 Ho Chi Minh Square

THE STUDY
ON
URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM
IN
HANOI CITY

APPENDIX (B)

CITY DEVELOPMENT PLAN

FEBRUARY 1995

THE STUDY ON
URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM
IN
HANOI CITY

APPENDIX (B)
CITY DEVELOPMENT PLAN

Table of Contents

List of Table

List of Figures

B City Development Plan

B.1 Present Land Use and Urban Development

The Study Area consists of Hanoi city's four urban districts, Dong Da, Ba Dinh, Hoan Kiem and Hai Ba Trung, and two suburban districts, Thanh Tri and Tu Liem. Additionally, Van Yen of the Ha Tay Province is included, because of its unity with the city. Boundaries of the Study Area, districts and subdistricts are presented in Figure B1.1

Present land use by categories of the Study Area is shown on Table B1.1 and Figure B1.2. Hanoi's enhanced urbanized area, including the city centre, the urban residential area and the industrial area, shares 32% of the Study Area, and occupies 74% of the four urban districts. The agricultural land totals 35% of the Study Area, but 98% of this land is on the outskirts of the urbanized area.

The urbanized area basically corresponds to the urban district boundaries, however some areas project into the suburban area. Almost half of the urbanized area is residential. Most of houses facing major streets are of mixed use, with the first floors being utilized for commercial and small and light industrial purposes. This causes complications in identifying residential land in the city centre.

In the agriculture area of the suburban districts there are scattered villages. These villages are located at a higher altitude from the surrounding area in order to avoid frequent flooding. As a large area of the suburban land 15% of suburban area or 88 % of the Study Area is covered by water, it is generally used for fishery industries.

Hanoi's urban area in the Study Area has an area of 3940 ha, and its population density reaches 242 per ha. The central part of the city has the highest density, e.g. Hoan Kiem District has 426 per ha and is topped by Phuong Han Bo with 1,260 per ha. Three other districts follow; Hai Ba Trung : 271, Dong Da : 225, Ba Dinh : 174. The suburban area has a much lower density of 26 per ha.

The urban area's land is divided into two categories by their state of ownership. Civil land occupies 72%, almost 3,000 ha, and non-civil or private occupies 28%, or 1,200 ha. Civil area per person is 32.9 sq.m, 1.1 sq.m for green and park areas and 4.0 sq.m for other urban spaces.

A brief review of urban development in the city shows its recent development of axes radiating from the central core of Hanoi to beyond the To Lich River. These axial developments form the skeleton of Hanoi's development and land use pattern. There are four major axes as shown in Figure B1.3.

(a) Gia Lam axis:

which runs beyond the Red River and the Study Area boundary and is the axis of industrial development and relocation,

(b) R.1 axis :

which developed along R.1 with a mixed use of industrial, residential and public development,

(c) R.6 axis :

which is located along R.6 towards Ha Dong, south-west out of Hanoi. This is one of the most powerful mixed use development, including industry, mass housing, and institutions, and

(d) R.32 axis :

which runs westward comprising of institutions and industries. Together with the R.6 axis, it is one of the most vigorous development, in Hanoi.

Apart from these four major development axes, one other minor axis is the Thanh Long-Nghia Do axis, running north to south. At present, there are only several factories and educational institutes, but it is a rising axis which will become important, considering its location advantage along the highway connecting with the Noi Bai Airport and the interregional railway.

Based on the structure and pattern of Hanoi's land use and development, the following urban districts can be summarized;

a. Dong Da District

Dong Da is a district located in the south-western part of Hanoi's urban area, it includes the R.6 development axis, bill-shaped, projecting from the urban area. The district has an area of 1,485 ha and population of almost 350,000 with density of 230 per ha. This district can be divided into three parts. The R.6 axis area is one of the most active development areas, in Hanoi, with large-scale factories, including auto and textile, and mass multi-storied housing. The housing developments of the peripheral area of the district brought about a high level of population growth of 7 - 10% per annum. Density is still quite moderate. The majority of the residents work in the central part of the city, causing commuting problems, especially during floods. The insufficient investment on utility infrastructure, the water supply and sanitation, are other problems which need to be addressed.

The second, is the area developed as a periphery of Hanoi's historic core, which has long been absorbed by the growth of the city's core. It developed in the western side of Hanoi Central Station, and spread in the form of mass multi-storied housing toward the south. The area has quite a high density of approximately over 300 per hectare with a maximum of 581 in the Kham Tien sub-district. Some old factories isolated among the high density residential areas are causing serious environmental pollution. Other public facilities and institutes including the Bach Mai Hospital, may also become polluting sources in the near future, if adequate improvement to the drainage a treatment facilities is not undertaken.

The third, is a newly developed area located between the second area and the To Lich River. The recent development is occupied by public facilities and multi-storied housing. According to the Master Plan of Hanoi, it is placed as a new residential area with good living conditions, circulated by new roads and fringed by green along the To Lich River. The area still has low density and is

now in its developing stage. Its problems are not so evident at present, however, future development will surely populate the area.

b. Ba Ding District

Ba Ding is a district in the north and north-west of the urban area with an area of 1168.8 ha. In this district, the R.32 development corridor runs to the west, connected to the Nghia Do development station in Tu Liem District. Other sub-axes are Doi Can Street and Giang Vo-Lang Ha Street. In this district, three different types of development can be seen, spreading from the city centre to the outer area.

The first is located in the very centre of the city, next to Hoan Kiem District. This area was developed under French colonialism on functioned as a modern administrative, diplomatic and commercial center. It includes the Ho Chi Minh Mausoleum and the Citadel, and is flanked by old quarters, north and south. The built-up ratio and green-covered ratio are higher than other areas in the city centre. Therefore, its population density is rather moderate, for instance, Phuong Dien Bien has 81 per ha. This area is approximately 360 ha.

The second area is in the intermediate area from Dai Yen to Giang Vo, north to south, with an approximate area of 440 ha. This area was developed recently. There are several residential estates, governmental offices, foreign embassies, and other public facilities. Even in districts with residential estates, population density is quite moderate, e.g. Giang Vo District has 270 per ha. Development and redevelopment in this area is now on going, which will create good living conditions on a par with international levels.

The third part is a fringe area to the west totaling about 370 ha. This is an area of parks, institutes and housing. New developments are on going on land created by recent drainage works. The northernmost part is to become important, connecting the western centre of commerce and tourism with the city centre.

c. Hoan Kiem District

Hoan Kiem is the very core of Hanoi City, including the commercial and administrative centre with an area of 417.0 ha. It has phuongs with the city's highest density, reaching a 1,263 per hectare. These phuongs are in the historic part of the city, "Hanoi Ancient", presently commercial and residential. This district also can be divided into two parts.

The first is ancient Hanoi, a residential and commercial area. A typical traditional land use pattern can be seen here, the privately used "tunnel house", which is only 3-5 m in width and 30-40m in depth. In these kind of houses, there multi-families dwell, and in some cases, less than 2 sq.m is shared for each person. This part of the district is located in a higher altitude, thus flood damage is not a problem usually, however large floods have caused extensive damage in this area.

The second is an old part, which had been developed rather recently under French colonialism. In this area are some magnificent monuments including the former National Central Bank, the Opera House, and luxury hotels.

Spaces between these larger buildings are filled with shops/houses in the traditional style as can be seen in the ancient area.

The drainage/sewerage system, which was constructed under French rule, is not working sufficiently.

d. Hai Ba Trung District

Hai Ba Trung is a large district which is located in the southeast of the Hanoi urban area. Totaling 1108 ha with a population of 300,372. It roughly consists of three parts.

One is the older area next to Hoan Kiem District with a rather high population density ; in Bach Mai it counts to 492 per ha. The southern area is a development front of high rise multi-storey apartment, and individual low housing.

The southeastern part of the district, in Minh Khai and Vinh Tuy, fronting the Red River, is an industrial centre of large scale factories, including engineering, textile, and food processing. Products are shipped from the Pha Den Port. Amongst the factories are high density housing areas, thus the population density is very high, and in Vinh Tuy it reaches 160 per ha.

The southwestern part of the district has a rather moderate population density; Hoang Van Thu has 125 per ha. This area still has a village-like atmosphere, but along R.1, one of the major development axis, transportation facilities like the Giap Bat Bus Terminal have been developed.

e. Thanh Tri District

This district has an area of 5,586 ha and population of 116,821 in 1992. R.1 runs all the way across the district and along this area located newly established engineering factories. The eastern part of the district is covered by water which is used for high productive fisheries.

The area between R.1 and R.6 is agricultural, mainly consisting of villages and farm land. It has a low population density, with Thanh Liet achieving 18 per ha. Recent industrial developments are in the southernmost part, almost alongside the district boundary.

This district is to be developed in the near future to absorb the Urban area's expansion caused by immigrants and resettlement from the city centre. The strategic treatment of low populated farm lands is one of the most critical issues of city planning.

f. Tu Liem District

Tu Liem is the district bounded by the Red River, Ho Tay, the To Lich, the Nhue and the R.6 development axes. It is located in the western part of the city, with about 5,700 ha and 182,000 population.

The district has two major development axes, Thang Long-Nghia Do and R.32. Thus large scale developments of public facilities, higher educational institutes and factories can be found along the R.32 and major rivers.

The residential areas are in the style of traditional farm villages. Modern style housing developments are not present, except illegal housing along the transportation axes connecting with the city centre and other minor centres.

B.2 FUTURE DEVELOPMENT PLAN -HANOI CITY MASTER PLAN-

Hanoi Municipal and Vietnamese National Government spent two years from 1990 to 1992 to prepare Hanoi's "City Master Plan". It was authorized by the Governments in 1993. This Master Plan covers about 10,000 ha of four urban districts and three suburban districts of Hanoi City and an additional area of Ha Dong of Ha Tay Province. Except for the Gia Lam District, the Study Area corresponds to the project area of the Master Plan.

Figure B2.1 and Table B2.1 summarize land use of the Master Plan. The Master Plan almost follows the recent development trend. Existing development axes emphasized their importance by the addition of a new axis, the Thang Long-Nghia Do axis, which will be the back bone of the northwest new development. These development axes direct urban development toward the peripheral areas. Strengthening the development skeleton, and lead development in a web-like pattern between axes, as shown on a schematic diagram, Figure B2.2. (Also refer to Figure B2.3, which presents population growth from 1993 to 2010, estimated by the Study Team).

Land use change between 1993-2010 is summarized on Table B2.1. Urban land will expand, especially the residential area of the Tu Liem District, to 1650 ha. This development is seen in the northwestern part or Nghia Do along R.32 axis, and the western part or Yen Hoa west bank of the Thoh Lich River. Industrial expansion is to be located mainly in the Thanh Long South and Nghia Do in the Tu Liem District, increasing by approximately 170 ha. All these will be changed from existing agricultural land. The city centre will not expand but will enhance its use by renovating the land use.

The following is a summarized outline of the Master Plan concerned with the development strategy and land use of the Study Area.

The Plan mentions the following points as a planning and development strategy ;

- The Plan will be prepared based on the market economy system
- A target will be set at the meeting point of technological and economic development
- Urban area planning will be made with a self support principle
- Relationship with other areas will be taken into account
- Improvement of urban amenities will be considered
- Managing and implementation organizations will be established
- Steady investment and implementation programs will be prepared

Following these strategies, the Plan will distribute the urban functions of Hanoi's territory. The space development formation of Hanoi city is to concentrate the City Centre functions to Hoan Kiem and Ba Dinh with their centrifugal development

sub-centres, which are connected by development axes or corridors. These will form a "star shape" or "spider net" pattern. Based on land use and functional categories, the following concepts are built up, and their locations are also identified.

(a) Functional Footholds

To found a functional formation of well-ordered development, the following functions will be stationed in strategic locations in the city.

i) Administration and Residential Core

Up to 2010, target year of the Plan, 14 cores shall be established. Their locations are ; Ba Dinh, Tay Ho, Nghia Do, Hoan Kiem, Dong Xuan, Van Mieu, Dong Da, Thanh Cong, Thanh Xuan, Hai Ba Trung, Bach Mai, Mai Dong, Xuan La and Gia Lam

ii) Industrial Area

- Minh Khai-Vinh Tuy (Hai Ba Trung) : 81 ha
- Thuong Dinh (Dong Da) : 76 ha
- Truong Dinh-Duoi Ca (Hai Ba Trung) : 32 ha
- Van Dinh-Phap Van (Thanh Tri) : 39 ha
- Cau Dien-Nghia Do (Tu Liem) : 27 ha
- Chem (Tu Liem) : 14 ha
- Cau Buou (Thang Tri) : 4 ha

iii) Centre Area

The following three centres are planned ; Hoan Kiem Commercial and Trade Centre, Ba Dinh Political Centre, and Ho Tay Culture-Tourism Centre.

iv) Historic Sites and Scenic Places

The City's precious historical heritage and natural scenic places including Dong Da, Le Minh, and Thu Le are designated as recreation places and tourist attractions.

(b) Residential Area Arrangement

Hanoi's addressing system follows the "street numbering system". The system is, major factors are streets and each community is composed of streets which are recognized as axes. Phuong boundaries sometimes zig-zag, including opposite sides of a street, so the new Plan will be based on a "block numbering system". Residential or community units will be bounded by streets and roads and they will be the prime elements to which with to identify communal units.

Residential units or clusters will be defined by roads, and consist of houses, shops, cultural places, community centres, and handicraft centres. Green areas and promenades will connect with other clusters and parks, and a primary school will be the core of each cluster. In these kinds of clusters, 10,000 inhabitants will reside consisting of 10-15 lesser units.

Each residential unit shall prepare their future development plan following the general plan. This detailed plan will control architectural features and form, population and building density, location and scale of public facilities, future characteristics of the unit and other physical features.

The residential area is categorized by the following;

i) Ancient Area

Architectural preservation area with three levels. 36 streets are designated as preservation areas in the Ancient Hanoi District.

ii) Old Area

Along four streets, south of Hoan Kiem Lake, is an area designated for renovation with preservation considerations.

iii) Villa Area

Three areas, around Thuyen Ouang Lake, Tanbat Ha and Ba Dinh, are designated for street scape beautification.

iv) Self Construction Area

Areas along the commercial and trade axes, Hang Bai-Bach Mai, Giai Phong-Le Duan, Tay Son and Doi Can are to be renovated and expanded, raising up houses and shops to increase usability of the land, and also to create better living condition, and amenities.

v) Outskirt Villages

Villages, such as Nhoc Ha, Trich Ha and Nghi Tam, will have urban infrastructure and be renovated to create an up-to-date living condition. Road connections will be improved and communication with the city centre and other districts will be secured.

vi) State-Built Area

The renovation of high-rise living quarters creating sufficient transportation, services and utilities will improve living conditions. Low building quarters, after privatization, will be renovated by dwellers themselves with a state invested infrastructure.

vii) Newly Constructed Area

In areas like Thanh Xuan, Thang Cong and Nghia Do, along the city gate axis, high-rise state apartments and self-constructed low dwellings will be constructed for immigrants and those who live in poor housing. Along the road axes, stand high rise apartments and behind are lower housing.

(c) Service System and Centre Functions

In Hanoi City, some centres and sub centres will be established. Three centres are Hoan Kiem Trade and Commercial Centre, Ba Dinh Political Centres and Ho Tay Culture/Tourism/Sports Centre. These centres will be supported by and linked with the West Sub-Centre on Thanh Long-Ba Dinh axis, the South Sub-Centre on R.1 axis in Duoi Ca, and the East Sub-Centre in Nguyen Van, Gia Lam. For good relations and communications between residential areas and these centre/sub-centres, and full utilization of their functions and potentials, several sub-axes will be prepared ; Hang Bai-Tho Kue-Bach Mai-Duong Dinh, Cat Linh-Giang Vo-Lang Ha-Nghia Do-Cua Dien, and Tay Son-Nguyen Trai Axes

(d) Offices and Educational Facilities

Offices and educational institutes will remain at their approved location with some appropriate functional adjustment, so as to catch up to new requirements. New higher educational institutes like universities and colleges will be located in two areas; northwest, along R.32 and Nghia Do and southwest, along R.6.

(e) Green Areas and Their Networks

Green areas will be located following the star form urban skeleton structure. Green promenades will be created along rivers and canals. The park system will include Thanh Nhan, Le Minh, Thuyenh Quan, Dong Da, Giang Vo, Ngoc Khanh and Thu Le Parks and the major green and water centres of Ho Tay and Truc Bach being linked by green promenades. Historic places like Ho Tay, Van Mieu, Dong Da, Hoan Kiem Lake will be focal points of the restoration, and adequate managing and operation systems will be installed.

Apart from the Master Plan, Hanoi UPI is preparing a plan titled "The Environment - View and Tourist Services at the West Lake", an areal development master plan. The outline of its development concept and target are as follows ;

- West lake is a centre of culture, entertainment, recreation, sport and international trading.

- Tourism development targets are ;

Project		Peninsula	Northern Bank	Western Bank	Total
Hotel	No. of Beds	2,420	1,694	726	4840
	Site Area(ha)	16.0	7.5	6.4	29.9
Office	Site Area(ha)	2.0	4.0		6.0
Trade Centre, Service	Site Area(ha)	3.0	12.0	1.5	16.5
Total	Site Area(ha)	21.0	23.5	7.9	52.4

These targets are based on the estimation that expects 40% of Hanoi's tourists will stay around the West Lake.

With the above mentioned concepts and development strategy, eight projects are given priority for early implementation by the year 1995. Following is a list of priority projects.

(1) Transportation System Improvement and Development

(2) Drainage System Improvement and Development

(3) Environmental Hygiene Improvement

(4) Housing Improvement and Development

(5) Water Supply Improvement

(6) Power Supply Improvement and Development

(7) Post and Telecommunication Development

(8) Public Utility Improvement

The Master Plan strives for moderate targets, making it more realistic. The physical plan for the enhanced areas including the city centre, it is emphasized that urban redevelopment will depend upon moderate renovations. The development goal is set as a result of an accumulation of these renovations.

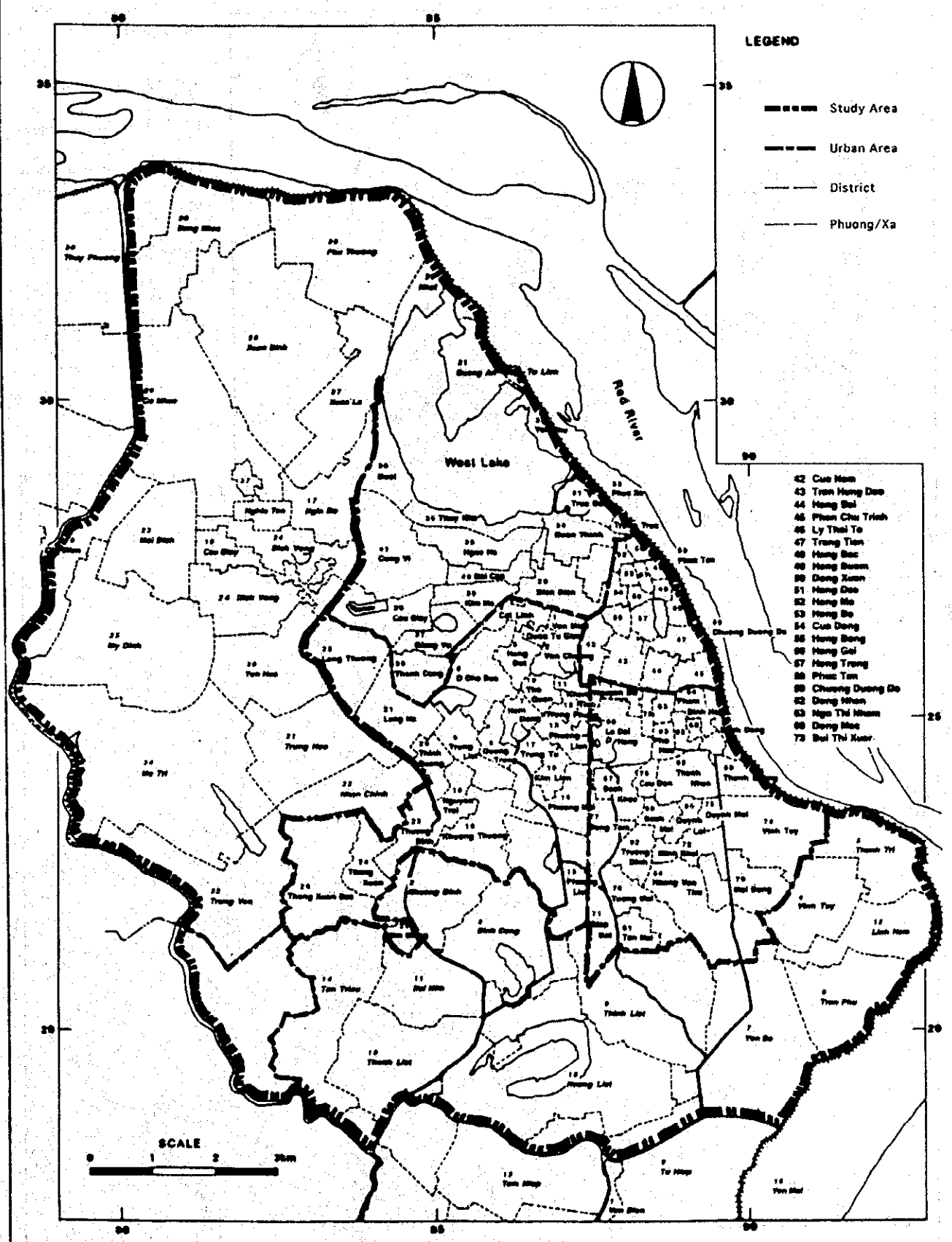
Table B2.1 Land Change of the Study Area, 1993 & 2010

(ha)

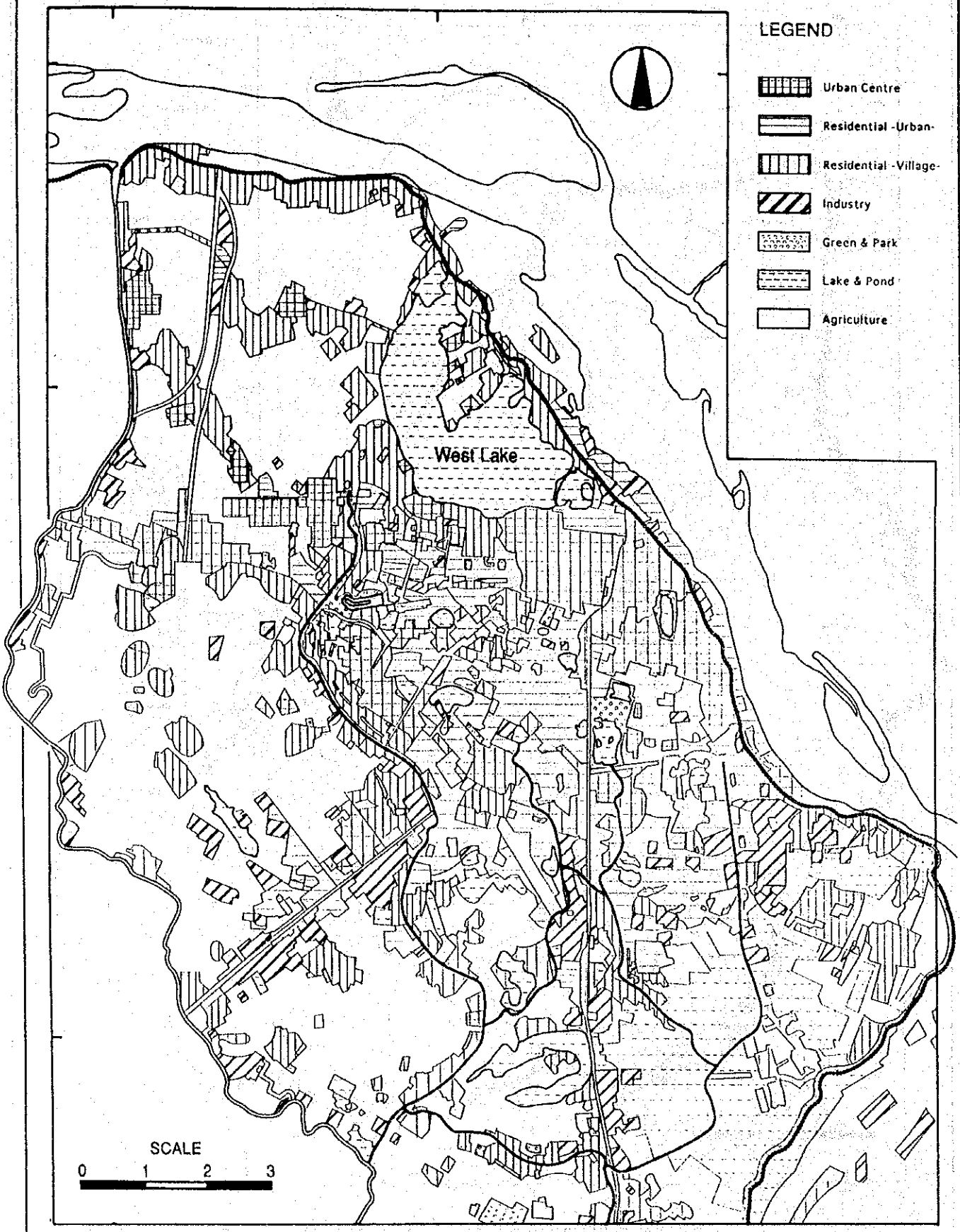
		City * Centre	%	Residential Urban	%	Residential Village	%	Industry	%	Green & Park	%	Lake & Pond	%	Agriculture Land	%	District Total
1993 Present Land Use	URBAN	860	6.4	1,900	14.0	510	3.8	150	1.1	150	1.1	260	1.9	110	0.8	3,940
	SUBURBAN	60	0.4	1,100	8.1	1,290	9.5	450	3.3	0	0.0	2,010	14.8	4,690	34.6	9,600
	STUDY AREA	920	6.8	3,000	22.2	1,800	13.3	600	4.4	150	1.1	2,270	16.8	4,800	35.5	13,540
2010 Master Plan	URBAN	860	6.4	1,970	14.5	510	3.8	230	1.7	150	1.1	220	1.6	0	0.0	3,940
	SUBURBAN	120	0.9	3,360	24.8	1,780	13.1	420	3.1	210	1.6	1,710	12.6	2,000	14.8	9,600
	STUDY AREA	980	7.2	5,330	39.4	2,290	16.9	650	4.8	360	2.7	1,930	14.3	2,000	14.8	13,540
1993-2010 Change	URBAN	0	0.0	70	0.5	0	0.0	80	0.6	0	0.0	-40	-0.3	-110	-0.8	0
	SUBURBAN	60	0.4	2,260	16.7	490	3.6	-30	-0.2	210	1.6	-300	-2.2	-2,690	-19.9	0
	STUDY AREA	60	0.4	2,330	17.2	490	3.6	50	0.4	210	1.6	-340	-2.5	-2,800	-20.7	0

*: City Centre includes Ancient Area, Public, Office and Commercial

Source Existing Land Use Map, JICA Study Team, 1993
Master Plan Map, HUPI, 1992



SOCIALIST REPUBLIC OF VIET NAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. B1.1 Study Area and Administrative Boundery

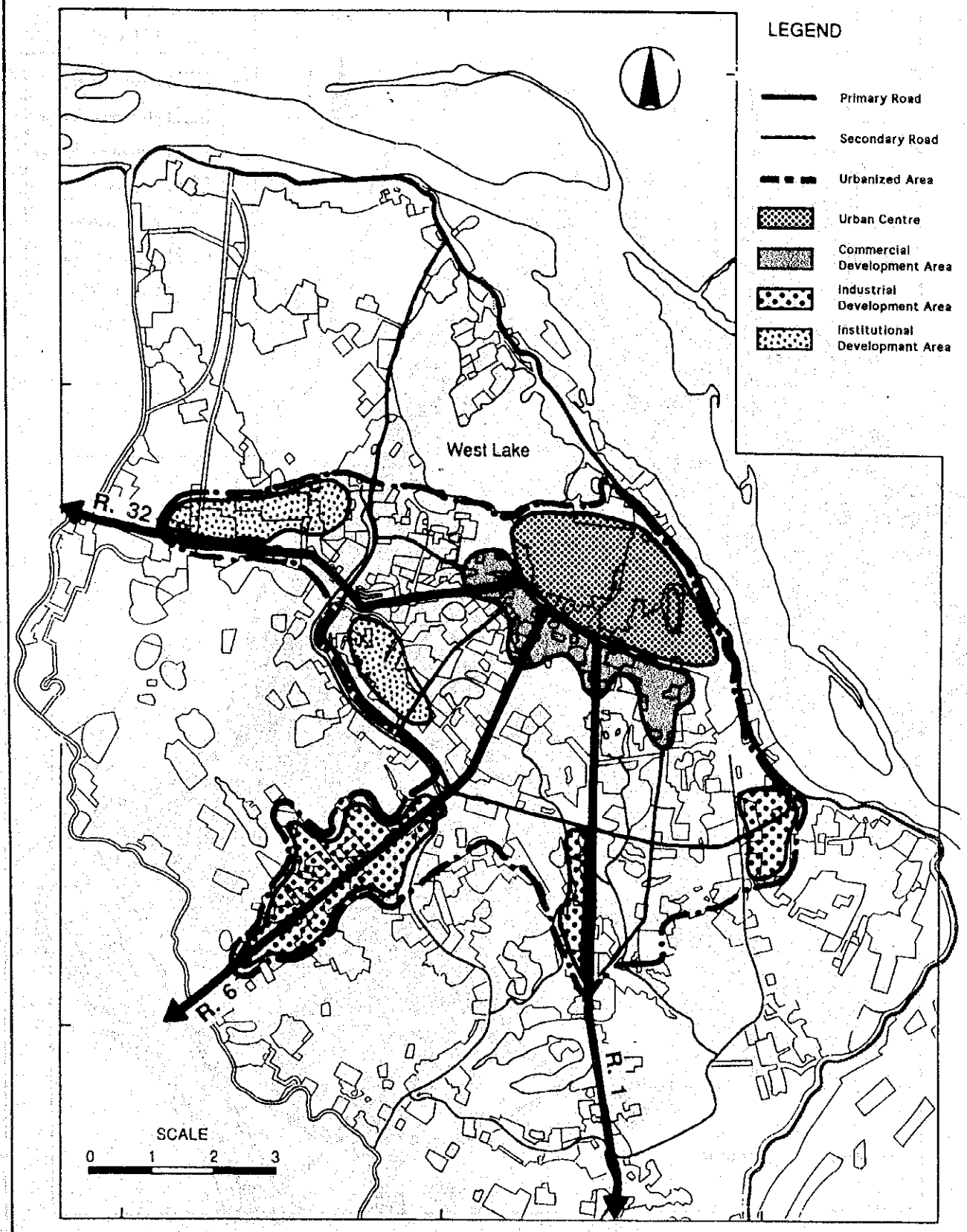


SOCIALIST REPUBLIC OF VIET NAM
THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY

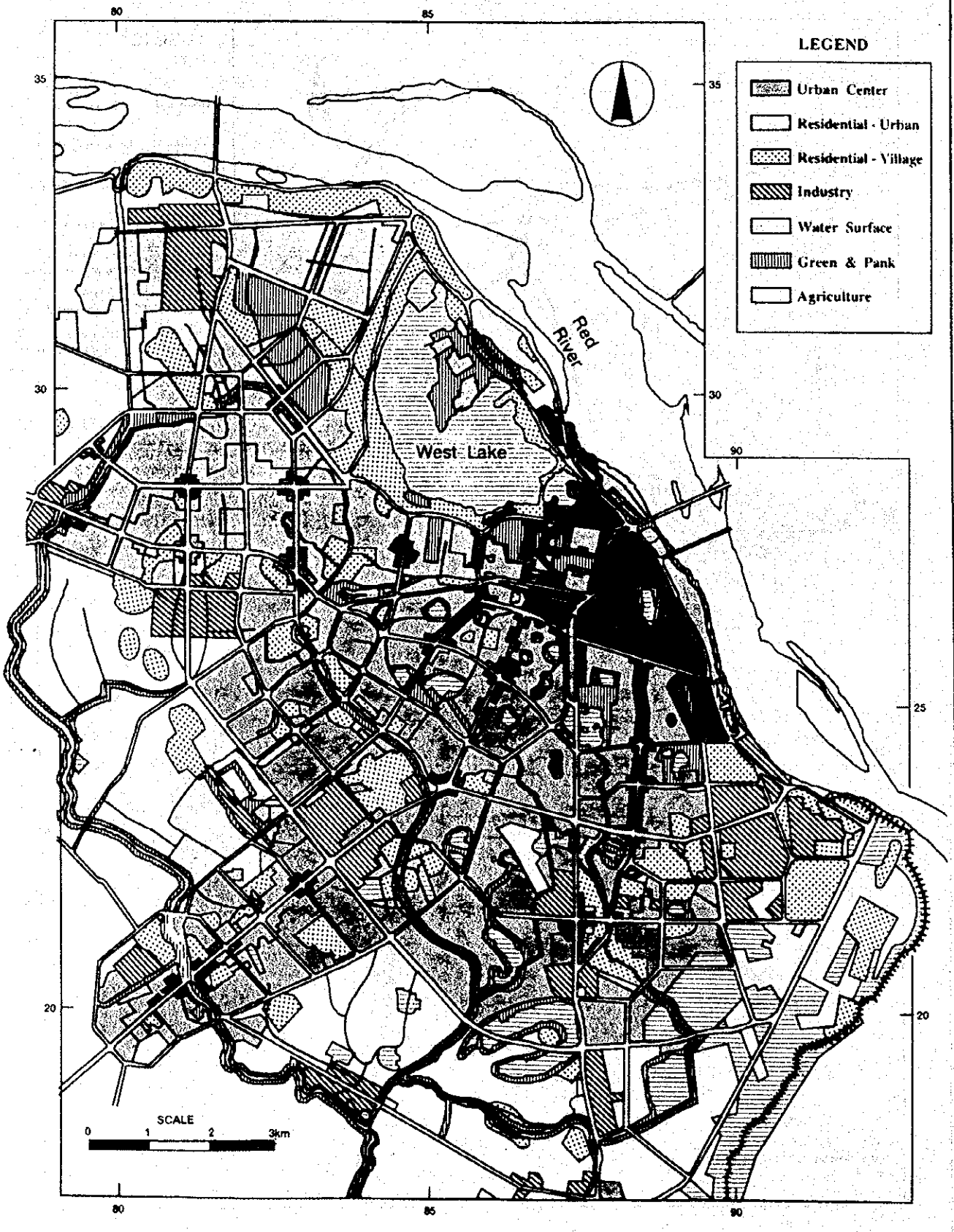
JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. B1.2

Present Land Use, 1993



SOCIALIST REPUBLIC OF VIET NAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. B1.3 Urban Structure of Hanoi City

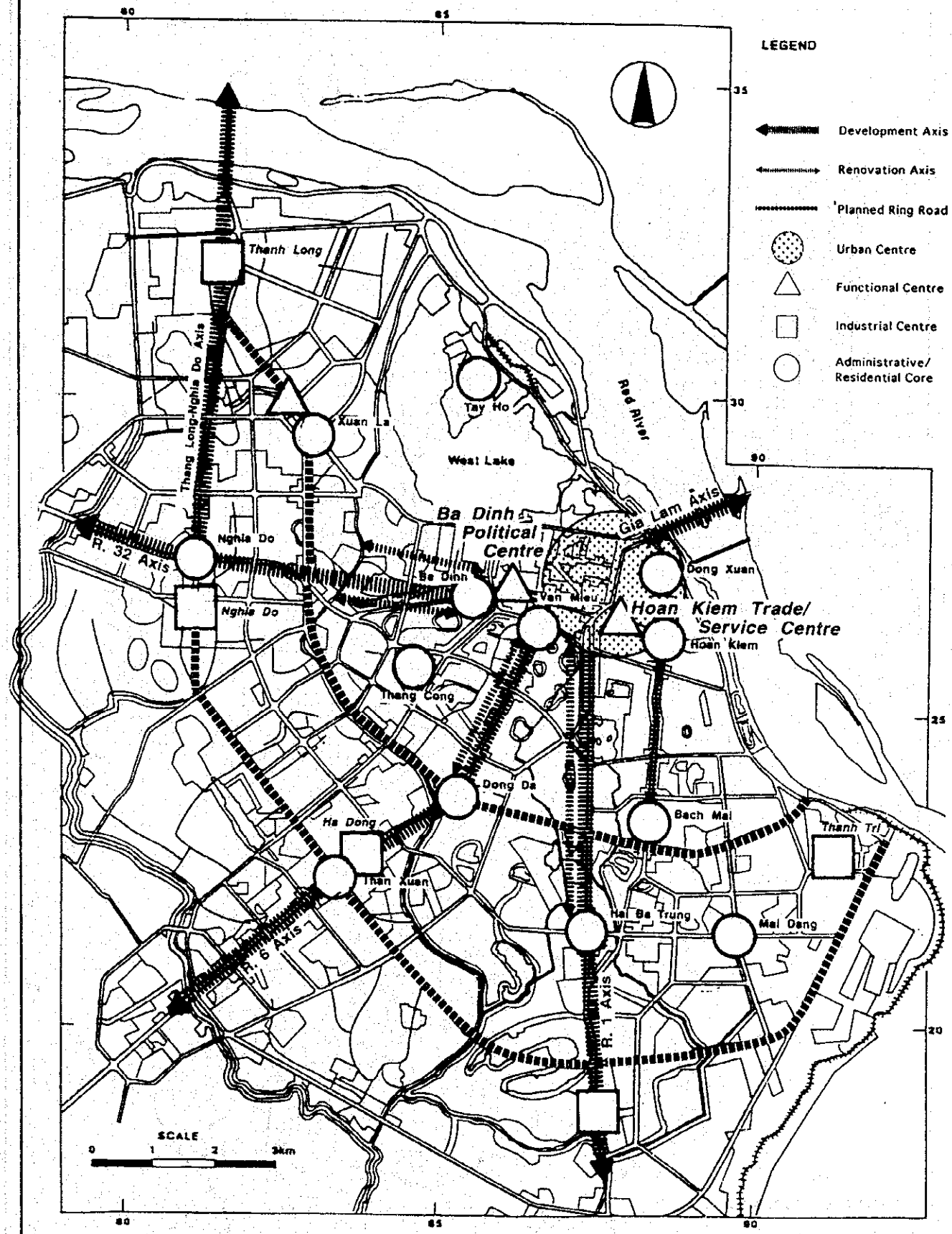


SOCIALIST REPUBLIC OF VIET NAM
THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. B2.1

Hanoi Master Plan Land Use, 2010



SOCIALIST REPUBLIC OF VIET NAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. B2.2 Urban Structure of Hanoi City, 2010