Table 2.1.16 Secondary Technical School and Secondary Vocational School

Unit: schools

	Secondary Technical school	Secondary Vocational school
No. of schools	239	151
No. of students	124,608	91,401
No. of teaching staffs	9,770	5,342

Source: MOET

Table 2.1.17 Number of Students and Teaching Staff by Group of Subject

Unit: students and staffs

	Secondary Technical school		Secondary Vocational school	
	Students	Teaching staff	Students	teaching staff
Technical	18,869	1,933		
Agro-forestry-fishery	15,672	1,233	9,969	558
Economic-service	26,009	1,630	8,351	498
Pedagogy	33,938	2,351		
Healthcare-sport	21,682	1,799		
Culture-Arts	8,438	824		
Industry			36,361	2,227
Construction			13,179	765
Transportation-post			22,123	1,227
Culture-Information			1,418	67
Total	124,608	9,770	91,401	5,342

Source: MOET

Table 2.1.18 The Ratio of Teaching Staff by Qualification

Unit: %

Qualification	Secondary Technical school	Secondary Vocational school
Doctor	0.0	-
Master of science	0.3	-
Master	4.3	2.1
Bachelor	75.7	60.7
Secondary Technical	14.7	19.4
Secondary Vocational	-	14.3
Others	5.0	3.4

Source: MOET

(4) Vocational training

There are around 1,800 vocational training centers (VTCs) throughout Vietnam. But they do not play sufficient roles in training skilled workers. The demand for skilled workers in Vietnam is from 300,000 to 350,000, however VTC can provide only 17,500. In Hanoi, only 20 % of the demand for skilled workers can be supplied.

Vietnam has a plan to set up one center in each district. In Ha Tay, 9 district out of 13 have VTC. The districts which do not have VTC are Phu Xuyen, Chuong My, Dan Phuong and Ba Vi.

(5) Evaluation for HRD in Vietnam

According to the questionnaire survey on enterprises, research institutes and higher education institutes, they are facing the shortage of highly educated personnel such as engineer, researcher, and professor. The fields such as management, electronics and machinery are required urgently. This result means that the current higher education does not meet the needs of enterprises, research institute and higher education institute.

(6) Existing Facilities in Surrounding Area

Son Tay has two secondary vocational schools and one VTC. Xuan Mai has one university, two colleges one secondary technical school and one secondary vocational school. Hoa Lac and Mieu Mon do not have any facilities.

(7) Review of HRD System in the Master Plan of HHTP

Master plan of HHTP conducted by JICA proposed that establishment of four centers and one institute in the Phase-1, which targets 2005 and 800 ha. M/P conducted by the Government of Vietnam targets 2003 and 200 ha as Stage-1 of Phrase-1. This 200 ha includes the areas where four centers and an institute locate but there is no mention about concept of them.

According to the M/P of HHTP by JICA, three of five facilities above mentioned will be established to provide training services. Those facilities are i) Technical Institute, ii) OJT Technical Support Center and iii) National Software Center. National Software Center will be established in Software Park, on the north of R&D Zone, and remaining facilities will locate in HHTP center area.

The proposed floorage of each facility is shown in the Table 2.1.19.

Table 2.1.19 Floorage of Proposed Facilities

Center / Institute	Floorage (m^2)
Technical Institute	6,170
OJT Support Center	2,830
National Software Center	6,016

The proposed function of each facility is as follows:

(a) Technical Institute

This institute is a kind of secondary technical school for aiming at the development of high-tech human resources. The offered plan is 2-year technical education and 6-month in-plant training for upper secondary school graduates, 3-year technical education and institutional training and 6-month in-plant training for lower secondary school graduates. The proposed courses are information technology, pollution prevention technology, electric engineering and analysis technology. The curriculum for lower secondary school graduates includes fundamental subjects such as mathematics, physics, chemistry, English, etc. The capacity of this institute is 300 students and number of teaching staff is 45.

(b) OJT Technical Support Center

This center will be established aiming to re-educate and re-train workers for high-tech industries. One of major services is to support a new plant operation. When an enterprise begins to operate a new plant, the center will provide space to the enterprise and the enterprise gives practical and technical training to its employees by using specific equipment for that new plant confidentially. And another service offered by this center is short-term training such as Computer Aided Design (CAD), electronic circuit design, precision machining and total quality management (TQM). The capacity of training is about 200 students and number of instructors is 30. This center equipped with training laboratories, lecture rooms, multifunction rooms, technical library, etc.

(c) National Software Center

National Software Center will be established to promote the computer software, which is the first priority target of high technology. The role of this center is expected to supply the manpower to information services, high grade electric and telecommunication services and computer industries and to support small- and medium-enterprises (SMEs) in software industries by providing several services such as rental office, technical consultant, etc. This center offers an intelligent building equipped rental office space, multipurpose room, workstation, etc., which linked with one another by local area network (LAN).

From the long-term viewpoint, it is necessary for the success of HHTP to provide all services and facilities above mentioned. But economic climate has changed by regional economic crisis and it is difficult to expect so much foreign direct investment (FDI) for a while. In such a condition, the demand for some centers is not so much as estimated in the M/P of JICA. Therefore, OJT Technical Support Center should be postponed until high-tech enterprises accumulate to some extent that the sufficient demand for these centers generates.

Functions of the National Software Center can be substituted by other centers in the initial stage because the demand for this center will not be so much as estimated in the M/P of JICA. National Center for High-Tech Research and Training (NCHRT), aiming at R&D and education and training on information technology (IT), can provide E&T function for software and technical consultation service of support function for SMEs in software industries. High-Tech Park Center can offer other main function to software industries such as providing office space, management consultation service for entrepreneurs and commercial facilities. When sufficient investment can be seen in Software Park in future, National Software Center may be established.

Technical Institute has high priority because it takes much time to nourish fully educated and trained personnel and providing qualified personnel shall be one of the sales points in the Corridor 21 Development.

Technical Institute should increase the capacity including number of teaching staff to meet growing demand for technicians as well as to balance the budget. The period of E&T for lower secondary school graduates is not enough to master both fundamental subjects and specialized subjects. The proposed courses should be reconsidered. They do not include mechanical areas, which are the most basic studies for manufacturing. The demand for analysis technology course in the initial stage will not be so much as estimated in the Master Plan. The graduates mastering this course will be a kind of assistants of researchers. Most research institutes where they work will locate in HHTP after 2005.

2.1.3 Needs of the Corridor 21 Development

Admittedly, the living environment in the central Hanoi area is so inadequate in terms of its dwelling quality, population density, traffic congestion, and so on, and furthermore, it should face, in the not too distant future, the crucial issues pertaining to spill over population from the

Development. From the aspect of alleviating the excessive urban concentration in the future HMA, the proposed development of a new satellite city in the Hoa Lac and Xuan Mai Areas will be of strategic importance and significance, first to solve the degrading urban environment in HMA, and secondly, to promote the development of human resources as well as science and technology in the country.

(1) Limited Space to Absorb New Population

The Development was initiated to absorb the probable spillover population from the central Hanoi area in the medium- and long-term future. As the economic and administrative center of the country, HMA has been and will be attracting constant influx of migrating people to seek job opportunity. With the limitation of the absorptive capacity of the central area, the Government plans to develop both sides of the Red River for its new residential areas. However, they can only accommodate the people who are now living in the central Hanoi area, and hence, other residential areas will be required to absorb the surplus population.

(2) Living Environment

Average dwelling area per person is reported as 4.87 m^2 in Hoan Kiem District, 5.2 m^2 in Ba Dinh, 4.7 m^2 in Dong Da, and 5.24 m^2 in Hai Ba Trung District. These marginal dwelling areas reflect a high density of population. In one house, many family members are living together because of a short supply of housing.

Quality of dwellings has been deteriorating since the Government had to allocate a large amount of budget to improve other infrastructure, such as water supply, electricity, and so on. Even now investment for the housing development is inadequate, and maintenance works have not been well conducted since rental fees had been kept at a very low level. General conditions of the present dwellings are totally inadequate. Part of the solution is to supply new dwellings outside the central urban area, for which the Hoa Lac and Xuan Mai Areas can best offer new living environments.

(3) Traffic Congestion

Almost all the roads in the central Hanoi area are substandard to guarantee a smooth flow of the potential traffic, which is heavily mixed with bicycles and motorcycles. There is a bare capability to expand existing roads and/or construct new roads in the densely populated and well-established urban area. The report entitled "Master Plan for Transport Development Project in Hanoi Capital up to 2020 (1997) " has suggested that any traffic

policy cannot effectively solve the expected traffic congestion. When majority of transportation means will shift from bicycles to cars, this situation will be aggravated further, which crucially needs to be attended somehow. The development to share over-concentrated urban functions from the central Hanoi area is expected to provide an answer to this problem, although it would not be a total solution.

(4) Administrative Capability

The Government has adjusted its development policy by altering its concept of the Greater Hanoi to include the concept of developing satellite town including Son Tay and Ha Tay, and proposing to transfer the administrative capacity for urban development to a local government level. Along this policy, Ha Tay Province, as a principal stakeholder for the Hoa Lac and Xuan Mai urban development, should take the administrative initiative for the development of a new satellite town.

2.1.4 Potentiality of the Hoa Lac and Xuan Mai Areas

The Hoa Lac and Xuan Mai Urban Area has the advantage of inheriting a wide, unused government land, which greatly contributes to easier and economic development for such a huge urban development. The following are the major advantageous points:

(1) Inexpensive Land

The land of the proposed site is mostly hilly and uncultivated area free from any flooding, and as such, costly land filling is not necessary unlike the land adjacent to the Hanoi Area. Furthermore, the development will face minimum resettlement problems due to mostly being uncultivated area with relatively lesser degree of inhabitants involved.

(2) Easy Acquisition

The Government owns large parcels of the land in the proposed site, which can greatly contribute to savings in total land acquisition cost. This is in fact a tremendous advantage to agglomerate a huge area necessary for the purpose of a large-scale urban development. This same situation seems unlikely to be duplicated in any other place in the HMA.

(3) Good Natural Environment

The natural environment of the proposed site shows a sharp contrast to the central Hanoi area located over the alluvial flat plane of the river. In Hoa Lac and Xuan Mai urban Areas, there are mountains, rivers and lakes, which present beautiful, resort-like natural

scenery. This is the precious environment within which to establish a garden city. And the Dong Mo Resort Area located just adjacent to the Hoa Lac Urban Area can add to the attractiveness of the new town for potential residents, thus contributing to induce an influx of new residents and investors as well.

(4) Accessible Distance from Hanoi

The proposed new town in Hoa Lac is located approximately 30 km west south from the Hanoi City. Once the new Lang-Hoa Lac Highway is completed probably by the end of 1999, it will take only half an hour drive from Hanoi City. This short traveling time may fall within the acceptable range for commuters between the new town and Hanoi City. And no longer be a factor even when compared to the other major industrial zones (IZs) being developed around the Hanoi City.

(5) Availability of Surface Water

Reportedly, ground water available in the proposed site cannot meet the probable requirement and thus new water sources become necessary. One of the most promising water sources is from the Da River, and Hoa Lac is located about 30 to 40 km (depending on the place of intake) from the Da River. It would require a minimum expenditure to facilitate the water supply system for the new town in Hoa Lac.

2.2 Review of the MOC Master Plan

The concept for the development of the area covering Mieu Mon - Xuan Mai - Hoa Lac - Son Tay was positioned within the future development framework of the HMA, and the formulation of a master development plan was directed to MOC in April 18th, 1996 by the Prime Minister Office. The work for the formulation was conducted by the NIURP of MOC, and the results were approved by the Prime Minister in June 2nd, 1996 (see Figure 2.2.1 and 2.2.2).

The master development plan area covers the northwestern part of Ha Tay Province (partly including the area of Hoa Binh Province) located about 30 km west of Hanoi City. The area is located along the National Road 21A (NR 21A) with the approximate area of 17,000 ha having gently sloping terrain from west to east, where Vietnam National University (VNU), Hoa Lac High-Tech Park (HHTP), IZs, and other urban functions are planned to be introduced to form a satellite town with the target population of one million in the future.

In this section, the MOC M/P is reviewed in relation with its characteristics and subjects that may require further studies, as it will serve as a basis for the JICA Study.

2.2.1 Objectives of the MOC Master Plan

The objectives of the MOC M/P are as follows:

(a) To implement the national development strategy for urban corridor on the North of Vietnam and the spatial development strategy for the Capital to form Hanoi urban group,

(b) This development plan will contribute to establish a reasonable and solid spatial development orientation on the West area of the Hanoi City, as well as to create a motivation for the socio-economic development of Ha Tay Province,

(c) To create advantages to implement large projects such as VNU and International University, HLTP, Phu Cat Concentrated Industrial Zone, Vietnam Ethnic Traditional and Cultural Villages, Ba Vi Mountainous Tourism Resource, Suoi Hai Health Care Center, Dong Mo Tourism Resource, Lang-Hoa Lac Highway, North-South Highway, Mieu Mon International Airport, and many other important projects,

(d) To combine the socio-economic development with the national security and defense, and

(e) To establish a legal foundation for development guiding and land management.

2.2.2 Prerequisites for Development by MOC

(1) Functions of Towns

The functions of towns are as follows:

(a) An area for urban development aims at reasonable development of Ha Tay Province and Hanoi City,

(b) A center for training, scientific research, and high-tech with the significance for the country, the region, and the world,

(c) An industrial center concentrating high-tech and military industry.

(d) A cultural, tourist and resting region, and

(e) An important position for national defense and security.

(2) Socio-economic Framework

High population growth rate of urban areas is caused mainly by social migration including scientists, professors, students, technical workers and their family, according to the regulation rule. Another part is free migration of intellectuals and skilled workers together with part of population working in the form of unskilled workers they come form adjacent urban areas (see Table 2.2.1 and 2.2.2).

Table 2.2.1 Population Frame (MOC)

Unit: Persons

Ref.	Name of Urban Area	Present 1996	Distribution, according to planning stages		
			Short-term 2005	Mid-term 2010	Long-term 2020
I	Son Tay Urban Area	40,000	60,000	80,000	100,000
II	Hoa Lac Urban Area	44,000	150,000	120,000	670,000
III	Xuan Mai Urban Area	35,000	60,000	100,000	170,000
IV	Mieu Mon Urban Area	1,000	5,000	10,000	30,000
V	Reservation	-	10,000	20,000	30,000
	Total	120,000	285,000	620,000	1,000,000

Source: NIURP/MOC

Table 2.2.2 Employment Frame (MOC)

Ref.	Name of Urban Area	Current State of 1996 (Labor)	Distribution, according to planning stages (laborers)		
			Short-term 2005	Mid-term 2010	Long-term 2020
I	Son Tay Urban Area	16,000	25,800	36,000	50,000
II	Hoa Lac Urban Area	17,600	74,500	189,000	335,000
III	Xuan Mai Urban Area	14,000	25,800	45,000	85,000
IV	Mieu Mon Urban Area	400	172	180	200
V	Reservation				
	Total	48,000	126,272	270,780	470,000

(3) Land Use Frame

The Land Use Frame and land Use Demand are summarized in the Tables 2.2.3 and 2.2.4.

Table 2.2.3 Construction Land Demand for Each Urban Area (MOC)

Unit : ha

Ref.	Name of Urban Area	Total land for urban development per phase (ha)		
		Short-term 2005	Mid-term 2010	Long-term 2020
I	Son Tay Urban Area	700	800	900
II	Hoa Lac, includes:	3,900	8,000	12,000
2.1	Dong Xuan Residential Area-Town Center	800	2,700	3,600
2.2	International University	100	200	300
2.3	Vietnam National University (VNU)	500	1,000	1,200
2.4	Hoa Lac High-Tech Park (HHTP) (excluding water surface/stabilization ponds)	800 (300)	1,200 (300)	1,600 (300)
2.5	Phu Cat Concentrated Industrial Zone	600	850	1,200
2.6	Binh Yen Residential Area	200	800	600
2.7	Dong Mo tourist, cultural, resting, amusement, sport are of which, (excluding water surface/stabilization ponds)	900 (500)	1,750 (800)	3,500 (1,250)
III	Xuan Mai Urban Area	100	1,500	2,500
IV	Micu Mon Urban Area (excluding water surface/stabilization ponds)	400 (150)	700 (300)	1,600 (1,000)
	Total Urban Area (excluding water surface/ stabilization ponds)	5,100 (850)	11,000 (1,400)	17,000 (2,550)

Table 2.2.4 Land Use Demand by Categories (MOC)

Unit : ha

Ref.	Description	Shot-term 2005	Long-term 2020
	Total Demand of Urbanization Area (I + II)	6,000.0	17,000.0
I	Civil land	2,462.5	7,980.0
1.1	Residential land	1,207.5	3,480.0
1.2	Land of public works, services	275.0	618.0
1.3	Land of roads, square	492.0	1,934.0
1.4	Land of green trees, sport and gymnastic, famous landscape	668.0	1,588.0
II	Land out of civil use	3,537.5	7,210.0
2.1	Land under industrial production premises	880.0	2,400.0
2.2	Land of agencies, schools	620.8	1,275.0
2.3	Land of external relation roads	220.2	340.0
2.4	Land of national defense	413.2	499.9.0
2.5	Land of forestations	113.0	138.9
2.6	Reserved land	501.0	554.0
2.7	Land of technical connection projects (excluding airport)	56.8	156.2
2.8	Land of prohibited area	56.8	138.8
2.9	Other land	126.7	300.0
2.10	Land of airport	540.0	1,400.0

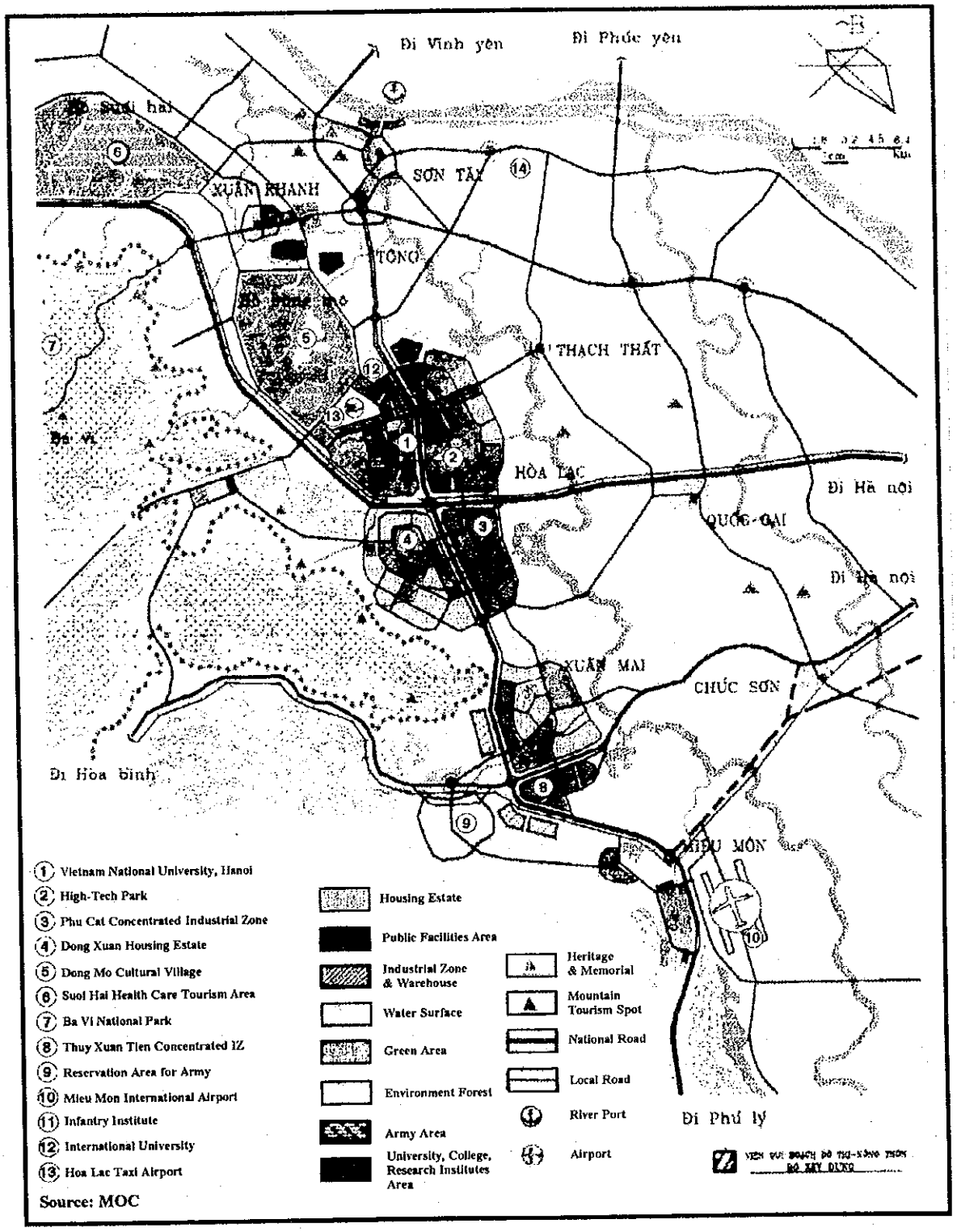

Figure 2.2.1 MOC Master Plan

2.2.3 Spatial Development Orientation by MOC

(1) Selection of Suitable Area for Urban Development

Using the land of gentle hills along both sides of the NR21A from Mieu Mon through Xuan Mai, Hoa Lac, and Son Tay.

Limited Urban Development Area:

Joining the Red river to the North,
Tuy Lai Lake to the South,
Tich River to the East, and
Ba Vi Mountain to the West.

Slope direction of natural topography: From West to East, there is Tich River to the East that is the place to drain rain water - natural river.

The cover of land selected for development mainly includes land under cash crop, gentle hills, valleys under industrial plants and regenerating forest. The proportion of land that has been used for construction is not significant.

Total land is able to exploit 80,000 ha.

(2) Mieu Mon Urban Area

The function of Mien Mon Urban Area will be international airport, service center for international airport and an important position for the national defense.

Main functions are as follows:

(a) Mieu Mon International Airport: The area of tarmac terminal, airline safety area, newly upgrade airport area based on existing field aerodrome area,

(b) Airline Service and Tourist Center: Airline Service Center will be arranged in the north of Dap Xuong lake, and the Tourist Center: Around Dap Xuong lake (excluding the North),

(c) Consumers' goods production cluster - Van Son: Handicraft and fine-art products for export will be arranged in the West of Van Son lake, with the scale of 100 ha,

(d) Living area organizing the form of the entire garden street in the South and the West of the tourist area around Dap Xuong lake, and

(e) Green trees parks, lake, sport and gymnastics: Building a part near Van Son lake in the North, a park of Dap Xuong lake at the urban center, forest park and sub-urban golf course in the South West.

(3) Xuan Mai Urban Area

Urban function: being a concentrated industrial, economic center, and an important area for national defense. The functions are as follows:

(a) Industry and warehouse system: It is planned to build an industrial zone for construction material, mechanical assembling and manufacturing at Thuy Xuan Tien, with the scale of 450 ha and an industrial zone for high-quality consumer's goods production at Hoa Son, with the scale of 150 ha.

(b) National defence areas: Existing establishment of National defense will be maintained basically, just scheduling peripheral infrastructure system.

Residential areas:

on the basis of improving a part, and newly building 4 sub-areas: Hoa Linh, Son Linh, North Thuy Xuan Tien. South Thuy Xuan Tien, with average scale of 40,000 people for each sub-area.

Urban public service center:

includes administrative center in the South of Nuot mountain, commerce and service center at Xuan Mai intersection.

Sports and cultural center in 2 areas:

Thuy Xuan Tien lake and the bridge crossing the Bui river.

Green tree park, water surface system:

includes and integrated system or green trees of rivers and lakes separating functions areas directing the "Tam Hoi Tu" park into the park of Thuy Xuan Tien lake, and ecological forest parks in hill and high mountains area.

(4) Hoa Lac Urban Area

Urban function: being an industrial economic and tourist center and a national sports and cultural center - a center for training, scientific research, high-tech and a national high-tech center, an important traffic connection and for national defense (see Figure 2.2.2).

Including the functions as follows:

(a) Industry and premises: Phu Cat high-tech industrial zone with the scale of 1,200 ha - high-tech industrial products, and a national and international high-tech industrial zone with the scale of 1,650 ha.

(b) System of universities and institution and for science research is planned to be the completely trained center inside the area of Vietnam National University (VNU), International University, and the one of its parts is located in Hoa Lac High-Tech Park (HHTP) with its scale is 1,000 ha.

(c) Residential District: including of Dong Xuan large-scale residential zone for cadres and workers of the high-tech contributed industrial zone, and VNU. Binh Yen mediation-scale residential zone for cadres and workers of the HHTP and International University. The students reside at inner hostels of VNU, the main workers of the high tech zone reside at the inner high standard residence of HHTP.

(d) System of the 1st level public construction of urban consists of Hoa Lac commercial administration center from Doi Dun Mountain to NR21A, and the center of Dong Mo sport-culture-entertainment tourism.

(e) System of the 2nd level public construction of urban consists of the service execution centers belonging to each inner region of VNU, HHTP and the high-tech industrial region.

(f) System of green trees-part of the physical sport zone, inner surface of water: including of the cluster of big parks such as Dong Xuan, Tan Xa lake, Than Lan, Phu Cat, Dong Mo lake and the sections of ecological green park covered round the side of inner zone.

(5) Son Tay Urban Area

Urban function to be a center of tourism service, an important position of national defense. Consists of the following function urban areas:

(a) The old Son Tay town: includes housing areas in Ngo Quyen, Quang Trung ward and Phu Nhi, Thieu Khe, Mai Trai hamlet, and administrative, cultural center and river port industrial and tourism equipment manufacturing centers.

(b) Son Loc area: includes housing areas in Son Loc ward, Nghia Phu, Mai Trac hamlet and commercial services and tourism center with transport network.

(c) Xuan Khanh urban area: includes housing areas in Xuan Khanh ward, and processing industry and tourism services centers.

(d) Military urban areas: the existing works are in the south of Route 87A

(e) Green, parks and sport yards: the Ancient Citadel will be a central museum park the green along Tich River with periphery environment park and other historical and cultural heritage.

(6) Ba Vi Tourism Area

The Ba Vi health care and tourism area includes the land of 11 mountainous communes near Da River (of which 7 communes are the neighboring areas of Bavi National Park and 4 communes on the North of Suoi Hai Lake), with the total area of 24.754 ha (of which 5,000 ha are natural forest and 1,200 ha is of the large Suoi Hai Lake). Present population is 60,000 people.

2.2.4 Development Plan of the Phase-1 by MOC

(1) Objectives of Phase One Development

- To plan to exploit effectively the land, landscape preparing the space ground and land ground for 211 area. As initial the premise is urban infrastructure and racial facilities to build for the plan of the first years of the 21st century.
- To create a basic to make project on calling for investment and building management. Particularly to all investment of projects of any fields.
- To clearly determine the parts of long-term building for all land as general planning.
- To limit the elevation ideal long-term comprehensive scale.
- To meet building request for the First Stage of ten years.

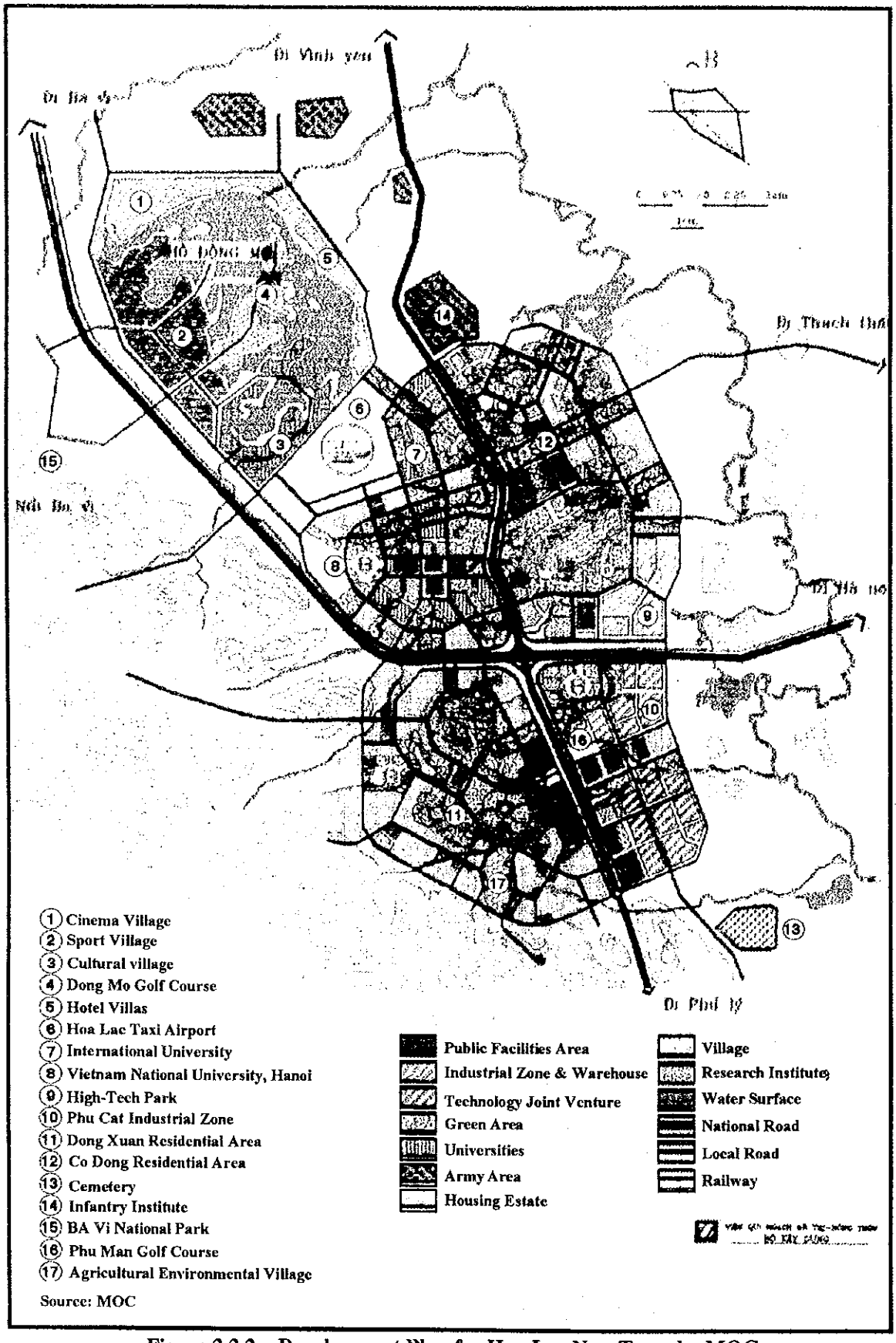

Figure 2.2.2 Development Plan for Hoa Lac New Town by MOC

(2) Land Use Plan

1) Land Use Principles

(a) Comprehensive investment, complete every field

(b) Meet the developing demand of every field

(c) Flexible, suitable division of the investment capital

(d) Make foundation for next stages

(e) Building centrally infrastructure near NR21A, Lang-Hoa Lac Highway and North-south Highway.

(f) Obey strictly the comprehensive planning of Hoa Lac

2) Land Requirement Land (see Table 2.2.5.)

Table 2.2.5 Land Requirement for Phase-1 Development by MOC (1996-2005)

Ref.	Towns	Civil land (A)		Non-civil land (B)		Total land required for the first phase (A + B)	
		Target (m^2/p)	Area (ha)	Target (m^2/p)	Area (ha)	Target (m^2/p)	Area (ha)
I	Mieu Mon	95	47.5	70.5	352.5	165.5	4,000
II	Xuan Mai	90	540	76.7	460	166.7	1,000
III	Hoa Lac	95	1,425	165.0	2,475	260	3,900
IV	Son Tay	75	450	40.3	250	115.3	700
	Total		2,462.5		3537.5		6,000

2.2.5 Considerations on the MOC Master Plan

(1) Characteristics of the MOC Master Plan

The Corridor 21 Development is composed of the four districts, namely Mieu Mon, Xuan Mai, Hoa Lac, and Son Tay. These districts are mutually linked by NR 21A, thus the linkages among the districts are taken into consideration for the future development.

Among the four districts, Mieu Mon, Xuan Mai, and Son Tay have their existing urban or community accumulation, and therefore, they should be developed in an "expansion" type. In contrast, Hoa Lac is a new development although there are some commune villages in

the proposed area. The Corridor 21 Development can be developed as an attractive new town by taking advantage of the existence of the existing urban accumulations as well as their distinct historical and cultural characteristics.

The MOC M/P designates the development area chiefly lying in the gentle hills avoiding the flooding in the rainy season as well as the reduction of agricultural land as it is important industry in the area.

Obviously, the Hoa Lac Urban Area is the center of the whole Corridor 21 Development where diverse urban functions are concentrated with the population assignment of more than 70 % or 670,000 in the area of 12,500 ha out of the target one million in the total area of 17,500 ha according to the MOC M/P.

The specific characteristics of Hoa Lac Urban Area are as follows:

(a) Central location of the Corridor 21 Development

(b) Availability of a large-scale agglomerated land for development

(c) Lined with the Hanoi City with the Lang-Hoa Lac Highway currently under construction.

These characteristics imply the high potentiality for its development, and therefore, development efforts should be concentrated to Hoa Lac positioning it as the center of the Corridor 21 Development with high concentration of diverse urban functions. Also, it is of the strategic important that the principal functions to be introduced in Hoa Lac such as the human resources development (HRD), research and development, and high-tech industry should be developed in a mutually linked and complimentary manner. In this context, a concept of concentrating these functions in the proximity of the C-21 Urban Center Area is essential to ensure a well-united town.

These are the characteristics of the MOC M/P to be recognized excellent and important, and as such, they will be basically complied by the JICA Study Team in the Master Plan Study.

(2) Review of the MOC Master Plan

The JICA Study Team has accepted with some modifications the basic framework that had been established in the MOC M/P (Figure 2.2.1). However, the JICA Study Team has the

following comments for consideration and incorporation in the subsequent formulation of the Concept Plan (C/P).

1) The System of Urban Planning and Development

The central part of the Corridor 21 Development is the development of a new town in the Hoa Lac Urban Area where the primary urban functions such as VNU, HHTP, Phu Cat Industrial Zone and Dong Xuan Area will be introduced as the preceding projects. The MOC M/P is considered to be a guideline for the Corridor 21 Development, which designates the responsible agencies for each component.

(a) Academic Town by VNU

(b) HHTP by Ministry of Science and Technology

(c) Phu Cat Industrial Zone by Ha Tay Province

(d) Dong Xuan and Binh Yen Residential Zone by MOC

In the project implementation system in Vietnam, each responsible agency separately obtains the Prime Minister's approval for development and proceed with respective projects, which is referred to as the "management board system". However, as to the new town development in Hoa Lac, close linkage among the introduced functions is quite essential to ensure the central functions for Human Resource Development (HRD), research and development (R&D), and promotion of advanced technology. As a matter of fact, many science cities in the world have experienced the development path with a triad linkage among education, research, and industry. In this context, it is considered important to establish the system where the proposed urban development can be implemented in a more integrated and comprehensive manner.

2) Consideration on Urban Structure

According to the MOC M/P, VNU, HHTP, Dong Xuan Area, and Phu Cat Industrial Zone are planned to be developed separately each having the scale of more than 1,000 ha, and functional linkages among them seem to be insufficient. This may be attributable to the above management board system. When considering the urban structure, a concept to ensure the efficient linkage among the functional areas will become necessary, which requires the location of an attractive urban center and the road network linking each other.

When considering the land use, it is not desirous to adopt such a large-scale monolithic land use, and real needs exist to ensure the functionally complimentary land use and the proximity of living and working places. Citing the urban developments in the world, 2,000 to 3,000 ha is the scale of a city, and thus inappropriate to be used for the genuine and exclusive land use pattern.

More importantly, urban development needs to pursue the compactness in its process so that infrastructure cost should be minimized or investment efficiency should be maximized. In this connection, independent and separate development of each functional area will have disadvantages with the result of higher infrastructure cost and less accumulated development effects. Therefore, it is also important to establish the system of linking the four functional areas, thus ensuring the growth of the town in an integrated manner.

3) Arterial Road Network

According to the MOC M/P, NR21A and Lang-Hoa Lac Highway run through the Hoa Lac Urban Area in the directions of north to south and east to west, respectively, thus separating the area into the four functional areas. And a large-scale interchange is planned at the intersection of the roads. This arterial road patter has a merit to ensure good accessibility from the functional areas to the arterial roads, whilst it has demerits to physically separate the area and aggravate the urban environment. Particularly, the M/P adopts the wide right-of-way such as 300 to 400 meters including green belts, which virtually leads to the inability of mutually linking the functional areas, and makes difficult to develop the C-21 Urban Center Area as will be later described.

In order to avoid the problems, NR21A should have a bypass to limit through traffic in the center area, thus ensuring the effective linkage of the four functional areas and more flexible land use in its entirety.

4) Location of the C-21 Urban Center Area

According to the MOC M/P, urban center is provided in the middle of the Dong Xuan Area adjacent to NR21A, which is deemed reasonable in that the area will absorb more than half of the population of the whole Corridor 21 Development. However, urban center should assume the function not only supporting convenient urban life and activities but also expressing the image of the whole town, and in this context, it should be located in the center of the four functional areas.

Also, due consideration should be given to the Urban Center Area where the future Mass Railway Transit (MRT) system and its station will be located. By providing NR 21 Bypass as above mentioned, it becomes possible to locate the C-21 Urban Center Area at the intersection of NR 21A and Lang-Hoa Lac Highway.

It is importantly recognized that the successful implementation of the two preceding projects, which are VNU and HHTP, is extremely important to give a momentum for the whole implementation of the Project. From this aspect, diverse supporting functions should be attached to the Hoa Lac Urban Area so that they can giver certain incentives to ensure the smooth relocation of VNU and to induce prospective investors to come in HHTP.

5) Development Pattern

According to the MOC M/P, the land is used for urban functions in such a way as surrounding the natural land (forests and lakes) in each functional area, which aims at preserving the natural land as it is, and ensuring good accessibility from residential areas. The M/P proposes a garden city concept taking advantage of utilizing the natural environment.

Whilst, this development pattern contains some problematic factors. First, it may reduce the investment efficiency for infrastructure development, secondly inconvenience to access to the Center Area and inefficiency in internal traffic flow, and thirdly the natural environment is discontinued by the use of land for urban functions. From the environmental aspect, the natural lands should be preserved one another with their physical continuity, thus ensuring the ecological habitat and mobility. This is indeed one of the basic conditions to create a ecological town (as called the **"Eco-science Town"**).

The urban development pattern to be adopted to the M/P should ensure the effective and efficient formation of the new town with due care to this ecological aspect.

2.3 Review of the Vietnam National University Relocation

2.3.1 The situation of VNU

The Vietnam National University (VNU) was founded in accordance with Decree No. 97/CP, dated December 10th, 1993. This degree, issued by the Government of Vietnam, unified the three leading universities, which had been founded in the 1950s. These were the Hanoi

University, The Hanoi Teachers' Training College No.1 and The Hanoi Foreign Languages Teacher's Training College. VNU operates according to a special regulation promulgated by the Prime Minster of the Vietnamese Government (Decision No.477/ITg dated September 5th, 1994). VNU holds a special position in the Vietnamese higher education system to have the right to work with the related ministries in order to solve problems relating to VNU.

VNU has been divided into five affiliated universities:

(a) University of General Education,

(b) University of Natural Sciences,

(c) University of Social Sciences and Humanities,

(d) University of Pedagogy, and

(e) University of Foreign Languages.

At present, the VNU has three campuses, comprising a total area of 39 hectares, located at the following addresses:

(a) 19, Le Thanh Tong Street, (in the Center of Hanoi City): 4.3 ha,

(b) Can Giay, (in the West of Hanoi City): 27 ha, and

(c) Thuong Dinh and Metri, 90 Nguyen Trai Road: 7.7 ha.

VNU is planning to relocate these campuses to the Hoa Lac Urban Area. The Hoa Lac and Xuan Mai Urban Development includes the relocation of the Vietnam National University (VNU) to the Hoa Lac Urban Area. The VNU relocation is to reorganize and integrate its existing affiliated universities into a comprehensive university in the short-term, and then integrate non-affiliated universities in the medium- and long-term. The VNU relocation is expected to respond to the increasing need for higher education as well as the development of science and technology (S&T) in the country. In reorganizing and integrating, priority will be given to strengthening the fields of S&T, aiming at establishing a triad linkage among universities, enterprises, and public/private research and development (R&D) institutes.

2.3.2 The Government's Concept for the VNU Relocation

The Prime Minister's decision on the approval on the C/P of the VNU issued on January 26, 1998 outlines the policies as follows:

VNU is a center for education, training, and scientific research of multiple sectors, as well as inter-sector operational linkage among universities, research institutes, and experimental units, ensuring the integration between training and scientific research, and technology transfer. Also, VNU is a cultural center assuming the roles of solidifying science and cultural interchange in the higher education in Vietnam. According to the policies, VNU is expected to assume functions of i) education, research and other related activities, and ii) science and cultural interchange in the higher education in Vietnam.

Along the line, VNU is expected to grow as a comprehensive university that can cover a wide range of research fields as well as higher education and training activities, which necessitates for VNU to augment additional professional study courses in the fundamental fields. In relation with the science and cultural interchange, VNU is expected to assume central functions to network the information among academic institutes as well as between academic institutes and industrial sector, and promote higher education among the nation through broadcast education, correspondence education, social education, and so on. According to the plan, the relocation area will be 1,000 ha and the educational scale will grow as follows;

(a) Phase-1A: 30,000 to 40,000 students
(b) Phase-1B: 60,000 students
(c) Phase-2: 100,000 students

2.3.3 The Pre-Feasibility Study by VNU

According to the Prime Minister's approved plan, VNU has conducted a "Pre-Feasibility Study of VNU " in 1998 (see Figure 2.3.1). The student numbers and the relocation area proposed by the study are consistent with those of the approved plan.

The study proposes that universities (Technology, Law, and Economics and Finance) should be established by 2005. Also, research institutes and centers will be established. By 2010 additional universities (Pharmacy, Applied Technology, State Management, Agro-Forestry, Architecture, International Relations, and Healthcare and Social Services) should be established. By 2020, these universities mentioned above will be consolidated and some more additional universities will be established if the conditions allow.

In addition, the study examines land use for the VNU campus, facilities including dormitories, cost estimation, analyses on investment efficiency, necessary infrastructure and so on. Finally the study concludes that the VNU relocation project is indispensable for urgent requirements of the country in resolving social problems and catching up with advanced countries in the world.

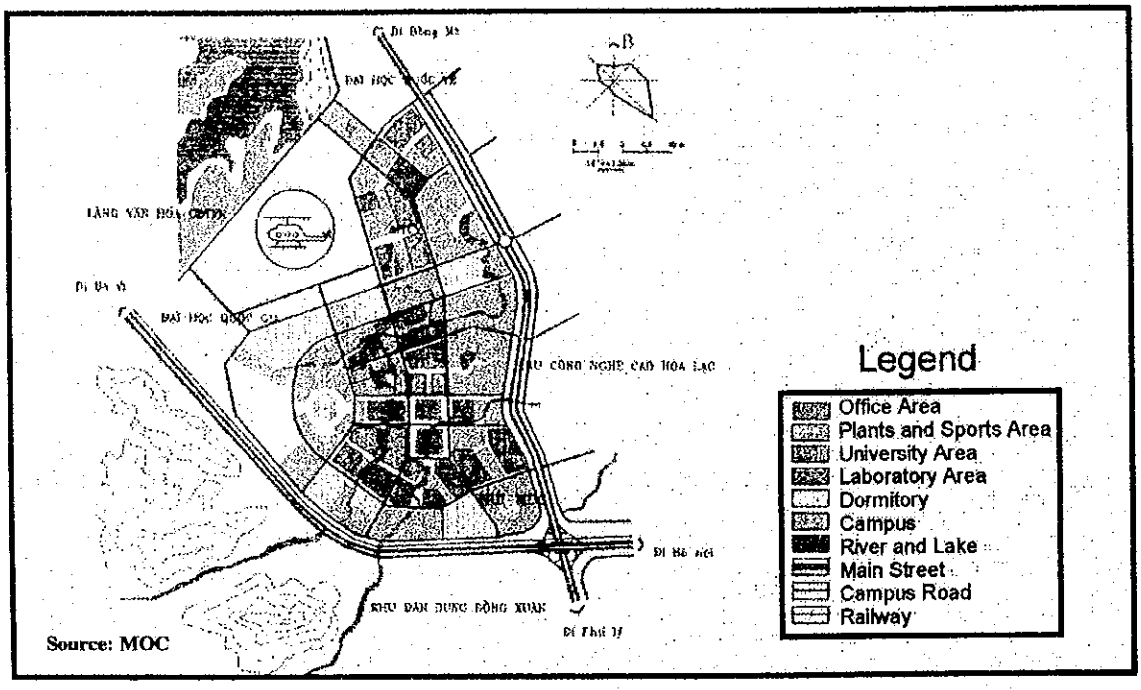

Figure 2.3.1 Spatial Layout Plan Prepared by VNU

2.4 Review of the Hoa Lac High-Tech Park Development

2.4.1 Review of the Master Plan and Feasibility Study on HHTP by JICA

The JICA Study for the HHTP development commenced at the beginning of 1997 and the final report of the study was submitted to Vietnamese Government at the end of March, 1998. The concept of HHTP prepared by the JICA Study Team (hereinafter referred to as HHTP-ST) is that of a self-sustained park-wise area including the following six functions/components.

(a) Research and Development (R&D),

(b) Urban and business,

(c) Housing,

(d) High-Tech industry,

(e) Education and Training (E&T), and

(f) Sports and recreation.

The HHTP development direction to integrate the above functions/components comprehensively is shown as follows (Source: The Final Report of HHTP by HHTP-ST, March, 1998):

The HHTP-ST proposed the HHTP development into three phases; the first phase is from 1998 to 2005, the second phase from 2006 to 2010, and the third phase from 2011 to 2020. The HHTP development areas in each phase are 796 hectares in the first phase, 317 hectares in the second phase, and 537 hectares in the third phase respectively. In the study, it was proposed that the total area of 1,650 hectares would be developed until the year of 2020. The HHTP development scenario in each phase is summarized as follows:

(1) Phase-1 (1998-2005)

The key words of Phase-1 by the HHTP-ST are i) period of start-up, ii) promotion of import and transfer of technologies, and iii) the localization hub of high-tech in Vietnam. There are four major zones to be developed, such as the R&D Zone, High-Tech Industrial Zone, Center Zone, and High-Grade Residential Zone. The Software Park is included in the R&D Zone.

Regarding the "period of start-up," the State initiatives are emphasized especially in the R&D Zone and in the Center Zone. In the former, the HHTP-ST emphasized the establishment or relocation of public R&D institutes by the State initiatives and collaboration of research activities with foreign countries in the high-tech fields.

The HHTP-ST also recommended establishing the National Software Center in the R&D Zone in order to provide common services to the tenanted companies in the Software Park. In the latter, the four centers were proposed to establish the following: i) the Techno-Partnership Center which will cover a wide range of services, from incubator to technology-support functions, ii) the High-Tech Park Center, which will be the intelligent building for administration function and offices (there is no description on the business and commercial zone in the first phase), iii) On the Job Training (OJT) Technical Support Center, which will undertake pre-training to the staff and workers for the investors, and iv) Technical Institutes, which will provide education facilities to the diploma class in the fields of science and engineering. The basic policies for the establishment of the aforementioned centers are to avoid duplication and to complement each other.

In the High-Tech Industrial Zone, the R&D type or knowledge intensive industries will be expected to locate. The HHTP-ST proposes establishing standard factories for the small- and medium-scale enterprises, as well as attracting the global giants in the high-tech industries.

The last zone of the development at Phase-1 is the High-Grade Residential Zone with a nine-hole golf course in which housing will be developed to accommodate foreign businessmen, including managers/executives, researchers and engineers of high-tech factories as well as researchers of national high-tech R&D institutes.

(2) Phase-2 (2006-2010)

Phase-2 is placed by the HHTP-ST as the period to become the national high-tech center. In other words, it is the time of "internal enrichment in quality" rather than that of "expansion in quantity." The HHTP-ST, therefore, predicted that the establishment of the laboratories and high-tech factories would be limited during Phase-2.

The new development of this period is the establishment of the Technology Museum, which is expected to attract students and young people in the central park area. Regarding the High-Grade Residential Zone, another nine-hole golf course will be developed.

As the main point of Phase-2, the HHTP-ST emphasized encouraging or establishing an integration system of R&D and production among the located facilities in and around the HHTP, the organizations in whole Vietnam and those in foreign countries.

(3) **Phase-3 (2011-2020)**

Regarding Phase-3, the report emphasized that the R&D activities in HHTP shall progress dramatically and that HHTP will become a "technopole" (it is considered to be an analogy of growth pole, but its concept is unclear) in the Asia-Pacific region. On the other hand, there is no description of high-tech industries. Regarding the High-Tech Industrial Zone during the Phase-3 period, in the development frame of the Master Plan summarized in the following section of this interim report, the development area in the High-Tech Industrial Zone will be rather bigger than that of previous two periods. The scenario for the Phase-3 should include the development of high-tech industries as well as the software industry.

2.4.2 Development Framework

Based on the "Concept Plan (C/P)" or development scenario, the HHTP M/P is formulated. The M/P is composed of four sections; namely, i) development framework, ii) land grading plan, iii) infrastructure development plan, and iv) development schedule and cost.

The section about the development framework consists of five subsections, such as i) High-Tech Industrial Zone, ii) R&D and software industry, iii) Center facilities, iv) land development plan, and v) other zones. Regarding High-Tech Industrial Zone, the major indicators by the framework are summarized in the Table 2.4.1.

Table 2.4.1 Development Framework of High-Tech Industrial Zone by HHTP-ST

	2005	2010	2020
Factory Site Area (ha)	62	79	179
Employment (persons)	8,600	11,200	25,200
Value Added/year (US$ million)	394	766	3,054
Water Consumption (m^3/day)	6,700	8,700	19,600
Electricity (Wh/Month)	57,200	74,400	167,600
Cargo Outflow (tons/year)	163,300	212,600	478,500

Source: Report of the M/P and F/S on the HHTP Project, Volume-II, March, 1998, JICA

Regarding the R&D institutes, the initial stage of the M/P will be led by the national institutes, followed by the private institutes since the investment demand of private R&D institutes based on the result of questionnaire survey was almost nil, at least in the short-run. This pattern was observed at the development of Tsukuba Science City in Japan where the location of private

R&D institutes commenced only after the accumulation of most national R&D institutes. In the report, the National Center for Natural Science and Technology (NCST) is expected to relocate or establish other institutes and become a main player.

The software industry, which is emphasized as the most favorable industry in Vietnam in the report, will locate in the National Software Center as proposed by the HHTP-ST. The development area of the Software Park is planned in the R&D Zone and covers 15 hectares. The land demand by R&D institutes and the software industry according to the HHTP-ST is over the proposed development area of R&D Zone. The major indicators of frameworks in the R&D and software industry are summarized as shown in the Table 2.4.2.

Table 2.4.2 Development Framework of R&D Zone

Description	2005	2010	2020	Total
Development Area (ha)	118	0	47	165
	(98)	(0)	(38)	165 (136)
Employment (persons)	3,900	3,900	5,400	-
Water Consumption (m^3/day)	2,040	2,040	2,820	-
Electricity (MWh/year)	14,000	14,000	19,250	-

Source: Report of the M/P and F/S on the HHTP Project, Volume-II, March, 1998, JICA

Note: Figures in parenthesis means net area in ha.
The development area in Phase-1 includes the Software Park of 15 hectares.

The rest of the development framework by functional aspect concerns the Center facilities. The HHTP-ST proposed five types of center facilities as follows:

(a) **"Technical Institute"** for human skill development program,

(b) **"OJT Technical Support Center"** for labor skills development program,

(c) **"High-Tech Park Center"** for location of public administration and private sector offices to apply the various service programs and investment promotion,

(d) **"Technopartnership Center"** for application of technical transfer system among the various institutions and collaboration for R&D, and

(e) **"National Software Center"** for establishment of software enterprise production and nourishment and supply of software engineers by applying the incubation program.

Since the National Software Center was planned to be established in the Software Park of the R&D Zone, the other four centers will be established in the "Center Area." The development

framework of these centers is described in the following subsection and F/S. The demand analysis of the centers is weak. The relationship among the centers is complicated.

2.4.3 Land Use Plan of HHTP

The land development plan including such centers or the Center area was conducted on the basis of the result of assessment of development constraint and principles. The detailed land use plan was summarized in Table 2.4.3.

Table 2.4.3 Land Use Plan of HHTP by HHTP-ST

Description	2005 Area (ha)	2005 (%)	2010 Area (ha)	2010 (%)	2020 Area (ha)	2020 (%)	Total Area (ha)	Total (%)
1. R & D Zone	118	14.8	0	0.0	47	8.8	165	10.0
2. Center Area	16	2.0	0	0.0	32	6.0	48	2.9
3. High-Tech Industrial Zone	71	8.9	22	6.9	117	21.8	210	12.7
4. Urban/Business Zone	26	3.2	8	2.5	47	8.8	81	4.9
5. High Grade Residential Zone	76	9.5	56	17.7	0	0.0	132	8.0
6. New Town Zone		74	9.3	23	7.3	150	27.9	247
15.0								
7. Infrastructure	142	17.8	18	5.7	108	20.1	268	16.2
8. Tan Xa lake	120	15.1	180	56.8	0	0.0	300	18.2
9. Green River, Reserve Area	153	19.2	10	3.2	36	6.7	199	12.1
Total	796	100.0	317	100.0	537	100.0	1,650	100.0

Source: Report of the M/P and F/S on the HHTP Project, Volume-II, March, 1998, JICA

The infrastructure development plan was formulated on the basis of the above land use plan. As the development framework of the other zones, the employment and population frameworks were projected. Based on the framework, the population of those who will reside in the HHTP was forecast. The employment and population frameworks are summarized in Table 2.4.4.

Table 2.4.4 Employment and Population Framework in HHTP by HHTP-ST

	Land Use	Number (Cumulative) 2005	2010	2020	Increment ~2005	2005 ~ 2010	2010 ~02020
	Employment						
1.	R&D Zone	3,900	3,900	5,400	3,900	0	1,500
2.	Center Area	300	300	900	300	0	600
	1) Technical institute	50	50	150	50	0	100
	2) High-Tech park center	130	130	450	130	0	320
	3) OJT technical support center	20	20	100	20	0	80
	4) Technopartnership center	100	100	200	100	0	100
3.	High-Tech Industrial Zone	8,600	11,200	25,200	8,600	2,600	14,000
4.	Urban/Business Zone	1,300	1,900	5,400	1,300	600	3,500
5.	High-Grade Residential Zone (commercial function)	100	200	200	100	100	0
6.	New Town Zone (commercial function)	100	100	200	100	0	100
7.	Total	14,300	17,600	37,300	14,300	3,300	19,700
	Population generated by development	28,600	35,200	74,600		6,600	39,400
	Population in HHTP	12,800	15,000	31,000		2,200-	16,000
		45%	43%	42%	-	-	-
	Ref. Utility						
	Water Demand (m^3/day)	13,000	17,000	37,000	-	-	-
	Telecommunication Lines	8,800	10,300	20,900			
	Electricity (MW)	48	61	135	-	-	-

Source: Report of the M/P and F/S on the HHTP Project, Volume-II, March, 1998, JICA

2.4.4 Infrastructure Development Plan

The infrastructure was divided into two categories; one was external infrastructure and the other internal infrastructure. The former contributed to the expansion of the regional economy, including to the HHTP, and their cost was excluded from the HHTP project cost. The development plan of internal and external infrastructure summarized in the Table and included the trunk road inside HHTP. The demand to formulate the infrastructure development plan is projected by the assumption of the existing MOC M/P. If the plan would be restructured, it should be required to reconsider the external infrastructure. In this case, the basic infrastructure plan in HHTP will not be changed.

The most crucial issue to develop the HHTP is to supply water since the water resource in the project area is not sufficient and the existing water supply plan is late for the HHTP project. The HHTP-ST proposed the temporary water treatment plant using the ground water of 2,800 m^3 per day before 2005.

The development schedule is proposed along the three phases mentioned above. The initial stage of development proposed to commence the F/S at the year 1998, to complete the construction at the year 2003, and to operate the factories and institutes at the year 2005. The HHTP development schedule is presented in the following figure.

The development cost was estimated in both external and internal development. The former was predicted at double compared to the latter. The total infrastructure development cost was estimated at US$ 688 million. The development cost is summarized in Tables 2.4.5 and 2.4.6.

Table 2.4.5 Development Cost of Internal Infrastructure of HHTP by HHTP-ST

Unit: US$ million

Item		2005	2010	2020	Total
1.	Earth Work	3.2	5.4	2.7	11.3
2.	Road	13.3	11.7	26.2	51.1
3.	Water Supply	5.1	1.5	9.8	16.4
4.	Sewage	2.5	0.7	5.6	8.8
5.	Drainage	7.5	2.3	16.3	26.1
6.	Electric Power Supply	13.7	3.1	14.9	31.7
7.	Telecommunication	3.3	0.8	4.2	8.3
8.	Park & Sport Facilities	26.0	0.7	1.0	27.7
	Sub-total	74.6	26.2	80.6	181.4
9.	Engineering Service Cost	9.0	3.1	9.7	21.8
10.	Physical Contingency	8.4	2.9	9.0	20.3
	Total	92.0	32.3	99.3	223.6

Source: Report of the M/P and F/S on the HHTP Project, Volume-II, March, 1998, JICA

Note:
1) Land acquisition cost and compensation cost is not included.
2) Price escalation is not included.
3) Assumed engineering service cost and physical contingency: 12 % and 10 % respectively.
4) Any building/housing construction cost is not included.
5) External infrastructure cost is not included.
6) A temporary water treatment plant is planned and included in the development of the external infrastructure.
7) Price contingency is not included.

Table 2.4.6 Development Cost of External Infrastructure of HHTP by HHTP-ST

Unit: US$ million

Item		2005	2010	2020	Total
1. Earth Work	57.8	6.5	36.9	101.2	
2. Road		75.8	18.2	20.6	114.6
3. Water Supply	26.6	19.3	11.6	57.5	
4. Sewage		3.9	2.0	1.9	7.8
5. Drainage		44.2	2.2	10.1	56.5
6. Electric Power Supply	46.5	18.9	61.4	126.8	
		254.8	67.1	142.5	464.4

Source: Report of the M/P and F/S on the HHTP Project, Volume-II, March, 1998, JICA

Note:
1) Land acquisition neither cost nor compensation cost is not included.
2) Price escalation is not included.
3) Engineering service cost and physical contingency are assumed at 12 % and 10 % respectively
4) Any building/housing construction cost is not included.
5) Price contingency is not included.

The border of the HHTP Area to be developed was set back at 200 meters from the existing NR21A and the Lang-Hoa Lac Highway, which is being constructed. Such setback was caused by the regulation for highway development, which requires a sufficient buffer area between highway and development area. The study by the HHTP-ST, therefore, presumed the basic structure of the Hoa Lac Urban Area development and plans of the other three components conducted by the MOC. In the concept of the Corridor 21 Development, the JICA Study Team proposes that the Lang-Hoa Lac Highway as well as NR21A be an ordinary trunk road from the border of Hoa Lac Urban Area. If this is realized, there would no longer be a reason to keep the 200 meters buffer, as well as the interchange of the Lang-Hoa Lac Highway and NR21A planned by the MOC.

2.4.5 Land Use plan

In the HHTP M/P by the HHTP-ST, the south-west area or vicinity of the junction was planned as the greenery or neighboring parks (since the current land use of the western part of the area is the forest, the area will be the preservation greenery in the M/P) and expansion of new town at the Phase-II is targeted in the year 2010. In the M/P prepared by HHTP-ST, the analysis of Business/Urban Zone is rather weak, therefore, further study shall be required. The F/S of the HHTP was conducted in the area of Phase I or 800 hectares targeting the year 2005. The area for the F/S is the southern part of the whole HHTP, excluding the area near the junction. The study consisted of eight sections such as the site selection, priority plan, land use and zoning, center area, landscape, infrastructure development, implementation and management, and project evaluation. The land use plan of the Phase-I is summarized in the Table 2.4.7.

Table 2.4.7 Land Use Plan of Phase-I by HHTP-ST

Item		Area (ha)	(%)	Remarks
1)	R&D Zone	117.5	14.8	
2)	Center Area	16.3	2.1	
3)	High-Tech Industrial Zone	70.7	8.9	
4)	Urban/Business Zone	25.7	3.2	
5)	High Grade Residential Zone	75.6	9.5	inclusive of golf course
6)	New Town Zone	74.3	9.4	
7)	Main road, sewage plant, etc.	94.0	11.8	inclusive of retention pond
8)	Park & Green	153.5	19.3	
9)	Tan Xa Lake	120.3	15.1	
10)	Reserved Area	46.3	5.8	
	Total	794.2	100.0	

Source: Report of the M/P and F/S on the HHTP Project, Volume-II, March, 1998, JICA

The land use plan in the F/S is basically the same as that of the M/P, except for infrastructure, park & green, and reserved area. Those of R&D Zone, the Center Area, and High-Tech Industrial Zone are basically the same as in the M/P. On the other hand, Urban/Business Zone and Residential Zone, including High-Grade Residential Zone and New Town Zone, are planned rather in detail. HHTP-ST planned the Business/Urban Zone based on the experience of development of other countries' high-tech park, with the exception of the demand analysis. This zone, therefore, is considered from the point of view of high-tech park except that of Hoa Lac New Town. It is required to assess the needs for the Business/Urban functions from the point of view of new town as well as that of a university.

2.4.6 Management System

The HHTP-ST planned the center facilities in detail, however the actual implementation plan or programs are still insufficient. A detailed study should be carried as well as Human Resource Development (HRD) programs. The Government of Vietnam officially requested to conduct the study on the HRD for Official Development Assistance (ODA). The HHTP shall be the core of the HRD in the field of high-tech as well as the academic viewpoint owing to the university to be located in the Hoa Lac Urban Area. Regarding the implementation and management system, the HHTP Management Board (hereinafter referred to as MB) will be established in accordance with Decree No. 36/CP after the submission of the Prime Minister's

decision on the development. The HHTP-ST recommends establishing the Steering Committee in parallel to the MB. It also needs to reassess the necessity of such committee.

2.5 Review of the Vietnam Master Plan and Feasibility Study on HHTP by MOSTE

2.5.1 Review of the HHTP by MOSTE

After the submission of the Report by the HHTP-ST, the MOSTE has been working to prepare the M/P and F/S (hereinafter referred to as VN- M/P & F/S) for approval by the Prime Minister. It is a common procedure to implement the national project, thus, work completion was expected by the middle of June, 1998. The MOSTE met with the Steering Committee thrice and many individual meetings with relevant organizations were held in order to concretize the VN- M/P & F/S. Review of the reports was based on the draft report.

The VN- M/P & F/S follows the study conducted by JICA Study Team as reviewed in previous sections basically. The difference is the division of Phase-1 into two stages in the VN-M/P & F/S. In the Stage-1 of Phase-1 targeting the year 2003, the MOSTE proposed to develop the area of 200 hectares, which is included in the Phase-1 proposed by the HHTP-ST. The development areas of Stage-1 are planned in the vicinity of the junction of NR21A and the Lang-Hoa Lac Highway. Regarding the land use plan, the Software Park will be independent from the R&D Zone in the JICA M/P. The land use plan and development frameworks of Stage-1 are summarized in Table 2.5.1. Figure 2.5.1 shows the spatial layout plan prepared by HHTP.

Table 2.5.1 Land Use Plan of Phase-I by MOSTE

Item	Stage-1 Area (ha)	Stage-1 (%)	Phase-I Area (ha)	Phase-I (%)	JICA F/S Area (ha)	JICA F/S (%)
1) R&D Zone	20.0	10.0	93.3	11.7	117.5	14.8
1') Software Park	15.0	7.5	24.0	3.0		
2) Center Area	10.0	5.0	16.3	2.1	16.3	2.1
3) High-Tech Industrial Zone	34.5	17.2	96.1	12.1	70.7	8.9
4) Urban/Business Zone	15.8	7.9	27.7	3.5	25.7	3.2
5) High Grade Residential Zone	18.8	9.4	75.6	9.5	75.6	9.5
6) New Town Zone	28.6	14.3	74.3	9.4	74.3	9.4
7) Skeleton Road of HHTP	30.0	15.0	49.8	6.3	49.8	6.3
8) Central Park	16.0	8.0	45.8	5.8	45.8	5.8
9) Swage Treatment	10.0	5.0	10.0	1.3	10.0	1.3
10) Tan Xa Lake	0.0	0.0	120.3	15.1	120.3	15.1
11) Green Area	11.3	5.7	80.3	10.1	107.7	13.6
12) Retention Pond	12.2	6.1	34.2	4.3	34.2	4.3
13) Water Reservoir	0.5	0.3	0.5	0.1		
14) Reserve Area	0.0	0.0	45.7	5.8	46.3	5.8
Total	222.7	100.0	794.1	100.0	794.2	100.0

Source: VN-M/P & F/S by MOSTE

Note: Since the planned area of Stage-1 is 200 hectares, the above land use plan will be modified from 222.7 hectares to 200 hectares. The Summary Report described the area of Stage-1 as 200 hectares. The difference is to treat the items of 9), 11), 12), 13) of above table.

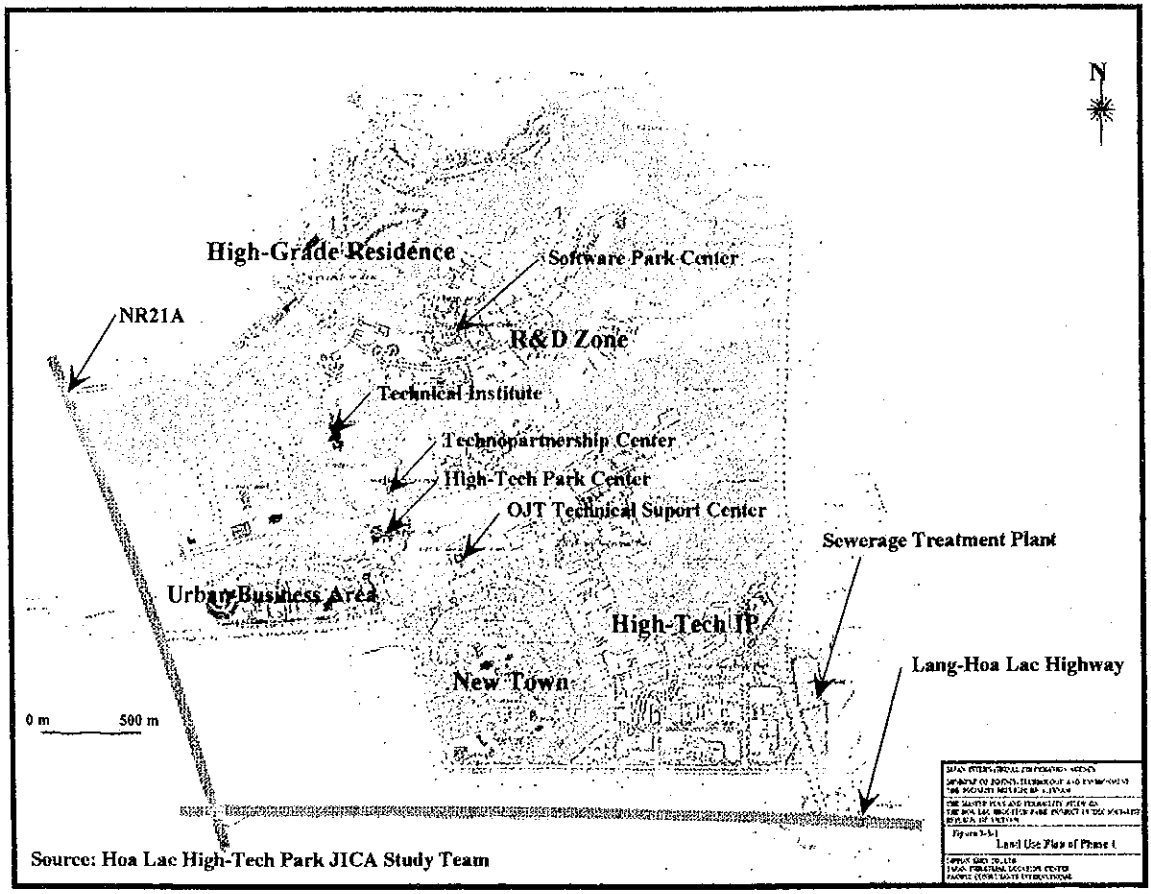

Figure 2.5.1 Spatial Layout Plan Prepared by HHTP

The development frame of Stage-1 was formulated on the basis of the JICA study. The major indicators of the development framework are summarized in the Table 2.5.2.

Table 2.5.2 Employment and Population Framework in HHTP

	Land Use	Number (Cumulative) 2003	2005	Ref. JICA 2005
	Employment			
1.	R&D Zone	900	3,000	3,900
	Software Park	600	1,500	-
2.	Center Area	200	300	300
	1) Technical Institute	50	50	50
	2) High-Tech Park Center	80	130	130
	3) OJT Technical Support Center	20	20	20
	4) Technopartnership Center	50	100	100
3.	High-Tech Industrial Zone	4,850	11,650	8,600
4.	Urban/Business Zone	500	1,300	1,300
5.	High Grade Residential Zone (commercial function)	50	200	100
6.	New Town Zone			
	(commercial function)	100	200	100
	entertainment	50	100	-
	Total	7,250	18,250	14,300
	Population generated by development	14,500	36,500	28,600
	Population in HHTP	5,110	12,800	12,800
		35%	35%	45%
	Ref. Utility			
	Water Demand (m3/day)	5,525	16,118	13,000
	Electricity (MW)	23	63	48
	Telecommunication Lines	3,300	8,400	8,800

Source: M/P & F/S of VN

The major change in the VN-M/P & F/S is the development frameworks of High-Tech Industrial Zone and Software Park. The number of employees of high-tech industries is forecast at 11,650 employees, which is around 3,000 employees more than that of the JICA Study. In the JICA Study, the employees of R&D Zone included that of software industry; however, in the VN-M/P & F/S, the Software Park was considered independently and the number of employees predicted was rather big as compared to the JICA Study. The increment of 3,600 employees comparing to the JICA Study reflects the population generated by the HHTP project. Since the development of housing in HHTP is assumed as the same as that of the JICA Study, the commuters from outside of the HHTP will increase.

2.5.2 Present Situation of the HHTP Development

The implementation of the HHTP project has been delayed about one year behind the schedule established in the M/P and the subsequent F/S, during which serious economic crisis has been attacking many Asian countries including Vietnam. However, in October 1998, the Prime Minister approved its implementation, and now the HHTP development stands at the stage for embarkation.

In order to put the project on a right implementation track, a number of issues need to be sorted out, which include arrangements for obtaining ODA assistance, establishment of implementation institutions in coordination with relevant agencies and organizations, and legal and financing arrangements necessary for its effective and efficient implementation.

In this light, MOSTE is planning to initiate a "HRD program" as a fast track component of the whole project, while maintaining the schedule of starting the first phase physical development in 2000 and completing it in 2003. The HRD plan is aimed at nurturing qualified researchers, teaching staff, and instructors in advance, involving the existing National Center for Natural Science and Technology (NCST) and the Hanoi University of Technology (HUT).

The fast track HRD plan remains to be seen in terms of its scope and contents, but the ultimate objective of the plan is to create a comprehensive center for high-tech research and training in Hoa Lac. Taking this into consideration, the JICA Study Team proposes that a **"National Center for High-Tech Research and Training (NCHRT)"** is to be included in the Action Plan so that a receptacle will be prepared for the HRD plan.

2.6 Review of the Phu Cat Industrial Zone

2.6.1 Background of Phu Cat Industrial Zone

To justify the project, the Ha Tay Socio-Economic Development Plan (HSEDP) was reviewed. The economic trend in Ha Tay during the period after the open door policy is summarized. Compared to 1990 figures, the 1996 share of primary industry to the total GRDP decreased while those of the secondary and tertiary industries increased. The structural change caused the increase in per-capita GRDP. The HSEDP highlighted the high growth rate of 15 to 16 % per annum in the industrial sector, including small- and medium-scale enterprises (SMEs). With the development of "trade villages," which numbered 88 and were scattered throughout the province, the output ratio in the non-state and SME sectors marked 66 to 74 %. Exports from the province increased in recent years of which major items are tea, nuts, handicraft goods,

among other things. Since 1996, the export goods by Foreign Direct Investment (FDI) began to be produced and the total export reached US$ 7 million. The licensed FDI projects counted 23 during the period from 1992 to 1996, of which 12 projects operated in 1996, employed 2,000 workers, and produced export goods valued at US$ 25 million per annum. The share of industrial sector to the GRDP total in 2010 is targeted at 23 %, and the Phu Cat IZ shall be the main player for the industrial development.

The Phu Cat IZ justification was conducted by decision of the government in respect to the industrial and infrastructure development M/P during the period from 1996 to 2000. This M/P, which includes the industrial development and its regional allocation, should be the base of industrial zone development and of urban development. The plan also includes the industrial zone projects developed up to the year 2010 and the 33 priority projects, which are selected from above possible projects to be developed until the year 2000.

2.6.2 Master Plan of Phu Cat Industrial Zone

In the M/P, the North Phu Cat High-Tech Integrated Industrial Park (NPIP) project should be included in the Corridor 21 Development. At the initial stage of the Corridor 21 Development, the NPIP shall play the prime engine for the development. The M/P is conducted based on the experience of Vietnam as well as that of neighboring countries in order to be responsive to the requirement of investors flexibly. The major roles of the Industrial Park are summarized as follows:

- To exploit local resources; producing qualified products by advanced technology;
- To use low cost labor; producing competitive export products;
- To balance the industrial and urban development between Hanoi and Ha Tay; upgrading the industrial structure in Ha Tay;
- To establish the core of the Hoa Lac Urban Area; and
- To attract investors both from domestic and foreign; preparing qualified facilities.

In the institutional aspect, the Management Board (MB) shall be established to provide one-stop services to investors and to implement the industrial development and its maintenance.

The residence for employment generated by the industrial park development shall be prepared in the Dong Xuan Area, where the housing development will be planned.

There are three options of the type of industries for the NPIP, which covers a development area of 400 hectares.

The total amount of infrastructure investment, industrial investment, output and employment are estimated in each option. Based on the projection, the M/P recommends Option-2 indicated in the Table 2.6.1, which is the case of minimum investment cost for infrastructure and maximum absorption of employment. The area of planned site lots is 1.5 to 5 hectares. Since the process of selecting the target industries is excluded from the report, the evaluation of the options is hard to understand. The target industrial sub-sectors in each option are also summarized in the table below.

Table 2.6.1 Three Options and Target Industries

	Option-1	Option-2	Option-3
Target-Industry	Electronics Consumer Goods Precision Equipment	Electronics Consumer Goods Precision Equipment Food & Foodstuff	Electronics Heavy Engineering Food & Foodstuff
Infra. Investment	US$ 100-110 million	US$ 85-90 million	US$ 90-100 million
Ind. Investment	US$ 2,200-2,400 million	US$ 1,800-2,000 million	US$ 1,500-1,600 million
Output by Ind.	US$ 1,800-2,000 million	US$ 1,600-1,800 million	US$ 1,400-1,500 million
Labor	22,000 person	24,000 person	20,000 person

Source: Pre-Feasibility Study Report on the NPIP.

2.6.3 First Phase Development Plan of the NPIP

The first phase development of 230 hectares will be commenced from the area surrounded by the Lang-Hoa Lac Highway and the tributary of Tich River targeting the year 2000. The rest of the area, or 170 hectares, shall be developed after the year 2000, subject to the consequence of the first phase development. The first phase is divided into two stages and the development of 100 hectares will be initiated. The development plan for 230 hectares is depicted in the Table 2.6.2.

Job creation by the development is estimated to be around 21 thousand. The labor force to be available to the industrial park from the surrounding districts will be around 3,200. Since the available labor supply from the whole province is some 12 to 14 thousand, the total labor supply to the industries is calculated at 17,200 within the province. The labor supply shortage in the province shall be compensated by those attracted from Hanoi and the surrounding provinces. In the report, the indirect jobs generated by the project are estimated at around 100 thousand. However, it is not clear as to what types of jobs are covered by these indirect jobs. When the indirect job, for example, covers workers employed to the construction of industrial park and factories, the resident workers in the new town would be rather small. Supposing such employment includes the construction works, which are temporary jobs to the new town, labor supply would be required. The estimation of such labor supply was not done.

Table 2.6.2 First Phase Development Plan

	Area		Employment	Water	Electricity	Telecom.
	ha	%	(No.)	(m^3/day)	(kW)	(No. of lines)
Factory Lots	132.0	57.4	15,485	16,211	45,802	660
Accurate	35.0	(26.5)	4,556	2,373	12,250	
Electronics	28.4	(21.5)	2,860	2,444	13,360	
Communicati	19.4	(14.7)	2,158	1,487	5,820	
Pharmacy,	29.6	(22.4)	2,383	6,755	9,472	
Garments	19.6	(14.8)	3,528	3,152	4,900	
IZ Center	70.0	30.4	5,600	3,500	3,500	1,050
Road	28.0	12.2	-	280	1,400	-
Total	230.0	100.0	21,085	27,600	50,702	1,710

Source: Pre-Feasibility Study Report of the NPIP

Note: 1) Nos. in parentheses ( ) in the % column indicate shares to factory lots.
2) The total of water consumption does not equal to the summation of each item since the total includes leakage and stand-by water.

2.6.4 Facilities in Phu Cat IZ Center

In the Plan, 70 hectares, or 30 % of the total, is designated as the IZ center area. (In the detailed explanation of each function in the IZ center, however, the planned area for IZ center was calculated at 80 hectares) The IZ center area consists of three functional areas; namely: i) public facilities function, ii) production supporting function, and iii) public welfare function. The concrete facilities included in each function are summarized in the Table 2.6.3.

Table 2.6.3 Functions and Facilities of IZ Center

I. Public Facilities Function	
Area	24 hectare
Facilities	Banks; Post Office; Customs Office; Police Station; Administration Office; Office
II. Production Supporting Function	
Area	20 hectare
Facilities	Show Room; Trading Center; Commercial Center; Bonded Warehouse; Waste Water Treatment Plant; Maintenance Center; Gas Station
III. Public Welfare Function	
Area	36 hectare
Facilities	Health Care Center; Library; Vocational Training Center; Sports Facilities; Guest House; Restaurant; Parks

Source: Pre-Feasibility Study Report of the NPIP

A part of the above function or facilities shall be shared with the Urban Center, which will be proposed by the JICA Study Team, and with some facilities, which are proposed by the HHTP. To raise the cost performance or to secure the investment efficiency of the IP development, such

facilities that can be shared with other areas, should be carefully assessed. In the Ha Tay Socio-Economic Development Plan, the establishment of a commercial center in Hoa Lac Area is proposed, which will include a show room, trading center, shopping center, office and so on. From the point of view of investment efficiency, the JICA Study Team recommends that the commercial center, including a show room, trading center, library, and guesthouse proposed to be established within the IZ shall be shared with the C-21 Urban Center. The author of the report assumed the concept of the IZ center to be rather an isolated location since the provided services will be beyond the requirement of investors. In other word, the scale of IZ center is too big to the total development area. In the next step, meaning the F/S period, the function of the IZ center shall be assessed. From the point of view of construction cost, the IZ center shall be reconsidered since the share of construction cost of IZ center to the total is estimated at 27.3% or US$ 9.8 million.

2.6.5 Investment and Finance

Cost estimate was worked out based on the following assumptions: cost of infrastructure is around US$ 36.0 million and the required investment, around US$ 56.5 million. The detailed cost and required investment are shown in the Table 2.6.4.

Table 2.6.4 Infrastructure Cost and Total Investment

	Item	Amount (US$ 1,000)	
I.	Infrastructure	35,999	63.7%
1.	Land Grading	6,406	(17.8%)
2.	Road Construction	5,801	(16.1%)
3.	Water Supply	1,157	(3.2%)
4.	Drainage	4,281	(11.9%)
5.	Waste Water Treatment	5,733	(15.9%)
6.	Electricity	1,158	(3.2%)
7.	Telecommunication	1,541	(4.3%)
8.	Greenery and Parks	93	(0.3%)
9.	Industrial Zone Center	9,829	(27.3%)
II.	Land Clearance	5,750	10.2%
III.	Land Use Right	11,500	20.3%
IV.	Investment Preparation	780	1.4%
V.	Management and Administration	1,016	1.8%
VI.	Working Capital	1,480	2.6%
	TOTAL	56,525	100.0%

Source: Pre-Feasibility Study Report on the NPIP

In the report, the investment will begin from 1998 (it should be delayed), and the investment in the first year is estimated at some US$ 31 million, or 55.8 % of the total. The investment will continue up to 2001 or a period of four years. The financing schedule and resources are also estimated; the partners' contribution is US$ 23 million, loan and borrowing is US$ 33.5 million. The rent is expected to cost US$ 70 per square meter over a period of 50 years, which is rather expensive as compared to that of Nomura-Haiphong IZ and of HHTP Industrial Zone. (The rent in NHIZ is 60 US$/$m^2$ and that in HHTP is proposed at 45 US$/ m^2). The calculated Internal Rate of Return (IRR) for the project is 15.07 %, and the project is recommended as feasible.

2.6.6 Proposed Facilities in Phu Cat IZ Center

The JICA Study Team proposes that the center facilities should provide services for mainly the tenanted enterprises and their employees. The common service facilities, such as gas station, commercial center, and so on, shall be located at the C-21 Urban Center and its vicinity. The selected facilities for the IZ are described as follows:

- Public Services
- Custom Office, Administration Office, Post Office, Banks
- Public Welfare
- Clinic, Vocational Center

The JICA Study Team also proposes to introduce the "Wholesalers' Center." In the current system of the market in Vietnam, the wholesalers do business in the public market with retailers. In Hoa Lac Urban Area, the wholesalers with storage and warehouses provide professional services for the retailers. The area of the Center shall locate in the vicinity of the interchange of Lang-Hoa Lac Highway and NR21 Bypass. The major function and facilities in the center are proposed as follows:

- Wholesalers' Center Building: office, shop, multi-purpose hall,
- Storage and Warehouse,
- Bonded Warehouse, and
- Truck Terminal.

This center is slightly similar to the production function proposed by the M/P. The center facilities in the M/P, however, are planned based on the provision for the tenanted investors. The services by the production function, therefore, shall target the locating manufacturers. On the other hand, this Center will provide services for retailers as well as the tenanted manufacturers.

2.7 Review of the Dong Mo Cultural Village Development

2.7.1 Outline and Situation of the Development

The development policy for the Vietnamese Ethnic Cultural Village, which was stated in the State Cultural and National Policies, has been accepted by the Government. The objectives of the project for the next generation are as follows:

(a) to identify and enjoy ethnic culture and tradition,

(b) to exchange knowledge, and

(c) to create an atmosphere of national unity.

The other political, social, and educational development objectives are to create an enjoyable culture, artistic activities, and traditions and entertainment. This project should also play a role in the introduction of Vietnamese culture, tradition and civilization to foreigners.

The demand for recreational activities among younger generations has been increasing. However, attractive destinations and facilities are not available in and around the Hanoi City. The M/P for the project was studied by National Institute for Urban and rural Planning (NIURP) and managed by the Ministry of Culture and Information (MCI), which undertook the viability analysis for the project; thereafter, the location and development scale was approved by the government in 1995.

The situation of the Cultural Village is as follows:

(a) The cultural village was located in the south of the Dong Mo Lake by the Ministerial Council for Hanoi Metropolitan Development on July 17, 1976.

(b) The Cultural Village on the Ha Tay Socio-Economic Cultural Development Master Plan was decided by the Prime Minister on September 16, 1992.

(c) The government accepted the development guideline on Ba Vi National Park on December 17, 1993.

(d) The development area was approved by the Prime Minister on November 22, 1994.

(e) Agreement between the Ha Tay Province and the Ministry of Defense was made accordingly.

(f) The location and development area were approved by the Prime Minister on March 15, 1995.

2.7.2 Basic Development Policy

There are a total of 54 ethnic groups in Vietnam, each one with their own unique culture and tradition, characteristics and soul that contain a part of Vietnam. However, cultural and historical heritage were damaged and lost by the past long wars. Therefore, these 54 ethnic groups' traditional culture should not only be preserved but also revitalized and enhanced by this Cultural Village.

2.7.3 Major Roles and Functions

(a) To create a national cultural center to preserve, explore, revitalize, and expose the traditional culture of 54 ethnic groups,

(b) To create national unity by exchanging and reinforcing the mutual understanding of ethnic groups,

(c) To create a suburban type resort, attractive as qualified recreational area for younger generations and foreigners,

(d) To create exhibitions and a place of exchange of Vietnamese tradition and culture with other cultures in the world, and

(e) To create a qualified international and domestic tourist destination.

2.7.4 Development Framework

(1) Target International Tourist Arrivals into Zone-1: Northern Vietnam

(a) Tourist Arrivals : 2000 - 2 million, 2010 - 4.6 million

- 8.7 % of the annual growth ratio
- Target growth ratio should utilize a logistic curve for the forecast.
- At over one million, growth ratio of international tourist will slow down.

(b) Average Length of Stay:

- 5.3 nights (2000), 6.4 (2010) nights (this figure will be for the whole nation (Vietnam), for Zone-1, average length of stay will be 30 to 40 % of the above)
- 1.5 to 2.1 nights (2000), 1.9 to 2.6 nights (2010)

(c) Total Tourist Day (night):

- 10.6 million (2000),.4 million (2010) (total tourist night is 10 % per annum equivalent 1.1 million (2000 and 2.9 million (2010))

(2) Target Domestic Tourist Generation in Zone-1

Tourist Generation: 5.85 million (2000) (around 15 % of zone-1 population)
15 million (2010) (around 30 % of zone-1 population)
Annual growth ratio = 9.9 %

Average Length of Stay: 3.8 nights (2000), 4.3 nights (2010)

The number of tourist generation in a year is still small as compared to the other. However, under the Doi Moi regime, the above tour generation and length of stay situation will change in the future. From 1999, a 5-day working system will be applied, under which average length of stay will be 1.5 to 2.5 days in the future and the number of tour generation per year will be 1.5 to 3 million. Considering variety and the characteristics of tourism development, the target length of stay will be 2 nights or less for the Cultural Village. The tourism development framework for the Cultural Village is shown in Table 2.7.1.

Table 2.7.1 Development Framework for Cultural Village

International Tourist			2005	2010	2020
Zone-1	Tourist Arrivals	(000 p.)	1,665	2,176	2,711
	Average Length of Stay		3.9	4.1	4.5
	Total Yearly Tourist Nights		250	653	1085
Cultural Village	Share of Cultural Village		15%	20%	30%
	Tourist Arrivals	(000 p.)	250	653	1,085
	Average Daily Tourist Arrivals		700	1,800	3,000
	Average Length of Stay		1.5	1.7	2
	Total Yearly Tourist Nights (000/t. n.)		375	1,110	2,170
	Average Daily Tourist Nights		1,000	3,000	5,900
	Peak Factors (monthly)		2	1.8	1.7
	Peakday Tourist Arrivals		1,400	3,200	5,100
	Peakday Tourist Nights		2,000	5,400	10,000
Domestic Tourist			2,005	2,010	2,020
Urban Population in Metropolitan Hanoi		(000 p.)	1,725	2,300	4,500
Zone-1	Tour Generation Ratio per year		1.5	2	3
	Number of Tourist	(000 p.)	2,588	4,600	13,500
	Average Length of Stay		1.5	2	2.5
	Total Tourist Nights	(000 p./nigh)	3,881	9,200	33,750
Cultural Village	Share of Cultural Village in Zone-1		40%	40%	40%
	Total Tourist Arrivals into Cultural Village		1,035	1,840	5,400
	Average Length of Stay in the Village		1.0	1.5	2.0
	Total Tourist Nights		1,035	2,760	10,800
	Average Daily Arrivals		3,000	5,000	15,000
	Average Daily Tourist Nights		3,000	8,000	30,000
	Peak Factors (monthly X weekly)		4.0	3.5	3.0
	Peakday Tourist Arrival		12,000	17,500	45,000
	Peakday Tourist Nights		12,000	28,000	90,000
Day Tripper			2,005	2,010	2,020
Zone-1	Trip Generation Ratio per year		12	18	24
	Number of Day Tripper	(000 p.)	20,700	41,400	108,000
Cultural Village	Share of Cultural Village in Zone-1		8%	6%	4%
	Day Tripper Arrivals into Cultural Village		1,725	2,300	4,500
	Average Daily Arrivals		5,000	6,000	12,000
	Peak Factors (monthly X weekly)		6	5	4
	Peakday Arrivals into Cultural Village		30,000	30,000	48,000
Totals			2,005	2,010	2,020
Total Tourist/Day Tripper Arrivals		(000 p.)	3,010	4,793	10,985
	International Tourist	(000 p./year)	250	653	1,085
	Domestic Tourist	(000 p./year)	1,035	1,840	5,400
	Day Tripper Arrivals	(000 p./year)	1,725	2,300	4,500
	Average Daily Arrivals	(p./day)	8,700	12,800	30,000
	Peakday Arrivals	(p./day)	43,400	50,700	98,100
Total Tourist Nights		(000 p.n./y)	4,256	10,310	35,920
	International Tourist	(000 p.n./y)	375	1,110	2,170
	Domestic Tourist	(000 p.n./y)	3,881	9,200	33,750
	Average Daily Tourist Nights	(p. t./day)	4,000	11,000	35,900
	Peakday Tourist Nights	(p. t./day)	14,000	33,400	100,000

Source: M/Pon Cultural & Tourism Village of Vietnam Ethnic Groups

(3) Special Development Framework

Special development frame work is as follows:

(a) Vietnamese Ethnic Group Villages: 116 ha

(b) Vietnamese and its Foundation and Defense Periods: 95 ha

(c) World Heritage: 40 ha

(d) Recreation and Relaxation: 75 ha

(e) Lake Oriented Sports and Recreational Activities: 22 ha

(f) Hotel Accommodation and Village Management: 37 ha

2.7.5 Major Development Facilities

(1) Vietnamese Ethnic Group Villages: 116 ha

(a) 1st. Zone: 3 Regional Clusters (Northern, Central, and Southern Regions)

- Northern Cluster: Hilly Mountainous Area (Kinh Village: Quan Ho Traditional Folksong Village, Dong Ky Firecracker Village and Silk Village, Chinese Village), and Mountainous Area (Muong Village, Black Thai Village, Ha Nhi Village, H'Mong Village, Cao Lan Village, Dao Village)
- Central Cluster: Delta/Coastal Area (Cham Village, Kinh Village), and Tay Nguyen (Gie Trieng, Hre, Ma, E de, Khua, Ba na and Stieng Villages)
- Southern Cluster: Kho Me Village, Kinh, Chinese and Cham Villages
  Each Village will be composed of 10 traditional houses, communal houses, pagodas or churches, cultural houses, gardens, local trees, rice fields and ponds, and so on. Each village will present traditional and cultural activities and daily life.

(b) 2nd Zone: Cultural Centers (Soft performance of traditional/cultural activities)

- Festival Center: information, restaurant, kiosk, first aid, museum, national theater, and park.
- Service Center: traditional theater restaurant (on water), indoor/outdoor shopping mall

(c) 3rd Zone: National Sports

Athletic fields, racecourse, boat race, water skiing, and indoor sports facilities,

(d) 4th Zone: Gate and Handicraft Center

- Gate Zone: gate, monorail station, visitor center, photo gallery of ethnic groups, headquarters of the village, and fist aid.
- Handicraft Zone: traditional handicraft center (equip each ethnic group shop with a demonstration room), open air markets

(e) 5th Zone: Parks and Gardens

Vietnamese botanical garden, flower garden, water park, herbal garden (with herbal medicine center)

(2) Vietnamese and its Foundation and Defense Periods : 95 ha

This area is composed of two major areas which are the Vietnamese Dragon Pavilion and the National Foundation and Defense Plaza.

(a) Vietnamese Dragon Pavilion

This is a huge-facility with a floor space of 231,000 m^2 and a height of 90 m up to the head of the dragon. It will be around 900 meter long. However, exhibition themes for each part of the dragon are not clear yet and are duplicated.

This pavilion comprises five themes as follows:

- Head of Dragon: 50,000 m^2 (w = 30 m x l =5 5 m x 90 m)
  This part will be the symbol tower for the Cultural Village.
- Neck of Dragon: 65,000 m^2 (w = 30 m x l = 220 m x 30 m)
  This part will be utilized for the Vietnamese cultural exhibition hall, training and enhancement center for folklore and traditional culture, and shopping center of traditional handicrafts.
- Back of Dragon: 76,000 m^2 (w = 30 m x l = 170 m x 45 m)
  This part will be utilized for the presentation of legends, myths, fairy tales and puppet shows.

- Tail of Dragon: 40,000 m^2 (w = 20 m x l = 400m x 15 m)
  This part is a reserved space for cultural, recreational, and entertainment activities, and for shopping.
- Ground Floor of the Above: Miniature of Vietnam (30 m x 900 m)

(b) National Foundation and Defense Plaza

The history of the national development will be shown at the plaza. This plaza is composed of three foundation and protection periods, which are located along Revolution Road.

The facilities for each commemorative plaza are a symbolic monument, hero house, festival/performance plaza, famous cultural parks, and so on.

(3) World Heritage: 40 ha

This area shows the registered World Heritage designated by UNESCO, and introduces a civilization in the world. The area will be divide into the heritage areas of five continents, a center, and other cultural heritage areas of other continents.

What sort of world heritages and how to showcase them are not planned yet.

(4) Center and Recreation, Relaxation, Entertainment, Cultural Performance: 75 ha

The area is divided into two zones as follows:

(a) Gate/Central Axis: entrance area (gate, car parking, headquarter office, and souvenir shops)

(b) Central Axis: Vietnamese architectural monuments, multifunctional hall/amphitheater, visitor center, coffee shops, souvenir shops, 100 meter high fountain, water stage, central monorail station, and operation and maintenance offices workshops.

Parks Zone: bird sanctuary, butterfly garden, water palace garden, and adventurous garden.

(5) Lake Oriented Sports and Recreational Activities: 22 ha

(6) Hotel Accommodation and Village Management : 37 ha

This area is reserved for hotels and amenity facilities development. The planned facilities are as follows:

Hotel/Accommodation: cottage and villa type hotels (ethnic style arch-type which are Hoi An Ancient Street, Hanoi 36 Street, and Ky Lua Market Styles) - 400 rooms / 200 rooms, and high-rise modern hotel - 300 rooms.

Estimated hotel demand on the development framework: 7,800 rooms (2005), 18,600 rooms (2010), and 55,500 rooms (2020). This will require more than 500 ha and thus exceeds the allocated total development area of 385 ha. The proper scale of development on the allocated 385 ha can be somewhere between 1,000 to 2,000 rooms.

On this basis, the framework for the Cultural Village needs to be reviewed in relation with the spatial layout plan including recreation and sports area, restaurants and ethnic food restaurants, handicraft and souvenir shops, traditional dance and music center, galleries, painting and sculpturing workshops, and staff housing (apartment).

2.7.6 Land Preparation and Infrastructure Development

(1) Land suitability for development

Land suitability for development is assessed on a slope analysis.

The evaluation criteria are as follows:

(a) less than 10 %: Suitable for whole development type,

(b) 10 to 25 %: suggested to be fully used. (10 to 15 % can be fully used. But over 15 % to 25 % slope areas should be carefully used. There will be cost for earthwork and foundation, infrastructure developments),

(c) more than 25 %: evaluated to be fully used (In general, these steep slope areas are classified as slope protection areas. It is suggested to conserve ground cover and partially use for parks and gardens),

(d) To avoid and minimize cost, earthwork and heavy grading are proposed.

(2) Storm Water Drainage and Water Level of the Lake

(a) Sewer system for storm water and sewerage are proposed to divide into two systems, which are suggested to underground box and pipeline systems.

(b) Level of the water in Dong Mo Lake: 20 meter above sea level

(3) External Transportation Network

(a) Access from Hanoi

Lang-Hoa Lac Highway links through Tan Linh to Ba Vi, which is 35 to 37 km from Hanoi 60 to 80 meter width.

(b) Access from the Other Areas

NR32 and NR6 and the Provincial Road 84 will be a good access road network for the other area.

(c) Air Transport Service

In the long term future, Mieu Mon 2nd International Airport and Hoa Lac Taxi Airport developments will provide air route access for international tourist. Air transport service is not an advantageous access to the cultural village as compared to land transport services through NR21 Bypass from a time distance and cost analysis.

(d) River Transport service is also identified

(4) Inner Transportation Network

The planned road network for the village is composed of a 3-level hierarchical road system with transport services as follows:

(a) Main Axis: pedestrian (w = 3.5 m), medium (w = 2m), mini train, two-way horse carriage/mini car road (w = 7.5 m), total length = 6.7 km. Planned width of pedestrian way is narrow as compared with tourist arrivals/inflow in the village, which are estimated in the development framework,

(b) Local Axis: width of the roads will be set based on the surrounding characteristics and traffic demand and modes, total length = 3.55 km,

(c) Local Road: mainly pedestrian way, total length = 100 km, and

(d) Monorail: function of monorail is to link with the major theme areas.

The above transportation system lacks a service, operation and maintenance road system for the whole planned facilities.

(5) Water Supply

(a) Estimated Water Demand: 3,000 m^3/day for operation and maintenance (18,000 m^3/day will be additionally required for special water work). The total demand is a mismatch with development framework (number of tourist nights and hotel accommodation requirement - estimated water demand for hotel operation is more than 30,000 m^3/day).

(b) Water Resources: to share the Da River water resource development and supply network for the Corridor 21 Development and Hanoi City

(c) Water Supply Network: total length = around 20 km

(d) Facilities: main pump/tank (300 m^3), high-pressure pump (50 m^3), low-pressure pump for cascade, water treatment plant for water slider.

(6) Electric Power Supply

A 110 kV transmission power supply line is planned and required from the major electric power sub-station in Hoa Lac (the JICA Study Team will propose to develop it in the middle of Hoa Lac and Xuan Mai) or the existing Xuan Khanh Sub-station (110 kV / 220 kV / 0.4 kVA). The estimated total power supply demand is 20,000 kV (estimated total 16,500 kW)

Facilities development plan is inconsistent with development framework (e.g. the planned number of hotel rooms is 900 rooms, however, the estimated hotel requirement under the development framework is 55,000 rooms)

Planned and proposed electric power supply system for the Corridor 21 Development will face the difficulties to cater and absorb the additional increment demand in the Cultural Village (130,000 total population = around 100,000 Peak-day tourist night + 30,000 citizens) under the fast-track development framework of the previous study.

The development framework should be properly reviewed from the viewpoint of marketability, strategies for tourist distribution and development in the Northern Vietnam/Metropolitan Hanoi and land availability and development suitability analysis of the surrounding Dong Mo Lake.

(7) Sewerage Treatment and Environment

(a) Treatment plant is planned near the airport. Its capacity is 2,100 m^3/day. It is strictly prohibited to discharge sewage to the lake, even if a septic tank is utilized. The discharge of treated sewage to the lake should be planned using environmental standards, although it was not clearly stated in the report.

(b) Solid waste treatment plant is planned on the side of the sewerage treatment plant. Planned capacity is estimated as 15,000 m^3/year (estimated demand 12,300 m^3/year, and 33.7 m^3/day)

Incinerator and compost plant systems for solid waste management seem to be not viable in Northern Vietnam. It may result in considerable cost for the initial investment and operation stage. It should be coordinated with the solid waste management system in the Corridor 21 Development.

2.7.7 Implementation Program

(1) Estimated Employment and Population

Estimated employment and population is shown in the Table 2.7.2.

Table 2.7.2 Estimated Employment and Population

Theme Area	Employment/Pop.
1 VN ethnic Village and World Heritage	500
2 VN Historical Park	800
3 Cultural, Exhibition and Recreation Center	1,200
4 Hotel, Service and Management Center	2,000
Total Employment	4,500
Total population (employment. ratio = 1/3)	13,500
Staff Housing Demand	
Total Population	13,500
Total Housing Floor Area Demand (m^3)	162,000
High-rise Apartment (m3, 60 % of total)	97,200
Low-stories Housing (m3, 40 % of total)	64,800

Source: M/P or Cultural & Tourism Village of Vietnam Ethnic Group

(2) Estimated Investment Cost

Estimated investment cost is shown in the Table 2.7.3.

Table 2.7.3 Estimated Investment Cost

Major Development Areas/Projects	Planned	Dev't Area(-2010)		Investment	
	Area(ha)	area(ha)	(%)	US$ (million)	Sector
1 Vietnamese Ethnic Groups' Village	116	11	9%	56.9	Vietnam
2 Historical (Vietnamese/World)Parks	95	95	100%	148.1	Foreign
3 World Cultural Heritage Park	40	40	100%	47.5	Foreign
4 Cultural/Entertainment Center	75	37	49%	29.4	Foreign
5 Hotel/Services/Management Center	37	37	100%	37.1	Foreign
6 River and Water Palace	22	0	0%	0.0	
7 Roads/Infrastructure				77.6	Vietnam
Sub-total	385	220	57%	396.6	
8 Compensation Cost				2.0	Vietnam
9 Land Use Rights Transfer				0.1	Vietnam
10 Land Rent Tax for 30 years				183.5	
11 Other Expense				8.0	Vietnam
Totals	385	220	57%	590.3	

Source: M/P on Cultural & Tourism Village of Vietnam Ethnic Group

Investment by Sector :	Vietnam	million US$	139.7	24%
	Foreign	million US$	267.1	45%

Identified supporting project:

a. Improvement of Ben Mam Pumping Station
b. Buffer Green Planting
c. Restoration of Historical/Cultural Heritage on the Surrounding
d. Staff Housing Development
e. Foods/Beverages Production/Supply
f. Staff Training

(3) Development Phasing

The currency crisis in Southeast and East Asian countries has adversely affected national economic growth causing extreme shortage of national budget to implement the Cultural Village. Under the above situation, a staged development system is proposed to initiate the Cultural Village Development as follows:

(a) Phase-1: 1996 to 2000 Vietnamese Ethnic Groups' Village 116 ha (30 % of total), US$ 53.3 million (original US$ 56.9 million is reduced to US$ 53.3 million - 13.4 % of the total), other expenses for land use transfer and ethical houses: US$ 0.179 million

(b) Phase-2: 2000 to 2005 Cultural/Entertainment Center75 ha (19.5 % of total), US$ 29.4 million (7.4 % of the total)

(c) Phase-3: after 2005 All of remaining theme areas 195 ha (50.5 % of total), US$ 313.9 million (79.2 % of the total)

2.7.8 Financial Aspect

(1) Total Investment Cost

US$ 590 million

(2) Annual Operational Expenses

US$ 23.5 million/year

(3) Total Revenues

US$ 75.8 million/year

(a) Admission Fee to the Village

US$ 39.2 million/year is 52 % of total revenues. The above fixed revenue of admission fee for the financial analysis could not be understood under the framework which is set for the growth of tourist arrivals.

Admission fee may utilize US$ 10/person or more. This high admission fee system may lose the domestic market, which is estimated at 6 million persons (around 70 % of total tourist arrivals at 2020) based on the framework.

(b) Hotel and Villa Operation

US$ 18.6 million is around 25 % of the total. 2,000 accommodation rooms may operate 65 % of room occupancy rate and US$ 40/room/night. 2,000 rooms x 365 days x 65 % x US$ 40/room/night = US$ 18,980,000. Those factors should be incorporated into the analysis.

a) Room occupancy rate should increase.

b) Food and beverage are another prospective revenue items, which should be considered and incorporated in the analysis.

c) Target figures of tourist arrivals and average length of stay on the framework are not utilized and inconsistent with the facilities development framework.

(c) Facility and Equipment Lease Fee

US$ 100,000: Lease items are identified in detail but total/year lease revenues are small amounts.

(d) Shopping Facilities

US$ 17,000,000/year is around 19 % of the total. For this item, fixed revenue/year is utilized, which is difficult to be understood. Expenditure per tourist could be estimated at US$ 2.5 to 5 per tourist. Tourist expenditure should be separately estimated by foreign tourists, domestic tourists, and day-trippers per day.

(4) Annual Depreciation

US$ 14,446,000/year is around 3.6 % of the construction cost.

(5) Capital Return Period

11 years after the completion of construction (17 years include construction period) is deemed too long for the capital return.

(6) Annual Gains on the 17th year

US$ 52 million is 8.9 % of the capital investments.

2.7.9 Issue of the Development

The significance and qualitative benefit of the project are well stated as follows:

(a) It is beneficial to the political, cultural, social and economic aspects of the country,

(b) It is located on the national development project area which is called the Corridor 21 Development, and

(c) It will be a memorial project of the 21st century for the capital and the nation.

(d) Quantitative benefits and environmental aspects are not stated on the report.

(1) Recommendations

(a) Early approval for the M/P,

(b) F/S for each sub-project that belongs to the theme area,

(c) To organize a Land Compensation Committee on the government level,

(d) To organize a Joint Venture (J/V) between a public (MCI/MPI) and private foreign company or companies for F/S and quick implementation, and

(e) To replace the irrigation functions (under the province of Ha Tay and MARD) on the Dong Mo Lake to stabilize the level of the lake water, which is the key point to creating a water-oriented recreational area.

(2) Identified Major Planning Issues for Further Study

(a) Financial analysis of the staged development,

(b) Review of the main report (the summary report does not describe details of financial analysis),

(c) Re-examination of revenue items (see the comment on each item),

(d) Careful formulation of development framework with market analysis (not only based on the trend analysis). The formulated framework should set the physical development frame for each facility and estimate tourist expenditures and revenues,

(e) Clear definition of the organizational structure, roles and functions of each implementation body, and

(f) Encouragement of more private sector participation for tourism sector development. Plans and programs for private sector participation are not only required to promote investment, but also to market and promote tourism products, as well as to nurture tour operation activities.

The tourism-related domestic industries, which include food production/supply, souvenir production/supply, transportation services, guide, hotels and accommodation services, and so on should be improved and enhanced in order to support the Cultural Village Development. Systems and mechanism for private sector participation of both foreign and domestic tourism related-industries should be carefully considered.

2.8 Transport Sector

2.8.1 General Conditions

The transport sector in Vietnam comprises road, railway, inland waterway, seaport and airport modes. Nevertheless, the current share of road transport accounts for more than 80 % and 65 % for passengers and freight respectively in Vietnam. Furthermore, the share of road transport mode occupies more than 95 % for passengers and 85 % for freight among the whole transport sector in the Hanoi Metropolitan Area (HMA). In this view, provision of efficient land transport infrastructure network is regarded as a high priority with urban development as it occupies the highest share among the transport modes.

An integrated transport network system should be secured to provide efficient urban function. In particular, the improvement of a transport network that links seaports/airports through roads/railways should be taken into account to promote industrial activities of the region.

The transport study will be carried out mainly focusing on the land transport modes, including road and railway, to meet the future traffic demand in Son Tay, Hoa Lac, Xuan Mai and Mieu Mon (the Study Area of the Corridor 21 Development), which will collectively serve as a sustainable new town.

(1) Overall Road Network and Existing Conditions

The road network around HMA forms a radial pattern from Central Hanoi, as illustrated in Figure 2.8.1, and comprises National Road 1A (NR1A), NR2, NR23, NR3, NR5, NR6 and NR32. These roads are linked to Ring Road 2 (RR2) with a diameter of approximately 5 km from HMA, although the condition of some road segments is insufficient because of narrow road width and poor maintenance. Currently, the improvement plan of Ring Road 3 (RR3) is proposed to relieve traffic congestion in Central Hanoi. The overall road network of the Hanoi region is show in Figure 2.8.1, while the present condition of roads is listed in Table 2.8.1.

(2) Transport Improvement Plans and Projects

The on-going or proposed transport improvement projects in HMA are under the supervision of the Ministry of Transport (MOT). The details of road improvement plans are described in Table 2.8.2.

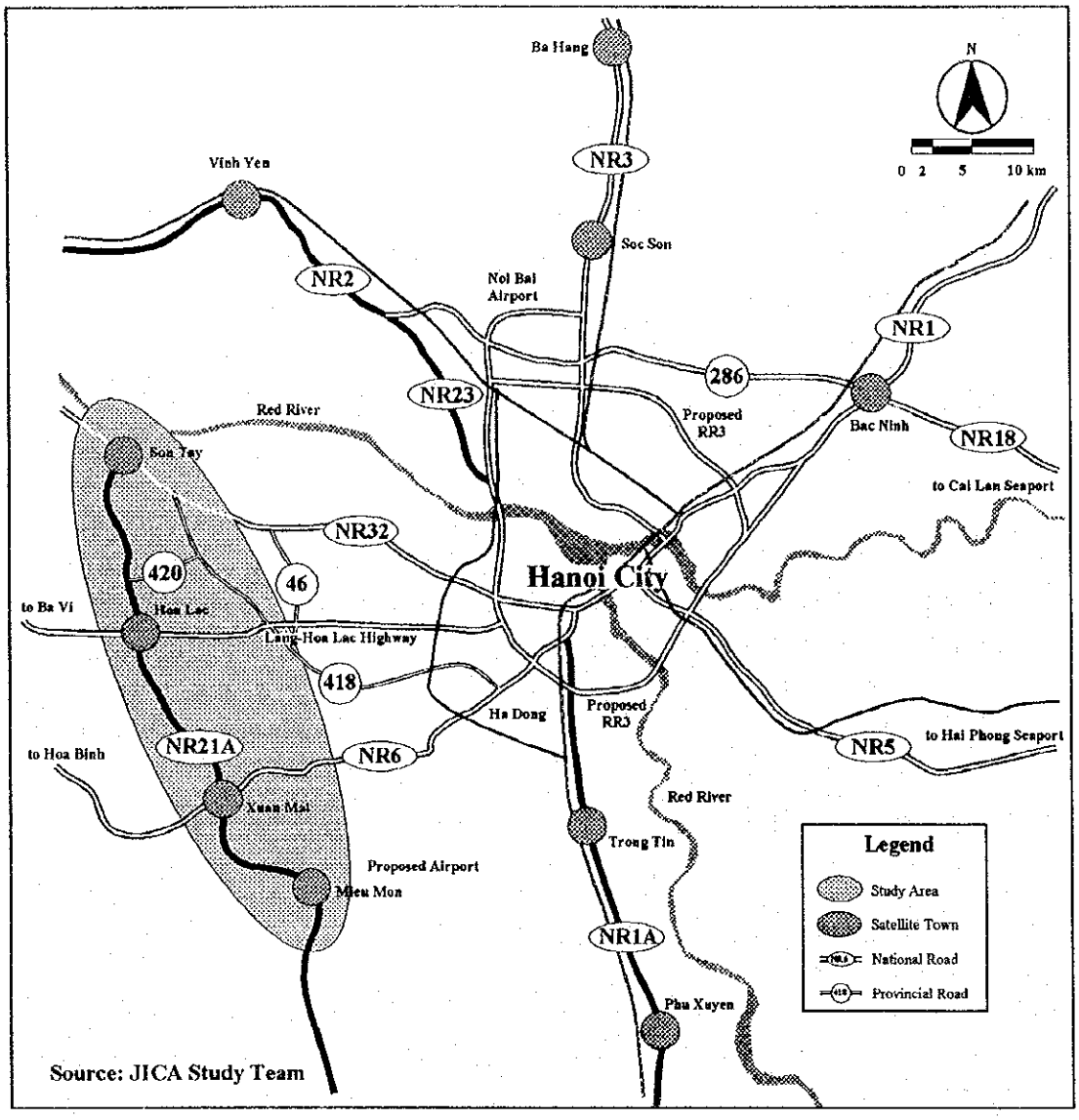

Figure 2.8.1 Existing Road Network in Hanoi Region

Table 2.8.1 The Present Situation of Road in Hanoi Area Landscape

Road No.	Road Class	Starting and Finishing Point	Management	Road Width	Lane	Traffic Forecast (vehicle/day) year of 2000 and 2010	Present Traffic Volume	Survey Sot of Present Traffic Volume (1997)
NR1A	Class I-III	Lang Son-Ca Mau (L=2,300	VRA/MOT	Paved=9-31 m Foundaton=10-12 m	2-4 lanes	13,540 (2000) 21,400	5,857 (1997)	30 km south of Hanoi
NR2	Class II-III	Hanoi-Ha Giang (L=313 km)	VRA/MOT	8-14 m with 2-3 m shoulder	2 lanes	8,520 (2000) 13,701 (2010)	4,305 (1997)	15 km north of Hanoi
NR3	Class III	Hanoi-Cao Bang (L=313 km)	VRA/MOT	Paved=7.9 m Foundaton=9-12 m	2 lanes	10,567 (2000) 27,854	5,310 (1997)	18 km north of Hanoi
NR5	Class II	Hanoi-Hai Phong (L=106 km)	VRA/MOT	Paved=9-31 m Foundaton=10-12 m	Existing 2 lanes, 4 lanes expansion (under construction)	25,304 (2000) 41,583 (2010)	10,508 (1997)	9 km east of Hanoi
NR6	Class III	Hanoi-Tuan Giao (L=500 km)	VRA/MOT	8-14 m wide	2 lanes	6,100 (2000) 11,212 (2010)	2,714 (1997)	20 km west of Hanoi
NR18	Class III	Bac Ninh-Mong Cai (L=160 km)	VRA/MOT	8-14 m wide	2 lanes	6,081 (2000) 6,141 (2010)	2,070 (1997)	40 km north of Bac Ninh
NR32	Class IV	Hanoi-Lao Cai (L=387 km)	VRA/MOT	6-7 m wide	2 lanes	-	3,472 (1997)	16 km west of Hanoi
RR2	Class II-III	Central Hanoi Area	VRA/MOT	14-25.5 m wide	2-4 lanes	-	-	-
RR3	-	NR5-Noi Bai-NR5	VRA/MOT	Than Long-Noi Bai=23 m wide	Noi Bai-Ben Xe Lien Tinh=4 lanes	-	-	-
Lang-Hoa Lac Highway	Class I-II	Hanoi-Hoa Lac (L=30 km)	VRA/MOT	12 m wide	2 lanes (under construction)	12,698 (2000) 40,768	-	-

Source: TDSI of MOT

Note: Class I means 4 to 6 lanes divided highway with provision for bicycles where necessary.
Class II means 4 lanes divided highway with provision for bicycles where necessary.
Class III means 2 lanes divided highway with provision for bicycles where necessary.
Class IV means 2 lanes rural road.
VRA means Vietnam Road Administration and MOT means Ministry of Transport.
NR means national Road and RR means ring road.

Table 2.8.2 Road Improvement Plan in Hanoi Area Landscape

Road No.	Road Class	Improvement Section	Management	Road Width	Lane	Criteria of Improvement	Improvement Period
NR1A	Class I	NR1A Bypass: Hanoi-South Hanoi (30 km)	VRA/MOT	26-33 m	2-4 lanes	To serve as a national northsouth corridor for socio-economic activities	Under Construction by 2000
NR2	Class I	Hanoi City (5.5 km)	VRA/MOT	22.5 m (Noi Bai-Hanoi boundary)	4 lanes with 2 non-motorized lanes	To serve as a major route for trading activities with	2005 to 2010
NR3	Class I	Hanoi-Hanoi border (32.5 km)	VRA/MOT	22.5-30 m	6 lanes (central Hanoi-RR3=11.5	To cope with increasing traffic demand in northern provinces of Hanoi	2000 to 2005
NR5	Class I	Hanoi-Hai Phong (L=106 km)	VRA/MOT	26-33 m	6 lanes (Central Hanoi-Hanoi Boundary=8.5 km) 4 lanes	To cope with distribution traffic from/to Hai Phong Seaport	Under Construction by 2000
NR6	Class I-II	Hanoi-Hoa Binh	VRA/MOT	22.5 km (Noi Bai-Hanoi boundary)	4 lanes	To cope with future expansion of new town to the west of Hanoi	2005 to 2010
NR18	Class I	Noi Bai-Bac Ninh	VRA/MOT	13.5-26 m	2-4 lanes	To serve important arterial road in the northern provinces with industrialization of	2 lanes by 2001 and 4 lanes by 2013
NR32	Class I-III	Hanoi (RR2)-Hanoi boundary (8.5 km)	VRA/MOT	33 m (Cau Guay-Tan Long)	4-6 lanes	To relieve heavy traffic on the road and cope with future expansion of new town to the west of Hanoi	2001 to 2005
RR2	Class I-II	Central Hanoi Area	VRA/MOT	33.5 m	2-4 lanes	To relieve heavy traffic on the central urban Hanoi	2001 to 2005
RR3	Class I	NR5-Noi Bai-NR5	VRA/MOT	25-32 m	NR5-Noi Bai (6 lanes in south and 6-8 lanes in north)	To meet the demand for industrial zones and urbanized area	South RR3 by 2000 and north RR3 by 2006 to 2015
Lang-Hoa Lac Highway	Class I-II	Hanoi-Hoa Lac (L=30 km)	VRA/MOT	26.5 m	6 lanes	To cope with future expansion of new town to the west of Hanoi	2 lanes by 1998 and 6 lanes by 2020

Source: TDSI of MOT

Note: Class I means 4 to 6 lanes divided highway with provision for bicycles where necessary.
Class II means 4 lanes divided highway with provision for bicycles where necessary.
Class III means 2 lanes divided highway with provision for bicycles where necessary.
Class IV means 2 lanes rural road.
VRA means Vietnam Road Administration and MOT means Ministry of Transport.
NR means national Road and RR means ring road.

2.8.2 Present Conditions of Road Transport

(1) Management

The Vietnam Road Administration (VRA) under MOT is mainly responsible for management and maintenance of the existing roads. Under MOT, there are two institutes that are involved in road planning and design; namely, Transport Engineering Design Incorporation (TEDI) and Transport Development and Strategy Institute (TDSI).

The national highways are under the supervision of MOT. The VRA is responsible for the management unit of national highway including maintenance and operation. Provincial roads are under the Transport and Urban Public Works (TUPWS) and Provincial Transport Authority (PTA). TUPWS, which is under the Hanoi People's Committee (HN-PC), has three road construction companies for maintenance work of mainly provincial roads and some other national and district roads. In addition, district roads are under the district transport office. The district management units are responsible for municipal, village and district roads.

(2) Existing Condition

The road network is described in both regional and area context: i) Hanoi Regional Road Network and ii) Access Road to the Study Area. The overall road network of the Hanoi region is illustrated in above-mentioned.

NR1A is a major backbone of the national road transport network which connects the northern part of Vietnam in Lang Son up to the Chinese border, and Ca Mau Province to the southern part of Vietnam through Ho Chi Minh City (HCMC), a distance that is more than 2,300 km long. This highway has played an extremely important role for economic and social activities in the nation. Currently, the NR1 Bypass improvement project is carried out with the assistance of international financial organizations such as World Bank, Overseas Economic Cooperation Fund (OECF) and Asian Development Bank (ADB). The improvement plan includes re-alignment by providing a Bypass in the northern section of Hanoi. In addition, there is a plan to construct a bypass (about 30 km long) in parallel with the existing NR1A to the east in the south section of Hanoi.

NR5 runs from Hanoi to Hai Phong Seaport to the east, a distance of about 106 km. This highway has served major international trade routes for the seaport in Hanoi. The Cau Chui - Chau Quy segment has been improved with the cross section of 30 meters in recent

years. At present, road widening is underway from 2-lanes to 4-lanes in the whole section, while the expansion of the 6.7 km urban road section from 4-lane to 6-lane with shoulder, has long been planned. All roads will be upgraded to class-I and the expected completion year is 2010.

Extending 270 km long, NR3 runs from Hanoi to Cao Bang to the northern provinces near the Chinese border. The road improvement gains more significance because of the potential development of industrial zones (IZs) and new towns in the north of Hanoi.

In addition, NR2 runs from Hanoi to Ha Giang Province through Viet Tri to the northwest. This highway has played a role in the trade activity with China, linking to Noi Bai International Airport and IZs. The existing road has a width of 8-14 meters with 2-3 meters shoulder.

NR18 extends to Mong Cai, diverging from NR1A at Bac Ninh, with about 300 km long to the east. More importantly, the highway links Noi Bai Airport to the major seaports, including Ha Long and Cai Lan Seaport in the northeastern provinces through proposed IZs. At present, the Noi Bai - Bac Ninh segment is still unpaved.

The RR3 Improvement Project has been studied to alleviate serious traffic problems by separating external traffic from urban traffic in Hanoi area. The improvement plan includes the construction of a 4-lane highway for motorized vehicles and two side lanes for bicycles with 40 meters width. In addition, this ring road links with the Noi Bai South Thang Long Highway and surrounding HMA, a total of 72 km. The implementation of the RR3 would offer an access road to new towns and proposed IZs in Hanoi suburbs to form a regional transport corridor.

Future improvement plans for the ring road include the provision of a 6-lane road for motorized traffic and a 2-lane road for non-motorized traffic. For the Thang Long - Noi Bai section, which is 23 meters wide, 4 lanes, the plan is for improvement to 6-8 lanes. Completion of the ring road is expected to contribute to promote decentralization in Hanoi in the future.

(3) Major Constraints on Road Transport

Hanoi has been suffering from chronic urban environmental problems due mainly to high population density and traffic congestion. Although the road network in the Hanoi is extensive, the road design and condition are not suitable for modern vehicles in general. One of the conspicuous constraints of road transport is the mix of various vehicle modes on

the main roads. The major road transport mode for people is motorcycles and bicycles rather than private cars or public transport in Vietnam as well as Hanoi. Modal split on the major highways around Hanoi surveyed in 1997 is summarized in Table 2.8.3. The mixed-vehicle traffic has decreased the quality of efficient urban traffic flow.

Table 2.8.3 Share of Two-Wheel Vehicles on the National Road Around Hanoi

Unit: vehicles/day (share %)

National Road Number	4-Wheel vehicles	Motorcycle	Bicycle
NR1A	5,887 (46.3%)	3,860 (30.3%)	2,921 (23.4%)
NR2	4,305 (38.4%)	3,591 (32.0%)	3,296 (29.6%)
NR3	5,310 (30.4%)	6,309 (36.1%)	5,824 (33.5%)
NR5	10,508 (35.6%)	11,568 (39.2%)	7,416 (25.2%)
NR6	2,714 (21.0%)	6,243 (48.4%)	3,929 (30.6%)
NR32	3,472 (10.1%)	13,713 (39.8%)	17,250 (50.1%)

Source: Vietnam Road Administration, June 1998

The average traffic volume per day on the well-facilitated urban road is about 7,000-9,000 vehicles daily per lane at 40-60 km/hr. The urban traffic of 4-wheel vehicles in Hanoi City maintains only 20-30 km/hr, owing to high occupancy of motorcycles and bicycles on the main roads. This phenomenon of the mixed-vehicle modes also causes the inefficient road maintenance cost and investments.

In addition, as a number of motorcycles are old and poorly-maintained, air pollution remains a serious problem on many streets in central Hanoi. Furthermore, traffic accident rate has been increasing in recent years due to the majority of two-wheel vehicles on main roads.

The countermeasure against these problems is basically to convert to public transport system from the present mixed transport modes. Currently, public transport users account for only 2-3 % of the population in Hanoi. The Government of Vietnam, as well as the MOT, has promulgated a policy to develop sound public transport system with a share of up to 55-60 % by 2010. Along with this effort to strengthen public transport, the relevant authorities should ensure regulations and control for the management of transport.

Another constraint is that the existing road condition is generally in poor or fair condition due to the lack of maintenance in urban Hanoi. This causes the increase of vehicle operating cost as well as inefficient traffic flow.

(4) Access Roads to the Study Area

The major access roads to the Study Area include NR6, NR21A and NR32 as well as the Lang-Hoa Lac Highway, which is currently being constructed. The present condition of access roads is summarized as mentioned in Table 2.3.1. and Figure 2.3.1. In addition, the traffic volumes and survey spots on NR6, NR21A and NR32 are shown in Table 2.3.4.

(a) National Road 6

NR6 runs southwest of Hanoi through Xuan Mai and Hoa Binh and extends to the south of Lai Chau Province. The section of Hanoi-Xuan Mai is asphalt-paved road, which is about 36 km long. The whole pavement condition is generally fair, although partial segment of undulated road surface is observed on this road.

The section of Hanoi-Ha Dong is a 6-lane road, while the section of Ha Dong-Xuan Mai is a 2-lane road. The Hanoi-Ha Dong section has a two-wheel vehicle lane on each side. Nevertheless, it is observed that the lane on each side for motorcycles and bicycles are almost unutilized. The Hanoi-Ha Dong section shows the highest traffic flow among the surrounding radial-pattern national roads in Hanoi.

(b) National Road 32

NR32 runs northwest of Hanoi, which links from Hanoi to the northwest of Lao Cai Province through Son Tay. The Son Tay- Hanoi section is about 42km long with a 2-lane asphalt pavement. In general, the road design is sub-standard and pavement is in poor condition with about 6-7 meters basement and 4.5-5 meters paved surface width. In some parts of this segment, it is observed that sharply curved and undulated pavement condition seems to be problems. In particular, the traffic volume of trucks and buses is slightly heavy in the Hanoi-Tram Troi segment, causing traffic congestion.

(c) Lang - Hoa Lac Highway

Lang-Hoa Lac Highway links Hanoi City to Hoa Lac Urban Area with a total length of 45 km. The construction of this Highway commenced in the middle of 1996. Phase-I (30.2 km) of the 2-lane highway construction with 12 meters width has been implemented under the supervision of MOT.

Currently, the construction has been implemented with partial asphalt pavement and macadam in some segments. The earthwork in the whole section is completed except

in Central Hanoi due to the existing housing clearance. According to the MOT, the construction of Phase-I will be completed by the end of 1998. In the long-term view, there is an expansion plan of this road to 6-lane highway of 35.5 meters width.

According to the F/S by TEDI under MOT in 1995, the future traffic volume on this highway is estimated at 12,700 vehicles/day by the year 2000. In addition, traffic volume will reach 40,760 vehicles/day by the year 2010.

When the road construction is completed in accordance with highway standard with the speed of 80-100 km/hour, the running time between Hoa Lac and Hanoi is approximately 20-25 minutes. The Lang–Hoa Lac Highway is expected to contribute to the formation of a multi-purpose functional transport network to cater to industrial activities, commuters, amusement trip purpose, and so on, of the new town.

(d) National Road 21A

NR21A runs north-south of Ha Tay and Nam Ha Province, which links from Son Tay to Nam Dinh through Hoa Lac, Xuan Mai, Mieu Mon of Ha Tay Province and Lac Thuy (Hoa Binh Province). NR21A is connected with NR10 in Nam Dinh. The Mieu Mon-Son Tay section is about 47 km long and the road is in good condition with a 2-lane asphalt pavement, although gently hilly segments are observed in parts of the section.

The Xuan Mai-Mieu Mon section is about 15 km long. The road has a 2-lane asphalt pavement with hilly and undulated segment. In general, most parts of the road segment are narrow with 7.5 meters foundation and 5-6 meters surface width. Along with the future new town development in Mieu Mon, it seems that this access road would not be able to cope with the future traffic demand in the area. In addition, as the extension road of NR21A from Xuan Mai toward Mieu Mon does not aligned with NR21A, this could hinder smooth traffic movement from Hoa Lac Urban Area to the Mieu Mon.

The present situation of access roads to the Study Area is summarized in Table 2.8.4.

Table 2.8.4 Present Situation of Access Roads

Road No.	Lang-Hoa Lac Highway (Phase-I)	NR6 (Hanoi-Xuan Mai)	NR32 (Hanoi-Son Tay)	NR21A (Son Tay-Xuan Mai)	NR21A (Xuan Mai-Mieu Mon)
Road class	Class 1-Class 2	Class 3	Class 4	Class 3	Class 3
Road standard					
* Basement width	10 m	8.5-10.5 m	6-7 m	9.5-10.5 m	7.54 m
* Surface width	12 m	7.5-8.5 m	4.5-5 m	7.5 m	5-6 m
Improvement plan	Under construction	Class 1 or 2	Class 1-3	Class 1 or 2	Class 1 or 2 (2005-2010)
Lane	2 lanes (by 1998)	2 lanes	2 lanes	2 lanes	2 lanes
Pavement	Asphalt	asphalt	asphalt	Asphalt	asphalt
Road length	30.2 km	34 km	42 km	30 km	17 km
Traffic Volume		2,714 vehicles/day (1997)	3,472 vehicles/day (1997)	988 vehicles/ day (1997)	

Source: Transport Development and Strategy Institute (TDSI)

Note: 1) Road classification
Class 1: 4-6 lane divided highway with provision for bicycle where necessary.
Class 2: 4 lane divided highway with provision for bicycle where necessary.
Class 3: 2 lanes divided highway with provision for bicycle where necessary.
Class 4: 2 lanes rural road
2) The traffic volume is not inclusive of motorcycle and bicycle.

2.8.3 Rail Transport

(1) Management

The Vietnam Railway Union (VRU) under MOT is responsible for the management of railway transport in Vietnam. As for research and design institutes of railway transport, there are two institutes; the TEDI under MOT and Railway Investment Constructions and Consulting Company (RICCC) under VRU.

(2) Existing Condition

The railway network around Hanoi extends as a radial pattern as illustrated in Figure 2.8.2. The main line runs from Hanoi to the Chinese border through Ha Bac and Lang Son Province to the northeast. Of which, the section of Hanoi-Gia Lam is meter gauge (1,000 mm) with about 5 km long, and the rest of the section towards the border is mix gauge. The main line to the southern part runs to HCMC through Ha Tay, Nam Dinh, and Ninh Binh Provinces with a meter gauge. The Hanoi-Hai Phong railway section, diverging from Gia Lam, links to Hai Phong with a meter gauge.

Hanoi-Lao Cai railway line runs from Hanoi to the northwest provinces up to the Chinese border. As the railway connects with Chinese railway at Lao Cai, this line is somewhat important route as an international railway network. In addition, Hanoi-Trieu line runs from Hanoi to the northern parts with a total length of 72 km, diverging from Hanoi-Lao Cai line at Dong Anh.

Luu Xa-Ha Long line runs toward southeast provinces up to Ha Long through Ha Bac Province with about 104 km long, which diverges from Hanoi-Quan line at Kep. Using a standard gauge (1,435 mm), this line provides direct access from Ha Bac Province to Ha Long. Furthermore, Van Dien Bac Hong Yen Vien line runs a circular route in Hanoi. The route includes Thang Long Bridge, located northeast of Central Hanoi. The northern section of the bridge uses standard and meter gauge, while the southern part route, only a meter gauge.

The radial-pattern railway network in HMA causes traffic congestion in the urban area, particularly in the east-west traffic direction. Also, the at-grade cross-sections with roads seem to be a constraint in urban traffic. Moreover, the condition of railway facility is obsolete and poorly maintained.

In addition, the demand of commuting railway passengers will be increased with the future expansion of urbanization in the outskirts of Hanoi. In this regard, the improvement of railway network including mass railway transit (MRT) system is required as a countermeasure. According to the VRU, the improvement plan of the following sections around Hanoi region has been proposed:

(a) Ha Dong / Hang Co / Phu Dien Line section

(b) Giap Bat / Yen Vien Line section

(c) Giap Bat / RR 3 / Noi Bai / Nhat Tan / Hoang Quoc Viet Line section

(d) Van Tri / Co Bi Station Line section

(e) Me Tri / Hoa Lac Line section