

## The Corridor 21 Development

### 2.6 URBAN CENTER DEVELOPMENT PLAN

#### ● Planning Concept

1. The Urban Center is the core of the Corridor 21 Development. The principal functions of the Urban Center are categorized in relation with the land zoning.
  - VNU Area: Academic and Cultural Center
  - HHTP Area: Research and International Exchange Center
  - Phu Cat Area: Recreation and Sports Center
  - Dong Xuan Area: Civic Center and Commercial Center.
2. The Urban Center symbolizes the urbanity of the Corridor 21 Development, where new city residents, as well as visitors, can enjoy the urban life and cultural attractions.
3. The Urban Center presents the identity of the Corridor 21 Development with its unique urban space, differentiating it as a "science and research city," an "international city," and a "garden city."
4. The principal roles of the Urban Center are threefold.
  - To encourage convenient urban life,
  - To make urban life attractive, and
  - To facilitate the VNU relocation and the HHTP development by attracting students, teaching staff, researchers, and investors.
5. Quality urban services are regarded as an important urban infrastructure of the Corridor 21 Development. Although quality urban services will gradually be consummated over the long development period, some basic urban services should be provided from the early phase of the development.

#### ● Compact Development

A "compact development" is essential for a cost-efficient development thereby minimizing infrastructure cost, a more functional and convenient development for users, and a flexible development reasonably responding to future changing needs and circumstances. A compact development can create from the beginning an attractive and convenient urban space, thus attracting more people and investors to come in. In the light of this, the Urban Center is proposed to pursue a compact development on a stage basis.

#### ● Urban Center Structure

Among the functions to be introduced in the Urban Center, the functions of commerce and business, and transport are most important and require larger areas.

In terms of land assignment, more than half of the area (55%) will be assigned to the Dong Xuan area, and the remaining 45% will be evenly assigned to the VNU, HHTP, and Phu Cat areas (15% each). A transport terminal will be located in the Dong Xuan area, which assumes the terminus functions for inter-urban traffic between Hoa Lac-Hanoi and other areas in the Corridor 21, as well as intra-urban traffic within the Hoa Lac and Xuan Mai Area.

#### ● VNU Area (70 ha): Academic and Cultural Center

As an academic and cultural center, the following services shall be provided:

1. Extensive social services,
2. Support for scientific research,
3. Scientific research exchange,
4. Cultural, and
5. Commercial, business, and service.

#### ● HHTP Area (50 ha): Research and International Exchange Center

The area shall provide the following services:

1. International convention center,
2. International exhibition and event halls,
3. Convention hotels,
4. World trade center, and
5. Support industries for scientific research and development.

#### ● Phu Cat Area (60 ha): Recreation and Sports Center

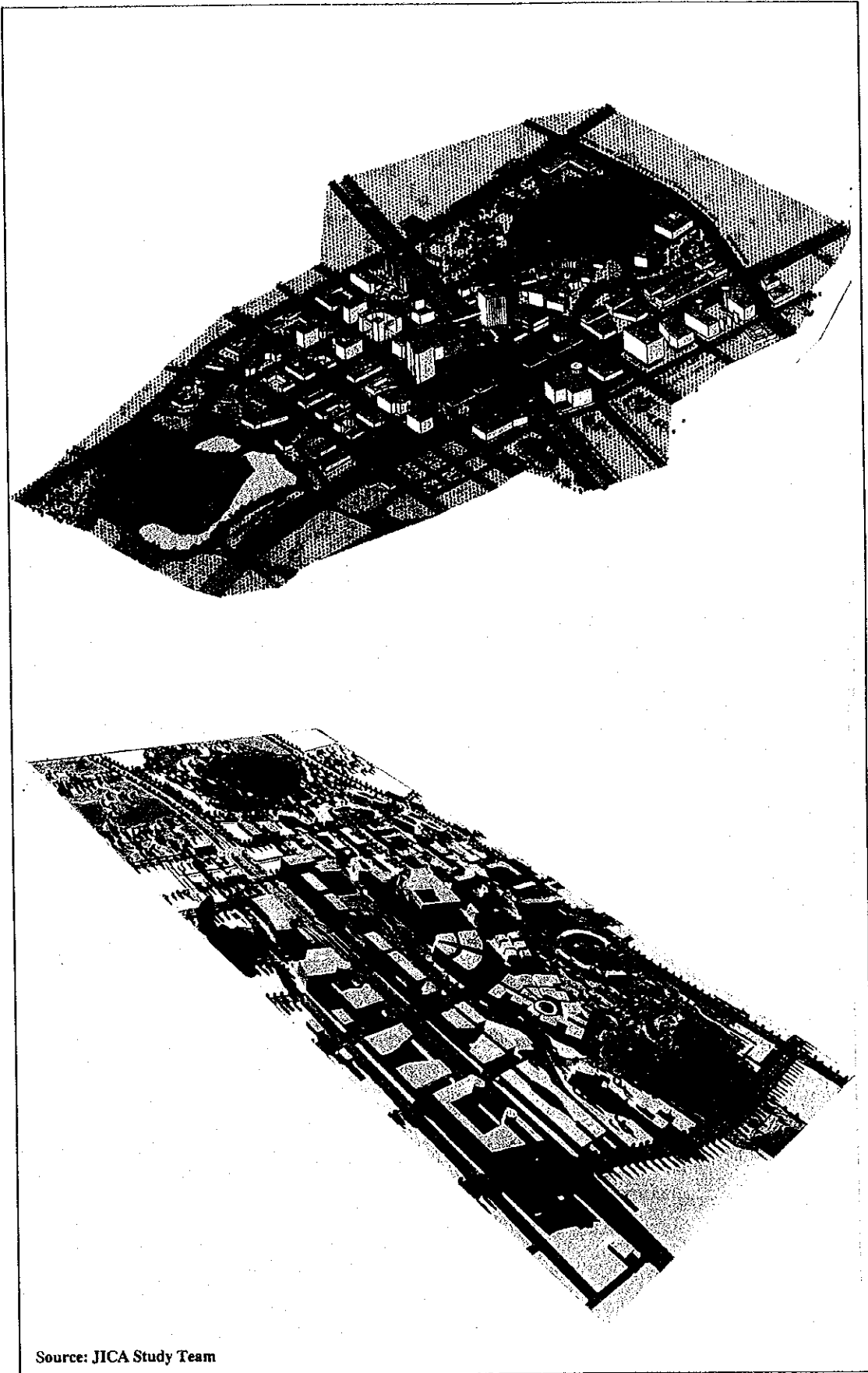
The following amenities shall be provided:

1. Theme park,
2. Large-scale amusement park,
3. Circus,
4. Zoo and botanical garden, and
5. Theater, cinema, bowling, playground.

#### ● Dong Xuan Area (150 ha): Civic Center and Commercial Center

The area shall have the following functions:

1. Civic center,
2. Commercial,
3. Business and service,
4. Accommodation and cultural exchange,
5. Education and learning,
6. Cultural,
7. Amusement
8. Medical and social welfare, and
9. Transportation.



Source: JICA Study Team

## The Corridor 21 Development

### 2.7 HOUSING DEVELOPMENT

#### ● Pioneering Housing Development

The Hoa Lac and Xuan Mai Urban Development is a pioneer project in the context of promoting nationwide housing development, in order to improve the living environment of the people, thus contributing to enhancing the national economy and welfare. In light of the present situation and issues in the country's housing sector, the following two objectives are deemed important, and attempts should be made in the development to seek for viable solutions thereof:

1. Establishment of a housing financing system by mobilizing both public and private funds, and institutional building for housing supply; and
2. Production capacity building to increase not only the number but also the quality of housing.

#### ● Housing Supply System

The basic concept is that the proposed "Corridor 21 Development Authority (C-21DA)" will develop the housing estate and wholesale it to the public "Housing Development Corporation (HDC)" and the public and/or private "Housing Developers (HDs)." HDC and HD will then sell or lease the developed housing to prospective enterprises, cooperatives, and individuals. HDs include State-owned Enterprises (SOE), Joint-stock Companies (J/S), Joint Venture Companies (J/V), and Private Companies (PD). Cooperatives imply Housing Cooperatives (Coop).

| Basic Concept                                      | Type  | Ownership                | Supply Entity                                 |
|--|---|--------------------------|---|
| <b>High Income</b>                                 |   |                          |   |
| Diverse Types, Ownership & Supply Entity           | -Detached<br>-Semi-detached<br>-Row house                 | -S<br>-S<br>-S           | -PD/Self<br>-PD/JS/SOE<br>-JS/SOE             |
|  | -High-rise<br>-Medium-rise                                | -S/L<br>-S/L             | -JS/SOE/JV<br>-JS/SOE/JV                      |
| <b>Medium Income</b>                               |   |                          |   |
| Diverse Types, Chiefly for Sale & Partly For Lease | -Semi-detached<br>-Row house<br>-Medium-rise<br>-Low-rise | -S<br>-S<br>-S/L<br>-S/L | -PD/JS/SOE<br>-PD/JS/SOE<br>-HDC/Coop<br>-HDC |
| <b>Low Income</b>                                  |   |                          |   |
| Apartment Type Chiefly For Lease                   | -Medium-rise<br>-Low-rise                                 | -S/L<br>-L               | -HDC/Coop<br>-HDC                             |

Source: JICA Study Team

Notes: S : for Sale  
L : for Lease  
Self : Self-construction

#### ● Housing Financing System

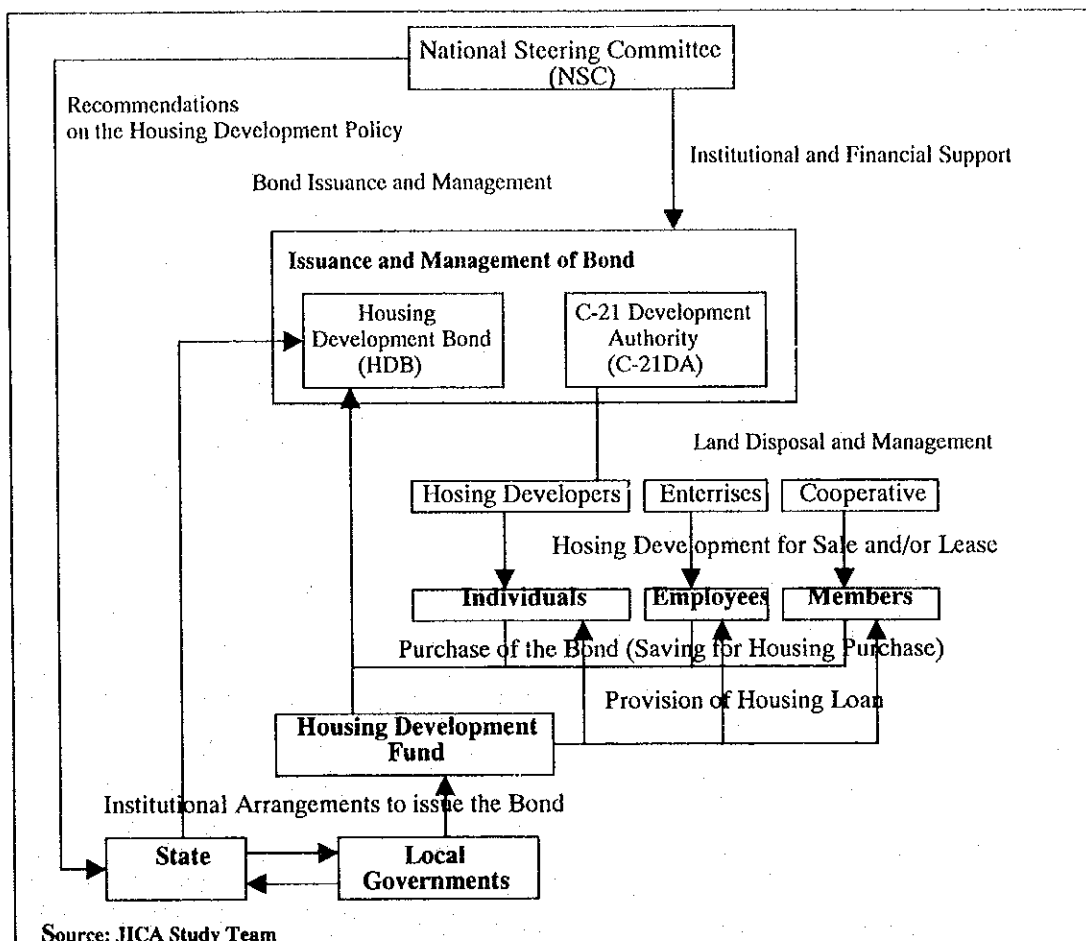
One of the most crucial issues related to the housing development is the non-availability of a "housing financing system," that caters to both housing developers and purchasers. Although the Government is planning to establish the "Housing Development Fund," it may not be readily and specifically available for the housing development in Hoa Lac and Xuan Mai. Under such circumstances, it is recommended to issue a "Hoa Lac and Xuan Mai Housing Development Bond" on an experimental basis. The terms and conditions of issuing the Bond are as follows:

1. The Bond is issued by the C-21DA;
2. The Bond is purchased by individuals, enterprises, or cooperatives, who wish to have housing or land in the area,
3. The Purchaser of the Bond enters into a contract with the Issuer concerning the transfer and conduct of rights;
4. The Purchaser has the right of borrowing long-term institutional loans (e.g. from the Housing Development Fund);
5. The Government establishes the credit security machinery, streamlines the land administration systems to settle the property mortgage, and readjusts related laws and institutions;
6. Bond transfer is regulated, in principle; and
7. Information on the Hoa Lac development is publicized in advance to encourage purchase of the Bond.

#### ● Housing Productivity

The present production capacity of housing in Vietnam lags seriously behind a satisfactory level, and therefore needs Government intervention in order to strengthen construction technology and housing industries as well.

1. Development and promotion of housing development planning and design: planning and design standards, development of low-cost housing.
2. Development and promotion of housing production technology and construction technology: development of pre-fabricated housing system.
3. Production of housing construction materials, equipment, and other related products: development of materials and standardization, inducement of production plants for housing materials and parts.



Source: JICA Study Team

**Scheme of Housing Development Bond**

**Monthly Average per-capita Income: Red River Delta**

Unit: VND 1,000

| Year    | 1996   |
|---------|--------|
| Group 1 | 79.85  |
| Group 2 | 138.55 |
| Group 3 | 181.38 |
| Group 4 | 234.23 |
| Group 5 | 523.06 |
| Total   | 223.30 |

Source: Statistical Yearbook 1997.

**Estimated Housing Price**

Unit: US\$ (VND 1,000)

|                      | Land Area per Unit | Floor Area per Unit         | Construction Cost   | Sale Price          |
|----------------------|--------------------|-----------------------------|---------------------|---------------------|
| Detached House       | 400 m <sup>2</sup> | 120 m <sup>2</sup>          | 15,480<br>(216,000) | 18,580<br>(259,200) |
| Row house            | 250 m <sup>2</sup> | 100 m <sup>2</sup>          | 10,700<br>(150,000) | 12,840<br>(180,000) |
| Low-rise Condominium | 100 m <sup>2</sup> | 70 m <sup>2</sup><br>(80.5) | 8,610<br>(120,750)  | 10,340<br>(144,900) |
| High-rise Apartment  | 80 m <sup>2</sup>  | 50 m <sup>2</sup><br>(60)   | 7,740<br>(108,000)  | 9,290<br>(129,600)  |

Source: JICA Study Team

**Affordable Housing Price**

Unit: VND 1,000

| Income Group  | Annual Income (Monthly Income) A | Household Income B (A x 3) | Advance Payment | Affordable Price at 5-Year Installment | Affordable Price at 10-Year Installment | Affordable Price at 15-Year Installment |
|---------------|----------------------------------|----------------------------|-----------------|--|---|---|
| High Income   | 9,600<br>(800)                   | 28,800                     | B x 5           | B x 6.32<br>182,000                    | B x 7.35<br>211,680                     | B x 8.16<br>235,000                     |
| Medium Income | 7,200<br>(600)                   | 21,600                     | B x 5           | B x 6.32<br>136,510                    | B x 7.35<br>158,760                     | B x 8.16<br>176,250                     |
| Low Income    | 3,600<br>(300)                   | 10,800                     | B x 5           | B x 6.32<br>68,260                     | B x 7.35<br>79,380                      | B x 8.16<br>88,120                      |

Source: JICA Study Team

Note: The high income group can afford to buy a detached house, the medium income group can afford to buy a low-rise condominium, and the low income group can hardly buy even a high-rise apartment house.

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### 2.8 TRANSPORTATION PLAN

#### ● Traffic Demand Forecast

Based on the established socio-economic framework, the future traffic demand was forecasted for the following two sections:

1. The East-West Section, including the Lang-Hoa Lac Highway, National Road 32 (NR32), and NR6; and
2. The North-South Section along NR21A.

The following 3 cases were considered in relation with the future modal changes of vehicles that might occur with the introduction of public transport systems:

1. Case-1: No transfer from motorcycle mode to public bus system
2. Case-2: 50% transfer from motorcycle mode to bus system
3. Case-3: 100% transfer from motorcycle mode to bus system

| Section            | Unit: PCU/day |          |         |
|--------------------|---------------|----------|---------|
|                    | Phase-1A      | Phase-1B | Phase-2 |
| <b>East-West</b>   |               |          |         |
| Case-1             | 50,000        | 62,000   | 100,000 |
| Case-2             | 44,000        | 55,000   | 88,000  |
| Case-3             | 39,000        | 47,000   | 76,000  |
| <b>North-South</b> |               |          |         |
| Case-1             | 4,000         | 6,000    | 9,000   |
| Case-2             | 4,000         | 5,000    | 8,000   |
| Case-3             | 4,000         | 4,000    | 7,000   |

Source: JICA Study Team

Note: PCU means passenger car unit.

#### ● Road Improvement Scheme

Taking into consideration the design traffic capacity of multiple-lane roads, the following road improvement scheme will become necessary:

| Section          | Unit: Number of lanes |          |         |
|------------------|-----------------------|----------|---------|
|                  | Phase-1A              | Phase-1B | Phase-2 |
| 1. Lang-Hoa Lac  | 4                     | 4        | 6       |
| 2. NR21A         | 2-4                   | 4        | 4-6     |
| 3. NR21 Bypass   | 2                     | 4        | 4       |
| 4. Hoa Lac-Ba Vi | * 2                   | * 4      | 4       |

Source: JICA Study Team

Note: \* Limited to the stretch between the Urban Center to the western perimeter.

#### ● Basic Arterial Road Network

As discussed in 2.5 Urban Structure and Land Use, the basic road network of the Hoa Lac and Xuan Mai Area is of the ladder (or grid) pattern made up with north-south and east-west arterial roads. However, the use of the road network will be changed depending upon the traffic management policy as to whether private vehicles are

restrictively used for the sake of public transport or freely used at the risk of future traffic congestion. The pros and cons thereof will be discussed later, but the earlier introduction of public transport systems should be carefully considered in so far as realistic and viable.

#### ● Introduction of Public Bus System

In order to realize a "public-transport-oriented urban development," an express bus system will be introduced in the Lang-Hoa Lac Highway until the traffic demand reaches the level of requiring a rail-based mass transit system. The express bus system requires exclusive bus lanes (two lanes alongside the center), which necessitates the expansion of the Highway to a minimum of 4 lanes by 2005. Also, it requires "park-and-ride" terminals at both ends of the Highway with bicycle and motorcycle parking areas. To enhance the transport capacity, consideration will be given to the use of articulated buses.

The successful mass transit by a bus system adopted in Curitiba in Brazil tells a maximum transport capacity of some 15,000 passengers/hour/lane should articulated buses and special service systems (e.g. tariff collection and passengers getting on/off) be adopted.

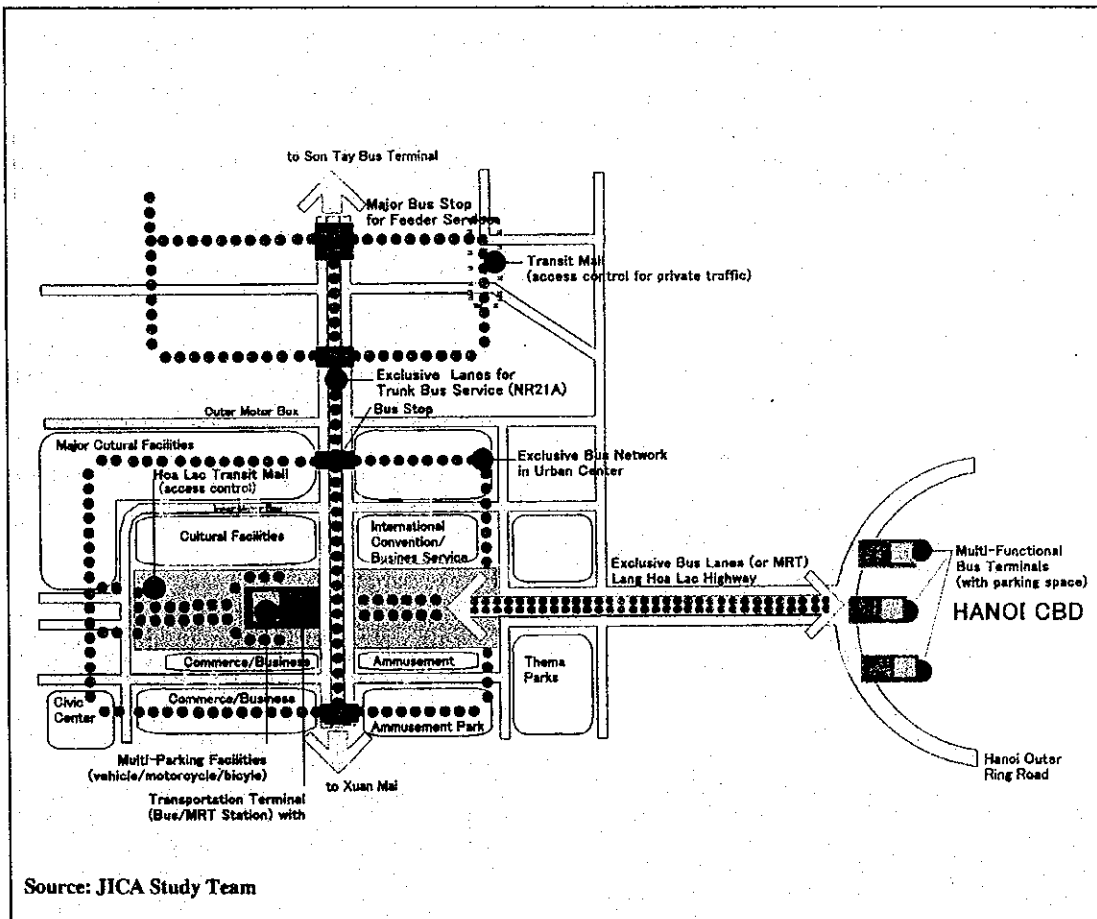
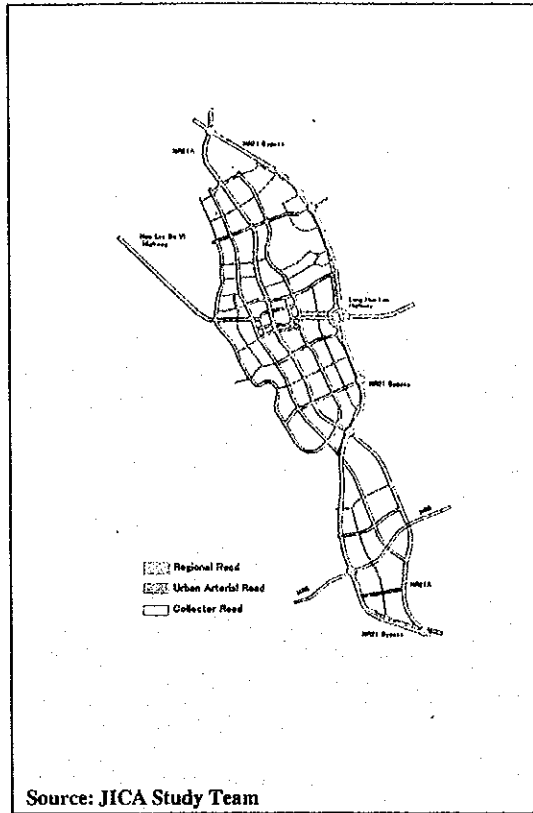
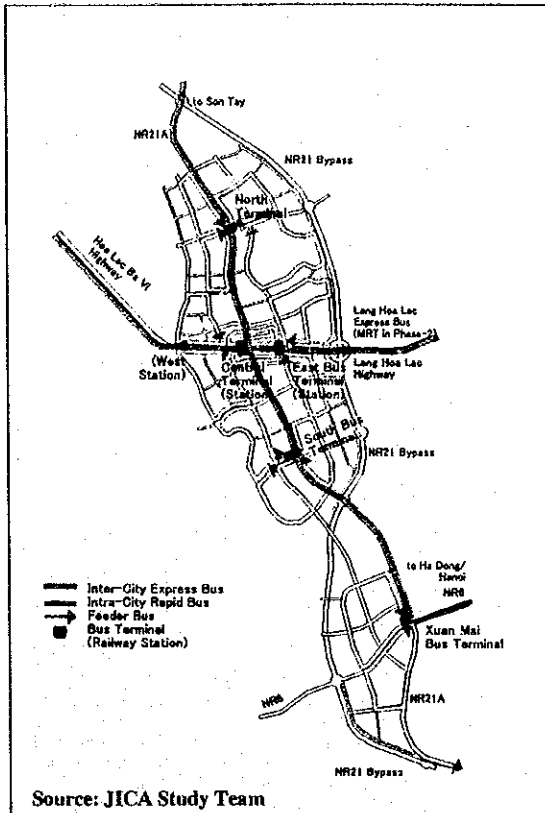
A similar public bus system is also proposed for the intra-transport system within the Hoa Lac and Xuan Mai Area by using NR21A. For that purpose, NR21A needs to be expanded to 4 lanes, thus enabling to provide 2 exclusive bus lanes alongside the median. It should be noted, however, that the public bus system would require appropriate institutional and managerial systems to attract bus users as well as bus operators for financial cash flow.

Also, taking into consideration the mixed traffic that causes serious congestion in the Central Hanoi Area, the cross configuration of arterial roads will be designed to segregate public buses, as well as other vehicles such as motorcycles and bicycles.

#### ● Introduction of Mass Railway Transit

As established in the framework, about 20,000 persons will reside in the Hoa Lac and Xuan Mai Area by 2020, who will commute to Central Hanoi for work. Added to this figure is the transport demand resulting from the increasing functional linkage between Central Hanoi and Hoa Lac, including a huge number of holiday seekers, who will visit the Dong Mo Area particularly after the completion of the proposed Cultural Village. The increasing transport demand would necessitate a mass railway transit (MRT) system, which enhances transport capacity to over 50,000 passengers per hour. The MRT system could be developed by the private sector by providing appropriate incentives, such as concessions for the development of off-rail business.

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## 2.9 PUBLIC TRANSPORTATION

### ● Basic Planning Policy

In order to induce a public transport oriented urban development, the following concepts are recommended for the urban transportation system.

### Reservation of Right-of-way for Future Phased Development

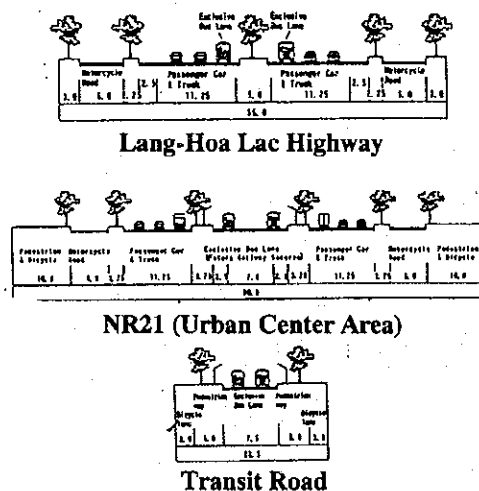
1. Reservation of the right-of-way for future expansion to meet the future traffic demand;
2. Realization of forming a compact urban structure in the initial phase to minimize the initial investment cost; and
3. Introduction of a phased road development plan to control and manage excessive motorization in future.

### Public Transport Oriented Plan

1. Introduction of an Express Bus System between Hanoi and Hoa Lac (securing exclusive bus lanes, development of bus terminals, purchasing articulated buses, etc.);
2. Formation of convenient intra-urban bus systems (securing priority and/or exclusive bus lanes); and
3. Formation of a transit oriented road network (partial interception of grid-shaped road systems, provision of transit mall zones, formation of road network systems convenient to public, etc.)

### Transportation Facility Plan Compatible with Vietnamese Transport Characteristics

Segregation of four-wheel vehicle lanes and motorcycle lanes in arterial roads, and provision of bicycle lanes.



The grid pattern road systems and the transit oriented road systems are compared below in terms of their relative pros and cons. Which systems can better suite for urban traffic management will basically depend on the future

traffic trends and demand. Transport policy should wisely select the optimum system based on a trade-off analysis between realities and development goals.

| Item                        | Grid Pattern  | Transit Oriented Patter   |
|-----------------------------|---|---|
| Public Transport            | <ul style="list-style-type: none"> <li>• Convenient for four-wheel vehicles, thus relatively reducing the modal split of public transport</li> </ul>  | <ul style="list-style-type: none"> <li>• Convenient for public transport as against the use of private four-wheel vehicles, thus inducing the use of public transport</li> </ul>  |
| Private Four-wheel Vehicles | <ul style="list-style-type: none"> <li>• Convenient for four-wheel vehicles to secure their choice and convenience of shortest access to all destinations, thus promoting the use of four-wheel vehicles</li> <li>• High absorptive network capacity of increasing future traffic demand</li> </ul> | <ul style="list-style-type: none"> <li>• Not so convenient for four-wheel vehicles and motorcycles due to inconvenient accessibility to destinations</li> <li>• Concentration of four-wheel vehicles in main roads such as NR 21A, resulting in inevitable traffic congestion of NR 21A when the city grows and traffic volume increases</li> </ul> |
| Pedestrian and Bicycles     | <ul style="list-style-type: none"> <li>• Not significant effects on pedestrians and bicycles</li> </ul>   | <ul style="list-style-type: none"> <li>• Encouragement of the use of bicycles depending on the zone setting of transit malls.</li> </ul>  |
| Environmental Effects       | <ul style="list-style-type: none"> <li>• Inducing effects on the use of four-wheel vehicles and motorcycles result in negative effects on urban environment</li> </ul>  | <ul style="list-style-type: none"> <li>• By controlling the use of four-wheel vehicles and motorcycles and encouraging the use of public transport, environmentally friendly city will be created.</li> </ul>   |
| Traffic Control             | <ul style="list-style-type: none"> <li>• No strict traffic control and management</li> </ul>  | <ul style="list-style-type: none"> <li>• Without the strict traffic control, this pattern would not be realistic.</li> </ul>  |

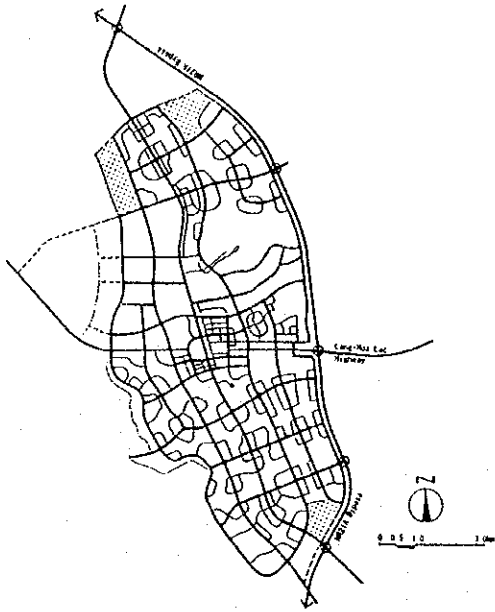
### ● Transportation in Urban Center Area

1. Segregation of private vehicular traffic and public transit as well as pedestrian traffic, and forming respectively independent network as much as possible;
2. Distribution of vehicular traffic to NR21A and urban ring route, and securing the priority operations of public transit over private vehicular and motorcycle traffic;
3. Grade separation with future railway transit; and
4. Interception of east-west through traffic, thus preventing the Urban Center from physical separation by through traffic.

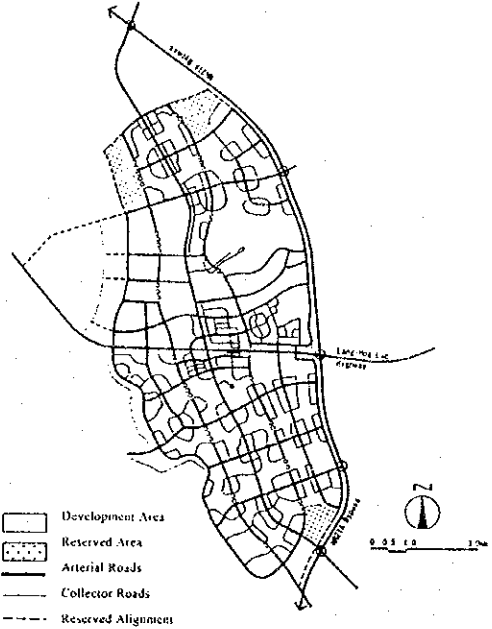
### ● Future Subjects

1. Viability of introducing an express bus operations between Hanoi and Hoa Lac (bus terminals, public bus operations, etc.);
2. Policy options towards formulating a public transport oriented urban development (traffic control and regulations); and
3. Careful examination on building a compact urban structure in Phase 1A and Phase 1B, and phased development of road network.

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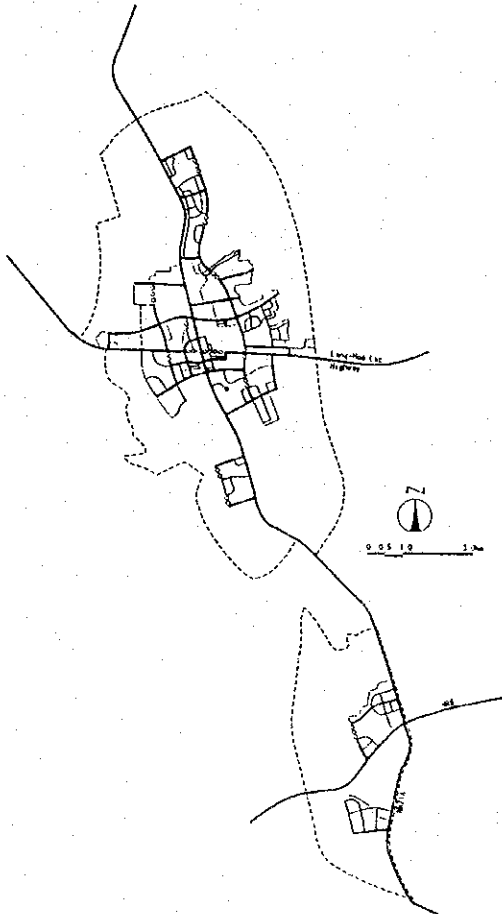


**Grid Pattern**

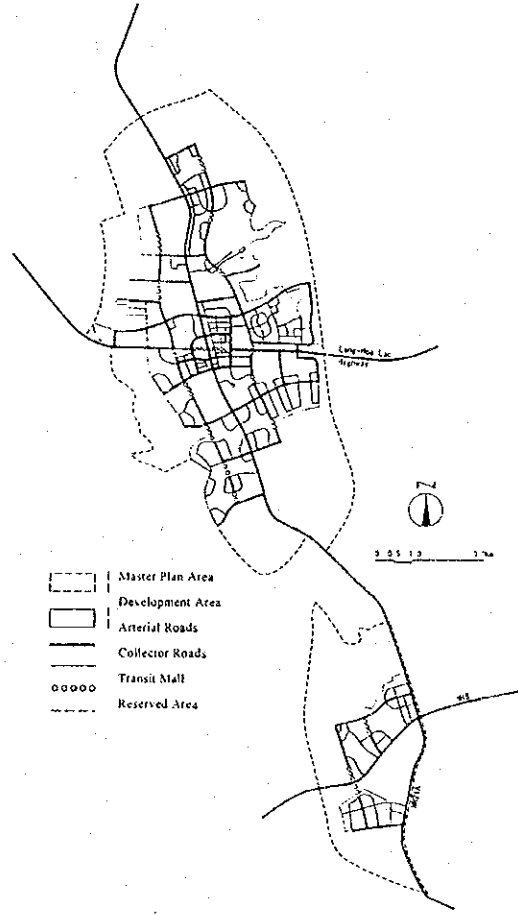


**Transit Oriented Pattern**

- Development Area
- Reserved Area
- Arterial Roads
- Collector Roads
- Reserved Alignments



**Road Development Plan by 2005**



**Road Development Plan by 2010**

- Master Plan Area
- Development Area
- Arterial Roads
- Collector Roads
- Transit Mall
- Reserved Area



## The Corridor 21 Development

### 2.10 FACILITIES DEVELOPMENT PLAN

#### ● VNU Area

The VNU area spreads over 1,400 ha. However, the area required for the development by 2020 is estimated at 650 ha, and the western part of the area will be reserved for future development that may include the possible location of Asian Institute of Technology (AIT) and Hanoi University of Technology (HUT).

Considering the functional linkage with HHTP, the University of Natural Science and the Faculty of Technology (FOT) together with its associated Research Institute of Science and Technology (RIST) are designed to be located along NR21A.

VNU headquarters is located at the gate zone adjacent to the Urban Center. Starting from the headquarters, a central axis extends northward, which constitutes a major boulevard in the campus. Universities and faculties are located on both sides of the central axis. Dormitories are located in proximity to the residential areas in Binh Yen and Dong Xuan.

#### ● HHTP Area

The first stage implementation of 200 ha to be completed by 2003 has been approved by the Prime Minister in October, 1998. The basic land use remains unchanged from the original HHTP master plan and the feasibility study carried out by JICA. However, from the aspect of creating a well-integrated and united urban structure, the following minor modifications are applied:

1. The development frame is planned so as to secure realistic development, taking into consideration the financing and locators-inducement issues.
2. Major roads in the campus area are linked to the road network to be built in the Hoa Lac Area, thus enhancing accessibility to the surrounding areas.
3. To secure the cumulative effects of R&D with the functional linkage with VNU, R&D functions are concentrated in the area adjacent to VNU. The High-tech Industrial Park is located along the NR21A Bypass to avoid heavily-loaded traffic entering NR21A and the Urban Center.
4. Core facilities, such as the On-the Job Training (OJT) Technical Support Center, Technical Institute, Techno-partnership Center, and the National Software Center are located in the middle of the R&D Zone. However, the future R&D facilities should be located as much as possible near to the NR21A.
5. The residential area is located in Binh Yen to form an integrated residential area in the north

of Hoa Lac.

#### ● Dong Xuan Area

The Dong Xuan Area spreads over 2,600 ha, in the middle of which hills of about 200 m high run in a north-southward direction. The hills separate the area, and the development of both sides of the area will result in investment inefficiency and an inconvenient residential area. Therefore, the development by 2020 should be limited to the east of the hills.

The Urban Center having the civic and commercial center functions is located at the intersection of NR21A and the Lang-Hoa Lac Highway. The residential area consists of the areas in the central Hoa Lac and in the south Hoa Lac, partly expanding over to the Phu Cat Area.

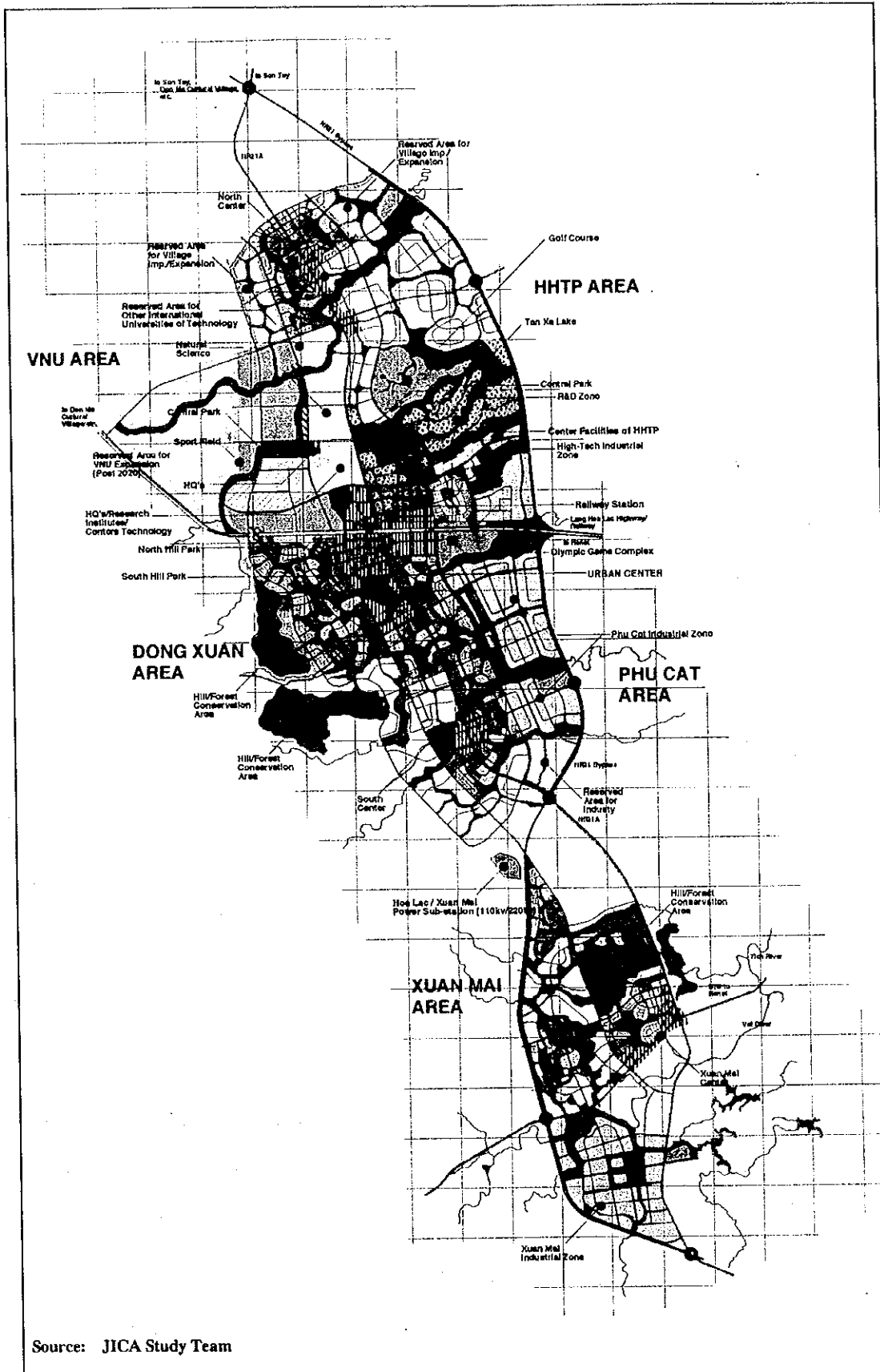
#### ● Phu Cat Area

Flowing through the Phu Cat Area are the 3 tributaries of the Tich River, which forms low land alongside. The low land functions as reservoirs at floods and requires costly earthwork, if it is developed as urbanized land. Therefore, the low land is basically excluded from the development.

The original plan designates the industrial land use over 1,200 ha. However, in light of the land productivity and the attractive mixed-use of the land, diverse land use is proposed to include part of the Urban Center, residential area, and sports and recreation. Especially, an Olympic Game Complex is proposed to be located in the area adjacent to the Urban Center. The complex was proposed to be located in the VNU campus area, but due to its nature of luring massive audiences, the location is changed to the area more conveniently accessible from Hanoi.

#### ● Xuan Mai Area

There exist many urbanized areas and communities in the Xuan Mai Area, particularly alongside NR6 and NR21A. The eastern and southern parts of the area are of low land, and not suitable for development. A new residential area is proposed to be located in the north-western part, and a new industrial zone (IZ) in the southern part.



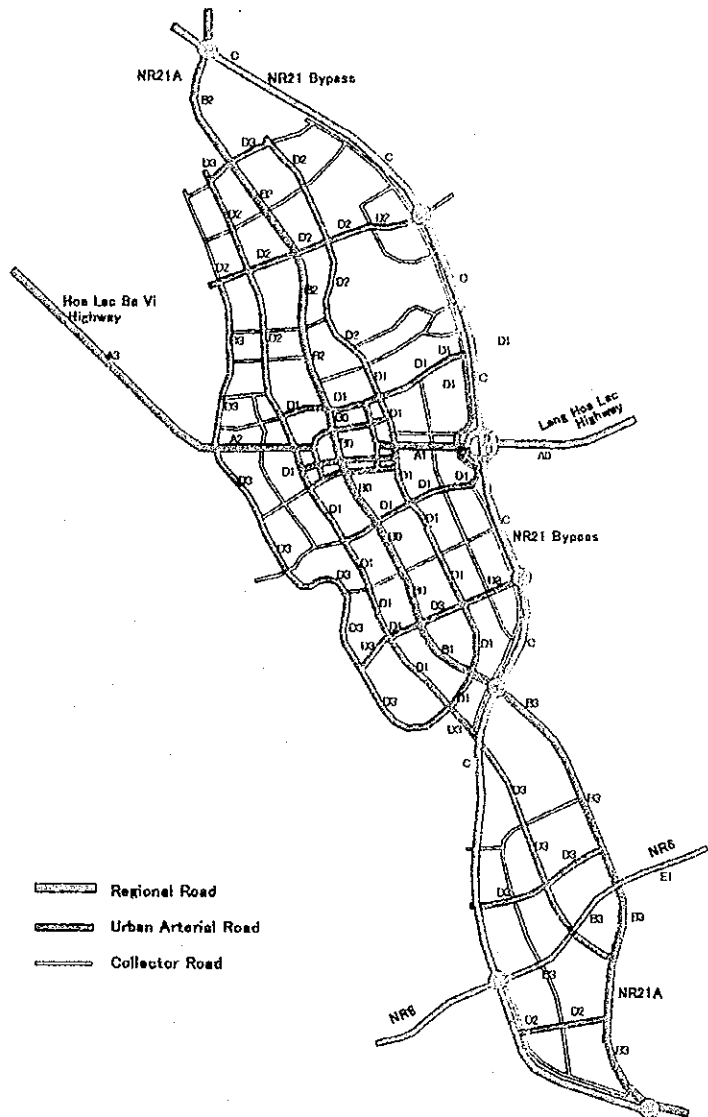
Source: JICA Study Team

## The Corridor 21 Development

### 2.11 INFRASTRUCTURE DEVELOPMENT PLAN - TRANSPORTATION, ELECTRICITY, AND TELECOMMUNICATIONS

#### ● Transportation

1. Lang-Hoa Lac Highway is to be expanded to a 4-lane highway by 2005, and further expanded to a 6-lane highway by 2020.
2. The NR21A is to be expanded to a 4-lane road by 2005 in the central stretch in Hoa Lac, and by 2010 in the remaining stretch.
3. The NR21 Bypass is to be constructed with a 2-lane road by 2005, and it is to be expanded to a 4-lane road by 2010.
4. The Hoa Lac-Ba Vi Highway, which is the extension of the Lang-Hoa Lac Highway, is to be constructed as a 2-lane road in the 3-km stretch in Hoa Lac, and it is to be extended to Mt. Ba Vi by 2010. The 3-km stretch in Hoa Lac is to be expanded to a 4-lane road by 2010, and the remaining stretch (probably up to the proposed Cultural Village in Dong Mo) by 2020.
5. The on-site road network in the Hoa Lac and Xuan Mai Area is to be constructed on a stage basis in terms of its cross-sectional configuration and network expansion.
6. A public-transport-oriented urban development is proposed. In the initial phase, probably until 2015, when a rail-based mass transportation system (namely MRT) becomes inevitable, a public bus system is proposed due to its lesser financial implications. The proposed bus route network is shown below.



| Road             | Width (m) | Phase-1A       | Phase-1B       | Phase 2        | Total (m)      |
|------------------|-----------|----------------|----------------|----------------|----------------|
| Regional Road    |           | 3,220          | -              | 29,700         | 32,920         |
| ● NR21 Bypass    | 28        | -              | -              | 29,700         | 29,700         |
| ● NR6            | 55        | 3,220          | -              | -              | 3,220          |
| Urban Arterial-1 |           | 31,460         | -              | -              | 31,460         |
| ● Lang-Hoa Lac   | 55-90     | 6,450          | -              | -              | 6,450          |
| ● Hoa Lac-Va Bi  | 50-80     | 7,000          | -              | -              | 7,000          |
| ● NR21A          | 60-80     | 18,010         | -              | -              | 18,010         |
| Urban Arterial-2 | 30-45     | 24,090         | 16,740         | 27,490         | 68,320         |
| Urban Arterial-3 | 22.5      | 14,590         | 10,880         | 25,810         | 51,280         |
| Collector Road   | 16.5      | 11,760         | 10,840         | 30,730         | 53,330         |
| Service Road     | 6-7       | 36,590         | 68,330         | 43,320         | 148,240        |
| <b>Total</b>     |           | <b>121,710</b> | <b>106,790</b> | <b>157,050</b> | <b>385,550</b> |

Source: JICA Study Team

| Road Width                 |
|----------------------------|
| Lang Hoa Lac/Hoa Lac Ba Vi |
| AD: 70m                    |
| NR21A Urban Artery         |
| NR21 Bypass                |
| C: 28m                     |
| Other Urban Artery         |
| NR6 Regional Road          |
| E: 60m                     |
| Collector Road             |
| 22.5m                      |

## The Corridor 21 Development

### ● Electricity

The future demand for electricity supply is forecasted on the basis of the future per capita power consumption categorized by citizen, factory worker, and high-tech employee.

| Area         | Power Demand (MW) |              |              |
|--------------|-------------------|--------------|--------------|
|              | Phase-1A          | Phase-1B     | Phase-2      |
| Son Tay      | 11.2              | 18.2         | 43.0         |
| Hoa Lac      | 79.4              | 153.4        | 304.0        |
| VNU          | 13.8              | 26.3         | 59.2         |
| HHTP         | 40.0              | 65.4         | 112.1        |
| D. Xuan      | 7.5               | 20.3         | 54.9         |
| P. Cat       | 18.1              | 41.4         | 82.8         |
| Xuan Mai     | 35.1              | 43.2         | 74.2         |
| Mieu Mon     | 1.0               | 1.5          | 3.0          |
| <b>Total</b> | <b>126.7</b>      | <b>216.3</b> | <b>429.2</b> |

Source: JICA Study Team

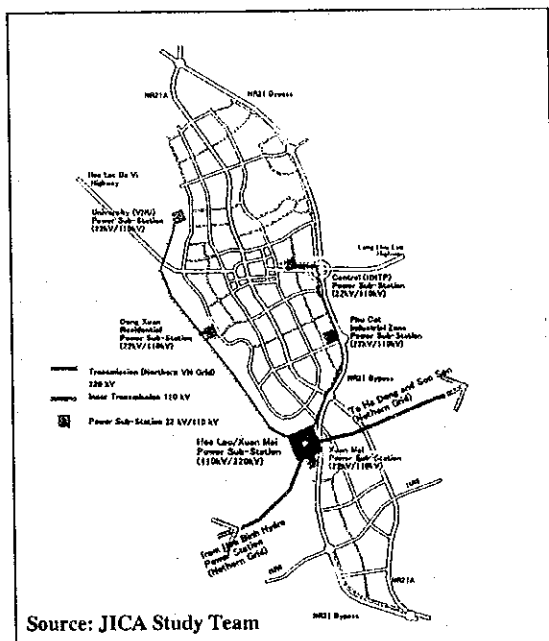
Note: Population in upper and lower rows show those in daytime and nighttime, respectively.

The high voltage transmission lines from Hoa Binh Dam are shown below.

| Power Demand                   | Phase-1A     | Phase-1B     | Phase-2      |
|--------------------------------|--------------|--------------|--------------|
| Domestic Use (kw/capita)       | 250          | 450          | 800          |
| Factory (kw/employee)          | 3,500        | 3,500        | 3,500        |
| Special Hi-tech (kw/cmp)       | 6,500        | 6,500        | 6,500        |
| ● VNU Area                     | 13.8         | 26.3         | 59.2         |
| ● HHTP Area                    | 40.0         | 65.4         | 112.1        |
| ● Dong Xuan Area               | 6.9          | 18.8         | 68.9         |
| ● Phu Cat Area                 | 18.1         | 41.4         | 82.8         |
| Hoa Lac Urban Area             | 78.8         | 151.9        | 323.0        |
| Xuan Mai Urban Area            | 35.1         | 43.2         | 74.2         |
| <b>Total Power Demand (MW)</b> | <b>113.9</b> | <b>195.1</b> | <b>397.2</b> |

Source: JICA Study Team

Note: Target power consumption was based on the "Overseas Electric Power Industry Statistics".



Source: JICA Study Team

### ● Telecommunications

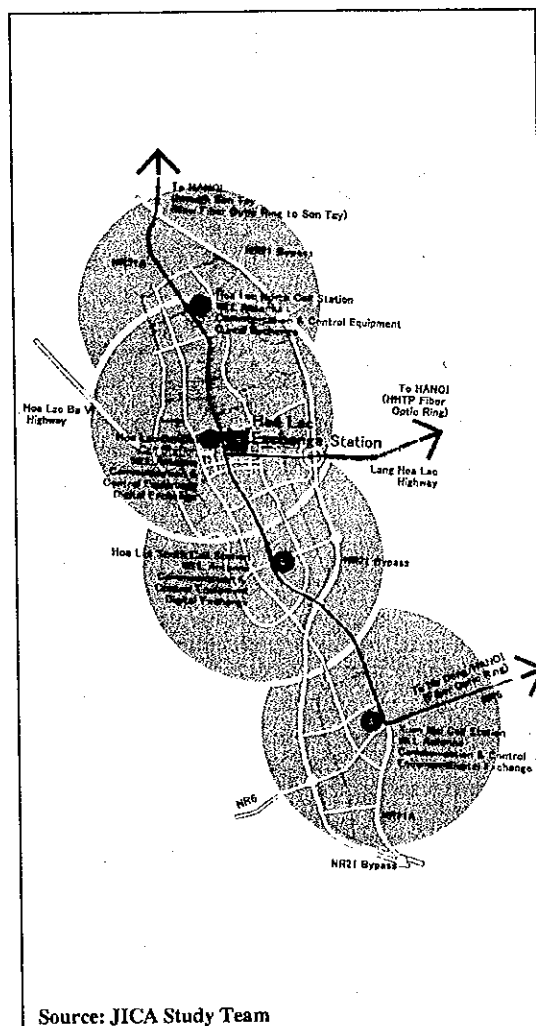
The subscriber demand in each phase is forecasted below.

| Area         | Unit: Nos. of subscriber |               |                |
|--------------|--------------------------|---------------|----------------|
|              | Phase-1A                 | Phase-1B      | Phase-2        |
| Son Tay      | 10,000                   | 15,000        | 36,000         |
| Hoa Lac      | 34,200                   | 55,200        | 146,000        |
| 1. VNU       | 8,800                    | 16,000        | 38,000         |
| 2. HHTP      | 12,000                   | 13,000        | 45,000         |
| 3. P. Cat    | 1,400                    | 3,200         | 10,000         |
| 4. D. Xuan   | 12,000                   | 23,000        | 53,000         |
| Xuan Mai     | 9,200                    | 13,800        | 41,000         |
| Mieu Mon     | 300                      | 500           | 1,600          |
| <b>Total</b> | <b>53,700</b>            | <b>84,500</b> | <b>224,600</b> |

Source: JICA Study Team

| Telecom.                    | Phase-1A | Phase-1B | Phase-2 |
|-----------------------------|----------|----------|---------|
| Target Subscribers/100 pop. | 20       | 25       | 40      |
| Population                  | 231,500  | 322,000  | 594,000 |
| Total Demand (lines)        | 46,300   | 80,500   | 237,600 |
| Additional Lines            | 46,300   | 34,200   | 157,100 |

Source: JICA Study Team



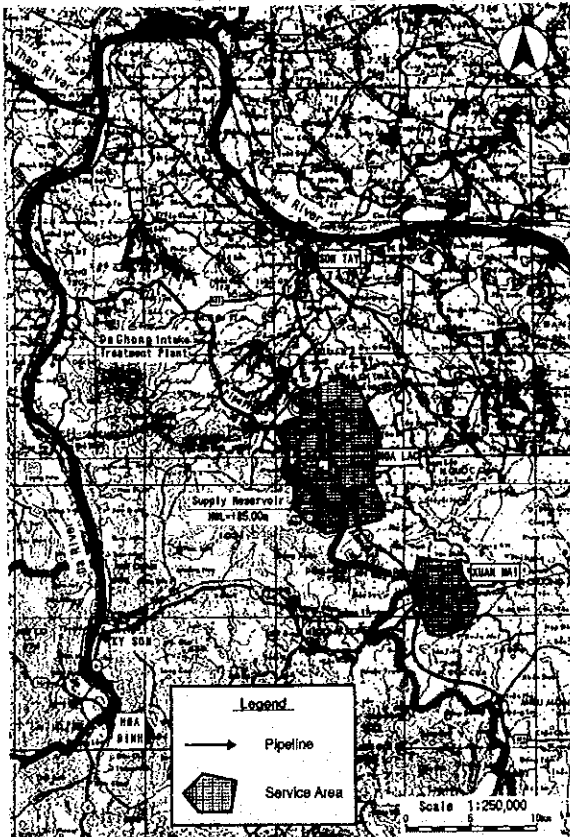
Source: JICA Study Team

## The Corridor 21 Development

### 2.12 INFRASTRUCTURE DEVELOPMENT PLAN - WATER SUPPLY, SEWERAGE, AND SOLID WASTE

#### ● Water Supply

The water supply for the Hoa Lac and Xuan Mai Urban Development is sourced from the Da River, taking raw water and purifying it in the neighborhood of the Da Chong area. The treated water will be pumped and transmitted with pipelines to a supply reservoir, that will be built on the top of the small hill (Mt. Muc) located in the VNU area. From the supply reservoir, water will be distributed by gravity flow to all consumers through distribution pipelines.



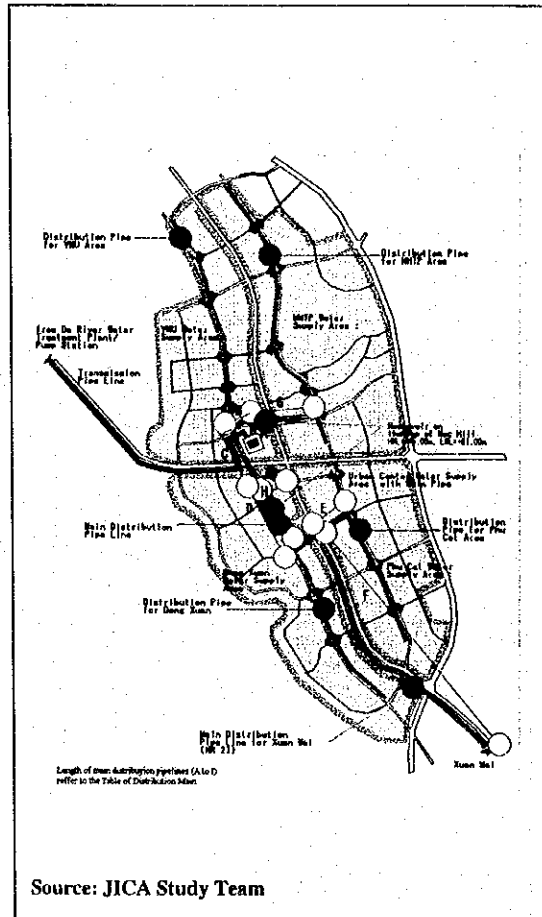
The future water demand in terms of the Daily Maximum Distribution (maximum treatment and distribution capacity) is estimated as shown below.

| Area            | Unit: m <sup>3</sup> /day |                |                |
|-----------------|---------------------------|----------------|----------------|
|                 | Phase-1A                  | Phase-1B       | Phase-2        |
| <b>Hoa Lac</b>  | 61,400                    | 108,900        | 222,200        |
| 1. VNU          | 15,800                    | 24,400         | 48,000         |
| 2. HHTP         | 16,500                    | 27,900         | 49,400         |
| 3. Urban Center | 4,200                     | 8,500          | 18,300         |
| 4. Dong Xuan    | 13,300                    | 26,900         | 62,400         |
| 5. Phu Cat      | 11,500                    | 21,200         | 44,200         |
| <b>Xuan Mai</b> | 17,100                    | 23,300         | 57,000         |
| <b>Total</b>    | <b>78,500</b>             | <b>132,300</b> | <b>279,200</b> |

Source: JICA Study Team

The system is composed of two major components.

1. The Da River water treatment facilities, including raw water intake facility, treatment plant, transmission pumps, transmission pipeline, and supply reservoir, and
2. The water distribution facilities, including distribution mains, pipelines, and service pipes. The distribution network and mains are illustrated below.



Source: JICA Study Team

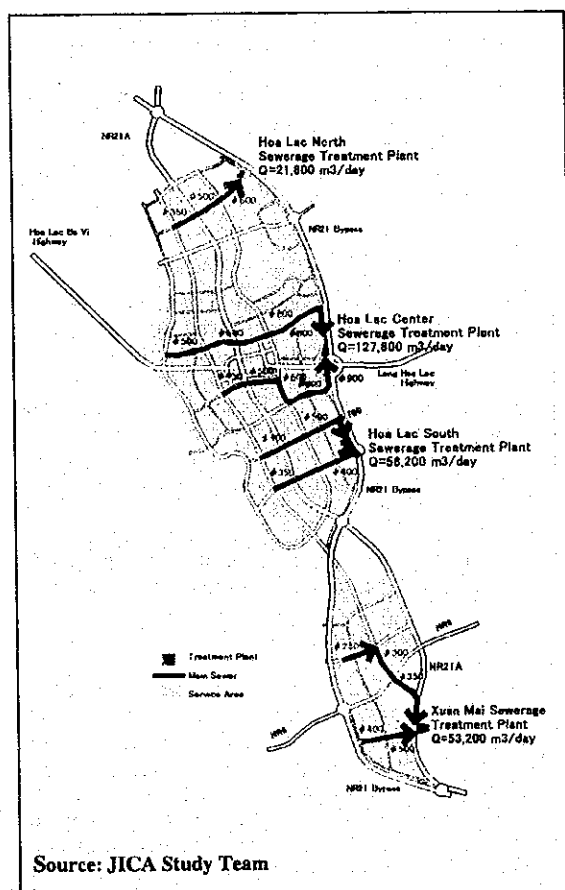
#### ● Sewerage

The proposed sewerage system is to collect and treat wastewater drained from domestic households, as well as from miscellaneous facilities and enterprises. Sewage collected by pipelines flows to the sewerage plants built at the east perimeter of the development area. The 4 locations indicated below are designated as the plant sites, each covering their respective service areas.

As for industrial waste water and any other waste containing hazardous or toxic substances, the generators must have their own facilities for appropriate treatment or pre-treatment.

- No.1 Hoa Lac Central: South of VNU  
South of HHTP  
North of Dong Xuan  
North of Phu Cat
- No.2 Xuan Mai: Whole Xuan Mai Area
- No.3 Hoa Lac South: South of Dong Xuan  
South of Phu Cat
- No.4 Hoa Lac North: North of VNU  
North of HHTP

The sewerage facilities layout plan is illustrated below.



The capacity of the plants are determined as follows:

| Plant             | Unit: m <sup>3</sup> /day and ha |          |         |      |
|-------------------|----------------------------------|----------|---------|------|
|                   | Phase-1A                         | Phase-1B | Phase-2 | Area |
| No.1 H.L. Central | 54,700                           | 91,100   | 132,800 | 20   |
| No.2 Xuan Mai     | 16,000                           | 21,800   | 53,300  | 8    |
| No.3 H.L. South   | -                                | 10,700   | 52,600  | 8    |
| No.4 H.L. North   | -                                | -        | 21,800  | 4    |

Source: JICA Study Team

● Solid Waste

Solid waste is more conveniently categorized into municipal waste and industrial waste. Waste management is a coherent flow at all stages from generation, handling, storage, transport, processing, and ultimate disposal. The following are the points to be given due consideration in formulating a solid waste management plan:

1. To recognize, that solid waste collection and disposal are essential to protect public health and welfare, thus securing a healthy and productive environment;
2. To recognize the roles and responsibilities to be shared between the public and private sectors in waste management, and to promote inter-governmental and public/private cooperation and coordination in exerting waste management efforts;
3. To give due consideration to the environmental aspects in selecting a disposal site by avoiding flood plains and protected groundwater resources, and by discouraging the introduction of disposal facilities in areas unsuitable for the purpose;
4. To follow appropriate steps necessary for reservation of suitable land for future waste disposal needs, recognizing the land disposal as a means of enhancing distressed land for subsequent public use; and
5. To maximize recycling of depletable resources, explore and exploit opportunities for waste volume reduction, materials recovery and recycling, and consider economic incentives and/or subsidies as a means of encouraging waste reuse and recycling.

The amount of wastes generated in the Hoa Lac and Xuan Mai Area is summarized as follows:

| Category            | Unit: ton/year |          |         |
|---------------------|----------------|----------|---------|
|                     | Phase-1A       | Phase-1B | Phase-2 |
| 1. Municipal Waste  | 54,910         | 88,010   | 203,580 |
| 2. Industrial Waste |                |          |         |
| Utilized            | 11,250         | 25,030   | 49,280  |
| General             | 17,750         | 39,520   | 77,790  |
| Hazardous           | 3,140          | 6,970    | 13,730  |

Source: JICA Study Team

## The Corridor 21 Development

### 2.13 IMPLEMENTATION PLAN

#### ● Overall Implementation Policy

As stated heretofore, the Corridor 21 Development is of the national importance and significance, and hence, it should be regarded and dealt with as a national flagship project. The successful implementation of the national project requires "concentrated utilization of economic resources", "introduction of new approaches and systems", and "provision of preferential treatment". In order to properly address these issues, the Development should be designated as a special urban development area, legislated as a sort of "Special Economic Zone - SEZ".

Under the SEZ concept, the following are the incentives to induce prospective investors and people to come in the Hoa Lac and Xuan Mai Area.

1. Liberalized financial and capital mobilization,
2. Attractive incentive package for investment
3. Quality public services,
4. Diverse economic and employment opportunities, and
5. Intelligent urban life.

Procedures related to the SEZ establishment are;

1. To designate the Hoa Lac and Xuan Mai Area as a legislated "Special Economic Zone" and establish a legal zone authority, and
2. To provide the Zone with preferential treatment such as attractive incentives, easy licensing, one-stop services, quality public services, sound management and operational infrastructure, and so on.

#### ● Implementation Organization

In light of its scale and characteristics, successful implementation of the Zone development will be totally dominated by the project management capacity focusing on the "coordination among parties concerned," "sustainability to ensure continuous implementation," and "business orientation attractive to people and business entities." The organizational structure will be set up at two levels, the Central Government level for policy making and inter-ministerial coordination, and the implementation level fully equipped with implementation capacity with authorization for decision making.

The "National Steering Committee (NSC)" will be the one at the Central Government level, headed by the Prime Minister, and comprise representatives of relevant ministries, local governments, VNU, and other related agencies and organizations. The organization at the implementation level will be structured through two steps, the first step is to establish the 3 independent Management Boards (MB), and the second step is to establish the zone authority named the "Corridor 21 Development

Authority (C-21DA)" probably by integrating the 3 MBs. The C-21DA could be a mixture of half-public and half-private. The Board of Directors will be established within C-21DA with the representatives from the Central Government, Ha Tay Province, and Hanoi City. The Management Board and Infrastructure Development Companies of Ha Tay Province will be merged into C-21DA.

1. Implementation planning, scheduling, and programming;
2. Land acquisition and management;
3. Development of infrastructure and public facilities;
4. Operation, maintenance, and management of infrastructure and public facilities;
5. Disposal of properties for sale and/or lease;
6. Project financing, including issuing "public authority bonds" and inducing various types of investments;
7. Establishment of subsidiary companies and/or equity participation in joint venture developments; and
8. Pursuance of privatization schemes, including PFI for infrastructure development.

#### ● Land Acquisition

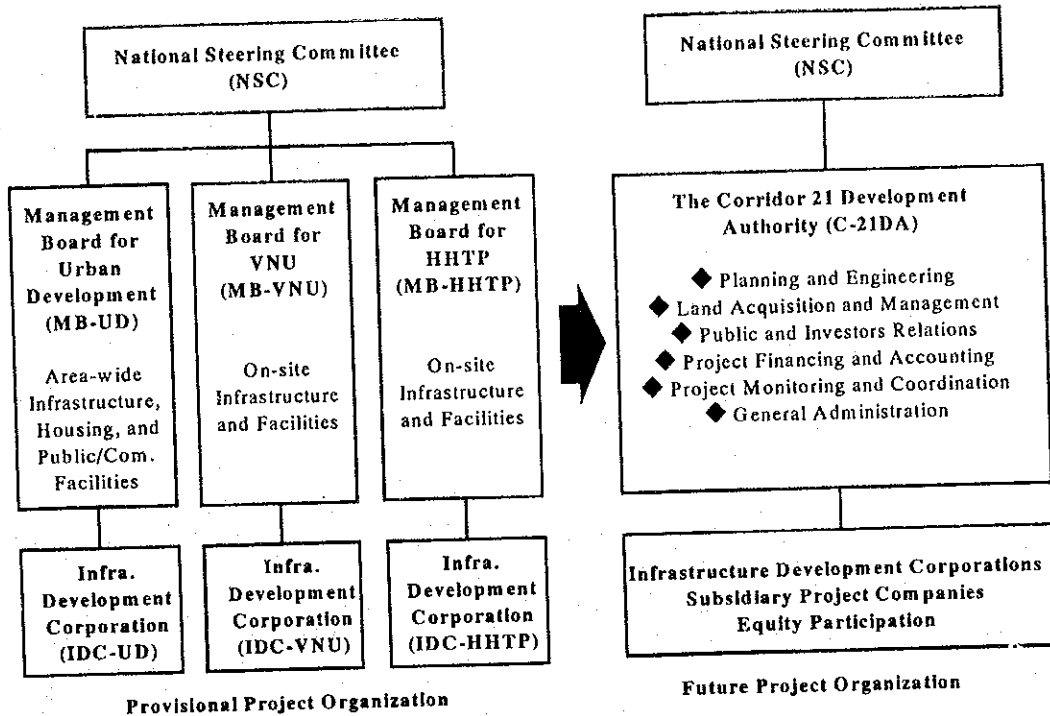
In order to ensure smooth land acquisition and to curtail front-heavy cash flows, due to massive compensation for land acquisition, new land-related institutions should be introduced, and, at the same time, land administration and management should be augmented reasonably.

1. Land re-adjustment system ("Kukaku-seiri")
2. Land use right trust system
3. Preventive measures against speculative commercial transactions of land use right, and
4. Registration & administration of land use right.

#### ● Project Financing

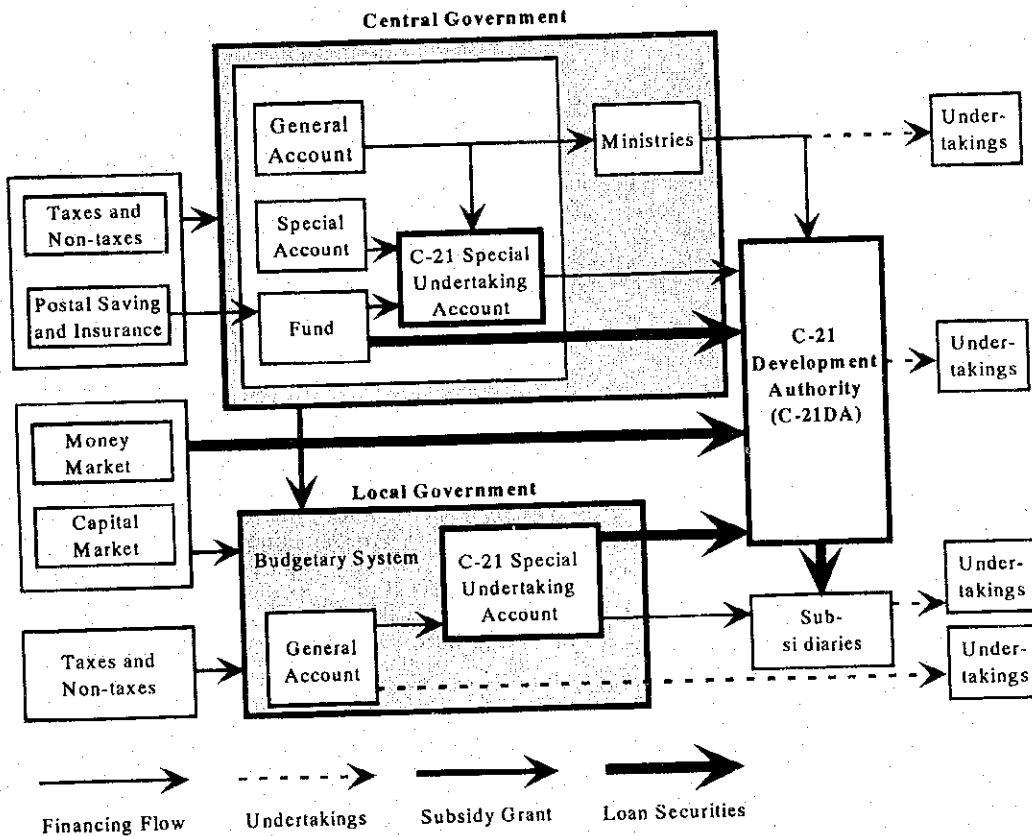
Diversification of financial sources is of prime importance, and it entails two directions. One is to shift the weight from foreign financial resources to more domestic ones, thus mitigating possible financial turmoils affected by the external economic situation. The other is to broaden and deepen the financial resources recycling system, which entails public investment with taxes/revenues, and financing/capitalization. As to taxes, introduction of an "asset tax" and "urban development tax" is recommended, so that Ha Tay Province can collect the tax revenues to compensate for its investment and expenditure for social and civic services. Facilitation of financing and capitalization should be directed to diversification of credit institutions as well as strengthening of guarantee functions, project financing, corporate financing, and syndicate loaning. C-21DA should be financially self-supporting as much as possible, by involving itself in revenue-producing projects and cross-subsidizing the captured revenues to non-revenue and/or less-revenue producing projects.

# The Corridor 21 Development



Source: JICA Study Team

## Organization Structure



Source: JICA Study Team

## General Financing System



## The Corridor 21 Development

### 2.14 ACTION PLAN

#### ● Definition of the Action Plan

The Master Plan (M/P) for the Hoa Lac and Xuan Mai Urban Development discussed heretofore is the “**basic plan**” that will serve as the basis for its implementation. As far as national importance and significance remain unchanged, the project should be implemented as planned, even though it would take a considerable span of time. However, the M/P should be flexible against the surrounding circumstances in terms of its scale, scope, and speed for development. In this context, a strong “head wind” is blowing against the project, due to the current economic crisis all over the world.

In light of this, considerations were given to an Action Plan, that is in fact a “**cost-minimizing alternative**” of the proposed Phase-1A (2005). The Action Plan will be formulated by introducing only highest priority components with minimum supporting infrastructure and facilities, basically in compliance with the basic framework of the M/P.

As the initial-cost-minimizing alternative, the Action Plan will be proposed to include the following components:

#### ● VNU Relocation

Only a “**Faculty of Technology (FOT)**” will be established newly by means of separating and reorganizing the existing University of Science. FOT may cover the fields of informatics, electronics & telecommunication, bio-technology mechatronics, new materials, new energy, and environmental technology. Together with FOT, “**Research Institute of Science & Technology (RIST)**” will be established. RIST will be used openly by outside universities and research institutes. Within the VNU Area, some sports and dormitory facilities will be built, which will be used in advance for the SEA Game to be held in 2003. After the Game, those facilities will be transferred to VNU. The number of VNU-related population (excluding dependents) will be approximately 2,000 including, 1,500 students and 500 staff and employees.

#### ● HHTP Development

A new training and research institution, which is tentatively named the “**National Center for High-Tech Research and Training (NCHRT)**” will be established in the HHTP area. MOSTE plans to implement the program for upgrading the existing training and research institutes in Hanoi by improving training programs and materials, renovating and expanding laboratory equipment, and training lecturers and researchers through domestic and foreign training. NCHRT will be established to consummate the program. The existing Hanoi University of Technology and the

National Center for Natural Science and Technology (NCST) will be particularly called for to support the establishment of NCHRT. Apart from NCHRT, a multi-purposed “**Hoa Lac High-tech Center (HHTC)**” will be provided to accommodate a Service Center, Software Park, and so on. The number of NCHRT-related population (excluding dependents) will be approximately 1,500, including 1,000 researchers and trainees, and 500 staff and employees.

#### ● Urban Infrastructure and Facilities

A minimum required arterial road network would be provided to link FOT, RIST, NCHRT, HHTC, Center Area, and designated residential areas. Minimum required functions, such as civic services, business and commerce, hotels, and so on, will be located in the Center Area. One smaller neighborhood unit with one primary school having a population size of some 3,500 will be provided. Supply and treatment facilities, such as electricity, water, sewerage, solid waste, and so on, will be provided by improving and expanding existing systems, or by providing newly minimum required systems in the absence of appropriate existing systems.

#### ● Action for Initiation and Embarkation

The core of the Hoa Lac Urban Development should be put on the right implementation track upon completion of the M/P Study. However, the M/P Study may not necessarily be sufficient to formulate a firm consensus among the parties concerned, and to push it toward implementation. Hence, the Feasibility Study (F/S) for the Action Plan (the conduct of which is intended as Phase-II of the Study) will become important to direct toward implementation the efforts and concerns of the parties involved.

The F/S is in fact regarded as part of the implementation, due to its objective to pursue optimization for implementation in terms of investment-efficiency. Therefore, it is strongly recommended that the F/S should be conducted under the initiative of the agency, which should be directly responsible for the overall implementation of the project. Toward that end, a “**Joint Management Board**” is to be established as early as possible, which will be later re-organized as the proposed C-21DA.

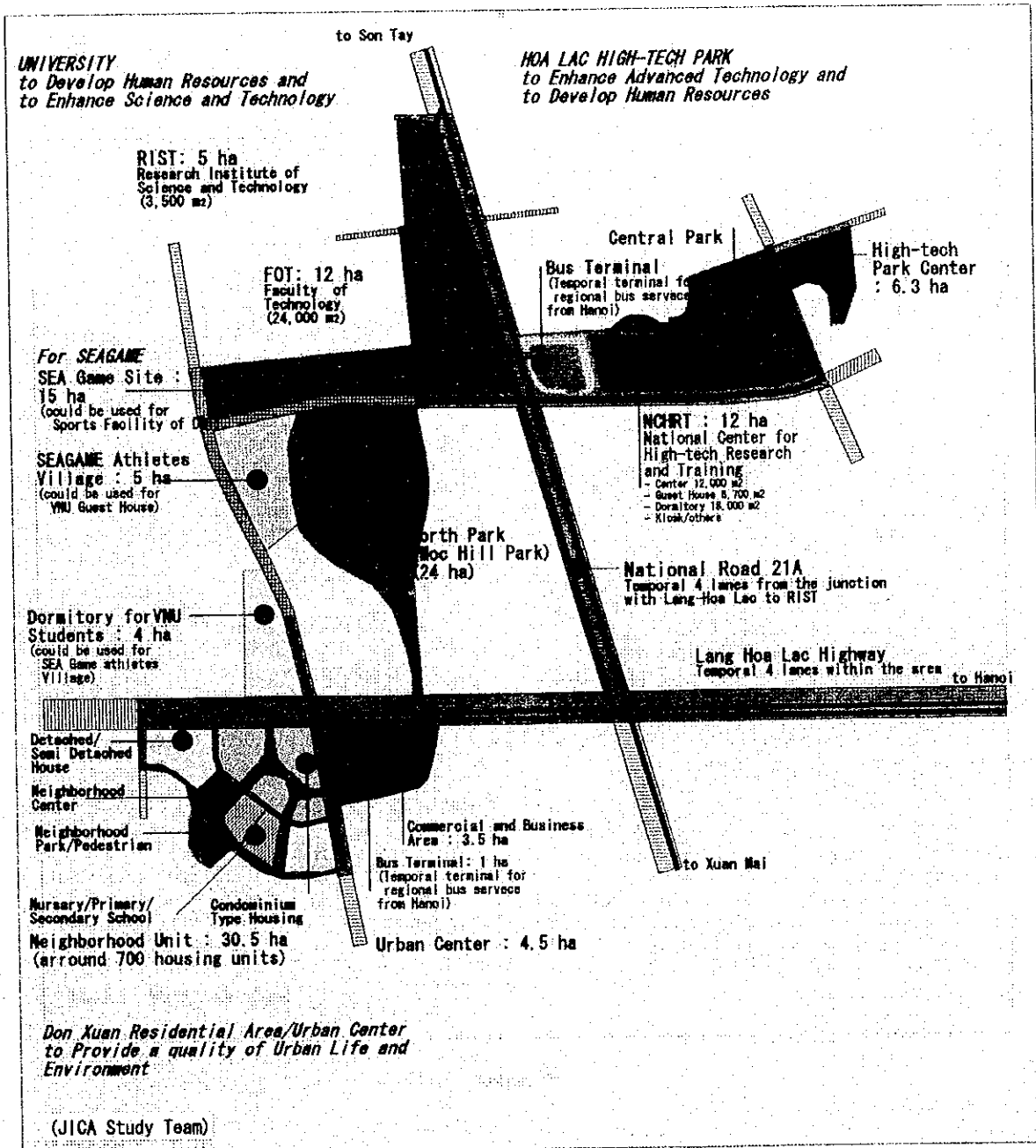
#### ● Summary of the Cost for the Action Plan

The investment cost for the Action Plan was preliminarily estimated as below.

|                                    | Unit: US\$ 1,000 |
|------------------------------------|------------------|
| 1. Road Construction               | 15,078           |
| 2. Urban Center                    | 405              |
| 3. Facilities Construction in VNU  | 26,159           |
| 4. Facilities Construction in HHTP | 33,153           |
| 5. Housing and Community Facility  | 7,379            |
| 6. Total Cost                      | 82,174           |

Source: JICA Study Team

# The Corridor 21 Development



## Action Plan

## The Corridor 21 Development

### 2.15 IMPLEMENTATION COST AND EVALUATION OF THE DEVELOPMENT

#### ● Overall View

The magnitude of the Hoa Lac and Xuan Mai Urban Development is so huge and complicated, and its implementation would require a considerable period of time under changing circumstances. Moreover, investment effects for the sectors of human resource development and development of science and technology defy their reasonable quantification in monetary terms, thus making it difficult to evaluate the economic benefits of the development in a tangible way. The evaluation of the development will be discussed by its principal components mostly in a qualitative way.

#### ● Economic Multiplier Effects

The economic multiplier effects of urban development projects relate to the economic effects rippling over the national and regional economies, and the social effects rippling over regional social development.

Among the economic effects, incremental demand for construction-related industries and inductive production are dominant factors, which fall in 3.5 times in terms of induced productive output (1.6 times in terms of value added) versus investment cost, according to a survey conducted in Japan. Among the social effects, upgrading of the physical environment as well as the living environment are dominant factors, although their quantification in monetary terms is difficult.

In light of its inclusion of highly value-added high-tech industries and other manufacturing industries, as well as intensive involvement of housing sector projects of which multiplier effects are predominant in local resource-based industries, it could be safely said that the development would bring about multiplier effects of not less than 3 times the investment cost.

#### ● Investment for Human Resource Development

As discussed earlier in the basic concept, the developing world needs to reorient its development path towards a more endogenous direction to augment its economic fundamentals and capacities. Obviously, among the endogenous development efforts, nothing is more important than that for human resource development. This is becoming even more true in the present world, in which societal systems are changing toward more information-oriented network systems, and more intelligence-oriented value-added systems.

The economic benefits accrued from the investment in the education sector, particularly for

higher education, can be quantified in terms of incremental lifetime incomes as a result of having received a higher education versus the cost incurred for the higher education. Precedent surveys conducted in Japan reveal that the economic return for the investment in higher education is in the neighborhood of 10 %.

In light of the absolute shortage of and real need for highly educated people in the country, it could be safely said that the figure would be much higher in Vietnam

#### ● Industrial Development

Promotion of science and technology is no less important than human resource development in that Vietnam should internalize imported technologies and enhance value-added production, in order to be competitive in the fiercely competitive markets of the 21<sup>st</sup> century.

The economic benefits generated from the HHTP development should be construed in this context. Neither the economic benefits from incremental industrial output and employment opportunities, nor the financial profit from sale or lease of industrial estate could tell the real feasibility or necessity of the development.

Although simply based on industrial value-added, the previous JICA Study revealed that the expected economic rate of return for the HHTP development is 25.9 %. MOSTE reviewed the result taking into account only the first stage development (200 ha by 2003), which resulted in 14.3 %.

#### ● Environmental Evaluation

The Hoa Lac and Xuan Mai Urban Development Area is mostly of the cultivated land with a little possibility of the habitat of rare fauna and flora that should be conserved from the natural environmental aspect. However, as stated earlier, one of the basic planning concept is to achieve the creation of an environmentally friendly "garden city" or "eco-city". From that aspect, careful attention should be directed to the environmental issues that may occur during the development and post-development phases as stated below.

1. To adopt proper construction techniques such as cut and fill operations to mitigate negative environmental impacts;
2. To investigate and assess in detail the fauna and flora to be conserved in the area as a forestation plan;
3. To adopt appropriate measures to harmonize artificial facilities with the natural scenic landscape in the area;
4. To prepare well developed infrastructure for environmental conservation and anti-pollution measures such as water supply, sewerage, and waste disposal systems;

## The Corridor 21 Development

5. To adopt pollution prevention measures at the source rather than the end-of-pipe technology to minimize the environmental impacts caused by a variety of activities, especially in the industrial areas of HHTP, Phu Cat, and Xuan Mai; and
6. Environmental Impact Assessment (EIA) should be carried out to assess the potential impacts in and around the Development Area during both construction and operation periods, and to propose policy recommendations for the environmental conservation in the Area.

### ● Investment Cost

The investment cost is estimated on the basis of the following conditions. The cost is the total cost for the development of infrastructure and facilities regardless of funding sources (including both public and private funding). However, the cost for the Lang-Hoa Lac Highway and possible future MRT is not included as external cost.

1. The cost is based on the price prevalent in 1998.
2. The exchange rate used for conversion is: US\$ 1.00 = VND 13,900
3. The cost includes all the related costs, including those for engineering, temporary works, construction, and physical contingency.
4. The cost estimation does not include land acquisition cost, nor the cost for resettlement of inhabitants.
5. The cost for industrial development does not include the cost for production plants and equipment in factories.
6. The cost does not include any taxes, levies, and charges.

### Construction Cost for Hoa Lac and Xuan Mai Development Project (1998 basis)

Unit: Million US\$

| Development Components                 | Phase 1A | Phase 1B | Phase 2 | Total |        |
|--|----------|----------|---------|-------|--------|
| 1 VNU (Public Sector) Zone             | 234      | 175      | 303     | 713   | 10%    |
| 2 HHTP Zone                            | 1,024    | 579      | 992     | 2,595 | 36%    |
| 3 Phu Cat Industrial Zone              | 77       | 105      | 198     | 380   | 5%     |
| 4 C21 Urban Center Area                | 94       | 136      | 206     | 436   | 6%     |
| 5 Xuan Mai Industrial Zone             | 56       | 34       | 223     | 313   | 4%     |
| 6 Housing and Public Facilities        | 504      | 174      | 654     | 1,333 | 18%    |
| 6 Road/Transportation Facilities       | 0        | 167      | 168     | 537   | 7%     |
| 7 Infrastructure                       | 360      | 174      | 402     | 935   | 13%    |
| Water Supply                           | 133      | 27       | 72      | 232   | 3%     |
| Electric Power Supply                  | 122      | 81       | 102     | 304   | 4%     |
| Telecommunication                      | 36       | 29       | 135     | 200   | 3%     |
| Sewerage Disposal                      | 63       | 37       | 93      | 193   | 3%     |
| Solid Waste Disposal                   | 6        | -        | -       | 6     | 0%     |
| 8 Total Cost                           | 2,349    | 1,545    | 3,147   | 7,242 | 100%   |
| Public Sector Investment               | 791      | 724      | 1,373   | 3,089 | 43%    |
| Third Sector Investment                | 66       | 40       | 120     | 226   | 3%     |
| Private Sector Investment              | 1,492    | 781      | 1,655   | 3,927 | 54%    |
| (Land Acquisition Cost for reference*) | 24       | 20       | 45      | 88    | (1.2%) |

Source: JICA Study Team

On the item of HHTP, construction costs uses the unit cost of the F/S of HHTP by MOSTE.

On the construction costs of regional roads outside the M/P Area and MRT are excluded.

Item of water supply is included in the cost of External Transmission from Da River.

Item of Electric Supply includes External 220kV Transmission Line from Hoa Binh Hydro Power Station.

\*Land Acquisition Cost for Reference: (estimated on the conditions as follows)

- 1) Land acquisition cost includes costs for land use right and compensation fees.
- 2) Unit costs are the same as the one used in the feasibility study of HHTP by MOSTE.
- 3) Cost for land use right excludes the area of the Village Improvement and Expansion Area
- 4) Compensation for tree/green covers the 80 % of the forest area.
- 5) Compensation for household relocation covers the 20 % of present households within the area.  
(remaining 80 % of the households remain in the village improvement/expansion area)











