

5.1.2 Network Plan

The Urban Center of the C21 is the core of the various urban activities and the transportation node connecting with Hanoi. Accordingly, the traffic is highly concentrated in the Urban Center. Therefore, it is particularly important to plan a city that gives high priority to public transportation in consideration of the Urban Center servicing one million population.

This section reviews the following three alternatives regarding the transportation system of the Urban Center Area (refer to Figure 5.1.2).

Plan A: The grid pattern

Plan B: North and south separation pattern

Plan C: Motor box pattern

Plan A: The Grid Pattern

In this plan, the road network within the Center Area is divided into two systems: for four-wheel vehicles, for public buses and pedestrians. Each system independently constructs a grid pattern network. A rail system laid out in the center of the Lang-Hoa Lac Highway (open cut system). The Lang-Hoa Lac Highway consists of rails in the center, carriage ways for through traffic on the both sides, and service roads on the outside. The Lang-Hoa Lac Highway intersects with NR21A and other 4 north-south arterial roads at five places within the Urban Center.

The main bus terminal takes terminal functions for the city bus system. Rapid and local service buses enter the main bus terminal through the exclusive bus lanes on NR 21A. This terminal is also the node of the transit mall and bus network servicing within the Urban Center Area. The transit mall in the Urban Center Area and the Lang-Hoa Lac Highway are grade separated.

The grid road pattern helps to ensure the convenience of the private vehicle traffic within the Urban Center Area. That several intersections between the Lang-Hoa Lac Highway and arterial roads are dispersed in the Urban Center Area to smooth the traffic management of intersections. Furthermore, exclusive lanes for through traffic of the Urban Center linking to Hanoi and Dong Mo helps them smoothly pass the Urban Center.

On the other hand, to establish the road network convenient for private vehicles discourages the use of public transportation. In particular, the traffic coming from Hanoi to Dong Mo by using the Lang-Hoa Lac Highway discourages the use of NR 21 Bypass. Moreover, the function, space, and scenery of the Urban Center are significantly separated between north and south by

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the Lang-Hoa Lac Highway whose width is about 100 meter. Besides, the investment cost is increased by constructing many grade-separated intersections, which also raises a issue on the landscape of the Urban Center.

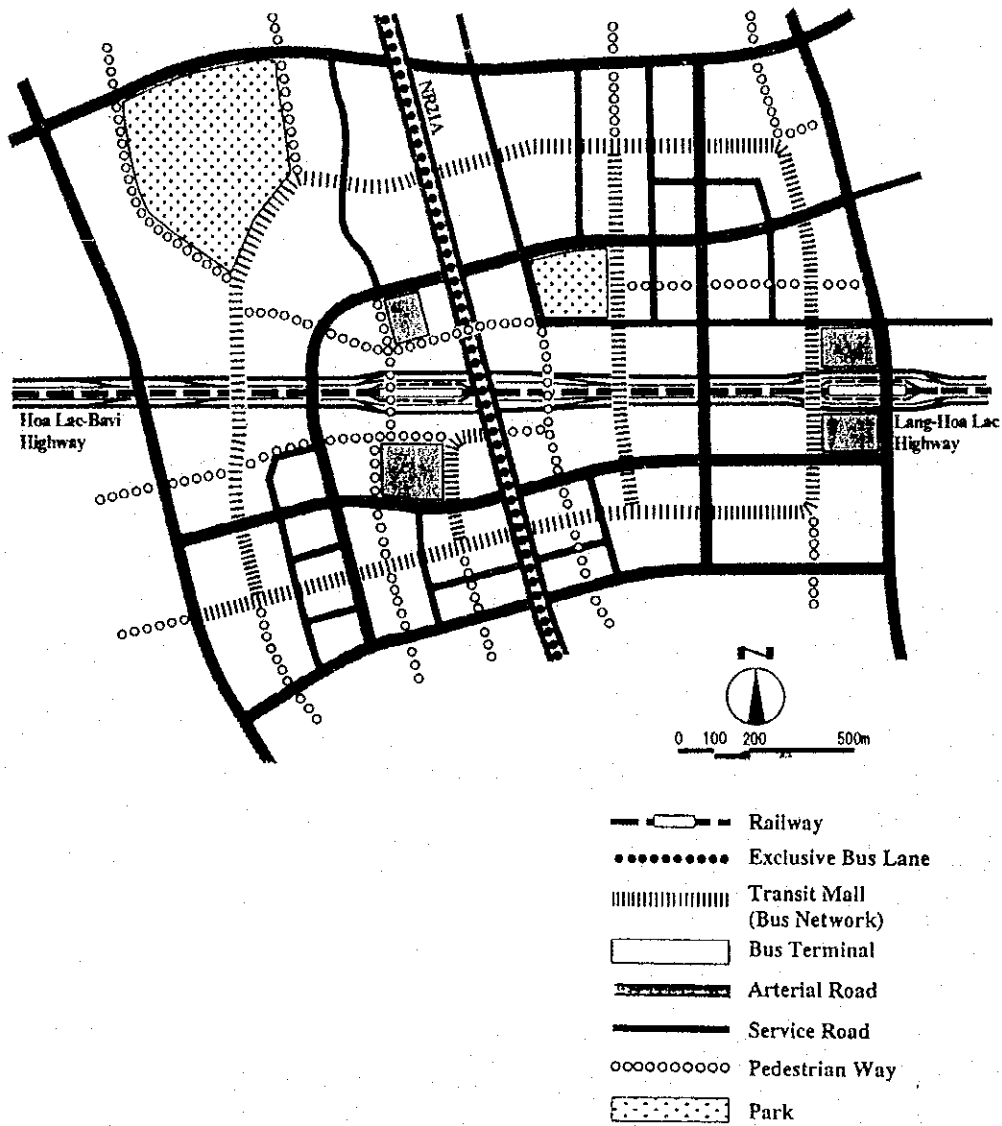


Figure 5.13 Alternative Urban Center Area Circulation Plan-A : Grid Pattern

Plan B: North and South Separation Pattern

This plan is to encourage use of the public transportation by controlling the private vehicle and motorcycle traffic in the Urban Center running the north-south direction. In order to control such traffic, north-south bound arterial roads are partly disconnected by providing a transit mall system for the convenience of buses, bicycles and pedestrians. It is planned to construct only three intersections of the Lang-Hoa Lac Highway and arterial roads in the Urban Center, thus, most private vehicle traffic coming from Hanoi to the Urban Center is guided to use NR21A. Travel within the Urban Center must also make a detour. Thus, it is essential to construct the sophisticated bus route network whose main terminal is located in front of the railway station of the Urban Center.

In the plan, the Lang-Hoa Lac Highway has totally six-lane carriage way plus railways and is not separated between the main carriage way and service roads. In this case, the width of the Highway is approximately 80 meters. Since the heavy volume of traffic is concentrated in the intersection between the Lang-Hoa Lac Highway and NR21A, it forms diamond-shaped grade-separated crossing. The intersection between the Lang-Hoa Lac Highway and the transit mall is at-grade crossing. The pedestrian way is an overpass crossing.

Plan B is inconvenient for private vehicle and relatively convenient for bus users. This is a city planning that gives high priority to the public transportation. Nevertheless, when the rate of four-wheel vehicle ownership increases associated with the traffic volume increase, the traffic will concentrate on NR21A, and the intersection between the Lang-Hoa Lac Highway and NR21A will be congested, which will raise serious traffic problems.

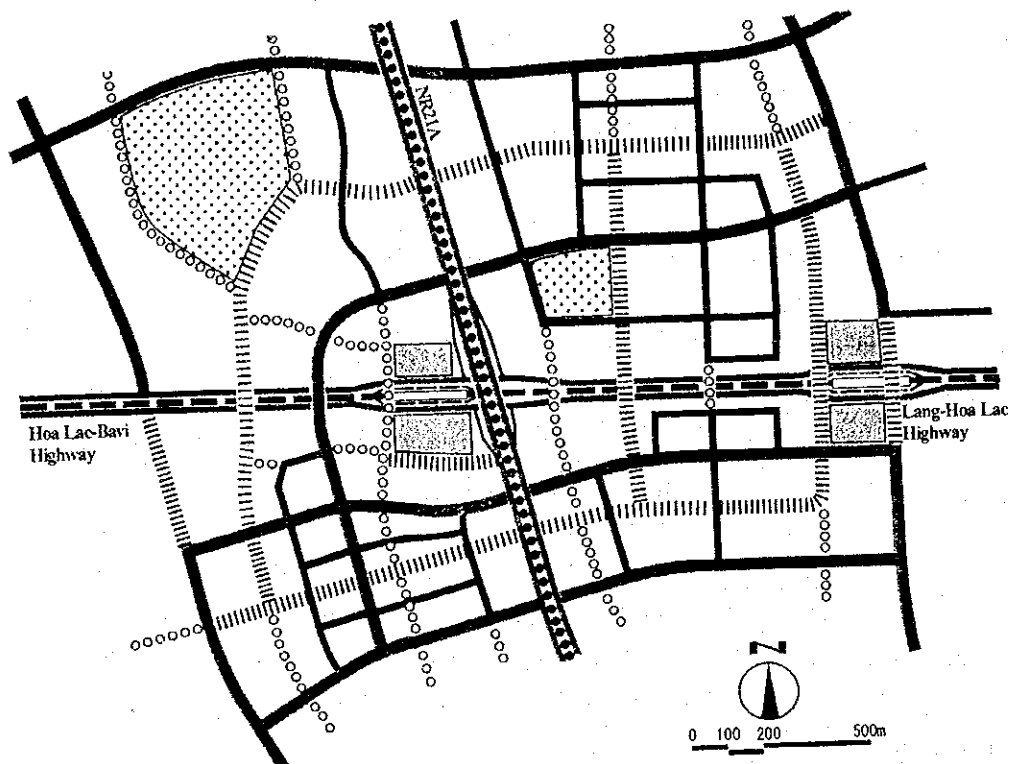


Figure 5.1.4 Alternative Urban Center Area Circulation Plan-B : North and South Separation Pattern

Plan C: Motor Box Pattern

The significant characteristics of Plan B is that two box-shaped arterial roads within the Urban Center absorb the traffic coming from Hanoi to the Corridor 21 by blocking the Lang-Hoa Lac Highway at the center of the Urban Center. The road network in the Urban Center is categorized into two structures: the road network for private vehicles and for public buses and pedestrians. Each structure forms an independent grid pattern network, such as the two other plans discussed above. All private vehicle traffic traveling from Hanoi to the Corridor 21 and its Urban Center must make a detour by using the outer or inner box (in general, outer box distribute an incoming traffic, and inner box distribute a generated traffic in the Center). The private vehicle traffic traveling from elsewhere in the Corridor 21 to the Urban Center must use

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NR21A. By doing so, this system disperses the private vehicle traffic. It should prohibit the private vehicle traffic from coming inside the inner box. The inner box is used as a transit mall, which is exclusively for buses, bicycles, and pedestrians.

City bus routes are gathered in the main bus terminal in front of the railway station by using the exclusive bus lanes on NR21A. The main bus terminal is the hub of a highly dense bus route network in the Urban Center. At the intersection between NR21A and railway/transit mall, carriage ways are crossing with an flyover, and bus lanes, bicycles, and pedestrians are grade-separated crossing with the transit mall. This structure public transportation around the railway station.

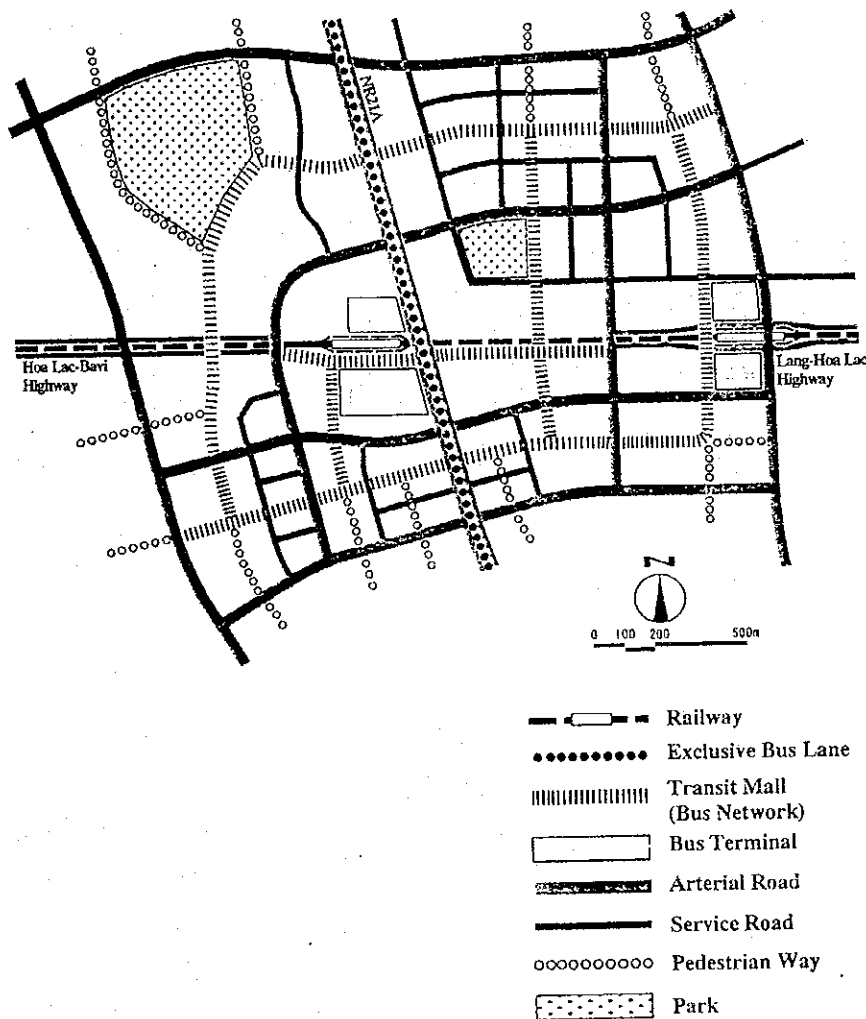


Figure 5.1.5 Alternative Urban Center Area Circulation Plan-C: Motor Box Pattern

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Evaluation and Recommendation

As a result of the comparative evaluation on the three plans, it is concluded that Plan C: Motor Box Pattern is the most appropriate plan for the Hoa Lac and Xuan Mai Development Project. The reasons are the following:

- Plan C can relatively ensure the convenience of buses, compared to private vehicles and motorcycles.
- Plan C makes it possible to smoothly manage the public transportation around the railway station
- Plan C makes it possible to respond the future increase in the private vehicle traffic demand by dispersing the traffic demand to NR21 A and the two motor box routes.
- Plan C eliminates the private vehicle traffic going east-west bound and minimizes the urban center space separated.

The Project adopts Plan C because of the above reasons. Based on this plan, transportation facility plan of the Urban Center is determined.

Figures 5.1.3 to 5.1.5 illustrate the transportation network and phased development plan of the Urban Center based on Plan C. These plans show that controlling the private vehicle traffic running east-west and north-south direction in the Urban Center ensures the advantage of the public bus transportation in Phases 1A and 1B.

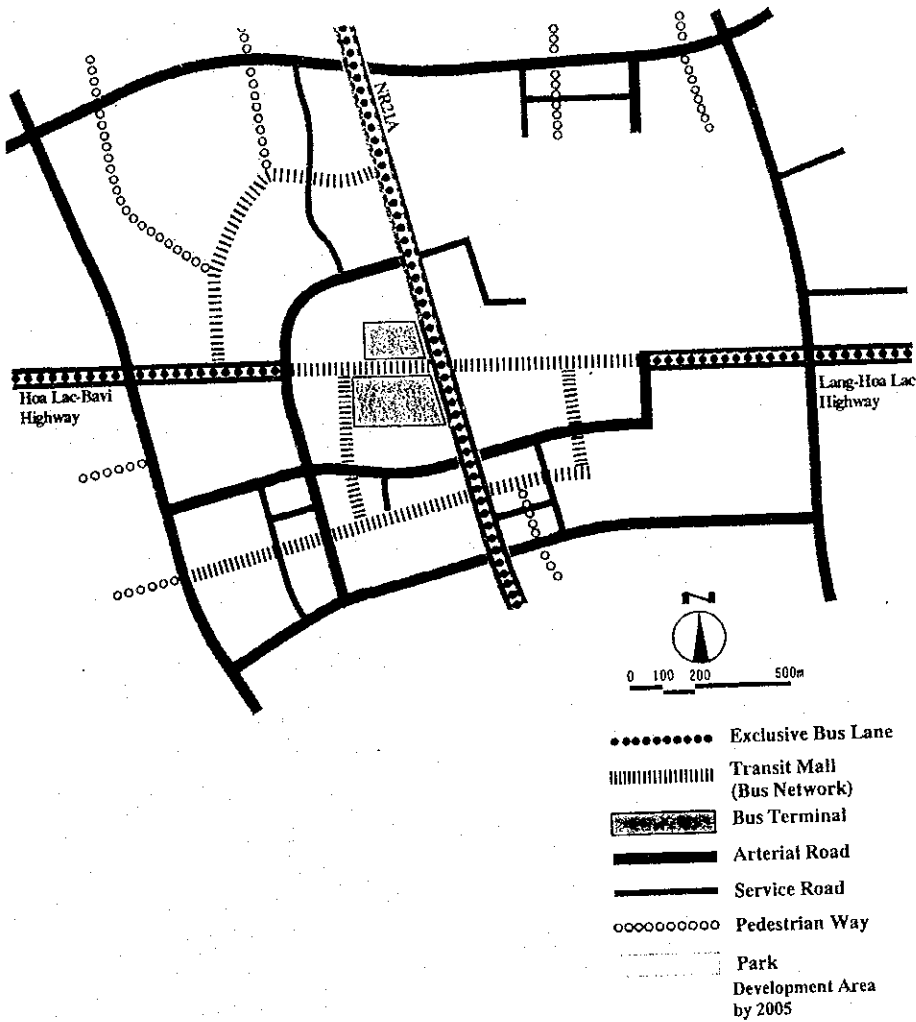


Figure 5.1.6 Transportation Network Plan for Urban Center: Phase-1A

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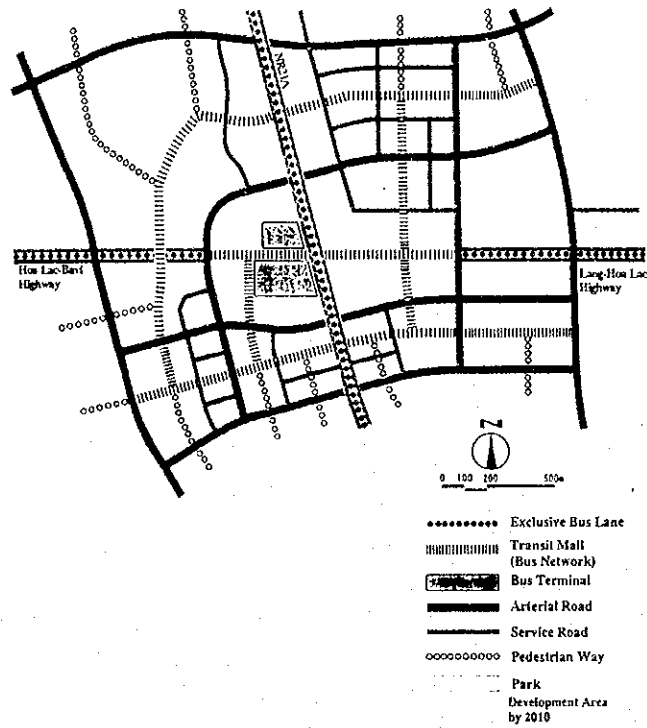


Figure 5.1.7 Transportation Network Plan for Urban Center: Phase-1B

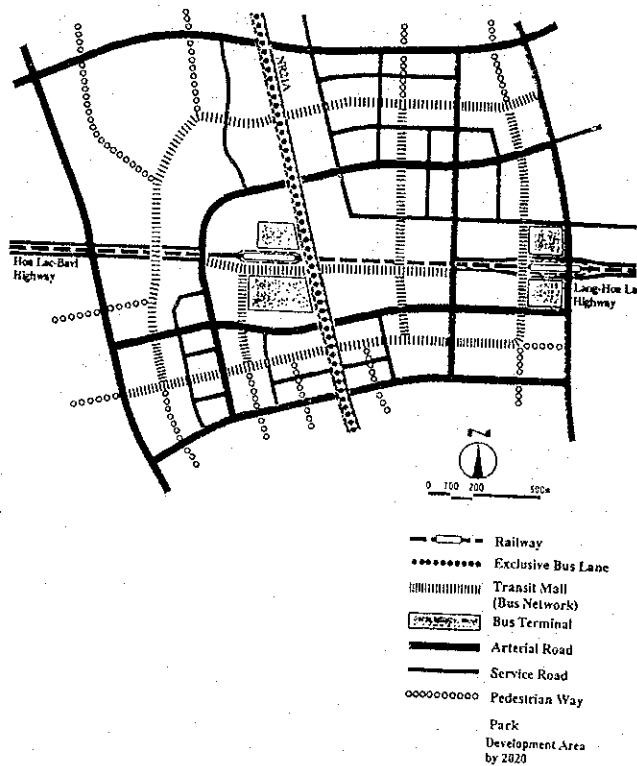


Figure 5.1.8 Transportation Network Plan for Urban Center: Phase-2

5.1.3 Phased Development Plan

(1) Phased Development

In Phase-1A, development efforts will be concentrated in the commercial zone in the SW (south western part) of the Center Area to create a compact but attractive urban center from the beginning. Besides the above, other Areas will also be developed rather in a small scale centering the areas alongside NR21A and the Lang-Hoa Lac Highway.

The four Urban Center Areas are connected each other even in Phase 1A development. The development in Phase-1B takes the form of expanding Phase 1A development to substantiate and accumulate the compact urban space initiated in Phase-1A.

The Phase-2 development will follow the same development pattern. Some areas will be reserved for the development after 2020 in response to the future changes of the demand for urban functions.

(2) Phased Development for Each Four Urban Center Areas

1) NW (VNU) Area

In Phase 1A, university library, science museum, science and technology exchange center, and some administrative facilities are provided along NR21A. In Phase-1B, those facilities developed in Phase-1A will be more substantiated, and in addition, art museum, theater, and science and technology information center will be provided. In Phase-2, a concert hall is provided in the foot of the small hill.

2) NE (HHTP) Area

In Phase-1A, business center and offices are developed to be supportive of the science and technology promotion, which will be substantiated with their facilities on a phased basis. In Phase 2, center facilities to support international exchange will be developed in the area along the Lang-Hoa Lac Highway.

3) SW (Dong Xuan) Area

The development in Phase-1A concentrates the commercial and civic centers including hotel accommodations, as well as schools, clinics, and hospitals, which are essential for the

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daily life of the residents. In the commercial zone, a traditional open market is provided. In planning the detailed development, care should be invited not only to the physical planning but also the software planning such as how to provide effective and efficient services, operations, and management program.

In Phase-1B, the Urban Center will grow and expand as scheduled. A cultural center for children is provided in the south park.

4) SE (Phu Cat) Area

In Phase-1A, amenity facilities such as movie theaters and other theaters will be developed in the area along NR21A. Also, in the east of it, a leisure land is created including a circus and others. In Phase-1B, Phase-1A development will be more expanded and diversified with additional facilities such as botanical garden, theme park, and so on.

Table 5.1.3 Phased Land Use Plan by 4 Area: Urban Center Area

Area	Phase 1A	Phase 1B	Phase 2	Reserve	Total (ha)	%
VNU Area	48.1	16.0	5.0	-	69.1	21.4
HHTP Area	14.5	-	28.5	-	43.0	13.3
Dong Xuan Area	36.4	23.7	81.8	10.6	152.5	47.3
Phu Cat Area	26.4	31.2	-	-	57.6	17.9
Total (ha)	125.4	70.9	115.3	10.6	322.2	100.0

Source: JICA Study Team

Table 5.1.4 Phased Land Use Plan by Component: Urban Center Area

Land Use	Phase-1A		Phase-1B		Phase-2		Total	
	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)
1 Public Space	85.5	69	19.4	27	62.1	49	167.0	52
NR21A/Lang-Hoa Lac (incl. Rail)	33.4		-		-		33.4	
Other Arterial and Collector Road	21.6		8.1		10.6		40.3	
Parks and Open Space	6.5		11.3		31.5		49.3	
Green Hills in the Urban Center	24.0		-		9.0		33.0	
Water-surface (River, Pond, Lake)	-		-		11.0		11.0	
2 Urban Facility Area	39.0	31	51.5	73	54.5	43	145.0	45
3 Reserved Area for Facility	-		-		10.6	8	10.6	3
Grand Total	124.5	100	70.9	100	127.2	100	322.6	100

Source: JICA Study Team

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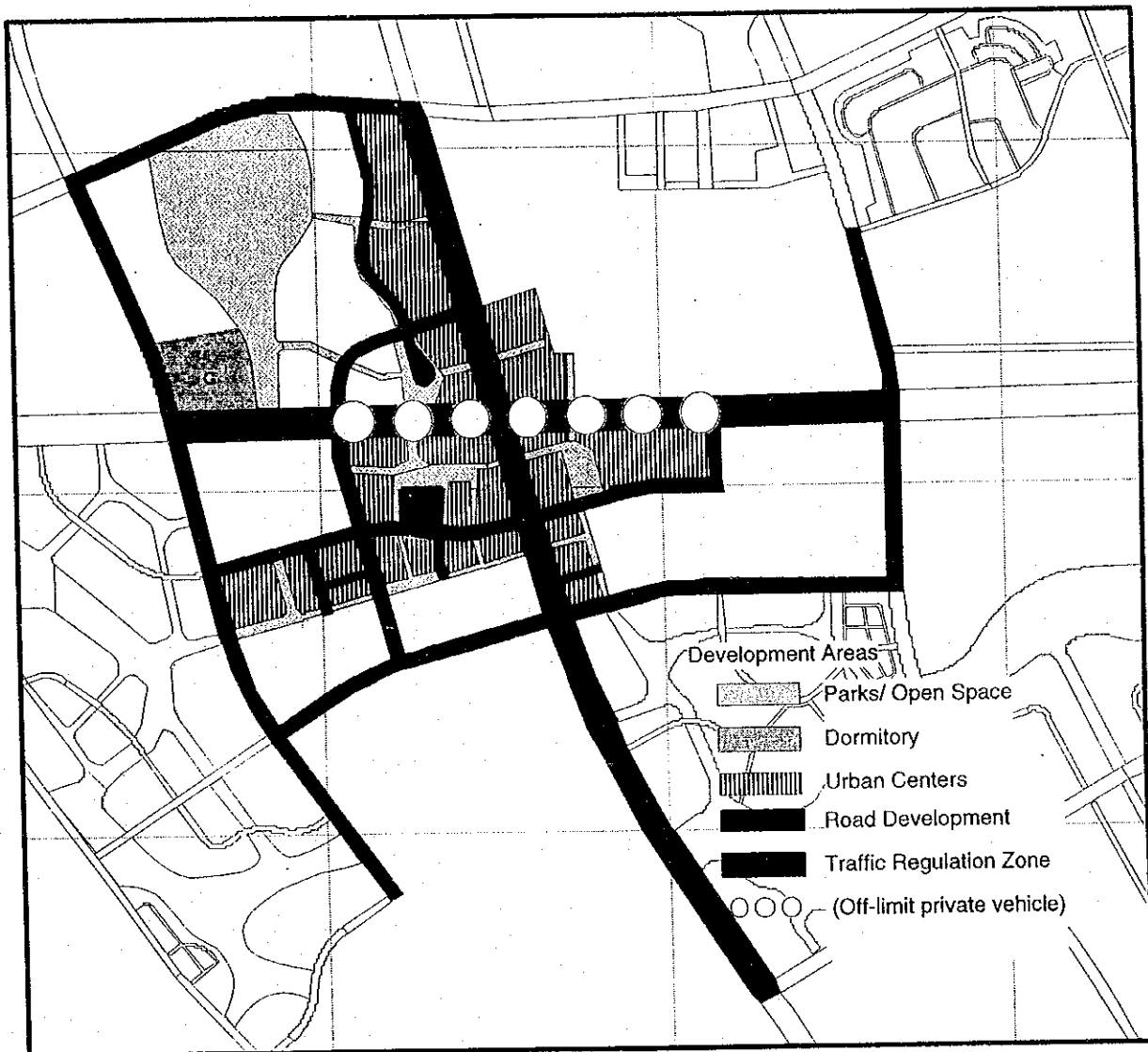


Figure 5.1.9 Phased Development Plan of Urban Center Area: Phase-1A

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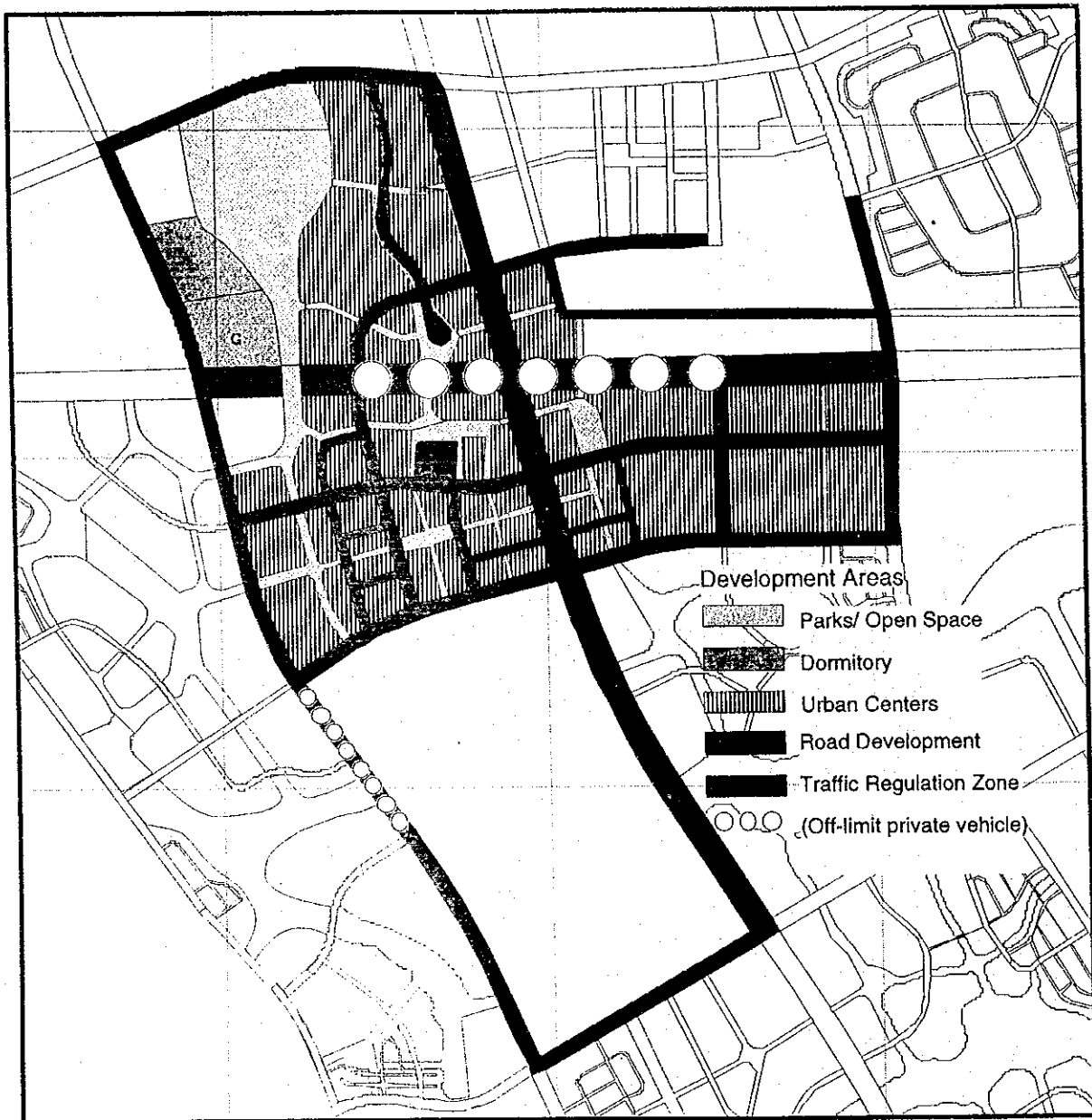


Figure 5.1.10 Phased Development Plan of Urban Center Area: Phase-1B

5.2 VNU Area

The VNU relocation zone occupies around 65% of the VNU Area. The Hoa Lac North Residential Zone is provided in the north of the area in the shape of crossing NR21A, the western part of which belongs to the VNU Area. The north center for the Hoa Lac North Residential Zone is located along NR21A. However, the northeastern part of the VNU relocation zone along NR21A is allocated as the reserved area where other technology universities (such as AIT, Hanoi University of Technology, and so on) will be located. Also, outside the western part of the area to be developed by 2020 is the area reserved for future expansion.

5.2.1 Land Use Plan

VNU Area spreads out to a size of 1,755 ha including the reserved areas. On the other hand, it is estimated that the necessary area for VNU relocation zone is about 640 ha by 2020. Therefore, by 2020 the development area (about 1,325 has) of VNU should be concentrated along NR21A, and the area (about 430 ha) on the west of VNU relocation zone, where is the part of designated area for the VNU relocation project, should be reserved for the future expansion. The objective of the VNU relocation project is not only to relocate VNU and to found an integrated and comprehensive university, but also to establish the national center for the promotion of science and technology and human resource development. Thus, it is important to reserve some space (124 ha) for the other technology universities such as Hanoi University of Technology (expansion plan) and AIT (Hanoi campus) along NR21A in order to facilitate R&D activities and human resource development between VNU and HHTP.

The VNU headquarter office is located in the center of VNU relocation zone. The facility axis of university lies from north to south directions. On this axis, many facilities are located such as the center of each faculty, library, service center, dormitory, stores, and restaurants.

Since VNU facilities are gradually expanded from the beginning of the project toward 2020, it is necessary to reserve space for the expansion in each faculty at each phase. In particular, the Research Institute of Natural Science and Technology (RIST), as a center of the promotion of science and technology, should consider the cooperation with other universities, and institutes of HHTP, which have human resource development functions. Thus, these facilities are located adjacent to HHTP and the Urban Center. In particular, the main facilities of VNU, such as RIST, and R&D facilities of HHTP are located in a way that they can easily cooperate each other. The faculty of health care and social services, including a university hospital, is located close to the Urban Center.

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On the other hand, dormitory is located close to the residential zones of Dong Xuan in the south and Bin Yen in the north. Because the designated 1,000 ha area for VNU relocation zone has plenty of land available, the northern part of the area, which is assigned to be an International University by MOC, is dedicated to the residential area, so that this residential area and one in HHTP together make one agglomerated residential zone in Hoa Lac North.

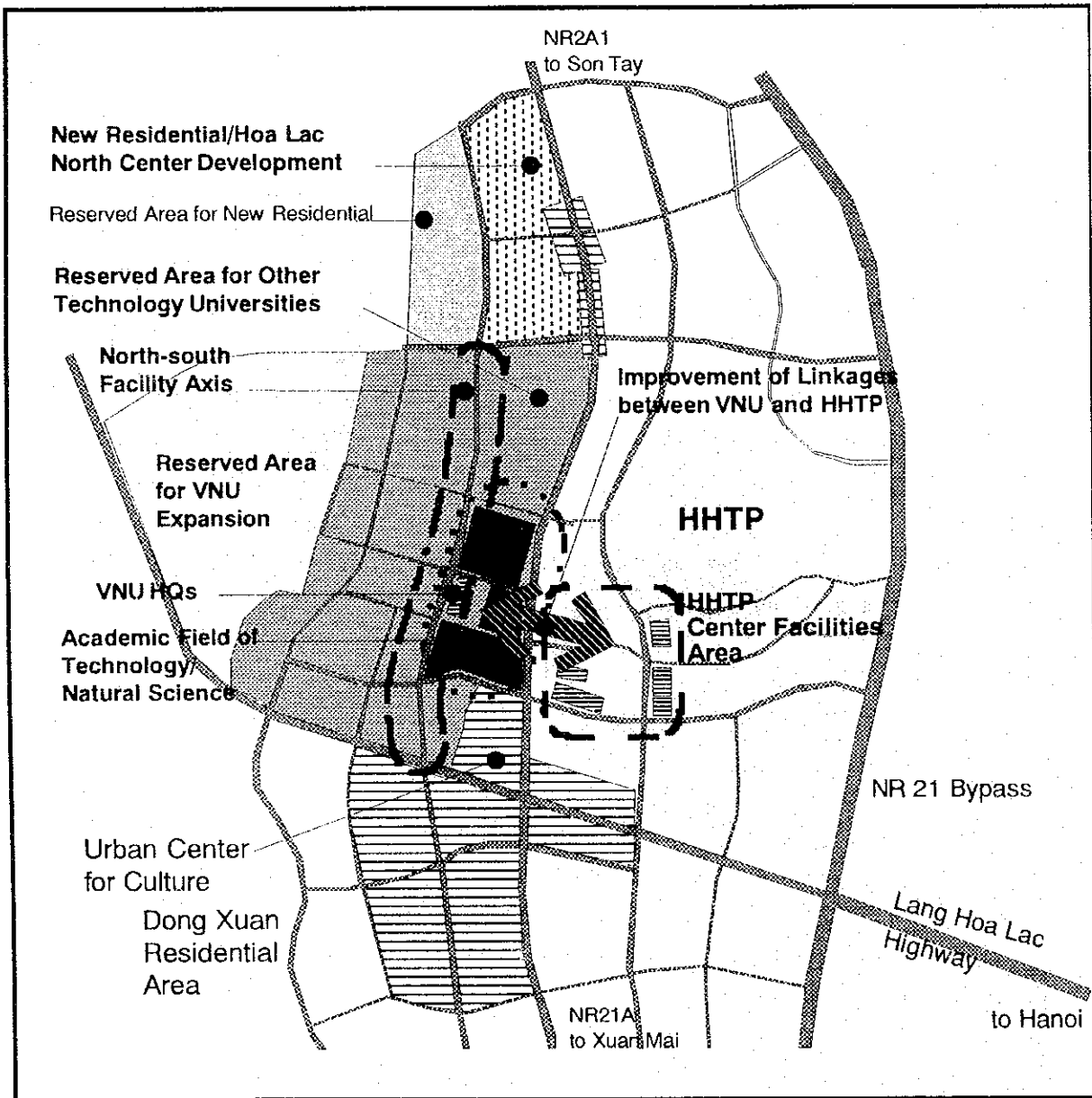


Figure 5.2.1 Basic Concept for Land Use

5.2.2 Facility Layout Plan

VNU campus facilities described in Table 5.2.1 are laid out in the zone. Along the policy of establishing the center functions for human resource development and development of science and technology in close coordination with HHTP, the University of Natural Sciences as well as the newly established Faculty of Technology are located along NR21A and opposite to the R&D facilities in HHTP. The purpose is to secure the physical proximity of those VNU and HHTP facilities, thus ensuring their mutual functional linkage.

Running in the north-south direction in the middle of the Area is the central artery of the VNU Campus Zone, along which various campus facilities such as headquarter building, various faculties, and research institutes and centers are located facing to or keeping reasonable distance from the artery for easy access. The VNU headquarter is located in the southern part of the artery near the Urban Center, where a large-scale central park is provided as the core space of the whole VNU Area.

The areas without numbering in Figure 5.2.3 indicate the open space network covering the whole Hoa Lac Urban Center, where the central park of campus will be provided having a lake made by utilizing the nearby river.

The dormitory areas for students are divided into north and south, but each area has a service center to support for the daily life of students. Also, in the service centers are bookshops, stationary shops, clinics, conference facilities, bars and restaurants, and super markets.

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Table 5.2.1 Building and Land Requirement at VNU Relocation Project by 2020

Facilities	Floor Requirement (sq.m)				Land Requirement (ha)		
	Phase-1A	Phase-1B	Phase-2	F/L Ratio	Phase-1A	Phase-1B	Phase-2
Headquarter	6,700	8,950	13,325	25%	2.7	3.6	5.3
Sub-total of Natural Science	113,481	160,872	316,403		46.0	66.3	126.9
Natural Science	81,689	81,689	95,323	33%	33.5	33.5	39.6
Technology	31,792	47,768	127,386	33%	12.5	19.3	50.2
Agro-Forestry (Env.)	0	15,381	61,725	33%	0.0	6.6	24.5
Architecture	0	16,034	31,968	33%	0.0	6.8	12.6
Sub-total of Research Center/Institu	12,980	23,180	43,580		4.9	9.0	16.1
R.I. of Science/Tech.	10,200	20,400	40,800	33%	4.1	8.1	15.2
R.C. of Natural Resource/Env.	2,780	2,780	2,780	33%	0.8	0.8	0.8
Sub-total of Social Science	82,886	110,278	156,017		37.9	52.1	73.8
Social Science/Humanities	55,376	55,376	55,376	33%	25.6	25.6	25.6
Law	13,755	18,287	27,451	33%	6.1	8.5	13.2
State Management	0	9,164	18,287	33%	0.0	4.7	8.5
Economics and Finance	13,755	18,287	27,451	33%	6.1	8.5	13.2
International Relations	0	9,164	27,451	33%	0.0	4.7	13.2
Sub-total of Research Center/Institu	13,600	23,800	34,000		5.1	9.1	12.2
R.I. of Development	10,200	20,400	30,600	33%	4.1	8.1	11.2
R.C. of VN Studies/Int. Relations	1,700	1,700	1,700	33%	0.5	0.5	0.5
R.C. of Refreshment of Revolutio	1,700	1,700	1,700	33%	0.5	0.5	0.5
Sub-total of Pedagogy/Foreign Lan	118,762	137,463	155,810		55.6	64.2	72.7
Pedagogy	81,288	81,288	90,263	33%	38.4	38.4	42.1
Foreign Language	37,474	56,175	65,546	33%	17.2	25.9	30.7
Sub-total of Research Center/Institu	9,900	9,900	9,900		4.0	4.0	4.0
R.I. of Pedagogy	8,200	8,200	8,200	33%	3.5	3.5	3.5
R.C. of Education Quality	1,700	1,700	1,700	33%	0.5	0.5	0.5
Sub-total of Health Care/Social Ser	0	71,000	166,200		0.0	25.0	58.0
Health Care and Social Services	-	46,600	93,100	33%	-	16.0	31.0
Pharmacy	-	24,400	73,100	33%	-	9.0	27.0
Sub-total of Accommodation	390,556	581,375	892,718		79.5	119.6	183.5
Dormitory-1: 4 p/room type	329,963	461,853	689,970	50%	66.0	92.4	138.0
Dormitory-2: family type **	46,748	87,477	154,908	50%	9.3	17.5	31.0
Guest House ***	13,845	32,045	47,840	33%	4.2	9.7	14.5
Cent. Park/Major O. Space				(15 sq.m/p)	45.0	60.0	90.0
Road/River/Others					44.2	66.2	101.4
Total	748,866	1,126,819	1,787,952		325	479	744.0

Source: JICA Study Team

Note: * Dormitory capacity for Phase-1A should be prepared for all students (after the phase, dormitory should be prepared for demand base).

** Family type will be supplied for 50% of master course students and 90% of doctor course students.

*** Guesthouse will serve to professors and scholars from outside the university, which will be 10% of teaching staff. Estimated Building Floor Areas include common space and mechanical room (30% of each total net floor area requirement).

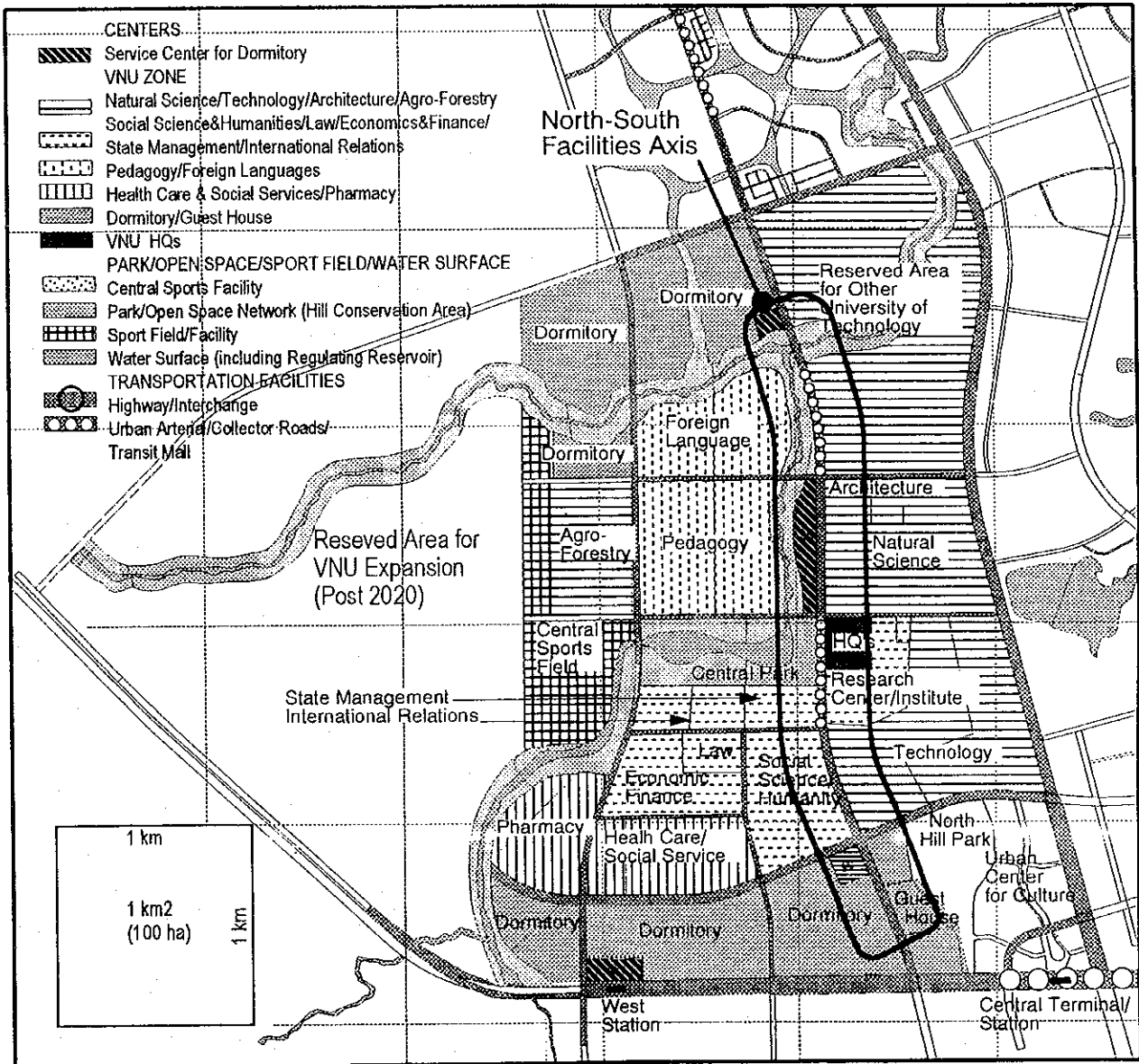


Figure 5.2.2 Facility Layout Plan of VNU Relocation Project

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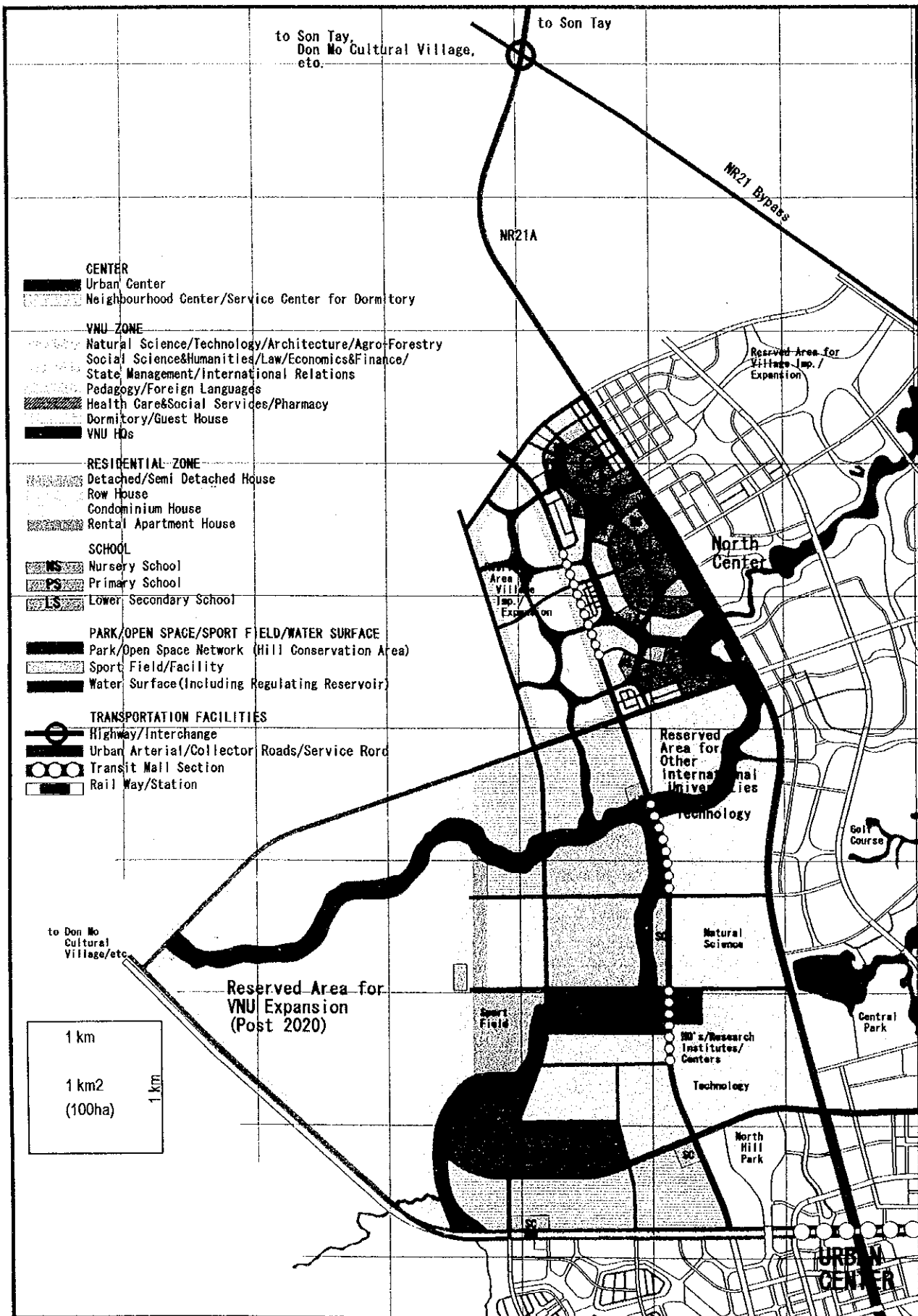


Figure 5.2.3 Land Use Plan of VNU Area

5.2.3 Phased Development Plan

If the project follows the facility layout plan of VNU zone as shown in Figures 5.2.4 from the phase-1, there are many empty spaces left in the VNU campus for a long time. In other words, the objective of the phased development plan, which is to create a compact city, cannot be achieved. Therefore, this project chooses the plan shown in Figure 5.2.4, and 5.2.5, which results in a compact city. The service center supporting students' life is established on the VNU campus. Dormitory is located southern part of the area close to the Urban Center in Phase-1A and northern part of the area after Phase-1B. Table 5.2.1 shows the detail of facilities and land requirement for each phase. In Phase-2, the residential areas will be developed along NR21A. North Center is established to mainly serve for both the residential zones of VNU and HHTP Areas.

Table 5.2.2 Phased Land Use Plan by Component: VNU Area

Land Use	Phase-1A		Phase-1B		Phase-2		Total	
	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)
1 Public Space	109.2	31.7	52.3	20.8	156.8	21.5	318.3	24.0
NR21A/Lang-Hoa Lac (incl. Railway)	38.2		-		-		38.2	
Other Arterial/Collector Road	36.5		18.2		48.7		103.4	
Parks and Open Space	32.0		21.7		82.4		136.1	
Water Surface (River, Pond, and Lake)	2.5		12.4		25.7		40.6	
Others			-		-		0.0	
2 VNU Area	235.0	68.3	199.0	79.2	327.0	44.8	761.0	57.4
Campus	156.0		129.0		138.0		423.0	
Guest House and Dormitory	79.0		70.0		65.0		214.0	
Other Tech. Universities	-		-		124.0		124.0	
3 Residential Area	-		-		232.5	31.9	232.5	17.6
Type-1 Neighborhood Unit Public Facilities in Type-1	-		-		85.7		85.7	
Neighborhood Units Reserved Type-1	-		-		21.0		21.0	
Neighborhood Units	-		-		125.8		125.8	
4 North Center (Type-2 Neighborhood Units)	-		-		12.9	1.8	12.9	1.0
Grand Total	344.2	100.0	251.3	100.0	729.2	100.0	1,324.7	100.0
Reserved Area for VNU Expansion Area after 2020							429.8	

Source: JICA Study Team

Note: Type-1 Neighborhood Unit is located on the New Residential Zone.

Type-2 Neighborhood Unit is located on the Village Improvement and Expansion Zone.

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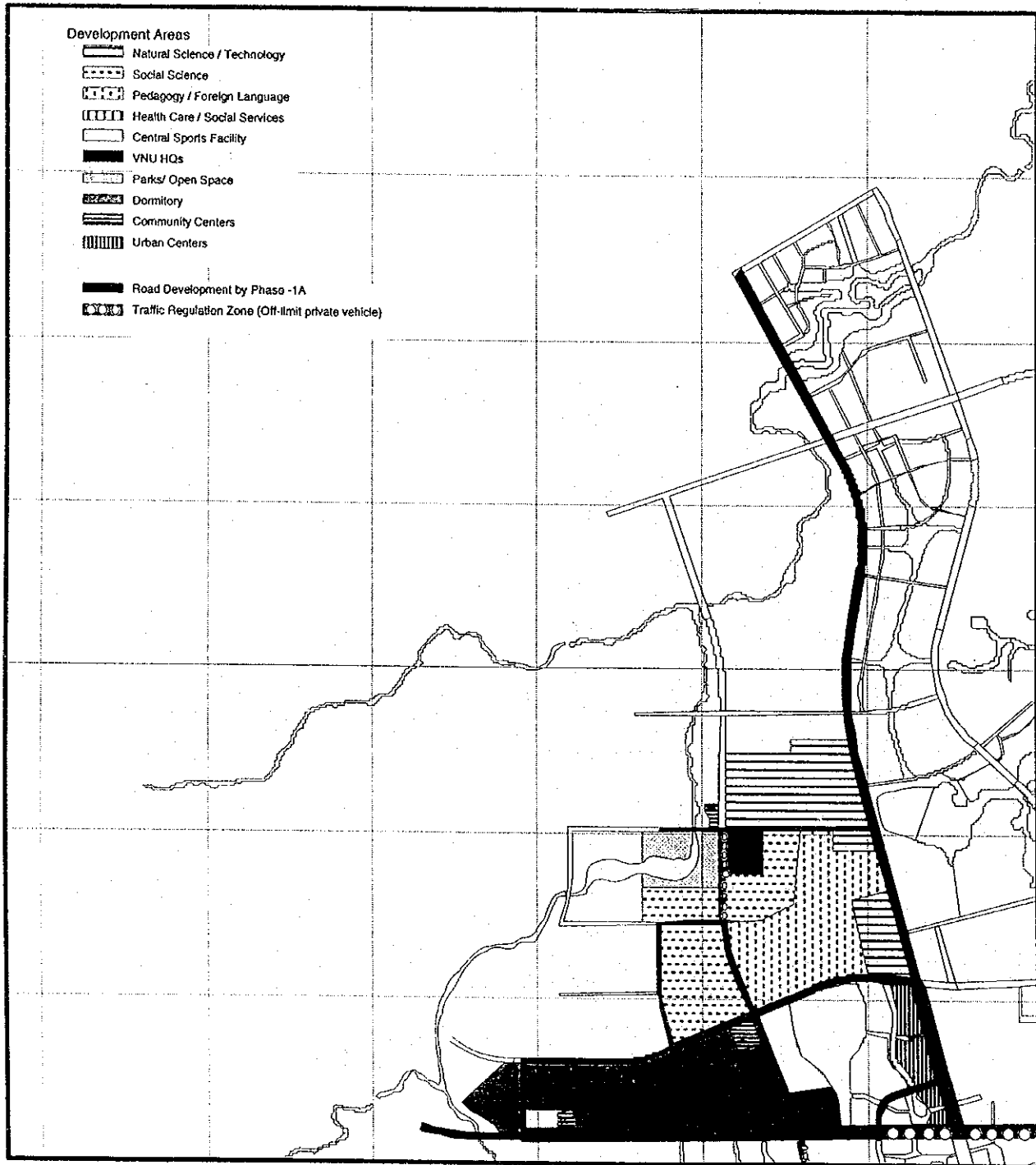


Figure 5.2.4 Phased Development Plan of VNU Area: Phase-1A

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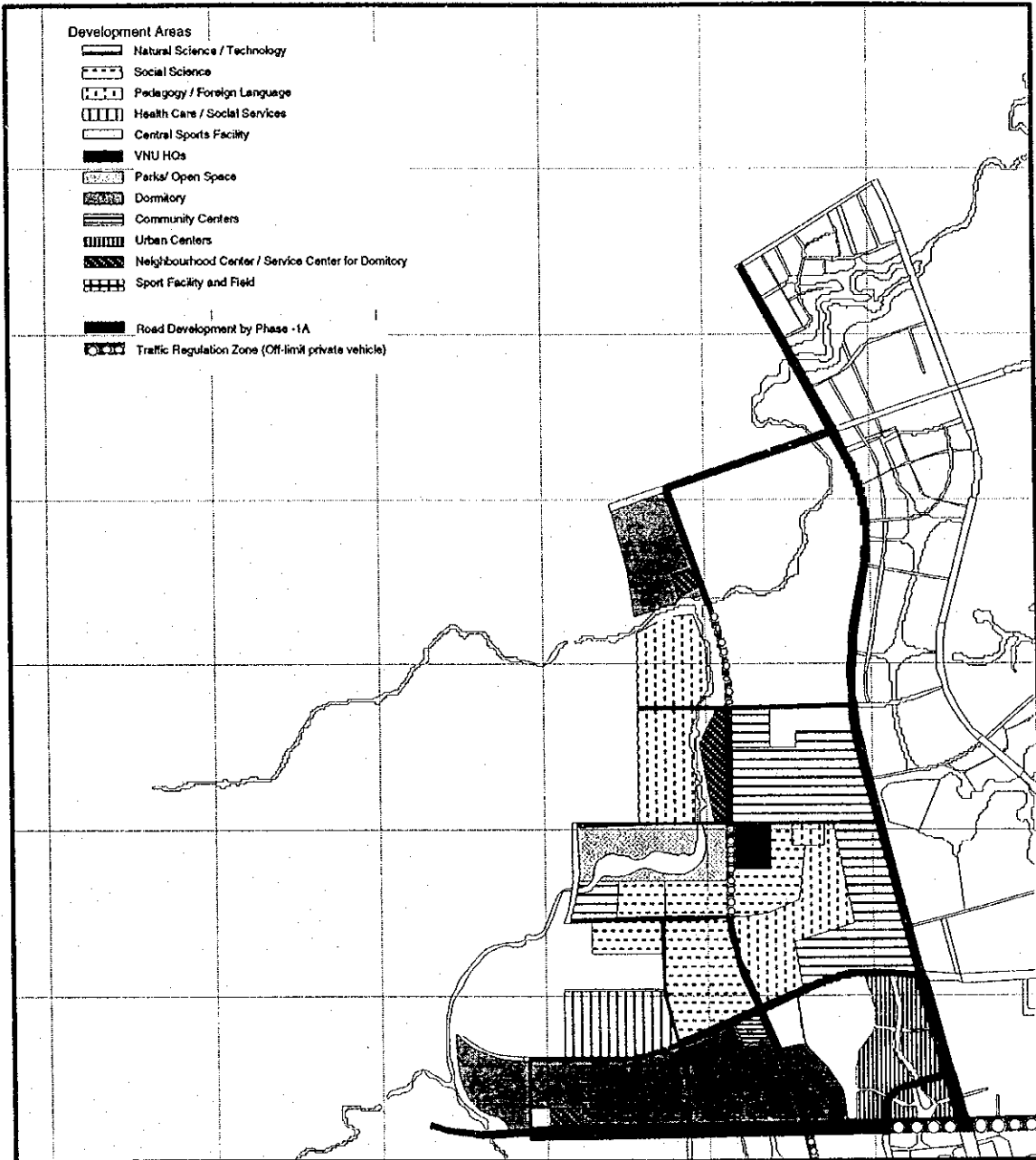


Figure 5.2.5 Phased Development Plan of VNU Area: Phase-1B

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5.3 HHTP Area

5.3.1 Basic Concepts for Land Use and Facilities Planning

The HHTP Area is mostly used for the functions related to R&D and high-tech industries, but the northern part is used for the residential purpose. There exist a large accumulation of existing villages in this part, and thereby designated to provide the North Center of the Hoa Lac north residential zone.

The area deemed necessary for the framework by 2020 will be developed along NR21A and in the north of the Area, and the remaining area will be reserved for the residential expansion.

The Stage 1 implementation program of HHTP, whose target year is 2003, is already approved by the Government. Therefore, land use plan of HHTP of the Corridor 21 Development Project should be consistent with the one prepared by MOSTE. The HHTP development after 2003 is reviewed and modified from the point of view that HHTP is part of the whole New Town development.

The following are modifications made on the basis of HHTP Master Plan/Feasibility Study of MOSTE (supported by JICA) in the year 1998:

(1) Development Framework

The phased development target is reviewed from the economic, financial and foreign investment situation as described in Chapters 3 and 4. The reviewed target development area is 250 ha by Phase-1A, 550 ha by Phase-1B, and 800 ha by Phase-2.

(2) Arterial Road Pattern

In order to strengthen the linkage with surrounding areas such as VNU and Urban Center, the network between arterial roads within the HHTP Area and ones outside the HHTP Area ought to be reinforced.

(3) Allocation of Land Use

Since it is essential for R&D functions to cooperate with VNU, they are located adjacent to the VNU zone. High-tech industrial zone is located in the eastern part of the HHTP Area along NR21 Bypass.

(4) Allocation of Major Facilities

Some major facilities of HHTP, such as OJT Technical Support Center, Technical Institute, Techno-Partnership Center, and National Software Center, are located in the center of the HHTP Area, according to the plan prepared by MOSTE. Other major facilities, which will be established such as National Center for High-tech Research and Training (NCHRT), should be located along NR21A to create an integrated facility zone with major science and technology facilities of VNU.

(5) Residential Zone Plan

The agglomerated residential zone is allocated in the northern part of the HHTP Area (Binh Yen District), which creates the integrated residential zone with the one in the VNU Area, named Hoa Lac North.

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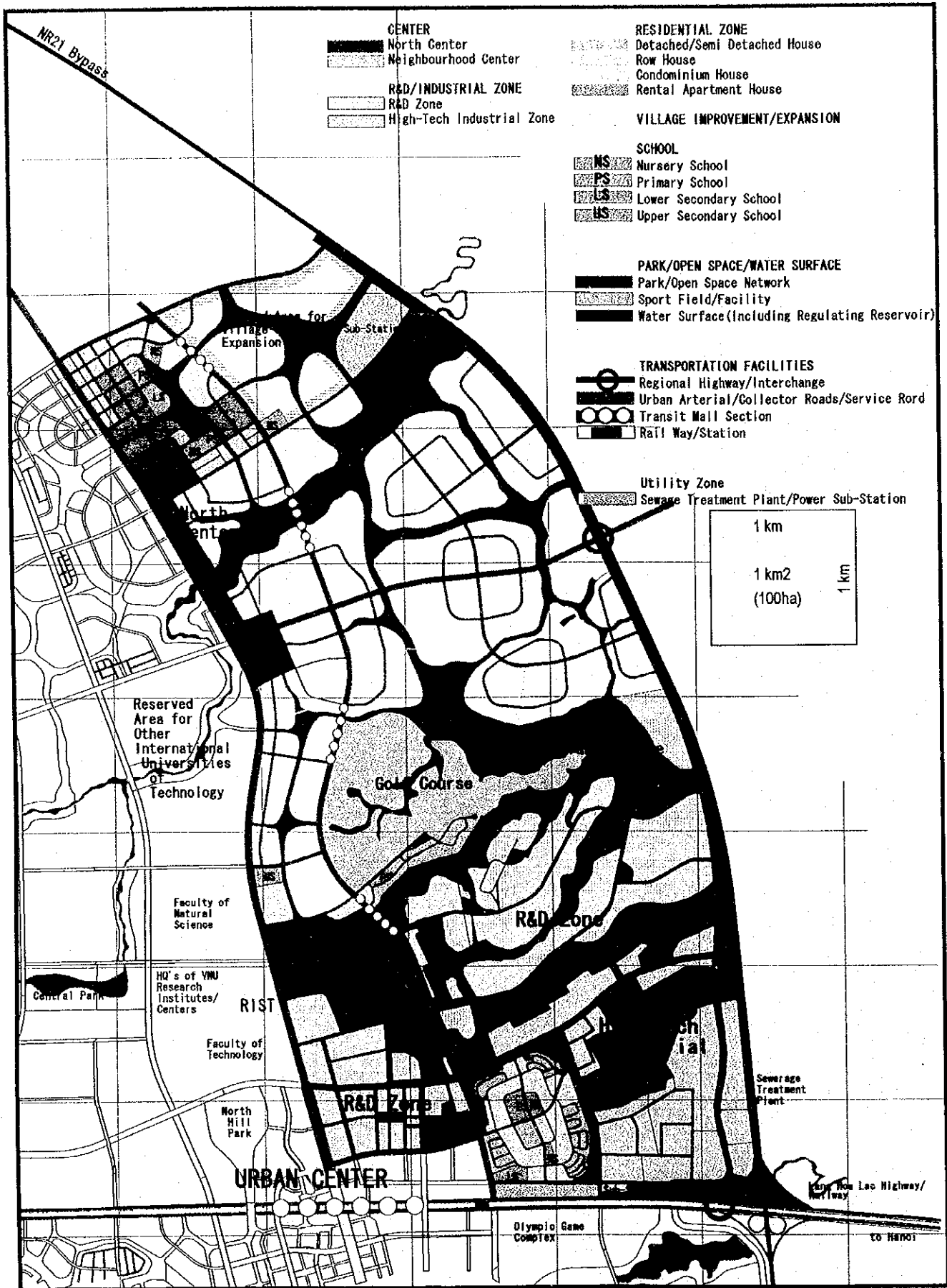


Figure 5.3.1 Land Use Plan of HHTP Area

5.3.2 Facility Layout Plan

The land use plan and facility layout plan shall basically comply with the previous plan prepared by MOSTE (supported by JICA). The National Center for High-tech Research and Training (NCHRT) is tentatively named by the Study Team, but its concept was formulated by the HRD program by MOSTE. NCHRT will be located in the western part of the Area adjacent to NR21A, originally planned as the Urban Business Zone. In and after Phase 1B, the area of 50 ha adjacent to the Urban Center in the north will be added to the area for use of R&D and business activities.

According to the MOC master plan, a 150 to 200 meters buffer zone was planned along the Lang-Hoa Lac Highway and NR21A, considering the both roads being used as a high-standard highway allowing through traffic. However, in this Master Plan, the future through traffic is to be shifted to NR21 Bypass, and therefore, such a large-scale buffer zone will not become necessary. Instead, the planned buffer zone area will be used for highly productive urban space. Therefore, the area is added to the Area for use of R&D and business activities.

It was assumed that Phase-1A development of HHTP would be some 200 ha and the development will expand over 800 ha by 2020. There are a number of lakes (the biggest one is Tan Xa lake) and green spaces, and as such, creating suitable environment for the High-tech Park.

As stated, the north of the Area is used for the residential purpose by involving existing villages and communities to form the "village improvement and expansion zone" (Type-2 neighborhood). Adjacent to the area in the west is also the residential area annexed to the VNU Campus Zone. Integrating all these residential areas, the Hoa Lac North will be formulated, where the North Center will be provided alongside NR21A. The location of the North Center involves many existing villages and communities, thus requiring a comprehensive land readjustment to formulate the center with Type-2 neighborhoods.

The residential area in the Area consists of 17 neighborhood units including 3 of them in the HHTP zone. 12 units of 14 neighborhood units in the north are expected to be Type-2. Due to lack of reasonably accurate social information at present, two units of Type-1 units, which is neighborhood in the new residential area, will be reserved for residential development.

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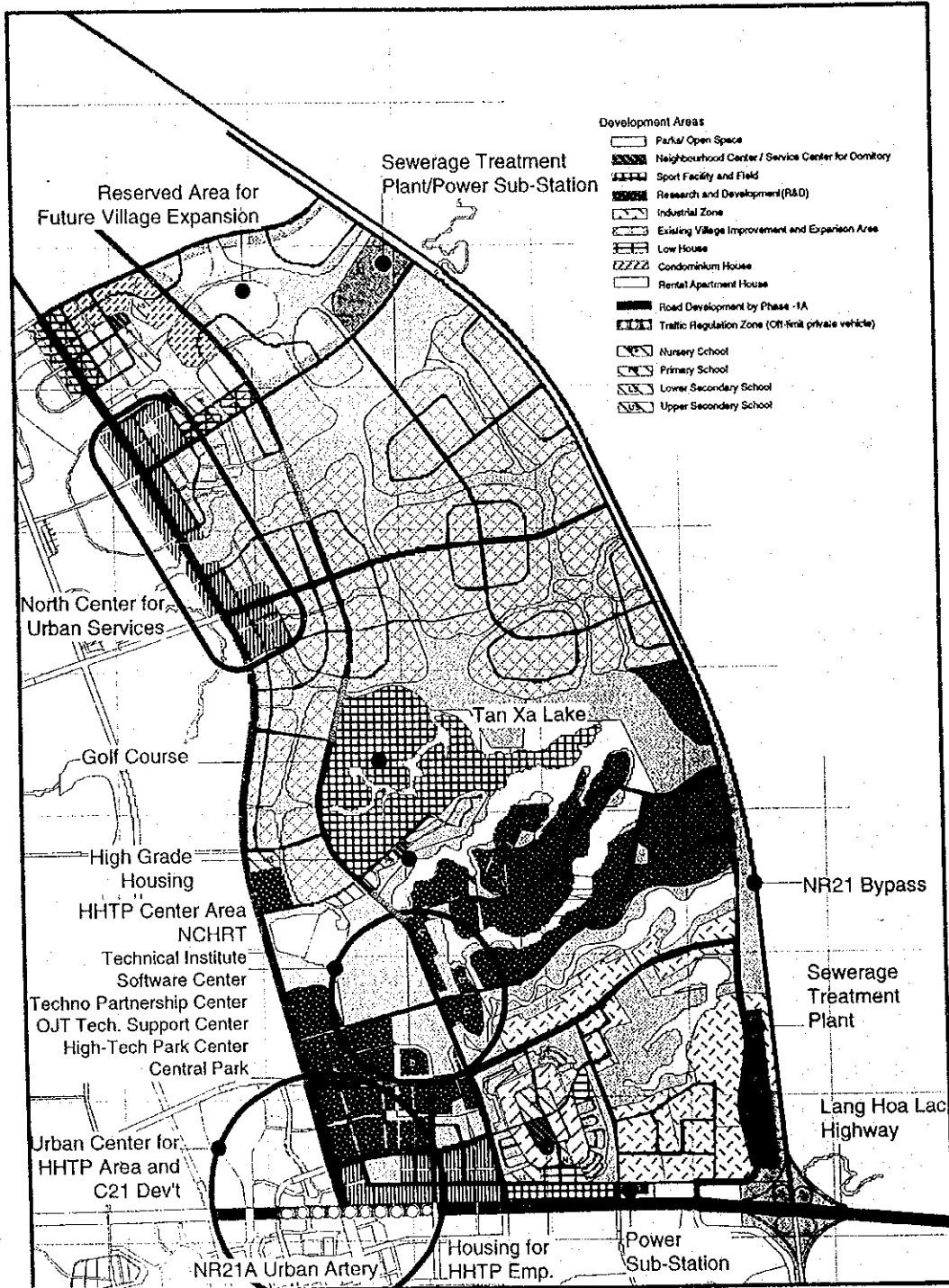


Figure 5.3.2 Facility Layout Plan of HHTP Area

5.3.3 Phased Development Plan

The Action Plan area of Phase-1A shall be the area approved by the Prime Minister in October 1998, with minor modifications as stated above.

The more than half of the residential area development is carried out in Phase 2. The development of the residential area in Phase-1A is three neighborhood units in total, which includes one neighborhood unit out of 3 neighborhood units in HHTP Area and two Type-2 neighborhood units along NR 21A in the north. This development area includes the North Center. One neighborhood unit within HHTP zone and two neighborhood units east of the residential zone developed in Phase-1A along NR21A are developed in Phase-1B. All neighborhood units except for those in HHTP zone belong to Type-2. The small one neighborhood in the northern part of HHTP zone is planned for high-class detached housing by MOSTE.

The remaining, 11 neighborhood units, which are three Type-1 neighborhood units and eight Type-2 neighborhood units in the northeast of HHTP Area, are developed in Phase 2. Two neighborhood units in the northeast end are reserved for the residential expansion.

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Table 5.3.1 Phased Land Use Plan by Component: HHTP Area

Land Use	Phase-1A		Phase-1B		Phase-2		Total	
	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)
1 Public Space	277.8	51.6	182.1	50.5	433.7	42.2	893.6	46.4
NR21A/Lang Hoa Lac (incl. Railway)	32.1		-		31.2		63.3	
Other Arterial/Collector R	86.0		38.1		131.9		256.0	
Parks and Open Space	130.0		106.6		211.6		448.2	
Water Surface (River, Pond, and Lake)	17.7		27.4		37.0		82.1	
Others (Sewage Treatment Plant and Sub-	12.0		10.0		22.0		44.0	
2 HHTP Facility Area	135.0	25.1	88.6	24.6	156.3	15.2	379.9	19.7
R&D, Research Center, etc	90.0		63.0		117.0		270.0	
HHTP Industries	45.0		25.6		39.3		109.9	
3 Residential Area	125.1	23.3	89.9	24.9	407.3	39.6	622.3	32.3
Type-1 Neighborhood Uni	20.9		25.6		48.5		95.0	
Public Facilities in Type- 1 Neighborhood Units	8.5		7.1		14.0		29.6	
Reserved Type-1 Neighborhood Units	-		-		105.0		105.0	
Type-2 Neighborhood Uni	78.3		46.8		196.2		321.3	
Public Facilities in Type- 2 Neighborhood Units	17.4		10.4		43.6		71.4	
4 North Center (Type-2 Neighborhood Units)	-		-		30.6	3.0	30.6	1.6
Grand Total	537.9	100.0	360.6	100.0	1,027.9	100.0	1,926.4	100.0

Source: JICA Study Team

Note: Type-1 Neighborhood Unit is located on the New Residential Zone.

Type-2 Neighborhood Unit is located on the Village Improvement and Expansion Zone.

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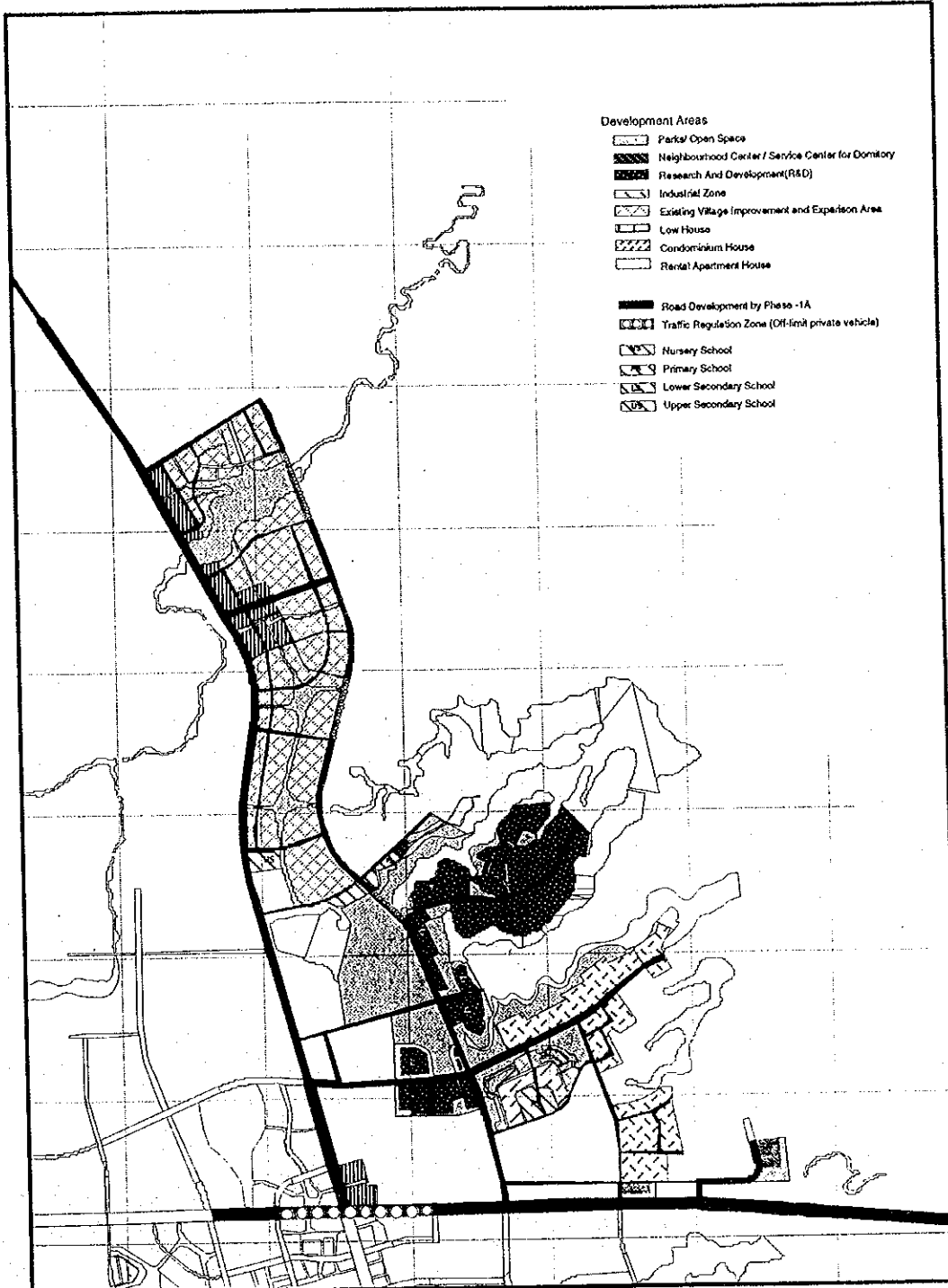


Figure 5.3.3 Phased Development Plan of HHTP Area: Phase-1A

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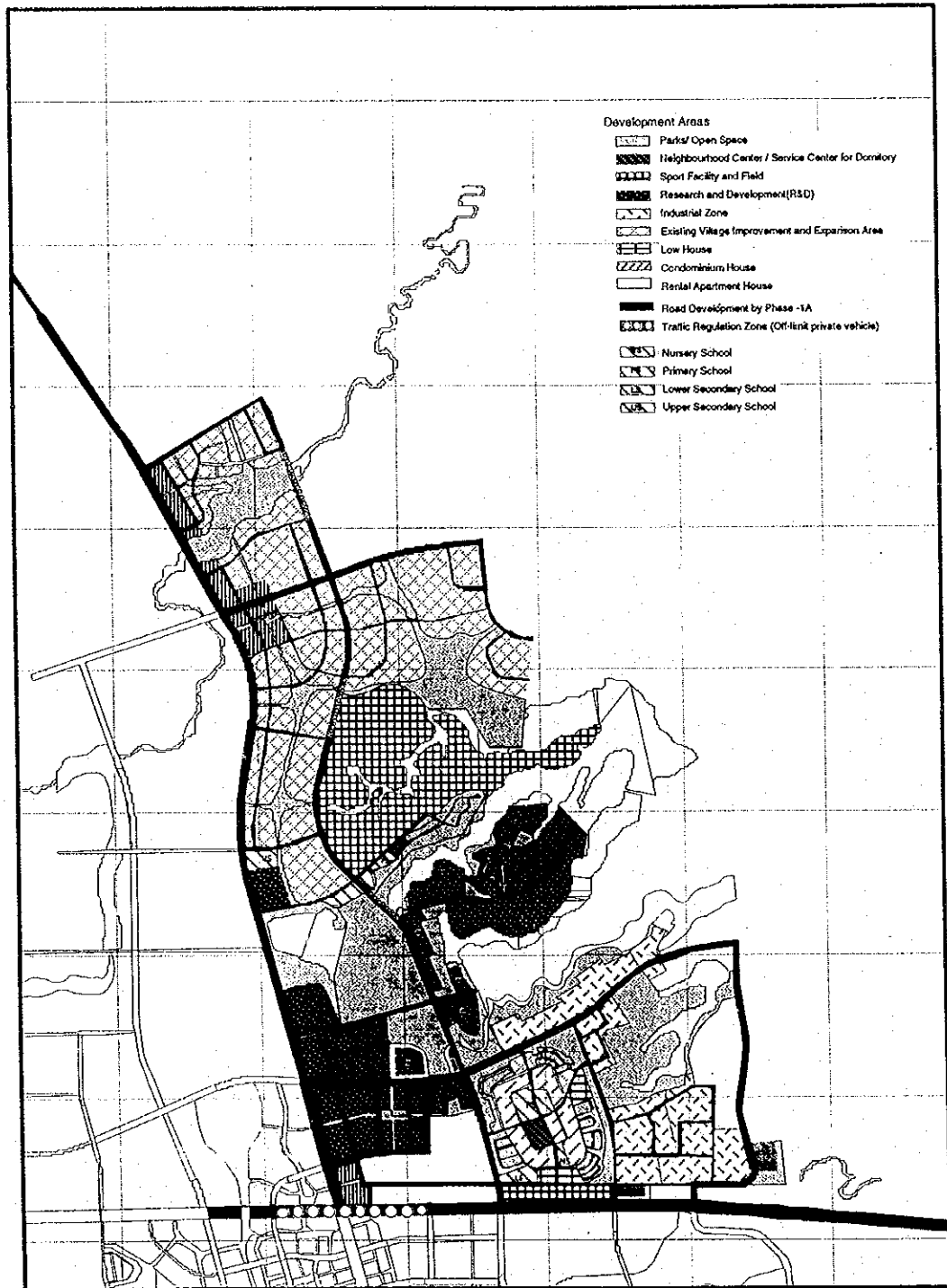


Figure 5.3.4 Phased Development Plan of HHTP Area: Phase-1B

The Corridor 21 Development

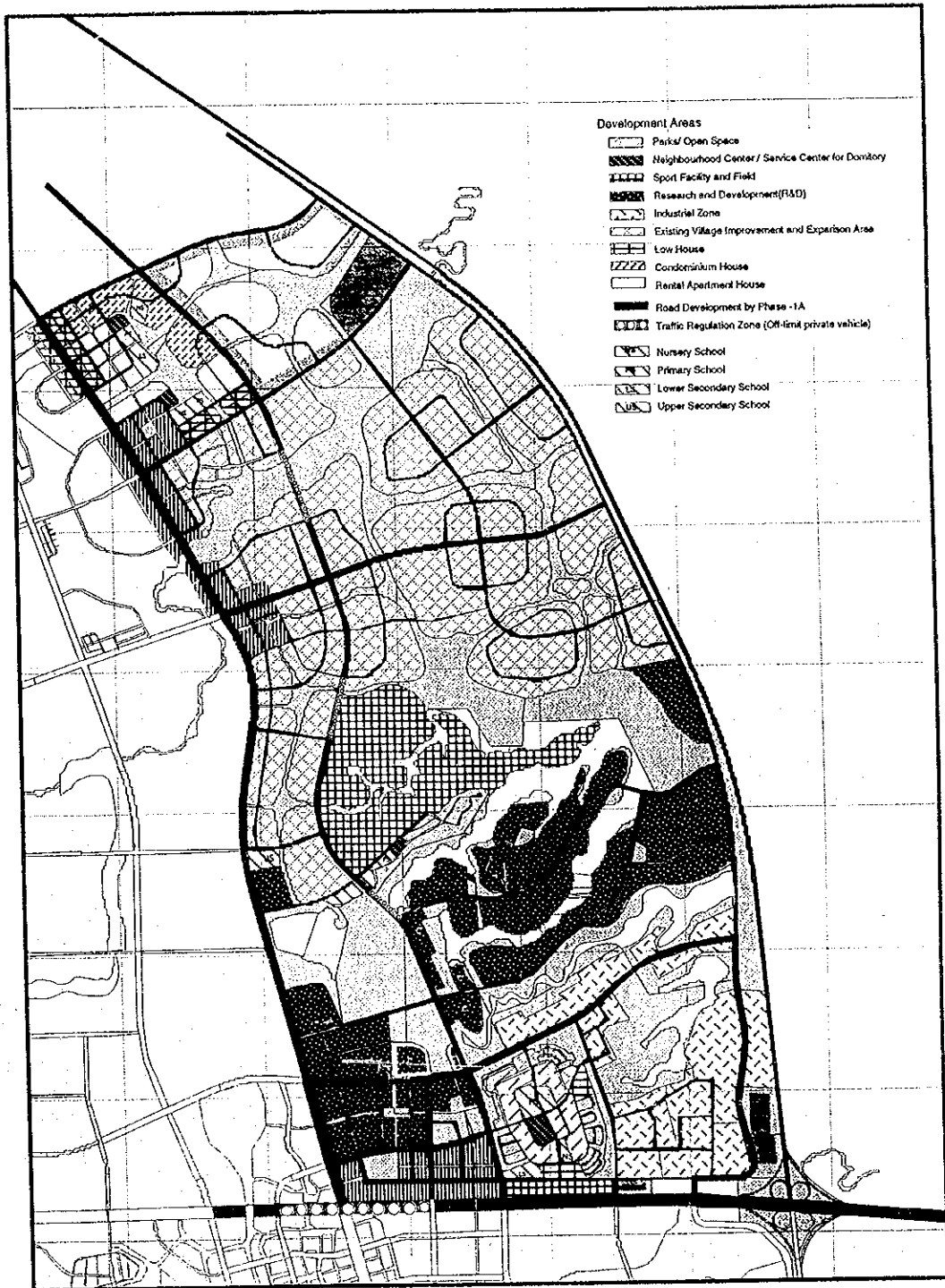


Figure 5.3.5 Phased Development Plan of HHTP Area: Phase-2

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5.4 Dong Xuan Area

5.4.1 Land Use Concept

Dong Xuan Area spreads out over about 2,600 ha, but there exists hilly areas of about 100 to 200 m altitude in the middle of Dong Xuan area, which was identified on the MOC master plan. Thus Dong Xuan area is geographically divided into the eastern and western flat land by the hilly area. In this Master Plan, by the year 2020 all of development concentrate to only the eastern part of the above, thus excluding the almost of the hilly area and western area to avoid inconvenient and costly development as the residential area. The area around 1,220 ha of the eastern Dong Xuan area, where is the north-south narrow belt between NR21A and the above hilly area, is urbanized Dong Xuan Area consists of the Hoa Lac Central Residential District and the Hoa Lac South Residential District, which create the integrated residential zone together with the western Phu Cat Area.

5.4.2 Facility Layout Plan

There are also small hills of around 100 meters altitude in the west of the Urban Center, which are to be graded for the development of the residential area. As a result, the Dong Xuan Area extends along NR21A narrowly in the east-west direction (about 2.5 km in the north and about 1.5 km in the south) and widely in the north-south direction (about 7 km), thus forming a belt shape. The northeastern part of the Area is adjacent to the Urban Center, which is 1 km in the east-west direction and 2 km in the north-south direction. Also, as it is located in the proximity with the Urban Center, the area is suitable for a high-density development from the aspect of maximizing the land use efficiency.

The Area is scarcely inhabited with existing villages and terrain conditions are rather flat, which leads to easier and inexpensive development as the residential area.

The rivers originated from the western mountainous area meander through the Area, which is utilized to form the main green belt network linking with the western mountain green and the eastern agricultural green areas inside and outside the Area. This is particularly suitable to create restful environment as the residential area. The green belt network also link with the Urban Center and neighborhood centers, thus ensuring good accessibility to the center areas by bicycle or by walk through exclusive bicycle roads or pedestrian paths provided in the green belt network.

The community structure in the Area is divided into the Hoa Lac Central Residential District and the Hoa Lac South Residential District. The Hoa Lac Central Residential District is composed of 13 neighborhood units in the Dong Xuan Area, 3 unit in the HHTP Area, and 4 units in the Phu Cat Area, which makes 20 units all together surrounds the Urban Center. Grading the small hills should be limited to have 10 to 15 % slopes to create diverse townscapes

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with attractive strolling paths and to reduce massive earthwork. The Hoa Lac South Residential District is also composed of 8 neighborhood units in the Dong Xuan Area and 4 units in the Phu Cat Area, thus making 12 units all together surrounds the South Center.

Arterial and collector roads are planned so as to surround two neighborhood units, and each neighborhood unit is also served by major neighborhood roads along which neighborhood center and other public service facilities are located. Also, linking to the green belt network, neighborhood parks are provided in each neighborhood unit.

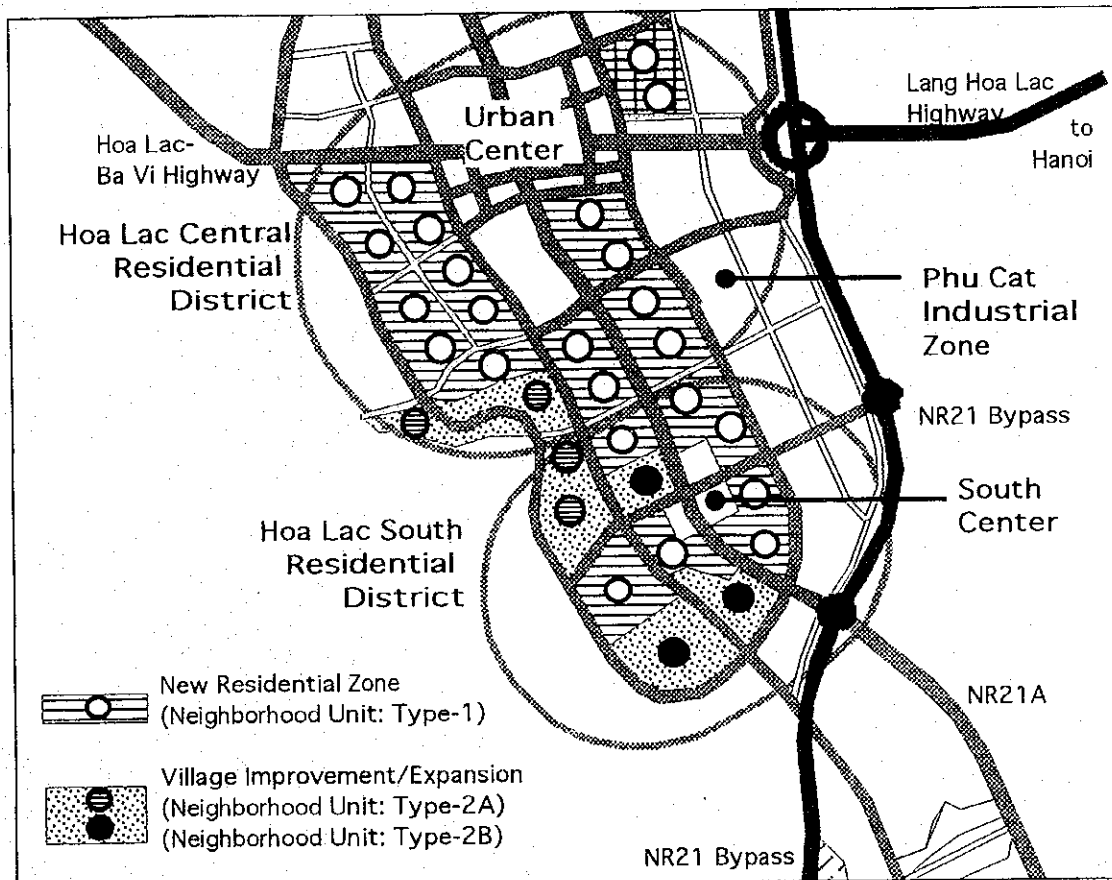


Figure 5.4.1 Community and Neighborhood Layout in Dong Xuan and Phu Cat Areas

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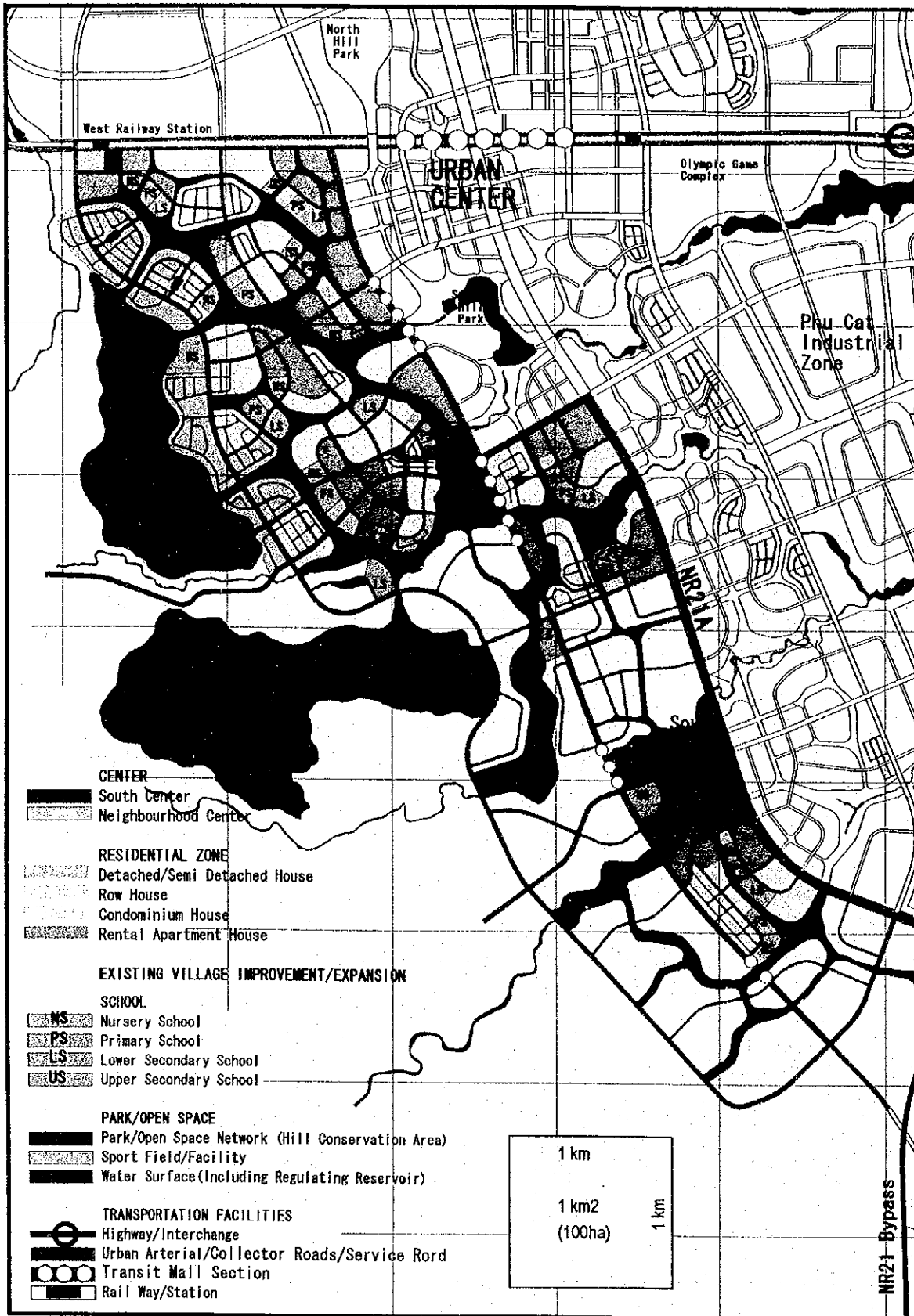


Figure 5.4.2 Land Use Plan of Dong Xuan Area

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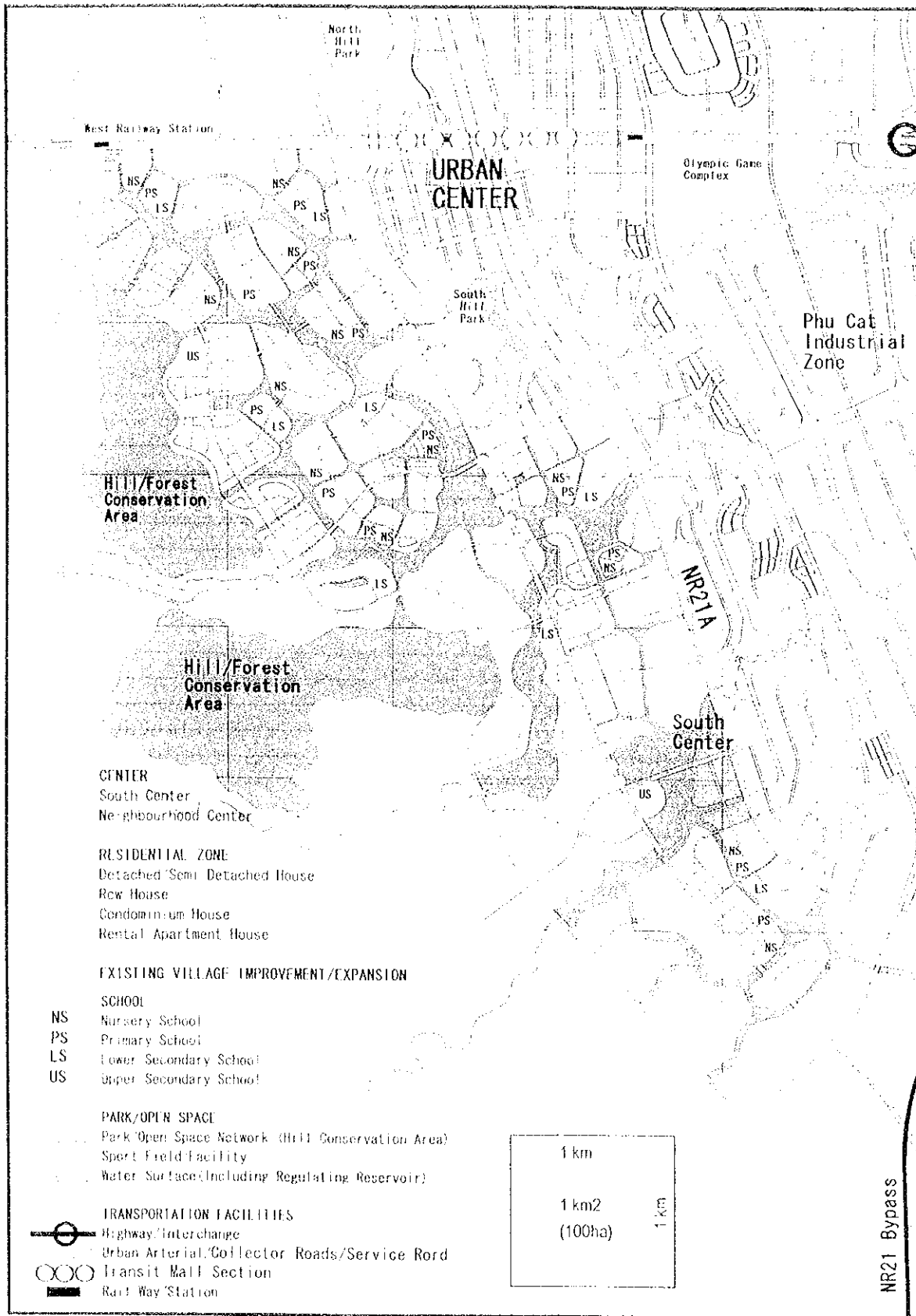


Figure 5.4.2 Land Use Plan of Dong Xuan Area

5.4.3 Phased Development Plan

In developing the Hoa Lac Urban Area, VNU campus and HHTP function as “engines” to move the whole development, whilst the Urban Center and residential areas function as a body to support the balanced development. The Phase-1A development should consider how an attractive urban space could be created even at the Action Plan stage where only limited functions are introduced. In general, residents in a newly developed city are poorly and inconveniently served at the beginning stage, which might adversely affect the subsequent development or the quality of living environment. Also, more often than not, urban development takes considerable span of time during which social and economic changes of unforeseeable scale and nature take place. Therefore, urban planning should be flexible enough to cope with such changes.

This Master Plan intends to highlight the point as to how an attractive urban space can be created as a whole in Phase-1A without necessarily touching on its details. The basic concept for the phased development is to concentrate the Urban Center from which development momentum and direction can be created spontaneously. Another important intent of this M/P is to realize compact urban space in each phase, thus creating attractive and convenient urban space at the minimum cost.

(1) Phase-1A Development

The New Residential development in Phase-1A should start from the area adjacent to the Urban Center and progressively expand towards south along NR21A. This implies that three neighborhood units near the Urban Center should be developed first to support the formulation of the Urban Center and to enable the residents to enjoy convenient services from the Urban Center. The Village Improvement and Expansion zone should also be attended from those located along NR21A taking into consideration their accessibility to the Urban Center. But the planning needs to be based on more site-specific information on the social and physical conditions of prospective villages and communities.

(2) Phase-1B Development

The New Residential development advanced near the Urban Center should be completed at the early stage of Phase-1B and development efforts should be concentrated to formulate the Hoa Lac Center area. As to the Village Improvement and Expansion zone, they should be involved in the New Residential development nearby so that the New and expanded existing village communities will be integrated together, and that the

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public/community facilities and services will be more efficiently utilized by all the residents.

(3) Phase-2 Development

The Phase-2 development area is much larger than those of Phase-1A and Phase-1B. The residential developments are the remaining northwest New Residential zone and the western part of Hoa Lac South Residential District in Dong Xuan. Three neighborhood units in the southwest the Dong Xuan is the Village Improvement and Expansion zone.

At the time of preparing this M/P, the site-specific information on the existing villages and communities are not made available, and the actual need for the accommodation of residents is not known precisely nor reasonably. Therefore, taking into consideration some allowance, the hilly area located north of the Dong Xuan is planned as the residential area to be developed by 2020.

Table 5.4.1 Neighborhood Unit Development in Dong Xuan Area

	Type-1	Type-2	Total
Phase-1A	3	2	5
Phase-1B	3	3	6
Phase-2	7	3	10
Total (neighborhood units)	13	8	21.0

Source: Study Team

Note: Type-1 is developed in New Residential Zone and Type-2 is developed in Village Improvement and Expansion Zone.

Table 5.4.2 Phased Land Use Plan by Component: Dong Xuan Area

Land Use	Phase-1A		Phase-1B		Phase-2		Total	
	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)
1 Public Space	129.4	50	124.0	43	309.0	46	562.4	46
Hoa LacNR21A/Lang (incl.	24.6		-		-		24.6	
Other Arterial/Collector Road	41.7		38.3		97.0		177.0	
Parks and Open Space	54.6		65.7		193.0		313.3	
Water Surface (River, Pond, and	8.5		18.0		19.0		45.5	
Sewage treatment plant and	-		2.0		-		2.0	
2 Residential Area	128.8	50	162.8	57	347.4	52	639.0	53
Type-1 Neighborhood Units	62.0		68.2		163.4		293.6	
Public Facilities in Type-1 N. Units	17.2		14.3		37.1		68.6	
Type-2 N. Units	40.6		65.7		120.2		226.5	
Public Facilities in Type-2 N. Units	9.0		14.6		26.7		50.3	
3 South Center	-		-		14.7	2	14.7	1
Grand Total	258.2	100	286.8	100	671.1	100	1,216.1	100

Source: JICA Study Team

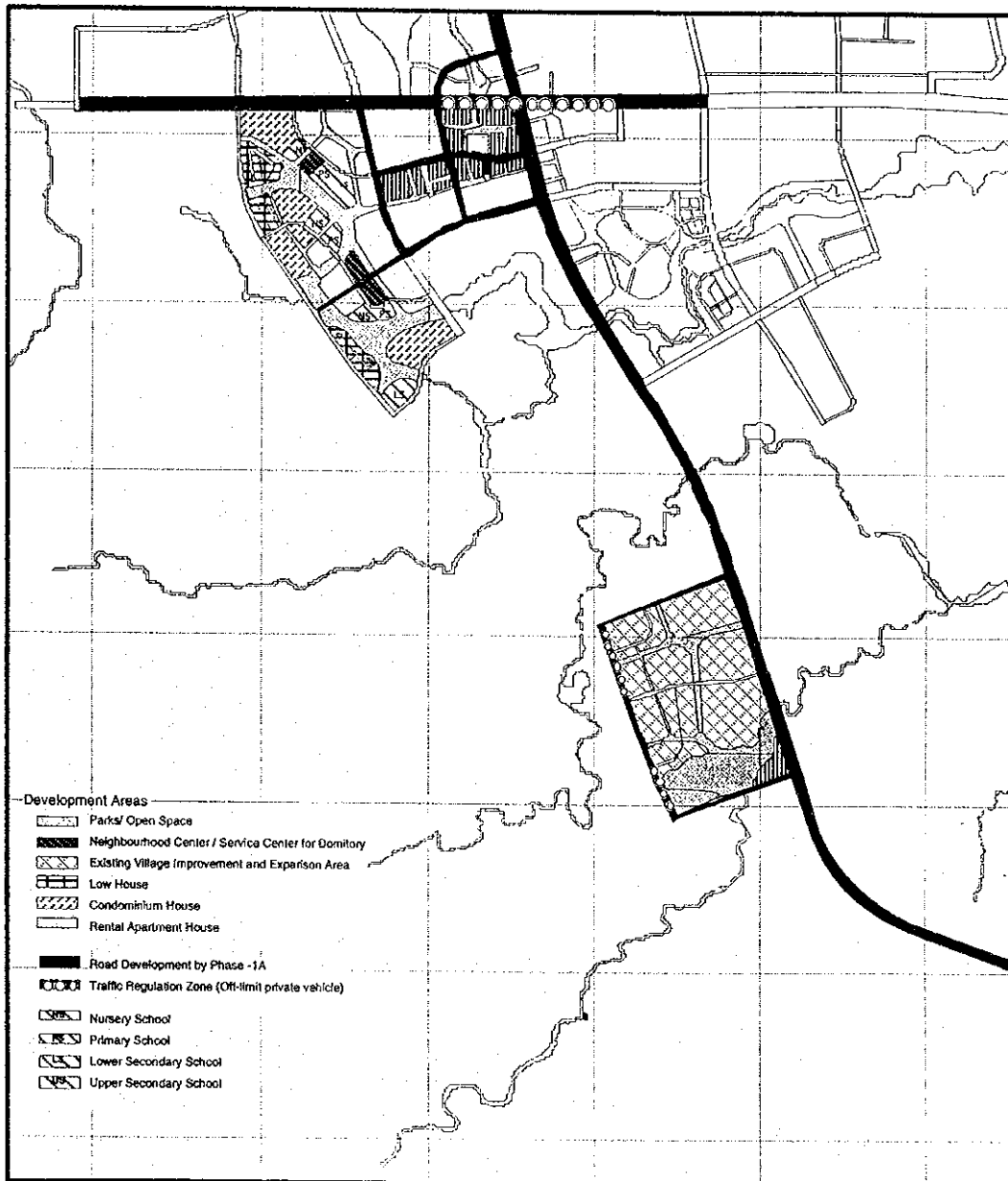


Figure 5.4.3 Phased Development Plan of Dong Xuan Area: Phase-1A

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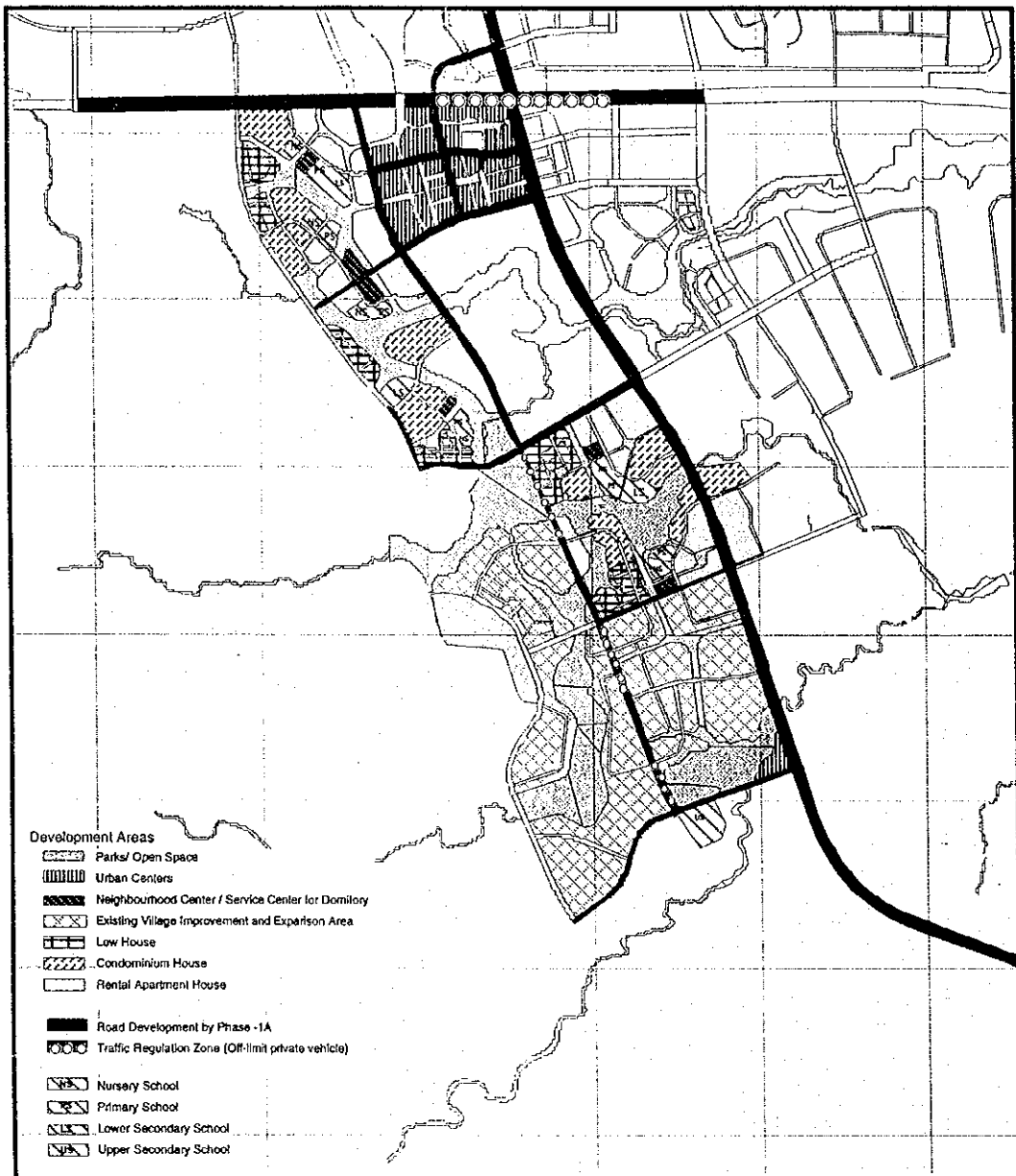


Figure 5.4.4 Phased Development Plan of Dong Xuan Area: Phase-1B

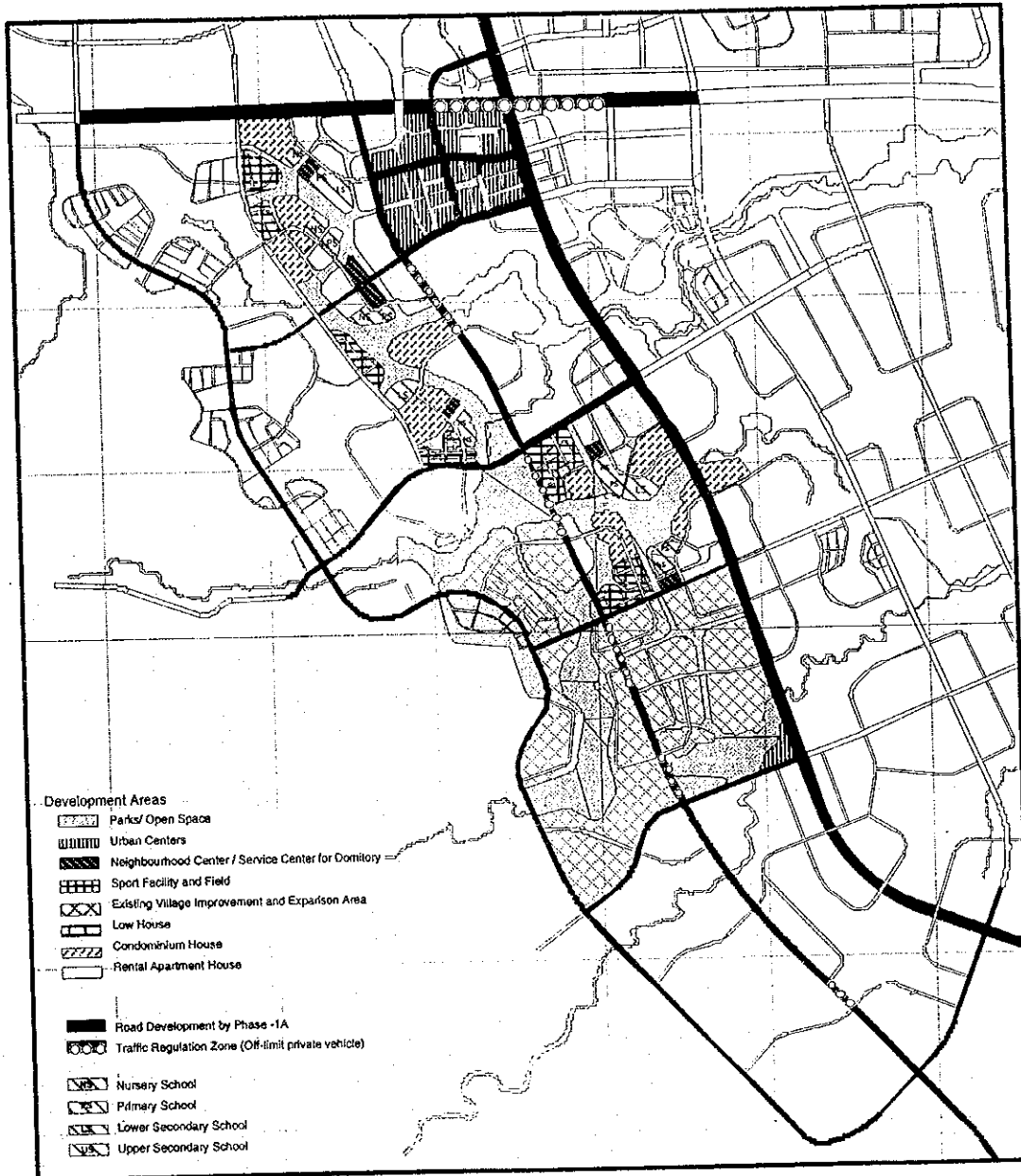


Figure 5.4.5 Phased Development Plan of Dong Xuan Area: Phase-2

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5.5 Phu Cat Area

5.5.1 Land Use Concept

Three tributaries of the Tich River run through the Phu Cat Area. The land is low along these rivers. If it would be land filled, the other low land would be flooded. Therefore, these areas are excluded from the development area as much as possible.

Although the MOC master plan allocates almost all the Phu Cat Area, about 1,200 ha, to the industrial use (net 600 ha), this Master Plan includes various urban functions, such as housing, sports, and recreation, in order to make the area diverse and attractive. In particular, the Olympic Game Complex, which is one of the main urban functions of this project, is located adjacent to the Urban Center. Even though these facilities are originally part of the VNU relocation plan, it is better to locate them along the Lang-Hoa Lac Highway. This is because a large number of people visit these facilities. In addition, this location is the entrance zone of Hoa Lac New Town when visitors approach to Hoa Lac from Hanoi, so that the Olympic Game Complex is expected to be a landmark of the Corridor 21.

5.5.2 Facility Layout Plan

The Phu Cat Area is planned as an exclusive industrial area by the MOC M/P. However, this Master Plan adopts a mixed urban land use although its larger part shall predominantly remain as the industrial use. The Area has 3 km in the east-west direction and 5 km in the north-south direction, thus has a strip shape along NR 21A. The northwestern part of the Area is adjacent to the Urban Center, where is commercial, and sports and recreational urban functions.

The areas alongside the Lang-Hoa Lac Highway as well as NR 21A have good accessibility to Hanoi or other Urban Areas in the C21, and therefore, those areas shall be urbanized to ensure their higher land potentiality. The terrain of the Area is almost flat but there exist a small hill of about 58 m altitude in the north near the Urban Center. The eastern part of the Area is generally a low land with a number of villages and paddies. In principle, the development is applied only to the land above 10 m altitude, thus avoiding the use of the low land. The proposed alignment of NR21 Bypass runs along the border of the land for the urbanization and the preservation of agricultural land in the east.

Along the west of NR21 Bypass, industrial parks and a goods distribution center will be located so that the traffic generated from and destined to the area should have better access through the Bypass.

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The area adjacent to the Urban Center are the sports and recreational facility, which including a main stadium, indoor gymnasium, and outdoor swimming pool, is named the Olympic Game Complex. The area is linked to a recreational and amusement functions provided in the Urban Center, and forms sports and recreation zone for Hoa Lac and C21 as well. This zone is also linked to the riverside park and green belt network, thus presenting the wealth of natural environment.

As discussed in the Dong Xuan Urban Area, the northwestern part of the Area is used for the residential zone, which will be gradually developed from the area adjacent to the Urban Center towards the south along NR1A.

The industrial zone along the west of NR21 Bypass dominantly characterizes the Area, and about 350 ha of land will be used for the industrial zone by 2020. In addition, about 90 ha of land will be reserved for the future expansion. A large-scale park will be provided between the industrial zone and the reserved zone for expansion by using the riverside green space. There are New Residential Zone in the west of the industrial zone, and therefore, a green buffer zone of 30 m will be provided along the border of the industrial and residential zones to mitigate a environmental impacts.

A Center for industrial zone is planned in the industrial zone, which has the functions and facilities for an administration office, vocational education center, information center, and so on. The Center is located beside the western north-south urban arterial road, easily accessible to NR21A and Lang-Hoa Lac Highway. A part of the industrial zone is used for the goods distribution center that has a truck terminal, wholesale market, warehouses, and so on, which cater for Hoa Lac and the whole C21.

The residential zone is located along NR21A having the width of 800 to 900 m with the length of 4.5 km. The northern part of the residential zone consists of 4 neighborhood units which belong to the Hoa Lac Central Residential District, and the southern part of the residential zone consists 6 neighborhood units which belong to the Hoa Lac South Residential District. The South Center will be provided at the intersection of NR21A and the southern-most east-west urban arterial road. The southern-most neighborhood units (3 units) are of the Village Improvement and Expansion type (Type-2).

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5.5.3 Phased Development Plan

(1) Phase 1A Development

The industrial development will start from the northwestern part with about 55 ha. The center for industrial zone will be developed at the entrance directly accessible from NR21A with about 10 ha. Of the 10 ha area, only 1 ha is developed for building an administration office in this Phase.

The first development of the residential zone is the two neighborhood units located north of the Area. The small hill of 58 m altitude is to be graded for the residential use, maintaining its slopes of around 10 % for the purpose of creating attractive terrain and reducing the earthwork.

(2) Phase 1B Development

The industrial development in this Phase extends Phase-1A development in the east with 100 ha, and the access from NR 21Bypass will be provided. A vocational training center will be provided in the industrial Center. The residential zone will be expanded from north to south, and the two neighborhood units located south of the Urban Center will be developed. The development may progress keeping pace with those in the Dong Xuan Area. The residential development in this Phase may not include the Village Improvement and Expansion zone.

Also, the Olympic Game Complex will be initiated from this Phase, which takes the main functions for the sports and recreation needs in HMA. The Complex caters for international events as well as daily needs of the citizens of C21 and Hanoi. The area surrounding the Complex is linked to the riverside open space, and provides the restful space for citizens. The area of the Complex is about 50 ha.

(3) Phase 2 Development

The industrial development will be expanded to south along NR21 Bypass from the area developed in Phase-1A and Phase-1B with the area of about 185 ha. A goods distribution center will be provided in this Phase, which takes the central distribution functions in the Corridor 21.

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The residential zone will be progressively expanded to south along NR21A with the development of 4 neighborhood units in the Hoa Lac South Residential District. These units may include the Village Improvement and Expansion Type-2, but due to its lesser extent, they will be dealt with as Type-1. The South Center will be completed in this Phase, which will provide more diverse civic services to the residents. The Center extends to the Dong Xuan Area, and forms good environment with the riverside green belt network.

Table 5.5.1 Phased Land Use Plan by Component: Phu Cat Area

Land Use	Phase-1A		Phase-1B		Phase-2		Total	
	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)
1 Public Space	118.4	50	149.1	48	282.0	43	549.5	45
NR21A/Lang-Hoa Lac (incl. Railway)	34.0		-		24.7		58.7	
Other Arterial/Collector Road and Transp.	29.8		29.7		58.6		118.1	
Parks and Open Space	42.2		45.4		138.8		226.4	
Olympic Game Complex	-		50.0		-		50.0	
Water Surface (River, Pond, and Lake)	12.4		24.0		37.9		74.3	
Others	-		-		22.0		22.0	
2 Industrial Facility Area	65.0	27	100.0	32	255.3	38	420.3	35
Industrial Center	10.0		-		9.1		19.1	
Industrial Facility Area	55.0		100.0		175.4		330.4	
Reserved Area for Industries Expansion	-		-		70.8		70.8	
3 Residential Area	54.5	23	63.1	20	108.3	16	225.9	19
Type-1 Neighborhood Units	44.0		49.1		74.6		167.7	
Public Facilities in Type-1 Neighborhood Units	10.5		14.0		21.0		45.5	
Type-2 Neighborhood Units	-		-		10.4		10.4	
Public Facilities in Type-2 Neighborhood Units	-		-		2.3		2.3	
4 South Center	-		-		17.9	3	17.9	1
Grand Total	237.9	100	312.2	100	663.5	100	1,213.6	100

Source: JICA Study Team

Note: Type-1 Neighborhood Unit is developed on the proposed New Residential Zone
 Type-2 Neighborhood Unit is located in the proposed Village Improvement and Expansion Zone.

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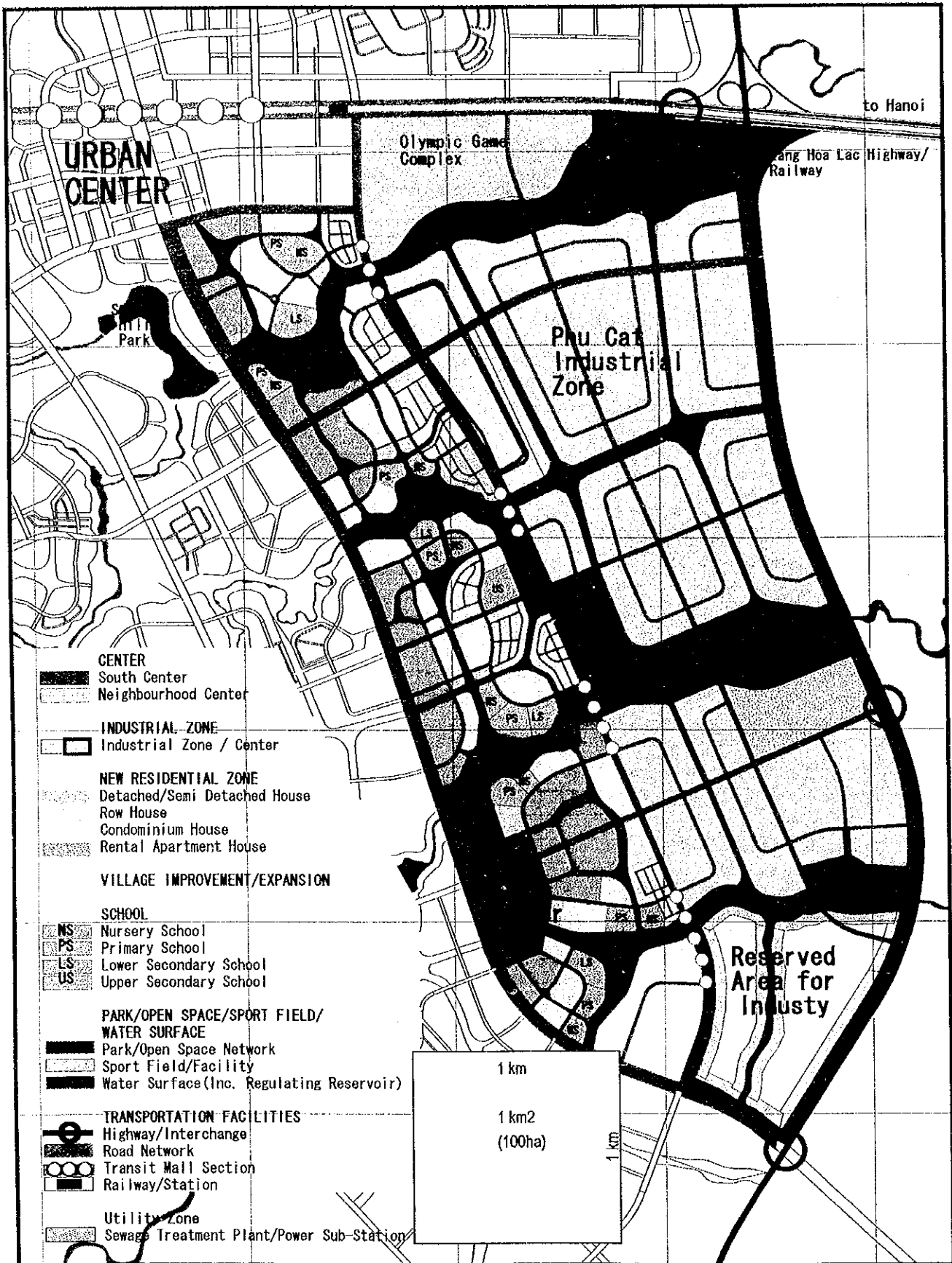


Figure 5.5.1 Facility Layout Plan of Phu Cat Area

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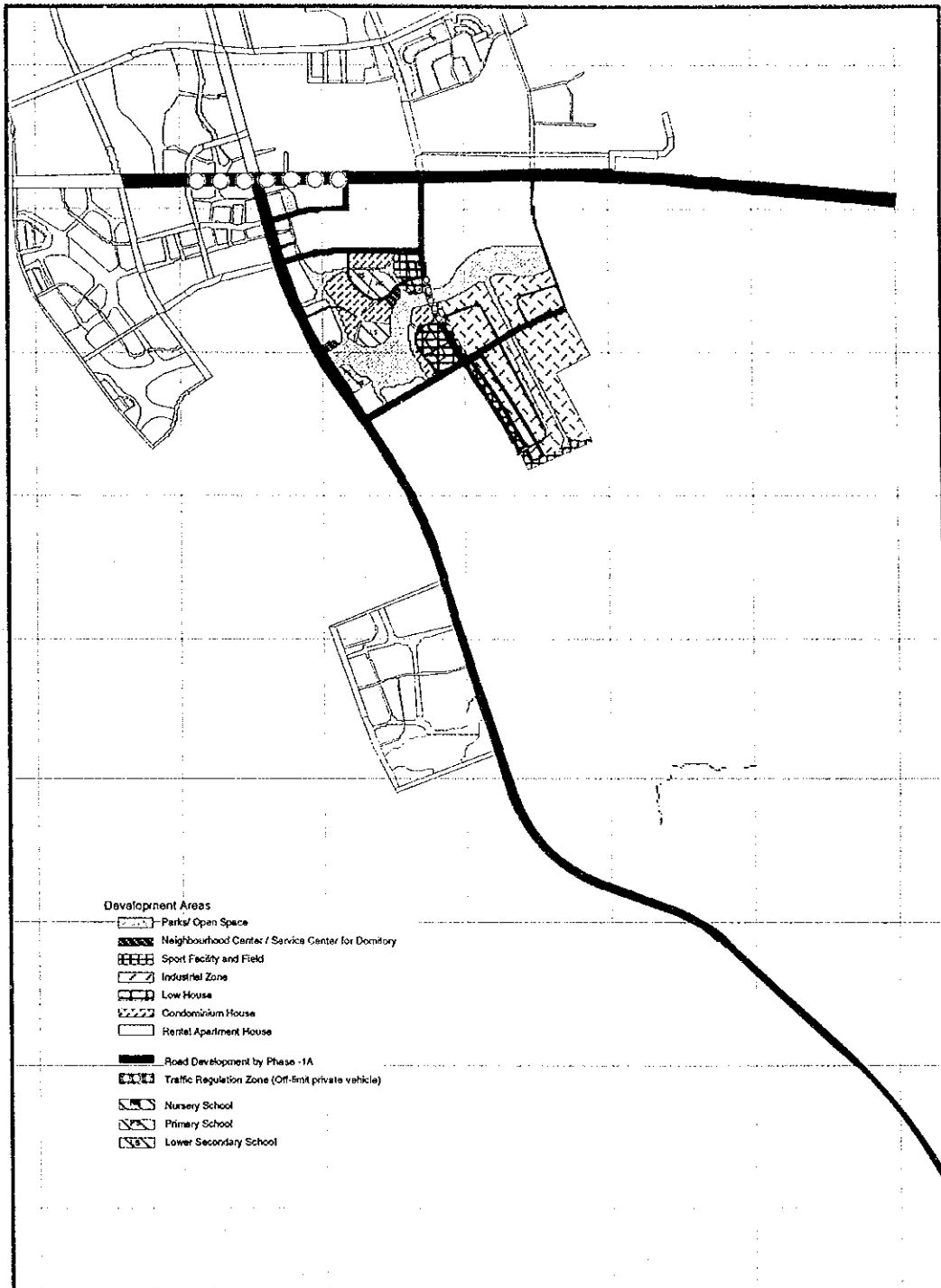


Figure 5.5.2 Phased Development Plan of Phu Cat Area: Phase-1A

The Corridor 21 Development

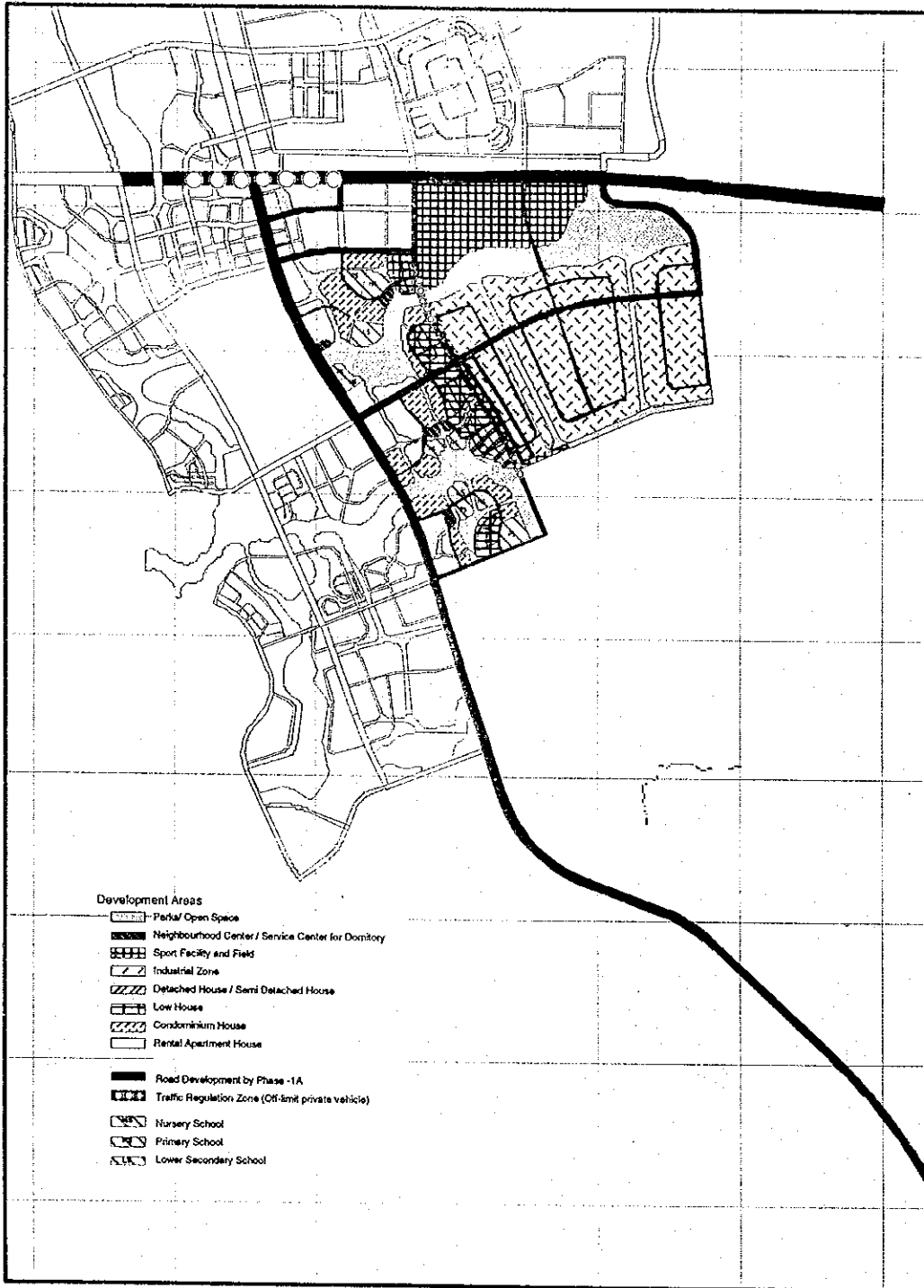


Figure 5.5.3 Phased Development Plan of Phu Cat Area: Phase-1B

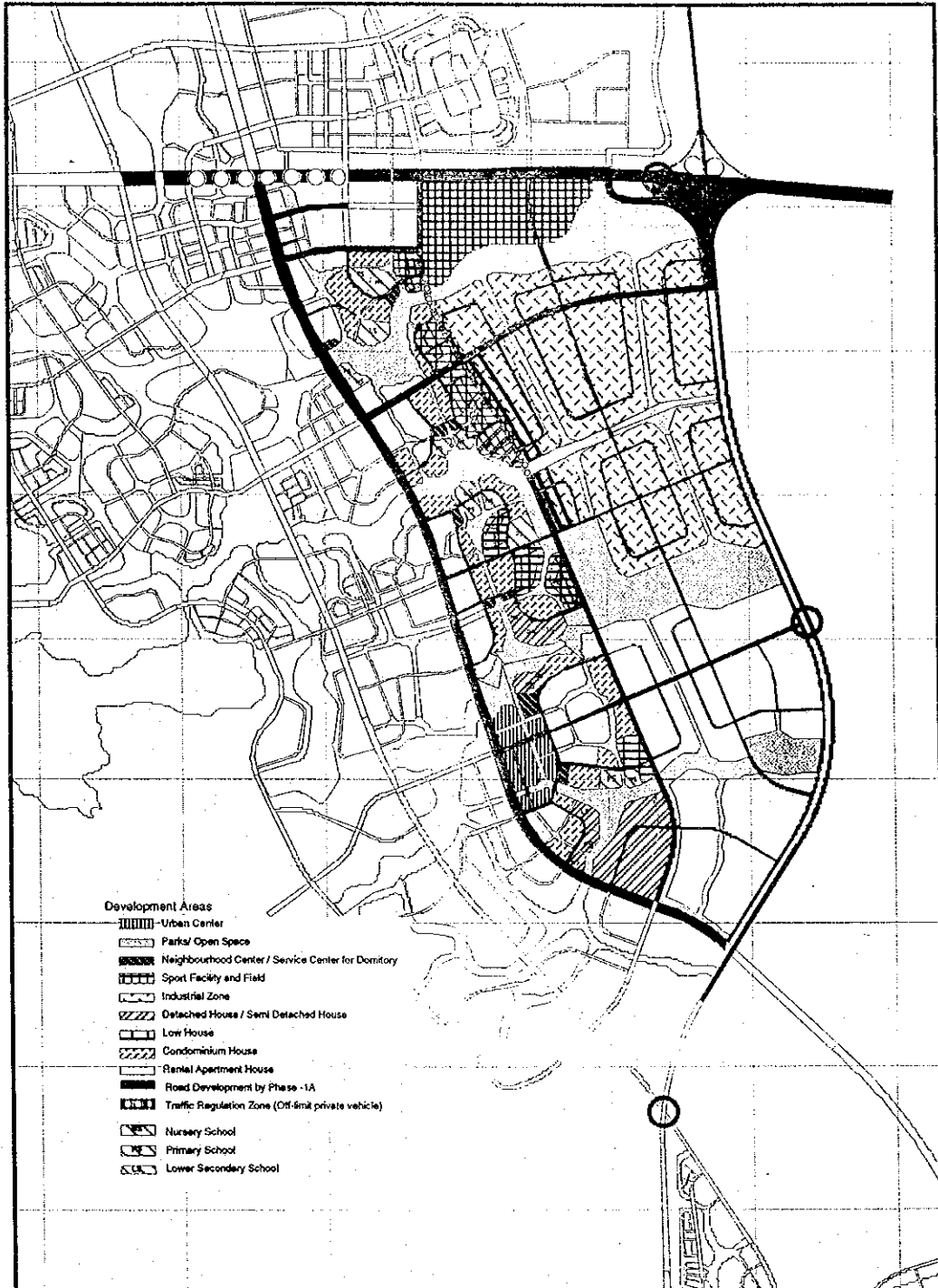


Figure 5.5.4 Phased Development Plan of Phu Cat Area: Phase-2

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5.6 Xuan Mai Area

5.6.1 Land Use Concept

The development area has its border with NR21A in the east and expands south beyond NR6 towards the Mieu Mon Urban Area. Running in the middle to the east-west direction is NR6 separating the residential zone in the north and the industrial zone in the south. The eastern part of the Area is the low land along the Tich River. The development area is of a belt shape with 3.5 km in the east-west direction and 8 km in the north-south direction.

Existing town and villages spread out along NR6 and NR 21A in Xuan Mai Area. The appropriate land for the development is limited because eastern and southern part of the area is below 10 meter altitude. The new residential zone is located in the northwest hilly the area, and the industrial zone is located in the south.

The residential development expands over the area north of NR6, west of NR21A, and bordered by NR21 Bypass. In the middle of the area exists a hill of 133 m altitude, which shall be preserved as a urban forest park. In the north of the area exist a range of hills in the east-west direction, and the development expands in the north up to the foot of these hills. The concept accords with that of MOC master plan.

The Xuan Mai Center is located at the intersection of NR6 and NR21A. The Center expands over the west of the intersection due to availability of suitable land for development. It is envisaged that the future development after 2020 might expand further to west and north even beyond the hilly area to reach the Hoa Lac South.

In this case, new sub-centers for a expanded communities shall be provided in the west and in the north, respectively.

The industrial zone south of NR6 should avoid the low land and expand over the area of higher altitude over 10 m along the west of NR21A, which accounts for about 300 ha. The terrain is rather flat as compared to that in the north residential zone. The total development area accounts for around 1,400 ha which include the area of about 210 ha for the existing village and expansion.

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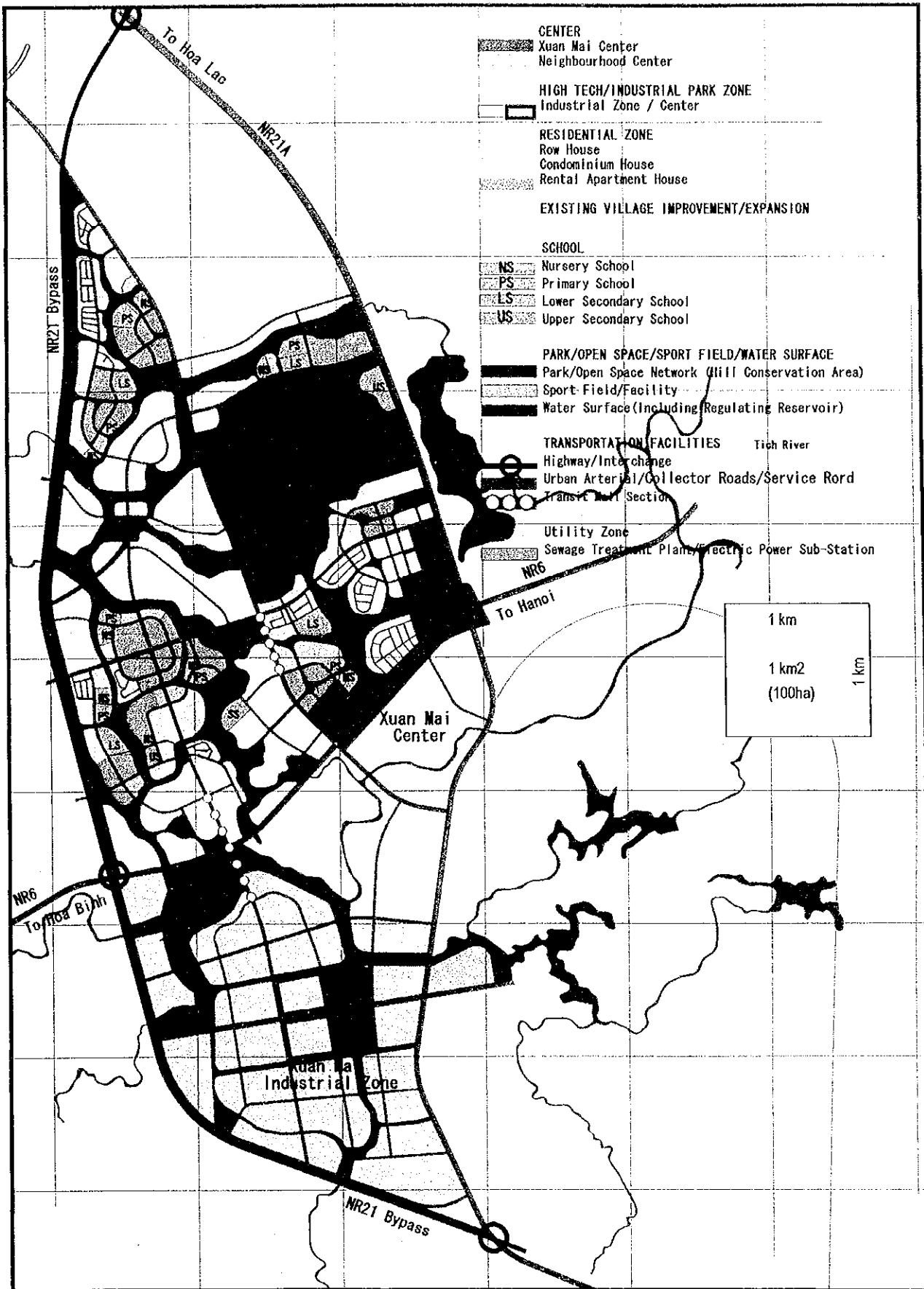


Figure 5.6.1 Land Plan of Xuan Mai Area

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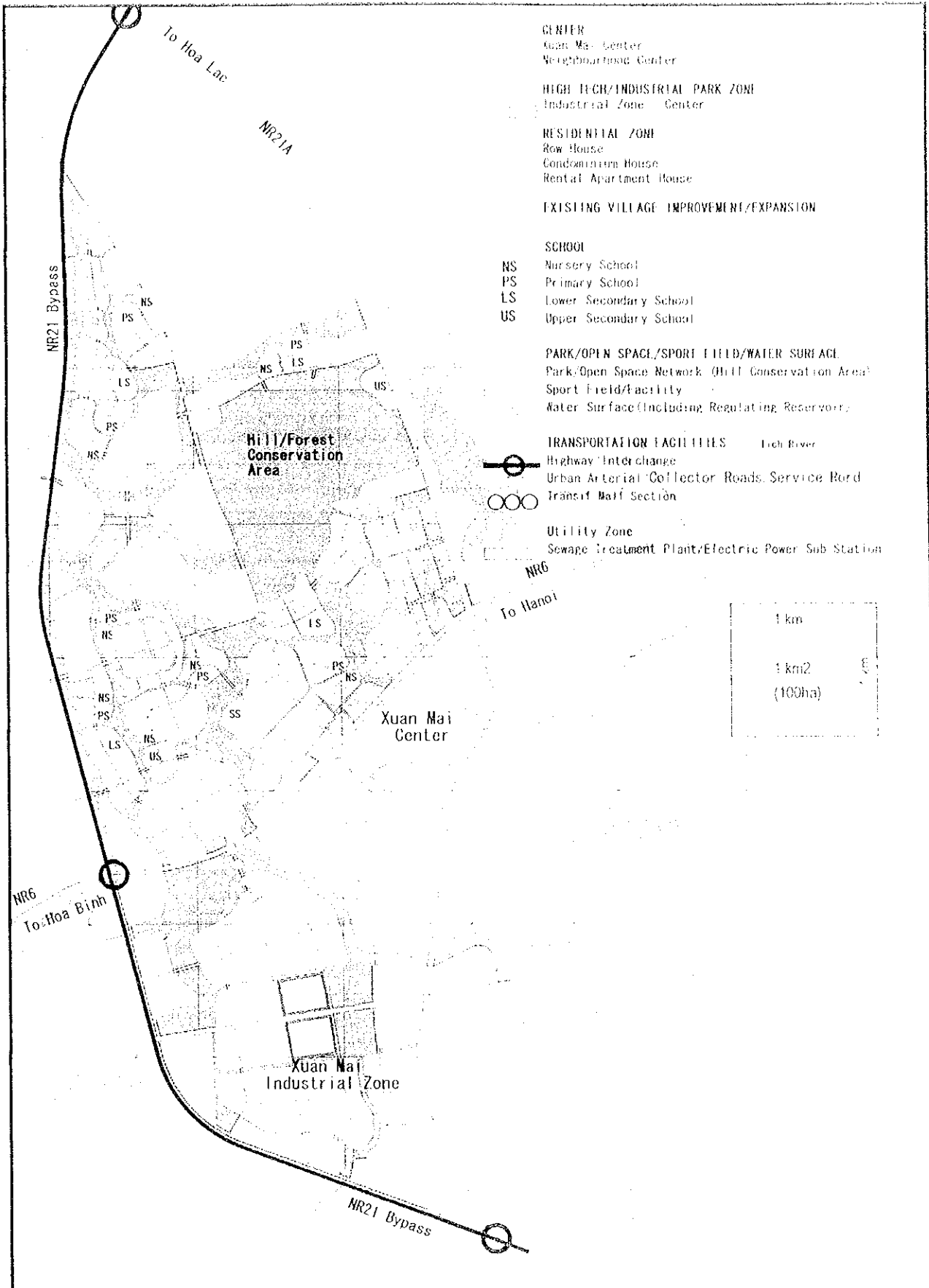


Figure 5.6.1 Land Plan of Xuan Mai Area

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5.6.2 Facility Layout Plan

The residential zone expands in the north, except for the 133 m hill, with the development of 14 neighborhood units. Of the 14 neighborhood units, 8 units are of Type-2, accommodating the existing villages and communities along NR6. The targeted population is 100,000, of which the present one is 35,000 in 1996 and the half of rest will be regarded as migrants from outside in the future.

New urban arterial roads will be provided to serve for the area, two in the east-west direction and one in the north-south direction. This results in the two neighborhood units being surrounded by the arterial /or collector roads. One of the east-west urban arterial road is to form the planned bypass of NR 6 (planned on the MOC master plan).

The industrial zone accounts for about 300 ha (net area is about 280 ha), bordering by NR21A in the east, low land of the Tich tributary in the north, NR 21 Bypass in the west and the south. A center for industrial zone is provided in the middle of the zone alongside the new urban arterial road.

In the Xuan Mai Area is a tributary of the Tich River flowing in the east-west direction, along which the riverside green space are provided to create a green belt network in the Area as well as linking the natural environment lying outside the area.

The Corridor 21 Development

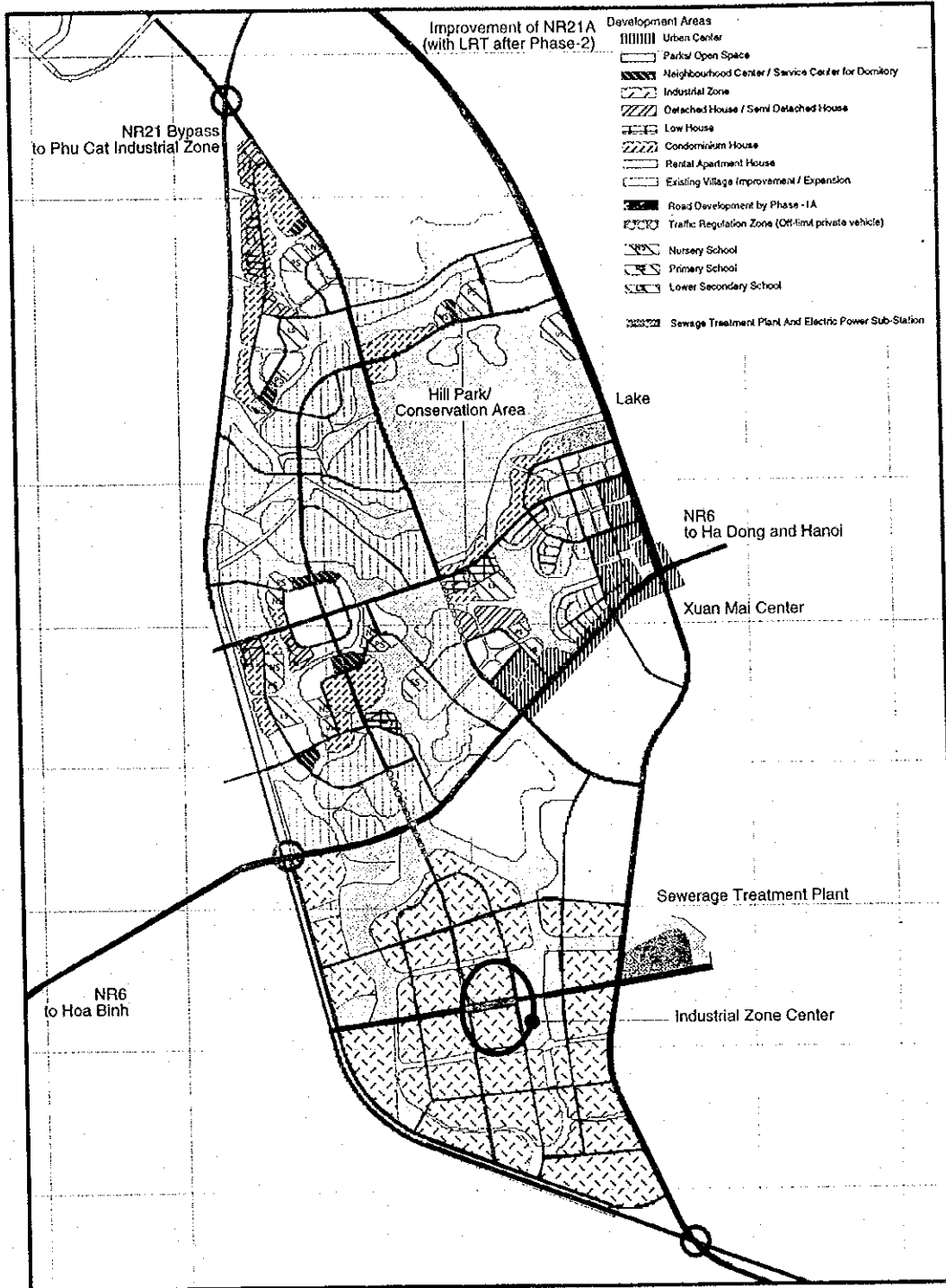


Figure 5.6.2 Facility Layout Plan of Xuan Mai Area