社会開発調査部報告書

No. 60

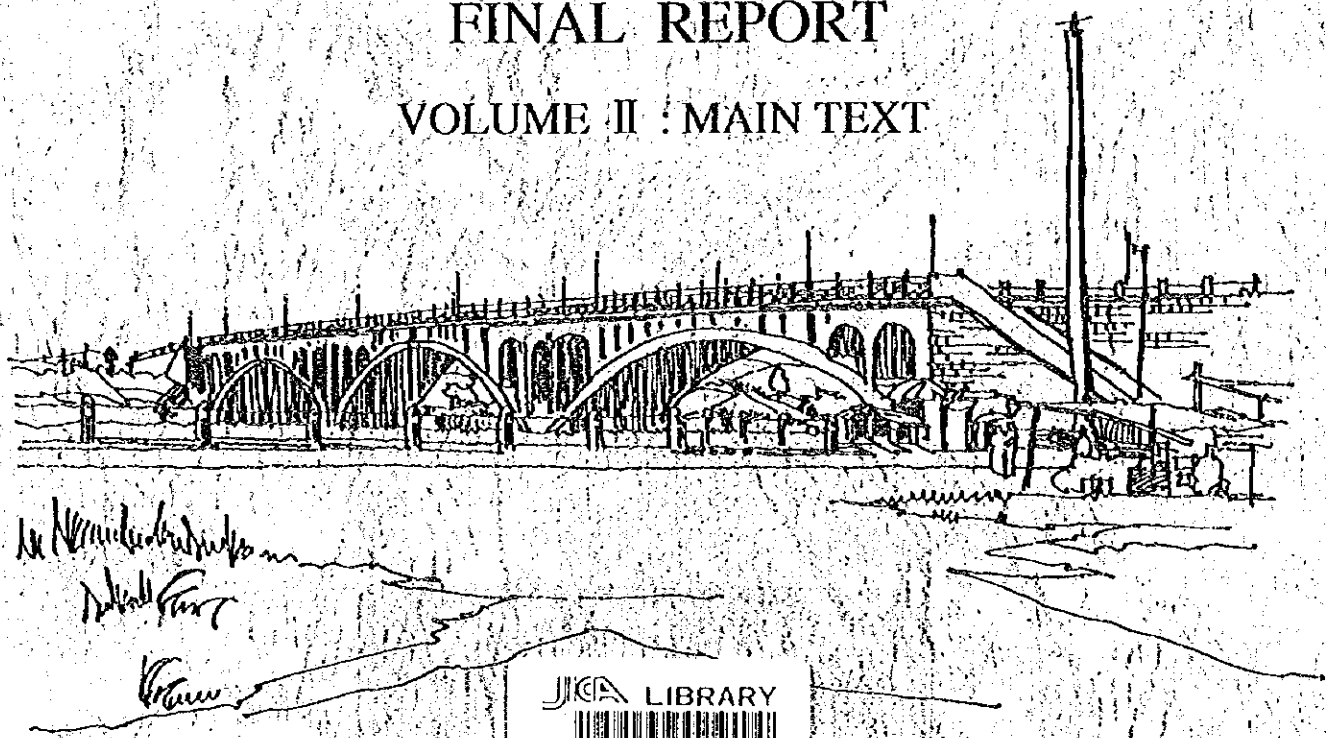
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF TRANSPORT
THE SOCIALIST REPUBLIC OF VIETNAM

FEASIBILITY STUDY
ON
THE HIGHWAY NO.18 IMPROVEMENT IN VIETNAM

FINAL REPORT

VOLUME II : MAIN TEXT



MARCH 1996

PACIFIC CONSULTANTS INTERNATIONAL

ORIENTAL CONSULTANTS CO.,LTD

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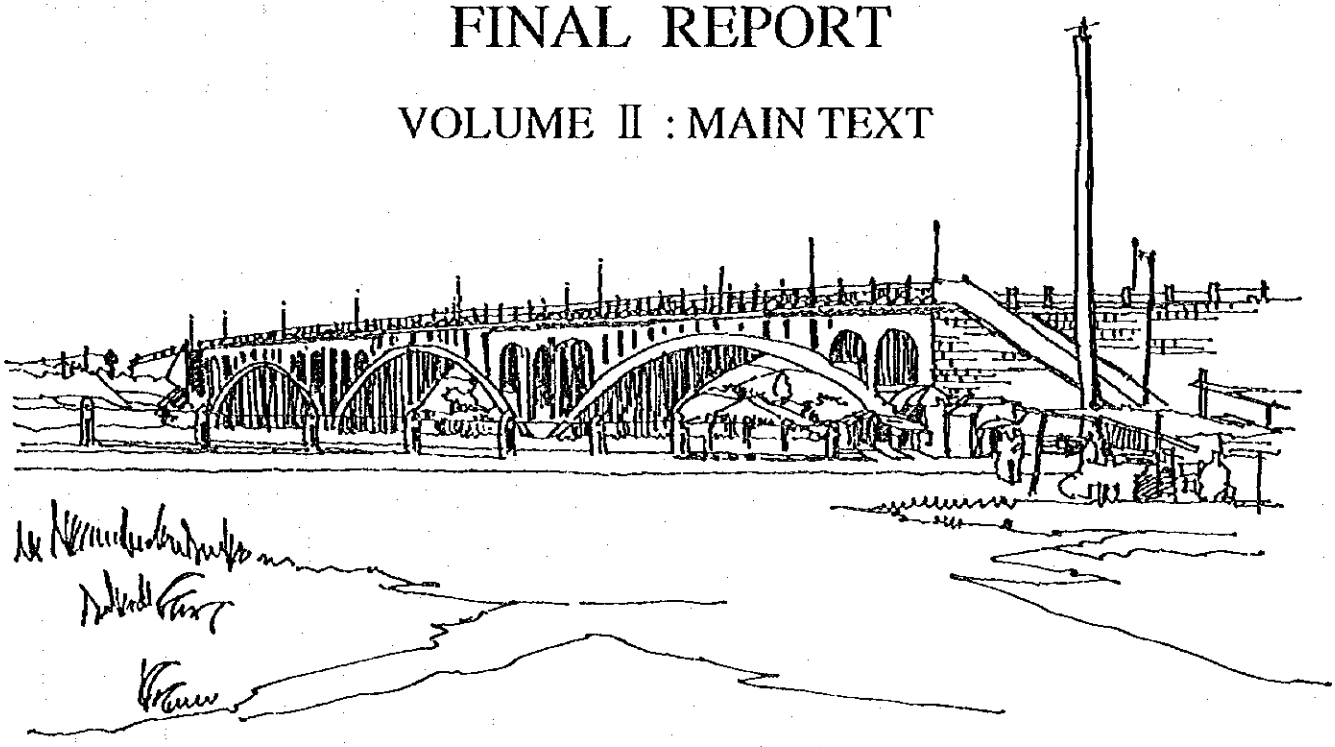

MARCH 1996

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ORIENTAL CONSULTANTS CO.,LTD

The following foreign exchange rate is applied in the study:

US$ 1.00 = 10,950 Dong (as of January 1996)

PREFACE

In response to a request from the Government of the Socialist Republic of Vietnam, the Government of Japan decided to conduct a feasibility study on the highway No. 18 improvement in the Socialist Republic of Vietnam and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Vietnam a study team headed by Mr. Akira Shikichi, Pacific Consultants International, between July 1995 to February 1996.

The team held discussions with the officials concerned of the Government of Vietnam, further studies were made and the present report was prepared.

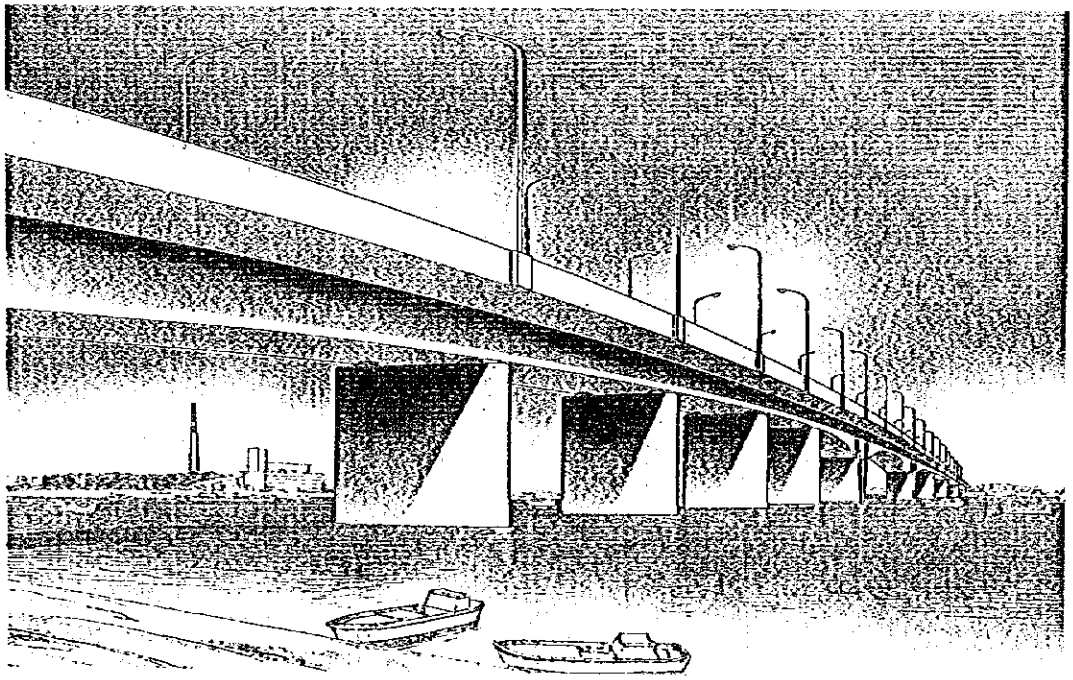
I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Socialist Republic of Vietnam for their close cooperation extended to the team.

March 1996

Kimio Fujita
President
Japan International Cooperation Agency

PERSPECTIVE VIEWS
OF
HIGHWAY NO. 18 IMPROVEMENT



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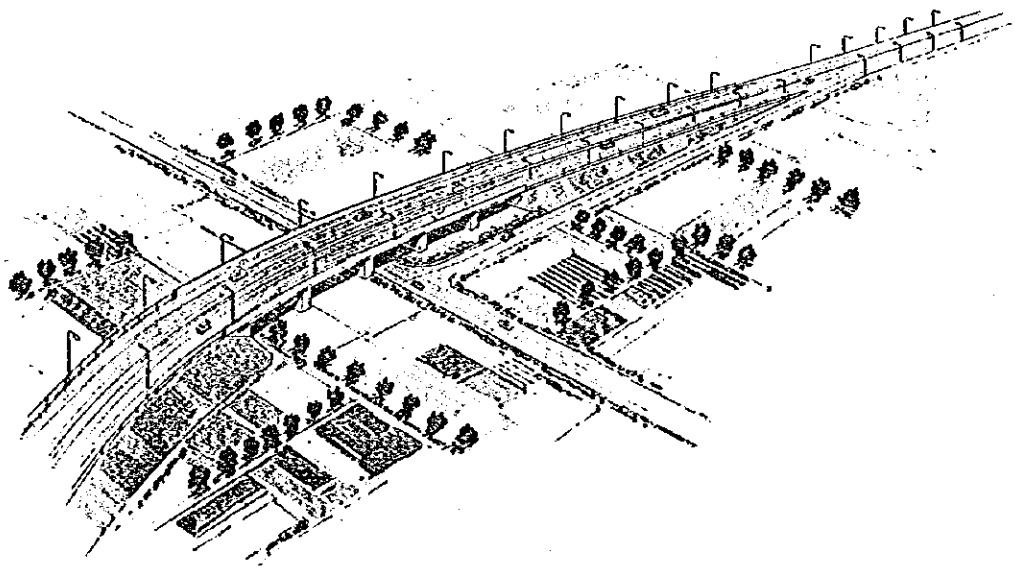

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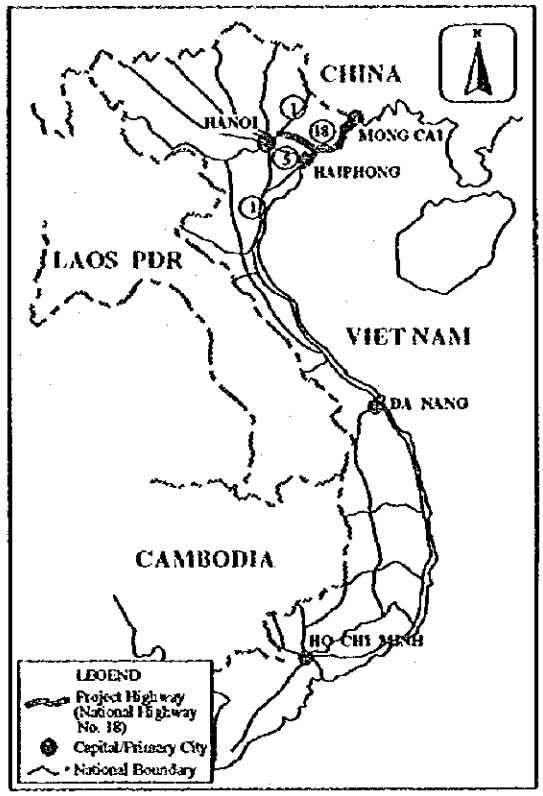
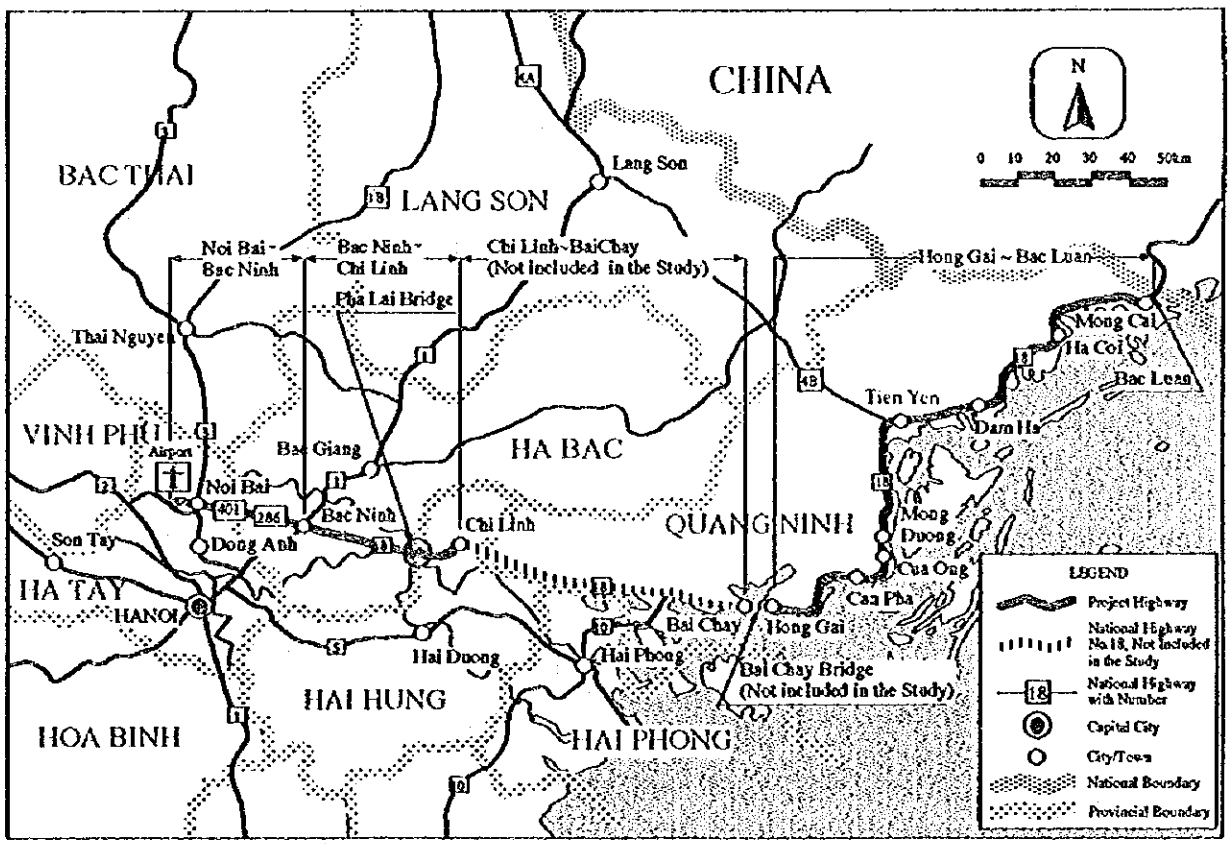
PROJECT LOCATION MAP





DEFINITIONS AND ABBREVIATIONS

(1) Agencies

ADB	Asian Development Bank
CEETIA	Centre for Environmental Engineering of Towns and Industrial Areas
HPC	Hanoi People's Committee
IBRD	International Bank for Reconstruction and Development (World Bank)
IDA	International Development Association
JICA	Japan International Cooperation Agency
MOE	Ministry of Energy
MOT	Ministry of Transport
OECF	Overseas Economic Cooperation Fund, Japan
PMU No. 18	No. 18 Projects Management Unit
SPC	State Planning Committee
TEDI	Transport Engineering Design Inc.
TESI	Transport Economic Scientific Institute
UNDP	United Nations Development Program

(2) Technical, Traffic and Economic Terms

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Concrete
ADT	Average Daily Traffic
B/C	Benefit Cost Ratio
CLEPZ	Cai Lan Export Processing Zone
DID	Densely Inhabited District
DWT	Dead Weight Tonnage
EIRR	Economic Internal Rate of Return
EPZ	Export Processing Zone
ESAL	Equivalent 8.2 Ton Single Axle Load
GDP	Gross Domestic Product
GNP	Gross National Product
GPP	Gross Provincial Product
Highway No. 18	National Highway No. 18
NBIA	Noi Bai International Airport
NFEA	Northern Focal Economic Area
NMV	Non-Motorized Vehicles
NPV	Net Present Value
NTSR	National Transport Sector Review
NVMP	Northern Vietnam Master Plan Study (1994, by JICA)
OD	Origin and Destination

PC	Prestressed Concrete
PCU	Passenger Car Unit
RC	Reinforced Concrete
ROW	Right-Of-Way
SPT	Standard Penetration Test
Sta.	Station
USD/US $	US Dollar
V/C	Volume to Capacity Ratio

PROJECT SUMMARY

1. COUNTRY	The Socialist Republic of Vietnam
2. NAME OF STYDY	Feasibility Study on The Highway No.18 Improvement in Vietnam
3. COUNTERPART AGENCY	Project Management Unit 18(PMU18), Ministry of Transport
4. OBJECTIVE OF STUDY	To carry out the feasibility study on the highway No.18 improvement

1. SITE OF AREA : Area between Noi Bai ~ Bac Luan on route of Highway No.18 and surrounding area (except Chi Linh ~ Bai Chay)

2. FUTURE TRAFFIC VOLUME

Section No.		1	2	Chi Linh ~ Bai Chay	Bai Chay Bridge	3	4	5
Road Length		31.3km	36.4km	82.0km	0.8km	38.7km	43.5km	86.9km
Traffic Volume (PCU/day)	Year 1995	1,800	2,800	5,500	3,800	4,900	600	700
	Year 2005	7,600	14,800	26,500	17,200	21,300	3,200	3,400
	Year 2015	22,700	37,100	58,200	39,100	49,800	9,700	9,900

3. NUMBER OF LANE AND TYPICAL CROSS SECTIONS

Section No.	Section	Design Speed	Number of Lane	Typical Cross Section*
1	Noi Bai ~ Bac Ninh	120km/hr	4	Type D
2	Bac Ninh ~ Chi Linh	80km/hr	2	Type A-1
3	Hong gai ~ Cua Ong	60(80)km/hr	4	Type C-2
4	Cua Ong ~ Tien Yen	60km/hr	2	Type A-1 or B
5	Tien Yen ~ Bac Luan	60km/hr	2	Type B

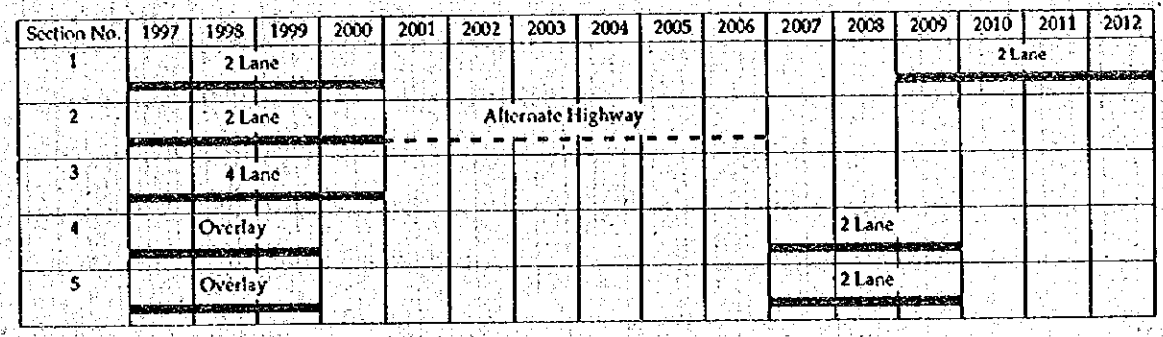
Note : *See Figure 2

4. PROJECT COST

-Unit : Million Dong
-1996 January Prices
-1US$=10,950 Dong

Section No.	Section	Length	Initial Stage	Final Stage	Total
1	Noi Bai ~ Bac Ninh	31.3km	664,379	591,105	1,255,484
2	Bac Ninh ~ Chi Linh	36.4km	531,438	-	531,438
3	Hong gai ~ Cua Ong	38.7km	836,030	-	836,030
4	Cua Ong ~ Tien Yen	43.5km	61,966	219,589	281,555
5	Tien Yen ~ Bac Luan	86.9km	150,942	452,825	603,767
Total		236.8km	2,244,755	1,263,519	3,508,274

5. IMPLEMENTATION SCHEDULE



6. FEASIBILITY AND ECONOMIC INDICATOR

	Section 1	Section 2	Section 3	Section 4	Section 5
EIRR(%)	15.1%	15.4%	20.6%	19.7%	18.3%
NPV(Million Dong)	387,194	274,826	720,926	183,501	339,567
B/C	1.70	2.00	2.28	2.67	2.47

Note : NPV and B/C were calculated based on a discount rate of 10% p.a.

7. RECOMMENDATION

1. Noi Bai ~ Bac Ninh Section is to be constructed as four (4) lane road (two lane opened at 2001 and additional two lane opened at 2013).
2. Bac Ninh ~ Chi Linh Section is to be widened to two lane road opened at 2001, and the realization of Alternate Highway is expected to be opened at 2007.
3. Hong Gai ~ Cua Ong Section is to be widened to four (4) lane road opened at 2001.
4. Cua Ong ~ Bac Luan Section is first to be overlaid to the existing pavement and to be opened at 2000 together with bridges and by-passes, and secondly to be widened to two (2) lane road opened at 2010 together with bridges and by-passes.
5. It is recommended that a road management unit for the maintenance of Highway 18 is set up in RMU No.2
6. Intermediate to major repair work should be switched from force account system to contract basis, and RMU No.2 should change its organization to respond chiefly to routine maintenance and emergency repairs.
7. Noise buffers are to be provided for public facilities along the highway between Hong Gai and Cua Ong.
8. Care is to be taken in selecting locations for dumping of excess cut soil, also for erroslon prevention and drainage facilities in these locations in section 4.

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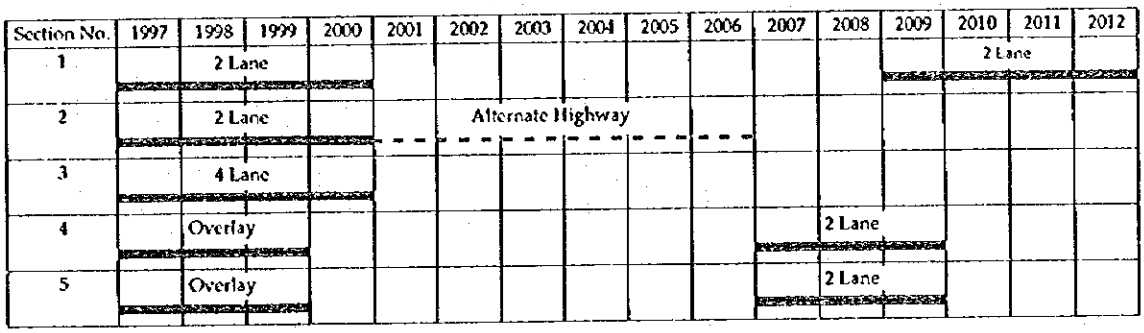

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5. It is recommended that a road management unit for the maintenance of Highway 18 is set up in RMU No.2
6. Intermediate to major repair work should be switched from force account system to contract basis, and RMU No 2 should change its organization to respond chiefly to routine maintenance and emergency repairs.
7. Noise buffers are to be provided for public facilities along the highway between Hong Gai and Cua Ong.
8. Care is to be taken in selecting locations for dumping of excess cut soil, also for erosion prevention and drainage facilities in these locations in section 4.

OUTLINE OF THE STUDY

The Socialist Republic of Vietnam, Feasibility Study on the Highway No. 18 Improvement

- Study period: July, 1995 - March, 1996
- Counterpart Agency: Ministry of Transport, PMU 18

1. Background

National Highway No. 18 as currently conceived, starts at the Noi Bai International Airport and terminates at Bac Luan border gate. It constitutes an important trunk highway network in the Northern Part of Vietnam which connects Noi Bai International airport and major industrial zones such as Ha Noi, Hai Phong, Quang Ninh; sea ports (Hai Phong and Cai Lan), tourism centers (Ha Noi, Ha Long) which are being developed in the Northern Focal Economic Area.

However, the present condition of National Highway No. 18 suffers from a number of constraints and is not fulfilling the required functions of a national highway or trunk road; lack of direct connecting roads (Noi Bai - Bac Ninh), shortage of carriageway width, existence of ferry crossing (Pha Lai) and lack of all-weather connected river crossings (Tien Yen - Bac Luan), bridges with insufficient bearing capacity are the major problems.

2. Objective

The objective of the Study is to carry out the feasibility study on the Highway No. 18 improvement, targeting year 2015.

3. Study Area

The study covers the area between Noi Bai and Bac Luan and its environs.

- Noi Bai International Airport - Bac Ninh (31 km);
- Bac Ninh - Chi Linh (including Pha Lai Bridge (36 km));
- Hong Gai - Cua Ong (39 km);
- Cua Ong - Tien Yen (44 km);
- Tien Yen - Bac Luan (87 km).

4. Project Outline

4.1 Basic Policy

As stated in 1. Background, planning has been made to resolve all major issues of the improvement project by the target year 2015. However, considering the enormous amount of investment required for the project, the most appropriate initial investment, and road structure which meets traffic demand must be

selected to ensure the greatest possible investment efficiency. Furthermore, in planning the improvement of National Highway No. 18, involvement and interaction with road planning of related areas must be taken into account. In particular, relation to planned alternate highway (expressway) must be made clear.

4.2 Content

Plans for the improvement of National Highway No. 18 were made in reference to the basic policy stated above.

The order followed and results of study are stated below.

(1) Forecast Future Traffic Volume

A forecast of future traffic volume based on present volume and the future socio-economic framework of the study area is shown in the table below.

Table 1 Future Traffic Volume

Section No.		1	2	Chi Linh ~ Bai Chay	Bai Chay Bridge	3	4	5
Road Length		31.3km	36.4km	82.0km	0.8km	38.7km	43.5km	86.9km
Traffic Volume (PCU/day)	Year 1995	1,800	2,800	5,500	3,800	4,900	600	700
	Year 2005	7,600	14,800	26,500	17,200	21,300	3,200	3,400
	Year 2015	22,700	37,100	58,200	39,100	49,800	9,700	9,900

(2) Number of Lanes and Standard Cross Section

Judging from future traffic volume and traffic capacity, the number of required lanes was considered. Road geometric standard, which includes design speed and cross-section structure, was determined in consideration of the characteristics of each section.

Table 2 Number of Lane and Typical Cross Sections

Section No.	Section	Design Speed	Number of Lane	Typical Cross Section*
1	Noi Bai ~ Bac Ninh	120km/hr	4	Type D
2	Bac Ninh ~ Chi Linh	80km/hr	2	Type A-1
3	Hong gai ~ Cua Ong	60(80)km/hr	4	Type C-2
4	Cua Ong ~ Tien Yen	60km/hr	2	Type A-1 or B
5	Tien Yen ~ Bac Luan	60km/hr	2	Type B

Note: See Figure 2 for typical cross sections in page 6.

(3) Preliminary Design, Construction Planning, and Accumulate Project Cost

Based upon the road's geometric standard, route selection was made with efforts to keep influences on the human and natural environments to a minimum. At the same time, improvement plans of bridges, preliminary design and construction planning were conducted. The project cost estimation was made in consideration of these aspects. (see Table 3)

(4) Outline of Project

As mentioned in 4.1, a phased construction system is adopted to raise investment efficiency, and improvements were planned in conjunction with the plans for the new alternate highway. (see Figure 1)

- Noi Bai to Bac Ninh section is to be constructed as a four (4) lane road, of which only two lanes are to be completed in initial stage construction, to minimalize front investment.
- Considering that plans are made for an alternate highway, upgrading of the existing Highway No. 18 route between Bac Ninh and Chi Linh beyond enhanced two-lane status is neither justifiable in terms of traffic demand nor in terms of road network.
- The Hong Gai - Cam Pha - Cua Ong section of Highway No. 18 requires four traffic lanes.
- Considering the relatively slow growth of traffic volume section No. 4 from Cua Ong to Bac Luan is to be widened to the two lane road in the final stage, after pavement overlay in the initial stage.

5. Project Costs

The estimated project costs by stage in exchange rates effective in January 1996 (1US$ = 10,950 D) for each section are shown in the following in local and foreign currencies;

Table 3 Estimated Proejct Cost in 1996 Prices

(Unit : Million Dong)

Section	Stage	Financial Cost			
		Total	Foreign Currency	Local Currency	
Section 1 : Noi Bai - Bac Ninh	Initial Stage	664,379	382,629	281,750	(75,338)
	Final Stage	591,105	360,037	231,068	(70,993)
Section 2 : Bac Ninh - Chi Linh	Initial Stage	531,438	318,664	212,774	(62,776)
Section 3 : Hong Gai - Cua Ong	Initial Stage	836,030	452,768	383,262	(89,135)
Section 4 : Cua Ong - Tien Yen	Initial Stage	61,966	37,743	24,223	(7,436)
	Final Stage	219,589	128,213	91,376	(25,253)
Section 5 : Tien Yen - Bac Luan	Initial Stage	150,942	90,105	60,837	(17,750)
	Final Stage	452,825	268,145	184,680	(52,820)

Note: Values in ( ) shows tax amount

6. Project Evaluation

6.1 Economic Analysis

The economic indicators for the project are shown in Table 4. All sections' construction is deemed feasible.

Table 4 Results of Economic Analysis

(Unit : Million Dong)

Section No.	Section	Present Worth of Benefit at i = 10%	B/C Ratio at i = 10%	IRR (%)
1.	Noi Bai - Bac Ninh	387,194	1.70	15.1
2.	Bac Ninh - Chi Linh	274,826	2.00	15.4
3.	Hong Gai - Cua Ong	720,926	2.28	20.6
4.	Cua Ong - Tien Yen	183,501	2.67	19.7
5.	Tien Yen - Bac Luan	339,567	2.47	18.3

Note: Figures for "Present Worth of Benefit" and "B/C Ratio" were attained by a discounting rate of 10 % p.a.

6.2 Environmental Aspects

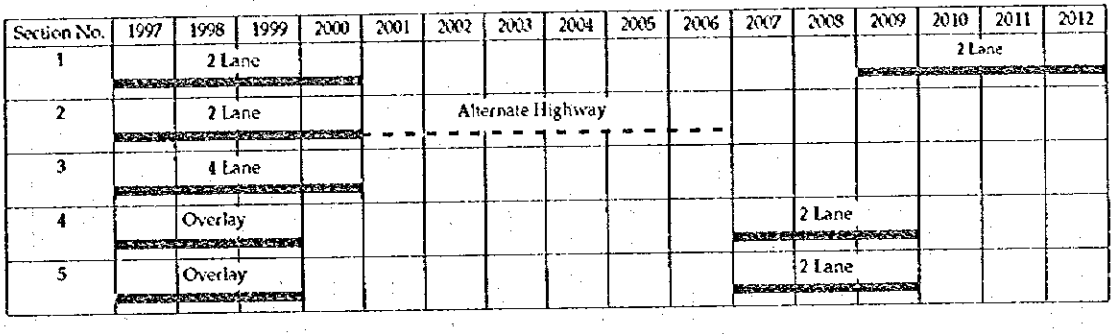
The improvement of Highway No. 18 will entail a great amount of favorable impacts on society and the economy of the people along the highway as well as the state, but not without adverse effects. Therefore the following points are to be considered;

- Appropriate compensation should be made for land and structures affected by the project;
- The forest system along the route is secondary growth, with almost no species of exceptional ecological rarity. A valuable mangrove forest which would have been affected was previously destroyed by local residents. Therefore, adverse ecological effects are not anticipated.;
- The section No. 4 from Cua Ong to Tien Yen will produce excavated excess material of about one (1) million m^3 for which disposal sites should be carefully selected and protected to avoid environmental problems;
- In Section No. 3 from Hong Gai to Cua Ong, noise barriers of 220 m long are needed to mitigate the noise level; these buffer structures are to be installed as parts of the wall for each affected facility, varying from 2 m to 3 m.

7. Implementation Schedule

In order to minimalize initial investment and maximize investment efficiency, construction has been planned in stages. (see Figure 1)

Figure 1 Project Implementation Schedule



(Note) The project plans for Section 2 are based upon the assumption that the alternate highway is completed by the year 2006.

8. Recommendations

(1) Noi Bai - Bac Ninh section is to be constructed as four (4) lane road (two lanes opened in 2001 and two additional lanes opened in 2013).

(2) Bac Ninh - Chi Linh section is to be widened to two-lane road opened in 2001, and the alternate highway is expected to be opened in 2007.

(3) Hong Gai - Cua Ong section is to be widened to four (4) lanes and opened in 2001.

(4) Cua Ong - Bac Luan section is initially to be overlaid and opened in the year 2000, and afterwards to be widened to two (2) lanes opened in 2010 together with bridges and by-passes.

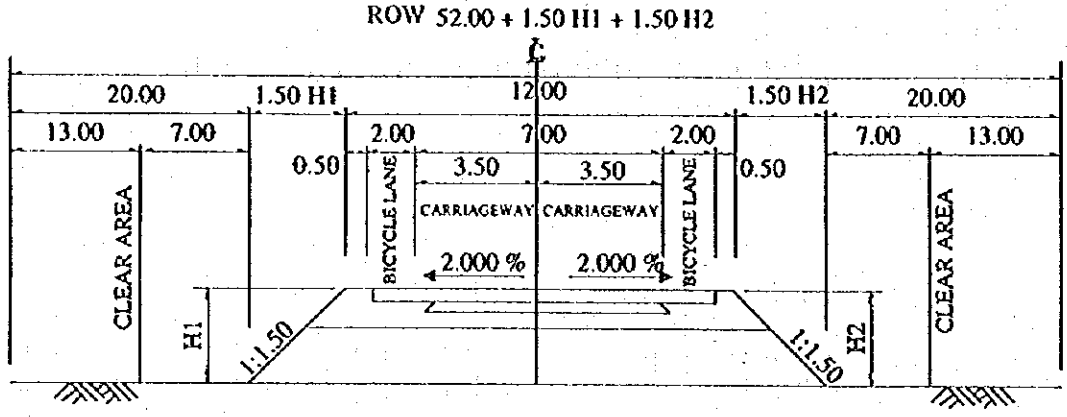
(5) Since at present there is no authority responsible for the maintenance of Highway No. 18, it is recommended that a road management unit should be set up (RMU No. 2).

(6) In light of the present changeover to a market system, intermediate to major repair work should be switched from direct administration to contract basis, and RMU No. 2 should change its organization to respond chiefly to routine maintenance and emergency repairs.

(7) Noise buffers are to be provided for certain structures (religious structures, schools, hospitals) along the highway, between Hong Gai and Cua Ong.

(8) Care is to be taken in selecting locations for dumping of excess cut soil to prevent adverse environmental affects (e.g., water contamination, filling, muddiness, etc.) downstream from the locations, also for erosion prevention and drainage facilities in these locations.

Type A-1



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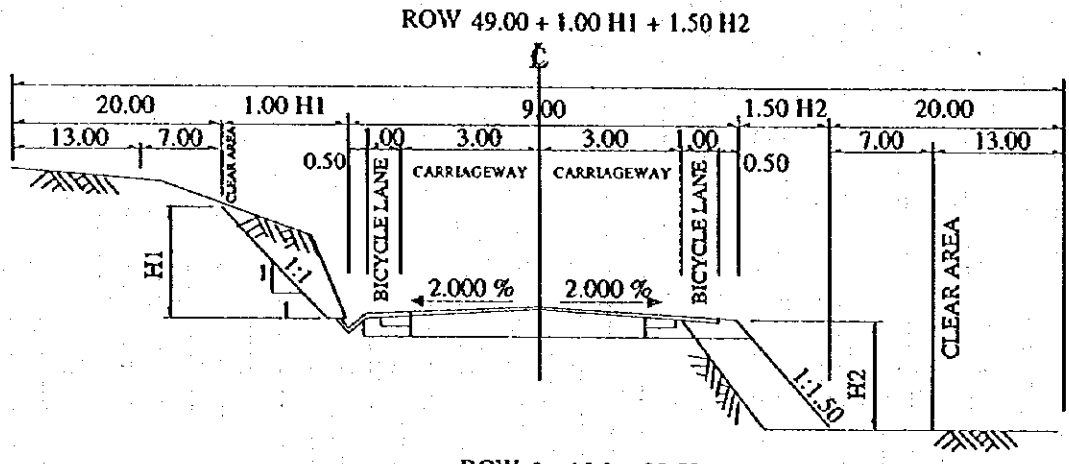

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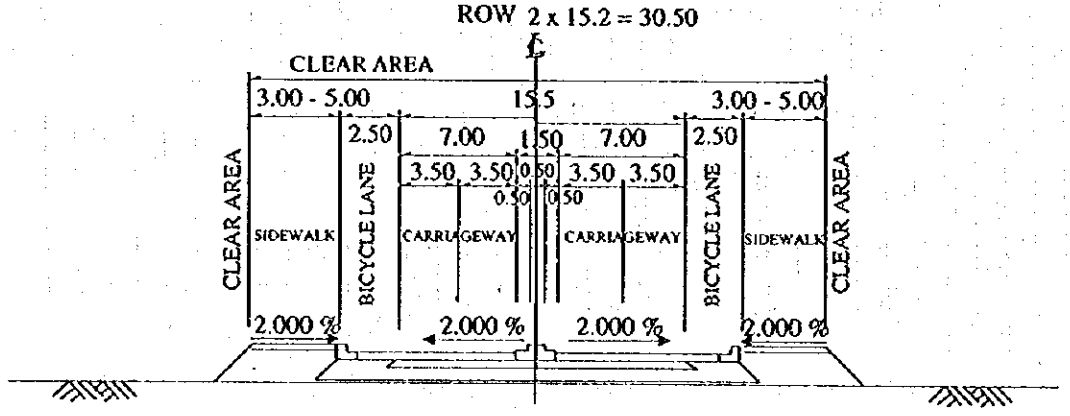

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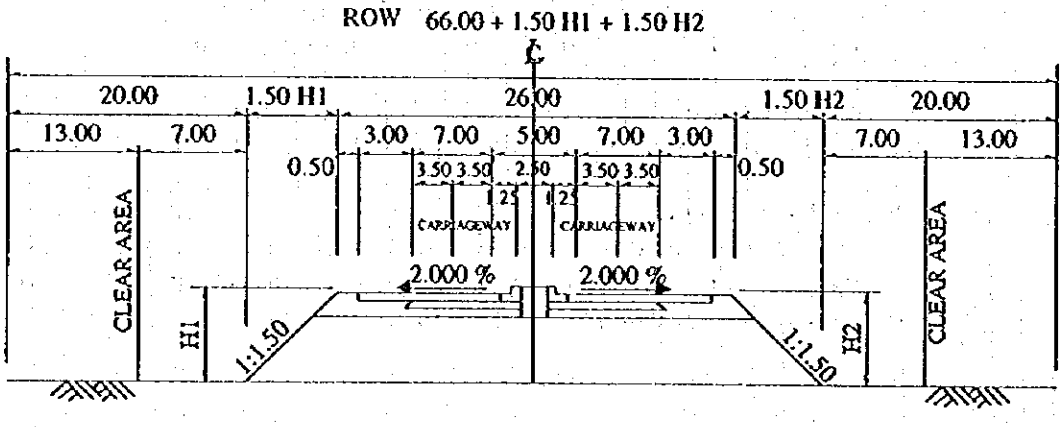

Figure 2 Typical Cross Sections

FEASIBILITY STUDY
ON
THE HIGHWAY NO. 18 IMPROVEMENT
IN VIETNAM

FINAL REPORT

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Chapter 1

INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 Background

The Government of the Socialist Republic of Vietnam (hereinafter referred to as "the government") has embarked on a profound remodeling of the country under the "Doi Moi" policy. A new vision for its future socio-economic development targeted for the year 2000 and the direction for further economic development were confirmed at the National Conference of the Communist Party held in 1991. An efficient transport system is a vital element to achieve the future socio-economic development and further economic development.

To cope with this situation, the government decided to improve National Highway Nos. 5 and 18 which directly influence the development of Red River Delta and Northern Forcal Economic Area.

National Highway No. 18 as currently conceived, starts at the Noi Bai International Airport and terminates at Bac Luan border gate. National Highway No. 18 constitutes an important trunk highway network in the Northern Part of Vietnam and connects Noi Bai International Airport and planned major industrial zone/deep sea ports in the Northern Forcal Economic Area and further connects with the Peoples Republic of China.

However, the present condition of National Highway No. 18 has been suffering from several road transport constraints. For example in the stretch between Noi Bai - Bac Ninh (approximately 30 km) geometric design features are poor and the roadway is still unpaved or of badly deteriorated rock-surfaced status. Between Bac Ninh and Hong Gai (approximately 120 km) the road is narrow and pavement deteriorated. The highway also passes through crowded major towns and there are two ferries (i.e. Pha Lai, 250 m; and Bai Chay, 500 m) which are the main constraints. In between Hong Gai and Bac Luan (approximately 170 km), even though traffic volumes are limited, the upgrading of existing highway by providing a number of new bridges and appropriate geometric standards and paving are the main issues.

To proceed with the regional development in the Red River Delta and Northern Focal Economic Area, Ha Noi - Noi Bai International Airport Highway has been open to the public since 1993, and National Highway No. 5 which connects Ha Noi and Hai Phong is now under construction with improvement completion scheduled for 1998. The feasibility study for the middle portion of National Highway No. 18 between Chi Linh - Bai Chay (approximately 82 km) was completed in 1994.

Under such circumstances, it is urgent to complete the feasibility study for the remaining portions of National Highway No. 18, between Noi Bai - Chi Linh and Hong Gai - Bac Luan (herein after referred to as "Highway No. 18") since road transport constraints in the corridor could become a major problem in the near future.

In regards to the background mentioned above, the Vietnamese government therefore requested the Government of Japan to implement a Feasibility Study on Highway No. 18 Improvement.

In response to the request of the Vietnamese government , the Government of Japan decided to conduct the Feasibility Study on Highway No. 18 Improvement (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical programs of the Japanese government, determined to undertake the study in close cooperation with the concerned authorities in Vietnam.

In January 1995, JICA dispatched the Preparatory Study Team to Vietnam headed by Mr. Akira Hirose for the purpose of discussing the scope of work for the study. The scope of work together with the study schedule was agreed upon by the No. 18 Projects Management Unit (hereinafter referred to as "PMU No. 18"), Ministry of Transport of the Government and the JICA Preliminary Study Team.

JICA sent a study team to Vietnam headed by Mr. Akira Shikichi, Pacific Consultants International, from July 1995 to February 1996.

The Team held discussions with the concerned officials of the Government of Vietnam, and conducted field surveys and studies in Vietnam. After the Team returned to Japan, further studies have be made and the Final Report has been prepared.

1.2 Objective of the Study

The objective of the study is to carry out the feasibility study on Highway No. 18 improvement. The study sections are comprised of:

(1) Noi Bai Airport - Bac Ninh (approximately 31 kilometers)

(2) Bac Ninh - Chi Linh (approximately 36 kilometers, including Pha Lai Bridge)

(3) Hon Gai - Cua Ong (approximately 39 kilometers)

(4) Cua Ong - Tien Yen (approximately 44 kilometers)

(5) Tien Yen - Bac Luan (approximately 87 kilometers)

1.3 Study Area

The study is defined as the direct-influence area of the Highway No. 18 Improvement Project (see Figure 1.1). This includes such administrative districts as the cities of Ha Noi, Hai Phong; provinces of Hai Hung, Ha Bac and

Quang Ninh. The 81 km stretch of highway between Chi Linh (37 km from Bac Ninh) and Bai Chai (118 km from Bac Ninh) is not included in the study area as it is already in the final detailed design stage. Thus, the 36.4 km section between Bac Ninh and Chi Linh and 169 km section between Hong Gai and Bac Luan along Highway No. 18 and the Bac Ninh - Noi Bai International Airport route which will link up achieve Highway No. 18 status upon completion, are together considered as the study area.

1.4 Influence Area

The influence area is defined as the twenty province/city the northern part of Vietnam which as depicted in Figure 1.1. This area can be divided into two district sub-regions when described in terms of geographical and socio-economic characteristics. There are:

- The North Mountain and Midland Region; and
- The Red River Delta.

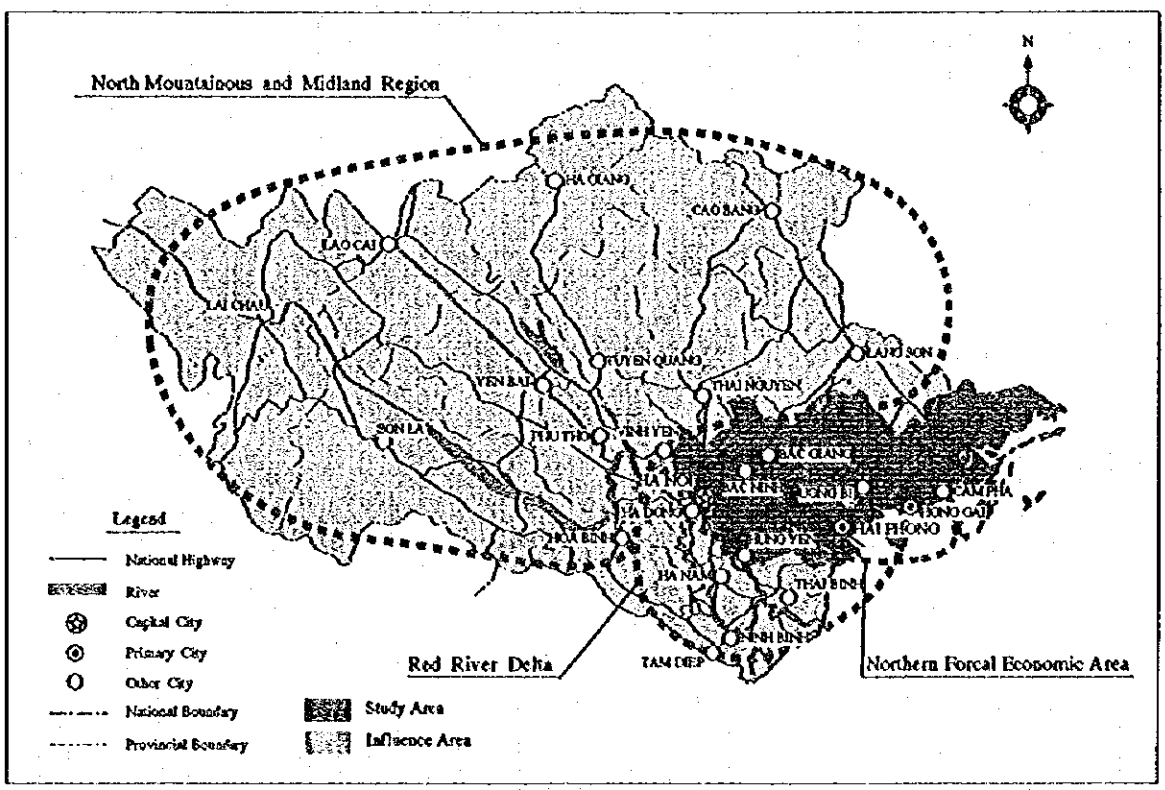


Figure 1.1 Study Area and Influence Area

1.5 Scope of the Study

In order to achieve the objective mentioned above, the study will cover the following items.

(1) Collection, review and analysis of existing data, information and studies

(2) Reconnaissance survey

(3) Problem identification

(4) Supplementary survey
   a. Traffic survey
   b. Soils and materials investigation

(5) Formulation of socio-economic framework

(6) Future traffic demand forecast

(7) Setting up of design criteria

(8) Setting up of alternative solutions (for the problems)

(9) Preliminary design

(10) Construction plan

(11) Preparation of management and maintenance plan

(12) Cost estimation

(13) Environmental impact assessment

(14) Economic and financial analysis

(15) Implementation plan

(16) Overall evaluation and recommendations

1.6 Basic Study Approach

The study was carried out in principle based on the scope of work which was agreed upon between PMU No. 18 and JICA Preliminary Study Team in January 1995. The study will be carried out in two steps, Step - 1 and Step - 2. The major works in Step - 1 were:

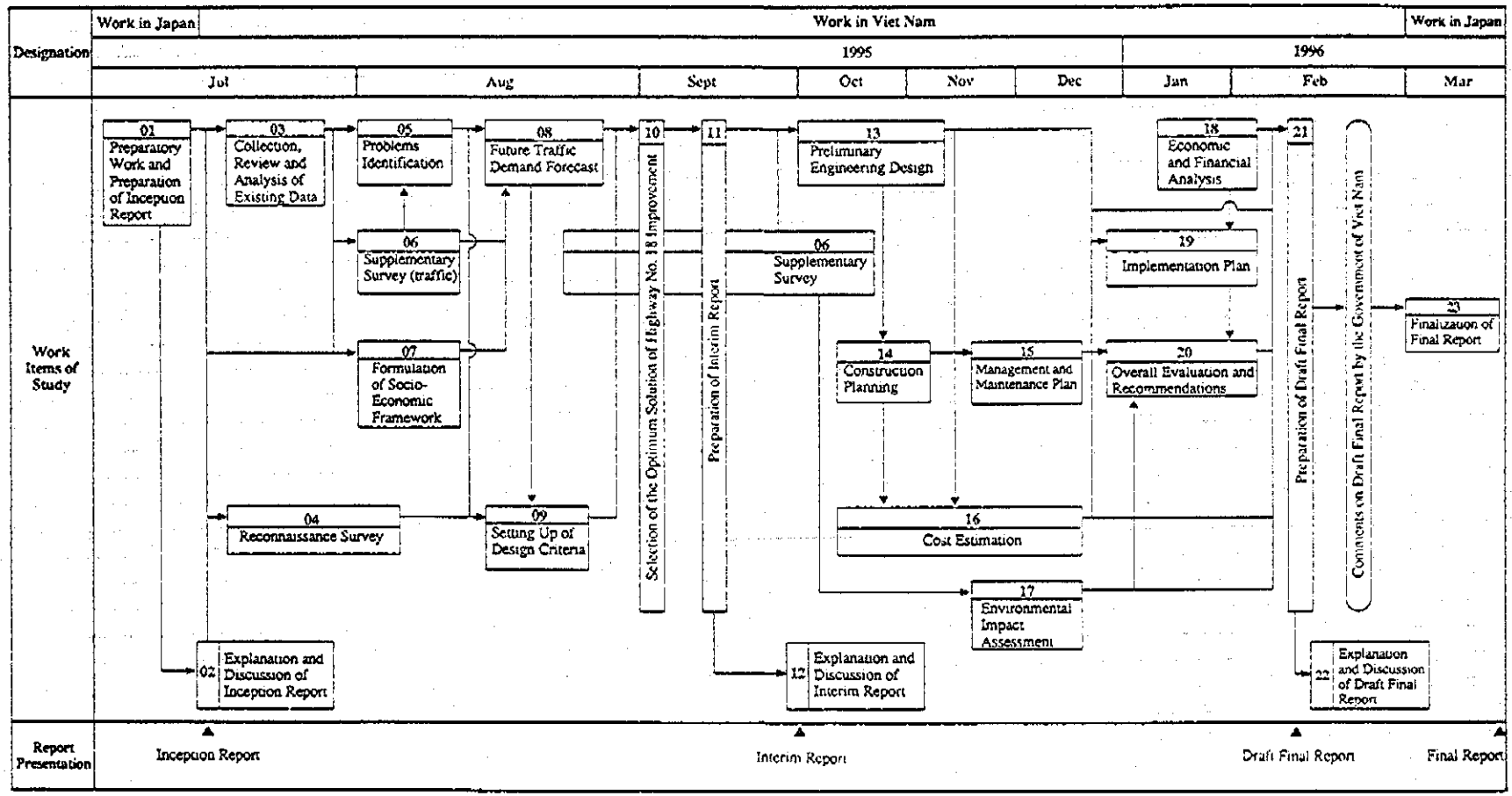
- Socio-economic study and formulation of socio-economic framework;
- Supplementary traffic survey and future traffic demand forecast; and
- Selection of optimum solution for Highway No. 18 improvement.

The major works in Step - 2 were :

- Preliminary engineering design and cost estimation ;
- Economic and financial analysis ;
- Environmental impact assessment ; and
- Recommendations.

1.7 Basic Activities and General Work Flow

A general work flow chart of the study has been prepared as shown in Figure 1.2. Since many activities will be performed in a short period, the work flow chart is related to time and the interrelationship of each basic activities.



HIGHWAY NO. 18 IMPROVEMENT | Figure 1.2 General Work Flow Chart

1.8 Study Organization

The study was carried out by the JICA Study Team organized by JICA, which was comprised of members of Pacific Consultants International (PCI) and Oriental Consultants Co., Ltd., and their Vietnamese counterparts organized by their government. The JICA Study Team was headed by Mr. Akira Shikichi of PCI. For the duration of the study the following committees were set up.

- JICA Advisory Committee
- Vietnam Steering Committee

The study Organization is shown in Figure 1.3.

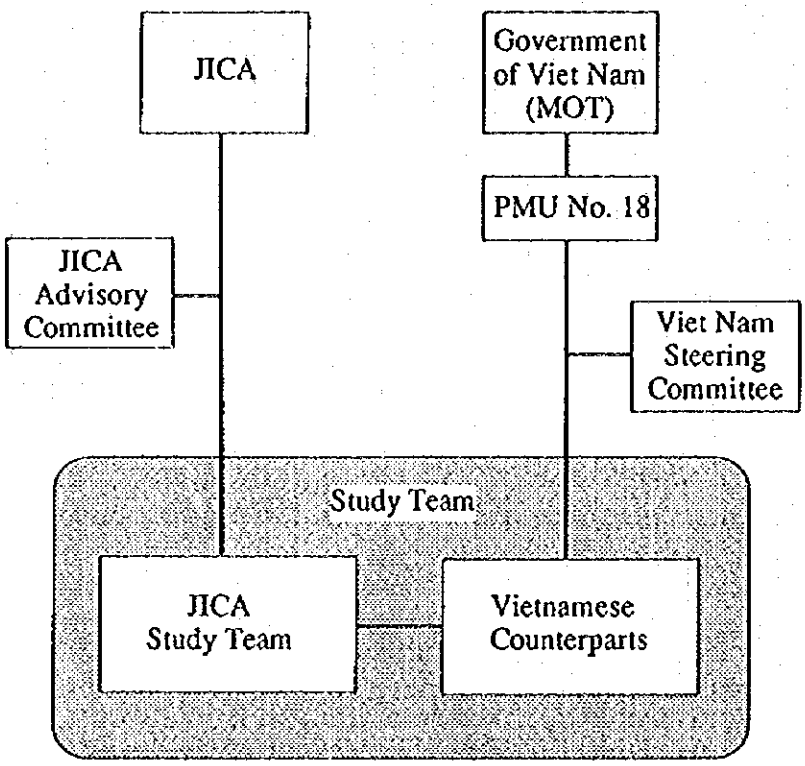


Figure 1.3 Study Organization

The members of the government's steering committee (Vietnam Steering Committee) and counterparts (Vietnam counterparts), JICA Advisory Committee and JICA Study Team, for execution of the study are as follows:

(1) Vietnam Steering Committee

Name	Organization
Mr. Nguyen Viet Tien	Director General, PMU 18 Ministry of Transport
Dr. Tran Doan Tho	Deputy Director General, Investment & Planning Dept., Ministry of Transport
Mr. Nguyen Van Vien	Expert, Dept. of Infrastructure, State Planning Committee

(2) Vietnam Counterparts

Name	Organization
Mr. Doan Van Chiem	Vice Director of Planning, PMU 18
Mr. Le Toan Thinh	Bridge/Highway Engineer, PMU 18
Mr. Pham Tien Dung	Highway Engineer, PMU 18

(3) JICA Advisory Committee

Name	Organization
Mr. Kiyotaka Niki	Chairman Managing Director, Road Department, Shikoku Regional Construction Bureau, Ministry of Construction
Mr. Masaaki Kurenuma	Member Assistant Manager, Road Project Coordination Division, Road Department, Chubu Regional Construction Bureau, Ministry of Construction

(4) JICA Study Team

Name	Assignment
Mr. Akira Shikichi	Team Leader/Highway Planner
Mr. Motoyoshi Yamada	Regional Planner
Mr. Haruo Sakashita	Highway Engineer (1)
Mr. Hitoshi Okita	Highway Engineer (2)/Hydrologist
Mr. Kiminori Matsumoto	Bridge Engineer (1)
Mr. Yoshiki Miyazaki	Bridge Engineer (2)
Mr. J.E. Thompson	Traffic Engineer (1)
Mr. Mitsuyoshi Asada	Traffic Engineer (2)
Mr. Masamitsu Toriyama	Transport Economist
Mr. Michio Toba	Soils and Materials Engineer
Mr. Takao Inami	Cost Estimator
Mr. Hiroshi Tanaka	Environmental Specialist

1.9 Final Report

The Final Report is contains summarized findings and recommendations, followed by the descriptions of all the work carried out in the study, including cost estimates and all analyses which support our conclusion and recommendations.

The Final Report consists of the volumes as listed below:

Volume I : Summary
Volume II : Main Text
Volume III : Drawings

Chapter 2

SOCIO - ECONOMIC CONDITIONS OF THE STUDY AREA

CHAPTER 2 SOCIO-ECONOMIC CONDITIONS OF THE STUDY AREA

2.1 Population

2.1.1 Population in Influence Area

The influence area registered a population of 25.9 million with 15% living in urban areas. The average population density was 224 persons per km² in 1993. The Red River Delta accounts for 13.8 million people with an average density of 1,104 persons per km² and 17% in urban areas population. The North Mountain and Midland Region accounts for 12.1 million people with an average density of 118 persons per km² and 13% in urban areas. Population density in the Red River Delta is almost 10 times higher than that in the North Mountain and Midland Region. Urban population ratios in both the Red River Delta and North Mountain and Midland Region are below the national average of 20%.

Population of the influenced area increased at an average annual growth rate of 2.39% over the period between 1979 and 1989. Table 2.1 shows population, population density and average annual population growth rate of the regions in the Influence Area. Population density by province is illustrated in Figure 2.1.

Table 2.1 Population Growth Rate and Population Density in Influence Area

Region/Area	1979 (1000 persons)	1989	pop. growth rate (79'-89')	Area (sq. km)	population 1993 (1000')	population density per sq. km
N.M & Midland	9,131	11,907	2.69%	102,965	12,109	118
Red River Delta	9,545	11,739	2.09%	12,511	13,809	1,104
Influence Area	18,676	23,645	2.39%	115,476	25,918	224
Entire Nation	52,742	64,376	2.01%	331,114	70,983	214

Source: VIETNAM POPULATION CENSUS - 1989/STATISTICAL YEAR BOOK 1993

2.1.2 Population in Study Area

The population distribution in the study area is shown in Table 2.2. Hai Hung province holds the largest population of 2.66 million in 1993 followed by the provinces of Ha Bac (2.26 million), Ha Noi, (2.15 million), Hai Phong (1.58 million) and Quang Ninh (0.89 million) respectively.

HIGHWAY NO. 18 IMPROVEMENT | Figure 2.1 Population Density

Source: Statistical Year Book 1993

2.2 Landuse in Study Area

Landuses of provinces in the study area are summarized in Table 2.3. More than 30% of the area of each province is developed for agricultural land, except Quang Ninh province. Hai Hung province discloses the highest percentage of agricultural land (62.23%) and Ha Noi (48.00%), Hai Phong (45.27%) and Ha Bac (31.78%) follow. Quang Ninh province shows very low percentage of agricultural land of 9.66% since about 40% of total area has been covered by untouched hilly and mountainous areas. It is noted that Ha Noi province is covered with more than 10% of residential land. Provinces of Hai Hung, Ha Bac, and Hai Phong are occupied by residential land of about 5 - 6% of the respective total areas and Quang Ninh province shows an extremely low percentage of about 2%.

Table 2.2 Population by Province in Study Area (1990 - 1993)

Unit : 1000 person

Province	1990	1991	1992	1993	Growth Rate
Ha Noi	2,052.3	2,070.0	2,099.6	2,154.9	1.64
Hai Phong	1,483.0	1,512.2	1,556.6	1,583.9	2.22
Hai Hung	2,503.3	2,559.0	2,613.6	2,658.0	2.02
Ha Bac	2,122.3	2,172.8	2,218.4	2,262.8	2.16
Quang Ninh	830.9	857.5	878.8	889.6	2.30
Entire Nation	66,233.3	67,774.1	69,405.2	70,982.5	2.36

Source: Statistical Data on Labor and Social Affairs Statistical Publishing House, 1994

Table 2.3 Landuse in Study Area in 1993

Unit : ha

Province	Agricultural land	Forest	Special land	Residential land	Undeveloped flatland	Undeveloped mountainous land	Lakes, swamps, etc.	Other undeveloped land	Total
Ha Noi	44,188 (48.0%)	6,708	18,084	11,595 (12.60%)	640	2,080	1,286	7,475	92,056
Hai Phong	68,061 (45.27%)	5,292	16,394	7,877 (5.24%)	8,774	2,460	5,488	36,004	150,350
Hai Hung	158,702 (62.23%)	11,551	36,539	16,751 (6.57%)	1,717	3,941	7,282	18,534	255,017
Ha Bac	146,691 (31.78%)	139,827	62,507	26,693 (5.78%)	5,945	53,305	7,912	18,699	461,579
Quang Ninh	57,364 (9.66%)	153,032	29,736	11,169 (1.88%)	13,326	236,483	13,943	78,805	593,858
Total	316,304	304,859	126,721	57,334	28,685	294328	28,629	140,983	1,297,843
Whole country	7,348,449	9,641,142	1,117,699	773,960	1,074,700	10,402,919	205,739	2,534,687	33,099,093

Source: Statistical Year Book, 1994

2.3 Economic Situations

Although the influence area accounts for 37% of the country's population, its GDP share is 25% and per capita GDP is estimated at US$ 162 as shown in Table 2.4.

Table 2.4 shows estimated GDP of the influence area in relation to national GDP estimates and Figure 2.2 shows GPP distribution of each province of influence Area.

Table 2.4 1993 GDP Value of the Influence Area

Name of region	GDP (million US%)	Percentage Share of GDP	Population (mill . pop)	% share of population	Per capita GDP (US$)	% of average GDP/ capita
Northern region study area	4,190	25%	25,9	37%	$ 162	67%
Central region	2,754	17%	19,4	28%	$ 142	59%
Southern region	9,760	58%	24.3	35%	$ 401	167%
Entire nation	16,704	100%	69.6	100%	$ 240	100%

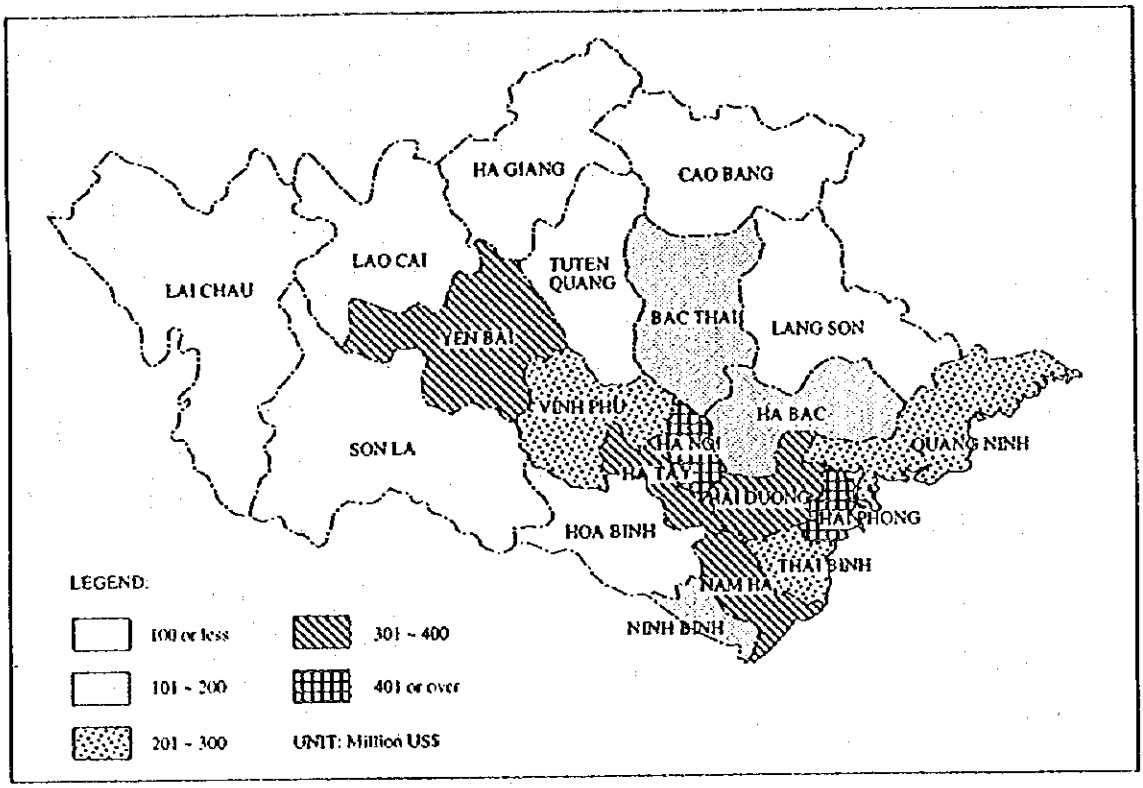
Source: Estimated by Master Plan Study Team based on information and data provided by the Institute of Long Term Planning and Regional Planning, SPC

The increase of index of gross domestic product (GDP) according to type of economic activity is shown in Table 2.5. Finance, banking, and insurance show the highest figures, followed by the construction industry. The slowest growth is seen in agriculture and forestry.

Table 2.5 Increase of GDP Index by Kind of Economic Activity at Constant Prices of 1989 : Previous Year = 100

Category	1992	1993	1994
Industry	114.6	112.1	112.9
Construction	111.0	118.3	119.4
Agriculture & forestry	107.1	103.8	103.9
Transport, postal and other communications	106.3	106.5	107.0
Finance, banking & insurance	110.7	116.5	122.8

Source: Statistical Year Book, 1994



Source: Master Plan Study on the Transport Development in the Northern Part in Vietnam. JICA

Figure 2.2 GPP of Each Province in the Influence Area

Chapter 3

SOCIO - ECONOMIC FRAMEWORK

CHAPTER 3 SOCIO ECONOMIC FRAMEWORK

3.1 Recent Economic Development of Vietnam

3.1.1 Growth of GDP

Recent economic development in Vietnam is remarkable. The real economic growth in 1992, 1993 and 1994 has been, respectively, 8.6%, 8.1% and 8.3% per annum. The growth rate in GDP in 1995 is estimated at 9.5%; 13% in industrial production, 4% for agriculture and forestry in spite of heavy natural disasters, 20.8% in export value which is estimated at 3.6 billion USD.

3.1.2 Linkage with External Economics

Foreign trade with Vietnam has rapidly expanded due to the change in trade policies such as abolition of state trade monopoly, adoption of market based exchange rate, etc., since 1989. Trade turnover measured in US dollar has been expanded at an average rate of 27% per annum during the 1991 - 1994 period.

Foreign investment in Vietnam approved by the government has increased from US$533 million in 1989 to US$ 3.9 billion in 1994, implying an average growth rate of about 50% per annum. Although the investment initially was concentrated in the oil and gas sectors, hotel construction, import-substitution industries, and the export-oriented light industries using low-cost labor have increased significantly in recent years.

3.2 Social and Economic Development Strategy

3.2.1 Focal Economic Areas in Vietnam

The government has set forth social and economic development strategies up to the year 2000 for which three focal economic areas are planned. The first one covers Hanoi, Hai Phong and Quang Ninh in the Northern part of Vietnam, the second area includes Da Nang and the surrounding area and the third area is the core of the Southern part of Vietnam including Ho Chi Minh city.

3.2.2 Northern Focal Economic Area and Red River Delta Region

It is the intention of the government to establish the Northern Focal Economic Area (NFEA) mainly comprising Ha Noi, Hai Phong and Quang Ninh. Hence, integration of different transport modes within this area as well as integration of the NFEA with the whole Influence Area are important to ensure a smooth transport of cargo and people. The NFEA falls within the same administrative boundaries of five provinces which are included in the study area.

Apart from the focal economic area, the influence area is divided into two major parts, the North Mountain and Midland Region is one; the Red River Delta which comprises the provinces of Ha Noi, Hai Phong, Hai Hung, Ha Tay, Thai Binh, Nam Ha and Ninh Binh is the other.

3.3 Development Plans

3.3.1 Regional Structure in Red River Delta

A number of development centers are recognized as sub-regional growth poles endowed with different economic potentials for industrial, commercial and tourism development in the Red River Delta Region, all of which need to be integrated into the entire regional economy with an adequate road transport network, as conceptually illustrated in Figure 3.1.

Furthermore, in order to encourage foreign direct investment in the industrial sector a number of new industrial zones to accommodate industrial estate projects, including Estate Planning Zone (EPZ), have been planned in the region as shown in Table 3.1.

3.3.2 Development Plans in Hanoi Area

(1) Hanoi City Master Plan, 2010

The Hanoi People's Committee (hereafter referred to as "HPC") has a Hanoi City Master Plan, 2010. Some projects in this master plan have been approved by the government for implementation and some developments are ongoing. The most vital issues in the master plan are road transport network development and new land development in order to meet the demand of recent urbanization and industrialization.

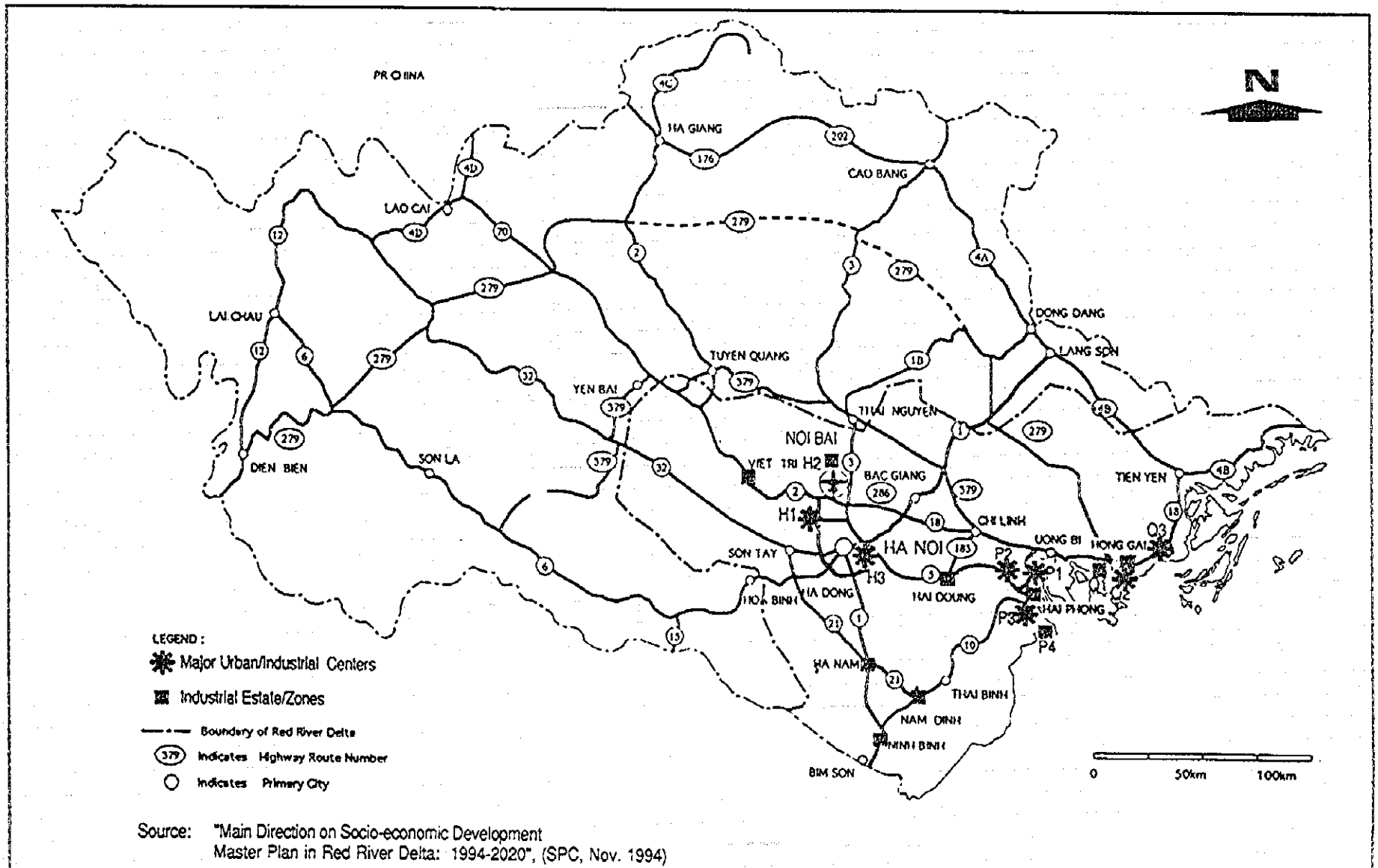
1) A New Urban-Structure (2010)

A new urban structure as conceptually illustrated in Figure 3.2 had been formulated together with a planned Hanoi Ring Road which is expected:

- To provide better access for new urban development areas and industrial zones; and
- To provide land access to Noi Bai International Airport

2) New Industrial Development Areas

New industrial developments are planned mainly in the north of Red River, in Gai Lam, Dong Anh and Soc Son districts. Tourism development projects have also been planned in Soc Son and Dong Anh districts.



Source: "Main Direction on Socio-economic Development Master Plan in Red River Delta: 1994-2020", (SPC, Nov. 1994)

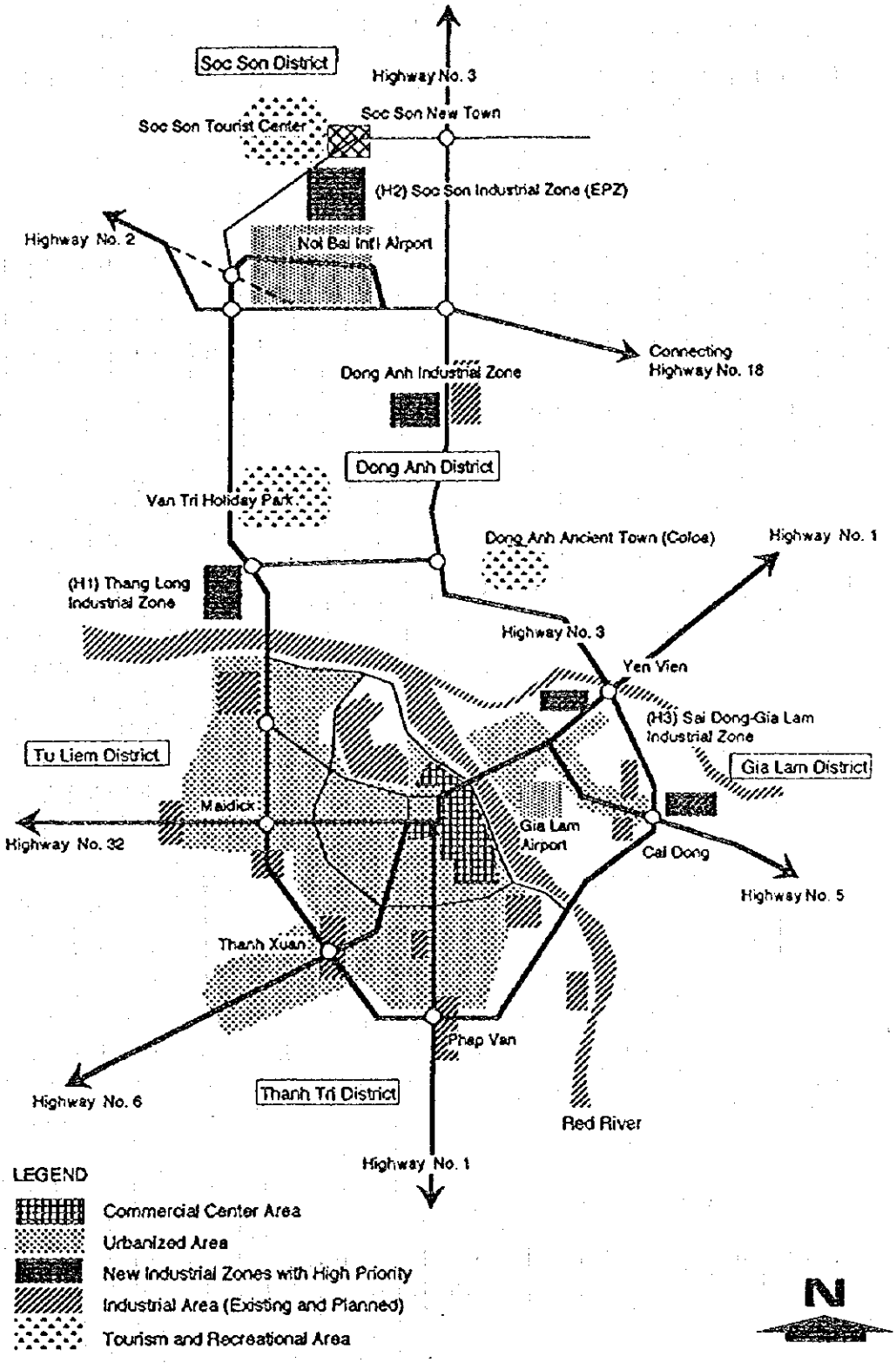
HIGHWAY NO. 18 IMPROVEMENT

Figure 3.1 Regional Structure in 2010 for Red River Delta Region

Table 3.1 New Industrial Zones to be Developed by 2010

Province	Industrial Zones	Major Types of Industries	Area
Ha Noi	H1: North Thang Long	Electric and electronic appliances; High - quality construction materials; Optical products;	300 ha
	H2: Soc Son Industrial Zone (EPZ)	Electric and electronic appliances/ parts; Computer-related industries; Optical products; Precision machinery; Toys.	300 - 400 ha
	H3: Sai Dong-Gia Lam*	Electric products/ appliances: Packaging industries : Machinery/ parts; Food processing; Beverages	500 ha
Hai Phong	P1: Minh Duc	Ship repairing; Construction materials	
	P2: Thuong Li - Quan Toan*	Ship repairing; Construction materials, Food processing	2.000 ha on-going
	P3: Doan Xa	Food processing; Enamel wares; Chemical products; Glass works; Construction materials	
	P4: Do Son (EPZ)*	Electric and Electronic products; Optical equipment; Precision Machinery; Toys	800 ha
Quang Ninh	Q1: Cai Lan - Hoanh Bo (EPZ)*	Electric appliances; Machinery; Equipment and parts; Food and aquatic processing; Tourism services.	300 ha
	Q2: Hon Gai - Bai Chay	Coal: Machinery; Construction materials; Garments; Food processing; Printing	
	Q3: Cam Pha - Duong Huy	Coal; Engineering; Construction materials; Garments; Printing; Food processing	

Note : * Denotes the industrial zones for projects given "high priority".
Source : "Main Direction on Socio-Economic Development Master Plan in Red River Delta, 1994 - 2010" SPC, Nov. 1994



Source: Hanoi People's Committee

HIGHWAY NO. 18 IMPROVEMENT	**Figure 3.2 Urban Structure in Hanoi City Master Plan (2010)**

(2) Thang Long Industrial Estate, 2000

Thang Long industrial estate plan may include the following subsidiary facilities in addition to the estate itself:

- Cargo distribution center ; and
- Residential area nearby the estate.

The Table 3.2 of a master plan study by JICA study team is the outline of basic concept at the moment (refer to Figure 3.2 for location).

Table 3.2 Outline of the Basic Concept of Thang Long North Industrial Estate

Designation	Description	Notes
Industrial Estate :	Gross area Net factory lot No. of lots	280 ha 200 ha 50 - 100 approx.
Cargo Distribution Center	Gross area Intended facilities	40 ha Transport control center, loading/ unloading facilities, warehouses, container yard, etc.
Residential Area :	Gross area Population	50 ha approx. 10,000

Source: "Main Direction on Socio-Economic Development Master Plan in Red River Delta, 1994-2010", SPC, Nov. 1994

Thang Long industrial estate development will be comprised of provisions for road network, water supply facilities, sewage facilities, storm water drainage systems, electric power supply and distribution facilities and telecommunications.

(3) Gia Lam Industrial Estate, 2000

Gia Lam industrial estate plan may be comprised of an industrial park and cargo distribution center. Table 3.3 is the outline of basic concept at the moment.

Table 3.3 Outline of the Basic Concept of Gia Lam Industrial Estate

Designation	Description	Notes
Industrial Estate :	Gross area Net factory lot No. of lots	510 ha 302 ha 90 - 200
Cargo Distribution Center :	Gross area Intended facilities	90 ha Transport control Center, Loading/ unloading facilities, warehouses, container yard, etc.

Source: "Main Direction on Socio-Economic Development Master Plan in Red River Delta, 1994-2010", SPC, Nov. 1994

Gia Lam industrial estate development will be comprised of the provisions of similar supporting facilities such as road network, water supply facilities, etc., mentioned for Thang Long Industrial Estate.

(4) Tourism Development in Hanoi Area

1) Tourism Center in Soc Son District

A tourist center in Soc Son district; the Week-End and Holiday Village located nearby Noi Bai Airport; has been approved by the government, as a project of HPC. A total of 500 ha, of which 200 ha have been prepared and are ready to invite foreign investors. The tourism center is intended to develop a complex which comprises hotels and recreational facilities compatible with natural and historical assets (Thanh Giong Temple).

2) Dong Anh Ancient Town (Coloa Fortification)

Coloa fortification is of great historic and cultural value to Vietnam. The fortification is scheduled by HPC for improvements and to be utilized as a tourist destination. It is located between Noi Bai Airport and Hanoi City nearby National Highway No. 3.

3) Van Tri Holiday Park

Van Tri Holiday Park has been planned by HPC to include a holiday complex for sports and amusement facilities in a preserved natural environment; to be located between Noi Bai Airport and Hanoi City along Than Long Expressway.

4) Golf Course Project in Soc Son District

A golf course project has been approved as a JV project with a Malaysian investor, for the development of a golf course with an area of 100 ha which is located adjacent to the Week-End and Holiday Village. Land acquisition and compensation have been completed.

3.3.3 Regional Development Direction of Ha Long City

The northern focal economic area is comprised of the provinces of Ha Noi, Hai Phong and Quang Ninh, Ha Long city, established in 1993, forms the center of the Quang Ninh province. Recent development of Quang Ninh province has been supported by abundant natural resources such as:

- High quality coal deposits for easier mining;
- Potential aquacultural areas and wide seacoast;
- Huge limestone and clay deposit for the establishment of cement and brick producing industry; and
- Ha Long scenery spot (bay area) to attract tourists.

Ha Long City Master Plan and JICA study envisages the future city as follows:

1) Ha Long will be the main focus of human activities in Quang Ninh province generating social and economic benefits that have important multiplier effects over the rest of the region (i.e. center of social, economic and culture in Quang Ninh province).

2) The deep sea port of Cai Lan will be developed and this will enhance the urban function of Ha Long city. Improved land access measures (i.e. an expressway and a railway line) between the city and Hanoi will also be provided in the future.

3) Tourism industry for domestic and international tourists will be encouraged in Ha Long Bay area.

4) Development of industrial estates/areas will be enhanced by the provision of up-to-date transport systems.

5) Commercial and trade services will become important industries as developments proceed. The Ha Long City Master Plan considers the expansion of the city in three phases until the year 2010. In the first phase (1994 - 2000) Ha Long city (Hong Gai and Bai Chay) will annex two communes, Viet Hung and Dai Yen. In the second phase the city will include the whole Bai Chay Bay area. In the third phase the city will annex Cam Pha town.

An initial master plan for Ha Long was prepared by Quang Ninh People's Committee in 1994; however some modification became inevitable since a large scale study for Cai Lan Port has been carried out (1993 - 1995) by JICA study team. Figure 3.3 shows the regional development direction modified by JICA study team (for the feasibility study on Cai Lan port construction project). The following describes the outlines concerning the major plans together with the suggestions made by JICA study team where applicable. The introduction of strategic transport plans is dealt with separately in subsection 3.3.5.

3.3.4 Development Plans in Quang Ninh Province

(1) Cement Industry

By the year 2010 more than five cement factories will be located along Highway 18. The total capacity is estimated at 7 - 10 million tons/year. Appropriate port facilities for these factories are to be constructed north of Bai Chay Bay (according to master plan).

The JICA study team verified plans for three cement factories (Figure 3.3) in the hearing with Vietnam Cement Corporation. Among these, it was found that two joint-venture companies had already finished their feasibility study concerning the investment, and had forecast that one factory will start production by the year 2000 and the other two by the year 2010. The projected capacity of each of these three factories is 1.2 - 1.4 million tons per year.

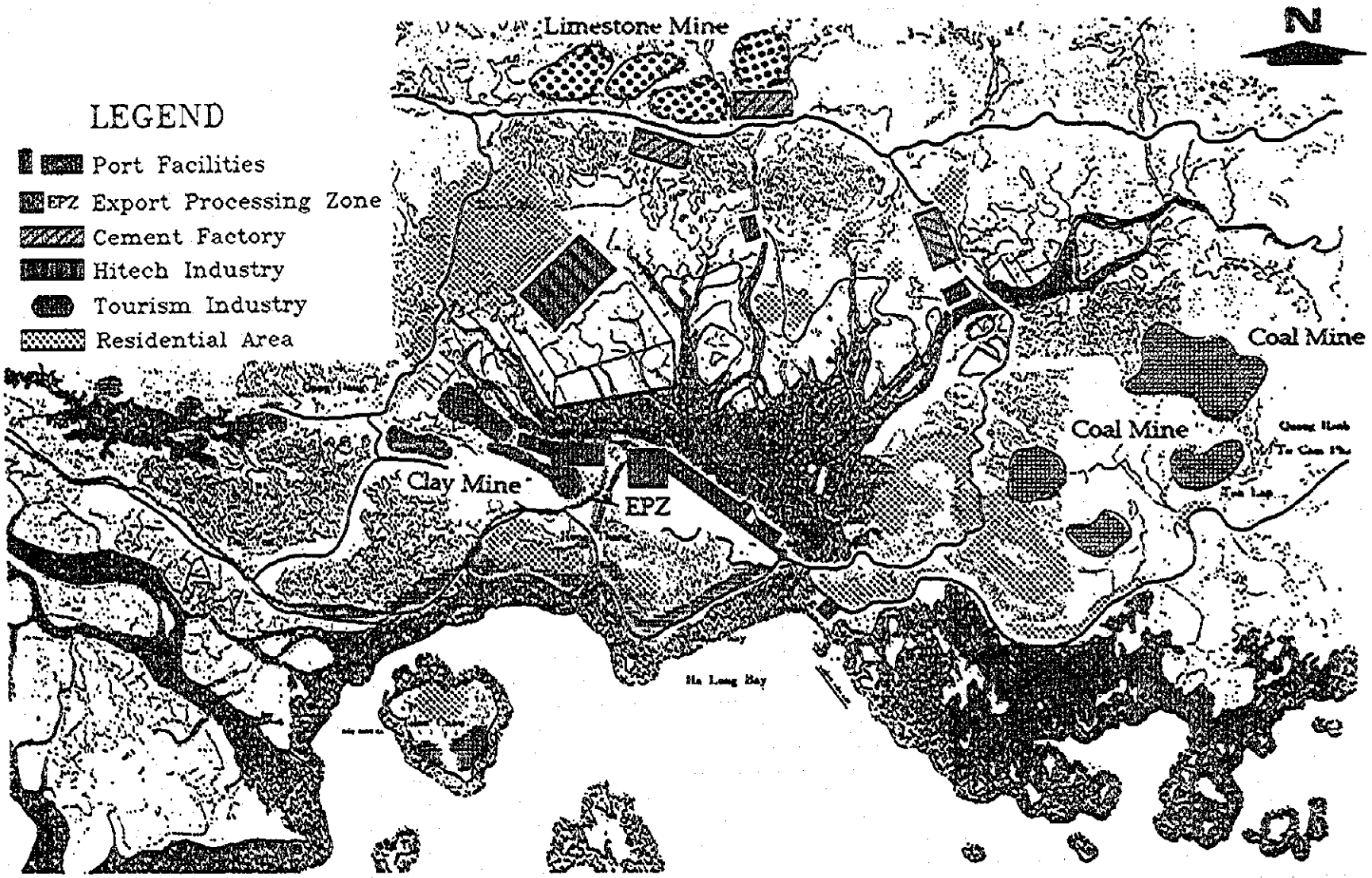
(2) Steel Industry

Vietnam Steel Corporation is planning to build a steel mill factory near Cai Lan port. The outline of information is as follows :

Location	:	Next to the port. Near the berth that accommodates 30,000 DWT ship
Scale	:	20 ha facilities
Year of Completion	:	2000
		1st stage : Setting-up of steel produciton plant
		2nd stage : Rolling facility
Present Situation	:	Study
Raw Material	:	Imported scrap, 600,000 tons/year
Number of Labourers	:	500

(3) Chemical (Fertilizer) Industry

The northern part of Vietnam has abundant mineral resources. The Fertilizer Basis Chemicals Corporation (FERCHEMCO) plans to construct a fertilizer factory. The materials (apatite) are to be transported from Lao Cai by railway. Other information of the project is as follows.



Source : Feasibility Study on Cai Lan Port Project, JICA 1995

HIGHWAY NO. 18 IMPROVEMENT

Figure 3.3 Regional Development Direction of Ha Long City

Location	:	Dai Yen (western Ha Long City, along National Highway No. 18)
Market	:	Vietnam
Scale	:	10 ha
Capacity	:	150,000 tons/year
Completion	:	2000
Raw Materials	:	200,000 tons/year and other materials

(4) Cai Lan Export Processing Zone (CLEPZ)

Ha Long City Master Plan (hereinafter called "the master plan") indicated the scale of the CLEPZ to be 100 ha. However the JICA study suggests that the scale must not be less than 120 ha, since the Cai Lan Port will accommodate large vessels including container ships and port-oriented industries will prefer the export processing zone.

1) Land Access

Land access to the CLEPZ will be attained by the improvement of Highway No. 18 (by 2000), Highway No. 10 and the railway between Cai Lan and Ha Noi (by 2000).

2) Development Policy

- Mainly export-oriented industry;
- Utilization of domestic materials and creation of job opportunity for local citizens;
- Application of advanced technologies; and
- Minimalization of adverse environmental impacts.

3) Production Field

- General light industry;
- Food and beverage processing;
- Electric appliances, machinery and parts;
- Food processing; and
- Heavy equipment fabrication, assembly and repair facilities.

(5) Coal Mining Industry

Quang Ninh province has the largest scale of coal producing area in the country. They are located between Uong Bi and Cam Pha. Total volume of coal was 6.4 million tons in 1987 and 5 million tons in 1993. Based on the estimation by the Ministry of Energy (MOE) the volume will reach 10 million tons in the year 2000. However the Cai Lan Port study team considered what it will be difficult to achieve this target due to the lack of sufficient number of coal screening equipment and the ill-equipped coal-handling ports. Hong Gai Port can only accept ships with a maximum of 10,000 DWT. Berth size at Cam Pha Port is also insufficient to accommodate large ships compatible to the MOE's

target. Present coal handling berths at Cam Pha Port can accommodate 30,000 DWT ships and there is a plan to increase the capacity to 50,000 DWT.

The Hong Gai Coal Company requested an increase of the present Hong Gai Port. However by the time that Cai Lan Port is developed, both the number and size of ships utilizing the same port will increase; thus water transportation will become congested especially near Cua Luc Strait.

In addition to this as the tourism industry develops in the Ha Long coastal area the problem will become more serious. In such circumstances the center of coal industry may be shifted to Cam Pha area. Table 3.4 shows the forecast coal production in Quang Ninh province in the master plan.

Table 3.4 Forecast of Coal Production

Unit : Million tons

Year	Production		
	Hong Gai	Uong Bi	Cam Pha
1997	1.4	1.2	3.0
2000	1.4	1.2	4.5
2005	1.8	1.2	4.5

Source : Ha Long City Master Plan

(6) Tourism Industry

Ha Long Bay is the outstanding resort of northern Vietnam. Ha Long Bay consists of 1,500 km² of water area with about 1,600 uniquely shaped stone islands. By UNESCO's decision in 1994 Ha Long has become an international natural inheritance and 300 km² of Ha Long Bay area has been considered as an international property.

Tourism has become the major industry of Quang Ninh Province. In the future Bai Chay will be the one of major international tourism centers of Vietnam. According to the Ha Long City Master Plan the number of tourists to visit Ha Long City will increase from 840 thousand (1992) to over 2 million by the year 2010, of which foreigner tourists will increase from 15,000 to nearly one million. The master plan recommends development of Tuan Chau Island and Yen Lap Lake to accommodate these tourists.

3.3.5 Strategic Transport Development Plans in the Study Area (Seaport, Airport and Railway)

Department of Provincial and Regional Economy of SPC has recently drawn up a long-term master plan for the Red River Delta Region targeting the year 2010. The Red River Development Master Plan indicated the general guidelines for

development policies/strategies and a spatial framework for priority transport projects.

(1) Cai Lan Port

To date Hai Phong Port is the only major international port in the northern part of Vietnam. Compared with the inland population of more than 26 million, the port capacity is limited and the expansion had been judged difficult. The heavy siltation of the navigation channel has been a major problem. To remedy this situation the development of Cai Lan Deep Sea Port has been planned. Table 3.5 shows the summary of forecast of planned Cai Lan Port. Port development is divided into three stages:

First stage (up to 2000)	:	7 berths and related facilities including access road.
Second stage (2000 - 2010)	:	EPZ, High-tech industry, extension of railway, cement factories, fertilizer factory, etc.
Third stage (2010 - afterward)	:	international airport, reallocation of coal mining and related facilities

Table 3.5 Summary of Demand Forecast of Cai Lan Port

Unit : 1,000 tonnes

Commodity	Year	
	2000	2010
Export		
Ore (tin, manganese, cupper)	-	545
Metal	-	71
Rice	200	513
Maize	300	316
Grained Wheat	30	125
Cement	240	2,060
Containerizable Cargo	131	1,550
Total loaded	901	5,180
Import		
Coal	10	31
Other ore		204
Scrap	287	854
Fertilizer	103	124
Chemicals	89	525
Asphalt	30	120
Wheat	240	1,001
Containerizable Cargo	312	3,509
Total loaded	1,071	6,368
Domestic		
Ore	-	74
Gypsum	-	84
Rice	158	148
Cement & Clinker	-	380
Steel	350	1,050
Fertilizer	74	153
General Cargo	122	863
Total loaded	704	2,752
Total	2,676	14,300

Source : Feasibility Study on Cai Lan Port Construction Project, 1995 (JICA)

(2) Hai Phong Port

The urgent rehabilitation plan for Hai Phong Port has been studied by a JICA Team in 1993. The following describes the outline of conclusions.

1) Forecast Traffic Demand

It is estimated that containers will amount to 1.2 million tons and 150,000 TEU. Cargo demand of China (1 million tons) has also been taken into account. In the year 2000 cargo will be shared with the Cai Lan Port.

In 1998	;	Cargo throughput 4,7 million tons Containers 1.2 million tones, 150,000 TEU
In 2000	;	Cargo to/from China : 1.0 million tons
Cai Lan port	;	sharing be considered

2) Target of Channel Planning

The target of urgent improvement will be the restoration of the channel to a state which allows 10,000 DWT class ships to enter the port.

Water depth	;	-6 m, bottom width 80 - 100 m
Overall length	;	38 km
Ship size	;	10,000 DWT class vessels under tidal operation

3) Rehabilitation of Container Terminal in Chua Ve Area

The yard will be expanded and paved, and yard equipment will be procured to restore to the original condition.

4) Rehabilitation of Main Port Area

Present container berths at scattered locations will be combined into one and new cargo handling equipment will be provided.

(3) Noi Bai International Airport

As the economy of Vietnam has been growing rapidly, the number of air passengers handled at Noi Bai International Airport (NBIA) has increased about twofold (from some 0.45 million passengers in 1990 to 1.1 million passengers in 1994).

Various forecasts suggest that the demand at NBIA would reach 4 million passengers per annum by 2005. Thus, necessity arises to apply world-class standards to NBIA in order to meet the requirement compatible to the national gateway airport in the capital.

(4) Hanoi - Cai Lan Railway Line

JICA railway study team assumed that the railway will play a great role in the region considering a marked increase in land-transport demand associated with the development of Cai Lan port. The feasibility study on Lao Cai - Cai Lan line rehabilitation and improvement is now in progress.

The Hanoi - Cai Lan line had initially been laid for military purposes, and was scheduled for abandonment by 1990 since there was no significant industry besides coal mining; and the line had been in deficit.

Development plan of a new deep seaport Cai Lan Port has changed the situation. Cai Lan port is expected to induce industrial development in the surrounding areas and to form a doorway for freight to/from Hanoi and other inland areas.

Hanoi - Cai Lan Railway Line is assumed to be important :

- To form a means of transportation to carry an arterial traffic flow ;
- To share a role in inducing the progress of regional development along the line; and,
- To induce international transportation with China.

The new Cai Lan Port is expected to handle 2.7 million tons of freight in the opening year of 2000 and reach 14.3 million tons in the target year of 2010. With a link, which has an uncompleted portion between Ha Long and Cai Lan, the utilization of the existing railway will be limited unless completed.

It is assurable that once transportation service is provided through railway improvement, the line will induce economic activity in the region by the provision of better accessibility.

3.3.6 Strategic Highway Network Development Plans

(1) General

Through the Master Plan Study on the Transport Development in the Northern Part of Vietnam (JICA 1994) the demand forecast for the years 2000 and 2010 has been confirmed. The current road network will be far from sufficient to cope with the forecast traffic demand, if not improved, particularly in the Red River Delta.

Overall development objectives for the road transport in the influence area were identified mainly as follows:

- Adoption and enforcement of international road quality and engineering standards;

- Increase in the pavement ratio from 20% currently, to some 40% to 50% by the target year 2010;
- Expansion of the road width in identified road sectors; and
- Construction of additional new roads, including high-priority roads, as suggested in the development program.

(2) National Highway No. 1

National Highway No. 1 is the longest in the country (about 2,200 km in total length) and most important route in Vietnam. It starts at Lang Son and goes south passing Ha Noi and Ho Chi Minh, terminating at Ca Mau.

As mentioned before the government has set forth three Focal Economic Areas; Ha Noi, Hai Phong and Quang Ninh in the north; Da Nang and the surrounding area in the center, and the core of the southern region which in includes Ho Chi Minh City.

Presently the improvement of National Highway No. 1 is under way as shown in Table 3.6.

Table 3.6 Improvement of National Highway No. 1

Highway Section and Financing Agency	Length (km)	Name of Project
Ho Chi Minh City - Can Tho * World Bank * OECF	170	Highway Rehabilitation Project National Highway No.1 Bridge Rehabilitation Project (1)
Nha Trang - Ho Chi Minh * ADB * OECF	440	Highway No. 1 Improvement Project National Highway No. 1 Bridge Rehabilitation Project (1)
Dong Ha - Nha Trang * ADB * OECF	689	Second Road Improvement Project National Highway No. 1 Bridge Rehabilitation Project (2)
Ha Noi - Vinh * World Bank * OECF	285	Highway Rehabilitation Project National Highway No.1 Bridge Rehabilitation Project (1)
Lang Son - Ha Noi * ADB * OECF	164	Second Road Improvement Project National Highway No.1 Bridge Rehabilitation Project (2)

Source: MOT

Improvement of National Highway No. 1 adopting a four-lane carriageway between Bac Giang and Ha Nam via Ha Noi had been suggested by the JICA study team for the Master Plan Study on the Transport Development in the Northern Part of Vietnam (hereinafter referred to as "MPSTD") as a priority project.

(3) National Highway No. 2

This is the highway which connects Viet Tri and Phu Lo (53 km length). Present condition is 5.5 m - 6.5 m carriageway (Class-IV) in poor condition. This highway composes an important section of the route connecting Lao Cai and Ha Noi; thus JICA's MPSTD study team suggested early improvement before 2000 adopting a four-lane carriageway.

(4) National Highway No. 5

National highway No. 5 links Ha Noi and Hai Phong (Hai Phong port has been playing a role of hub port in the northern part of Vietnam) with a distance of about 102 km. Improvement of the highway is in progress adopting four-lane/six-lane carriageways over the entire section as the highest priority construction.

(5) Ha Noi Ring Road

The construction of a portion of Ha Noi Ring Road between NBIA and Maidick has been completed and now in the stage of development of further sections.

3.4 Future Socio-Economic Framework

3.4.1 General

Socio-economic framework is one of the most significant items of input data for forecast of traffic demand. However since Vietnam is now experiencing the transition from planned to market economy, historically reliable data for the analysis of socio-economic trends are very limited. Mainly GDP and population have been taken as a basis for the development framework of the influence and study areas.

3.4.2 GDP Growth Rate

Based on the verification of economic performance of the recent years and the review of economic projections by various organizations in previous studies the economy of Vietnam is likely to attain a 8.5 - 11.0% growth up to the year 2000, led by the present momentum of investment in the productive sector.

A framework of long-term national economic growth in Vietnam is presented in Table 3.7. Three scenarios are assumed: (1) high case: (2) medium case: and (3) low case.

In regards to the future national economic growth framework the SPC set as a minimum framework yearly average economic growth rates at 9.8 % for 1996 ~ 2000 and 10.0 % for 2001 ~ 2010. Vietnam's GDP growth rate over previous year for 1995 is certain to reach 9.5 %. It is not likely that case (3), that is, a pessimistic projection in Table 3.1 for 1995, will occur.

On the other hand an overly optimistic case such as (1) in the same table would not be considered realistic judging from survey results. Therefore future economic framework should be judged on the most realistic case (2).

Table 3.7 Framework of Long-term National Economic Growth

Year	(1) High Case GDP (VNDBill)	(1) High Case Annual Growth Rate	(2) Medium Case GDP (VND Bill)	(2) Medium Case Annual Growth Rate	Low Case GDP (VND Bill)	Low Case Annual Growth Rate
Actual						
1991	31,286	6.0%	31,286	6.0%	31,286	6.0%
1992	33,991	8.6%	33,991	8.6%	33,991	8.6%
1993	36,735	8.1%	36,735	8.1%	36,735	8.1%
1994	39,975	8.8%	39,975	8.8%	39,975	8.8%
Estimated						
1995	43,778	9.5%	43,778	9.5%	43,778	9.5%
Projected						
2000	73,768	11.0%	68,917	9.5%	65,827	8.5%
2005	118,804	10.0%	106,037	9.0%	96,721	8.0%
2010	182,795	9.0%	155,803	8.0%	135,656	7.0%
2015	268,586	8.0%	218,522	7.0%	185,861	6.5%

Notes : GDP at 1989 prices
Source : 1) "Statistical Yearbook 1993". Statistical Publishing House
2) Ministry of Finance
3) JICA Study Team

3.4.3 Regional Economic Growth

The "Regional Master Plan 2010" which was recently presented by SPC has been selected as a basic framework for future regional economic development.

This master plan explains the national policy of long-term development in the three strategic regions which are given higher priorities in industrialization.

In the study the above basic framework has been slightly modified and extended until the year 2015 as shown in Table 3.8.

Table 3.8 Regional Contribution of GDP in Three Focal Economic Areas

Year	Northern Focal Economic Area	Middle Corridor	Southern Focal Economic Area	Total of the Three Economic Growth Areas
1994 (Actual)	13.00%	1.80%	28.00%	42.80%
1995	13.17%	1.89%	28.54%	43.60%
2000	14.05%	2.43%	31.40%	47.88%
2005	14.99%	3.12%	34.54%	52.65%
2010	16.00%	4.00%	38.00%	58.00%
2015	16.53%	4.54%	39.87%	60.94%

Source: "Development Orientation for Regional Master Plan in 2010". Institute of Development Strategy, SPC 1995.

Based on the regional contribution of Northern Focal Economic Area shown in Table 3.8 the framework of GRDP in the study area is setup as shown in Table 3.9.

Table 3.9 Framework of GRDP in Study Area

Year	Entire Nation	Study Area	
	VND Billion	VND Billion	Growth Rate (% p.a.)
1994	39,975	5,197	10.93
2000	68,917	9,683	9.92
2010	155,803	24,928	7.70
2015	218,522	36,122	

Source: 1) "Development Orientation for Regional Master Plan in 2010". Institute of Development Strategy, SPC 1995.
2) JICA Study Team

3.4.4 Population of Vietnam

Two kinds of future population projections are available. Scenario - 1 in Table 3.10 shows the population forecast figured by General Statistics Development and Scenario - 2 shows the projected figures based on "the Population of Vietnam", by Statistical Publishing House, 1992.

Table 3.10 Projection of Future Population of Vietnam

	Scenario - 1	Scenario - 2	Scenario - 3
Population in Million			
1993	72.0	70.2	70.9
1995	75.0	73.2	73.9
2000	82.0	80.2	81.3
2010	95.0	91.6	94.6
2015	-	-	101.8
Annual Growth Rate			
1993 - 1995	2.06%	2.11%	2.09%
1996 - 2000	1.80%	1.84%	1.92%
2001 - 2010	1.48%	1.34%	1.53%
2011 - 2015	1.48%	1.34%	1.48%

The study adopts Scenario - 3 which applies moderate population growth rates compared with the other two. This is because the up-to-date projection by province has been given by SPC and the said projection assumes that the growth rate of population will be controlled to bring down to 1,4% in the year 2010. Population projection is thus totally dependent on performance of population control policy and family planning. Compared with the natural growth rate (2.1%) in the period between two census years (1979 - 1989), it is said that each population projection sets an assumption on growth rate ranging from 1.34% to 1.53% during the period between 2000 and 2010.

However population increase between the years 1989 and 1994 reached 2.28% and shows a reverse effect of population control and raises the question whether or not the population can really be controlled as the SPC assumes.

3.4.5 Future Population in Study Area

Future population is estimated under the following assumptions:

1) Population growth rate of each province is set at the same level of the national population growth rate which is discussed in Subsection 3.4.4.

2) No migration from the northern region to the central or southern regions is considered. However some migration from rural areas to the Focal Economic Areas is expected to occur.

3) Average growth rate of urban population is considered to be 5% per annum. Generally rapid urban population growth leads to various urban problems and the growing population could not be accommodated sufficiently. However provinces located next to the Ha Noi urban area will experience an urban population growth rate of more than 5% per annum, because of urban

fringe area of Ha Noi pushing into these provinces. Three provinces bordering Ha Noi, belonging to the North Mountain and Midland Region, will experience a 10 to 15% urban population growth. This will cause a slightly higher population growth rate in the North Mountain and Midland Region after the year 2005.

4) Maximum urbanization level is set at 80%. Less than 10% of all the Ha Noi urban area is presently a Densely Inhabited District (DID). Even if the urban area expands to the rural area of Ha Noi, more than half of the land will remain as rural area. Rural population will remain at certain levels even though large numbers of rural inhabitants commute to urban areas to work.

5) Rural population will be stable after year 2005 (saturation level). Rural population is basically engaged in the primary sector, i.e. agriculture and forestry. Growth of the primary sector largely depends on the natural land conditions and marketing situation. Diversification of crops and introduction of agro-industry is indispensable so as to develop the rural areas. Even though that may be achieved, it is expected that scarcity of arable land will set limits on the rural population growth which can be sustained, consistent with improvements in rural living conditions. It is nevertheless assumed that, up to year 2005, rural population increase could be absorbed by rural communities and/or nearby provincial urban areas.

On the basis of above conditions population of the Study Area by zone/ province is calculated as shown in Table 3.11.

Table 3.11 Population Forecast by Zones

Province	Zone No.	Zone Name	1993 Population Urban	%	Total	%	urban. ratio	1995 Population Urban	%	Total	%	urban. ratio	2005 Population Urban	%	Total	%	urban. ratio	2015 Population Urban	%	Total	%	urban. ratio
1 Ha Noi		Province Total	1,106,000	100.0	2,155,000	100.0	51.3	1,289,216	100.0	2,246,020	100.0	57.4	1,945,385	100.0	2,664,911	100.0	73.0	2,692,007	100.0	3,094,261	100.0	87.0
	1	Ha Noi	1,070,608	96.8	1,936,366	89.9	55.3	1,247,961	96.8	2,018,152	89.9	61.8	1,883,133	96.8	2,394,544	89.9	78.6	2,605,863	96.8	2,780,335	89.9	93.7
	2	Hien Ninh	22,120	2.0	70,547	3.3	31.4	25,784	2.0	73,527	3.3	35.1	38,908	2.0	87,240	3.3	44.6	53,840	2.0	101,295	3.3	53.2
	3	Tan Minh	13,272	1.2	148,087	6.9	9.0	15,471	1.2	154,341	6.9	10.0	23,345	1.2	183,127	6.9	12.7	32,304	1.2	212,631	6.9	15.2
2 Ha Bac		Province Total	114,000	100.0	2,263,000	100.0	5.0	131,641	100.0	2,350,733	100.0	5.6	409,481	100.0	2,824,009	100.0	14.5	1,021,034	100.0	3,461,133	100.0	29.5
	4	Hiep Hoa	2,964	2.6	319,166	14.1	0.9	3,423	2.6	331,539	14.1	1.0	10,647	2.6	398,185	14.1	2.7	26,547	2.6	488,020	14.1	5.4
	5	Tien Son	4,218	3.7	339,455	15.0	1.2	4,871	3.7	352,615	15.0	1.4	15,151	3.7	423,601	15.0	3.6	37,778	3.7	519,170	15.0	7.3
	6	Bac Ninh	51,186	44.9	69,358	3.1	73.8	59,107	44.9	72,047	3.1	82.0	183,857	44.9	254,161	9.0	72.3	458,444	44.9	484,559	14.0	94.6
	7	Que Vo	1,368	1.2	337,207	14.9	0.4	1,580	1.2	350,281	14.9	0.5	4,914	1.2	420,777	14.9	1.2	12,252	1.2	515,709	14.9	2.4
	8	Bac Giang	47,766	41.9	809,686	35.8	5.9	55,158	41.9	841,076	35.8	6.6	171,573	41.9	841,555	29.8	20.4	427,813	41.9	858,361	24.8	49.8
	9	Luc Nam	2,736	2.4	176,204	7.8	1.6	3,159	2.4	183,035	7.8	1.7	9,828	2.4	220,273	7.8	4.5	24,505	2.4	269,968	7.8	9.1
	10	Luc Ngan	3,762	3.3	211,923	9.4	1.8	4,344	3.3	220,139	9.4	2.0	13,513	3.3	265,457	9.4	5.1	33,694	3.3	325,347	9.4	10.4
3 Hai Hung		Province Total	137,000	100.0	2,658,000	100.0	5.2	146,335	100.0	2,761,047	100.0	5.3	415,691	100.0	3,325,529	100.0	12.5	980,837	100.0	3,846,421	100.0	25.5
	11	Chi Linh	29,455	21.5	150,866	5.7	19.5	31,462	21.5	156,715	5.7	20.1	89,374	21.5	188,755	5.7	47.3	210,880	21.5	218,320	5.7	96.6
	12	Banyen Nhan	25,345	18.5	807,517	30.4	3.1	27,072	18.5	838,824	30.4	3.2	76,903	18.5	1,010,317	30.4	7.6	181,455	18.5	1,168,567	30.4	15.5
	13	Hai Duong	80,419	58.7	1,119,752	42.1	7.2	85,899	58.7	1,163,163	42.1	7.4	244,011	58.7	1,400,966	42.1	17.4	575,752	58.7	1,620,405	42.1	35.5
	14	Kim Mon	1,781	1.3	579,864	21.8	0.3	1,902	1.3	602,345	21.8	0.3	5,404	1.3	725,491	21.8	0.7	12,751	1.3	839,128	21.8	1.5
4 Quang Ninh		Province Total	377,000	100.0	890,000	100.0	42.4	500,157	100.0	924,504	100.0	54.1	774,154	100.0	1,113,891	100.0	69.5	1,234,067	100.0	1,460,435	100.0	84.5
	16	Dong Trieu	88,595	23.5	225,170	25.3	39.3	117,537	23.5	224,654	24.3	52.3	181,926	23.5	233,917	21.0	77.8	290,006	23.5	306,691	21.0	94.6
	17	Hoanh Bo	15,457	4.1	169,100	19.0	9.1	20,506	4.1	171,958	18.6	11.9	31,740	4.1	161,514	14.5	19.7	50,597	4.1	157,727	10.8	32.1
	18	Bai Chay	53,911	14.3	70,310	7.9	76.7	71,522	14.3	73,036	7.9	97.9	110,704	14.3	116,959	10.5	94.7	176,472	14.3	182,554	12.5	96.7
	19	Hong Gai	80,678	21.4	105,020	11.8	76.8	107,034	21.4	109,091	11.8	98.1	165,669	21.4	167,084	15.0	99.2	264,090	21.4	277,483	19.0	95.2
	20	Cam Pha	70,876	18.8	85,440	9.6	83.0	94,029	18.8	96,148	10.4	97.8	145,541	18.8	153,717	13.8	94.7	232,005	18.8	240,972	16.5	96.3
	21	Mong Duong	47,502	12.6	56,960	6.4	83.4	63,020	12.6	64,715	7.0	97.4	97,543	12.6	102,478	9.2	95.2	155,492	12.6	159,187	10.9	97.7
	22	Tien Yen	10,179	2.7	53,400	6.0	19.1	13,504	2.7	55,470	6.0	24.3	20,902	2.7	66,833	6.0	31.3	33,320	2.7	73,022	5.0	45.6
	23	Quang Ha	9,802	2.6	124,600	14.0	7.9	13,004	2.6	129,431	14.0	10.0	20,128	2.6	111,389	10.0	18.1	32,086	2.6	62,799	4.3	51.1
5 Hai Phong	15	Hai Phong	532,000	100.0	1,584,000	100.0	33.6	613,738	100.0	1,645,410	100.0	37.3	1,101,105	100.0	1,966,260	100.0	56.0	2,070,352	100.0	2,524,819	100.0	82.0
Total			2,266,000	–	9,550,000	–	23.7	2,681,087	–	9,927,714	–	27.0	4,645,817	–	11,894,600	–	39.1	7,998,298	–	14,387,069	–	55.6

SOURCE : JICA STUDY TEAM

Chapter 4

CURRENT ROAD TRANSPORT PROFILE AND RESULTS OF TRAFFIC SURVEY

CHAPTER 4 CURRENT ROAD TRANSPORT PROFILE AND RESULTS OF TRAFFIC SURVEY

4.1 Current Road Transport

4.1.1 Road Network

(1) Road Network in Vietnam

Table 4.1 Road Conditions in Vietnam

	Total Length	Asphalt Concrete	Macadam Penetr.	Gravel	Earth/ Gravel
National Roads	10,805km 100.0%	3,305km 30.5%	3,600km 33.3%	1,400km 13.0%	2,500km 23.2%
Provincial Roads	15,295km 100.0%	115km 0.8%	2,650km 17.3%	2,330km 15.2%	10,200km 66.7%
District Roads	25,290km 100.0%	60km 0.2%	1,200km 4.8%	4,430km 17.5%	19,600km 77.5%
Total	51,390km 100.0%	3,480km 6.7%	7,450km 14.5%	8,160km 15.9%	32,300km 62.9%

Source: Ministry of Transport, 1994

The ratio of road density within the entire nation of Vietnam is 0.32 km/km², which is by no means inferior to other Asian nations[1] Surface conditions of the naitoniwde road network are shown in Table 4.1.

Most roads in Vietnam are of narrow width and gravel or earth surfaces. National roads, which have comparatively good surface conditions, are paved with asphalt (or cement) concrete over 30 % of the total length. Including provincial and district roads, paved roads are less than 7 % of the total.

Due to these circumstances the current main focus is on the upgrading of road quality, which means improvement of road facilities, i.e., road widening, paving and alignment improvement.

(2) Road Network in the Study Area

The study area includes five provinces in the northern part of Vietnam related to Highway No. 18. These provinces are Ha Noi, Ha Bac, Hai Hung, Hai Phong, and Quang Ninh. The classified lengths and surface conditions of roads in the study area are shown in Table 4.2.

Total road length in each province varies depending on the area of each province. Hanoi, as a matter of course, shows particularly high road density,

1) For example, Thailand 0.20 km/km², Malaysia 0.25 km/km², Philippines 0.54 km/km².

however, the figures of the other provinces are more or less the same as the national average.

In spite of the above facts, the ratio of paved roads in the study area demonstrates a peculiar difference from the national average. The percentage of asphalt pavement and macadam penetration pavement; which we will call it a pavement ratio; of the whole study area is even higher than the national average. However much of pavement in the study area is macadam penetration, and the percentage of asphalt (and cement) concrete pavement is rather low. This causes deterioration of pavement and inferior surface conditions of roads in the study area in general. Therefore road improvement policy is now shifting gradually from macadam penetration to asphalt concrete.

The focus of road improvement strategy in the study area therefore should be on improvements from macadam penetration to asphalt (or cement) concrete pavement. Considering the fact that asphalt/cement concrete pavement has much longer life than penetration macadam, to maintain penetration macadam frequently under high traffic volume is not necessarily cost effective than asphalt/concrete pavement.

4.1.2 Road Transport

(1) Modal Distribution

According to NTSR (National Transportation Sector Review[2]), the nationwide total of interprovincial freight movement is 40 million tons. The number of passenger movements is assumed to be 106 million as a nationwide total. Table 4.3 summarizes the modal distribution of freight and passenger transport.

Table 4.2 Classified Road Length and Surface Conditions in the Study Area

Province	National Roads (km)					Provincial Roads (km)					District Roads (km)					Grand Total	Length per Area
	Total Length	Asphalt Conc.	Macadam Penetr.	Gravel	Earth / Gravel	Total Length	Asphalt Conc.	Macadam Penetr.	Gravel	Earth / Gravel	Total Length	Asphalt Conc.	Macadam Penetr.	Gravel	Earth / Gravel	km	km/km2
Ha Noi (921 km2)	121.0 100.0%	100.0 82.6%	21.0 17.4%	0.0 0.0%	0.0 0.0%	436.0* 100.0%	0.0 0.0%	332.0* 76.1%	104.0 23.9%	0.0 0.0%	1,382.0 100.0%	0.0 0.0%	0.0 0.0%	500.0 36.2%	882.0 63.8%	1,939.0	2.11
Ha Bac (4,614 km2)	316.8 100.0%	0.0 0.0%	106.1 33.5%	46.2 14.6%	164.5 51.9%	278.8 100.0%	0.0 0.0%	54.8 19.7%	0.0 0.0%	224.0 80.3%	561.0 100.0%	0.0 0.0%	0.0 0.0%	0.0 0.0%	561.0 100.0%	1,156.6	0.25
Hai Hung (2,551 km2)	125.0 100.0%	47.0 37.6%	40.0 32.0%	25.0 20.0%	13.0 10.4%	370.0 100.0%	0.0 0.0%	74.0 20.0%	296.0 80.0%	0.0 0.0%	430.0 100.0%	0.0 0.0%	22.0 5.1%	300.0 69.8%	108.0 25.1%	925.0	0.36
Hai Phong (1,504 km2)	88.0 100.0%	20.0 22.7%	68.0 77.3%	0.0 0.0%	0.0 0.0%	125.0* 100.0%	0.0 0.0%	125.0* 100.0%	0.0 0.0%	0.0 0.0%	345.0 100.0%	0.0 0.0%	0.0 0.0%	145.0 42.0%	200.0 58.0%	558.0	0.37
Quang Ninh (5,939 km2)	330.0 100.0%	0.0 0.0%	289.0 87.6%	0.0 0.0%	41.0 12.4%	193.0 100.0%	0.0 0.0%	37.0 19.2%	38.0 19.7%	118.0 61.1%	997.0 100.0%	0.0 0.0%	22.0 2.2%	0.0 0.0%	975.0 97.8%	1,520.0	0.26
Study Area Total	980.8 100.0%	167.0 17.0%	524.1 53.4%	71.2 7.3%	218.5 22.3%	1,402.8 100.0%	0.0 0.0%	622.8 44.4%	438.0 31.2%	342.0 24.4%	3,715.0 100.0%	0.0 0.0%	44.0 1.2%	945.0 25.4%	2,726.0 73.4%	6,098.6	0.39
National Total	10,805.0 100.0%	3,305.0 30.6%	3,600.0 33.3%	1,400.0 13.0%	2,500.0 23.1%	15,295.0 100.0%	115.0 0.8%	2,650.0 17.3%	2,330.0 15.2%	10,200.0 66.7%	25,290.0 100.0%	60.0 0.2%	1,200.0 4.7%	4,430.0 17.5%	19,600.0 77.5%	51,390.0	0.32

Source: Ministry of Transport

Note: Figure with * includes unban roads

Table 4.3 Modal Distribution of Freight and Passenger Transport

Category	Road	Rail	River	Coastal	Air	Total
Freight (ton)	40.7 %	5.4 %	29.1%	24.8 %	---	100.0 %
Freight (ton-km)	32.0 %	18.0 %	37.0 %	13.0 %	---	100.0 %
Passenger	89.5 %	2.3 %	8.0 %	0.1 %	0.1 %	100.0 %
Passenger-km	78.0 %	12.0 %	7.0 %	---	3.0 %	100.0 %

Source: NSTR, 1992

Table 4.3 shows that both freight and passenger transport highly depend on road transport. These figures have been changing year by year, however, the road share of transport will by no means decrease in the future.

(2) Road Transport

Road transport entities have experienced radical liberalization and have split up into smaller entities since 1989. Such liberalization began in freight transport sector, and began in passenger transport sector in 1990. Initially the price control system was abolished in freight transport. This caused stiffer competition and, as a result, the price levels came to less than the cost to be recovered. This situation has made even vehicle depreciation almost impossible.

Privately-owned truck transport companies were 16 % of the total in 1991; however, they are presumed to have increased dramatically since then. The main type of freight transported by trucks is construction materials, which accounts for 22 % of the total amount. (61 % of river transport is coal, 61 % of rail transport is coal and other industrial products.) Though the current situation seems to have enough supplying ability, it is expected to lead to price increase due to predicted shortage of supply.

Passenger transport entities have had difficulty replacing buses. About half of all buses are more than 10 years old. 80 % of bus enterprises had privatized by 1993. Bus fares are going down as the competition heats up. As a result of decreasing bus fares, bus enterprises have had difficulty keeping business in unprofitable rural areas.

Taxation to road users is far from the amount to pay for infrastructure construction. The tax collection system is also not efficient. Road traffic conditions are worsening throughout the entire road network, and frequent traffic accidents are becoming a major social problem. More than 3,500 people died in traffic accidents in the northern part in 1989, which is considerably a high figure compared with the number of vehicles on roads.

4.1.3 Vehicle Ownership

The last vehicle registration statistics available are those of 1991, when the Transport Economic Scientific Institute (TESI) of the Ministry of Transport, and the Ministry of Heavy Industries conducted a license plate survey in the course of the NTSR study.

Table 4.4 shows 1991 vehicle registration data in the study area. Some 38,000 vehicles (19 % of the national total) were registered within the study area during 1991. The highest amount of all categories of vehicles by far was registered in Hanoi (64.3 % of the whole study area), which is about 24,800 cars, buses and trucks. The data for other provinces show more or less the same level of numbers from 2,700 to 4,100 vehicles.

A comparison of modal percentages between the study area and the national total shows a tendency of more trucks and less buses. 61.5 % of the registration in the study area is by trucks, which is much higher than the national percentage of 47.3 %. Buses make up only 9.2 % of the total compared with the national figure of 22.3 %. This tendency is particularly observed in Ha Noi and Quang Ninh, where industrial activities tend to be in growth stages.

The composite average ownership aggregated to 2.8 vehicles per 1,000 persons. Ha Noi province exhibited the highest rate (12 vehicles per 1,000 people) followed by Quang Ninh province (4.8 vehicles per 1,000 people) and Hai Phong province (2.7 vehicles per 1,000 people). In contrast the lowest ownership rate was found in Hai Hung province, 1.1 vehicles per 1,000 people.

4.2 1995 Traffic Survey

A traffic count and roadside interviews were carried out to ascertain up-to-date vehicle trip patterns in the study area. The purposes of the surveys were:

- To provide traffic volume data at zone boundaries to facilitate the analysis of 1995 interzonal trip patterns;
- To clarify vehicle origin-destination patterns within the study area as well as between the study area and other parts of the nation.

Twenty one locations were designated for collecting two day traffic counts, of which five locations were also designated for an origin/destination interview survey. We were able to utilize another set of traffic count data in June 1995, gathered by another JICA Study Team carrying out the Feasibility Study on the Rehabilitation and Improvement of the Railway in Vietnam (hereinafter called "The Railway Study"). The utilized data were from nine locations around Ha Noi.

Table 4.4

1991 Vehicle Registration Data in the Study Area

Province	Registered Vehicles				Registration Percentages				Modal Percentages			
	Cars	Buses	Trucks	Total	Cars	Buses	Trucks	Total	Cars	Buses	Trucks	Total
Ha Noi	7,678	1,627	15,450	24,755	68.2	45.9	65.2	64.3	31.0	6.6	62.4	100.0
Ha Bac	917	454	1,421	2,792	8.2	12.8	6.0	7.3	32.8	16.3	50.9	100.0
Hai Hung	835	325	1,551	2,711	7.4	9.2	6.6	7.0	30.8	12.0	57.2	100.0
Hai Phong	935	750	2,455	4,140	8.3	21.1	10.4	10.8	22.6	18.1	59.3	100.0
Quang Ninh	892	391	2,798	4,081	7.9	11.0	11.8	10.6	21.8	9.6	68.6	100.0
Study Area Total	11,257	3,547	23,675	38,479	100.0	100.0	100.0	100.0	29.3	9.2	61.5	100.0
National Total	62,400	45,760	96,940	205,100	---	---	---	---	30.4	22.3	47.3	100.0

Source: Transport Modeling and Demand Forecasts, Technical Report from the Master Plan Study on the Transport Development in the Northern Part of Viet Nam, JICA 1994

The two location data of our own survey and the nine location Railway Study survey were consolidated for our usage. Table 4.5 and Figure 4.1 show the details of these locations. 21 locations of our traffic survey locations together with 9 locations of the other survey were numbered in order making a total of 30 locations. The locations were carefully selected to catch the traffic passing over the zone boundaries. The description of the surveys is explained in the subsequent sections.

4.2.1 Classified Traffic Count Survey

Our own traffic count survey (21 locations) was conducted on weekdays in the middle of August, 1995; 24 hour survey at 10 locations, and 12-hour survey at 11 locations (see Appendix A-4.1). The traffic volume data at all locations were monitored by direction and by clock hour. The 24 hour survey was conducted for 24 hours over two days (6:00 - 6:00), and the 12 hour survey was conducted for 12 hours over two days (6:00 - 18:00). The survey was carried out manually for all the passing vehicles at each location according to the nine following vehicle types:

- motorized passenger vehicle:
  1) Passenger cars/Vans/Jeeps
  2) Buses (less than 15 seats)
  3) Buses (more than 15 seats)
- motorized freight vehicles:
  4) Pick-up trucks
  5) Trucks with 2 axles
  6) Trucks with 3 axles
  7) Trucks with 4 and more axles
- other vehicles:
  8) Bicycles/Tricycles
  9) Motorcycles

The Railway Study survey at 9 locations was conducted in June, 1995; 24 hour survey at 4 locations and 16-hour survey at 5 locations. Though the vehicle classification category was slightly different from our own survey the data were re-sorted into similar categories.

4.2.2 Roadside OD Survey

The roadside origin/destination survey was conducted on weekdays in the middle of August, 1995 at 5 locations among the locations where the traffic count was also conducted (see Appendix A-4.2). Vehicle classifications for OD survey are as follows:

- motorized passenger vehicle:
  1) Passenger cars
  2) Buses
- motorized freight vehicles:
  3) Pick-up trucks
  4) Trucks with 2 axles
  5) Trucks with 3 axles
  6) Trucks with 4 and more axles

Table 4.5 Roadside Survey Types and Locations

Highway	Survey Site (1)		Traffic Count			Interview
No.	No.	Location	12 hrs	16 hrs	24 hrs	12 hrs
1	1	Ha Bac-Lang Son Province Boundary			●	
	2	North of Bac Ninh	●			
	3	South of Bac Ninh	●			
	(4)	Hanoi-Ha Bac Provinces Boundary (2)			(●)	(●)
	(5)	Hanoi-HaTai Provinces Boundary (2)			(●)	(●)
2	(6)	Hanoi-Vinh Phu Province Boundary (2)			(●)	(●)
	7	West of Highway No. 3	●			
3	(8)	Hanoi-Bac Thai Provinces Boundary (2)		(●)		(●)
	9	South of Highway No. 2	●			
5	(10)	Hanoi-Hai Hung Provinces Boundary (2)			(●)	(●)
	11	Hai Phong-Hai Hung Provinces Boundary			●	●
6	(12)	Hanoi-Ha Tai Provinces Boundary (2)		(●)		(●)
10	13	Hai Phong-Quang Ninh Provinces Boundary			●	●
	14	Hai Phong-Thai Binh Provinces Boundary			●	
18	15	East of Bac Ninh	●			
	16	Ha Bac-Hai Hung Provinces Boundary			●	●
	17	Hai Hung-Quang Ninh Provinces Boundary			●	●
	18	West of Hong Gai	●			
	19	Bai Chay Ferry			●	●
	20	East of Hong Gai			●	
	21	East of Cam Pha	●			
	22	Ba Che Bridge (Toll Bridge)	●			
	23	East of Tien Yen	●			
23	(24)	Hanoi-Vinh Phu Provinces Boundary (2)		(●)		(●)
32	(25)	Hanoi-HaTai Provinces Boundary (2)		(●)		(●)
183	26	Between Highway No. 5 and No. 18			●	
	27	Hai Hung-Ha Bac Provinces Boundary			●	
286	(28)	Hanoi-Ha Bac Provinces Boundary (2)		(●)		(●)
	29	West of Bac Ninh	●			
---	30	Noi Bai Airport Road South of Highway No. 2	●			

(1) Refer to Figure 4.1 for illustrated locations.

(2) (●)Data collected within framework of "The Feasibility Study on the Rehabilitation and Improvement of the Railway in Viet Nam", prepared for Ministry of Transport by JICA, 1995

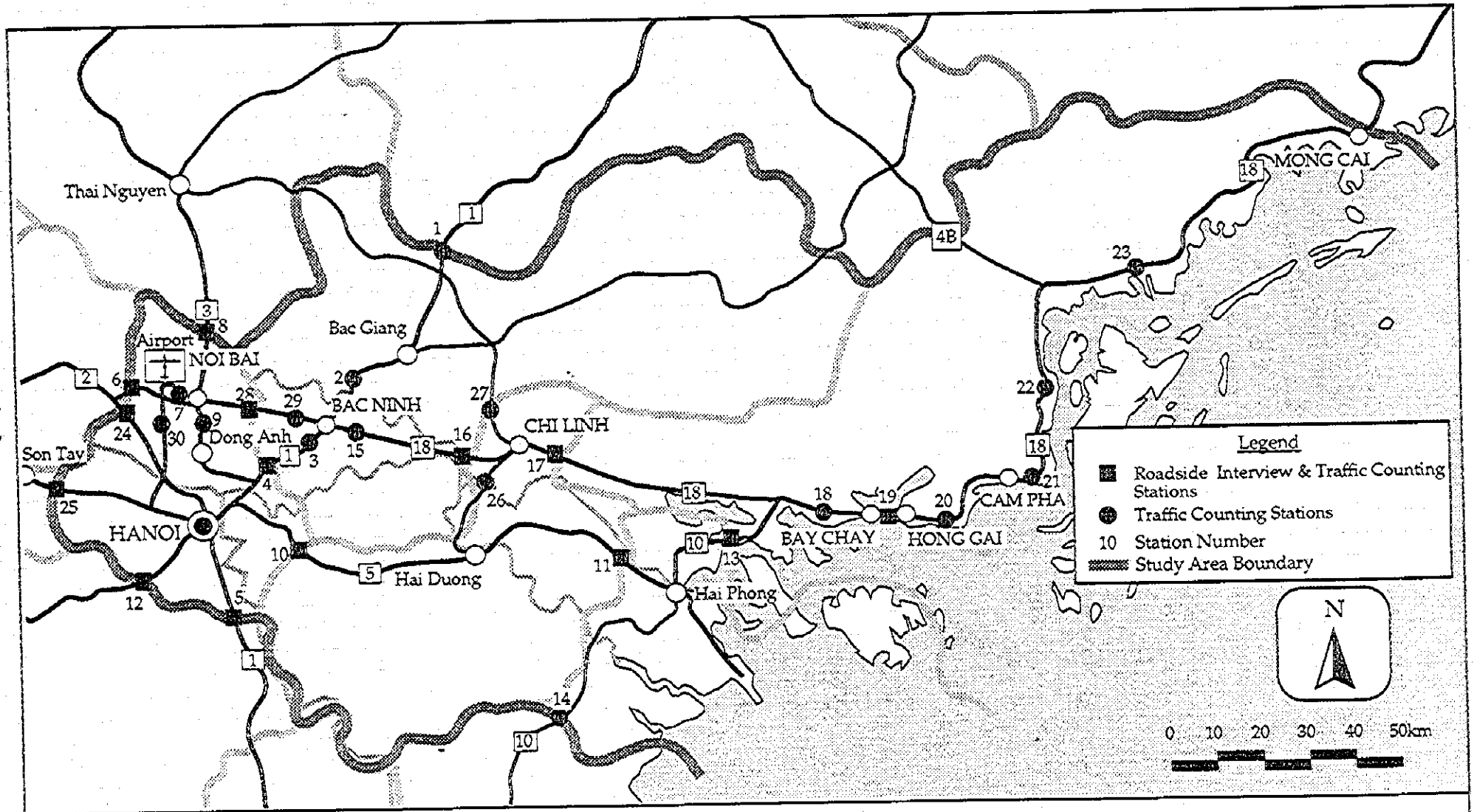


Figure 4.1 Station Locations Roadside Interview and Count Survey