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No. 52

LAO PEOPLE'S DEMOCRATIC REPUBLIC

FEASIBILITY STUDY
ON
THA NGON BRIDGE CONSTRUCTION PROJECT

FINAL REPORT

MAIN REPORT

FEBRUARY 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

BRIDGE CONSTRUCTION PROJECT
FINAL REPORT
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LAO PEOPLE'S DEMOCRATIC REPUBLIC

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JAPAN INTERNATIONAL COOPERATION AGENCY

P R E F A C E

In response to a request from the Government of the Lao People's Democratic Republic, the Japanese Government decided to conduct a feasibility study on Tha Ngon Bridge Construction Project and entrusted the Study to the Japan International Cooperation Agency (JICA).

JICA sent to Lao PDR a study team headed by Mr. Kimio Chiba three times between February 1990 and December 1990.

The team held discussions with the officials concerned of the Government of Lao PDR, and conducted field surveys. After the team returned to Japan, 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 Lao PDR for their close cooperation extended to the team.

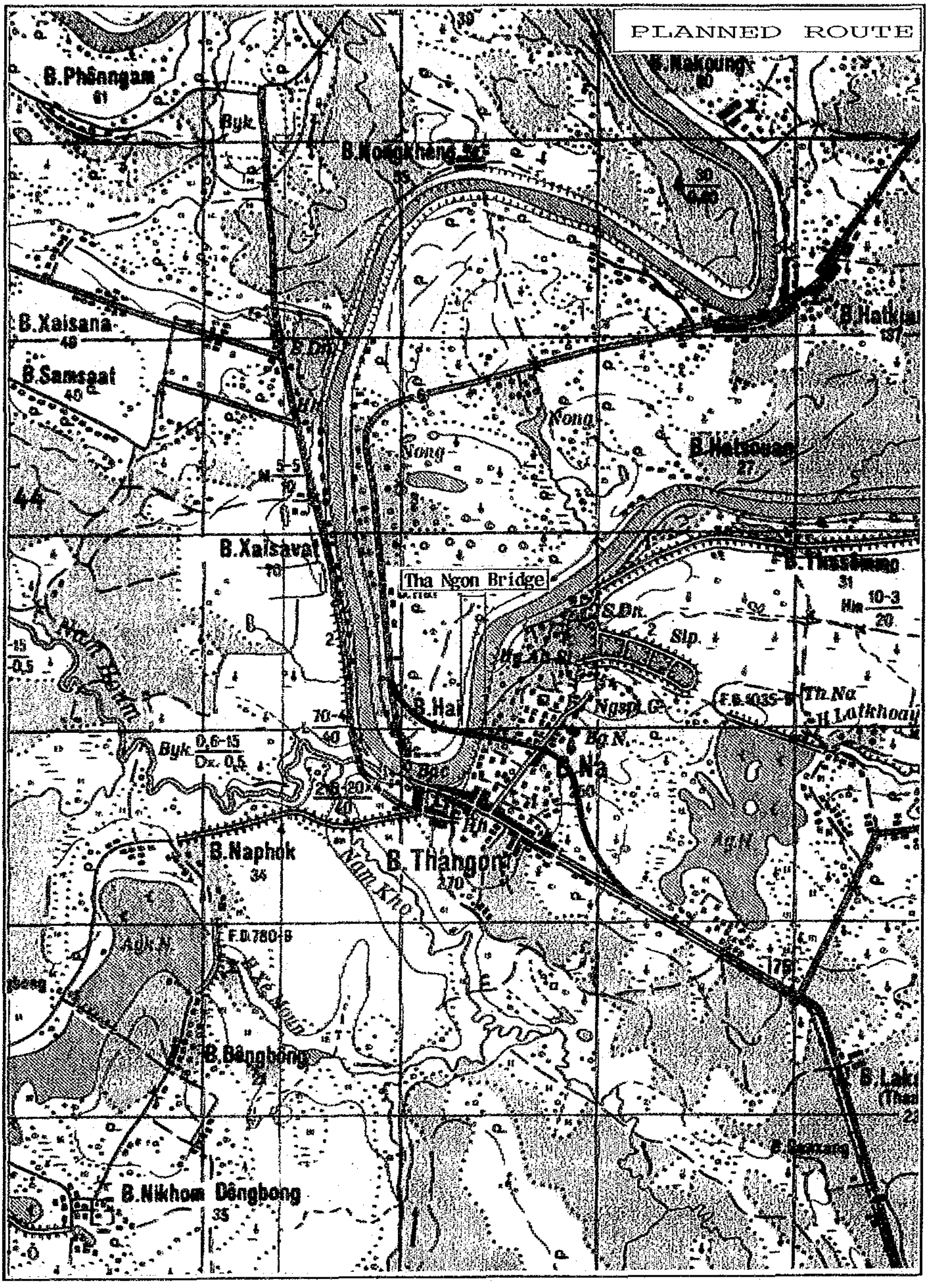
February, 1991

Kensuke Yanagiya

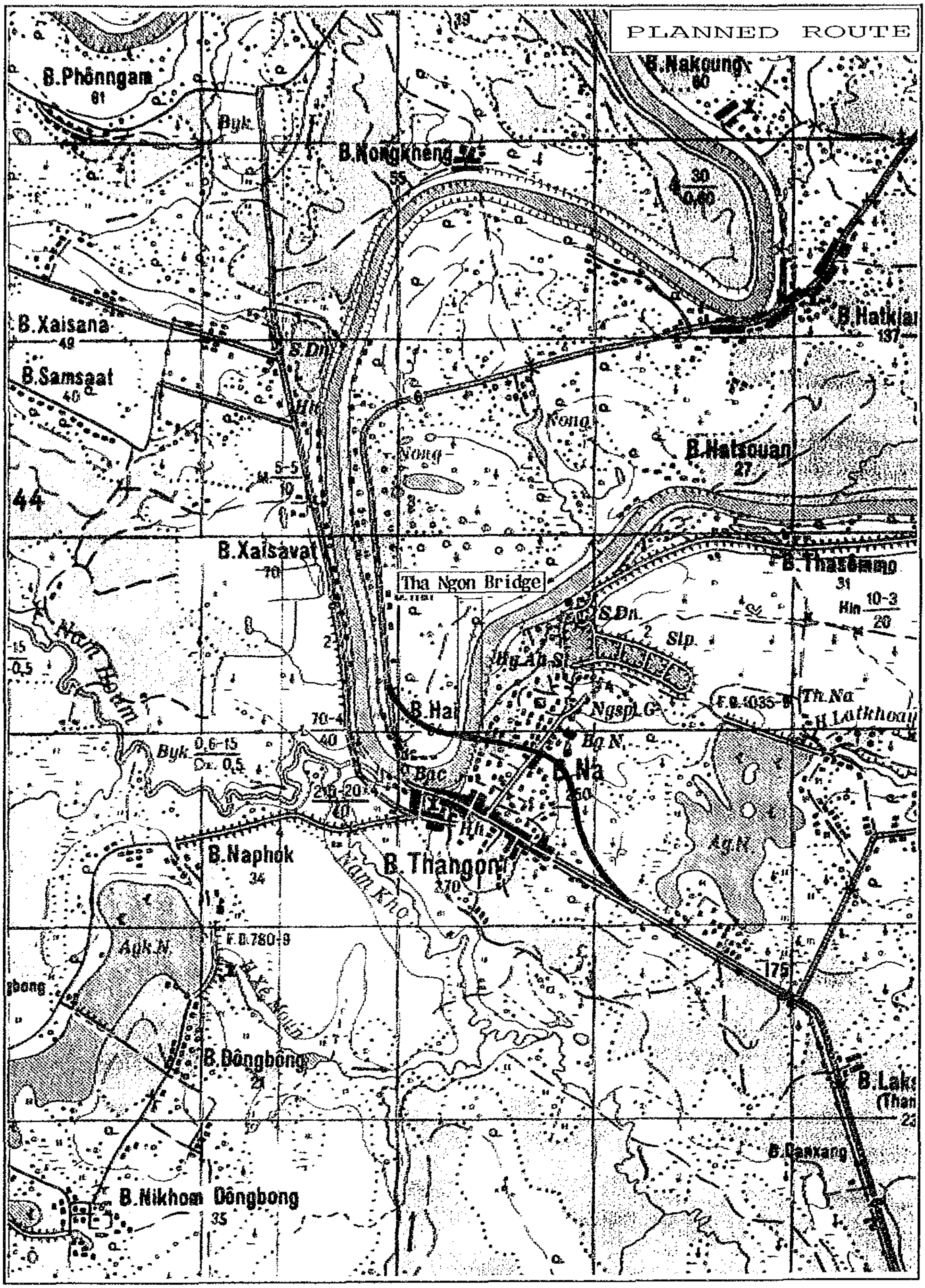
Kensuke Yanagiya
President
Japan International Cooperation Agency

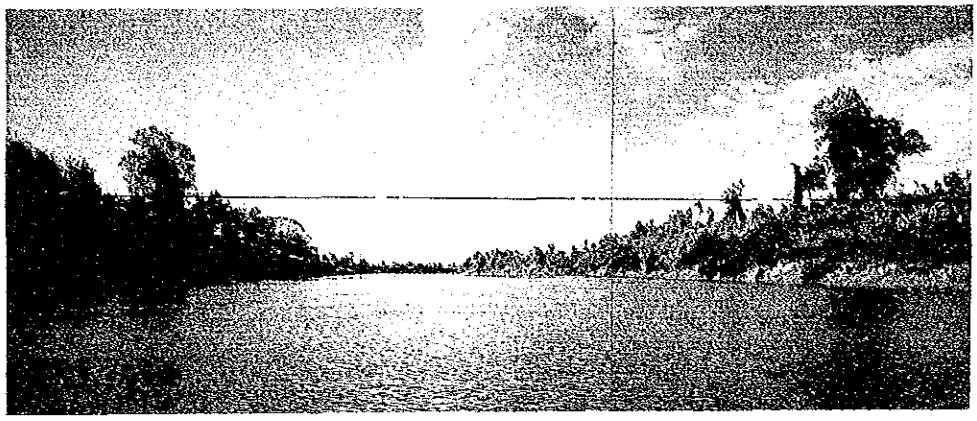

LOCATION MAP
PROJECT SITE
VIENTIANE
NAM KHONG
NAM KHONG
Nam Ngum
LAO PDR
VIENTIANE
THAILAND
KAMPUCHEA
VIET NAM


LOCATION MAP
PROJECT SITE
VIENTIANE
LAO PDR
VIENTIANE
THAILAND
KAMPUCHEA
VIET NAM

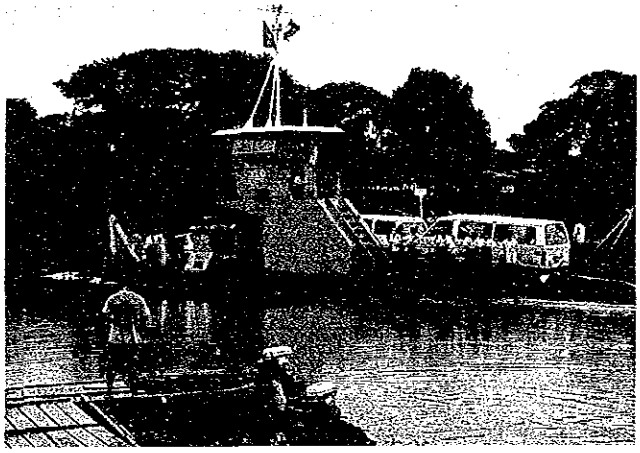


PLANNED ROUTE
B.Phônngam
B.Nongkheng
B.Xaisana
B.Samsaat
B.Xaisavat
Tha Ngon Bridge
B.Hatsouan
B.Hai
B.Na
B.Naphok
B.Thangon
Nam Kho
B.Bângbong
B.Nikhom Dôngbong


PLANNED ROUTE
B.Phônngam
B.Nakoung
B.Nongkheng
B.Xaisana
B.Samsaat
B.Hatkiam
B.Hatsouan
B.Xaisavat
B.Thasômmo
Tha Ngon Bridge
Nam Ngum
B.Hai
B.Na
B.Naphok
B.Thangon
Nam Kho
B.Dôngbong
B.Nikhom Dôngbong
B.Danxang

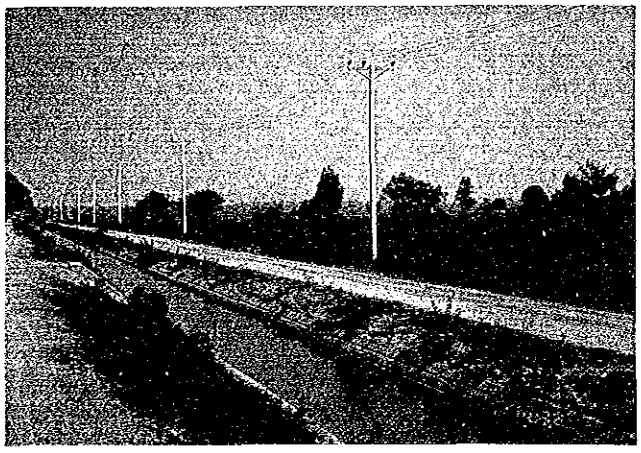


Location of Tha Ngon Bridge



Tha Ngon Ferry

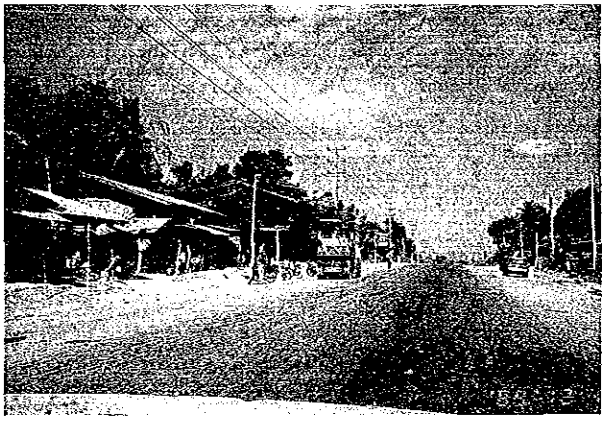
Flood area on right bank side



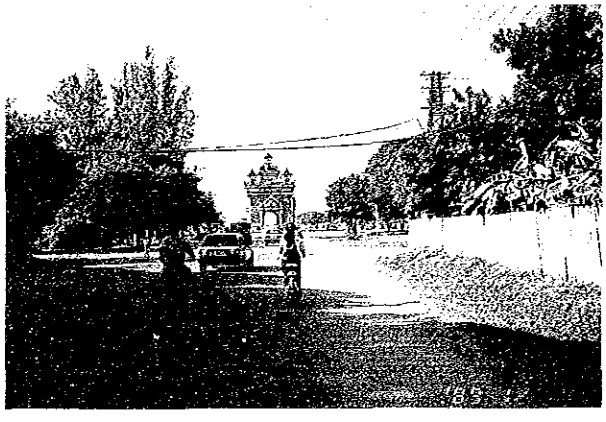
Tha Ngon Farm

Route 10 on the way from Vientiane to Tha Ngon

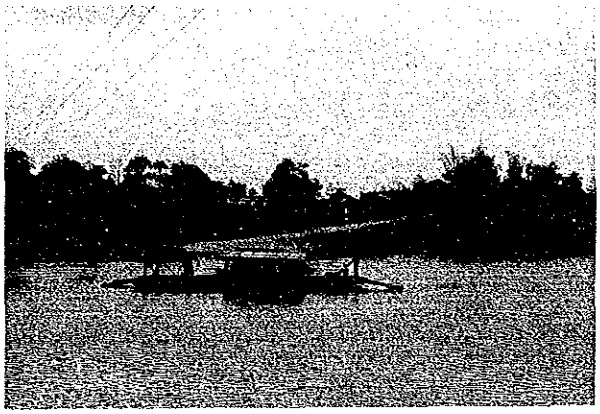
Route 10 after rehabilitation



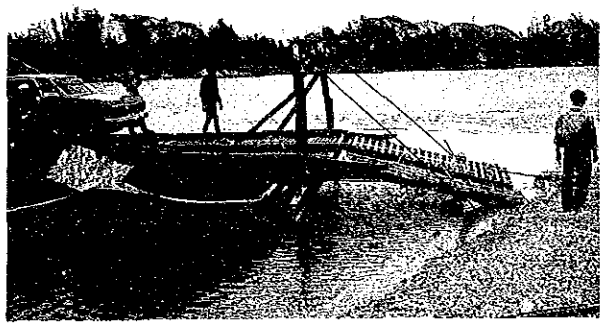
Route 13 near Vientiane



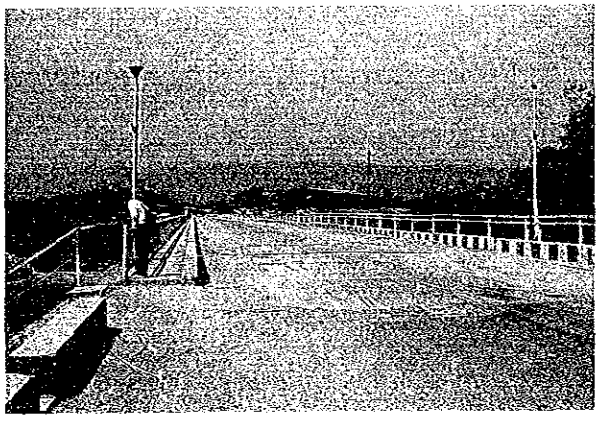
Vientiane



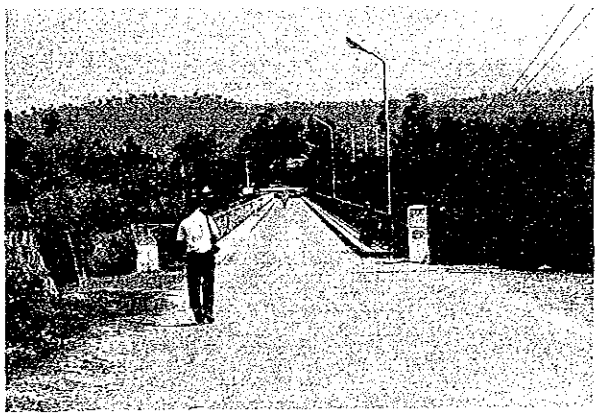
Muang Kao Ferry

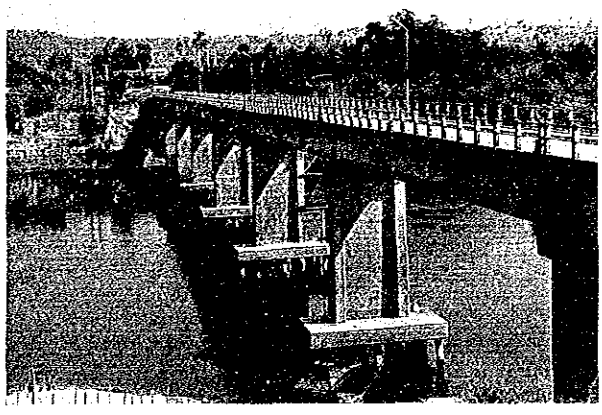


Hatsiao Ferry



Ban Hai Bridge

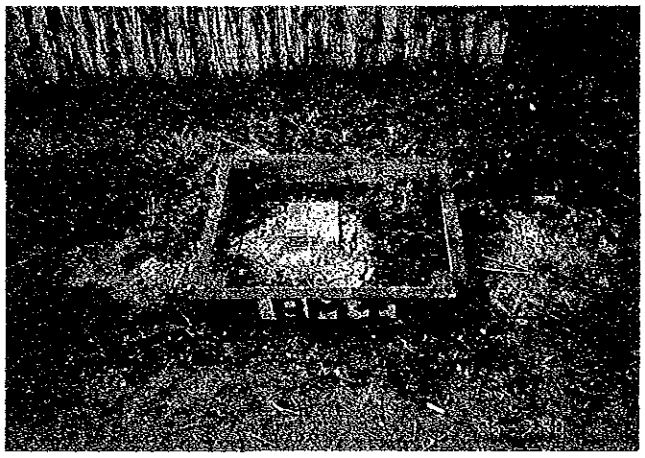




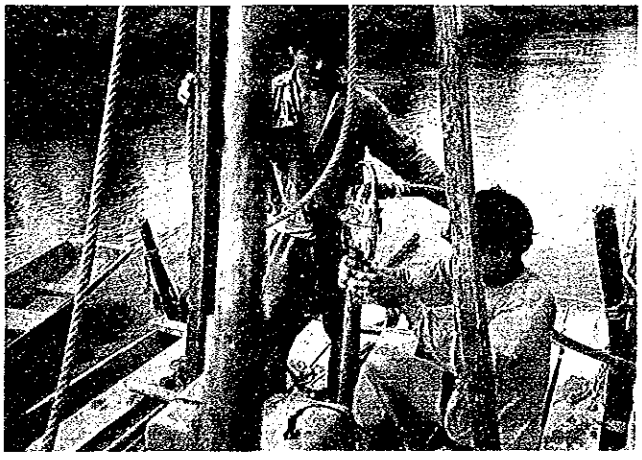
Thin Keo Bridge

O-D Survey on 25th February 1990

O-D Survey on 27th February 1990



Topograhic Survey (Bench Mark setting)



Boring on the Nam Ngum River

CONCLUSION AND RECOMMENDATION

1. CONCLUSION

As the results through the Project, Construction costs were computed as follows:

Description	Financial cost (100 US$)
Bridge	43,952
Approach road	13,337
Temporary bridge	8,260
Rivetment work	4,636
Indirect construction cost	59,574
Land Acquisition Cost	952
Engineering Service Cost	16,338
Contingency	6,479
Total Project Cost	153,527

Based upon these figures and results of traffic estiamtion, socio-economic study and others, results of Economic Evaluation are summarized as follows:

Case	EIRR (%)	NPV(US$1,000)
Base case	11.90	8,345
Construction cost 10% up	11.17	7,164
Construction cost 25% up	10.22	5,392
Traffic growth rate 10% down	9.35	2,494

Gross Domestic Product

Lao economy grew at a relatively high pace between 1982 and 1986. In 1987, the severe drought hampered Lao economy. The economy, however, significantly recovered from the down. The average annual growth rate during the period of 1982-89 is 4.9% which is excess of population growth rate.

Year	1982	1983	1984	1985	1986	1987	1988	1989
GDP(bil.kip)*	190	196	205	221	244	223	228	265
Growth rate(%)		3.0	4.5	7.7	10.4	-8.2	0.1	16.0

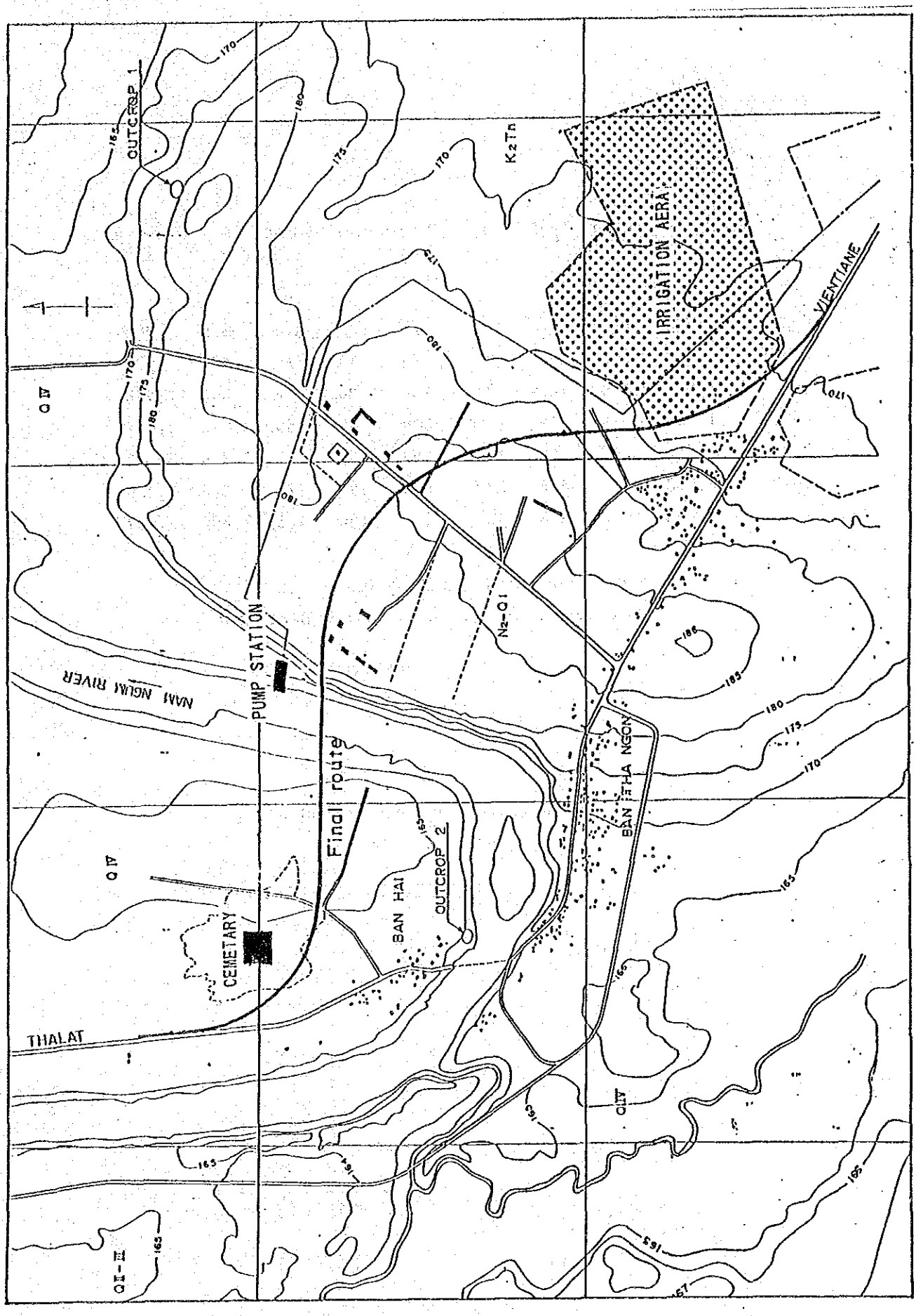
Note : * means GDP in 1988 constant prices

Preliminary Design

Under these economic growth, however, present manner to cross the Nam Ngum River is only the way by means of ferry boat having capacity of 45 tons. This is the bottle neck for traffic on Route 10.

Construction site of the proposed bridge is on the alternative route No.4 as shown in the attached Figure on next page. Bridge length is planned 230m with 5 spans. Substructure is consisting of Reverse Circulation Method's concrete pile with pier, and superstructure shall be the PC concrete beams. The bridge has 2 lanes and one carriageway is 3.0 meters width. 2.5 meters side walk and balcony on the upper stream side were prepared with lighting facility.

On the other hand, approach road is having 3,350 meters in total. The carriage width is 3.0 meters and surface course is designed Double Bituminous Surface Treatment(DBST).



Alignment of Final Route

Future Traffic Volume

Estimated future traffic by year on the planned new route is ;

Year	M/C	P/C	P/U	M/T	H/T	L/B	H/B	Sum	PCU
1990*	228	61	58	23	79	14	16	479	575
1996	647	156	143	71	224	26	33	652	1,548
2000	1,054	229	212	110	348	39	50	2,042	2,414
2005	1,755	346	322	179	564	61	77	3,304	3,883
2010	2,923	523	486	289	909	195	121	5,345	6,238
2015	4,006	699	650	396	1,246	130	165	7,292	8,507

Note : * shows present traffic volume
PCU means passenger car equivalent unit

Costs

Estimated construction costs for the Project are ;

Description	Financial cost (100 US$)
Bridge	43,952
Approach road	13,337
Temporary bridge	8,260
Rivetment work	4,636
Total Direct construction cost	70,184
Preliminaries and general items	11,938
Packing and transport	14,771
Dispatch of expatriate technician	12,503
Site on cost	12,093
Overhead	8,269
Total of Indirect construction cost	59,574
Total of Construction Cost	129,758
Land Acquisition Cost	952
Engineering Service Cost	16,338
Contingency	6,479
Total Project Cost	153,527

Benefits

Economic costs without the Project are;

1) Time cost of passengers crossing Nam Ngum River at Tha Ngon
2) Economic loss due to no ferry operation
3) Extra vehicle operation cost(VOC) and time costs due to diversion from Route 10 to Route 13
4) Extra VOC and time cost of diverted traffic from Route 13 to Route 10
5) Ferry operation and maintenance costs
6) Replacement of ferry boat

Economic benefit with the Project are;

1) VOC saving of generated and developed traffic
2) Salvage value of the ferry coat
3) Residual value of the proposed bridge and approach roads

Economic Evaluation

The economic internal rate of return(EIRR) is calculated at 11.90% for 20 year project life with an assumption that the Project initiates in 1992 and the proposed bridge opens at the beginning of 1996. Net present value of the Project is about US$ 8.34 million with discount rate of 8%. The Project is relatively sensitive to future trafic volume.

The results of sensitivity analysis are as follows.

Case	EIRR (%)	NPV(US$1,000)
Base case	11.90	8,345
Construction cost 10% up	11.17	7,164
Construction cost 25% up	10.22	5,392
Traffic growth rate 10% down	9.35	2,494

2. RECOMMENDATION

As the results of this Feasibility Study, it is found that the Project is feasible with EIRR of 11.90% (base case). It is clearly understood that the Project will rush the national socio economic development schem and also give great assistance to the public activities.

The Project needs only US$ 15 million consisting of US$ 7 million direct construction costs, 6 million of indirect costs and others. Besides total benefits is counting about US$ 80 million.

Other than above, uncountable national economic losses are born from ferry troubles. Thus it is strongly recommended that the Project shall be started as soon as possible.

A. SUMMARY

B. MAIN REPORT

C. ANNEX

D. DRAWINGS

TABLE OF CONTENTS

CHAPTER VIII PRELIMINARY DESIGN

CHAPTER X ECONOMIC EVALUATION

CHAPTER XI CONCLUSION AND RECOMMENDATION

TABLES

CHAPTER - I

CHAPTER - II

CHAPTER III

CHAPTER V

CHAPTER VI

CHAPTER VII

CHAPTER VIII

CHAPTER IX

FIGURES

CHAPTER II

CHAPTER III

CHAPTER IV

CHAPTER V

CHAPTER VI

CHAPTER VII

CHAPTER VIII

CHAPTER IX

APPENDIX

CHAPTER I

INTRODUCTION

CHAPTER I INTRODUCTION

1 Introduction

1.1 General

In response to the request of the Government of Lao People's Democratic Republic (hereinafter referred to as "Lao PDR"), the Government of Japan decided to carry out the Feasibility Study of Tha Ngon Bridge Construction Project(hereinafter referred to as "the Study"). The Study was entrusted to the Japan International Cooperation Agency(hereinafter referred as "JICA"), the official executing agency for implementing the technical cooperation of the Japanese Government.

JICA selected the consultants to carry out the Study in accordance with the Scope of Work agreed between the Lao PDR and the Government of Japan. Simultaneously, organized advisory committee headed by Mr. NAMBU to oversee the Study.

Lao PDR assigned the Vientiane Municipality as the counterpart agency. Department of Communication, Transport and Construction(hereinafter referred to as "DCTC") was appointed as the actual counterpart department.

1.2 Objectives of the Study

The objectives of the study are:

(1) to verify technical feasibility of the Project
(2) to verify economical feasibility of the Project
(3) to undertake transfer of technical knowledge to Lao PDR counterpart personnel.

1.3 Projected Area

As of 1989, the population of Lao PDR was 4,053,000 with a population density of 17.1 persons per sq.Km. Lao PDR is a landlocked country surrounded by Vietnam, Cambodia, Myanmar, Thailand and China with an area of 236,800 sq. Km.

Two thirds of the country is classified as mountainous terrain.

Administratively, whole land is divided into 16 provinces and Vientiane Municipality. Each province consists of 3 to 13 districts and each district is parted in villages (Muang). Vientiane Municipality has eight such administrative districts as follows;

1) Chanthabouli	2) Disattanak
3) Xaisettha	4) Sikhottabong
5) Hatwayfonng	6) Xaithani
7) Naxaythong	8) Phialat

Meanwhile, Vientiane Province has nine districts as follows;

1) Xanakham	2) Fuang
3) Phonhong	4) Kasi
5) Vangviang	6) Xaisomboun
7) Keo-Oudomm	8) Hom
9) Thoulakhom	

With an area of 3,920 sq.Km and a population of 416,000(106 person per sq.Km) in 1988, Vientiane Municipality accommodates about 10.5% of the total population.

Lao PDR has a 13,094 Km of road network consisting of 3,486 Km national roads, 6,149 Km provincial roads and 3,459 Km district roads as shown in Table 1.1.

Of this total, Vientiane Municipality contains about 1,300 Km of roads.

The roads in Lao PDR and Vientiane Municipality are classified by type of pavement in the following table:

	Nationwide	Vientiane M.
Total	13,100-Km	1,300-Km
Paved	2,560-Km(19%)	230-Km(19%)
Lateritic	3,750-Km(29%)	530-Km(44%)
Unpaved	6,790-Km(52%)	540-Km(37%)

Source : "BASIC DATA 1989" Ministry of Economy, Planning and Finance

In the country of Laos, 91.2% of freight and 80% of passenger flow are depending on the road transportation system.

	Freight transport Mil. Tons.Km(%)	Passenger transport Mil. Person.Km(%)
Road	170.9(91.2%)	283.7(80.0%)
Water	16.1(8.6%)	35.1(9.8%)
Air	0.4(0.2%)	36.0(10.2%)

Source : "BASC DATA 1989"

Lack of network and poor maintenance of the road are causing significantly many constraints in regional development.

Recently, a part of route 10 was rehabilitated with the Loan of Asian Development Bank(ADB) Loan. Because bridge construction at Tha Ngon was not included in the above mentioned rehabilitation program, traffic including bicycle and pedestrians is obliged to cross the Nam Ngum River by means of ferry boat.

Inadequate accessibility to Vientiane is, therefore, seriously affecting the regional development in the left side of Nam Ngum River.

Most of the villages and large cultivated lands are located on the left bank of the River. Vientiance Municipality/Vientiane Province produces 23% of rice and 20% of vegetables to the total national product. The area, therefore, is very important to supplying agricultural products to Vientiane Municipality.

In this point of view, Tha Ngon Bridge is expected to be constructed soon.

1.4 Outline of the Study

1.4.1 The Study

The Study started with preparatory works in January 1990 in Japan. First field survey was conducted from February to March 1990. The Team submitted and explained Inception Report and started the first field work which consisted of socio-economic survey, road transport survey, traffic survey, establishment of alternative routes, preliminary physical condition survey, preliminary engineering survey and other necessary investigations at the site.

In June 1990, the Team submitted the Interim Report(I) to the DCTC. The second field work consisted of supplemental socio-economic survey, engineering survey, physical condition survey and others. Topographic survey, boring and necessary laboratory test were also implemented in this stage. During this stage, the route alignment and bridge length were slightly modified based on the actual site situations and conditions in accordance with the topographic survey, borings and other information.

During the second field work (from June to early August 1990), final route, design standards for the Study and other fundamental matters were discussed and agreed by the DCTC and other authorities concerned.

The Interim Report(II) was a results of the second field survey and home work. The report explains the final route, road structure, type of bridge (foundation, pier/abutment, superstructure, spanning), design standards, result of additional traffic survey and supplemental socio-economic survey.

1.4.2. Organization of the Study

The Study is conducted by JICA on behalf of the Government of Japan and the DCTC as the counterpart agency who has close cooperation with other authorities concerned with the Study in the Lao PDR. Authorities such as Ministry/Department concerned with the Project are as follows:

Lao Government/Vientiane Municipality

Vientiane Municipality

Department of Communication, Transport and Construction

Department of Economy, Planning and Finance

Ministry of Communication, Transport, Post and Construction(MCTPC)

Ministry of commerce

Ministry of Economy, Planning and Finance

Ministry of Agriculture and Forestry

Ministry of Foreign Affairs

Ministry of Industry

Vientiane Province

International Organization/Foreign Consultant/Company

United Nations Development Programme

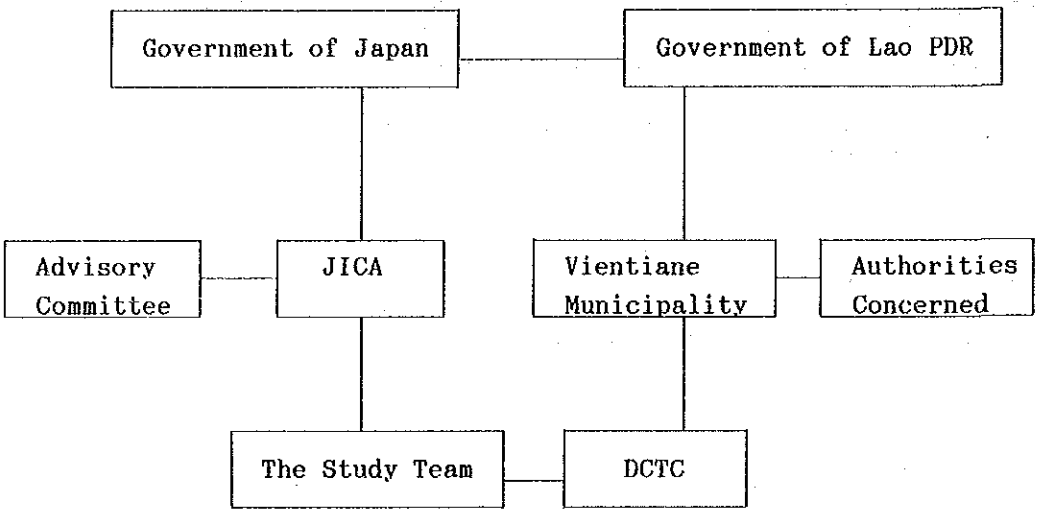
Mekong Secretariat

Societe Shell du Laos

ADB/UNDP Lao Third Road Improvement Project Route 13, North Vientiane=Vangvieng

Details of the name of persons and positions are described in Table 1.2.

Project organization is structured as follows:



1.4.3 Work Schedule

The Study contains two stages. Stage I consists of first home work and first field work, while Stage II consists of second, third and fourth home and field works and fifth home work.

As aforementioned, the Study has started on January 1990 and the First Home work, the First Field Work, the Second Home Work, the Second Field Work and the Third Home Work have been completed.

Fourth Home work started from 11th of September to carry out following works, in Japan.

1) Preliminary Design Work
2) Cost Estimation
3) Economic Evaluation
4) Project Implementation Plan
5) Total Project Evaluation
6) Preparation of Draft Final Report

This Draft Final Report is submitted as the results of Forth Home Work, in Vientiane in early December 1990.

Within two(2) months after receipt of the comment(s) on the Draft Final Report, Final Report will be prepared by the team.

Work schedule is shown in the following time table.

Work Item	1990 J	F	M	A	M	J	J	A	S	O	N	D	1991 J	F
First Home Work	==													
First Field Work		===												
Second Home Work					===									
Second Field Work						======								
Third Home Work							==							
Third Field Work							=							
Fourth Home Work								======						
Forth Field Work												==		
Fifth Home Work													=	
Reporting														
Inception Report	**													
Interim Report(I)						**								
Interim Report(II)								**						
Draft Final Report												**		
Final Report														*

1.5 Structure of the Report

This Draft Final Report is consisting of three volumes such as Main Report (including Summary), Annex(Data), and Drawings.

The Final Report will be divided into four volumes i.e.;

i) Summary;
ii) Main Report;
iii) Annex; and
iv) Drawings.

Table 1.1 Road Length in the Lao PDR

Category	Length (Km)	Density (Km/Km^2)
National Road	3,486 (3,356)*	0.015 (0.014)*
Provincial Road	6,149	0.026
District Road	3,459	0.014
Total	13,094 Km	0.055

Note: * shows figure based on the CDRI's information

Table 1.2(a) Name and position of the person concerned

Lao Government/Vientiane Municipality

Vientiane Municipality

His excellency, Mr. Sisavath KEOBOUNPHANE
Chairman, Vientiane Municipality

His excellency, Mr. Siho BANNAVONG
Vice Chairman, Vientiane Municipality

Department of Communication, Transport and Construction

Mr. Xay PHAKAXOUM
Director, Department of CTC

Mr. Phila KHAMKHOHOMPHANH
Acting Director, Department of CTC
Vientiane Municipality

Mr. Khamla SAYAVONGSA
Deputy Director, Department of CTC
Vientiane Municipality

Mr. Phomma SINGNANONH
Civil Engineer, Chief of Panning and Finance Division,
Department of CTC, Vientiane Municipality

Mr. Phaychith MANOSAN
Assistant Chief of Section, Department of CTC
Vientiane Municipality

Mr. Dapkeo DOUANGPRACHANH
Chief of Bridge and Road Division, Department of CTC,
Vientiane Municipality

Mr. Somchith SITHIPHONG
Hydraulic Engineer, Mekong Bank Protection Project
Department of CTC, Vientiane Municipality

Mr. Soukhon SOUTHICHAK
Director of Preparing School of Housing, Road and
Bridge Construction, Department of CTC,
Vientiane Municipality

Mr. Oudone VANTHANAXAY
Officer, Department of CTC, Vientiane Municipality

Mr. Soulasith OUPRAVANH
Service of Agriculture, Forestry Irrigation and
Cooperatives

Table 1.2(b) *Name and position of the person concerned*

Department of economy, Planning and Finance

Mr. Sithone SIBOUNHEUNG
Vice Minister of Administrative Committee
Director, Department of Economy, Planning and Finance Vientiane Municipality

Mr. Khambay CHAREUN
Deputy Director, Dept. of Economy, Planning and Finance, Vientiane Municipality

Ministry of Communication, Transport, Post and Construction

Mr. Himmakone MANOTHAM
Vice Minister, Ministry of CTPC

Mr. Simon DARARASMY
Director, Department of Planning and Finance
Ministry of CTPC

Mr. Khamla VISISOMBAT
Director, Department of Transport

Mr. Math SOUMALA
Project Management Committee
Department of Communication, Ministry of CTPC

Mr. Boualay SOUK ALOUNG
Director, Department of Communication
Ministry of CTPC

Mr. Home ONE
Departmnet of Communication
Ministry of CTPC

Mr. Channala CHULAMANY
Director, Communication, Design and Research Instiute, Ministry of CTPC

Mr. Khamsay HONGSOUVANH
Engineering and Research Manager, CDRI
Ministry of CTPC

Mr. Savth NOKEO
Managing Director, State Enterprise of Road and Bridge, No.10, Ministry of CTPC

Mr. Phan PHOUTHAVONGS
National Project Manager(Road No.13)
Lao-Swedish Road Project, Ministry of CTPC

Table 1.2(c) Name and position of the person concerned

Mr. Sivisay NGEUN
Director, Enterprise for Survey and Construction Material Laboratory, Ministry of CTPC

Mr. Prathoumvan SAISANA
Deputy Director, Institute of Technical Research and Planning, Ministry of CTPC

Ministry of Commerce
Dr. Bountheuang MOULASY
Acting Director, Department of Economic External Relation, Ministry of Commerce

Ministry of Economy, Planning and Finance
Mr. Chanthavong SAIGNASITH
Department of Capital Investment
Ministry of Economy, Planning and Finance

Mr. Thong PHOUMMATHEP
Acting Director, State Statistic Center
Ministry of Economy, Planning and Finance

Mr. Thao BOUNTHANH
Direction des Imports et Contributions,
Ministere de l'Economie, du Plan et des Finances

Ministry of Agriculture and Forestry
Mr. Kou CHANSINA
Director General, Department of Planning, Finance and Cooperation, Ministry of Agriculture and Forestry

Mr. Langsy SAYVISITH
Director, Irrigation Department, Ministry of Agriculture

Mr. Khamthong SOUKHATHAMMAVONG
Deputy Director, Department of Meteorology and Hydrology, Ministry of Agriculture and Forestry

Mr. Thanousay OUNTHOUANG
Depuy Director, Ministry of Agriculture and Forestry

MR. Bountham PHOXAY
Livestock Feed Enterprise, Thangone Animal Feed Mill

Table 1.2(d) Name and position of the person concerned

Ministry of Foreign Affairs
Mrs. Somsanouk VONGSACK
Department No.2, Ministry of Foreign Affairs

Ministry of Industry
Mr. Vene SOMPASONG
Dhef de Cabinet-Adjoint
Ministry of Industry

Vientiane Province
Mr. Phaylong PHANNARATH
Deputy Director, Department of economy, Planning and Finance, Vientiane Province

Mr. Oudong PHONGPHAYPADITH
Provincial Coordinator, Department of Economy, Planning and Finance, Vientiane Province

Electricite du Laos
Mr. Khamsone PHONGSAVAN
Deputy Manager, Project Department

Mr. Vayakone BODHISANE
Deputy General Director, Lao National Tourism

International Organization/Foreign Consultant/Company

Mr. Claudine TAVEL
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CHAPTER II

PRESENT SOCIO ECONOMIC SITUATION

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2 Present Socio Economic Situation

2.1 Overview of Socio Economic Situation of Lao PDR

2.1.1 Geographical Setting

Lao PDR covers 236,800 square kilometers, stretching about 1,000 kilometers from north to south and between 200 and 400 kilometers from east to west. Lao PDR is a landlocked country bordered by Thailand, Myanmar, China, Vietnam and Cambodia.

2.1.2 Population

Lao PDR is one of the least populated state in the mainland Southeast Asia at present

Lao PDR conducted the national census survey in 1985. The total population in 1985 was about 3,618.000. The population growth rate during 1970s was 2.6% per year. Mainly due to the baby boom, at present, the growth rate is estimated to further increase up to 2.9%. As a result, the total population exceed 4,000,000 in 1989 and some 45% of them belong to the age group under 15 year old.

Savannakhet Province recorded the largest population with 621,000 in 1989 as shown in Table 2.1. Vientiane Municipality had the third largest population by 429,000 after Champassak Province. Vientiane Province was the fifth rank in terms of population size. The population density in 1989 was 19 persons per square kilometer, which is the lowest in the Southeast Asia.

2.1.3 Gross Domestic Product and Industrial Structure

1) Gross Domestic Product

Lao economy grew at a relatively high pace between 1982 and 1986. In 1987, the severe drought hampered Lao economy with GDP decrease by 8.2%. The economy, however, significantly recovered and marked 16.0% growth rate

due to high growth of agriculture forestry, industry, and commerce & government sectors in 1989 as shown below. The average annual growth rate during the period of 1982-89 is 4.9%: This was well excess of population growth rate during the same period.

Year	1982	1983	1984	1985	1986	1987	1988	1989
GDP(bil.Kip)/a	190	196	205	221	244	223	228	265
Growth rate		3.0%	4.5%	7.7%	10.4%	-8.2%	2.1%	16.0%

Note: a/ in 1988 constant prices
Source: State Planning Committee, "10 Years of Socio-Economic Development in the Lao People's Democratic, "1985, and the World Bank

GNP per capita is estimated at US$ 116 in 1989: This is one of the lowest figures in the world. This figure, however, does not necessarily give a true picture of the living standards in Lao PDR because monetization of the economy is still on the way.

As it can be seen in Table 2.2, GDP shares of production sectors did not change so much during 1984-89. Agriculture & forestry sector keeps the large share of approximately 60%. Industry and service sectors have similar shares of approximately 20%. Within industry sector, manufacturing increased its share, while electricity, gas & water subsector has lost its share gradually. Transport, storage & communication and wholesale & retail sub-sectors increased their shares by about one percent for five years.

2) Agriculture and Forestry Sector

The two principal farming systems in Lao PDR are 1) paddy cultivation on the plains and in valley bottoms, and 2) shifting cultivation, so-called slash-and-burn on the slopes and on the areas where wet rice fields are not available. Agricultural production is largely dominated by paddy cultivation, which shares some 95% of the total agricultural production.

Vientiane Municipality has the largest share of rice production by 12.5%, followed by Vientiane Province as shown in Table 2.3. They also recorded the highest yield. As for livestock, Vientiane Province has relatively high shares in buffaloes and cows/oxen as given in Table 2.4.

Exploitable surface water resources exceed any foreseeable effective demand. Current irrigation development is minimal relative to the 600,000 ha potential area estimated by the Ministry of Agriculture and Forestry. Namely, it is easy to increase agricultural production if required inputs and infrastructure are provided.

The government gradually shifts its policy from rice intensification to diversification of agricultural crops. Also, the government aims to eliminate slush-and-burn agriculture and intensify use of low-land areas. In addition, reforestation programs are being implemented with government initiative.

3) Industry Sector

Available data indicate that there were 257 public industrial enterprises in 1987. Out of 257 enterprises, about 30% are centrally supervised by various ministries and 70% are supervised by the provinces. The larger enterprises are located in and around Vientiane.

The manufacturing sector experienced decline of production during the First Five Year Development Plan period (1980-1984).

In order to revitalize the manufacturing sector, the Government implemented major reforms in 1985 including increase in prices, which reflects actual production costs and wages. Also, several public enterprises have been given greater freedom of production and decision making.

4) Service Sector

During 1982-86, the transport sector grew at a slower rate than GDP. With the removal of restrictions on shipment of goods across provinces, the relationship between GDP and transport would follow the usual pattern characterized in such a way that transport services increase at a faster rate than

GDP. At the same time, the 1987-88 removal of restrictions on private activities in services and commerce would lead to growth in private relevant sectors.

5) Specific Feature of Lao Industrial Structure

In comparison with developing countries with similar level of GDP per capita, the service sector in Lao PDR has an extremely small GDP share as shown below. This is mainly due to insufficient infrastructure, less developed economic system and insufficient inter-linkage among sectors. Since the economic system changed into the market economy, service sector including transportation has become more important for economic development.

	Lao PDR	Bangla-desh	Myan-mar	Malawi	Guinea Bissau	Mali
Agriculture	60.4%	46.7%	46.0%	34.3%	51.3%	57.4%
Industry and construction	21.0	14.4	13.7	17.1	17.4	11.2
Services	18.6	38.9	40.3	48.6	31.4	37.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Per capita income (in US$)	164/a	160.0	200.0	160.0	170.0	170.0

/a : estimation
Source: Lao PDR authorities and The World Bank

6) Employment

Labor force in Lao PDR in 1986 was estimated at 1.55 million, which was 42% of total population according to the World Bank. The employment shares by industrial sector in 1988 were estimated at 80% for agriculture, 2% for industry, and 18% for service sector.

7) External Trade

Historically, Lao PDR's external trade is characterized by a persistent disequilibrium, with exports covering only 27-30% of imports in 1984-87. The export-import ratio, however, has been slightly improving. Principal exported

goods are electricity, coffee, and processed wood (refer to Table 2.5), while major imported goods are vehicles, fuel, construction materials and textile (refer to Table 2.6).

The current deficit increased from US$83 million in 1984 to US$114 million in 1987 as shown below (also see Table 2.8). Net capital inflows rose steadily in recent years from US$86 million in 1984 to US$115 million in 1987. Unlike previous years, inflows from both the convertible and the non-convertible areas increased due to larger disbursements of long-term loans from multilateral institutions. An important characteristic of the Lao PDR's balance of payment is the need to maintain two separate balance of payments, one for the convertible currency area and one for the non-convertible currency area.

(Unit : Million US$)

	1984	1985	1986	1987
Export	43.8	53.6	55.0	64.2
Import	161.9	193.2	185.7	216.2
Current account	-82.9	-93.7	-89.9	-114.3
Capital account	86.0	101.9	106.7	115.0
Convertible area	7.6	4.3	15.9	9.6
Non-convertible area	78.4	97.6	90.8	105.4
Loan (net)	28.3	46.8	33.1	50.3

Source: The World Bank

External public debt outstanding is estimated to have increased from $445 million in 1984 to $839 million at the end of 1987, of which some 70% is owed to the non-convertible currency area. In 1986, at the time of the preparation of the Second National Development Plan, the repayment of the outstanding debt to the non-convertible area was deferred until 1991 when a further review is to take place. The debt service ratio decreased to 15.6% in 1988 from 22.4% in the peak year, 1985.

8) Foreign Exchange Rate

The multiple exchange rate system consisting of seven exchange rates was infrequently adjusted during the period of 1982-86. At the beginning of 1986, the Government initiated unification of the multiple exchange rates in parallel to the implementation of a new economic management system. The system was changed in September 1987 to reflect market rates. During the period of 1985-88, the exchange rate was relatively stable around 400 kip = 1 US$. Since the end of 1988, Kip has been devalued stepwise as shown below. As of March 1990, the official exchange rate is 1 US$ = 717 kip: difference between the official and market rates is less than 10%.

Year	Month	Rate
1984		253
1985		424
1986		400
1987		390
1988	January	385
1988	March	355
1988	August	422
1988	December	455
1989	February	475
1989	April	555
1989	September	612
1989	December	717
1990	August	715

Source: Lao authority

9) Price System and Inflation

Monetization in Laos is still on the way. Only an estimated 1.5% of the GDP arose from cash transactions prior to the fiscal reforms in 1988. Traditionally, the most important unit of exchange for most of the economy has been rice or paddy.

Before 1985, there were two types of prices: the official price which was controlled by the Government and the free market price. Naturally, the market price was significantly higher than the official price. In 1985, the Government determined to decrease the difference between the two prices,

which was considered as the major reason of confusion of the price system. The difference was almost eliminated in 1988.

During the last decade, the Lao economy suffered from the high inflation rate. Especially in 1985 a high price escalation, 115% increase from the previous year, mainly due to imbalance between excess money supply and shortage of commodities was observed as shown below. To cope the inflation, the Lao Government decreased money supply in the short-term and reformed the price system. As a result, the inflation rate declined to 7% in 1987. However, the inflation rate again increased to 33% in 1988 mainly due to the abolition of most price controls, devaluation of Kip, elimination of subsidies and adjustment of official prices with market prices. Although the official prices substantially increased in early 1988, parallel market prices remained relatively stable: they rose by 7.7% in 1987 and 4.4% during the first half of 1988.

	1984	1985	1986	1987	1988
Consumer price index	100	215	290	311	413
Inflation rate	27	115	35	7	33

Source: The World Bank and the UNDP

2.1.4 Government Policies

1) National Socio-economic Development Plan

The objectives of the Second Five Year Plan (1986-1990) which are similar to those adopted under the First Five Year Plan (1981-1985) as follows:

a) to ensure food self-sufficiency and food security

b) to reduce the area subject to slash-and-burn cultivation and to conserve forest resources

c) to expand the agro-forest resources

d) to improve the balance of payments by reducing non-food ports and increasing exports, particularly to convertible currency countries

e) to improve the transport and telecommunications networks very significantly

f) to strengthen managerial capabilities and to overcome the bottlenecks created by the lack of qualified manpower.

The targeted annual growth rate was set at 10% during the planning period. All the sectors except internal trade are expected to row faster than the previous planning period as shown below:

Sector	Target Annual Growth Rates (at constant prices) First Plan 1981-85	Second Plan 1986-90
Agriculture	7.35 %	9.85 %
Livestock	(11.85)	(7.05)
Crops	(5.30)	(11.30)
Industry	7.20	13.65
Transport	7.80	11.30
Construction	7.10	12.55
Internal Trade	10.20	7.70
Overall growth	7.00	10.35

Source: Lao authorities

The period of 1991-1995 is considered as an interim period in the course of the economic development. Further investments, as well as increasing government revenues from taxation, will still be necessary in order to increase export. Imports are closely linked to GDP growth and cannot easily be reduced. During the next five years, exports are predicted to increase by 5.5% per annum slightly faster than GDP.

2) Public Finance

Lao Government planned to invest one and half times of the actual amount of the First Five Year Plan during the Second Five Year Plan period. Transport sector received the highest investment share (slightly over one quarter) during both the Fist and Second Five Year Development Plan periods as it can be seen from Table 2.8.

Fully four-fifths of investment in the transport sector was for road rehabilitation and construction as shown in Table 2.9. The remainder was for transport facilities.

The Government recently acknowledged the needs to increase maintenance expenditures, particularly in the transport sector. Required annual maintenance cost to uphold the present standard of the national and provincial road networks is estimated at US$ 800 per km according to the National Transport Study.

Due to lack of revenues, both at the central and provincial levels, it has been very difficult to allocate domestic financial resources to government capital investment. It is considered that reduction of operating expenditures and salaries of civil servants are possible alternatives to generate additional funds. They are, however, already too low to reduce.

The capital investments in 1990s are expected to remain around 15% of GDP, which are the same as planned for 1986-1990. The two main priorities are likely to be the expansion of hydroelectric power generation and the continued development of transport and communications. No large scale investments in industrial development or mining are foreseen before 1995, at least not by the public sector.

3) New Economic Mechanism

Through the substantial progress towards economic development during the early 1980s, several critical issues were identified. First issue was the lack of incentives and flexibility. Second bottleneck was the low saving rate. Recognizing these shortcomings, the Government initiated a reform of

public enterprise management in 1985. Also, during 1987 and 1988, a series of government decrees were published in order to establish new economic mechanism. Concretely speaking, the following policy changes were adopted to speed up the country's development with a more efficient economy:

a) increased decentralization of government decision making

b) granting of financial and managerial autonomy to over half of the state enterprises

c) liberalization of prices to reflect market values

d) decontrolled procurement procedures for enterprises

e) liberalization of domestic and international trade

f) establishment of a single exchange rate for the Kip based on market rates

g) intensified efforts to substitute cash transactions for exchange of goods

h) decrease in the size of the civil services at the central level

i) abolition of subsidies and transfers to state enterprises to place public and private enterprises on an equal footing

j) abolition of consumer subsidies

k) tax reforms (January, 1988)

l) promulgation of a foreign investment code to encourage foreign investment (January, 1988)

m) establishment of self-managed autonomous banking institutions to handle foreign exchange and assure commercial and development functions, with central bank functions retained by the State Bank.

4) Development Plan of Vientiane Plain

Based on the Second Five Year Socio Economic Development Plan, Vientiane Municipality clarified the following general directions for Socio Economic development:

a) To improve living standard by supplying foods for daily consumption, consumer goods and houses

b) To increase the agricultural production by introducing the intensive production

c) To improve industrial sector based on the new economic policies

d) To improve transportation and communication system

e) To train professionals and technical specialists

f) To guarantee income, budget and fiscal situation

The overall target annual growth rate of output was set at 10%. The sectional target growth rates are 12.2% for agriculture, 10.0% for industry, and 11.7% for commercial sector.

2.2 Present Socio Economic Situation of Influence Area

2.2.1 Overview of Vientiane Plain

The Vientiane Plain is located in the west-central part of Lao PDR. The Plain is bounded by Mekong River to the south and south-west, and 1,500-meter high mountain ranges to the north, east and west. The Plain lies between latitudes 17.50 and 18.40 north and longitudes 102.00 and 103.15 east. It is an alluvial flood plain area formed by Mekong and Nam Ngum Rivers.

The Lao PDR consists of 16 provinces and Vientiane Municipality. The area which receives impacts from the Project spreads in a part of Vientiane Municipality (Xaythani District) and Vientiane Province (Thourakhom District) as presented in Figure 2.1. The Project will significantly improve the access to Vientiane from this area.

The Vientiane Plain is primarily a rural area in nature and thus its economy is predominantly dependent on agriculture and forestry. Urbanization is limited in the Plain, compared to the other areas of the South-East Asia. Nevertheless, Vientiane city is the largest urban center not only in the Plain but also in the nation.

From the viewpoint of the hierarchy of settlements in the Vientiane Plain, Tha Ngon and Ban Keun function as secondary centers (see Figure 2.2). In addition, there are several relatively large villages along Route 10 on the left side of Nam Ngum River (see Figure 2.3).

2.2.2 Population

Population of Vientiane Municipality and Vientiane Province in 1990 are estimated at 409,000 and 305,000, respectively. Estimated population growth rate is 3.4% for the Municipality and 2.9% for the Province. Xaythani District is the most populated district in the Municipality (79,000) and Thourakhom District is the second in the Province (51,000) as given in Tables 2.10 and 2.11.

2.2.3 Land Use

Vientiane Municipality is covered mainly by forest and wet-rice field: their areas are 668 square kilometers for forest, 388 for wet-rice field, including 97 square kilometers of irrigated area. In Vientiane Province, forest and green areas cover some 90% of the total area. Agricultural area cover about 70 square kilometers.

Land use near the project site is mainly agricultural field. In the ferry landing areas on the both sides, there are several stores and stables. On the Ban Tha Ngon side, a public market functions as a collecting point of agricultural products. There are also two factories in operation and a high level educational facility under construction. Down the Nam Ngum River from the ferry crossing, Tha Ngon Farm whose irrigation system was recently improved spreads along the River. On the Ban Hai side of the River, agricultural field is used extensively. The area between Nam Ngum River and the mountains is flat and is used for agricultural purposes.

2.2.4 Gross Regional Product

Gross regional product of Vientiane Municipality is estimated at 23 billion kip in 1989. The GRP shares by industrial sector in 1989 were 78% for agriculture, 12% for industry, 5% for commerce, 4% for transportation, communication and construction, and 1% for others.

2.2.5 *Agriculture and Forestry*

1) Trend of Agricultural Production

Xaythani District significantly increased agricultural production during the last five years as shown below and also in Table 2.12. About 1,450 ha of new rice fields were developed in five years and rice production increased at 9.6% per annum. Production of sugar cane doubled for four years. Statistical data on Thourakhom District show similar growth rates for agricultural products as shown below. Table 2.13 shows detail data. The high growth rates are mainly brought by introduction of market oriented economy.

	Xaythani		Thourakhom	
	Production (ton, 1989)	Growth rate (1985-89)	Production (ton, 1989)	Growth rate (1986-89)
Rice	45,846	9.6%	22,550	10.6%
Sugar cane	19,800	19.8%	4,375	17.0%
Maize	500	2.5%	888	11.2%
Soybean	10	49.5%		
Tobacco			1,313	-1.3%

Source: Xaythani and Thourakhom District Offices

After the improvement of Route 10 which was completed in December 1987, 80 to 90% of farmers along Route 10 Thouraklom District go Vientiane to sell their products. All year around they sell vegetables and fruits. In addition, some merchants come from Vientiane to Thourakhom District in order to sell daily goods and buy agricultural products for markets in Vientiane.

2) Agricultural Credit

There are two state banks provide loan to farmers in the influence area. The loan amount seems to be rapidly increasing as these banks inform villages of loan availability and conditions. The loan is applied to production of dry and rained rice, industrial crop such as soybean and tobacco, and handy craft. Namely, farmers can use the loan for purchasing fertilizer, insecticide, seed, buffaloes, and fuel, and hiring labor.

3) Possible Irrigation Areas and Agricultural Projects

Ministry of Agriculture and Forestry has a policy to implement agricultural projects in easily accessible areas. Thus, the Ministry started to construct irrigation systems from the land along Route 13, the right bank of Nam Ngum River. The next area to be irrigated is the left bank, which is more fertile than the right bank. The improvement of Route 10 significantly contributed in reducing the constraints for developing the left bank but have not eliminated all of them. The Tha Ngon ferry is remaining the last constraint on Route 10, for regional development. The proposed bridge will erase the last and maximum constraint to and from vientiane on the route 10.

There are about 4,800 ha of irrigation possible areas in Xaythani District and 3,800 ha in Thourakhom District as present in Figure 2.4. About half of these areas are not yet irrigated as shown below. But there is a large scale irrigation plan for Vientiane Plain as presented in Figure 2.5.

District	Rained Field	Irrigation Area (1990) Possible	Actual	Actual/Possible
Xaythani	19,060 ha	4,800 ha	2,600 ha	54%
Thourakhom	7,046	3,800	1,880	49%

Source: Ministry of Agriculture and Forestry, and
Xaythani and Thourakhom District Offices

The following projects on the left side of Nam Ngum River, have high possibilities for implement after the bridge construction:

a) Irrigation
   Pakhagnoung (500ha)
   Tadmala (470ha)
   Ban Napeng (Nava)
   Hatkiang (300ha)
   Ban Keun (500ha)
   Ban Tanpiao (600ha)
   Hoi Nhang

b) Cattle breeding
   Napeng Cattle Farm

c) Rehabilitation of Nam Ngum Reservoir

d) Pou Kao Kouay Integrated Development

4) Forestry

The volume of logs with over 60 cm diameter is some 30 million cubic meters in Vientiane Municipality and Vientiane Province. Out of 30 million cubic meters of logs, some 34% is accessible. There is 45,000 ha possible area for logging on the left side of Nam Ngum River. However, logging is banned to conserve forest resources at present, and Vientiane Province is reforesting 165 ha of land in Thourakhom District in 1990.

2.2.6 Industry

1) Manufacturing

There are 11 large scale industries in Xaythani District including 10 ministerial management factories as presented in Table 2.14. In the influence area, there are 4 sawmills, 29 rice-mills, 4 tobacco drying factories, 1 salt factory, and more than 20 small brick factories. Trend of production of major manufactured goods are shown below.

Product	1985	1986	1987	1988	1989
Salt(ton)	1,000	1,300	4,000	3,000	4,000
Brick(1,000 pieces)	1,700	3,000	3,000	4,500	7,000
Dried tobacco(ton)					690

Source: Vientiane Province

There is an animal feed mill in Tha Ngon. From 1990, the mill will be producing soybean meal and oil soybean besides animal feed as shown in Table 2.15. A part of raw materials are brought from Xaythani and Thourakhom Districts. In addition, the sugar factory in Pak Sap, Xaythani District (the right side of Nam Ngum River) currently purchases some 1,500 ton of sugar cane from Hatkiang (the left bank of Nam Ngum River).

2) Mining

Mineral resources except salt have not been discovered in the influence area. The UNDP started a mineral exploration study covering the whole part of Vientiane Province at the beginning of this year. Mine(s) of copper, silver, lead, zinc, tin and/or antimony are expected to be found in the mountainous area at north and east sides of Nam Ngum Reservoir. Also, sand gold might be found along Nam Ngum River between Tha Ngon and Nam Ngum Dam. In case that a mine is found to be financially viable, the Lao Government plans to puts the exploitation right in a tender.

3) Electricity

The rural electrification project in Vientiane Plain was completed in march, 1990. New 22 kv lines were installed between Nam Ngum Dam and Napheng and between Tha Ngon and Tongmang via Hatkiang. The area receiving power supply stretches along Route 10 and some feeder roads as shownin Figure 2.6. Supply capacity is sufficient for certain level of industrial development. As of March 1990, tariff is significantly cheap by 7 Kip/KW; however, tariff will be raised soon.

2.2.7 Tourism

In 1985, the central government reopened Laos to international tourists. The tourism earning significantly increased from 120,000 US$ in 1988 to 560,000 US$ in 1989. According to Lao National Tourism, target number of foreign tourists are;

Year	1990	1991	1992	1993	1994	1995	2000
Number of Person	6,000	8,000	10,500	12,800	15,200	17,500	30,000

Nam Ngum Reservoir Area is given the first development priority in the local level according to the National Tourism Development Plan: There are some first priority projects in different provinces in the national level.

Two agents operate one-day and two-day bus tours to Nam Ngum Reservoir. Some 20% of foreign travellers who come to Laos visit there. Thai tourist groups go to the Reservoir everyday. Tour buses take Rout 13 to the Reservoir and drive back to Vientiane via Route 10, dropping at the salt extraction site in Ban Bo. When Tha Ngon Ferry does not work, the tour bus has to take an alternative route, which is unpopular among tourists and makes troublesome problems in tour promotion.

There are 12 sightseeing boats on Nam Ngum Reservoir at present. A state enterprise operates one large sightseeing boat with a capacity of 300 passengers once a week in average. Private tour boats have capacity of some 40 persons. Each boat makes one 5-hour tour per day.

A 36-room hotel was constructed on an island which is one-hour boat trip from lakeside. A generator, however, has to be repaired. In addition, the existing 81 room hotel in the area is planed to improve and expand.

Pou Kao Kouay Area which is a mountainous area at the northeast of the Vientiane Plain has been considered as another potential tourism development area in the Vientiane Plain. Tourism resources are grass field, virgin forests, water falls, cool and fresh air, overlook of the Vientiane Plain. Due to lack of access, these resources are not exploited yet. Tourism development in this area is considered as a long term project.

Table 2.1 Population by Province

Province	1985 (1000)	1986 (1000)	1987 (1000)	1988 (1000)	1989 (1000)	Area (sq.km)	Pop.dens (p/sq.km)
Vientiane Muni.	381	392	404	416	429	3,920	109
Vientiane	267	275	284	293	302	19,990	15
Phongsaly	124	128	131	134	138	16,270	8
Luangnamtha	98	101	104	107	111	9,325	12
Oudomxay	189	194	200	275	283	21,190	13
Bokeo	56	58	59	60	62	4,970	12
Luangphrabang	298	307	314	323	331	16,875	20
Houaphanh	212	218	224	230	236	16,500	14
Xayabouri	226	232	237	174	178	11,795	15
Xiengkhuang	163	168	173	178	183	17,315	11
Borikhamxay	123	126	132	135	140	16,470	9
Khammouane	215	221	228	235	242	16,315	15
Savannakhet	549	565	584	603	621	22,080	28
Saravane	189	194	198	202	206	10,385	20
Sekong	51	52	54	56	57	7,665	7
Champasack	407	419	430	443	456	15,415	30
Attapeu	70	72	74	76	78	10,320	8
Total	3,618	3,722	3,828	3,940	4,053	236,800	17

Source: State Planning Committee, "10 Years of Socio-economic Development in the Lao People's Democratic Republic," 1985 and Ministry of Economy, Planning, and Finance, "BASIC DATA 1989", 1990

Table 2.2 GDP Share by Production Sector

	1984	1985	1986	1987	1988	1989
Agriculture	59.03%	60.41%	60.34%	59.00%	59.36%	60.28%
Industry	22.06%	21.43%	21.02%	19.11%	19.71%	19.77%
Mining & Quarrying	0.31	0.34	0.35	0.29	0.23	0.29
Manufacturing	6.90	7.17	7.47	7.63	7.05	8.03
Construction	10.38	9.73	9.51	8.57	10.06	9.12
Electricity, Gas, & Water	4.47	4.19	3.70	2.61	2.37	2.33
Services	18.92%	18.16%	18.64%	21.89%	20.93%	19.94%
Trans. Storage & Comm.	3.33	3.23	3.92	4.85	5.11	4.38
Wholesale & Retail	8.39	8.52	8.55	9.71	8.44	9.43
Bank, Insure. & Real Est.	0.14	0.13	0.15	0.41	0.24	0.22
Ownership of dwelling	1.32	1.25	1.19	1.31	1.33	1.18
Public adminsitration & defense	5.65	4.93	4.72	5.48	5.63	4.56
Other Services	0.09	0.09	0.11	0.14	0.18	0.17

Source: The Wold Bank

Table 2.3 Rice Production by Province (1989)

Province	Sown Area(ha)	Irrigated Area(ha)	Yield (t/ha)	Producution (ton)	(%)
Vientiane Muni.	39,673	5,502	3.45	136,862	9.7
Vientiane	58,200	510	2.38	138,537	9.9
Phongsaly	23,764		1.53	36,352	2.6
Luangnamtha	17,827	12	2.00	35,711	2.5
Oudomxay	40,437	150	2.12	85,675	6.1
Bokeo	5,449		2.86	15,593	1.1
Luangphrabang	42,106	1,006	1.70	71,657	5.1
Houaphanh	30,531	120	2.11	64,368	4.6
Xayabouri	27,419	296	2.38	65,217	4.6
Xiengkhuang	20,242		2.37	47,965	3.4
Borikhamxay	24,100		2.17	52,250	3.7
Khammouane	39,200	590	2.51	98,572	7.0
Savannakhet	90,183	1,300	2.75	247,613	17.6
Saravane	40,165	254	2.56	102,820	7.3
Sekong	7,303		1.21	8,812	0.6
Champasack	77,484	474	2.17	167,934	12.0
Attapeu	12,077		2.33	28,165	2.0
Total	596,160	10,214	2.36	1,404,103	100.0

Source: Ministry of Economy, Planning, and Finance, "BASIC DATA 1989", 1990

Table 2.4 Number of Livestock by Province (1989)

Province	Buffalo		Cow/Ox		Pig		Goat/Sheep		Poultry	
	(head)	(%)	(head)	(%)	(head)	(%)	(head)	(%)	(1000)	(%)
Vientiane Muni	60,452	5.9	47,421	5.8	23,921	1.8	1,672	1.6	348.4	4.8
Vientiane	86,000	8.4	82,600	10.1	105,000	7.8	5,300	5.0	550.0	7.6
Phongsaly	24,269	2.4	9,312	1.1	30,790	2.3	347	0.3	138.4	1.9
Luangnamtha	20,100	2.0	11,244	1.4	53,797	4.0	10,034	9.5	115.0	1.6
Oudomxay	75,210	7.3	48,661	6.0	149,430	11.1	14,107	13.4	711.4	9.8
Bokeo	13,600	1.3	10,200	1.2	62,000	4.6	4,600	4.4	209.0	2.9
Luangphrabang	52,445	5.1	21,865	2.7	130,526	9.7	15,975	15.2	763.4	10.5
Houaphanh	56,414	5.5	28,179	3.5	147,375	10.9	13,755	13.1	863.7	11.9
Xayabouri	47,376	4.6	25,915	3.2	56,577	4.2	2,350	2.2	449.7	6.2
Xiengkhuang	36,357	3.5	45,219	5.5	67,585	5.0	15,404	14.6	250.0	3.4
Borikhamxay	43,255	4.2	32,105	3.9	55,330	4.1	277	0.3	219.0	3.0
Khammouane	85,821	8.4	35,106	4.3	85,450	6.3	400	0.4	236.5	3.3
Savannakhet	178,471	17.4	205,661	25.2	106,354	7.9	15,213	14.5	47.1	0.6
Saravane	74,153	7.2	94,739	11.6	138,072	10.2	2,571	2.4	677.0	9.3
Sekong	19,564	1.9	11,560	1.4	22,818	1.7	2,435	2.3	95.7	1.3
Champasack	113,750	11.1	102,614	12.6	97,399	7.2	261	0.2	1,359.0	18.7
Attapeu	38,948	3.8	4,125	0.5	17,554	1.3	456	0.4	166.4	2.3
Total	1,026,185	100.0	816,526	100.0	1,349,478	100.0	105,157	100.0	7,249.7	100.0

Source: Ministry of Economy, Planning, and Finance, "BASIC DATA 1989", 1990

Table 2.5 Principal Exported Goods

Item	Unit	1984	1985	1986	1987	1988	1989
Electric power	mil.kwh	658	666	683	387	374	496
Timber	th.c.m	9	50	34	20	100	20
Lumber	th.c.m	3	15	11	6	40	50
Plywood	th.sheets	109	170	80	68	310	450
Chipped wood	th.s.m	30	50	138	380	130	101
Rattan	th.pieces				760	600	500
Coffee	tons	4,040	4,351	4,156	2,340	2,341	5,400
Sesame	tons				380	500	1,200
Cardamone	tons	58	310	59	50	81	1,000
Benjoin	tons	18	148	32	70	12	160
Buffalo	th.tons				10	21	20
Cattle	th.tons				4	7	19
Gypsum	th.tons.	70	80	91	99	46	63
Tin	th.tons.	0.4		0.5	0.5	0.4	0.1

Source: Ministry of Economy, Planning, and Finance, "BASIC DATA 1989", 1990

Table 2.6 Principal Imported Goods

Item	Unit	1984	1985	1986	1987	1988	1989
Electric power	mil.kwh	15	18	19	18	16	13
Trucks	unit	178	358	318	712	387	389
Sedan cars	unit	60	90	70	80	608	801
Specialized cars	unit	49	8	34	20	50	59
Buses	unit	11	18	9	8	10	50
Moytorcycles	unit				600	3,184	4,753
Bicycles	th.tons	5	11	21	22	121	179
Fuel	th.tons	65	50	119	79	89	124
Cement	th.tons	23	65	11	3	81	107
Iron	th.tons	5	20	3	4	11	50
Paper	tons	1,000	1,000	1,100	1,397	1,039	1,450
Cotton thread	tons	350	250	268	273	341	290
Fabircs	th.m	8,782	8,125	2,583	4,617	1,254	1,954
Medicines	th.US$	2,597	9,209	549	725	1,790	8
Sugar	tons	3,120	4,000	1,530	5,185	2,451	17,995
Condensed milk	th.cans	700	700	120	250	193	20,860
Sewing machine	unit	2,560	7,000	4,026	2,100	3,764	5,618
Rice	th.tons	38		13	29		42
Salt	tons	500	500	200	200	150	

Source: Ministry of Economy, Planning, and Finance, "BASIC DATA 1989", 1990 and State Planning Committee, "10 Years of Socio-economic Development in the Lao People's Democratic Republic," 1985

Table 2.7 Balance of Payments, 1984-87
(in million US dollars)

	1984	1985	1986	1987
Exports	43.8	53.6	55.0	64.2
Imports	-161.9	-193.2	-185.7	-216.2
Trade balance	-118.1	-139.6	-130.7	-152.0
Services (net)	-9.8	-7.2	6.6	7.2
Convertible area	45.0	53.1	34.2	30.5
Current acocunt	-82.9	-93.7	-89.9	-114.3
Capital account	86.0	101.9	106.7	115.0
Convertible area	7.6	4.3	15.9	9.6
Non-convertible area	78.4	97.6	90.8	105.4
Loans (net)	(28.3)	(46.8)	(33.1)	(50.3)
Bilateral clearing arrangements	(50.1)	(50.8)	(57.7)	(55.1)
Errors and omission	-9.1	10.5	-7.7	-11.8
Chanage in reserves (- = increase)	6.0	-18.7	-9.1	-11.1

Source: The World Bank

Table 2.8 Allocation of Investment Expenditures During the First and Second Five-Year Plans (in million Kip, 1986 prices)

	First Five-Year Plan(1981-85)/a				Second Five-Year Plan(1986-90)/b			
	Domestic resources	Foreign resources	Total	% of Total	Domestic resources	Foreign resources	Total	% of Total
Agriculture	3,086	6,716	9,802	19.1%	7,500	6,569	14,069	18.5%
Industry	2,057	4,460	6,517	12.7	3,750	11,851	15,601	20.5
Commerce	514	676	1,190	2.3	1,000	1,136	2,136	2.8
Transport	5,315	8,612	13,927	27.1	5,000	15,134	20,134	26.4
Construction	686	2,964	3,650	7.1	1,250	4,926	6,176	8.1
Other productive investsment	1,714	6,073	7,787	15.2	1,250	-	1,250	1.6
Education	2,055	688	2,743	5.3	2,000	1,361	3,361	4.4
Health	685	1,900	2,585	5.0	1,250	1,293	2,543	3.3
Culture	343	1,616	1,959	3.8	750	1,137	1,887	2.5
Housing	688	484	1,172	2.3	1,250	768	2,018	2.6
Others	-	-	-	-	7,000	-	7,000	9.2
	17,143	34,189	51,332	100.0	32,000	44,175	76,175	100.0

/a Actual expenditures. Foreign resources were converted into domestic currency by using an exchange rate of Kip 95 per US$.
/b Planned expenditures.

Source: Lao PDR authorities

Table 2.9 Government Expenditure on Transport 1986-1988

	Actual Expenditure 1986	1987	1988	Budget 1989
A. Government Outlays on Transport	4,204	4,716	15,482	16,350
i. foreign aid & loans/a	2,404	2,869	12,240	13,850
ii. local funds	1,800	1,847	3,242	2,500
- equivalnet in million US$	44.3	49.6	38.7	32.7
- % of total Government outlays	41	41	44	34
B. Government Outlays by Mode				
1. Roads	4,198	4,542	14,150	14,280
i. foreign aid & loans	2,404	2,698	10,920	11,800
ii. local funds	1,794	1,844	3,230	2,480
2. River Ports	6	174	1,332	2,070
i. foreign aid & loans	0	171	1,320/d	2,050
ii. local funds/b	6	3	12/d	20
C. Government Outlays by Source				
1. National road construction	3,907	4,113	13,335	12,190
i. foreign aid & loans	2,404	2,698	10,920/d	10,630
ii. local funds	1,503	1,415	2,415/d	1,560
2. National road maintenance	3,907	223	520	1,694
i. foreign aid & loans	0	0	0	1,170
ii. local funds	166	223	520	524
3. Provincial road construction/c	8	18	30	40
4. Provincial road maintenance	90	160	230	320
5. Survey and design	27	28	35	36

Notes: /a The commercial exchange rates of US$ as used by Government are Kip 95 (1986 and 1987), Kip 400 (1988) and Kip 500 (1989)
/b Includes workshop construction
/c Estimated here at about 10% of the total outlays for provincial roads (local resources only)
/d Includes the additional allowance required for the completion of Road No.9

Source: SWECO, "National Transport Study: Interim Report I," September 1989

Table 2.10 Estimated Population by District (1990)

	District	Population	Area sq.km	Density p/sq.km
VTE	Municipality			
	Chanthabouri	50,343	18	2,797
	Sikhottabong	55,670	133	419
	Xaysettha	57,230	157	365
	Sisattanak	52,198	16	3,262
	Naxaythong	36,556	807	45
	Xaythani	79,112	1,229	64
	Hatxayfong	62,670	300	209
	Phialat	15,000	956	16
	Total	408,779	3,616	113
VTE	Province			
	Phonehong	59,436	608	68
	Thourakhom	51,182	610	84
	Muang Feuang	34,093		
	Kasi	32,595		
	Keo Oudom	26,585	379	70
	Vangvieng	37,022		
	Muang Hom	18,145		
	Xaysomboun	19,174		
	Xanakham	26,331		
	Total	304,568		

Note: Population is estimated based on the 1985 census.

Source: Vientiane Municipality and Vientiane Province

Table 2.11 Population of Xaythani District (1990)

Old Tasseng	Population	Household
1. Ban Xay	10,178	1,808
2. Pakao	8,602	1,504
3. Houa Xiang	8,307	1,404
4. Tha Ngon	14,018	2,051
5. Dong Nang	7,309	1,221
6. Nafay	7,545	1,343
7. Naxone	7,376	1,487
8. Hat Kiang	5,787	1,098
9. Ban Xang	5,891	1,078
10. Sin Xai	4,222	819
Total	79,235	13,813

Source: Xaythani District Office

Table 2.12 Agricultural Production in Xaythani District

Year	Rice			Sugar Cane		
	Area (ha)	Production (ton)	Growth rate	Area (ha)	Production (ton)	Growth rate
1985	13,836	31,823		320	9,600	13.0%
1986	14,186	36,884	15.9%	350	10,850	-11.5%
1987	13,920	38,976	5.7%	300	9,600	106.3%
1988	14,500	42,050	7.9%	600	19,800	0.0%
1989	15,282	45,846	9.0%	600	19,800	
1990/a	19,060	59,086		600	21,000	
85-89			9.6%			19.8%
89/85		1.44			2.06	

Year	Maize			Soybean		
	Area (ha)	Production (ton)	Growth rate	Area (ha)	Production (ton)	Growth rate
1985	680	816		5	2	
1986	690	826	1.5%	5	2	0.0%
1987	600	1,020	23.2%	5	2	0.0%
1988	500	850	-16.7%	5	3	50.0%
1989	500	900	5.9%	20	10	233.3%
1990/a	600			20		
85-89			2.5%			49.5%
89/85		1.10			5.00	

a/ target numbers

Source: Xaythani District

Table 2.13 Agricultural Production in Thourakhom District

Year	Rice			Sugar Cane		
	Area (ha)	Production (ton)	Growth rate	Area (ha)	Production (ton)	Growth rate
1986	6,142	16,673		78	2,730	
1987	6,824	19,109	14.6%	200	7,000	156.4%
1988	n.a.	n.a.	n.a	n.a	n.a.	n.a
1989	7,047	22,550		125	4,375	
85-89			10.6%			17.0%
89/85		1.35			1.60	

Year	Maize			Soybean		
	Area (ha)	Production (ton)	Growth rate	Area (ha)	Production (ton)	Growth rate
1986	322	645		220	1,364	
1987	320	640	-0.8%	250	1,625	19.1%
1988	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1989	355	888		202	1,313	
85-89			11.2%			-1.3%
89/85		1.38			0.96	

Source: Thourakhom District

Table 2.14 Location of Large Industries by District, Vientiane Plain

Industries by Management	Chant-habouri	Xays-ettha	Sikhot-tabong	Sisat-tanak	Hatx-ayfong	Naxay-thong	Xayt-hani	Keo Oudom	Phone-hong	Thoura khom	Total
1. District Managed	4	2	3	7	6	-	-	6	1	6	35
- District owned	4	2	3	-	2	-	-	1	7	6	25
- Co-operative	-	-	4	-	-	-	-	-	-	-	4
2. Prefecture Management											
- Prefecture owned	5	4	7	2	5	-	1	-	-	-	24
- Co-operative	3	-	-	1	-	-	-	-	-	-	4
- Prefecture owned & private	5	-	1	2	-	-	-	-	-	-	8
3. Provincial Management	-	-	-	-	-	-	-	1	3	1	5
4. Ministrial Management	4	2	5	2	17	2	10	-	-	-	42
Total	25	10	23	14	30	2	11	8	11	13	147
(%)	17.0	6.8	15.6	9.5	20.4	1.4	7.5	5.4	7.5	8.8	100.0

Source: Vientiane Municipality
"Urban Development Program in the Municipality of Vientiane", 1989

Table 2.15 Products and Raw Materials of Animal Feed Mill

	1986	1987	1988	1989	1990	1991	1995
Products							
Animal feed	4,000	5,000	5,000	3,500	5,000	5,000	8,000
Oil bean					50	70	150
Bean meal					300	350	800
Raw Materials							
Maize	1,800	2,500	2,500	1,500	2,500	2,500	3,400
Cassava	800	850	850	500	1,000	1,000	1,600
Soybean	400	500	500	350	500	500	800
Others	1,000	1,150	1,150	1,150	1,150	1,150	2,000

Source: Animal Feed Mill

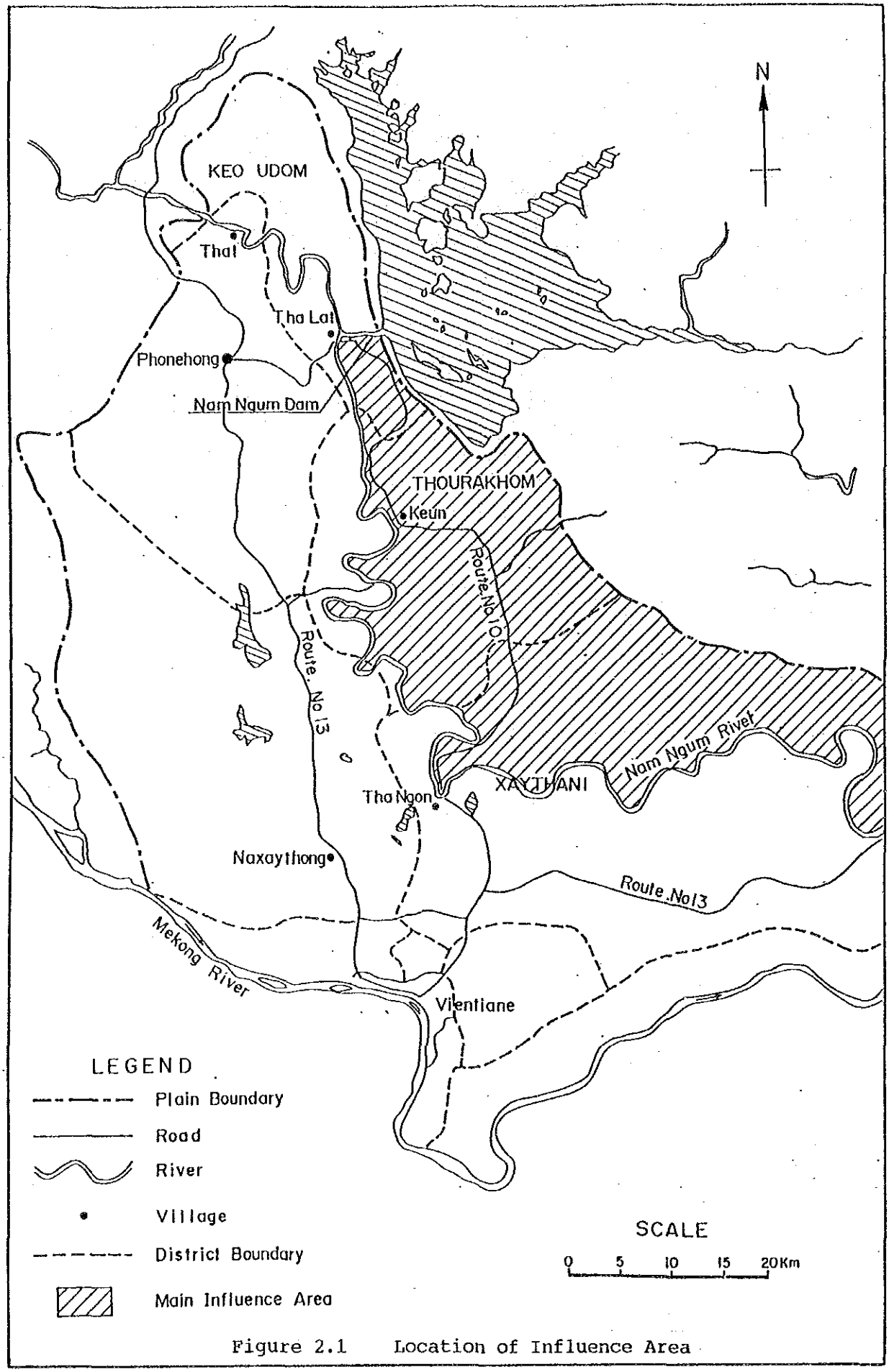


Figure 2.1 Location of Influence Area

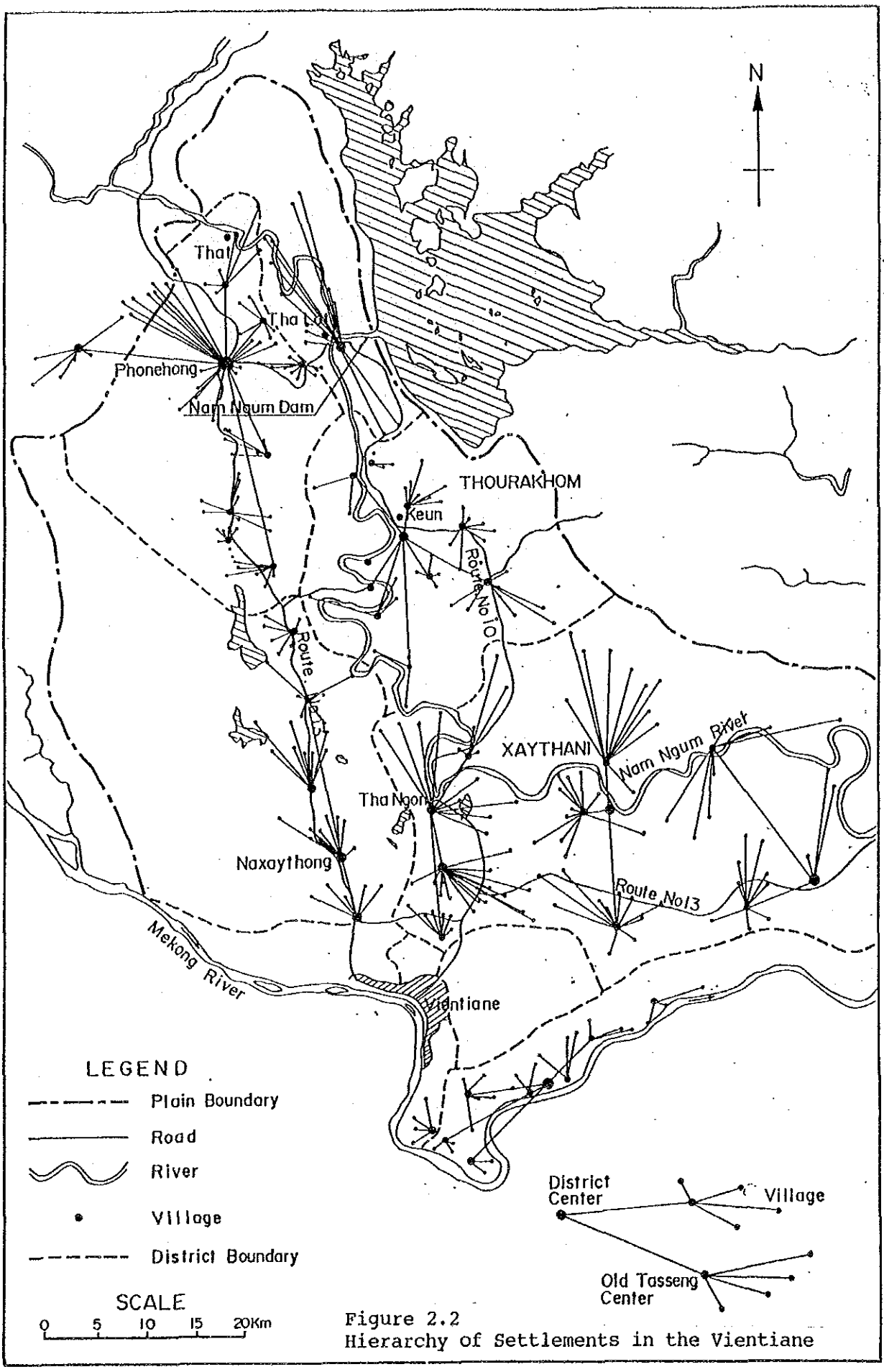


Figure 2.2
Hierarchy of Settlements in the Vientiane

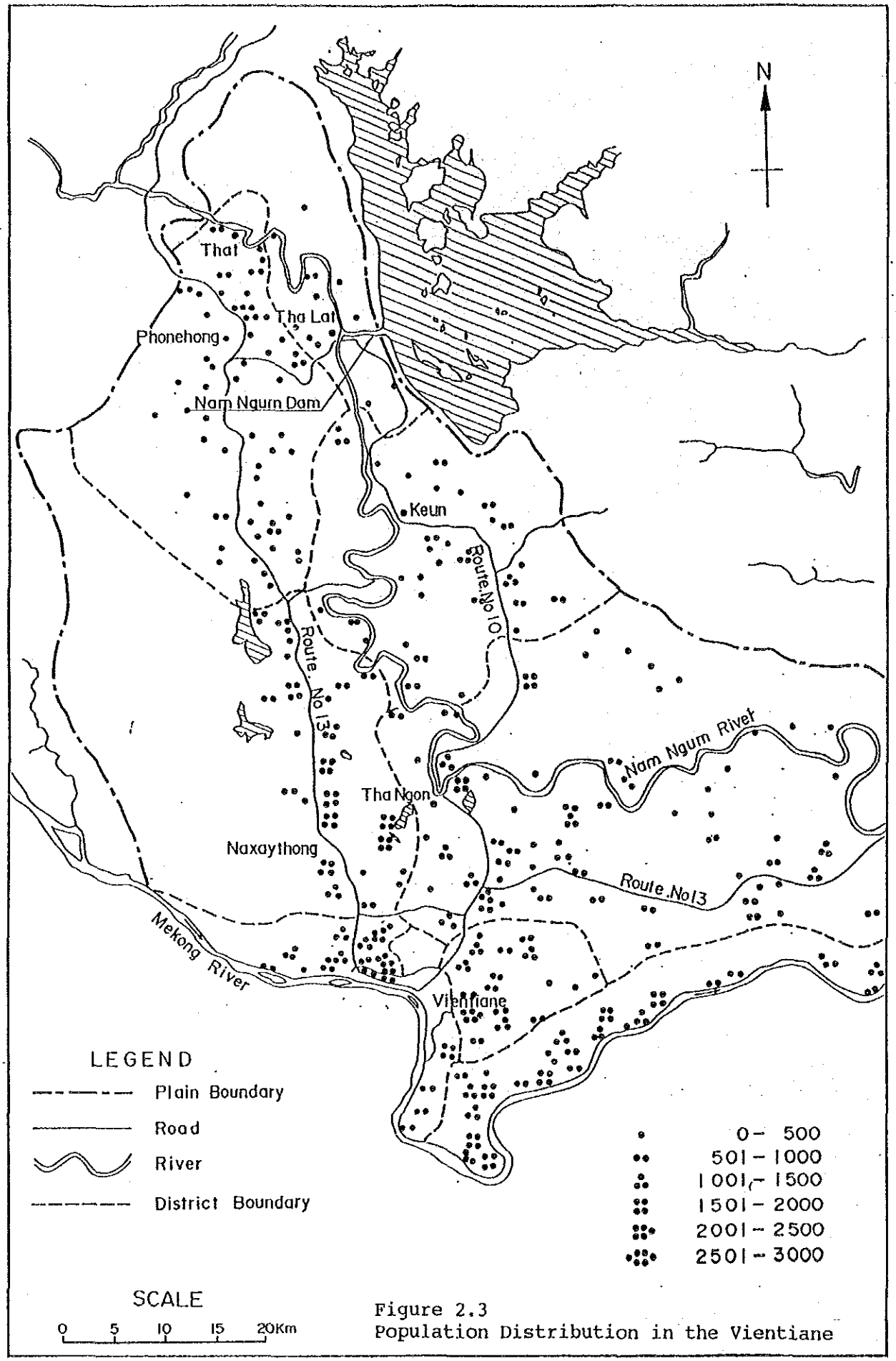


Figure 2.3
Population Distribution in the Vientiane

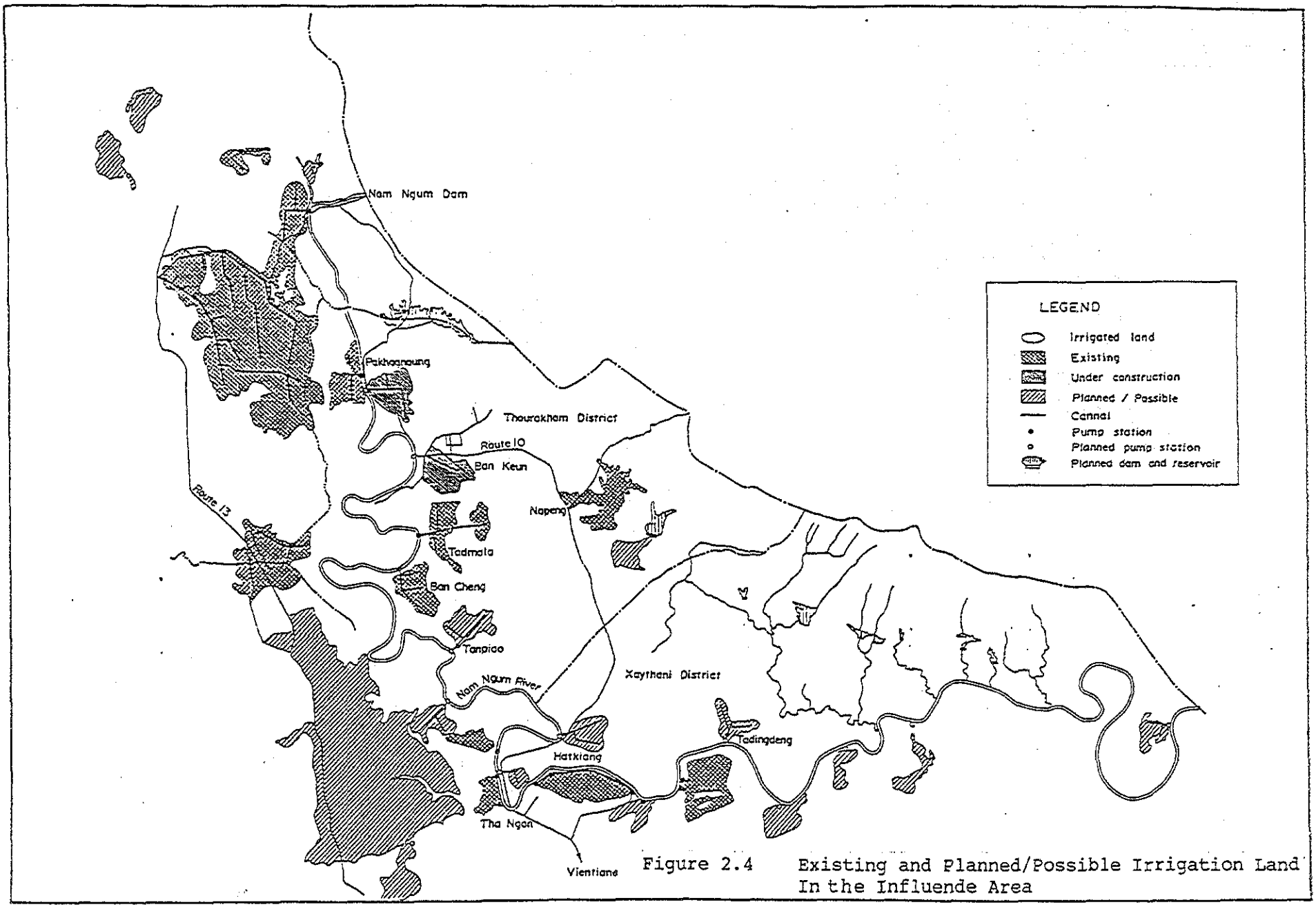


Figure 2.4 Existing and Planned/Possible Irrigation Land In the Influende Area

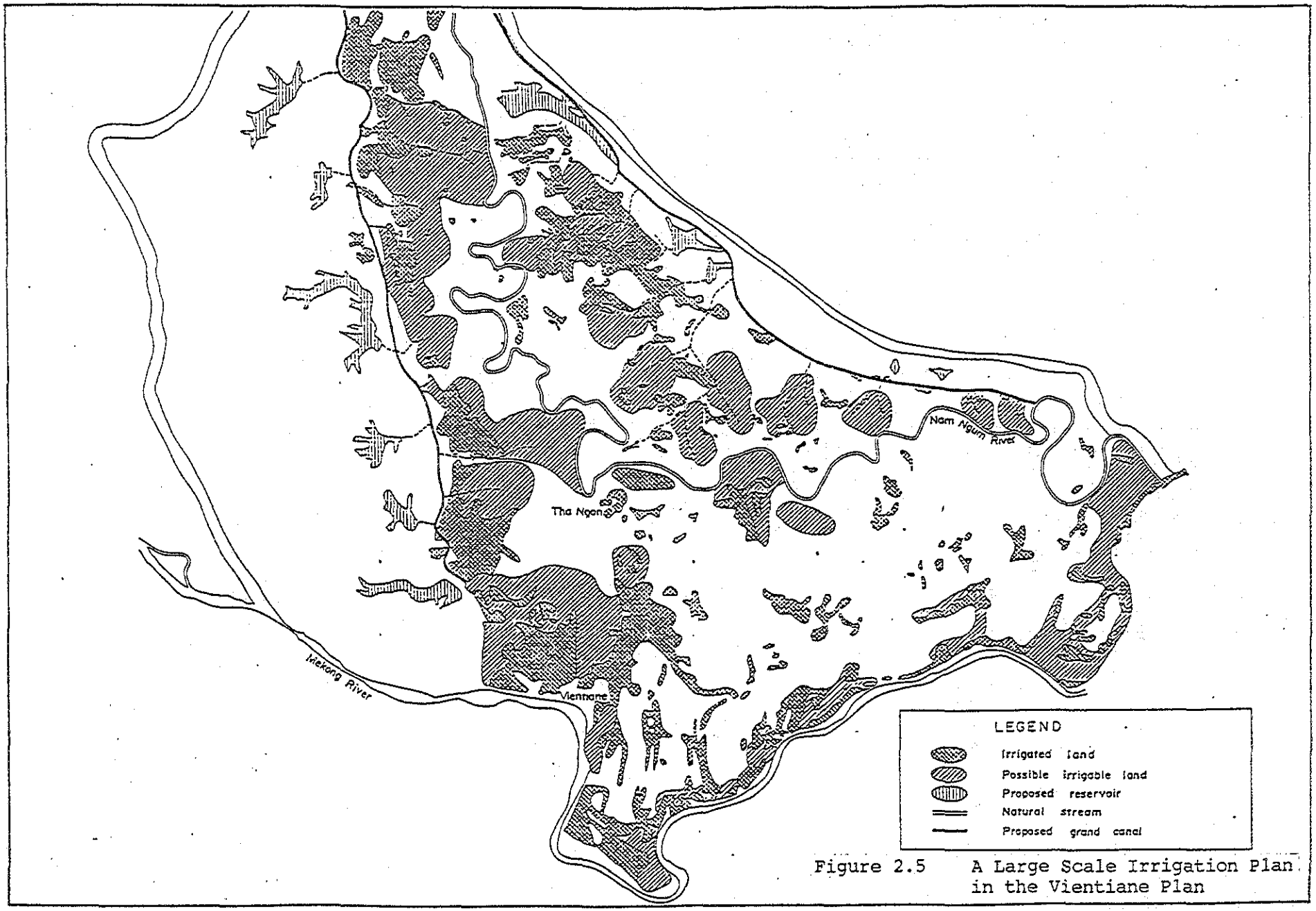


Figure 2.5 A Large Scale Irrigation Plan in the Vientiane Plan

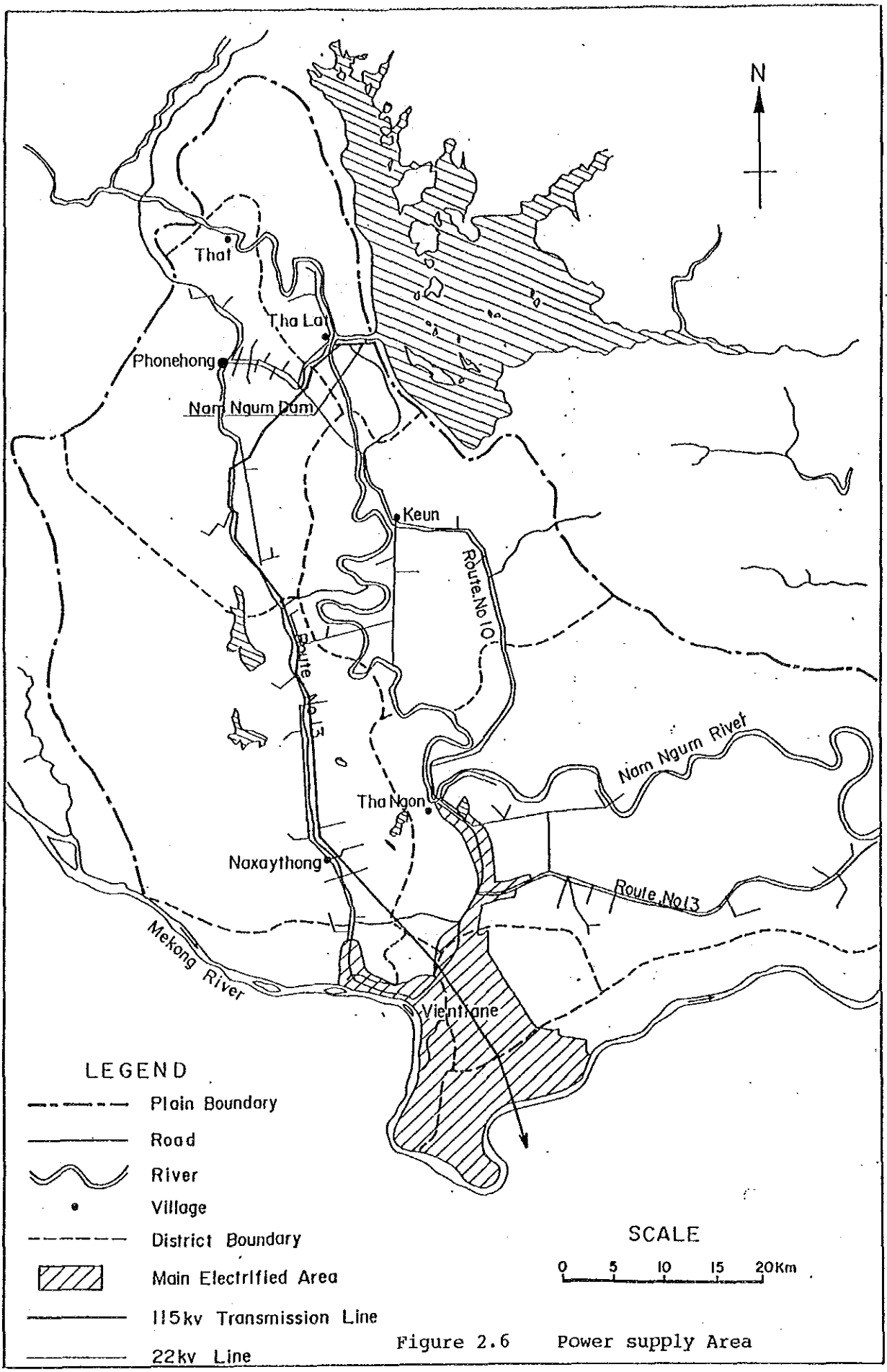


Figure 2.6 Power supply Area

CHAPTER III

ROAD TRANSPORT

CHAPTER III ROAD TRANSPORT

3 Road Transport

3.1 Trend of Registered Vehicles

At the end of 1989, total number of registered vehicles in Vientiane Municipality was some 46,000 as shown below. Roughly half of them are motorcycles. About one quarter of total vehicles are owned by public sector. Over 60% of trucks belong to public sector.

During the first half of 1980s trucks increased with two-digit growth rates. Along with relaxation of vehicles import, vehicles increased drastically in 1989. The rapid increase in vehicles is observed also this year. Nevertheless, import of a vehicle with a steering wheel on the right hand side is prohibited for safety reason since the middle of 1990.

Year	Motorcycle	Passenger car & Pick up	Truck	Total
1980	6,454	10,105	2,552	19,111
1981	6,894(6.8%)	10,474(3.7%)	2,909(14.0%)	20,277(6.1%)
1982	7,361(6.8%)	10,912(4.2%)	3,500(20.3%)	21,773(7.4%)
1983	7,650(3.9%)	11,419(4.6%)	4,041(15.5%)	23,110(6.1%)
1984	7,861(2.8%)	11,826(3.6%)	4,599(13.8%)	24,286(5.1%)
1985	7,996(1.7%)	12,071(2.1%)	4,712(2.5%)	24,749(1.9%)
1986	8,369(4.7%)	12,504(3.6%)	5,104(8.3%)	25,977(5.0%)
1987	8,554(2.2%)	12,691(1.5%)	5,223(2.3%)	26,468(1.9%)
1988	9,838(15.0%)	12,985(2.3%)	5,642(8.0%)	28,465(7.5%)
1989	22,290(126.6%)	15,768(21.4%)	7,927(40.5%)	45,985(61.5%)

Note: Figures in ( ) are growth rates

Source: Vientiane Municipality

3.2 Road Transport Industry

3.2.1 Freight Transport

In 1988, monopoly of state transport companies was terminated in parallel to the introduction of the new economic mechanism. Along with open market policies, goods transport has increased rapidly, along with increase in the share of private transport companies. The freight transport company under Vientiane Municipality operates in Vientiane and its vicinity with 35 trucks. While private freight transport companies (cooperatives) operate with 350 trucks in total. In Vientiane Province, there are four public freight transport companies and private ones district by district.

Under the MCTPC, there are four transport companies. State Company No.1 (Vientiane) covers Vientiane and Northern Lao and State Company No.2 (Savannaket) covers Vientiane and Southern Lao. State Company No.3 (Vientiane) transports heavy goods and equipments while State Company no.4 is specialized in fuel transport.

Transport charge has been raised in parallel with an increase in gasoline price as shown in Table 3.1. Present charge except heavy goods, in 35 kip per ton. Heavy goods are charged 15 to 20% more, depending on road conditions: good, fair, bad, or very bad.

Freight transport increased at over 10 percent per annum during 1982-1989 as shown below. During the same period, GDP increased at 4.8 percent per annum. Namely, the growth rate of freight transport is 2.13 times larger than that of GDP. This is equivalent to elasticity of 1.75 between freight transport and GDP. Especially, mainly due to dispersion of the new economic policies including privatisation of transport industry, freight transport tremendously increased. In Vientiane Province, freight transport recorded high growth rate over 10 percent during the last 5 years.

Year	Nation		Vientiane Province	
	ton/a ('000)	ton km (million)	ton ('000)	ton km (million)
1982	835	82		
1983	891(6.7)	91(11.3)		
1984	916(2.8)	98(7.4)		
1985	954(4.1)	114(16.5)	39	2.58
1986	1,040(9.0)	159(39.5)	47(20.5)	2.50(- 2.9)
1987	954(-8.3)	167(5.0)	37(-21.3)	3.65(45.8)
1988	1,254(31.5)	171(2.4)	39(5.4)	3.15(-13.8)
1989	1,658(32.3)	244(42.7)	58(48.7)	4.20(33.6)
1990/b			63(8.6)	4.62(10.0)
82-89	(10.3)	(16.9)		
85-89	(16.0)	(21.0)	(10.4)	(13.0)

a/ Figures in ( ) are growth rates in percentage.
b/ planned

Source: Vientiane Province and State Planning Committee, "10 Years of Socio-Economic Development in the Lao People's Democratic Republic," and Ministry of Economy, Planning and Finance, "Basic Data, 88, 89."

3.2.2 Passenger Transport

Passenger transport increased along with growth of Lao economy at 7 percent during 1982-1988 as shown below. Data in 1989 seem to be outliner because of negative growth against a large positive value of GDP growth rate. The growth rate of passenger traffic is 2.31 times larger than GDP growth rate during the same period. This corresponds with elasticity of 1.52 between passenger transport and GDP. Vientiane Area recorded over 30 percent growth rate in 1989 and it is expected over 50 percent for this years.

Year	Nation		Vientiane Province	
	persons/a ('000)	persons km (million)	persons ('000)	persons km (million)
1982	7,285	201		
1983	8,019(10.1)	246(22.7)		
1984	8,967(11.8)	271(9.9)		
1985	9,470(5.6)	285(5.6)		
1986	10,507(11.0)	262(-8.2)	3,264	
1987	9,455(-10.0)	242(-7.6)	2,581(-20.9)	102
1988	11,006(16.4)	284(17.4)	3,090(19.7)	93(-8.8)
1989	10,709(- 2.7)	276(-2.8)	4,085(32.2)	117(25.9)
1990/b			6,377(56.1)	169(44.4)
82-89	(5.7)	(4.6)		
82-88	(7.1)	(5.9)		
87-8	(5.4)	(3.6)	(7.8)	(9.0)

a/ Figures in ( ) are growth rates in percentage.
b/ planned

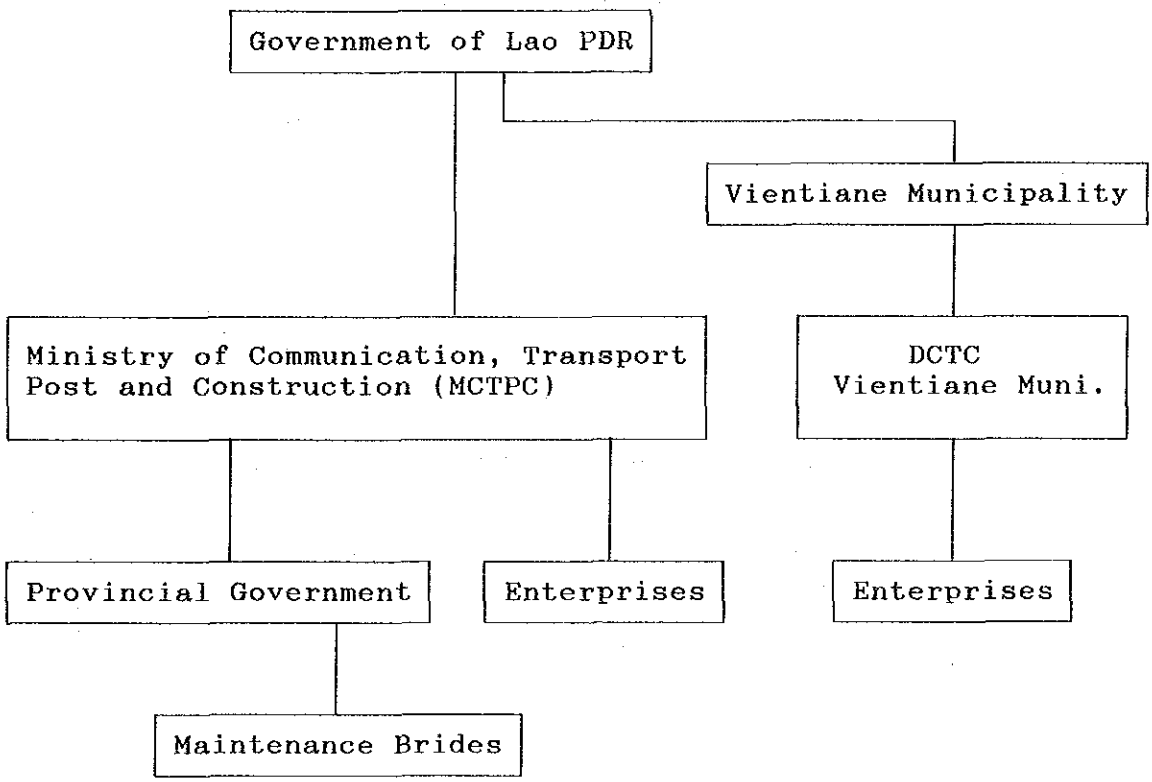
Source: Vientiane Municipality, Vientiane Province, and State Planning Committee, "10 Years of Socio- Economic Development in the Lao People's Democratic Republic," and Ministry of Economy, Plan and Finance, "Basic Data, 88, 89."

The bus company under Vientiane Municipality operates 35 routes with 32 large buses (66 passengers) and 18 micro buses (29 passengers). There are three routes crossing Nam Ngum River at Tha Ngon: Vientiane - Ban Kuen (3 trips per day). Vientiane - Tanpiao (3 trips per day), and Vientiane - Nakhanthoung (2 trips per day). Private companies also operate buses crossing Nam Ngum River.

3.3 Road

3.3.1 Administration of Roads and Bridges

Administration system for roads and bridges in Lao PDR is as follows.



As mentioned above, roads and bridges in Lao PDR is mainly administrated by the Ministry of Communication, Transport, Post and Construction (MCTPC) with Provincial Government and Enterprise concerned.

MCTPC and enterprises under MCTPC are responsible for construction and maintenance works of the national roads.

A Provincial government has responsibility for maintenance and repair works on roads and bridges except national ones by using maintenance brigade.