

<u>Existing Condition</u>		<u>After the Project</u>	
Fleet	114 nos.	Fleet required for the Project	149 nos.
Servicable	23 nos.	Fleet expected to be available during the Project	59 nos.
Ratio of servicable equipment to the total	15.6%	Additional requirement under the Project	69 nos.

Reinforcement of the fleet of construction equipment will secure accelerating completion of the Project road and the following positive effects under the Project.

- 1) Connection of Vientiane to Vinh port with the shortest route and access toward the coastal area of China Sea via well established National Road No.8 will reduce transport costs of the imported or exported goods very significantly compared to the use of the route via National Road No.9.
- 2) Facilitate the improvement projects of the rural roads which will link with the National Road No. 8 scheme embraced by Bolikhamxai Provincial government.
- 3) Improvement of living standards of rural population and promotion of development in relatively backward Bolikhamxai Province by means of improved access to the central area of Laos.
- 4) Promotion of the construction and/or renovation of pipelines from Vietnamese area to Vientiane for transport of petroleum.

As the equipment of MCTPC increases, the mechanized road construction will be generalized across the country, hence it will become imperative to establish the equipment management system and the standardization of road maintenance work. The Government of Lao P.D.R. has a strong interest in assistance of the Government of Japan in the field of training of road maintenance staff and engineers, in particular, of middle-level. In this regard, the study team considers that a study be made for the possibility of assistance by the Government of Japan in the future.

In conclusion, early implementation of the Project through the Japanese Grant Aid is strongly recommended.

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CHAPTER 1 INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 Objectives of the Basis Design Study

In Second Five Year Development Plan (1986-1990) under the policy of NEM, an emphasis was placed on increase of food production, environment preservation, development and conservation of agricultural and forestry resources, increase of export, etc. in line with political reform. In particular, reconstruction and rehabilitation of the existing road network and the improvement of transport services were given the highest priority. Several international funding agencies and countries have assisted this sector through the road and bridge construction projects.

Through those assistances, particularly, National Road No.13 which is the north-south trunk roads and provincial roads connecting to National Road No.13 have been improved significantly. In the Third Five Year Plan (1991-95), in addition to the improvement of such national and provincial roads, construction of national roads which shall serve as alternative routes for international trade are given the utmost highest priority.

In this context, National Road No.8 is the most expecting east-west corridor which joins Vientiane to Vietnam and to its coastal area on China Sea with the shortest route. Of a total length of 132 km of the road, 81 km near the Vietnamese border was already improved with asphaltic pavement, and other remaining 51 km section has been constructed by National Road No.8 construction Company (the Company) under the Ministry of Communication, Transport, Post and Construction (MCTPC).

As this 51 km section passes through rocky and mountainous area the construction has faced many difficulties. Furthermore, the construction equipment possessed by the Company are already old and aggravated to the extent that the work will meet the deadlock in near future.

Under these conditions, the government of Lao P.D.R. made a request to the Government of Japan for the procurement of the road construction equipment to be used for completion of National Road No.8.

The objectives of the basic design study entail confirmation of the request from the Government of Lao P.D.R., confirmation of appropriateness of the Project as Japanese Grant Aid, evaluation of the effects and determination of appropriate size of the Project. The study, thus far, comprises survey of the existing condition of the National Road No.8 construction project (Project road) and the existing fleet in view point of strengthening capacity of the Company.

1.2 The Basic Design Study Team

The Government of Japan understood necessity and emergency of the Project, and deemed the objective of the Project generally appropriate for Japanese Grant Aid and decided to extend a study. Japan International Cooperation Agency (JICA) sent the study team, headed by Mr. Tadashi Yoshida, Deputy Director, Construction Equipment Division, Economic Affairs Bureau, Ministry of Construction.

The study team had carried out analysis in Japan based on the investigation of the field study and prepared the Basic Design Study Report.

1.3 Content of the Basic Design Study

The study team conducted the following field study with the close cooperation of the relevant officials of the Government of Lao P.D.R.

- (1) Confirmation of the background and content of the request
- (2) Understanding of the appropriateness, necessity of the Project and investigation and discussion on the dimensions of the Project
- (3) Investigation on the management, operation and maintenance of the equipment to be procured.
- (4) Investigation on the existing equipment
- (5) Investigation on the existing workshops
- (6) Investigation on the stock of spare parts and mechanical materials
- (7) Investigation on the training for equipment maintenance operations
- (8) Investigation on the delivery route and final destination of the equipment to be procured.
- (9) Confirmation of the necessary measures to be taken by the Government of Lao P.D.R. in case that Japanese Grant be extended.

CHAPTER 2 BACKGROUND OF THE PROJECT

CHAPTER 2 BACKGROUND OF THE PROJECT

2.1 General

In 1986, the Government introduced New Economic Mechanism (NEM) during the period of the Second Five Year Plan (1986-90). The NEM includes reforms of financial and foreign exchange system, introduction of free international trade and self-supporting accounting system to the state owned companies.

The main objectives of the current Third Five Year Plan (1991-95) on the basis of NEM entail consecutively:

- (1) Improvement of living standard of the population through stable supply of basic needs such as housing, food, sanitation, education, etc.,
- (2) Economic growth under minimum inflation, and
- (3) Improvement of access roads toward both Thailand Bay and China Sea are in order to facilitate the international and multilateral trade.

2.2 Outline of the Road Sector

Laos is a land locked country bordered by five nations and 90% of freight and 85% of passenger transport depends almost solely on the roads. However road infrastructure still remains in less developed condition. Unpaved roads including lateritic and earthen road which accounts for 76% of the road network become substantially unpassable due to the rains in the wet season. Such low condition of the road network affects critically the national economy and social life.

Laos has a 13,971 km of road network, which comprises, 3,346 km of asphaltic paved roads, 4,775 km of lateritic paved road and 5,850 km of earth roads. The national roads under the control of MCTPC accounts for 3,387 km. Improvement or rehabilitation of the national roads is the responsibility of MCTPC.

Road Length by Type

Road Type	Length (km)	Ratio (%)
Asphaltic Paved Road	3,346	24
Lateritic Paved Road	4,775	34
Earthen Road	5,850	42
Total	13,971	100

Source: Dept. of Communication, MCTPC, 1993

Road Length by Category

Road Category	Length (km)	Ratio (%)
National Road	3,387	25
Provincial Road	5,690	41
District Road	4,604	34
Total	13,681	100

Source: Dept. of Communication, MCTPC, 1993

Main thrusts of the road sub sector in the Third Five Year Plan are:

- To realise access to every provincial capitals by all-weather road.
- To rehabilitate and maintain the existing roads rather than to construct new road.
- To rehabilitate and maintain main rural roads connecting to the trunk roads such as provincial or urban roads.
- To develop important access towards both Thailand Bay and China Sea to facilitate international and multilateral trade.

In relation to these objectives, the highest priority is given to both the improvement projects of National Road No.13 and No.8. The former is a north south trunk road along Mekong River providing access to China and Thailand Bay, and the latter is east-west artery connecting Vientiane to Vinh Port complex in Vietnam.

Improvement of National Roads No.1, No.4, No.6, No.7 and No.12 are also programmed in parallel with the No.13 and No.8.

Table 2.2.1 Details of the Road Improvement Plan for the Period of 1900-2000

No.	Project Name	Length (km)	Financier	Funds (Million US\$)	1990	91	92	93	94	95	96	97	98	99	2000
I	Construction & Reconstruction of National Road & Provincial Road														
01	No.13(N), Luang Prabang - Pak Mong	114	ADB(5)	20.52											
02	No.13(N), Kasi - Luang Prabang	166	ADB(4)	25.6											
03	No.13(N), Ban Beng - Kasi	57	ADB(4)	6.78											
04	No.13(N), Vientiane - Ban Beng	143	ADB(3)	16.16											
05	No.13(S), Vientiane - Thabok	93	SIDA	6.51											
06	No.13(S), Thabok - Pak Kading	96	SIDA	19.20											
07	No.13(S), Pak Kading - Savannakhet	270	IDA(2)	47.12											
08	No.13(S), Savannakhet - Pakse	270	IDA(2)+IDA(3)	5.28											
09	No.13(S), Pakse - Khinak - No.10	160	ADB(7)	25.01											
10	No.16, Saravane - Sekong - Attapeu														
	No.18, Attapeu - Vietnam Boundary	260	ADB(6)	26.30											
11	No.13(A) & No.20, Pakse - Saravane - Paksong	136	ADB(2)	13.60											
12	No.1, Sayabouri - Pakrai	168	UNDP/FEUND	8.40											
13	No.6, Phou Lao - Sam Neua	93	Germany	6.05											
14	No.7, Phou Khoune - Phone Savann	136		21.12											
15	No.8, Ban Lao - Km 51	51		2.55											
16	No.4, Xieng Khouang - Hatham	78		3.90											
17	No.1, Luang Namtha - Houeisai	194		15.52											
18	No.4, Pak Nam Noi - Phongsaly	116		12.76											
19	No.12, Thakhek - Vietnam Boundary	150		75.00											
20	No.1, Thateng - Saeavane	720		108.00											
	Sub Total			465.34											
II	Provincial Road & Lural Road														
21	Phongsaly, Luang Namtha, Bokeo, Oudomsa, Sayabouri, Xieng Khouang, Houa Phan Province	400		6.00											
22	Vientiane, Borikhamisai, Khammouane, Saravane	500		7.50											
23	Provincial Road	500		5.00											
24	Champassak, Sekong, Attapeu Provincial Road	100		30.00											
25	Vientiane Municipality Road, Side Ditch	500		15.65											
	Lural Road														
	Sub Total			64.15											
III	Long Span Bridge														
26	Tha Ugon Bridge	230(m)	Australia B.O.T.	3.50											
27	Nam Theune Bridge (No.8)	252(m)	USSR	10.00											
28	Mekong Bridge No.1	1,000(m)	Australia	32.00											
29	39 Bridges, Road No.13 (Paktading - Savannakhet)	700(m)	IDA(3)	17.50											
30	Nam Ban Fai Bridge (No.13S)	(150(m) ?	?	5.00											
31	Nam Ban Hieng Bridge (No.13S)	205(m)	IDA(2)	6.28											
32	Ban Nune Bridge (No.13S)	140(m) ?	?	5.95											
33	Mekong Bridge No.2	1,200(m) ?	?	35.00											
	Sub Total			115.23											
IV	?														
34	?	1,000 ?		15.00											
35	?	6,000 ?		30.00											
36	?	800(m) ?		2.00											
37	Bay Bridge	500(m) ?		3.75											
38	Bay Bridge	500(m) ?		3.75											
39	Bay Bridge	500(m) ?		3.75											
	Sub Total			58.25											
V	Ferry Facility														
40	Nam Ou Lai (No.13)		ADB(5)	0.50											
41	Nam Ou (Muong Khouang) - River Conservation	?	?	0.50											
42	Houay Xay (Bokeo) - Maintenance			0.50											
43	Madeua (Xayabouri) - Maintenance			0.50											
44	Phakkagnong (Vientiane) - Improve			0.50											
45	Thakhek - Nakonphanom (Khammouane) New Construction			0.50											
46	Pakse - M. Kao (Champassak) - Improve			1.00											
47	M. Moun, Mekong - Improve			0.50											
48	Samia, Vaphi (Saravane) - Improve			0.50											
49	Xe Kong (Attapeu) - Improve		ADB(6)	0.50											
50	Kong (Xekong) - Improve		ADB(6)	0.50											
	Sub Total			6.50											

CHAPTER 3 OUTLINE OF THE PROJECT AREA

CHAPTER 3 OUTLINE OF THE PROJECT AREA

3.1 Location and Social Background

3.1.1 Borikhamxay Province and Influence Area

National Road No.8 is located in Pakkading and Khamkeut Districts in Borikhamxay Province in the central area of the country. As shown in Fig. 3.1.1.1. Borikhamxay Province is bordered by Vientiane Province, Vientiane Municipality and Thailand in the west, Xiangkhouang Province in the north, Khammouan Province in the south and Vietnam in the east. Area is 16,470 m² accounting for 7% of the total of the country.

The Province comprises six districts including about 550 villages with population of 143,000, which account for 3.5% of the national total. Almost all population engage in agriculture.

Table 3.1.1.1 Population by District in Borikhamxay Province

District Name	Village Number	Families Number	Population
1. Pakxan	80	5,300	31,000
2. Thaphabat	30	3,200	19,000
3. Pakkading	60	4,300	23,000
4. Viangthong	100	2,400	17,000
5. Bolikhan	60	3,900	16,000
6. Khamkeut	220	5,900	37,000
Total of the Province	550	25,000	143,000

Source: Laos Statistical Data (1975-1990)

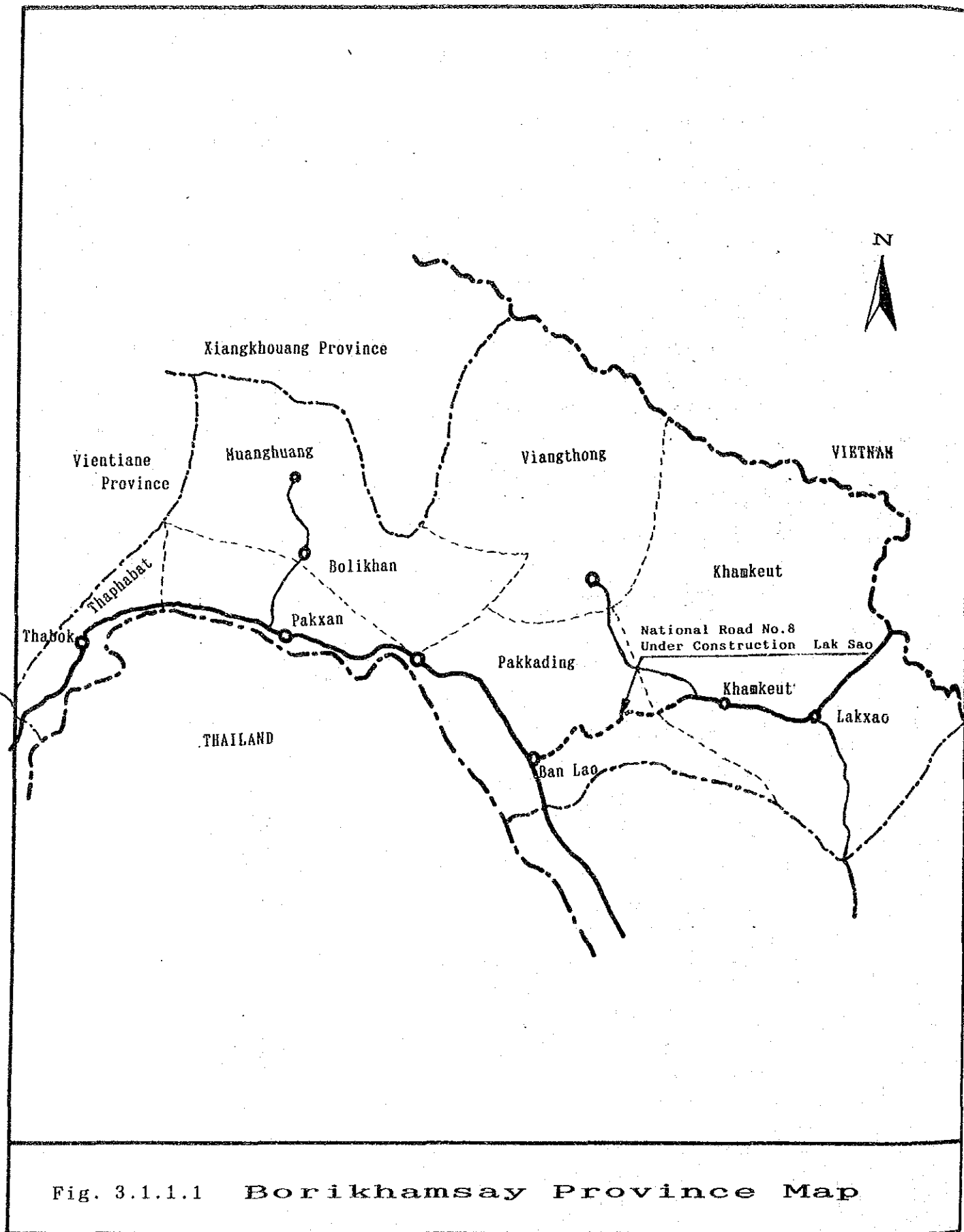


Fig. 3.1.1.1 Borikhamsay Province Map

It is seen that direct effects born by the completion of Road No.8 construction project is limited in socio-economic recovery in the two districts of Borikhamxay Province. However, as the project road, National Road No.8 will branch off from the National Road No.13 traversing through almost all the provinces of Laos, and connect the central part of Laos with Vietnam with the shortest distance, the significant effects are expected to be accrued not only in Borikhamxay but also in Vientiane Municipality, Xiangkhouang, Vientiane, Kammouan and Savannakhet provinces. The total influence area to be benefited by the implementation of the Project is 96,000 km² (41% of total area of the country), and population to be 1.98 million (48% of the national total). Rice production in the above area accounts for 47% of the national total, and commodity transport by road for 64%.

Table 3.1.1.2 Population, Rice Production and Road Transport in the Area to be Benefited by the Implementation of Project Road (1990)

Province Name	Population (1,000 person)	Area (km ²)	Rice Production (1,000 t)	Commodity Transport by Road (1,000 t·km)
1. Vientiane Municipality	464	3,920	143	47
2. Vientiane	305	19,990	130	57
3. Xiangkhouang	181	17,315	54	9
4. Bolikhamxay	143	16,470	32	2
5. Khammouan	245	16,315	119	6
6. Savannakhet	639	22,080	223	90
Total of the Influence Area	1,977	96,090	701	211
Total of the Country	4,140	236,800	1,491	328
Ratio of the Influence Area	47.8	40.6	47.0	864.3

Source: Laos Statistical Data (1975-1990)

3.1.2 Development Projects in Borikhamxay Province

Societe Phathana Khetphoudoi Import-Export (BPKR), Provincial Development Company, plays an important role for the development of the province. (Usually at least two companies are established in each province throughout the country.)

BPKR, established in 1985, includes businesses of timber production, irrigation, construction and tourism. Public investment project from the Central Government is to be ordered to the Company for implementation through the Provincial Government.

Table 3.1.1.3 Development Projects in Borikhamxay Province

(unit: million KIP)

No.		Project Cost	Completed	Project Status (as of Jan. 1992)
1.	Improvement of National Road No.8 Lak Sao - Vietnamese Frontier	1,174	1,791	2,386 (57%)
2.	Construction of Hospital	533	314	219 (41%)
3.	Construction of Hospital	211	132	79 (37%)
4.	Improvement of Airport	1,174	53	1,121 (95%)
5.	Improvement of Fuel Tank	15	15	- (100%)
6.	Small-scale Electric Power Plant	3,285	1,314	1,974 (60%)
7.	Improvement of Irrigation Facilities	1,419	145	1,274 (89%)
8.	Education and Formation of Medical Personnel	56	56	- (100%)
9.	Settlement Programme for Slash and Burn Farmer	72	62	10 (14%)
	Total	10,939	3,882	7,057 (65%)

Source: Borikhamxay Province Development Programme, ECFA, 1992

3.1.3 Agricultural Produce

Principal agricultural produce are: timber, rice, maize, kyassaba and livestock. Timber products reach 30,000 m³ per annum.

Rain-fed farming is dominant for rice plantation, but three dams for irrigation were completed recently. The Central Government and Provincial Government have implemented settlement programme for slash-and-burn cultivation farmers for environment conservation purpose.

Table 3.1.3.1 Cultivated Area and Rice Production in Borikhamxay Province

(unit: million KIP)

Year	Area (1,000 ha)	Rice Production (1,000 t)
1986	19	41
1987	23	47
1988	23	53
1989	29	60
1990	29	32

Source: Borikhamxay Province Development Programme, ECFA, 1992

Abrupt fall in 1990 compared to the previous years is due to draught throughout the country, for which emergency aid from international agencies and countries was made.

Annual production of maïse and kyassaba are 2,600 t and 5,200 t respectively.

3.2 Natural Condition

Topographically, western part of the province is the Mekon River Basin and in eastern part mountainous terrain is dominant. There are two seasons, i.e. dry season (May to October) and rainy season (November to April).

Table 3.2.1.1 Rainfall at Ban Seno Station

	Jan.	Feb.	Mar.	Apr.	May	June	July	Apr.	Sep.	Oct.	Nov.	Dec.
Rainfall	No	No	28.8	84.7	282.5	538.7	50.2	No	No	No	No	No
Rainy Day	0	0	5	6	11	20	9	0	0	0	0	0

Source: Lower Mekong Hydrologic Yearbook, 1989

The province has rich water resources such as Nam Kading, Nam Theun, Nam Hinboun, and mineral resources such as iron, tin, lead, gold, etc.

The Central Government and Provincial Government have strong intention to develop the mining industry by introducing the foreign capital.

Location	Mineral
Ph. Hai	lead
Khamkhet	gold
Lak Sao	tin
Ban Nape	tin
Nape	hot spring
Ban Thana	tin
Ban Phonheng	tin
Ban Nhonsun	tin
Ban Phonheng	bismas
Ban Nanlnnok	iron
Ban Pha Kouanchan	lead
Ban Nakadok	gold, tin
Namphao	hot spring
Ban Phakhot	hot spring

Source: Borikhamxay Province Development Programme, ECFA, 1992

3.3 Public Services

Social infrastructure in the province is very poor. The following Table indicates the situation of the development.

Table 3.3.3.1 Main Public Service Facilities

Facilities	Lak Sao	Pakadine
Education		
Elementary	4	1
Secondary	0	1
Medical		
Hospital	1	1
Nos. of Bed	100	5
Nurse	150	0
Public Market	0	0

Source: Borikhamxay Province Development Programme, ECFA, 1992

There is no water supply system and sewage system. Small scale power plant is under construction in Lak Sao. Services will start in 1994.

3.4 Road Infrastructure

Under the Road Improvement Five Year Programme in Borikhamxay Province made by Provincial Government, the following projects are under study or under construction (1991-1995, except National Road No.8 Lak Sao - Vietnamese Frontier).

Table 3.4.1.1 Road Improvement Five Year Programme in Borikhamxay Province

Location	Road Link	Km	Cost	Source of Fund
Bolikhan	Muong Kao - Muong Heuang	35	460,000	Timber Income
	Muong Heuang - frontier of Xiaeng Khouang	40	N.A.	Provincial Budget
	Thasy - Nakoum New Road Construction	80	N.A.	Foreign Aid
	Muong Kao - Muong Bo	46	N.A.	Foreign Aid
	Muong Heuang - Muong Bo	25	N.A.	Foreign Aid
	Muong Bo - Vanguaxay - Muong Hom	15	N.A.	Provincial Budget
	Muon Kao - Na Ho New Road Construction	6	N.A.	Foreign Aid
Pakxan	Paksane - Khaolon	20	N.A.	Provincial Budget
	Ban Na Khaolon - Namai	8	N.A.	Provincial Budget
	Phonexay - N.R. 13	8	N.A.	Provincial Budget
	Ban Nong Boua - Nong Vaing - Ban Na Hao	6	N.A.	Provincial Budget
	Hui Hai - Nong Nhung	10	N.A.	Provincial Budget
Thaphabath	Ban Naxay - Pakngum	10	N.A.	Provincial Budget
	Thaphabath - Phonsane	3	N.A.	Provincial Budget
	Ban Phapong - Hong - N.R. 13	7	N.A.	Provincial Budget
Pakkading	N.R. 13S - Ban Nam Yao	60	N.A.	Foreign Aid
	Ban Boungkhang - N.R. 13	12	N.A.	Foreign Aid
	Ban Na Mai Rehabilitation Road	20	N.A.	Foreign Aid
Khamkeut	Lak Sao - Sobkhom	16.6	N.A.	Provincial Budget
	Khamkeut - Ban Na Va	25	N.A.	Foreign Aid
	Total	452.5	N.A.	

Source: Borikhamxay Province Development Programme, ECFA, 1992

CHAPTER 4 OUTLINE OF THE PROJECT

CHAPTER 4 OUTLINE OF THE PROJECT

4.1 Objective

The Second Five Year Plan (1986-90) was started in 1986 to realize market economy in the context of New Economic Mechanism (NEM), which main objectives are to ensure stable food supply, to develop medium and small scale mining and manufacturing industry, and to develop and conserve the forest resources. Emphasis has been especially put on rehabilitation and maintenance of existing road network and improvement of transport services. Multilateral or bilateral funding authorities such as UNDP, IDA and ADB, and Australia and Sweden have assisted the sector projects through variety of programmes for the aspects of construction, improvement, rehabilitation and maintenance of roads and bridges.

Given the assistances by those authorities National Road No.13 which being a north-south trunk road and the provincial roads connecting thereto have been significantly improved. In the current Third Five Year Plan (1991-95), in addition to the consecutive improvement of the national and provincial roads, that of important international trade corridors with neighbouring countries are given the highest priority. While National Road No.13 is functioned as not only the most important access to Thailand, but also an international transit route joining Thailand (Thailand Bay)-Laos-China and Thailand (Thailand Bay)-Laos-Vietnam (China Sea), and has been given the highest priority in the National Five Year Plans, National Road No.8 is also the extremely essential east-west artery running through the central region of the country and at the same time it plays a role of link between Vietnam and Vietnam (China Sea), and forms international trade corridor joining Thailand-Laos-Vietnam (China Sea).

National Road No.8 joins to a road in Vietnamese side which leads to Vinh Port facing to the China Sea, where construction project of Cua Lo wharf for the exclusive use of Laos is being prepared in close coordination with Vietnam. Under this circumstance, completion of National Road No.8 is strongly desired not only by Laos but also the neighboring countries.

Of a total of 132 km of National Road No.8, the section of 81 km from Mt. Hai to Vietnamese frontier has already been improved to asphaltic paved road and opened to the traffics. The remaining 51 km from Mt. Hai to Ban Lao on the

designed route is being constructed by the National Road No.8 Construction Company under the control of MCTPC.

As this 51 km section passes through mountainous and rocky area, the construction has faced many difficulties, particularly in hard rock excavation which needs heavy blasting works. Moreover as the majority of equipment fleet operated by the Company had once been used for the previous construction of National Road No.9, then after its completion, transferred to National Road No.8 construction, almost all the existing equipment have become old and aggravated, furthermore there are obvious shortage of appropriate type and number of equipment at the Site. Only with the existing fleet, it seems very difficult to continue the construction works.

The Government of Laos has firm intention to complete the construction of this important road in due time, and for this purpose, hopes to renew and reinforce the capacity of road construction equipment through the Japanese Grant Aid.

4.2 Study and Examination of the Request

4.2.1 Rationality and Necessity of the Project

(1) Contents of the Request

The equipment requested by the Government of Laos to the Government of Japan for the construction of National Road No.8 was as follows:

Equipment	Type	Nos.
Group I (for Earthwork)		
1) Bulldozer	320 HP, tilt, with ripper	2
2) Bulldozer	225 HP, tilt, with ripper	2
3) Hydraulic Excavator	19 t, bucket 0.7 m ³ class	4
4) Vibration Roller	11 t, pad-foot front roller	2
5) Vibration Roller	9.5 t, smooth front roller	2
6) Vibration Roller	4 t, front & rear drive	2
Group II (for Road Maintenance)		
1) Motor Grader	155 HP, blade 3.7 m class	4
2) Wheel Loader	110 HP, bucket 1.5 m ³ class	4
Group III (for material transport)		
1) Dump Truck	8 t, 4 x 4	14
2) Flat Bed Truck	with 2 - 3 t crane	1
3) Pick up	double cabin, 4 WD	2
Group IV (miscellaneous)		
1) Air Compressor	7.5 m ³ /min.	5
2) Vibration Roller	hand guided, 600 kg	2
3) Drilling Machine		2
Group V (others)		
1) Asphalt Distributor		1
2) Mobile Workshop	with welding machine	2
3) Vibrating Screen for Crushing Plant		1
4) Survey Equipment		1
Spare Parts	20% of amount of the above equipment value	

Through discussions held after the site inspections with the concerned staff of the Department of Communication of MCTPC and the Company, the type and number of the equipment to be requested were confirmed as follows:

Table 4.2.1.1 The Confirmed Content of the Request

Equipment	Type	Nos.
Group I (for Earthwork)		
1) Bulldozer	225 HP, tilt, with ripper	2
2) Hydraulic Excavator	19 t, bucket 0.7 m ³ class	4
3) Vibration Roller	11 t, pad-foot front roller	2
4) Vibration Roller	9.5 t, smooth front roller	2
5) Tyre Roller	9 t, front rear drive	2
6) Motor Grader	230 HP, blade 4.0 m class	3
7) Wheel Loader	110 HP, bucket 1.5 m ³ class	4
8) Spare parts of the above	for 2 years use of equipment	sum
Group II (for material transport)		
1) Dump Truck	8 t, 4 x 4	14
2) Flat Bed Truck	with 2 - 3 t crane	2
3) Pick up	double cabin, 4 WD	2
4) Water Tanker	6,000 ltr.	2
5) Fuel Tanker	4,000 ltr. with meter	2
6) Tractor/Trailer	30 t, 280 HP	1
7) Spare Parts of the above	for 2 years use of equipment	sum
Group IV (miscellaneous)		
1) Air Compressor	7.5 m ³ /min.	5
2) Vibration Roller	hand guided, 600 kg	2
3) Drilling Machine	crawler type, 7.0 m ³ /min.	2
4) Jack Hammer	sinker type, hand-guided, 10 kg	5
5) Concrete Mixer	0.3 m ³	3
6) Concrete Mixer	0.5 m ³	2
7) Asphalt Distributor	8,000 liter.	1
8) Mobile Workshop	with welding machine	1
9) Mobile Maintenance Vehicle	5 t, flat bed truck	1
10) Vibrating Screen for Crushing Plant	25 - 35 t/hour	1
11) Generator	100 KVA, 220 V	1
12) Hydraulic Crane	15 t	1
13) Survey Equipment	2-theodolite, 2-level	sum
14) Material Testing Equipment	standard set	sum
15) Spare Parts of the above	for 2 years use of equipment	sum

(2) Content of National Road No.8 Construction Project

Regarding the progress of the Project road, MCTPC had conducted interim inspection as of May 1992. The results of the inspection including recommendations for the progress of works were distributed to the concerned parties.

The above report was reviewed closely by the Basic Design Study Team, and together with the results of site inspection, the actual work situation was examined to depth concerning the background of the Project, bottlenecks of the construction works necessary measures to be taken, etc.

1) Characteristics of Route of National Road No.8

A. Old National Road No.8

As indicated in Fig. 4.2.1.1, the beginning point of the old National Road No.8 was located between Ban Nam Thone and Hinboune on Road No.13. It passed through the Mt. Hai terrain at altitude about 580 m a.s.l. and Nam Theun River, then reaches to Kiewkeoneua village near the border of Vietnam. It was constructed in the period of 1936-1938 by French authority. For entire section of 147 km, it was earthen road with a longitudinal gradient at maximum 20%.

B. New National Road No.8

Detailed design for the construction project was started in 1979 by the Vietnamese Road No.8 Construction Unit (hereinafter referred to as "Vietnamese No.8 Unit") for the section from Kiewkeoneua (Sta. 131+725 Vietnamese border) to Ban Lao (Sta. 0+000, Road No.13S). (Agreement of the detailed design was made on August 20, 1979, which included topographic survey, bridge and box culvert designs, etc.). The construction contract was awarded to Vietnamese No.8 Unit and Vietnamese No.12 Engineering Corps.

The new route passes through Mt. Hai area (Project ending point, Sta. 50+642), Nam Thone River, Lin River, Sanam River and Mt. Phapet, then reaches to Ban Lao (junction at Route No.13 Sta. 0+000).

As the old route traversed the low lying plain such as Hai River and Hinboune River basins, Ban Sanam and Ban Katep had been inundated by the flood annually and the traffic thereon was interrupted for some months in a year. Flood of Hinboune River has risen upto 3 - 4 m above the plain level (annual average rainfall to be 2,600 mm - 3,000 mm). Because of this, the section of a length of 20 - 25 km in the south of Mt. Hai was broken in every rainy season and recovery work of high embankment was repeated every year. The main reason why the new alignment was shifted toward the mountainous terrain in the north of the old road was to avoid the affects by the annual foods. However, the new road should be to follow the old road alignment as long as possible except for the this section and section Sta. 50+642 - Sta. 131+486 (Vietnam border) in order to reduce the new construction work.

The construction was started in 1984 by Vietnamese No.8 Unit, in accordance with the agreement made between Laos and Vietnam. For the section of 71 km from Kiewkoneua (Sta. 131+486, Vietnam Frontier) to the west bank of Nam Theun River was completed in 1989 and has already been opened to the traffics since 3 years.

The project section of 51 km from the west bank of Nam Theun River to Ban Lao (Sta. 0+000) through Mt. Hai (Sta. 50+642) was constructed by Vietnamese No.12 Engineering Corps. Earthwork including subgrade work was already completed for the section of 8 km from Ban Lao (Sta. 0+000) to Sta. 8+000 and surface course was already placed for the section of 10 km from Nam Theun River toward Mt. Hai.

The Company succeeded the consultant's function from the Vietnamese No.8 Unit when the latter withdraw from Laos, except detailed designs of 10 bridges on National Road No.8 which had been completed by Lao Communication Design and Research Institute (hereinafter referred to as "Lao Communication Institute") in 1991. At the same time the Company has assumed construction responsibility from Vietnam No.12 Engineering Corps, and restarted the construction for the project section of some 51 km.

C. Summary of the Project Dimensions and Design Criteria

Project status as mentioned in the interim inspection report by MCTPC was as follows:

a) Project Outline

o Location

The project road is located in the Khamkeut and Pakkading Districts of the Borixhamxay Province, which is demonstrated in Fig. 4.2.1.1.

o Topography

The project road runs through rolling and mountainous terrains.

o Road length and chainage

Lao village (Sta. 0+000) to Mt. Hai (Sta. 50+642)
Total length = 50.642 km

o Contract

Negotiated contract between the Company and MCTPC on annual basis. The Contract for 1992 fiscal year (period from January to December, 1992) was agreed on 30 March 1992.

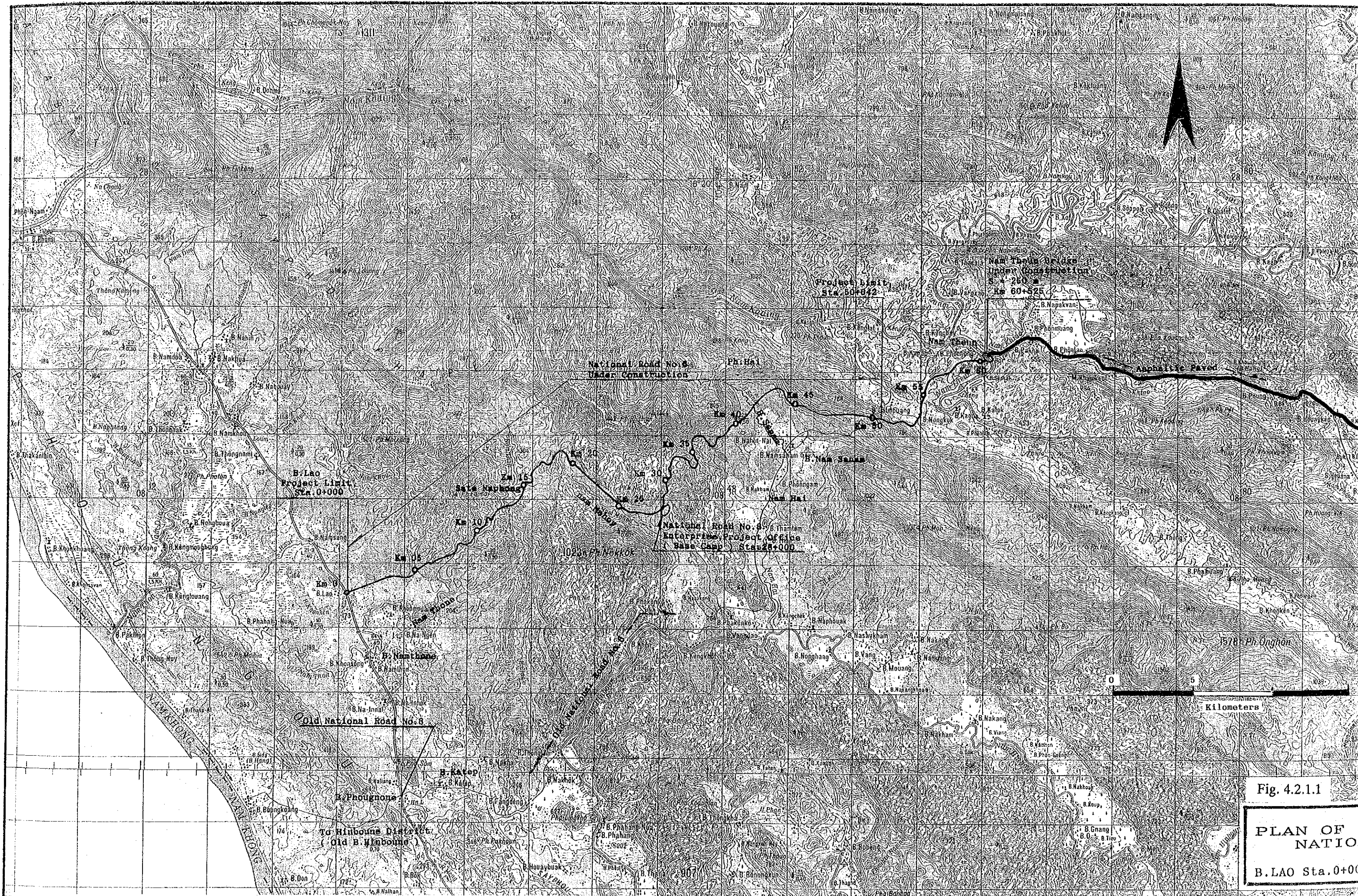


Fig. 4.2.1.1

PLAN OF
NATION
B. LAO Sta. 0+00

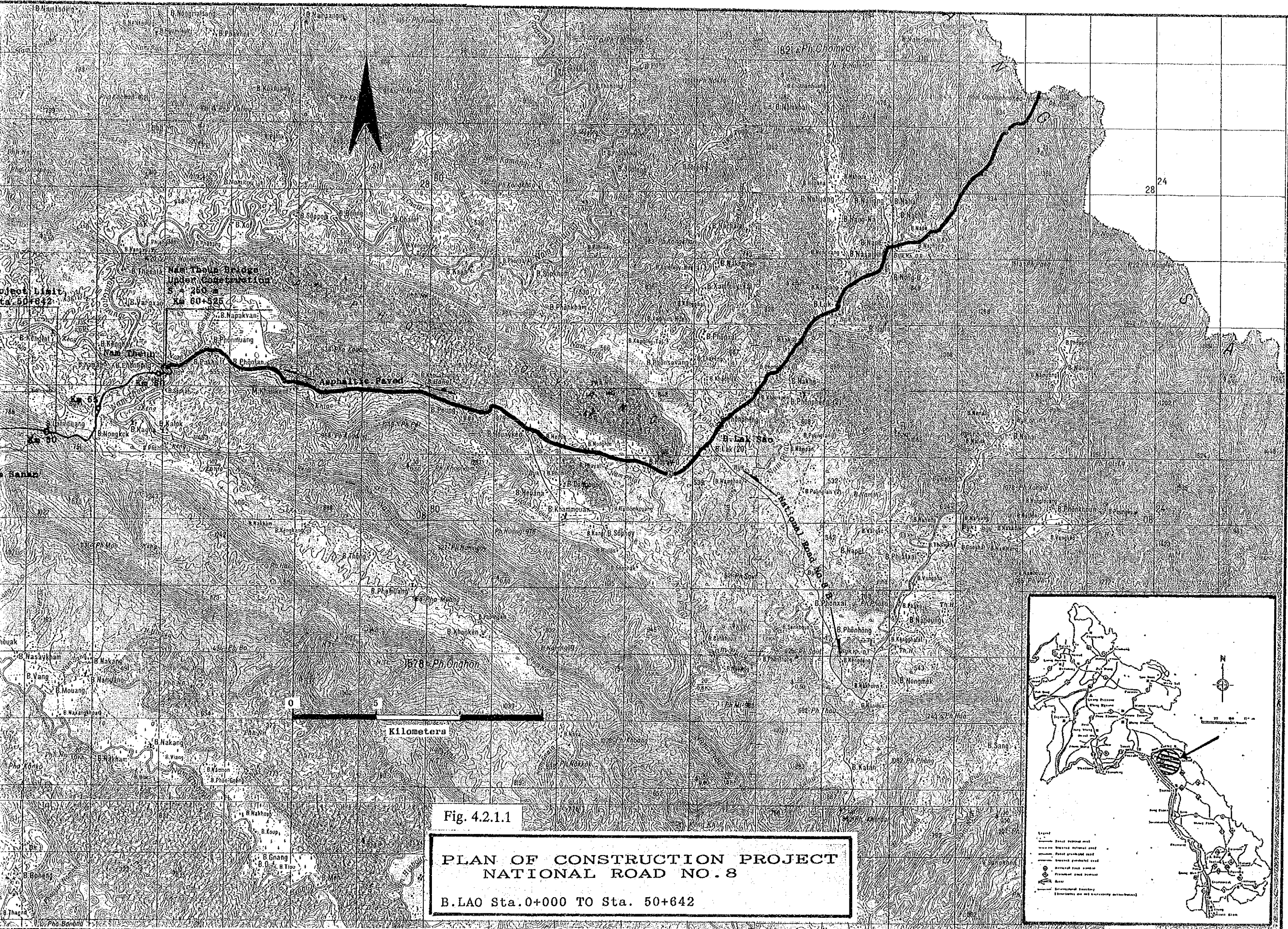


Fig. 4.2.1.1
**PLAN OF CONSTRUCTION PROJECT
NATIONAL ROAD NO. 8**
B.LAO Sta.0+000 TO Sta. 50+642

