社会開発調査部報告書

JICA

THE FEASIBILITY STUDY ON THANH TRI BRIDGE AND THE SOUTHERN FINAL FINAL REPORT FINAL REPORT SECTION OF RING ROAD NO.3 IN HANOI IN THE SOCIALIST REPUBLIC OF VIETNAM VOLUME II : MAIN REPORT

September

JIKA

123

45

IBRARY

98-106

THE FEASIBILITY STUDY ON THANH TRI BRIDGE AND THE SOUTHERN SECTION OF RING ROAD NO.3 IN HANOI IN THE SOCIALIST REPUBLIC OF VIETNAM

FINAL REPORT VOLUME II : MAIN REPORT



September 1998

PACIFIC CONSULTANTS INTERNATIONAL



JAPAN INTERNATIONAL COOPERATION AGENCY(JICA) MINISTRY OF TRANSPORT THE SOCIALIST REPUBLIC OF VIETNAM

THE FEASIBILITY STUDY ON THANH TRI BRIDGE AND THE SOUTHERN SECTION OF RING ROAD NO.3 IN HANOI IN

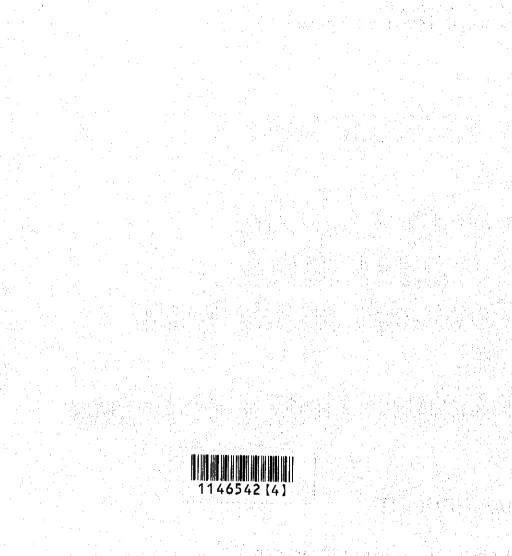
THE SOCIALIST REPUBLIC OF VIETNAM

FINAL REPORT

VOLUME II : MAIN REPORT

September 1998

PACIFIC CONSULTANTS INTERNATIONAL



The following foreign exchange rate is applied in the study:

US\$ 1.00 = 12,950 Dong (as of January 1998)

PREFACE

In response to a request from the Government of the Socialist Republic of Vietnam, the Government of Japan decided to conduct the feasibility study on Thanh Tri Bridge and the Southern Section of Ring Road No. 3 in Hanoi in the Socialist Republic of Vietnam and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Vietnam a study team headed by Mr. Minoru Shibuya, Pacific Consultants International, several times between August 1997 and July 1998.

The team held discussions with the officials concerned of the Government of Vietnam, and conducted field surveys in the study area. 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 Socialist Republic of Vietnam for their close cooperation extended to the team.

September 1998

lice

Kimio Fujita President Japan International Cooperation Agency

Mr. Kimio Fujita President Japan International Cooperation Agency

Letter of Transmittal

Dear Sir,

We are pleased to submit herewith the Final Report of "The Feasibility Study on Thanh Tri Bridge and the Southern Section of Ring Road No. 3 in Hanoi (the Project)" in the Socialist Republic of Vietnam.

The report contains the results of study which was carried out by Pacific Consultants International between August 1997 and September 1998. The report consists of four volumes of Summary, Main Report, Appendix and Drawings.

The Summary briefly illustrates the findings of the entire study. The Main Report consists of 19 chapters and presents current road transport profile and the feasibility study on the Project. It recommends that the Project should be implemented at the earliest opportunity and arrangement of land acquisition of the right-of-way should commence as soon as possible. The Appendix contains the supporting data including detailed results of several field surveys carried out by us in Vietnam. The Drawings compiles plans and details associated with the preliminary design of highway, bridges and other structures.

We wish to express grateful acknowledgment to the personnel of your Agency, Ministry of Foreign Affairs, Advisory Committee, Ministry of Construction and Embassy of Japan in Vietnam, and also to officials of the Ministry of Transport, Government of Vietnam for their assistance extended to the Study Team. The Study Team sincerely hopes that the results of this study will contribute to the development of road network in Vietnam.

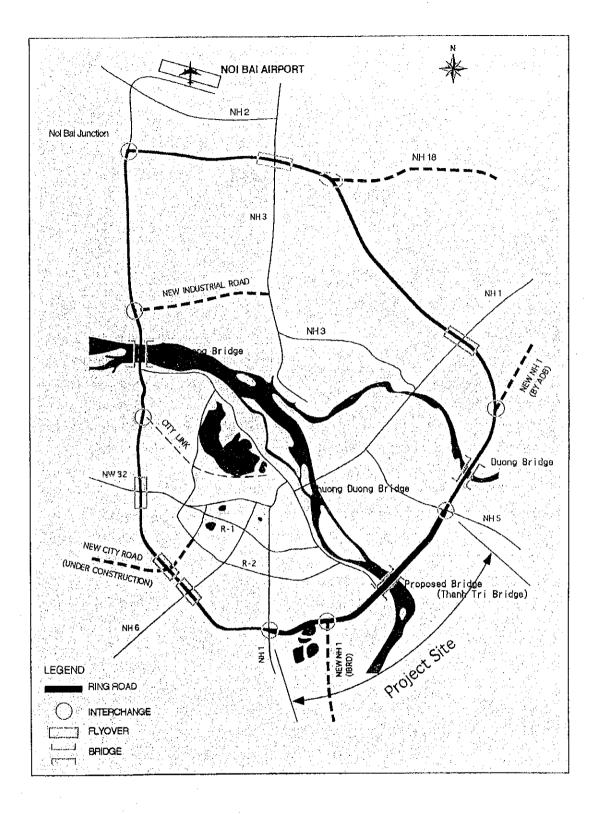
Yours faithfully,

Minoru Shibuya Team Leader

The Feasibility Study on Thanh Tri Bridge and the Southern Section of Ring Road No. 3 in Hanoi in the Socialist Republic of Vietnam



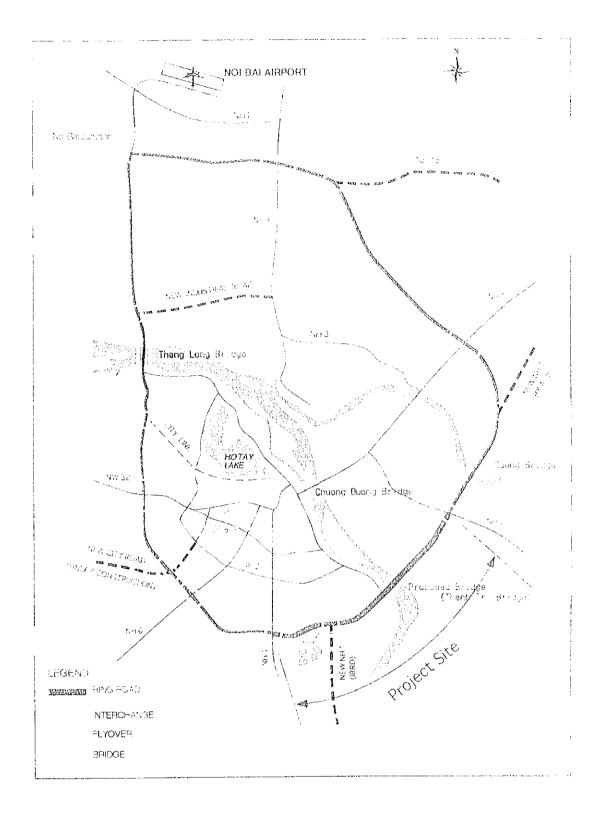
THANH TRI BRIDGE PRESTRESSED CONCRETE BOX GIRDER DESIGN



PROJECT LOCATION MAP



THANH TRI BRIDGE PRESTRESSED CONCRETE BOX GIRDER DESIGN



PROJECT LOCATION MAP

DEFINITIONS AND ABBREVIATIONS

(1) Agencies

AASHTO	American Association of State Highway and Transportation	
ADB	Asian Development Bank	
DOSTE	Hanoi Department of Science Technology and Environment	
HPC	Hanoi People's Committee	
IBRD/WB	International Bank for Reconstruction and Development/Worl	d
JICA	Japan International Cooperation Agency	
MOSTE	Ministry of Science and Technology and Environment	•
MOT	Ministry of Transport	
OECF	Overseas Economic Cooperation Fund, Japan	2
PMU Thang Long	Project Management Unit Thang Long	
TEDI	Transport Engineering Design Incorporation	
TUPWS	Transport and Urban Public Works Services, HPC	
UNDP	United Nations Development Program	
VRA	Vietnam Road Association, Ministry of Transport	-
(2) Technical, Tra	ffic and Economic Terms	

AADT	Average Annual Daily Traffic
	· · · · · · · · · · · · · · · · · · ·
AC	Asphaltic Concrete
ADT	Average Daily Traffic
BOD	Biological Oxygen Demand
BP	By-pass
CBD	Central Business District
CBR	California Bearing Ratio
EIA	Environmental Impact Analysis
EIRR	Economic Internal Rate of Return
FIRR	Financial Internal Rate of Return
F/S	Feasibility Study
GDP	Gross Domestic Product
GRDP	Gross Regional Domestic Product
HTRR	Hanoi Third Ring Road
HUTMP	Hanoi Urban Transport Masterplan Study (The Master Plan of Urban Transport for Hanoi City in Vietnam, JICA)
HWL	High Water Level
IC	Interchange
IFRR	Internal Financial Rate of Return
LWL	Low Water Level
NH	National Highway
NPV	Net Present Value
	2017년 1917년 - 1917년 1월 17년 1월 17년 18월 1917년 - 1917년 1917년 1917년 - 1917년 - 1917년

		Of the Development
	0-D	Origin-Destination
	O/M	Operation and Maintenance
	Pass. or Pas.	Passenger
	PC	Prestressed Concrete
	PCU	Passenger Car Unit
•	RC	Reinforced Concrete
÷.	ROW	Right-Of-Way
	SHTRR	Southern Section of Hanoi Third Ring Road
	SPT	Standard Penetration Test
17 - 1	Sta.	Station
	STRADA	System for Traffic Demand Analysis
÷.	TCVN	Standard of Vietnam
	US\$/USD	US Dollar
art ar	VND	Vietnam Dong
	VOC	Vehicle Operation Cost
	VRA	Vietnam Road Association, Ministry of transport
: _:	n an	
•		
		에는 것은 것은 것이 가지 않는 것을 위한 것을 알았다. 또한 한 것을 받았는 것을 가지 않는 것을 가지 않는 것이다. 같은 것이 같은 것이 같은 것은 것이 같은 것이 있다. 것이
. •		in a second s The second sec
5		n terre an Arrain an

- ii -

PROJECT SUMMARY The Socialist Republic of Victnam I. COUNTRY Pencibility Study on Thanh Tri Bridge and the Southern Section of Ring Road No. 3 in Hanoi 2 NAME OF STUDY Project Management Unit Thang Long, Ministry of Transport 3. COUNTERPART AGENCY To carry out the feasibility study on the construction of Thanh Tri Bridge and the SHTRR 4 OBJECTIVE OF STUDY NOTE: SHTER denotes Southern Section of Hanoi Third Ring Road. 1. STUDY AREA: Hanoi and Surrounding 6 Provinces (Ha Tay, Vinh Phue, Thai Nguyen, Bac Gian, Bac Ninh and Hung Yen) 2. FUTURE TRAFFIC VOLUME 1 9 1 ÷ Gia Lam Section of SHTRR Theels Tri Section of SHTRR Thank Tri Bridge 3.2 km 6.1 km 3.1 **km** 1000 C 1000 2000 73:100 57,600 / 73,100 73,100 Traffic Velam: Year 2010 111.700 86.400/111.700 (PCUMby) 111,700 Year 2024 1. NUMBER OF LANE AND TYPICAL CROSS SECTIONS Typical Cross Section * Number of Lanc Desire Second Red and Rose Tores In Bulley Tores In Sectors of Stitute HOL BOARD Type A 6 Type C or D 100 km/hr 4 Cas Ann Section of Section Type B or C 3 · Non-Sie Parto I. 4 TRANSPORT Project Cost Road/Bridge Unit: Million Dang Januny 1993 Prints (USS=12,350 Dang Foreign Local Total Length 89 A S Exchange Currency 2.928.955 1.782.803 1,146,152 THE STORES 3.1 km 485,903 1,067.111 TANK TO SALES OF SHITTED 581,298 6 I ka (the Loss Resident of Shifting 590,523 3.2 448 350,668 239,855 1 1.871.910 4.586.589 2.714.679 alle China 12.4 km - Contraction of the Property of the 2002 2003 a change 2001 (N POT 2 ે છે 21 6 G. mar gate at g ó, JANE 6 11 18 18 20 A BEDROOM: AND TRUMELAL PARA ATCHS Project as a whole 201.065 PERE I) 5.63 FIRE 2) 5.64 1) In case the Project implemented by private active (BOT project) 5.64 2) In case the Project implemented by the Government 5.64 38 d d as auchaical difficulty is anticipated for the construction) els regional development other than the

as due to the capit development of the region. Speace inconfictely

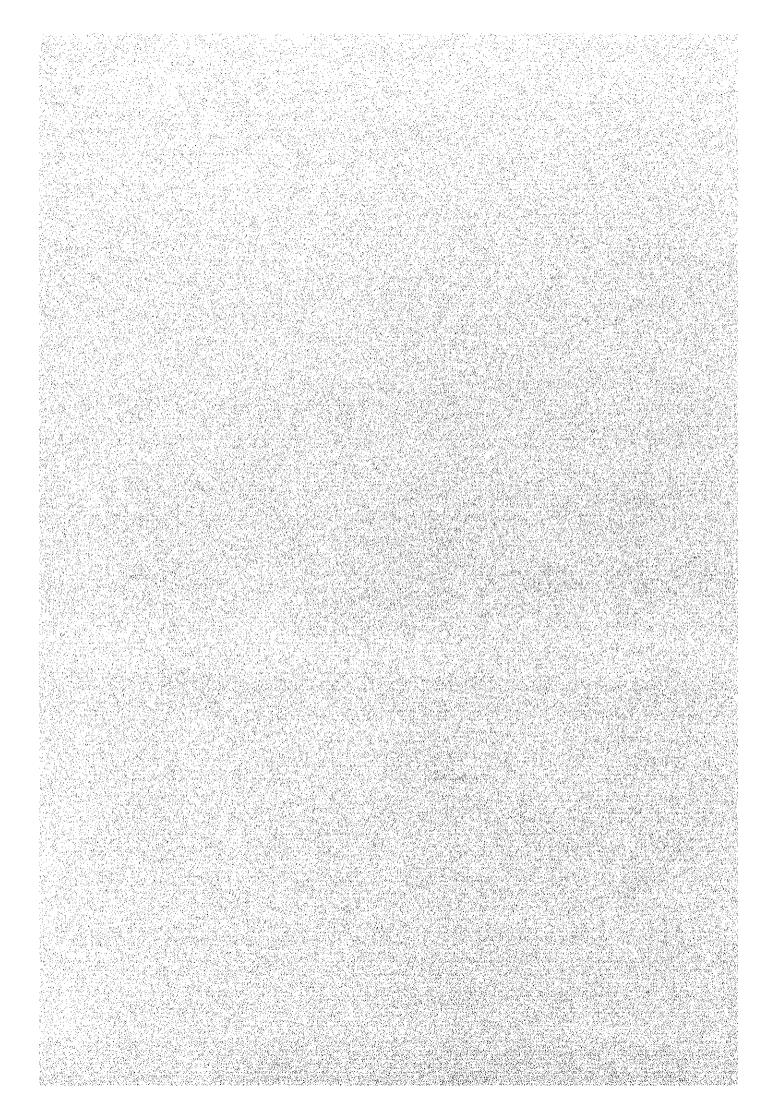
5.45.90

n and a second second

0-D	Origin-Destination
O/M	Operation and Maintenance
Pass, or Pas.	Passenger
PC	Prestressed Concrete
PCU	Passenger Car Unit
RC	Reinforced Concrete
ROW	Right-Of-Way
SHTRR	Southern Section of Hanoi Third Ring Road
SPT	Standard Penetration Test
Sta.	Station
STRADA	System for Traffic Demand Analysis
TCVN	Standard of Vietnam
US\$/USD	US Dollar
VND	Vietnam Dong
VOC	Vehicle Operation Cost
VRA	Vietnam Road Association, Ministry of transport

PROJECT SUMMARY

	UNTRY		Th	e Socialist Republi	c of Vietnam				·
	ME OF STU			asibility Study on	Thanh Tri Bridge	and the Southerr	Section of Rin	g Road No. 3 in Ha	1001
	UNTERPAR			pject Management	Unit Thang Long	g, Ministry of Tra	nsport Thanh Tri Brid	ge and the SITTRR	
	JECTIVE OI			n of Hanoi Third R		ie construction of	Than the orig	<u> </u>	
NUTE:	SHIKK dend	acs soun	iem secuo		ing itoliti.				
1. ST	UDY AREA:	Hanoi an	d Surround	ing 6 Provinces (I	la Tay, Vinh Phu	ic, Thai Nguyen,	Bac Gian, Bac N	linh and Hung Yen	i)
	TURE TRAF					···· ··· ··· ···	• · · · • · · · · · · · · · · · · · · ·		
ſ	Dl • 1				<u> </u>	2		3	
	Package 1 Section	NO.		Thanh Tri E	Bridge	Thanh Tri Sectior	of SHTRR	Gia Lam Sectio	n of SHTR
	Road/Bri	dge Leng	th	3.1 kn		6.1 kn	1	3.2 k	
	Traffic Volun	nc Y	ear 2010	73,100		57,600/73		73,10	
. L	(PCU/day)	Y	'ear 2020	111,70	0	86,400/11	1,700		00
3. NU	IMBER OF L	ANE AN	ID TYPICA	L CROSS SECTION	ONS			·	
q]	ackage No.		Sect	ion	Design	Speed	Number of La		ross Section
	1	Thanh 1	Fri Bridge		100 k	cm/hr	6		ype A
	2	Thanh '	I'ri Section		100 1		4		e C or D
	3		n Section o	f SHTRR	100 k	(m/hr	4	<u> </u>	e B or C
*	Note: See Fig	gure 1.	· · · · · · · · · · · · · · · · · · ·	<u> </u>					. <u></u>
4. PR	OJECT COS	Т					· ·		
								Project Cost	
- Un	it: Million D	ong	Package No.	Sec	tion	Road/Bridge Length	Foreign	Local	Total
- Jan	nuary 1993 P	rices	190.				Exchange		
-10	JS\$=12,950	Dong	1	Thanh Tri Bridg		3.1 km	1,782,803		2,928,9
. I			2	Thanh Tri Secti		6.1 km	581,208		1,067,1
			3	Gia Lam Sectio Total	n of SHTRR	3.2 km	2,714,679		4,586,5
5 IN	IPLEMENTA		CHEDULE						
	dag sa sa sa dar		ta tu						200
	Package No.			cription	1999	2000	2001	2002	2003
	1, 2 and 3	L and A	d Design	and Resettlement	· · · · ·				
		Constru							
	2			and Resettlement					
	. Z	Constru		L D					
	<u>e e e e e e e e e e e e e e e e e e e </u>		Acquisition	and Resettlement					
	3			and the second second					
6 14	3	Constr	uction	IDICATORS					
6. E	3 CONOMIC A	Constr ND FIN/	uction	go an board an	whole	12:.	ancial Indicator	rs Proi	icct as a who
6. E	3 CONOMIC A Econo	Constru- ND FIN/ mic Indie	uction ANCIAL IN ators	IDICATORS		<u> </u>	nancial Indicator FIRR 1)	rs Proj	iect as a who 5.63
6. E	3 CONOMIC A Econo	Constr ND FIN/	uction ANCIAL IN ators	Project as a			FIRR 1) FIRR 2)		5.63 5.64
6. B	3 CONOMIC A Econo E NPV (E	Constru- ND FIN/ mic Indic EIRR (%) Million D B/C Ratio	uction ANCIAL IN eators Dong)	Project as a 13.14 329,44 1.12	9	Note: 1)	FIRR 1) FIRR 2) In case the Pr	oject implemented	5.64
	3 CONOMIC A Econo E NPV (E Note: NPV a	Constru- ND FIN/ mic Indic EIRR (%) Million E B/C Ratio and B/C r	uction ANCIAL IN eators Dong)	Project as a 13.14 329,44	9		FIRR 1) FIRR 2) In case the Pr sector (BOT p In case the Pr	oject implemented	5.63 5.64 by private
	3 Econo Econo E NPV (E Note: NPV a discou	Constru- ND FIN/ mic Indic EIRR (%) Million D Million D Million D Million T and B/C runt rate of	uction ANCIAL IN eators Dong) atio were c [12 % p.a.	Project as a 13.14 329,44 1.12	9	Note: 1)	FIRR 1) FIRR 2) In case the Pr sector (BOT r	oject implemented	5.63 5.64 by private
	3 CONOMIC A Econo E NPV (E Note: NPV a	Constru- ND FIN/ mic Indic EIRR (%) Million D Million D Million D Million T and B/C runt rate of	uction ANCIAL IN eators Dong) atio were c [12 % p.a.	Project as a 13.14 329,44 1.12	9	Note: 1)	FIRR 1) FIRR 2) In case the Pr sector (BOT p In case the Pr	oject implemented	5.63 5.64 by private
	3 Econo Econo E NPV (E Note: NPV a discou	Constru- ND FIN/ mic Indic EIRR (%) Million L B/C Ratio and B/C r int rate of DATION	uction ANCIAL IN eators Dong) atio were c [12 % p.a. IS	Project as a 13.14 329,44 1.12 alculated based on	<u>9</u> a	Note: 1) 2)	FIRR 1) FIRR 2) In case the Pr sector (BOT p In case the Pr Government	oject implemented roject) oject implemented	5.63 5.64 by private by the
	3 ECONOMIC A Econo E NPV (E Note: NPV a discou RECOMMEN	Constru- ND FIN/ mic Indic EIRR (%) Million L B/C Ratio and B/C r int rate of DATION DATION is of the S mically f	uction ANCIAL IN eators Dong) atio were c [12 % p.a. IS Study indic feasible.	Project as a 13.14 329,44 1.12 alculated based on ate that the Project Taking into account	9 a t is technically so t the direct and o	Note: 1) 2) ound (no serious mormous indirect	FIRR 1) FIRR 2) In case the Pr sector (BOT p In case the Pr Government technical difficu	oject implemented	5.63 5.64 by private by the or the const
	3 ECONOMIC A Econo E NPV (E Note: NPV a discou RECOMMEN I. The result and econo quantified	Constr ND FIN/ mic Indic SIRR (%) Million E %C Ratio and B/C ratio and and and and and and and and and and	uction ANCIAL IN ators Dong) atio were c [12 % p.a. IS Study indic feasible.	Project as a 13.14 329,44 1.12 alculated based on ate that the Project Faking into accoun sts, the Project sho	9 a t is technically so t the direct and c uld be implement	Note: 1) 2) ound (no serious cnormous indirect ated at the earliest	FIRR 1) FIRR 2) In case the Pr sector (BOT p In case the Pr Government technical diffict benefits toward opportunity.	oject implemented oroject) oject implemented ilty is anticipated f is regional develop	5.63 5.64 by private by the or the const oment other
7. 5	3 ECONOMIC A Econo E NPV (E Note: NPV a discou RECOMMEN I. The result and econo quantified 2 Delay of i	Constr ND FIN/ mic Indic SIRR (%) Million E %C Ratio and B/C ratio and and and and and and and and and and	uction ANCIAL IN ators Dong) atio were c [12 % p.a. [S Study indic feasible. in travel co ttation wou	Project as a 13.14 329,44 1.12 alculated based on ate that the Project Faking into account sts, the Project should entail increasing	9 a t is technically so t the direct and o uld be implement ty difficult land	Note: 1) 2) ound (no serious mormous indirect need at the earliest acquisition and re	FIRR 1) FIRR 2) In case the Pr sector (BOT p In case the Pr Government technical diffict benefits toward opportunity.	oject implemented oroject) oject implemented ilty is anticipated f is regional develop	5.63 5.64 by private by the or the const oment other
7. 5	3 ECONOMIC A Econo E NPV (E Note: NPV a discou RECOMMEN I. The result and econo quantified 2. Delay of i especially 3. Proposed	Constru- ND FIN/ mic Indic EIRR (%) Million L B/C Ratio and B/C r int rate of DATION by DATION ts of the S omically f I savings implement in Thank	uction ANCIAL IN eators Dong) atio were c [12 % p.a. [12 % p.a. [13 Study indic feasible. in travel co ttation wou h Tri area.	Project as a 13.14 329,44 1.12 alculated based on ate that the Project Caking into accoun sts, the Project sho Id entail increasing Arrangement of L edule is to emphas	9 a t is technically so t the direct and o uld be implemer ly difficult land and acquisition a ize simultaneous	Note: 1) 2) ound (no serious enormous indirect ned at the earliest acquisition and re and resettlement si commencement	FIRR 1) FIRR 2) In case the Pr sector (BOT p In case the Pr Government technical diffict benefits toward opportunity. esettlement due the hould commence of services in all	oject implemented project) oject implemented ilty is anticipated f is regional develop to the rapid develop e immediately.	5.63 5.64 by private by the or the const ment other
7. 5	3 ECONOMIC A Econo E NPV (E Note: NPV a discou RECOMMEN 1. The result and econo quantified 2. Delay of i especially 3. Proposed due consi 4. Such a st	Constru- ND FIN/ mic Indic EIRR (%) Million E %C Ratio and B/C runt rate of DATION ts of the S pomically fi savings implement i n Thank implement deration of age const	uction ANCIAL IN eators Dong) atio were c [12 % p.a. IS Study indic feasible. in travel co station wou h Tri area. ntation schoon inevitab	Project as a 13.14 329,44 1.12 alculated based on ate that the Project Faking into accoun sts, the Project sho Id entail increasing Arrangement of la edule is to emphase le lead-time for lan	a t is technically so t the direct and o uld be implement dy difficult land and acquisition a ize simultaneous d acquisition and from four lanes	Note: 1) 2) ound (no serious enormous indirect net at the earliest acquisition and re and resettlement st commencement of resettlement, to to six lancs in d	FIRR 1) FIRR 2) In case the Pr sector (BOT p In case the Pr Government technical diffict benefits toward opportunity. settlement due thould commence of services in all optimize investu	oject implemented oroject) oject implemented dity is anticipated f is regional develop to the rapid develop c immediately. I three construction ment schedule.	5.63 5.64 by private by the or the const oment of the sections, su
7. 5	3 ECONOMIC A Econo E NPV (E Note: NPV a discou RECOMMEN 1. The result and econo quantified 2. Delay of i especially 3. Proposed due consi 4. Such a st	Constru- ND FIN/ mic Indic EIRR (%) Million E %C Ratio and B/C runt rate of DATION ts of the S pomically fi savings implement i n Thank implement deration of age const	uction ANCIAL IN eators Dong) atio were c [12 % p.a. IS Study indic feasible. in travel co station wou h Tri area. ntation schoon inevitab	Project as a 13.14 329,44 1.12 alculated based on ate that the Project Faking into accoun sts, the Project sho Id entail increasing Arrangement of la edule is to emphase le lead-time for lan	a t is technically so t the direct and o uld be implement dy difficult land and acquisition a ize simultaneous d acquisition and from four lanes	Note: 1) 2) ound (no serious enormous indirect net at the earliest acquisition and re and resettlement st commencement of resettlement, to to six lancs in d	FIRR 1) FIRR 2) In case the Pr sector (BOT p In case the Pr Government technical diffict benefits toward opportunity. settlement due thould commence of services in all optimize investu	oject implemented project) oject implemented ilty is anticipated f is regional develop to the rapid develop e immediately.	5.63 5.64 by private by the or the const oment of the sections, su
7. 5	3 ECONOMIC A Econo E NPV (E Note: NPV a discou RECOMMEN 1. The result and econo quantified 2. Delay of i especially 3. Proposed due consi 4. Such a st	Constru- ND FIN/ mic Indic EIRR (%) Million E %C Ratio and B/C runt rate of DATION ts of the S pomically fi I savings implement i m Thank implement deration of and const	uction ANCIAL IN eators Dong) atio were c [12 % p.a. IS Study indic feasible. in travel co station wou h Tri area. ntation schoon inevitab	Project as a 13.14 329,44 1.12 alculated based on ate that the Project Faking into accoun sts, the Project sho Id entail increasing Arrangement of la edule is to emphase le lead-time for lan	a t is technically so t the direct and o uld be implement dy difficult land and acquisition a ize simultaneous d acquisition and from four lanes	Note: 1) 2) ound (no serious enormous indirect net at the earliest acquisition and re and resettlement st commencement of resettlement, to to six lancs in d	FIRR 1) FIRR 2) In case the Pr sector (BOT p In case the Pr Government technical diffict benefits toward opportunity. settlement due thould commence of services in all optimize investu	oject implemented oroject) oject implemented dity is anticipated f is regional develop to the rapid develop c immediately. I three construction ment schedule.	5.63 5.64 by private by the or the const oment of the sections, su



OUTLINE OF THE STUDY

The Socialist Republic of Vietnam, Feasibility Study on Thanh Tri Bridge and the Southern Section of Ring Road No.3 in Hanoi

- Study Period: July, 1997 September, 1998
 - Counterpart Agency: Project Management Unit Thanh Long,

Ministry of Transport

Background

1.

2.

3.

4.

4.1

Since an effective transport system is a basic requirement to achieve the future socioeconomic development of the region, a number of transport infrastructures improvement projects are either planned or under construction.

Many industrial zones are now either in operation or in the construction stage around Hanoi and along the major transport arteries. The traffic entering in and originating from Hanoi will increase drastically in the near future.

In Hanoi, the total length of the road network is not sufficient for this increased usage, a ring road system has not been implemented, road widths are insufficient to allow heavy vehicles, and bridges are deteriorating.

Study Objectives

The objectives of the Study are to study feasibility of the construction of Thanh Tri Bridge over the Red River, the Southern Section of Ring Road No. 3 between the intersection of National Highway No. 1 and the intersection of National Highway No. 5 in Hanoi, and further to transfer technology to the Vietnamese counterparts during the execution of the Study.

Study Area

The Study Area is defined as the direct and indirect influence area of the Project. This includes such administrative districts as Hanoi City and its surrounding 6 provinces (Ha Tay, Vinh Phuc, Thai Nguyen, Bac Gian, Bac Ninh and Hung Yen).

Project Outline

Basic Policy

Although the official target year of the plan is the year 2010, additional supplementary demand forecast for the year 2020 will also be conducted in order to provide a grasp of further future conditions.

- 1 -

4.2 Content

Plans for the construction of Thanh Tri Bridge and the Southern section of Hanoi Third Ring Road (SHTRR) were made in reference to the basic policy stated above.

The results of the Study are stated below.

(1) Forecast Future Traffic Volume

A forecast of future traffic volume based on present volume and the future socioeconomic framework of the Study Area is shown in Table 1.

Table 1 Future Traffic Volume

Package No.	2
Section	Thanh Tri Bridge Thanh Tri Section of SHTRR Gis Lam Section of SHTRR
Road/Bridge Length	3.1 km 3.2 km
Traffic Volume Year 2010	73,100 57,600 / 73,100 73,100
(PCU/day) Year 2020	111,700 86,400 / 111,700 111,700

(2) Number of Lanes and Standard Cross Section

Judging from future traffic volume and traffic capacity, the number of required lanes was considered. Road geometric standard, which includes design speed and crosssection structure, was determined in consideration of the characteristics of each package (Table 2).

 Table 2
 Number of Lane and Typical Cross Sections

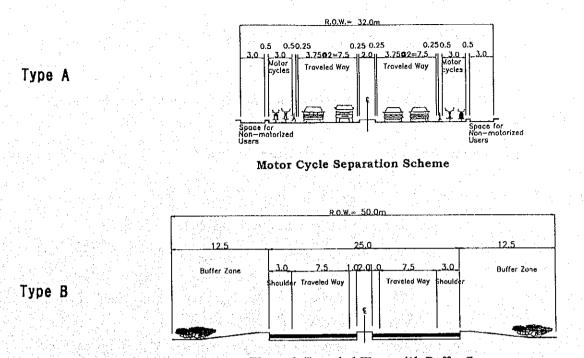
Pakege No. Section	n 🦾 👘	Design Speed	Numb	eroflane	Typical Cross Section *
1 Thanh Tri I	Bridge	100 km / hr	$\phi_{1,2}\phi_{1,2}^{\dagger}$, $\phi_{1,2}\phi_{2,3}^{\dagger}$, $\phi_{1,2}^{\dagger}$, $\phi_{2,3}^{\dagger}$,	6	TypeA
2 Thanh Tri Section	of SHTRR	100 km / hr	the second and		Type C or D
3 Gia Lam Section	of SHTRR	100 km / hr	a she an	a construction of the second	Type B or C

* Note: See Figure 1.

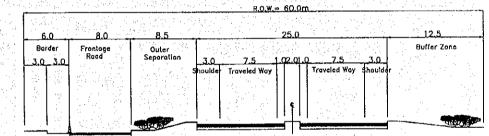
(3) Preliminary Design, Construction Planning, and Estimation of Project Cost

- 2 -

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

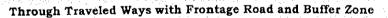


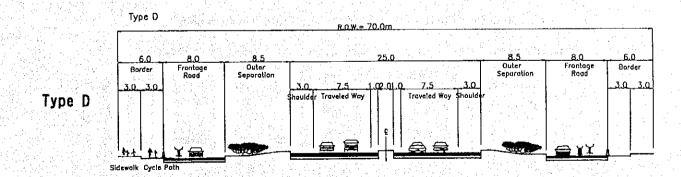
Through Traveled Ways with Buffer Zone



Sidewolk Cycle Path

Type C





Through Traveled Ways with Frontage Road on Both Sides

Figure 1 Typical Cross Sections

(4) Outline of Project

Construction is divided into three packages:

• Package 1 : Thanh Tri Bridge

Construction of 2×15.0 m effective widths of main bridge as well as approach and dyke bridges.

Package 2 : Than Tri Section of SHTRR

Main construction works in Package 2 are the construction of:

Four lane throughways, frontage roads and border facilities;

One partial cloverleaf type interchange to connect SHTRR and National Highway No.1 including flyover bridge;

One Y-type interchange to connect SHTRR and New National Highway No.1 including ramp bridges;

One half-diamond type interchange to connect Thanh Tri bridge and dyke road; and

Three prestressed concrete girder throughway bridges.

Package 3 : Gia Lam Section of SHTRR

Main construction works in package 3 are the construction of:

Four lane throughways, frontage roads and border facilities;

One partial cloverleaf type interchange to connect SHTRR and National Highway No.5 including flyover bridge;

One half-diamond type interchange to connect Thanh Tri bridge and dyke road;

One barrier type toll plaza; and

One prestressed concrete girder throughway bridges.

5. Project costs

The estimated project costs in exchange rates effective in January 1998 (1US = 12,950 Dong) for each package is shown in Table 3.

		0.40	a standard	Project Cost
Package No.	Section	Road/Bridge Length	Foreign Exchange	Local Total Currency
같은생산품화	Thanh Tri Bridge	3.1°km	1,782,803	1,146,152 2,928,955
2	Thanh Tri Section of SHTRR	6.1 km	581,208	485.903 1.067,111
3 . 2017	Gia Lam Section of SHTRR	3.2 km	350,668	239.855 590,523
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Total	12.4 km	2,714,679	1,871,910 4,586,589

Table 3

Estimated Project Cost in 1998 Prices

Project Evaluation

6.1 Economic Analysis

6.

The economic indicators for the project are shown in Table 4. The Project is deemed economically feasible.

Table 4	Results of Economic A	nalysis

Economic		Project as a	whole
EIRR	.(%)	13,14	
NPY (Milli	ion Dong)	329,449	
B/C F	Catio	1.12	
Charles and the second s			

Note: NPV and B/C ratio were calculated based on a discount rate of 12 % p.a.

6.2 Financial Analysis

The financial analysis revealed that:

In case the Project was implemented by the Government, calculated FIRR showed 5.64 % which is higher than the weighted average interest rate of 4.61 % (soft loan 70 % and bank loan 30 %) and judged to be financially feasible; and

In case the Project was implemented by private sector (build operate transfer - BOT), calculated FIRR showed 5.63 % which is much lower than the average interest of 8.5 % (equity 30 % and bank loan 70%), therefore it is judged to be financially not feasible.

FIRRs for the above cases are shown in Table 5.

Table 5)
---------	---

Financial Indicators	Project as a whole Judgement
FIRR(%) 1)	5.63 Not Feasible
FIRR (%) 2	5.64 Feasible

Note: 1) In case the Project implemented by private sector (BOT project)

2) In case the Project implemented by the Government

6.3 Environmental Aspects

The construction of Thanh Tri Bridge and SHTRR will entail a great amount of favorable impacts on society and the economy of the people along the highway as well as the state, but with adverse effects. Appropriate compensation should be made for land and properties affected by the Project.

7. Implementation Schedule

Tentative project implementation time schedule is drawn up as shown in Figure 2.

Pakege No.	Description	1999	2000	2001	2002	2003
1,2 and 3	Detailed Design	an a			1.000	
- 4. 52 - 1 - K K K	Land Acquisition and Resettlement			S. Starting		1945 B
	Construction				de characteria	Set of States of States
 A set of the set of	Land Acquisition and Resettlement	1999 - 1999 -	the States States	V. S. A. S. W. Martin C. B. B. B.	en services	
	Construction		Conversion Conversion		and the second	<u>na an a</u>
	Land Acquisition and Resettlement				an a	
	Construction		W. C. S. C. S.	Salaria Carta da	201. S. P. 195 (192)	

Figure 2 Project Implementation Schedule

As shown in Figure 2, the completion of the construction in all packages will be set at the same time of the end of 2003 to attain the optimum investment schedule and to consider the time required for land acquisition and resettlement.

Recommendations

8.

(1) Implementation of the Project

The results of the Study indicate that the Project is technically sound (no serious technical difficulty is anticipated for the construction) and economically feasible. Taking into account the direct and enormous indirect benefits towards regional development other than the quantified savings in travel costs, the Project should be implemented at the earliest opportunity.

(2) Land Acquisition and Resettlement

Delay of implementation would entail increasingly difficult land acquisition and resettlement due to the rapid development of the region, especially in Thanh Tri area. Arrangement of land acquisition and resettlement should commence immediately.

(3) Project Implementation Schedule

Proposed implementation schedule is to emphasize simultaneous commencement of services in all three construction sections, subject to due consideration on inevitable lead-time for land acquisition and resettlement, to optimize investment schedule.

(4) Construction Scheme for Thanh Tri Bridge

Such a stage construction scheme as widening from four lanes to six lanes in due time will entail diverse technical difficulties when applied to Thanh Tri Bridge. Thus it is recommendable to provide whole six lanes in the initial and single construction stage.

- 6 -