

JICA

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

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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

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

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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.

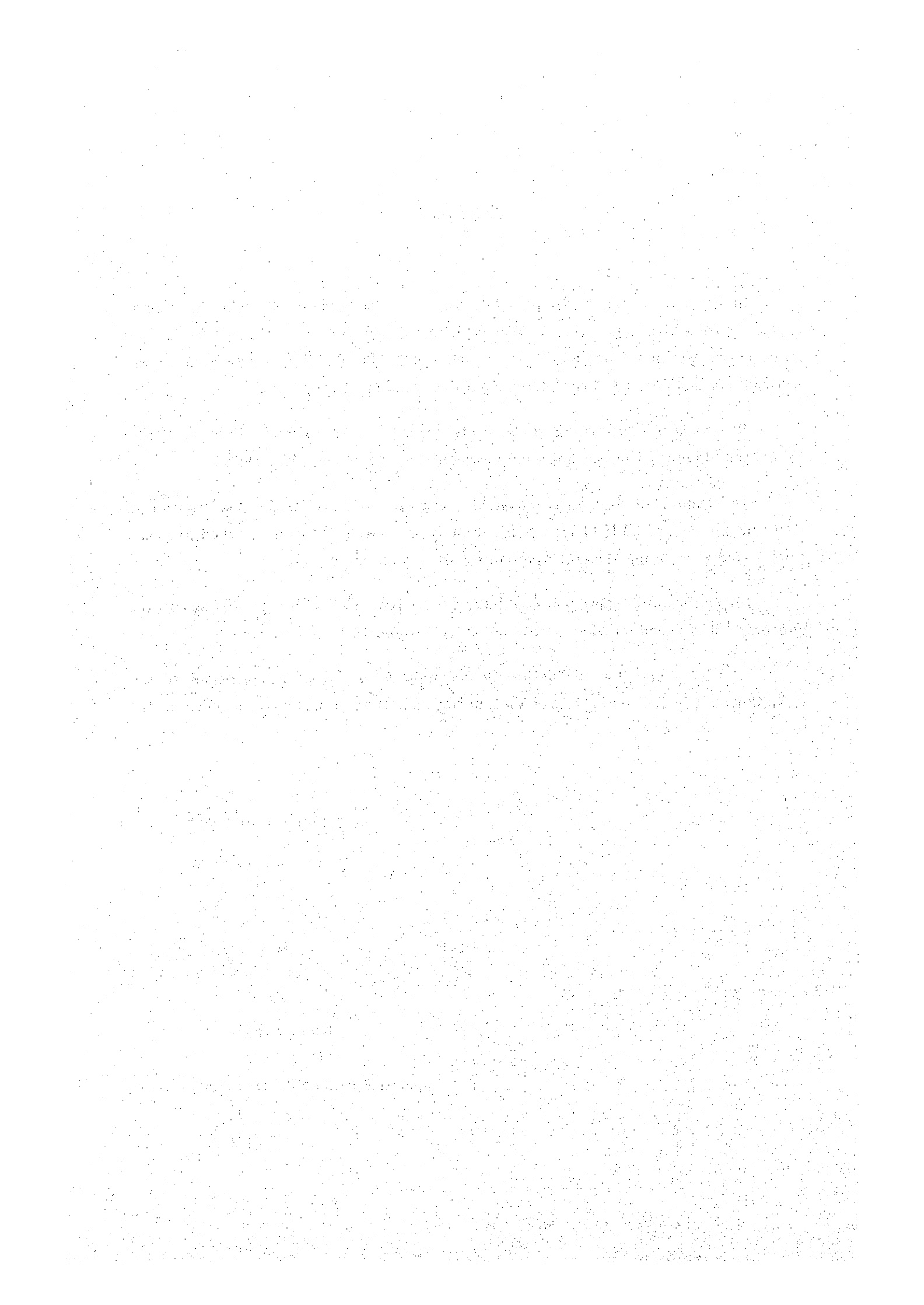
I wish to express my sincere appreciation to the officials concerned of the Government of Socialist Republic of Vietnam for their close cooperation extended to the team.

September 1998



Kimio Fujita
President

Japan International Cooperation Agency



September 1998

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Letter of Transmittal

Dear Sir,

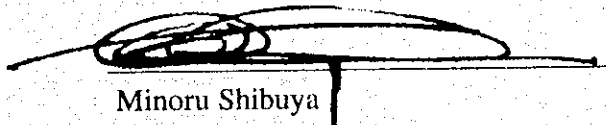
We are pleased to submit herewith the Final Report of "The Feasibility Study on Thanh Tri Bridge and the Southern Section of Ring Road No. 3 in Hanoi (the Project)" in the Socialist Republic of Vietnam.

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.

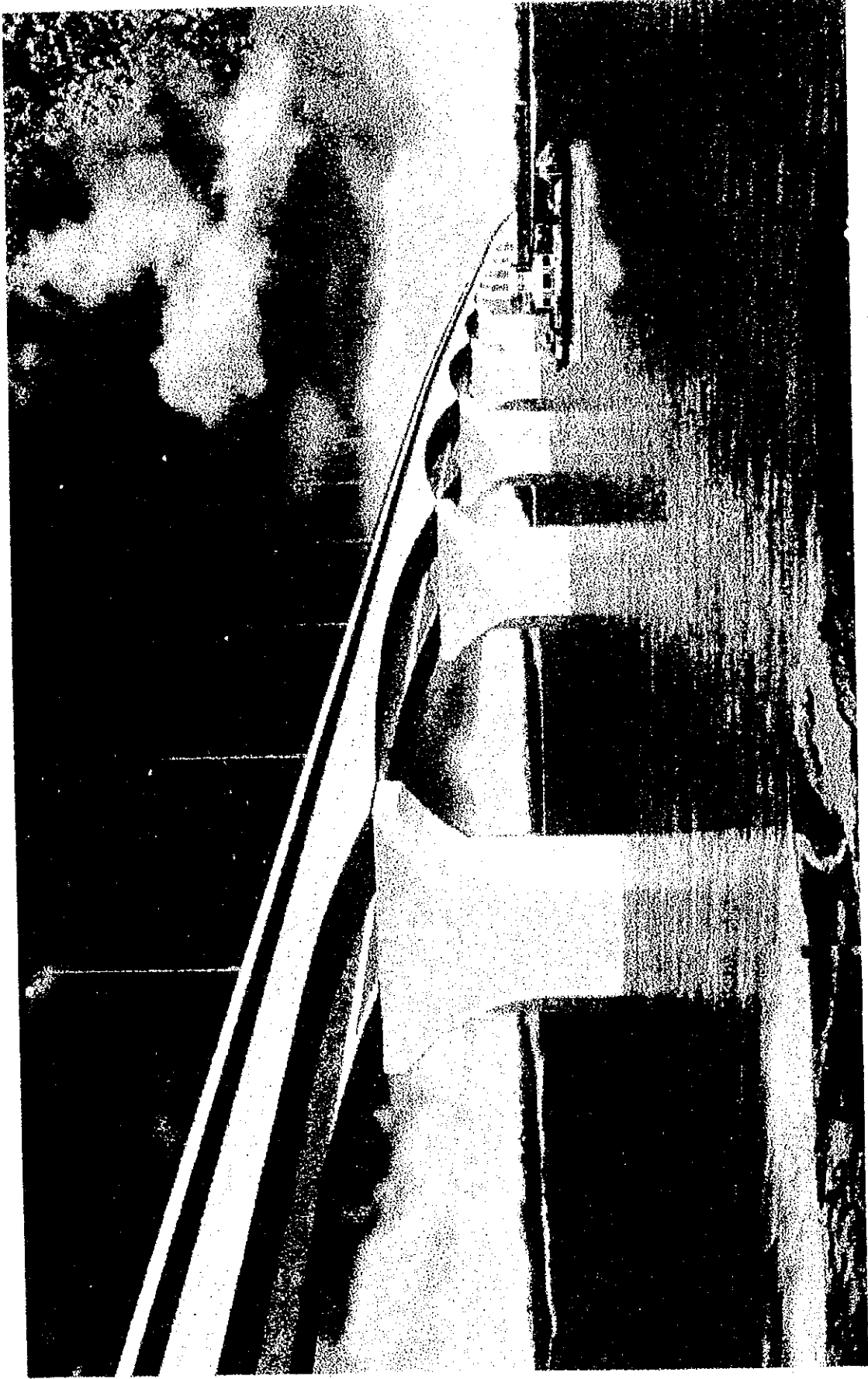
Yours faithfully,



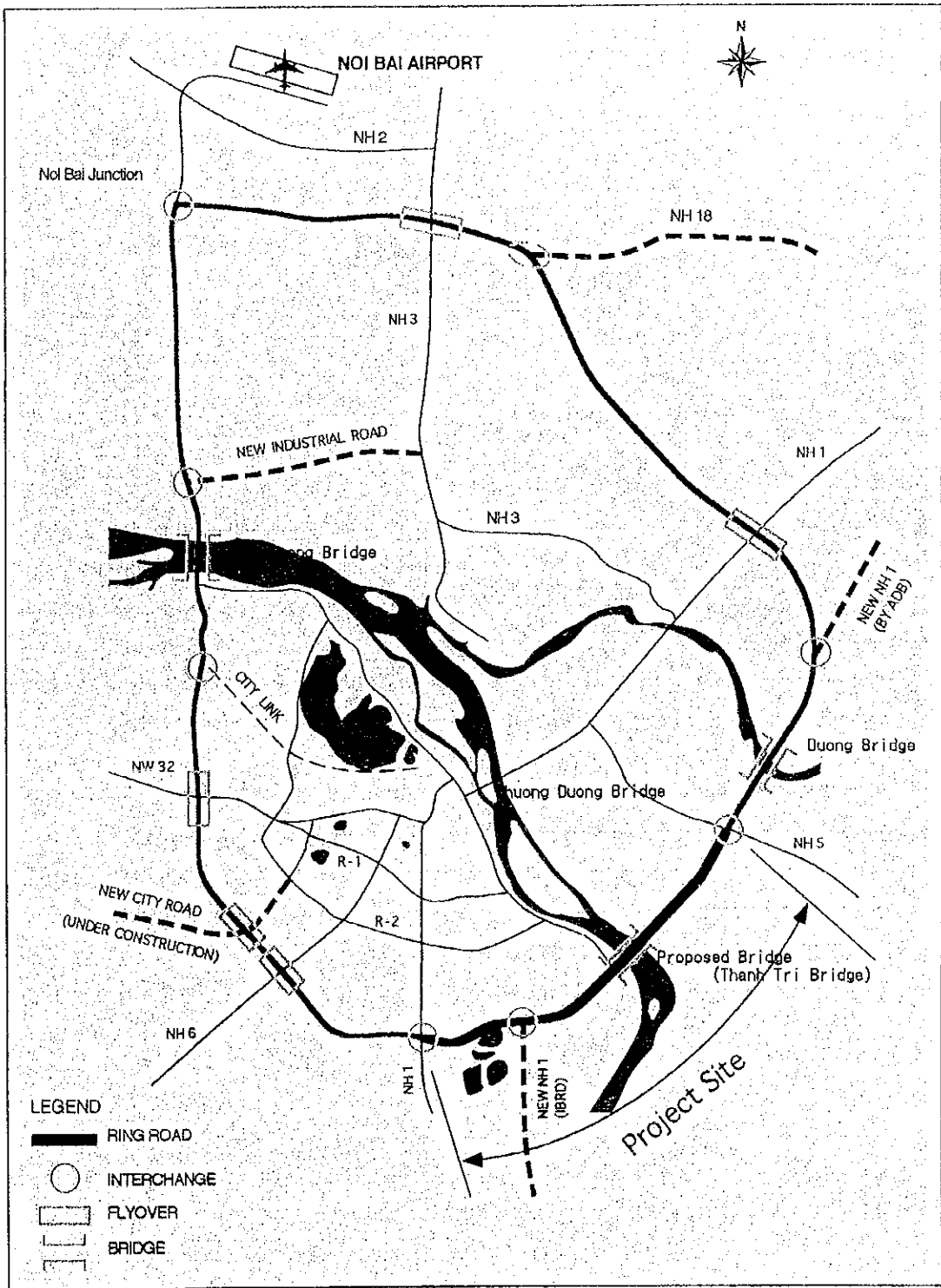
Minoru Shibuya

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



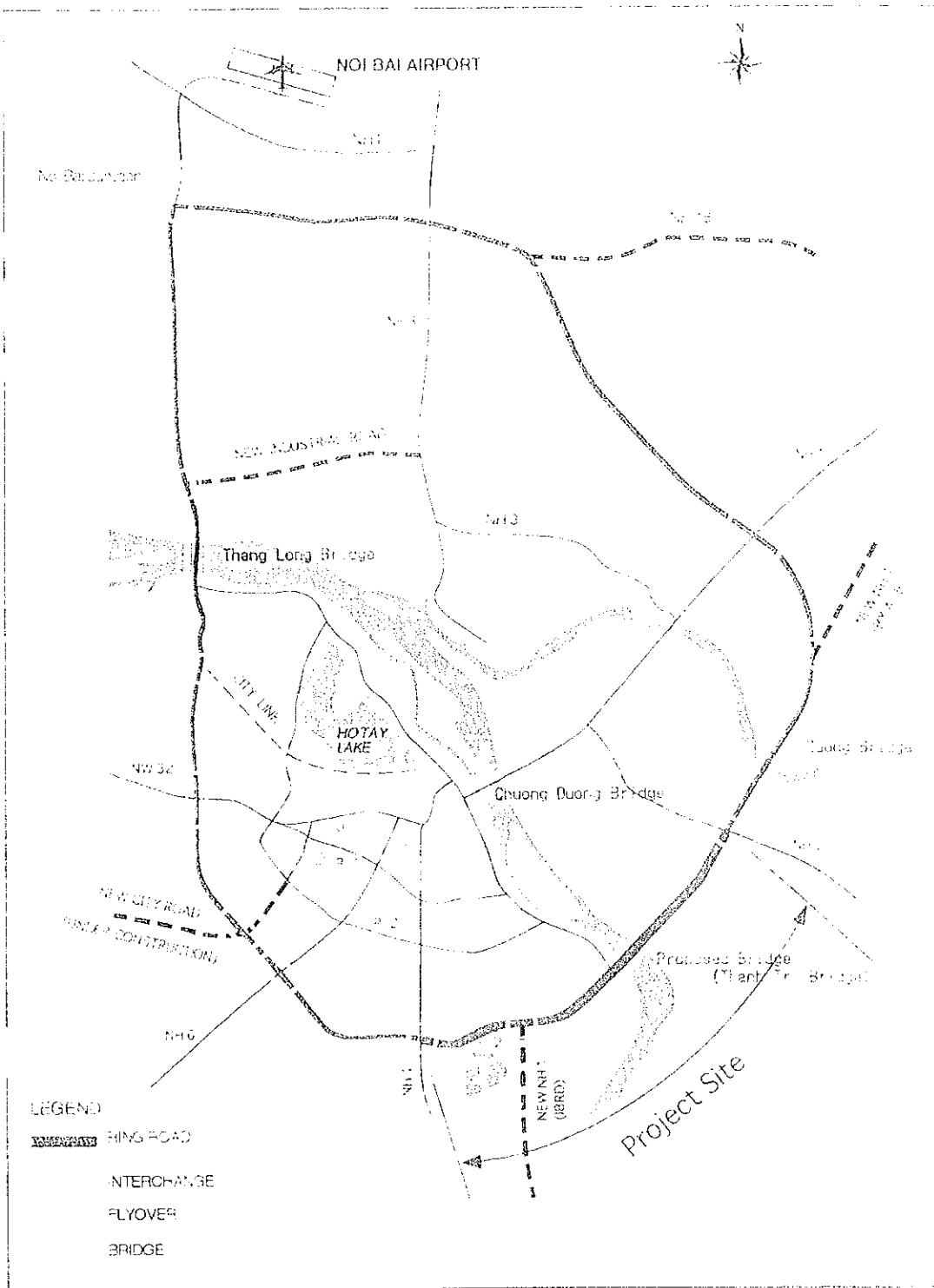
THANH TRI BRIDGE
PRESTRESSED CONCRETE BOX GIRDER DESIGN



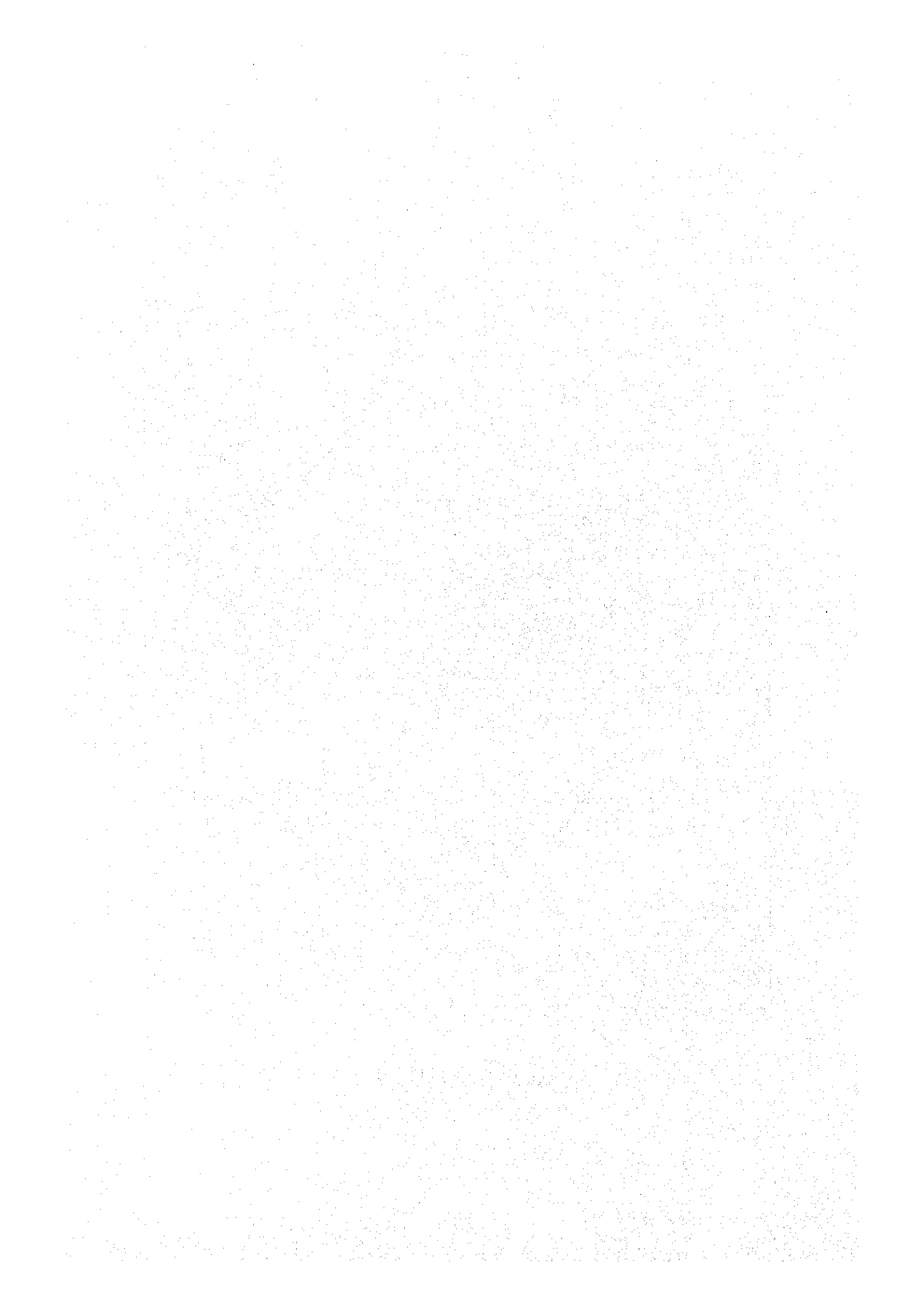
PROJECT LOCATION MAP



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/World Bank
JICA	Japan International Cooperation Agency
MOSTE	Ministry of Science and Technology and Environment
MOT	Ministry of Transport
OECF	Overseas Economic Cooperation Fund, Japan
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, Traffic 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

O-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

1. COUNTRY	The Socialist Republic of Vietnam
2. NAME OF STUDY	Feasibility Study on Thanh Tri Bridge and the Southern Section of Ring Road No. 3 in Hanoi
3. COUNTERPART AGENCY	Project Management Unit Thang Long, Ministry of Transport
4. OBJECTIVE OF STUDY	To carry out the feasibility study on the construction of Thanh Tri Bridge and the SHTRR

NOTE: SHTRR denotes Southern Section of Hanoi Third Ring Road.

1. STUDY AREA: Hanoi and Surrounding 6 Provinces (Ha Tay, Vinh Phuc, Thai Nguyen, Bac Gian, Bac Ninh and Hung Yen)

2. FUTURE TRAFFIC VOLUME

Package No.	1	2	3
Section	Thanh Tri Bridge	Thanh Tri Section of SHTRR	Gia Lam Section of SHTRR
Road/Bridge Length	3.1 km	6.1 km	3.2 km
Traffic Volume (PCU/day)	Year 2010	57,600 / 73,100	73,100
	Year 2020	111,700	86,400 / 111,700

3. NUMBER OF LANE AND TYPICAL CROSS SECTIONS

Package No.	Section	Design Speed	Number of Lane	Typical Cross Section *
1	Thanh Tri Bridge	100 km/hr	6	Type A
2	Thanh Tri Section of SHTRR	100 km/hr	4	Type C or D
3	Gia Lam Section of SHTRR	100 km/hr	4	Type B or C

* Note: See Figure 1.

4. PROJECT COST

Unit: Million Dong January 1993 Prices 1 US\$=12,950 Dong	Package No.	Section	Road/Bridge Length	Project Cost		
				Foreign Exchange	Local Currency	Total
	1	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	Gia Lam Section of SHTRR	3.2 km	350,668	239,855	590,523
	Total		12.4 km	2,714,679	1,871,910	4,586,589

5. IMPLEMENTATION SCHEDULE

Package No.	Description	1999	2000	2001	2002	2003
1, 2 and 3	Technical Design					
1	Land Acquisition and Reclamation Construction					
2	Land Acquisition and Reclamation Construction					
3	Land Acquisition and Reclamation Construction					

6. ECONOMIC AND FINANCIAL INDICATORS

Indicator	Project as a whole
NPV (10%)	13.34
IRR (10%)	50.4%
Payback	1.57

Note: NPV and IRR are based on a discount rate of 10%.

Financial Indicator	Project as a whole
FIRR (1)	5.63
FIRR (2)	5.64

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

7. RECOMMENDATIONS

- The results of the study indicate that the Project is technically sound (no serious technical difficulty is anticipated for the construction) and economically feasible. It is recommended that the Government should give priority to the Project and commence construction as early as possible. The Project should be implemented at the earliest opportunity.
- Due to the rapid development of the region, land acquisition and reclamation should commence immediately.
- The Government should ensure the timely completion of services in all three construction sections, subject to the availability of funds. The Government should also ensure that the Project is implemented in accordance with the investment schedule.
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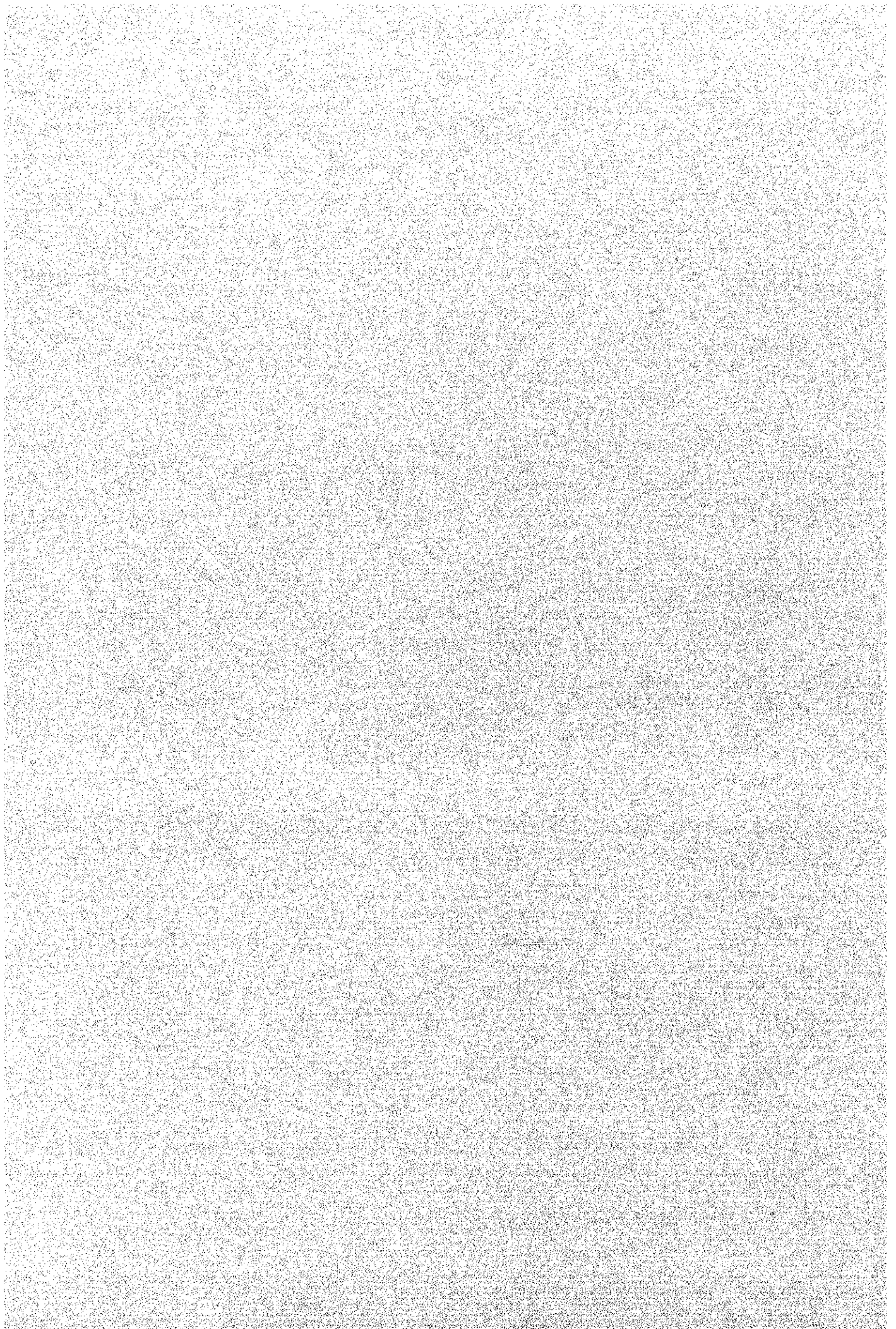
O-D	Origin-Destination
O/M	Operation and Maintenance
Pass. or Pas.	Passenger
PC	Prestressed Concrete
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SIHTRR	Southern Section of Hanoi Third Ring Road
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	Year 2020	111,700	86,400 / 111,700	111,700			
3. NUMBER OF LANE AND TYPICAL CROSS SECTIONS							
Package No.	Section	Design Speed	Number of Lane	Typical Cross Section *			
1	Thanh Tri Bridge	100 km/hr	6	Type A			
2	Thanh Tri Section of SHTRR	100 km/hr	4	Type C or D			
3	Gia Lam Section of SHTRR	100 km/hr	4	Type B or C			
* Note: See Figure 1.							
4. PROJECT COST							
- Unit: Million Dong - January 1993 Prices - 1 US\$=12,950 Dong	Package No.	Section	Road/Bridge Length	Project Cost			
				Foreign Exchange	Local Currency	Total	
	1	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	Gia Lam Section of SHTRR	3.2 km	350,668	239,855	590,523	
	Total	12.4 km	2,714,679	1,871,910	4,586,589		
5. IMPLEMENTATION SCHEDULE							
Package No.	Description	1999	2000	2001	2002	2003	
1, 2 and 3	Detailed Design	██████████					
1	Land Acquisition and Resettlement	██████████	██████████				
	Construction		██████████	██████████	██████████		
2	Land Acquisition and Resettlement			██████████	██████████		
	Construction		██████████	██████████	██████████		
3	Land Acquisition and Resettlement		██████████	██████████	██████████		
	Construction		██████████	██████████	██████████		
6. ECONOMIC AND FINANCIAL INDICATORS							
Economic Indicators		Project as a whole		Financial Indicators		Project as a whole	
EIRR (%)		13.14		FIRR 1)		5.63	
NPV (Million Dong)		329,449		FIRR 2)		5.64	
B/C Ratio		1.12		Note: 1) In case the Project implemented by private sector (BOT project)			
Note: NPV and B/C ratio were calculated based on a discount rate of 12 % p.a.				2) In case the Project implemented by the Government			
7. RECOMMENDATIONS							
1. 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. 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. 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. 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.							



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

1. Background

Since an effective transport system is a basic requirement to achieve the future socio-economic 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.

2. 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.

3. 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).

4. Project Outline

4.1 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.

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 socio-economic framework of the Study Area is shown in Table 1.

Table 1 Future Traffic Volume

Package No.		1	2	3
Section		Thanh Tri Bridge	Thanh Tri Section of SHTRR	Gia Lam Section of SHTRR
Road/Bridge Length		3.1 km	6.1 km	3.2 km
Traffic Volume (PCU/day)	Year 2010	73,100	57,600 / 73,100	73,100
	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 cross-section structure, was determined in consideration of the characteristics of each package (Table 2).

Table 2 Number of Lane and Typical Cross Sections

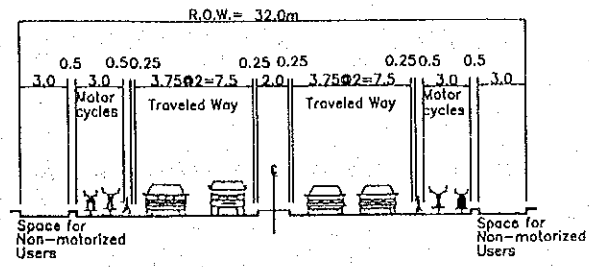
Package No.	Section	Design Speed	Number of Lane	Typical Cross Section *
1	Thanh Tri Bridge	100 km / hr	6	Type A
2	Thanh Tri Section of SHTRR	100 km / hr	4	Type C or D
3	Gia Lam Section of SHTRR	100 km / hr	4	Type B or C

* Note: See Figure 1.

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

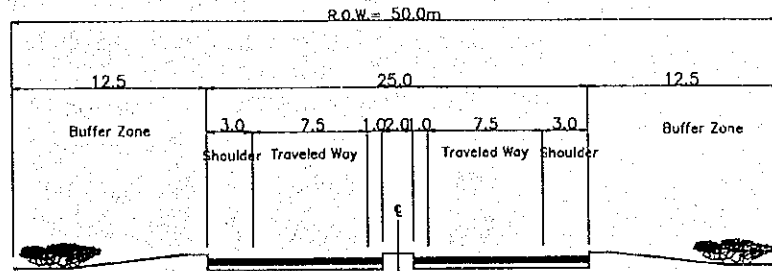
Based upon the highway's geometric standard, route selection was made with efforts to keep influences on the human and natural environments to a minimum. At the same time, preliminary design and construction planning were conducted. The project cost estimation was made in consideration of these aspects.

Type A



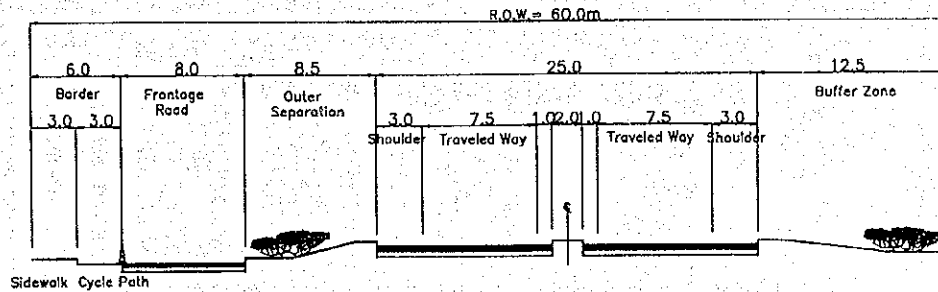
Motor Cycle Separation Scheme

Type B



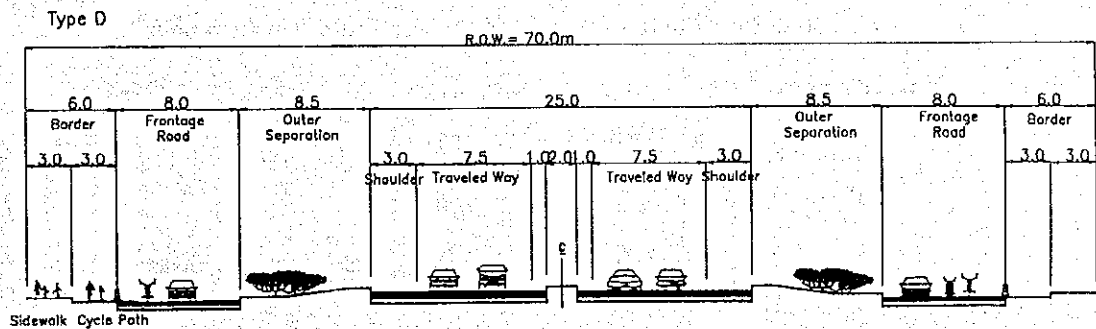
Through Traveled Ways with Buffer Zone

Type C



Through Traveled Ways with Frontage Road and Buffer Zone

Type D



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 x 15.0 m effective widths of main bridge as well as approach and dyke bridges.

- Package 2 : Thanh 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.

Table 3 Estimated Project Cost in 1998 Prices

Package No.	Section	Road/Bridge Length	Project Cost		
			Foreign Exchange	Local Currency	Total
1	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	Gia Lam Section of SHTRR	3.2 km	350,668	239,855	590,523
	Total	12.4 km	2,714,679	1,871,910	4,586,589

6. Project Evaluation

6.1 Economic Analysis

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

Table 4 Results of Economic Analysis

Economic Indicators	Project as a whole
EIRR (%)	13.14
NPV (Million Dong)	329,449
B/C Ratio	1.12

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.

Package No.	Description	1999	2000	2001	2002	2003
1, 2 and 3	Detailed Design	██████████				
1	Land Acquisition and Resettlement	██████████	■ ■ ■ ■			
	Construction		██████████	██████████	██████████	██████████
2	Land Acquisition and Resettlement		██████████	■ ■ ■ ■		
	Construction			██████████	██████████	██████████
3	Land Acquisition and Resettlement		██████████	■ ■ ■ ■		
	Construction			██████████	██████████	██████████

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.

8. Recommendations

(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.