

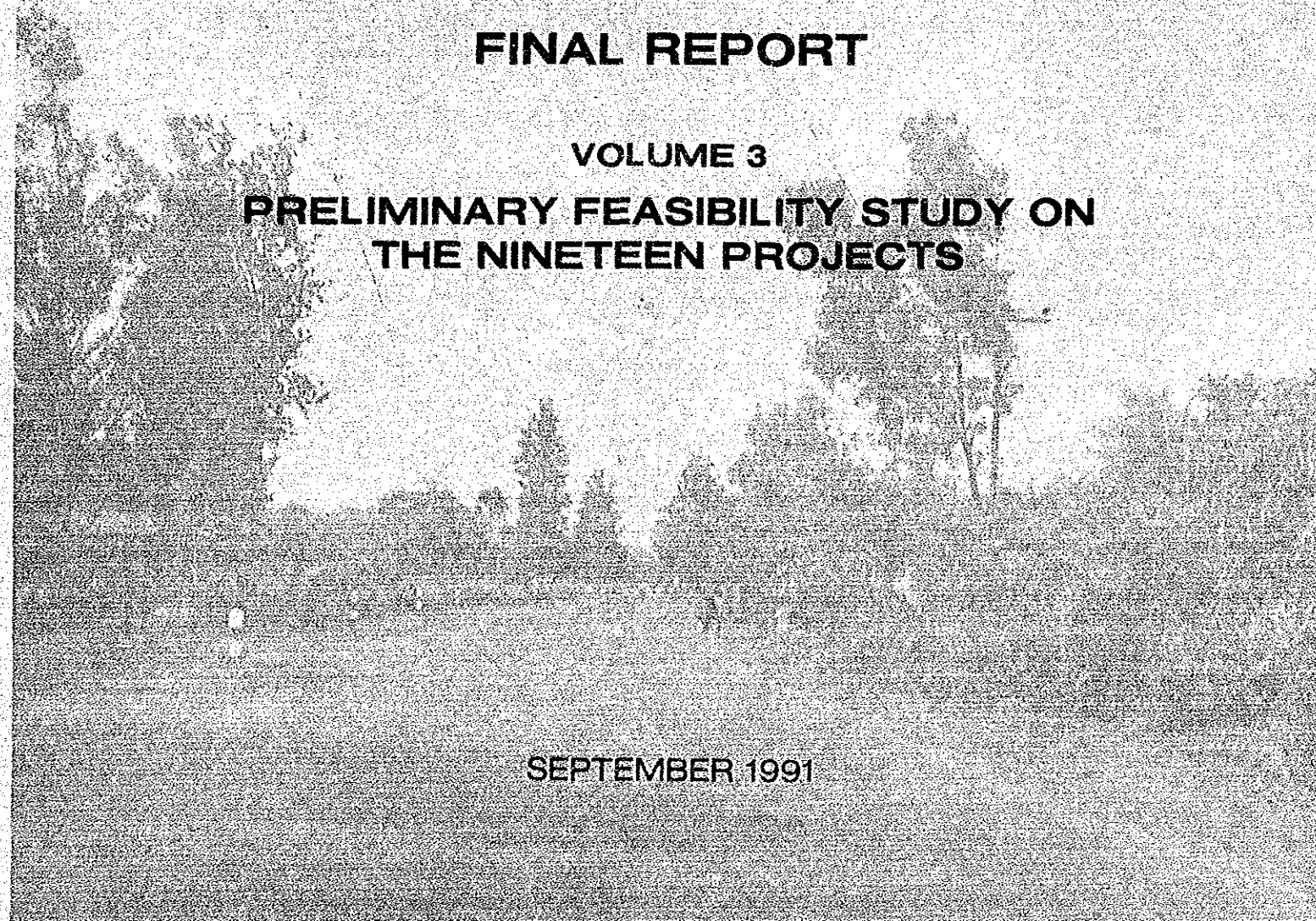
KINGDOM OF THAILAND  
MINISTRY OF TRANSPORT AND COMMUNICATIONS  
DEPARTMENT OF HIGHWAYS

**ROAD DEVELOPMENT STUDY  
IN THE SOUTHERN REGION**

**FINAL REPORT**

VOLUME 3

**PRELIMINARY FEASIBILITY STUDY ON  
THE NINETEEN PROJECTS**



SEPTEMBER 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

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国際協力事業団

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Table of Contents

	Page
1. Summary of Preliminary Feasibility Study .....	1 - 1
2. Summary of Preliminary Design .....	2 - 1
3. Preliminary Design of Priority Projects .....	3 - 1
3.1 Chumphon City Link (NC-1) .....	3 - 2
3.2 Nakhon Si Thammarat Bypass (NC-2) .....	3 - 9
3.3 Thap Put Bypass (NC-3) .....	3 - 16
3.4 Trang Bypass (NC-4) .....	3 - 23
3.5 Short Cut Route 4 / 406 (NC-5) .....	3 - 30
3.6 Yala Bypass (NC-6) .....	3 - 37
3.7 Route No. 401 (Rt.4 - Rt.4142) (AD-1) .....	3 - 44
3.8 Route No. 402 Phuket - Kok Kloi (AD-2) .....	3 - 53
3.9 Route No. 4 Kok Kloi - Phangnga (AD-3) .....	3 - 61
3.10 Route No. 4 and 43 Phatthalung - Hat Yai (AD-4) .....	3 - 69
3.11 Route No.4009 Surat Thani - Wiang Sa (WD7-1) ..3	- 80
3.12 Route No. 4035 Phra Saeng - Ao Luk (WD7-2) ...3	- 90
3.13 Route No. 4046 to Trang (WD7-3) .....	3 - 100
3.14 Route No. 408 Hua Sai - Songkhla (WD7-4) .....	3 - 108
3.15 Route No. 4 Ranong - 4006 (WD7-5) .....	3 - 118
3.16 Route No. 401 from Phun Phin to 416 (WD7-6) ..3	- 125
3.17 Route No. 417 Palian - Khuan Kalong (WD6-1) ...3	- 134
3.18 Yala - Narathiwat Link (RW7-1) .....	3 - 145
3.19 Ko Lanta Link (UBS-1) .....	3 - 154

R/W	: Right of Way
(E)	: Embankment
(C)	: Cut
Rt.	: Route
J.	: Junction
EX.	: Existing
PWD	: Public Work Department
ARD	: The Office of Accelerated Rural Development

(Material Type of Surface)	
SA	: Soil Aggregate
BT	: Bitumen
SGST	: Single Surface Treatment
DBST	: Double Surface Treatment
UPM	: Under STD Penetration Macadam
PN	: Penetration Macadam
ASC	: Asphalt Concrete

(Pavement Surface Conditions)	
G	: Good
G/F	: Good/Fair
F	: Fair
F/P	: Fair/Poor
P	: Poor

(Type of Structures)	
RC	: Reinforced Concrete Bridge
PC	: Prestressed Concrete Bridge
BX	: Box Culvert

(Type of Improvement)	
NC	: New Road Construction
AD	: Additional Lane Construction
WD	: Widening of Carriageway
RW	: Reconstruction and Widening of Carriageway
UBS	: Upgrading to Bitumen Standard
RA	: Re-Alignment
RE	: Re-Embankment
RC	: Re-Construction

(Socio-economy)	
IRR	: Economic Internal Rate of Return
B/C	: Benefit Cost ratio
ADT	: Average Daily Traffic



# 1. Summary of Preliminary Feasibility Study



Preliminary designing of the projects was carried out based on the following design policy:

- a) the DOH standard is to be applied in designing;
- b) improvement is to be based on the best use of the existing highways;
- c) earth work materials are to be procured from borrow pit; and
- d) appropriate measures are to be incorporated into designing for preventing the damages caused by natural disasters.

A series of standard pattern of design was prepared for preliminary designing of the projects. Each project was designed by applying appropriate standard patterns by taking account of the project site information mainly based on the DOH road data base and site reconnaissance.

Table 1.2 summarizes the results of the preliminary feasibility study. Total costs of the nineteen projects amount to about 6.1 billion baht. In terms of the economic internal rate of return (EIRR), AD-2 showed the highest EIRR of 77.6 % , followed by NC-1 of 73.5 %. These projects are characterized by the increase of highway capacity to the existing small capacity highway of cul-de-sac shape on which every directional traffic is forced to concentrate. NC-6 showed the lowest EIRR of 4.1 % because of the high cost of long bridge construction.

Table 1.2 Summary of Preliminary Economic Evaluation

	Financial Project Cost (million baht)	Economic Evaluation		
		NPV	B/C	EIRR (%)
New Construction (NC): 1,322.4				
NC-1 Chumphon	93.5	514	12.4	73.5
NC-2 Nakhon Si T.	280.4	9	1.1	12.6
NC-3 Thap Put	82.0	63	2.7	30.4
NC-4 Trang	383.1	6	1.0	12.3
NC-5 Rt. 4-406	140.2	726	11.3	53.8
NC-6 Yala	342.3	-99	0.4	4.1
Additional Lane (AD): 2,463.4				
AD-1 Rt. 401 (41-4142)	666.9	1,341	5.0	34.2
AD-2 Rt. 402 Phuket	528.6	4,388	17.5	77.6
AD-3 Rt. 4 Phangnga	273.0	1,496	12.4	51.0
AD-4 Rt. 4/43 Hat Yai	994.0	1,785	4.8	42.9

Widening 7.0 Meters (WD7):929.1

WD7-1 Rt. 4009 Surat	166.2	316	5.1	43.3
WD7-2 Rt. 4035 Ao Luk	200.2	120	2.3	21.8
WD7-3 Rt. 4046 Trang	168.7	28	1.4	16.0
WD7-4 Rt. 408 Songkhla	140.4	532	8.9	46.3
WD7-5 Rt. 4 Ranong	88.0	29	1.7	18.1
WD7-6 Rt. Rt. 401	165.6	-7	0.9	10.8

Widening 6.0 Meters (WD6):				
WD6-1 Rt. 417 Palian	251.2	117	1.9	22.4

Reconstruction (RW7):				
RW7-1 Yala-Narathiwat	309.1	283	2.9	26.7

Upgrading (UBS):				
UBS-1 Ko Lanta	804.0	(7)	1.0	11.8
		587	2.5	22.0

Grand Total 6,079.2

- Note: 1) NPV (Net Present Value) in million baht discounted at 12 %  
 2) B/C (Benefit Cost Ratio) discounted at 12 %  
 3) EIRR (Economic Internal Rate of Return) in percentage



## **2. Summary of Preliminary Design**

2. SUMMARY OF PRELIMINARY DESIGN

1) New-Construction Projects (NC)								(m)
Control Section	Length	Existing Road Class	Existing Cross-Section	Pavement Condition	Right of Way	Proposed Road Class	Proposed Cross-Section	Improved Length
<NC-1: Chumphon City Link>								
New-Link	1,800	PWD	6.00			F1	12.00RC (PV)	1,800
New-Link	7,600					F1	12.00NC	7,600
(Subtotal)	9,400						(Subtotal: 12.00NC)	9,400
<NC-2: Nakhon Si Thammarat Bypass>								
New-Link	8,000					F1	12.00NC	8,000
4103-0100	22,100	F3	2.00+ 6.00+2.00	G/F	40.00+40.00		(Out of Project	22,100)
New-Link	12,500	ARD	6.00			F1	12.00RC	12,500
(Subtotal)	42,600						(Subtotal: 12.00NC)	20,500
<NC-3: Thap Put Bypass>								
New-Link	6,400					S1	12.00NC	6,400
416-0200	1,300	F4	1.50+ 5.00+1.50	G/F	20.00+35.00	S1	12.00WD	1,300
(Subtotal)	7,700						(Subtotal: 12.00NC)	7,700
<NC-4: Trang Bypass>								
New-Link	30,700					P1	12.00NC	30,700
(Subtotal)	30,700						(Subtotal: 12.00NC)	30,700
<NC-5: Rt.4/406 Short Cut Route>								
New-Link	3,000	PWD	6.00		9.00	S3	10.00RC (PV)	3,000
New-Link	14,300					S3	10.00NC	14,300
(Subtotal)	17,300						(Subtotal: 10.00NC)	17,300
<NC-6: Yala Bypass>								
New-Link	3,000					S1	12.00NC	3,000
New-Link	6,500	PWD	6.00		9.00	S1	12.00RC (PV)	6,500
New-Link	7,200					S1	12.00NC	7,200
(Subtotal)	16,700						(Subtotal: 12.00NC)	16,700
Total	124,400						Total	102,300

## 2) Additional Lane Projects

(m)

Control Section	Length	Existing Conditions Road Class	Cross-Section	Pavement Condition	Right of Way	Proposed Conditions Road Class	Cross-Section	Improved Length	
<AD-1: Rt.4153/4008/401 41-4142>									
4153-0100	8,536	F3	2.00+ 6.00+2.00	F	20.00+20.00	SD	11.00NC+ 11.00WD	8,536	
4008-0100	2,002	SD	2.50+13.00+2.50	F	15.00+20.00	SD	(Out of Project	2,002)	
401-0601	6,983	SD	2.50+13.00+2.50	F	25.00+25.00	SD	(Out of Project	6,983)	
401-0602	10,535	S1	2.50+ 7.00+2.50	G	15.00+35.00	SD	11.00NC+ 12.00EX	10,535	
401-0700	11,415	S1	2.50+ 7.00+2.50	G/F	20.00+20.00	SD	11.00NC+ 12.00EX	11,415	
401-0801	29,850	S3	2.00+ 6.00+2.00	G/F	20.00+20.00	SD	11.00NC+ 10.00EX	29,850	
(Subtotal: 69,321)							(Subtotal: 60,336)		
<AD-2: Rt.402 Kok Kloi - Phuket>									
402-0101	8,413	S3	2.50+ 7.00+2.50	G	20.00+20.00	SD	11.00NC+ 12.00EX	8,000	
							(Out of Project	413)	
402-0201	41,718	S3	2.50+ 6.00+2.50	G	20.00+20.00		(Out of Project	4,087)	
							SD	10.00WD+ 10.00WD	37,631
(Subtotal: 50,131)							(Subtotal: 45,631)		
<AD-3: Rt.4 Kok Kloi - Phangnga>									
4-3000	24,828	P3	2.00+ 6.00+2.00	G	20.00+20.00	PD	11.00NC+ 10.00EX	24,828	
4-3101	10,772	P3	2.00+ 6.00+2.00	G/F	20.00+20.00	PD	11.00NC+ 10.00EX	10,772	
(Subtotal: 35,600)							(Subtotal: 35,600)		
<AD-4: Rt.4/43 Phatthalung - Hat Yai>									
4-4000	40,038	P3	2.00+ 6.00+2.00	F/P	20.00+20.00	PD	11.00NC+ 11.00WD	40,038	
4-4100	25,190	P3	1.50+ 6.00+1.50	F/P	20.00+20.00	PD	11.00NC+ 11.00WD	25,190	
43-0101	11,160	P2	2.25+ 6.50+2.25	G	50.00+30.00	PD	11.00NC+ 11.00EX	11,160	
43-0102	11,840	P2	2.25+ 7.00+2.25	G/F	50.00+30.00	PD	11.00NC+ 11.50EX	11,840	
43-0200	7,219	P3	2.00+ 6.00+2.00	G/F	20.00+20.00	PD	11.00NC+ 10.00EX	7,279	
(Subtotal: 95,507)							(Subtotal: 95,507)		
Total	250,559						Total	237,074	

## 3) Widening Projects (WD)

(m)

Control Section	Length	Existing Road Class	Existing Cross-Section	Pavement Condition	Right of Way	Proposed Road Class	Proposed Cross-Section	Improved Length
<WD7-1: Rt.4009 Surat Thani - Wiang Sa>								
4009-0100	40,869	F4	1.75+ 5.50+1.75	F	15.00+15.00	FD	10.00WD+ 10.00WD	2,702
						F1	12.00WD	38,167
4009-0200	21,930	F4	1.50+ 5.00+1.50	F	15.00+15.00	F1	12.00WD	21,930
								(Subtotal: 62,799)
<WD7-2: Rt.4035 Ao Lok - Phra Saeng>								
4035-0100	20,812	F4	1.50+ 5.00+1.50	F	20.00+20.00	F1	12.00WD	20,812
4035-0200	44,688	F4	1.50+ 5.00+1.50	F	20.00+20.00	F1	12.00WD	44,688
4035-0300	2,600	F4	1.50+ 5.00+1.50	F	20.00+20.00	F1	12.00WD	2,600
								(Subtotal: 68,100)
<WD7-3: Rt.4046 Trang - Khuan Kun>								
4046-0100	29,329	F4	1.75+ 5.50+1.75	F	15.00+15.00	F1	12.00WD	22,629
						F1	12.00NC (RA)	3,700
							(Out of Project	3,700)
						F1	12.00RC (RB)	3,000
						F1	12.00NC (RA)	1,200
							(Out of Project	1,834)
Mncpl. Rd.	1,834							
4046-0200	18,522	F4	1.75+ 5.50+1.75	G/F	20.00+20.00	F1	12.00WD	18,522
								(Subtotal: 49,051)
<WD7-4: Rt.408 Hua Sai - Song Khla>								
408-0301	11,904	S3	1.00+ 6.00+1.00	G/F	15.00+35.00	S1	12.00WD	11,904
408-0302	17,113	F3	2.00+ 6.00+2.00	F	15.00+35.00	S1	12.00WD	17,113
408-0400	34,517	F3	2.00+ 6.00+2.00	G/F	15.00+15.00	S1	12.00WD	34,517
408-0500	31,874	F3	2.00+ 6.00+2.00	G/F	15.00+15.00	S1	12.00WD	31,874
								(Subtotal: 95,408)
<WD7-5: Rt.4 Ranong - J.Rt.4006>								
4-2202	25,852	P3	2.00+ 6.00+2.00	G/F	20.00+20.00	P1	12.00WD	25,852
								(Subtotal: 25,852)
<WD7-6: Rt.401 J.Rt.416 - Phum Phin>								
401-0302	2,076	S3	2.00+ 6.00+2.00	G/F	30.00+30.00	S1	12.00WD	2,076
401-0400	29,923	S3	2.00+ 6.00+2.00	G/F	30.00+30.00	S1	12.00WD	29,923
401-0500	32,001	S3	2.00+ 6.00+2.00	G/F	30.00+30.00	S1	12.00WD	32,001
								(Subtotal: 64,000)
<WD6-1: Rt.4137/417 Khuan Kalong - Palian>								
4137-0100	26,780	F4	1.00+ 5.00+1.00	F	15.00+15.00	S3	10.00WD	21,680
						S3	10.00NC (RA)	5,100
							(Out of Project	5,100)
417-0101	12,820	F4	1.50+ 5.00+1.50	G/F	15.00+15.00		(Out of Project	3,900)
						S3	10.00WD	8,920
417-0102	1,459	F4	1.50+ 5.00+1.50	G/F	15.00+15.00	S3	10.00WD	1,459
417-0200	25,800	F4	1.50+ 5.00+1.50	G/F	15.00+15.00	S3	10.00WD	4,400
						S3	10.00NC (RA)	14,300
							(Out of Project	21,400)
417-0301	14,700	F4	1.50+ 5.00+1.50	F	20.00+20.00	S3	10.00WD	6,650
							(Out of Project	8,050)
417-0302	16,675	F4	1.50+ 5.00+1.50	G/F	20.00+20.00	S3	10.00WD	16,675
								(Subtotal: 79,184)
Total	464,078						Total	444,394

4) Reconstruction and Widening Projects (RW)

(m)

Control Section	Length	Existing Conditions Road Class	Cross-Section	Pavement Condition	Right of Way	Proposed Road Class	Conditions Cross-Section	Improved Length
<RW7-1: Rt.4063/4066/4107/New-Link Yala - Narathiwat>								
4063-0100	9,100	F4	1.25+ 6.00+1.25	G/F	15.00+15.00	F1	12.00WD	8,500
						F1	12.00NC (RA)	2,050
							(Out of Project	600)
4066-0100	10,147	F4	1.50+ 5.00+1.50	G/F	15.00+15.00		(Out of Project	1,950)
4107-0100	7,000	F4	1.50+ 5.00+1.50	G	15.00+15.00	F1	12.00WD	8,197
						F1	12.00WD	3,560
						F1	12.00RC (RB)	3,400
New-Link	25,450	ARD	5.00		5.00	F1	12.00RC	15,800
						F1	12.00NC	9,650
(Subtotal: 51,697)								(Subtotal: 51,157)

5) Upgrading to Bitumen Standard Project (UBS)

(m)

Control Section	Length	Existing Conditions Road Class	Cross-Section	Pavement Condition	Right of Way	Proposed Road Class	Conditions Cross-Section	Improved Length
<UBS-1: Rt.4206/New-Link Khlong Thom - Ko Lanta>								
4206-0100	10,061	F6	6.00		15.00+15.00	F3	10.00RC (PV)	10,061
New-Link	68,639	PWD	4.00			F3	10.00RC (PV)	27,039
						F3	10.00NC	39,700
						F3	10.00NC (BR)	1,900
(Subtotal: 78,700)								(Subtotal: 78,700)