PROJECT NC-5

RT. 4/406 SHORT CUT ROUTE CHANGWAT: SONGKHLA

3.5 Short Cut Route 4 / 406 (NC-5)

1) Summary

The aim of the project is to improve accessibility from Satun to the regional urban center of Hat Yai/Songkhla as well as to Hat Yai International Airport. The project contribute to shorten the distance between Satun and Hat Yai/Songkhla by about 10 kilometers.

"S3" standard is applied to the project with asphaltic concrete carriageway of 6.0 meter width and soil aggregate shoulders of 2.0 meters on both sides.

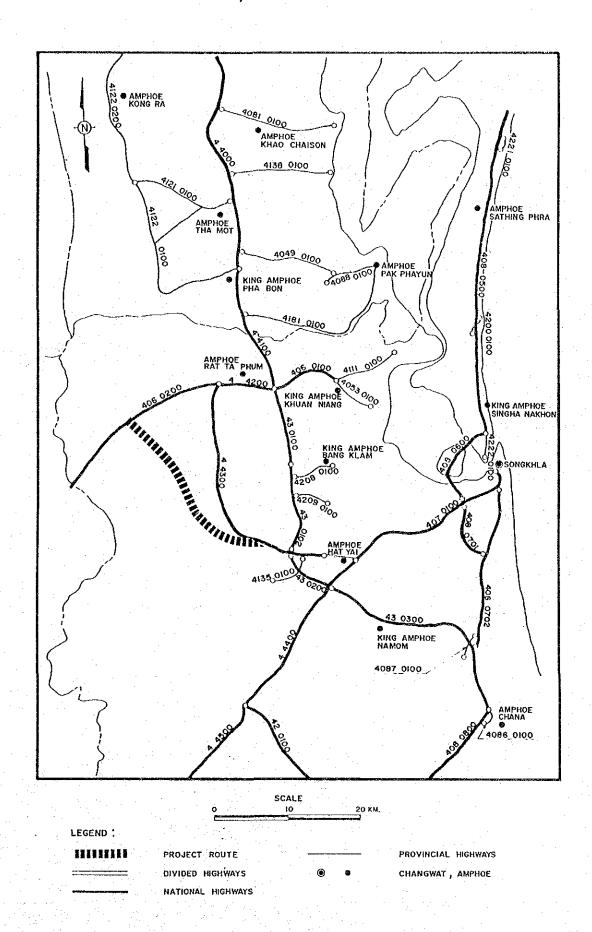
The proposed short cut route connect Route 4 with Route 406 over a distance of 17.3 kilometers: new construction for 14.3 kilometers; and reconstruction of the existing PWD road for 3.0 kilometers. Most of the new construction section is located at the foot of mountain and frequently come across with small rivers approximately at one kilometer interval. Due to the locational conditions, it is likely that mud flow and flood will strike the route. Disaster prevention measures, drainage facilities in particular, are very important in this project.

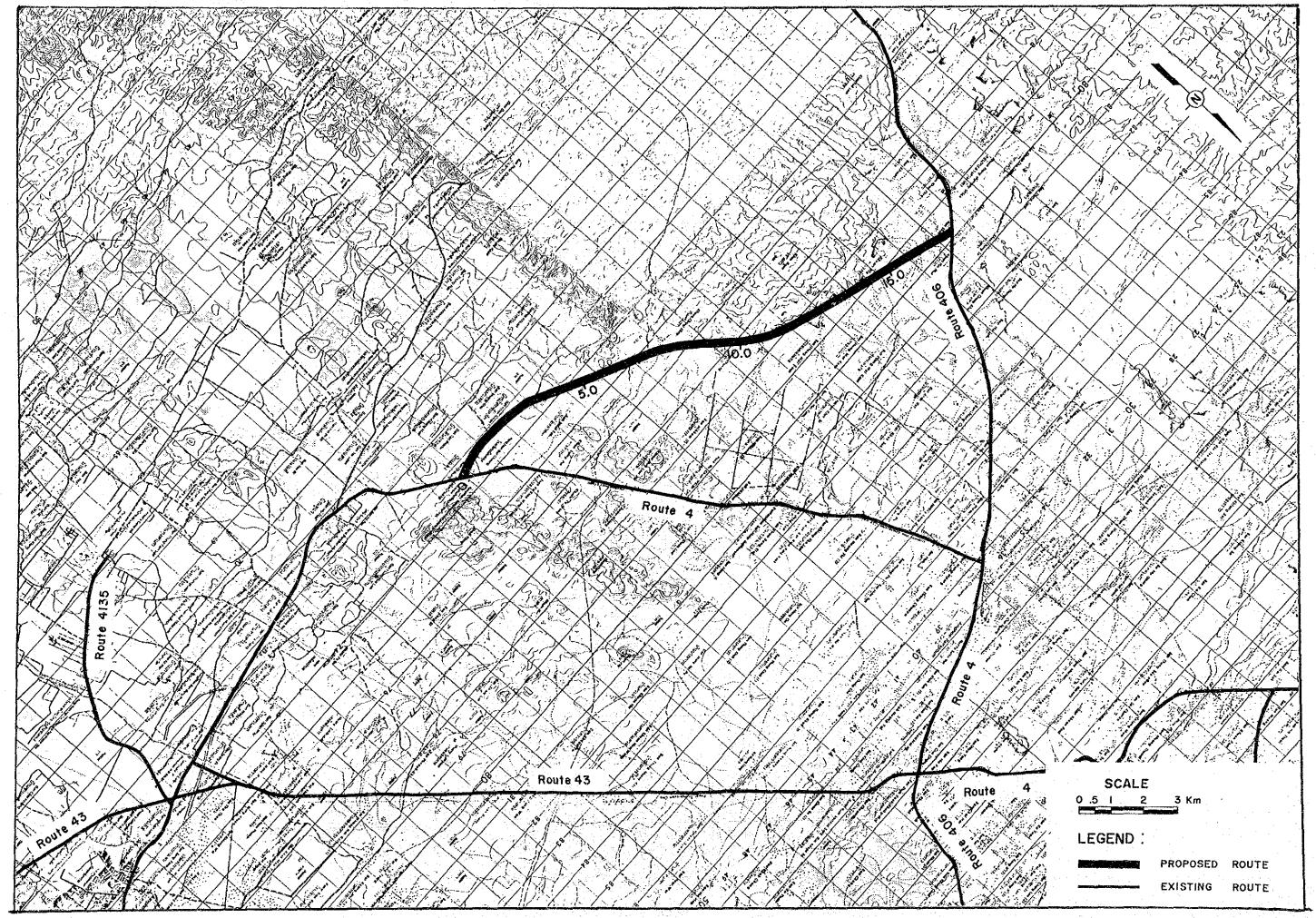
The EIRR is calculated at 53.8 % because of the combined benefit of the shortened travel distance and capacity increase to the traffic between Satun and Hat Yai.

NC-5	Description
Road Class Cross Section (m) Surface Type Length: Total DOH Road	: Songkhla : RT.4/406 Short Cut Route (4 - 406) : S3 : 2.00+6.00+2.00 (6.00:PWD) : SA /ASC / SA : 17.3 km : 14.3 km:New : 3.0 km:PWD
AADT<'96/'01/'06>	: 3,200 / 5,300 / 8,500
Financial Cost NPV B/C EIRR	: 140.2 million baht : 726 million baht (12% discount rate) : 11.3 (12% discount rate) : 53.8 %

(): Existing Condition or Value

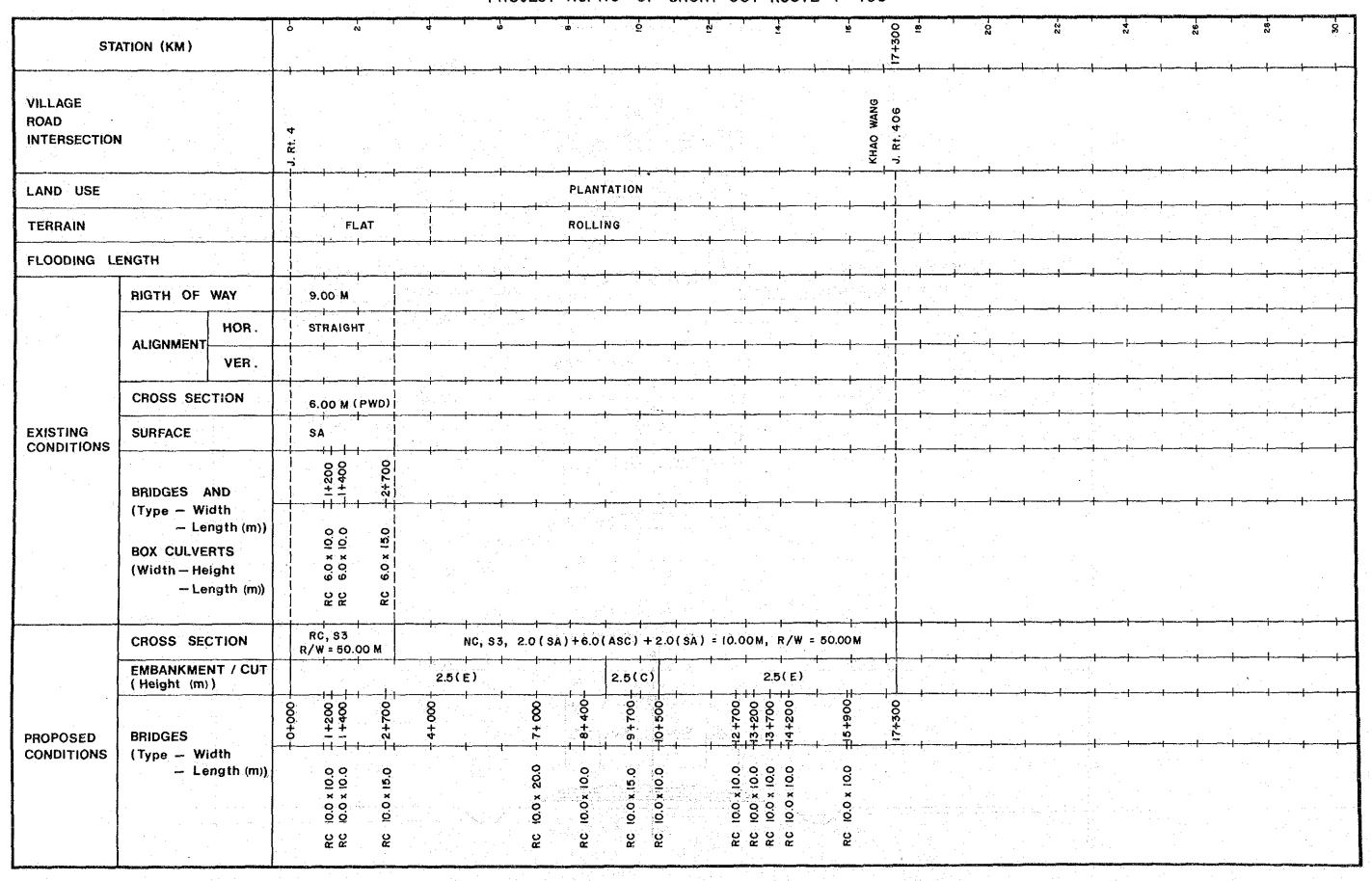
2) ROUTE MAP



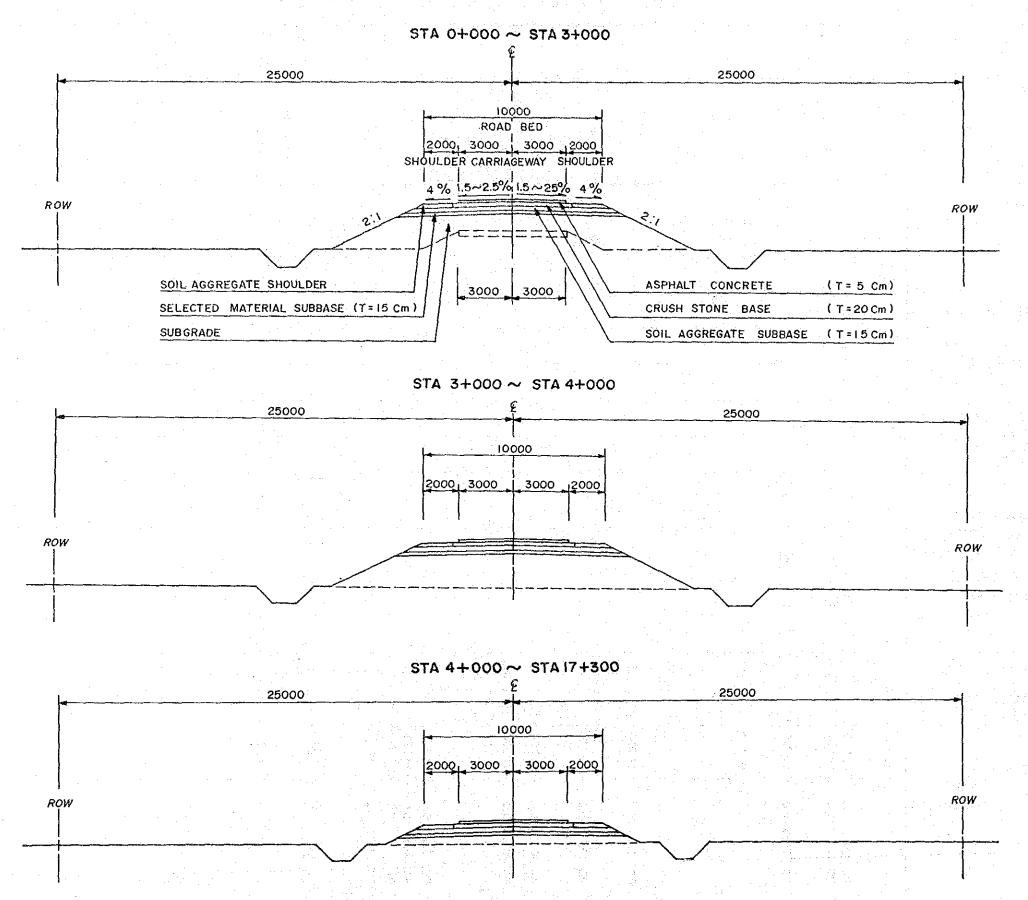


4) PROFILE OF PROJECT

PROJECT NO. NC - 5: SHORT CUT ROUTE 4~406



5) TYPICAL CROSS SECTION



6) CONSTRUCTION QUANTITIES AND COSTS .

CONSTRUCTION QUANTITIES AND COSTS (Project NC -5 Length = 17.300 Km) (Improved Length 17.300 Km)

ITEM	Unit		ncial Cost	Duantity	Financial Total cost-		mic cost	Resid	lual Value
			Baht		1000 Baht	7	1000 Baht	%	1000 Baht
EARTH WORK	,42222					83		90	
Clearing & Grubbing	SQ.M		1	338,500	339				
Roadway Excavation(Unclassified)	CU.N		30				100		
Embankment(Borrowed Material)	CU.M		100	496,041	49,604				
Slope Protection(Stripe Sodding)	SQ.M		6	187,249					
Sand Mat (t=0.5m)	SQ.M		50	0	0				
Excavate Existing									
Surface	SQ.M		2	0	0				
Thickness Over 10Cm (2 Lay)	SQ.M		14	0	0		1000		
SUB TOTAL					52,472	100	43,552		39,197
				1.0	and the				
SUBBASE AND BASE	5.0			7.35.27		83		50	
Subbase(Selected Material)	CU,M		190	31,659	6,015				
Subbase(Soil Aggregate)	CU.M		190						
Base Coarses(Crush Stone)	CU.M		280	22,836	6,394				
Shoulder(Soil Aggregate)	CU.M		. 190	11,764	2,235				
SUB TOTAL					20,660		17,148		8,57
	- 1								
SURFACE			ind.		4. 4. 4. 4.	83		50	
Asphaltic Prime coat	SQ.M		13	103,800	1,349				
Asphaltic Tack coat	SQ.M		7	0	0				
Asphalt concrete Surfacing	CU.M		1,900	5,190	9,861		-		
SUB TOTAL		٠,			11,210		9,305		4,652
OTO1107107075				and the same of	2.5.5	83		50	* .
STRUCTURES(Equivalent)	М		1,380	776	1,071	0.5			
RC Pipe Culvert(D= 600 m)	M		1,950		0				
(D= 800 m) (D=1000 m)	H		2,650		Ŏ				
	H		3,850						
(D=1200 m) RC Box Culvert(1-2.40*2.40 m)	M.		5,700				The state of the s		
RC Bridge Wideing	SQ.M		9.600						
RC Bridge (W=13.0 m)	M M		3,200°						
	M		0,000	0;					٠.
PC Bridge (W=13.0 m) SUB TOTAL	п .	13	0,000	0.	14, 167		11,758		5,879
TOTAL (a)					98,509	1	81,763		58,302
Miscellaneous Works [(a)*7%]	Ls		1		6,896		5,723		4,08
CONTRACT AMOUNT (b)			•		105,405		87,486	i.	62,38
PHYSICAL CONTINGENCIES [(b)*10%] (c)	Ls		1		10,540		8,749		6,23
ENGINEERING & SUPERVISION	Ls		1		11,595	85	9,855	0	(
[((b)+(c))*10%] (d)									
LAND ACQUISITION(Average)	SQ.M		15	847,000	12,705	100	12,705	100	12,70
PROJECT COST [(b)+(c)+(d)+(e)]					140,245	-	118,795		81,32
AVERAGE COST PER KM	1.5%	; · · · · .			8,107	11.			

MAINTENANCE BUDGET CALCULATION

Project Road No. NC -5	Na=	8,200 Baht/Km/yea
(Proposed Road)	Km≃	1.001
	lenoth ≍	17.300 Km

-			Proposed Road								
	I TEMS		Condition	Factor							
1.	Surface /Base Type	х1	AC	0.00							
2.	Subgrade CBR	X2 .	4 %	0.50							
3.	A.D.T	Х3	3,200	1.14							
4.	Service Life (year)	Х4	NEW	0.00							
5.	Pavement Width (m)	X5	6 m	0.05							
6.	R-O-W Width (m)	Y1	50 m	0.05							
7.	Shoulder,Access,Median Width (m)	Y2	2.00 m	0.00							
8.	Traffic Service Operation Topography	Y3	0 - 3 %	0.00							
9.	Drainage Topography	Y4	0 - 3 %	0.00							
10.	Bridge Quantity (m/Km)	Y5	. 8	0.00							
11.	NO. Of Lanes		2								

Ka(Existing) = 1+0.5(X1+	x2+x3+x4+x5+Y1+Y2+Y3+Y4+Y5)=	1.870
	head= Ka * Km * Na * 1.28 =	19,647 Baht/Km/yea
Total Cost(Existing)	=Length *(Baht/Km/year)=	339,896 Baht/year
	Financial Cost =	340,000 Baht/year
	Economic Cost =	282,000 Baht/year
	(282,200)Baht/year

7) Construction Schedule

Project NC-5 Short Cut Route (4-406)

year and				. 1	irs	t '	Yea	Г					÷				Sec	ond	Ye	BF	ď								Thi	rd	Yea	ır		٠.	
Month Work Items	1	2	3	4	5	6	7 ===	8	ç	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9 1	10 1	1 12
Land Acquisition	. ===	===	===										•								_•														
Preparatory Works	. i		=	==:	:==\$	==																	•				÷								
Earth Works							===	===	=# =	==:	:=5:	=						٠.		202	==:	=													
Pavement Works																			===	===	==:		:==	===	===	===	===	-==:	.==:	:577	:				
Bridge Works									= 5=	 .	===	===:	= # # !	===		:===	===	===:	:==	===											-				1, 3
Hiscellaneous Works											==:		=							= = =	==:		.						٠		== =	====			
Clearing -Up									•			٠.							•		•												===:		:22
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8) Economic Evaluation

Project NC-5 Short Cut Route (4-406)

(unit ; 1000 Baht)

Year	Conct-	Mainte-	Total	voc	Time	Balance	Sensi.
	ruction Cost	nance Cost	Cost	Saving	Saving	Benefit=	Analysis 0.8
	oost	COST	11.			Cost=	
1990	0	0	0	0	0	0	0
1991	0	0	0	. 0	. 0	and the Oaksan	0
1992	0	0	0	. 0	0	0	0
1993	56,730	0	56,730	0	0	(56,730)	(68,076)
1994	43,253	0	43,253	0	0	(43,253)	(51,904)
1995	18,812	0	18,812	0	0	(18,812)	(22,574)
1996	0	189	189	44,284	21,256	65,351	52,205
1997	0	189	189	48,599	42,709	91,119	72,820
1998	0	189	189	52,914	64,162	116,887	93,434
1999	0	189	189	57,230	85,614	142,655	114,048
2000	0	189	189	61,545	107,067	168,423	134,663
2001	0	189	189	65,860	128,520	194,191	155,277
2002	0	189	∙189	67,874	184,714	252,399	201,843
2003	0	189	189	69,888	240,908	310,607	248,410
2004	0	189	189	71,902	297,101	368,814	294,976
2005	0	189	189	73,916	353,295	427,022	341,542
2006	. 0	189	189	75,930	409,489	485,230	388,108
2007	. 0,	189	189	75,930	409,489	485,230	388,108
2008	. 0	189	189	75,930	409,489	485,230	388,108
2009	0	189	189	75,930	409,489	485,230	388,108
2010	0	189	189	75,930	409,489	485,230	388,108
Total	118,795	2,835	121,630	993,662	3,572,791	4,444,823	3,507,207
			· · · · · · · · · · · · · · · · ·	IRR =		53.78%	43.84%
				NPV (1;12	%) ≃	726,340	
				B/C (1:12	%) =	11.26	

PROJECT NC-6

YALA BYPASS

CHANGWAT: YALA

3.6 Yala Bypass (NC-6)

1) Summary

The aim of the project is to ease the traffic congestions in the municipal area of Yala city which is caused by the confluence of through traffic on Route 410 with urban traffic in the city center.

"S1" standard is applied to the project with asphaltic concrete carriageway of 7.0 meter width and soil aggregate shoulders of 2.5 meters on both sides.

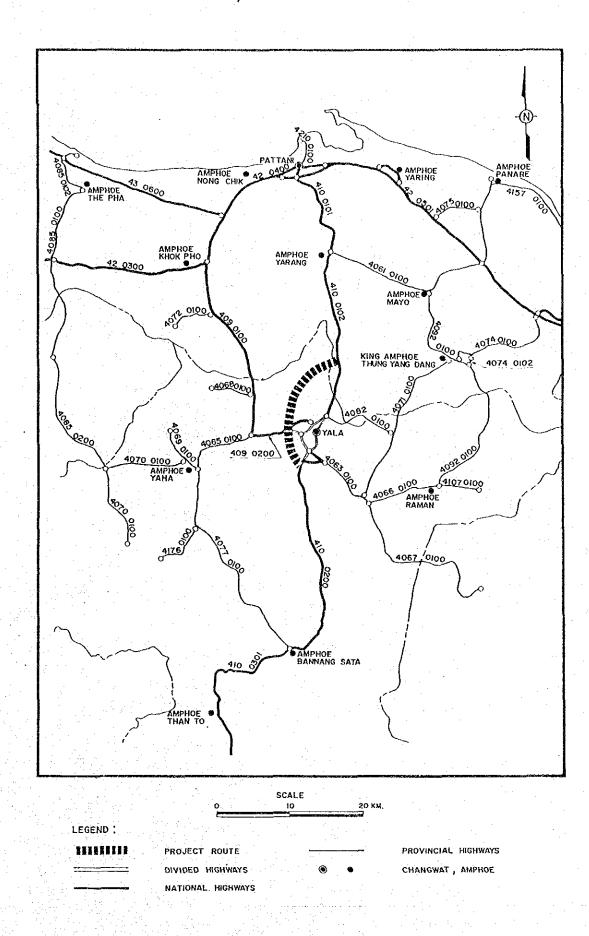
The bypass diverts from Route 410, 7 kilometers north of the city center of Yala, and joins again to Route 410, 5 kilometers south of the city center. The length of the project is 16.7 kilometers comprising reconstruction of the existing PWD road of 6.5 kilometers and new construction of 10.2 kilometers. Two long bridges are required to cross the Pattani River. Since most part of the project is in flood prone area of the Pattani river basin, height of embankment is planned at three meters to keep the traffic free from flooding disturbance.

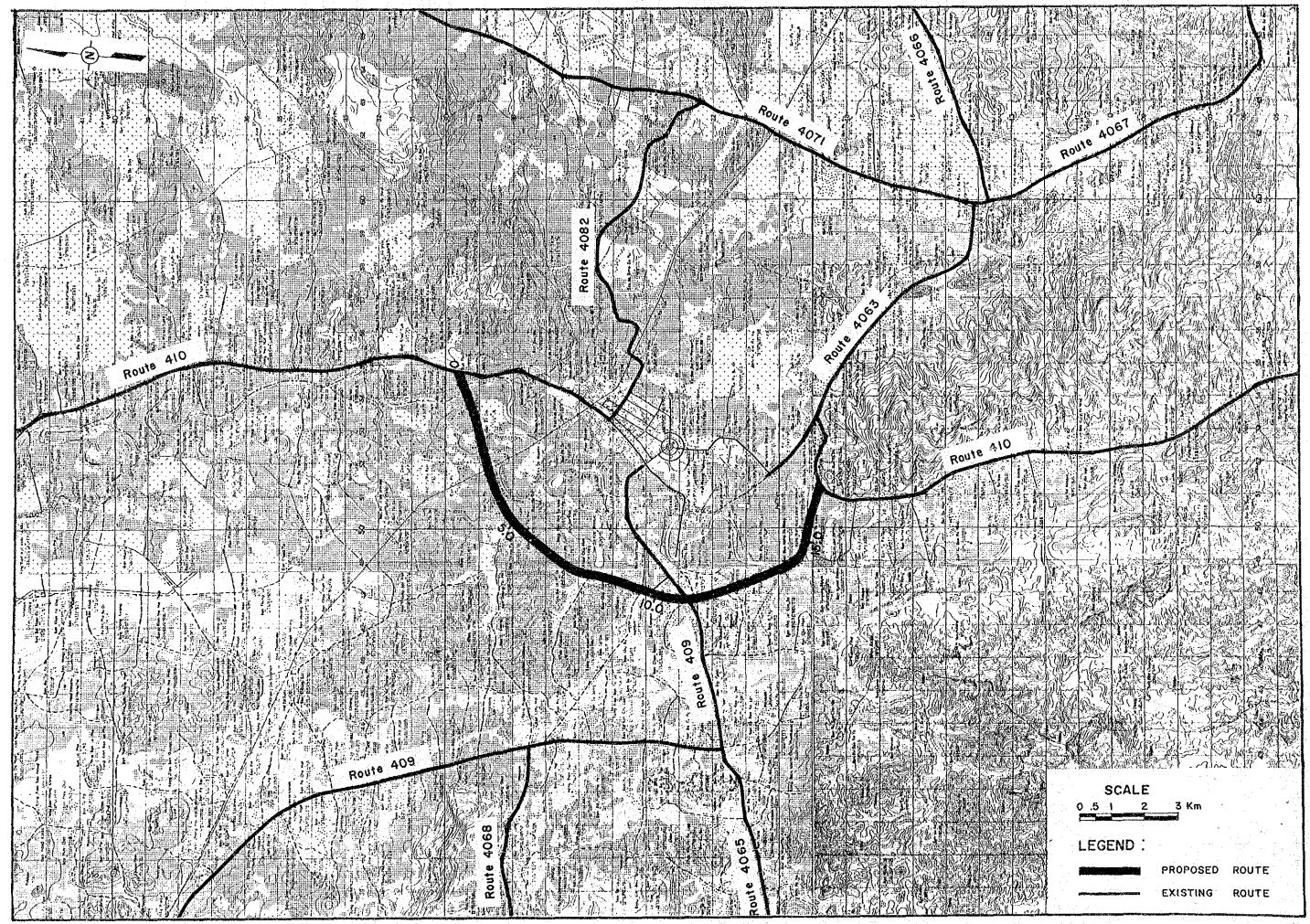
The EIRR is calculated at as low as 4.1 % because of the high cost incurred by reconstruction of the existing bridge.

NC-6	Description
Name or Location Road Class Cross Section (m) Surface Type Length: Total DOH Road	: Yala : Yala Bypass : S1 : 2.50+7.00+2.50 (6.00:PWD) : SA /ASC / SA : 16.7 km : 10.2 km:New : 6.5 km:PWD
AADT<'96/'01/'06>	: 1,100 / 2,100 / 3,100
NPV B/C	: 342.3 million baht : -99.0 million baht (12% discount rate) : 0.4 (12% discount rate) : 4.1 %

(): Existing Condition or Value

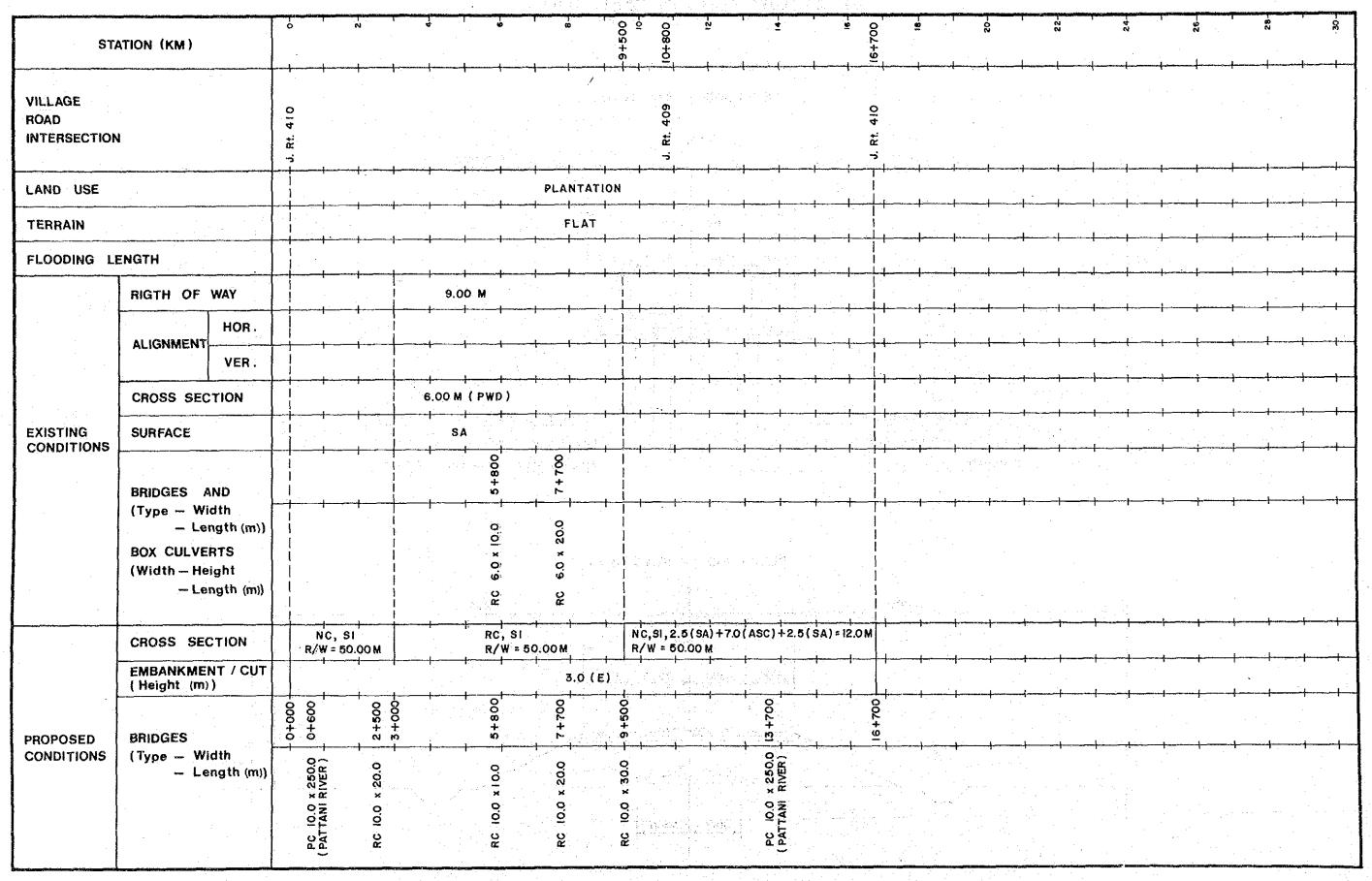
2) ROUTE MAP





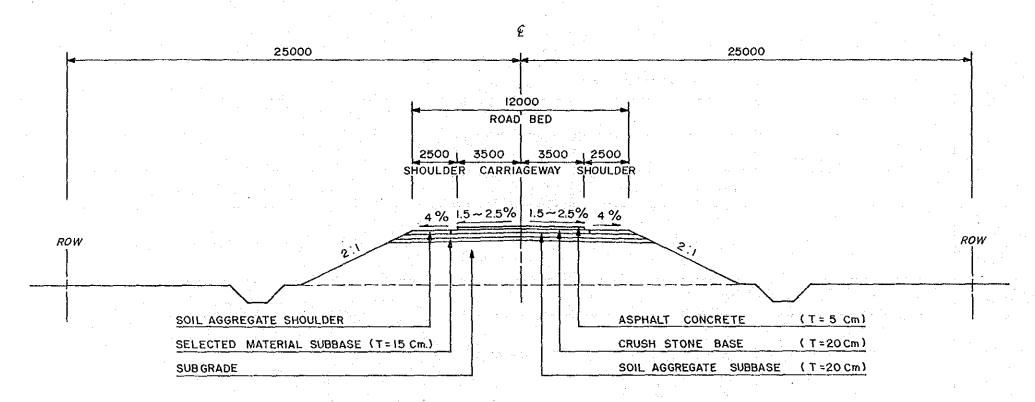
4) PROFILE OF PROJECT

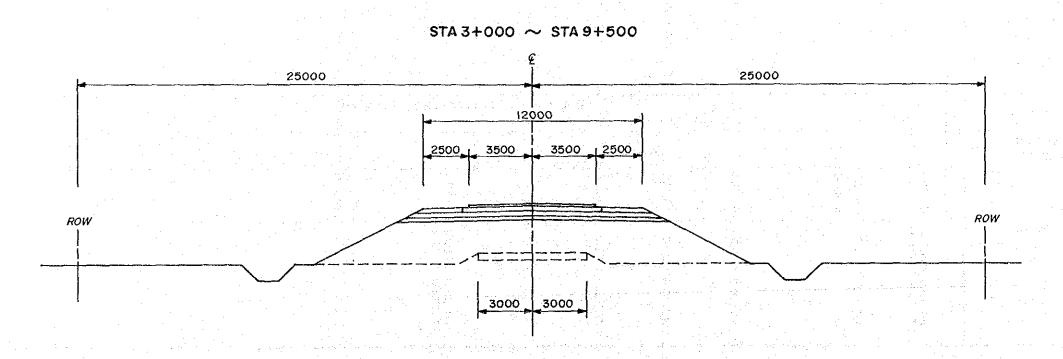
PROJECT NO. NC - 6: YALA BYPASS



5) TYPICAL CROSS SECTION

STA 0 +000 ~ STA 3+000 STA 9+500 ~ STA 16+700





6) CONSTRUCTION QUANTITIES AND COSTS

CONSTRUCTION QUANTITIES AND COSTS
(Project NC -6 Length = 16.700 Km)
(Improved Length 16.700 Km)

ITEM	Unit	Financial Unit Cost	and the second second	Financial Total cost		mic cost	Resid	Jual Value
=======================================		Baht		1000 Baht		1000 Baht	. %	1000 Bahi
EARTH WORK					83		90	
Clearing & Grubbing	SQ.M	1	400,800	401			•	
Roadway Excavation(Unclassified)	CU.H	30						
Embankment(Borrowed Material)	CU.M	100	-					
Slope Protection(Stripe Sodding)	SQ.M	6		•				are District
Sand Mat (t=0.5m)	SQ.M	50		• .				
Excavate Existing	Juli		•	•				
Surface	SQ.M	2	0	0	$\mathcal{L}_{i} = \mathcal{L}_{i}$			
Thickness Over 10Cm (2 Lay)	SQ.M	14						6 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
the contract of the contract o	ou.m	14	v	78,699		65,320		58,788
SUB TOTAL				10,033		05,320		30,10
NIDDAGE AND DAGE		4 mg 14	1 3 4		83		50	
SUBBASE AND BASE	CH LU	190	36,072	6.854	03	1. 1.		
Subbase(Selected Material)	CU.M	190						
Subbase(Soil Aggregate)		280		7,108				
Base Coarses(Crush Stone)	CU.M							
Shoulder(Soil Aggregate)	CU.M	190	14,696	•		24 700		10.74
SUB TOTAL		*		25,892		21,490	1.5	10,74
				_	0.7		50	
URFACE			*** 000	4 500	83		50	
Asphaltic Prime coat	SQ.M	13	•			11		
Asphaltic Tack coat	SQ.M	7		0				79.5
Asphalt concrete Surfacing	CU.M	1,900	5,845	11,106				F
SUB TOTAL				12,625		10,479		5,23
			100					
TRUCTURES(Equivalent)			ن د د	4 047	83		50	
RC Pipe Culvert(D= 600 m)	M	1,380		1,913				
(D= 800 m)	М	1,950	2.7					
(D=1000 m)	М	2,650	* * * * * * * * * * * * * * * * * * * *	0				
(D=1200 m)	М	3,850		0				
RC Box Culvert(1-2.40*2.40 m)	H	5,700		2,633				
RC Bridge Wideing	SQ.M							1.1
RC Bridge (W=15.0 m)	M	96,000						
PC Bridge (W=15.0 m)	H	150,000	500°		4 1		100	
SUB TOTAL				87,226		72,398		36, 19
TOTAL (a)				204,442		169,687		110,97
iscellaneous Works [(a)*7%]	Ls	1		14,311		11,878		7,76
ONTRACT AMOUNT (b)				218,753		181,565		118,73
HYSICAL CONTINGENCIES [(b)*10%] (c)	Ls	1		21,875		18,156		11,87
MOTHER THE P CHINERWITCH	i e	. 1		2/ 047	05	20 723	0	
NGINEERING & SUPERVISION	Ls			24,063	85	20,453	v	
[((b)+(c))*10%] (d) AND ACQUISITION(Average) (e)	SQ.M	100	776,500	77,650	100	77,650	100	77,65
ROJECT COST [(b)+(c)+(d)+(e)]				342,341		297,824		208,26
VERAGE COST PER KM				20,499				

MAINTENANCE BUDGET CALCULATION

Project Road No. N	C	-6		Na≔	8,200	Baht/Km/year
(Proposed Road)		-		Km=	1.001	
• •			Length	=	16.700	Km

Asphalt Pavement

			Proposed Road	
	ITEMS		Condition Facto	r
1.	Surface /Base Type	X1	AC	0.00
2.	Subgrade CBR	:X2	4 %	0.50
3.	A.D.T	X3	2,000	0.61
4.	Service Life (year)	X4	NEW	0.00
5.	Pavement Width (m)	X5	6 m	0.05
6.	R-O-W Width (m)	Y1	50 m	0.05
7-	Shoulder,Access,Median Width (m)	Y2	2.00*2	0.00
8.	Traffic Service Operation Topography	Y3	0 - 3 %	0.00
9.	Drainage Topography	Y4	0 - 3 %	0.00
10.	Bridge Quantity (m/Km)	Y5	33	0.06
11. =====	NO. Of Lanes		2 	

Ka(Existing) =1+0.5(X1+	X2+X3+X4+X5	+71+72+73+74	(+Y5)=	1,635	
Maintenance cost + Over			=		Baht/Km/year
Total Cost(Existing)	=Length	*(Baht/Km/)	year)=	224,121	8eht/year
		Financial (Cost =	224,000	Baht/year
		Economic (Cost =	186,000	Baht/year
		ř	(185,920)Baht/year

7) Construction Schedule

Project NC-6 Yala Bypass

year and	First Year				Second Year						Third Year																
Honth Work Items	1 2 3	4 5	6	7 8	9 1	0 11	12	1	2 3	4	5	6 7	8	9	10	11	12	1	2	3	4	5 ====	6	7 8	9	10 1	1 12
and Acquisition								•										•								- 1	
reparatory Works		*====	====																							e ²	
arth Works			. :	19261	===:	:====		####	:====	2252	== =			,		٠.							. S 2 1	122			
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Disbursement (%)		٠.			34 2	ζ.								38	X										27	X	

8) Economic Evaluation

Project NC-6 Yala Bypass

unit:	1000	Baht)	ł
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Year	Const- ruction Cost	Mainte- nance Cost	Total Cost	VOC Saving		Batance	Benefit= Cost=	Sensi. Analysis 0.8 1.2
1990	0	0	0	0	0	0		0
1991	0	0	0	0	0	0		. 0
1992	0	0	0	. 0	. 0	0	٠.,	9 €
1993	137,941	0	137,941	0	0	(137,941)		(165,529)
1994	80,273	0	80,273	0	0	(80,273)		(96,327)
1995	79,611	. 0	79,611	0	0	(79,611)		(95,534)
1996	. 0	186	186	612	1,416	1,842		1,399
1997	0	186	186	1,128	2,611	3,553	****	2,768
1998	0	186	186	1,644	3,806	5,264		4,136
1999	Ò	186	186	2,160	5,000	6,974		5,505
2000	0	186	186	2,676	6, 195	8,685	Maria de la	6,874
2001	0	186	186	3,192	7,390	10,396	100	8,242
2002	• 0	186	186	6,268	14,510	20,592		16,399
2003	0	186	186	9,343	21.630	30,788		24,556
2004	0	186	186	12,419	28,751	40,983		32,712
2005	0	186	186	15,494	35,871	51,179	At a second	40,869
2006	0	186	186	18,570	42,991	61,375		49,026
2007	0	186	186	18,570	42,991	61,375		49,026
2008	0	186	186	18,570	42,991	61,375		49,026
2009	0	186	186	18,570	42,991	61,375	4. No. 1	49,026
2010	0	186	186	18,570		61,375		49,026
Total	297,825	2,790	300,615	147,786	342,135	189,307		31,199
					EIRR = NPV (1;12 8/C (1:12	4.13% (99,025) 0.43		0.68%