Engineering Study 4.5

1) AD-2-1

Summary (1)

The alignment follows that of the existing Route 402 except for the realignment section of 3.3 km at amphoe Thalang. The additional lanes are proposed on both sides of the existing carriageway without shifting the center line of the existing highway. This is because the existing highway is located along the center of the right of way and the width of the right of way is not wide enough to accommodate the new two lanes on one side,

Due to some difficulties of land acquisition, a center median is not installed at some sections, 2.5 km in length, where road side is fully occupied by shops and houses.

Motorcycle lane is installed on both sides of carriageway at the section from amphoe Thalang to Phuket city, 16.1 km in length.

The existing pavement is overlaid by 5 cm to satisfy the standard of proposed road class and estimated traffic volume. Pavement for new construction comprises surface course of 10 cm, base course of 15 cm and subbase course of 15 cm, 40 cm in total.

Six existing reinforced concrete slab bridges are widened on both sides to accommodate undivided four lanes, center-median and sidewalks. New two bridges are proposed on realignment section.

New intersection with Route 4030 is planned to be signalized. An intersection of unsignalized roundabout at Thao Thep Kasattri monument is proposed to be a signalized roundabout without any change to the monumental statue.

AD-2-1	Description
Changwat : Name or Location : Road Class : Cross Section (m): : Surface Type : Bridge: New : Widening : Length: Total Widening Realignment	Phuket Rt.402, Ban Yit - Phuket City SD (S3) $2.5 + 7.0 + 4.2^* + 7.0 + 2.5$ (2.5+7.0+2.5) 0.5 + 7.0 + 7.0 + 0.5 (2.5+7.0+2.5) SA / ASC / SA
Financial Cost NPV	<pre>13,900 / 21,100 / 30,800 612.6 million baht (in 1990 price) 4,260 million baht (12% discount rate) 12.0 (12% discount rate) 69.2 %</pre>

Design Standard and Conditions (2)

(a)

Minimum

Minimum

Maximum

Minimum

Design Cr	iteria			
Road Cl	ass	:	SD	
Design	Speed	•	70	

Geometric Design Criteria

De De	escription	
m	Radius of Curvature (m)	28
im	Stopping Sight Distance (1	m) 15
im	Gradient (%)	
ım	Gradient (%)	
		: 10 % : AASH : 7 ye
. *	Rainfall Intensity	: Rain Curve
	Return Period	: Culv : Mino

90 km/h

Design	Speed	(km/h)
90	80	70
80	220	160
50	120	100
6	7	.7
0.3	0.3	0.3

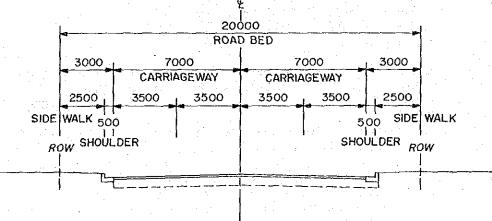
8 ASHTO years

infall Intensity Duration ve at Chumphon Observatory

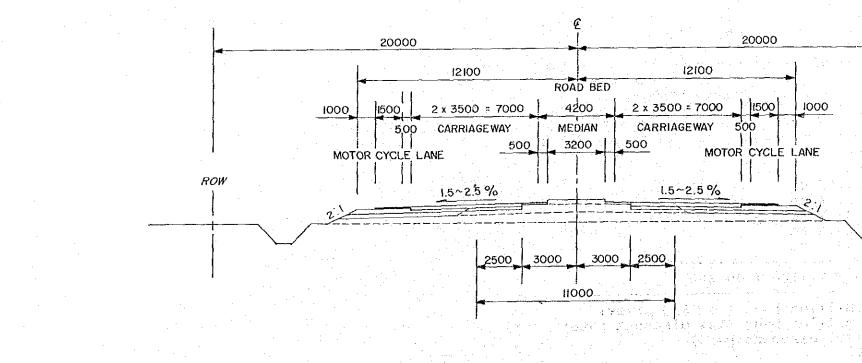
ulvert-----10 years nor Bridge---20 years

(3) Typical Cross Section

STA. $0 + 000 \sim$ STA. 1 + 450STA. $4 + 800 \sim$ STA. 5 + 800

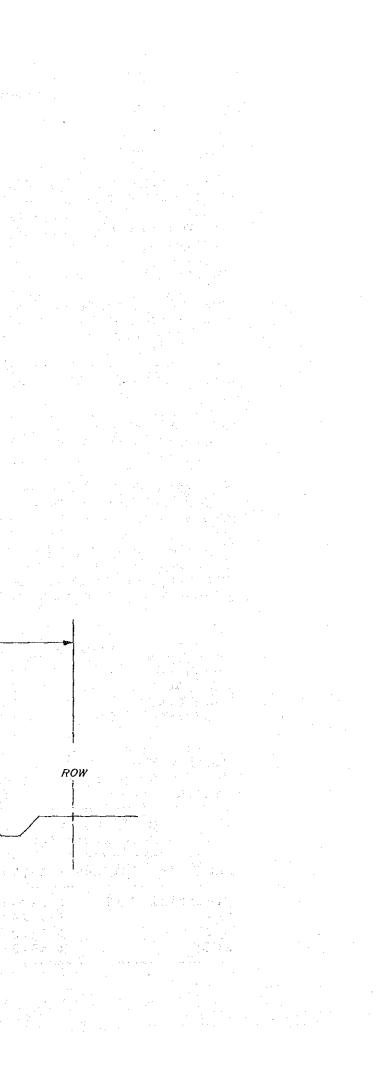


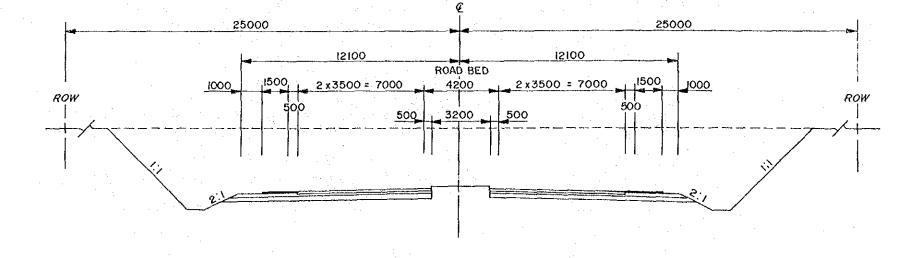
STA. $1 + 450 \sim STA$. 4 + 800STA. $5 + 800 \sim STA$. 15 + 300STA. $18 + 550 \sim STA$. 38 + 400



6

(

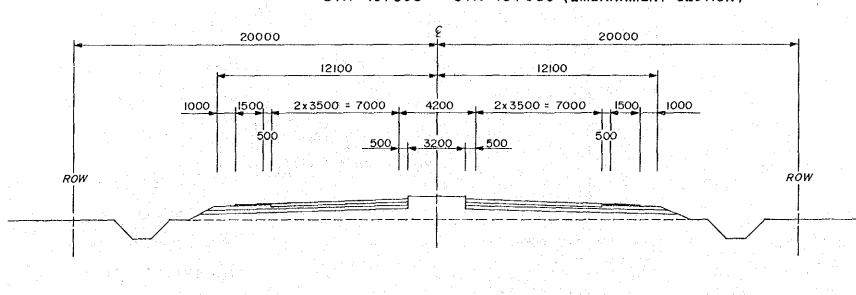


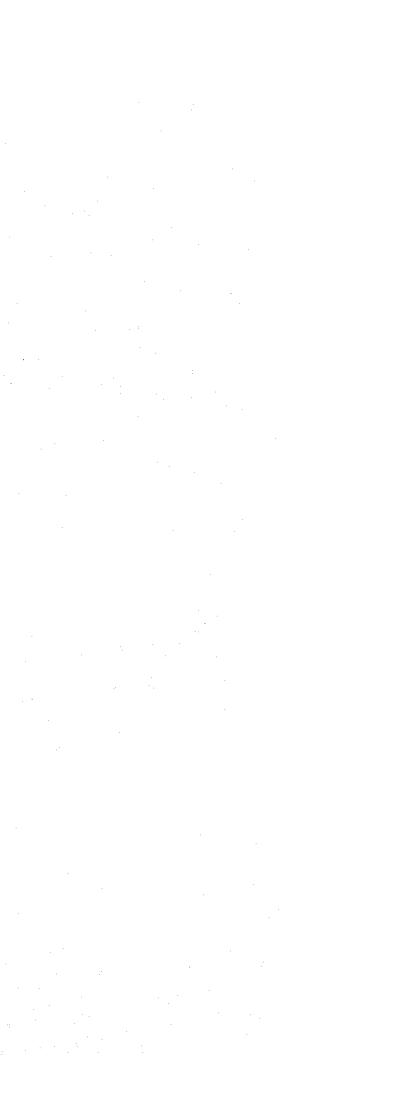


STA. 15 + 300 ~ STA. 18 + 550 (CUT SECTION)

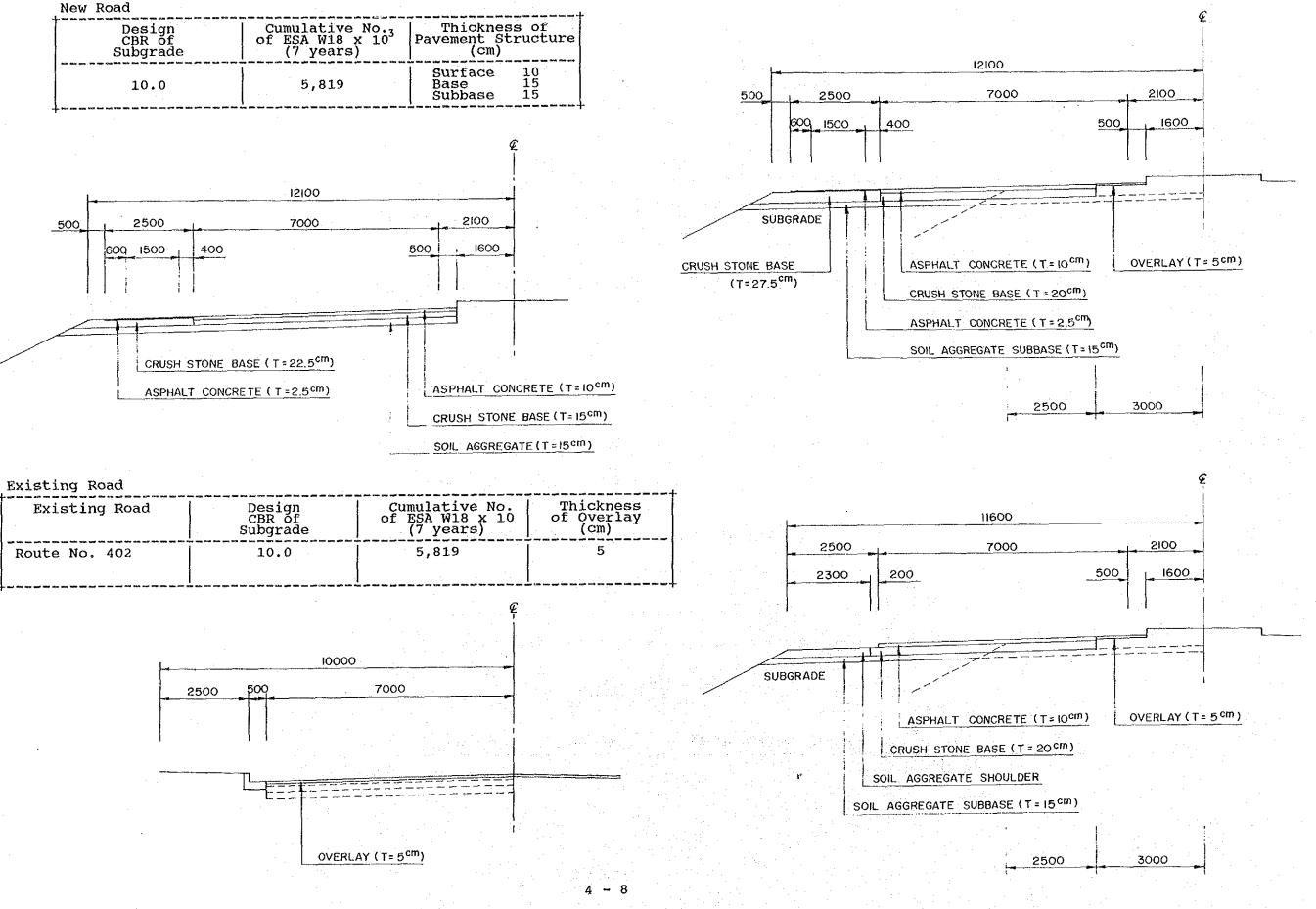
STA 15+300 ~ STA 18+550 (EMBANKMENT SECTION)

4 - 7

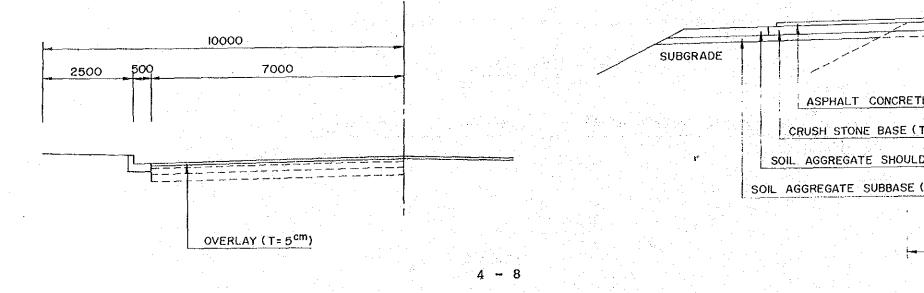




(4) Pavement Design



	DALOCING NOUN				F-		
	Existing Road	Design CBR of Subgrade	Cumulative No. of ESA W18 x 10 (7 years)	Thickness of Overlay (cm)			1160
	Route No. 402	10.0	5,819	5		2500	70
						2300 200	
-		ک بلای کار بالا این این کار بلای میں کی لیے ایک ایک ایک میں میں ایک ایک میں ایک ایک ایک	20 dan ant shi fili an an sa an da da an		r		



2) AD-2-2

(1) Summary

The aim of the project is to provide a better access to the beach resort area located along the west coast of Phuket island for tourism promotion. For this aim, the alignment is proposed as close to the west coast as possible and, as a result, passes on mountainous terrain around 6 km in length and crosses the Phuket airport property through tunnel.

To pass on mountainous terrain, a tunnel and some hillside bridges are proposed to moderate the gradient. The maximum gradient in mountainous terrain is 10 %. Another tunnel and some depressed structures are proposed to pass the airport under the runway and the taxiway.

The existing pavement is planned to be overlaid by 7.5 cm for Route 4031, Route 4025, Route 4020 and Route 4030. Pavement for new construction comprises surface course of 5 cm, base course of 15 cm and subbase course of 20 cm, 40 cm in total.

Ten bridges are proposed to cross rivers in flat terrain and six hillside bridges are planned to pass on mountainous terrain.

Measures for preventing slope failure and mud-flow are introduced to cope with possible natural disasters in mountainous terrain.

AD-2-2	Description
Changwat Name or Location Road Class Cross Section (m) Surface Type Bridge:New Tunnel Length: Total New Widening Reconstruction	<pre>: Phuket : Phuket West Coast Link : J.Rt.402 - Phuket City : S1 : 2.5 + 7.0 + 2.5 (5.0 - 6.5:DOH) : SA / ASC / SA (ASC:DOH, SA:ARD) : 16 sites, 525 m : 2 sites, 900 m : 35.2 km : 20.5 km : 10.1 km (DOH) : 4.6 km (ARD)</pre>
AADT ('96/'01/'06)	: 4,000 / 5,000 / 6,000
Financial Cost NPV B/C EIRR	: 1,401.0 million baht (in 1990 price) : 1,220 million baht (12% discount rate) : 2.5 (12% discount rate) : 27.4 %

(2) Design Standard and Conditions

(a) Design Criteria

	Road Class	:	
. •	Design Speed	:	

Geometric Design Criteria

		Design	Speed ((km/h)	·
Description	90	80	70	55	40
Minimum Radius of Curvature (m)	280	220	160	90	50
Minimum Stopping Sight Distance (m)	150	120	100	70	40
Maximum Gradient (%)	6	7	7	8	10
Minimum Gradient (%)	0.3	0.3	0.3	0.3	0.3

(b)	Clearance for Tunnel
	Vertical Clearance :
(c)	Pavement Design Condition
· ·	Design CBR: 10Design Method: AADesign Period: 7
(d)	Drainage Design Condition
	Rainfall Intensity : Ra

: Culvert-----10 years Return Period : Minor Bridge---20 years

(): Existing Condition

S140 - 90 km/h

5.0 m

IS

8 SHTO years

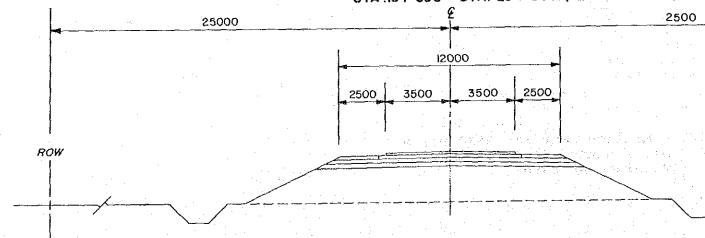
IS

Rainfall Intensity Duration Curve at Chumphon Observatory

(3) Typical Cross Section

STA. 0 + 000 ~ STA. 1+ 400 Ę 20000 20000 I2000 ROAD BED 3500 3500 2500 2500 SHOULDER CARRIAGEWAY SHOULDER ROW

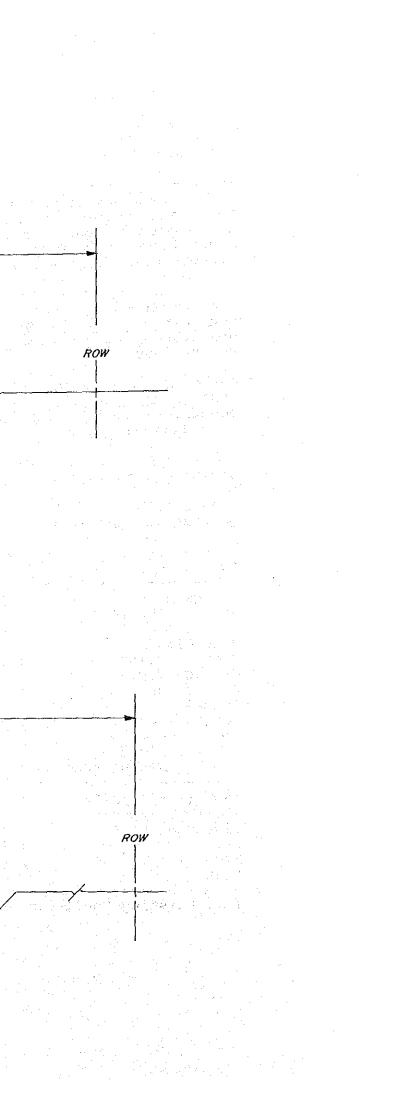
4% 15~2.5% 15~2.5% 4% 6500 1500

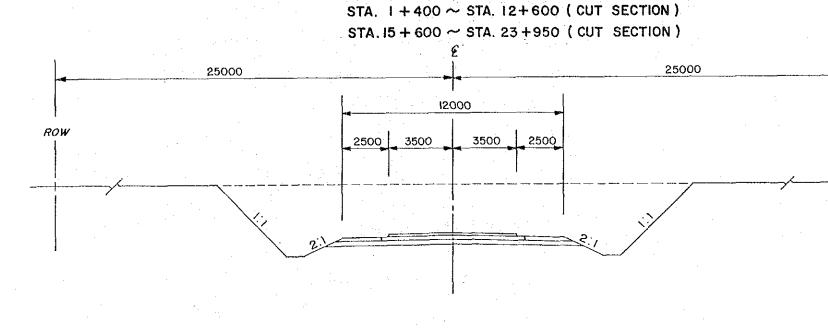


4 - 10

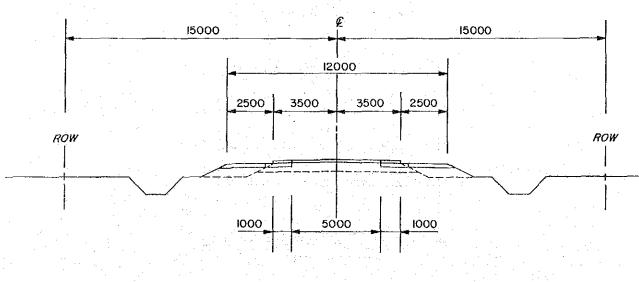
STA. 1 + 400~STA. 12 + 600 (EMBANKMENT) STA .15+ 600~STA. 23+ 950 (EMBANKMENT)

1500

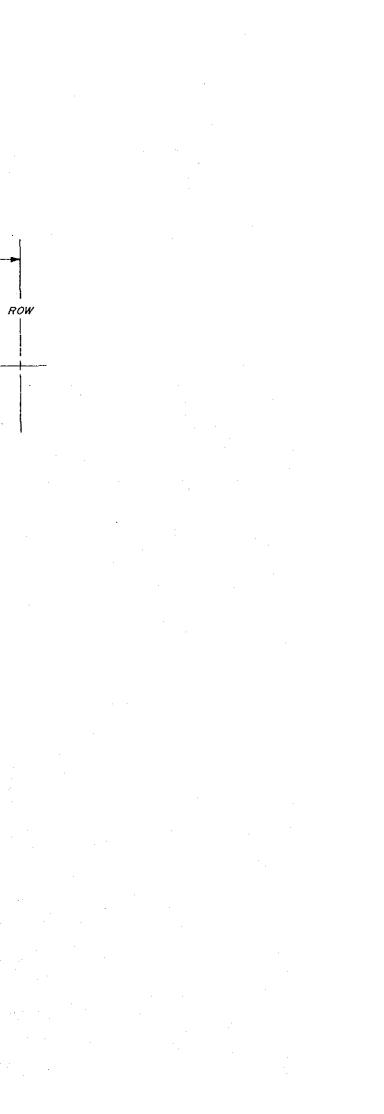


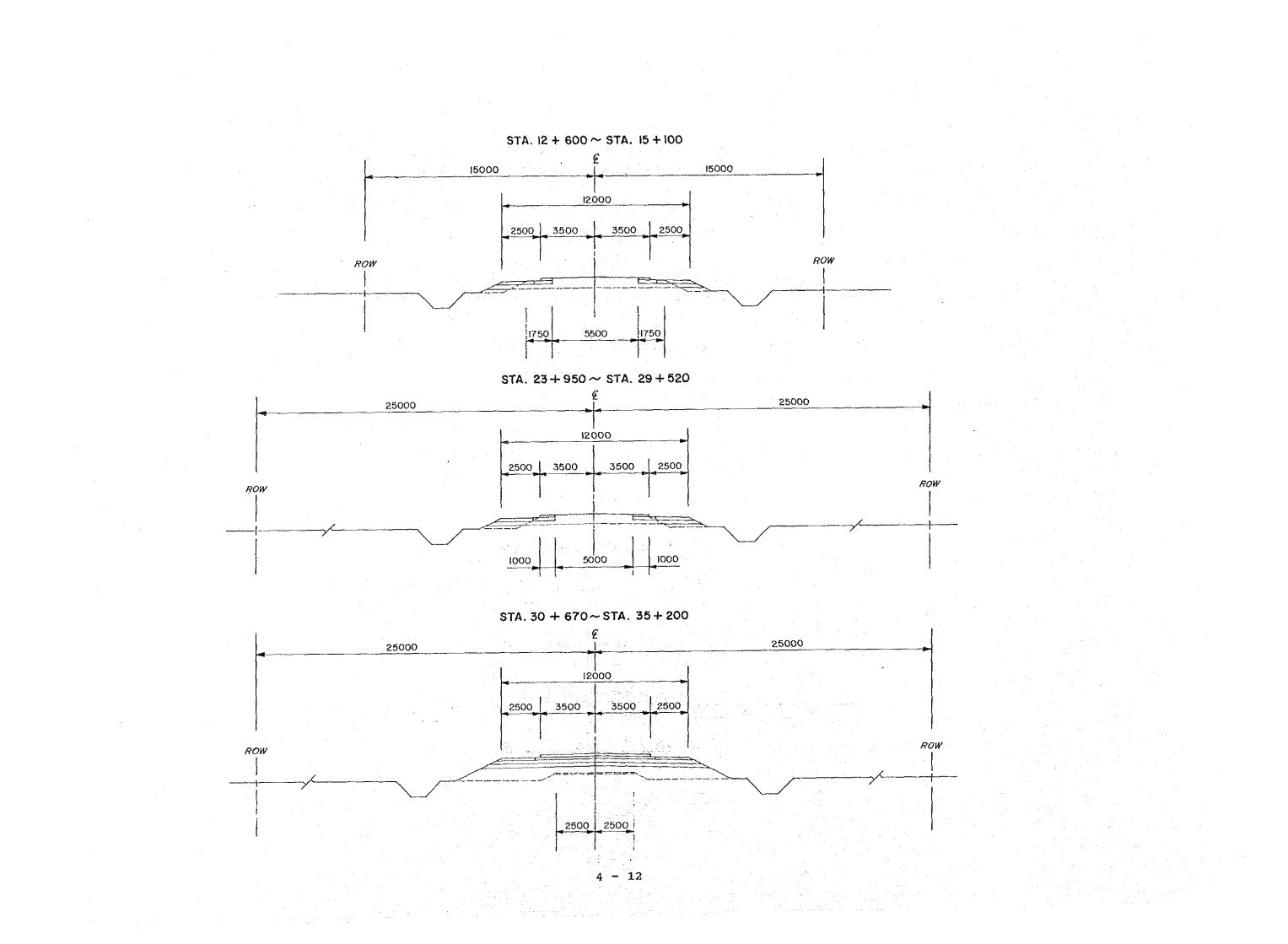


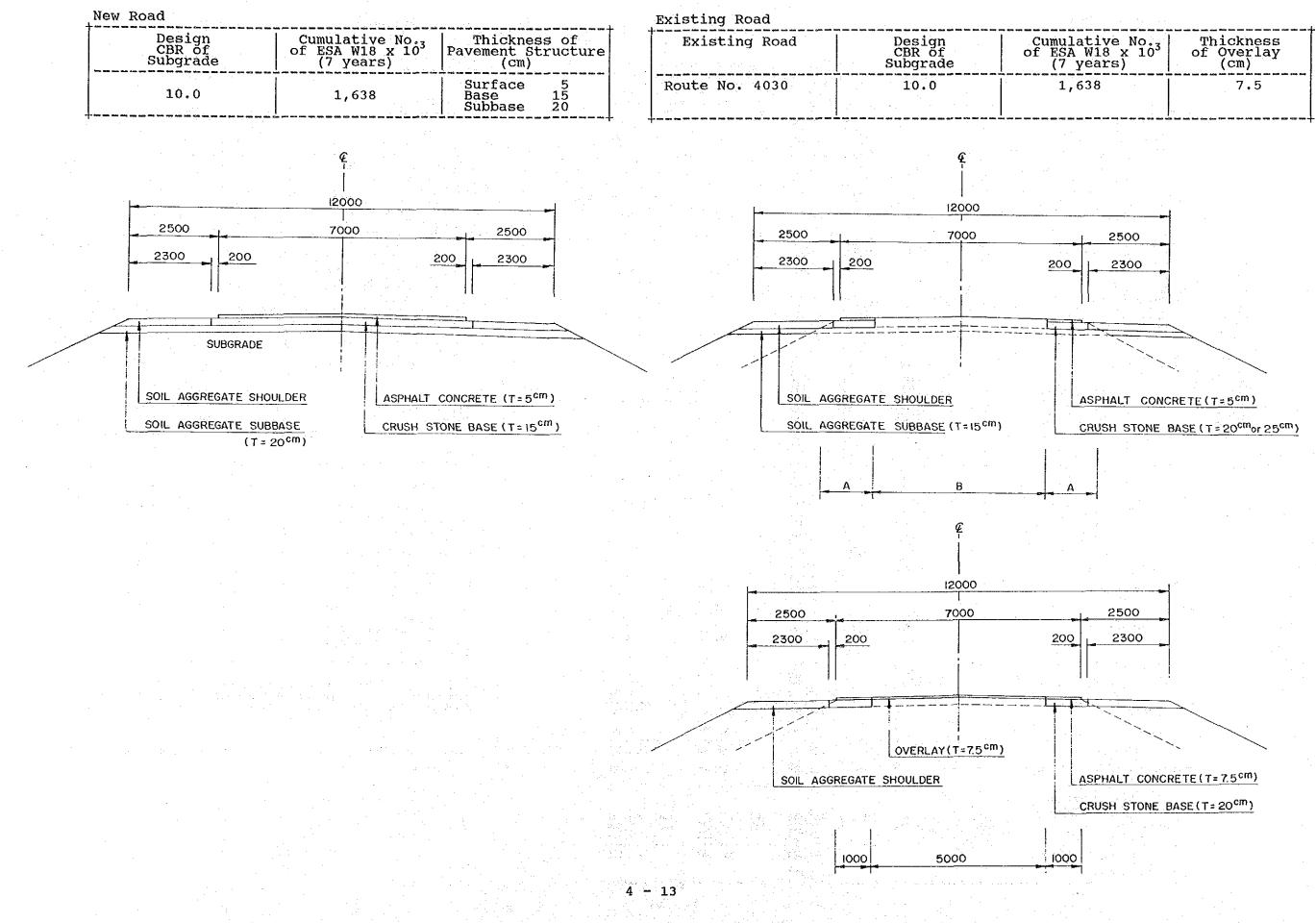
STA. 15 + 100~ STA. 15 + 600



4 - 11







4.6 Construction Cost

Table 4.5.1 CONSTRUCTION COST

1) AD 2-1

(1) CONSTRUCTION QUANTITIES AND COSTS

(Project AD -2-1 Length = 38.400 Km) (Improved Length 38.400 Km)

Beht 1000 Bant 2 1000 Bant	ITEM	Unit		Quantity	Financial Total cost		mic cost		al Value
ARTH LOCK Clearing & Grubbing Bendlay Extingtion (Strips Solid Slope Protection(Strips Solid)) Sol. 4 1 524 333 (Solid) 526 (Solid) (Solid) 536 (Solid) (Solid) 536 (Solid) (Solid) 536 (Solid) 536 (Solid)			Baht		1000 Baht	%	1000 Baht ========		000 Baht
Excernet Existing Current Construction Solution	ARTH WORK Clearing & Grubbing Roadway Excavation(classified) Embankment(Borrowed Material) Slope Protection(Stripe Sodding) (Sodding) (Shot Concrete) (Concrete Biock)	CU.M CU.M SQ.M SQ.M SQ.M SQ.M	100 6 9 500 450	86,518 181,764 157,808 6,317 0 0	7,354 18,176 947 57 0 0	83		90	
BBASE ADD BASE Sable Concress (Cruch Stone) CU.H CU.H 190 77,939 14,003 83 50 Sable Concress (Cruch Stone) CU.H 295 116,058 34,326 25,701 43,078 21,539 RFACE SS.H 190 77,939 14,602 55,701 43,078 21,539 RFACE SS.H 7 77,670 553 50 35,000 35,000 65,079 43,040 Asphaltic concrete Suffacing CU.H 1,900 45,640 88,633 50 43,040 RC Pipe Cuivert(D + 400 m) H 900 23 271 65 50 (D = 600 m) H 1,530 560 76 71 65 71 65 71 65 71 65 71 65 71 65 71 65 71 71 71 71 71 71 71 71 71 71 71 71 71 71 71 71 71 71	Excavate Existing Thickness Over 10cm (2 Lay)			234,913	3,289 30,359		25,198	. *	22,678
Asphaltitic Prime coat So. H 13 533, 569 6,999 Asphaltitic neck coat So. H 1,900 3,994 7,570 88,633 Overlay (Som) CU. M 1,900 3,994 7,570 86,079 43,040 RUCURESCEQUIVALENT Image: Cu. M 1,900 23 21 53 50 RC Pipe Culver() Image: Cu. M 1,300 522 71 73 70 86,079 43,040 RUCURESCEQUIVALENT Image: Cu. M 1,300 522 721 6 50 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 <td< td=""><td>BBASE AND BASE Subbase(Soil Aggregate) Base Coarses(Crush Stone) Shoulder(Soil Aggregate)</td><td>CU.M</td><td>295</td><td>116,358</td><td>14,808 34,326 2,767</td><td>83</td><td>43,078</td><td>50</td><td>21,539</td></td<>	BBASE AND BASE Subbase(Soil Aggregate) Base Coarses(Crush Stone) Shoulder(Soil Aggregate)	CU.M	295	116,358	14,808 34,326 2,767	83	43,078	50	21,539
RC URES(Equivalent) B 900 23 21 83 50 RC Pipe Culver(C D= 400 m) H 1,300 562 731 1 57 233 50 (D= 800 m) H 1,700 157 233 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50 50	Asphaltic Prime coat Asphaltic Tack coat Asphalt concrete Surfacing Overlay (5cm)	SQ.M CU.M	7 1,900	79,670 46,649	88,633	83	86,079	50	43,040
(D=1.0m ² 2) M 4,890 109 533 (D=1.0m ² 2) M 7,355 28 205 RC Box Culvert(1-2.40*2.40 m) M 5,900 13 77 (2-1.20*1.80 m) M 7,000 14 98 (2-1.20*1.80 m) M 7,600 28 213 (2-1.20*1.80 m) M 10,000 14 140 (3-1.50*1.50 m) M 10,500 14 147 (3-1.60*1.50 m) M 10,500 14 147 (3-1.60*1.50 m) M 11,600 14 140 (3-1.60*1.50 m) M 11,600 14 147 (3-1.60*1.50 m) M 11,600 14 147 (3-1.60*1.50 m) M 12,500 0 0 RC Bridge (W=12.5 m) M 80,000 48 3,840 SUB TOTAL SD 35,853 35,853 35,953 35,953 Side Valk (M= 2.5 m) M 1,000 39,252 32,579 16,290 Tensection (Unsignal) Ls 800,00	RUCTURES(Equivalent) RC Pipe Culvert(D= 400 m) (D= 500 m) (D= 800 m) (D=1000 m) (D=400m*2) (D=600m*2) (D=800m*2)	И И И И И И	1,300 1,780 2,445 1,800 2,600 3,900 3,560	562 145 97 14 36 13	21 731 258 237 25 94 51 142	83		50	
RC Bridge Wideing SQ.M 9,600 1,586 15,226 RC Bridge (W=12.5 m) M 80,000 68 3,840 PC Bridge (W=12.5 m) M 125,000 0 0 Bearing Unit Of Bridge Ls 500,000 21,000 1,000 SUB TOTAL 23,856 19,800 9,900 DIAN & SIDE WALK 83 50 Median (W= 3.2 m) M 1,000 35,853 35,853 35,853 Side Volk (W= 2.5 m) M 700 4,856 3,399 32,579 16,290 SUB TOTAL 39,252 32,579 16,290 90 90 1-intersection (Unsignal) Ls 80,000 4 320 90 90 T-Intersection (Signal) Ls 80,000 1 800 90 1,717 SUB TOTAL 251,198 208,643 115,164 30,643 115,164 scellaneous Works [(a)*7%] Ls 1 17,564 14,605 8,061 NTRACT AMOUNT (b) 268,782 223,248 123,225 123,225 123,225	(D=1.0m*2) (D=1.0m*3) RC Box Culvert(1-2.40*2.40 m) (2-1.20*1.80 m) (2-1.80*1.50 m) (2-2.10*2.10 m) (3-1.50*1.20 m) (3-1.50*1.20 m) (3-1.80*1.20 m) (3-1.80*1.50 m)	М М М М М М М М	4,890 7,335 5,900 7,600 10,000 9,600 10,500 10,500 11,400	28 13 14 28 14 26 14 14 14	205 77 98 213 140 250 147 147 160				
Median (W= 3.2 m) M 1,000 35,853 35,853 35,853 Side Walk (W= 2.5 m) M 700 4,856 3,399 39,252 32,579 16,290 TERSECTION Substant State 90 90 90 90 T-Intersection (Unsignal) Ls 80,000 1 800 1000 1,000 Four-Leg Intersection (Signal) Ls 1,000,000 1 1,000 2,120 1,908 1,717 TOTAL (a) 251,198 208,643 115,164 8,061 15,164 Scellaneous Works [(a)*7%] Ls 1 17,584 14,605 8,061 NTRACT AMOUNT (b) 268,782 223,248 123,225 12,323 GINEERING & SUPERVISION Ls 1 29,566 85 25,131 0 0 I((b)+(c))*10%1 (d) Ls 1 29,566 85 25,131 0 0 ND ACQUISITION & COMPENSATION Ls 1,654 170,226 281,554 100 281,554 100 281,554 287,354 Compens	RC Bridge (W=12.5 m) PC Bridge (W=12.5 m) Bearing Unit Of Bridge	M M	80,000 125,000	48	3,840 0 1,000	· · ·	19,800	• •* •	9,900
T-Intersection (Unsignal) Ls 80,000 4 320 T-Intersection (Signal) Ls 800,000 1 800 Four-Leg Intersection (Signal) Ls 1,000,000 1 1,000 SUB TOTAL 2,120 1,908 1,717 TOTAL (a) 251,198 208,643 115,164 scellaneous Works [(a)*7%] Ls 1 17,584 14,605 8,061 NTRACT AMOUNT (b) 268,782 223,248 123,225 YSICAL CONTINGENCIES ((b)*10%) (c) Ls 1 26,878 22,325 12,323 GINEERING & SUPERVISION Ls 1 29,566 85 25,131 0 0 I((b)+(c))*10%] (d) Ls 1 29,566 85 25,131 0 0 ND ACQUISITION & COMPENSATION Ls 1,654 170,226 281,554 100 281,554 100 281,554 100 281,554 100 281,554 287,354 287,354 287,354 287,354 287,354 287,354 287,354 287,354 287,354 287,354 287,354 2	Median (W= 3.2 m) Side Walk (W= 2.5 m)		1,000 700		3,399	83	32,579	50	16,290
scellaneous Works [(a)*7%] Ls 1 17,584 14,605 8,061 NTRACT AMOUNT (b) 268,782 223,248 123,225 YSICAL CONTINGENCIES ((b)*10%) (c) Ls 1 26,878 22,325 12,323 GINEERING & SUPERVISION Ls 1 29,566 85 25,131 0 0 I((b)+(c))*10%] (d) ND ACQUISITION Compensation 1,654 170,226 281,554 100 281,554 100 281,554 100 5,800 100 5,800 100 5,800 287,354 287,354 287,354 287,354 287,354 287,354 287,354 287,354 287,354 287,354	T-Intersection (Unsignal) T-Intersection (Signal) Four-Leg Intersection (Signal)	٤s	800,000	4 1 1	800	90	1,908		1,717
NTRACT AMOUNT (b) 268,782 223,248 123,225 YSICAL CONTINGENCIES ((b)*10%) (c) Ls 1 26,878 22,325 12,323 GINEERING & SUPERVISION Ls 1 29,566 85 25,131 0 0 I((b)+(c))*10%1 (d) Ls 1 29,566 85 25,131 0 0 ND ACQUISITION & COMPENSATION Land Acquisition (Average) SQ.M 1,654 170,226 281,554 100 281,554 100 281,554 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 100 100	TOTAL (a)				251,198		208,643		115,164
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	scellancous Works [(a)*7%]	Ls	1		17,584		14,605		8,061
SINEERING & SUPERVISION Ls 1 29,566 85 25,131 0 0 [((b)+(c))*10%] (d) ID ACQUISITION & COMPENSATION 1 281,554 100 281,554 100 281,554 100 281,554 100 281,554 100 281,554 100 281,554 100 281,554 100 281,554 100 281,554 100 281,554 100 281,554 100 281,554 100 281,554 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100 5,800 100	ITRACT AMOUNT (b)		n Riss To gen		268,782		223,248		123,225
[((b)+(c))*10%] (d) ID ACQUISITION & COMPENSATION Land Acquisition (Average) SQ.M 1,654 170,226 281,554 100 281,554 100 281,554 Compensation Ls 5,800,000 1 5,800 100 5,800 100 5,800 TOTAL (e) 287,354 287,354 287,354	SICAL CONTINGENCIES [(b)*10%] (c)	Ls	_1	e de la composición d Composición de la composición de la comp	26,878		22,325		12,323
Compensation Ls 5,800,000 1 5,800 100 5,800 TOTAL (e) 287,354 287,354 287,354	[((b)+(c))*10%] (d) ID ACQUISITION & COMPENSATION		1	470 554		/			
OJECT COST [(b)+(c)+(d)+(e)] 612,580 558,057 422,902	Compensation			170,226 1	5,800		5,800		5,800
ERAGE COST PER KM	OJECT COST [(b)+(c)+(d)+(e)]						558,057		422,902

(2) MAINTENANCE COST

Subgrade CBR X2 4 % 0.50 A.D.T X3 >5,700 2.25 Service Life (year) X4 4 0.20 Pavement Width (m) X5 7 m 0.19 R-0-W Width (m) Y1 40 m 0.00 Shoulder, Access, Median Y2 2.50 m 0.05 Width (m) Y1 40 m 0.00 Shoulder, Access, Median Y2 2.50 m 0.05 Width (m) Drainage Topography Y4 0 - 3 % 0.00 D. Bridge Quantity (m/Km) Y5 3 0.00 1. NO. Of Lanes 2 7,264 Baht/Km/year (a * 1+0.5(X1+X2+X3+X4+X5+Y1+Y2+Y3+Y4+Y5)= 2.595 2.595 taintenance cost + Overhead= Km * Na * 1.28 = 27,264 Baht/Km/year (botal Cost (financial) = Length *(Baht/Km/year)= 958,342 Baht/Year (Proposed Road) Length = 38.400 Km Asphalt Pavement Condition Factor 1 Surface /Bace Type X1 AC 0.00<	JTEMS 1. Surfa 2. Subgr 3. A.D.T 4. Servi 5. Pavem 6. R-O-W 7. Shoul Width 8. Traff Topog 9. Drain 10. Bridg 11. NO.	ce /Bace Type ade CBR ce Life (year) ent Width (m) Width (m) der,Access,Median (m) ic Service Operatio raphy age Topography e Quantity (m/Km) Of Lanes	F X1 X2 X3 X4 X5 Y1 Y2 on Y3 Y4	AC AC AC 4 % >5,700 4 7 m 40 m 2.50 m	Factor 0.00 0.50 2.25 0.20 0.19 0.00 0.05	
Proposed Road ITEMS Condition Factor Subgrade CBR X2 4 % 0.50 A.D.T X3 >5,700 2.25 Service Life (year) X4 4 0.20 Pevement Width (m) X5 7 m 0.19 R-O-W Width (m) Y1 40 m 0.00 Shoulder, Access, Median Y2 2.50 m 0.00 Traffic Service Operation Y3 03 % 0.00 Topography Y4 0<-3 % 0.00 Itemas 2 0.00 0.00 0.00 0.00 Drainage Topography Y4 0<-3 % 0.00 1. NO. of Lanes 2 2 55 taintenance cost + Overhead= Ka * Km * Na * 1.28 = 27,266 Baht/Km/year (Economic) = 795,424 Baht/year Projosed Road Km= 1.001 Length 38.400 Km 38.400 Km	ITEMS I. Surfa Subgr J. Subgr J. Subgr J. Subgr J. Servi S. Pavem J. Shoul Width B. Traff Topog 9. Drain 10. Bridg 11. NO.	ce /Bace Type ade CBR ce Life (year) ent Width (m) Width (m) der,Access,Median (m) ic Service Operatio raphy age Topography e Quantity (m/Km) Of Lanes	F X1 X2 X3 X4 X5 Y1 Y2 on Y3 Y4	AC AC AC 4 % >5,700 4 7 m 40 m 2.50 m	Factor 0.00 0.50 2.25 0.20 0.19 0.00 0.05	
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	6. R-O-W 7. Shoul Width 8. Traff Topog 9. Drain 10. Bridg 11. NO.	Width (m) der,Access,Median (m) ic Service Operatic raphy age Topography e Quantity (m/Km) Of Lanes	Y1 Y2 on Y3 Y4	40 m 2.50 m	0.00 0.05	
	7. Shoul Vidth 8. Traff Topog 9. Drain 10. Bridg 11. NO.	der,Access,Median (m) ic Service Operatic raphy age Topography e Quantity (m/Km) Of Lanes	Y2 on Y3 Y4	2.50 m	0.05	
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$\begin{array}{rcl} \mbox{Interval} & \mb$	Ka menera	1+U.J(X1+X2+X4	17777717171 (a * Km *	Na * 1 28 =		Baht/Km/vez
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1. Surface /Bace Type X1 AC 0.00 2. Subgrade CBR X2 4 % 0.50 3. A.D.T X3 >5,700 4.50 4. Service Life (year) X4 NEW 0.00 5. Pavement Width (m) X5 7 m * 2 0.38 6. R-0-W Width (m) Y1 50 m 0.05 7. Shoulder, Access, Median Y2 2.50m * 2 0.10				Condition	Factor	
2. Subgrade CBR X2 4 % 0.50 3. A.D.T X3 >5,700 4.50 4. Service Life (year) X4 NEW 0.00 5. Pavement Width (m) X5 7 m * 2 0.38 6. R-O-W Width (m) Y1 50 m 0.05 7. Shoulder, Access, Median Y2 2.50m * 2 0.10						•
3. A.D.T X3 >5,700 4.50 4. Service Life (year) X4 NEW 0.00 5. Pavement Width (m) X5 7 m * 2 0.38 6. R-O-W Width (m) Y1 50 m 0.05 7. Shoulder, Access, Median Y2 2.50m * 2 0.10						
4. Service Life (year) X4 NEW 0.00 5. Pavement Width (m) X5 7 m * 2 0.38 6. R-O-W Width (m) Y1 50 m 0.05 7. Shoulder, Access, Median Y2 2.50m * 2 0.10				the second se		
5. Pavement Width (m) X5 7 m * 2 0.38 6. R-O-W Width (m) Y1 50 m 0.05 7. Shoulder, Access, Median Y2 2.50m * 2 0.10						
6. R-D-W Width (m) Y1 50 m 0.05 7. Shoulder, Access, Median Y2 2.50m * 2 0.10						
7. Shoulder, Access, Median Y2 2.50m * 2 0.10				• … =		
Width (m)	Width	(m)		· · ·		1
	8. Traff	ic Service Operation	on Y3	0-3%	0.00	
B. Traffic Service Operation Y3 0 - 3 % 0.00	Topog	raphy				
Topography		age Topography		U-5%		
Topography 9. Drainage Topography Y4 0 - 3 % 0.00		. O			A AA	
Topography 9. Drainage Topography Y4 0 - 3 % 0.00 10. Bridge Quantity (m/Km) Y5 3 0.00	10. Bridg			3 /	0.00	
Width (m)	1. Surfa 2. Subgr 3. A.D.T 4. Servi 5. Paven 6. R-O-V 7. Shoul Widt	ce /Bace Type ade CBR ce Life (year) went Width (m) Width (m) der,Access,Median (m)	X1 X2 X3 X4 X5 Y1 Y2	Condition AC 4 % >5,700 NEU 7 m * 2 50 m 2.50m * 2	Factor 0.00 0.50 4.50 0.00 0.38 0.05 0.10	
3. Traffic Service Operation Y3 0 - 3 % 0.00				ti stači s		
			¥4 .	0-3%	0.00	
Topography	9. Drair			~ .		
Topography 9. Drainage Topography Y4 0 - 3 % 0.00		e Quantity (m/Km)		. 3	0.00	
Topography 9. Drainage Topography Y4 0 - 3 % 0.00 10. Bridge Quantity (m/Km) Y5 3 0.00	10. Bridg 11. NO.	Of Lanes		5 4	0.00	.*

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(3) CONSTRUCTION SCHEDULE

Project AD 2-1 (Two Section) Third Year year and Second Year First Year Month -----Work Items 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 Land Acquisition -----Preparatory Works **====== Earth Works DESERTE STREET, STREET Pavement Works Bridge Works =0223225 Miscellaneous Works _____ 222222222 Clearing -Up Percentage Of 28 % Disbursement (%) 50 % 22 %

4) ECONOMIC EVALUATION

Cost and Benefit Flows of the Project Project; AD-2-1

1991 1992 1993 341, 1994 79, 1995 136, 1996 1997 1998 1999 2000 2001 2002 2003 2004	361 0	79,361	0 0 0 112133 119495 126857 134219 141581 148943	0 596571 699244 801917 904590 1007263	0 0 -341984 -79361 -136712 708239 818274 928309 1038344 1148379		- 41038 - 9523 - 16405 566403 65443 74246 83048 91851
1992 1993 341, 1994 79, 1995 136, 1996 1997 1998 1999 2000 2001 2001 2002 2003	0 0 984 0 361 0 712 0 0 465 0 465 0 465 0 465 0 465 0 465 0 465 0 465	0 341,984 79,361 136,712 465 465 465 465 465	0 0 0 112133 119495 126857 134219 141581	0 0 596571 699244 801917 904590 1007263	-79361 -136712 708239 818274 928309 1038344		-9523 -16405 56640 65443 74246 83048
1992 1993 341, 1994 79, 1995 136, 1997 1998 1999 2000 2001 2001 2002 2003	0 0 984 0 361 0 712 0 0 465 0 465 0 465 0 465 0 465 0 465 0 465 0 465	0 341,984 79,361 136,712 465 465 465 465 465	0 0 0 112133 119495 126857 134219 141581	0 0 596571 699244 801917 904590 1007263	-79361 -136712 708239 818274 928309 1038344		-9523 -16405 56640 65443 74246 83048
1993 341, 1994 79, 1995 136, 1996 139, 1997 1998, 1999 2000 2001 2002 2003 2003	984 0 361 0 712 0 0 465 0 465 0 465 0 465 0 465 0 465 0 465 0 465	341,984 79,361 136,712 465 465 465 465 465	0 0 112133 119495 126857 134219 141581	0 596571 699244 801917 904590 1007263	-79361 -136712 708239 818274 928309 1038344		-9523 -16405 56640 65443 74246 83048
1994 79, 1995 136, 1996 1997 1998 1999 2000 2001 2001 2002 2003	361 0 712 0 0 465 0 465 0 465 0 465 0 465 0 465 0 465	79,361 136,712 465 465 465 465 465	0 112133 119495 126857 134219 141581	0 596571 699244 801917 904590 1007263	-79361 -136712 708239 818274 928309 1038344		-9523 -16405 56640 65443 74246 83048
1995 136, 1996 1997 1998 1999 2000 2001 2002 2003	712 0 0 465 0 465 0 465 0 465 0 465 0 465 0 465	136,712 465 465 465 465 465 465	0 112133 119495 126857 134219 141581	0 596571 699244 801917 904590 1007263	- 136712 708239 818274 928309 1038344		- 16405 56640 65443 74246 83048
1996 1997 1998 1999 2000 2001 2002 2003	0 465 0 465 0 465 0 465 0 465 0 465 0 465	465 465 465 465 465	112133 119495 126857 134219 141581	596571 699244 801917 904590 1007263	708239 818274 928309 1038344		56640 65443 74246 83048
1997 1998 1999 2000 2001 2002 2003	0 465 0 465 0 465 0 465 0 465 0 465	465 465 465 465	119495 126857 134219 141581	699244 801917 904590 1007263	818274 928309 1038344		65443 74246 83048
1998 1999 2000 2001 2002 2003	0 465 0 465 0 465 0 465 0 465	465 465 465	126857 134219 141581	801917 904590 1007263	928309 1038344		74246 83048
1999 2000 2001 2002 2003	0 465 0 465 0 465	465 465	134219 141581	904590 1007263	1038344		83048
2000 2001 2002 2003	0 465 0 465	465	141581	1007263			
2001 2002 2003	0 465						
2002 2003				1109936	1258414		100654
		465	147624	1206208	1353366		108250
2007	0 465	465	146305	1302480	1448319		115846
2004	0 70,654	70,654	144985	1398752	1473083		115020
2005	0 465	465	143666	1495024	1638225		131039
2006	0 465	465	142347	1591296	1733178		138635
2007	0 465	465	142347	1591296	1733178		138635
2008	0 465	465	142347	1591296	1733178		138635
2009	0 465	465	142347	1591296	1733178		138635
2010	0 465	465	142347	1591296	1733178	2000 - 1990 2000 - 1990	138635
lotal 558,0	057 77,170	635,227	2,077,543	18,478,465	19,920,781	1	5,682,53

- 15 4

(unit ; 1000 Baht)

2) AD 2-2

(1) CONSTRUCTION QUANTITIES AND COSTS

(Project AD -2-2 Length = 35.200 Km) (Improved Length 35.200 Km)

	·	Fina	ncial		Financial	Econo	mic cost	Resid	ual Value
LTEM	Unit		Cost Baht		Total cost- 1000 Baht	%	1000 Baht		1000 Baht
ARTH WORK Clearing & Grubbing Roadway Excavation(Classified) Roadway Excavation(Unclassified) Embankment(Selected Material) Slope Protection(Stripe Sodding) (Sodding) (Shot Concrete) (Concrete Block) Sand Mat (t=0.5m)	SQ.M CU.M CU.M SQ.M SQ.M SQ.M SQ.M SQ.M	- - -	1 85 25 60 6 9 500 450 100	758,828 699,552 117,123 21,427 225,490 8,104 61,149 10,178 0	759 59,462 2,928 1,286 1,353 73 30,575 4,580 0	83		90	-
Excavate Existing Thickness Over 10cm (2 Lay) SUB TOTAL	SQ.M		14	30,000	420 101,435		84,191		75,772
SUBBASE AND BASE Subbase(Soil Aggregate) Base Coarses(Crush Stone) Shoulder(Soil Aggregate) SUB YOTAL	CU.M CU.M CU.M	· .	190 295 190	65,613 30,902 29,308	12,466 9,116 5,569 27,151	83	22,535	50	11,268
SURFACE Asphaltic Prime coat Asphaltic Tack coat Asphalt concrete Surfacing Overlay (7.5cm) SUB TOTAL	SQ.M SQ.M CU.M CU.M		13 7 1,900 1,900	190,390 30,180 8,899 179	2,475 211 16,908 340 19,935	83	16,546	50	8,273
STRUCTURES(Equivalent) RC Pipe Culvert(D= 400 m) (D= 600 m) (D= 800 m) (D=1200 m) (D=1200 m) (D=1500 m)	M M M M M		900 1,300 1,780 2,445 3,575 4,400	12 1,784 74 920 16 40	11 2,319 132 2,249 57 176	83		50	
RC Box Culvert(1-1.80*1.80 m) (1-2.10*2.10 m) (1-2.40*2.40 m) (2-2.10*2.10 m) RC Bridge Wideing RC Bridge (W=14.0 m) PC Bridge (W=14.0 m) Bearing Unit Of Bridge SUB TOTAL	M M SQ.M M Ls		4,200 5,000 5,900 10,000 9,600 89,600 140,000 500,000	310 6 0 22 525 0 16	1,302 30 220 0 47,040 8,000 61,536		51,075		25,538
UNNEL Tunnel(Hountain) (Open Cut & Pipe Roof) SUB TOTAL	M Ls		255,000 200,000	600 1	153,000 360,000 513,000	83	425,790	50	212,895
NTERSECTION T-Intersection (Unsignal) SUB TOTAL	Ls		80,000	. 6	480 480	90	432	90	389
TOTAL (a)					723,537		600,569		334,134
iscellaneous Works [(a)*7%]	Ls		1		50,643		42,040		23,389
ONTRACT AMOUNT (b)					774,184		642,609		357,523
HYSICAL CONTINGENCIES [(b)*10%] (c)	LS		1		77,418		64,261	· .	35,752
NGINEERING & SUPERVISION {({b}+{c})*10%} (d) AND ACQUISITION & COMPENSATION Land Acquisition (Average) Compensation TOTAL (e)	LS SQ.M Ls	8,2	1 356 200,000	1,281,070 1	85,160 456,061 8,200 464,261	85 100 100	72,386 456,061 8,200 464,261	0 100 100	0 456,061 8,200 464,261
ROJECT COST [(b)+(c)+(d)+(e)]		•			1,401,024		1,243,517		857,536
VERAGE COST PER KM					39,802				

•			0.00	Baht/Km/yea	r		
	t Road No, AD ~2-2 ing Road)	Na≂ Km≓	1.001				
	Lengt		14.500				
أمطعم	+ Devemont						
spnat saass	t Pavement						and the second
			Proposed Road				
	ITEMS		Condition	Factor		1	e producer de la composition de la comp
92322				*********			a that a second
-	Surface /Bace Type	X1	AC	0.00		1	
•	Subgrade CBR	X2- X3	4 % 3,000	1.02			1997 - A.
• 2		X3 X4	3,000				
•		x5	7 m	0.19			
•		Ŷĺ	40 m	0.00			
	Shoulder, Access, Median		2.50 m	0.05			
	Width (m)						
•	Traffic Service Operation	¥3	0-3%	0.00	· .		
	Topography Drainage Topography	Y4	0-3%	0.00			1. A 1. A
ó	Bridge Quantity (m/Km)	Y5	3	0.00			·
1.	NO. Of Lanes		2			· ·	
	#835835222222222222222222222222222222222		******************	***********			
							· ·
a	= 1+0.5(X1+X2+X3+X4+X			1.980	i ga an		
sinte	enance cost + Overhead= Ka	* Km '	* Na * 1.28 =	20,803	Baht/Km/ye	ear	
otal	Cost (Financial) = Lengt	h *(8	aht/Km/year)=		Baht/year		~
	(Economic) =		_	250 362	Baht/year		
			-	C.)0, 50C	Durid Your		
			-	200,00E	Durd Your		
•			_		:	•	
	st Road No, AD 2-2	Na=		l Baht/Km/yea	:	•	
	st Road No, AD 2-2 bsed Road)	Km≠	1,001	Baht/Km/yea	:		
	st Road No, AD 2-2	Km≠	1,001	Baht/Km/yea	:		
Propo	st Road No, AD 2-2 bsed Road) Lengt	Km≠	1,001	Baht/Km/yea	:		
Pròpo	st Road No, AD 2-2 used Road) Lengt	Km≠ h =	1.001 35.200) Baht/Km/yea) Km			
Propo	st Road No, AD 2-2 bsed Road) Lengt	Km≠ h =	1.001 35.200) Baht/Km/yea) Km			
Pròpo	st Road No, AD 2-2 used Road) Lengt	Km≠ h =	1.001 35.200 Proposed Road) Baht/Km/yea) Km ((1996)	r (2001)	(2006)	
propo sphal	st Road No, AD 2-2 osed Road) Lengt It Pavement	Km≠ h = =====	1.001 35.200 Proposed Road) Baht/Km/yea) Km i (1996) Factor	(2001) Factor	(2006) Factor	•
sphal	it Road No, AD 2-2 bsed Road) Lengt It Pavement ITEMS	Km≠ h ≠ =====	1.001 35.200 Proposed Road) Baht/Km/yea) Km i (1996) Factor	(2001) Factor	(2006) Factor	• •
sphal	St Road No, AD 2-2 Dised Road) Lengt It Pavement ITEMS Surface /Bace Type	Km≠ h = ===== X1	1.001 35.200 Proposed Roac Condition) Baht/Km/yea) Km i (1996) Factor 0.00	r (2001) Factor 0.00	(2006) Factor 0.00	•
Prop: sphal ===== :	St Road No, AD 2-2 Dised Road) Lengt It Pavement ITEMS Surface /Bace Type Subgrade CBR	Km= h = ===== X1 X2	1.001 35.200 Proposed Road Condition AC 4 %) Baht/Km/yea) Km i (1996) Factor 0.00 0.50	(2001) Factor 0.00 0.50	(2006) Factor 0.00 0.50	•
sphal	st Road No, AD 2-2 used Road) Lengt It Pavement ITEMS Surface /Bace Type Subgrade CBR A.D.T	Km≉ h ≠ ===== X1 X2 X3	1.001 35.200 Proposed Road Condition AC 4 % 4,000) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51	(2001) Factor 0.00 0.50 1.88	(2006) Factor 0.00	•
sphal	St Road No, AD 2-2 Josed Road) Lengt Lengt It Pavement ITEMS Surface /Bace Type Subgrade CBR A.D.T Service Life (year)	Km≠ h ≠ ≈==== X1 X2 X3 X4	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00	(2001) Factor 0.00 0.50 1.88 0.00	(2006) Factor 0.00 0.50 2.25	• •
Prop: sphal	St Road No, AD 2-2 Used Road) Lengt Lt Pavement ITEMS Surface /Bace Type Subgrade CBR A.D.T Service Life (year) Pavement Width (m)	Km≠ h ≠ ≈==== X1 X2 X3 X4 X5	1.001 35.200 Proposed Read Condition AC 4 % 4,000 NEW 7 m) Baht/Km/yea) Km ((1996) Factor 0.00 0.50 1.51 0.00 0.19	(2001) Factor 0.00 0.50 1.88 0.00 0.19	(2006) Factor 0.00 0.50 2.25 0.00 0.19	•
Propo	St Road No, AD 2-2 Sed Road) Lengt Lt Pavement ITEMS Surface /Bace Type Subgrade CBR A.D.T Service Life (year) Pavement Width (m) R-O-W Width (m)	Km≠ h = ===== X1 X2 X3 X4 X5 Y1	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW 7 m 50 m) Baht/Km/yea) Km ((1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05	•
Propo sphal	St Road No, AD 2-2 Sed Road) Lengt Lt Pavement ITEMS Surface /Bace Type Subgrade CBR A.D.1 Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder,Access,Median	Km≠ h ≠ ≈==== X1 X2 X3 X4 X5	1.001 35.200 Proposed Read Condition AC 4 % 4,000 NEW 7 m) Baht/Km/yea) Km ((1996) Factor 0.00 0.50 1.51 0.00 0.19	(2001) Factor 0.00 0.50 1.88 0.00 0.19	(2006) Factor 0.00 0.50 2.25 0.00 0.19	•
Prop: sphal	St Road No, AD 2-2 Seed Road) Lengt Lt Pavement ITEMS Surface /Bace Type Subgrade CBR A.D.T Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder,Access,Median Width (m)	Km= h = x1 X2 X3 X4 X5 Y1 Y2	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW 7 m 50 m) Baht/Km/yea) Km ((1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05	•
Prop: sphal	St Road No, AD 2-2 Seed Road) Lengt Lt Pavement ITEMS Surface /Bace Type Subgrade CBR A.D.T Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation	Km= h = x1 X2 X3 X4 X5 Y1 Y2	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05	•
sphal	St Road No, AD 2-2 Seed Road) Lengt Lengt Lengt Lengt Lengt Lengt Subgrade CBR A.D.T Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation Topography	Km= h = x1 X2 X3 X4 X5 Y1 Y2	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05	
Prop: sphal	St Road No, AD 2-2 Seed Road) Lengt Lengt Lengt Lengt Lengt Surface /Bace Type Subgrade CBR A.D.T Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation Topography Drainage Topography	Km= h = X1 X2 X3 X4 X5 Y1 Y2 Y3	1.001 35.200 Proposed Road Condition AC 4.% 4.000 NEW 7 m 50 m 2.50 m 0 - 3 %) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05 0.00	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05 0.05 0.00	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05 0.00	
Prop: sphal	St Road No, AD 2-2 Seed Road) Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt	Km= h = X1 X2 X3 X4 X5 Y1 Y2 Y3 Y4 Y5	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m 0 - 3 % 0 - 3 % 3 2) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05 0.05 0.00 0.00	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00	
Prop: sphal	St Road No, AD 2-2 Seed Road) Lengt Lengt Lengt Lengt Lengt Surface /Bace Type Subgrade CBR A.D.T Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation Topography Drainage Topography	Km= h = X1 X2 X3 X4 X5 Y1 Y2 Y3 Y4 Y5	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m 0 - 3 % 0 - 3 % 3 2) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05 0.05 0.00 0.00	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00	
Prop: sphal	St Road No, AD 2-2 Seed Road) Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Surface /Bace Type Subgrade CBR A.D.I Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation Topography Drainage Topography Bridge Quantity (m/Km) NO. Of Lanes	Km= h = X1 X2 X3 X4 X5 Y1 Y2 Y3 Y4 Y5	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m 0 - 3 % 0 - 3 % 2) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05 0.05 0.00 0.00	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05 0.05 0.00 0.00	
Prop: sphal	st Road No, AD 2-2 used Road) Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Subgrade CBR A.D.T Service Life (year) Pavement Width (m) R-O-W Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation Topography Drainage Topography Bridge Quantity (m/Km) NO. Of Lanes = 1+0.5(X1+X2+X3+X4+)	Km== h = X11 X2 X3 X4 X5 Y1 Y2 Y3 Y4 Y5 = 5+Y1+	1.001 35.200 Proposed Roac Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m 0 - 3 % 0 - 3 % 2 2) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05 0.05 0.05 0.00 0.00 0.00 0.0	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 2.335	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00	
Prop: sphal =====	st Road No, AD 2-2 psed Road) Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Subgrade CBR A.D.1 Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation Topography Drainage Topography Bridge Quantity (m/Km) NO. Of Lanes = 1+0.5(X1+X2+X3+X4+) enance cost + Overhead= Ka	Km== h = X1 X2 X3 X4 X5 Y1 Y2 Y3 Y4 Y5 5+Y1+ * Km	1.001 35.200 Proposed Reac Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m 0 - 3 % 0 - 3 % 0 - 3 % 2 2 Y2+Y3+Y4+Y5)= * Na * 1.28 =) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 0.0	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 0.0	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 2.520 26,476	
Prop: sphal =====	st Road No, AD 2-2 psed Road) Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Subgrade CBR A.D.1 Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation Topography Drainage Topography Bridge Quantity (m/Km) NO. Of Lanes = 1+0.5(X1+X2+X3+X4+) enance cost + Overhead= Ka	Km== h = X1 X2 X3 X4 X5 Y1 Y2 Y3 Y4 Y5 5+Y1+ * Km	1.001 35.200 Proposed Reac Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m 0 - 3 % 0 - 3 % 0 - 3 % 2 2 Y2+Y3+Y4+Y5)= * Na * 1.28 =) Baht/Km/yea) Km ((1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 0.0	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 0.0	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 2.520 26,476	
Prop: sphal	<pre>st Road No, AD 2-2 based Road) Lengt Lt Pavement ITEMS Surface /Bace Type Subgrade CBR A.D.T Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation Topography Drainage Topography Bridge Quantity (m/Km) NO. Of Lanes = 1+0.5(X1+X2+X3+X4+) enance cost + Overhead= Ka Cost (Financial) = Lengt) (Economic) =</pre>	Km== h = X1 X2 X3 X4 X5 Y1 Y2 Y3 Y4 Y5 Y4 Y5 Y4 Y5 Y1 Y2 Y3 X4 X5 Y1 Y2 Y3 X4 Y5 Y1 Y2 Y3 Y4 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y7 Y7 Y5 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m 0 - 3 % 0 - 3 % 3 2 Y2+Y3+Y4+Y5)= * Na * 1.28 = aht/Km/year)=) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 0.0	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05 0.05 0.05 0.00 0.00 0.00 0.0	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 2.520 26,476	
Proposed sphal	st Road No, AD 2-2 based Road) Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Lengt Surface /Bace Type Subgrade CBR A.D.T Service Life (year) Pavement Width (m) R-O-W Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation Topography Drainage Topography Bridge Quantity (m/Km) NO. Of Lanes = 1+0.5(X1+X2+X3+X4+) enance cost + Overhead= Ka Cost (Financial) = Lengt	Km== h = X1 X2 X3 X4 X5 Y1 Y2 Y3 Y4 Y5 Y4 Y5 Y4 Y5 Y1 Y2 Y3 X4 X5 Y1 Y2 Y3 X4 Y5 Y1 Y2 Y3 Y4 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y7 Y7 Y5 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m 0 - 3 % 0 - 3 % 3 2 Y2+Y3+Y4+Y5)= * Na * 1.28 = aht/Km/year)=) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 0.0	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 0.0	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 2.520 26,476	
Propo sphal 	<pre>st Road No, AD 2-2 bsed Road) Lengt It Pavement ITEMS Surface /Bace Type Subgrade CBR A.D.T Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation Topography Drainage Topography Bridge Quantity (m/Km) NO. Of Lanes = 1+0.5(X1+X2+X3+X4+) enance cost + Overhead= Ka Cost (Financial) = Lengt) (Economic) = Cost (Financial) = ADT(5) Cost (Financial) = Cost (Financial) =</pre>	Km== h = X1 X2 X3 X4 X5 Y1 Y2 Y3 Y4 Y5 Y4 Y5 Y4 Y5 Y1 Y2 Y3 X4 X5 Y1 Y2 Y3 X4 Y5 Y1 Y2 Y3 Y4 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y1 Y5 Y7 Y7 Y5 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7 Y7	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m 0 - 3 % 0 - 3 % 3 2 Y2+Y3+Y4+Y5)= * Na * 1.28 = aht/Km/year)=) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 0.0	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 0.0	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 2.520 26,476	
Propo sphal 	<pre>st Road No, AD 2-2 seed Road) Lengt It Pavement ITEMS Surface /Bace Type Subgrade CBR A.D.T Service Life (year) Pavement Width (m) R-O-W Width (m) Shoulder, Access, Median Width (m) Traffic Service Operation Topography Drainage Topography Bridge Quantity (m/Km) NO. Of Lanes = 1+0.5(X1+X2+X3+X4+) enance cost + Overhead= Ka Cost (Financial) = Lengt) (Economic) = Cost (Financial) = ADT(5)) (Economic) = 100000000000000000000000000000000000</pre>	Km== h = X1 X2 X3 X4 X5 Y1 Y2 Y3 Y4 Y5 Y4 Y5 5+Y1+ * Km h *(00	1.001 35.200 Proposed Road Condition AC 4 % 4,000 NEW 7 m 50 m 2.50 m 0 - 3 % 0 - 3 % 3 2 Y2+Y3+Y4+Y5)= * Na * 1.28 = aht/Km/year)= CAR/DAY) =) Baht/Km/yea) Km i (1996) Factor 0.00 0.50 1.51 0.00 0.19 0.05 0.05 0.05 0.05 0.00 0.00 0.00 0.0	(2001) Factor 0.00 0.50 1.88 0.00 0.19 0.05 0.05 0.05 0.00 0.00 0.00 0.00 0.0	(2006) Factor 0.00 0.50 2.25 0.00 0.19 0.05 0.05 0.00 0.00 0.00 0.00 2.520 26,476	

Overlay Cost (2004)

4 - 16

=

= 32,169,984 Baht

(3) CONSTRUCTION SCHEDULE

Project AD 2-2				(Two Section)
year and	First Year	*****	Second Year	
Month Work Items	1 2 3 4 5 6 7 8	9 10 11 12 1 2 3 4	5 6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12
and Acquisition		-		•
eparatory Works				
arth Works		LTODKOZCZZAZDZECAJCEŻUŻ		
avement Works				
idge Works	======	***************************************		======================================
Innel	======	20922222222222222222222222		222020224222222
scellaneous Works				
learing -Up				
	=======================================			
ercentage Of isbursement (%)	4	6 %	32 %	22 %

4) ECONOMIC EVALUATION

4 - 17

Cost and Benefit Flows of the Project Project; AD-2-2

Year	Const- ruction	Mainte- nance	Total Cost	VOC Saving	Time Saving	Balance	Sensi. Analysis
	Cost	Cost	0000	Quiling		Benefit=	0.8
						Cost=	1.2
1991	0	0	0	0	0	0	0
1992	0	ŏ	· . ŏ	. õ	ŏ	ň.	Ō
1993	700,647	ŏ	700,647	, o	ŏ	(700,647)	(840,776
1994	337,322	. Õ	337,322	õ	ŏ.	(337,322)	(404,786
1995	205,548	Ő	205,548	Ō	0	(205,548)	(246,658
1996	0	410	410	74,840	358,318	432,748	346,035
1997	Ō	410	410	74,632	381,174	455,397	364,153
1998	Ō.	410	410	74,425	404,030	478,045	382,272
1999	õ	410	410	74,217	426 885	500,693	400,391
2000	ŏ	410	410	74,010	449 741	523,341	418,509
2001	Ō	466	466	73,802	472 597	545,933	436,560
2002	Ō	466	466	78,281	486,072	563,887	450,923
2003	0	466	466	82,760	499,547	581,840	465,286
2004	0	32,636	32,636	87,238	513,022	567,624	441,045
2005	0	466	466	91,717	526,497	617,748	494,012
2006	0	523	523	96,196	539,972	635,645	508,307
2007	0	523	523	96,196	539,972	635,645	508,307
2008	0	523	523	96,196	539,972	635,645	508,307
2009	0	523	523	96,196	539,972	635,645	508,307
2010	0	523	523	96,196	539,972	635,645	508,307
otal	1,243,517	39,166	1,282,682	1,266,902	7,217,743	7,201,963	5,248,497
				EIRR =		27.44%	19.75
				NPV (1;12%)	=	1,220,310	

(unit ; 1000 Baht)

Drawings 4.7

1) AD-2-1

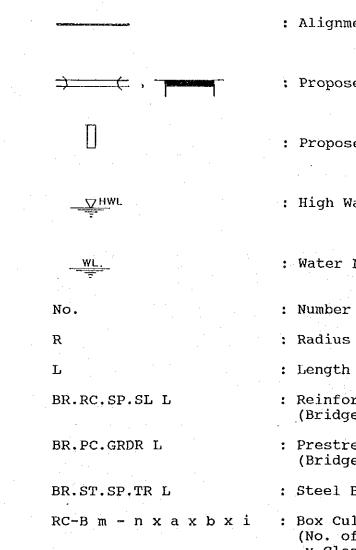
Drawing

SHEET	NO.	L
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Ľ	NO.	LIST	OF	DRAWINGS

1 5.	Plan and Profile
6.	Plan of Intersection
7.	(A) Reinforced Concrete Slab Bridge
8.	(B) Reinforced Concrete Slab Bridge
9.	(C) Reinforced Concrete Slab Bridge
10.	(D) Reinforced Concrete Slab Bridge
11.	Box Culvert
12.	Pipe Culvert





: Alignment of Proposed Route

: Proposed Bridge

: Proposed Box Culvert

: High Water Level

: Water Level

: Radius of Curvature

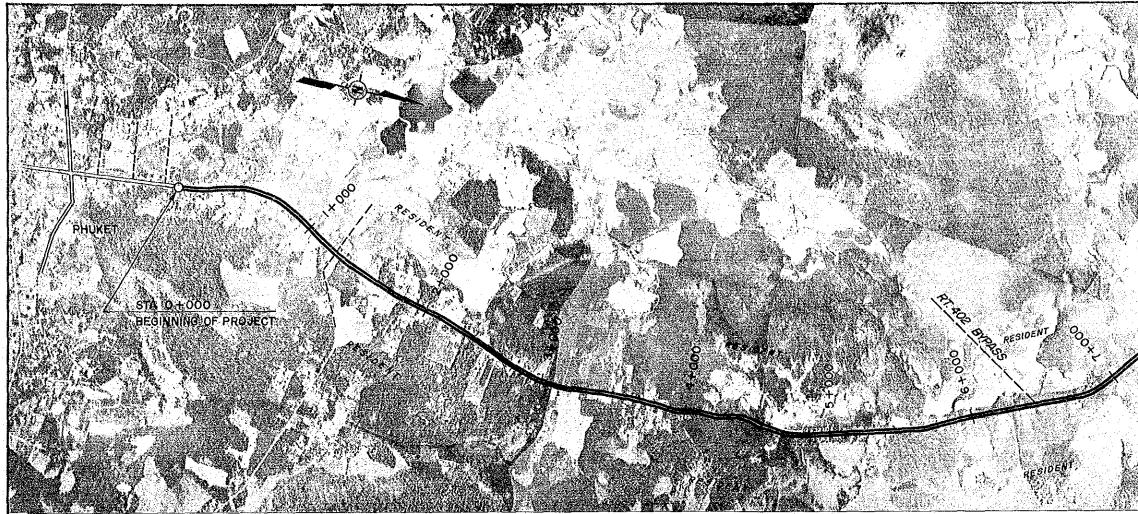
: Length of Curve

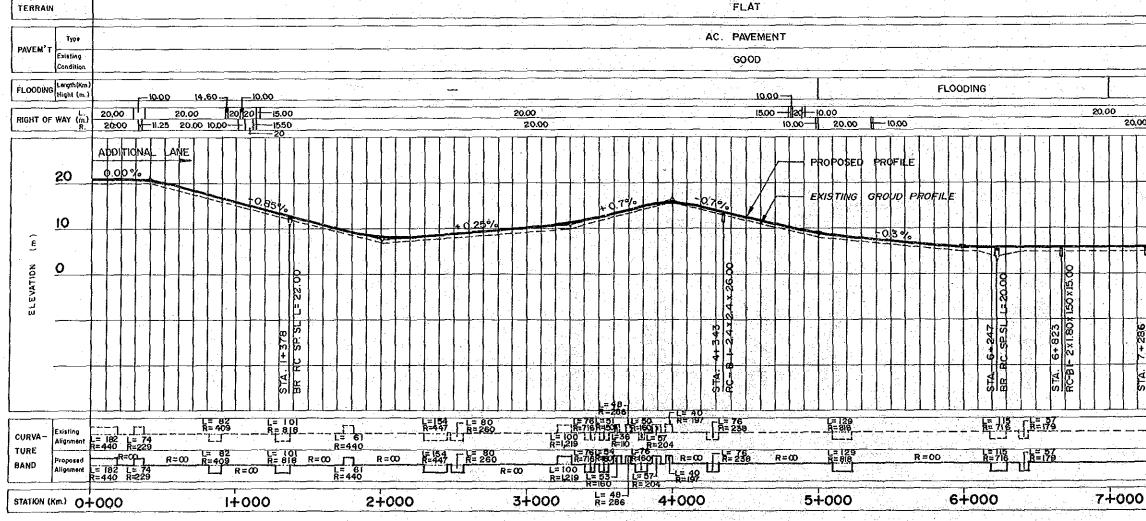
: Reinforced Concrete Bridge (Bridge Length)

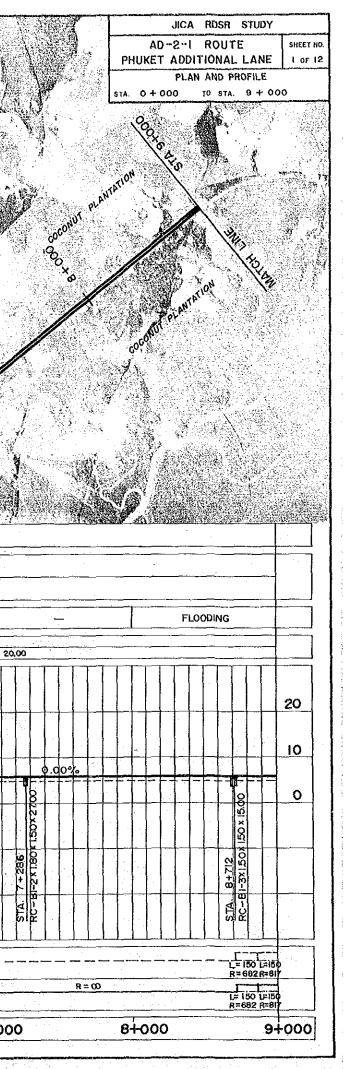
: Prestressed Concrete Bridge (Bridge Length)

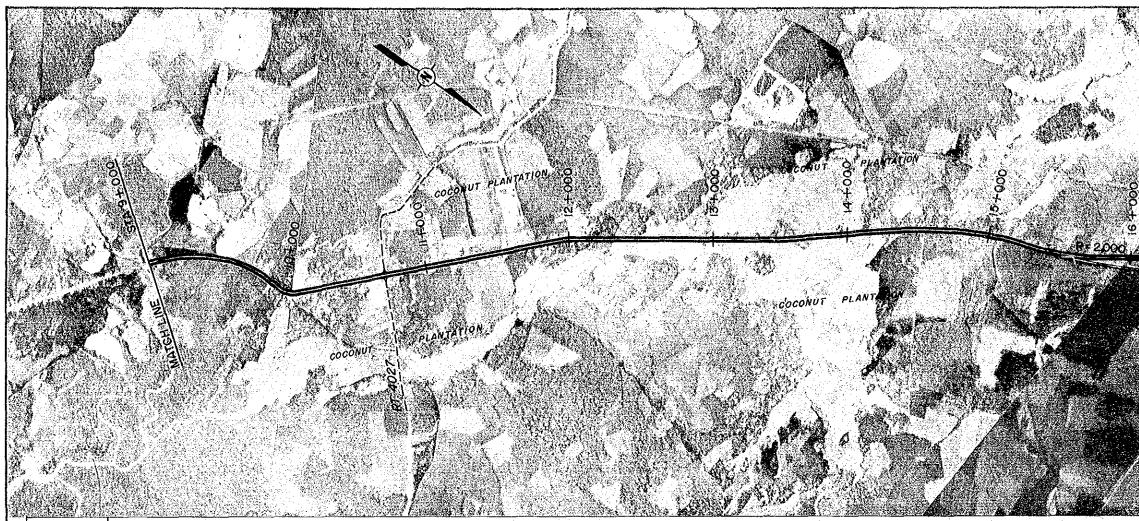
: Steel Bridge (Bridge Length)

: Box Culvert (No. of Locations - No. of Cells x Clear Span x Depth x Length)

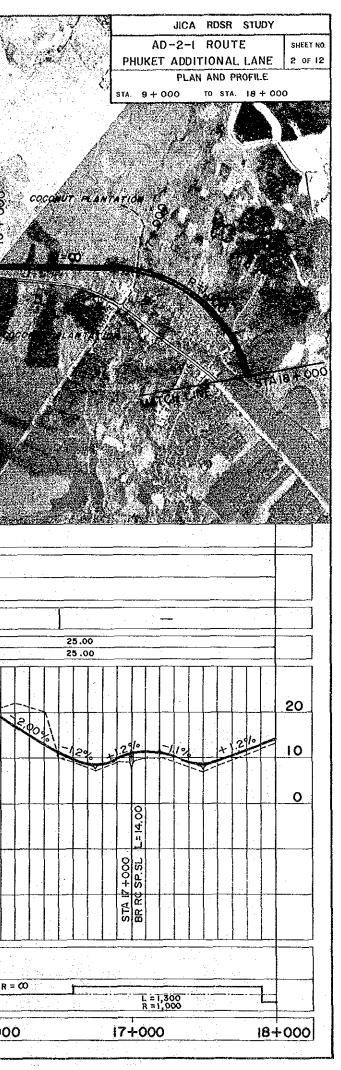


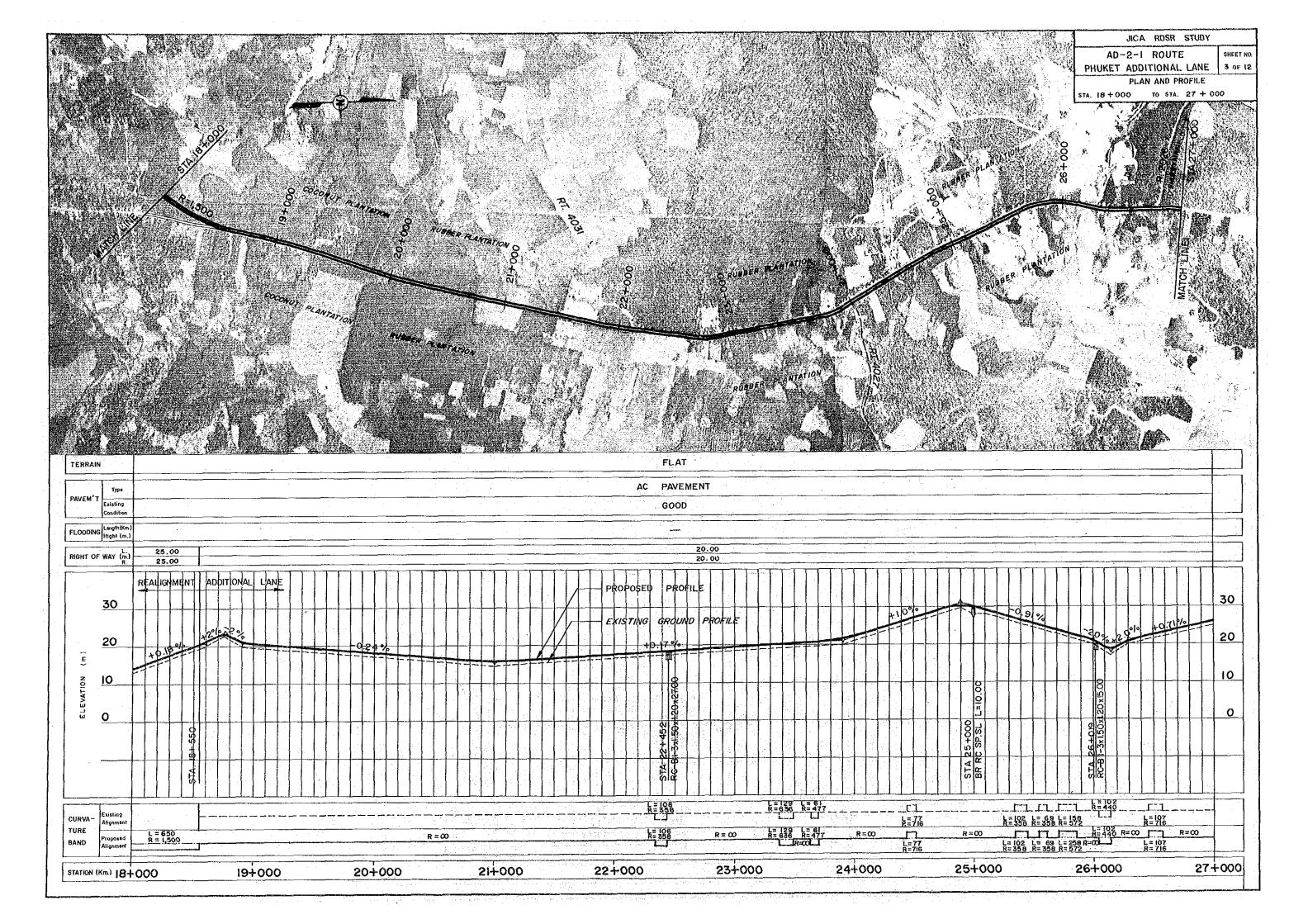


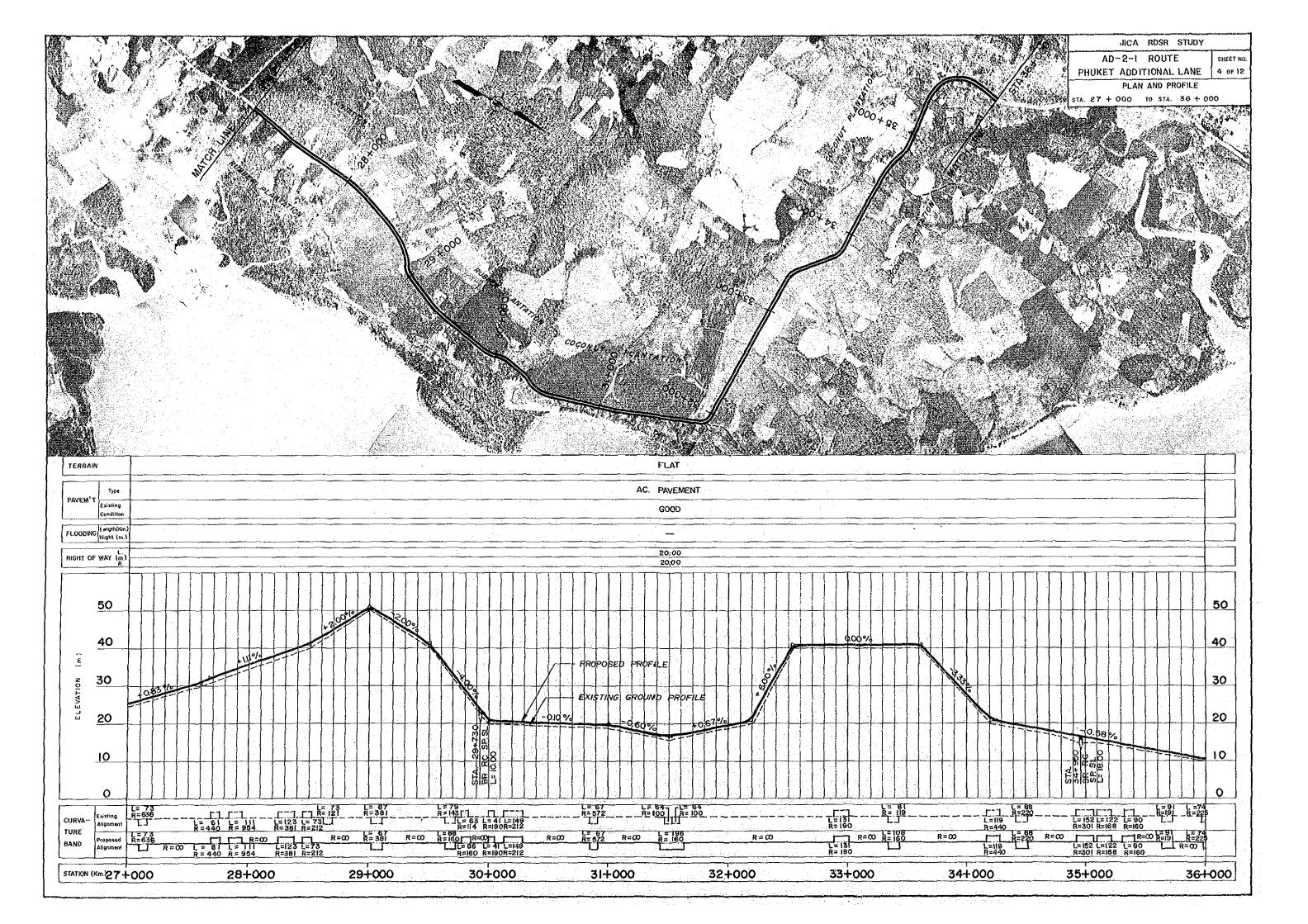




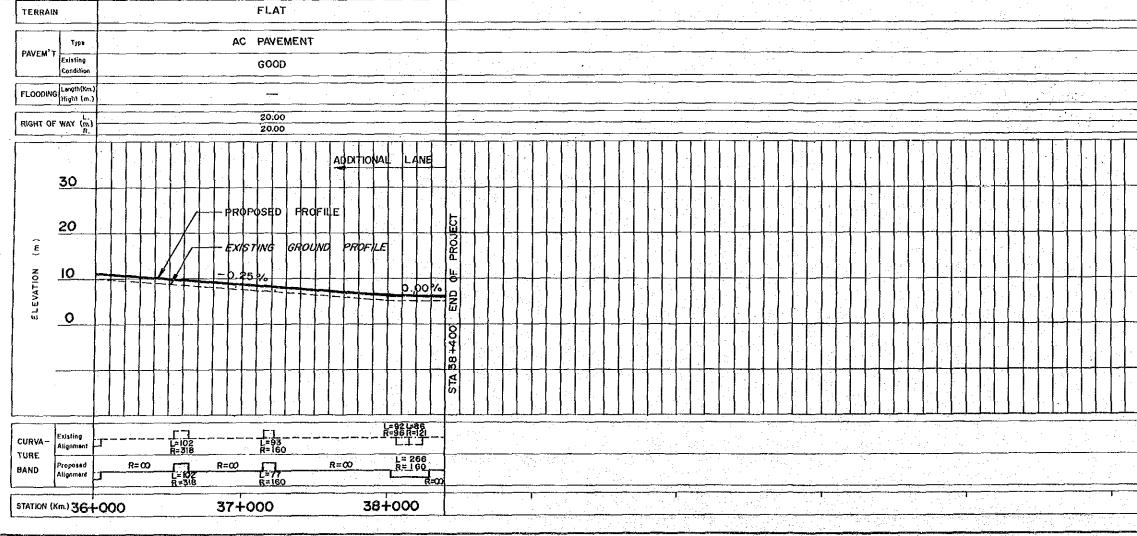
TERRAI	N		a		FLAT		
	Туре				AC PAVEMEN	T	
PAVEM'I	Existing Condition		· · · · · · · · · · · · · · · · · · ·		GOOD		
FLOODIN	G Leigth(Km.) Hight (m.)		FLOOD				FLOOD
RIGHT O	F WAY (m.) R,			20.0			
	20				PROPOSED PROFILE		LANE REALIGVMENT
	10					90 <i>FILE</i> +0.25%	
(E	0	╞╌╪╼╞╌╋╌╞╼╡╌┽╴╡╼╞╖╣╴┽╺┾╼	0.00 %	+9	50%		
ELEVATION	<u> </u>	1.0x15.00 30x13.00			STA 12 + 3.32 BR RC SESL L=15.00 STA 12 + 878 RC-BI-3x1.80x1.20x15.00 RC-BI-3x1.80x1.50x15.00	3 × 100	00.00
		STA 9+ 3/2 RC-Br-2x2l0x2.l0x1500 RTA 9+ 878 RC-Br3x 2:l0x1500			SIA 124 332 BR RC SPSL 1 = STA 12 + 878 RC-B1-31 180x11 FC-B1-31 180x11 FC-B1-31 180x11	4+ 098 2x12x1,8 x16.00	5+500 5+500 5+500
		RC-B RC-B RC-B			STAL ERRC STAL RC-BI	STAI RC-B	STA.1 STA I BR RG
CURVA- TURE	Existing Asigament R	L= 62 L= 89 T_1_7_ R=12 R=138 = 00 L=139 LJL_J = 572 R=572		L=200 R=L/145	L= 126 R=1,432	R=1904 R = 145	.= 169 L = 125 =2,994 R = 1,909 L1
BAND	Proposed	L=82 L= 89 K=160 L=139 R=00 L1 572 B=572	R = 00	 8≣ ĉĝ\$	R=00 L=128 R=1,432 R=00 L_1	<u>k≡1909</u> k≡1536	169 L=125 L=500 2994 R=1909 R=2,000
STATION	(Km.) 9-		00 11+00	0 12+000	13+000	14+000 15	+000 16+0
		· · · · · · · · · · · · · · · · · · ·					

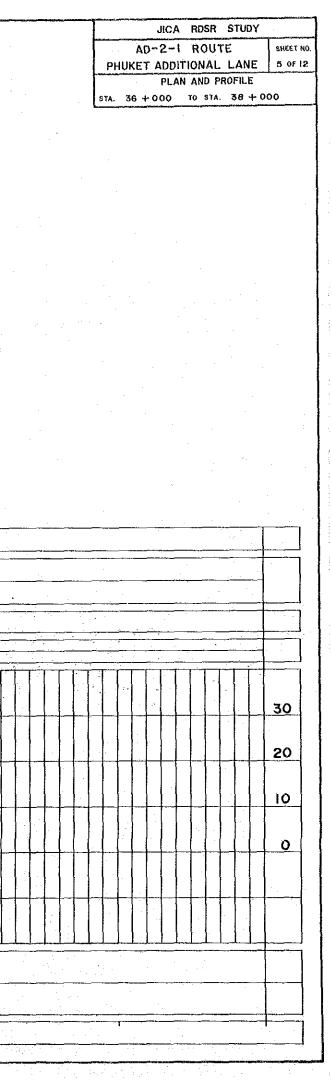


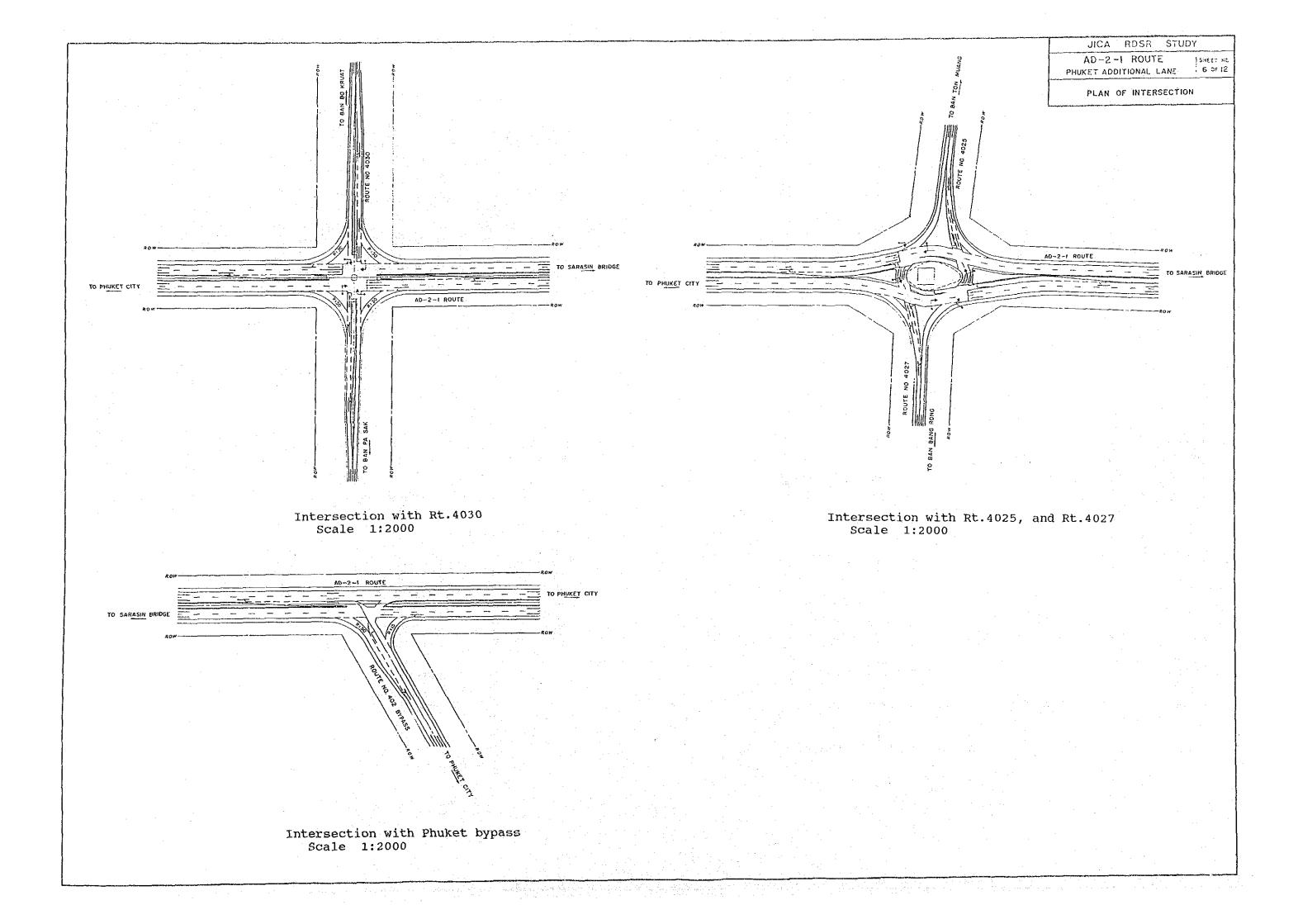


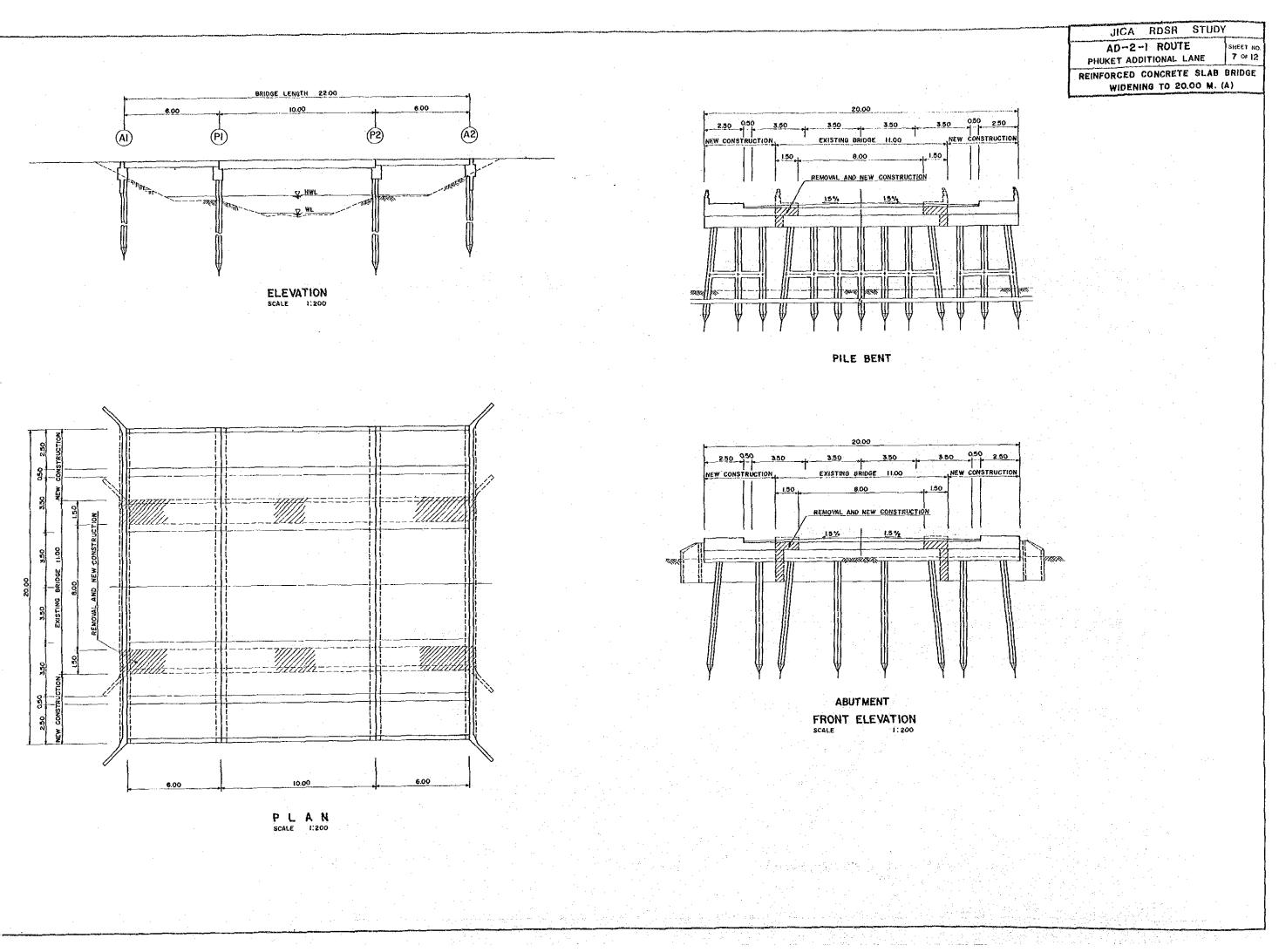


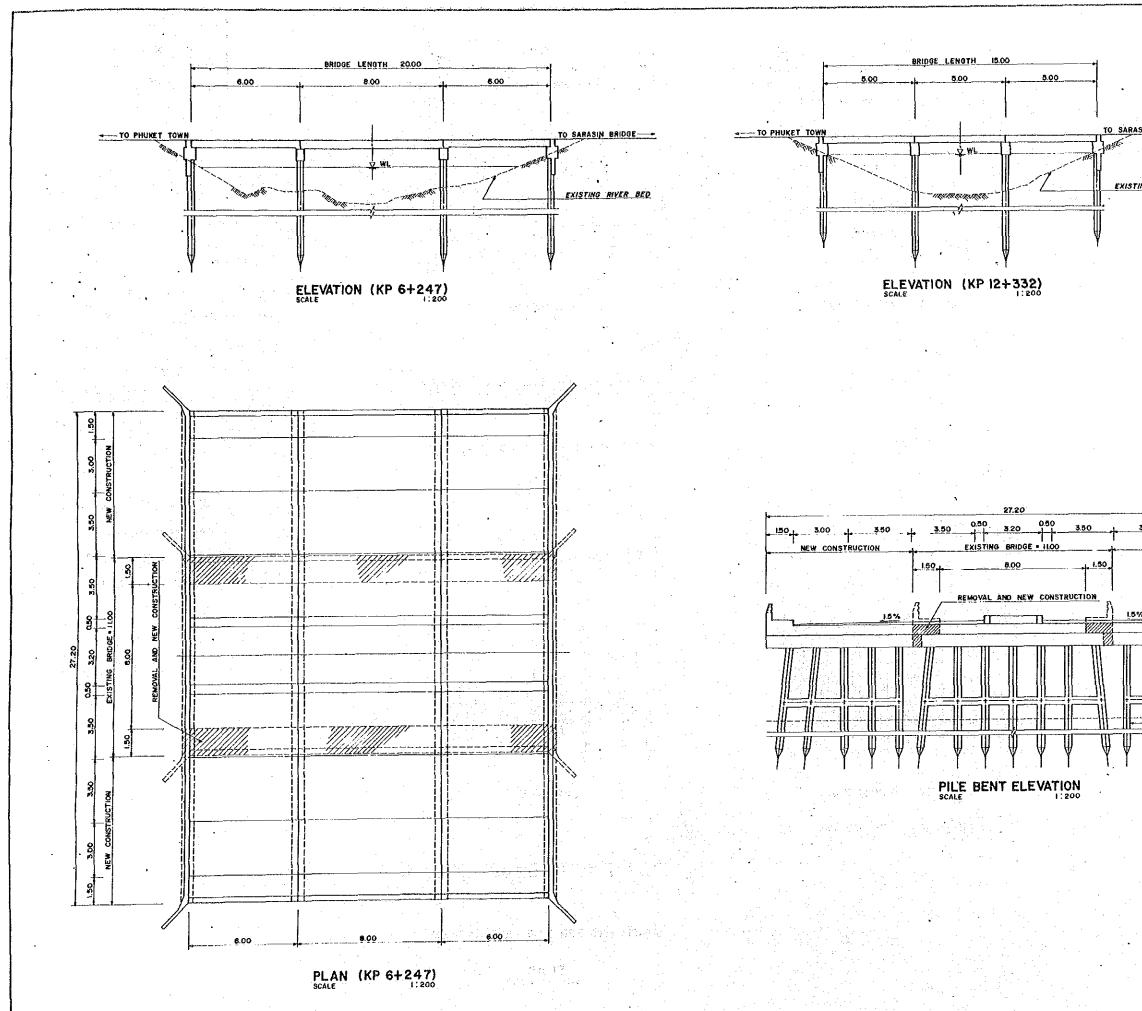


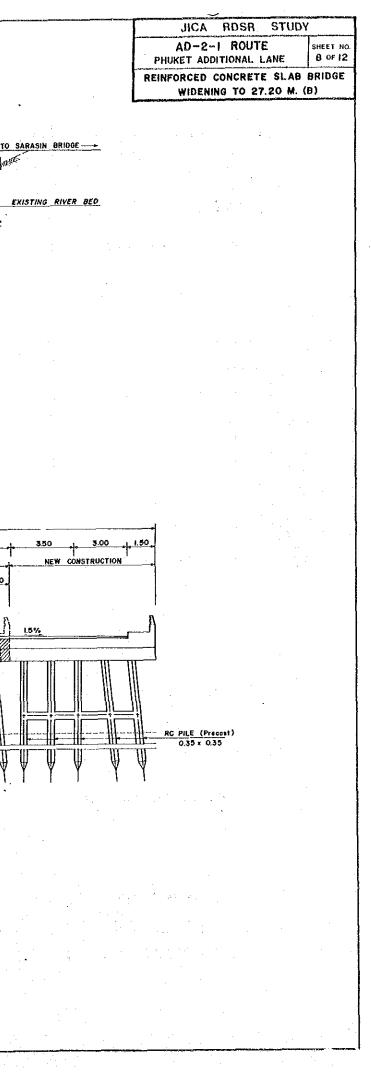


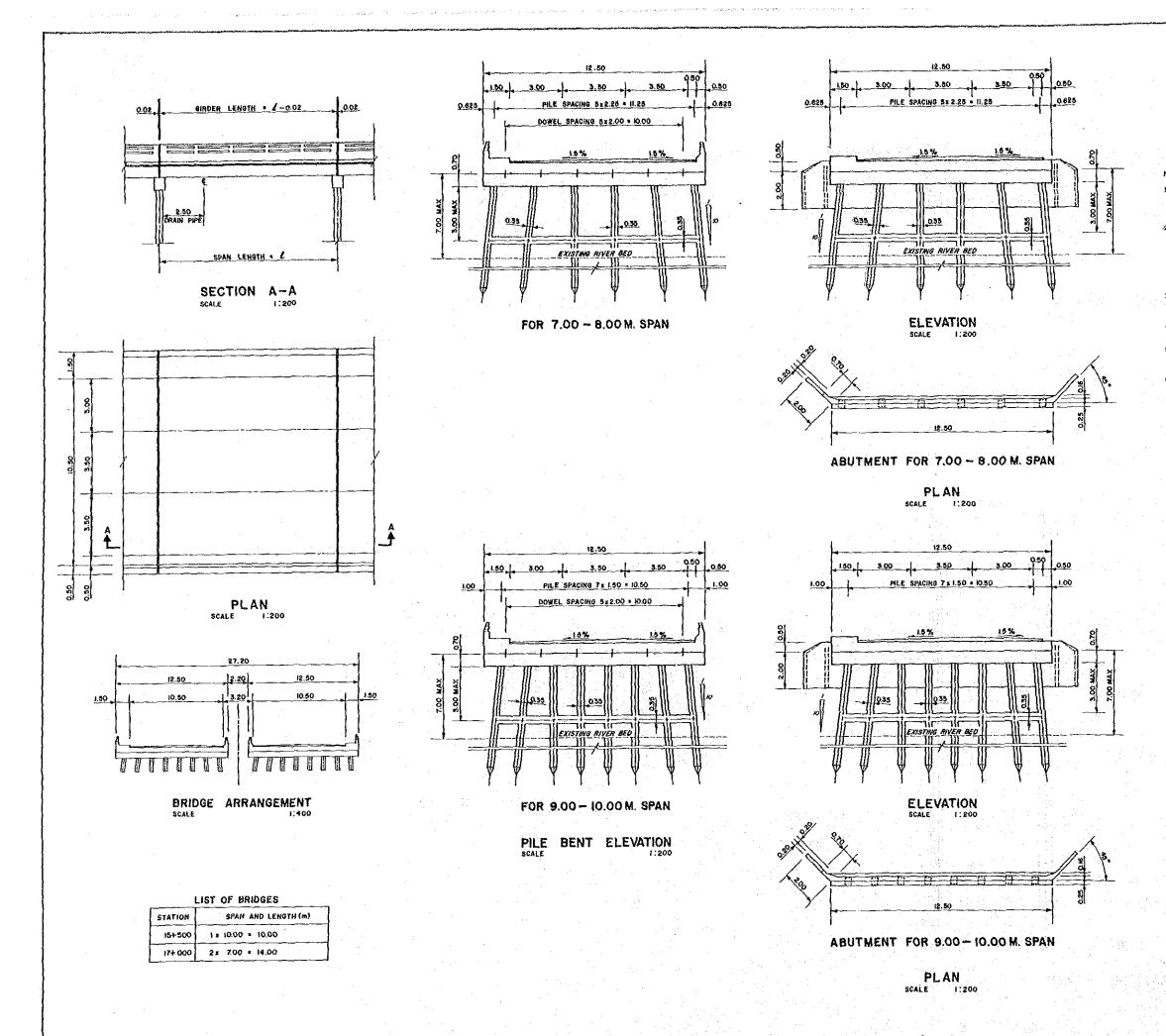












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÷		AD-2-1 ROUTE PHUKET ADDITIONAL LANE	SHEET NO. 9 OF 12
		REINFORCED CONCRETE SLA	B BRIDGE
	· .]		ang ting galaxy and the second
1.	а. С. С		
OTE	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
•	D) stren 1	fo = 70 KSC. fs = 1,400 KSC. (INTERNEDIATE GR fs = 1,200 KSC. (STRUCTURAL GRAD	
•	CONCRETE SHALL OF 210 KG/CH ² APPROXIMATE M	NAVE MINIMUM ULTIMATE COMPRESSIVE For .15 X .15 X .15 CUBE AT 28 DA IX DESIGN PER CUBIC METER IS SUGG	STRENGTH NYS. AND JESTED AS
	PORTLAND SAND CRUSHED R	CEMENT, NEN. 350 KG. 0.43 H ² IOCK OR GRAVEL 0.86 H ³ SLUMP, MAX 10 CH.	<u>.</u>
•		COVER FOR TOP REINFORCEMENT IN SL CN. ELSEWHERE OF SLAB BRIDGE AND	AB BRIDGE SIDEWALK
· ·	ALL CONCRETE UNLESS OTHERWI	EXPOSED CORNERS SHALL HAVE 2 CM. SE INDICATED.	
5.	BARS, OTHERS S OTHERWISE INDI		RS URLESS
5.	LOCATIONS OF L ENGINEER.	AP SPLICE OF REBARS SHALL BE APPROV	ED BY THE
,	LAP LENGTH SHI BAR IN CASE OF FOR DEFORMED E	and the second	IGGER BAR
	PORTLAND CENER SHALL BE USED FROM NORMAL O	ALINE PROTECTION, HIGH SULPHATE I AT TYPE 5 CONFORMED TO AASHTO SPECI AND ADDITIONAL CONCRETE COVER OF CASE ALL AROUND SHALL BE PROVIDED ACATIONS OF REBARS.	FICATIONS
•	ALL HATERIALS ENGINEER.	S SHALL BE USED UNDER THE APPROVA	IL OF THE
10.	WHICH EXPOSED	BE PROVIDED ON ALL SURFACES AT BR TO TRAFFIC. WHITE AND BLACK COLOUR ERNATELY. WHITE COLOUR SHALL 2.	R SHALL BE
	ALL DIMENSIO INDICATED.	NS SHOWN ARE IN METERS UNLESS O	THERWISE
12.	BRIDGE WHEREV LOCATIONS OF 7	MAY BE TAKEN OUT ONE BAR ON EACH SJ FER THEY PASS THROUGH DRAIN FIFES. INESE BARS ARE NEAR V-DRIP SUCH THAN ADEQUATE, THEY SHALL BE PLACED ON ARS WHICH PASS THROUGH DRAIN PIPES E PIPES.	IF THE CONCRETE
13.		CH DO NOT HAVE LOG PROTECTION WALLS The Top cross bracing.	SHALL BE
14	IF ANY NOTES ON THIS DRAWN	OR THE ORAWINGS OF PIERS CONTRADICT NG, THEY WILL BE SUPERSEDED BY THES	THE NOTES E NOTES.
15.	IN CASE OF AN	IS ADAPTED FROM DON DNG NO. 3 AD5- Y DISCREPANCY BETWEEN SUCH DRAWING DARD DRAWING WILL PREVAIL UNDER THE ER.	S ARISES,
÷	alay ya shi		
	etilie Gilterite seele		

