19.2 AGRICULTURAL DEVELOPMENT

19.2.1 Present Condition

Fifty-seven percent of the cultivated land in the influence area is covered by paddy fields. Among the major crops planted in upland fields in the 1983 crop year, cassava ranks first followed by kenaf, groundnuts, beans and maize.

Land use and capability conditions in the area are shown in Table 19.2.1 and Figure 19.2.1. A typical cropping calendar in the area is shown in Figure 19.2.2.

19.2.2 Development Projection

Future agricultural development in the area of influence was projected for both cases of "with and without project". The projected planted area, unit yields by crop, and the consequent production amount are shown in Table 19.2.2.

Based on the above projected production amount, farmgate prices and production costs estimated separately, net production value (NPV) was obtained as shown in Table 19.2.3. The difference in NPV between the two cases is deemed to be the development benefit of the study route.

FIGURE 19.2.1 LAND USE AND CAPABILITY OF INFLUENCE AREA

STUDY ROUTE NO. IM-19

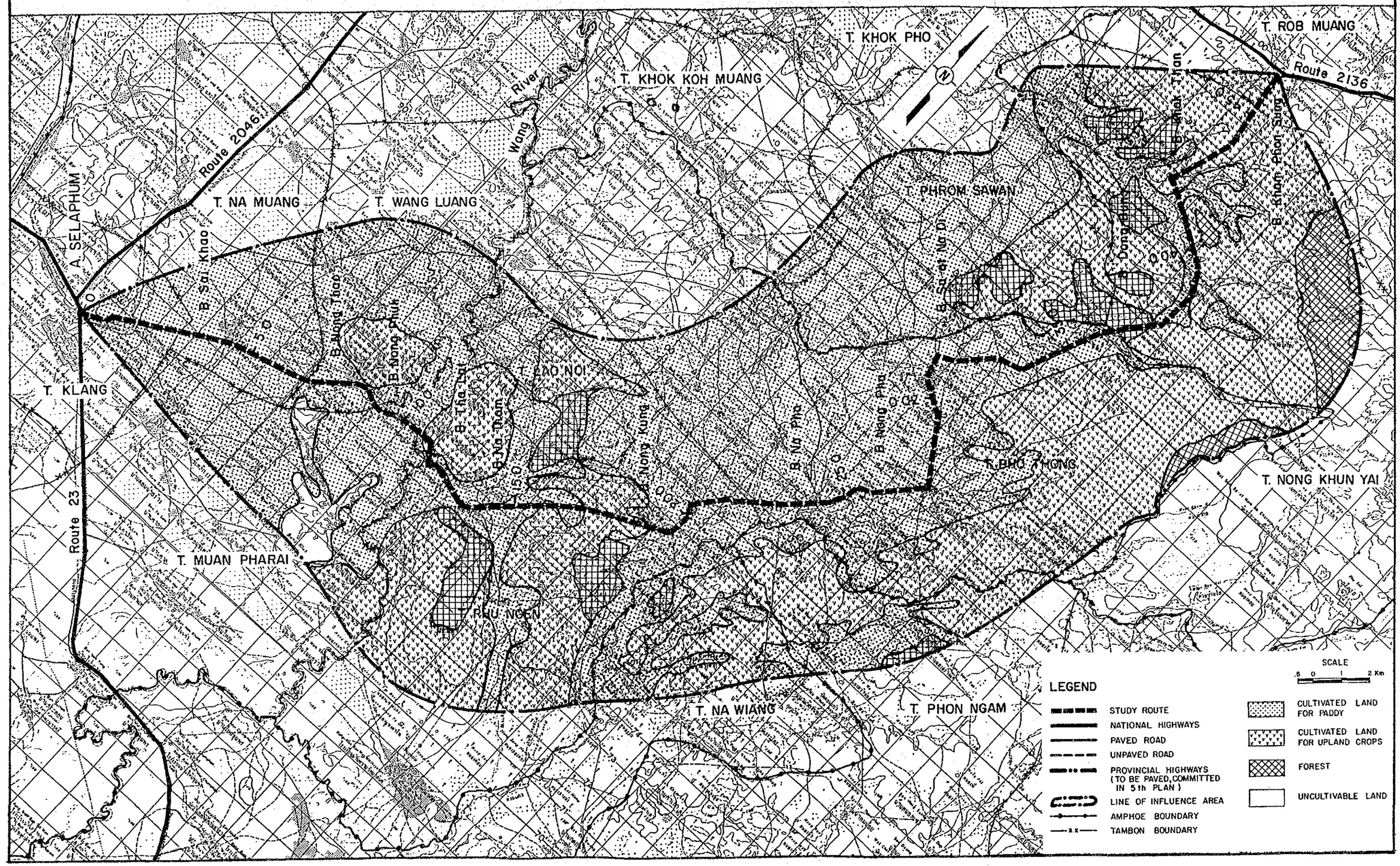
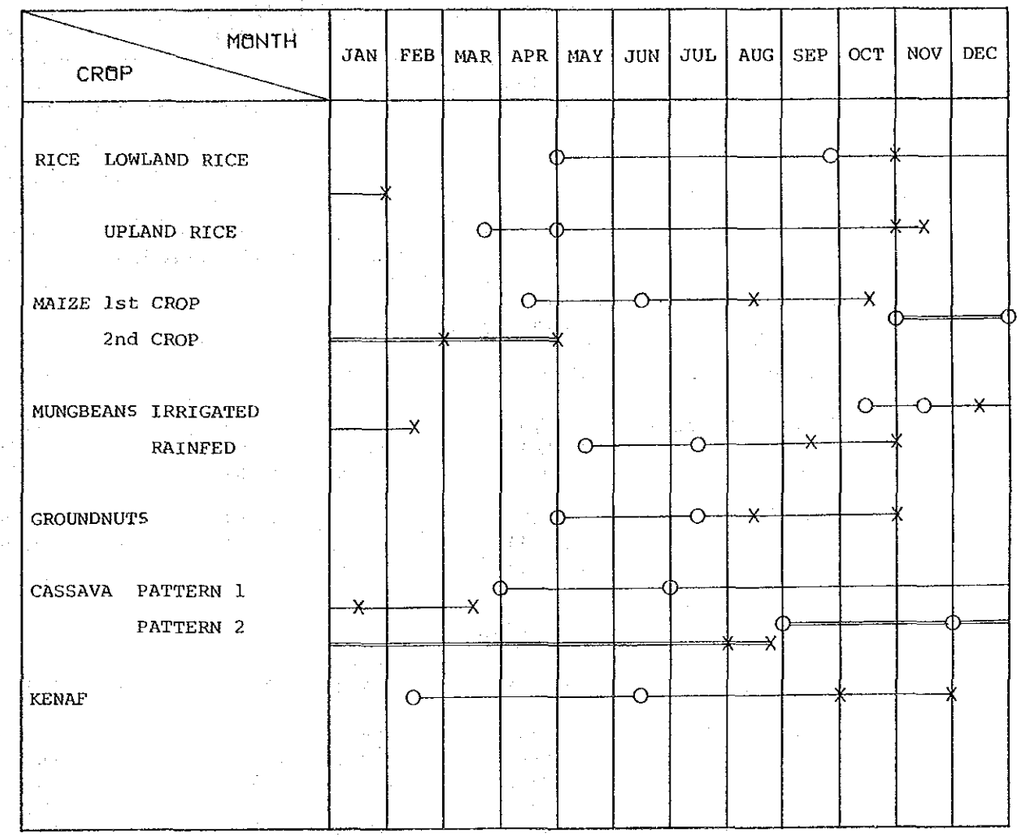


FIGURE 19.2.2 CROPPING CALENDAR

ROUTE IM-19

Related Amphoes: 0903 Phon Thong
0905 Nong Phok
0907 Selaphum
1002 Sai Mum
1003 Kut Chum



Note:

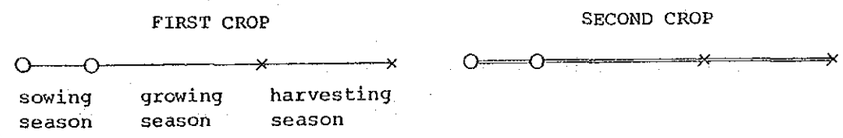


TABLE 19.2.1 CULTIVATED LAND

[UNIT : 1000 RAI (KM2)]

CHANGWAT NAME	AMPHOE NAME	CULTIVATED LAND		
		PADDY FIELD	UPLAND FIELD	TOTAL
ROI ET	PHON THONG	16.75 (26.80)	4.19 (6.70)	20.94 (33.50)
	NONG PHOK	5.63 (9.01)	22.92 (36.67)	28.55 (45.68)
	SELAPHUM	78.93 (126.29)	42.48 (67.97)	121.41 (194.26)
YASOTHON	SAI MUN	4.19 (6.70)	5.06 (8.10)	9.25 (14.80)
	KUT CHUM	3.44 (5.50)	6.43 (10.29)	9.87 (15.79)
TOTAL		108.94 (174.30)	81.08 (129.73)	190.02 (304.03)

TABLE 19.2.2 CROP PRODUCTION

ITEM		RICE (PADDY)	MAIZE	SORGHUM	BEANS	GROUND NUTS	CASSAVA	KENAF	SUGAR CANE	COTTON	CASTOR BEANS	UPLAND TOTAL	TOTAL
PLANTED AREA	(1000 RAI)												
BASE YEAR	(1983)	91.07	0.64	-	0.94	1.27	45.70	22.48	-	-	-	71.03	162.10
WITHOUT PROJECT	(1988)	91.47	0.64	-	0.94	1.27	45.70	22.48	-	-	-	71.03	162.50
	(1994)	91.95	0.64	-	0.94	1.27	45.70	22.48	-	-	-	71.03	162.98
	(2002)	92.60	0.64	-	0.94	1.27	45.70	22.48	-	-	-	71.03	163.63
WITH PROJECT	(1988)	91.82	0.64	-	0.94	1.27	45.70	22.48	-	-	-	71.03	162.85
	(1994)	94.42	0.64	-	0.94	1.27	45.70	22.48	-	-	-	71.03	165.45
	(2002)	98.00	0.64	-	0.94	1.27	45.70	22.48	-	-	-	71.03	169.03
CROP YIELD	(KG/RAI)												
BASE YEAR	(1983)	319.1	479.7	-	139.3	193.4	2062.3	212.4	-	-	-		
WITHOUT PROJECT	(1988)	319.1	479.7	-	140.7	193.4	2062.3	212.4	-	-	-		
	(1994)	319.1	479.7	-	142.4	193.4	2062.3	212.4	-	-	-		
	(2002)	319.1	479.7	-	144.7	193.4	2062.3	212.4	-	-	-		
WITH PROJECT	(1988)	319.4	479.7	-	141.1	193.4	2064.4	212.4	-	-	-		
	(1994)	320.9	479.7	-	145.4	193.4	2076.8	212.4	-	-	-		
	(2002)	323.0	479.7	-	151.3	193.4	2093.5	212.4	-	-	-		
CROP PRODUCTION AMOUNT	(TON)												
BASE YEAR	(1983)	29,060	307	-	131	246	94,247	4,775	-	-	-	99,705	128,766
WITHOUT PROJECT	(1988)	29,188	307	-	132	246	94,247	4,775	-	-	-	99,707	128,895
	(1994)	29,342	307	-	134	246	94,247	4,775	-	-	-	99,708	129,050
	(2002)	29,549	307	-	136	246	94,247	4,775	-	-	-	99,711	129,259
WITH PROJECT	(1988)	29,322	307	-	133	246	94,341	4,775	-	-	-	99,801	129,124
	(1994)	30,300	307	-	137	246	94,909	4,775	-	-	-	100,373	130,673
	(2002)	31,654	307	-	142	246	95,671	4,775	-	-	-	101,140	132,794

NOTE : SYMBOL "-" MEANS ZERO OR NEGLIGIBLE

TABLE 19.2.3 NET PRODUCTION VALUE

ITEM			RICE (PADDY)	MAIZE	SORGHUM	BEANS	GROUND NUTS	CASSAVA	KENAF	SUGAR CANE	COTTON	CASTOR BEANS	UPLAND TOTAL	TOTAL
FARMGATE PRICE	(BAHT/TON)													
WITHOUT PROJECT	(1983 - 2002)		3,642	1,545	-	6,180	10,754	786	4,217	-	-	-		
WITH PROJECT	(1988 - 2002)		3,666	1,569	-	6,204	10,778	802	4,265	-	-	-		
CROP PRODUCTION COST	(BAHT/RAI)													
BASE YEAR		(1983)	697	624	-	434	988	784	647	-	-	-		
WITHOUT PROJECT		(1988)	697	624	-	434	988	784	647	-	-	-		
		(1994)	697	624	-	434	988	784	647	-	-	-		
		(2002)	697	624	-	439	988	784	647	-	-	-		
WITH PROJECT		(1988)	697	624	-	434	988	784	647	-	-	-		
		(1994)	700	624	-	439	988	787	647	-	-	-		
		(2002)	704	624	-	444	988	790	647	-	-	-		
NET PRODUCTION VALUE	(1000 BAHT)													
WITHOUT PROJECT		(1988)	42,548	75	-	409	1,386	38,249	5,590	-	-	-	45,709	88,257
		(1994)	42,773	75	-	419	1,386	38,249	5,590	-	-	-	45,719	88,492
		(2002)	43,074	75	-	428	1,386	38,249	5,590	-	-	-	45,728	88,802
WITH PROJECT		(1988)	43,500	83	-	415	1,392	39,833	5,819	-	-	-	47,542	91,042
		(1994)	44,987	83	-	435	1,392	40,151	5,819	-	-	-	47,880	92,867
		(2002)	47,051	83	-	465	1,392	40,625	5,819	-	-	-	48,384	95,435
NET VALUE ADDED	(1000 BAHT)													
1988			952	8	-	6	6	1,584	229	-	-	-	1,833	2,785
1994			2,214	8	-	16	6	1,902	229	-	-	-	2,161	4,375
2002			3,977	8	-	37	6	2,376	229	-	-	-	2,656	6,633

NOTE : SYMBOL "-" MEANS ZERO OR NEGLIGIBLE

19.3 VOC SAVINGS

In accordance with the concept and data given in Section 3.4 of the Text Report, VOCs on the road link concerned were calculated in the two cases of "with and without project".

Road length by road class is shown in Table 19.3.1. Data for additional VOCs are shown in Table 19.3.2.

VOC savings, obtained as the balance of total link VOCs between the two cases, were calculated as shown in Table 19.3.3.

TABLE 19.3.1 ROAD LENGTH BY ROAD CLASS

(UNIT : KM)

LINK NO.	WITHOUT PROJECT CASE						WITH PROJECT CASE
	PAVED	LATERITE			EARTH	TOTAL	PAVED
		GOOD	FAIR	POOR			
1	-	-	1.7	23.0	-	24.7	24.7
2	-	-	-	21.6	-	21.6	21.6

TABLE 19.3.2 DATA FOR ADDITIONAL VOC COST

(UNIT OF LENGTH : M)

LINK NO.	CASE	CURVE									GRADE					VILLAGE		NO. OF INTER-SECTION	NO. OF TIMBER BRIDGE	NO. OF NARROW BRIDGE	NO. OF CORNER
		100	150	200	250	300	375	500	750	1500	1	2	3	4	5	NO.	LENGTH				
1	WITHOUT	357	394	125	269	120	123	420	112	600	5550	2650	900	200	250	5	6475	9	1	8	4
	WITH	357	394	125	269	120	123	420	112	600	7150	1350	1500	-	150	5	6475	-	-	-	1
2	WITHOUT	507	155	234	66	-	86	-	357	151	10483	1050	-	-	-	6	4484	2	-	8	1
	WITH	507	155	234	66	-	86	-	357	151	12383	350	50	-	-	6	4484	-	-	-	1

TABLE 19.3.3 VEHICLE OPERATING COST SAVING

(UNIT : 1000 BAHT)

LINK NO.	1988			1994			2002		
	WITHOUT	WITH	SAVING	WITHOUT	WITH	SAVING	WITHOUT	WITH	SAVING
1	18,909	10,490	8,420	24,858	13,698	11,160	36,365	19,908	16,457
2	6,509	4,546	1,963	8,370	5,701	2,669	11,777	7,867	3,910
TOTAL	25,418	15,036	10,382	33,227	19,398	13,829	48,142	27,775	20,367

N O T E
(1) WITHOUT : WITHOUT PROJECT CASE
(2) WITH : WITH PROJECT CASE
(3) SAVING : VEHICLE OPERATING COST SAVING
(4) LINK NO. = 1 - 9 : PROPOSED LINK
(5) LINK NO. = 11 - 19 : SURROUNDING LINK

19.4 ENGINEERING

19.4.1 Soil and Materials

Existing subgrade soil and material sources in the vicinity of the study route investigated by DOH and their physical characteristics are shown in Figure 19.4.1 and Table 19.4.1, respectively.

Rock aggregate sources were assumed as shown below:

No.	Source	Description of Sample	Est. Quantity m^3
19/CS-1	KM. 167+700 Rt 300 M. Mukdahan-Nakhon Phanom	Mekhong-River Gravel	Plentiful
19/CS-2	KM. 163+000 Rt close to Amnat Charoen-Mukdahan	Mekhong-River Gravel	Plentiful

The borehole locations, boring log and summary of boring test results are shown in Figures 19.4.2 and 19.4.3 and Table 19.4.2, respectively.

FIGURE 19.4.1 SOIL AND MATERIAL SOURCES

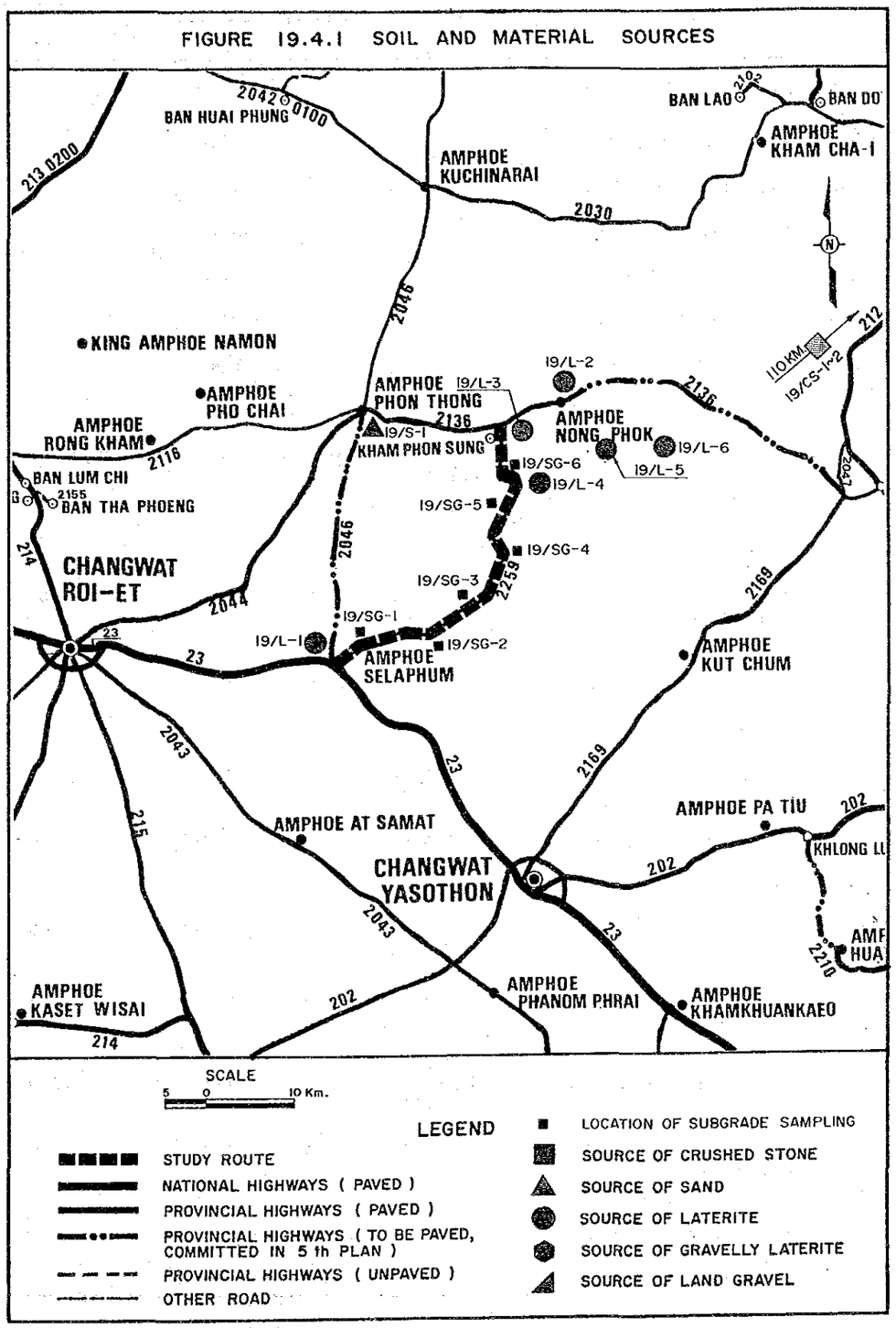


TABLE 19.4.1 PHYSICAL CHARACTERISTICS OF MATERIALS

No.	Source	Description of Sample	Est. Quantity m^3	AASHTO Classification	Sieve Analysis % Passing 50.0	25.0	19.0	9.5	#4	#10	#40	#200	Plasticity LL	PT	Comp. DH-T Stand. Opt. 95%	gm/cc	Lab. C.B.R. CBR 95%	Swell %	Durability Abr.	Dur.
	SUBGRADE																			
19/SG-1.	KM. 5+000 Lt 13 M.			A-2-4						100	96.3	25.3	N-P		10.4	1.791	12.3	-		
19/SG-2.	KM. 12+000 Rt 14 M.			A-4					100	99.8	99.1	37.0	N-P		12.7	1.833	20.0	-		
19/SG-3.	KM. 19+000 Lt 15 M.			A-2-4					100	99.7	99.1	35.0	N-P		12.9	1.917	12.4	-		
19/SG-4.	KM. 26+000 Rt 15 M.			A-2-4						100	95.5	28.4	N-P		12.3	1.707	24.5	-		
19/SG-5.	KM. 33+200 Lt 12 M.			A-2-4						100	90.6	15.3	N-P		12.0	1.708	57.3	-		
19/SG-6.	KM. 41+000 Rt 14 M.			A-4						100	99.7	35.6	N-P		12.5	1.813	20.7	-		
	SAND																			
19/S-1	KM. 2+850 Lt, Rt Phon Thong - Lerng Nok Ta	Lum Nam Bang sand	Plentiful	A-3							100	3	N.P.		More color than standard					
	LATERITE																			
19/L-1	KM.150+000 Lt 3.0 KM. Roi Et - Selaphum	Laterite	20,000	A-2-4	100	98.2	85.4	72	46.9	33.7	28.2	18.9	29.6	9.2						
19/L-2	KM. 28+000 Lt close to Phon Thong - Lerng Nok Ta	Laterite	60,000	A-6		100	74	60	53.0	51.0	38.0	29.0	11.0	9.0	2.060	13	0.10	48	48	
	L3:S3 = 1:1 by weight	Laterite and sand		A-2-4		100	97	77	50.0	40.0	19.0	15.0	7.0	8.1	2.200	25				
19/L-3	KM. 2+000 Lt close to Kam Phon Sung - Selaphum	Laterite	76,000	A-2-6	100	99	80	40	24.0	21.0	16.0	32.0	12.0	12.7	2.080	24	0.22	40	50	
	L2:S1 = 9:1 by weight	Laterite and sand		A-2-4	100	98	83	48	31.0	29.0	15.0	23.0	9.5	12.5	2.100	46	0.18			
19/L-4	KM. 9+000 Lt close to Kam Phon Sung - Selaphum	Laterite	11,250	A-2-4	100	90	65	50	41.0	37.0	25.0	17.0	6.7	8.6	2.200	27		44	27	
	L1:S3 = 4:1 by weight	Laterite and sand	-	A-1-b	100	92	72	58	50.0	35.0	20.0	14.0	5.7	8.10	2.240	37				
19/L-5	KM. 31+000 Rt 5.5 KM. Phon Thong - Lerng Nok Ta	Laterite	10,000	A-4	100	99	78	58	52.0	50.0	27.0	25.0	6.5	4.6	2.150	8	1.40	34	76	
19/L-6	KM. 39+000 Rt 3.5 KM. Phon Thong - Lerng Nok Ta	Laterite	128,000	A-1-b		100	79	52	36.0	31.0	23.0		N.P.		10.0	2.150	16	-	52	43

FIGURE 19.4.2 BOREHOLE LOCATIONS By-1, By-2, By-3

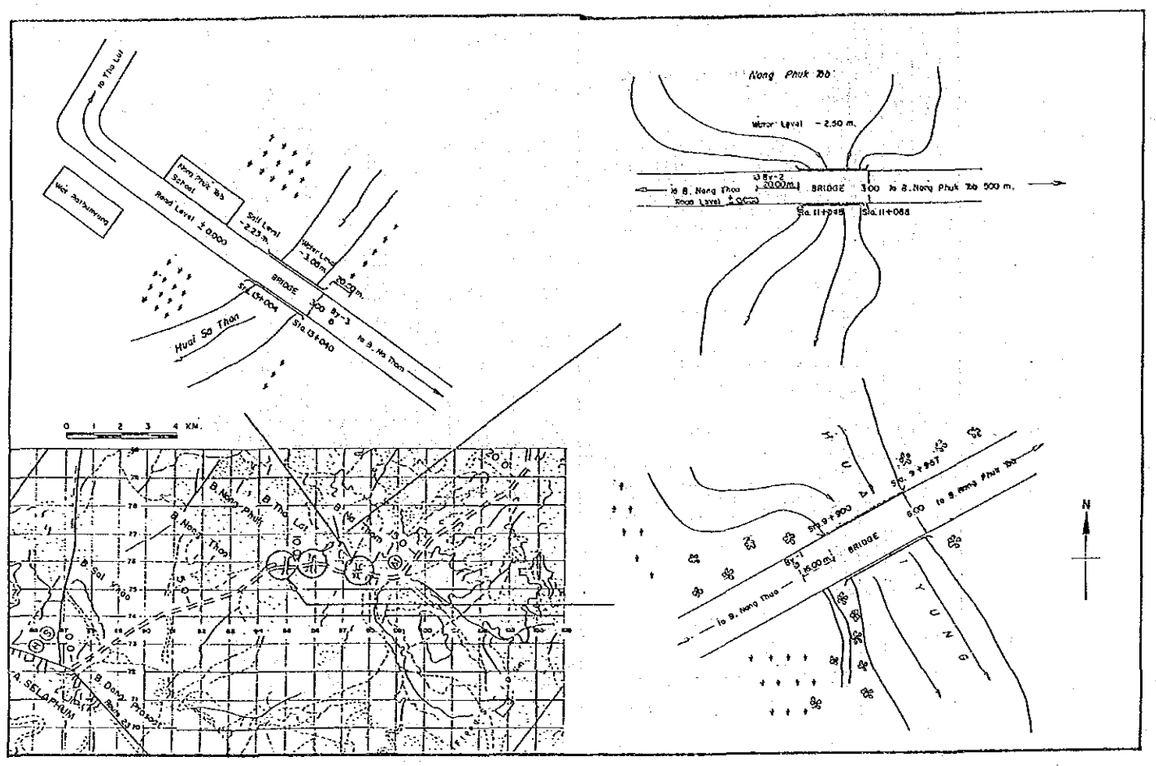


FIGURE 19.4.3-1 BORING LOG By-1

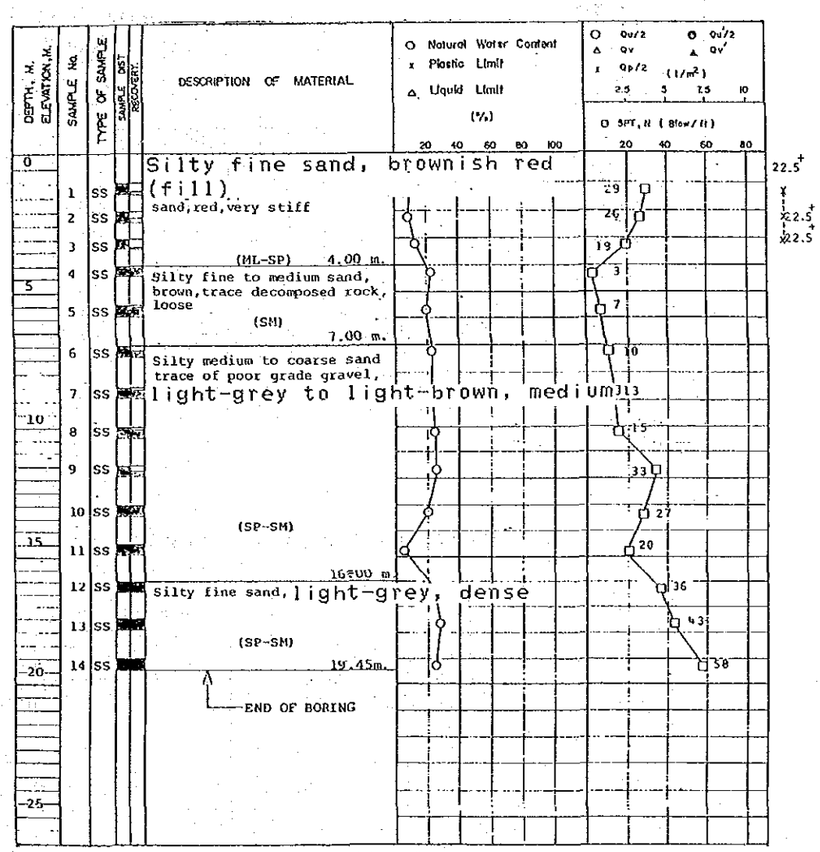


TABLE 19.4.2-1 SUMMARY OF TEST RESULTS By-1

SAMPLE No.	DEPTH M. FROM	DEPTH M. TO	WATER CONTENT %	ATTERBERG LIMIT % LL	PL	PI	WET UNIT WEIGHT t/m³	SIEVE ANALYSIS % FINER No. 3/8"	No. 4	No. 10	No. 40	No. 200	CLASSIFICATION	UNDRAINED SHEAR STRENGTH t/m.² UNCONFINED SHEAR Qu/2	Qu'/2	FIELD VANE SHEAR Qv	Qv'	POCKET PENETRATION ½ Qp	STANDARD PENETRATION (N)		
SS-1	1.00	1.45	9.3	9.0	6.2	2.8			100	99	99	84	ML					22.5+	29		
SS-2	2.00	2.45	8.0		N.P.						100	90	ML					22.5+	26		
SS-3	3.00	3.45	11.8		N.P.		2.23	82	67	52	31	4	SP					22.5+	19		
SS-4	4.00	4.45	21.6		N.P.						100	56	ML					-	3		
SS-5	5.50	5.95	20.2										SM					-	7		
SS-6	7.00	7.45	22.4		N.P.					100	99	16	SM					-	10		
SS-7	8.50	8.95	21.6										SM					-	13		
SS-8	10.00	10.45	23.4		N.P.					100	96	10	SP-SM					-	15		
SS-9	11.50	11.95	24.6		N.P.					100	98	6	SP-SM					-	33		
SS-10	13.00	13.45	19.5		N.P.			100	98	95	57	3	SP					-	27		
SS-11	14.50	14.95	5.5										SP					-	20		
SS-12	16.00	16.45	23.6		N.P.				100	99	99	12	SP-SM					-	38		
SS-13	17.50	17.95	25.8		N.P.				100	99	99	25	SM					-	43		
SS-14	19.00	19.45	23.9		N.P.				100	99	99	14	SP-SM					-	58		

FIGURE 19.4.3-2 BORING LOG By-2

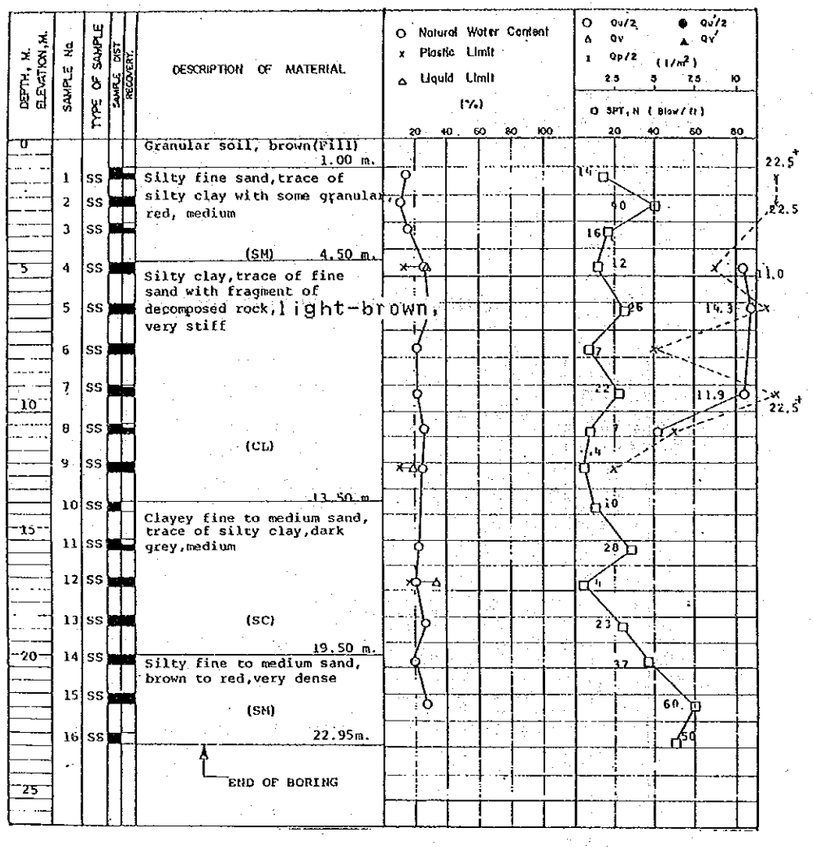


TABLE 19.4.2-2 SUMMARY OF TEST RESULTS By-2

SAMPLE No.	DEPTH M. FROM	DEPTH M. TO	WATER CONTENT %	ATTERBERG LIMIT % LL.	ATTERBERG LIMIT % PL.	ATTERBERG LIMIT % PI.	WET UNIT WEIGHT t/m³	SIEVE ANALYSIS % FINER No. 3/8"	No. 4	No. 10	No. 40	No. 200	CLASSIFICATION	UNDRAINED SHEAR STRENGTH t/m² UNCONFINED SHEAR Qu/2	Qu'/2	FIELD VANE SHEAR Qv	Qv'	POCKET PENETRATION 1/2 Qp	STANDARD PENETRATION (N)
SS-1	1.00	1.45	13.4				2.08						ML	-				22.5+	14
SS-2	2.00	2.45	9.5		NP.		2.24	84	69	58	53	35	SM	-				22.5+	40
SS-3	3.00	3.45	13.8				-						SM	-				-	16
SS-4	4.50	4.95	24.9	26.4	12.4	14.0	2.00			100	99	97	CL	11.0				8.7	12
SS-5	6.00	6.45	27.6				1.99						CL	14.3				20.0	26
SS-6	7.50	7.95	21.1				2.09						CL	-				5.0	7
SS-7	9.00	9.45	21.3				2.07						CL	11.9				22.5+	22
SS-8	10.50	10.95	26.2				2.04						CL	5.3				6.2	7
SS-9	12.00	12.45	24.3	19.0	10.2	8.8	-			100	100	78	CL	-				2.5	4
SS-10	13.50	13.95	-	No	Sample		-						(SP)	-				-	10
SS-11	15.00	15.45	22.3		NP.		-		100	99	77	8	SP-SM	-				-	26
SS-12	16.50	16.95	21.0	31.4	18.0	13.4	-		100	97	92	41	SC	-				-	4
SS-13	18.00	18.45	24.3				-						SC	-				-	23
SS-14	19.50	19.95	20.4				-						SM	-				-	37
SS-15	21.00	21.45	26.0		NP.		-			100	99	41	SM	-				-	60
SS-16	22.50	22.95	-	No	Sample		-						(SM)	-				-	50

FIGURE 19.4.3-3 BORING LOG By-3

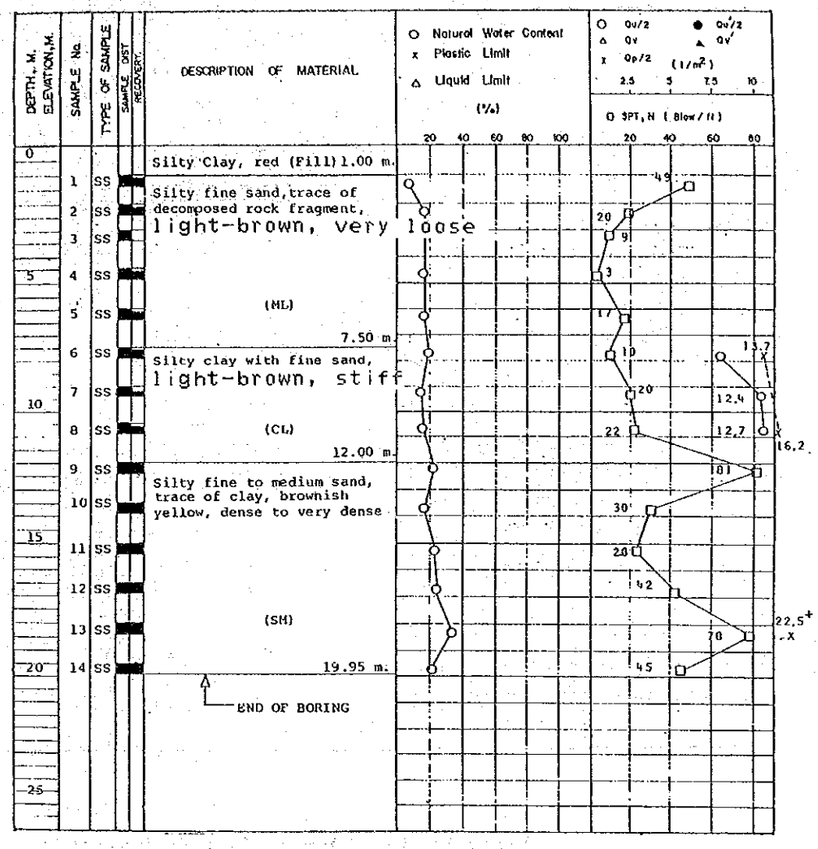


TABLE 19.4.2-3 SUMMARY OF TEST RESULTS By-3

SAMPLE No.	DEPTH M. FROM	DEPTH M. TO	WATER CONTENT %	ATTERBERG LIMIT % LL.	ATTERBERG LIMIT % PL.	ATTERBERG LIMIT % PI.	WET UNIT WEIGHT t/m³	SIEVE ANALYSIS % FINER No. 3/8"	No. 4	No. 10	No. 40	No. 100	CLASSIFICATION	UNDRAINED SHEAR STRENGTH t/m² UNCONFINED SHEAR Qu/2	Qu'/2	FIELD VANE SHEAR Qv	Qv'	POCKET PENETRATION 1/2 Qp	STANDARD PENETRATION (N)
SS-1	1.00	1.45	6.8		NP.		-		100	99	96	44	SM	-				-	49
SS-2	2.00	2.45	15.7		NP.		-			100	99	51	ML	-				-	20
SS-3	3.00	3.45	-		No Recovery		-						(ML)	-				-	9
SS-4	4.50	4.95	16.5	-	NP.	-	-		100	99	97	69	ML	-				-	3
SS-5	6.00	6.45	15.8				-						ML	-				-	17
SS-6	7.50	7.95	19.0				2.04						CL	8.0				13.7	10
SS-7	9.00	9.45	15.3				2.10						CL	12.4				-	20
SS-8	10.50	10.95	16.4				2.14						CL	12.7				16.2	22
SS-9	12.00	12.45	21.2		NP.		-		100	99	98	21	SM	-				-	81
SS-10	13.50	13.95	16.6		NP.		-			100	91	22	SM	-				-	30
SS-11	15.00	15.45	21.9				-						SM	-				-	23
SS-12	16.50	16.95	23.0		NP.		2.02		100	99	87	16	SM	-				-	42
SS-13	18.00	18.45	33.4		NP.		2.29	100	99	99	97	44	SM	-				22.5+	78
SS-14	19.50	19.95	21.9				-						SM	-				-	45

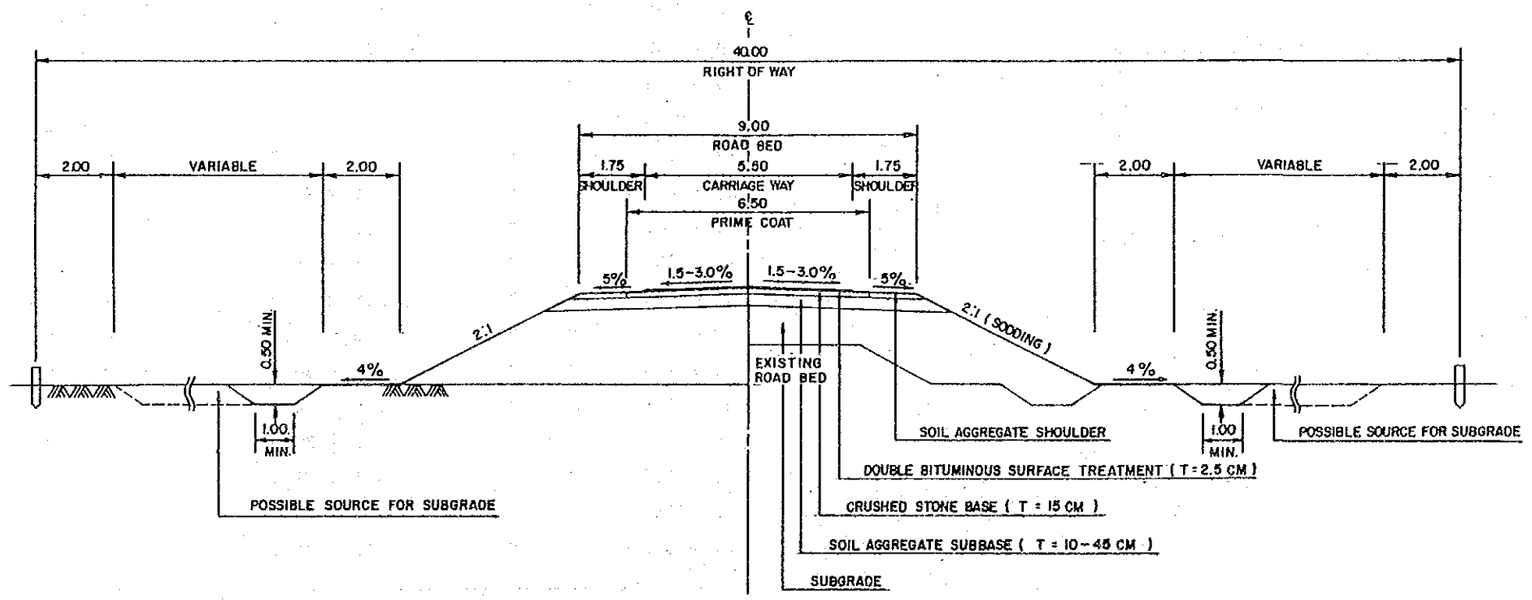
19.4.2 Preliminary Design

19.4.2.1 Design Criteria

Design Standard	:	F4
Geometric Design Criteria	:	DOH (Provincial Highway)
Typical Cross Section	:	as shown in Figure 19.4.4
Minimum Height of Embankment in Flooding Section	:	0.7 m above flood level
Pavement Structure		
DBST	:	2.5 cm
Crushed Aggregate Base CBR≥ 80%	:	15.0 cm
Soil Aggregate Subbase CBR≥ 25%	:	10.0 cm (minimum requirement)
Selected Materials CBR≥ 6%	:	as required
Pipe Culvert		
Standardized type	:	80, 100, 120 & 150 cm in diameter
Location	:	as required
Standard intervals		
Paddy area	:	200 m
Others	:	500 m
Box Culvert		
Standard size	:	1.5×1.5, 2.4×2.4 & 3.0×3.0 m
Location	:	as required
Bridge		
Reinforced concrete standard type	:	Width 9.0 m
Substructure	:	Pile-bent type

The existing and designed plan and profile are shown in Drawings 19-1/19-6.

FIGURE 19.4.4 TYPICAL CROSS SECTION



PROVINCIAL HIGHWAY (CLASS F4)

19.4.2.2 Special Conditions in Designing

Widening of Narrow Concrete Bridges

Sixteen of the 18 concrete bridges on the route are narrow. These narrow bridges are of good qualtity and can handle traffic loads in the near future. Only widening to 4.5 m was employed instead of replacement for reasons of economy.

19.4.2.3 Pavement Design

1) Cumulative number of ESA in one direction

- ESA conversion factors

Heavy bus	:	0.50
Medium truck	:	0.76
Heavy truck	:	1.24

- Forecasted ADT by vehicle type

Year	1988				1994			
Traffic/road link	1	2	3	4	1	2	3	4
Heavy bus	4	2	—	—	14	15	—	—
Medium truck	32	19	—	—	34	17	—	—
Heavy truck	8	2	—	—	12	4	—	—

- Cumulative number of ESA in one direction by road link

Road link	1	2	3	4
7 years (10^6)	0.054	0.024	-	-

2) Design CBR values

Road link	1	2	3	4
Design CBR (%)	12.5	22.8	-	-

3) Required thickness of pavement

Surfacing	:	DBST (2.5 cm)
Aggregate base	:	15 cm (CBR not less than 25%)
Subbase	:	Minimum requirement 10 cm

Road link	1	2	3	4
	10 cm	10 cm	-	-

4) Overlay required in 7 years
DBST resurfacing

19.4.2.4 Drainage and Structures

The locations of existing and designed RC box culverts and RC bridges and their dimensions are shown below:

STATION	EXISTING STRUCTURES		PROPOSED STRUCTURES	
	TYPE	SIZE	TYPE	SIZE
0 + 540	Timber Bridge	4.0 x 6.0	Box Culvert	2-2.4 x 2.4 x 16.0
7 + 254	RC Bridge	3.5 x 12.0	RC Bridge	3.5 x 12.0
9 + 104	" "	7.0 x 60.0	-	-
9 + 431	" "	3.5 x 40.0	RC Bridge	4.5 x 40.0
9 + 545	" "	3.5 x 40.0	RC Bridge	4.5 x 40.0
9 + 934	" "	7.0 x 66.0	-	-
11 + 058	" "	3.5 x 60.0	RC Bridge	4.5 x 60.0
13 + 020	" "	3.5 x 30.0	" "	4.5 x 30.0
13 + 211	" "	3.5 x 24.0	" "	4.5 x 24.0
15 + 186	" "	3.5 x 12.0	" "	4.5 x 12.0
22 + 861	" "	3.5 x 14.0	" "	4.5 x 14.0
27 + 082	" "	3.5 x 20.0	" "	4.5 x 20.0
28 + 331	" "	3.5 x 16.0	" "	4.5 x 16.0
33 + 185	" "	3.5 x 30.0	" "	4.5 x 30.0
34 + 768	" "	3.5 x 24.0	" "	4.5 x 24.0
35 + 917	" "	3.5 x 20.0	" "	4.5 x 30.0
37 + 176	" "	3.5 x 12.0	" "	4.5 x 12.0
38 + 541	" "	3.5 x 14.0	" "	4.5 x 14.0
41 + 319	" "	3.5 x 24.0	" "	4.5 x 24.0

19.4.3 Quantities and Construction and Road Maintenance Costs

The required construction costs were estimated based on the results of the preliminary design as shown in Table 19.4.5. Financial costs with breakdown into local and foreign currency portions, economic costs and residual values were estimated as follows and in 19.4.4:

IM—19 L = 46.3 km (baht)

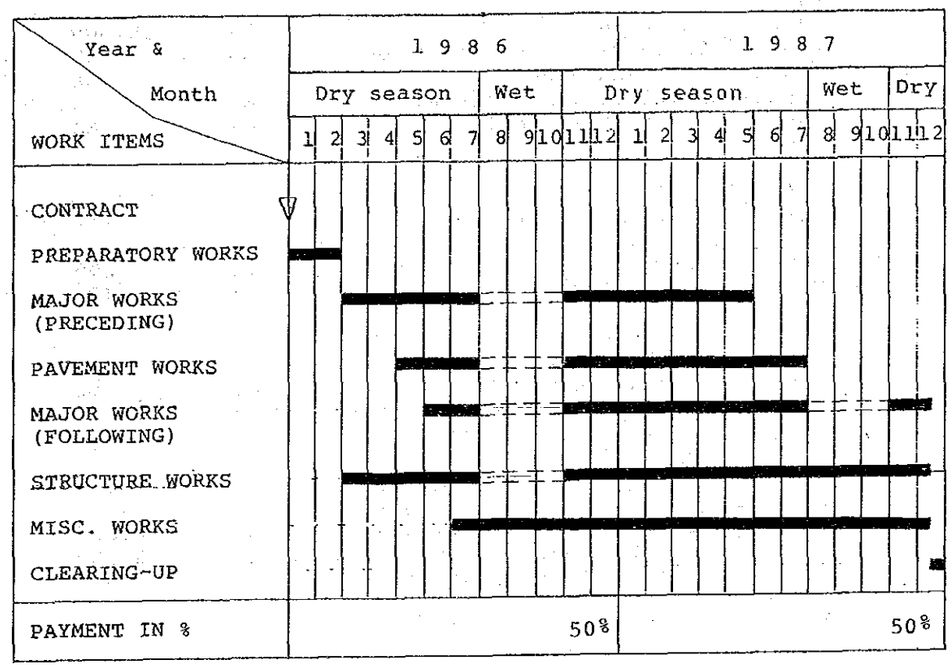
Financial cost	:	91,998,000
Economic cost	:	76,824,000
Residual value	:	32,383,000

The required road maintenance cost savings are shown in Table 19.4.6.

19.4.4 Construction and Disbursement Schedules

IM—19 **Length = 46.3 km**

Construction Schedule
Assumption: Completion date December 31, 1987



Yearly Disbursement Schedule
Assumption: Annual rise in prices

Year / Currency	Base year 1984	(1985)	1986	1987
Local	100	110.0	121.0	133.1
Foreign	100	106.5	113.4	120.8

LOCAL AND FOREIGN COMPONENTS OF CONSTRUCTION COST

(Route IM - 19)

(Unit : Million Baht)

	1986			1987			Total		
	L/C	F/C	Total	L/C	F/C	Total	L/C	F/C	Total
Construction Cost	22.7	23.2	45.9	22.8	23.3	46.1	45.5	46.5	92.0
Price Contingency	4.8	3.1	7.9	7.5	4.8	12.3	12.3	7.9	20.2
Total	27.5	26.3	53.8	30.3	28.1	58.4	57.8	54.4	112.2
	(1.02)	(0.97)	(1.99)	(1.12)	(1.04)	(2.16)	(2.14)	(2.01)	(4.16)

Remarks : L/C : Local Currency Portion
F/C : Foreign Currency Portion
( ) : US$ Equivalent (US$1 = 27 Baht)

TABLE 19.4.5 CONSTRUCTION QUANTITIES AND COSTS
(ROUTE IM—19 Length = 46.3 km)

DBST

Item	Unit	Financial Unit Rate B	Quantity	Financial Cost 1000 B			Economic Cost		Residual Value	
				Total	Local	Foreign	%	1000 B	%	1000 B
EARTHWORK							83		90	
Clearing & Grubbing	ha	10,000	108	1,080						
Roadway Excavation, Unclassified	m3	19	20,700	393						
Embankment, Common Soil	m3	38	394,300	14,983						
Embankment, Selected Material	m3	70	0	0						
Replacement of Soft Spot	m3	88	3,700	326						
Sub Total				16,782	8,559	8,223		13,929		12,536
SUBBASE & BASE COURSES							83		50	
Subbase, Soil Aggregate	m3	112	43,500	4,872						
Aggregate Base*	m3	372	0	0						
Cement Stabilized Base	m3	390	45,200	17,628						
Shoulder, Soil Aggregate	m3	120	17,400	2,088						
Sub Total				24,588	13,278	11,310		20,408		10,204
SURFACE COURSES							85		50**	
Asphaltic Prime/Tack Coat	m2	12	301,000	3,612						
Double Bituminous Surface Treatment*	m2	39	254,700	9,933						
Asphaltic Concrete Surfacing**	t	750	0	0						
Sub Total				13,545	5,960	7,585		11,514		0
STRUCTURES							83		50	
RC Pipe Culvert (D 1.0m Equivalent)	m	2,000	1,237	2,474						
RC Box Culvert (2.4mx2.4m Equivalent)	m	18,800	32	602						
RC Bridg (W=9.0m L=10m Equivalent)	m	46,500	281	13,067						
Sub Total				16,142	8,071	8,071		13,398		6,699
Total (a)				71,058	35,867	35,190		59,249		29,439
INCIDENTALS							83		0	
Miscellaneous Work ((a)x7%)	ls			4,974	2,487	2,487		4,128		0
CONTRACT AMOUNT (b)				76,032	38,354	37,677		63,377		29,439
PHYSICAL CONTINGENCIES ((b)x10%) (c)	ls			7,603	3,835	3,768		6,338		2,944
ENGINEERING AND SUPERVISION							85		0	
(((b)+(c))x10%) (d)	ls			8,363	3,345	5,018		7,109		0
LAND ACQUISITION							100		100	
Highly Developed Land	ha	50,000	0	0						
Less Developed Land	ha	15,000	0	0						
Sub Total (e)	ls			0	0	0		0		0
PROJECT COST ((b)+(c)+(d)+(e))				91,998	45,535	46,463		76,824		32,383
AVERAGE COST PER KM				1,987						

Note : * The unit prices are modified by aggregate haulage distance.
** Rate is applied only for Asphaltic Concrete Surfacing

TABLE 19.4.6 ROAD MAINTENANCE COST SAVING

LINK NO.	YEAR	WITHOUT PROJECT CASE: AVERAGE DAILY TRAFFIC <ADT> (VEHICLE)	LENGTH OF LINK <L> (KM)	FACTOR FOR ADT <A1>	ROAD CHARA. FACTOR <KA>	UNIT MAINTE. COST <U> (BAHT/KM)	TOTAL MAINTE. COST <T> (1000 BAHT)	WITH PROJECT CASE: AVERAGE DAILY TRAFFIC <ADT> (VEHICLE)	LENGTH OF LINK <L> (KM)	FACTOR FOR ADT <X3>	ROAD CHARA. FACTOR <KB>	UNIT MAINTE. COST <U> (BAHT/KM)	TOTAL MAINTE. COST <T> (1000 BAHT)	ROAD MAINTE. COST SAVING (1000 BAHT)
	1988	273.0	24.7	0.47	1.63	17,169	424	299.6	24.7	0.00	1.17	13,129	324	100
1	1994	372.5	24.7	0.70	1.79	18,871	466	392.9	24.7	0.00	1.17	13,129	324	142
	2002	567.8	24.7	0.95	1.97	20,706	511	571.0	24.7	0.00	1.17	13,129	324	187
	1988	121.1	21.6	0.12	1.38	14,569	315	128.9	21.6	0.00	1.17	13,129	284	31
2	1994	157.0	21.6	0.20	1.44	15,183	328	156.9	21.6	0.00	1.17	13,129	284	44
	2002	224.0	21.6	0.36	1.55	16,329	353	209.9	21.6	0.00	1.17	13,129	284	69
	1988	202.2	46.3			15,956	739	219.9	46.3			13,129	608	131
TOTAL	1994	272.0	46.3			17,151	794	282.8	46.3			13,129	608	186
	2002	407.4	46.3			18,664	864	402.5	46.3			13,129	608	256

NOTE (1) TOTAL MAINTENANCE COST T = U * L

(2) UNIT MAINTENANCE COST U = M * (KA or KB) * FA * (1 + FR) * FE

M ; SPECIFIED MAINTENANCE COST
WITHOUT PROJECT CASE M = 7,700 BAHT/KM
WITH PROJECT CASE M = 8,200 BAHT/KM

FA = 1.40 ADMINISTRATION FACTOR FOR DIRECT LABOUR OPERATION BY DOH
FR = 0.15 EMERGENCY REHABILITATION COST FACTOR
FE = 0.85 ECONOMIC MAINTENANCE COST FACTOR TO FINANCIAL MAINTENANCE COST

(3) ROAD CHARACTERISTIC FACTOR
WITHOUT PROJECT CASE KA = 1.30 + 0.70 * A1
WITH PROJECT CASE KB = 1.17 + 0.05 * X3

(4) FACTOR FOR ADT
WITHOUT PROJECT CASE A1 = -0.1630 + 0.002320 * ADT
WITH PROJECT CASE X3 = -0.2034 + 0.000409 * (ADT / LANE) ; LANE = 2

19.5 EVALUATION

19.5.1 Economic Evaluation

The yearly distribution of the economic costs and benefits and the calculated economic indicators for evaluation are given in the table below.

The results indicate that the improvement of this study route is feasible by employing the F4 standard with DBST surfacing.

COSTS AND BENEFITS STATEMENT OF ROUTE IM - 19

(1000 BAHT)

YEAR	COST	BENEFITS				DISCOUNTED(12%)	
	CONST. COST	AGRI. BENEFIT	VOC SAVING	RMC SAVING	TOTAL	TOTAL COST	TOTAL BENEFIT
1986	38,412	0	0	0	0	48,184	0
1987	38,412	0	0	0	0	43,021	0
1988	0	2,785	10,382	131	13,298	0	11,873
1989	0	3,050	10,957	140	14,147	0	11,278
1990	0	3,315	11,531	149	14,996	0	10,674
1991	0	3,580	12,106	159	15,844	0	10,069
1992	0	3,845	12,680	168	16,693	0	9,472
1993	0	4,110	13,255	177	17,542	0	8,887
1994	0	4,375	13,829	186	18,390	0	8,319
1995	16,667	4,657	14,646	195	19,498	7,539	7,875
1996	0	4,940	15,464	204	20,607	0	7,431
1997	0	5,222	16,281	212	21,715	0	6,992
1998	0	5,504	17,098	221	22,823	0	6,561
1999	0	5,786	17,915	230	23,932	0	6,143
2000	0	6,069	18,733	239	25,040	0	5,739
2001	0	6,351	19,550	248	26,148	0	5,350
2002	-32,383	6,633	20,367	256	27,257	-5,916	4,980
TOTAL	61,108	70,221	224,794	2,914	297,930	92,828	121,642
DISCOUNTED	92,828	28,109	92,334	1,200	121,642		

NET PRESENT VALUE : 28,814

BENEFIT/COST RATIO : 1.31

INTERNAL RATE OF RETURN : 15.7 %

FIRST YEAR RATE OF RETURN : 13.0 %

OPTIMUM OPENING YEAR : 1988

SENSITIVITY TESTS

ITEM	CASE		
	BASE	1	2
NET PRESENT VALUE	28,814	14,890	10,567
BENEFIT/COST RATIO	1.31	1.14	1.11
INTERNAL RATE OF RETURN	15.7 %	13.7 %	13.4 %
FIRST YEAR RATE OF RETURN	13.0 %	11.3 %	11.1 %
COSTS	BASE	+15%	BASE
BENEFITS	BASE	BASE	-15%

19.5.2 Social Impact

The social impact brought about by the improvement of the study route is shown in the following social benefit indicators:

Construction Cost (million baht) : 76.8

1) General Accessibility Benefit (million baht) : 4.04
2) Education Benefit (million baht) : 4.98
3) Medical Care Benefit (million baht) : 0.092
4) Total Social Benefits (million baht) (1+2+3) : 9.11
5) Social Benefit/Cost Ratio ($\times 10^{-2}$) : 11.86
6) Ranking by Social Benefits : 8
7) Weighted Production Value Gain/Cost ($\times 10^{-2}$) : 5.19
8) Ranking by 7 : 12
9) Combined Ratio ($\times 10^{-2}$) : 17.05

Overall Ranking : 11

8.5.3 Overall Evaluation

It is concluded and recommended that, considering the overall ranking and the improvement schedule and/or new construction of the study routes, this study route should be improved with the opening year 1988.

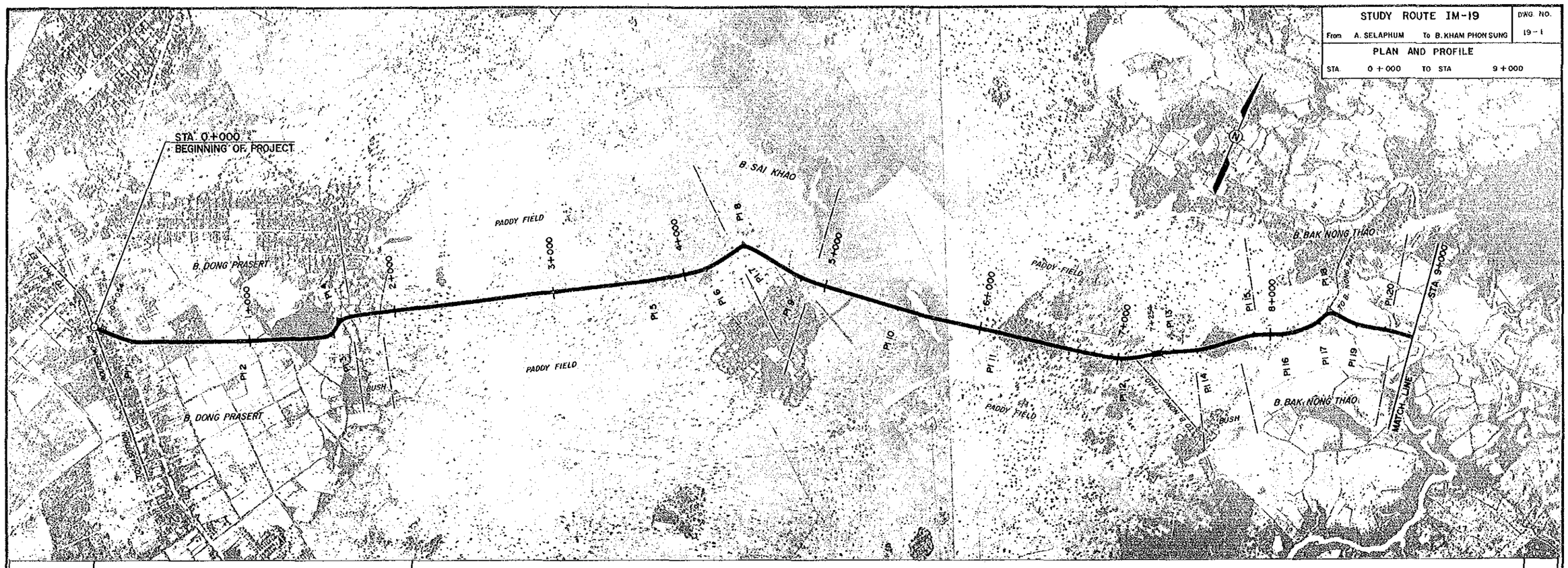
STUDY ROUTE IM-19

DWG NO. 19-1

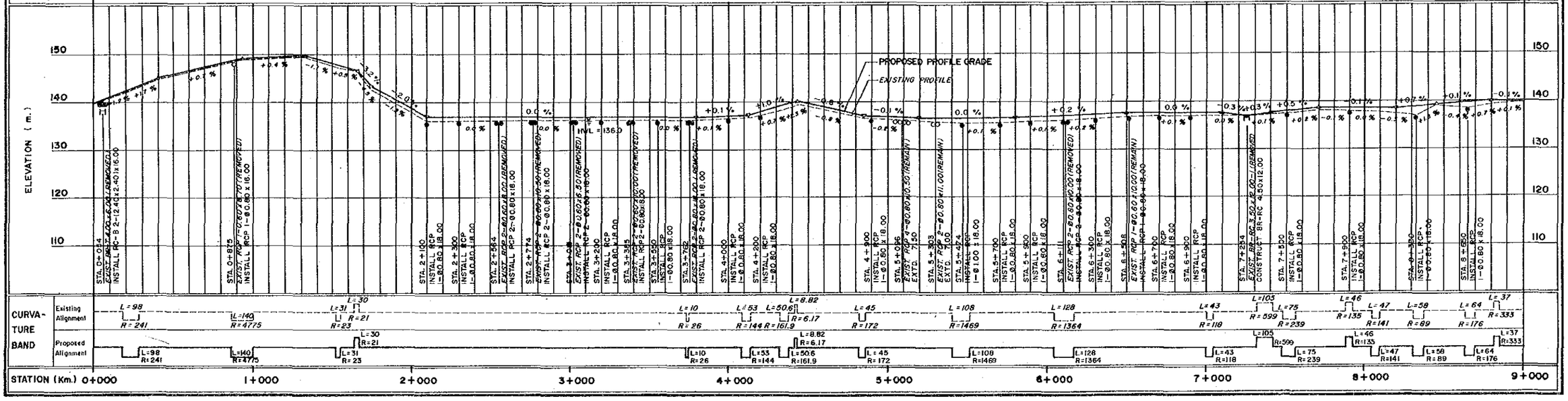
From A. SELAPHUM To B. KHAM PHON SUNG

PLAN AND PROFILE

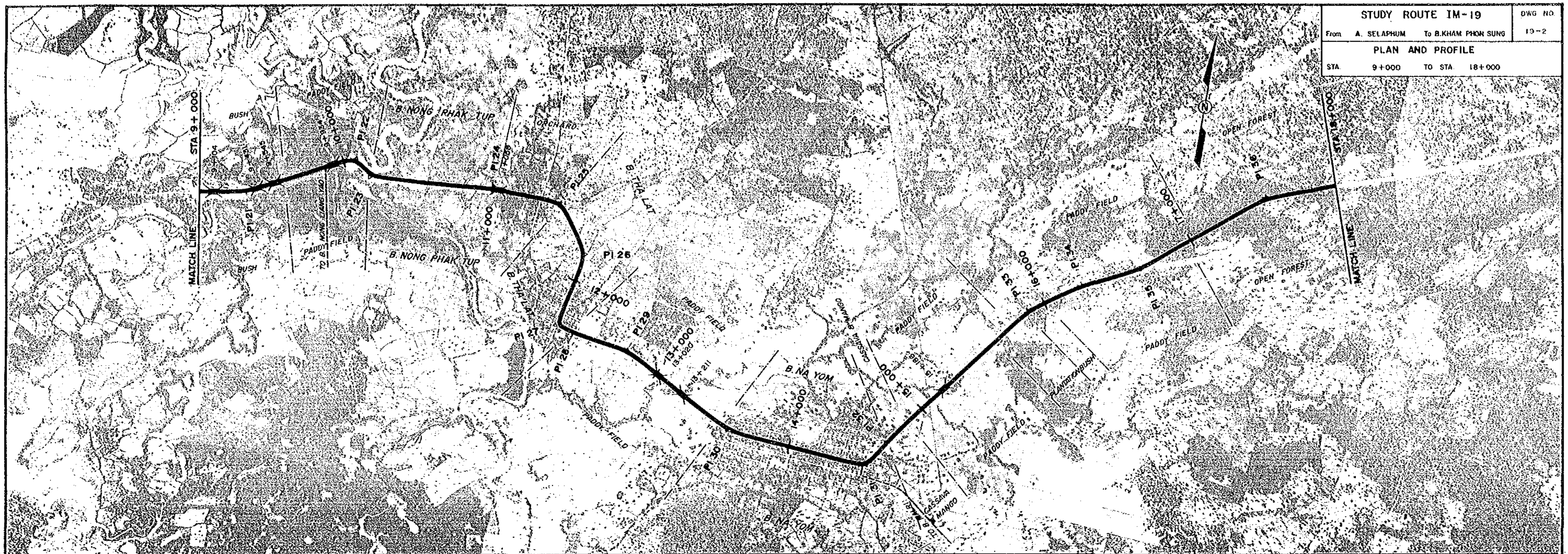
STA 0 + 000 TO STA 9 + 000



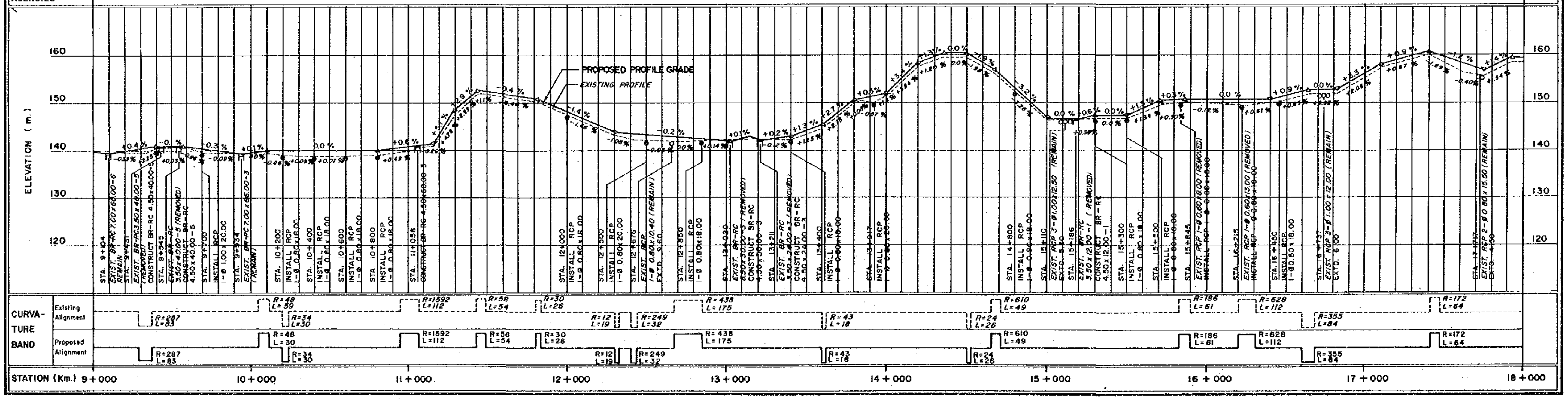
TERRAIN		ROLLING	FLAT
PAVEMENT	Type	ST	LATERITE
	Condition	FAIR	POOR
FLOODING	Length (m.)		
	Height (m.)		
RIGHT OF WAY (m.)		10.00	22.00
ROUTE NO. AGENCIES		DOH ROUTE NO. 2259	



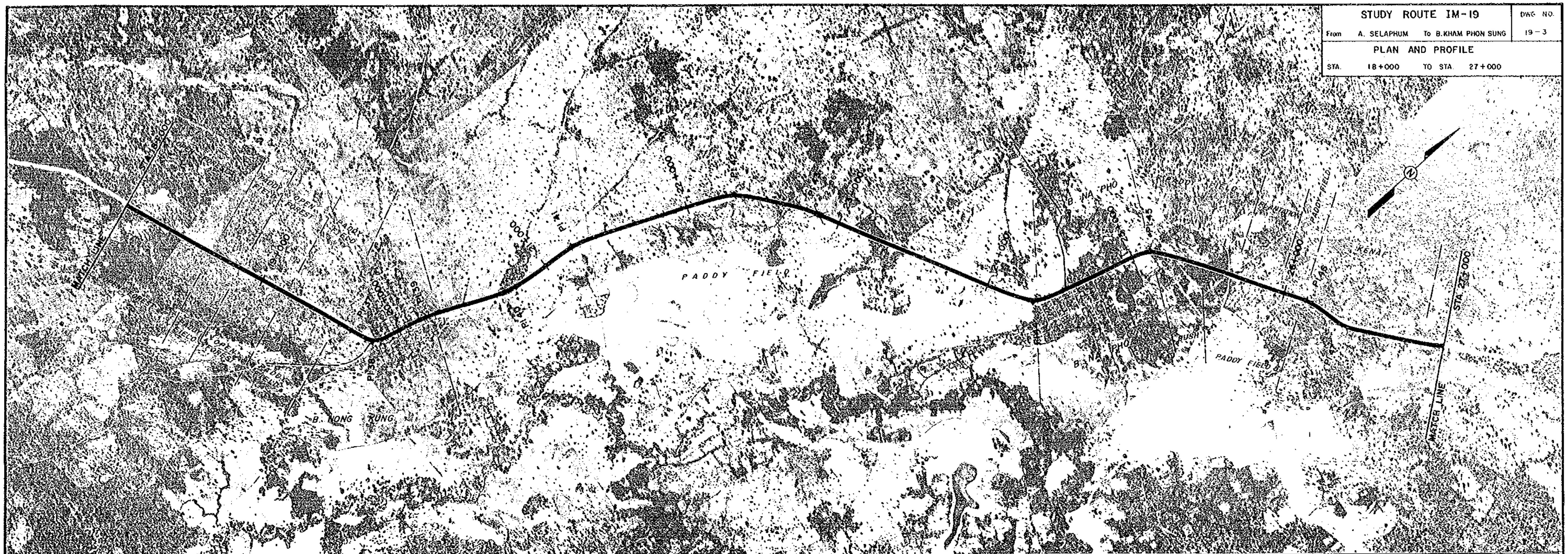
STUDY ROUTE IM-19	DWG NO.
From A. SELAPHUM To B.KHAM PHON SUNG	19-2
PLAN AND PROFILE	
STA. 9+000 TO STA. 18+000	



TERRAIN		FLAT	ROLLING	FLAT	ROLLING
PAVEM'T	Type	LATERITE			
	Condition	POOR			
FLOODING	Length (m.) Height (m.)				
RIGHT OF WAY (m.)		22.00	10.00	22.00	
ROUTE NO. AGENCIES		DOH ROUTE NO. 2259			



STUDY ROUTE IM-19	DWG. NO.
From A. SELAPHUM To B. KHAM PHON SUNG	19 – 3
PLAN AND PROFILE	
STA. 18+000 TO STA. 27+000	

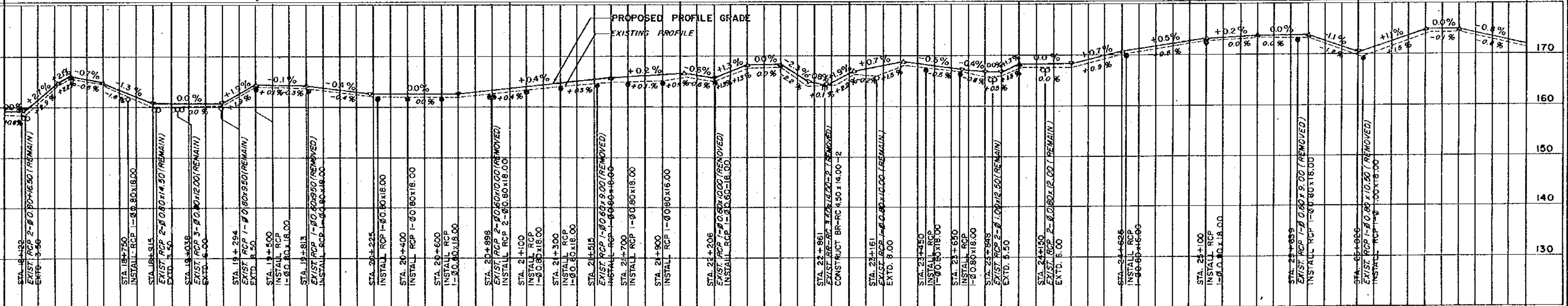


TERRAIN	ROLLING	FLAT	ROLLING
PAVEM'T Type	LATERITE		
PAVEM'T Condition	POOR		
FLOODING Length (m.) Height (m.)			

RIGHT OF WAY (m.)	22.00	10.00	22.00	10.00	22.00

ROUTE NO. AGENCIES	DOH ROUTE NO. 2259

ELEVATION (m.)

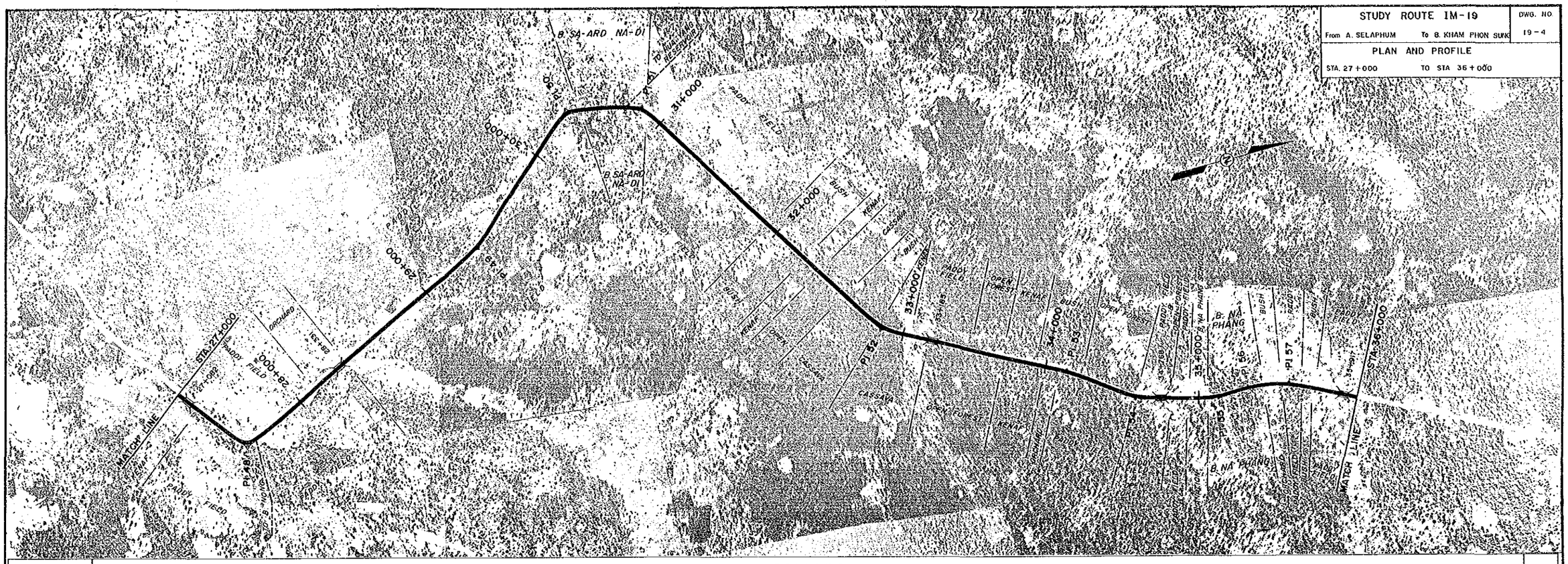


CURVATURE BAND

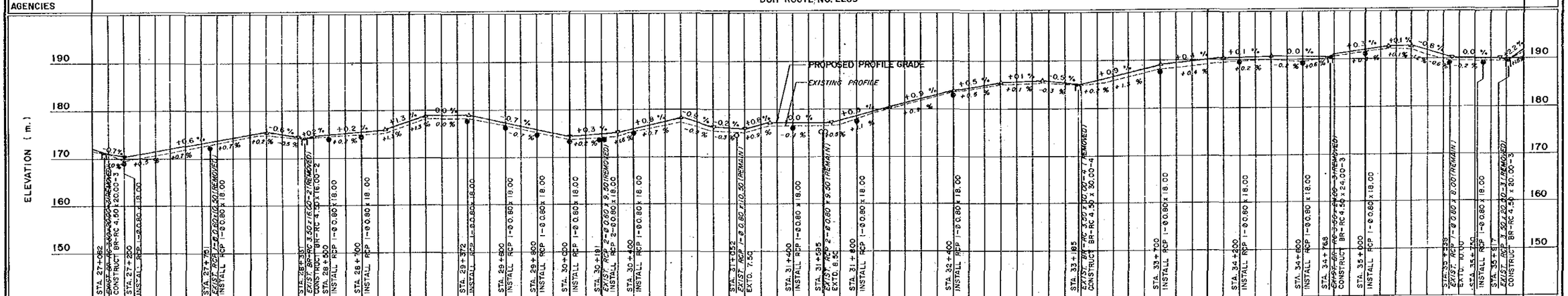
Alignment												
Existing Alignment	L=39 R=377	L=14 R=13	L=91 R=519	L=64 R=229	L=43 R=119	L=88 R=168	L=112 R=6289	L=26 R=30	L=64 R=84	L=86 R=345	L=59 R=161
Proposed Alignment	L=39 R=377	L=14 R=13	L=91 R=519	L=64 R=229	L=43 R=119	L=88 R=168	L=112 R=6289	L=26 R=30	L=64 R=84	L=86 R=345	L=59 R=161

STATION (Km.) 18+000 | 19+000 | 20+000 | 21+000 | 22+000 | 23+000 | 24+000 | 25+000 | 26+000 | 27+000

STUDY ROUTE IM-19	DWG. NO.
From A. SELAPHUM To B. KHAM PHON SUNG	19-4
PLAN AND PROFILE	
STA. 27+000 TO STA 36+000	



TERRAIN		ROLLING
PAVEM'T	Type	LATERITE
	Condition	POOR
FLOODING	Length (m.) / Height (m.)	
RIGHT OF WAY (m.)		22.00 | 10.00 | 22.00 | 10.00 | 30.00
ROUTE NO. AGENCIES		DOH ROUTE NO. 2259



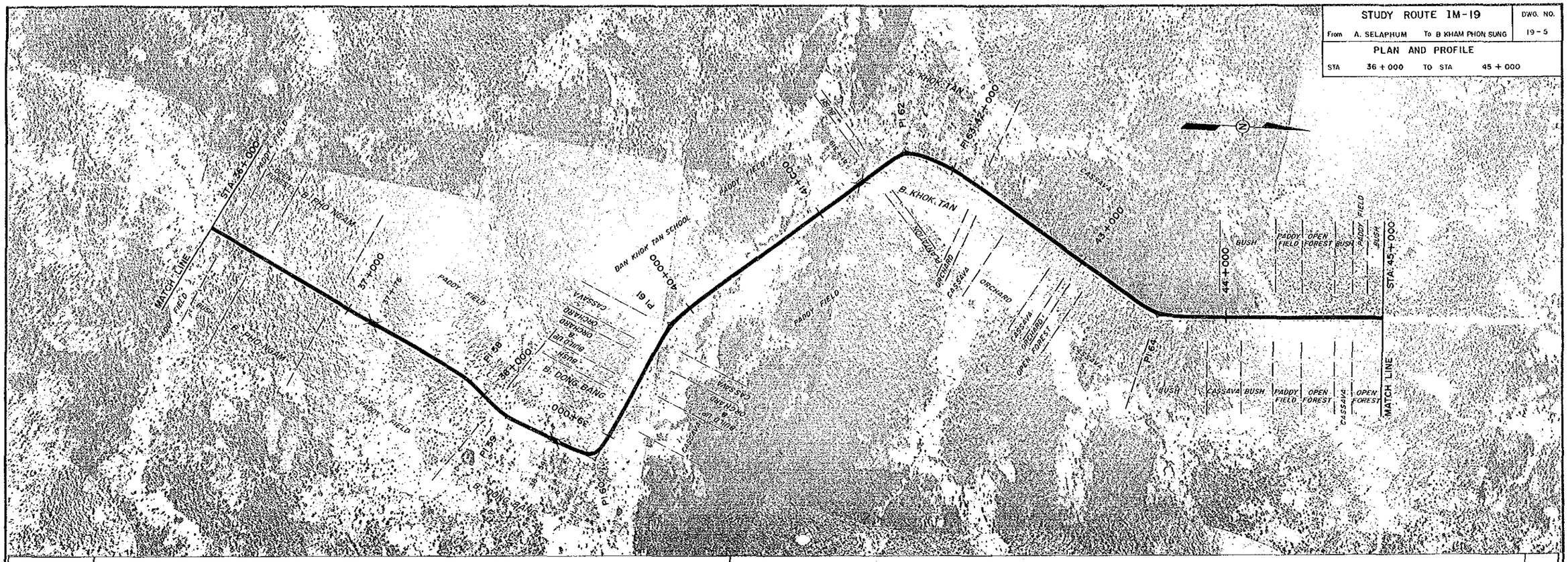
CURVATURE BAND	Existing Alignment	L = 85, R = 61 | L = 48, R = 144 | L = 74, R = 79 | L = 65, R = 76 | L = 92, R = 180 | L = 102, R = 655 | L = 43, R = 120 | L = 57, R = 202 | L = 151, R = 1415 | L = 43, R = 123
	Proposed Alignment	L = 85, R = 61 | L = 48, R = 144 | L = 74, R = 79 | L = 65, R = 76 | L = 92, R = 180 | L = 102, R = 655 | L = 43, R = 120 | L = 57, R = 202 | L = 151, R = 1415 | L = 43, R = 123
STATION (Km.)		27+000 | 28+000 | 29+000 | 30+000 | 31+000 | 32+000 | 33+000 | 34+000 | 35+000 | 36+000

STUDY ROUTE 1M-19 | DWG. NO. 19-5

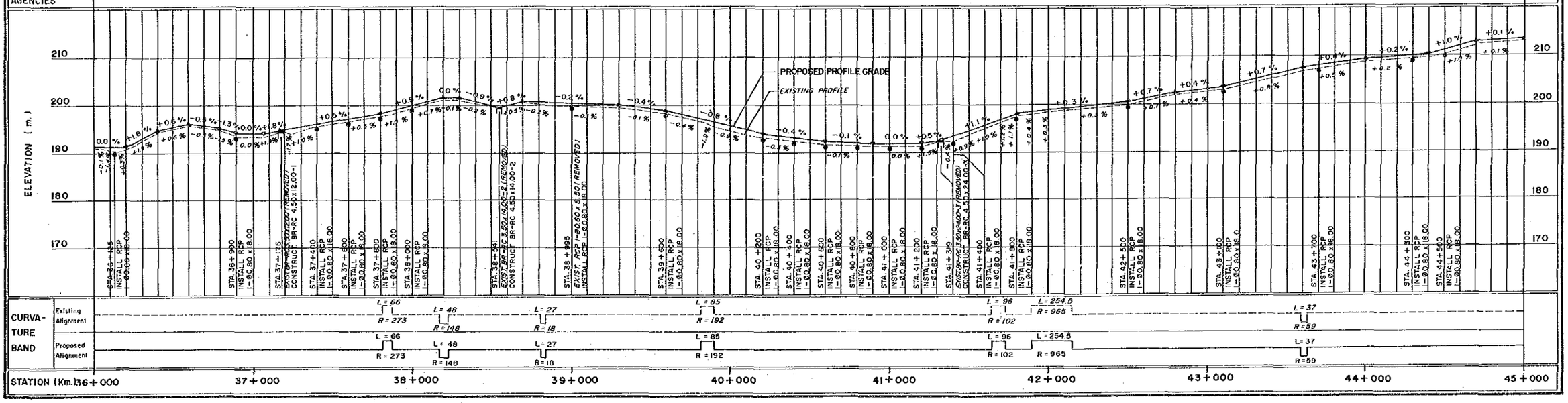
From A. SELAPHUM To B KHAM PHON SUNG

PLAN AND PROFILE

STA 36+000 TO STA 45+000

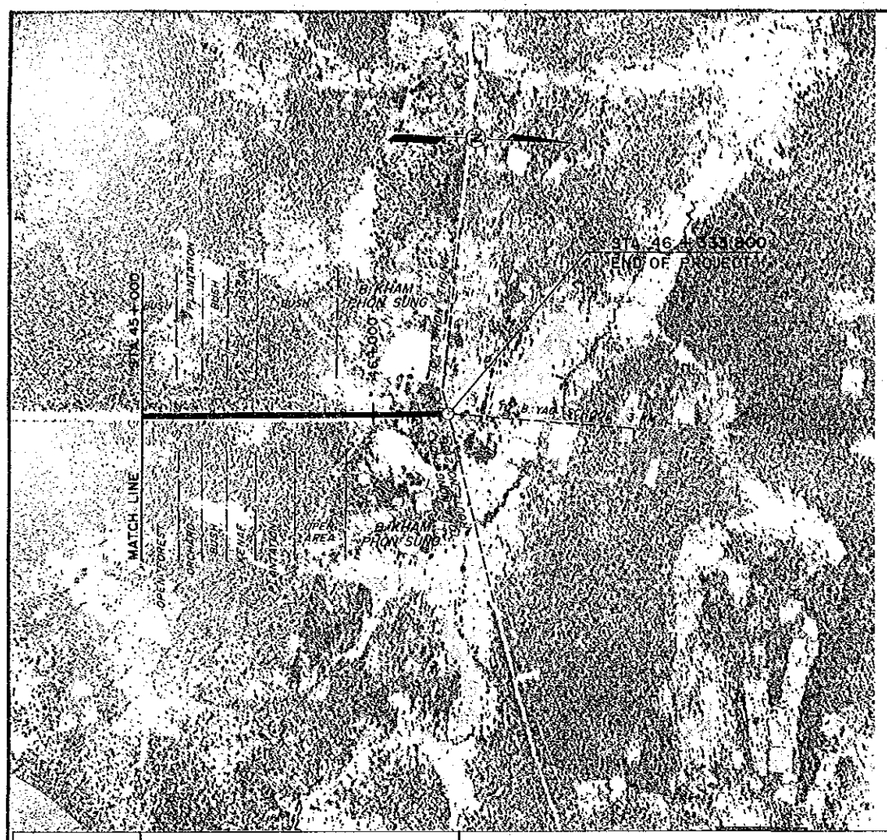


TERRAIN	ROLLING				FLAT			
PAVEM'T Type	LATERITE							
PAVEM'T Condition	POOR							
FLOODING Length (m.) / Height (m.)								
RIGHT OF WAY (m.)	30.00	14.00	30.00	14.00	30.00	14.00	30.00	
ROUTE NO. AGENCIES	DOH ROUTE NO. 2259							

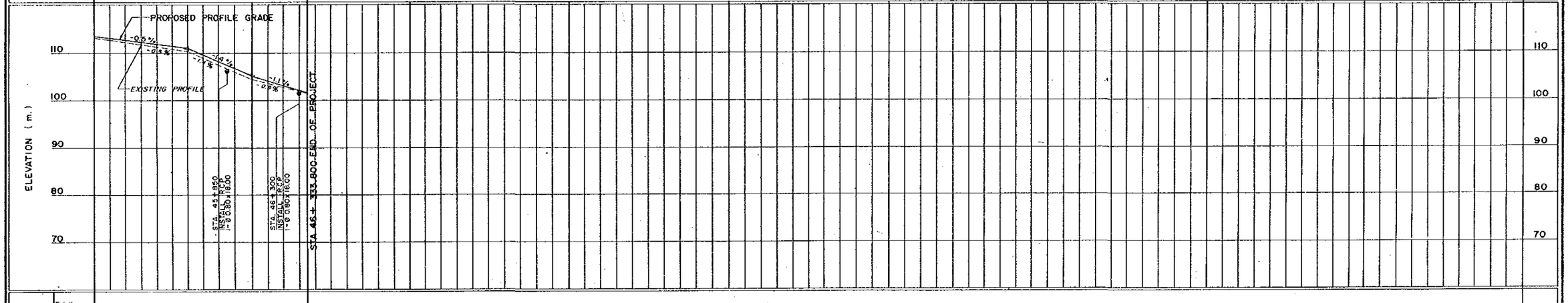


CURVATURE BAND	Existing Alignment	L=66 R=273	L=48 R=148	L=27 R=18	L=85 R=192	L=96 R=102	L=254.5 R=965	L=37 R=59	
	Proposed Alignment	L=66 R=273	L=48 R=148	L=27 R=18	L=85 R=192	L=96 R=102	L=254.5 R=965	L=37 R=59	
STATION (Km.)	36+000	37+000	38+000	39+000	40+000	41+000	42+000	43+000	44+000	45+000

STUDY ROUTE IM-19	DWG. NO.
From A. SELAPHUM To B. KHAM PHON SUNG	19-6
PLAN AND PROFILE	
STA 45+000 TO STA 46.+333.800	



TERRAIN		FLAT
PAVEMENT	Type	LATERITE
	Condition	POOR
FLOODING	Length (m.) / Height (m.)	
RIGHT OF WAY (m.)		30.00 / 14.00
ROUTE NO. AGENCIES		DOH ROUTE NO. 2259



CURVATURE BAND	Existing Alignment	
	Proposed Alignment	
STATION (Km.)		45+000 46+000

STUDY ROUTE NO. IM – 24

Changwat : Ubon Ratchathani

B. Na Suang (J.R. 24) – B. Na Yia

Length : 13.6 KM.

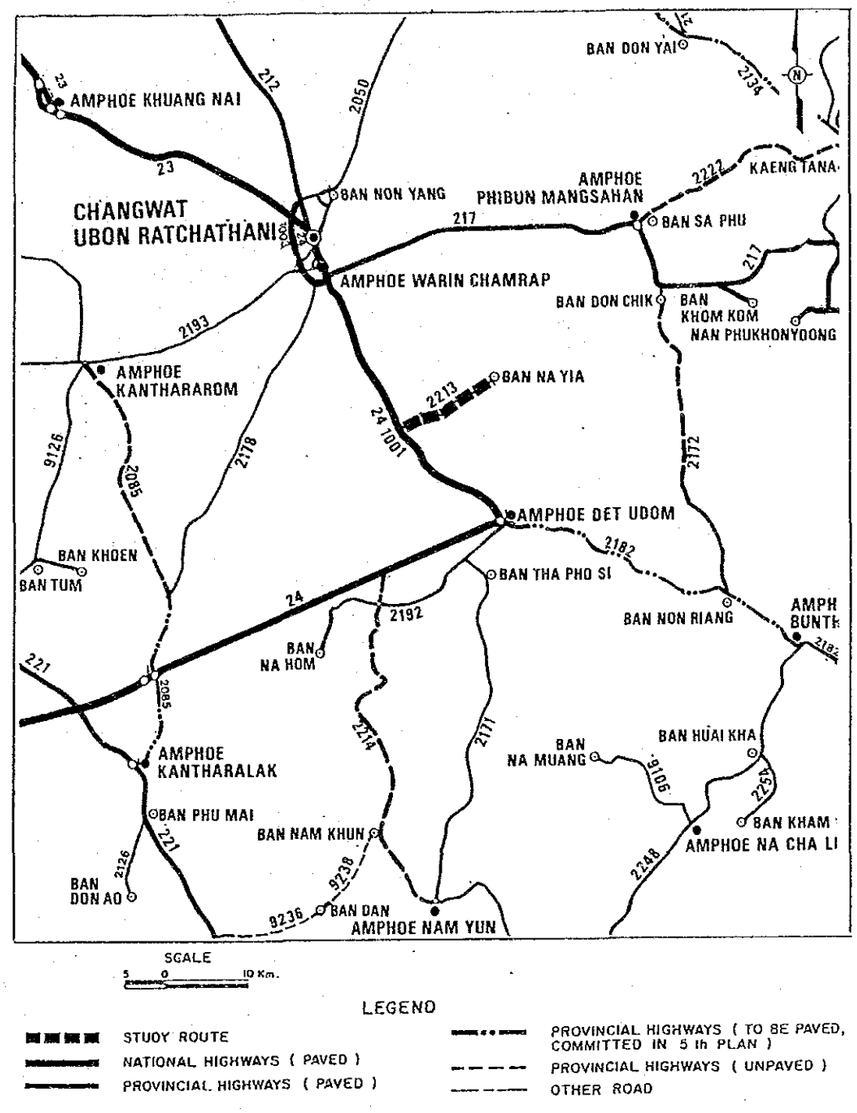
TABLE OF CONTENTS

SUMMARY

STUDY ROUTE IM-24

General		
Changwat	:	Ubon Ratchathani
Origin and Destination	:	B. Na Suang — B. Na Yia
Connected Road Network	:	24
Amphoe on Route	:	-
Number of Related Villages	:	1
Influence Area		
Area	:	102 km^2
Cultivated Area Ratio to Total Land Area in %	:	91
Population in 1983	:	10,800
Main Crops	:	Paddy & Kenaf
Number of Public Activities		
Public Health Service Centers	:	-
Hospitals Changwat Level	:	1
Amphoe Level	:	-
Schools Primary	:	3
Secondary	:	2
Traffic (ADT)	:	1984—164 1988—308 1994—463 2002—789
Nomenclature of Study Route		
Total Length	:	13.6 km
Improvement Section	:	13.6 km
DOH Road	:	13.6 km
ARD Road	:	-
Other Road	:	-
New Construction Section	:	-
Design Standard Employed	:	F4
Construction Cost in Baht		
Financial	:	26,580,000
Economic	:	22,196,000
Economic Indicators		
IRR	:	14.2 Ranking: 8
Social Impact		
Social B/C Ratio	:	0.119 Ranking: 14
Recommendations		
Opening Year	:	1988 Overall Ranking: 8

LOCATION OF STUDY ROUTE

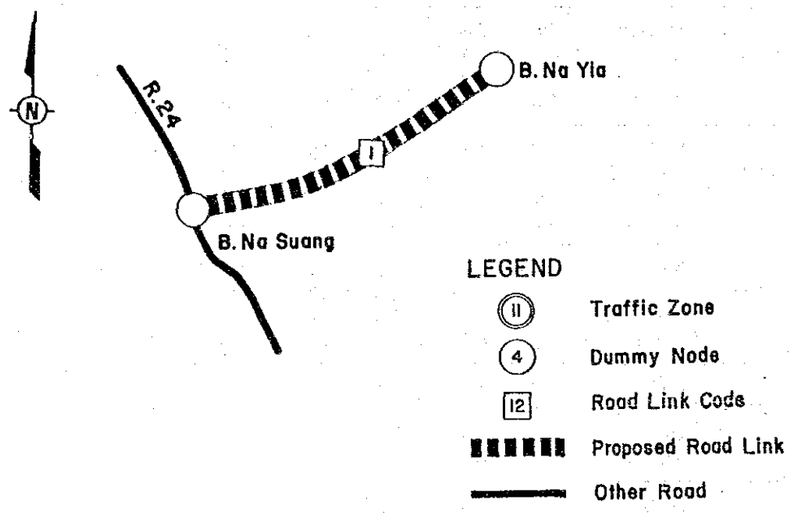


24.1 TRAFFIC

24.1.1 Method Employed in Traffic Forecasting

The growth rate method was employed in forecasting traffic because no diverted traffic after improvement was expected on this study route.

24.1.2 Assumed Road Link



24.1.3 Traffic Forecast

1) Items necessary for forecasting traffic were:
   - Traffic volume in base year
   - Passenger and freight movement in base year
   - Growth rates of passenger and freight movement
   - Rate of induced and developed movement
   - Traffic composition

TRAFFIC VOLUME IN BASE YEAR

LINK	TYPE OF VEHICLE								ADT	M/C	TOTAL
	P/C	L/B	M/B	H/B	P/P&T	4/T	6/T	10/T			
1	22	8	22	11	29	33	24	15	164	147	311

PASSENGER AND FREIGHT MOVEMENT IN BASE YEAR

PROPOSED ROAD LINK	PASSENGER MOVEMENT (TRIPS PER DAY)	FREIGHT MOVEMENT (TONNAGE PER DAY)		
		NON-AGRI.	AGRI.	TOTAL
1	1174	167.9	26.8	194.7

GROWTH RATE OF PASSENGER MOVEMENT

(UNIT : % P.A.)

YEAR	PER CAPITA INCOME	POPULATION	PASSENGER MOVEMENT
1984 - 1988	3.1	2.9	7.3
1988 - 1994	3.1	2.4	6.9
1994 - 2002	3.1	2.0	6.5

GROWTH RATE OF FREIGHT MOVEMENT

(UNIT : % P.A.)

YEAR	NON-AGRI. FREIGHT	AGRI. FREIGHT	FREIGHT MOVEMENT
1984 - 1988	9.1	0.1	8.0
1988 - 1994	8.5	0.1	7.8
1994 - 2002	8.0	0.1	7.6

RATE OF INDUCED AND DEVELOPED MOVEMENT

(UNIT : %)

YEAR	INDUCED	DEVELOPED		
	LINK 1	PASSENGER MOVEMENT	NON-AGRI. FREIGHT MOVEMENT	AGRI. FREIGHT MOVEMENT
1988	15.0	0.0	0.0	0.4
1994	15.0	0.0	0.0	2.8
2002	15.0	0.0	0.0	5.7

TRAFFIC COMPOSITION

(UNIT : %)

LINK NO.	YEAR	PASSENGER					FREIGHT			
		P/C	P/P	L/B	M/B	H/B	P/T	4/T	6/T	10/T
1	1984	31.0	33.8	6.9	18.8	9.4	6.5	42.9	31.2	19.5
	1988	32.8	34.8	6.0	17.5	8.9	7.9	35.8	35.4	20.9
	1994	35.5	36.2	4.7	15.6	8.1	10.1	25.2	41.6	23.1
	2002	39.0	38.0	3.0	13.0	7.0	13.0	11.0	50.0	26.0

2) The following were output:
- Forecasted ADT
- Traffic volumes

AVERAGE FUTURE TRAFFIC ON PROPOSED ROUTE

YEAR	TYPE OF VEHICLE								ADT	M/C	TOTAL
	P/C	L/B	M/B	H/B	P/P&T	4/T	6/T	10/T			
1988	57	10	30	15	69	41	41	24	287	321	608
1994	98	13	43	22	117	42	70	39	445	384	830
2002	199	15	66	36	230	31	139	72	789	467	1256

TRAFFIC VOLUME ON ROUTE IM- 24 LINK COUNT= 1

YEAR		1988		1994		2002	
LINK		1	AVR.	1	AVR.	1	AVR.
P/C	N+D	49	49	85	85	173	173
	I	7	7	13	13	26	26
	DV	0	0	0	0	0	0
	TOTAL	57	57	98	98	199	199
L/B	N+D	9	9	11	11	13	13
	I	1	1	2	2	2	2
	DV	0	0	0	0	0	0
	TOTAL	10	10	13	13	15	15
M/B	N+D	26	26	38	38	58	58
	I	4	4	6	6	9	9
	DV	0	0	0	0	0	0
	TOTAL	30	30	43	43	66	66
H/B	N+D	13	13	19	19	31	31
	I	2	2	3	3	5	5
	DV	0	0	0	0	0	0
	TOTAL	15	15	22	22	36	36
P/P&T	N+D	60	60	102	102	200	200
	I	9	9	15	15	30	30
	DV	0	0	0	0	0	0
	TOTAL	69	69	117	117	230	230
4/T	N+D	36	36	37	37	27	27
	I	5	5	6	6	4	4
	DV	0	0	0	0	0	0
	TOTAL	41	41	42	42	31	31
6/T	N+D	35	35	61	61	121	121
	I	5	5	9	9	18	18
	DV	0	0	0	0	0	0
	TOTAL	41	41	70	70	139	139
10/T	N+D	21	21	34	34	63	63
	I	3	3	5	5	9	9
	DV	0	0	0	0	0	0
	TOTAL	24	24	39	39	72	72
ADT	N+D	250	250	387	387	685	685
	I	37	37	58	58	103	103
	DV	0	0	0	0	1	1
	TOTAL	287	287	445	445	789	789
M/C	N+D	300	300	364	364	447	447
	I	20	20	20	20	20	20
	DV	0	0	0	0	0	0
	TOTAL	321	321	384	384	467	467
TOTAL	N+D	550	550	751	751	1132	1132
	I	58	58	78	78	123	123
	DV	0	0	0	0	1	1
	TOTAL	608	608	830	830	1256	1256

NOTE
N : NORMAL TRAFFIC D : DIVERTED TRAFFIC
DV : DEVELOPED TRAFFIC I : INDUCED TRAFFIC

24.2 AGRICULTURAL DEVELOPMENT

24.2.1 Present Condition

Ninety percent of the cultivated land in the influence area is covered by paddy fields. Many old paddy fields are affected by salinity and the average yield of rice is comparatively low. Among the major crops planted in upland fields in the 1983 crop year, kenaf ranks first followed by beans, maize and cassava.

Land use and capability conditions in the area are shown in Table 24.2.1 and Figure 24.2.1. A typical cropping calendar in the area is shown in Figure 24.2.2.

24.2.2 Development Projection

Future agricultural development in the area of influence was projected for the two cases of "with and without project". The projected planted area, unit yields by crop, and the consequent production amount are shown in Table 24.2.2.

Based on the above projected production amount, farmgate prices and production costs estimated separately, net production value (NPV) was obtained as shown in Table 24.2.3. The difference in NPV between the two cases is deemed to be the development benefit of the Study Route.

FIGURE 24.2.1 LAND USE AND CAPABILITY OF INFLUENCE AREA

STUDY ROUTE NO. IM-24

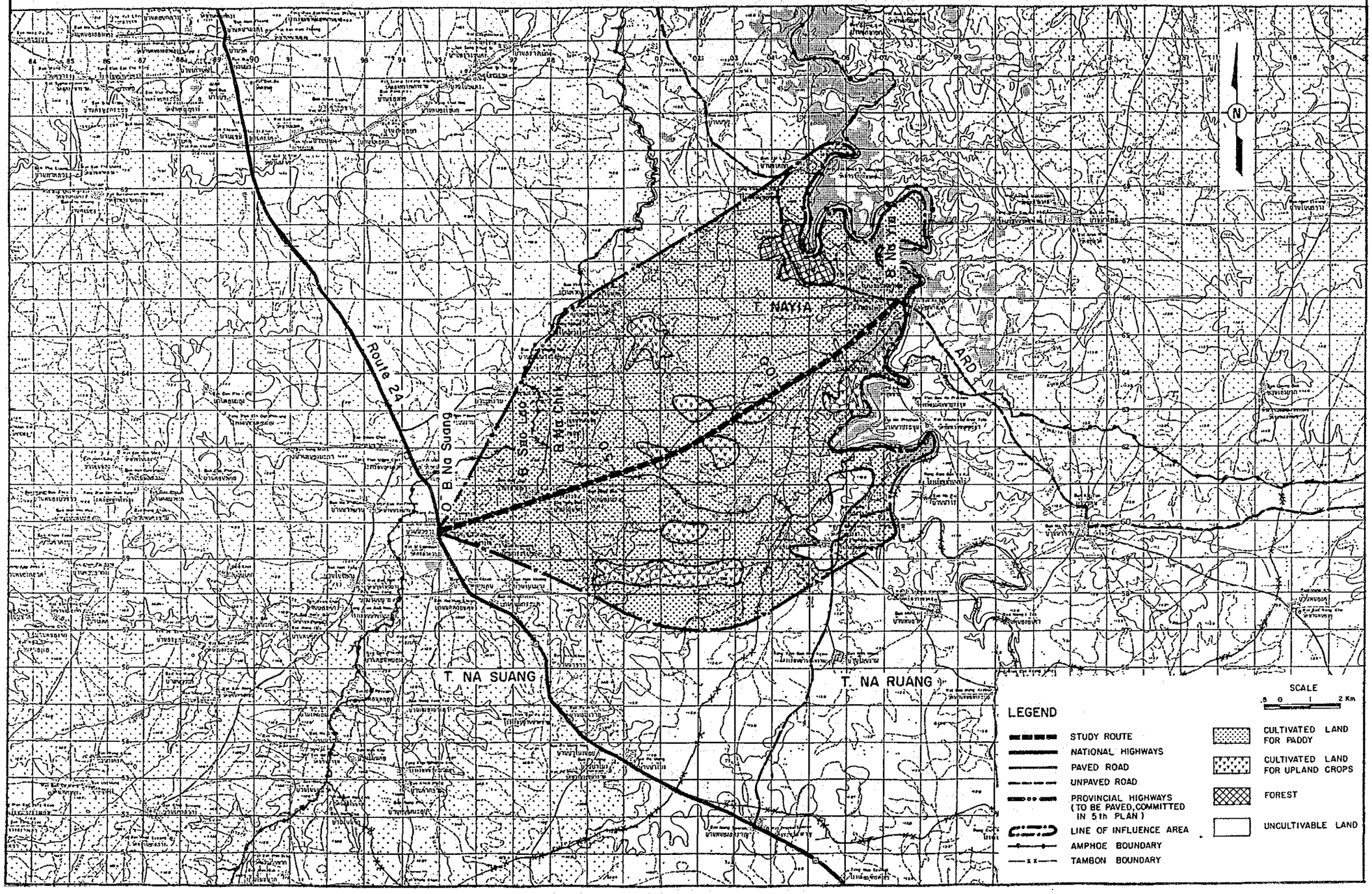
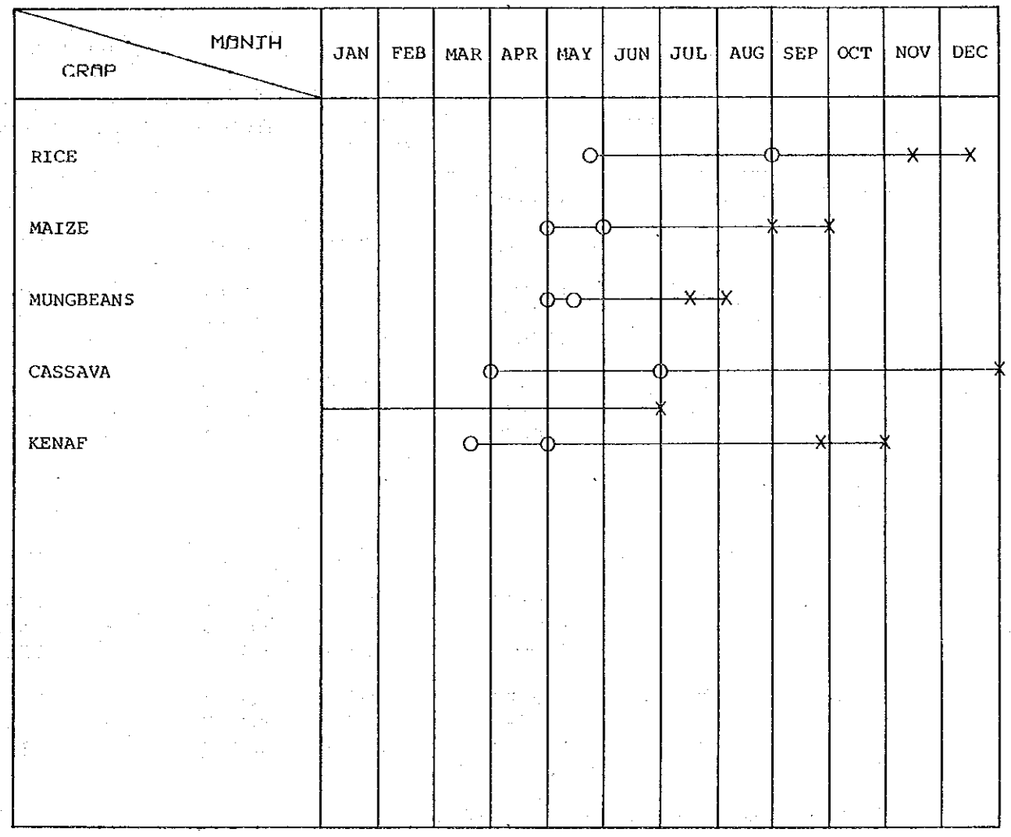


FIGURE 24.2.2 CROPPING CALENDAR

ROUTE IM-24 Related Amphoe: 1117 Det Udom



Note:

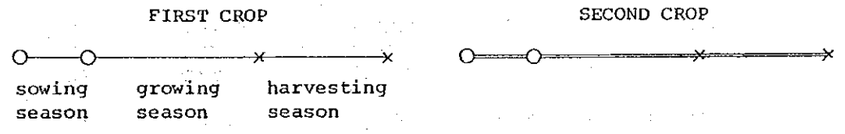


TABLE 24.2.1 CULTIVATED LAND

[UNIT : 1000 RAI (KM2)]

CHANGWAT NAME	AMPHOE NAME	CULTIVATED LAND		
		PADDY FIELD	UPLAND FIELD	TOTAL
UBON RATCHATHANI	DET UDOM	53.44 (85.50)	4.63 (7.41)	58.07 (92.91)
TOTAL		53.44 (85.50)	4.63 (7.41)	58.07 (92.91)

TABLE 24.2.2 CROP PRODUCTION

ITEM		RICE (PADDY)	MAIZE	SORGHUM	BEANS	GROUND NUTS	CASSAVA	KENAF	SUGAR CANE	COTTON	CASTOR BEANS	UPLAND TOTAL	TOTAL
PLANTED AREA	(1000 RAI)												
BASE YEAR	(1983)	52.91	0.18	-	0.47	-	0.16	1.59	-	-	-	2.40	55.31
WITHOUT PROJECT	(1988)	52.91	0.19	-	0.51	-	0.16	1.69	-	-	-	2.54	55.45
	(1994)	52.91	0.20	-	0.56	-	0.16	1.81	-	-	-	2.73	55.64
	(2002)	52.91	0.23	-	0.63	-	0.16	1.99	-	-	-	3.00	55.91
WITH PROJECT	(1988)	52.91	0.19	-	0.51	-	0.16	1.70	-	-	-	2.57	55.48
	(1994)	52.91	0.22	-	0.61	-	0.16	1.95	-	-	-	2.95	55.86
	(2002)	52.91	0.24	-	0.69	-	0.16	2.15	-	-	-	3.24	56.15
CROP YIELD	(KG/RAI)												
BASE YEAR	(1983)	257.5	312.5	-	150.0	-	2250.0	180.0	-	-	-		
WITHOUT PROJECT	(1988)	258.9	314.1	-	150.8	-	2250.0	180.0	-	-	-		
	(1994)	260.7	316.0	-	151.7	-	2250.0	180.0	-	-	-		
	(2002)	263.0	318.5	-	152.9	-	2250.0	180.0	-	-	-		
WITH PROJECT	(1988)	259.9	314.4	-	151.4	-	2250.0	180.0	-	-	-		
	(1994)	267.5	318.2	-	156.0	-	2250.0	180.0	-	-	-		
	(2002)	278.0	323.3	-	162.3	-	2250.0	180.0	-	-	-		
CROP PRODUCTION AMOUNT	(TON)												
BASE YEAR	(1983)	13,624	56	-	70	-	360	286	-	-	-	773	14,397
WITHOUT PROJECT	(1988)	13,700	60	-	76	-	360	304	-	-	-	800	14,500
	(1994)	13,792	65	-	84	-	360	326	-	-	-	835	14,627
	(2002)	13,915	72	-	96	-	360	358	-	-	-	885	14,801
WITH PROJECT	(1988)	13,751	61	-	78	-	360	307	-	-	-	805	14,556
	(1994)	14,154	70	-	95	-	360	352	-	-	-	877	15,031
	(2002)	14,709	79	-	112	-	360	386	-	-	-	937	15,646

NOTE : SYMBOL "-" MEANS ZERO OR NEGLIGIBLE

TABLE 24.2.3 NET PRODUCTION VALUE

ITEM			RICE (PADDY)	MAIZE	SORGHUM	BEANS	GROUND NUTS	CASSAVA	KENAF	SUGAR CANE	COTTON	CASTOR BEANS	UPLAND TOTAL	TOTAL
FARMGATE PRICE	(BAHT/TON)													
WITHOUT PROJECT	(1983 - 2002)		4,043	2,307	-	5,150	-	731	4,532	-	-	-		
WITH PROJECT	(1988 - 2002)		4,057	2,321	-	5,164	-	741	4,560	-	-	-		
CROP PRODUCTION COST	(BAHT/RAI)													
BASE YEAR		(1983)	661	600	-	438	-	837	810	-	-	-		
WITHOUT PROJECT		(1988)	664	602	-	438	-	837	810	-	-	-		
		(1994)	668	604	-	438	-	837	810	-	-	-		
		(2002)	673	606	-	438	-	837	810	-	-	-		
WITH PROJECT		(1988)	666	602	-	438	-	837	810	-	-	-		
		(1994)	680	605	-	443	-	837	810	-	-	-		
		(2002)	700	610	-	448	-	837	810	-	-	-		
NET PRODUCTION VALUE	(1000 BAHT)													
WITHOUT PROJECT		(1988)	20,258	23	-	172	-	129	10	-	-	-	334	20,592
		(1994)	20,417	25	-	191	-	129	10	-	-	-	355	20,772
		(2002)	20,652	29	-	219	-	129	11	-	-	-	388	21,040
WITH PROJECT		(1988)	20,550	25	-	177	-	133	18	-	-	-	353	20,903
		(1994)	21,443	29	-	221	-	133	21	-	-	-	404	21,847
		(2002)	22,637	34	-	270	-	133	23	-	-	-	460	23,097
NET VALUE ADDED	(1000 BAHT)													
		1988	292	2	-	5	-	4	8	-	-	-	19	311
		1994	1,026	4	-	30	-	4	11	-	-	-	49	1,075
		2002	1,985	5	-	51	-	4	12	-	-	-	72	2,057

NOTE : SYMBOL "-" MEANS ZERO OR NEGLIGIBLE