Table 8A-6 REDUCTION FOR DOWNHILL GRADE COSTS (% of Level Tangent Costs)

Motor Cycle (M/C) and Passenger Car (P/C)

SPEED (km/h)	GRADE (%)						
	1	2	3	4	5	6	7
16	3.74	12.26	12.09	11.82	11.24	10.44	8.92
24	4.40	11.55	14.62	14.30	13.69	12.96	11.48
32	4.99	11.16	16.90	16.53	15.99	15.23	13.86
40	5.25	10.47	15.86	18.50	17.93	17.29	15.97
48	5.47	10.51	15.61	19.68	19.97	19.22	18.08
56	5.67	10.56	15.42	19.36	21.69	21.14	19.97
64	5.80	10.62	15.30	19.21	22.81	22.87	21.67
72	5.73	10.70	15.66	19.53	22.99	24.78	23.52
80	5.75	10.81	15.77	19.71	23.13	26.03	25.18
88	5.75	11.01	16.04	20.45	23.84	26.28	26.81

Heavy Bus (H/B) and Medium Truck (M/T)

SPEED (km/h)	GRADE (%)						
	1	2	3	4	5	6	7
16	5.37	9.54	13.50	16.61	17.35	16.86	16.36
24	6.79	11.88	16.13	19.17	20.80	20.02	19.17
32	7.83	13.60	18.13	20.77	22.78	22.49	21.34
40	8.51	14.99	20.70	21.78	23.59	24.49	23.11
48	8.92	16.02	19.81	22.39	24.33	25.11	24.51
56	9.02	16.28	20.03	22.61	24.47	24.86	24.13
64	8.94	16.06	19.99	22.14	23.30	22.61	-
72	8.85	15.37	20.03	21.90	-	-	-
80	8.73	14.49	19.38	-	-	-	-
88	8.92	13.47	18.28	-	-	-	-

Light Bus (L/B) and Light Truck (L/T)

SPEED (km/h)	GRADE (%)						
	1	2	3	4	5	6	7
16	3.86	7.21	10.26	11.05	10.55	9.82	8.33
24	4.39	8.11	11.71	13.32	12.80	12.21	10.83
32	4.69	8.46	12.68	15.27	14.86	14.28	13.07
40	4.96	8.76	13.12	16.55	16.85	16.40	15.27
48	5.06	9.26	13.91	17.07	19.05	18.51	17.60
56	5.55	9.67	14.41	17.56	20.79	20.62	19.78
64	5.42	10.14	15.16	18.30	21.59	22.82	21.97
72	5.70	10.67	16.10	19.79	23.09	25.29	24.68
80	5.98	11.13	16.83	21.28	24.74	27.51	27.47
88	6.24	11.96	17.67	23.35	27.35	29.75	29.65

Heavy Truck (H/T)

SPEED (km/h)	GRADE (%)						
	1	2	3	4	5	6	7
16	8.07	11.67	15.28	14.35	11.56	9.26	7.00
24	10.30	14.85	18.70	17.28	14.53	11.51	8.36
32	11.95	17.91	21.23	19.59	17.16	13.75	-
40	13.05	19.75	21.73	20.38	18.53	14.95	-
48	13.59	20.90	21.81	20.83	19.25	-	-
56	12.99	20.63	21.77	-	-	-	-
64	12.80	20.41	22.59	-	-	-	-
72	10.43	19.47	22.66	-	-	-	-
80	11.96	18.37	-	-	-	-	-
88	12.40	17.58	-	-	-	-	-

Table 8A-7 ADDITIONAL COST PER SPEED CHANGE CYCLE ABOVE CONTINUING AT INITIAL SPEED
(% of Level Tangent Cost per km at Initial Speed)

Motor Cycle (M/C) and Passenger Car (P/C)

INITIAL SPEED (km/h)	REDUCED SPEED (km/h)									
	Stop	16	24	32	40	48	56	64	72	80
16	6.55	-	-	-	-	-	-	-	-	-
24	13.13	4.71	-	-	-	-	-	-	-	-
32	21.35	11.47	6.21	-	-	-	-	-	-	-
40	31.25	20.75	14.73	8.04	-	-	-	-	-	-
48	42.90	31.99	25.71	18.42	10.04	-	-	-	-	-
56	56.34	45.25	38.80	31.48	22.74	12.43	-	-	-	-
64	71.98	60.79	54.22	46.86	38.14	27.95	15.21	-	-	-
72	89.77	78.59	72.07	64.66	55.95	46.03	33.19	18.19	-	-
80	110.16	98.99	92.37	84.97	76.21	66.53	53.92	39.14	21.42	-
88	133.35	122.03	115.53	107.98	99.11	89.36	77.14	62.71	45.36	24.74

Light Bus (L/B) and Light Truck (L/T)

INITIAL SPEED (km/h)	REDUCED SPEED (km/h)									
	Stop	16	24	32	40	48	56	64	72	80
16	7.02	-	-	-	-	-	-	-	-	-
24	13.41	5.04	-	-	-	-	-	-	-	-
32	21.80	12.25	6.61	-	-	-	-	-	-	-
40	32.04	21.55	15.46	8.37	-	-	-	-	-	-
48	44.19	32.96	26.49	19.04	10.25	-	-	-	-	-
56	58.36	46.55	39.79	32.05	23.13	12.50	-	-	-	-
64	74.52	62.30	55.36	47.40	38.24	27.52	15.02	-	-	-
72	92.45	79.84	72.80	64.77	55.58	44.93	32.45	17.61	-	-
80	111.73	100.50	91.84	83.86	74.67	64.17	51.81	37.28	20.22	-
88	131.66	118.89	111.74	103.83	94.81	84.36	72.45	58.39	41.82	22.54

Table 8A-7 ADDITIONAL COST PER SPEED CHANGE CYCLE ABOVE CONTINUING AT INITIAL SPEED
(% of Level Tangent Cost per km at Initial Speed)

Heavy Bus (H/B) and Medium Truck (M/T)

INITIAL SPEED (km/h)	REDUCED SPEED (km/h)									
	Stop	16	24	32	40	48	56	64	72	80
16	9.74	-	-	-	-	-	-	-	-	-
24	19.07	6.78	-	-	-	-	-	-	-	-
32	30.66	16.83	8.95	-	-	-	-	-	-	-
40	43.63	29.12	20.91	11.25	-	-	-	-	-	-
48	58.39	43.52	35.12	25.31	13.69	-	-	-	-	-
56	74.64	59.77	51.32	41.61	30.05	16.41	-	-	-	-
64	92.74	78.01	69.60	59.99	51.71	35.24	19.33	-	-	-
72	112.45	97.91	89.71	80.31	69.31	56.33	40.91	22.36	-	-
80	133.58	119.47	111.44	102.24	91.59	79.04	64.20	46.50	25.36	-
88	155.53	141.85	134.14	125.26	115.00	102.91	88.77	71.92	51.84	28.00

Heavy Truck (H/T)

INITIAL SPEED (km/h)	REDUCED SPEED (km/h)									
	Stop	16	24	32	40	48	56	64	72	80
16	17.01	-	-	-	-	-	-	-	-	-
24	35.79	14.75	-	-	-	-	-	-	-	-
32	61.34	42.47	21.02	-	-	-	-	-	-	-
40	93.05	66.71	49.76	27.78	-	-	-	-	-	-
48	130.11	102.41	84.85	62.61	34.78	-	-	-	-	-
56	171.27	143.59	125.78	103.48	75.91	41.92	-	-	-	-
64	215.90	188.86	171.16	149.36	122.51	89.54	49.28	-	-	-
72	262.58	236.37	219.46	198.55	172.84	141.38	103.07	56.25	-	-
80	309.51	284.64	268.60	248.80	224.63	195.11	159.27	115.53	62.71	-
88	352.90	329.71	314.79	296.50	274.13	246.88	213.77	173.52	125.09	67.35

Table 8A-8 ADDITIONAL TIME FOR SPEED CHANGE CYCLE ABOVE CONTINUING AT INITIAL SPEED
(% of Initial Time per km at Initial Speed)

Motor Cycle (M/C) and Passenger Car (P/C)

INITIAL SPEED (km/h)	REDUCED SPEED (km/h)									
	Stop	16	24	32	40	48	56	64	72	80
16	2.42	-	-	-	-	-	-	-	-	-
24	4.80	1.10	-	-	-	-	-	-	-	-
32	7.97	2.98	1.12	-	-	-	-	-	-	-
40	11.92	5.60	3.20	1.12	-	-	-	-	-	-
48	16.61	8.98	5.95	3.36	1.10	-	-	-	-	-
56	22.06	13.10	9.46	6.22	3.36	1.06	-	-	-	-
64	28.29	17.98	13.63	9.73	6.21	3.26	1.02	-	-	-
72	35.28	23.62	18.50	13.90	9.65	5.98	3.02	0.94	-	-
80	42.96	30.00	24.08	18.72	13.68	9.20	5.44	2.80	0.88	-
88	51.39	37.05	30.36	24.11	18.30	12.94	8.27	5.02	2.46	0.79

Light Bus (L/B) and Light Truck (L/T)

INITIAL SPEED (km/h)	REDUCED SPEED (km/h)									
	Stop	16	24	32	40	48	56	64	72	80
16	1.79	-	-	-	-	-	-	-	-	-
24	3.65	1.13	-	-	-	-	-	-	-	-
32	6.18	2.75	1.31	-	-	-	-	-	-	-
40	9.44	4.96	3.04	1.40	-	-	-	-	-	-
48	13.49	7.82	5.42	3.26	1.44	-	-	-	-	-
56	18.37	11.48	8.51	5.82	3.47	1.51	-	-	-	-
64	24.19	16.00	12.35	9.09	6.14	3.65	1.60	-	-	-
72	30.96	21.31	16.99	13.03	9.50	6.41	3.82	1.73	-	-
80	38.96	27.84	22.72	18.08	13.84	10.08	6.72	3.92	1.76	-
88	48.22	35.55	29.66	24.11	19.01	14.43	10.38	6.95	4.14	1.94

Table 8A-8 ADDITIONAL TIME FOR SPEED CHANGE CYCLE ABOVE CONTINUING AT INITIAL SPEED (2)
(% of Initial Time per km at Initial Speed)

Heavy Bus (H/B) and Medium Truck (H/T)

INITIAL SPEED (km/h)	REDUCED SPEED (km/h)									
	Stop	16	24	32	40	48	56	64	72	80
16	2.35	-	-	-	-	-	-	-	-	-
24	5.28	1.49	-	-	-	-	-	-	-	-
32	9.38	3.94	1.70	-	-	-	-	-	-	-
40	14.68	7.44	4.48	1.80	-	-	-	-	-	-
48	21.12	12.00	8.26	4.85	1.87	-	-	-	-	-
56	28.73	17.70	13.05	8.90	5.10	2.02	-	-	-	-
64	37.57	24.58	19.01	13.95	9.47	5.31	1.98	-	-	-
72	42.24	29.06	23.30	17.98	13.25	8.77	4.86	1.79	-	-
80	58.64	42.08	34.64	27.76	21.44	15.44	10.16	5.76	2.24	-
88	71.02	52.98	44.62	36.70	29.48	22.53	16.19	10.82	6.25	2.82

Heavy Truck (H/T)

INITIAL SPEED (km/h)	REDUCED SPEED (km/h)									
	Stop	16	24	32	40	48	56	64	72	80
16	2.35	-	-	-	-	-	-	-	-	-
24	5.52	1.32	-	-	-	-	-	-	-	-
32	10.21	3.81	1.60	-	-	-	-	-	-	-
40	16.64	7.80	4.48	1.88	-	-	-	-	-	-
48	25.06	13.68	9.02	5.14	2.11	-	-	-	-	-
56	35.90	22.06	15.90	10.53	5.99	2.46	-	-	-	-
64	49.66	33.54	25.92	18.94	12.67	7.42	3.14	-	-	-
72	67.32	48.96	40.10	31.46	23.40	15.91	9.43	4.10	-	-
80	90.72	69.60	59.20	48.96	39.04	29.76	21.12	13.28	6.24	-
88	122.67	97.86	85.71	73.74	62.04	50.69	39.60	29.04	18.83	9.15

Appendix 9

道路インヴェントリー

Appendix 9

ROAD INVENTORY

ABBREVIATION

C-P-n(ø)-L : PIPE CULVERT

C-B-n(AxB)-L : BOX CULVERT

n : Number of rows

ø : Diameter (cm)

A : Width (m)

B : Height (m)

L : Length (m)

Br-C(WxL) : CONCRETE BRIDGE

Br-T(WxL) : TIMBER BRIDGE

W : Carriageway Width (m)

L : Bridge length (m)

E. : EARTH

S.A.P. : SOIL AGGREGATE PAVEMENT

S.B.S.T. : SINGLE BITUMINOUS SURFACE TREATMENT

D.B.S.T. : DOUBLE BITUMINOUS SURFACE TREATMENT

Table 9A-1

ROAD INVENTORY

SEGMENT-1 (NONG BUA - ROUTE 11, 2.4 km)
MINE ROAD

STATION (km)			0	1	2 2.4
NAME OF VILLAGE			NONG BUA		ROUTE 11
TERRAIN			FLAT		
LAND USE	LEFT		VILLAGE	PADDY	
	RIGHT		VILLAGE	PADDY	
CARRIAGEWAY WIDTH (m)			5.6	6.0	5.3
ROAD FORMATION WIDTH (m)			10.0	10.0	8.8
ROAD SURFACE	TYPE		SAS?	SAP	
	CONDITION		FAIR		
ALIGNMENT	HORIZONTAL		GOOD		
	VERTICAL		GOOD		
EARTH WORK	LEFT	CUTTING DEPTH (m)			
		EMBANKMENT HEIGHT (m)	0.5	0.5	
	RIGHT	CUTTING DEPTH (m)			
		EMBANKMENT HEIGHT (m)	0.6	0.5	
OVERFLOW SECTION	LENGTH (km)				
	FLOOD HEIGHT (m)				
SIDE DITCH	LEFT	WIDTH (m)	3.0	3.0	
		DEPTH (m)	1.5	1.0	
	RIGHT	WIDTH (m)		5.0	
		DEPTH (m)		0.8	
BRIDGE AND DRAINAGE STRUCTURES			C-2(100)-15.8		

TABLE 9A-2
1 of 3

Table 9A-2

ROAD INVENTORY

SEGMENT 4 (ROUTE 11 - NONG NGU LUAH, 32.0 km)
MINE ROAD & RURAL ROAD

STATION (km)			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NAME OF VILLAGE			ROUTE 11									BAN PAK DONG			MUANG RAE			
TERRAIN										FLAT								
LAND USE	LEFT						FOREST/PADDY							MAIZE		VILLAGE	MAIZE	
	RIGHT						FOREST/PADDY							MAIZE		VILLAGE	MAIZE	
CARRIAGEWAY WIDTH (m)			5.3	4.8	4.8	5.0	4.8	3.7	4.0	5.5	5.5	5.2	5.0	5.2	5.2	3.7	3.2	3.0
ROAD FORMATION WIDTH (m)			8.8	8.5	8.0	7.5	7.0	5.6	7.4	8.7	8.0	7.2	7.0	7.2	8.4	5.8	6.0	5.5
ROAD SURFACE	TYPE									S.A.P.							E	
	CONDITION								PAIR/POOR								POOR	
ALIGNMENT	HORIZONTAL									PAIR							BAD	
	VERTICAL									PAIR								
EARTH WORK	LEFT	CUTTING DEPTH (m)			0.3	0.3							1.0					
		EMBANKMENT HEIGHT (m)										0.6		0.4		0.5		1.5
	RIGHT	CUTTING DEPTH (m)				0.3							0.5	0.3	0.5			
		EMBANKMENT HEIGHT (m)			0.5							0.5				0.3		1.5
OVERFLOW SECTION	LENGTH (km)																	
	FLOOD HEIGHT (m)																	
SIDE DITCH	LEFT	WIDTH (m)			1.0		0.7						0.5					
		DEPTH (m)			0.2		0.4						0.4					
	RIGHT	WIDTH (m)				0.5	1.0						1.5	0.8	1.0			
		DEPTH (m)				0.2	0.3						0.3	0.2	0.4			
BRIDGE AND DRAINAGE STRUCTURES				C-P(60)-8.2	C-P(60)-7.0	C-P(60)-7.8	C-P(60)-8.0	C-P(60)-8.2	Bx-T(3.5x13.0)	C-P-2(120)-6.0	C-P(80)-6.0		C-P(60)-9.0	C-P(80)-8.2		Bx-T(2.5x8.5)		C-P(100)-8.5	Bx-T(3.0x5.0)	C-P(60)-8.0

Table 9A-2

ROAD INVENTORY

TABLE 9A-2
2 of 3

SEGMENT 4 (ROUTE 11 - NONG NGU LUAM, 32.0 km) - Continued
MINE ROAD & RURAL ROAD

STATION (km)		15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
NAME OF VILLAGE		LAM PHET CHURUMPONG					BAN MAI SAMAKI			KLONG KHAM LUANG							
TERRAIN		FLAT															
LAND USE	LEFT	MAIZE					VILLAGE			MAIZE							
	RIGHT	MAIZE					VILLAGE			MAIZE							
CARRIAGEWAY WIDTH (m)		3.0	3.0	3.0	3.0	4.5	5.0	5.0	5.2	4.4	5.0	5.2	4.2	4.6	4.8	5.0	4.7
ROAD FORMATION WIDTH (m)		5.5	5.2	5.0	5.0	6.5	7.2	8.2	8.0	6.4	7.2	7.7	6.2	7.0	6.8	7.6	6.8
ROAD SURFACE	TYPE	E.							S.A.P.								
	CONDITION	VERY BAD	BAD				POOR		BAD		POOR				BAD	POOR	
ALIGNMENT	HORIZONTAL	FAIR															
	VERTICAL	FAIR															
EARTH WORK	LEFT CUTTING DEPTH (m)																
	LEFT EMBANKMENT HEIGHT (m)	1.5	0.7	1.0						1.5	0.6			1.2	1.0	1.0	0.5
	RIGHT CUTTING DEPTH (m)										0.5						
	RIGHT EMBANKMENT HEIGHT (m)	1.5		1.0				0.5		1.5				1.2	1.0	1.5	1.0
OVERFLOW SECTION	LENGTH (km)		0.2														
	FLOOD HEIGHT (m)		0.5														
SIDE DITCH	LEFT WIDTH (m)																
	LEFT DEPTH (m)																
	RIGHT WIDTH (m)																
	RIGHT DEPTH (m)																
BRIDGE AND DRAINAGE STRUCTURES		C-P(80)-8.0	Br-T(3.2x8.5)			C-P(60)-6.7	C-P(80)-8.0	C-P(60)-10.2	C-P(60)-10.2	C-P-2(80)-10.2	C-P(80)-10.2	C-P-2(80)-10.2	C-P-2(60)-10.2	C-P(60)-10.2	C-P(80)-10.2	C-P(60)-9.4	C-P-2(60)-10.2
		C-P(80)-10.2	C-P(80)-10.2	C-P(80)-10.2	C-P-2(80)-10.8	Br-T(3.2x12.6)	Br-T(3.0x14.0)	Br-T(2.9x16.5)	C-P-2(80)-9.2	C-P-2(80)-9.2	C-P-2(80)-10.5	C-P-2(80)-10.2	C-P(80)-10.2	C-P-3(80)-8.2	C-P-2(60)-10.2	C-P(80)-10.2	C-P(60)-8.4
		C-P-(80)-10.5	C-P-2(80)-10.0														

Table 9A-2

ROAD INVENTORY

SEGMENT 4 (ROUTE 11 - NONG NGU LUAM, 32.0 km) - Continued
MINE ROAD & RURAL ROAD

STATION (km)		30	31	32	
NAME OF VILLAGE				NONG NGU LUAM	
TERRAIN		PLAT			
LAND USE	LEFT	MAIZE		VILLAGE	
	RIGHT	MAIZE		VILLAGE	
CARRIAGEWAY WIDTH (m)		4.7	5.2	3.8	
ROAD FORMATION WIDTH (m)		6.8	7.2	6.0	
ROAD SURFACE	TYPE		S.A.P.		
	CONDITION		FAIR		
ALIGN-MENT	HORIZONTAL		FAIR		
	VERTICAL		FAIR		
EARTH WORK	LEFT CUTTING DEPTH (m)				
	LEFT EMBANKMENT HEIGHT (m)	0.5	1.2	0.4	
	RIGHT CUTTING DEPTH (m)				
	RIGHT EMBANKMENT HEIGHT (m)	1.0	1.5		
OVERFLOW SECTION	LENGTH (km)				
	FLOOD HEIGHT (m)				
SIDE DITCH	LEFT WIDTH (m)				
	LEFT DEPTH (m)				
	RIGHT WIDTH (m)				
	RIGHT DEPTH (m)				
BRIDGE AND DRAINAGE STRUCTURES		C-P(80)-10.1	B-T(3.0x24.5) B-T(2.0x11.5)	C-P(80)-9.2	

Table 9A-3

ROAD INVENTORY

SEGMENT 8 (NONG NGU LUAM - HIN DAT YAI, 13.3 km)
RURAL ROAD

STATION (km)		0	1	2	3	4	5	6	7	8	9	10	11	12	13 13.3
NAME OF VILLAGE		NONG NGU LUAM				NONG CHAI KHOI									HIN DAT YAI
TERRAIN		FLAT					ROLLING							FLAT	
LAND USE	LEFT	MAIZE/FOREST				VILLAGE	MAIZE		VILLAGE	BEANS		MAIZE			
	RIGHT	MAIZE/FOREST				VILLAGE	MAIZE		VILLAGE	BEANS		MAIZE			
CARRIAGEWAY WIDTH (m)		3.8	4.3	4.8	4.8	3.4	3.7	2.8	2.7	3.0	2.7	2.5	3.2	3.0	2.9
ROAD FORMATION WIDTH (m)		6.0	6.8	7.0	7.8	6.4	6.6	4.7	4.7	5.0	5.0	5.0	5.7	5.0	5.3
ROAD SURFACE	TYPE	S.A.P.													
	CONDITION	POOR			BAD	VERY BAD	BAD				VERY BAD	POOR			
ALIGNMENT	HORIZONTAL	FAIR													
	VERTICAL	POOR						BAD			POOR				
EARTH WORK	LEFT CUTTING DEPTH (m)				0.3						0.2				
	LEFT EMBANKMENT HEIGHT (m)	0.4	0.5										0.4	1.0	
	RIGHT CUTTING DEPTH (m)				0.3										
	RIGHT EMBANKMENT HEIGHT (m)		0.5										0.5	1.0	
OVERFLOW SECTION	LENGTH (km)												0.2	0.5	
	FLOOD HEIGHT (m)												0.3	0.6	
SIDE DITCH	LEFT WIDTH (m)														
	LEFT DEPTH (m)														
	RIGHT WIDTH (m)														
	RIGHT DEPTH (m)														
BRIDGE AND DRAINAGE STRUCTURES		C-P(80)-10.1	C-P(80)-10.1	C-P(60)-9.4	Bx_I(3.7x9.4)	C-P(40)-7.0	Bx-I(3.0x9.0) C-P(40)-7.5	C-P(40)-7.1	C-P(40)-6.0	C-P-2(60)-6.2	C-P(40)-6.8	C-P(60)-7.0	C-P(40)-7.6	C-P(60)-5.0	C-P(100)-8.5 C-P(60)-6.0 C-P(60)-6.4

TABLE 9A-4

Table 9A-4

ROAD INVENTORY

SEGMENT 9 (WANG PHIKUN - SAP MAI DAENG, 12.3 km)

ARD ROAD

STATION (km)		0 1 2 3 4 5 6 7 8 9 10 11 12 12.3
NAME OF VILLAGE		WANG PHIKUN — BONG BUN CHALOEN — SAP MAI DAENG
TERRAIN		FLAT
LAND USE	LEFT	MAIZE; PADDY (4–5); MAIZE
	RIGHT	MAIZE; PADDY (4–5); MAIZE
CARRIAGEWAY WIDTH (m)		6.5 5.5 6.5 6.5 3.5 5.0 5.3 5.5 5.5 4.5 5.0 5.0 5.0
ROAD FORMATION WIDTH (m)		9.5 8.3 9.5 8.8 6.5 7.5 7.5 7.0 7.3 8.0 8.2 8.5 8.0
ROAD SURFACE	TYPE	S.A.P.
	CONDITION	FAIR; BAD (4.5–5.0); FAIR
ALIGNMENT	HORIZONTAL	
	VERTICAL	
EARTH WORK	LEFT CUTTING DEPTH (m)	0.5 1.5 1.5 1.0
	LEFT EMBANKMENT HEIGHT (m)	0.5 0.6 0.5 1.3
	RIGHT CUTTING DEPTH (m)	1.5
	RIGHT EMBANKMENT HEIGHT (m)	0.4 0.7 0.6 1.0 0.5
OVERFLOW SECTION	LENGTH (km)	0.4 (4.5–4.9); 0.3 (11.5–11.8)
	FLOOD HEIGHT (m)	0.3 (4.5–4.9); 1.0 (11.5–11.8)
SIDE DITCH	LEFT WIDTH (m)	1.5 3.5
	LEFT DEPTH (m)	0.8 0.5
	RIGHT WIDTH (m)	4.0
	RIGHT DEPTH (m)	0.5
BRIDGE AND DRAINAGE STRUCTURES		C-P(80)-9.3; Bx-T(3.5x15.0); C-P(100)-10.0; C-P(80)-9.5; C-P(60)-10.0; C-P(80)-9.5; C-P(80)-11.7; Bx-T(4.0x11.3); C-P(80)-9.0; C-P(80)-9.0; C-P(80)-8.5; C-P(80)-5.0; C-P-3(80)-6.2; C-P(60)-11.0; C-P(60)-11.5; C-P(80)-10.3

Table 9A-5

ROAD INVENTORY

SEGMENT 10 (HIN DAT YAI - SAP MAI DAENG, 6.0 km)
ARD ROAD

STATION (km)		0	1	2	3	4	5	6	
NAME OF VILLAGE		HIN DAT YAI			SAP PHRAIWAN			SAP MAI DAENG	
TERRAIN		ROLLING			PLAT				
LAND USE	LEFT				MAIZE				
	RIGHT				MAIZE				
CARRIAGEWAY WIDTH (m)		4.3	5.0	5.2	5.2	5.3	4.8	4.7	
ROAD FORMATION WIDTH (m)		7.0	7.8	8.5	8.0	8.5	7.3	8.2	
ROAD SURFACE	TYPE				S.A.P.				
	CONDITION				FAIR				
ALIGNMENT	HORIZONTAL				FAIR				
	VERTICAL				FAIR				
EARTH WORK	LEFT CUTTING DEPTH (m)								
	LEFT EMBANKMENT HEIGHT (m)	0.5	1.0	0.8	0.3	1.3	0.6	1.7	
	RIGHT CUTTING DEPTH (m)								
	RIGHT EMBANKMENT HEIGHT (m)	0.5	0.7	1.2	0.6	1.3	0.8	1.5	
OVERFLOW SECTION	LENGTH (km)				0.1				
	FLOOD HEIGHT (m)				0.2				
SIDE DITCH	LEFT WIDTH (m)								
	LEFT DEPTH (m)								
	RIGHT WIDTH (m)								
	RIGHT DEPTH (m)								
BRIDGE AND DRAINAGE STRUCTURES		C-P-2(80)-14.0 C-P-2(80)-15.0	C-P-2(80)-14.0	C-P-2(60)-10.0	C-P(40)-5.0 C-P-2(80)-10.0 C-P(60)-10.0 C-P-3(80)-11.0	C-P-3(100)-11.0	Br-T(3.0x9.0) (BROKEN)	C-P(80)-16.0	C-P(80)-6.8 C-P-2(100)-16.2 C-P(100)-15.2 C-P(100)-15.2

Table 9A-6

ROAD INVENTORY

SEGMENT 11 (HIN DAT YAI - KHAO KHAT, 4.7 km)

RURAL ROAD

STATION (km)			0 1 2 3 4 4.7
NAME OF VILLAGE			HIN DAT YAI → ← KHAO KHAT
TERRAIN			ROLLING
LAND USE		LEFT	MAIZE VILLAGE MAIZE
		RIGHT	MAIZE VILLAGE MAIZE
CARRIAGEWAY WIDTH (m)			3.0 2.8 2.9 3.0 3.0
ROAD FORMATION WIDTH (m)			5.5 5.2 5.7 5.8 4.5
ROAD SURFACE	TYPE		S.A.P.
	CONDITION		POOR
ALIGNMENT	HORIZONTAL		FAIR
	VERTICAL		BAD
EARTH WORK	LEFT	CUTTING DEPTH (m)	0.2 0.2
		EMBANKMENT HEIGHT (m)	
	RIGHT	CUTTING DEPTH (m)	0.2
		EMBANKMENT HEIGHT (m)	
OVERFLOW SECTION	LENGTH (km)		0.3
	FLOOD HEIGHT (m)		0.5
SIDE DITCH	LEFT	WIDTH (m)	0.3
		DEPTH (m)	0.3
	RIGHT	WIDTH (m)	0.3
		DEPTH (m)	0.3
BRIDGE AND DRAINAGE STRUCTURES			C-P(40)-5.8 C-P(60)-5.0 C-P(60)-7.0 C-P(50)-6.0 C-P(50)-6.0 C-P(60)-6.4

Table 9A-7

ROAD INVENTORY

SEGMENT 14 (KHAO KHAT - SAP SAMO THOT (N), 6.7 km)

RURAL ROAD

STATION (km)		0	1	2	3	4	5	6	6.7
NAME OF VILLAGE		KHAO KHAT							SAP SAMO THOT (N)
TERRAIN		FLAT							
LAND USE	LEFT	MAIZE						VILLAGE	
	RIGHT	MAIZE						VILLAGE	
CARRIAGEWAY WIDTH (m)		2.8	3.0	3.2	3.0	3.0	3.0	3.0	
ROAD FORMATION WIDTH (m)		5.5	5.5	5.7	5.5	5.2	5.3	6.0	
ROAD SURFACE	TYPE	S.A.P.						S.B.S.T.	
	CONDITION	POOR						FAIR	
ALIGNMENT	HORIZONTAL	FAIR							
	VERTICAL	BAD		FAIR					
EARTH WORK	LEFT CUTTING DEPTH (m)								
	LEFT EMBANKMENT HEIGHT (m)	0.5	0.5	0.7	0.5	1.2			
	RIGHT CUTTING DEPTH (m)								
	RIGHT EMBANKMENT HEIGHT (m)	1.0	0.5	0.7	0.5	1.0			
OVERFLOW SECTION	LENGTH (km)								
	FLOOD HEIGHT (m)								
SIDE DITCH	LEFT WIDTH (m)								
	LEFT DEPTH (m)								
	RIGHT WIDTH (m)								
	RIGHT DEPTH (m)								
BRIDGE AND DRAINAGE STRUCTURES		C-P(80)-8.0	C-P-2(60)-11.2 (3.0x4.5)	B-T(2.8x9.5)	C-P(60)-7.0	C-P-2(60)-8.2	C-P(80)-8.5	C-P(80)-6.0	

TABLE 9A-8

Table 9A-8

ROAD INVENTORY

SEGMENT 15 (SAP MAI DAENG - SAP SAMO THOT (S), 7.3 km)

ARD ROAD

STATION (km)		0	1	2	3	4	5	6	7	7.3
NAME OF VILLAGE		SAP MAI DAENG							SAP SAMO THOT (S)	
TERRAIN		ROLLING			PLAT			ROLLING	PLAT	
LAND USE	LEFT	MAIZE								
	RIGHT	MAIZE								
CARRIAGEWAY WIDTH (m)		4.7	5.4	5.5	5.3	5.7	5.6	5.4	4.8	
ROAD FORMATION WIDTH (m)		8.2	8.6	8.5	8.0	8.2	7.8	7.8	7.3	
ROAD SURFACE	TYPE	S.A.P.							S.B.S.T.	
	CONDITION	FAIR								
ALIGNMENT	HORIZONTAL	FAIR								
	VERTICAL	BAD			FAIR			BAD	FAIR	
EARTH WORK	LEFT CUTTING DEPTH (m)									
	LEFT EMBANKMENT HEIGHT (m)									
	RIGHT CUTTING DEPTH (m)									
	RIGHT EMBANKMENT HEIGHT (m)									
OVERFLOW SECTION	LENGTH (km)									
	FLOOD HEIGHT (m)									
SIDE DITCH	LEFT WIDTH (m)									
	LEFT DEPTH (m)									
	RIGHT WIDTH (m)									
	RIGHT DEPTH (m)									
BRIDGE AND DRAINAGE STRUCTURES			C-P(100)-12.0	C-P(60)-11.0	C-P(80)-11.0	C-P(100)-12.0	Bx-T(3.8x18.0)	C-P(80)-11.0	C-P-2(80)-13.0 C-P(100)-11.0	C-P(80)-13.0

TABLE 9A-9
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Table 9A-9

ROAD INVENTORY

SEGMENT 27 & 29 (WANG KATHA - NON PUAI, 33.0 km)
ARD ROAD 11010 & RURAL ROAD

STATION (km)		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NAME OF VILLAGE		WANG KATHA	ARD ROAD			HUAI SAPAN										KHOK SA-AT	
TERRAIN								ROLLING									
LAND USE	LEFT							FOREST							PADDY	VILLAGE	
	RIGHT							FOREST							PADDY	VILLAGE	
CARRIAGEWAY WIDTH (m)		4.3	4.5	3.9	3.8	4.3	4.3	4.2	4.0	4.2	4.1	4.0	4.3	4.0	4.3	4.5	4.0
ROAD FORMATION WIDTH (m)		6.1	5.8	5.8	5.8	7.0	7.0	6.0	5.0	5.2	5.4	5.5	6.7	5.8	6.8	7.4	7.0
ROAD SURFACE	TYPE							S.A.P.									
	CONDITION							FAIR									
ALIGNMENT	HORIZONTAL		FAIR			BAD		FAIR			BAD			FAIR			
	VERTICAL		FAIR			BAD		FAIR			BAD		FAIR		BAD	FAIR	
EARTH WORK	LEFT CUTTING DEPTH (m)												1.5	0.7			0.4
	LEFT EMBANKMENT HEIGHT (m)	1.1	0.8	0.5	0.6	0.9	0.5	1.0		0.8	0.8				0.6	0.8	
	RIGHT CUTTING DEPTH (m)													0.7			0.4
	RIGHT EMBANKMENT HEIGHT (m)	0.5	0.7		0.3	0.5	0.5	0.9		1.0	1.0	0.5			0.9	0.9	
OVERFLOW SECTION	LENGTH (km)													0.05			0.2
	FLOOD HEIGHT (m)													0.5			0.5
SIDE DITCH	LEFT WIDTH (m)	1.5						1.5		1.5			2.0	1.0			
	LEFT DEPTH (m)	0.3						0.4		0.3			0.5	0.7			
	RIGHT WIDTH (m)	1.5		3.0				2.0		1.2				1.5			
	RIGHT DEPTH (m)	0.2		0.5				0.4		0.5				0.5			
BRIDGE AND DRAINAGE STRUCTURES		C-P-2(60)-12.3 C-P-2(60)-12.4	C-P(60)-12.4 C-P-3(60)-13.4	C-P-2(80)-14.8 C-P(60)-12.4 C-P(60)-10.4	Bx-T(4.0x25.3)	C-P-2(60)-13.5 C-P(80)-14.4	C-P(50)-12.3 C-P-2(60)-12.6 C-P-2(60)-13.4	C-P-2(50)-12.4 C-P-2(50)-12.4	C-P(50)-12.4 C-P(60)-12.4	C-P-2(60)-12.3 C-P-2(60)-12.5	C-P(60)-13.4 C-P-2(80)-12.5 C-P(50)-12.3	Bx-T(4.0x25.5)	C-P-2(80)-13.4 C-P-2(60)-13.4	C-P-2(80)-14.5	C-P-2(60)-12.8	C-P-2(60)-12.4	C-P(60)-12.4 C-P-2(60)-12.4 C-P(80)-12.8 C-P(60)-12.0	C-P(80)-13.4 C-P(80)-12.4

Table 9A-9

ROAD INVENTORY

SEGMENT 27 & 29 (WANG KATHA - NON PUAI, 33.0 km) - Continued
ARD ROAD 11010 & RURAL ROAD

STATION (km)			15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
NAME OF VILLAGE							SEGMENT 27 ←→ SEGMENT 29		NONG YANANG	NONG BUA RAWE		ARD ROAD ←→ RURAL ROAD						
TERRAIN				ROLLING			FLAT				ROLLING FLAT		ROLLING					
LAND USE	LEFT			FOREST			PADDY	FOREST		PADDY	VILLAGE	PADDY	FOREST					
	RIGHT			FOREST			PADDY	FOREST		PADDY	VILLAGE	PADDY	CASSAVA	FOREST				
CARRIAGEWAY WIDTH (m)			4.0	4.0	4.1	4.2	4.3	4.5	5.6	5.5	5.5	5.1	5.0	5.0	5.0	4.0	3.0	3.0
ROAD FORMATION WIDTH (m)			7.0	6.2	6.6	6.7	6.8	6.7	7.6	7.5	7.5	6.2	6.0	7.0	7.5	5.5	4.5	4.5
ROAD SURFACE	TYPE			S.A.P.										E.		S.A.P.		
	CONDITION			FAIR						BAD	FAIR			VERY BAD		BAD		
ALIGNMENT	HORIZONTAL									FAIR								
	VERTICAL		BAD	FAIR	BAD	FAIR	BAD	FAIR					BAD	FAIR				
EARTH WORK	LEFT	CUTTING DEPTH (m)	0.4	0.7									0.3			0.3	0.7	0.3
		EMBANKMENT HEIGHT (m)					0.9	0.3	0.7	1.4		0.5						
	RIGHT	CUTTING DEPTH (m)	0.4															0.5
		EMBANKMENT HEIGHT (m)		0.7	0.7	0.9	0.8	0.4	0.8	1.5		0.4				0.3	0.7	
OVERFLOW SECTION	LENGTH (km)		0.1	0.1			0.2		0.1	0.3	0.1	0.9	0.3	0.2			0.3	
	FLOOD HEIGHT (m)		3.0	3.0			0.5		0.5	0.7	0.1	0.3	0.2	0.5			1.0	
SIDE DITCH	LEFT	WIDTH (m)			0.2						0.7		1.0					
		DEPTH (m)			0.7						0.2		0.3					
	RIGHT	WIDTH (m)				3.5					1.0		0.7					
		DEPTH (m)				0.5					0.3		0.3					
BRIDGE AND DRAINAGE STRUCTURES				Bx-C(7.0x105)	C-P(60)-12.3	C-P-2(80)-13.3	C-P(60)-12.2	C-P(60)-11.3	C-P(40)-11.5	C-P-2(80)-13.5	Bx-T(4.0x20.3)	C-P-2(80)-12.4	Bx-T(4.0x20.4)	C-P(60)-11.5	C-P-3(80)-11.0	C-P-3(80)-13.5	C-P-2(60)-11.1	C-P(40)-10.0

STATION (km)			15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
BRIDGE AND DRAINAGE STRUCTURES			C-P(60)-10.3	C-P(60)-10.4	C-P(60)-10.0	C-P(60)-11.0	C-P(60)-8.0	C-P(60)-8.0	C-P(60)-8.0	C-P(60)-8.0	C-P(60)-8.0	C-P(60)-8.0	C-P(60)-8.0	C-P(60)-8.0				

Table 9A-9

ROAD INVENTORY

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SEGMENT 27 & 29 (WANG KATHA - NON PUAI, 33.0 km) - Continued
ARD ROAD 11010 & RURAL ROAD

STATION (km)			30 31 32 33
NAME OF VILLAGE			PAKHAI CHONG MAEO; RURAL ROAD; NON PUAI
TERRAIN			TERRACE
LAND USE		LEFT	FOREST | JUTE/PADDY
		RIGHT	FOREST | JUTE/PADDY
CARRIAGEWAY WIDTH (m)			3.0 3.5
ROAD FORMATION WIDTH (m)			4.5 4.8 3.0 4.5
ROAD SURFACE	TYPE		S.A.P.
	CONDITION		FAIR
ALIGNMENT	HORIZONTAL		FAIR | BAD | FAIR
	VERTICAL		FAIR
EARTH WORK	LEFT	CUTTING DEPTH (m)	
		EMBANKMENT HEIGHT (m)	
	RIGHT	CUTTING DEPTH (m)	
		EMBANKMENT HEIGHT (m)	
OVERFLOW SECTION	LENGTH (km)		1.1
	FLOOD HEIGHT (m)		0.5
SIDE DITCH	LEFT	WIDTH (m)	
		DEPTH (m)	
	RIGHT	WIDTH (m)	
		DEPTH (m)	
BRIDGE AND DRAINAGE STRUCTURES			C-P(60)-8.0; C-P(60)-8.0; Bx-C(7.0x100) UNDER CONST.; C-P(100)-8.4

Table 9A-10

ROAD INVENTORY

SEGMENT 28 (HUAI NAM DAM - LUP PHO, 33.0 km)

IRD ROAD

STATION (km)			0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
NAME OF VILLAGE			HUAI NAM DAM
TERRAIN			ROLLING
LAND USE		LEFT	FOREST
		RIGHT	FOREST
CARRIAGEWAY WIDTH (m)			3.5 4.0 3.5 3.5 4.0 3.5 3.5 3.5 3.5 3.8 3.5 3.5 4.0 4.0 3.5
ROAD FORMATION WIDTH (m)			4.5 5.0 8.5 7.0 6.5 7.0 7.3 7.5 7.5 7.5 7.0 8.0 10.0 10.0 8.5 8.5
ROAD SURFACE	TYPE		E. S.A.P. E.
	CONDITION		BAD FAIR BAD FAIR
ALIGNMENT	HORIZONTAL		FAIR
	VERTICAL		FAIR BAD FAIR BAD FAIR BAD FAIR BAD FAIR
EARTH WORK	LEFT	CUTTING DEPTH (m)	0.3 0.5 0.6 2.5 0.2
		EMBANKMENT HEIGHT (m)	0.8 0.5 0.8 0.5
	RIGHT	CUTTING DEPTH (m)	0.5 0.6 2.5
		EMBANKMENT HEIGHT (m)	1.0 0.6 0.5
OVERFLOW SECTION	LENGTH (km)		
	FLOOD HEIGHT (m)		
SIDE DITCH	LEFT	WIDTH (m)	
		DEPTH (m)	
	RIGHT	WIDTH (m)	1.0 1.5
		DEPTH (m)	0.8 0.8
BRIDGE AND DRAINAGE STRUCTURES			C-P(100)-7.2 C-P(100)-11.0 Bx-C(6.5x20.0) C-P(60)-10.0 Bx-C(6.5x20.0) C-P(100)-12.0 C-P(60)-10.0 C-P(100)-16.0 C-P(80)-10.3 C-P(60)-10.3 C-P(80)-10.3 C-P(80)-10.0 C-P(100)-12.0 C-P(100)-12.0 C-P(100)-12.2 C-P(100)-12.3 C-B(2.4x2.4)-16.0 C-P(60)-8.0 C-P(60)-13.3 C-P(100)-14.0 C-B(2.4x2.4)-14.0 C-P(100)-17.0

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Table 9A-10

ROAD INVENTORY

SEGMENT 28 (HUAI NAM DAM - LUP PHO, 33.0 km) - Continued

IRD ROAD

STATION (km)			15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
NAME OF VILLAGE																		
TERRAIN			ROLLING									FLAT			ROLLING			
LAND USE	LEFT		FOREST									PADDY			CASSAVA		FOREST	
	RIGHT		FOREST									PADDY			CASSAVA		FOREST	
CARRIAGEWAY WIDTH (m)			3.5	3.5	3.5	4.0	3.5	3.5	4.0	4.5	4.5	3.7	3.5	3.0	4.0	3.8	3.0	3.0
ROAD FORMATION WIDTH (m)			8.5	7.5	7.5	8.5	7.8	7.0	7.5	8.0	7.0	8.0	8.5	6.5	8.0	7.3	7.0	7.5
ROAD SURFACE	TYPE		S.A.P.												S.A.P.			
	CONDITION		FAIR												GOOD			
ALIGNMENT	HORIZONTAL			BAD									FAIR					
	VERTICAL		FAIR		BAD			FAIR	BAD					FAIR				
EARTH WORK	LEFT	CUTTING DEPTH (m)				1.6												
		EMBANKMENT HEIGHT (m)	1.7				2.5	0.8			0.9	1.2	0.8	1.9				1.3
	RIGHT	CUTTING DEPTH (m)				1.5												
		EMBANKMENT HEIGHT (m)	1.5	2.5			3.5	1.0		0.9	0.8	1.0	0.8	1.8		1.0		1.3
OVERFLOW SECTION	LENGTH (km)																	
	FLOOD HEIGHT (m)																	
SIDE DITCH	LEFT	WIDTH (m)																
		DEPTH (m)																
	RIGHT	WIDTH (m)																
		DEPTH (m)																
BRIDGE AND DRAINAGE STRUCTURES			C-P(100)-14.2	C-P(60)-12.0		C-P(100)-15.0	C-P(100)-16.2	C-P(100)-14.0	C-P(100)-16.0	C-P(60)-17.5		C-P(60)-10.0	C-B(1.8x1.8)-16.0	C-P(60)-8.3		C-P-2(100)-11.0	C-P-2(100)-11.2	C-P-2(20)-11.0	Bx-C(6.5x20.0)	C-P(100)-11.1	C-P(150)-14.4	Bx-C(6.5x20.0)	C-P(80)-10.5	C-P(100)-11.5	C-P(100)-10.0	C-P-2(100)-12.4	C-P-2(100)-12.3

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Table 9A-10

ROAD INVENTORY

SEGMENT 28 (HUAI NAM DAM - LUP PHO, 33.0 km) - Continued
IRD ROAD

STATION (km)			30	31	32	33
NAME OF VILLAGE						LUP PHO
TERRAIN				ROLLING		
LAND USE		LEFT		FOREST		PADDY
		RIGHT		FOREST		PADDY
CARRIAGEWAY WIDTH (m)			3.5	3.5	3.0	3.5
ROAD FORMATION WIDTH (m)			7.0	7.0	7.0	6.5
ROAD SURFACE	TYPE			S.A.P.		
	CONDITION			GOOD		
ALIGNMENT	HORIZONTAL			FAIR		
	VERTICAL			FAIR		
EARTH WORK	LEFT	CUTTING DEPTH (m)				
		EMBANKMENT HEIGHT (m)			0.5	1.3
	RIGHT	CUTTING DEPTH (m)				
		EMBANKMENT HEIGHT (m)			0.5	1.3
OVERFLOW SECTION	LENGTH (km)					
	FLOOD HEIGHT (m)					
SIDE DITCH	LEFT	WIDTH (m)				
		DEPTH (m)				
	RIGHT	WIDTH (m)				
		DEPTH (m)				
BRIDGE AND DRAINAGE STRUCTURES					C-P(100)-12.3	C-P(80)-10.3

Table 9A-11

ROAD INVENTORY

SEGMENT 30 (NON PUAI - LUP PHO, 6.0 km)

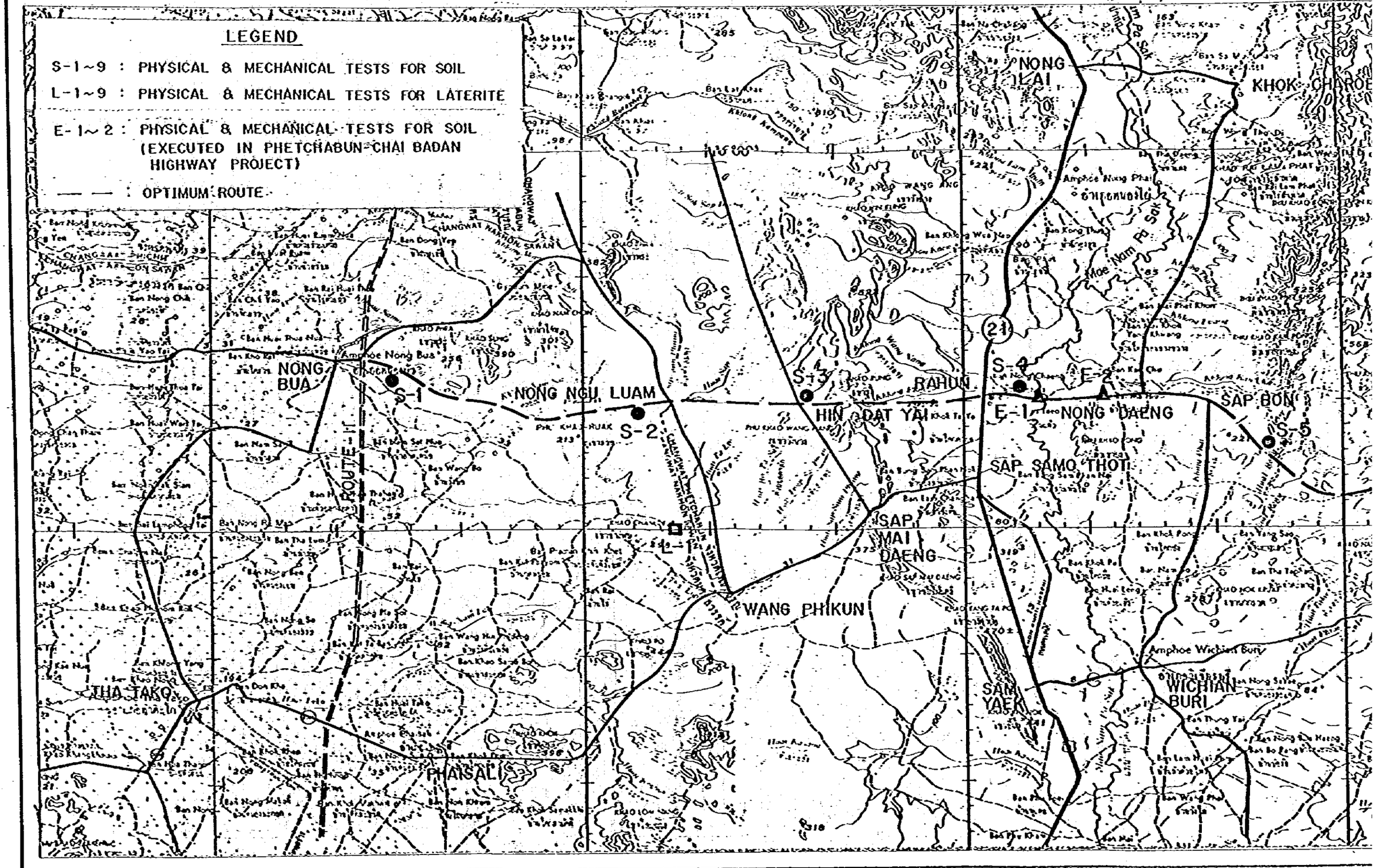
RURAL ROAD

STATION (km)		0 1 2 3 4 5 6
NAME OF VILLAGE		NON PUAI → ← LUP PHO
TERRAIN		FLAT
LAND USE	LEFT	PADDY/FOREST/KENAF
	RIGHT	PADDY/FOREST/KENAF
CARRIAGEWAY WIDTH (m)		
ROAD FORMATION WIDTH (m)		4.8 5.4 5.0 5.0 6.0 5.0 4.4
ROAD SURFACE	TYPE	S.A.P.
	CONDITION	FAIR
ALIGNMENT	HORIZONTAL	BAD
	VERTICAL	BAD
EARTH WORK	LEFT CUTTING DEPTH (m)	
	LEFT EMBANKMENT HEIGHT (m)	
	RIGHT CUTTING DEPTH (m)	
	RIGHT EMBANKMENT HEIGHT (m)	
OVERFLOW SECTION	LENGTH (km)	1.0
	FLOOD HEIGHT (m)	0.3
SIDE DITCH	LEFT WIDTH (m)	
	LEFT DEPTH (m)	
	RIGHT WIDTH (m)	
	RIGHT DEPTH (m)	
BRIDGE AND DRAINAGE STRUCTURES		C-P(50)-7.0 C-P(50)-8.2 C-P(50)-9.0 C-P(40)-8.2 C-P(40)-8.1 C-P(40)-7.8 Bx-R(3.6x15.5) Bx-R(3.6x6.0) Bx-R(3.6x11.7) Bx-R(3.4x17.8)

Appendix 10

土質および材料調査

FIGURE 10A-1 LOCATI



IOA-I LOCATION OF SOIL SAMPLINGS

LOCATION OF SOIL SAMPLINGS

FIGURE IOA-I

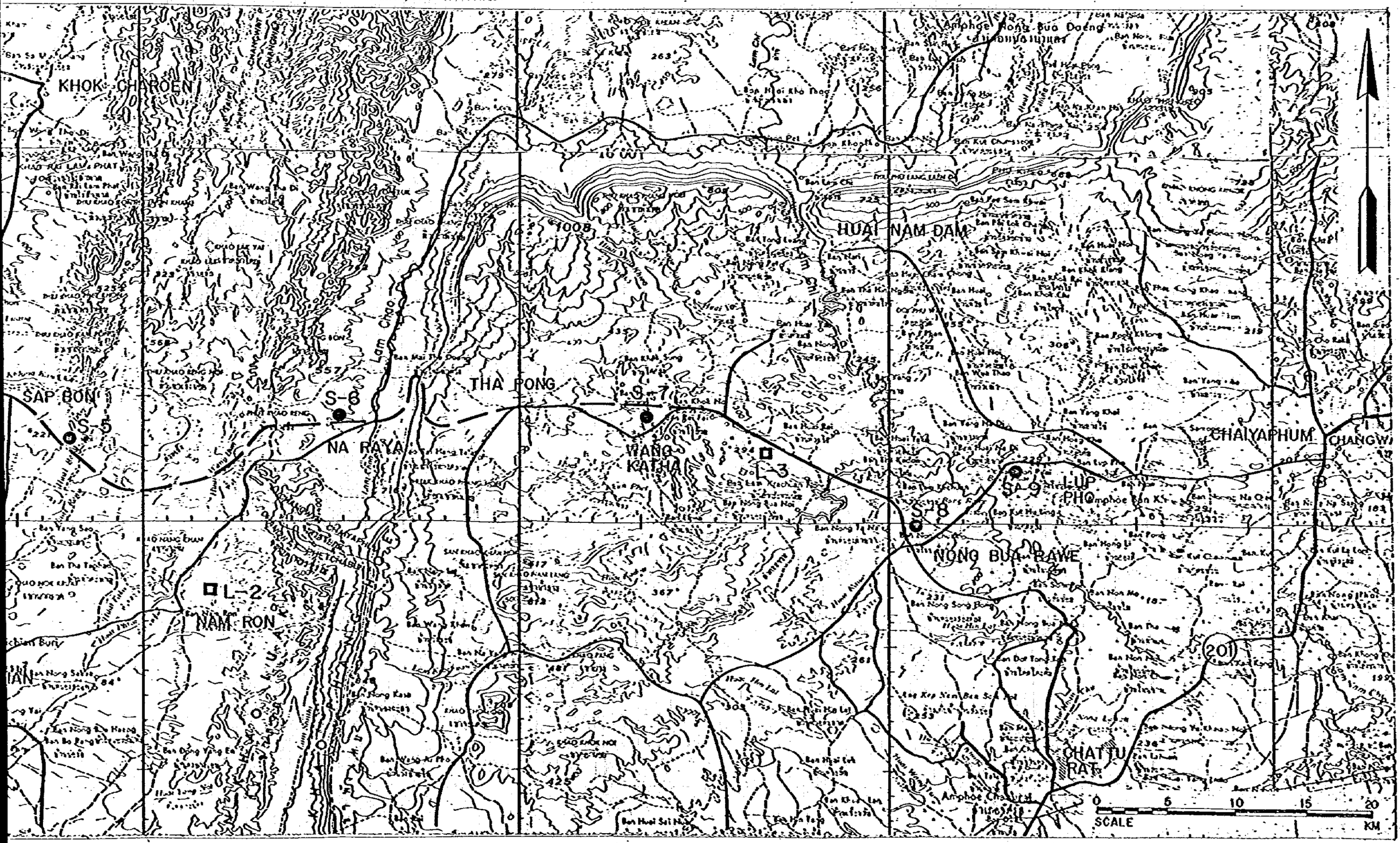
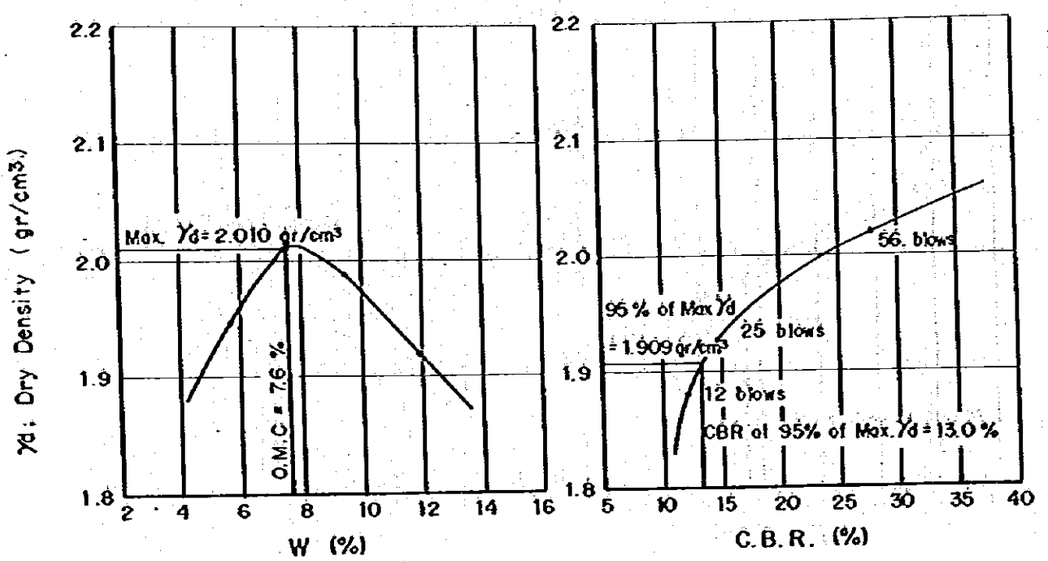
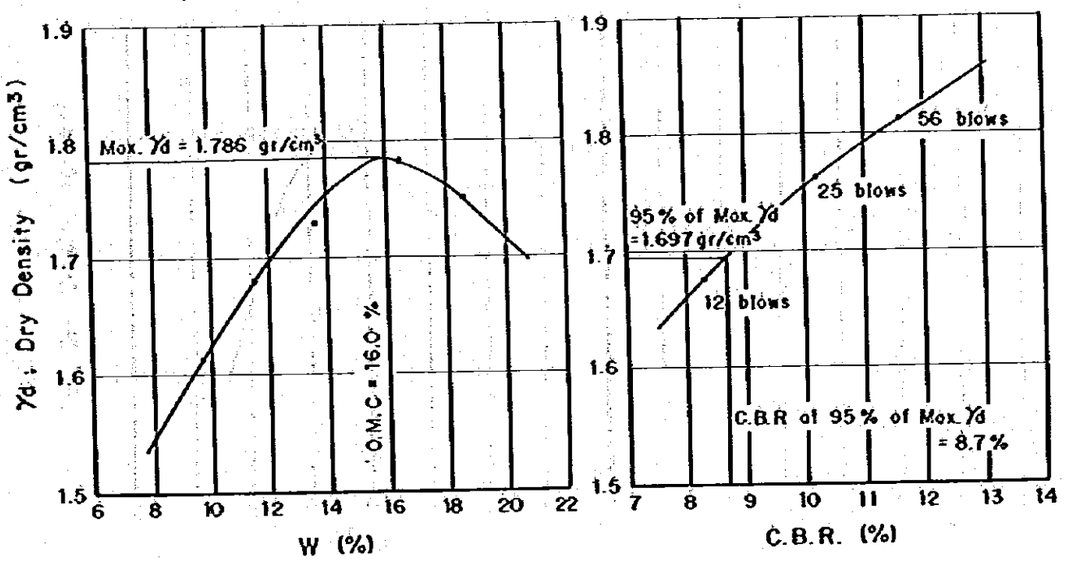


Figure 10A-2 SOIL TEST RESULTS (1)

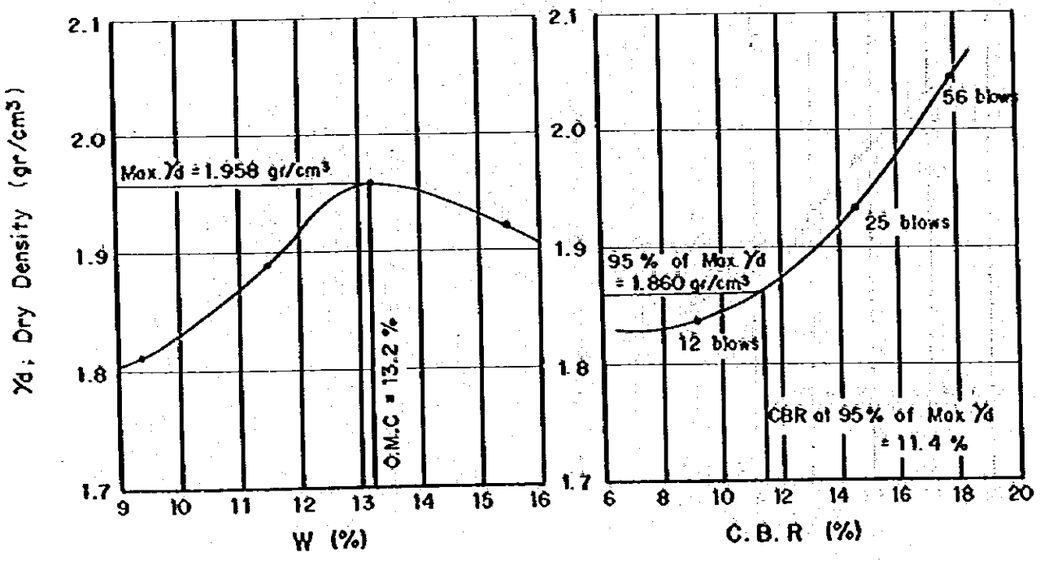
SAMPLE S-1 (SEGMENT-2)



SAMPLE S-3 (SEGMENT-7)



SAMPLE S-2 (SEGMENT-5)



SAMPLE S-4 (SEGMENT-18)

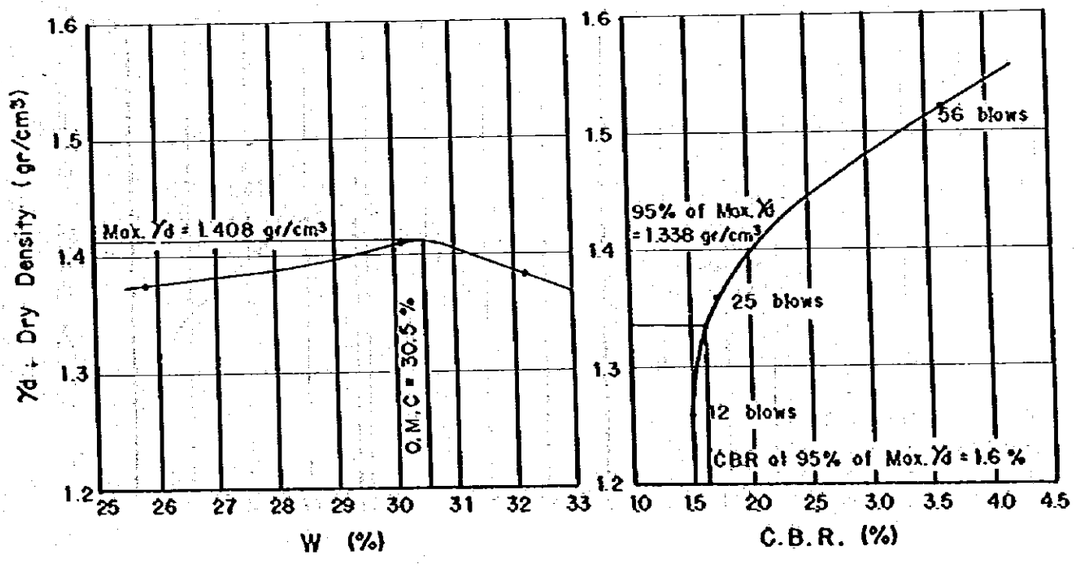
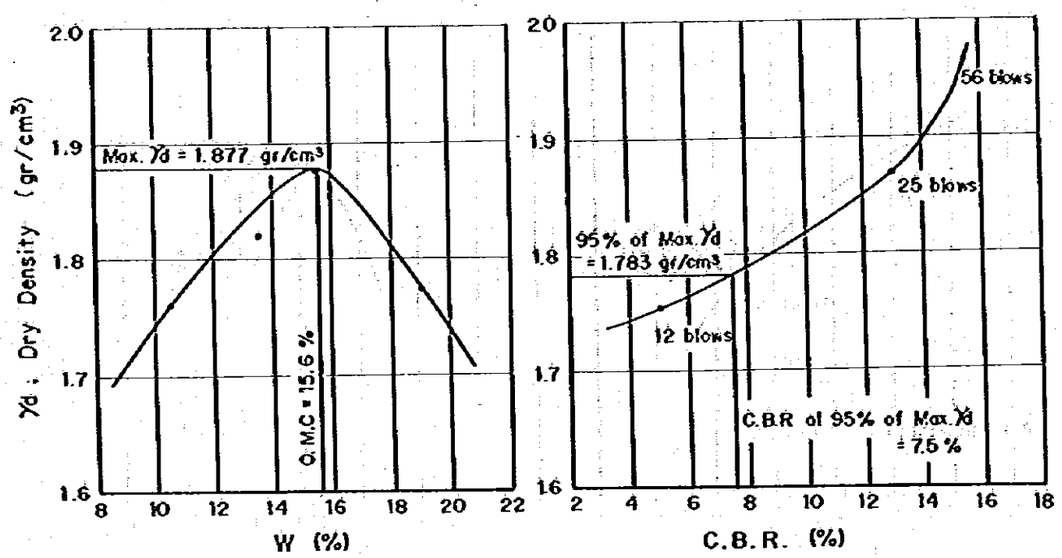
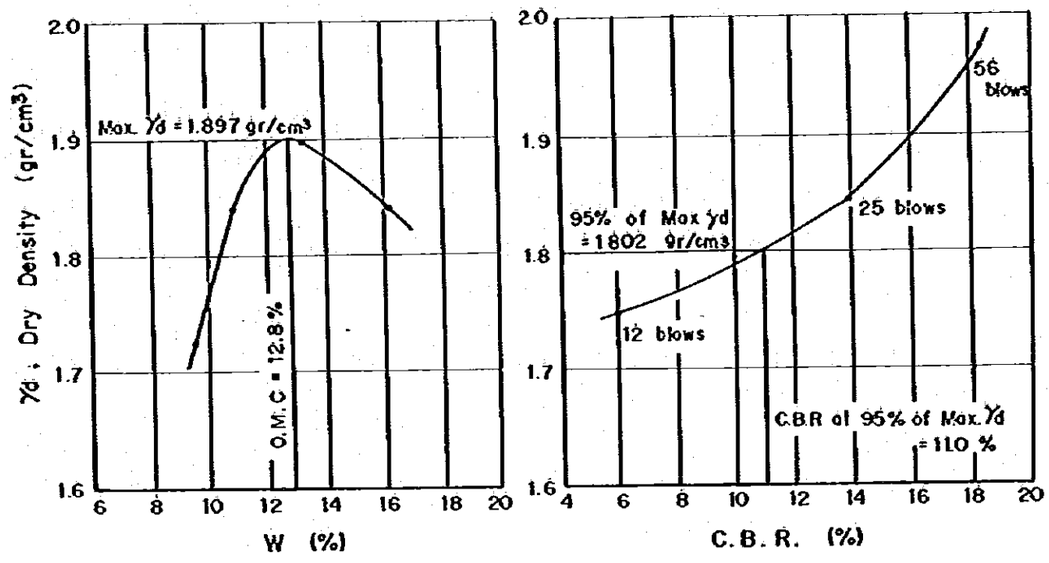


Figure 10A-2 SOIL TEST RESULTS (2)

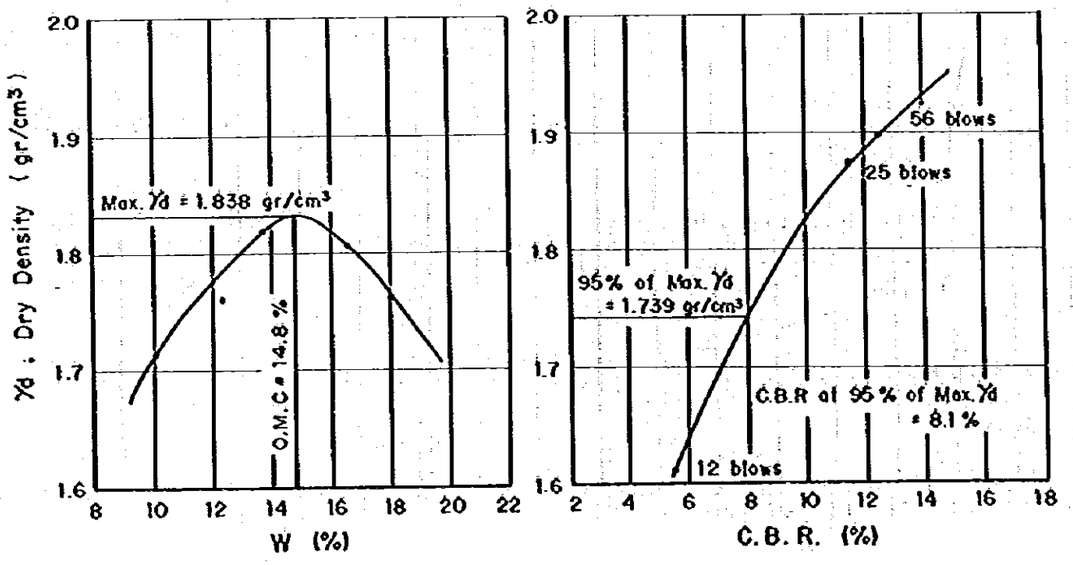
SAMPLE S-5 (SEGMENT-21)



SAMPLE S-7 (SEGMENT-27)



SAMPLE S-6 (SEGMENT-22)



SAMPLE S-8 (SEGMENT-29)

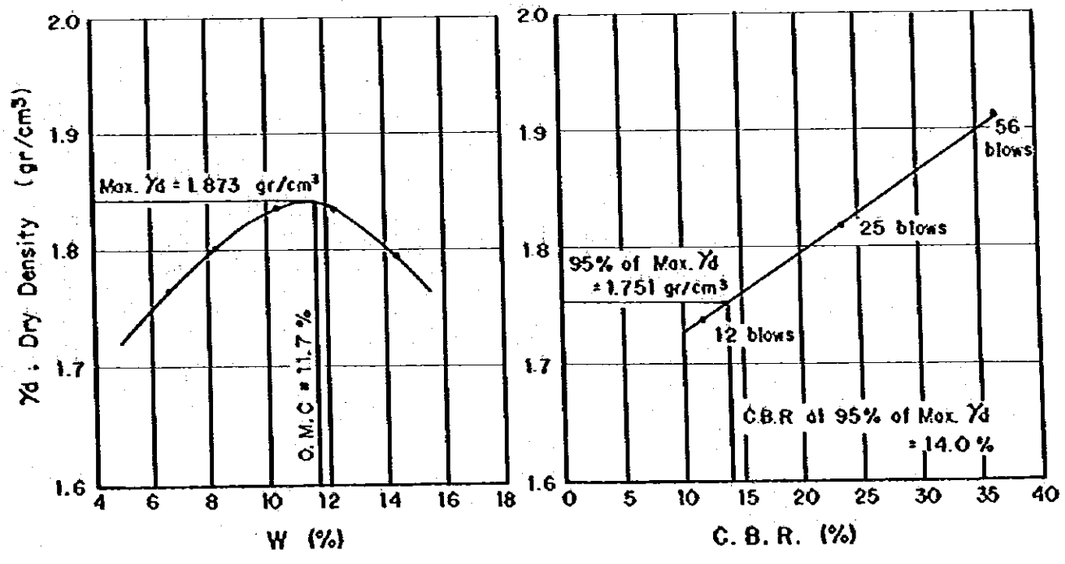
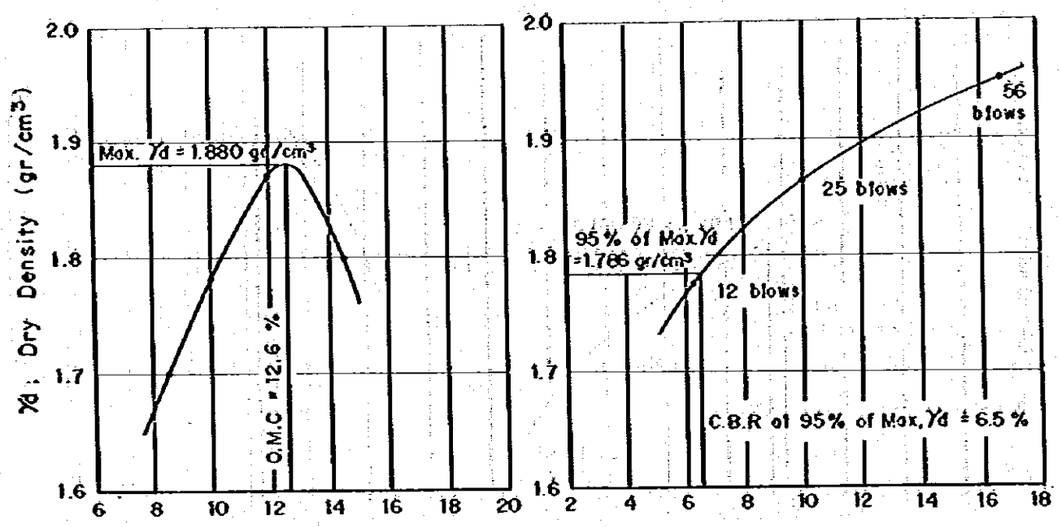


Figure 10A-2 SOIL TEST RESULTS (3)

SAMPLE S-9 (SEGMENT-30)



SAMPLE E-1 (SEGMENT-18)

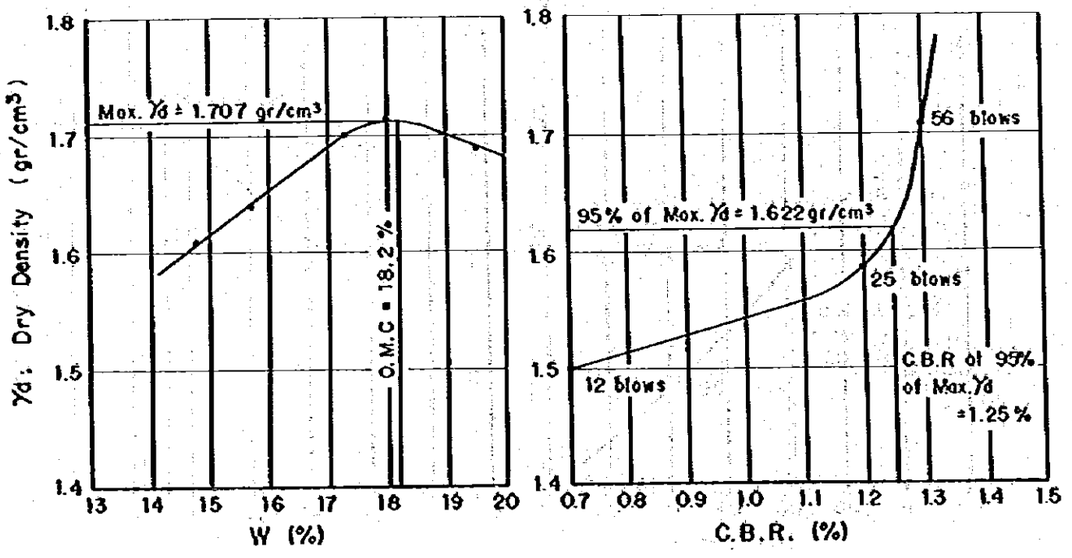
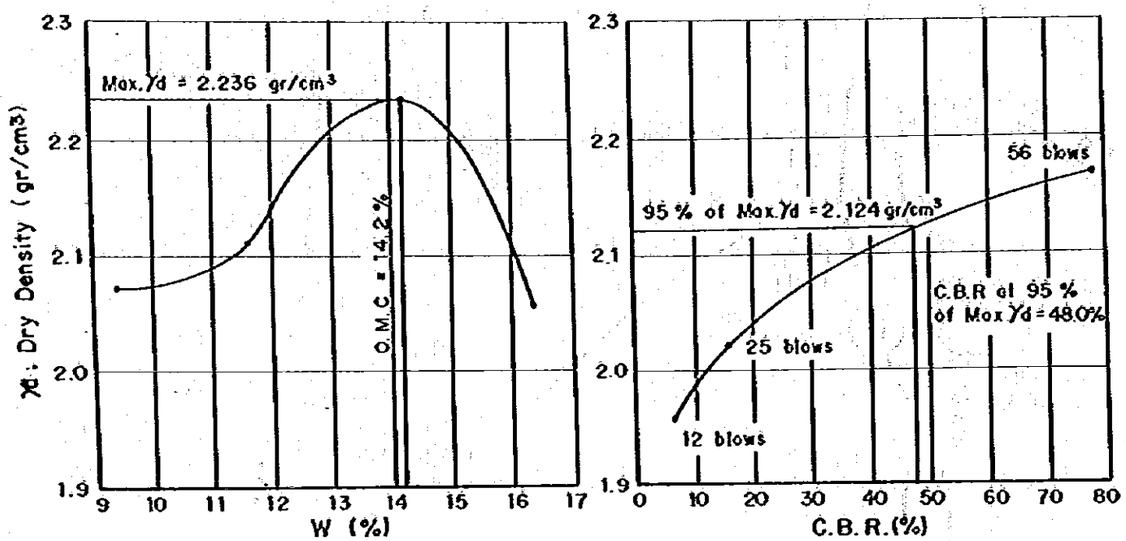
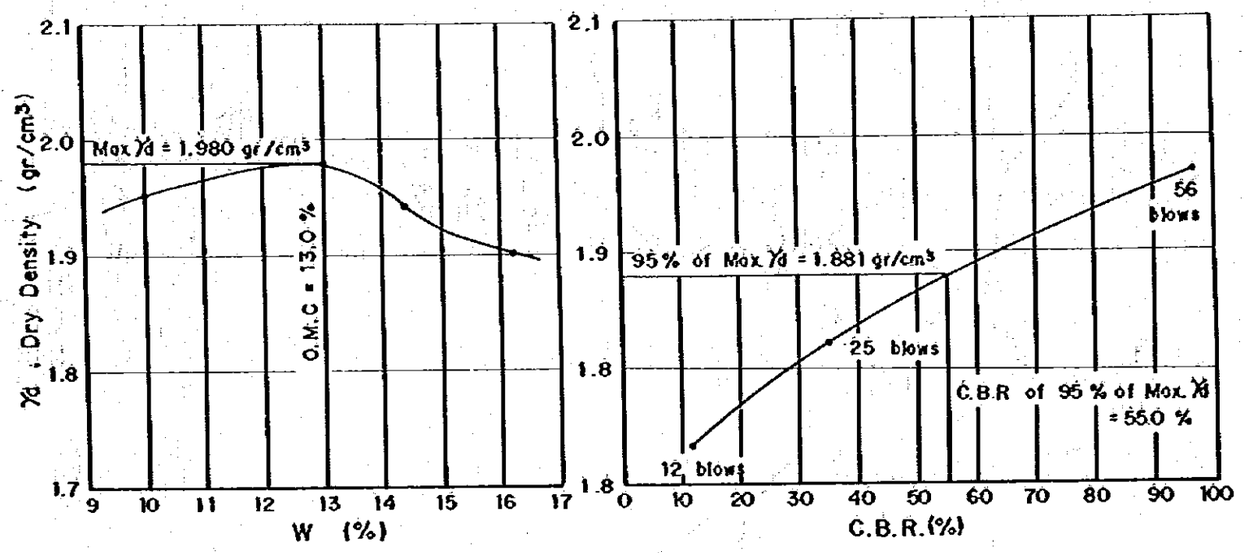


Figure 10A-2 SOIL TEST RESULTS (4)

SAMPLE L-1-B



SAMPLE L-3-B



SAMPLE L-2-B

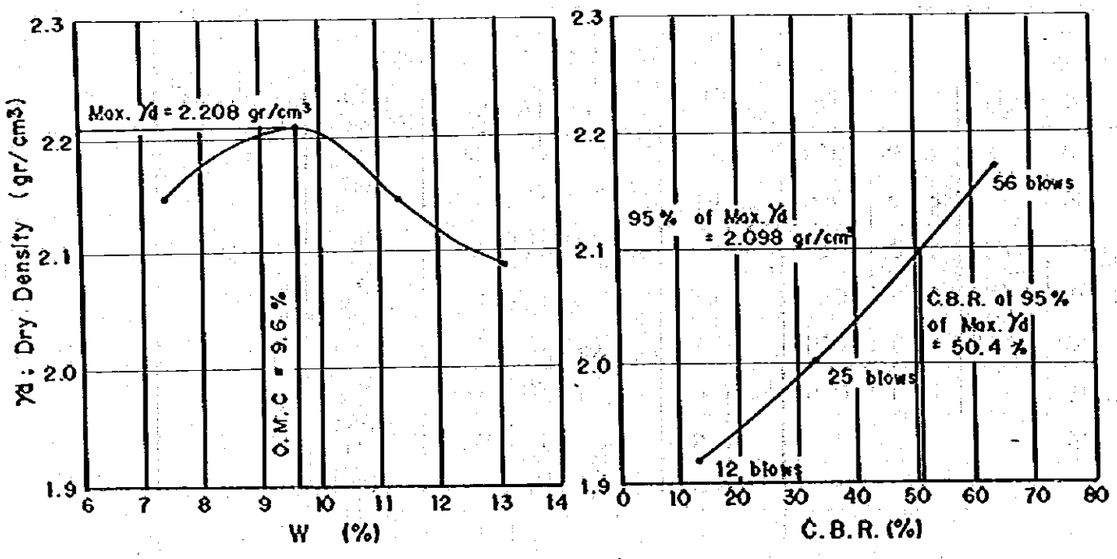
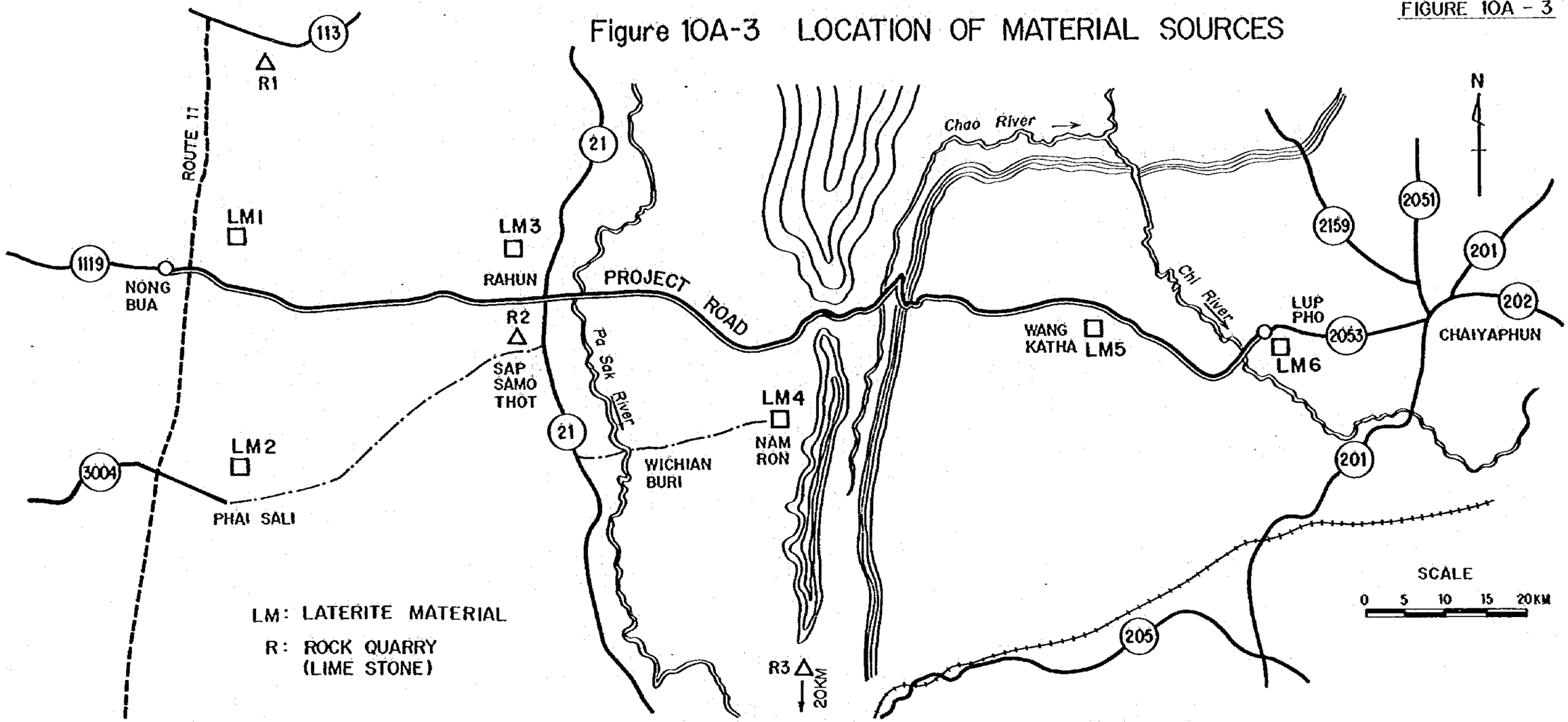


Figure 10A-3 LOCATION OF MATERIAL SOURCES



MATERIAL	SOURCE OF MATERIAL			SIEVE ANALYSIS (%)									ATTERBERG LIMIT (%)		CBR (%)	REMARKS
	ROAD CATEGORY	LOCATION	OFF SET (KM)	2"	1"	1/2"	3/4"	3/8"	#4	#10	#40	#200	LL	PI		
LM1	MINE ROAD	5KM FROM NONG BUA	0	100	94.3	—	91.3	79.6	62.6	44.5	31.8	26.6	43.0	18.0	36.0	
LM2	RURAL ROAD	3KM FROM PHAI SALI	0	100	89.3	—	85.7	59.3	41.5	28.3	15.3	6.2	26.0	9.8	28.0	
LM3	ROUTE 21	10KM FROM SAP SAMO THOT	5.0	100	99.0	81.0	71.0	68.0	55.0	44.0	32.0	28.0	—	—	—	
LM4	ARD ROAD	18KM FROM WICHIAN BURI	3.0	100	99.0	79.0	70.0	65.0	56.0	46.0	30.0	20.0	33.0	11.8	—	BAN NAM RON
LM5	ARD ROAD	15KM FROM NONG BUA RAWE	2.0	100	100	100	100	99.0	72.0	27.0	10.0	2.0	26.5	6.6	—	BAN DON MA KOK
LM6	ROUTE 2053	3KM FROM LUP PHO	0.3	100	86.4	—	36.8	29.5	12.5	39.0	28.0	23.5	35.0	11.0	—	
R1	ROUTE 113	30KM FROM NONG BUA	2.0	ABRASION TEST 30.0%											—	BAN KHAO SAI
R2	ROUTE 21	2KM FROM SAP SAMO THOT	4.0												—	
R3	ROUTE 205	20KM FROM LAM NARAI	1.0	ABRASION TEST 26.8%											87.0	BAN KHAO TAMBON

Appendix 11

水文解析

Appendix 11

水文解析

11-1 単位図法

単位図法（Unit Hydrograph Method）は1932年にShermanにより提唱されたもので世界各国で広く用いられている。この方法は次の3つの仮定に立脚している。

a) 同一の流域では，降雨強度の大小にかかわらずピーク流量の出現時刻と流出期間は一定である。

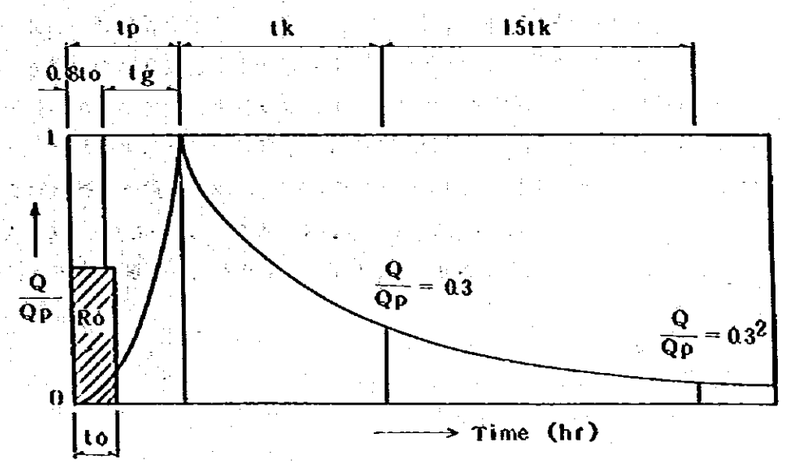
b) 同一の流域では，有効降雨の強度が変化しても流出量の時間的割合は変化しない。

c) 長い継続時間を持つ有効降雨による流出量は，短時間に分割した降雨それぞれに対する流出量を加えたものに等しい。

このことは，言い換えれば，単位図の形を規定する要素は降雨特性よりも，むしろ流域特性であるということである。

単位図，つまり単位時間の単位有効雨量による単位流出量曲線を作る計算法はこれまで多く発表されてきているが，ここに説明するものは中安の方法である。

単位図は次図の形状を有すると考えられる。



前図の上昇曲線および下降曲線は次式により表わされる。

上昇曲線 $$\frac{Q}{Qp} = \left(\frac{t}{tp}\right)^{2.4} \quad \cdots\cdots (1)$$

下降曲線 $$\frac{Q}{Qp} = 0.3^{\frac{t-tp}{tk}} \quad \left(1 \geq \frac{Q}{Qp} \geqq 0.3\right) \quad \cdots\cdots (2)$$

$$\frac{Q}{0.3Qp} = 0.3^{\frac{t-(tp+tk)}{1.5\,tk}} \quad \left(0.3 \geq \frac{Q}{Qp} \geqq 0.3^2\right) \quad \cdots\cdots (3)$$

$$\frac{Q}{0.3^2Qp} = 0.3^{\frac{t-(tp+tk+1.5tk)}{2.0\,tk}} \quad \left(0.3^2 \geq \frac{Q}{Qp}\right) \quad \cdots\cdots (4)$$

ここで，　Q：時刻tにおける流出量（㎥／sec）

Qp：単位時間to，有効雨量Roによるピーク流量（㎥/sec）

tp：流量がピークに到達する時間（hr）

tk：流量がQpから0.3Qpになる時間（hr）

上記の(1)～(4)式は単位時間toを，出水のおくれtg ——単位時間toをもつ降雨ピークによるピーク流量の遅れを0.8toの時刻より測ってtgとする——の0.5～1.0倍にとるときの単位図の総合化である。

全洪水流量Qtは(1)～(4)式に基づき，流量Qを積分して次の様に得られる。

$$Qt = \int Q \cdot dt = Qp\,(0.3\,tp + tk) \quad \cdots\cdots (5)$$

ここで，　Qt：全洪水流量（㎥／sec）

一方，全洪水流量Qtはまた，次式によって与えられる。

$$Qt = 0.2778\,Ro \cdot A \quad \cdots\cdots (6)$$

ここで，　Ro：有効雨量（㎜）

A：流域面積（㎢）

したがって，ピーク流量Qpは(5)式および(6)式から次のように計算される。

$$Qp = \frac{0.2778\,A \cdot Ro}{0.3\,tp + tk}$$

tpは前掲の図より次のように表わされる。

$$tp = 0.8\,tg + to$$

ここで，tpは洪水流量が零からピーク流量Qpになる時間（hr）である。

なお，tgおよびtkは次のように与えられる。

$$tg = 0.21L^{0.7} \quad (L<15)$$

$$tg = 0.4 + 0.058L \quad (L>15)$$

ここで，　tg：出水のおくれ（hr）

L：最大流路長（㎞）

tk = 1.5 tg（出水の出が遅く引きが早い河川）（hr）

tk = 3.0 tg（出水の出が早く引きが遅い河川）（hr）

tp：流出量がピーク流量に増加するまでの時間（hr）

以上の式によって，流域特性から単位図をつくることが出来るため，洪水記録の乏しい河川においても単位図法を適用することができるわけである。

11－2　避溢橋の長さ決定の例

道路リンク18に対する避溢橋の長さ決定の1例としてここに説明する。

計算条件は以下のものである。

i）現橋の長さ：　1338（m）

ii）上流側の許容最高水位：　80.0（m）

iii）最大流出量：　1987.0（㎥/sec）

（Appendix－11のFigure 11A－3参照）

iv）水位－貯留量曲線：　Figure 11A－3参照

v）水位－流出量曲線（下流部）：　Figure 11A－4参照

まず最初に，現橋の長さに対して上流側の水位を計算しチェックしたが，許容水位を越えた。したがって橋長を延長して計算水位が許容水位以下になるまで計算を繰返した。現橋長1338mおよび延長した橋長233，283および333mに対する水位－流量曲線をそれぞれFigure 11A－5，11A－6，11A－7および11A－8に示す。

結果を下表に要約し，またFigure 11A－9に示す。

橋　長 (m)	流入量 (m^3/sec)	基底流量 (m^3/sec)	水　位 (m)
1338	1987	7394	80.60
2330	1987	8523	80.62
2830	1987	8884	80.26
3330	1987	9361	79.84

注) ： 許容水位は8000mである。

この結果に基いて，建設橋の長さは176mと求められた。

Table 11A-1 RAINFALL PATTERN (Effective Rainfall)

(mm)

Time (hr)	Total Rainfall	Loss	Effective Rainfall
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	8.1	8.0	0.1
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.4	0.4	0.0
10	0.0	0.0	0.0
11	0.0	0.0	0.0
12	0.2	0.2	0.0
13	3.7	3.6	0.1
14	12.1	11.2	0.9
15	129.4	40.6	88.8
16	0.0	0.0	0.0
17	0.0	0.0	0.0
18	0.0	0.0	0.0
19	0.0	0.0	0.0
20	0.0	0.0	0.0
21	0.0	0.0	0.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0
Total	153.9		89.9

TABLE 11A-2
1 of 3

TABLE 11A-2 DRAINAGE CAPACITY OF BRIDGES AND CULVERTS IN OPTIMUM ROUTE

Catching Basin No.	Existing Structure		Discharge Calculation						Capacity Calculation				
	Station (km)	Type of Structure	Catchment Area (km^2)	Length of River Channel (km)	Height Difference (m)	Unit Hydrograph: Time lag tp(hr)	Unit Hydrograph: Peak discharge Qp (m^3/sec)	Design Discharge (m^3/sec)	Proposed Structure	Area of Water Way (m^2)	Hydraulic Radius (m)	Velocity (m/sec)	Capacity (m^3/sec)
1	5 + 850	-	1.9	4.0	45	0.82	0.28	25	Box Culvert 2(2.1x2.1)	8.8	0.70	3.94	27
2	8 + 150	-	1.5	2.0 0.8	25 120	0.42	0.43	39	Box Culvert 2(2.1x2.1)	8.8	0.70	4.80	42
3	10 + 700	-	8.8	4.3 0.9	25 290	1.34	0.79	71	Concrete Bridge (7.0x20.0)	40.5	2.04	1.91	77
4	12 + 50	-	1.0	2.0	20	0.44	0.27	24	Box Culvert 2(2.1x2.1)	8.8	0.70	3.94	27
5	12 + 400	-	3.3	3.0 0.6	20 220	0.86	0.46	42	Concrete Bridge (7.0x15.0)	25.5	1.72	2.03	51
6	13 + 50	-	43.5	15.0	65	5.46	0.96	86	Concrete Bridge (7.0x25.0)	62.1	2.47	2.58	160
7	15 + 350	-	118.0	27.0 3.0	105 140	10.74	1.33	119	Concrete Bridge (7.0x25.0)	62.1	2.47	2.58	160
8	37 + 100	-	1.6	3.1 1.3	100 260	0.39	0.50	45	Box Culvert 2(2.1x2.1)	8.8	0.70	6.23	48
9	42 + 950	-	4.7	4.5 0.3	100 90	0.62	0.92	83	Concrete Bridge (7.0x25.0)	62.1	2.47	1.64	102
10	50 + 300	Timber Bridge (4.3x18.3)	6820	217	230	92.6	8.90	1987	Concrete Bridge (7.0x21.0)	Bridge for Relief Open			Refer to Hydrological Study in Appendix-11
	50 + 600	Timber Bridge (4.4x25.0)							Concrete Bridge (7.0x24.0)				
	50 + 900	Timber Bridge (4.4x15.5)							Concrete Bridge (7.0x16.0)				
	51 + 700	-							Concrete Bridge (7.0x176.0)				
11	53 + 950	Timber Bridge (4.2x5.0)	1.3	2.0	10	0.67	0.23	21	Box Culvert 2(2.1x2.1)	8.8	0.70	3.94	27

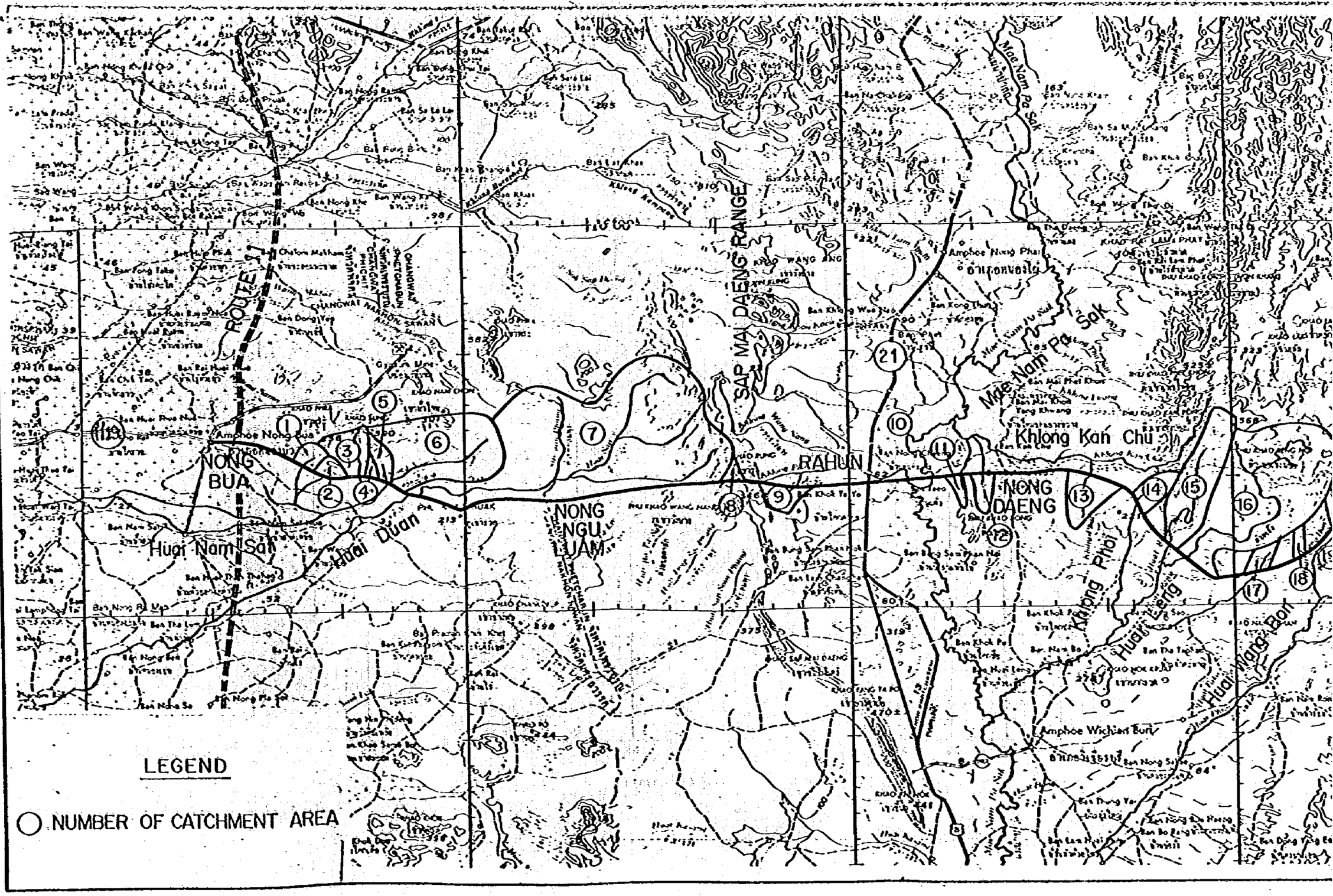
TABLE 11A-2 DRAINAGE CAPACITY OF BRIDGES AND CULVERTS IN OPTIMUM ROUTE (Cont'd)

Catching Basin No.	Existing Structure		Discharge Calculation						Capacity Calculation				
						Unit Hydrograph							
	Station (km)	Type of Structure	Catchment Area (km^2)	Length of River Channel (km)	Height Difference (m)	Time lag tp(hr)	Peak Discharge Qp(m^3/sec)	Design Discharge (m^3/sec)	Proposed Structure	Area of Water Way (m^2)	Hydraulic Radius (m)	Velocity (m/sec)	Capacity (m^3/sec)
12	56 + 100	-	1.8	2.5	30	0.49	0.44	39	Box Culvert 2(2.1x2.1)	8.8	0.70	4.80	42
13	63 + 100	Timber Bridge (4.2 x 15.0)	5.8	3.0 1.0	10 60	1.36	0.52	46	Concrete Bridge (7.0x15.0)	25.5	1.72	2.03	51
14	66 + 950	-	3.1	3.0 0.8	40 140	0.59	0.64	57	Concrete Bridge (7.0x15.0)	25.5	1.72	2.87	73
15	71 + 200	-	23.9	14.5 2.0	120 120	3.73	0.77	70	Concrete Bridge (7.0x15.0)	25.5	1.72	4.05	104
16	72 + 900	-	78.0	16.2 7.7	120 315	4.90	1.92	169	Concrete Bridge (7.0x30.0)	88.0	2.89	2.87	252
17	77 + 300	-	2.3	3.5 1.3	60 100	0.64	0.43	38	Box Culvert 2(2.1x2.1)	8.8	0.70	4.80	42
18	80 + 100	-	1.9	3.5	70	0.51	0.45	40	Box Culvert 2(2.1x2.1)	8.8	0.70	4.80	42
19	84 + 800	-	0.8	2.5 0.5	65 80	0.24	0.40	26	Box Culvert 2(2.1x2.1)	8.8	0.70	3.94	27
20	86 + 800	-	6.6	7.8	180	1.04	0.77	69	Concrete Bridge (7.0x15.0)	25.5	1.72	2.73	70
21	89 + 100	-	1.5	3.0 0.8	38 110	0.61	0.30	26	Box Culvert 2(2.1x2.1)	8.8	0.70	3.94	27
22	89 + 400	-	1.3	3.5 0.8	40 130	0.74	0.21	19	Box Culvert 2(2.1x2.1)	8.8	0.70	3.94	27
23	89 + 800	-	1.5	3.5 0.4	40 70	0.73	0.25	22	Box Culvert 2(2.1x2.1)	8.8	0.70	3.94	27
24	92 + 900	-	10.9	7.2 2.8	70 180	1.81	0.73	65	Concrete Bridge (7.0x20.0)	40.5	2.04	2.27	92
25	95 + 50	-	53.2	10.7 0.8	120 120	2.24	2.87	258	Concrete Bridge (7.0x40.0)	152.5	3.72	2.16	330

TABLE 11A-2 DRAINAGE CAPACITY OF BRIDGES AND CULVERTS IN OPTIMUM ROUTE (Cont'd)

Catching Basin No.	Existing Structure		Discharge Calculation						Capacity Calculation				
						Unit Hydrograph							
	Station (km)	Type of Structure	Catchment Area (km^2)	Length of River Channel (km)	Height Difference (m)	Time lag tp(hr)	Peak Discharge Qp(m^3/sec)	Design Discharge (m^3/sec)	Proposed Structure	Area of Water Way (m^2)	Hydraulic Radius (m)	Velocity (m/sec)	Capacity (m^3/sec)
26	106 + 650	-	2.7	5.0	140	0.59	0.55	48	Box Culvert 2(2.1x2.1)	8.8	0.70	5.52	48
27	112 + 400	-	121.7	9.0 12.0	80 480	3.28	4.48	404	Concrete Bridge (7.0x40.0)	152.5	3.72	3.40	518
28	114 + 400	-	1.5	2.5 0.5	25 50	0.37	0.49	27	Box Culvert 2(2.1x2.1)	8.8	0.70	3.94	27
29	116 + 300	-	0.9	2.5	35	0.45	0.24	22	Box Culvert 2(2.1x2.1)	8.8	0.70	3.94	27
30	121 + 100	-	6.8	5.5 1.0	40 40	1.56	0.53	47	Concrete Bridge (7.0x10.0)	15.0	1.43	3.58	53
31	121 + 900	-	24.2	7.5 3.5	60 250	2.13	1.37	123	Concrete Bridge (7.0x20.0)	40.5	2.04	3.22	130
32	126 + 500	-	10.0	5.0	100	0.73	1.65	149	Concrete Bridge (7.0x25.0)	62.1	2.47	2.58	160
33	131 + 250	-	26.0	5.0 1.0	80 20	1.41	2.23	200	Concrete Bridge (7.0x30.0)	88.0	2.89	2.87	252
34	141 + 250	Timber Bridge (4.0 x 20.3)	16.5	7.0 5.0	25 40	4.12	0.48	43	Concrete Bridge (7.0x25.0)	62.1	2.47	1.17	73
35	143 + 700	Timber Bridge (4.0 x 20.4)	57.7	12.0 6.0	25 50	8.25	0.84	76	Concrete Bridge (7.0x30.0)	88.0	2.89	1.30	114
36	158 + 900	Timber Bridge (3.6 x 15.5)	313.4	30.0 10.0	100 500	13.61	2.78	250	Concrete Bridge (7.0x30.0)	88.0	2.89	1.83	160
	159 + 100	Timber Bridge (3.6 x 6.0)							Concrete Bridge (7.0x25.0)	62.1	2.47	1.64	102
	159 + 250	Timber Bridge (3.6 x 11.7)							Concrete Bridge (7.0x30.0)	88.0	2.89	1.83	160
	159 + 800	Timber Bridge (3.4 x 17.8)							Concrete Bridge (7.0x30.0)	88.0	2.89	1.83	760
													582

FIGURE 11A-1


ROUTE 1
SAP MAI DAENG RANGE
Mae Nam Pa Sak
Khlong Kan Chu
NONG BUA
RAHUN
NONG DAENG
NONG NGU LUAM
Huai Duan
Huai Nam Sai
Khlong Phai
Huai Eang
Huai Wang Bon
Amphoe Nong Phai
Amphoe Wichian Buri
CHANGWAT NAKHON SAWAN
LEGEND
NUMBER OF CATCHMENT AREA

RE 11A-1 CATCHMENT AREAS

CATCHMENT AREAS | FIGURE 11A-1

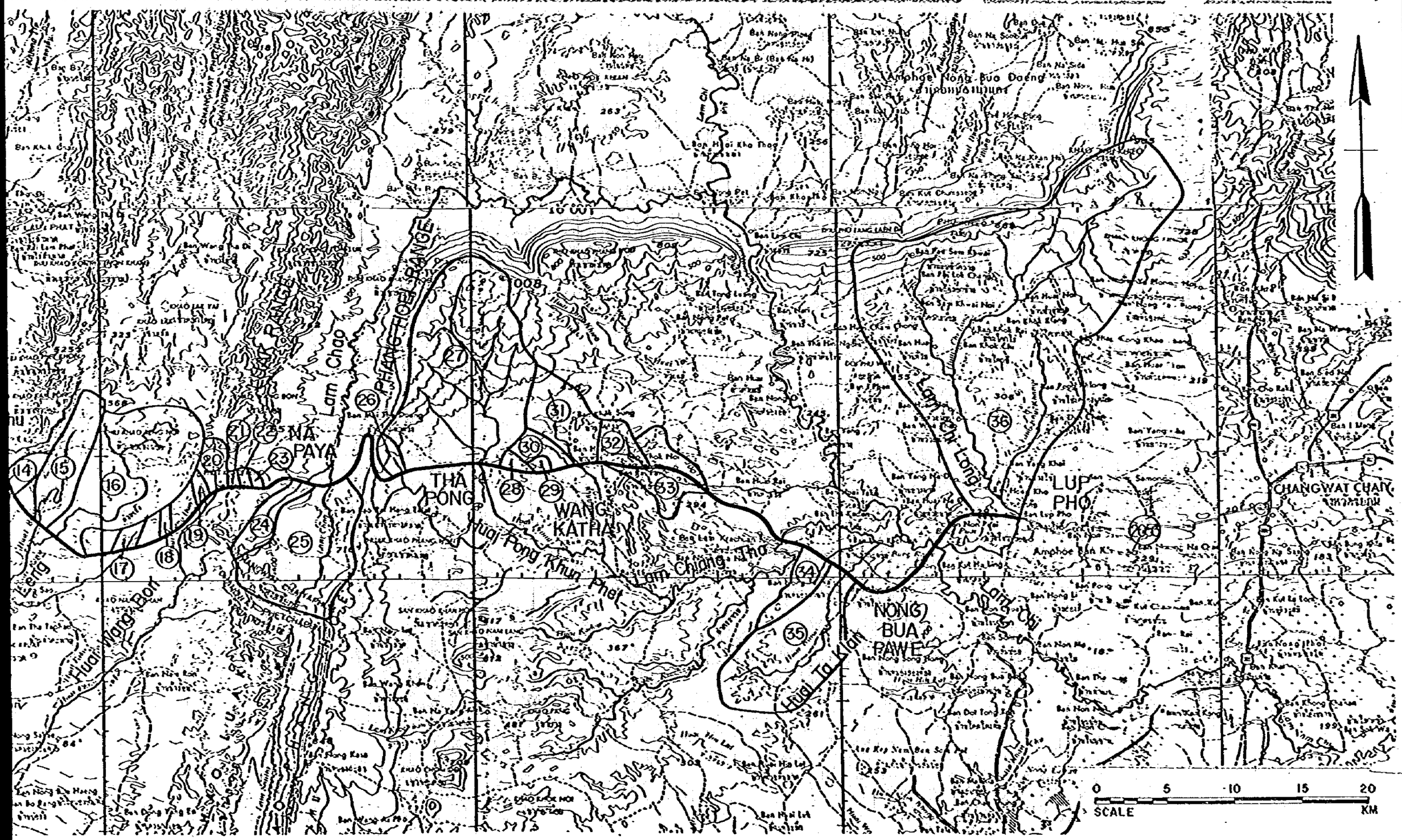


FIGURE 11A - 2

Figure 11A - 2 DISCHARGE CURVE

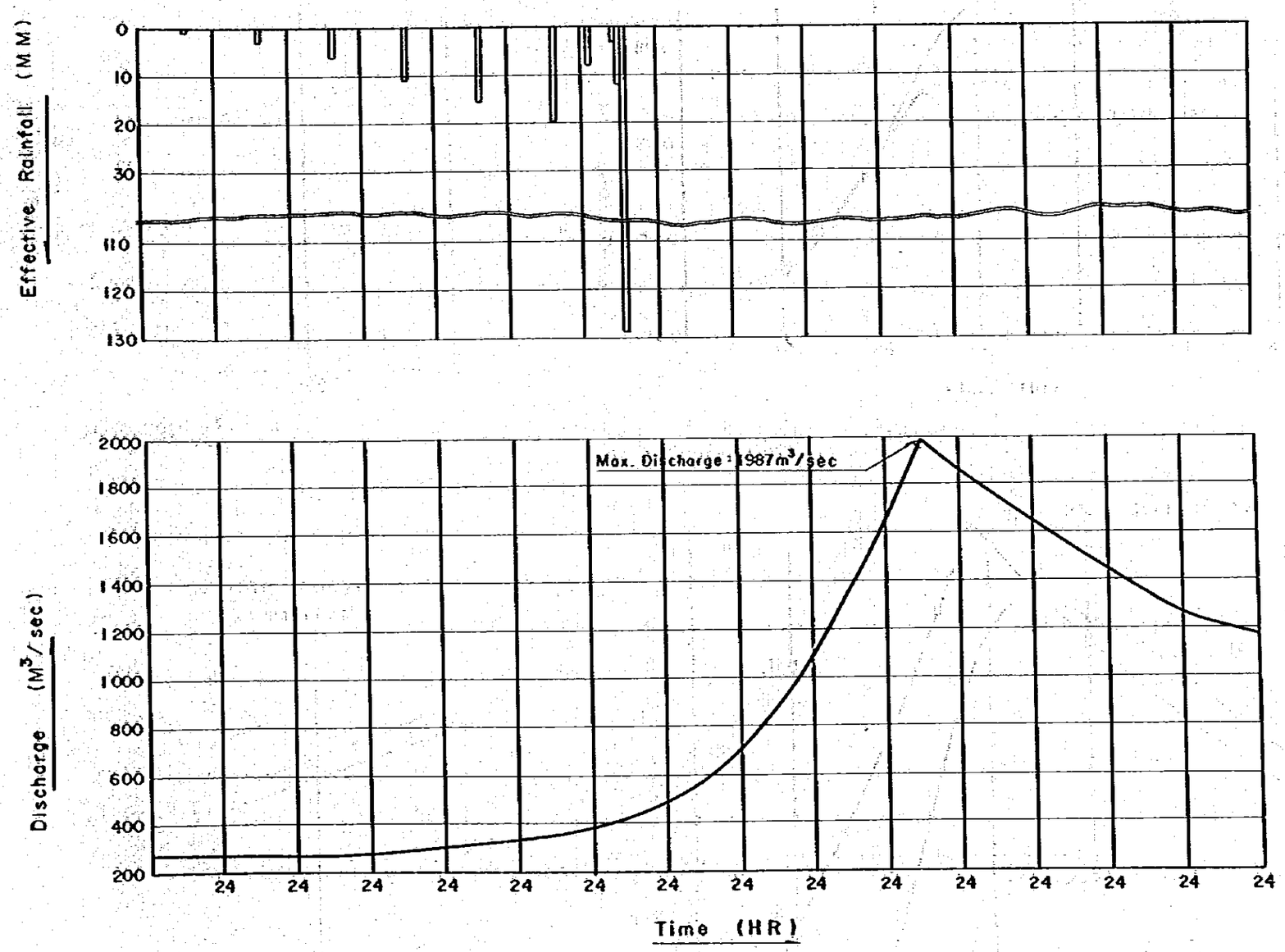


Figure 11A-3 WATER LEVEL- RESERVED VOLUME CURVE

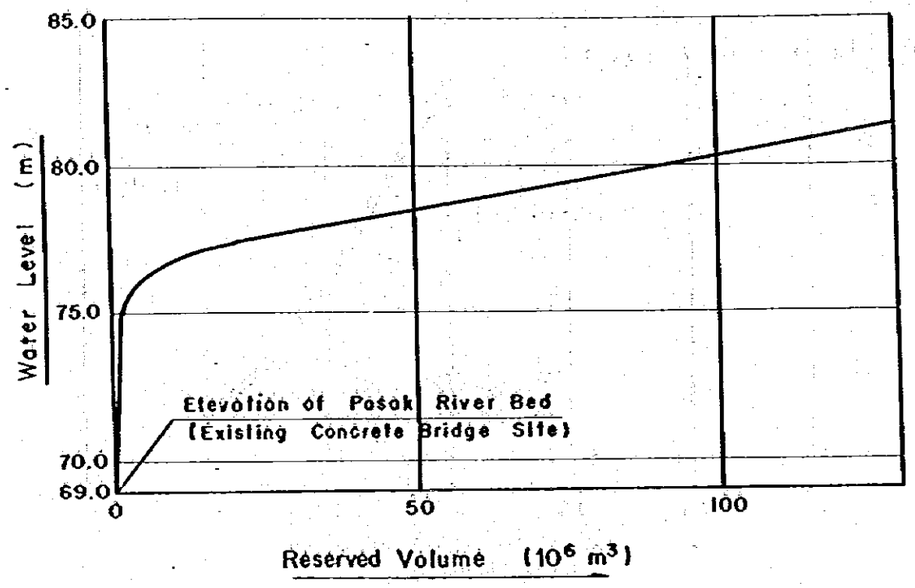


Figure 11A-4 WATER LEVEL— DISCHARGE CURVE
(Downstream)

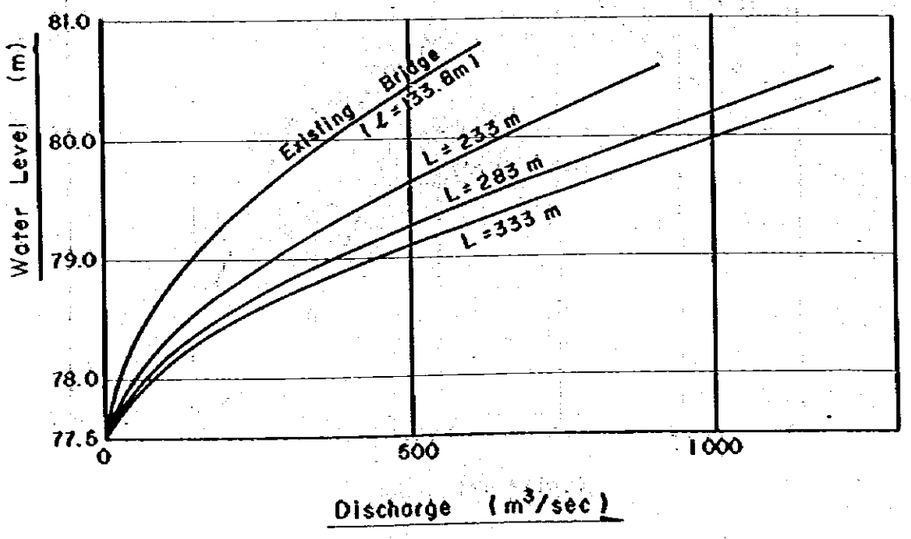
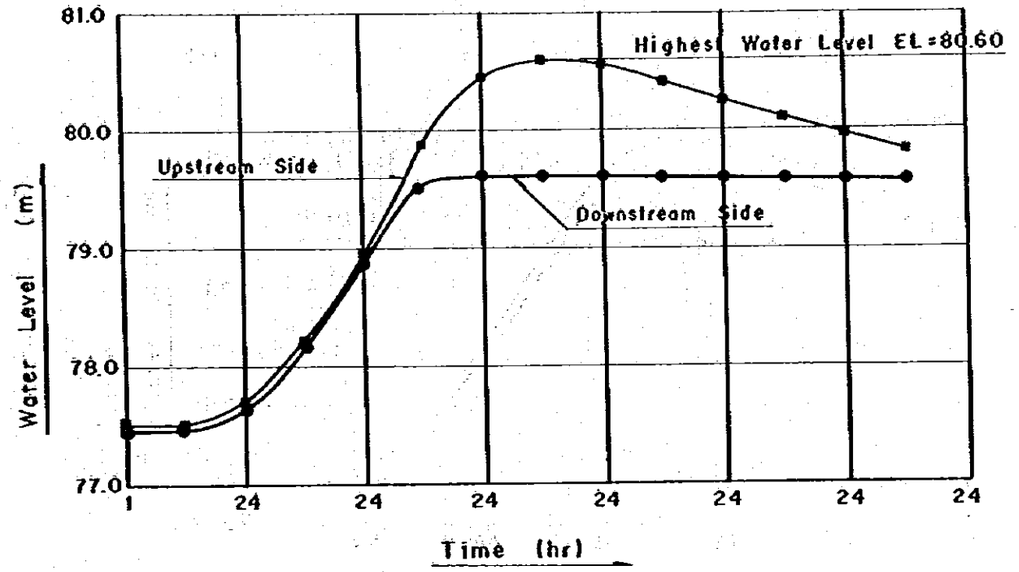


Figure 11A-5 WATER LEVEL AND DISCHARGE
(Bridge Length 133.8m : Existing Bridge)



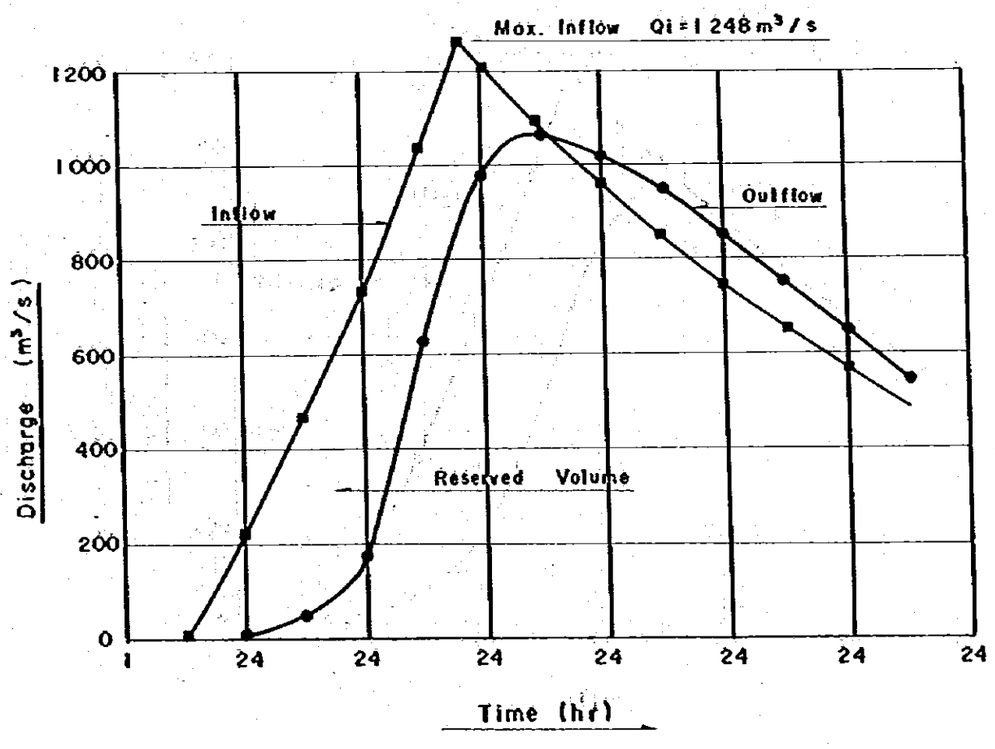


Figure 11A-6 WATER LEVEL AND DISCHARGE
(Bridge Length 233m)

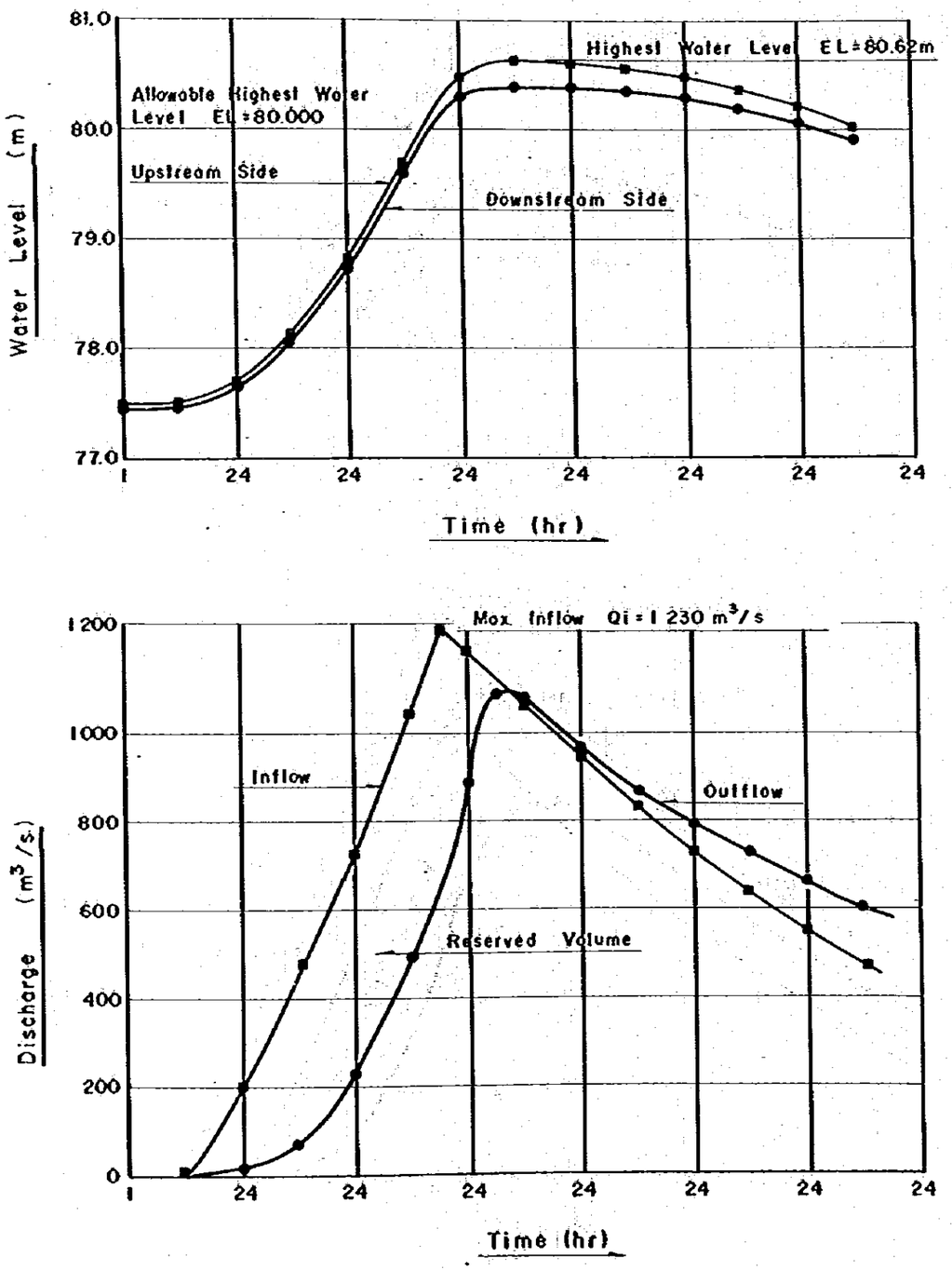


Figure 11A-7 WATER LEVEL AND DISCHARGE
(Bridge Length 283m)

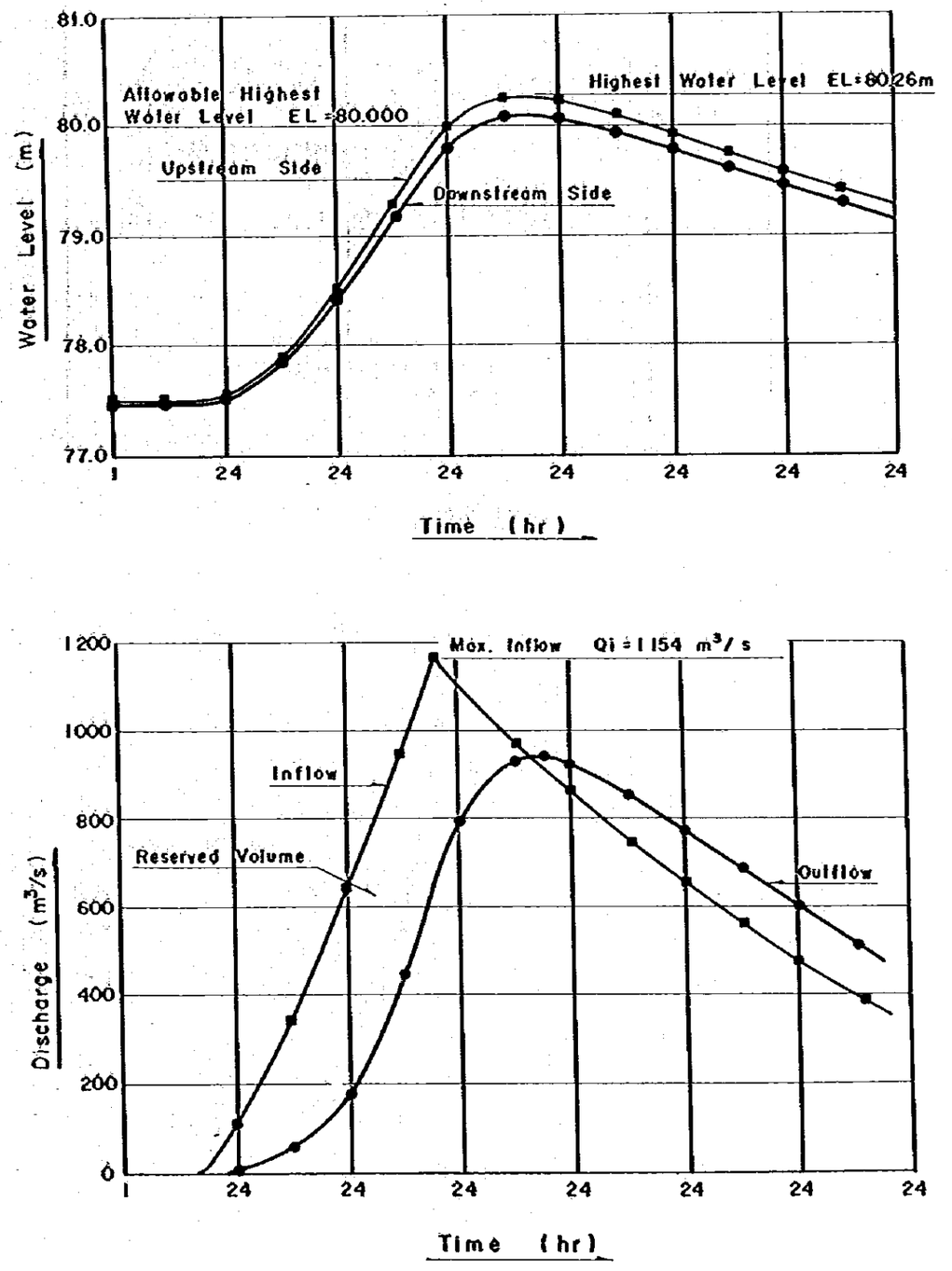


Figure 11A-8 WATER LEVEL AND DISCHARGE
(Bridge Length 333 m)

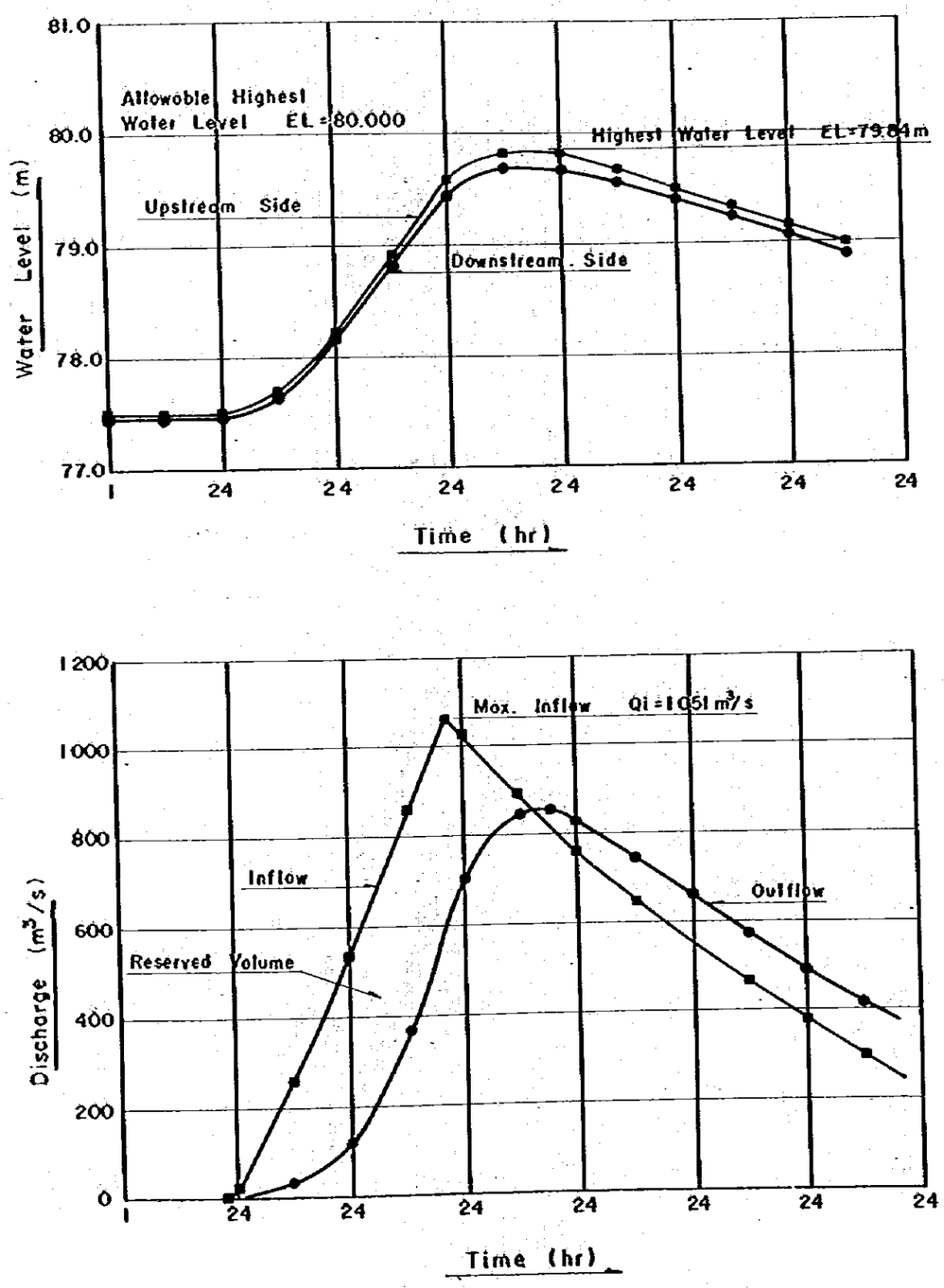
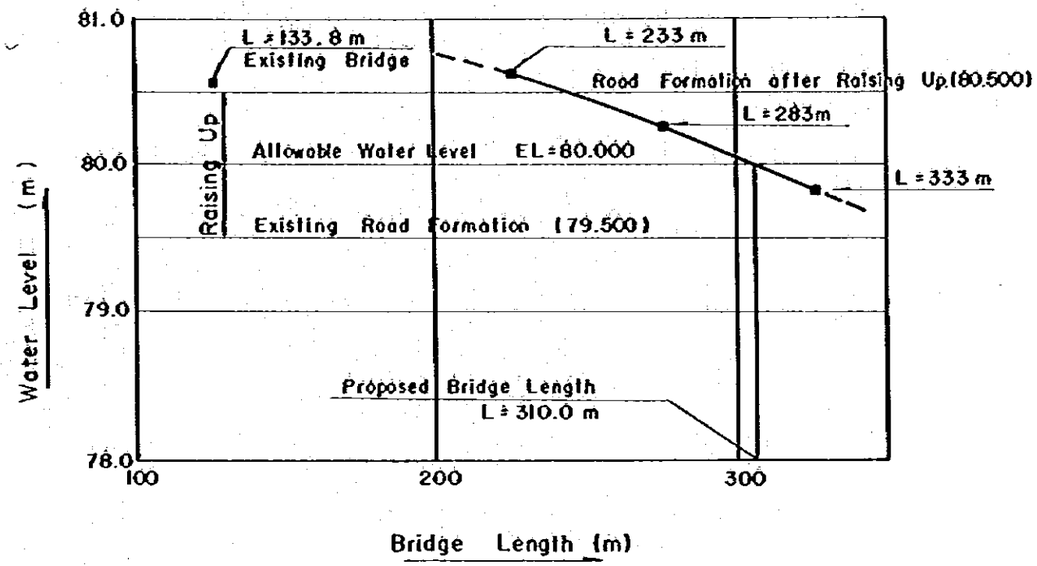


Figure 11A-9 BRIDGE LENGTH FOR RELIEF OPEN



Appendix 12

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TABLE 12A-1 LIST OF BRIDGES

TABLE 12A-1
1 of 2

ROAD SEGMENT NO.	LOCATION 1/	EXISTING BRIDGE TYPE 2/	EXISTING BRIDGE WIDTH & LENGTH (m)	PROPOSED BRIDGE TYPE 3/	PROPOSED BRIDGE LENGTH (m)	REMARKS
3*	3.6	-	-	C-S	20.0	Long Du River
4	4.7	T	3.5x13.0	C-S	20.0	
4	10.7	T	2.5x8.5	C-S	15.0	
4	15.8	T	3.2x8.5	C-S	15.0	
4	23.3	T	3.2x12.6	C-S	20.0	
4	24.1	T	3.0x14.0	C-S	20.0	
4	24.7	-	-	C-S	30.0	
4	30.6	T	3.0x24.5	C-S	15.0	
4	30.8	T	3.0x11.5	C-S	15.0	
5*	0.7	-	-	C-S	15.0	
5*	1.4	-	-	C-S	25.0	Nam Sat River
5*	3.7	-	-	C-S	25.0	Duan River
6	4.4	-	-	C-S	20.0	
6	5.3	-	-	C-S	40.0	
6	11.7	-	-	C-S	30.0	
6	19.3	-	-	C-S	25.0	
6	19.8	-	-	C-S	30.0	
6	21.8	-	-	C-S	40.0	
8	3.8	T	3.7x9.4	C-S	15.0	
8	5.5	T	3.0x9.0	C-S	15.0	
8	11.0	-	-	C-S	15.0	
8	12.0	-	-	C-S	20.0	
9	1.6	T	3.5x15.0	C-S	25.0	
9	5.6	T	4.0x11.3	C-S	20.0	
10	1.2	-	-	C-S	15.0	
10	2.0	-	-	C-S	20.0	
10	3.4	T	3.0x9.0	C-S	15.0	
10	4.5	-	-	C-S	15.0	
11	2.4	-	-	C-S	15.0	
12*	7.6	-	-	C-S	25.0	
14	5.2	T	3.0x4.5	-	-	To be replaced with Box Culvert
14	5.9	T	2.8x9.5	-	-	do
15	3.5	T	3.8x18.0	C-S	20.0	
16	1.6	-	-	C-S	15.0	
16	3.5	-	-	C-S	25.0	
16	5.0	-	-	C-S	25.0	
17	6.2	-	-	C-S	25.0	
18*	3.0	T	(4.3x18.3)	C-S	21.0	No Bridge (Carried away)
18*	3.3	T	(4.4x25.0)	C-S	24.0	do
18*	3.6	T	4.4x15.5	C-S	16.0	
18*	4.4	-	-	C-S	105.0	Relief Open
18*	4.8	C	7.0x75.0	-	-	Pasak River
18*	6.7	T	4.2x5.0	-	-	To be replaced with Box Culvert
19 4/	3.0	T	4.2x15.0	C-S	15.0	
20	0.0	-	-	C-S	100.0	Pasak River
20	1.0	-	-	C-S	100.0	Relief Open
20	2.3	-	-	C-S	20.0	
20	5.4	-	-	C-S	20.0	
20	9.4	-	-	C-S	30.0	
20	11.3	-	-	C-S	20.0	
20	11.8	-	-	C-S	20.0	
20	14.1	-	-	C-S	30.0	

TABLE 12A-1 LIST OF BRIDGES (cont'd)

ROAD SEGMENT NO.	LOCATION 1/	EXISTING BRIDGE TYPE 2/	EXISTING BRIDGE WIDTH & LENGTH (m)	PROPOSED BRIDGE TYPE 3/	PROPOSED BRIDGE LENGTH (m)	REMARKS
21*	1.6	-	-	C-S	15.0	
21*	5.8	-	-	C-S	15.0	
21*	7.5	-	-	C-S	30.0	Leng River
22*	11.2	-	-	C-S	15.0	
23*	1.2	-	-	C-S	20.0	
23*	3.4	-	-	C-S	40.0	Chao River
23*	20.7	-	-	C-S	40.0	Pong Khun Phet River
25*	3.8	-	-	C-S	10.0	
25*	4.6	-	-	C-S	20.0	
26	1.3	-	-	C-S	15.0	
26	8.4	-	-	C-S	20.0	
26	9.2	-	-	C-S	25.0	
26	12.4	-	-	C-S	25.0	
26	14.5	-	-	C-S	20.0	
26	15.2	-	-	C-S	20.0	
26	19.1	-	-	C-S	20.0	
26	20.6	-	-	C-S	25.0	
27*	4.5	T	4.0x25.3	C-S	25.0	
27*	9.3	T	4.0x22.5	C-S	30.0	
27*	15.5	C	7.0x105.0	-	-	Chang Tha River
27*	19.3	T	4.0x20.3	C-S	25.0	
28	0.0	-	-	C-S	100.0 5/	Chi River
28	2.6	C	6.5x20.0	-	-	
28	3.9	C	6.5x20.0	-	-	
28	20.8	-	-	C-S	15.0	
28	25.9	C	6.5x20.0	-	-	
28	26.6	C	6.5x20.0	-	-	
29*	0.7	T	4.0x20.4	C-S	30.0	
29*	9.3	C	7.0x100.0	-	-	Chi River
30*	4.6	T	3.6x15.5	C-S	30.0	Chi Long River
30*	4.8	T	3.6x6.0	C-S	25.0	do
30*	5.0	T	3.6x11.7	C-S	30.0	do
30*	5.5	T	3.4x17.8	C-S	30.0	do

Note:

1/ Location means distance (km) from the beginning point of each road segment.

2/ C : Concrete Bridge.
T : Timber Bridge.

3/ C-S : Short Span Concrete Bridge

4/ Segment No. 19 is included in Phetchabun - Chai Badan Highway Project.

5/ Under Construction as of August 1979.

* Marks show the segments in the Optimum route.

Appendix 13

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Table 13A-1 FUTURE FARM INCOMES WITH AND WITHOUT PROJECT (1)

(1) UNIT CROP INCOME FOR FARMERS

	Without Project					With Project				
	Farmgate Price (B/kg)	Average Yield (kg/rai)	Gross Benefit (B/rai)	Production Cost (B/rai)	Net Benefit (B/rai)	Farmgate Price (B/kg)	Average Yield (kg/rai)	Gross Benefit (B/rai)	Production Cost (B/rai)	Net Benefit (B/rai)
Paddy										
N/P	2.42	330	799	503	296	2.42	350	847	529	318
C	2.42	290	702	470	232	2.42	310	750	494	256
Maize										
N/P	1.62	330	535	410	125	1.70	345	587	426	161
C	1.55	295	457	338	119	1.63	320	522	359	163
Mung beans										
N/P	4.7	130	611	445	166	4.72	140	661	460	201
C	4.65	130	605	460	145	4.67	140	654	475	179
Cassava										
C	0.55	2,090	1,150	555	595	0.59	3,100	1,829	780	1,049
Kenaf										
C	3.1	250	775	535	240	3.1	250	775	535	240
Soybeans										
N/P	4.6	180	828	420	408	4.62	180	832	420	412
C	4.5	175	788	440	348	4.52	175	791	440	351
Groundnut										
N/P	5.4	185	999	795	204	5.44	185	1,006	795	211
C	5.3	190	1,007	815	192	5.34	190	1,015	815	200
Sorghum										
N/P	1.45	230	334	215	119	1.45	230	334	215	119
C	1.4	200	280	220	60	1.4	200	280	220	60
Cotton										
N/P	8.0	225	1,800	980	820	8.0	225	1,800	980	820
C	7.8	220	1,716	1,000	716	7.8	220	1,716	1,000	716

Table 13A-1 FUTURE FARM INCOMES WITH AND WITHOUT PROJECT (2)

(2) ANNUAL CROP INCOME OF TYPICAL FARM IN 1998 (at 1978 constant price)

Farm Type	Without Project				With Project			
	N/P		C		N/P		C	
	Cultivated Area (rai)	Net Crop Income (B)	Cultivated Area (rai)	Net Crop Income (B)	Cultivated Area (rai)	Net Crop Income (B)	Cultivated Area (rai)	Net Crop Income (B)
1. Paddy Farm								
Paddy	24	7,104	19	4,408	24	7,632	20	5,120
Mung beans	1	166			2	402		
Other crops /1	1	235	1	225	1	240	1	230
Total	26	7,505	20	4,633	27	8,274	21	5,350
2. Maize Farm								
Maize	23	2,875	17	2,023	23	3,703	18	2,934
Mung beans	3	498	(Kenaf) 2	480	4	804	(Kenaf) 2	480
Other crops /1	1	235	2	450	2	480	3	690
Total	27	3,608	21	2,953	29	4,987	23	4,104
3. Cassava & Kenaf Farm								
Cassava			7	4,165			8	8,392
Kenaf			8	1,920			7	1,680
Other crops /2			5	1,125			5	1,150
Total			20	7,210			20	11,222

Note:

/1 Other crops include soybeans, groundnuts, sorghum, sesame, cotton and vegetables.

/2 Include upland crops other than cassava and kenaf.

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DRAWINGS