Appendix 6

道路リンク別工事数量

TABLE 6A-1 CONSTRUCTION QUANTITIES BY LINK

DESCRIPTION	UNIT OF Q'TY	ROAD LINK NUMBER										
		3	6	7	8	10	11	12	15	16	17	18
LINK LENGTH	km	12.5	18.0	17.0	13.2	10.0	24.0	20.5	15.7	21.0	18.0	5.3
WORK ITEMS												
Clearing & Grubbing	ha	-	-	68	-	32	-	82	-	-	30	-
Soil Excavation	m^3	38,100	24,000	40,800	146,900	56,100	101,500	99,800	44,300	64,800	64,300	-
Rock Excavation	m^3	-	-	2,200	-	6,400	-	11,600	-	-	10,700	-
Embankment	m^3	94,200	116,600	209,700	163,900	121,700	142,700	201,100	51,100	102,600	202,800	4,500
Selected Fill	m^3	9,700	19,200	36,700	14,000	21,600	23,200	44,300	17,000	16,700	36,000	500
Subbase/1	m^3	13,100	22,400	34,000	15,800	20,000	27,100	41,000	19,600	22,300	34,000	2,600
Shoulder/2	m^3	6,000	8,600	8,200	6,200	4,800	11,400	9,800	7,500	10,300	8,600	2,200
Base/2	m^3	11,400	16,500	15,600	10,700	9,100	19,200	18,800	14,400	19,600	16,400	4,100
Prime & SBST/2	m^2	72,100	104,300	98,600	71,600	57,800	121,400	118,900	90,900	124,100	104,000	26,000
Pipe Culvert	m	80	85	720	135	270	380	540	420	285	700	5
Box Culvert	m	25	50	90	-	55	-	195	-	25	25	-
Long Span Bridge	m	-	-	-	90	-	-	-	-	65	-	-
Short Span Bridge	m	-	-	-	125	40	265	-	25	40	65	15
LAND ACQUISITION	ha	-	-	68	-	40	-	82	-	-	60	-

Remarks: /1 To be understood as laterite surfacing in case that F5 Standard is applied.
/2 To be excluded in case that F5 Standard is applied.

Table 6A-1 CONSTRUCTION QUANTITIES BY LINK (continued)

DESCRIPTION	UNIT OF Q'TY	ROAD LINK NUMBER										
		19	20	22	23	25	27	28	29	30	33	35
LINK LENGTH	km	14.2	12.8	14.0	4.4	6.0	4.5	15.5	9.0	10.0	6.5	8.5
WORK ITEMS												
Clearing & Grubbing	ha	44	-	-	-	-	-	50	-	12	-	-
Soil Excavation	m^3	51,900	159,500	40,500	800	-	-	110,300	50,300	163,400	27,200	40,900
Rock Excavation	m^3	5,000	-	-	-	-	-	15,500	-	13,800	-	-
Embankment	m^3	162,000	178,900	50,400	5,900	6,900	4,900	184,900	48,700	175,300	39,000	58,500
Selected Fill	m^3	29,600	14,500	5,700	700	700	500	33,400	5,500	21,600	4,900	7,300
Subbase/1	m^3	27,400	16,400	11,000	2,600	3,400	2,500	30,900	7,600	20,000	6,300	9,500
Shoulder/2	m^3	6,600	6,000	7,000	2,000	2,900	2,100	7,400	3,700	4,800	3,100	4,300
Base/2	m^3	12,500	11,500	13,300	3,900	5,400	4,100	14,200	7,000	9,200	5,900	8,200
Prime & SBST/2	m^2	79,500	72,900	84,400	24,600	34,400	25,700	89,700	44,300	58,000	37,700	52,200
Pipe Culvert	m	135	215	280	220	95	5	185	5	260	75	115
Box Culvert	m	105	25	25	-	-	-	40	-	40	5	10
Long Span Bridge	m	-	-	-	-	-	-	-	90	-	-	-
Short Span Bridge	m	-	165	150	60	70	65	30	125	-	-	-
LAND ACQUISITION	ha	55	-	-	-	-	-	62	-	40	-	-

Remarks: /1 To be understood as laterite surfacing in case that F5 Standard is applied.
/2 To be excluded in case that F5 Standard is applied.

Table 6A-1 CONSTRUCTION QUANTITIES BY LINK (continued)

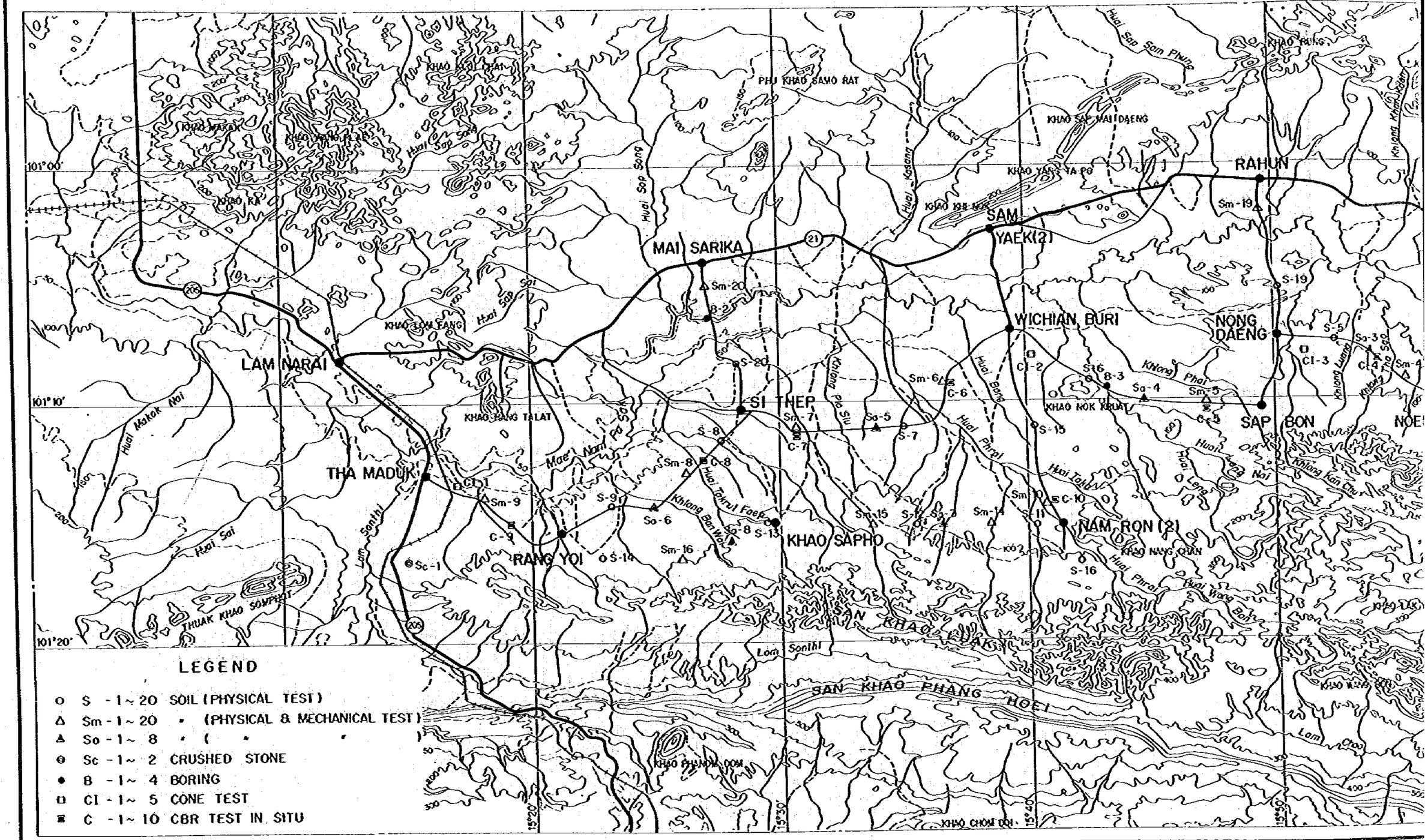
DESCRIPTION	UNIT OF Q'TY	ROAD LINK NUMBER								
		36	37	40	10*	15*	18*	27*	36*	40*
LINK LENGTH	km	8.0	11.7	11.0	2.0	4.5	2.5	4.3	4.5	3.0
WORK ITEMS										
Clearing & Grubbing	ha	-	-	-	6	14	8	13	15	10
Soil Excavation	m^3	150,300	49,000	284,200	11,200	25,200	14,000	24,100	25,200	16,800
Rock Excavation	m^3	-	-	-	1,300	2,900	1,600	2,800	2,900	1,900
Embankment	m^3	142,200	71,500	264,100	24,300	54,800	30,400	52,300	54,800	36,500
Selected Fill	m^3	10,300	9,000	22,300	4,300	9,700	5,400	9,300	9,700	6,500
Subbase/1	m^3	10,300	11,600	21,100	4,000	9,000	5,000	8,600	9,000	6,000
Shoulder/2	m^3	2,200	5,600	5,600	1,000	2,200	1,200	2,100	2,200	1,400
Base/2	m^3	4,200	10,700	10,300	1,800	4,100	2,300	3,900	4,100	2,700
Prime & SBST/2	m^2	26,400	67,900	65,400	11,600	26,000	14,400	24,800	26,000	17,300
Pipe Culvert	m	40	140	90	50	120	70	120	120	80
Box Culvert	m	-	15	-	10	25	15	25	25	20
Long Span Bridge	m	110	-	-	-	-	-	-	-	-
Short Span Bridge	m	145	-	230	-	20	20	20	20	20
LAND ACQUISITION	ha	-	-	-	8	18	10	17	18	12

Remarks: /1 To be understood as laterite surfacing in case that F5 Standard is applied.
/2 To be excluded in case that F5 Standard is applied.

Appendix 7

土質および材料調査

FIGURE 7A-1 LOCATION OF SOIL AND MATERIA



LEGEND

- ○ S - 1 ~ 20 SOIL (PHYSICAL TEST)
- △ Sm - 1 ~ 20 " (PHYSICAL & MECHANICAL TEST)
- ▲ So - 1 ~ 8 " (" "
- ⊖ Sc - 1 ~ 2 CRUSHED STONE
- ● B - 1 ~ 4 BORING
- □ CI - 1 ~ 5 CONE TEST
- ▣ C - 1 ~ 10 CBR TEST IN SITU

SOIL AND MATERIAL INVESTIGATIONS

FIGURE 7A - 1

LOCATION OF SOIL AND MATERIAL INVESTIGATIONS

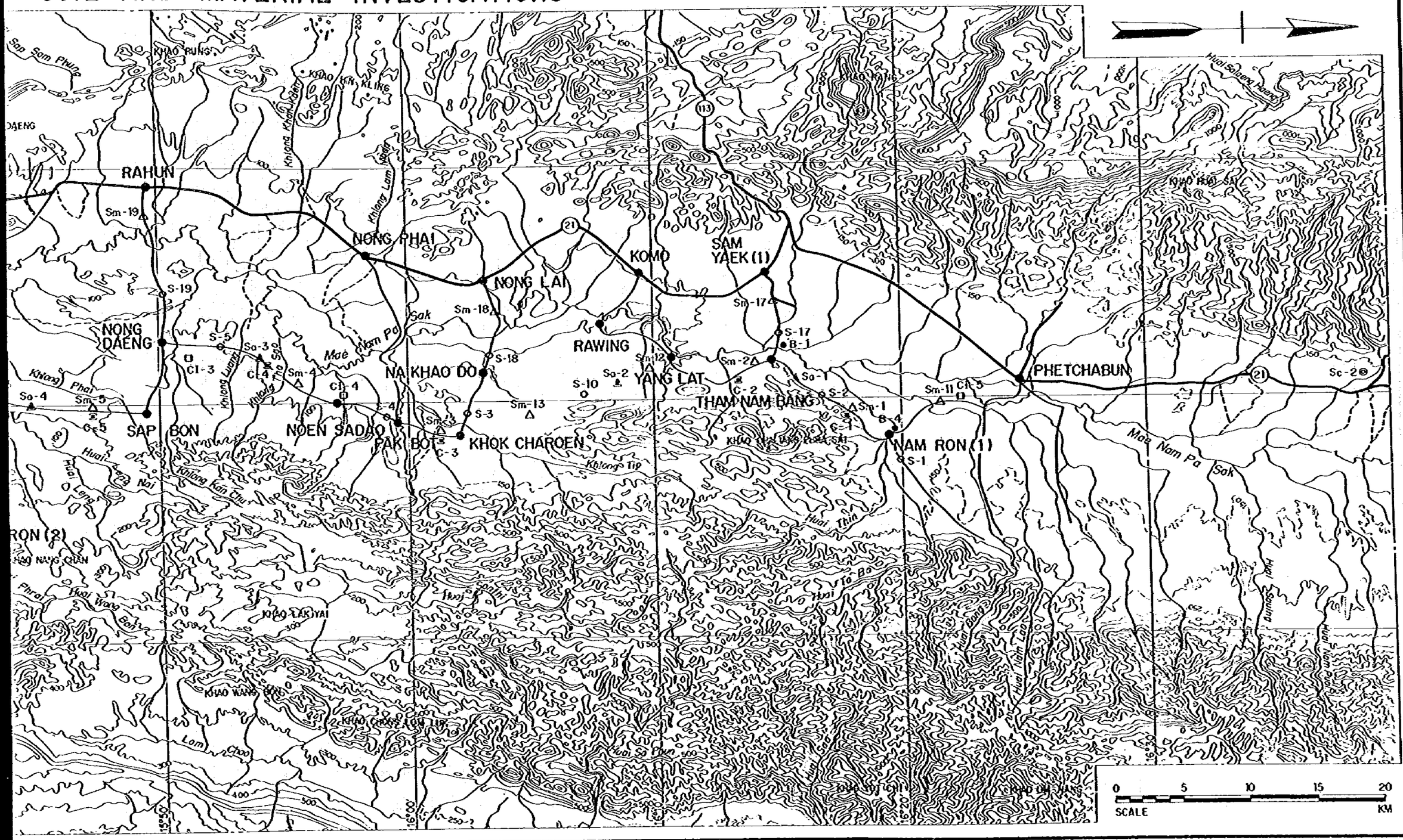


Figure 7A-2 LOG OF BORING

LOG OF BORING NO. B-3

PROJECT NAME: Phetchobun - Chai Badan
SITE: Amphoe Wichian Buri
W.L. - 1.80 m. after 24 hrs.

DEPTH ELEVATION M	DESCRIPTION OF MATERIAL	SOIL SYMBOL
0	SURFACE ELEVATION	
	(A)	
	Silty clay, dark grayish brown, very stiff	CL
5		
	Silty clay, dark brown & gray, very stiff	CL
10		
	Silty clay, some fine sand, dark brown & gray, very stiff	CL
15	(B)	
	Clayey silt, some decomposed Siltstone, grayish brown, hard	MH
	END OF BORING	
20	(A) Silty clay trace of organic matter, dark grayish brown. Top soil	
	(B) Fine to coarse sandy clay, dark brown & gray, very stiff	
25		

WATER CONTENT %
STANDARD "N" PENETRATION (BLOWS/FT.)
20 40 60 80 100
W.L.
124/20cm
174/20cm

LOG OF BORING NO. B-4

PROJECT NAME: Phetchobun - Chai Badan
SITE: Ban Nam Ron
W.L. - 0.50 m. after 24 hrs.

DEPTH ELEVATION M	DESCRIPTION OF MATERIAL	SOIL SYMBOL
0	SURFACE ELEVATION	
	(A)	
	Silty clay, yellowish brown, hard	CL
5		
	Silty clay, some very fine sand, grayish dark brown, hard	CL
10		
	Clayey silt, some very fine sand, light-gray & gray, hard	MH
15	END OF BORING	
	(A) Silty clay, some very fine sand, brown. Top soil	
20		
25		

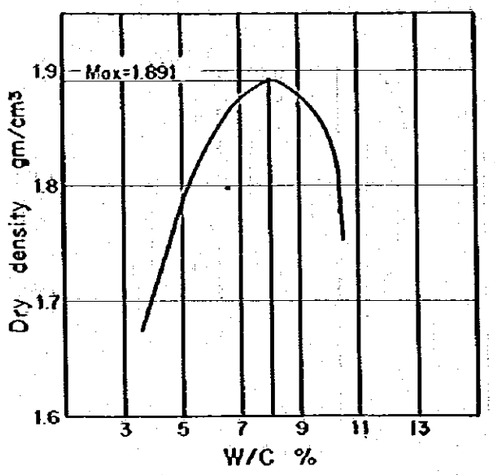
WATER CONTENT %
STANDARD "N" PENETRATION (BLOWS/FT.)
20 40 60 80 100
W.L.
137
111
145/3cm

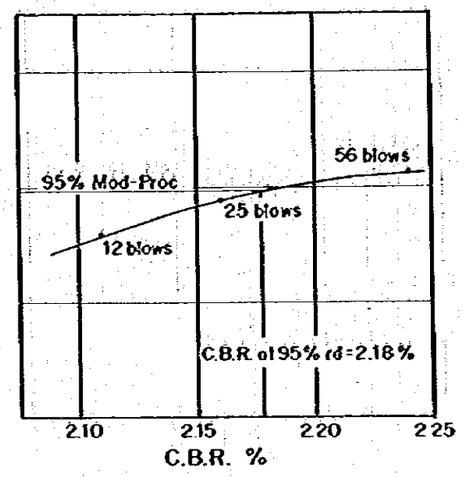
PIGURE 7A - 3
1 of 5

Figure 7A-3 RESULTS OF C.B.R. TEST (1)

LINK NO.3

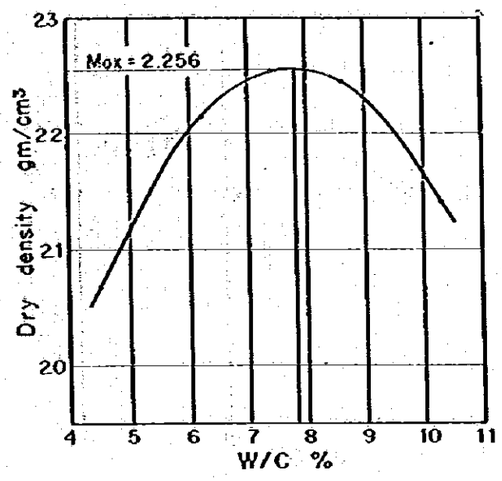
Sample NO.Sm-9

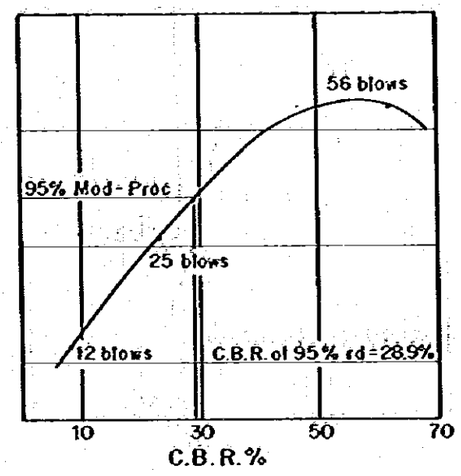




LINK NO.6

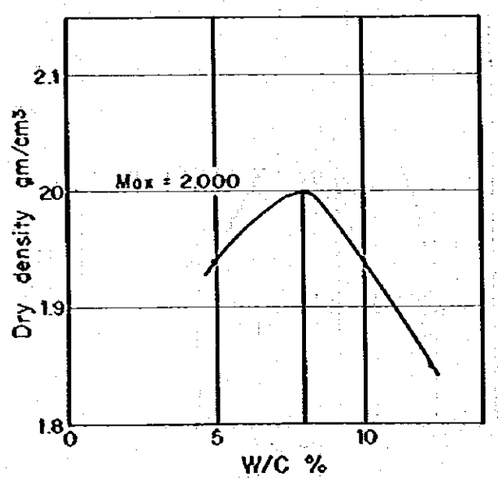
Sample NO.Sm-8

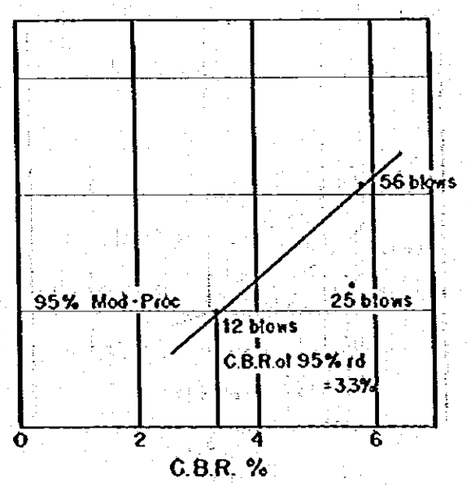




LINK NO.6

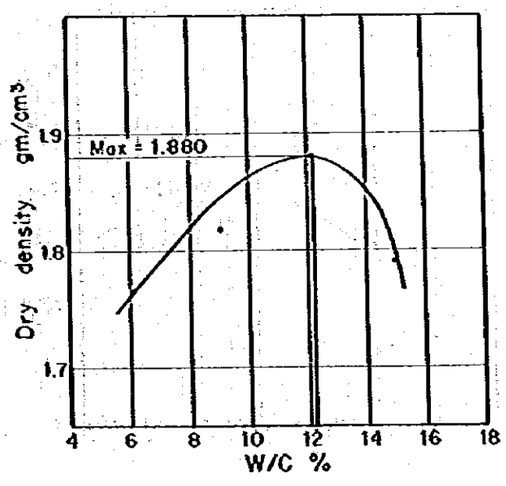
Sample NO.Sa-6





LINK NO.11

Sample NO.Sm-7



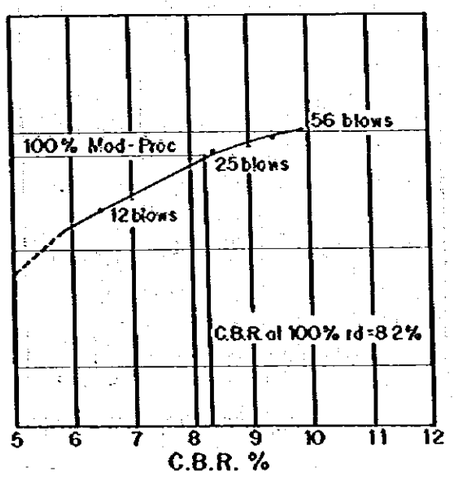
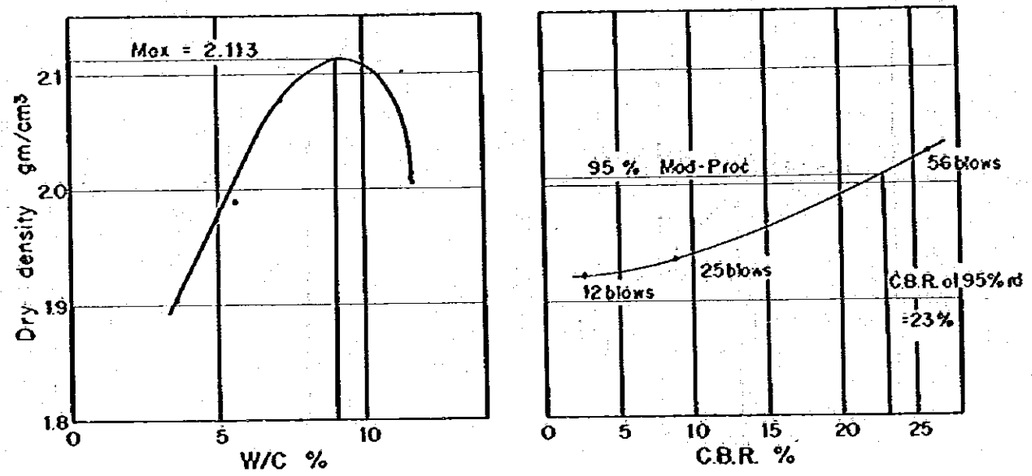
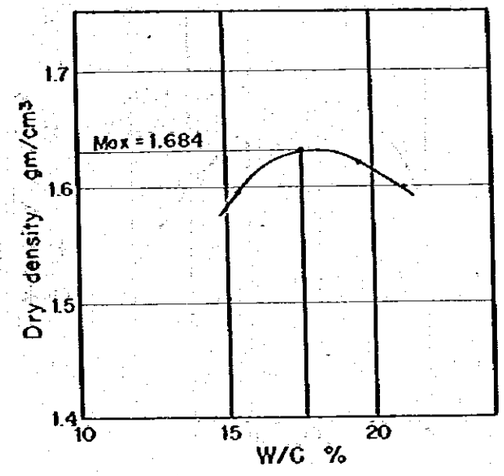


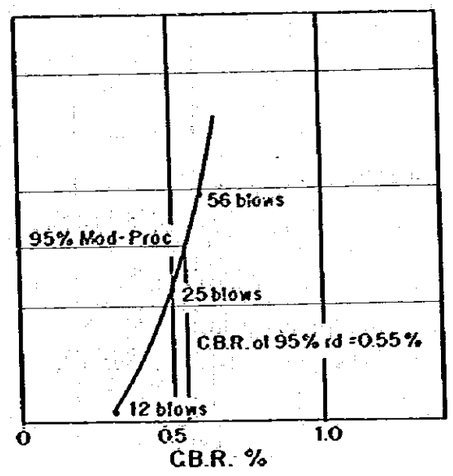
Figure 7A-3 RESULTS OF C.B.R. TEST (2)

LINK NO.11
Sample NO.Sa-5

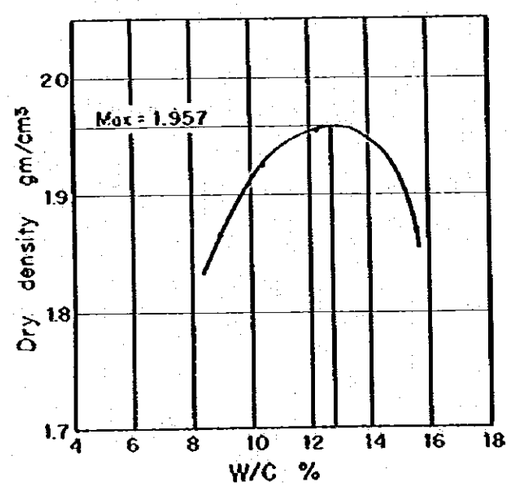


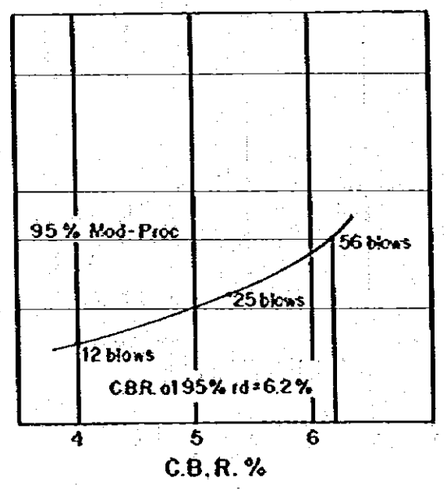
LINK NO.16
Sample NO.Sa-4



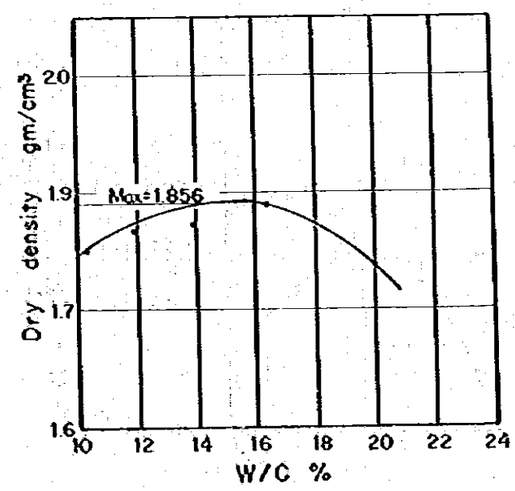


LINK NO.11
Sample NO.Sm-6





LINK NO.16
Sample NO.Sm-5



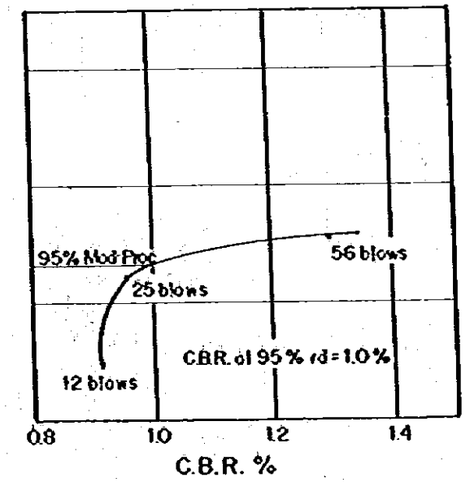
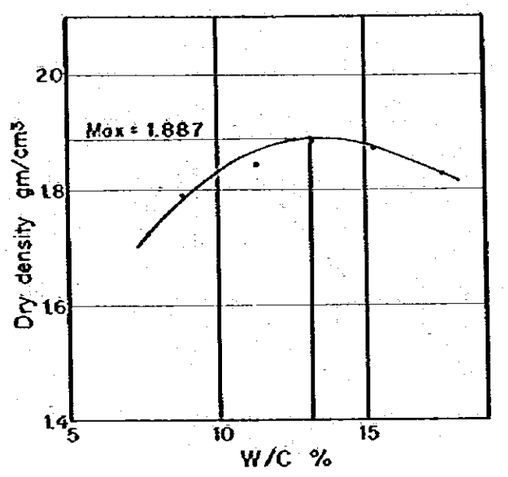
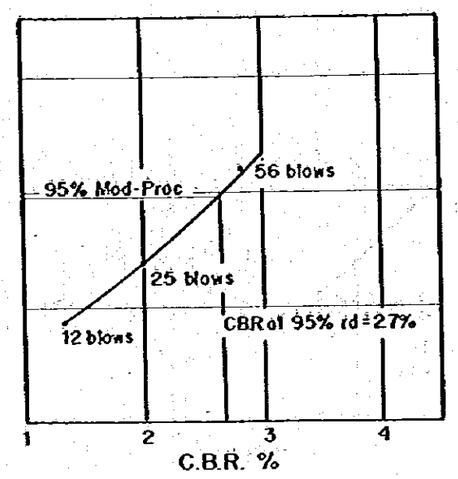


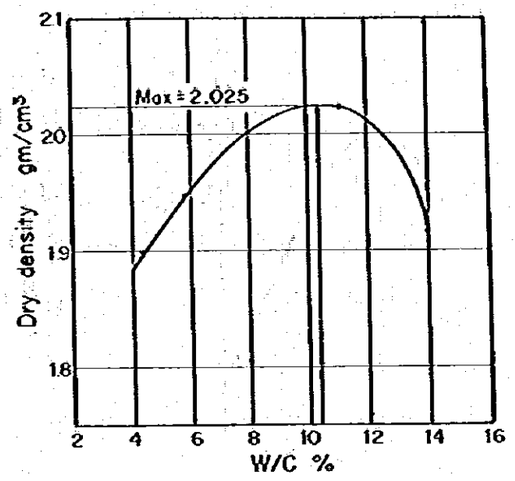
Figure 7A-3 RESULTS OF C.B.R. TEST (3)

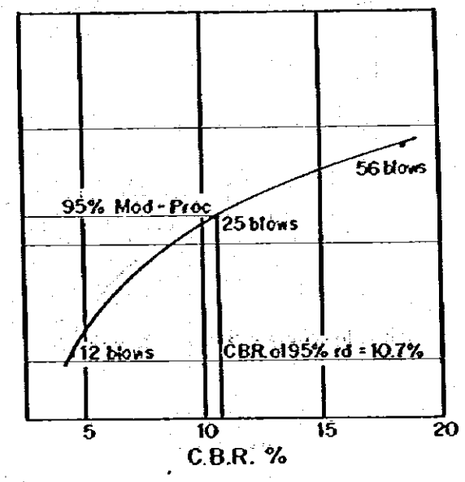
LINK NO.22
Sample NO.Sa-3



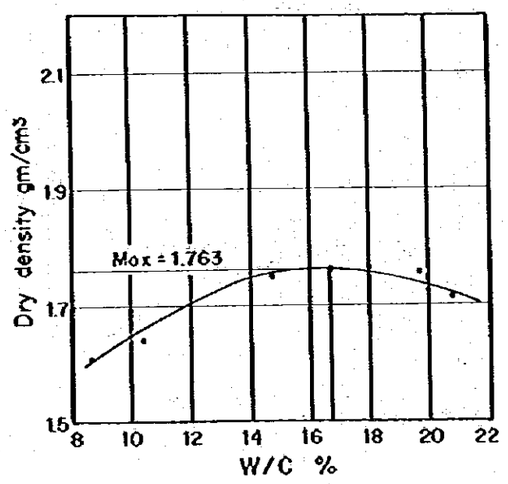


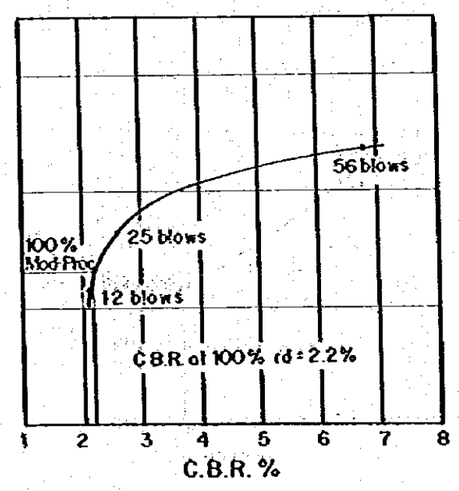
LINK NO.25
Sample NO.Sm-3



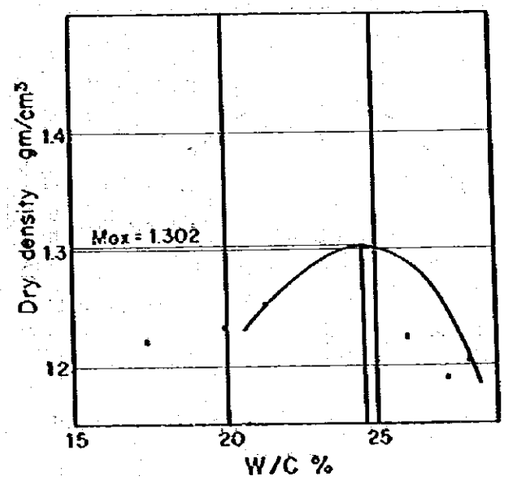


LINK NO.22
Sample NO.Sm-4





LINK NO.28
Sample NO.Sm-13



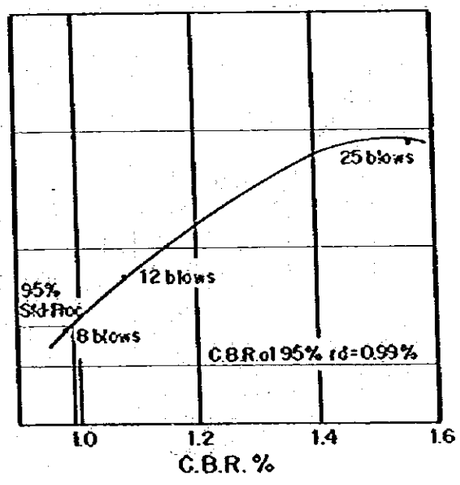
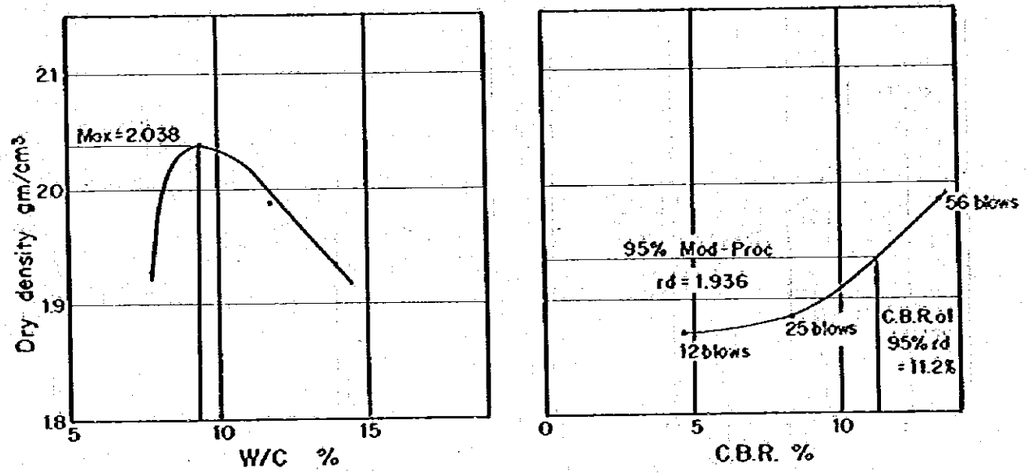
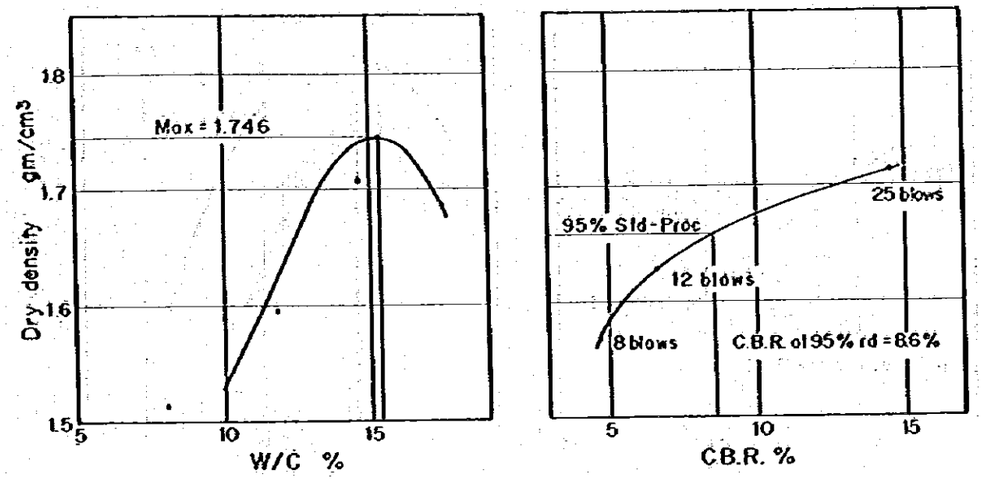


Figure 7A-3 RESULTS OF C.B.R. TEST (4)

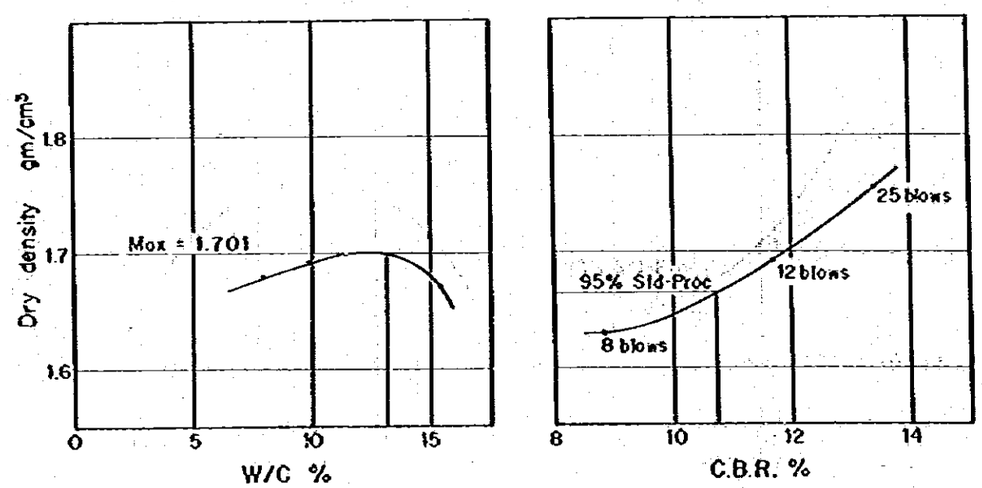
LINK NO.28
Sample NO.Sa-2



LINK NO.35
Sample NO.Sm-2



LINK NO.28
Sample NO.Sm-12



LINK NO.37
Sample NO.Sa-1

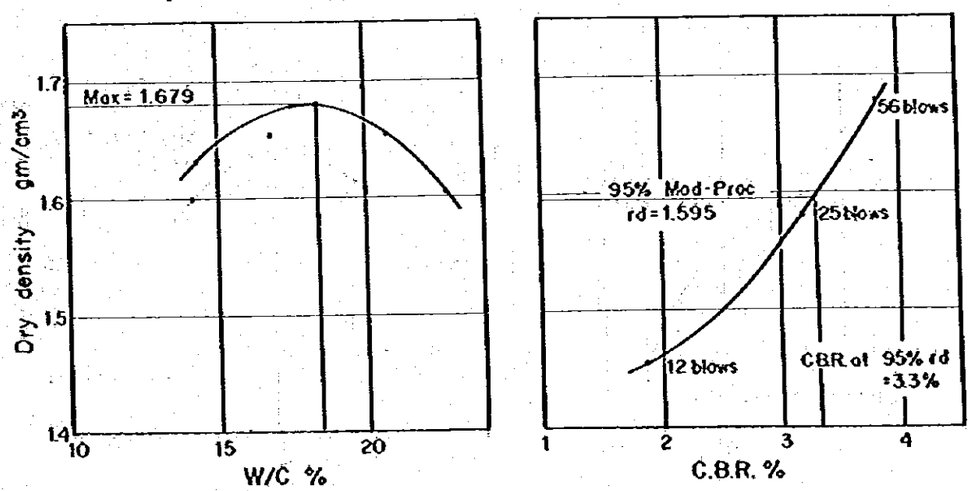
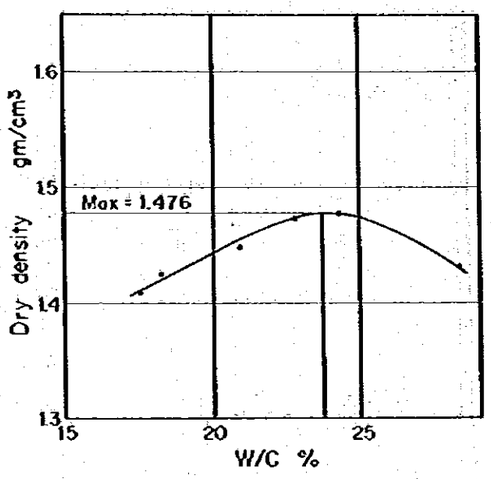
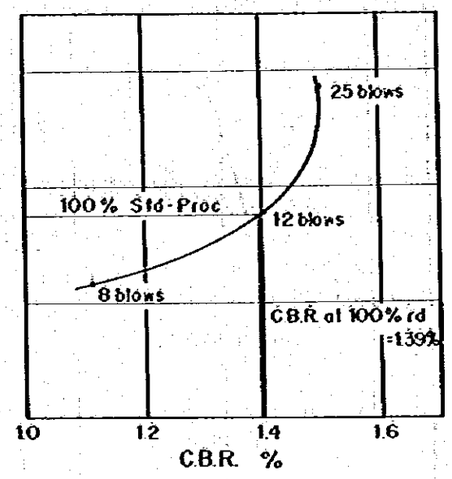


Figure 7A-3 RESULTS OF C.B.R. TEST (5)

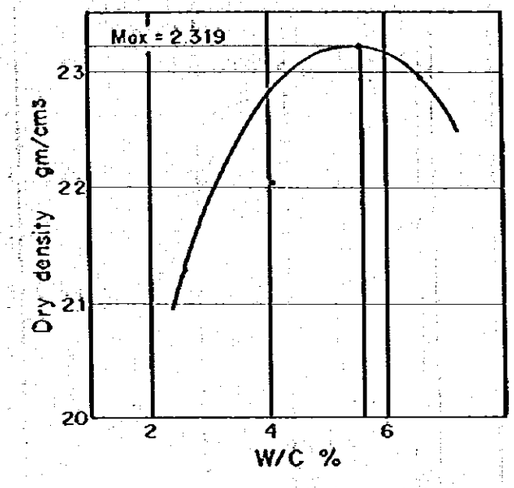
LINK NO.37

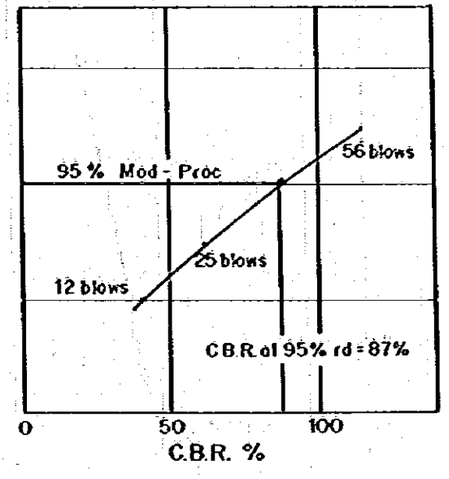
Sample NO.Sm-1





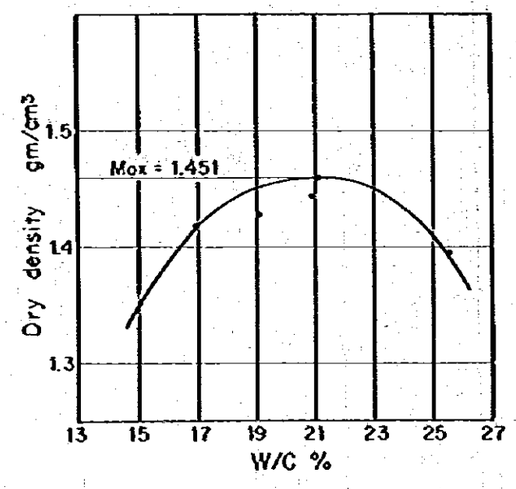
Sample NO.Sc-1

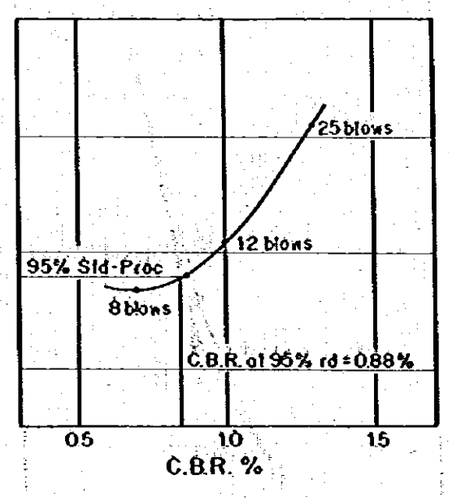




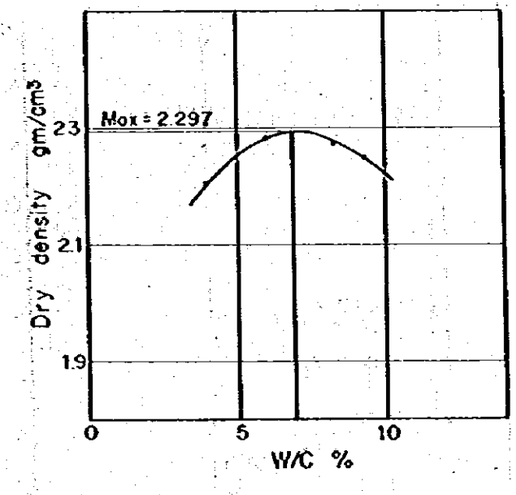
LINK NO.40

Sample NO.Sm-11





Sample NO.Sc-2



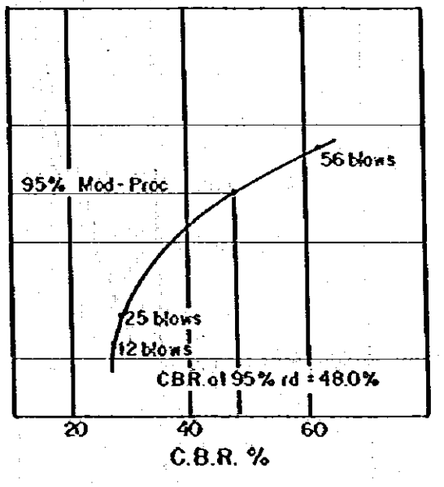
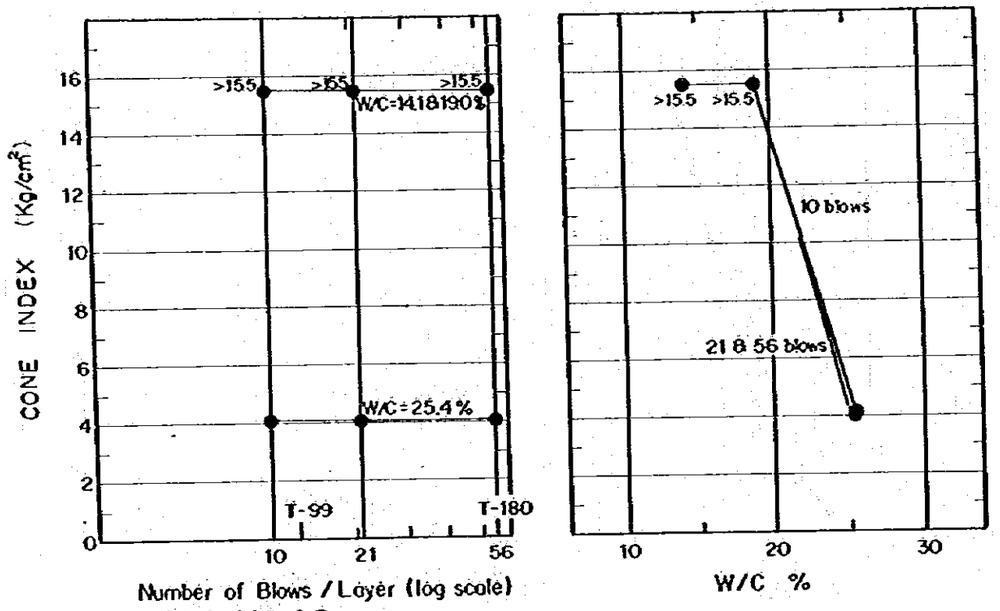
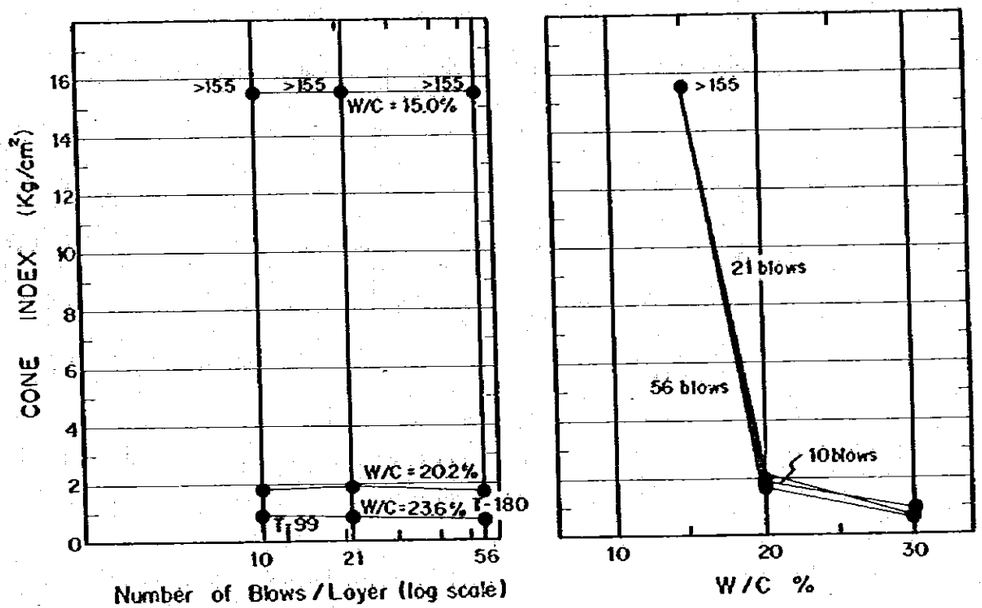


Figure 7A-4 RESULTS OF CONE TEST (1)

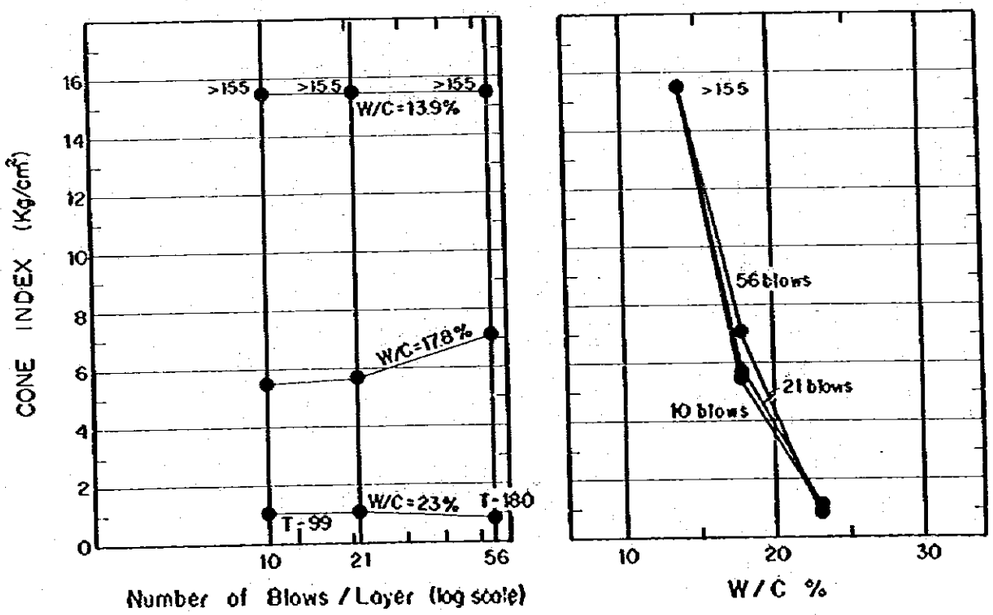
LINK NO.3
Sample NO.CI-1
Natural Water Content 20.7%
Soil Description Dark gray silty clay



LINK NO.22
Sample NO.CI-3
Natural Water Content 21.2%
Soil Description Li-gray and brown silty clay



LINK NO.16
Sample NO.CI-2
Natural Water Content 19.0%
Soil Description Gray and brown silty clay



LINK NO. 23
Sample NO.CI-4
Natural Water Content 39.8%
Soil Description Yellowish brown clay

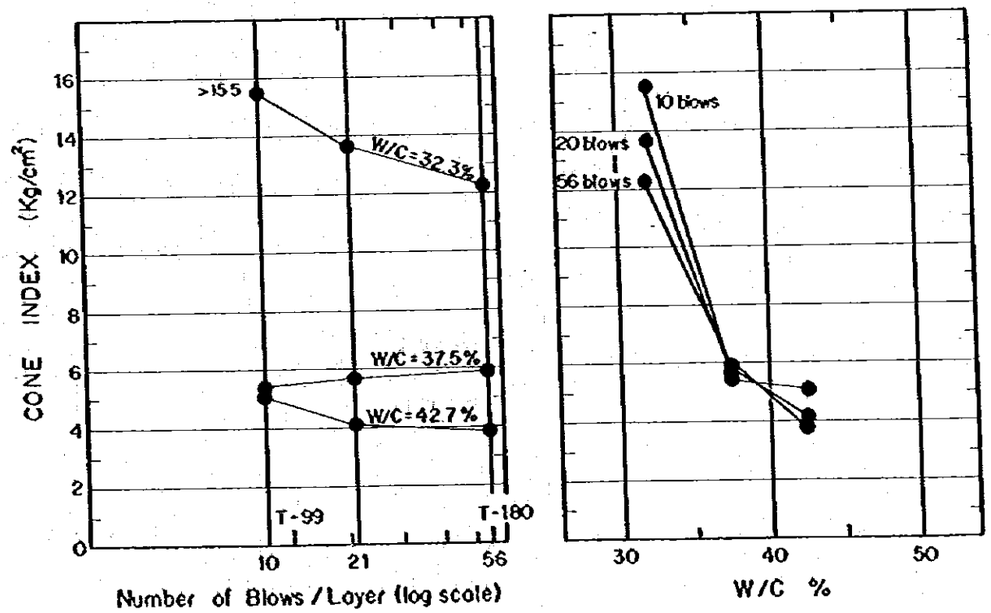


Figure 7A-4 RESULTS OF CONE TEST (2)

LINK NO. 40
Sample NO.CI-5 Natural Water Content 13.5%
Soil Description Brown silty clay

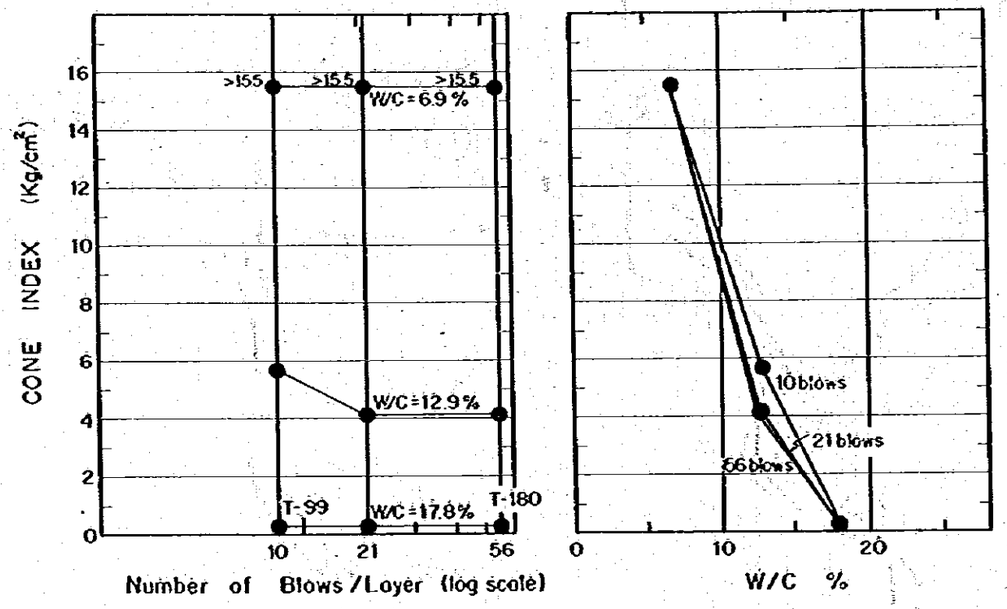
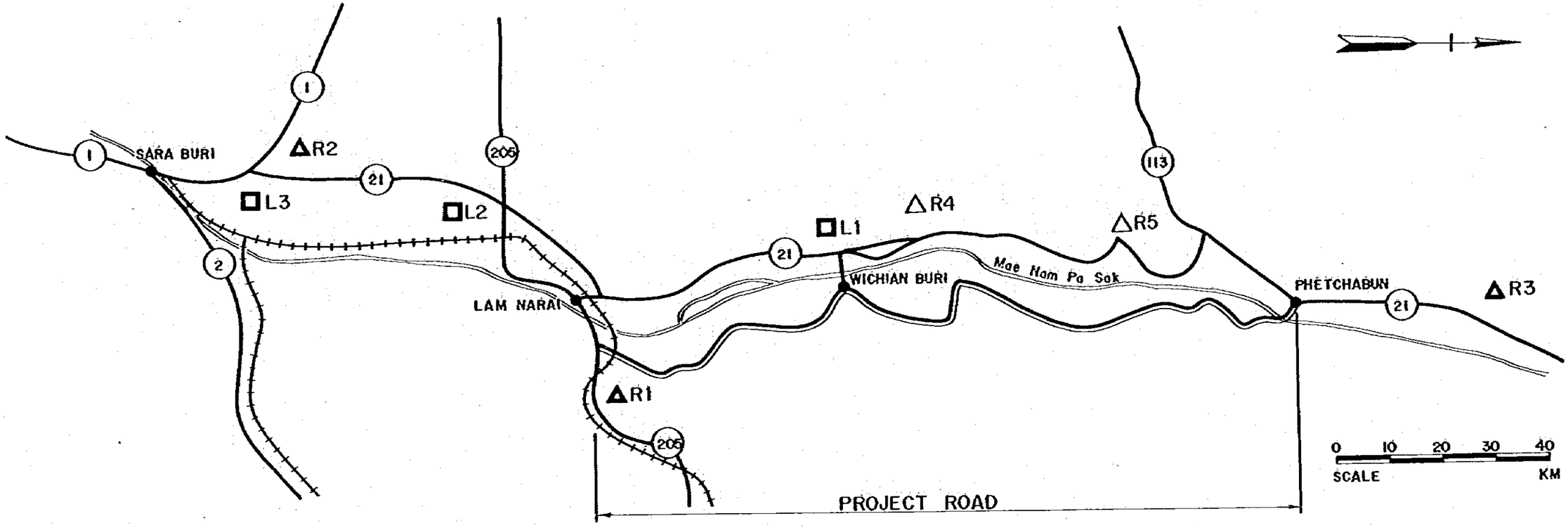


FIGURE 7A-5 LATERITE AND ROCK MATERIALS



MATERIAL	SOURCE OF MATERIAL			SIEVE ANALYSIS (%)									ATTERBERG LIMIT (%)		CBR	REMARKS
	ROUTE NO.	LOCATION	OFFSET (KM)	2"	1"	1/2"	3/4"	3/8"	#4	#10	#40	200	LL	PI	(%)	
L1	21	46KM FROM LAM NARAI	2.0	100	90.3	74.1	85.5	63.6	30.0	20.2	14.6	11.9	25.0	4.7	86.0	
L2	21	41KM FROM SARA BURI	4.0	100	99.4	87.5	97.1	74.8	33.3	24.8	20.6	11.0	21.9	3.6	36.5	
L3	21	6KM FROM SARA BURI	0.5	100	97.8	84.2	93.6	75.7	51.8	40.0	26.0	20.3	26.1	6.9	22.4	
R1	205	20KM FROM LAM NARAI	1.0	ABRASION TEST 26.8 %											87.0	BAN KHAO TAMBON
R2	1	20KM FROM SARA BURI	—	ABRASION TEST 29.1 %												
R3	21	30KM FROM PHETCHABUN	4.0												48.0	BAN TAM PA
R4	21	20KM FROM WICHIAN BURI	4.0													
R5	21	70KM FROM WICHIAN BURI	2.0													KHAO CHON THO

L: LATERITE
R: ROCK QUARRY

Appendix 8

水文解折

Appendix 8

水文解折

8－1 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。

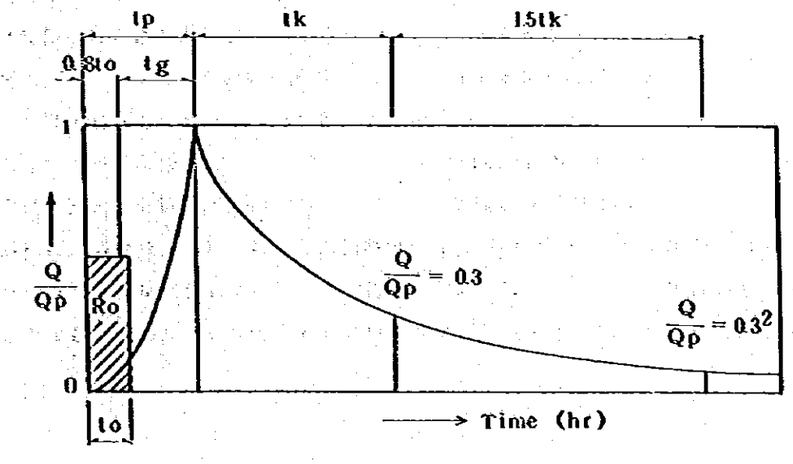
b）同一の流域では，有効降雨の強度が変化しても流出量の時間的割合は変化しない。

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。

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

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

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

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

ここで，Qp：単位時間 to，有効雨量 Ro によるピーク流量（m^3／sec）

tp：流量がピークに到達する時間（hr）

tk：流量が Qp から 0.3 Qp 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 0.8 to 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。

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

ここで，Qt：全洪水流量（m^3／sec）

一方，全洪水流量 Qt はまた，次式によって与えられる。

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

ここで，Ro：有効雨量（mm）

A：流域面積（Km^2）

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。

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

$$tp = 0.8tg + to$$

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（km）

tk = 1.5 tg （出水の出が遅く引きが早い河川）

tk = 3.0 tg （出水の出が早く引きが遅い河川）

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。

8－2　避溢橋の長さ決定の例

道路リンク１１に関連する流域番号１２のケースを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：　３４.４（m）

ii）上流側の許容最高水位：　６６.５（m）

iii）流入量から基底流量を除いた流量：　４７８.９（m^3／sec）

（第１巻第１０章の Table１０－２参照）

iv）水位－貯留量曲線：　Figure 8A-2 参照

v）水位－流出量曲線（下流部）：　Figure 8A-3 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３４.４m および延長した橋長５０,７５ および１００m に対する水位－流量曲線をそれぞれ Figure

8A－4，8A－5，8A－6および8A－7に示す。この結果を下表に要約し，またFigure 8A－8に示す。

Bridge Length (m)	Inflow Volume (m^3/sec)	Outflow Volume (m^3/sec)	Reserved Volume (1,000 m^3)	Calculated Water Level (m)
34.4	478.9	43.9	16,000	66.725
50.0	478.9	59.6	14,780	66.638
75.0	478.9	80.9	13,264	66.531
100.0	478.9	100.0	12,109	66.449

Note: Allowable water level is 66.5 (m).

以上の検討の結果から流域番号12に対して必要な避溢橋の長さを84mと決定した。

Table 8A-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	0.3	0.0
13	3.7	3.6	0.1
14	12.0	11.1	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	153.8	63.9	89.9

Table 8A-2 DRAINAGE CAPACITY OF BRIDGES AND CULVERTS

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)	GRADIENT ($\times 10^{-3}$)	VELOCITY (km/hr)	TIME OF CONCENTRATION (hr)	DESIGN DISCHARGE (m^3/sec)	PROPOSED STRUCTURE	AREA OF WATER WAY (m^2)	HYDRAULIC RADIUS (m)	CAPACITY (m^3/sec)
1	4+550	Box culvert 4(2.4x2.4)	36.0	4.5 11.3	18 75	4.0 6.6	2.62 3.54	4.91	79	Box culvert 4(2.4x2.4)	23.0	0.80	83
2	10+700	Box culvert 3(3.6x3.3)	5.8	3.5 3.0	30 170	18.6 56.6	4.15 12.85	1.08	58	Box culvert 3(3.6x3.3)	35.6	1.16	240
3	12+400	Concrete bridge (7.0x36.0)	5.7	4.2 3.8	44 240	10.5 63.2	4.68 13.73	1.17	52	Concrete bridge (7.0x36.0)	68.2	1.86	210
4	12+500	Concrete bridge (7.0x41.0)	19.6	7.8 4.1	44 200	5.6 48.8	3.21 11.76	2.78	76	Concrete bridge (7.0x41.0)	55.0	1.33	99
5	17+200	Box culvert 3(2.4x2.4)	25.9	11.3 2.4	62 140	5.5 58.3	3.17 13.08	3.74	74	Box culvert 3(2.4x2.4)	17.3	0.80	74
6	20+200	Box culvert 3(3.0x2.4)	39.1	12.8 6.6	42 260	3.3 39.4	2.34 10.34	6.11	68	Box culvert 3(3.0x2.4)	21.6	0.92	78
7	23+300	Box culvert 4(3.3x3.0)	36.8	12.3 10.7	42 300	3.4 28.0	2.38 8.43	6.44	61	Box culvert 4(3.3x3.0)	39.6	1.06	160
8	24+150	Box culvert 3(3.0x3.0)	6.9	4.8 4.8	12 35	2.5 7.3	1.98 3.76	3.70	20	Box culvert 3(3.0x3.0)	27.0	1.00	90
9	27+700	Concrete bridge (7.0x22.5)	38.1	15.9 6.4	40 250	2.5 39.1	1.98 10.30	8.65	48	Concrete bridge (7.0x22.5)	41.2	1.75	60
10	30+0	Box culvert 3(2.1x2.1)	7.7	6.0 2.0	20 7	3.3 3.5	2.34 2.42	3.39	24	Box culvert 3(2.1x2.1)	13.2	0.70	40
13	50+0	Pipe culvert 4ϕ 1.0 ϕ 0.8	27.0	8.3 6.0	7 10	0.8 1.7	1.00 1.57	12.12	24	Pipe culvert 16ϕ 1.0 ϕ 0.8	12.6	0.28	26
14	57+700	Pipe culvert 4ϕ 0.8	11.9	4.8 5.1	7 15	1.5 2.9	1.46 2.16	5.65	23	Box culvert 2(2.4x2.4)	11.5	0.80	26

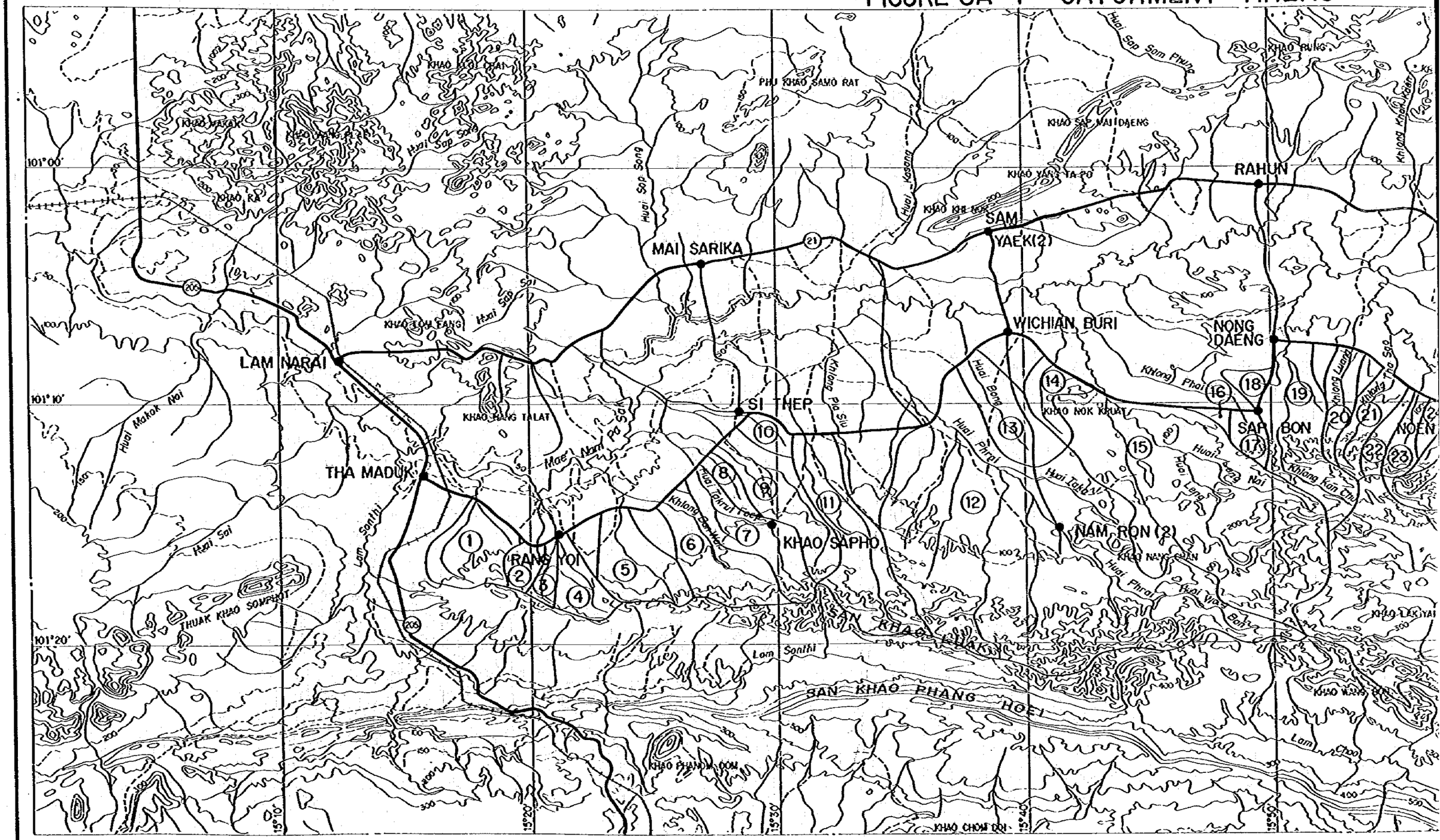
Table 8A-2 DRAINAGE CAPACITY OF BRIDGES AND CULVERTS (continued)

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)	GRADIENT (x10-3)	VELOCITY (km/hr)	TIME OF CONCENTRATION (hr)	DESIGN DISCHARGE (m^3/sec)	PROPOSED STRUCTURE	AREA OF WATER WAY (m^2)	HYDRAULIC RADIUS (m)	CAPACITY (m^3/sec)
16	69+400	Timber bridge (4.2x11.3)	5.2	2.4 4.5	10 40	4.2 8.9	2.69 4.23	1.96	28	Concrete bridge (7.0x14.0)	22.0	1.45	36
17	72+950	Timber bridge (4.2x11.5)	6.9	4.1 3.5	30 160	7.3 45.7	3.76 11.31	1.40	53	Concrete bridge (7.0x14.0)	29.0	1.83	74
18	76+900	Timber bridge (4.2x15.0)	4.1	1.0 3.0	5 60	5.0 20.0	3.00 6.89	0.77	57	Concrete bridge (7.0x14.0)	32.0	1.95	71
19	81+0	Timber bridge (4.2x14.9) (4.2x11.2) (4.2x22.5)	55.2	15.3 9.8	78 222	5.1 22.6	3.03 7.41	6.37	93	Concrete bridge (7.0x14.0) (7.0x14.0) (7.0x21.0)	60.8	1.18	97
20	85+700	Timber bridge (4.3x11.5)	14.2	8.3 5.4	30 175	3.6 32.4	2.46 9.20	3.96	38	Concrete bridge (7.0x14.0)	24.3	1.58	40
21	89+0	Logs (2.7x2.5)	17.2	7.6 8.5	42 270	5.5 31.7	3.17 9.08	3.57	55	Concrete bridge (7.0x14.0)	26.3	1.65	55
22	90+850	Timber bridge (4.2x11.2)	10.5	5.5 6.6	22 290	4.0 43.9	2.62 11.04	2.70	41	Concrete bridge (7.0x14.0)	24.3	1.58	42
23	89+850	Logs (2.7x4.5)	6.5	6.0 2.3	30 180	5.0 78.3	3.00 15.62	2.15	32	Concrete bridge (7.0x14.0)	22.0	1.45	40
24	91+650	Timber bridge (4.2x15.0)	11.1	6.9 3.9	32 280	4.6 71.8	2.85 14.83	2.68	44	Concrete bridge (7.0x21.0)	36.0	1.62	67
25	94+350	Timber bridge (4.4x15.4)	6.9	8.4 1.5	30 180	3.6 120.0	2.46 20.18	3.49	21	Concrete bridge (7.0x14.0)	22.0	1.45	34
26	97+0	Timber bridge (4.2x18.4) (4.5x24.3)	46.0	13.1 5.3	70 240	5.3 45.3	3.10 11.25	4.70	105	Concrete bridge (7.0x21.0) (7.0x24.0)	82.1	1.81	178
29	108+800	–	7.6	5.0 2.4	40 140	8.0 58.3	3.97 13.08	1.44	56	Box culvert 2(2.4x3.0)	14.4	0.90	77

Table 8A-2 DRAINAGE CAPACITY OF BRIDGES AND CULVERTS (continued)

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)	GRADIENT ($x10^{-3}$)	VELOCITY (km/hr)	TIME OF CONCENTRATION (hr)	DESIGN DISCHARGE (m^3/sec)	PROPOSED STRUCTURE	AREA OF WATER WAY (m^2)	HYDRAULIC RADIUS (m)	CAPACITY (m^3/sec)
30	109+800	–	11.0	7.0 2.5	35 140	5.0 56.0	3.00 12.77	2.53	47	Box culvert 2 (2.4x3.0)	14.4	0.90	61
31	118+0	–	4.3	2.3 2.7	10 160	4.3 59.2	2.74 13.20	1.04	44	Box culvert 2(2.4x3.0)	14.4	0.90	57
32	119+0	–	11.9	5.0 6.8	40 160	8.0 23.5	3.97 7.59	2.16	59	Box culvert 2(2.4x3.0)	14.4	0.90	77
33	124+500	Timber bridge (3.5x21.9)	48.5	7.0 9.0	65 220	9.3 24.4	4.35 7.76	2.77	188	Concrete bridge (7.0x21.0)	55.2	2.39	191

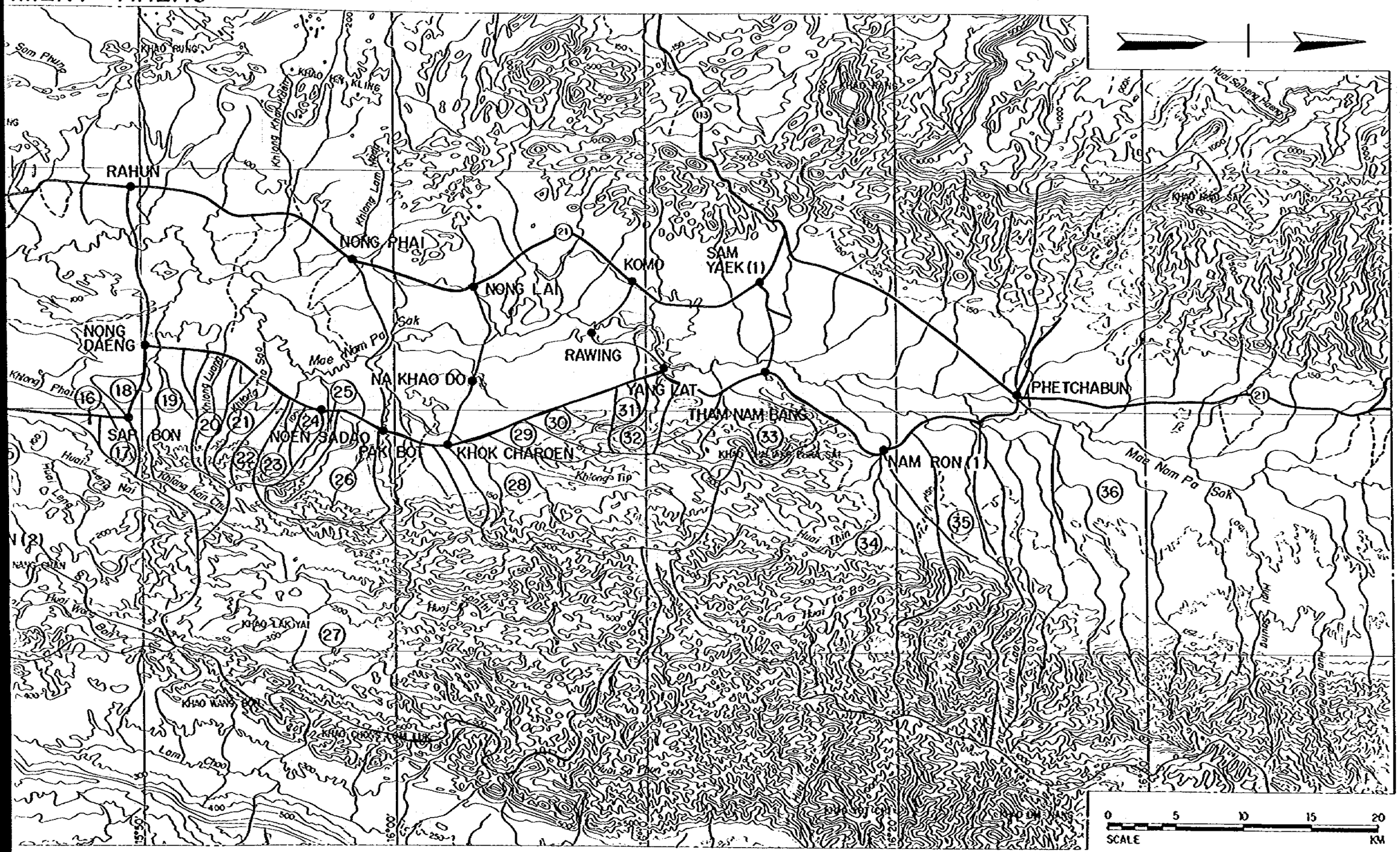
FIGURE 8A-1 CATCHMENT AREAS



IMENT AREAS

CATCHMENT AREAS

FIGURE 8A - 1



PIGURE 8A - 2 to 4

Figure 8A-2 WATER LEVEL - RESERVED VOLUME CURVE

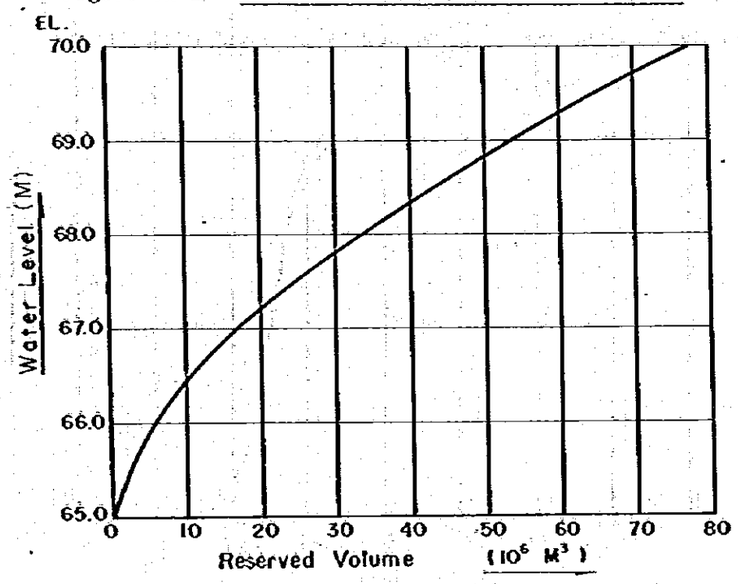


Figure 8A-3 WATER LEVEL - DICHARGE CURVE
(Downstream)

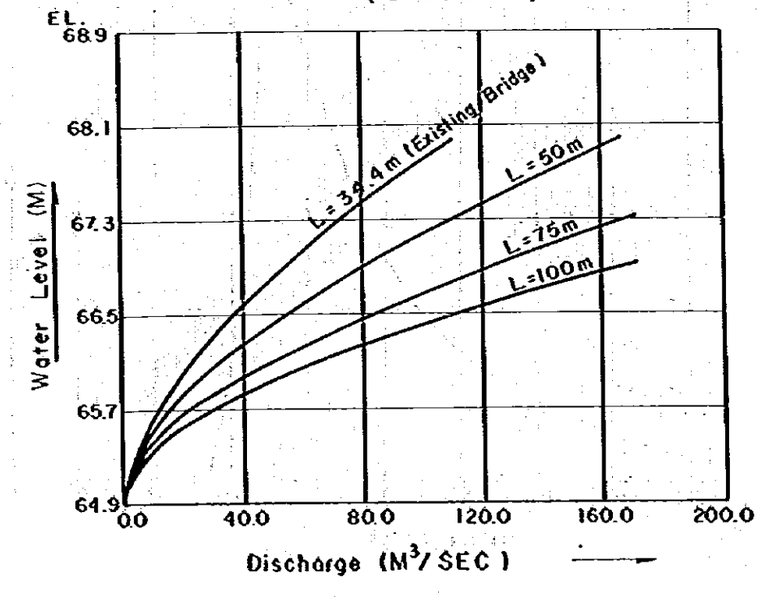
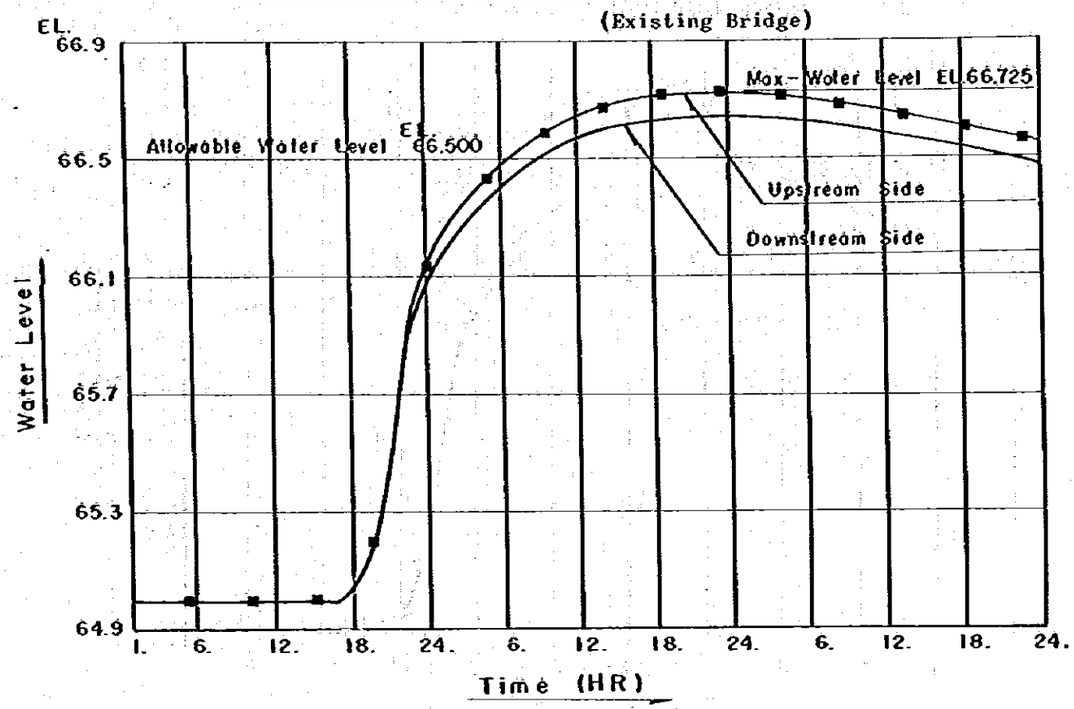


Figure 8A-4 WATER LEVEL AND DISCHARGE (Bridge Length 34.4 m)
(Existing Bridge)



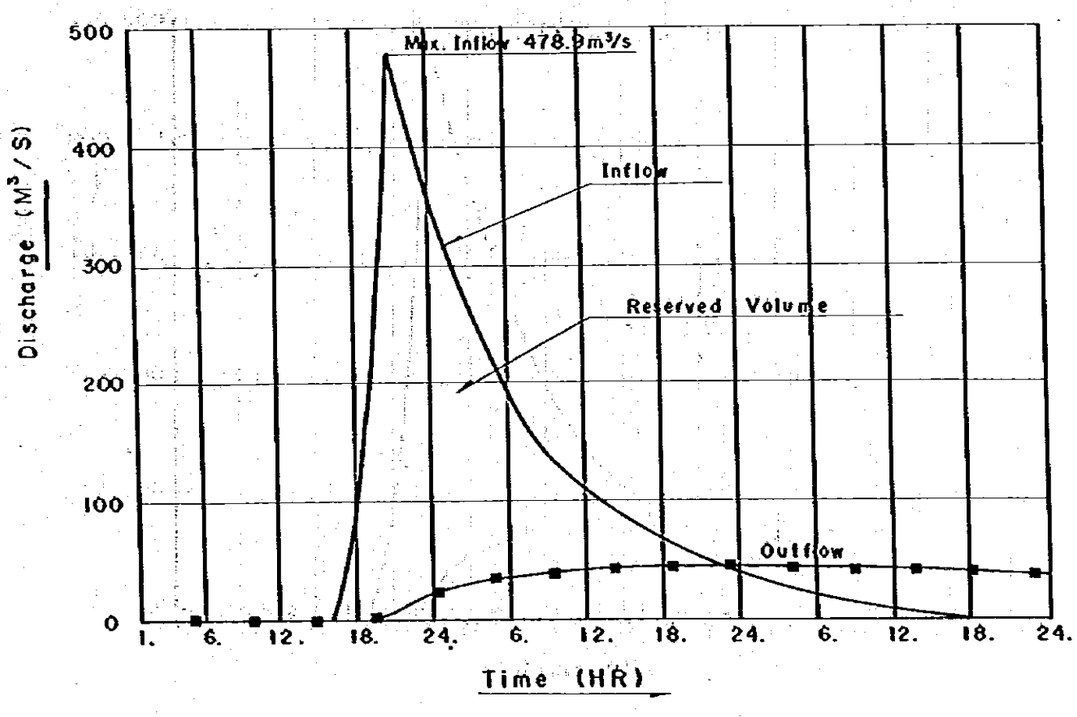


Figure 8A-5 WATER LEVEL AND DISCHARGE (Bridge Length 50.0 m)

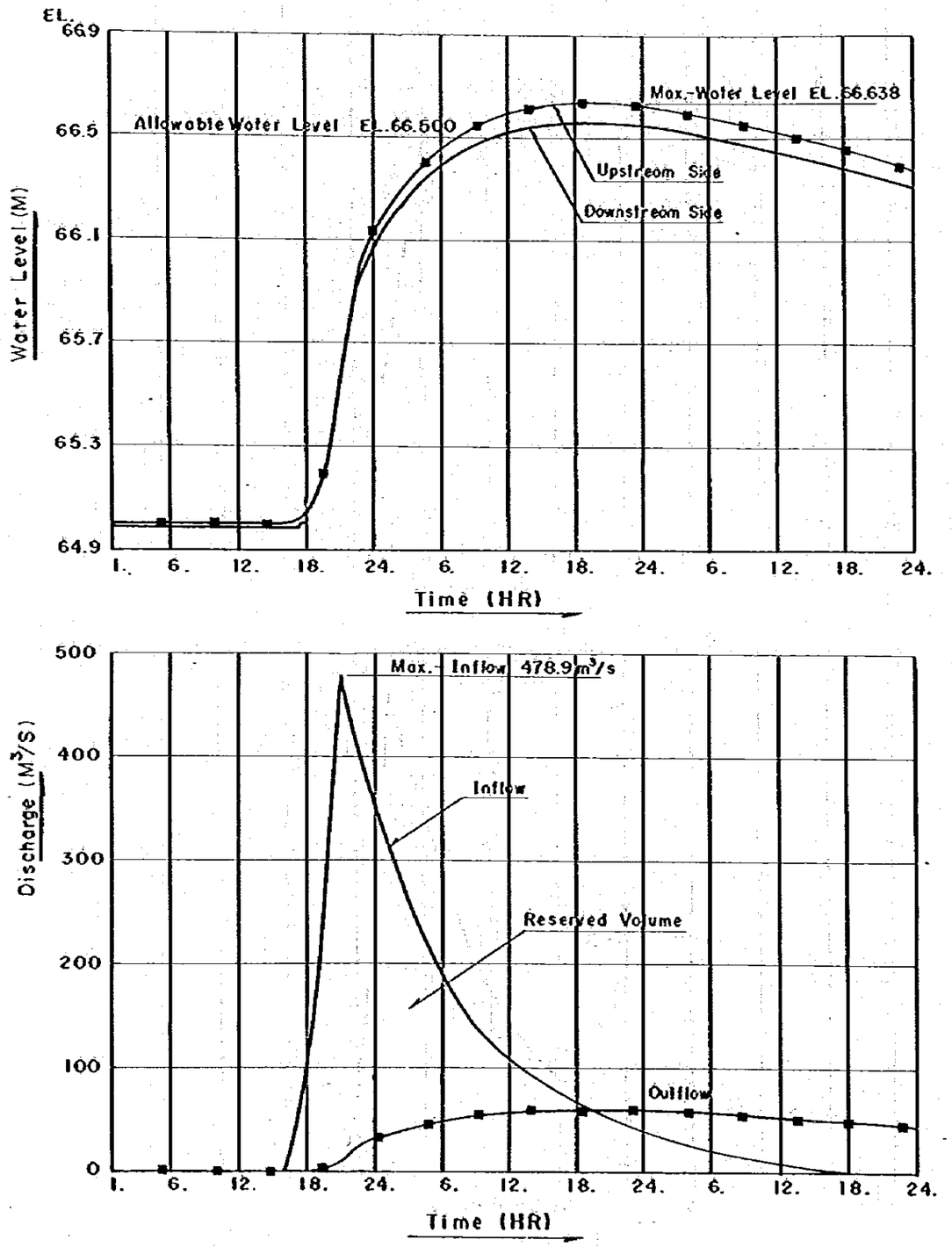


Figure 8A-6 WATER LEVEL AND DISCHARGE (Bridge Length 75.0 m)

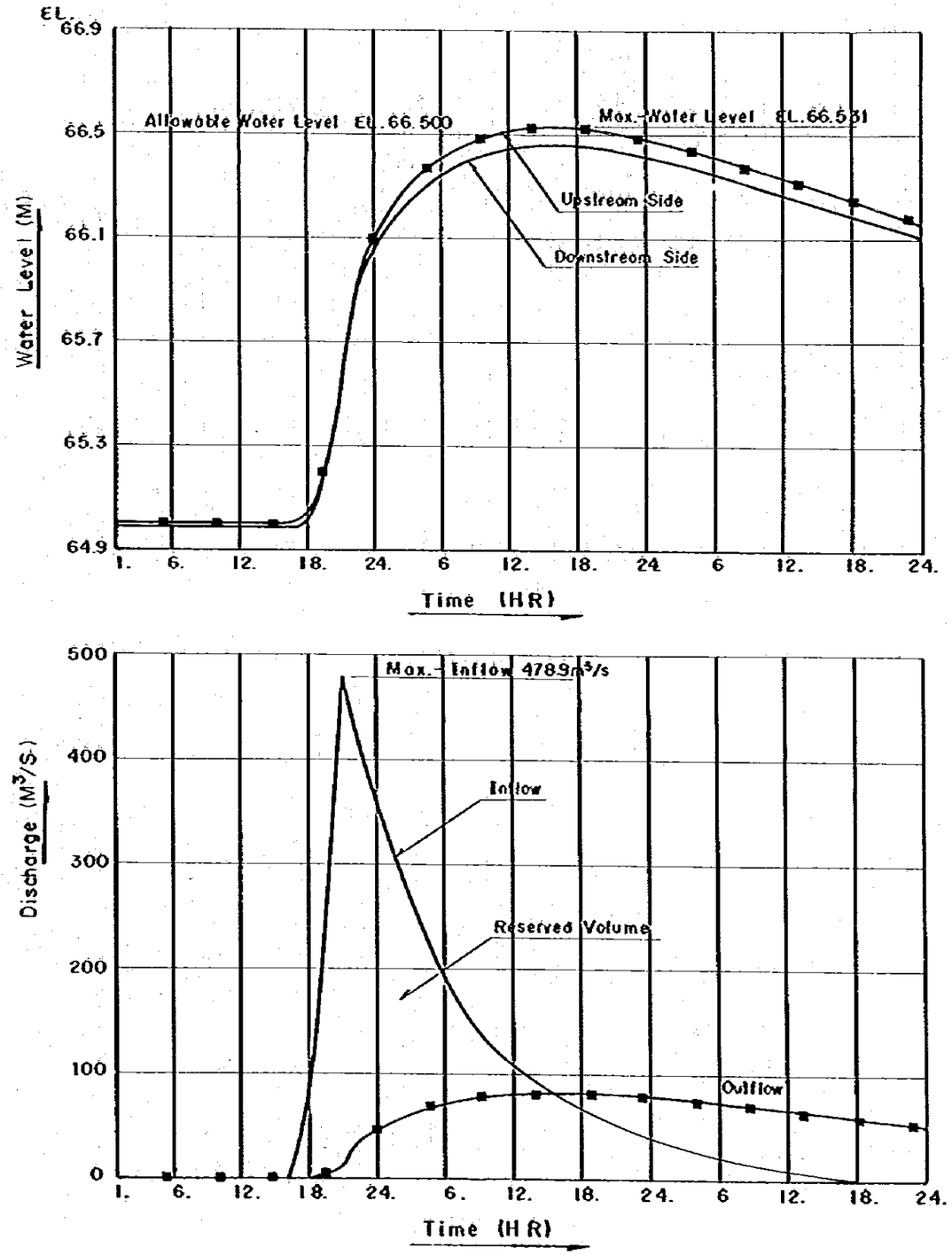


Figure 8A-7 WATER LEVEL AND DISCHARGE (Bridge Length 100.0 m)

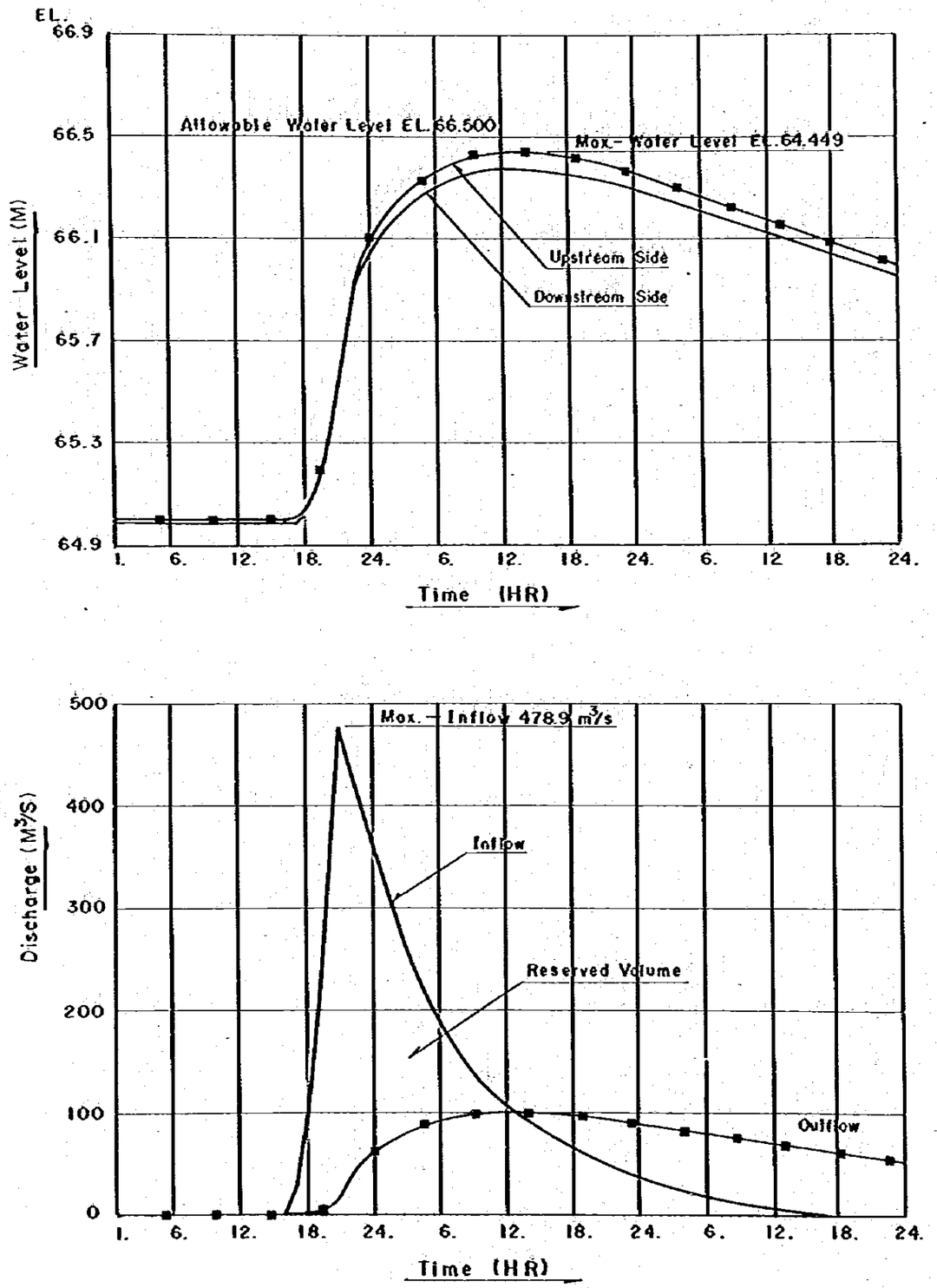
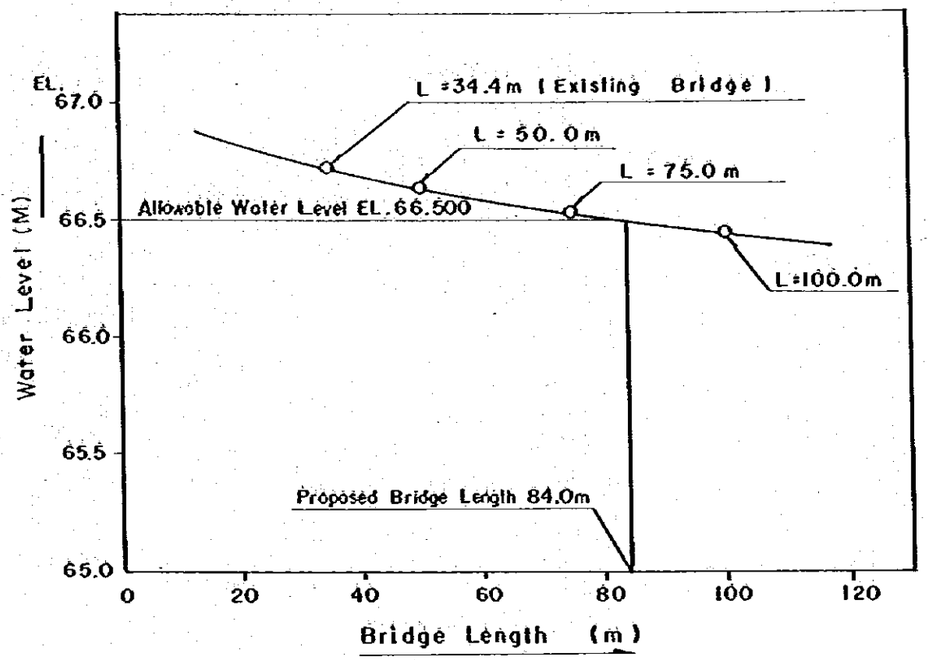


Figure 8A-8 BRIDGE LENGTH FOR RELIEF OPEN

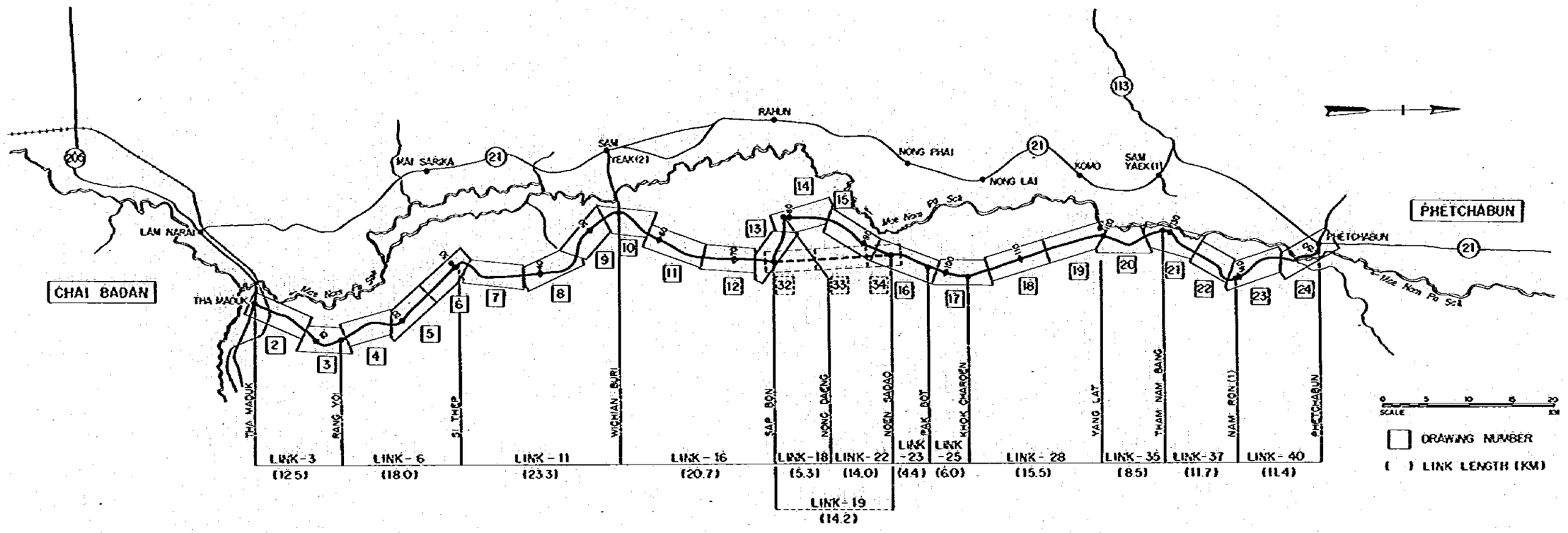
PIGURE 8A-7 to 8



第2部

DRAWINGS

PHETCHABUN CHAI BADAN HIGHWAY FEASIBILITY STUDY	SHEET No
COVER SHEET	DWG - 1



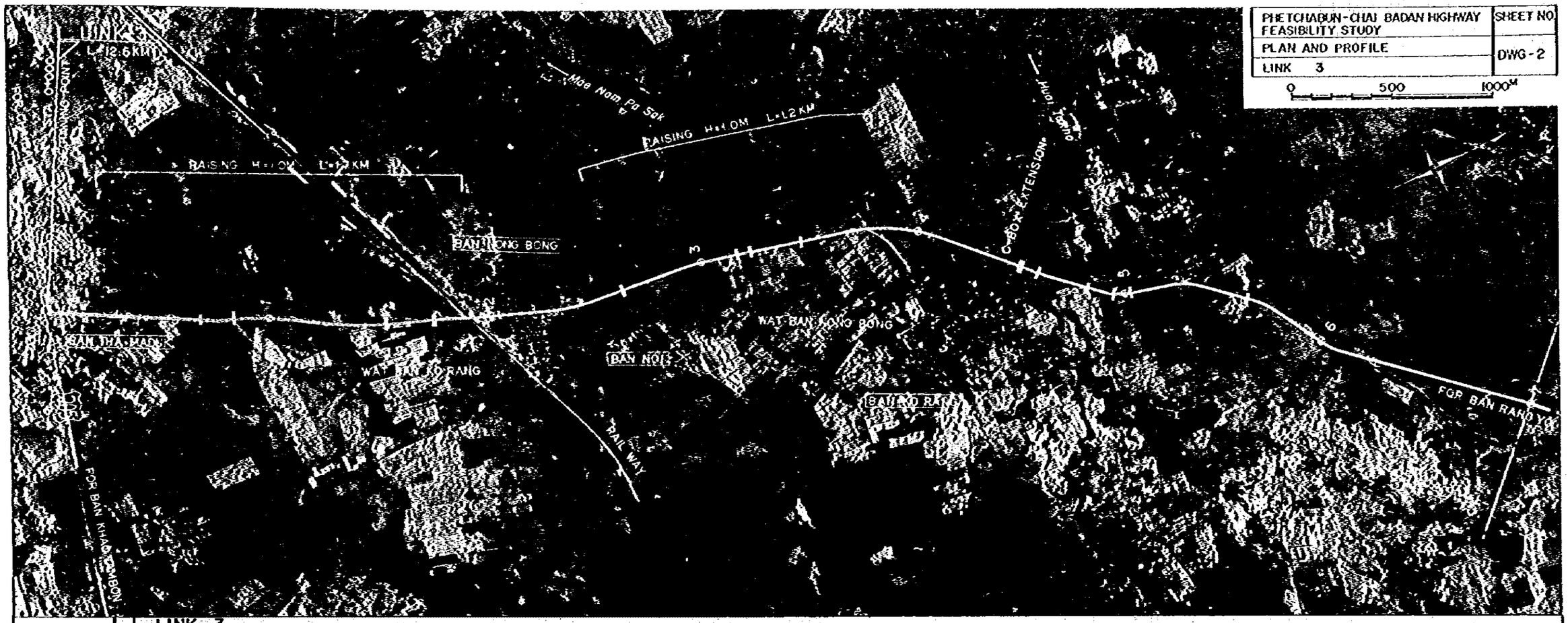
INDEX OF DRAWINGS	SHEET NUMBER
COVER SHEET	DWG-1
PLAN AND PROFILE	DWG-2~DWG-24
TYPICAL CROSS SECTION (EXISTING ROAD SECTION)	DWG-25
TYPICAL CROSS SECTION (NEW ROAD SECTION)	DWG-26
TYPICAL PAVEMENT STRUCTURE	DWG-27
STANDARD BRIDGE	DWG-28
STANDARD BOX CULVERT	DWG-29
STANDARD PIPE CULVERT	DWG-30
DIAGRAMMATIC LAYOUTS OF INTERSECTIONS	DWG-31
PLAN AND PROFILE	DWG-32~DWG-34

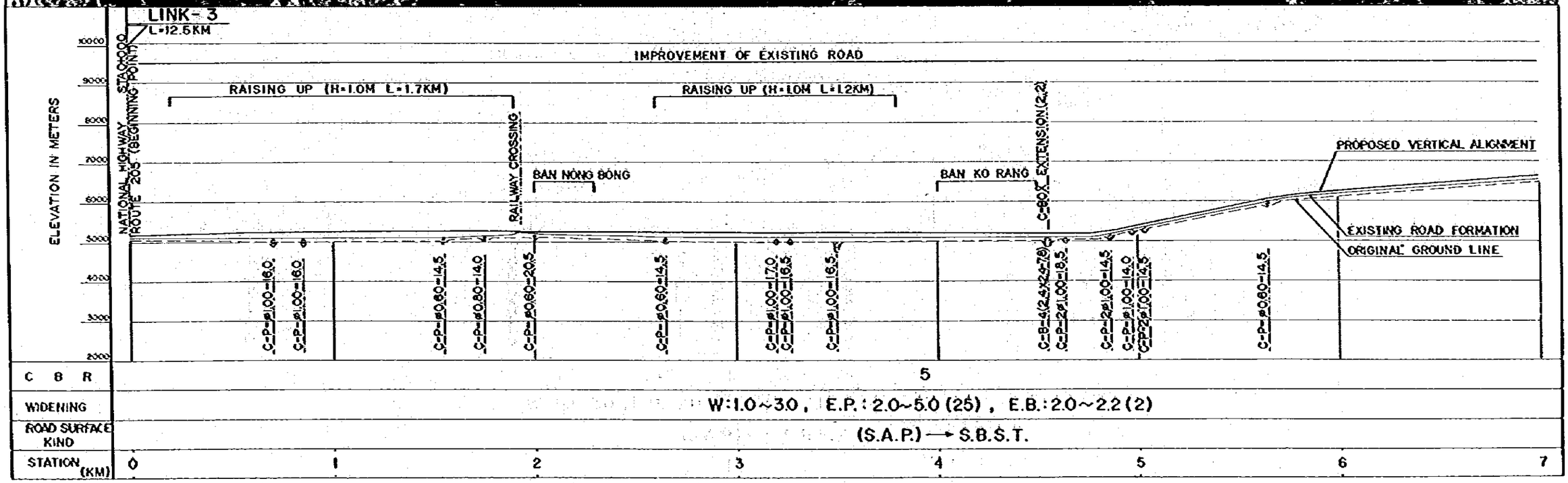
ABBREVIATIONS

W : a ~ b	WIDENING OF ROAD WIDTH : a ~ b METERS
E.P. a ~ b (n)	EXTENSION OF PIPE CULVERT : a ~ b METERS (NUMBER)
E.B. a ~ b (n)	EXTENSION OF BOX CULVERT : a ~ b METERS (NUMBER)
(S.A.P.)	SOIL AGGREGATE PAVEMENT (EXISTING CONDITION)
S.B.S.T.	SINGLE BITUMINOUS SURFACE TREATMENT
L.T.	LATERITE PAVEMENT
C-P-nØa-ℓ	EXISTING PIPE CULVERT, n (ROW), Øa (DIAMETER, M), ℓ (LENGTH, M)
C-B-n(a x b)-ℓ	EXISTING BOX CULVERT, n (NOS. OF TUBE), a x b (LATERAL x VERTICAL, M), ℓ (LENGTH, M)
Br-T (a x ℓ) (n)	EXISTING TIMBER BRIDGE, a x ℓ (WIDTH x LENGTH, M), n (NOS. OF SPAN)
Br-C (a x ℓ) (n)	EXISTING CONCRETE BRIDGE, a x ℓ (CARRIAGE WAY WIDTH x LENGTH, M), n (NOS. OF SPAN)
Br-C(S)(a x ℓ)(n@s)	PROPOSED CONCRETE SLAB BRIDGE, a x ℓ (CARRIAGE WAY WIDTH x LENGTH, M), n@s (NOS. OF SPAN @ SPAN LENGTH, M)
C-P-nØa-ℓ	PROPOSED PIPE CULVERT, n (ROW), Øa (DIAMETER, M), ℓ (LENGTH, M)
C-B-n(a x b)-ℓ	PROPOSED BOX CULVERT, n (NOS. OF TUBE), a x b (LATERAL x VERTICAL, M), ℓ (LENGTH, M)
C-BOX EXTENSION (ℓ)	PROPOSED BOX CULVERT, ℓ (EXTENSION LENGTH, M)
RAISING UP (H,L)	RAISING UP OF EXISTING ROAD FORMATION H(HEIGHT OF RAISING UP, M), L(LENGTH OF RAISING UP SECTION, KM)

PHETCHABUN-CHAI BADAN HIGHWAY FEASIBILITY STUDY	SHEET NO.
PLAN AND PROFILE	DWG-2
LINK 3	

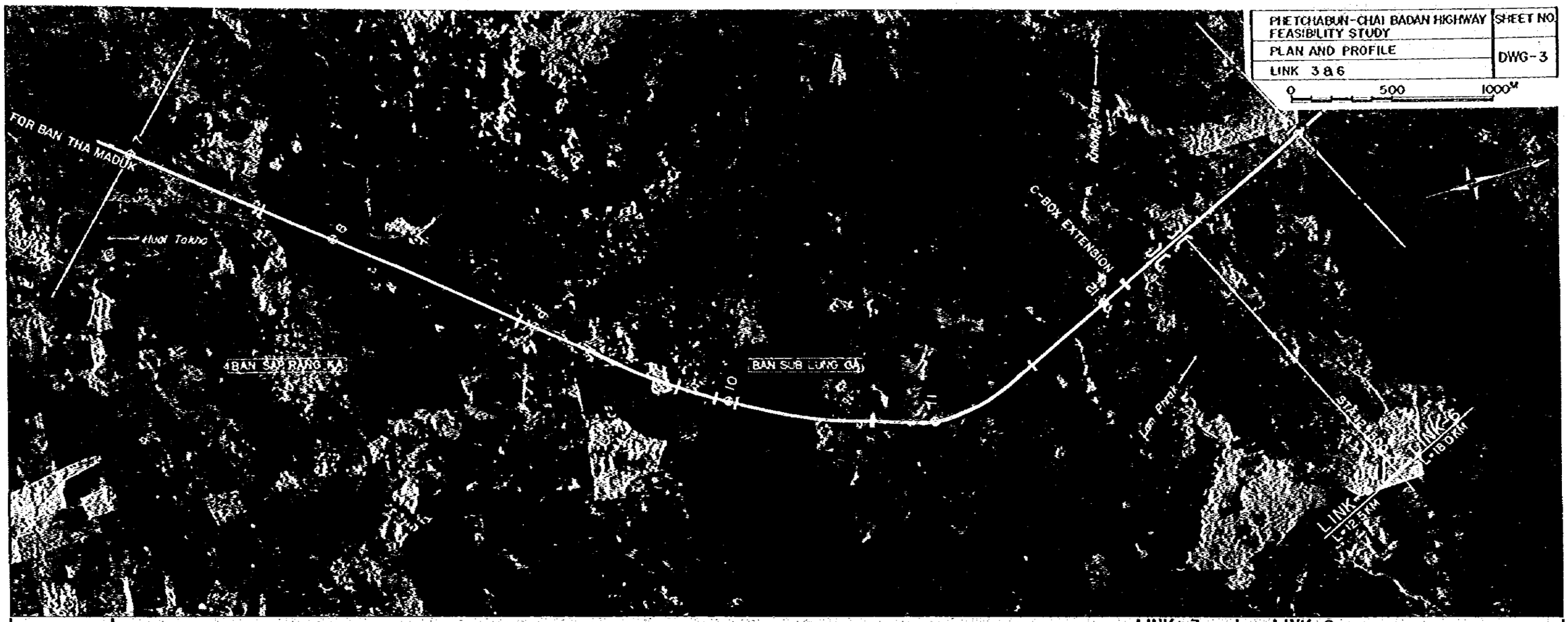
0 500 1000M

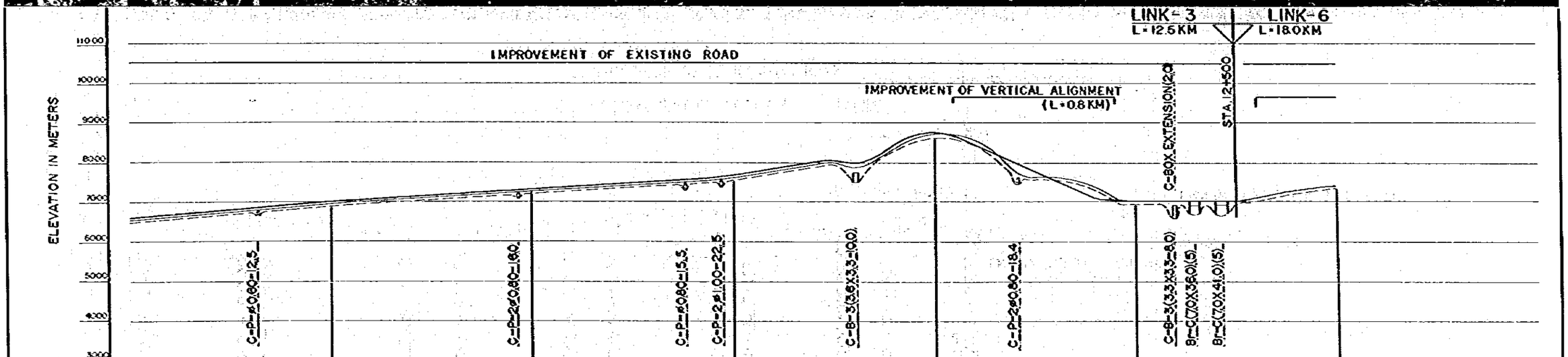




PHETCHABUN-CHAI BADAN HIGHWAY FEASIBILITY STUDY	SHEET NO.
PLAN AND PROFILE	DWG-3
LINK 3 & 6	

0 500 1000M

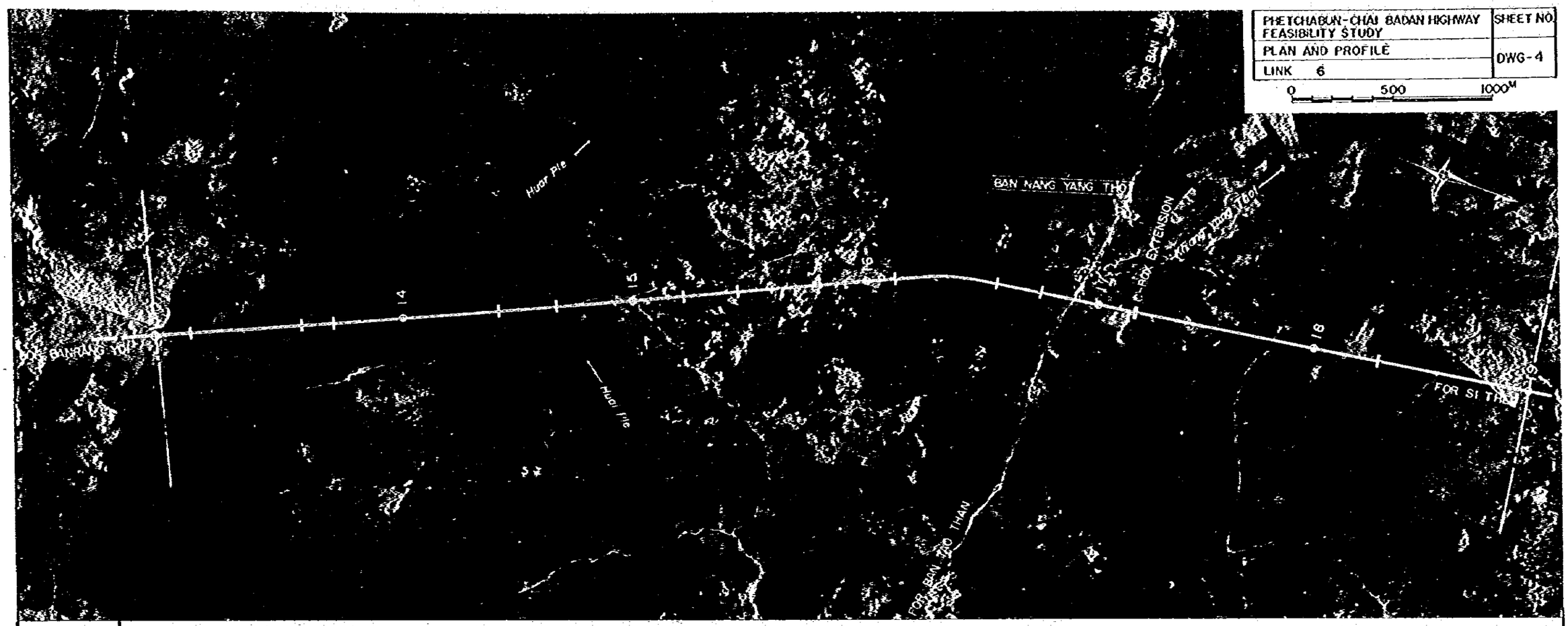


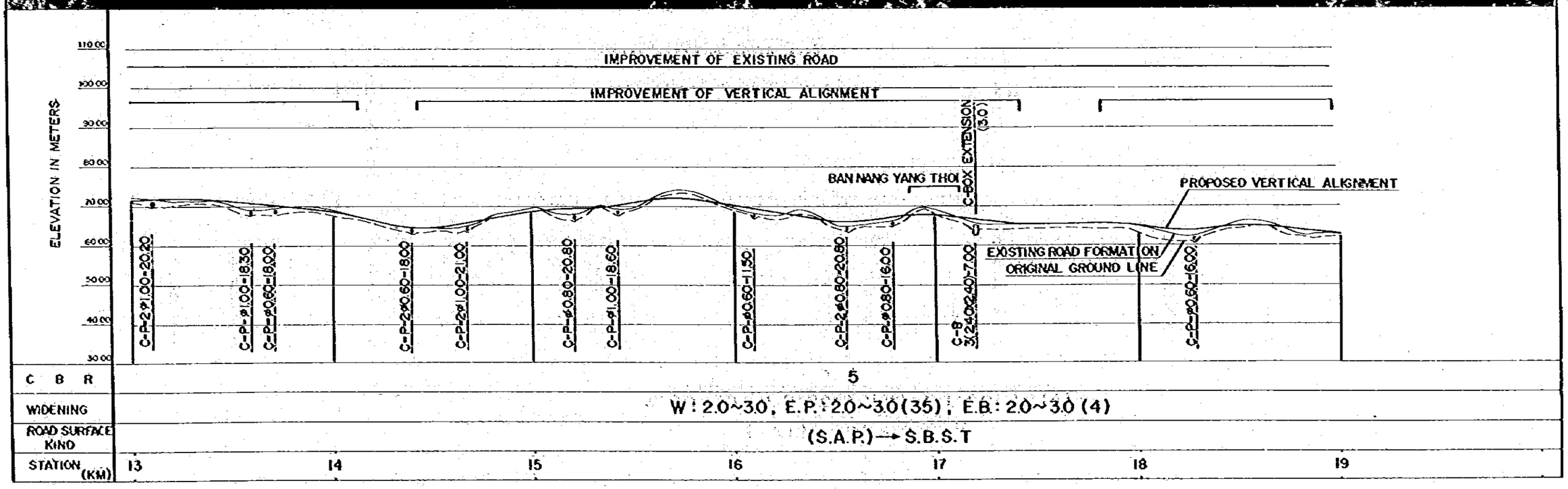


C B R	5											
WIDENING	W:1.0~3.0 , E.P.:2.0~5.0(2.5), E.B.:2.0~2.2 (2)											
ROAD SURFACE KIND	(S.A.P.) → S.B.S.T.											
STATION (KM)	7		8		9		10		11		12	13

PHETCHABUN-CHAI BADAN HIGHWAY FEASIBILITY STUDY	SHEET NO.
PLAN AND PROFILE	DWG-4
LINK 6	

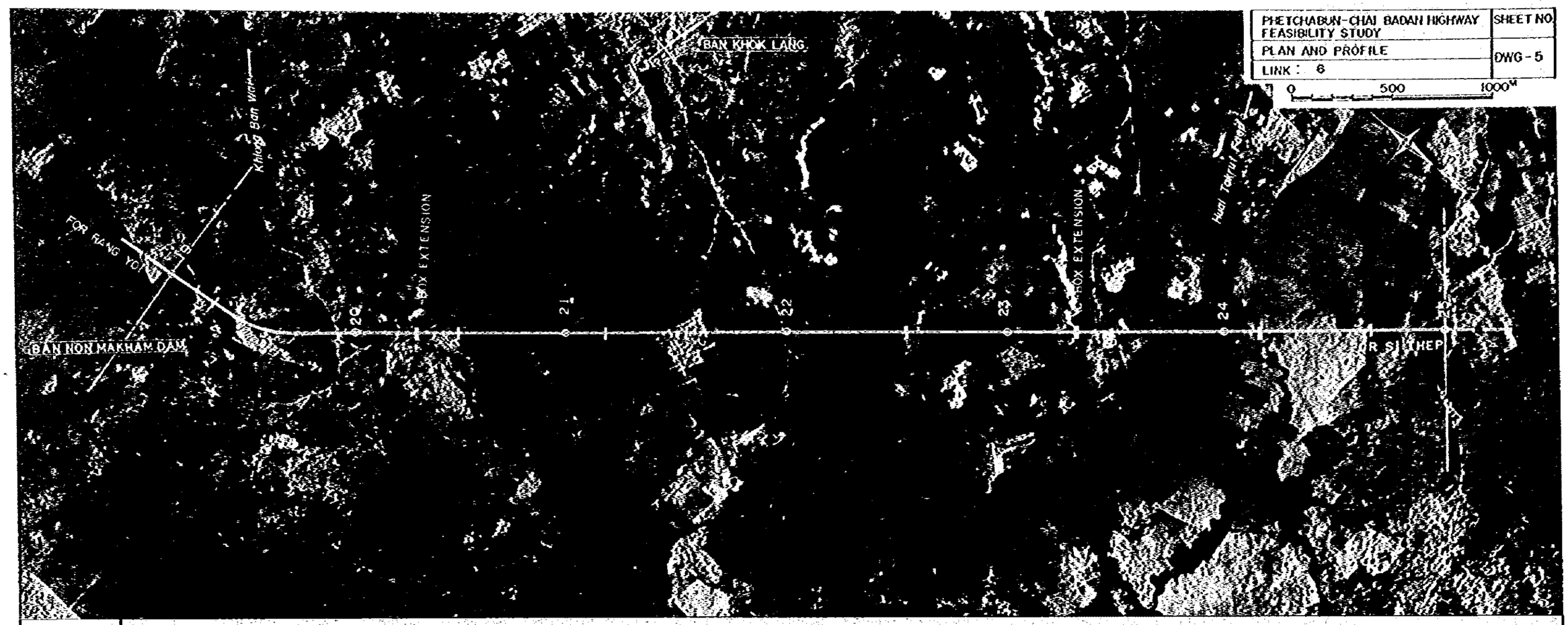
0 500 1000M

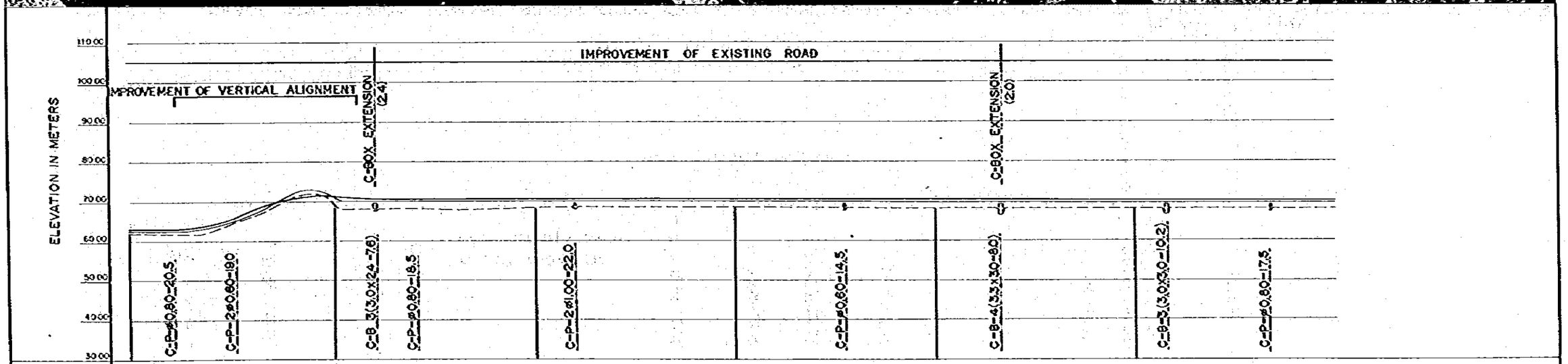




PHETCHABUN-CHAI BADAN HIGHWAY FEASIBILITY STUDY	SHEET NO.
PLAN AND PROFILE	DWG-5
LINK : 6	

0 500 1000M

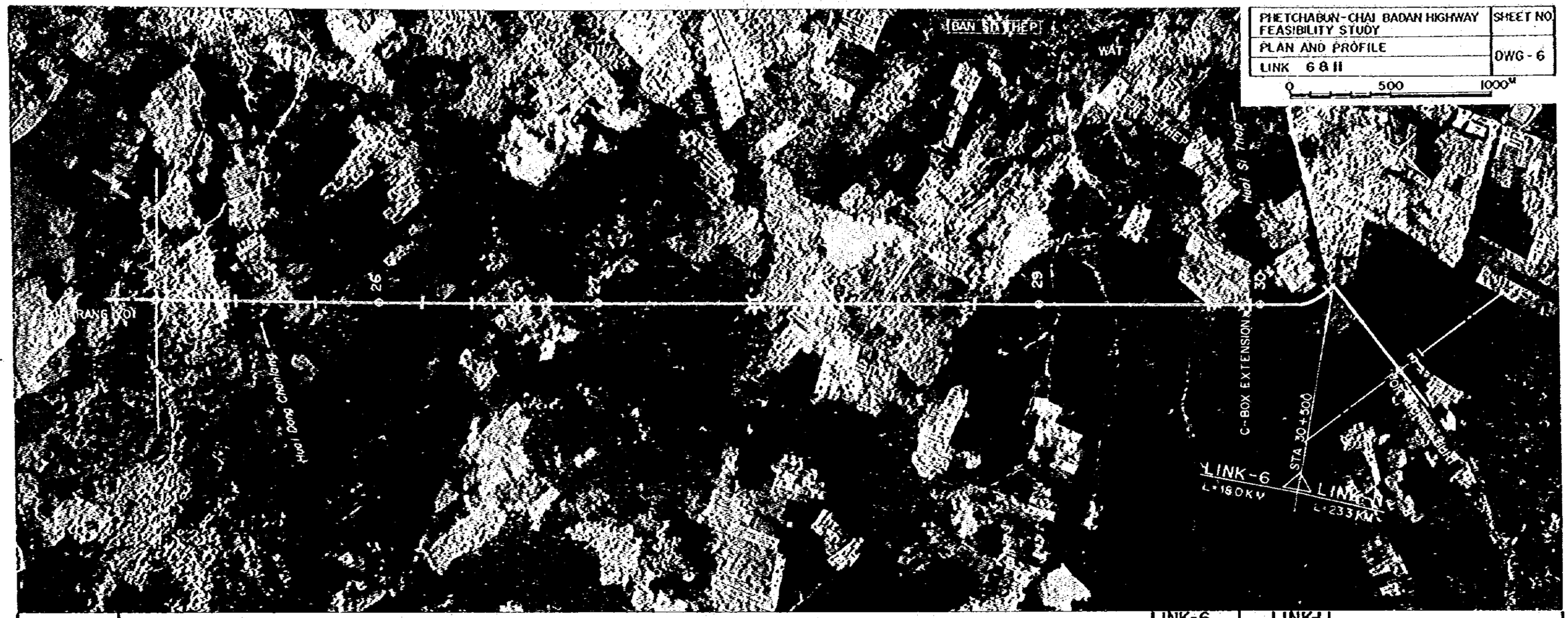


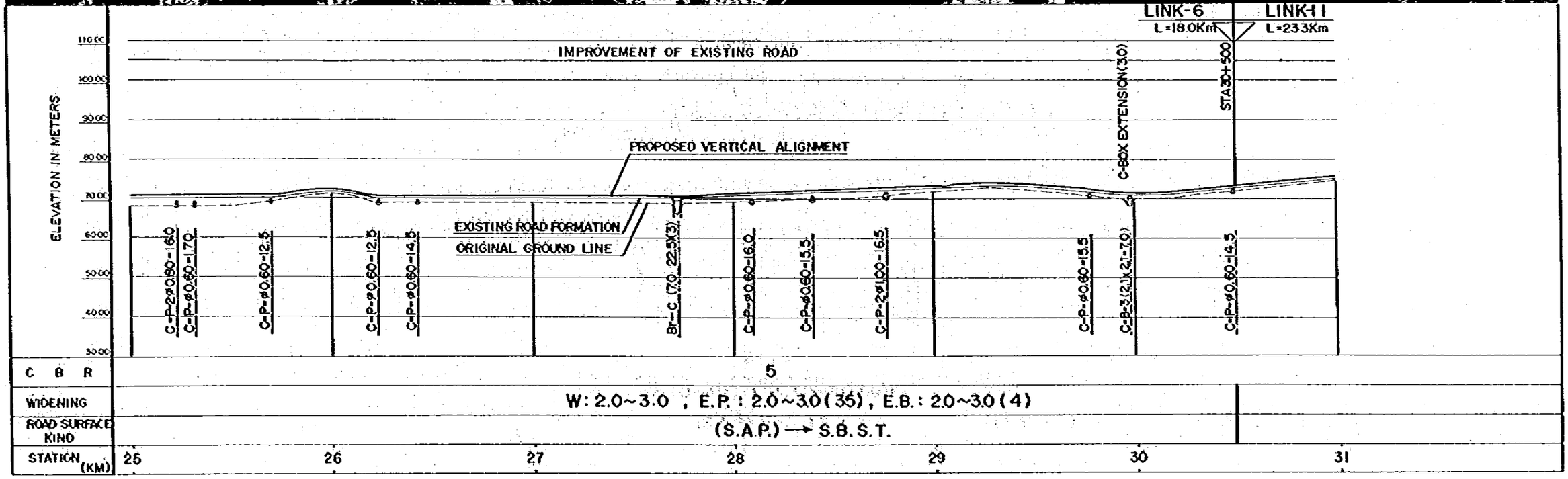


C B R	5
WIDENING	W: 2.0~3.0 , E.P.: 2.0~3.0(3.5), E.B.: 2.0~3.0 (4)
ROAD SURFACE KIND	(S.A.P.) → S.B.S.T.
STATION (KM)	19 20 21 22 23 24 25

PHETCHABUN-CHAI BADAN HIGHWAY FEASIBILITY STUDY	SHEET NO.
PLAN AND PROFILE	DWG - 6
LINK 6 & 11	

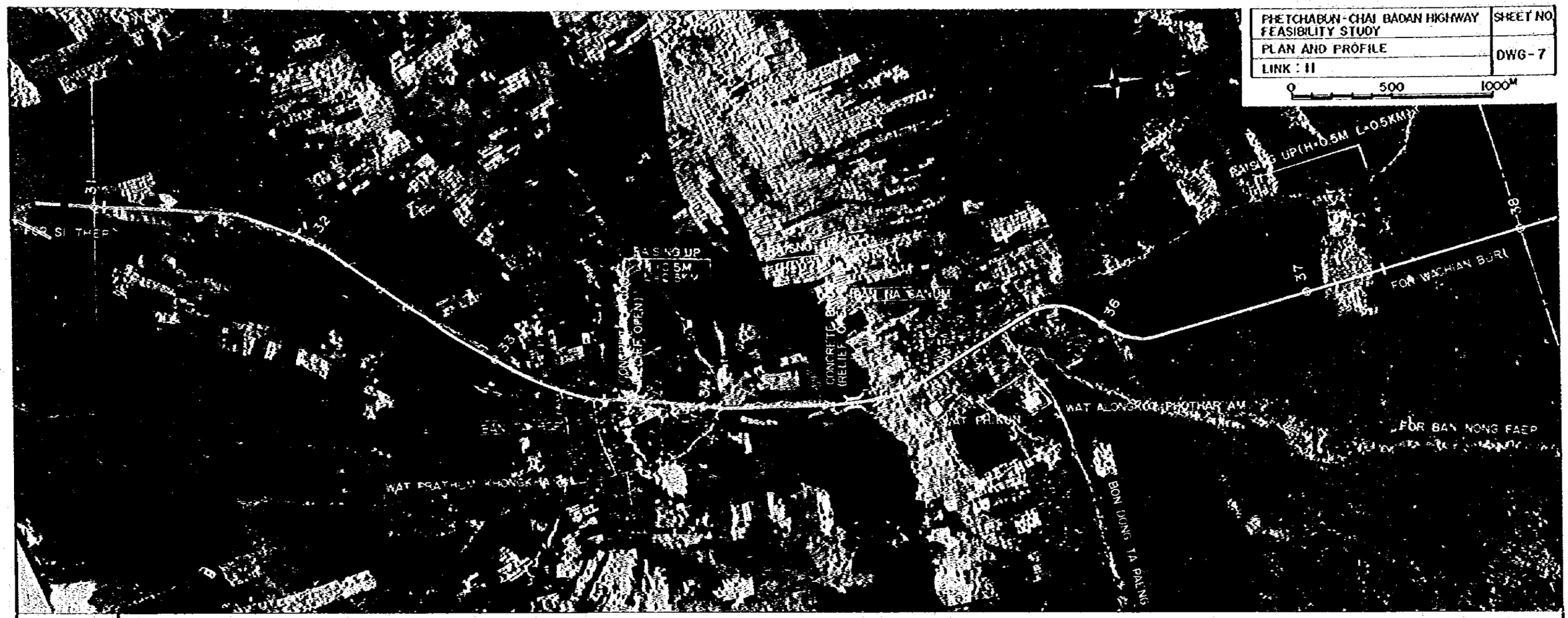
0 500 1000M

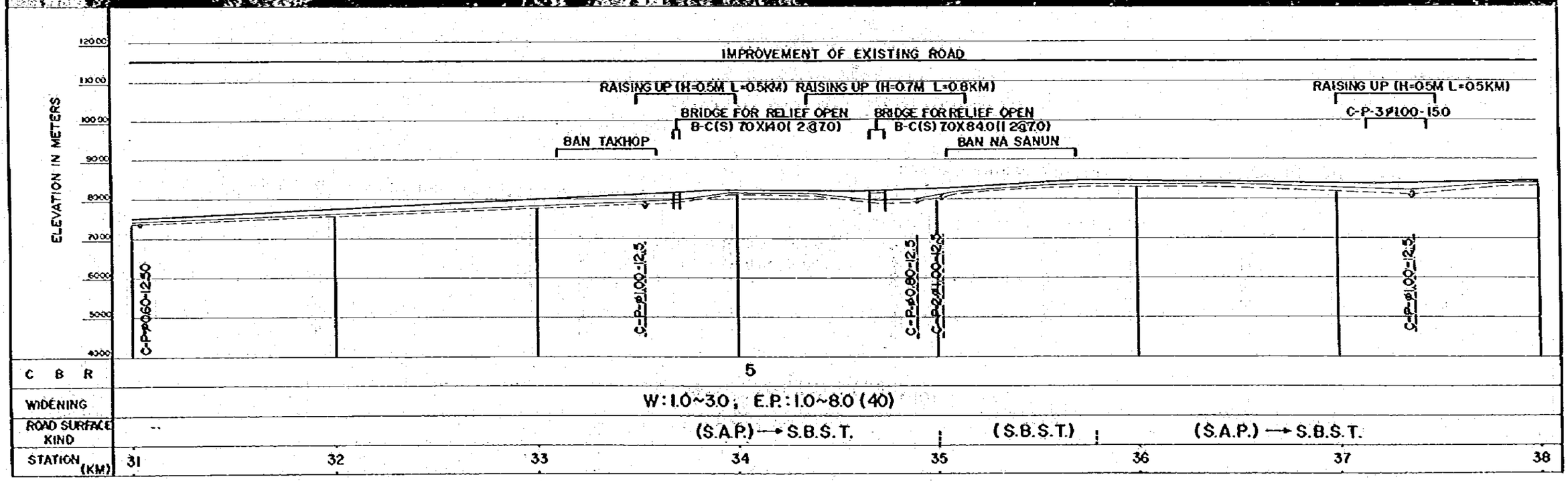




PHETCHABUN - CHAI BADAN HIGHWAY FEASIBILITY STUDY	SHEET NO.
PLAN AND PROFILE	DWG-7
LINK : II	

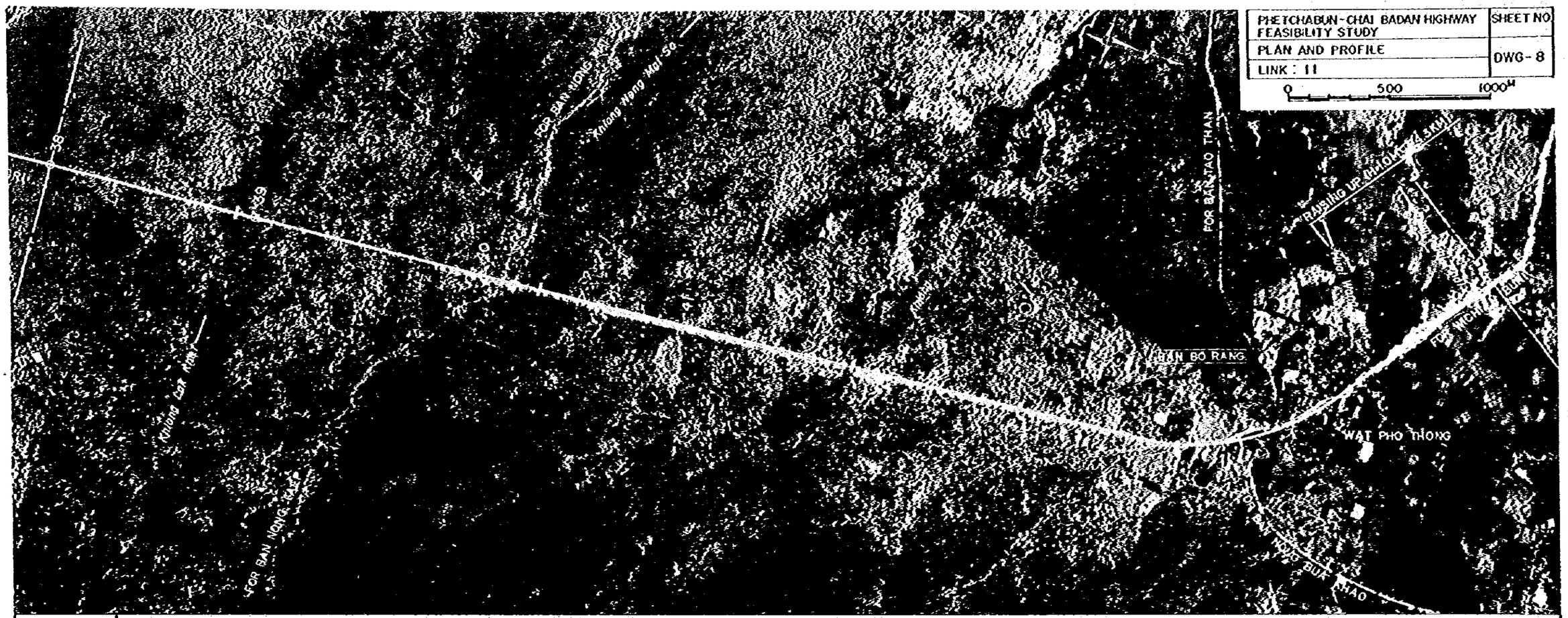
0 500 1000M

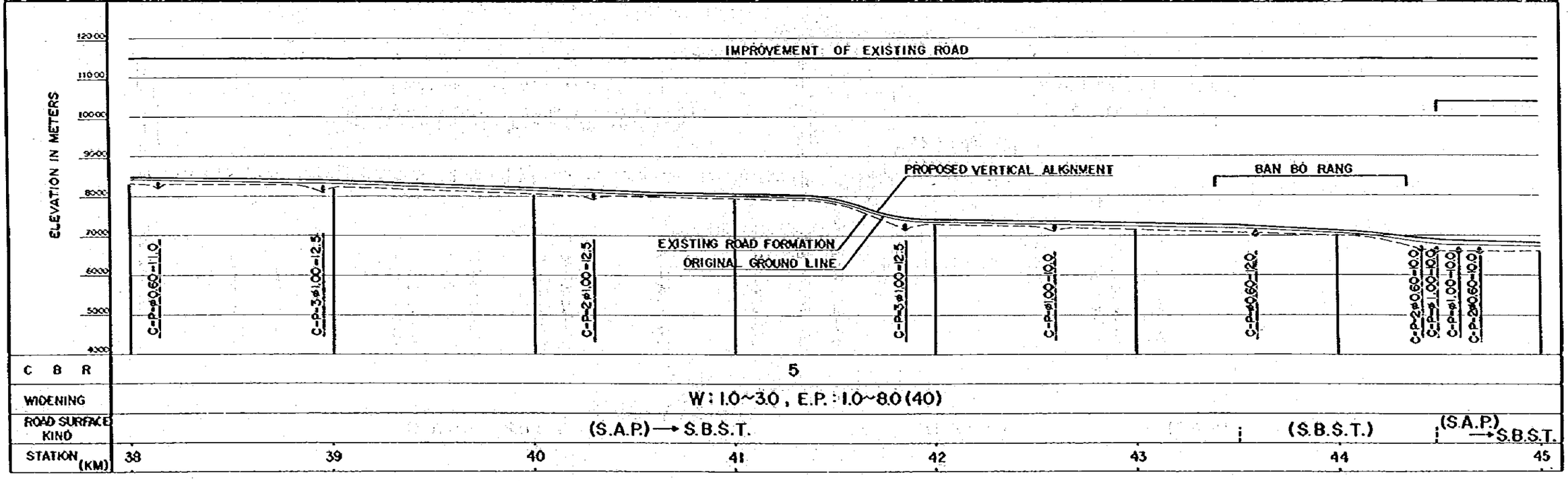




PHETCHABUN-CHAI BADAN HIGHWAY FEASIBILITY STUDY	SHEET NO.
PLAN AND PROFILE	DWG-8
LINK : 11	

0 500 1000M





C B R	5							
WIDENING	W: 1.0~3.0 , E.P. : 1.0~8.0 (40)							
ROAD SURFACE KIND	(S.A.P) → S.B.S.T.					(S.B.S.T.)	(S.A.P) → S.B.S.T.	
STATION (KM)	38	39	40	41	42	43	44	45