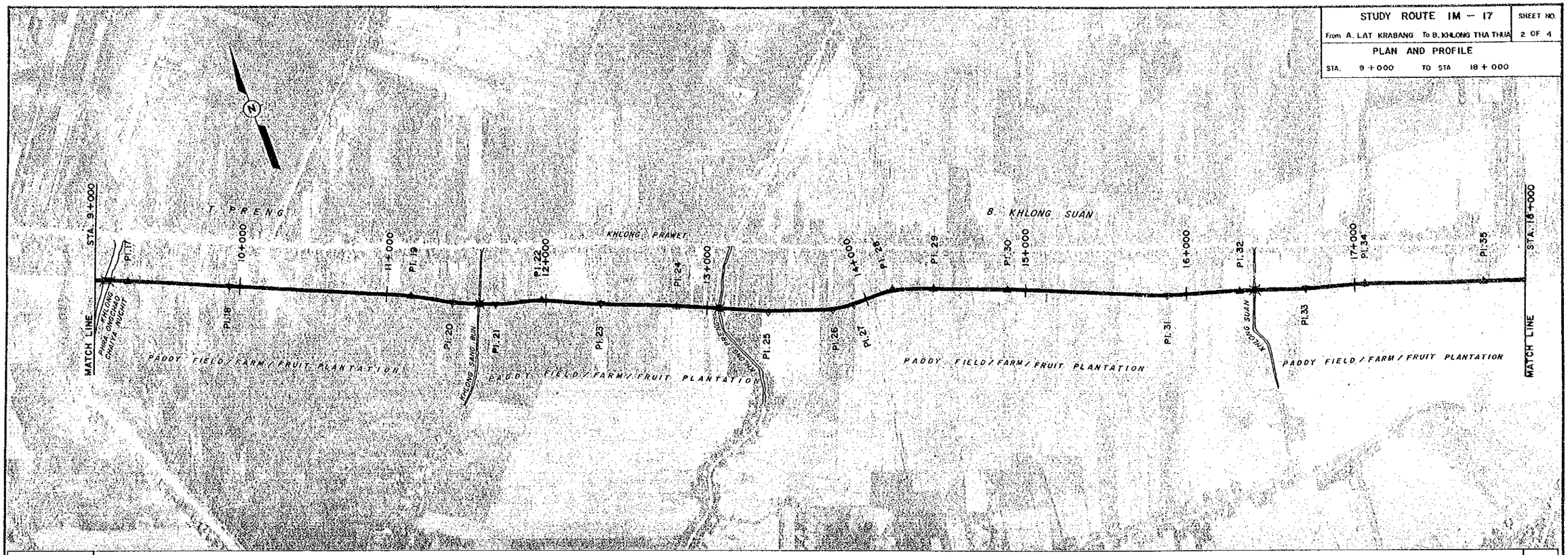
STUDY ROUTE IM – 17 | SHEET NO. 2 OF 4

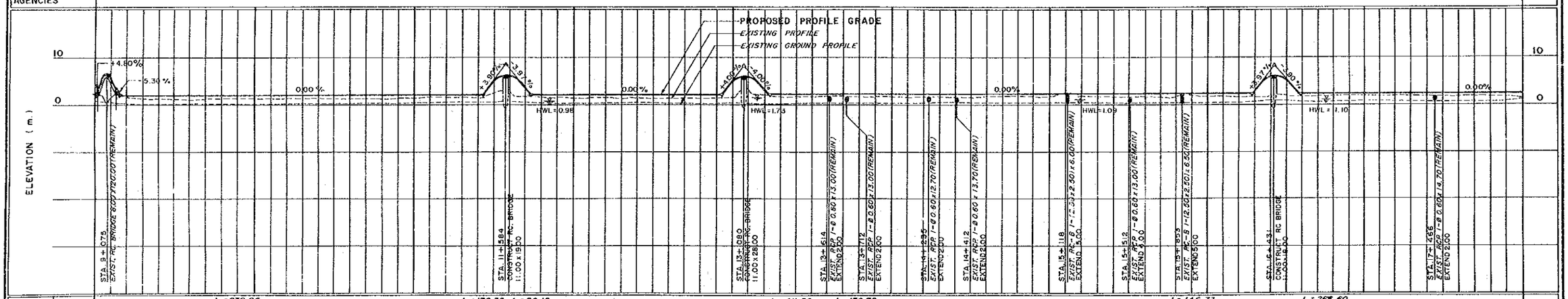
From A. LAT KRABANG To B. KHLONG THA THAIA

PLAN AND PROFILE

STA. 9 + 000 TO STA 18 + 000



TERRAIN		FLAT
PAVEMENT	Type / Length	LATERITE / SBST
	Condition	POOR
FLOODING	Length (Km.) / Height (m.)	–
RIGHT OF WAY (m.)	LT.	15.00
	RT.	15.00
ROUTE NO. AGENCIES		RURAL



CURVATURE BAND	Existing Alignment	L = 278.26 R = 32,263.11
		L = 145.84 R = 1,005.41
		L = 170.30 R = 1,038.65
		L = 92.16 R = 966.06
		L = 144.58 R = 1,453.06
		L = 154.36 R = 9,927.79
		L = 211.39 R = 1,862.77
		L = 132.70 R = 736.20
		L = 89.13 R = 251.57
		L = 256.30 R = 16,423.18
		L = 279.91 R = 16,323.30
		L = 146.73 R = 1,795.43
		L = 242.31 R = 24,463.59
		L = 266.60 R = 8,885.02
		L = 129.12 R = 2,605.75
		L = 127.22 R = 6,744.08
	Proposed Alignment	L = 94.67 R = 11,203.20
		L = 278.26 R = 32,263.11
		L = 145.84 R = 1,005.40
		L = 170.30 R = 1,038.65
		L = 92.16 R = 966.06
		L = 144.58 R = 1,453.06
		L = 154.36' R = 9,927.79
		L = 211.30 R = 1,862.77
		L = 132.70 R = 736.20
		L = 135.95 R = 1,285.04
		L = 89.13 R = 251.57
		L = 256.30 R = 16,423.18
		L = 279.91 R = 16,323.30
		L = 146.73 R = 1,795.43
		L = 242.31 R = 24,463.59
		L = 266.60 R = 8,885.02
		L = 129.12 R = 2,605.75
		L = 127.22 R = 6,744.08

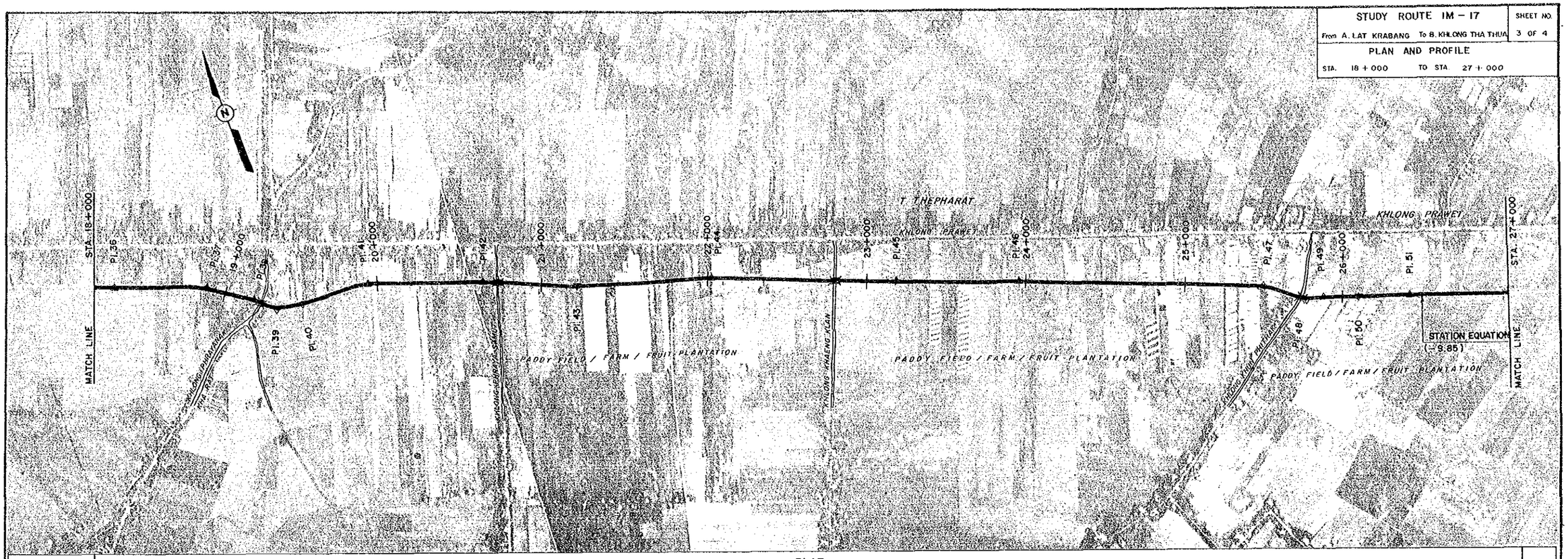
STATION (Km.) 9+000 10+000 11+000 12+000 13+000 14+000 15+000 16+000 17+000 18+000

STUDY ROUTE IM – 17 | SHEET NO. 3 OF 4

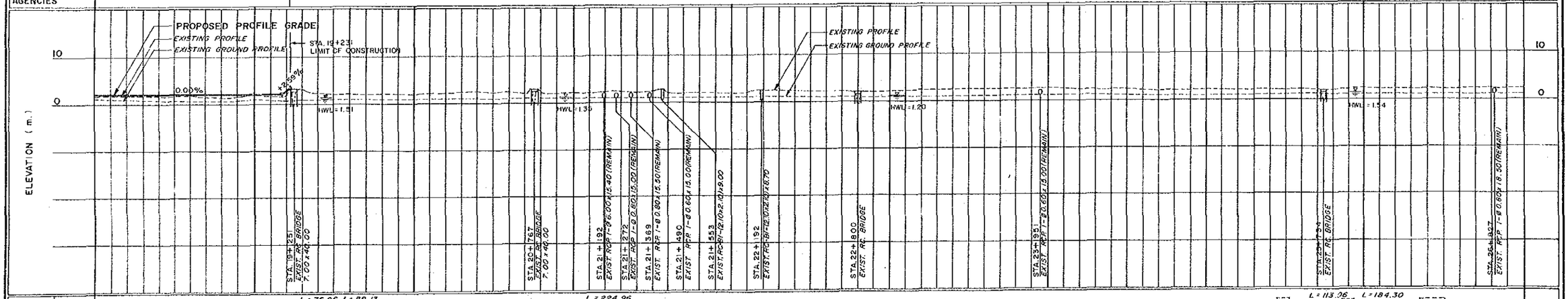
From A. LAT KRABANG To B. KHLONG THA THUA

PLAN AND PROFILE

STA. 18 + 000 TO STA. 27 + 000

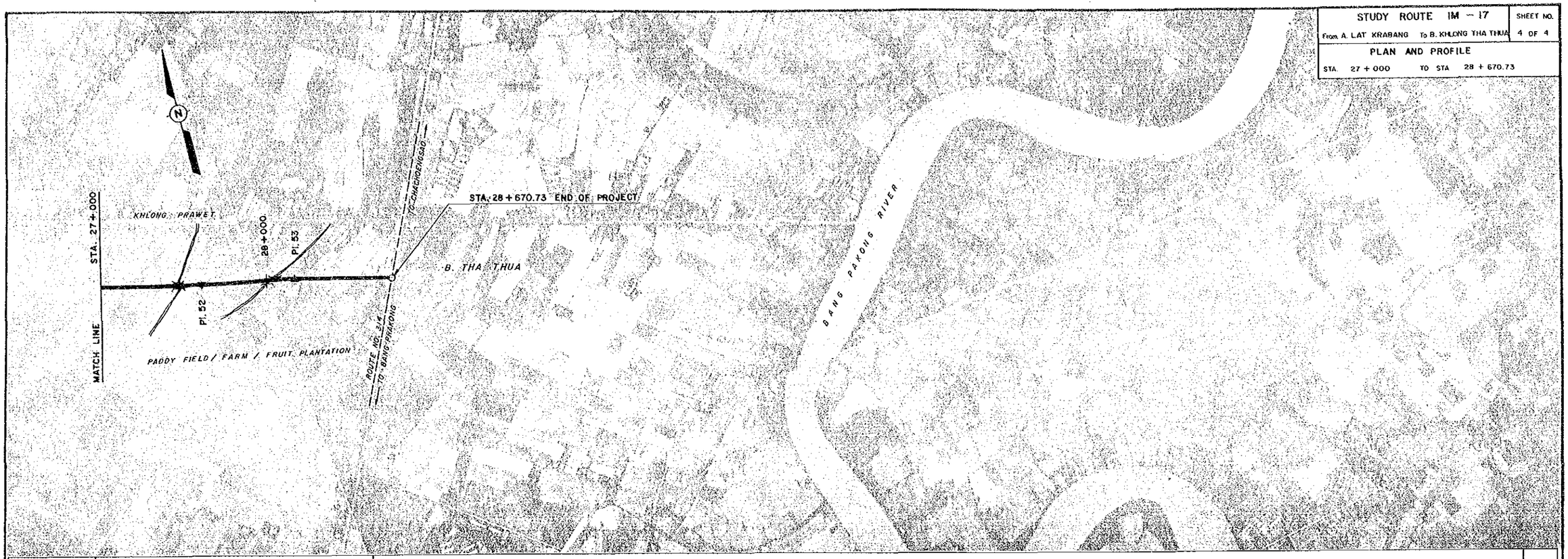


TERRAIN		FLAT		
PAVEMENT	Type / Length	SBST	CONC. PAVEMENT	DBST
	Condition	FAIR	POOR	GOOD
FLOODING	Length (Km) / Height (m)	—		
RIGHT OF WAY (m.)	LT.	15.00		
	RT.	15.00		
ROUTE NO. AGENCIES		RURAL		PWD

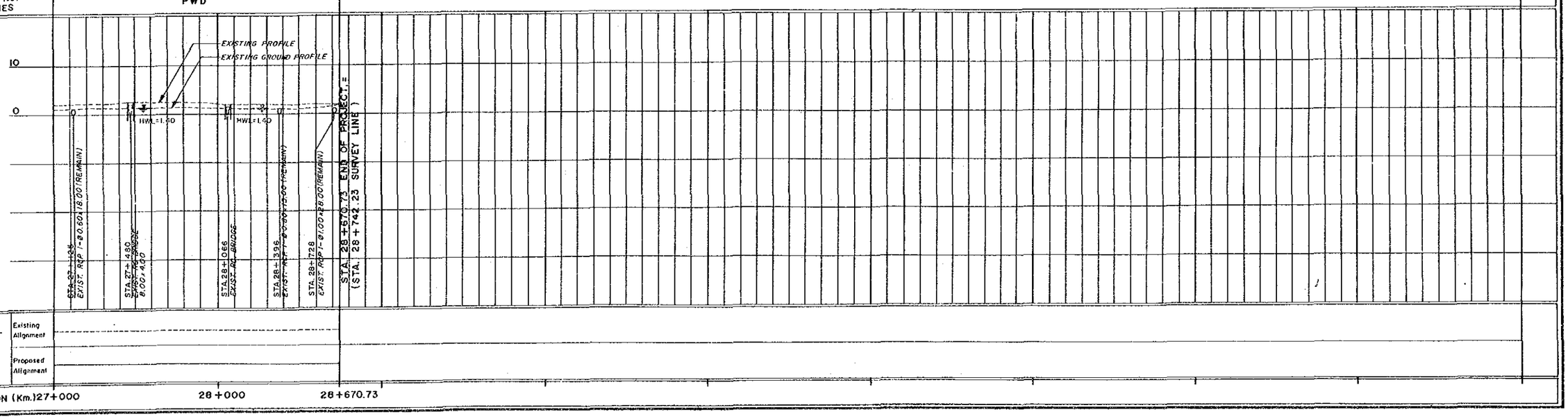


CURVATURE BAND	Existing Alignment	L=136.60 R=15,549.33	L=127.36 R=582.24	L=61.74 R=336.65	L=76.96 L=88.13 R=123.34 R=1,214.36	L=73.55 R=272.56	L=159.24 R=4,876.75	L=224.96 R=3,722.54	L=144.65 R=21,180.52	L=326.01 R=18,979.41	L=113.06 R=271.47 L=81.25 R=307.88	L=184.30 R=9,434.98 L=79.65 R=721.77 L=149.30 R=1,145.78
	Proposed Alignment	L=136.60 R=15,549.33	L=127.36 R=582.24	L=61.74 R=336.65	L=102.43 L=88.13 R=160.00 R=1,214.36	L=73.55 R=272.56	L=159.24 R=4,876.75	L=224.96 R=3,722.54	L=144.65 R=2,180.52	L=326.01 R=18,979.41	L=113.06 R=271.47 L=81.25 R=307.88	L=184.30 R=9,434.98 L=79.65 R=721.77 L=149.30 R=1,145.78
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 – 17	SHEET NO.
From A. LAT KRABANG To B. KHLONG THA THUA	4 OF 4
PLAN AND PROFILE	
STA. 27 + 000 TO STA 28 + 670.73	



TERRAIN		FLAT
PAVEMENT	Type / Length	DBST
	Condition	GOOD
FLOODING	Length (Km) Height (m)	—
RIGHT OF WAY (m.)	LT.	15.00
	RT.	15.00
ROUTE NO. AGENCIES		PWD

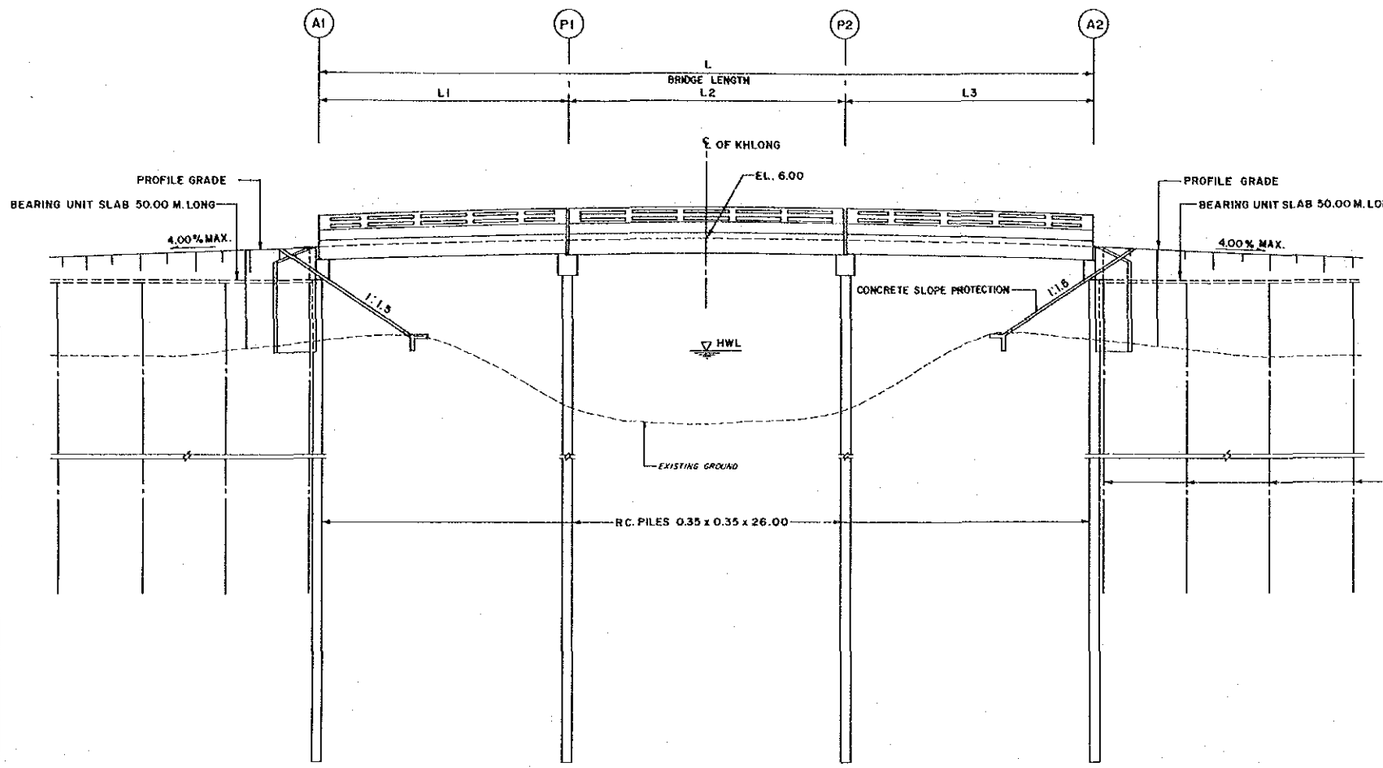


CURVATURE BAND	Existing Alignment	
	Proposed Alignment	

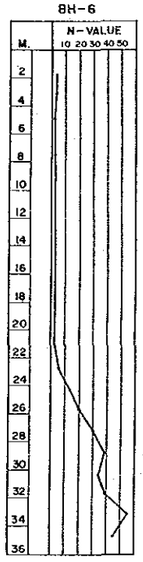
STATION (Km.) 27+000 28+000 28+670.73

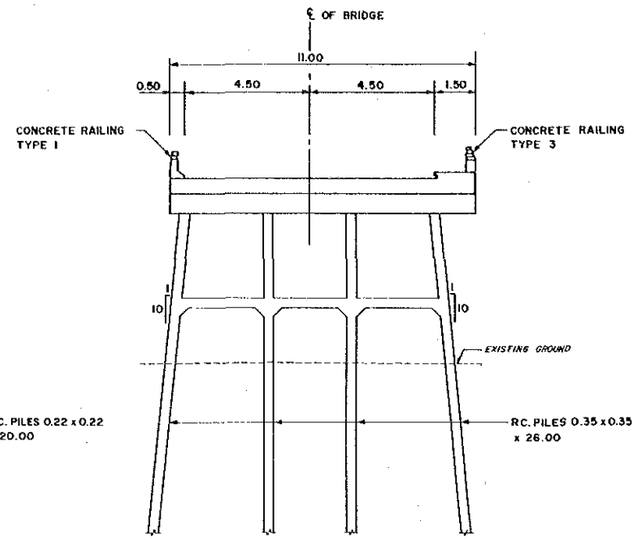
STUDY ROUTE IM-17	SHEET NO.
From A.LAT KRABANG To B. KHLONG THA THUA	1 OF 1

BRIDGES STA. 11+584, STA.13+080 AND STA.16+431
PLAN, ELEVATION AND SECTION

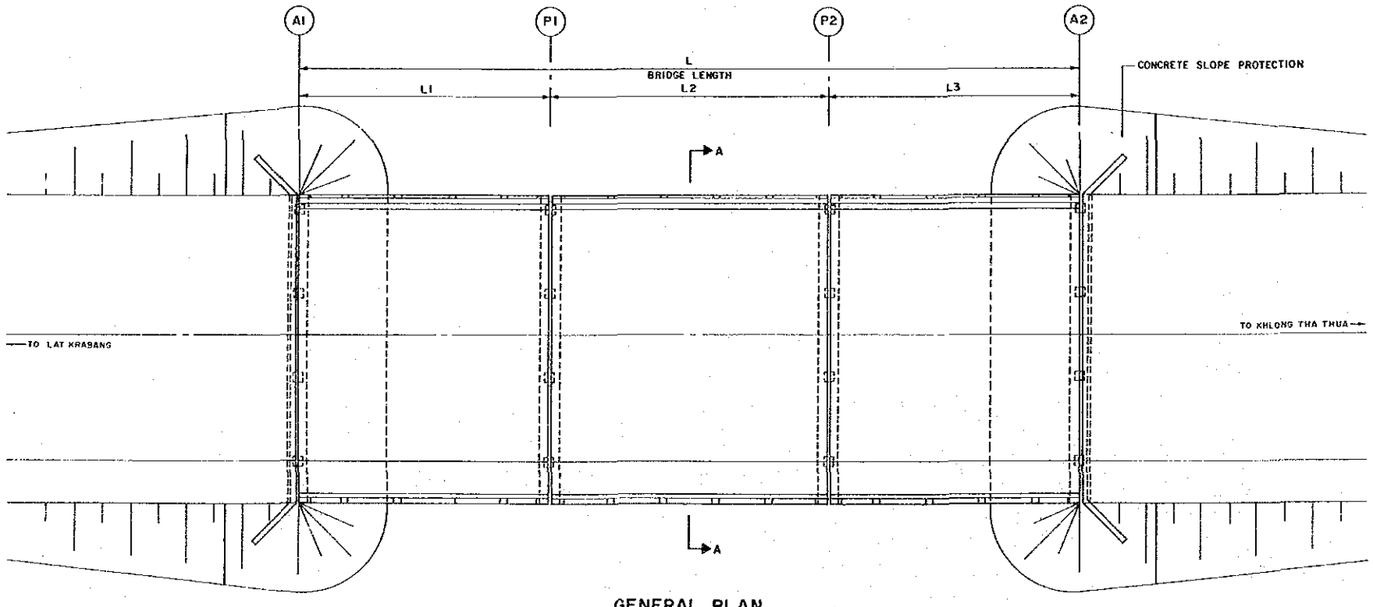


GENERAL ELEVATION
SCALE 1 : 100





SECTION A-A
SCALE 1 : 100



GENERAL PLAN
SCALE 1 : 100

TABLE OF SUPERSTRUCTURE

STA.NO.	BRIDGE LENGTH	SPAN LENGTH			THICKNESS			TYPE	ELEV.	HWL.	EXISTING BRIDGE
		L1	L2	L3	L1	L2	L3				
11 + 584	19.00	5.00	9.00	5.00	0.32	0.47	0.32	RC. SLAB	6.00	0.98	4.0 x 15.0
13 + 080	28.00	9.00	10.00	9.00	0.47	0.53	0.47	RC. SLAB	6.00	1.73	6.0 x 24.0
16 + 431	18.00	5.00	8.00	5.00	0.32	0.43	0.32	RC. SLAB	6.00	1.10	4.0 x 14.5

LIST OF EXISTING BRIDGES

STA. NO.	WIDTH & LENGTH (M.)	WITHDRAW (M^3)
11 + 584	4.0 x 15.0	32
13 + 080	6.0 x 24.0	76
16 + 431	4.0 14.5	31
	TOTAL	139

ITEM	UNIT	QUANTITY			
		STA. 11+584	STA.13+080	STA. 16+431	TOTAL
1. CONCRETE CLASS B (1/2) FOR BRIDGE DECK	M^3	91	164	82	337
CLASS B (1/2) FOR PILE BENT PIER & ABUTMENT	M^3	86	87	90	263
CLASS SPECIAL B (1/2) FOR BEARING UNIT SLAB	M^3	330	330	330	990
2. STEEL REINFORCEMENT	T	43	61	42	146
3. RC. PILE 0.22 x 0.22 M.	LM	1,892	1,892	1,760	5,544
4. RC. PILE 0.35 x 0.35 M.	LM	504	504	530	1,538
5. CONCRETE RAILING TYPE-1	LM	19	28	18	65
TYPE-3	LM	19	28	18	65
6. CONCRETE SLOPE PROTECTION	M^2	348	405	348	1,101

PROJECT IM - 22

Changwat : Bangkok/Chachoengsao

A. Nong Chok - A. Bang Nam Prieo

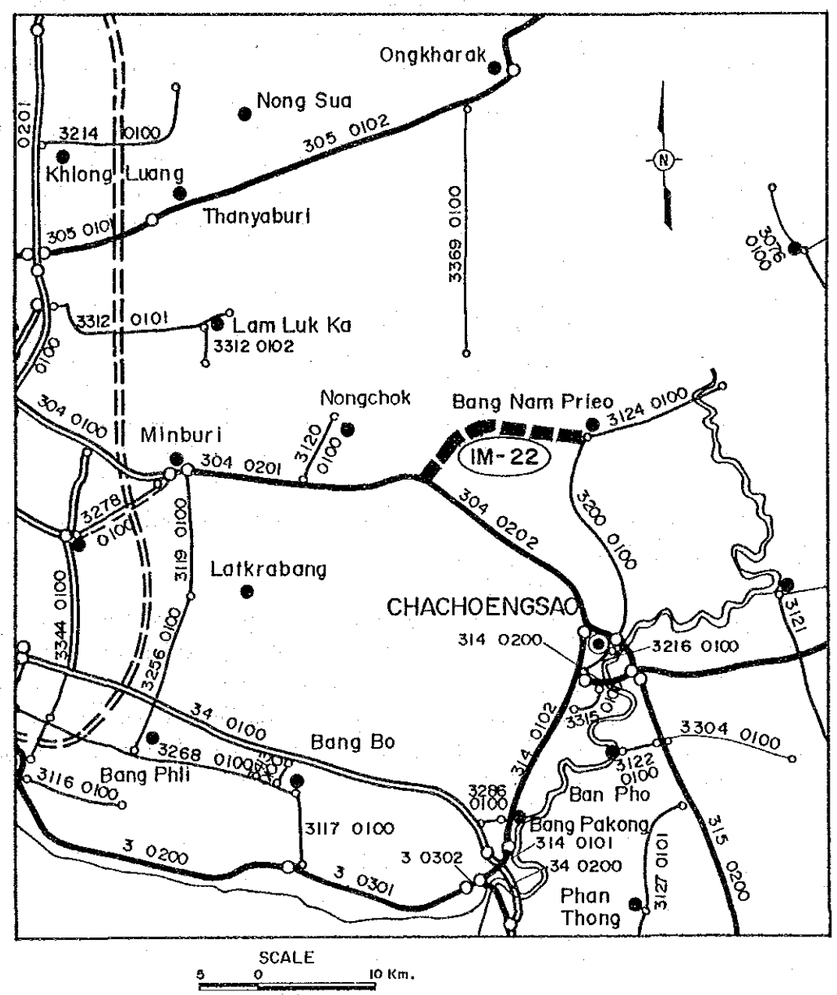
Length : 15.9 km

SUMMARY

PROJECT IM-22

ITEM	DESCRIPTION
Changwat	Bangkok/Chachoengsao
Origin	Rt. 304
Destination	A. Bang Nam Prieo (Rt. 3124)
Route No.	Rural
Project Length	15.90 km
Standard	
- Existing	P1
- Proposed	F-3
Traffic	
- Base	31
- 2000	1,100
- 2008	1,700
Pavement Type	
- Existing	Laterite
- Proposed	PCC pavement (t = 7.5)
Bridges	
- New Construction	6 sites, 225 m
- Replacement	—
Construction Costs	
- Financial	95,838,000 Baht
- Economic	85,714,000 Baht
Economic Evaluation	
- IRR	23.7%
- B/C	2.26

LOCATION OF PROJECT ROUTE



1. GENERAL

The proposed route lies in Changwat Chachoengsao and Bangkok.

Two alternative routes were examined. One follows the existing road which originates in Amphoe Nong Chok and runs eastward to end in Amphoe Bang Nam Prieo with a total length of 22.5 km. The other originates at the junction with Route 304, runs northeastward to join the existing road and ends in Amphoe Bang Nam Prieo with a total length of 16.5 km. For the latter alternative, there is no existing road for 4 of the first 5 km.

In the former alternative the first 5.5 km section of the existing road is already paved with asphalt 5 m wide. Widening is needed to satisfy F4 standards. The latter alternative requires the complete new construction of a 4.0 km section including two bridges over khlongs. The former alternative, however, also requires the construction of a new bridge as the existing one is wooden.

The existing road is occasionally submerged during the rainy season. The surface condition of the existing laterite road is very poor.

The area along the road in either alternative is fully cultivated with paddy and no land is left unused.

The primary function of the improved road will be to connect Amphoe Bang Nam Prieo with Bangkok in either case.

After a careful examination the latter alternative was chosen. The proposed road follows the existing paved road for the first section of about 1.0 km starting from Route 304, then veers eastward avoiding a factory at STA 1 + 350 and joins the existing laterite road near STA 5 + 000. Improvements are desirable in terms of horizontal alignment near the end point. However, only minor improvements are proposed due to the existence of bridges and houses nearby.

2. TRAFFIC FORECAST

Base Traffic Volume

(Unit:Vehicles/Day)

Project Code	Section	Year	Traffic Volume MC	PC	LB	HB	LT	MT	HT	ADT
IM-22	RURAL	1988	141	3	0	1	26	1	0	31

Traffic Growth Rate

(Unit:Percent)

Project	Section	Period	MC	PC	LB	HB	LT	MT	HT
IM-22	RURAL	-1993	5.70	6.68	5.96	5.90	4.01	4.92	1.37
		1994 -2000	6.78	8.30	5.70	5.73	5.66	6.62	3.47
		2000 -2008	5.95	6.65	5.09	5.05	4.99	4.45	5.71

Diverted Traffic Volume

(Unit:Vehicles/Day)

Project	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
IM-22	RURAL	1994	0	308	0	10	268	50	36	672
		2000	0	497	0	15	372	73	44	1001
		2008	0	832	0	22	550	104	69	1577

Induced Traffic Volume

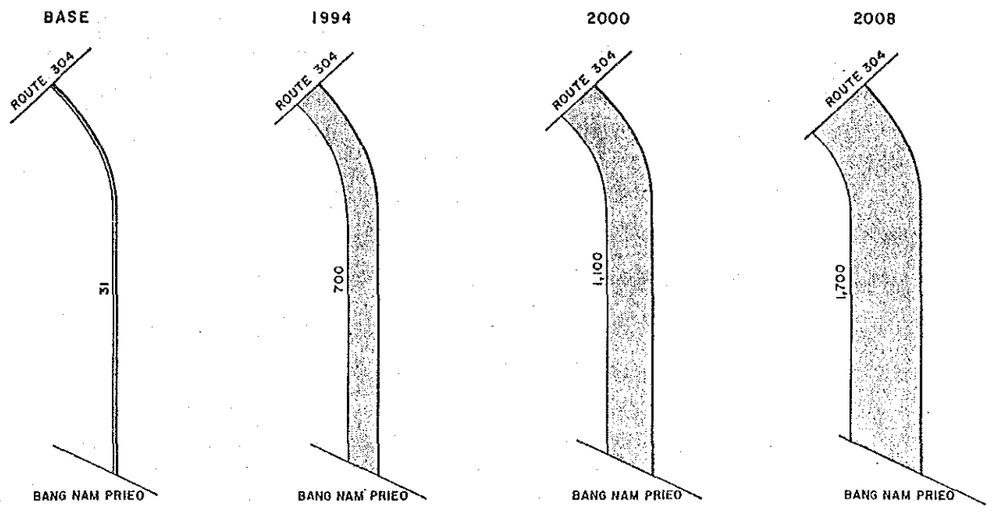
(Unit:Vehicles/Day)

Project	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
IM-22	RURAL	1994	58	1	0	0	11			12
		2000	92	2	1	0	16			19
		2008	147	4	1	1	23			29

Future Traffic Volume

(Unit:Vehicles/Day)

Project	Section	Year	MC	PC	LB	HB	LT	MT	HT	ADT
IM-22	RURAL	1994	257	314	2	12	312	51	37	728
		2000	386	507	3	17	434	75	45	1081
		2008	615	848	4	25	641	106	71	1695



PROJECT IM – 22

3. ENGINEERING

3.1 Materials and Boring Results

(1) Materials

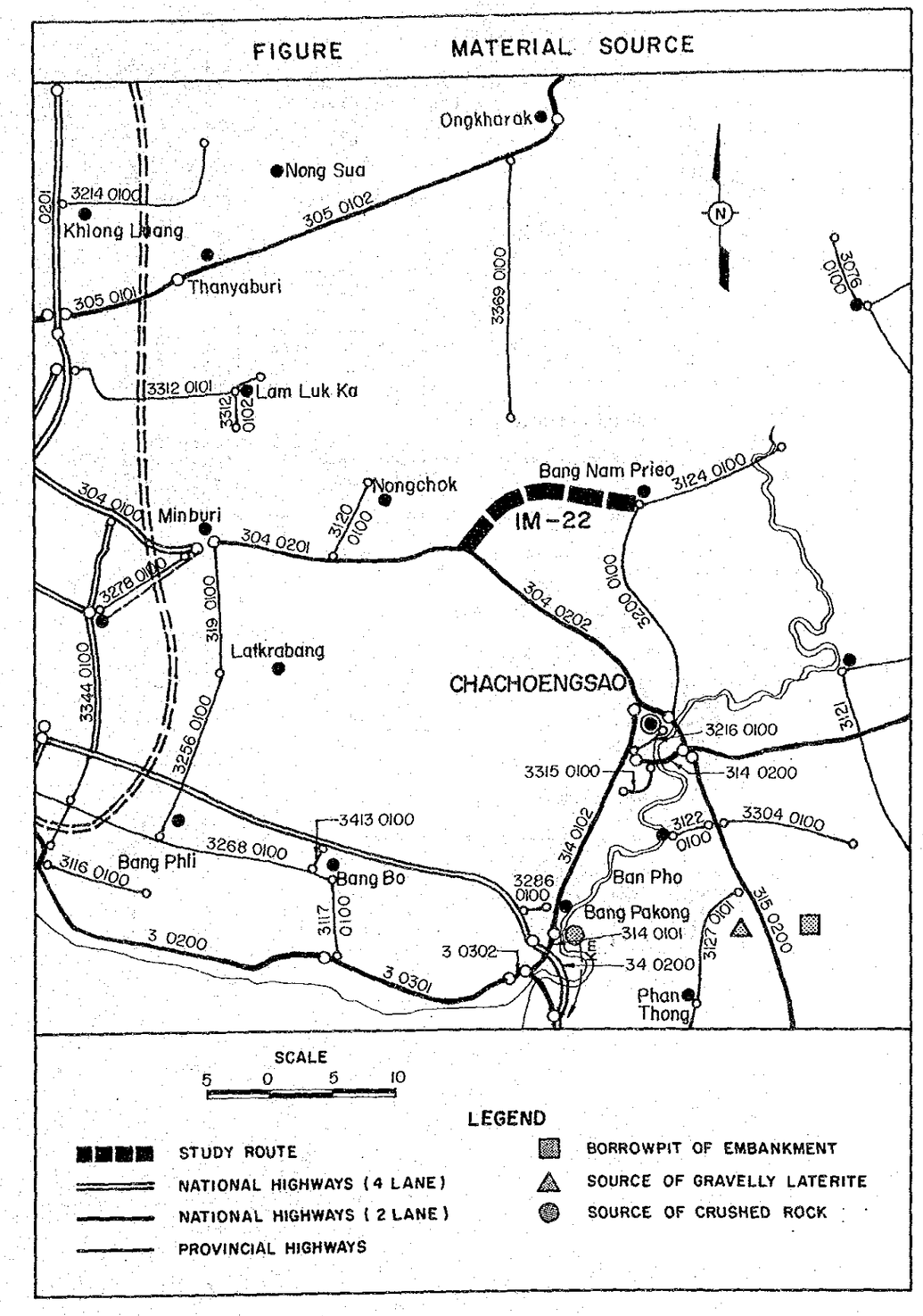
DESCRIPTION OF MATERIAL SOURCES

Material	Source	Description of Sample	Estimated Quantity cu.m.	Hauling Distance (km)
Soil	Route 3200 Km 18+000 Right Side 0.1 Km	Clayey Fine Sand	Plentiful	25
Laterite	Route 315 Km 19+900 Left Side 5.0 Km	Gravelly Laterite	83.00	56
Crushed Rock	Route 3 Km 99+150 Left Side 2.1 Km	Lime Stone	Plentiful	73

RESULTS OF LABORATORY TESTS

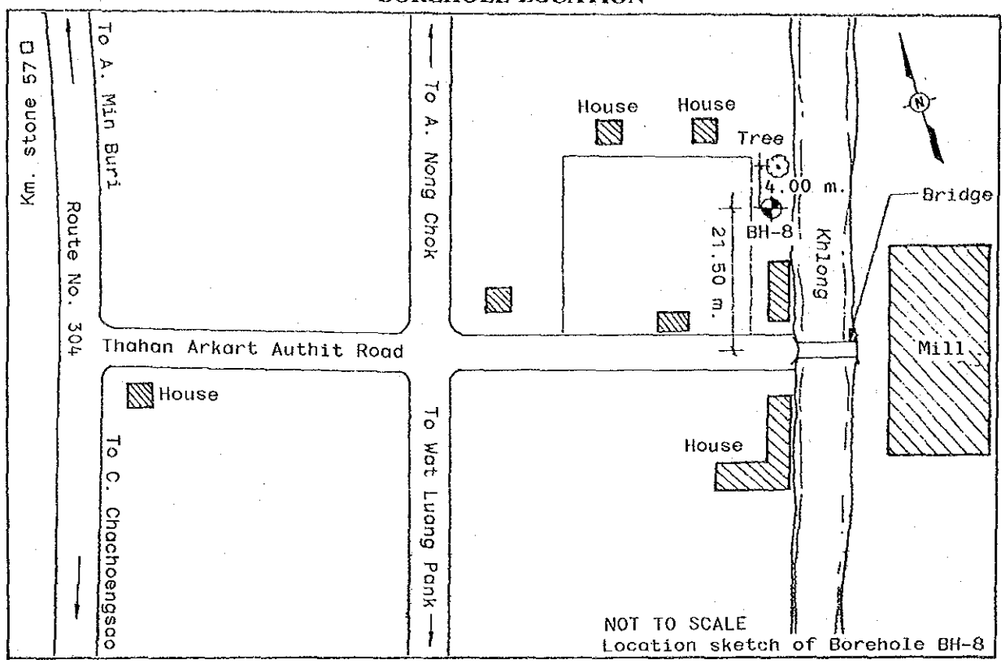
	Sieve Analysis % Passing								Plasticity		Comp. DH-T Stand.		Lab. C.B.R.	
	50.0	25.0	19.0	9.5	#4	#10	#40	#200	LL	PI	Opt. 95%	gn/cc	CBR 95%	Swell %
Soil					100	99	83	46	21.0	8.9	10.2	1.94	6.0	0.1
Laterite	100	96	93	77	51	26	17	13	29.8	8.8	7.4	2.21	37	-
Crushed Rock													>80	

FIGURE MATERIAL SOURCE

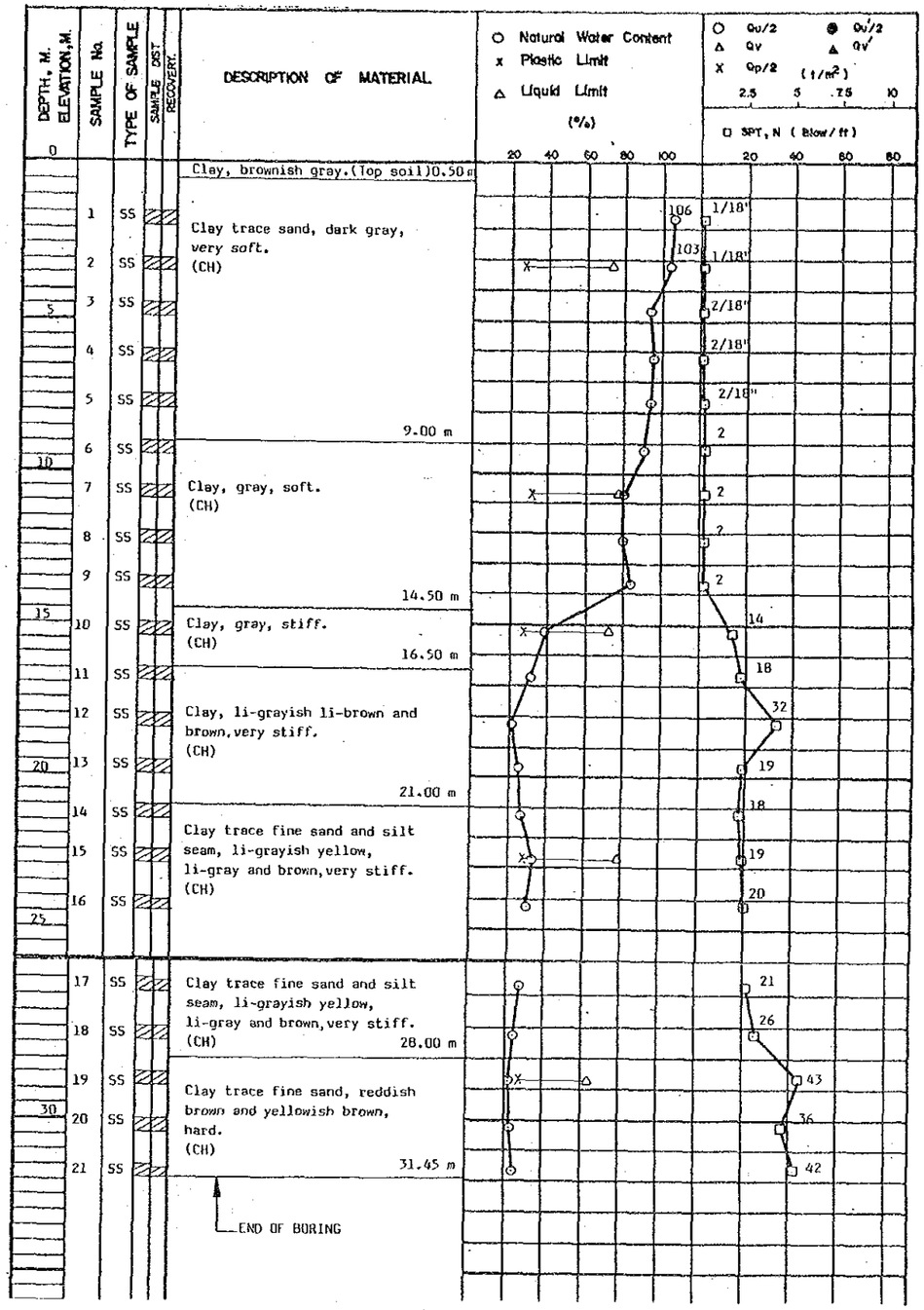


(2) Boring Results

BOREHOLE LOCATION



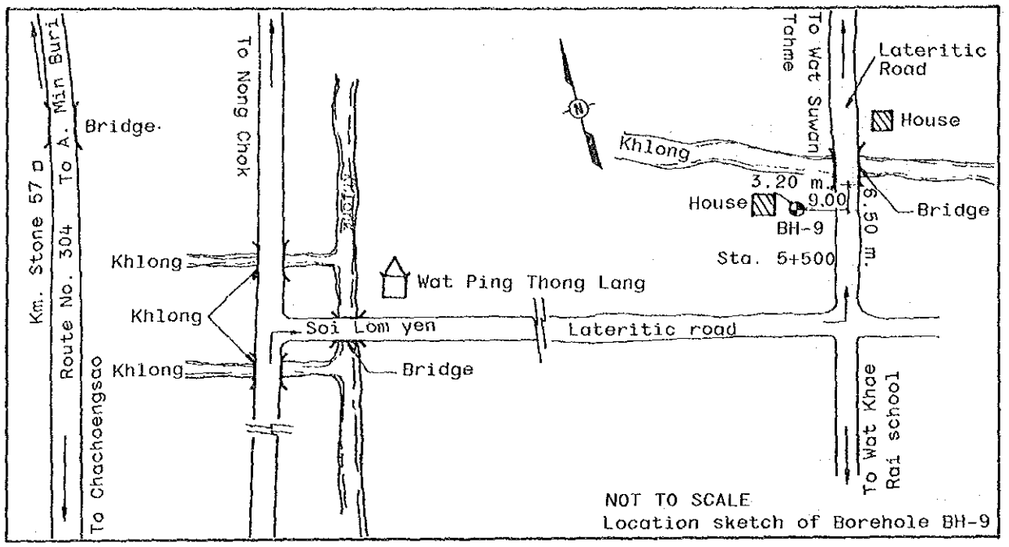
BORING LOG



SUMMARY OF TEST RESULTS

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/m.² UNCONFINED SHEAR Qu/2	Qu'/2	FIELD VANE SHEAR Qv	Qv'	POCKET PENETRATION ½Qp	STANDARD PENETRATION (N)
SS-1	1.50	1.95	105.8				1.45						CH					1.2	1/18"
SS-2	3.00	3.45	102.5	73.0	26.7	46.3	1.46						CH					1.2	1/18"
SS-3	4.50	4.95	94.0				1.48			100	99	93	CH					1.2	2/18"
SS-4	6.00	6.45	96.1										CH					1.2	2/18"
SS-5	7.50	7.95	93.1										CH					1.2	2/18"
SS-6	9.00	9.45	89.7				1.51						CH					1.2	2
SS-7	10.50	10.95	80.1	78.0	30.0	48.0							CH					1.2	2
SS-8	12.00	12.45	79.5								100	99	CH					1.2	2
SS-9	13.50	13.95	82.6				1.55						CH					1.2	2
SS-10	15.00	15.45	38.8	71.6	29.0	42.6	1.85					100	CH					10.0	14
SS-11	16.50	16.95	29.6				2.10						CH					11.2	18
SS-12	18.00	18.45	21.3				2.07						CH					12.5	32
SS-13	19.50	19.95	26.2				1.93						CH					16.2	19
SS-14	21.00	21.45	27.3							100	99	93	CH					12.5	18
SS-15	22.50	22.95	31.4	79.2	28.8	50.4	1.90						CH					12.5	19
SS-16	24.00	24.45	30.0				1.91						CH					12.5	20
SS-17	25.50	25.95	27.4				1.95						CH					12.5	21
SS-18	27.00	27.45	24.2				2.04						CH					15.0	26
SS-19	28.50	28.95	22.0	63.0	25.8	37.2	1.97						CH					18.7	43
SS-20	30.00	30.45	21.9				2.05		100	99	95	93	CH					22.5+	36
SS-21	31.50	31.95	22.5				2.06						CH					22.5+	42

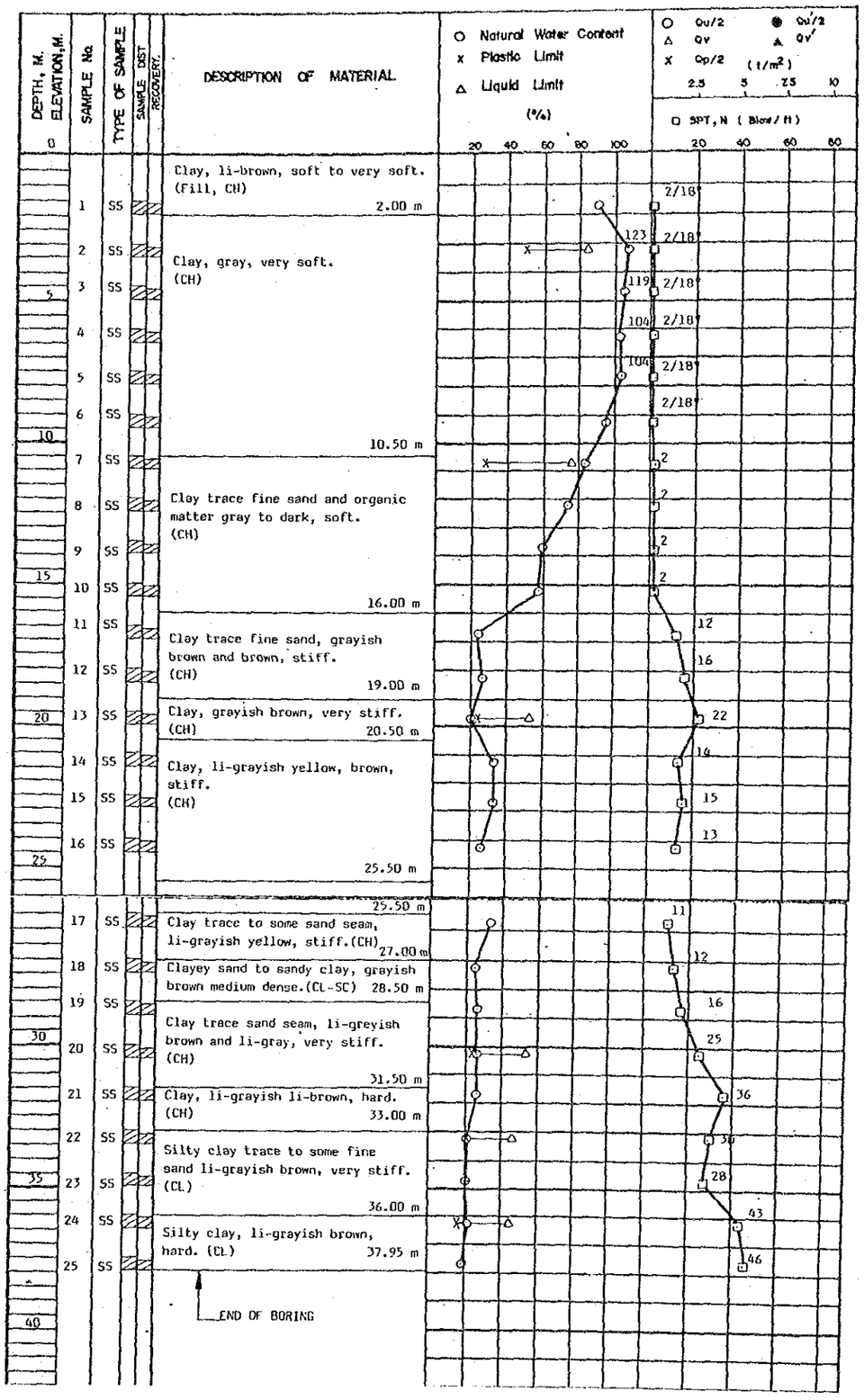
BOREHOLE LOCATION



SUMMARY OF TEST RESULTS

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	1.50	1.95	90.0				1.50						CH					1.2	2/18"
SS-2	3.00	3.45	123.2	83.3	49.9	33.4						100	CH					1.2	2/18"
SS-3	4.50	4.95	118.7				1.42						CH					1.2	2/18"
SS-4	6.00	6.45	103.9										CH					1.2	2/18"
SS-5	7.50	7.95	103.5				1.46						CH					1.2	2/18"
SS-6	9.00	9.45	94.8				1.51						CH					1.2	2/18"
SS-7	10.50	10.95	82.9	76.8	28.1	48.7							CH					2.5	2
SS-8	12.00	12.45	74.3				1.58						CH					2.5	2
SS-9	13.50	13.95	59.2				1.62				100	95	CH					2.5	2
SS-10	15.00	15.45	57.6										CH					2.5	2
SS-11	16.50	16.95	23.4				1.95						CH					12.5	12
SS-12	18.00	18.45	25.3				2.00				100	96	CH					18.7	16
SS-13	19.50	19.95	20.3	52.4	23.0	29.4	2.03						CH					17.5	22
SS-14	21.00	21.45	31.2				1.83						CH					13.7	14
SS-15	22.50	22.95	31.5				1.84						CH					13.7	15
SS-16	24.00	24.45	26.8							100	99	98	CH					12.5	13
SS-17	25.50	25.95	31.8				1.83						CH					12.5	11
SS-18	27.00	27.45	23.0					100	99	94	91	47	CL-SC					12.5	12
SS-19	28.50	28.95	25.6				1.94						CH					17.5	16
SS-20	30.00	30.45	25.6	54.3	23.9	30.4	1.98						CH					20.0	25
SS-21	31.50	31.95	25.5				1.96				100	99	CH					22.5	36
SS-22	33.00	33.45	20.6	45.5	20.4	25.1	2.01						CL					20.0	30
SS-23	34.50	34.95	20.0				2.09			100	99	84	CL					18.7	28
SS-24	36.00	36.45	20.7	43.8	17.1	26.7	2.06						CL					22.5	43
SS-25	37.50	37.95	18.7				2.08						CL					22.5	46

BORING LOG



3.2 Preliminary Design

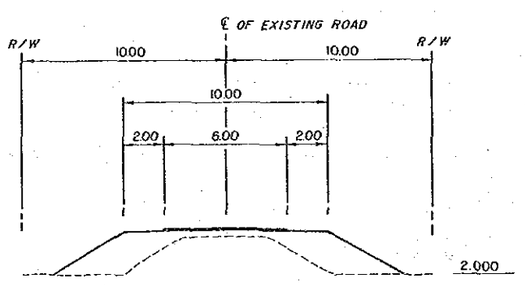
(1) Geometric Design Criteria

Design Standard : F-3

Design Speed : 70~90 km/h

Geometric Design Criteria

Description	Design Speed (km/h)		
	70	80	90
Minimum Radius & Curvature (m)	160	210	280
Minimum Stopping Sight Distance (m)	90	115	140
Maximum Gradient (%)	7	6	5



STA. 0+000 TO STA. 1+100
STA. 5+632.29 TO STA. 15+905

(2) Pavement Design

Design CBR of Subgrade	Cumulative No. of ESA W18 x 10 (10 years)	Thickness of Pavement Structure (cm)	
4.0	220	Surface	7.5
		Base	20
		Subbase	15

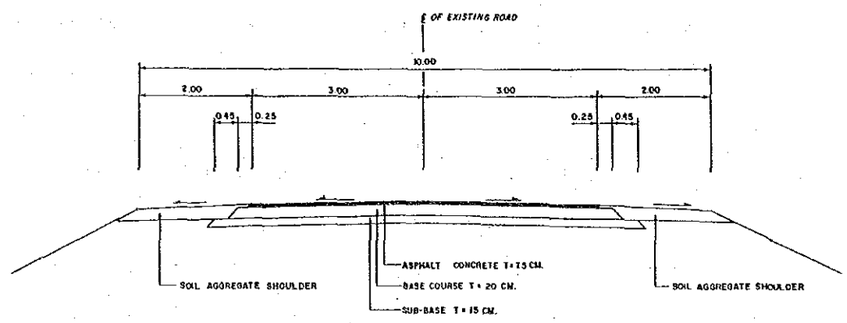


FIGURE TYPICAL PAVEMENT STRUCTURE FOR FLEXIBLE PAVEMENT IM~22

(3) Culverts

NO.	CHAINAGE	EXISTING CULVERT	NEW CULVERT
1	0+016	BOX 1-2.40x2.00x8.10	REMAIN
2	3+300	-	RCP 1-Dia 1.00x14.00
3	3+800	-	RCP 1-Dia 1.00x14.00
4	4+300	-	RCP 1-Dia 1.00x14.00
5	4+800	-	RCP 1-Dia 1.00x14.00
6	5+590	RCP 1-Dia 0.30x11.00	RCP 1-Dia 0.60x13.00
7	6+140	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x13.00
8	7+841	RCP 1-Dia 0.60x8.00	EXTEND 1-Dia 0.60x4.00
9	8+060	-	BOX 2-3.00x2.20x11.00
10	8+430	RCP 1-Dia 0.30x8.50	RCP 1-Dia 0.60x14.00
11	8+719	RCP 1-Dia 0.30x9.00	RCP 1-Dia 0.60x13.00
12	8+796	RCP 1-Dia 0.30x9.00	RCP 1-Dia 0.60x13.00
13	9+799	RCP 1-Dia 0.30x9.00	RCP 1-Dia 0.60x13.00
14	9+965	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x13.00
15	10+039	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x13.00
16	10+114	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x14.00
17	10+784	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x12.00
18	10+873	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x12.00
19	11+017	BOX 1-2.20x1.50x4.10	EXTEND 1-2.20x1.50x6.00
20	11+194	RCP 1-Dia 0.60x9.00	EXTEND 1-Dia 0.60x 4.00
21	11+396	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x13.00
22	11+688	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x13.00
23	11+826	RCP 1-Dia 0.60x9.00	EXTEND 1-Dia 0.60x4.00
24	12+206	RCP 1-Dia 0.30x9.00	RCP 1-Dia 0.60x13.00
25	12+544	RCP 1-Dia 0.60x9.00	EXTEND 1-Dia 0.60x4.00
26	12+920	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x16.00
27	13+448	RCP 1-Dia 0.30x9.00	RCP 1-Dia 0.60x15.00
28	13+581	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x14.00
29	13+896	RCP 3-Dia 0.40x9.00	RCP 1-Dia 1.00x14.00
30	14+077	RCP 1-Dia 0.30x9.00	RCP 1-Dia 0.60x15.00
31	14+195	RCP 1-Dia 0.30x9.00	RCP 1-Dia 0.60x15.00
32	14+291	RCP 1-Dia 0.30x9.00	RCP 1-Dia 0.60x15.00
33	14+349	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x15.00
34	14+513	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x16.00
35	14+564	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x16.00
36	14+695	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x16.00
37	14+744	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x15.00
38	14+874	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x15.00
39	15+122	RCP 1-Dia 0.40x9.00	RCP 1-Dia 0.60x15.00

(4) Bridges

NO	CHAINAGE	EXISTING BRIDGE		PROPOSED BRIDGE	
1	1+350	-		10.00x40.00	SLAB TYPE
2	2+780	-		10.00x24.00	SLAB TYPE
3	5+798	4.50x61.90	WOOD TYPE	10.00x65.00	SLAB TYPE
4	6+605	4.50x60.70	WOOD TYPE	10.00x65.00	SLAB TYPE
5	8+060	4.00x 8.00	WOOD TYPE	-	
6	9+439	4.50x16.30	WOOD TYPE	10.00x16.00	SLAB TYPE
7	13+193	4.50x15.30	WOOD TYPE	10.00x15.00	SLAB TYPE
8	16+209	7.00x31.90	SLAB TYPE W/LIFT CENTRAL	REMAIN SPAN	
9	16+343	7.00x24.40	SLAB TYPE W/LIFT CENTRAL	REMAIN SPAN	

(1) CONSTRUCTION QUANTITIES AND COSTS

(Project IM-22 Length = 15.9 km)

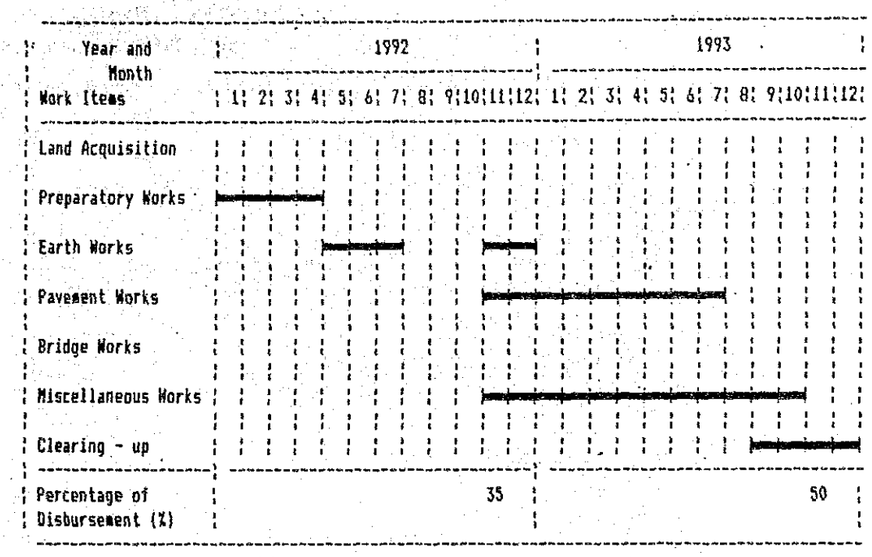
Item	Unit	Financial Unit Rate Baht	Quantity	Financial Total Cost 1000 Baht	Economic Cost %	Economic Cost 1000 Baht	Residual Value %	Residual Value 1000 Baht
EARTHWORK								
Clearing & Grubbing	ha	10,000	40	400	85	340	90	306
Roadway Excavation (Unclassified)	m^3	18	3,500	63	84	53	90	48
Roadway Excavation (Classified Unsuitable Material below Grade)	m^3	51	-	-	84	-	90	-
Embankment (Common)	m^3	33	-	-	86	-	90	-
Embankment (Borrow)	m^3	115	177,900	20,459	86	17,595	90	15,836
Removal of Existing Structure	each	60,000	-	-	84	-	90	-
Sub Total				20,922		17,988		16,190
SUBBASE and BASE COURSES								
Subbase	m^3	207	16,600	3,436	83	2,852	50	1,426
Aggregate base	m^3	345	22,500	7,763	84	6,521	50	3,261
Shoulder (Soil Aggregate)	m^3	240	10,200	2,448	83	2,032	50	1,016
Sub Total				13,647		11,405		5,703
SURFACE COURSES								
Asphaltic Prime Coat	m^2	11	109,500	1,205	93	1,121	50	561
Asphaltic Tack Coat	m^2	5	-	-	93	-	50	-
Double Bituminous Surface Treatment	m^2	33	-	-	91	-	50	-
Asphalt Concrete Surfacing	ton	922	16,500	15,213	90	13,692	50	6,846
Portland Cement Concrete Pavement	m^3	1,665	-	-	90	-	50	-
Sub Total				16,418		14,813		7,407
STRUCTURES (Equivalent)								
RC Pipe Culvert (D=1.00 m)	m	1,800	280	504	88	444	50	222
RC Box Culvert (2-2.40x 2.40 m)	m	10,000	15	150	90	135	50	68
RC Bridge (W=10.0 m)	m	60,000	225	13,500	87	11,745	50	5,873
PC Bridge (W=10.0 m)	m	87,300	-	-	87	-	50	-
Bearing Unit	m^2	1,600	-	-	87	-	50	-
Sub Total				14,154		12,324		6,163
Total (a)				65,141		56,530		35,463
Miscellaneous Work ((a) x 7%)	ls			4,560	87	3,967	0	0
CONTRACT AMOUNT (b)				69,701		60,497		35,463
PHYSICAL CONTINGENCIES ((b) x 10%) (c)	ls			6,970		6,050		3,546
ENGINEERING AND SUPERVISION (((b) + (c)) x 10%) (d)	ls			7,667	100	7,667	0	0
LAND ACQUISITION								
Developed Land	ha	1,250,000	-	-				
Less Developed Land	ha	500,000	23	11,500				
Total (e)				11,500	100	11,500	100	11,500
PROJECT COST ((b) + (c) + (d) + (e))				95,838		85,714		50,509
AVERAGE COST PER KM				6,028				

(2) Road Maintenance Costs

(Unit : Baht/Year)

	Without Project	With Project
1994	187,832	155,399
2004	189,890	262,269

3.4 Construction Schedule



4. BENEFITS

ROAD CONDITIONS

(unit : km)

Section	Without Project										With Project				
		Paved				Laterite									
	Road Length	Good	Good /Fair	Fair	Fair /Poor	Poor	Good	Fair	Poor	No. of Narrow Bridge	No. of Wooden Bridge	Road Length	Paved Good	No. of Narrow Bridge	No. of Wooden Bridge
RURAL	21.9	-	-	1.5	-	-	-	-	20.4	-	5	15.9	15.9	-	-

VOC AND TIME SAVINGS

(1000 BAHT)

Year	VOC Savings			Time Savings			Total Savings		
	Normal Traffic	Induced Traffic	Total	Normal Traffic	Induced Traffic	Total	Normal Traffic	Induced Traffic	Total
1994	18,187	32	18,219	2,909	212	3,122	21,097	244	21,341
2000	27,011	57	27,068	4,518	341	4,859	31,529	399	31,928
2008	42,513	93	42,606	7,186	535	7,722	49,699	628	50,327

COST AND BENEFIT STATEMENT

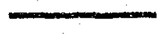
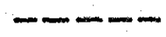
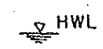
(1000 BAHT)

	COST	BENEFITS				DISCOUNTED(12%)	
YEAR	CONST. COST	VOC SAVING	TIME SAVING	MAINT. SAVING	TOTAL	COST	BENEFIT
1992	30,000				0	37,632	0
1993	55,714				0	62,400	0
1994		18,219	3,122	32	21,373	0	19,083
1995		19,694	3,411	25	23,130	0	18,439
1996		21,169	3,701	18	24,888	0	17,715
1997		22,644	3,991	11	26,646	0	16,934
1998		24,119	4,280	4	28,403	0	16,117
1999		25,594	4,570	(3)	30,161	0	15,281
2000		27,068	4,859	(10)	31,917	0	14,438
2001		29,011	5,217	(17)	34,211	0	13,817
2002		30,953	5,575	(24)	36,504	0	13,164
2003		32,895	5,933	(31)	38,797	0	12,492
2004	10,203	34,837	6,291	(38)	41,090	3,285	11,812
2005		36,779	6,648	(45)	43,382	0	11,135
2006		38,721	7,006	(52)	45,675	0	10,468
2007		40,664	7,364	(59)	47,969	0	9,815
2008	(50,509)	42,606	7,722	(72)	50,256	(10,335)	9,182
TOTAL	45,408	444,973	79,690	(261)	524,402	92,982	209,892

NET PRESENT VALUE : 116,910
BENEFIT COST RATIO : 2.26
INTERNAL RATE OF RETURN : 23.7%
FIRST YEAR RATE OF RETURN : 19.1%

6. DRAWINGS

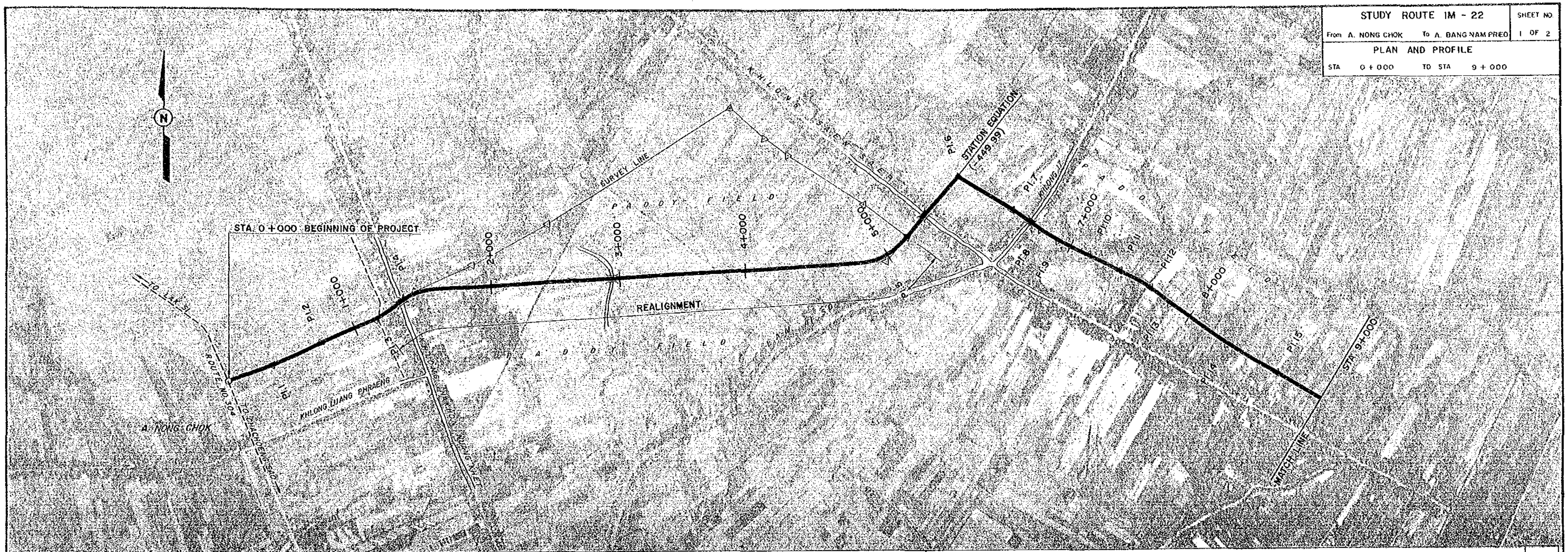
ABBREVIATIONS AND SYMBOLS FOR PLAN AND PROFILE

	NEW CONSTRUCTION SECTION OF STUDY ROUTE
	IMPROVEMENT SECTION OF STUDY ROUTE
	BRIDGE (PROPOSED , EXISTING)
	BOX CULVERT (PROPOSED , EXISTING)
	PIPE CULVERT (PROPOSED , EXISTING)
	HIGH WATER LEVEL

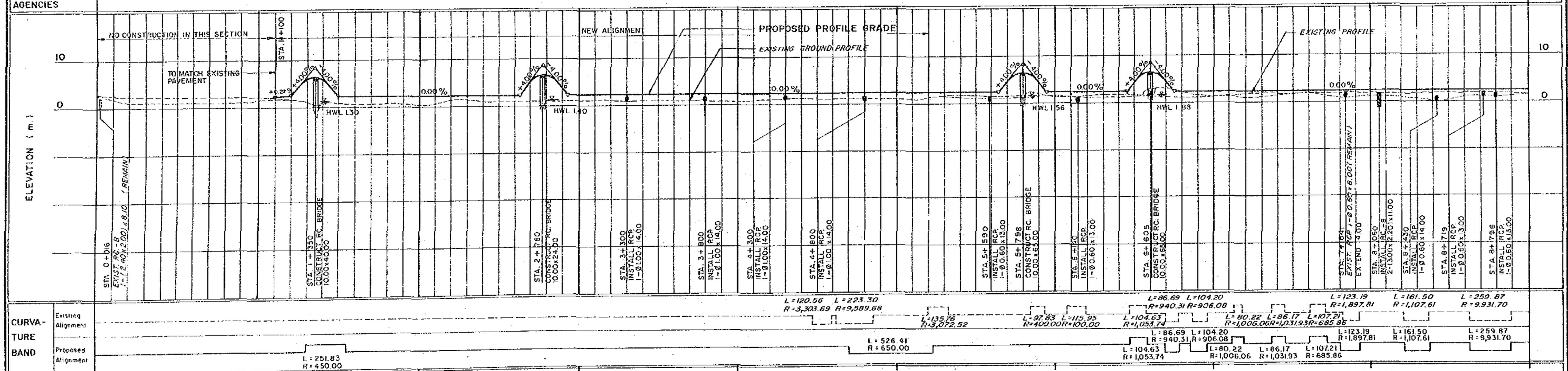
HWY	HIGHWAY
PI	POINT OF HORIZONTAL INTERSECTION
NO. or #	NUMBER
△	DEFLECTION ANGLE
R	RADIUS OF CURVATURE
T	TANGENT LENGHT
L	LENGHT OF CURVE
RT	RIGHT
LT	LEFT
EXIST.	EXISTING
EXTD.	EXTEND

RC—P—n—Øa x l	PIPE CULVERT, n (ROW), Øa (DIAMETER, m), l (LENGTH, m)
RC—B—n—a x b x l	BOX CULVERT, n (NO. OF CELLS), a x b x l (CLEAR SPAN x DEPTH x LENGTH, m)
BR—T—a x l—n	TIMBER BRIDGE, a x l (WIDTH x LENGTH, m), n (NO. OF SPANS)
BR—RC—a x l—n	CONCRETE BRIDGE, a x l (ROADWAY WIDTH x LENGTH, m) n (NO. OF SPANS)

STUDY ROUTE IM - 22	SHEET NO.
From A. NONG CHOK To A. BANG NAM PREO	1 OF 2
PLAN AND PROFILE	
STA 0 + 000 TO STA 9 + 000	

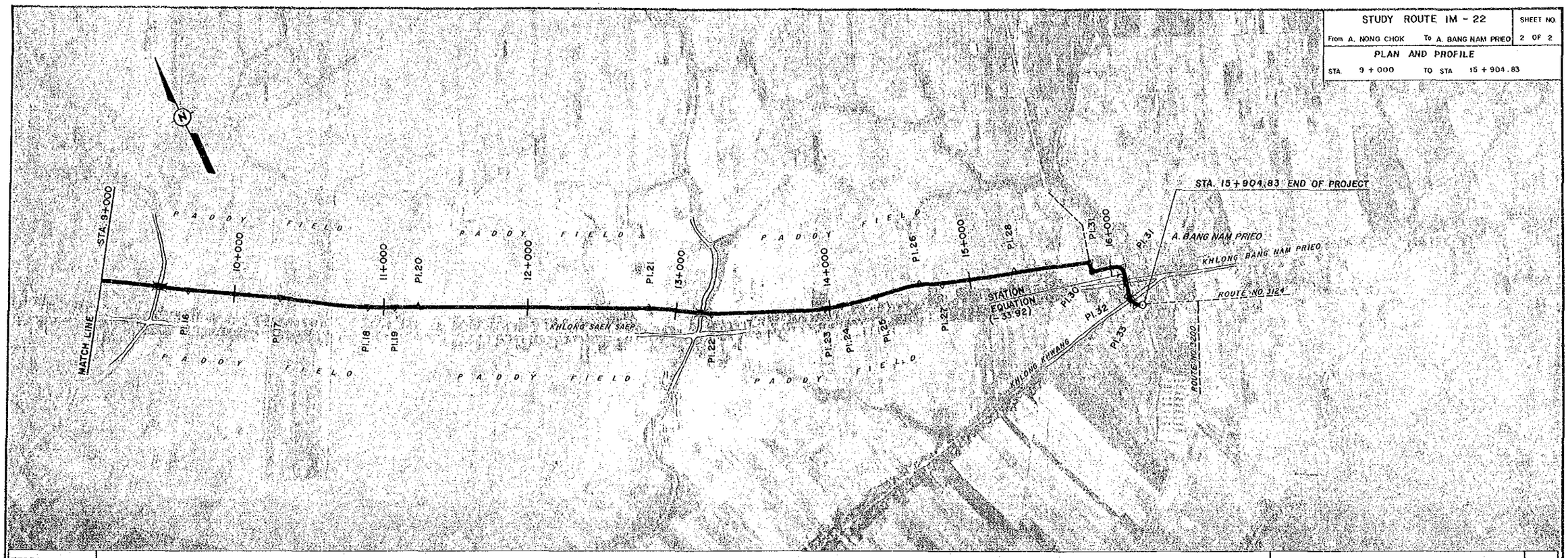


TERRAIN		FLAT	PADDY FIELD	FLAT
PAVEM'T	Type / Length	AC. PAVEMENT	NEW CONSTRUCTION	LATERITE
	Condition	FAIR		VERY POOR
FLOODING	Length (Km) / Height (m.)			—
RIGHT OF WAY (m.)	LT.	10.00	NEW 20.00	10.00
	RT.	10.00	NEW 20.00	10.00
ROUTE NO. AGENCIES				RURAL

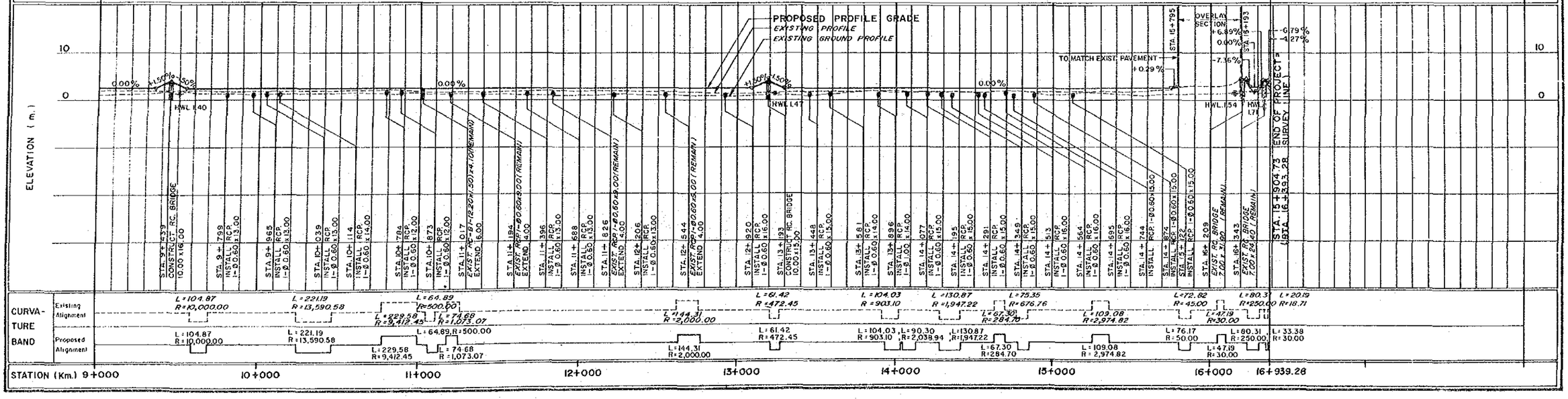


STATION (Km.) 0+000 | 1+000 | 2+000 | 3+000 | 4+000 | 5+000 | 6+000 | 7+000 | 8+000 | 9+000

STUDY ROUTE IM - 22	SHEET NO.
From A. NONG CHOK To A. BANG NAM PRIEO	2 OF 2
PLAN AND PROFILE	
STA. 9 + 000 TO STA 15 + 904.83	



TERRAIN		FLAT
PAVEMENT	Type / Length	LATERITE / AC. PAVEMENT
	Condition	POOR / FAIR
FLOODING	Length (Km) / Height (m)	—
RIGHT OF WAY (m.)	LT.	10.00
	RT.	10.00
ROUTE NO. AGENCIES		RURAL



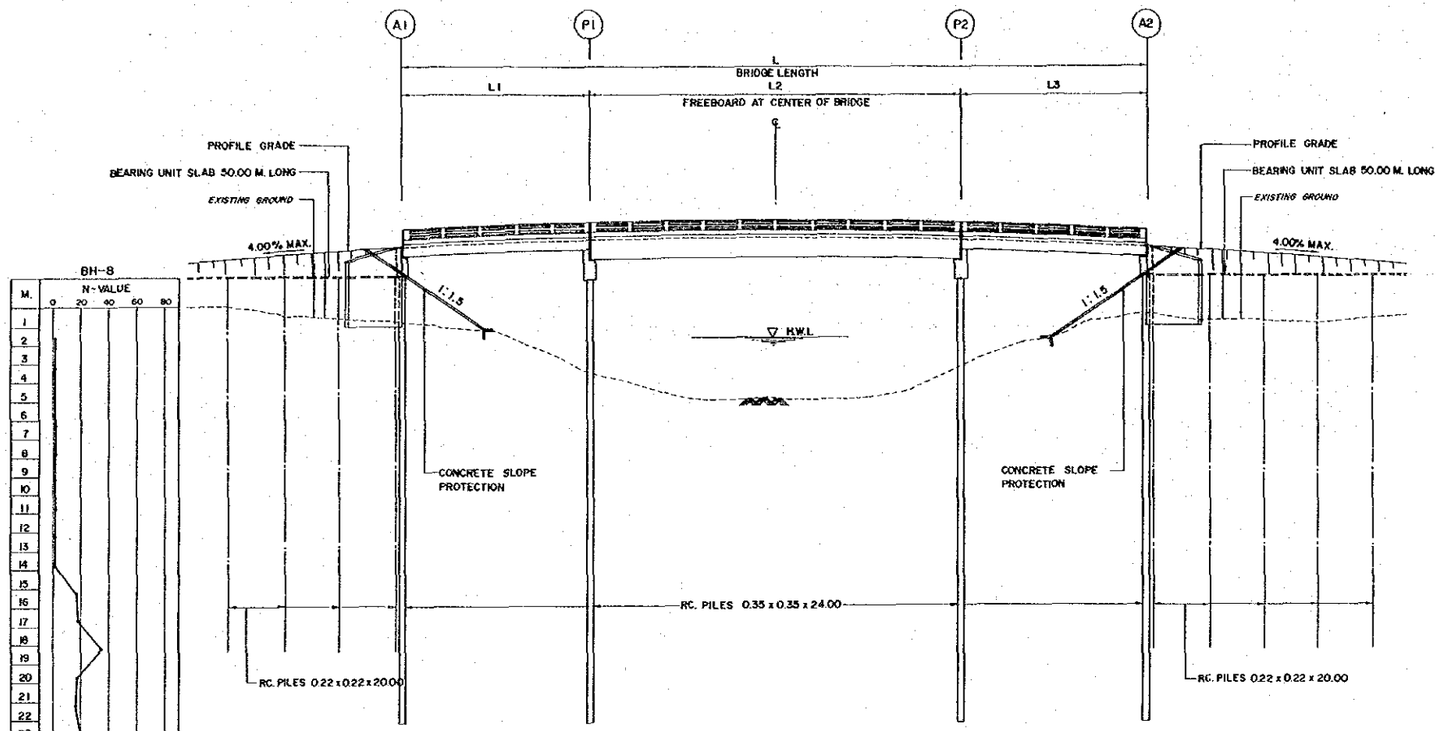
CURVATURE BAND	Existing Alignment	L = 104.87 R = 10,000.00 / L = 221.19 R = 13,590.58 / L = 229.58 R = 9,412.45 / L = 64.89 R = 500.00 / L = 74.68 R = 1,073.07 / L = 144.31 R = 2,000.00 / L = 61.42 R = 472.45 / L = 104.03 R = 903.10 / L = 130.87 R = 1,947.22 / L = 67.30 R = 284.70 / L = 75.35 R = 676.76 / L = 109.08 R = 2,974.82 / L = 72.82 R = 45.00 / L = 47.19 R = 30.00 / L = 80.31 R = 250.00 / L = 20.19 R = 18.71
	Proposed Alignment	L = 104.87 R = 10,000.00 / L = 221.19 R = 13,590.58 / L = 229.58 R = 9,412.45 / L = 64.89, R = 500.00 / L = 74.68 R = 1,073.07 / L = 144.31 R = 2,000.00 / L = 61.42 R = 472.45 / L = 104.03, L = 90.30 R = 903.10, R = 2,039.94 / L = 130.87 R = 1,947.22 / L = 67.30 R = 284.70 / L = 109.08 R = 2,974.82 / L = 76.17 R = 50.00 / L = 47.19 R = 30.00 / L = 80.31 R = 250.00 / L = 33.38 R = 30.00

STATION (Km.)	9+000	10+000	11+000	12+000	13+000	14+000	15+000	16+000	16+939.28

STUDY ROUTE IM-22	SHEET NO.
From A. NONG CHOK To A. BANG NAM PRIEO	1 OF 3

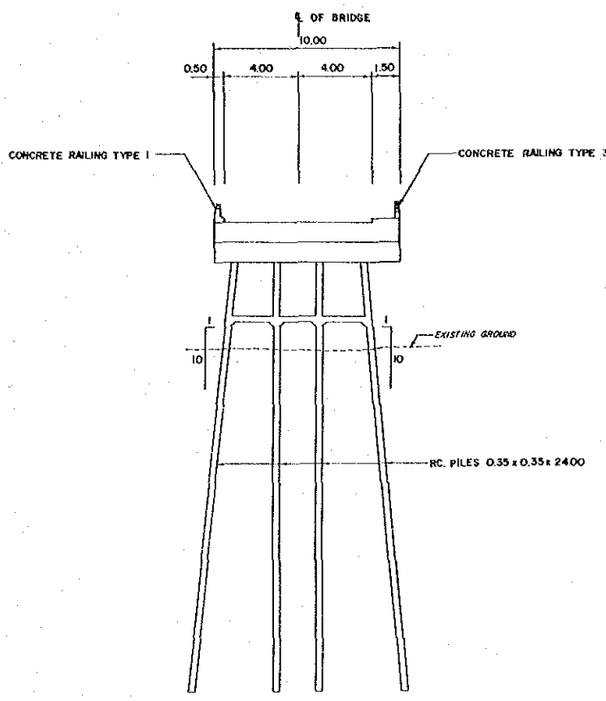
BRIDGES STA. 1+350 & 2+780

PLAN, ELEVATION AND SECTION



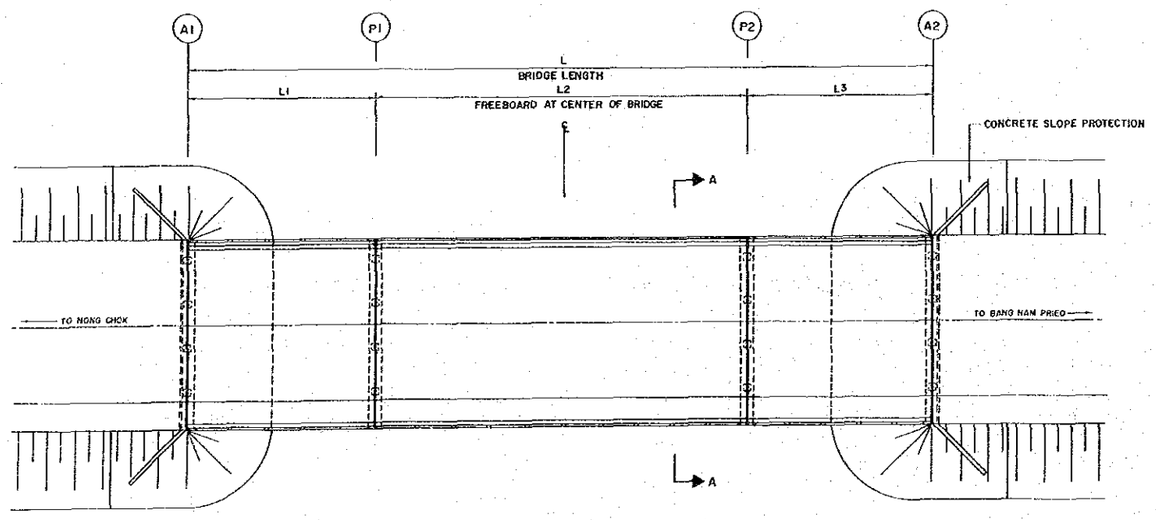
GENERAL ELEVATION

SCALE 1:150



SECTION A - A

SCALE 1:50



GENERAL PLAN

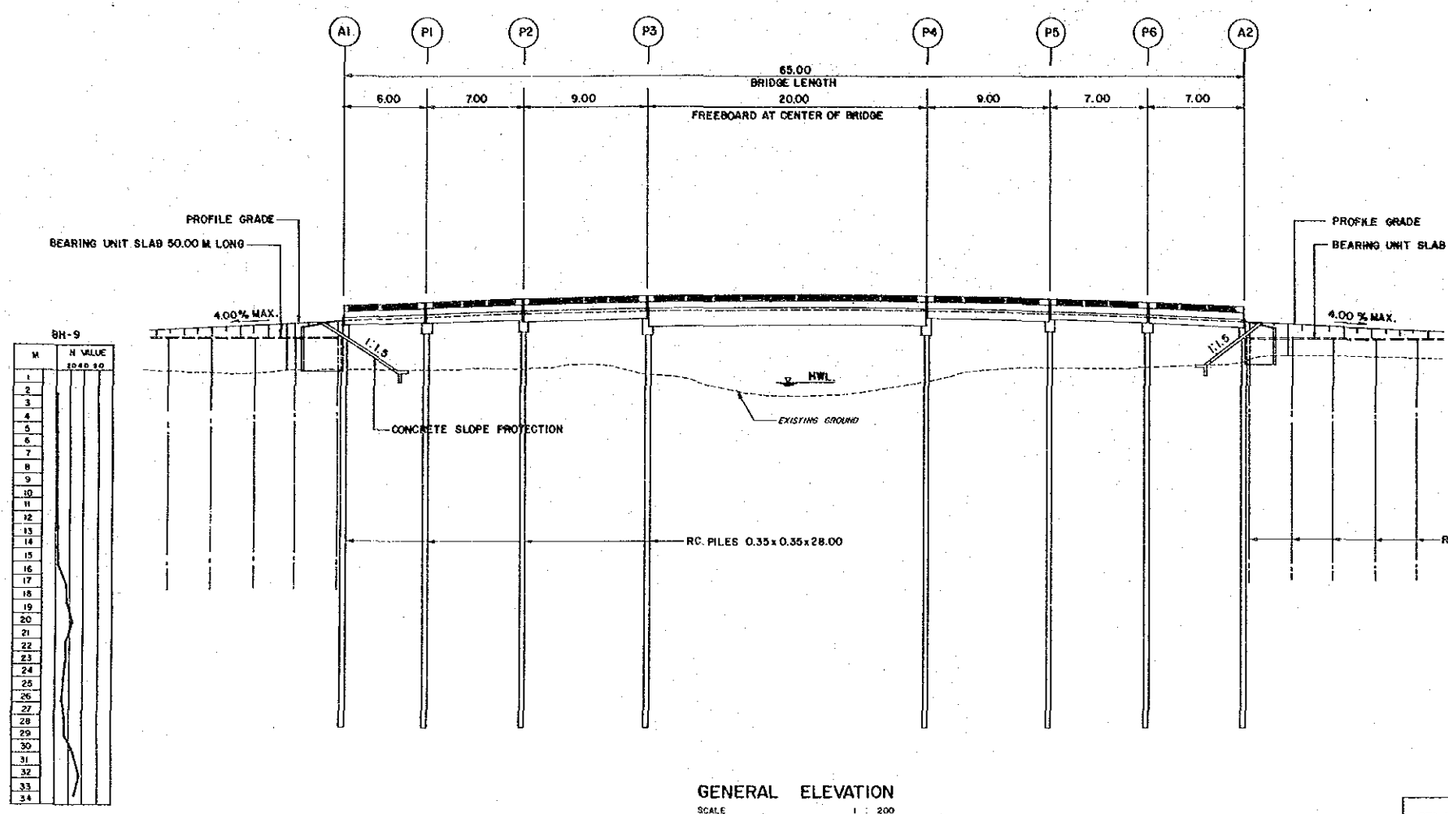
SCALE 1:150

TABLE OF SUPERSTRUCTURE

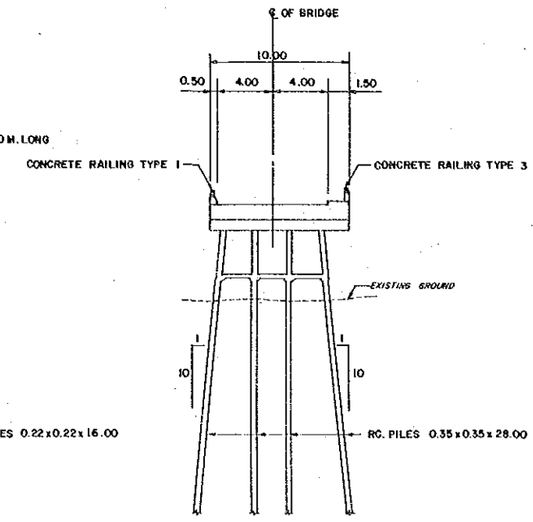
STA. NO.	BRIDGE LENGTH	SPAN LENGTH			THICKNESS			TYPE	ELEVATION	H.W.L	EXISTING BRIDGE
		L1	L2	L3	L1	L2	L3				
1+350	40.00	10.0	20.0	10.0	0.53	1.05	0.53	RC-SLAB	6.60	1.30	—
2+780	24.00	7.0	10.0	7.0	0.39	0.53	0.39	RC-SLAB	6.60	1.40	—

ITEM	UNIT	QUANTITY		
		STA. 1+350	STA. 2+780	TOTAL
1. CONCRETE				
CLASS B(1½) FOR BRIDGE DECK	M^3	334	119	453
CLASS B(1½) FOR PILE BENT PIER & ABUTMENT	M^3	84	84	168
CLASS SPECIAL B(1½) FOR BEARING UNIT SLAB	M^3	300	300	600
2. STEEL REINFORCEMENT	T	100	49	149
3. RC. PILE 0.22 x 0.22 M.	LM	2720	2720	5440
4. RC PILE 0.35 x 0.35 M.	LM	495	495	990
5. CONCRETE RAILING TYPE - 1	LM	40	24	64
CONCRETE RAILING TYPE - 3	LM	40	24	64
6. CONCRETE SLOPE PROTECTION	M^2	352	352	704

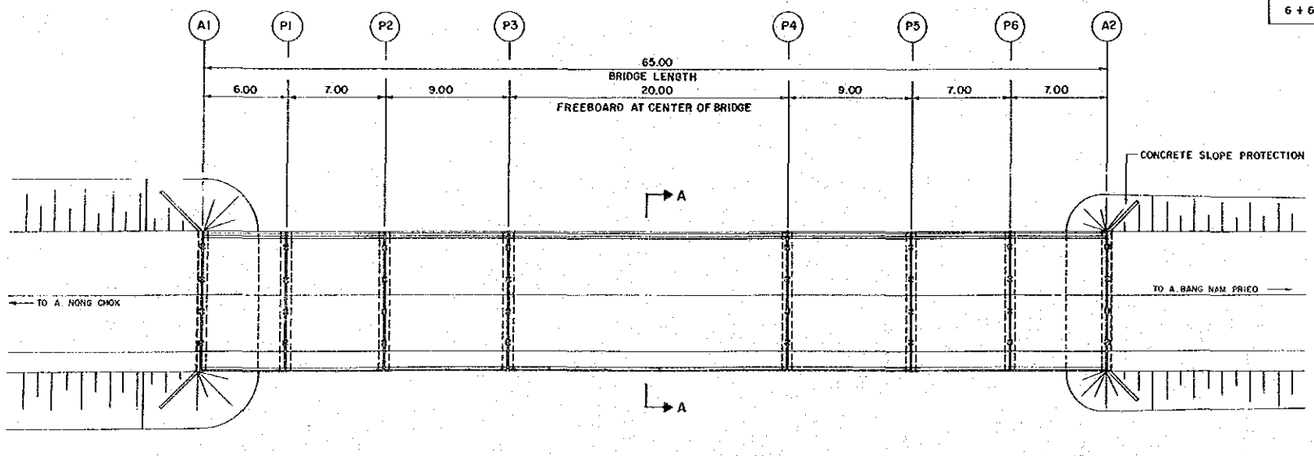
STUDY ROUTE IM - 22	SHEET NO.
From A. NONG CHOK To A. BANG NAM PRIEO	2 OF 3
BRIDGES STA. 5+798 AND STA. 6+605	
PLAN, ELEVATION AND SECTION	



GENERAL ELEVATION
SCALE 1 : 200



SECTION A-A
SCALE 1 : 200



GENERAL PLAN
SCALE 1 : 200

TABLE OF SUPERSTRUCTURE

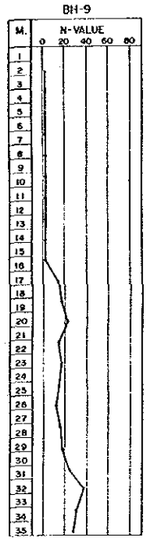
STA. NO.	BRIDGE LENGTH	SPAN LENGTH					THICKNESS					TYPE	HWL.	EXISTING
		L1	L2,L6	L3,L5	L4	L7	L1	L2,L6	L3,L5	L4	L7			
5+798	65.00	6.00	7.00	9.00	20.00	7.00	0.36	0.39	0.47	1.05	0.39	RC.SLAB	1.56	4.5 x 61.9
6+605	65.00	6.00	7.00	9.00	20.00	7.00	0.36	0.39	0.47	1.05	0.39	RC.SLAB	1.88	4.5 x 60.7

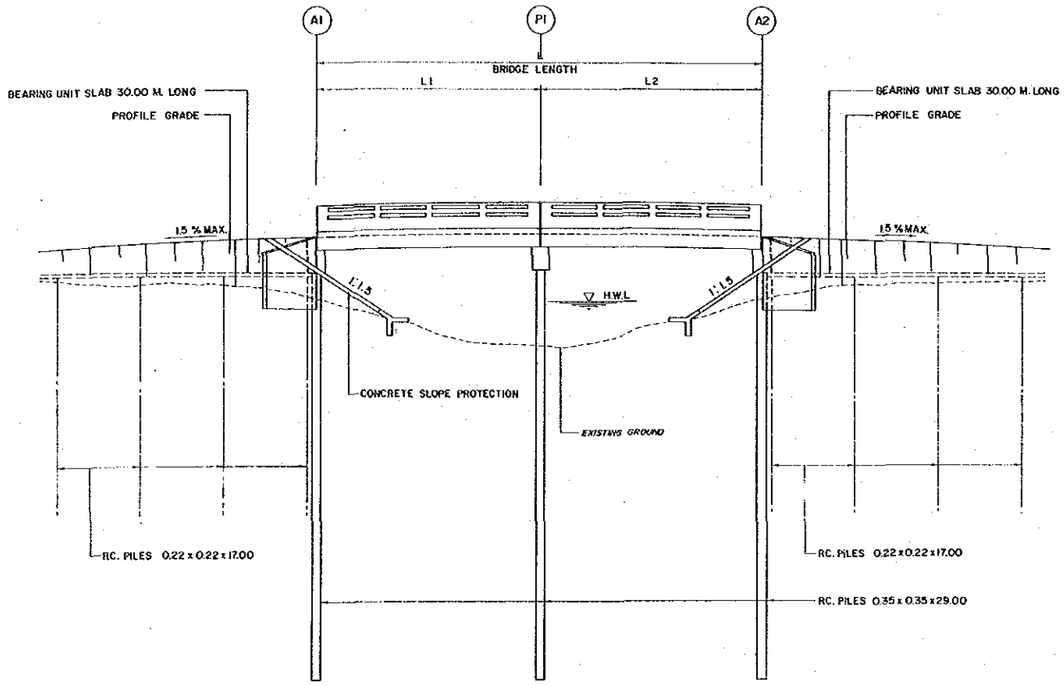
LIST OF EXISTING BRIDGE

STA. NO.	WIDTH & LENGTH (M.)	WITHDRAW (M^3)
5+798	4.50 x 61.90	148
6+605	4.50 x 60.70	145
	TOTAL	293

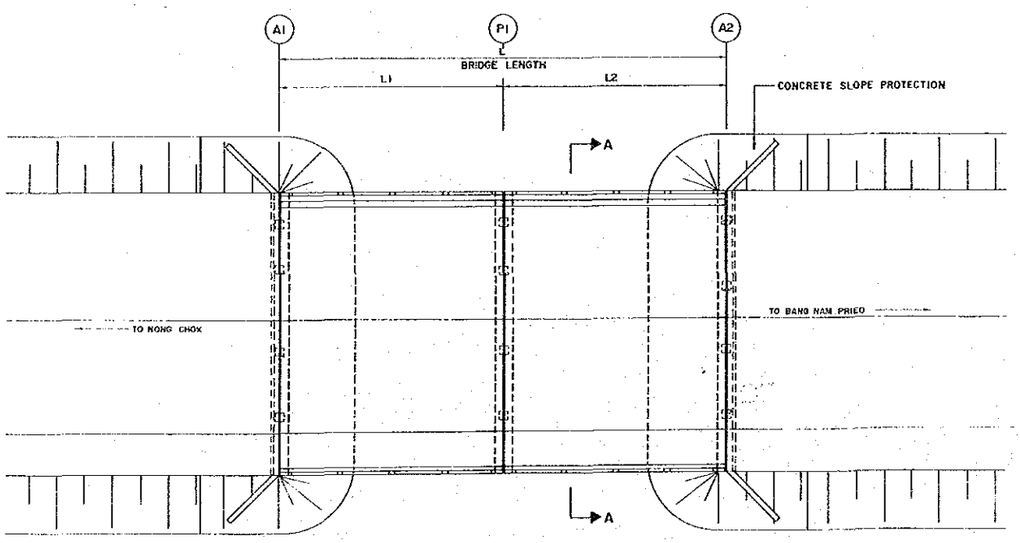
ITEM	UNIT	QUANTITY		
		STA.5+798	STA.6+605	TOTAL
1. CONCRETE CLASS B (1½) FOR BRIDGE DECK	M^3	428	428	856
CLASS B (1½) FOR PILE BENT PIER & ABUTMENT	M^3	182	182	364
CLASS SPECIAL B (1½) FOR BEARING UNIT SLAB	M^3	300	300	600
2. STEEL REINFORCEMENT	T	147	147	294
3. RC. PILE 0.22 x 0.22 M.	LM	2,176	2,176	4,352
4. RC. PILE 0.35 x 0.35 M.	LM	142	142	284
5. CONCRETE RAILING TYPE -1	LM	65	65	130
TYPE -3	LM	65	65	130
6. CONCRETE SLOPE PROTECTION	M^2	330	330	660

STUDY ROUTE IM-22	SHEET NO.
From A. NONG CHOK To A. BANG NAM PRIEO	3 OF 3
BRIDGES STA. 9+439 & STA. 13+193	
PLAN, ELEVATION AND SECTION	

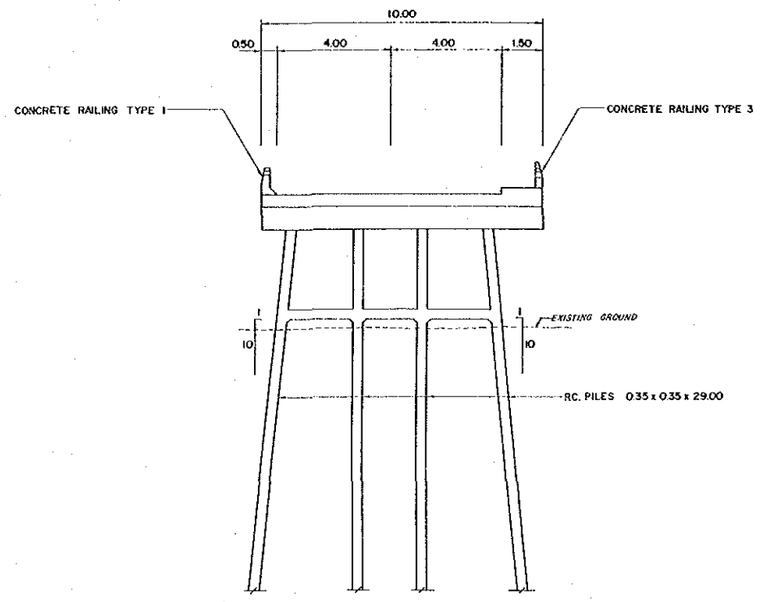




GENERAL ELEVATION
SCALE 1:100



GENERAL PLAN
SCALE 1:100



SECTION A - A
SCALE 1:100

TABLE OF SUPERSTRUCTURE

STA. NO.	BRIDGE LENGTH	SPAN LENGTH		THICKNESS		TYPE	ELEVATION	H.W.L	EXISTING BRIDGE
		L1	L2	L1	L2				
9+439	16.00	8.00	8.00	0.43	0.43	RC-SLAB	3.80	1.40	4.50 x 16.30
13+193	18.00	8.00	7.00	0.43	0.39	RC-SLAB	3.80	1.47	4.50 x 15.30

LIST OF EXISTING BRIDGE

STA. NO.	WIDTH&LENGTH (M)	WITHDROW
9+439	4.50x16.30	39 M^3
13+193	4.50x15.30	36 M^3
	TOTAL	75 M^3

ITEM	UNIT	QUANTITY		
		STA. 9+439	STA. 13+193	TOTAL
1. CONCRETE				
CLASS B(1½) FOR BRIDGE DECK	M^3	76	70	146
CLASS B(1½) FOR PILE BENT PIER & ABUTMENT	M^3	72	72	144
CLASS SPECIAL B(1½) FOR BEARING UNIT SLAB	M^3	300	300	600
2. STEEL REINFORCEMENT	T	36	34	70
3. RC. PILE 0.22 x 0.22 M.	LM	1496	1496	2992
4. RC PILE 0.35 x 0.35 M.	LM	437	437	874
5. CONCRETE RAILING TYPE - 1	LM	16	15	31
CONCRETE RAILING TYPE - 3	LM	16	15	31
6. CONCRETE SLOPE PROTECTION	M^2	72	95	167