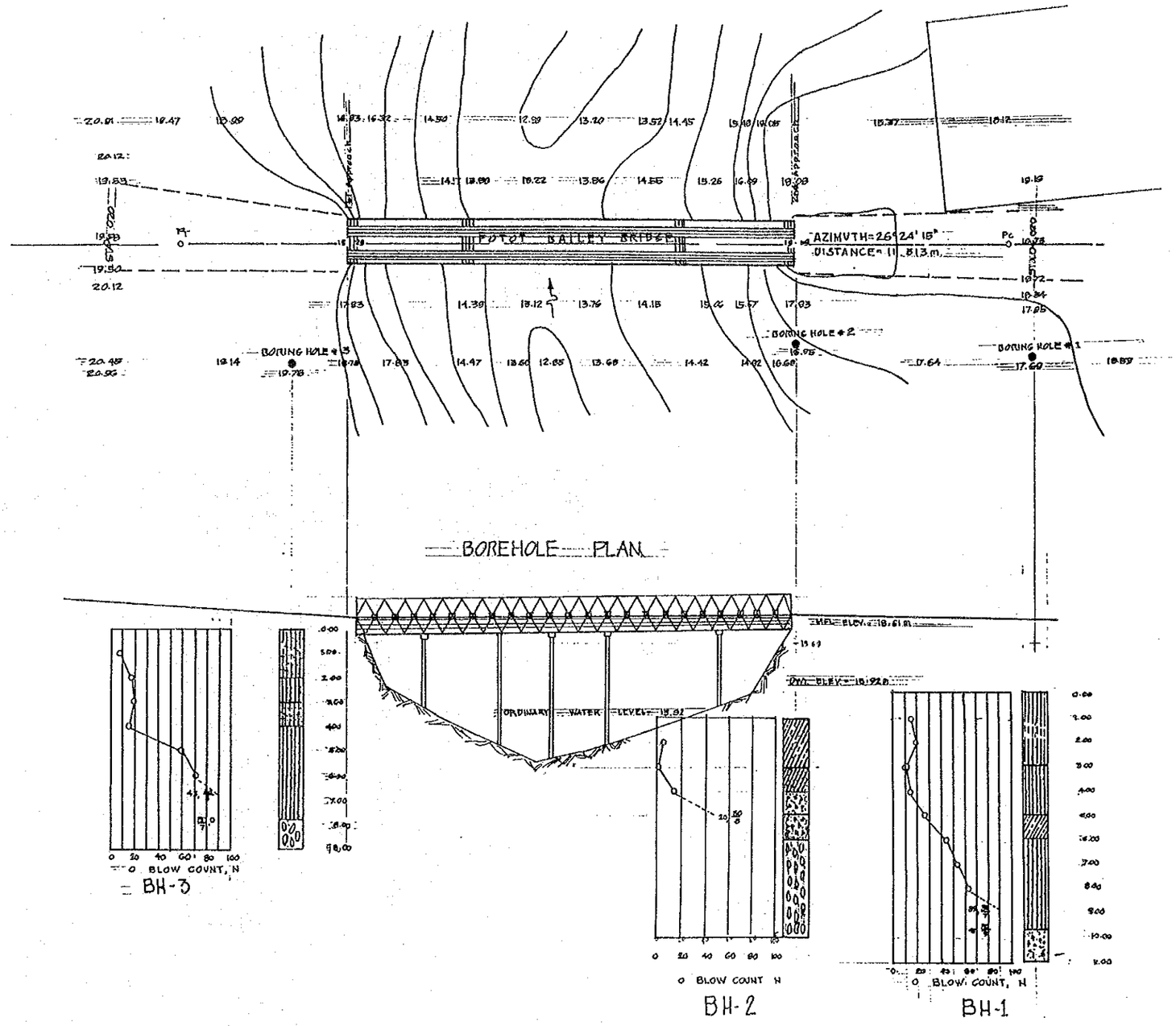
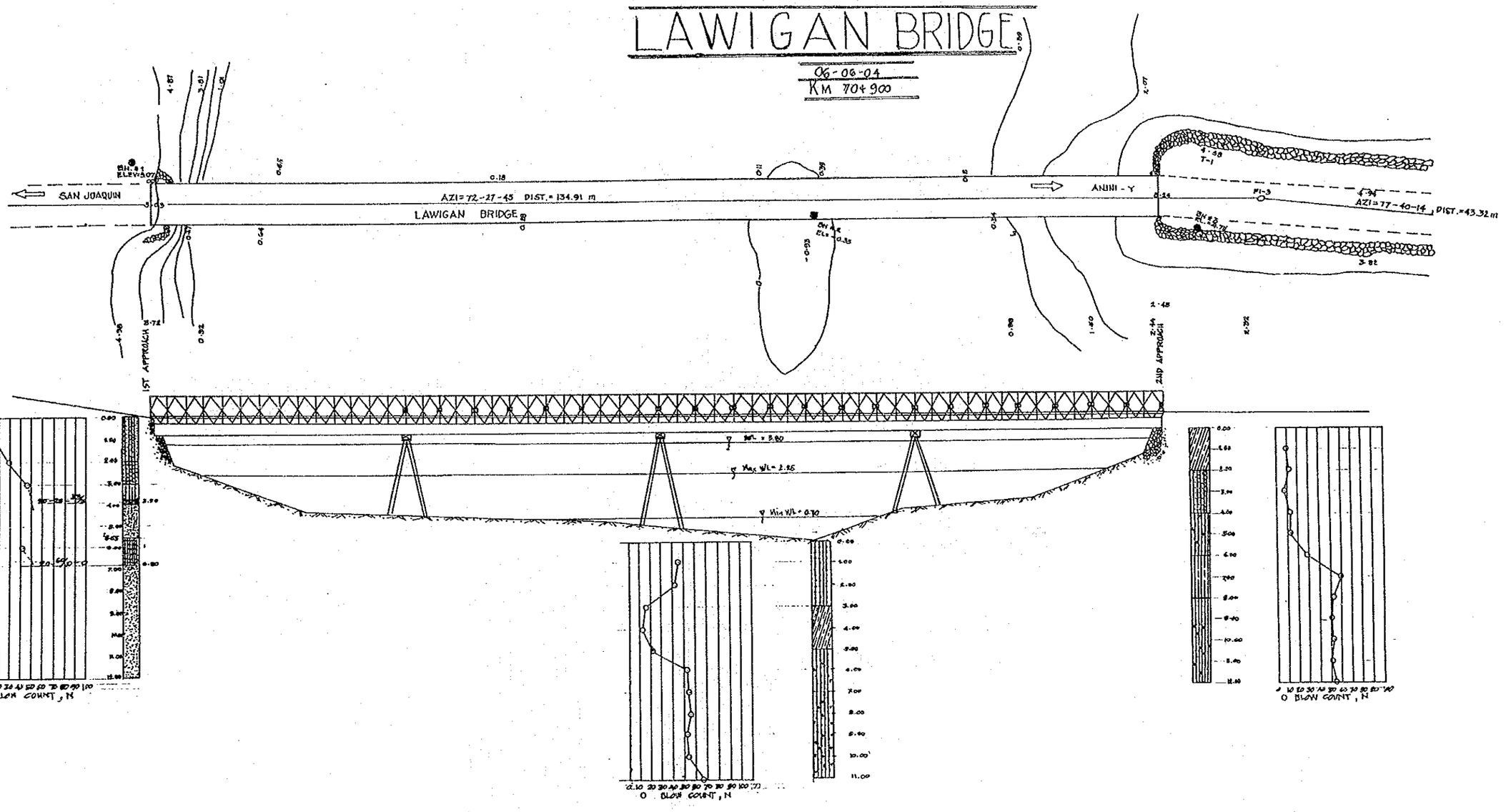
POTOT BRIDGE

Km. 37 + 739.78 No. 05-06-05

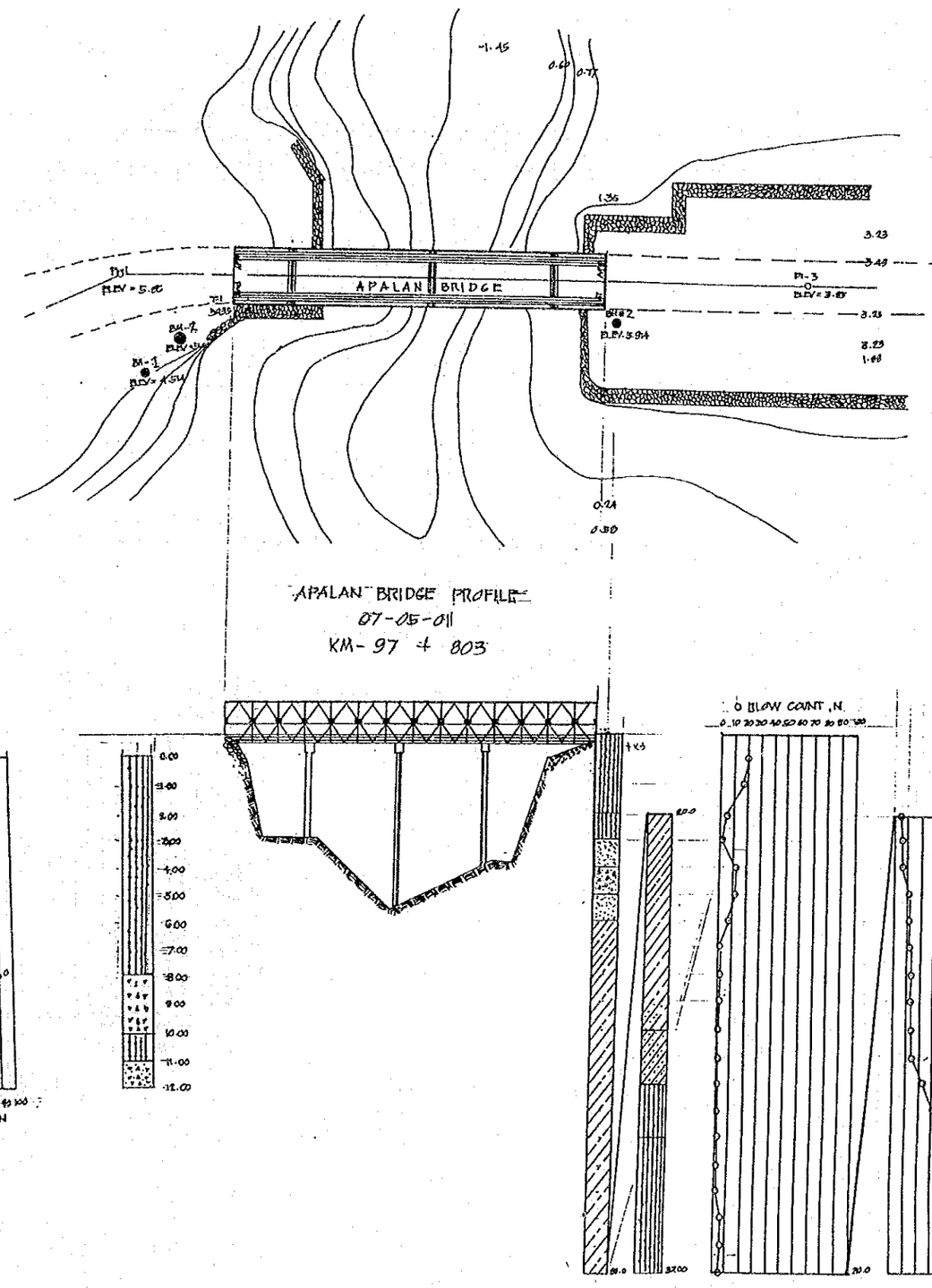


LAWIGAN BRIDGE

06-06-04
Km 704+900



APALAN BRIDGE

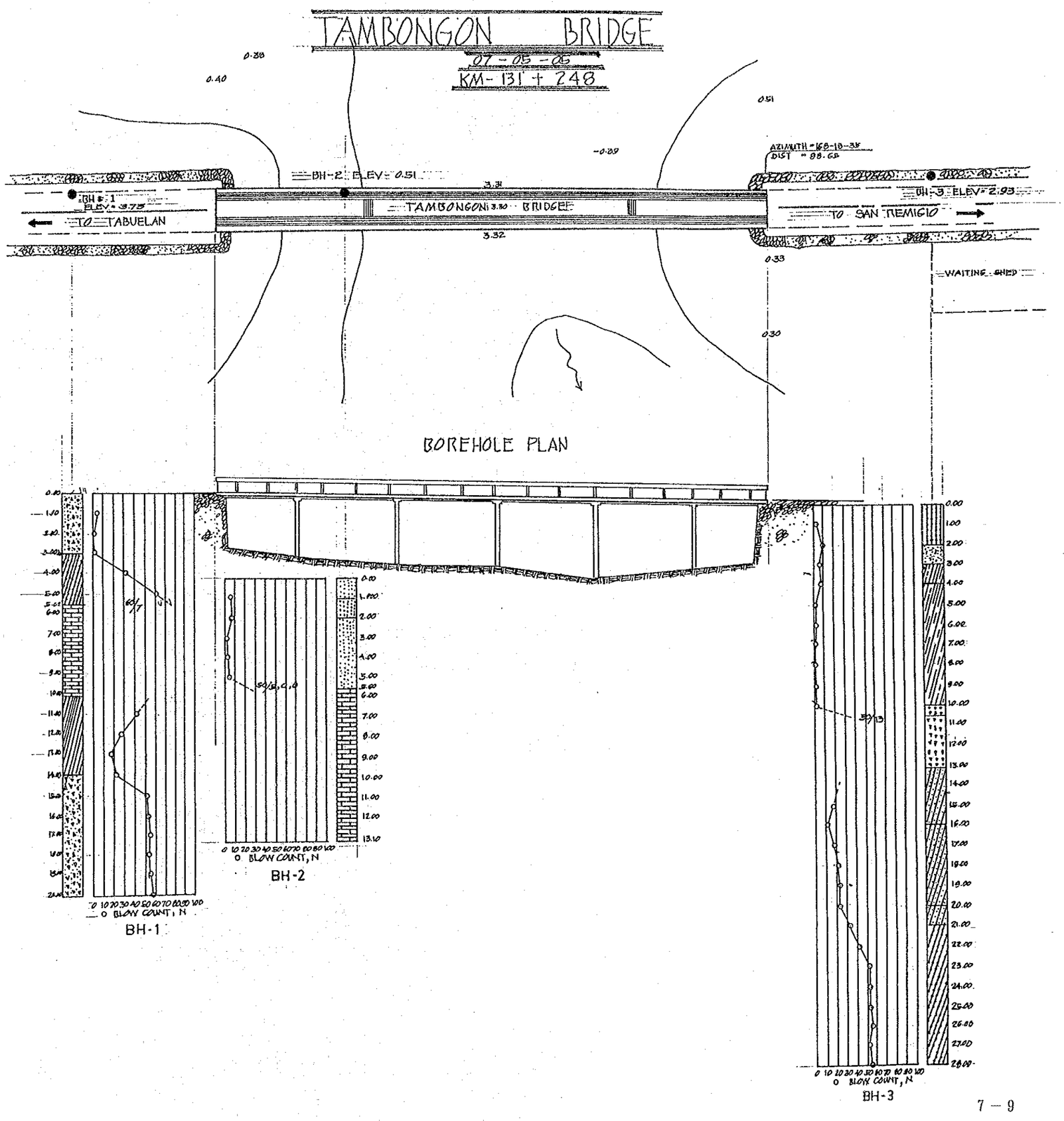


APALAN BRIDGE PROFILE
07-05-011
KM- 97 + 803

TAMBONGON BRIDGE

07 - 05 - 05

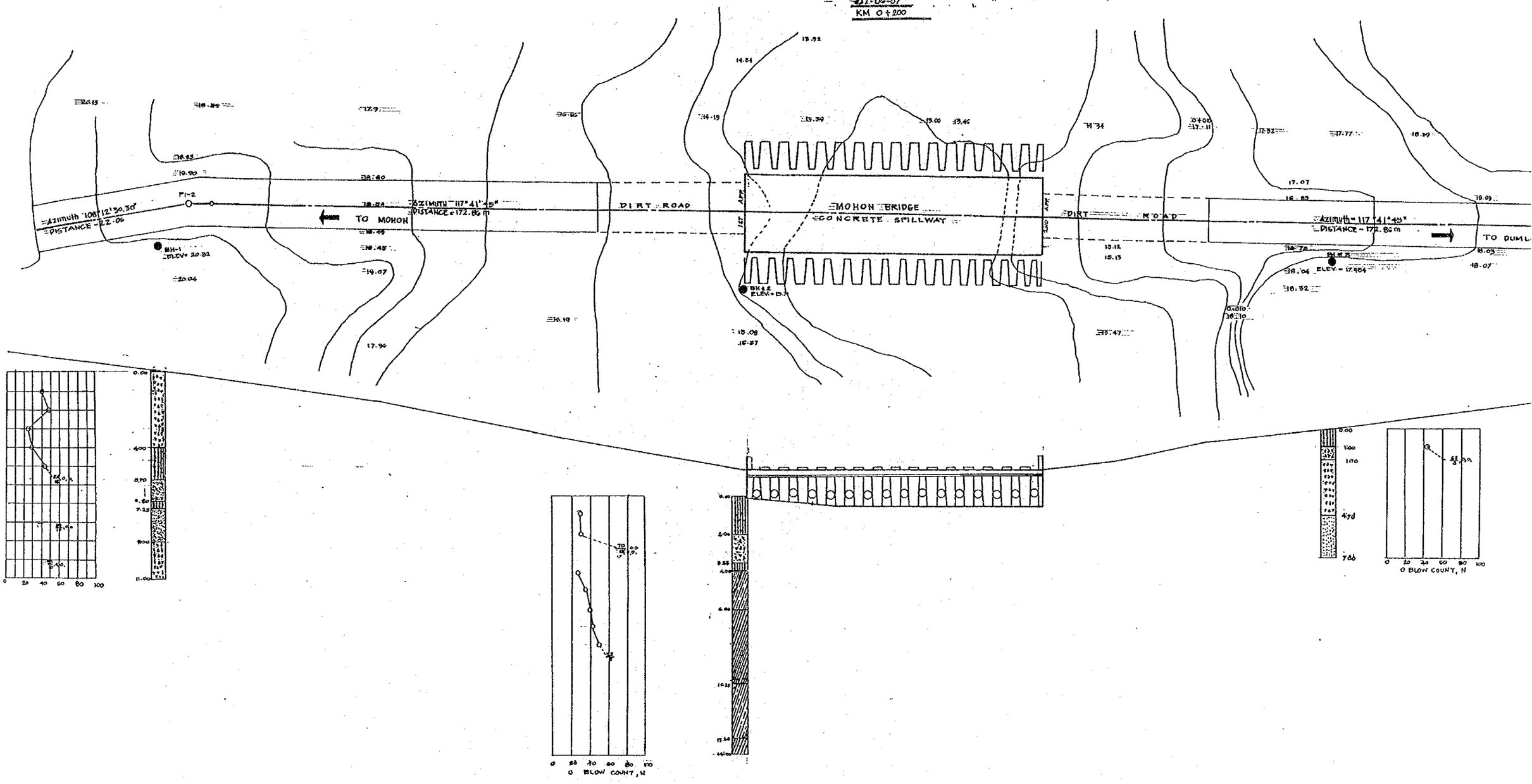
KM - 131 + 248



MOHON BRIDGE

07-03-07

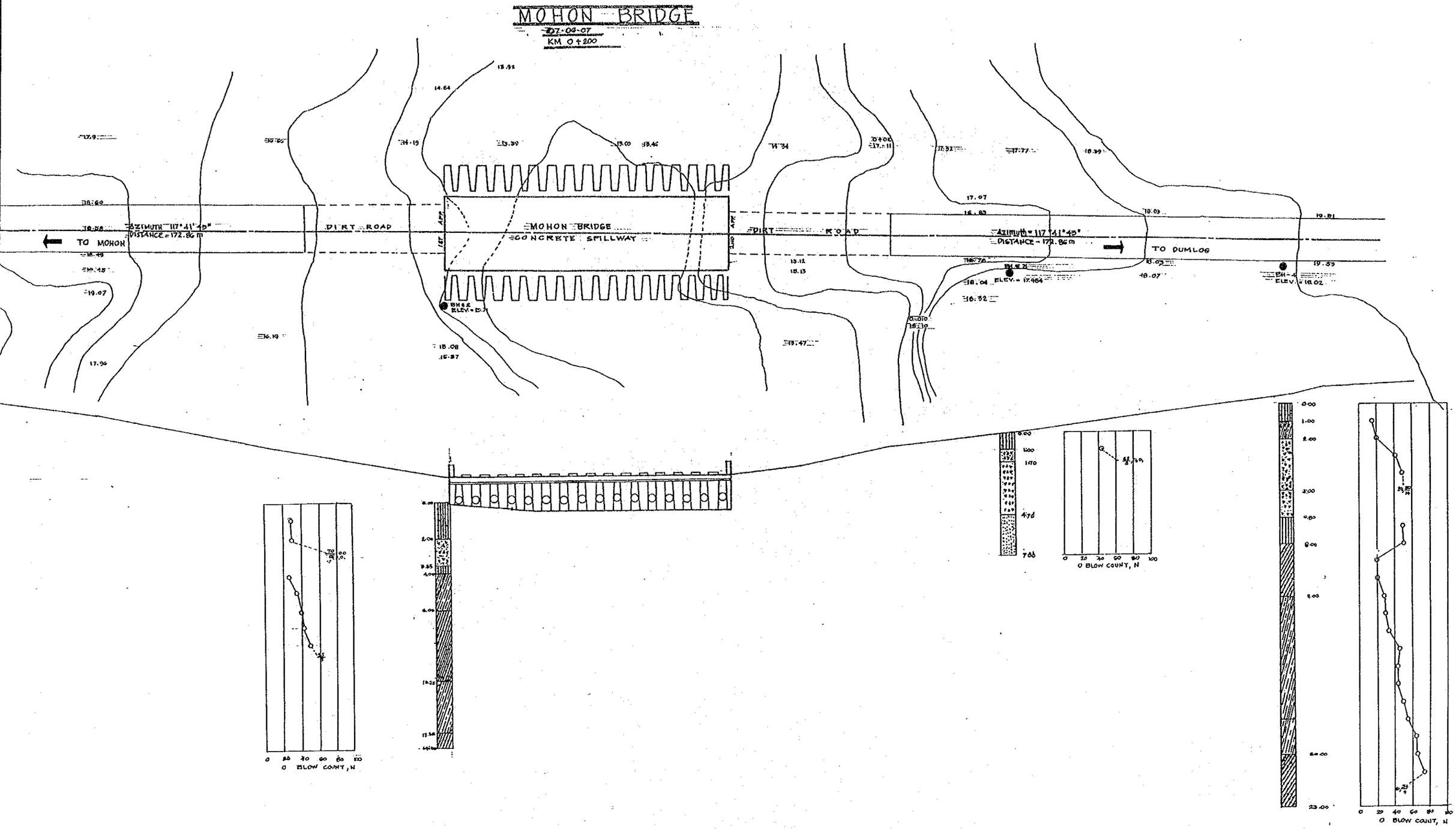
KM 0+200



MOHON BRIDGE

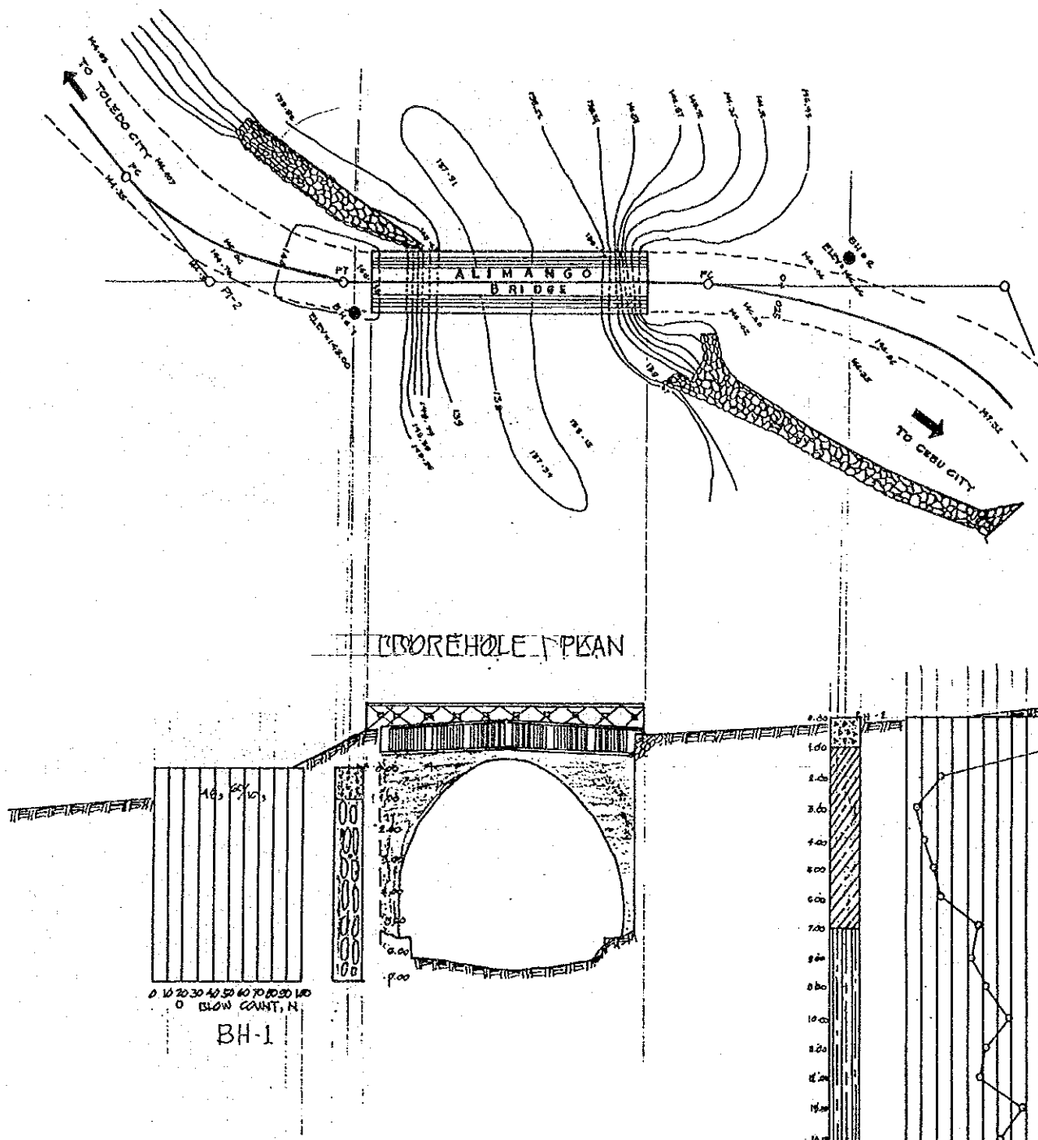
27-06-07

KM 0+200



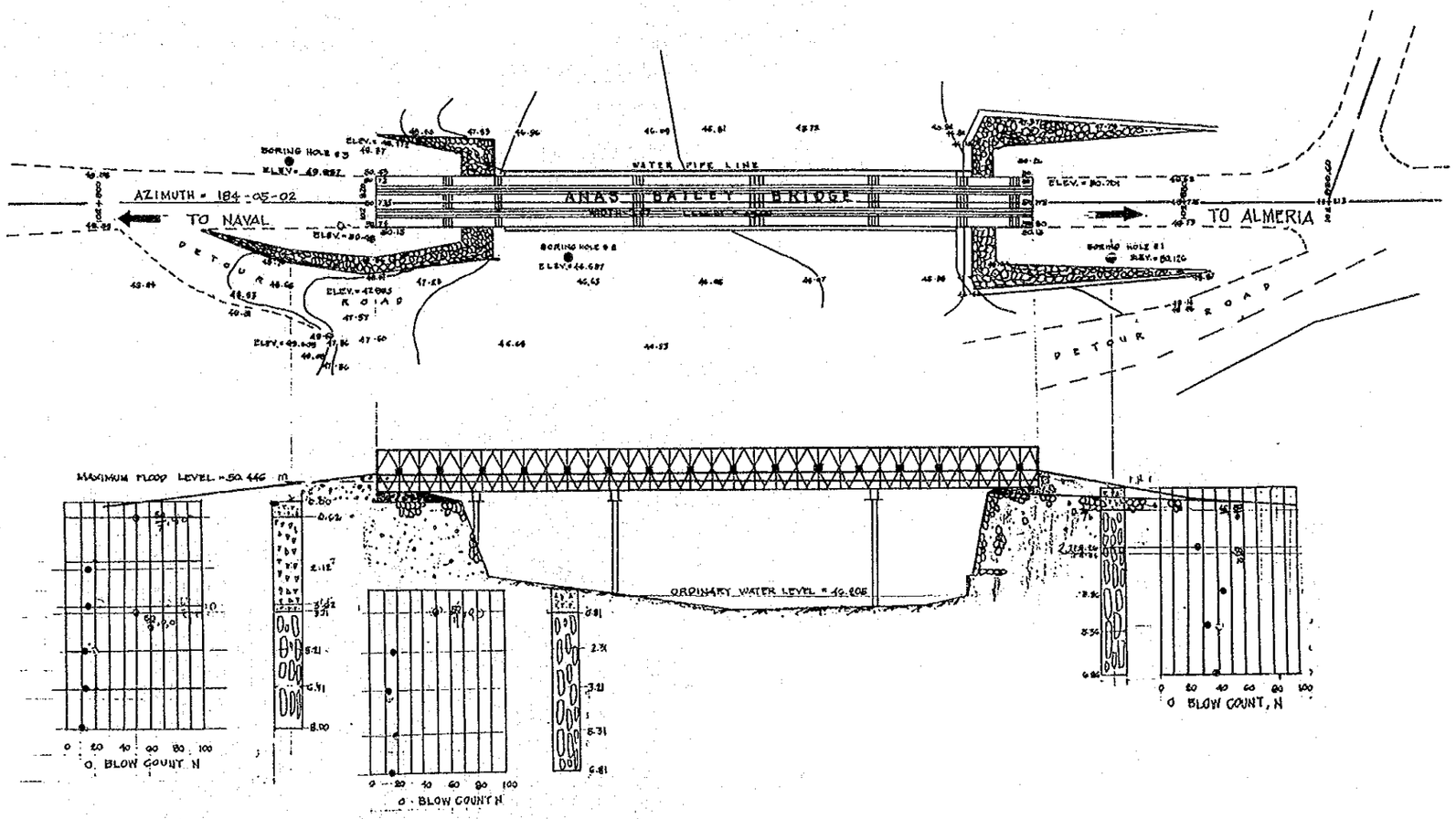
ALIMANGO BRIDGE

Br. No. 07-15-16A Cebu T



A'NA'S BAILEY BRIDGE

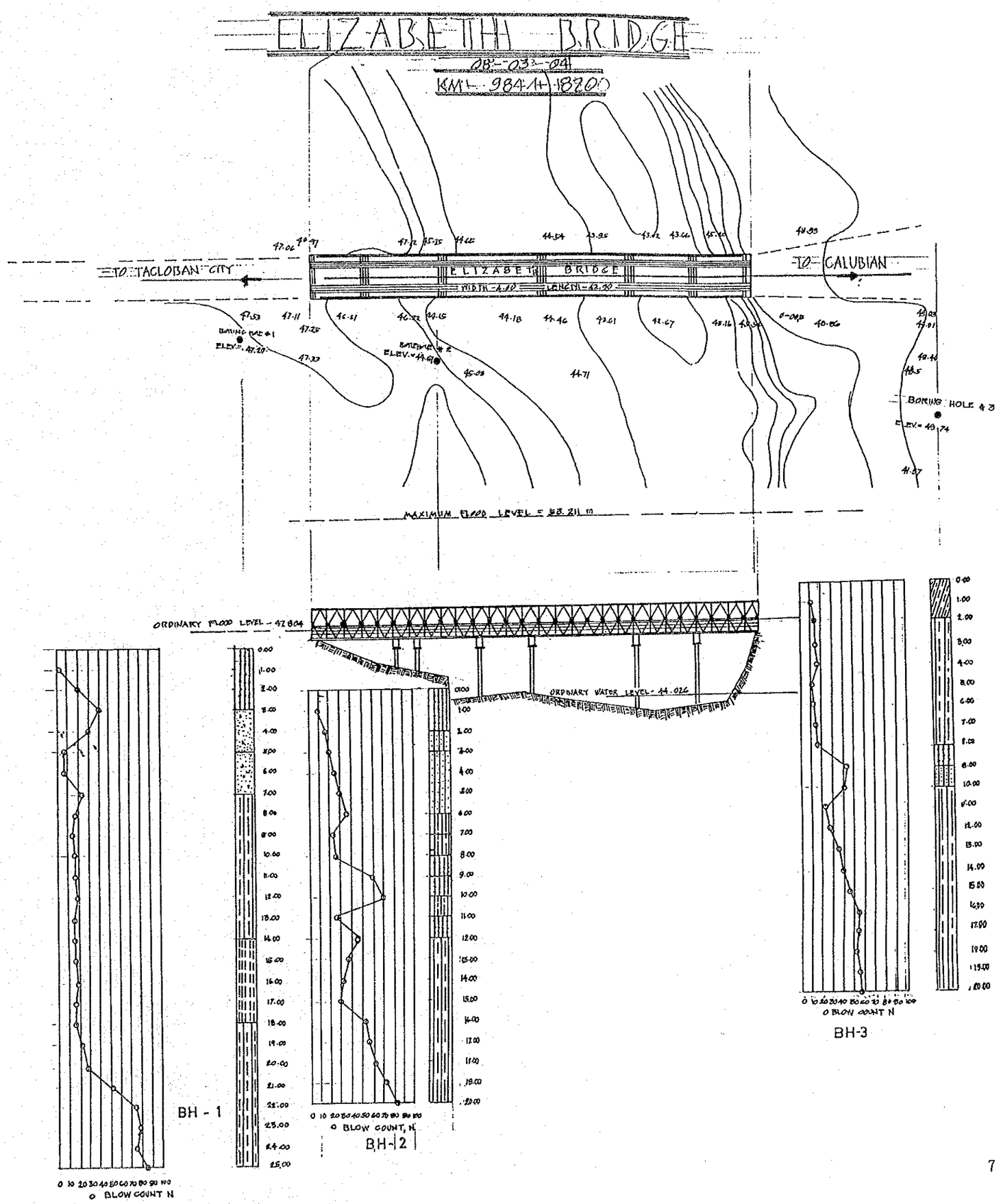
Km. 102.3820 No. 08.01.01



ELIZABETH BRIDGE

28°-032-04

KM L 9841+1820



APPENDIX 8

HYDROGRAPHIC ANALYSIS

1. OPEN CHANNEL HYDRAULICS

The hydraulic design component of this study is concerned with the determination of the different flood levels that might occur in a channel due to a given flood and of the minimum waterway opening under a structure. The different flood levels were determinated by the rating curve computation which is based on Manning's Formula (in metric units):

$$Q = \frac{1}{n} AR^{2/3} S^{1/2}$$

Where:

Q = discharge, m/S
n = Manning's roughness coefficient
A = cross-sectional area, m
R = hydraulic radius

$$\left(\text{equals } \frac{\text{cross sectional area}}{\text{wetter perimeter}}\right)$$

The value of the coefficient "n" was estimated based on information. Assuming uniform to nearly uniform flow, the value of the hydraulic gradient "S" can be considered equal to the average slope of the stream.

For each site, three channel cross-sections were considered: upstream section, bridge point section and downstream section. The selection of the upstream and downstream sections depended on their representativeness to the channel reach under study. Using the energy equation and the results of the rating curve computation, the water depth at the bridge point was obtained.

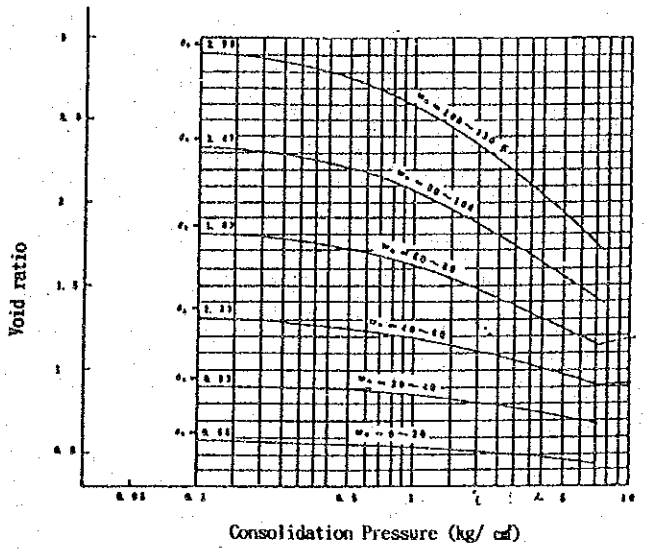
The results of the hydraulic computation are given in Table 1 while the calculation details are reported separately.

Table 1 RESULTS OF HYDRAULIC (AND HYDRAULICAL) INVESTIGATIONS

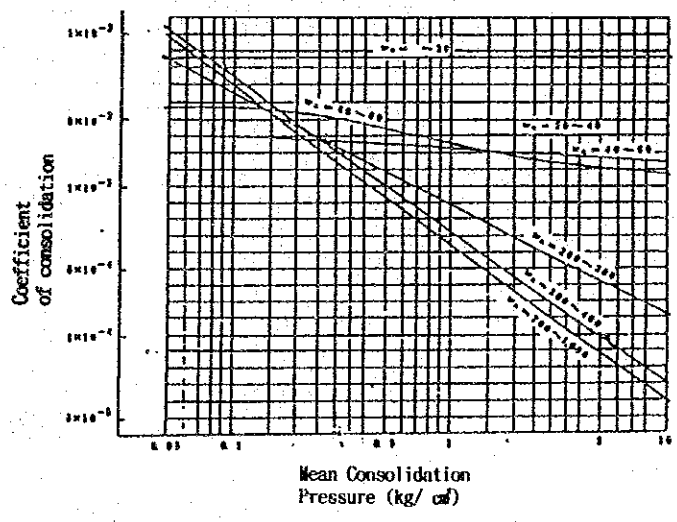
Bridge No.	Name of Bridge	DA (Km^2)	Q (Design)	V (Average) (m/s)	MFL (Computed) (Elev.)	MFL (Inter-view) (Elev.)	MFL (Design) (Elev.)
05.02.04	Banquerohan	30.831	618.966*	1.503	4.160	1.000	88.00
05.03.01	Hitoma	46.651	713.275	2.485	11.170	10.110	85.60
05.06.04	Lanang	106.753	1055.737	2.024	17.920	18.820	77.80
05.06.05	Potot	16.307	238.150	1.933	17.950	18.630	61.40
06.06.04	Lawigan	43.269	490.336*	1.587	3.850	3.922	99.00
07.05.01	Apalan	13.161	369.524*	3.094	4.290	2.500	37.20
07.05.05	Tambongon	21.747	510.547*	1.562	4.430	3.160	78.00
07.06.07	Mojon	85.206	808.000	2.455	19.050	21.200	160.00
07.15.06A	Alimango	11.267	248.550	9.876	140.820	142.550	23.40
08.01.01	Anas	30.245	321.495	5.708	47.780	50.200	60.80
08.03.04	Elizabeth	74.854	443.910	3.571	48.750	51.400	59.80

Note:

DA	- Drainage Area
Q (Design)	- Design Discharge
V (Ave.)	- Average Velocity under the Bridge
MFL (Computed)	- Maximum Flood Level (50-year Frequency)
MFL (Interview)	- Maximum Flood Level on Field Interview
MFL (Design)	- Maximum Flood Level for Design of Bridge
*	- Design Discharge = Peak Flood Discharge (50 years Frequency) + Sea Water Discharge



e-logp curve



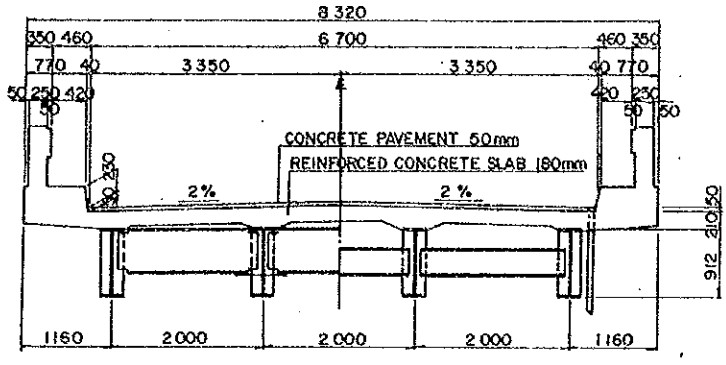
water content (Wn) and unconfined compressive strength

(qu = 2 x cohesion)

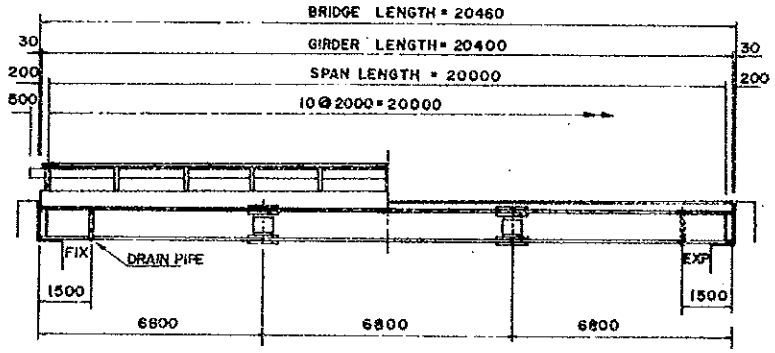
APPENDIX 9

FIGURE - TABLE

Figure · Table



H-BEAM COMPOSITE GIRDER (SPAN: 24m)



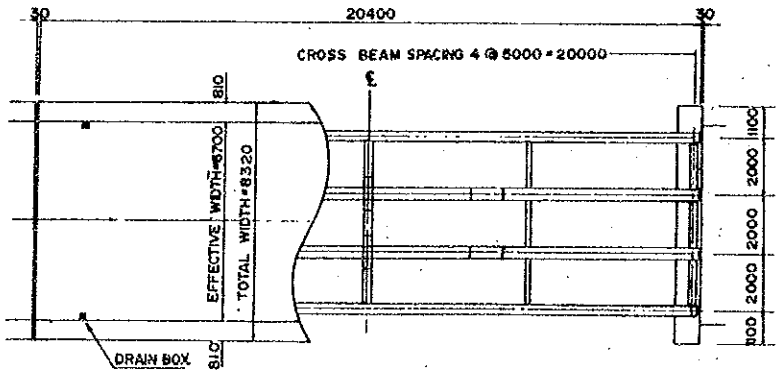
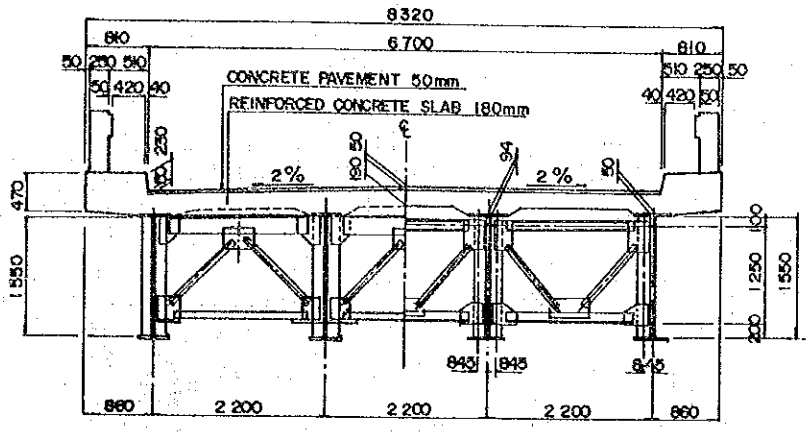
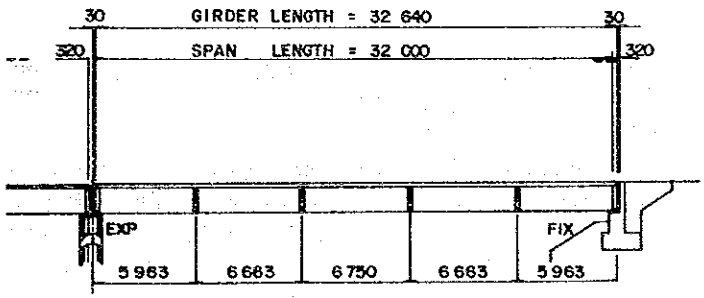


Figure 9-1 TYPICAL GENERAL VIEW OF SUPERSTRUCTURES (H-BEAM COMPOSITE GIRDER)

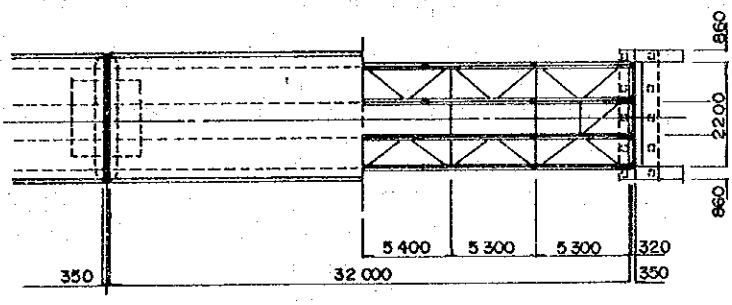


CROSS SECTION

(SPAN LENGTH : 32 m)



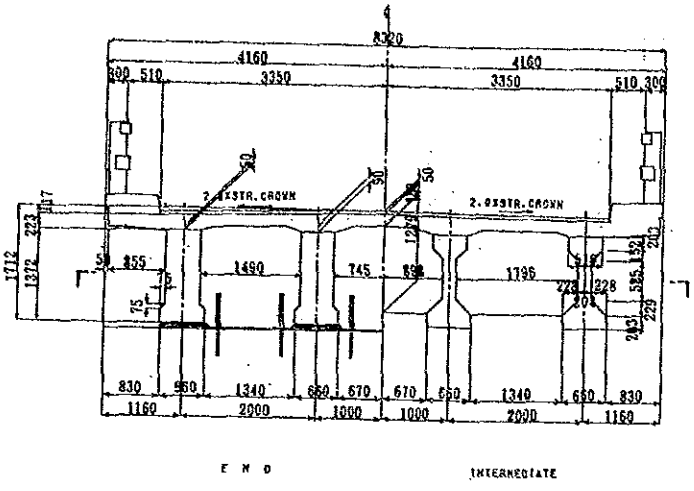
SIDE VIEW



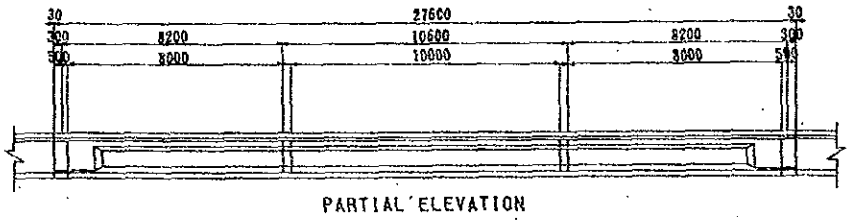
PLAN

(SPAN LENGTH : 32 m)

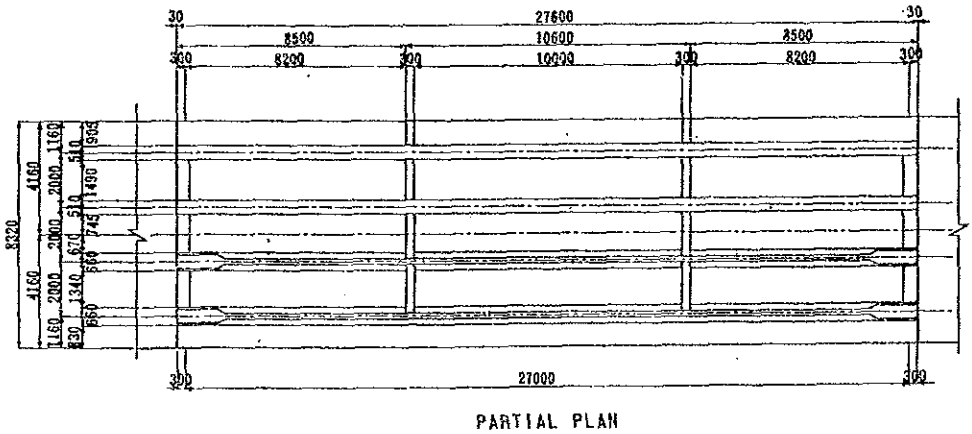
Figure 9-2 TYPICAL GENERAL VIEW OF SUPERSTRUCTURES (BUILT-UP PLATE GIRDER)



SECTION

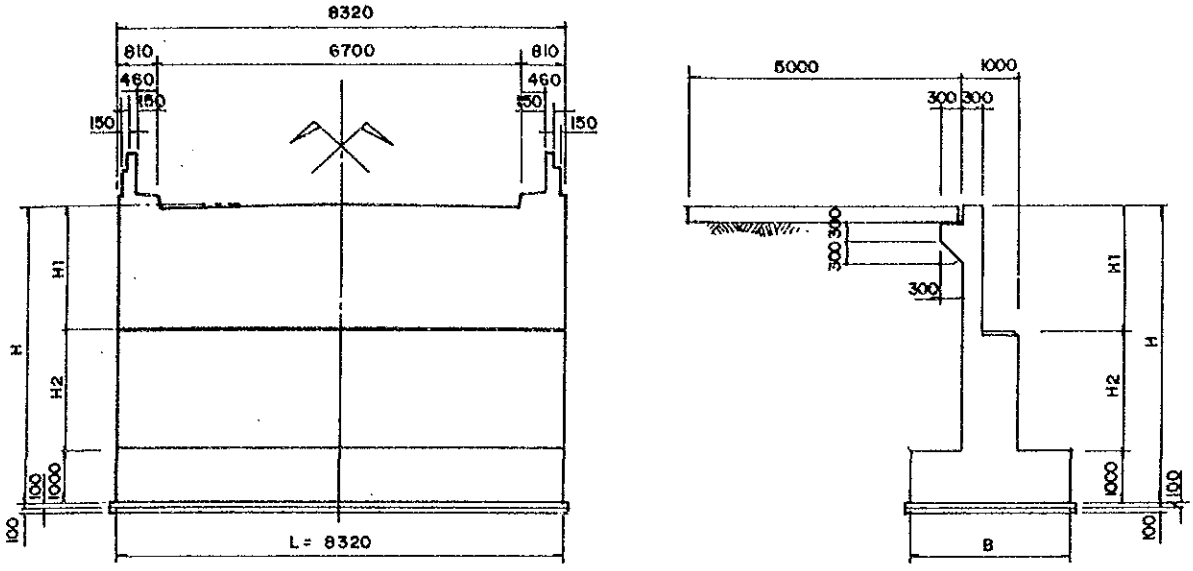


PARTIAL ELEVATION

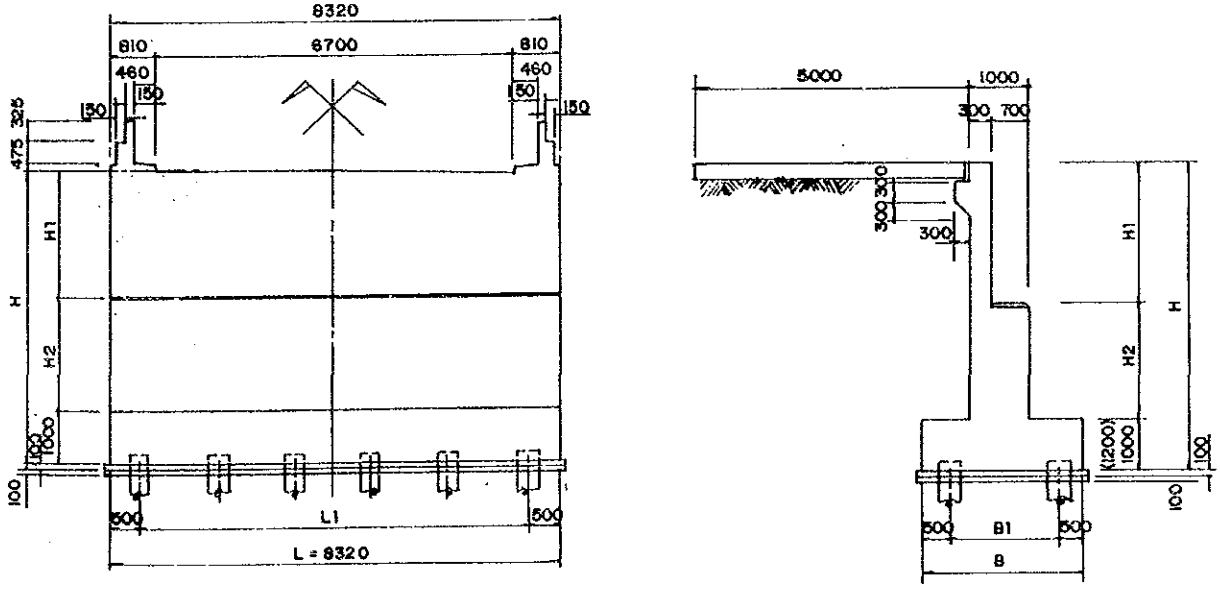


PARTIAL PLAN

Figure 9-3 TYPICAL GENERAL VIEW OF SUPERSTRUCTURES (PC GIRDER)

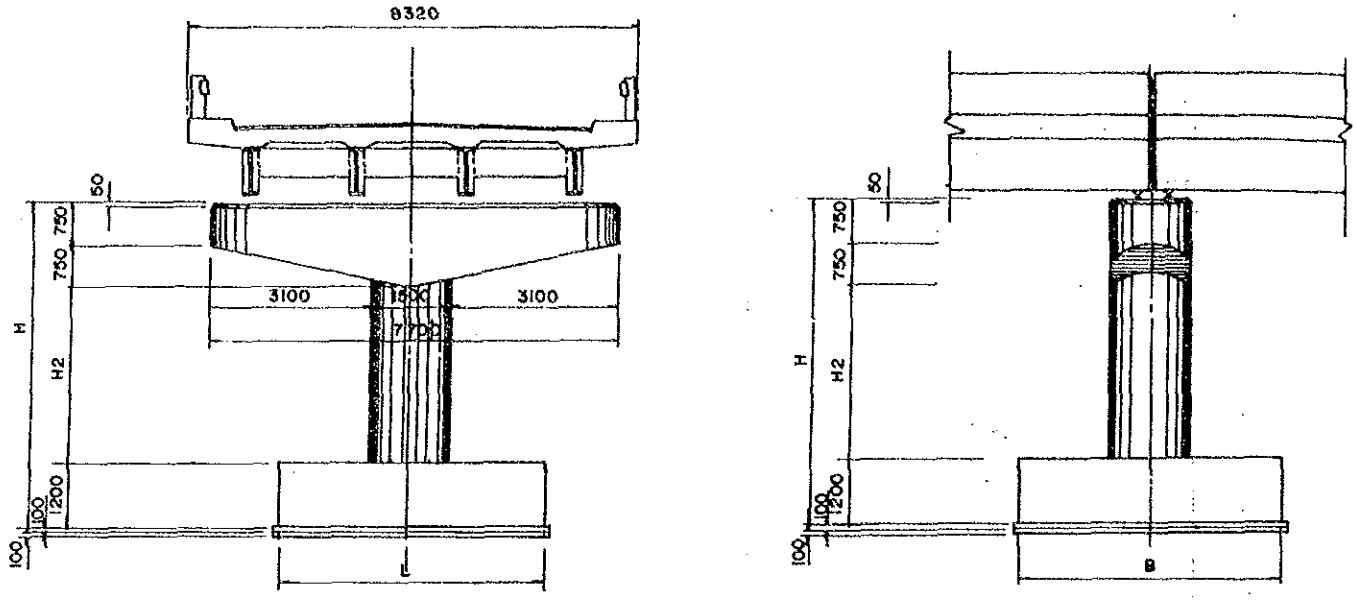


ABUTMENT ON SPREAD FOUNDATION

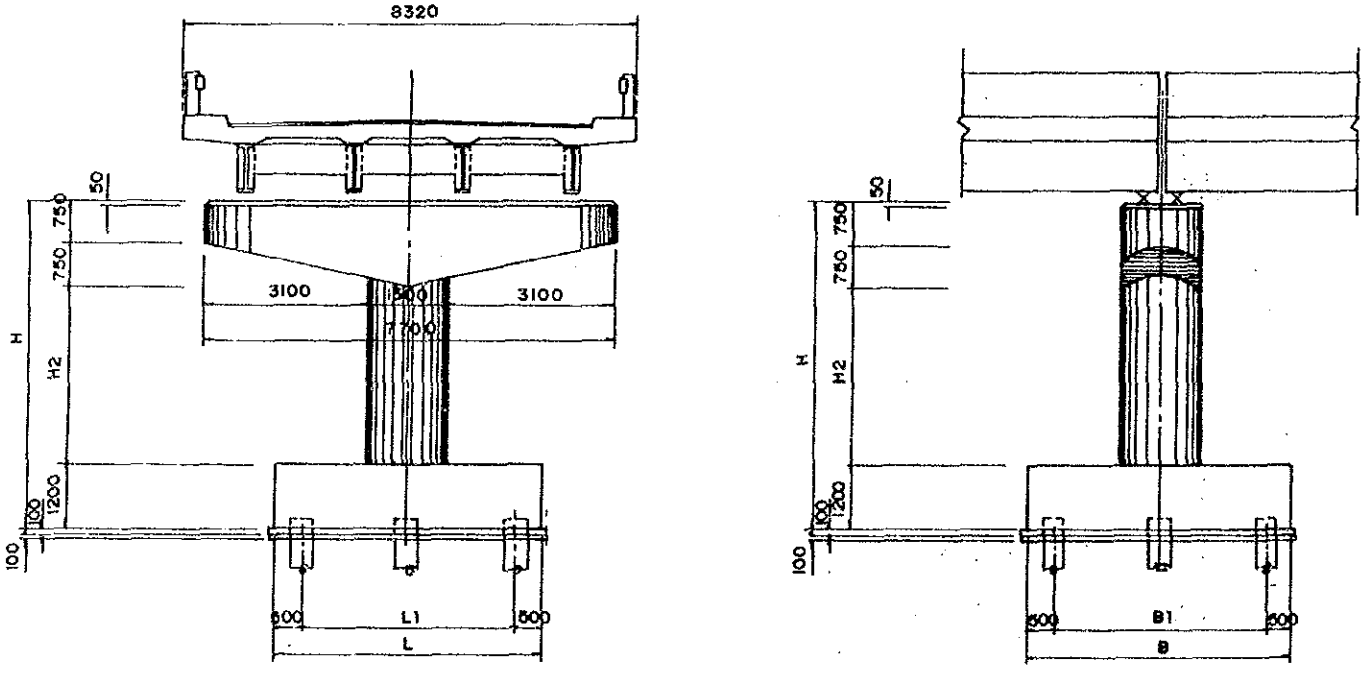


ABUTMENT ON PILE FOUNDATION

Figure 9-4 TYPICAL ABUTMENT

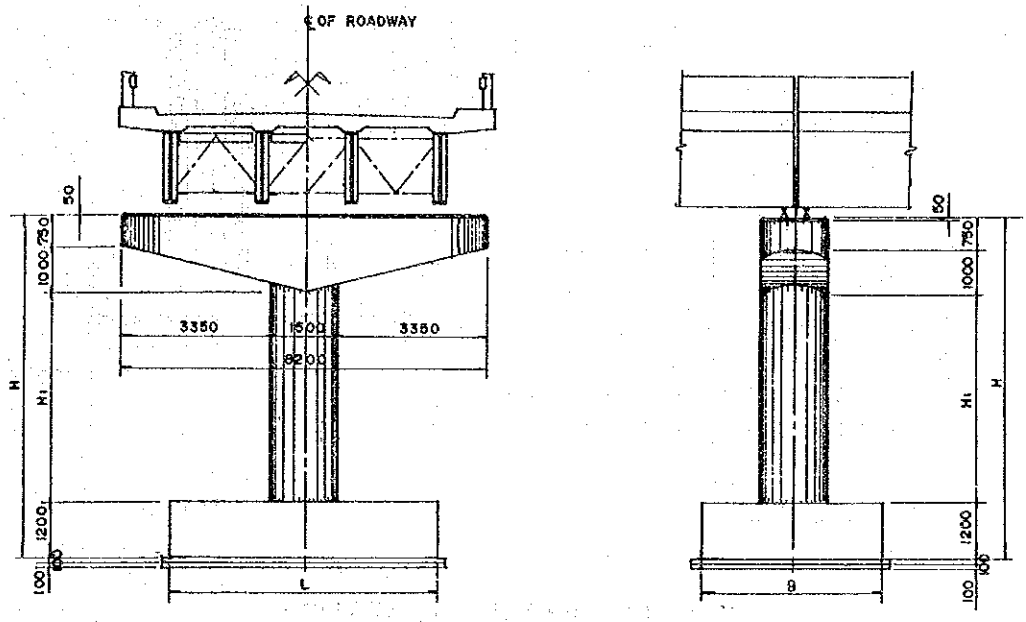


PIER ON SPREAD FOUNDATION

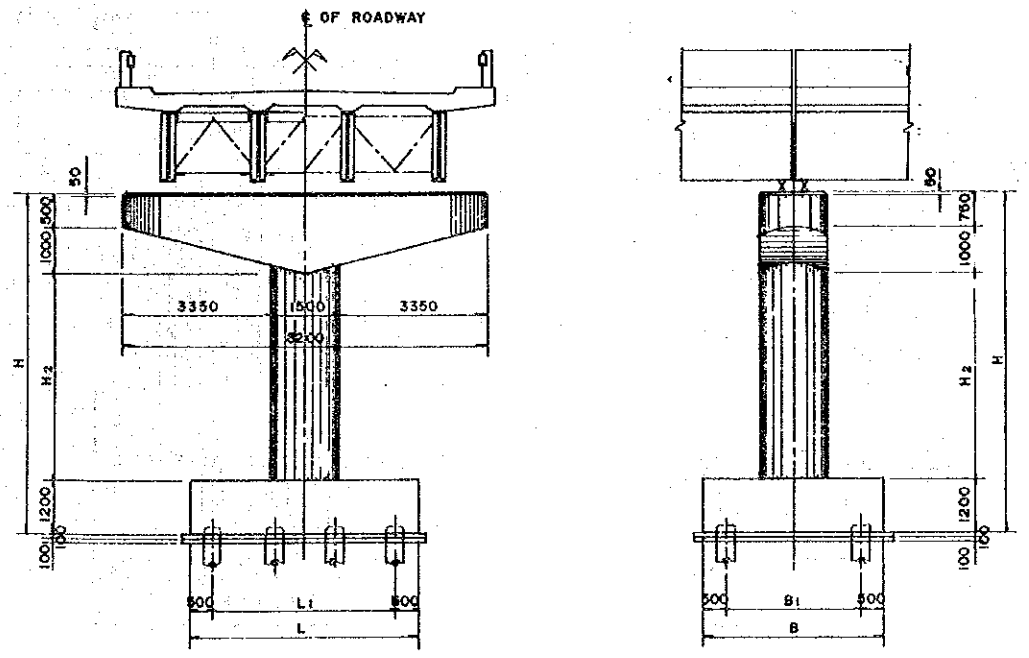


PIER ON PILE FOUNDATION

Figure 9-5 TYPICAL PIER (SPAN LENGTH; 15m~ 24m)

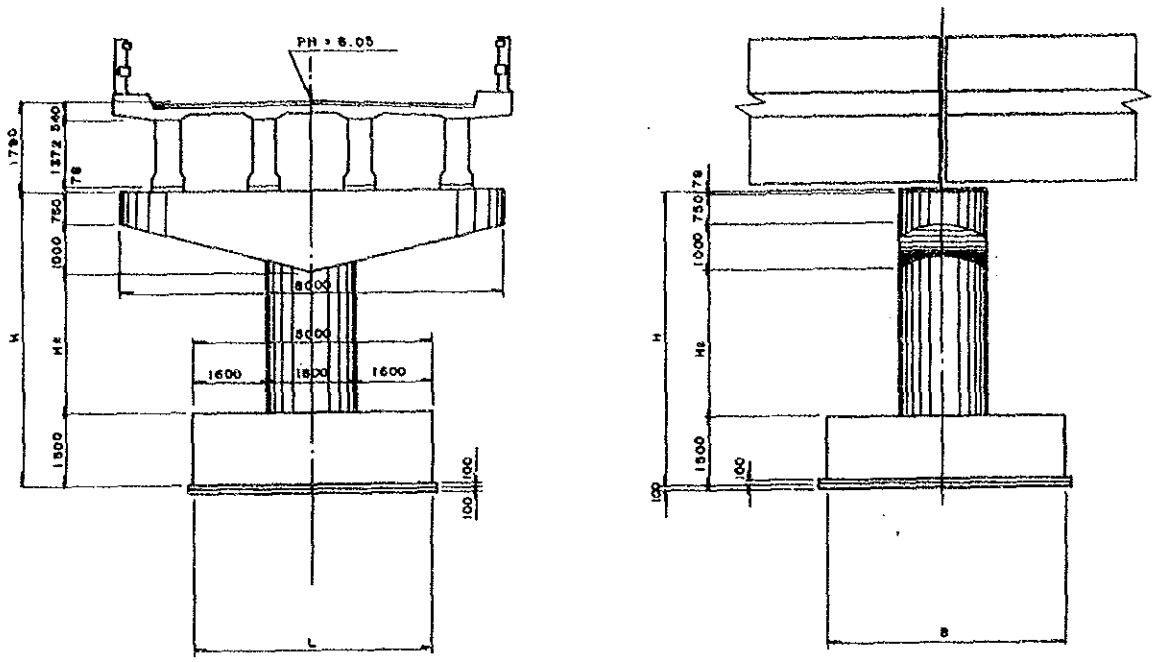


PIER ON SPREAD FOUNDATION

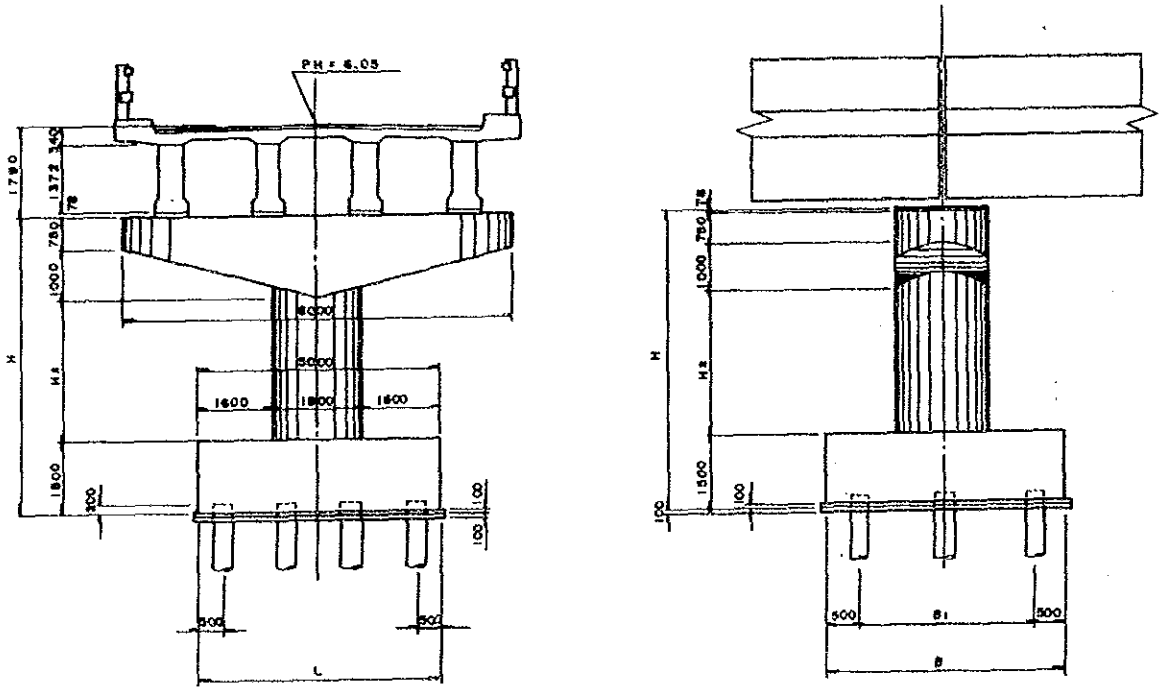


PIER ON PILE FOUNDATION

Figure 9-6 TYPICAL PIER (SPAN LENGTH; 25m~ 35m)



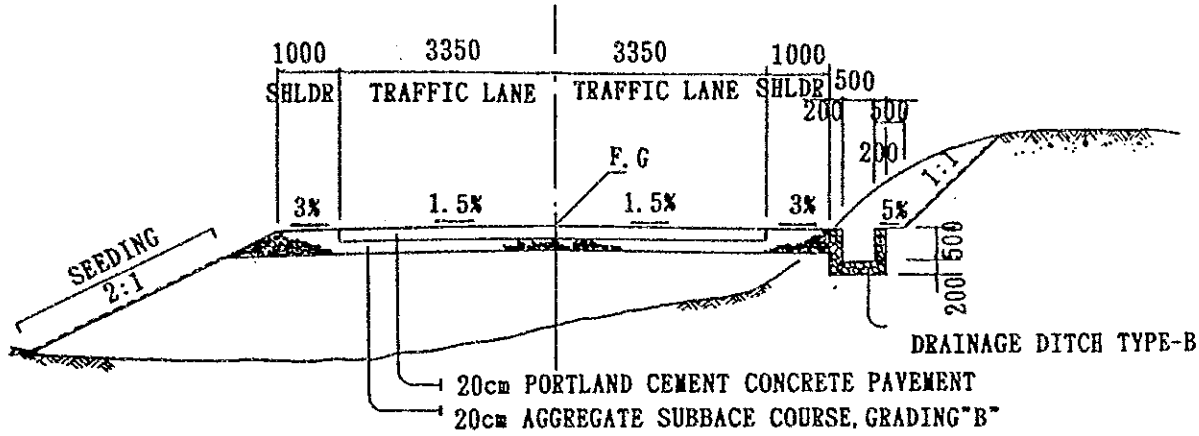
PIER ON SPREAD FOUNDATION



PIER ON PILE FOUNDATION

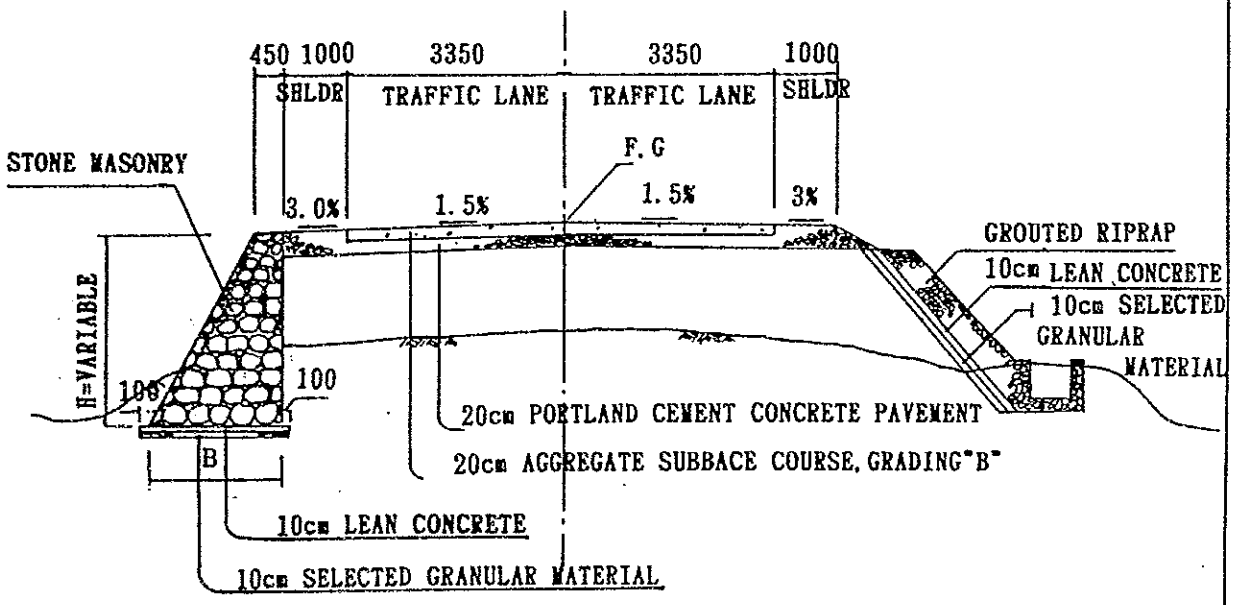
Figure 9-7 TYPICAL PIER (PC GIRDER)

Typical Roadway Sections



SECTION IN FILL

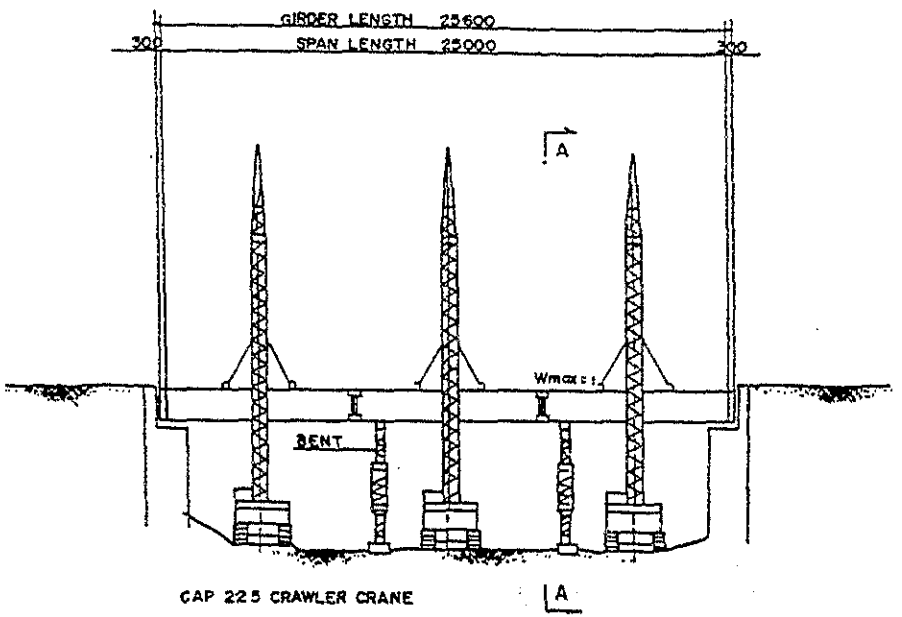
SECTION ON CUT

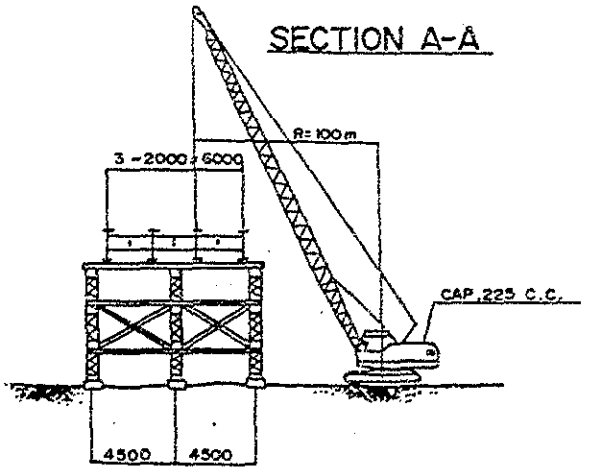


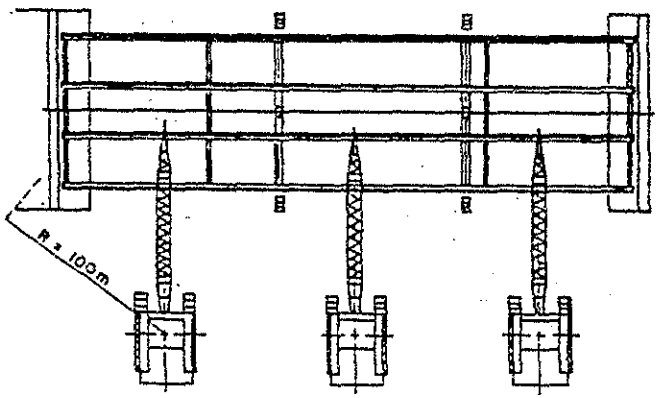
SECTION WITH STONE MASONRY WALL

SECTION WITH GROUTED RIPRAP

Figure 9-8 TYPICAL ROADWAY SECTION



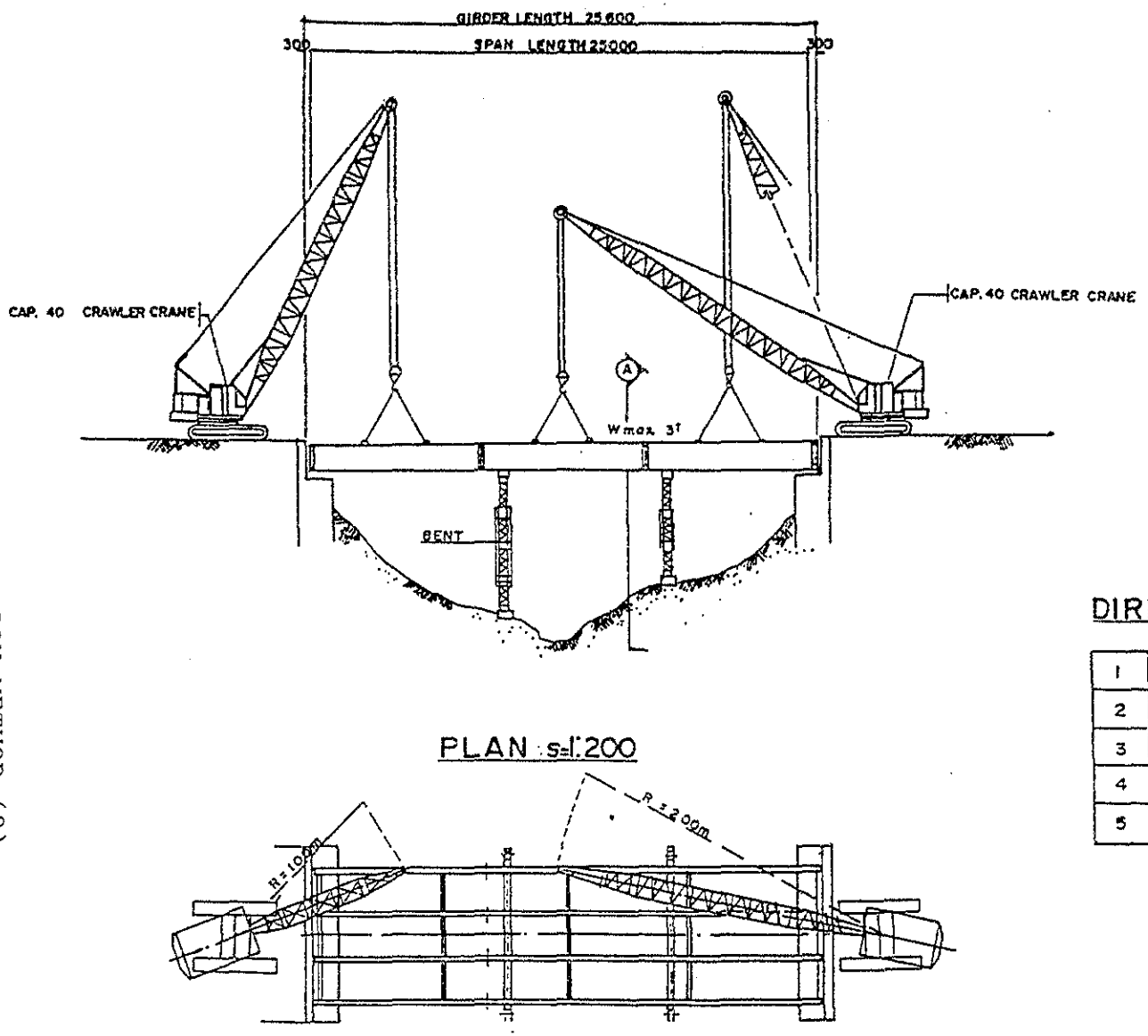




MAIN MACHINE / TOOL

1	CRAWLER CRANE 22.5T	1
2	BENT	2
3	STEEL BLOCK	some
4	TORQUE WRENCH	1
5	WIRE ROPE 16Ø	1

Figure 9-9 DIRECT ERECTION METHOD (1)



1	CRAWLER CRANE 40T	1
2	BENT	2
3	STEEL BLOCK	SAME
4	TORQUE WRENCH	1
5	WIRE ROPE 16φ	1

Figure 9-10 DIRECT ERECTION METHOD (2)

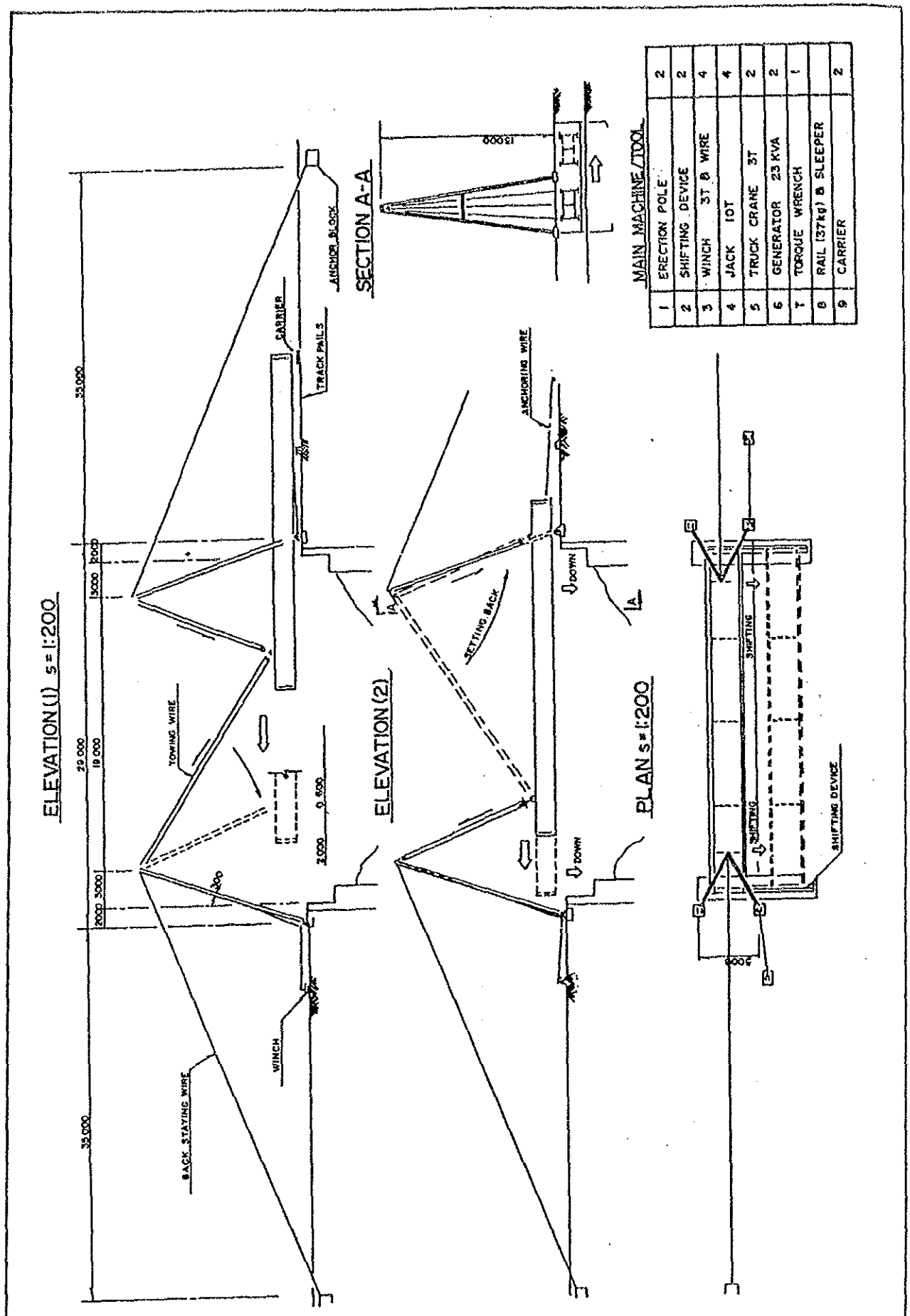
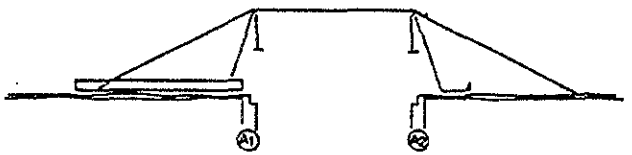


Figure 9-11 TOWING-CABLE METHOD (1)

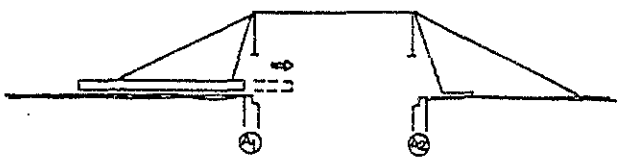
PROCEDURE DIAGRAM

STEP 1 ERECTION OF ERECTIONING POLE

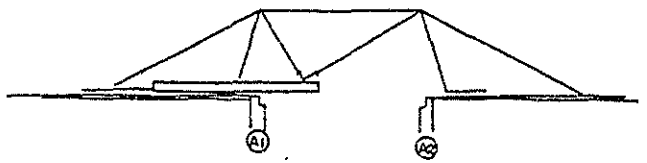
STEP 2 FABRICATION OF GIRDERS AND FASTENING OF H.T. BOLTS



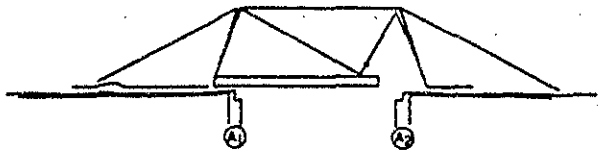
STEP 3 FORWARDING OF MAIN GIRDER



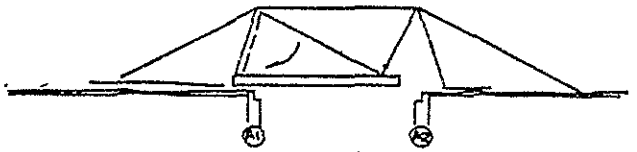
STEP 4 HANGING BY MAIN WIRES



STEP 5 FURTHER FORWARDING

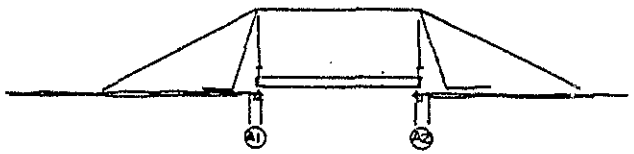


STEP 6 RELOCATION OF ONE MAIN WIRE

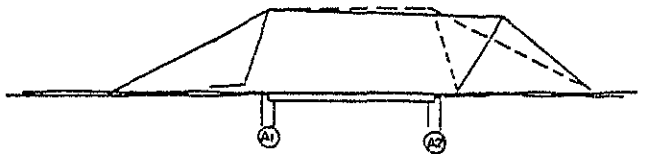


REMOVAL OF SADDLE

STEP 7 SETTLEMENT OF MAIN GIRDER



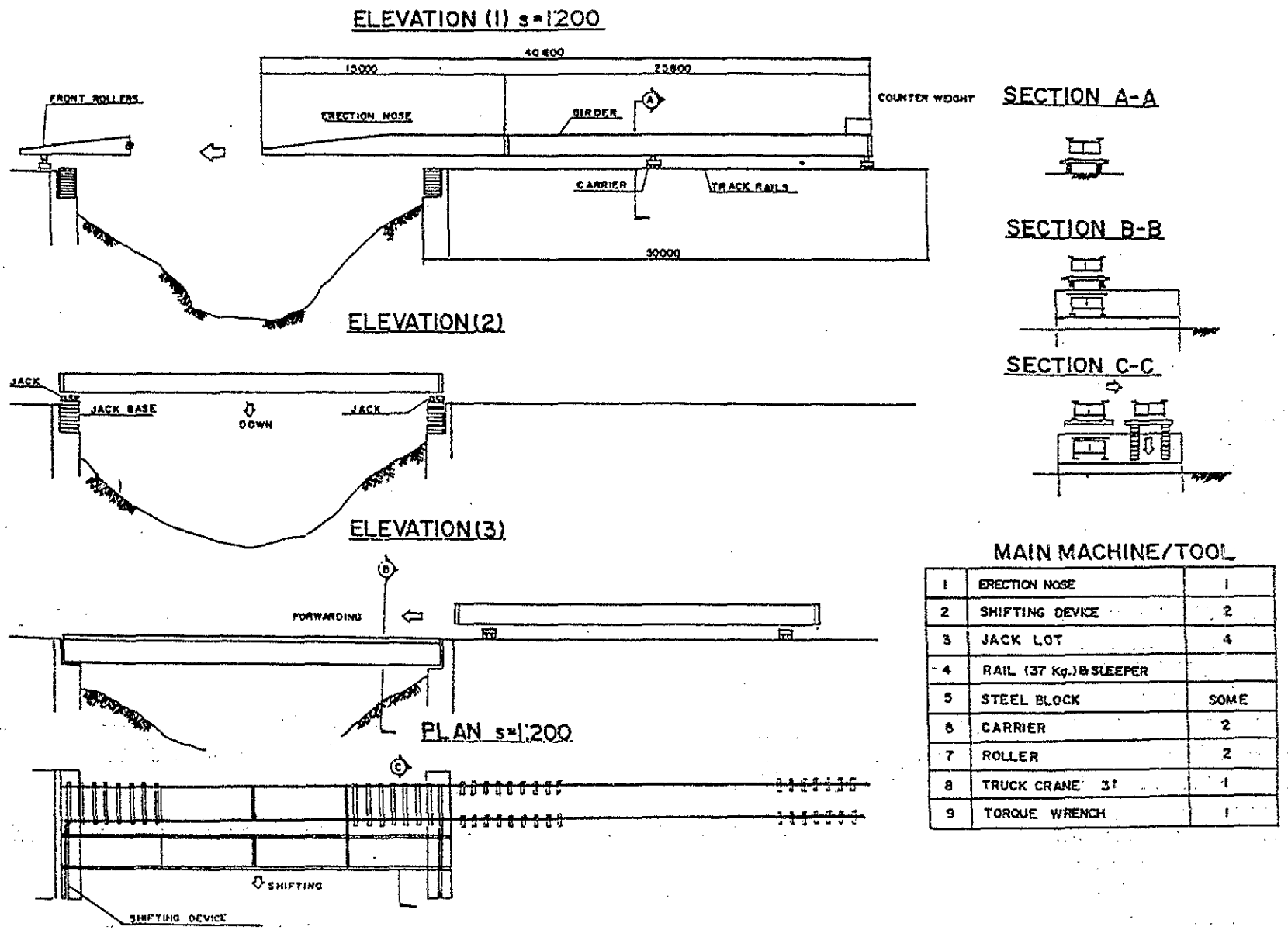
STEP 8 DISMANTLE AND REMOVAL OF ERECTIONING POLE



FLOW CHART

PREPARATION OF FOUNDATION FOR ERECTIONING POLE. PREPATION OF ANCHORAGE FOR BRACING WIRE.
↓
FABRICATION OF ERECTIONING POLE ON THE GROUND SURFACE.
↓
PREPATION AND FIXING OF WINCH.
↓
PREPARATION OF WOODEN SHEAR LEGS FOR ERECTION OF ERECTIONING POLE.
↓
WIRING AND FIXING OF MAIN WIRE.
↓
ERECTION OF ERECTIONING POLE.
↓
PREPARATION OF RAILING AND ROLLER.
↓
FABRICATION OF GIRDERS AND FASTENING OF HIGH STRENGTH BOLTS.
↓
TEMPORAL ARRANGEMENT BEARING SHOE.
↓
PREPARATION OF SIDE SLIDING UNIT (FOR 4 MAIN GIRDER BRIDGE ONLY.
↓
PREPARATION OF SADDLE ON THE ABUTMENTS.
↓
FORWARDING OF MAIN GIRDER.
↓
HANGING BY MAIN WIRES, FURTHER FORWARDING, RELOCATION OF ONE WIRE, FINAL LOCATING.
↓
REMOVAL OF SADDLE ON THE ABUTMENTS.
↓
SIDE SLIDING OF MAIN GIRDER. (FOR 4 GIRDER BRIDGE ONLY.
↓
FIXING OF CROSS BEAMS.
↓
DISMANTLING OF SIDE SLIDING UNIT (FOR 4 GIRDER BRIDGE ONLY)
↓
PREPARATION OF SHEAR LEGS FOR LAYING DOWN OF ERECTIONING POLE.
↓
LAYING DOWN, DISMANTLE AND REMOVAL OF ERECTIONING POLE.
↓

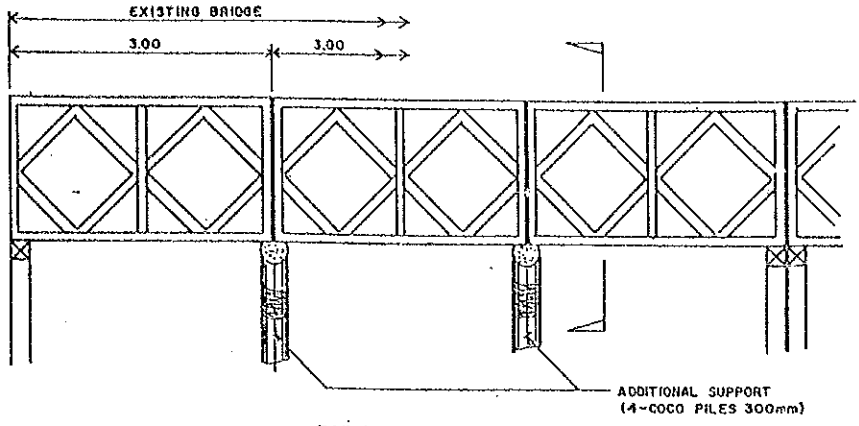
Figure 9-11 TOWING-CABLE METHOD (2)



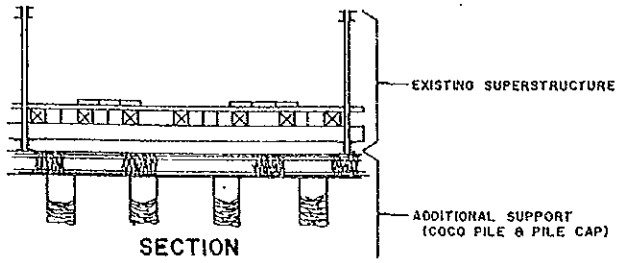
MAIN MACHINE/TOOL

1	ERECTION NOSE	1
2	SHIFTING DEVICE	2
3	JACK LOT	4
4	RAIL (37 Kg.)& SLEEPER	
5	STEEL BLOCK	SOME
6	CARRIER	2
7	ROLLER	2
8	TRUCK CRANE 3t	1
9	TORQUE WRENCH	1

Figure 9-12 LAUNCHING METHOD

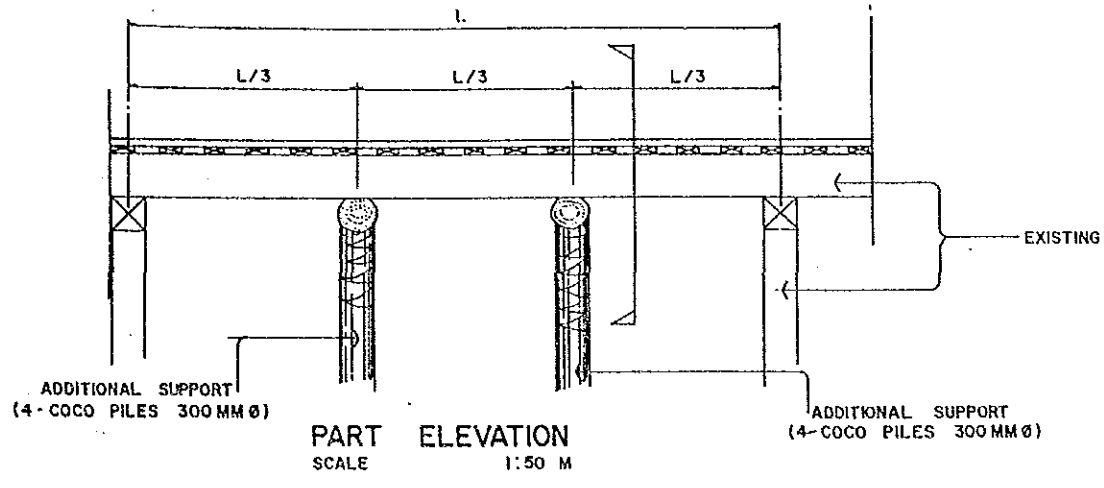


PART ELEVATION

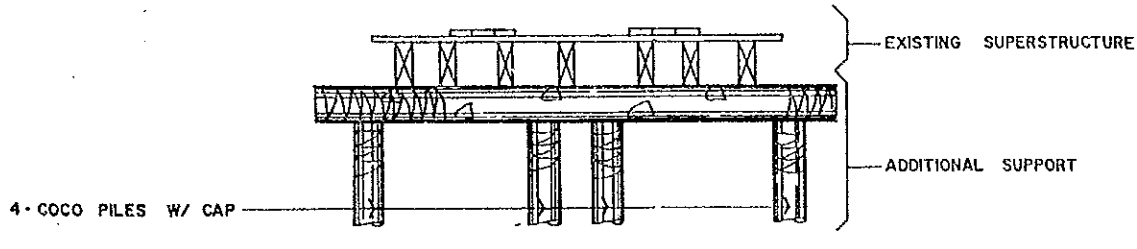


SECTION

ADDITIONAL SUPPORT FOR WEAK BAILY BRIDGE



PART ELEVATION
SCALE 1:50 M



SECTION
SCALE 1:50 M

ADDITIONAL SUPPORT FOR WEAK TIMBER BRIDGE

Figure 9-13 ADDITIONAL SUPPORT FOR WEAK BAILEY BRIDGE AND TIMBER BRIDGE

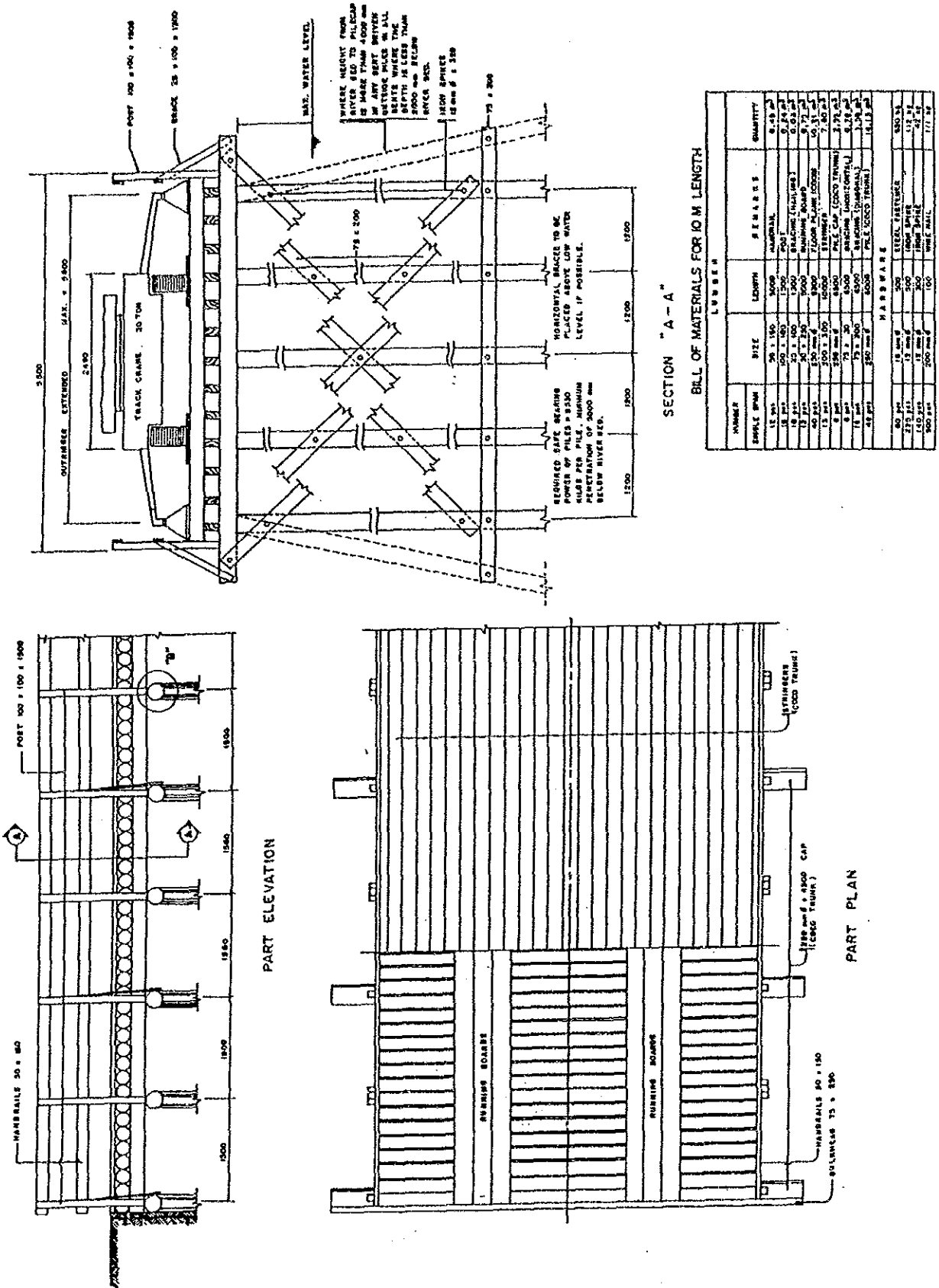


Figure 9-14 TYPICAL SECTION OF TIMBER BRIDGE AND TEMPORARY BAILEY DETOUR BRIDGE

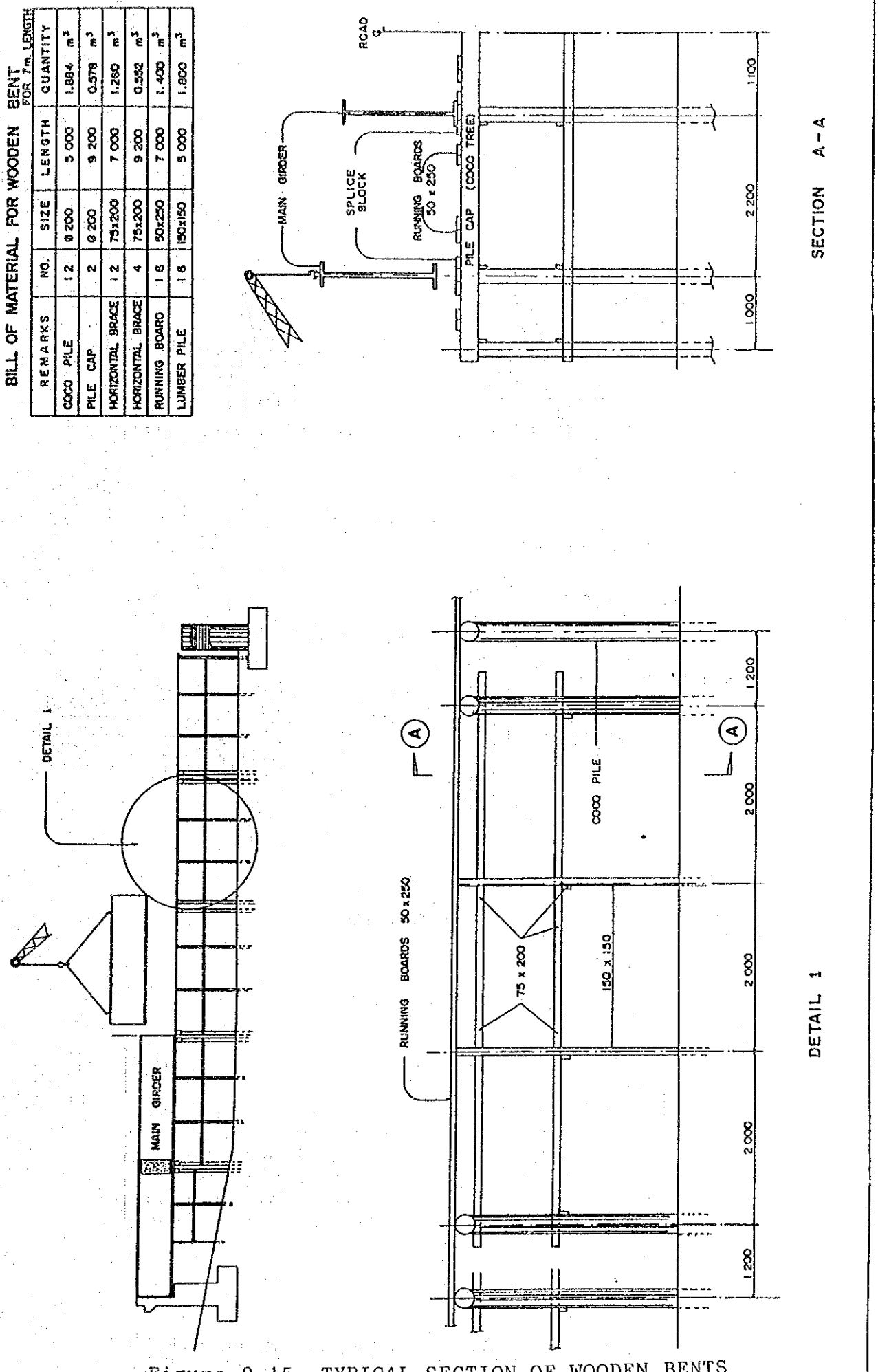
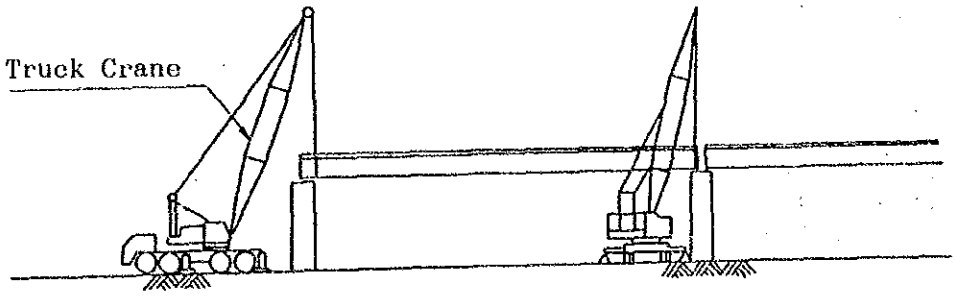
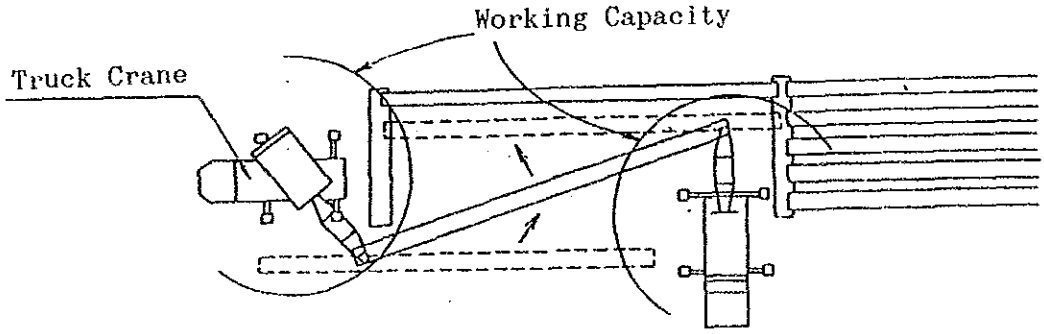


Figure 9-15 TYPICAL SECTION OF WOODEN BENTS



SIDE VIEW

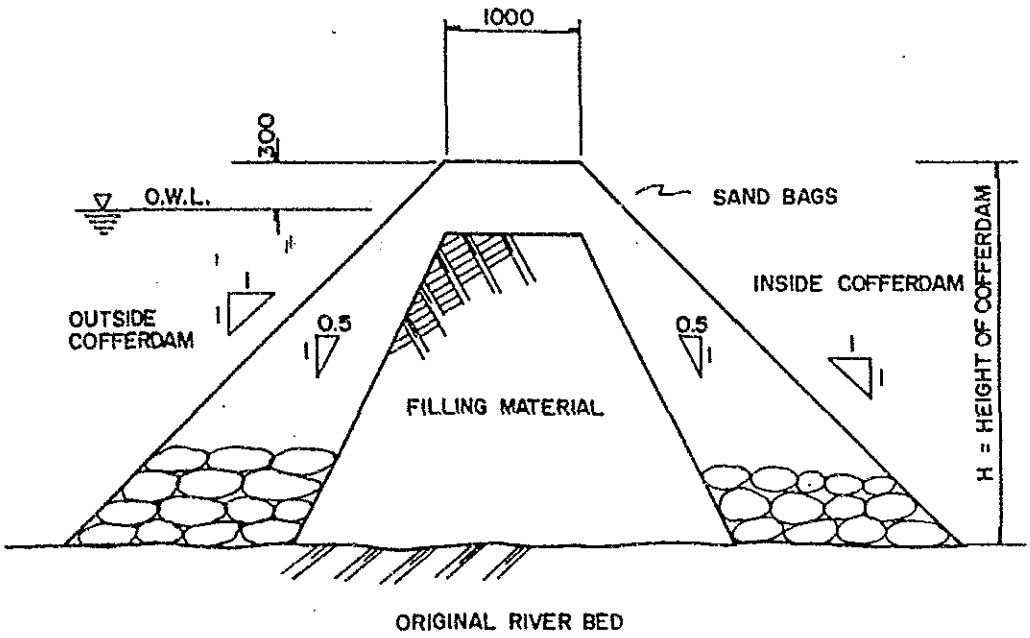


PLANE VIEW

Erection Equipment

Item		Q'ty
Truck Crane	120 t	2 No.
Steel Plate	22 mm	8 No.
Wire Rope	ø 42 mm	4 No.

Figure 9-16 ERECTION METHOD OF PC GIRDER



BILL OF MATERIALS FOR COFFERDAM

FOR 1 m LENGTH

HEIGHT OF COFFERDAM H (mm)	SAND BAGS (m^3)	FILL (m^3)
500	0.75	0
1,000	1.38	0.63
1,100	1.53	1.78
1,200	1.70	0.95
1,300	1.87	1.12

Figure 9-17 FILLED COFFERDAM

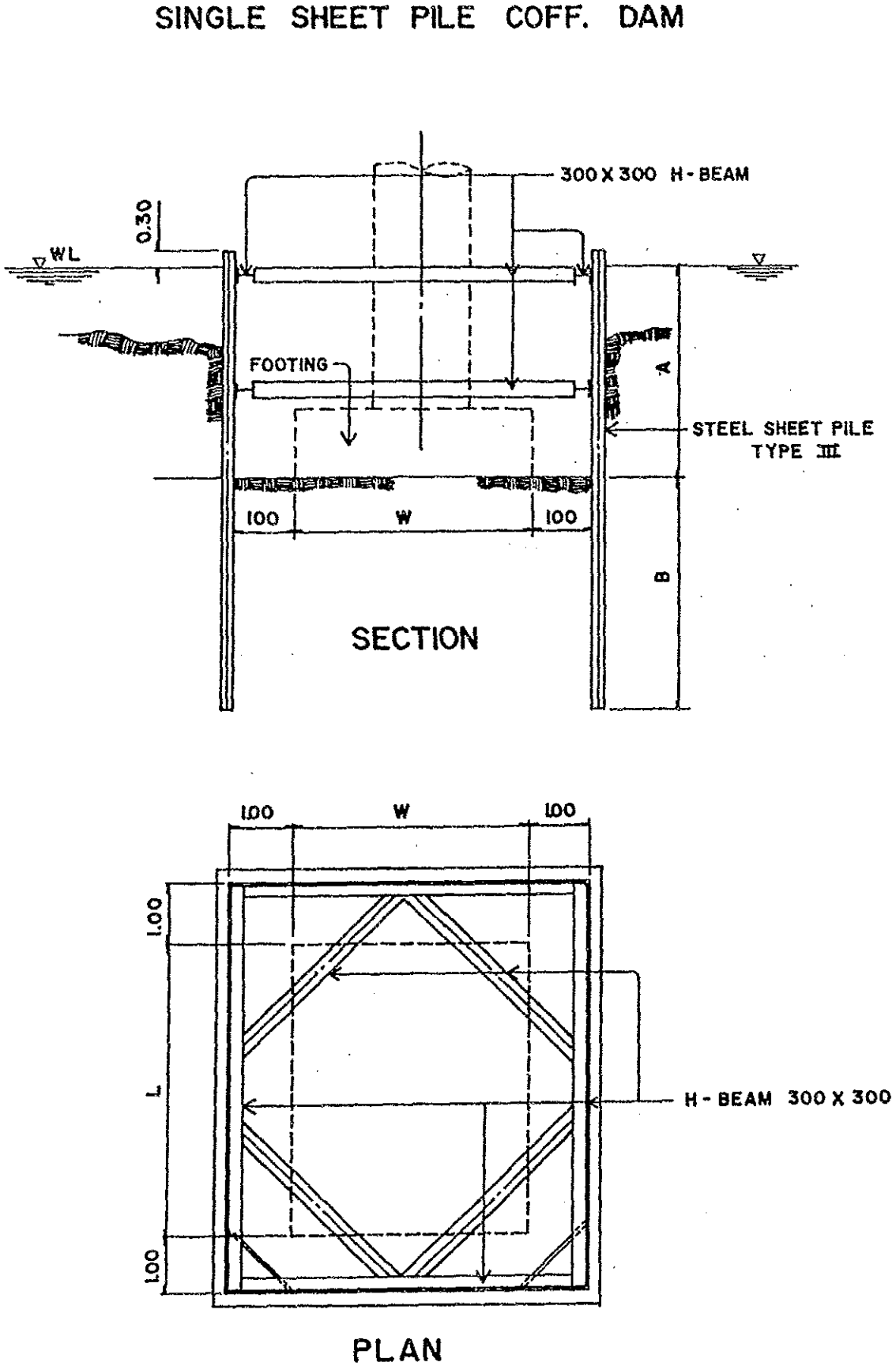


Figure 9-18 SINGLE SHEET PILE COFF. DAM

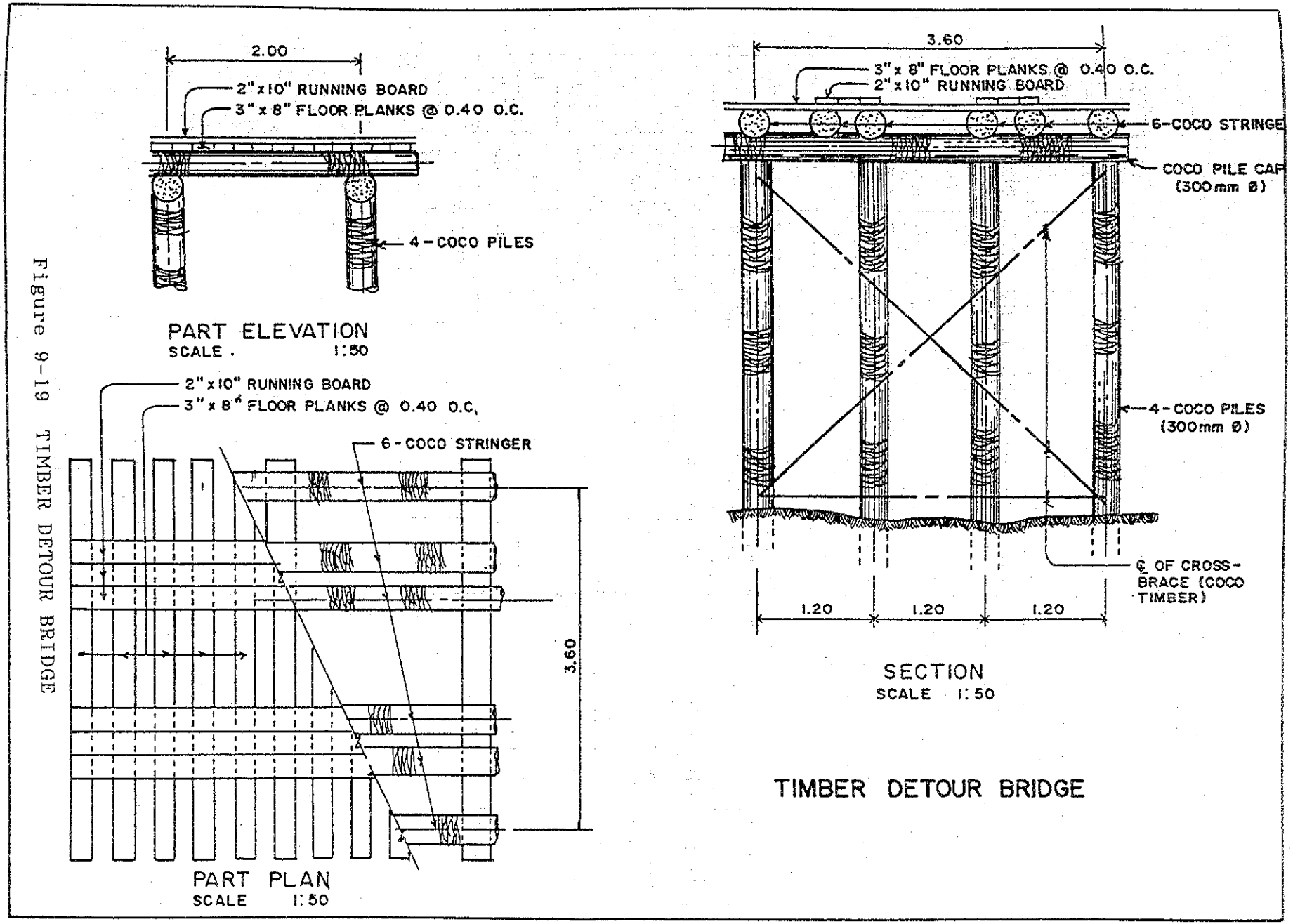


Figure 9-19 TIMBER DETOUR BRIDGE

Table 9-1 SIZE AND STRESS INTENSITY OF THE GIRDER FOR GROUP-1 BRIDGES

Span Length (m)		15	17	18	20	22	23	24
Carriageway (m)		6.7	6.7	6.7	6.7	6.7	6.7	6.7
Type		H-beam	H-beam	H-beam	H-beam	H-beam	H-beam	H-beam
Girder Height		H700x300	H792x300	H792x300	H890x299	H900x300	H912x302	H912x302
Type of Steel Material		SMA50	SMA50	SMA50	SMA50	SMA50	SMA50	SMA50
Section	Principal Moment of Inertia (cm^4)	201,000	254,000	254,000	345,000	411,000	498,000	498,000
	Section Area (cm^2)	235.5	243.4	243.4	270.9	309.8	364.0	364.0
	Section Modulus (cm^2)	4,980	6,410	6,410	7,760	9,140	10,900	10,900
Bending Moment	Loading (t · m)	111.2	138.3	153.2	183.8	216.6	233.8	247.3
Bending Stress	Stress (kg/cm^2)	1,610	1,838	1,991	1,999	2,030	1,858	2,029
	Allowable Stress (kg/cm^2)	2,100	2,100	2,100	2,100	2,100	2,100	2,100
Shearing	Loading (t)	31.7	34.3	35.6	38.3	40.7	42.0	42.6
Shearing Stress	Stress (kg/cm^2)	374	328	340	201	301	276	280
	Allowable Stress (kg/cm^2)	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Deflection	Deflection	$\frac{1}{1,563}$	$\frac{1}{1,328}$	$\frac{1}{1,208}$	$\frac{1}{1,220}$	$\frac{1}{1,100}$	$\frac{1}{1,139}$	$\frac{1}{1,053}$
	Allowable Deflection	$\frac{1}{1,333}$	$\frac{1}{1,172}$	$\frac{1}{1,111}$	$\frac{1}{1,000}$	$\frac{1}{909}$	$\frac{1}{870}$	$\frac{1}{833}$

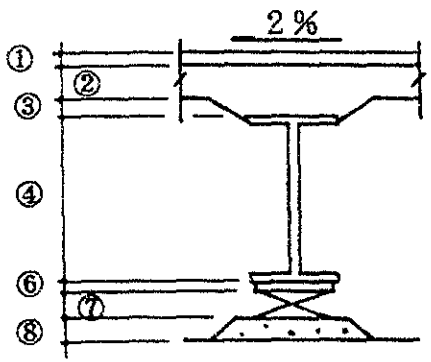
Table 9-2 SIZE AND STRESS INTENSITY OF THE GIRDER FOR GROUP-2 BRIDGES

Span Length (m)		20	25	27	32	35
Carriageway (m)		6.7	6.7	6.7	6.7	6.7
Type		H-beam	PI-Girder	PI-Girder	PI-Girder	PI-Girder
Girder Height		H792x300	1,350	1,450	1,550	1,550
Type of Steel Material		SMA490Y	SM490Y	SM490Y	SMA490	SMA490
Section	Principal Moment of Inertia (cm^4)	345,000	1,074,900	1,289,260	1,883,000	2,433,580
	Section Area (cm^2)	270.9	310.7	325.5	397.1	554.0
	Section Modulus (cm^2)	7,760	15,522	17,190	23,400	27,654
Bending Moment	Loading (t · m)	183.8	310.1	352.2	474.1	554.0
Bending Stress	Stress (kg/cm^2)	1,999	2,011	2,049	2,048	2,003
	Allowable Stress (kg/cm^2)	2,100	2,100	2,100	2,100	2,100
Shearing	Loading (t)	38.3	50.8	54.0	60.7	64.7
Shearing Stress	Stress (kg/cm^2)	201	418	414	435	423
	Allowable Stress (kg/cm^2)	1,200	1,200	1,200	1,200	1,200
Deflection	Deflection	$\frac{1}{2,220}$	$\frac{1}{809}$	$\frac{1}{752}$	$\frac{1}{630}$	$\frac{1}{659}$
	Allowable Deflection	$\frac{1}{1,000}$	$\frac{1}{799}$	$\frac{1}{740}$	$\frac{1}{625}$	$\frac{1}{571}$

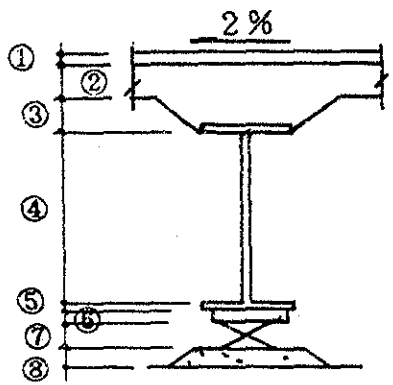
Table 9-3 SIZE OF SLABS, GIRDERS AND SHOES FOR GROUP-1 AND GROUP-2 BRIDGES

Type	Span (m)	0 Slope	① Concrete Pavement	② Slab	③ Haunch	④ Girder	⑤ Flange	⑥ Sole Plate	⑦ Shoe	⑧ Mortar	Total H (m)	Shoe	Reaction (t)
HBB	15	60	50	180	30	700	-	22	63	50	1155	Metal	45
HBB	17	60	50	180	30	792	-	22	63	50	1247	Metal	45
HBB	18	60	50	180	30	792	-	22	63	50	1247	Metal	45
HBB	20	60	50	180	30	890	-	22	63	50	1345	Metal	45
HBB	22	60	50	180	30	900	-	22	63	50	1355	Metal	45
HBB	23	60	50	180	30	912	-	22	63	50	1352	Metal	45
HBB	24	60	50	180	30	912	-	22	63	50	1352	Metal	45
PLG	25	66	50	190	50	1350	19	25	75	35	1860	Metal	75
PLG	27	66	50	190	50	1450	19	25	75	35	1960	Metal	75
PLG	32	66	50	190	50	1550	19	25	75	35	2060	Metal	75
PLG	35	66	50	190	50	1700	19	25	75	35	2210	Metal	75
PC	27	60	50	180	50	1372	-	-	50	28	1790	Rubber	70
PC	32	57	50	180	50	1600	-	-	50	33	2020	Rubber	85

H. B. B.



P. L. G.



P. C. G.

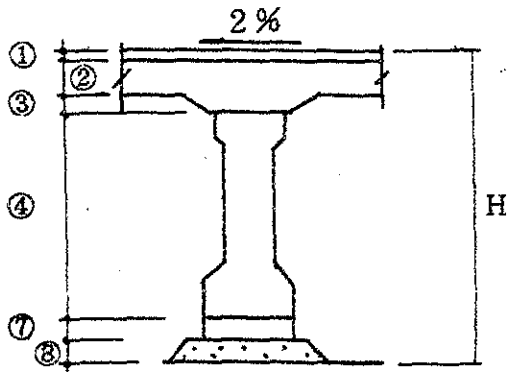


Table 9-4 REACTION AND DESIGN REACTION OF ABUTMENTS FOR GROUP-1 & -2 BRIDGES

(Unit ; Ton)

Span (m)		Normal Condition			Seismic Condition			
		Vertical Reaction			Longitudinal		Lateral	
		Dead L.	Live L.	Total	Vertical	Horizontal	Vertical	Horizontal
HBB	15	56.4	55.0	111.4	56.4	13.5	56.4	6.8
	17	64.0	56.7	120.7	64.0	15.4	64.0	7.7
	18	67.6	57.4	125.0	67.6	16.2	67.6	8.1
	20	75.0	59.0	134.0	75.0	18.0	75.0	9.0
	22	82.4	60.0	142.4	82.4	19.8	82.4	9.9
	23	86.4	60.4	146.8	86.4	20.7	86.4	10.4
	24	93.3	63.7	157.0	93.3	22.4	93.3	11.2
PLG	25	99.2	65.9	165.1	99.2	23.8	99.2	11.9
	27	109.8	70.6	180.4	109.8	26.4	109.8	13.2
	32	129.0	81.3	210.3	129.0	31.0	129.0	15.5
	35	145.2	83.7	228.9	145.2	34.8	145.2	17.4
PC	27	175.3	74.0	249.3	175.3	42.1	175.3	21.0
	32	249.8	77.0	326.8	249.8	60.0	249.8	30.0

Span (m)		Live Load (t)	Ratio of Inter Girder/out Girder	Impact	G 1 (t)	G 2 (t)
HBB	15	55.0	1.199	0.287	16.1	19.3
	17	57.4	1.181	0.277	16.6	19.6
	18	57.0	1.186	0.272	16.7	19.8
	20	59.0	1.181	0.262	17.1	20.2
	22	60.0	1.186	0.254	17.2	20.4
	23	60.4	1.185	0.249	17.3	20.5
	24	63.0	1.190	0.246	17.9	21.3
PLG	25	65.9	1.249	0.242	18.1	22.6
	27	70.6	1.349	0.234	18.6	25.1
	32	81.3	1.329	0.217	21.3	28.3
	35	83.7	1.338	0.209	22.8	30.5
PC	27	74.0	1.147	0.234	19.7	22.6
	32	77.0	1.163	0.217	20.3	23.6

Note: Reaction of G1 & G2 includes Impact

Table 9-5 SUBSTRUCTURE TYPES AND REACTION OF PILE (PIER) (2/2)

No.	Bridge No.	Abutment	Type	Bridge Length	Bearing	Abutment (Height) H (m)	Abutment (Width) B (m)	No. of Pile	Reaction of Pile						Allowable Horizontal Force (t)			
									Normal Condition (t/Pile)			Seismic Condition (t/Pile)			N-Value	Type of Pile	Normal Condition Ha	Seismic Condition Ha
									N max	N min	H	N max	N min	H				
1	05.02.04	P1	M	25.0	F-E	5.5	3.0	8	44.5	41.2	0.2	56.5	13.1	4.4	5	B	18.6	27.9
		P2	M	25.0	F-E	5.5	3.0	8	44.5	41.2	0.2	56.5	13.1	4.4	5	B	18.6	27.9
2	05.03.01	P1	PC	27.0	F-E	5.5	3.5	0										
		P2	PC	27.0	F-E	5.5	3.5	0										
3	05.06.04	P1	PC	27.0	E-F	12.5	5.0	0										
		P2	PC	27.0	E-F	12.5	5.0	0										
4	05.06.05	P1	PC	20.0	F-E	7.5	3.5	8	38.8	34.3	0.3	53.0	6.2	3.7	10	B	31.3	47.0
		P2	PC	20.0	F-E	6.0	3.0	8	37.2	33.7	0.2	47.1	9.4	3.6	10	B	31.3	47.0
5	06.06.04	P1	PC	32.0	E-F	6.5	3.5	8	56.2	52.2	0.2	79.5	9.1	5.5	10	B	31.3	47.0
		P2	PC	32.0	E-F	6.5	3.5	8	56.2	52.2	0.2	79.5	9.1	5.5	10	B	31.3	47.0
6	07.05.01	P1	PC	27.0	F-E	6.5	3.5	8	50.1	46.1	0.2	64.1	14.9	5.0	5	B	18.6	27.9
7	07.05.05	P1	PC	27.0	E-F	6.0	3.5	8	69.0	64.4	0.2	93.8	21.9	7.2	10	B	31.3	47.0
		P2	PC	27.0	E-F	6.0	3.5	8	69.0	64.4	0.2	93.8	21.9	7.2	10	B	31.3	47.0
8	07.06.07	P1	PC	32.0	E-F	7.5	4.5	12	61.4	56.8	0.2	90.9	14.9	6.6	10	B	31.3	47.0
		P2	PC	32.0	E-F	12.0	5.0	16	64.6	57.5	0.4	113.0	-2.2	3.3	10	B	31.3	47.0
		P3	PC	32.0	E-F	12.0	5.0	16	64.6	57.5	0.4	113.0	-2.2	3.3	10	B	31.3	47.0
		P4	PC	32.0	E-F	6.5	4.5	12	60.9	56.6	0.1	86.2	8.7	6.5	10	B	31.3	47.0
10	08.01.01	P1	M	20.0	E-F	7.0	3.0	8	38.6	34.3	0.2	51.4	7.4	3.7	10	B	31.3	47.0
		P2	M	20.0	E-F	7.0	3.0	8	38.6	34.3	0.2	51.4	7.4	3.7	10	B	31.3	47.0
11	08.03.09	P1	M	20.0	E-F	10.5	4.0	10	33.1	28.0	0.3	48.2	2.5	3.3	10	B	31.3	47.0
		P2	M	20.0	E-F	9.0	3.5	8	39.6	34.3	0.3	53.6	2.5	3.9	10	B	31.3	47.0

Note : Type of Pile A : φ30-8 Steel Bars B : φ25-8 Steel Bars E : Exp F : Fix

Table 9-5 SUBSTRUCTURE TYPES AND REACTION OF PILE (ABUTMENT) (1/2)

No.	Bridge No.	Abutment	Type	Bridge Length	Bearing	Abutment (Height) H (m)	Abutment (Width) B (m)	No. of Pile	Reaction of Pile						Allowable Horizontal Force (t)			
									Normal Condition (t/Pile)			Seismic Condition (t/Pile)			N-Value	Type of Pile	Normal Condition Ha	Seismic Condition Ha
									N max	N min	H	N max	N min	H				
1	05.02.04	A	M	25.0	EXP	5.5	3.5	12	43.5	33.4	5.9	43.2	12.2	11.1	5	A	18.6	27.9
		B	M	25.0	FIX	4.5	3.0	10	45.8	41.8	7.1	53.4	11.5	13.1	5	A	18.6	27.9
2	05.03.01	A	PC	27.0	EXP	5.0	3.5	0										
		B	PC	27.0	FIX	5.0	3.5	0										
3	05.06.04	A	M	27.0	FIX	6.0	4.0	0										
		B	M	27.0	EXP	6.0	4.0	0										
4	05.06.05	A	M	20.0	EXP	4.0	3.0	0										
		B	M	20.0	FIX	4.0	3.0	8	50.5	33.8	5.0	39.2	16.3	10.0	10	A	31.3	47.0
5	06.06.04	A	M	32.0	FIX	5.0	3.5	10	56.0	38.8	6.0	49.7	16.5	12.4	10	A	31.3	47.0
		B	M	32.0	EXP	5.5	3.5	10	57.5	42.6	7.1	54.1	17.0	13.6	10	A	31.3	47.0
6	07.05.01	A	M	27.0	EXP	6.0	3.5	12	46.5	36.5	7.0	49.3	10.9	12.7	5	A	18.6	27.9
		B	M	27.0	FIX	6.0	3.5	12	46.5	36.5	7.0	51.3	8.9	12.9	5	A	18.6	27.9
7	07.05.05	A	PC	27.0	FIX	7.0	4.0	18	39.1	32.5	6.1	50.2	3.5	12.0	10	A	31.3	47.0
		B	PC	27.0	EXP	7.0	4.0	18	39.1	32.5	6.1	47.1	6.6	11.7	5	A	18.6	27.9
8	07.06.07	A	PC	32.0	FIX	6.5	4.0	18	42.1	33.9	5.4	48.0	10.7	11.0	10	A	31.3	47.0
		B	PC	32.0	EXP	5.5	4.0	16	47.4	34.9	4.8	49.8	13.5	11.6	10	A	31.3	47.0
9	07.15.06	A	M	35.0	EXP	4.5	3.5	0										
		B	M	35.0	FIX	4.5	3.5	10	52.8	39.9	5.0	47.0	18.3	11.3	10	A	31.3	47.0
10	08.01.01	A	M	20.0	FIX	4.5	3.0	10	43.9	28.5	5.0	36.1	12.8	9.4	10	A	31.3	47.0
		B	M	20.0	EXP	4.5	3.0	10	43.9	28.5	5.0	34.8	14.0	9.3	10	A	31.3	47.0
11	08.03.09	A	M	20.0	FIX	5.0	3.0	10	43.2	33.1	6.0	42.1	10.3	10.9	10	A	31.3	47.0
		B	M	20.0	EXP	7.0	4.0	18	32.7	25.9	6.1	37.1	5.3	10.8	5	A	18.6	27.9

Note : Type of Pile A : ø30-8 Steel Bars B : ø25-8 Steel Bars

APPENDIX 10

LIST OF COLLECTED DATA

LIST OF DATA COLLECTED FOR BASIC DESIGN STUDY

1. 1991 Philippine Statistical Yearbook
2. 1990 Philippine Almanac
3. Implementing Agency and Organization
4. Socio-economic condition of the project area
5. Construction condition of the project area
6. Status of Major project (Region V, VI, VII, VIII)
7. Highlights of 1988 DPWH Infrastructure Program
8. Highlights of Proposed 1989 DPWH Infrastructure Program
9. Highlights of 1990 DPWH Infrastructure Program
10. Highlights of Proposed 1991 DPWH Budget
11. Highlights of 1992 DPWH Budget
12. Plan and profile of existing bridges for Phase IV project
13. The Five-Year Comprehensive bridges reconstruction program along secondary roads
14. Rainfall - Intensity - Duration - Frequency Data

APPENDIX 11

COST SHOULDERED BY THE GOVERNMENT OF THE REPUBLIC OF THE PHILIPPINES

11.1 Group-1 Bridges

1. Construction Cost

(Unit : ₱)

Item		Unit	Q'ty	Unit Price	Amount
Substructure	Abutment: H= 2.5m	No.	1	114,600.00	114,600.00
	H= 3.0m	No.	14	137,500.00	1,925,000.00
	H= 3.5m	No.	16	160,400.00	2,566,400.00
	H= 4.0m	No.	12	183,300.00	2,199,600.00
	H= 4.5m	No.	6	206,300.00	1,237,800.00
	H= 5.0m	No.	4	229,200.00	916,800.00
	H= 5.5m	No.	4	252,100.00	1,008,400.00
	H= 6.0m	No.	7	275,000.00	1,925,000.00
	H= 7.0m	No.	3	320,800.00	962,400.00
	H=12.0m	No.	1	550,000.00	550,000.00
	Sub Total	No.	68		13,406,000.00
	Pier : H= 5.0m	No.	1	229,200.00	229,200.00
	H= 5.5m	No.	2	252,100.00	504,200.00
	H= 6.0m	No.	3	275,000.00	825,000.00
	H= 7.0m	No.	6	320,800.00	1,924,800.00
	H= 7.5m	No.	4	343,800.00	1,375,200.00
	H= 8.0m	No.	2	366,700.00	733,400.00
	H= 8.5m	No.	4	389,600.00	1,558,400.00
	H= 9.0m	No.	1	412,500.00	412,500.00
	H=10.0m	No.	1	458,400.00	458,400.00
	H=10.5m	No.	1	481,300.00	481,300.00
	H=12.0m	No.	1	550,000.00	550,000.00
	H=17.0m	No.	1	779,200.00	779,200.00
	H=19.0m	No.	1	870,900.00	870,900.00
	Sub Total	No.	28		10,702,500.00
	RC Pile : L=10.0m	No.	744	10,850.00	8,072,400.00
	L=15.0m	No.	368	16,280.00	5,991,040.00
	Sub Total	No.	1,112		14,063,440.00
Total					38,171,940.00
Superstructure	Transportation for Steel Materials	t	1,415,540	8,520.00	12,060,400.00
	Erection	t	1,322,651	9,110.00	12,049,350.00
	Slab	m²	9,277	5,200.00	48,240,400.00
Total					72,350,150.00
Related Works	Approach Road	m	2,690	24,650.00	66,308,500.00
	River Bank Protection	m²	8,248	2,920.00	24,084,160.00
Total					72,350,150.00
Grand Total					₱200,914,750.00 ¥1,010,600,000.00

Note: Exchange Rate : ₱1 = ¥5.03

2. Custom Clearance Fee

- Custom Clearance Fee = ₱2,350.00 + (C & F Value - ₱200,000.00) x 0.125 %

(Custom Clearance Fee / B/L of One Cargo)

1) Custom Clearance Fee

- No. of B/L : 4 No.
  - Ocean Freight to Manila International Port : 1 No.
  - Ocean Freight to Iloilo International Port : 1 No.
  - Ocean Freight to Cebu International Port : 1 No.
  - Ocean Freight to Tarloban International Port : 1 No.

- Custom Clearance Fee = ₱167,652.49 (¥843,000)

3. Inland Transportation

(Unit : ₱)

Region / Transportation Port		Unit	Q'ty	Unit Price	Amount
V	Manila International Port Legazpi (Region Office)	F/T	786.558	1,725.00	1,356,812.55
VI	Iloilo International Port Iloilo (Region Office)	F/T	516.759	150.00	77,513.85
VII	Cebu International Port Cebu (Region Office)	F/T	856.013	240.00	205,443.12
VIII	Tacloban International Port Tacloban (Region Office)	F/T	365.256	150.00	54,788.40
T o t a l		F/T	2,524.586		1,694,557.92 (¥8,523,000)

Note ; Exchange Rate : 1 Peso = 5.03 Yen

11-2 Group-2 Bridges

1. Right of Acquisition & Provision of Necessary Land Area for the Construction Works.

1) Right of Way Acquisition

(Unit : ₱)

Bridge No.	Bridge Name	Q'ty	Unit	Unit Price	Amount
05.02.04	Banquerohan Br.	2,520	m^2	65.00	163,800.00
05.03.01	Hitoma Br.	2,710	m^2	65.00	176,150.00
05.06.04	Lanang Br.	2,830	m^2	65.00	183,950.00
05.06.05	Potot Br.	2,280	m^2	65.00	148,200.00
06.06.04	Lawigan Br.	2,390	m^2	65.00	155,350.00
07.05.01	Apalan Br.	2,690	m^2	65.00	174,850.00
07.05.05	Tambongon Br.	2,760	m^2	65.00	179,400.00
07.06.07	Mojon Br.	2,660	m^2	65.00	172,900.00
07.15.06A	Alimango Br.	2,540	m^2	65.00	165,100.00
08.01.01	Anas Br.	2,580	m^2	65.00	167,700.00
08.03.04	Elizabeth Br.	2,730	m^2	65.00	177,450.00
	Total	28,690	m^2		1,864,850.00 (¥9,380,000)

Note ; Exchange Rate : 1 Peso = 5.03 Yen

2) Provision of Necessary Land Area for the Construction Works.

(Unit : ₱)

Bridge No.	Bridge Name	Q'ty	Unit	Unit Price	Amount
05.02.04	Banquerohan Br.	2,062	m²	15.00	30,930.00
05.03.01	Hitoma Br.	2,432	m²	15.00	36,480.00
05.06.04	Lanang Br.	1,530	m²	15.00	22,950.00
05.06.05	Potot Br.	1,754	m²	15.00	26,310.00
06.06.04	Lawigan Br.	1,782	m²	15.00	26,730.00
07.05.01	Apalan Br.	2,118	m²	15.00	31,770.00
07.05.05	Tambongon Br.	2,432	m²	15.00	36,480.00
07.06.07	Mojon Br.	3,234	m²	15.00	48,510.00
07.15.06A	Alimango Br.	1,670	m²	15.00	25,050.00
08.01.01	Anas Br.	1,782	m²	15.00	26,730.00
08.03.04	Elizabeth Br.	2,300	m²	15.00	34,500.00
	Total	23,096	m²		346,440.00 (¥1,742,000)

Note ; Exchange Rate : 1 Peso = 5.03 Yen

2. Demolition of Obstacles including Houses within the Right of Way.

1) Demolition of houses

(Unit : ₱)

Bridge No.	Bridge Name	Q'ty	Unit	Unit Price	Amount
05.03.01	Hitoma Br.	1	No.		40,000.00
	· Wooden houses	1	No.	40,000.00	40,000.00
06.06.04	Lawigan Br.	3	No.		160,000.00
	· Concrete houses	2	No.	60,000.00	120,000.00
	· Wooden houses	1	No.	40,000.00	40,000.00
07.06.07	Mojon Br.	4	No.		160,000.00
	· Wooden houses	4	No.	40,000.00	160,000.00
	Total	8	No.		360,000.00 (¥1,810,000)

Note ; Exchange Rate : 1 Peso = 5.03 Yen

2) Relocation of incidential facilities

(Unit : ₱)

Bridge No.	Bridge Name	Q'ty	Unit	Unit Price	Amount
05.02.04	Banquerohan Br.				281,200.00
	· Electric Cable	280	m	930.00	260,400.00
	· Electric Post	4	No.	5,200.00	20,800.00
06.06.04	Lawigan Br.				604,820.00
	· Electric Cable	250	m	930.00	232,500.00
	· Electric Post	4	No.	5,200.00	20,800.00
	· Water Pipe(ø50)	338	m	1,040.00	351,520.00
07.05.01	Apalan Br.				206,800.00
	· Electric Cable	200	m	930.00	186,000.00
	· Electric Post	4	No.	5,200.00	20,800.00
07.05.05	Tambongon Br.				103,400.00
	· Electric Cable	100	m	930.00	93,000.00
	· Electric Post	2	No.	5,200.00	10,400.00
07.06.07	Mojon Br.				299,800.00
	· Electric Cable	300	m	930.00	279,000.00
	· Electric Post	4	No.	5,200.00	20,800.00
08.01.01	Anas Br.				929,400.00
	· Electric Cable	220	m	930.00	204,600.00
	· Electric Post	4	No.	5,200.00	20,800.00
	· Water Pipe(ø100)	338	m	1,040.00	351,520.00
08.03.04	Elizabeth Br.				183,000.00
	· Electric Cable	180	m	930.00	167,400.00
	· Electric Post	3	No.	5,200.00	15,600.00
	Total				2,608,420.00 (¥13,120,000)

Note ; Exchange Rate : 1 Peso = 5.03 Yen

3. Improvement of Bridges and Roads for Transportation of Materials

1) Improvement of Bridges

(Unit : ₱)

Bridge No.	Bridge Name	Q'ty	Unit	Unit Price	Amount
05.03.01	Hitoma Br.	2	No.		20,000.00
	· Old bailey bridges	2	No.	10,000.00	20,000.00
05.06.04	Lanang Br.	8	No.		66,000.00
	· Old bailey bridges	2	No.	10,000.00	20,000.00
	· Old timber bridges	2	No.	13,000.00	26,000.00
	· Leveling of riverbed	4	No.	5,000.00	20,000.00
05.06.05	Potot Br.	4	No.		49,000.00
	· Old bailey bridges	1	No.	10,000.00	10,000.00
	· Old timber bridges	3	No.	13,000.00	39,000.00
06.06.04	Lawigan Br.	4	No.		40,000.00
	· Old bailey bridges	4	No.	10,000.00	40,000.00
07.05.01	Apalan Br.	6	No.		60,000.00
	· Old bailey bridges	6	No.	10,000.00	60,000.00
07.05.05	Tambongon Br.	3	No.		39,000.00
	· Old bailey bridges	3	No.	10,000.00	39,000.00
08.01.01	Anas Br.	4	No.		43,000.00
	· Old bailey bridges	3	No.	10,000.00	30,000.00
	· Old timber bridges	1	No.	13,000.00	13,000.00
	Total	31	No.		317,000.00 (¥1,594,000)

Note ; Exchange Rate : 1 Peso = 5.03 Yen

2) Improvement of roads

(Unit : ₱)

Bridge No.	Bridge Name	Q'ty	Unit	Unit Price	Amount
05.02.04	Banquerohan Br.	607	km		91,050.00
	・Manila~Construction Site	607	km	150.00	91,050.00
05.03.01	Hitoma Br.	596	km		113,700.00
	・Manila~Tabaco	542	km	150.00	81,300.00
	・Virac ~Construction Site	54	km	600.00	32,400.00
05.06.04	Lanang Br.	56	km		33,600.00
	・Masbate ~ Construction Site	56	km	600.00	33,600.00
05.06.05	Potot Br.	37	km		22,200.00
	・Masbate ~ Construction Site	37	km	600.00	22,200.00
06.06.04	Lawigan Br.	75	km		45,000.00
	・Iloilo~Construction Site	75	km	600.00	45,000.00
07.05.01	Apalan Br.	95	km		38,000.00
	・Cebu ~ Construction Site	95	km	400.00	38,000.00
07.05.05	Tambongon Br.	117	km		46,800.00
	・Cebu ~ Construction Site	117	km	400.00	46,800.00
07.06.07	Mojon Br.	21	km	400.00	8,400.00
	・Cebu ~ Construction Site	21	km	400.00	8,400.00
07.15.06A	Alimango Br.	43	km		17,200.00
	・Cebu ~ Construction Site	43	km	400.00	17,200.00
08.01.01	Anas Br.	124	km		74,400.00
	・Tacloban ~ Construction Site	124	km	600.00	74,400.00
08.03.04	Elizabeth Br.	81	km		48,600.00
	・Tacloban ~ Construction Site	81	km	600.00	48,600.00
	Total	1,852	km.		538,950.00 (¥2,710,000)

Note ; Exchange Rate : 1 Peso = 5.03 Yen

4. Demolition of Existing Bridges after Construction

(Unit : ₱)

Bridge No.	Bridge Name	Q'ty	Unit	Unit Price	Amount
05.02.04	Banquerohan Br.				422,284.00
	· Concrete structure	386	m^3	1,094.00	422,284.00
05.03.01	Hitoma Br.				141,684.00
	· Concrete structure	83	m^3	1,094.00	90,802.00
	· Timber pier	3	No.	414.00	1,242.00
	· Timber slab	293	m^2	145.00	42,485.00
	· Bailey bridge	8.600	t	832.00	7,155.00
05.06.04	Lanang Br.				75,486.00
	· Concrete structure	69	m^3	1,094.00	75,486.00
05.06.05	Potot Br.				26,817.00
	· Timber pier	5	No.	414.00	2,070.00
	· Timber slab	146	m^2	145.00	21,170.00
	· Bailey bridge	4.300	t	832.00	3,577.00
07.05.01	Apalan Br.				42,828.00
	· Concrete structure	21	m^3	1,094.00	22,974.00
	· Timber pier	3	No.	414.00	1,242.00
	· Timber slab	110	m^2	145.00	15,950.00
	· Bailey bridge	3.200	t	832.00	2,662.00
07.05.05	Tambongon Br.				48,485.00
	· Concrete structure	12	m^3	1,094.00	13,128.00
	· Timber pier	8	No.	414.00	3,312.00
	· Timber slab	221	m^2	145.00	32,045.00
07.06.07	Mojon Br.				319,448.00
	· Concrete structure	292	m^3	1,094.00	319,448.00
08.03.04	Elizabeth Br.				35,016.00
	· Timber pier	6	No.	414.00	2,484.00
	· Timber slab	171	m^2	145.00	24,795.00
	· Bailey bridge	9.300	t	832.00	7,737.00
	Total	8	Br.		1,112,048.00 (¥5,593,000)

Note ; Exchange Rate : 1 Peso = 5.03 Yen