

TYPE OF WORK
LOCATION

CONCRETE APRON (EL+0.400)
JOINT FILLER

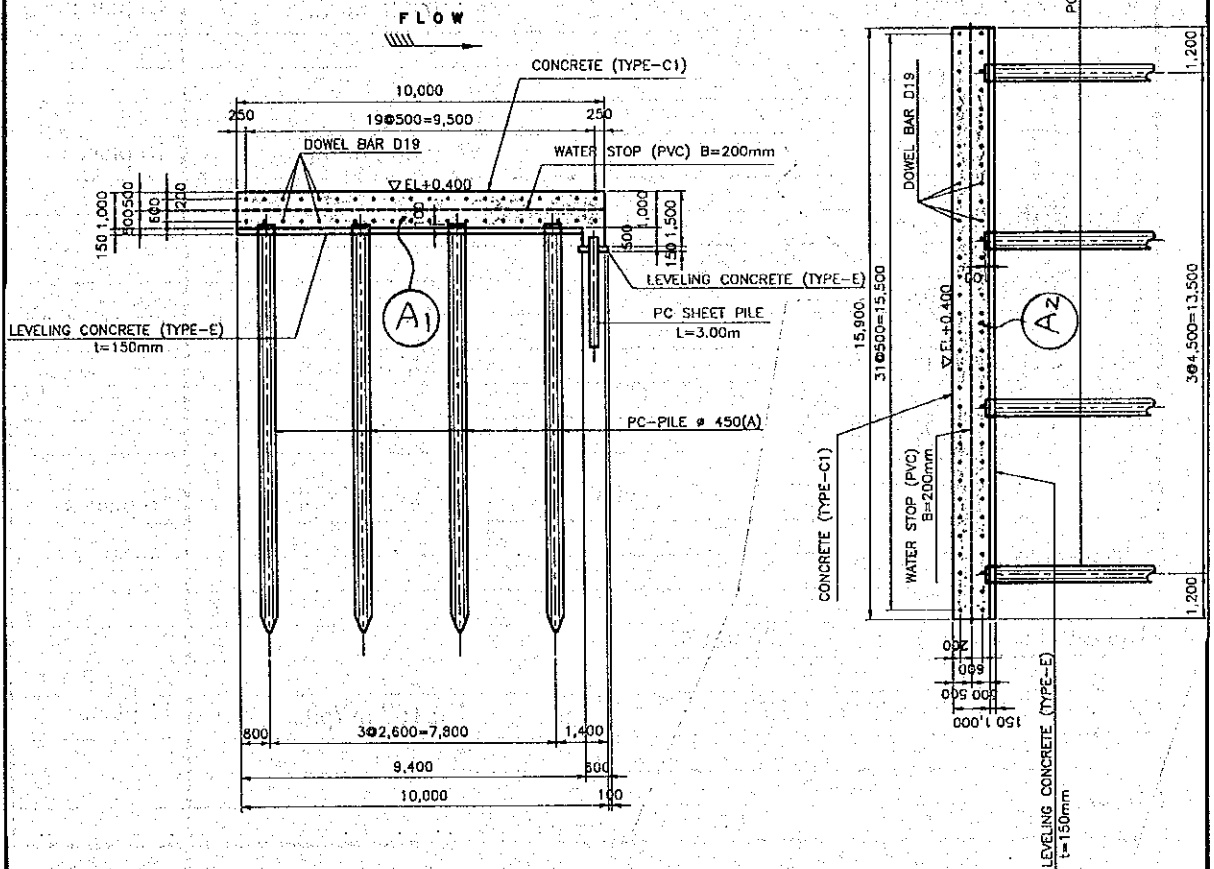
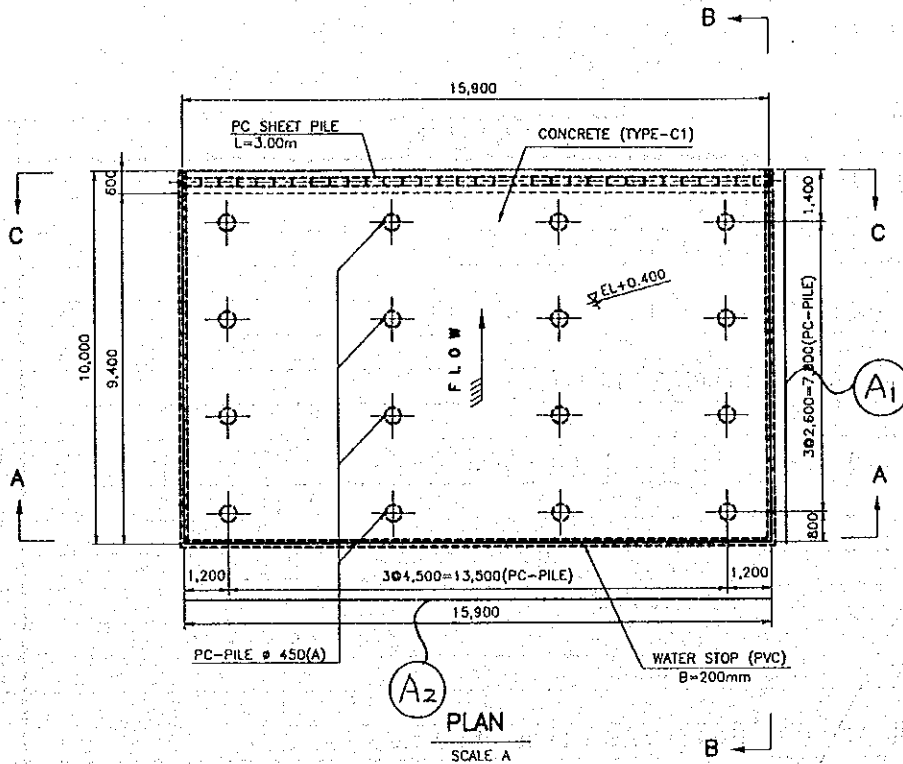
CALCULATION	RESULT
$t = 10$ (ELASTIC MATERIAL)	
$A_1 = (1.00 \times 10.00) + (0.60 \times 0.50 - 0.22 \times 0.25)$	
$A_2 = 1.00 \times 15.90$	

TYPE OF WORK

CONCRETE APRON (EL+0.400)
JOINT FILLER

LOCATION

EXPLANATORY DRAWING



TYPE OF WORK : PILE HEAD TREATMENT
 LOCATION : CONCRETE APRON (EL. +0.400)
 : No. 1 (LEFT BANK)

CALCULATION	RESULT
PC PILE DIA 450 (A) n = 16 PILES	
LENGTH OF DESIGN : $L_1 = 10.20$ m	
SPARE PILE LENGTH : $L_2 = 1.00$ m	
Therefore, ADOPTED PILE LENGTH :	
$L = 10.20 + 1.00 = 11.20$ 12.00 m/pile	16 places
PILING	
N VALUE : $N = 32$ (Average)	
$D = 10.20$ m/pile	16 places
CONCRETE FILLING (TYPE-C1) n = 16 PILES	
$V = \frac{\pi}{4} \times 0.29^2 \times 0.55 = 0.036$ m ³ /pile	16 places
SUSPENDED FORM	
$A = \frac{\pi}{4} \times 0.29^2 = 0.066$ m ³ /pile	16 places
REINFORCING BAR	
D 13 (W = 1.04 kg/m)	
$W_1 = 6 \text{ Bars} \times 0.45 \times 1.04 = 2.808$	
$W_2 = 4 \text{ Bars} \times 0.96 \times 1.04 = 3.994$	
TOTAL W = 6.802 kg.f/pile	16 places
CUTTING PILE HEAD	
Height of cutting : $h = 1.80$ m/pile	
$V = \frac{\pi}{4} \times (0.45^2 - 0.29^2) \times 1.80 = 0.167$ m ³ /pile	16 places

TYPE OF WORK : PILE HEAD TREATMENT
 LOCATION : CONCRETE APRON (EL. +0.400)
 : No. 2 to No. 5

CALCULATION	RESULT
PC PILE DIA 450 (A) n = 16 PILES	
LENGTH OF DESIGN : $L_1 = 10.40$ m	
SPARE PILE LENGTH : $L_2 = 1.00$ m	
Therefore, ADOPTED PILE LENGTH :	
$L = 10.40 + 1.00 = 11.40$ 12.00 m/pile	16 places
PILING	
N VALUE : $N = 22$ (Average)	
$D = 10.40$ m/pile	16 places
CONCRETE FILLING (TYPE-C1) n = 16 PILES	
$V = \frac{\pi}{4} \times 0.29^2 \times 0.55 = 0.036$ m ³ /pile	16 places
SUSPENDED FORM	
$A = \frac{\pi}{4} \times 0.29^2 = 0.066$ m ³ /pile	16 places
REINFORCING BAR	
D 13 (W = 1.04 kg/m)	
$W_1 = 6 \text{ Bars} \times 0.45 \times 1.04 = 2.808$	
$W_2 = 4 \text{ Bars} \times 0.96 \times 1.04 = 3.994$	
TOTAL W = 6.802 kg.f/pile	16 places
CUTTING PILE HEAD	
Height of cutting : $h = 1.60$ m/pile	
$V = \frac{\pi}{4} \times (0.45^2 - 0.29^2) \times 1.60 = 0.149$ m ³ /pile	16 places

3.2.5 Approach Wall

TYPE OF WORK : APPROACH WALL
 LOCATION : CONCRETE (TYPE - C1)
 : DOWNSTREAM, LEFT BANK

CALCULATION		RESULT
W - 1L		
$V_1 = 0.60 \times 0.50 \times 10.00$	=	3.000
$V_2 = 4.80 \times 1.00 \times 10.00$	=	48.000
$V_3 = (0.40 + 0.75) \times \frac{1}{2} \times 4.40 \times 10.00$	=	25.300
$V_4 = (0.40 + 0.75) \times \frac{1}{2} \times 4.40 \times (4.80 - 0.40)$	=	11.132
(Deduction for PC Sheet Pile)		
$V_5 = -(0.22 \times 0.25 \times 10.00)$	=	-0.550
(Deduction for PC Pile)		
$V_6 = -(\pi/4 \times 0.60^2 \times 0.10 \times 12 \text{ piles})$	=	-0.339
W - 2L		
$V_7 = 0.60 \times 0.50 \times 15.00$	=	4.500
$V_8 = 7.00 \times 1.40 \times 15.00$	=	147.000
$V_9 = (0.45 + 1.10) \times \frac{1}{2} \times 7.70 \times 1.5.00$	=	89.513
$V_{10} = (0.45 + 1.10) \times 7.70 \times (4.00 - 0.45)$	=	21.185
W - 6L		
$V_{11} = 0.50 \times 3.00 \times 3.10$	=	4.650
$V_{12} = \{(0.35 + 0.50) \times \frac{1}{2} \times 4.20 + (0.35 + 0.445) \times \frac{1}{2} \times 2.65\} \times \frac{1}{2} \times 3.10$	=	4.399
W - 7L		
$V_{13} = 0.35 \times 2.20 \times (2.20 + 1.611) \times \frac{1}{2}$	=	1.467
$V_{14} = 0.35 \times 2.20 \times (5.20 + 4.611) \times \frac{1}{2}$	=	3.777
$V_{15} = 0.35 \times 2.80 \times (2.20 + 5.20)$	=	7.252
TOTAL		370.286
		370.286 m³

APPROACH WALL

TYPE OF WORK :

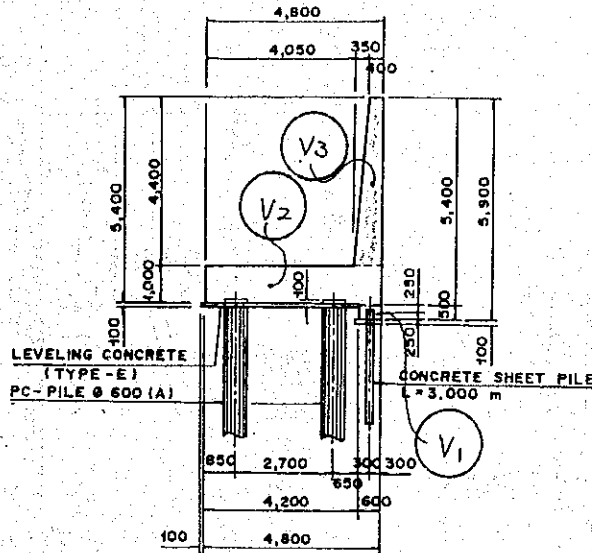
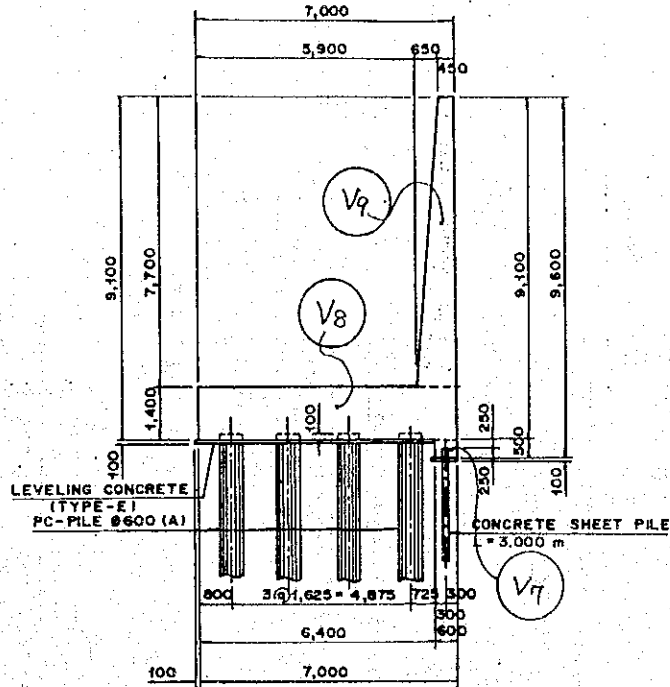
CONCRETE (TYPE - C1.)

(1/2)

LOCATION :

DOWNSTREAM, LEFT BANK

EXPLANATORY DRAWING



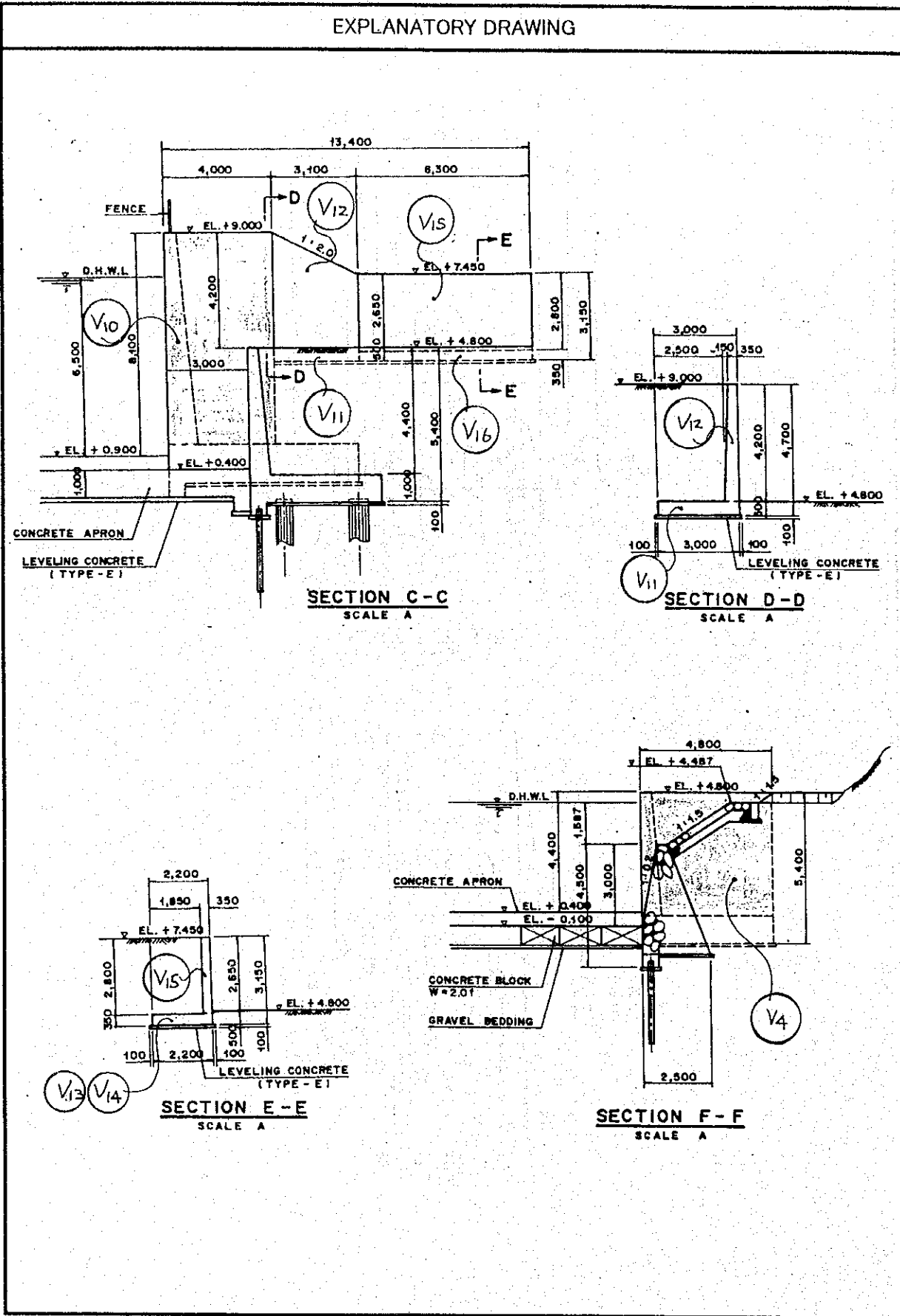
APPROACH WALL

TYPE OF WORK : CONCRETE (TYPE - C)

LOCATION : DOWNSTREAM, LEFT BANK

(2/2)

EXPLANATORY DRAWING



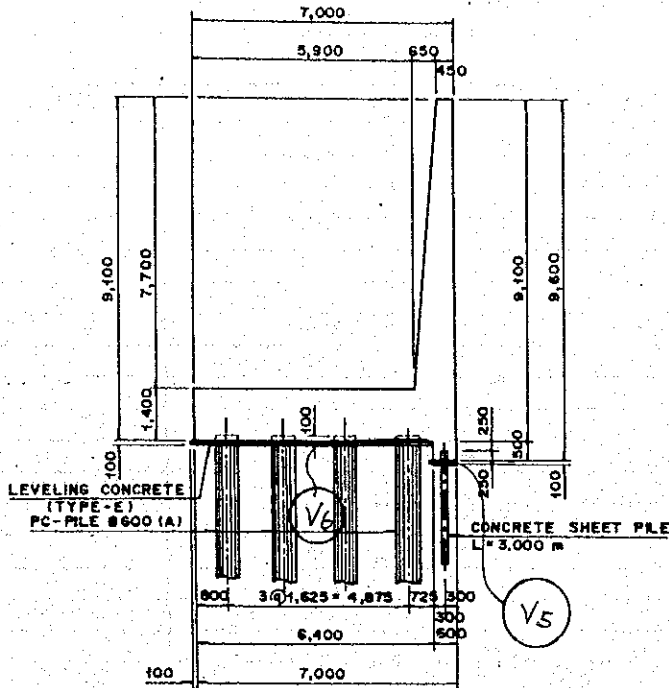
TYPE OF WORK : APPROACH WALL
 LOCATION : LEVELING CONCRETE
 : DOWNSTREAM, LEFT BANK

CALCULATION		RESULT
(TYPE - E)		
W - 1L		
$V_1 = 0.80 \times 0.10 \times 10.00$	=	0.800
$V_2 = 4.30 \times 0.10 \times 10.10$	=	4.343
(Deduction for PC Sheet Pile)		
$V_3 = -(0.22 \times 0.10 \times 10.00)$	=	- 0.220
(Deduction for PC Pile)		
$V_4 = -(\pi/4 \times 0.60^2 \times 0.10 \times 12 \text{ piles})$	=	- 0.339
W - 2L		
$V_5 = 0.80 \times 0.10 \times 15.00$	=	1.200
$V_6 = 6.50 \times 0.10 \times 15.20$	=	9.880
(Deduction for PC Sheet Pile)		
$V_7 = -(0.22 + 0.10) \times 1.5.00$	=	- 0.330
(Deduction for PC Piles)		
$V_8 = (\pi/4 \times 0.60^2 \times 0.10 \times 36 \text{ piles})$	=	- 1.018
W - 6L		
$V_9 = 0.10 \times 3.20 \times 3.10$	=	0.992
W - 7L		
$V_{10} = (1.611 + 2.20 \times \frac{1}{2} \times 2.40 \times 0.10$	=	0.457
$V_{11} = (4.611 + 5.20) \times \frac{1}{2} \times 2.40 \times 0.10$	=	1.177
TOTAL	=	16.942
		16.942 m ³

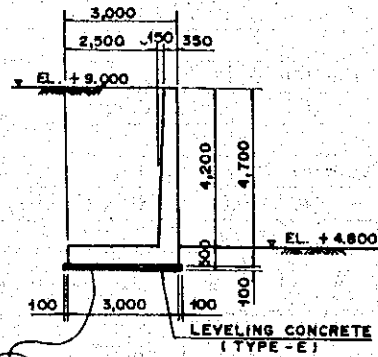
APPROACH WALL

TYPE OF WORK : LEVELING CONCRETE
 LOCATION : DOWNSTREAM, LEFT BANK

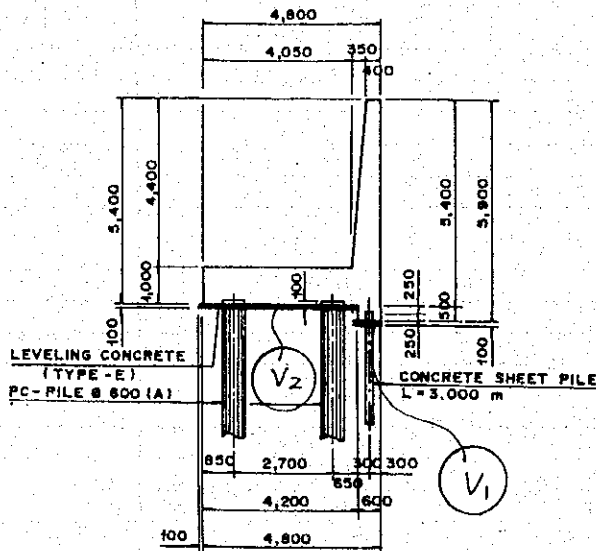
EXPLANATORY DRAWING



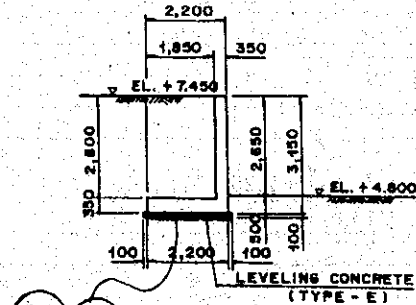
SECTION A - A
 SCALE A



SECTION D - D
 SCALE A



SECTION B - B
 SCALE A



SECTION E - E
 SCALE A

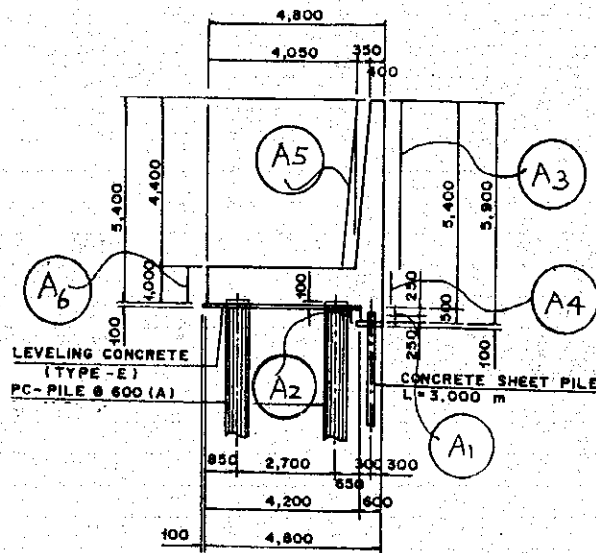
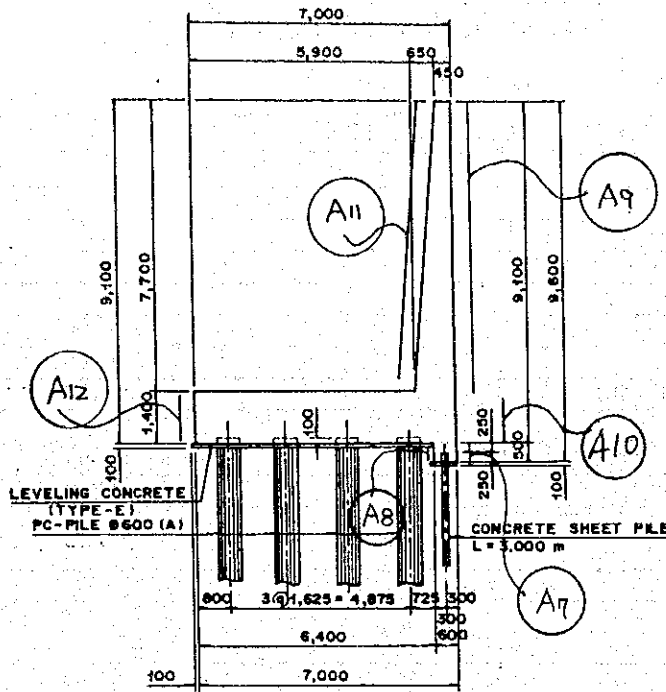
TYPE OF WORK : APPROACH WALL
 LOCATION : FORM
 : DOWNSTREAM, LEFT BANK

CALCULATION		RESULT
(H ≥ 4.0 m)		
W - 1L		
$A_1 = 0.50 \times 10.00$	=	5.000
$A_2 = 0.40 \times 10.00$	=	4.000
$A_3 = 4.40 \times (10.00 + 4.80)$	=	65.120
$A_4 = 1.00 \times 10.00$	=	10.000
$A_5 = \sqrt{0.35^2 + 4.40^2} \times (10.00 + 4.40)$	=	63.560
$A_6 = 1.00 \times 4.80$	=	4.800
W - 2L		
$A_7 = 0.50 \times 15.00$	=	7.500
$A_8 = 0.40 \times 15.00$	=	6.000
$A_9 = 7.70 \times (15.00 + 4.00)$	=	146.300
$A_{10} = 1.40 \times 15.00$	=	21.000
$A_{11} = \sqrt{0.65^2 + 7.70^2} \times (15.00 + 3.55)$	=	143.343
$A_{12} = 7.70 \times 1.40 \times 2$	=	19.600
TOTAL A		496.223
(H < 4.0 m)		
W - 6L		
$A_1 = 0.50 \times 3.10 \times 2$	=	3.100
$A_2 = 0.50 \times 3.00 \times 2$	=	3.000
$A_3 = (4.20 + 2.65) \times \frac{1}{2} \times 3.10$	=	10.618
$A_4 = 1.0006 \times (4.20 + 2.65) \times \frac{1}{2} \times 3.10$	=	10.624
$A_5 = 1.0006 \times (0.35 + 0.445) \times \frac{1}{2} \times 2.65$	=	1.053
W - 7L		
$A_6 = 0.35 \times (2.20 + 5.20)$	=	2.590
$A_7 = 0.35 \times (1.611 + 4.611)$	=	2.178
$A_8 = 0.35 \times 2.20$	=	0.770
$A_9 = 2.80 \times (2.20 + 5.20) \times 2$	=	41.440
$A_{10} = 2.80 \times 0.35$	=	0.980
TOTAL A		76.353
		76.353 m ²

APPROACH WALL

TYPE OF WORK : FORM ($H \geq 4.0m$)
LOCATION : DOWNSTREAM, LEFT BANK

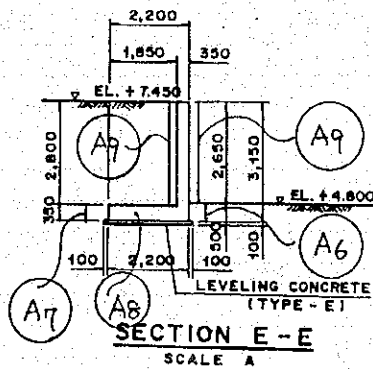
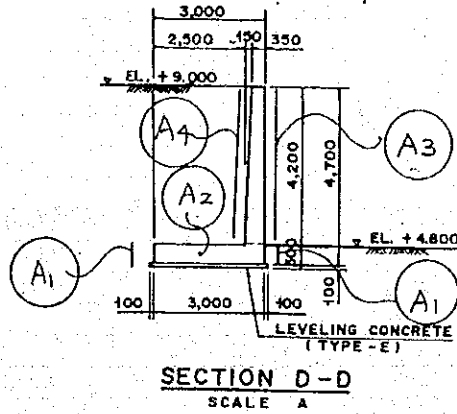
EXPLANATORY DRAWING



APPROACH WALL

TYPE OF WORK : FORM ($H < 7.0\text{M}$)
LOCATION : DOWNSTREAM, LEFT BANK

EXPLANATORY DRAWING



TYPE OF WORK : APPROACH WALL
 LOCATION : FORM OF LEVELING CONCRETE
 : DOWNSTREAM, LEFT BANK

CALCULATION		RESULT
(H < 4.0 m)		
W - 1L		
$A_1 = 0.10 \times 10.00 \times 2$	=	2.000
$A_2 = 0.10 \times 10.10 \times 2$	=	2.020
$A_3 = (0.80 \times 0.10) + (4.30 \times 0.10)$	=	0.510
(Deduction for PC Sheet Pile)		
$A_4 = -(0.22 \times 0.10)$	=	-0.022
W - 2L		
$A_5 = 0.10 \times 15.00 \times 2$	=	3.000
$A_6 = 0.10 \times 15.20 \times 2$	=	3.040
$A_7 = (0.80 \times 0.10) + (6.50 \times 0.10)$	=	0.730
(Deduction for PC Sheet Pile)		
$A_8 = -(0.22 \times 0.10)$	=	-0.022
W - 6L		
$A_9 = 0.10 \times 3.20 \times 2$	=	0.640
$A_{10} = 3.10 \times 0.10 \times 2$	=	0.620
W - 7L		
$A_{11} = (2.20 + 5.30) \times 0.10$	=	0.750
$A_{12} = (1.611 + 4.711) \times 0.10$	=	0.632
$A_{13} = 2.40 \times 0.10$	=	0.240
TOTAL	=	14.138
		14.138 m ²

TYPE OF WORK : APPROACH WALL
 LOCATION :
 : DOWNSTREAM, LEFT BANK

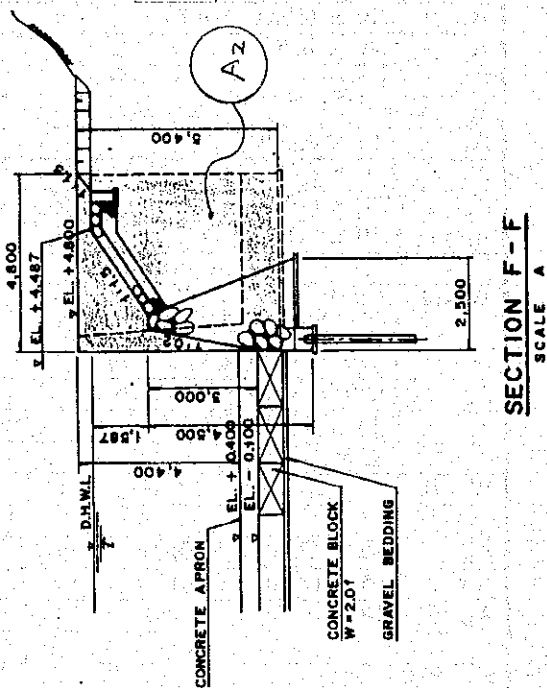
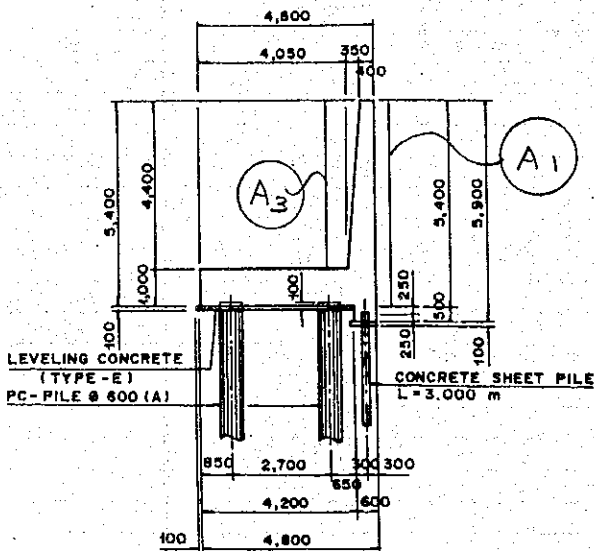
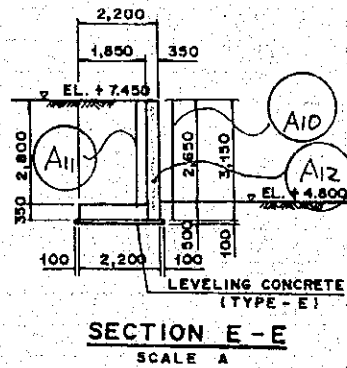
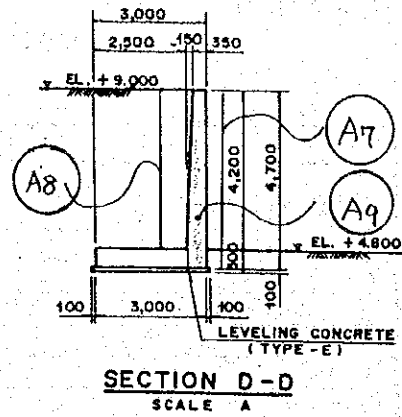
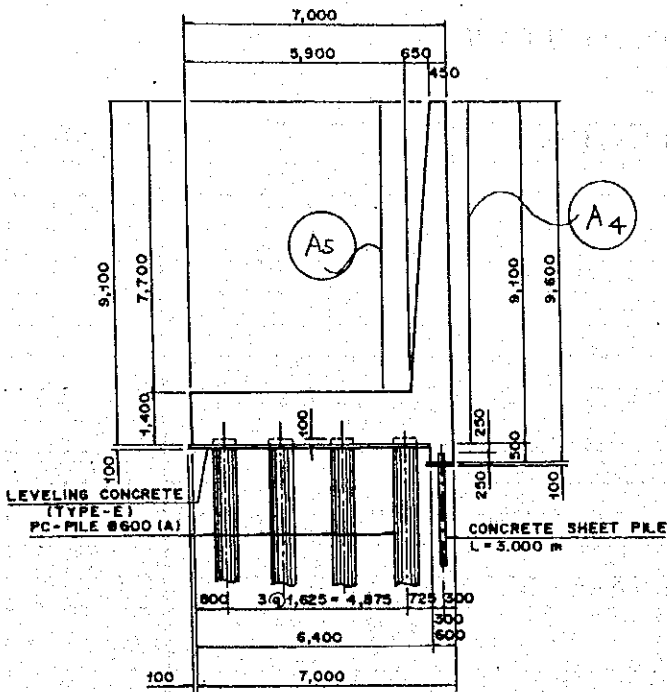
CALCULATION		RESULT
• WATER STOP		
W - 1L		
$L_1 = (4.40 + 0.50) + (4.05 + 0.55)$	=	9.500
W - 6L		
$L_2 = (4.20 + 0.25)$	=	4.450
W - 7L		
$L_3 = (2.65 + 0.25) \times 2$	=	5.800
$L_4 = (1.85 + 0.175)$	=	2.025
TOTAL	=	21.775
		21.775 m
• SCAFFOLDING		
W - 1L		
$A_1 = 5.40 \times 10.00$	=	54.000
$A_2 = 5.40 \times 4.80$	=	25.920
$A_3 = 4.40 \times (10.00 + 4.80)$	=	65.120
$A_3' = 5.40 \times 0.70$	=	3.780
W - 2L		
$A_4 = 9.10 \times 15.00$	=	136.500
$A_5 = 9.10 \times 4.00$	=	36.400
$A_6 = 7.70 \times (10.00 + 4.00)$	=	115.500
$A_6' = 9.10 \times 1.10$	=	10.010
W - 6L		
$A_7 = (4.70 + 3.15) \times \frac{1}{2} \times 3.10$	=	12.168
$A_8 = (4.70 + 2.65) \times \frac{1}{2} \times 3.10$	=	10.618
$A_9 = 3.15 \times 0.455$	=	1.433
W - 7L		
$A_{10} = 3.15 \times (2.20 + 5.20)$	=	23.310
$A_{11} = 2.65 \times (2.20 + 5.20)$	=	19.610
$A_{12} = 3.15 \times 0.35$	=	1.103
TOTAL	=	515.472
		515.472 m ²

APPROACH WALL

TYPE OF WORK : SCAFFOLDING

LOCATION : DOWNSTREAM , LEFT BANK

EXPLANATORY DRAWING



TYPE OF WORK : APPROACH WALL
 LOCATION : JOINT FILTER
 : DOWNSTREAM, LEFT BANK

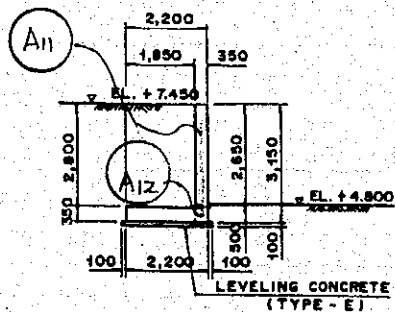
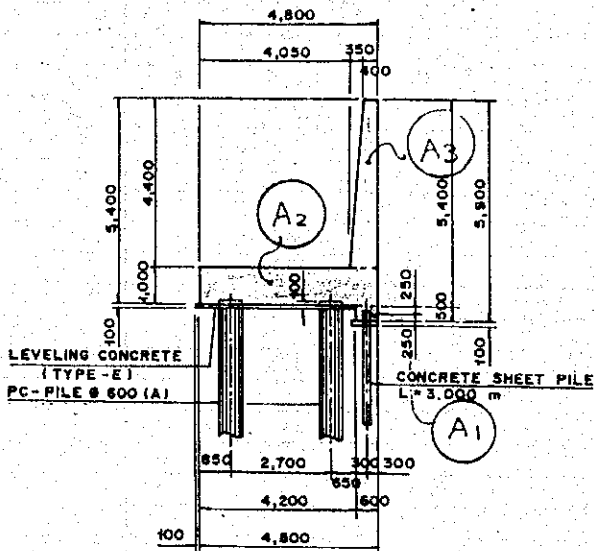
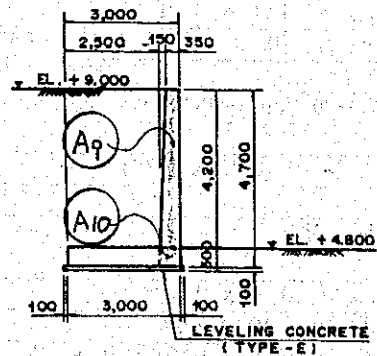
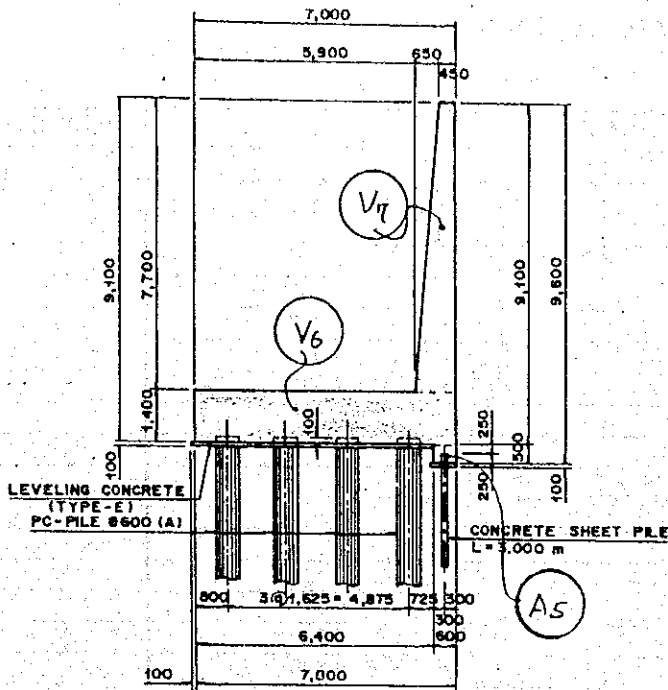
CALCULATION		RESULT
t = 10 (ELASTIC MATERIAL)		
W - 1L		
$A_1 = 0.60 \times 0.50$	=	0.300
$A_2 = 1.00 \times 4.80$	=	4.800
$A_3 = (0.40 + 0.75) \times \frac{1}{2} \times 4.40$	=	2.530
(Deduction for PC Sheet Pile)		
$A_4 = -(0.22 \times 0.25)$	=	-0.055
W - 2L		
$A_5 = 0.60 \times 0.50$	=	0.300
$A_6 = 1.40 \times 7.00$	=	9.800
$A_7 = (0.45 + 1.10) \times \frac{1}{2} \times 7.70$	=	5.968
(Deduction for PC Sheet Pile)		
$A_8 = -(0.22 \times 0.25)$	=	-0.055
W - 6L		
$A_9 = (0.35 + 0.50) \times \frac{1}{2} \times 4.20$	=	1.785
$A_{10} = 0.50 \times 0.50$	=	0.250
W - 7L		
$A_{11} = 0.35 \times 2.80$	=	0.980
$A_{12} = 0.35 \times 2.20$	=	0.070
TOTAL	=	27.373
		27.373 m ²

APPROACH WALL

TYPE OF WORK : JOINT FILLER

LOCATION : DOWNSTREAM LEFT BANK

EXPLANATORY DRAWING



TYPE OF WORK : PILE HEAD TREATMENT
 LOCATION : APPROACH WALL
 : DOWN STREAM, LEFT BANK

CALCULATION	RESULT
W - 1L	
PC PILE DIA 600 (A) n = 12 PILES	
LENGTH OF DESIGN : $L_1 = 9.60$ m	
SPARE PILE LENGTH : $L_2 = 1.00$ m	
ADOPTED PILE LENGTH	
$L = 9.60 + 1.00 = 10.60$ 11.00 m/pile	12 places
PILING	
N VALUE : $N = 32$ (Average)	
$D = 9.60$ m/pile	12 places
CONCRETE FILLING (TYPE-C1) n = 12 PILES	
$V = \frac{\pi}{4} \times 0.40^2 \times 1.30 = 0.163$ m ³ /pile	12 places
SUSPENDED FORM	
$A = \frac{\pi}{4} \times 0.40^2 = 0.126$ m ³ /pile	12 places
REINFORCING BAR	
D 19 (W = 2.23 kg/m)	
$W_1 = 10$ Bars $\times 1.95 \times 2.23 = 43.485$	
D 13 (W = 1.04 kg/m)	
$W_2 = 14$ Bars $\times 1.29 \times 1.04 = 18.782$	
TOTAL W = 62.267 kg.f/pile	12 places
CUTTING PILE HEAD	
Height of cutting : $h = 1.40$ m/pile	
$V = \frac{\pi}{4} \times (0.60^2 - 0.40^2) \times 1.40 = 0.220$ m ³ /pile	12 places

TYPE OF WORK : PILE HEAD TREATMENT
 LOCATION : APPROACH WALL
 : DOWN STREAM, LEFT BANK

CALCULATION	RESULT
W - 2L	
PC PILE DIA 600 (A) n = 36 PILES	
LENGTH OF DESIGN : $L_1 = 10.10$ m	
SPARE PILE LENGTH : $L_2 = 1.00$ m	
ADOPTED PILE LENGTH	
$L = 10.10 + 1.00 = 11.10$ 12.00 m/pile	36 places
PILING	
N VALUE : $N = 32$ (Average)	
$D = 10.10$ m/pile	36 places
CONCRETE FILLING (TYPE-C1) n = 36 PILES	
$V = \frac{\pi}{4} \times 0.40^2 \times 1.30$ = 0.163 m ³ /pile	36 places
SUSPENDED FORM	
$A = \frac{\pi}{4} \times 0.40^2$ = 0.126 m ³ /pile	36 places
REINFORCING BAR	
D 19 (W = 2.23 kg/m)	
$W_1 = 12 \text{ Bars} \times 1.95 \times 2.23$ = 52.182	
D 13 (W = 1.04 kg/m)	
$W_2 = 14 \text{ Bars} \times 1.29 \times 1.04$ = 48.782	
TOTAL W = 70.964 kg.f/pile	36 places
CUTTING PILE HEAD	
Height of cutting : $h = 1.90$ m/pile	
$V = \frac{\pi}{4} \times (0.60^2 - 0.40^2) \times 1.90$ = 0.280 m ³ /pile	36 places

TYPE OF WORK : APPROACH WALL
 LOCATION : CONCRETE (TYPE - C1)
 : UPSTREAM, LEFT BANK

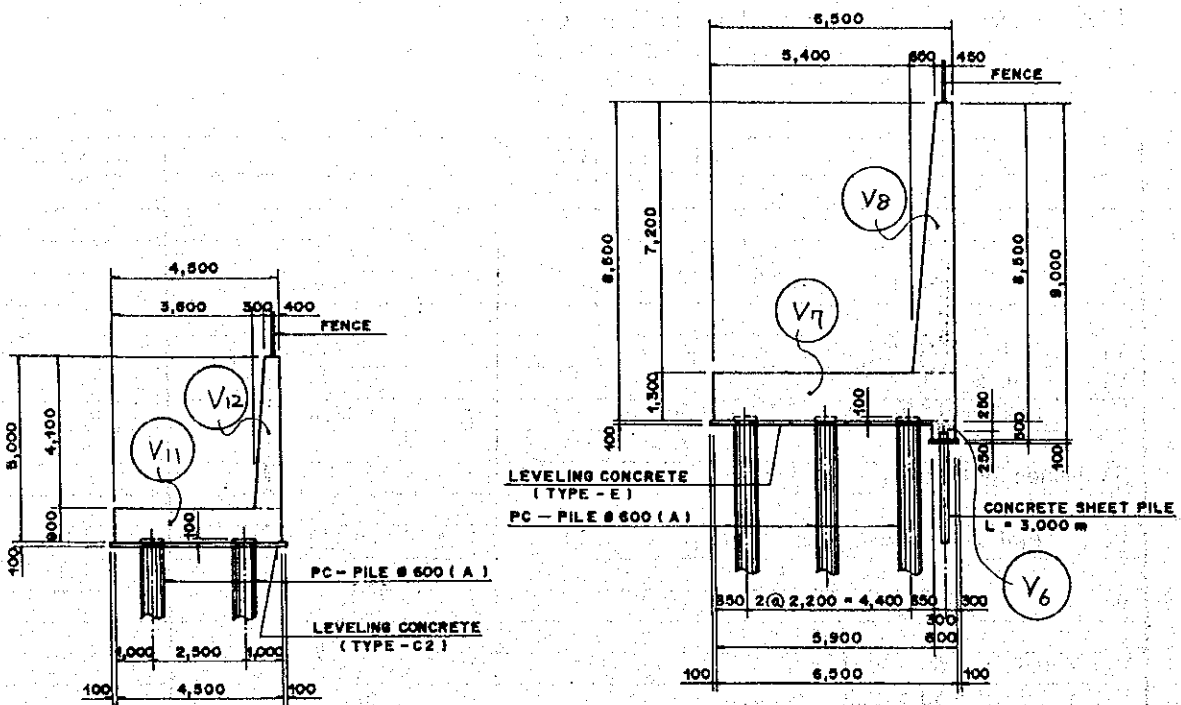
CALCULATION		RESULT
W - 3L		
$V_1 = 0.50 \times 0.60 \times 7.50$	=	2.250
$V_2 = 1.30 \times 6.50 \times 7.50$	=	63.375
$V_3 = (0.45 + 1.10) \times \frac{1}{2} \times 7.20 \times 7.50$	=	41.850
(Deduction for PC Pile)		
$V_5 = (\pi/4 \times 0.60^2 \times 0.10 \times 15 \text{ piles})$	=	- 0.424
W - 4L		
$V_6 = 0.50 \times 0.60 \times 9.50$	=	2.850
$V_7 = 1.30 \times 6.50 \times 9.50$	=	80.275
$V_8 = (0.45 + 1.10) \times \frac{1}{2} \times 7.20 \times 9.50$	=	53.010
(Deduction for PC Sheet Pile)		
$V_9 = -(0.22 \times 0.25 \times 9.50)$	=	- 0.523
(Deduction for PC Pile)		
$V_{10} = (\pi/4 \times 0.60^2 \times 0.10 \times 18 \text{ piles})$	=	- 0.509
W - 5L		
$V_{11} = 0.90 \times 4.50 \times 7.50$	=	30.375
$V_{12} = (0.40 + 0.70) \times \frac{1}{2} \times 4.10 \times 7.50$	=	16.913
(Deduction for PC Pile)		
$V_{13} = -(\pi/4 \times 0.60^2 \times 0.10 \times 8 \text{ piles})$	=	- 0.226
TOTAL		289.216
		289.216 m ³

APPROACH WALL

TYPE OF WORK : CONCRETE (TYPE-C1)

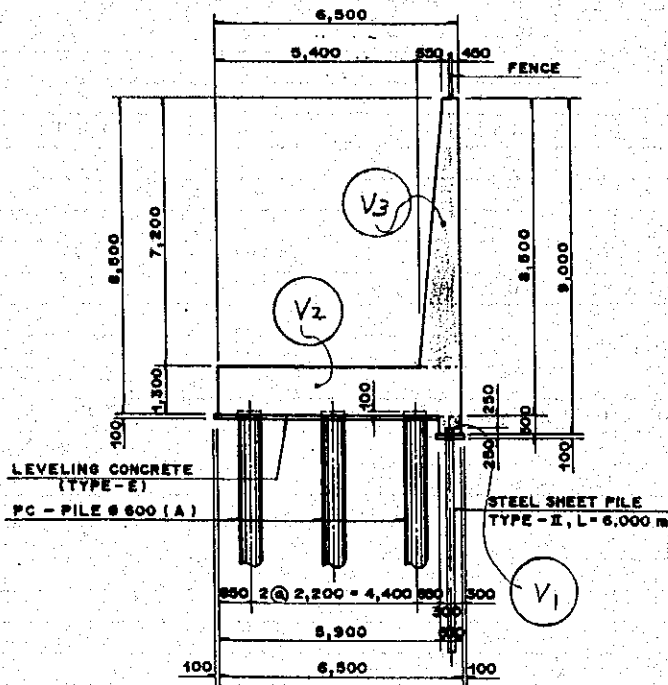
LOCATION : UPSTREAM, LEFT BANK

EXPLANATORY DRAWING



SECTION A-A
SCALE A

SECTION B-B
SCALE A



SECTION C-C
SCALE A

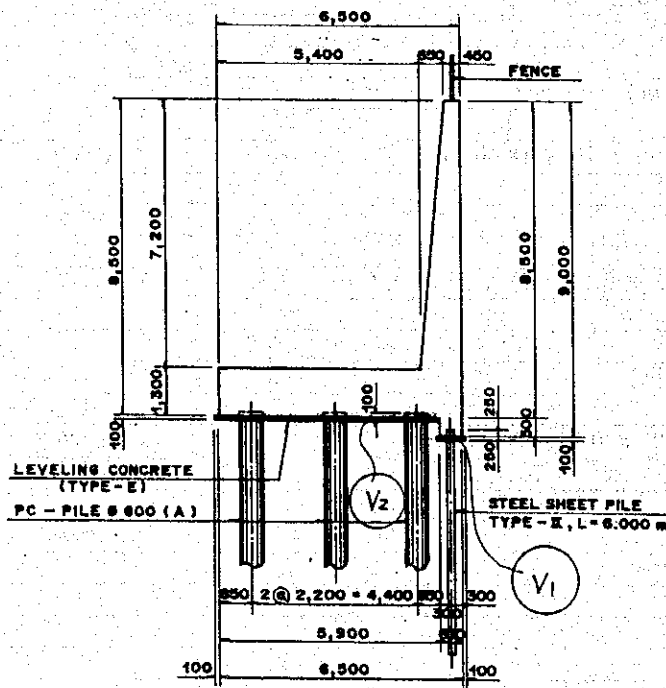
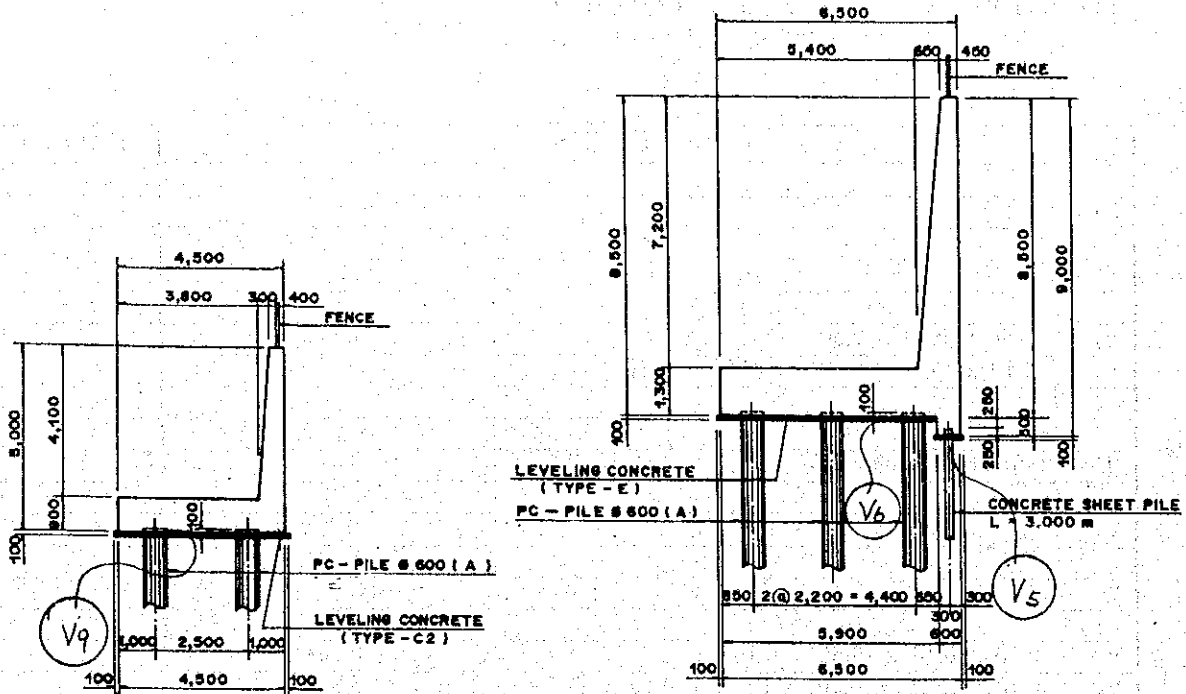
TYPE OF WORK : APPROACH WALL
 LOCATION : LEVELING CONCRETE
 : UPSTREAM, LEFT BANK

CALCULATION		RESULT
(TYPE - E)		
W - 3L		
$V_1 = 0.80 \times 0.10 \times 7.50$	= 0.600	
$V_2 = 0.10 \times (5.90 + 0.10) \times (7.50 + 0.10)$	= 4.560	
(Deduction for PC Sheet Pile)		
$V_4 = (\pi/4 \times 0.60^2 \times 0.10 \times 15 \text{ piles})$	= -0.424	
W - 4L		
$V_5 = 0.80 \times 0.10 \times (9.50 + 0.10)$	= 0.768	
$V_6 = 0.10 \times (5.90 + 0.10) \times (9.50 + 0.10 \times 2)$	= 5.820	
(Deduction for PC Sheet Pile)		
$V_7 = -(0.22 \times 0.10 \times 9.60)$	= -0.211	
(Deduction for PC Pile)		
$V_8 = (\pi/4 \times 0.60^2 \times 0.10 \times 18 \text{ piles})$	= -0.509	
W - 5L		
$V_9 = 0.10 \times (4.50 + 0.10 \times 2) \times (7.50 + 0.10 \times 2)$	= 3.619	
(Deduction for PC Pile)		
$V_{10} = -(\pi/4 \times 0.60^2 \times 0.10 \times 8 \text{ piles})$	= -0.226	
TOTAL	= 13.997	13.997 m ³

APPROACH WALL

TYPE OF WORK : LEVELING CONCRETE
 LOCATION : UPSTREAM, LEFT BANK

EXPLANATORY DRAWING



TYPE OF WORK : APPROACH WALL
 LOCATION : FORM
 : UPSTREAM, LEFT BANK

CALCULATION		RESULT
(H ≥ 4.0 m)		
W - 3L		
$A_1 = 0.50 \times 7.50$	=	3.750
$A_2 = 0.40 \times 7.50$	=	3.000
$A_3 = 1.30 \times 7.50 \times 2$	=	19.500
$A_4 = 7.20 \times 7.50$	=	54.000
$A_5 = \sqrt{0.65^2 + 7.20^2} \times 7.50$	=	54.220
$A_6 = 1.30 \times 6.50 \times 2$	=	16.900
W - 4L		
$A_7 = 0.50 \times 9.50$	=	4.750
$A_8 = 0.40 \times 9.50$	=	3.800
$A_9 = 1.30 \times 9.50 \times 2$	=	24.700
$A_{10} = 7.20 \times 9.50$	=	68.400
$A_{11} = \sqrt{0.65^2 + 7.20^2} \times 9.50$	=	68.678
$A_{12} = 1.30 \times 6.50 \times 2$	=	16.900
$V_{13} = (0.45 + 1.10) \times \frac{1}{2} \times 7.20$	=	5.580
(H ≥ 4.0 m)		
W - 5L		
$A_{14} = 0.90 \times 7.50 \times 2$	=	13.500
$A_{15} = 0.90 \times 4.50 \times 2$	=	8.100
$A_{16} = 4.10 \times 7.50$	=	30.750
$A_{17} = \sqrt{0.30^2 + 4.10^2} \times 7.50$	=	30.832
$A_{18} = (0.40 + 0.70) \times \frac{1}{2} \times 4.10$	=	2.255
TOTAL		= 429.615
		429.615 m ³

APPROACH WALL

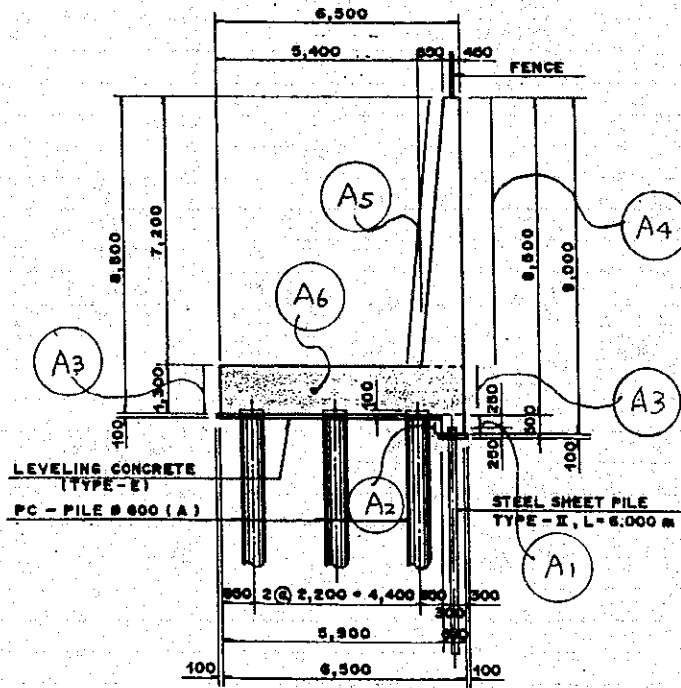
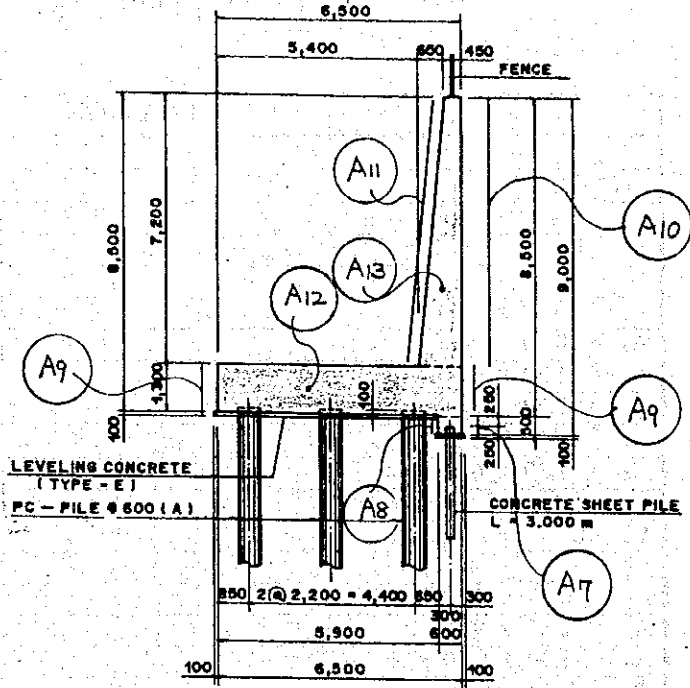
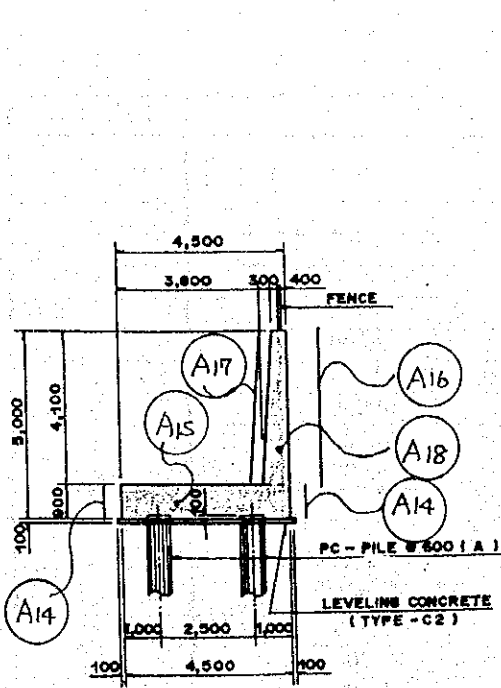
TYPE OF WORK :

FORM

LOCATION :

UPSTREAM, LEFT

EXPLANATORY DRAWING



TYPE OF WORK : APPROACH WALL
 LOCATION : FORM OF LEVELING CONCRETE
 : UPSTREAM, LEFT BANK

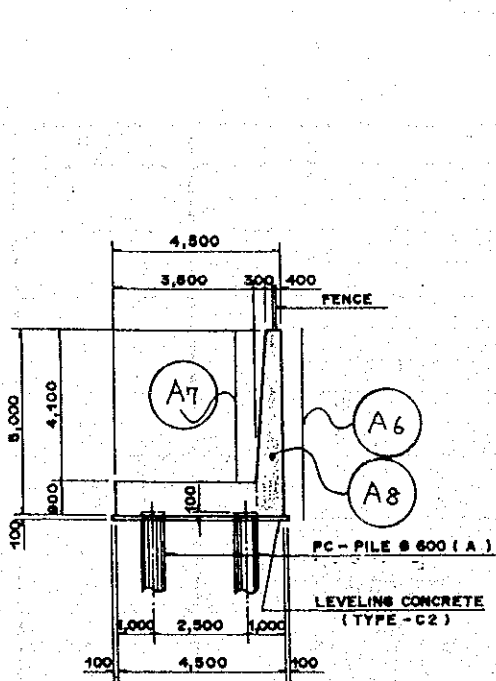
CALCULATION		RESULT
FORM OF LEVELING CONCRETE		
(H ≥ 4.0 m)		
W - 3L		
$A_1 = 0.10 \times 7.50 \times 2$	= 1.500	
$A_2 = 0.10 \times (7.50 + 0.10) \times 2$	= 1.520	
$A_3 = 0.10 \times (5.90 + 0.10) \times 2$	= 1.200	
W - 4L		
$A_4 = 0.10 \times (9.50 + 0.10) \times 2$	= 1.920	
$A_5 = 0.10 \times 0.80$	= 0.080	
$A_6 = 0.10 \times (9.50 + 0.10 \times 2) \times 2$	= 1.940	
TOTAL	= 11.818	11.818 m ²
WATER STOP		
B = 200 mm		
W - 3L		
$L_1 = 8.500$		
W - 4L		
$L_2 = 8.500$		
$L_3 = 5.00$		
TOTAL	= 22.000	22.000 m
SCAFFOLDING		
W - 3L		
$A_1 = 8.50 \times 7.50$	= 63.750	
$A_2 = 7.20 \times 7.50$	= 54.000	
$A_3 = 8.50 \times 9.50$	= 80.750	
$A_4 = 7.20 \times 9.50$	= 68.400	
$A_5 = 1.10 \times 8.50$	= 9.350	
W - 5L		
$A_6 = 5.00 \times 7.50$	= 37.500	
$A_7 = 4.10 \times 7.50$	= 30.750	
$A_8 = 0.70 \times 5.00$	= 3.500	
TOTAL	= 348.000	348.000 m ²

APPROACH WALL

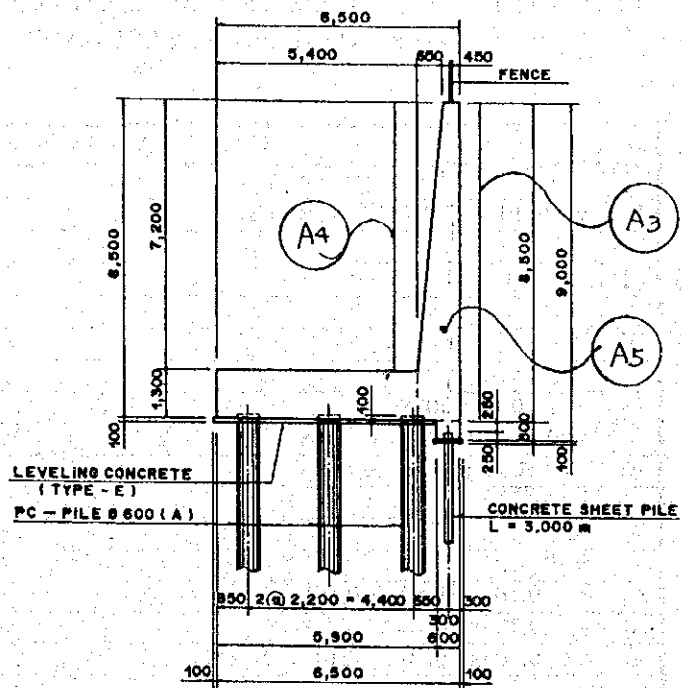
TYPE OF WORK : SCAFFOLDING

LOCATION : UPSTREAM, LEFT BANK

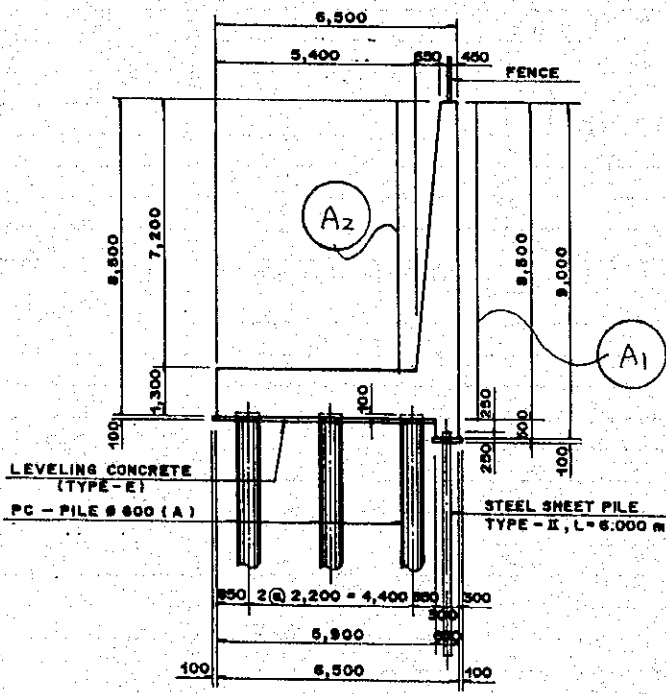
EXPLANATORY DRAWING



SECTION A-A
SCALE A



SECTION B-B
SCALE A



SECTION C-C
SCALE A

TYPE OF WORK : APPROACH WALL
 LOCATION : JOINT FILLER
 : UPSTREAM, LEFT BANK

CALCULATION	RESULT
$t = 10$ (ELASTIC MATERIAL)	
(W-3L)	
$A_1 = (0.45 + 1.10) \times \frac{1}{2} \times 7.20 + (1.30 \times 6.50)$	
$= 14.030$	
$A_2 = 0.50 \times 0.60 \times 2$	$= 0.600$
$A_3 = (0.45 + 1.10) \times \frac{1}{2} \times 7.20 + (1.30 \times 1.10) = 7.010$	
(Deduction for PC Sheet Pile)	
$A_4 = (0.22 \times 0.25) \times 2 = 0.110$	
(W-4L)	
$A_5 = (0.45 + 1.10) \times \frac{1}{2} \times 7.20 + (1.30 \times 1.10) = 7.010$	
$A_6 = 0.50 \times 0.60$	$= 0.300$
(Deduction for PC Sheet Pile)	
$A_7 = -(0.22 \times 0.25)$	$= -0.055$
(W-5L)	
$A_8 = (0.40 + 0.70) \times \frac{1}{2} \times 4.10 + (0.90 \times 0.70) = 2.885$	
TOTAL = 31.780	31.780 m ²

APPROACH WALL

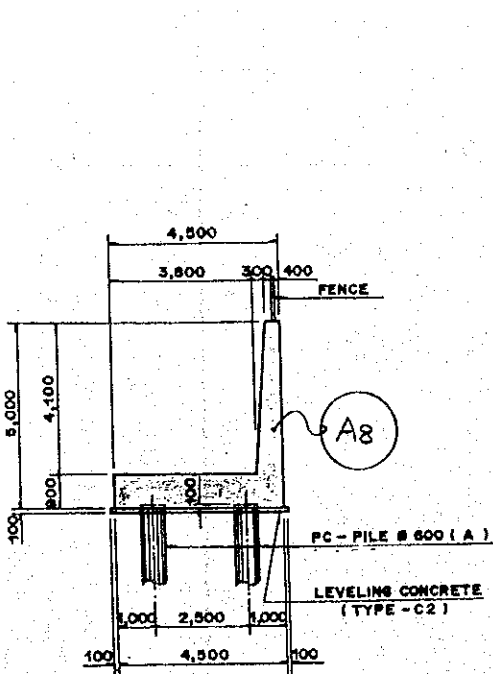
TYPE OF WORK :

JOINT FILLER

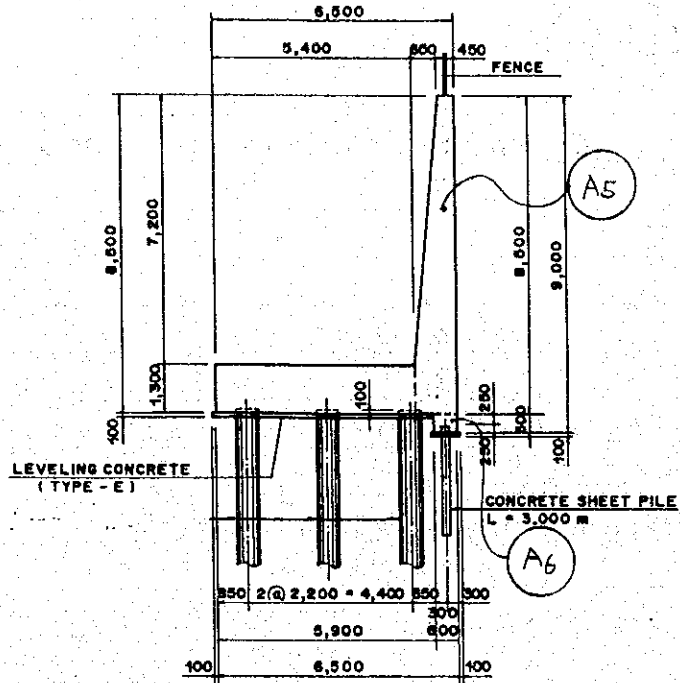
LOCATION :

UPSTREAM, LEFT BANK

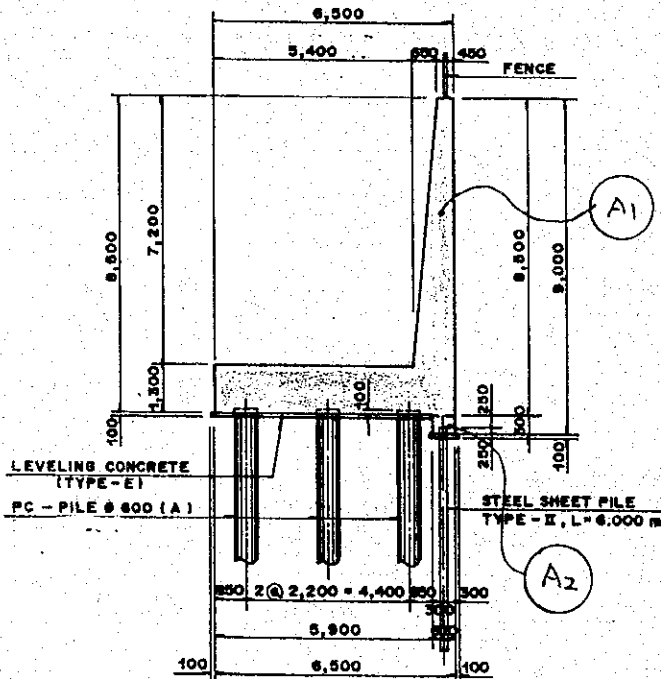
EXPLANATORY DRAWING



SECTION A-A
SCALE A



SECTION B-B
SCALE A



SECTION C-C
SCALE A

TYPE OF WORK : PILE HEAD TREATMENT
 LOCATION : APPROACH WALL
 : UP STREAM, LEFT BANK

CALCULATION	RESULT
W - 3L	
PC PILE DIA 600 (A) n = 15 PILES	
LENGTH OF DESIGN : $L_1 = 10.70$ m/pile	
SPARE PILE LENGTH : $L_2 = 1.00$ m	
ADOPTED PILE LENGTH	
$L = 10.70 + 1.00 = 11.70$ 12.00 m/pile	15 places
PILING	
N VALUE : $N = 28$ (Average)	
$D = 10.70$ m/pile	15 places
CONCRETE FILLING (TYPE-C1) n = 15 PILES	
$V = \frac{\pi}{4} \times 0.40^2 \times 1.30 = 0.163$ m ³ /pile	15 places
SUSPENDED FORM	
$A = \frac{\pi}{4} \times 0.40^2 = 0.126$ m ³ /pile	15 places
REINFORCING BAR	
D 19 (W = 2.23 kg/m)	
$W_1 = 12 \text{ Bars} \times 1.95 \times 2.23 = 52.182$	
D 13 (W = 1.04 kg/m)	
$W_2 = 14 \text{ Bars} \times 1.29 \times 1.04 = 18.782$	
TOTAL W = 70.964 kg.f/pile	15 places
CUTTING PILE HEAD	
Height of cutting : $h = 1.30$ m/pile	
$V = \frac{\pi}{4} \times (0.60^2 - 0.40^2) \times 1.30 = 0.204$ m ³ /pile	15 places

TYPE OF WORK : PILE HEAD TREATMENT
 LOCATION : APPROACH WALL
 : UP STREAM, LEFT BANK

CALCULATION	RESULT
W - 4L	
PC PILE DIA 600 (A) n = 18 PILES	
ADOPTED PILE LENGTH	
L = 12.00 m/pile	18 places
PILING	
N VALUE : N = 28 (Average)	
D = 10.70 m/pile	18 places
CONCRETE FILLING (TYPE-C1) n = 18 PILES	
V = 0.163 m ³ /pile	18 places
SUSPENDED FORM	
A = 0.126 m ³ /pile	18 places
REINFORCING BAR	
W = 70.964 kg.f/pile	18 places
CUTTING PILE HEAD	
Height of cutting : h = 1.30 m/pile	
V = 0.204 m ³ /pile	18 places
W - 5L	
PC PILE DIA 600 (A) n = 8 PILES	
LENGTH OF DESIGN : L₁ = 6.00 m/pile	
SPARE PILE LENGTH : L₂ = 1.00 m	
ADOPTED PILE LENGTH	
L = 6.00 + 1.00 = 7.00 m/pile	8 places

TYPE OF WORK : PILE HEAD TREATMENT
 LOCATION : APPROACH WALL
 : UP STREAM, LEFT BANK

CALCULATION		RESULT
PILING		
N VALUE : N = 28 (Average)		
D = 6.00 m/pile		8 places
CONCRETE FILLING (TYPE-C1) n = 8 BARS		
$V = \frac{\pi}{4} \times 0.40^2 \times 1.150$		= 0.145 m ³ /pile
		8 places
SUSPENDED FORM		
$A = \frac{\pi}{4} \times 0.40^2$		= 0.126 m ³ /pile
		8 places
REINFORCING BAR		
D 16 (W = 1.58 kg/m)		
$W_1 = 8 \text{ Bars} \times 1.65 \times 1.58$		= 20.856
D 13 (W = 1.04 kg/m)		
$W_1 = 12 \text{ Bars} \times 1.25 \times 1.04$		= 15.600
TOTAL W		= 36.456 kg.f/pile
		8 places
CUTTING PILE HEAD		
Height of cutting : h = 1.00 m/pile		
$V = \frac{\pi}{4} \times (0.60^2 - 0.40^2) \times 1.00$		= 0.157 m ³ /pile
		8 places

APPROACH WALL

TYPE OF WORK

: CONCRETE (TYPE - C1)

LOCATION

: DOWNSTREAM, RIGHT BANK

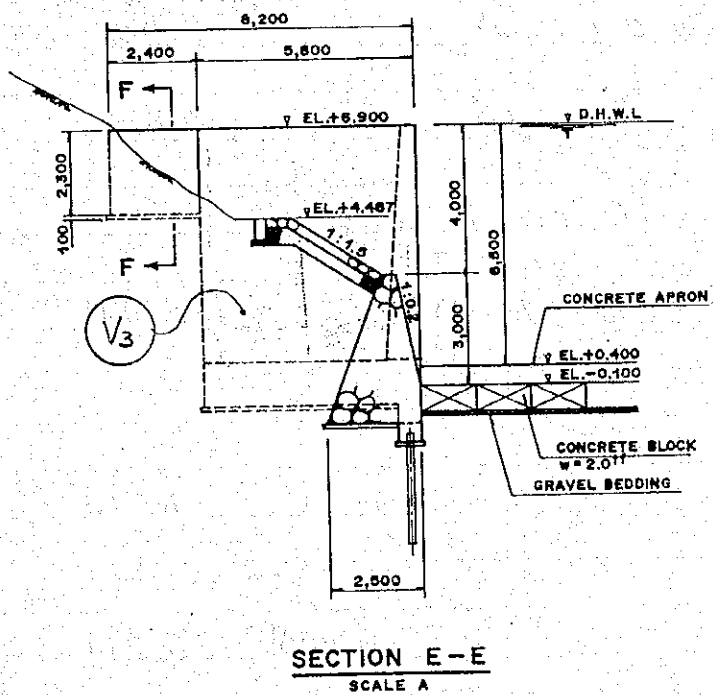
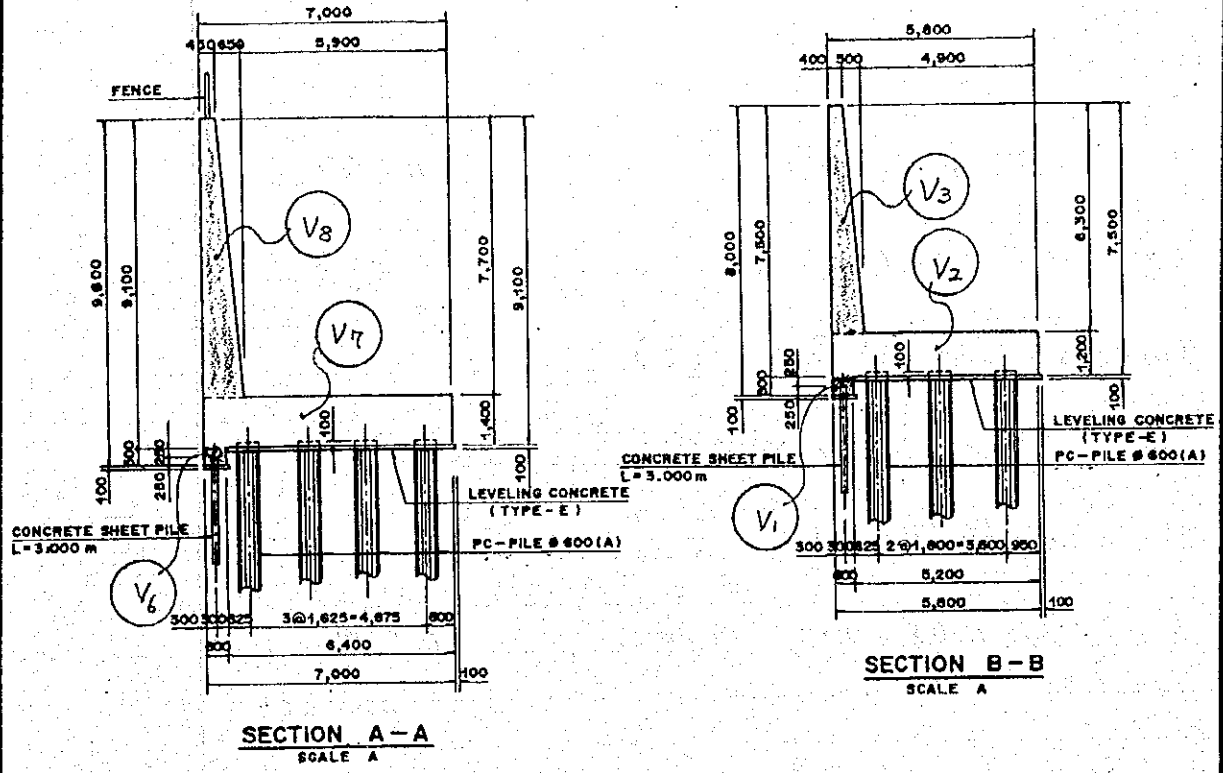
CALCULATION	RESULT
(TYPE - C1)	
<u>W-1R</u>	
$V_1 = 0.50 \times 0.60 \times 10.00$	$= 3.000$
$V_2 = 1.20 \times 5.80 \times 10.00$	$= 69.600$
$V_3 = (0.40 + 0.90) \times \frac{1}{2} \times 6.30 \times (10.00 + 5.40)$	
	$= 63.063$
(Deduction for PC Sheet Pile)	
$V_4 = -(0.22 \times 0.25 \times 10.00)$	$= -0.550$
(Deduction for PC Pile)	
$V_5 = -(\frac{\pi}{4} \times 0.60^2 \times 0.10 \times 18 \text{ piles})$	$= -0.509$
<u>W-2R</u>	
$V_6 = 0.50 \times 0.60 \times 15.00$	$= 4.500$
$V_7 = 1.40 \times 7.00 \times 15.00$	$= 147.000$
$V_8 = (0.45 + 1.10) \times \frac{1}{2} \times 7.70 \times 15.00$	$= 89.513$
(Deduction for PC Sheet Pile)	
$V_9 = -(0.22 \times 0.25 \times 15.00)$	$= -0.825$
(Deduction for PC Pile)	
$V_{10} = -(\frac{\pi}{4} \times 0.60^2 \times 0.10 \times 36 \text{ piles})$	$= -1.018$

TOTAL = 373.774 373.774 m³

APPROACH WALL

TYPE OF WORK : CONCRETE (TYPE-C1)
 LOCATION : DOWNSTREAM, RIGHT BANK

EXPLANATORY DRAWING

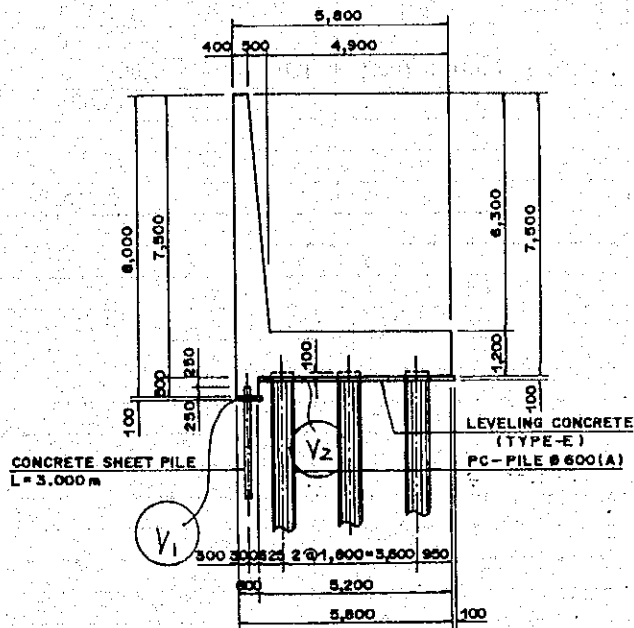
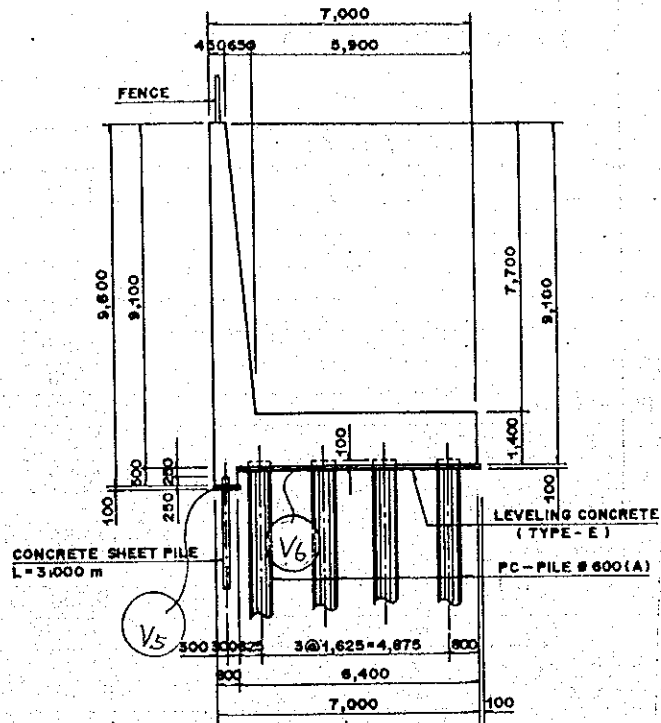


TYPE OF WORK : APPROACH WALL
 : LEVELING CONCRETE
 LOCATION : DOWNSTREAM, RIGHT BANK

CALCULATION	RESULT
(TYPE - E)	
(W-1R)	
$V_1 = 0.80 \times 0.10 \times 10.00 = 0.800$	
$V_2 = 0.10 \times 10.10 \times 5.30 = 5.353$	
(Deduction for PC Sheet Pile)	
$V_3 = -(0.22 \times 0.10 \times 10.00) = -0.220$	
(Deduction for PC Pile)	
$V_4 = -(\frac{\pi}{4} \times 0.60^2 \times 0.10 \times 18 \text{ piles}) = -0.509$	
(W-2R)	
$V_5 = 0.80 \times 0.10 \times 15.00 = 1.200$	
$V_6 = 0.10 \times 15.10 \times 6.50 = 9.815$	
(Deduction for PC Sheet Pile)	
$V_7 = -(0.22 \times 0.10 \times 15.00) = -0.330$	
(Deduction for PC Pile)	
$V_8 = -(\frac{\pi}{4} \times 0.60^2 \times 0.10 \times 36 \text{ piles}) = -1.018$	
TOTAL = 15.091	15.091 m ³

TYPE OF WORK : APPROACH WALL
 LEVELING CONCRETE
 LOCATION : DOWNSTREAM, RIGHT BANK

EXPLANATORY DRAWING



TYPE OF WORK : APPROACH WALL
 LOCATION : FORM
 : DOWNSTREAM, RIGHT BANK

CALCULATION		RESULT
(H ≥ 4.0 m)		
W - 3R		
A ₁ =	0.50 x 10.00 =	5.000
A ₂ =	0.40 x 10.00 =	4.000
A ₃ =	7.50 x (10.00 + 5.40) =	118.500
A ₄ =	$\sqrt{0.50^2 + 6.30^2} \times (10.00 + 5.40)$ =	97.325
A ₅ =	1.20 x 10.00 =	12.000
A ₆ =	$(0.5 \times 0.60) + (1.20 \times 5.80) + (0.40 + 0.90) \times \frac{1}{2} \times 6.30$ =	11.355
A ₇ =	0.50 x 0.60 =	0.300
(Deduction for PC Sheet Pile)		
A ₈ =	$-(0.22 \times 0.25) \times 2$ =	-0.110
W - 2R		
A ₉ =	0.50 x 15.00 =	7.500
A ₁₀ =	0.40 x 15.00 =	6.000
A ₁₁ =	9.10 x 15.00 =	136.500
A ₁₂ =	$\sqrt{0.65^2 + 7.70^2} \times 15.00$ =	115.911
A ₁₃ =	1.40 x 15.00 =	21.000
A ₁₄ =	$(0.50 \times 0.60) + (1.40 \times 7.00) + (0.45 + 1.10) \times \frac{1}{2} \times 7.00$ =	15.525
(Deduction for PC Sheet Pile)		
A ₁₅ =	$-(2.22 \times 0.25)$ =	-0.055
TOTAL =		550.751
		550.751 m ²

APPROACH WALL

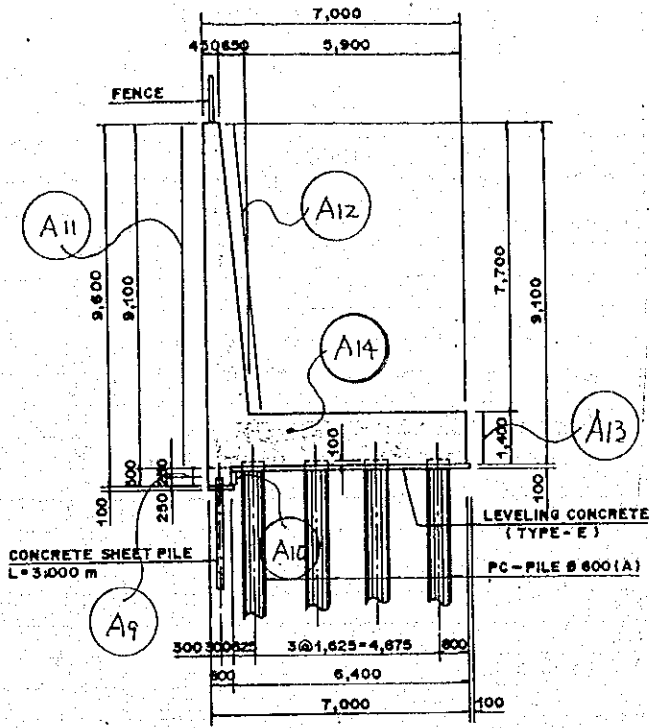
TYPE OF WORK :

FORM

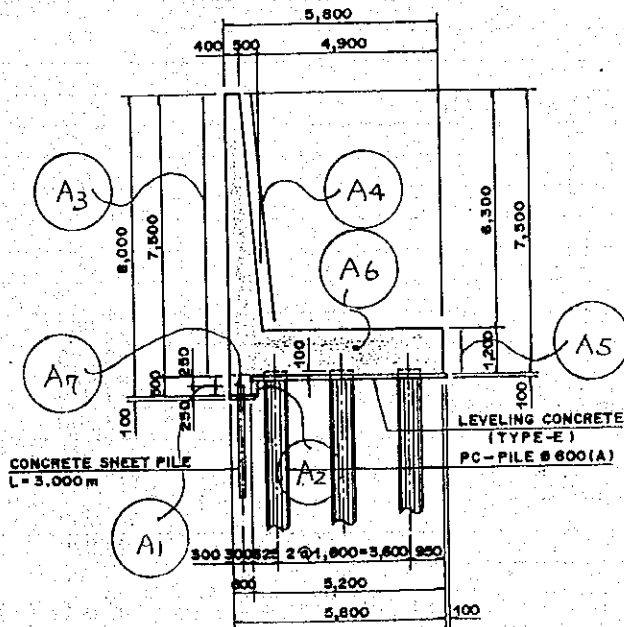
LOCATION :

DOWNSTREAM , RIGHT BANK

EXPLANATORY DRAWING



SECTION A - A
SCALE A



SECTION B - B
SCALE A

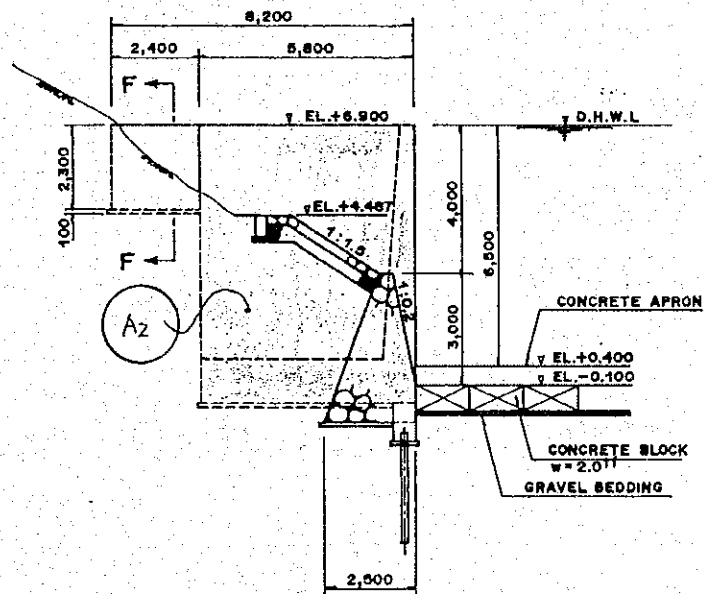
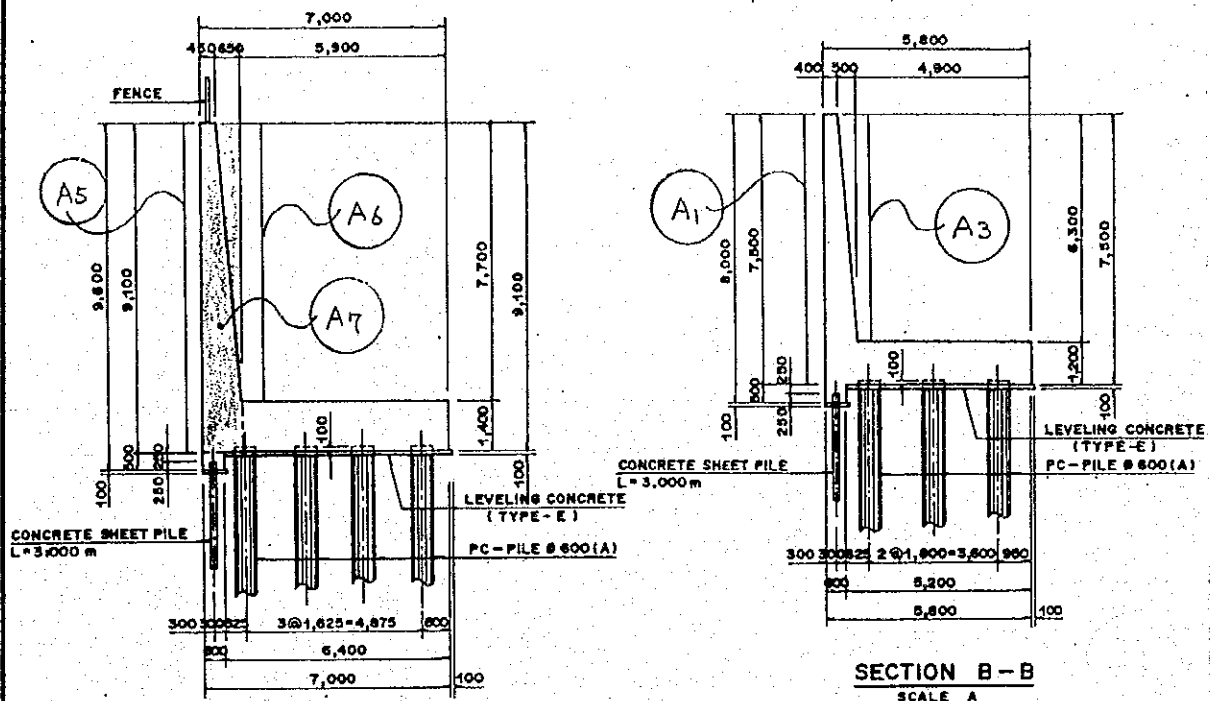
TYPE OF WORK : APPROACH WALL
 LOCATION : FORM OF LEVELING CONCRETE
 : DOWNSTREAM, RIGHT BANK

CALCULATION			RESULT
FORM OF LEVELING CONCRETE			
W - 3L			
$A_1 = 0.10 \times 10.00 \times 2$	=	2.000	
$A_2 = 0.10 \times 10.10 \times 2$	=	2.020	
$A_3 = (0.80 \times 0.10) + (5.30 \times 0.10)$	=	0.610	
(Deduction for PC Sheet Pile)			
$A_4 = -(0.22 \times 0.10)$	=	-0.022	
W - 2L			
$A_5 = 0.10 \times 15.00 \times 2$	=	3.000	
$A_6 = 0.10 \times 15.20 \times 2$	=	3.040	
$A_7 = (0.80 \times 0.10) + (6.50 \times 0.10)$	=	0.730	
(Deduction for PC Sheet Pile)			
$A_8 = -(0.22 \times 0.10)$	=	-0.002	
TOTAL		= 11.356	11.356 m ²
WATER STOP			
B = 200 mm			
W - 1R			
$L = (6.30 + 0.60) + (4.90 + 0.70)$	=	12.500	12.500 m
SCAFFOLDING			
W - 1L			
$A_1 = 0.75 \times 10.00$	=	75.000	
$A_2 = 0.75 \times 5.80$	=	43.500	
$A_3 = 6.30 \times (10.00 + 5.40)$	=	97.020	
$A_4 = 0.75 \times 0.90 \times 2$	=	13.500	
W - 2L			
$A_5 = 9.10 \times 15.00$	=	136.500	
$A_6 = 7.70 \times 15.00$	=	115.500	
$A_7 = 9.10 \times 1.10 \times 2$	=	20.020	
TOTAL		= 501.040	501.040 m ²

APPROACH WALL

TYPE OF WORK : SCAFFOLDING
 LOCATION : DOWNSTREAM, RIGHT BANK

EXPLANATORY DRAWING



APPROACH WALL

TYPE OF WORK : JOINT FILLER
 LOCATION : DOWNSTREAM RIGHT BANK

CALCULATION	RESULT
$t = 10$ (ELASTIC MATERIAL)	
$(W-1L)$	
$A_1 = 0.60 \times 0.50 = 0.300$	
$A_2 = 1.20 \times 5.80 = 6.960$	
$A_3 = (0.40 + 0.90) \times \frac{1}{2} \times 6.30 = 4.095$	
(Deduction for PC Sheet Pile)	
$A_4 = -(0.22 \times 0.25) = -0.055$	
$(W-2L)$	
$A_5 = 0.60 \times 0.50 = 0.300$	
$A_6 = 1.40 \times 7.00 = 9.800$	
$A_7 = (0.45 + 1.10) \times \frac{1}{2} \times 7.70 = 5.968$	
(Deduction for PC Sheet Pile)	
$A_8 = -(0.22 \times 0.25) = -0.055$	
TOTAL = 27.313	27.313 m²

APPROACH WALL

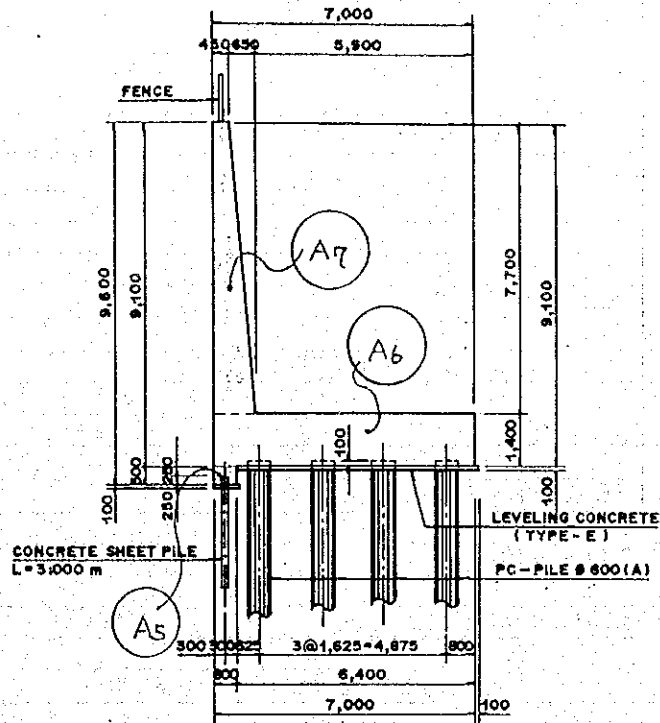
TYPE OF WORK :

JOINT FILLER

LOCATION :

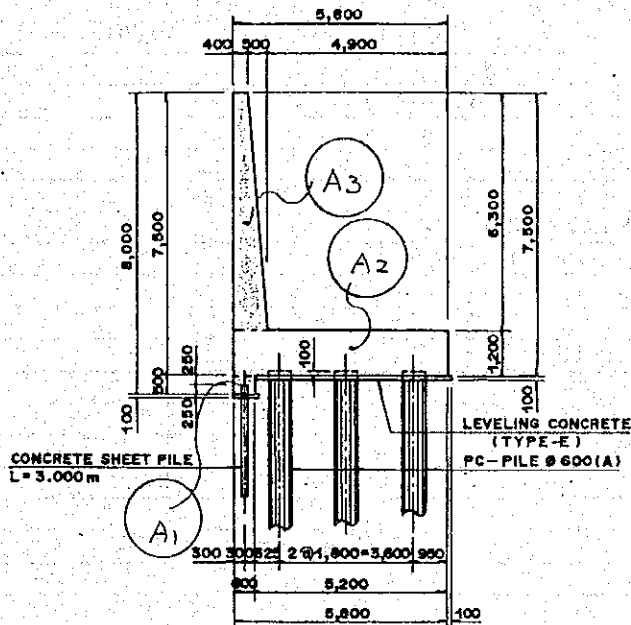
DOWNSTREAM, RIGHT BANK

EXPLANATORY DRAWING



SECTION A - A

SCALE A



SECTION B - B

SCALE A

TYPE OF WORK : APPROACH WALL
 LOCATION : EARTH RETAINING WALL
 : DOWNSTREAM, RIGHT BANK

CALCULATION		RESULT
• WET STONE MASONRY		
(H = 2.30 m)		
$V_1 = (0.30 + 1.80) \times \frac{1}{2} \times 2.30 \times 2.40$	=	5.796
(H ≥ 2.60 m)		
$V_2 = (0.35 + 2.10) \times \frac{1}{2} \times 2.60 \times (12.25 + 12.301) \times \frac{1}{2}$	=	38.667
	$\Sigma V =$	44.463
		44.463 m ³
• LEVELING CONCRETE (TYPE - E)		
(H = 2.30 m)		
$V_3 = 2.00 \times 0.10 \times (2.40 + 0.10)$	=	0.500
(H = 2.60 m)		
$V_4 = 2.30 \times 0.10 \times (12.031 + 0.10)$	=	2.790
	$\Sigma V =$	3.290
		3.290 m ³
• FORM (H < 4.0 m)		
(H = 2.30 m)	$A_1 = (2.40 + 0.10) \times 2 + 2.00 \times 0.10$	= 5.200
(H = 2.60 m)	$A_2 = (12.031 + 0.10) \times 2 + 2.30 \times 0.10$	= 24.492
	TOTAL	= 29.692
		29.692 m ²
• JOINT FILLER (t = 10, ELASTIC MATERIAL)		
(H = 2.30 m)		
$A_1 = (0.30 + 1.80) \times \frac{1}{2} \times 2.30$	=	2.415
(H = 2.60 m)		
$A_2 = (0.35 + 2.10) \times \frac{1}{2} \times 2.60 \times 1.004$	=	3.198
	coefficient of length	
	$\Sigma A =$	5.613
		5.613 m ²
• CEMENT MORTAR POINTING		
(H = 2.30 m)		
$A_3 = 2.30 \times 2.40$	=	5.520
(H = 2.60 m)		
$A_4 = 2.10 \times 12.25$	=	25.725
	$\Sigma A =$	31.245
		31.245 m ²