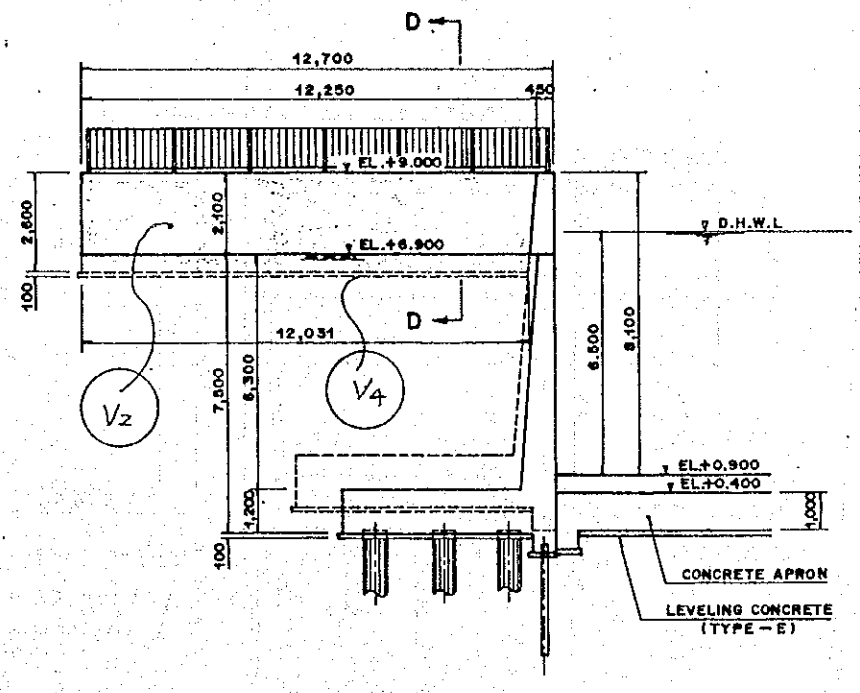
TYPE OF WORK : APPROACH WALL
EARTH RETAINING WALL

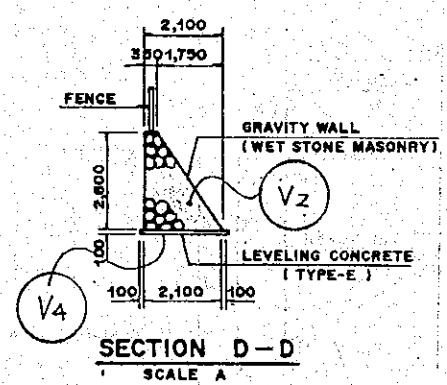
LOCATION : DOWNSTREAM, RIGHT BANK

(1/2)

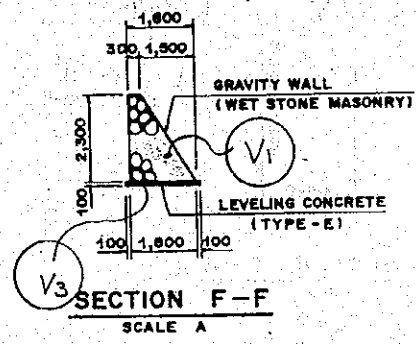
EXPLANATORY DRAWING



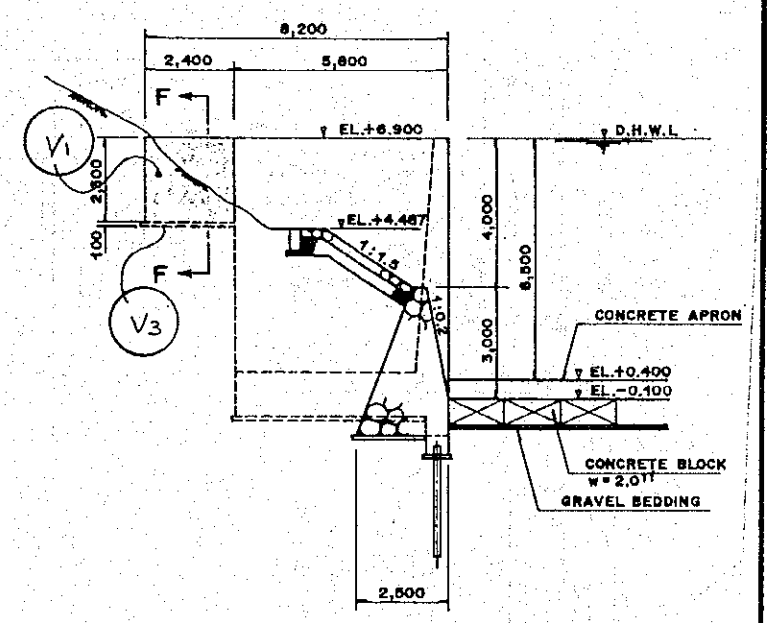
SECTION C-C
SCALE A



SECTION D-D
SCALE A



SECTION F-F
SCALE A



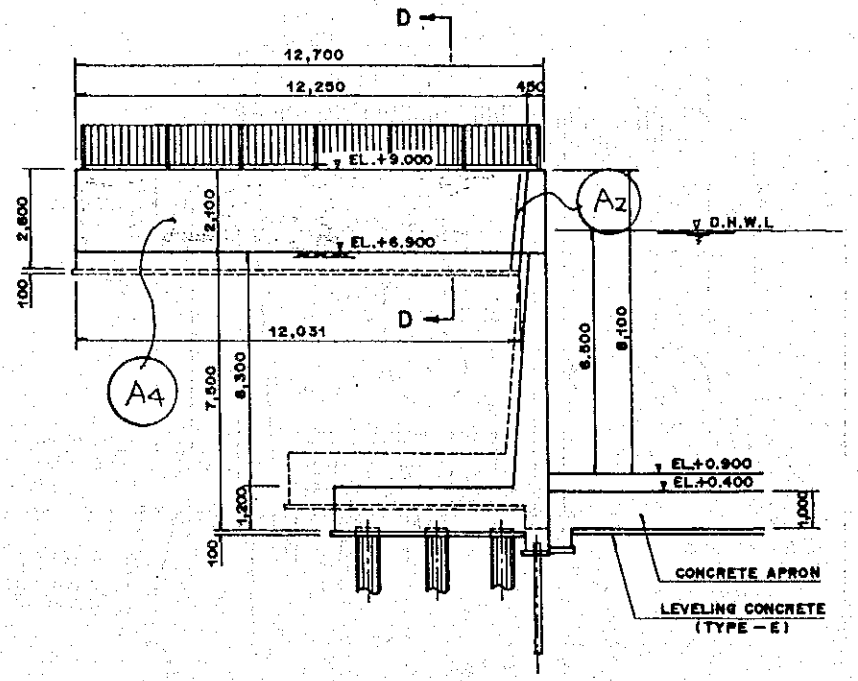
SECTION E-E
SCALE A

APPROACH WALL

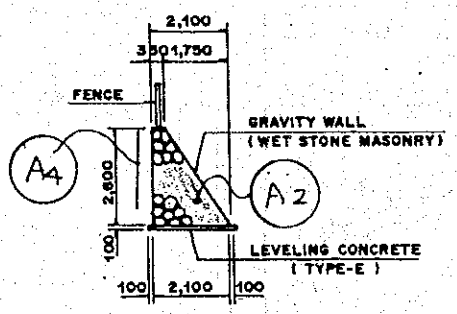
TYPE OF WORK : EARTH RETAINING WALL (2/2)

LOCATION : DOWNSTREAM, RIGHT BANK

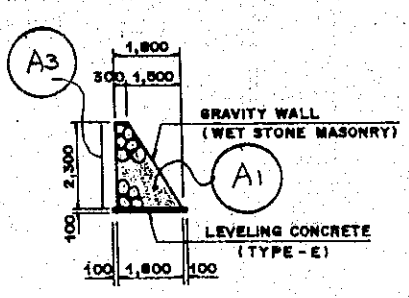
EXPLANATORY DRAWING



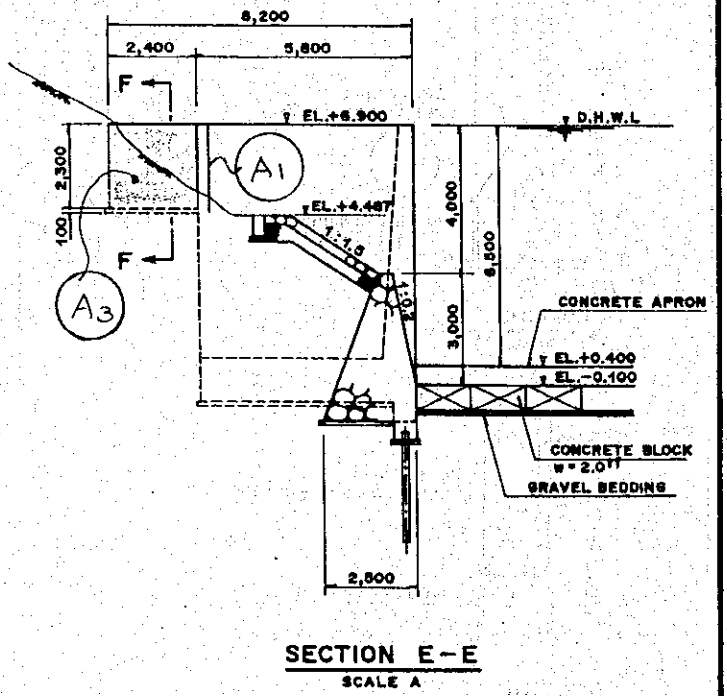
SECTION C-C
SCALE A



SECTION D-D
SCALE A



SECTION F-F
SCALE A



SECTION E-E
SCALE A

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

CALCULATION	RESULT
W – 1R	
PC PILE DIA 600 (A) n = 18 PILES	
LENGTH OF DESIGN : L_1 = 10.50 m	
SPARE PILE LENGTH : L_2 = 1.00 m	
ADOPTED PILE LENGTH	
L = 10.50 + 1.00 = 11.50 12.00 m/pile	18 places
PILING	
N VALUE : N = 22 (Average)	
D = 10.50 m/pile	18 places
CONCRETE FILLING (TYPE-C1) n = 18 PILES	
V = $\pi/4$ x 0.40^2 x1.30 = 0.163 m^3/pile	18 places
SUSPENDED FORM	
A = $\pi/4$ x 0.40^2 = 0.126 m^3/pile	18 places
REINFORCING BAR	
D 19 (W = 2.23 kg/m)	
W_1 = 10 Bars x 1.95 x 2.23 = 43.485	
D 13 (W = 1.04 kg/m)	
W_2 = 14 Bars x 1.29 x 1.04 = 18.782	
TOTAL W = 62.267 kg.f/pile	18 places
CUTTING PILE HEAD	
Height of cutting : h = 1.50 m/pile	
V = $\pi/4$ x (0.60^2 - 0.40^2) x 1.50 = 0.236 m^3/pile	18 places

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

CALCULATION	RESULT
W – 2R	
PC PILE DIA 600 (A) n = 36 PILES	
LENGTH OF DESIGN : L_1 = 11.00 m	
SPARE PILE LENGTH : L_2 = 1.00 m	
ADOPTED PILE LENGTH	
L = 11.00 + 1.00 12.00 m/pile	36 places
PILING	
N VALUE : N = 22 (Average)	
D = 11.00 m/pile	36 places
CONCRETE FILLING (TYPE-C1) n = 36 PILES	
V = $\pi/4$ x 0.40^2 x1.30 = 0.163 m^3/pile	36 places
SUSPENDED FORM	
A = $\pi/4$ x 0.40^2 = 0.126 m^3/pile	36 places
REINFORCING BAR	
D 19 (W = 2.23 kg/m)	
W_1 = 12 Bars x 1.95 x 2.23 = 52.182	
D 13 (W = 1.04 kg/m)	
W_2 = 14 Bars x 1.29 x 1.04 = 18.782	
TOTAL W = 70.964 kg.f/pile	36 places
CUTTING PILE HEAD	
Height of cutting : h = 1.00 m/pile	
V = $\pi/4$ x (0.60^2 - 0.40^2) x 1.00 = 0.157 m^3/pile	36 places

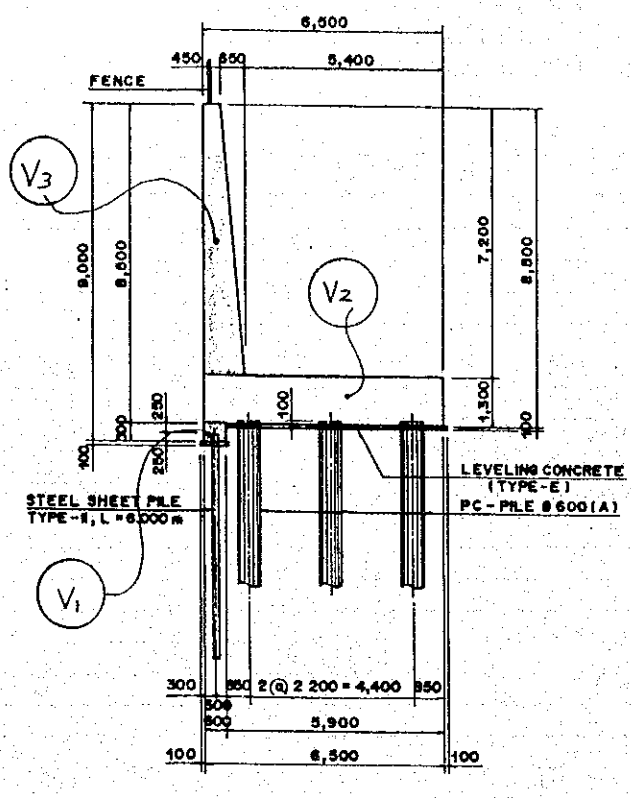
TYPE OF WORK : APPROACH WALL
LOCATION : CONCRETE (TYPE – C1)
: UPSTREAM , RIGHT BANK

CALCULATION			RESULT
(TYPE – C)			
W – 3R			
V_1 = 0.60 x 0.50 x 7.50	=	2.250	
V_2 = 1.30 x 6.50 x 7.50	=	63.375	
V_3 = (0.45 + 1.10) x ½ x 7.20 x 7.50	=	41.850	
(Deduction for PC Pile)			
V_4 = (π/4 x 0.60^2 x 0.10 x 15 piles)	=	- 0.424	
W – 4R			
V_5 = 0.60 x 0.50 x 12.00	=	3.600	
V_6 = 1.30 x 6.50 x 12.00	=	101.400	
V_7 = (0.45 + 1.10) x ½ x 7.20 x 12.00	=	66.960	
(Deduction for PC Sheet Pile)			
V_8 = - (0.22 x 0.25 x 12.00)	=	- 0.660	
(Deduction for PC Pile)			
V_9 = - (π/4 x 0.60^2 x 0.10 x 24 piles)	=	- 0.679	
W – 5R			
V_{10} = 0.90 x 4.50 x 9.00	=	36.450	
V_{11} = (0.40 + 0.70) x ½ x 4.10 x 9.00	=	20.295	
(Deduction for PC Pile)			
V_{12} = - (π/4 x 0.60^2 x 0.10 x 8 piles)	=	- 0.226	
TOTAL	=	334.191	334.191 m^3

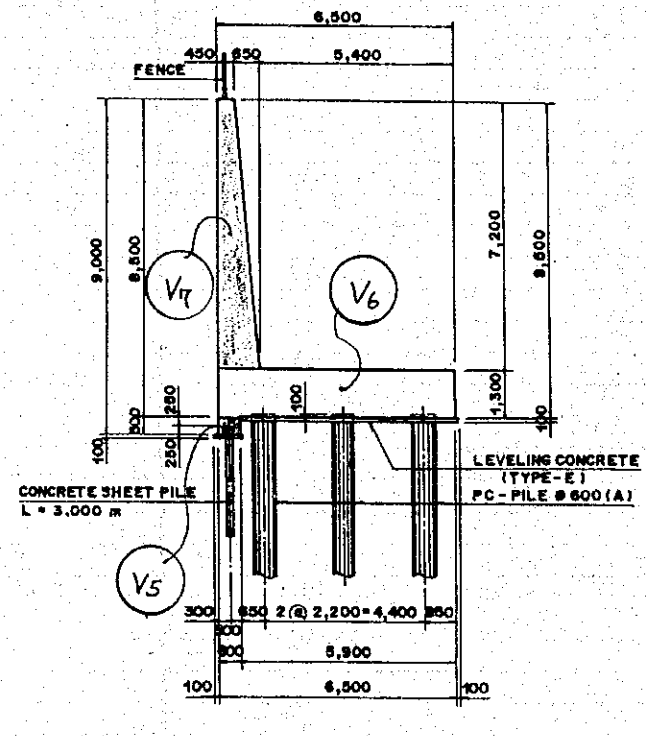
TYPE OF WORK : APPROACH WALL CONCRETE (TYPE-C1)

LOCATION : UPSTREAM, RIGHT BANK

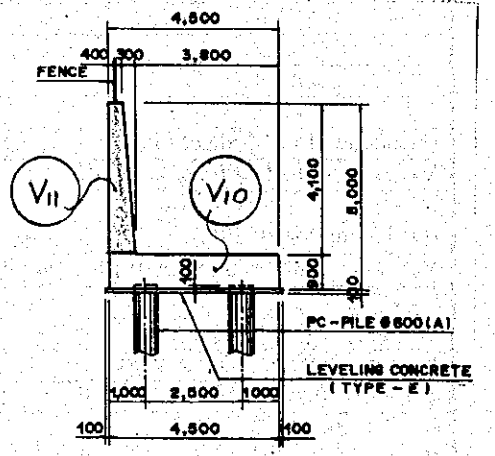
EXPLANATORY DRAWING



SECTION A-A
SCALE A



SECTION B-B
SCALE A



SECTION C-C
SCALE A

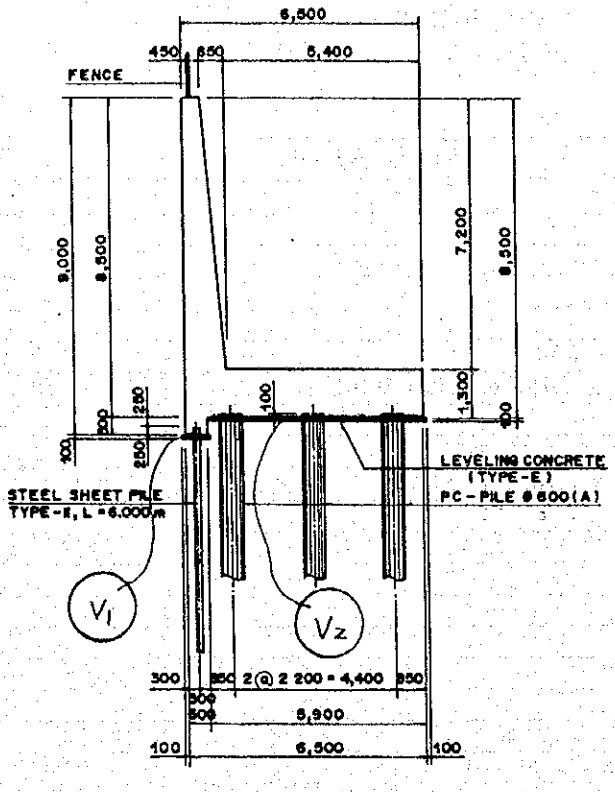
TYPE OF WORK : APPROACH WALL
LOCATION : LEVELING CONCRETE
: UPSTREAM , RIGHT BANK

CALCULATION			RESULT
(TYPE – E)			
W – 3R			
V_1 = 0.80 x 0.10 x 7.50	=	0.600	
V_2 = 0.10 x (5.90 + 0.10) x (7.50 + 0.10)	=	4.560	
(Deduction for PC Pile)			
V_4 = (π/4 x 0.60^2 x 0.10 x 15 piles)	=	- 0.424	
W – 4R			
V_5 = 0.80 x 0.10 x (12.00 + 0.10)	=	0.968	
V_6 = 0.10 x (5.90 + 0.10) x (12.00 + 0.10 x 2)	=	7.320	
(Deduction for PC Pile)			
V_7 = (0.22 x 0.25 x 12.00)	=	- 0.660	
(Deduction for PC Pile)			
V_8 = (π/4 x 0.60^2 x 0.10 x 24 piles)	=	- 0.679	
(Deduction for PC Sheet Pile)			
V_8 = - (0.22 x 0.25 x 12.00)	=	- 0.660	
W – 5L			
V_9 = (4.50 + 0.10 x 2) x (9.00 + 0.10 x 2) x 0.10	=	4.324	
(Deduction for PC Pile)			
V_{10} = - (π/4 x 0.60^2 x 0.10 x 8 piles)	=	- 0.226	
TOTAL	=	15.783	15.783 m^3

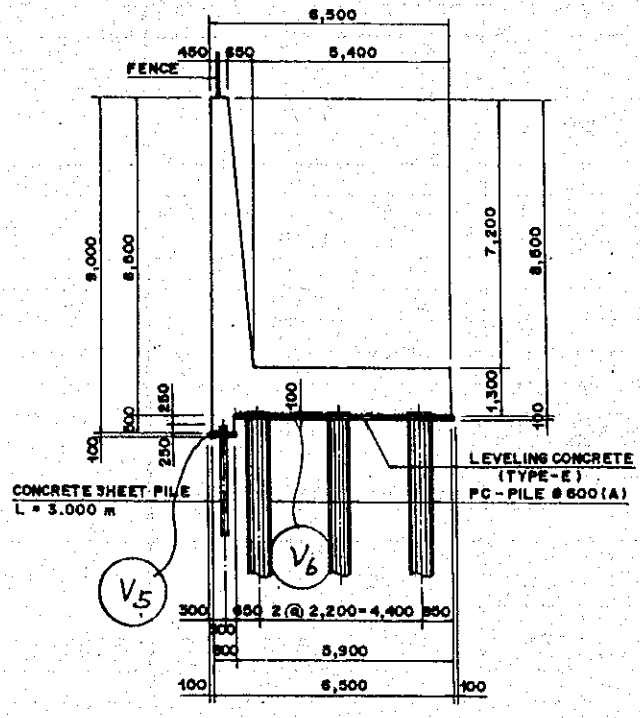
TYPE OF WORK : APPROACH WALL
LEVELING CONCRETE

LOCATION : UPSTREAM . RIGHT BANK

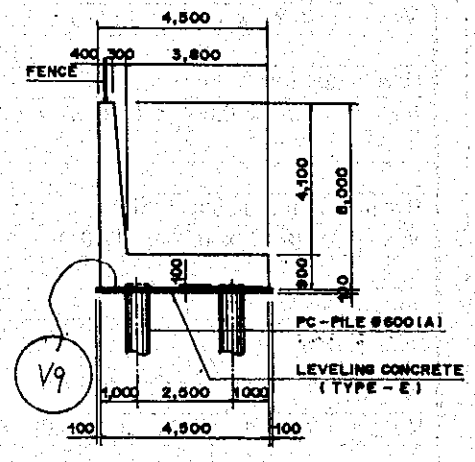
EXPLANATORY DRAWING



SECTION A-A
SCALE A



SECTION B-B
SCALE A



SECTION C-C
SCALE A

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

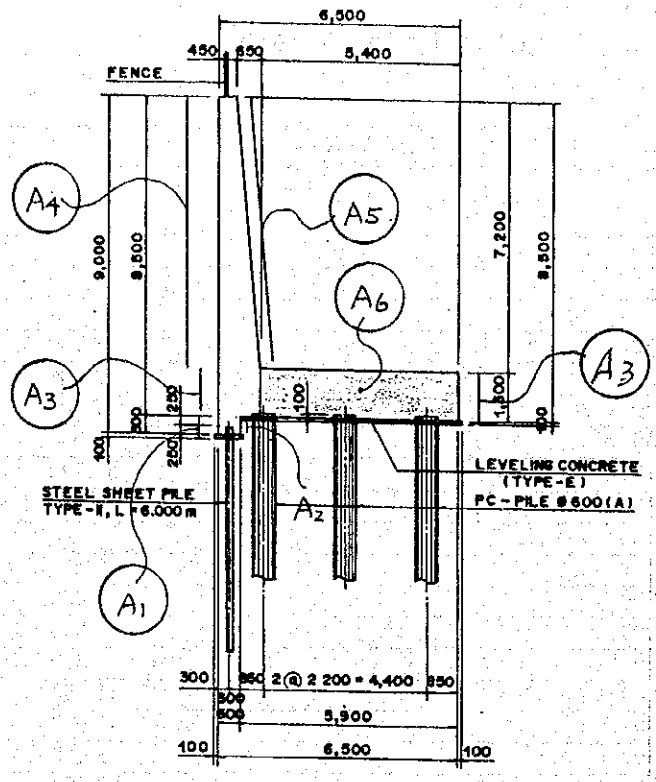
CALCULATION			RESULT
(H ≥ 4.0 m)			
W – 3R			
A_1 = 0.50 x 7.50	=	3.750	
A_2 = 0.40 x 7.50	=	3.000	
A_3 = 1.30 x 7.50 x 2	=	19.500	
A_4 = 7.20 x 7.50	=	54.000	
A_5 = $\sqrt{0.65^2 + 7.20^2}$ x 7.50	=	54.220	
A_6 = 5.40 x 1.30	=	7.020	
W – 4R			
A_7 = 0.50 x 12.00	=	6.000	
A_8 = 0.40 x 12.00	=	4.800	
A_9 = 0.50 x 0.60	=	0.300	
A_{10} = 1.30 x 12.00 x 2	=	31.200	
A_{11} = 5.40 x 1.30	=	7.020	
A_{12} = 6.50 x 1.30	=	8.450	
A_{13} = 7.20 x 12.00	=	86.400	
A_{14} = $\sqrt{0.65^2 + 7.20^2}$ x 12.00	=	86.751	
A_{15} = (0.45 + 1.10) x ½ x 7.20 x 2	=	11.160	
W – 5R			
A_{16} = 0.90 x 9.00 x 2	=	16.200	
A_{17} = 0.90 x 4.50 x 2	=	8.100	
A_{18} = 4.10 x 9.00	=	36.900	
A_{19} = $\sqrt{0.30^2 + 4.10^2}$ x 9.00	=	36.999	
A_{20} = (0.40 + 0.70) x ½ x 4.10 x 2	=	4.510	
TOTAL	=	486.280	486.280 m^2

APPROACH WALL

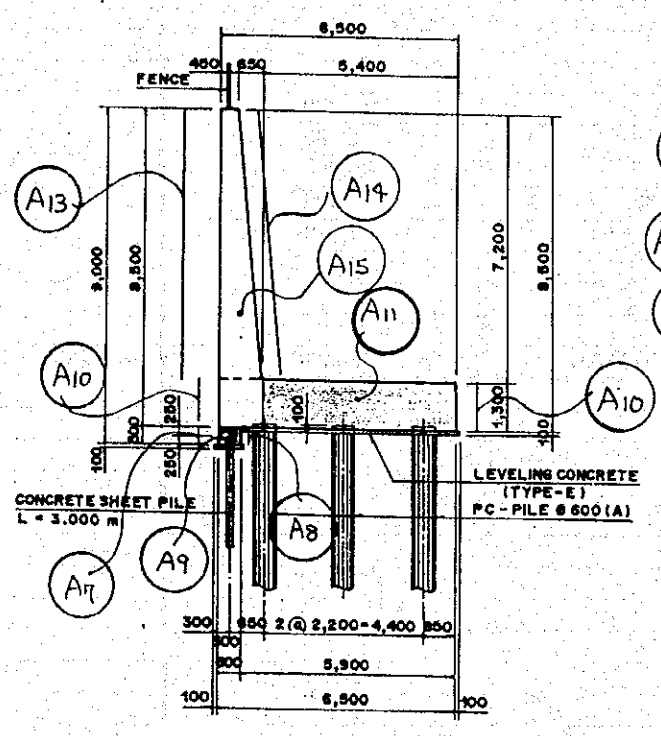
TYPE OF WORK : FORM

LOCATION : UPSTREAM , RIGHT BANK

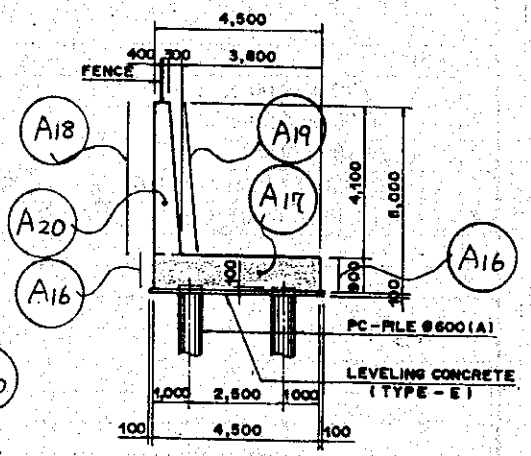
EXPLANATORY DRAWING



SECTION A - A
SCALE A



SECTION B - B
SCALE A



SECTION C - C
SCALE A

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

CALCULATION				RESULT
(H < 4.0 m)				
W – 3R				
A_1 = 0.10 x 7.50 x 2		=	1.500	
A_2 = 0.10 x (7.50 + 0.10) x 2		=	1.520	
A_3 = 0.10 x (5.90 + 0.10) x 2		=	1.200	
W – 4R				
A_4 = 0.10 x (12.00 x 0.10) x 2		=	2.420	
A_5 = 0.10 x 0.80		=	0.080	
A_6 = 0.10 x (12.00 + 0.10 x 2) x 2		=	2.440	
A_7 = 0.10 x (5.90 + 0.10) x 2		=	1.200	
(Deduction for PC Sheet Pile)				
A_8 = - (0.22 x 0.10)		=	- 0.022	
W – 5R				
A_9 = 0.10 x (9.00 + 0.10 x 2) x 2		=	1.840	
A_{10} = 0.10 x (4.50 + 0.10 x 2) x 2		=	0.940	
	TOTAL	=	13.118	13.118 m^2
B = 200 mm				
W – 3R				
L_1 = 8.500				
W – 4R				
L_2 = 8.500				
W – 5R				
L_3 = 5.000				
	TOTAL	=	22.000	22.000 m

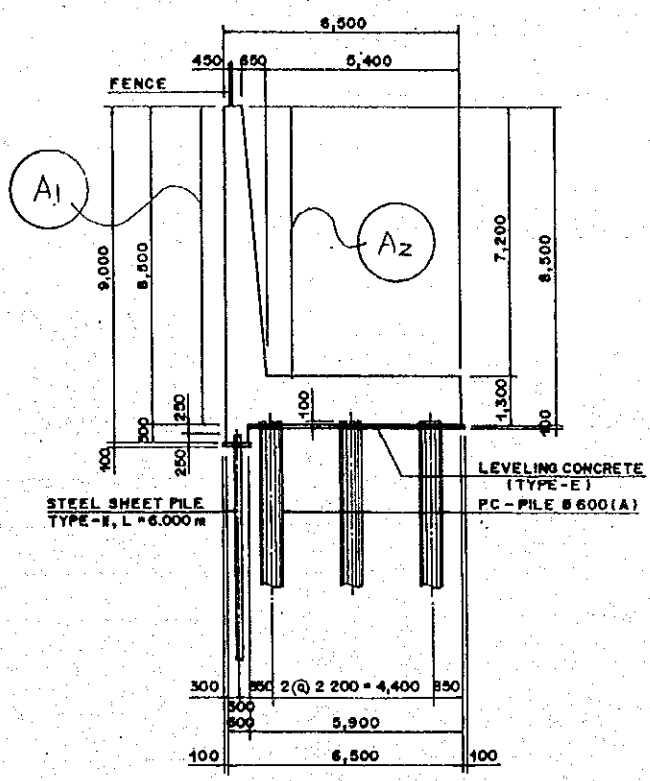
TYPE OF WORK : APPROACH WALL
LOCATION : SCAFFOLDING
: UPSTREAM , RIGHT BANK

CALCULATION			RESULT
W – 3R			
A_1 = 8.50 x 7.50	=	63.750	
A_2 = 7.20 x 7.50	=	54.000	
W – 4R			
A_3 = 8.50 x 12.00	=	102.000	
A_4 = 7.20 x 12.00	=	86.400	
A_5 = 1.10 x 8.50	=	9.350	
W – 5R			
A_6 = 5.00 x 9.00	=	45.000	
A_7 = 4.10 x 9.00	=	36.900	
A_8 = 0.70 x 5.00	=	3.500	
TOTAL	=	400.900	400.900 m^2

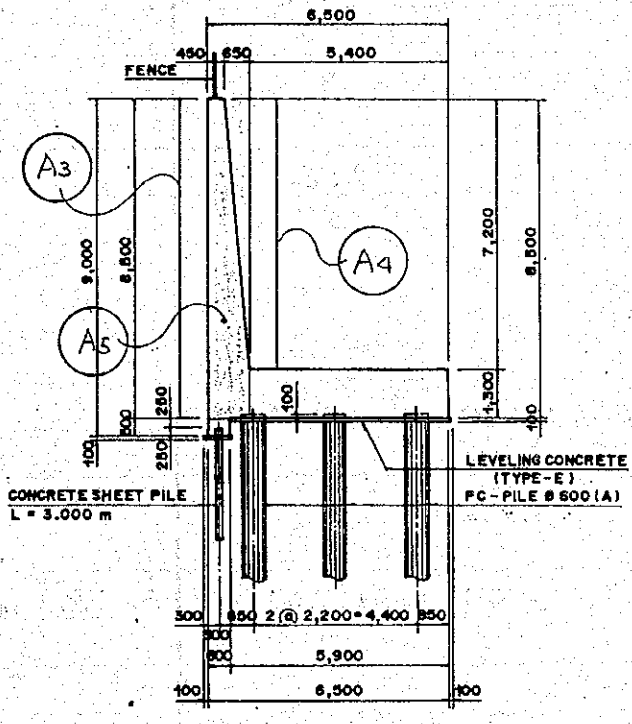
TYPE OF WORK : APPROACH WALL SCAFFOLDING

LOCATION : UPSTREAM, RIGHT BANK

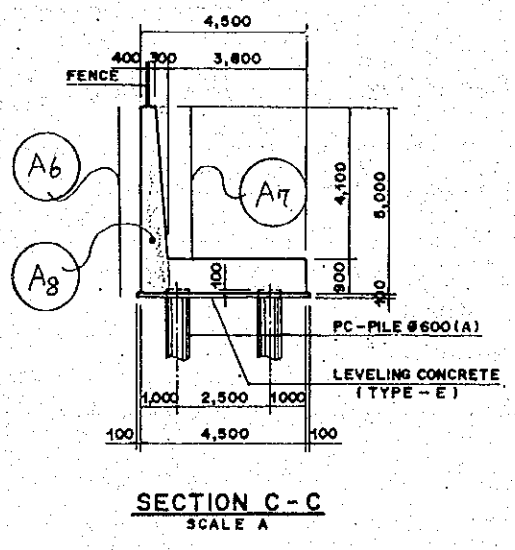
EXPLANATORY DRAWING



SECTION A-A
SCALE A



SECTION B-B
SCALE A



SECTION C-C
SCALE A

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

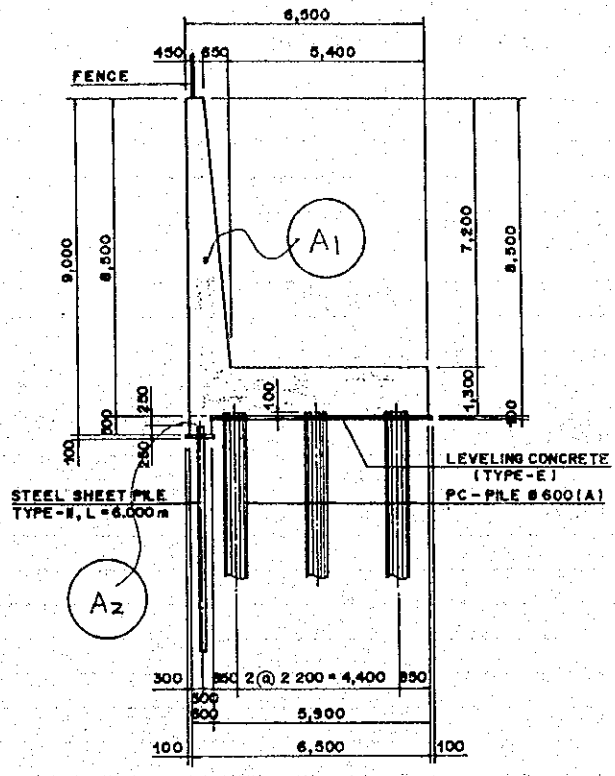
CALCULATION	RESULT
t=10 (ELASTIC JOINT FILLER)	
(W-3R)	
$A_1 = (0.45 + 1.10) \times 1/2 \times 7.20 + (1.30 \times 6.50)$	
$= 14.030$	
$A_2 = 0.50 \times 0.60 \times 2 = 0.600$	
$A_3 = (0.45 + 1.10) \times 1/2 \times 7.20 + (1.30 \times 1.10) = 7.010$	
(W-4R)	
$A_4 = (0.45 + 1.10) \times 1/2 \times 7.20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

APPROACH WALL

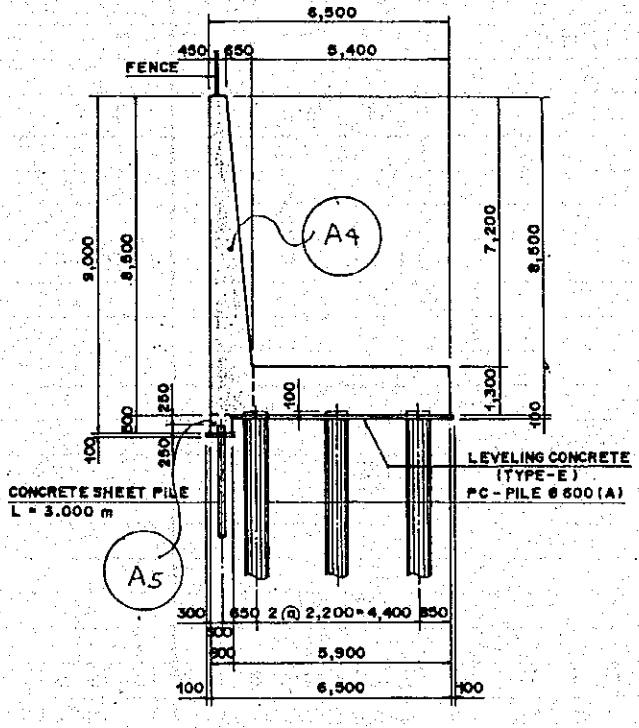
TYPE OF WORK : JOINT FILLER

LOCATION : UPSTREAM, RIGHT BANK

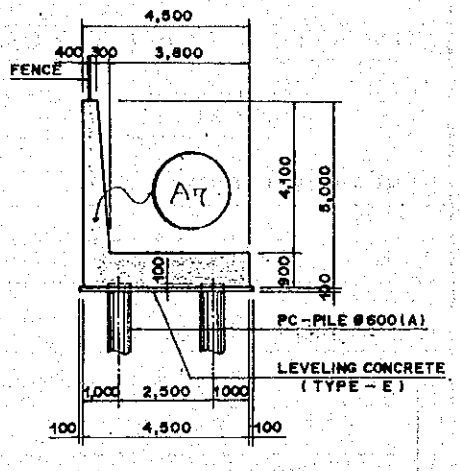
EXPLANATORY DRAWING



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, RIGHT BANK

CALCULATION	RESULT
W – 3R	
PC PILE DIA 600 (A) n = 15 PILES	
LENGTH OF DESIGN : L_1 = 11.60 m/pile	
SPARE PILE LENGTH : L_2 = 1.00 m	
ADOPTED PILE LENGTH	
L = 11.60 + 1.00 = 12.60 13.00 m/pile	15 places
JOINTING	
n = 1 place/pile	15 points
PILING	
N VALUE : N = 22 (Average)	
D = 11.60 m/pile	15 places
CONCRETE FILLING (TYPE-C1) n = 15 PILES	
$V = \pi/4 \times 0.40^2 \times 1.30$ = 0.163 m^3/pile	15 places
SUSPENDED FORM	
$A = \pi/4 \times 0.40^2$ = 0.126 m^3/pile	15 places
REINFORCING BAR	
D 19 (W = 2.23 kg/m)	
W_1 = 12 Bars x 1.95 x 2.23 = 52.182	
D 13 (W = 1.04 kg/m)	
W_1 = 14 Bars x 1.29 x 1.04 = 18.782	
TOTAL W = 70.964 kg.f/pile	15 places

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

CALCULATION	RESULT
CUTTING PILE HEAD	
Height of cutting : h = 1.40 m/pile	
V = $\pi/4$ x (0.60^2 - 0.40^2) x 1.40 = 0.220 m^3/pile	15 places
W – 4R	
PC PILE DIA 600 (A) n = 24 PILES	
ADOPTED PILE LENGTH	
L = 13.00 m/pile	24 places
JOINTING	
n = 1 place/pile	24 points
PILING	
N VALUE : N = 22 (Average)	
D = 11.60 m/pile	24 places
CONCRETE FILLING (TYPE-C1) n = 24 PILES	
V = 0.163 m^3/pile	24 places
SUSPENDED FORM	
A = 0.126 m^3/pile	24 places
REINFORCING BAR	
W = 70.964 kg.f/pile	24 places
CUTTING PILE HEAD	
Height of cutting : h = 1.40 m/pile	
V = 0.220 m^3/pile	24 places

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

CALCULATION	RESULT
W – 5R	
PC PILE DIA 600 (A) n = 8 PILES	
LENGTH OF DESIGN : L_1 = 6.50 m/pile	
SPARE PILE LENGTH : L_2 = 1.00 m	
ADOPTED PILE LENGTH	
L = 6.50 + 1.00 = 7.50 8.00 m/pile	8 places
PILING	
N VALUE : N = 22 (Average)	
D = 6.50 m/pile	8 places
CONCRETE FILLING (TYPE-C1) n = 8 PILES	
V = $\pi/4$ x 0.40^2 x1.150 = 0.145 m^3/pile	8 places
SUSPENDED FORM	
A = $\pi/4$ x 0.40^2 = 0.126 m^3/pile	8 places
REINFORCING BAR	
D 16 (W = 1.58 kg/m)	
W_1 = 8 Bars x 1.65 x 1.58 = 20.856	
D 13 (W = 1.04 kg/m)	
W_1 = 12 Bars x 1.25 x 1.04 = 15.600	
TOTAL W = 36.456 kg.f/pile	8 places
CUTTING PILE HEAD	
Height of cutting : h = 1.50 m/pile	
V = $\pi/4$ x (0.60^2 - 0.40^2) x 1.50 = 0.236 m^3/pile	8 places

3.3 Intake Structure

TYPE OF WORK : CONCRETE (TYPE – C1)
LOCATION : INTAKE WEIR RIGHT

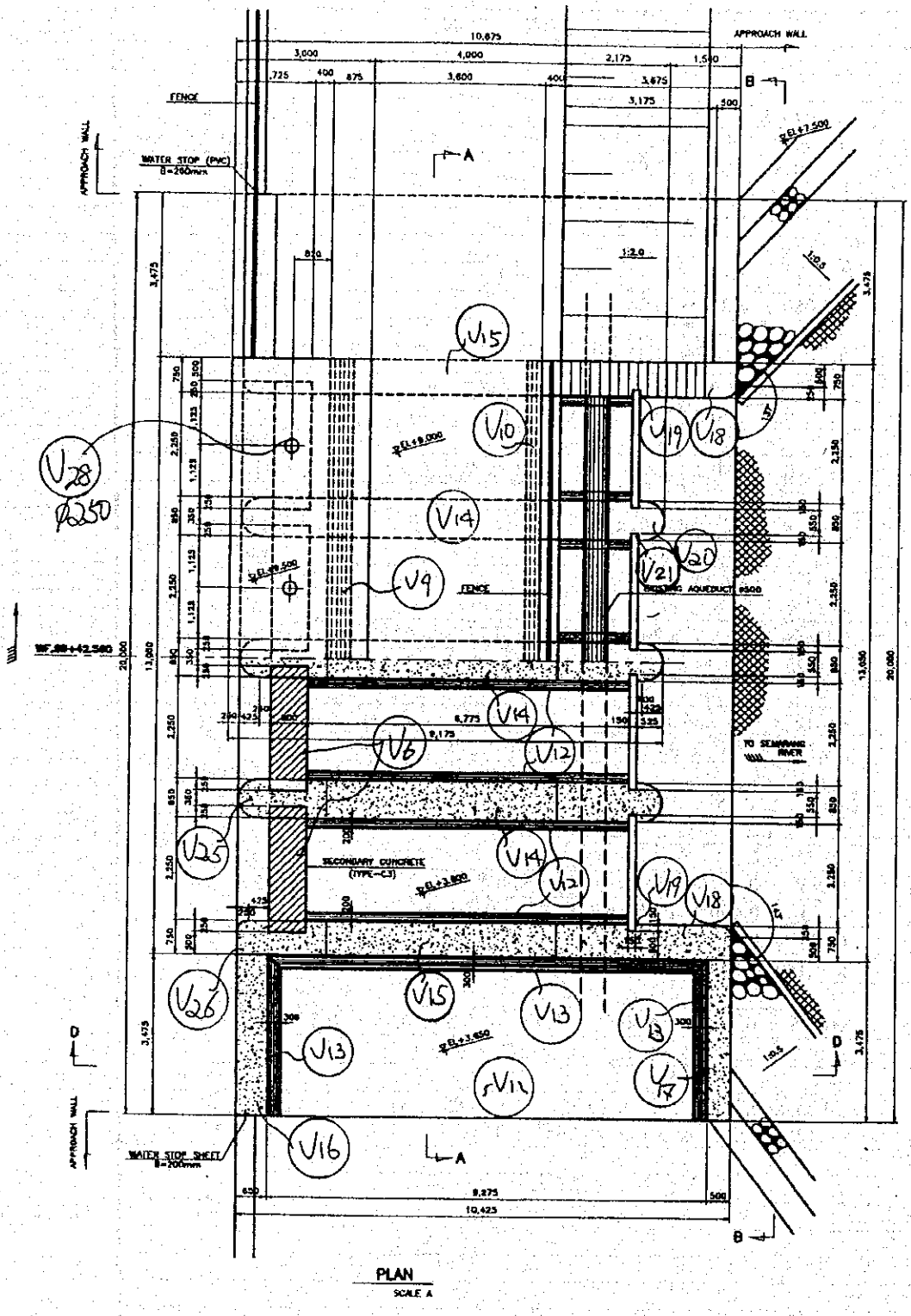
CALCULATION				RESULT
V_1 =	10.675 x 20.000 x 0.85	=	181.475	
V_2 =	0.500 x 0.600 x 20.000	=	6.000	
V_3 =	2.950 x 0.600 x 20.000	=	35.400	
V_4 =	½ x 0.500 x 0.500 x 20.000	=	2.500	
V_5 =	- 0.15 x (2.25 + 0.15 x 2) x 0.15 x 4	=	- 0.230	
V_6 =	- 0.8 x 0.2 x 2.75 x 4	=	- 1.760	
V_7 =	$-(0.35 \div 2)^2$ x 3.142 x (8 x 5) x 0.1	=	- 0.385	
V_8 =	13.050 x 4.875 x 0.5	=	31.809	
V_9 =	½ x 0.5^{00} x 0.5^{00} x 13.05^{0}	=	1.631	
V_{10} =	½ x 0.3^{00} x 0.3^{00} x 13.05^{0}	=	0.587	
V_{11} =	0.4^{00} x 2.7^{00} x 13.0^{50}	=	14.094	
V_{12} =	½ x 0.2^{00} x 0.2^{00} x (5.275 x 8 + 6.775 x 8)	=	1.928	
V_{13} =	½ x 0.3^{00} x 0.3^{00} x {(9.275 - 0.2) x 2 + (3.475 - 0.1) x 4}	=	1.424	
V_{14} =	0.85 x 2.000 x 4.875 x 3	=	24.863	
V_{15} =	0.75^{0} x 2.000 x 4.875 x 2	=	14.625	
V_{16} =	0.65^{0} x 5.20^{00} x 3.475 x 2	=	23.491	
V_{17} =	0.5^{00} x 3.7^{00} x 3.475 x 2	=	12.858	
V_{18} =	{1/2 x (3.700 + 5.200) x 3.000 x 0.75 + 0.675 x 3.700 x 0.75 - 0.25 x 0.25 x 3.7 + 0.25 x 3.142 ÷ 4 x 3.7} x 2	=	23.672	
V_{19} =	- 0.15 x 015 x 4.413 x 2	=	- 0.199	
V_{20} =	{2.3^{00} x 1.65^{0} x 0.85^{0} + 0.425 x 0.425 x 3.142 ÷ 2 x 2.3^{00}}	=	3.878	
V_{21} =	- 0.15 x 0.15 x 2.3^{00} x 6	=	- 0.311	
V_{22} =	(3^{000} x 0.5^{00} + ½ x (1.2^{00} + 3^{000}) x 0.15) x 13.05	=	23.686	
V_{23} =	(0.75^{0} x 0.4^{00} + 0.5^{00} x 0.8^{00}) x 3.05^{0} x 2	=	4.270	
V_{24} =	(0.85^{0} x 0.400 + 0.35^{0} x 0.8^{00}) x 3.05^{0} x 3	=	5.673	
V_{25} =	(0.85^{0} x 0.4^{00} + 0.35^{0} x 0.8^{00} + 0.25^{0} x 0.85^{0} + 0.425 x 0.425 x 3.142 ÷ 2) x 2.000 x 3	=	6.698	
V_{26} =	{(0.75 x 0.4 + 0.5 x 0.8) x 2.0 + (0.425 x 0.75 + 0.5 x 0.25 + 0.25 x 0.25 x 3.142 ÷ 4) x (5.05^{0} + 1/3 x 0.15^{0})} x 2	=	7.827	
V_{27} =	- 0.25 x 0.25 x 3.142 x (0.75 x 2 + 0.85 x 3)	=	- 0.795	
V_{28} =	- 0.125 x 0.125 x 3.142 x 0.65^{0} x 4	=	- 0.128	
	TOTAL	=	424.581	424.581 m^3

TYPE OF WORK : CONCRETE (Type-C1)

LOCATION : INTAKE WEIR RIGHT

(1/2)

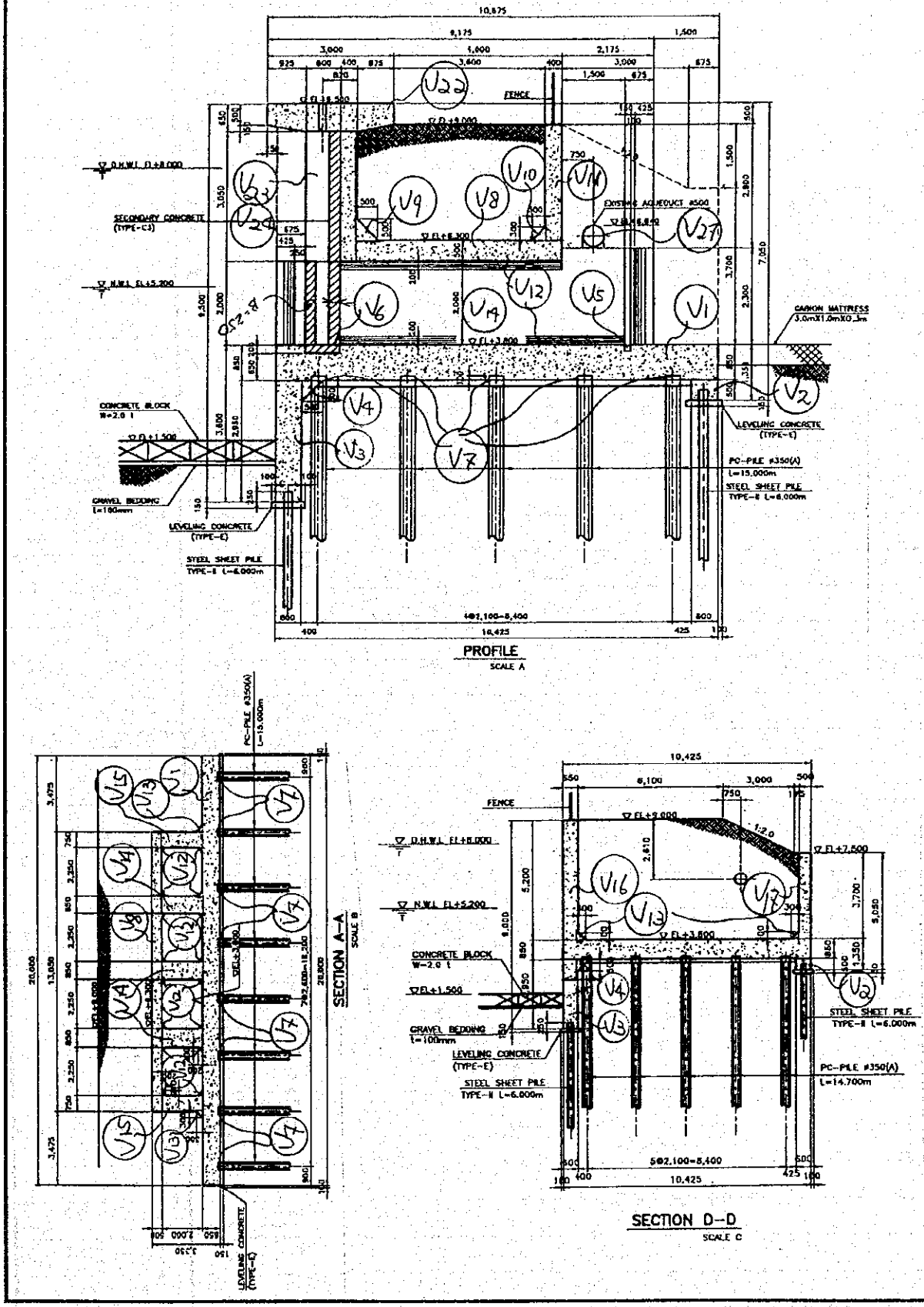
EXPLANATORY DRAWING



TYPE OF WORK : CONCRETE (Type-C1) (2/2)

LOCATION : INTAKE WEIR RIGHT

EXPLANATORY DRAWING



TYPE OF WORK : LEVELING CONCRETE (TYPE-E)

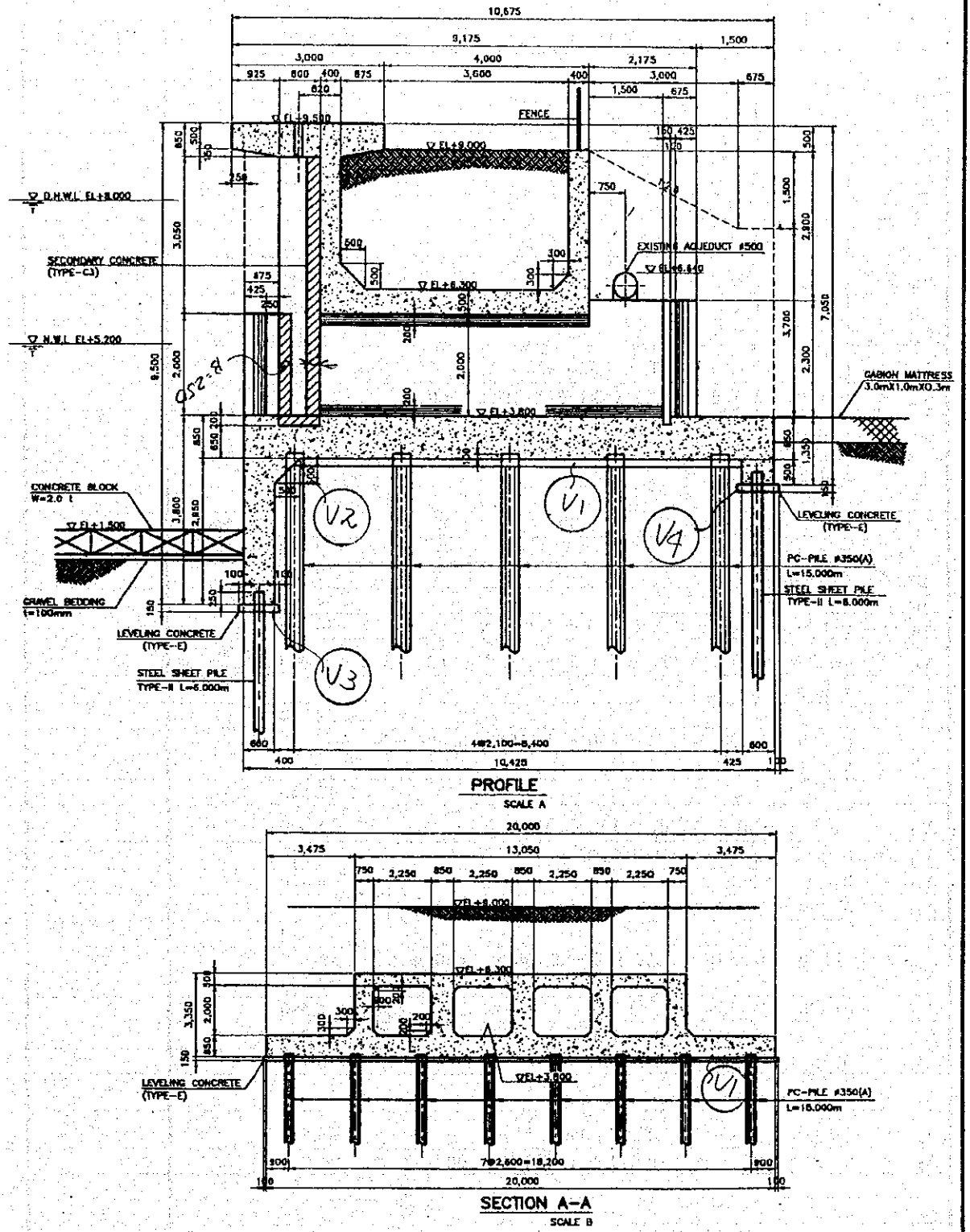
LOCATION : INTAKE WEIR RIGH

CALCULATION		RESULT
$V_1 = 8.325 \times 20.2 \times 0.15 =$	25.225	
$V_2 = 1/2 \times 0.15 \times 0.15 \times 20.2 \times 0.15 =$	0.034	
$V_3 = 0.8 \times 20.2 \times 0.15 =$	2.424	
$V_4 = 0.8 \times 20.2 \times 0.15 =$	2.424	
$V_5 = -0.175 \times 0.175 \times 3.142 \times 0.15 \times 40 =$	-0.577	
TOTAL	29.530	29.530 m^3

TYPE OF WORK : LEVELING CONCRETE

LOCATION : INTAKE WEIR RIGHT

EXPLANATORY DRAWING



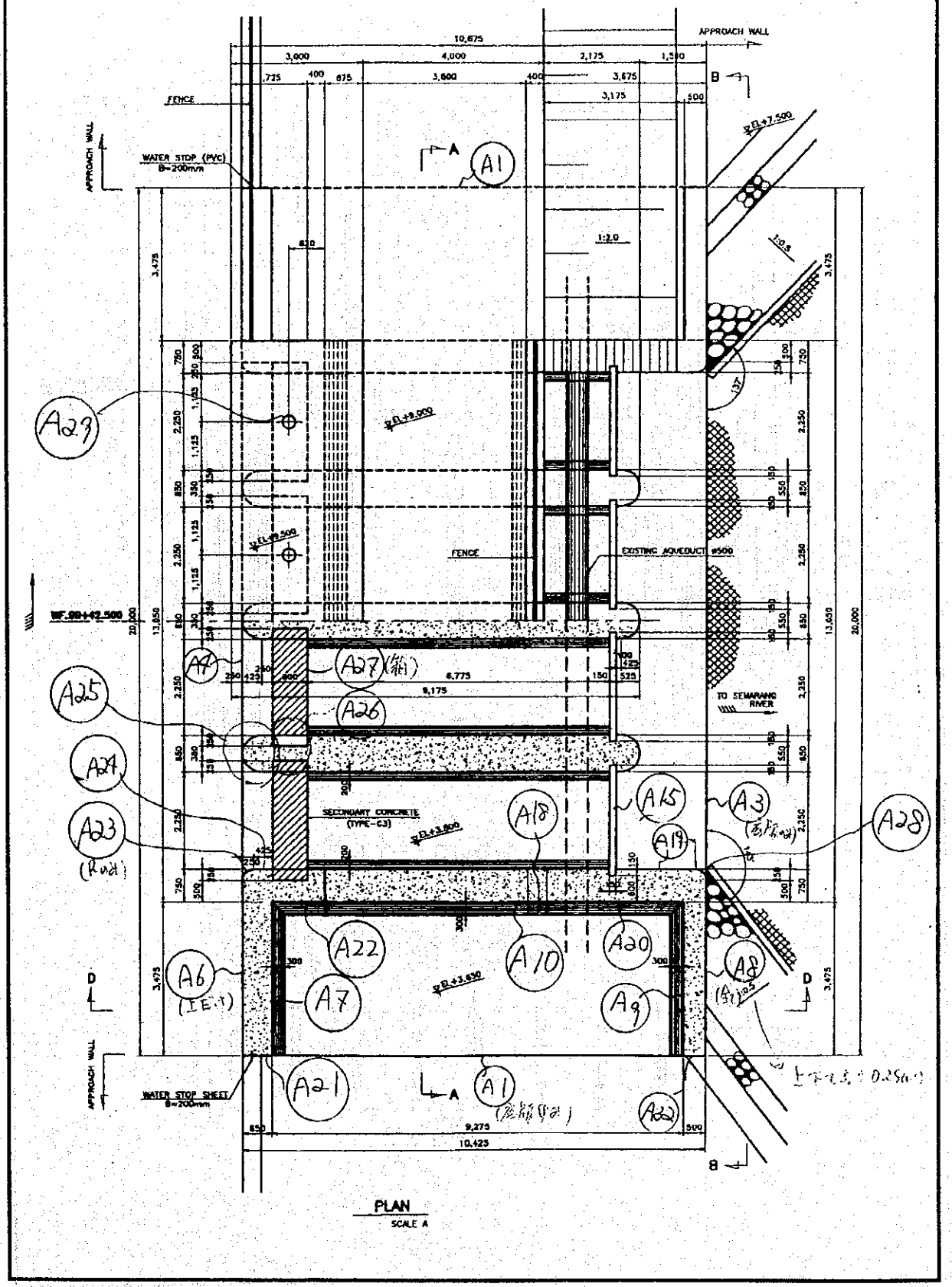
TYPE OF WORK : FORM ($H \geq 4.0$ m)
LOCATION : INTAKE WEIR RIGHT

CALCULATION				RESULT
A_4	= $3.8^{00} \times 20^{000}$	=	76.000	
A_5	= $(2.45^{0} + \sqrt{2} \times 0.5^{00}) \times 20^{000}$	=	63.142	
A_6	= 3.975 x 5.200 x 2	=	41.340	
A_7	= $(\sqrt{2} \times 0.300 + 4.900) \times 3.475 \times 2$	=	37.004	
A_8	= (1.35 x 4.225 + 3.700 x 3.975) x 2	=	40.823	
A_9	= $(\sqrt{2} \times 0.300 + 3.400) \times 3.475 \times 2$	=	26.579	
A_{10}	= $(\sqrt{2} \times 0.300 + 2.200) \times 4.475 \times 2$	=	23.487	
A_{11}	= ½ x 0.500 x 0.500 x 2	=	0.250	
A_{12}	= ½ x 0.300 x 0.300 x 2	=	0.090	
A_{13}	= $(\sqrt{2} \times 0.200 + 2.100) \times 1.500 \times 6$	=	21.446	
A_{14}	= (0.100 x 2 + 2 x 0.425 x 3.142 ÷ 2) x 2.300 x 3			
		=	10.594	
A_{15}	= 0.150 x 2 x 2.450 x 8 + 0.150 x 2 x 2.25 x 4 + ½ x 0.200 x 0.200 x 8			
		=	8.740	
A_{16}	= 0.300 x 2.250 x 4 + ½ x 0.200 x 0.200 x 8			
		=	2.860	
A_{17}	= 2.900 x 13.050	=	37.845	
A_{18}	= 0.4 x 6.05 x 2	=	4.840	
A_{19}	= (0.675 x 3.700 + ½ x (3.700 + 5.200) x 2	=	30.124	
A_{20}	= $(\sqrt{2} \times 0.300 + 3.400) \times 0.175 + \{(\sqrt{2} \times 0.3 + 3.4) \times 2 + 1.5) \times$ ½ x 3.0} x 2			
		=	28.784	
A_{21}	= (0.650 x 9.000 + ½ x (0.850 + 1.150) x 0.300 + ½ x 0.500 x 0.500) x 2			
		=	12.550	
A_{22}	= $(\sqrt{2} \times 0.30 + 4.750) \times 1.875 \times 2$	=	21.970	
A_{23}	= 0.25 x 2 x 3.142 ÷ 4 x 5.200 x 2	=	12.819	
A_{24}	= 0.425 x 5.200 x 2	=	4.420	
A_{25}	= (0.250 x 2 + 0.425 x 2 x 3.142 ÷ 2 + 0.250 x 2)			
		=	14.012	
A_{26}	= (0.800 + 0.250) x 5.050 x 8 + 0.250 x 5.050 x 2			
		=	44.945	
A_{27}	= (0.800 + 2.750 x 2) x 0.200 x 4	=	5.680	
A_{28}	= 0.25 x 2 x 3.142 ÷ 4 x 3.700 x 2	=	2.906	
A_{29}	= 0125 x 0.125 x 3.142 x 0.65 x 4	=	0.128	
A_{30}	= $(\sqrt{2} \times 0.500 + 2.050) \times 13.050$	=	35.980	
A_{31}	= $(\sqrt{2} \times 0.300 + 2.400) \times 13.050$	=	36.857	
A_{32}	= 0.500 x 5.05 + ½ x (0.850 + 1.150) x 0.300 x 2			
		=	3.125	
	TOTAL	=	649.338	649.338 m^2

TYPE OF WORK : FORM (H≥4.0m)

LOCATION : INTAKE WEIR, RIGHT (1/2)

EXPLANATORY DRAWING



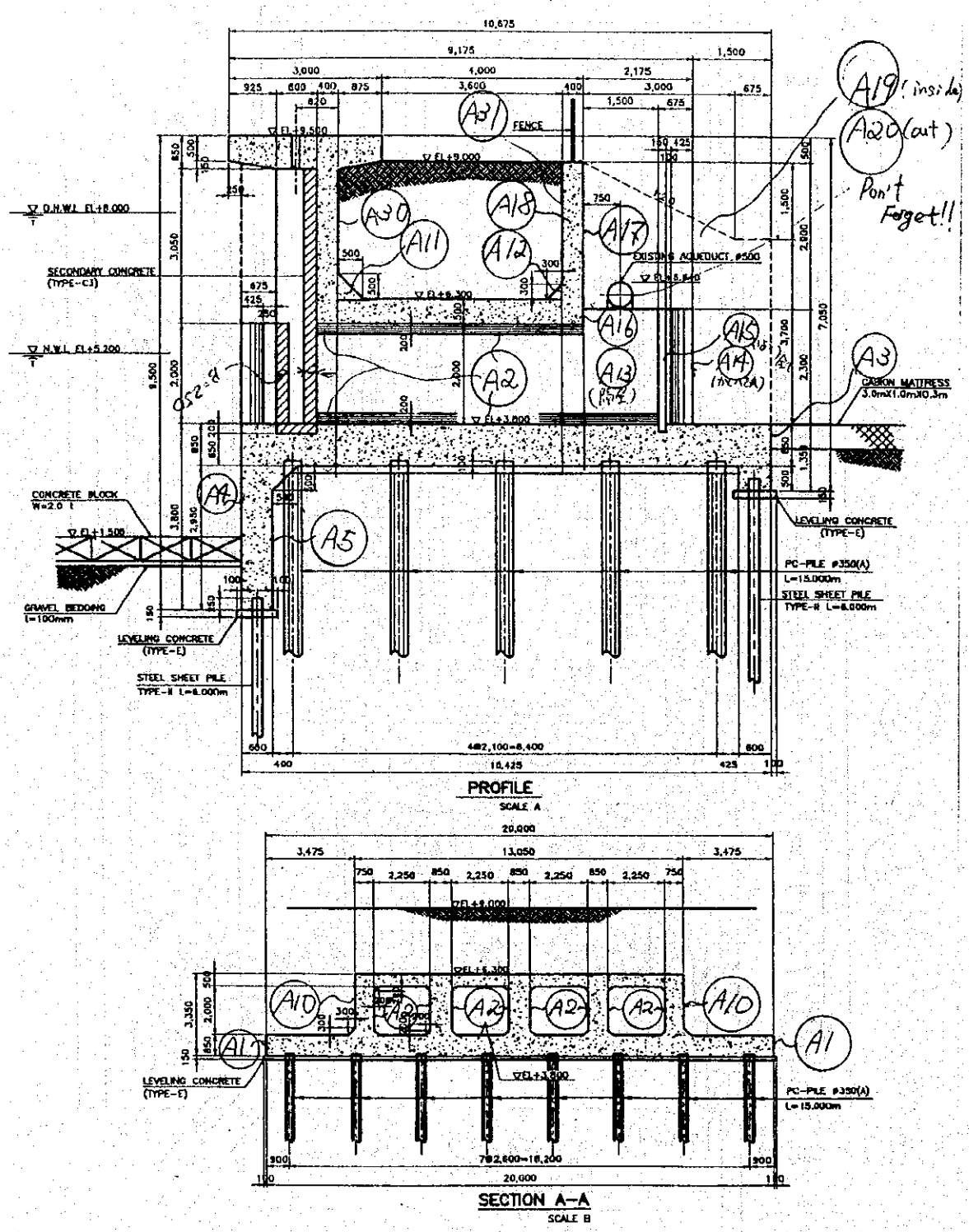
PLAN

SCALE A

TYPE OF WORK : FORM (H≥4.0m)

LOCATION : INTAKE WEIR RIGHT (2/2)

EXPLANATORY DRAWING



TYPE OF WORK :
LOCATION : INTAKE WEIR RIGHT

CALCULATION			RESULT
❑ FORM (H < 4.0 m)			❑
A_1 = 0.850 x 8.675 x 2	=	14.748	
A_2 = ($\sqrt{2}$ x 0.200 x 2 + 1.6) x 6.775 x 2 x 4	=	117.380	
A_3 = 1.35 x 11.55	=	15.593	
TOTAL	=	147.721	147.721 m^3
❑ FORMWORK FOR LEVELLING CONCRETE (H < 4.0 m)			
A_1 = (10.425 - 0.6 x 2 - 0.5) x 0.15 x 2	=	2.612	
A_2 = ½ x 0.15 x 0.15 x 2	=	0.023	
A_3 = (0.8 x 2 + 20.2 x 2) x 0.15	=	6.300	
A_4 = (0.8 x 2 + 20.2 x 2) x 0.15	=	6.300	
TOTAL	=	15.241	15.241 m^2

TYPE OF WORK :
LOCATION : INTAKE WEIR RIGHT

CALCULATION			RESULT
□ SECONDARY CONCRETE & ANCHOR BAR			
(TYPE - C3)			
V_1 = (2.25 + 0.25 x 2) x 0.8 x 0.25 x 4	=	2.200	
V_2 = 2.0 x 0.25 x 0.285 x 8	=	1.140	
V_3 = 4.95 x 0.25 x 0.25 x 8	=	2.475	
V_4 = (0.5^{00} x 0.22 + 0.175 x 0.03) x 2.25 x 4	=	1.037	
TOTAL	=	6.852	6.852 m^3
□ FORM FOR SECONDARY CONCRETE			
(H ≥ 4.0 m)			
A_1 = 0.25 x 4.95 x 2 x 4	=	9.900	
A_2 = 0.25 x 2.25 x 4	=	2.250	
A_3 = 0.25 x 4.95 x 2 x 4	=	9.900	
A_4 = 0.285 x 2.00 x 2 x 4	=	4.560	
A_5 = 0.25 x 2.00 x 2 x 4	=	4.000	
A_6 = 0.50 x 2.25 x 4	=	4.500	
TOTAL	=	35.110	35.110 m^2
□ ANCHOR BAR (D19 , L = 300 mm/Bar)			
BOTTOM (6 x 3 + 6 x 2 + 4) x 4	=	136	
TOP 3 x 5 x 4	=	60	
FORMER SIDE 4 x 2 x 2 x 4	=	64	
LATTER SIDE 9 x 2 x 2 x 4	=	144	
n = 404 Bars			
W = 404 Bars x 0.30 x 2.23 kgf/m	=	270.276 kgf	0.270 tf

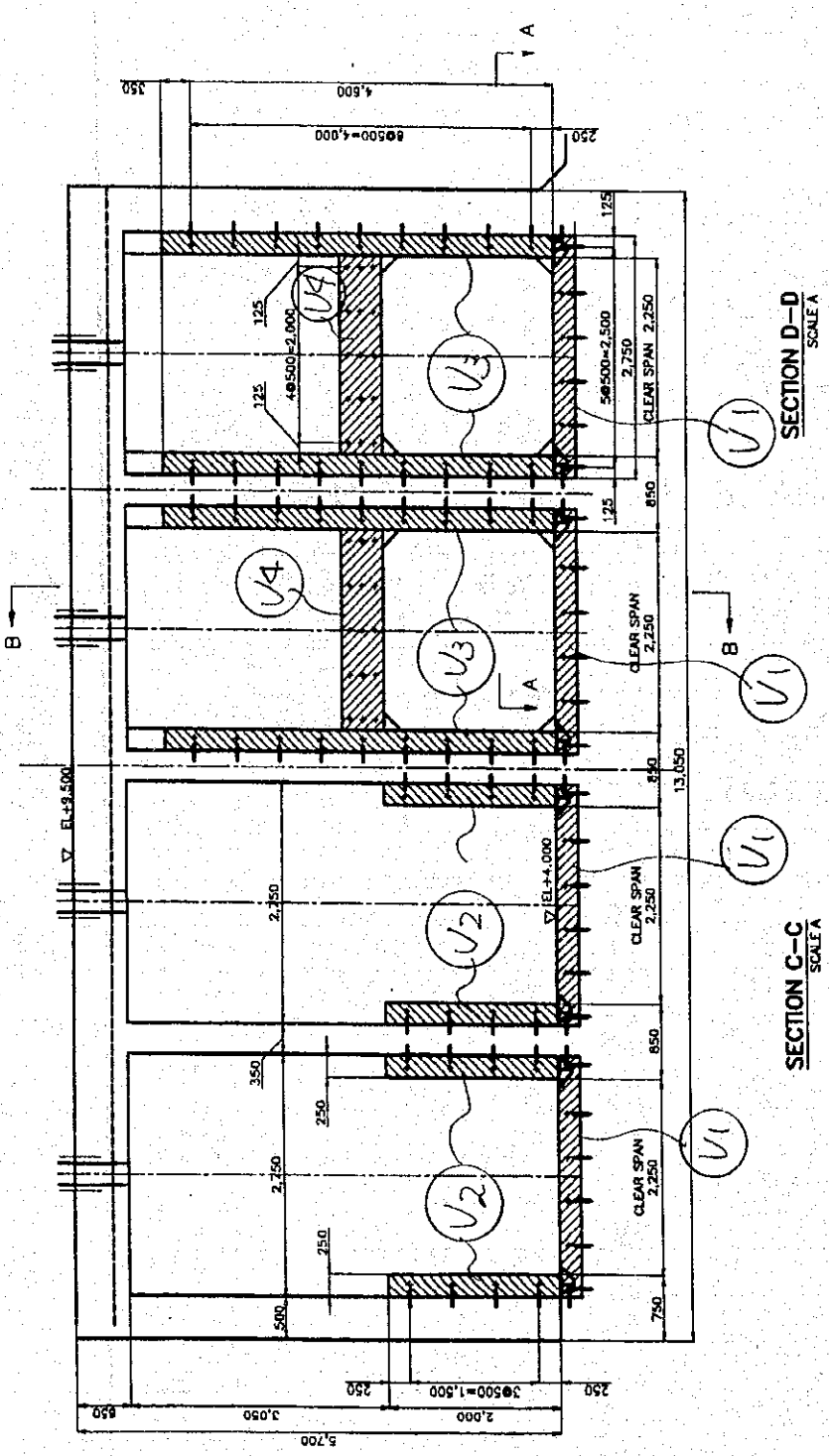
TYPE OF WORK : FORM FOR SECONDARY CONCRETE
LOCATION : INTAKE STRUCTURE (RIGHT BANK)

CALCULATION		RESULT
(H ≧ 4.0m)		
A_1 = 0.25 × 4.95 × 2 × 4	= 9.900	
A_2 = 0.25 × 2.25 × 4	= 2.250	
A_3 = 0.25 × 4.95 × 2 × 4	= 9.900	
A_4 = 0.285 × 2.00 × 2 × 4	= 4.560	
A_5 = 0.25 × 2.00 × 2 × 4	= 4.000	
A_6 = 0.50 × 2.25 × 4	= 4.500	
TOTAL	= 35.110	35.110 m^2

TYPE OF WORK : SECONDARY CONCRETE & ANCHOR BAR

LOCATION : INTAKE WEIR RIGHT

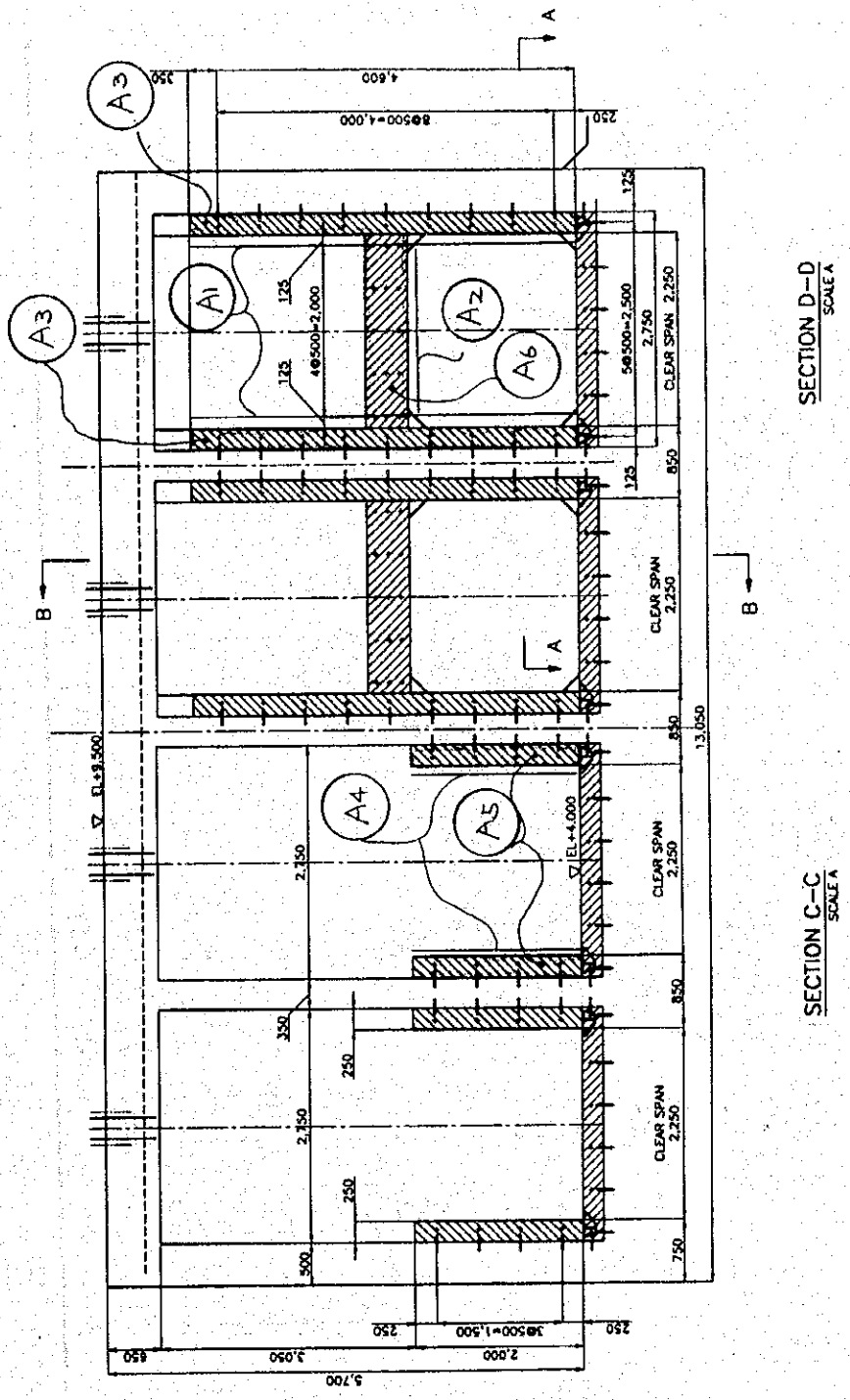
EXPLANATORY DRAWING



TYPE OF WORK : FORM FOR SECONDARY CONCRETE

LOCATION : INTAKE STRUCTURE (RIGHT BANK)

EXPLANATORY DRAWING



TYPE OF WORK : SUPPORTING

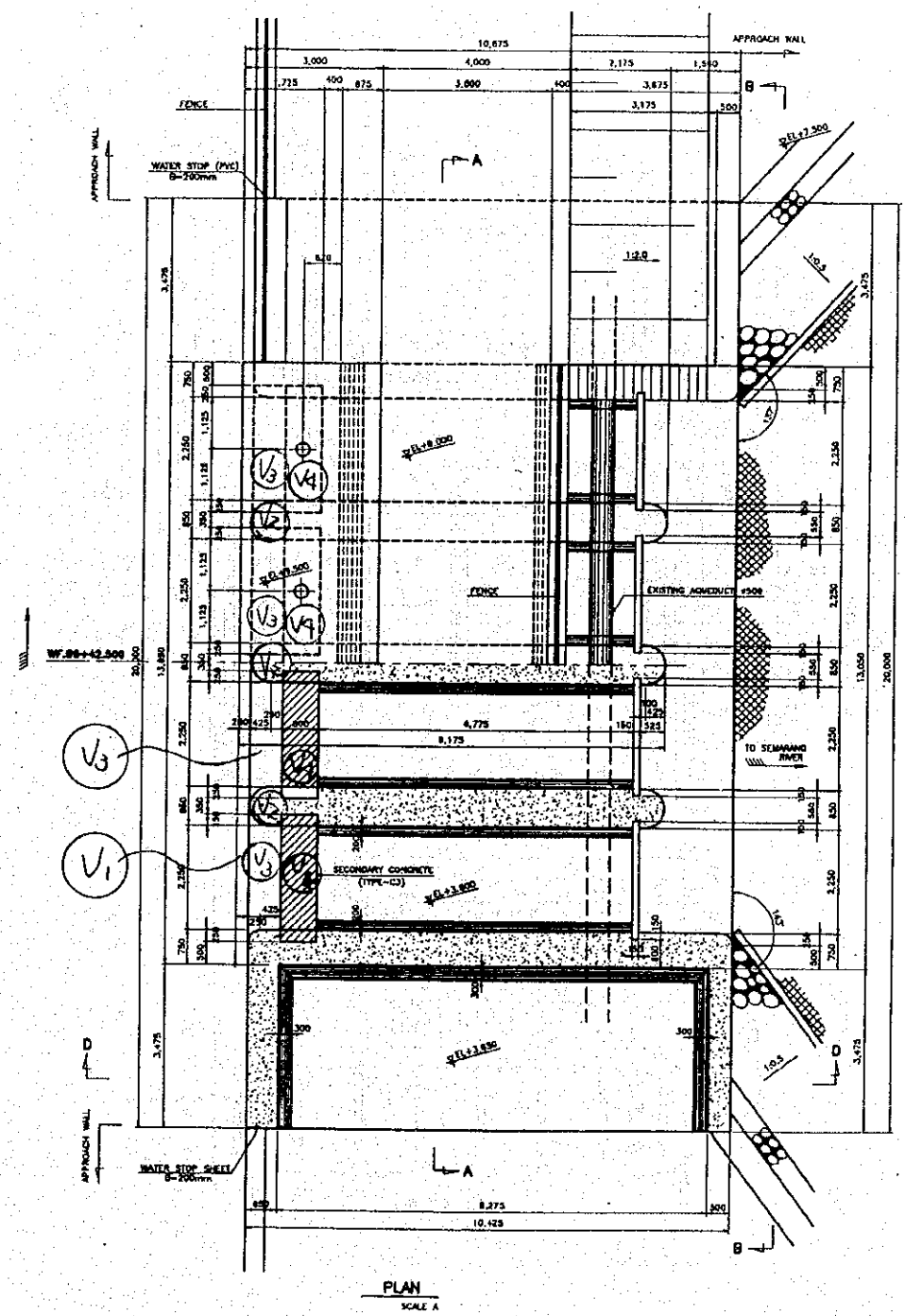
LOCATION : INTAKE WEIR RIGHT

CALCULATION		RESULT
$V_1 = 13.05^{0} \times (0.25^{0} \times 8.85^{0} + \frac{1}{2} \times 0.25 \times (0.15 + 0.109)) =$	29.296	
$V_2 = \{(0.25 \times 0.85 + 0.425 \times 0.425 \times 3.142 \div 2) \times 3\} \times (3.05 + \frac{1}{3} \times 0.109) = 1.4888 \times 3.0863 =$	4.595	
$V_3 = (0.675 \times 11.55 - 1.4888) \times (5.05 + \frac{1}{3} \times 0.109) =$	32.082	
$V_4 = 0.8^{00} \times 2.75^{0} \times (5.05 + 0.2^{00}) \times 4 =$	46.200	
$V_5 = \{(2.05^{0} + 2.200) \times 0.875 \times \frac{1}{2} + \frac{1}{2} \times (0.375 + 0.875) \times 0.5^{00}\} \times 13.05 =$	28.343	
$V_6 = (2.00 \times 2.250 - \frac{1}{2} \times 0.2^{00} \times 0.2^{00} \times 4) \times 5.275 \times 4 =$	93.262	
TOTAL	233.778	233.778 m^3
FORM OF TOP SLAB		
$A1$ (CONT) $= 11.55 \times \sqrt{0.925^2 + 0.15^2} =$	10.823	
$A2$ (-ditto-) $= 2.75 \times 0.8 \times 4 =$	8.800	
$A3$ (-ditto-) $= 13.05 \times \sqrt{0.875^2 + 0.15^2} =$	11.585	
$A4$ (Box) $= 1.85 \times 5.275 \times 4 =$	39.035	
TOTAL	70.243 m^2	

TYPE OF WORK : SUPPORTING

LOCATION : INTAKE WEIR RIGHT (1/2)

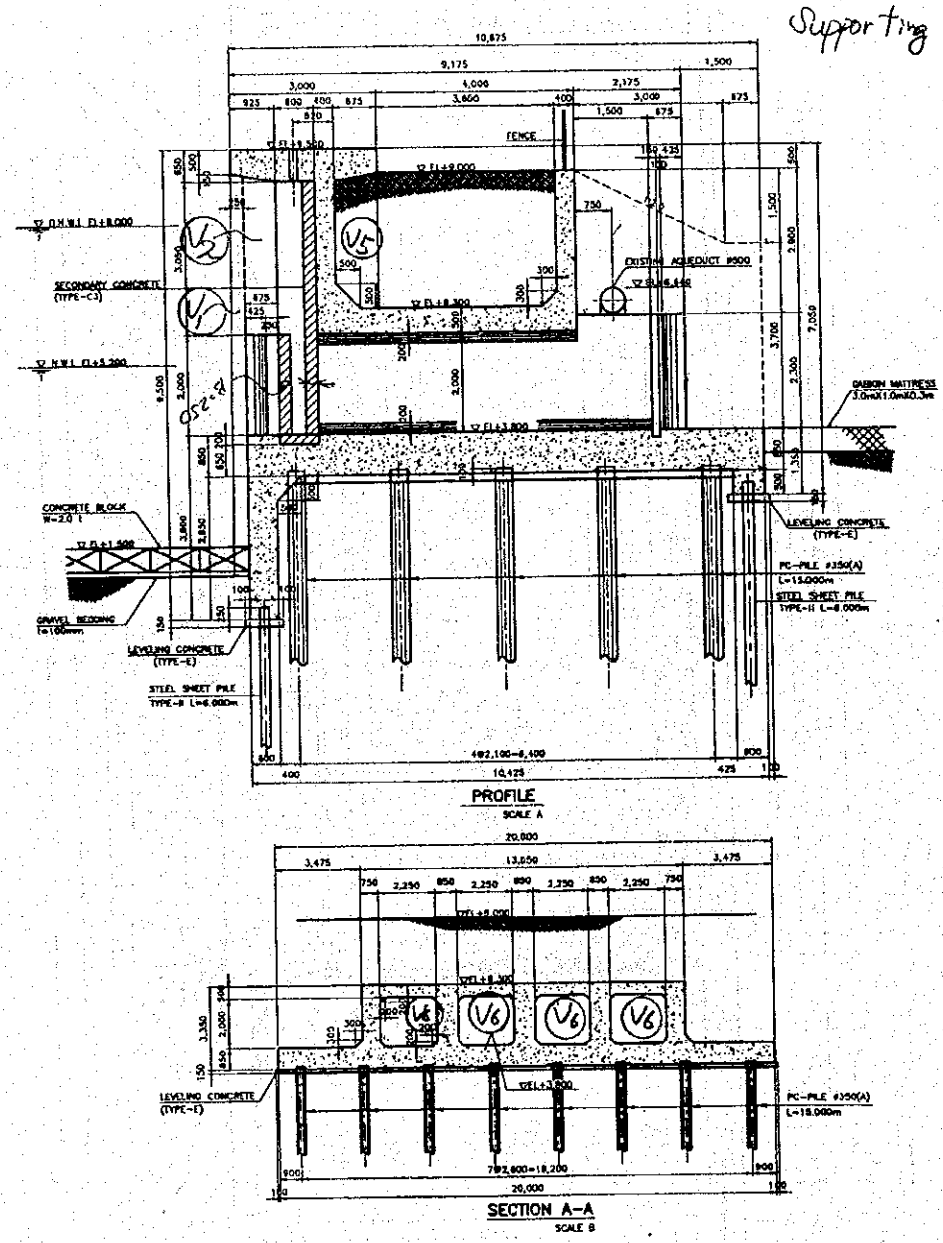
EXPLANATORY DRAWING



TYPE OF WORK : SUPPORTING

LOCATION : INTAKE WEIR RIGHT (2/2)

EXPLANATORY DRAWING



TYPE OF WORK : SCAFFOLDING

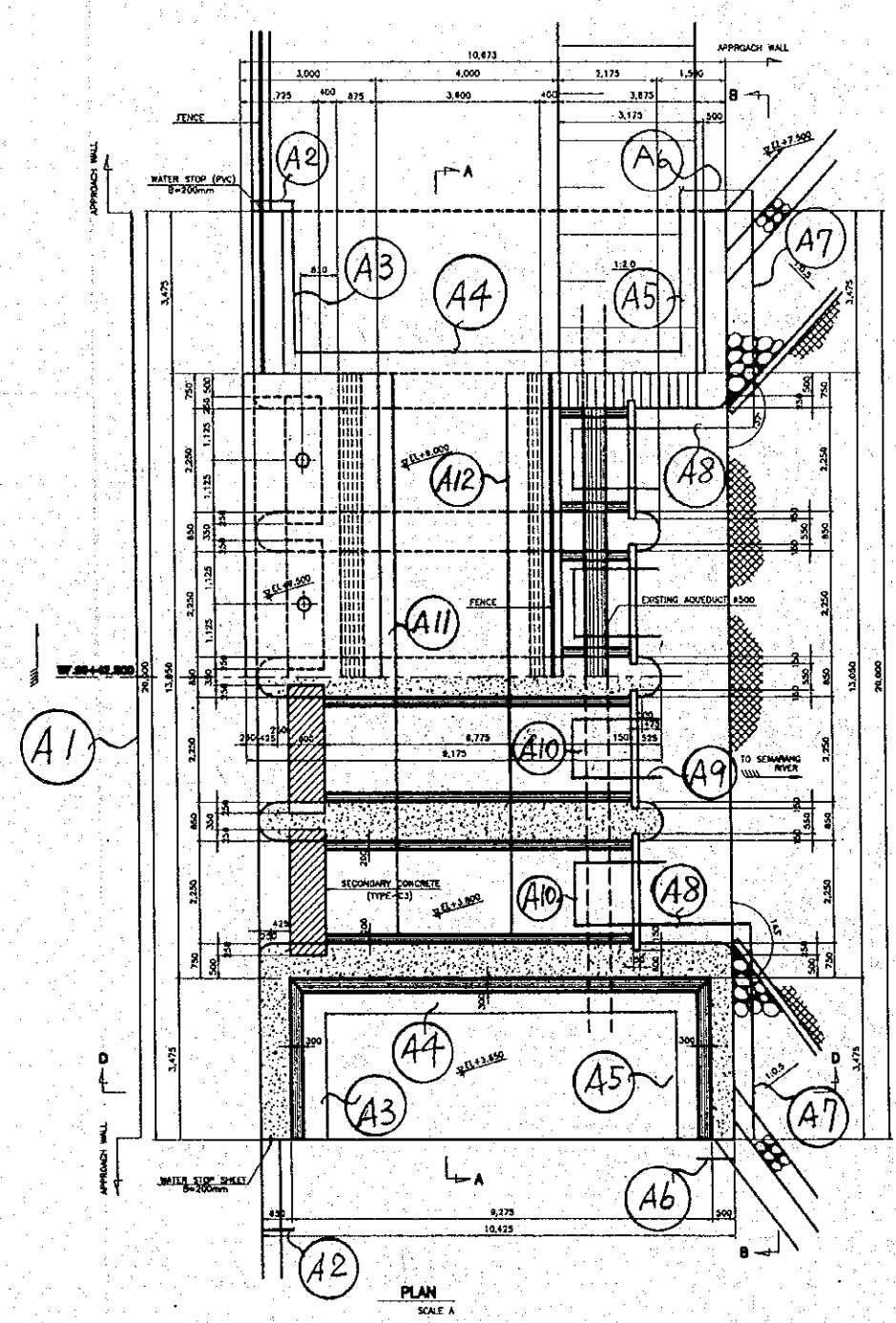
LOCATION : INTAKE WEIR RIGHT

CALCULATION		RESULT
$A_1 = 9.5^{00} \times 20.^{000} =$	190.000	
$A_2 = 9.^{000} \times 0.65^{0} \times 2 =$	11.700	
$A_3 = 5.2^{00} \times 3.475 \times 2 =$	36.140	
$A_4 = \{5.2^{00} \times 2.35^{0} + 2.5^{00} \times 3.6^{00} + 5.2^{00} \times 0.4$ $+ \frac{1}{2} \times (3.7^{00} + 5.2^{00}) \times 3.^{000} + 0.075 \times 3.7^{00}\}$ $\times 2 =$	73.855	
$A_5 = 5.2^{00} \times 3.475 \times 2 =$	36.140	
$A_6 = 4.55^{0} \times 0.6^{00} \times 2 =$	5.460	
$A_7 = 4.55^{0} \times 4.225 \times 2 =$	38.448	
$A_8 = \{3.700 \times 0.675 + \frac{1}{2} \times (3.7^{00} + 5.200) \times 3.^{000}\}$ $\times 2 =$	31.685	
$A_9 = 2.3^{00} \times 2.175 \times 6 =$	30.015	
$A_{10} = 5.2^{00} \times 2.25^{0} \times 4 =$	46.80	
$A_{11} = 3.2^{00} \times 13.05^{0} =$	41.760	
$A_{12} = 2.7^{00} \times 13.05^{0} =$	35.235	
TOTAL	577.248	

TYPE OF WORK : SCAFFOLDING

LOCATION : INTAKE WEIR RIGHT (1/2)

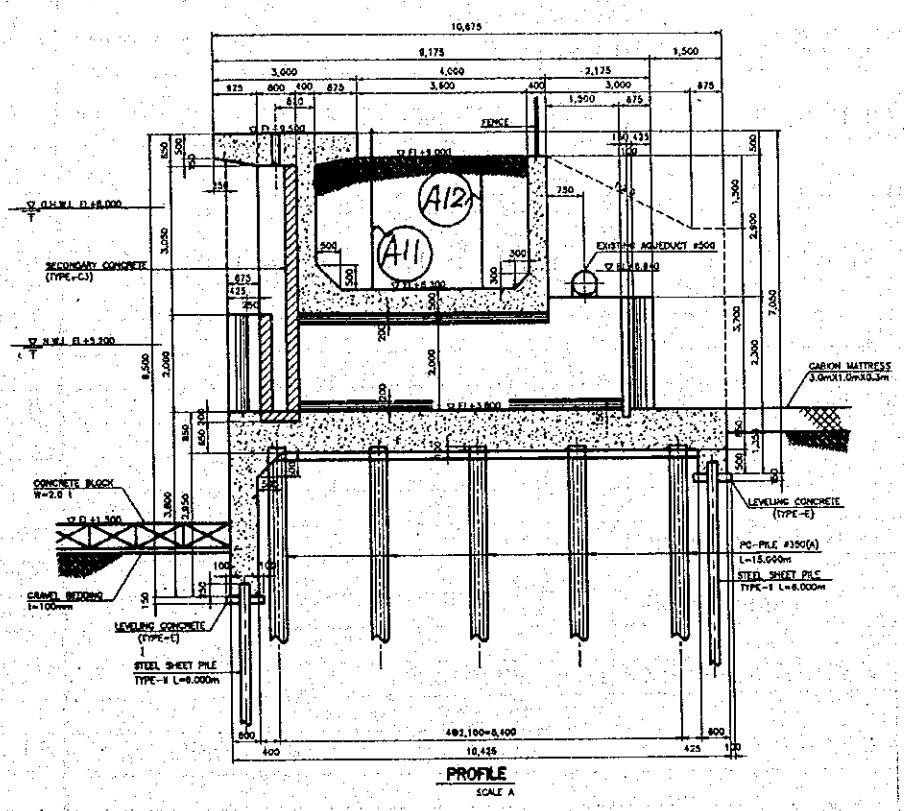
EXPLANATORY DRAWING



TYPE OF WORK : SCAFFOLDING

LOCATION : INTAKE WEIR RIGHT (2/2)

EXPLANATORY DRAWING



TYPE OF WORK : PILE HEAD TREATMENT
LOCATION : INTAKE STUCTURE
: RIGHT BANK

CALCULATION	RESULT
PC PILE DIA 350 (A) n = 40 PILES	
LENGTH OF DESIGN : L_1 = 14.00 m/pile	
SPARE PILE LENGTH : L_2 = 1.00 m	
ADOPTED PILE LENGTH : L = 14.00 + 1.00 = 15.00 m/pile	40 places
JOINTING	
n = 1 place/pile	40 places
PILING	
N VALUE : N = 22 (Average)	
D = 14.00 m/pile	40 places
CONCRETE FILLING (TYPE-C1) n = 40 PILES	
V = $\pi/4$ x 0.22^2 x 0.55 = 0.021 m^3/pile	40 places
SUSPENDED FORM	
A = $\pi/4$ x 0.22^2 = 0.038 m^3/pile	40 places
REINFORCING BAR	
D 13 (W = 1.04 kg/m)	
W_1 = 6 Bars x 0.45 x 1.04 = 2.808	
W_2 = 4 Bars x 0.74 x 1.04 = 3.078	
TOTAL W = 5.886 kg.f/pile	40 places
CUTTING PILE HEAD	
Height of cutting : h = 1.00 m/pile	
V = $\pi/4$ x (0.35^2 - 0.40^2) x 1.00 = 0.058 m^3/pile	40 places

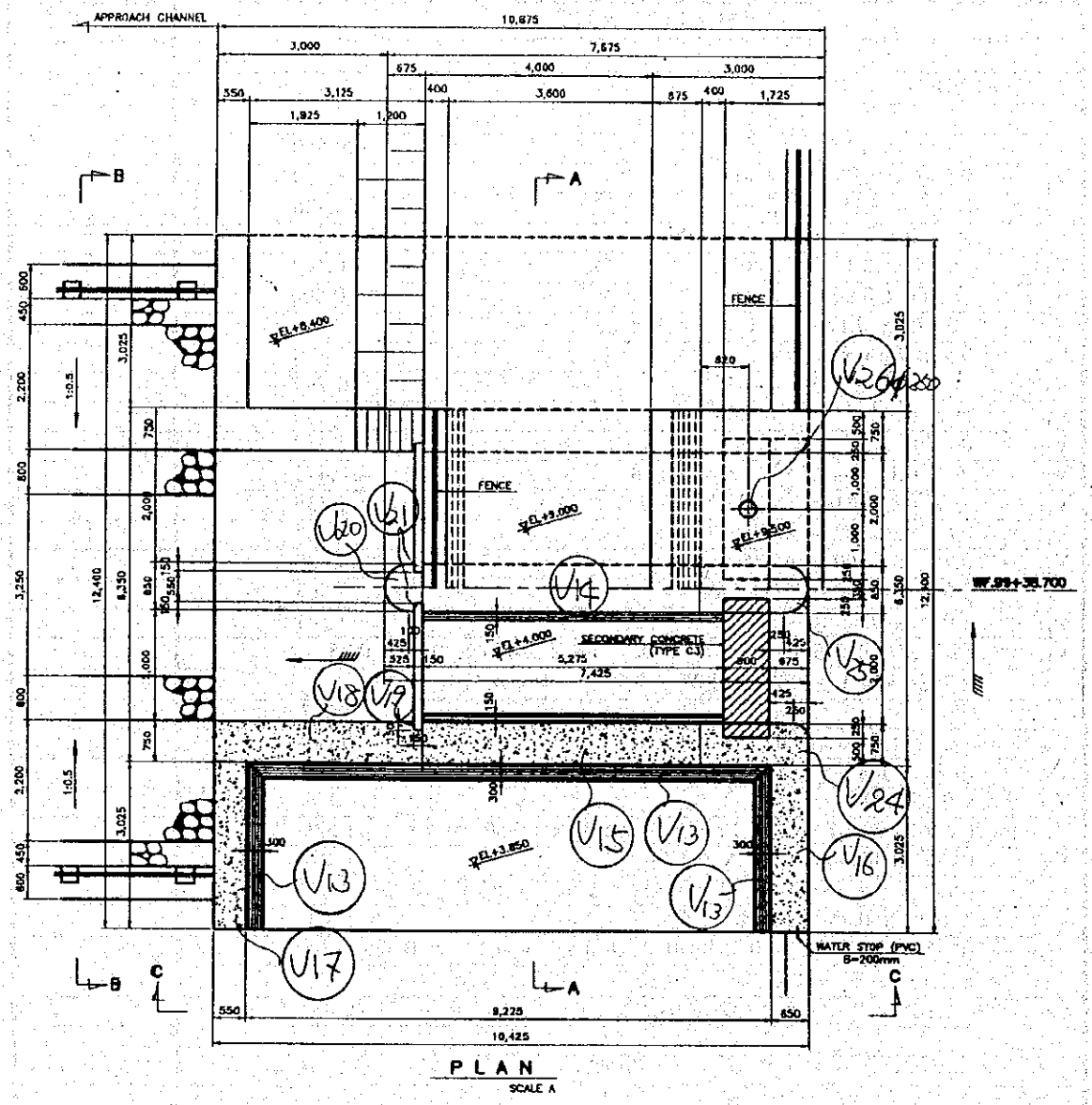
TYPE OF WORK :
LOCATION : INTAKE WEIR LEFT

CALCULATION				RESULT
□ CONCRETE (TYPE – C1)				
V_1 = 10.425 x 12.4^{00} x 0.85^{0}	=	109.880		
V_2 = 0.500 x 0.600 x 12.400	=	3.720		
V_3 = 0.600 x 3.150 x 12.400	=	23.436		
V_4 = ½ x 0.500 x 0.500 x 12.400	=	1.55		
V_5 = - 0.15 x 0.15 x 2.300 x 2	=	- 0.104		
V_6 = - 0.200 x 0.800 x 2.500 x 2	=	- 0.800		
V_7 = - 0.175 x 0.175 x 3.142 x 0.1 x 25	=	- 0.241		
V_8 = 0.5 x 6.35 x 4.875	=	15.478		
V_9 = ½ x 0.5^{00} x 0.5^{00} x 6.35^{0}	=	0.794		
V_{10} = ½ x 0.3^{00} x 0.3^{00} x 6.35^{0}	=	0.286		
V_{11} = 0.4^{00} x 2.5^{00} x 6.35^{0}	=	6.350		
V_{12} = ½ x 0.15^{00} x 0.15^{00} x 5.275 x 8	=	0.475		
V_{13} = ½ x 0.3^{00} x 0.3^{00} x (9.025 + 2.925 x 2) x 2	=	1.339		
V_{14} = 0.85^{0} x 2.000 x 4.875	=	8.288		
V_{15} = 0.75^{0} x 2.000 x 4.875 x 2	=	14.625		
V_{16} = 3.025 x 0.65^{0} x $5.^{000}$ x 2	=	19.663		
V_{17} = 3.025 x 0.55^{0} x 4.4^{00} x 2	=	14.641		
V_{18} = {1/2 x (4.4 + 5.0) x 1.2 x 0.75 + 4.4 x 2.475 x 0.75 - 0.25 x 0.25 x 4.4 + 0.25 x 0.25 x 3.142 ÷ 4 x 4.4} x 2	=	24.677		
V_{19} = - 0.15 x 015 x (5.0 - 0.075) x 2	=	- 0.222		
V_{20} = (0.25 x 0.85 + 0.425 x 0.425 x 3.142) x 2	=	1.560		
V_{21} = - 0.15 x 0.15 x 20 x 2	=	- 0.09		
V_{22} = (½ x (1.2 + 3.0) x 0.15 + 0.5 x 3.0) x 6.350	=	11.525		
V_{23} = (0.85^{0} x 0.400 + 0.8^{00} x 0.35^{0}) x 2.85^{0}	=	1.767		
V_{24} = (0.75 x 0.4 + 0.8 x 0.5) x 4.85 + (0.425 x 0.75 + 0.25 x 0.5^{00} + 0.25 x 0.25 x 3.142 ÷ 4)	=	5.810		
V_{25} = (0.85 x 0.4 + 0.8 x 0.35^{0} + 0.25^{0} x 0.85^{0} + 0.425 x 0.425 x 3.142 ÷ 2) x 2.0	=	2.233		
V_{26} = - 0.125 x 0.125 x 3.142 x 0.65 x 2.0	=	- 0.064		
TOTAL	=	226.576		226.576 m^3
□ LEVELLING CONCRETE (TYPE – E)				
(TYPE – E)				
V_1 = 8.975 x 12.6 x 0.15	=	16.963		
V_2 = ½ x 0.15 x 0.15 x 12.6	=	0.142		
V_3 = 0.8 x 12.6 x 0.15	=	1.512		
V_4 = 0.8 x 12.6 x 0.15	=	1.512		
V_5 = - 0.175 x 0.175 x 3.142 x 0.15 x 25	=	- 0.361		
TOTAL	=	19.768		19.768 m^3

TYPE OF WORK : CONCRETE (Type-C1)

LOCATION : INTAKE WEIR LEFT (1/2)

EXPLANATORY DRAWING

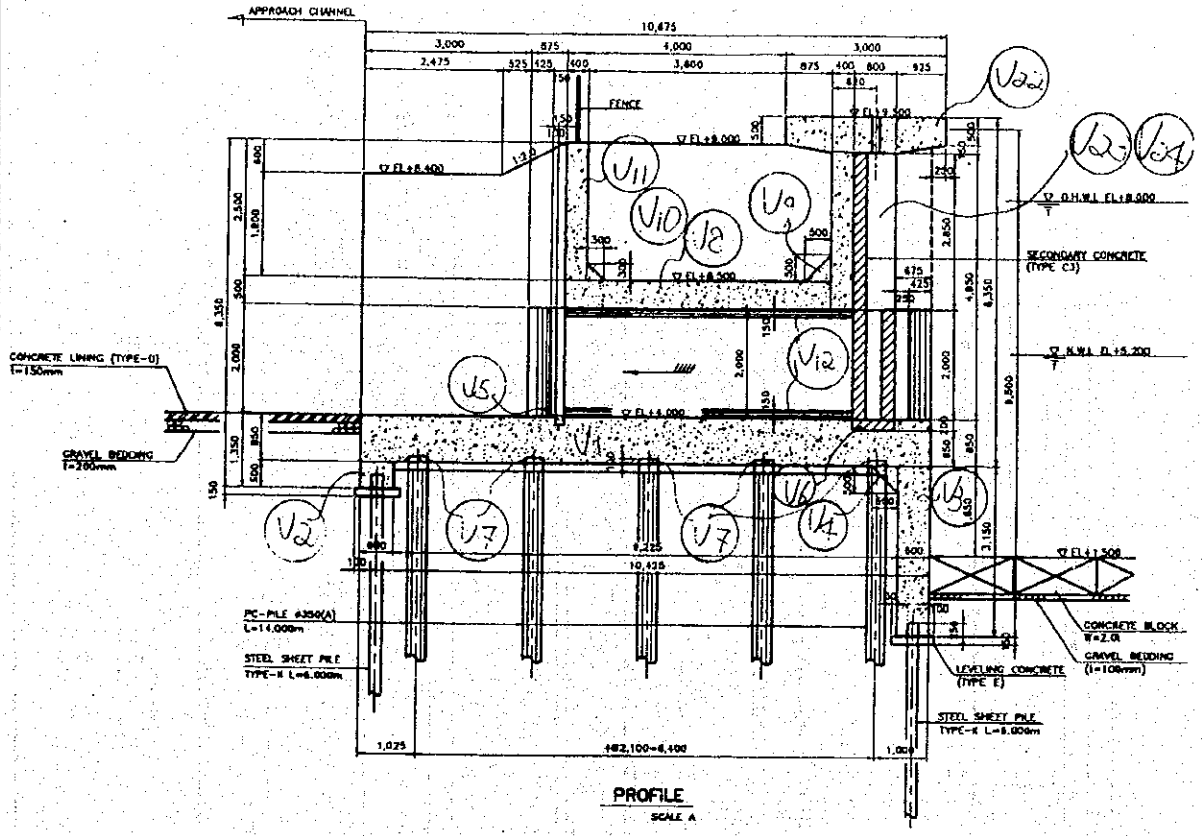


TYPE OF WORK : CONCRETE (Type-C1)

LOCATION : INTAKE WEIR LEFT

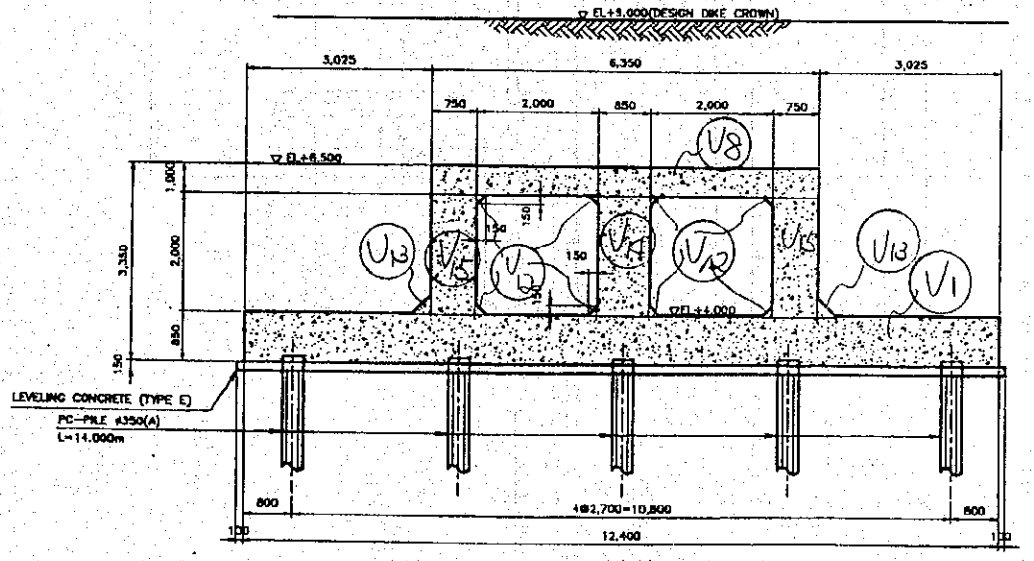
(2/2)

EXPLANATORY DRAWING



PROFILE

SCALE A



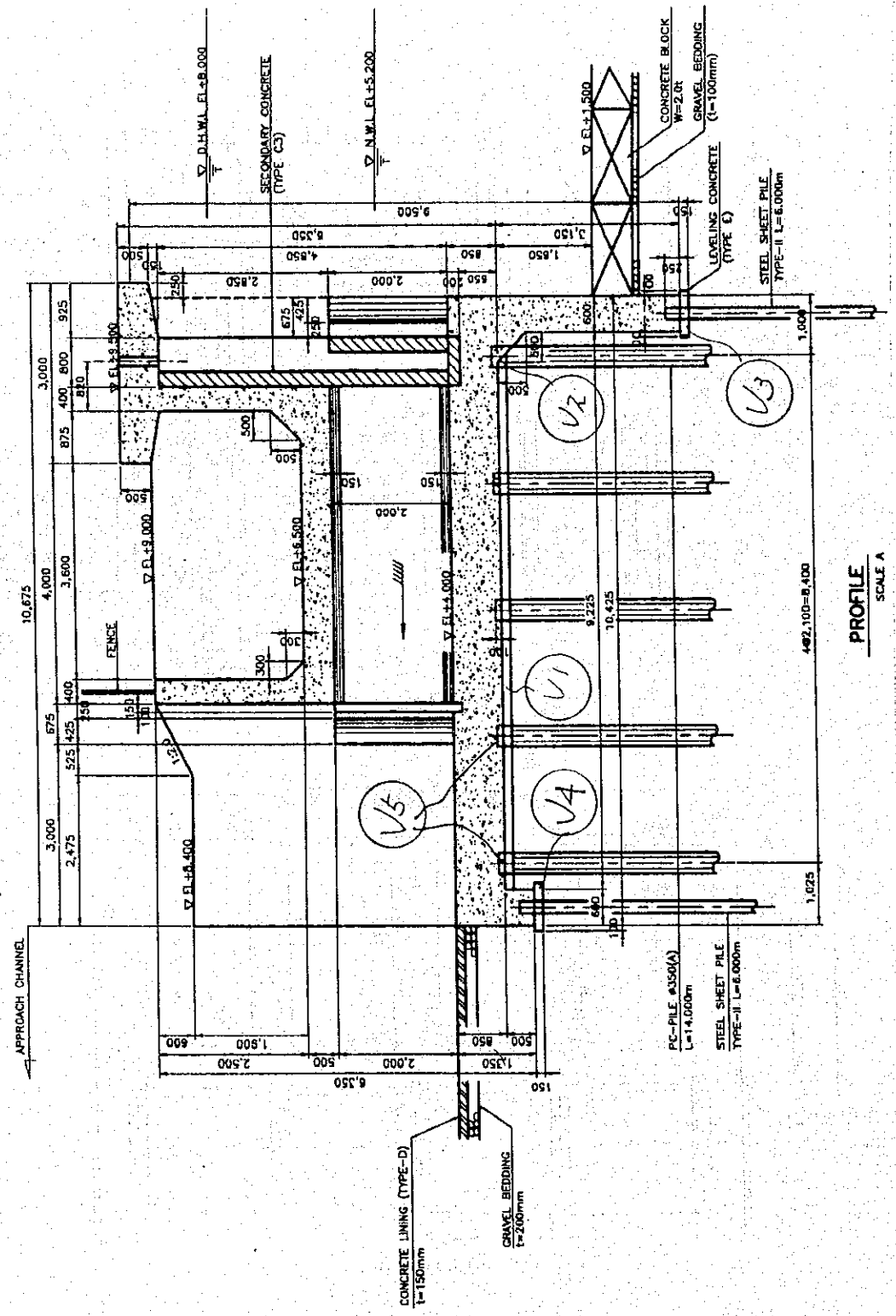
SECTION A-A

SCALE A

TYPE OF WORK : LEVELING CONCRETE

LOCATION : INTAKE WEIR LEFT

EXPLANATORY DRAWING



TYPE OF WORK : FORM ($H \geq 4.0$ m)
LOCATION : INTAKE WEIR LEFT
:

CALCULATION				RESULT
A_4	= (3.150 + 0.850) X 12.400	=	49.600	
A_5	= ($\sqrt{2}$ x 0.500 + 2.650) x 12.400	=	41.628	
A_6	= 5.000 x 3.525 x 2	=	35.250	
A_7	= ($\sqrt{2}$ x 0.300 + 4.700) x 3.025 x 2	=	31.002	
A_8	= 5.15 x 3.775 x 2	=	38.883	
A_9	= ($\sqrt{2}$ x 0.300 + 4.100) x 3.025 x 2	=	27.372	
A_{10}	= ($\sqrt{2}$ x 0.300 + 2.200) x 4.475 x 2	=	23.487	
A_{11}	= ½ x 0.5^{00} x 0.5^{00} x 2	=	0.250	
A_{12}	= ½ x 0.3^{00} x 0.3^{00} x 2	=	0.090	
A_{13}	= ½ x 0.3^{00} x 0.3^{00} x (9.025 + 2.925 x 2) x 2	=	0.400	
A_{14}	= 0.425 x 2 x 3.142 ÷ 2 x 2.000	=	2.671	
A_{15}	= (0.150 x 2 + 2.300 x 2) x 0.150 x 2 + 0.150 x 3 x 2.000 x 2 + 0.15 x 3 x 4.963 x 2	=	7.737	
A_{16}	= ½ x 0.150 x 0.150 x 4	=	0.045	
A_{17}	= 3.000 x 6.300	=	18.900	
A_{18}	= ($\sqrt{2}$ x 0.3 + 4.700) x 0.400 x 2	=	4.099	
A_{19}	= (4.400 x 2.475 + ½ x (4.400 + 4.925) x 1.05) x 2	=	31.571	
A_{20}	= {($\sqrt{2}$ x 0.300 + 4.100) x 1.975 + ($\sqrt{2}$ x 0.3 + 4.1) x 2 + 0.6) x 1.200 x ½ }	=	29.449	
A_{21}	= (0.550 x 5.250 + 0.500 x 0.600 + ½ x (0.85 + 1.15)	=	6.975	
A_{22}	= ($\sqrt{2}$ x 0.300 + 5.550) x 1.475 + 0.500 x 3.00 + ½ x 0.15 x 0.875 + ½ x 0.146 x 0.9000) x 2	=	20.887	
A_{23}	= (0.25^{0} x 2 x 3.142 ÷ 4 x 4.850 x 2	=	3.810	
A_{24}	= 0.425 x 4.85 x 2	=	4.123	
A_{25}	= (0.250 x 2 + 0.425 x 3.142 ÷ 2 + 0.25 x 2) x 2	=	4.671	
A_{26}	= ((0.250 + 0.800) x 4 + 0.250 x 2	=	22.795	
A_{27}	= (0.800 x 2 + 2.500 x 2) x 0.200 x 2	=	2.640	
A_{28}	= 0.125 x 0.125 x 3.142 x 0.650 x 2	=	0.064	
A_{29}	= ($\sqrt{2}$ x 0.500 + 1.85) x 6.350	=	16.238	
A_{30}	= {($\sqrt{2}$ x 0.300 + 2.05) x 6.350	=	15.712	
A_{31}	= (0.650 x 5.85 + 0.600 x 3.150 + ½ x 0.300 x 0.300 + ½ x 0.500 x 0.500 + 0.850 x 0.300	=	6.118	
	TOTAL	=	133.482	