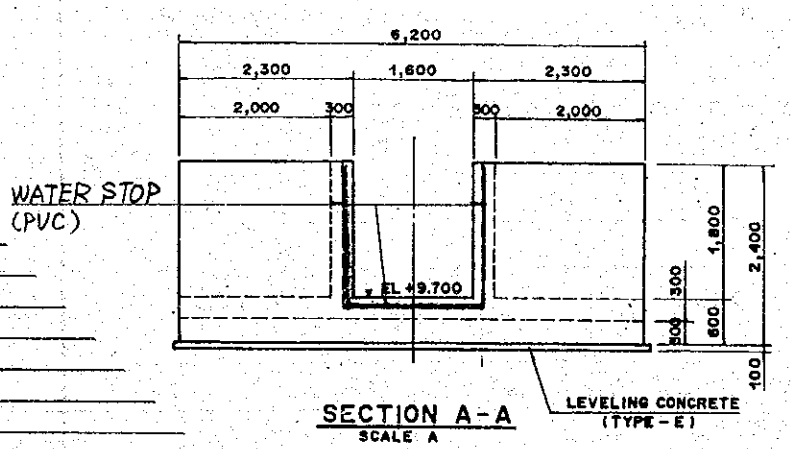
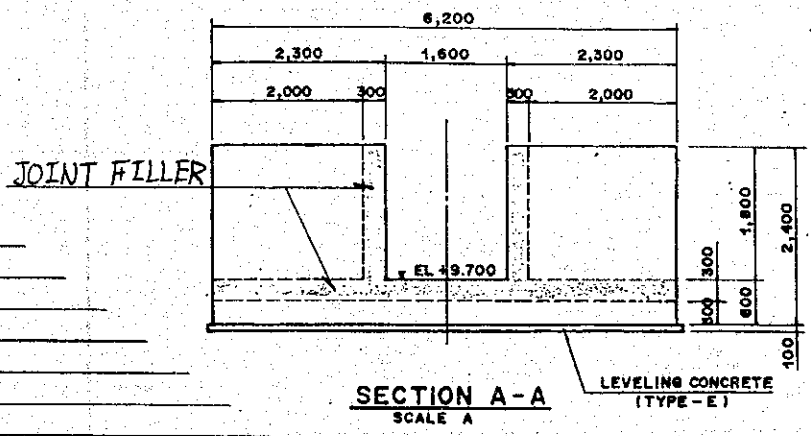
TYPE OF WORK : WING WALL
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

CALCULATION	RESULT
WATER STOP	
B = 200 mm	
L = (1.80 + 0.15) x 2 + (1.60 + 0.15 x 2) = 5.800	5.800 m
	
JOINT FILTER	
t = 10 , ELASTIC MATERIAL	
A = (0.30 x 6.339) + (0.307 x 1.80) x 2 = 3.007	3.007 m²
	

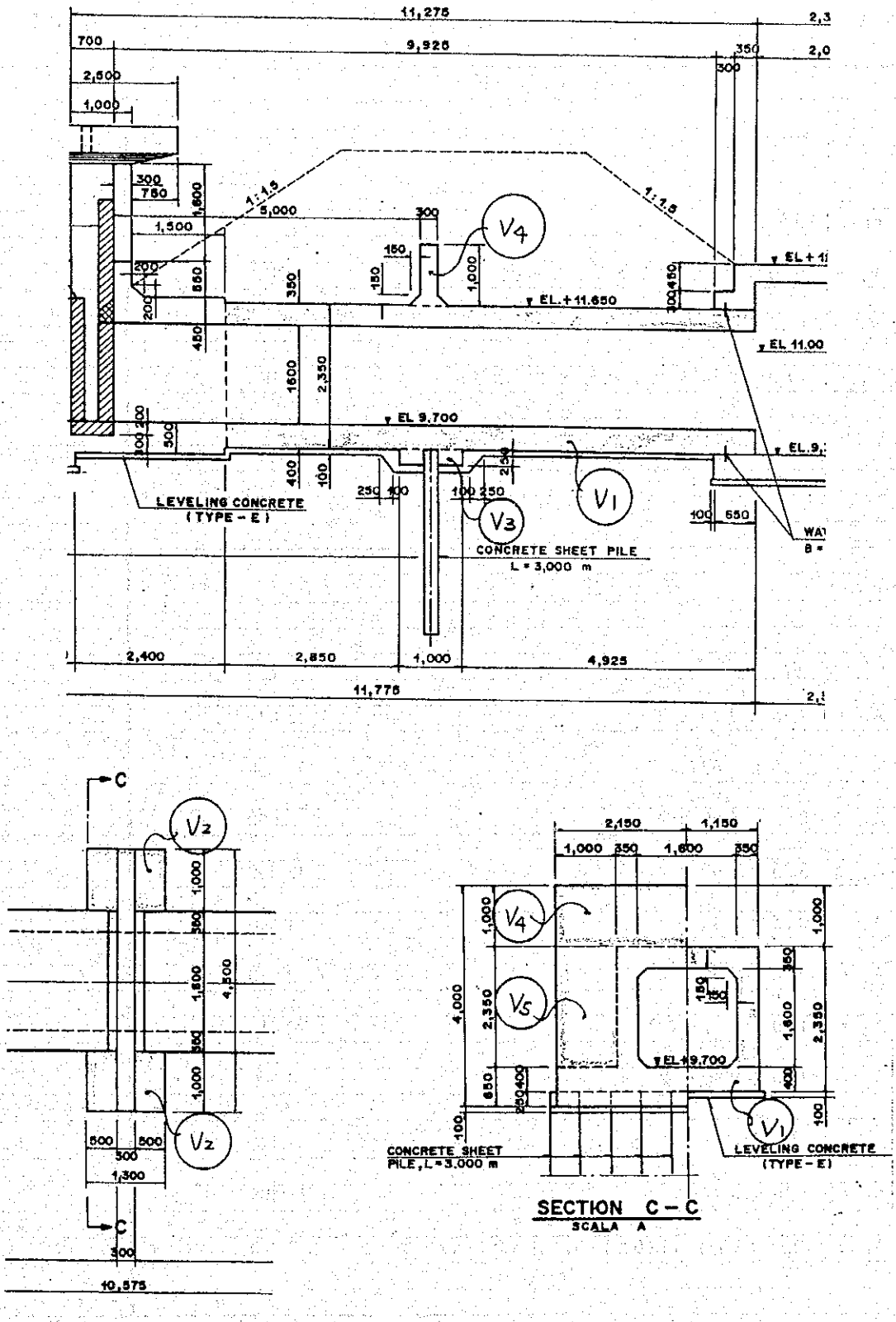
TYPE OF WORK : DRAINAGE SLUICEWAY AT WA.172R+15m
CONCRETE (TYPE-C1)
LOCATION : BOX CULVERT

CALCULATION	RESULT
(TYPE-C1)	
$V_1 = \{(2.30 \times 2.35) - (1.60 \times 1.60) + \frac{1}{2} \times 0.15^2 \times 4\} \times 8.775$	
$= 25.360$	
$V_2 = (1.00 \times 0.40 \times 1.30) \times 2$ $= 1.040$	
$V_3 = 0.25 \times 1.30 \times 4.30$ $= 1.398$	
$V_4 = 1.00 \times 4.30 \times 0.30 + \frac{1}{2} \times 0.15^2 \times 2.30 \times 2$	
$= 1.342$	
$V_5 = 1.00 \times 2.35 \times 0.30 \times 2$ $= 1.410$	
(Deduction for PC Sheet Pile)	
$V_6 = -(0.25 \times 0.22 \times 4.50)$ $= -0.248$	
TOTAL = 30.302	30.302 m^3

TYPE OF WORK : DRAINAGE SLUICEWAY AT WF. 172R + 15M CONCRETE (TYPE-C1)

LOCATION : BOX CULVET

EXPLANATORY DRAWING



TYPE OF WORK : BOX CULVERT
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m TYPE OF WORK

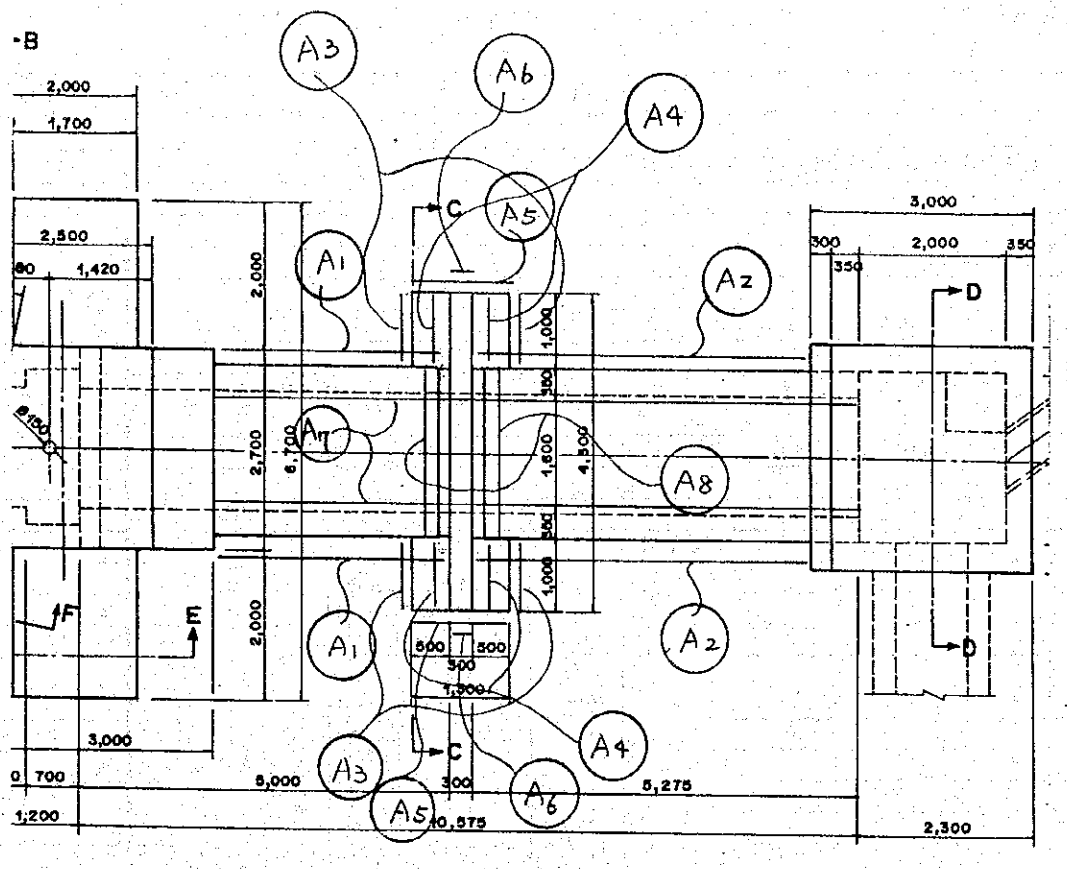
CALCULATION			RESULT
LEVELLING CONCRETE			
(TYPE – E)			
V_1 = 0.10 x 2.50 x 6.825	=	1.706	
V_2 = 0.10 x 4.50 x 1.30	=	0.585	
V_3 = (0.10 + 0.35) x ½ x 0.25 x 4.50 x 2	=	0.506	
TOTAL	=	2.797	2.797 m^3
FORM			
(H < 4.0 m)			
A_1 = 2.35 x 3.20 x 2	=	15.040	
A_2 = 2.35 x 4.625 x 2	=	21.738	
A_3 = 0.65 x 1.00 x 2 x 2	=	2.600	
A_4 = 3.35 x 1.00 x 2 x 2	=	13.400	
A_5 = 0.65 x 1.30 x 2	=	1.690	
A_6 = 0.30 x 3.35 x 2	=	2.010	
A_7 = 1.30 x 8.775 x 2	=	22.815	
A_8 = 1.00 x 2.30 x 2	=	4.600	
A_9 = $\sqrt{2}$ x 0.15 x 8.775 x 4	=	7.446	
A_{10} = 1.30 x 8.775	=	11.408	
A_{11} = (2.30 x 2.35) – (1.60 x 1.60) + ½ x 0.15 x 4	=	2.890	
TOTAL	=	105.637	105.637 m^2

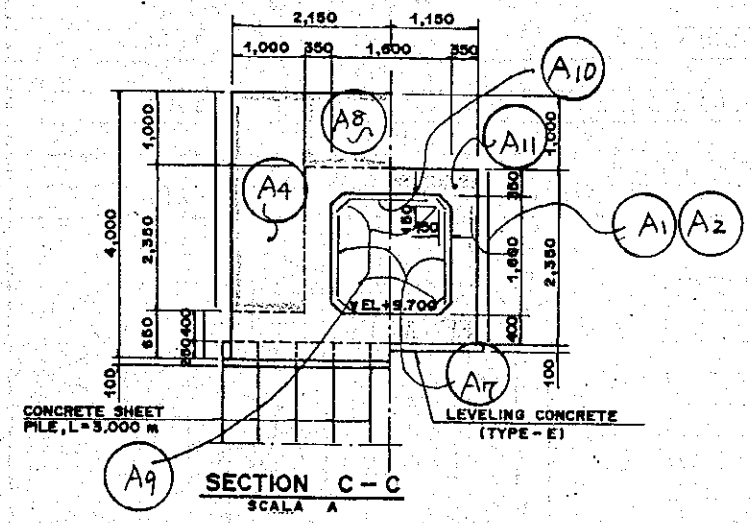
DRAINAGE SLUICEWAY AT WF.172R +15m

TYPE OF WORK : FORM

LOCATION : BOX CULVET

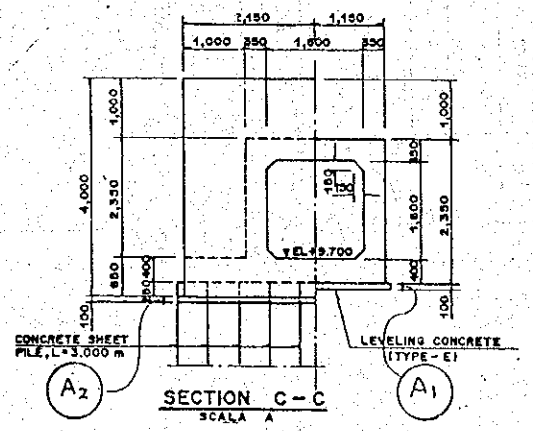
EXPLANATORY DRAWING

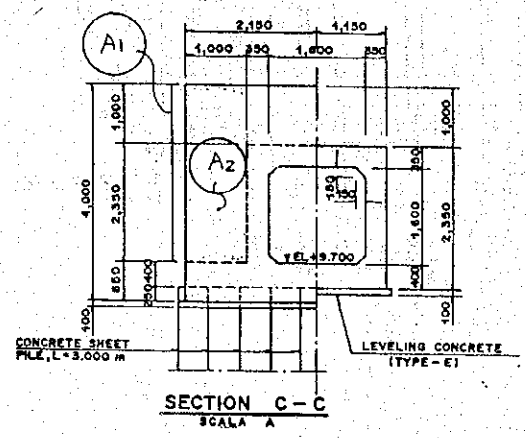




TYPE OF WORK : BOX CULVERT
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

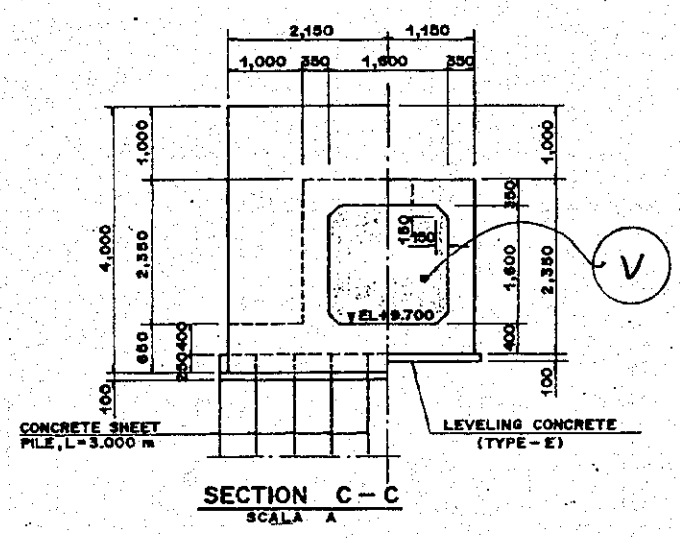
CALCULATION			RESULT
FORM FOR LEVELLING CONCRETE			
(H < 4.0 m)			
A_1 = 0.10 x 6.825 x 2	=	1.365	
A_2 = 0.10 x 1.30 x 2	=	0.260	
A_3 = (0.10 + 0.35) x ½ x 0.25 x 4	=	0.225	
TOTAL	=	1.850	1.850 m^3
SCAFFOLDING			
A_1 = 3.35 x 0.30 x 2	=	2.010	
A_2 = 3.35 x 1.00 x 2 x 2	=	13.400	
TOTAL	=	15.410	15.410 m^2





DRAINAGE SLUICEWAY AT WF. 172R+15m

TYPE OF WORK :	SUPPORTING
LOCATION :	BOX CULVERT



SECTION C – C
SCALA A

CALCULATION	RESULT
$V = \{(1.60 \times 1.60) - 1/2 \times 0.15^2\} \times 8.775$	
$= 22.365$	$22.365 m^3$

TYPE OF WORK : DRAINAGE SLUICEWAY AT WF.172R+15m

LOCATION : CONCRETE (TYPE-C1)

: GATE PIER

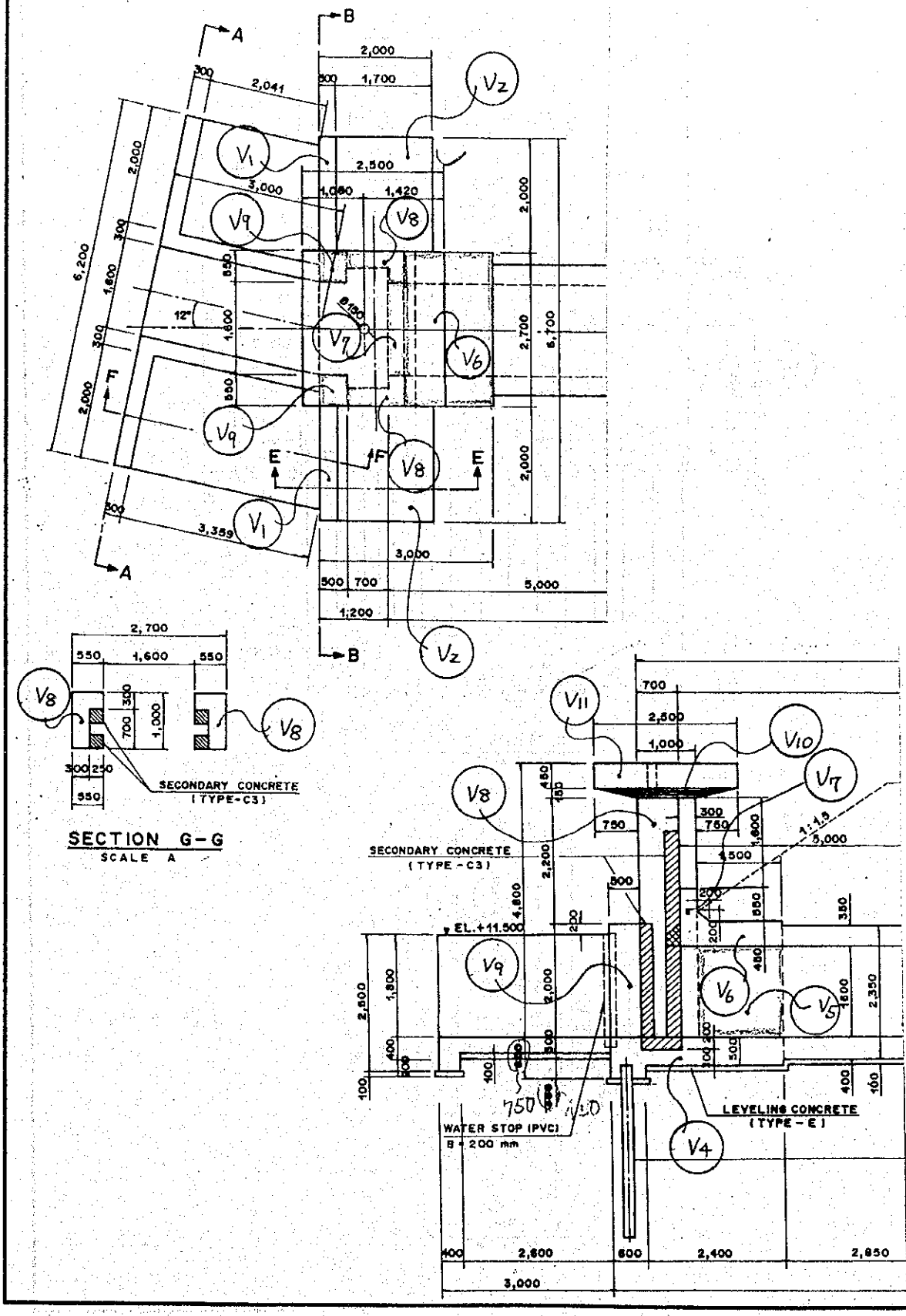
CALCULATION	RESULT
$V_1 = 0.30 \times 1.80 \times 2.00 \times 2 = 2.160$	
$V_2 = 0.40 \times 2.00 \times 2.00 \times 2 = 3.200$	
$V_3 = 0.25 \times 0.60 \times 2.00 \times 2 = 0.600$	
$V_4 = (3.00 \times 0.50 + 0.25 \times 0.60) \times 2.70 - (0.20 \times 0.70) \times 2.10 = 4.161$	
$V_5 = 1.60 \times 1.50 \times 0.55 \times 2 = 2.640$	
$V_6 = 2.70 \times 0.45 \times 1.50 + 1/2 \times 0.20^2 \times 2.70 = 1.877$	
$V_7 = 1.00 \times 0.30 \times 1.60 = 0.480$	
$V_8 = (0.55 \times 0.30 + 0.70 \times 0.30) \times 4.40 \times 2 = 3.300$	
$V_9 = 0.50 \times 0.55 \times 2.20 \times 2 = 1.210$	
$V_{10} = \{(2.50 + 1.00) \times 1/2 \times 0.15 \times (0.55 + 0.70) \times 1/2\} \times 2 = 0.328$	
$V_{11} = 2.50 \times 2.70 \times 0.45 - \pi/4 \times 0.15^2 \times 0.45 = 3.030$	
(Deduction for PC Sheet Pile)	
$V_{12} = -(6.50 \times 0.22 \times 0.25) = -0.358$	
TOTAL = 22.628	22.628 m^3

TYPE OF WORK : DRAINAGE SLUICEWAY AT WF. 172R+15m CONCRETE (TYPE-C1)

LOCATION : GATE PIER

(1/2)

EXPLANATORY DRAWING

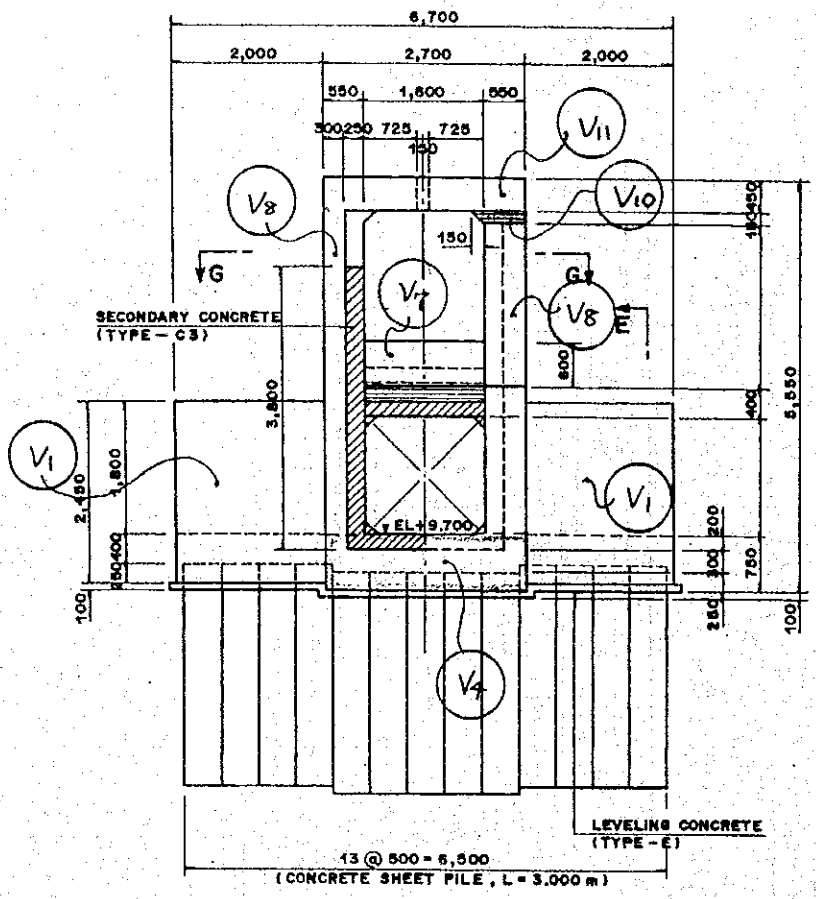


DRAINAGE SLUICEWAY AT WF. 172R + 15m

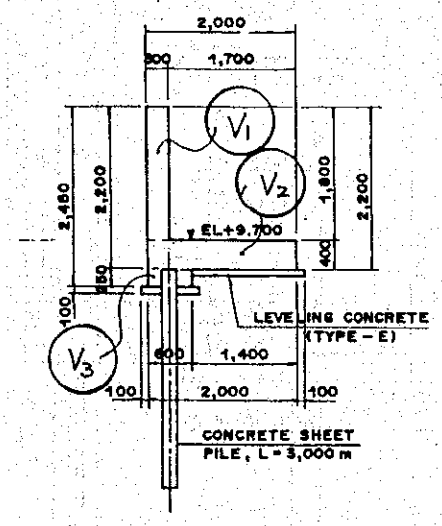
TYPE OF WORK : CONCRETE (TYPE-C1)

LOCATION : GATE PIER (2/2)

EXPLANATORY DRAWING



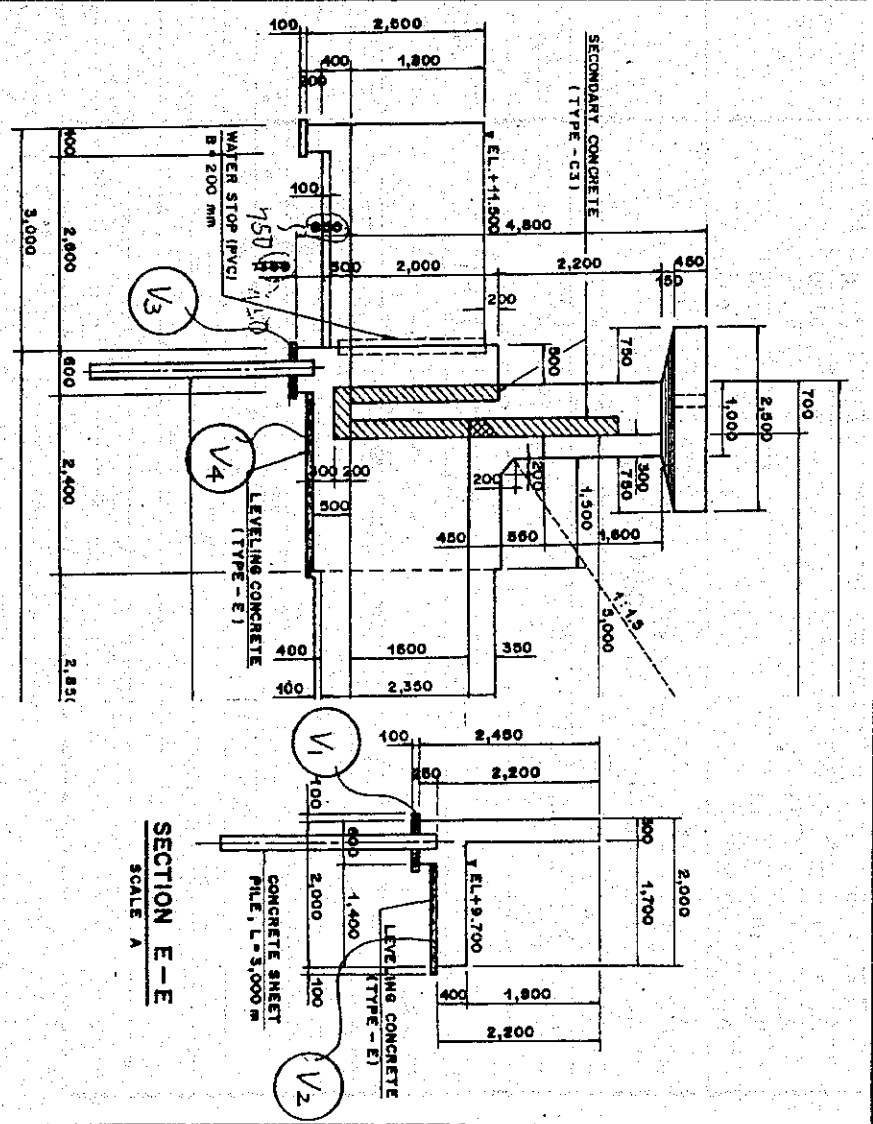
SECTION B-B
SCALE A



SECTION E-E
SCALE A

DRAINAGE SLUICEWAY AT WF.172R + 15m

TYPE OF WORK :	LEVELING CONCRETE
LOCATION :	GATE PIER



CALCULATION	RESULT
(TYPE - E)	
$V_1 = 0.80 \times 0.10 \times (2.00 + 0.10) \times 2 = 0.336$	
$V_2 = 1.50 \times 0.10 \times (2.00 + 0.10) \times 2 = 0.630$	
$V_3 = 0.80 \times 0.10 \times (2.70 + 0.10 \times 2) = 0.232$	
$V_4 = 2.40 \times 0.10 \times (2.70 + 0.10 \times 2) = 0.696$	
(Deduction for PC Sheet Pile)	
$V_5 = -(6.50 \times 0.10 \times 0.22) = -0.143$	
TOTAL = 1.751	1.751 m^3

TYPE OF WORK : GATE PIER
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

CALCULATION			RESULT
FORM			
(H < 4.0 m)			
A_1 = 2.00 x 2.45 x 2	=	9.800	
A_2 = 2.00 x 1.80 x 2	=	7.200	
A_3 = 2.00 x 0.40 x 2	=	1.600	
A_4 = {(0.40 x 2.00) + (0.25 x 0.60)} x 2	=	1.900	
A_5 = 0.30 x 1.80 x 2	=	1.080	
A_6 = 0.15 x 2.00 x 2	=	0.600	
A_7 = {(0.25 x 0.60) + (0.50 + 3.00) + (2.20 x 1.00) + (1.00 x 2.50) x ½ x 0.15 + (0.45 x 2.50)} x 2	=	23.675	
A_8 = (2.95 x 0.55) x 2 + (0.75 x 1.60)	=	4.445	
A_9 = 0.10 x 2.75	=	0.270	
A_{10} = (2.35 x 0.20) x 2	=	0.940	
A_{11} = (2.20 x 0.30) x 2	=	1.320	
A_{12} = (2.40 x 0.25) x 2	=	1.200	
A_{12}^1 = (0.20 x 1.60) x 2	=	0.640	
A_{13} = (2.20 x 0.50) x 2	=	2.200	
A_{14} = (4.40 x 0.25) x 2	=	2.200	
A_{15} = (4.40 x 0.70) x 2	=	6.160	
A_{16} = (1.60 x 0.30) x 2	=	0.960	
A_{17} = (1.95 x 0.55) x 2	=	2.145	
A_{18} = (0.35 x 1.60)	=	0.560	
A_{19} = 1.00 x 1.60	=	1.600	
A_{20} = $\sqrt{2}$ x 0.20 x 2.70	=	0.764	
A_{21} = $\{(0.55+0.70x1/2x)\sqrt{0.15+0.75}\}x4$	=	1.912	
A_{22} = 0.45 x 2.50 x 2	=	2.250	
A_{23} = (1.60 x 1.00) + (0.25 x 0.70) x 2	=	1.950	
TOTAL	=	77.371	77.371 m^2

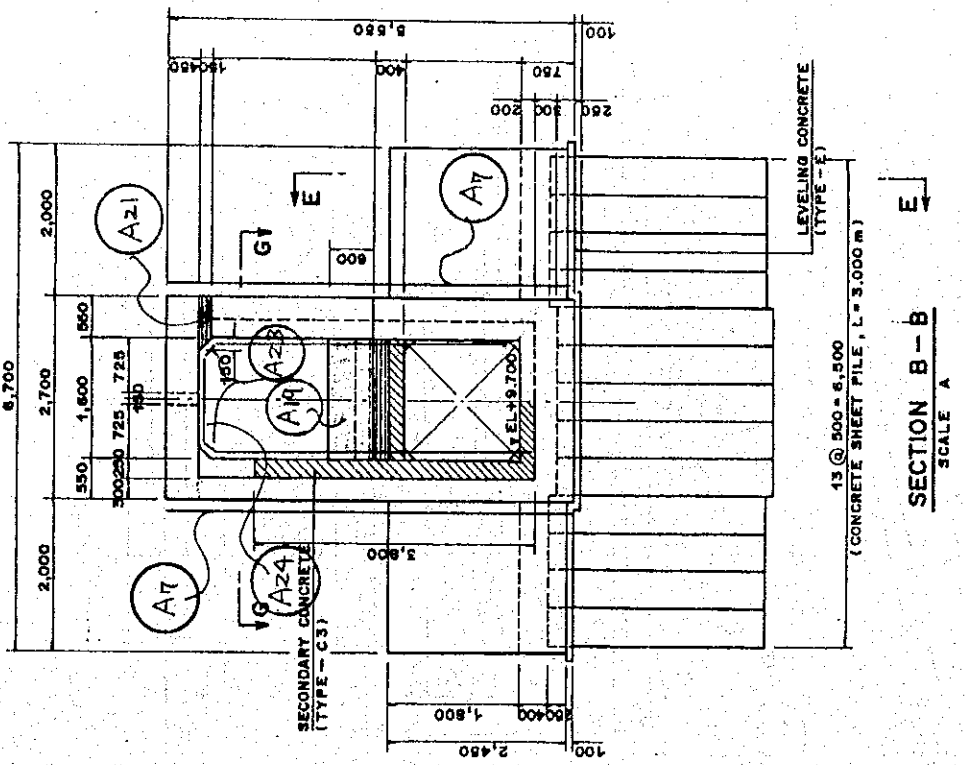
DRAINAGE SLUICEWAY AT WF 172 R + 15m

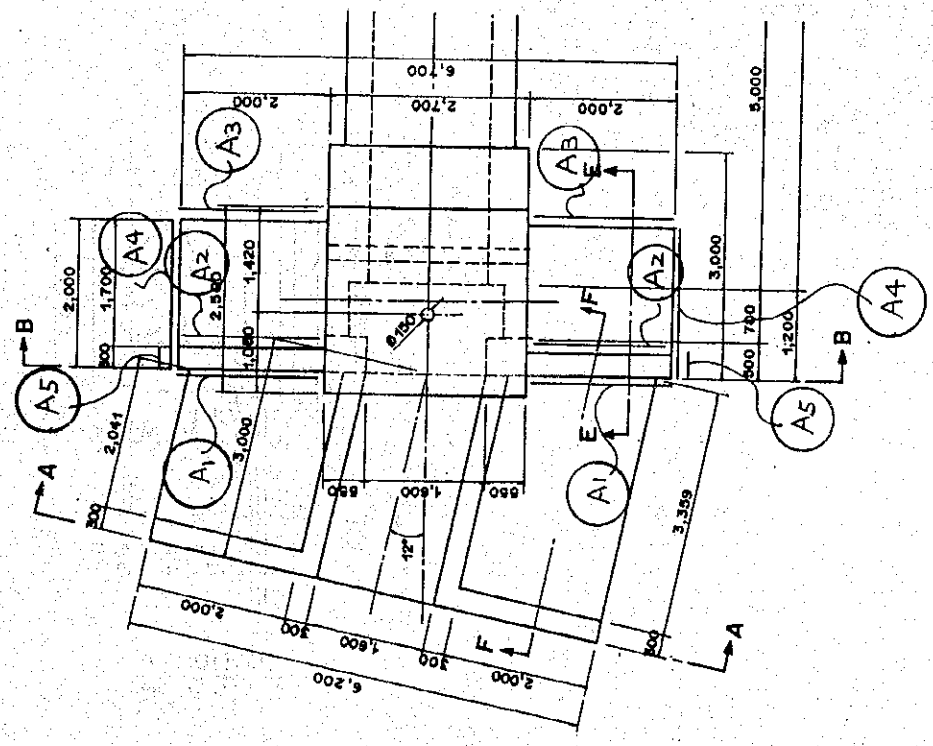
TYPE OF WORK : FORM

LOCATION : GATE PIER

(1/3)

EXPLANATORY DRAWING





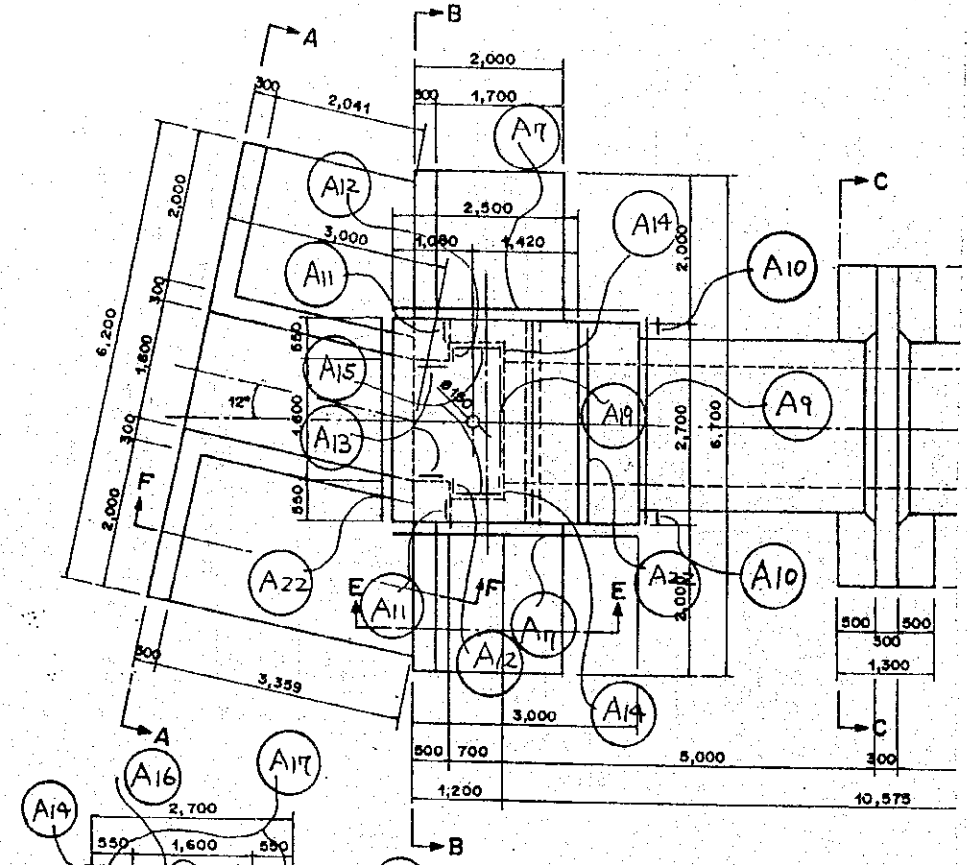
DRAINAGE SLUICEWAY AT WF172R + 15m

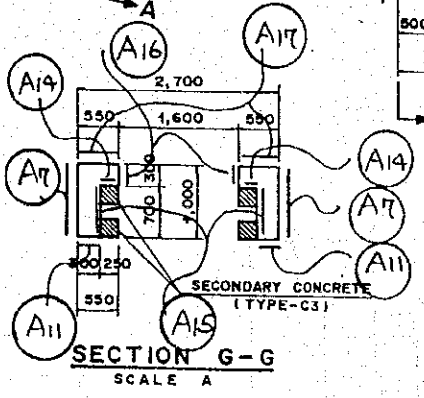
TYPE OF WORK : FORM

LOCATION : GATE PIER

(2/3)

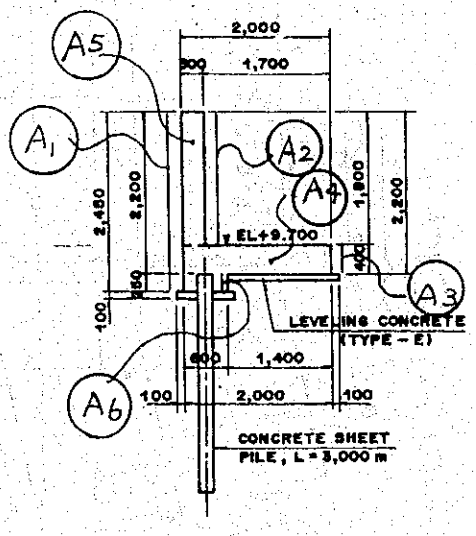
EXPLANATORY DRAWING





SECTION G-G

SCALE A



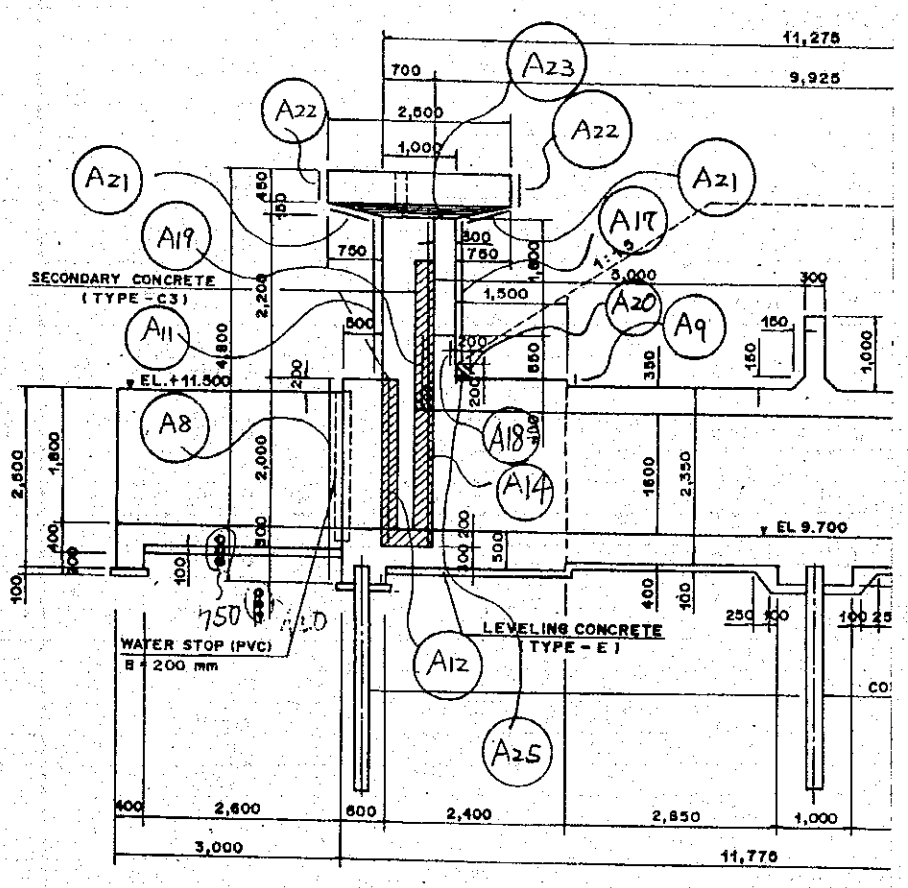
SECTION E-E

SCALE A

TYPE OF WORK : DRAINAGE SLICEWAY AT WF172R+15m FORM

LOCATION : GATE PIER (3/3)

EXPLANATORY DRAWING



TYPE OF WORK : GATE PIER
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

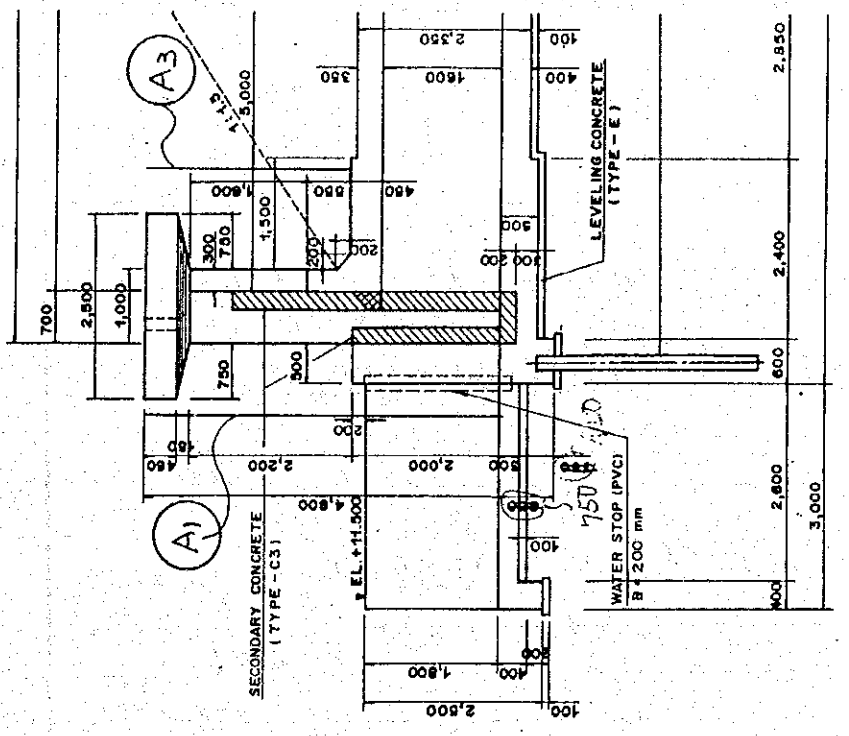
CALCULATION			RESULT
FORM FOR LEVELLING CONCRETE			
(H < 4.0 m)			
A_1 = 0.10 x (2.00 + 0.10) x 2 x 2	=	0.840	
A_2 = 0.10 x (2.00 + 0.10) x 2 x 2	=	0.840	
A_3 = 0.10 x 0.80 x 2	=	0.160	
A_4 = 0.10 x 1.50 x 2	=	0.300	
A_5 = 0.10 x 2.90 x 2	=	0.580	
A_6 = 0.10 x 2.90	=	0.290	
A_7 = 0.10 x 0.80 x 2	=	0.160	
A_8 = 0.10 x 2.50 x 2	=	0.500	
TOTAL	=	3.670	3.670 m^2
SCAFFOLDING			
A_1 = 4.80 x 2.70	=	12.960	
A_2 = 4.80 x 2.50 x 2	=	24.000	
A_3 = 2.75 x 2.70	=	7.425	
TOTAL	=	44.385	44.385 m^2

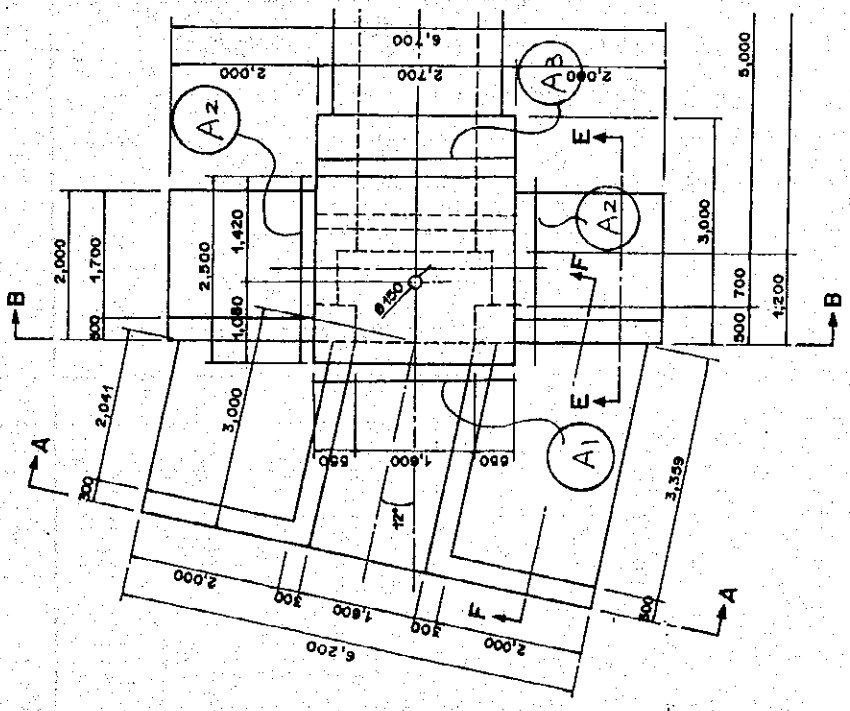
DRAINAGE SLUICEWAY AT WF. 172R + 15m

TYPE OF WORK : SCAFFOLDING

LOCATION : GATE PIER

EXPLANATORY DRAWING





DRAINAGE SLUICEWAY AT WF. 172R +15 m

TYPE OF WORK : SUPPORTING

LOCATION : GATE PIER

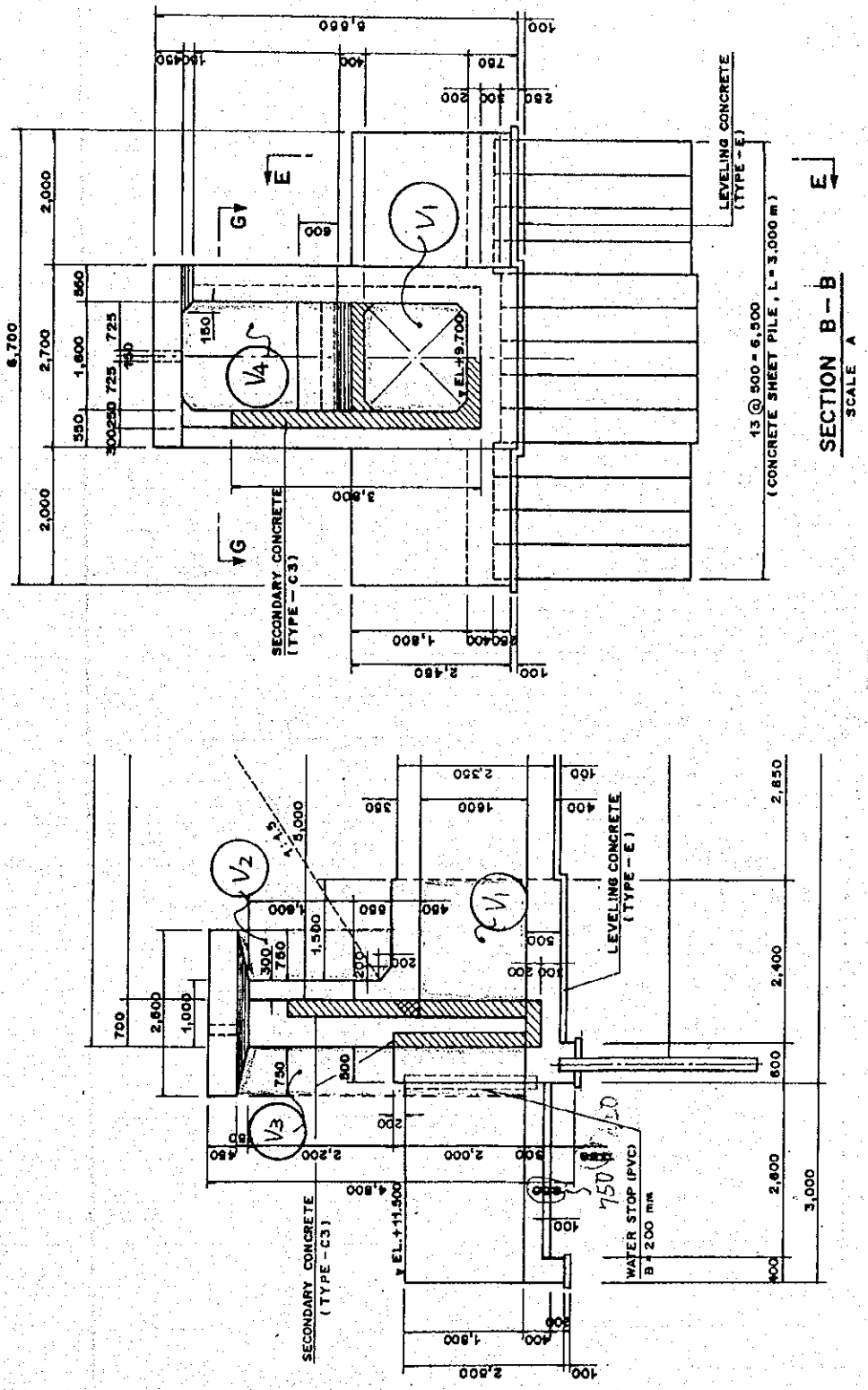
CALCULATION	RESULT
$V_1 = \{(1.60 \times 1.60) - 1/2 \times 0.15^2 \times 4\} \times 1.80 = 4.527$	
$V_2 = \{(2.30 + 2.15) \times 1/2 \times 0.75 - 1/2 \times 0.20^2\} \times 2.70$	
$= 4.452$	
$V_3 = (4.35 + 4.20) \times 1/2 \times 0.75 \times 2.70 = 8.657$	
$V_4 = \{(4.20 \times 1.60) - (1/2 \times 0.15^2 \times 2)\} \times 0.70$	
$= 4.688$	
$V_4' = \{(1.60 \times 1.60) - (1/2 \times 0.15^2 \times 2)\} \times 0.30$	
$= 0.761$	
TOTAL = 23.085	23.085 m^3

DRAINAGE SLUICEWAY AT WF. 172 R + 15 m

TYPE OF WORK : SUPPORTING

LOCATION : GATE PIER

EXPLANATORY DRAWING



DRAINAGE SLUICEWAY AT WF.172R + 15m

TYPE OF WORK : SECONDARY CONCRETE

LOCATION : GATE PIER

(1/2)

CALCULATION	RESULT
SECONDARY CONCRETE (TYPE-C3)	
V_1 = 0.20 × 0.70 × 2.10 = 0.294	
V_2 = 0.20 × 0.25 × 2.00 × 2 = 0.200	
V_3 = 0.25 × 0.25 × 3.70 × 2 = 0.463	
V_4 = 0.25 × 0.50 × 1.60 = 0.200	
TOTAL = 1.157	1.157 m^3
FORM (H < 4.0m)	
A_1 = 0.25 × 2.00 × 2 = 1.000	
A_2 = 0.25 × 3.70 × 2 = 1.850	
A_3 = 0.20 × 2.00 × 2 = 0.800	
A_4 = 0.25 × 3.70 × 2 = 1.850	
A_5 = 0.25 × 1.60 = 0.400	
A_6 = 0.50 × 1.60 = 0.800	
TOTAL = 6.700	6.700 m^2

TYPE OF WORK : DRAINAGE SLUICEWAY AT WF. 172R + 15m
SECONDARY CONCRETE

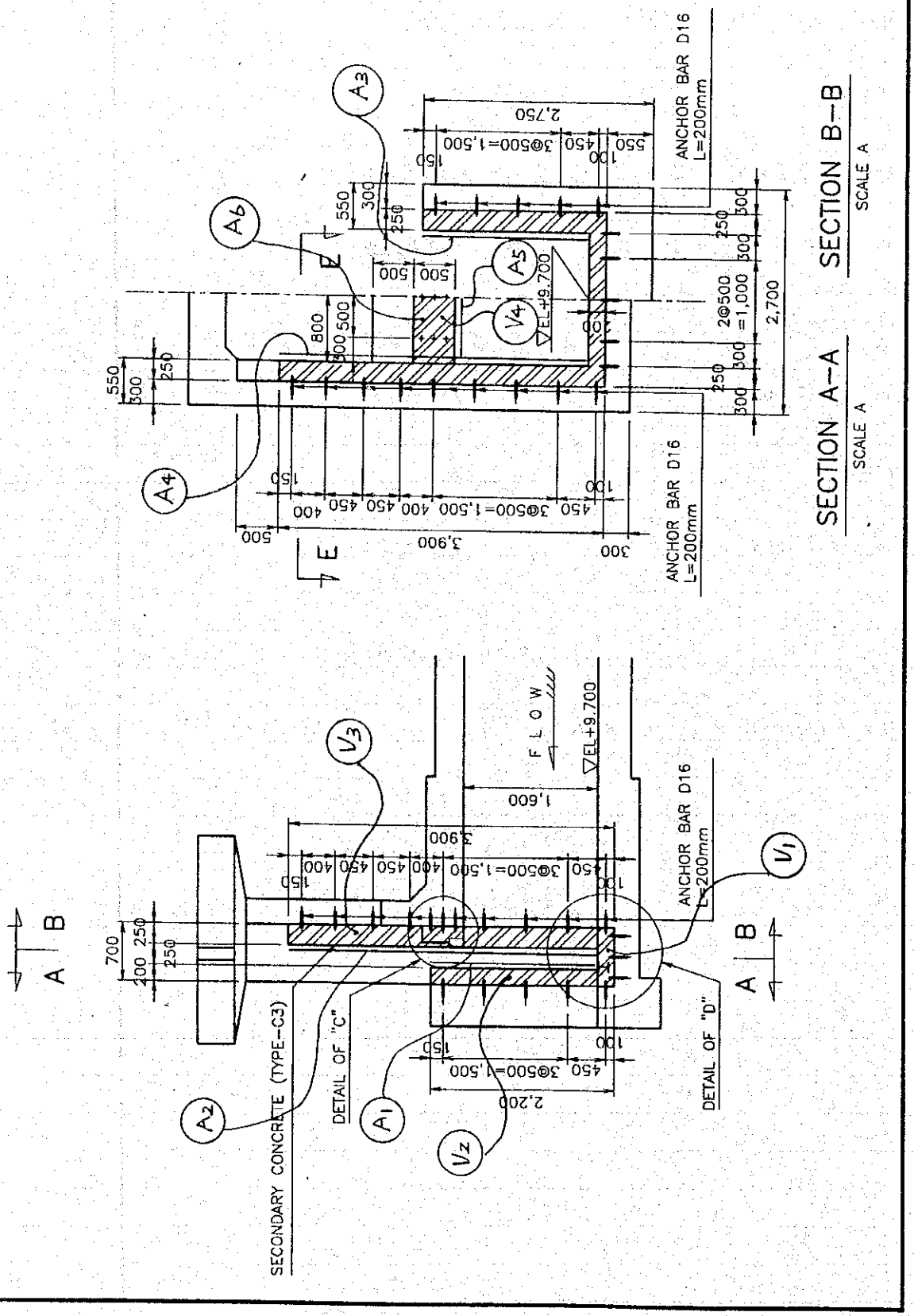
LOCATION : GATE PIER

CALCULATION	RESULT
ANCHOR BAR (Ð16, L = 200mm /Bar)	
(Side)	
n_1 = 9 Bars x 2 x 2 = 36 Bars	
n_2 = 5 Bars x 2 x 2 = 40 Bars	
(Bottom)	
n_3 = 5 Bars x 3 = 15 Bars	
(TOP)	
n_4 = 3 Bars x 3 = 9 Bars	
TOTAL = 100 Bars	
W = 100 Bars x 0.20 x 1.58 kgf/m = 31.600 kgf	0.032 tf

TYPE OF WORK : DRAINAGE SLUICEWAY AT WF. 172R+15m SECONDARY CONCRETE

LOCATION : GATE PIER

EXPLANATORY DRAWING



TYPE OF WORK : GATE PIER
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

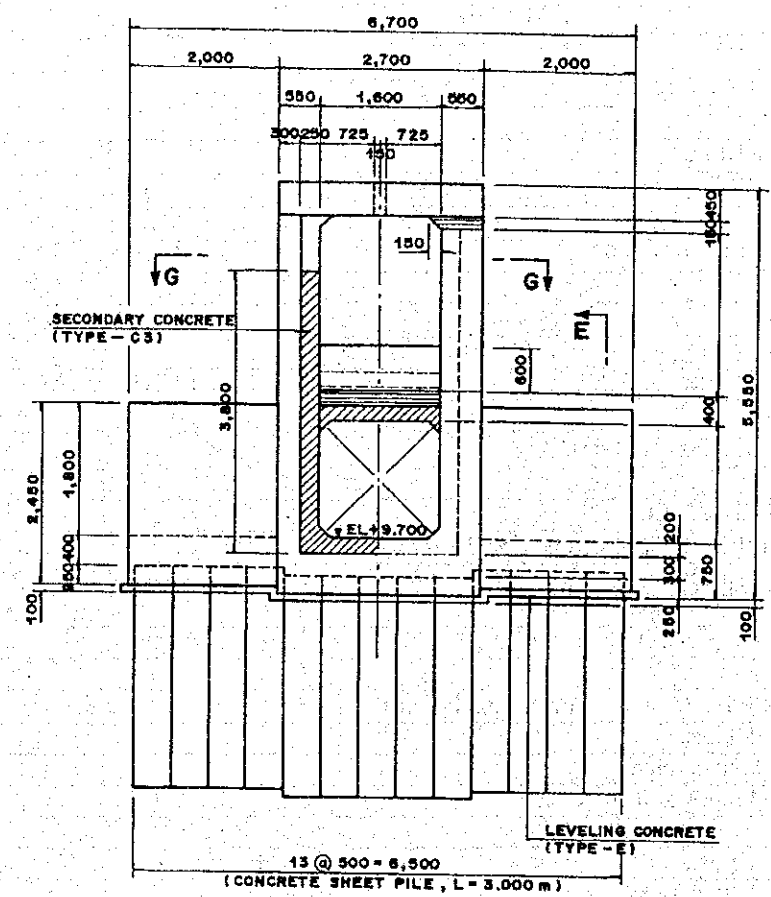
CALCULATION				RESULT
SEEPAGE BLOCKING				
• PC SHEET PILE				
n_1 = 6.70 : 0.50	= 13.40	≅	13 piles	
n_2 = 4.30 : 0.50	= 8.60	≅	9 piles	
L = (13 + 9) x 3.00		=	66.000	66.000 m
• PILING				
N Value : N = 27 (AVERAGE)				
L = 21 piles x 3.00		=	66.000	66.000 m
HAND RAIL AND LADDER				
(GALVANIZED STEEL)				
• STEEL PIPE Ø 75 (W = 5.77 kgf /m)				
n_1 = 6 pipes				
L_1 = 1.40 m /pipe				
W_1 = 6 pipes x 1.40 x 5.77		=	48.468	
• STEEL PIPE Ø 50 (W = 2.63 kgf /m)				
n_2 = 4 pipes				
L_2 = 0.80 m /pipe				
W_2 = 4 pipes x 0.80 x 2.63		=	8.416	
n_3 = 4 pipes				
L_3 = 2.20 m /pipe				
W_3 = 4 pipes x 2.20 x 2.63		=	23.144	
n_4 = 2 pipes				
L_4 = 2.40 m /pipe				
W_4 = 2 pipes x 2.40 x 2.63		=	12.624	
n_5 = 2 pipes				
L_5 = 4.76 m /pipe				
W_5 = 2 pipes x 4.76 x 2.63		=	25.038	
• ROUND BAR Ø 16 (W = 1.58 kgf /m)				
n_6 = 31 pipes				
L_6 = 1.10 m /pipe				
W_6 = 31 pipes x 1.10 x 1.58		=	53.878	
n_7 = 5 pipes				
L_7 = 1.58 m /pipe				
W_7 = 5 pipes x 0.60 x 1.58		=	4.740	
TOTAL ($W_1 + W_2 + W_3 + W_4 + W_5 + W_6 + W_7$)		=	176.308	0.176 tf

DRAINAGE SLUICEWAY AT WT.172R+15M

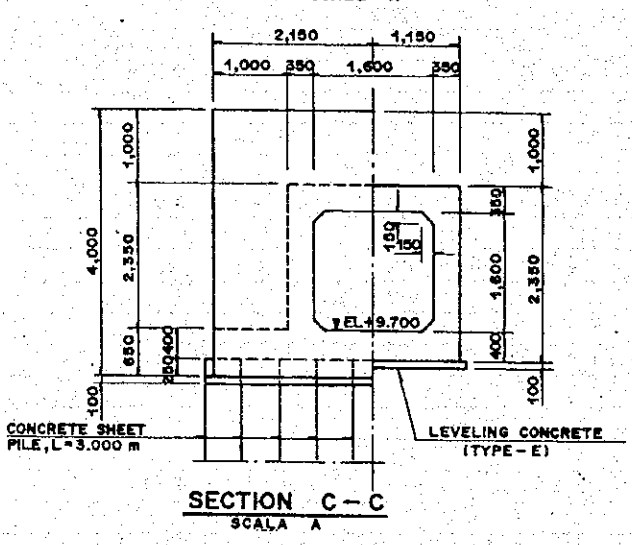
TYPE OF WORK : SEEPAGE BLOCKING

LOCATION : GATE PIER

EXPLANATORY DRAWING



SECTION B – B
SCALE A



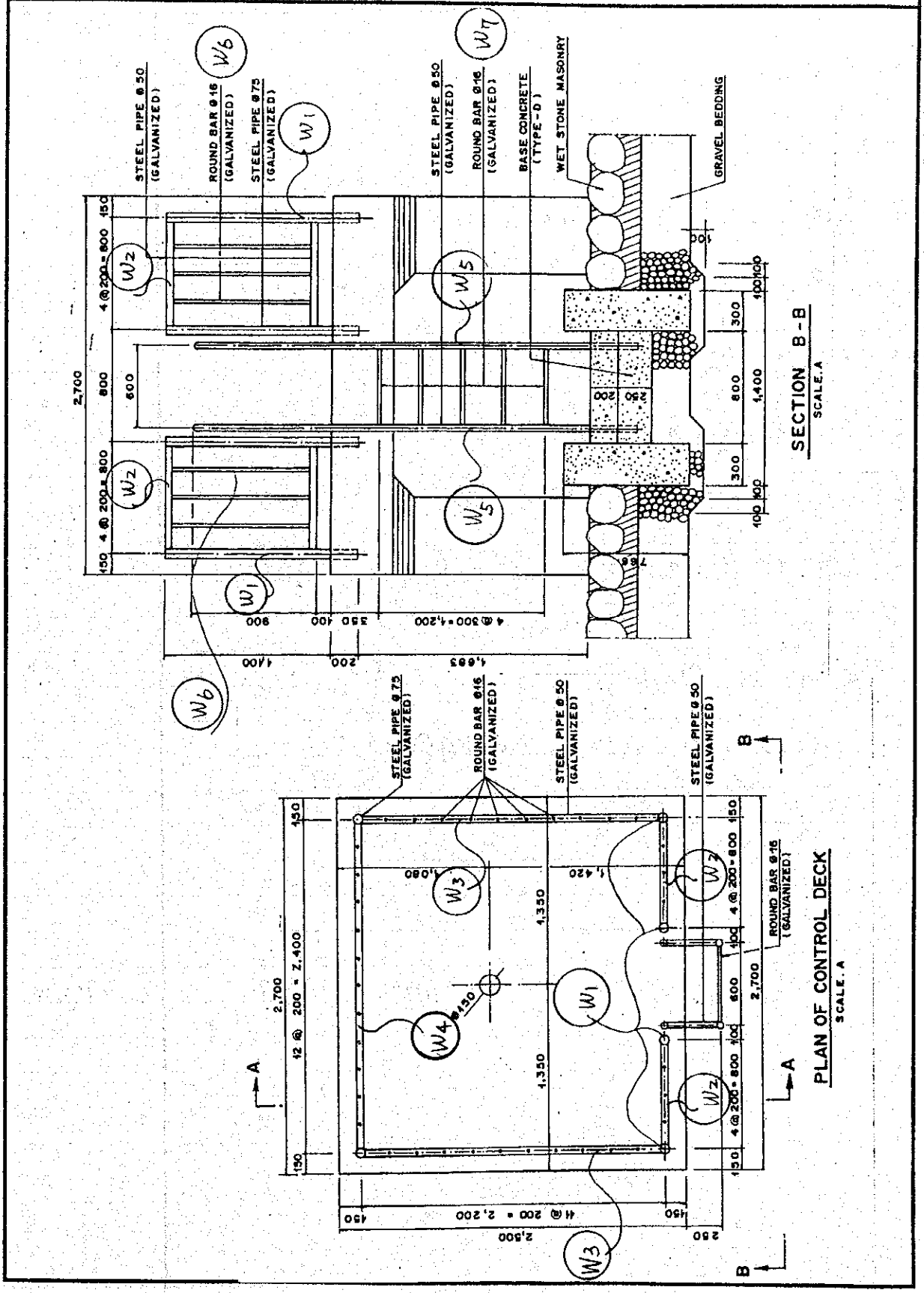
SECTION C – C
SCALA A

DRAINAGE SLUICEWAY AT WF172R + 15M

TYPE OF WORK : HAND RAIL AND LADDER

LOCATION : GATE PIER

EXPLANATORY DRAWING



DRAINAGE SLUICEWAY AT WF.172R+15m

TYPE OF WORK : CONCRETE (TYPE-C1)

LOCATION : CONNECTING BOX

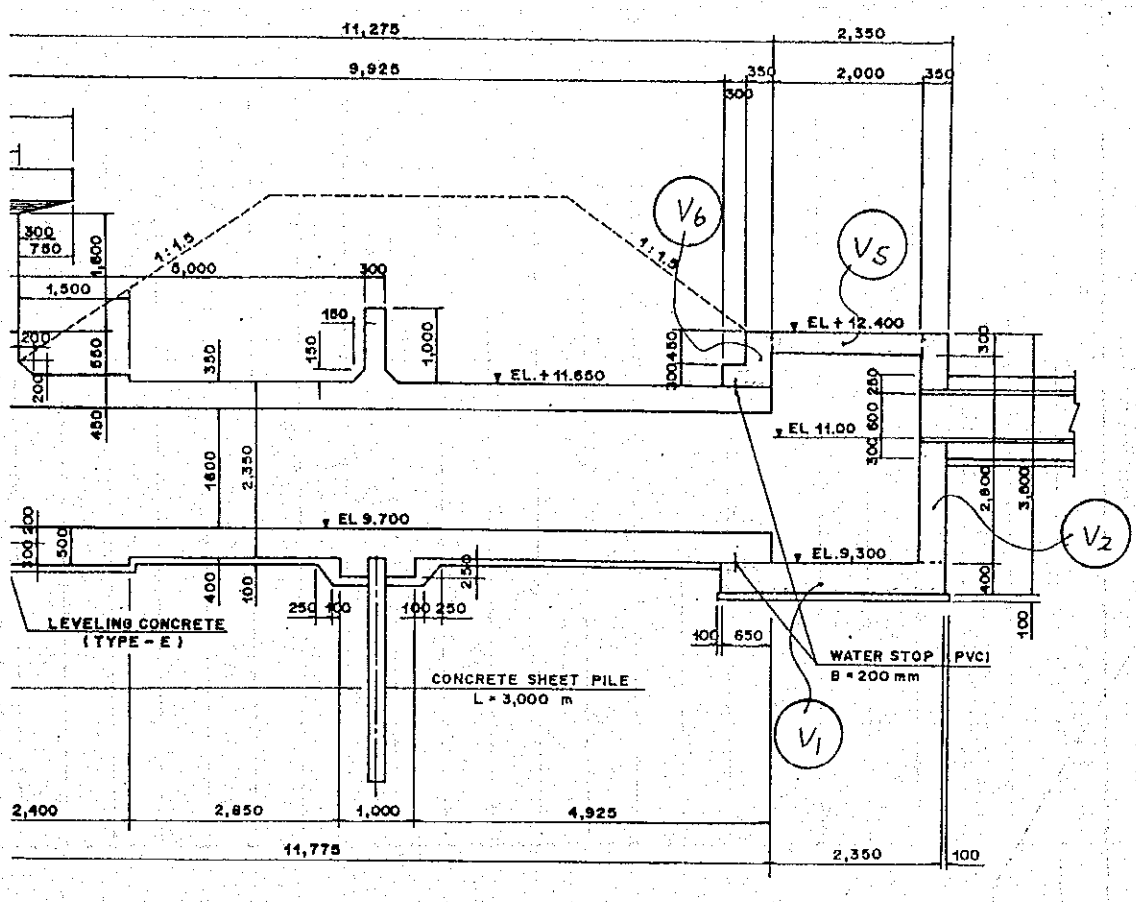
CALCULATION	RESULT
(TYPE-C1)	
$V_1 = 3.00 \times 3.00 \times 0.40 = 3.600$	
$V_2 = 3.00 \times 3.10 \times 0.35 - (\pi/4 \times 0.74^2 \times 0.35) = 3.104$	
$V_3 = 2.00 \times 3.10 \times 0.35 = 2.170$	
$V_4 = 2.00 \times 3.10 \times 0.35 - (1.30 \times 1.00 \times 0.35) = 1.715$	
$V_5 = 2.00 \times 2.30 \times 0.30 = 1.380$	
$V_6 = (0.30 \times 0.65 + 0.45 \times 0.35) \times 3.00 = 1.058$	
$V_7 = 2.35 \times 0.35 \times 0.65 \times 2 = 1.069$	
(Deduction for Opening)	
$V_8 = -\{(1.00 \times 1.00 \times 0.15) + (0.80 \times 0.80 \times 0.15)\}$	
$= -0.246$	
$V_9 = 0.49 \times 0.98 \times 0.15 \times 2 = 0.144$	
TOTAL = 13.994	13.994 m^3

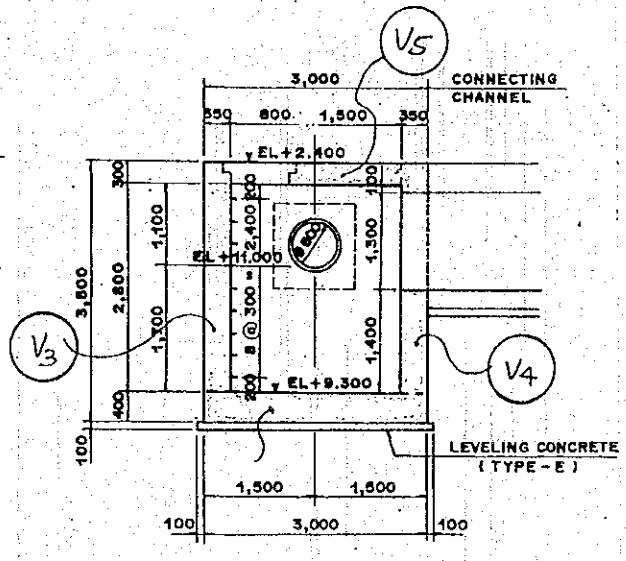
DRAINAGE SLUICEWAY AT WF. 172R+15M

TYPE OF WORK : CONCRETE (TYPE-C1)

LOCATION : CONNECTING BOX

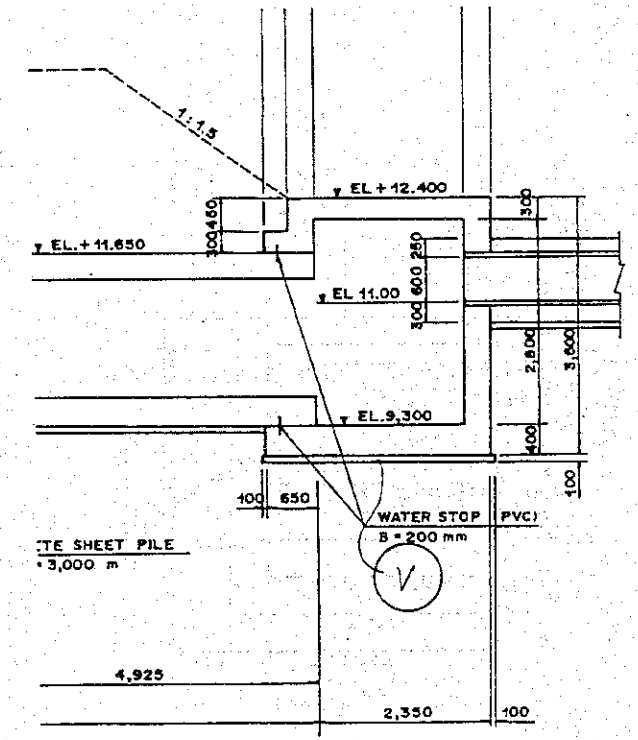
EXPLANATORY DRAWING





DRAINAGE SLUICEWAY AT WF. 172R+15m

TYPE OF WORK :	LEVELING CONCRETE
LOCATION :	CONNECTING BOX



CALCULATION	RESULT
(TYPE-E)	
$V = (3.00 + 0.10 \times 2)^2 \times 0.10 = 1.024$	$1.024\ m^3$

TYPE OF WORK : DRAINAGE SLUICEWAY AT WF. 172R+15m FORM

LOCATION : CONNECTING BOX

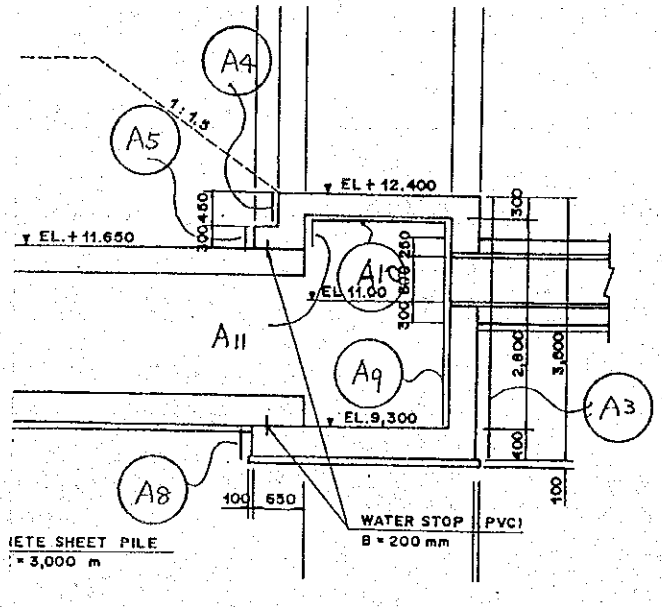
CALCULATION	RESULT
(H < 4.0m)	
$A_1 = \{(3.00 \times 3.05) + (0.45 \times 2.70)\} - (1.30 \times 1.00)$	
$= 9.065$	
$A_2 = (3.00 \times 3.05) + (0.45 \times 2.70) = 10.365$	
$A_3 = (3.50 \times 3.00) - \pi/4 \times 0.75^2 = 10.058$	
$A_4 = 0.45 \times 3.00 = 1.350$	
$A_5 = 0.30 \times 3.00 = 0.900$	
$A_6 = 2.40 \times 0.35 = 0.840$	
$A_7 = 2.40 \times 0.35 = 0.840$	
$A_8 = 0.30 \times 3.00 = 0.900$	
$A_9 = 2.80 \times 2.30 - \pi/4 \times 0.74^2 = 6.010$	
$A_{10} = 2.00 \times 2.30 - (0.80 \times 0.80) = 3.960$	
$A_{11} = 2.30 \times 0.45 = 1.035$	
$A_{12} = 2.80 \times 2.00 - (1.30 \times 1.00) = 4.300$	
$A_{13} = 2.80 \times 2.00 = 5.600$	
$A_{14} = (1.00 \times 0.15) \times 4 = 0.600$	
$A_{15} = (1.30 \times 0.35) \times 2 + (1.00 \times 0.35) = 1.260$	
TOTAL = 57.083	57.083 m²

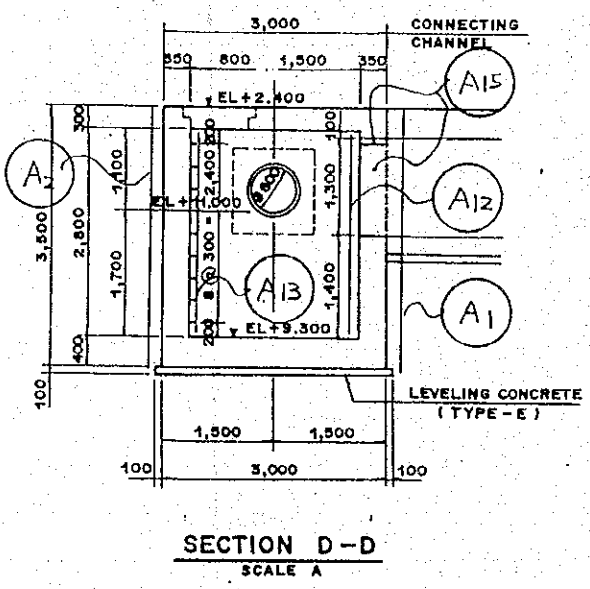
DRAINAGE SLUICEWAY AT WF. 172R + 15M

TYPE OF WORK : FORM

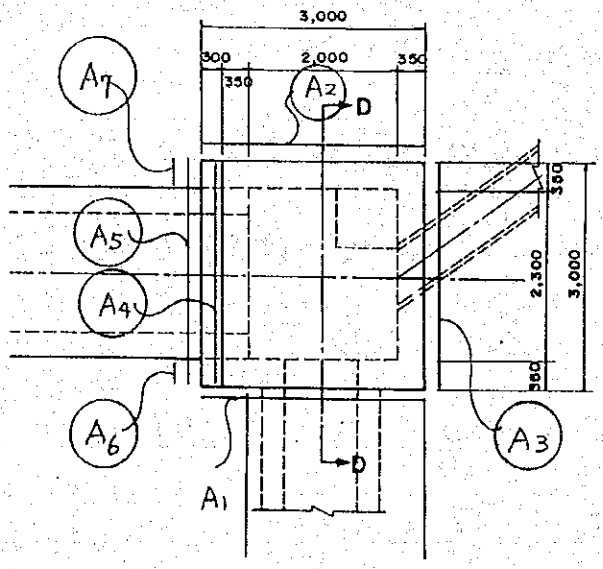
LOCATION : CONNECTING BOX

EXPLANATORY DRAWING



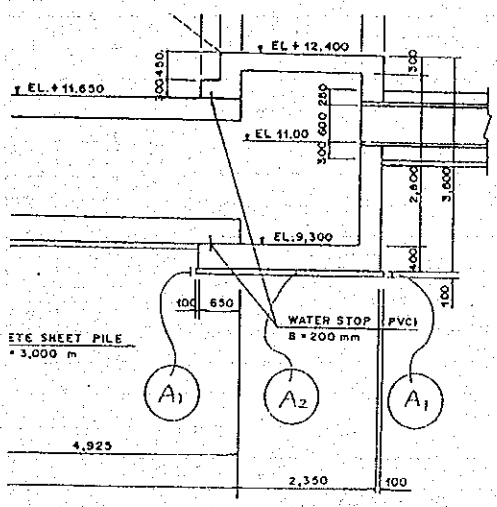


SECTION D – D
SCALE A

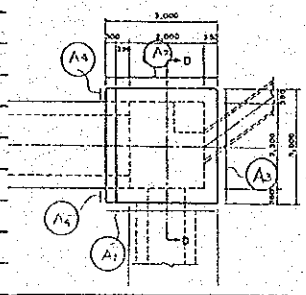
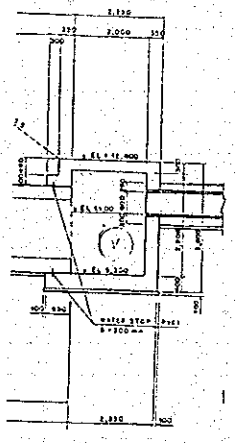


TYPE OF WORK : CONNECTING BOX
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

CALCULATION			RESULT
FORM FOR LEVELLING CONCRETE			
(H < 4.0 m)			
A_1 = 0.10 x 3.20 x 2	=	0.640	
A_2 = 0.10 x 3.20 x 2	=	0.640	
TOTAL	=	1.280	1.280 m^2
WATER STOP			
B = 200 m			
L = 2.30 x 2 + 2.35 x 2	=	9.300	9.300 m

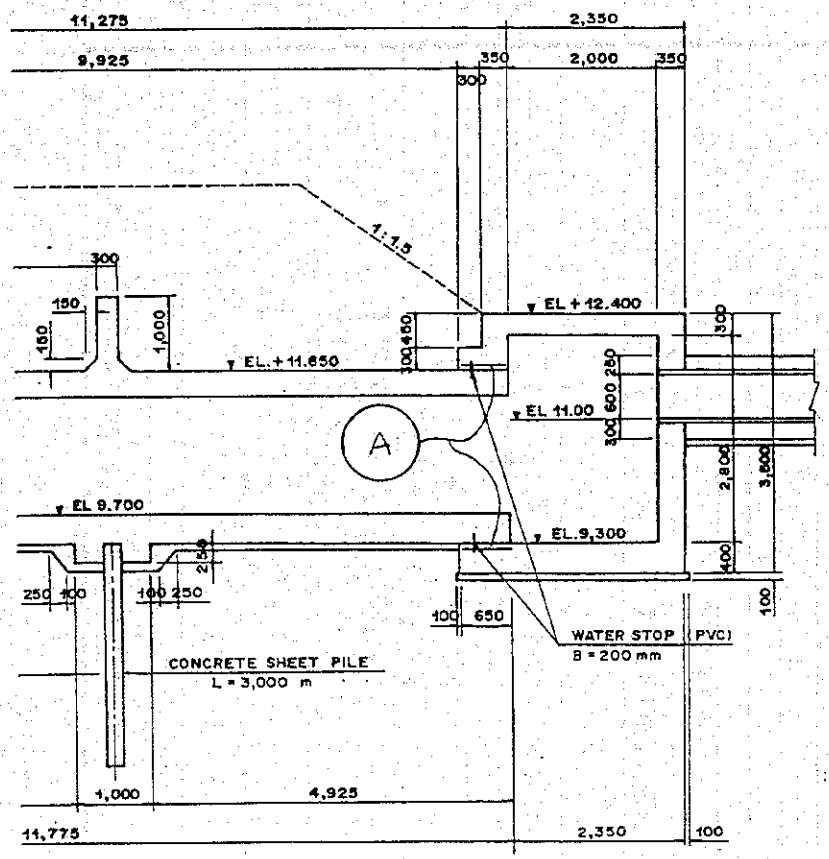


TYPE OF WORK : CONNECTING BOX
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

CALCULATION			RESULT
SCAFFOLDING			
A_1 = 3.50 x 3.00	=	10.50	
A_2 = 3.50 x 3.00	=	10.50	
A_3 = 3.50 x 3.00	=	10.50	
A_4 = 3.50 x 0.35 x 2	=	2.45	
TOTAL	=	33.950	33.950 m^2
			
SUPPORTING			
V = 2.80 x 2.00 x 2.30	=	12.880	12.880 m^3
			

DRAINAGE SLUICEWAY AT WF. 172R+15m

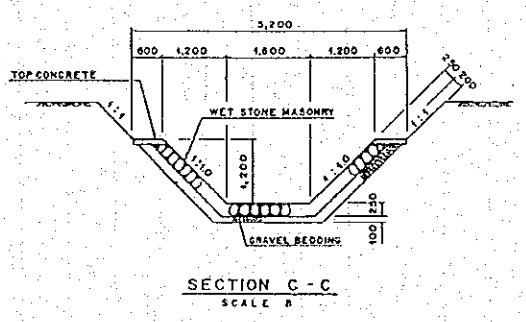
TYPE OF WORK :	JOINT FILLER
LOCATION :	CONNECTING BOX



CALCULATION	RESULT
t=10, ELASTIC MATERIAL	
A = (2.30+2.35)×2 × 0.65 = 6.045	6.045 m^2

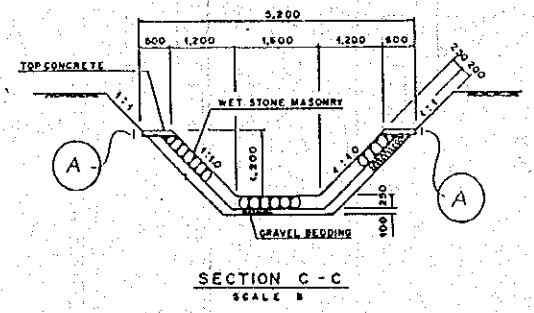
TYPE OF WORK : RIVERSIDE OPEN CHANNEL
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

CALCULATION			RESULT
CONCRETE			
• (TYPE – D)			
A = (0.60 + 0.70) x ½ x 0.10	=	0.065 m^2	
V = 0.065 x (18.70 + 3.00) x 2	=	2.821	2.821 m^3



SECTION C - C
SCALE B

FORM			
(H < 4.0 m)			
A = 0.10 x (18.70 + 3.00) x 2	=	4.340	4.340 m^2

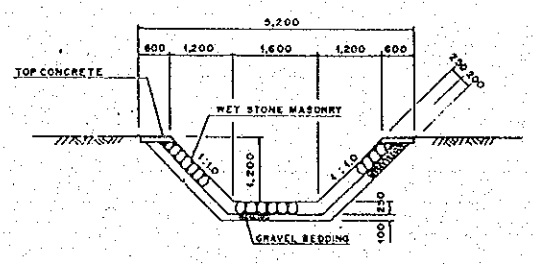
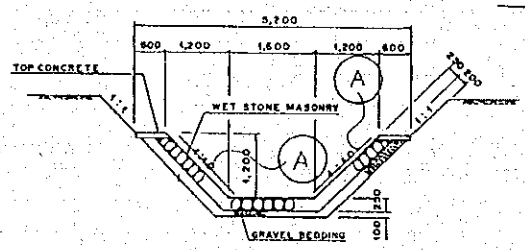


SECTION C - C
SCALE B

TYPE OF WORK : RIVERSIDE OPEN CANNEL
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

CALCULATION			RESULT
WET STONE MASONRY			
A_1 = 1.555 x 0.25 x 2 + (2.141 + 2.307) x ½ x 0.25	=	1.334 m^2	
V_1 = 1.334 x (18.70 + 4.00)	=	30.280	
A_2 = 1.60 x 0.25	=	0.400 m^2	
V_2 = (0.40 + 1.334) x ½ x 2.40	=	2.081	
V_3 = 1.60 x 0.35 x 0.60	=	0.336	
TOTAL ($V_1 + V_2 + V_3$)	=	32.699	32.699 m^3
GRAVEL BEDDING			
A_1 = 1.621 x 0.20 x 2 + (2.307 + 2.523) x ½ x 0.10	=	0.890 m^2	
V_1 = 1.890 x (18.70 + 4.00)	=	20.203	
A_2 = 1.60 x 0.10	=	0.160 m^2	
V_2 = (0.16 + 0.89) x ½ x 2.40	=	1.260	
TOTAL ($V_1 + V_2$)	=	21.463	21.463 m^3

TYPE OF WORK : RIVERSIDE OPEN CHANNEL
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

CALCULATION			RESULT
STRUCTURAL EXCAVATION			
A = (2.358 + 5.20) x ½ x 120	=	40.535 m^2	
V = 4.535 x (22.70 + 25.10) x ½	=	108.387	108.4 m^3
 SECTION C - C SCALE			
CEMENT MORTAR POINTING			
A_1 = 1.555 x (18.70 + 4.00) x 2	=	70.597	
A_2 = ½ x (1.555 x 2.40) x 2	=	3.732	
TOTAL	=	74.329	74.329 m^3
 SECTION C - C SCALE			

TYPE OF WORK : REINFORCEMENT OF EXISTING DIKE
LOCATION :

CALCULATION				RESULT
STRUCTURAL EXCAVATION				
A_1 = (2.00 + 2.80) x ½ x 0.80		=	1.920 m^2	
A_2 = 1.90 X 2.00		=	3.800 m^2	
	A	=	5.720 m^2	
V = 5.720 x 20.00		=	114.40	114.40 m^3
BACKFILL WITH SELECTED SOIL				
A_1 = (0.50 + 0.9) x ½ x 0.90		=	0.630 m^2	
A_2 = (0.50 + 2.2) x ½ x 2.10		=	2.835 m^2	
	A	=	3.465 m^2	
V = 3.465 x 20.00		=	69.300	69.300 m^3

TYPE OF WORK : REINFORCEMENT OF EXISTING DIKE
LOCATION :

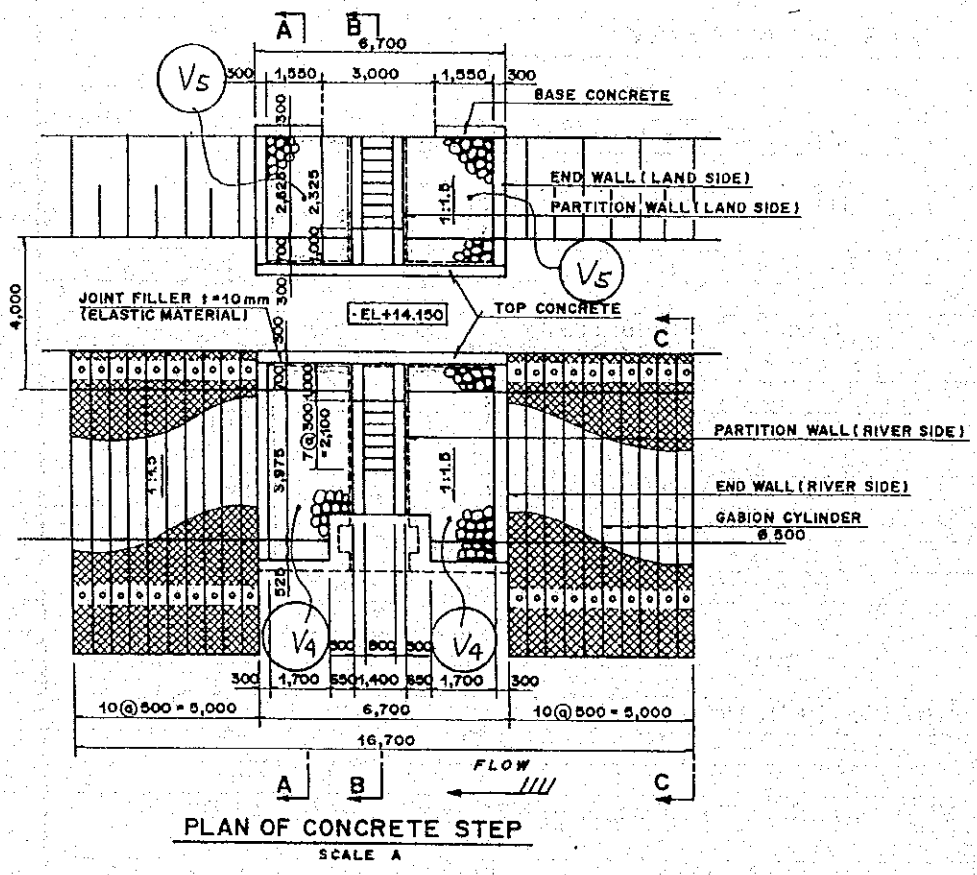
CALCULATION			RESULT
EMBANKMENT			
• EMBANKMENT			
A = (2.50 + 1.00) x ½ x 3.00	=	5.250 m^2	
V = 5.25 x 20.00	=	105.00	105.00 m^3
• SOIL SODDING			
L = 1.202 x 4.5	=	1.803 m	
A = 1.803 x 20.00	=	36.06	36.06 m^2
WET STONE MASONRY			
• WET STONE MASONRY			
A = (0.40 + 1.00) x ½ x 1.80	=	1.260 m^3	
V = 1.26 x 20.00	=	25.200	25.200 m^3
• GRAVEL BEDDING			
A = 1.20 x 0.10	=	0.120 m^2	
V = 0.12 x 20.00	=	2.400	2.400 m^3
• CEMENT MORTAR POINTTING			
A = (1.10 + 0.40) x 20.00	=	30.000	30.000 m^2

TYPE OF WORK : REVETMENT
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

CALCULATION			RESULT
WET STONE MASONRY			
V_1 = {(11.18 + 0.70) x 0.25 x 3.70} x 2	=	21.978	
V_2 = {(11.18 + 7.379) x ½ x 0.25 x 1.20} x 2	=	5.568	
V_3 = 7.379 x 0.25 x 1.60	=	2.952	
V_4 = {(0.525 + 4.778 + 0.70) x 0.30 x 1.70 + (3.967 + 0.70) x 0.30 x 0.65} x 2	=	7.943	
V_5 = {(3.155 + 0.70) x 0.30 x 2.35} x 2	=	5.436	
TOTAL	=	43.877	43.877 m^3
GRAVEL BEDDING			
V_1 = {(11.18 + 0.70) x 0.25 x 3.70} x 2	=	21.978	
V_2 = {(11.18 + 7.379) x ½ x 0.25 x 1.20} x 2	=	5.568	
V_3 = 7.379 x 0.25 x 1.60	=	2.952	
V_4 = {(0.525 + 4.778 + 0.70) x 0.30 x 1.70 + (3.967 + 0.70) x 0.30 x 0.65} x 2	=	7.943	
V_5 = (3.967 + 0.70) x 0.30 x 0.80	=	1.120	
V_6 = {(3.155 + 0.70) x 0.30 x 2.35} x 2	=	5.436	
V_7 = (3.155 + 0.70) x 0.30 x 0.80	=	0.925	
TOTAL	=	45.922	45.922 m^3

TYPE OF WORK : DRAINAGE SLUICEWAY AT WF.172R+15m
LOCATION : WET STONE MASONRY REVETMENT (1/2)

EXPLANATORY DRAWING



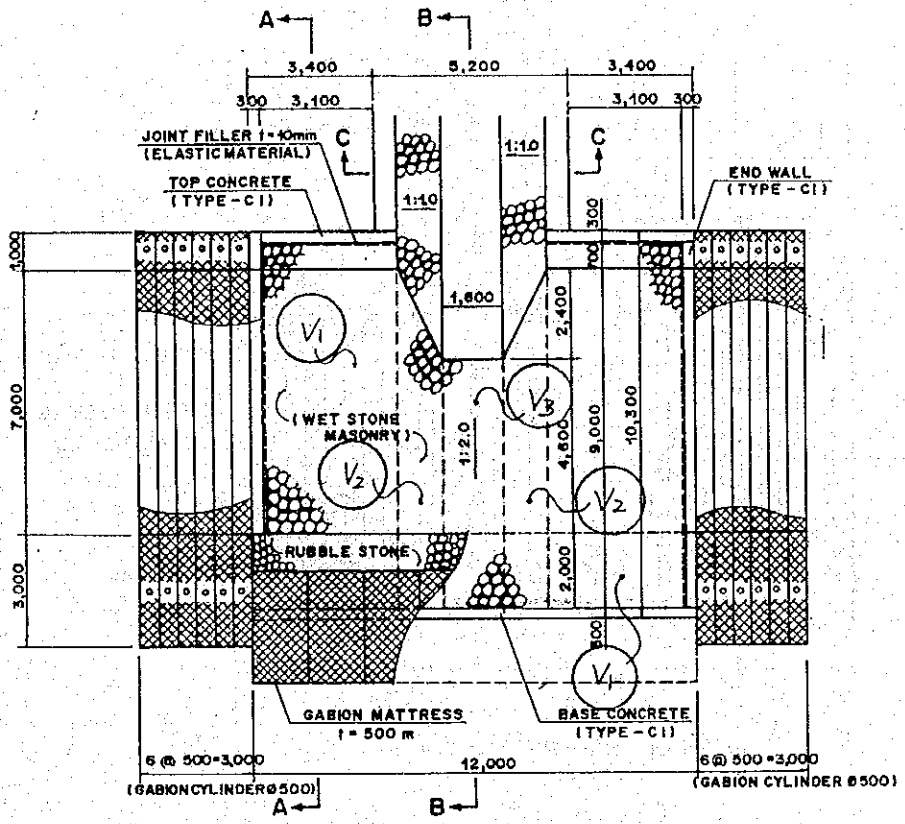
PLAN OF CONCRETE STEP
SCALE A

DRAINAGE SLUICEWAY AT WF. 172R + 15m

TYPE OF WORK : WET STONE MASONRY

LOCATION : REVETMENT (2/2)

EXPLANATORY DRAWING



ARRANGMENT OF REVETMENT (LOW WATER CHANNEL)

SCALE. A

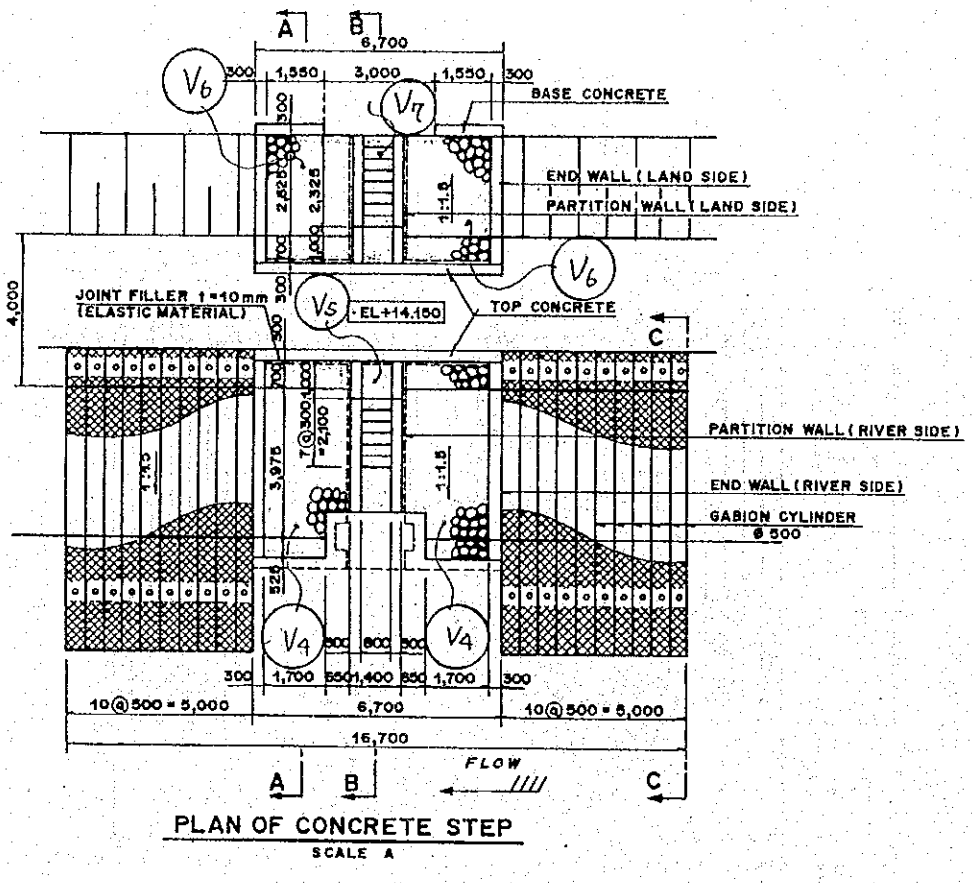
DRAINAGE SLUICEWAY AT WF. 172R + 15M

TYPE OF WORK : GRAVEL BEDDING

LOCATION : REVETMENT

(1/2)

EXPLANATORY DRAWING



PLAN OF CONCRETE STEP

SCALE A

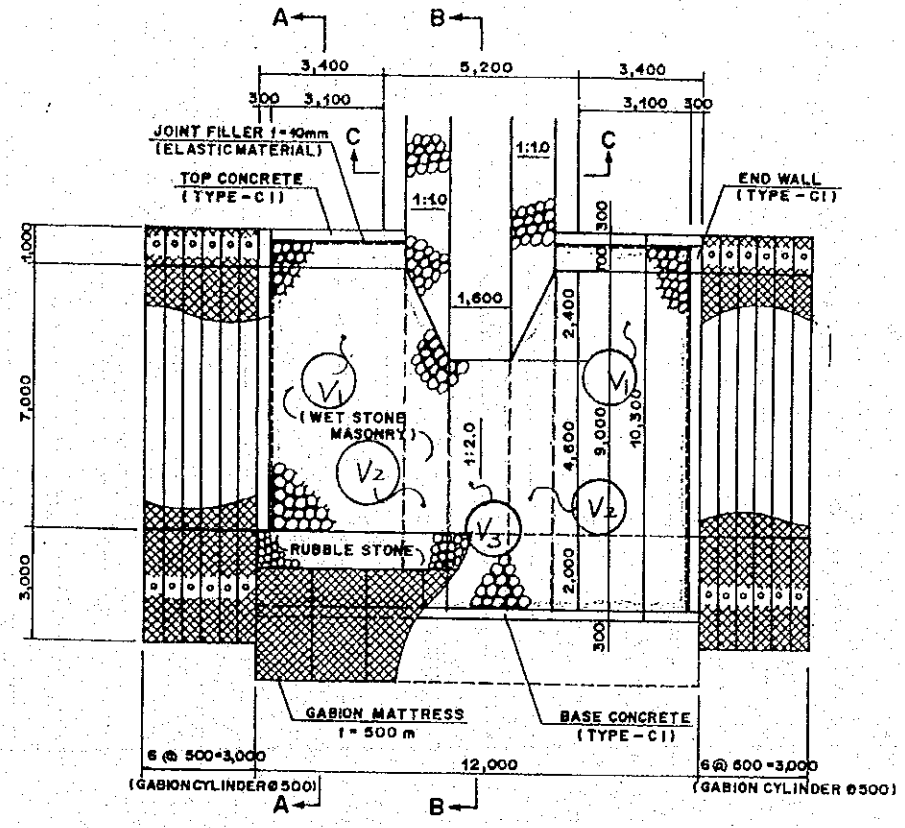
DRAINAGE SLUICEWAY AT WF. 172R + 15m

TYPE OF WORK : GRAVEL BEDDING

LOCATION : REVETMENT

(2/2)

EXPLANATORY DRAWING

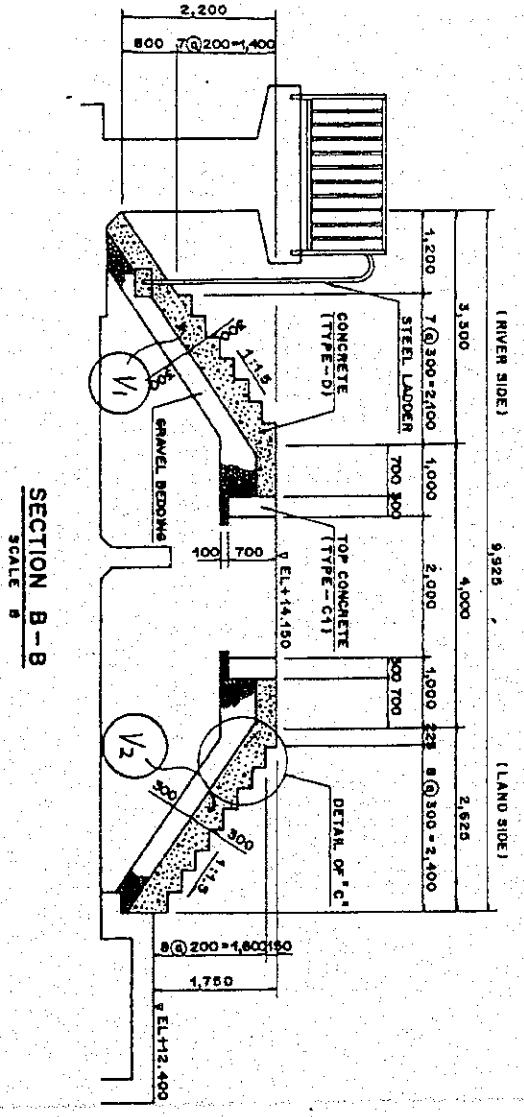


ARRANGMENT OF REVETMENT (LOW WATER CHANNEL)

SCALE. A

DRAINAGE SLUICEWAY AT WF. 172R+15m

TYPE OF WORK :	CONCRETE (TYPE-D)
LOCATION :	REVETMENT

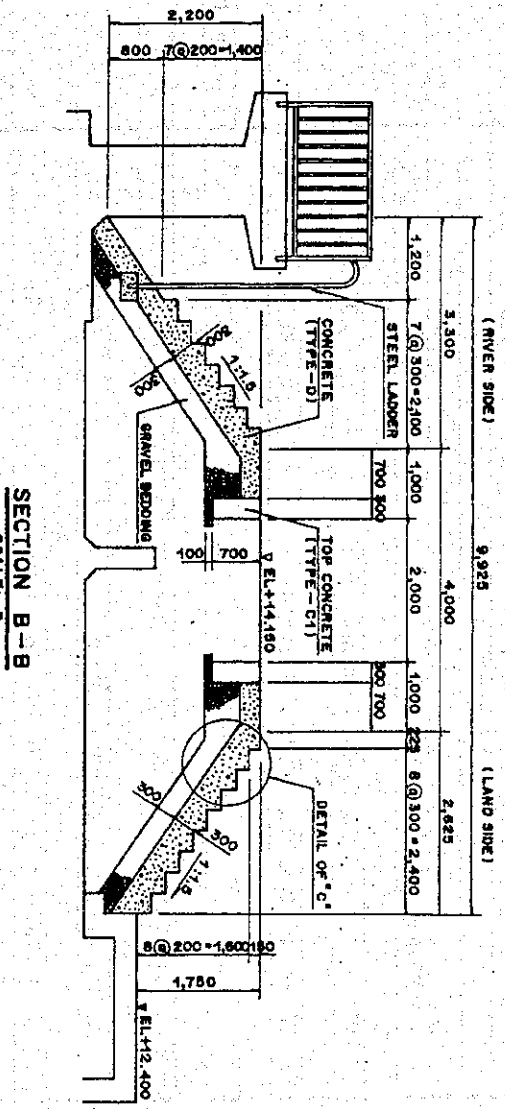


SECTION B-B
SCALE 1/50

CALCULATION	RESULT
(TYPE-D)	
$A_1 = (3.967+0.70)\times0.30 + \frac{1}{2}\times0.30\times0.20\times7$	
$= 1.610\ m^2$	
$V_1 = 1.61 \times 0.80 = 1.288$	
$A_2 = (3.155+0.70)\times0.30 + \frac{1}{2}\times0.30\times0.20\times9$	
$= 1.427\ m^2$	
$V_2 = 1.427 \times 0.80 = 1.142$	
TOTAL $(V_1+V_2) = 2.430$	$2.430\ m^3$

DRAINAGE SLUICEWAY AT WF. 172R+15m

TYPE OF WORK :	FORM
LOCATION :	REVETMENT



SECTION B-B
SCALE B

CALCULATION	RESULT
(H < 4.0m)	
$A_1 = 0.20 \times 0.80 \times 7 = 1.120$	
$A_2 = \sqrt{2} \times 0.03 \times 0.80 \times 7 = 0.238$	
$A_3 = 0.20 \times 0.80 \times 8 = 1.280$	
$A_4 = 0.15 \times 0.80 = 0.120$	
$A_5 = \sqrt{2} \times 0.03 \times 0.80 \times 9 = 0.305$	
TOTAL = 3.063	3.063 m²

TYPE OF WORK : REVETMENT
LOCATION : DRAINAGE SLUICEWAY AT WF.172R + 15 m

CALCULATION			RESULT
TOP CONCRETE			
• CONCRETE (TYPE – C1)			
V_1 = (4.00 x 2) x 1.80 / 10.00 m	=	1.440	
V_2 = (6.70 x 2) x 2.10 / 10.00 m	=	2.814	
TOTAL	=	4.254	4.254 m^3
• GRAVEL BEDDING			
V_1 = (4.00 x 2) x 0.75 / 10.00 m	=	0.600	
V_2 = (6.70 x 2) x 0.800 / 10.00 m	=	1.072	
TOTAL	=	1.672	1.672 m^3
• FORM (H < 4.0 m)			
A_1 = (4.00 x 2) x 12.18 / 10.00 m	=	9.744	
A_2 = (6.70 x 2) x 14.2 / 10.00 m	=	19.041	
TOTAL	=	28.785	28.785 m^2
• REINFORCING BAR			
W_1 = (4.00 x 2) x 0.094 / 10.00 m	=	0.075	
W_2 = (6.70 x 2) x 0.098 / 10.00 m	=	0.131	
TOTAL	=	0.206	0.206 tf
• JOINT FILTER			
A_1 = (4.00 x 2) x 2.605 / 10.00 m	=	2.084	
A_2 = (6.70 x 2) x 3.120 / 10.00 m	=	4.181	
TOTAL	=	6.265	6.265 m^2