

3.2.2 END PIER

TYPE OF WORK : CONCRETE (TYPE-C1)

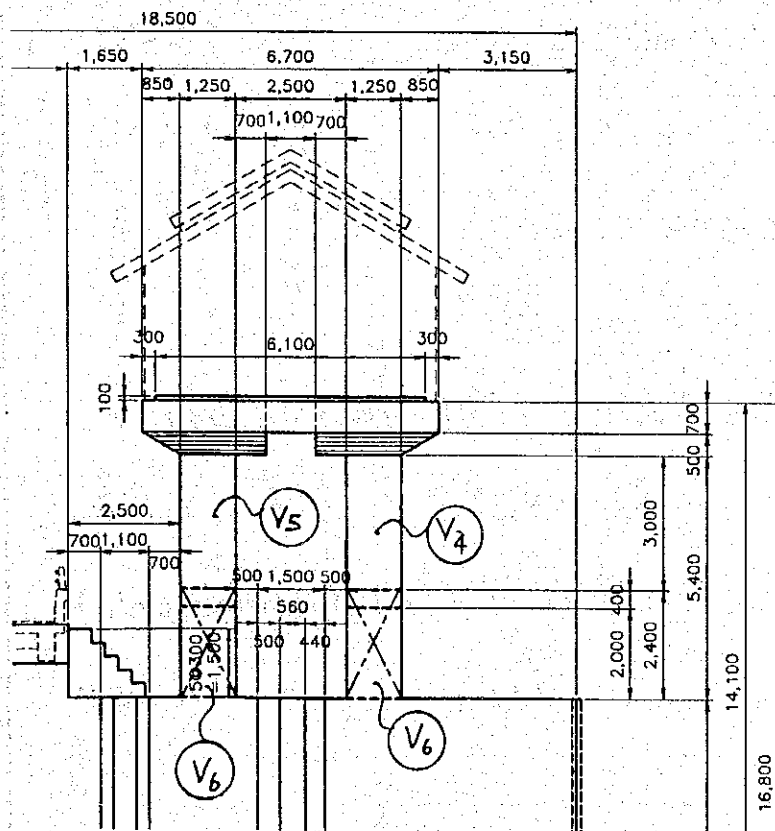
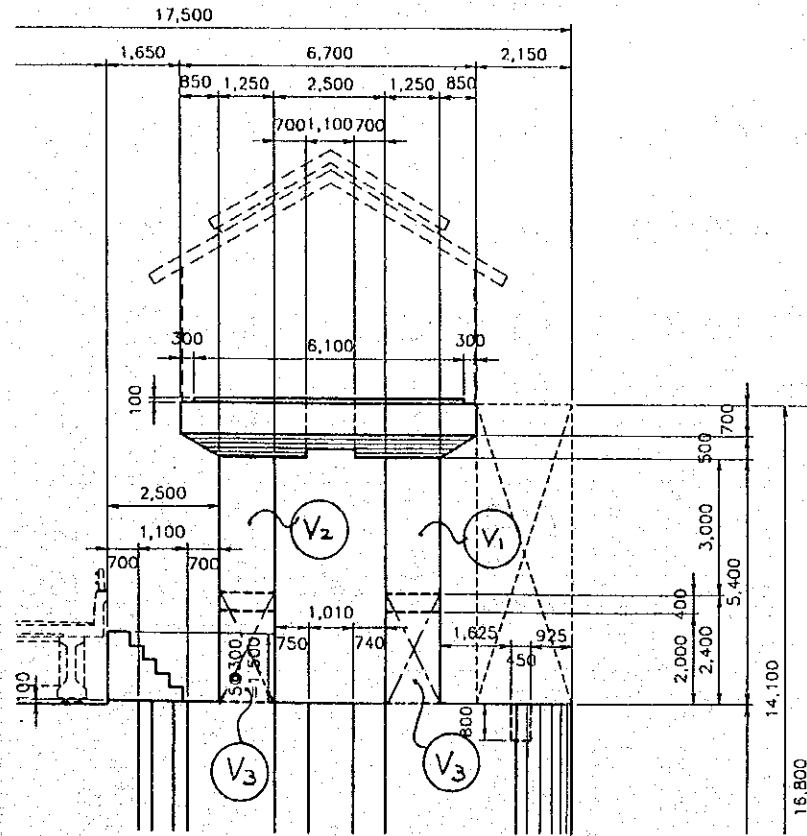
LOCATION : GATE PIER (I)

PER 1 PLACE

CALCULATION	RESULT
(TYPE-C1)	
$V_1 = 5.40 \times 2.50 \times 1.25$	
$V_2 = 5.40 \times 2.50 \times 1.25$	
$V_3 = -(\frac{\pi}{4} \times 0.80^2 \times \frac{1}{2} + 2.00 \times 0.80) \times 1.25 \times 2 = -4.628$	
$V_4 = 5.40 \times 2.00 \times 1.25$	
$V_5 =$	
$V_6 = -(\frac{\pi}{4} \times 0.80^2 \times \frac{1}{2} + 2.00 \times 0.80) \times 1.25 \times 2 = -4.628$	
$TOTAL = 51.494$	51.494 m^3

TYPE OF WORK : END PIER
 : CONCRETE (TYPE-C1)
 LOCATION : GATE PIER (I)

EXPLANATORY DRAWING



END PIER
 TYPE OF WORK : CONCRETE (TYPE-C1)
 LOCATION : GATE PIER (II)

(1/2)

CALCULATION	RESULT
(TYPE - C1)	
$V_1 = (\frac{\pi}{4} \times 2.50^2 \times \frac{1}{2} + 5.50 \times 2.50) \times 7.50$	= 121.533
$V_2 = (7.50 + 8.10) \times \frac{1}{2} \times 0.90 \times 2.50$	= 17.550
$V_{3-1} = (2.85 \times 8.10 \times 2.50) + (4.75 \times 8.00 \times 2.50)$	= 152.713
$V_{3-2} = \frac{\pi}{4} \times 2.50^2 \times \frac{1}{2} \times 7.00$	= 17.181
$V_{3-3} = 2.50 \times 2.25 \times 1.00$	= 5.625
$V_4 = 1.25 \times 0.50 \times 0.60$	= 0.375
$V_{5-1} = 8.25 \times 7.00 \times 2.00$	= 115.500
$V_{5-2} = 7.50 \times 11.500 \times 2.00$	= 172.500
$V_6 = 2.25 \times 1.00 \times 6.50$	= 14.625
$V_7 = 1.25 \times 0.85 \times 7.00$	= 7.438
$V_8 = 1.25 \times 0.87 \times 7.00$	= 7.613
(Deduction for Blockout of Maintenance Stairs)	
$V_9 = - (0.45 \times 0.45 \times 0.80)$	= -0.162
(Deduction for Blockout of Flood Discharge Gate)	
$V_{10} = - (2.50 \times 0.60 \times 7.50)$	= -11.250

TYPE OF WORK : END PIER
 : CONCRETE (TYPE-C1)
 LOCATION : GATE PIER (II)

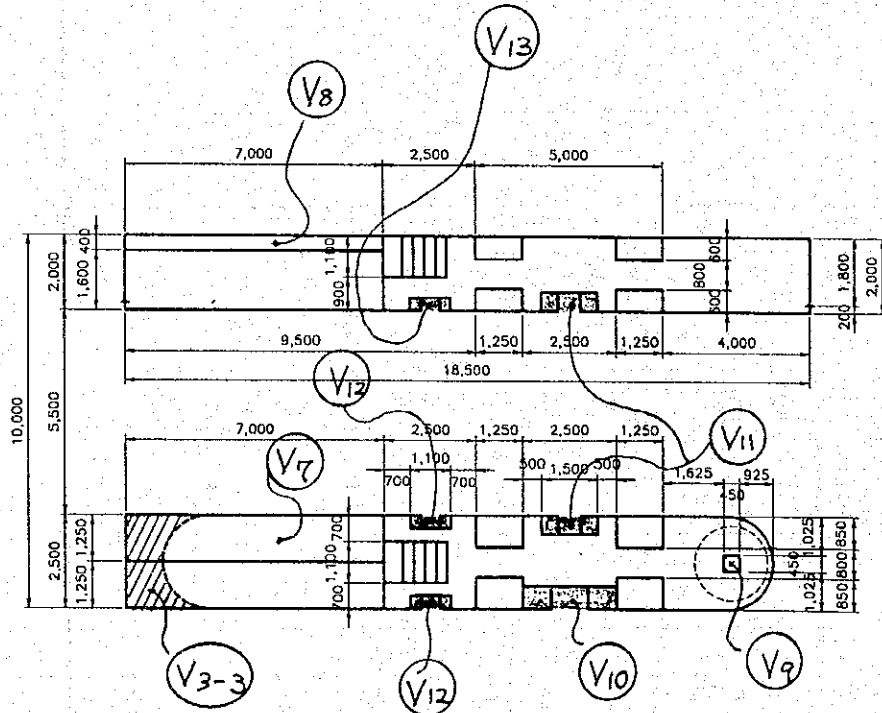
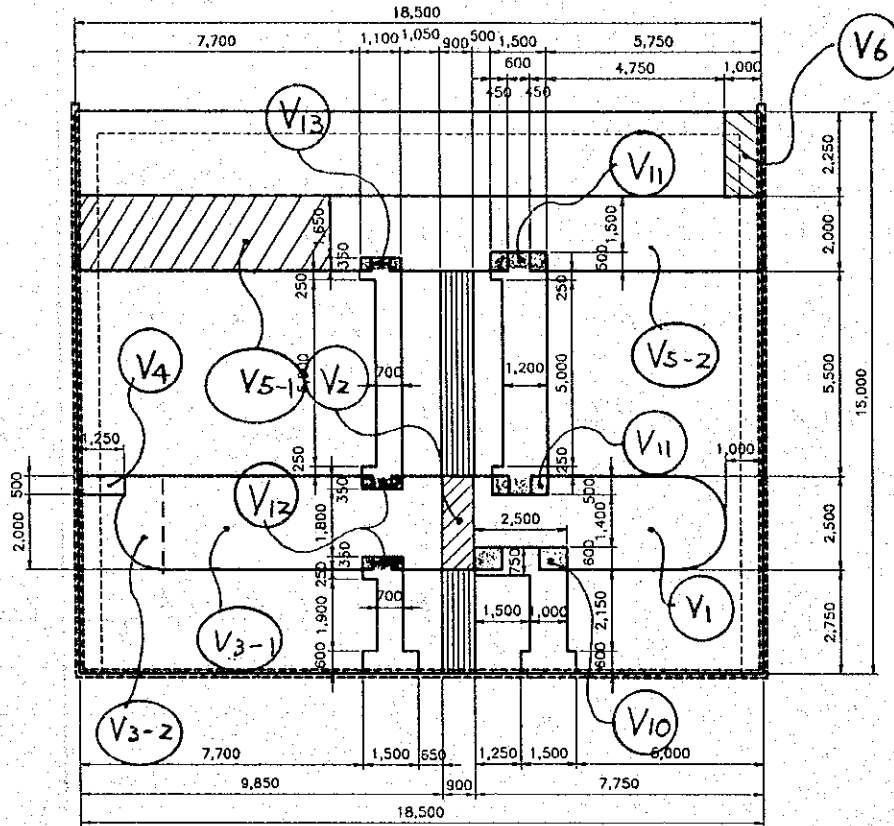
(2/2)

CALCULATION	RESULT
(Deduction for Blockout of Sediment Flush Gate)	
$V_{11} = - (1.50 \times 0.50 \times 7.50) \times 2 = -11.250$	
(Deduction for Blockout of Temporary Gate)	
$V_{12} = - (1.10 \times 0.35 \times 8.10) \times 2 = -6.237$	
$V_{13} = - (1.10 \times 0.35 \times 7.50) = -2.888$	
TOTAL = 600.866	600.866 m³

TYPE OF WORK : END PIER
 : CONCRETE (TYPE-C1)
 LOCATION : GATE PIER (II)

(1/3)

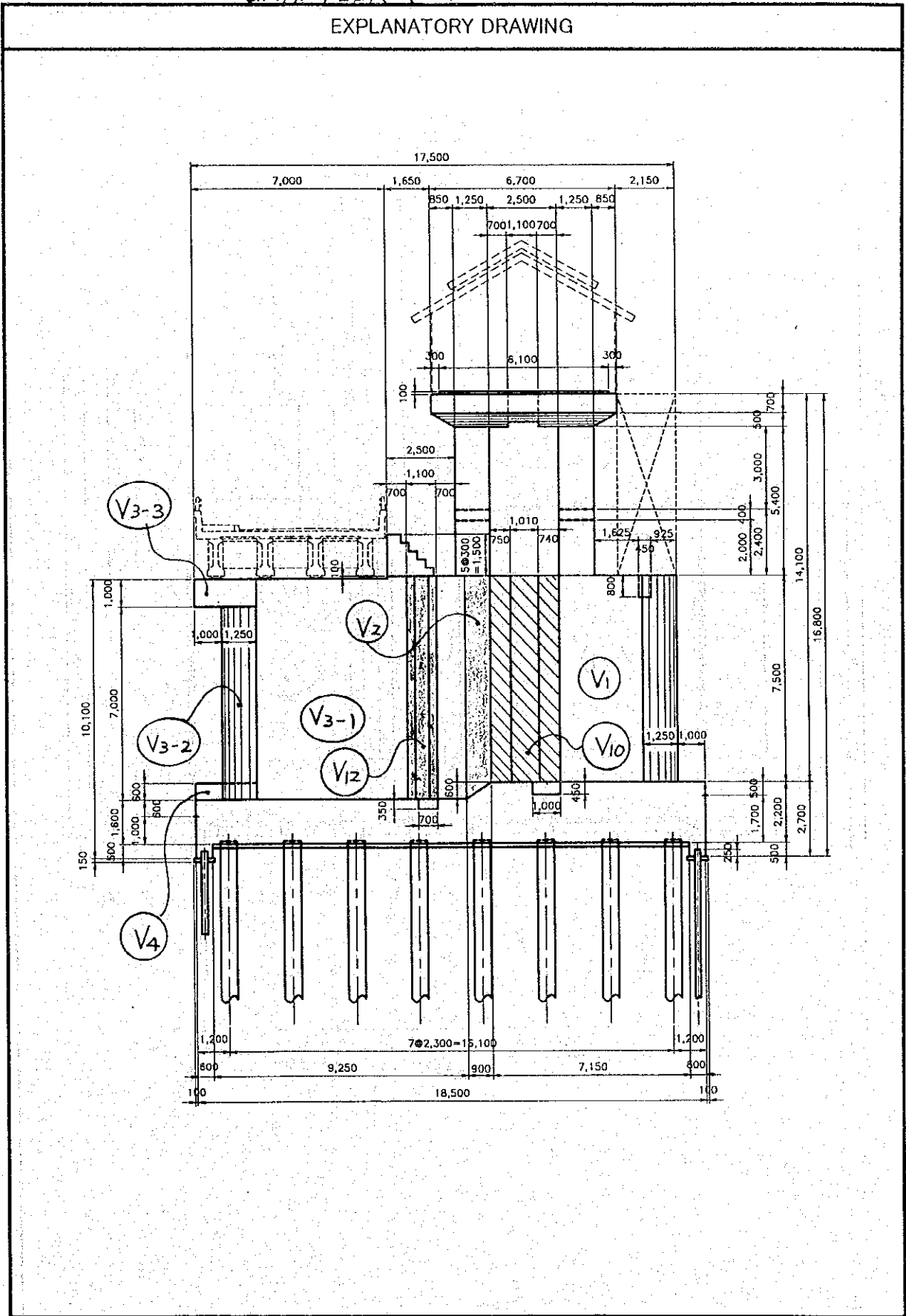
EXPLANATORY DRAWING



TYPE OF WORK : END PIER
 : CONCRETE (TYPE-C1)
 LOCATION : GATE PIER (II)

(2/3)

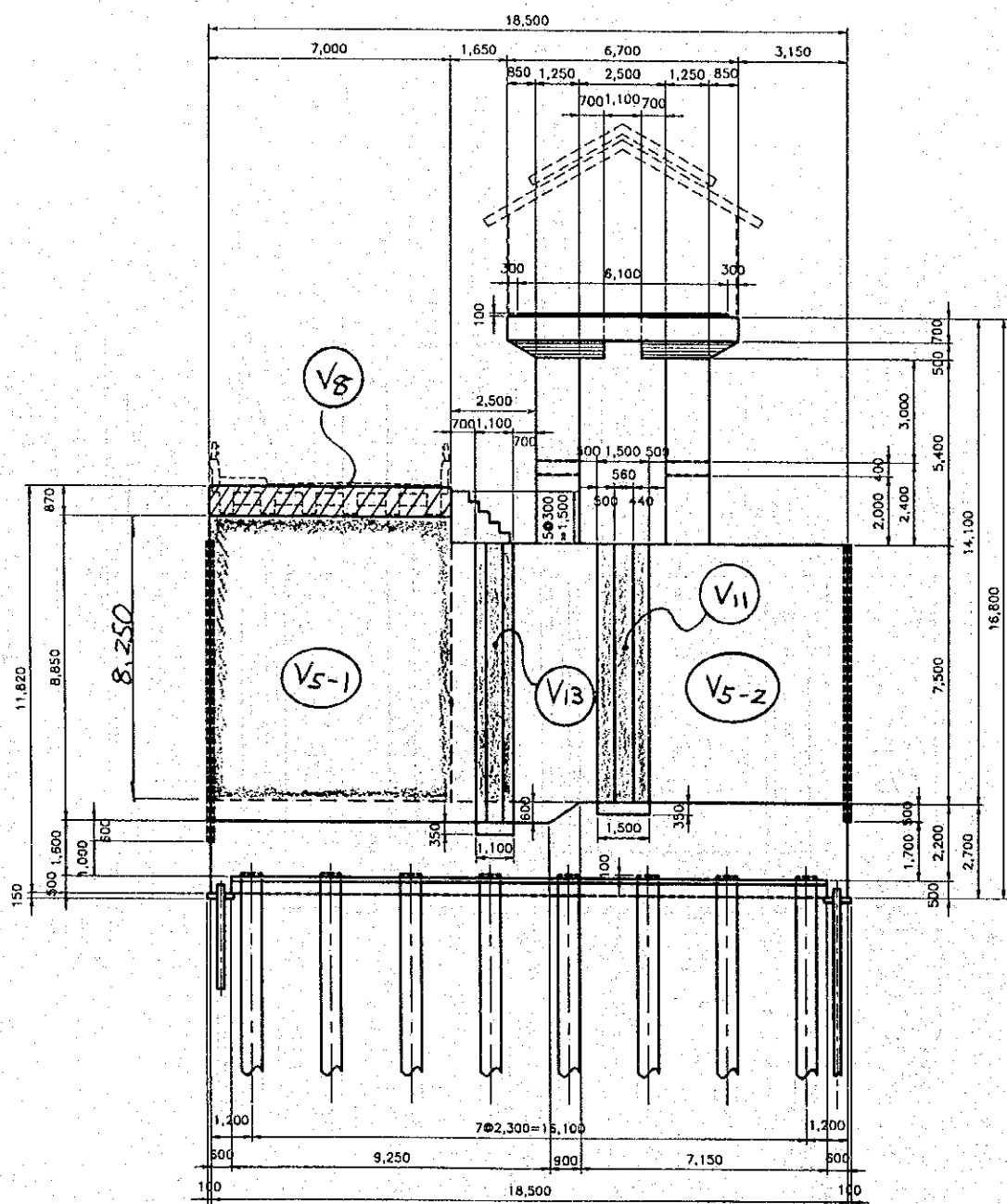
EXPLANATORY DRAWING



TYPE OF WORK : END PIER
 : CONCRETE (TYPE-C1)
 LOCATION : GATE PIER (II)

(3/3)

EXPLANATORY DRAWING

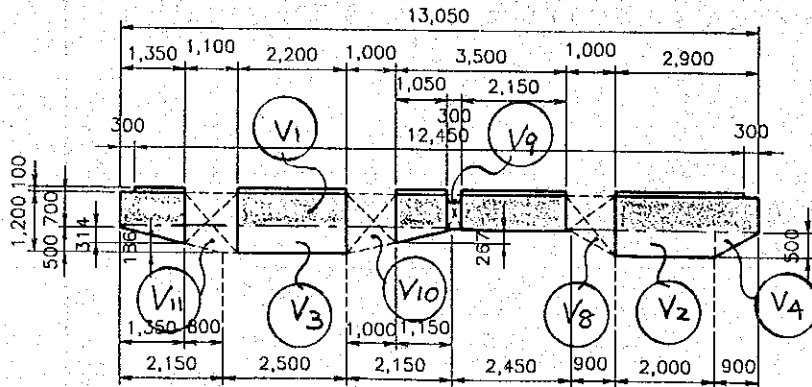
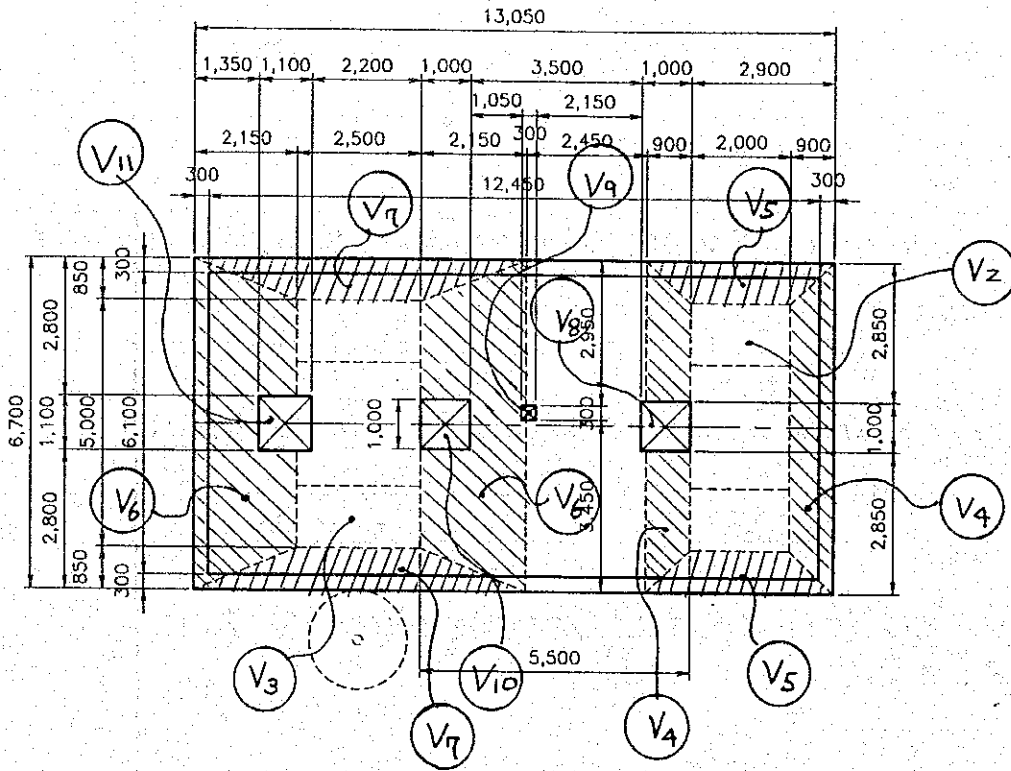


TYPE OF WORK : END PIER
 : CONCRETE (TYPE-C1)
 LOCATION : GATE PIER (III)

CALCULATION	RESULT
$V_1 = 13.05 \times 6.70 \times 0.70 = 61.205$	
$V_2 = 2.00 \times 5.00 \times 0.50 = 5.000$	
$V_3 = 2.50 \times 5.00 \times 0.50 = 6.250$	
$V_4 = \left\{ \left(\frac{1}{2} \times 0.90 \times 0.50 \times 5.00 \right) + \left(\frac{1}{2} \times 0.90 \times 0.50 \times 0.85 \times \frac{1}{3} \right) \times 2 \right\} \times 2$ $= 2.505$	
$V_5 = \left\{ \left(\frac{1}{2} \times 0.85 \times 0.50 \times 2.00 \right) + \left(\frac{1}{2} \times 0.85 \times 0.50 \times 0.90 \times \frac{1}{3} \right) \times 2 \right\} \times 2$ $= 1.105$	
$V_6 = \left\{ \left(\frac{1}{2} \times 2.15 \times 0.50 \times 5.00 \right) + \left(\frac{1}{2} \times 2.15 \times 0.50 \times 0.85 \times \frac{1}{3} \right) \times 2 \right\} \times 2$ $= 5.984$	
$V_7 = \left\{ \left(\frac{1}{2} \times 0.85 \times 0.50 \times 2.50 \right) + \left(\frac{1}{2} \times 0.85 \times 0.50 \times 2.15 \times \frac{1}{3} \right) \times 2 \right\} \times 2$ $= 1.672$	
$V_8 = - \left\{ (1.20 + 0.70) \times \frac{1}{2} \times 0.90 + (0.70 \times 0.10) \right\} \times 1.00$ $= -0.925$	
$V_9 = - (0.30 \times 0.30 \times 0.70) = -0.063$	
$V_{10} = - (1.20 + 0.70) \times \frac{1}{2} \times 1.00 = -0.950$	
$V_{11} = - \left\{ (1.20 + 1.014) \times \frac{1}{2} \times 0.80 + (0.20 \times 1.20) \right\} \times 1.100$ $= -1.238$	
TOTAL = 80.545	80.545 m ³

TYPE OF WORK : END PIER
 : CONCRETE (TYPE-C1)
 LOCATION : GATE PIER (III)

EXPLANATORY DRAWING



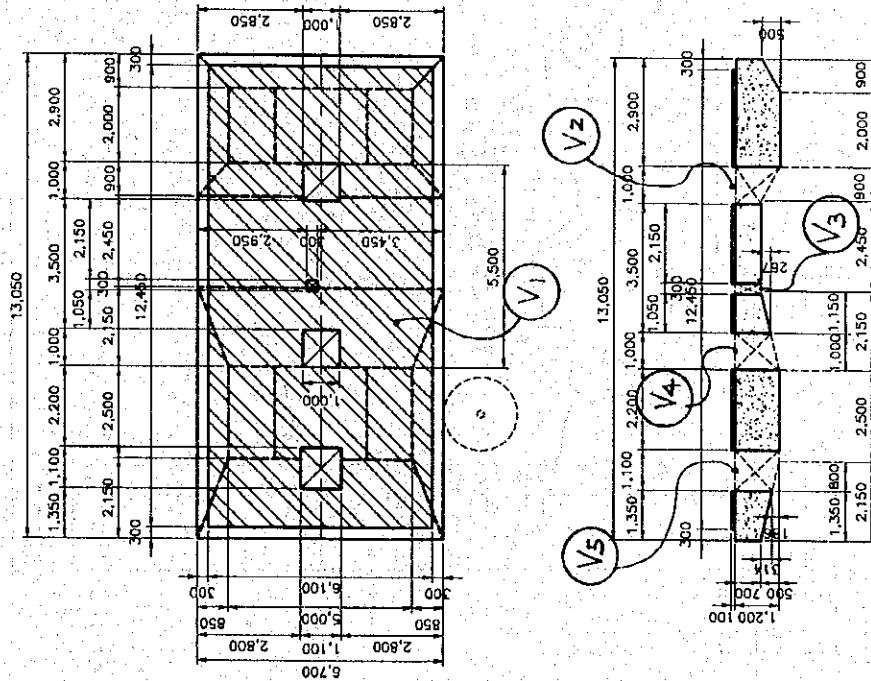
END PIER

CINDER CONCRETE

GATE PIER

TYPE OF WORK :

LOCATION :



CALCULATION

(TYPE - C3)

$$V_1 = 12.450 \times 6.10 \times 0.10 = 7.595$$

$$V_2 = - (1.00 \times 1.00 \times 0.10) = -0.100$$

$$V_3 = - (0.30 \times 0.30 \times 0.10) = -0.009$$

$$V_4 = - (1.00 \times 1.00 \times 0.10) = -0.100$$

$$V_5 = - (1.10 \times 1.10 \times 0.10) = -0.12$$

$$TOTAL = 7.265$$

7.265 m³

RESULT

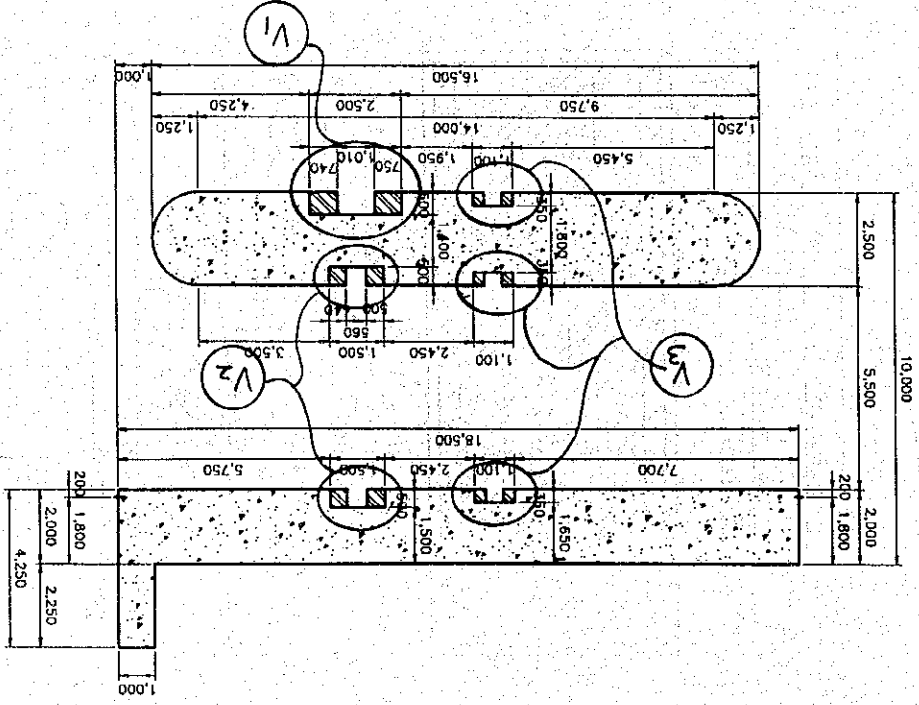
END PIER

SECONDARY CONCRETE

GATE PIER

TYPE OF WORK :
LOCATION :

CALCULATION	RESULT
(TYPE - C3)	
$V_1 = (0.75 \times 0.60 + 0.74 \times 0.60) \times 7.50$ $= 6.705$	
$V_2 = (0.50 \times 0.50 + 0.44 \times 0.50) \times 7.50 \times 2$ $= 7.050$	
$V_3 = \{ (0.32 \times 0.25) + (0.10 \times 1.10) + (0.28 \times 0.25) \}$ $\times 8.10 \times 3$ $= 6.318$	
$TOTAL = 20.073$	20.073 m ³



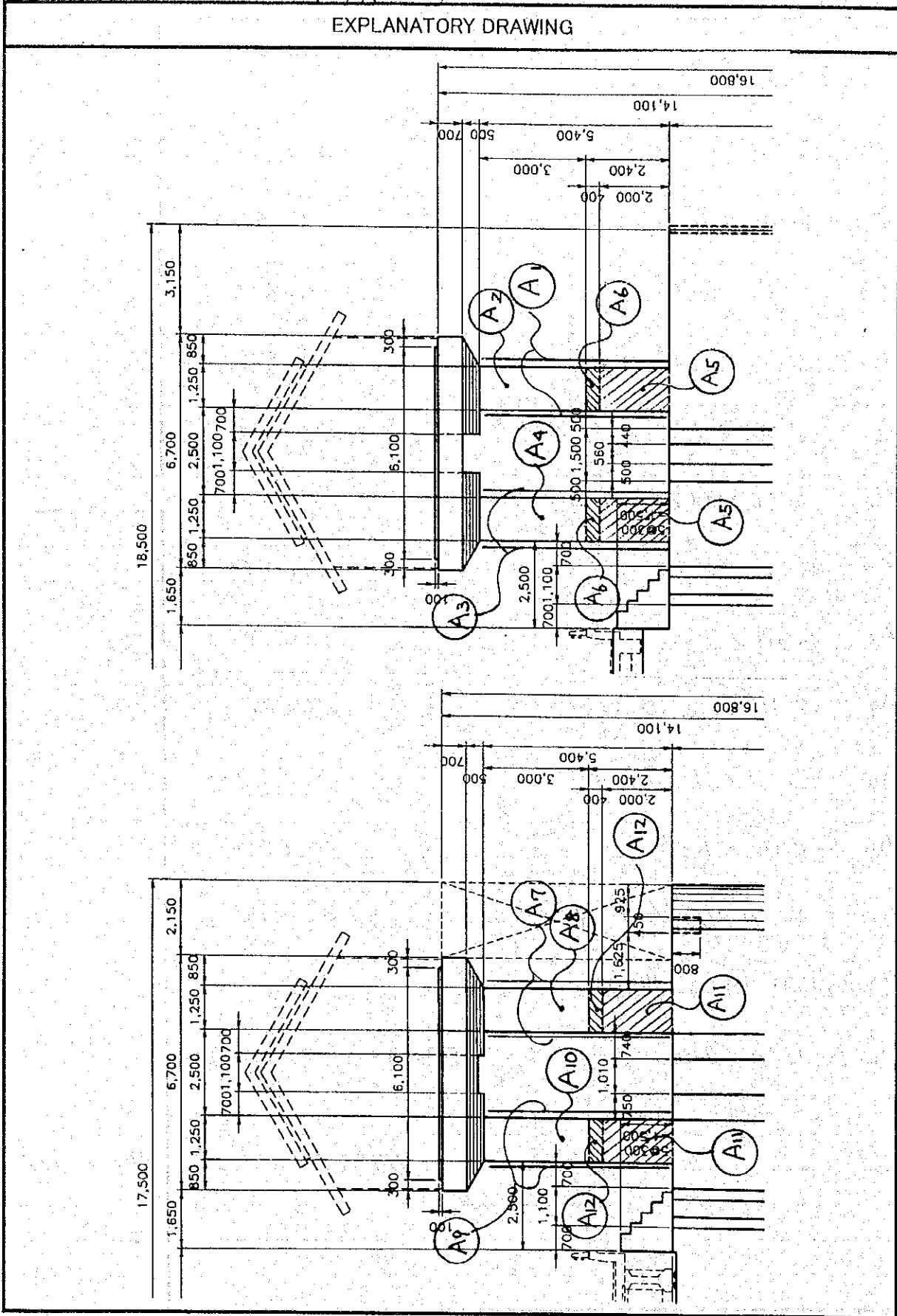
TYPE OF WORK : END PIER
 : FORM
 LOCATION : GATE PIER (I)

CALCULATION	RESULT
(H ≥ 4.0m)	
$A_1 = 5.40 \times 2.00 \times 2 = 21.600$	
$A_2 = 5.40 \times 1.25 \times 2 = 13.500$	
$A_3 = 5.40 \times 2.00 \times 2 = 21.600$	
$A_4 = 5.40 \times 1.25 \times 2 = 13.500$	
$A_5 = 2.00 \times 1.25 \times 2 \times 2 = 10.000$	
$A_6 = \pi \times 0.80 \times \frac{1}{2} \times 1.25 \times 2 = 3.142$	
$A_7 = 5.40 \times 2.50 \times 2 = 27.000$	
$A_8 = 5.40 \times 1.25 \times 2 = 13.500$	
$A_9 = 5.40 \times 2.50 \times 2 = 27.000$	
$A_{10} = 5.40 \times 1.25 \times 2 = 13.500$	
$A_{11} = 2.00 \times 1.25 \times 2 \times 2 = 10.000$	
$A_{12} = \pi \times 0.80 \times \frac{1}{2} \times 1.25 \times 2 = 3.142$	
(Deduction for Gallery)	
$A_{13} = -(\frac{\pi}{4} \times 0.80^2 \times \frac{1}{2} + 2.00 \times 0.80) \times 2 \times 2 = -7.405$	
TOTAL = 170.079	170.079 m ²

TYPE OF WORK : END PIER
 : FORM
 LOCATION : GATE PIER (I)

(1/2)

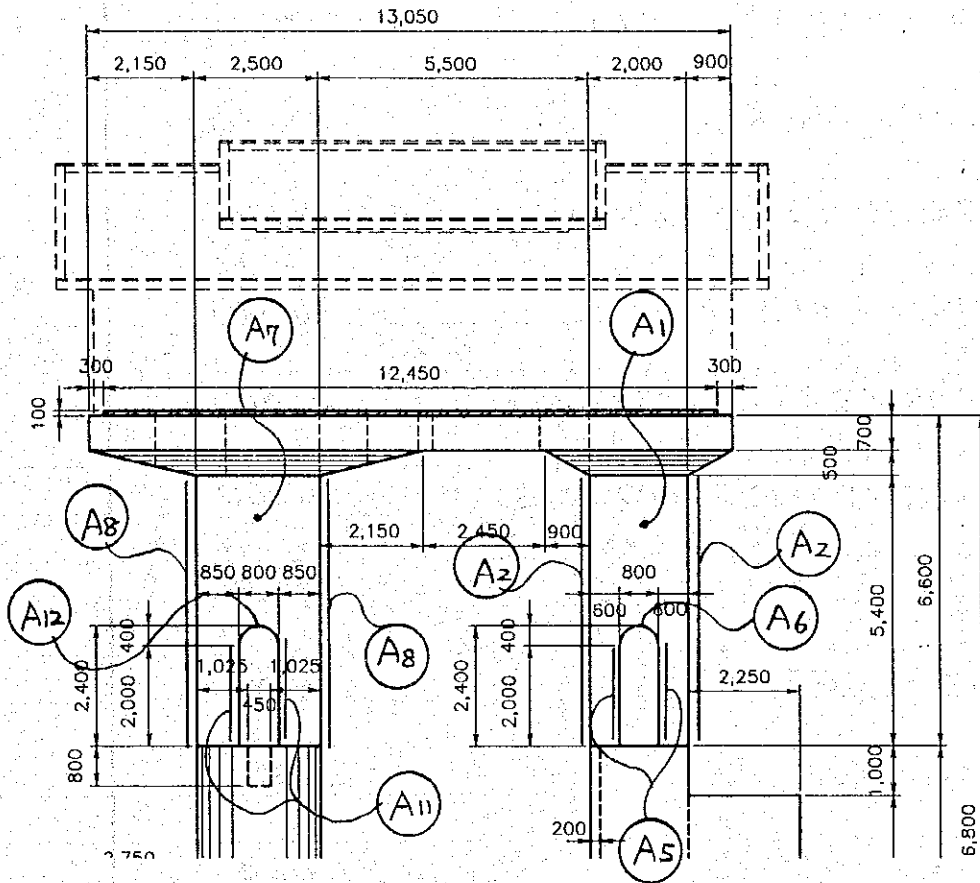
EXPLANATORY DRAWING



TYPE OF WORK : END PIER
 : FORM
 LOCATION : GATE PIER (I)

(2/2)

EXPLANATORY DRAWING



TYPE OF WORK : END PIER FORM
 LOCATION : GATE PIER (II)

(1/2)

CALCULATION	RESULT
(H ≥ 4.0m)	
$A_{1-1} = \pi \times 2.50 \times \frac{1}{2} \times 7.50$	= 29.452
$A_{1-2} = \pi \times 2.50 \times \frac{1}{2} \times 7.00$	= 27.489
$A_2 = 5.50 \times 7.50 \times 2$	= 82.500
$A_3 = (7.50 + 8.10) \times \frac{1}{2} \times 0.90 \times 2$	= 14.040
$A_4 = 2.85 \times 8.10 \times 2$	= 46.170
$A_5 = (4.75 \times 8.85) + (1.85 \times 2.25)$	= 46.200
$A_6 = (4.75 \times 8.00) + (1.00 \times 2.25)$	= 40.250
$A_7 = 0.85 \times 7.00$	= 5.950
$A_8 = 1.00 \times 2.50$	= 2.500
$A_9 = 0.75 \times 1.25$	= 0.938
$A_{10} = 0.85 \times 1.25$	= 1.063
$A_{11} = 0.10 \times 1.25$	= 0.125
$A_{12} = (2.25 \times 2.50) - \frac{\pi}{4} \times 2.50^2 \times \frac{1}{2}$	= 3.171
$A_{13} = 0.45 \times 0.80 \times 4$	= 1.440
$A_{14} = 0.60 \times 7.50 \times 2$	= 9.000
$A_{15} = 0.50 \times 7.50 \times 2$	= 7.500
$A_{16} = 0.35 \times 8.10 \times 2 \times 2$	= 11.340

TYPE OF WORK : END PIER
 : FORM
 LOCATION : GATE PIER (II)

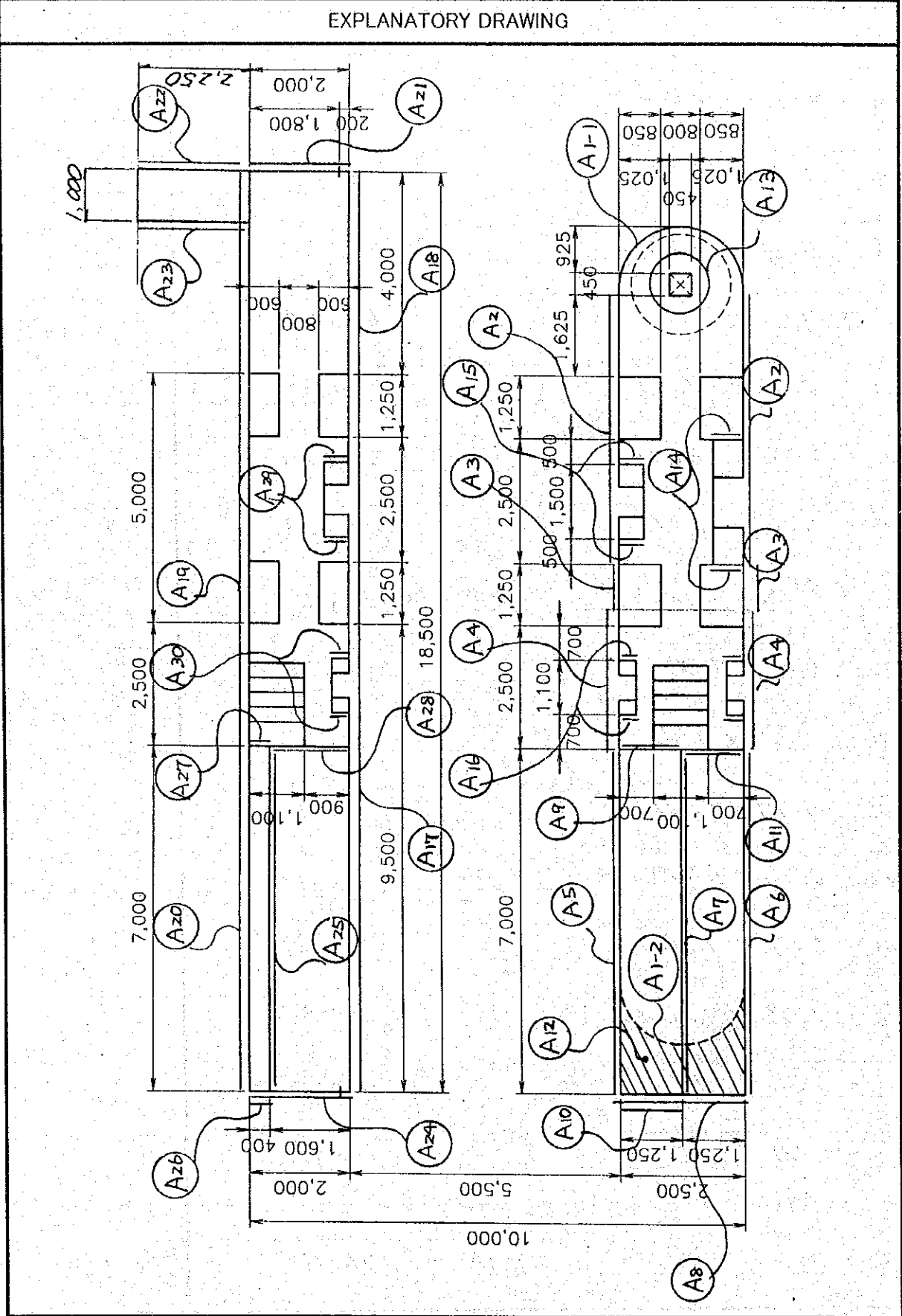
(2/2)

CALCULATION	RESULT
$A_{17} = 7.00 \times 8.25 = 57.750$	
$A_{18} = 11.50 \times 7.50 = 86.250$	
$A_{19} = 11.50 \times 7.50 = 86.250$	
$A_{20} = 7.00 \times 9.12 = 63.840$	
$A_{21} = 2.00 \times 7.50 = 15.000$	
$A_{22} = 2.25 \times 6.50 = 14.625$	
$A_{23} = 2.25 \times 6.50 = 14.625$	
$A_{24} = 8.25 \times 2.00 = 16.500$	
$A_{25} = 0.87 \times 7.00 = 6.090$	
$A_{26} = 0.87 \times 0.40 = 0.348$	
$A_{27} = 0.77 \times 0.40 = 0.308$	
$A_{28} = 0.75 \times 1.600 = 1.200$	
$A_{29} = 0.50 \times 7.50 \times 2 = 7.500$	
$A_{30} = 0.35 \times 7.50 \times 2 = 5.250$	
$A_{31} = 0.50 \times 0.60 = 0.300$	
$A_{32} = 0.60 \times 1.00 \times 2 = 1.200$	
TOTAL = 706.164	706.164 m²

TYPE OF WORK : END PIER
 : FORM
 LOCATION : GATE PIER (II)

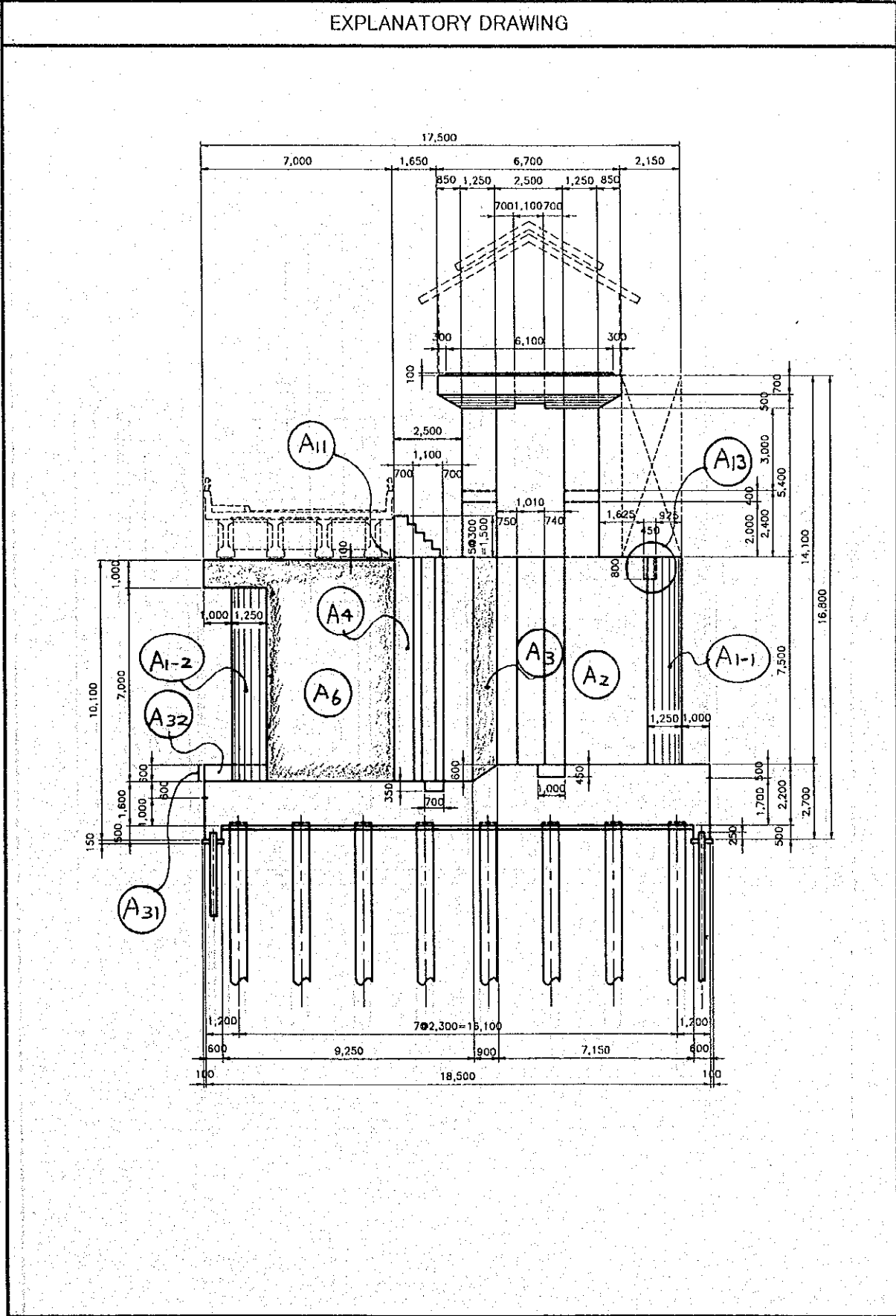
(1/3)

EXPLANATORY DRAWING



TYPE OF WORK : END PIER
 : FORM
 LOCATION : GATE PIER (II)

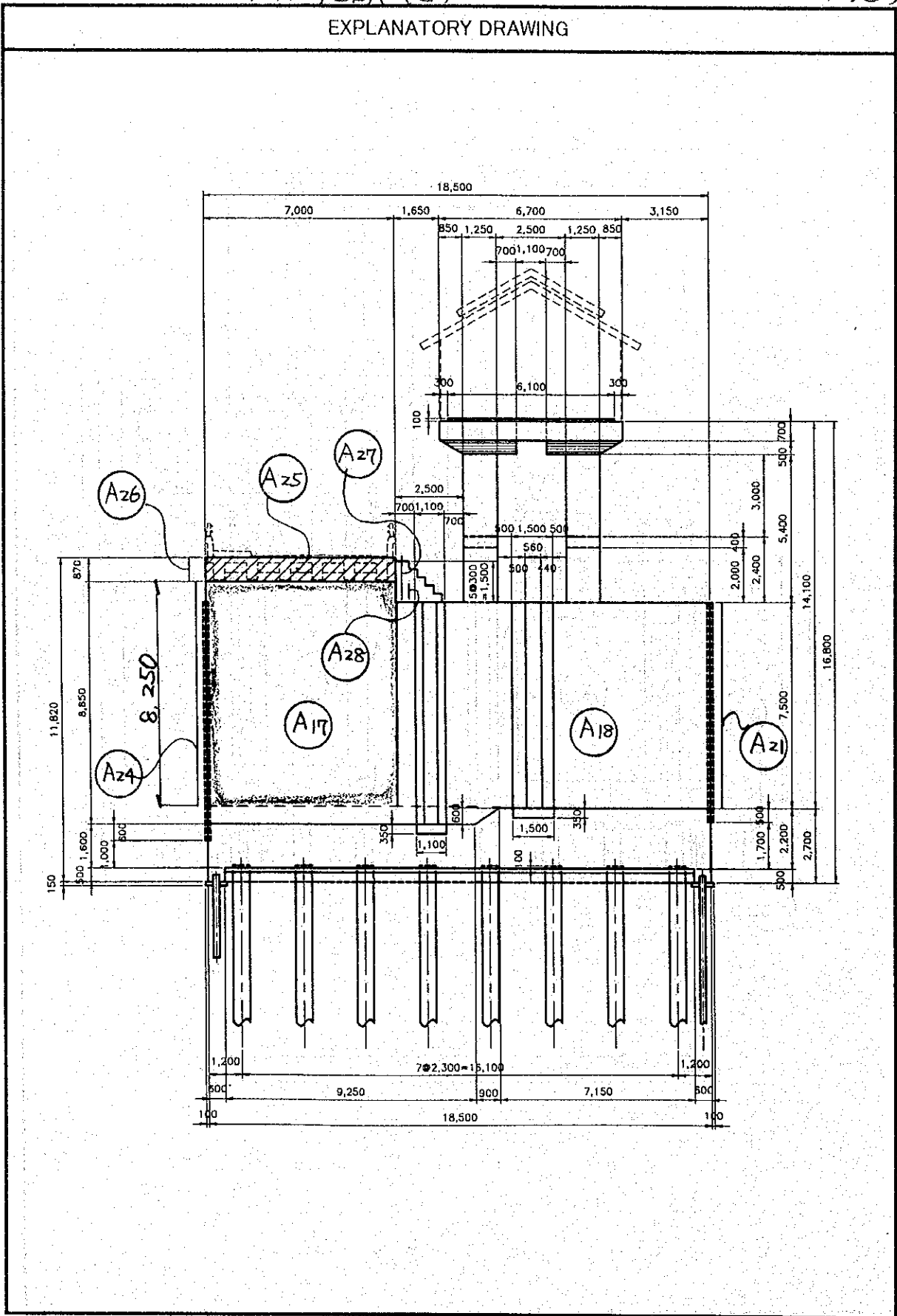
(2/3)



TYPE OF WORK : END PIER
 : FORM
 LOCATION : GATE PIER (II)

(3/3)

EXPLANATORY DRAWING



TYPE OF WORK : END PIER
 : FORM
 LOCATION : GATE PIER (III)

(1/2)

CALCULATION	RESULT
(H ≥ 4.0m)	
$A_1 = 13.05 \times 0.70 \times 2 = 18.270$	
$A_2 = 6.70 \times 0.70 \times 2 = 9.380$	
$A_3 = 2.50 \times 2.00 = 5.000$	
$A_4 = (2.50 \times 2.50) - (0.30 \times 1.10) = 5.920$	
$A_5 = (2.45 \times 6.70) - \{ (1.00 \times 0.10) + (0.20 \times 0.30) \}$	
$= 16.255$	
$A_6 = \{ (3.80 + 2.00) \times \frac{1}{2} \times \sqrt{(0.85)^2 + (0.50)^2} \} \times 2 = 5.720$	
$A_7 = (6.70 + 5.00) \times \frac{1}{2} \times \sqrt{(0.90)^2 + (0.50)^2} = 6.023$	
$A_8 = (5.70 + 4.00) \times \frac{1}{2} \times \sqrt{(0.90)^2 + (0.50)^2} = 4.993$	
$A_9 = (6.70 + 5.00) \times \frac{1}{2} \times \sqrt{(2.15)^2 + (0.50)^2} - (1.00 \times 1.027)$	
$= 11.886$	
$A_{10} = \{ (6.70 + 2.50) \times \frac{1}{2} \times \sqrt{(0.85)^2 + (0.50)^2} \} \times 2$	
$= 9.073$	
$A_{11} = (6.70 + 5.00) \times \frac{1}{2} \times \sqrt{(2.15)^2 + (0.50)^2} - (1.10 \times 0.80 \times 1.027)$	
REVISION	
$= 12.009$	
$A_{12} = \{ (0.70 + 1.20) \times \frac{1}{2} \times 0.90 + (0.70 \times 0.10) \} \times 2$	
$= 1.850$	

TYPE OF WORK : END PIER
 : FORM
 LOCATION : GATE PIER (III)

(2/2)

CALCULATION	RESULT
$A_{13} = 1.00 \times 1.20 = 1.200$	
$A_{14} = 0.70 \times 1.00 = 0.700$	
$A_{15} = 0.70 \times 0.30 \times 3 = 0.630$	
$A_{16} = 0.723 \times 0.30 = 0.217$	
$A_{17} = 0.967 \times 1.00 = 0.967$	
$A_{18} = (1.20 + 0.967) \times \frac{1}{2} \times 1.00 \times 2 = 2.167$	
$A_{19} = 1.20 \times 1.00 = 1.200$	
$A_{20} = (1.20 + 1.014) \times \frac{1}{2} \times 1.10 \times 2 = 2.435$	
$A_{21} = 1.014 \times 1.10 = 1.115$	
TOTAL = 117.010	117.010 m ²

TYPE OF WORK :

END PIER

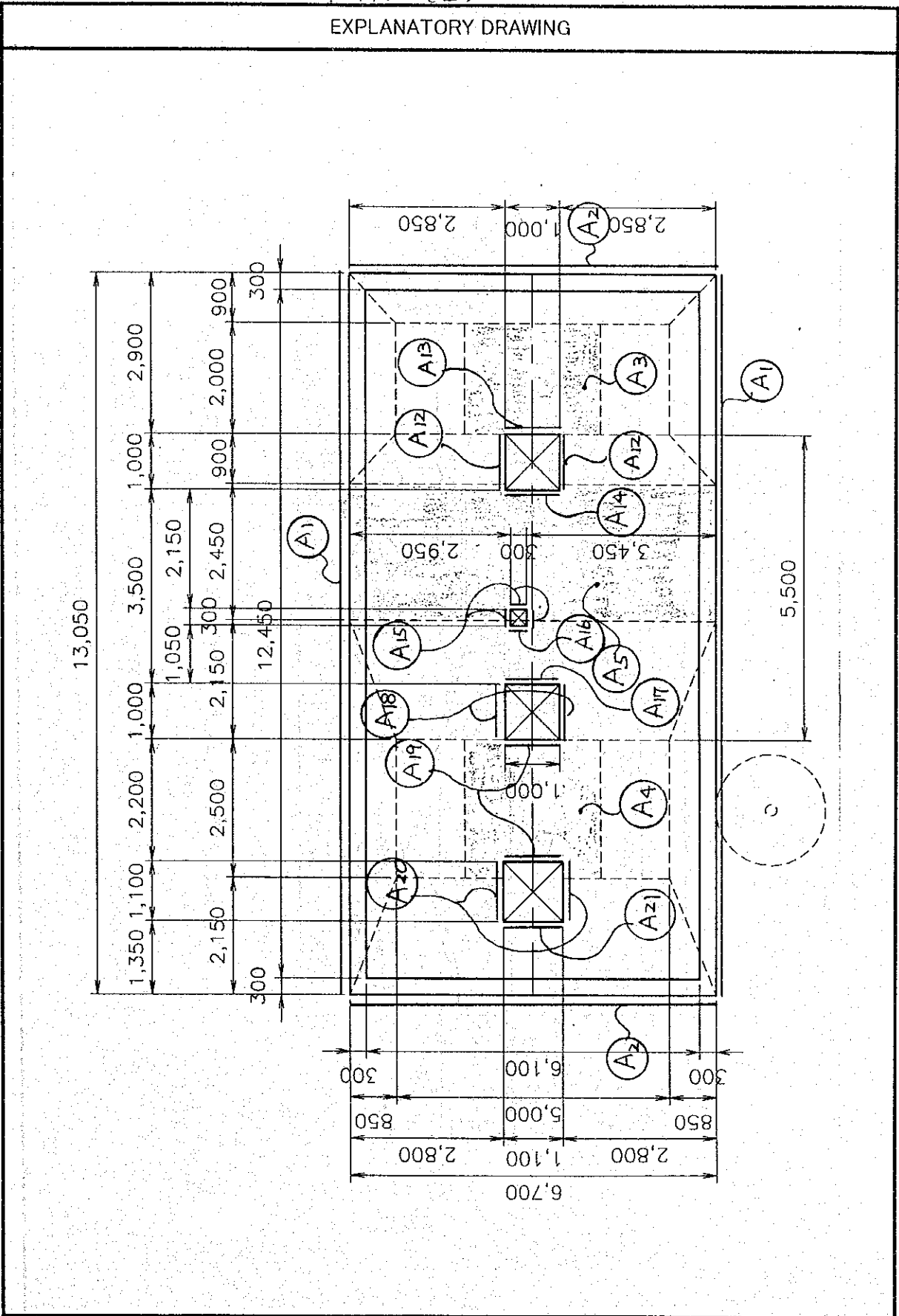
FORM

LOCATION :

GATE PIER (III)

(1/3)

EXPLANATORY DRAWING

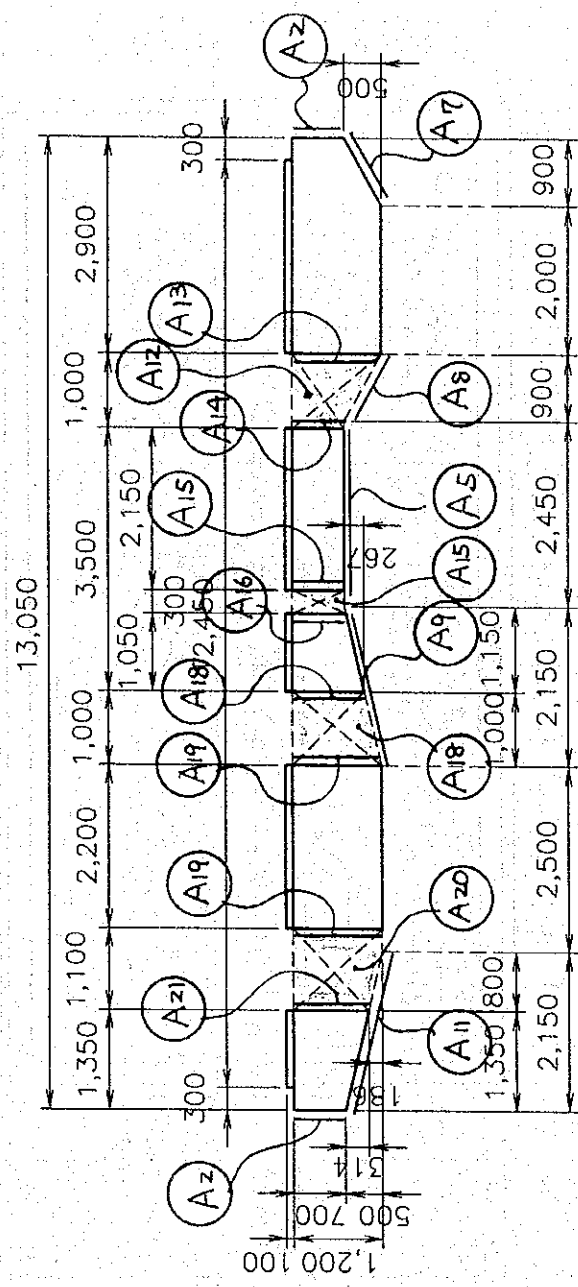


TYPE OF WORK :
 LOCATION :

END PIER
 FORM
 GATE PIER (III)

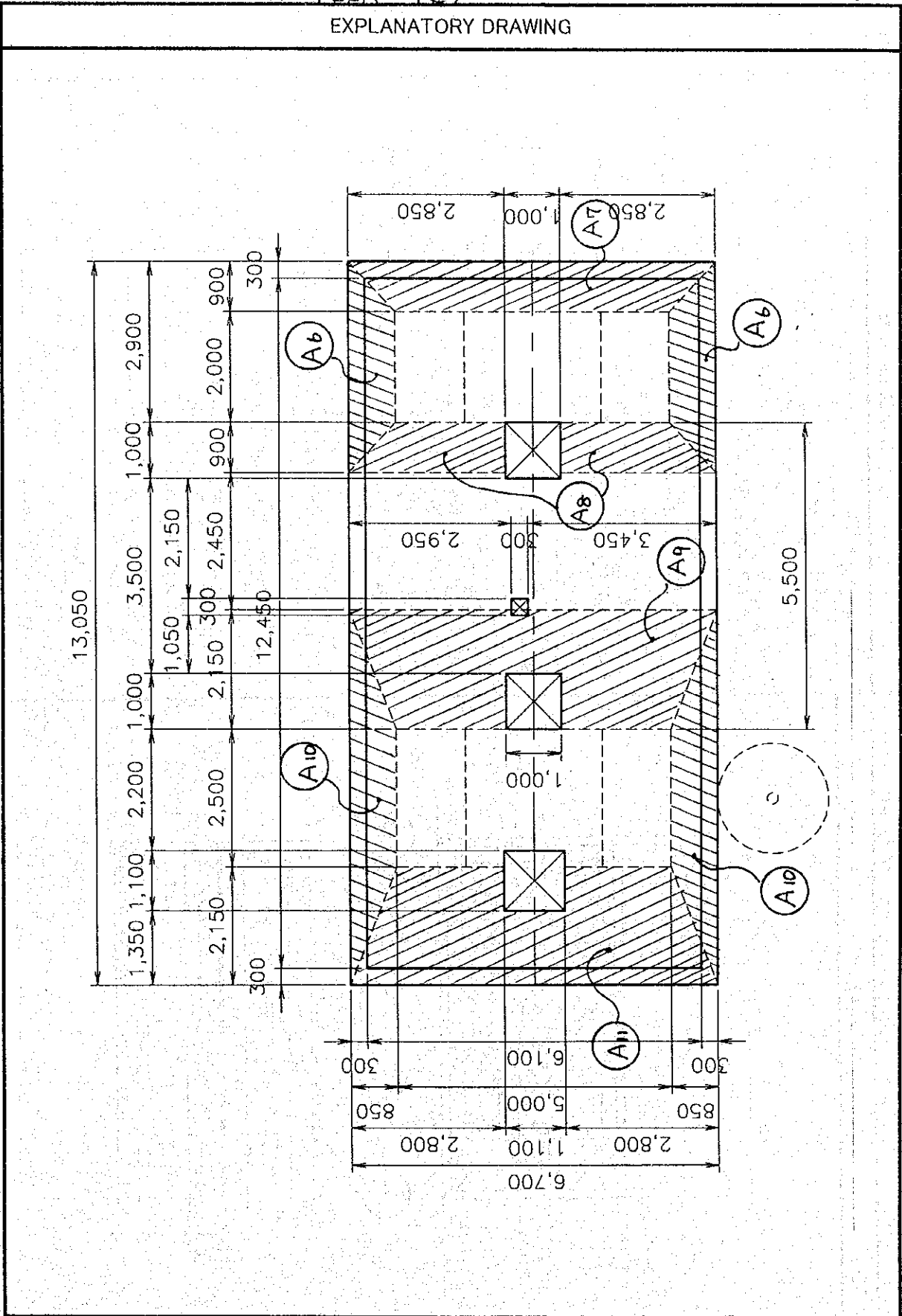
(2/3)

EXPLANATORY DRAWING



TYPE OF WORK : END PIER
 : FORM
 LOCATION : GATE PIER (III)

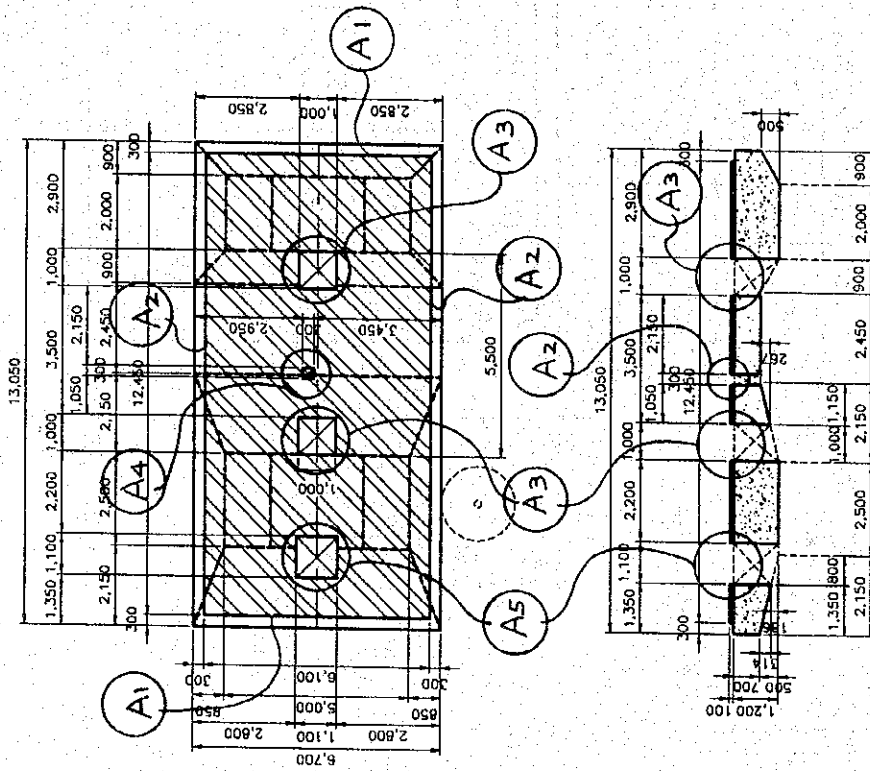
(3/3)



END PIER

TYPE OF WORK : FORM FOR CINDER CONCRETE

LOCATION : GATE PIER



CALCULATION

($H < 4.0m$)

$A_1 = 0.10 \times 6.10 \times 2 = 1.220$

$A_2 = 0.10 \times 12.45 \times 2 = 2.490$

$A_3 = 0.10 \times 1.00 \times 4 \times 2 = 0.800$

$A_4 = 0.10 \times 0.30 \times 4 = 0.120$

$A_5 = 1.10 \times 0.10 \times 4 = 0.440$

TOTAL = 5.070

5.070 m²

RESULT

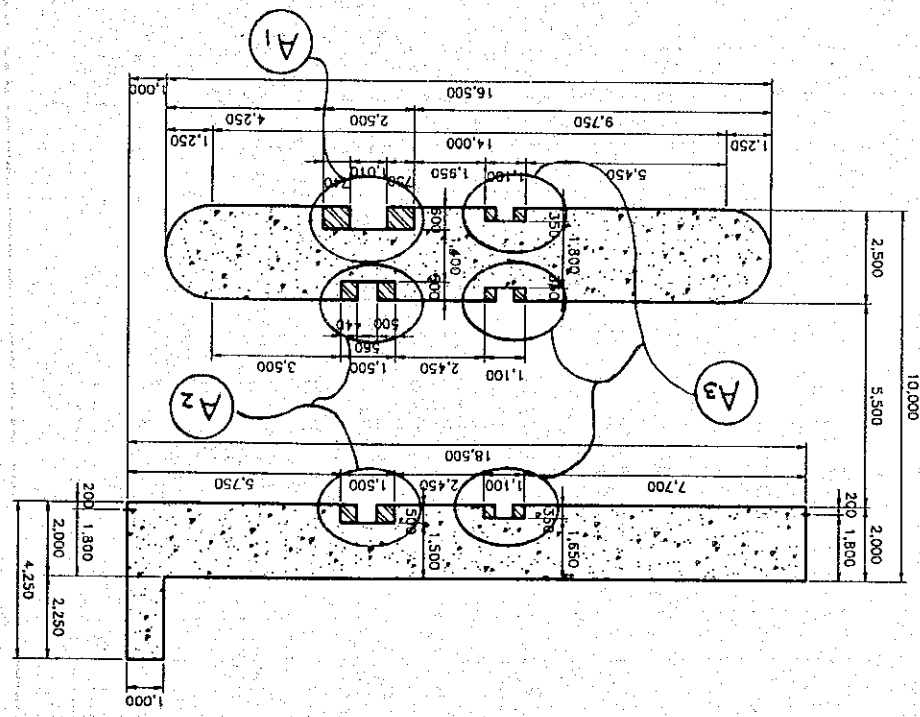
END PIER

FORM FOR SECONDARY CONC

GATE PIER

TYPE OF WORK :

LOCATION :



CALCULATION	RESULT
(H = 4.0m)	
$A_1 = (0.75 + 0.74 + 0.60 \times 2) \times 7.50 = 20.175$	
$A_2 = (0.50 \times 2 + 0.50 + 0.44) \times 7.50 \times 2 = 29.100$	
$A_3 = (0.32 + 0.25 \times 2 + 0.50 + 0.28) \times 8.10 \times 3$	
$= 38.880$	
TOTAL = 88.155	88.155 m ²

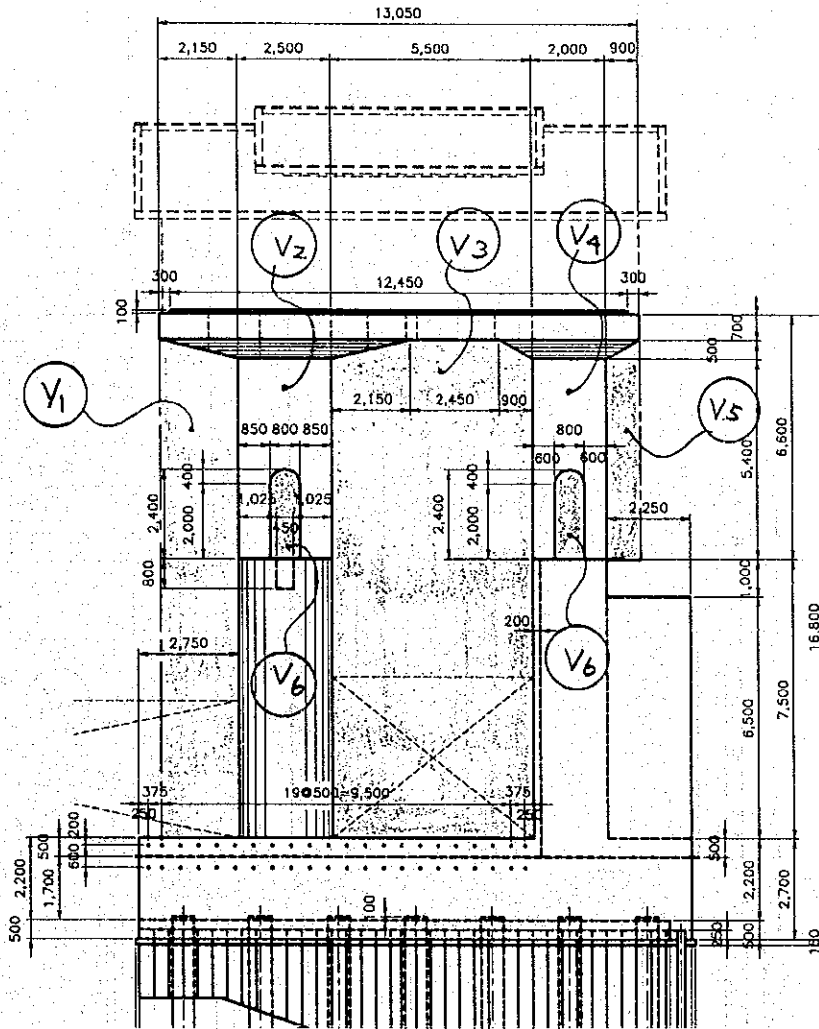
TYPE OF WORK : END PIER
 : SUPPORTING
 LOCATION : GATE PIER (I)

CALCULATION	RESULT
$V_1 = (13.40 \times 4.60 \times 2.15) + \left\{ (13.40 + 14.00) \times \frac{1}{2} \times 0.90 \times 2.15 \right\} + (14.00 \times 1.20 \times 2.15)$ $= 195.156$	
$V_2 = (2.50 \times 5.90 \times 0.85) \times 2 = 25.075$	
$V_3 = (13.40 \times 4.60 \times 5.50) + \left\{ (13.40 + 14.00) \times \frac{1}{2} \times 0.90 \times 5.50 \right\} + (14.00 \times 1.20 \times 5.50)$ $= 499.235$	
$V_4 = (2.00 \times 5.90 \times 0.85) \times 2 = 20.060$	
$V_5 = 6.70 \times 5.90 \times 0.90 = 35.577$	
$V_6 = \left(\frac{\pi}{4} \times 0.80^2 \times \frac{1}{2} + 2.00 \times 0.80 \right) \times 1.25 \times 2 \times 2$ $= 9.257$	
<p style="text-align: right;">TOTAL = 784.360</p>	<p>784.360 m³</p>

TYPE OF WORK : END PIER
 : SUPPORTING
 LOCATION : GATE PIER (I)

(1/2)

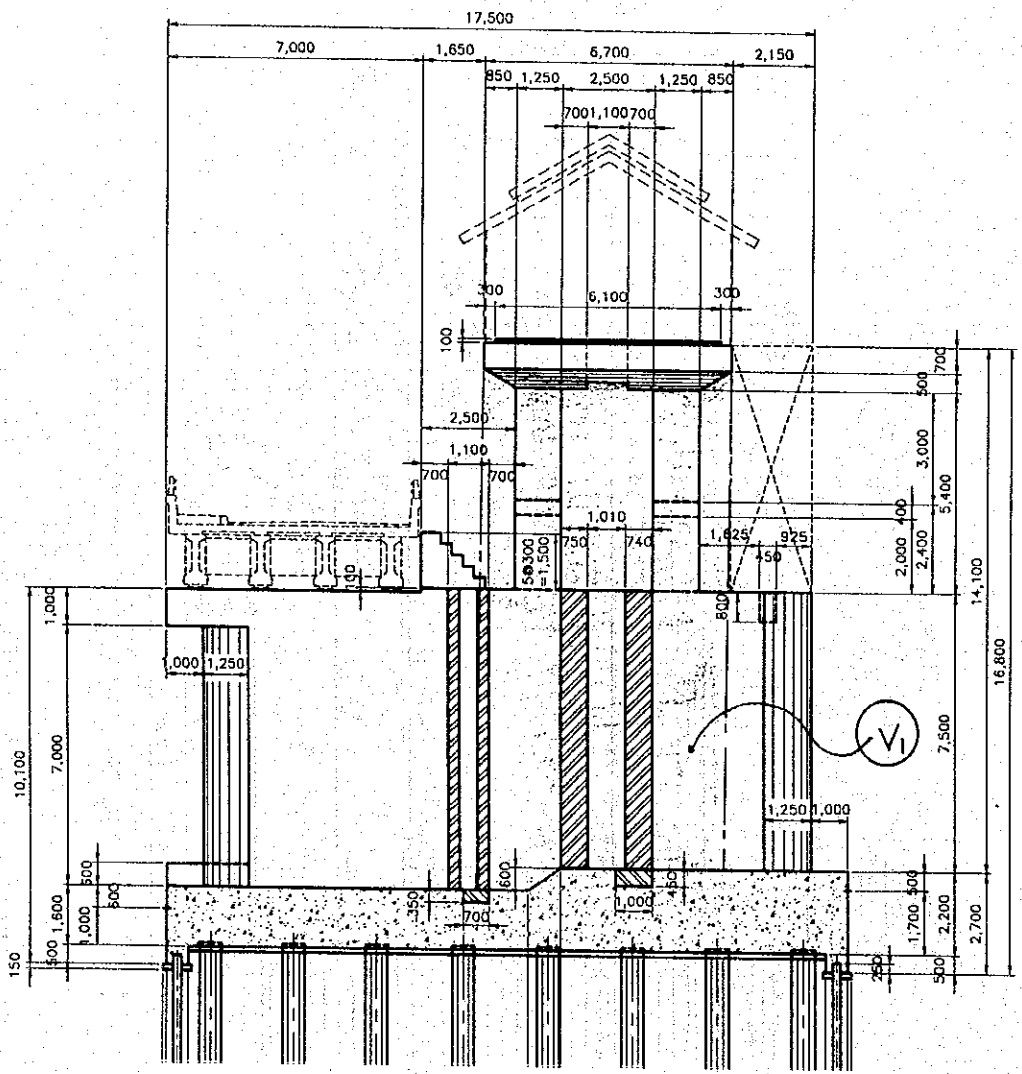
EXPLANATORY DRAWING



TYPE OF WORK : END PIER
 : SUPPORTING
 LOCATION : GATE PIER (I)

(2/2)

EXPLANATORY DRAWING



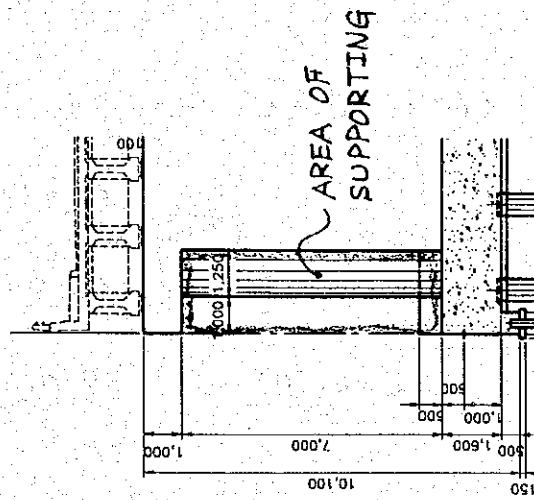
END PIER

SUPPORTING

GATE PIER (II)

TYPE OF WORK :

LOCATION :



TYPE OF WORK :	CALCULATION	RESULT
LOCATION :		
	$V = \left\{ (2.25 \times 2.50) - \frac{75}{4} \times 2.50^2 \times \frac{1}{2} \right\} \times 7.00$	
	$= 22.194$	22.194 m ³

TYPE OF WORK : END PIER
 : SCAFFOLDING
 LOCATION : GATE PIER

CALCULATION	RESULT
$A_1 = 10.15 \times 14.10$	$= 143.115$
$A_2 = (7.65 \times 8.10) + (10.45 \times 2.50)$	$= 88.090$
$A_3 = 10.15 \times 6.60$	$= 66.990$
$A_4 = 6.70 \times 6.60 \times 4$	$= 176.880$
$A_5 = 6.75 \times 7.50 \times 2$	$= 101.250$
$A_6 = (8.10 + 7.50) \times \frac{1}{2} \times 0.90 \times 2$	$= 14.040$
$A_7 = 8.10 \times 2.85 \times 2$	$= 46.170$
$A_8 = 7.00 \times 8.00 \times 2$	$= 112.000$
$A_9 = 16.30 \times 2.90$	$= 47.270$
$A_{10} = 7.75 \times 7.50 \times 2$	$= 116.250$
$A_{11} = (8.10 + 7.50) \times \frac{1}{2} \times 0.90 + (7.50 \times 0.90)$	$= 13.770$
$A_{12} = (8.10 \times 2.85) + (7.50 \times 2.85)$	$= 44.460$
$A_{13} = 8.85 \times 7.00$	$= 61.950$
$A_{14} = 9.12 \times 7.00$	$= 63.840$
$A_{15} = (2.90 \times 16.30) + (1.35 \times 8.70)$	$= 59.015$
$TOTAL = 1155.090$	1155.090 m^2

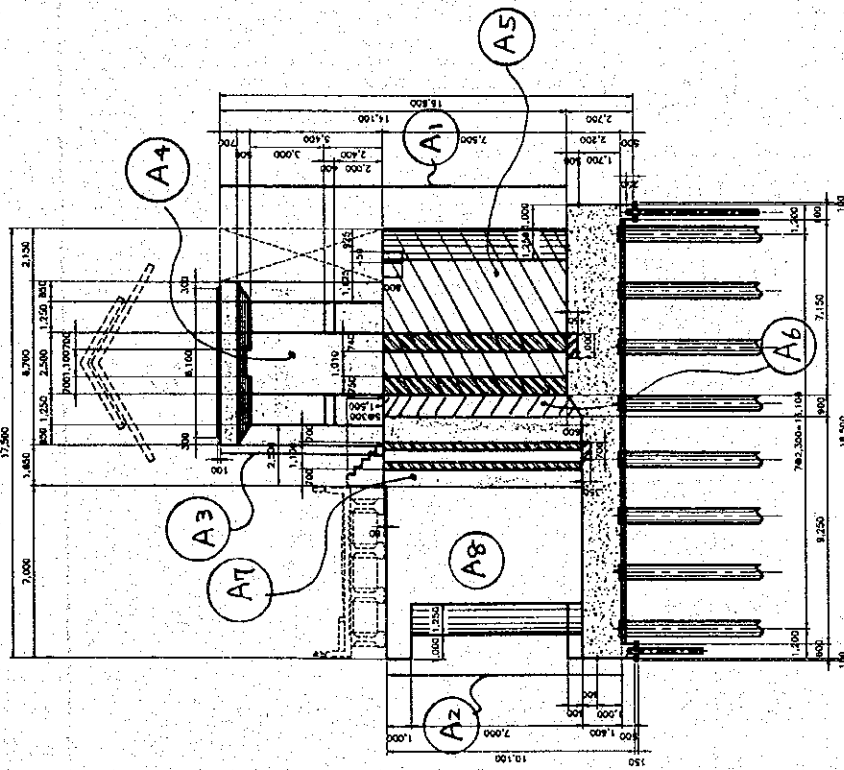
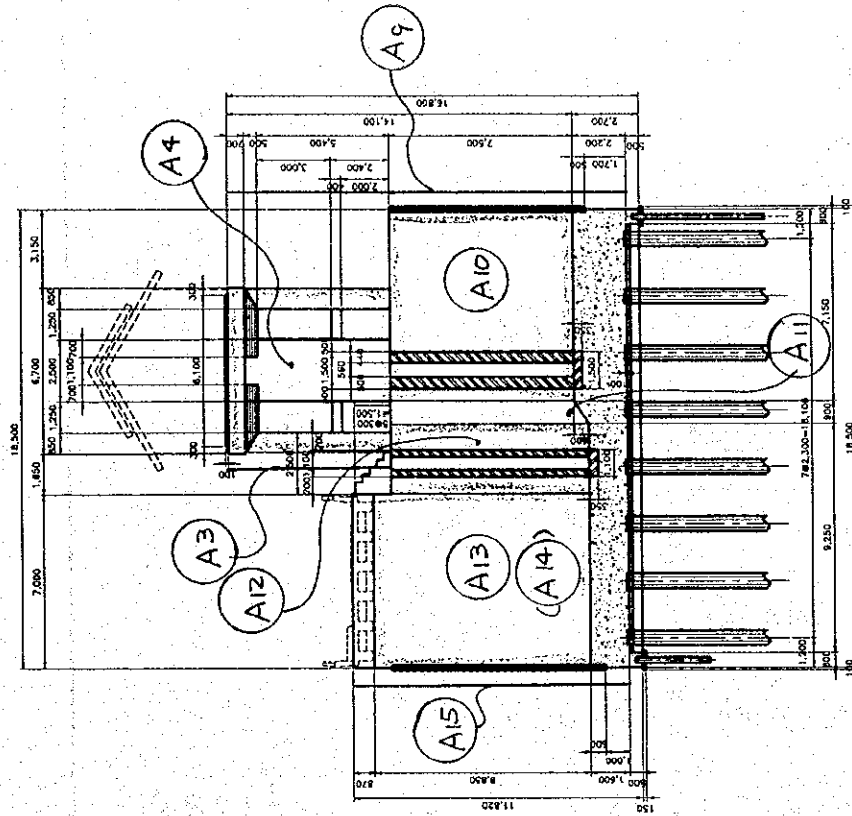
TYPE OF WORK

END PIER
SCAFFOLDING

LOCATION

GATE PIER

EXPLANATORY DRAWING



TYPE OF WORK : END PIER
 LOCATION : ANCHOR BAR
 : GATE PIER

(1/2)

CALCULATION	RESULT
(For Discharge Gate)	
• Pier Section	
$n_1 = 15 \times (4 + 4)$	$= 120 \text{ Bars}$
Ø 19 : Unit Weight = 2.23 kg/m	
$W_1 = 120 \times 0.30 \times 2.23$	$= 80.280$
• Slab Section	
$n_2 = 36 \text{ Bars}$	
Ø 19 : Unit Weight = 2.23 kg/m	
$W_2 = 36 \times 0.30 \times 2.23$	$= 24.084$
(For Sediment Flush Gate)	
$n_3 = 15 \times (3 + 4) \times 2$	$= 210 \text{ Bars}$
Ø 19 : Unit Weight = 2.23 kg/m	
$W_3 = 210 \times 0.30 \times 2.23$	$= 140.490$
• Slab Section	
$n_4 = (9 \times 6 + 5 \times 2 + 6 \times 2 + 3 \times 2)$	$= 82 \text{ Bars}$
$W_4 = 82 \times 0.30 \times 2.23$	$= 54.858$

TYPE OF WORK : END PIER
 LOCATION : ANCHOR BAR
 : GATE PIER

(2/2)

CALCULATION	RESULT
(For Temporary Gate)	
• Pier Section	
$n_5 = 16 \times 5 \times 3 = 240 \text{ Bars}$	
Ø19 : Unit Weight = 2.23 kg/m	
$W_5 = 240 \times 0.30 \times 2.23 = 160.560$	
• Slab Section	
$n_6 = 24 \text{ Bars}$	
$W_6 = 24 \times 0.30 \times 2.23 = 16.056$	
$n_7 = (9 \times 4 + 4 \times 2 + 5 \times 2 + 3 \times 2) = 60 \text{ Bars}$	
$W_7 = 60 \times 0.30 \times 2.23 = 40.140$	
$TOTAL = 516.468 \text{ kgf}$	0.516 tf

TYPE OF WORK : END PIER
 : JOINTING OF CONTROL HOUSE
 LOCATION : GATE PIER

(1/2)

CALCULATION	RESULT
(TYPE - A)	
• $\Phi 16$ ($W = 1.58 \text{ kg/m}$)	
$W_1 = (1.30 + 0.075 \times 2) \times 1 \times 1.58 = 2.291$	
$W_2 = (1.30 + 0.60 + 0.075 \times 2) \times 3 \times 1.58 = 9.717$	
$W = 12.008 \text{ kg/place}$	
$\Sigma W = 12.008 \times 4 \text{ places} = 48.032$	
• $\Phi 13$ ($W = 1.04 \text{ kg/m}$)	
$W_3 = 0.85 \times 4 \times 1.04 = 3.536 \text{ kg/place}$	
$\Sigma W = 3.536 \times 4 \text{ places} = 14.144$	
(TYPE - B)	
• $\Phi 16$ ($W = 1.58 \text{ kg/m}$)	
$W_1 = (1.30 + 0.075 \times 2) \times 1 \times 1.58 = 2.291$	
$W_2 = (1.30 + 0.60 + 0.075 \times 2) \times 5 \times 1.58 = 16.195$	
$W = 18.486 \text{ kg/place}$	
$\Sigma W = 18.486 \times 2 \text{ places} = 36.972$	

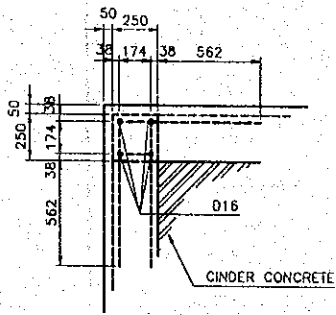
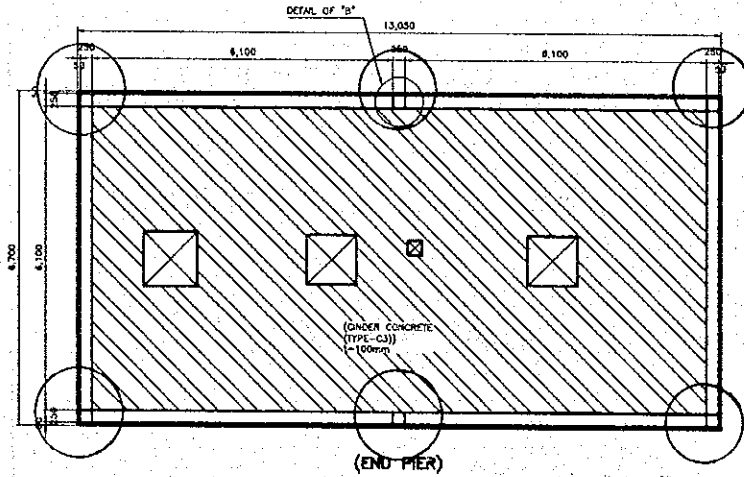
TYPE OF WORK : END PIER
 : JOINTING OF CONTROL HOUSE
 LOCATION : GATE PIER

(2/2)

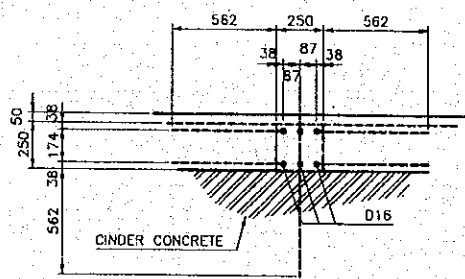
CALCULATION	RESULT
• D13 (w=1.04 kg/m)	
$W_3 = 0.85 \times 4 \times 1.04$	$= 3.536 \text{ kg/place}$
$\Sigma W = 3.536 \times 2 \text{ places}$	$= 7.072$
$TOTAL = 106.22 \text{ kgf}$	0.106 tf

TYPE OF WORK : END PIER
 : JOINTING OF CONTROL HOUSE
 LOCATION : GATE PIER

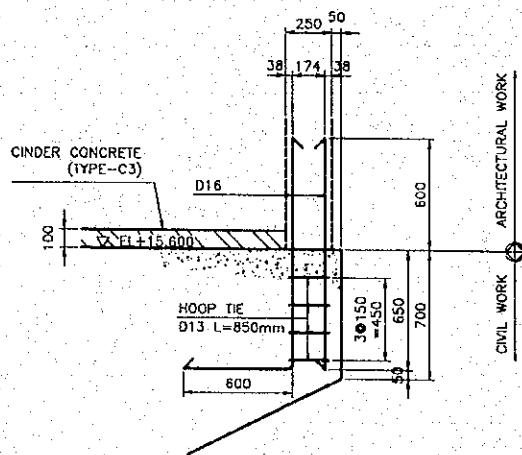
EXPLANATORY DRAWING



DETAIL OF "A"(END POSITION)
 SCALE B



DETAIL OF "B"(MIDDLE POSITION)
 SCALE B



STANDARD CROSS SECTION OF JOINTING
 SCALE B

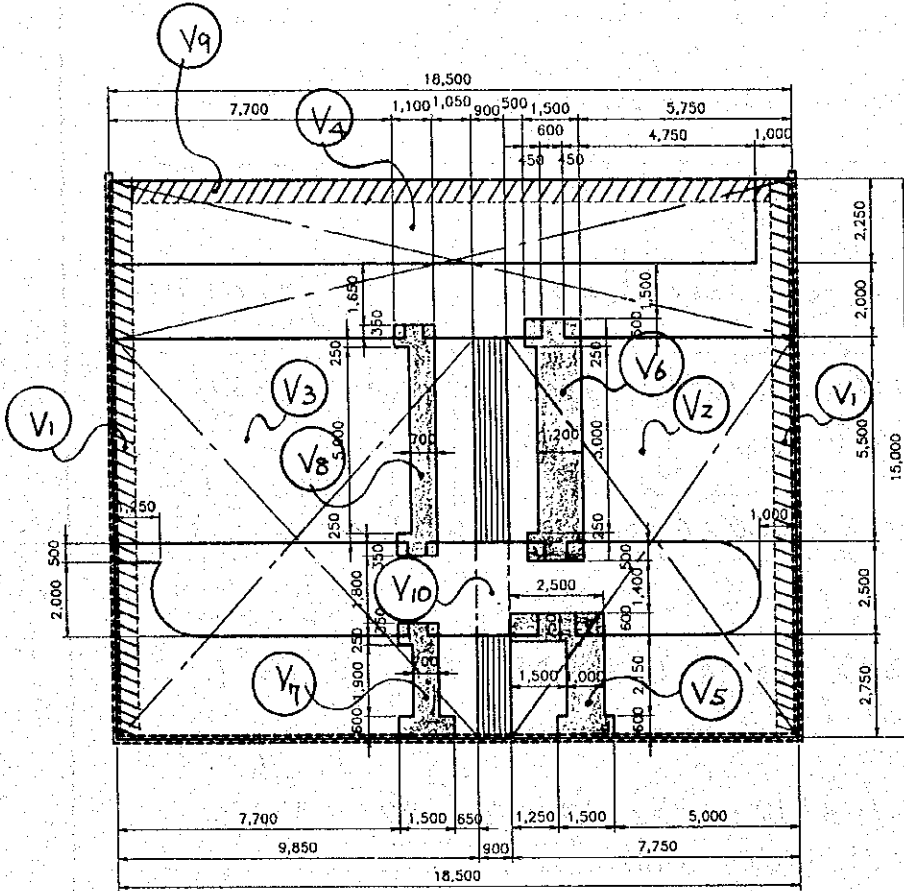
END PIER
 TYPE OF WORK : CONCRETE (TYPE-C1)
 LOCATION : SLAB

CALCULATION	RESULT
(TYPE - C1) : EL + 1.500m below	
$V_1 = 0.60 \times 0.50 \times 15.00 \times 2 = 9.000$	
$V_2 = 7.75 \times 2.20 \times 10.75 = 183.288$	
$V_3 = 9.85 \times 1.60 \times 10.75 = 169.420$	
$V_4 = 18.50 \times 4.25 \times 2.20 = 172.975$	
$V_5 = - \{ (1.50 \times 0.60 \times 0.45) + (1.00 \times 2.00 \times 0.45) + (2.50 \times 0.75 \times 0.45) \}$ $= -2.149$	
$V_6 = - \{ (0.75 \times 2.50 \times 0.35) \times 2 + (5.00 \times 1.20 \times 0.35) \}$ $= -3.413$	
$V_7 = - \{ (1.50 \times 0.60 \times 0.35) + (1.90 \times 0.70 \times 0.35) + (0.60 \times 1.10 \times 0.35) \}$ $= -1.012$	
$V_8 = - \{ (0.60 \times 1.10 \times 0.35) \times 2 + (5.00 \times 0.70 \times 0.35) + 0.35 \times 1.10 \times 0.60 \}$ $= -1.918$	
$V_9 = 0.60 \times 0.50 \times (18.50 - 0.60 \times 2) = 5.190$	
$V_{10} = (2.20 + 1.60) \times \frac{1}{2} \times 0.90 \times 10.75 = 18.383$	
(Deduction for PC Pile)	
$V_{11} = -\frac{\pi}{4} \times 0.60^2 \times 0.10 \times 56 \text{ piles} = -1.583$	
(Deduction for PC Sheet Pile)	
$V_{12} = -0.22 \times 15.00 \times 0.25 = -0.825$	
TOTAL = 547.356	547.356 m ³

TYPE OF WORK : END PIER
 : CONCRETE
 LOCATION : SLAB

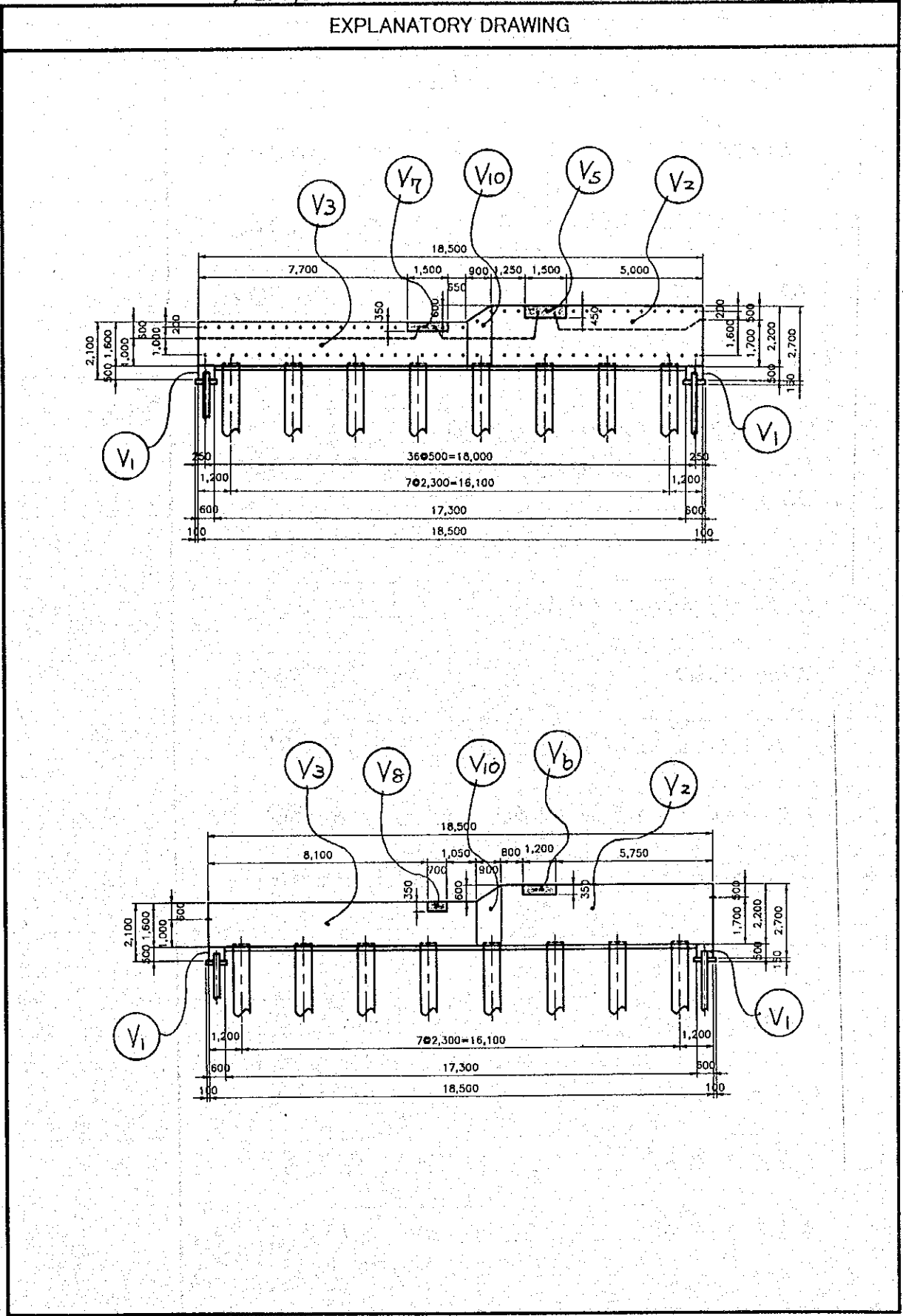
(1/2)

EXPLANATORY DRAWING



TYPE OF WORK : *END PIER*
 : *CONCRETE*
 LOCATION : *SLAB*

(2/2)



TYPE OF WORK
LOCATION

END PIER
FORM
SLAB

(1/2)

CALCULATION	RESULT
$(H < 4.0m) : EL + 1.500m \text{ below}$	
$A_1 = 2.70 \times 15.00 = 40.500$	
$A_2 = 0.50 \times (15.00 - 0.60) \times 2 = 14.400$	
$A_3 = 2.10 \times 15.00 = 31.500$	
$A_4 = 0.60 \times 4.25 = 2.550$	
$A_5 = 7.75 \times 2.20 + (2.20 + 1.60) \times \frac{1}{2} \times 0.90 + 9.85 \times 1.60 + 0.50 \times 0.60 \times 2 - (1.50 \times 0.45) - (1.50 \times 0.35) = 33.920$	
$A_6 = (18.50 - 0.60 \times 2) \times 0.50 = 8.650$	
$A_7 = 2.70 \times 18.50 = 49.950$	
$A_8 = \sqrt{(0.6)^2 + (0.9)^2} \times 10.25 = 11.087$	
$A_9 = (\frac{1}{2} \times 0.60 \times 0.90) + 9.85 \times 0.60 = 6.180$	
$A_{10} = 2.75 \times 0.45 = 1.238$	
$A_{11} = 2.00 \times 0.45 = 0.900$	
$A_{12} = 0.60 \times 0.45 \times 2 = 0.540$	
$A_{13} = 0.25 \times 0.45 \times 2 = 0.225$	
$A_{14} = 1.50 \times 0.45 = 0.675$	
$A_{15} = 2.50 \times 0.45 = 1.125$	

TYPE OF WORK : END PIER
 : FORM
 LOCATION : SLAB

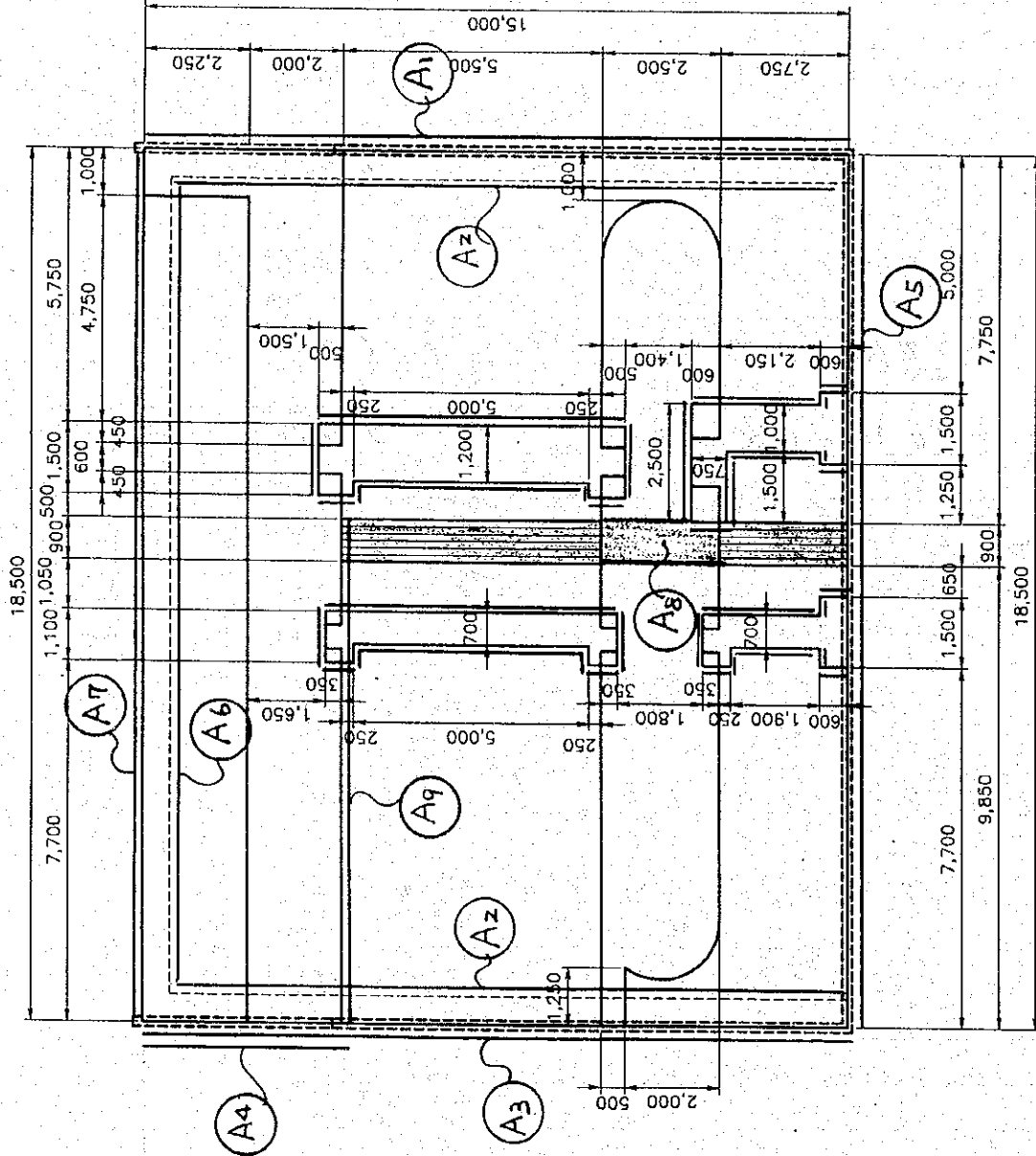
(2/2)

CALCULATION	RESULT
$A_{16} = 0.75 \times 0.45$	= 0.338
$A_{17} = 1.50 \times 0.35 \times 2$	= 1.050
$A_{18} = 6.50 \times 0.35$	= 2.275
$A_{19} = 5.00 \times 0.35$	= 1.750
$A_{20} = 0.75 \times 0.35 \times 2$	= 0.525
$A_{21} = 0.30 \times 0.35 \times 2$	= 0.210
$A_{22} = 0.60 \times 0.35 \times 2$	= 0.420
$A_{23} = 0.40 \times 0.35 \times 2$	= 0.280
$A_{24} = 1.90 \times 0.35$	= 0.665
$A_{25} = 2.50 \times 0.35$	= 0.875
$A_{26} = 1.10 \times 0.35 \times 3$	= 1.155
$A_{27} = 0.60 \times 0.35 \times 3$	= 0.630
$A_{28} = 0.40 \times 0.35 \times 3$	= 0.420
$A_{29} = 6.20 \times 0.35$	= 2.170
$A_{30} = 5.00 \times 0.35$	= 1.750

TYPE OF WORK : END PIER
 : FORM
 LOCATION : SLAB

(1/2)

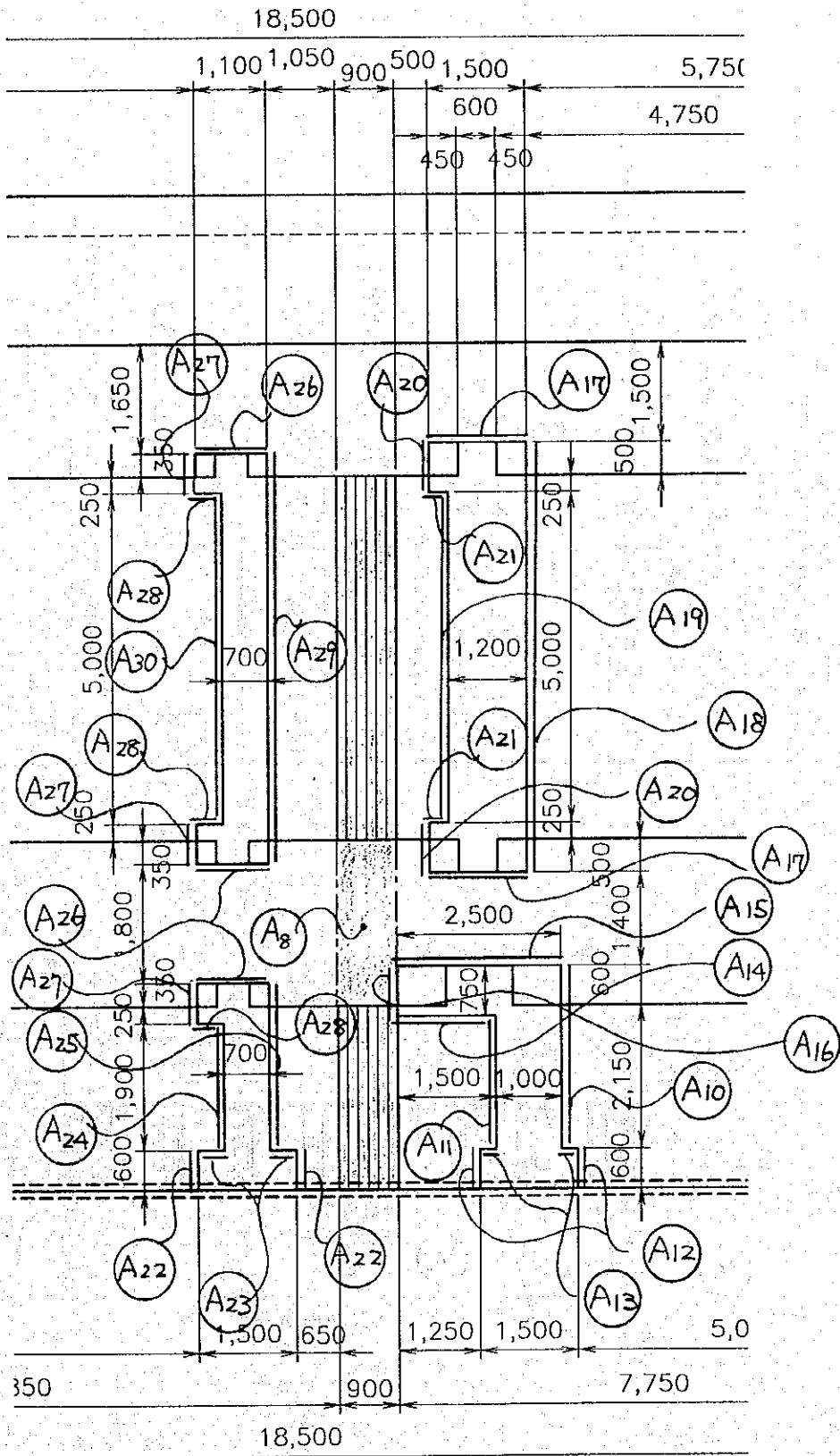
EXPLANATORY DRAWING



TYPE OF WORK : END PIER
 : FORM
 LOCATION : SLAB

(2/2)

EXPLANATORY DRAWING



END PIER

LEVELING CONCRETE

SLAB

TYPE OF WORK :

LOCATION :

CALCULATION

RESULT

(TYPE - E)

$$V_1 = 0.80 \times 0.15 \times 15.00 \times 2 = 3.600$$

$$V_2 = 0.80 \times 0.15 \times (18.50 - 0.60 \times 2) = 2.076$$

$$V_3 = (15.00 - 0.60) \times (18.50 - 0.60 \times 2) \times 0.15$$

$$= 37.368$$

(Deduction for PC File)

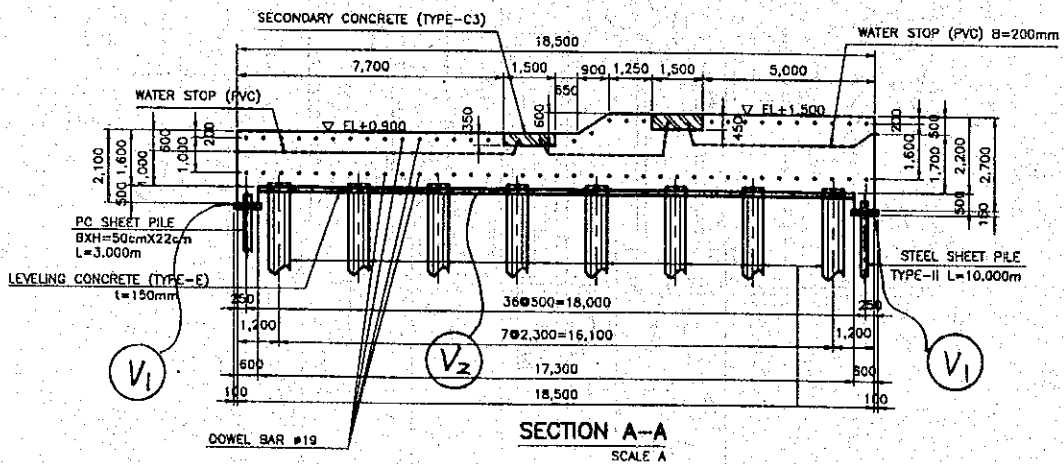
$$V_4 = -\frac{\pi}{4} \times 0.60^2 \times 0.15 \times 56 \text{ piles} = -2.375$$

(Deduction for PC Sheet Pile)

$$V_5 = -0.22 \times 15.00 \times 0.15 = -0.495$$

$$\text{TOTAL} = 40.174$$

$$40.174 \text{ m}^3$$

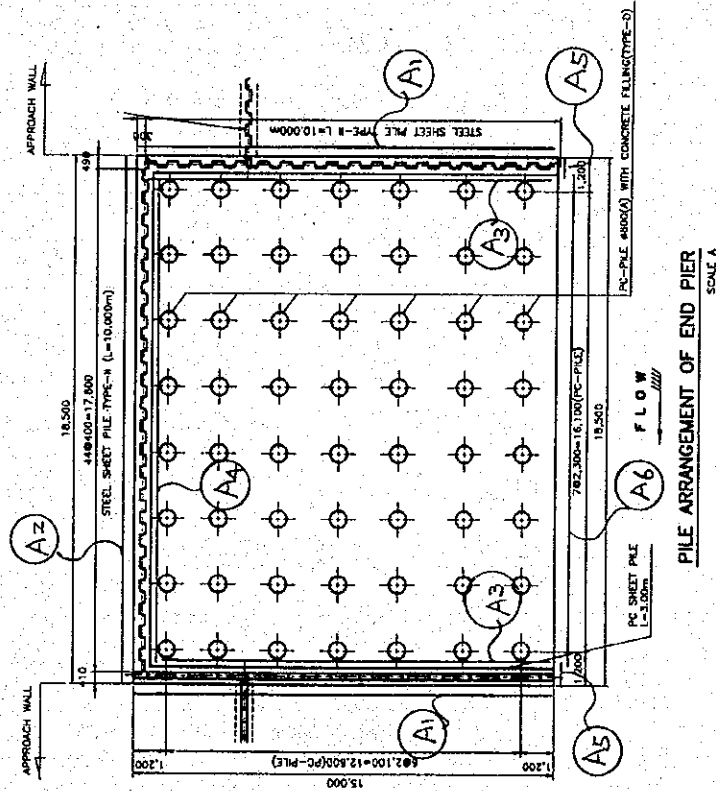


SECTION A-A
SCALE A

END PIER

TYPE OF WORK : **FORM FOR LEVELING CONCRETE**

LOCATION : **SLAB**



PILE ARRANGEMENT OF END PIER
SCALE 1:100

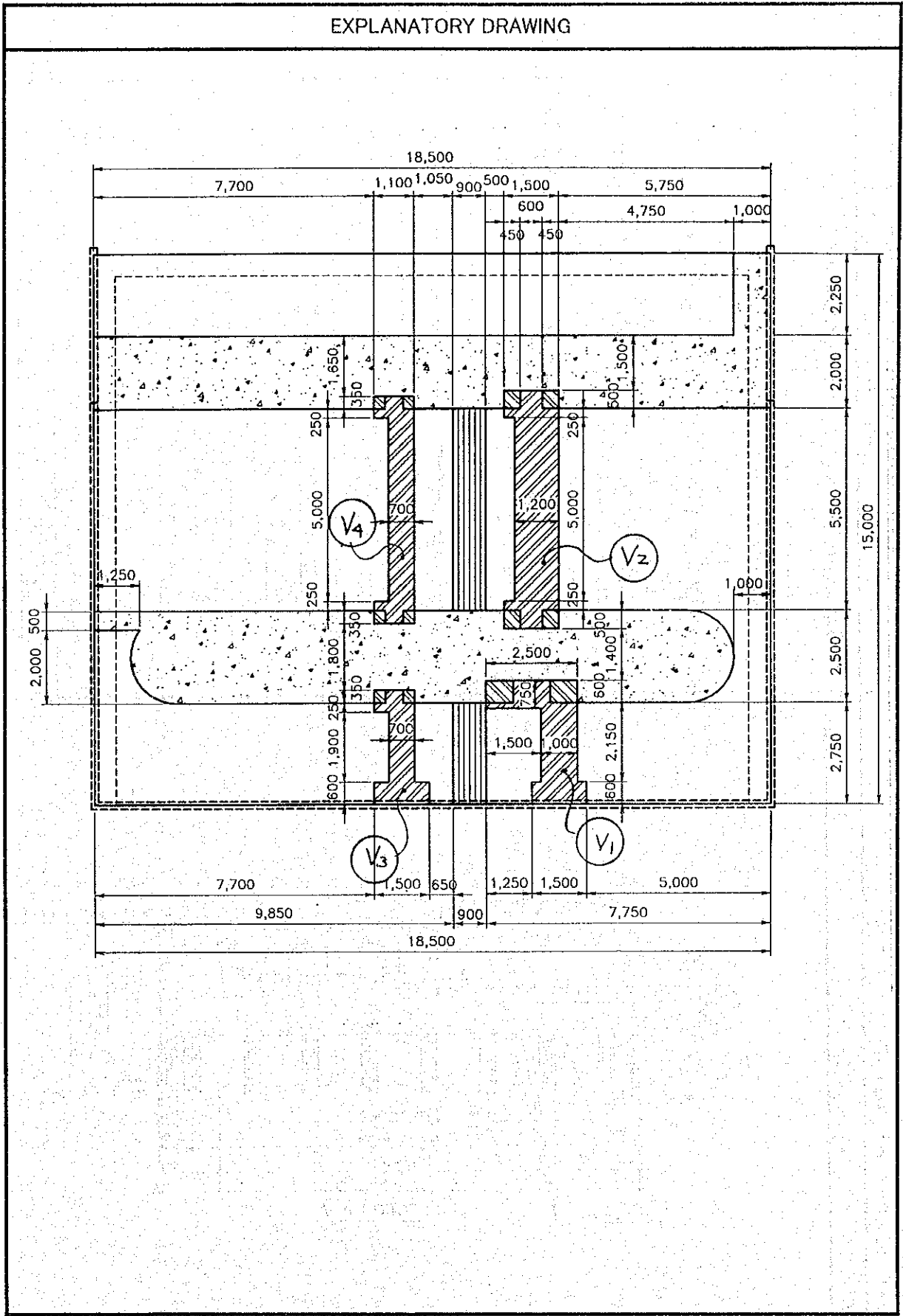
CALCULATION	RESULT
$(H < 4.0m)$	
$A_1 = 0.15 \times (15.00 + 0.1 \times 2) \times 2 = 4.560$	
$A_2 = 0.15 \times (18.50 + 0.1 \times 2) = 2.805$	
$A_3 = 0.15 \times (15.00 - 0.60 + 0.10) \times 2 = 4.350$	
$A_4 = 0.15 \times (18.50 - 0.60 \times 2) = 2.595$	
$A_5 = 0.15 \times 0.80 \times 2 = 0.240$	
$A_6 = 0.15 \times (18.50 - 0.60 \times 2) = 2.595$	
$A_7 = 0.15 \times 0.10 \times 2 = 0.030$	
TOTAL = 17.175	17.175 m²

TYPE OF WORK : END PIER
 : SECONDARY CONCRETE
 LOCATION : SLAB

CALCULATION	RESULT
(TYPE-C3)	
$V_1 = (1.50 \times 0.60 + 2.00 \times 1.00 + 2.50 \times 0.75) \times 0.45$	
$= 2.149$	
$V_2 = (0.75 \times 1.50 + 5.00 \times 1.20 + 0.75 \times 1.50) \times 0.35$	
$= 2.888$	
$V_3 = (1.50 \times 0.60 + 1.90 \times 0.70 + 0.60 \times 1.10) \times 0.35$	
$= 1.012$	
$V_4 = (0.60 \times 1.10 + 5.00 \times 0.70 + 0.60 \times 1.10) \times 0.35$	
$= 1.687$	
TOTAL = 7.736	
	7.736 m³

TYPE OF WORK : END PIER
 : SECONDARY CONCRETE
 LOCATION : SLAB

EXPLANATORY DRAWING



END PIER

TYPE OF WORK :

WATER STOP

LOCATION :

SLAB

CALCULATION

WATER STOP : B = 200mm

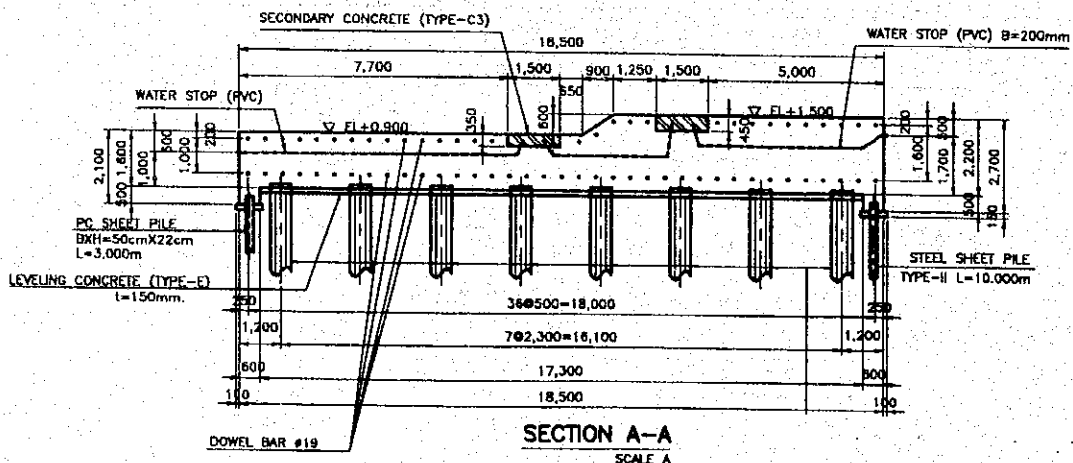
$L_1 = 19.50 \text{ m (side)}$

$L_2 = 15.00 + 8.50 = 23.50 \text{ m (Upstream)}$

$L_3 = 15.00 + 8.70 = 23.70 \text{ m (Downstream)}$

$\Sigma L = 19.50 + 23.50 + 23.70 = 66.70 \text{ m}$

RESULT



TYPE OF WORK : END PIER
: DOWEL BAR
LOCATION : SLAB

CALCULATION	RESULT
Number of Reinforcing Bar ($\phi 19$)	
$n = (22 + 22) \times 2 + (37 + 30) = 155 \text{ Bars}$	
$\phi 19 : \text{Unit weight} = 2.23 \text{ kg/m}$	
$W = 155 \times 1.24 \times 2.23 = 428,606 \text{ kgf}$	0.429 tf
PVC - Pipe ($\phi 25$)	
$n = 155 \text{ pipes}$	
$L = 155 \times 0.55 = 85.250$	85.250 m

TYPE OF WORK : PILE HEAD TREATMENT
 LOCATION : END PIER
 : LEFT BANK

CALCULATION	RESULT
PC PILE DIA 600 (A) n = 56 PILES	
LENGTH OF DESIGN : $L_1 = 9.90$ m	
SPARE PILE LENGTH : $L_2 = 1.00$ m	
Therefore, ADOPTED PILE LENGTH :	
$L = 9.90 + 1.00 = 10.90$ 11.00 m/pile	56 places
PILING	
N VALUE : $N = 28$ (Average) $D = 9.90$ m/pile	56 places
CONCRETE FILLING (TYPE-C1)	
$n = 56$ PILES	
$V = \frac{\pi}{4} \times 0.40^2 \times 1.15 = 0.145$ m ³ /pile	56 places
CONCRETE FILLING (TYPE-D)	
$V = \frac{\pi}{4} \times 0.40^2 \times 2.35 = 0.295$ m ³ /pile	56 places
SUSPENDED FORM	
$A = \frac{\pi}{4} \times 0.40^2 = 0.126$ m ³ /pile	56 places
REINFORCING BAR	
D 16 (W = 1.58 kg/m)	
$W_1 = 12 \text{ Bars} \times 1.65 \times 1.58 = 31.284$	
D 13 (W = 1.04 kg/m)	
$W_2 = 12 \text{ Bars} \times 1.25 \times 1.04 = 15.60$	
TOTAL	= 46.884 kg.f/pile
CUTTING PILE HEAD	
Height of cutting : $h = 1.10$ m	
$V = \frac{\pi}{4} \times (0.60^2 - 0.40^2) \times 1.10 = 0.173$ m ³ /pile	56 places

TYPE OF WORK : PILE HEAD TREATMENT
 LOCATION : END PIER
 : RIGHT BANK

CALCULATION	RESULT
PC PILE DIA 600 (A) n = 56 PILES	
LENGTH OF DESIGN : $L_1 = 10.30$ m	
SPARE PILE LENGTH : $L_2 = 1.00$ m	
Therefore, ADOPTED PILE LENGTH :	
$L = 10.30 + 1.00 = 11.30$ 12.00 m/pile	56 places
PILING	
N VALUE : $N = 22$ (Average) $D = 10.30$ m/pile	56 places
CONCRETE FILLING (TYPE-C1)	
$n = 56$ PILES	
$V = \frac{\pi}{4} \times 0.40^2 \times 2.35$ = 0.145 m ³ /pile	56 places
CONCRETE FILLING (TYPE-D)	
$V = \frac{\pi}{4} \times 0.40^2 \times 1.45$ = 0.295 m ³ /pile	56 places
SUSPENDED FORM	
$A = \frac{\pi}{4} \times 0.40^2$ = 0.126 m ³ /pile	56 places
REINFORCING BAR	
D 16 (W = 1.58 kg/m)	
$W_1 = 12 \text{ Bars} \times 1.65 \times 1.58$ = 31.284	
D 13 (W = 1.04 kg/m)	
$W_2 = 12 \text{ Bars} \times 1.25 \times 1.04$ = 15.60	
TOTAL = 46.884 kg.f/pile	56 places
CUTTING PILE HEAD	
Height of cutting : $h = 1.70$ m	
$V = \frac{\pi}{4} \times (0.60^2 - 0.40^2) \times 1.70$ = 0.267 m ³ /pile	56 places