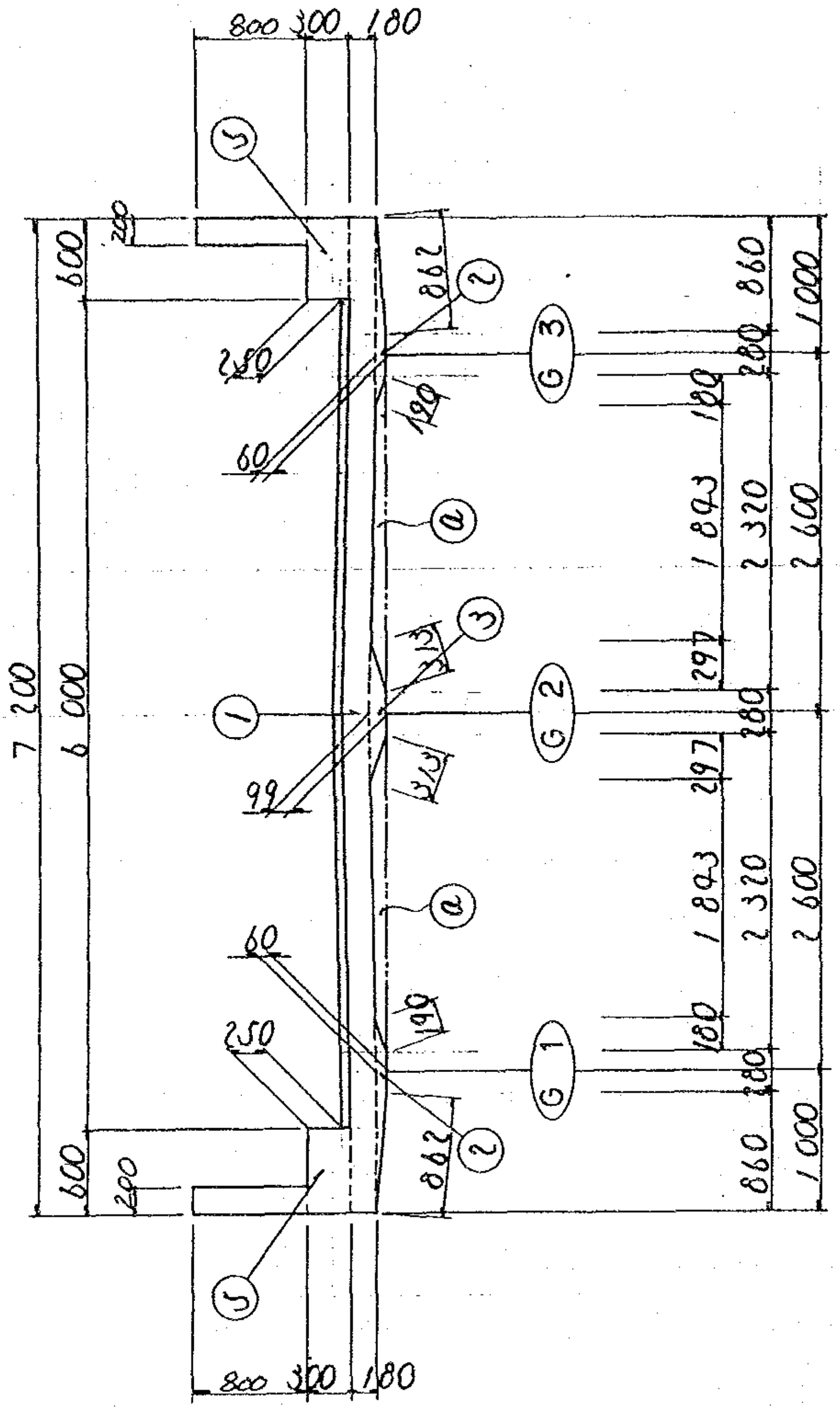
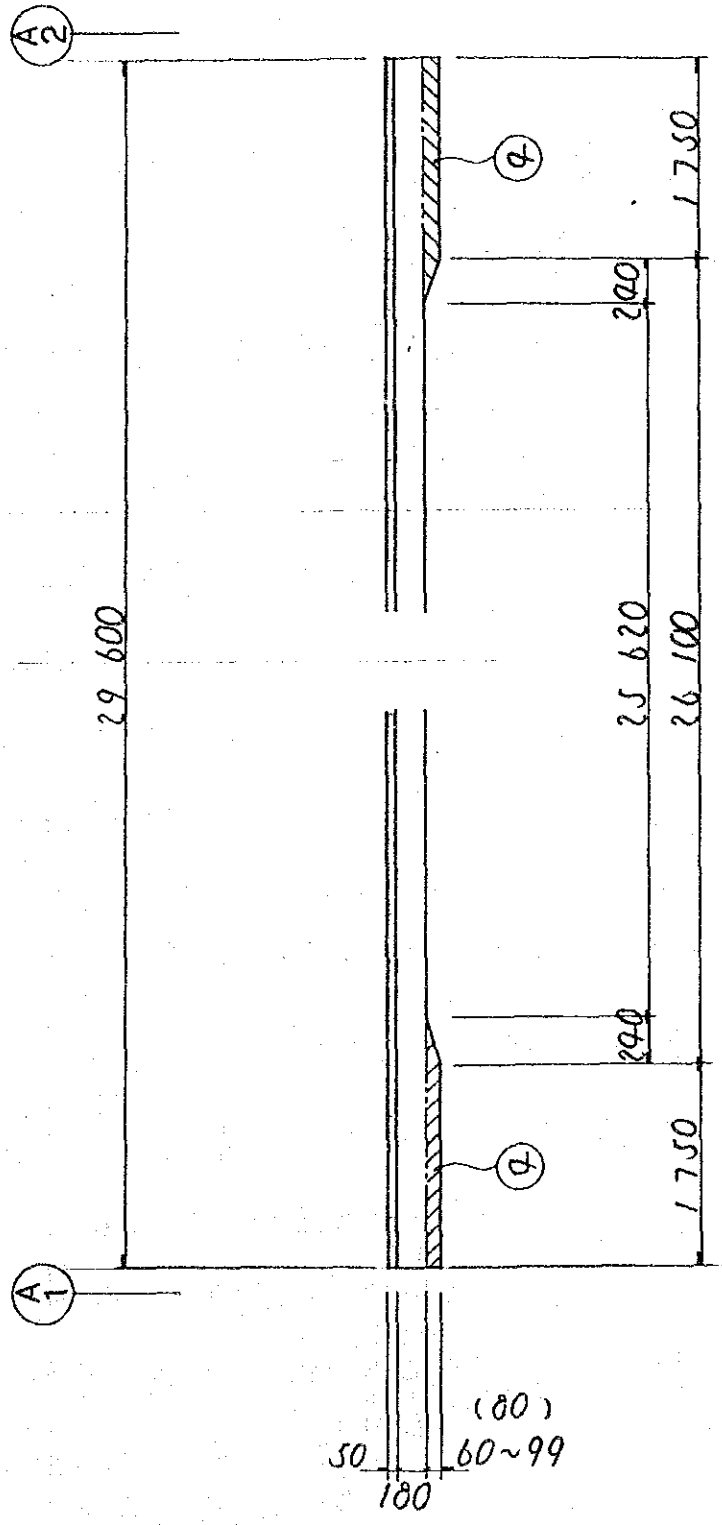

7 200
6 000
800 300 180
600
200
250
60
99
190
862
315
G 1
G 2
G 3
1 000
860
280
180
297
1 893
2 320
2 600



$$q\,A = 1/2 \times (1.750 + 1.990) \times 0.080 = 0.150\ m^2$$

1. Concrete Volume

1) Slab concrete

①	Slab	7.200 x 0.180 x 29.600	=	38.362
②	Hunch G.1.3	1/2 x (0.280 + 1.320) x 0.060 x 29.600 x 2	=	2.842
③	" G.2	1/2 x (0.280 + 0.874) x 0.099 x 29.600	=	1.691
④	Part a	1/2 x (1.843 + 2.320) x 0.150 x 4	=	1.249
		Total	=	44.144 m^3

2) Parapet wall

⑤		0.600 x 0.300 x 29.600 x 2	=	10.656 m^3
⑥		0.200 x 0.800 x 29.600 x 2	=	9.472
		Total		20.128 m^3

2 Form work F1

1) Slab

	(0.180 + 0.862) x 29.600 x 2	=	61.686
a,	1.893 x 25.620 x 2	=	94.935
	½ x (25.620 + 26.100) x 0.252 x 4	=	26.067
	½ x (1.893 + 2.320) x 0.252 x 4	=	2.098
	1.750 x 4.640 x 2	=	16.240
G1~3,	(0.280 - 0.230) x 10.200 x 3	=	1.530
			m²
	Total	=	202.056

2) Form work F3 (parapet wall)

			m²
	0.300 x 4 x 29.600	=	35.520
	0.800 x 4 x 29.600		94.720
	Total		130.24 m²

3. Asphalt pavement (t = 50)

			m²
	6.000 x 29.600	=	177.60

Item No.	Work	Unit	Quantity	Foregin Currency ( ) Unit Price	Foregin Currency ( ) Amount	Local Currency (Rs) Unit Price	Local Currency (Rs) Amount	Total Equivalent (Rs)	Ref. Clause or Sub-clause
E	INTAKE								
E1	Earthwork								
/01	Excavation, weathered rock, in open-cut	m3	290						T2.4.6
/02	Excavation, rock, in open-cut	m3	610						T2.4.6
/03	Anchor bar, 25 mm dia. for sliding	m	630						T2.10.5
/04	Chipping of existing concrete	m3	70						T2.11
	Subtotal of item E1								

Note: The Tenderer shall fill in J¥ or US$ in brackets adjacent to "Foreign Currency" described above, which the Tenderer proposes to apply as the foreign currency in the Contract.

Item No.	Work	Unit	Quantity	Foreign Currency ( ) Unit Price	Foreign Currency ( ) Amount	Local Currency (Rs) Unit Price	Local Currency (Rs) Amount	Total Equivalent (Rs)	Ref. Clause or Sub-clause
E2	Concrete Work								
/01	Concrete, class A, in blockout	m3	20						T4.1.18
/02	Concrete, class B, facing concrete	m3	220						T4.1.18
/03	Concrete, class C, intake structure	m3	3,190						T4.1.18
/04	Concrete, class D, inclined step	m3	80						T4.1.18
/05	Form, F1 for item /01 and /02	m2	160						T4.1.18
/06	Form, F2 for item /02 and /03	m2	3,710						T4.1.18
/07	Reinforcing bar	ton	160						T4.1.18
/08	Waterstop, type "A"	m	70						T4.1.18
/09	Joint filler	m2	340						T4.1.18
	Subtotal of item E2								

Note: The Tenderer shall fill in J¥ or US$ in brackets adjacent to "Foreign Currency" described above, which the Tenderer proposes to apply as the foreign currency in the Contract.

Item No.	Work	Unit	Quantity	Foreign Currency ( ) Unit Price	Foreign Currency ( ) Amount	Local Currency (Rs) Unit Price	Local Currency (Rs) Amount	Total Equivalent (Rs)	Ref. Clause or Sub-clause
E3	Miscellaneous Metalwork								
/01	Embedded metalwork	kg	920						T9.6.2
/02	200ø steel air vent pipe	m	150						T9.6.4
	Subtotal of item E3								
	TOTAL OF ITEM E								

Note: The Tenderer shall fill in J¥ or US$ in brackets adjacent to "Foreign Currency" described above, which the Tenderer proposes to apply as the foreign currency in the Contract.

Working Division: Intake.

Description	Calculation Details	Unit	Quantity	Remarks
E/	Earth work			
Excavation				
	Sections			
	0-0' $\frac{1}{2}$ 1.104 m² × 1.017 m = 0.562 m³			
	0'-1 $\frac{1}{2}$(1.104 + 3.199) × 1.654 = 3.558			
	1-1' $\frac{1}{2}$(3.199 + 7.440) × 0.802 = 4.266			
	1'-2 $\frac{1}{2}$(7.440 + 19.825) × 1.698 = 23.148			
	2-3 $\frac{1}{2}$(19.825 + 15.875) × 1.552 = 27.703			
	3-3' 15.875 × 0.448 = 7.112			
	3'-3" $\frac{1}{2}$(15.875 + 18.470) × 0.360 = 6.182			
	3"-4 $\frac{1}{2}$(18.470 + 11.119) × 0.450 = 6.658			
	4-5 $\frac{1}{2}$(11.119 + 15.832) × 0.684 = 9.217			
	5-6 $\frac{1}{2}$(15.832 + 31.205) × 1.866 = 43.886			
	6-7 $\frac{1}{2}$(31.205 + 11.271) × 3.192 = 67.792			
	7-8 $\frac{1}{2}$(11.271 + 7.373) × 1.168 = 10.888			
	8-9 $\frac{1}{2}$(7.373 + 10.202) × 1.790 = 15.730			
	9-9' $\frac{1}{2}$(10.202 + 14.957) × 0.490 = 6.164			
	9'-9" $\frac{1}{2}$(14.957 + 8.773) × 1.512 = 17.940			
	9"-9"' $\frac{1}{2}$(8.773 + 8.738) × 0.488 = 4.273			
	9"'-10 $\frac{1}{2}$(8.738 + 58.617) × 3.360 = 113.156			
	10-10' $\frac{1}{2}$(58.617 + 41.057) × 1.783 = 88.859			
	10'-11 $\frac{1}{2}$(41.057 + 43.027) × 0.217 = 9.123			
	11-11' $\frac{1}{2}$(43.027 + 31.485) × 0.567 = 21.124			
	11'-11" $\frac{1}{2}$(31.485 + 31.485) × 2.599 = 81.830			
	Sub-total. 27.699 m 569.171 m³			

Working Division:

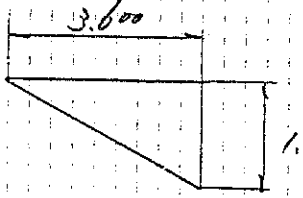
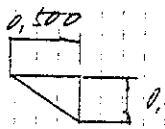
Description	Calculation Details	Unit	Quantity	Remarks
	11″–12 $\frac{1}{2}$(31.485 + 44.400) m² × 1.474 m = 55.927 m³			
	12 – 12′ 44.400 × 0.860 = 38.184			
	12′–12″ $\frac{1}{2}$(44.400 + 24.977) × 1.140 = 39.545			
	12″–13 $\frac{1}{2}$ · 24.977 × 3.720 = 46.457			
	sub-total. 34.893 m² 249.284 m³			
	Weathered rock 249.284 m³ × 0.20 = 49.857 m³			
	Rock 249.284 × 0.80 = 199.427			

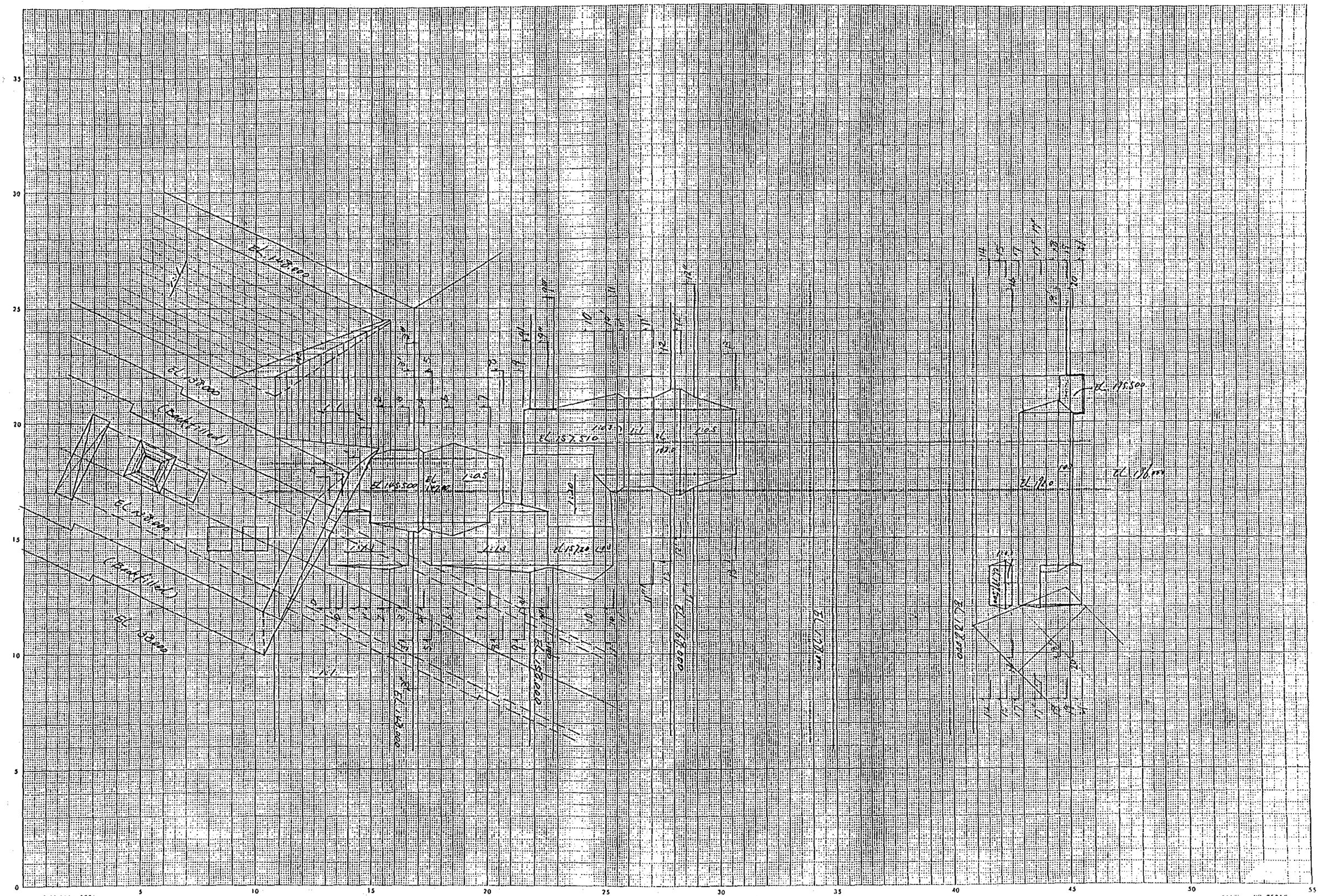
Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
(Excavation)				
	Sections			
		m^2 m m^3		
14-15	$\frac{1}{2} \cdot 5.179 \times 1.360 = 3.522$			
15-16	$\frac{1}{2}$ 5.179 × 0.583 = 1.510			
16-17	0.557			
17-17'	$\frac{1}{2} \cdot 31.726 \times 1.860 = 29.505$			
17'-17"	$\frac{1}{2} \cdot (31.726 + 30.040) \times 0.000 = —$			
17"-18	$\frac{1}{2} (30.477 + 5.282) \times 1.500 = 61.319$			
18-18'	$\frac{1}{2} (5.282 + 46.345) \times 0.140 = 6.834$			
18'-19	$\frac{1}{2} (46.345 + 30.704) \times 0.500 = 19.762$			
19-20	$\frac{1}{2} (30.704 + 4.251) \times 0.560 = 9.787$			
20-21	$\frac{1}{2} (4.251 + 1.675) \times 0.800 = 2.370$			
		m m^2		
	Sub-total. 7.860 134.109			
	Weathered Rock 100% 134.109 m^3			

VI-4-6

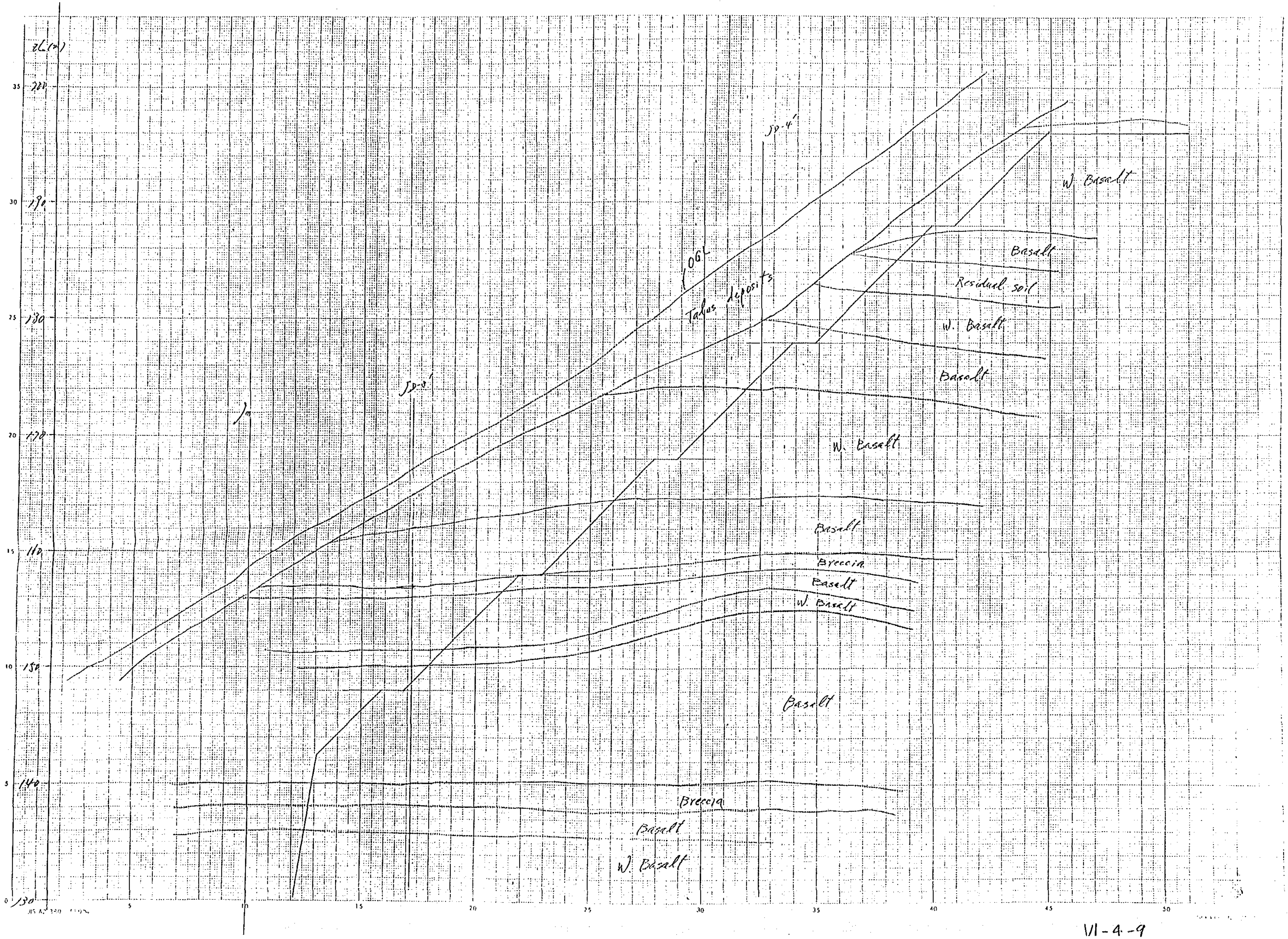
Working Division:

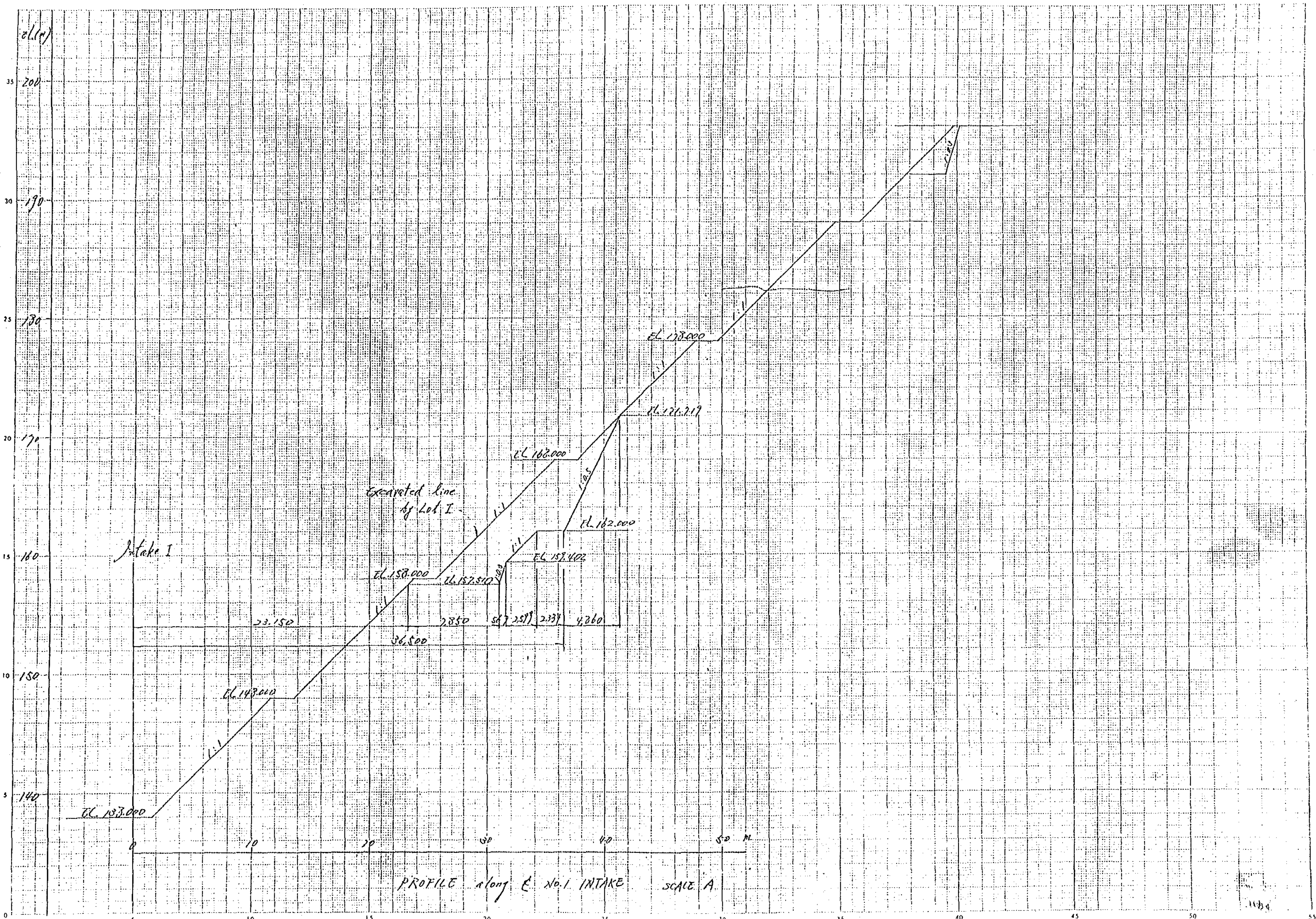
Description	Calculation Details	Unit	Quantity	Remarks
(Excavation)	EL 138.0 ~ EL 148.0			Area at EL 138.0 m  $A = \frac{1}{2} \times 3.600 \times 1.600 = 2.880\ m^2$ Area at EL 148.0 m  $B = \frac{1}{2} \times 0.500 \times 0.200 = 0.050\ m^2$
	$V = \frac{1}{3} \times 10.0 \cdot (A + \sqrt{AB} + B)$			
	$A = 2.880\ m^2$			
	$B = 0.050$ "			
	$V = 11.032\ m^3$			
	Weathered Rock $11.032^{m^3} \times 20\% = 2.206^{m^3}$			
	Rock $11.032 \times 80\% = 8.826$			
	Total.			
	Weathered Rock 281.172^{m^3}			
	Rock $608.753\ m^3$			
E2/01	Weathered Rock	M^3	290	
E2/02	Rock	"	610	

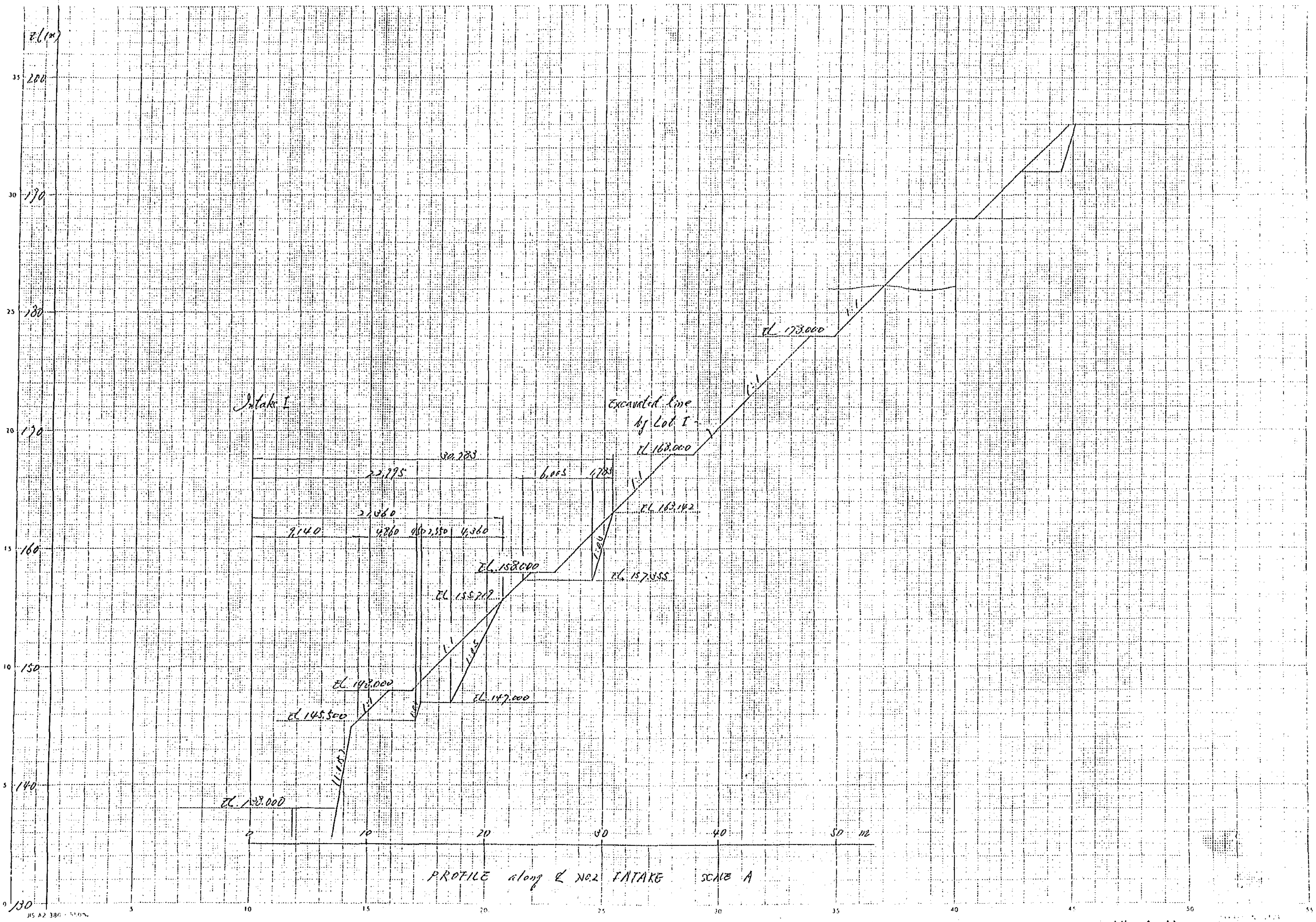


JIS A2 380×550㎜

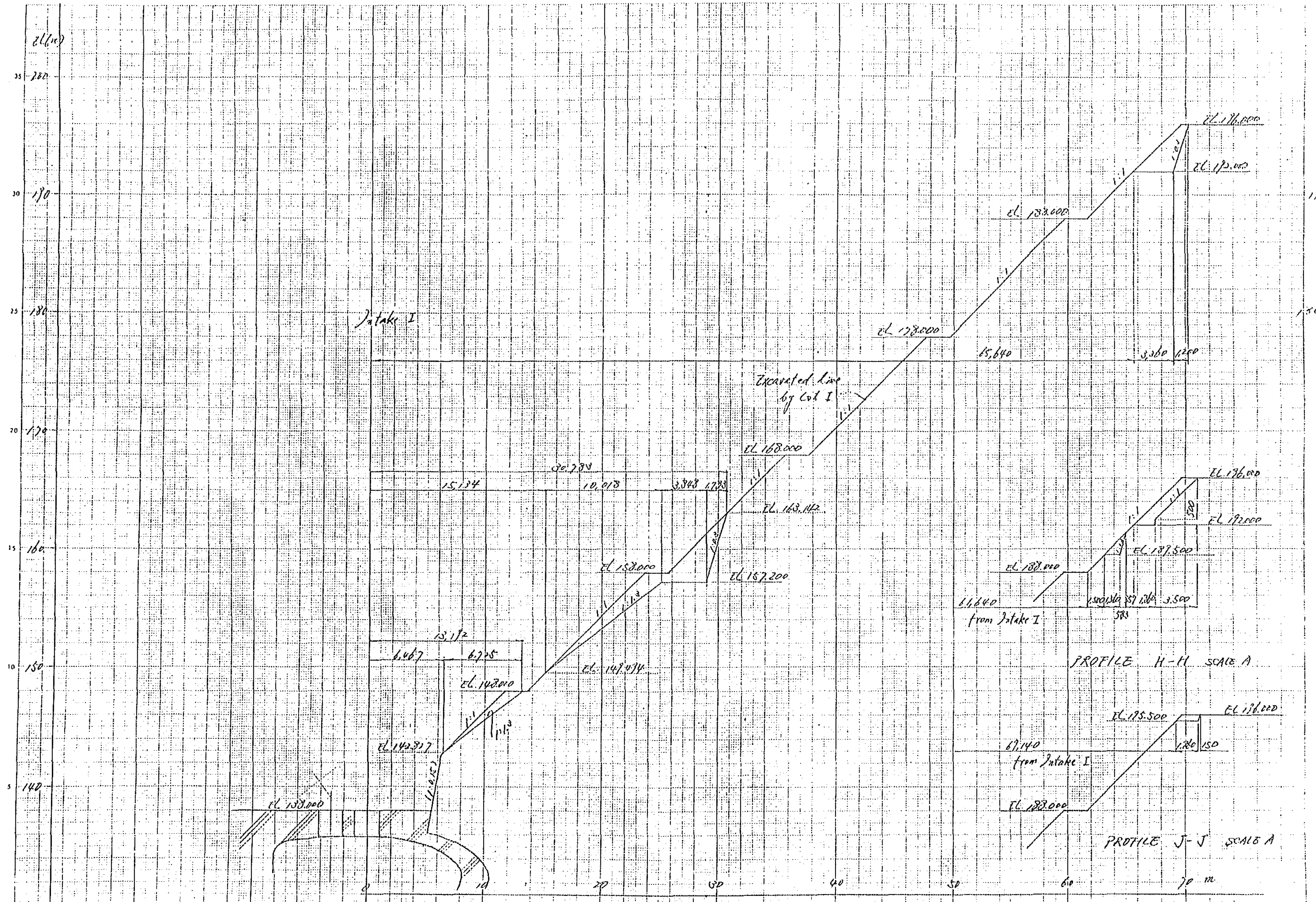
VI-4-8


EL(m)
200
190
180
170
160
150
140
130
SP-0'
SP-4'
OGL
Talus deposits
W. Basalt
Basalt
Residual soil
W. Basalt
Basalt
W. Basalt
Basalt
Breccia
Basalt
W. Basalt
Basalt
Breccia
Basalt
W. Basalt
5
10
15
20
25
30
35
40
45
50

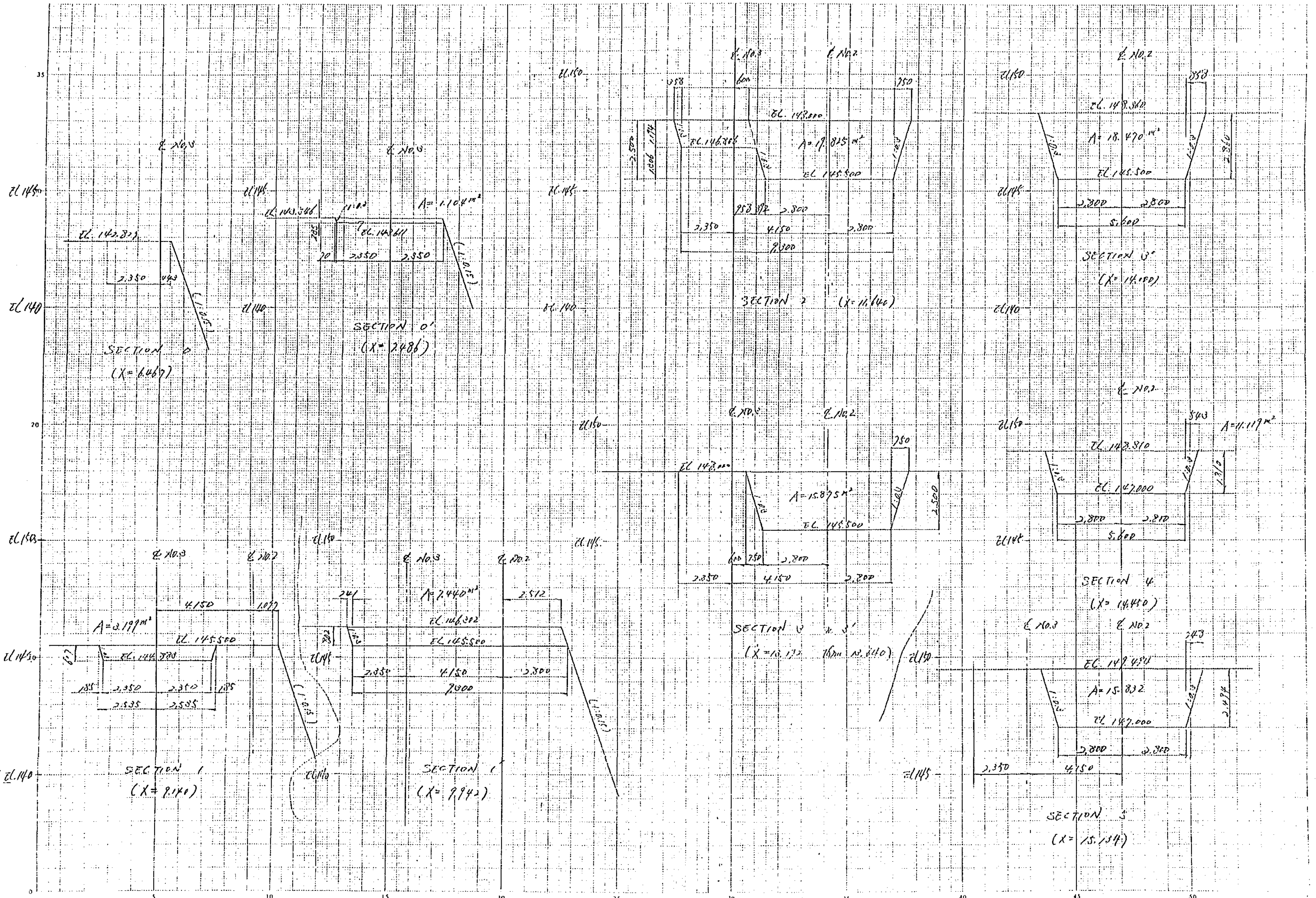

EL(m)
200
190
180
170
160
150
140
EL 133.000
EL 143.000
EL 158.000
EL 157.510
EL 159.402
EL 162.000
EL 168.000
EL 173.000
Excavated line by Lot I
Intake I
1:1
1:0.5
23.150
2.850
2.599
2.337
4.360
36.500
0
10
20
30
40
50 m
PROFILE along ℄ No.1 INTAKE SCALE A

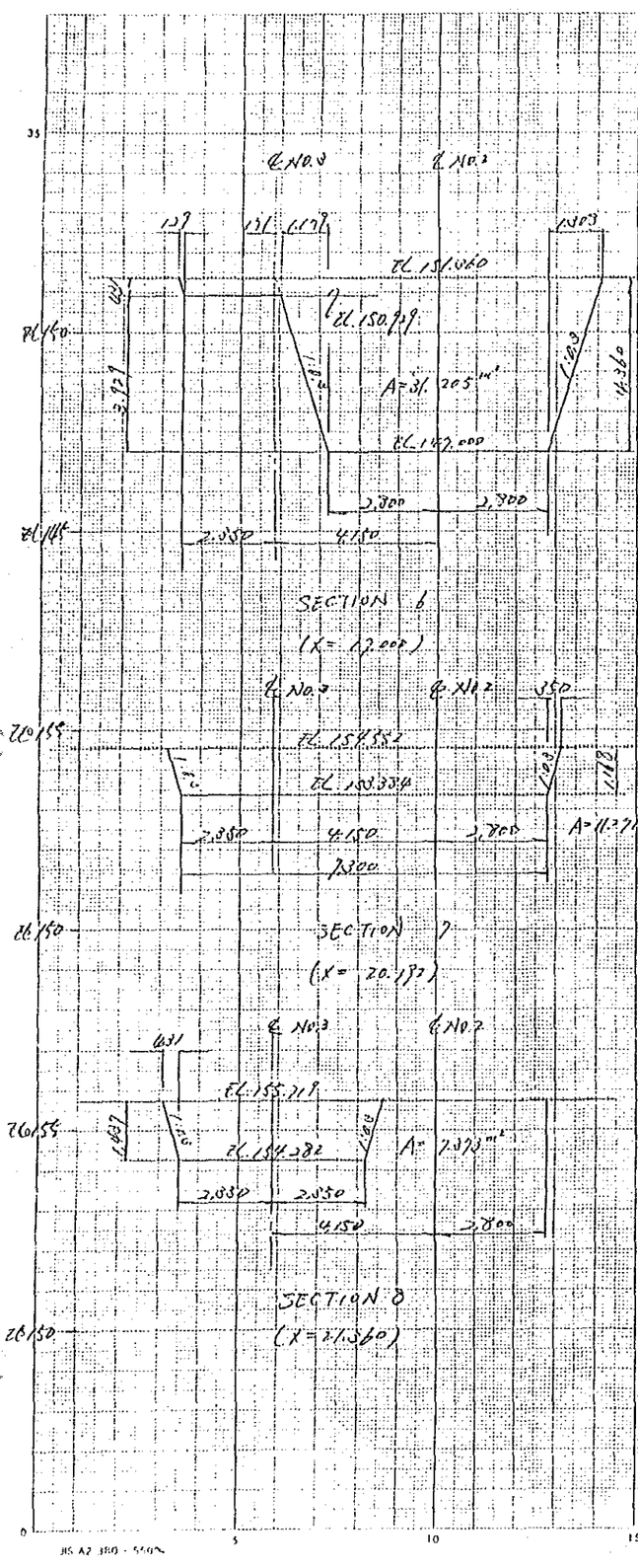


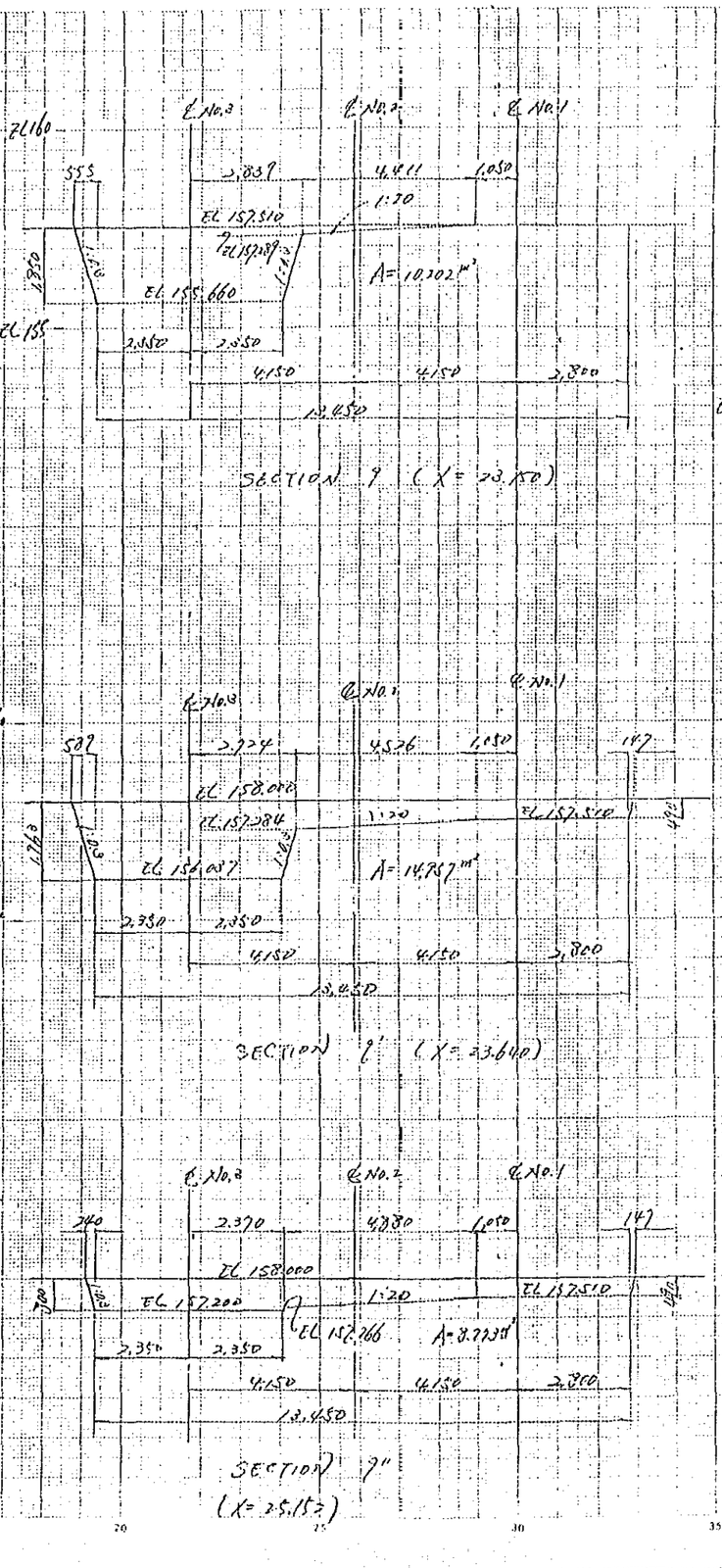
PROFILE along ℄ NO.2 INTAKE SCALE A

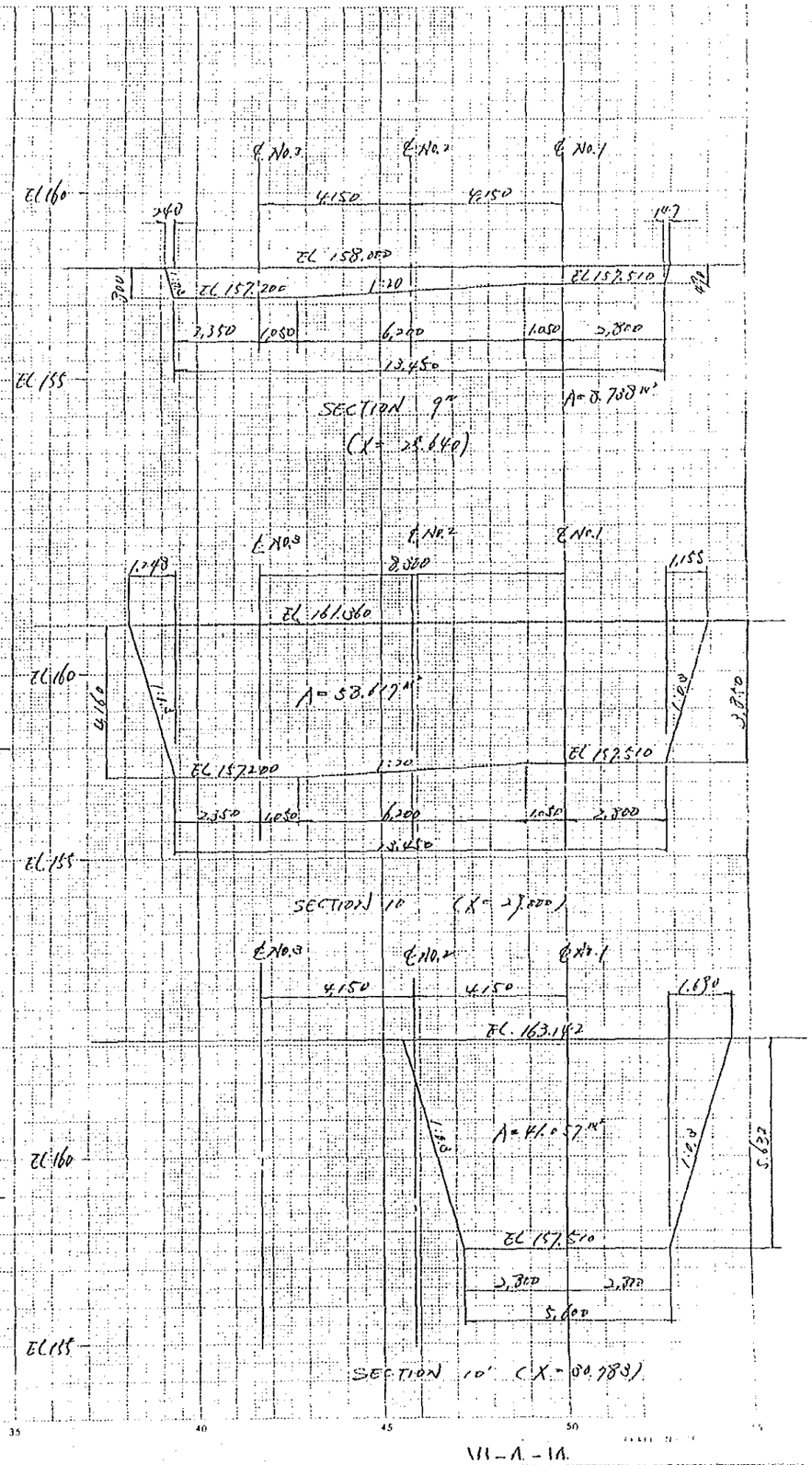


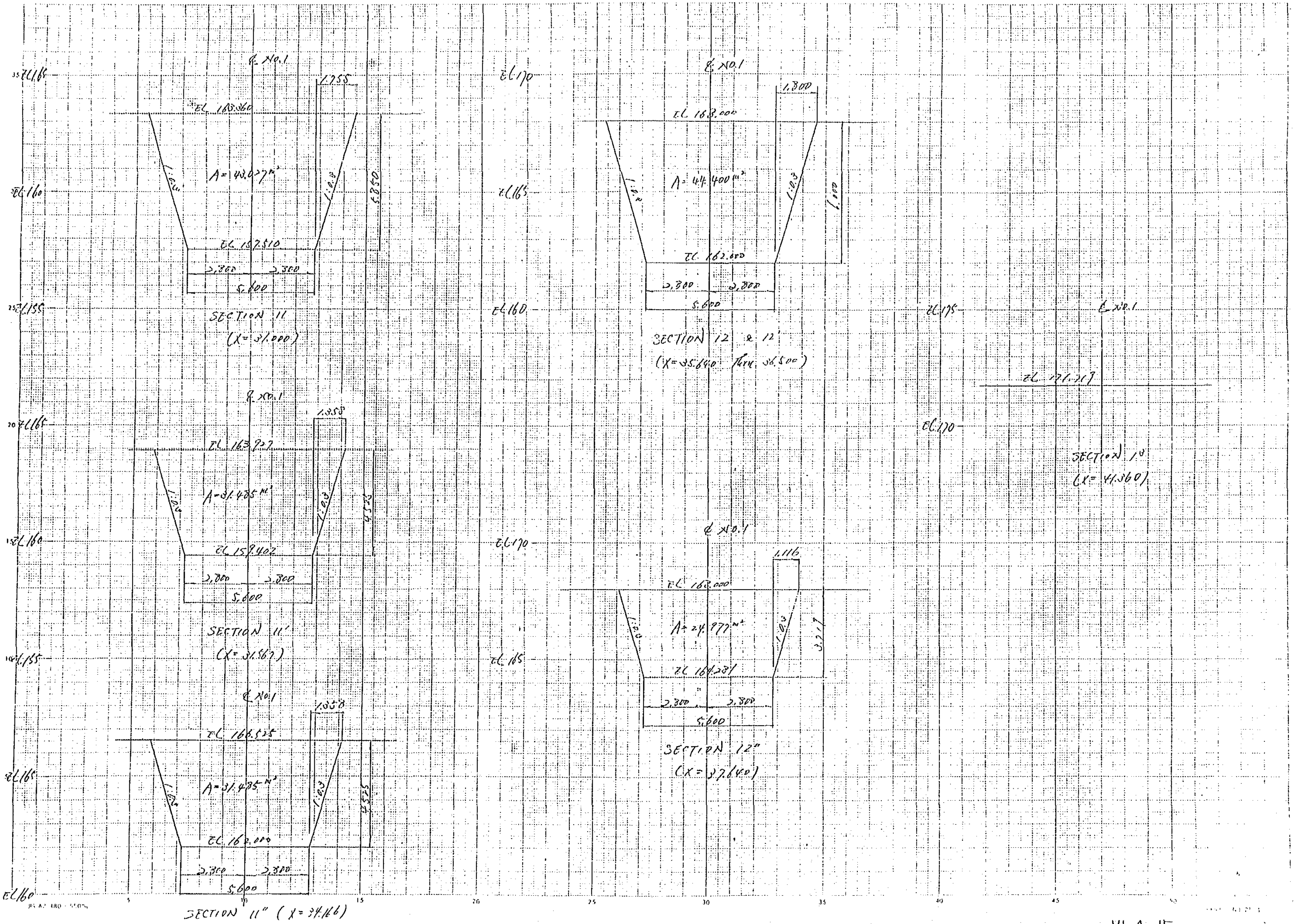
PROFILE along ℄ No.3 INTAKE SCALE A

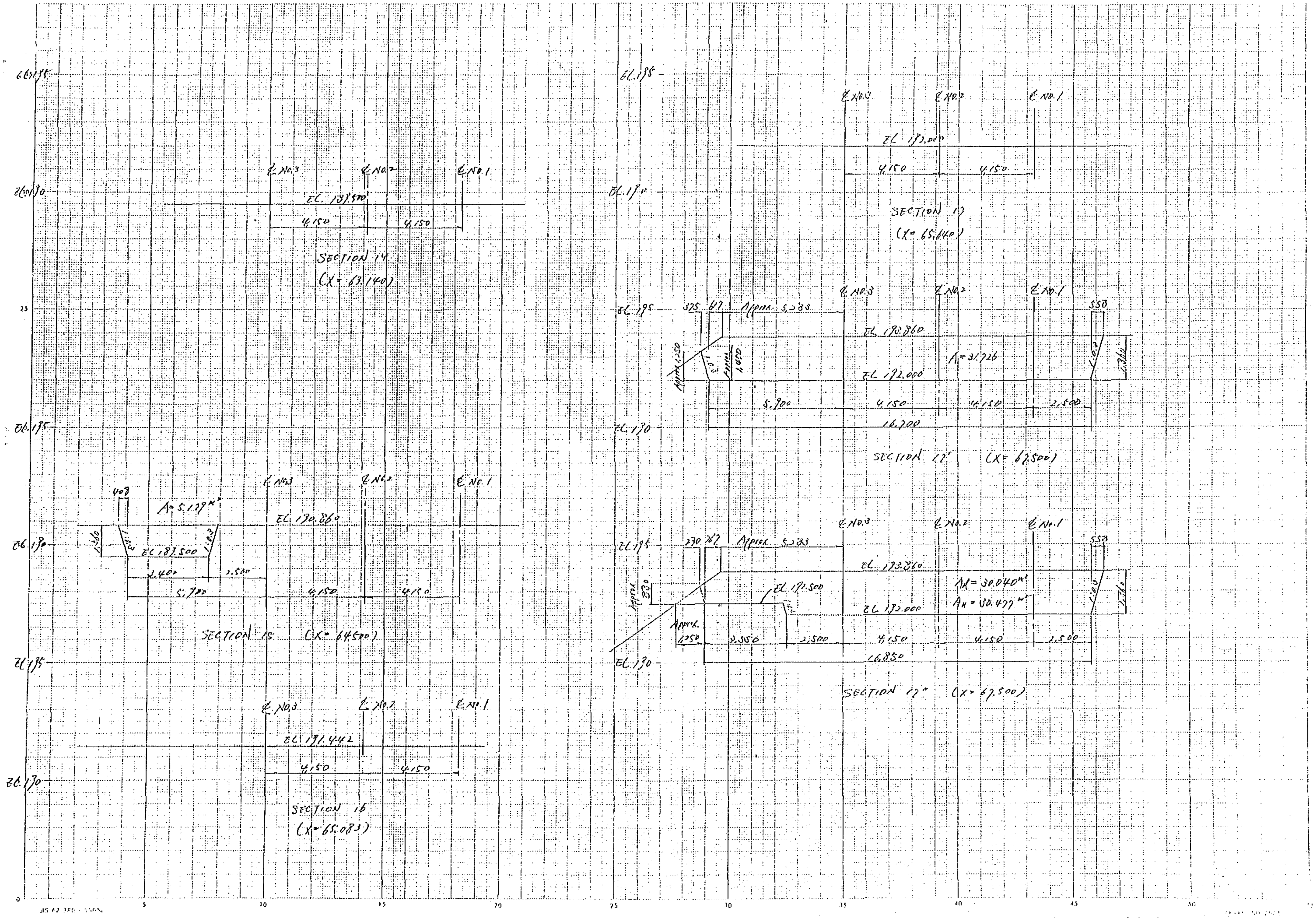

SECTION 0
(X= 6.467)
EL 142.825
2.350
SECTION 0'
(X= 7.486)
A= 1.104 m²
EL 143.346
2.350 2.350
SECTION 2 (X= 11.140)
A= 19.825 m²
EL 148.000
EL 146.866
EL 145.500
2.350 4.150 2.800
9.300
SECTION 3'
(X= 14.180)
A= 18.470 m²
EL 148.360
EL 145.500
2.800 2.800
5.600
SECTION 3 & 3'
A= 15.875 m²
EL 148.000
EL 145.500
2.350 4.150 2.800
SECTION 4
(X= 14.450)
A= 11.119 m²
EL 148.810
EL 147.000
2.800 2.810
5.600
SECTION 1
(X= 9.140)
A= 3.199 m²
4.150
EL 145.500
EL 144.880
2.350 2.350
2.535 2.535
SECTION 1'
(X= 9.942)
A= 7.440 m²
EL 146.302
EL 145.500
2.350 4.150 2.800
9.300
SECTION 5
(X= 15.134)
A= 15.832
EL 149.494
EL 147.000
2.800 2.800
2.350 4.150


SECTION 6
(X= 12.000)
SECTION 7
(X= 20.137)
SECTION 8
(X= 27.360)

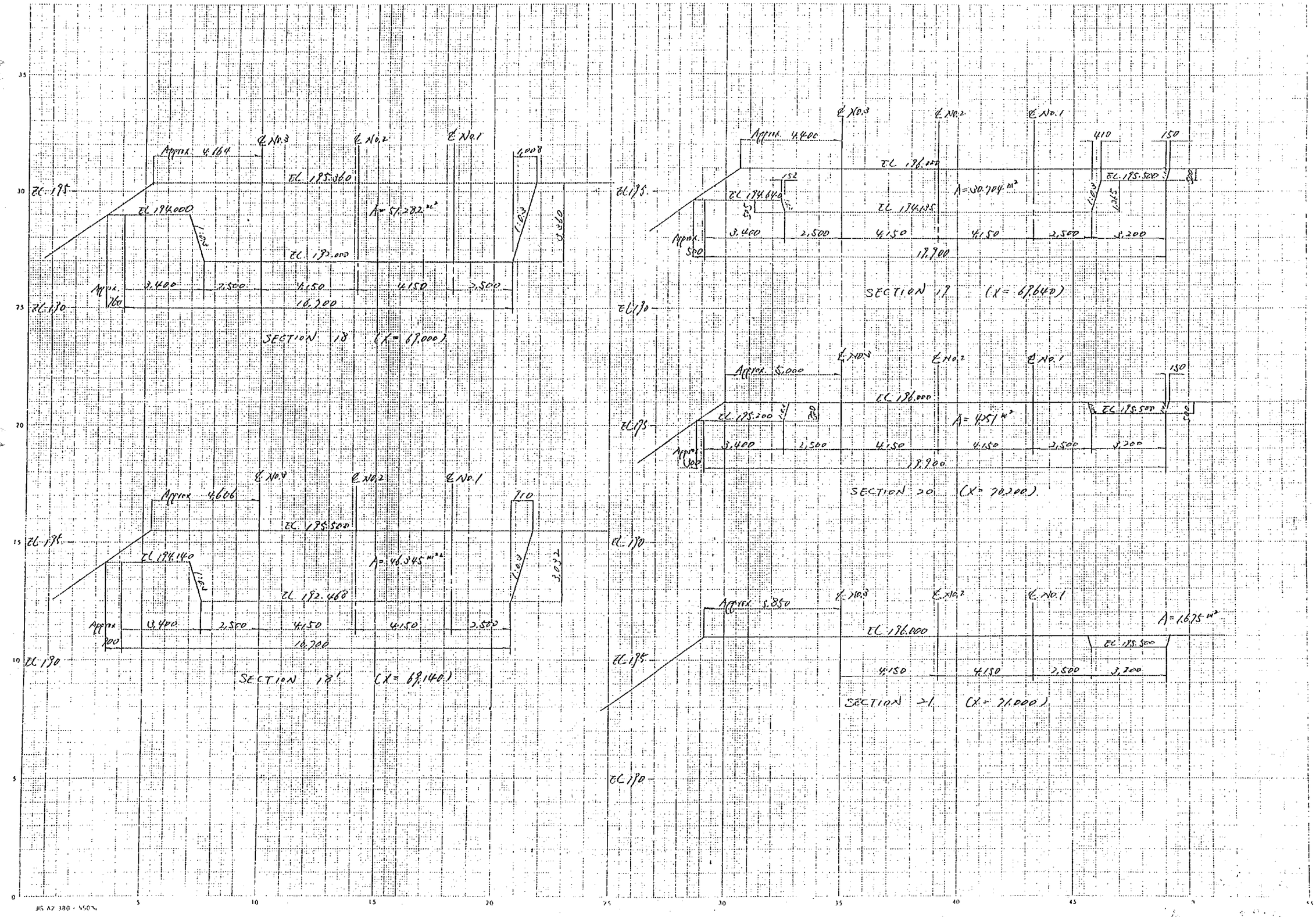

SECTION 9 (X= 23.150)
SECTION 9' (X= 23.640)
SECTION 9" (X= 25.152)


SECTION 9" (X= 25.640)
SECTION 10 (X= 27.000)
SECTION 10' (X= 30.783)


SECTION 11
(X= 31.000)
EL 165.360
EL 157.510
A= 40.037 m²
SECTION 11'
(X= 31.567)
EL 163.927
EL 159.402
A= 31.485 m²
SECTION 11" (X= 34.166)
EL 166.525
EL 162.000
A= 31.485 m²
SECTION 12 & 12'
(X= 35.640 THRU 36.500)
EL 168.000
EL 162.000
A= 44.400 m²
SECTION 12"
(X= 37.640)
EL 168.000
EL 164.281
A= 24.977 m²
SECTION 13
(X= 41.360)
EL 171.317
2.800
5.600



℄ No.3
℄ No.2
℄ No.1
EL. 193.500
4.150
4.150
SECTION 14
(X= 63.140)
EL. 193.000
SECTION 17
(X= 65.840)
325
117
Approx. 5.283
EL. 193.860
550
A= 31.726
EL. 192.000
Approx. 1.350
5.900
4.150
4.150
2.500
16.700
SECTION 17'
(X= 67.500)
408
A= 5.179m²
EL. 190.860
EL. 187.500
3.400
2.500
5.900
SECTION 15
(X= 64.500)
230
Approx. 5.283
EL. 193.860
553
EL. 191.500
AH= 30.040m²
AH= 30.477m²
EL. 192.000
Approx. 1.350
3.350
2.500
16.850
SECTION 17"
(X= 67.500)
EL. 191.442
SECTION 16
(X= 65.083)



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VI-A-17

Working Division: E Intake

Description	Calculation Details	Unit	Quantity	Remarks
	E1 Earthwork			
E1/103	Anchor Bar 25 mm dia. ⑤ 2,000 m			
	No.3 Intake 92.430 m (length)			
	No.2 " 70.158			
	No.1 " 45.557			
	Total 208.135 m ≒ 210 m			
	210 m / 2 × 2 = 210 Nos.			
	3.0 m / Nos.			
	Total length 210 Nos × 3 m = 630 m			
		m	630	

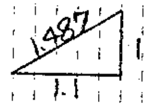
Working Division: E Intake

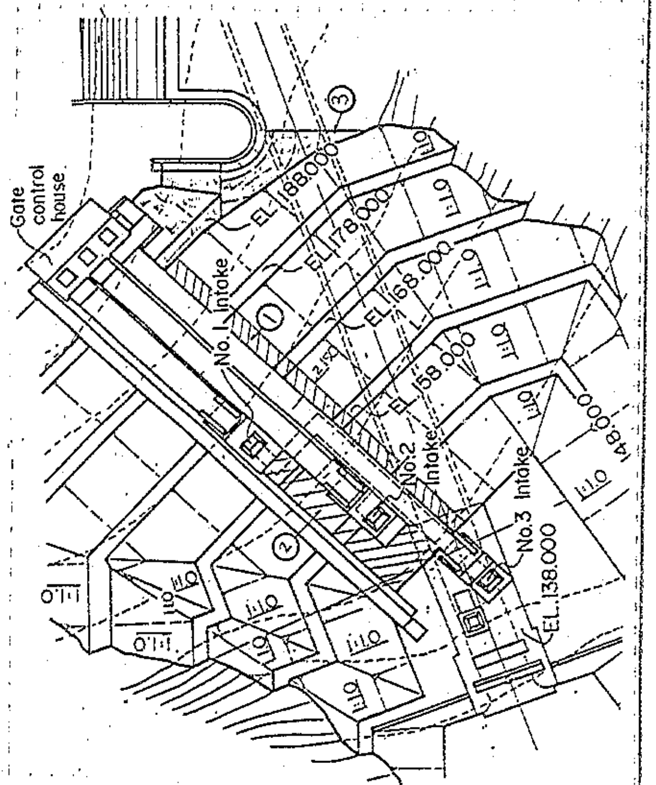
Description	Calculation Details	Unit	Quantity	Remarks
	E1 Earthworks			
E1/04	Chipping of existing concrete			
	5.0" × 11.763 − ½ 2.584 × 1.205 = 57.258	m²		
	4.0 × 3.781 = 15.124			
	− 2 × 2.1 × 2.1 = −8.820			
	Total 63.562 m²			
		m²	65	

Working Division: Concrete work

Description	Calculation Details	Unit	Quantity
E02/02	Concrete, class B, for facing concrete		
① Left side	2.15 x 59.9 m x 1.487 = 191.50 m²		
	t = 0.3 m		
	191.5 x 0.3 x 1.2 = 68.9 m³		
② Inside	19.5 cm² (by planimeter)		
	S = 1 : 200		
	19.5 x 1.487 x 4 x 0.3 x 1.2 = 41.8 m³		
③ Above EL.	188.0 m		
	7.8 cm² (by planimeter)		
	S = 1 : 500		
	7.8 x 1.487 x 25 x 0.3 x 1.2 = 104.4 m³		
	Total 68.9 + 41.8 + 104.4 = 215.1 m³	m³	220
E/06	Form, F2 for facing concrete		
	191.5 + 19.5 x 1.487 x 4 + 7.8 x 1.487 x 25		
	= 597.5 m²		
	597.5 - 2.0 x 2.15 x 5 = 576.0 m²	m²	600
	(berm portion)		

Remarks





Working Division: E2 Concrete Work

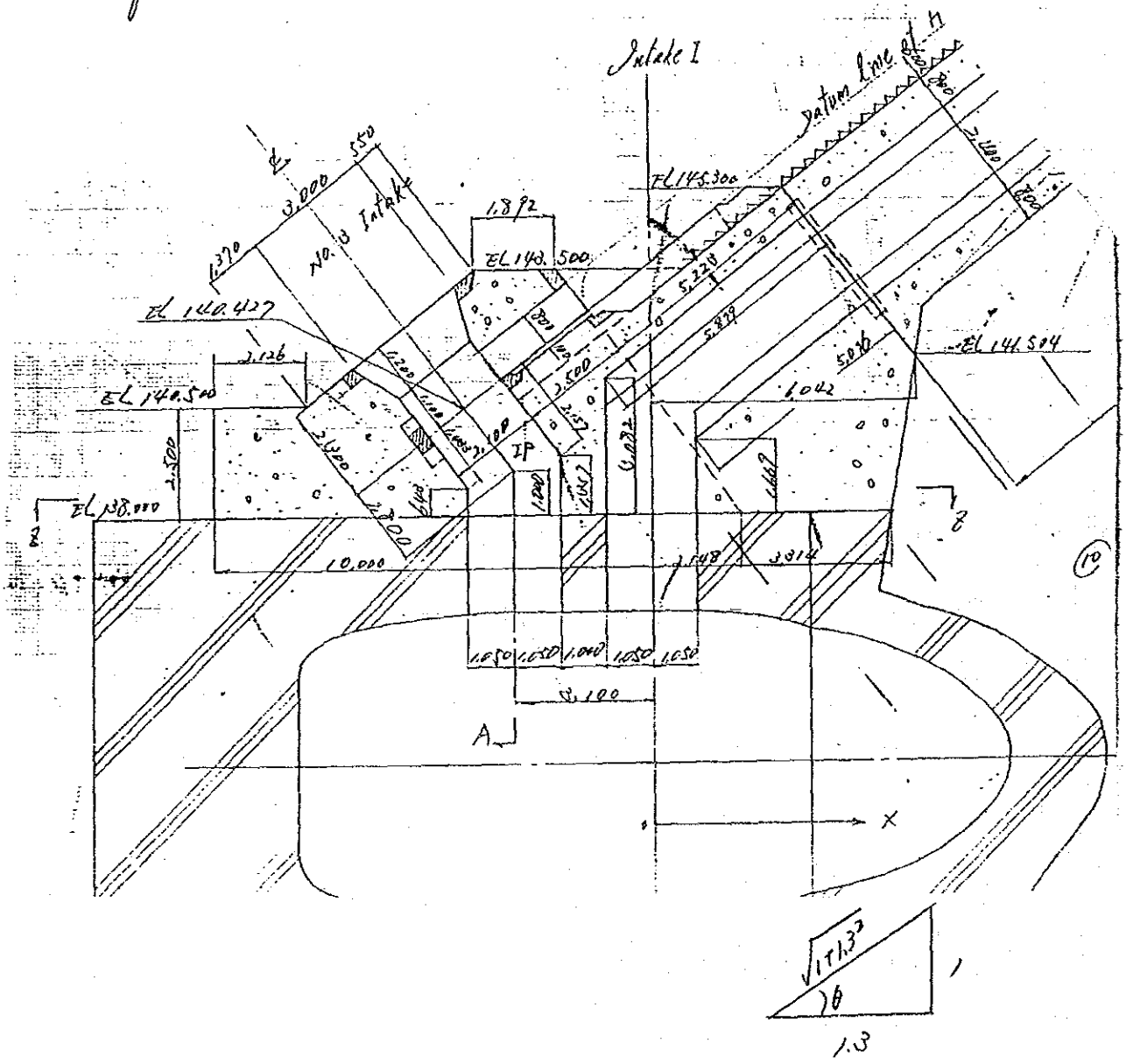
Description	Calculation Details	Unit	Quantity	Remarks
E2/03	Concrete class C Summary			
	Intake. Intake			
	No.3 No.2 No.1			
	Block 1 303.891 m³ — —			
	" 2 105.639 — —			
	" 3 144.257 388.895 —			
	" 4 — 385.068 —			
	" 5 108.219 154.518 394.590			
	" 6 97.721 97.721 97.721			
	" 7 75.116 75.116 75.116			
	Thrust Block — 183.017 —			
	Total. 2,787.105 m³			
	Launching slope 428.517 m³.			
	Retaining wall at EL 138.0 70. —			
	Total 3,185.622 m³	m³	3,190	
E2/04	Concrete class D	m³	80	See pages VI-4-103, -104

VI-4-20-2

Working Division: E2 Concrete Work

Description	Calculation Details	Unit	Quantity	Remarks
E2/02	Concrete class C			
	No.3 Intake			
	Block 1'			
	m^3			
	$\frac{1}{2}(12.148 + 10.225) \times 2.5 \times 5.0 = 139.831$			
	$\frac{1}{2}(10.225 - 2.126 + 1.892)$			
	$\times 3.0 \times 5.0 = 74.925$			
	$-\frac{1}{2} \cdot 2.534 \times 1.205 \times 2.50 = -3.817$			
	$-\frac{1}{2}(0.643 + 1.357) \times 2.10 \times 2.10 = -4.410$			
	$-\frac{1}{2}(2.533 + 3.257) \times 2.10 \times 2.10 = -12.767$			
	$-\frac{1}{3}(3.00^2 + 3.0 \times 2.10 + 2.10^2)$			
	$\times 1.200 = -7.884$			
	$-0.9 \times 2.50 \times 2.90 = -6.525$			
	m^3			
	sub-total $= 179.298$			

Equations of Basic Lines



Datum line $z = \frac{1}{1.3}(x - x_0) + z_0$

$x_0 = -3.170 - 1.800 \cdot \sin\theta = -4.1974$

$z_0 = EL\,138.000 + 1.0 + 1.8 \cdot \cos\theta = EL\,140.4267$

Concrete surface line $z = \frac{1}{1.3}(x - x_0) + z_0 - 0.600 \cdot \sec\theta$

$= \quad " \quad -0.7570$