Tender documents for new railway line for Cengkareng Airport construction project: quantities calculation sheets ; package I : civil and architectural work ; 5 of 5

REPUBLIC OF INDONESIA

MINISTRY OF COMMUNICATIONS
DIRECTORATE GENERAL OF LAND TRANSPORT
AND INLAND WATERWAYS

TENDER DOCUMENTS
FOR
NEW RAILWAY LINE FOR CENGKARENG AIRPORT
CONSTRUCTION PROJECT

QUANTITIES CALCULATION SHEETS

PACKAGE I CIVIL AND ARCHITECTURAL WORK

5 of 5

AUGUST 1984

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

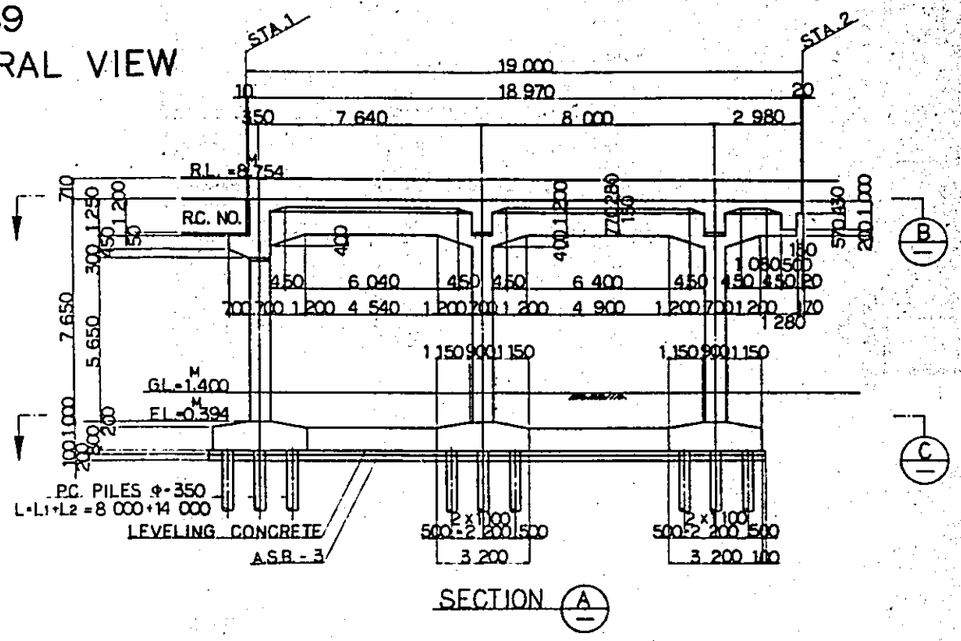
QUANTITIES CALCULATION SHEETS

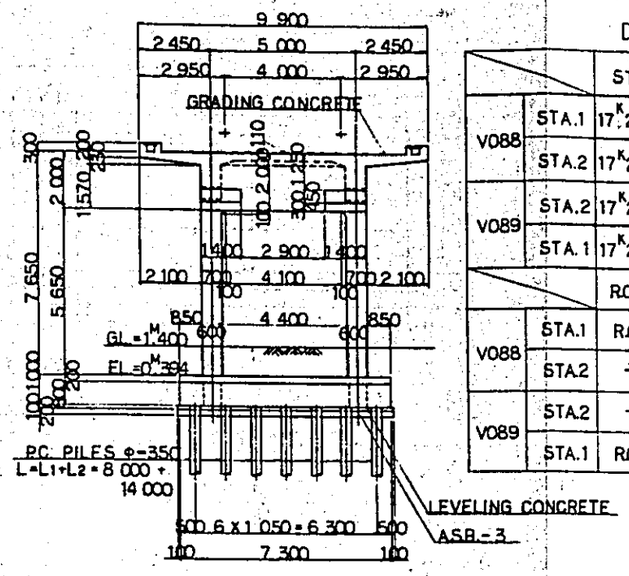
CONTENTS

§ 26. VIADUCT (2 OF 3)

CONTENTS

1. V089
GENERAL VIEW





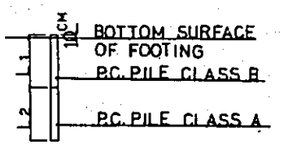
DIMENSION SCHEDULE

		STATION	R.L.	AZIMUTH ANGLE	CENGKARENG AIRPORT LINE COORDINATE
V088	STA.1	17K222M000	8.M754	345° 30' 45"	U.12 109M407 T. 1 024M159
	STA.2	17K241M000	"	"	U.12 114M161 T. 1 042M555
V089	STA.2	17K241M000	8.M754	345° 30' 45"	U.12 114M161 T. 1 042M555
	STA.1	17K260M000	"	"	U.12 118M914 T. 1 060M951

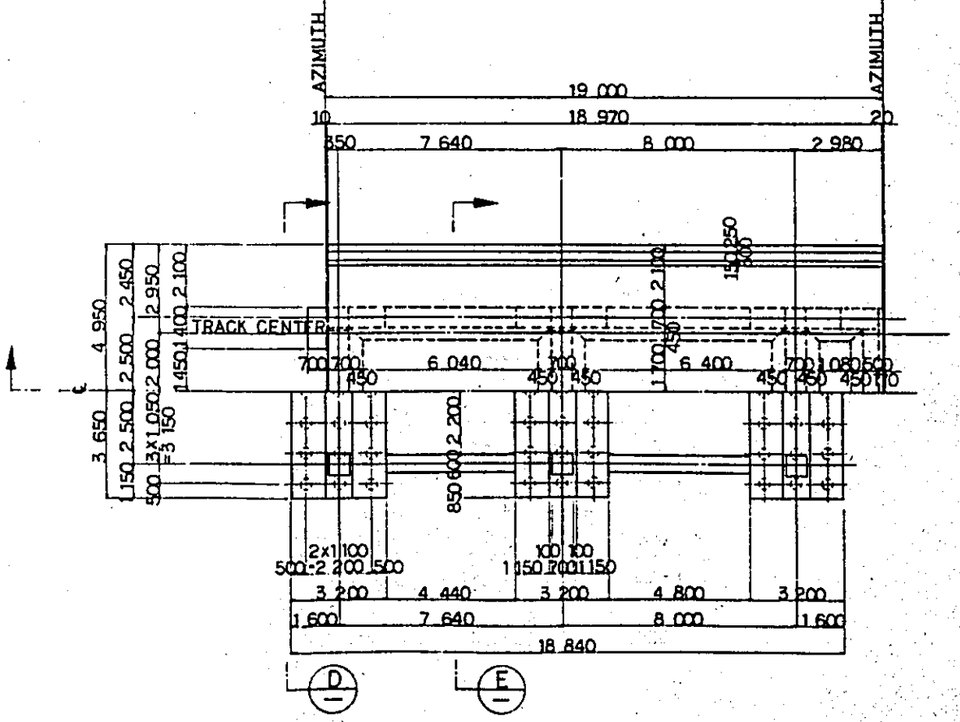
		RC. NO.
V088	STA.1	R.C.17
	STA.2	—
V089	STA.2	—
	STA.1	R.C.18

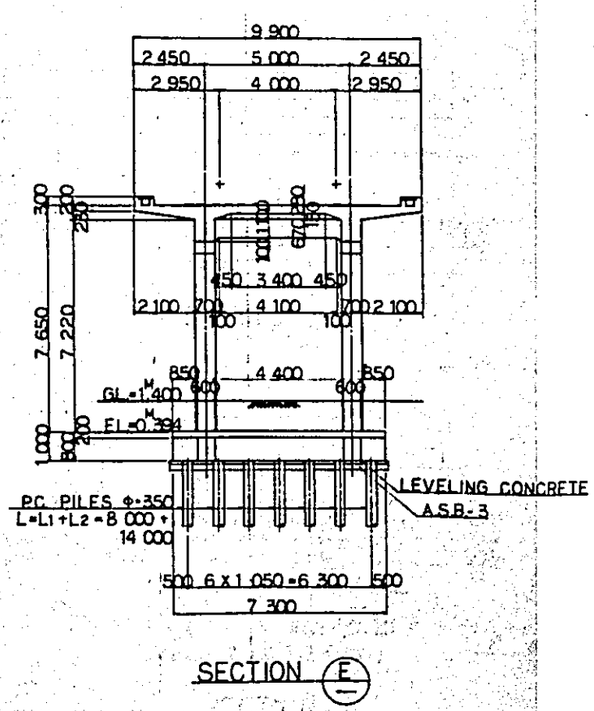
NOTES :

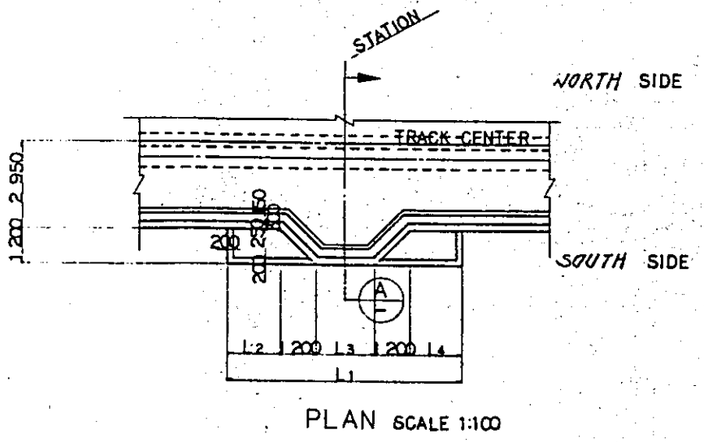
1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. REFERENCE DRAWING FOR BAR ARRANGEMENT: CS-195~201, CS-222 CS-224
3. TYPES OF P.C. PILE



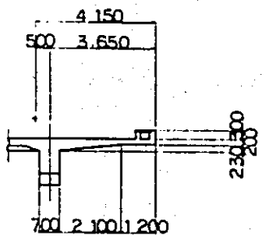
4. GRADING CONCRETE SHALL BE SIMULTANEOUSLY PLACED WITH SLAB CONCRETE







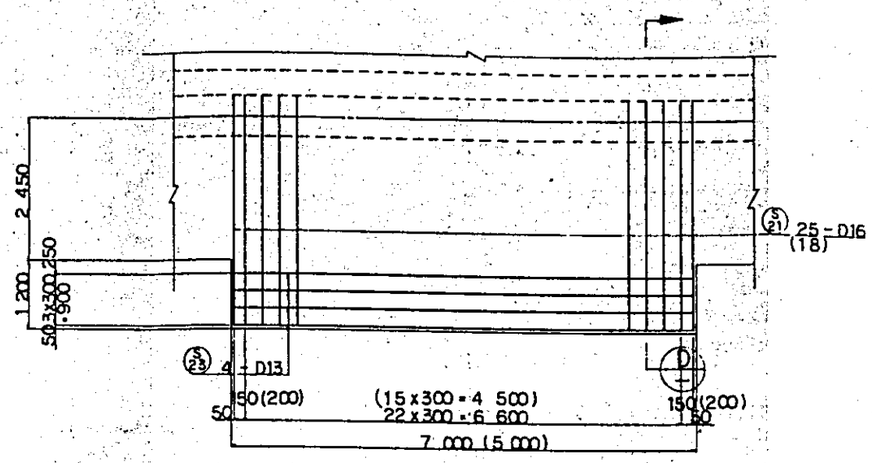
PLAN SCALE 1:100



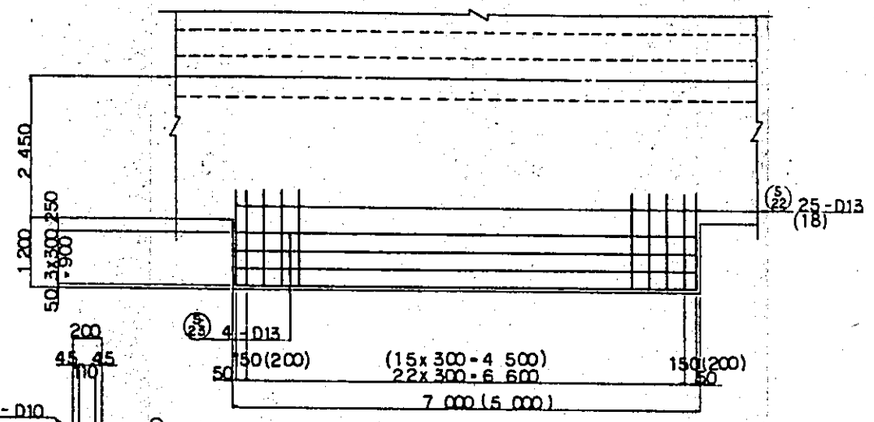
SECTION (A) SCALE 1:100

DIMENSION SCHEDULE

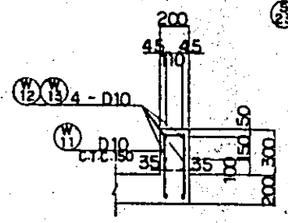
NO.	STATION		L_1	L_2	L_3	L_4
	SOUTH SIDE	NORTH SIDE				
V086	$17^{K}180^{M}000$	—	8 000	1 800	2 000	1 800
V089	$17^{K}256^{M}000$	—	5 000	—	—	—
	—	$17^{K}256^{M}500$	7 000	300	4 000	300
V095	$17^{K}474^{M}000$	—	7 000	—	—	—
	$17^{K}490^{M}000$	—	7 000	1 300	2 000	1 300
V097	—	—	2 500	1 300	—	—
RC.26	—	$17^{K}581^{M}000$	4 500	—	2 000	1 300



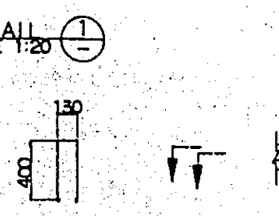
SECTION (B) SCALE 1:50

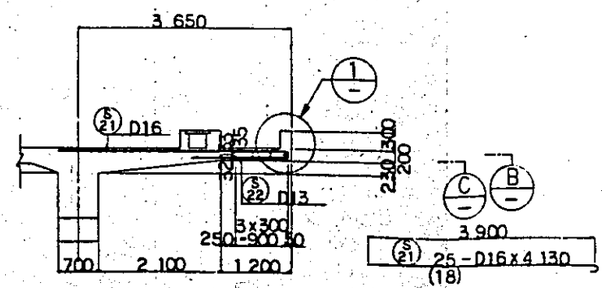


SECTION (C) SCALE 1:50

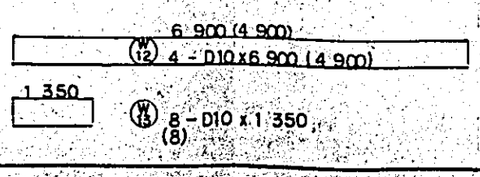


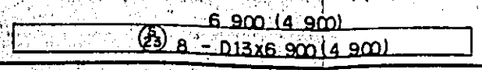
DETAIL (1) SCALE 1:20





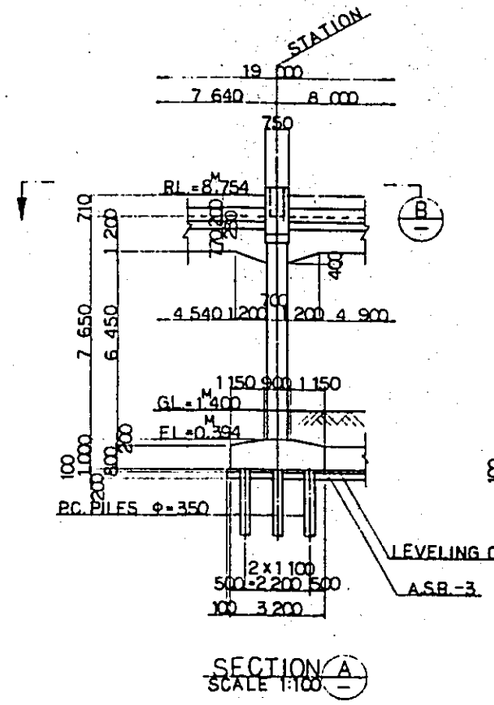
SECTION (D) SCALE 1:50



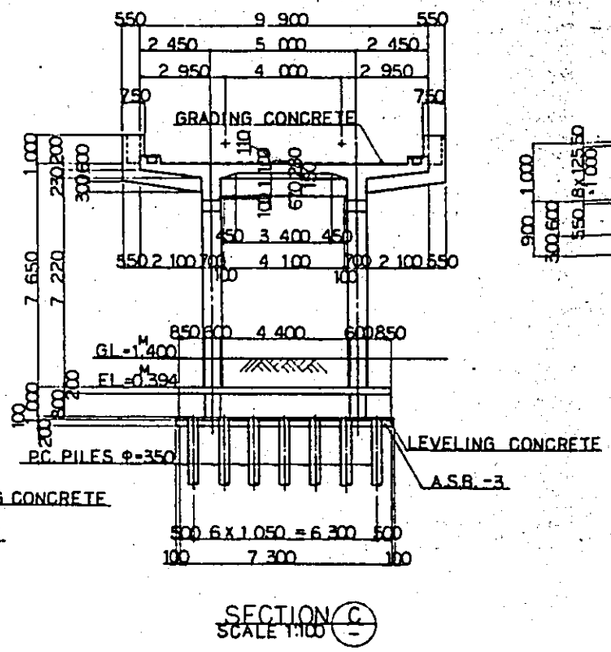


NOTES:

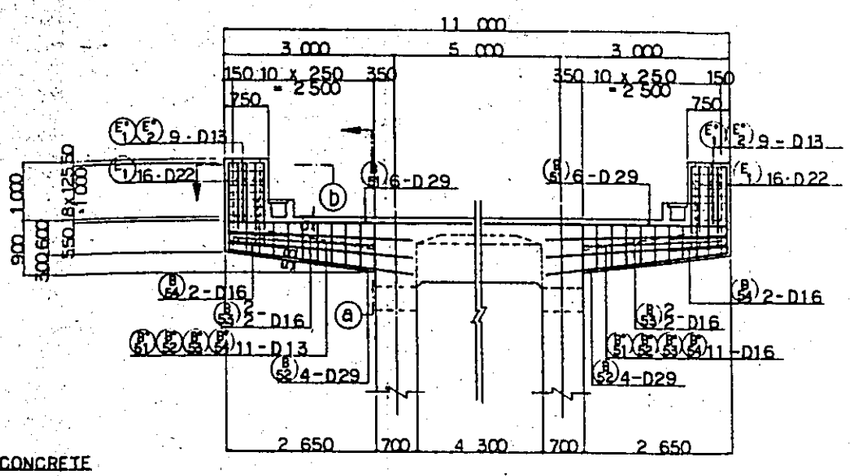
1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED



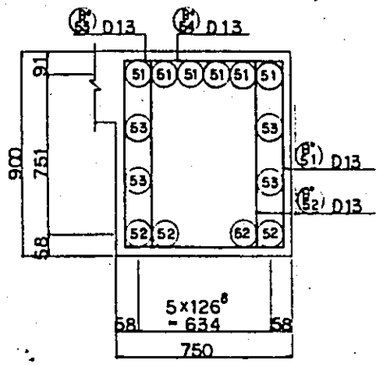
SECTION (A)
SCALE 1:100



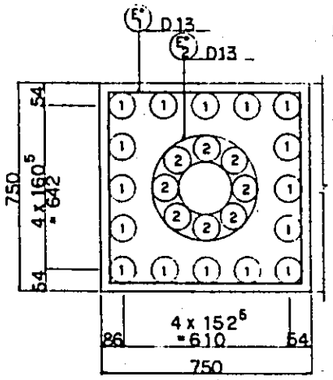
SECTION (C)
SCALE 1:100



SECTION (D)
SCALE 1:50



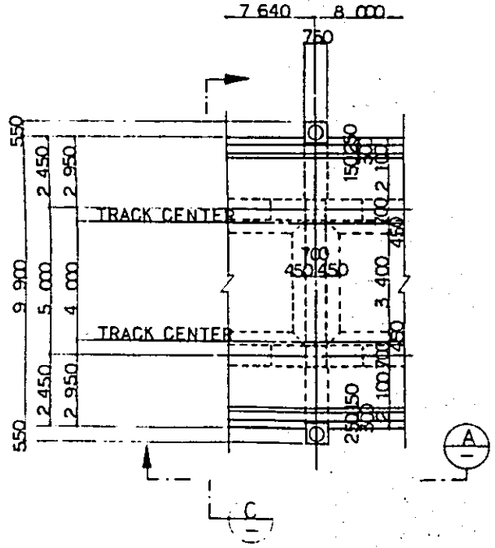
SECTION (a) - (a)



SECTION (b) - (b)

NOTES:

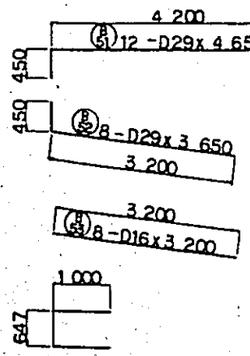
1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED

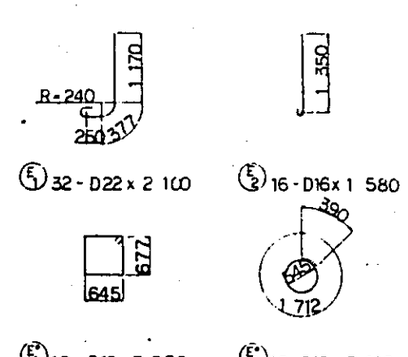


SECTION (B)
SCALE 1:100

DIMENSION SCHEDULE

NO.	STATION
V087	17K196M000
V089	17K252M000
V096	17K520M000
V097	17K570M000





VIADUCT (V089)

	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	60.2	180.1	5 050.4	83.9
BEAM	42.4	152.9	11 320.1	267.0
COLUMN	18.2	101.9	3 869.6	212.6
CURB	5.2	54.4	590.9	113.5
GRADING CONCRETE	11.3	———	———	———
TOTAL	137.3	489.3	20 830.5	151.7
FOOTING	65.0	49.0	7 595.2	116.8
BRACING BEAM	8.9	29.6	2 683.7	301.5
TOTAL	73.9	78.6	10 278.9	139.1

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	9.1	
AGGREGATE SUB BASE	m^3	18.1	
EXCAVATION	m^3	200.9	
MORTAR	m^3	0.005	
PILE	NUMBER	ϕ=350 N=A-63 N=B-63	ϕ350 ℓ=A-14.0m " ℓ=B-8.0m

VIADUCT (V088)

	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	57.3	164.7	4 807.5	83.9
BEAM	39.6	134.5	10 573.2	267.0
COLUMN	18.2	101.9	3 869.6	212.6
CURB	4.4	46.0	499.4	113.5
GRADING CONCRETE	11.3	—	—	—
TOTAL	130.8	447.1	19 749.7	151.0
FOOTING	65.0	49.0	7 585.2	116.8
BRACING BEAM	8.9	29.6	2 693.7	301.5
TOTAL	73.9	78.6	10 278.9	139.1

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	9.1	
AGGREGATE SUB BASE	m^3	18.1	
EXCAVATION	m^3	200.9	
MORTAR	m^3	0.005	
PILE	EACH	φ350 N=A-63 N=B-63	φ350 ℓ=A-14.0m " ℓ=B-8.0m

(V089) WEIGHT OF BARS BY DIAMETER

	Ø32	Ø29	Ø25	Ø22	Ø19	Ø16	Ø13	Ø10	TOTAL
SLAB	—	—	—	—	1 167.3	2 111.3	1 771.8	—	5 050.4
BEAM	5 963.3	1 695.3	262.7	209.3	963.9	918.6	2 322.0	—	11 320.1
COLUMN	—	—	3 309.1	—	—	—	565.5	—	3 869.6
CURB	—	—	—	—	—	—	—	590.4	590.4
FOOTING	2 357.1	—	2 171.7	—	1 166.6	1 040.2	859.6	—	7 595.2
BRACING BEAM	1 970.7	—	—	—	—	238.1	966.9	—	2 603.7
TOTAL	10 299.1	1 695.3	5 730.5	209.3	2 797.8	3 808.2	5 985.8	590.4	31 109.4

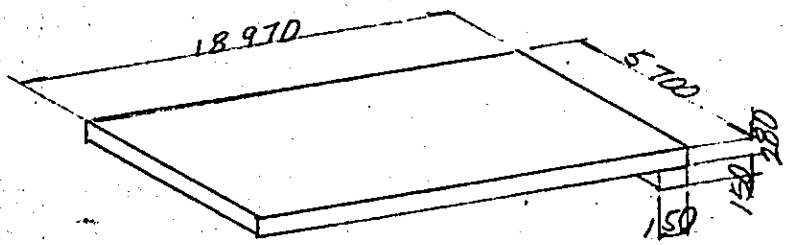
JICA

No. 6

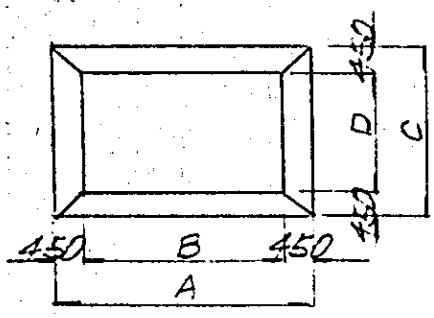
(V089) $2 \times 8 + 3 = 19.000$ m

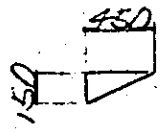
CONCRETE VOLUME

(1) SLAB



$V_h = 18.970 \times 5.700 \times 0.280 + 0.150 \times 0.150 \times 5.700 = 30.404$ m³



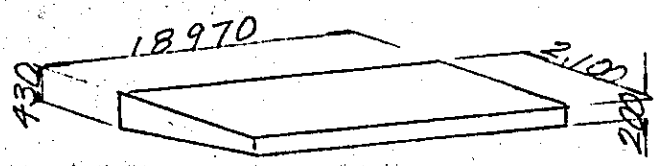


	A	B	C	D	
V_b' =	6940	6040	4300	3400	= 0.718
V_c' =	7300	6400	〃	〃	= 0.743
	1980	1080	〃	〃	= 0.383

V_b = = 0.718 m³

V_c = = 0.743 〃

V_d = = 0.383

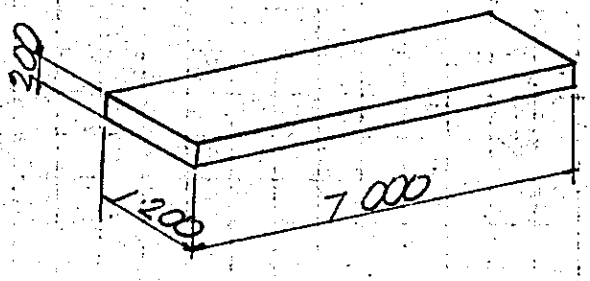


$V_d' = \frac{1}{2} \times (0.430 + 0.200) \times 2.100 \times 18.970 = 12.549$

$V_d = 12.549 \times 2$ = 25.098 m^3

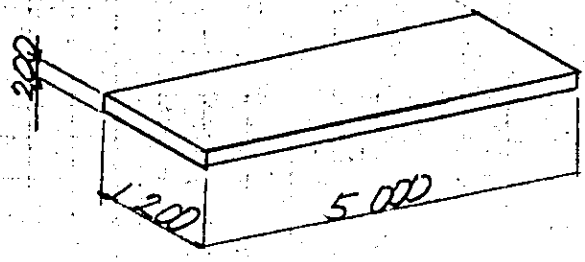
SUB TOTAL = 56.963 m^3

EXTENSION



$V = 1.20 \times 0.20 \times 7.00 = 1.680\ m^3$

SUB TOTAL = $1.680\ m^3$



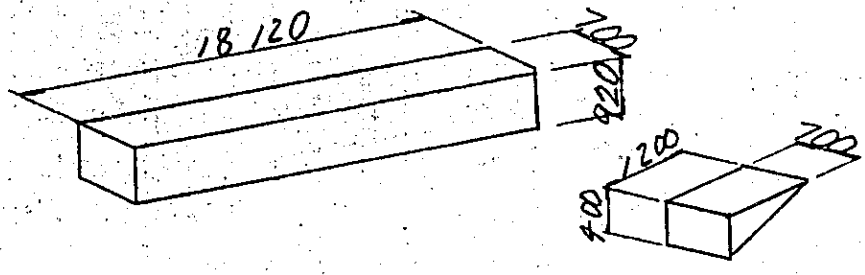
$V = 1.20 \times 0.20 \times 5.00 = 1.200\ m^3$

SUB TOTAL = $1.200\ m^3$

SLAB TOTAL $60.226\ m^3$

(2) BEAM

1) LONGITUDINAL BEAM



$V_a' = 0.920 \times 0.700 \times 18.120 = 11.669$

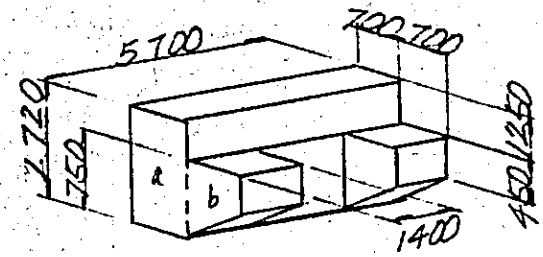
$V_a = 11.669 \times 2 = 23.338\ m^3$

$V_b' = 0.400 \times 1.200 \times \frac{1}{2} \times 0.700 = 0.168$

$V_b = 0.168 \times 5 \times 2 = 1.680$ "

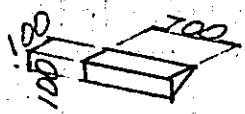
SAB TOTAL $25.018\ m^3$

2) AT END OF VIADUCT TRANSVERSE BEAM



$V_a = 1.720 \times 0.700 \times 5.700 = 6.863\ m^3$

$V_b = (0.450 + 0.750) \times 1/2 \times 0.700 \times 1.400 \times 2 = 1.176\ "$

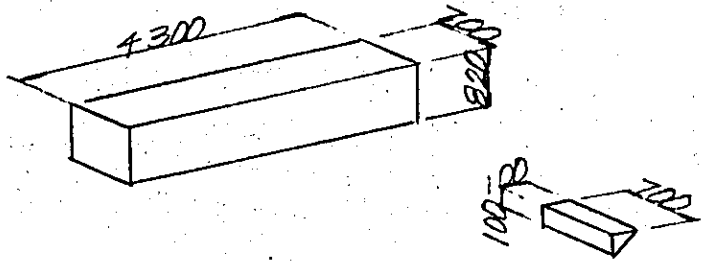


$V_{a'} = 0.100 \times 0.100 \times 1/2 \times 0.700 = 0.004$

$V_a = 0.004 \times 2 = 0.008\ "$

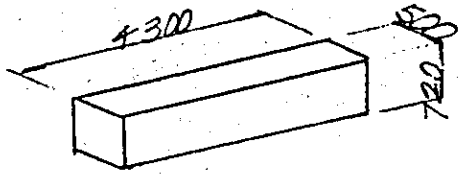
SUB TOTAL $8.047\ m^3$

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM



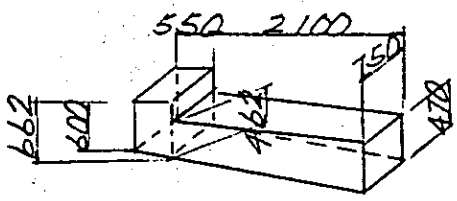
$V_a = 0.820 \times 0.700 \times 4.300 \times 2$	=	4.936 m^3
$V_b = 0.100 \times 0.100 \times \frac{1}{2} \times 0.700 \times 2 \times 2$	=	0.014 m^3
SUB TOTAL		4.950 m^3

4) OUTSIDE GIRDER



$V_a = 0.720 \times 0.500 \times 4.300$	=	1.548 m^3
SUB TOTAL		1.548 m^3

5) BASE OF ELECTRIC POLE



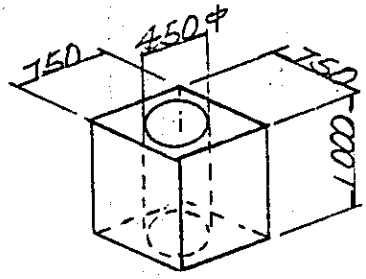
$Va' = (0.470 + 0.462) \times \frac{1}{2} \times 0.750 \times 2.100 = 0.734$

$Va'' = (0.600 + 0.662) \times \frac{1}{2} \times 0.750 \times 0.550 = 0.260$

$Va = 0.734 + 0.260 = 0.994 \times 2 = 1.988 \ m^3$

SUB TOTAL = 1.988 m^3

6) ELECTRIC POLE



$Va' = (0.750 \times 0.750 - 0.225^2 \times 3.142) \times 1.000 = 0.403$

$Va = 0.403 \times 2 = 0.806 \ m^3$

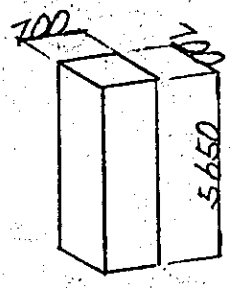
SUB TOTAL = 0.806 m^3

ELECTRIC TOTAL = 2.794 m^3

BEAM TOTAL = 42.357 m^3

(3) COLUMN

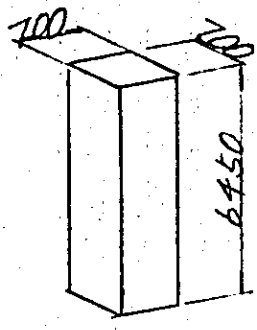
1) AT END OF VIADUCT COLUMN



$V_a' = 0.700 \times 0.700 \times 5.650 = 2.769$

$V_a = 2.769 \times 2 = 5.538\ m^3$

2) AT INTERMEDIATE OF VIADUCT COLUMN

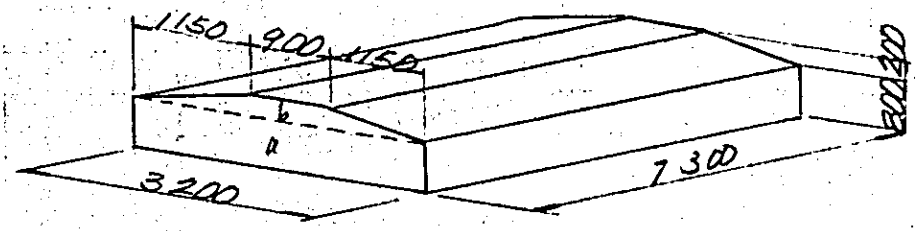


$V_a' = 0.700 \times 0.700 \times 6.450 = 3.161$

$V_a = 3.161 \times 2 \times 2 = 12.644\ m^3$

COLUMN TOTAL $18.182\ m^3$

(4) FOOTING



$V_a' = 3.200 \times 7.300 \times 0.800 = 18.688$ m³

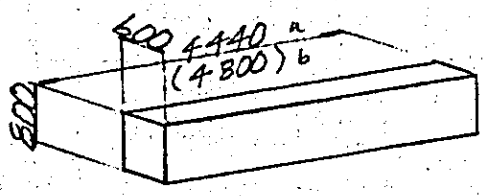
$V_a = 18.688 \times 3 = 56.064$ m³

$V_b' = (3.200 + 0.900) \times \frac{1}{2} \times 0.200 \times 7.300 = 2.993$

$V_b = 2.993 \times 3 = 8.979$ m³

FOOTING TOTAL 65.043 m³

(5) BRACING BEAM



$V_a' = 4.440 \times 0.600 \times 0.800 = 2.131$

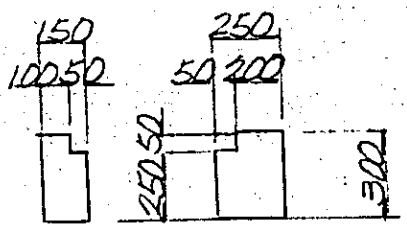
$V_a = 2.131 \times 2 = 4.262$ m³

$V_b' = 4.800 \times 0.600 \times 0.800 = 2.304$

$V_b = 2.304 \times 2 = 4.608$ "

BRACING BEAM TOTAL 8.870 m³

(6) CURB



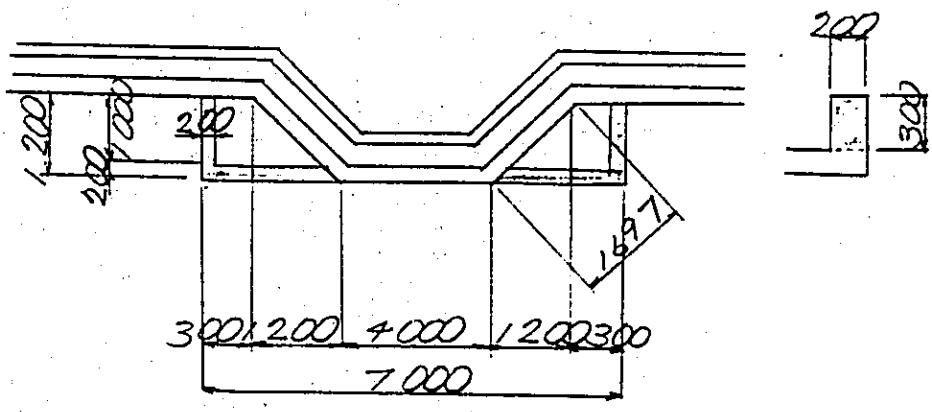
$\ell = 18.970^{m}$

$V_a = (0.250 \times 0.150 + 0.100 \times 0.050) \times 18.970 \times 2 = 1.612 \ m^3$

$V_b = (0.250 \times 0.250 + 0.200 \times 0.050) \times 18.970 \times 2 = 2.751 \ "$

SUB TOTAL $4.363 \ m^3$

EXTENSION

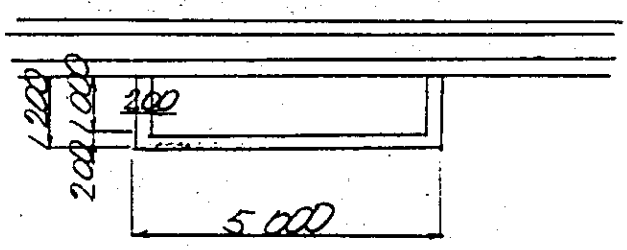


$V = (0.25 \times 0.15 + 0.10 \times 0.05) \times (1.697 - 1.20) \times 2 = 0.042\ m^3$

$V = (0.25 \times 0.25 + 0.20 \times 0.05) \times (1.697 - 1.20) \times 2 = 0.072\ m^3$

$V = 0.20 \times 0.30 \times (1.50 \times 2 + 1.00 \times 2) = 0.300\ m^3$

SUB TOTAL = $0.414\ m^3$

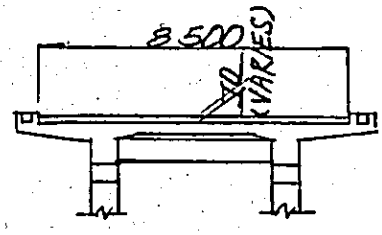


$V = 0.20 \times 0.30 \times (5.00 + 1.00 \times 2) = 0.420\ m^3$

SUB TOTAL = $0.420\ m^3$

CURB TOTAL $5.197\ m^3$

(7) GRADING CONCRETE

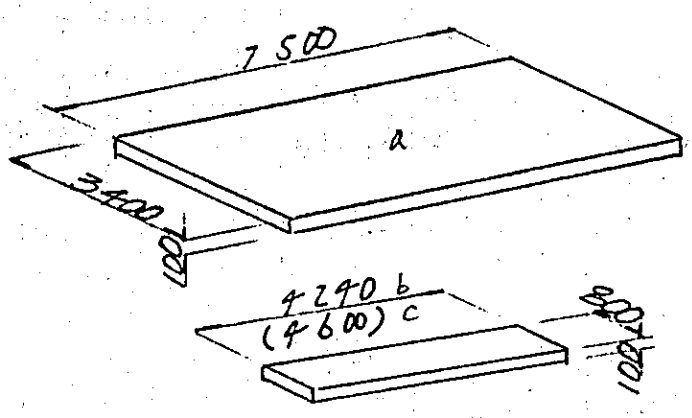


$\ell = 18.970^{m}$

$V = 0.07 \times 8.500 \times 18.970 = 11.287\ m^3$

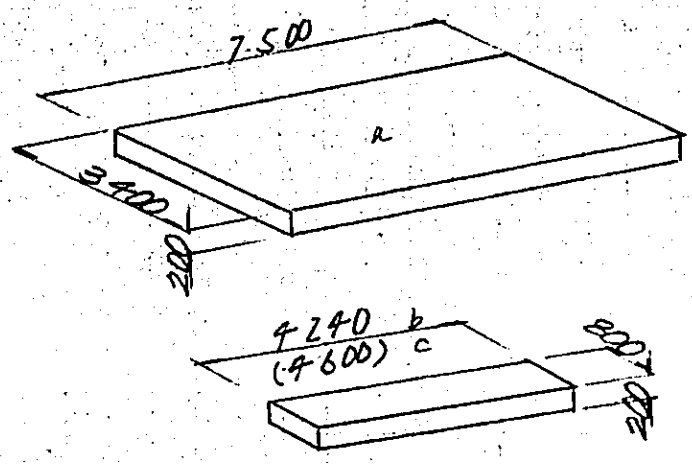
GRADING CONCRETE TOTAL $11.287\ m^3$

(8) LEVELING CONCRETE



$V_a' = 7.500 \times 3.400 \times 0.100 = 2.550$		
$V_a = 2.550 \times 3$	=	7.650 m^3
$V_b' = 4.240 \times 0.800 \times 0.100 = 0.339$		
$V_b = 0.339 \times 2$	=	0.678 "
$V_c = 0.368 \times 2$	=	0.736 "
LEVELING CONCRETE TOTAL		9.064 m^3

(9) AGGREGATE SUB BASE



$V_a' = 7.500 \times 3.400 \times 0.200 = 5.100$		
$V_a = 5.100 \times 3$	=	15.300 m³
$V_b' = 4.240 \times 0.800 \times 0.200 = 0.678$		
$V_b = 0.678 \times 2$	=	1.356 〃
$V_c' = 4.600 \times 0.800 \times 0.200 = 0.736$		
$V_c = 0.736 \times 2$	=	1.472 〃
AGGREGATE SUB BASE TOTAL		18.128 m³

(10) PILE

$\phi = 350$

$\ell = B - 8.0^{m}$

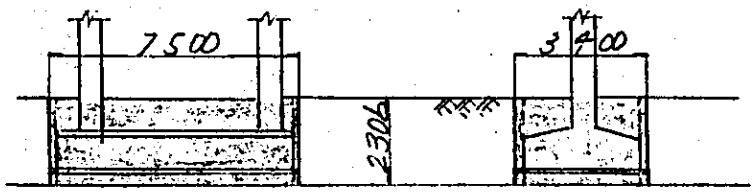
$\ell = A - 14.0^{m}$

$n = 21$

$\Sigma N = 21 \times 3 = 63$

(11) EXCAVATION

1) FOOTING

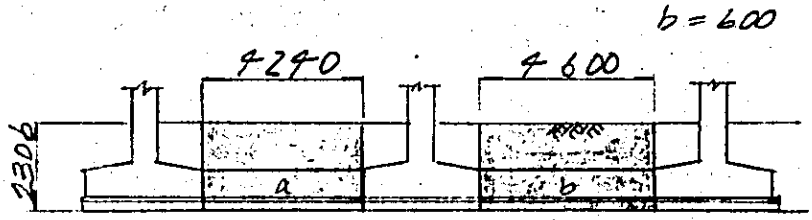


$V_a' = 7.500 \times 3.400 \times 2.306 = 58.803$

$V_a = 58.803 \times 3$ = 176.409 m^3

SUB TOTAL 176.409 m^3

2) BRACING BEAM



$V_a' = 4.290 \times 0.600 \times 2.306 = 5.866$

$V_a = 5.866 \times 2$ = 11.732 m^3

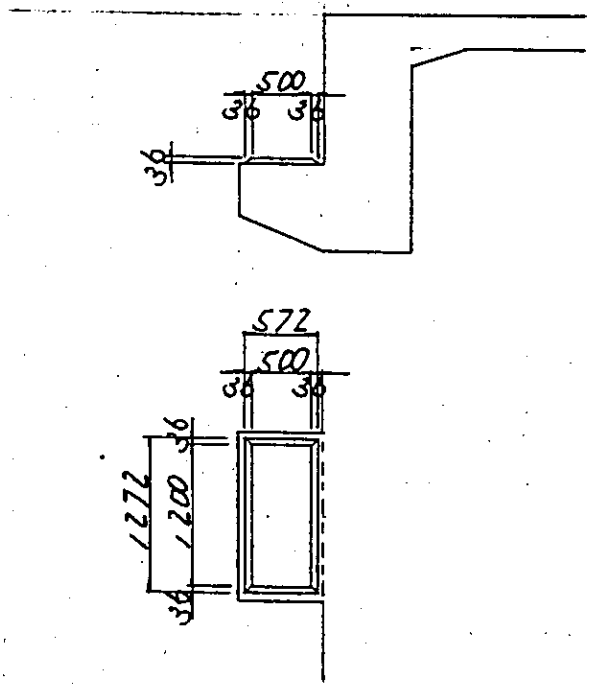
$V_b' = 4.600 \times 0.600 \times 2.306 = 6.365$

$V_b = 6.365 \times 2$ = 12.730 "

SUB TOTAL 24.462 m^3

EXCAVATION TOTAL 200.871 m^3

(12) FOUNDATION MORTAR



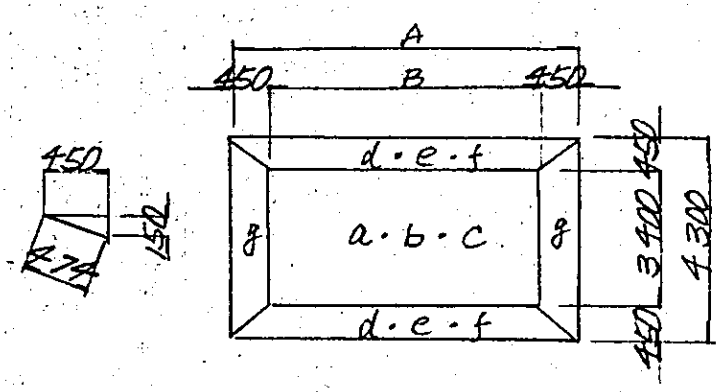
$$V = \{1.272 \times 0.572 - \{1.272 \times 0.572 + (1.272 + 1.20) \times (0.572 + 0.500) + 1.20 \times 0.50\} \times 1/6\} \times 0.036 \times 2$$

$$= 0.005^{36}$$

FOUNDATION MORTAR TOTAL = $0.005\ m^3$

FORM AREA

(1) SLAB



A	B
6940	6040
7300	6400
1980	1080

$A_a = 6.040 \times 3.400 = 20.536\ m^2$

$A_b = 6.400 \times 3.400 = 21.760$ "

$A_c = 1.080 \times 3.400 = 3.672$ "

$A_d' = (6.940 + 6.040) \times \frac{1}{2} \times 0.474 = 3.076$

$A_d = 3.076 \times 2 = 6.152$ "

$A_e' = (7.300 + 6.400) \times \frac{1}{2} \times 0.474 = 3.247$

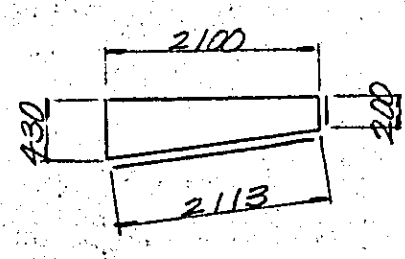
$A_e = 3.247 \times 2 = 6.494$ "

$A_f' = (1.980 + 1.080) \times \frac{1}{2} \times 0.474 = 0.725$

$A_f = 0.725 \times 2 = 1.450$ "

$A_g' = (4.300 + 3.400) \times \frac{1}{2} \times 0.474 = 1.825$

$A_g = 1.825 \times 2 \times 3 = 10.950$ "



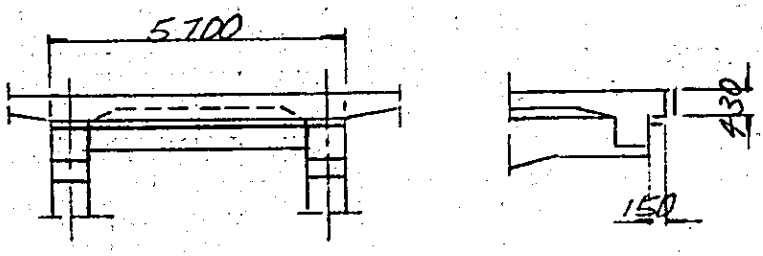
$\ell = 18.970^{m}$

$A_a' = (0.430 + 0.200) \times \frac{1}{2} \times 2.100 = 0.662$

$A_a = 0.662 \times 2 \times 2 = 2.648\ m^2$

$A_b' = (0.200 + 2.113) \times 18.970 = 43.878$

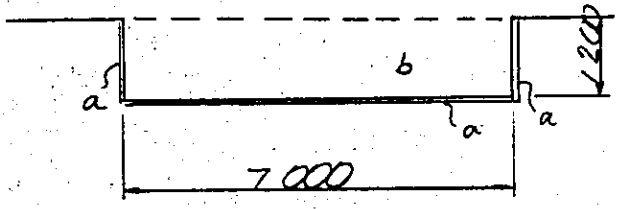
$A_b = 43.878 \times 2 = 87.756$ "

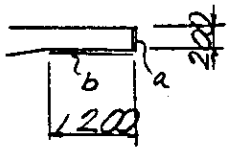


$A_a = (0.150 + 0.430) \times 5.700 = 3.306$ "

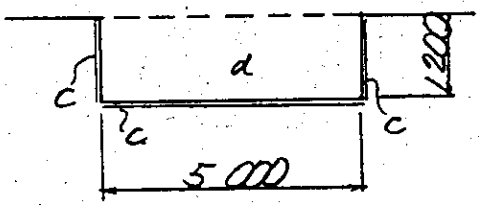
SUB TOTAL = $164.729\ m^2$

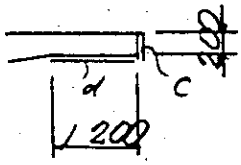
EXTENSION





$-A = 7.00 \times 0.20$	=	$-1.400\ m^2$
$Aa = (1.20 \times 2 + 7.00) \times 0.20$	=	$1.880\ m^2$
$Ab = 7.00 \times 1.20$	=	$8.400\ m^2$
SUB TOTAL	=	$8.880\ m^2$



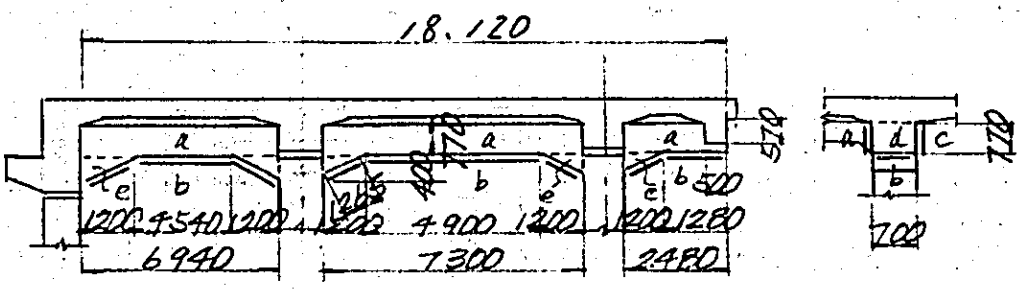


$Ac = (1.20 \times 2 + 5.00) \times 0.20$	=	$1.480\ m^2$
$Ad = 5.00 \times 1.20$	=	$6.000\ m^2$
$-A = 5.00 \times 0.20$	=	$-1.000\ m^2$
SUB TOTAL	=	$6.480\ m^2$

SLAB TOTAL	$180.084\ m^2$

(2) BEAM

1) LONGITUDINAL BEAM



$A_a' = 0.770 \times (6.940 + 7.300 + 2.480) - 0.500 \times 0.570 = 12.589$

$A_b' = 0.700 \times (1.265 \times 5 + 4.540 + 4.900 + 1.280) = 11.932$

$A_c' = 0.770 \times 18.120 = 13.952$

$A_d' = 0.770 \times 0.700 = 0.539$

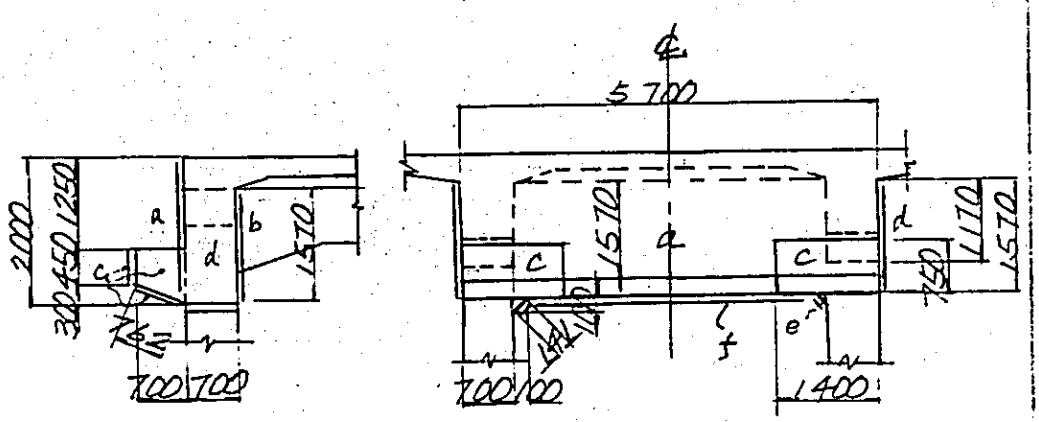
$A_e' = 1.200 \times 0.400 \times \frac{1}{2} \times 5 \times 2 = 2.400$

$A' = 12.589 + 11.932 + 13.952 + 0.539 + 2.400 = 41.412$

$A = 41.412 \times 2 = 82.824 \ m^2$

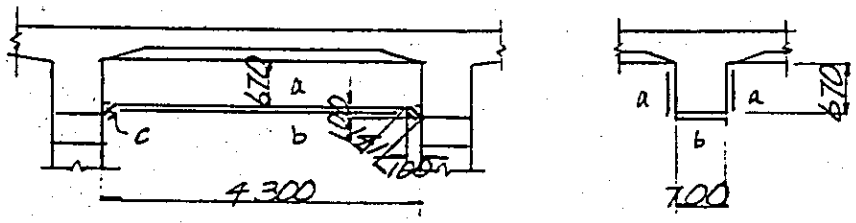
SUB TOTAL = $82.824 \ m^2$

2) AT END OF VIADUCT TRANSVERSE BEAM



$A_a = 5.700 \times 2.000 - 1.400 \times 0.750 \times 2$	=	9.300 m²
$A_b = 5.700 \times 1.570 - 1.170 \times 0.700 \times 2$	=	7.310 "
$A_c = \{(0.450 + 0.762) \times 1.400 + (0.450 + 0.750) \times \frac{1}{2} \times 0.700 \times 2\} \times 2$	=	5.074 "
$A_d = 1.570 \times 0.700 \times 2$	=	2.198 "
$A_e = \{0.100 \times 0.100 \times \frac{1}{2} \times 2 + 0.141 \times 0.700\} \times 2$	=	0.217 "
$A_f = 9.100 \times 0.70$	=	2.870 "
SUB TOTAL =		26.970 m²

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM



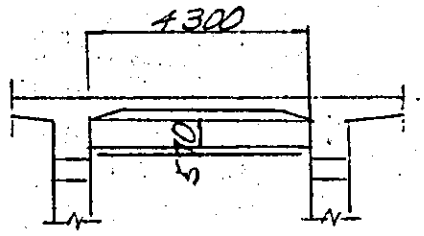
$A_a' = 4.300 \times 0.670 \times 2 = 5.762$

$A_b' = (4.100 + 0.141 \times 2) \times 0.700 = 3.067$

$A_c' = 0.100 \times 0.100 \times \frac{1}{2} \times 2 \times 2 = 0.020$

A_a =	5.762 × 2	=	11.524 m²
A_b =	3.067 × 2	=	6.134 "
A_c =	0.020 × 2	=	0.040 "
SUB TOTAL		=	17.698 m²

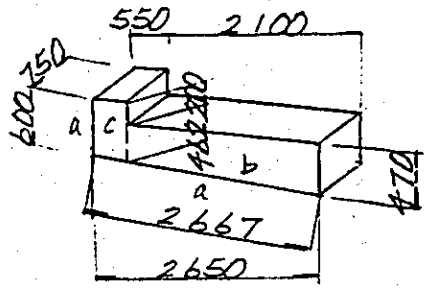
4) OUTSIDE GIRDER



$A = (0.570 \times 2 + 0.500) \times 4,300 = 7.052\ m^2$

SUB TOTAL = 7.052 m^2

5) BASE OF ELECTRIC POLE



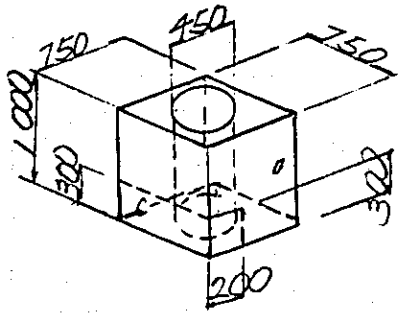
$A_a' = 0.750 \times (0.600 + 2.667) = 2.450$

$A_b' = (0.470 + 0.462) \times 1/2 \times 2.100 \times 2 = 1.957$

$A_c' = (0.600 + 0.662) \times 1/2 \times 0.550 \times 2 = 0.694$

$A = 2.450 + 1.957 + 0.694 = 5.101 \times 2 = 10.202\ m^2$

6) ELECTRIC POLE



$A_a' = 0.750 \times 1.000 \times 4 = 3.000$

$A_b' = 0.450 \times 3.142 \times 1.000 = 1.414$

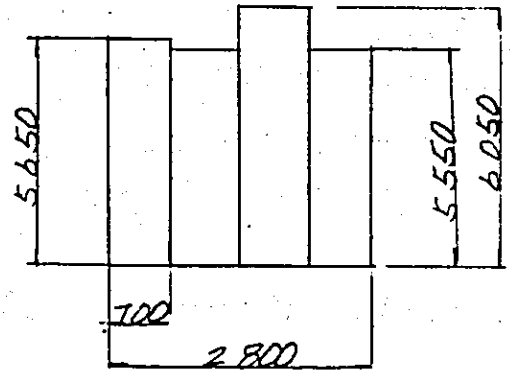
$-A_c = 0.20 \times 0.30 \times 2 + 0.75 \times 0.30 = -0.345$

$A = (3.000 + 1.414 - 0.345) \times 2 = 4.069 \times 2 = 8.138\ m^2$

BEAM TOTAL 152.884 m^2

(3) COLUMN

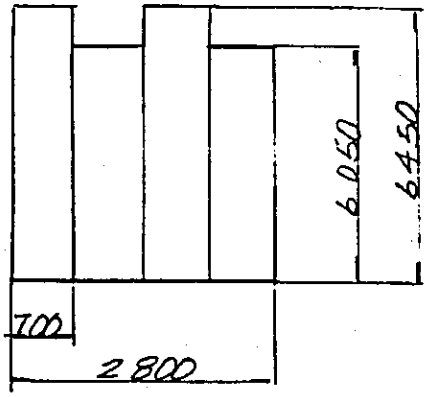
1) AT END OF VIADUCT COLUMN



$A\acute{a} = 0.700 \times (6.050 + 5.650 + 5.550 \times 2) = 15.960$

$Aa = 15.960 \times 2 = 31.920\ m^2$

2) AT INTERMEDIATE OF VIADUCT COLUMN

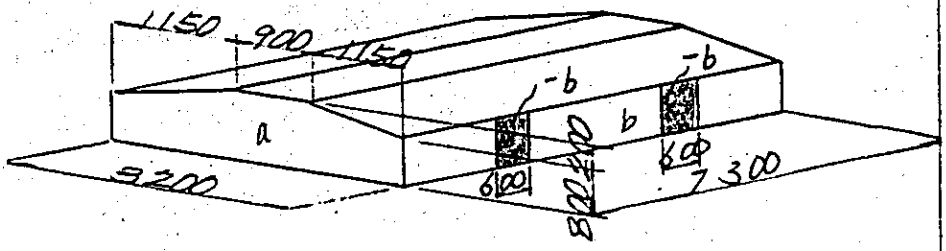


$A\acute{a} = 0.700 \times (6.450 + 6.050) \times 2 = 17.500$

$Aa = 17.500 \times 4 = 70.000\ m^2$

	m^2
COLUMN TOTAL	101.920

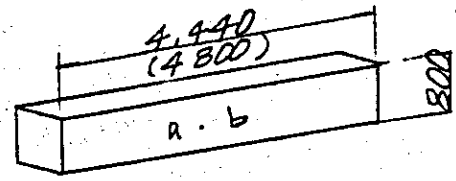
(4) FOOTING



$A_a' = 3.200 \times 0.800 + (3.200 + 0.900) \times 1/2 \times 0.200 = 2.970$

$A_a = 2.970 \times 2 \times 3$	=	17.820 m^2
$A_b' = 7.300 \times 0.800$	= 5.840	
$A_b = 5.840 \times 2 \times 3$	=	35.090 "
$-Ab = 0.60 \times 0.80 \times 8$	=	-3.840 "
FOOTING TOTAL		49.020 m^2

(5) BRACING BEAM



$A_{a'} = 4.440 \times 0.800 = 3.552$

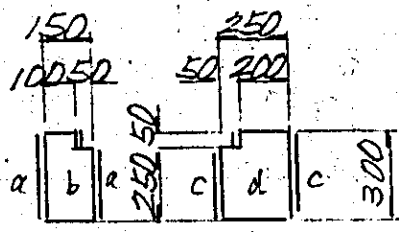
$A_a = 3.552 \times 2 \times 2 = 14.208\ m^2$

$A_{b'} = 4.800 \times 0.800 = 3.840$

$A_b = 3.840 \times 2 \times 2 = 15.360\ "$

BRACING BEAM TOTAL $29.568\ m^2$

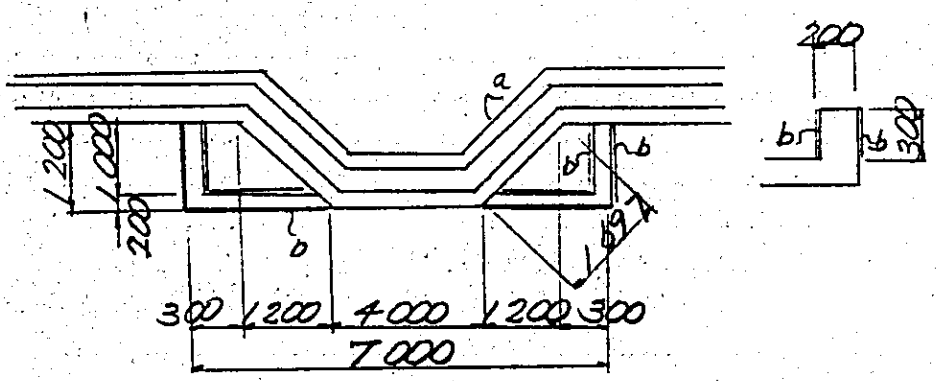
(6) CURB



$\ell = 18.970^{m}$

$A_a = 0.300 \times 2 \times 18.970 \times 2$	=	22.764^{m^2}
$A_b = (0.250 \times 0.150 - 0.050 \times 0.100) \times 2 \times 2$	=	$0.170^{"}$
$A_c = 0.300 \times 2 \times 18.970 \times 2$	=	$22.764^{"}$
$A_d = (0.250 \times 0.250 + 0.050 \times 0.200) \times 2 \times 2$	=	$0.290^{"}$
SUB TOTAL	=	45.988^{m^2}

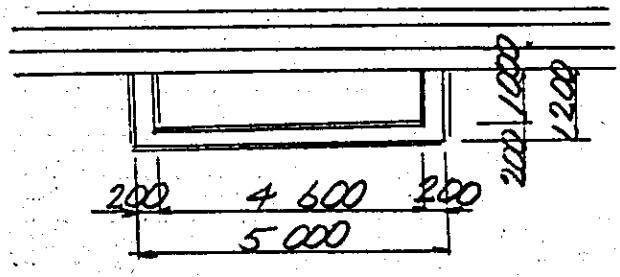
EXTENSION



$A = 0.30 \times (1.697 - 1.20) \times 4 \times 2 = 1.193\ m^2$

$A = 0.30 \times (1.50 \times 2 + 1.30 \times 2 + 1.20 \times 2 + 1.00 \times 2) = 3.000$

SUB TOTAL = $4.193\ m^2$



$A = 0.30 \times (5.00 + 4.60 + 1.20 \times 2 + 1.00 \times 2) = 4.200\ m^2$

SUB TOTAL = $4.200\ m^2$

CURB TOTAL $54.381\ m^2$

REINFORCING BAR

No. 38

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	(V009)					
	SLAB					
S 1	D16	1.56	11 090	57	986.1	
2	D19	2.25	8 400	7	132.3	
3	"	"	8 570	46	887.0	
4	D16	1.56	5 500	57	489.1	
5	"	"	4 090	18	113.4	
6	D19	2.25	3 000	12	81.0	
7	"	"	2 480	12	67.0	
8	D13	0.995	4 100	114	465.1	
9	"	"	2 600	18	96.6	
10	"	"	2 600	2	5.2	
S 21	D13	0.995	19 240	13	248.9	
22	D16	1.56	19 680	4	122.8	
23	"	"	19 680	4	122.8	
24	D13	0.995	18 740	11	205.1	
25	"	"	18 910	30	564.5	
26	"	"	1 420	28	39.6	(VARIES)
27	"	"	1 530	17	25.9	
				D19	1 167.3 kg	
				D16	1 834.2 "	
				D13	1 600.9 "	
		SUB	TOTAL WEIGHT		4 602.4 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	SLAB	EXTENSION				
	NORTH	SIDE				
S 21	D 16	1.56	@ 130	25	161.1	
22	D 13	0.995	1 800	25	99.8	
23	"	"	6 900	8	59.9	
				D 16	161.1 kg	
				D 13	99.7 "	
		SUB	TOTAL WEIGHT		260.8 kg	
	SOUTH	SIDE				
S 21	D 16	1.56	@ 130	18	116.0	
22	D 13	0.995	1 800	18	32.2	
23	"	"	@ 900	8	39.0	
				D 16	116.0 kg	
				D 13	71.2 "	
		SUB	TOTAL WEIGHT		187.2 kg	
		SLAB	TOTAL WEIGHT			
				D 19	1 167.3 kg	
				D 16	2 111.3 "	
				D 13	1 771.8 "	
		SLAB	TOTAL WEIGHT		5 050.4 kg	

No. 90

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	LONGITUDINAL BEAM					
B 1	D 32	6.23	21 390	10	1 332.6	
2	"	"	22 790	4	567.9	
3	"	"	21 750	4	542.0	
4	"	"	15 270	4	380.5	
5	"	"	4 260	40	1 061.6	
6	"	"	19 540	10	1 217.3	
7	D 19	2.25	19 010	8	342.2	
B' 1	D 13	0.995	3 140	108	337.9	
2	"	"	1 490	168	249.1	
3	"	"	2 790	108	299.8	
4	"	"	1 140	168	190.5	
5	"	"	3 540	60	211.3	(VARIES)
6	"	"	3 190	60	190.4	"
				D32	5 101.9 kg	
				D19	342.2 "	
				D13	1 478.5 "	
		SUB TOTAL WEIGHT			6 922.6 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
AT END OF VIADUCT TRANSVERSE BEAM						
B 21	D29	5.04	9 010	5	227.1	
22	"	"	6 200	5	156.2	
23	D16	1.56	5 940	8	74.1	
B°21	D13	0.995	4 670	18	83.6	
22	"	"	4 410	18	79.0	
23	"	"	1 490	18	26.7	
24	"	"	1 230	18	22.0	
				D29	383.3 kg	
				D16	74.1 "	
				D13	211.3 "	
		SUB TOTAL WEIGHT			668.7 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM						
B 31	D 29	5.04	7 210	12	436.1	
32	"	"	6 200	14	437.5	
33	D 16	1.56	5 940	8	74.1	
B°31	D 13	0.995	2 870	36	102.8	
32	"	"	2 530	36	90.6	
33	"	"	1 490	36	53.4	
34	"	"	1 230	36	44.1	
				D29	873.6 kg	
				D16	74.1 "	
				D13	290.9 "	
		SUB TOTAL WEIGHT			1 238.6 kg	

No. 43

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	OUTSIDE GIRDER					
B 61	D25	3.98	7 070	5	140.7	
62	"	"	6 130	5	122.0	
63	D16	1.56	5 950	4	37.1	
B°61	D13	0.995	2 530	18	45.3	
62	"	"	890	18	15.9	
				D25	262.7 kg	
				D16	37.1 "	
				D13	61.2 "	
		SUB TOTAL WEIGHT			361.0 kg	

JICA

No. 44

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	BEAM SUPPORT					
G 1	D 16	1.56	2 040	8	25.5	
2	〃	〃	1 250	18	35.1	
G 31	D 32	6.23	3 850	10	239.9	
32	〃	〃	3 620	12	270.6	
33	〃	〃	2 560	22	350.9	
34	D 19	2.25	3 380	16	121.7	
35	D 16	1.56	1 620	26	65.7	
36	〃	〃	1 800	4	11.2	
G°31	D 13	0.995	1 810	16	28.8	(VARIES)
				D 32	861.4 kg	
				D 19	121.7 〃	
				D 16	137.5 〃	
				D 13	28.8 〃	
		SUB TOTAL WEIGHT			1 149.4 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	BASE OF ELECTRIC POLE					
B S1	D29	5.04	4 650	12	281.2	
S2	"	"	3 650	8	147.2	
S3	D16	1.56	3 200	8	39.9	
S4	"	"	2 650	4	16.5	
B' S1	D13	0.995	2 200	22	49.9	(VARIES)
" S2	"	"	2 230	22	49.4	(")
S3	"	"	1 600	22	35.0	
S4	"	"	1 350	22	29.6	
	ELECTRIC POLE					
E 1	D22	3.04	2 100	32	209.3	
2	D16	1.56	1 580	16	39.9	
E' 1	D13	0.995	3 050	18	54.6	
2	"	"	2 110	18	37.8	
				D29	428.4 kg	
				D22	209.3	
				D16	85.8	
				D13	251.3	
		SUB TOTAL WEIGHT			979.8 kg	

JICA

No. 96

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
				D32	5963.3 kg	
				D29	1685.3 "	
				D25	262.7 "	
				D22	209.3 "	
				D19	463.9 "	
				D16	418.6 "	
				D13	2322.0 "	
		BEAM TOTAL WEIGHT			11320.1 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	CURB					
W 1	D 10	0.56	890	262	130.5	
2	〃	〃	710	262	104.3	
3	〃	〃	610	262	89.6	
4	〃	〃	18 910	16	169.4	
				D 10	493.8 kg	
		SUB TOTAL WEIGHT			493.8 kg	

No. 98

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	CURB	(SLAB EXTENSION)				
	NORTH	SIDE				
W 11	D 10	0.56	1 250	35	24.5	
12	"	"	6 900	4	15.5	
13	"	"	1 350	8	6.0	
				D 10	46.0 kg	
		SUB	TOTAL WEIGHT		46.0 kg	
	SOUTH	SIDE				
W 11	D 10	0.56	1 250	48	33.6	
12	"	"	4 900	4	11.0	
13	"	"	1 350	8	6.0	
				D 10	50.6 kg	
		SUB	TOTAL WEIGHT		50.6 kg	
				D10	590.4 kg	
		CURB	TOTAL WEIGHT		590.4 kg	

No. 99

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	COLUMN					
C 1	D25	3.98	8 850	24	845.9	
2	"	"	8 580	72	2 458.7	
C° 1	D13	0.995	2 870	198	565.5	
				D25	3 304.1 kg	
				D13	565.5 "	
		COLUMN	TOTAL WEIGHT		3 869.6 kg	
				D32	5 963.3 kg	
				D29	1 685.3 "	
				D25	3 566.0 "	
				D22	204.3 "	
				D19	1 631.2 "	
				D16	2 529.9 "	
				D13	4 659.3 "	
				D10	580.4 "	
			① TOTAL WEIGHT		20 830.5 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	FOOTING					
F 21	D 25	3.98	4 230	129	2 171.7	
22	D 16	1.56	4 250	75	497.3	
23	〃	〃	4 020	12	75.3	
F 21	D 13	0.995	2 800	57	158.8	
22	〃	〃	1 870	57	106.1	
F 31	D 32	6.23	8 610	23	1 233.7	
32	〃	〃	7 890	23	1 123.9	
33	D 19	2.25	8 230	63	1 166.6	
34	D 16	1.56	8 930	29	315.6	(VARIES)
35	〃	〃	8 120	12	152.0	
F 31	D 13	0.995	2 080	144	298.1	(VARIES)
32	〃	〃	2 070	144	296.6	(〃)
				D32	2 357.1 kg	
				D25	2 171.7 〃	
				D19	1 166.6 〃	
				D16	1 040.2 〃	
				D13	859.6 〃	
		FOOTING	TOTAL WEIGHT		7 595.2 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	BRACING BEAM					
F 1	D32	6.23	19 850	16	1 978.7	
2	D16	1.56	19 080	8	238.1	
F° 1	D13	0.995	2 040	136	276.1	
2	〃	〃	1 410	136	190.8	
				D32	1 978.7 kg	
				D16	238.1 〃	
				D13	466.9 〃	
	BRACING BEAM TOTAL WEIGHT				2 683.7 kg	

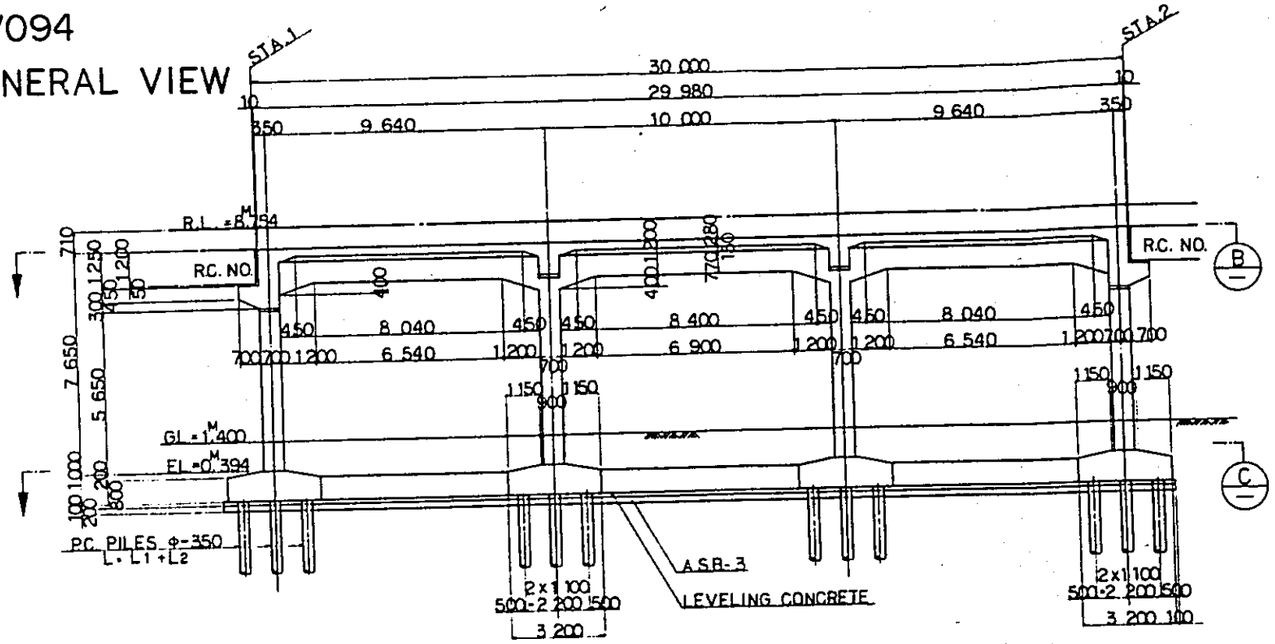
No. S2

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
				D32	4 335.8 kg	
				D25	2 171.7 "	
				D19	1 166.6 "	
				D16	1 278.3 "	
				D13	1 326.5 "	
		(2)	TOTAL WEIGHT		10 278.9 kg	

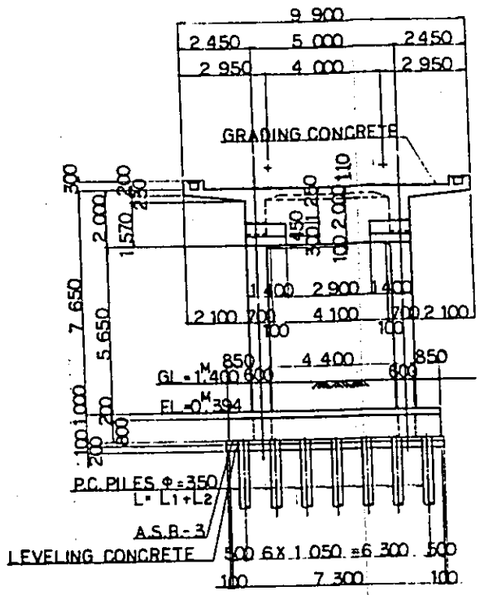
JICA

3. V094

GENERAL VIEW



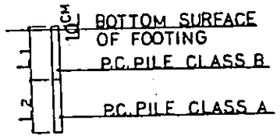
SECTION (A)



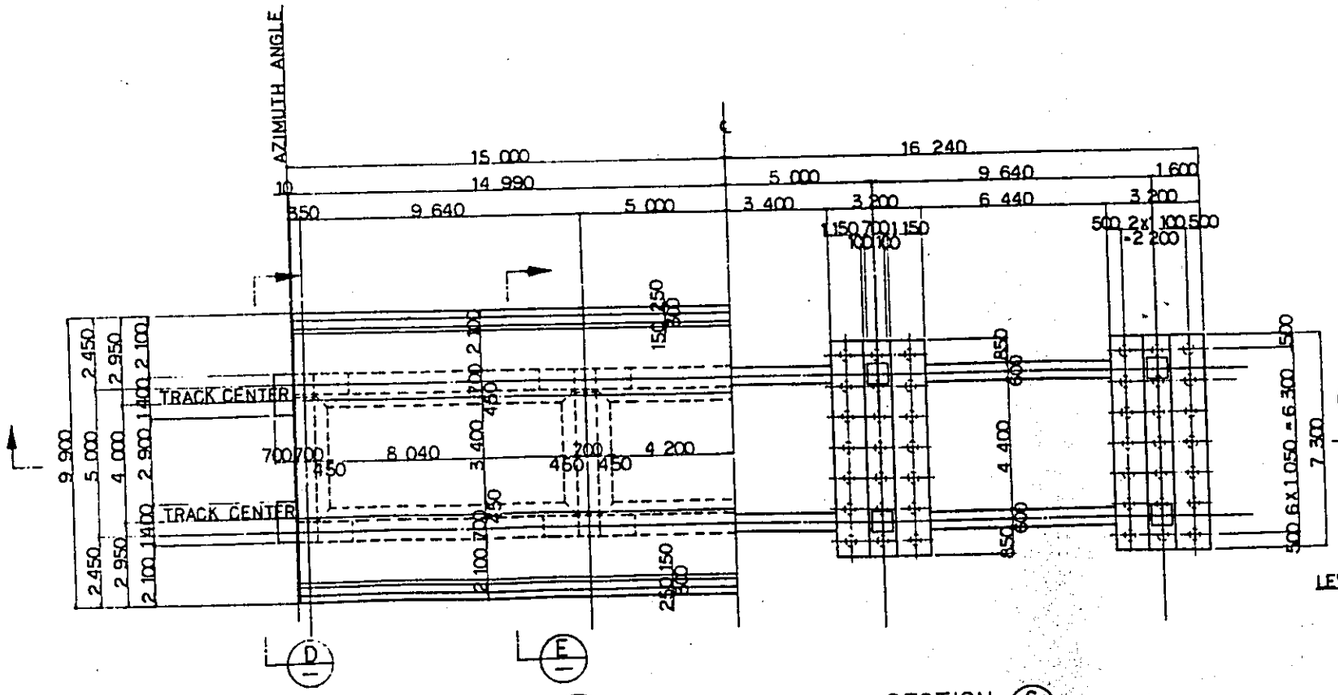
SECTION (D)

NOTES :

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. REFERENCE DRAWING FOR BAR ARRANGEMENT: CS-204~209, CS-223
3. TYPES OF P.C. PILE

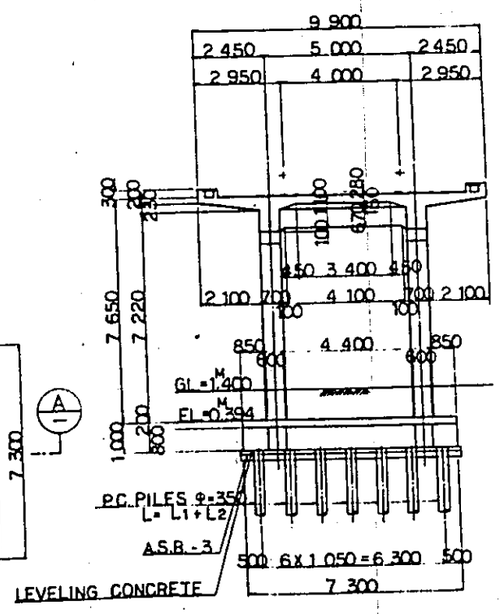


4. GRADING CONCRETE SHALL BE SIMULTANEOUSLY PLACED WITH SLAB CONCRETE



SECTION (B)

SECTION (C)



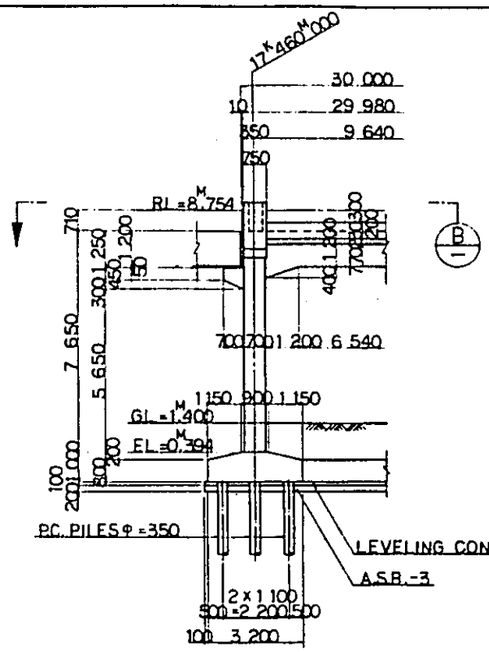
SECTION (E)

DIMENSION SCHEDULE

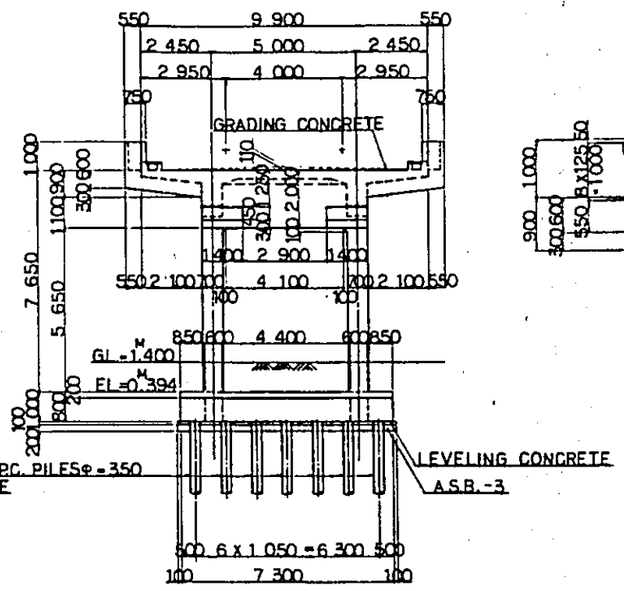
		STATION	R.L.	L1	L2	AZIMUTH ANGLE	CENGKAREN AIRPOAT LINE COORDINATE	RC. NO.
V090	STA.1	17K270M000	8.M754	8 000	13 000	345° 30' 45"	U.12 121M415 T. 1 070M633	RC.18
	STA.2	17K300M000	"			"	U.12 128M920 T. 1 099M679	RC.19
V091	STA.1	17K310M000	8M754	8 000	13 000	345° 30' 45"	U.12 131M422 T. 1 109M361	RC.19
	STA.2	17K340M000	"			"	U.12 138M927 T. 1 138M407	RC.20
V092	STA.1	17K350M000	8M754	8 000	13 000	345° 30' 45"	U.12 141M429 T. 1 148M089	RC.20
	STA.2	17K380M000	"			"	U.12 148M934 T. 1 177M135	RC.21
V093	STA.1	17K390M000	8M754	8 000	13 000	345° 30' 45"	U.12 151M435 T. 1 186M817	RC. 21
	STA.2	17K420M000	"			"	U.12 158M941 T. 1 215M863	RC. 22
V094	STA.1	17K430M000	8M754	8 000	12 000	345° 30' 45"	U.12 161M442 T. 1 225M545	RC.22
	STA.2	17K460M000	"			"	U.12 168M947 T. 1 254M591	RC.23

NOTES :

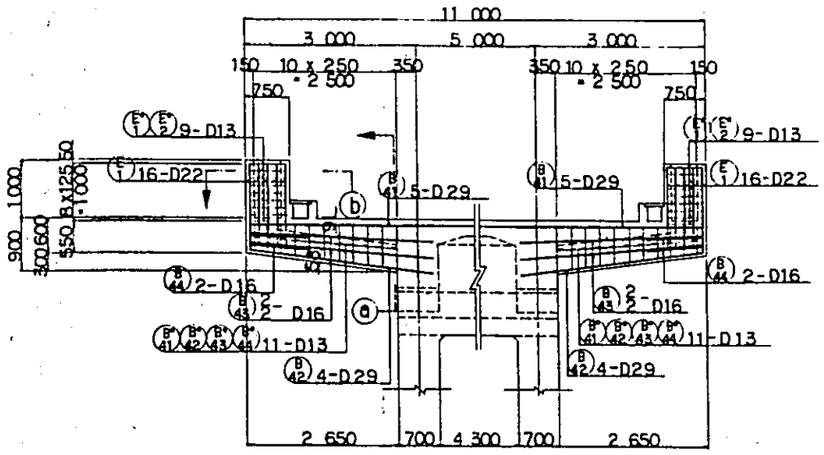
1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. REFERENCE DRAWING FOR GENERAL VIEW : CS-202



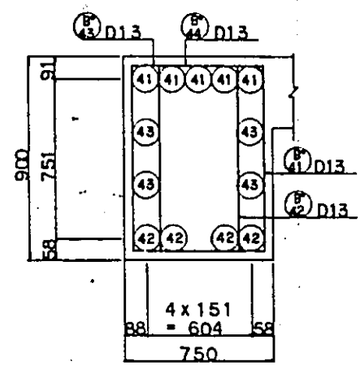
SECTION (A) — SCALE 1:100



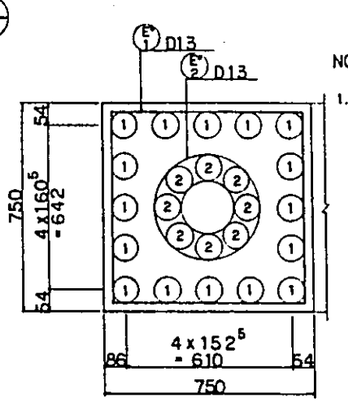
SECTION (C) — SCALE 1:100



SECTION (D) — SCALE 1:50



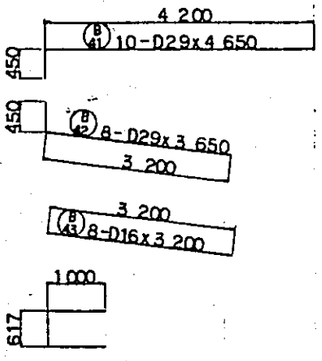
SECTION (a) - (a)

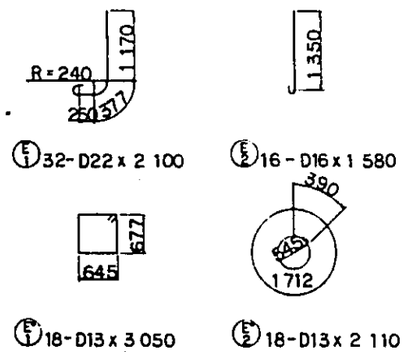


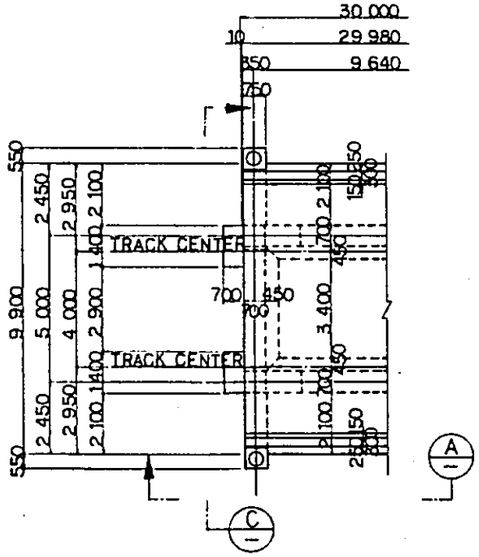
SECTION (b) - (b)

NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED







SECTION (B) — SCALE 1:100

VIADUCT (V094)

	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	90.1	256.5	7 696.1	89.9
BEAM	62.7	219.6	19 801.1	315.8
COLUMN	23.7	133.8	5 159.3	217.7
CURB	6.8	72.0	775.7	114.1
GRADING CONCRETE	17.8	——	——	——
TOTAL	201.1	681.9	33 382.2	166.0
FOOTING	86.7	64.7	10 989.2	126.7
BRACING BEAM	18.9	63.0	5 405.1	286.0
TOTAL	105.6	127.7	16 389.3	155.2

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	13.3	
AGGREGATE SUB BASE	m^3	26.7	
EXCAVATION	m^3	288.0	
	m^3	0.009	
PILE		ϕ=350 N=A-84 N=B-84	ϕ350 ℓ=A−12.0m " ℓ=B−8.0"

VIADUCT V090 ~ V093

	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	90.1	256.5	7 696.1	84.9
BEAM	59.9	201.2	18 916.4	315.8
COLUMN	23.7	133.8	5 159.3	217.7
CURB	6.8	72.0	775.7	114.1
GRADING CONCRETE	17.8	—	—	—
TOTAL	198.3	663.5	32 797.5	163.9
FOOTING	86.7	64.7	10 989.2	126.7
BRACING BEAM	18.9	63.0	5 905.1	296.0
TOTAL	105.6	127.7	16 389.3	155.2

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	13.3	
AGGREGATE SUB BASE	m^3	26.7	
EXCAVATION	m^3	288.0	
MORTAR	m^3	0.009	
PILE	EACH	φ=350 N=A-84 N=B-84	φ=350 ℓ=A-13.0m ; ℓ=B-8.0m

(V094) WEIGHT OF BARS BY DIAMETER

	Ø32	Ø29	Ø25	Ø22	Ø19	Ø16	Ø13	Ø10	TOTAL
SLAB	—	—	—	—	3 023.7	2 193.6	2 478.8	—	7 696.1
BEAM	11 989.4	2 021.8	—	209.3	786.1	593.0	4 211.5	—	19 801.1
COLUMN	—	—	4 905.3	—	—	—	754.0	—	5 159.3
CURB	—	—	—	—	—	—	—	775.7	775.7
FOOTING	3 279.5	3 666.9	—	—	2 511.8	723.8	802.2	—	10 984.2
BRACING BEAM	4 172.9	—	—	—	—	908.3	823.9	—	5 905.1
TOTAL	19 436.8	5 688.7	4 905.3	209.3	6 321.6	3 868.7	9 070.4	775.7	99 771.5

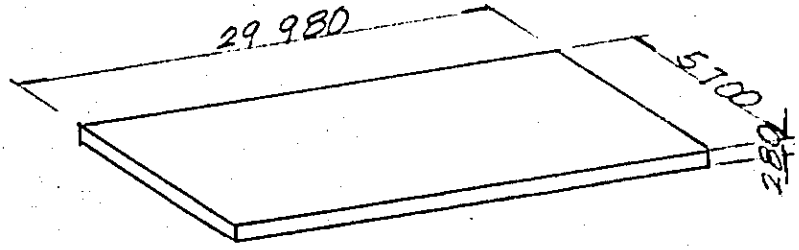
JICA

No. S.8

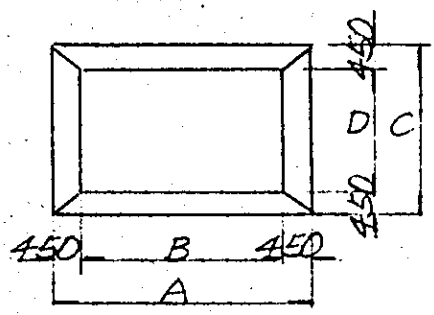
(V094) $3 \times 10 = 30.000^{m}$

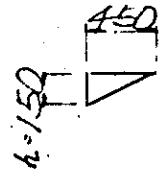
CONCRETE VOLUME

(1) SLAB



$Va = 29.980 \times 5.700 \times 0.280 = 47.848^{m^3}$



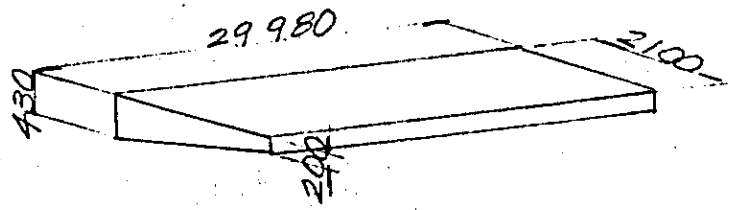


$V = \{A \times C - \{A \times C + (A+B) \times (C+D) + B \times D\} \times 1/6\} \times h$

	A	B	C	D	
$Vb' =$	9300	8400	4300	3400	$= 0.878^{m^3}$
$Vc' =$	8940	8040	〃	〃	$= 0.853$ 〃

$Vb = = 0.878^{m^3}$

$Vc = 0.853 \times 2 = 1.706$ 〃



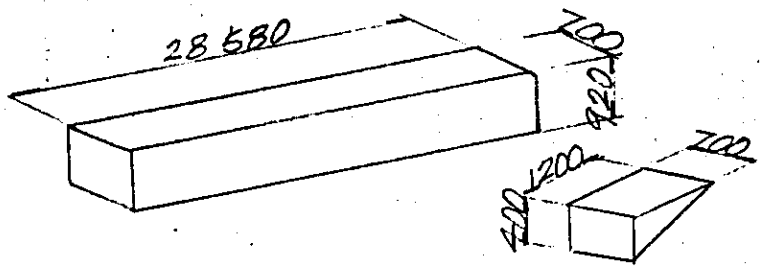
$Vd' = \frac{1}{2} \times (0.430 + 0.200) \times 2.100 \times 29.980 = 19.832$

$Vd = 19.832 \times 2$ = 39.664 m³

SLAB TOTAL 90.096 m³

(2) BEAM

1) LONGITUDINAL BEAM.



$V_a' = 0.920 \times 0.700 \times 28.580 = 18.406$

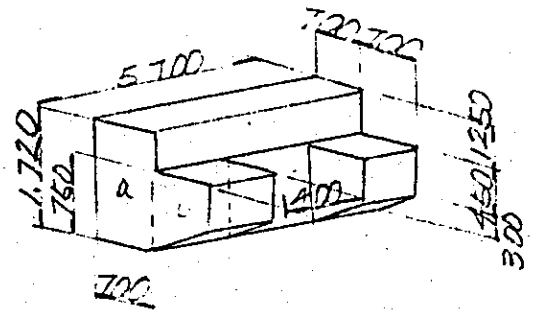
$V_a = 18.406 \times 2 = 36.812$ m³

$V_b' = 0.400 \times 1.200 \times 1/2 \times 0.700 = 0.168$

$V_b = 0.168 \times 6 \times 2 = 2.016$

SUB TOTAL 38.828 m³

2) AT END OF VIADUCT TRANSVERSE BEAM

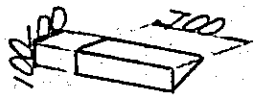


$V_a' = 1.720 \times 0.700 \times 5.700 = 6.863$

$V_a = 6.863 \times 2 = 13.726$ m³

$V_b' = (0.450 + 0.750) \times 1/2 \times 0.700 \times 1.400 \times 2 = 1.176$

$V_b = 1.176 \times 2 = 2.352$

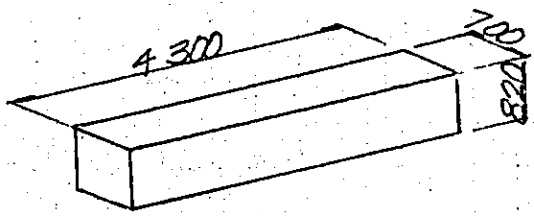


$V_c' = 0.100 \times 0.100 \times 1/2 \times 0.700 \quad = 0.004$

$V_c = 0.004 \times 2 \times 2 \quad = 0.016 \ m^3$

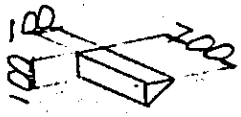
SUB TOTAL = 16.094 m^3

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM



$V_d' = 0.820 \times 0.700 \times 4.300 \quad = 2.468$

$V_d = 2.468 \times 2 \quad = 4.936 \ m^3$

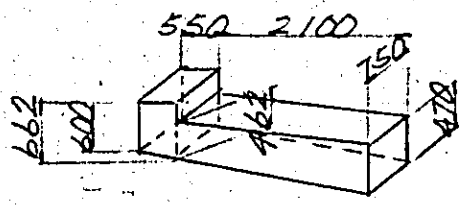


$V_b' = 0.100 \times 0.100 \times 1/2 \times 0.700 \quad = 0.004$

$V_b = 0.004 \times 2 \times 2 \quad = 0.016 \ m^3$

SUB TOTAL = 4.952 m^3

4) BASE OF ELECTRIC POLE



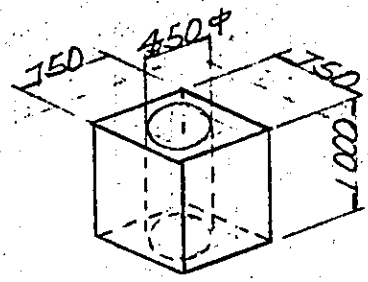
$Va' = (0.470 + 0.462) \times \frac{1}{2} \times 0.750 \times 2.100 = 0.734$

$Va'' = (0.600 + 0.662) \times \frac{1}{2} \times 0.750 \times 0.550 = 0.260$

$Va = 0.734 + 0.260 = 0.994 \times 2$ = 1.988 m^3

SUB TOTAL = 1.988 m^3

5) ELECTRIC POLE



$Va' = (0.750 \times 0.750 - 0.225^2 \times 3.142) \times 1.000 = 0.403$

$Va = 0.403 \times 2$ = 0.806 m^3

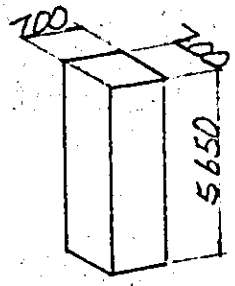
SUB TOTAL = 0.806 m^3

ELECTRIC TOTAL = 2.794 m^3

BEAM TOTAL = 62.668 m^3

(3) COLUMN

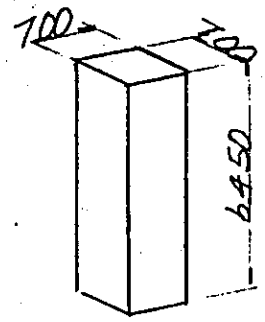
1) AT END OF VIADUCT COLUMN



$Va' = 0.700 \times 0.700 \times 5.650 = 2.769$

$Va = 2.769 \times 2 \times 2 = 11.076 \ m^3$

2) AT INTERMEDIATE OF VIADUCT COLUMN

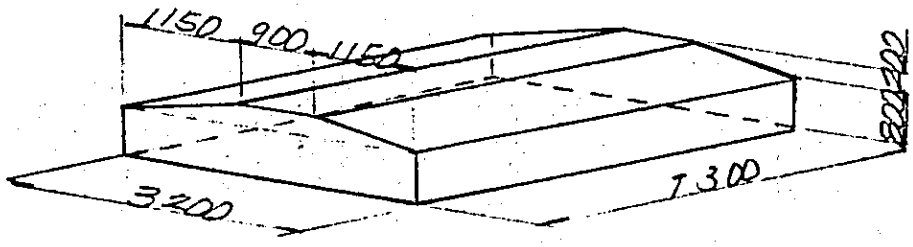


$Va' = 0.700 \times 0.700 \times 6.450 = 3.161$

$Va = 3.161 \times 2 \times 2 = 12.644 \ m^3$

COLUMN TOTAL	23.720 m^3

(4) FOOTING



$V_a' = 3.200 \times 7.300 \times 0.800 = 18.688$

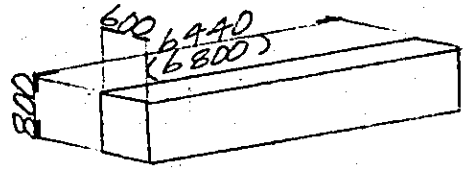
$V_a = 18.688 \times 4 = 74.752\ m^3$

$V_b' = (3.200 + 0.900) \times 1/2 \times 0.200 \times 7.30 = 2.993$

$V_b' = 2.993 \times 4 = 11.972$ "

FOOTING TOTAL 86.724 m^3

(5) BRACING BEAM.



$V_a' = 6.440 \times 0.600 \times 0.600 = 3.091$

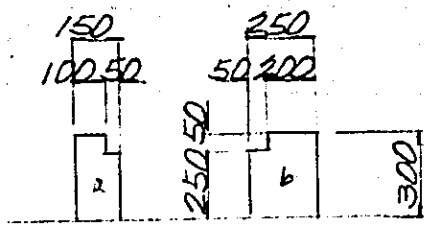
$V_a = 3.091 \times 2 \times 2 = 12.364\ m^3$

$V_b' = 6.800 \times 0.600 \times 0.800 = 3.264$

$V_b = 3.264 \times 2 = 6.528\ "$

BRACING BEAM TOTAL $18.892\ m^3$

(6) CURB



$\ell = 29.980$ m

$V_a = (0.250 \times 0.150 + 0.100 \times 0.050) \times 29.980 \times 2 = 2.548$ m³

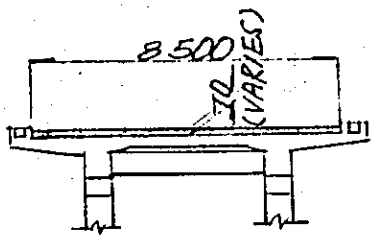
$V_b = (0.250 \times 0.250 + 0.200 \times 0.050) \times 29.980 \times 2 = 4.347$ "

伏假擋除

$-V_b = -(0.250 \times 0.250 + 0.200 \times 0.050) \times 0.750 \times 2 = -0.109$ "

CURB TOTAL 6.786 m³

(7) GRADING CONCRETE

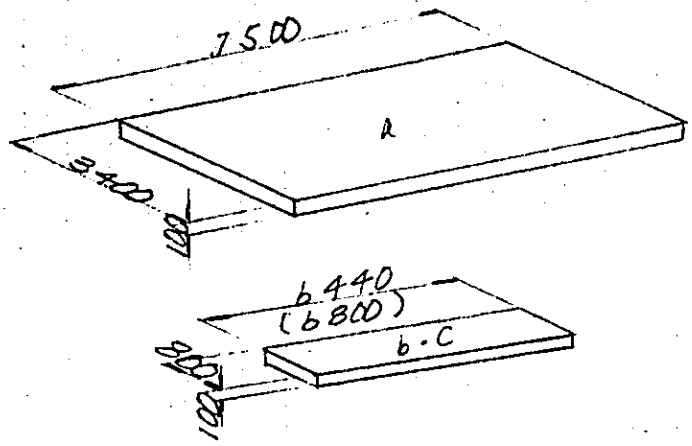


$\ell = 29.980^{m}$

$V = 0.070 \times 8.500 \times 29.980 = 17.838\ m^3$

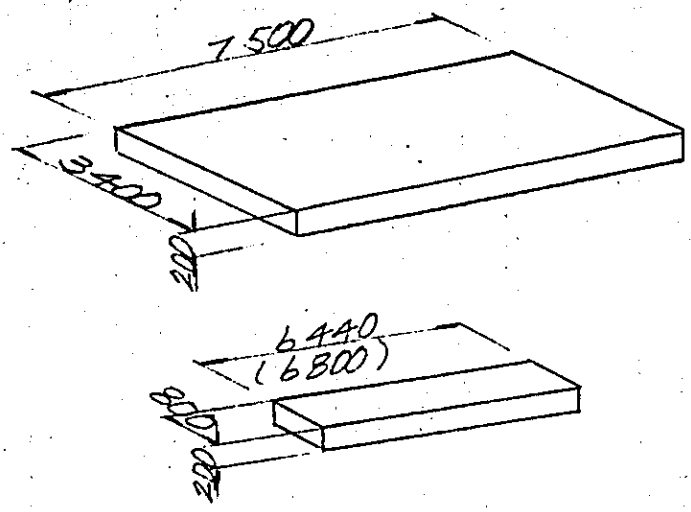
GRADING CONCRETE TOTAL	$17.838\ m^3$

(8) LEVELING CONCRETE



$V_a' = 7.500 \times 3.400 \times 0.100 = 2.550$		
$V_a = 2.550 \times 4$	=	10.200 m^3
$V_b' = 6.440 \times 0.800 \times 0.100 = 0.515$		
$V_b = 0.515 \times 2 \times 2$	=	2.060 "
$V_c' = 6.800 \times 0.800 \times 0.100 = 0.544$		
$V_c = 0.544 \times 2$	=	1.088 "
LEVELING CONCRETE TOTAL		13.348 m^3

(9.) AGGREGATE SUB BASE



$Va' = 7.500 \times 3.400 \times 0.200 = 5.100$		
$Va = 5.100 \times 4$	=	20.400 m³
$Vb' = 6.440 \times 0.800 \times 0.200 = 1.030$		
$Vb = 1.030 \times 2 \times 2$	=	4.120
$Vc' = 6.800 \times 0.800 \times 0.200 = 1.088$		
$Vc = 1.088 \times 2$	=	2.176
AGGREGATE SUB BASE TOTAL		26.696 m³

(10) PILE

$\phi = 350$ $\quad \ell = B$ —— 8.0m

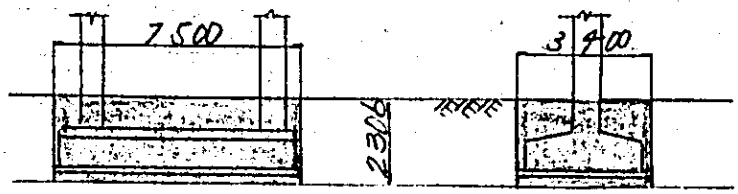
$\ell = A$ —— 13.0m

$n = 21$

$\Sigma N = 21 \times 4 = 84$

(11) EXCAVATION

1) FOOTING

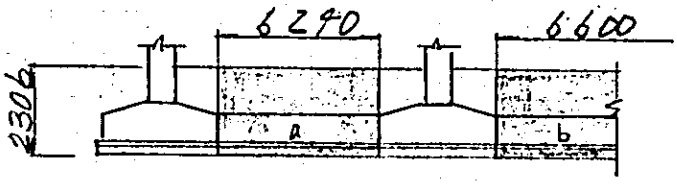


$Va' = 7.500 \times 3.400 \times 2.306 = 58.803$

$Va = 58.803 \times 4$ = 235.212 m^3

SUB TOTAL 235.212 m^3

2) BRACING BEAM



$Va' = 6.290 \times 0.600 \times 2.306 = 8.634$

$Va = 8.634 \times 2 \times 2$ = 34.536 m^3

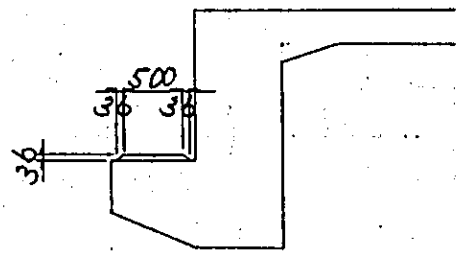
$Vb' = 6.600 \times 0.600 \times 2.306 = 9.132$

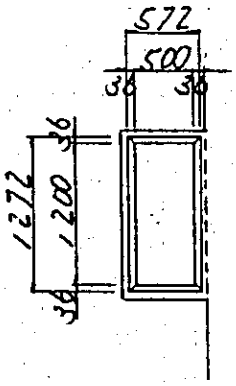
$Vb = 9.132 \times 2$ = 18.264 m^3

SUB TOTAL 52.800 m^3

EXCAVATION TOTAL 288.012 m^3

(12) FOUNDATION MORTAR





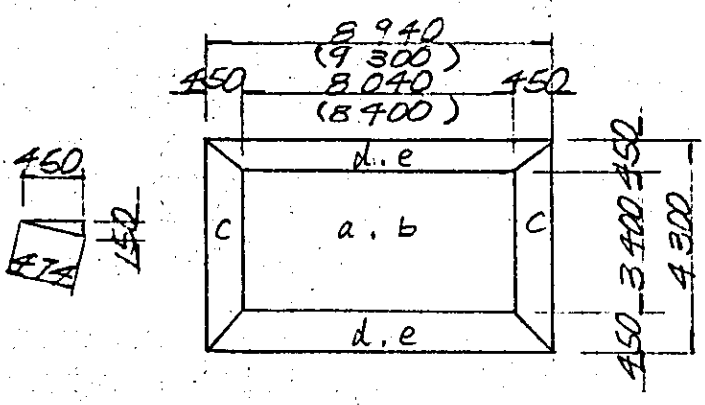
$$V = \{1.272 \times 0.572 - \{1.272 \times 0.572 + (1.272 + 1.20) \times (0.572 + 0.500) + 1.20 \times 0.50\} \times 1/6\} \times 0.036 \times 4$$

$$= 0.009\ m^3$$

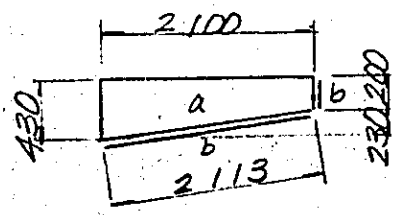
FOUNDATION MORTAR TOTAL = $0.009\ m^3$

FORM AREA

(1) SLAB



$A_{a'} = 8.040 \times 3.400$	$= 27.336$	
$A_a = 27.336 \times 2$		$= 54.672$ m²
$A_{b'} = 8.400 \times 3.400$	$= 28.560$	
$A_b = 28.560$		$= 28.560$ "
$A_{c'} = (4.300 + 3.400) \times \frac{1}{2} \times 0.474$	$= 1.825$	
$A_c = 1.82 \times 2 \times 3$		$= 10.950$ "
$A_{d'} = (8.940 + 8.040) \times \frac{1}{2} \times 0.474$	$= 4.024$	
$A_d = 4.024 \times 2 \times 2$		$= 16.096$ "
$A_{e'} = (9.300 + 8.400) \times \frac{1}{2} \times 0.474$	$= 4.195$	
$A_c = 4.195 \times 2$		$= 8.390$ "

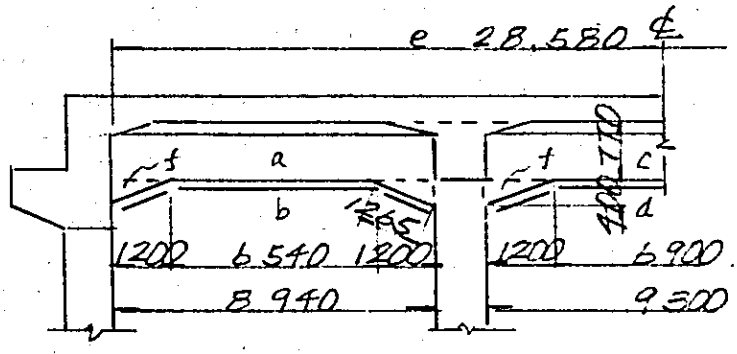


$\ell = 29.980^{m}$

$A_{a'} = (0.430 + 0.200) \times 1/2 \times 2.100$	$= 0.662$	
$A_a = 0.662 \times 2 \times 2$		$= 2.648\ m^2$
$A_{b'} = (0.200 + 2.113) \times 29.980$	$= 69.344$	
$A_b = 69.344 \times 2$		$= 138.688\ "$
$-A_{b'} = (0.200 + 2.113) \times 0.750$	$= -1.735$	
$-A_b = 1.735 \times 2$		$= -3.470\ "$
SLAB TOTAL		$256.534\ m^2$

(2) BEAM

1) LONGITUDINAL BEAM



b = 700

$A_a' = 0.770 \times 8.940 \times 2 = 13.768$

$A_b' = (1.265 \times 2 + 6.540) \times 0.700 \times 2 = 12.698$

$A_c' = 0.770 \times 9.300 = 7.161$

$A_d' = (1.265 \times 2 + 6.900) \times 0.700 = 6.601$

$A_e' = 28.580 \times 0.770 = 22.007$

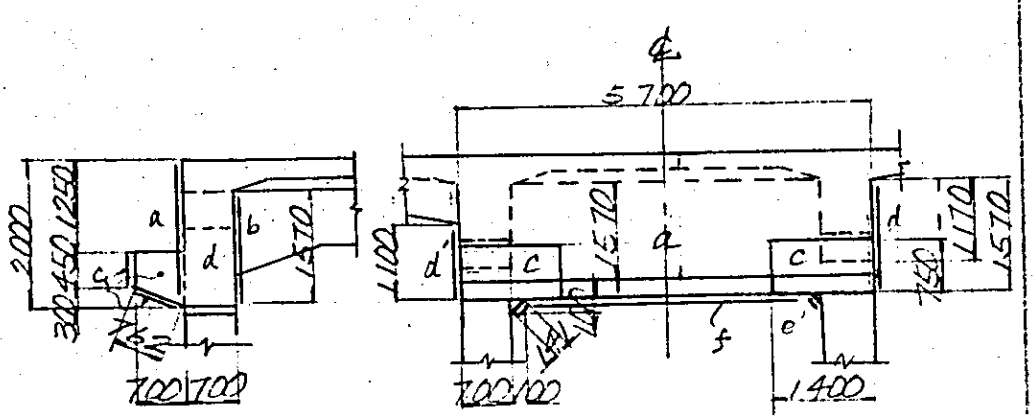
$A_f' = 1.200 \times 0.400 \times \frac{1}{2} \times 12 = 2.880$

$A' = 13.768 + 12.698 + 7.161 + 6.601 + 22.007 + 2.880 = 65.115$

$A = 65.115 \times 2 = 130.230$ m²

SUB TOTAL 130.230 m²

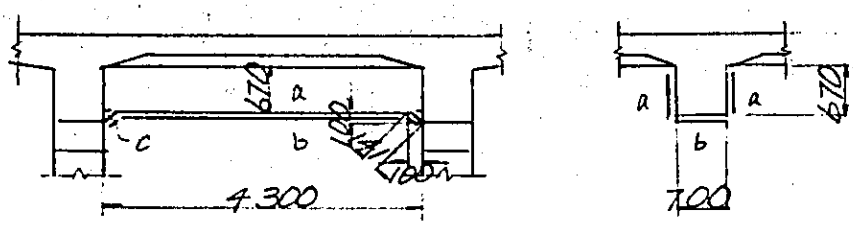
2) AT END OF VIADUCT TRANSVERSE BEAM



$A_a = 5.700 \times 2.000 - 1.400 \times 0.750 \times 2$	=	9.300 m²
$A_b = 5.700 \times 1.570 - 1.170 \times 0.700 \times 2$	=	7.311 "
$A_c = \{(0.450 + 0.762) \times 1.400 + (0.450 + 0.750) \times \frac{1}{2} \times 0.700 \times 2\} \times 2$	=	5.074 "
$A_d = 1.570 \times 0.700 \times 2$	=	2.198 "
$A_e = \{0.100 \times 0.100 \times \frac{1}{2} \times 2 + 0.141 \times 0.700\} \times 2$	=	0.217 "
$A_f = 4.100 \times 0.700$	=	2.870 "
SUB TOTAL	=	26.970 m²

$A_a = 9.300$	=	9.300 m²
$A_b = 7.310$	=	7.311 "
$A_c = 5.074$	=	5.074 "
$A_d = 1.100 \times 0.700 \times 2$	=	1.540 "
$A_e = 0.217$	=	0.217 "
$A_f = 2.870$	=	2.870 "
SUB TOTAL	=	26.312 m²

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM



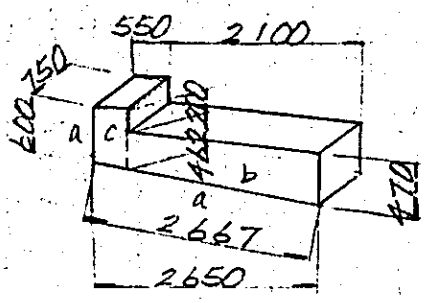
$A_a' = 4.300 \times 0.670 \times 2 = 5.762$

$A_b' = (4.100 + 0.141 \times 2) \times 0.700 = 3.067$

$A_c' = 0.100 \times 0.100 \times \frac{1}{2} \times 2 \times 2 = 0.020$

A_a =	5.762 × 2	=	11.524 m²
A_b =	3.067 × 2	=	6.134 "
A_c =	0.020 × 2	=	0.040 "
	SUB TOTAL	=	17.698 m²

4) BASE OF ELECTRIC POLE



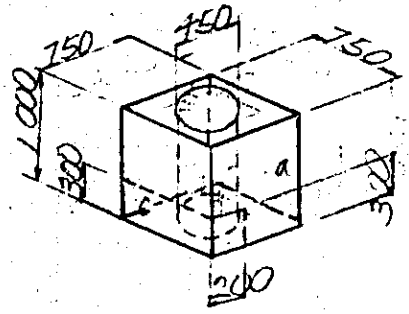
$A_a' = 0.750 \times (0.600 + 2.667) = 2.450$

$A_b' = (0.470 + 0.462) \times 1/2 \times 2.100 \times 2 = 1.957$

$A_c' = (0.600 + 0.662) \times 1/2 \times 0.550 \times 2 = 0.694$

$A = 2.450 + 1.957 + 0.694 = 5.101 \times 2 = 10.202\ m^2$

5) ELECTRIC POLE



$A_a' = 0.750 \times 1.000 \times 4 = 3.000$

$A_b' = 0.450 \times 3.142 \times 1.000 = 1.414$

$-Ac = 0.20 \times 0.30 \times 2 + 0.75 \times 0.30 = -0.345$

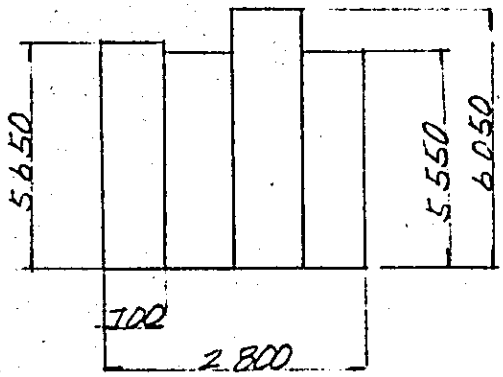
$A = (3.000 + 1.414 - 0.345) \times 2 = 4.069 \times 2 = 8.138\ m^2$

SUB TOTAL = $18.340\ m^2$

BEAM TOTAL 219.550 m^2

(3) COLUMN

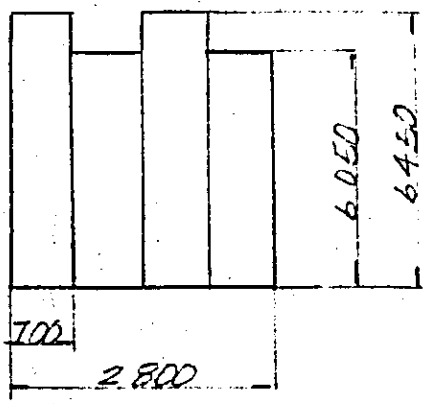
1) AT END OF VIADUCT COLUMN



$A\acute{a}$ = 0.700 × (6.050 + 5.650 + 5.550 × 2) = 15.960

A_a = 15.960 × 4 = 63.840 m^2

2) AT INTERMEDIATE OF VIADUCT COLUMN

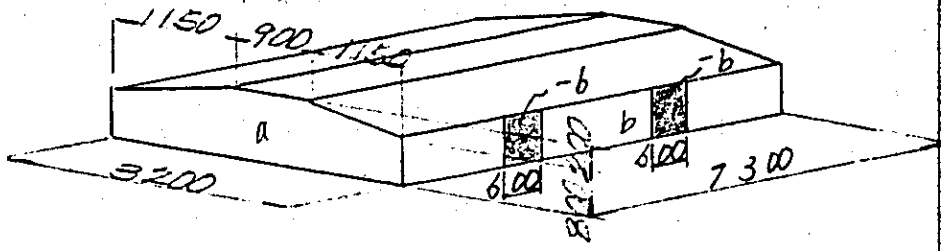


$A\acute{a}$ = 0.700 × (6.450 + 6.050) × 2 = 17.500

A_a = 17.500 × 4 = 70.000 m^2

COLUMN TOTAL	133.840 m²

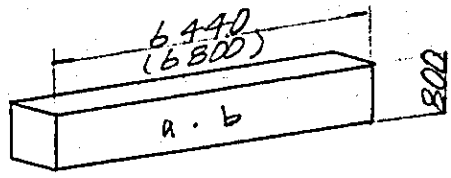
(4) FOOTING



$A_a' = 3.200 \times 0.800 + (3.200 + 0.900) \times 1/2 \times 0.200 = 2.970$

$A_a = 2.970 \times 2 \times 4$	=	23.760 m²
$A_b' = 7.300 \times 0.800$	= 5.840	
$A_b = 5.840 \times 2 \times 4$	=	46.720 "
$-A_b = 0.60 \times 0.80 \times 12$	=	-5.760
FOOTING TOTAL		64.720 m²

(5) BRACING BEAM



$A_{a'} = 6.440 \times 0.800 = 5.152$

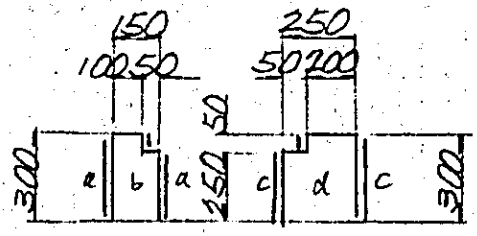
$A_a = 5.152 \times 2 \times 4 = 41.216\ m^2$

$A_{b'} = 6.800 \times 0.800 = 5.440$

$A_b = 5.440 \times 2 \times 2 = 21.760\ "$

BRACING BEAM TOTAL 62.976 m^2

(6) CURB



$\ell = 29,980$ m

$A_a = 0.300 \times 2 \times 29.980 \times 2$	=	35.976 m²
$A_b = (0.250 \times 0.150 \quad 0.050 \times 0.100) \times 2 \times 2$	=	0.170 "
$A_c = 0.300 \times 2 \times 29.980 \times 2$	=	35.976 "
$A_d = (0.250 \times 0.250 + 0.050 \times 0.200) \times 2 \times 2$	=	0.290 "
$-A = -0.300 \times 0.750 \times 2$	=	− 0.450 "
CURB TOTAL		71.962 m²

No. 09

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	V099					
	SLAB					
S 1	D16	1.56	11 090	99	1626.2	
2	D19	2.25	8 900	10	189.0	
3	"	"	8 570	79	1523.4	
4	"	"	5 500	94	1163.3	
5	D16	1.56	4 040	20	126.0	
6	D19	2.25	3 000	12	81.0	
7	"	"	2 980	12	67.0	
8	D13	0.995	4 100	188	767.0	
9	"	"	2 600	20	51.7	
S 21	D13	0.995	30 920	13	399.9	
22	D16	1.56	31 360	4	195.7	
23	"	"	31 360	4	195.7	
24	D13	0.995	29 920	41	1220.6	
25	"	"	1 420	28	39.6	(VARIES)
				D19	3023.7 kg	
				D16	2193.6 "	
				D13	2478.8 "	
		SLAB	TOTAL WEIGHT		7646.1 kg	

JICA

No. 05

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	LONGITUDINAL BEAM					
B 1	D32	6.23	33 290	19	2 899.2	
2	〃	〃	35 370	4	881.4	
3	〃	〃	35 370	4	881.4	
4	〃	〃	8 000	12	598.1	
5	〃	〃	4 260	60	1 592.4	
6	〃	〃	30 400	18	3 409.1	
7	D19	2.25	30 150	8	542.7	
B' 1	D13	0.995	3 190	270	843.5	
2	〃	〃	1 490	366	542.8	
3	〃	〃	2 790	270	749.5	
4	〃	〃	1 190	366	415.0	
5	〃	〃	3 540	96	338.1	(VARIES)
6	〃	〃	3 190	96	304.7	(〃)
				D32	10 261.6 kg	
				D19	542.7 〃	
				D13	3 193.6 〃	
		SUB	TOTAL WEIGHT		13 997.9 kg	

JICA

No. 86

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
AT END OF VIADUCT TRANSVERSE BEAM						
B 21	D29	5.04	9 010	10	454.1	
22	"	"	6 200	10	312.5	
23	D16	1.56	5 990	16	148.3	
B° 21	D13	0.995	9 670	36	167.3	
22	"	"	9 410	36	158.0	
23	"	"	1 990	36	53.9	
24	"	"	1 230	36	44.1	
				D29	766.6 kg	
				D16	148.3 "	
				D13	422.8 "	
		SUB TOTAL WEIGHT			1337.7 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM						
B 31	D29	5.04	7 210	12	436.1	
32	〃	〃	6 200	14	437.5	
33	D16	1.56	5 990	8	74.1	
B' 31	D13	0.995	2 870	36	102.8	
32	〃	〃	2 530	36	90.6	
33	〃	〃	1 490	36	53.4	
34	〃	〃	1 230	36	44.1	
				D29	873.6 kg	
				D16	74.1 〃	
				D13	290.9 〃	
		SUB TOTAL WEIGHT			1 238.6 kg	

No. 00

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	BEAM SUPPORT					
G 1	D16	1.56	2 040	16	50.9	
2	〃	〃	1 250	36	70.2	
G 31	D32	6.23	3 850	20	479.7	
32	〃	〃	3 620	24	541.3	
33	〃	〃	2 560	44	701.8	
34	D19	2.25	3 380	32	243.4	
35	D16	1.56	1 620	52	131.4	
36	〃	〃	1 800	8	22.5	
G' 31	D13	0.995	1 810	32	57.6	(VARIES)
				D32	1 722.8 kg	
				D19	243.4 〃	
				D16	275.0 〃	
				D13	57.6 〃	
		SUB TOTAL WEIGHT			2 298.8 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	BASE OF ELECTRIC POLE					
B 1	D 29	5.04	4 650	10	234.4	
2	"	"	3 650	8	147.2	
3	D 16	1.56	3 200	8	39.9	
4	"	"	2 620	4	16.3	
B' 1	D 13	0.995	2 250	22	49.3	(VARIES)
2	"	"	1 850	22	42.1	(")
3	"	"	1 570	22	34.4	
4	"	"	1 270	22	27.8	
	ELECTRIC POLE					
E 1	D 22	3.04	2 100	32	204.3	
2	D 16	1.56	1 580	16	39.4	
E' 1	D 13	0.995	3 050	18	54.6	
2	"	"	2 110	18	37.8	
				D 29	381.6 kg	
				D 22	204.3 "	
				D 16	85.6 "	
				D 13	246.6 "	
			SUB TOTAL WEIGHT		928.1 kg	

No. 10

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
				D32	11 994.4 kg	
				D29	2 021.8 "	
				D22	209.3 "	
				D19	796.1 "	
				D16	593.0 "	
				D13	4 211.5 "	
		BEAM TOTAL WEIGHT			19 801.1 kg	

JICA

No. 81

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	CURB					
W 1	D10	0.56	890	410	204.2	
2	〃	〃	710	410	163.2	
3	〃	〃	610	410	140.2	
4	〃	〃	29 920	16	268.1	
				D10	775.7 kg	
		CURB	TOTAL WEIGHT		775.7 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	COLUMN					
C 1	D25	3.98	8 850	32	1127.1	
2	"	"	8 580	96	3278.2	
C° 1	D13	0.995	2 870	264	754.0	
				D25	4405.3 kg	
				D13	754.0 "	
		COLUMN	TOTAL WEIGHT		5159.3 kg	
				D32	11984.9 kg	
				D29	2021.8 "	
				D25	4905.3 "	
				D22	209.3 "	
				D19	3809.8 "	
				D16	2736.6 "	
				D13	1999.3 "	
				D10	175.1 "	
		①	TOTAL WEIGHT		33382.2 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	FOOTING					
F 21	D29	5.04	4 230	172	3 666.9	
22	D19	2.25	4 250	100	956.3	
23	D16	1.56	4 020	16	100.3	
F° 21	D13	0.995	2 800	76	211.7	
22	〃	〃	1 870	76	141.4	
F 31	D32	6.23	8 610	32	1 716.5	
32	〃	〃	7 890	32	1 563.0	
33	D19	2.25	8 230	84	1 555.5	
34	D16	1.56	8 430	32	420.8	(VARIES)
35	〃	〃	8 120	16	202.7	
F° 31	D13	0.995	2 090	192	399.4	(VARIES)
32	〃	〃	2 080	24	49.7	(〃)
				D32	3 279.5 kg	
				D29	3 666.9 〃	
				D19	2 511.8 〃	
				D16	723.8 〃	
				D13	802.2 〃	
		FOOTING	TOTAL WEIGHT		10 984.2 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	BRACING BEAM					
F 1	D32	6.23	33 490	20	4172.9	
2	D16	1.56	32 720	8	408.3	
F° 1	D13	0.995	2 090	240	497.2	
2	〃	〃	1 410	240	336.7	
				D32	4172.9kg	
				D16	408.3 〃	
				D13	823.9 〃	
	BRACING BEAM	TOTAL	WEIGHT		5405.1kg	

No. 95

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
				D32	1 452.9 kg	
				D29	3 666.9 "	
				D19	2 511.8 "	
				D16	1 182.1 "	
				D13	1 626.1 "	
		(2)	TOTAL WEIGHT		16 389.3 kg	

JICA

VIADUCT (V086)

	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	89.0	264.7	7467.1	83.9
BEAM	55.1	184.0	14711.7	267.0
COLUMN	24.5	136.9	5209.7	212.6
CURB	6.6	71.3	749.1	113.5
GRADING CONCRETE	17.4	—	—	—
TOTAL	192.6	656.9	28136.6	146.1
FOOTING	91.5	67.3	10607.2	116.0
BRACING BEAM	13.5	44.9	4070.3	301.5
TOTAL	105.0	112.2	14757.5	140.5

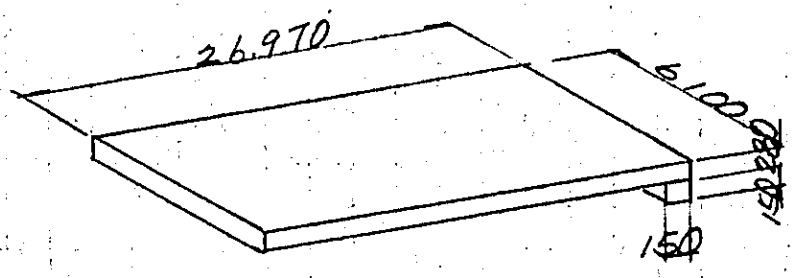
	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	12.9	
AGGREGATE SUB BASE	m^3	25.8	
EXCAVATION	m^3	255.9	
MORTAR	m^3	0.007	
PILE	EACH	φ350 N = A - 84 N = B - 84	φ350 ℓ = A - 14.0 m " ℓ = B - 8.0 m

(V086) $3 \times 8 + 3 = 27.000^{m}$

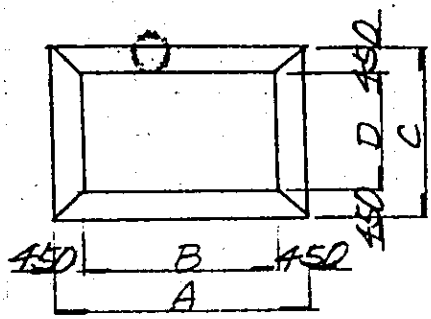
Refer((V089) $2 \times 8 + 3 = 19.000^{m}$)

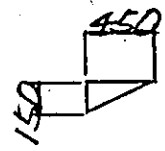
CONCRETE VOLUME

(1) SLAB



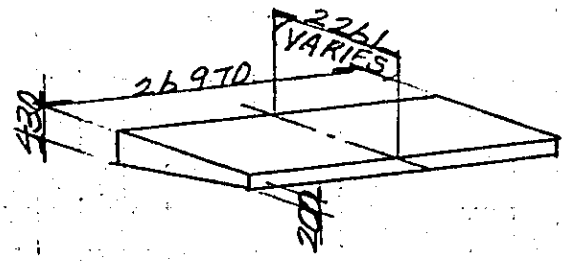
$Va = 26.970 \times 6.100 \times 0.280 + 0.150 \times 0.150 \times 6.100 = 46.202\ m^3$





	A	B	C	D	
$Vb' =$	6.940	6.040	4.700	3.800	$= 0.745$
$Vc' =$	7.300	6.400	〃	〃	$= 0.770$
$Vd' =$	1.980	1.080	〃	〃	$= 0.410$

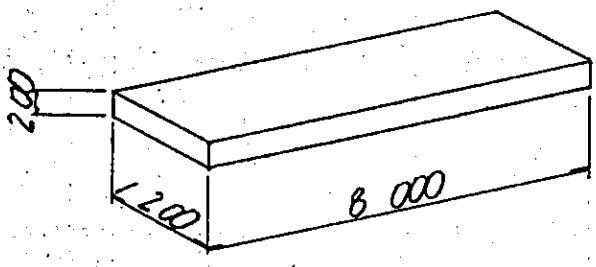
$V_b = 0.795$	=	$0.795\ m^3$
$V_c = 0.770 \times 2$	=	$1.540\ "$
$V_d = 0.910$	=	$0.910\ "$



$V_e' = 1/2 \times (0.430 + 0.200) \times 2.261 \times 26.970 = 19.084$

$V_e = 19.084 \times 2$	=	$38.168\ m^3$

EXTENSION



$V = 1.200 \times 0.20 \times 8.000$ = $1.920\ m^3$

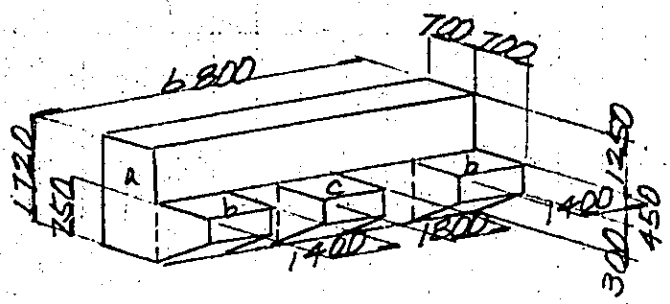
SLAB TOTAL $88.985\ m^3$

(2) BEAM

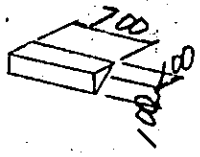
1) LONGITUDINAL BEAM

$Va = 23.338 \times {}^{2T}/_{19}$	=	33.165 m^3
$Vb = 0.168 \times 7 \times 2$	=	2.352 "
SUB TOTAL	=	35.517 m^3

2) AT END OF VIADUCT TRANSVERSE BEAM

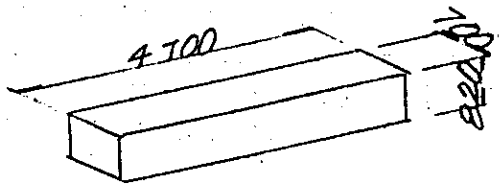


$Va = 1.720 \times 0.700 \times 6.800$	=	8.187 m^3
$Vb = 1.176$	=	1.176 "
$Vc = (0.45 + 0.75) \times {}^{1}/_{2} \times 0.700 \times 1.800$	=	0.756 "
$-V = (0.930 + 0.200) \times {}^{1}/_{2} \times 0.700 \times 1.722$	=	− 0.380 "



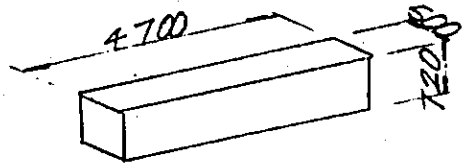
$Ya = 0.008$	=	0.008 "
SUB TOTAL	=	9.747 m^3

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM



$V_A = 0.820 \times 0.700 \times 4.700 \times 3$	=	8 093 m^3
$V_B = 0.100 \times 0.100 \times 1/2 \times 0.700 \times 2 \times 3$	=	0.021 "
SUB TOTAL =		8.114 m^3

4) OUTSIDE GIRDER



$V_A = 0.720 \times 0.500 \times 4.700$	=	1.692 m^3
SUB TOTAL =		1.692 m^3
BEAM TOTAL		55.070 m^3

(3) COLUMN

1) AT END OF VIADUCT COLUMN

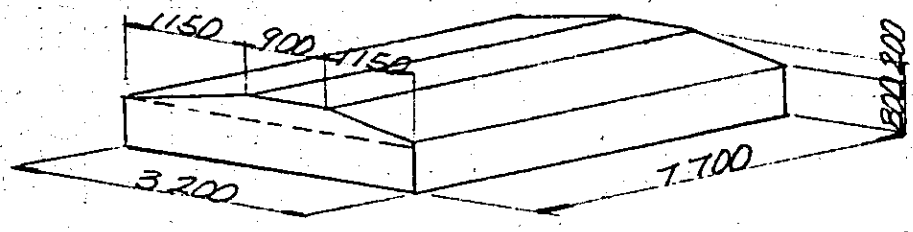
$V_a = 2.769 \times 2 = 5.538\ m^3$

2) AT INTERMEDIATE OF VIADUCT COLUMN

$V_a = 3.162 \times 2 \times 3 = 18.972\ m^3$

COLUMN TOTAL $24.510\ m^3$

(4) FOOTING



$V_a' = 3.200 \times 7.700 \times 0.800 = 19.712$

$V_a = 19.712 \times 4 = 78.848$ m³

$V_b' = (3.200 + 0.900) \times \frac{1}{2} \times 0.200 \times 7.700 = 3.157$

$V_b = 3.157 \times 4 = 12.628$ "

FOOTING TOTAL 91.476 m³

(5) BRACING BEAM

$V_a = 2.131 \times 2$	=	4.262 m^3
$V_b = 2.304 \times 2 \times 2$	=	9.216 "
BRACING BEAM TOTAL		13.478 m^3

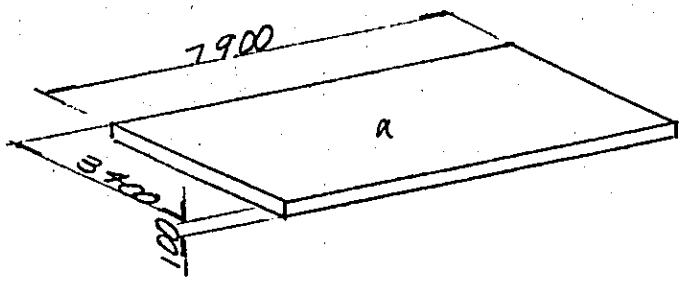
(6) CURB

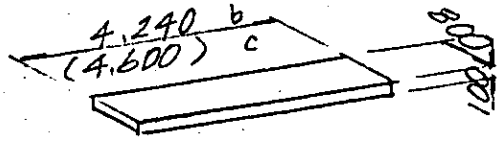
$V_a = 1.612 \times 27/19$	=	2.291 m^3
$V_b = 2.751 \times 27/19$	=	3.909 "
EXTENSION		
$V = 0.378$	=	0.378 m^3
CURB TOTAL	=	6.578 m^3

(7) GRADING CONCRETE

$V = 0.07 \times 9.222 \times 26.970$	=	17.410 m^3
GRADING CONCRETE TOTAL		17.410 m^3

(8) LEVELING CONCRETE

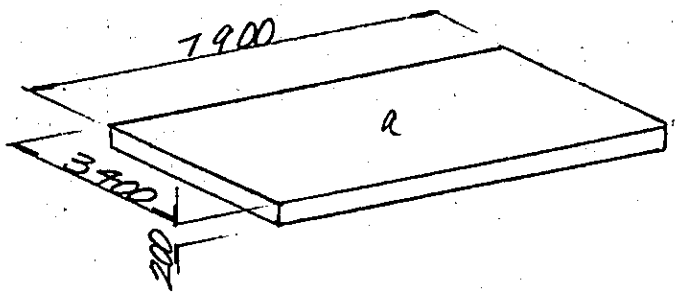


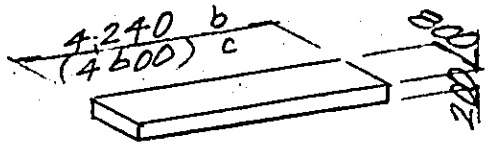


$V_a' = 7.900 \times 3.400 \times 0.100 = 2.686$

$V_a = 2.686 \times 4$	=	10.744 m^3
$V_b = 0.339 \times 2$	=	0.678 "
$V_c = 0.368 \times 2 \times 2$	=	1.472 "
LEVELING CONCRTE TOTAL		12.894 m^3

(9) AGGREGATE SUB BASE





$Va' = 7.900 \times 3.400 \times 0.200 = 5.372$

Va	$= 5.372 \times 4$	=	21.488 m^3
Vb	$= 0.678 \times 2$	=	1.356 "
Vc	$= 0.736 \times 2 \times 2$	=	2.944 "
	AGGREGATE SUB BASE TOTAL		25.788 m^3

(10) PILE

φ350 ℓ = B —— 8.0m

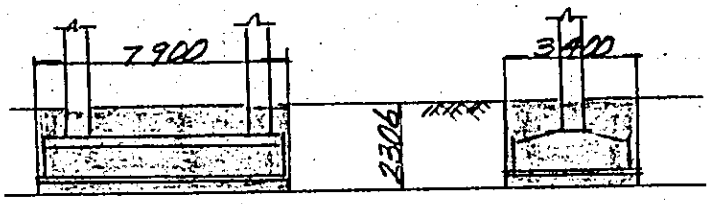
ℓ = A —— 14.0m

$n = 21$

$\Sigma N = 21 \times 4 = 84$

(11) EXCAVATION

1) FOOTING



$Va' = 7.900 \times 3.400 \times 2.036 = 54.687$

$Va = 54.687 \times 4$ = 218.748 m^3

SUB TOTAL = 218.748 m^3

2) BRACING BEAM

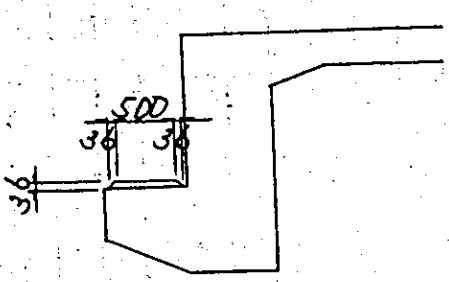
$Va = 5.866 \times 2$ = 11.732 m^3

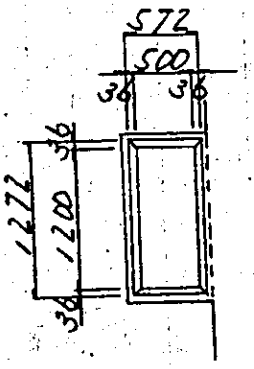
$Vb = 6.365 \times 2 \times 2$ = 25.460 "

SUB TOTAL = 37.192 m^3

EXCAVATION TOTAL 255.940 m^3

(12) FOUNDATION MORTAR





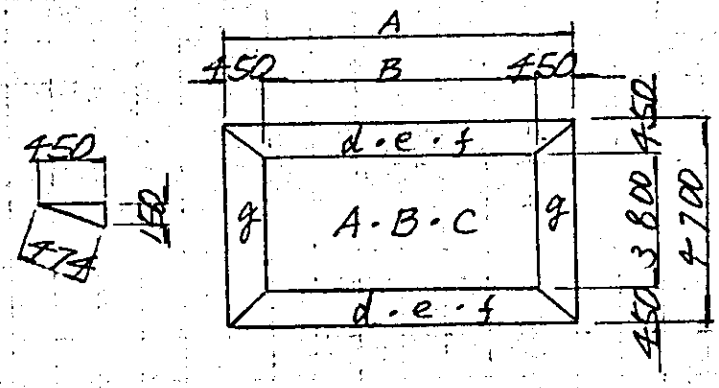
$$V = \{1.272 \times 0.572 - \{1.272 \times 0.572 + (1.272 + 1.20) \times (0.572 + 0.500) + 1.20 \times 0.50\} \times 1/6\} \times 0.036 \times 3$$

$$= 0.007 \ m^3$$

FOUNDATION MORTAR TOTAL = $0.007 \ m^3$

FORM AREA

(1) SLAB



A	B
6940	6040
7300	6400
1980	1080

$A_a = 6.040 \times 3.800$ = 22.952 m²

$A_b = 6.400 \times 3.800 \times 2$ = 48.640 "

$A_c = 1.080 \times 3.800$ = 4.104 "

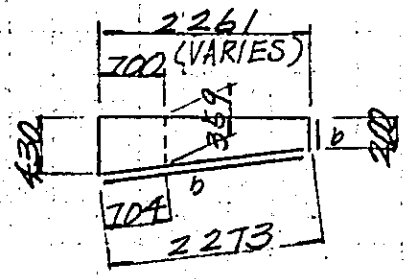
$A_d = 3.076 \times 2$ = 6.152 "

$A_e = 3.247 \times 2 \times 2$ = 12.988 "

$A_f = 0.725 \times 2$ = 1.450 "

$A_g' = (4.700 + 3.800) \times \frac{1}{2} \times 0.474 = 2.015$

$A_g = 2.015 \times 8$ = 16.120 "



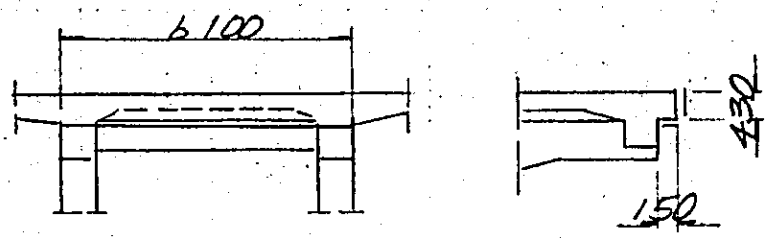
$\ell = 26.970$

$A_a' = (0.430+0.200)\times 1/2 \times 2.261 = 0.712$

$A_a = 0.712 \times 4 - (0.430+0.359)\times 1/2 \times 0.700 = 2.572\ m^2$

$A_b' = (0.200+2.273)\times 26.970 = 66.697$

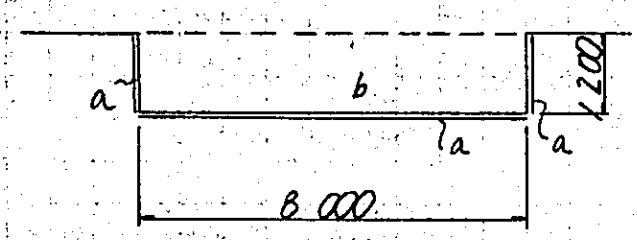
$A_b = 66.697\times 2 - 0.704\times 0.700 = 132.901\ "$

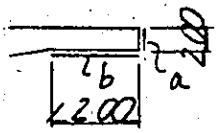


$A_a = (0.150+0.430)\times 6.100 = 3.538\ "$

SUB TOTAL = $251.417\ m^2$

EXTENSION

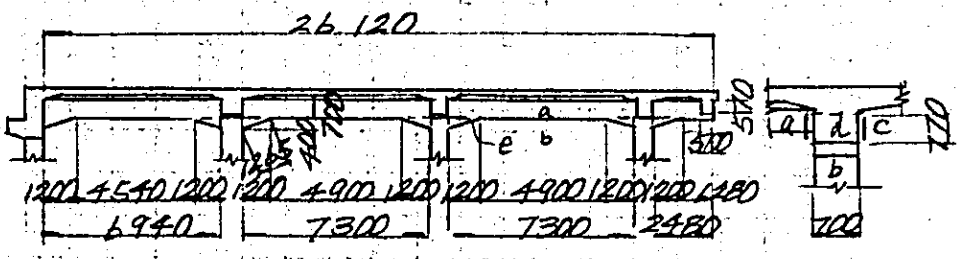




$-A = 8.00 \times 0.20$	=	$1.600\ m^2$
$Aa = (1.20 \times 2 + 8.00) \times 0.20$	=	$2.080\ "$
$Ab = 8.00 \times 1.20$	=	$9.600\ "$
SUB TOTAL =		$13.280\ m^2$
SLAB TOTAL		$264.697\ m^2$

(2) BEAM

1) LONGITUDINAL BEAM



$A'a = 0.770 \times (6.940 + 7.300 \times 2 + 2.480) - 0.500 \times 0.570 = 18.210$

$Ab = 0.700 \times (1.265 \times 7 + 4.540 + 4.900 \times 2 + 1.280) = 17.133$

$Ac' = 0.770 \times 26.120 = 20.112$

$Ad' = 0.770 \times 0.700 = 0.539$

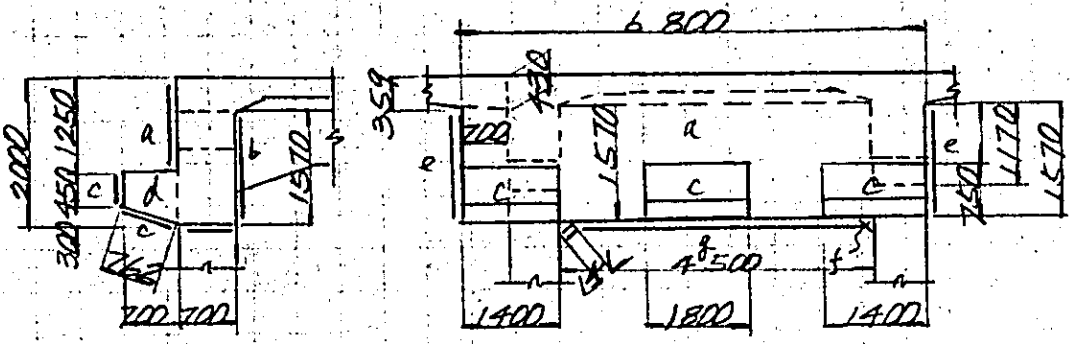
$Ae' = 1.200 \times 0.400 \times 1/2 \times 7 \times 2 = 3.360$

$A' = 18.210 + 17.133 + 20.112 + 0.539 + 3.360 = 59.354$

$A = 59.354 \times 2 = 118.708 \ m^2$

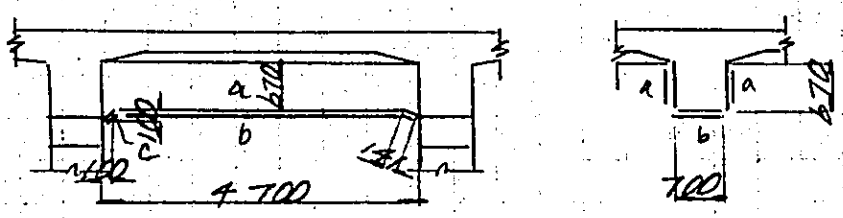
SUB TOTAL = 118.708 m^2

2) AT END OF VIADUCT TRANSVERSE BEAM



$A_a = 6.800 \times 2.000 - (1.400 \times 2 + 1.800) \times 0.750$	=	10.150 m^2
$A_b = 6.800 \times 1.570 - 1.170 \times 0.700 \times 2 - (0.430 + 0.359) \times 1/2 \times 0.700$	=	8.762 "
$A_c = (1.400 \times 2 + 1.800) \times (0.450 + 0.762)$	=	1.577 "
$A_d = (0.450 + 0.750) \times 1/2 \times 0.700 \times 2 \times 3$	=	2.520 "
$A_e = 1.570 \times 0.700 \times 2$	=	2.198 "
$A_f = 0.100 \times 0.100 \times 1/2 \times 4 + 0.141 \times 0.700 \times 2$	=	0.217 "
$A_g = 4.500 \times 0.700$	=	3.150 "
SUB TOTAL	=	28.574 m^2

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM



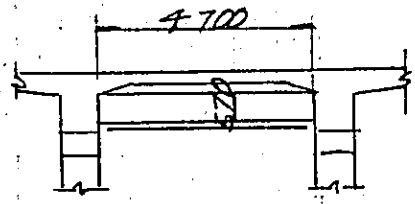
$A_a' = 4.700 \times 0.670 \times 2 = 6.298$

$A_b' = (4.500 + 0.141 \times 2) \times 0.700 = 3.347$

$A_c' = 0.020 = 0.020$

$A_a = 6.298 \times 3$	=	18.894 m^2
$A_b = 3.347 \times 3$	=	10.041 "
$A_c = 0.020 \times 3$	=	0.060 "
SUB TOTAL =		28.995 m^2

4) OUTSIDE GIRDER



b = 500

$A = (0.570 \times 2 + 0.500) \times 4.700$	=	7.708 m^2
SUB TOTAL	=	7.708 m^2
BEAM TOTAL		183.985 m^2

(3) COLUMN

1) AT END OF VIADUCT COLUMN

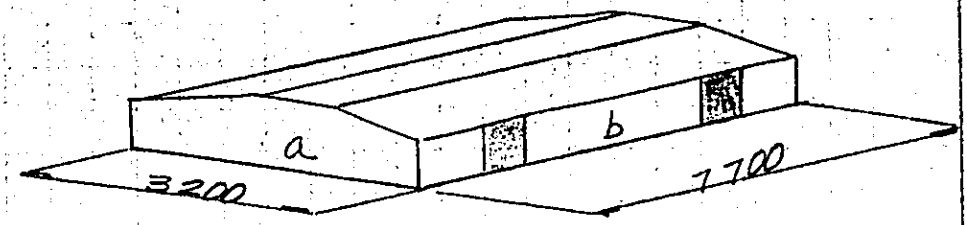
$A_c = 15.960 \times 2 = 31.920\ m^2$

2) AT INTERMEDIATE OF VIADCUT COLUMN

$A_c = 17.500 \times 6 = 105.000\ m^2$

COLUMN TOTAL $136.920\ m^2$

(4) FOOTING



$A_a = 2.970 \times 2 \times 4$	=	23.760 #1
$A_b' = 7.700 \times 0.800$ = 6.160		
$A_b = 6.160 \times 2 \times 4$	=	49.280 "
$-A_b = 0.600 \times 0.800 \times 2 \times 6$	=	− 5.760 "
FOOTING TOTAL		67.280 #2

(5) BRACING BEAM

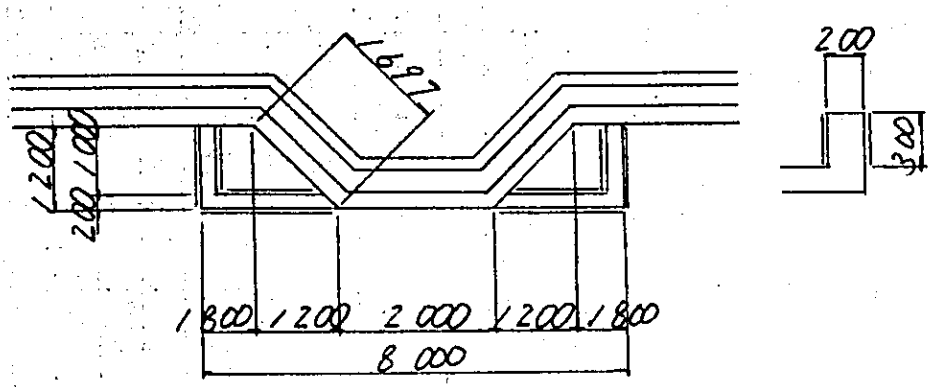
$A_a = 3.552 \times 2 \times 2$	=	14.208 m^2
$A_b = 3.840 \times 2 \times 4$	=	30.720 "
BRACING BEAM TOTAL		44.928 m^2

(6) CURB

$\ell = 26.970$

$A = 45.988 \times 27/19$	=	65.351 m^2
SUB TOTAL	=	65.351 m^2

EXTENSION



$A = 0.30 \times (1.697 - 1.20) \times 4 \times 2$ = 1.193 m²

$A = 0.30 \times (3.00 \times 2 + 2.80 \times 2 + 1.20 \times 2$

$+ 1.00 \times 2)$ = 4.800 "

SUB TOTAL = 5.993 m²

CURB TOTAL 71.394 m²

VIADUCT (V087)

	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	87.1	252.2	7 307.7	83.9
BEAM	56.8	203.0	15 165.6	267.0
COLUMN	24.5	136.9	5 208.7	212.6
CURB	6.2	65.4	703.7	113.5
GRADING CONCRETE	17.4	—	—	—
TOTAL	192.0	657.5	28 385.7	147.8
FOOTING	91.5	67.3	10 687.2	116.8
BRACING BEAM	13.5	44.9	4 070.3	301.5
TOTAL	105.0	112.2	14 757.5	140.5

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	12.9	
AGGREGATE SUB BASE	m^3	25.8	
EXCAVATION	m^3	255.9	
MORTAR	m^3	0.005	
PILE	EACH	φ350 N=A-84 N=B-84	φ350 ℓ=A-14.0m 〃 ℓ=B-8.0m

(V087) $3 \times 8 + 3 = 27.000^{m}$

Refer ((V086) $3 \times 8 + 3 = 27.000^{m}$)

CONCRETE VOLUME

(1) SLAB

$V_a + V_b + V_c + V_d + V_e = 46.202 + 0.745 + 1.540 + 0.410 + 38.168 = 87.065^{m^3}$

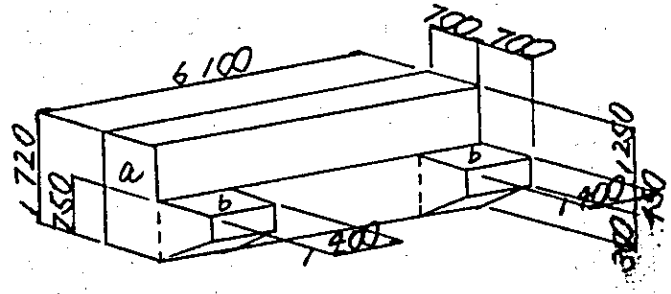
SLAB TOTAL 87.065^{m^3}

(2) BEAM

1) LONGITUDINAL BEAM $= 35.517^{m^3}$

SUB TOTAL $= 35.517^{m^3}$

2) ATEND OF VIADUCT TRANSVERSE BEAM



$V_a = 1.720 \times 0.700 \times 6.100 = 7.344^{m^3}$

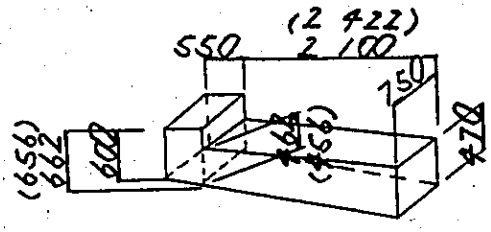
$V_b = (0.45 + 0.75) \times 1/2 \times 0.700 \times 1.400 \times 2 = 1.176^{"}$

$V_c = 0.008 = 0.008^{"}$

SUB TOTAL $= 8.528^{m^3}$

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM	=	8.114 m³
SUB TOTAL =		8.114 m³
4) OUTSIDE GIRDER	=	1.692 m³
SUB TOTAL =		1.692 m³

5) BASE OF ELECTRIC POLE



$V_a' = (0.470 + 0.462) \times 1/2 \times 0.750 \times 2.100$	=	0.734 m³
$V_a'' = (0.600 + 0.662) \times 1/2 \times 0.750 \times 0.550$	=	0.260 "
$V_b' = (0.470 + 0.456) \times 1/2 \times 0.750 \times 2.422$	=	0.841 "
$V_b'' = (0.600 + 0.656) \times 1/2 \times 0.750 \times 0.550$	=	0.259 "
SUB TOTAL =		2.094 m³
6) ELECTRIC POLE	=	0.806 m³
SUB TOTAL =		0.806 m³
ELECTRIC TOTAL		2.900 m³
BEAM TOTAL		56.751 m³

(3) COLUMN		
1) AT END OF VIADUCT COLUMN	=	5.538 m^3
		5.538 m^3
2) AT INTERMEDIATE OF VIADUCT COLUMN	=	18.972 m^3
		18.972 m^3
COLUMN TOTAL		24.510 m^3
(4) FOOTING	=	91.476 m^3
FOOTING TOTAL		91.476 m^3
(5) BRACING BEAM	=	13.478 m^3
BRACING BEAM TOTAL		13.478 m^3
(6) CURB	=	6.200 m^3
CURB TOTAL		6.200 m^3
(7) GRADING CONCRETE	=	17.410 m^3
GRADING CONCRETE TOTAL		17.410 m^3

(8) LEVELING CONCRETE	=	12.894 m³
LEVELING CONCRETE TOTAL		12.894 m³
(9) AGGREGATE SUB BASE	=	25.788 m³
AGGREGATE SUB BASE TOTAL		25.788 m³

(10) PILE

$\phi = 350$ $\quad \ell = B = 8.0^{m}$

$\ell = A = 14.0^{m}$

$n = 21$

$\Sigma N = 21 \times 4 = 84$

(11) EXCAVATION

1) FOOTING	=	218.748 m³
		218.748 m³
2) BRACING BEAM	=	37.192 m³
		37.192 m³
EXCAVATION TOTAL		255.940 m³

(12) FOUNDATION MORTAR

$V = (1.272 \times 0.572 - \{1.272 \times 0.572 + (1.272 + 1.20) \times (0.572 + 0.500) + 1.20 \times 0.50\} \times 1/6) \times 0.036 \times 2 =$ 0.005 m^3

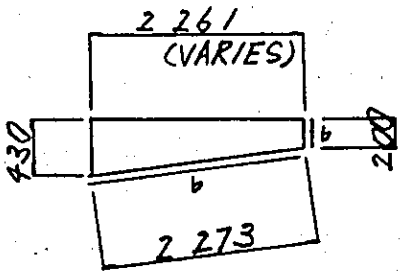
FOUNDATION MORTAR TOTAL 0.005 m^3

FORM AREA

(1) SLAB

$A_a + A_b + A_c + A_d + A_e + A_f + A_g = 22.952 + 98.640$

$+ 4.109 + 6.152 + 12.988 + 1.450 + 16.120 = 112.406\ m^2$



$\ell = 26.970$

$A_a = 0.712 \times 4 = 2.848\ m^2$

$A_b = 66.697 \times 2 = 133.394\ "$

$A_c = (0.150 + 0.430) \times 6.100 = 3.538\ "$

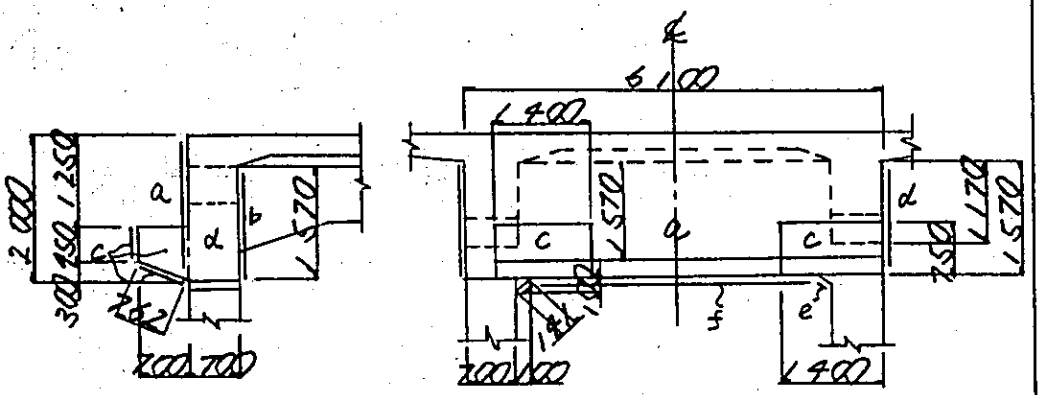
SLAB TOTAL $= 252.186\ m^2$

(2) BEAM

1) LONGITUDINAL BEAM $= 118.708\ m^2$

SUB TOTAL $= 118.708\ m^2$

2) AT END OF VIADUCT TRANSVERSE BEAM



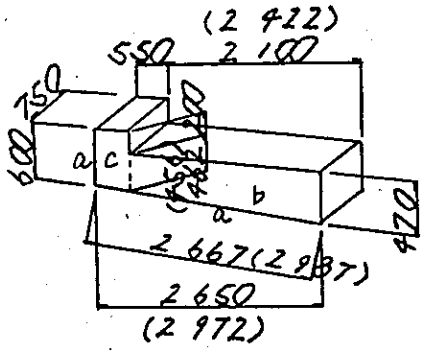
$A_a = 6.100 \times 2.000 - 1.400 \times 0.750 \times 2$	=	10.100 m²
$A_b = 6.100 \times 1.570 - 1.170 \times 0.700 \times 2$	=	7.939 "
$A_c = \{(0.450 + 0.762) \times 1.400 + (0.450 + 0.750) \times 1/2 \times 0.700 \times 2\} \times 2$	=	5.074 "
$A_d = 1.570 \times 0.700 \times 2$	=	2.198 "
$A_e = \{0.100 \times 0.100 \times 1/2 \times 2 + 0.141 \times 0.700\} \times 2$	=	0.217 "
$A_f = 4.500 \times 0.70$	=	3.150 "
SUB TOTAL =		28.678 m²

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM = 28.995 m²

SUB TOTAL =		28.995 m²

4) OUTSIDE GIRDER	=	7.708 m²
		7.708 m²

5) BASE OF ELECTRIC POLE



$Aa' = 0.750 \times (0.600 + 2.667)$	=	2.450 m²
$Ab' = (0.470 + 0.462) \times 1/2 \times 2.100 \times 2$	=	1.957 "
$Ac' = (0.600 + 0.662) \times 1/2 \times 0.550 \times 2$	=	0.694 "
$Aa'' = 0.750 \times (0.600 + 2.987)$	=	2.690 "
$Ab'' = (0.470 + 0.456) \times 1/2 \times 2.422 \times 2$	=	2.243 "
$Ac'' = (0.600 + 0.656) \times 1/2 \times 0.550 \times 2$	=	0.691 "
SUB TOTAL	=	10.725 m²
6) ELECTRIC POLE	=	8.138 m²
		8.138 m²
BEAM TOTAL		202.952 m²

(3) COLUMN		
1) AT END OF VIADUCT COLUMN	=	31.920 m^2
		31.920 m^2
2) AT INTERMEDIATE OF VIADUCT COLUMN	=	105.000 m^2
		105.000 m^2
COLUMN TOTAL		136.920 m^2
(4) FOOTING	=	67.280 m^2
FOOTING TOTAL		67.280 m^2
(5) BRACING BEAM	=	44.928 m^2
BRACING BEAM TOTAL		44.928 m^2
(6) CURB	=	65.351 m^2
CURB TOTAL		65.351 m^2

VIADUCT (V095)

	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	94.8	281.0	8048.5	84.9
BEAM	62.0	207.4	19579.6	315.8
COLUMN	23.7	133.8	5159.3	217.7
CURB	8.0	83.0	912.8	114.1
GRADING CONCRETE	17.8	—	—	—
TOTAL	206.3	705.2	33700.2	163.4
FOOTING	86.7	64.7	10989.2	126.7
BRACING BEAM	18.9	63.0	5905.1	286.0
TOTAL	105.6	127.7	16394.3	155.2

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	13.3	
AGGREGATE SUB BASE	m^3	26.7	
EXCAVATION	m^3	288.0	
MORTAR	m^3	0.011	
PILE	EACH	φ350 N=A-84 N=B-84	φ350 ℓ=A-12.0m , ℓ=B-8.0m

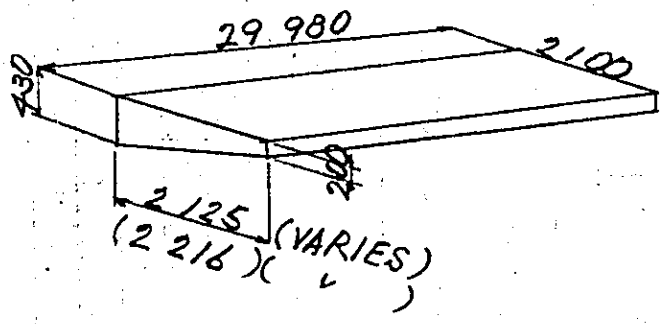
(V095) 3 × 10 = 30.000 m

Refer ((V094) 3 × 10 = 30.000 m)

CONCRETE VOLUME

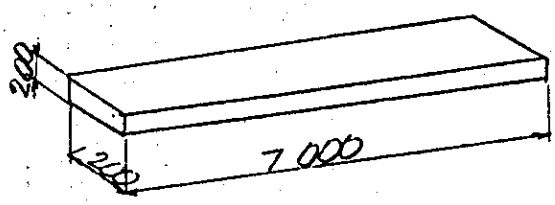
(1) SLAB

Va + Vb + bc = 47.848 + 0.878 + 1.706 = 50.432 m²



Vd = (0.430 + 0.200) × 1/2 × (2.125 + 2.216) × 29.980 = 40.995

EXTENSION



n = 2

Ve = 1.200 × 0.200 × 7.000 × 2 = 3.360

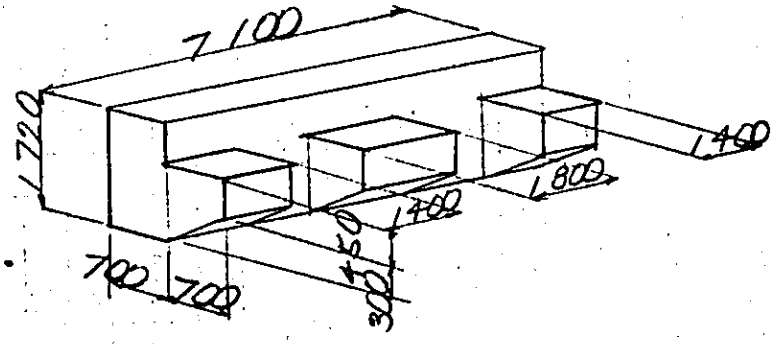
SLAB TOTAL 94.787 m³

(2) BEAM

1) LONGITUDINAL BEAM = 38.820 m³

2) AT END OF VIADUCT TRANSVERSE BEAM

16.094 × 1/2 = 8.047 m³



V_a = 0.700 × 1.720 × 7.100 = 8.548 m³

V_b = (0.450 + 0.750) × 1/2 × 0.700 × (1.800 + 1.400 × 2) = 1.932 m³

$-V$ = (0.430 + 0.200) × 1/2 × 0.700 × (1.233 + 0.167) = − 0.309 m³

SUB TOTAL = 18.218 m³

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM 4.952 m³

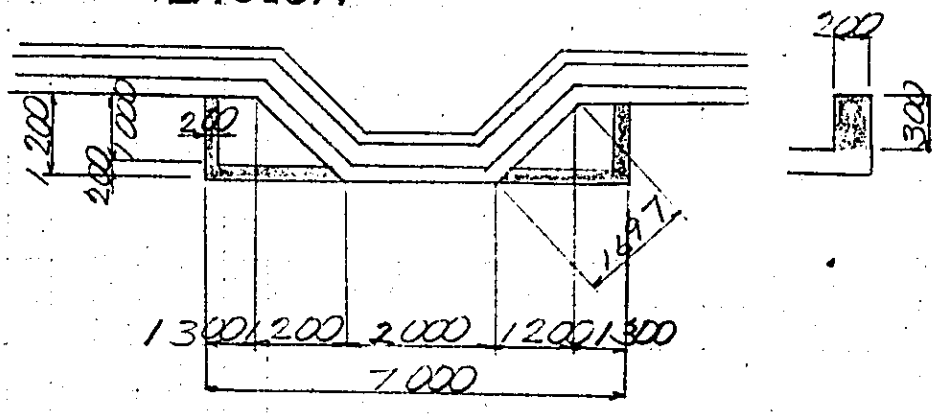
BEAM TOTAL 61.998 m³

(3) COLUMN	=	23.720 m^3
COLUMN TOTAL		23.720 m^3
		86.724 m^3
(4) FOOTING		
FOOTING TOTAL		86.724 m^3
(5) BRACING BEAM	=	18.892 m^3
BRACING BEAM TOTAL		18.892 m^3

(6) CURB

$Va + Vb = 2.548 + 4.347 = 6.895\ m^3$

EXTENSION

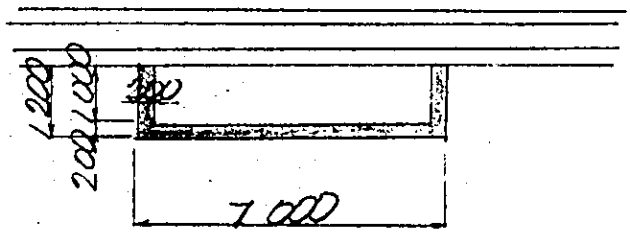


$V = (0.25 \times 0.15 + 0.10 \times 0.05) \times (1.697 - 1.20) \times 2 = 0.042\ m^3$

$V = (0.25 \times 0.25 + 0.20 \times 0.05) \times (1.697 - 1.20) \times 2 = 0.072$ "

$V = 0.20 \times 0.30 \times (2.50 \times 2 + 1.00 \times 2) = 0.420$ "

SUB TOTAL = $0.534\ m^2$



$V = 0.20 \times 0.30 \times (7.00 + 1.00 \times 2) = 0.540\ m^3$

$0.540\ m^2$

CURB TOTAL $7.967\ m^3$

(7) GRADING CONCRETE =	17.838 m^3
GRADING CONCRETE TOTAL	17.838 m^3
(8) LEVELING CONCRETE	13.348 m^3
LEVELING CONCRETE TOTAL	13.348 m^3
(9) AGGREGATE SUB BASE	26.696 m^3
AGGREGATE SUB BASE TOTAL	26.696 m^3

(10) PILE

$\varphi = 350$ $\quad \ell = B$ —— 8.0 m

$\ell = A$ —— 13.0 "

$n = 21$

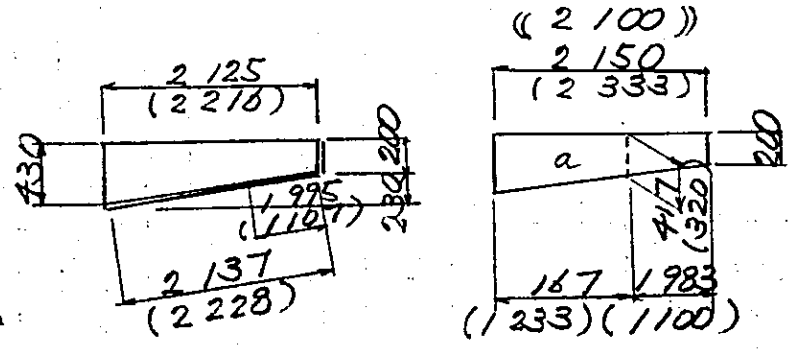
$\Sigma N = 21 \times 4 = 84$

(11) EXCAVATION		288.012 m^3
	EXCAVATION TOTAL	288.012 m^3
(12) FOUNDATION MORTAR		
$V = 0.009 \times \frac{5}{4}$	=	0.011 m^3
	FOUNDATION MORTAR TOTAL	0.011 m^3

FORM AREA

(1) SLAB

$Aa + Ab + Ac + Ad + Ae = 54.672 + 28.560 + 10.950 + 16.096 + 8.390 = 118.668\ m^2$

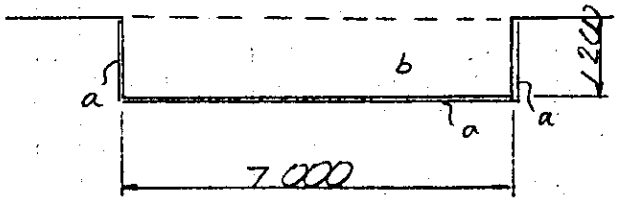


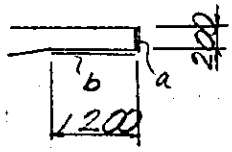
$\ell = 29.98^m$

$\ell = 29.28^m$
$(\ell = 0.70^m)$

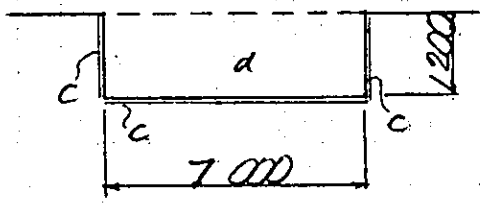
$Aa = (0.430 + 0.200) \times 1/2 \times 2.100 \times 2$	=	$1.323\ m^2$
$Ab = (0.430 + 0.417) \times 1/2 \times 1.983$	=	$0.840\ "$
$Ac = (0.430 + 0.320) \times 1/2 \times 1.100$	=	$0.413\ "$
$Ad = 0.20 \times 29.980 \times 2$	=	$11.992\ "$
$Ae = (2.137 + 2.228) \times 29.280$	=	$127.807\ "$
$Af = (1.995 + 1.107) \times 0.700$	=	$2.171\ "$
SUB TOTAL	=	$263.214\ m^2$

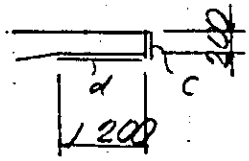
EXTENSION





$-A = 7.00 \times 0.20$	=	$-1.400\ m^2$
$Aa = (1.20 \times 2 + 7.00) \times 0.20$	=	$1.880\ m^2$
$Ab = 7.00 \times 1.20$	=	$8.400\ "$
SUB TOTAL	=	$8.880\ m^2$



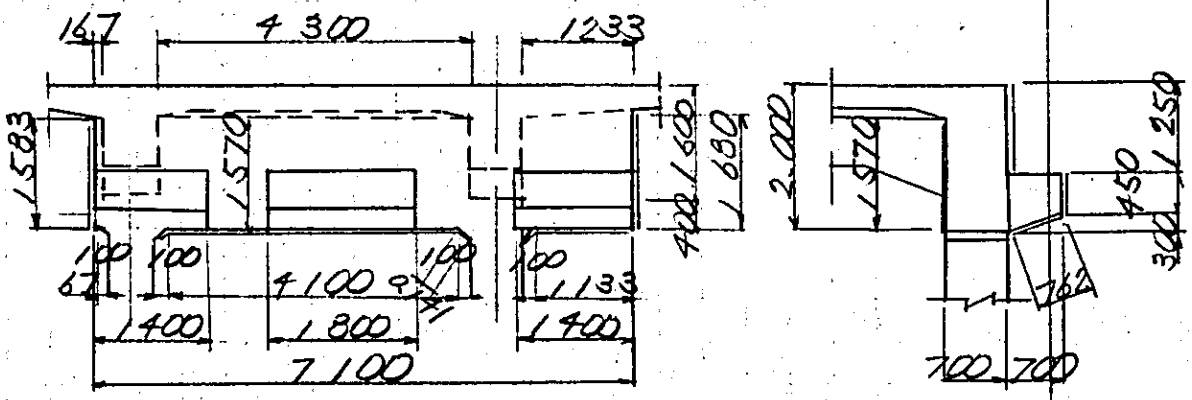


$Ac = (1.20 \times 2 + 7.00) \times 0.20$	=	$1.880\ m^2$
$Ad = 7.00 \times 1.20$	=	$8.400\ "$
$-A = 7.00 \times 0.20$	=	$-1.400\ "$
SUB TOTAL		$8.880\ m^2$
SLAB TOTAL		$280.974\ m^2$

(2) BEAM

1) LONGITUDINAL BEAM = 130.230 m²

2) AT END OF VIADUCT TRANSVERSE BEAM = 26.970 "



$A_a = (1.583 + 1.570) \times 1/2 \times 0.167$ = 0.263 m²

$A_b = 4.300 \times 1.570$ = 6.751 "

$A_c = (1.680 + 1.570) \times 1/2 \times 1.233$ = 2.004 "

$A_d = 0.700 \times 0.400 \times 2$ = 0.560 "

$A_e = 7.100 \times 2.00 - 1.400 \times 0.750 \times 2$

$- 1.800 \times 0.750$ = 10.750 "

$A_f = (0.067 + 4.100 + 1.133 + 0.141 \times 4) \times 0.700$ = 4.105 "

$A_g = (0.450 + 0.750) \times 1/2 \times 0.700 \times 6$ = 2.520 "

$A_h = (0.450 + 0.762) \times (1.400 \times 2 + 1.800)$ = 5.575 "

SUB TOTAL = 32.528 m²

3) AT INTERMEDIATE OF VIADUCT TRNSVERSE BEAM	=	17.698 m^2
BEAM TOTAL		207.426 m^2
(3) COLUMN	=	133.840 m^2
COLUMN TOTAL		133.840 m^2
(4) FOOTING		64.720 m^2
FOOTING TOTAL		64.720 m^2
(5) BRACING BEAM	=	62.976 m^2
BRACING BEAM TOTAL		62.976 m^2

(6) CURB

$Aa + Ab + Ac + Ad = 35.976 + 0.170 + 35.976 + 0.290 =$ 72.412 m^2

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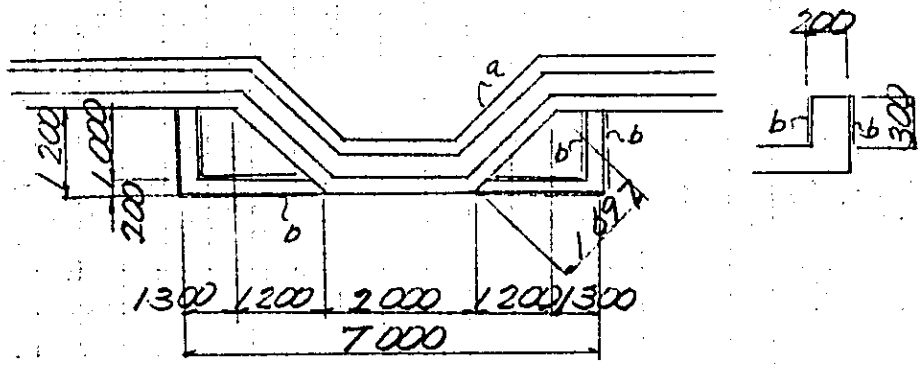
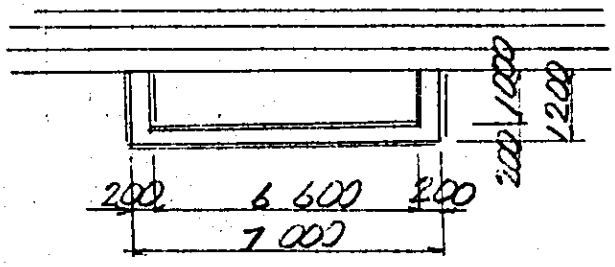


$A = 0.30 \times (1.697 - 1.20) \times 4 \times 2$ = 1.193 m^2

$A = 0.30 \times (2.50 \times 2 + 2.30 \times 2 + 1.20 \times 2 + 1.00 \times 2)$ = 4.200 m^2

SUB TOTAL 5.393 m^2



$A = 0.30 \times (7.00 + 6.60 + 1.20 \times 2 + 1.00 \times 2) =$ 5.220 m^2

SUB TOTAL 5.220 m^2

CURB TOTAL 83.025 m^2

VIADUCT (V096)

	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	138.9	392.3	11 792.6	84.9
BEAM	99.2	332.2	31 327.4	315.8
COLUMN	35.6	200.8	7 750.1	217.7
CURB	6.9	72.4	787.3	114.1
GRADING CONCRETE	29.4	—	—	—
TOTAL	310.0	997.7	51 657.4	166.6
FOOTING	150.9	96.4	19 119.0	126.7
BRACING BEAM	28.3	94.5	8 093.8	286.0
TOTAL	179.2	190.9	27 212.8	151.9

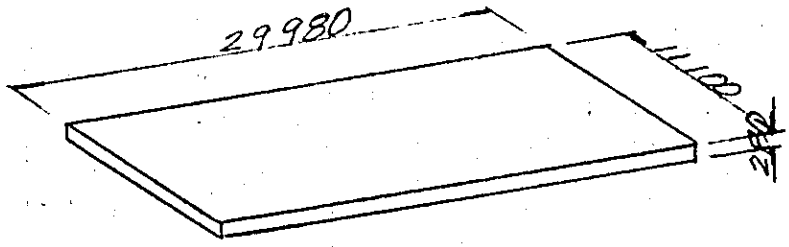
	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	22.1	
AGGREGATE SUB BASE	m^3	44.2	
EXCAVATION	m^3	483.8	
MORTAR	m^3	0.014	
PILE	EACH	$N = A - 132$ ($\phi 350$) $N = B - 132$	$\phi 350$ $\ell = A - 12.0^m$ " $\ell = B - 8.0^m$

(V096) $3 \times 10 = 30.000^{m}$

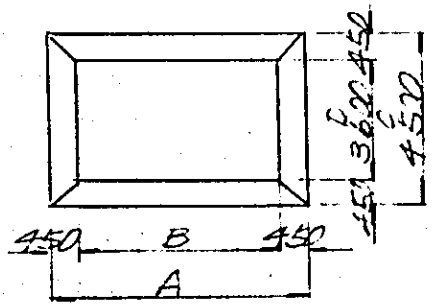
Refer ((V099) $3 \times 10 = 30.000^{m}$)

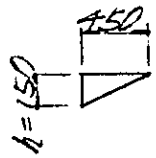
CONCRETE VOLUME

(1) SLAB



$V_a = 29.980 \times 11.100 \times 0.280 = 93.178^{m^3}$

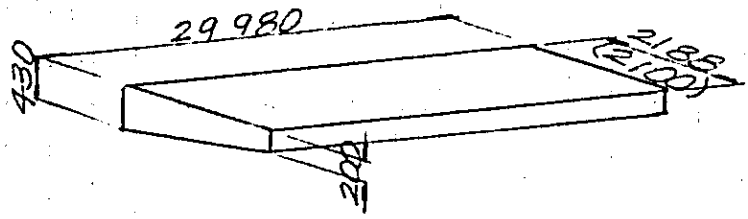




$V=[A \times C - \{A \times C + (A+B) \times (C+D) + B \times D^2\} \times 1/6] \times h$

	A	B	C	D	
$V_b' =$	9300	8400	4500	3600	$= 0.891^{m^3}$
$V_c' =$	8940	8040	〃	〃	$= 0.867^{〃}$

$V_b = 0.891 \times 2$	=	1.782 m³
$V_c = 0.867 \times 4$	=	3.468 "



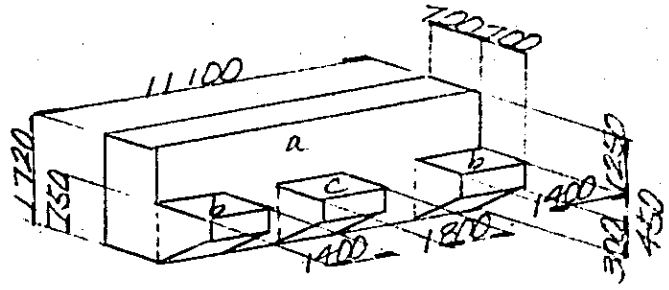
$V_d = \frac{1}{2} \times (0.430 + 0.200) \times 2.155 \times 29.980$	=	20.663 m³
$V_e = \frac{1}{2} \times (0.430 + 0.200) \times 2.100 \times 29.980$	=	19.532 "
SLAB TOTAL		138.923 m³

(2) BEAM

1) LONGITUDINAL BEAM

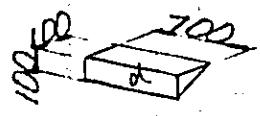
$V_a = 18.406 \times 3$	=	55.218 m^3
$V_b = 0.168 \times 6 \times 3$	=	3.024 "
SUB TOTAL	=	58.242 m^3

2) AT END OF VIADUCT TRANSVERSE BEAM



$V_a' = 1.720 \times 0.700 \times 11.100 = 13.364$

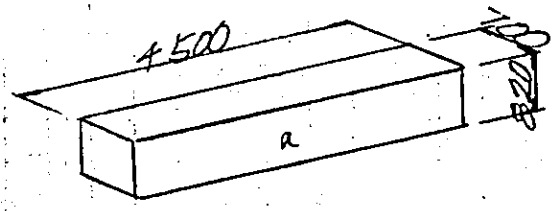
$V_a = 13.364 \times 2$	=	26.728 m^3
$V_b' = (0.450 + 0.750) \times \frac{1}{2} \times 0.700 \times 1.400 = 0.588$		
$V_b = 0.588 \times 2 \times 2$	=	2.352 "
$V_c' = (0.450 + 0.750) \times \frac{1}{2} \times 0.700 \times 1.800 = 0.756$		
$V_c = 0.756 \times 2$	=	1.512 "



$V_a = 0.004 \times 4 \times 2$ = 0.032 m^3

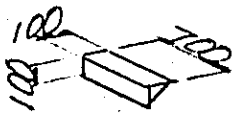
SUB TOTAL = 30.624 m^3

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM



$V_a' = 0.820 \times 0.700 \times 4.500 = 2.583$

$V_a = 2.583 \times 4$ = 10.332 m^3



$V_b = 0.004 \times 2 \times 4$ = 0.032 m^3

SUB TOTAL = 10.364 m^3

BEAM TOTAL = 99.230 m^3

(3) COLUMN

1) AT END OF VIADUCT COLUMN

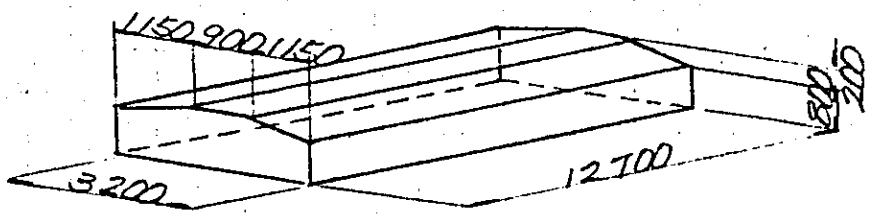
$Va = 2.769 \times 3 \times 2$ = 16.614 m^3

2) AT INTERMEDIATE OF VIADUCT COLUMN

$Va = 3.161 \times 3 \times 2$ = 18.966 "

COLUMN TOTAL	35.580 m^3

(4) FOOTING



$V_a' = 3.200 \times 12.700 \times 0.800 = 32.512$ m³

$V_a = 32.512 \times 4 = 130.048$ "

$V_b' = (0.900 + 3.200) \times \frac{1}{2} \times 0.200 \times 12.700 = 5.207$ "

$V_b = 5.207 \times 4 = 20.828$ "

FOOTING TOTAL 150.876 m³

(5) BRACING BEAM

$V_a = 3.091 \times 3 \times 2 = 18.546$ m³

$V_b = 3.264 \times 3 = 9.792$ "

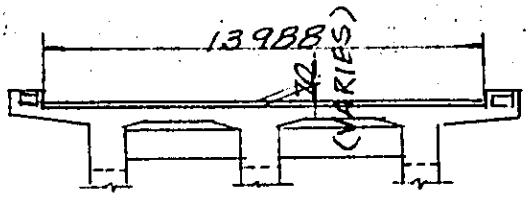
BRACING BEAM TOTAL 28.338 m³

(6) CURB

$\ell = 29.980$

$V_a = 2.548$	=	2.548 m^3
$V_b = 4.347$	=	4.347 "
CURB TOTAL		6.895 m^3

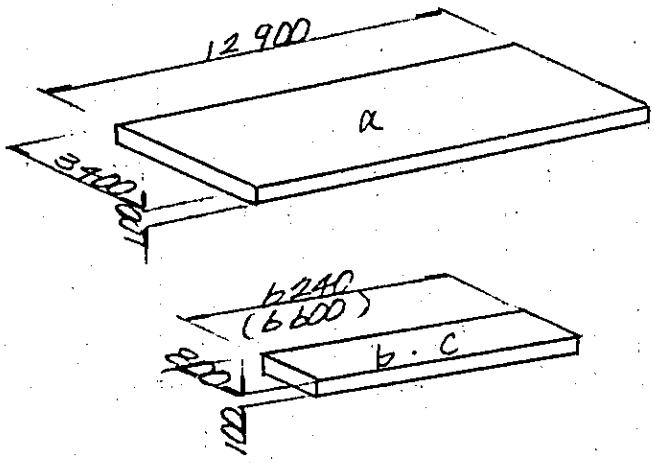
(7) GRADING CONCRETE



$\ell = 29.980$

$V_a = 0.070 \times 13.988 \times 29.980$	=	29.355 m^3
GRADING CONCRETE TOTAL		29.355 m^3

(8) LEVELING CONCRETE



$V_{a'} = 12.900 \times 3.400 \times 0.100 = 4.386$

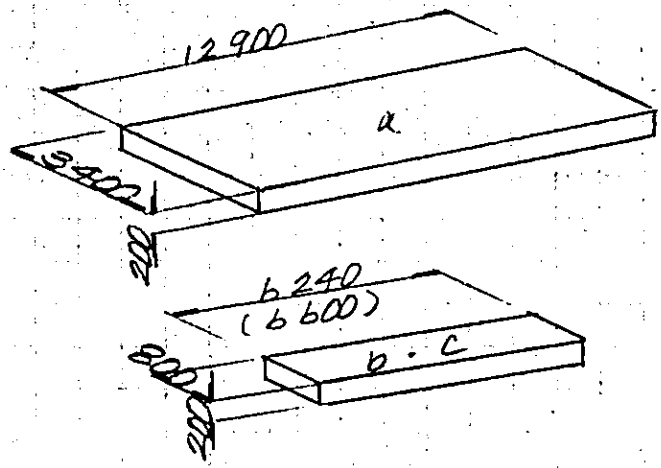
$V_a = 4.386 \times 4$ = 17.544 "

$V_b = 6.240 \times 0.800 \times 0.100 \times 3 \times 2$ = 2.995 "

$V_c = 6.600 \times 0.800 \times 0.100 \times 3$ = 1.584 "

LEVELING CONCRETE TOTAL = 22.123 m³

(9) AGGREGATE SUB BASE



$V_a' = 12.900 \times 3.400 \times 0.200 = 8.772$ m³

$V_a = 8.772 \times 4 = 35.088$ m³

$V_b = 6.240 \times 0.800 \times 0.200 \times 3 \times 2 = 5.990$ m³

$V_c = 6.600 \times 0.900 \times 0.200 \times 3 = 3.168$ m³

AGGREGATE SUB BASE TOTAL	44.246 m³

(10) PILE

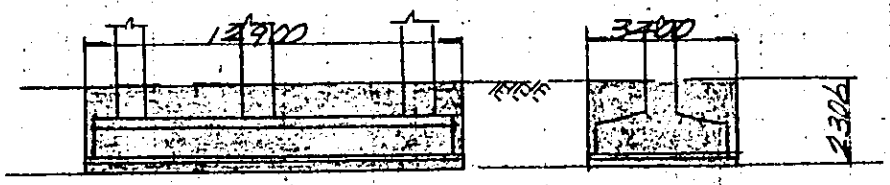
$\phi = 350^{mm}$ $\ell = 20.000^{m}$ $n = 33$

$N = 33 \times 4$ = 132

PILE TOTAL	132

(11) EXCAVATION

1) FOOTING



$Va' = 12.900 \times 3.400 \times 2.306 = 101.141$

$Va = 101.141 \times 4$ = 404.564 m³

SUB TOTAL = 404.564 m³

2) BRACING BEAM

$Va = 8.634 \times 3 \times 2$ = 51.804 m³

$Vb = 9.132 \times 3$ = 27.396 "

SUB TOTAL = 79.200 m³

EXCAVATION TOTAL 483.764 m³

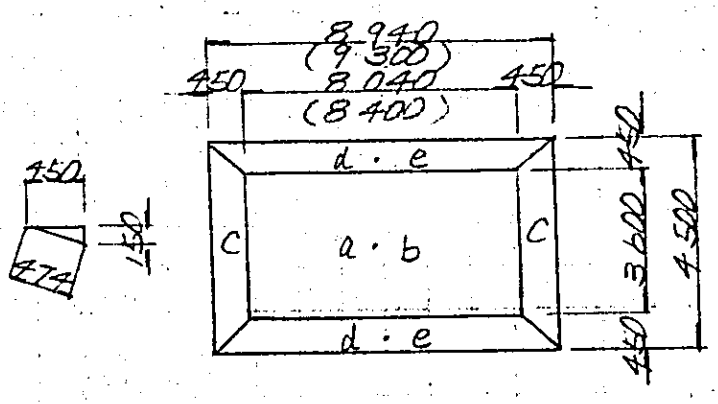
(12) FOUNDATION MORTAR

$V = 0.009 \times \frac{6}{4}$ = $0.014\ m^3$

FOUNDATION MORTAR TOTAL $0.014\ m^3$

FORM AREA

(1) SLAB



$A_a' = 8.040 \times 3.600 = 28.944$

$A_a = 28.944 \times 4 = 115.776\ m^2$

$A_b' = 8.400 \times 3.600 = 30.240$

$A_b = 30.240 \times 2 = 60.480\ "$

$A_c' = (4.500 + 3.600) \times \frac{1}{2} \times 0.474 = 1.920$

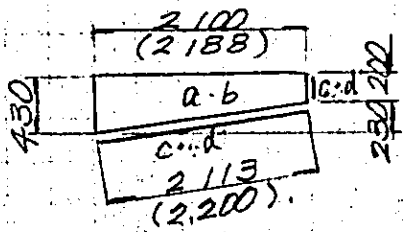
$A_c = 1.920 \times 2 \times 6 = 23.040\ "$

$A_d' = (8.940 + 8.040) \times \frac{1}{2} \times 0.474 = 4.024$

$A_d = 4.024 \times 2 \times 4 = 32.192\ "$

$A_e' = (9.300 + 8.400) \times \frac{1}{2} \times 0.474 = 4.195$

$A_e = 4.195 \times 2 \times 2 = 16.780\ "$



$l = 29.980$

$A_a = 0.662 \times 2$ = 1.324 m^2

$A_b' = (0.430 + 0.200) \times \frac{1}{2} \times 2.188 = 0.689$

$A_b = 0.689 \times 2$ = 1.378 "

$A_c = 69.344$ = 69.344 "

$A_d = (2.200 + 0.200) \times 29.980$ = 71.952 "

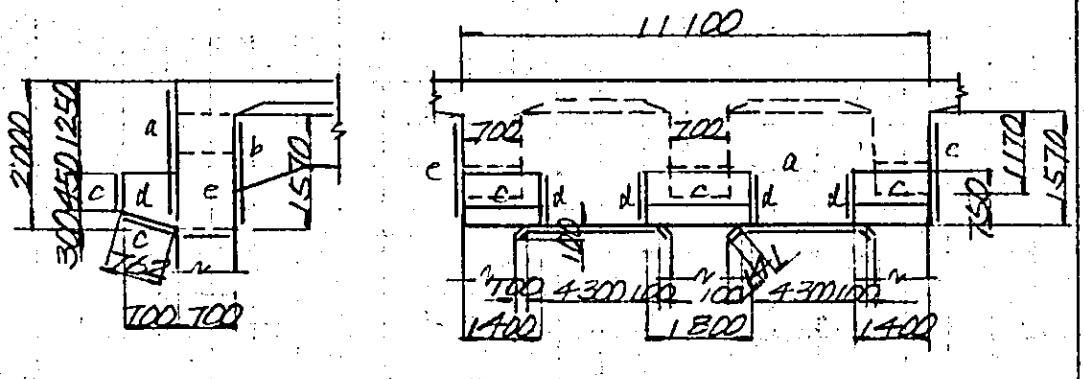
SLAB TOTAL 392.266 m^2

(2) BEAM

1) LONGITUDINAL BEAM

A_a = 13.768 × 4	=	55.072 m²
A_b = 12.698 × 3	=	38.094 "
A_c = 7.161 × 4	=	28.644 "
A_d = 6.601 × 3	=	19.803 "
A_e = 22.007 × 2	=	44.014 "
A_f = 2.880 × 3	=	8.640 "
SUB TOTAL =		194.267 m²

2). AT END OF VIADUCT TRANSVERSE BEAM



$A_a' = 11.100 \times 2.000 - (1.400 \times 2 + 1.800) \times 0.750 = 18.750$

$A_b' = 11.100 \times 1.570 - 1.170 \times 0.700 \times 3 = 14.970$

$A_c' = (0.450 + 0.762) \times (1.400 \times 2 + 1.800) = 5.575$

$A_d' = (0.450 + 0.750) \times 1/2 \times 0.700 \times 2 \times 3 = 2.520$

$A_e' = 0.700 \times 1.570 \times 2 = 2.198$

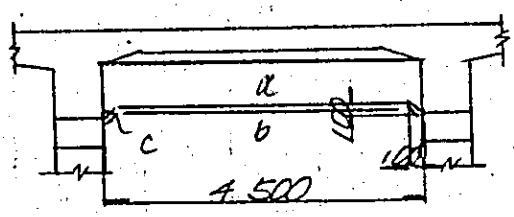
$A_f' = 0.100 \times 0.100 \times 1/2 \times 8 = 0.040$

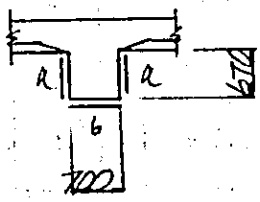
$A_g' = (0.141 \times 4 + 4.300 \times 2) \times 0.700 = 6.415$

$A = (18.750 + 14.970 + 5.575 + 2.520 + 2.198 + 0.040 + 6.415) \times 2 = 100.936 \ m^2$

SUB TOTAL = 100.936 m^2

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM





$A_a' = 4.500 \times 0.670 \times 2 = 6.030$

$A_b' = (4.300 + 0.141 \times 2) \times 0.700 = 3.207$

$A_c' = 0.020$

$A_a = 6.030 \times 4$	=	24.120 m²
$A_b = 3.207 \times 4$	=	12.828 〃
$A_c = 0.020 \times 4$	=	0.080 〃
SUB TOTAL =		37.028 m²
BEAM TOTAL		332.231 m²

(3) COLUMN

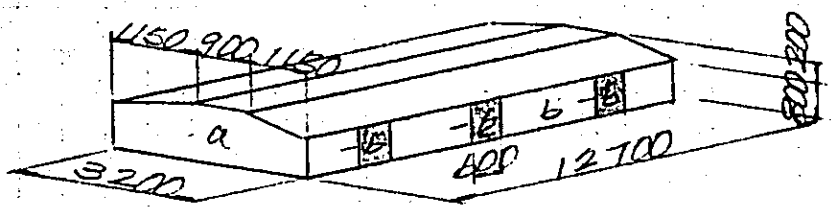
1) AT END OF VIADUCT COLUMN

$A_a = 15.960 \times 6$	=	95.760 m²

2) AT INTERMEDIATE OF VIADUCT COLUMN

$A_a = 17.500 \times 6$	=	105.000 m²
COLUMN TOTAL		200.760 m²

(4) FOOTING



$A_a = 2.970 \times 2 \times 4$	=	23.760 m²
$A_b = 12.700 \times 0.800 \times 2 \times 4$	=	81.280 "
$-A_b = 0.600 \times 0.800 \times 3 \times 6$	=	− 8.640 "
FOOTING TOTAL		96.400 m²

(5) BRACING BEAM

$A_a = 5.152 \times 2 \times 6$	=	61.824 m²
$A_b = 5.440 \times 2 \times 3$	=	32.640
BRACING BEAM TOTAL		94.464 m²

(6) CURB

ℓ = 29.980

A_a = 35.976	=	35.976 m²
A_b = 0.170	=	0.170 "
A_c = 35.976	=	35.976 "
A_d = 0.290	=	0.290 "
	CURB TOTAL	72.412 m²

VIADUCT (V097)

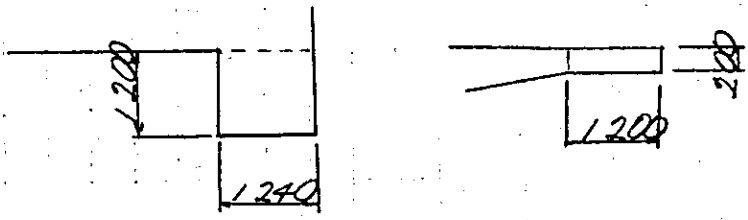
	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	139.2	394.2	11 818.1	84.9
BEAM	99.2	332.2	31 327.4	315.8
COLUMN	35.6	200.8	7 750.1	217.7
CURB	7.1	74.1	810.1	114.1
GRADING CONCRETE	29.4	—	—	—
TOTAL	310.5	1001.3	51 705.7	166.5
FOOTING	150.9	96.4	19 119.0	126.7
BRACING BEAM	28.3	94.5	8 093.8	286.0
TOTAL	179.2	190.9	27 212.8	151.9

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	22.1	
AGGREGATE SUB BASE	m^3	44.2	
EXCAVATION	m^3	483.8	
MORTAR	m^3	0.014	
PILE	EACH	ϕ350 N=A-132 N=B-192	ϕ350 ℓ=A-12.0m ℓ=B-8.0m

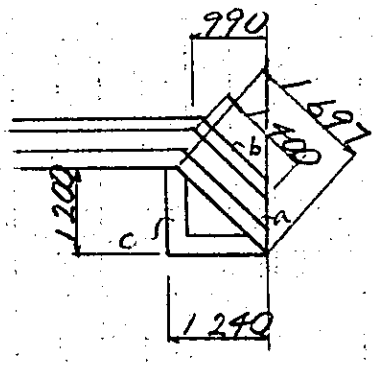
(V097) 3 × 10 = 30.000m

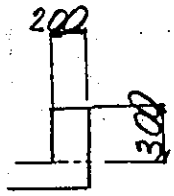
Refer ((V096) 3 × 10 = 30.000m)

CONCRETE VOLUME

(1) SLAB	=	138.923 m³
EXTENSION		
		
V = 1.200 × 1.240 × 0.200	=	0.298 m³
SLAB TOTAL		139.221 m³
(2) BEAM	=	99.230 m³
(3) COLUMN	=	35.580 m³
(4) FOOTING	=	150.876 m³
(5) BRACING BEAM	=	28.338 m³
(6) CURB $V_a + V_b$ = 2.548 + 4.347	=	6.895 m³

EXTENSION





$V_a = (0.25 \times 0.15 + 0.10 \times 0.05) \times (1.40 - 0.99)$ = 0.017 m^3

$V_b = (0.25 \times 0.25 + 0.20 \times 0.05) \times (1.697 - 1.24)$ = 0.033 m^3

$V_c = 0.20 \times 0.30 \times (1.24 + 1.00)$ = 0.134 m^3

CURB TOTAL 7.079 m^3

(7) GRADING CONCRETE = 29.355 m^3

(8) LEVELING CONCRETE = 22.123 m^3

(9) AGGREGATE SUB BASE = 44.246 m^3

(10) PILE

$\phi 350^{mm}$ $\ell = 20.00^{m}$ $n = 33$

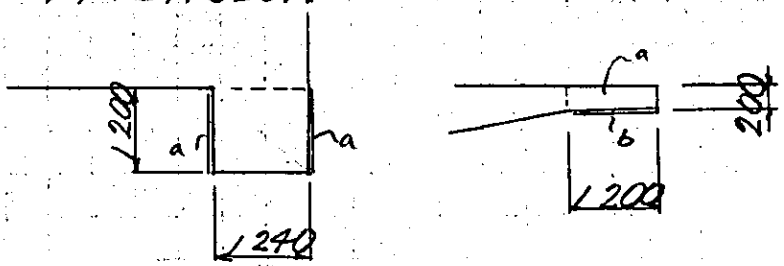
$N = 33 \times 4 = 132$

(11) EXCAVATION	=	483.764 m^3
(12) FOUNDATION MORTAR	=	0.014 m^3

FORM AREA

(1) SLAB	=	392.266 m^2

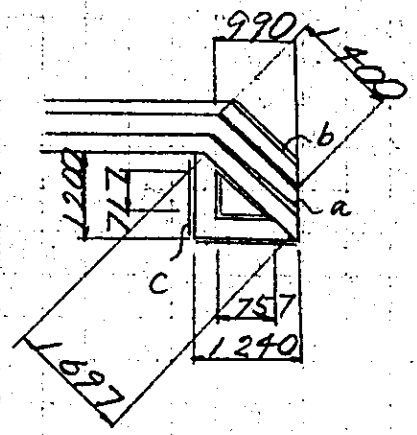
EXTENSION

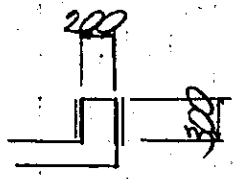


$A_a = 1.200 \times 0.200 \times 2$	=	0.480 m^2
$A_b = 1.200 \times 1.240$	=	1.488 "
SLAB TOTAL		394.234 m^2
(2) BEAM	=	332.231 m^2
(3) COLUMN	=	200.760 m^2
(4) FOOTING	=	96.400 m^2
(5) BRACING BEAM	=	94.464 m^2

(6) CURB = 72.412 m²

EXTENSION





$A_a = 0.300 \times (1.697 - 1.240) \times 2$ = 0.274 m²

$A_b = 0.300 \times (1.400 - 0.990) \times 2$ = 0.246 "

$A_c = 0.300 \times (1.240 + 0.757 + 1.200 + 0.717)$ = 1.174 "

CURB TOTAL 74.106 m²

No. 0-1

§ 27. VIADUCT (3 OF 3)

JICA

CONTENTS

No. /

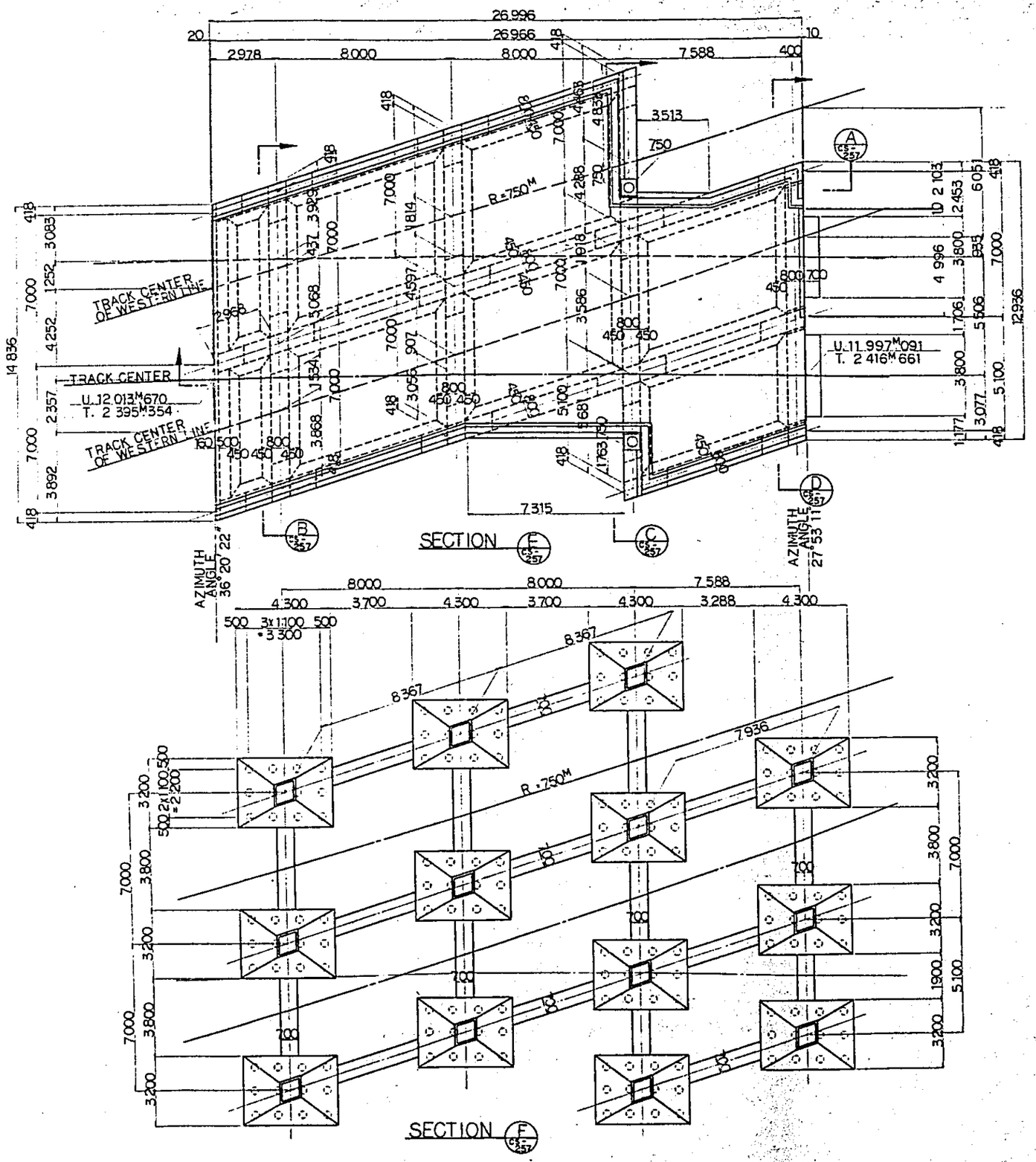
1. V 129

JICA

VIADUCT (V129)

	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	118.7	322.8	14 770.0	124.4
BEAM	103.5	359.2	30 893.9	298.5
COLUMN	77.1	334.3	13 837.7	179.5
CURB	7.5	77.7	939.4	125.3
GRADING CONCRETE	23.9	—	—	—
TOTAL	330.7	1097.0	60 441.0	182.8
FOOTING	185.1	152.8	14 620.7	79.0
BRACING BEAM	40.3	130.2	13 391.1	332.3
TOTAL	225.4	283.0	28 011.8	124.3

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	25.3	CLASS F
AGGREGATE SUB BASE	〃	50.6	A.S.B.-3
EXCAVATION	〃	640.9	
FOUNDATION MORTAR	〃	0.08	σ_{ck} = 400 kg/cm² 0.02×4 = 0.08 m^3
PILE	m × NUMBER	8.00×156=1248.000	φ=350 CLASS B
		7.00×156=7092.000	φ=350 CLASS A



NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. REFERENCE DRAWING FOR BAR ARRANGEMENT:

CS - 258	CS - 265
CS - 259	CS - 266
CS - 260	CS - 267
CS - 261	CS - 268
CS - 262	CS - 269
CS - 263	CS - 270
CS - 264	CS - 271

REPUBLIC OF INDONESIA
DEPARTMENT OF TRANSPORT
DIRECTORATE GENERAL OF LAND TRANSPORT AND INLAND WATERWAYS

NEW RAILWAY LINE FOR CENGKARENG AIRPORT CONSTRUCTION PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

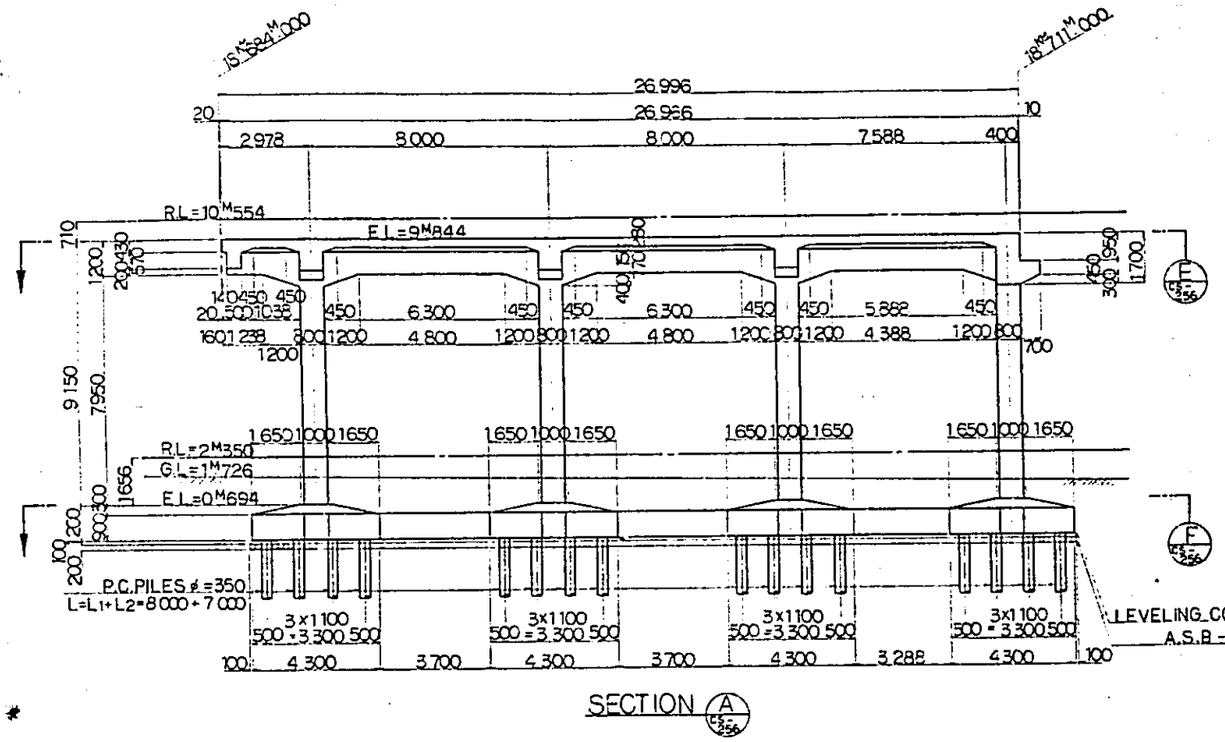
REVISIONS	DATE	DESIGNED	DRAWN	CHECKED	REVIEWED	SUBMITTED
B	1 AUG '84					
A	[illegible]	T.K.	[illegible]	[illegible]	K.M.	[illegible]

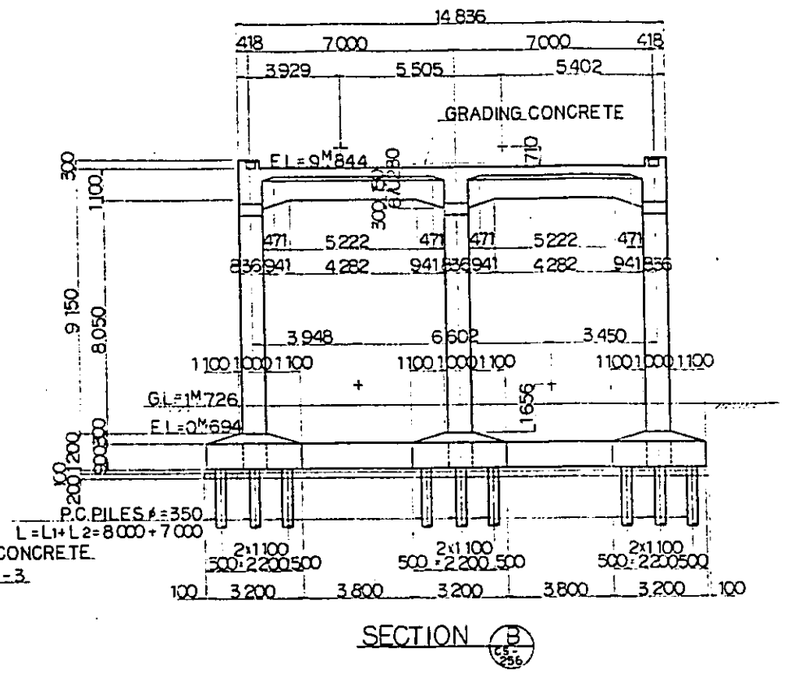
VIADUCT V129
GENERAL VIEW
(SHEET 1 OF 2)

PACKAGE: I CIVIL AND ARCHITECTURAL WORK

SCALE 1 : 100

DRAWING NO: CS-256



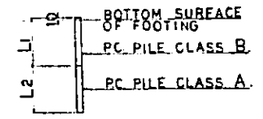


NOTES:

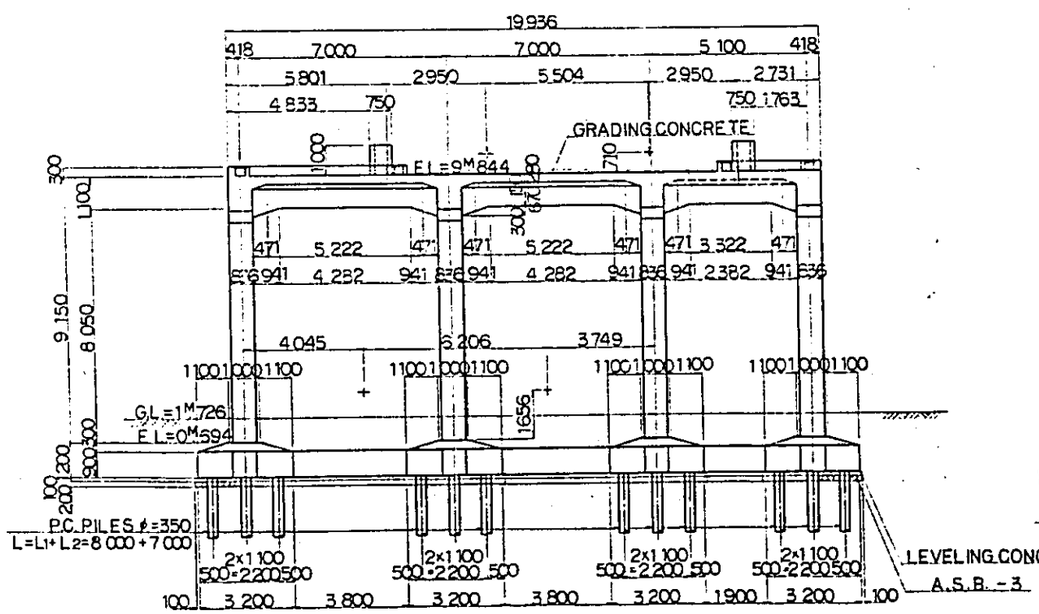
1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. REFERENCE DRAWING FOR BAR ARRANGEMENT:

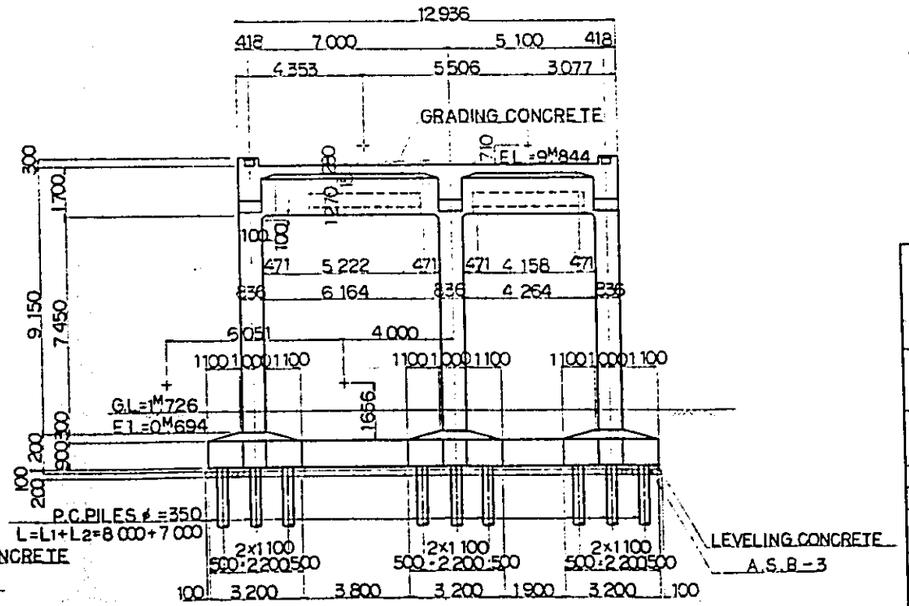
CS-258	CS-263	CS-268
CS-259	CS-264	CS-269
CS-260	CS-265	CS-270
CS-261	CS-266	CS-271
CS-262	CS-267	

3. TYPES OF P.C. PILE



4. GRADING CONCRETE SHALL BE SIMULTANEOUSLY PLACED WITH SLAB CONCRETE





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DIRECTORATE GENERAL OF LAND TRANSPORT AND INLAND WATERWAYS

NEW RAILWAY LINE FOR CENGKARENG AIRPORT CONSTRUCTION PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

REVISIONS	DATE	DESIGNED	DRAWN	CHECKED	REVIEWED	SUBMITTED
B	1 AUG '84			K. Z		
A	15 FEB '84	T.K	A.O	K. Z	K.M	K

VIADUCT V129
GENERAL VIEW
(SHEET 2 OF 2)

PACKAGE: I CIVIL AND ARCHITECTURAL WORK

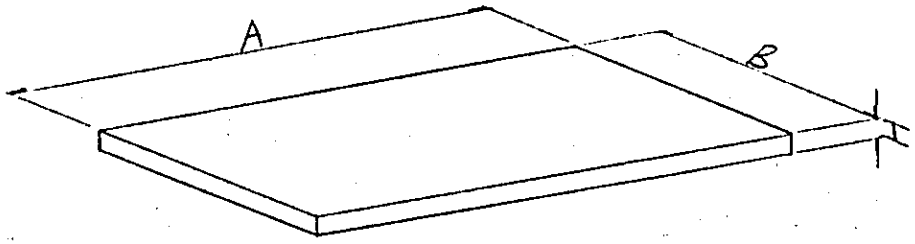
SCALE 1 : 100

DRAWING NO. CS-257

(V129) 3 + 3 × 8 = 27.000m

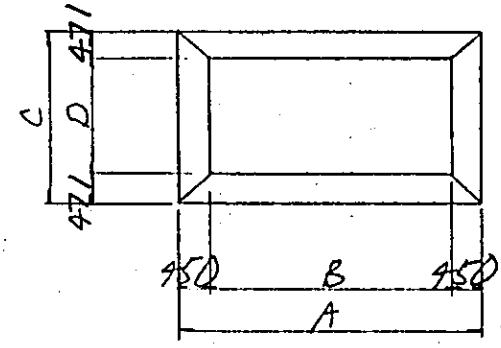
CONCRETE VOLUM

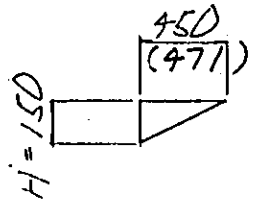
(1) SLAB



$V = A \times B \times H \times n$

V_{A1} = 8.000 × 7.418 × 0.280 × 4	=	66.465 m3
V_{A2} = 7.988 × 12.936 × 0.280 × 1	=	25.833 "
V_{A3} = 2.968 × 7.418 × 0.280 × 2	=	12.329 "
V_{A4} = 1/2 × 3.513 × 1.076 × 0.430 × 1	=	0.813 "
V_{A5} = 1/2 × 7.315 × 2.241 × 0.430 × 1	=	3.524 "
V_{A6} = 0.400 × 7.000 × 0.280 × 1	=	0.784 "
V_{A7} = 0.400 × 5.100 × 0.280 × 1	=	0.571 "
V_{A8} = 8.000 × 0.418 × 0.280 × 2	=	1.873 "





$$V=\{A\times C-[A\times C+(A+B)\times(C+D)+B\times D]\times 1/6\}\times H$$

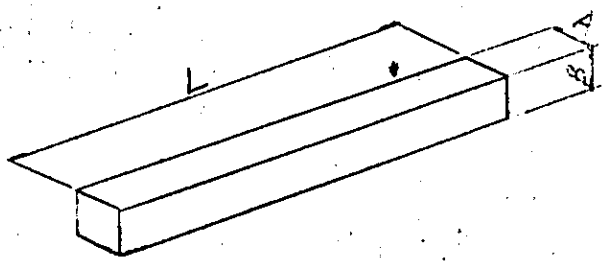
	A	B	C	D	
Vc_1' =	7.200	6.300	6.164	5.222	= 0.882 m³
Vc_2' =	1.928	1.028	6.164	5.222	= 0.510 "
Vc_3' =	6.788	5.888	6.164	5.222	= 0.853 "
Vc_4' =	6.788	5.888	4.264	3.322	= 0.725 "

Vc_1 = 0.882 × 4 = 3.528 m³

Vc_2 = 0.510 × 2 = 1.020 "

Vc_3 = 0.853 × 1 = 0.853 "

Vc_4 = 0.725 × 1 = 0.725 "



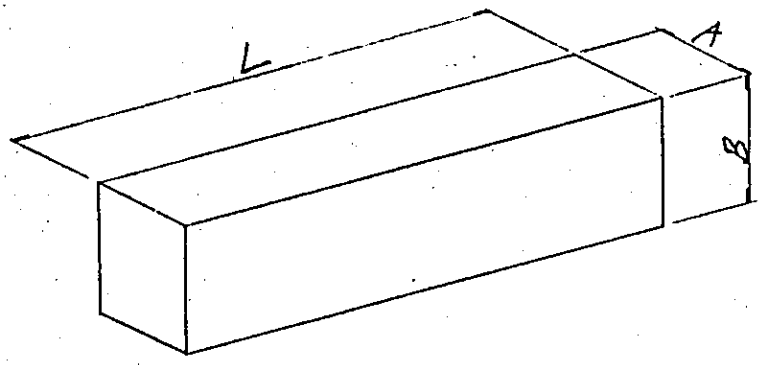
$V = A \times B \times L \times n$

$V_{A1} = 0.150 \times 0.150 \times 14.836 \times 1$ = 0.334 m^3

SLAB TOTAL = 118.652 m^3

(2) BEAM

1) LONGITUDINAL BEAM

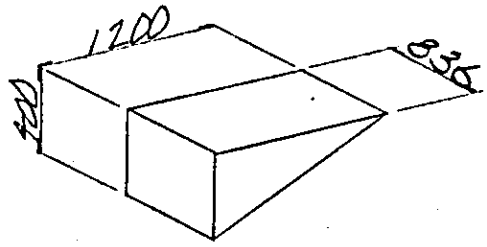


$$V = A \times B \times L \times n$$

$V_{a1} = 0.836 \times 0.920 \times 7.200 \times 6 = 33.226\ m^3$

$V_{a2} = 0.836 \times 0.920 \times 5.088 \times 3 = 11.740\ "$

$V_{a3} = 0.836 \times 0.920 \times 2.828 \times 3 = 6.525\ "$

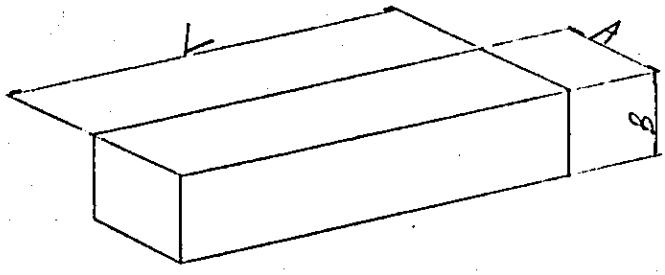


$V = 1/2 \times 1.200 \times 0.400 \times H \times n$

$V_b = 1/2 \times 1.200 \times 0.400 \times 0.836 \times 21$ = 4.213 m^3

SUB TOTAL 55.704 m^3

2) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM

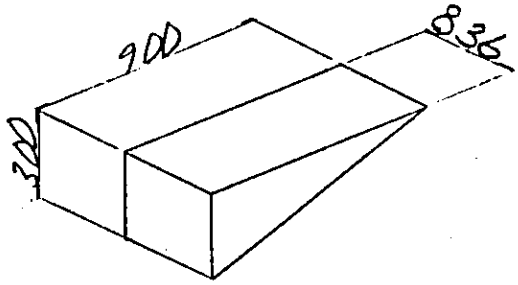


$V = A \times B \times L \times n$

$V_{a1} = 0.800 \times 0.820 \times 6.164 \times 6 = 24.262\ m^3$

$V_{a2} = 0.800 \times 0.820 \times 4.264 \times 1 = 2.797\ "$

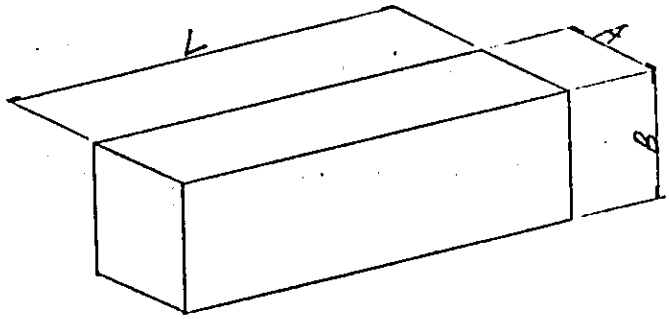
$V_{a3} = 0.500 \times 0.720 \times 6.164 \times 2 = 4.438\ "$



$V_b = \frac{1}{2} \times 0.900 \times 0.300 \times 0.800 \times 14$ = 0.432 m^3

SUB TOTAL = 31.929 m^3

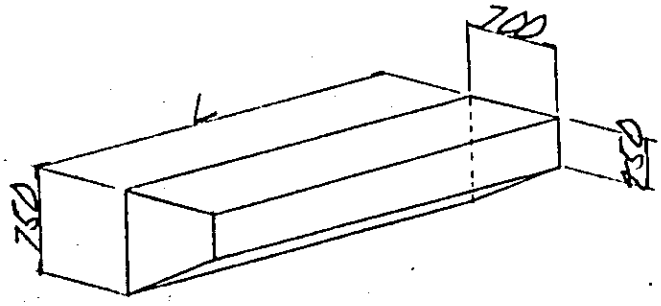
3) AT END OF VIADUCT TRANSVERSE BEAM



$V = A \times B \times L \times n$

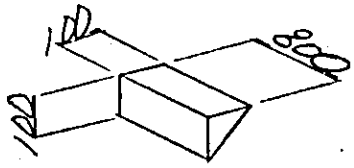
$V_{a1} = 0.800 \times 1.420 \times 6.164 \times 1$ = 7.002 m^3

$V_{a2} = 0.800 \times 1.420 \times 4.264 \times 1$ = 4.844 "



$V = \frac{1}{2} \times (0.450 + 0.750) \times 0.700 \times L \times n$

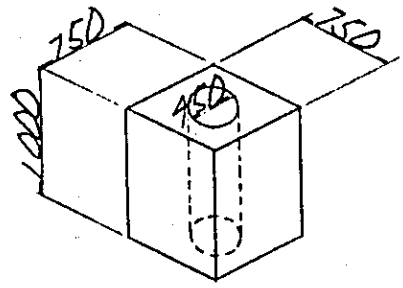
$V_{b1} = \frac{1}{2} \times (0.450 + 0.750) \times 0.700 \times 3.800 \times 2$ = 3.192 m^3



$Vc = 1/2 \times 0.100 \times 0.100 \times 0.800 \times 4$ = 0.016 m^3

SUB TOTAL = 15.054 m^3

4) ELECTRIC POLE



$Va' = (0.750 \times 0.750 - 1/4 \times 3.142 \times 0.450^2) \times 1.000$

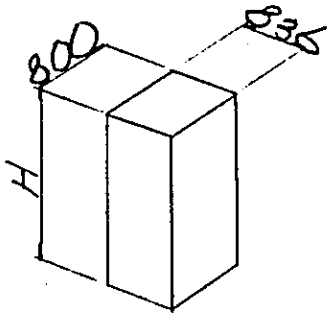
$= 0.403\ m^3$

$Va = 0.403 \times 2$ - $0.806\ m^3$

SUB TOTAL $0.806\ m^3$

BEAM TOTAL= $103.493\ m^3$

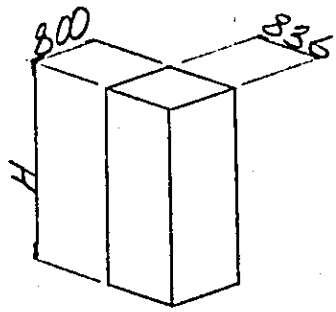
(3) COLUMN



$V = 0.800 \times 0.836 \times H \times n$

$V_{A1} = 0.800 \times 0.836 \times 8.870 \times 10 = 59.323\ m^3$

SUB TOTAL 59.323 m^3



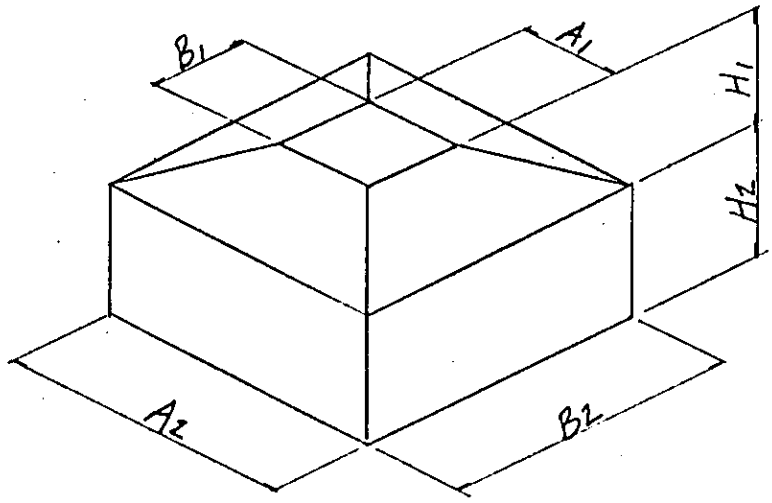
$V = 0.800 \times 0.836 \times H \times n$

$Vb = 0.800 \times 0.836 \times 8.870 \times 3 = 17.797\ m^3$

SUB TOTAL = $17.797\ m^3$

COLUMN TOTAL = $77.120\ m^3$

(4) FOOTING

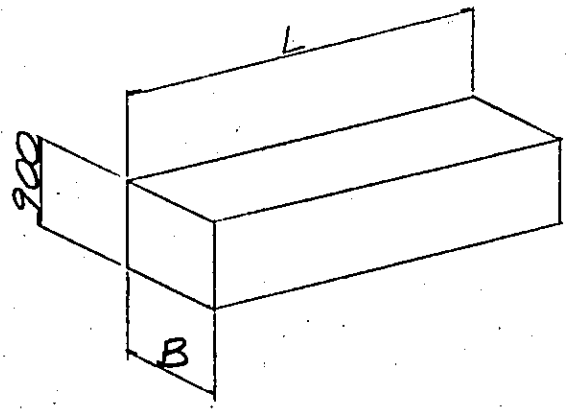


$$V = (1/6 \times (A_1 \times B_1 + A_2 \times B_2 + 4 \times \frac{A_1+A_2}{2} \times \frac{B_1+B_2}{2}) \times H_1 + A_2 \times B_2 \times H_2) \times n$$

$$V_{A1} = (1/6 \times (1.000 \times 1.000 + 3.200 \times 4.300 + 4 \times 2.100 \times 2.650) \times 0.300 + 3.200 \times 4.300 \times 0.900) \times 13 = 185.055\ m^3$$

FOOTING TOTAL	185.055 m^3

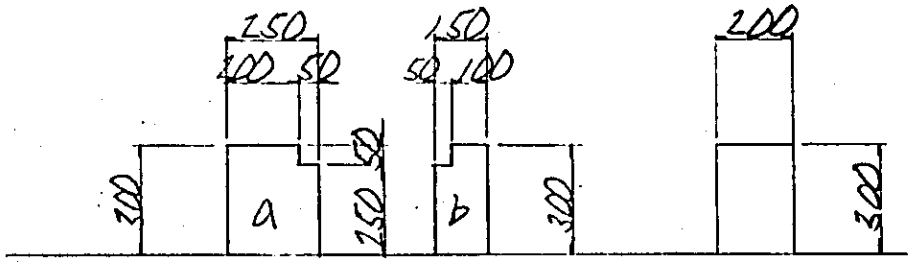
(5) BRACING BEAM



$V = 0.900 \times B \times L \times n$

$V_{a1} = 0.900 \times 0.732 \times 3.700 \times 6$	=	14.625 m^3
$V_{a2} = 0.900 \times 0.732 \times 3.288 \times 3$	=	6.498 "
$V_{a3} = 0.900 \times 0.700 \times 3.800 \times 7$	=	16.758 "
$V_{a4} = 0.900 \times 0.700 \times 1.900 \times 2$	=	2.394
BRACING BEAM TOTAL	=	40.275 m^3

(6) CURB



l_a = 18.753 + 4.840 + 7.644 + 1.500 + 27.203 + 2.056 = 61.996 m

l_b = 18.053 + 4.840 + 8.319 + 1.500 + 28.528 + 2.056 = 63.296 "

l_c = 4.996

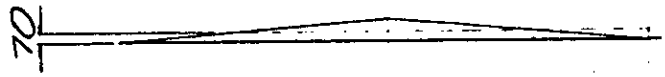
$V_a = (0.250 \times 0.300 - 0.050 \times 0.050) \times 61.996 = 4.495$ m³

$V_b = (0.150 \times 0.300 - 0.050 \times 0.050) \times 63.296 = 2.690$ "

$V_c = 0.200 \times 0.300 \times 4.996 = 0.300$ "

CURB TOTAL 7.485 m³

(7) GRADING CONCRETE

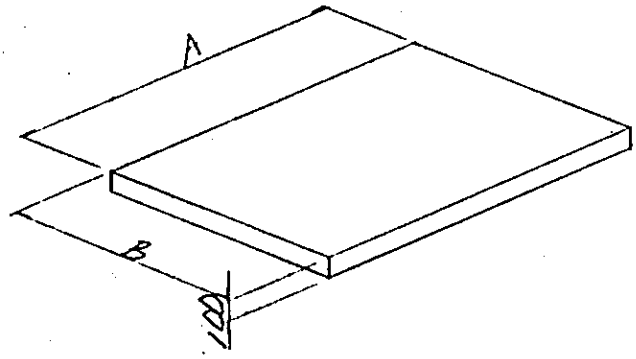


$A = 12.935 \times 18.976 + 11.053 \times 7.988$
$+ 1/2 \times 3.913 \times 0.571 + 1/2 \times 1.846 \times 7.715$
$= 341.984\ m^2$

$V = 341.984 \times 0.070 = 23.939\ m^3$

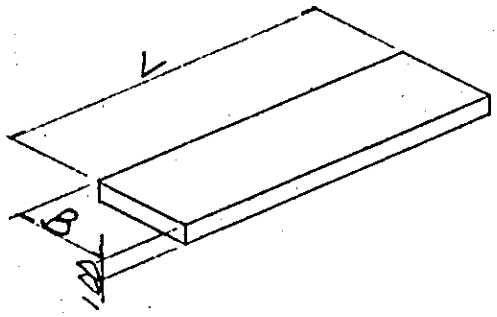
GRADING CONCRETE TOTAL = $23.939\ m^3$

(9) LEVELING CONCRETE



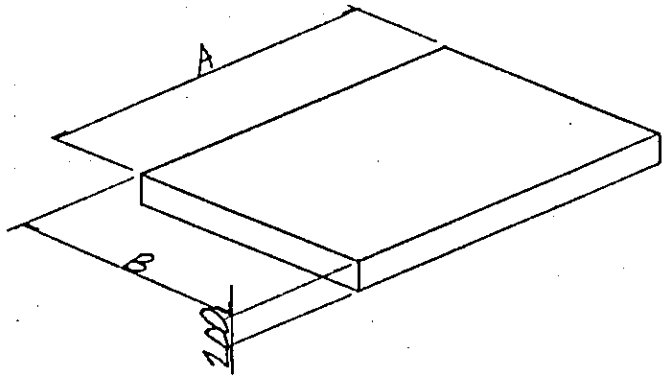
$V = A \times B \times 0.100 \times n$

$V_{a1} = 4.500 \times 3.400 \times 0.100 \times 13$			m^3 19.890
$V_{b1} = 0.941 \times 0.100 \times 3.500 \times 6$			m 1.976
$V_{b2} = 0.941 \times 0.100 \times 3.088 \times 3$			" 0.872
$V_{b3} = 0.900 \times 0.100 \times 3.600 \times 7$			2.268
$V_{b4} = 0.900 \times 0.100 \times 1.700 \times 2$			0.306
LEVERING CONCRETE			m^3 25.312



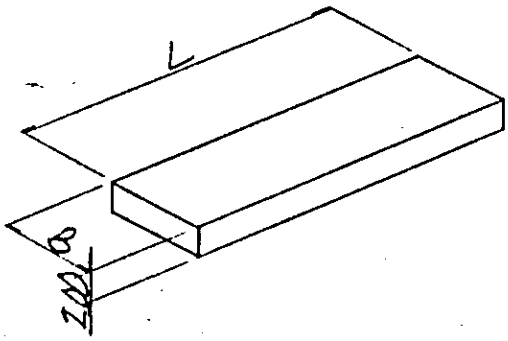
$V = B \times 0.100 \times L \times n$

(10) AGGREGATE SUB BASE



$V = A \times B \times 0.200 \times n$

$V_{a1} = 4.500 \times 3.400 \times 0.200 \times 13 = 39.780\ m^3$



$V = B \times 0.200 \times L \times n$

$V_{b1} = 0.941 \times 0.200 \times 3.500 \times 6 = 3.952\ m^3$

$V_{b2} = 0.941 \times 0.200 \times 3.088 \times 3 = 1.743$ "

$V_{b3} = 0.900 \times 0.200 \times 3.600 \times 7 = 4.536$ "

$V_{b4} = 0.900 \times 0.200 \times 1.700 \times 2 = 0.612$ "

AGGREGATE SUB BASE TOTAL $50.623\ m^3$

(11) PILE

$\phi = 350^{mm}$ $\ell = 15.000^{m}$ $n = 12^{本}$

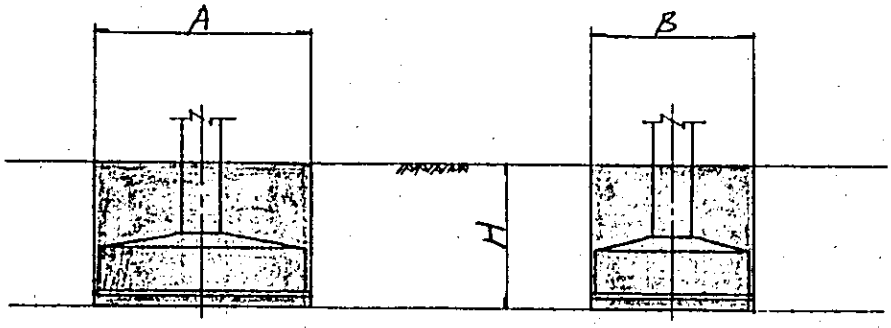
$N = 12^{本} \times 13$ = 156 本

PILE TOTAL 156 本

$L = 156 \times 15.000$ = 2340 M

(12) EXCAVATION

1) FOOTING

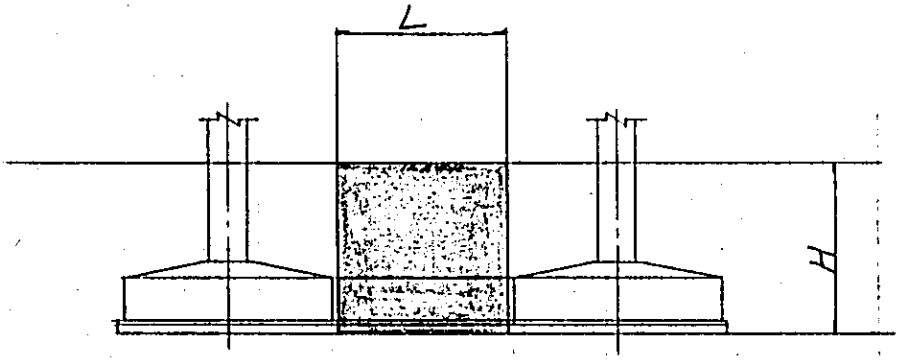


$V = A \times B \times H \times n$

$Va_1 = 4.500 \times 3.400 \times 2.532 \times 13 = 503.615\ m^3$

SUB TOTAL = 503.615 m^3

2) BRACING BEAM



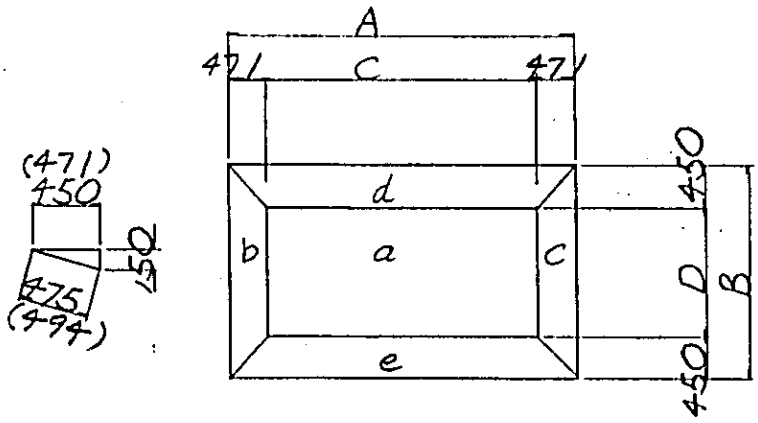
$b = 0.700 + 0.200 = 0.900^{m}$

$V = b \times H \times L \times n$

$V_{a1} = 0.941 \times 2.532 \times 3.500 \times 6$	=	50.035^{m^3}
$V_{a2} = 0.941 \times 2.532 \times 3.088 \times 3$	=	$22.073^{"}$
$V_{a3} = 0.900 \times 2.532 \times 3.600 \times 7$	=	$57.426^{"}$
$V_{a4} = 0.900 \times 2.532 \times 1.700 \times 2$	=	$7.748^{"}$
SUB TOTAL		137.282^{m^3}
EXCAVATION TOTAL		640.897^{m^3}

FORM AREA

(1) SLAB



$Aa = C \times D \times n$

$Aa_1 = 6.300 \times 5.222 \times 4$ = 131.594 m²

$Aa_2 = 1.028 \times 5.222 \times 2$ = 10.736 "

$Aa_3 = 5.888 \times 5.222 \times 1$ = 30.747 "

$Aa_4 = 5.888 \times 3.322 \times 1$ = 19.560 "

$Ab = (B + D) \times 1/2 \times 0.475 \times n$

$Ab_1 = (6.164 + 5.222) \times 1/2 \times 0.475 \times 4$ = 10.817 m²

$Ab_2 = (6.164 + 5.222) \times 1/2 \times 0.475 \times 2$ = 5.408 "

$Ab_3 = (6.164 + 5.222) \times 1/2 \times 0.475 \times 1$ = 2.704 "

$Ab_4 = (4.264 + 3.322) \times 1/2 \times 0.475 \times 1$ = 1.802 "

$Ac = (B + D) \times 1/2 \times 0.475 \times n$

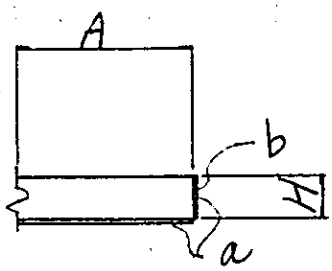
$Ac_1 = (6.164 + 5.222) \times 1/2 \times 0.475 \times 4$	=	$10.817\ m^2$
$Ac_2 = (6.164 + 5.222) \times 1/2 \times 0.475 \times 2$	=	$5.408\ "$
$Ac_3 = (6.164 + 5.222) \times 1/2 \times 0.475 \times 1$	=	$2.704\ "$
$Ac_4 = (4.264 + 3.322) \times 1/2 \times 0.475 \times 1$	=	$1.802\ "$

$Ad = (A + C) \times 1/2 \times 0.494 \times n$

$Ad_1 = (7.200 + 6.300) \times 1/2 \times 0.494 \times 4$	=	$13.338\ m^2$
$Ad_2 = (1.928 + 1.028) \times 1/2 \times 0.494 \times 2$	=	$1.460\ "$
$Ad_3 = (6.788 + 5.888) \times 1/2 \times 0.494 \times 1$	=	$3.131\ "$
$Ad_4 = (6.788 + 5.888) \times 1/2 \times 0.494 \times 1$	=	$3.131\ "$

$Ae = (A + C) \times 1/2 \times 0.494 \times n$

$Ae_1 = (7.200 + 6.300) \times 1/2 \times 0.494 \times 4$	=	$13.338\ m^2$
$Ae_2 = (1.928 + 1.028) \times 1/2 \times 0.494 \times 2$	=	$1.460\ "$
$Ae_3 = (6.788 + 5.888) \times 1/2 \times 0.494 \times 1$	=	$3.131\ "$
$Ae_4 = (6.788 + 5.888) \times 1/2 \times 0.494 \times 1$	=	$3.131\ "$



$L_1 = 7.315$

$L_2 = 3.513$

$Aa = A \times L + H \times L$

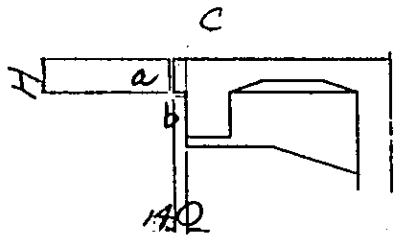
$Aa_1 = 1/2 \times 2.241 \times 7.315 + 0.430 \times 7.315 = 11.342\ m^2$

$Aa_2 = 1/2 \times 1.076 \times 3.513 + 0.430 \times 3.513 = 3.401\ "$

$Ab = H \times L$

$L = 11.900 + 2.731 + 8.773 + 4.262 + 5.801 + 20.267 = 53.734\ m$

$Ab_1 = 0.430 \times 53.734 = 23.106\ "$



$Aa = H \times L \times n$

$Aa_1 = 0.430 \times 14.836 \times 1$ = 6.379 m^2

$Ab = 0.140 \times L \times n$

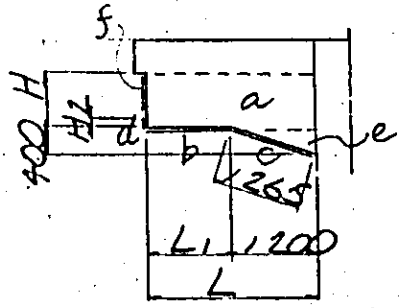
$Ab_1 = 0.140 \times 14.836 \times 1$ = 2.077 m^2

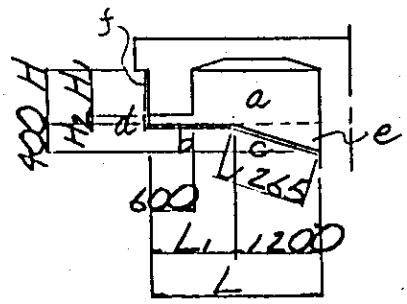
$Ac = 0.140 \times 0.430 \times 2$ = 0.120 m^2

SLAB TOTAL 322.644 m^2

(2) BEAM

1) LONGITUDINAL BEAM





B = 0.836

$Aa = L \times H \times n$

$Aa_1 = 2.539 \times 0.770 \times 2$ = 3.910 m^2

$Aa_2 = 2.539 \times 0.770 \times 4$ = 7.820 "

控除

$-Aa' = -0.600 \times H_1 \times n$

$-Aa'_1 = -0.600 \times 0.570 \times 4$ = −1.368 m^2

$Ab = L_1 \times b \times n$

$Ab_1 = 1.284 \times 0.836 \times 3$ = 3.220 m^2

$Ac = 1.265 \times B \times n$

$Ac_1 = 1.265 \times 0.836 \times 3 = 3.173\ m^2$

$Ad = H_2 \times B \times n$

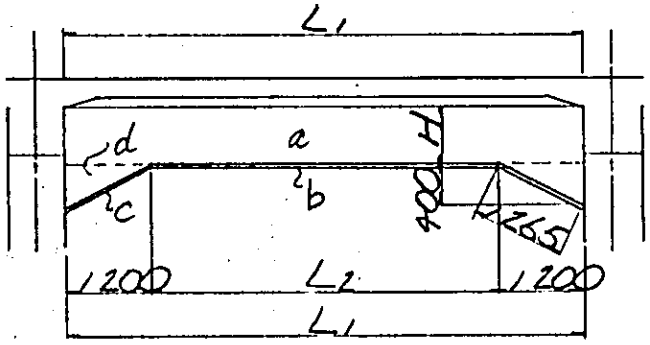
$Ad = 0.200 \times 0.836 \times 3 = 0.502''$

$Ae = 1/2 \times 0.400 \times 1.200 \times n$

$Ae_1 = 1/2 \times 0.400 \times 1.200 \times 6 = 1.440''$

$Af = 0.800 \times H_1 \times n$

$Af_1 = 0.800 \times 0.570 \times 3 = 1.368''$



B = 836

$A_a = H \times L_1 \times n$

$A_{a1} = 0.770 \times 7.530 \times 12$ = 69.577 m²

$A_{a2} = 0.770 \times 7.099 \times 6$ = 32.797 "

$A_b = L_2 \times B \times n$

$A_{b1} = 4.800 \times 0.836 \times 6$ = 24.077 "

$A_{b2} = 4.388 \times 0.836 \times 3$ = 11.005 "

$A_c = 1.265 \times B \times n$

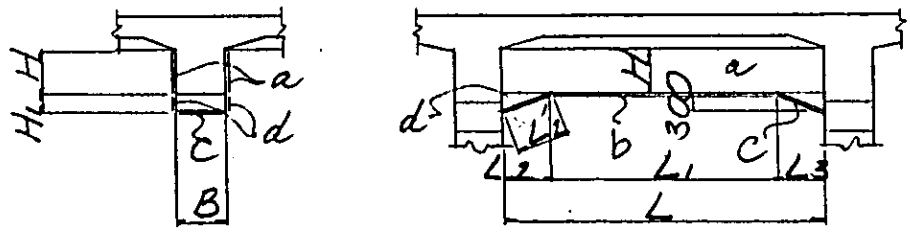
$A_{c1} = 1.265 \times 0.836 \times 18$ = 19.036 "

$Ad = 0.400 \times 1.255 \times 1/2 \times n$

$Ad_1 = 0.400 \times 1.255 \times 1/2 \times 36 = 9.036\ m^2$

SUB TOTAL = $185.593\ m^2$

2) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM



$A_a = H \times L \times n$

$A_{a1} = 0.670 \times 6.164 \times 12 = 49.559\ m^2$

$A_{a2} = 0.670 \times 4.264 \times 2 = 5.714\ "$

$A_{a3} = 0.570 \times 6.164 \times 4 = 14.054\ "$

$A_b = B \times L_1 \times n$

$A_{b1} = 0.800 \times 6.164 \times 6 = 29.587\ "$

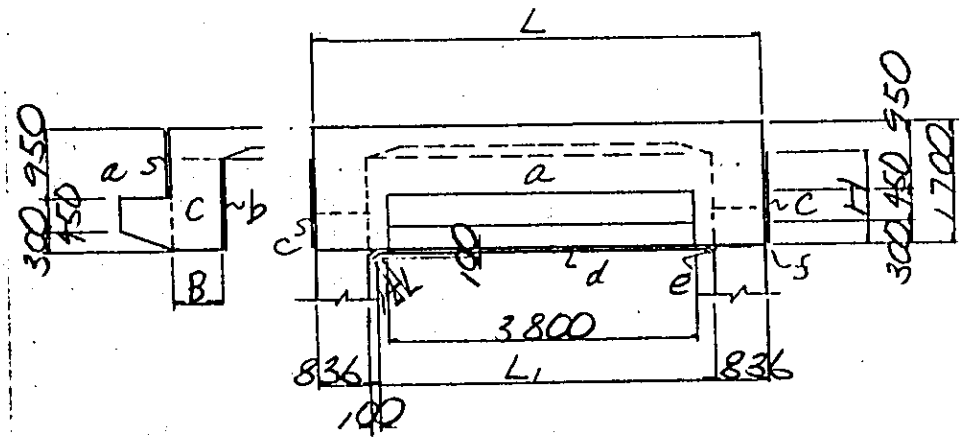
$A_{b2} = 0.800 \times 4.264 = 3.411\ "$

$A_c = 0.800 \times 0.988 \times 14 = 11.066\ "$

$A_d = 1/2 \times 0.300 \times 0.988 \times 28 = 0.148\ "$

SUB TOTAL = $113.539\ m^2$

3) AT END OF VIADUCT TRANSVERSE BEAM



$A_a = L \times 1.700$

$A_{a1} = 12.936 \times 1.700$ = 21.991 m^2

$A_b = L_1 \times H$

$A_{b1} = (6.164 + 4.264) \times 1.270$ = 13.244 "

$A_c = B \times H \times n$

$A_c = 0.836 \times 1.270 \times 2$ = 2.123 "

$Ad = (L_1 - 0.200) \times B$

$Ad_1 = (10.428 - 0.200) \times 0.800 = 8.182\ m^2$

$Ae = 0.141 \times B \times n$

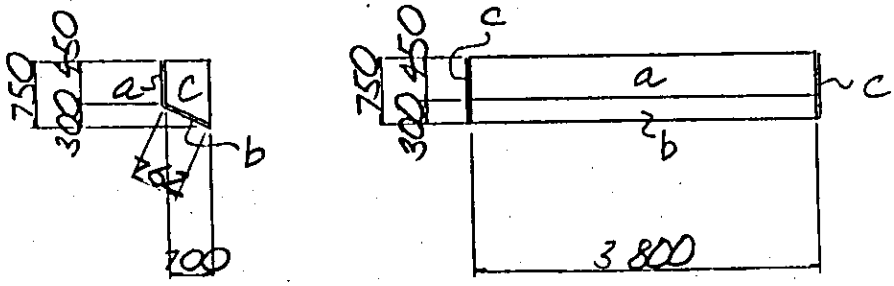
$Ae_1 = 0.141 \times 0.836 \times 4 = 0.472$"

$Af = 1/2 \times 0.100 \times 0.100 \times n$

$Af_1 = 1/2 \times 0.100 \times 0.100 \times 8 = 0.040$"

控除

$-A = -0.750 \times 3.800 \times 2 = -5.700$"



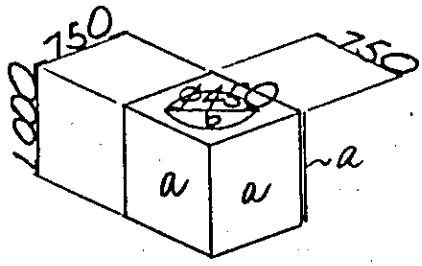
$Aa = 3.800 \times 0.450 \times 2$ = 3.420 m^2

$Ab = 3.800 \times 0.762 \times 2$ = 5.791 "

$Ac = \frac{1}{2} \times (0.450 + 0.750) \times 0.700 \times 4$ = 1.680 "

SUB TOTAL = 51.243 m^2

4) ELECTRIC POLE



$A_a = 1.000 \times 0.750 \times n$

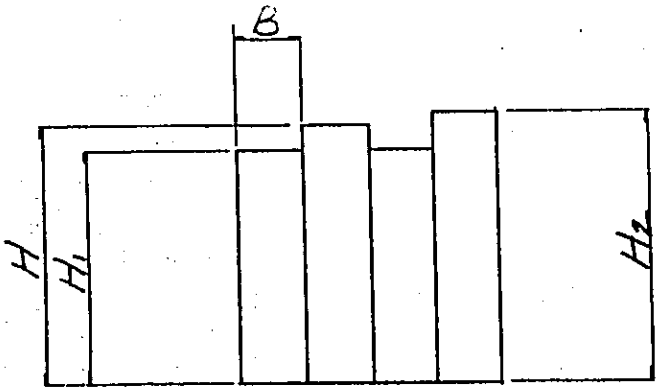
$A_{a1} = 1.000 \times 0.750 \times 4 \times 2$ = 6.000 m^2

$A_b = 0.450 \times \pi \times 1.000 \times n$

$A_{b1} = 0.450 \times \pi \times 1.000 \times 2$ = 2.827 "

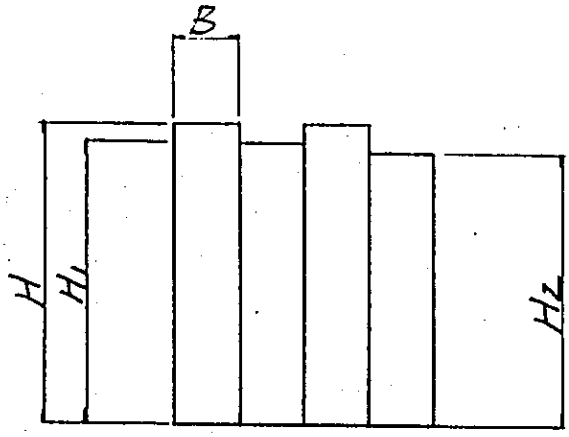
SUB TOTAL	8.827 m^2
BEAM TOTAL	359.202 m^2

(3) COLUMN



Aa · H x B x n

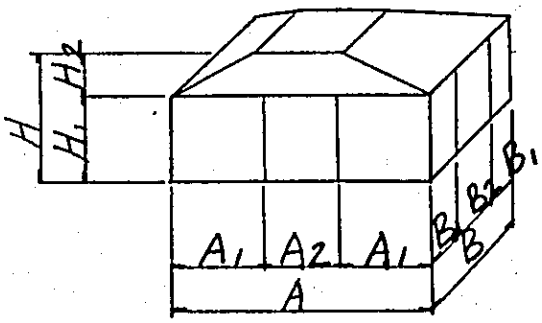
Aa_1 = 7.750 x 0.836 x 6	=	39.877 m^2
Aa_2 = 7.550 x 2 x 0.836 x 9	=	113.612 "
Aa_3 = 7.750 x 0.836 x 14	=	90.706 "
Aa_4 = 8.720 x 0.836 x 2	=	14.580 "
SUB TOTAL	=	258.769 m^2



$Aa = H \times B \times n$

$Aa1 = 7.550 \times 0.836 \times 3$	=	$18.935\ m^2$
$Aa2 = 7.350 \times 0.836 \times 4$	=	$24.578\ "$
$Aa3 = 7.950 \times 0.836 \times 2$	=	$13.292\ "$
$Aa4 = 7.450 \times 0.836 \times 3$	=	$18.685\ "$
SUB TOTAL	=	$75.490\ m^2$
COLUMN TOTAL		$334.259\ m^2$

(4) FOOTING



$Aa = A \times H_1 \times n - A_2 \times H_1 \times n$

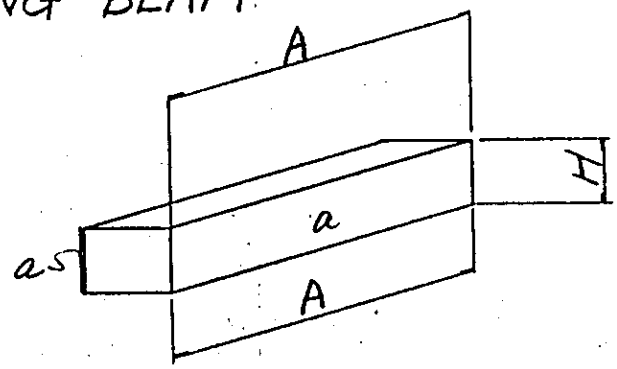
$Aa_1 = 4.300 \times 0.900 \times 26 - 0.700 \times 0.900 \times 18 =$ 89.280 m²

$Ab = B \times H_1 \times n - B_2 \times H_1 \times n$

$Ab_1 = 3.200 \times 0.900 \times 26 - 0.700 \times 0.900 \times 18 =$ 63.540 m²

FOOTING TOTAL 152.820 m²

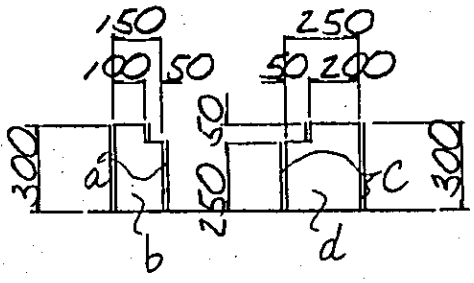
(5) BRACING BEAM



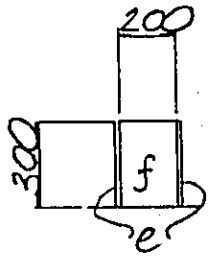
$Aa = A \times H \times n$

$Aa_1 = 3.700 \times 0.900 \times 6 \times 2$	=	$39.960\ m^2$
$Aa_2 = 3.288 \times 0.900 \times 6 \times 2$	=	$35.510\ m^2$
$Aa_3 = 3.800 \times 0.900 \times 7 \times 2$	=	$47.880\ m^2$
$Aa_4 = 1.900 \times 0.900 \times 2 \times 2$	=	$6.840\ m^2$
BRACING BEM TOTAL		$130.190\ m^2$

(6) CURB



l_1 l_2



l_3

$l_1 = 61.996^{m}$

$l_2 = 61.996^{m}$

$l_3 = 4.996^{m}$

$Aa = 0.300 \times 2 \times l_1$

$Aa_1 = 0.300 \times 2 \times 61.996 = 37.198^{m^2}$

$Ab = (0.300 \times 0.150 - 0.050^2) \times n$

$Ab_1 = (0.300 \times 0.150 - 0.050^2) \times 2 = 0.085''$

$Ac = 0.300 \times 2 \times l_2$

$Ac_1 = 0.300 \times 2 \times 61.996 = 37.198''$

$Ad = (0.300 \times 0.250 - 0.050^2) \times n$

$Ad_1 = (0.300 \times 0.250 - 0.050^2) \times 2 = 0.145''$

$Ae = 0.300 \times 2 \times ls$

$Ae_1 = 0.300 \times 2 \times 4.996$ = 2.988 m^2

$Af = 0.300 \times 0.200 \times n$

$Af_1 = 0.300 \times 0.200 \times 2$ = 0.120 m^2

CURB TOTAL	77.744 m^2

VIADUCT (V129)

REINFORCING BAR

(SD30)

	D32	D29	D25	D22	D19	D16	D13	D10	TOTAL
SLAB	—	—	—	—	10 762.4	3931.5	76.1	—	14770.0
BEAM	13 145.6	6 742.8	1 063.1	715.8	768.2	1479.9	6978.5		30 893.9
COLUMN	—	—	12 166.5	—	—	—	1 671.2	—	13 837.7
CURB	—	—	—	—	—	—	—	939.4	939.4
TOTAL	13 145.6	6 742.8	13 229.6	715.8	11 530.6	5411.4	8725.8	939.4	60 441.0
FOOTING	—	—	6 030.3	4 173.3	—	3 085.9	1 331.2	—	14 620.7
BRACING BEAM	—	10 255.2	—	—	—	1 019.9	2 116.0	—	13 391.1
TOTAL	—	10 255.2	6 030.3	4 173.3	—	4 105.8	3 447.2	—	28 011.8

JICA

No. 25

REINFORCING BAR

No. 46

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	SLAB					
S 1	D19	2.25	15 970	40	1431.3	
2	〃	〃	16 320	23	844.6	
3	〃	〃	14 770	58	1 927.5	
4	〃	〃	17 440	29	1 138.0	
5	〃	〃	17 890	10	402.5	
6	〃	〃	17 730	10	398.9	〃
7	〃	〃	1 520	25	85.5	
8	〃	〃	14 070	13	411.6	
9	〃	〃	14 420	5	162.2	
10	〃	〃	14 420	5	162.2	〃
11	〃	〃	12 870	23	666.0	
12	〃	〃	15 020	12	405.5	
13	〃	〃	15 230	5	171.3	
14	〃	〃	15 320	5	172.4	〃
15	〃	〃	1 330	11	32.9	
S 21	D19	2.25	29 170	9	590.7	
22	〃	〃	29 170	9	590.7	〃
23	〃	〃	21 090	8	379.6	〃
24	〃	〃	21 090	8	379.6	〃
25	〃	〃	21 040	1	47.3	
26	〃	〃	22 060	1	49.6	〃
27	〃	〃	10 050	6	135.7	
28	〃	〃	13 190	3	89.0	
29	〃	〃	12 120	3	81.8	〃
30	D16	1.56	28 470	23	1021.5	
31	〃	〃	27 970	21	916.3	
32	〃	〃	20 120	18	565.0	
33	〃	〃	20 040	21	656.5	
34	〃	〃	21 720	5	169.4	〃
35	〃	〃	1 680	4	10.5	〃
36	〃	〃	8 870	8	110.7	
37	〃	〃	7 870	15	184.2	
38	〃	〃	14 160	9	198.8	
39	〃	〃	4 550	8	56.8	
40	〃	〃	7 900	2	24.6	〃
41	〃	〃	5 500	2	17.2	〃

JICA

No. 47

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
42	D13	0.995	1 530	50	76.1	⊏
			D19		10762.4 kg	
			D16		3931.5 "	
			D13		76.1 "	
		SLAB	TOTAL		14770.0 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	BEAM					
	SECTION	A - A				
B 1	D32	6.23	22 450	7	979.0	
2	〃	〃	8 020	2	99.9	
3	〃	〃	23 080	2	287.6	
4	〃	〃	23 080	2	287.6	〃
5	〃	〃	20 440	7	891.3	
6	〃	〃	4 660	16	464.5	
7	〃	〃	4 110	4	102.4	
8	D19	2.25	20 200	4	181.8	
B° 1	D13	0.995	1 590	118	186.7	
2	〃	〃	1 180	118	138.5	〃
3	〃	〃	3 240	73	235.3	
4	〃	〃	2 830	73	205.6	〃
5	〃	〃	3 640	45	163.0	〃
6	〃	〃	3 230	45	144.6	〃
	SECTION	B - B				
B 21	D32	6.23	30 380	14	2649.7	
22	〃	〃	8 020	4	199.9	
23	〃	〃	32 170	4	801.7	
24	〃	〃	32 170	4	801.7	〃
25	〃	〃	28 370	14	2474.4	
26	〃	〃	4 660	48	1 393.5	
27	〃	〃	4 110	16	409.7	
28	D19	2.25	28 140	8	506.5	
B° 21	D13	0.995	1 590	330	522.1	
22	〃	〃	1 180	330	387.5	〃
23	〃	〃	3 240	208	670.6	
24	〃	〃	2 830	208	585.7	〃
25	〃	〃	3 640	122	441.9	〃
26	〃	〃	3 230	122	392.1	〃

REIN NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	SECTION	C - C				
B 41	D32	6.23	11 430	7	498.5	
42	〃	〃	12 090	2	150.6	
43	〃	〃	12 080	2	24.0	〃
44	〃	〃	9 110	7	397.3	
45	〃	〃	4 660	8	232.3	
46	D19	2.25	8 880	4	79.9	
B°41	D13	0.995	1 590	47	74.4	
42	〃	〃	1 180	47	55.2	〃
43	〃	〃	3 240	31	99.9	
44	〃	〃	2 830	31	87.3	〃
45	〃	〃	3 640	16	57.9	〃
46	〃	〃	3 230	16	51.4	〃
			D32		13 145.6 kg	
			D19		768.2 〃	
			D13		4 499.7 〃	
		SUB	TOTAL		18 413.5 kg	
	SECTION	D-D				
b 1	D29	5.04	16 380	14	1 155.8	
2	〃	〃	15 310	18	1 388.9	
3	〃	〃	4 300	32	693.5	
4	D16	1.56	15 070	8	188.1	
b° 1	D13	0.995	1 590	124	196.2	
2	〃	〃	2 970	84	248.2	
3	〃	〃	3 280	40	130.5	〃
4	〃	〃	1 280	124	157.9	
5	〃	〃	2 660	84	222.3	
6	〃	〃	2 970	40	118.2	〃

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
		SECTION	E-E			
b 21	D29	5.04	21 480	7	757.8	
22	"	"	20 410	9	925.8	
23	"	"	4 300	24	520.1	
24	D16	1.56	20 170	4	125.9	
b°21	D13	0.995	1 590	84	132.9	
22	"	"	2 970	54	159.6	
23	"	"	3 280	30	97.9	
24	"	"	1 280	84	107.0	
25	"	"	2 660	54	142.9	
26	"	"	2 970	30	88.7	
		SECTION	F-F			
b 41	D29	5.04	15 680	7	553.2	
42	"	"	15 450	1	77.9	
43	"	"	13 290	10	669.8	
44	D16	1.56	13 050	8	162.9	
b°41	D16	1.56	1 770	43	118.7	
42	"	"	4 220	43	283.1	
43	"	"	1 360	43	91.2	
44	"	"	3 810	43	255.6	
		SECTION	G-G			
b 61	D25	3.98	16 210	5	322.6	
62	"	"	15 210	5	302.7	
63	D16	1.56	15 040	4	93.8	
b°61	D13	0.995	890	84	74.4	
62	"	"	2 530	84	211.5	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)		NUMBER	WEIGHT (kg)	REMARKS
			D29			6 742. 8 kg	
			D25			625. 3 "	
			D16			1 319. 3 "	
			D13			2 088. 2 "	
		SUB	TOTAL			10 775. 6 kg	
			D25	218.9	x 2 =	437. 8 kg	
			D22	255.8	x 2 =	511. 6 "	
			D13	149.1	x 2 =	298. 2 "	
		SUB	TOTAL	623.8	x 2 =	1 247. 6 "	
	BEARING	BASE MORTAR					
			D16	30.3	x 4 =	121. 2 kg	
		SUB	TOTAL	30.3	x 4 =	121. 2 kg	
	ELECTRIC POLE						
			D22	102.1	x 2 =	204. 2 kg	
			D16	19.7	x 2 =	39. 4 "	
			D13	46.2	x 2 =	92. 4 "	
		SUB	TOTAL	168.0	x 2 =	336. 0 kg	
			D32			13 145. 6 kg	
			D29			6 742. 8 "	
			D25			1 063. 1 "	
			D22			715. 8 "	
			D19			768. 2 "	
			D16			1 479. 4 "	
			D13			6 978. 5 "	
		BEAM	TOTAL			30 893. 4 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
		COLUMN				
C 1	D25	3.98	10 550	52	2 183.4	
2	"	"	10 280	244	9 983.1	
C° 1	D13	0.995	3 400	494	1 671.2	
			D25		12 166.5 kg	
			D13		1 671.2 "	
		COLUMN	TOTAL		13 837.7 kg	
		FOOTING				
F 1	D25	3.98	5 550	273	6 030.3	
2	D22	3.04	4 400	312	4 173.3	
3	D16	1.56	5 230	39	318.2	
4	"	"	5 220	78	635.2	"
5	"	"	5 180	26	210.1	
6	"	"	4 170	26	169.1	
7	"	"	4 160	130	843.6	"
8	"	"	4 090	26	165.9	
9	"	"	5 130	52	416.1	
10	"	"	4 040	52	327.7	"
F° 1	D13	0.995	2 380	416	985.1	
2	"	"	2 230	156	346.1	
			D25		6 030.3 kg	
			D22		4 173.3 "	
			D16		3 085.9 "	
			D13		1 331.2 "	
		FOOTING	TOTAL		14 620.7 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
		BRACING BEAM				
	SECTION	A-A				
T 1	D29	5.04	22 440	12	1357.2	⌐¬
2	D16	1.56	21 340	4	133.2	⟷
T° 1	D13	0.995	1 510	76	114.2	⌐
2	"	"	2 340	76	177.0	⌐¬
	SECTION	B-B				
T 21	D29	5.04	30 380	24	3674.8	⌐¬
22	D16	1.56	29 280	8	365.4	⟷
T°21	D13	0.995	1 510	196	294.5	⌐
22	"	"	2 340	196	456.3	⌐¬
	SECTION	C-C				
T 41	D29	5.04	13 640	12	824.9	⌐¬
42	D16	1.56	8 880	4	55.4	⟷
T°41	D13	0.995	1 510	43	64.6	⌐
42	"	"	2 340	43	100.1	⌐¬
			D29		5856.9 kg	
			D16		554.0 "	
			D13		1206.7 "	
		SUB	TOTAL		7617.6 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
		SECTION	D-D			
t 1	D29	5.04	18 300	24	2213.6	
2	D16	1.56	17 390	8	217.0	
t° 1	D13	0.995	1 510	116	174.3	
2	"	"	2 220	116	256.2	
		SECTION	E-E			
t 21	D29	5.04	25 300	12	1530.1	
22	D16	1.56	24 390	4	152.2	
t°21	D13	0.995	1 510	77	115.7	
22	"	"	2 220	77	170.1	
		SECTION	F-F			
t 41	D29	5.04	16 400	6	495.9	
42	"	"	15 740	2	158.7	
43	D16	1.56	15 490	4	96.7	
t°41	D13	0.995	1 510	52	78.1	
42	"	"	2 220	52	114.9	
			D29		4398.3 kg	
			D16		465.9 "	
			D13		909.3 "	
		SUB	TOTAL		5773.5 kg	
			D29		10255.2 kg	
			D16		1019.9 "	
			D13		2116.0 "	
	BRACING BEAM		TOTAL		13391.1 kg	

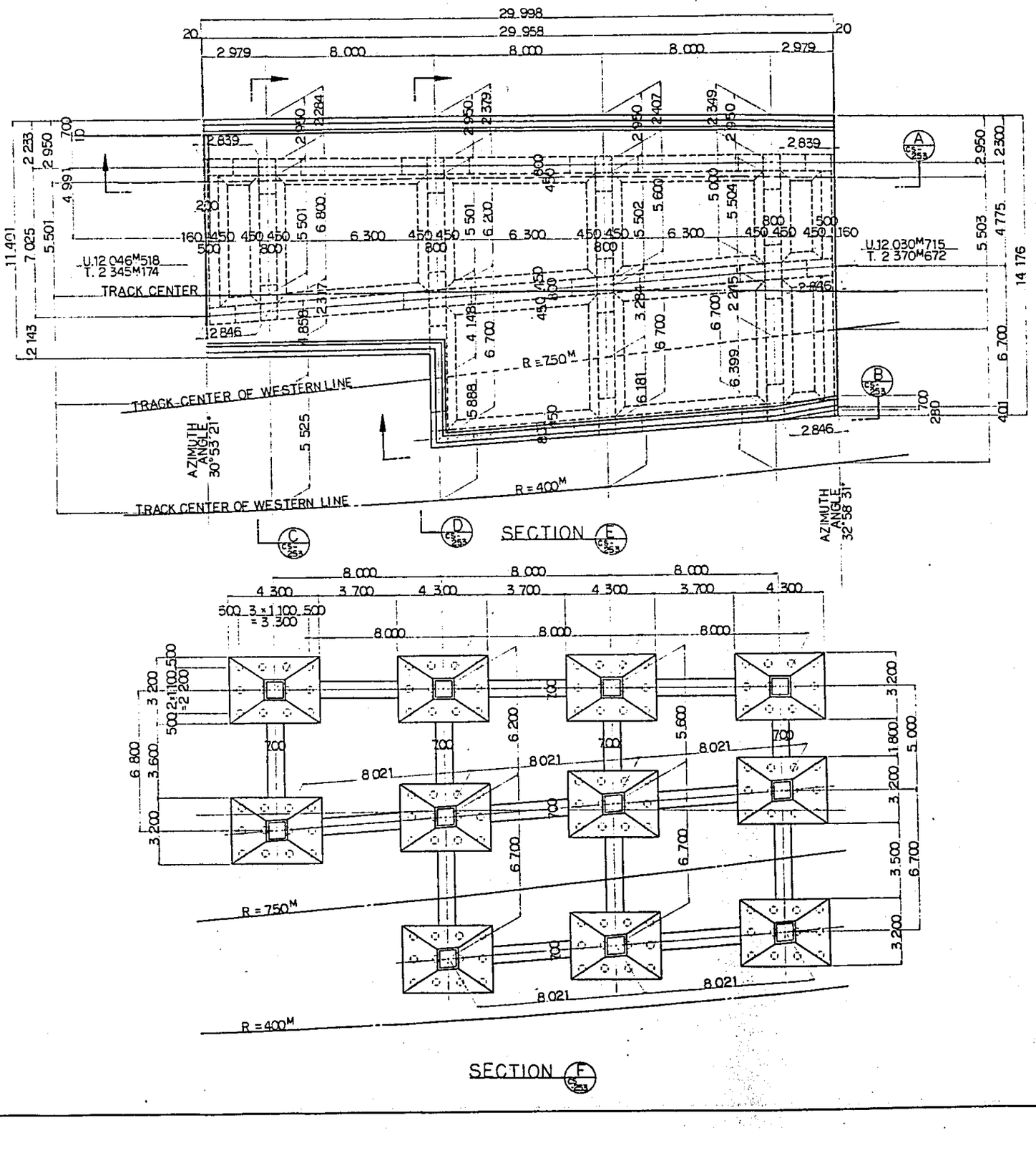
JICA

No. 55

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
		CURB				
W 1	D10	0.560	1 130	419	265.1	
2	〃	〃	940	419	220.6	
3	〃	〃	800	434	194.4	
4	〃	〃	19 600	4	43.9	
5	〃	〃	19 000	2	21.3	〃
6	〃	〃	5 200	4	11.6	〃
7	〃	〃	5 600	2	6.3	〃
8	〃	〃	3 500	4	7.8	〃
9	〃	〃	4 900	2	5.5	〃
10	〃	〃	4 300	4	9.6	〃
11	〃	〃	3 600	2	4.0	〃
12	〃	〃	1 600	4	3.6	〃
13	〃	〃	1 300	2	1.5	〃
14	〃	〃	650	2	0.7	〃
15	〃	〃	11 800	4	26.4	〃
16	〃	〃	11 700	2	13.1	〃
17	〃	〃	7 300	4	16.4	〃
18	〃	〃	8 700	2	9.7	〃
19	〃	〃	2 100	4	4.7	〃
20	〃	〃	2 500	2	2.8	〃
21	〃	〃	8 100	4	18.1	〃
22	〃	〃	7 500	2	8.4	〃
23	〃	〃	1 730	34	32.9	
24	〃	〃	4 900	4	11.0	〃
			D10		939.4 kg	
		CURB	TOTAL		939.4 kg	

JICA

2. V 127



NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. REFERENCE DRAWING FOR BAR ARRANGEMENT :

CS - 258	CS - 265
CS - 259	CS - 266
CS - 260	CS - 267
CS - 261	CS - 268
CS - 262	CS - 269
CS - 263	CS - 270
CS - 264	CS - 271

REPUBLIC OF INDONESIA
DEPARTMENT OF TRANSPORT
DIRECTORATE GENERAL OF LAND TRANSPORT AND INLAND WATERWAYS

NEW RAILWAY LINE FOR CENGKARENG AIRPORT CONSTRUCTION PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

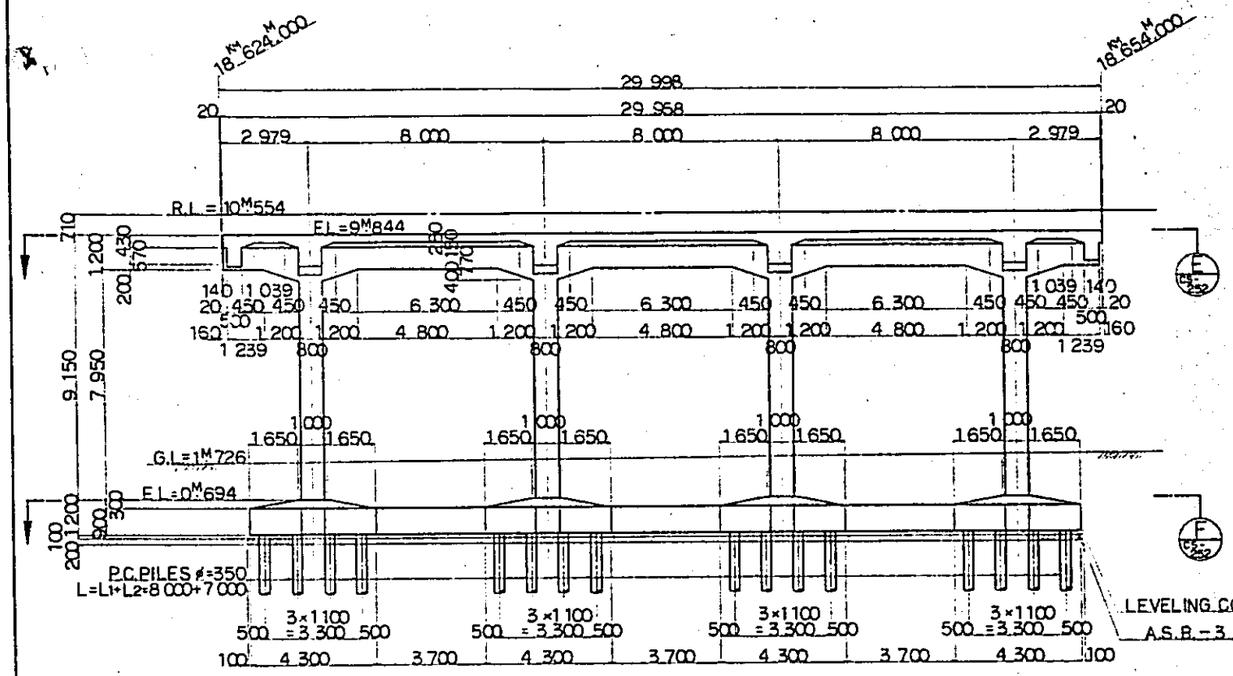
REVISIONS	DATE	DESIGNED	DRAWN	CHECKED	REVIEWED	SUBMITTED
S	1 AUG. '84				K.M	
A	14 FEB '85	T.K	L.O			

VIADUCT V127
GENERAL VIEW
(SHEET 1 OF 2)

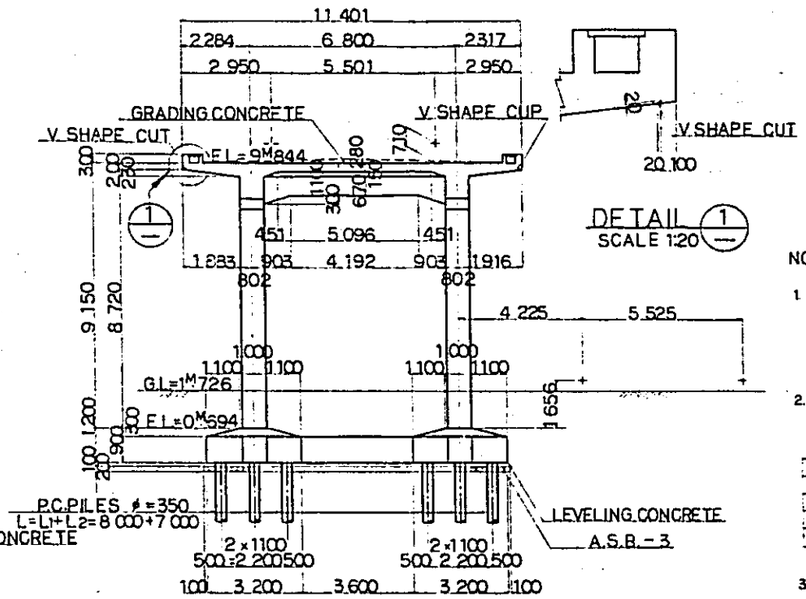
PACKAGE: 1 CIVIL AND ARCHITECTURAL WORK

SCALE 1:100

DRAWING NO. CS-252



SECTION (A) CS-252



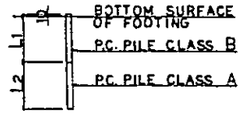
SECTION (C) CS-252

NOTES:

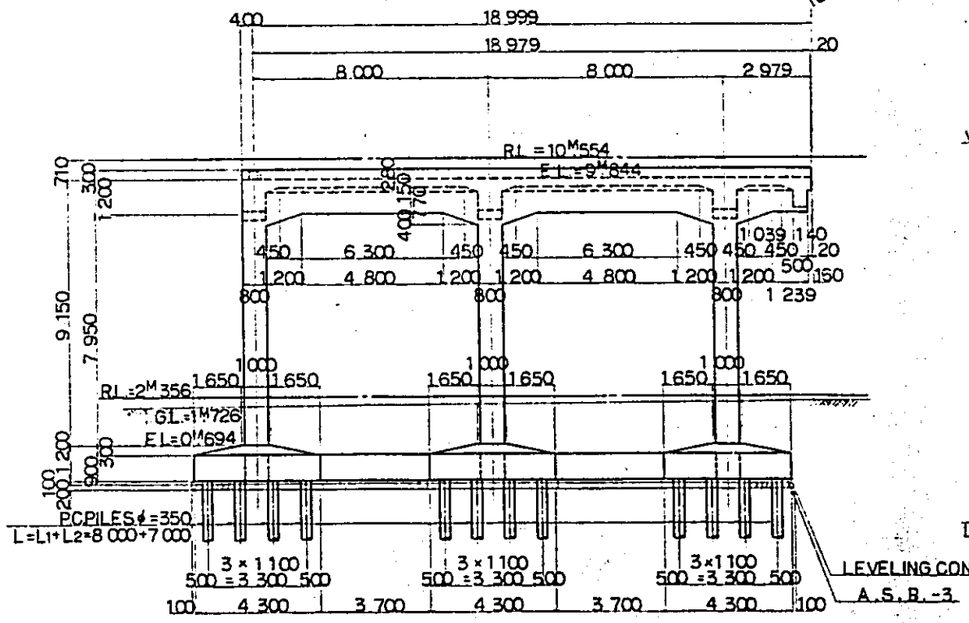
1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. REFERENCE DRAWING FOR BAR ARRANGEMENT :

CS-258	CS-263	CS-268
CS-259	CS-264	CS-269
CS-260	CS-265	CS-270
CS-261	CS-266	CS-271
CS-262	CS-267	

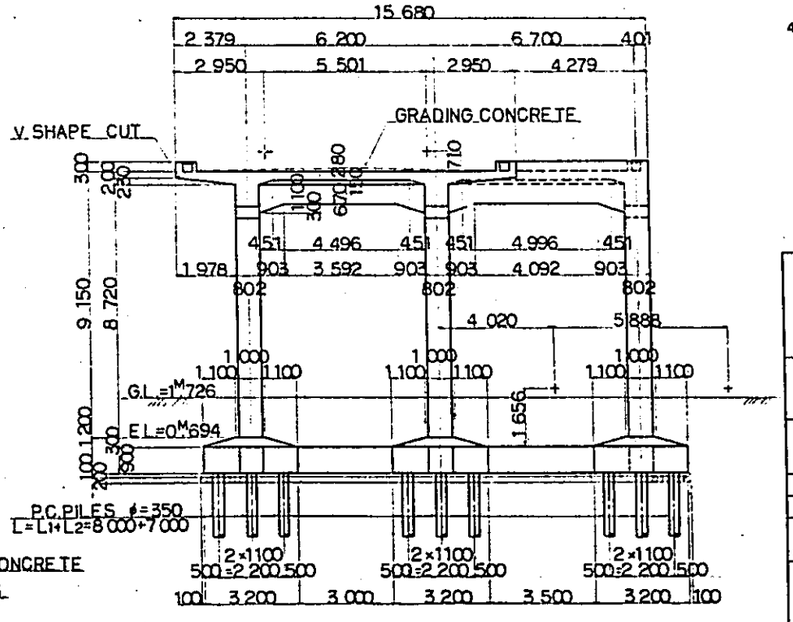
3. TYPES OF P.C. PILE



4. GRADING CONCRETE SHALL BE SIMULTANEOUSLY PLACED WITH SLAB CONCRETE



SECTION (B) CS-252



SECTION (D) CS-252

REPUBLIC OF INDONESIA
DEPARTMENT OF TRANSPORT
DIRECTORATE GENERAL OF LAND TRANSPORT AND INLAND WATERWAYS

NEW RAILWAY LINE FOR CENGKARENG AIRPORT CONSTRUCTION PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

REVISIONS	DATE	DESIGNED	DRAWN	CHECKED	REVIEWED	SUBMITTED
B	1 AUG. '84					
A	15 FEB. '84	T.K	A.D	K.A	U.M	M.K

VIADUCT V127
GENERAL VIEW
(SHEET 2 OF 2)

PACKAGE: I CIVIL AND ARCHITECTURAL WORK

SCALE 1:100

DRAWING NO. CS-253

VIADUCT (V127)

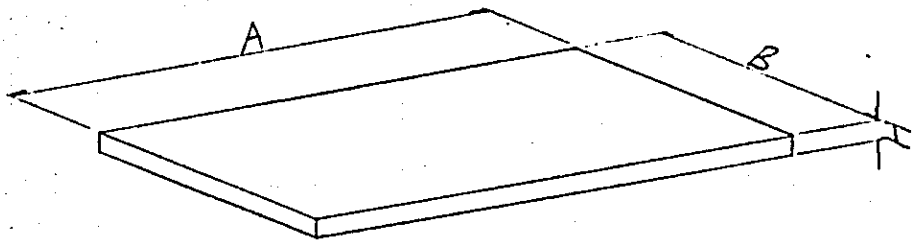
	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	123.3	338.3	15 338.5	124.4
BEAM	87.7	294.7	26 178.5	298.5
COLUMN	62.4	276.4	11 200.8	179.5
CURB	7.2	80.3	964.8	125.3
GRADING CONCRETE	25.6	—	—	—
TOTAL	306.7	989.7	53 672.6	175.0
FOOTING	156.6	129.6	12 371.4	79.0
BRACING BEAM	32.1	91.8	10 666.8	332.3
TOTAL	188.6	221.2	23 038.2	122.2

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	21.1	CLASS F
AGGREGATE SUB BASE	"	42.3	A.S.B.-3
EXCAVATION	"	535.1	
FOUNDATION MORTAR	"	—	f_{ck} = 400 kg/cm^2
PILE	m. xNUMBER	8.00 x 132 = 1056.00	ϕ = 350 CLASS B
		7.00 x 132 = 924.00	ϕ = 350 CLASS A

(V127) $3 + 3 \times 8 + 3 = 30.000^{m}$

CONCRETE VOLUM

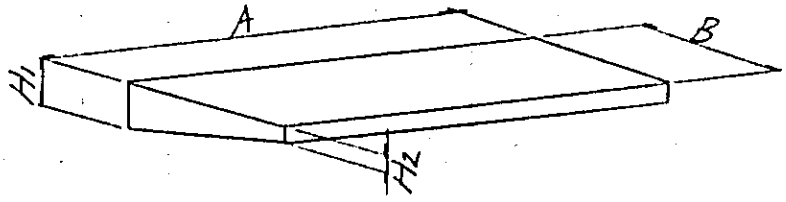
(1) SLAB



$V = A \times B \times H \times n$

$V_{A1} = 10.580 \times 7.413 \times 0.280 \times 1 = 21.960^{m3}$

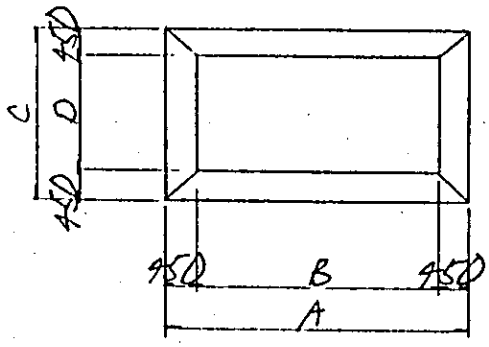
$V_{A2} = 19.380 \times 12.988 \times 0.280 \times 1 = 70.478^{"}$

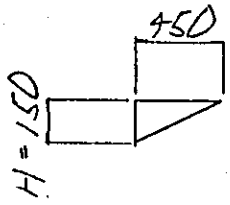


$V = 1/2 \times (H_1 + H_2) \times B \times A \times n$

$V_{b1} = 1/2 \times (0.200 + 0.430) \times 1.925 \times 29.980 \times 1 = 18.179\ m^3$

$V_{b2} = 1/2 \times (0.200 + 0.430) \times 2.027 \times 10.590 \times 1 = 6.762\ "$

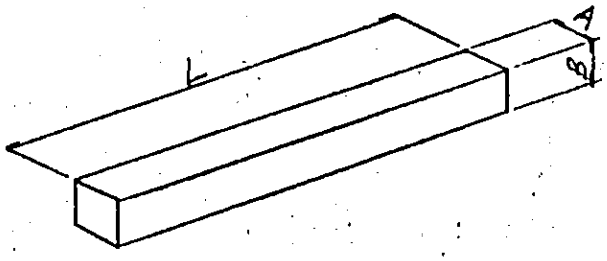




$$V=\{A\times C-\{A\times C+(A+B)\times(C+D)+B\times D\}\times 1/6\}\times H$$

	A	B	C	D	
Vc1 =	1.940	1.040	5.100	4.200	= 0.435 m3
Vc2 =	7.200	6.300	5.100	4.200	= 0.790 "
Vc3 =	1.940	1.040	5.900	5.000	= 0.489 "
Vc4 =	7.200	6.300	5.900	5.000	= 0.844 "

Vc1 =	0.435 × 2	=	0.870 m3
Vc2 =	0.790 × 3	=	2.370 "
Vc3 =	0.489 × 1	=	0.489 "
Vc4 =	0.844 × 2	=	1.688 "



$V = A \times B \times L \times n$

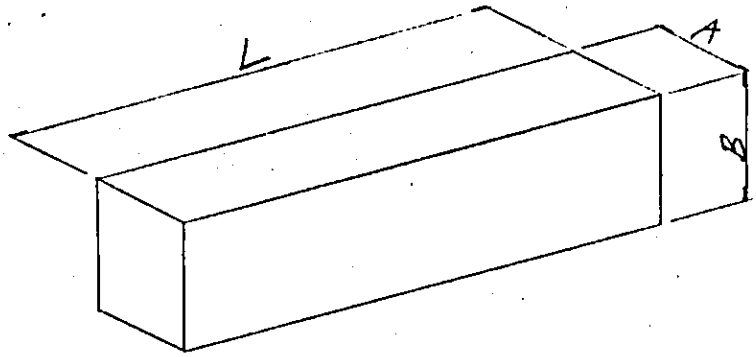
$V_{d1} = 0.150 \times 0.150 \times 6.700 \times 2 = 0.302\ m^3$

$V_{d2} = 0.150 \times 0.150 \times 7.100 \times 1 = 0.160\ "$

SLAB TOTAL = 123.258 m^3

(2) BEAM

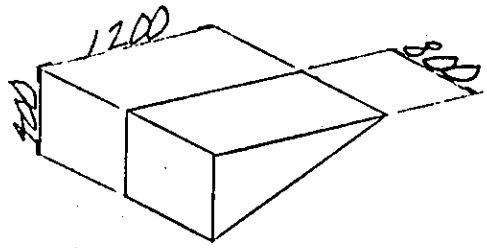
1) LONGITUDINAL BEAM



$$V = A \times B \times L \times n$$

$V_{a1} = 0.800 \times 0.920 \times 2.440 \times 5 = 8.979\ m^3$

$V_{a2} = 0.800 \times 0.920 \times 7.200 \times 8 = 42.394\ "$

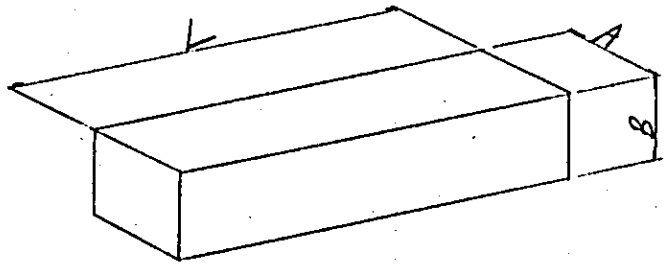


$V = 1/2 \times 1.200 \times 0.400 \times H \times n$

$V_b = 1/2 \times 1.200 \times 0.400 \times 0.800 \times 21$ = 4.032 m^3

SUB TOTAL = 55.405 m^3

2) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM



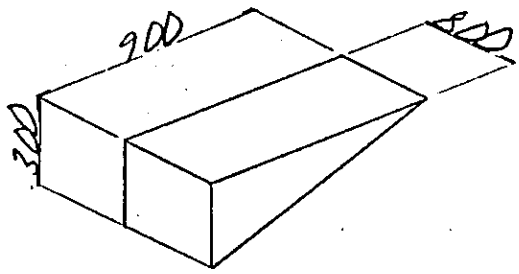
$V = A \times B \times L \times n$

$V_{a1} = 0.800 \times 0.820 \times 5.100 \times 4 = 13.382\ m^3$

$V_{a2} = 0.800 \times 0.820 \times 5.900 \times 3 = 11.611\ "$

$V_{a3} = 0.500 \times 0.720 \times 5.100 \times 2 = 3.672\ "$

$V_{a4} = 0.500 \times 0.720 \times 5.900 \times 1 = 2.124\ "$

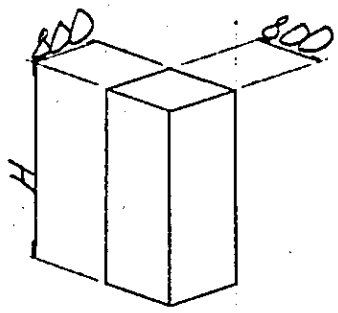


$V_b = \frac{1}{2} \times 0.900 \times 0.300 \times 0.800 \times 14 = 1.512\ m^3$

SUB TOTAL = 32.301 m^3

BEAM TOTAL 87.706 m^3

(3) COLUMN

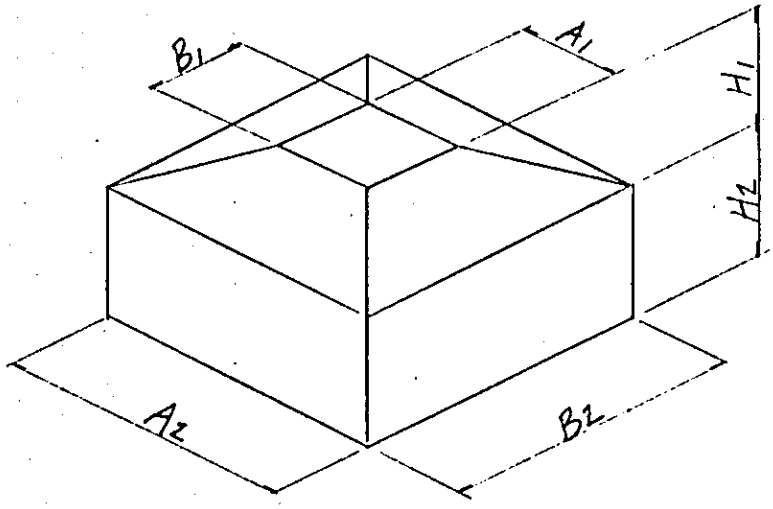


$V = 0.800 \times 0.800 \times H \times n$

$Vb = 0.800 \times 0.800 \times 8.870 \times 11$ = 62.445 m^3

COLUMN TOTAL 62.445 m^3

(4) FOOTING

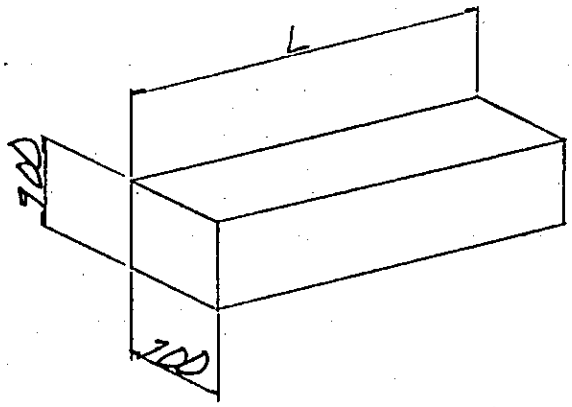


$$V = (1/6 \times (A_1 \times B_1 + A_2 \times B_2 + 4 \times \frac{A_1+A_2}{2} \times \frac{B_1+B_2}{2}) \times H_1 + A_2 \times B_2 \times H_2) \times n$$

$$V_{a1} = (1/6 \times (1.000 \times 1.000 + 4.300 \times 3.200 + 4 \times 2.650 \times 2.100) \times 0.300 + 4.300 \times 3.200 \times 0.900) \times 11 = 156.585 \ m^3$$

FOOTING TOTAL 156.585 m^3

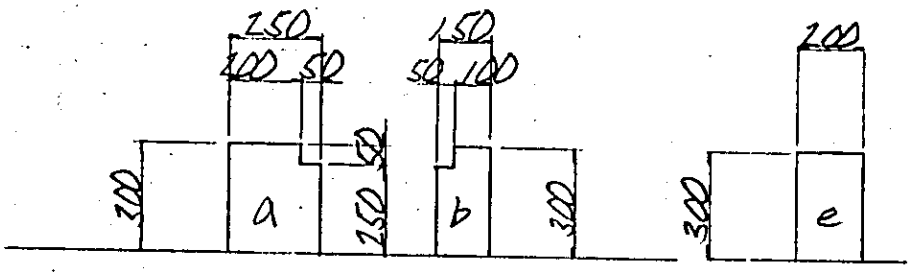
(5) BRACING BEAM



$V = 0.700 \times 0.900 \times L \times n$

$V_{A1} = 0.700 \times 0.900 \times 3.700 \times 8$	=	18.648 m^3
$V_{A2} = 0.700 \times 0.900 \times 2.700 \times 4$	=	6.804 "
$V_{A3} = 0.700 \times 0.900 \times 3.500 \times 3$	=	6.615 "
BRACING BEAM TOTAL	=	32.067 m^3

(6) CURB



$l_a = 29.980 \times 2 + 4.279 = 64.239^{m}$

$l_b = 29.980 \times 2 + 4.279 = 64.239^{m}$

$l_c = 4.991^{m}$

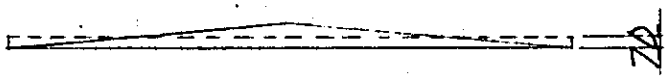
$V_a = (0.250 \times 0.300 - 0.050 \times 0.050) \times 64.239 = 4.657^{m^3}$

$V_b = (0.150 \times 0.300 - 0.050 \times 0.050) \times 64.239 = 2.730^{"}$

$V_c = 0.200 \times 0.300 \times 4.991 = 0.299$

CURB TOTAL 7.686^{m^3}

(7) GRADING CONCRETE

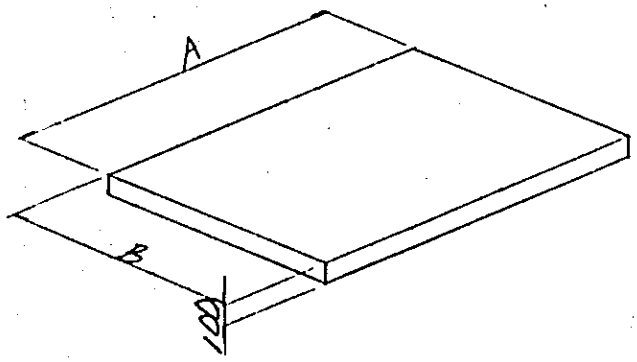


$V_1 = 10.001 \times 0.070 \times 11.290 = 7.904\ m^3$

$V_2 = 13.528 \times 0.070 \times 18.690 = 17.699\ "$

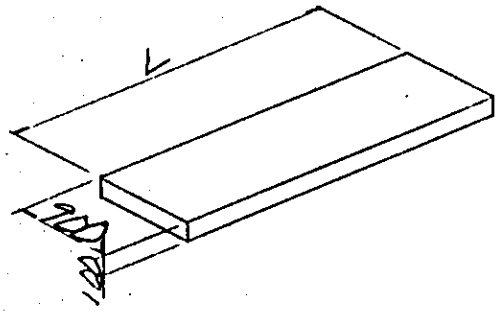
GRADING CONCRETE TOTAL $25.603\ m^3$

(9) LEVELING CONCRETE



$V = A \times B \times 0.100 \times n$

$Va_1 = 4.500 \times 3.400 \times 0.100 \times 11 = 16.830\ m^3$



$V = 0.900 \times 0.100 \times L \times n$

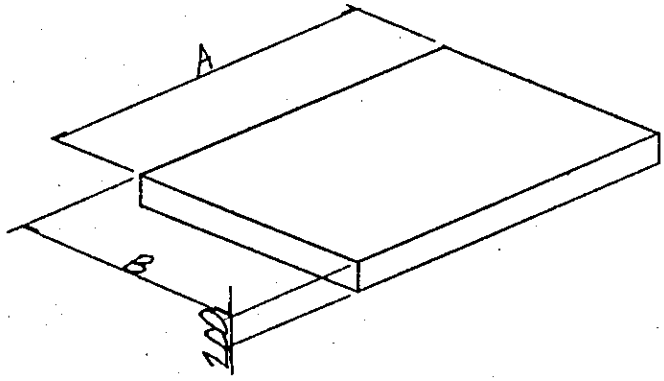
$Vb_1 = 0.900 \times 0.100 \times 3.500 \times 8 = 2.520\ m^3$

$Vb_2 = 0.900 \times 0.100 \times 2.500 \times 4 = 0.900\ "$

$Vb_3 = 0.900 \times 0.100 \times 3.300 \times 3 = 0.891\ "$

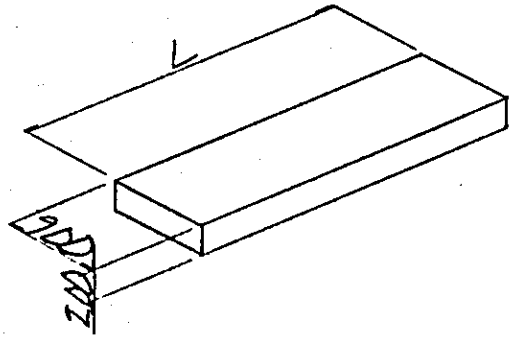
LEVERING CONCRETE	21.141 m^3

(10) AGGREGATE SUB BASE



$V = A \times B \times 0.200 \times n$

$V_{a1} = 4.500 \times 3.400 \times 0.200 \times 11 = 33.660\ m^3$



$V = 0.900 \times 0.200 \times L \times n$

$V_{b1} = 0.900 \times 0.200 \times 3.500 \times 8 = 5.040\ m^3$

$V_{b2} = 0.900 \times 0.200 \times 2.500 \times 4 = 1.800\ "$

$V_{b3} = 0.900 \times 0.200 \times 3.300 \times 3 = 1.782\ "$

AGGREGATE SUB BASE TOTAL $42.282\ m^3$

(11) PILE

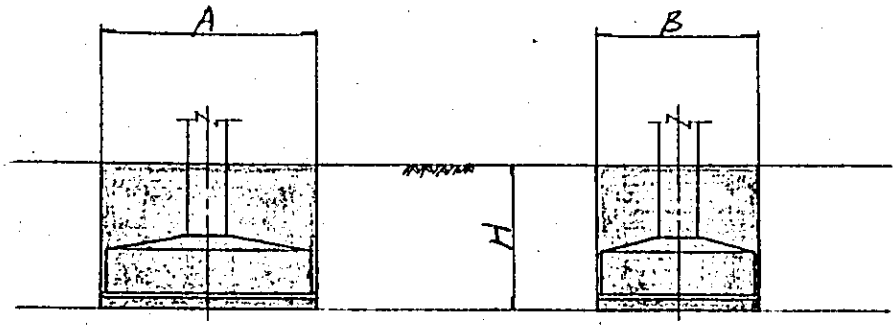
$\phi = 350^{mm}$ $\ell = 15.000^{m}$ $n = 12$ 本

$N = 12$ 本 $\times$ 11 = 132 本

PILE TOTAL	132 本

(12) EXCAVATION

1) FOOTING

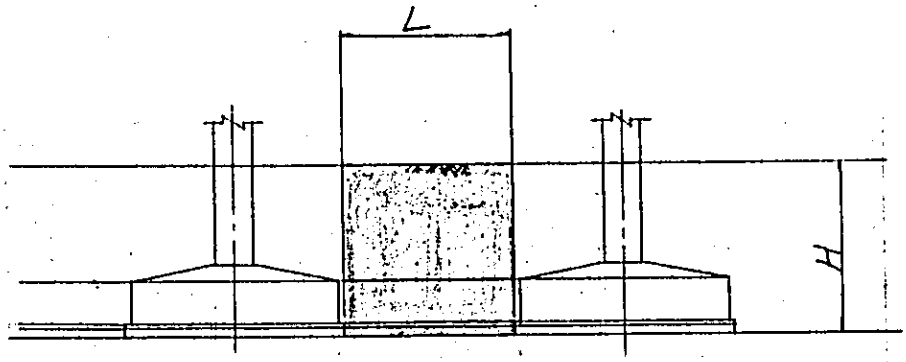


$V = A \times B \times H \times n$

$Va_1 = 4.500 \times 3.400 \times 2.532 \times 11 = 426.136\ m^3$

SUB TOTAL = 426.136 m^3

2) BRACING BEAM



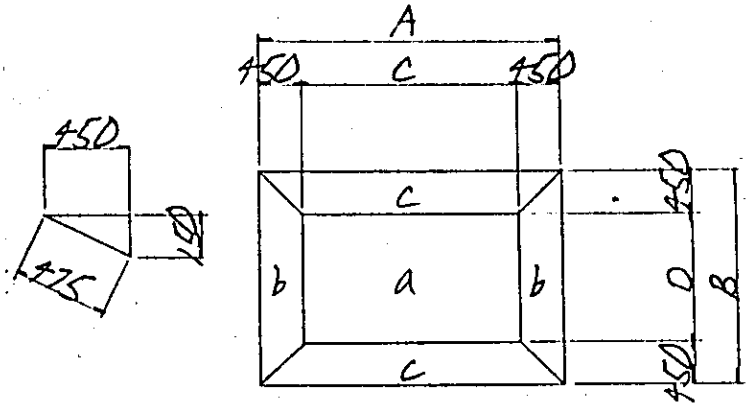
$b = 0.700 + 0.200 = 0.900$ m

$V = b \times H \times L \times n$

$V_{a1} = 0.900 \times 2.532 \times 3.500 \times 8$	=	63.806 m^3
$V_{a2} = 0.900 \times 2.532 \times 2.550 \times 4$	=	23.244 "
$V_{a3} = 0.900 \times 2.532 \times 3.200 \times 3$	=	21.876 "
SUB TOTAL =		108.926 m^3
EXCAVATION TOTAL		535.062 m^3

FORM AREA

(1) SLAB



$$Aa = C \times D \times n$$

$Aa_1 = 1.040 \times 5.213 \times 1$ = 5.422 m^2

$Aa_2 = 1.040 \times 3.188 \times 1$ = 3.316 "

$Aa_3 = 6.300 \times 4.200 \times 3$ = 79.380 "

$Aa_4 = 6.300 \times 5.000 \times 2$ = 63.000 "

$Aa_5 = 1.040 \times 5.000 \times 1$ = 5.200 "

$$Ab = (A + C) \times 1/2 \times 0.475 \times n$$

$Ab_1 = (1.940 + 1.040) \times 1/2 \times 0.475 \times 6 = 4.247\ m^2$

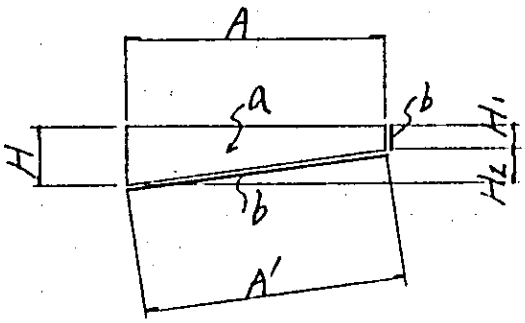
$Ab_2 = (7.200 + 6.300) \times 1/2 \times 0.475 \times 3 = 9.619\ "$

$Ab_3 = (7.221 + 6.321) \times 1/2 \times 0.475 \times 8 = 25.730\ "$

$$Ac = (B + D) \times 1/2 \times 0.475 \times n$$

$Ac_1 = (5.100 + 4.200) \times 1/2 \times 0.475 \times 10 = 22.088\ "$

$Ac_2 = (5.900 + 5.000) \times 1/2 \times 0.475 \times 6 = 15.533\ "$



$$A' = \sqrt{A^2 + H^2}$$

$$Aa = (H_1 + H) \times 1/2 \times A \times n$$

$Aa_1 = (0.200 + 0.430) \times 1/2 \times 1.833 \times 1$ = 0.577 m^2

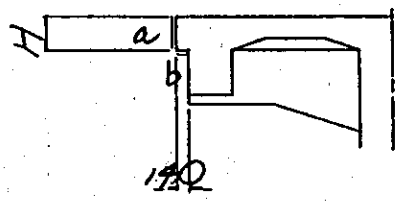
$Aa_2 = (0.200 + 0.430) \times 1/2 \times 1.900 \times 1$ = 0.599 "

$Aa_3 = (0.200 + 0.430) \times 1/2 \times 1.743 \times 1$ = 0.549 "

$$Ab = (A' + H_1) \times L \times n$$

$Ab_1 = (1.881 + 0.200) \times 29.980 \times 1$ = 62.388 m^2

$Ab_2 = (2.095 + 0.200) \times 10.590 \times 1$ = 24.304 "



$Aa = H \times L \times n$

$Aa_1 = 0.430 \times 7.825 \times 1$	=	m^2
$Aa_2 = 0.430 \times 12.275 \times 1$	=	3.365 "
$Aa_3 = 0.430 \times 4.278 \times 1$	=	1.840 "
$Aa_4 = 0.430 \times 19.438 \times 1$	=	8.358 "

$Ab = 0.150 \times L \times n$

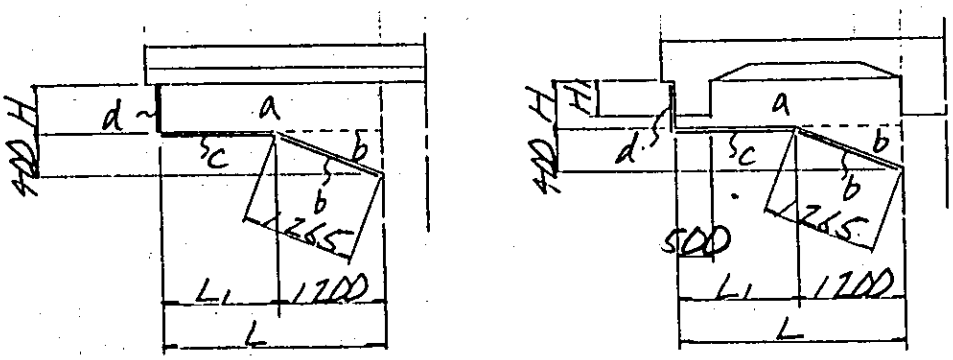
$Ab_1 = 0.140 \times 7.825 \times 1$	=	1.096 "
$Ab_2 = 0.140 \times 12.275 \times 1$	=	1.719 "

SLAB TOTAL	338.330 m^2

(2) BEAM

1) LONGITUDINAL BEAM

B = 0.800 m



$$Aa = H \times L \times n - 0.500 \times H_1 \times n$$

$$Aa_1 = 0.770 \times 2.440 \times 10 - 0.500 \times 0.570 \times 6 = 17.078\ m^2$$

$$Ab = 1.200 \times 0.400 \times 1/2 \times n + B \times 1.265 \times n$$

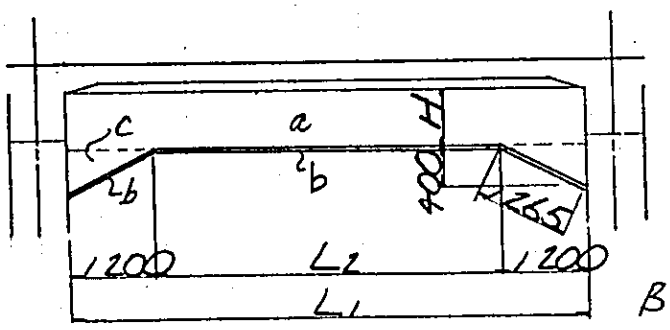
$$Ab_1 = 1.200 \times 0.400 \times 1/2 \times 10. + 0.800 \times 1.265 \times 5 = 7.460\ "$$

$$Ac = B \times L_1 \times n$$

$$Ac_1 = 0.800 \times 1.240 \times 10 = 9.920\ "$$

$$Ad = B \times H \times n$$

$$Ad_1 = 0.770 \times 0.800 \times 5 = 3.080\ "$$



B = 0.800 m

$A_a = H \times L_1 \times n$

$A_{a1} = 0.770 \times 7.200 \times 6$ = 33.264 m^2

$A_{a2} = 0.770 \times 7.221 \times 10$ = 55.602 "

$A_b = (1.265 \times 2 + L_2) \times B \times n$

$A_{b1} = (1.265 \times 2 + 4.800) \times 0.800 \times 3$ = 17.592 "

$A_{b2} = (1.265 \times 2 + 4.821) \times 0.800 \times 5$ = 29.404 "

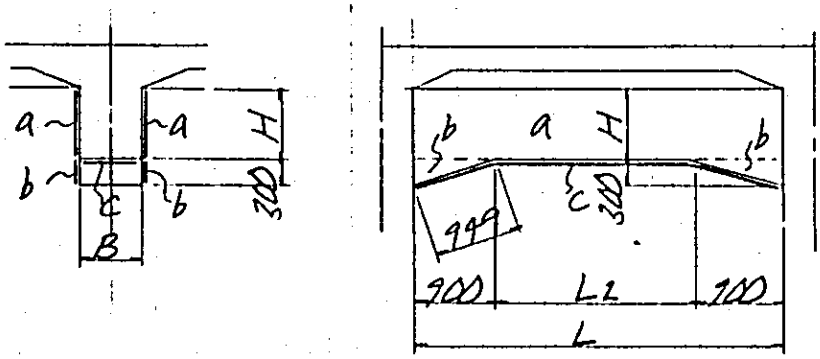
$A_c = 1.200 \times 0.400 \times 1/2 \times n$

$A_{c1} = 1.200 \times 0.400 \times 1/2 \times 32$ = 7.680 "

SUB TOTAL = 181.080 m^2

2) AT INTERMEDIATE OF VIADUCT

TRANSVERSE BEAM



$Aa = H \times L \times n$

$Aa_1 = 0.670 \times 5.100 \times 8$ = 27.336 m^2

$Aa_2 = 0.670 \times 5.900 \times 6$ = 23.718 "

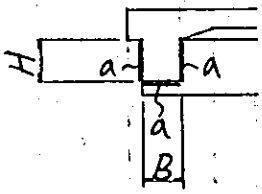
$Ab = 0.900 \times 0.300 \times 1/2 \times n$

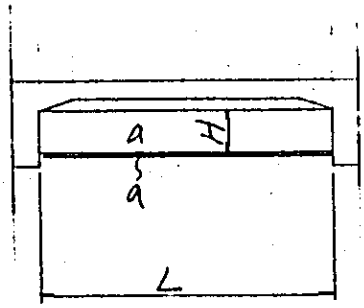
$Ab_1 = 0.900 \times 0.300 \times 1/2 \times 28$ = 3.780 "

$Ac = (0.949 \times 2 + L2) \times 0.800 \times n$

$Ac_1 = (0.949 \times 2 + 3.300) \times 0.800 \times 4$ = 16.634"

$Ac_2 = (0.949 \times 2 + 4.100) \times 0.800 \times 3$ = 14.395"





$A_a = (2 \cdot H + B) \times L \times n$

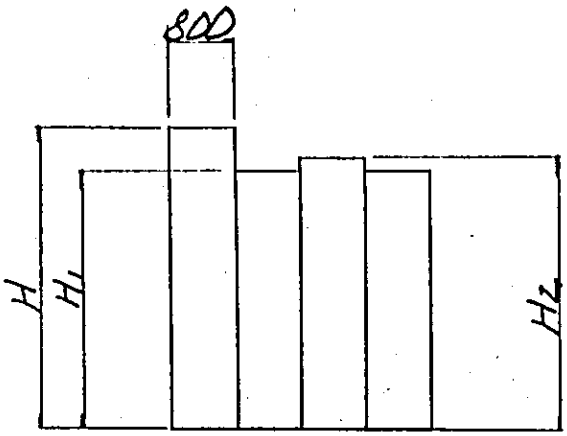
$A_{a1} = (2 \times 0.570 + 0.500) \times 6.225 \times 1 = 10.209\ m^2$

$A_{a2} = (2 \times 0.570 + 0.500) \times 10.675 \times 1 = 17.507\ m^2$

SUB TOTAL = 113.579 m^2

BEAM TOTAL 294.659 m^2

(3) COLUMN



$Aa = (H + H_1 \times 2 + H_2) \times 0.800 \times n$

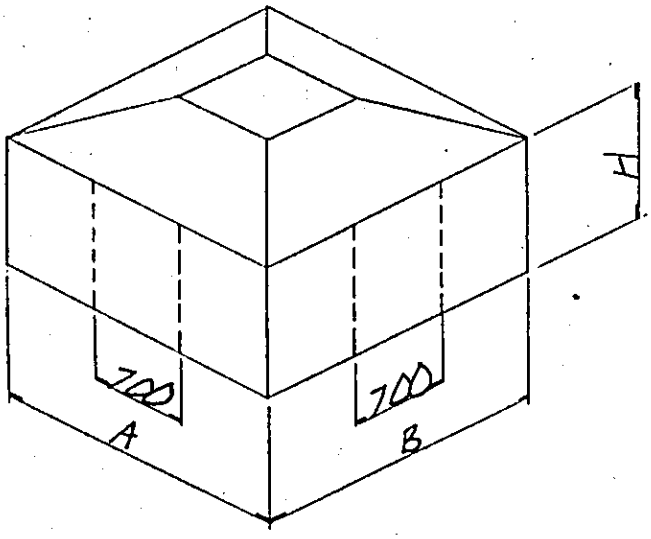
$Aa_1 = (8.720 + 7.550 \times 2 + 7.750) \times 0.800 \times 7 = 176.792\ m^2$

$Aa_2 = (7.750 + 8.720 \times 2 + 7.550) \times 0.800 \times 1 = 26.192\ "$

$Aa_3 = (7.750 + 7.550 \times 2 + 7.750) \times 0.800 \times 3 = 73.440\ "$

COLUMN TOTAL 276.424 m^2

(4) FOOTING

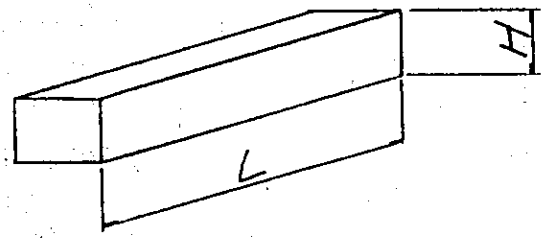


$$Aa = (A+B)\times 2\times H\times n - 0.700\times H\times n$$

$$Aa_1 = (4.300+3.200)\times 2\times 0.900\times 11 - 0.700\times 0.900\times 30 = 129.600\ m^2$$

FOOTING TOTAL 129.600 m^2

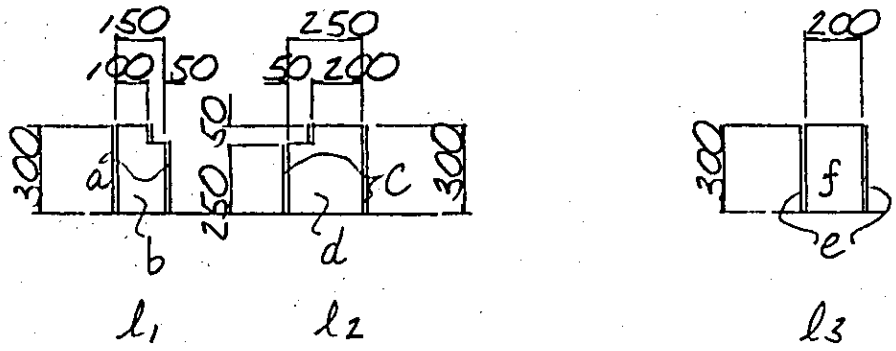
(5) BRACING BEAM



$Aa = L \times H \times 2 \times n$

$Aa_1 = 3.700 \times 0.900 \times 2 \times 3$	=	$19.980\ m^2$
$Aa_2 = 3.721 \times 0.900 \times 2 \times 5$	=	$33.489\ m^2$
$Aa_3 = 2.700 \times 0.900 \times 2 \times 4$	=	$19.440\ m^2$
$Aa_4 = 3.500 \times 0.900 \times 2 \times 3$	=	$18.900\ m^2$
BRACING BEAM TOTAL		$91.809\ m^2$

(6) CURB



$l_1 = 29.960 \times 2 + 4.279 = 64.119$ m

$l_2 = 29.960 \times 2 + 4.279 = 64.119$ "

$l_3 = 4.991$ m

$A_a = 0.300 \times 2 \times l_1$

$A_{a1} = 0.300 \times 2 \times 64.119 = 38.471$ m²

$A_b = (0.300 \times 0.150 - 0.050^2) \times n$

$A_{b1} = (0.300 \times 0.150 - 0.050^2) \times 2 = 0.085$ "

$A_c = 0.300 \times 2 \times l_2$

$A_{c1} = 0.300 \times 2 \times 64.119 = 38.471$ "

$A_d = (0.300 \times 0.250 - 0.050^2) \times n$

$A_{d1} = (0.300 \times 0.250 - 0.050^2) \times 2 = 0.145$ "

$Ae = 0.300 \times 2 \times ls$

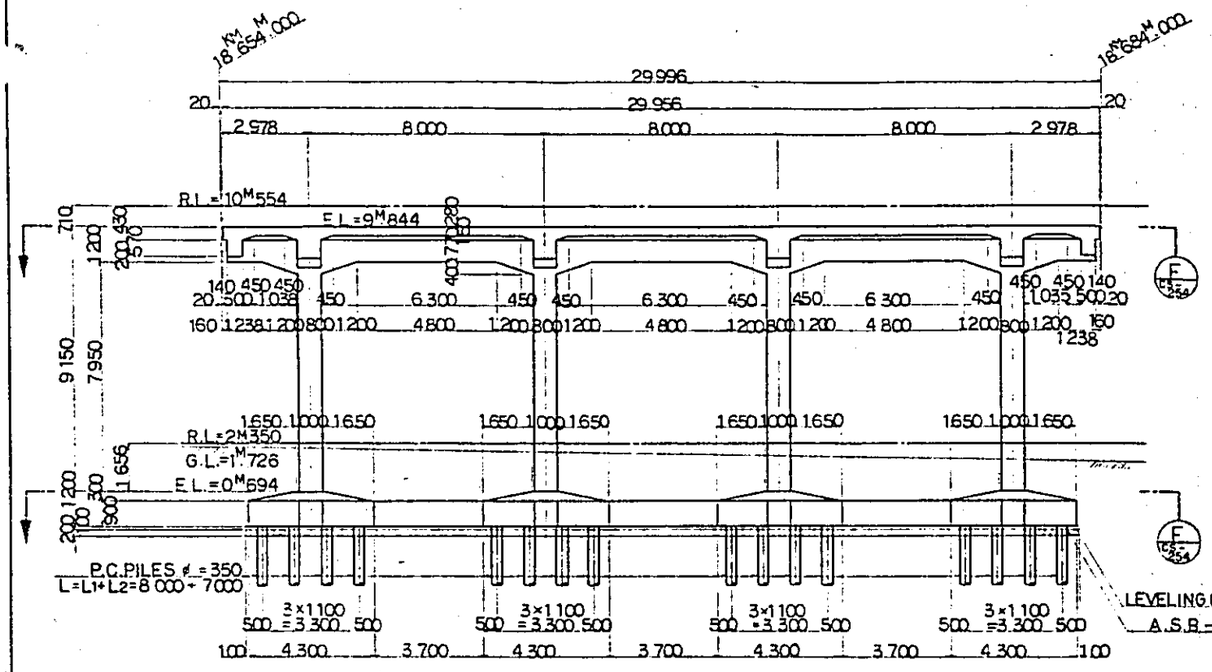
$Ae_1 = 0.300 \times 2 \times 4.991$ = 2.995 m^2

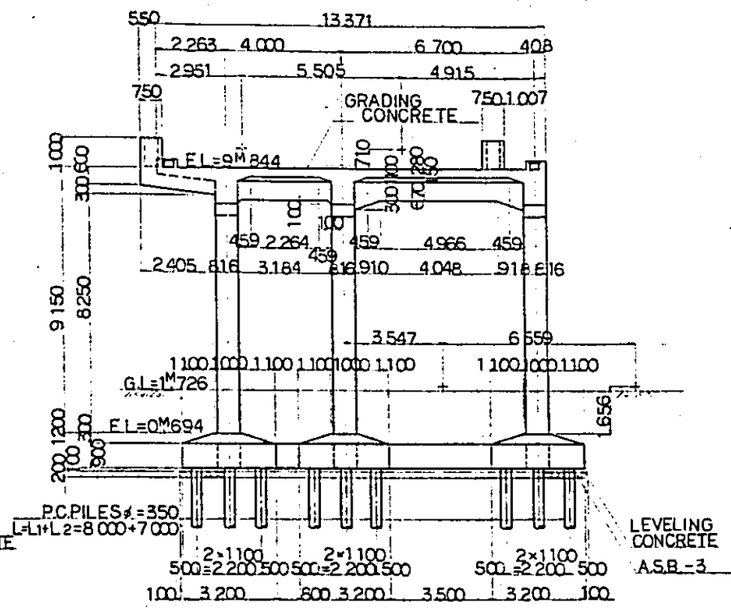
$Af = 0.300 \times 0.200 \times n$

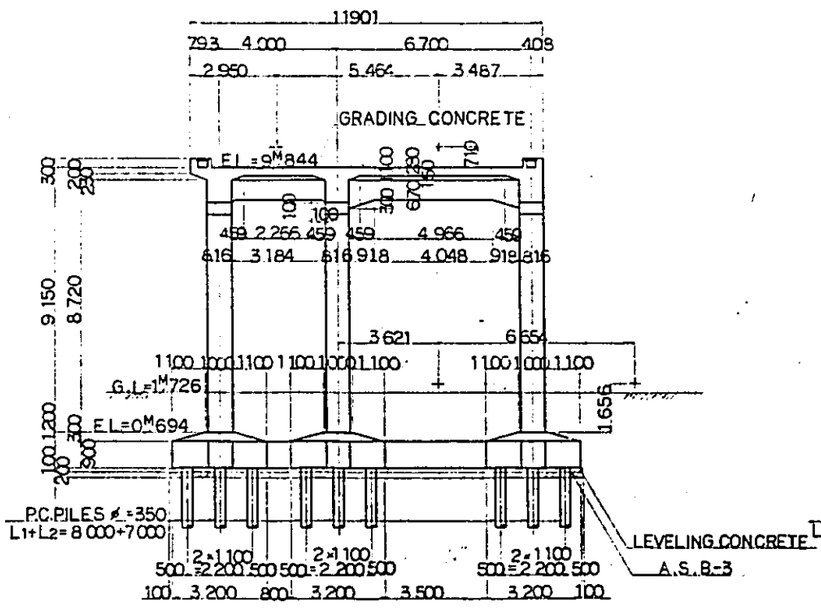
$Af_1 = 0.300 \times 0.200 \times 2$ = 0.120 "

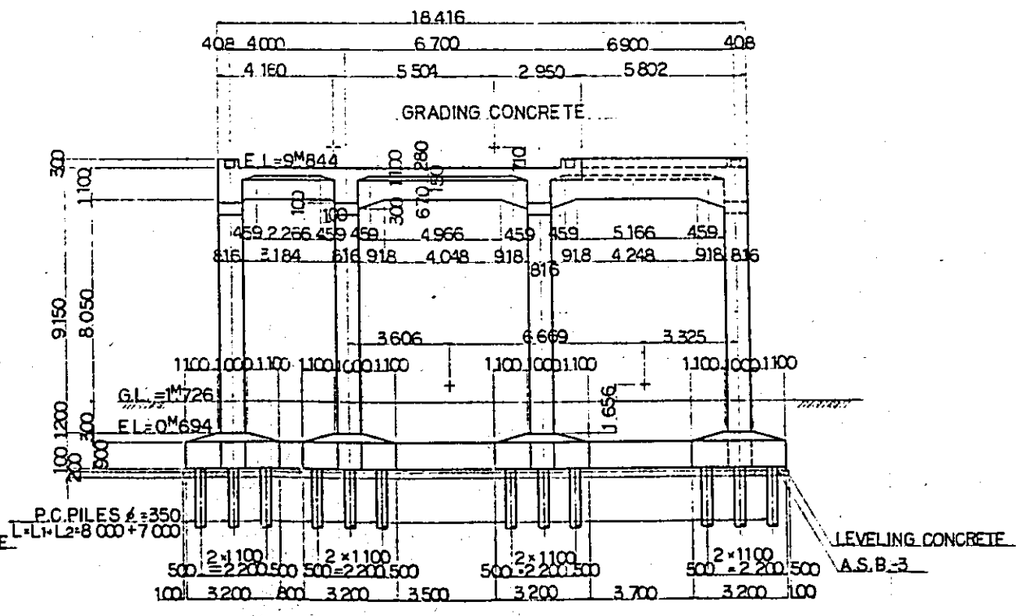
CURB TOTAL 80.287 m^2

3. V 128







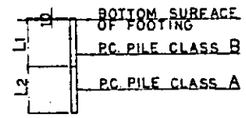


NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. REFERENCE DRAWING FOR BAR ARRANGEMENT:

CS-258	CS-263	CS-268
CS-259	CS-264	CS-269
CS-260	CS-265	CS-270
CS-261	CS-266	CS-271
CS-262	CS-267	

3. TYPES OF P.C. PILE



4. GRADING CONCRETE SHALL BE SIMULTANEOUSLY PLACED WITH SLAB CONCRETE

REPUBLIC OF INDONESIA
DEPARTMENT OF TRANSPORT
DIRECTORATE GENERAL OF LAND TRANSPORT AND INLAND WATERWAYS

NEW RAILWAY LINE FOR CENGKARENG AIRPORT CONSTRUCTION PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

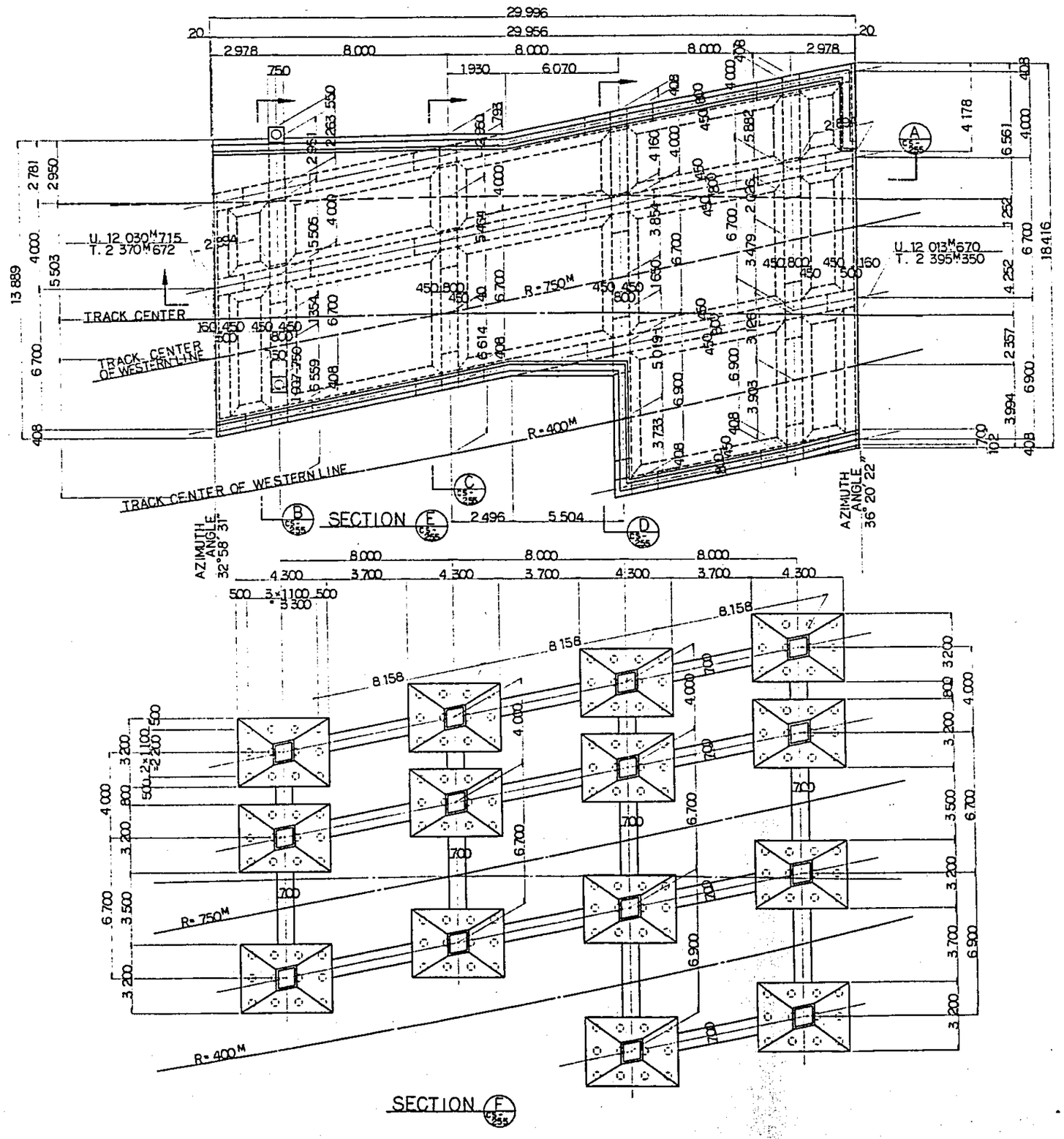
REVISIONS	DATE	DESIGNED	DRAWN	CHECKED	REVIEWED	SUBMITTED
B	1 AUG'84					
A	FEB'84	T.K	A.O		K.M	

VIADUCT V128
GENERAL VIEW
(SHEET 2 OF 2)

PACKAGE: I CIVIL AND ARCHITECTURAL WORK

SCALE 1 : 100

DRAWING NO. CS-255



SECTION (F) CS-255

NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. REFERENCE DRAWING FOR BAR ARRANGEMENT:

CS - 258	CS - 265
CS - 259	CS - 266
CS - 260	CS - 267
CS - 261	CS - 268
CS - 262	CS - 269
CS - 263	CS - 270
CS - 264	CS - 271

REPUBLIC OF INDONESIA
DEPARTMENT OF TRANSPORT
DIRECTORATE GENERAL OF LAND TRANSPORT AND INLAND WATERWAYS

NEW RAILWAY LINE FOR CENGKARENG AIRPORT CONSTRUCTION PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

REVISIONS	DATE	DESIGNED	DRAWN	CHECKED	REVIEWED	SUBMITTED
B	1 AUG '84					
A	FEB '84	T.K	A.O		K.M	M.K

VIADUCT V126
GENERAL VIEW
(SHEET 1 OF 2)

PACKAGE: I CIVIL AND ARCHITECTURAL WORK

SCALE 1 : 100

DRAWING NO: CS-254

VIADUCT (V128)

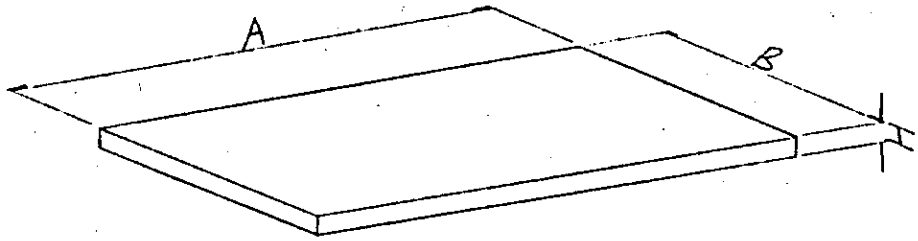
	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	133.3	352.4	16 582.5	124.4
BEAM	115.9	310.7	34 596.2	298.5
COLUMN	81.1	360.1	14 557.5	179.5
CURB	7.3	77.3	914.7	125.3
GRADING CONCRETE	27.5	——	——	——
TOTAL	365.1	1 100.5	66 650.9	182.6
FOOTING	199.3	163.8	15 744.7	79.0
BRACING BEAM	39.3	79.0	13 059.4	332.3
TOTAL	238.6	242.8	28 804.1	120.7

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	25.6	CLASS F
AGGREGATE SUB BASE	"	51.1	A.S.B. - 3
EXCAVATION	"	674.5	
FOUNDATION MORTAR	——	——	σ_{CK} = 400 kg/cm^2
PILE	m x NUMBER	8.00 x 168 = 1344.000	ϕ = 350 CLASS B
		7.00 x 168 = 1176.000	ϕ = 350 CLASS A

(V128) 3 + 3 × 8 + 3 = 30 m

CONCRETE VOLUM

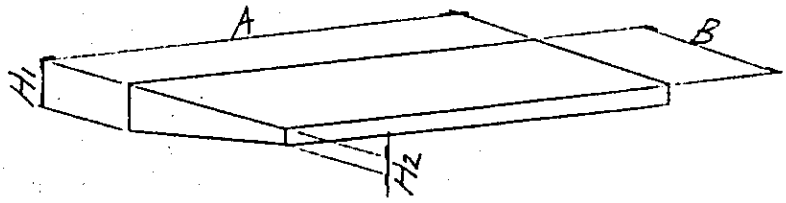
(1) SLAB



$V = A \times B \times H \times n$

$V_{A1} = 29.956 \times 11.516 \times 0.280 \times 1 = 96.593\ m^3$

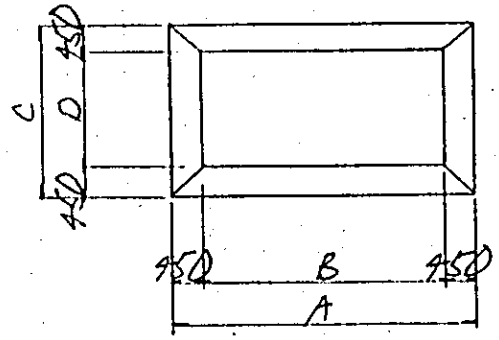
$V_{A2} = 11.378 \times 6.900 \times 0.280 \times 1 = 21.982\ "$

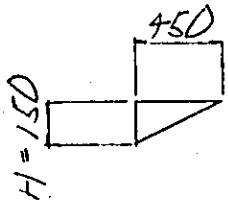


$V = 1/2 \times (H_1 + H_2) \times B \times A \times n$

$V_{b1} = 1/2 \times (0.430 + 0.280) \times 1.187 \times 12.918 \times 1 = 5.443\ m^3$

$V_{b2} = 1/2 \times (0.430 + 0.430) \times 5.104 \times 0.509 \times 1 = 1.047\ "$

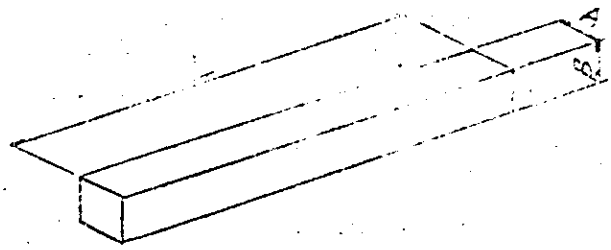




$$V=\{A\times C-\{A\times C+(A+B)\times(C+D)+B\times D\}\times 1/6\}\times H$$

	A	B	C	D	
$Vc1'$ =	7.200	6.300	5.884	4.966	= 0.852 m3
$Vc2'$ =	7.200	6.300	3.184	2.266	= 0.669 "
$Vc3'$ =	1.938	1.038	5.884	4.966	= 0.489 "
$Vc4'$ =	1.938	1.038	3.184	2.266	= 0.307 "
$Vc5'$ =	7.200	6.300	6.084	5.166	= 0.865 "
$Vc6'$ =	1.938	1.038	6.084	5.166	= 0.503 "

$Vc1$ = 0.852	× 3	=	2.556 m3
$Vc2$ = 0.669	× 3	=	2.007 "
$Vc3$ = 0.489	× 2	=	0.978 "
$Vc4$ = 0.307	× 2	=	0.614 "
$Vc5$ = 0.865	× 1	=	0.865 "
$Vc6$ = 0.503	× 1	=	0.503 "



$V = A \times B \times L \times n$

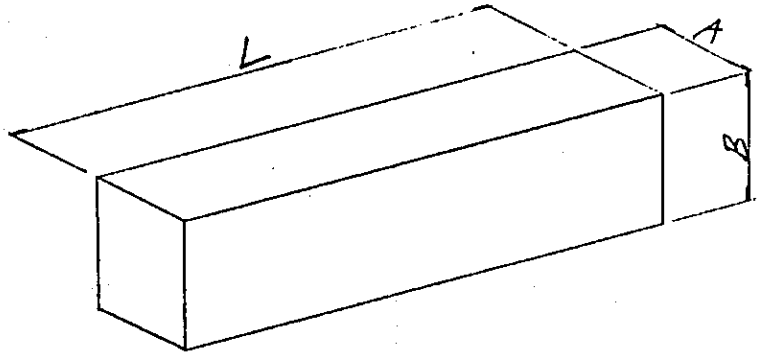
$V_{d1} = 0.150 \times 0.150 \times 11.516 \times 1 = 0.259\ m^3$

$V_{d2} = 0.150 \times 0.150 \times 18.416 \times 1 = 0.414\ "$

SLAB TOTAL = 133.261 m^3

(2) BEAM

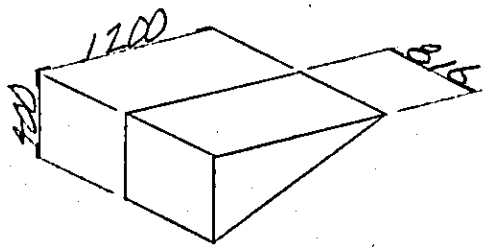
1) LONGITUDINAL BEAM



$$V = A \times B \times L \times n$$

$V_{a1} = 0.818 \times 0.920 \times 7.200 \times 10 = 54.184\ m^3$

$V_{a2} = 0.818 \times 0.920 \times 2.438 \times 7 = 12.843\ "$

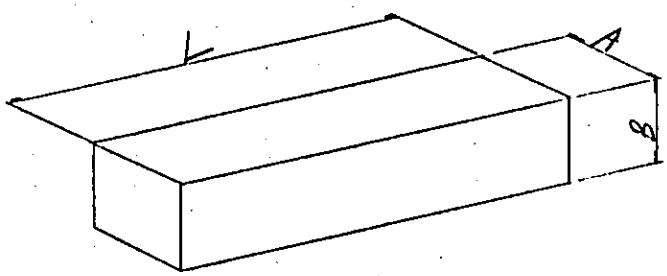


$V = 1/2 \times 1.200 \times 0.400 \times H \times n$

$V_b = 1/2 \times 1.200 \times 0.400 \times 0.816 \times 27$ = 5.288 m^3

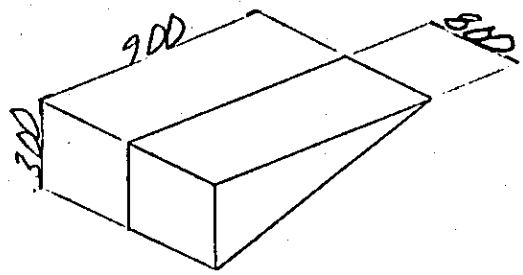
SUB TOTAL = 72.315 m^3

2) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM

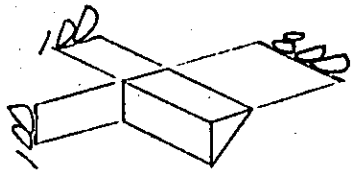


$V = A \times B \times L \times n$

$V_{a1} = 0.800 \times 0.820 \times 5.884 \times 4$	=	15.440 m³
$V_{a2} = 0.800 \times 0.820 \times 3.184 \times 4$	=	8.355 "
$V_{a3} = 0.800 \times 0.820 \times 6.084 \times 2$	=	7.982 "
$V_{a4} = 0.500 \times 0.720 \times 5.884 \times 2$	=	4.236 "
$V_{a5} = 0.500 \times 0.720 \times 3.184 \times 2$	=	2.292 "
$V_{a6} = 0.500 \times 0.720 \times 6.084 \times 1$	=	2.190 "



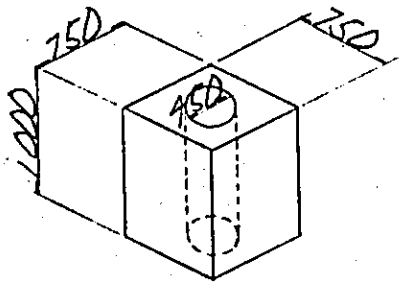
$V_b = \frac{1}{2} \times 0.900 \times 0.300 \times 0.800 \times 12 = 1.296\ m^3$



$V_c = \frac{1}{2} \times 0.100 \times 0.100 \times 0.800 \times 8 = 0.032\ m^3$

SUB TOTAL = 41.823 m³

3) ELECTRIC POLE



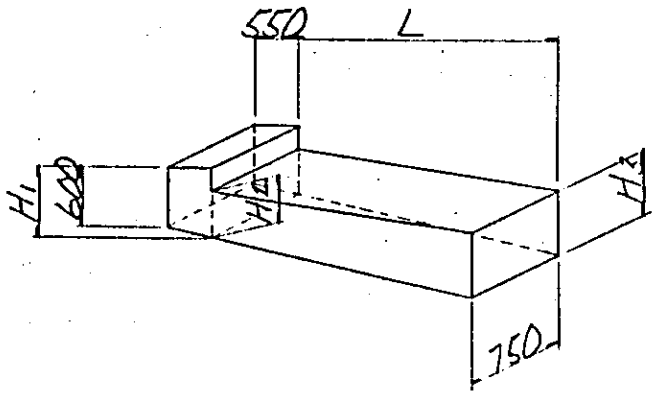
$Va' = (0.750 \times 0.750 - 1/4 \times 3.142 \times 0.450^2) \times 1.000$

$= 0.403 \ m^3$

$Va = 0.403 \times 2$ - 0.806 m^3

SUB TOTAL- 0.806 m^3

5) BASE ELECTRIC POLE

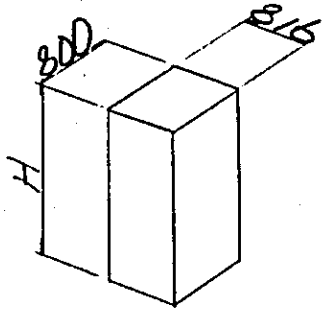


$$V = 1/2 \times (0.600 + H_1) \times 0.550 \times 0.750$$
$$+ 1/2 \times (H_2 + H_3) \times L \times 0.750$$

$$V_{a1} = 1/2 \times (0.600 + 0.669) \times 0.550 \times 0.750$$
$$+ 1/2 \times (0.469 + 0.470) \times 1.855 \times 0.750 = 0.915 \ m^3$$

SUB TOTAL =	0.915 m^3
ELCTRIC TOTAL =	1.723 m^3
BEAM TOTAL =	115.861 m^3

(3) COLUMN

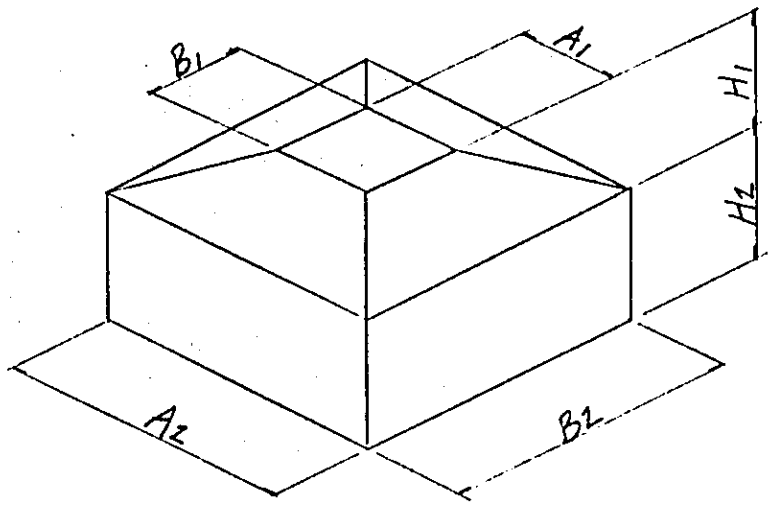


$V = 0.800 \times 0.816 \times H \times n$

$V_{A1} = 0.800 \times 0.816 \times 8.870 \times 14$ = 81.065 m^3

COLUMN TOTAL = 81.065 m^3

(4) FOOTING

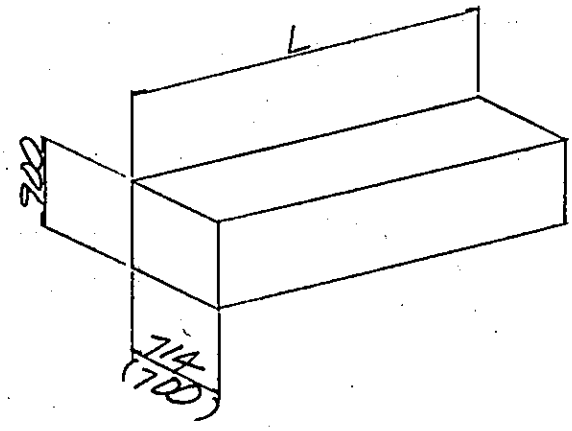


$$V = (1/6 \times (A_1 \times B_1 + A_2 \times B_2 + 4 \times \frac{A_1+A_2}{2} \times \frac{B_1+B_2}{2}) \times H_1 + A_2 \times B_2 \times H_2) \times n$$

$$V_{A1} = (1/6 \times (1.000 \times 1.000 + 4.300 \times 3.200 + 4 \times 2.650 \times 2.100) \times 0.300 + 4.300 \times 3.200 \times 0.900) \times 14 = 199.290 \ m^3$$

FOOTING TOTAL	199.290 m^3

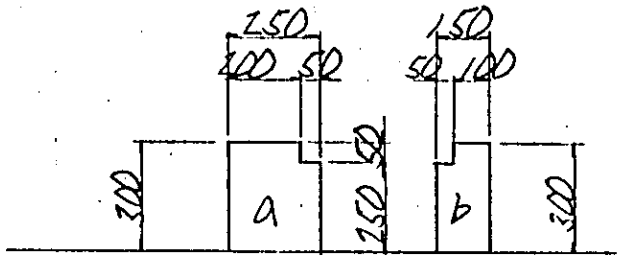
(5) BRACING BEAM



$$V = 0.714\ (0.700) \times 0.900 \times L \times n$$

$V_{a1} = 0.714 \times 0.900 \times 3.700 \times 10$	=	23.776 m^3
$V_{a2} = 0.700 \times 0.900 \times 3.500 \times 4$	=	8.820"
$V_{a3} = 0.700 \times 0.900 \times 0.800 \times 4$	=	2.016"
$V_{a4} = 0.700 \times 0.900 \times 3.700 \times 2$	=	4.662"
BRACING BEAM TOTAL	=	39.274 m^3

(6) CURB



l_a = 2.613 + 9.555 + 17.273 + 3.736 + 5.229 + 25.244
= 63.650 m

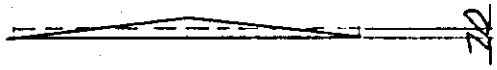
l_b = 12.918 + 16.763 + 4.110 + 30.473
= 64.264 m

$V_a = (0.250 \times 0.300 - 0.050 \times 0.050) \times 63.650 = 4.615$ m³

$V_b = (0.150 \times 0.300 - 0.050 \times 0.050) \times 64.264 = 2.731$ "

CURB TOTAL 7.346 m³

(7) GRADING CONCRETE



$V_1 = 1/2 \times (12.489 + 10.116) \times 12.918 \times 0.070 = 10.220\ m^3$

$V_2 = 10.116 \times 0.566 \times 0.070 = 0.401\ "$

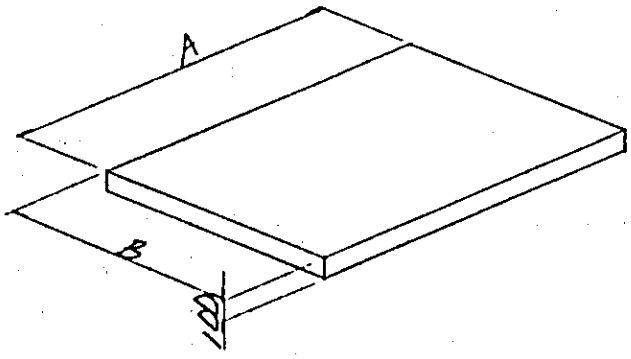
$V_3 = 1/2 \times (10.116 + 11.134) \times 5.804 \times 0.070 = 4.317\ "$

$V_4 = 17.016 \times 9.988 \times 0.070 = 11.897\ "$

$V_5 = 0.700 \times 13.405 \times 0.070 = 0.657\ "$

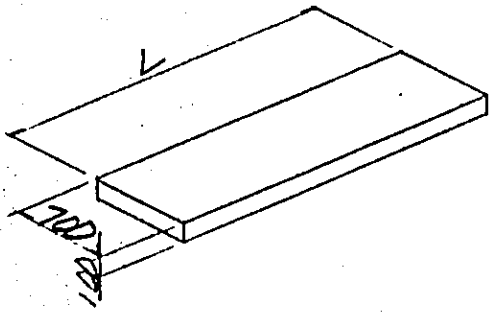
GRADING CONCRETE TOTAL = 27.492 "

(9) LEVELING CONCRETE



$V = A \times B \times 0.100 \times n$

$V_{a1} = 4.500 \times 3.400 \times 0.100 \times 14 = 21.420$ m³



$V = 0.700 \times 0.100 \times L \times n$

$V_{b1} = 0.700 \times 0.100 \times 3.658 \times 10 = 2.561$ m³

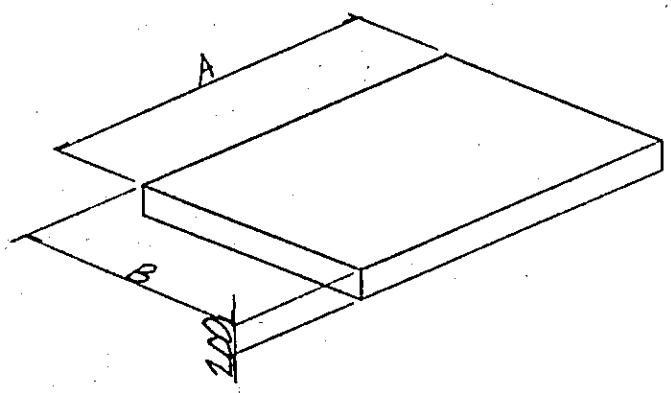
$V_{b2} = 0.700 \times 0.100 \times 3.300 \times 4 = 0.924$ "

$V_{b3} = 0.700 \times 0.100 \times 0.600 \times 4 = 0.168$ "

$V_{b4} = 0.700 \times 0.100 \times 3.500 \times 2 = 0.490$ "

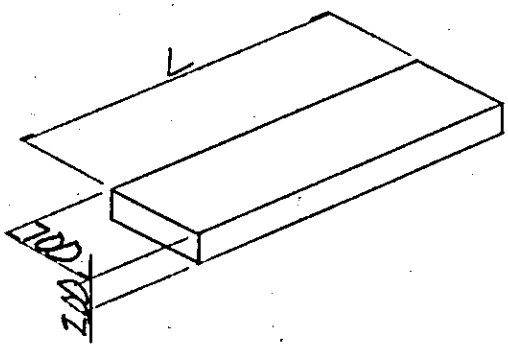
.LEVERING CONCRETE	25.563 m³

(10) AGGREGATE SUB BASE



$V = A \times B \times 0.200 \times n$

$V_{a1} = 4.500 \times 3.400 \times 0.200 \times 14 = 42.840\ m^3$



$V = 0.700 \times 0.200 \times L \times n$

$V_{b1} = 0.700 \times 0.200 \times 3.658 \times 10 = 5.121\ m^3$

$V_{b2} = 0.700 \times 0.200 \times 3.300 \times 4 = 1.848$ "

$V_{b3} = 0.700 \times 0.200 \times 0.600 \times 4 = 0.336$ "

$V_{b4} = 0.700 \times 0.200 \times 3.500 \times 2 = 0.980$ "

AGGREGATE SUB BASE TOTAL $= 51.125\ m^3$

(11) PILE

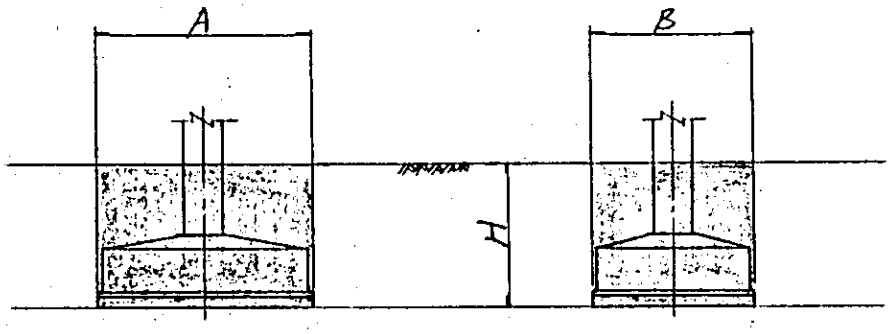
$\phi = 350^{mm}$ $\ell = 15.000^{m}$ $n = 12$ 本

$N = 12$ 本 $\times 14$ = 168 本

PILE TOTAL 168 本

(12) EXCAVATION

1) FOOTING

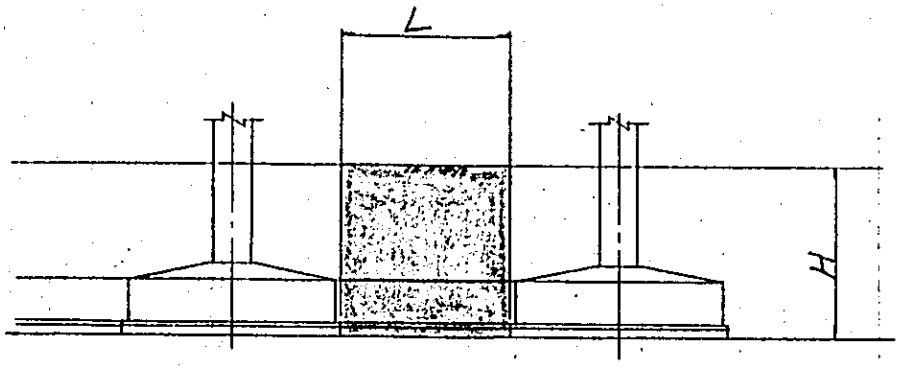


$V = A \times B \times H \times n$

$Va_1 = 4.500 \times 3.400 \times 2.532 \times 14$ = 542.354 m^3

SUB TOTAL = 542.354 m^3

2) BRACING BEAM



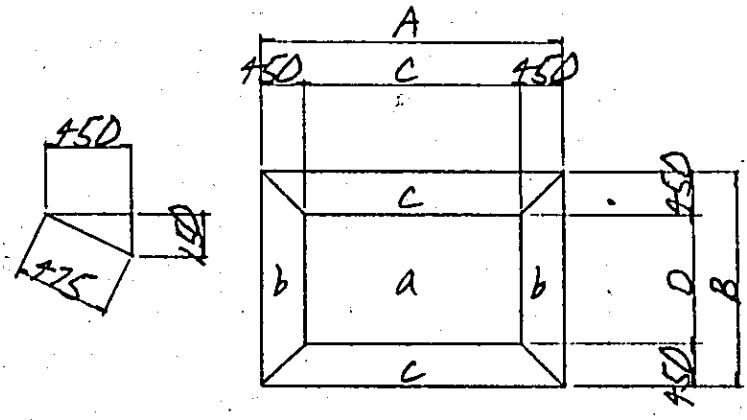
$b = 0.700 + 0.200 = 0.900$ m

$V = b \times H \times L \times n$

$V_{A1} = 0.900 \times 2.532 \times 3.658 \times 10$	=	83.359 m³
$V_{A2} = 0.900 \times 2.532 \times 3.300 \times 4$	=	30.080 "
$V_{A3} = 0.900 \times 2.532 \times 0.600 \times 4$	=	2.735 "
$V_{A4} = 0.900 \times 2.532 \times 3.500 \times 2$	=	15.952 "
SUB TOTAL	=	132.126 m³
EXCAVATION TOTAL		674.480 m³

FORM AREA

(1) SLAB



$$Aa = C \times D \times n$$

Aa_1 =	6.300 × 4.966 × 3	=	93.857 m^2
Aa_2 =	6.300 × 2.266 × 3	=	42.827 "
Aa_3 =	1.038 × 4.966 × 2	=	10.309 "
Aa_4 =	1.038 × 2.266 × 2	=	4.704 "
Aa_5 =	6.300 × 5.166 × 1	=	32.546 "
Aa_6 =	1.038 × 5.166 × 1	=	5.362 "

$$Ab = (A + C) \times \frac{1}{2} \times 0.475 \times n$$

$Ab1 = (5.884 + 4.966) \times \frac{1}{2} \times 0.475 \times 10 = 25.769\ m$

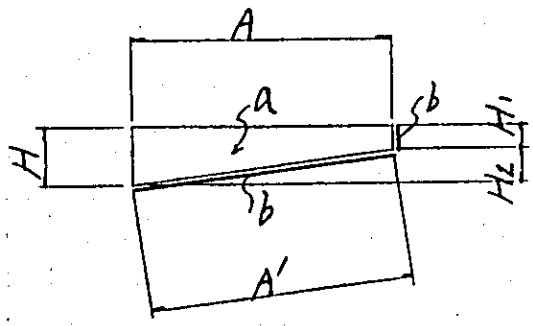
$Ab2 = (3.184 + 2.266) \times \frac{1}{2} \times 0.475 \times 10 = 12.944\ "$

$Ab3 = (6.084 + 5.166) \times \frac{1}{2} \times 0.475 \times 4 = 10.688\ "$

$$Ac = (B + D) \times \frac{1}{2} \times 0.475 \times n$$

$Ac1 = (7.342 + 6.424) \times \frac{1}{2} \times 0.475 \times 14 = 45.772\ "$

$Ac2 = (1.976 + 1.058) \times \frac{1}{2} \times 0.475 \times 10 = 7.206\ "$



$$A' = \sqrt{A^2 + H^2}$$

$$Aa = (H_1 + H) \times 1/2 \times A \times n$$

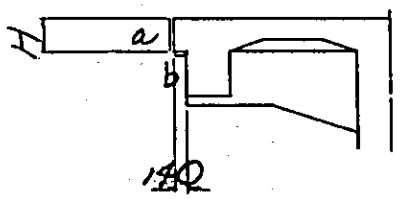
$$Aa_1 = (0.200 + 0.430) \times 1/2 \times 2.373 \times 1 = 0.747\ m^2$$

$$Ab = (A' + H_1) \times L \times n$$

$$Ab_1 = (1.209 + 0.200) \times 12.918 \times 1 = 18.201\ m^2$$

$$Ab_2 = (0.509 + 0.430) \times 5.104 \times 1 = 4.793\ "$$

$$-Ab = -0.750 \times (0.200 + 1.859) \times 1 = -1.544\ "$$



$Aa = H \times L \times N$

Aa_1	$0.430 \times 11.516 \times 1$	=	4.952 m^2
Aa_2	$0.430 \times 18.416 \times 1$	=	7.919 "
Aa_3	$0.430 \times 17.242 \times 1$	=	7.414 "
Aa_4	$0.430 \times 25.057 \times 1$	=	10.775 "
Aa_5	$0.430 \times 6.290 \times 1$	=	2.705 "

$Ab = 0.150 \times L \times N$

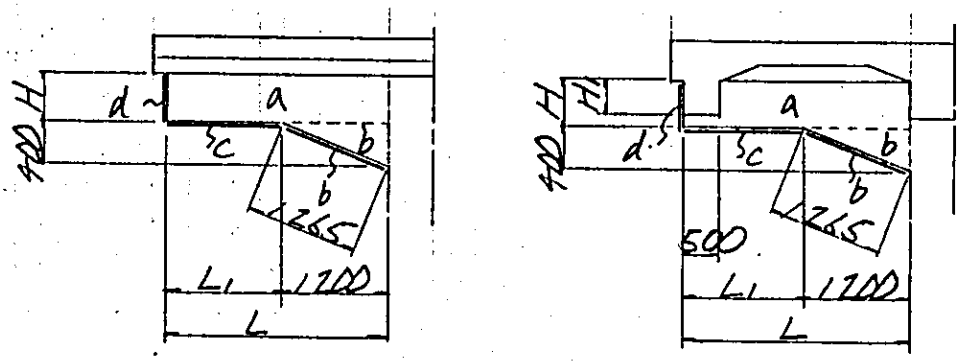
Ab_1	$0.140 \times 11.516 \times 1$	=	1.612 "
Ab_2	$0.140 \times 18.416 \times 1$	=	2.578 "

SLAB TOTAL = 352.136 m^2

(2) BEAM

1) LONGITUDINAL BEAM

B = 0.800 m



$$Aa = H \times L \times n - 0.500 \times H_1 \times n$$

$$Aa_1 = 0.770 \times 2.486 \times 14 - 0.500 \times 0.570 \times 10 = 23.949\ m^2$$

$$Ab = 1.200 \times 0.400 \times 1/2 \times n + B \times 1.265 \times n$$

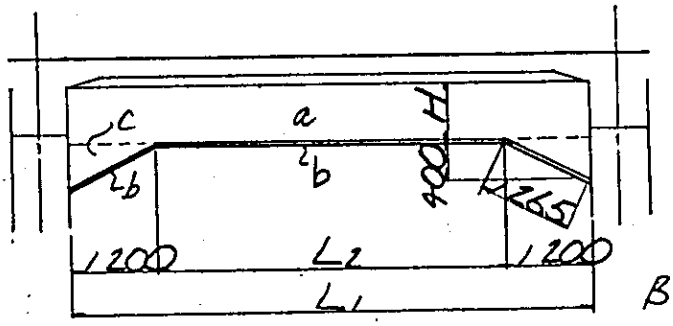
$$Ab_1 = 1.200 \times 0.400 \times 1/2 \times 14 + 0.800 \times 1.265 \times 7 = 16.684\ "$$

$$Ac = B \times L_1 \times n$$

$$Ac_1 = 0.800 \times 1.286 \times 7 = 1.058\ "$$

$$Ad = B \times H \times n$$

$$Ad_1 = 0.800 \times 0.770 \times 7 = 4.312\ "$$



B = 0.800 m

$A_a = H \times L_1 \times n$

$A_{a1} = 0.770 \times 7.200 \times 10$ = 55.440 m^2

$A_b = (1.265 \times 2 + L_2) \times B \times n$

$A_{b1} = (1.265 \times 2 + 4.800) \times 0.800 \times 10$ = 58.640 "

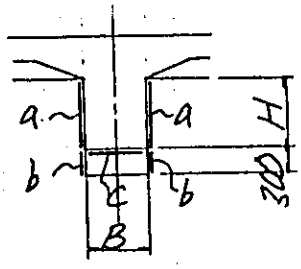
$A_c = 1.200 \times 0.400 \times 1/2 \times n$

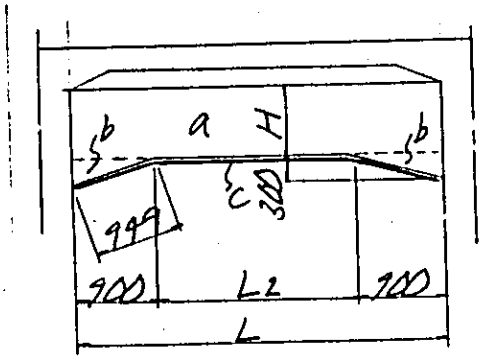
$A_{c1} = 1.200 \times 0.400 \times 1/2 \times 20$ = 4.800 "

SUB TOTAL = 164.883 m^2

2) AT INTERMEDIATE OF VIADUCT

TRANSVERSE BEAM





$Aa = H \times L \times n$

$Aa_1 = 0.670 \times 5.900 \times 4$ = 15.812 m^2

$Aa_2 = 0.670 \times 6.100 \times 2$ = 8.174 "

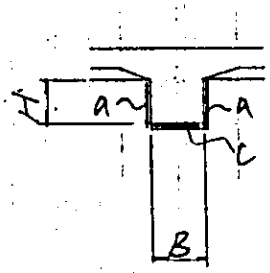
$Ab = 0.900 \times 0.300 \times 1/2 \times n$

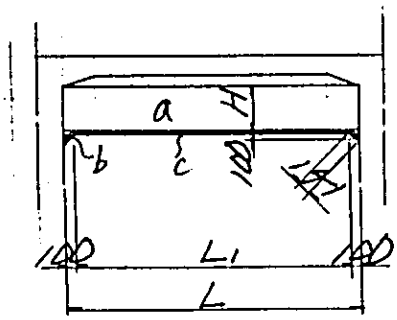
$Ab_1 = 0.900 \times 0.300 \times 1/2 \times 12$ = 1.620 "

$Ac = (0.949 \times 2 + L2) \times 0.800 \times n$

$Ac_1 = (0.949 \times 2 + 4.100) \times 0.800 \times 4$ = 19.194 "

$Ac_2 = (0.949 \times 2 + 4.300) \times 0.800 \times 2$ = 9.917 "





$Aa = H \times L \times n$

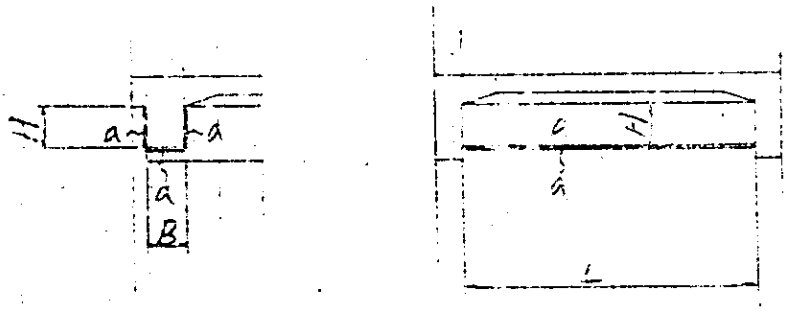
$Aa_1 = 0.670 \times 3.200 \times 8 = 17.152\ m^2$

$Ab = 0.100 \times 0.100 \times 1/2 \times n$

$Ab_1 = 0.100 \times 0.100 \times 1/2 \times 16 = 0.080''$

$Ac = (0.141 \times 2 + L_1) \times B \times n$

$Ac_1 = (0.141 \times 2 + 3.000) \times 0.800 \times 4 = 10.502''$



$A_a = (2 \cdot H + B) \cdot L \times N$

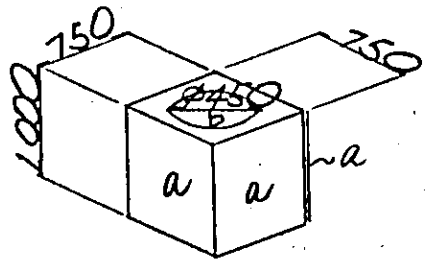
$A_{a1} = (2 \times 0.570 + 0.500) \times 5.900 \times 2$ = 19.352 m^2

$A_{a2} = (2 \times 0.570 + 0.500) \times 3.200 \times 2$ = 10.496 "

$A_{a3} = (2 \times 0.570 + 0.500) \times 6.100 \times 2$ = 20.008 "

SUB TOTAL = 132.307 m^2

) ELECTRIC POLE



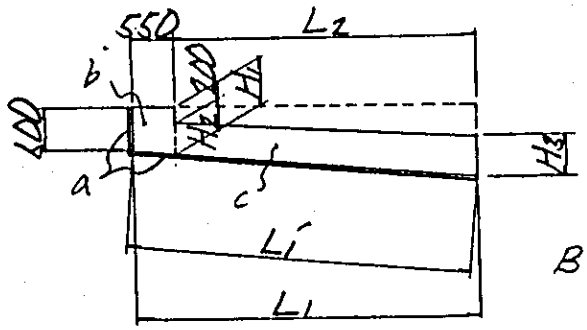
$A_a = 1.000 \times 0.750 \times n$

$A_{a1} = 1.000 \times 0.750 \times 2 \times 4$ = $6.000\ m^2$

$A_b = 0.450 \times \pi \times 1.000 \times n$

$A_{b1} = 0.450 \times \pi \times 1.000 \times 2$ = $2.827\ "$

) BASE OF ELECTRIC POLE



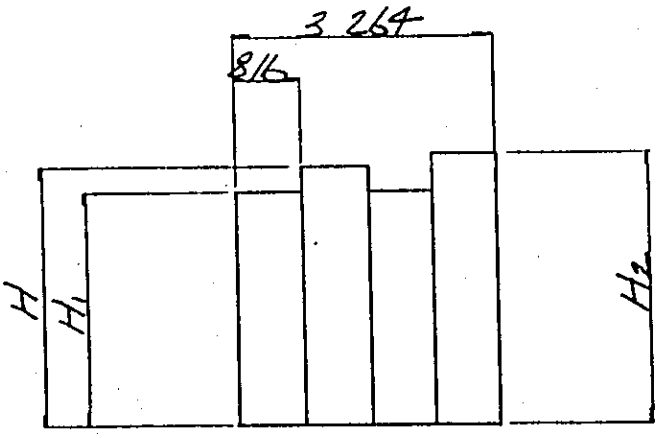
$$\begin{cases} Aa = (0.600 + L1') \times 0.750 \\ Ab = (0.600 + H_1) \times 0.550 \times 1/2 \times 2 \\ Ac = (H_2 + H_3) \times L_2 \times 1/2 \times 2 \end{cases}$$

$$\begin{cases} Aa_1 = (0.600 + 2.416) \times 0.750 = 2.262\ m^2 \\ Ab_1 = (0.600 + 0.659) \times 0.550 \times 1/2 \times 2 = 0.692\ " \\ Ac_1 = (0.459 + 0.470) \times 1.847 \times 1/2 \times 2 = 1.716\ " \end{cases}$$

SUB TOTAL = 13.497 m^2

BEAM TOTAL 310.687 m^2

(3) COLUMN



$Aa = (H + H_1 \times 2 + H_2) \times 0.816 \times n$

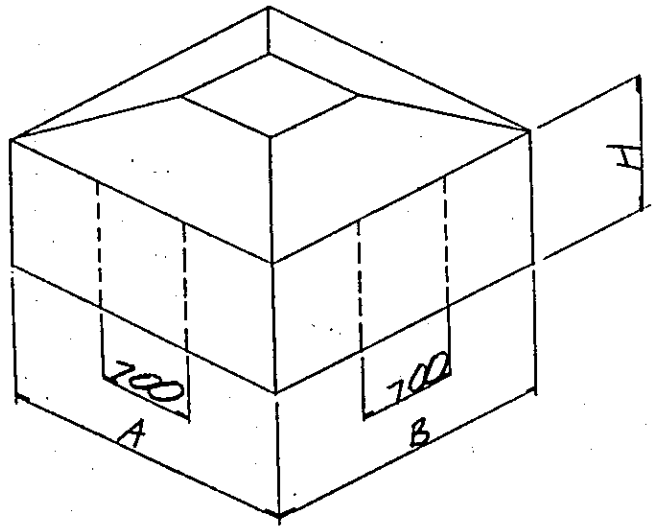
$Aa_1 = (7.950 + 7.550 \times 2 + 8.720) \times 0.816 \times 7 = 181.470\ m^2$

$Aa_2 = (7.950 + 8.720 \times 2 + 7.550) \times 0.816 \times 1 = 26.879\ "$

$Aa_3 = (7.950 \times 2 + 7.550 \times 2) \times 0.816 \times 6 = 151.776\ "$

COLUMN TOTAL = 360.125 m^2

(4) FOOTING

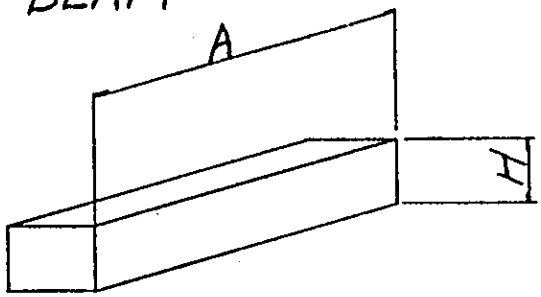


$$Aa = (A+B) \times 2 \times H \times n - 0.700 \times H \times n$$

$$Aa1 = (4.300 + 3.200) \times 2 \times 0.900 \times 14 - 0.700 \times 0.900 \times 40 = 163.800\ m^2$$

FOOTING TOTAL = 163.800 m^2

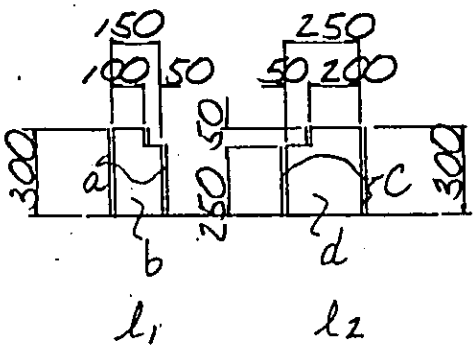
(5) BRACING BEAM



$Aa = A \times H \times n$

$Aa_1 = 3.500 \times 0.900 \times 8$	=	$25.200\ m^2$
$Aa_2 = 3.700 \times 0.900 \times 4$	=	$13.320\ m^2$
$Aa_3 = 0.800 \times 0.900 \times 8$	=	$5.760\ m^2$
$Aa_4 = 3.858 \times 0.900 \times 10$	=	$34.722\ m^2$
BRACING BEAM TOTAL=		$79.002\ m^2$

(6) CURB



$l_1 = 63.650^{m}$

$l_2 = 64.264^{m}$

$A_a = 0.300 \times 2 \times l_1$

$A_{a1} = 0.300 \times 2 \times 63.65 = 38.190^{m^2}$

$A_b = (0.300 \times 0.150 - 0.050^2) \times n$

$A_{b1} = (0.300 \times 0.150 - 0.050^2) \times 6 = 0.255''$

$A_c = 0.300 \times 2 \times l_2$

$A_{c1} = 0.300 \times 2 \times 64.264 = 38.558''$

$A_d = (0.300 \times 0.250 - 0.050^2) \times n$

$A_{d1} = (0.300 \times 0.250 - 0.050^2) \times 4 = 0.290''$

CURB TOTAL	77.293 m²

No.....

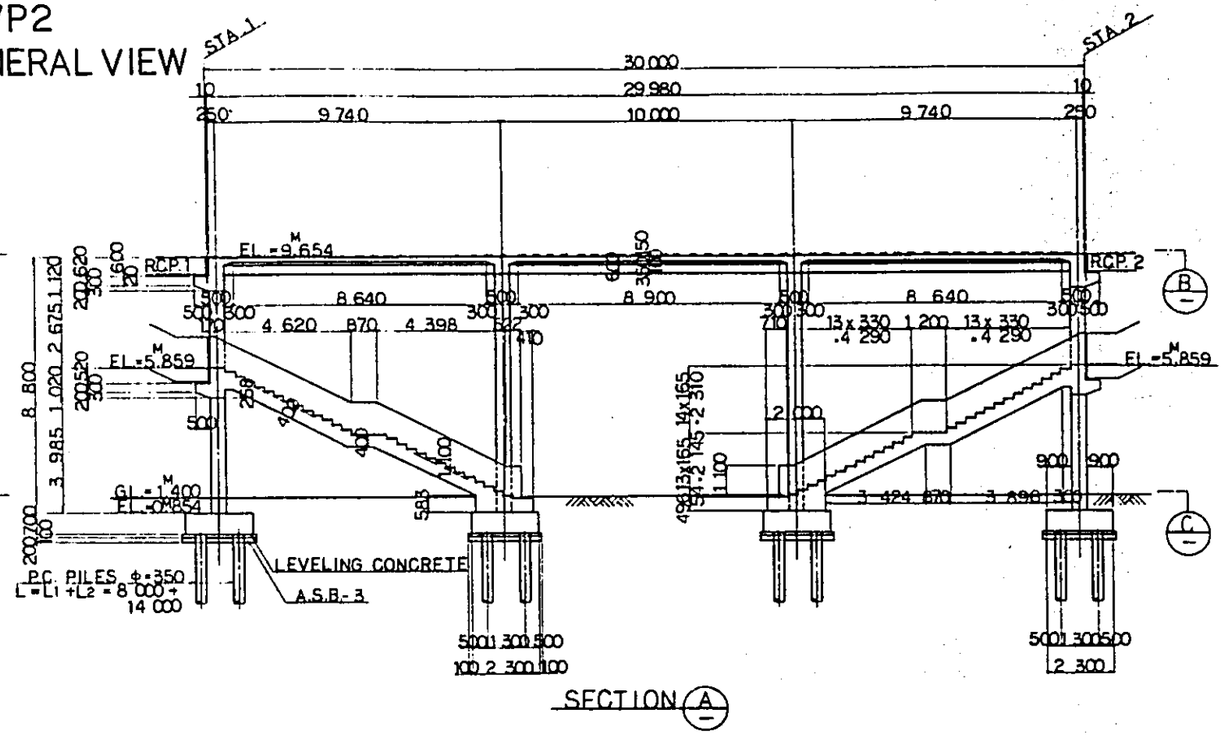
§28. PLATFORM OF KOTA INTAN STATION

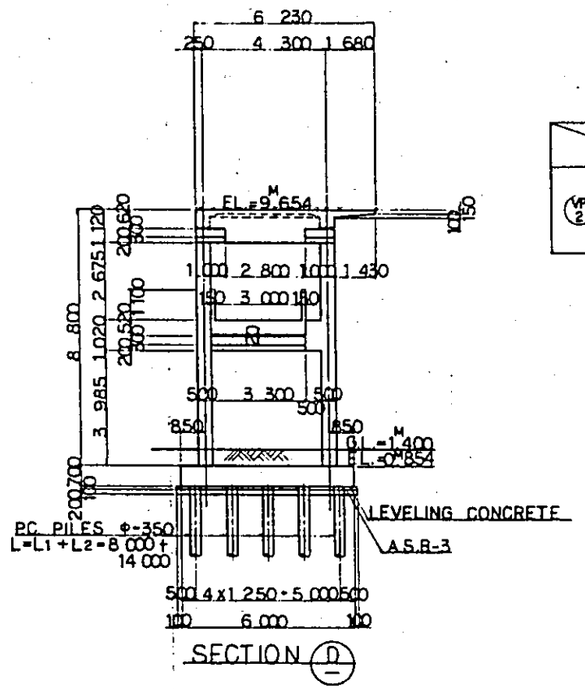
JICA

No.

CONTENTS PAGE

1. VP2
GENERAL VIEW



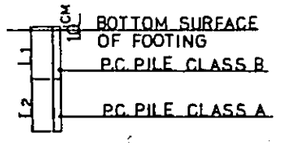


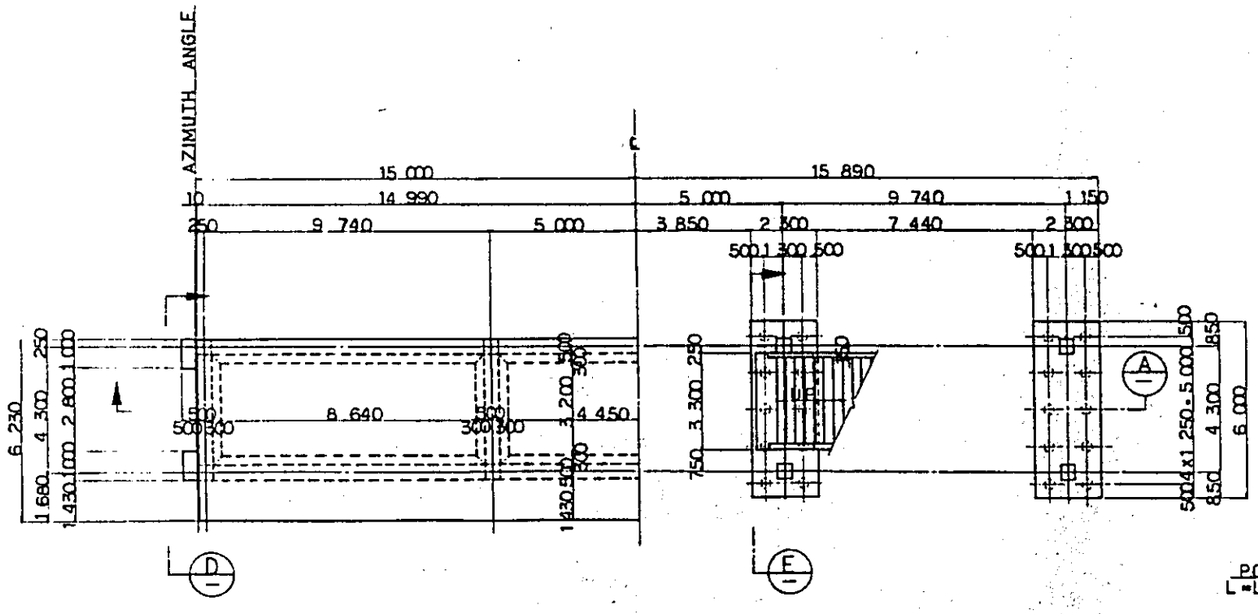
DIMENSION SCHEDULE

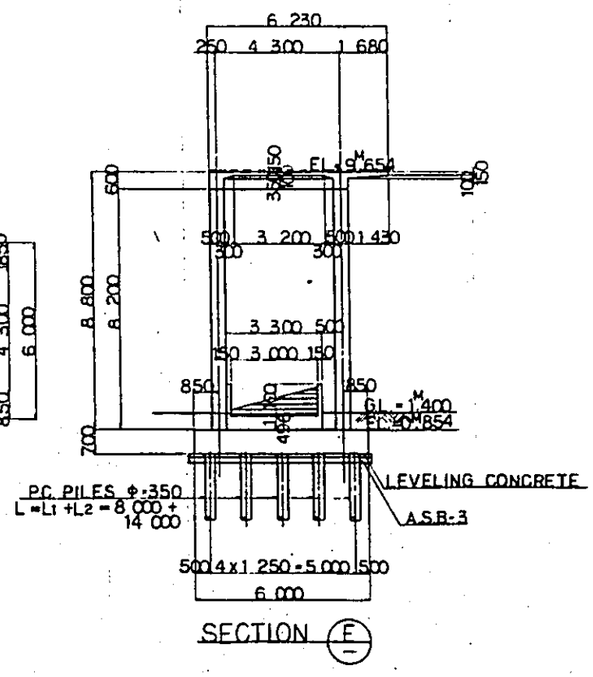
		STATION	AZIMUTH ANGLE
(VP2)	STA.1	17K 350M 000	345° 30' 45"
	STA.2	17K 380M 000	〃

NOTES :

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. REFERENCE DRAWING FOR BAR ARRANGEMENT: CS-229~234
3. TYPES OF P.C. PILE







VIADUCT (VP2)

	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	31.3	155.6	1 778.7	56.8
BEAM	25.4	129.4	8 830.1	347.6
COLUMN	15.9	123.0	6 696.2	421.1
CURB	———	———	———	———
STAIRWAY	46.1	204.8	6 147.8	133.4
TOTAL	118.7	612.8	23 452.8	197.6
FOOTING	38.6	46.5	4 935.5	127.9
BRACING BEAM	———	———	———	———
TOTAL	38.6	46.5	4 935.5	127.9

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	6.2	CLASS F
AGGREGATE SUB BASE	m^3	12.4	A.S.B.-3
EXCAVATION	m^3	95.9	
FOUNDATION MORTAR	m^3	0.001	σ_{CK} = 400 kg/cm²
PILE	EACH	ϕ=350 N=A−40 N=B−40	ϕ360 ℓ=A-14.0m 〃 ℓ=B-8.0m

(VP2) WEIGHT OF BARS BY DIAMETER

	Ø32	Ø29	Ø25	Ø22	Ø19	Ø16	Ø13	Ø10	TOTAL
SLAB	—	—	—	—	—	—	—	1 770.7	1 770.7
BEAM	3 871.1	—	2 007.8	187.9	651.1	99.5	2 017.7	—	8 830.1
COLUMN	—	6 152.8	—	—	—	—	543.4	—	6 696.2
STAIR WAY	—	—	—	2 759.0	—	1 390.2	1 998.6	—	6 147.8
FOOTING	1 922.0	—	—	615.6	1 022.1	1 372.5	503.3	—	5 435.5
BRACING BEAM	—	—	—	—	—	—	—	—	—
TOTAL	5 793.1	6 152.8	2 007.8	3 562.5	1 673.2	2 857.2	5 063.0	1 770.7	28 308.3

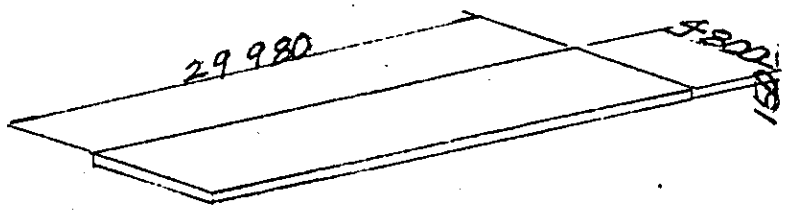
JICA

No. 3

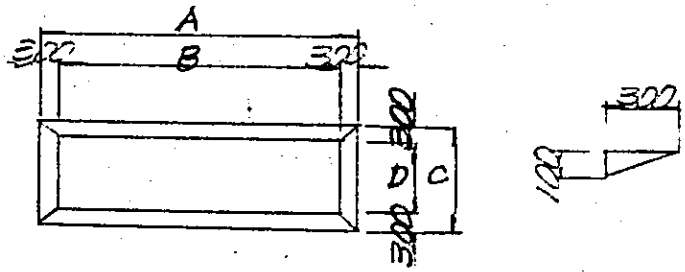
(VP2)

CONCRETE VOLUME

(1) SLAB



$V_a = 29.980 \times 4.800 \times 0.150$ = 21.586 m^3

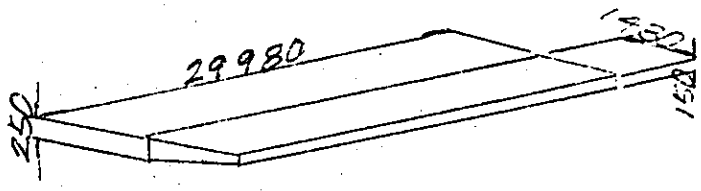


$V = [A \times C - \{A \times C + (A+B) \times (C \times D) + B \times D^2\} \times 1/6 \times h$

	A	B	C	D	
V_b =	9.240	8.640	3.800	3.200	n = 2
(V_c') =	9.500	8.900	〃	〃	n = 1

$V_b = 0.379 \times 2$ = 0.758

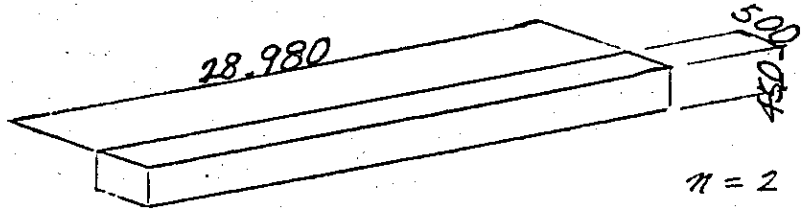
$(V_c) = 0.387$ = 0.387



$V_1 = \frac{1}{2} \times (0.250 + 0.150) \times 1.430 \times 29.980$	=	$8.574\ m^3$
SLAB TOTAL		$31.356\ m^3$

(2) BEAM

1) LONGITUDINAL BEAM

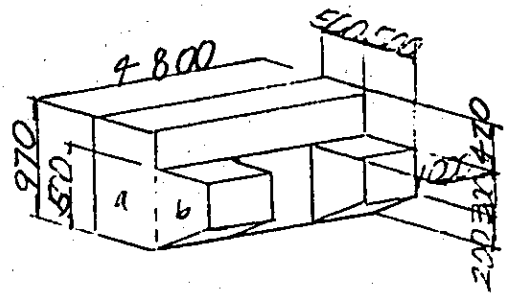


$V_1' = 0.450 \times 0.500 \times 28.98 = 6.521$

$V_a = 6.521 \times 2 = 13.042\ m^3$

SUB TOTAL = $13.042\ m^3$

2) AT END OF VIADUCT TRANSVERSE BEAM

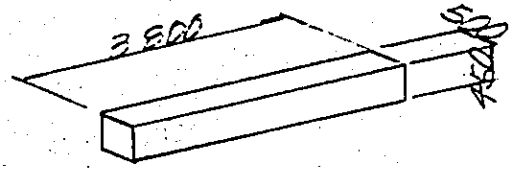


$V_a = 0.970 \times 0.500 \times 4.800 \times 2 = 4.656\ m^3$

$V_b = \{(0.500 + 0.300) \times \frac{1}{2} \times 0.500 \times 1.000 \times 2\} \times 2 = 0.800\ m^3$

SUB TOTAL = $5.456\ m^3$

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM



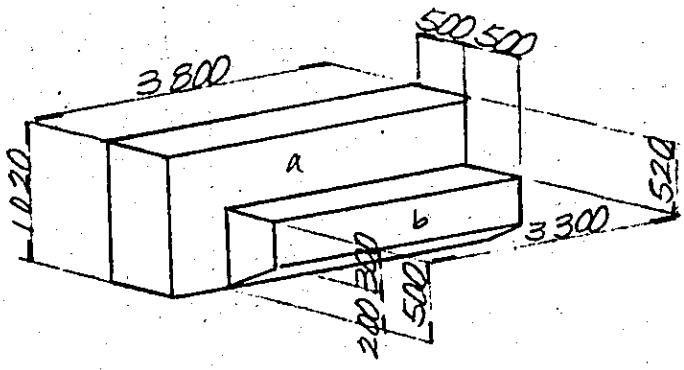
$n = 2$

$Va' = 3.800 \times 0.500 \times 0.450 = 0.855$

$Va = 0.855 \times 2 = 1.710\ m^3$

SUB TOTAL = $1.710\ m^3$

4) STAIR WAY BEAM SUPPORT



$V_a' = 3.800 \times 0.500 \times 1.020 = 1.938$ m³

$V_a = 1.938 \times 2 = 3.876$ m³

$V_b' = 3.300 \times (0.500 + 0.300) \times 1/2 \times 0.500 = 0.660$ m³

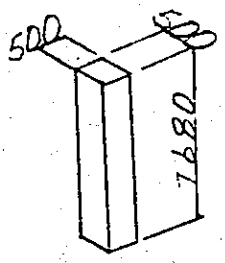
$V_b = 0.660 \times 2 = 1.320$ m³

SUB TOTAL = 5.196 m³

BEAM TOTAL 25.404 m³

(3) COLUMN

1) AT END OF VIADUCT COLUMN

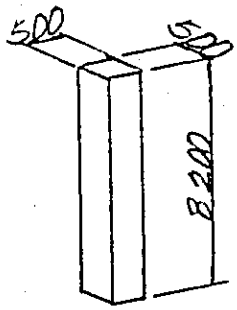


$n = 4$

$V_A' = 0.500 \times 0.500 \times 7.680 = 1.920$

$V_A = 1.920 \times 2 \times 2 = 7.680 \ m^3$

2) AT INTERMEDIATE OF VIADUCT COLUMN



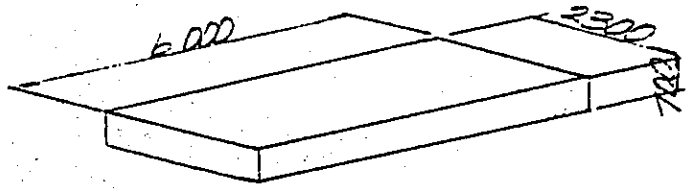
$n = 4$

$V_A' = 0.500 \times 0.500 \times 8.200 = 2.050$

$V_A = 2.050 \times 2 \times 2 = 8.200$

COLUMN TOTAL	15.880 m^3

(4) FOOTING

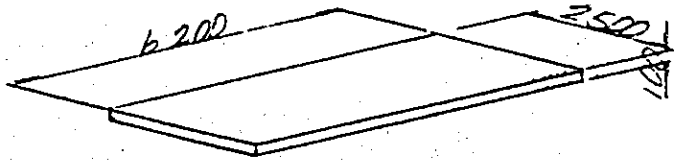


$V_d' = 6.000 \times 2.300 \times 0.700 = 9.660$ m³

$V_d = 9.660 \times 4 = 38.640$ m³

FOOTING TOTAL 38.640 m³

(5) LEVELING CONCRETE

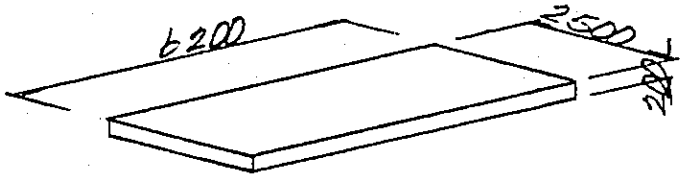


$V_{a'} = 6.200 \times 2.500 \times 0.100 = 1.550$

$V_a = 1.550 \times 4$ = 6.200 m^3

LEVELING CONCRETE TOTAL 6.200 m^3

(6) AGGREGATE SUB BASE

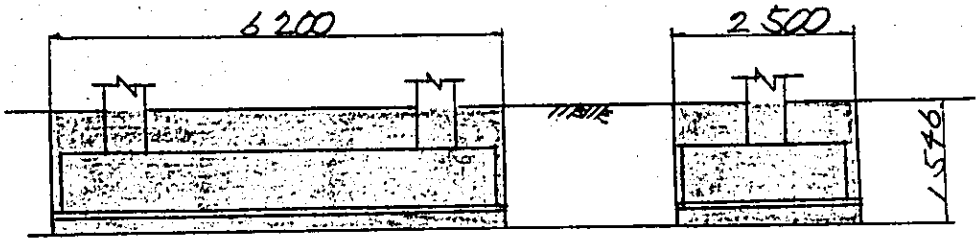


$V_{a'} = 6.200 \times 2.500 \times 0.200 = 3.100$

$V_a = 3.100 \times 4$ = 12.400 m^3

AGGREGATE SUB BASE TOTAL 12.400 m^3

(7) EXCAVATION



Va' = 6.20 × 2.50 × 1.546 = 23.963

Va = 23.963 × 4 = 95.852 m^3

EXCAVATION TOTAL 95.852 m^3

(8) PILE

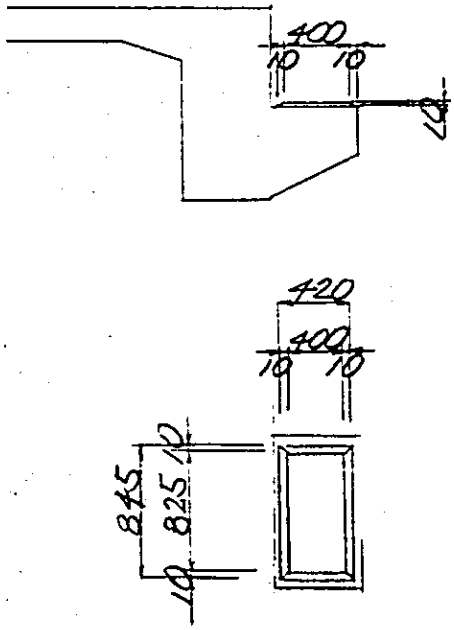
$\phi = 350$ $\quad \ell = B - 8.0^{m}$

$\ell = A - 14.0^{m}$

$n = 10$

$\Sigma N = 10 \times 4 = 40$

(9) FOUNDATION MORTAR



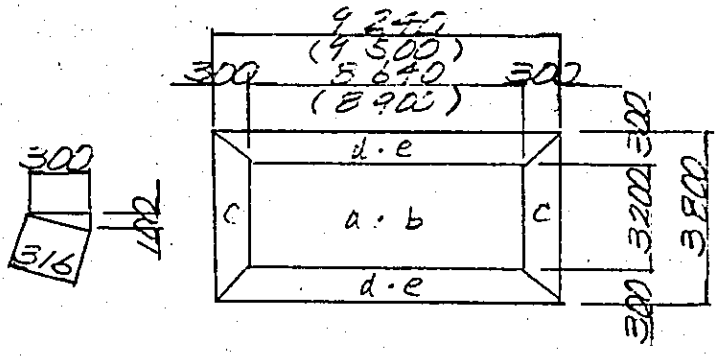
$n = 8$

$$V = \{0.845 \times 0.42 - \{0.845 \times 0.42 + (0.845 + 0.825) \times (0.42 + 0.40) + 0.825 \times 0.40\} \times 1/6\} \times 0.010 \times 8 = 0.001 \text{ m}^3$$

FOUNDATION MORTAR TOTAL 0.001 m³

FORM AREA

(1) SLAB



$A_a' = 8.640 \times 3.200 = 27.648$

$A_a = 27.648 \times 2 = 55.296$ m²

$A_b' = 8.900 \times 3.200 = 28.480$

$A_b = 28.480 = 28.480$ "

$A_c' = (3.800 + 3.200) \times 1/2 \times 0.316 = 1.106$

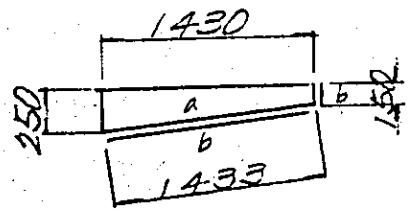
$A_c = 1.106 \times 6 = 6.636$ "

$A_d' = (9.240 + 8.640) \times 1/2 \times 0.316 = 2.825$

$A_d = 2.825 \times 2 \times 2 = 11.300$ "

$A_e' = (9.500 + 8.900) \times 1/2 \times 0.316 = 2.907$

$A_e = 2.907 \times 2 = 5.814$ "



$\ell = 29.980$

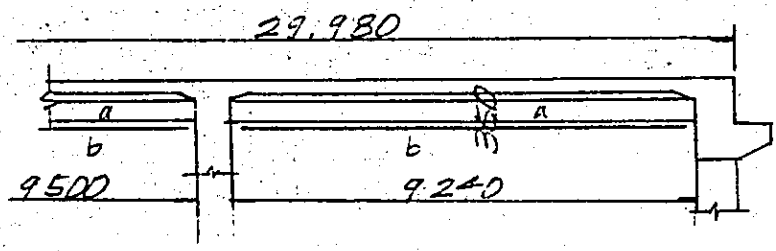
$A_a = (0.250+0.150) \times \frac{1}{2} \times 1.430 \times 2 = 0.572\ m^2$

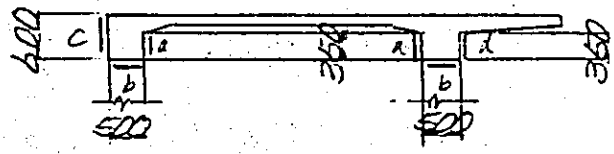
$A_b = (1.433+0.150) \times 29.980 = 47.458\ m^2$

SLAB TOTAL	155,556 m^2

(2) BEAM

1) LONGITUDINAL BEAM





$A_x' = (9.240 \times 2 + 9.500) \times 0.350 = 9.793$

$A_a = 9.793 \times 2 = 19.586\ m^2$

$A_b' = (9.240 \times 2 + 9.500) \times 0.500 = 13.990$

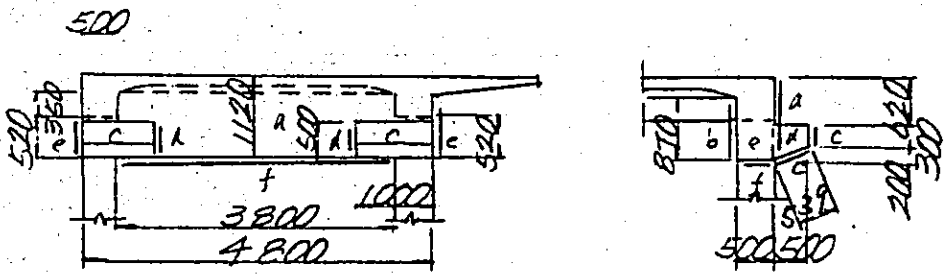
$A_b = 13.990 \times 2 = 27.980$ "

$A_c = 29.980 \times 0.600 = 17.988$ "

$A_x = 29.980 \times 0.350 = 10.493$ "

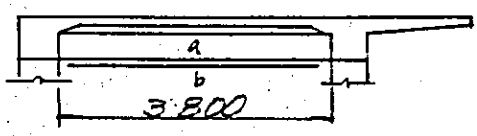
SUB TOTAL = 76.097 m^2

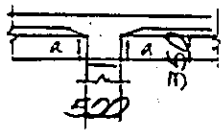
2) A'END OF VIADUCT TRANSVERSE BEAM



$A_a = (1.120 \times 4.800 - 0.500 \times 1.000 \times 2) \times 2$	=	8.752 m²
$A_b = (0.870 \times 4.800 - 0.350 \times 0.500 \times 2) \times 2$	=	7.652 "
$A_c = \{(0.300 + 0.539) \times 1.000 \times 2\} \times 2$	=	3.356 "
$A_d = \{(0.300 + 0.500) \times 1/2 \times 0.500 \times 4\} \times 2$	=	1.600 "
$A_e = 0.520 \times 0.500 \times 2 \times 2$	=	1.040 "
$A_f = 3.800 \times 0.500 \times 2$	=	3.800 "
SUB TOTAL	=	26.200 m²

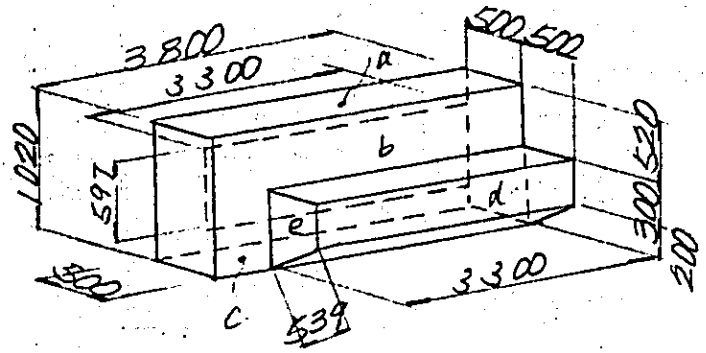
3) AT INTERMEDIATE OF VIADUCT TRANSVERE BEAM





$A_a' = 0.350 \times 3.600 \times 2$	$= 2.660$		
$A_a = 2.660 \times 2$		$=$	$5.320\ m^2$
$A_b' = 0.500 \times 3.800$	$= 1.900$		
$A_b = 1.900 \times 2$		$=$	3.800
	SUB TOTAL	$=$	$9.120\ m^2$

4) AT END OF VIADUCT TRANSVERSE BEAM



$A_a' = 3.800 \times 1.020 - 3.300 \times 0.597 = 1.906$

$A_b' = 3.800 \times 1.020 - 3.300 \times 0.500 = 2.226$

$A_c' = 3.800 \times 0.500 = 1.900$

$A_d' = 3.300 \times (0.300 + 0.539) = 2.769$

$A_e' = (0.500 + 0.300) \times \frac{1}{2} \times 0.500 = 0.200$

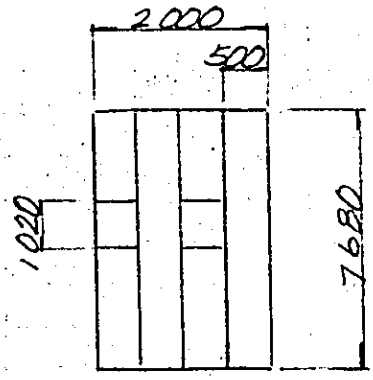
$A = 1.906 + 2.226 + 1.900 + 2.769 + 0.200 = 9.001 \times 2 =$ 18.002 m^2

SUB TOTAL = 18.002 m^2

BEAM TOTAL 129.369 m^2

(3) COLUMN

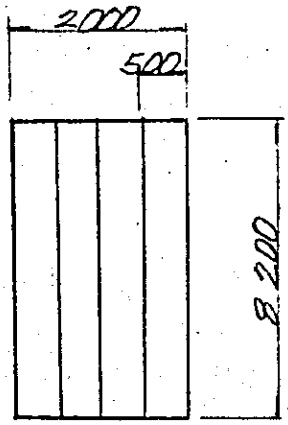
1) AT END OF VIADUCT COLUMN



$A_a' = 7.680 \times 2.000 - 1.020 \times 0.500 \times 2 = 14.340$ m²

$A_a = 14.340 \times 4 = 57.360$ m²

2) AT INTERMEDIATE OF VIADUCT COLUMN

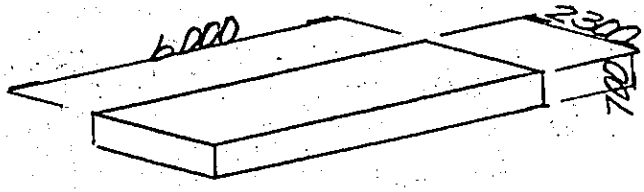


$A_a' = 8.200 \times 2.000 = 16.400$ m²

$A_a = 16.400 \times 4 = 65.600$ m²

COLUMN TOTAL 122.960 m²

(4) FOOTING



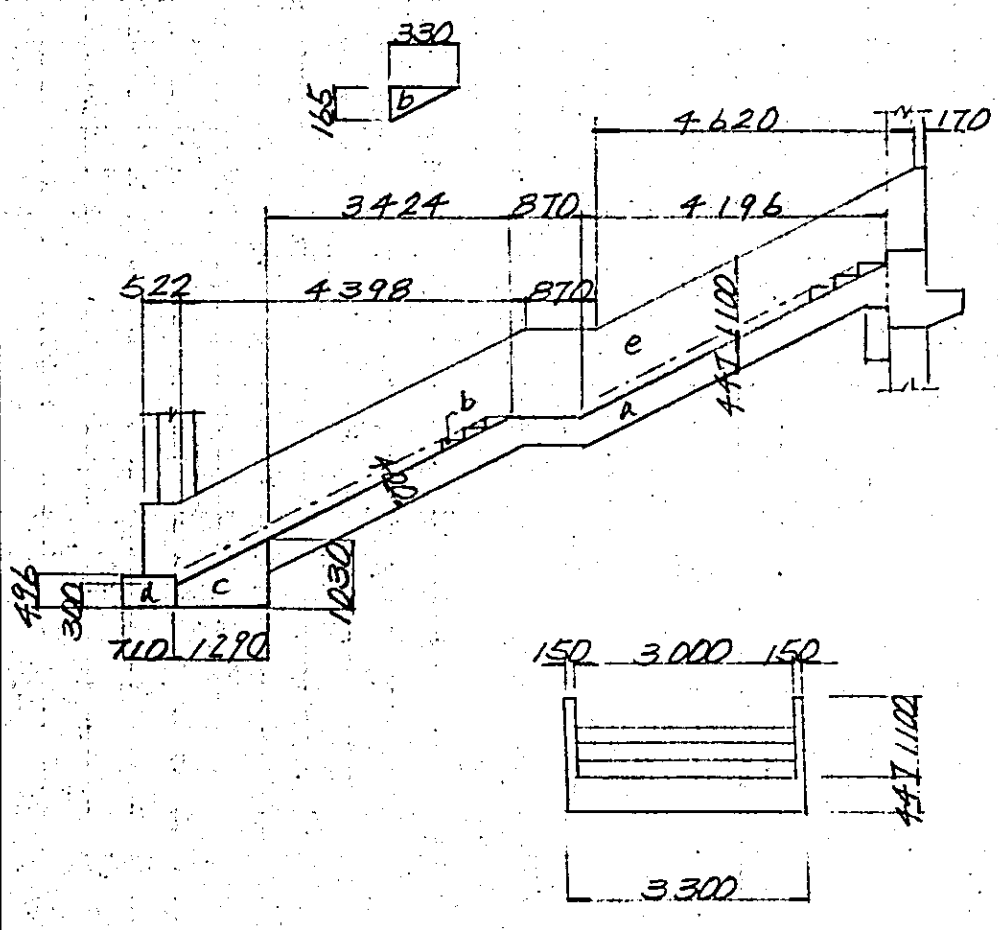
$A_a' = (6.000 + 2.300) \times 2 \times 0.700 = 11.620$

$A_a = 11.620 \times 4$ = 46.480 m²

FOOTING TOTAL 46.480 m²

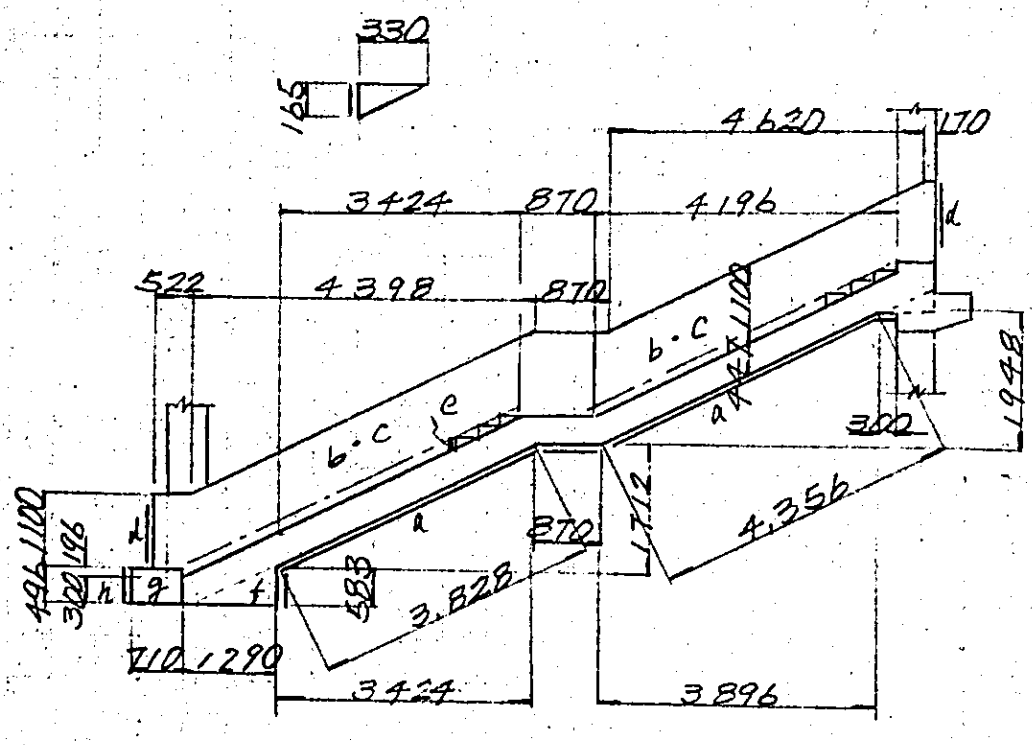
(5) STAIR WAY

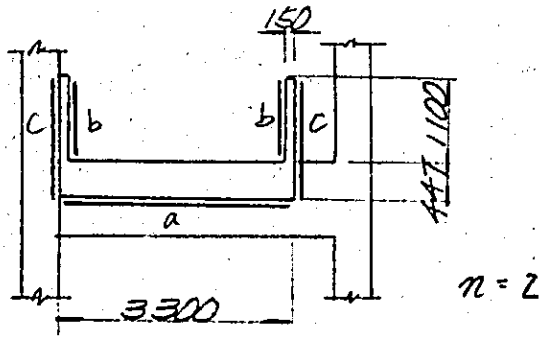
1) CONCRETE VOLUME



$V_a = (3.424 + 0.870 + 4.196) \times 0.477 \times 3.300 \times 2 =$		26.728 m³
$V_b = 0.165 \times 0.330 \times \frac{1}{2} \times 3.000 \times 27 \times 2$	=	9.410 "
$V_c = (0.300 + 1.030) \times \frac{1}{2} \times 1.290 \times 3.300 \times 2$	=	5.662 "
$V_d = 0.496 \times 0.710 \times 3.300 \times 2$	=	2.324 "
$V_e = (0.522 + 4.398 + 0.870 + 4.620 + 0.170) \times 1.100$		
$\times 2 \times 0.150 \times 2$	=	6.983 "
TOTAL		46.107 m³

2) FORM AREA





$A_a = (0.583 + 3.828 + 0.870 + 4.356 + 0.300)$

$\times 3.300 \times 2$ $= 65.584\ m^2$

$A_b = (0.522 + 4.398 + 0.870 + 4.620 + 0.170)$

$\times 1.100 \times 2 \times 2$ $= 46.552\ "$

$Ac = (0.522 + 4.398 + 0.870 + 4.620 + 0.170 - 0.500 \times 2) \times 1.547 \times 2 \times 2$	=	59.281 m²
$Ad = 0.150 \times 1.100 \times 4 \times 2$	=	1.320 "
$Ae = 0.165 \times 3.300 \times 27 \times 2$	=	29.403 "
$Af = 0.583 \times 1.290 \times 1/2 \times 2 \times 2$	=	1.504 "
$Ag = 0.710 \times 0.300 \times 2 \times 2$	=	0.852 "
$Ah = 0.996 \times 3.300 \times 2$	=	3.274 "
$-Ai = 0.165 \times 0.330 \times 1/2 \times 27 \times 2 \times 2$	=	-2.940 "
TOTAL		204.830 m²

REINFORCING BAR

No. 26

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	VP 2					
	SLAB					
S 1	D10	0.56	6 800	86	365.6	
2	"	"	6 080	6	20.4	
3	"	"	6 160	43	148.4	
4	"	"	6 160	42	144.9	
5	"	"	4 670	86	251.0	
6	"	"	2 480	8	11.1	
7	"	"	1 760	10	9.9	
8	"	"	2 560	86	137.7	
9	"	"	1 800	8	8.1	
S 21	D10	0.56	30 920	12	207.8	
22	"	"	31 100	4	69.7	
23	"	"	31 100	3	52.2	
24	"	"	29 820	21	351.9	
				D10	1 778.7 kg	
		SLAB	TOTAL WEIGHT		1 778.7 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	LONGITUDINAL BEAM					
B 1	D32	6.23	32 180	6	1 202.9	
2	"	"	33 290	4	829.6	
3	"	"	7 000	16	697.8	
4	"	"	30 520	6	1 140.8	
5	D25	3.98	30 400	4	484.0	
B' 1	D13	0.995	1 750	376	654.6	
2	"	"	1 280	376	479.0	
				D32	3 871.1 kg	
				D25	484.0 "	
				D13	1 133.6 "	
		SUB TOTAL WEIGHT			5 488.7 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	ATEND OF VIADUCT TRANSVERSE BEAM					
B 21	D25	3.98	6 590	10	262.3	
22	"	"	5 230	10	208.2	
23	D22	3.04	5 150	12	187.9	
B' 21	D13	0.995	2 720	62	167.8	
22	"	"	1 280	62	79.0	
				D25	9TO.5 kg	
				D22	187.9 "	
				D13	246.8 "	
			SUB TOTAL WEIGHT		906.2 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	STAIR WAY BEAM SUPPORT					
B 31	D25	3.98	5 230	28	582.8	
32	D16	1.56	5 050	8	63.0	
B°31	D13	0.995	2 570	62	133.0	
32	"	"	1 280	52	66.2	
				D25	582.8 kg	
				D16	63.0 "	
				D13	199.2 "	
		SUB TOTAL WEIGHT			895.0 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM					
B 41	D25	3.98	6 590	10	262.3	
42	"	"	5 230	10	208.2	
43	D16	1.56	5 050	4	31.5	
B' 41	D13	0.995	1 280	32	40.8	
42	"	"	1 620	32	51.6	
				D25	470.5 kg	
				D16	31.5 "	
				D13	92.4 "	
		SUB TOTAL WEIGHT			594.4 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	BEAM SUPPORT (1)					
G 1	D13	0.995	1 280	12	15.3	
2	"	"	800	24	19.1	
G 11	D19	2.25	2 440	28	153.7	
12	"	"	1 640	28	103.3	
13	D13	0.995	2 450	12	29.3	
14	"	"	1 220	36	43.7	
15	"	"	1 400	8	11.1	
9° 11	D13	0.995	1 300	20	25.9	(VARIES)
				D19	257.0 kg	
				D13	144.4 "	
		SUB	TOTAL WEIGHT		401.4 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	BEAM	SUPPORT (2)				
G 21	D13	0.995	1 280	12	15.3	
22	"	"	800	24	19.1	
G 31	D19	2.25	2 440	44	241.6	
32	"	"	1 540	44	152.5	
33	D13	0.995	2 450	20	48.8	
34	"	"	3 470	18	62.2	
35	"	"	3 150	4	12.5	
36	"	"	2 300	2	4.6	
G' 31	D13	0.995	1 300	30	38.8	(VARIES)
				D19	394.1 kg	
				D13	201.3 "	
		SUB	TOTAL WEIGHT		595.4 kg	
				D32	3 871.1 kg	
				D25	2 007.8 "	
				D22	187.9 "	
				D19	651.1 "	
				D16	99.5 "	
				D13	2 017.7 "	
		BEAM	TOTAL WEIGHT		8 830.1 kg	

No. 33

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	COLUMN					
C 1	D29	5.04	1 770	32	1 575.7	
2	"	"	1 960	96	4 577.1	
C° 1	D13	0.995	1 870	292	543.4	
				D29	6 152.8 kg	
				D13	543.4 "	
		COLUMN	TOTAL WEIGHT		6 696.2 kg	

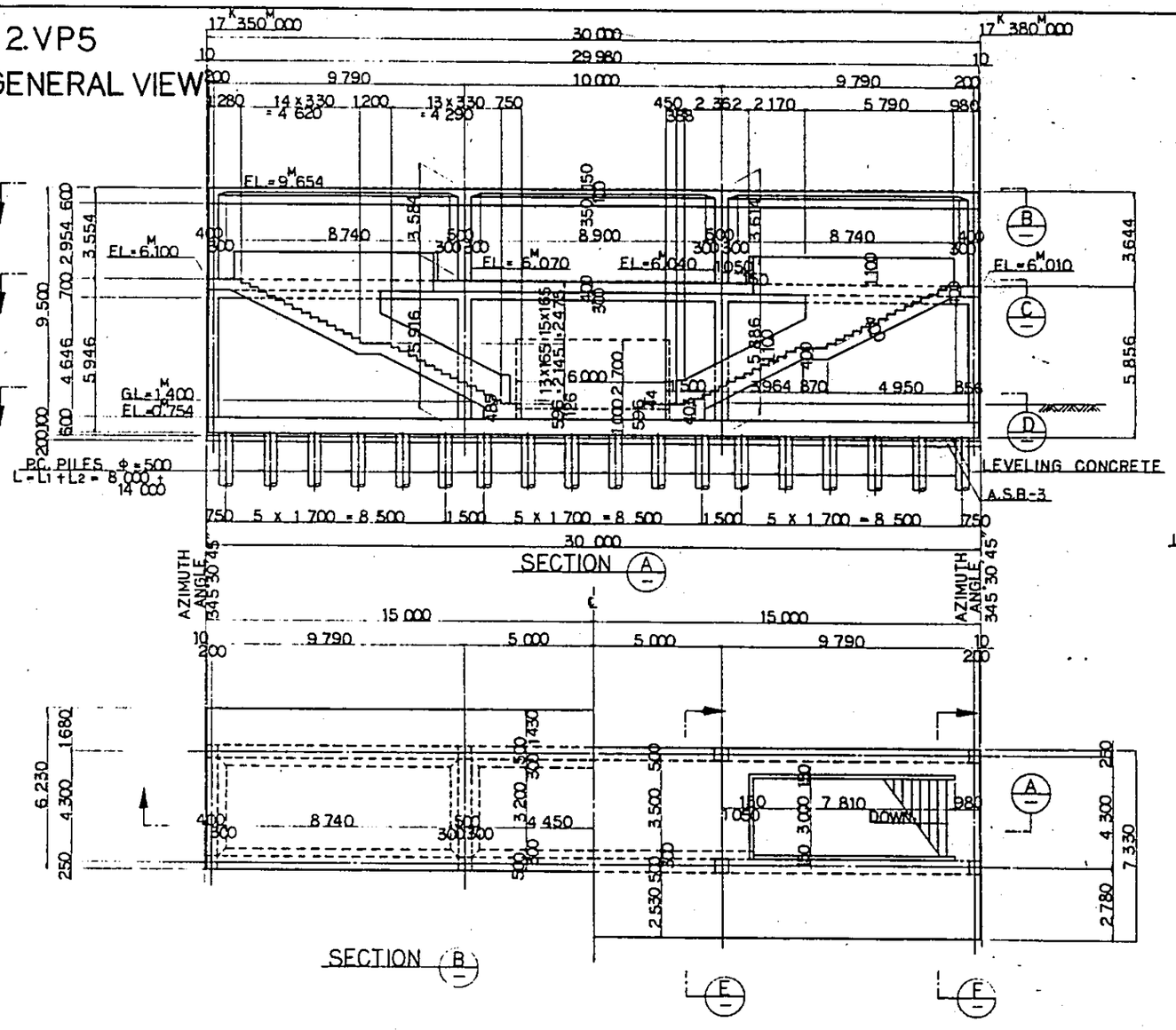
JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	STAIR	WAY				
S 1	D13	0.995	7 340	13	99.9	
2	"	"	7 990	13	96.2	
3	"	"	3 200	28	89.2	
S 11	D22	3.09	6 050	13	239.1	
12	"	"	6 800	13	268.7	
13	"	"	2 200	13	86.9	
14	"	"	2 550	6	96.5	
15	"	"	3 050	6	55.6	
16	"	"	7 400	13	292.4	
17	"	"	6 600	13	260.8	
18	"	"	3 300	6	60.2	
19	"	"	3 800	6	69.3	
20	D16	1.56	2 790	26	111.1	
21	"	"	3 820	98	584.0	
S° 11	D13	0.995	1 280	29	30.6	
12	"	"	1 380	198	271.9	
13	"	"	1 790	12	20.8	(VARIES)
14	"	"	1 970	92	61.4	
	WALL					
W 1	D13	0.995	1 600	84	133.7	
2	"	"	2 600	2	5.2	
3	"	"	6 800	10	67.7	
4	"	"	5 720	2	11.4	
5	"	"	5 700	8	45.4	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
				D22	1 379.5 kg	× 2 = 2 759.0 kg
				D16	695.1 "	× 2 = 1 390.2 "
				D13	999.3 "	× 2 = 1 998.6 "
	STAIR WAY AND WALL TOTAL					
				WEIGHT	3 073.9 kg	× 2 = 6 147.8 kg
				D32	3 871.1 kg	
				D29	6 152.8 "	
				D25	2 007.8 "	
				D22	2 946.9 "	
				D19	651.1 "	
				D16	1 904.7 "	
				D13	4 559.7 "	
				D10	1 778.7 "	
		①	TOTAL WEIGHT		23 952.8 kg	

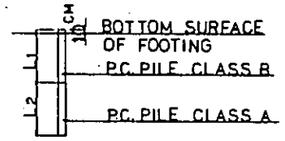
REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	FOOTING					
F 1	D19	2.25	3 070	82	566.5	
2	D16	1.56	3 060	106	792.9	
3	D32	6.23	6 750	28	1 177.5	
4	"	"	6 540	6	294.5	
5	D22	3.04	6 750	30	615.6	
6	D19	2.25	6 750	30	455.6	
7	D16	1.56	6 750	24	252.7	
8	"	"	6 820	16	170.2	
9	"	"	3 150	16	78.6	
10	"	"	3 150	16	78.6	
F' 1	D13	0.995	1 920	38	72.6	
2	"	"	1 570	76	118.7	
3	"	"	1 920	38	72.6	
4	"	"	1 670	72	119.7	
5	"	"	1 670	72	119.7	
				D32	1 422.0 kg	
				D22	615.6 "	
				D19	1 022.1 "	
				D16	1 372.5 "	
				D13	503.3 "	
		FOOTING	TOTAL WEIGHT		4 935.5 kg	

2.VP5
GENERAL VIEW



NOTES :

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. REFERENCE DRAWING FOR BAR ARRANGEMENT: CS-238 ~ 244
3. TYPES OF P.C. PILE



11

VIADUCT (VP5)

	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	77.0	307.4	6 074.8	78.9
BEAM	98.1	407.5	15 901.3	162.1
COLUMN	9.5	81.3	3 147.7	331.3
CURB	———	———	———	———
STAIR WAY	58.8	284.6	6 647.0	113.0
TOTAL	243.4	1 080.8	31 770.8	130.5
FOOTING	98.9	42.6	8 592.7	86.9
BRACING BEAM	———	———	———	———
TOTAL	98.9	42.6	8 592.7	86.9

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	17.2	CLASS F
AGGREGATE SUB BASE	m^3	34.4	A.S.B.-3
EXCAVATION	m^3	354.5	
FOUNDATION MORTAR	———	———	f_{ck} = 400 kg/cm²
PILE	EACH	φ500 N=A-72 N=B-72	φ500 l=A-14.0m = l=B-8.0m

(VP5) WEIGHT OF BARS BY DIAMETER

	Ø32	Ø29	Ø25	Ø22	Ø19	Ø16	Ø13	Ø10	TOTAL
SLAB	—	—	—	—	—	2 237.6	2 052.3	1 784.9	6 074.8
BEAM	6 191.1	—	1 330.8	360.7	4 025.7	43.6	3 921.4	—	15 901.3
COLUMN	—	—	2 729.2	—	—	—	423.5	—	3 147.7
STAIR WAY	—	—	—	3 031.6	—	1 282.8	2 332.6	—	6 647.0
FOOTING	—	—	3 653.7	—	2 065.5	2 291.9	581.6	—	8 592.7
BRACING BEAM	—	—	—	—	—	—	—	—	—
TOTAL	6 191.1	—	7 708.7	3 400.3	6 091.2	5 875.9	9 311.4	1 784.9	40 363.5

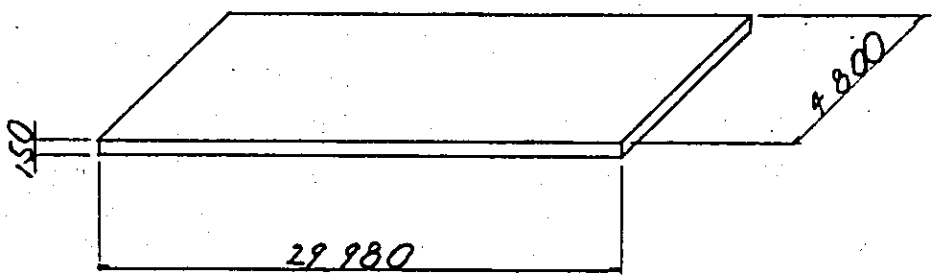
JICA

No. 37

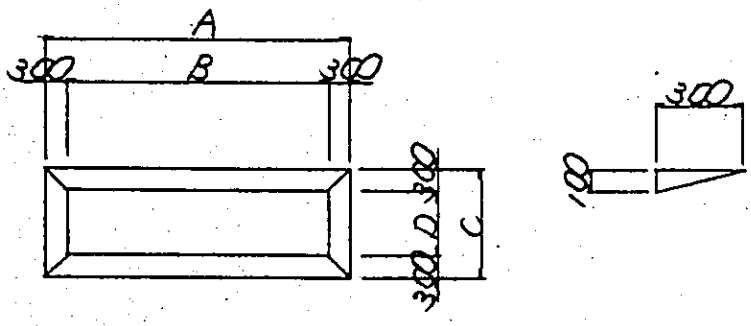
VP5

CONCRETE VOLUME

(1) UPPER SLAB



$Va = 29.98 \times 4.80 \times 0.15 = 21.586\ m^3$

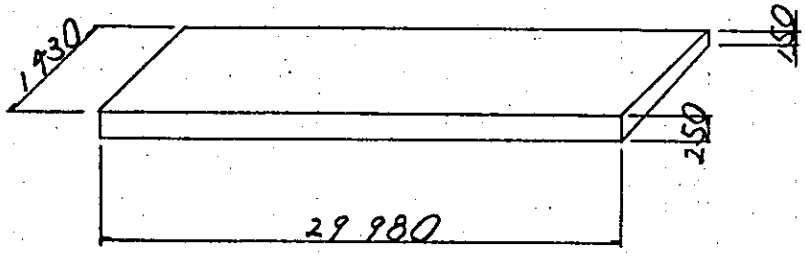


	A	B	C	D	
$Vb' =$	9340	8740	3800	3200	$n = 2$
$Vc' =$	9500	8900	〃	〃	$n = 1$

$$V = \{A \times C - \{A \times C + (A+B) \times (C+D) + B \times D\} \times 1/6\} \times h$$

$Vb = 0.382 \times 2 = 0.764$ 〃

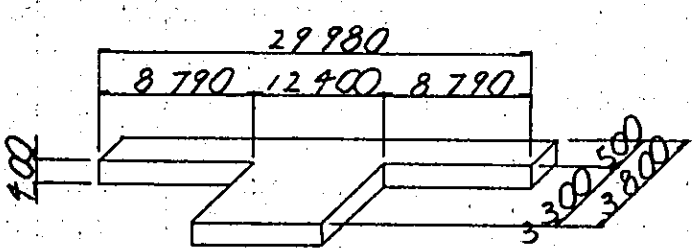
$Vc = 0.387 = 0.387$ 〃



$Vd = \frac{1}{2} \times (0.25 + 0.15) \times 1.93 \times 29.98 = 8.574\ m^3$

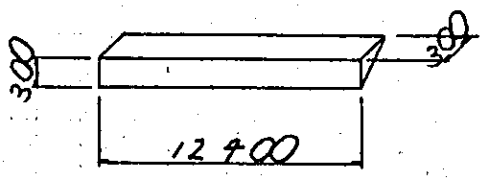
SUB TOTAL = $31.311\ m^3$

(2) INTERMEDIATE SLAB

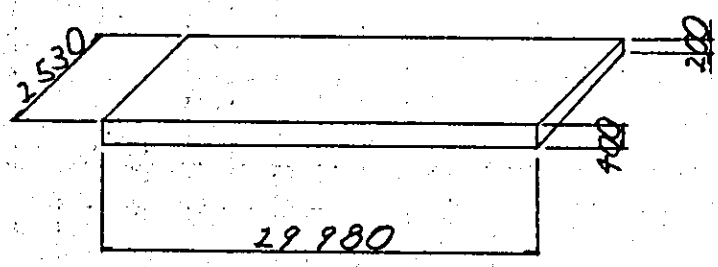


Va = 29.98 × 0.50 × 0.40 = 5.996 m³

Vb = 12.40 × 3.30 × 0.40 = 16.368 "



Vc = 0.30 × 0.30 × 1/2 × 12.40 = 0.558 "



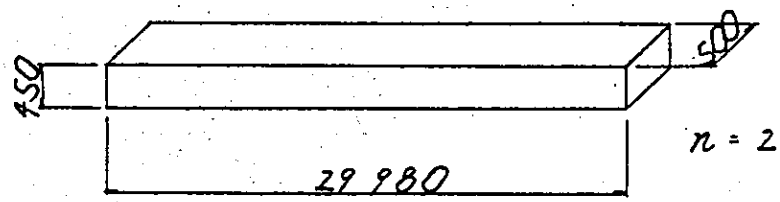
Vd = (0.40 + 0.20) × 1/2 × 2.53 × 29.98 = 22.755 "

SUB TOTAL = 45.677 m³

SLAB TOTAL 76.988 m³

(3) UPPER BEAM

1) LONGITUDINAL BEAM

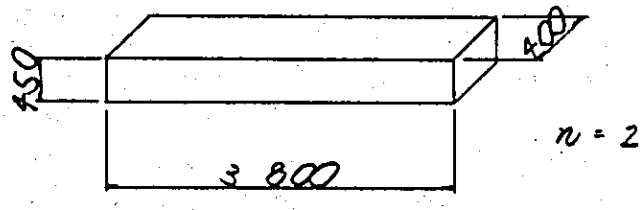


Va' = 29.98 × 0.50 × 0.45 = 6.521 m^3

Va = 6.521 × 2 = 13.042 m^3

SUB TOTAL = 13.042 m^3

2) AT END OF VIADUCT TRANSVERSE BEAM

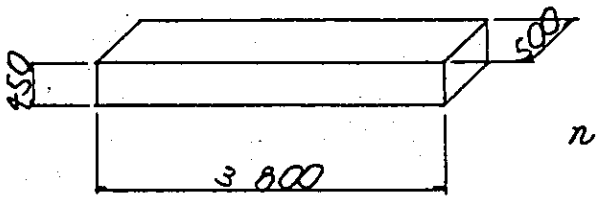


Va' = 3.80 × 0.40 × 0.45 = 0.684 m^3

Va = 0.684 × 2 = 1.368 m^3

SUB TOTAL = 1.368 m^3

3) AT INERMEDATE of VIADUCT TRANSVERSE BEAM



$n = 2$

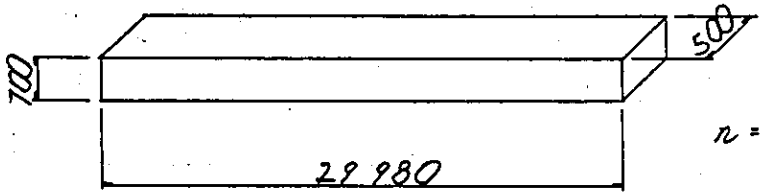
$Va' = 3.80 \times 0.50 \times 0.45 = 0.855\ m^3$

$Va = 0.855 \times 2 = 1.710\ m^3$

SUB TOTAL = $1.710\ m^3$

(9) INTERMEDIATE BEAM

1) LONGITUDINAL BEAM

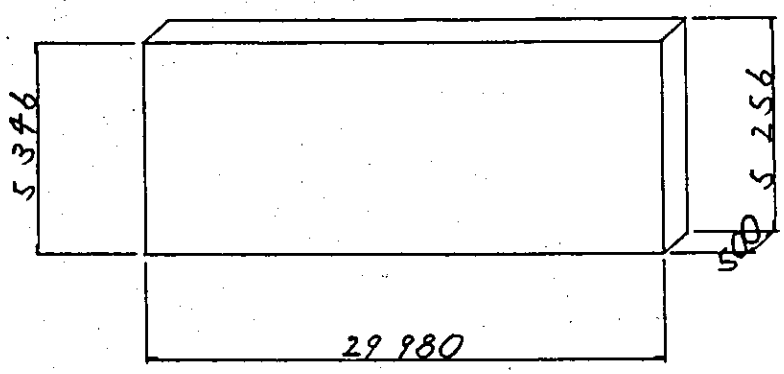


$n = 1$

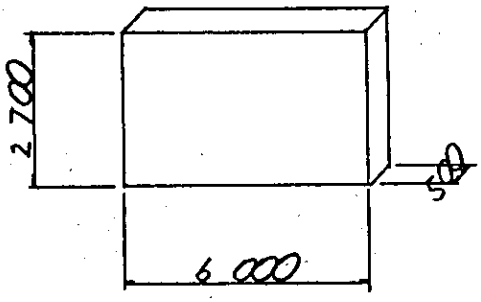
$Va = 29.98 \times 0.50 \times 0.70 = 10.493\ m^3$

SUB TOTAL = $10.493\ m^3$

(S)WALL



V_a = 29.98 × 0.50 × (5.396 + 5.256) × 1/2 = 79.462 m³



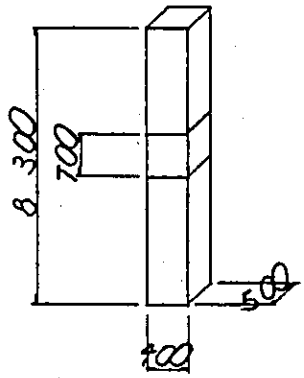
$-V_b$ = 6.00 × 2.70 × 0.50 = -8.100 "

SUB TOTAL = 71.462 m³

BEAM TOTAL 98.075 m³

(6) COLUMN

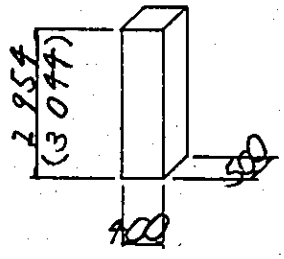
1) ATEND OF VIADUCT COLUMN



$n = 2$

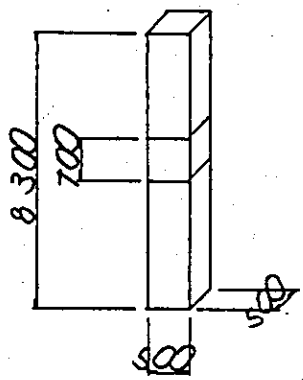
$Va' = 0.40 \times 0.50 \times (8.30 - 0.70) = 1.520\ m^3$

$Va = 1.520 \times 2 = 3.040\ m^3$



$Vb = 0.40 \times 0.50 \times (2.954 + 3.044) = 1.200\ "$

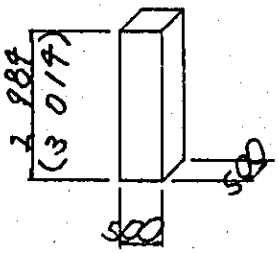
2) AT INTERMEDIATE OF VIADUCT COLUMN



$n = 2$

$Va' = 0.50 \times 0.50 \times (8.30 - 0.70) = 1.900^{m^3}$

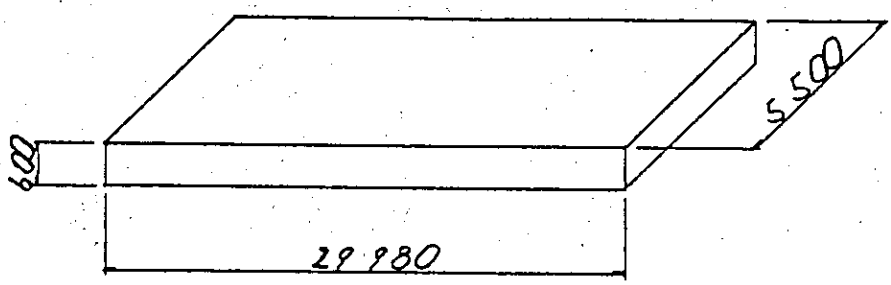
$Va = 1.900 \times 2 = 3.800^{m^3}$



$Vb = 0.50 \times 0.50 \times (2.984 + 3.019) = 1.500^{"}$

COLUMN TOTAL 9.540^{m^3}

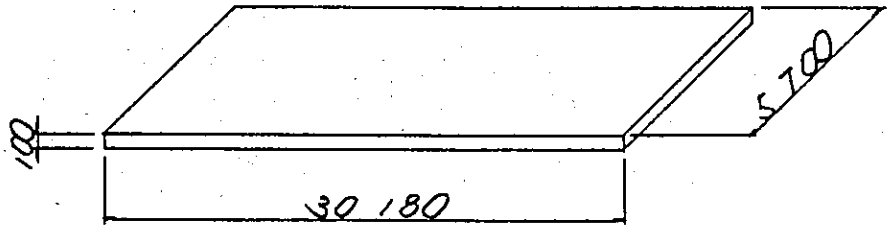
(T) FOOTING



$Va = 29.98 \times 5.50 \times 0.60 = 98.934\ m^3$

FOOTING TOTAL 98.934 m^3

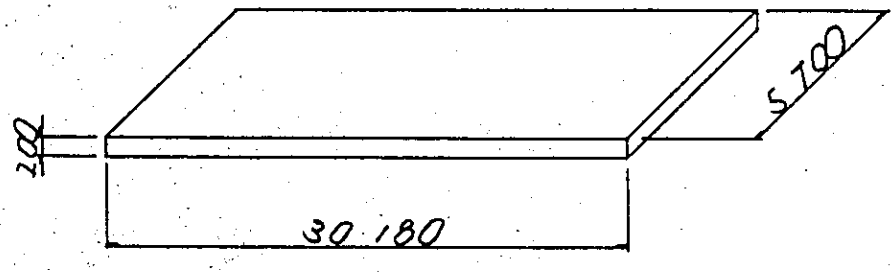
(8) LEVELING CONCRETE



$Va = 30.18 \times 5.70 \times 0.10 = 17.203\ m^3$

LEVELING CONCRETE TOTAL $17.203\ m^3$

(9) AGGREGATE SUB BASE



$Va = 30.18 \times 5.70 \times 0.20 = 34.405\ m^3$

AGGREGATE SUB BASE TOTAL $34.405\ m^3$

(10) PILE

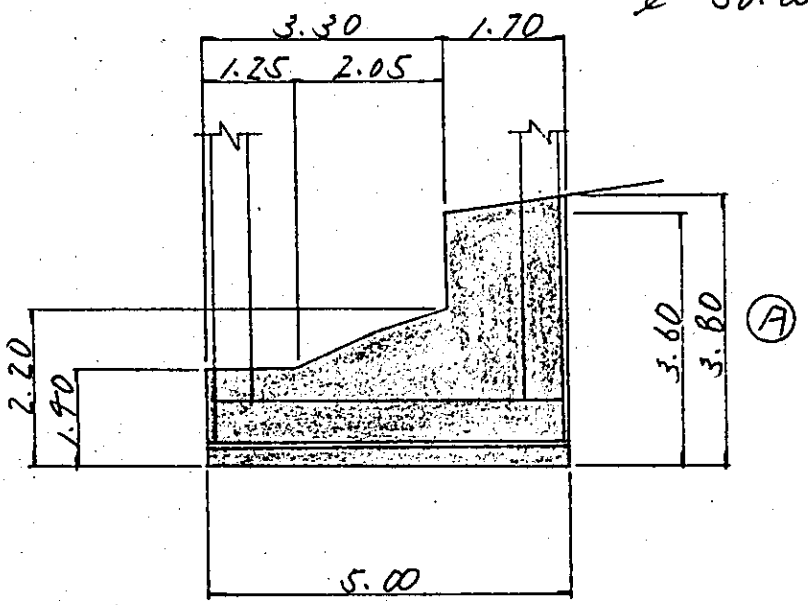
$\phi = 500^{mm}$ $\ell = A - 14.0^{m} \times 72$

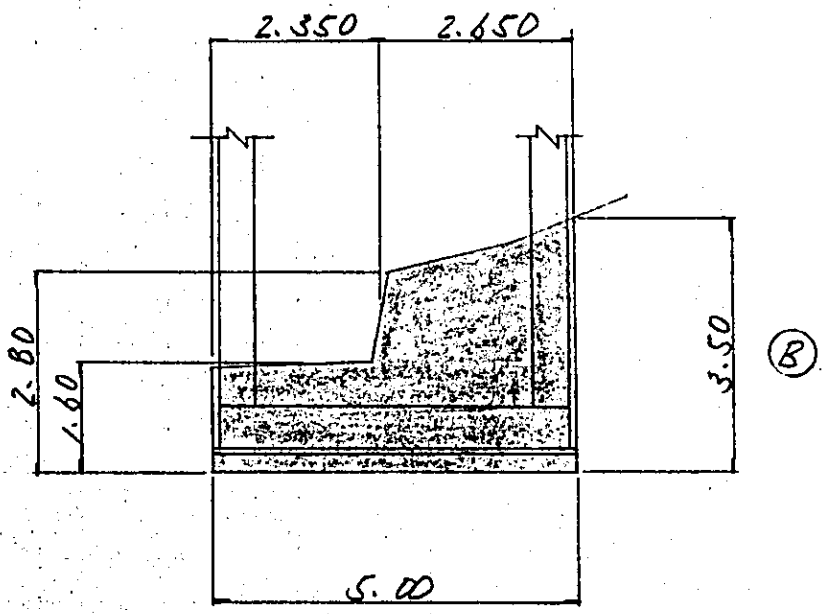
$\ell = B - 8.0^{m} \times 72$

(11) EXCAVATION

17K350M000 ~ 17K380M000

ℓ = 30.000 m





$A = 1/2 \times (3.80 + 3.60) \times 1.70 + 1/2 \times (2.00 + 1.40) \times 2.050 + 1.25 \times 1.90$

$= 11.525\ m^2$

$B = 1/2 \times (3.50 + 2.80) \times 2.650 + 2.35 \times 1.60$

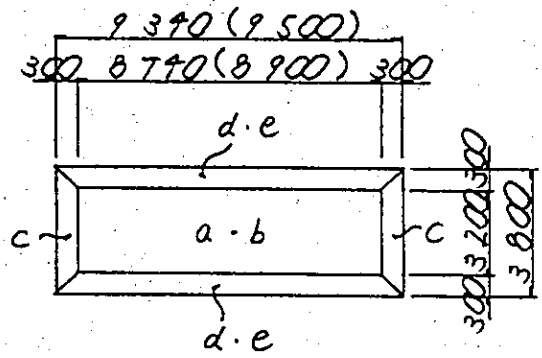
$= 12.108\ m^2$

$V = (11.525 + 12.108) \times 1/2 \times 30.00 = 354.495\ m^3$

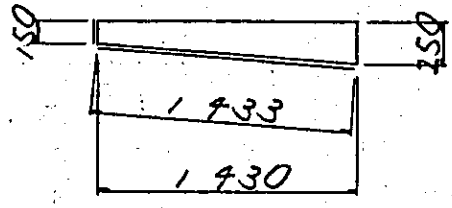
EXCAVATION TOTAL = $354.495\ m^3$

FORM AREA

(1) UPPER SLAB



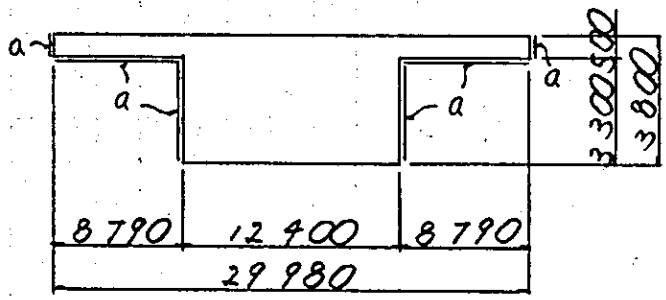
$Aa' = 8.74 \times 3.20 = 27.968^{m^2}$		
$Aa = 27.968 \times 2$	=	55.936^{m^2}
$Ab' = 8.90 \times 3.20 = 28.480^{m^2}$		
$Ab = 28.480$	=	$28.480^{"}$
$Ac' = (3.80 + 3.20) \times 1/2 \times 0.316 = 1.106^{m^2}$		
$Ac = 1.106 \times 6$	=	$6.636^{"}$
$Ad' = (9.34 + 8.74) \times 1/2 \times 0.316 = 2.857^{m^2}$		
$Ad = 2.857 \times 2 \times 2$	=	$11.428^{"}$
$Ae' = (9.50 + 8.90) \times 1/2 \times 0.316 = 2.907^{m^2}$		
$Ae = 2.907 \times 2$	=	$5.814^{"}$

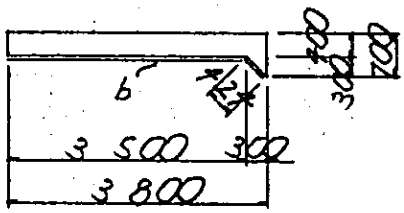


$\ell = 29.98^{m}$

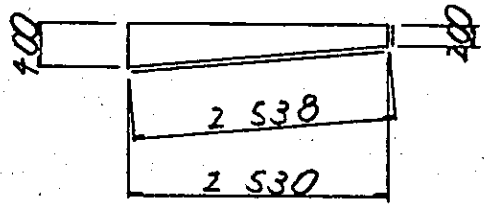
$A_a = (0.25 + 0.15) \times 1/2 \times 1.93 \times 2$	=	0.572^{m^2}
$A_b = (0.15 + 1.433) \times 29.98$		$47.458^{"}$
SUB TOTAL	=	156.324^{m^2}

(2) INTERMEDIATE SLAB





$Aa = (0.50 + 8.79 + 3.30) \times 2 \times 0.40$	=	10.072 m²
$Ab = (3.50 + 0.424) \times 12.40$	=	48.658 "
$Ac = 8.79 \times 2 \times 0.50$	=	8.790 "

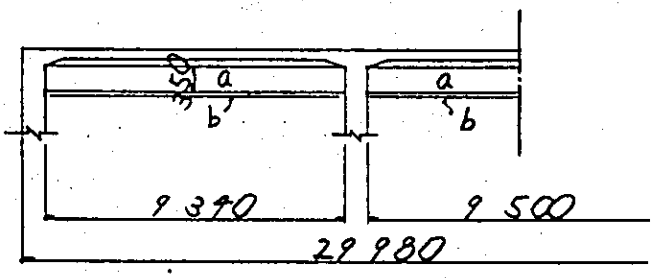


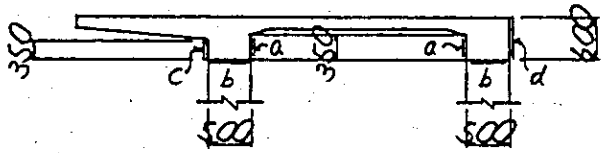
$\ell = 29.98$ m

$Aa = (0.40 + 0.20) \times 1/2 \times 2.53 \times 2$	=	1.518 "
$Ab \quad (2.538 + 0.20) \times 29.98$	=	82.085 "
SUB TOTAL =		151.123 m²
SLAB TOTAL =		307.447 m²

(3) UPPER BEAM

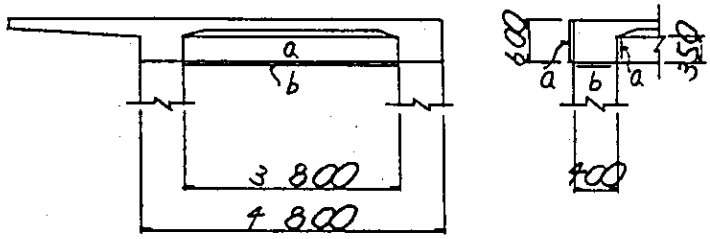
1) LONGITUDINAL BEAM





$Aa' = (9.39 \times 2 + 9.50) \times 0.35$	$= 9.863\ m^2$	
$Aa = 9.863 \times 2$		$= 19.726\ m^2$
$Ab' = (9.39 \times 2 + 9.50) \times 0.50$	$= 14.090\ m^2$	
$Ab = 14.090 \times 2$		$= 28.180\ "$
$Ac = 29.98 \times 0.35$		$= 10.493\ "$
$Ad = 29.98 \times 0.60$		$= 17.988\ "$
SUB TOTAL=		$76.387\ m^2$

2) AT END OF VIADUCT TRANSVERSE BEAM



$n = 2$

$Aa' = 4.80 \times 0.60 + 3.80 \times 0.35 = 4.210\ m^2$

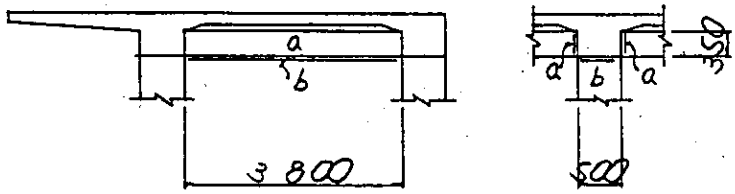
$Aa = 4.210 \times 2 = 8.420\ m^2$

$Ab' = 3.80 \times 0.40 = 1.520\ m^2$

$Ab = 1.520 \times 2 = 3.040\ m^2$

SUB TOTAL = $11.460\ m^2$

3) AT INTERMEDIATE OF VIADUCT TRANSVERE BEAM



$n = 2$

$Aa' = 3.80 \times 0.35 \times 2 = 2.660\ m^2$

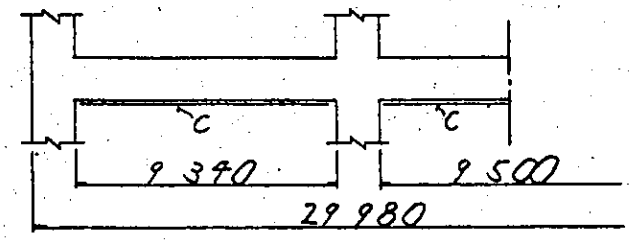
$Aa = 2.660 \times 2 = 5.320\ m^2$

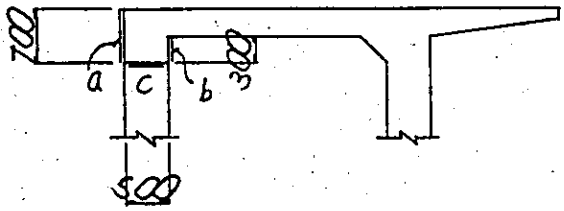
$Ab' = 3.80 \times 0.50 = 1.900\ m^2$

$Ab = 1.900 \times 2 = 3.800\ m^2$

SUB TOTAL = $9.120\ m^2$

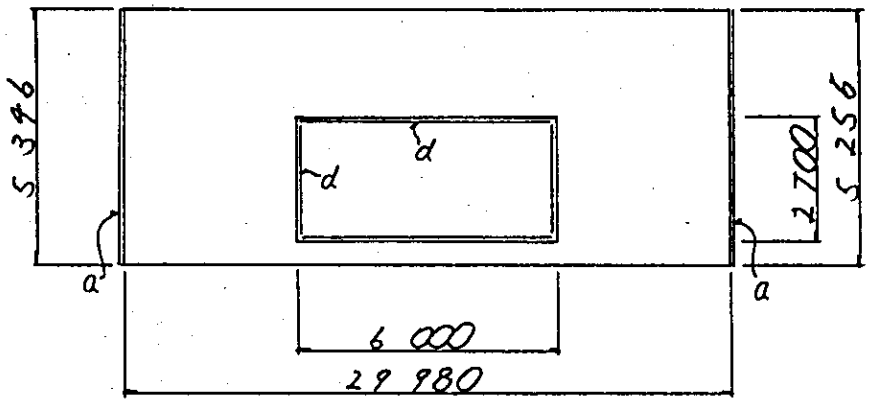
(4) INTERMEDIATE BEAM

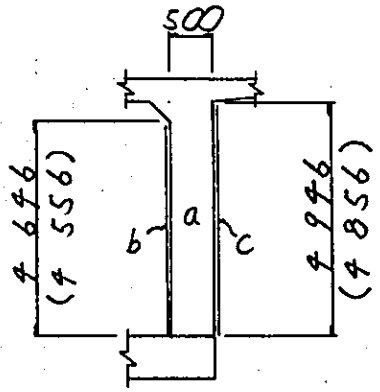




A_a = 29.98 × 0.70	=	20.986 m^2
A_b = 29.98 × 0.30	=	8.994 "
A_c = (9.34 × 2 + 9.50) × 0.50	=	14.090 "
SUB TOTAL =		44.070 m^2

(S) WALL

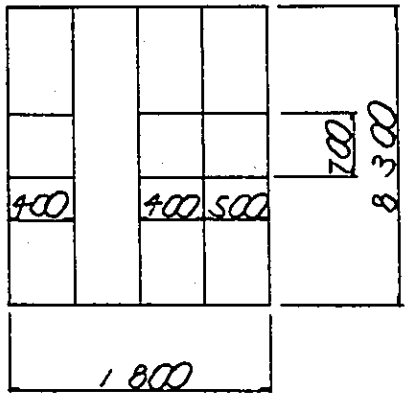




Aa =	$(5.346 + 5.256) \times 0.50$	=	$5.301\ m^2$
Ab =	$(4.646 + 4.556) \times 1/2 \times 29.98$		
	$- 6.00 \times 2.70$	=	$121.738\ "$
Ac =	$(4.946 + 4.856) \times 1/2 \times 29.98$		
	$- 6.00 \times 2.70$	=	$130.732\ "$
Ad =	$(6.00 + 2.70) \times 2 \times 0.50$	=	$8.700\ "$
		SUB TOTAL =	$268.471\ m^2$
		BEAM TOTAL	$407.508\ m^2$

(6) COLUMN

1) AT END OF VIADACT COLUMN

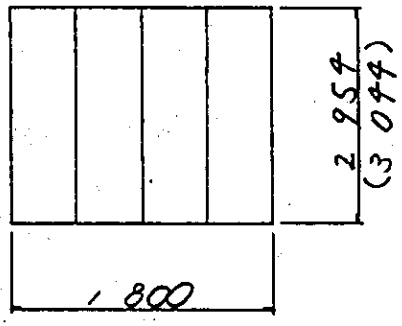


$n = 2$

$Aa' = 1.80 \times 8.30 - (0.40 \times 2 + 0.50) \times 0.70$

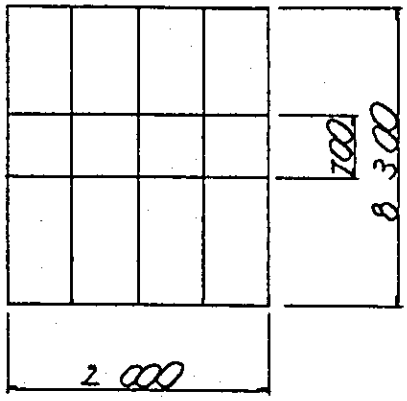
$= 14.030\ m^2$

$Aa = 14.030 \times 2 = 28.060\ m^2$



$Ab = 1.80 \times (2.954 + 3.044) = 10.796\ "$

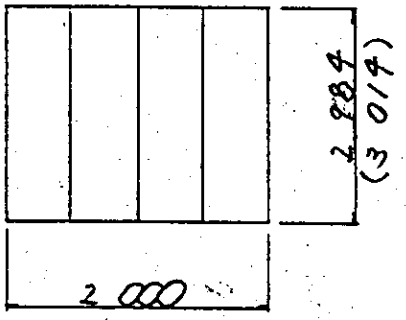
2) AT INTERMEDIATE of VIADUCT COLUMN



$n = 2$

$Aa' = 2.00 \times (8.30 - 0.70) = 15.200\ m^2$

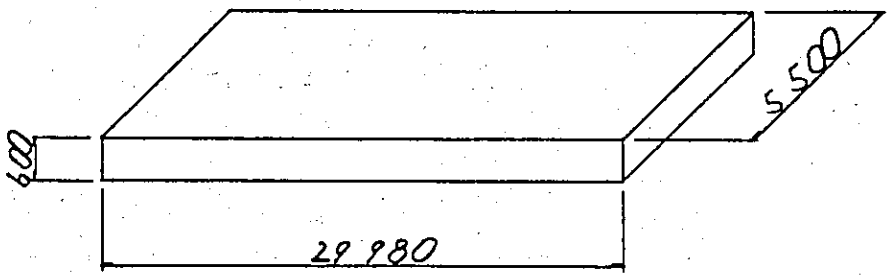
$Aa = 15.200 \times 2 = 30.400\ m^2$



$Ab = 2.00 \times (2.984 + 3.014) = 11.996\ m^2$

COLUMN TOTAL	$81.252\ m^2$

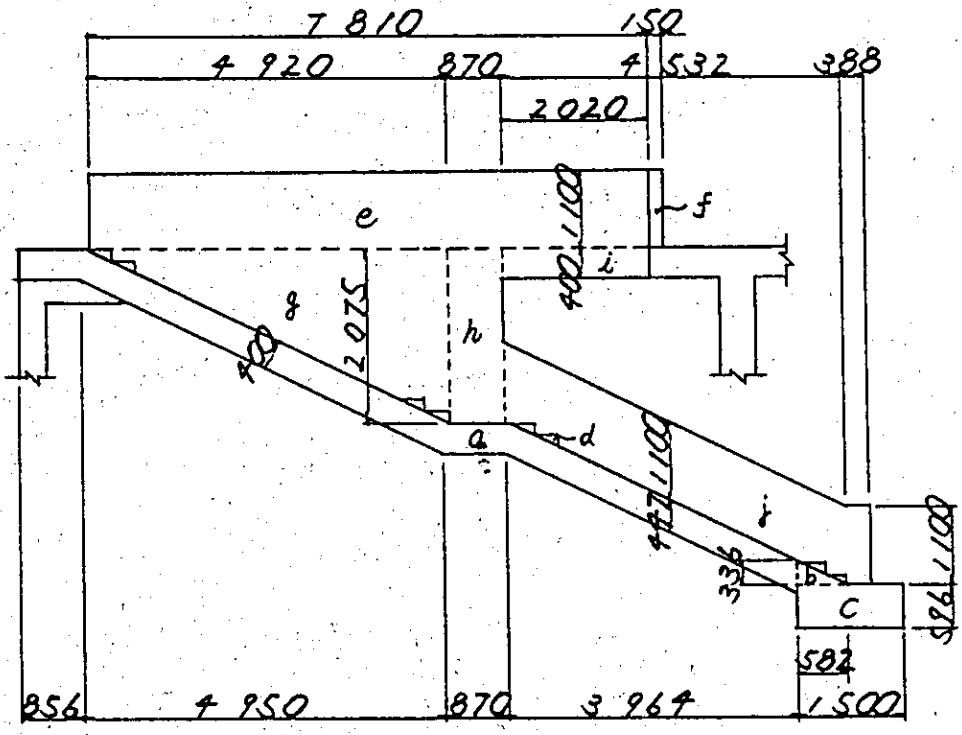
(7) FOOTING

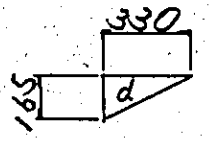


$A_a = (29.98 + 5.50) \times 2 \times 0.60 = 42.576\ m^2$

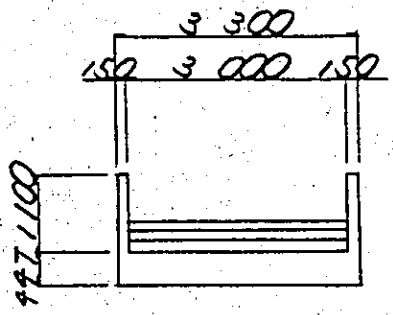
FOOTING TOTAL $42.576\ m^2$

(8) STAIR WAY (LEFT SIDE)
CONCRETE VOLUME



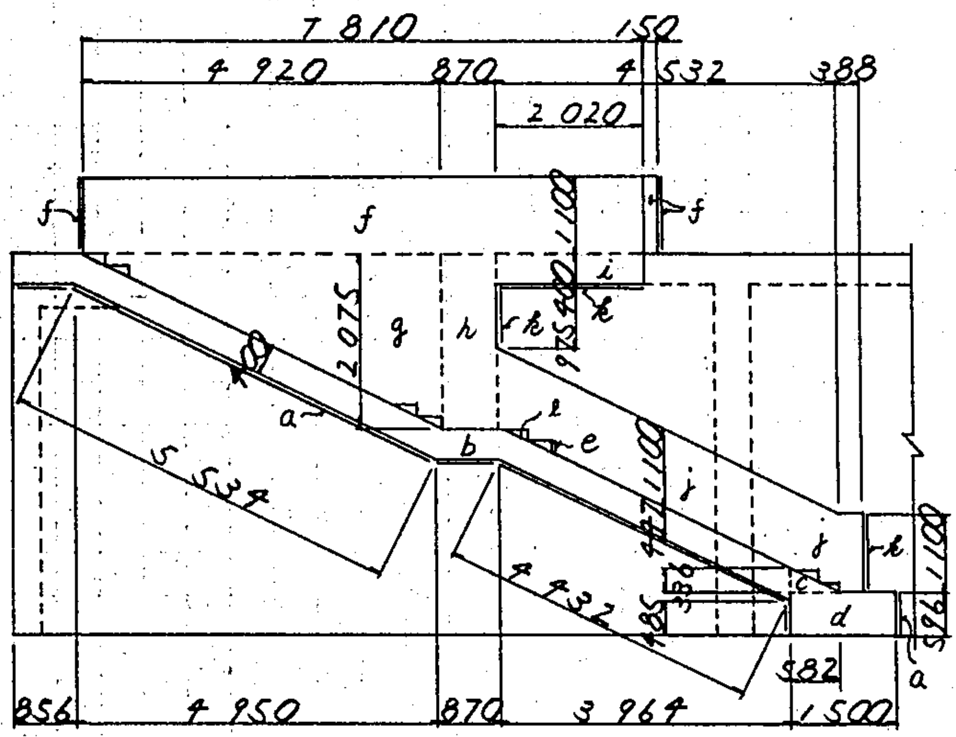


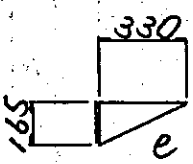
n = 29

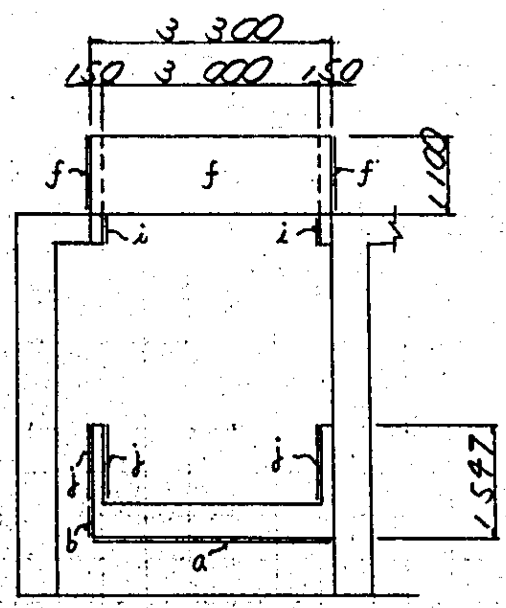


$V_a = (0.856 + 4.95 + 0.87 + 3.964) \times 0.477 \times 3.30$	=	$16.798\ m^3$
$V_b = 0.582 \times 0.336 \times 1/2 \times 3.30$	=	$0.323\ m^3$
$V_c = 1.50 \times 0.596 \times 3.30$	=	$2.950\ m^3$
$V_d = 0.33 \times 0.165 \times 1/2 \times 3.00 \times 29$	=	$2.369\ m^3$
$V_e = 7.81 \times 1.10 \times 0.15 \times 2$	=	$2.577\ m^3$
$V_f = 0.15 \times 1.10 \times 3.30$	=	$0.545\ m^3$
$V_g = 4.92 \times 2.075 \times 1/2 \times 0.15 \times 2$	=	$1.531\ m^3$
$V_h = 0.87 \times 2.075 \times 0.15 \times 2$	=	$0.542\ m^3$
$V_i = 2.02 \times 0.40 \times 0.15 \times 2$	=	$0.242\ m^3$
$V_j = (4.532 + 0.388) \times 1.10 \times 0.15 \times 2$	=	$1.624\ m^3$
TOTAL	=	$29.951\ m^3$

FORM AREA


7 810
150
4 920
870
4 532
388
2 020
f
f
f
1100
i
k
k
2075
g
h
a
b
l
e
1100
j
j
k
1100
c
d
5 534
4 432
485
336
596
a
582
856
4 950
870
3 964
1 500

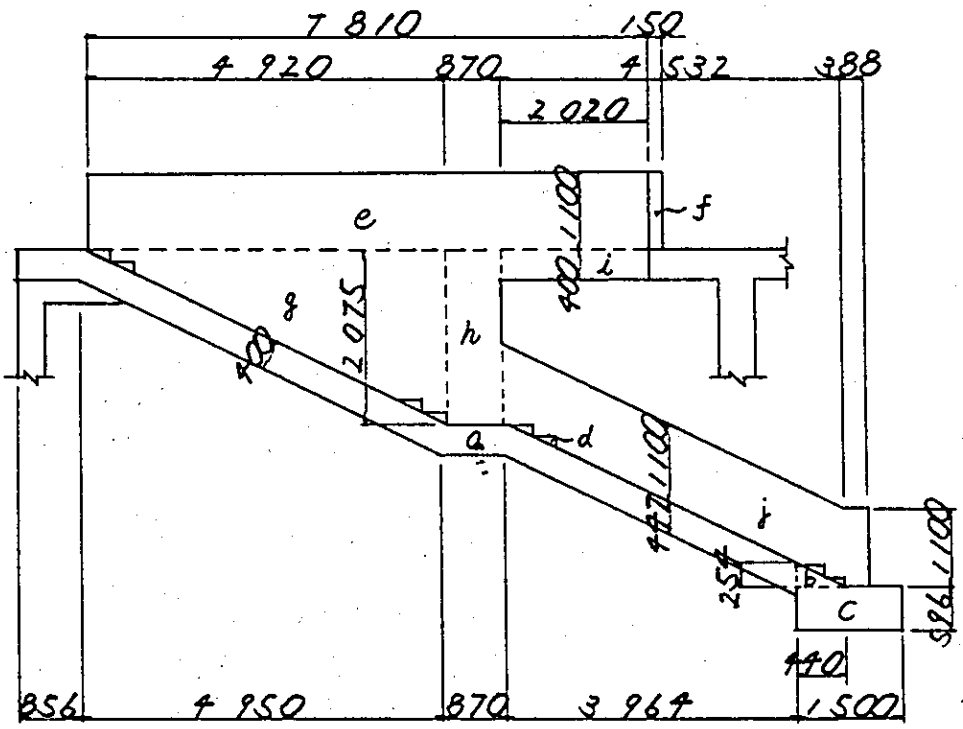

330
165
e

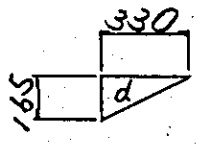

3 300
150
3 000
150
f
f
f
1100
i
i
j
j
j
b
a
1547

Aa = (0.856 + 5.534 + 0.87 + 4.432 + 0.485 + 0.596) × 3.30	=	42.151 m²
Ab = (0.856 + 4.95 + 0.87 + 3.964) × 0.447	=	4.756 "
Ac = 0.582 × 0.336 × 1/2	=	0.098 "
Ad = 1.50 × 0.596	=	0.894 "
Ae = 0.165 × 3.00 × 29	=	14.355 "
Af = {(7.81 + 0.15) × 4 + 3.00 + 3.30} × 1.10	=	41.954 "
Ag = 4.92 × 2.075 × 1/2 × 3	=	15.314 "
Ah = 0.87 × 2.075 × 3	=	5.416 "
Ai = 2.02 × 0.40 × 2	=	1.616 "
Aj = (4.532 + 0.388) × 1.10 × 3	=	16.236 "
Ak = (2.02 + 0.975 + 1.10) × 0.15 × 2	=	1.229 "
-Al = 0.33 × 0.165 × 1/2 × 29 × 2		-1.579 "
TOTAL	=	142.440 m²

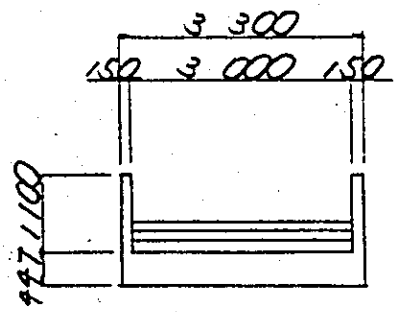
STAIR WAY (RIGHT SIDE)

CONCRETE VOLUME



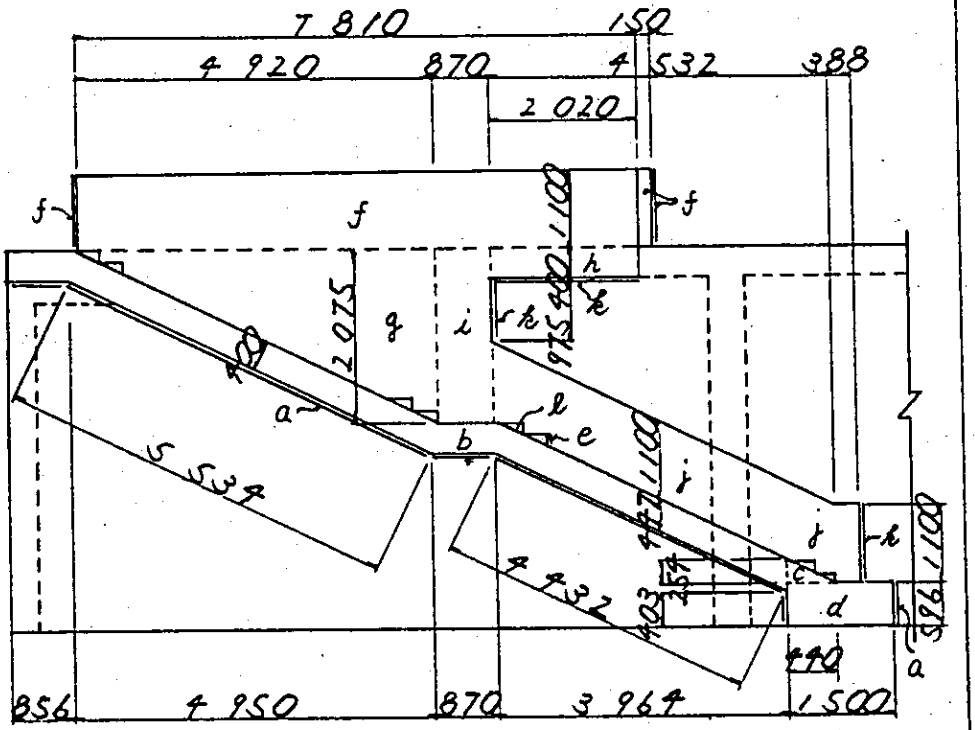


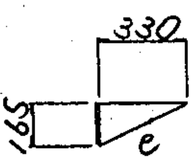
n = 29

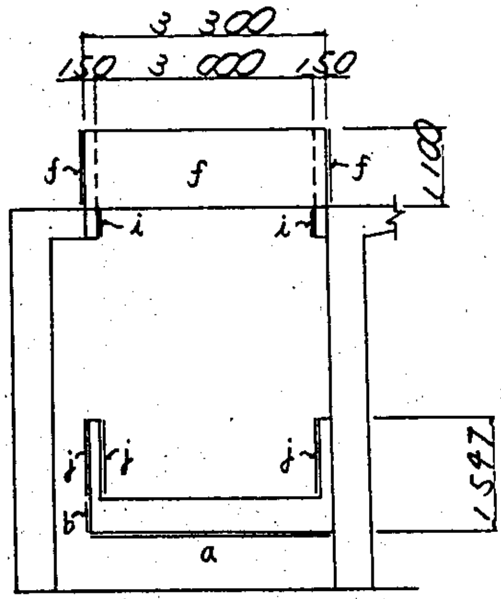


V_a = (0.856 + 4.95 + 0.87 + 3.964) × 0.477 × 3.30	=	16.748 m³
V_b = 0.490 × 0.254 × 1/2 × 3.30	=	0.184 "
V_c = 1.50 × 0.596 × 3.30	=	2.950 "
V_d = 0.33 × 0.165 × 1/2 × 3.00 × 29	=	2.369 "
V_e = 7.81 × 1.10 × 0.15 × 2	=	2.577 "
V_f = 0.15 × 1.10 × 3.30	=	0.545 "
V_g = 4.92 × 2.075 × 1/2 × 0.15 × 2	=	1.531 "
V_h = 0.87 × 2.075 × 0.15 × 2	=	0.542 "
V_i = 2.02 × 0.90 × 0.15 × 2	=	0.292 "
V_j = (4.532 + 0.388) × 1.10 × 0.15 × 2	=	1.624 "
TOTAL	=	29.312 m³

FORM AREA


7 810
150
4 920
870
4 532
388
2 020
f
f
f
1 100
h
k
k
2 075
g
i
a
b
l
e
5 534
1 100
j
j
k
1 100
4 432
403
c
d
596
440
a
856
4 950
870
3 964
1 500


330
165
e


3 300
150
3 000
150
f
f
f
1 100
i
i
j
j
j
b
a
1 547

Aa = (0.856 + 5.534 + 0.87 + 4.432 + 0.903 + 0.596) × 3.30	=	41.880 m^2
Ab = (0.856 + 4.95 + 0.87 + 3.964) × 0.447	=	4.756 "
Ac = 0.440 × 0.254 × 1/2	=	0.056 "
Ad = 1.50 × 0.596	=	0.894 "
Ae = 0.165 × 3.00 × 29	=	14.355 "
Af = {(7.81 + 0.15) × 4 + 3.00 + 3.30} × 1.10	=	41.959 "
Ag = 4.92 × 2.075 × 1/2 × 3	=	15.314 "
Ah = 0.87 × 2.075 × 3	=	5.416 "
Ai = 2.02 × 0.40 × 2	=	1.616 "
Aj = (4.532 + 0.388) × 1.10 × 3	=	16.236 "
Ak = (2.02 + 0.975 + 1.10) × 0.15 × 2	=	1.229 "
Al = 3.30 × 0.165 × 1/2 × 29 × 2	=	−1.579 "
TOTAL	=	142.127 m^2

REINFORCING BAR

No. 71

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	VP S					
	UPPER SLAB					
S 1	D10	0.56	6 800	96	365.6	
2	"	"	6 160	42	194.9	
3	"	"	6 160	45	155.3	
4	"	"	6 080	6	20.4	
5	"	"	4 670	96	251.0	
6	"	"	2 320	8	10.4	
7	"	"	1 760	10	9.9	
8	"	"	2 560	96	137.7	
9	"	"	1 800	8	8.1	
S 21	D10	0.56	30 920	12	207.8	
22	"	"	31 100	4	69.7	
23	"	"	31 100	3	52.2	
29	"	"	29 920	21	351.9	
				D10	1784.9 kg	
		SUB	TOTAL	WEIGHT	1784.9 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	INTERMEDIATE SLAB					
S 1	D16	1.56	8 420	38	499.1	
2	"	"	6 810	37	393.1	
3	"	"	1 760	76	208.7	
4	"	"	4 060	38	240.7	
5	"	"	2 450	38	145.2	
6	"	"	5 150	75	602.6	
7	"	"	1 250	76	148.2	
8	D13	0.995	3 060	76	231.4	
9	"	"	1 440	30	43.0	
S' 1	D13	0.995	1 430	136	193.5	
2	"	"	1 250	182	226.4	(VARIES)
S 21	D13	0.995	30 380	4	120.9	
22	"	"	1 710	44	74.8	
23	"	"	12 560	22	274.9	
24	"	"	29 820	19	563.7	
25	"	"	9 110	20	181.3	
26	"	"	4 600	20	91.5	
27	"	"	1 600	32	50.9	
				D16	2237.6 kg	
				D13	2052.3 "	
		SUB TOTAL WEIGHT			4289.9 kg	

No. 73

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
				D16	2 237.6 kg	
				D13	2 052.3 "	
				D10	1 784.9 "	
		SLAB	TOTAL WEIGHT		6 074.8 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	LONGITUDINAL BEAM (UPPER)					
B 1	D32	6.23	32 290	3	602.6	
2	"	"	33 350	2	415.5	
3	"	"	7 000	8	348.9	
4	"	"	30 520	3	570.4	
5	D25	3.98	30 900	2	242.0	
B' 1	D13	0.995	1 760	190	332.7	
2	"	"	1 290	190	244.0	
				D32	1 937.4 kg	
				D25	242.0 "	
				D13	576.7 "	
		SUB	TOTAL WEIGHT		2 756.1 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	LONGITUDINAL	BEAM (UPPER)	(WALL SIDE)			
B 1	D32	6.23	32 290	3	602.6	
2	"	"	33 350	2	415.5	
3	"	"	7 000	8	348.9	
4	"	"	30 520	3	570.4	
5	D25	3.98	30 900	2	242.0	
B' 1	D13	0.995	1 760	190	332.7	
2	"	"	1 290	190	244.0	
				D32	1 937.4 kg	
				D25	242.0 "	
				D13	576.7 "	
		SUB	TOTAL WEIGHT		2 756.1 kg	

JICA

No. 76

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	ATEND OF	VIADUCT		TRANSVERSE		BEAM
B 21	D25	3.98	6 590	8	209.8	
22	"	"	5 230	8	166.5	
23	D16	1.56	5 100	4	31.8	
B° 21	D13	0.995	1 530	32	48.7	
22	"	"	1 190	32	37.9	
				D25	376.3kg	
				D16	31.8"	
				D13	86.6"	
		SUB	TOTAL WEIGHT		494.7kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM						
B 31	D25	3.98	6 590	10	262.3	
32	"	"	5 230	10	208.2	
33	D16	1.56	5 100	4	31.8	
B' 31	D13	0.995	1 630	32	51.9	
32	"	"	1 290	32	41.1	
				D25	470.5 kg	
				D16	31.8 "	
				D13	93.0 "	
		SUB TOTAL WEIGHT			595.3 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	LONGITUDINAL (INTERMEDIATE)					
B 11	D32	6.23	30 520	10	1 901.4	
12	"	"	33 300	2	414.9	
13	D22	3.04	30 320	4	368.7	
B° 11	D13	0.995	1 920	190	362.9	
12	"	"	1 290	190	244.0	
				D32	2 316.3 kg	
				D22	368.7 "	
				D13	606.9 "	
		SUB TOTAL WEIGHT			3 291.9 kg	

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	WALL	(INTERMEDIATE)				
W 1	D19	2.25	6 140	240	3 315.6	(VARIES)
2	"	"	2 690	62	375.3	(")
3	D13	0.995	29 880	18	535.2	
4	"	"	11 890	36	425.9	
5	"	"	4 300	12	51.3	
6	"	"	7 600	12	90.7	
7	"	"	1 600	16	25.5	
8	D19	2.25	2 400	62	334.8	
W° 1	D13	0.995	1 570	546	852.9	
				D19	4 025.7 kg	
				D13	1 981.5 "	
		SUB TOTAL WEIGHT			6 007.2 kg	
				D32	6 191.1 kg	
				D25	1 380.8 "	
				D22	368.7 "	
				D19	4 025.7 "	
				D16	63.6 "	
				D13	3 921.4 "	
		BEAM TOTAL WEIGHT			15 901.3 kg	

No. 80

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	COLUMN					
C 1	D25	3.98	9 700	16	617.7	
2	"	"	9 930	32	1 201.0	
3	"	"	9 920	16	313.3	
4	"	"	9 650	32	592.2	
C° 1	D13	0.995	1 870	108	201.0	
2	"	"	2 070	108	222.5	
				D25	2 729.2 kg	
				D13	923.5 "	
		COLUMN	TOTAL WEIGHT		3 147.7 kg	

JICA

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	STAIR	WAY				
S 1	D 13	0.995	7 930	13	102.6	
2	〃	〃	7 440	13	96.2	
3	〃	〃	3 200	29	92.3	
S 11	D 22	3.04	7 200	13	289.5	
12	〃	〃	7 800	13	308.3	
13	〃	〃	3 460	6	63.1	
14	〃	〃	3 960	6	72.2	
15	〃	〃	7 500	13	296.4	
16	〃	〃	4 660	6	85.0	
17	〃	〃	5 160	6	99.1	
18	〃	〃	6 100	13	291.1	
19	〃	〃	1 800	13	71.1	
20	D 16	1.56	2 440	13	49.5	
21	〃	〃	3 720	102	591.9	
S°11	D 13	0.995	1 280	48	61.2	
12	〃	〃	1 380	216	296.6	
13	〃	〃	1 670	30	99.9	
	WALL					
W 1	D 13	0.995	1 600	39	62.1	
2	〃	〃	1 700	4	6.8	
3	〃	〃	1 900	6	11.3	(VARIES)
4	〃	〃	3 600	8	28.7	
5	〃	〃	2 800	40	111.4	(VARIES)
6	〃	〃	7 860	12	93.9	
7	〃	〃	5 800	10	57.7	
8	〃	〃	3 600	18	64.5	(VARIES)
9	〃	〃	700	10	7.0	
10	〃	〃	2 500	2	5.0	
11	〃	〃	3 200	6	19.1	

No. 82

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
				D22	1 515.8 kg	×2 = 3 031.6 kg
				D16	691.4 "	×2 = 1 282.8 "
				D13	1 166.3 "	×2 = 2 332.6 "
	STAIR WAY AND WALL TOTAL					
				WEIGHT	3 323.5 kg	× 2 = 6 647.0 kg
				D32	6 191.1 kg	
				D25	4 055.0 "	
				D22	3 400.3 "	
				D19	4 025.7 "	
				D16	3 584.0 "	
				D13	8 729.8 "	
				D10	1 784.9 "	
			TOTAL WEIGHT		31 770.8 kg	

JICA

No. 83

REINF. NO.	DIA. (mm)	U. WEIGHT (kg/m)	LENGTH (mm)	NUMBER	WEIGHT (kg)	REMARKS
	FOOTING					
F 1	D25	3.98	6 120	150	3 653.7	
2	D19	2.25	6 120	150	2 065.5	
3	D16	1.56	6 340	2	19.8	
4	〃	〃	30 920	96	2 175.8	
5	〃	〃	30 860	2	96.3	
F° 1	D13	0.995	1 580	370	581.6	
				D25	3 653.7 kg	
				D19	2 065.5 〃	
				D16	2 291.9 〃	
				D13	581.6 〃	
		FOOTING	TOTAL WEIGHT		8 592.7 kg	

JICA

VIADUCT (VP1), (VP3)

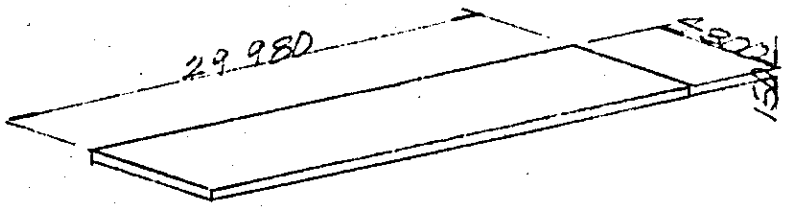
	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	31.3	155.6	1 778.7	56.8
BEAM	19.1	109.9	6 639.2	347.6
COLUMN	16.1	129.1	6 779.7	421.1
CURB	———	———	———	———
STAIRWAY	———	———	———	———
TOTAL	66.5	389.6	15 197.6	228.5
FOOTING	38.6	46.5	4 935.5	127.9
BRACING BEAM	———	———	———	———
TOTAL	38.6	46.5	4 935.5	127.9

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	6.2	CLASS F
AGGREGATE SUB BASE	m^3	12.4	A.S.B.-3
EXCAVATION	m^3	95.9	
FOUNDATION MORTAR	m^3	0.001	f_{ck} = 400 kg/cm^2
PILE	EACH	φ350 N=A-40 N=B-40	φ350 ℓ=A-14.0m = ℓ=B-8.0m

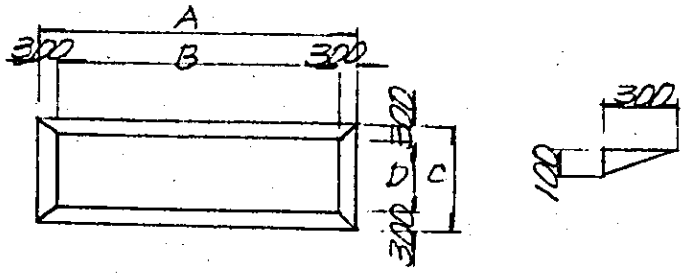
(VP1), (VP3)

CONCRETE VOLUME

(1) SLAB



$V_a = 29.980 \times 4.800 \times 0.150 = 21.586\ m^3$

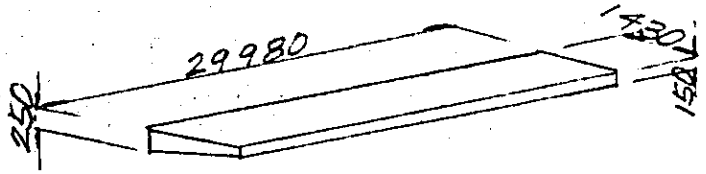


$V = [A \times C - \{A \times C + (A+B) \times (C \times D) + B \times D\} \times 1/6 \times h$

	A	B	C	D	
V_b =	9.240	8.640	3800	3200	$n = 2$
(V_c) =	9.500	8.900	〃	〃	$n = 1$

$V_b = 0.379 \times 2 = 0.758\ m^3$

$(V_c) = 0.387 = 0.387\ m^3$

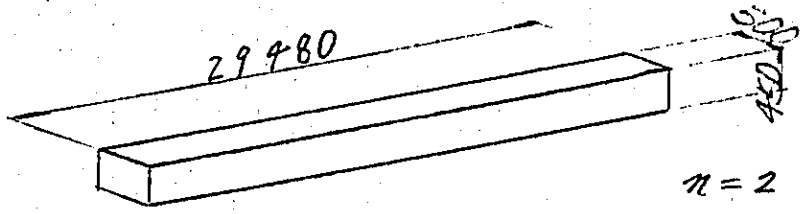


$V_2 = \frac{1}{2} \times (0.250 + 0.150) \times 1.430 \times 29.980$ = 8.574 m^3

SLAB TOTAL 31.305 m^3

(2) BEAM

1) LONGITUDINAL BEAM

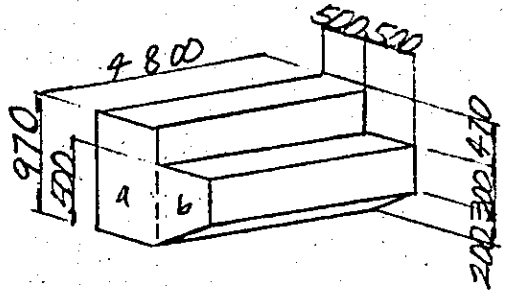


$Va' = 0.450 \times 0.500 \times 29.480 = 6.633$

$Va = 6.633 \times 2 = 13.266 \ m^3$

SUB TOTAL = $13.266 \ m^3$

2) ATEND of VIADUCT TRANSVERSE BEAM

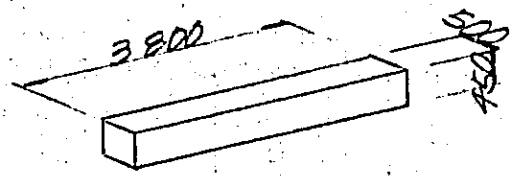


$Va = 0.97 \times 0.500 \times 9.800 = 2.328 \ m^3$

$Vb = (0.500 + 0.300) \times \frac{1}{2} \times 0.500 \times 9.800 = 0.960 \ m^3$

SUB TOTAL = $3.288 \ m^3$

3) AT INTERMEDIATE OF VIADUCT TRANSVERSE BEAM



$n = 3$

$Va' = 3.800 \times 0.500 \times 0.450 = 0.855$

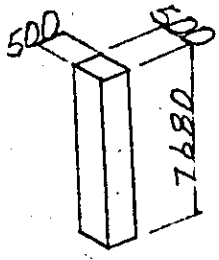
$Va = 0.855 \times 3 = 2.565 \ m^3$

SUB TOTAL = $2.565 \ m^3$

BEAM TOTAL $19.119 \ m^3$

(3) COLUMN

1) AT END OF VIADUCT COLUMN

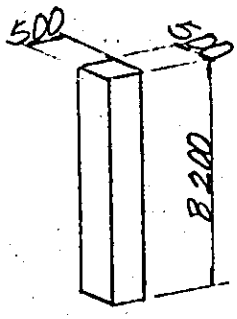


$n = 2$

$V_a' = 0.500 \times 0.500 \times 7.680 = 1.920$

$V_a = 1.920 \times 2 = 3.840 \ m^3$

2) AT INTERMEDIATE OF VIADUCT COLUMN



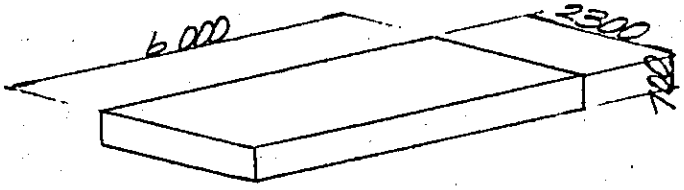
$n = 6$

$V_a' = 0.500 \times 0.500 \times 8.200 = 2.050$

$V_a = 2.050 \times 2 \times 3 = 12.300 \ m^3$

COLUMN TOTAL	16.140 m^3

(4) FOOTING

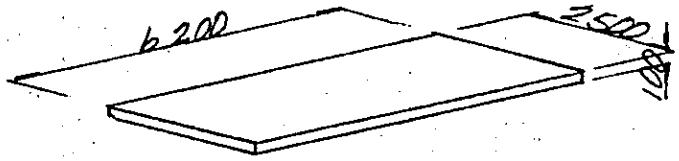


$V_a' = 6.000 \times 2.300 \times 0.700 = 9.660$ m³

$V_a = 9.660 \times 4 = 38.640$ m³

FOOTING TOTAL 38.640 m³

(5) LEVELING CONCRETE

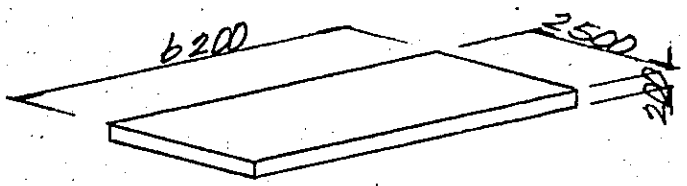


$V_a' = 6.200 \times 2.500 \times 0.100 = 1.550$

$V_a = 1.550 \times 4$ = 6.200 m^3

LEVELING CONCRETE TOTAL 6.200 m^3

(6) AGGREGATE SUB BASE

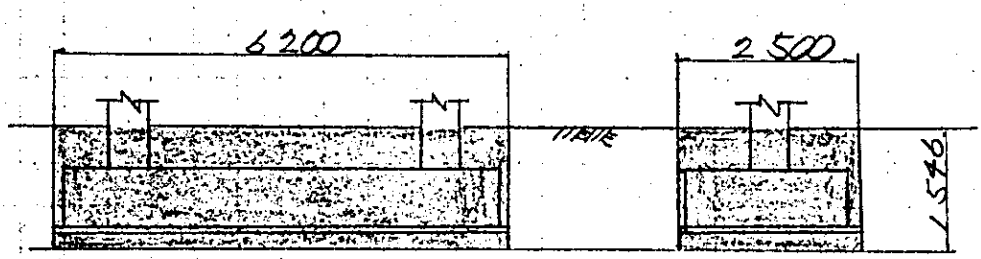


$V_a' = 6.200 \times 2.500 \times 0.200 = 3.100$

$V_a = 3.100 \times 4$ = 12.400 m^3

AGGREGATE SUB BASE TOTAL 12.400 m^3

(7) EXCAVATION



$Va' = 6.20 \times 2.50 \times 1.546 = 23.963$

$Va = 23.963 \times 4 = 95.852\ m^3$

EXCAVATION TOTAL 95.852 m^3

(8) PILE

$\varphi = 350$

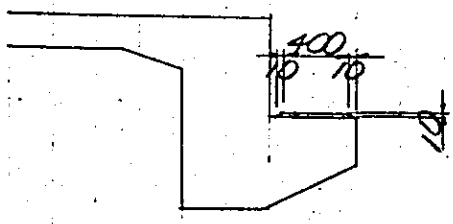
$\ell = B - 8.0^{m}$

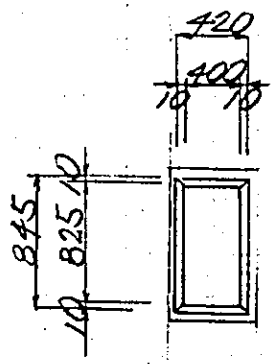
$\ell = A - 14.0^{m}$

$n = 10$

$\Sigma N = 10 \times 4 = 40$

(9) FOUNDATION MORTAR





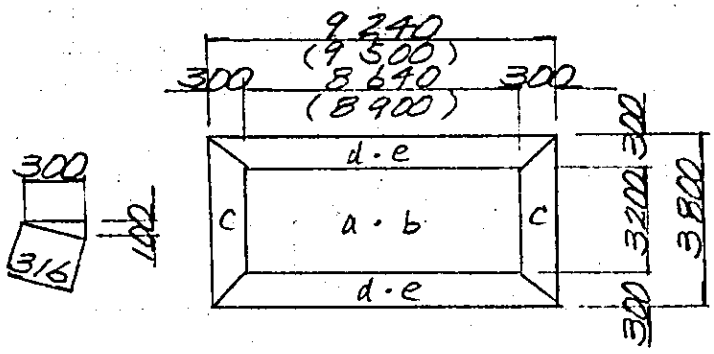
$n = 2$

$$V = \{0.845 \times 0.42 - \{0.845 \times 0.42 + (0.845 + 0.825) \times (0.42 + 0.40) + 0.825 \times 0.40\} \times 1/6\} \times 0.010 \times 2 = 0.001\ m^3$$

FOUNDATION MORTAR TOTAL 0.001 m^3

FORM AREA

(1) SLAB



$A_a' = 8.640 \times 3.200 = 27.648$

$A_a = 27.648 \times 2 = 55.296\ m^2$

$A_b' = 8.900 \times 3.200 = 28.480$

$A_b = 28.480 = 28.480$ "

$A_c' = (3.800+3.200) \times 1/2 \times 0.316 = 1.106$

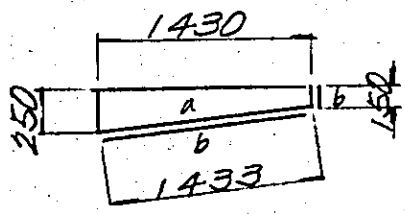
$A_c = 1.106 \times 6 = 6.636$ "

$A_d' = (9.240+8.640) \times 1/2 \times 0.316 = 2.825$

$A_d = 2.825 \times 2 \times 2 = 11.300$ "

$A_e' = (9.500+8.900) \times 1/2 \times 0.316 = 2.907$

$A_e = 2.907 \times 2 = 5.814$ "



$\ell = 29.980$

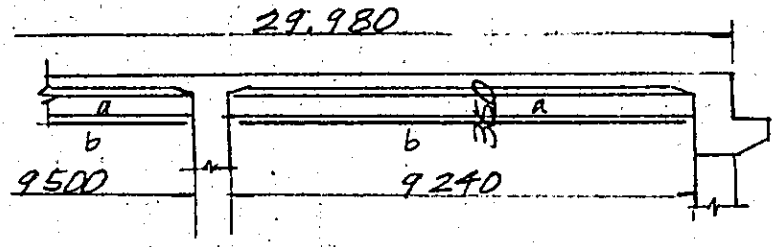
$A_a = (0.250+0.150) \times \frac{1}{2} \times 1.430 \times 2$ = 0.572 m^2

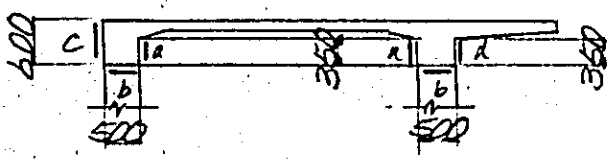
$A_b = (1.433+0.150) \times 29.980$ = 47.458 "

SLAB TOTAL 155.556 m^2

(2) BEAM

1) LONGITUDINAL BEAM





$A_a' = (9.240 \times 2 + 9.500) \times 0.350 = 9.793$

$A_a = 9.793 \times 2 = 19.586$ m²

$A_b' = (9.240 \times 2 + 9.500) \times 0.500 = 13.990$

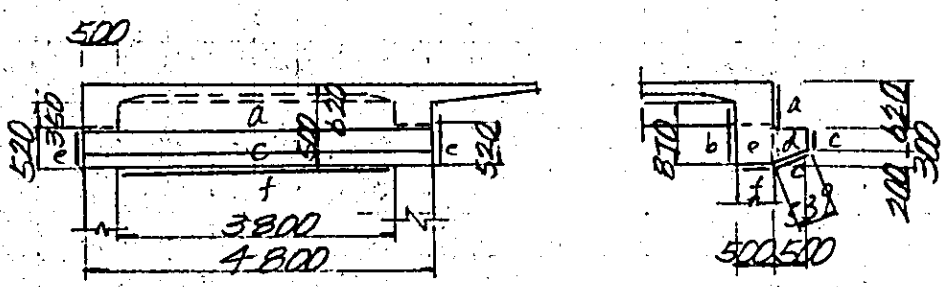
$A_b = 13.990 \times 2 = 27.980$ "

$A_c = 29.980 \times 0.600 = 17.988$ "

$A_d = 29.980 \times 0.350 = 10.493$ "

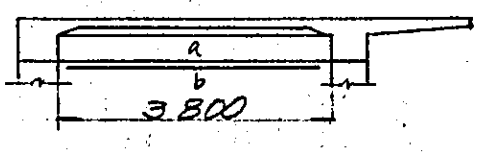
SUB TOTAL = 76.047 m²

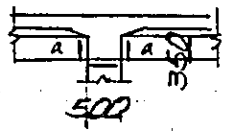
2) ATEND OF VIADUCT TRANSVERSE BEAM



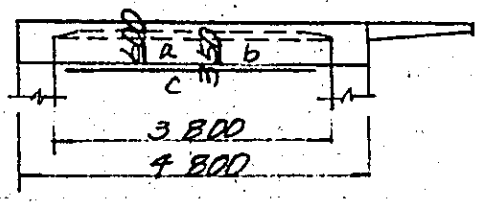
$A_a = 0.620 \times 4.800$	=	2.976 m^2
$A_b = 0.870 \times 4.800 - 0.350 \times 0.500 \times 2$	=	3.826 "
$A_c = (0.300 + 0.539) \times 4.800$	=	4.027 "
$A_d = (0.300 + 0.500) \times 1/2 \times 0.500 \times 2$	=	0.400 "
$A_e = 0.520 \times 0.500 \times 2$	=	0.520 "
$A_f = 3.800 \times 0.500$	=	1.900 "
SUB TOTAL =		13.649 m^2

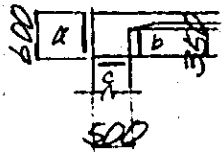
3) AT INTERMEDIATE OF VIADUCT TRANSVERE BEAM





$A_{a'} = 0.350 \times 3.800 \times 2$	$= 2.660$	
$A_a = 2.660 \times 2$		$= 5.320\ m^2$
$A_{b'} = 0.500 \times 3.800$	$= 1.900$	
$A_b = 1.900 \times 2$		$= 3.800$ "
SUB TOTAL		$= 9.120\ m^2$

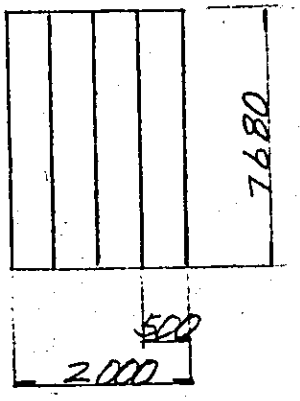




$A_a = 0.600 \times 4.800$		$= 2.880\ m^2$
$A_b = 0.350 \times 3.800$		$= 1.330$ "
$A_c = 0.500 \times 3.800$		$= 1.900$ "
SUB TOTAL		$= 6.110\ m^2$
BEAM TOTAL		$104.926\ m^2$

(3) COLUMN

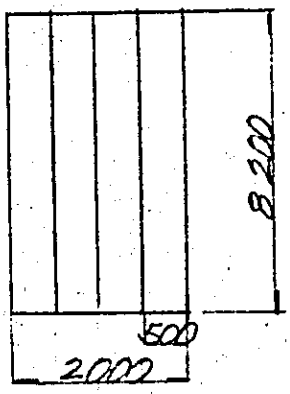
1) AT END OF VIADUCT COLUMN



$A_a' = 0.500 \times 7.680 \times 4 = 15.360$

$A_a = 15.360 \times 2 = 30.720$ m^2

2) AT INTERMEDIATE OF VIADUCT COLUMN

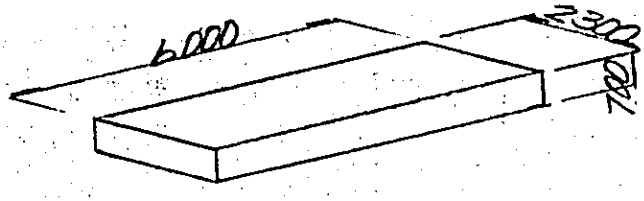


$A_a' = 0.500 \times 8.200 \times 4 = 16.400$

$A_a = 16.400 \times 2 \times 3 = 98.400$

COLUMN TOTAL	129.120 m^2

(4) FOOTING



$A_a' = (6.000 + 2.300) \times 2 \times 0.700 = 11.620$

$A_a = 11.620 \times 4$ = 46.480 m^2

FOOTING TOTAL 46.480 m^2

VIADUCT (VP4)

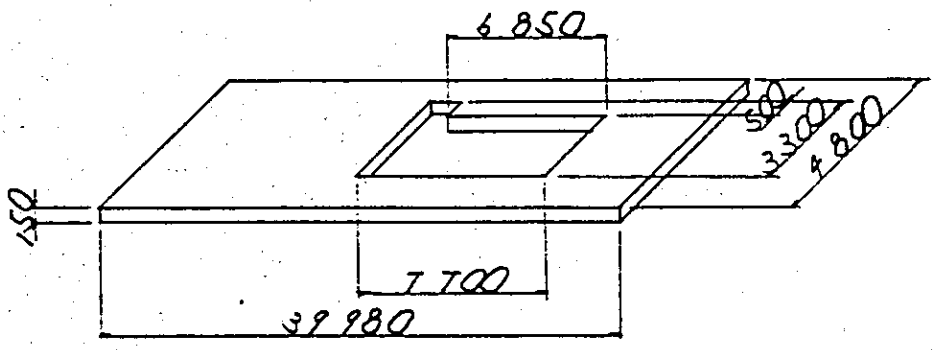
	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	131.2	453.4	10 351.7	78.9
BEAM	149.0	579.7	23 342.4	162.1
COLUMN	12.1	101.4	4 008.7	331.3
CURB	———	———	———	———
STAIR WAY	14.6	119.8	1 649.8	113.0
TOTAL	301.9	1 254.3	39 352.6	130.3
FOOTING	131.9	54.6	11 462.1	86.9
BRACING BEAM	———	———	———	———
TOTAL	131.9	54.6	11 462.1	86.9

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	22.9	CLASS F
AGGREGATE SUB BASE	m^3	45.8	A.S.B.-3
EXCAVATION	m^3	482.5	
FOUNDATION MORTAR	—	———	$\sigma_{ck} = 400\ kg/cm^2$
PILE	EACH	φ500 N=A-96 N=B-96	φ500 ℓ=A-14.0m " ℓ=B-8.0m

VP4

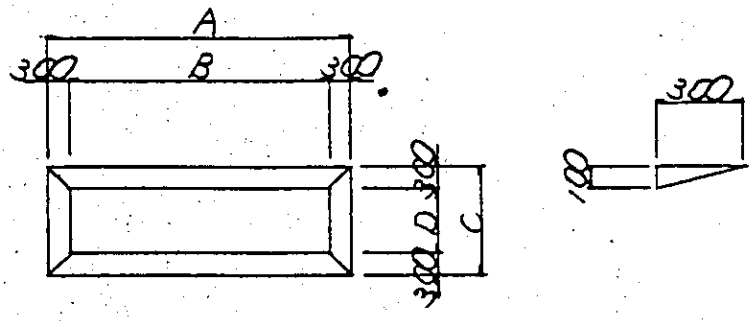
CONCRETE VOLUME

(1) UPPER SLAB



$Va = 39.98 \times 4.80 \times 0.15$ = 28.786 m³

$-Vb = (7.70 \times 3.30 - 6.85 \times 0.50) \times 0.15$ = −3.298 "

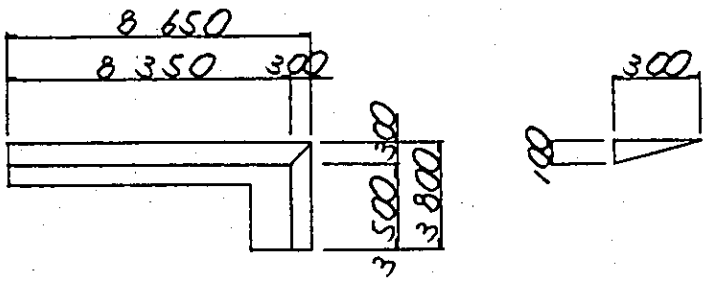


	A	B	C	D	
Vc' =	9 340	8 740	3 800	3 200	n = 2
Vd' =	9 500	8 900	〃	〃	n = 1

$$V = \{A \times C - \{A \times C + (A+B) \times (C+D) + B \times D\} \times 1/6\} \times h$$

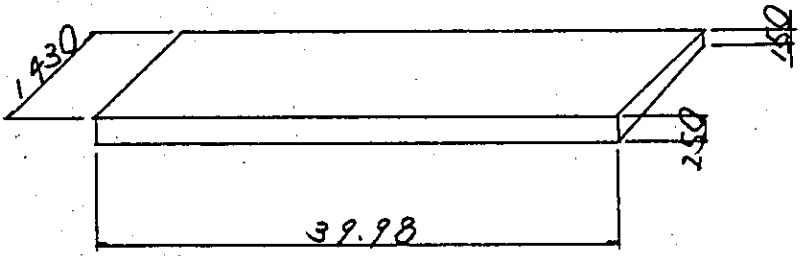
$Vc = 0.382 \times 2$ = 0.764 "

$Vd = 0.387$ = 0.387 "



$Ve = 0.30 \times 0.10 \times 1/2 \times (8.65 + 8.35) \times 1/2 = 0.128\ m^3$

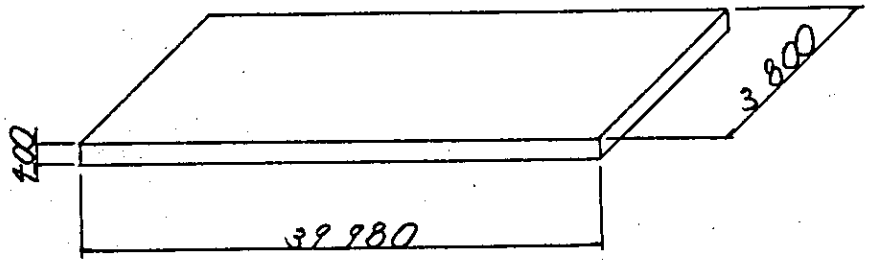
$Vf = 0.30 \times 0.10 \times 1/2 \times (3.80 + 3.50) \times 1/2 = 0.055\ "$



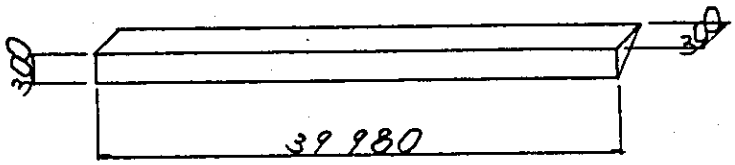
$Vg = 1/2 \times (0.25 + 0.15) \times 1.43 \times 39.98 = 11.434\ "$

SUB TOTAL = $38.256\ m^3$

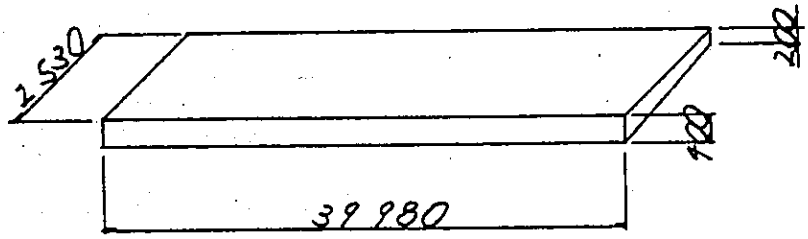
(2) INTERMEDIATE SLAB



$V_a = 39.98 \times 3.80 \times 0.40$ = 60.770 m³



$V_b = 0.30 \times 0.30 \times 1/2 \times 39.98$ = 1.799 "



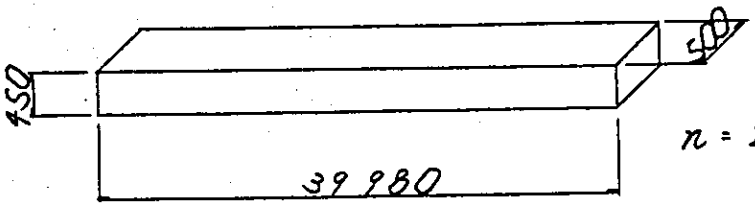
$V_c = 1/2 \times (0.40 + 0.20) \times 2.53 \times 39.98$ = 30.345 "

SUB TOTAL = 92.914 m³

SLAB TOTAL 131.170 m³

(3) UPPER BEAM

1) LONGITUDINAL BEAM

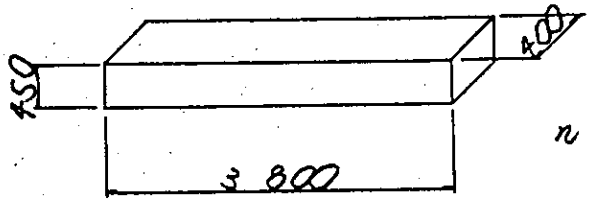


$Va' = 39.98 \times 0.50 \times 0.45 = 8.996\ m^3$

$Va = 8.996 \times 2 = 17.992\ m^3$

SUB TOTAL = $17.992\ m^3$

2) AT END OF VIADUCT TRANSVERSE BEAM

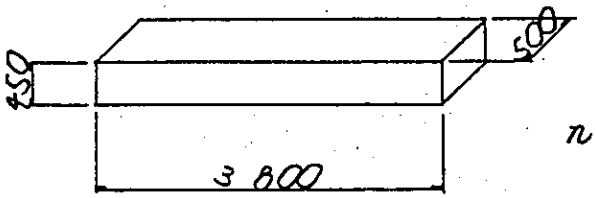


$Va' = 3.80 \times 0.40 \times 0.45 = 0.684\ m^3$

$Va = 0.684 \times 2 = 1.368\ m^3$

SUB TOTAL = $1.368\ m^3$

3) AT INERMEDATE OF VIADUCT TRANSVERSE BEAM



$n = 3$

$Va' = 3.80 \times 0.50 \times 0.45 = 0.855\ m^3$

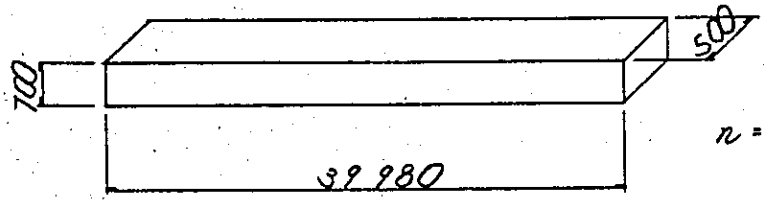
$Va = 0.855 \times 3 = 2.565\ m^3$

SUB TOTAL = $2.565\ m^3$

UPPER BEAM $21.925\ m^3$

(4) INTERMEDIATE BEAM

1) LONGITUDINAL BEAM

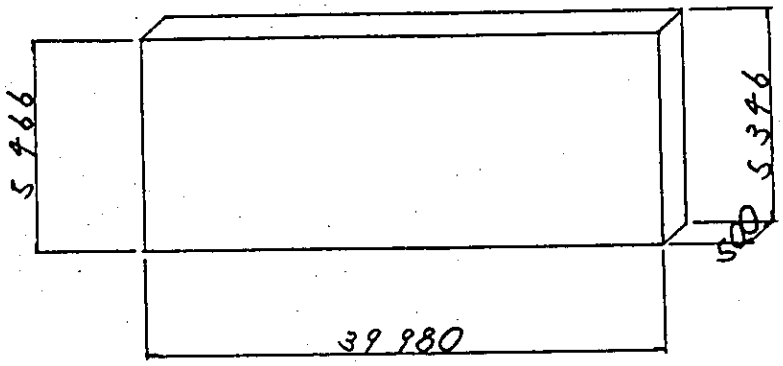


$n = 1$

$Va = 39.98 \times 0.50 \times 0.70$ = 13.993 m^3

13.993 m^3

WALL



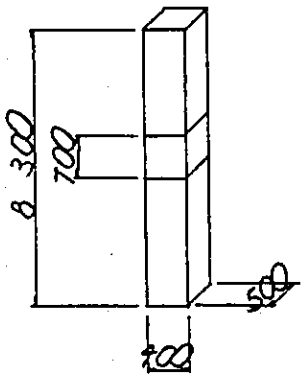
$V_a = 39.98 \times 0.50 \times (5.466 + 5.346) \times 1/2 = 108.066\ m^3$

108.066 m^3

BEAM TOTAL 143.984 m^3

(5) COLUMN

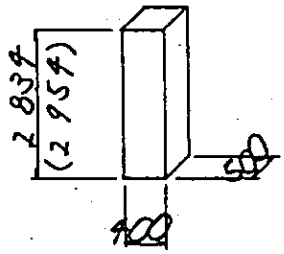
1) AT END OF VIADUCT COLUMN



$n = 2$

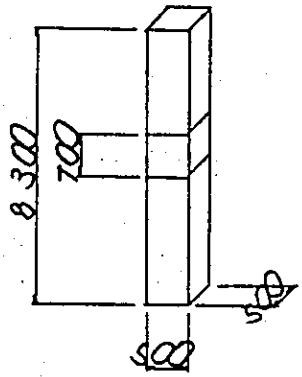
$Va' = 0.40 \times 0.50 \times (8.30 - 0.70) = 1.520\ m^3$

$Va = 1.520 \times 2 = 3.040\ m^3$



$Vb = 0.40 \times 0.50 \times (2.834 + 2.954) = 1.158\ "$

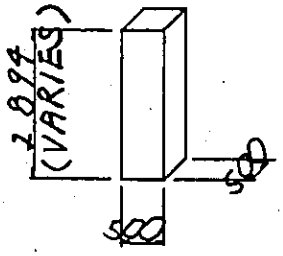
2) AT INTERMEDIATE OF VIADUCT COLUMN



$n = 3$

$Va' = 0.50 \times 0.50 \times (8.30 - 0.70) = 1.900\ m^3$

$Va = 1.900 \times 3 = 5.700\ m^3$



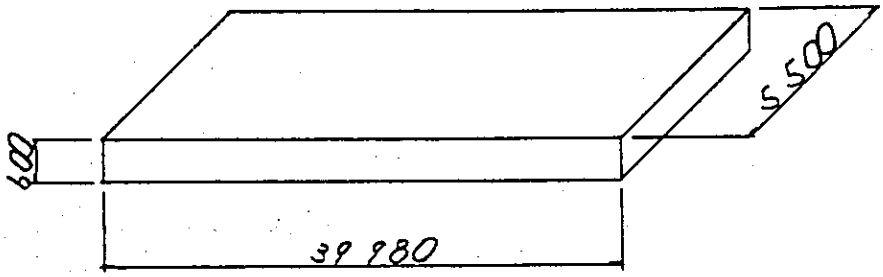
$n = 3$

$Vb' = 0.50 \times 0.50 \times 2.894 = 0.724\ m^2$

$Vb = 0.724 \times 3 = 2.172\ "$

COLUMN TOTAL	$12.070\ m^3$

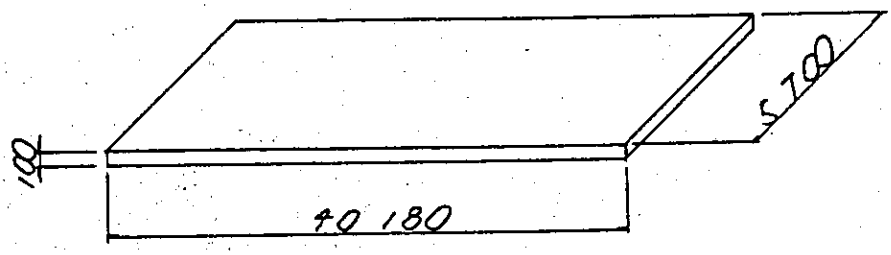
(6) FOOTING



V_a = 39.98 × 5.50 × 0.60 = 131.934 m^3

FOOTING TOTAL 131.934 m^3

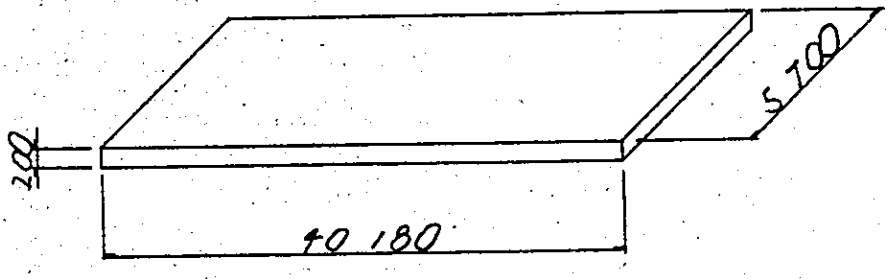
(7) LEVELING CONCRETE



$Va = 40.18 \times 5.70 \times 0.10 = 22.903\ m^3$

LEVELING CONCRETE TOTAL $22.903\ m^3$

(8) AGGREGATE SUB BASE



$Va = 40.18 \times 5.70 \times 0.20 = 45.805\ m^3$

AGGREGATE SUB BASE TOTAL $45.805\ m^3$

(9) PILE

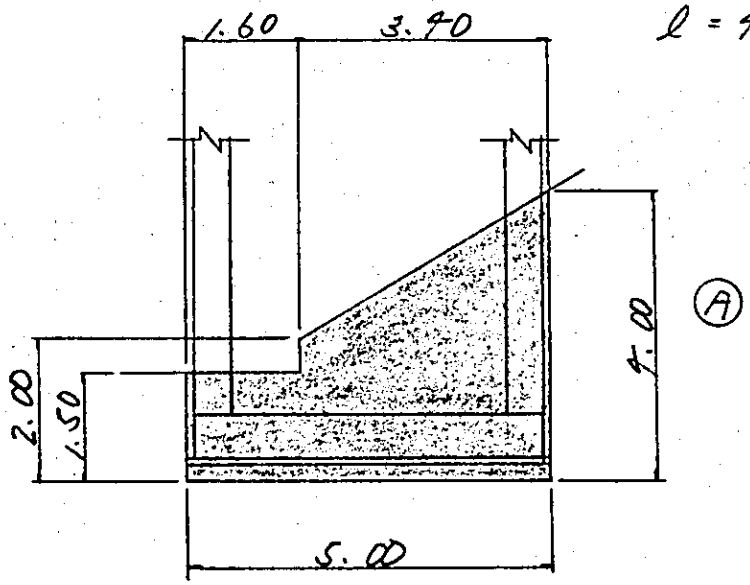
$\phi = 500^{mm}$ $\ell = A - 14.0^{m} \times 96$

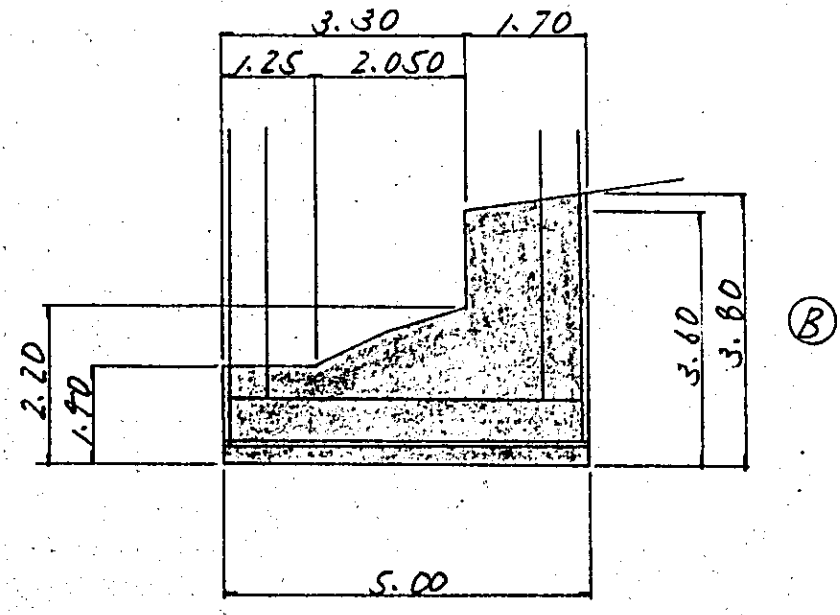
" $\ell = B - 8.0^{m} \times 96$

(10) EXCAVATION

17K310M000 ~ 17K350M000

ℓ = 40.000 m





$A = 1/2 \times (9.00 + 2.00) \times 3.90 + 1.60 \times 1.50$

$= 12.600\ m^2$

$B = 1/2 \times (3.80 + 3.60) \times 1.70 + 1/2 \times (2.00 + 1.90) \times 2.050 + 1.25 \times 1.90$

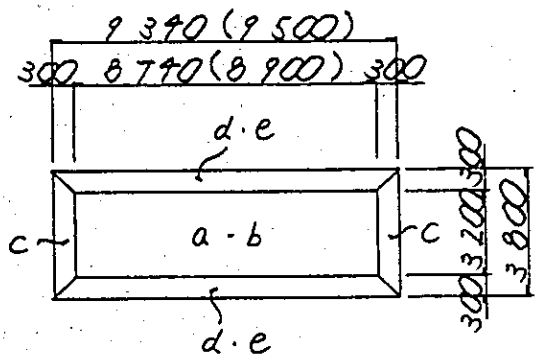
$= 11.525\ m^2$

$V = (12.600 + 11.525) \times 1/2 \times 90.00 = 982.500\ m^3$

EXCAVATION TOTAL = $982.500\ m^3$

FORM AREA

(1) UPPER SLAB



$n = 2$
$(n = 1)$

$Aa' = 8.74 \times 3.20 = 27.968^{m^2}$

$Aa = 27.968 \times 2 = 55.936^{m^2}$

$Ab' = 8.90 \times 3.20 = 28.480^{m^2}$

$Ab = 28.480 = 28.480^{"}$

$Ac' = (3.80 + 3.20) \times 1/2 \times 0.316 = 1.106^{m^2}$

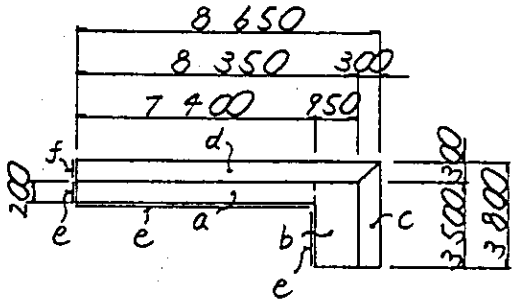
$Ac = 1.106 \times 6 = 6.636^{"}$

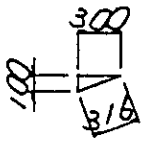
$Ad' = (9.39 + 8.74) \times 1/2 \times 0.316 = 2.857^{m^2}$

$Ad = 2.857 \times 2 \times 2 = 11.428^{"}$

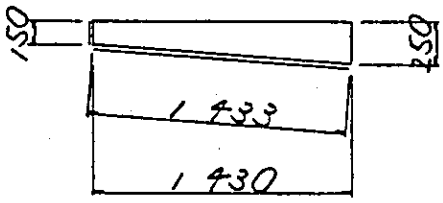
$Ae' = (9.50 + 8.90) \times 1/2 \times 0.316 = 2.907^{m^2}$

$Ae = 2.907 \times 2 = 5.814^{"}$





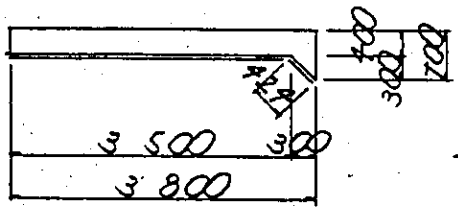
$Aa = 7.40 \times 0.20$	=	1.480^{m^2}
$Ab = 0.95 \times 3.50$	=	$3.325^{"}$
$Ac = (3.80 + 3.50) \times 1/2 \times 0.316$	=	$1.153^{"}$
$Ad = (8.65 + 8.35) \times 1/2 \times 0.316$	=	$2.686^{"}$
$Ae = (0.20 + 7.40 + 3.20) \times 0.15$	=	$1.620^{"}$
$Af = 0.30 \times 0.10 \times 1/2$	=	$0.015^{"}$



$\ell = 39.98^{m}$

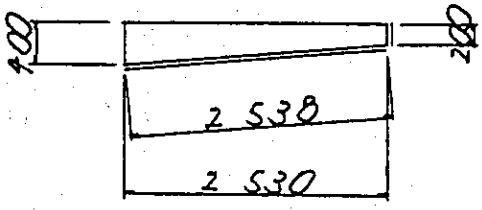
$Aa = (0.25 + 0.15) \times 1/2 \times 1.43 \times 2$	=	$0.572^{"}$
$Ab = (0.15 + 1.433) \times 39.98$	=	$63.288^{"}$
SUB TOTAL =		182.433^{m^2}

(2) INTERMEDIATE SLAB



ℓ = 39.98 m

Aa =	3.80 × 0.40 × 2	=	3.040 m²
Ab =	0.30 × 0.30 × 1/2 × 2	=	0.090 "
Ac =	(3.50 + 0.424) × 39.98	=	156.882 "

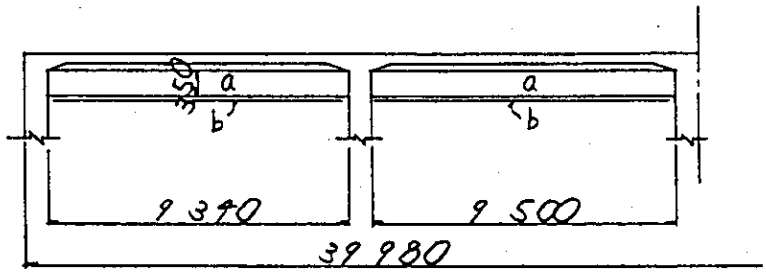


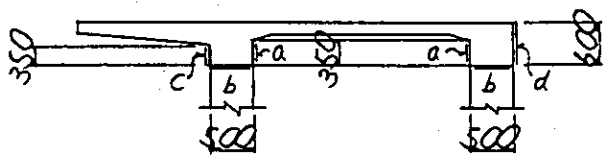
ℓ = 39.98 m

Aa =	(0.40 + 0.20) × 1/2 × 2.53 × 2	=	1.518 "
Ab =	(2.538 + 0.20) × 39.98	=	109.465 "
	SUB TOTAL	=	270.995 m²
	SLAB TOTAL	=	453.428 m²

(3) UPPER BEAM

1) LONGITUDINAL BEAM





$Aa' = (9.34 + 9.50) \times 2 \times 0.35 = 13.188\ m^2$

$Aa = 13.188 \times 2 = 26.376\ m^2$

$Ab' = (9.34 + 9.50) \times 2 \times 0.50 = 18.840\ m^2$

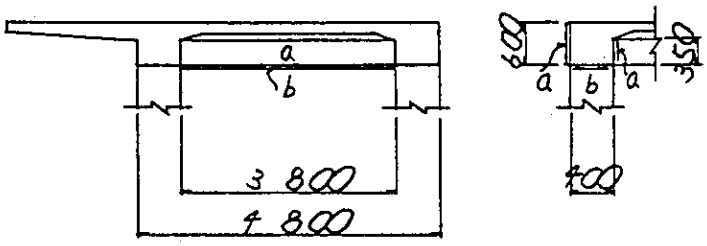
$Ab = 18.840 \times 2 = 37.680\ "$

$Ac = 39.98 \times 0.35 = 13.993\ "$

$Ad = 39.98 \times 0.60 = 23.988\ "$

SUB TOTAL = 102.037 m^2

2) AT END OF VIADUCT TRANSVERSE BEAM



$n = 2$

$Aa' = 4.80 \times 0.60 + 3.80 \times 0.35 = 4.210\ m^2$

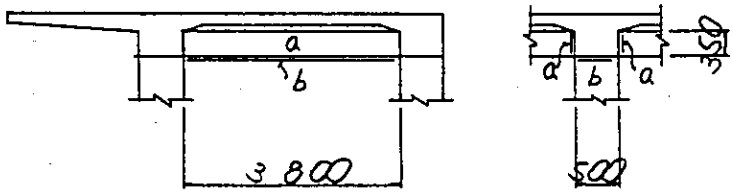
$Aa = 4.210 \times 2 = 8.420\ m^2$

$Ab' = 3.80 \times 0.40 = 1.520\ m^2$

$Ab = 1.520 \times 2 = 3.040\ m^2$

$11.460\ m^2$

3) AT INTERMEDIATE OF VIADUCT TRANSVERE BEAM



$n = 3$

$Aa' = 3.80 \times 0.35 \times 2 = 2.660\ m^2$

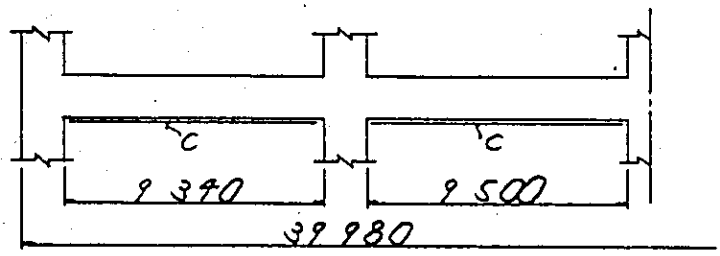
$Aa = 2.660 \times 3 = 7.980\ m^2$

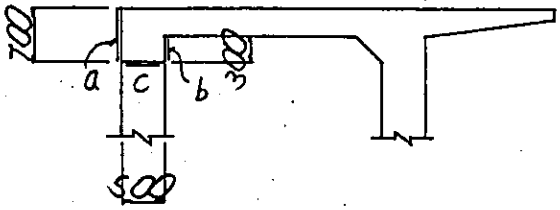
$Ab' = 3.80 \times 0.50 = 1.900\ m^2$

$Ab = 1.900 \times 3 = 5.700\ m^2$

SUB TOTAL = $13.680\ m^2$

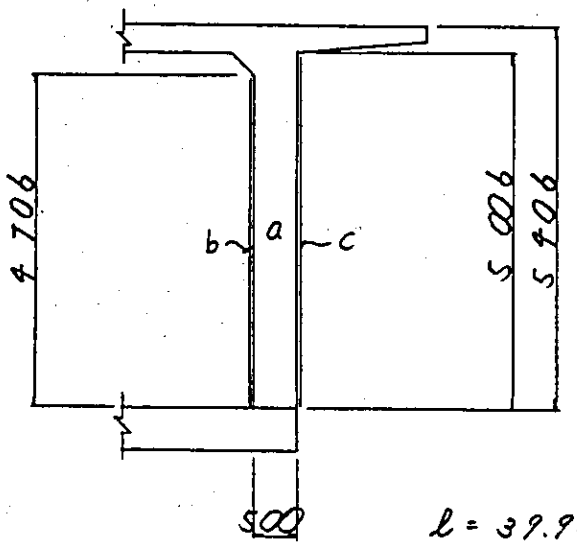
(4) INTERMEDIATE BEAM





$A_a = 39.98 \times 0.70$	=	$27.986\ m^2$
$A_b = 39.98 \times 0.30$	=	$11.994\ "$
$A_c = (9.39 + 9.50) \times 2 \times 0.50$	=	$18.840\ "$
SUB TOTAL	=	$58.820\ m^2$

WALL

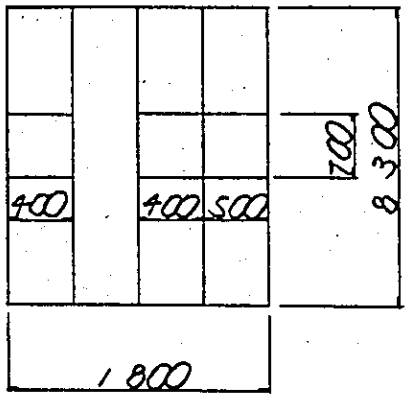


$\ell = 39.98^{m}$

A_a =	0.50 × 5.406 × 2	=	5.406^{m^2}
A_b =	4.706 × 39.98	=	$188.146^{"}$
A_c =	5.006 × 39.98	=	$200.140^{"}$
	SUB TOTAL -		393.692^{m^2}
	BEAM TOTAL -		579.689^{m^2}

(5). COLUMN

1) AT END OF VIADACT COLUMN

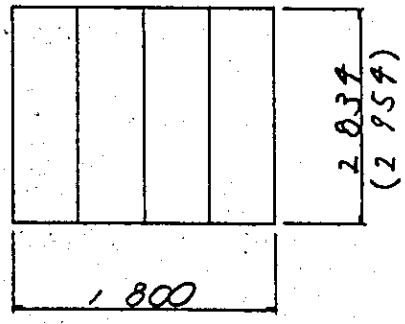


$n = 2$

$Aa' = 1.80 \times 8.30 - (0.40 \times 2 + 0.50) \times 0.70$

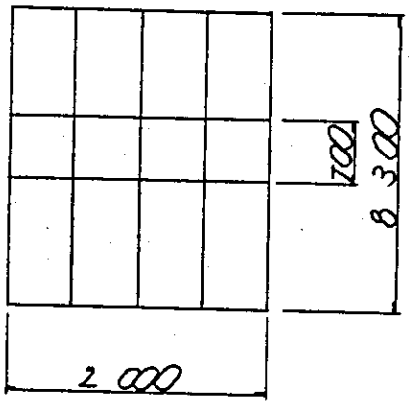
$= 14.030\ m^2$

$Aa = 14.030 \times 2 = 28.060\ m^2$



$Ab = 1.80 \times (2.834 + 2.954) = 10.418\ "$

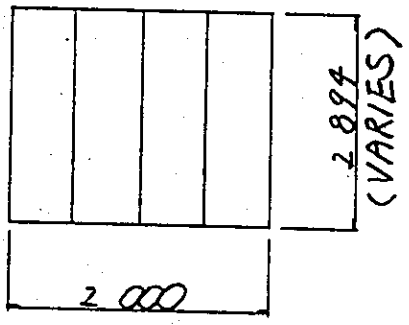
2) AT INTERMEDIATE OF VIADUCT COLUMN



$n = 3$

$Aa' = 2.00 \times (8.30 - 0.70) = 15.200\ m^2$

$Aa = 15.200 \times 3 = 45.600\ m^2$



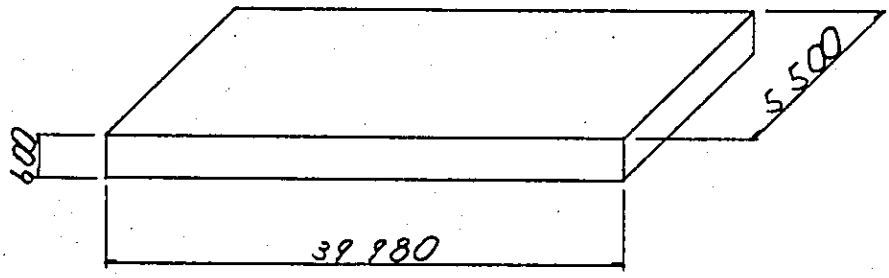
$n = 3$

$Ab' = 2.00 \times 2.894 = 5.788\ m^2$

$Ab = 5.788 \times 3 = 17.364\ m^2$

COLUMN TOTAL	$101.442\ m^2$

(6). FOOTING

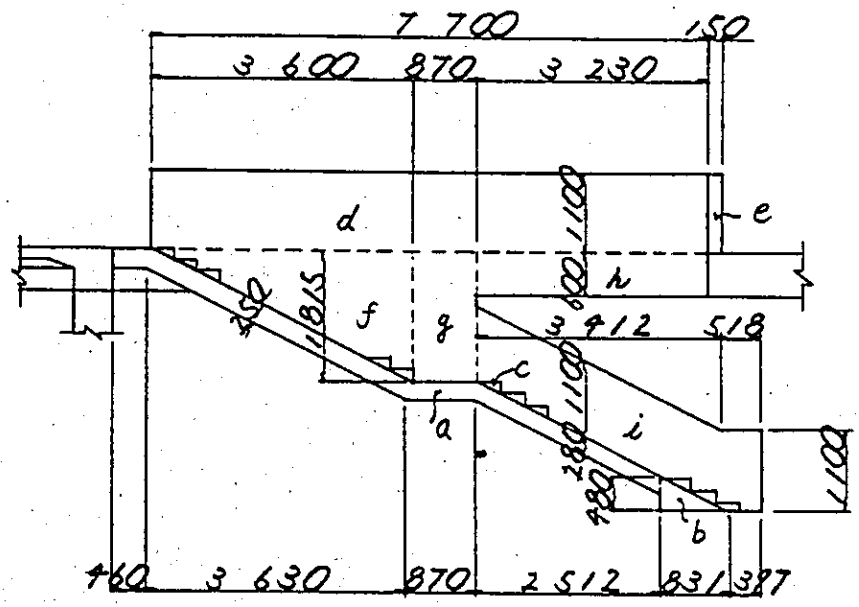


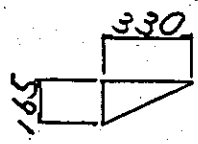
$Ao = (39.98 + 5.50) \times 2 \times 0.60 = 54.576\ m^2$

FOOTING TOTAL $54.576\ m^2$

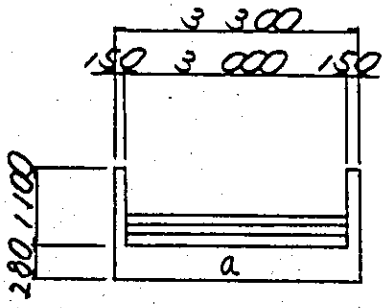
(7). STAIR WAY

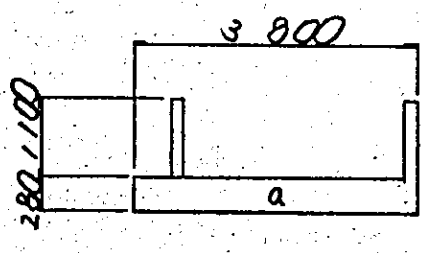
CONCRETE VOLUME





n = 21

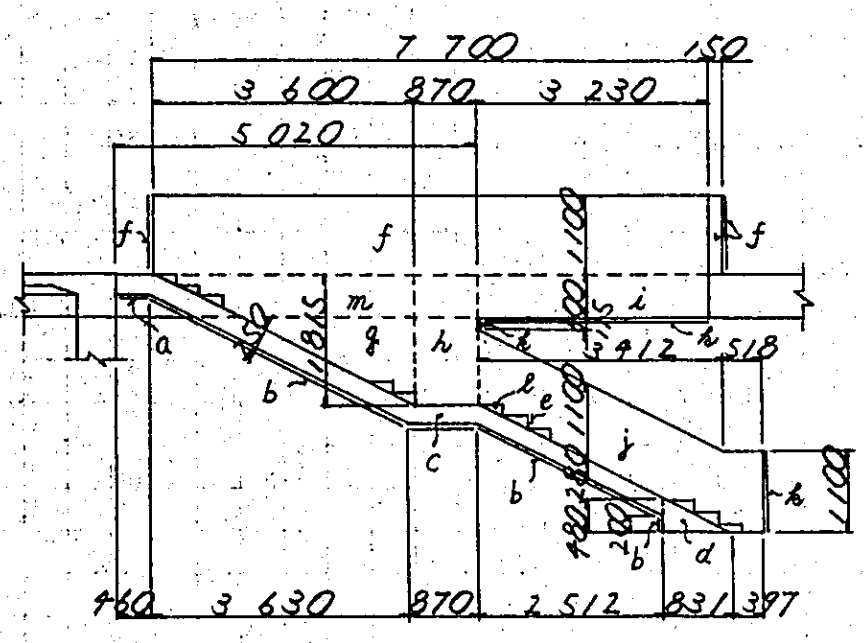


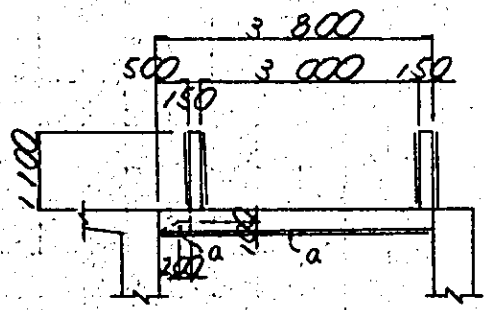


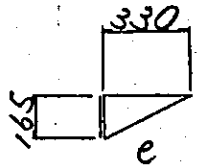
V_a =	$(3.63 + 0.87 + 2.512) \times 0.28 \times 3.30$		
	$+ 0.96 \times 0.28 \times 3.80$	=	$6.969\ m^3$
V_b =	$0.831 \times 0.98 \times 1/2 \times 3.30$	=	0.658 "
V_c =	$0.33 \times 0.165 \times 1/2 \times 21$	=	0.572 "
V_d =	$7.70 \times 1.10 \times 0.15 \times 2$	=	2.541 "
V_e =	$0.15 \times 1.10 \times 3.30$	=	0.545 "
V_f =	$3.60 \times 1.815 \times 1/2 \times 0.15 \times 2$	=	0.980 "
V_g =	$0.87 \times 1.815 \times 0.15 \times 2$	=	0.474 "
V_h =	$3.23 \times 0.60 \times 0.15 \times 2$	=	0.581 "
V_i =	$(3.412 + 0.518) \times 1.10 \times 0.15 \times 2$	=	1.297 "
	TOTAL	=	$19.617\ m^3$

No. 128

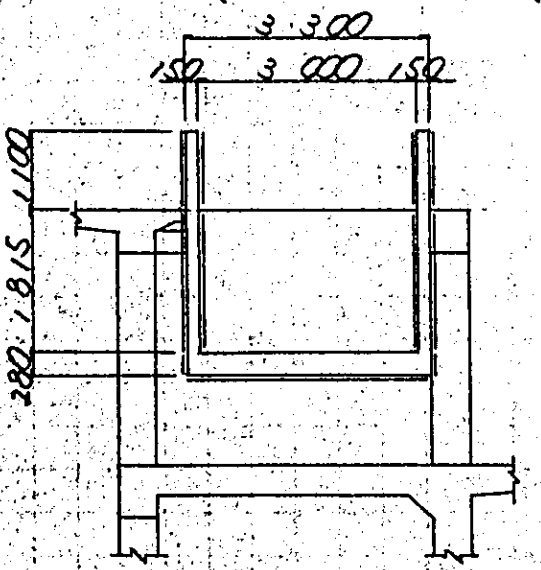
FORM AREA

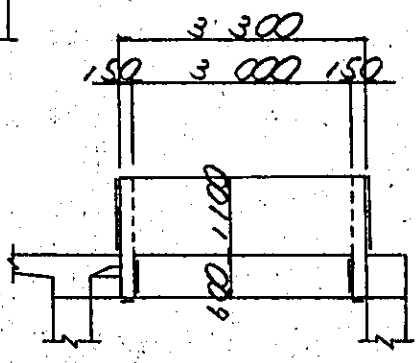






n = 21





JICA

$Aa = 0.46 \times 3.80 + (0.20 + 0.50) \times 1/2 \times 0.10$	=	1.783 m^2
$Ab = (3.63 + 0.87 + 2.512 + 0.20) \times 3.30$	=	23.800 "
$Ac = (0.46 + 3.63 + 0.87 + 2.512) \times 0.28 \times 2$	=	4.184 "
$Ad = 0.831 \times 0.48 \times 1/2 \times 2$	=	0.399 "
$Ae = 0.165 \times 3.00 \times 21$	=	10.395 "
$Af = \{(7.70 + 0.15) \times 4 + 3.00 + 3.30\} \times 1.10$	=	41.470 "
$Ag = 3.60 \times 1.815 \times 1/2 \times 2 \times 2$	=	13.068 "
$Ah = 0.87 \times 1.815 \times 2 \times 2$	=	6.316 "
$Ai = 3.23 \times 0.60 \times 2$	=	3.876 "
$Aj = (3.412 + 0.518) \times 1.10 \times 2 \times 2$	=	17.292 "
$Ak = (3.23 + 0.115 + 1.10) \times 0.15 \times 2$	=	1.334 "
$Al = -0.33 \times 0.165 \times 1/2 \times 21 \times 2$	=	-1.143 "
$Am = -5.02 \times 0.60$	=	-3.012 "
TOTAL	=	119.762 m^2

VIADUCT (VP6)

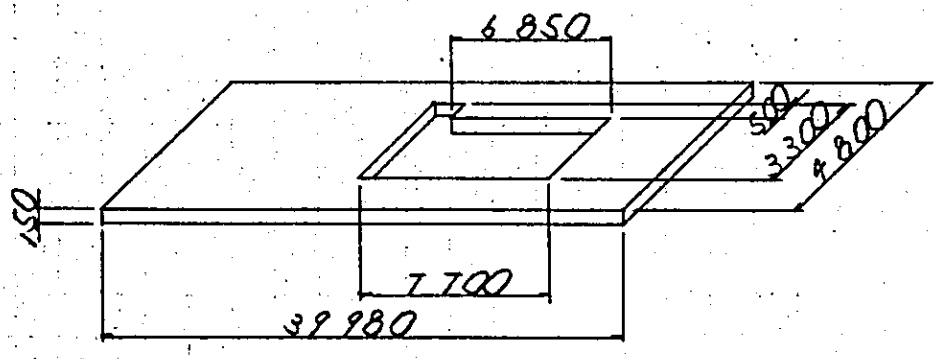
	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	131.2	453.4	10 351.7	78.9
BEAM	139.8	562.7	22 661.6	162.1
COLUMN	12.3	103.5	4 075.0	331.3
CURB	———	———	———	———
STAIRWAY	15.0	122.9	1 695.0	113.0
TOTAL	298.3	1 242.5	38 783.3	130.0
FOOTING	131.9	54.6	11 462.1	86.9
BRACING BEAM	———	———	———	———
TOTAL	131.9	54.6	11 462.1	86.9

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	22.9	CLASS F
AGGREGATE SUB BASE	m^3	45.8	A.S.B.-3
EXCAVATION	m^3	484.3	
FOUNDATION MORTAR	———	———	f'_{ck} = 400 kg/cm²
PILE	EACH	φ500 N=A-96 N=B-96	φ500 ℓ=A-14.0m 〃 ℓ=B-8.0m

VP6

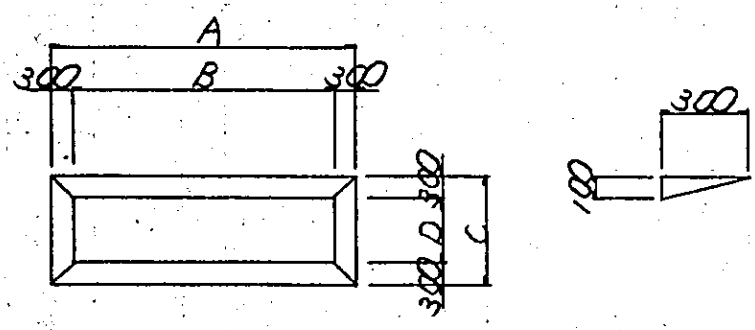
CONCRETE VOLUME

(1). UPPER SLAB



$Va = 39.98 \times 4.80 \times 0.15$ = 28.786 m³

$-Vb = (7.70 \times 3.30 - 6.85 \times 0.50) \times 0.15$ = -3.298 "

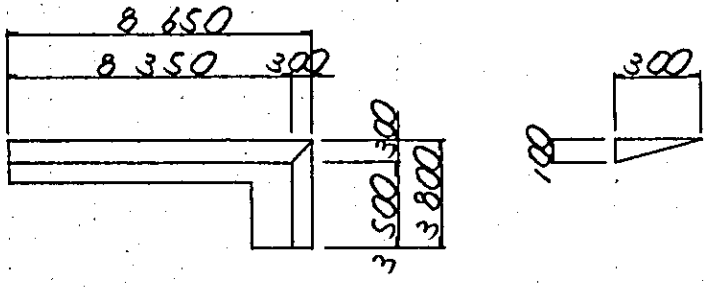


	A	B	C	D	
Vc' =	9 340	8 740	3 800	3 200	n = 2
Vd' =	9 500	8 900	〃	〃	n = 1

$V = [A \times C - \{A \times C + (A+B) \times (C+D) + B \times D\} \times 1/6] \times h$

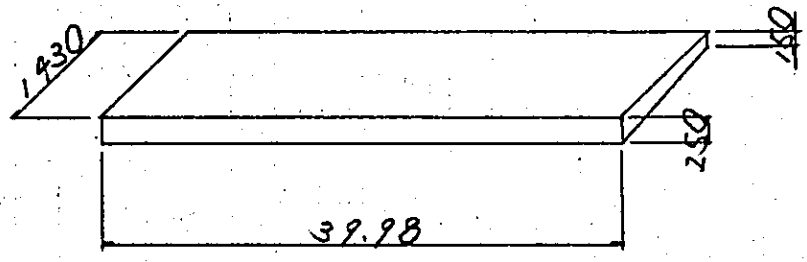
$Vc = 0.382 \times 2$ = 0.764 "

$Vd = 0.387$ = 0.387 "



$Ve = 0.30 \times 0.10 \times 1/2 \times (8.65 + 8.35) \times 1/2 = 0.128\ m^3$

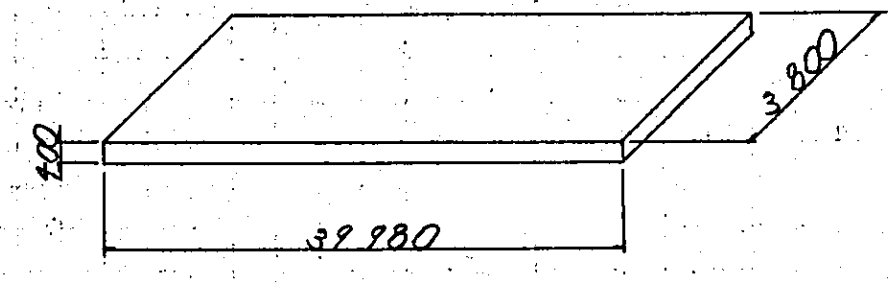
$Vf = 0.30 \times 0.10 \times 1/2 \times (3.80 + 3.50) \times 1/2 = 0.055\ "$



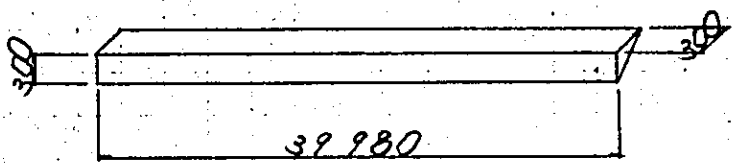
$Vg = 1/2 \times (0.25 + 0.15) \times 1.43 \times 39.98 = 11.434\ "$

SUB TOTAL = $38.256\ m^3$

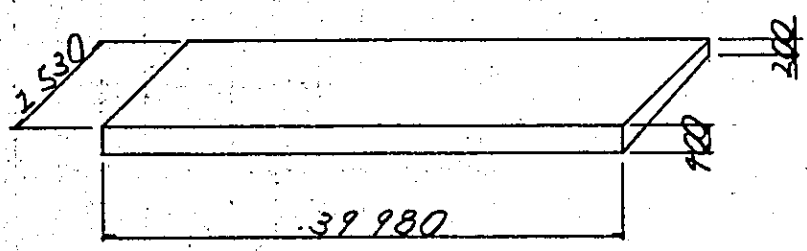
(2) INTERMEDIATE SLAB



$V_a = 39.98 \times 3.80 \times 0.40$ = 60.770 m^3



$V_b = 0.30 \times 0.30 \times 1/2 \times 39.98$ = 1.799 "



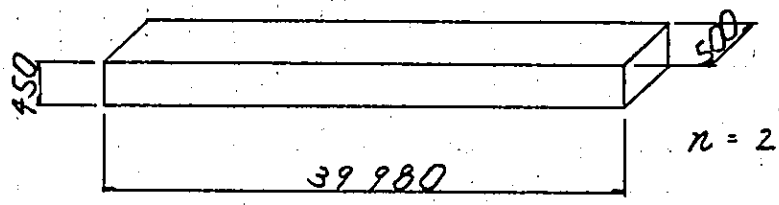
$V_c = 1/2 \times (0.40 + 0.20) \times 2.53 \times 39.98$ = 30.345 "

SUB TOTAL = 92.914 m^3

SLAB TOTAL 131.170 m^3

(3) UPPER BEAM

1) LONGITUDINAL BEAM

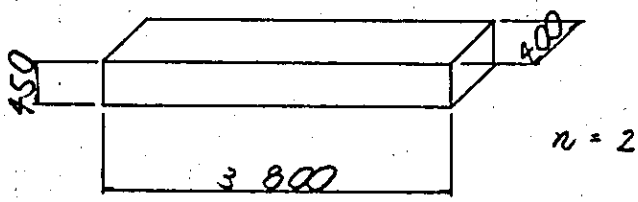


$Vá = 39.98 \times 0.50 \times 0.45 = 8.996\ m^3$

$Va = 8.996 \times 2 = 17.992\ m^3$

$17.992\ m^3$

2) ATEND OF VIADUCT TRANSVERSE BEAM

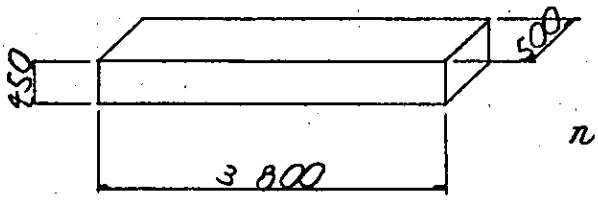


$Va' = 3.80 \times 0.40 \times 0.45 = 0.684\ m^3$

$Va = 0.684 \times 2 = 1.368\ m^3$

$1.368\ m^3$

3) ATINERMEDATE OF VIADUCT TRANSVERSE BEAM



$n = 3$

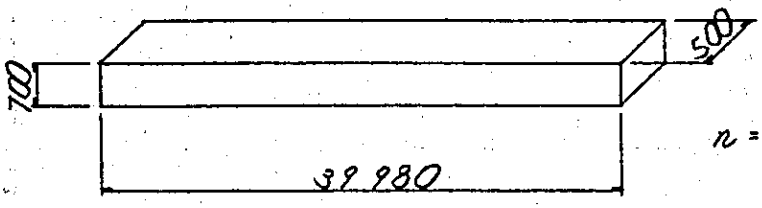
$Va' = 3.80 \times 0.50 \times 0.45 = 0.855\ m^3$

$Va = 0.855 \times 3 = 2.565\ m^3$

$2.565\ m^3$

(4) INTERMEDIATE SLAB

1) LONGITUDINAL BEAM

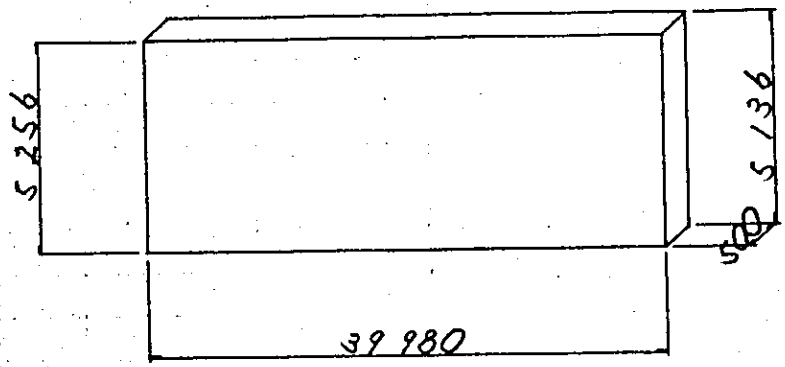


n = 1

$Va = 39.98 \times 0.50 \times 0.70$ = 13.993 m^3

13.993 m^3

WALL



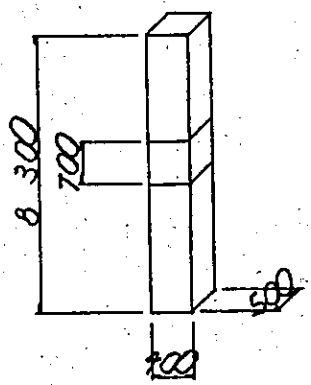
V_a = 39.98 × 0.50 × (5.256 + 5.136) × ½ = 103.868 m³

103.868 m³

BEAM TOTAL 139.786 m³

(5). COLUMN

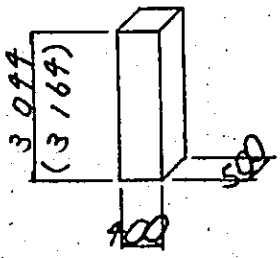
1) AT END OF VIADUCT COLUMN



$n = 2$

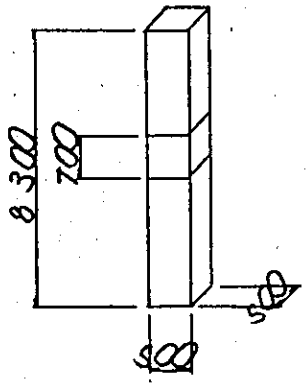
$Va' = 0.40 \times 0.50 \times (8.30 - 0.70) = 1.520^{m^3}$

$Va = 1.520 \times 2 = 3.040^{m^3}$



$Vb = 0.40 \times 0.50 \times (3.044 + 3.164) = 1.242^{"}$

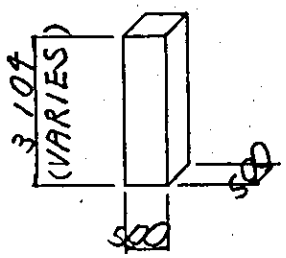
2) AT INTERMEDIATE OF VIADUCT COLUMN



$n = 3$

$Va' = 0.50 \times 0.50 \times (8.30 - 0.70) = 1.900\ m^3$

$Va = 1.900 \times 3 = 5.700\ m^3$



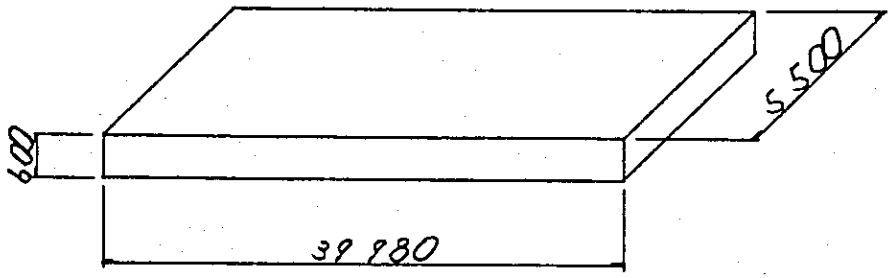
$n = 3$

$Vb' = 0.50 \times 0.50 \times 3.104 = 0.776\ m^2$

$Vb = 0.776 \times 3 = 2.328\ "$

COLUMN TOTAL	$12.310\ m^3$

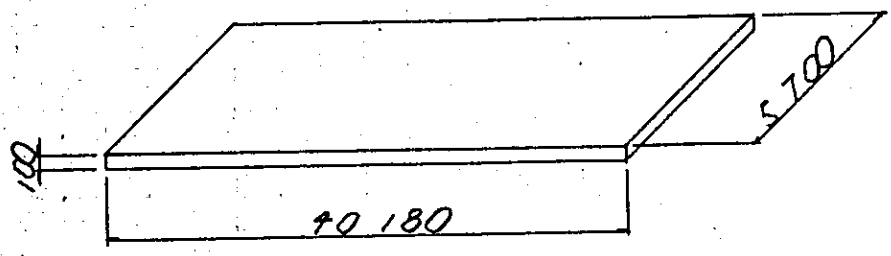
(6) FOOTING



V_a = 39.98 × 5.50 × 0.60 = 131.934 m^3

FOOTING TOTAL 131.934 m^3

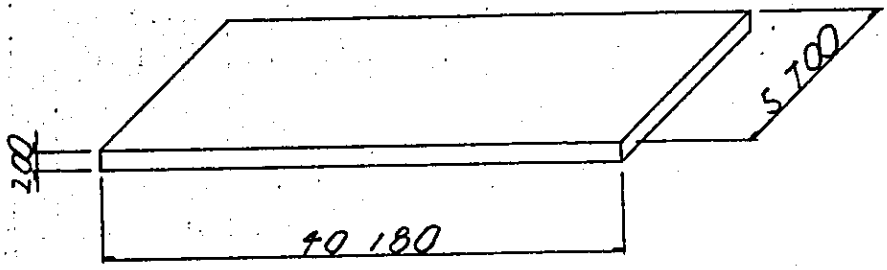
(7) LEVELING CONCRETE



$Va = 40.18 \times 5.70 \times 0.10 = 22.903\ m^3$

LEVELING CONCRETE TOTAL $22.903\ m^3$

(8) AGGREGATE SUB BASE



$Va = 40.18 \times 5.70 \times 0.20 = 45.805\ m^3$

AGGREGATE SUB BASE TOTAL $45.805\ m^3$

(9). PILE

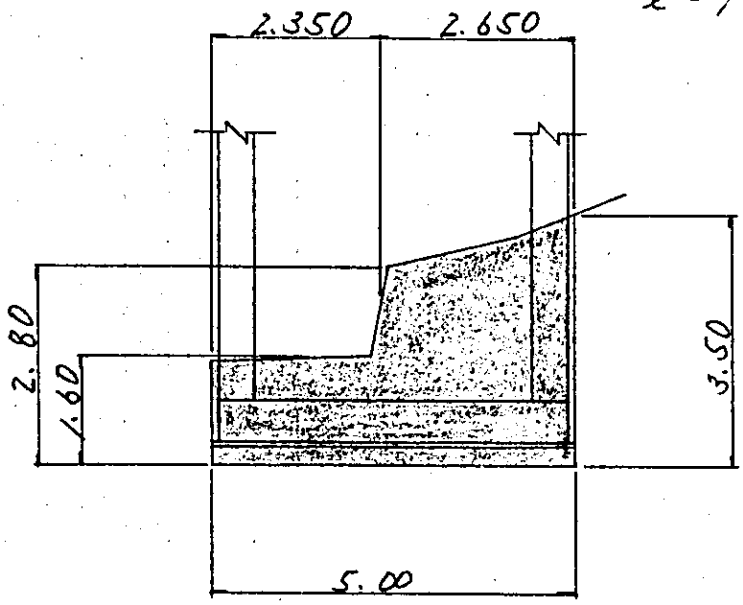
$\phi = 500^{mm}$ $\ell = A - 14.0^{m} \times 96$

" $\ell = B - 8.0^{m} \times 96$

(10) EXCAVATION

17K 380M 000 ~ 17K 420M 000

ℓ = 40.000 m



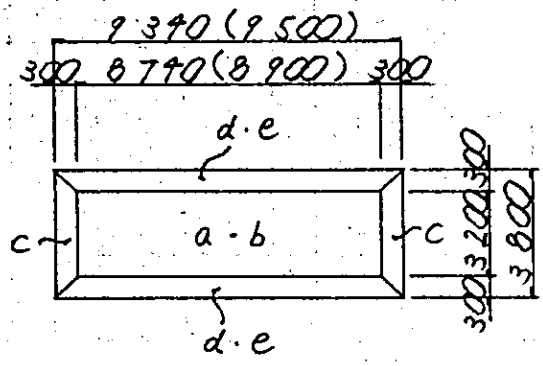
$V = \{1/2 \times (3.50 + 2.80) \times 2.650 + 2.350 \times 1.60\}$

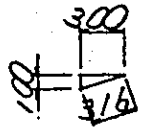
$\times$ 40.00 = 484.300 m³

EXCAVATION TOTAL = 484.300 m³

FORM AREA

(1) UPPER SLAB





$n = 2$

$(n = 1)$

$Aa' = 8.74 \times 3.20 = 27.968\ m^2$

$Aa = 27.968 \times 2 = 55.936\ m^2$

$Ab' = 8.90 \times 3.20 = 28.480\ m^2$

$Ab = 28.480 = 28.480\ "$

$Ac' = (3.80 + 3.20) \times 1/2 \times 0.316 = 1.106\ m^2$

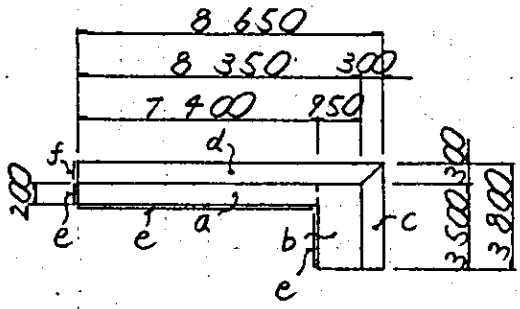
$Ac = 1.106 \times 6 = 6.636\ "$

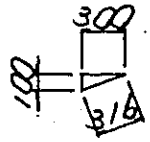
$Ad' = (9.34 + 8.74) \times 1/2 \times 0.316 = 2.857\ m^2$

$Ad = 2.857 \times 2 \times 2 = 11.428\ "$

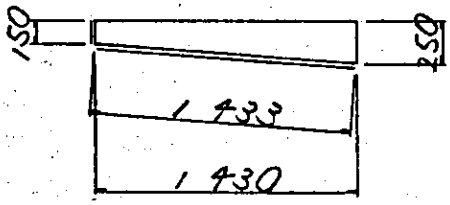
$Ae' = (9.50 + 8.90) \times 1/2 \times 0.316 = 2.907\ m^2$

$Ae = 2.907 \times 2 = 5.814\ "$





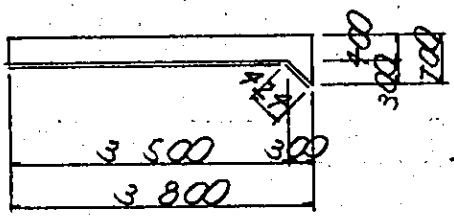
$Aa = 7.40 \times 0.20$	=	$1.480\ m^2$
$Ab = 0.95 \times 3.50$	=	$3.325\ "$
$Ac = (3.80 + 3.50) \times 1/2 \times 0.316$	=	$1.153\ "$
$Ad = (8.65 + 8.35) \times 1/2 \times 0.316$	=	$2.686\ "$
$Ae = (0.20 + 7.40 + 3.20) \times 0.15$	=	$1.620\ "$
$Af = 0.30 \times 0.10 \times 1/2$	=	$0.015\ "$



$\ell = 39.98\ m$

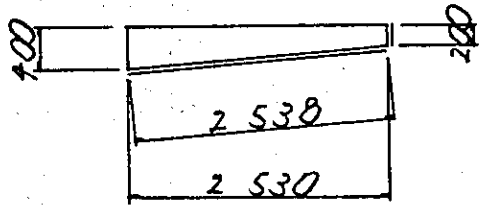
$Aa = (0.25 + 0.15) \times 1/2 \times 1.43 \times 2$	=	$0.572\ "$
$Ab = (0.15 + 1.433) \times 39.98$	=	$63.288\ "$
SUB TOTAL	=	$182.433\ m^2$

(2) INTERMEDIATE SLAB



$\ell = 39.98^{m}$

$Aa = 3.80 \times 0.90 \times 2$	=	3.040^{m^2}
$Ab = 0.30 \times 0.30 \times 1/2 \times 2$	=	$0.090^{"}$
$Ac = (3.50 + 0.424) \times 39.98$	=	$156.882^{"}$

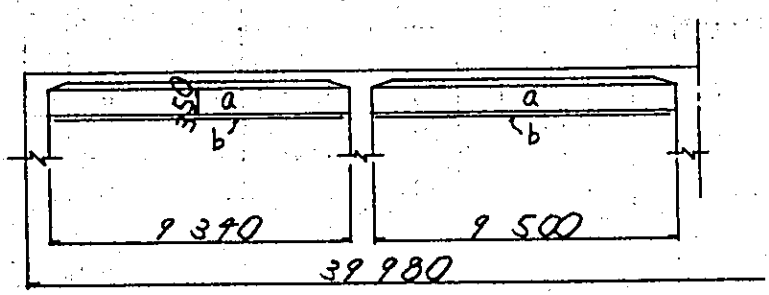


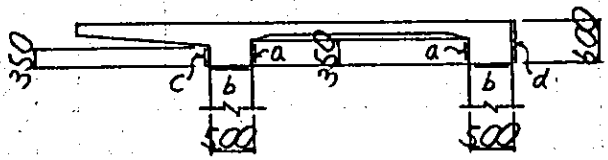
$\ell = 39.98^{m}$

$Aa = (0.90 + 0.20) \times 1/2 \times 2.53 \times 2$	=	$1.518^{"}$
$Ab = (2.538 + 0.20) \times 39.98$	=	$109.465^{"}$
SUB TOTAL	=	270.995^{m^2}
SLAB TOTAL		453.428^{m^2}

(3) UPPER BEAM

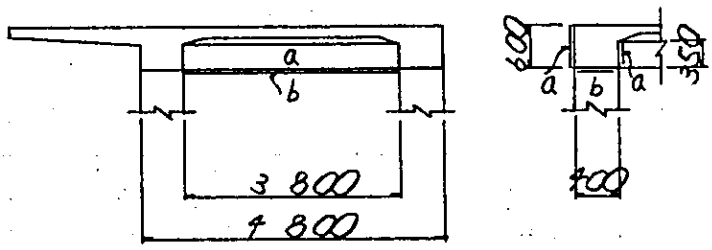
1) LONGLTUDINAL BEAM





$Aa' = (9.34 + 9.50) \times 2 \times 0.35$	$= 13.188^{m^2}$	
$Aa = 13.188 \times 2$		$= 26.376^{m^2}$
$Ab' = (9.34 + 9.50) \times 2 \times 0.50$	$= 18.840^{m^2}$	
$Ab = 18.840 \times 2$		$= 37.680^{"}$
$Ac = 39.98 \times 0.35$		$= 13.993^{"}$
$Ad = 39.98 \times 0.60$		$= 23.988^{"}$
SUB TOTAL		$= 102.037^{m^2}$

2) AT END OF VIADUCT TRANSVERSE BEAM



$n = 2$

$Aa' = 4.80 \times 0.60 + 3.80 \times 0.35 = 4.210\ m^2$

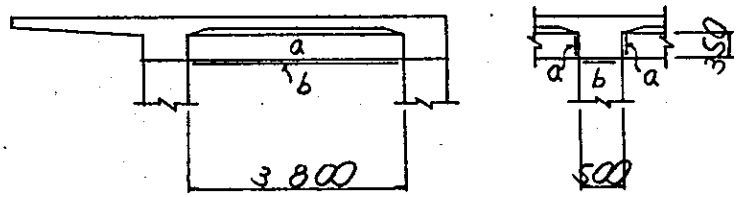
$Aa = 4.210 \times 2 = 8.420\ m^2$

$Ab' = 3.80 \times 0.40 = 1.520\ m^2$

$Ab = 1.520 \times 2 = 3.040\ m^2$

SUB TOTAL = $11.460\ m^2$

3) AT INTERMEDIATE OF VIADUCT TRANSVERE BEAM



$n = 3$

$Aa' = 3.80 \times 0.35 \times 2 = 2.660\ m^2$

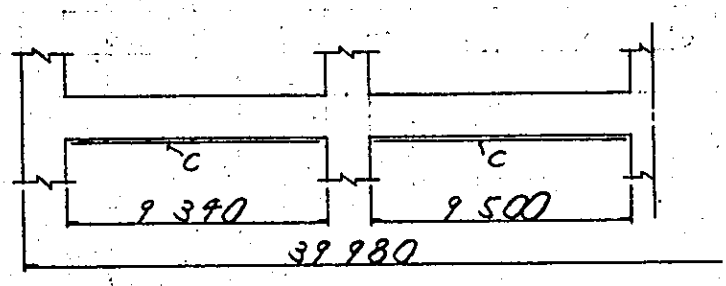
$Aa = 2.660 \times 3 = 7.980\ m^2$

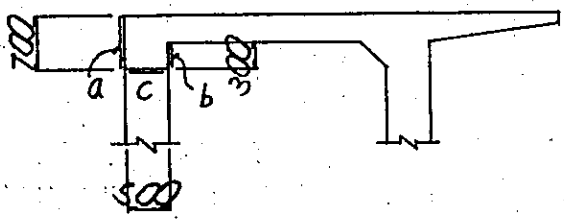
$Ab' = 3.80 \times 0.50 = 1.900\ m^2$

$Ab = 1.900 \times 3 = 5.700\ m^2$

SUB TOTAL = $13.680\ m^2$

(4) INTERMEDIATE BEAM

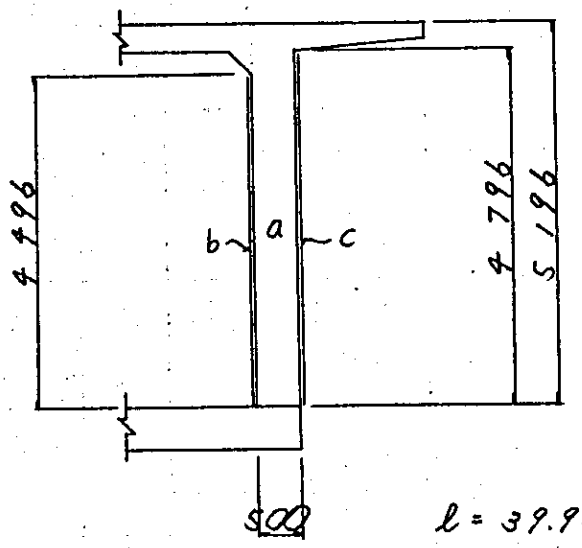




A_a = 39.98 × 0.70	=	27.986 m^2
A_b = 39.98 × 0.30	=	11.994 "
A_c = (9.34 + 9.50) × 2 × 0.50	=	18.840 "
SUB TOTHL	=	58.820 m^2

No. 199

WALL

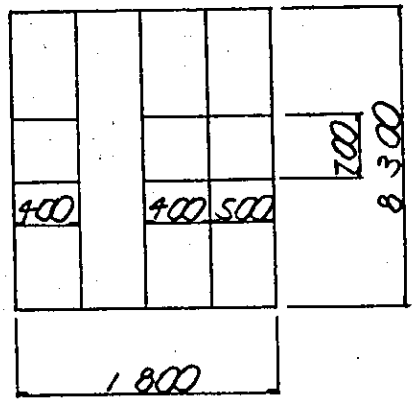


$\ell = 39.98^{m}$

Aa = 0.50 × 5.196 × 2	=	5.196^{m^2}
Ab = 4.496 × 39.98	=	$179.750^{"}$
Ac = 4.796 × 39.98	=	$191.744^{"}$
SUB TOTAL	=	376.690^{m^2}
BEAM TOTAL		562.687^{m^2}

(5) COLUMN

1) AT END OF VIADACT COLUMN

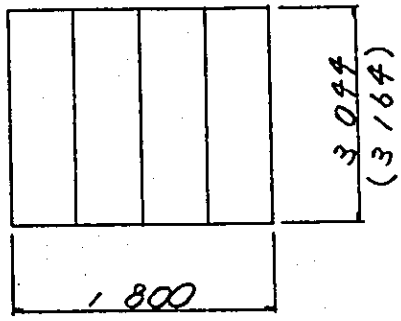


$n = 2$

$Ad' = 1.80 \times 8.30 - (0.40 \times 2 + 0.50) \times 0.70$

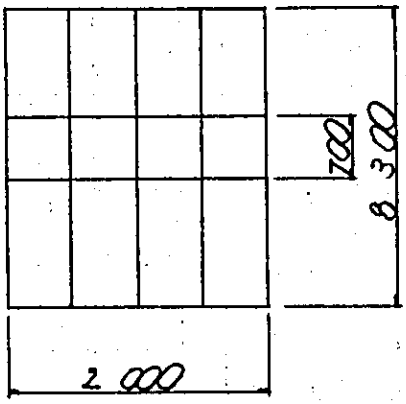
$= 14.030\ m^2$

$Aa = 14.030 \times 2 = 28.060\ m^2$



$Ab = 1.80 \times (3.044 + 3.164) = 11.174\ "$

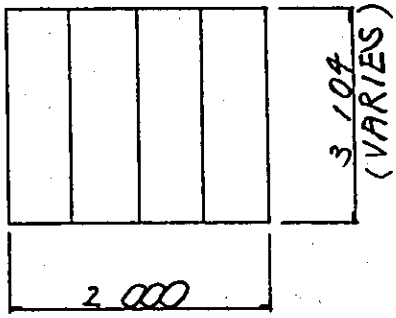
2) AT INTERMEDIATE OF VIADUCT COLUMN



$n = 3$

$Aa' = 2.00 \times (8.30 - 0.70) = 15.200\ m^2$

$Aa = 15.200 \times 3 = 45.600\ m^2$



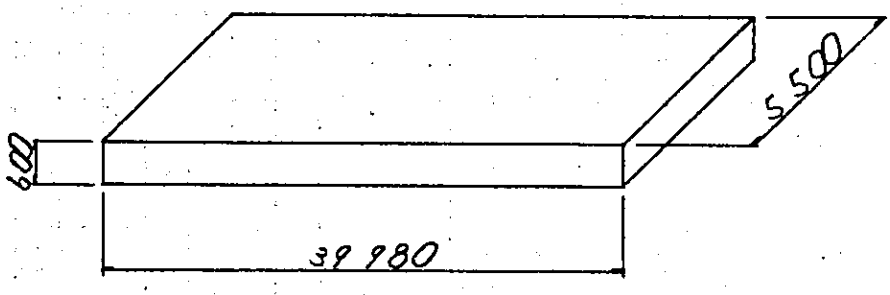
$n = 3$

$Ab' = 2.00 \times 3.104 = 6.208\ m^2$

$Ab = 6.208 \times 3 = 18.624\ "$

COLUMN TOTAL	$103.458\ m^2$

(6). FOOTING

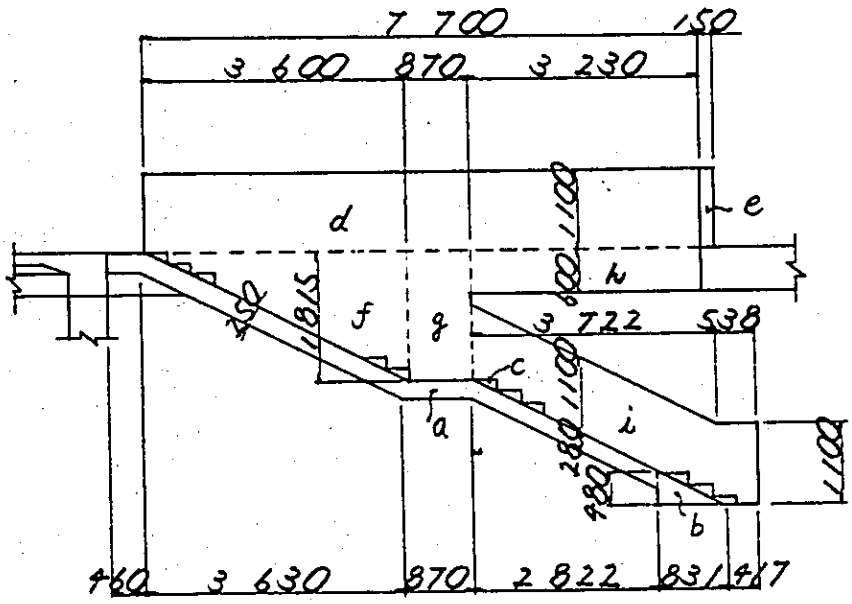


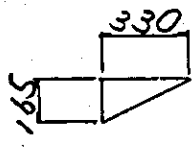
$Ao = (39.98 + 5.50) \times 2 \times 0.60 = 54.576\ m^2$

FOOTING TOTAL 54.576 m^2

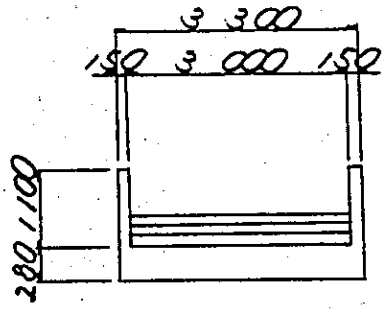
(7) STAIR WAY

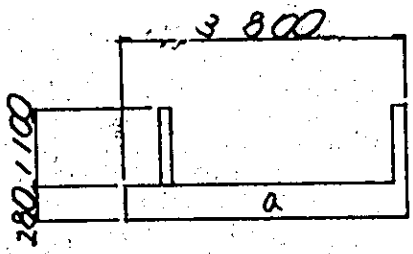
CONCRETE VOLUME





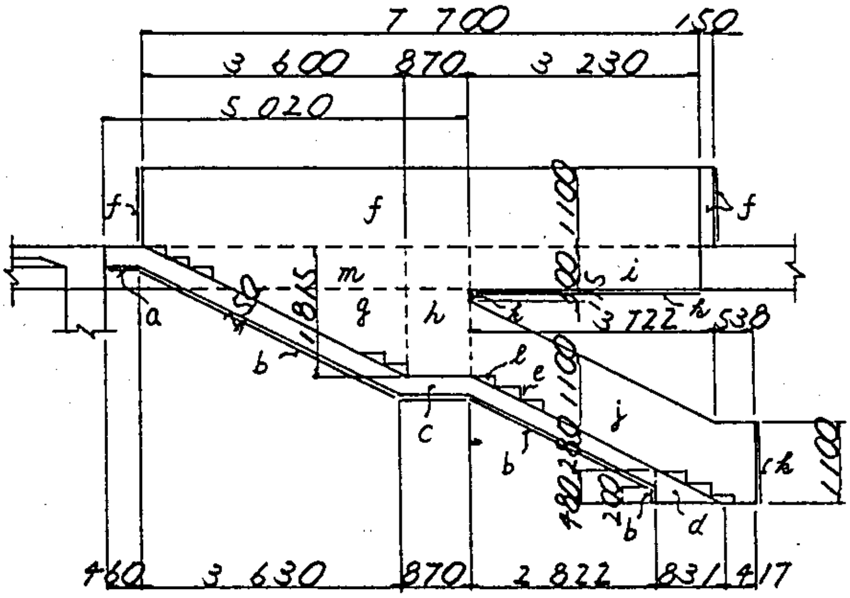
$n = 22$

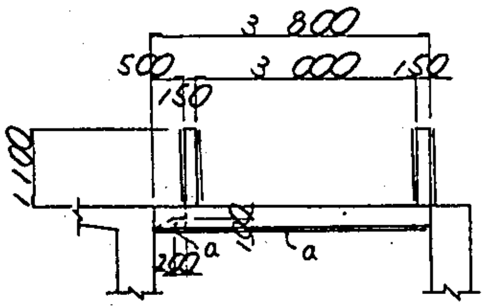


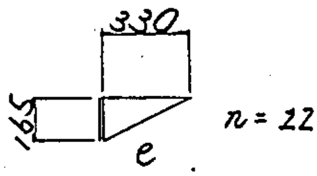


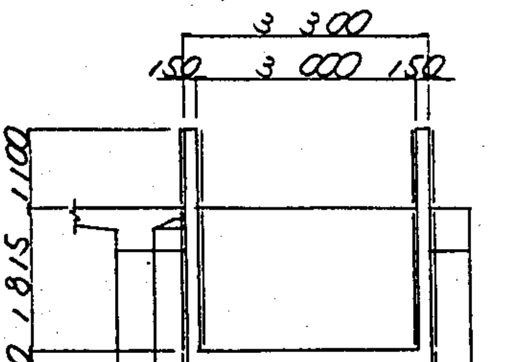
V_a =	$(3.63 + 0.87 + 2.822) \times 0.28 \times 3.30$	
	$+ 0.46 \times 0.28 \times 3.80$	= 7.255 m³
V_b =	$0.831 \times 0.48 \times 1/2 \times 3.30$	= 0.658 "
V_c =	$0.33 \times 0.165 \times 1/2 \times 22$	= 0.599 "
V_d =	$7.70 \times 1.10 \times 0.15 \times 2$	= 2.541 "
V_e =	$0.15 \times 1.10 \times 3.30$	= 0.545 "
V_f =	$3.60 \times 1.815 \times 1/2 \times 0.15 \times 2$	= 0.980 "
V_g =	$0.87 \times 1.815 \times 0.15 \times 2$	= 0.474 "
V_h =	$3.23 \times 0.60 \times 0.15 \times 2$	= 0.581 "
V_i =	$(3.722 + 0.538) \times 1.10 \times 0.15 \times 2$	= 1.406 "
	TOTAL	= 15.039 m³

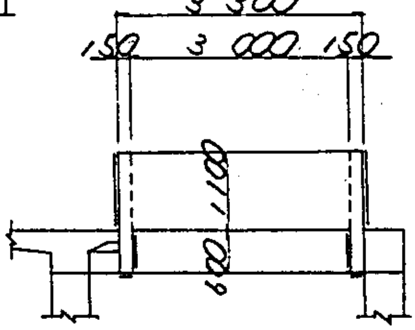
FORM AREA


7 700
150
3 600
870
3 230
5 020
1 100
1 815
3 722
538
1 100
460
3 630
870
2 822
831
417


3 800
500
3 000
150
150
1 100
200


330
165
e
n = 22


3 300
150
3 000
150
1 100
1 815
280


3 300
150
3 000
150
1 100
600

Aa =	$0.46 \times 3.80 + (0.20 + 0.50) \times 1/2 \times 0.10$	= 1.783 m^2
Ab =	$(3.63 + 0.87 + 2.822 + 0.20) \times 3.30$	= 24.823 "
Ac =	$(0.46 + 3.63 + 0.87 + 2.822) \times 0.28 \times 2$	= 4.358 "
Ad =	$0.831 \times 0.48 \times 1/2 \times 2$	= 0.399 "
Ae =	$0.165 \times 3.00 \times 22$	= 10.890 "
Af =	$\{(7.70 + 0.15) \times 4 + 3.00 + 3.30\} \times 1.10$	= 41.470 "
Ag =	$3.60 \times 1.815 \times 1/2 \times 2 \times 2$	= 13.068 "
Ah =	$0.87 \times 1.815 \times 2 \times 2$	= 6.316 "
Ai =	$3.23 \times 0.60 \times 2$	= 3.876 "
Aj =	$(3.722 + 0.538) \times 1.10 \times 2 \times 2$	= 18.744 "
Ak =	$(3.23 + 0.115 + 1.10) \times 0.15 \times 2$	= 1.334 "
Al =	$-0.33 \times 0.165 \times 1/2 \times 22 \times 2$	= -1.198 "
Am =	-5.02×0.60	= -3.012 "
	TOTAL	= 122.85 m^2

VIADUCT (VP7)

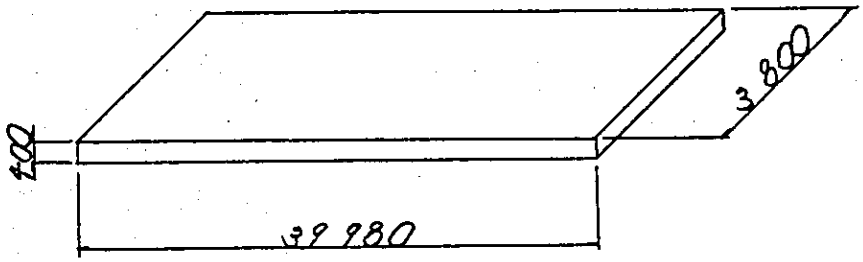
	CONCRETE VOLUME (m^3)	FORM AREA (m^2)	REINFORCING BAR (kg)	RATIO (kg/m^3)
SLAB	92.9	271.0	8 574.7	92.3
BEAM	122.1	453.2	13 846.1	113.4
COLUMN	5.4	45.2	1 789.0	331.3
CURB	———	———	———	———
STAIRWAY	———	———	———	———
TOTAL	220.4	769.4	24 209.8	109.8
FOOTING	131.9	54.6	11 462.1	86.9
BRACING BEAM	———	———	———	———
TOTAL	131.9	54.6	11 462.1	86.9

	UNIT	QUANTITY	REMARKS
LEVELING CONCRETE	m^3	22.9	CLASS F
AGGREGATE SUB BASE	m^3	45.8	A.S.B.-3
EXCAVATION	m^3	550.6	
FOUNDATION MORTAR	———	———	$\sigma_{CK} = 400\ kg/cm^2$
PILE	EACH	ϕ=500 N=A-96 N=B-96	ϕ500 ℓ=A-19.0m 〃 ℓ=B-8.0m

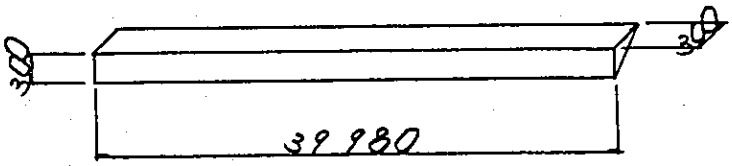
VP7

CONCRETE VOLUME

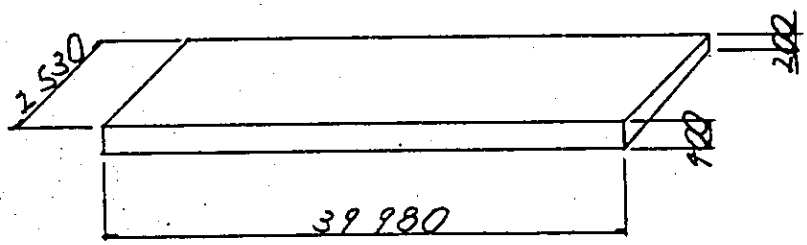
(1) SLAB



$V_a = 39.98 \times 3.80 \times 0.40$ = 60.770 m^3



$V_b = 0.30 \times 0.30 \times 1/2 \times 39.98$ = 1.799 "

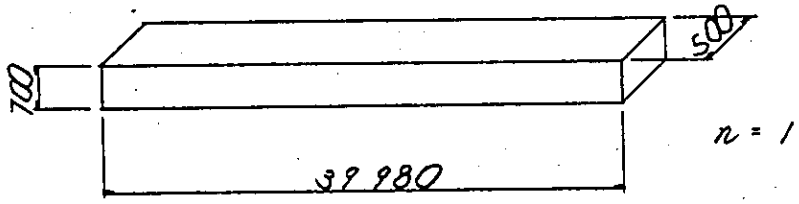


$V_c = 1/2 \times (0.40 + 0.20) \times 2.53 \times 39.98$ = 30.345 "

SLAB TOTAL 92.914 m^3

(2) BEAM

1) LONGITUDINAL BEAM

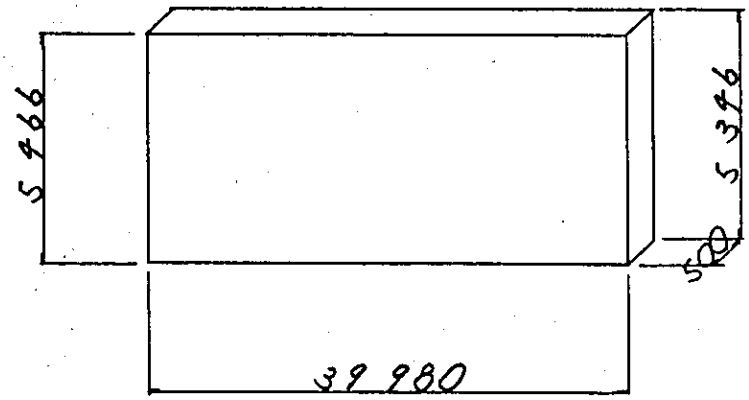


$n = 1$

$Va = 39.98 \times 0.50 \times 0.70$ = 13.993 m^3

13.993 m^3

2) WALL

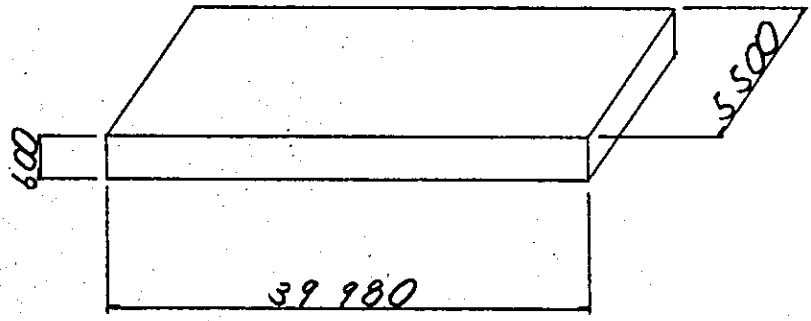


$Va = 39.98 \times 0.50 \times (5.466 + 5.346) \times 1/2 = 108.066\ m^3$

108.066 m^3

BEAM TOTAL 122.059 m^3

(4) FOOTING



$Va = 39.98 \times 5.50 \times 0.60 = 131.934\ m^3$

FOOTING TOTAL 131.934 m^3