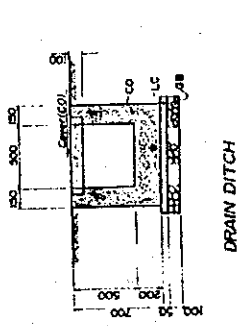
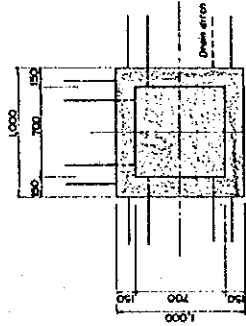
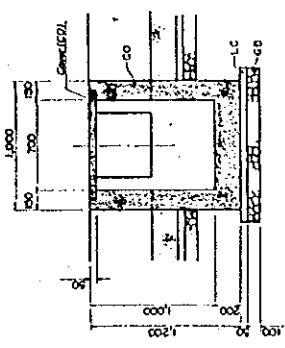


Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
103	Concrete, class F, for cable duct, drain ditch and catch basin			see figure of earth work
-	for cable duct			
①	Switchyard			
	Type A $l=43\text{ m}$			
	$43 \times 0.19 \text{ m}^3/\text{m} = 8.17 \text{ m}^3$			
	Type B $l=61\text{ m}$			
	$61 \times 0.236 \text{ m}^3/\text{m} = 14.40 \text{ m}^3$			
		m^3	22.57	
②	Transformer Yard			
	Type A $l=16\text{ m}$			
	$16 \times 0.19 \text{ m}^3/\text{m} = 3.04 \text{ m}^3$			
	Type B $l=40\text{ m}$			
	$40 \times 0.236 \text{ m}^3/\text{m} = 9.44 \text{ m}^3$			
	Type C $l=114\text{ m}$			
	$114 \times 0.405 \text{ m}^3/\text{m} = 46.17 \text{ m}^3$			
	Type D $l=16.5\text{ m}$			
	$16.5 \times 0.68 \text{ m}^3/\text{m} = 11.22 \text{ m}^3$			
		m^3	69.87	
	sub total	m^3	92.44	
			= 92 m^3	

1-1-12

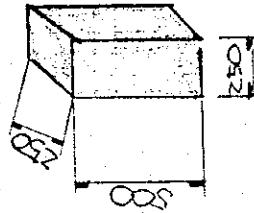
Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
- for drain ditch switchyard				
with cover	$l = 16\text{ m}$ $V = 0.34\text{ m}^3/\text{m}$			
without cover	$l = 202\text{ m}$ $V = 0.31\text{ m}^3/\text{m}$			
	$16 \times 0.34 + 202 \times 0.31$ $= 68\text{ m}^3$			
- for catch basin	$3\text{ nos } V = 0.60\text{ m}^3/\text{no.}$			
	$3 \times 0.60 = 2\text{ m}^3$			
	Total $92 + 68 + 2 = 162\text{ m}^3$			

1-1-153

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
104	Concrete, class G, for foundation of wire net fence			
	no. of foundation			
	91 nos Switchyard			
	166 nos Transformer yard			
	$0.25 \times 0.25 \times 0.5 \times (91 + 166)$ $= 8 \text{ m}^3$			



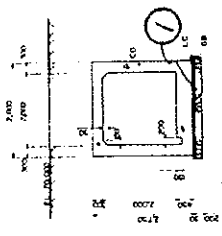
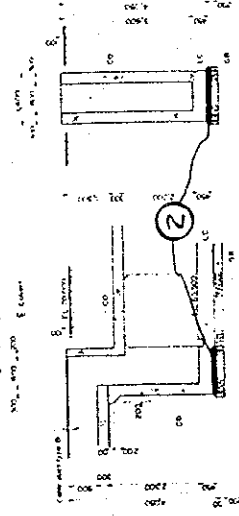
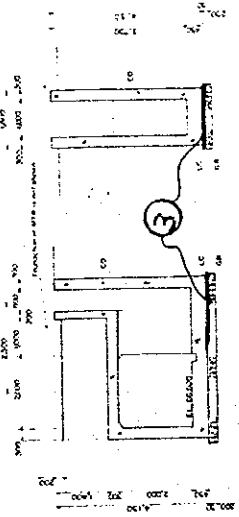
1-1-24

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
105 Concrete, class H, for levelling concrete of foundation of equipment, cable cabinet, cable duct, drain ditch and catch basin for foundation of equipment				see figure of earth work
NGR	1 set $\times 0.05 \text{ m}^3/\text{set} = 0.05 \text{ m}^3$			
MTR	2 sets $\times 2.53 \text{ m}^3/\text{set} = 5.06 \text{ m}^3$			
LA	12 sets $\times 0.098 \text{ m}^3 = 1.18 \text{ m}^3$			
CT	6 sets $\times 0.098 \text{ m}^3 = 0.59 \text{ m}^3$			
SI	3 sets $\times 0.098 \text{ m}^3 = 0.29 \text{ m}^3$			
CCPD	2 sets $\times 0.072 \text{ m}^3 = 0.14 \text{ m}^3$			
CPD	4 sets $\times 0.072 \text{ m}^3 = 0.29 \text{ m}^3$			
CH	4 sets $\times 0.072 \text{ m}^3 = 0.29 \text{ m}^3$			
TB	1 set $\times 0.06 \text{ m}^3 = 0.06 \text{ m}^3$			
DS	21 nos. $\times 0.224 \text{ m}^3 = 4.70 \text{ m}^3$			
CB	4 sets $\times 0.378 \text{ m}^3 = 1.51 \text{ m}^3$			
PI	7 sets $\times 1.10 \text{ m}^3 = 7.70 \text{ m}^3$			
P2	5 sets $\times 1.10 \text{ m}^3 = 5.50 \text{ m}^3$			
13.8KV CUB	1 set $\times 0.64 \text{ m}^3 = 0.64 \text{ m}^3$			
SC	6 sets $\times 0.627 \text{ m}^3/\text{m} = 3.76 \text{ m}^3$			
LTR	1 set $\times 0.132 \text{ m}^3/\text{m} = 0.13 \text{ m}^3$			
	Sub total		31.89 m ³	

1-1-15

Working Division:

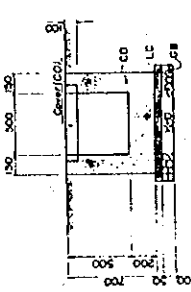
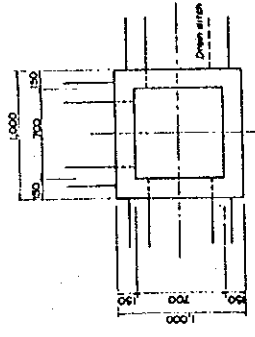
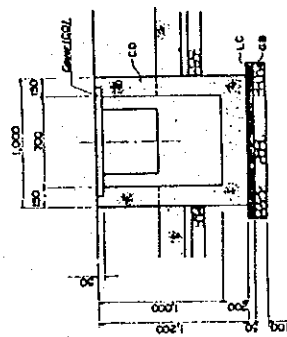
Description	Calculation Details	Unit	Quantity	Remarks
-	for cable culvert			
①	$22.8 \times 0.14 = 3.19 \text{ m}^3$			
②	connection to cable culvert type D $1.1 \times 1.2 \times 0.05 = 0.07 \text{ m}^3$			
③	connection to MTR $1.8 \times 1.8 \times 0.05 \times 2 = 0.32 \text{ m}^3$			
	sub total		3.58 m ³	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
-	for cable duct			
①	Switchyard			see figure of earth work
	Type A l=43 m			
	$43 \times 0.038 \text{ m}^3/\text{m} = 1.63 \text{ m}^3$			
	Type B l=61 m			
	$61 \times 0.043 \text{ m}^3/\text{m} = 2.62 \text{ m}^3$			
	4.25	m^3		
②	Transformer Yard			
	Type A l=16 m			
	$16 \times 0.038 \text{ m}^3/\text{m} = 0.61 \text{ m}^3$			
	Type B l=40 m			
	$40 \times 0.043 \text{ m}^3/\text{m} = 1.72 \text{ m}^3$			
	Type C l=114 m			
	$114 \times 0.055 \text{ m}^3/\text{m} = 6.27 \text{ m}^3$			
	Type D l=16.5 m			
	$16.5 \times 0.07 \text{ m}^3/\text{m} = 1.16 \text{ m}^3$			
	9.76	m^3		
	sub total		14.01	
			m^3	

1-1-157

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
-	for drain ditch $L = 218\text{m}$ $0.044\text{ m}^3/\text{m}$			 <p style="text-align: center;">DRAIN DITCH</p>
-	$V = 218 \times 0.044 = 9.59\text{ m}^3$			 <p style="text-align: center;">FLAN</p>
-	3 nos $V = 0.1\text{ m}^3/\text{no.}$			 <p style="text-align: center;">SECTION CATCH BASIN</p>
	$V = 3 \times 0.1 = 0.3\text{ m}^3$			
	Total			
	$31.89 + 3.58 + 14.01 + 9.59 + 0.3$			
	$= 59.37$			
	$= 60\text{ m}^3$			

8-N-1-1

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
106	Formwork, F1 finish, for concrete of item 101			
SC	6 sets $\times 9.0 \text{ m}^2/\text{set} =$		54.00	
LTR	1 set $\times 4.8 \text{ m}^2/\text{set} =$		4.80	
NGR	1 set $\times 2.88 \text{ m}^2/\text{set} =$		2.88	
MTR	2 sets $\times 33 \text{ m}^2/\text{set} =$		66.00	
LA	12 sets $\times 4.32 \text{ m}^2/\text{set} =$		51.84	
CT	6 sets $\times 4.32 \text{ m}^2/\text{set} =$		25.92	
SI	3 sets $\times 4.32 \text{ m}^2/\text{set} =$		12.96	
CCPD	2 sets $\times 3.6 \text{ m}^2/\text{set} =$		7.20	
CPD	4 sets $\times 3.6 \text{ m}^2/\text{set} =$		14.40	
CH	4 sets $\times 2.4 \text{ m}^2/\text{set} =$		9.60	
TB	1 set $\times 2.12 \text{ m}^2/\text{set} =$		2.12	
DS	2 nos. $\times 5.36 \text{ m}^2/\text{set} =$		10.72	
CB	4 sets $\times 9.84 \text{ m}^2/\text{set} =$		39.36	
PI	7 sets $\times 30.34 \text{ m}^2/\text{set} =$		212.38	
P2	5 sets $\times 23.12 \text{ m}^2/\text{set} =$		115.60	
	13.8KV CUB set $\times 7.24 \text{ m}^2/\text{set} =$		7.24	
			738.86	
			= 739 m ²	

see figure of earth work

1-1-179

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
107	Formwork, F1 finish, for concrete of item 102			see figure of Item 102
①	$22.8 \times 5.5 = 125.40 \text{ m}^2$			
②	Connection to cable duct type D			
	$-2.0 \times 1.1 = -2.20 \text{ m}^2$			
	$1.3 \times 1.4 = 1.82$			
	$1.3 \times 4.05 \times 2 = 10.53$			
	$0.3 \times 2 \times 1.1 = 0.66$			
	10.81 m^2			
③	Connection to MTR			
	$-2.0 \times 1.0 = -2.00 \text{ m}^2$			
	$2.75 \times 2.1 = 5.78$			
	$1.1 \times 1.4 \times 2 = 3.08$			
	$1.6 \times 4.15 = 6.64$			
	$1.4 \times 1.6 = 2.24$			
	15.74			
	$15.74 \times 2 = 31.48 \text{ m}^2$			
④	Connection to cable duct type C			
	$-0.8 \times 1.4 = -1.12 \text{ m}^2$			
	$4.05 \times 2.6 - 0.6 \times 0.6 = 10.17$			
	$1.3 \times 1.3 \times 2 = 3.38$			
	$2.0 \times 1.3 = 2.60$			
	15.03 m^2			
	Total		$182.72 = 183 \text{ m}^2$	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
108 Formwork, F1 Finish, for concrete of items 103 and 104				see figure of earth work
- for cable duct				
① Switchyard				
Type A $l=43\text{ m}$	$43 \times 1.0 \text{ m}^2/\text{m} = 43.00 \text{ m}^2$			
Type B $l=61\text{ m}$	$61 \times 1.2 \text{ m}^2/\text{m} = 73.20 \text{ m}^2$			
	116.20	m^2		
② Transformer Yard				
Type A $l=16\text{ m}$	$16 \times 1.0 \text{ m}^2/\text{m} = 16.00 \text{ m}^2$			
Type B $l=40\text{ m}$	$40 \times 1.2 \text{ m}^2/\text{m} = 48.00 \text{ m}^2$			
Type C $l=114\text{ m}$	$114 \times 1.7 \text{ m}^2/\text{m} = 193.80 \text{ m}^2$			
Type D $l=16.5\text{ m}$	$16.5 \times 2.2 \text{ m}^2/\text{m} = 36.30 \text{ m}^2$			
	294.10	m^2		
	sub total	410.30 m^2		

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
-	for drain ditch with cover $l = 16m$ $A = 16 \times 2.4 m^2 = 38.40 m^2$ without cover $l = 202m$ $A = 202 \times 1.4 m^2 = 282.80 m^2$			see figure of item 103
	sub total		321.20 m ²	
-	for satch basin 3 nos. $A = 3 \times 4.6 = 13.80 m^2$			
-	for foundation of wire net fence $A = 0.25 \times 0.5 \times 4 = 0.50 m^2$ switchyard 91 nos. transformer yard 166 nos. $A = (91 + 166) \times 0.50 = 128.5 m^2$			
	Total		410.30 + 321.20 + 13.80 + 128.5 = 873.8 m ²	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
109	Formwork, F2 finish, for concrete of item 102			see figure of Item 102
①	$22.8 \times 4.5 =$	102.6 m^2		
②	Connection to cable duct type D			
	$- 2.0 \times 0.8 =$	$- 1.6 \text{ m}^2$		
	$0.8 \times 3.6 \times 2 =$	5.76 m^2		
	$1.3 \times 0.8 =$	1.04 m^2		
	$2.5 \times 0.8 =$	2.0 m^2		
		7.2 m^2		
③	Connection to MTR			
	$- 2.0 \times 1.0 =$	$- 2.0 \text{ m}^2$		
	$1.2 \times 2.0 \times 2 =$	4.8 m^2		
	$0.6 \times 3.7 \times 2 =$	4.44 m^2		
	$1.0 \times 3.7 =$	3.70 m^2		
	$1.0 \times 1.7 =$	1.70 m^2		
	$1.0 \times 1.2 =$	1.20 m^2		
		13.84 m^2		
	$13.84 \times 2 =$	27.68 m^2		
④	Connection to cable duct type C			
	$- 1.4 \times 0.8 =$	$- 1.12 \text{ m}^2$		
	$2.0 \times 2.0 + 1.4 \times 1.3 - 0.6 \times 0.6 =$	5.46 m^2		
	$1.4 \times 1.6 =$	2.24 m^2		
	$0.8 \times 1.6 \times 2 =$	2.56 m^2		
		9.14 m^2		
	Total	146.62 m^2		

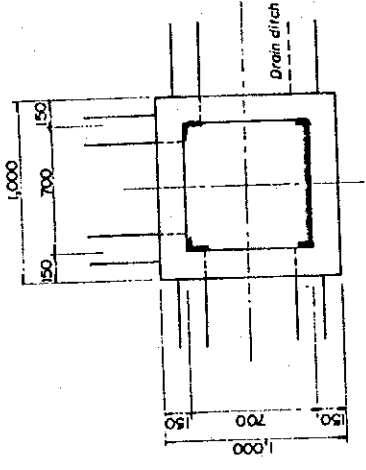
Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
/ 10	Formwork, F2 finish, for concrete of item / 03			
-	for cable duct			
①	Switchyard			
	Type A $l=43m$			
	$43 \times 0.6 m^2/m = 25.80 m^2$			
	Type B $l=61m$			
	$61 \times 0.8 m^2/m = 48.80 m^2$			
	74.60	m^2		
②	Transformer Yard			
	Type A $l=16m$			
	$16 \times 0.6 m^2/m = 9.60 m^2$			
	Type B $l=40m$			
	$40 \times 0.8 m^2/m = 32.00 m^2$			
	Type C $l=114m$			
	$114 \times 1.2 m^2/m = 136.80 m^2$			
	Type D $l=16.5m$			
	$16.5 \times 1.6 m^2/m = 26.40 m^2$			
	204.80	m^2		
	Total 279.40	m^2		

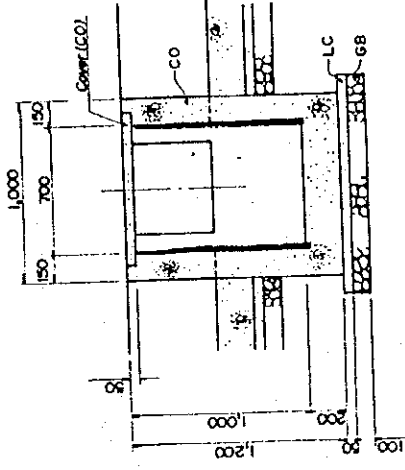
see figure of earthwork

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
111	Formwork, F3 finish, for concrete of item 103			
-	for drain ditch $D = 218 \text{ m}$			
-	for catch basin 3 nos $A = 1.0 \text{ m}^2/\text{m} \times 218 = 218 \text{ m}^2$			
	$A = 3 \times 2.1 \text{ m}^2/\text{nos} = 6.3 \text{ m}^2$			
	Total 224.3 m^2			

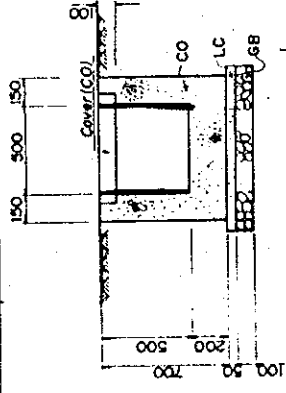


PLAN



SECTION

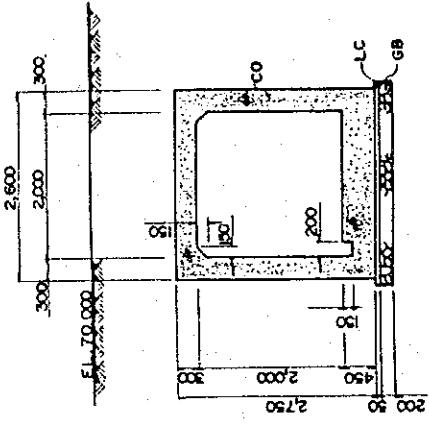
CATCH BASIN



DRAIN DITCH

Working Division:

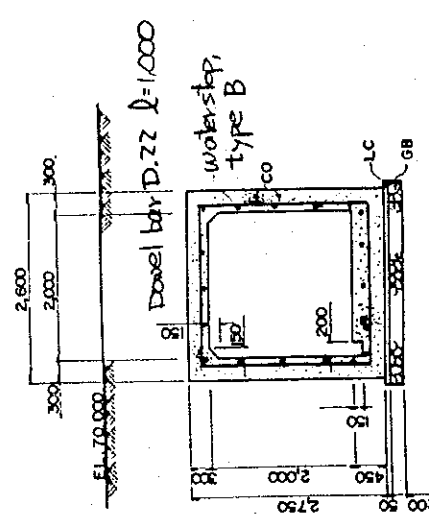
Description	Calculation Details	Unit	Quantity	Remarks
/12	Bituminous coating for contraction joint of cable culvert			
	$0.3 \times (2.6 + 2.0) \times 2 + \frac{1}{2} \times 0.15^2 \times 2$			
	- 0.15×0.20			
	= 2.75 m^2			
	= 2.8 m^2			



Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
1/3	Reinforcing bars for concrete works			
-	for foundation of equipment Concrete 342 m^3			
	Re-bar 40 kg/m^3			
	$W = 342 \times 40 = 13,680 \text{ kg}$			
-	cable culvert			
	C: 86 m^3			
	R: 75 kg/m^3			
	$W = 86 \times 75 = 6,450 \text{ kg}$			
-	cable duct			
	C: 92 m^3			
	R: 45 kg/m^3			
	$W = 92 \times 45 = 4,140 \text{ kg}$			
-	drain ditch			
	C: 68 m^3			
	R: 30 kg/m^3			
	$W = 68 \times 30 = 2,040 \text{ kg}$			
-	catch basin			
	C: 2 m^3			
	R: 50 kg/m^3			
	$W = 2 \times 50 = 100 \text{ kg}$			
	Total		26,410 kg	
				= 26.4 ton

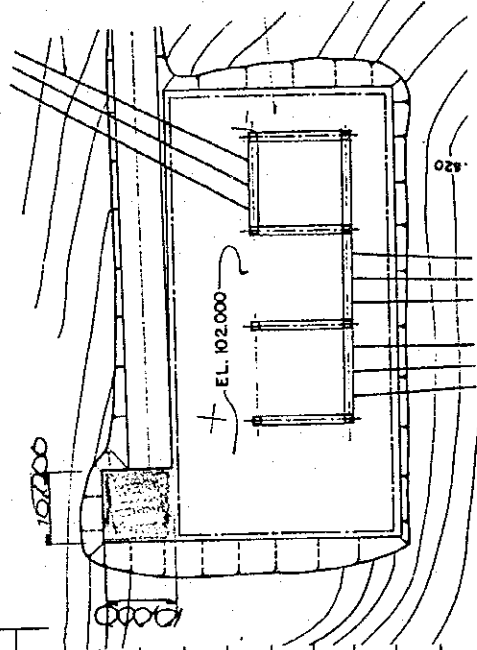
Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
14	P.V.C waterstop, Type B			
	$2.3 \times 4 = 9.2 \text{ m}$			
15	Dowel bar, 22 mm dia. (round bar), for cable seal vent $w = 2.98 \text{ kg/m}$ $l = 1.0 \times 18 = 18 \text{ m}$			
	$W = 18 \times 2.98 = 53.64 = 54 \text{ kg}$			

1-1-168

Working Division:

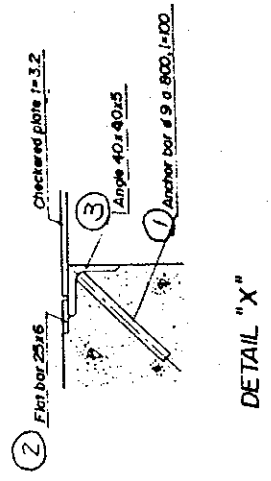
Description	Calculation Details	Unit	Quantity	Remarks
5.3 ROAD WORK				
101	Graded crushed stone subbase			
	switchyard			
	Area = $10 \times 10 = 100 \text{ m}^2$			
	T = 150 mm			
	V = $100 \times 0.15 = 15 \text{ m}^3$			



1-1-169

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
5.4 MISCELLANEOUS METAL WORKS				
101 Embedded metal for checkered plate	Per meter of cable duct (checkered plate)			
① Anchor bar	$l = 100$ @ 800 $w = 0.499 \text{ kg/m}$ $1,000 / 800 \times 2 \times 0.1 \times 0.499 = 0.125 \text{ kg/m}$			
② Flat bar	$0.025 \times 0.006 \times 1.0 \times 2 \times 7,850$ $= 2.355 \text{ kg/m}$			
③ Angle	$(0.04 + 0.04) \times 0.005 \times 1.0 \times 2 \times 7,850$ $= 6.28 \text{ kg/m}$			
			8.76 kg/m	



Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
① Switchyard				
Type A	l = 43 m			
	$43 \times 8.76 \text{ kg/m} = 376.68 \text{ kg}$			
Type B	l = 61 m			
	$61 \times 8.76 \text{ kg/m} = 534.36 \text{ kg}$			
	911.04 kg	kg		
② Transformer Tard				
Type A	l = 16 m			
	$16 \times 8.76 \text{ kg/m} = 140.16 \text{ kg}$	kg		
Type B	l = 40 m			
	$40 \times 8.76 \text{ kg/m} = 350.40 \text{ kg}$	kg		
Type C	l = 114 m			
	$114 \times 8.76 \text{ kg/m} = 998.64 \text{ kg}$	kg		
Type D	l = 16.5 m			
	$16.5 \times 8.76 \text{ kg/m} = 144.54 \text{ kg}$	kg		
	1,633.74	kg		
③ Cable culvert manhole				
	l = (0.8 + 1.4) × 2 = 4.4 m			
	$W = 4.4 \times 8.76 \text{ kg/m} = 38.54 \text{ kg}$	kg		
	Total		2,583	kg

Working Division:

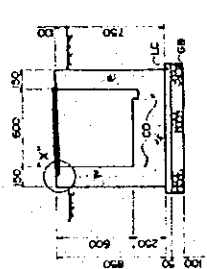
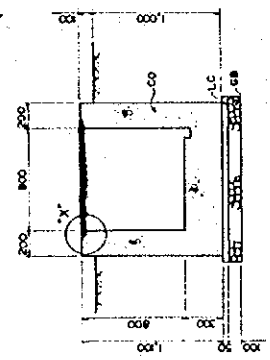
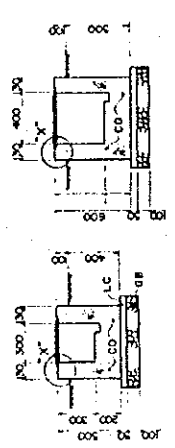
Description	Calculation Details	Unit	Quantity	Remarks
/02	Wire net fence with $W = 13 \text{ kg/m}$			
	switchyard $L = 180 \text{ m}$			
	$W = 13 \times 180 = 2,340 \text{ kg}$			
	Transformer Yard			
	$L = 122 + 44 = 166 \text{ m}$			
	$W = 13 \times 166 = 2,158 \text{ kg}$			
	Total 4,498 kg			

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
103	Round bar, for step ladder			
	for manhole of cable culvert			
	10 nos ϕ 22 mm round bar			
	$l = 1.26 \text{ m/no.}$			
	$l = 1.26 \times 10 = 12.6 \text{ m}$			
	$w = 2.98 \text{ kg/m}$			
	$w = 2.98 \times 12.6 = 37.5 \text{ kg}$			

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
104	checkered plate			
	$t = 3.2 \text{ mm}$ $w = 26.8 \text{ Kg/m}^2$			
	- for cable duct			
①	switchyard			
	Type A $l = 43 \text{ m}, W = 0.3 \text{ m}$			
	$43 \times 0.3 \times 26.8 = 345.72 \text{ kg}$			
	Type B $l = 61 \text{ m}, W = 0.4 \text{ m}$			
	$61 \times 0.4 \times 26.8 = 653.92 \text{ kg}$			
	999.64 kg			
②	Transformer Yard			
	Type A $l = 16 \text{ m}, W = 0.3 \text{ m}$			
	$16 \times 0.3 \times 26.8 = 128.64 \text{ kg}$			
	Type B $l = 40 \text{ m}, W = 0.4 \text{ m}$			
	$40 \times 0.4 \times 26.8 = 428.80 \text{ kg}$			
	Type C $l = 114 \text{ m}, W = 0.6 \text{ m}$			
	$114 \times 0.6 \times 26.8 = 1833.12 \text{ kg}$			
	Type D $l = 16.5 \text{ m}, W = 0.8 \text{ m}$			
	$16.5 \times 0.8 \times 26.8 = 353.76 \text{ kg}$			
	2,744.32 kg			
③	Cable culvert manhole			
	$A = 0.8 \times 1.4 = 1.12 \text{ m}^2$			
	$\bar{W} = 1.12 \times 26.8 = 30.02 \text{ kg}$			
	Total		3,774 kg	



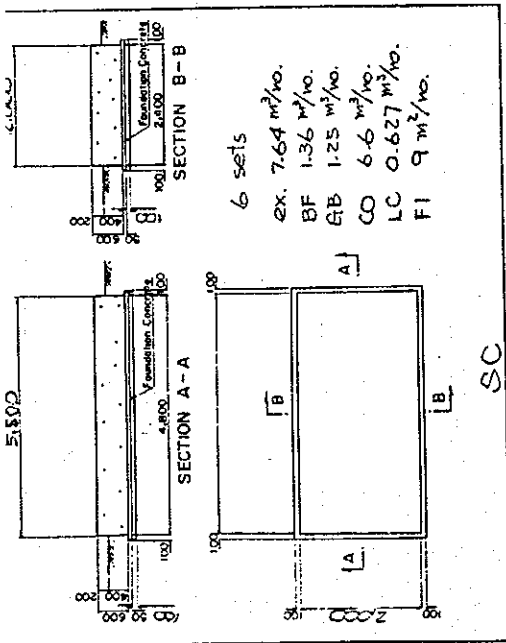
1-1-174

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
17. DAULF-PERIPA 13.8 KV SWITCHGEAR YARD				
17.1. EARTHWORK				
101	Trench excavation, all classes, for foundation of equipment			
	DS 12 nos. x 4.92 m ³ /no. = 5.90 m ³			
	CB 1 set x 6.89 m ³ /set = 6.89 "			
	SI 3 sets x 2.38 m ³ /set = 7.14			
	LA 3 sets x 2.38 m ³ /set = 7.14			
	CT 3 sets x 2.38 m ³ /set = 7.14			
	CCPD 1 set x 1.85 m ³ /set = 1.85			
	CPD 2 sets x 1.85 m ³ /set = 3.70			
	P1 2 sets x 85.8 m ³ /set = 171.60			
	Total 211.36 m ³ = 211 m ³			

see figures in the following pages.

1-1-175



6 sets

ex. 7.64 m³/no.

BF 1.36 m³/no.

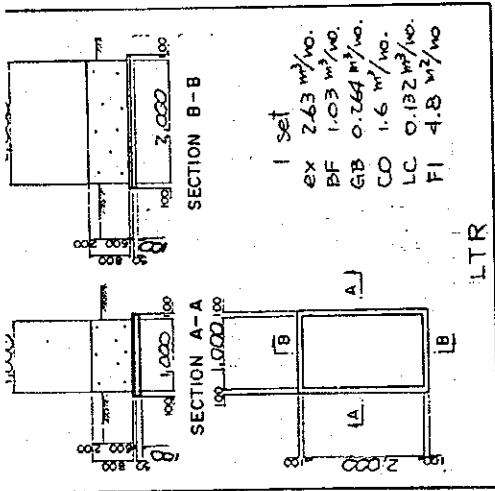
GB 1.25 m³/no.

CO 6.6 m³/no.

LC 0.627 m³/no.

FI 9 m³/no.

SC



1 set

ex 2.63 m³/no.

BF 1.03 m³/no.

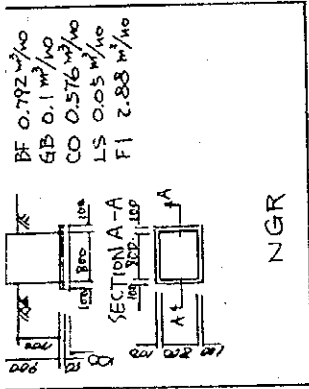
GB 0.264 m³/no.

CO 1.6 m³/no.

LC 0.132 m³/no.

FI 4.8 m³/no.

LTR



BF 0.792 m³/no

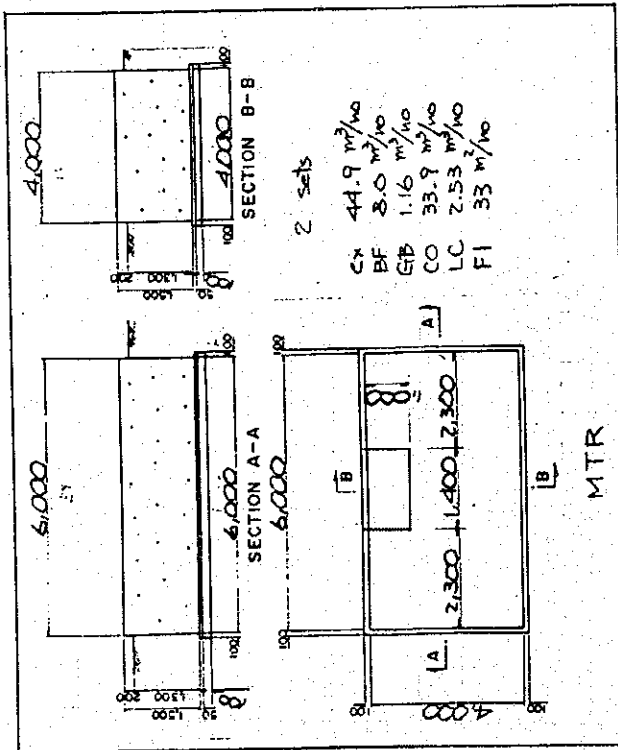
GB 0.1 m³/no

CO 0.576 m³/no

LS 0.05 m³/no

FI 2.88 m³/no

NGR



2 sets

ex 44.9 m³/no

BF 8.0 m³/no

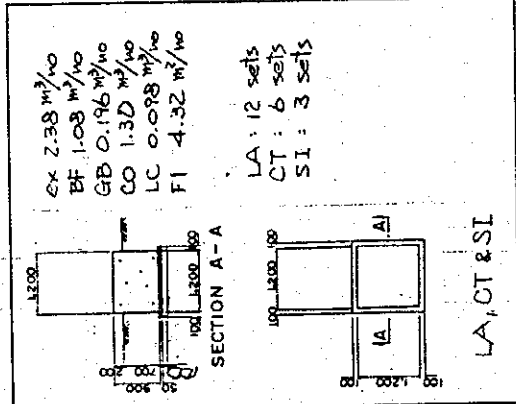
GB 1.16 m³/no

CO 33.9 m³/no

LC 2.53 m³/no

FI 33 m³/no

MTR

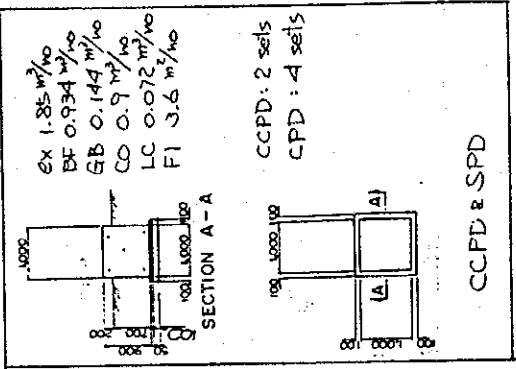


LA: 12 sets

CT: 6 sets

SI: 3 sets

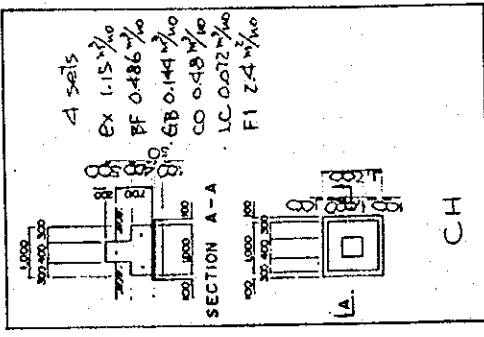
LA, CT & SI



CCPD: 2 sets

CPD: 4 sets

CCPD & SPD



4 sets

ex 1.15 m³/no

PF 0.486 m³/no

GB 0.144 m³/no

CO 0.418 m³/no

LC 0.072 m³/no

FI 2.4 m³/no

CH

ex: trench excavation

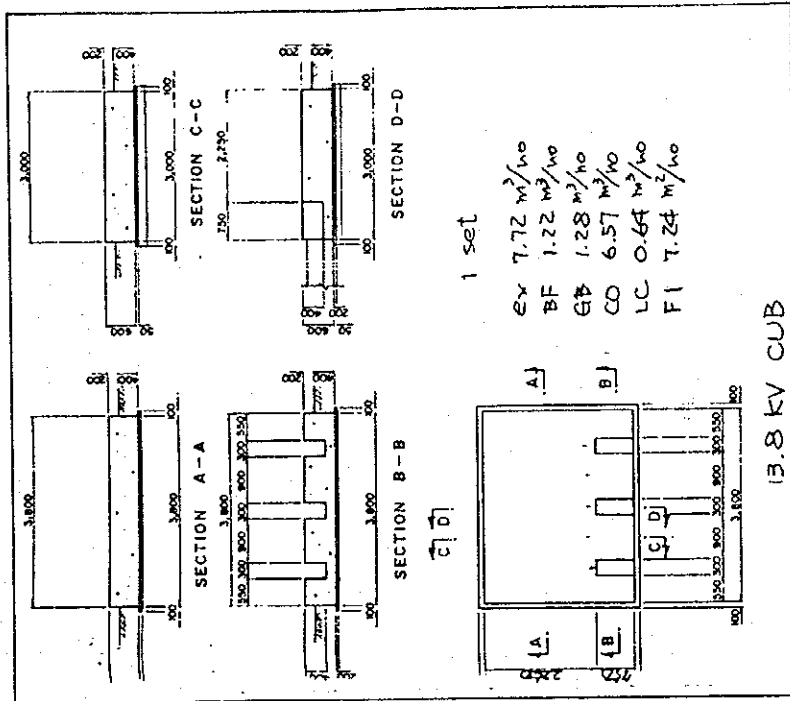
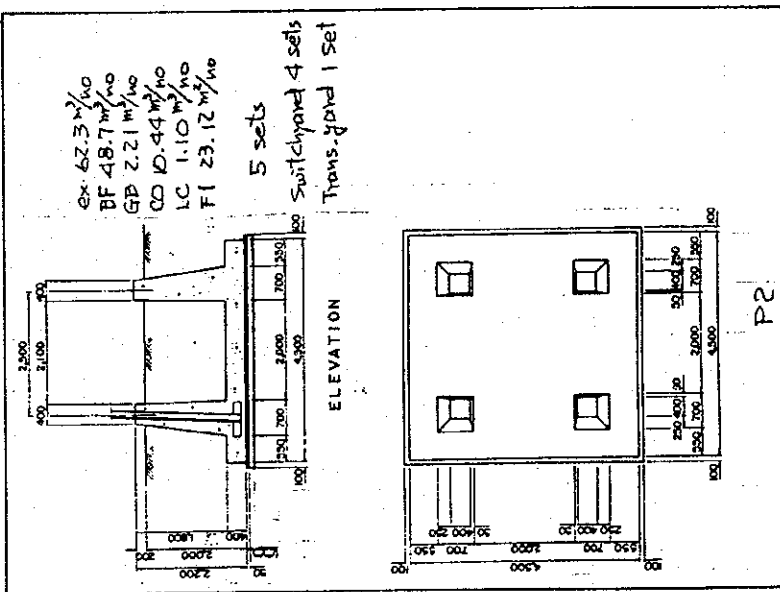
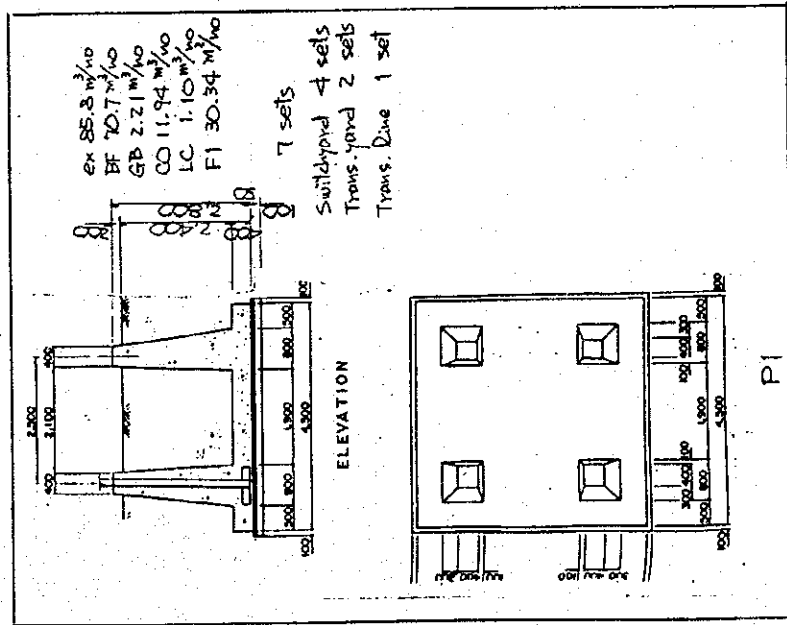
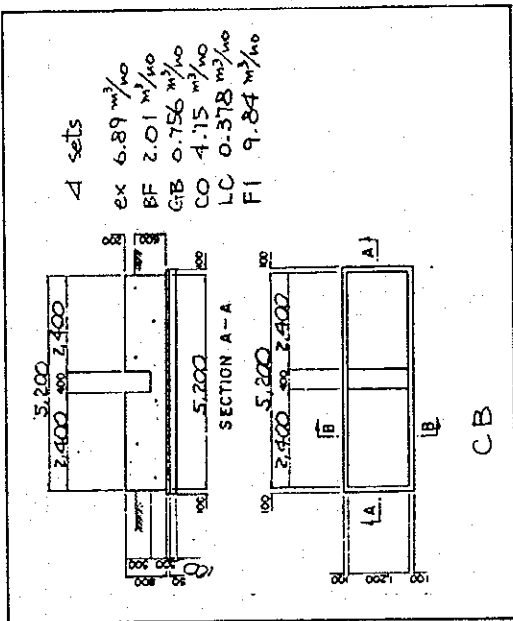
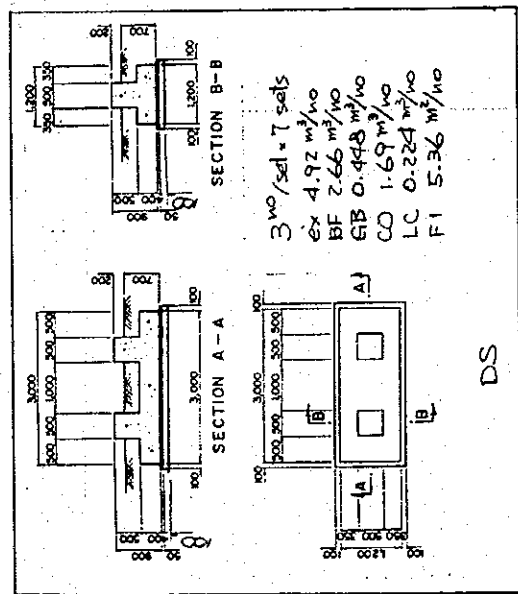
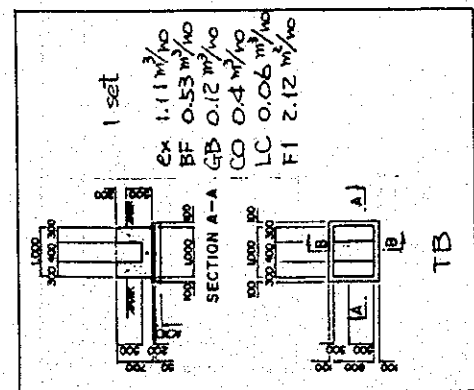
BF: Backfill

GB: Gravel bedding

CO: Concrete, class E

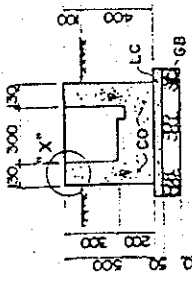
LC: Leveling concrete, class H

FI: Form, FI finish



Working Division:

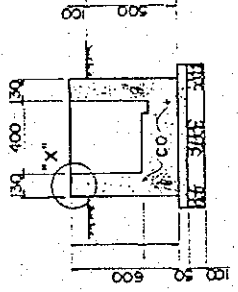
Description	Calculation Details	Unit	Quantity	Remarks
/02	Trench excavation, all classes, for cable duct			
	Type A $l = 31.5\text{ m}$			
	$31.5 \times 0.508\text{ m}^3/\text{m} = 21.84\text{ m}^3$			
	Type B $l = 41\text{ m}$			
	$41 \times 0.528\text{ m}^3/\text{m} = 21.65\text{ m}^3$			
	Total 43.49 m^3			
	$= 43\text{ m}^3$			



TYPE A

length: Switchyard 43m
Trans.yard 16m

- ex 0.508 m³/m
- BF 0.17 m³/m
- GB 0.076 m³/m
- CO 0.19 m³/m
- LC 0.038 m³/m
- F1 1.0 m²/m
- F2 0.6 m²/m



TYPE B

- ex 0.528 m³/m length
- BF 0.069 m³/m
- GB 0.086 m³/m
- CO 0.236 m³/m
- LC 0.043 m³/m
- F1 1.2 m²/m
- F2 0.8 m²/m

Switchyard 61m
Trans.yard 40m

ex: trench excavation

- BF: Backfill
- GB: Gravel bedding.
- CO: Concrete, class F
- LC: Leveling concrete, class H
- F1: Form, F1 finish
- F2: Form, F2 finish

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
103	Backfill for foundation of equipment and cable duct			see figures of Item 101
-	for foundation of equipment			
	DS 12 nos. x 2.66 m ³ /no = 31.92 m ³			
	CB 1 set x 2.01 m ³ /set = 2.01 "			
	SI 3 sets x 1.08 " = 3.24 "			
	IA 3 sets x 1.08 " = 3.24 "			
	CI 3 sets x 1.08 " = 3.24 "			
	CCPD 1 set x 0.934 " = 0.93 "			
	CPD 2 sets x 0.934 " = 1.87 "			
	PI 2 sets x 70.7 " = 141.40 "			
	Sub total 187.85	m ³		
-	for cable duct			
	Type A			
	31.5 x 0.17 m ³ /m = 5.36 m ³			
	Type B			
	41 x 0.069 m ³ /m = 2.83 m ³			
	Sub total 8.19 m ³			
	Total 196.04			
	= 196 m ³			

1-1-179

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
104	Gravel bedding for foundation of equipment and cable duct			see figures of Item /01
-	for foundation of equipment			
	DS 12 nos. $\times 0.448 \text{ m}^3/\text{no} = 5.38 \text{ m}^3$			
	CB 1 set $\times 0.756 \text{ m}^3/\text{set} = 0.76 \text{ m}^3$			
	SI 3 sets $\times 0.196 \text{ " } = 0.59 \text{ "}$			
	IA 3 sets $\times 0.196 \text{ " } = 0.59 \text{ "}$			
	CT 3 sets $\times 0.196 \text{ " } = 0.59 \text{ "}$			
	CCPD 1 set $\times 0.144 \text{ " } = 0.14 \text{ "}$			
	CPD 2 sets $\times 0.144 \text{ " } = 0.29 \text{ "}$			
	PI 2 sets $\times 2.21 \text{ " } = 4.42 \text{ "}$			
	sub total 12.76 m^3			
-	for cable duct			see figure of Item /02
	Type A			
	$31.5 \times 0.076 \text{ m}^3/\text{m} = 2.39 \text{ m}^3$			
	Type B			
	$41 \times 0.086 \text{ m}^3/\text{m} = 3.53 \text{ m}^3$			
	sub total 5.92 m^3			
	Total 18.68			
	= 19 m^3			

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
17. 2. CONCRETE WORK				
/01	Concrete, class F ₁			
	for foundation of equipment			see figures of Item 17.1 /01
	DS 12 nos. x 1.69 m ³ /no = 20.28 m ³			
	CB 1 set x 4.75 m ³ /set = 4.75 m ³			
	SI 3 sets x 1.3 " = 3.90 "			
	LA 3 sets x 1.3 " = 3.90 "			
	CT 3 sets x 1.3 " = 3.90 "			
	CCPD 1 set x 0.9 " = 0.90 "			
	CPD 2 sets x 0.9 " = 1.80 "			
	PI 2 sets x 11.94 " = 23.88 "			
	Total 63.31 m ³			
	= 63 m ³			

18/1-1-1

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
102	Concrete, class F, for cable duct			see figure of Item 17.1/02
	Type A $l = 31.5\text{ m}$ $31.5 \times 0.19\text{ m}^3/\text{m} = 5.99\text{ m}^3$			
	Type B $l = 41\text{ m}$ $41 \times 0.236\text{ m}^3/\text{m} = 9.68\text{ m}^3$			
	Total 15.67 $= 16\text{ m}^3$			

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
103	Concrete, class H, for levelling concrete of foundation of equipment and cable duct			see figures of Item 17.1/01
-	for foundation of equipment			
	DS 12 nos. $\times 0.224 \text{ m}^3/\text{no} = 2.69 \text{ m}^3$			
	CB 1 set $\times 0.378 \text{ m}^3/\text{set} = 0.38$			
	SI 3 sets $\times 0.098 = 0.29$			
	LA 3 sets $\times 0.098 = 0.29$			
	CT 3 sets $\times 0.098 = 0.29$			
	CCPD 1 set $\times 0.072 = 0.07$			
	CPD 2 sets $\times 0.072 = 0.14$			
	PI 2 sets $\times 1.10 = 2.20$			
	sub total 6.35 m ³			
-	for cable duct			see figure of Item 17.1/02
	Type A $l = 31.5 \text{ m}$			
	$31.5 \times 0.038 \text{ m}^3/\text{m} = 1.20 \text{ m}^3$			
	Type B $l = 41 \text{ m}$			
	$41 \times 0.043 \text{ m}^3/\text{m} = 1.76 \text{ m}^3$			
	sub total 2.96 m ³			
	Total 9.31 m ³			

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
Formwork of item 101	12 nos. x 5.36 m ² /no = 64.32 m			see figures of Item 17.1/01
	DS 1 set x 9.84 m ² /set = 9.84			
	SI 3 sets x 4.32 " = 12.96"			
	JA 3 sets x 4.32 " = 12.96"			
	CT 3 sets x 4.32 " = 12.96"			
	CCPD 1 set x 3.6 " = 3.60"			
	CPD 2 sets x 3.6 " = 7.20"			
	PI 2 sets x 30.34 " = 60.68"			
	Total 184.52 m ²			
	= 185 m ²			

1-1-189

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
105	Formwork, F1 finish, for concrete of item 102			see figure of Item 17.1/02
	Type A $l = 31.5m$ $31.5 \times 1.0 \text{ m}^2/m = 31.50 \text{ m}^2$			
	Type B $l = 41m$ $41 \times 1.2 \text{ m}^2/m = 49.20 \text{ m}^2$			
	Total 80.70 $= 81 \text{ m}^2$			

1-1-185

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
106	Formwork, F2 finish, for concrete of item 102			see figure of Item 17.1/02
	Type A $l = 31.5\text{ m}$			
	$31.5 \times 0.6 \text{ m}^2/\text{m} = 18.90 \text{ m}^2$			
	Type B $l = 41\text{ m}$			
	$41 \times 0.8 \text{ m}^2/\text{m} = 32.80 \text{ m}^2$			
	Total 51.70			
	= 52 m ²			

2-1-186

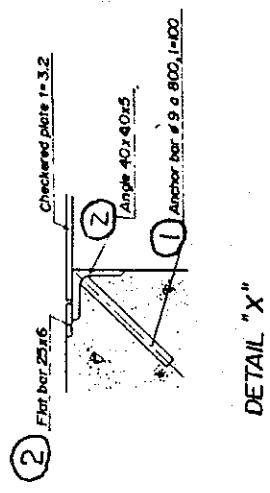
Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
107	Reinforcing bars for concrete works			
-	for foundation of equipment			
	Concrete 63 m ³			
	Re-bar 40 kg/m ³			
	W = 63 x 40 = 2,520 kg			
-	for cable duct			
	concrete 16 m ³			
	Re-bar 45 kg/m ³			
	W = 16 x 45 = 720 kg			
	Total 3,240 kg			
	= 3.2 ton			

1-1-107

Working Division:

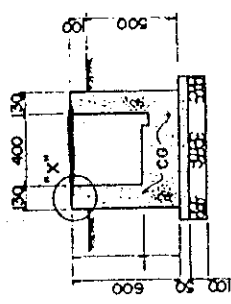
Description	Calculation Details	Unit	Quantity	Remarks
3.	MISCELLANEOUS METAL WORK			
101	Embedded metal for checkered plate of cable duct			
	unit weight per meter of cable duct			
	Anchor bar 0.125 kg/m			
	Flat bar 2.355 "			
	Angle 6.28 "			
	8.76 kg/m			
	Type A l=31.5 m			
	W = 31.5 x 8.76 = 275.94 kg			
	Type B l=41 m			
	W = 41 x 8.76 = 359.16 kg			
	Total 635.1 kg			



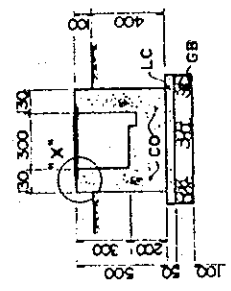
1-1-100

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
/02	checkered plate, for cable duct			
	$W = 26.8 \text{ kg/m}^2$ ($t = 3.2 \text{ mm}$)			
	Type A $l = 31.5 \text{ m}$, $W = 0.3 \text{ m}$			
	$W = 31.5 \times 0.3 \times 26.8 = 253.26 \text{ kg}$			
	Type B $l = 41 \text{ m}$, $W = 0.4 \text{ m}$			
	$W = 41 \times 0.4 \times 26.8 = 439.52 \text{ kg}$			
	Total		692.78	
			= 693 kg	



TYPE A



TYPE B

601-1-1

1.2 Superstructura

Superstructure

Working Division: Durham Station

Description	Concrete		Formwork		Remarks
	Dimensions	Nos	Volume	Dimensions	
			m ³	m ²	m ²
Summation					
102 Concrete A		104		Formwork F ₁ 105	Formwork F ₃
101 Concrete C		106		Formwork F ₁ 106	Formwork F ₃
Concrete C			161.07		347.7
			72.14		235.07
			147.96		454.96
			93.08		449.73
			49.10		565.180
			44.46		280.38
			26.82		144.79
			113.02		441.52
			114.01		442.27
					573.47
			821.66		3302.34
					7355.07
Concrete A			97.57		693.25
			6.99		276.00
					136.26
					18.63
			104.58		
					909.125
					154.89

Working Division:

Description	Concrete		Formwork		Area		Remarks
	Dimensions	Nos	Volume	Dimensions	No.	m ²	
Girder							
R G1	50 x 80	7	21.84	180 x 780	7	98.128	
"	50 x 180	2	5.52	180			(7) line
Z G2)	42 x 80	8	19.35	(0.185 x 740	8	48.98	
Z G3)	42 x 80	1	2.40	(0.165 x 720	8	37.144	
				(0.185 x 715	1	6.108	(8) - (7)
				(0.165 x 715	1	4.65	
	60 x 80	1	2.27	150 x 710	1	10.165	(7) - (8)
	42 x 80	4	9.81	(0.185 x 730	4	24.82	
				(0.165 x 730	4	18.98	
R G1	47 x 80	2	5.87	(0.195 x 730	2	14.82	
				(0.8 x 730	2	12.48	
R G12	42 x 80	1	2.45	(0.185 x 780	1	6.63	
				(0.8 x 780	1	6.124	
"	44 x 82	1	2.63	191 x 780	1	14.90	
			72.14			235.107	94.69

Working Division:

Remarks

Description	Concrete			Formwork			m ²		Remarks
	Dimensions	Nos	Volume	Dimensions	Nos	Area F1	Area F2		
ZG4	1.50 16.10	2	48.30	4.00 16.10	2	128.80			
ZG5	1.40 11.60	2	8.57	0.72 11.60	2	16.42			
RG3	1.50 7.10	4	30.67	3.42 7.10	4	97.13			
RG4	1.00 3.70	2	6.11	1.35 3.70	2	9.99			
	1.90 4.00	1	2.38	1.15 4.00	1	4.60			
	1.92 3.70	4	14.06	1.35 3.70	4	19.98			
	1.92 4.00	2	5.89	1.15 4.00	2	9.20			
CG1	1.50 1.50	17	7.65	1.40 1.20	17	28.56			
ZB1	1.70 7.50	10	15.75	1.40 7.50	10	105.00			
ZB1 ZB1A	1.70 7.75	4	6.51	1.40 7.75	4	43.80			
RB2	1.70 7.30	2	3.07	1.40 7.30	2	20.44			
			147.96			454.96	106.46		

Working Division:

Description	Concrete			No. Volume	Dimensions	Formwork			Area F ₁	Area F ₃	Remarks
	Dimensions	No.	m ³			Dimensions	No.	m ²			
R.B.	.30 70	7.10	6	8.95	1.60 7.10	6	59.64				
R.B.2	.32 160	7.50	9	12.96	0.75 7.10	9	47.93	38.34			
"	.32 60	7.75	4	5.95	0.75 7.75	4	23.25				
Outer Walls					0.60 7.75	4		18.60			
1 line	.22 23.64		1				23.64	23.64			Area of walls (7.8 x 3.8) - (2.4 x 3.6) = 23.64 m ²
8 line	.22 21.42		1				21.42	21.42			(6.9 x 3.8) - (1.6 x 3.2) = 21.42
C. line 1-4	.22 65.24		1				65.24	65.24			(21.7 x 3.8) - (2.4 x 5 + 5.22) = 65.24
4-8	.22 75.48		1	70.16			75.48	75.48			(24.6 x 3.8) - (2.4 x 7 + 1.2) = 75.48
B line 1-4	.22 64.46		1				64.46	64.46			(21.7 x 3.8) - (2.4 x 3 + 10.2) = 64.46
4-7	.22 68.67		1				68.67	68.67			(21.65 x 3.8) - (2.4 x 5 + 1.6) = 68.67
				93.08			449.73	375.85			

Working Division:

Description	Concrete			Formwork			Remarks
	Dimensions	Nos.	Volume m ³	Dimensions	Nos.	Area F ₁ m ²	
Interior walls							
1-2	.15 33'2.9	1	4.99	33'2.9	2	66	8.2 x 4.45 - 3.2 = 33.21 4.45 x 4.45 = 19.80
	.15 19'8.0	1	2.97	19'8.0	1	39.16	
3-4	.20 26'4.4	1	5.29	26'4.4	2	52.88	7.8 x 3.8 - 3.2 = 26.44
	.15 10'9.7	1	1.65	10'9.7	2	21.94	2.825 x 4.45 - 1.6 = 10.97
	.15 28'9.3	1	4.34	28'9.3	2	57.86	6.5 x 4.45 = 28.93
4-5	.20 22'6.0	1	4.52	22'6.0	2	45.26	(2.35 + 4.55) x 4.45 = 22.60
	.15 26'7.3	1	4.01	26'7.3	2	53.46	(5.425 + 1.3) x 4.45 - 3.2 = 26.73
	.20 29'4.1	1	5.88	29'4.1	2	58.82	7.9 x 3.9 - 1.4 = 29.41
	.20 5'8	1	1.02	5'8	2	10.16	1.5 x 4.45 - (0.8 x 2.0) = 5.08
	.20 19'7.5	1	2.67	13'3.5	2	26.70	3.0 x 4.45 = 13.35
5-6	.20 10'4.6	1	2.09	10'4.6	2	20.92	2.35 x 4.45 = 10.46
	.20 25'7.3	1	5.15	25'7.3	2	51.46	6.5 x 4.45 - 3.2 = 25.73
	.15 30'11	1	4.52	30'11	2	60.22	7.325 x 4.45 - 1.6 = 31.00
			49.10			585.80	

Working Division:

Description	Concrete		Formwork		Remarks	
	Dimensions	Max Volume	Dimensions	Net	Area F ₁	Area F ₂
Pent House Wall	22	385	17.52		17.52	17.52
C line						$7.3 \times 2.4 = 17.52$
B line	22	412	18.73		18.73	$8.13 \times 2.5 = 18.73$
4 line	22	227	10.32		10.32	$5.3 \times 2.4 = 10.32$
5 line	22	774	7.92		7.92	
Interior	20	300	14.98	2	29.96	$5.5 \times 3.05 = 16.8$
	20	222	11.08	2	22.16	$5.5 \times 2.5 = 13.8$
Roof	15	588	7.08	5.10		39.17
Parapet	117	374	7.11	34.66	38.14	38.14
		2682			144.99	131.80

Working Division:

Description	Concrete		Formwork		Formwork		Remarks
	Dimensions	Nos	Volume	Dimensions	Nos	Area	
Roof at EL 74.7	.15	53.40	9.95	53.90	9.95	536.31	
Slab	.15	31.50	2.94	3.50	2.94	210.29	stairs
(-)	.15	8.00	2.90	8.00	2.90	48.40	Blade 7-8
Para pet.	.17	82	128.00	1.81	128.00	231.68	$57.8 + 49^2 + 12 + 9 = 128.8$
	.15	82	24.00	1.99	24.00	47.76	
ENTRANCE canopy	.10	2.98	4.09	2.78	4.09	11.37	
	.10	30	4.00	7.0	4.00	2.80	
Plane Canopy	.17	58	2.40	67	2.74	1.84	
Blade coping at EL 70.10	.15	.17	62.50	1.32	62.50	20.00	
Platform	.20	25.38	5.08	25.38	2	50.76	$7' \times 3.8 - 1.6 = 25.38$
Wall, Blade 7-8	.22	20.69	6.75	30.69	2	30.69	$7' \times 5.9 - (5.6 \times 2) = 30.69$
	.125	9.23	1.20				$7' \times 1.3 = 9.23$
8-9	.22	30.69	6.75	30.69		30.69	$7' \times 5.9 - (5.6 \times 2) = 30.69$
			113.02			411.52	816.69

Description	Concrete			Formwork			Area F ₁ m ²	Area F ₃	Remarks
	Dimensions	Vol	No.	Dimensions	No.	Area F ₂ m ²			
Elevator	20 x 47.87	9.57	2	47.87	2	95.74			1.95 x 24.55 = 47.87
	20 x 36.19	7.24	2	36.19		72.38			1.8 x 24.55 = 44.19
	45 x 1.80 x 20.10	16.28		1.80 x 20.10		36.18			
Staircase 1									
Wall	20 x 3.95 x 24.50	16.42	2	24.50		164.49			3.35 x 24.55 = 82.24
Landing	14 x 1.46 x 4.09	3.68	5	4.09		20.45			1.46 x 2.8 = 4.09
Steps	28 x 1.20 x 38.60	12.97	1	1.20 x 38.60		46.32			2.7 x 4.3 + 3.4 x 4.5 + 3.5 x 4.5 + 3.8 x 4.6 = 38.6m
Stringer						38.88			
Fiser						152.40			
Staircase 2									
Wall	20 x 3.90 x 18.1	14.12	2	70.59		141.18			4.6 + 4.5 + 4.5 + 4.5 = 18.1
Landing	18 x 1.58 x 3.40	3.87	4	3.40		21.49			3.9 x 18.1 = 70.59
Steps	38 x 1.20 x 40.0	13.44		1.20 x 40.0		48.00			3.9 + 4.3 + 3.9 + 4.3 + 3.9 + 4.6
						693.25			1.46 x 3 + 4 + 5.3 = 40
		97.59				136.26			

108 Reinforcing bar, deformed for concrete works.
 Refuerzo Total:

columnas	23.65 t	columns
Vigas	29.61	beams & girders
losas	16.22	slabs
parapetos, canopy, etc	4.93	parapets, canopy, etc
muros 15 cm	1.89	wall
muros 20 cm	15.07	Wall
gradas	2.76	stairs
pared de bloque	8.50	Wall of concrete blocks
	<hr/>	
	102.13 t	

1-2-13

Elementos	Nº Elementos	Nº barras	ϕ	α	b	Barra.	C. perimetral m	C. Total m	Per. p. Kg	Peso Kg
Columna 60x80 h=6.5 □ estribos diponables	12	10 23 2x6	2.5 12 12	5.5 0.5 0.86	0.40 0.7	0.20 2x0.11 2x0.11	6.10 2.62 1.08	732.0 723.12 155.52	3.85 0.89 0.89	2812.2 643.6 138.4
Columna 60x80 h=7.70 □ estribos diponables	4	10 38 2x11	2.5 12 12	6.7 0.5 0.86	0.40 0.7	0.20 2x0.11 2x0.11	9.30 2.62 1.08	372.0 393.74 95.04	3.85 0.89 0.89	1432.2 254.4 84.6
Columna 90x150 h=12.1 forma sencilla □ estribos □ estribos □ estribos diponables	6	22 22 2x38 2x28 38 2x12	2.8 12 12 12 12	14.74 3.00 0.50 0.80 0.80 1.61	1.40 1.00 0.70	0.26 2x0.26 2x0.11 2x0.11 2x0.11 2x0.11	12.00 3.52 4.02 3.82 3.22 1.83	1584.0 464.64 1833.12 1741.92 734.16 262.52	4.83 4.83 0.89 " " " "	7650.7 2244.2 1631.5 1550.3 652.4 234.5
Columna 90x130 □ estribos □ estribos □ estribos diponables	6	2 2x25 2x25 25 2x6	2.8 12 12 12 12	4.10 0.50 0.50 0.50 1.44	1.20 1.10 0.55	2x0.11 2x0.11 2x0.11 2x0.11	4.10 3.62 3.42 2.32 1.66	49.2 1086.0 1026.0 348.0 119.5	4.83 0.89 0.89	-237.6 966.5 913.1 309.7 106.4
Columna 40x70 □ estribos diponables	4	10 2x46 2x15 10	2.0 12 12 2.0	10.30 0.50 0.78 4.00	0.32 0.30	0.16 2x0.11 2x0.11	10.78 1.82 1.00 4.00	431.2 669.76 120.00 160.00	2.46 0.89 0.89	1060.8 596.1 106.8 393.4
										23651.4

Elemento	N.º Estimador	v.º barras	q.º	a	b	ganchos	L. parral	L. total	Peso q.º	Peso
Vip 50x80 261 C61	7	2x4 4	22	6.50	0.40		6.90	386.4	2.98	1151.5
□ estribos			20	8.60	0.40	2x0.20	9.00	252.0	2.46	619.9
□ estribos		2x3	25	2.40		2x0.11	2.80	117.6	3.85	452.8
□ ref. lateral		2x40	12	0.26	0.70	2x0.09	2.14	1198.4	0.89	1066.6
		40	10	0.40		2x0.09	0.58	162.4	0.62	100.7
		2	12	8.60		2x0.09	8.78	122.92	0.89	109.4
Vip 40x60 261 C61	16	4	20	1.90	2x0.40		2.70	172.8	2.46	425.1
□ estribos		7	10	0.30	0.50	2x0.09	1.78	199.36	0.62	123.6
□ estribos		7	10	0.30		2x0.9	0.48	53.76	0.62	33.3
□ ref. lateral		2	10	1.90		2x0.09	2.08	66.56	0.62	41.3
Vip 50x80 261	2	4	22	10.00	0.40x1.20		11.60	92.0	2.98	276.5
□ estribos		4	20	8.60	0.40x2		9.40	75.2	2.46	185.0
□ estribos		2x3	25	2.40		2x0.20	2.80	33.6	3.85	129.4
□ ref. lateral		2x33	12	0.26	0.70	2x0.11	2.14	282.48	0.89	251.4
		33	10	0.40		2x0.09	0.58	38.28	0.62	23.7
		2	12	8.60		2x0.9	8.78	35.12	0.89	31.3
Vip 30x60 262	13	6	18	8.70		0.15	8.85	690.3	2.00	1380.6
□ ref. lateral		2	10	8.60		0.89	8.69	225.9	0.62	140.1
□ estribos		38	10	0.25	0.50	2x0.09	1.68	829.72	0.62	514.6
□ ref. lateral		38	10	0.25		2x0.09	0.43	212.42	0.62	131.7
Vip 40x80 263-262	13	8	20	8.70		2x0.16	9.02	938.08	2.46	2307.7
□ estribos		37	12	0.35	0.70	2x0.11	2.32	1115.92	0.89	993.2
□ ref. lateral		37	10	0.35		2x0.09	0.53	254.93	0.62	158.1
□ ref. lateral		2	12	8.60		2x0.09	8.78	228.28	0.89	203.2

10850.7

1-2-2

Elemento	Nº Elemento	Nº Barras	Ø	a	b	Sanchos	L parral	L Total	Porcº	Suma
Vija 30x70 2B1-RB2 RB1 ref. lateral ↳ laterales ↳ laterales	21	6	20	8.70		2x0.16	9.02	1136.52	2.46	2795.8
Vija 40x70 2BA ref. lateral ↳ laterales ↳ laterales	1	8	20	8.70		2x0.16	9.02	72.16	2.46	177.5
		2	10	8.60		2x0.09	8.78	17.56	0.62	10.9
		37	10	0.35	0.60	2x0.09	2.08	76.96	0.62	47.7
	12	12	0.35		2x0.09	0.53	6.36			3.9
Vija 40x80 RB2 ref. lateral ↳ laterales ↳ laterales	2	8	20	8.50	2x0.40	2x0.11	9.30	148.8	2.46	366.0
		2	12	8.50		2x0.11	8.72	34.88	0.89	31.0
		37	12	0.35	0.70	2x0.11	2.32	171.68	0.89	152.8
	12	12	0.35		2x0.11	0.57	13.68			12.2
Vija 45x80 RB1 ↳ laterales ↳ laterales ref. lateral	2	8	20	8.80	2x0.40		9.60	153.6	2.46	377.9
		4	20	2.20	0.40	0.16	2.76	22.08	2.46	54.3
		36	12	0.40	0.70	2x0.11	2.42	174.24	0.89	155.1
	12	12	0.40		2x0.11	0.62	14.88			13.2
	2	2	12	8.80		2x0.11	9.02	36.08	0.89	32.1
Vija 100x150 2B4 ref. lateral ↳ laterales ↳ laterales	4	20	25	8.90	0.40		9.30	744.0	3.85	2064.4
		4	12	8.60		2x0.11	8.82	141.12	0.89	125.6
		2x35	12	0.70	1.40	2x0.11	4.42	1237.6	0.89	1101.5
	25	12	1.40		2x0.11	1.62	226.8			201.9
	2x12	12	0.70		2x0.11	1.12	107.52			95.7
										9821.0

Elemento	Nº Elemento	Nº Barras	Ø	n	b	Barra	l _{pernal}	l _{total}	Pond	Peso
Vija 70x40 265 □ atornillos	2	16 51	18 12	6.50 0.60	0.40 0.35	2x0.11	6.90 2.12	220.8 216.24	2.0 0.89	441.6 192.5
Vija 70x150 R63 ref. lateral □ atornillos → atornillos	4	14 4 2x35 2x12	25 12 12 12	8.90 8.50 0.40 0.60	0.40 1.40	2x0.11 2x0.11 2x0.11	9.30 8.82 3.82 0.82	520.8 141.12 1069.6 78.72	3.85 0.89 0.89 0.89	2005.1 125.6 951.9 70.1
Vija 90x150 R6A	6	7 7 7	25 25 25	7.0 6.0 6.0	2x0.50 0.50	0.20 2x0.20	8.00 6.70 6.40	336.00 281.40 134.40	3.85	1293.6 1083.4 517.4
ref. lateral □ atornillos → atornillos	3 6 6	1 4 2x51 2x17	25 12 12 12	1.8 7.0 0.70 0.80	0.50 1.40	0.20 2x0.11 2x0.11 2x0.11	2.50 7.22 4.42 1.02	15.00 173.28 1352.52 104.04	0.89 0.89	57.8 154.2 1203.7 92.6
Mensula	4	8 8 10 2x4	25 12 12 12	1.80 1.30 1.70 1.60	2x0.50 1.40 0.80 0.60	2x0.11 2x0.11 2x0.11	2.80 2.92 5.22 4.62	89.6 93.44 208.8 147.84	3.85 0.89 0.89	345.0 83.2 185.8 131.6
Los2 180x8.0	13	8 8	12 10	8.80	2x0.20		9.20 9.20	956.8 956.8	0.89 0.62	851.6 593.2
Los2 250x8.0	8	11 11	12 10				9.20 9.20	809.6 809.6	0.89 0.62	720.5 502.0
Los2 3.24x8.0	7	16 16	12 10				9.20 9.20	1030.4 1030.4	0.89 0.62	917.1 638.8
Los2 2.66x8.0	8	12	12 10				9.20 9.20	883.2 883.2	0.89	786.0 547.6

14491.9

1-2-17

Elements	n: Elem	1: Elem	d	a	b	Gamma	Gamma	Total	Sum d	Sum
Refers transversal Loss 5 x 12	5	2 x 38	12 10	6.80	0.00			2546.0 2546.0	0.89 0.62	2265.9 1578.5
Loss 8 x 9.0	1	38 38	12 10	8.80	2 x 0.40			364.8 364.8	0.89 0.62	224.7 226.2
Loss 8 x 10.10	1	38 38	12 10	9.90	2 x 0.40			406.6 406.6	0.89 0.62	361.9 252.1
Loss 8 x 4.76	2	38 38	12 10	4.65	2 x 0.40			414.2 414.2	0.89 0.62	368.6 256.8
Loss cubicals 8.0 x 2.0	4	2 x 13	12 10	8.70	0.00			946.4 946.4	0.89 0.62	842.3 586.8
Loss cubicals 8.0 x 3.25	4	2 x 15	12 10	8.70	0.40			1092.0 1092.0	0.89 0.62	971.9 677.0
Refers transversal	4	36	12 10	7.10	2 x 0.40			1137.6 1137.6	0.89 0.62	1012.5 705.3
										10430.5

Elemento	No Elementos	H.E. bonos	δ	α	6	Bonos	C.pase.	L total	Paseo	Paseo
Parapeto bajo L=131m		3	12				151.0	1153.0	0.89	1103.2
		6	10				151.0	906.0	0.62	561.7
		3	12	2x0.45			0.90	32.4	0.89	28.8
		6	10	2x0.35			0.70	50.4	0.62	31.2
		755	10	1.85			1.85	1396.75	0.62	856.0
		747	10	0.90			0.90	673.30	0.62	416.8
Parapeto 2o piso	4	3	12	8.30		2x0.11	3.12	109.44	0.89	97.4
		6	10	8.90		2x0.09	9.08	217.92	0.62	135.1
		45	10	1.85			1.85	333.00	0.89	276.4
		44	10	0.90			0.90	158.4	0.62	98.2
Parapeto 3to L=61.8		309	10	1.82			1.82	562.38	0.62	348.7
		305	10	0.95			0.95	289.75	0.62	179.6
		305	10	0.55			0.55	167.75	0.62	104.0
		3	12				61.8	185.4	0.89	165.0
		9	10				61.8	556.2	0.62	344.8
		3	12	0.90			0.90	13.5	0.89	12.0
		9	10	0.70			0.70	31.5	0.62	19.5
										1108.4
Referencia baja (Sobremuros) L=51.0		257	12	1.0				257	0.89	228.7

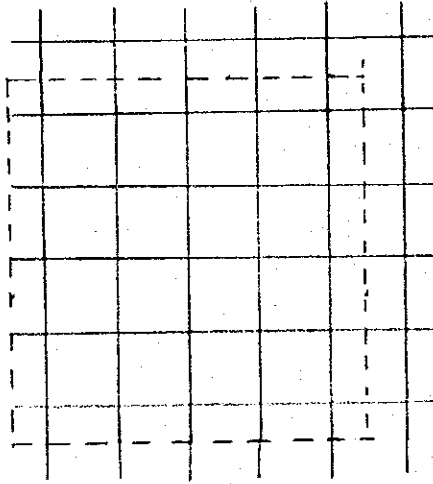
Refuerzo en los muros

Muro $h = 15 \text{ cm}$

$\phi 10$ a 200
 $\phi 10$ a 200

$5 \text{ m } \phi 10 \times 5 \text{ m}$

$l = 10 \text{ m } \phi 10$



anclajes $l = 75$ para muro de 3.7 de alto

$$l_1 = \frac{75}{3.7} = 20.3 \text{ cm} \times 5 = 101.5 \text{ cm}$$

anclajes en vigas 50cm

$$l_2 = \frac{50}{3.7} = 13.5 \text{ cm} \times 5 = 67.5 \text{ cm}$$

$$L_1 = 10.0 + 1.015 + 0.675 = 11.69 \text{ m/m}^2$$

$$P_{\text{muro}} = 11.69 \times 0.62 = 7.25 \text{ Kg/m}^2$$

b) Muro $h = 20 \text{ cm}$.

Tiene doble armadura

$$P = 2 \times 7.25 = 14.50 \text{ Kg/m}^2$$

c) Refuerzo puertas

$$4 \times 120 \times 0.012 = 5.76 \text{ m}$$

$$2(2 + 2 \times 80 \times 0.012) = 6.88 \text{ m}$$

$$6 + 2 \times 60 \times 0.012 = 6 + 1.44 \text{ m}$$

$$\phi 12 L = 14.02 + 6$$

para muro $h = 15$

$$\phi 12 L = 28.16 + 26$$

para muro $h = 20$

d) Refuerzo columnas

$$5.76 + 2(h + 2 \times 60 \times 0.012) + 6 + (h \times 60 \times 0.012) = 7.92 + 3h + 6 \quad 15 \text{ cm}$$

$$16.84 + 6h + 26 \quad 20 \text{ cm}$$

21

Muro $h = 15 \text{ cm}$

$$L = 2.8 + 6.3 + 6.3 + 8.2 + 4.1 + 16.4 + 2.7 + 2.3 + 6.1 = 55.2 \text{ m}$$

$$A_1 = 55.2 \times 4.35 = 240.1 \text{ m}^2$$

$$A_2 = 6.0 \times 3.7 = 22.2 \text{ m}^2$$

$$P_{\text{puertas}} = (0.7 + 0.7 + 0.8 + 1.6 + 1.2 + 0.8 + 1.6) 2 = 14.8 \text{ m}^2$$

$$A_{\text{TOTAL}} = 240.1 + 22.2 - 14.8 = 247.5 \text{ m}^2$$

$$\text{refuerzo} = 247.5 \times 7.25 = 1794.4 \text{ Kg}$$

$$\begin{aligned} \text{ref. puertas} &= 2(14.08 + 0.7) + 2(14.08 + 0.8) + 2(14.08 + 1.6) + 14.08 + 1.2 \\ &= 105.96 \times 0.89 = 94.3 \text{ Kg} \end{aligned}$$

$$\text{Total } \textcircled{D} = 1794.4 + 94.3 = 1888.7$$

Muro $h = 20 \text{ cm}$

$$L_1 = 7.2 \times 9 + 7.2 \times 4 + 7.8 + 4.5 + 2.4 + 6.8 + 6.8 + 3 + 7.7 \times 2 = 146.7$$

$$L_2 = + 7.8 \times 2 + 7 \times 2 + 6.8 + 5.6 = 42.0$$

$$A = 146.7 \times 3.7 + 42 \times 2.4 = 643.6 \text{ m}^2$$

$$\begin{aligned} \text{puertas} &= 24 \times 1.6 \times 1.5 + 12 \times 1.0 + 4.2 \times 2.85 + 1.8 \times 2.9 + 1.8 \times 2.0 \\ \text{ventanas} &+ 7.08 \times 1.5 + 0.8 \times 2.0 \times 2 + 0.5 \times 0.5 \times 2 + 0.9 \times 2 \times 2 = 97.5 \text{ m}^2 \end{aligned}$$

$$A_T = 643.6 - 97.5 = 546.1 \text{ m}^2$$

$$\text{refuerzo} = 546.1 \times 14.50 = 7918.5 \text{ Kg}$$

$$\begin{aligned} \text{puertas} &= (15.84 + 6 \times 1.5 + 2 \times 1.6) 24 + 15.84 + 6 \times 2 \times 1.2 + 15.84 + 6 \times 2.85 \\ &+ 2 \times 4.2 + 15.34 + 6 \times 2.9 + 2 \times 1.2 + 15.84 + 12 + 2 \times 1.8 + \\ &15.84 + 6 \times 1.5 + 2 \times 7.08 + 2(15.84 + 6 \times 2 + 2 \times 2) + 2(15.84 + \\ &6 \times 0.5 + 2.05) + 2(15.84 + 6 \times 2 + 2 \times 0.9) = 1008.5 \text{ m} \end{aligned}$$

$$\text{refuerzo} = 1008.5 \times 0.89 = 897.5 \text{ Kg}$$

$$\text{Total} = 7918.5 + 897.5 = 8816 \text{ Kg}$$

1-2-21

Muro h = 20 Paredes 11 m.

$$A_1 = 7.1 \times 10.6 \times 4 = 301.0 \text{ m}^2$$

$$\text{Ventanas} = 1.6 \times 3.5 \times 4 \times 4 = 89.6 \text{ m}^2$$

$$A_1 = 301.0 - 89.6 = 211.4 \text{ m}^2$$

$$A_2 = \left[11 \times 5.9 + 11.4 \times 4.8 + \frac{(4 + 11.4)}{2} \times 1.05 \right] \times 2 = 255.4 \text{ m}^2$$

$$\text{Ventanas} = 1.6 \times 3.5 \times 6 + 5 \times 5 = 58.6$$

$$\text{Puerto} \\ A_2 = 255.4 - 58.6 = 196.8 \text{ m}^2$$

$$A_1 = 211.4 + 196.8 = 408.2 \text{ m}^2$$

$$\text{Columnas} = 0.4 \times 11.75 \times 2 + 0.4 \times 10.2 = 13.5 \\ \text{Vigas}$$

$$A_{\text{TOTAL}} = 408.2 - 13.5 = 394.7 \text{ m}^2$$

$$\text{Referencia} = 394.7 \times 14.50 = 5723.2 \text{ Kg}$$

$$\text{puertas y vent} = 28.16 + 2 \times 5 + (15.84 + 6 \times 3.5 + 2 \times 1.6) \times 14 = 598.7$$

$$\text{Ref puertas} = 598.7 \times 0.89 = 532.8$$

$$\text{Ref total} = 5723.2 + 532.8 = 6256 \text{ Kg}$$

Resumen :

$$\text{Columnas} = 23.65 \text{ t}$$

$$\text{Vigas} = 29.51$$

$$\text{losa} = 16.22$$

$$\text{paredes} = 4.11$$

$$\text{muro h=15} = 1.89$$

$$\text{muro h=20} = 15.07$$

$$\text{TOTAL} = 90.55 \text{ t}$$

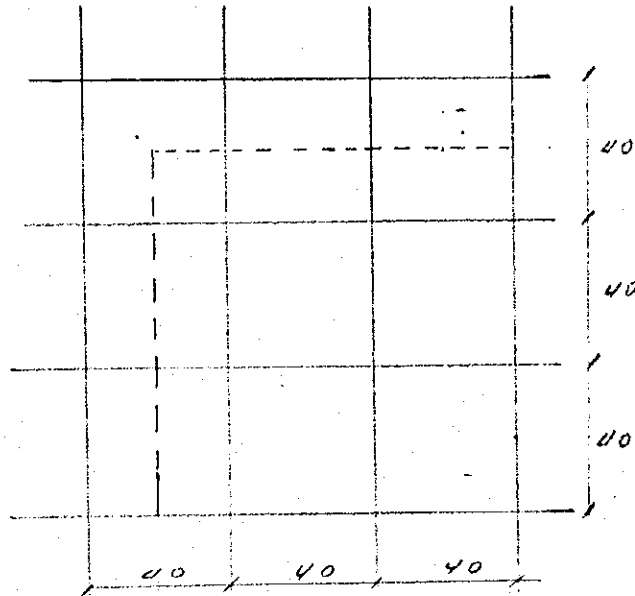
Elemento	Nº Estruct.	Nº barras	φ	a	b	Familia	l.punc.	l total	Peso p	Peso Total
CANALIZADO L = 6.0 m	1	2	12	5.80		2x12	6.04	12.08	0.89	10.8
		4	10	5.80		2x11	6.02	24.08	0.62	14.9
		30	10	2.00			2.00	60.00	0.62	37.2
CANALIZADO L = 2.2 m	1	2	12	2.10		2x12	2.34	4.68	0.89	4.2
		4	10	2.10		2x11	2.32	9.28	0.62	5.8
		12	10	2.00			2.00	24.00	"	14.9
lazo pino embudo	1	34	12	5.10		2x12	5.34	181.56	0.89	161.6
		2x27	12	3.50	0.20		3.70	199.80		177.8
		27	10	2x45	0.25		1.33	35.91		22.3
arco embudo	1	1	12	3.0	2x0.15	2x12	3.54	3.54	0.89	3.2
		1	10	3.0	2x0.15	2x11	3.52	3.52	0.62	2.2
		17	10	0.95			0.95	16.15	0.62	10.0
fumbado	1	28	12	1.40	0.25		1.65	46.2	0.89	41.1
		5	12	4.10		2x12	4.34	21.7		19.3
		20	10	4.10		2x11	4.32	86.4	0.62	53.6
		20	10	2.95	2x1.40	3.75	75.0	0.62	46.5	
		28	12	2.40		2.40	2.40	67.2	0.89	59.8
							otros	20%		137.0
							Total	varios		822.2

1-2-20

Elemento	No	Porcentaje	φ	a	b	Forma	Superficie	Perímetro	Area	
Fundos	1	9	12	7.50			7.30	87.6	0.89	78.0
		2x9	12	2.70			2.70	48.6		43.3
		9	16	3.90			3.90	35.1	1.58	55.5
		9	10	6.50			6.50	58.5	0.62	36.3
		9	12	1.10	2x0.20		1.50	13.5	0.89	12.0
	6	16	10	1.10			1.32	21.12	0.62	13.1
		2x9	12	3.20	2x0.15		3.50	378.00	0.89	336.4
		9	12	7.40			7.40	599.4	0.89	533.5
		2x9	12	2.00			2.00	324.0	0.89	288.4
		9	16	5.00			5.00	405.0	1.58	639.9
9	9	10	8.45			8.45	684.45	0.62	424.4	
	11	12	1.10	2x0.20		1.50	148.5	0.89	132.2	
	2x11	10	1.10			1.32	261.36	0.62	162.0	
										2755.0 %

1-2-24

Refuerzos en paredes de bloques de hormigón



$$L = 6 \text{ m } \phi 10$$

$$\text{ancho} = 1.20 \text{ clavillo } \quad L = 5.0 \text{ m} \quad \frac{1.20 \times 3}{5} = 0.72 \text{ m}$$

$$\text{paso col} = 0.40 \text{ clavillo } \quad \frac{0.4}{5} = 0.08 \text{ m}$$

$$L_{\phi 10} = 6.0 + 0.72 \times 2 + 0.08 = 7.52 \text{ m } \phi 10$$

$$L_{\phi 12} = \frac{0.75}{2} + \frac{1.0}{5} = 0.35 \text{ m } \phi 12$$

$$Paso = 7.52 \times 0.62 + 0.35 \times 0.89 = 5.0 \text{ Kg/m}^2$$

$$Paso = 1600.56 \text{ m}^2$$

$$\text{Refuerzo} = 1600.56 \times 5 = 8002.8 \text{ Kg}$$

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
103 Concrete Covering to Roof (Concrete class H1)				
EL. 74.70	$(23.8 \times 11.5) + (32.5 \times 11.5) - (8.9 \times 6.07) - (8.75 \times 2.8)$			
EL. 82.10	(12.5×16.2)			
EL. 77.90	(8.4×7.5)			
EL. 70.10	(51.0×2.5)			
	1522.08×0.1	m ³	152.20	
109 Welded Mesh (same area as for Item 103)		m ²	1522.0	
110. Metal Lath to waterproof cement plaster				
Parapet at 94.70	$(24.5 \times 2 + 32.5 \times 2 + 3) = 117\text{m}$			
	$(12.2 + 9 + 5.93) = 38.93$			
	$117.0 \times 1.4\text{m} + 38.93 \times 1.05$	m ²	204.68	
Penthouse	$(8.9 \times 2 + 6.07 \times 2) = 29.94$			
	29.94×0.87	m ²	26.05	
Parapet at 82.10				
	$(16.00 + 0.9) \times (0.16 + 0.9 + 0.17 + 0.15 + 0.9)$	m ²	38.53	
	$14.0 \times (0.16 + \frac{0.2}{2} + 0.17 + 0.15 + 0.55)$		20.87	
Parapet at EL. 77.90				
	$9.0 \times 2 \times (0.35 + 0.15 + 0.55) + 8.9 \times 2 \times (0.35 + 0.15 + 0.9)$	m ²	43.82	
Parapet at EL. 77.10				
	$(8.0 \times 4 + 8.5 \times 2 + 11.0 + 1.2 \times 4) \times 12 \div$			
	$119.1 \times (0.17 + 0.15 + 0.55)$	m ²	103.62	
			437.42	

570.08
202.5
63.0
686.5

1522.08 = Total Area of Roof

$0.35 + 0.15 + 0.9 = 1.4\text{m}$
 $0.35 + 0.15 + 0.55 = 1.05\text{m}$
 $0.17 + 0.15 + 0.55 = 0.87$

119.1m

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
11 Foamed Polyethylene to construction joint (columns)	0.6×4.5	m^2	2.7	
	(girders) $0.8 \times (7.0 - 1.2) + 0.6 \times 1.5$		6.24	
	(Parapets) $0.6 \times (9 + 1.5 \times 2)$		7.2	
			17.04	
12. 3-ply build up asphalt roofing				
EL 20.0	$(51.0 - 0.9) \times 11.8 + 0.35 \times (61.9 + 1.5 \times 4 \times 12)$	m^2	638.05	
EL 24.70	$(12.0 - 0.3) \times 24.6 + (11.8 \times 32.6) - (6.0 \times 8.55 \times 9 \times 2.6)$		594.20	
	$0.4 \times (11.7 \times 2 + 24.5 \times 2) + (11.8^2 + 32.6 + 23.7 - 2 \times 4.8 \times 9.855 \times 2 - 6.0^2)$		70.11	
EL 22.9	$(9.0 - 0.3) \times (8.5 - 0.3 + 0.2) + 0.4 \times (8.7 \times 2 + 8.4 \times 2)$		86.76	
EL 22.1	$(18.0 + 0.9 - 0.3) \times (14.0 - 0.3) + 0.4 \times (16.6 \times 2 + 13.7 \times 2)$		251.66	
			1840.78	
13 2-ply build up asphalt roofing				
	$(8.5 - 0.2) \times 2.07 + 2.6 \times 2.1 + 0.3 \times (8.5 + 2.7 + 2.6 \times 2.1) \times 2$	m^2	35.36	
14 Waterproof cement mortar to drainage gutter in substructure				
EL 30.0	(line A) $6.6 + 7.2 \times 2 + 7.5 + 5.8 + 6.6 = 40.9 m$			
	(line C) 5.4×6		$= 32.4$	
	(line 1.7) $(4.5 + 9.2) \times 2$		$= 21.4$	
EL 55.0	$0.7 \times (30.9 + 32.4 + 21.4) \times 2$	m^2	103.26	
60.0	(line A) $6.6 \times 2 + 7.2 \times 2 + 7.5 \times 2 + 5.8 = 48.4 m$			
	(line C) 5.4×7		$= 37.8$	
65.0	(line 1.8) $(4.5 + 9.2) \times 2$		$= 21.4$	
	$0.7 \times (48.4 + 37.8 + 21.4)$		58.104	
		m^2	751.5	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
1.5 Asphalt compound joint				
EL. 74.7	$(240 \times 5) + (10.0 \times 9) + (23.3 \times 4 + 8.5 \times 23.0)$		334.70	
EL. 77.9	$(8.5 \times 4) + (7.3 \times 5) + \frac{24.5^2}{2} + (16.2 \times 5) + (12.5 \times 8)$		251.5	
EL. 76.1	$(50.1 \times 4) + (11.8 \times 7)$		401	
			987.2	
1.6 Polyurethane caulking to 20 mm				
	caulking for parapet			
	$(5 \times 2) + (11.7 \times 4) + (8.75 + 8.75 + 6.1) \times (5.5 \times 2 + 16.6 \times 2)$	m	249	
	caulking wall 4.6 x 6		27.6	
	caulking for floor 9-12		7.8	
		m	287.4	
1.7 Polyurethane caulking to fixtures		m	456.9	
	From calculation sheet for fixtures			

Working Division:

29

Description	Calculation Details	Unit	Quantity	Remarks
18-in. Hollow	Concrete Blocker in Substructure (17x40)			
A line	EL 50.0 ~ EL 55.0 / ~7			
	$(49.0 - 15.4) \times (20 \text{ blocks} \times 0.2^2) =$	m ²	134.40	
	EL 55.0 ~ EL 63.0			
	$(57.0 - 17.8) \times (28 \times 0.2^2) =$		219.52	
	EL 63.0 ~ EL 70.0			
	$(57.0 - 17.8) \times (22 \times 0.2^2) =$		172.48	
B line	EL 50.0 ~ EL 55.0 / ~7			
	$(19.0 - 8.4) \times (19 \times 0.2^2) =$		154.38	
	EL 55.0 ~ EL 70.0			
	$(57.0 - 10.0) \times (19 \times 0.2^2) \times 3 =$		535.80	
1 line	EL 50.00 ~ 70.0 A ~ B			
	$(10.5 - 1.3) \times (50.0 - 5.0) =$		133.48	
	EL 50.00 ~ 70.00 B ~ C			
	$(7.0 - 2.9) \times (19.0 \times 0.2) \times 4 =$		62.32	
7 line	EL 50.0 ~ 55.0 A ~ C			
	$(17.5 - 4.2) \times (19 \times 0.2^2) =$		50.54	
8 line	EL 55.00 ~ 70.0 A ~ C			
	$(17.5 - 4.2) \times (19 \times 0.2^2) \times 3 =$		151.62	
		m ²	1614.44	

1-2-29

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
18-c Hollow	Concrete block $t=100$			
Trilit	sink wall 2.0×1.0		2.00	
	wind wall 2.0×1.5		2.80	
	partition 1.5×2.0		2.00	
	Shower room partition 1.2×2.8		3.36	
Roof	EL 70.40 B.C. lime			
	$(57.0 - 0.15 \times 4) \times 0.22 \times 2$		22.56	
	$1.4 \times 4 \times 8$ base			
	$(12.0 - 0.15 \times 2) \times 0.2 \times 4$		9.36	
	Peat house			
	$(8.5 + 0.4) \times 0.2 \times 2$		3.56	
	Columns $(0.3 - 0.6) \times 2 \times 0.2 \times 2$		1.12	
	Peat house roof			
	$(8.5 + 0.4 - 0.3) \times 2 + (9.0 - 0.3) \times 2 \times 0.2$		6.92	
	Platform roof			
	$\{(14.0 - 0.3) \times 2 + (16.0 - 0.9 - 0.3) \times 2\} \times 0.2$		12.16	
	EL 70.10 wall			
	$\{(8.0 \times 4 + 8.5 \times 2 + 0.4 \times 2 + 0.45) + (11.0 - 1.5) + (11.5 \times 4 \times 1/2)\} \times 0.2$		26.69	
			92.53	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
11) Glazed Ceramic tile				
Toilet	$(17.9 \times 2 + 2.15 \times 2) \times 2.45 - (2.4 \times 2 + 1.6) =$		42.845	
Kitchen	$1.5 \times 1.6 + 1.5 \times 1.6 =$		3.20	
SHOWER	$(2.5 \times 6) - (1.2 + 1.33) =$		12.22	
			58.27	
120. Terrace tile to floor				
EL 50.0 Pump Room	$(47.2 \times 17.0) - (16.9 \times 6.4 \times 6 + 4 \times 4 + 6.0 + 6 \times 2 + 7.5 + 14.35) =$		622.65	
EL 55.0 Repair Shop & High-Tension cubicle room	$(55.0 \times 6.4) - (4 \times 5 + 6 + 2.0 + 14.4 \times 2) =$		300.80	
EL 60.0 Low-Tension Switchgear room	$(55.0 \times 6.4) - (20.0 + 6 + 2.7 + 14.4 \times 2) =$		300.80	
EL 65.0 Cable Gallery & Store room	$(31.5 \times 6.4) - (4 \times 3 + 3.0 + 2.7 + 14.4 \times 2) =$		155.10	
EL 70.0 Entrance Hall, Corridor, Kitchen	$(2.6 \times 2.825) + (1.8 \times 2.2) + (1.5 \times 3.6) + (2.6 \times 5.0) + (5.6 \times 5.0) + (4.0 \times 1.525) + (1.525 \times 7.675) + (2.6 \times 4.0) + (1.8 \times 8.105) + (3.1 \times 1.475) + (5.075 \times 2.4) =$		117.06	
			1495.81	
121. Mosaic tile to floor	$2.4 \times 8.1 + 2.0 \times 2.4$	m ²	24.24	

Description	Calculation Details	Unit	Quantity	Remarks
122 PVC Tile	slip landing	m ²		
	staircase (1) $(2.4 \times 1.2 \times 128) + (1.56 \times 2.1 \times 6)$		119.3	
	alcove (2) $(0.4 \times 1.2 \times 142) + (1.56 \times 2.1 \times 5)$		90.78	
	control room 10.825×8.2		86.30	
	tile staircase 2.825×5.4		15.26	
	conference room $6.305 \times 6.125 + 0.7 \times 3.795$		41.38	
	office 6.305×7.325		46.33	
	manager 5.505×3.05		21.27	
		m ²	400.67	
123 Sprayed Tile	ceiling for F3 finish to exterior wall(s)	m ²	1740	
124 a Cement mortar finished to wall				
	A line $50^{\circ} \sim 70^{\circ} (47 \times 18) + (0.50 \times 2 \times 6.2 \times 6)$	m ²	831.5	
	" $7^{\circ} \sim 8.55^{\circ} \sim 70^{\circ} (8 \times 119) + (0.50 \times 2 \times 6.2)$		101.4	
	1 line A ~ B $50^{\circ} \sim 70^{\circ} (105 \times 18.9)$		198.45	
	" B ~ ($50^{\circ} \sim 70^{\circ} (65 \times 17.5)$		105.00	
	C line $50^{\circ} \sim 55^{\circ} 47 \times 4.4 + (3.3 \times 2 \times 2 \times 4.4)$		264.38	
	" $55^{\circ} \sim 70^{\circ} 55 \times 13.7 + (3.2 \times 2 \times 2 \times 13.7)$		928.06	
	7.8 line $50^{\circ} \sim 70^{\circ}$ A ~ B 10.5×18.3		192.15	
	" " B ~ C 6.5×16.6		107.9	
	B line $50^{\circ} \sim 55^{\circ} (8 \times 4 + 10) \times 4.375$ 柱型		183.75	
	" $55^{\circ} \sim 60^{\circ} (8 \times 5 + 10) \times 4.375$ 柱型		218.75	
	" $60^{\circ} \sim 70^{\circ} (7 \times 5 + 9) \times 4.375$ 柱型		192.5	
	B line $50^{\circ} \sim 70^{\circ} (2.5 \times 3.5) + (2.5 \times 40 \times 3)$ 柱型		387.5	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
Platform	$19.6 \times 12.8 - (5.6 \times 8)$	m ²	206.08	A line
	$19.6 \times 12.8 - (5.6 \times 8 - 1.6)$		216.28	B line
	$13.4 \times 13.2 - (5.6 \times 8)$		130.08	7 line
	$13.4 \times 13.2 - (25.0 - 5.6 \times 2)$		140.68	9 line
Stair case (1) EC 7490	$5.2 \times 3.05 - 1.44$	m ²	14.42	
	$5.2 \times 3.05 - 1.6$		14.26	
	$3.0 \times 3.05 - 2.4$		6.75	
	3.05×3.05		9.30	
Battery Room	$(17.2 \times 4.25) - (3.04 + 2.4)$	m ²	57.46	$5.00 \times 2 + 3.6 \times 2 = 17.2$
Air Con Room	$(19.6 \times 4.25) - (3.44 + 2.4)$		77.46	$5.00 \times 2 + 4.8 \times 2 = 19.6$
Control room	$(30.8 \times 3.3) - (2.4 \times 3 + 5.22 + 3.04 \times 2 + 10.6)$		98.94	$11.00 \times 2 + 8.4 \times 2 = 38.8$
Corridor	$(44.3 \times 3.1) - (2.4 \times 7 + 1.52 \times 2)$		117.49	$8.0 \times 3 + 8.5 \times 2 + 0.2 \times 7 + 1.1 + 0.4 \times 2 = 44.3$
ENTRANCE	$7.75 - (3.02)$		4.73	$2.5 \times 3.1 = 7.75$
	$(113.16 \times 3.1) - (1.52 + 3.04 \times 7.52 + 1.33)$		343.39	$(8.5 \times 2 + 0.4 + 1.0 \times 2.0 + 1.2 + 3.3 + 2.1) \times 3.1 = 113.16$
Tel room	$(17.2 \times 2.9) - (2.4 + 1.52)$		45.96	$(5.6 \times 2 + 3.0 \times 2) = 17.2$
Canteen	$(28.2 \times 2.9) - (1.74 + 3.04)$		76.34	$16.7 \times 2 + 4.9 \times 2 = 28.2$
Fen	$(17.5 \times 4.25) - (2.4 + 3.08) =$		45.27	$(3.05 \times 2 + 5.7 \times 2) = 17.5$
Office	$(28.0 \times 2.9) - (2.4 \times 2 + 3.04 + 1.52)$		71.84	$(6.5 \times 2 + 7.5 \times 2) = 28$
Manager	$(19.4 \times 2.9) - (2.4 + 3.28)$		51.59	$(4.60 \times 2 + 5.7 \times 2) = 19.4$
	6 reduce for concrete blocks wall (124-6)		12.14	
		m ²	3847.15	
124-6 Cement mortar to Hollow concrete blocks wall (same as for 19-a)		m ²	1614	

1 1 2 1 2 2 2 2

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
124C Cement mortar skirting H=100				
EL. 74 900" ELEVATOR ROOM	$(5.47 \times 7.7 + 2.875 \times 2) - 0.8$	m	15.89	
STORE ROOM	$(2.57 \times 2 + 5.75 \times 2) - 1.6$		13.59	
EL. 70.2 AIR & VENT.	$5.1 \times 2 + 4.525 \times 2 - 1.8$		17.45	
CONTROL	$10.88 \times 2 + 8.7 \times 2 - 1.42 - 1.8$		33.05	
TELE -	$2.875 \times 2 + 5.6 \times 2 - 0.8$		18.15	
CONFERENCE	$8.825 \times 2 + 6.3 \times 2 - 1.6$		24.65	
OFFICE	$7.325 \times 2 + 6.3 \times 2 - 1.6 - 0.8$		24.85	
MANAGER	$3.675 \times 2 + 5.6 \times 2 - 1.2$		17.35	
FAN	$3.25 \times 2 + 5.6 \times 2 - 1.6$		16.10	
EL. 5" CABLE	$6.0 + 23.5 + 5.0 \times 2 + 3.0$		42.50	
			221.38	
124d Cement mortar skirting H=200				
Platform				
Align	$16.0 + 0.9 \times 2$		17.8	
B line	$16.0 + 0.9 \times 2 - 0.8$		17.0	
(7) line	$5.5 \times 2 + 0.9 \times 2 + 0.5 \times 4$		14.8	
(9) line	$5.5 \times 2 + 0.9 \times 7 + 0.5 \times 4 - 5.0$		9.8	
Erection Bay				
	$10.0 + 8.0 + 0.5$		18.5	
			77.9	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
124-c	Cement mortar skirting H=300. (exterior)			
1 line	$9.0 - 1.8$		7.2	
C line	$57.0 + 0.4 \times 2 + 0.7 \times 13 + 1.5 + 2.9 + 0.2 \times 2 - 1.8$		67.8	
B line	$9.0 - 1.3 + 0.4 - 0.9 - 1.6$		7.4	
B line	$8.0 + 0.45 - 0.1 + 0.4 \times 2$		9.5	
g line	$11.0 + 1.5 \times 2 - 5.0 + 0.2 \times 6$		10.2	
A line	$8.0 \times 2 + 0.45 \times 2 + 0.4 \times 4$		18.5	
			120.25	
125-a	Cement mortar applied to RC floor t=30 (same area as for 120 turrgo floor)		1496	
125-b	Cement mortar t=30 to staircase			
Stair case landing	$1.46 \times 2.90 \times 5$	m ²	21.17	
Steps	$(0.24 + 0.185) \times (27 + 27 \times 4)$		56.1	
Staircase landing	$1.46 \times 2.90 \times 5$		21.17	
Steps	$(0.24 + 0.185) \times (27 \times 5)$		37.38	
			155.82	

1-2-24

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
125-4	Cement screed to asphalt roofing (same area as for 103)	m ²	1522.68	
127A	Cement screed to Blazed Ceramic Tile (same area as for 103)	m ²	59	
- b	Cement screed to terrazzo tile (same area as for 120)	m ²	1496	
- c	Cement screed to asphalt block tile Battery Room $(5.0 \times 2.0 - 0.075) \times (3.0 - 0.4 - 0.075)$	m ²	12.94	
- d	Cement screed to PVC tile from 122. $66.30 + 15.76 + 41.38 + 46.23 + 271.27$	m ²	190.54	
- e	Cement screed to mosaic tile (same area as for 121)	m ²	2424	
128	Steel through finish to exposed concrete			
- a	Floor (platform, $(11.0 + 0.9 \times 2) \times (8.05) + 2.0 \times 2.3$)	m ²	108.8	
- b	Covering concrete of roof (same area as for 103)	m ²	1523	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
129. Terra 330 Border	$9.7 + 2.0 + 1.3 + (4.9 \times 5) + 1.7 + (4.8 \times 5)$	m	62.2	
	$6 \times 7 \times 2 + 8 \times 6 + 10$		192.2	
	$5.0 + (6.0 \times 0.9) \times 2 =$		18.8	
			273.2	
130. Terra 330 Skirting H=100.				
EL 50°	$4.7 + 2.13 + 8.0 + 8.5 \times 2 - 0.8 + 3.4 + 2.9 + 16.5 \times 2$ $+ 8 \times 4 + 10.$		154.63	
EL 55°	$6.5 + 8 \times 2 + 9.0 + 1.1 + 2.9 + 8.0 + 11.5 + 2.9 + 8.0 + 6 \times 5 + 7.$		102.9	
EL 60			102.9	
EL 65	$102.9 - (8.5 \times 8.0 + 7.5 + 6.5 + 3 + 6 \times 2)$		57.4	
EL 70°	$8.5 \times 2 + 8.0 \times 3 + 0.2 \times 7 + 1.4 + 0.4 \times 2 - 0.8 + 1.2 + 8.5 + 1.0$ $+ 1.5 + 2.0 + 1.5 + 1.2 + 2.7 + 6.5 + 1.6 + 7.1 - 0.8 + 0.8 + 4.0 - 1.2$ $+ 3.1 + 2.75 + 1.4 + 0.8.$		53.4	
			24.3	
			6.45	
			501.98	
131. Terra 330 to corner frame of elevator door				
	4.8 x 5	m	24.0	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
132 Coloured Cement spraying				
Outside walls	$(1.85 \times 57.2) - (1.85 \times 49.2) + (1.3 \times 1.2 \times 15)$	m ²	220.40	
Interbay Ceiling				
E747 Staircase	2.1×5.525	m ²	11.651	
E1702 Fan room	2.85×5.525		15.95	
Air con room	5.2×4.5		23.40	
Platform	$(12.2 + 1.1 \times 3) \times (6.0 - 0.9 \times 2) =$		220.10	
Crane Girder	$(4.0 \times 32) + (2.5 \times 55) + (4 \times 55) =$		485.50	
Pump Room	$(11.0 \times 48.9) + (1.0 \times 12) \times 11.0 + (1.0 \times 4 \times 38.5)$		889.90	
E.L.B. EL655	$55 \times 6.0 - (30 \times 5 + 45) - (9 \times 2.0) \times 3$		614.2	
E.L.D.	$47 \times 6.5 - (4.0 \times 4 + 6.0) - 1.7 \times 2.0$		280.1	
		m ²	2965.86	
133 Asbestos cement sheet ceiling				
	$(2.0 \times 2.7) + (2.1 \times 2.5) \times (3 \times 2.5)$	m ²	34.07	
134 Acoustic rockwool tile ceiling				
Entrance corridor	(41.11.50 Terrazzo tile)	m ²	117.06	
Central	10.525×8.2		66.30	
Telcom	2.825×5.4		15.26	
Conference	$6.325 \times 6.25 + 0.7 \times 3.775$		41.38	
Office	6.325×7.325		46.33	
Manager	5.525×3.85		21.27	
			307.10	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
135 Acid-proof blocks				
	2.6 x 5.1	m ²	13	
136 Oil paint applied to				
a. Structural steel				
b. Steel Handrail		m ²	132.0	
	Type A 120 x 1.1' =			
	Type B 37 x 1.1' =		40.7	
	Type C 152.4 x 0.17		106.68	
	Removable Type 19.2 x 1.1'		21.12	
			300.5	
c. Caged Ladder				
	5.0 x 0.9 x 24.74	m ²	9.00	
d. Steel doors and frame (from Annex summary)			158.55	
e. Wooden surface		m ²	43.0	
	建具板 4-y			
	partition screen (3.5 + 2.0) x 1.8		9.9	
	door frames. (5.6 + 10.5 + 10.0 + 4.4 + 4.8 + 14.5 + 5.2 + 7.6) x 1.2		31.90	
			84.80	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
136-6	oil paint to be used - d. d. d. $0.1 \times 13 \times 0.2 \times 1.5$	m ³	0.47	
137-6	Vinyl paint to asbestos cement ceiling (same area as for 133)	m ²	55.0	
-5	Vinyl paint to cement plaster wall skirting from 124-a, 124-b, and 124-c, d)	m ²	5438.78	
138	Acid paint wall and ceiling from 124-a and 124-c 67.66×12.94	m ²	80.4	
140	Cupboard & shelf	Nos	1	
141	Blind box, 165 x 150 mm deep $1.6 \times 8 \times 7.100 = 19.9$	m	19.9	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
147	Clear wire glass t=6.5mm (from /45)	m ²	143.52	
148	Figured sheet glass t=4mm (from /39)	m ²	198	
149	Clear sheet glass t=6mm (from /44)	m ²	1074	
150	Steel pipe handrail			
	Type A 6.2 x 2 + 6 x 6	m	120.0	
	B (1+1) x 2 + 2 x 6 + (3+3.5+4.5)		39.0	
	C 2 + (3.5+4.3+3.5+4.5+3.3+4.5+3.5) x 2			
	+ 3.3+3.0+4.0 = 82.9			
	66 + 2.5 x 2 + (4.6+3.5 x 2) x 4 + 4.6+3.5+4.2 x 4 = 69.5			
	82.9 + 69.5		152.4	
	Non-slip 3570			
	10.0 + 10 + 2.5 + 2			
151	Caged ladder 5.0 x 0.9	L.S.		
152	Stainless steel door mat 1.500 x 600	No.	1	

Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
153 Steel pipe embedded in concrete	$400 \times 20 \times 8 + 1500 \times 20 \times 1 + 500 \times 15 \times 5$	m	99.5	
154 Parapet ring		nos	15	
155 Grating steel hatch cover	$2500 \times 1500 \times 50$	no	1	
156 Expansion cover to roof		m	20	
157 Stainless meshing to stairs	$12 \times (132 + 139)$	m	325	
158 PVC rainwater downspout	D100 $4.5 \times 17 + (74 \times 1) + (12.1 \times 3) + (3.2 \times 2)$	m	130.6	
159 Kitchen sink		set	1	
160 Wooden partition screen	$1.8 \times (3.5 + 1 + 1)$	m ²	9.9	
161 Skylight upstair lounge		set	120	
162-a Cast iron made roof drain		Nos	25	
-b substructure		Nos	2	

Working Division: 2.6.3 Diesel Generator House

Description	Calculation Details	Unit	Quantity	Remarks
2.6.3 Diesel Generator House				
Earth Works				
101 Open-cut excavation in random backfill	$7.00 \times 5.50 \times 1.30$	m^3	50.05	
102 Random backfill	$50.05 - (202 - 768 - 166 - 546) =$	m^3	18.29	
103 Gravel bedding	$(4.15 \times 5.65 - (1.2 \times 2.7)) \times 0.1$	m^3	2.02	
104 Concrete class C				
	$2.34 + 5.81 + 2.27 + 14.55 + 1.77 + 10.71 + 18.61$ $+ 8.98 + 0.73$	m^3	65.93	from sheet No. 2
105 Concrete class H	$0.28 + 1.02 + 0.46 + 3.00$	m^3	5.26	from sheet No. 3
106 Formwork for F1 finish	$61.07 + 4.96$	m^2	66.05	from sheet No. 3
107 Formwork F3 finish	$239.27 + 0$	m^2	239.27	
108 Reinforcing Bars				

Working Division:

Description	Concrete			Formwork			Remarks
	Dimensions	Nos.	Volume m ³	Dimensions	Nos.	Area F1 m ²	
105 Concrete Class H							
Foundation							
1.4 1.4 0.1	4	0.18	5.6 0.1	4	0.24		
Foundation Beams							
0.55 0.86 0.1		1.02	1.86 0.1		1.86		
Generator Foundation							
1.4 2.19 0.1	1	0.46	8.6 0.1	1	0.86		
Concrete on roof							
7.8 4.8 0.08	1	3.00					
		5.26				4.96	

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Working Division:

Description	Calculation Details	Unit	Quantity	Remarks
109	Hollow concrete blocks 31.0 x 0.4	m ²	12.4	
110	3-ply Asphalt roof covering 8.7 x 8.7 + 31 x 0.4 = 58.79 + 12.4	m ²	70.69	
111	Cement mortar to floor 4.3 x 5.8 - (1.2 x 2.7)	m ²	21.7	
112	Base cement mortar covering 6.9 x 8.4	m ²	57.96	
113	Cement mortar interior plastering l=100 (9.3 x 2 + 5.8 x 2)	m	20.2	
114	Cement mortar to external skirting l=200 (5.1 x 2) + (6.6 x 2 - 1.6) - 0.2 x 8	m	23.4	
115	Cement mortar to interior wall	m ²	72.21	4.05 x (4.3 + 5.8) x 2 - 1.6 x 2.0 x 3 = 72.21
116	Waterproof cement mortar to roof gutter	m ²	4.8	8.0 x 0.6 =
117	" " to parapet	m ²	23.25	(0.7 + 0.35 + 0.20) x (7.4 + 8.7) x 2 = 23.25
118	Concrete floor finish on floor	m ²	3.63	1.2 x 2.7 + (1.2 - 2.7) x 2 x 0.1 = 3.63
119	Spray tile on exposed concrete 263.788 + 46.2 + 39.6	m ²	349.79	wall 3.9 x (6.6 + 5.1) x 2 + 0.2 x 8 + (-1.6 x 3) = 76.79 parapet (1.0 + 0.2 + 0.2) x (7.4 + 8.7) x 2 = 46.2 scaffit.

Working Division:

b

Description	Calculation Details	Unit	Quantity	Remarks
120	oil paint to metal surface from sheet 7	m ²	80	
121	Steel doors (from sheet 7)	m ²	32	
122	Aluminium windows and Louvers (from sheet 7)	m ²	650	
123	figured wire glass 16.8 (from sheet 7)	m ²	27	
124	roof drains	No	2	
125	Steel horizontal beam	kg	3908	(294 x 200) 56.8 ^{kg} / _m x 65 =
126	Checkered steel plate 0.6 x 5.8 + 0.35 x 1.4 = 3.97	m ²	3.97	
127	PVC downspout 4.5 x 2 + 2	m	11.0	
128	Elastic joint filler (1.2 + 2.7) x 2 = 7.8	m	7.8	

Working Division:

Description	Calculation Details						Remarks		
	Dimensions	Qty	Area	Painting TYPE	Fac. Area	Glass Dimensions	Area m ²	TYPE	Caulking
Steel Channel									
SP-1	16 210	1	3.2	OP	Z.S	Ø10			7.20 (1.6+2.0) x 2 = 7.2
Aluminum									
AW-1	16 202	1	8.4			1.5 x 0.9 x 2	2.7	2.9	14.6 (1.6 + 2.0) x 2 x 2 = 14.4