Bangladesh University of Engineering and Technology

EEE 414

Final Report

Group 2

Submitted to Rifat Shahriar, Lecturer, Department of EEE

Istiak Mahmud, Lecturer, Department of EEE

Submitted by Eshanee Chowdhury (1606131)

Shadman Sakib Showrov (1606138)

Nafisa Sadaf Prova (1606158)

Shumiya Alam (1606172)

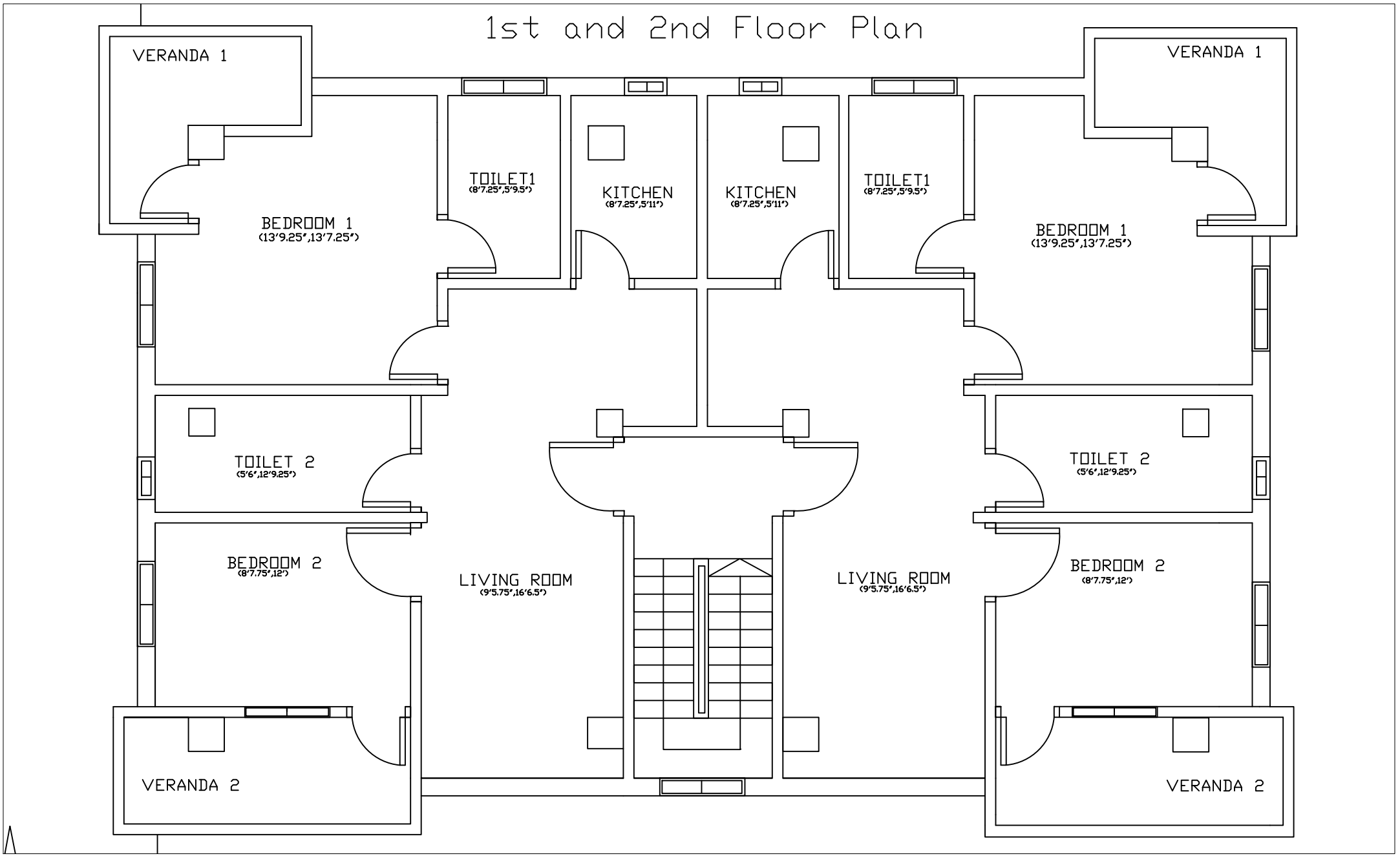
Md. Tawheedul Islam Bhuiyan (1606173)

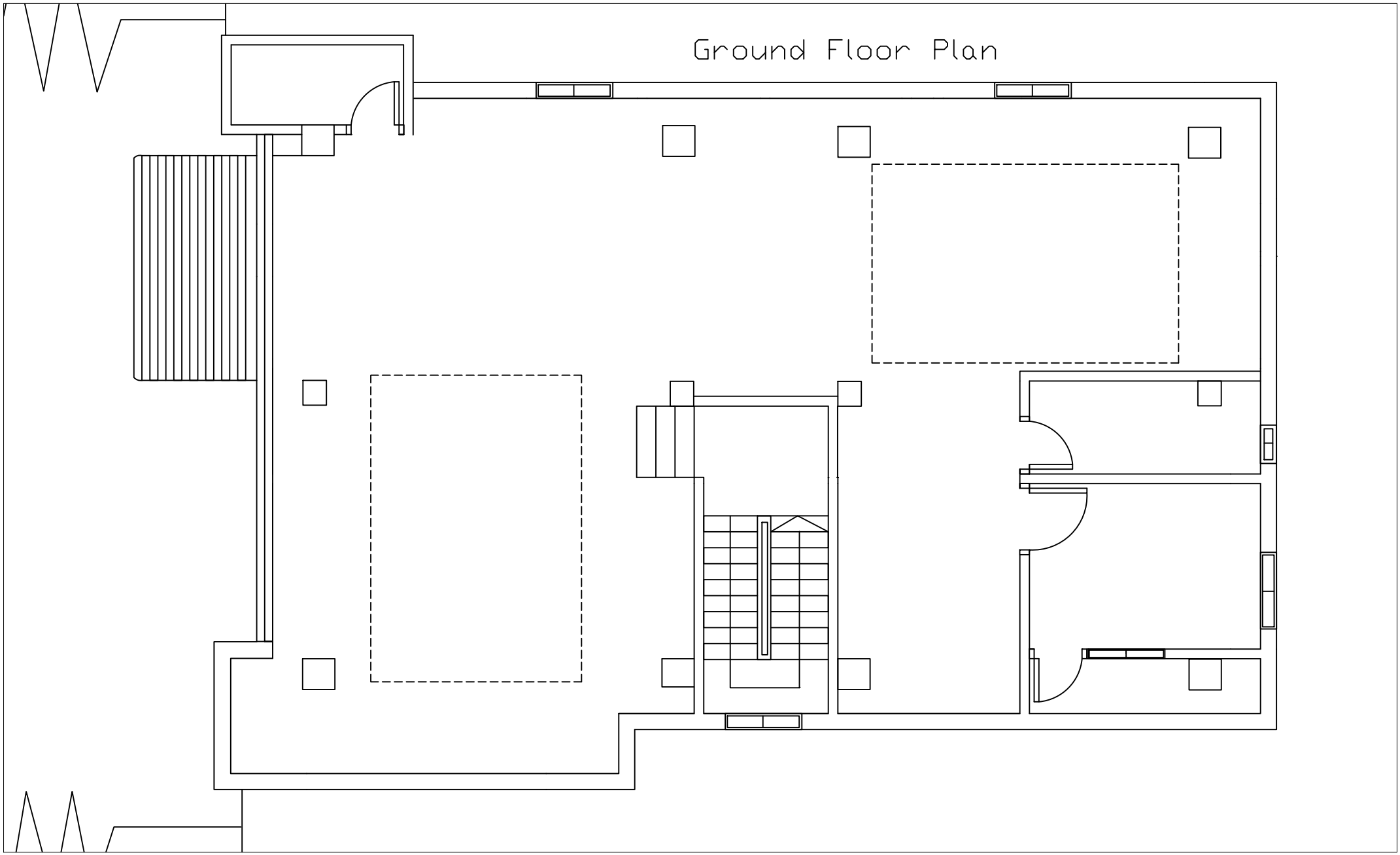
Md. Rizwanuzzaman (1606175)

Ishrat Jahan Moon (1606176)

Suhala Rabab Saba (1606184)

1st and 2nd Floor Plan




Ground Floor Plan

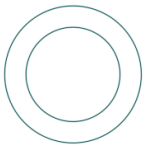
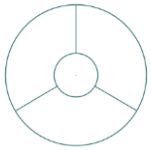
Fittings and Fixtures Calculations

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Room Type**	**Length(ft**	**inch**	**breadth(ft**	**inch**	**Length(m)**	**breadth(m**	**Area(sq-m)**	**Illumination**	**N_Light(18W**	**N_Light(12W**	**Light**	**N_Fan**	**Fan**
2	**BED1**	13	9.25	13	7.3	4.19735	4.14655	17.404522	150	2.07196686	3.10795029	1B+1T	1.873	1*
3	**KITCHEN**	8	7.25	5	11	2.62255	1.8034	4.7295067	200	0.75071534	1.12607302	1T		
4	**TOILET_1**	8	7.25	5	9.3	2.62255	1.75895	4.6129343	100	0.3661059	0.54915885	1B		
5	**TOILET_2**	5	6	12	9.3	1.6764	3.89255	6.5254708	100	0.51789451	0.77684176	1B		
6	**BED2**	8	7.75	12	0	2.63525	3.6576	9.6386904	100	0.76497543	1.14746314	1B +1T	1.038	1
7	**LIVING**	9	5.75	16	6.3	2.88925	5.03555	14.548963	100	1.15467959	1.73201939	1T	1.566	1
8	**VER**	11	2	3	0	3.4036	0.9144	3.1122518	100	0.24700411	0.37050617	1B		
9														
10														
11														
12	**LLF*UF**	0.7												
13	**n**	1												
14	**EnergyPac 12W**	1200												
15	**EnergyPac 18W**	1800												
16														
17														
18	**N_Light (12W)**	12W Lights are used												
19	**N_Light (18W)**	18W Lights are used												
20	**Light**	Number of lights used in Rooms												
21	**N_Fan**	Number of fans as per calculation												
22	**Fan**	Number of fans used in Rooms												
23														

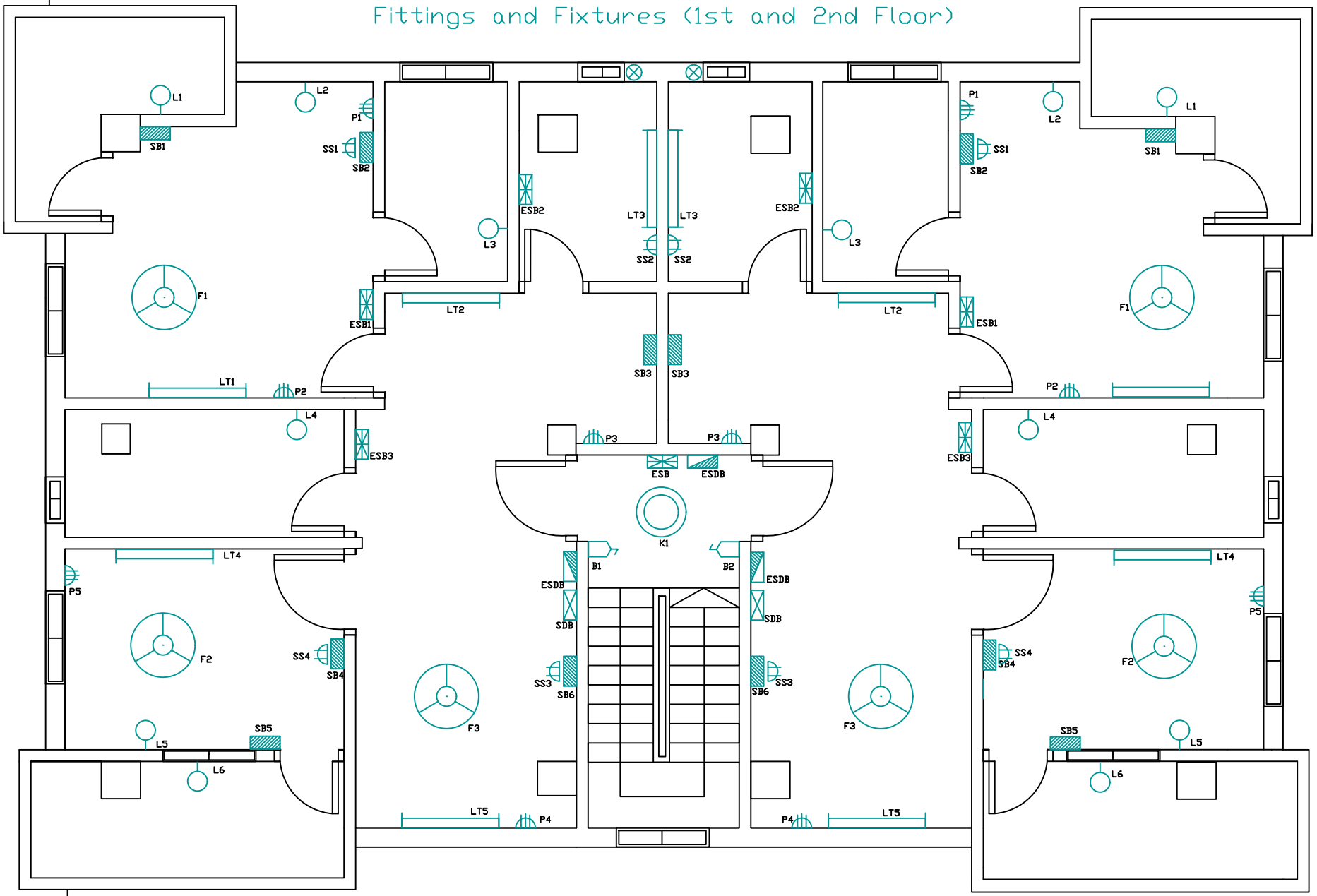
Conduit Legend

Name	Cables	Size
C1	2x 1.5 rm BYM	¾”
C2	4x 1.5 rm BYM	¾”
C3	6x 1.5 rm BYM	¾”
C4	8x 1.5 rm BYM	¾”
C5	10x 1.5 rm BYM	1”
C6	12x 1.5 rm BYM	1”
C7	14x 1.5 rm BYM	1”
C8	2x 4 rm BYM + 4 rm BYA ECC	¾”
C9	4x 4 rm BYM + 2x4 rm BYA ECC	1”

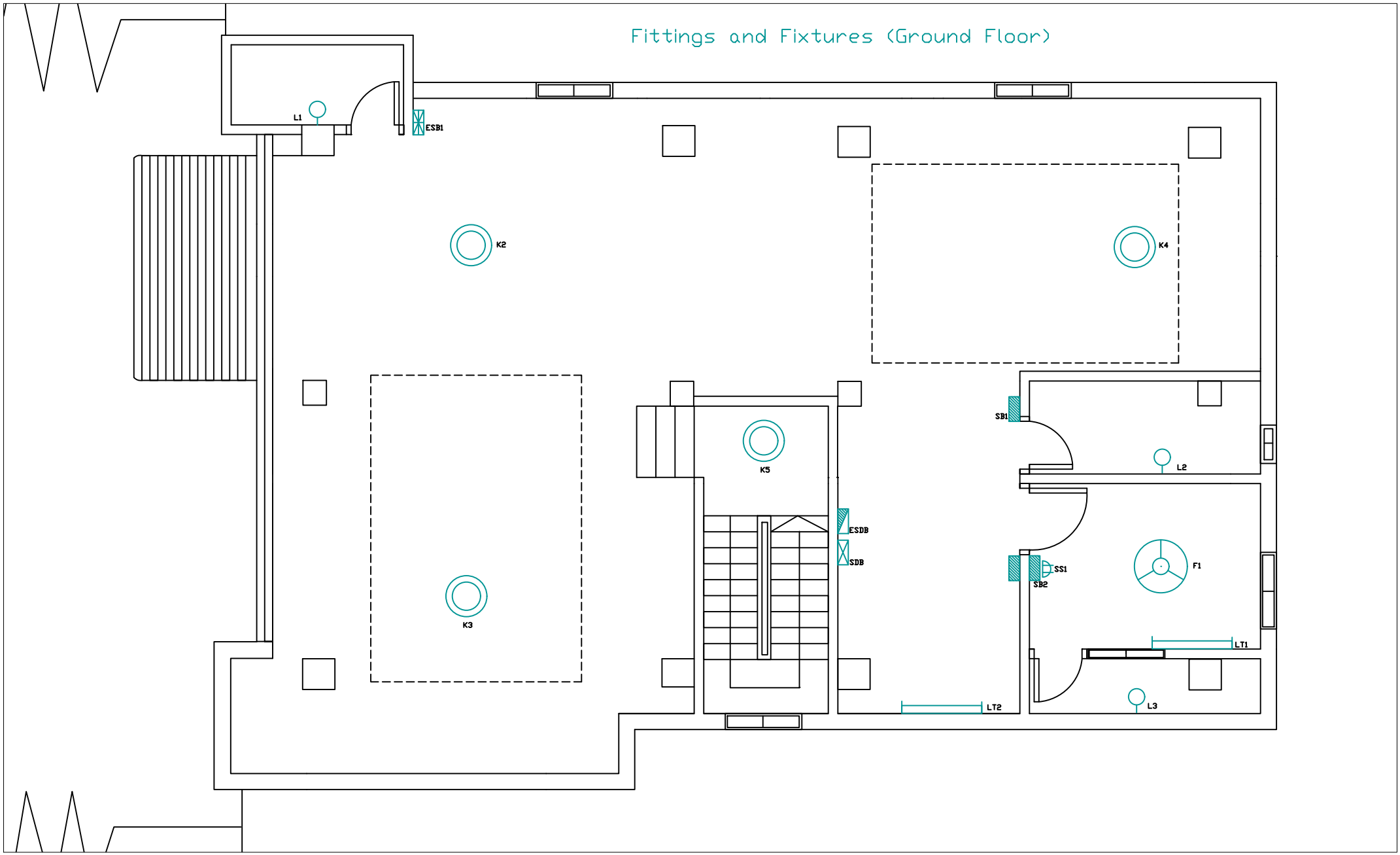
Symbols for fittings & fixtures

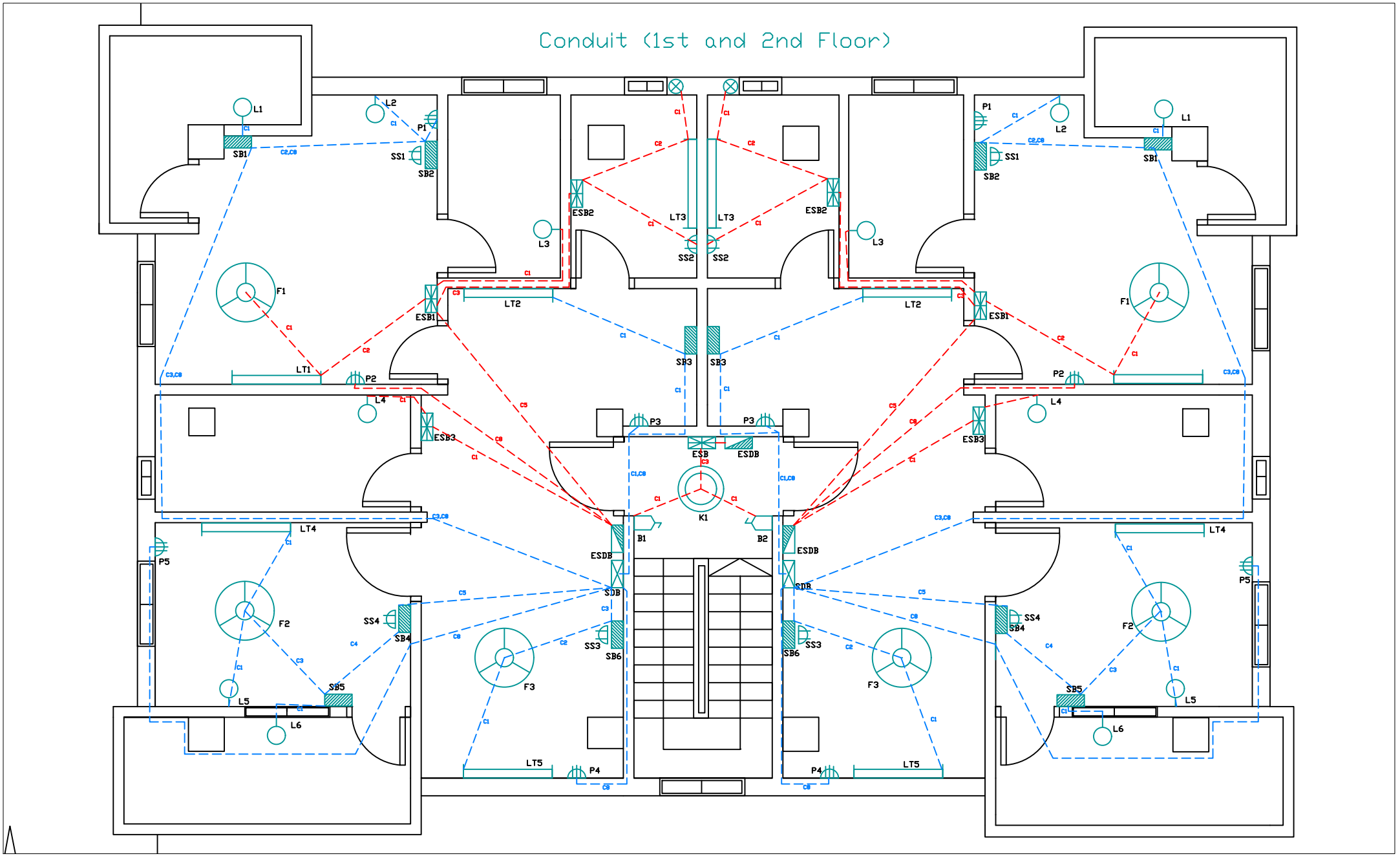
Symbol Description	Fittings and Fixture
Wall Bracket Light at Lintel Level	
Fluorescent Wall Light Fitting	
Ceiling Light Fitting Type k	
Ceiling Fan	
2-Pin 5A Socket at SB Level	
3-Pin 15A Socket	
Switch Board	
Emergency Switch Board	
Sub Distribution Board	
Emergency Sub Distribution Board	
Calling Bell	
Exhaust fan	

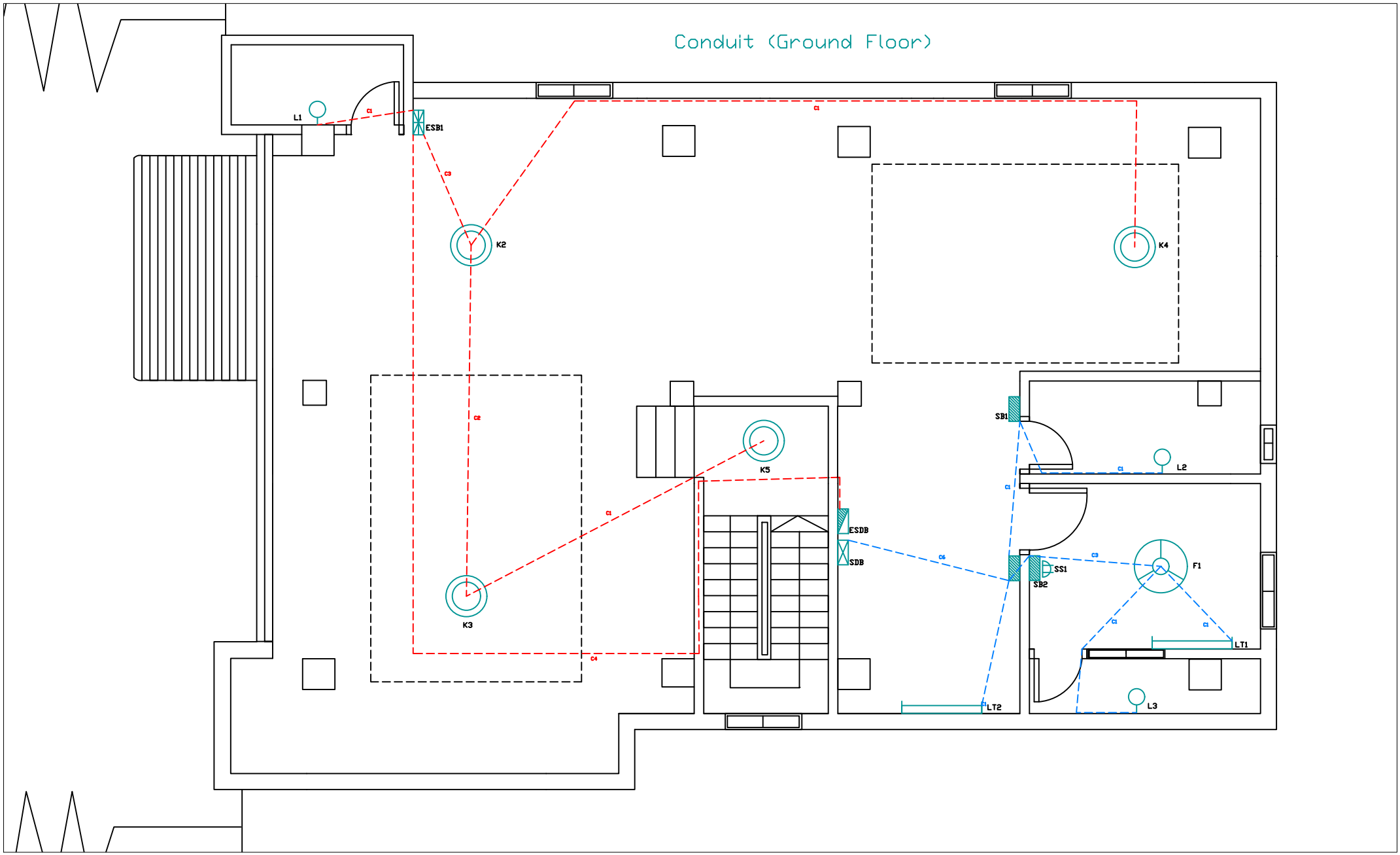
Fittings and Fixtures (1st and 2nd Floor)



Fittings and Fixtures (Ground Floor)




Conduit (1st and 2nd Floor)
L1
L2
P1
SB1
SS1
SB2
ESB2
LT3
SS2
L3
F1
ESB1
LT2
SB3
LT1
P2
L4
ESB3
P3
ESB
ESDB
K1
B1
B2
SDB
LT4
P5
F2
SS4
SB4
SS3
SB6
F3
SB5
L5
L6
LT5
P4
C1
C2
C3
C4
C5
C8
C1,C8
C2,C8
C3,C8


Conduit (Ground Floor)
L1
ESB1
C1
C3
K2
K4
K5
K3
C2
C4
ESDB
SDB
C6
SB1
SB2
SS1
L2
F1
LT1
LT2
L3

☐ Calculation for Conduits

Formula for ampere rating, $I = \frac{P}{V \times pf}$ Ampere

we consider pf = 0.7 on average.

Wattage of

Light Bulb = 12W

Tube Light = ~~40W 20W~~ 18W

Ceiling Fan = 100W

SwitchBoard socket = 100W

Ceiling light = ~~100W~~ 20W

Calling Bell = 2W

To Sub-Distribution Board: (per each unit, 1st, 2nd Floor)

CKT1 Rating: (SB1, SB2)

$$I = \frac{12 + 12 + 100}{220 * 0.7} = 0.805A$$

CKT2 Rating: (SB4, SB5)

$$I = \frac{18 + 12 + 12 + 100 + 100}{220 * 0.7} = 1.571A$$

CKT3 Rating: (SB3)

$$I = \frac{18}{220 * 0.7} = 0.11A$$

CKT4 Rating: (SB6)

$$I = \frac{18 + 100 + 100}{220 * 0.7} = 1.41A$$

So, 2x1.5mm BYM + 1.5 BYA ECC are used

To Emergency Sub Dist. Board (per each Unit, 1st & 2nd Floor)

Ckt1' Rating: (ESB1, ESB2)

$$I = \frac{18+100+12+18+100+60}{220*0.7} = 2\ A$$

Ckt2' Rating: (ESB 3)

$$I = \frac{18}{220*0.7} = 0.11\ A$$

So, 2x1.5 mm BYM + 1.5 BYA Ecc wire used

Circuit Breaker Calculation for SDB: (1st & 2nd Floor)

Power Socket load = 3000W
no. of power sockets = 4

Ckt1 load	124W
Ckt2 load	242W
Ckt3 load	18W
Ckt4 load	218W
Total load	602W

Considering duty cycle,

SDB load = $(602 \times 0.7) + (4 \times 3000 \times 0.2) = 2821.4$

SDB current = $\frac{2821.4}{220 \times 0.7} = 18.32\ A$

So, A 20A SP MCCB is needed from SDB to MDB

Circuit Breaker Calculation for ESDB: (1st and 2nd Floor)

Power Socket load = 3000W

Ckt1' load	= 308
Ckt2' load	= 18
total load	= 326

ESDB load = $326 \times .7 + 3000 \times .6 = 2028.2\ W$

ESDB Current = $\frac{2028.2}{220*.7} = 13.17\ A$

So, A 15A SP MCB is needed from ESDB to EMDB

☐ Ground Floor Conduit Calculation:

To SDB:

CKT5 Rating:

$$I = \frac{12+12+18+18+100+100}{220*0.7} = 1.688A$$

To ESDB:

CkT3' Rating:

$$I = \frac{20+20+20+20+12}{220*0.7} = 0.597A$$

☐ Staircase Conduit Calculation:

To ESDB:

CKT4' Rating:

$$I = \frac{20+2+2}{220*0.7} = 0.1558A$$

☐ Circuit Breaker Calculation:

Total SDB load = 260W

SDB Current = $\left(\frac{260}{220*0.7}\right)*0.7 = 1.181A$

So, A 5A MCCB is needed from SDB to MDB

Total ESDB load = 92W

ESDB Current = $\left(\frac{92}{220*0.7}\right)*0.7 = 0.4181A$

So, A 5A MCCB is needed from ESDB to MDB

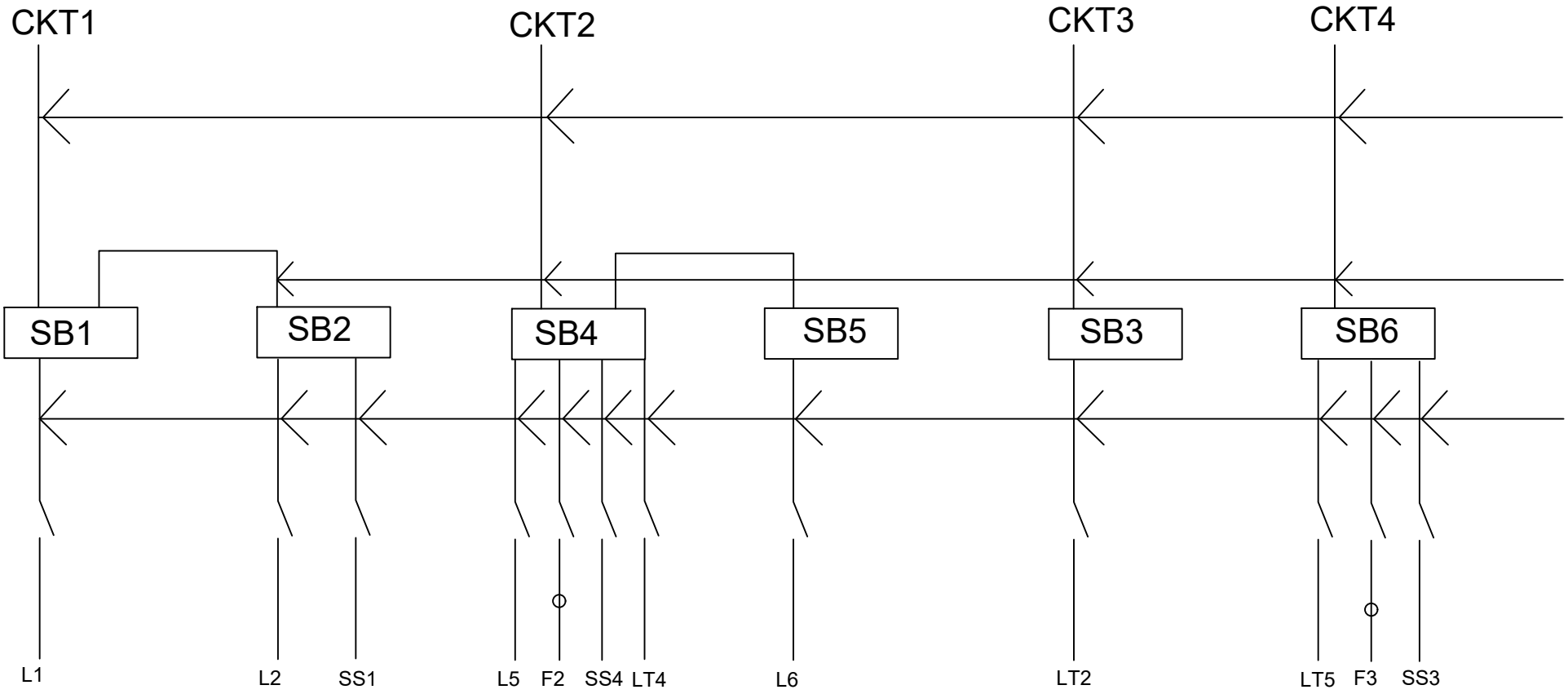
for Staircase,

Total ESDB ~~current~~ load = 20+2+2 = 24W

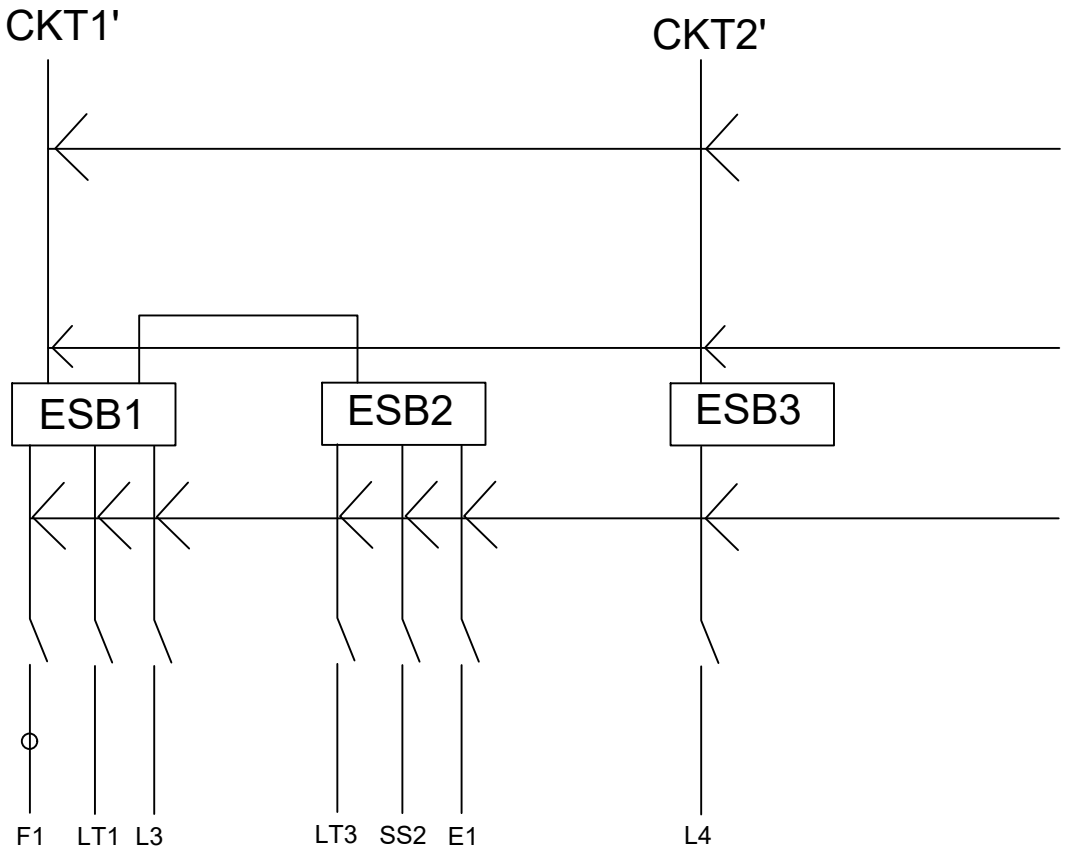
ESDB Current = $\left(\frac{24}{220*.7}\right)*.7 = 0.109A$

So, A 5A MCCB is needed from ESDB to MDB

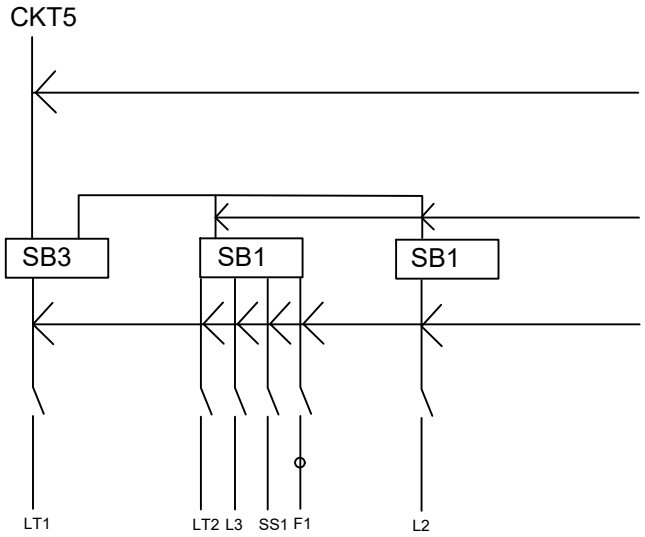
SDB Connection Diagram (per unit)



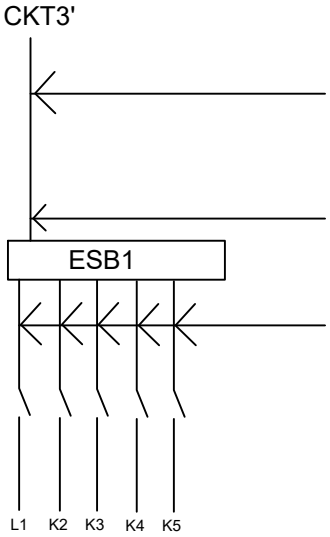
ESDB Connection Diagram (per unit)



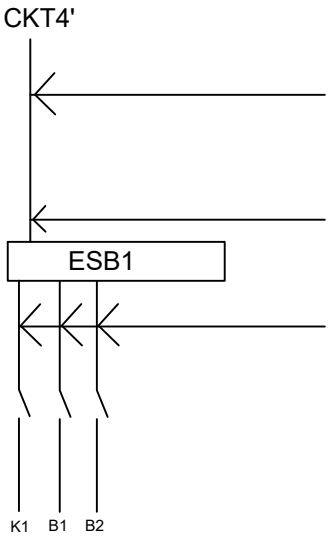
SDB Connection Diagram (Ground)



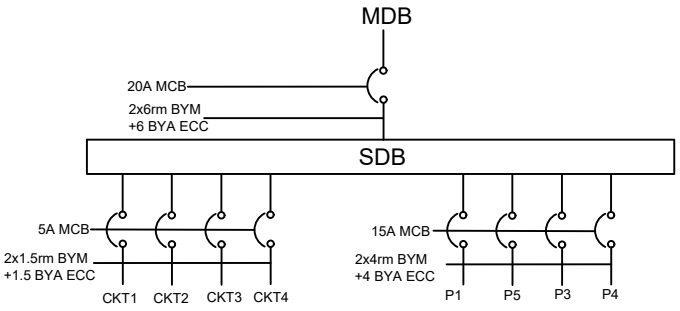
ESDB Connection Diagram (Ground)



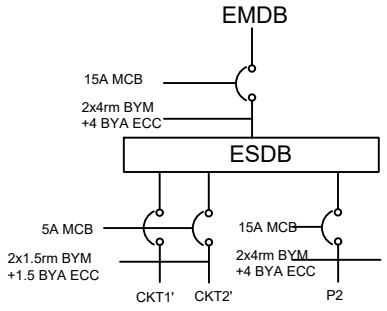
ESDB Connection Diagram (Staircase)



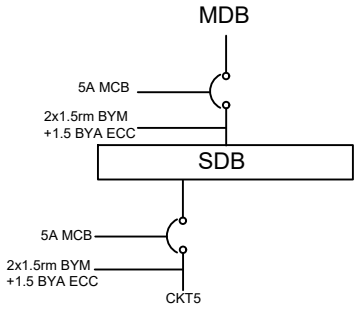
SDB Diagram



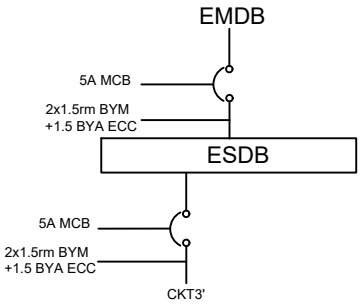
ESDB Diagram



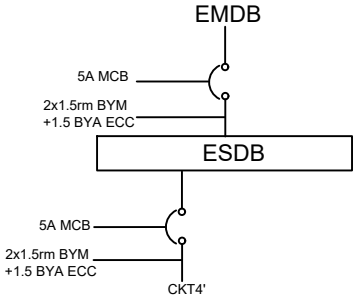
SDB Diagram (Ground)



ESDB Diagram (Ground)



ESDB Diagram (Staircase)



Calculation for EMDB:

Phase voltage = 220V

Line voltage = $\sqrt{3} * 220V = 381.05V$

power factor = 0.7

ESDB load from apartments = 2028.2W

ESDB load from ground = 92W

ESDB load from staircase = 24W

EMDB load = $(4 \times 2028.2 \times 0.7) + (92 \times 0.7) + (2 \times 24 \times 0.7)$

= 5776.96W ≈ 5.78KW

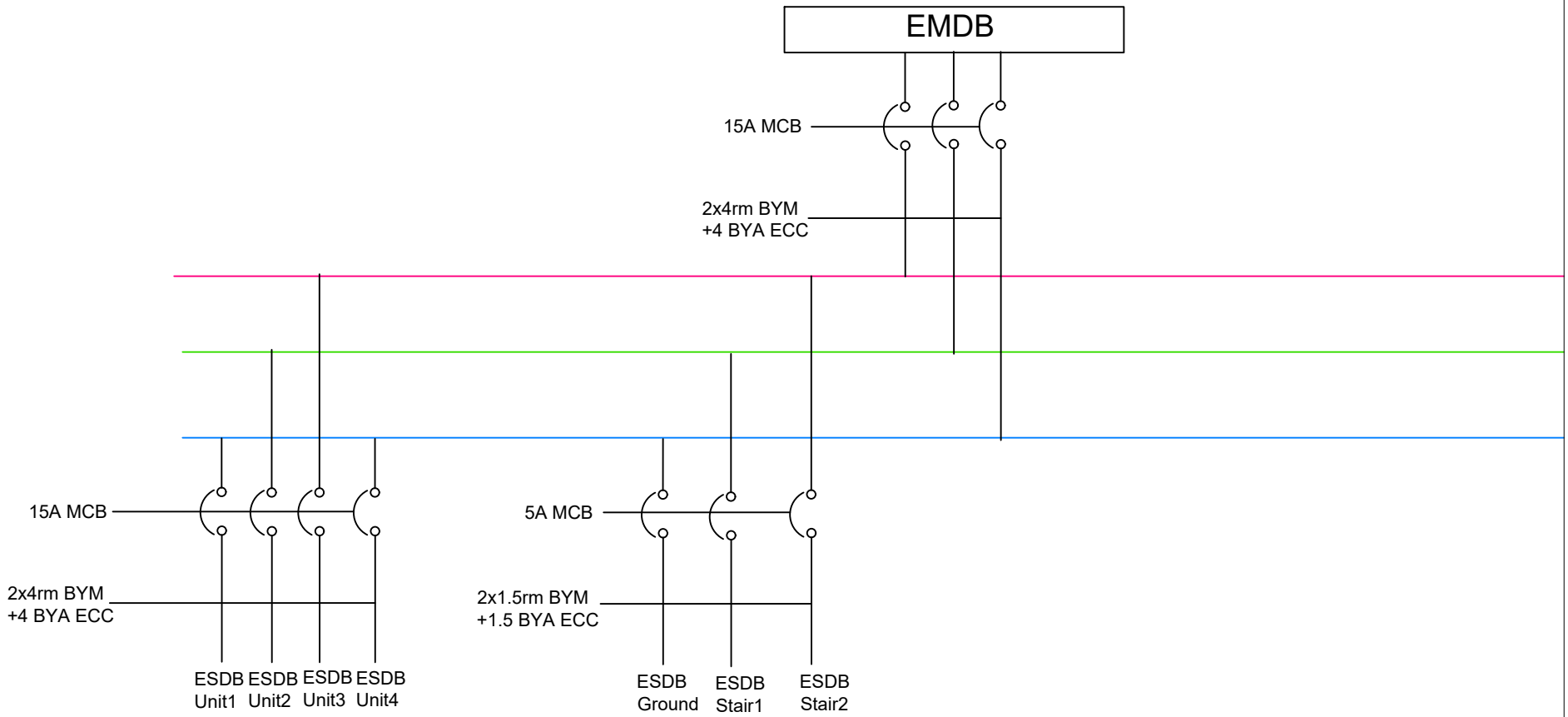
EMDB current = $\frac{5776.96}{\sqrt{3} * 381.05 * 0.7}$

= 12.5A

So, 15A MCCB is needed from EMDB to MDB.

A 6kW Generator is used to supply EMDB

EMDB Diagram



Calculation for MDB:

Phase voltage = 220V

Line voltage = $\sqrt{3} * 220V = 381.05V$

power factor = 0.7

SDB load from apartment = 2821.4

SDB load from ground = 260

pump load = 1500KW (≈2 HP)

MDB load = $(4 \times 2821.4 + 260) * 0.7 + 5776.96$

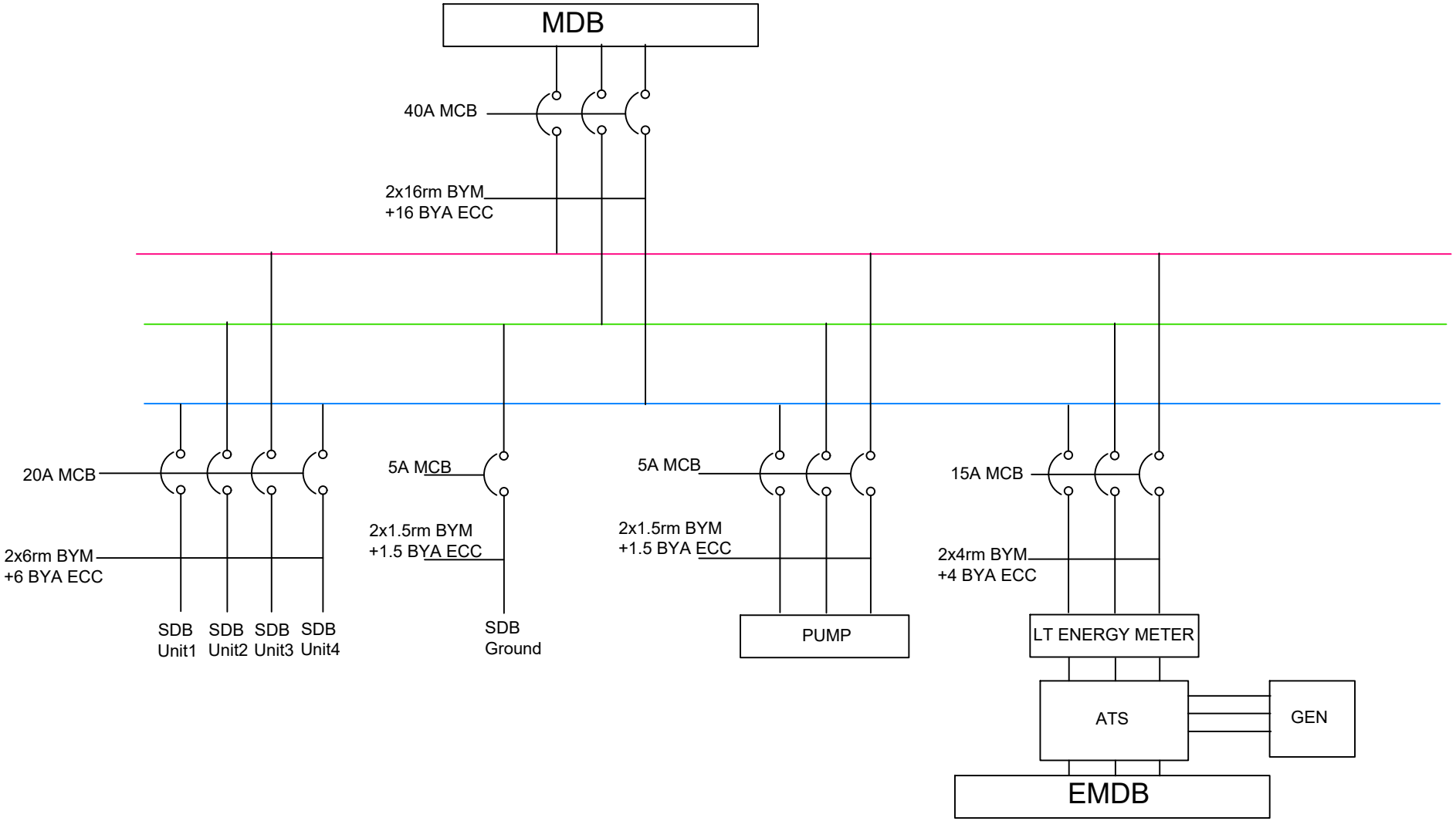
= 13858.88 KW

$$\text{MDB current} = \frac{13858.88}{\sqrt{3} \times 381.05 \times 0.7}$$

$$= 29.99$$

So, we should use a 40A CB MCCB from MDB to main line. (we can use 30A too, but safety is considered)

MDB Diagram


MDB
40A MCB
2x16rm BYM
+16 BYA ECC
20A MCB
2x6rm BYM
+6 BYA ECC
SDB Unit1
SDB Unit2
SDB Unit3
SDB Unit4
5A MCB
2x1.5rm BYM
+1.5 BYA ECC
SDB Ground
5A MCB
2x1.5rm BYM
+1.5 BYA ECC
PUMP
15A MCB
2x4rm BYM
+4 BYA ECC
LT ENERGY METER
ATS
GEN
EMDB