PROJECT

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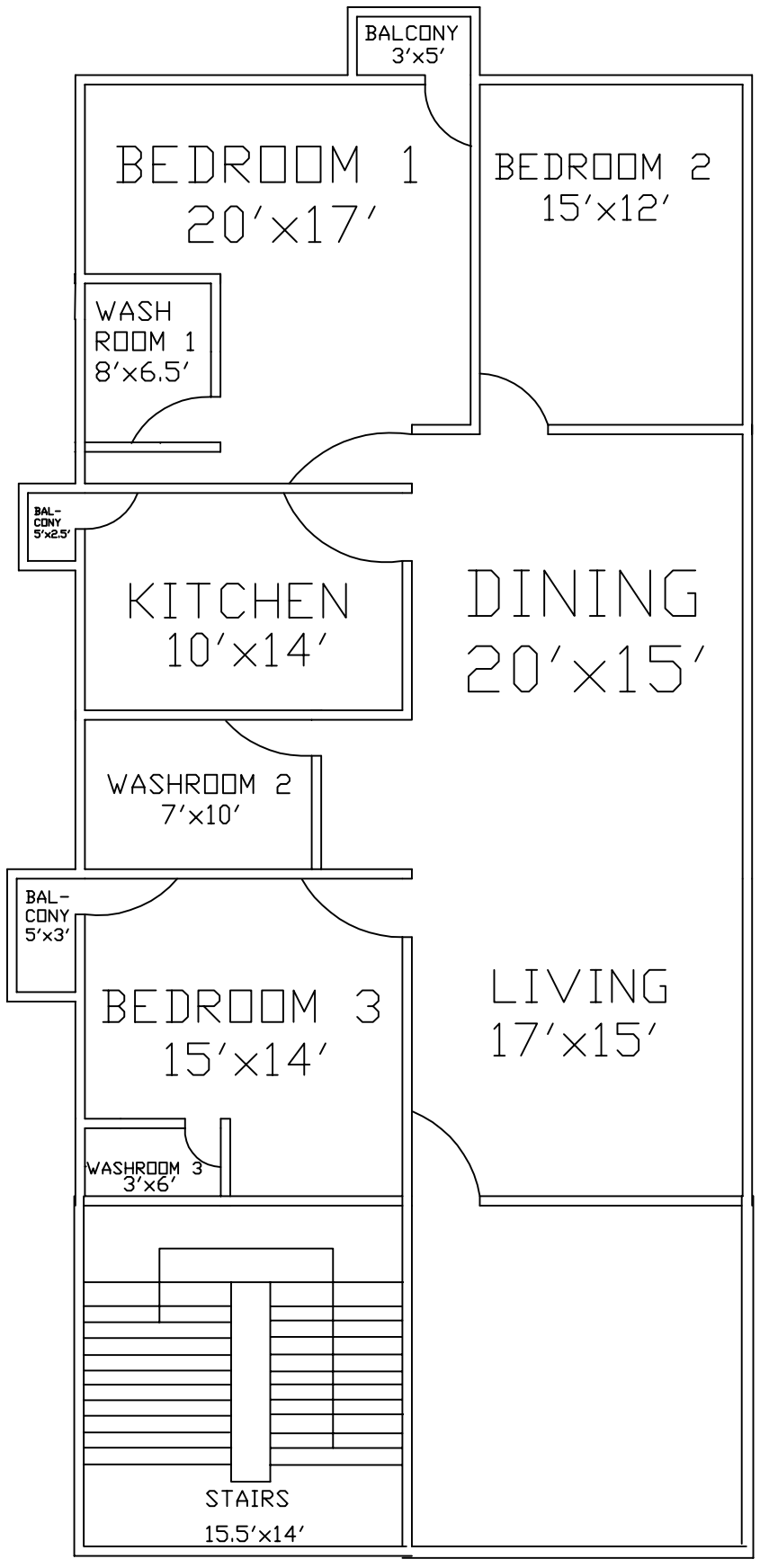
Course Title: Electrical Wiring and Drafting

Course Code: EEE 220

Section : A

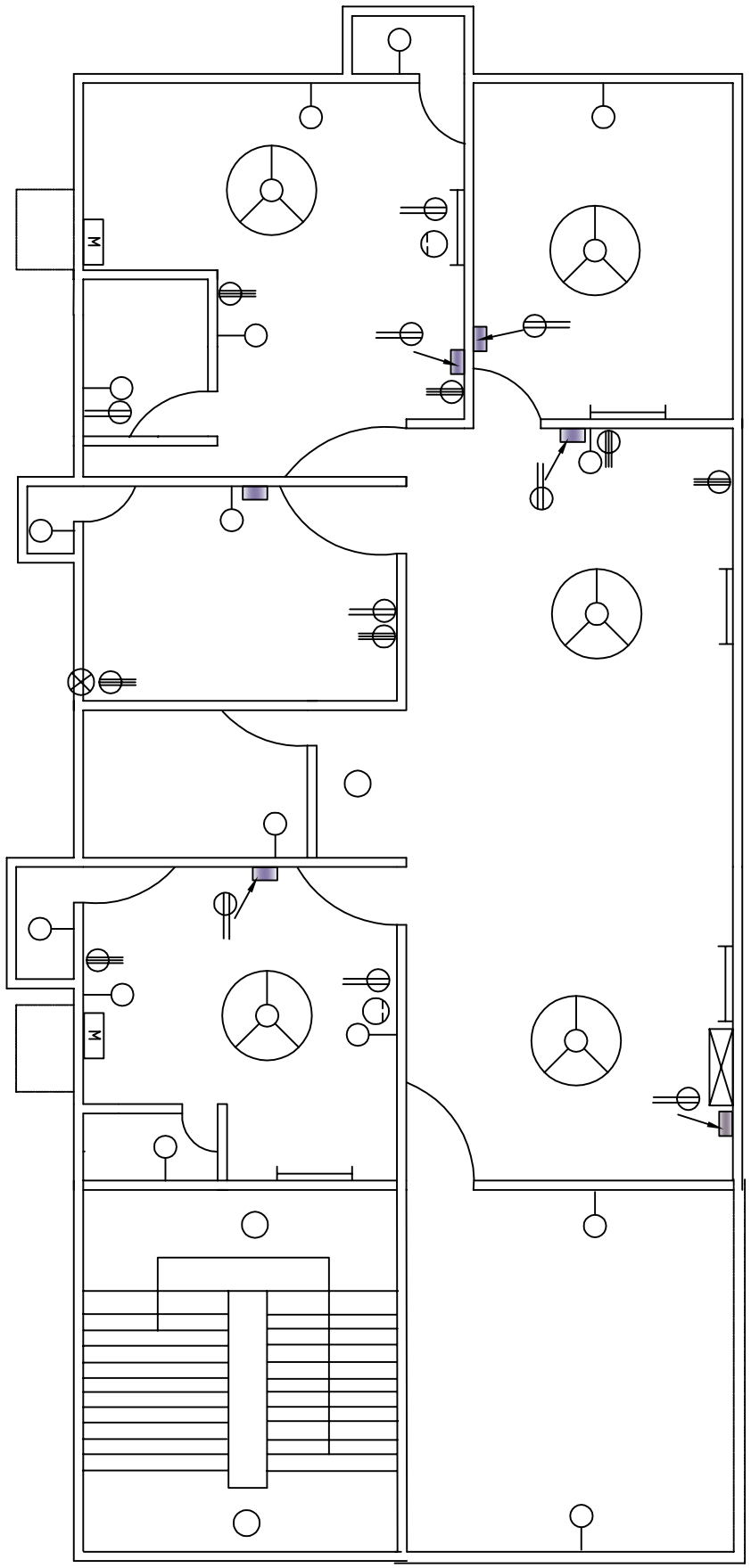
Date: 13. 01. 21

Layout

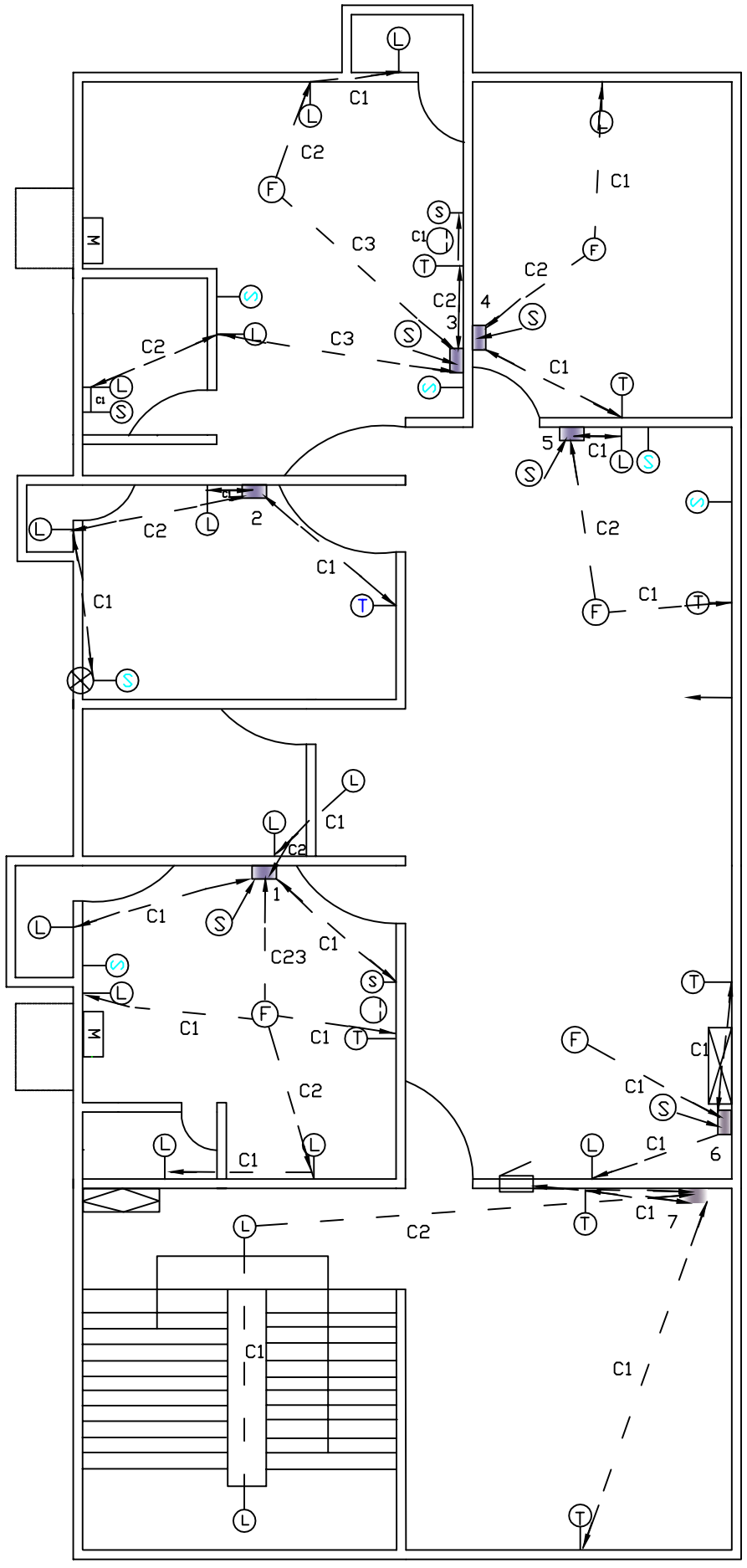


TotalSpace=
55' x 32' =
1760 sq
feet

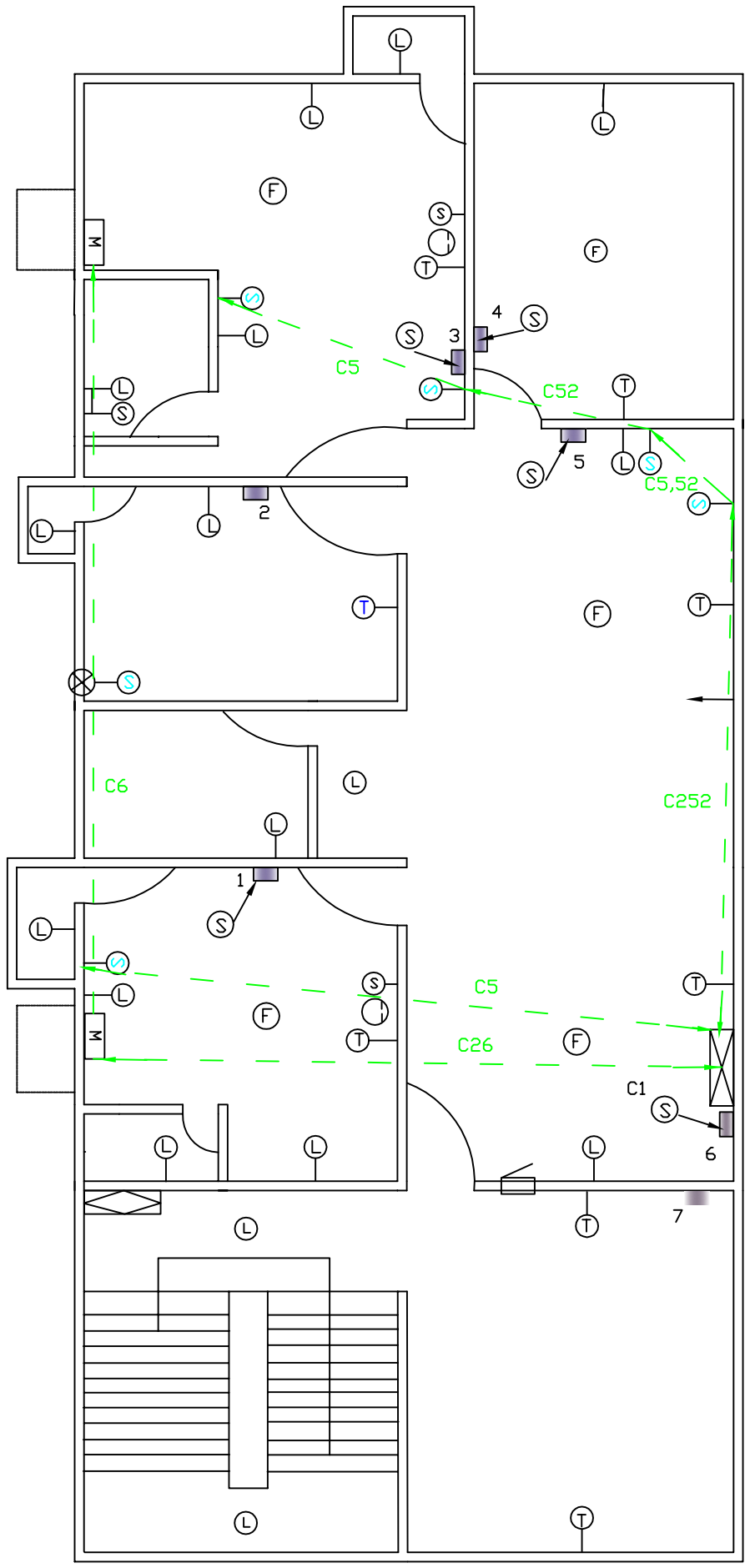
Fittings Layout



Light Load



Heavy Load



Calculation for Switch Board

SB 01	**SB 02**	**SB 03**
5L= 5* 26 = 130 W 1T= 1*40 = 40 W 1F= 1*80 = 80 W 1TS= 1*500= 500 W 1SS= 1*500= 500 W 1K = 1*60 = 60 W 1310 W P= VIcosθ Cosθ= 1 I= P/Vcosθ = 1310/240 = 5.46 A	2L= 2* 26 = 52 W 1SL= 1*500= 500 W 1ST= 1*500= 500 W 1052 W P= VIcosθ Cosθ= 1 I= P/Vcosθ = 1052/240 = 4.38 A	4L= 5* 26 = 104 W 1T= 1*40 = 40 W 1F= 1*80 = 80 W 1TS= 1*500= 500 W 1SS= 1*500= 500 W 1ST= 1*500= 500 W 1310 W P= VIcosθ Cosθ= 1 I= P/Vcosθ = 1724/240 = 7.18 A
SB 04	**SB 05**	**SB 06**
1L= 1* 26 = 26 W 1T= 1*40 = 40 W 1F= 1*80 = 80 W 1SS= 1*500= 500 W 646 W P= VIcosθ Cosθ= 1 I= P/Vcosθ = 646/240 =2.69 A	1L= 1* 26 = 26 W 1T= 1*40 = 40 W 1F= 1*80 = 80 W 1SS= 1*500= 500 W 646 W P= VIcosθ Cosθ= 1 I= P/Vcosθ = 646/240 =2.69 A	1L= 1* 26 = 26 W 1T= 1*40 = 40 W 1F= 1*80 = 80 W 1SS= 1*500= 500 W 646 W P= VIcosθ Cosθ= 1 I= P/Vcosθ = 646/240 =2.69 A

Calculation for Switch Board

SB 07

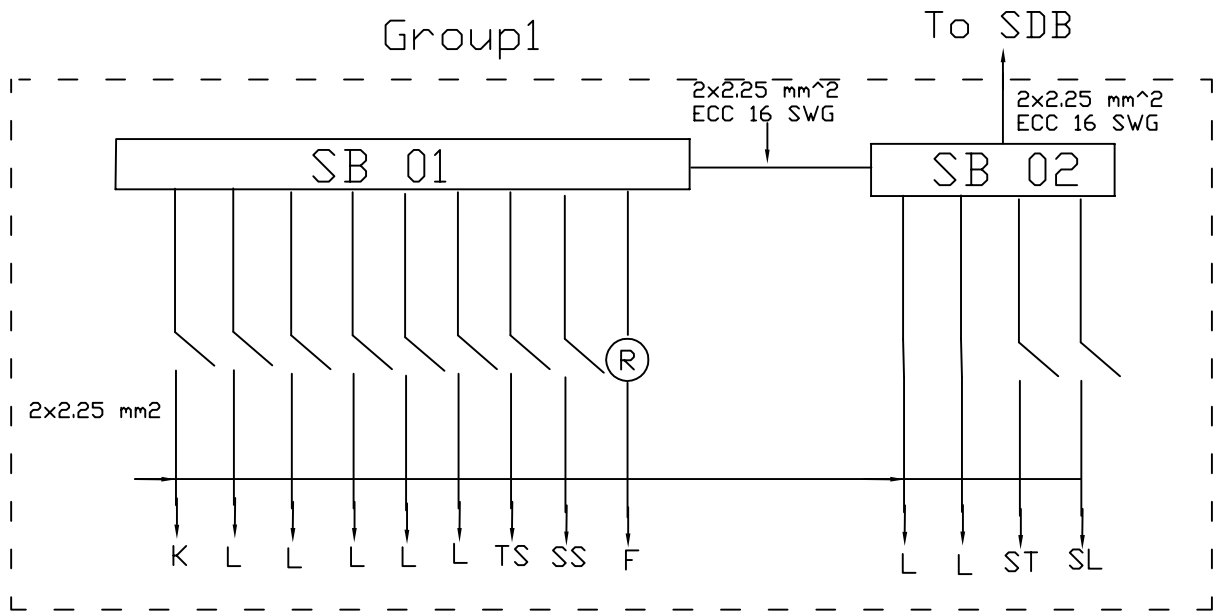
2K= 2* 60 = 120 W
2T = 2*40 = 80 W

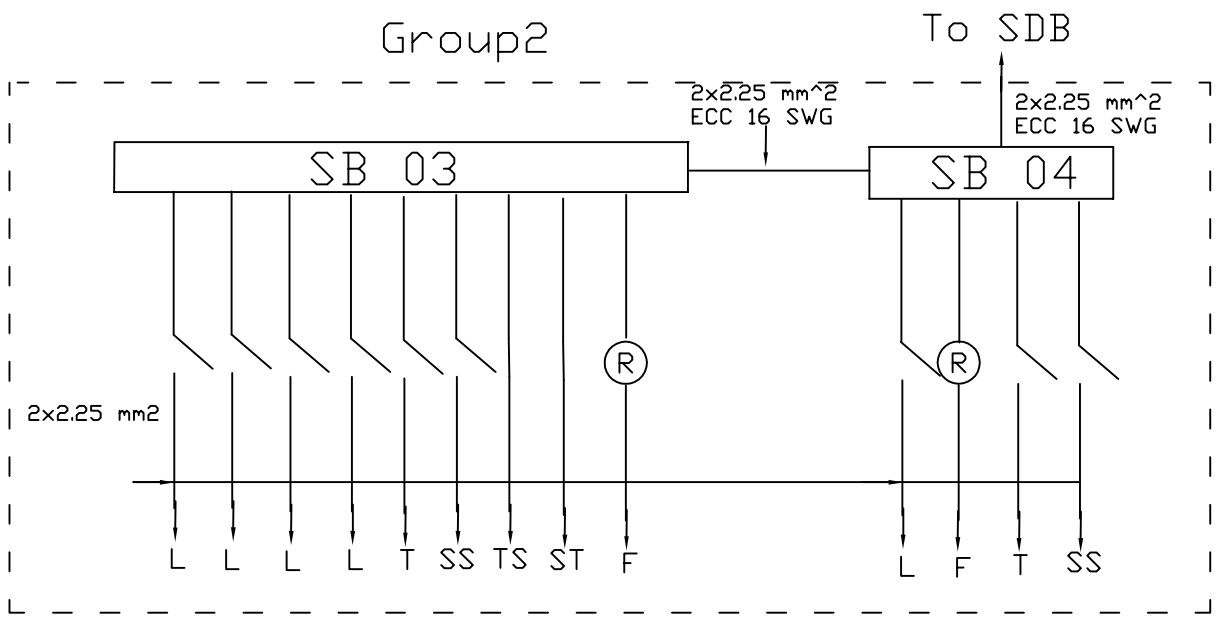
200 W

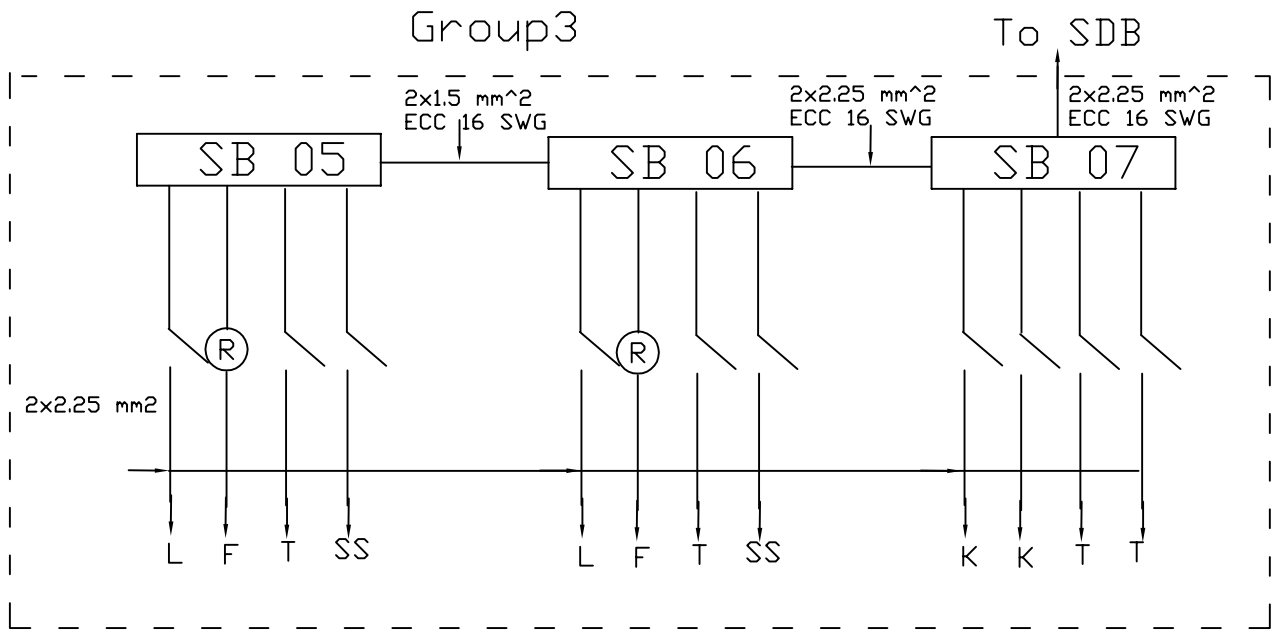
P= VIcosθ
Cosθ= 1

I= P/Vcosθ
= 200/240
=0.83 A

Switch Board Connection Diagram







Calculation of Switch Board Grouping

Group 1	Group 2	Group 3
SB= SB 01, SB 02	SB= SB 03, SB 04	SB= SB 05, SB 06, SB 07
I= 5.46A + 4.38A = 9.84 A	I= 7.18 A + 2.69A = 9.87 A	I= 2.69A + 2.69A + 0.83A = 6.21 A
MCB rating= 10 A	MCB rating= 10 A	MCB rating= 10 A

Calculation of SDB

P_{LL} = 1310 + 1052 + 1724 + 646 + 646 + 646 + 200 = 6224 W

P_{HL-15} = 5*1000 = 5000 W

P_{HL-20} = 2*2250 = 4500 W

P_{total} = (6224 * 0.6) + (5000*0.7) + (4500*1)

= 11734.4 W = 11.7 kW > 9 kW

Therefore, 3-Ø and 415 V L-L is used.

I = (11.7*1000) / (1.73*415*0.9) = 18.09 A

With spare and safety factor,

I = (18.09+10) * 1.25 = 35.11 A

= 40A MCB

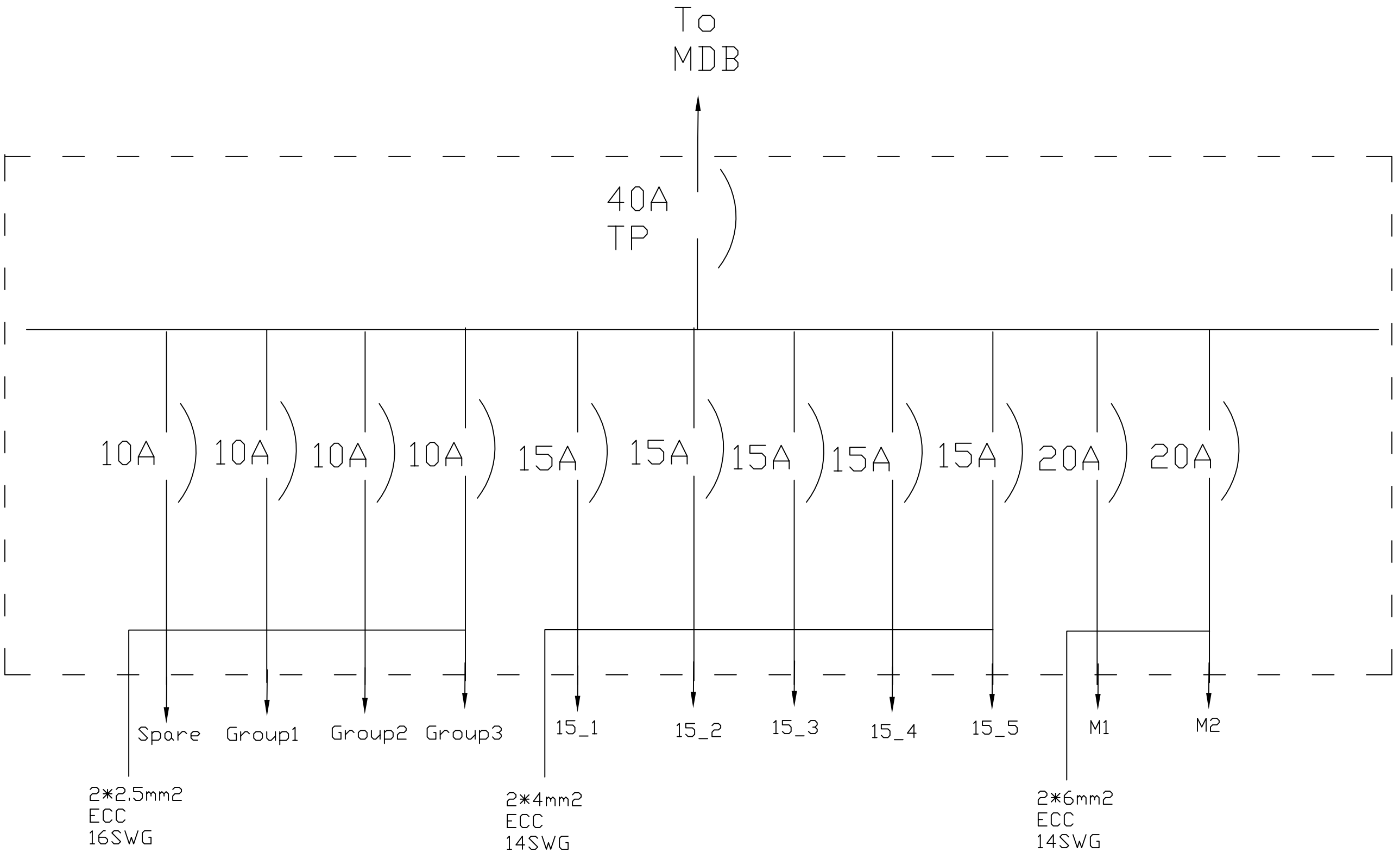
Calculation of MDB

- 10 stored building each floor has 1 unit.
- One 3hp pump and one 10 hp elevator

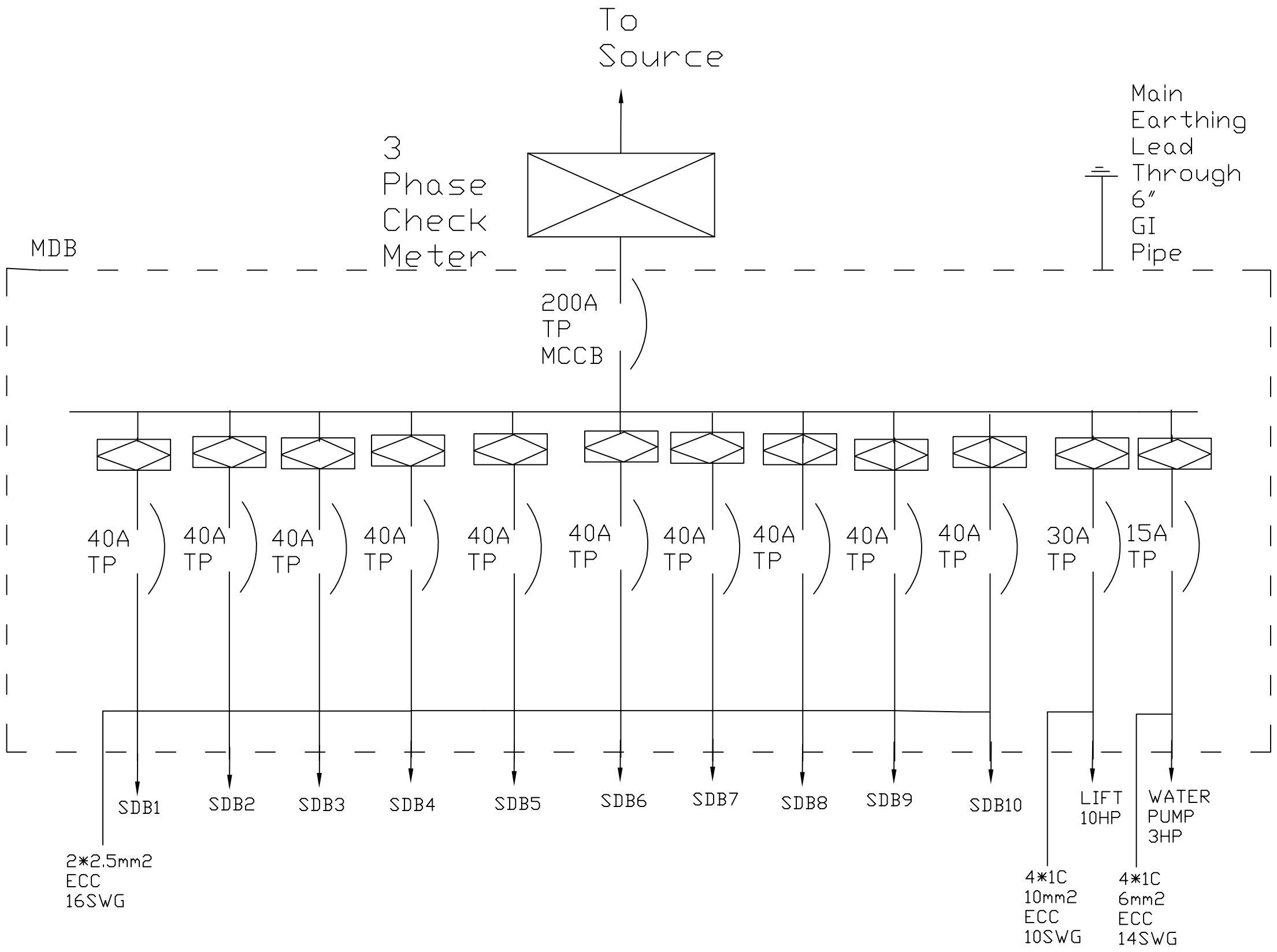
$P_{Biulding}$= (11.7*1000*10) + (3*745.7) + (10*745.7)
= 126.7kW

I= (126.7*1000) / (1.73*415*0.9)
= 196.08 A = 200 A MCCB

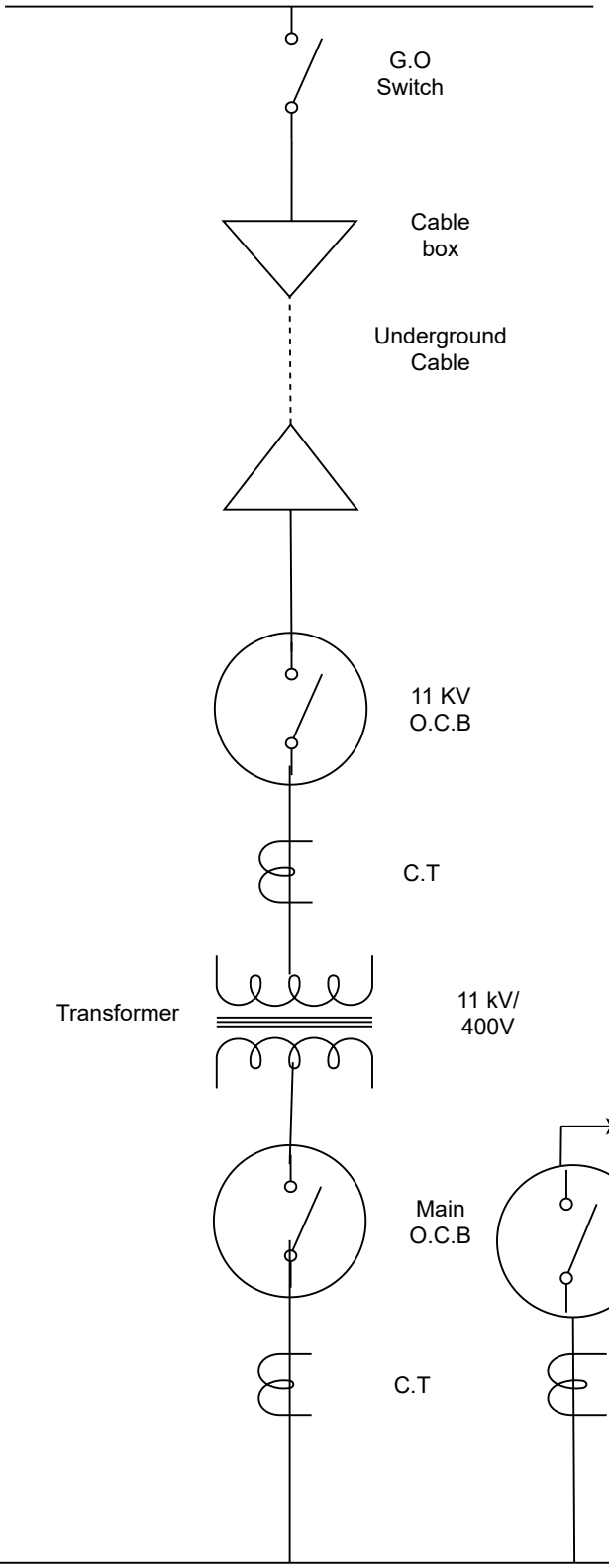
Flat Distribution Connection Diagram



Main Distribution Board Connection Diagram



Single Line Diagram of 11kV / 400V Indoor Substation



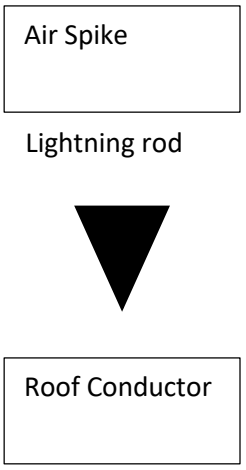
Transformer rating calculation:

Total Power= 126.7 kW
126.7*1000*0.8*1.23=124.7 kVA
= 160 kVA

G.O Switch= Gang Operated Switch

O.C.B= Oil Circuit Breaker

Lightning Protection of the Building



Earthing System of the Building

Earth Continuity Conductor (ECC)

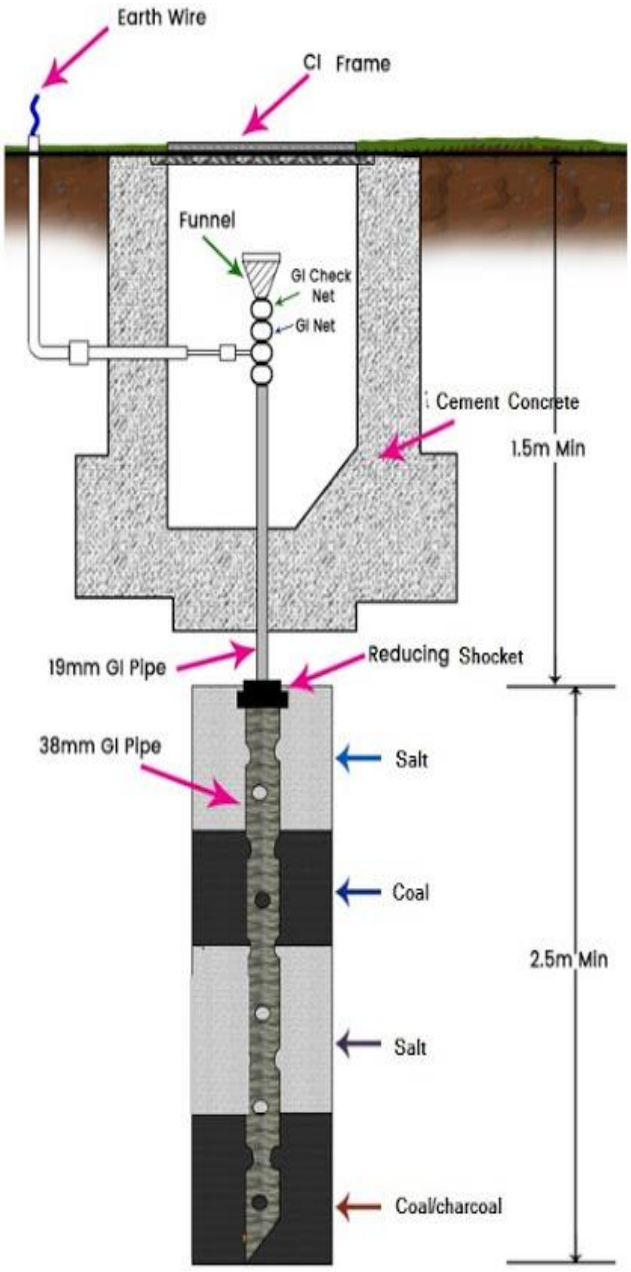
Transfers leakage current from faulty equipment to Earth

Earth Lead (EL)

To convert ECC Earth electrode

Earth Electrode

Buried under the ground, lets the faulty current to Earth.



Earth resistance measured with 3 point method and is found to be less than 3Ω.

Light Calculation of Dining Room

Room Specifications

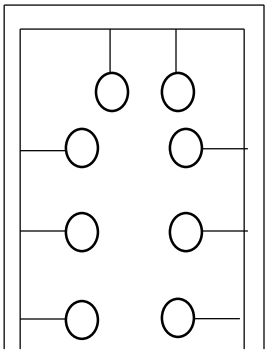
Room dimension = 20'*15'

Required illumination= 70 Lux

Wattage of light = 10 W

Room height= 3.25 m

Working distance = 0.5 m



Living Room 20'*15'

Room index= (6.09*4.57)/2.75 (6.09+4.57)

= 0.95

Using 70-50-20, UF=0.42 and LLF=0.8

No. of lambs= (70*6.09*4.57) / (806*0.42*0.8)

= 7.19 = 8

Distance between lights= 20'/(3+1)

= 4'

PV System Calculation

Appliance	Total Number	Wattage	Hour of Operation	Energy (Wh)
CFL Lamp	14	26	8	2912
Fluorescent Lamp	7	40	6	1680
Fan	5	80	12	4800
Ceiling Light	3	60	10	1800
Mirror Light	3	40	2	720
Television	2	200	6	2400

= 14312 Wh

For 10 stored building with 5% laod,

= 14312 * 10 * 0.05

= 7156 Wh

Total Power per floor= (14*26) + (7*40) + (5*80) + (3*60) + (3*40) + (2*200)

= 1744W = 1.7 kW

For 10 stored building with 5% laod,

= 1744 *10* 0.05

= 862 Wh

BP Solar MSX- 300 Module

Max Power= 300 (STP)

Max Current= 8.35 Amp

Max voltage= 36 V

Nominal Output Voltage= 36V

$V_{oc=}$ 43.4 V and $I_{ac=}$ 9.5A