ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

PROJECT REPORT

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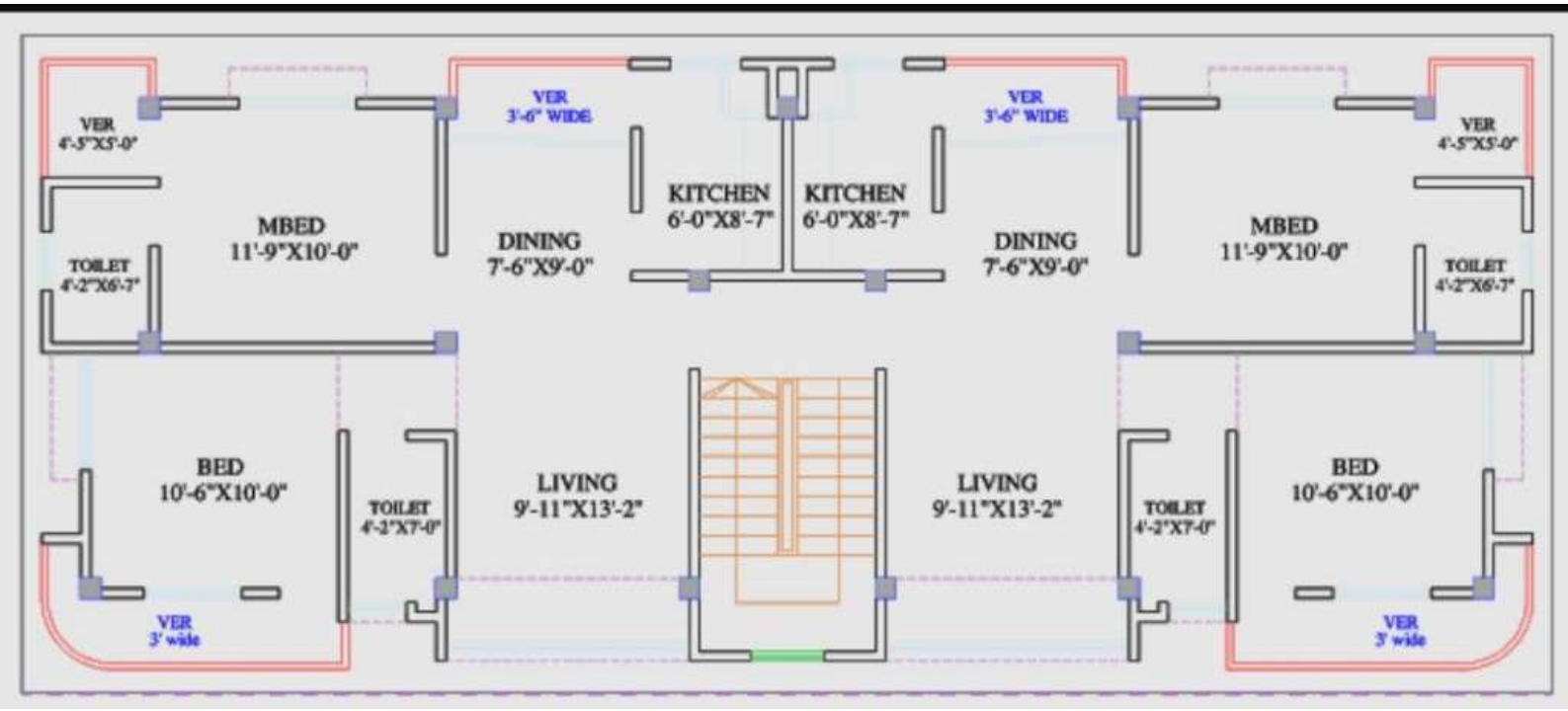
DEPARTMENT : EEE
SECTION & GROUP : C,C1

DATE OF SUBMISSION : 20.5.23

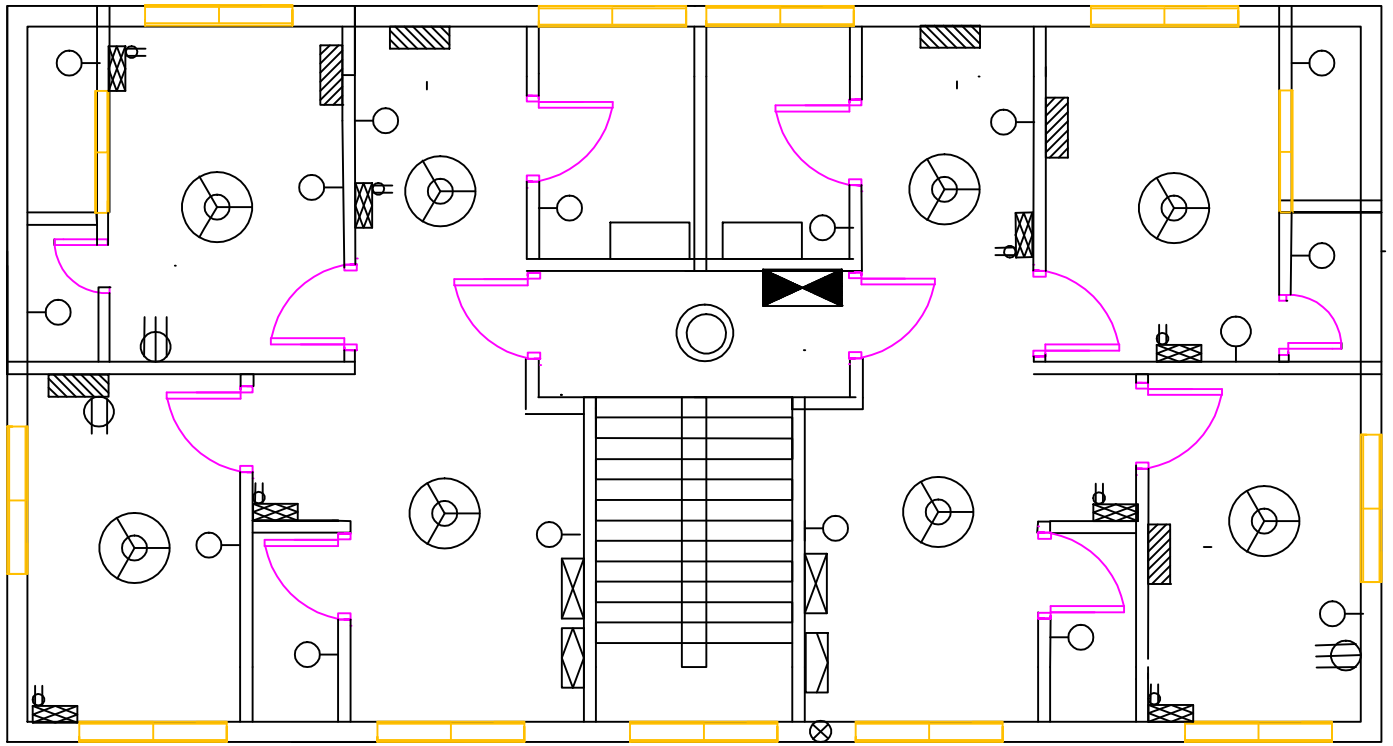
COURSE NO. : EEE 4418

COURSE TITLE : Electrical Service Design Lab

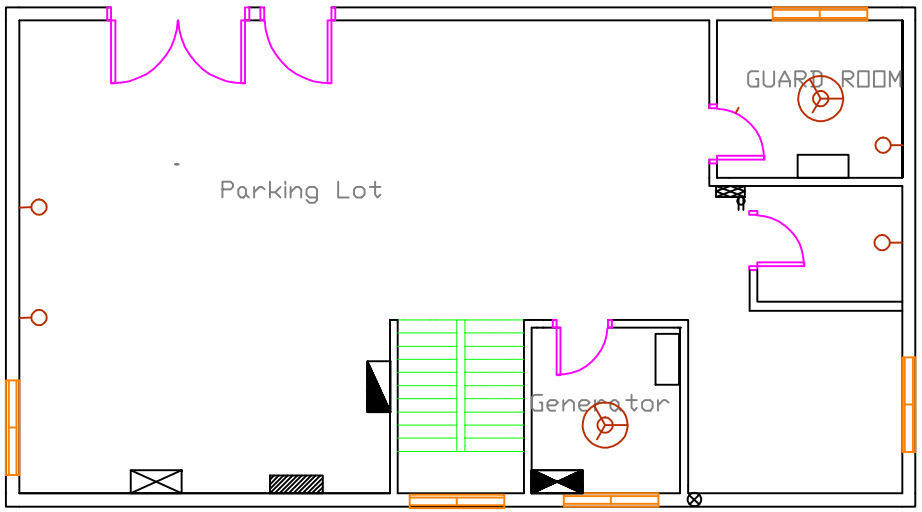
PROJECT NAME : Complete Design of Second Storey Building


VER
4'-5"X5'-0"
VER
3'-6" WIDE
VER
3'-6" WIDE
VER
4'-5"X5'-0"
MBED
11'-9"X10'-0"
DINING
7'-6"X9'-0"
KITCHEN
6'-0"X8'-7"
KITCHEN
6'-0"X8'-7"
DINING
7'-6"X9'-0"
MBED
11'-9"X10'-0"
TOILET
4'-2"X6'-7"
TOILET
4'-2"X6'-7"
BED
10'-6"X10'-0"
TOILET
4'-2"X7'-0"
LIVING
9'-11"X13'-2"
LIVING
9'-11"X13'-2"
TOILET
4'-2"X7'-0"
BED
10'-6"X10'-0"
VER
3' wide
VER
3' wide

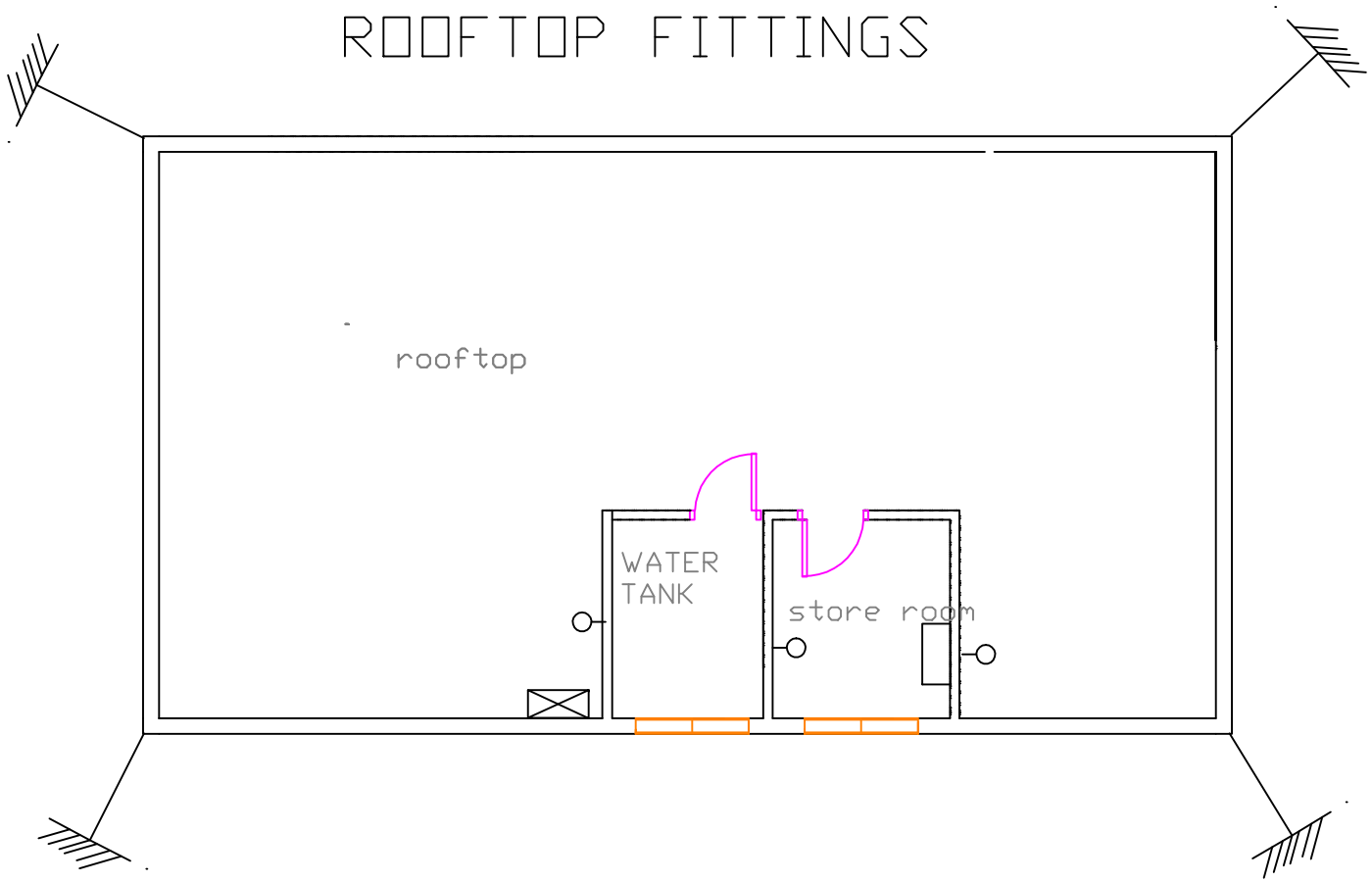
FITTINGS AND FIXTURES



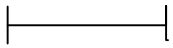
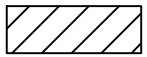
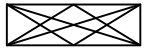
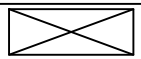
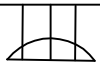
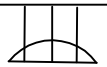
PARKING LOT



ROOFTOP FITTINGS

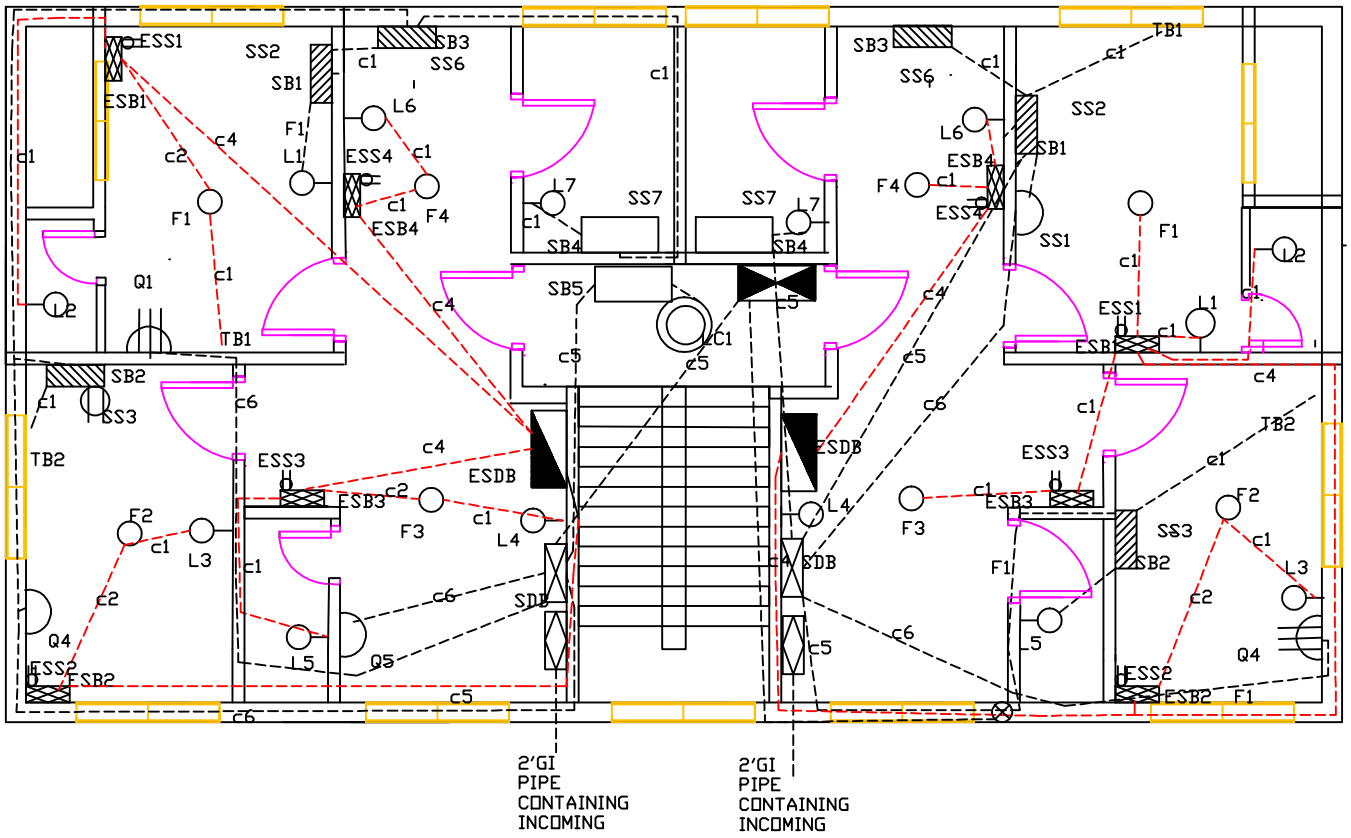


LEGENDS

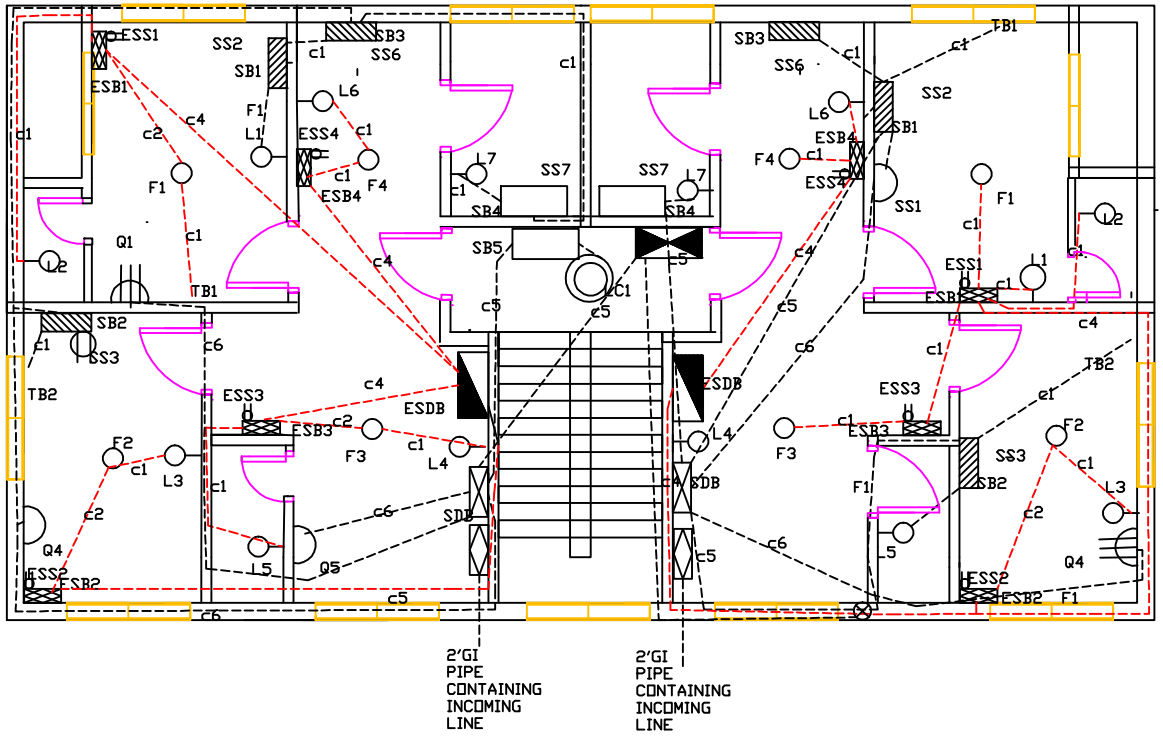
DESCRIPTION	HEIGHT	CAPTION	SYMBOL
4'-20W WALL MOUNTED FLUROSCENT TUBE LIGHT	LINTEL	TB	
20W FLUORESCENT	LINTEL	LB	
20 W FLUOESCENT	CELLING	LC	
56''70W SWEEP FAN	CELLING	F	
SWITCH BOARD	MID WALL	SB	
EMERGENCY SWITCH BOARD	MID WALL	ESB	
SUB DISTRIBUTION BOARD	LINTEL	SDB	
EMERGENCY SUB DISTRIBUTION BOARD	LINTEL	ESDB	
POWER SOCKET FOR PC	LOWER WALL	P	
POWER SOCKET FOR AC	LINTEL	Q	

Legends for Conduits	**Conduit size**
C1 = 2 x 1.5 rm BYM + 1.5 rm BYA ECC	¾ “
C2 = 4 x 1.5rm BYM + 1.5 rm BYA ECC	¾ “
C3 = 6 x 1.5 rm BYM + 1.5 rm BYA ECC	¾ “
C4 = 2 x 1.5 rm BYM +1.5 rm BYA ECC	¾ “
C5 = 2 x 1.5 rm BYM + 1.5 rm BYA ECC	¾ “
C6 = 2 x 4 rm BYM + 4 rm BYA ECC	¾ “
C7 = 2 x 6 rm BYM + 6 rm BYA ECC	¾ “
C8 = 4 x 4 rm BYM + 4 rm BYA ECC	¾ “
C9 = 4 x 6 rm BYM + 6 rm BYA ECC	¾ “

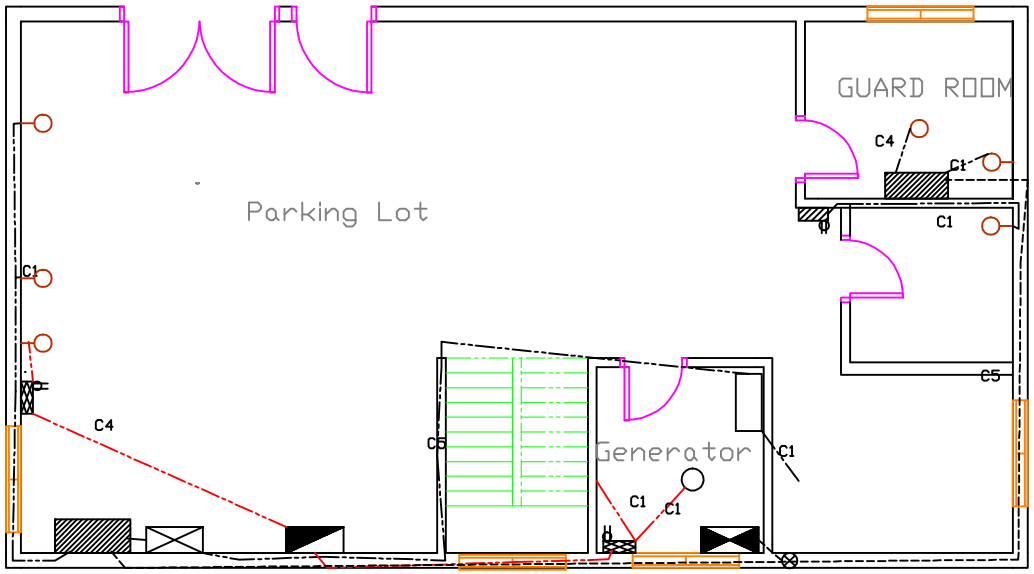
FIRST FLOOR WITH CONDUITS



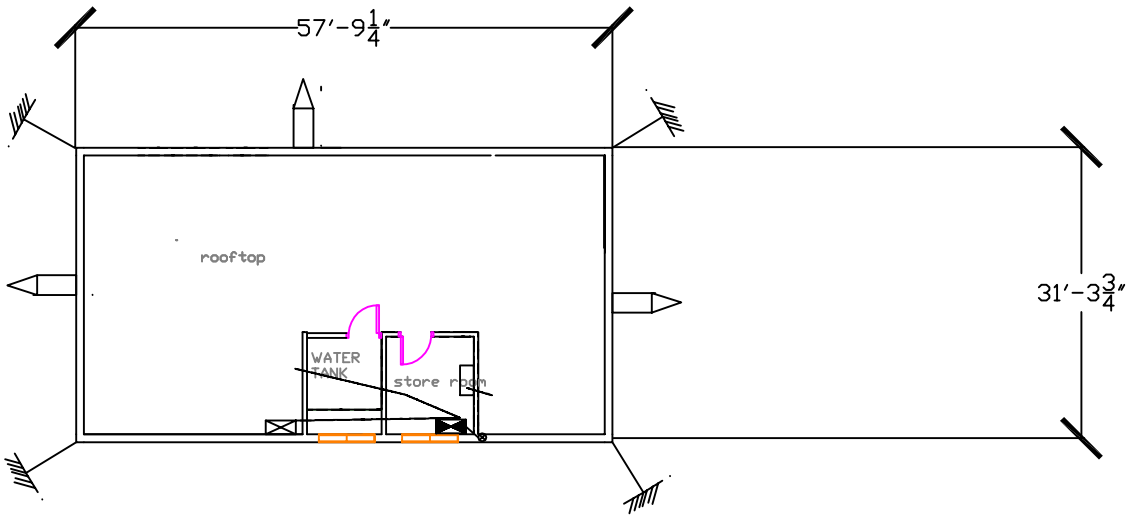
SECOND FLOOR WITH CONDUITS



PARKING LOT



ROOFTOP



LEGENDS

13 mm outer brass rod

15 mm long pointer

AIR TERMINAL

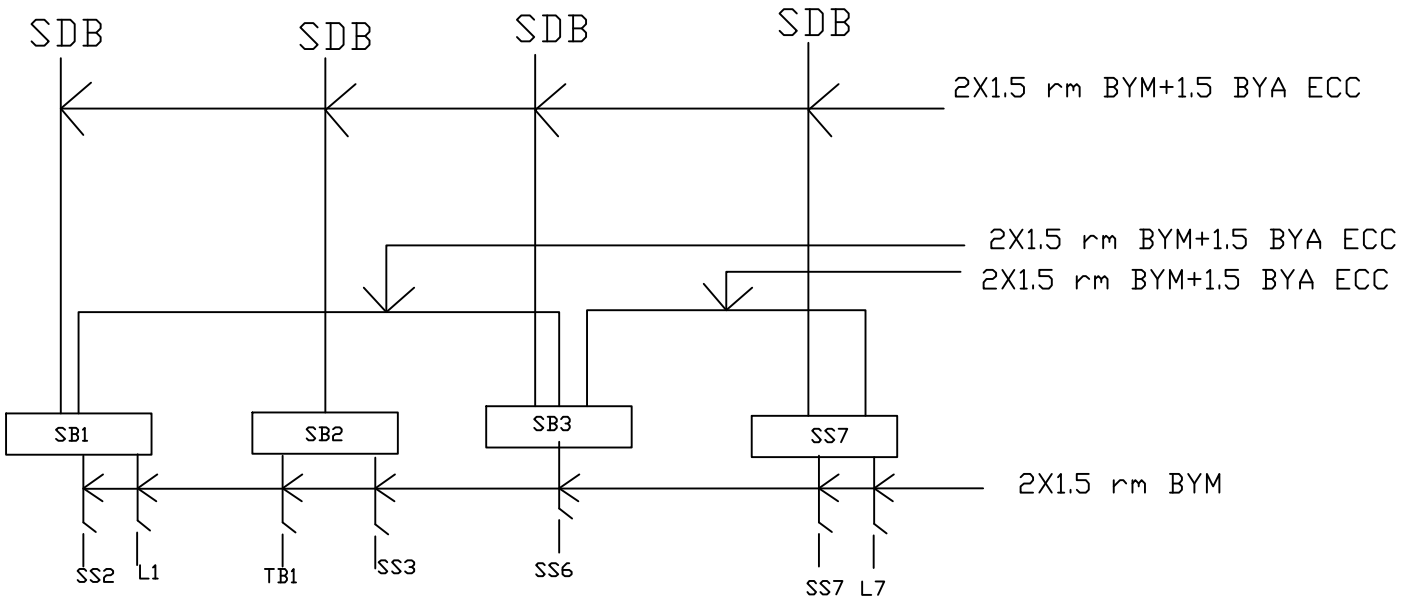
1/3

ROOF CONDUCTOR

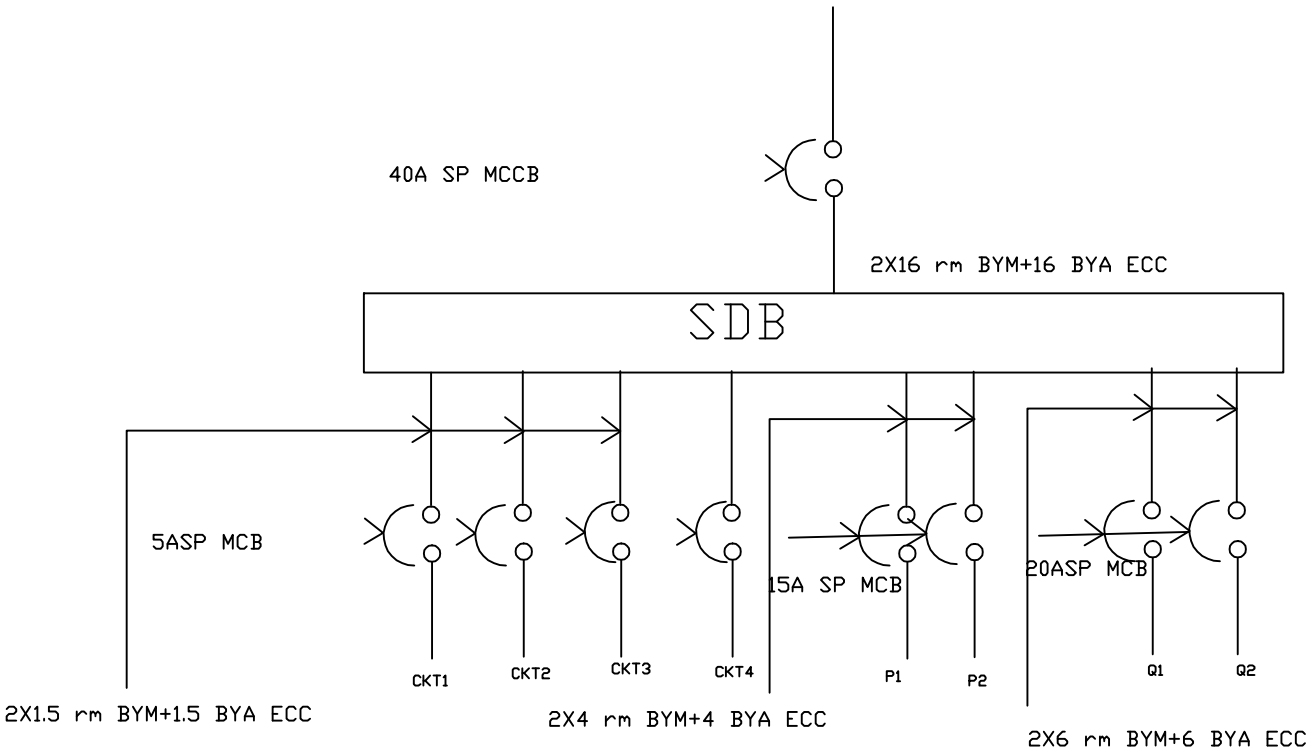
DOWN CONDUCTOR

EARTHING

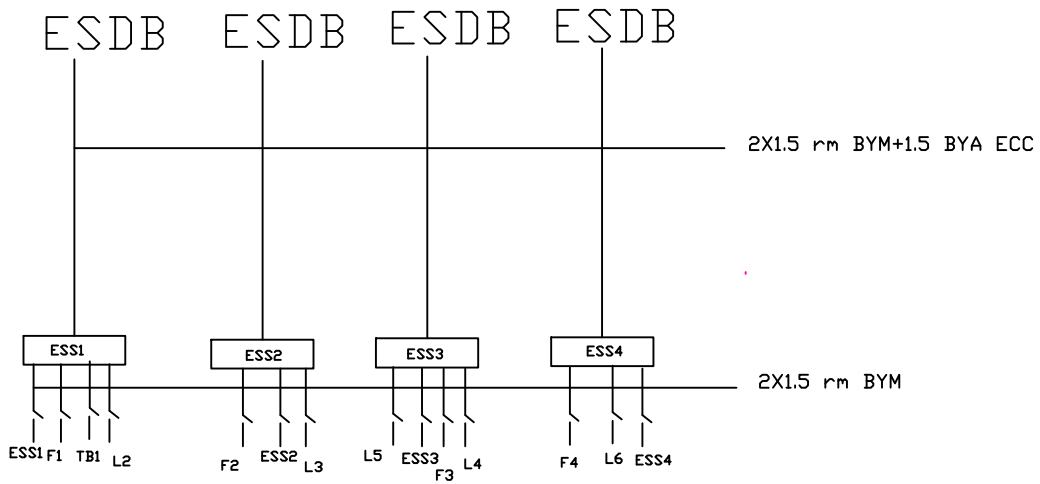
SB DIAGRAM


SDB
SDB
SDB
SDB
2X1.5 rm BYM+1.5 BYA ECC
2X1.5 rm BYM+1.5 BYA ECC
2X1.5 rm BYM+1.5 BYA ECC
SB1
SB2
SB3
SS7
2X1.5 rm BYM
SS2
L1
TB1
SS3
SS6
SS7
L7

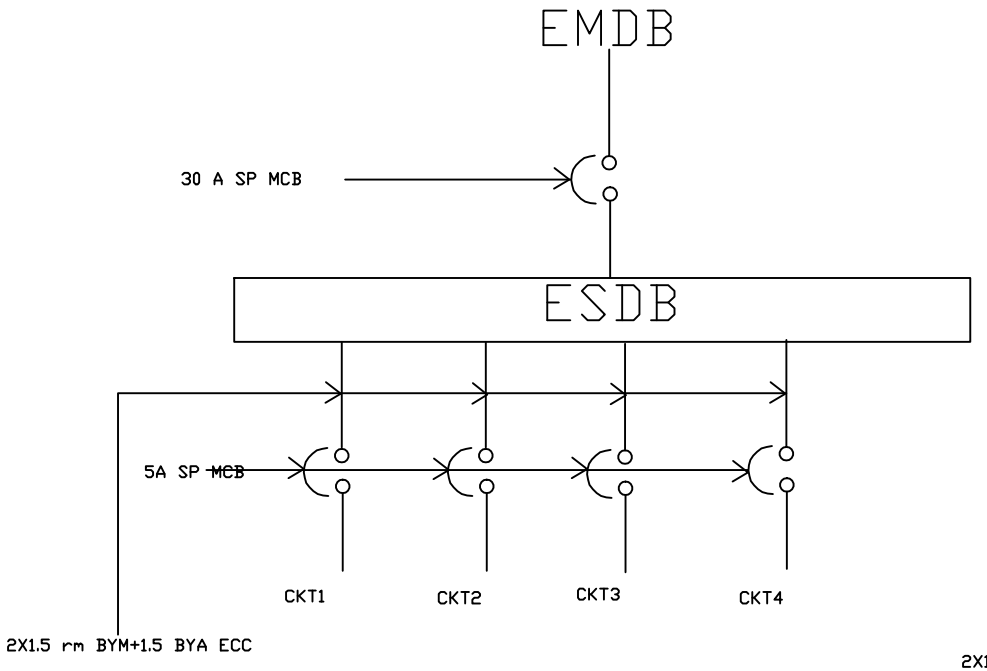
SDB DIAGRAM

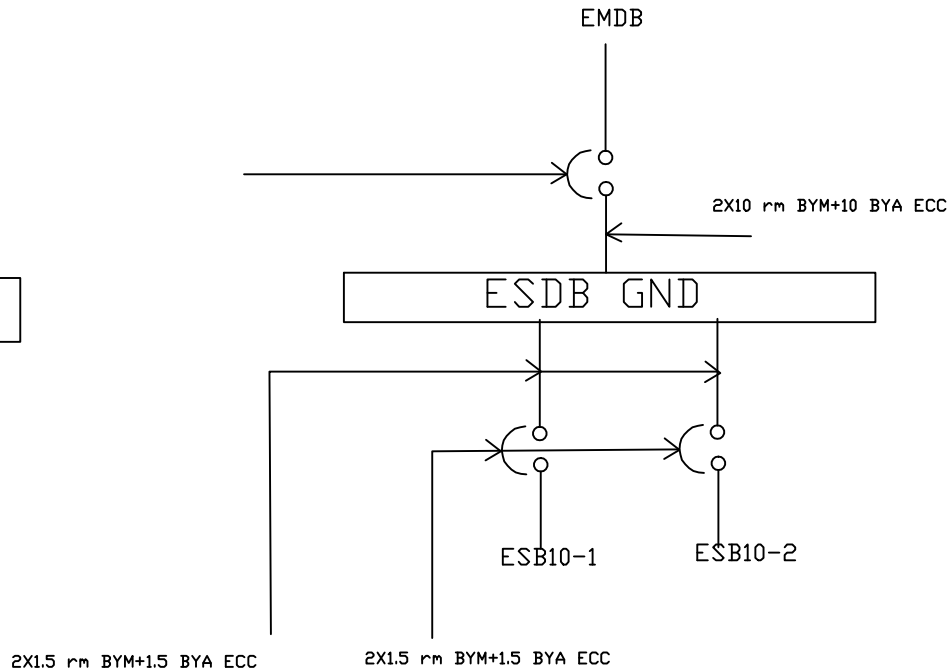

MDB
40A SP MCCB
2X16 rm BYM+16 BYA ECC
SDB
5ASP MCB
CKT1
CKT2
CKT3
CKT4
15A SP MCB
P1
P2
20ASP MCB
Q1
Q2
2X1.5 rm BYM+1.5 BYA ECC
2X4 rm BYM+4 BYA ECC
2X6 rm BYM+6 BYA ECC

ESB DIAGRAM

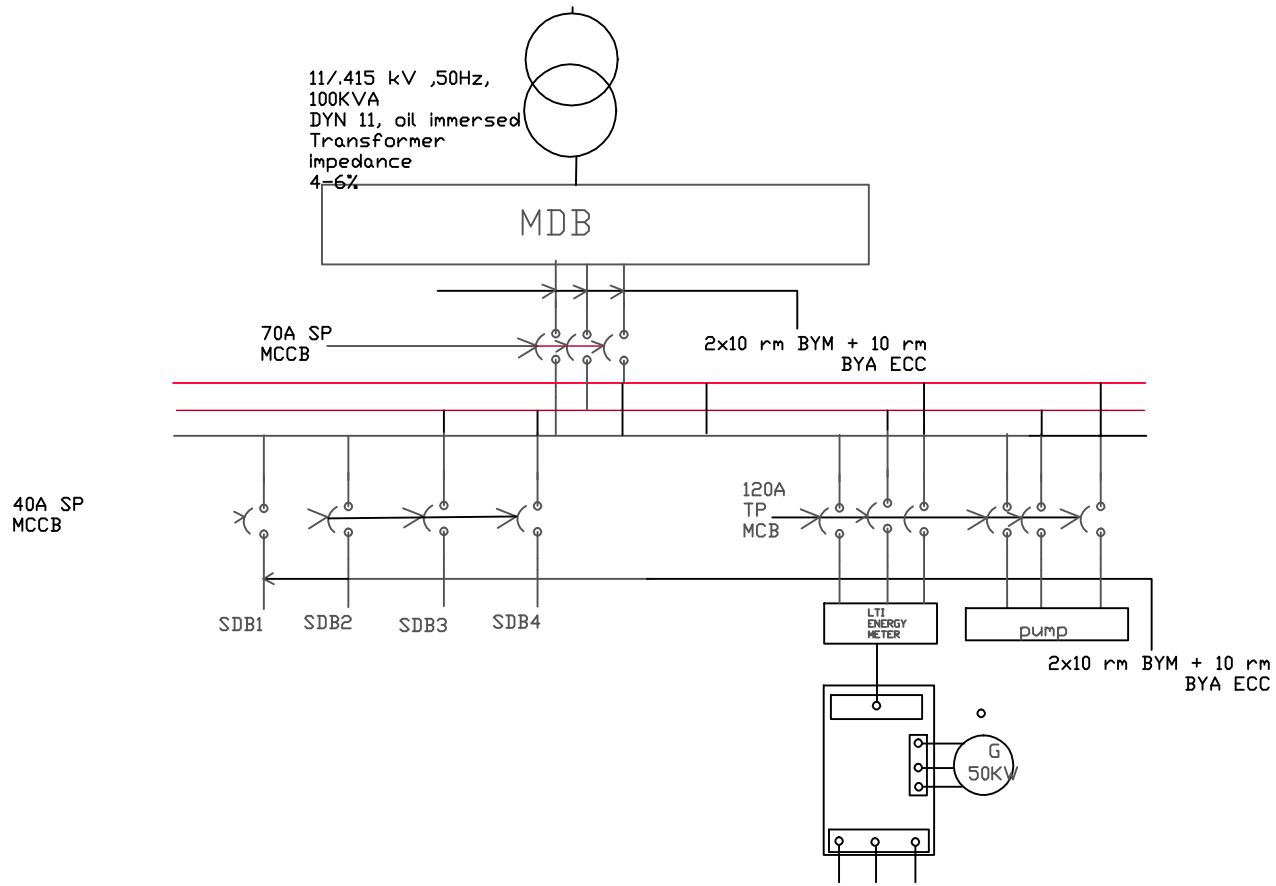

ESDB
ESDB
ESDB
ESDB
2X1.5 rm BYM+1.5 BYA ECC
ESS1
ESS2
ESS3
ESS4
2X1.5 rm BYM
ESS1
F1
TB1
L2
F2
ESS2
L3
L5
ESS3
F3
L4
F4
L6
ESS4

ESDB DIAGRAM

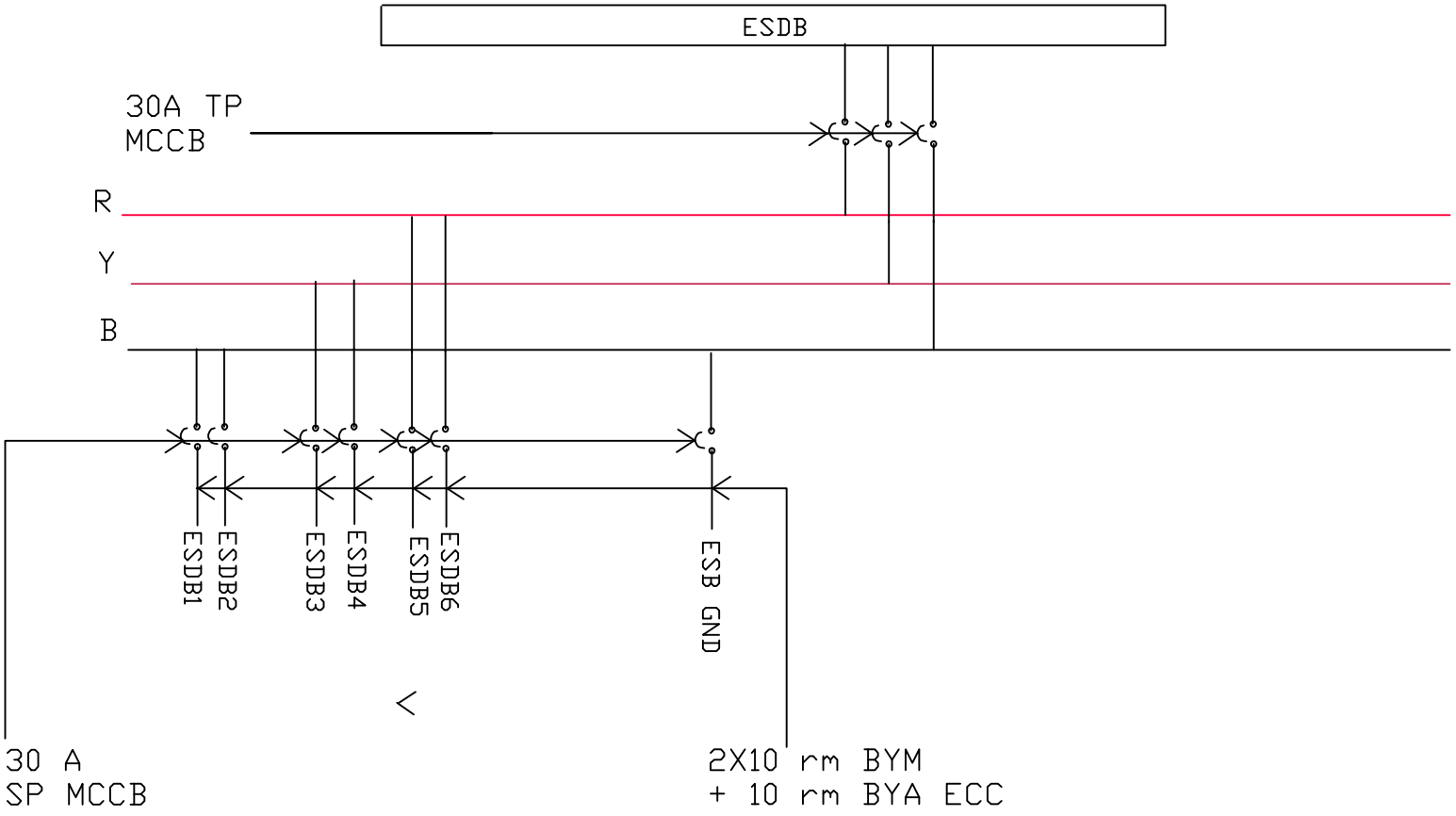




MDB Diagram


11/.415 kV ,50Hz,
100KVA
DYN 11, oil immersed
Transformer
impedance
4-6%
MDB
70A SP
MCCB
2x10 rm BYM + 10 rm
BYA ECC
40A SP
MCCB
120A
TP
MCB
SDB1
SDB2
SDB3
SDB4
LTI
ENERGY
METER
pump
2x10 rm BYM + 10 rm
BYA ECC
G
50KV

EMDB DIAGRAM



Calculations for Light Bulbs(LB) and Fans(F)

Formula for Light Bulbs, E= n*N*F*UF*LLF/A(A in mA2)

Number of Fans =A/100(a in sqft)

Bedroom-1

Area =(9'6'' * 11'8'')=116.833 Square feet = 10.2967 m2

Illuminance E= 100 lumen/m2

Light Loss Factor and Utilization Factor , LLF x UF = 0.7

Number of lights per luminaire, n=1

Flux = 1250 Lumen (20 W Energy Saving Bulb and Fluorescent Tubelight)

Number of lights, N=?

Calculating from the above formula , N= 1.176

So, 1 light bulb and 1 tube light are needed.

Number of Fans = 1.1

So, 1 fan will be needed

Bedroom-2

Area =(8' * 11'11'')=95.33 Square feet = 8.8564 m2

Illuminance E= 100 lumen/m2

Light Loss Factor and Utilization Factor , LLF x UF = 0.7

Number of lights per luminaire, n=1

Flux = 1250 Lumen (20 W Energy Saving Bulb and Fluorescent Tubelight)

Number of lights, N=?

Calculating from the above formula , N= 1.01

So, 1 light bulb is needed

Number of Fans = 0.953

So, 1 fan will be needed

Drawing Room

Area =(13' * 11')=143 Square feet = 13.2851 m2

Illuminance E= 100 lumen/m2

Light Loss Factor and Utilization Factor , LLF x UF = 0.7

Number of lights per luminaire, n=1

Flux = 1250 Lumen (20 W Energy Saving Bulb and Fluorescent Tubelight)
Number of lights, N=?

Calculating from the above formula , N= 1.51829

So, 1 light bulb and 1 tube light are needed.

Number of Fans = 1.43

So, 1 fan will be needed (average)

Dining Room

Area =(7' * 7'11'')=55.4167 Square feet = 5.14837 m2

Illuminance E= 100 lumen/m2

Light Loss Factor and Utilization Factor , LLF x UF = 0.7

Number of lights per luminaire, n=1

Flux = 1250 Lumen (20 W Energy Saving Bulb and Fluorescent Tubelight)
Number of lights, N=?

Calculating from the above formula , N= 0.588

So, 1 light bulb or 1 tube light are needed.

Number of Fans = 0.55

So, 1 fan will be needed

Toilet-1

Area =(5'7'' * 2'10'')=15.8194 Square feet = 1.4696 m2

Illuminance E= 100 lumen/m2

Light Loss Factor and Utilization Factor , LLF x UF = 0.7

Number of lights per luminaire, n=1

Flux = 1250 Lumen (20 W Energy Saving Bulb and Fluorescent Tubelight)
Number of lights, N=?

Calculating from the above formula , N= 0.167

So, 1 light bulb is needed

Kitchen

Area =(6'4'' * 6'11'')=43.805 Square feet = 4.0696 m2

Illuminance E= 200 lumen/m2

Light Loss Factor and Utilization Factor , LLF x UF = 0.7

Number of lights per luminaire, n=1

Flux = 1250 Lumen (20 W Energy Saving Bulb and Fluorescent Tubelight)
Number of lights, N=?

Calculating from the above formula , N= 0.930

So, 1 light bulb is needed.

1 exhaust fan will be needed

Toilet-2

Area =(3'6'' * 5'8'')=19.833 Square feet = 1.8425 m2

Illuminance E= 100 lumen/m2

Light Loss Factor and Utilization Factor , LLF x UF = 0.7

Number of lights per luminaire, n=1

Flux = 1250 Lumen (20 W Energy Saving Bulb and Fluorescent Tubelight)
Number of lights, N=?

Calculating from the above formula , N= 0.21

So, 1 light bulb is needed.

Corridor

Area =(13' * 5')=6.0387 m2

Illuminance E= 70 lumen/m2

Light Loss Factor and Utilization Factor , LLF x UF = 0.7

Number of lights per luminaire, n=1

Flux = 1250 Lumen (20 W Energy Saving Bulb and Fluorescent Tubelight)
Number of lights, N=?

Calculating from the above formula , N= 0.483

So, 1 ceiling mounted light is needed

Calculation for Conduits

Formula for Ampere Rating , I=P/(V*pf)*(A)

Pf= 0.7 is considered on an average.

Energy Saving Bulb = 20W

Tube Light = 20W

Ceiling Fan = 100W

Switchboard Socket(max)= 100 W

Celing Light = 20W

All internal wires are below 5A rating so 2 x 1.5 rm BYM is used in all internal wiring.

To Sub Distribution Board(SDB)

CKT1 Rating

I = (20+100)/(220*0.7) = 0.77A

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

CKT2 Rating

I = (3 x 20 + 100 + 2 x 100)/(220 x 0.7)

= 2.337 A

So, 2 x 1.5 nm BYM + 55 BYA ECC are used.

CKT3 Rating

I= (100+ 20+ 20 + 100 + 20)/(220 x 0.7)

= 1.658 A

So, 2 x 1.5 rm BYM + 1.5 BYA ECC are used

CKT4 Rating

I=(100 + 20 + 100)/(220 x 0.7)

= 1.418 A

So, 2 x 1.5 nm BYM + 55 BYA ECC are used.

To Emergency Sub Distribution Board(ESDB)

CKT1 Rating

I= (20 + 100)/(220 x 0.7)

= 0.7792 A

so, 2 x 1 .5 rm BYM + 1 .5 BYA ECC are used.

CKT2 Rating

I= (20 + 100)/(220 x 0.7)

= 0.7792 A

so, 2 x 1 .5 rm BYM + 1 .5 BYA ECC are used.

CKT3 Rating

I= (2x100 + 3 x 20)/(220 x 0.7)

= 1.68 A

so, 2 x 1 .5 rm BYM + 2 x 1 .5 BYA ECC are used.

Calculations for SDB

SDB load = Total load x 0.7 + Total P socket load x 0.5 + total Q socket load x 0.3

Total load = CKT1 load + CKT2 load + CKT3 load + CKT4 load

SDB current = SDB load / Voltage *pf

P load =15A

Q load = 20 A

Voltage =220 V

Power Factor, pf=0.7

CKT1 Load = 20 +100=120 W

CKT2 Load = 3 x 20 +100 + 2 x 100 = 360 W

CKT3 Load = 20*3 +100*2=260 W

CKT4 Load = 100 + 20 + 100 = 220 W

Total load = 960 W

SDB load = 960 * 0.7 + 3000*0.2*2+4000*2*.2 = 3472W

SDB current = 3472/ (220 *0.7) = 22.5454A

40A Sp MCCB is required From SDB to MDB

Calculations for ESDB

ESDB load= Total load x 0.7 + Total P socket load x 0.2 + total Q socket load x 0.2

Total Load = CKTI' load + CKT2' load + CKT3' load

ESDB Current = ESDB Load/Voltage * pf

CKT1 Load = 20 +100=120 W

CKT2 Load = 20*3 + 100 *2= 260 W

CKT3 Load = 20*4 +100*3=380 W

Total load = 760 W

ESDB load =6 x 760x 0.7 = 3192

Total ESDB Current=3192/(220*.7)=20.72A

30A Sp MCCB is required From ESDB to EMDB

CALCULATION OF ESDB GROUND

ESDB GND CURRENT=120*.7/220*.7=.545A

5A SP MCCB is needed from ESDB GND TO EMDB

EMDB calculation

EMDB load = total ESDB load x 0.7

Total ESDB load = 6x ESDB load

EMDB current = EMDB load / 3^1/2 x line voltage c pf

Phase voltage = 220V

Line voltage = 3^1/2 x 220 = 381.05 V

Power factor = 0.7

ESDB load = 6 x 760 x 0.7 = 3192

EMDB load=3192*6*.7=13406.4w

Current = (3192x 6x 0.7)/(3^1/2x381.05x0.7)=29.0182715A

30A Tp MCCB needed from EMDB to MDB

MDB calculation

MDB load = total SDB load x 0.7 + (EMDB load + pump load) x 0.7

= 6x 3472 x 0.7 + (13406.4+ 5000) x 0.7

= 27466.8W

Current = 27466.8/(3^1/2 x 381.05 x 0.7) = 59.45A

150 A TP MCCB needed from MDB to main line

AIR TERMINAL CALCULATION

Total circumference=2x3+31x4+57x2+5x2=254feet=77.4192meter

Air terminal should be placed 20 meter distance

Air terminal number=77.4192/20=3.87

So 4 air terminal.