

Electrical Design Report For G+2 MIXED USE Building

Owner: ASHU

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Electrical Design Report

The requirements of installation are mainly dependent up on the type of work to be carried out in the space in question. The no of Luminaries for the space is calculated by taking in to account of the visual task to be carried out in the space, the area of the space, reflection factor of the ceiling wall and working plane and the room index and also the maintenance factor.

In all case the reflectance of ceiling wall and working plan are taken to be 0.7, 0.5, 0.3 respectively maintenance factor of 0.8 are taken.

For all residence RZB type incandescent Luminaries are used. The following illumination level is taken for various type of visual task to be carried out.

No (Lux)	Visual Task	Average	Illumination
1	Kitchen	200	
2	Living and dining Room	200	
3	Bed room	150	
4	Corridor /Lobby/	100	
5	Car Parking	100	
6	Terrace	75	
7	Toilet	100	
8	Study room	300	
9	Garden	50	
9	Shop	300	
9	Office	300	

The average horizontal is calculated from:- $\phi_{ins} = \frac{EA}{UF.MF}$

Ø	The total luminous flux of lamp
E	Average illumination
A	Area of working space
U	utilization factor
M	Maintenance Factor

U is found from photo metric DATA of chosen luminary.

The room index is calculated from

$$RI = \frac{L \times W}{H(L+W)}$$

Where L = room length

W = Room width

Hm -Mounting height of the laminar

So based on this calculative we can determine the no of lemonier (lamp) for every room.

Ground Floor

STORE

$$\begin{aligned} \text{Ø} &= EA = \frac{200 \times 65}{0.59 \times 0.8} = 27542 \text{ lux} \end{aligned}$$

Number of lamp = $27542/3000 = 9$ nine lamp for ceiling

PARKING

$$\begin{aligned} \text{Ø} &= EA = \frac{200 \times 30}{0.59 \times 0.8} = 12713 \text{ lux} \end{aligned}$$

Number of lamp = $12713/3000 = 4$ four lamp for ceiling

Corridor

$$\begin{aligned} \text{Ø} &= EA = \frac{100 \times 20}{0.55 \times 0.8} = 3708 \text{ lux} \end{aligned}$$

Number of lamp = $3708/750 = 6$ six lamp for ceiling

First Floor

OFFICE

$$\emptyset = EA = \underline{300 \times 45} = 28602 \text{ Lux}$$

$$U.M \quad 0.59 \times 0.8$$

$$\text{Number of lamp} = 28602 / \underline{3000} = 9 \text{ NINE lamp at ceiling}$$

OFFICE

$$\emptyset = EA = \underline{300 \times 21} = 13345 \text{ Lux}$$

$$U.M \quad 0.59 \times 0.8$$

$$\text{Number of lamp} = 13345 / \underline{3000} = 4 \text{ four lamp at ceiling}$$

OFFICE

$$\emptyset = EA = \underline{300 \times 58} = 36864 \text{ Lux}$$

$$U.M \quad 0.59 \times 0.8$$

$$\text{Number of lamp} = 36864 / \underline{3000} = 12 \text{ lamp at ceiling}$$

Corridor

$$\emptyset = EA = \underline{100 \times 20} = 3708 \text{ lux}$$

$$U.M \quad 0.55 \times 0.8$$

$$\text{Number of lamp} = \underline{3708 / 750} = 6 \text{ six lamp for ceiling}$$

Toilet

$$\emptyset = EA = \underline{100 \times 2.5 \times 2.8} = 1483 \text{ lux}$$

$$U.M \quad 0.59 \times 0.8$$

$$\text{Number of lamp} = \underline{1483 / 750} = 2 = 1 \text{ lamp for ceiling \& one lamp for mirror light}$$

SECOND Floor

OFFICE

$$\emptyset = EA = \underline{300 \times 45} = 28602 \text{ Lux}$$

$$U.M \quad 0.59 \times 0.8$$

$$\text{Number of lamp} = 28602 / \underline{3000} = 9 \text{ NINE lamp at ceiling}$$

OFFICE

$$\emptyset = EA = \underline{300 \times 21} = 13345 \text{ Lux}$$

$$\text{U.M} \quad 0.59 \times 0.8$$

**Number of lamp = $13345/3000 = 4$ four lamp at ceiling
OFFICE**

$$\varnothing = EA = 300 \times 58 = 36864 \text{ Lux}$$

$$\text{U.M} \quad 0.59 \times 0.8$$

**Number of lamp = $36864/3000 = 12$ lamp at ceiling
Corridor**

$$\varnothing = EA = 100 \times 20 = 3708 \text{ lux}$$

$$\text{U.M} \quad 0.55 \times 0.8$$

Number of lamp = $3708/750 = 6$ six lamp for ceiling

Toilet

$$\varnothing = EA = 100 \times 2.5 \times 2.8 = 1483 \text{ lux}$$

$$\text{U.M} \quad 0.59 \times 0.8$$

**Number of lamp = $1483/750 = 2 = 1$ lamp for ceiling & one lamp
for mirror light**

Power calculation 2nd floor

Power for lighting $9 \times 100 \times 3 + 8 \times 100 \times 2 = 4300 \text{ VA}$

Power for socket outlet $6 \times 200 = 1200 \text{ VAX} 4 = 4800 \text{ VA}$

Total power for SDB -2nd Floor =

$4300 \text{ VA} + 4800 \text{ VA}$

Total Power = $9100 \text{ VA} = 9 \text{ KVA}$

$$I = \frac{9000 \text{ VA}}{\sqrt{3} \times 380}$$

15A but we select the next higher

Rating of A.C.B = $3 \times 25 \text{ A}$

Rating of cable size $5 \times 4 \text{ mm}$ according to the size of A.C.B

Power calculation 1st floor

Power for lighting $9 \times 100 \times 3 + 8 \times 100 \times 2 = 4300 \text{ VA}$

Power for socket outlet $6 \times 200 = 1200 \text{ VAX} 4 = 4800 \text{ VA}$

Total power for SDB -1st Floor =

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4300 VA + 48000 VA

Total Power = 9100 VA = 9KVA

$$I = \frac{9000\text{VA}}{\sqrt{3} \times 380}$$

15A but we select the next higher

Rating of A.C.B = 3x25 A

Rating of cable size 5x4mm according to the size of A.C.B

Total power for MDB =

Power for lighting = $9 \times 100 + 8 \times 100 \times 2 + 10 \times 100 = 3500\text{VA}$

Power for socket = $6 \times 200 + 1200 \times 3 = 3600\text{VA}$

Total power for =MDB

$3500\text{VA} + 3600\text{VA} = 7100\text{VA}$

Total power for MDB = $7100\text{VA} + 9000\text{VA} + 9000\text{VA} = 25100\text{KVA}$

Total Power = 25KVA

$$\text{D.F} = 0.7$$

$P(\text{tot}) : 25\text{KVA} \times 0.7 = 18\text{KVA}$

$P_{\text{max}}: 18\text{KVA} \times 0.8 = 14\text{KW}$

$$I = \frac{18000}{\sqrt{3} \times 380} = 27\text{A}$$

$$\sqrt{3} \times 380$$

Rating of A.C.B 3x32A

Rating of cable 5X16mm

To check a voltage drop from MDB to KWHM and from MDB to SDB is very short less than 10 meter so no need of checking voltage drop.

LOCATION OF OUT LETS

All dimensions is measured from F.F level

Switch = 1:30 cm

Junction box = 20 cm

Socket out lets 30 cm

Control Board 1:80cm

Bed size Switch 1m

Water Heater 170m
Stove 30cm
Kitchens socket 1:10m
Bell Push-button: 1m
Bell Indicate 1:70 cm

So we can use four corner lamps and to ceiling lamp with four down light each.

Socket Point

One Normal Socket are provided for each table and bed in every room
TV sockets are provided in each room where TV to be installed.

Bed Room Three ordinary socket

Living & Dining Five ordinary socket

Master Bed Room three or four ordinary socket

Corridor one ordinary socket

Toilet one ordinary socket and one power socket for water heater

Master Base one ordinary socket and two power socket for water heater and Jacuzzi.

Telephone Point

Telephones points are providing in each room conduit of 19/29mm diameter are to be installed for Telephone Wire /Cable is for ETC regulation.

Bell Call System

Low voltage bell call system is designed and bell push button are provided in each room requiring the call system call panel of

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appropriate digital number are also installed in nearly mid location or at the kitchen.

Distribution Board

Plush mounted distribution board containing only miniature automatic ckt breaker are installed at accessible point even in main Distributions board the newly designed is according to the total power required to designed the type of ckt breaker.

Power Calculative

Power is calculated for each distribution board by taking in to account the power of each incandescent lamp having an actual power of less than 100 VA to be 100 VA for incandescent lamp having more than 100 VA actual proper is taken for single and double flour sent lamp power of 100 & 200 VA are taken respectively.

To calculate the rating of ACB and cable size or single phase $I = \frac{P}{V}$

For three phase $I = \frac{P}{\sqrt{3} \times 380}$

For each normal socket outlet a power of 200 VA is taken power of 1500 VA & 3000 VA are taken for water heater and socket cooker (coffee machine/ respectively/

Scope of the Work

The scope of the work to be covered by the contractor including the supply & installation of all material, equipment all other. Faculty necessary for proper and effective operation of electrical system specified here in the bill of quantities and indicated with drawing.

General Requirement

Installation shall be carried out in accordance with the Ethiopia electrical power **corporation (EEPCOLs)** the Ethiopian Telecommunication corporation (ETC) rule and regulation.

The Ethiopia Electric power corporation supplied power to the main distribution board with 3 phase 4 wire 380 V/220V 50HZ system. All material and equipment for this supply connection and measuring instrument for consumption of power shall be supplied by EEPCO's the electrical work including here is shall be excited in the best and most effective manner and to be completed satisfaction of the engineer who shall have a power to reject any work and material which is his judgment are not in a full accordance with the drawing and specification. No change shall be done any part of the design without prior approval of the consultant engineer the work shall meet all requirement of neat good work man ship and be performed by skilled election that possess the appropriate classification field of competence issued by EEPCOs.