GUIDELINE TO DESIGN ELECTRICAL NETWORK

How to calculate load—

1. Find out built up area in Sqft.of per flat per House/Dwelling unit.

2. Multiply area in Sqft. by Load/Sqft.

Type of Load	**Load/Sqft**
Industrial	100 Watt/Sqft
Commercial	30 Watt/Sqft
Domestic	15 Watt/Sqft

3. Apply the diversity factor and Compute the load of all dwelling units in the area.

Type of Load	Diversity Factor
Industrial	0.5
Commercial	0.8
Domestic	0.4

4. Add the load of common services such as Auditorium, Street Lights, Lifts and Water Pumps etc. For simplicity purpose 0.5kW/dwelling units may be considered as common load.

5. Compute the "Total Load" of the area by adding load observed at above.

6. Apply the power factor of 0.8 to determine the load in kVA.

7. Compute the Load in kVA= "Total Load"/0.8

8. Take transformer loading of 65% considering the network arrangement Ring Main Circuit.

9. The decision for voltage grade is to be taken as follows:

    - If load is equal to or more than 2.50MVA, the area shall be fed through 33kV feeder. For such loads, the land space for 33/11kV Sub-station shall have to be allocated by builder / Society/ Authority.
    - For load between 1 MVA to 2.5MVA, dedicated 11kV feeder shall be preferred.
    - For load below 1 MVA, existing 11kV feed can be tapped through VCB or RMU.

10. The maximum capacity of distribution transformer acceptable is 400 kVA as a standard capacity in the inventory.

11. Only two-no of transformer at one location shall be acceptable. If there is more number of transformers HT shall be required to extend using underground cables to locate additional transformer.

12. Either VCB or Ring Main Circuit shall be used to control transformers. There cables should have metering arrangement at 11 kV. The protection system at incoming supply shall be using numerical relays.

13. On LT side of transformer, LT main feeder pillar shall be provided. The Incoming shall be protected by MCCB/SFU.

14. The distribution pillar-box shall be connected into Ring Main Unit. The incomer of distribution pillar shall have MCCB / SFU. The outgoing shall have HRC fuses.

15. The LT cables from transformers to LT panel / Main feeder pillar is to be taken as follows:
    - 630kVA transformers : 2 nos x 1C x 630 Sqmm, Al. Conductor, Armoured XLPE insulated
    - 400kVA transformers : 1 C x 630 Sqmm, Al. Conductor, Armoured XLPE insulated
    - 250kVA transformers : 3 ½ C x 400 Sqmm, Al. Conductor, Armoured XLPE insulated
    - 160kVA transformers : 3 ½ C x 300 Sqmm, Al. Conductor, Armoured XLPE insulated
    - 100kVA transformers : 3 ½ C x 150 Sqmm, Al. Conductor, Armoured XLPE insulated

16. The factors for cable loading shall be taken as 70%.

17. The factor for multiplicity of cables from same cable trench shall be 80%.

18. The suggested maximum length of LT cable feeder shall be 250 Mtrs.

19. The LT cables shall be connected in ring main circuit.

20. The load on sub-feeder pillar shall be restricted to 150kW.

21. The suggested LT cables from main feeder pillars to distribution pillar boxes shall be as follows:

	Load on distribution pillar is	LT Cable Size
a.	Upto 50kW	3 ½ C x 150 sqmm
b.	Upto 100kW	3 ½ C x 300 sqmm
c.	Upto 150 kW	3 ½ C x 400sqmm

AL, XLPE insulated armoured cable.

22. The entire system has to be designed for a **voltage drop of 2.0% from** 11kV Side of transformer to metering equipment at end consumer premises.

23. The entire system has to be designed for **T&D losses of service maximum 2.0% from** 11kV to end consumer meter including of service cable.

24. The specification of all equipment & cable along with electrical design shall be approved by NPCL prior to execution of work at site.
