
# ENEL 674 Industrial and Commercial Power Systems

Group 7

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## Project Milestone 2

Distribution Options for the Site

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## 1. Location of the Transformer:

- Considering the given site scenarios, our location for the transformer would be south-east (SE) side of the building. We are mentioning the exact location of the transformer in the power layout drawing.
- On the other hand, we can place transformer to the south of the building as well. But there are certain disadvantages as well.

| Types | Location: South-East | Location: South |
|---|---|---|
| **Complexity of network** | May be obstructed by sewer and gas lines | No complexity |
| **Length of Cable** | Less | More |
| **Voltage drops in LV Cable** | Less | More |
| **Fire fighter access** | Easy | Easy |
| **Cost of LV Cable** | Less | More |
| **Number of Bends in cable** | Less | More |

*Table 1 : Comparison of different transformer location design*

By comparing above 2 designs, we are going with South-East location as it has more advantages.

## 2. Voltage Levels:

- We are taking 24.9kV as input to our transformer and that is coming from the overhead line from the utility. All the electrical equipments are either 208V (3 Phase) or 120V (1 Phase). Our chosen transformer would be as following:

## 3. Rating of Transformer:

- 112.5 kVA & 24.9kV/208V Delta-Star (Grounded neutral), Type of transformer is outdoor.

| Transformer Details | | | |
|---|---|---|---|
| **kVA** | 112.5 | **Efficiency** | 99% |
| **HV (kV)** | 24.9 | **Frequency** | 60 Hz |
| **LV (kV)** | 0.208 | **Cooling** | ONAN |
| **HV side Current (A)** | 2.6 | **Vector Group** | Dyn11 |
| **LV side Current (A)** | 312.28 | **% Impedance** | 4.5 |

*Table 2 : Transformer Nameplate*

## 4. Cost of Transformer:

- For above specifications, approximate cost of the transformer would be around $25,000, installation cost and other miscellaneous cost would be around $10,000.

## 5. Grounding of Transformer:

- Neutral will be solidly grounded and we are providing 2 transformer body earthing for the extra safety.

## 6. Incoming HV Conductor:

- Incoming overhead conductors are part of utility. So, for our part of design, we are not considering incoming conductor design.

## 7. Outgoing LV Cable:

- Secondary of transformer is connected to main switchgear panel via cables. Size of that cable is $700\ kcmil$ with jacket.

## 8. Size of Incoming Circuit Breaker:

- We are using $300A$ circuit breaker (Calculation for the service sizing already mentioned in service sizing file) for the overloading protection. From this main switchgear panel, power will be distributed to all other panels.

## 9. Route and laying of LV Cable:

- Underground Cable: Cable will go along the east end of the wall. Depth of the cable will be 4 feet. We will use the caution tape and safety tiles over the cable for the mechanical protection of the cable. Our suggestion for cable laying will be underground trench of 2 feet wide and 4 feet deep.
- Cable laying in raceway: Cable will run along the outside wall of the building on east.
- We can go with either design depending upon the client's budget.

## 10. Extra Safety:

- Fire extinguishers will be provided for the any kind of fire hazard.