HOW TO SIZE RESIDENTIAL TRANSFORMERS AND SECONDARY CABLES FOR RESIDENCES WITH ELECTRIC HEAT

Step 6: **Calculate Secondary Cable Length and Pedestal Distance Tradeoffs (Continued)**

Connected Heating Load for One House	Voltage Drop Per Foot of 1/0		Distance From Pedestal To Residence		Voltage Drop from Pedestal to Residence
10 kW	0.0067	x	______ ft	=	________ V
15 kW	0.0100	x	______ ft	=	________ V
20 kW	0.0133	x	______ ft	=	________ V
25 kW	0.0166	x	______ ft	=	________ V

Connected Heating Load for One House	Voltage Drop Per Foot of 1/0		Distance From Pedestal To Residence		Voltage Drop from Pedestal to Residence
10 kW	0.0036	x	______ ft	=	________ V
15 kW	0.0054	x	______ ft	=	________ V
20 kW	0.0072	x	______ ft	=	________ V
25 kW	0.0091	x	______ ft	=	________ V

7. Subtract 1/0 and 4/0 voltage drop numbers from part 6 from the voltage at the pedestal, step 5.

Volt drop available if 1/0 _________ V

Volt drop available if 4/0 _________ V

You are now at the meter. If the voltage drop available is less than 0, you have used more volts than are available. Go back to Step 4 or Step 6 and change the distance assumptions and try it again.

HOW TO SIZE RESIDENTIAL TRANSFORMERS AND SECONDARY CABLES FOR RESIDENCES WITH ELECTRIC HEAT

Step 7: **Locate and Size Transformers**

1. Make the first transformer placement in the platting. Connect EVERY lot within the 4/0 Al service cable length to the first transformer, assuming street crossings. Use pedestals as appropriate.
2. Locate the subsequent transformers, using the same assumption.
3. Count the number of residences for each transformer.

   Transf.1 _/_ Transf.2 _/_ Transf.3 _/_ Transf.4 _/_
   Transf.5 _/_ Transf.6 _/_ Transf.7 _/_ Transf.8 _/_
4. Review the maximum number of residences determined in Step 3, and assign an initial size for each transformer.

5A. For basically LINEAR plattings, finalize transformer locations and sizes by following these steps:
   a. If the transformer has the capacity to serve more residences than are connected, use the next smaller transformer size. Transfer the overflow lots to the adjoining transformers.
   b. Step down the platting, relocating, and resizing the transformers.
   c. Minimize the number of "extra" residences of all the transformers.
   d. Use pedestals as appropriate.

5B. For TREE type plattings with many cul-de-sacs and street branches, finalize transformer locations and sizes by following these steps:
   a. If the transformer has the capacity to serve more residences than are connected, adjust the transformer location to permit the connection of more residences within the cable length limit.
   b. Adjust the location and/or size of adjoining transformers.
   c. Minimize the number of "extra" residences of all the transformers.
   d. Use pedestals as appropriate.

5C. Plattings that have a combination of LINEAR and TREE type characteristics can be served using a combination of the layout techniques described above.

HOW TO SIZE RESIDENTIAL TRANSFORMERS AND SECONDARY CABLES FOR RESIDENCES WITH ELECTRIC HEAT

Step 7: **Locate and Size Transformers**

6. In order to OPTIMIZE design and MINIMIZE cost, the following facts should be considered:
   a. Designs that use larger distribution transformers are generally cheaper. A 50 kVA transformer provides the same kVA as two 25 kVA transformers but, in most cases, costs less to install. This is true even if we include the cost of heavier service cable [4/0 vs. 1/0] and pedestals. A straight up comparison of a 50 kVA unit plus 1 pedestal to 2 - 25 kVA transformers will show a savings of about $1000.
   b. Street crossings are generally more cost effective than running cable completely around cul-de-sacs, even when trenching or augering costs are included.
   c. Distribution design is flexible and varies on a case by case basis. The use of pedestals increases the number of residences that can be provided from a single transformer.
   d. More than one optimum design is possible for a given platting. Customer Service Representatives and Designers can use these guidelines to enhance designs and optimize transformer loading.
   e. Significant cost savings can be achieved if two or three options are explored for every platting.

HOW TO SIZE RESIDENTIAL TRANSFORMERS AND SECONDARY CABLES FOR RESIDENCES WITH ELECTRIC HEAT

Step 8: Select a Final Design

At this point, a design has been prepared. Significant cost savings can be achieved if 2 or 3 options are explored for each platting. A cost estimate comparison will make a clear choice possible.

Determine the cost per residence served.

Total Cost $______ ÷ # of Residences ______ = Cost per Residence Served $ ________

HOW TO SIZE RESIDENTIAL TRANSFORMERS AND SECONDARY CABLES FOR RESIDENCES WITH ELECTRIC HEAT

WORKSHEET FOR ELECTRIC HEAT LOADS

Step 1: ***Gather Required Information***

1. Average size of residence ________ sq ft
2. Type of water heating (electric or other) ________
3. Amount of resistive heat load ________%
4. Plat plan ________ lots
5. Voltage Drop available ________ V

Step 2: ***Determine A Diversified Peak Load*** ________ ton

Step 3A: ***Determine the Maximum Number of Residences on a Transformer***
OR 3B: ***Calculate the Maximum Number of Residences on a Transformer***
25 kVA: __________ 50 kVA: ______ 75 kVA: ______ 100 kVA:

Step 4: ***Determine Secondary Cable Length Limits WITHOUT Pedestals***

Cable Size	Current Limit	Cable Length Limit (Transf. to Meter)
1/0 Al	200 A	__________ ft
4/0 Al	300 A	__________ ft

Step 5: ***Determine Secondary Cable Length WITH Pedestals (pedestal to residence)***

Cable Size	2 Residences per Conn. (ped to meter)	3 Residences Per Conn. (ped to meter)	4 Residences Per Conn. (ped to meter)
1/0 Al	________ ft	________ ft	________ ft
4/0 Al	________ ft	________ ft	________ ft

Step 6: ***Calculate Seconary Length and Pedestal Distance Tradeoffs***

Pedestal Distance Limit (transf. to ped)	Cable Size	2 Residences Per Conn. (ped to meter)	3 Residences Per Conn. (ped to meter)	4 Residences Per Conn. (ped to meter)
________ ft	1/0 Al	________ ft	________ ft	________ ft
________ ft	4/0 Al	________ ft	________ ft	________ ft

Step 7: ***Locate and Size Transformers***

Transf.1 __/__ Transf.2 __/__ Transf.3 __/__ Transf.4 __/__
Transf.5 __/__ Transf.6 __/__ Transf.7 __/__ Transf.8 __/__

Step 8: ***Select Final Design***

Total Cost $______ ÷ # of Residences ______ = Cost per Residence Served $ ________

HOW TO SIZE RESIDENTIAL TRANSFORMERS AND SECONDARY CABLES FOR RESIDENCES WITHOUT ELECTRIC HEAT

Step 1: Gather required information.

Step 2: Determine load per home.

Step 3: Determine the maximum number of residences on a transformer.

Step 4: Determine the service cable length limits (transformer to residence).

Step 5: Determine secondary cable distance limits (transformer to pedestal).

Step 6: Locate and size transformers.

Step 7: Prepare cost estimates/select final design.

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