

Avery Substation and Transmission Line Project

Substation Engineering

Electric distribution substations are a key component of any electric delivery system because they are the main transition point between the high voltage transmission levels and lower voltage distribution levels. Distribution substations receive electric power from high voltage transmission lines and serve to reduce, or “step-down”, these higher voltage levels to lower voltage levels. Once the voltage is reduced, it is distributed to customers by way of electric distribution lines or “feeders.”

Substations typically contain a number of electrical components and related physical supporting structures including: 1) dead-end structures and static masts; 2) voltage modification devices called transformers, regulators, and capacitors; 3) circuit protection and control devices called switches, relays, and circuit breakers; and 4) high voltage cables or rigid tubing typically referred to as a bus, which carry electricity between components of the substation. The heart of all substations is the transformer. The transformer and all other associated equipment are referred to as a transformer bay.

To accommodate the substation components, approximately eight to 10 acres would be graded and fenced. Typically, dead-end structure and static masts are approximately 55 to 62-foot-tall. Typical busses are approximately 35 feet tall and electrical equipment enclosures are generally no taller than 15 feet.



Typical Substation Layout: Broomfield Substation located near the intersection of Wadsworth Boulevard and 116th Avenue (approximately 6.8 acres).

Grading and landscaping amenities can require additional area, typically increasing the substation site size, usually not exceeding five acres. The total site size depends on the existing topography and visual screening opportunities.

The substation will require an access road capable of supporting the transformers, which can weigh in excess of 135,000 lbs. The typical access road width is 24 feet with maximum slopes of six to eight percent.

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