Early this year, Rockefeller Hall electrical system experienced a “single phasing” event. The purpose of this toolbox talk is to ensure responding personnel recognize a single phasing condition, understand potential hazards of single phasing and utilizes Customers Service or EMCS to initiate prompt response to correct the situation.

There are generally two types of electrical service entrances commonly used to provide electricity to a Building. A single phase 220/240Volts (V) residential or light commercial service, and a 3-phase commercial and industrial service. The majority of the larger buildings on the Cornell Ithaca campus use a 3-phase service entrance. The 3-phase service is fed from a higher voltage utility line ranging from 2,400 Volts to 13,000 Volts and is typically stepped down to either 208V or 480V at a building transformer. A 3-phase service entrance typically has a large amount of energy available to it to serve the large loads present in the building.

There is a commonly used term called “single phasing” that generally refers to the loss of one phase in a 3-phase system. This condition produces an imbalance in the building voltages. Depending on the specific cause, many things can manifest themselves in a loss of one phase. Typical indicators are:

- Some lighting dims or goes out while other lighting remains on
- Elevators fail to work
- HVAC “sounds strange” or stops working
- Air compressors trip breakers

The primary take away is that the system response is now unpredictable!

During a loss of phase event the voltage on the failed phase will go to zero, however, the other 2 phases may actually rise in voltage. Because one phase is not contributing to a balanced power flow, large devices such as pumps and compressors may overheat during operation in this condition. The larger concern is that often there is not adequate circuit protection to detect a loss of phase and the downstream devices are unable to protect against this imbalance. Motors and 277V lighting are particularly susceptible to damage during these events.

If the cause of the loss of phase happens to be at the building service entrance the entire building is now affected rather than portions of the building. The amount of energy imbalance becomes very large. This energy dissipates in the form of heat. This heat
energy may be in a transformer, switchgear, and/or the cables. If left in this unbalanced condition the heat continues to rise and eventually some component will overheat and fail. This can result in a fire, smoke, and other collateral damage to adjacent equipment. Leaving components energized during a loss of phase event is extremely dangerous. Once identified, the cause of the loss of phase needs to be investigated immediately. Large motors need to be secured and isolated. As an example: most electric driven fire pumps would be unable to meet head and flow requirements under these conditions.

When a Single Phase condition is determined, contact customer service so qualified electrical personnel can respond.