

# T e c h n i c a l   M e m o r a n d u m

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Project Tennessee State University Campus Master Plan

Subject 3. Existing Campus Conditions  
3.2 Existing Campus Infrastructure  
3.2.2 Electric Power

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To Tennessee State University

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The objective of this work is to discuss the condition and capability of the existing electrical distribution system. The TSU campus electrical distribution system is made up of one (1) continuous perimeter campus loop with two (2) substations rated at 5000 KVA each.

An underground 4.16kV distribution system forms a loop around the Campus extending from the main switchgear at each substation. Padmounted switches are installed in the Campus loop to provide isolation and fused protection of the buildings' transformers.

The perimeter campus loop is comprised of 350 MCM conductors, which is a limiting factor in the perimeter loop due to the existing demand on the Campus. These conductors can carry less than 50 percent of the existing Campus peak demands. Therefore, the North and South loops are switched using the padmounted switches as to not overload the loop conductors.

## **1. SUBSTATION NO. 1 WEST**

Substation no. 1 west is located on 37<sup>th</sup> Avenue North, East of the central power plant, and has installed the following equipment:

- One (1) each main switch
- One (1) each bypass switch
- One (1) each North feed (power for North campus)
- One (1) each South feed (power for South campus)
- One (1) each power factor correction unit and switch

The electrical power feed from the utility company (Nashville Electric Service) is 13.8kV, 3 phase through three (3) each step-down transformers (owned by NES), with a secondary voltage of 4.2 kV. The voltage for each campus building is from padmount transformers with secondary voltages at either 208Y/120V or 480Y/277V. The West station is sized to carry approximately 70 percent of total campus electrical load at this time.

## 2. SUBSTATION NO. 2 EAST

Substation No. 2 East is located on 33<sup>rd</sup> Avenue North at Alamaeda Street and has installed the following equipment:

- One (1) each main switch
- One (1) each bypass switch
- One (1) each North feed (power for North campus)
- One (1) each South feed (power for South campus)
- One (1) each power factor correction unit and switch

The electrical power feed from the utility company (Nashville Electric Service) is 13.8kV, 3 phase through three (3) each step-down transformers (owned by TSU), with a secondary voltage of 4.2 kV. The voltage for each campus building is from padmount transformers with secondary voltages at either 208Y/120V or 480Y/277V. The East station is sized to carry approximately 70 percent of total campus electrical load at this time.

A recent electrical distribution upgrade project included the addition of nine (9) padmount switches and 1400 feet of underground distribution cable on the 4.16kV East and West loops. The TSU underground electrical distribution system consists of the following equipment/components:

- Total number of transformers located at buildings is forty-eight (48).
- Total number of distribution padmount switches installed on campus for the 5 kV system is twenty-eight (28).
- Total number of distribution padmount switches installed on campus for the 13.8 kV system is three (3).
- Total amount of underground distribution cable installed is 12.7 miles.
- Total number of electrical manholes installed on campus is forty-eight (48).
- Total electrical campus distribution system is maintained and controlled by Facilities Management Personnel.