

SERVICE AND DISTRIBUTION

DESIGN GUIDELINES

1. Summary:
 - a. This section provides guidelines and standards for Substations, Substation Metering, Control and Protective Relays
2. Existing WUSM Distribution
 - a. WUSM has four outdoor main substations through-out the campus. These outdoor substations are the McKinley substation, CSRB substation, Duncan substation and the Mid-Campus substation and they are fed by two separate Ameren U.E. primary feeders, except for the Mid-Campus substation which is fed by three feeders.
 - b. Present campus substations have a primary of 4.16 kV.
3. Design
 - a. Buildings served by the above outdoor substations shall have indoor substations designed as double-ended with automatic open transition on the tie breaker if power is lost from either of the two outdoor substation feeds and closed transition on restoration.
 - b. The substation shall have manual closed transition features to transfer power from either end of the substation to the other.
 - c. Typically, the substation secondary voltage shall be 480V., 3 Phase, 4 Wire.
 - d. The distribution section of the substation shall be UL 891 Switchboard construction, unless otherwise required for project specific requirements.
 - e. Lockout features shall be provided on both main breakers to prevent the automatic closing of those breakers into a fault, overload or work environment.
 - f. The substations shall be provided with instantaneous and time overcurrent, under-voltage, over-voltage, negative sequence, lockout and phase sequencing relays.
 - g. Substation transformer secondary to be provided with digital metering and tied into existing Schneider Electric WAGES metering system via WUSM Ethernet connectivity. Coordinate with Schneider Electric for on-site commissioning and reprogramming of the WAGES software for storage of data, graphics and alarming.
 - h. Provide minimum 1000W UPS power for digital metering to maintain power.
 - i. Indoor substation main breakers to have LSIG function. Refer to Circuit Breaker Design Standard.
 - j. Substations shall be designed for arc flash mitigation on the medium voltage breakers.
 - k. Power quality shall be assumed adequate; no power conditioning is required.
 - l. Provide hinged doors at the rear of all freestanding switchboards and substation distribution sections.
 - m. Provide 4" high concrete housekeeping pad.

4. Related Sections
 - a. Medium Voltage Switches
 - b. Switchboards
 - c. Circuit Breakers
 - d. Identification of Electrical Systems

EQUIPMENT and PRODUCT REQUIREMENTS

1. Substations:
 - a. Approved Manufacturers:
 - Square D
 - Eaton Cutler-Hammer
2. Substation Metering:
 - a. Approved Manufacturers:
 - Square D ION7650 or PM850
 - b. Features:
 - Ethernet Card, Display and complete internal wiring for interface to the Power-Logic communications system.
3. Control and Protective Relays
 - a. Approved Manufacturers:
 - Time/Instantaneous Overcurrent Relay (IEEE 50/51): Basler BE1-50/51B
 - Voltage Relay (IEEE 27/47N/59): Basler BE1 -27/47N/59
 - Lockout Relay (IEEE 86): Electro Switch Series 24 LOR
 - Control Switch Relay: Electro Switch Series 24
 - b. Coordinate with WUSM before designing alternate switching, control or protective relaying methods.

END OF SECTION