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 throughout 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