ELECTRICAL BASIS OF DESIGN FOR BRIDGING DOCUMENT

1. ELECTRICAL SYSTEMS

1.1. General:

A. Provide design, engineering, installation, and start-up, testing, adjusting, and commissioning of the complete, operational new electrical systems for the entire project. The electrical system shall be designed in accordance with current applicable California Code of Regulations.

B. Owner Project Requirements are as follows:

1. Applicable Electrical design to comply with the LEED sustainable built environment criteria for New Construction, with the goal to achieve USGBC-LEED Silver (50-59 points for all applicable disciplines) certification or better.

2. Participate in the Statewide Saving By Design Energy Efficiency programs for new construction sponsored by Southern California Edison (SCE) or Southern California Gas Company (SoCalGas).

1.2. On Site Utilities:

A. Electrical Service:

1. New Science, Nursing, Vocational Technology Building shall be served from 5kV Feeder #1 campus loop thru pull box #6 located at driveway near lake at north-east corner of existing Science Building. Provide a new outdoor type 500kVA pad-mount transformer with primary selective medium voltage switch and connection to Feeder #1 & #2 (5kV campus loop). The transformer will provide the service voltage of 480Y/277V-3 phase, 4 wires to new 800 Amp bus Main Service Switchboard installed in the building Main Electrical Room

B. Voice and Data Service.

1. Campus telecommunication services are currently provided by Verizon, who is the Local Exchange Carrier for the voice network and data.

   300 pair copper cable terminated in the Student Services I (building #52) and 100 pair terminated in the Administration Services (Building #10).

   The fiber optic service provided by Verizon is consist of 12 strands of single mode cable, terminated in the Student Services I (Building #52).

2. Quantity and specification of Fiber and Copper cables required for voice and data service of the new Science Building shall be coordinated with College, as well as exact connection point at the site.
1.3. **Distribution System Characteristic:**

A. Service voltage will be 480Y/277V-3 phase, 4 wire with solidly grounded electrical system. Power will be distributed from the 277/480 Volt -3 phase, 4 wire main service switchboard throughout the facility in a simple radial distribution system.

B. Integral factory mounted TVSS with minimum 240kA (Peak Surge Current Rating per-phase), and customer intelligent power monitor (equivalent to Square D - PM 870 series) shall be installed in the main service switchboard.

C. Feeders will be extended from the 480Y/277V-3 phase, 4 wire distribution switchboards to lighting panel boards, mechanical equipment and strategically located step-down low voltage distribution transformers for 120/208 Volt branch circuit panel boards to supply power for convenience outlets, appliances and miscellaneous equipment load.

D. Motors 0.75 horsepower and larger will be served at 480 Volt - 3 phase, whereas 0.33 horsepower and below will be served at 120 Volt, 1 phase. Small power equipment will be served at 120 Volt single phase, or 208 Volt single or three phase.

E. Each 120/208 Volt branch circuit panel board shall be supplied with integral factory mounted TVSS with minimum 120kA (Peak Surge Current Rating per-phase), protecting user equipment at the utilization end points.

1.4. **Special Distribution System:**

A. Separate segregation 120/208 Volt branch circuit panel boards shall serve the Simulation Center to emulate normal and emergency critical power systems in hospital environmental.

B. The segregated 120/208 Volt branch circuit panelboard, shall be assigned for emergency critical system and shall serve only the red color receptacles.

C. Separate dedicated lighting branch circuit (unswitched) shall serve the battery pack equipped lighting fixtures to provide emergency lights along egress pathway with minimum 1 Foot-Candle at floor level.

1.5. **Grounding System:**

A. The electrical system of serving the new Science Building shall be a 480Y/277V, three-phase, and four wires solidly grounded system thru a pad mounted transformer.

B. Electrical grounding system at the service point shall be bonded to building steel frames, ground electrode systems, as well as utility cold water service metallic pipe.
C. Metal frames of distribution switchboards and panel boards will be grounded via a separate grounding conductor in addition to conduit or raceway as an equipment ground path.

D. Complete grounding system for electrical equipment shall be provided in accordance with NEC Article 250.

1.6. Ground Fault Protection System:
A. The main service circuit breaker and feeders shall be provided with ground fault protection as per-Code requirement.

1.7. Allowable Voltage Drop:
A. The maximum combined voltage drop will not exceed 5 percent overall from the electrical service to the point of utilization, with 2 percent maximum for feeders and 3 percent for branch circuit conductors.

B. 120/208 Volt branch circuit panel boards shall be provided serving each half of the new Science building. Minimum branch circuit wires shall be #12 AWG-THHN/THWN cu wires.

1.8. Electrical Load:
A. Anticipated new Science, Nursing, Vocational Technology Building electrical design connected load will be 20VA per-square foot, including the HVAC equipment load.

B. The 21,400SF area of the new Science Building would be equivalent to 428 kVA new electrical load. With consideration of additional 20% load for future expansion, the 500kVA transformer shall be provided for this new building.

C. Two 150 kVA, 480Y/208-120V, 3phase, 4 wires low voltage distribution transformers shall be provided, each serving half of the building load.

1.9. Lighting System:
A. Basis of Design:

1. The lighting design will be consistent with the use of high efficiency lighting fixtures, high efficacy combination fluorescent lamp with electronic ballast or high efficacy LED (70-100 lumen/watt) light fixtures, to achieve actual lighting power density of 15% better than the allowed LPD values per-current Title 24 of the California Administrative Code, achieving USGBC - LEED, EA Credit 1. All selected LED’s shall have a 50,000 hours L70 lifetime.

2. High efficacy LED (70-100 lumen/watt) light fixture shall be utilized for high ceiling area or hard to reach area to reduce maintenance costs.
3. Direct/indirect or volumetric recessed fluorescent or LED light fixtures shall be installed in areas where continuous work is to be performed, such as private offices, and other work areas.

4. Direct/indirect fluorescent or LED pendant fixtures shall be implemented in the classroom with adequate ceiling height with the General and A/V Mode Lighting zones switching.

5. Recessed prismatic lens troffer shall be provided in the support or storage rooms with drop ceiling type.

6. Industrial fluorescent strip fixtures shall be provided for mechanical, electrical and utility rooms.

7. F32-T8 with high lumen, extended life and RoHS compliant fluorescent lamps and electronic ballast shall be specified.

B. Illumination Level:
The lighting illumination levels shall be consistent with the recommended horizontal illumination level by building area and task according to IESNA Lighting Handbook.

C. Outdoor Lighting:
The outdoor lighting system shall be designed utilizing the LED type fixtures with considerably precise optical control in order to achieve USGBC-LEED, SS Credit 8.
All outdoor light fixtures shall have vandal proof features.

D. Lighting Control System:
1. In addition to Mandatory requirements per-Title 24 of the California Code of Regulations, local bi-level switching shall be provided in all rooms or private offices with the occupancy sensors.

2. Corridors and lobbies lighting will be on relay control with programmable times clock and digital low voltage local override switches.

3. Photocell control general lighting level shall be implemented in the areas with direct exposure to daylight (daylight harvesting), fluorescent dimming ballast or LED fixtures with dimming LED driver shall used in this area.

E. Egress/Emergency Lighting System:
Life Safety Emergency Egress Lighting shall be provided by Battery Pack equipped Light Fixtures wired on separate dedicated unswitched branch circuit system. Minimum 1 Foot-Candle lights on floor level shall be designed along the egress pathway.
2. **FIRE ALARM SYSTEM**

2.1. **System Description:**

A. Remote monitoring of the campus new fire alarm systems shall include:

1. Services for an UL Listed 24 hour 7 day remote supervising station to monitor new Fire Alarm Control Panel’s System Alarm, System Trouble and System Supervisory Status Conditions via leased dedicated telephone lines.

2. New Fire Alarm Control Panels shall include an integral Digital Alarm Communication Transmitter (DACT) to facilitate System Alarm, System Trouble, System Supervisory Status Signals to an UL Listed 24 hour 7 day remote supervising station.

B. An electrically-operated, electrically-supervised, intelligent-multiplex fire alarm system shall be provided based on Notifier NFS-320C Fire Alarm Control Panels. The system components will include fire alarm control and annunciator panel, alarm initiating devices (water flow devices, smoke detectors, and manual pull stations), fire alarm terminal cabinets, remote control relays for air handling fans and dampers, alarm signal devices (speakers, ADA strobes), paging microphones and a graphic annunciator panel. In addition, the fire alarm system will be interconnected to devices supplied under other divisions, including: electric/magnetic door holders, sprinkler water flow switches, sprinkler valves supervisory switches, elevator shaft dampers, elevator control panel and building air handlers. The graphic annunciator panel will be located at the main entrance for Fire Department immediate access.

3. **COMMUNICATION SYSTEM.**

3.1. **Infrastructure:**

A. A system of empty conduits, for the voice and data outlets, and connection sleeves between telephone terminal backboards shall be provided under electrical scope of works. Conduits shall be ¾-inch minimum in size and will not contain more than the equivalent of the two 90° bends without a pull box. Nylon pull lines will be provided in all empty conduits.

B. Communication cable trays (minimum 18" width with 6" usable depth) shall be provided along the corridor and terminated into Main Telecom room.

C. A maximum of two outlet boxes will be provided per one-inch home run. Empty conduits will be provided from the main telephone terminal backboard to terminal backboards in the telephone apparatus or satellite closets.
D. Three duplex receptacles connected to a separate and dedicated 20-Ampere, 120-volt A.C. emergency power circuits will be provided at each telephone terminal backboard.

E. Telephone Grounding Bar (1/4x2x18” Cu Bar) shall be provided at each telephone terminal backboard, and a number 6 AWG stranded copper, insulated ground shall be provided, connected from Telephone Grounding Bar to the electrical equipment grounding system, Main Grounding Bar.

F. Telephone terminal backboards shall be ¾-inch-thick plywood, interior A-C grade and TIA/EIA approved fire rated – provide on all sides of telephone room.

3.2. System Requirement:

A. Coordinate with College for communication standard requirements, including but not limited to distribution racks, wire management, riser and communication cables, patch panels and standard outlet requirements.

4. SECURITY SYSTEM

Security system shall be per-Campus Standard Security System, designed by designated Security Consultant directed by the College.

Device raceway, back box and power requirements shall be provided by Electrical Contractor.

Where uninterrupted power supply required for the system, integral battery back-up shall be specified as part of the security equipment.

5. SPECIFIC ELECTRICAL SYSTEMS

5.1. Specific Electrical/Low Voltage Requirements:

Based on activity and room function assigned by Architect, refer to room data sheets in the following room for specific Electrical/Low Voltage requirements:

A. Anatomy Lab (2 Rooms).
B. Balance Room.
C. Cadaver Room.
D. Cat Storage Room.
E. Dean’s Administrative Assistants.