

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1. The electrical systems design will take into consideration the type of facility, program, project type, and site considerations. Project requirements and program are to be reviewed and verified with the College prior to start of design and engineering.
2. Verify scope of electrical requirements with the College.
3. The potential and/or master planned aspect for future expansion(s) shall be discussed with the College. Services shall be coordinated with the future planning aspect in mind and the related impact.
4. The Engineer shall determine the electrical classifications of various areas of the building.
5. All applicable local and national electrical codes must be followed. Permits and fees shall be taken care of by the Contractor.
6. The electrical equipment and electrical installation shall be required to meet the seismic performance requirements required for the specific area where the facility is located.
7. The Contractor shall request a local inspection on each project with a “rough-in” and a final inspection. The College’s staff shall be notified of any violations.
8. The project shall include a power system study with short circuit, arc flash hazard, and coordination. The A/E shall do a preliminary short circuit study to determine available fault current to appropriately specify the equipment. During the construction phase, the contractor shall have a power system study done that includes short circuit, arc flash, and coordination based on the proposed equipment. The A/E shall review the study and confirm that the equipment meets the available fault current, incident energy levels, and proposed circuit breaker trip settings for power distribution equipment at specific locations on the building's power distribution system. The Contractor will be responsible for providing and installing the appropriate labels once the study has been finalized.
9. Follow current NEC code for ground fault protection.
10. Do not leave panelboards containing exposed “LIVE” parts unattended.
11. A/E shall require that all penetrations through fire-rated walls, floors, and ceilings be sealed with an approved UL fire stop assembly. Installation shall be assigned to a single qualified installer that has been approved by the current Insurance Company, “Approval of Firestop Contractors.”

PART 2 - ABBREVIATIONS

GFCI	Ground Fault Current Interrupter
NEC	National Electric Code

EMT	Electric Metal Tube
MC	Metal-Clad Cable
GRC	Galvanized Rigid Conduit
SPD	Surge Protection Device
HID	High-Intensity Discharge

PART 3 - DEMOLITION

1. Where existing work is removed, remove associated wiring, cabling, terminations, and all obsolete exposed and interfering conduit and work.
2. All existing exposed conduits, surface raceway, and wiring shall be completely removed unless directed otherwise by the Architect.
3. Existing outlet boxes that are being abandoned shall be covered with a blank wall plate to match new device plates specified.
4. All abandoned service entrance conduits entering buildings from underground shall be removed. If this is not feasible, all cable shall be removed from these conduits and conduits shall be sealed as to not allow water to leak into the building. Where abandoned service conduits stub up outdoors they must be cut off at grade level and sealed.
5. Interior conduits in slabs that are abandoned shall have all cable removed and shall be sealed. Abandoned conduits shall be removed from all panelboards and distribution panels where possible.
6. First right of refusal shall belong to the Owner. Contractor shall dispose of all materials not kept by Owner.
7. All remaining lights, switches, receptacles, motors, etc., not disturbed in the remodeling shall be checked for proper operation and any circuit opened by the remodeling work shall be properly reconnected.
8. All electrical work to be installed in finished rooms of the existing building shall be installed in a concealed manner where practicable; otherwise shall be installed in surface type, two-piece raceway.
9. During phasing of the work and/or general construction schedule, all systems, including fire alarm, shall remain operational until the new work is completed and operational; at which time the old work is to be removed.

SECTION 26 05 10 – CABLES

1. Minimum wire sizes shall be No. 12 AWG copper for lighting and power circuits and No. 14 AWG copper for 120V motor control and similar control wiring, unless otherwise stipulated.
2. Provide wire having NEC 600 volt insulation and of type THHN/THWN for dry locations, THWN/XHHN for wet areas.
3. High-voltage wire specifications must be confirmed with the College.
4. All wire terminating in light fixtures shall be of the heat-resisting type, approved for the specific application, but not less than 150 degrees Celsius (392 degrees Fahrenheit) insulation and may be type “AF” or “SFF-2”.
5. Use of aluminum conductors will not be permitted.
6. Provide stranded conductors for #10 and #12 AWG. Provide stranded conductors for sizes #8 AWG and larger.
7. Voltage Drop should not exceed 3% from the branch panel to the last outlet
8. As a minimum for 120 volts, 20 amp, 1500 watts #12 AWG shall not exceed 75’, #10 AWG shall not exceed 120’. For 208 volts, 3-phase, 4,320 watts #12 AWG shall not exceed 130’, #10 AWG shall not exceed 215’.
9. As a minimum for 277 volts, 20 amp, 3325 watts #12 AWG shall not exceed 170’, #10 AWG shall not exceed 250’, for 480 volts, 3-phase, 10,000 watts #12 AWG shall not exceed 300’, #10 AWG shall not exceed 500’.
10. All cables shall be plenum rated unless otherwise noted.

SECTION 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1. Where available on the premises, the building grounding electrode system shall consist of connections to the main water service piping, building steel, concrete encased electrode, ground ring, and ground rod(s). The grounding conductors used to bond grounding electrodes together shall be identified and sized in accordance with Article 250 of the NEC.
2. The ground rod system shall be comprised of three 10' x 3/4" ground rods spaced in a triangular configuration 10' apart. The rods shall be exothermically welded (cad welds or equal) together with a grounding electrode conductor sized in accordance current NEC. The bare grounding electrode shall be routed back to the service grounded bus. All cable and rods shall be buried a minimum of 18".
3. The water main shall be grounded with a continuous grounding electrode conductor sized in accordance with current NEC code. The connection must be made no more than 5' from the water main's entrance to the building.
4. Any water meters or pipe unions that might break ground continuity shall require bonding jumpers the size of the grounding electrode conductor.
5. Provide a ground node adjacent to the service switchboard/panelboard tying all grounding electrode conductors to a single location. Install equipment ground conductor from ground node to service switchboard/panelboard.
6. Equipment grounds from the ER and TR rooms goes back to grounding node at service switchboard/panelboard.

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - RACEWAYS

1. Exposed conduit shall be run at right angles parallel to the building walls and equipment in a neat and workmanlike manner. All conduits shall be run near the ceiling and at the same height and parallel with the utility piping, where such piping is level. Conduit sleeves, etc., required for the installation of conduit in floors, walls, partitions, etc., shall be set by the electrical contractor and shall arrange with the general contractor for all slots, openings, etc., which may be required for the conduit installation or for positioning and dimensions of such openings. All conduits shall be concealed unless otherwise noted. Where surface-mounted conduit, EMT or GRC, is accessible to students or staff, contractor must use 1-hole straps for support. Minerallac clamps may be used in all other areas.
2. EMT conduit shall be used unless otherwise noted in these specifications. Minimum trade size of $\frac{3}{4}$ " EMT.
3. Provide four $\frac{3}{4}$ " spare EMT conduits for each flush-mounted distribution panel board to an accessible space.
4. Provide separate raceways for different voltage systems.
5. All branch circuit conduits (for outlets and switches) shall be run overhead when possible. Feeder conduits (rigid or PVC) to electrical panelboards must be a minimum of 24" below slab.

PART 2 - GALVANIZED RIGID CONDUIT

1. Mechanical room and tunnel conduits shall be galvanized rigid. Minimum trade size of $\frac{3}{4}$ " GRC.
2. All exposed conduits outdoors and in damp locations shall be galvanized rigid.

PART 3 - PVC CONDUIT (MINIMUM $\frac{3}{4}$ ")

1. Schedule 40 PVC conduit shall be used for all underground conduit installations unless otherwise noted.
2. Schedule EB PVC shall be used when conduits are encased in concrete incoming electrical services.
3. Schedule 80 PVC shall be used when conduits are direct buried under roadways, loading dock areas, and sidewalks.
4. To prevent corrosion due to contact with soil and/or concrete and to prevent physical damage, install rigid galvanized steel or reinforced thermosetting resin RTRC conduit elbows where transitioning from below-grade to above-grade installations.
5. Flexible Metal Conduit
 - A. Flexible metal conduit shall be used in 6' lengths or less for the wiring of light fixtures, equipment

that is subject to vibration, transformers in dry locations, and motors in dry locations.

- B. An equipment grounding conductor shall be sized per the current National Electrical Code and shall be pulled in all flexible metal conduits.
- C. All flexible metal conduits shall originate in a junction box and terminate at the light fixture that it supplies. No fixture-to-fixture wiring will be permitted.
- D. Under no circumstances shall flexible metal conduit be used in place of the conduit specified for its particular area unless expressly approved by the College.

PART 4 - LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- 1. Liquidtight flexible conduit shall be used for any outdoor installation or any installation that may be subject to damp conditions. It may be used on the same type of equipment listed for flexible metal conduit.
- 2. Under no circumstances shall liquid-tight flexible metal conduit be used in lieu of the conduit specified for a particular area unless expressly approved by the College.

PART 5 - MC CABLE INSTALLATION

- 1. Support MC cable in accordance with the current NEC such that supports are not more than 6' apart.
- 2. All MC cable work shall be completed in a workmanlike and neat manner/appearance.
- 3. MC cable may be used for all branch circuits within the building envelope from the last branch circuit panelboard to the last device, except as follows:
 - A. Do not use MC cable when entering or leaving panelboards. Provide a splice box with terminal strips located above panelboards. Feed from panelboard to terminal strips with conduit and wire, feed from terminal strips to last device with MC cable.
 - B. Do not use MC cable in areas where there will be no ceiling. All wiring in these areas shall be installed in conduit.
 - C. Do not install MC cable in concrete or under floor slabs.
 - D. Do not use MC cable when exposed below 8'.
 - E. Do not use MC cable for circuits to and from the dimming racks.
 - F. Do not use MC cable for circuits supporting any sound equipment indicated on the documents.

PART 6 - WIREMOLD

- 1. Use Wiremold 2300 series or larger when possible. Provide a wire mold that can accommodate data in

classrooms that may be future computer rooms.

2. Wiremold V800 or 2300 shall be supported by two whole support straps.
3. Use wire mold 5400 series raceways with divider in classroom and computer labs for telecom and power requirements.

PART 7 - WIREWAYS

1. When a grouping of starters, switches, control equipment, etc. are provided, the contractor must furnish and install a complete approved metal raceway or trough for the conveyance and distribution of electric wires and cables, designed for easy accessibility to the wires and cables, and provided with concentric knockouts at intervals for the extension of conduit.
2. Square duct shall be standard 1, 2, 3, 4, 5, and 10' lengths, bolted together to form a continuous, unbroken wireway. Small sizes (4 x 4 and smaller) shall be provided with hinged cover and fastening device. Larger sizes (6 x 6 and larger) shall be provided with screw cover and gasket. Provide tees, elbows, pull box hangers, supports, etc., to make same adaptable to building structure. Ducts shall be permanently supported, anchored to wall, ceiling truss, etc. Bond each length together with a #12 AWG (minimum) green grounding conductor.

PART 8 - ELECTRICAL OUTLET AND JUNCTION BOXES

1. All switches and receptacles shall be 20A specification grade unless otherwise noted. Acceptable manufacturers are Cooper, Hubbell, Leviton, and Pass & Seymour.
2. Tamper-resistant receptacles shall be installed in locations as required by the NEC.
3. In addition to the required computer outlets, each classroom will have a minimum of two (2) general purpose 20 amp 120 volt circuits dedicated to the receptacles in that room. Provide duplex outlets spaced a maximum of 6' on center per wall (if not blocked by heaters, permanent casework, closets, etc.). Provide floor boxes with outlets as shown on the space planning standards.
4. All pull boxes shall be equipped with a proper cover and junction boxes shall be supported either by an all-thread rod or securely fastened to the building structure.
5. Size and gauge of boxes shall conform to the current NEC
6. Surface-mounted 4" and 4 ¹¹/₁₆" junction boxes shall be mounted on concrete walls with a minimum of two plastic anchors with #10 screws. Larger junction boxes shall be mounted on concrete walls with a minimum ¼" – 20 bolt size Ackerman Johnson lead anchor. When these boxes are mounted to concrete ceilings use steel drop-in anchors with a minimum bolt size ¼" x 20.
7. Wherever standard boxes are of insufficient size, provide and install pull boxes with screw covers as shown or where necessary to facilitate the installation of cables and wires. The pull boxes shall be of type suitable for application and of sufficient size to accommodate all cables within and without crowding.

8. The use of any floor boxes, power poles, and horizontal raceways shall be reviewed and discussed with the College.
9. Concealed work outlet boxes shall be code gauge formed steel, galvanized. Use square boxes in wood construction, Use deep boxes throughout. Flush device boxes in masonry or drywall walls shall be 4" square with raised square cut covered masonry boxes designed for installation in masonry or drywall walls. Include all necessary plaster rings. Exposed boxes shall cast type FS or FS with matching cover, threaded hubs, gaskets, and rustproof screws. Seal all unused openings with proper K.O. plugs.
10. Do not provide electrical outlets in restrooms that have a shower or shower wand. Light switches in these restrooms must be waterproof type.
11. There shall be adequate corridor receptacles for janitorial operations. Coordinate exact locations of pull boxes with other trades.
12. Switches for 3-way, 4-way, or single pole operation shall be specification grade and shall be rated 20 ampere – 120V/277V. Manufacturer shall be Cooper, Hubbell, Leviton, Pass & Seymour, or an approved equal.
13. Locking key switches for single pole, 3-way, or 4-way operation shall be specification grade similar to Hubbell 1221L-1223L-1224L, or the equivalent Cooper, Leviton, or Pass & Seymour switch.
14. All switches and receptacles shall be white. Cover plates shall be thermoplastic white. Exceptions: renovations shall match existing device color and cover plate; emergency devices and cover plates shall be red, locations with wood panel/wainscot shall be brown.
15. Dual technology occupancy sensors are required for public restrooms and toilet rooms.
16. GFCI outlets should be situated around the exterior of the building for convenience use. Install each of these circuits on dedicated 20 amp branch circuit to allow the custodian to turn them off when not needed. Install at least two receptacles near the front entry for Holiday lighting and an outlet at least every 100 lft along the building perimeter.
 - A. Architect/Engineer should ask the campus what exterior activities are planned for future activities. Ensure that exterior electrical locations are created for these events to occur.
 1. Movies, social events, parties, fairs, concerts, etc.
17. Each exterior outlet shall have an "in-use" weatherproof, lockable cover that is capable of being closed over a plug to maintain a dry outlet.
18. Review and coordinate with the College, any requirements for exterior hook-ups required for special exterior events.
19. Ceiling mount and wall mount displays shall have their outlets on the high wall no lower than 12" from the ceiling. Power cords shall not be plugged in above ceilings.
20. LCD projectors shall have two (2) 20 amp duplex receptacles mounted in a 2'x2' project mounting pan.

Power cords shall not be plugged above ceiling.

21. Provide a 20 amp GFCI duplex receptacle in every large walk-in plumbing chase.

PART 9 - OUTLET INSTALLATION SCHEDULE

Electrical Outlet and/or Device Type	Mounting Height Above Floor to Center Line of Outlet (Device) Box Note #1
Receptacle outlets, wire mold, microphone outlets (jacks), equipment outlets (jacks), television outlets (jacks), portable telephone outlets, etc.:	
A) General throughout	18"
B) Mechanical Equipment Rooms	18"
C) Above Top of Counter or Backsplash	2" min. to bottom
D) Behind Domestic Refrigerators	46"
E) Behind Domestic Washers and Dryers	46"
F) Serving Domestic Dishwashers	Inside base cabinet
G) Toggle Switches	46"
H) Recessed Motor Controllers	46"
I) Electric Panels, Terminal Cabinets, etc. – to Top of Tub or Box	72"
J) Speakers, Clocks, Horns	Near Ceiling
K) Thermostats	46"
L) Break Glass Stations (fire alarm)	46"
M) Fire Horn/Strobe	80" to bottom
N) Volume Controls, Call-in Switches, Door Bell Buttons	46"
O) Switches, generally, shall be located on strike sided of door, and 6" to 12" from edge of door, or as directed.	

SECTION 26 05 5-3 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - INDEXING

1. Each distribution panelboard circuit and each branch panelboard circuit shall have a typed directory identifying the area served including spares. Index shall be typewritten upon heavy card stock paper not subject to fading or mildew, shall be covered with a clear plastic window, and held securely in a suitable frame. Type date (month and year) and panel designation on each index.
2. Each index shall be sequenced in accordance with actual panel circuiting, i.e.:
 - A. Left side - top to bottom: 1, 3, 5, 7, etc.
 - B. Right side - top to bottom: 2, 4, 6, 8, etc.
 - C. Standard index cards printed 1, 2, 3, etc., are not acceptable.

PART 2 - TAGGING/LABELING

1. The Contractor shall tag all feeders, sub-feeders, branch circuits, and main cables in all junction boxes, pull boxes, wire gutters, and main switchboard.
2. Provide nameplates on all equipment such as switchgear, switchboards, panelboards, dry-type transformers, motor control centers, motor controllers, VFDs, heavy-duty disconnect switches, etc. Nameplate shall include the following:
 - A. Equipment identification name/number.
 - B. Voltage.
 - C. Source fed from.
3. Nameplates shall be laminated phenolic with a black surface and white core for normal power, or red surface and white core for emergency power. Use $\frac{1}{16}$ " inch thick material for plates up to 2" x 4". For larger sizes use $\frac{1}{8}$ " thick material.
4. Lettering shall be condensed Gothic. The space between lines shall be equal to the width of the letters. Use $\frac{1}{4}$ " inch minimum height letters which occupy four to the inch. Increase letter size to $\frac{3}{4}$ " on largest plates.
5. Provide arc flash labeling on all equipment such as switchgear, switchboards, panelboards, dry-type transformers, motor control centers, motor controllers, VFDs, heavy-duty disconnect switches, etc.
6. Mark circuit designations on all junction boxes and inside outlet cover plates using indelible marker or paint.

PART 3 - COLOR CODING OF CONDUCTOR INSULATION

1. The Contractor shall exercise great care in identifying the wires and cables of the electrical conduits.
 - A. Feeder and branch circuit wire and cable shall be identified with a visual color code which shall be an integral part of the braid or outer insulation and shall be of the permanent indelible type not affected by moisture, oil, grease, and age.
 - B. Color coding for phase identification shall be as follows:

	120/208V	277/480V
Phase "A"	Black	Brown
Phase "B"	Red	Orange
Phase "C"	Blue	Yellow
Neutral "N"	White	Gray
Ground "G"	Green	Green

2. Except when the system is the secondary of a (4) wire delta connected transformer secondary, then the "HI-LEG" phase shall be orange.
3. Generally, conductors of different systems (panelboard, etc.) shall not occupy the same raceway system or enclosures. Where dual occupancy is approved by the Engineer/College, the provisions of the NEC shall be followed.

SECTION 26 22 00 - TRANSFORMERS

PART 1 - LOW VOLTAGE GENERAL PURPOSE TRANSFORMERS

1. Shall comply with NEMA Standard ST 20 "Dry-Type Transformers for General Applications." Transformers shall meet the requirements of Federal law 10 CFR Part 431 "Energy Efficiency Program for Certain Commercial and Industrial Equipment," and shall be no less than the efficiency levels listed in Table 4-2 of NEMA Standard TP-1-2002.

PART 2 - TRANSFORMER CAPACITY AND VOLTAGE

1. Generally, three-phase transformers shall have a 480-volt Delta primary and a 208Y/120-volt wye secondary.

PART 3 - TRANSFORMER DESIGN

1. Transformers rated 3 KVA through 25 KVA shall have two (2) 5% F.C.B.N. taps unless otherwise noted.
2. Transformers larger than 25 KVA shall have two (2) 2½% FCAN taps and four (4) 2½% FCBN taps unless otherwise noted.

PART 4 - CORE, COIL ASSEMBLIES, ENCLOSURES, AND SOUND LEVELS

1. Transformer coils in all cases shall have a final wrap of electrical insulating material to prevent injury to the magnetic wire. Transformers having coils with magnetic wire visible will not be acceptable. The core and coil are to be subjected to a double dip and bake process. The unit is to be pre-baked and receive its first varnish dip while still warm.
2. All windings shall be copper.

PART 5 - NON-LINEAR LOAD TRANSFORMERS

1. Provide 'K' Rated transformers for all computer-related circuits, sized and rated for 200% of the secondary phased current.

PART 6 - INSTALLATION

1. Transformers Size 75KVA or Less: Wall, floor, or trapeze.
2. Transformers Size Greater than 75KVA: Floor.
3. Floor-mounted dry-type transformers shall be provided with a 4" high housekeeping concrete pad by the Electrical Contractor.

PART 7 - MEDIUM VOLTAGE PAD-MOUNTED, LIQUID-FILLED TRANSFORMERS

1. Shall meet ANSI C57.12.13, IEEE C57.12.00 pad-mounted, 2 winding transformers. Stainless steel tank base. Liquid shall have low toxicity and be non-hazardous.

SECTION 26 24 13 – SWITCHBOARDS

1. The electrical service and utility metering shall be coordinated with the local utility company.
2. Main service equipment shall be provided with a 100% rated electronic circuit breaker, with LSIG or LSI where applicable. All feeder/branch circuits in the main service equipment shall be circuit breakers with LSIG or LSI where applicable or required for coordination. Circuit breakers with frames rated 1200A or larger and continuous trip rating or settings 1200A or higher shall include an energy-reducing maintenance switching with local status indicator or an approved equivalent means as listed in the National Electrical Code.
3. Main service equipment shall have minimum AIC ratings based on the power system study.
4. Main service equipment bussing shall be copper.
5. The size of the main service equipment shall be based on the type of facility and any future expansion plans as identified by the College. Provide space for future main service equipment expansion or modifications when sizing the main electrical room.
6. Provide customer metering at each service entrance switchboard/panelboard.
7. Install surge protection devices within all main service equipment.
8. Where possible, circuit lighting at 277 volts; circuit mechanical equipment at 480 volts, 3 phase; and circuit receptacles and miscellaneous equipment at 208/120Y, 3 phase.
9. Coordinate requirements for different distribution voltages with the College for labs and lab equipment.
10. Routing of the primary and secondary underground electrical on College property shall be encased with concrete. The concrete shall be a 3000 psi mix with red dye. Exceptions shall be reviewed and approved by the College.
11. All branch circuit and feeder conduits shall be run overhead and not under/or in the slabs where possible.

SECTION 26 24 16 – PANELBOARDS

1. Panelboards shall be in rooms designated for electrical equipment only. This electrical room can contain both general power panels and computer power panels. Other electrical items such as motor controls, time clocks, relay panels, and transient surge suppressors can also be in these rooms. Each electrical room will have a plaque marked “ELECTRICAL ROOM” and the room number on the plaque. No other systems will be in these rooms except fire and sprinkler piping dedicated to the room. Each electrical room shall have a permanent plaque in the room marked “ELECTRICAL EQUIPMENT ONLY NO STORAGE”. Hallway power panels are not acceptable except as approved by the College.
2. All panelboards shall have main circuit breakers and be fully rated. Series rating is not allowed unless approved by the College.
3. All panelboard bussing shall be copper.
4. Provide ground bar in all panelboards.
5. Provide dedicated panelboards in all ER/TR rooms. Provide integral SPDs in all panelboards.
6. Provide dedicated panelboards in computer classrooms. Provide integral SPDs in all panelboards.

SECTION 26 29 20 – MOTORS

1. All motors will have an energy efficiency rating that will comply with the local power company, local or national codes, or guidelines for energy-efficient buildings.
2. All motors will have a service factor of at least 1.15.
3. Disconnects shall be sized in accordance with the current National Electrical Code and shall be fused.
4. Where variable frequency drives are not required, all 3-phase motors two horsepower or larger shall have single-phase protection. The single-phase protection shall be a part of the overload block. All overloads shall be the adjustable type.
5. All variable frequency drives for outside motors shall be indoors with their own disconnect. An additional safety disconnect shall be installed outdoors by the motor. Provide auxiliary contacts in all disconnect switches and variable frequency drives for disconnecting control wiring.
6. Motors ½ HP and less shall be single-phase and motors larger than ½ HP shall be 3-phase, except when only single-phase is available
7. Motors and variable frequency drives shall be provided by Division 23. Division 23 will install the motor, division 26 will install the variable frequency drive and install all conduit and power wire. Control wire shall be furnished and installed by temperature control contractor.

SECTION 26 32 13 - GENERATORS

1. A diesel standby generator shall be provided when required by the facility design or requested by the College. (Natural gas generators are not to be used for emergency or life safety loads because of the requirement for onsite fuel unless specifically approved by the Authority Having Jurisdiction and requested by the College.)
2. The generator shall serve the following loads, in order of importance:
 - A. Exit and egress lighting.
 - B. Fire alarm system.
 - C. Elevators.
 - D. Food service freezers and coolers.
 - E. Sewage ejector and/or storm water pumps.
 - F. Technology systems heating system (critical components, i.e. boiler and pump).
 - G. Emergency phones.
 - H. Temperature controls.
 - I. Consider any power needs associated with a shelter (if applicable).
 - J. Specific equipment as required by the facility program and approved by the College (i.e. power required for lab equipment/programs).
3. The transfer switch(s) shall be automatic with built-in bypass for permanent generator or manual double throw type for portable generator, depending on the facility evaluation.
4. Coordinate with the region any additional generator requirements.
5. If requested by the College a central inverter system meeting the requirements National Electrical Code may be installed for specific life safety loads such as exit and egress lighting.

SECTION 26 41 13 – LIGHTNING PROTECTION SYSTEM

1. A Lightning Protection System shall be installed when required by current insurance company of the College. Consult the College on which facilities require a lightning protection system.
2. Lightning protection equipment: All materials shall be copper and bronze and of the size, weight, and construction to suit the application and used in accordance with current LPI, UL, and NFPA code requirements. Class I-sized components may be utilized on roof levels 75' and below in height. Class II-sized components are required for roof levels over 75' in height. Bolt-type connectors and splices shall be utilized on Class I and Class II structures. Pressure squeeze clamps are not acceptable. All mounting hardware shall be stainless steel to prevent corrosion.
3. Aluminum components: Aluminum materials may not be used except on roofs that utilize aluminum roofing components. On aluminum metal roofs or where aluminum parapet caps exist, the entire roof lightning protection equipment shall utilize aluminum components to insure compatibility, however, the down leads and grounding are to utilize copper with the bimetal transition occurring at the through roof assembly with an approved bimetal through roof assembly.
4. Copper down lead conductors shall be utilized even when aluminum is required on the roof. Down lead conductors in conduit shall not be brought directly through the roof. Through roof assemblies with solid brass or stainless steel rods shall be utilized for this purpose. Structural steel may be utilized in the installation as outlined by current UL, NFPA, and LPI.
5. Coordination: The lightning protection installer will work with other trades to ensure a correct, neat, and unobtrusive installation. The roofing contractor will be responsible for sealing and flashing all lightning protection roof penetrations as per the roof manufacturer's recommendations. However, the lightning protection contractor will be required to coordinate locations of through roofs and submit details of through roof penetrations as required. Should the roofing manufacturer require any special walk pads, membrane patches, or pavers under the components of the lightning protection system, it shall be the responsibility of the lightning protection installer to install such items with the roofing materials (patches, pads, pavers, adhesive) supplied by the roofing manufacturer at no additional cost to the lightning protection installer. The roofing contractor shall be required to instruct the lightning protection installer of the proper installation procedures of the roof pads, patches, and/or pavers if required.
6. It shall be the responsibility of the lightning protection installer to ensure a sound bond to the main water service and to ensure interconnection with other ground systems.
7. Completion: Upon completion of the installation, the lightning protection installer shall secure and deliver to the college the Underwriters Laboratories, Inc. the Master Label certification and the Lightning Protection Institute Certified System certification. The system will not be accepted without the UL Master Label plate and the LPI certification certificate.

SECTION 26 43 13 – SURGE PROTECTIVE DEVICES

1. SPD to be UL-listed and labeled per latest edition of UL Standard 1449:
 - A. Type 1 when installed on the line side of the service disconnect.
 - B. Type 2 when installed on the load side of the service disconnect.
 - C. Type 3 when installed at the point of utilization equipment.
 - D. Type 4 for component surge protection.
2. Integrally-mounted.
3. Integral disconnect switch.
4. Indicator light display for protection status.
5. Surge counter.
6. SCCR: 200 kA.
7. Nominal Rating: 20kA.
8. Locations/Peak Current Surge Rating:
 - A. Main Service Switchboard/Power Distribution Panelboard – 250 kA.
 - B. Panelboards serving computer rooms, ERs, TRs – 150 kA.

SECTION 26 51 00 – INTERIOR LIGHTING

PART 1 - GENERAL

1. Provide lighting per the latest locally adopted ANSI/ASHRAE/IESNA standard 90.1 with any amendments, best practices, and as required by the application. Information shall be reviewed and approved by the College.
2. All lighting fixture drawings and/or "cuts" for approval shall indicate the manufacturer and catalog number of the ballast being used, if any.

PART 2 - LAMPS, LED DRIVERS AND ACCESSORIES

1. All new or replacement lighting shall be LED.
2. Provide not less than 10% spare LED modules, lamps, and exit fixtures. Spare lamps shall be properly packaged and turned over to the College prior to completion of project. Light fixture selections shall minimize lamp types.
3. All new buildings shall use LED lighting with 3500K color temperature or selectable color temperature and dimming capabilities.
4. Prismatic lenses where applicable shall be a minimum of 0.125" thick.

PART 3 - LIGHTING CONTROLS

1. Interior lighting in buildings larger than 5,000 sft shall be controlled with an automatic control device to shut off building lighting in all spaces. Dual technology occupancy sensors that shall turn off within 30 minutes of an occupant leaving a space. Occupancy sensor controls are desired for lighting and energy control in order of priority.
2. Classrooms: Sensor shall be dual technology passive infrared and ultrasonic technology. Provide a manual override (light switch, off only) at the wall near door entry.
3. Offices: Office area occupancy sensors shall be dual technology passive infrared and ultrasonic technology equipped with a manual override switch for 'off' control.
4. Restrooms: Provide dual technology passive infrared and ultrasonic technology ceiling sensor.
5. Corridors: Provide dual technology passive infrared and ultrasonic technology ceiling sensor.
6. Unoccupied rooms (storage rooms, etc.) shall have an ultrasonic sensor.
7. Power packs shall be capable of 120 volts and 277 volts and shall have integral HVAC relay with one (1) set of normally open and normally closed dry contacts. Provide sensors with correct size and quantity as space permits.

PART 4 - INTERIOR LIGHTING

1. Interior light fixtures shall be specification grade, painted after fabrication.
2. Interior lighting in classrooms shall be 2' x 4' high-performance recessed troffer LED. Utilize dimmable LED fixtures. Classroom lighting shall operate in two modes, general illumination and A/V mode. Drivers, LED modules, and lamps shall be accessible from below fixture.
3. Office areas, conference rooms, etc. shall be 2' x 4' high-performance recessed troffer LED. Drivers, LED modules, and lamps shall be accessible from below fixture.
4. Stairwell lights shall be located where they can be serviced from no more than a 6' ladder.
5. Kitchen areas: LED fixtures shall be enclosed on top and equipped with a plastic cover with gasket to seal out dust. Prismatic acrylic lens shall have prisms inverted. Door for prismatic lens shall be gasketed.
6. Surface-mount fixtures shall be chained to the structural members of the building.
7. Provide LED jelly jar lighting in large walk-in plumbing chases and elevator shaft with switch and timer (for time-out turn-off).
8. Systems shall be field tested prior to Building Substantial Completion.

PART 5 - AUDITORIUMS

1. Auditorium lighting shall be LED.
2. Seating: Do not use aisle lights that are built into the chairs. Use strip lighting on each side of the aisle. Stairs shall have strip lighting and not lights built into the concrete stair face.
3. House lights: All house lights must be serviceable without using scaffolding or pew stepper lifts. This may be accomplished by making all the lights serviceable from the attic above the auditorium. Suitable catwalks may be installed to reach all lights and equipment above the auditoriums.
4. Dimmer systems: These systems must have their own rooms with air conditioning and filtered air due to the sensitive electronics in these systems. The room shall be insulated to cut down on any equipment noise.
5. Each dimmer equipment room must have double doors suitable to remove and install dimmer racks when necessary.

PART 6 - EXIT AND EMERGENCY LIGHTING

1. Furnish and install LED exit lights as required by existing codes and regulations. Ceiling light fixtures shall not be located over stairwells or other locations where it will be hazardous or difficult to service. Mount fixture on wall a minimum of 8' 0" above finished floor or landing to bottom of fixture. All new or replacement exit lights shall be LED-type with an integral backup battery.

2. Integral battery packs only shall be used (if generator is not provided).
3. Provide red LED lights.
4. Corridors, stairways, auditoriums, and other means of egress pathways shall be provided with emergency lighting systems for illumination in event of total power failure. System shall provide emergency lighting for a period of at least 1½ hours (minimum). Emergency lighting in classrooms shall be provided as directed by the College.
5. Emergency light circuits shall be fed ahead of the switch from the same circuit that feeds the lighting in the area.
6. Provide an outdoor LED emergency light over exit areas for means of egress. The remote head shall be weatherproof and mounted to meet building code for illuminating exits.
7. Security lighting: Parking lot lights shall turn on with timers and be controlled by motion and dimming to meet the latest energy code. Building security lights shall turn on with photocells. Sufficient guards on fixtures for vandalism. New outdoor light poles shall be no taller than 30’.
8. Exterior entryway lights should be on exterior lighting control.

SECTION 26 56 00 – EXTERIOR LIGHTING

PART 1 - GENERAL

1. Provide lighting per the latest locally adopted ANSI/ASHRAE/IESNA standard 90.1 with any amendments, best practices, and as required by the application. Information shall be reviewed and approved by the College.
2. All lighting fixture drawings and/or "cuts" for approval shall indicate the manufacturer and catalog number of the ballast being used, if any.

PART 2 - EXTERIOR LIGHTING

1. Cameras: Adequate lighting will be installed near security camera areas.
2. Building and parking lot lights shall be LED.
3. Parking lot lights should be controlled with a combination of photocell and timer. College must be able to access and override when required. Show parking lot light locations, lumen levels, and location of the transformer on the site plan.
4. Exterior entryway lights should be on exterior lighting control.
5. Provide LED wall packs on all exterior walls and be part of exterior lighting control.
6. Great care must be taken to not illuminate neighbor's yards with ambient light from College property.
7. Each pole light shall have in-line fusing at its base. The fusing shall be rated at 125% of the total amp draw for that pole. The wiring method for pole lights will be PVC conduit and carry a full-size ground based on current NEC. Branch circuits for pole lights shall be sized to prevent a voltage drop of over 3%. The ground conductor shall be increased by the same percentage the branch circuit conductors were for voltage drop. Selected pole bases shall have 120 volt, 20 amp, GFCI duplex receptacles with weatherproof cover.
8. Fixtures exposed to weather shall be rustproof, cataloged weatherproof, or weather-resistant and provided with aluminum boxes and trim of stainless steel, cast aluminum, or other nonferrous material.
9. Exterior signage lighting shall be U.L. listed for wet location, LED or HPF ballast, primary fused utilizing high-intensity discharge lamps. Fixtures should be controlled with a combination of photocell and timer.
10. Flagpole lighting should be similar to exterior signage lighting except controlled by a photocell.