SECTION 26 00 00
BASIC ELECTRICAL REQUIREMENTS
Design Standard

PART 1 GENERAL

1.1 PURPOSE

A. This design standard has the purpose of maintaining a consistent application of the basic electrical requirements of the electrical systems throughout the San Mateo County Community College District therefore achieving a standard of quality for maintenance, reliability, and operation throughout all renovation and new building projects.

PART 2 PRODUCTS

2.1 Design and specify electrical systems required for this work, including labor, materials, equipment, and services necessary to complete installation of electrical work required for a complete operable facility and not specifically described in other Sections of these Standards. Refer to section 10 18 13 Sustainability for additional design requirements pertaining to energy efficiency, lighting, daylighting, renewable energy and other similar design strategies.

A. Following is a list of abbreviations generally used in Division 26:

1. ADA Americans With Disabilities Act
2. AHJ Authority Having Jurisdiction
3. ANSI American National Standards Institute
4. APWA American Public Works Association
5. ASTM American Society for Testing and Materials
6. CBC California Building Code
7. CEC California Electrical Code
8. CFC California Fire Code
9. EVSE Electric Vehicle Supply Equipment
10. FCC Federal Communications Commission
11. HVAC Heating, Ventilating and Air Conditioning
12. IEC International Electrotechnical Commission
13. IEEE Institute of Electrical and Electronics Engineers.
14. IETA International Electrical Testing Association
15. FM FM Global
16. NEC National Electric Code
17. NEMA National Electrical Manufacturers Association
18. NFPA National Fire Protection Association
19. NRTL Nationally Recognized Testing Laboratory
20. OSHA Occupational Safety and Health Administration
21. UL Underwriters Laboratories Inc.

B. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.
C. Conform to latest adopted version of the CBC with amendments by local AHJs.
D. Obtain and pay for electrical permits, plan review, and inspections from local AHJs.
E. Furnish products listed by UL or other testing firm acceptable to AHJ.
F. Conform to requirements of the serving electric, telephone, and cable television utilities.
G. Provide like items from one manufacturer, such as luminaire types, switches, receptacles, breakers, panels, and the like.

2.2 All materials to meet the following requirements based on Code requirements and industry standard of design and care:

A. Provide new electrical materials of the type and quality, listed by UL, bearing their label wherever standards have been established. Indicated brand names and catalog numbers are used to establish standards of performance and quality. The description of materials listed herein governs in the event that catalog numbers do not correspond to materials described herein.
B. Provide material and equipment that is acceptable to AHJ as suitable for the use. For example, provide wet labeled equipment in locations that are wet.
C. Provide incidentals not specifically mentioned herein, but needed to complete the system, in a safe and satisfactory working condition.

2.3 All documents to meet the following requirements based on District requirements and industry standard of design and care:

A. Prepare and submit layout drawings to coordinate installation and location of lighting, electrical and signal systems. Prepare composite drawings showing all equipment on a single sheet. The architectural floor plans, reflected ceiling plans, and access floor layout plan shall form the base for the coordination drawings. Prior to completion of Drawings, coordinate proposed installation with the Architect, structural requirements, and other trades (including HVAC, plumbing, fire protection, ceiling systems, and raised floor system), and provide required maintenance access. Systems shall include, although not limited to, the following:

1. Luminaires.
2. Occupancy sensors.
3. Wiring devices.
4. Electrical equipment enclosures.
5. Control equipment enclosures.
6. Route of feeders 100A and larger.
7. Route of cable tray systems.
8. Surface metal raceways.
9. Conduit rack supports.
10. Transformers and supports.
11. Standby engine generator.
12. Fire alarm devices, annunciators and control panel.
13. Outlet boxes and raceway system for security system alarm devices and control panel.
14. Outlet boxes and raceway system for telephone, data and CATV raceways 2 inches and larger.

B. Prepare Drawings as follows:

1. Prepare Drawings, to accurate scale, in latest BIM graphics format printed to media as directed by District.
2. Distribute plans to all trades and provide additional coordination as needed.
3. Advise Architect, in event a conflict occurs in location of equipment. Bear all costs for relocation of equipment, resulting from failure to properly coordinate installation or failure to advise Architect of conflict.
4. Provide means of access to all junction and pull boxes and concealed equipment which may require access, adjustment or servicing.
5. Final coordination drawings, with as-constructed information added, are to be submitted as record drawings at completion of project. Plans are to incorporate all addenda items and change orders.

C. Power Distribution:

1. Provide selector switch and medium voltage transformer for each new building service to allow connection to the campus distribution system.
2. Service: Where a new electrical service is required, size electrical service per CEC requirements. Include 20% spare capacity for future growth. Services over 800 amps should include a 100% rated switchboard with electronic trip adjustable breakers. Services shall generally be 480/277 volt for any building with a load over 300 KVA.
3. Panelboards: Provide distribution and branch panels as required to feed loads. Provide separate panels for HVAC, lighting and plug loads to meet Title 24 Part 6 requirements for separation of loads. Provide metering of loads as indicated in various specification sections.
4. Transformers: Provide transformers meeting the latest energy efficiency standards
5. Existing equipment: any distribution equipment that is existing to remain should be tested per iNETA standards and refurbished to meet minimum performance standards. All molded case breakers over 30 years old will be replaced.
6. Feeders: Provide voltage drop calculations for all feeders. Include 20% spare capacity for future growth. Provide heating load calculation for all feeders located outside or in ductbanks.

D. Branch Circuits/Wiring Devices:

1. Outlets:

a. Power Over Ethernet (PoE) is permitted; IEEE 802.3bt-2018 or most recent PoE standards shall apply
b. All outlets shall be clearly labeled with circuiting information.
c. Provide minimum eight (8) receptacles on perimeter walls per general classroom.
d. Any space designed for computer use will have dedicated outlets serving patch cords built into furniture.
e. Maximum 4 receptacles/circuit in classrooms, 5 receptacles/circuit in office spaces, dedicated receptacles as required for copiers, printers, lab equipment, other special equipment.
f. Provide additional receptacles for projectors, smart boards and similar AV/presentation equipment.
g. Receptacles in offices, reception lobbies, break rooms, conference rooms and copy rooms shall have one controlled receptacle within 6 of every non-controlled receptacle. Generally, this will be accomplished through split wired receptacles. Controlled receptacle to be clearly marked. Connect to lighting occupancy sensor for control.
h. Provide floor box under each conference room table with minimum 2 duplex receptacles and 4 data ports. Coordinate cover with architect.
i. Provide one receptacle every 40 feet in corridors for custodial use.
j. Provide one receptacle in each storage room, mechanical space, electrical room and similar utility space. Generally, this receptacle will be mounted next to the light switch and the entry door.
k. Provide one GFCI receptacle in each restroom. Provide power to hand dryers, automatic faucets and automatic toilets/urinals as required.
l. Provide receptacle on roof and/or outside for maintenance of HVAC equipment as required by code.

2. Branch Circuits: Loading on branch circuits shall not exceed 66% of the breaker trip rating.

3. Power Connections: Provide power to all devices permanently installed in the building, including but not limited to, IT equipment, security devices, AV equipment, projection screens, lab equipment, elevators, HVAC equipment, loading docks, break room equipment, laundry equipment, fire alarm systems, lighting control systems, gym equipment, motorized shades, auditorium equipment garbage disposals, trash compactors, restroom devices.
4. IDF/MDF Rooms: provide two L14-30 receptacles per rack. One receptacle from UPS and one from house power. Provide rack PDU's for each receptacle to distribute power to rack mounted equipment.

E. Lighting and Controls:

1. Provide a complete lighting and control system meeting all requirements of the most recent and applicable Title 24 Part 6 Energy Code.
   a. Existing lighting fixtures that meet Title 24 requirements may be reused in areas where the ceiling is not being replaced. In all areas where lighting fixtures need to be removed (ceiling replacement, HVAC access, etc.), provide new replacement fixtures. Where existing fixtures are reused, they shall be cleaned and relamped.
   b. Lighting levels shall meet Illuminating Engineering Society (IES) requirements. Lighting calculations shall be provided for each typical space. Light loss factors in calculations shall not exceed 0.75. Lighting levels shall not be sacrificed to meet energy restrictions.
2. Lighting design shall meet IES Design Guidelines. Refer to IES Recommended Practice for Educational Facilities, Offices, Libraries, Sports Facilities and other applicable guidelines.
3. Lighting Controls shall be secure, limited bandwidth and integrated with the BMS system.
4. Lighting Controls installer shall provide floor plans with Lighting and Occupancy Zone Overlays, and points to SE adhering to SMCCD space type and follow SMCCCD prescribed labeling guidelines.
   a. Classroom Control: control system in classrooms shall be equal to the Finelite ICLS system. Classrooms shall have a maximum brightness level on the projection screen/smart board of TBD footlamberts.
   b. Offices: offices and administrative spaces shall be Lutron Vive or equal.
   c. Conference Rooms to have controls to allow lighting directly on the projection screens or monitors to be turned off separately from the remainder of the lighting in the space.
5. Provide demand response capability on all buildings to uniformly reduce the lighting load by 15%.
6. Emergency lighting fixtures shall be separately circuited and powered by lighting inverter systems specific to each building. Fixture level battery backup is permitted with SMCCCD approval.

F. All installation methods to meet the following requirements based on district requirements and industry standard of design and care:

1. Install electrical equipment complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of the electrical equipment, examine the instructions thoroughly. When

requirements of the installation instructions conflict with the Contract Documents, request clarification from Architect prior to proceeding with the installation.

2. Do not install electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block the area passage's intended usage.
3. Earthwork:

    a. Refer to Division 31, Section "Earthwork."
    b. Perform excavation and backfill required for the installation of electrical work.

4. Noise Control:

    a. Do not install outlet boxes back to back. Do not use straight through boxes.
    b. Do not place contactors, transformers, starters and similar noise producing devices on walls which are common to occupied spaces unless specifically directed by the District. Where such devices must be mounted on walls common to occupied spaces, mount or isolate in such a manner as to effectively prevent the transmission of their inherent noise to the occupied space.
5. Firestopping:

    a. Coordinate with the Drawings the location of fire rated walls, ceilings, floors and the like. When these assemblies are penetrated by electrical equipment, seal around the equipment with approved firestopping material.
    b. Install firestopping material complete as directed per the manufacturer's installation instructions.

G. Electric Vehicle Supply Equipment (EVSE)
    1. EVSE is SAE J1772 Level 2 and is listed by an NRTL
    2. Provide installation, maintenance and operations instructions to SMCCCD
    3. Identify and verify EVSE installation location and provide associated SLD, structural and other planning documentation
    4. Each EVSE shall be wired directly to an unique branch circuit unless otherwise specified
        a. Multiplexing EVSE equipment is permitted with SMCCCD approval (must include all J1772 standards, cables, and protocols).
    5. Branch circuit feeders must be sized to 125% of EVSE nameplate current
H. All field quality control methods to meet the following requirements based on Code requirements and industry standard of design and care:

    1. Tests
        a. Conduct tests of equipment and systems to demonstrate compliance with requirements specified in Division 26.
        b. Refer to individual Specification Sections for required tests. Document tests and include in Closeout Documents.
        c. During site evaluations by the Inspector of Record (IOR), provide an electrician with tools to remove and replace trims, covers, devices, and the like, so that a proper evaluation of the installation can be performed.

    2. Testing shall include:

        a. Daylight automatic controls.
        b. Occupant sensing automatic controls.
        c. Automatic time and override controls for interior lighting.

d. Automatic time and photo controls for exterior lighting.
e. Lighting system control testing and commissioning:
   Test lighting controls to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with Drawings and Specifications. Provide functional testing of sequences of operation to ensure operation in accordance with Drawings and Specifications. Provide complete report of test procedures and results to engineer and insert approved copy into project closeout documents.
f. Conduct functional Ground Bond and Ground Continuity testing
g. Test for capacity to conduct fault current and for low impedance to limit voltage to ground

I. All cleaning methods to meet the following requirements based on district requirements and industry standard of design and care:

1. Remove dirt and debris caused by the execution of the electrical work.
2. Leave the entire electrical system installed under this Contract in clean, dust-free and proper working order.
3. Vacuum clean interiors of all new and modified electrical signal and communication equipment enclosures.

J. For renovations requiring demolition, all demolition methods to meet the following requirements based on district requirements and industry standard of design and care:

1. Coordinate with District so that work can be scheduled not to interrupt operations, normal activities, building access, access to different areas. The District will cooperate to the best of their ability to assist in a coordinated schedule, but will remain the final authority as to time of work permitted.
2. Examination: Determine the exact location of existing utilities and equipment before commencing work, compensate the District for damages caused by the failure to locate and preserve utilities. Replace damaged items with new material to match existing.
3. Promptly notify District if utilities are found which are not shown on record Drawings.
4. Execution:

   a. Remove existing luminaires, switches, receptacles, and other electrical equipment and devices and associated wiring from walls, ceilings, floors, and other surfaces scheduled for remodeling, relocation, or demolition.
   b. Maintain electrical continuity of existing systems. Remove or relocate electrical boxes, conduit, wiring, equipment, luminaires, and the like, as encountered in removed or remodeled areas in the existing construction affected by this work.
   c. Remove and restore wiring which serves usable existing outlets clear of the construction or demolition
   d. If existing junction boxes will be made inaccessible, or if abandoned outlets serve as feed through boxes for other existing electrical equipment which is being retained, provide new conduit and wire to bypass the abandoned outlets.
   e. If existing conduits pass through partitions or ceiling which are being removed or remodeled, provide new conduit and wire to reroute clear of the construction or demolition and maintain service to the existing load.
   f. Extend circuiting and devices in existing walls to be furred out.
   g. Remove abandoned wiring to leave site clean.

h. If existing lighting which is to remain or be relocated is to be relamped, reballasted and cleaned, notify architect and/or District. Leave all luminaires in proper working order.
i. If existing electrical equipment contains PCBs (polychlorinated biphenyl), replace with new. Dispose of material containing PCBs as required by federal and local regulations.
j. Repair adjacent construction and finishes damaged during demolition work.
k. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

K. For renovations requiring demolition, divert a minimum of 75% of waste. Waste reporting to SMCCCD and to the authority having jurisdiction, as appropriate, shall be conducted by the primary contract holder.
1. Develop and approve plans with SMCCCD to salvage and reuse materials on-site wherever possible. Where on-site reuse is deemed infeasible, catalogue all salvaged equipment and recycled materials.
2. First right of refusal shall be given to SMCCCD for reselling functional equipment and/or materials with potential value including but not limited to:

a. Copper or aluminum conductors, buses, motor/transformer windings, and the like.
b. Steel and aluminum from raceways, boxes, enclosures, housings and the like.
c. Acrylic and glass from luminaire lenses/refractors.
d.

3. New Construction and Major Renovations must divert a minimum of 85% from the landfill.
a. Clearly show site plan and provide separate on-site storage space for recycled and salvaged material. Clearly label space for intended use.
b. Provide written verification from the certified waste hauler of diversion rates at regular (no less than quarterly) intervals throughout the project implementation phase

4. For renovations requiring demolition, all systems requiring continuity of service shall meet the following requirements based on District requirements and industry standard of design and care:

a. No interruption of services to any part of existing facilities will be permitted without express permission in each instance from the District. Requests for outages shall state the specific dates and hours and the maximum durations, with the outages kept to these specific dates and hours and the maximum durations. Obtain written permission from the District for any interruption of power, lighting or signal circuits and systems.
b. If overtime is necessary, there will be no allowance made by District for extra expense for such overtime or shift work, due to maintaining continuity of service herein required.
c. Organize work to minimize duration of power interruption.

5. Operation and Maintenance Documentation: Provide copies of certificates of code authority acceptance, test data, product data, guarantees, warranties, and the like.

a. Closeout Documentation: Submit electrical code authority certification of inspection.

b. Include documentation of on-site electrical testing that was performed.
c. Include all electrical load calculations, single line diagrams and labeling to evidence compliance with NFPA 70
d. Include Maintenance and Operations electronic documentation for all major equipment. Provide orientation and training for Maintenance and Operations Staff prior to substantial completion

6. Sustainable Design Practices:

1. The San Mateo County Community College District is committed to utilizing sustainable design and construction. As part of the Electrical Design Standards, the project team is responsible for reviewing and incorporating SMCCCD's Sustainability Standard, section 01 81 13. Measures that help reduce, shift and produce energy are a few of the sample sustainable design opportunities provided in a table in the Sustainability Section.
2. New construction or major modernization projects will meet the latest version of LEED Gold standards.
3. New buildings will use PGE's latest Savings by Design program (or other applicable utility incentive program).

2.4 APPROVED MANUFACTURERS

Refer to individual standards.

PART 3 EXECUTION

3.1 SUBSTITUTES ALLOWED?

Yes, if performance and quality equivalency can be evidenced.

3.2 ASSOCIATED DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

A. Division 22 Plumbing
B. Division 23 Heating Ventilation and Air Conditioning
C. Division 26 Electrical
D. Division 27 Communications

END OF SECTION