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. FCC Federal Communications Commission
10. HVAC Heating, Ventilating and Air Conditioning
11. IEC International Electrotechnical Commission
12. IEEE Institute of Electrical and Electronics Engineers.
13. IETA International Electrical Testing Association
14. FM FM Global
15. NEMA National Electrical Manufacturers Association
16. NFPA National Fire Protection Association
17. OSHA Occupational Safety and Health Administration
18. 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. Outlets shall be clearly labeled with circuiting information.
    b. Provide minimum six (6) receptacles on perimeter walls per general classroom.
    c. Any space designed for computer use will have dedicated outlets serving patch cords built into furniture.
    d. Maximum 4 receptacles/circuit in classrooms, 5 receptacles/circuit in office spaces, dedicated receptacles as required for copiers, printers, lab equipment, other special equipment.
    e. Provide additional receptacles for projectors, smart boards and similar AV/presentation equipment.
    f. 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.
    g. Provide floor box under each conference room table with minimum 2 duplex receptacles and 4 data ports. Coordinate cover with architect.
    h. Provide one receptacle every 40 feet in corridors for custodial use.
    i. 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.
    j. Provide one GFCI receptacle in each restroom. Provide power to hand dryers, automatic faucets and automatic toilets/urinals as required.
    k. 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 latest Title 24 Part 6 Energy Code.
2. 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.
3. 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.
4. Lighting design shall meet IES Design Guidelines. Refer to IES Recommended Practice for Educational Facilities, Offices, Libraries, Sports Facilities and other applicable guidelines.
5. Lighting Controls shall be secure, limited bandwidth and integrated with the BMS system.
6. 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.
7. Offices: offices and administrative spaces shall be equal to Wattstopper DLM or Enlighted control systems.
8. 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.
9. Provide demand response on all buildings over 10,000 square feet to uniformly reduce the lighting load by 15%.
10. Emergency lighting shall be powered by lighting inverter systems specific to each building.

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. 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. Refer to individual Specification Sections for required tests. Document tests and include in Closeout Documents.
b. 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.

H. 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.

I. 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.

J. For renovations requiring demolition, all methods for salvaged equipment and recycled material shall meet the following requirements based on District requirements and industry standard of design and care:

1. Salvage the following equipment not being reused and return to District (as applicable):

a. Luminaires
b. Panelboards

c. Breakers
d. Transformers

2. Salvage the following equipment not being reused and sell/give to electrical salvage company (as applicable):

a. Luminaires
b. Panelboards
c. Breakers
d. Transformers

K. Electrical equipment that cannot be salvaged for reuse, sell/give to recycling company. Recycle the following excess, removed, or demolished electrical material (as applicable):

1. Copper or aluminum conductors, buses, motor/transformer windings, and the like.
2. Steel and aluminum from raceways, boxes, enclosures, housings and the like.
3. Acrylic and glass from luminaire lenses/refractors.

L. Provide separate on-site storage space for recycled and salvaged material. Clearly label space for intended use.

M. 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:

1. 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.
2. 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.
3. Organize work to minimize duration of power interruption.

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

O. Closeout Documentation: Submit electrical code authority certification of inspection. Include documentation of on-site electrical testing that was performed.

P. Sustainable Design Practices:

1. The San Mateo County Community College District has a desire to build buildings utilizing sustainable design techniques. As part of the Electrical Design Standards, sample sustainable design opportunities are provided in a table in the Sustainability Section of the SMCCCD standards. Each strategy needs to be integrated appropriately into their respective projects. Development of design strategies for each item is beyond the scope of this Design Standard and requires careful consideration for proper application. New construction or major modernization projects will meet the latest version of LEED Gold standards.
2. Refer to sustainability matrix in the project Request for Proposal for specific sustainability expectations and requirements.

3. New buildings will use PGE's latest Savings by Design 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