



Design Standard Basic Electrical Requirements

Purpose:

This design standard has the purpose of maintaining a consistent application of the basic electrical requirements of the electrical systems throughout the South San Francisco Unified School District thereby achieving a standard of quality for maintenance, reliability, and operation throughout all renovation and new building projects.

Design Standard:

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.

- Conform to requirements of the CEC, latest adopted version.
- Conform to latest adopted version of the CBC.
- Obtain and pay for electrical permits, plan review, and inspections.
- Furnish products listed by UL.
- Conform to requirements of the serving electric, telephone, and cable television utility companies.
- Provide like items from one manufacturer, such as luminaire types, switches, receptacles, breakers, panels, and the like.

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

- 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.
- Provide material and equipment that is acceptable to DSA as suitable for the use. For example, provide wet labeled equipment in locations that are wet.
- Provide incidentals not specifically mentioned herein, but needed to complete the system, in a safe and satisfactory working condition.

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



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- 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:
 - i) Luminaires.
 - ii) Occupancy sensors.
 - iii) Wiring devices.
 - iv) Electrical equipment enclosures.
 - v) Control equipment enclosures.
 - vi) Route of feeders 100A and larger.
 - vii) Route of cable tray systems.
 - viii) Surface metal raceways.
 - ix) Conduit rack supports.
 - x) Transformers and supports.
 - xi) Standby engine generator.
 - xii) Fire alarm devices, annunciators and control panel.
 - xiii) Outlet boxes and raceway system for security system alarm devices and control panel.
 - xiv) Outlet boxes and raceway system for telephone, data and CATV raceways 2 inches and larger.
- Prepare Drawings as follows:
 - i) Prepare Drawings, to accurate scale, in latest AutoCAD graphics format printed to media as directed by District.
 - ii) Distribute plans to all trades and provide additional coordination as needed.
- 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.
- Provide means of access to all junction and pull boxes and concealed equipment which may require access, adjustment or servicing.
- 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.

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

- 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



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

- Do not install electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block the area passage's intended usage.
- Earthwork:
 - i) Perform excavation and backfill required for the installation of electrical work.
- Noise Control:
 - i) Do not install outlet boxes back to back. Do not use straight through boxes.
 - ii) 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.
- Firestopping:
 - i) 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.
 - ii) Install firestopping material complete as directed per the manufacturer's installation instructions.

All field quality control methods to meet the following requirements based on Code requirements and industry standard of design and care:

- Tests:
 - i) 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.
 - ii) 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.
- Testing shall include:
 - i) Daylight automatic controls.
 - ii) Occupant sensing automatic controls.
 - iii) Automatic time and override controls for interior lighting.
 - iv) Automatic time and photo controls for exterior lighting.
 - v) 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



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complete report of test procedures and results to engineer and insert approved copy into project closeout documents.

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

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

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

- 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.
- 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.
- Promptly notify District if utilities are found which are not shown on record Drawings.
- Execution:
 - i) 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.
 - ii) 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.
 - iii) Remove and restore wiring which serves usable existing outlets clear of the construction or demolition
 - iv) 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.
 - v) 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.
 - vi) Extend circuiting and devices in existing walls to be furred out.
 - vii) Remove abandoned wiring to leave site clean.



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

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:

- The following equipment not being reused on site shall be offered to the District as salvage for reuse elsewhere. If accepted, deliver to District:
 - Luminaires
 - Panelboards
 - Breakers
 - Transformers
- Items above that are accepted by District- sell/give to electrical salvage company (as applicable- see 01 00 00 General Requirements):
- Electrical equipment that cannot be salvaged for reuse, sell/give to recycling company. Recycle the following excess, removed, or demolished electrical material (as applicable):
 - Copper or aluminum conductors, buses, motor/transformer windings, and the like.
 - Steel and aluminum from raceways, boxes, enclosures, housings and the like.
 - Acrylic and glass from luminaire lenses/refractors.
- Provide separate on-site storage space for recycled and salvaged material. Clearly label space for intended use.

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:

- 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.



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- 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.
- Organize work to minimize duration of power interruption.

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

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

Sustainable Design Practices

- The South San Francisco Unified School District has a desire to build buildings utilizing sustainable design techniques. Development of design strategies is beyond the scope of this Design Standard and requires careful consideration for proper application.

Approved Manufacturers:

- Refer to individual standards.

Substitutes Allowed:

Yes, if performance and quality equivalency can be evidenced.

Associated Design Standards

- Division 1 General Requirements
- Division 1 Codes, Standards & Abbreviations
- Division 22 Plumbing
- Division 23 Heating Ventilation and Air Conditioning
- Division 26 Electrical
- Division 27 Communications

End of Document