Design Standard
Basic Electrical Requirements

Purpose:

This design standard has the purpose of maintaining a consistent application of the basic requirements for electrical systems throughout the East Side Union High School District, therefore achieving a standard of quality for maintenance, reliability, and operation throughout all renovation and new building projects, as they are a long-term investment for the District.

Electrical systems shall provide a safe, comfortable and healthy environment for facility occupants while being energy efficient and inexpensive to maintain over the life of the building. Service life, energy efficiency, indoor air quality, comfort, maintenance cost, and flexibility are major considerations to be accounted for in the design of the electrical system.

Design of ESUHSD's original campus facilities date back as early as the 1940's. For current renovation and new building projects, the electrical system and its controls are expected to reflect a forward-thinking, contemporary design philosophy and aesthetic rather than emulating existing technology from the mid-20th Century.

Design Standard:

1. **General**
   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. Discuss upcoming revisions to codes and standards with Facilities Director to determine if they should be used for this project.
   a. Specify new electrical materials of the type and quality, listed by UL or other testing firm acceptable to AHJ, bearing their label wherever standards have been established.
   b. Specify 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. Include incidentals needed to complete the system, in a safe and satisfactory working condition.
   d. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.
   e. Conform to latest adopted version of the CBC with amendments by local AHJs.
   f. All equipment shall be installed per the more stringent requirements of: code, design standards, criteria documents and manufacturer's recommendations.

g. Conform to requirements of the serving electric, telephone, internet, and cable television utilities.
h. Provide like items from one manufacturer, such as luminaire types, switches, receptacles, breakers, panels, and the like.

2. Equipment Siting and Service Access

a. Design and specify installation of equipment to ensure maximum service access. Provide means of access to all junction and pull boxes and concealed equipment which may require access, adjustment or servicing.
b. Do not design installation of equipment in areas with public access, e.g., corridor walls, or walls in occupied spaces.
c. Do not install electrical equipment in obvious passages, doorways, scuttles or crawl spaces, which would impede or block the passage area's intended usage.
d. Arrange equipment in a manner that reserves space for future equipment and future uses.

3. Acoustics

Design to ensure the integrity of the acoustics of learning and working spaces. Conform with the requirements of the Acoustic Design Standard.

a. Do not install outlet boxes back to back. Do not use straight through boxes.
b. Provide acoustic caulking around boxes in shared walls where fire caulking is not required.
c. Do not place contactors, transformers, starters and similar noise producing devices on walls that are common to occupied spaces, unless specifically approved by the Facilities Director. 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.

4. Firestopping

Coordinate with architect to ensure the integrity of fire rated assemblies.

a. Indicate on drawings the location of fire rated walls, ceilings, floors and the like. When these assemblies are penetrated by electrical equipment, provide direction to seal around the equipment with approved firestopping material.
b. Provide direction to install firestopping material complete as directed per the manufacturer’s installation instructions.

5. Demolition

Provide direction to electrical contractor that no interruption of services to any part of existing facilities will be permitted without express permission in each instance from the District. 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 its ability to assist in a coordinated schedule, but will remain the final authority as to time of power outage permitted.

a. Requests for power 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. Contractor must obtain written permission from the District no less than one week in advance for any interruption of power, lighting or signal circuits and systems.
b. 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. Direct the contractor to organize work to minimize duration of power interruption.

6. Salvage and Recycling Operations

Early in the construction documents phase, ascertain the District's salvage requirements for the project. Direct the contractor to salvage and return to the District the equipment identified for re-use.

a. Those items include but are not limited to:
    i. Luminaires
    ii. Panelboards
    iii. Breakers
    iv. Transformers
    v. Disconnect Switches
    vi. Clocks
    vii. Fire Alarm Panels and Devices
    viii. Bell Paging System components
    ix. Intrusion Detection System components
b. Direct the contractor to recycle or salvage for reuse the equipment and materials that the District is not interested in retaining.

7. Field Quality Control

Specify field quality control methods to meet the requirements of the project based on Code, green design, commissioning requirements, and industry standard of design and care.

a. 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. Coordinate with Commissioning standards.
    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.
b. 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 commissioning agent, and insert approved copy into project closeout documents.

i. Daylight automatic controls.
ii. Occupant sensing automatic controls.
iii. Automatic time and override controls for interior lighting.
iv. Automatic time and photocell controls for exterior lighting.

8. Cleaning

Direct the contractor to maintain and provide a clean installation, using cleaning methods to meet the following requirements based on District requirements and industry standard of design and care:

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

9. Documentation

a. Construction Layout Drawings: Direct the contractor to 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 FFE, HVAC, plumbing, fire protection, ceiling systems, and raised floor system), and provide required maintenance access. Systems shall include but not be 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, including connections for overhead projectors

b. As-Constructed Drawings: Final construction drawings and specifications, together with final layout 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. Closeout Documentation: Submit electrical code authority certification of inspection. Include documentation of on-site electrical testing that was performed.

10. Start-Up Training:

a. Specify preparation of a formal training program for operating staff prior to the scheduled start-up date. The program will consist of the design, start-up, and operation of the electrical systems. The training program is to be coordinated with production of the operation and maintenance manuals. Operations and Maintenance data is to be available for training sessions.
b. Specify provision of 4 hours of on-site training in the operation and maintenance for installed system and major piece of equipment. Verify this quantity with the Facilities Director during the construction documents phase of design.

11. Sustainable Design Practices

ESUHSD has a desire to design and construct sustainable buildings and grounds. Sample sustainable design opportunities are provided in the table located in the ESUHSD Sustainability Design Standard. Each strategy needs to be integrated appropriately into their respective projects. Development of design strategies for each item is beyond the scope of this Electrical Design Standard and requires careful consideration for proper application. The District will select on a case by case basis the projects that are to achieve LEED™ certification, CHPS certification, pursue utility company incentive grants, etc. The design team shall discuss green design and certifications with the Facilities Director during the project's programming phase, in order to make a recommendation and seek the Director's approval for pursuit of certifications and incentive grants.

Engineer shall provide consulting and construction assistance to the District as needed to achieve LEED™ certification, CHPS certification, pursue utility company incentive grants, etc.

a. LEED™ certification: Provide design and documentation as required by United State Green Building Council to achieve the targeted certification.
b. CHPS certification: Provide design and documentation as required by the Collaboration for High Performance Schools to achieve the targeted certification.
c. Savings by Design energy incentive financing from PG&E.

Refer to Savings by Design Participant Handbook, published by PG&E. Create and submit to PG&E Savings by Design application(s).

i. Provide energy modeling software and simulations required by the Savings by Design Program.
ii. Establish the Title 24 baseline.
iii. Demonstrate to PG&E the energy model and electric energy savings in excess of Title 24 minimums.
iv. Complete the Savings by Design contract with PG&E for available rebates to the owner.

d. Other certification, incentive and grant programs: Provide design and documentation as required to achieve the targeted certification, incentive financing, grants, etc.

Approved Manufacturers:

Not applicable

Substitutes Allowed:

Not applicable

Associated Design Standards and Construction Specifications:

- Acoustic Design Standard
- Sustainability Design Standard
- Division 22 Plumbing Design Standards
- Division 23 HVAC Design Standards
- Division 25 Integrated Automation Design Standards
- Division 26 Electrical Design Standards
- Division 27 Communications Design Standards
- Division 28 Electronic Safety and Security Design Standards
- 01 91 00 Commissioning Design Standard
- 01 91 13 Commissioning Requirements Construction Specification

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