**ELECTRICAL DESIGN CRITERIA**

Table of Contents

[I. GENERAL 1](#_Toc460332186)

[II. CRITERIA 3](#_Toc460332187)

[A. SUBMITTALS 3](#_Toc460332188)

[B. ELECTRICAL LOAD CALCULATIONS 3](#_Toc460332189)

[C. FAULT CURRENT CALCULATIONS 3](#_Toc460332190)

[D. RISER DIAGRAMS 4](#_Toc460332191)

[E. FLORIDA BUILDING CODE – CHAPTER 13 4](#_Toc460332192)

[F. FLOOR PLAN (LIGHTING) 4](#_Toc460332193)

[G. FLOOR PLAN (POWER) 5](#_Toc460332194)

[H. PANEL SCHEDULES 5](#_Toc460332195)

[I. ELEVATORS (NEC ARTICLE 620) 5](#_Toc460332196)

[J. FIRE PUMPS (NEC ARTICLE 695) 6](#_Toc460332197)

[K. EMERGENCY, LEGALLY REQUIRED STANDBY OR OPTIONAL STANDBY SYSTEMS (NEC ARTICCLES 700, 701, 702) 6](#_Toc460332198)

[L. PEAK DEMAND RECORDS (NEC 220.35) 6](#_Toc460332199)

[M. SIGNAGE 6](#_Toc460332200)

# GENERAL

* 1. The Design Professional shall use this document in conjunction with the Educational Specifications, and District Master Specifications (DMS) to develop the design and contract documents
  2. Goals:

The purpose of this Division 26 Electrical Guideline is to provide consistent, uniform, quality, constructible construction documents for all PCSB District construction projects. This will improve the building plan review process, maintainability of equipment, and provide installation standardization.

* 1. This division contains requirements for the following elements:
     1. Submittals
     2. Electrical Load Calculations
     3. Fault Current Calculations
     4. Riser Diagrams
     5. Florida Building Code
     6. Floor Plan (Lighting)
     7. Floor Plan (Power)
     8. Panel Schedules
     9. Elevators
     10. Fire Pumps
     11. Emergency Systems
     12. Peak Demand Records
     13. Signage
  2. In this document, the term Engineer represents the professionally qualified Design Engineer of Record or Engineering Consultant, duly licensed in the State of Florida, that signs and seals project construction documents.
  3. The Engineer is the person responsible for the design and development of all project documents.
  4. Design shall incorporate the latest design or code requirements.
     1. National Electrical Code, NEC
     2. Illuminating Engineering Society of North America, IESNA
     3. Florida Building Code, FBC
     4. Florida Fire Prevention Code, FFPC
     5. Educational Specifications
     6. National Fire Prevention Code, NFPA
  5. The Criteria shall not limit or restrain the performance and liability of the Professional or Professionals responsible for the integrity and performance of the structure.
  6. The Criteria is applicable to new construction and to the remodeling and renovation of existing facilities.
  7. The use of the Criteria in this document does not exempt the Design Professionals from any federal or state code or standards controlling the design and construction of any Facility.
  8. Do not put electrical systems on the same drawings with electrical power system. Provide separate electrical systems drawings.
  9. Drawing Elements:
     1. On the Cover Page place the Title Block on the Right Edge of the page with the following information:
        1. Sheet number
        2. Project name & description
        3. Issue date with revision column
        4. PCSB Project Number/Work Order Number
        5. Drawn by & date
        6. Checked by & date
        7. PA/E name, address, phone numbers & email address
        8. Current Board Members & Superintendent
        9. Project issue date Vicinity map Drawing index
        10. 100% construction documents
     2. Number and Label the drawings with the following information:

Drawing Number Drawing Title

* + - 1. E0.00 ELECTRICAL SYMBOL LEGEND & SCHEDULES
      2. E0.01 ELECTRICAL LEAD-IN SHEET
      3. E0.02 ELECTRICAL SHEET SPECIFICATIONS
      4. E1.01 ELECTRICAL DEMOLITION PLAN - SITE
      5. E1.02 ELECTRICAL DEMOLITION PLAN - BUILDING 1
      6. E1.03 ELECTRICAL DEMOLITION PLAN - BUILDING 2
      7. E1.04 ELECTRICAL DEMOLITION PLAN - BUILDING 3
      8. E1.05 ELECTRICAL DEMOLITION PLAN - ROOF
      9. E2.01 ELECTRICAL SITE PLAN
      10. E2.02 GROUNDING, DATA, & POWER DISTRIBUTION PLAN
      11. E3.03 LIGHTING PLAN - BUILDING 1
      12. E3.04 LIGHTING PLAN - BUILDING 2
      13. E3.05 LIGHTING PLAN - BUILDING 3
      14. E4.01 POWER PLAN - BUILDING 1
      15. E4.02 POWER PLAN - BUILDING 2
      16. E4.03 POWER PLAN - BUILDING 3
      17. E4.04 POWER PLAN - ROOF
      18. E5.01 POWER ONE-LINE RISER DIAGRAM
      19. E5.02 COMMUNICATIONS BACKBONE RISER
      20. E6.01 ELECTRICAL SCHEDULES
      21. E6.02 ELECTRICAL SCHEDULES
      22. E6.03 ELECTRICAL SCHEDULES
      23. E8.01 ELECTRICAL DETAILS
      24. E8.02 ELECTRICAL DETAILS
      25. E8.03 ELECTRICAL DETAILS
      26. E8.04 ELECTRICAL DETAILS
      27. EF8.01 FIRE ALARM PLAN - BUILDING 1
      28. EF8.02 FIRE ALARM PLAN - BUILDING 2
      29. EF8.03 FIRE ALARM PLAN - BUILDING 3
      30. EF8.04 FIRE ALARM RISER & DETAILS

# II. CRITERIA

## SUBMITTALS

1. Electrical plans signed and sealed by a Registered Professional Engineer in the State of Florida.
2. Electrical plans showing power and lighting for each floor & the location of all panel boards using the most current Florida Inventory of School Houses (F.I.S.H.) numbers.
3. Electrical plans showing systems plans for each floor & the location of all MDF's and IDF's using the most current F.I.S.H. numbers.
4. Electrical panel schedules showing the loads in VA or KVA and the A.I.C. rating.
5. Riser diagram showing the point-to-point available fault current and the raceway and conductor size, type, and grounding methods.
6. A complete grounding electrode system detail, include all items specified in NEC 250.50 and NEC 250.30 for any transformers or other separately derived systems. Show how all items required to be bonded are tied together to comply with NEC 250.104.
7. Fault current calculations through the panelboard level or to the point that the fault current is below 10K A.I.C. Designate point-to-point in system calculated.
8. Lighting power densities per Chapter 13 of the Florida Building Code and Section 26 51 00 of the PCSB Master Specifications.

## ELECTRICAL LOAD CALCULATIONS

1. Electrical load calculations, including a load summary showing all demand factors.
2. NEC 220 - Breakdown of connected loads into proper NEC categories (lighting, receptacles, motors, HVAC, kitchen equipment, appliances, etc.)
3. NEC 220 - Demand factors applied to each category of load.
4. NEC 220 - Total connected load in VA or KVA.
5. NEC 220 - Total calculated amps.
6. PCSB Submittal Requirement - Panel board load calculation worksheet completed for all panel boards or shown in panel schedule.

## FAULT CURRENT CALCULATIONS

1. Panelboards/switchboards shall be provided with a minimum of 20% spare spacing for future additions.
2. Stub three (3) empty 3/4" conduits and two (2) empty 1" conduits to accessible location above ceiling out of each recessed panelboard.
3. NEC 110.9 / 110.10 - Submitted with enough information provided to clarify calculation.
4. NEC 110.9 / 110.10 - Utility transformer size in KVA and impedance (%Z) or known available fault current at the utility transformer.
5. NEC 110.9 / 110.10 - Conduit and wire size, type and length.
6. NEC 110.9 / 110.10 - Service equipment, panel boards, etc. - A.I.C. rating.
7. NEC 110.9 / 110.10 - Complete fault current information through the panel board level.
8. NEC 110.16 - Flash Protection compliance with 110.16.

## RISER DIAGRAMS

1. PCSB submittal Requirement - Clearly identified service point.
2. NEC 110.9 - Service equipment ampacity, A.I.C. rating and overcurrent protection.
3. NEC 215 /225 - Feeder conduit size & type, conductor size & type, and number of conductors.
4. NEC 215.10 /230.95 / 240.13 - Ground fault protection of equipment where required.
5. NEC 220.22 - Grounded service conductor sized for the maximum unbalanced load.
6. NEC 230 - Service conduit's size & type, number of parallel runs, conductor's size & type, and number of conductors is shown.
7. NEC 240.4 - Overcurrent protection of conductors.
8. NEC 240.21 - Tap conductor length to overcurrent protective device for all items (a) through (g).
9. NEC 250-Part III - Grounding electrode system, including concrete encased electrode, grounding electrode conductor, and main bonding jumper are sized properly.
10. NEC 250-Part VI - Type of equipment grounding conductor for feeders is shown.
11. NEC 250.30 - Grounding electrode system, grounding electrode conductor and equipment bonding conductor is sized properly for separately derived systems
12. NEC 250.32(B) - Grounding electrode system and grounding electrode conductor are sized properly when more than one building is supplied form a common service or feeder.
13. NEC 450.3 - Overcurrent protection of transformers is properly sized.
14. NEC Appendix C - Service and feeder raceway conductor fill complies.

## FLORIDA BUILDING CODE – CHAPTER 13

1. FBC C405.7.3.1 - Provide voltage drop calculations showing no greater than 2% voltage drop on all service entrance and feeder conductors.
2. FBC C405 - Electrical plans correspond to the provided energy calculation, including number and type of lighting fixtures, the occupancy type, and the watts per square foot allowed.
3. FBC C405 - Electrical plans denote the type and location of all lighting fixtures.
4. FBC C405.2 - Automatic shutoff control of interior lighting - School classrooms and office buildings greater than 5,000 square feet.
5. FBC C4058.2 - Electrical plans denote all required switch, occupancy/vacancy sensor, and daylight sensor locations.
6. FBC C405.2.4 - Automatic shutoff control of exterior lighting (timer, photocell, or building management system (BMS system).
7. FBC C405.7.3.2 - Branch circuit voltage drop calculations

## FLOOR PLAN (LIGHTING)

1. NEC 700.15 - Unit equipment used for egress lighting.
2. High intensity discharge lighting shall not be used in egress lighting systems.
3. Homerun conduits showing size, type and number of conductors.
4. FFPC/NFPA 101 - Emergency lighting clearly denoted on plans. Give code ref with +/- ratio.

## FLOOR PLAN (POWER)

1. NEC 110.3 - Locations denoted on electrical plans for all motors, compressors, heaters, stationary appliances, etc.
2. NEC 110.26 - Electrical plans denote the location of all electrical distribution equipment.
3. NEC 110.26 - All electrical equipment has working clearance shown, as required.
4. NEC 110.26.C(2) - Large equipment: for equipment rated 1200 amps or more and over 6' wide that contains overcurrent devices, there shall be one entrance to egress and one egress from the required working space not less than 24" W and 6.5' H at each end of working space.
5. NEC 210.8 - Proper GFCI protection provided.
6. NEC 210 Part III - Required receptacle outlet locations.
7. NEC 310.15 - Branch circuits properly sized for the load.
8. Homerun conduits showing size, type and number of conductors.
9. PCSB submittal requirement - Electrical equipment schedule shall be provided.
10. NEC 110.26.C (3) - Personnel doors: where equipment rated 800 amps or more that contain overcurrent devices installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 25' from the nearest edge of the working space, the door(s) shall open in the direction of the egress and be equipped with listed hardware.

## PANEL SCHEDULES

1. NEC 408.4 - Circuit modification shall be legibly identified as to its clear, evident, and specific purpose or use.
2. NEC 110.9 / 110.10 - Panelboard buss rating in voltage & amps is shown.
3. NEC 110.9 / 110.10 - Panelboard ampacity, A.I.C. rating and overcurrent protection.
4. NEC 110.9 / 110.10 - Main breaker size or main lug only is shown.
5. NEC 110.9 / 110.10 - Panel schedule denotes double lugs or feed-through lugs.
6. NEC 110.22 - The description or coding is provided for each branch circuit.
7. NEC 220 Part II - The connected load of each branch circuit is shown in VA or KVA.
8. NEC 220. Part II - The total connected and calculated load is shown in VA or KVA.

## ELEVATORS (NEC ARTICLE 620)

1. NEC 620.22 - Overcurrent protective devices for each elevator car light and ventilation is located in the elevator machine room.
2. NEC 620.23 - A separate branch circuit is provided for the elevator machine room receptacles and light.
3. NEC 620.24 - A separate branch circuit is provided for the elevator pit receptacles and light
4. NEC 620.62 - Selective coordination of the elevator driving machine overcurrent protective device
5. NEC 620.21 - Wiring methods comply.
6. NEC 620.85 - All 125 volt receptacles are GFCI protected.

## FIRE PUMPS (NEC ARTICLE 695)

1. NEC 695.3 - Normal power is supplied by a separate service or by a tap located ahead of and not within the same enclosure as the service disconnecting means.
2. NEC 695.3 - The normal power source is capable of carrying the locked-rotor current of the fire pump motor indefinitely.
3. NEC 695.3(b) - Fire pump has generator backup power.
4. NEC 695.4 - Supervision for the fire pump circuit is provided.
5. NEC 695.5 - All transformers associated with the fire pump installation complies.
6. NEC 695.6 - All power wiring associated with the fire pump installation complies.
7. NEC 695.6(E) - The fire pump controller or fire pump transfer switch does not supply any load other than the fire pump.
8. NEC 695.7 - Voltage drop calculations are provided.

## EMERGENCY, LEGALLY REQUIRED STANDBY OR OPTIONAL STANDBY SYSTEMS (NEC ARTICCLES 700, 701, 702)

1. NEC 445 – Generator
2. NEC 480 – UPS
3. NEC 701 - Separate Service (when allowed)
4. NEC 700.4 - System properly sized for the load.
5. NEC xxx - Generator load calculation for healthcare facilities complies.
6. NEC 700.5 - Multiple transfer switches required.
7. NEC 700.10 - Emergency system is totally separate from all other systems.
8. NEC 225.30 - Service rated disconnect shown for generators located outside the building.
9. NEC 445.18 - Disconnecting means provided at generator for systems operating in parallel.

## PEAK DEMAND RECORDS (NEC 220.35)

1. Starting and ending dates of the metering
2. Highest reading of the metering period clearly shown
3. Power factor adjustment shown, when necessary
4. Explain the details of seasonal and occupancy adjustment factors
5. Utility demand records or recordings of demand metering for the peak period must accompany the submittal

## SIGNAGE

1. NEC 110.16 - Arc Flash warning labels.
2. NEC 110.22 - Signage for series rated systems.
3. NEC 210.5(C) - Identification of ungrounded conductors. The branch circuit color code shall be posted at each panel board location. This shall be a permanent plaque.
4. NEC 225.37 / 230.2(E) - Identification of all feeders, services or branch circuits that supply or pass through the building. This identification will be a permanent plaque at each disconnect location denoting the location of all other disconnects and the area served by each
5. NEC 695.4(B)(3) - A permanent plaque shall identify fire pump disconnecting means
6. NEC 695.4(B)(4) - A permanent plaque shall be placed a the fire pump controller stating the location of the disconnecting means and the location of the key if locked
7. NEC 700.7 - A permanent plaque shall be placed at the service equipment denoting the type and location of on-site emergency power
8. NEC 700.7 - A permanent plaque shall identify the connection of the grounding electrode conductor for the emergency source when the connection is at a location remote from the emergency source
9. NEC 701.9 - A permanent plaque shall be placed a the service equipment denoting the type and location of on-site legally required standby power
10. NEC 701.9 - A permanent plaque shall identify the connection of the grounding electrode conductor of the legally required standby power source when the connection is at a location remote from the legally required standby power source
11. NEC 702.7 - A permanent plaque shall identify the connection of the grounding electrode conductor for the optional standby power source when the connection is at a location remote from the optional standby power source

END OF SECTION