

Division 16 – Electrical Equipment

16010 – Basic Electrical Requirements

1. Does the electrical design comply with the National Electric Code, IES Lighting Standards, State Fire Marshal requirements including applicable NFPA Codes and the Florida Building Codes?
(Specific drawing sheet #/specification page #____.)
2. Has the Square D Power Logic KWH/KWD meter been provided for each building and/or service?
(Specific drawing sheet #/specification page #____.)
3. Has it been specified that the connected electrical load in any building shall be corrected to 95 percent power factor or above, using automatically controlled capacitors, where required?
(Specific drawing sheet #/specification page #____.)
4. Has it been specified that the electrical feed will be from a campus 13,200 volt circuit?
(Specific drawing sheet #/specification page #____.)
5. Has it been specified that from the campus underground communications duct and manhole system, the Contractor will provide conduits into the buildings for telephone, clocks and bells, instructional television, fire alarm, and HVAC control and monitoring?
(Specific drawing sheet #/specification page #____.)
6. Has it been specified that reduced voltage starters shall be provided for all motors 25 horsepower and larger?
(Specific drawing sheet #/specification page #____.)
7. Has it been specified that variable speed drives have been specified where the application justifies?
(Specific drawing sheet #/specification page #____.)
8. Has it been specified that power and lighting equipment schedules and panelboard schedules shall be provided on the plans and not in the specifications?
(Specific drawing sheet #/specification page #____.)

(Specific drawing sheet #/specification page #____.)

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11. When adding or removing loads from existing switchboards and panelboards, have the circuit breakers and circuits been field verified for availability and loading per the methods permitted by NEC 220.87?
(Specific drawing sheet #/specification page #____.)
12. Has it been specified that emergency (life safety) and standby power circuits shall be separated per the Florida Building Code (i.e, emergency and standby power on separate transfer switches)?
(Specific drawing sheet #/specification page #____.)
13. Clocks, if required for the project, shall not be a building master clock system. Battery-operated 12-inch diameter analog clocks as listed in the FAUCCG Division 13 – Special Construction shall be provided.
(Specific drawing sheet #/specification page #____.)
14. Has it been specified that the electrical system shall be 277/480 V, 3 phase, 4 wire, with a 120/208 V, 3 phase, 4 wire subfeeder? All mains and feeders shall be protected by circuit breakers rated for the bolted fault short circuit current calculations and data for the building shall be provided to the Owner.
(Specific drawing sheet #/specification page #____.)
15. Has it been specified that quantity and quality of lighting shall be provided in compliance with the IES (Illuminating Engineers Society) standard?
(Specific drawing sheet #/specification page #____.)
16. Has it been specified that all electrical equipment shall be listed and labeled by agency in compliance with the

2. Has it been specified that all conduit used to connect secondary electrical service to outbuildings and/or building sections shall be rigid metal?
(Specific drawing sheet #/specification page #____.)
3. Has it been specified that PVC conduit shall not be used above grade either interior or exterior?
(Specific drawing sheet #/specification page #____.)
4. Has it been specified that all large spaces wired for TV cable shall have conduit and outlet at the "front" of the space? (Verify locations with FAU's Facilities Planning Project Manager).
(Specific drawing sheet #/specification page #____.)
5. Has it been specified that all empty conduits shall contain a polyolefin pull line-JET LINE #232 or approved equal, with engraved metal tag at each end indicating conduit designation?
(Specific drawing sheet #/specification page #____.)
6. Has it been specified that all building wiring shall be installed in metallic conduit?
(Specific drawing sheet #/specification page #____.)

16118 - Ductbanks

1. Are the inside dimensions of electrical manhole walls 7'-0" x 7'-0" or 8'-0" octagonal?
(Specific drawing sheet #/specification page #____.)
2. Are the inside dimensions of telephone manhole walls 7'-0" x 7'-0" or 8'-0" octagonal?
(Specific drawing sheet #/specification page #____.)
3.
(Specific drawing sheet #/specification page #____.)
- 6.

9. Is the flat entrance/exit duct face on the inside of the manhole at each corner a minimum of 1'-6" wide?
(Specific drawing sheet #/specification page #____.)
10. Are the cable racks used for electrical circuits heavy duty galvanized racks?
(Specific drawing sheet #/specification page #____.)
11. Are the hooks used for communication circuits 12" lengths or approved substitutes?
(Specific drawing sheet #/specification page #____.)
12. Do the rack backs in telephone manholes extend from ceiling down 4'-0" ?
(Specific drawing sheet #/specification page #____.)
13. Is the manhole hardware compatible in each manhole?
(Specific drawing sheet #/specification page #____.)
14. Is the hardware type provided equal to existing? (If not, replace with new hardware plus new quantities as scheduled).
(Specific drawing sheet #/specification page #____.)
15. Has it been specified that each manhole shall contain pulling irons located in the walls not less than 6" above or below and opposite the conduits entering the manhole? Irons shall be fabricated from bent steel bars and shall be hot-dip zinc-coated after fabrication.
(Specific drawing sheet #/specification page #____.)

16121 – Medium Voltage Cable

1. Has it been specified that voltage primary feeders shall be type MV-105, class B, single conductor, shielded, EPR insulated, 220 mils thickness? The cables shall be capable of operating at a normal continuous conductor temperature of 140 degrees C, an emergency overload conductor temperature of 140 degrees C and a short circuit conductor temperature of 250 degrees C.
(Specific drawing sheet #/specification page #____.)
2. Has it been specified that the transition from the lead covered feeders shall be made at the building site through a transition to Type EPR cable?
(Specific drawing sheet #/specification page #____.)

16123 – Building Wire and Cable

- 1.
2.
(Specific drawing sheet #/specification page #____.)

Yes No N/A

120/208 3 PH		277/480 – 3PH	
Phase A	Black	Phase A	Brown
Phase B	Red	Phase B	Orange
Phase C	Blue	Phase C	Yellow
Neutral	White	Neutral	Gray
Ground	Green	Ground	Green

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16170 – Grounding and Bonding

1. Has it been specified all conduits and raceways shall be provided with an equipment grounding conductor?
(Specific drawing sheet #/specification page #____.)
2. Has it been specified that each building electrical main shall be provided with a grounding electrode system? Ground rods, when used, shall be driven with a power driver as required. Additional rods shall be added if required to achieve the ground resistance reading specified by the Electrical Engineer of record. All manhole ground rods shall be connected by approved exothermic welding. Each rod shall be tested in the presence of the University's representative. A written record of the test results shall be prepared and signed by the Contractor's and FAU's representatives and submitted to the A/E.
(Specific drawing sheet #/specification page #____.)
3. Has it been specified that connections to all ground rods, except for telephone backboards, shall be exothermic?
(Specific drawing sheet #/specification page #____.)

16180 – Equipment Wiring Systems - (FUTURE)**16190 – Supporting Devices - (FUTURE)****16195 – Electrical Identification**

1. Has it been specified that all electrical panels shall have exterior identification, including feed identification, and all breakers shall be numbered and identified as to area served by a plastic covered index?
(Specific drawing sheet #/specification page #____.)
2. Has it been specified that all junction boxes and pull boxes shall be identified with permanent markings indicating panel designation and circuit number?
(Specific drawing sheet #/specification page #____.)

16289 – Transient Voltage Suppression (TVSS) - (FUTURE)**16311 – Unit Substations - (FUTURE)****16321 – Pad Mounted Distribution Transformers**

1. Has it been specified that oil-filled transformers installed pad mounted outside are preferred? If dry-type are used, they shall be kept away from mechanical rooms, steam pipes, hot water pipes, and the like. All transformers, switches, and other electrical equipment are to be PCB free and labeled as such.
(Specific drawing sheet #/specification page #____.)
2. Has it been specified that oil-filled transformers shall be provided with a 3-position switch for 1) Source A, 2) Open, and 3) Source B? Do not provide a loop type switch
(Specific drawing sheet #/specification page #____.)

3. Has a transformer with the following requirements been specified?
(Specific drawing sheet #/specification page #____.)

Liquid filled: Mineral Oil
 Proper KVA rating
 Primary volt:: 13200 Delta - 96 KV BIL
 Secondary volt: 480Y/277 - 30 KV BIL
 Standard: 60 Hertz
 Impedance: 3.5% - 7.5% Tolerance
 Conductor: Copper windings
 Temp: 120 degrees insulation class
 65 degree C rise over 30 avg-40 max amb
 Taps: 2-2 ½ % TA Above and Below.
 Altitude: Std. 3300 feet maximum
 Meet ANSI standards for maximum \$B levels

Modifications:

High Voltage-Dead Front
 #4 to 4/0 Incoming cable
 Six Bushings (200A, LB)
 Six External MOV 18 KV Arrestors
 Under Oil Switch - Three Position: Source A, Open, Source B, 600A
 Fuses: Cartridge Type Weak Link – Bay-O-Net
 Low Voltage Bushings: Epoxy
 Tin Plated Copper Material
 4 Hole Bushing Spade

Accessories:

Substation Accessory Group Included
 1inch Drain Valve With 3/8inch Sampler
 Dial Type Thermometer
 Liquid Level Gage
 Pressure Vacuum Gage
 Standard Pressure Relief Valve
 Nitrogen Test Port
 Paint Color Munsell #7.0GY-3.29/1.5

16361 – Air Interrupter Switches - (FUTURE)

16362 – Oil Interrupter Switches - (FUTURE)

16370 – Overhead Power Distribution - (FUTURE)

16426 – Distribution Switchboards (600 volt)

1. Has it been specified that the first service point in each building and at additional panels where justified shall have transient voltage suppression (TVSS) protection meeting IEEE, NEMA, UL and NEC standards?
(Specific drawing sheet #/specification page #____.)

2. Has the following been specified for normal power distribution systems?
(Specific drawing sheet #/specification page #____.)

Receptacle outlets dedicated for computers (communication outlets) shall be connected to non-linear electrical panels. These non-linear panels shall not feed any other loads. Non-linear panels shall have 200% rated neutral bus bars, the neutral feeder conductor shall be rated at 200% of phase conductors, and dry-type step down transformers (480 volts/208-120 volts) feeding non-linear panels shall be K-13 type.

3. Ha

3. Corridors: Pilot light switches located in custodial spaces or keys switches located within the corridors.
(Specific drawing sheet #/specification page #____.)
4. Group Toilet Light Fixtures: Shall be controlled by a pilot light switch located in the custodian room.
(Specific drawing sheet #/specification page #____.)
5. Toilet Exhaust System: Individual toilet exhaust fans in rooms without windows shall be connected to the toilet lighting circuit and switch through a five (5) minute time delay relay.
(Specific drawing sheet #/specification page #____.)
6. Emergency lighting shall be controlled by a separate switch via override relays for automatic operation upon failure of normal power.
(Specific drawing sheet #/specification page #____.)
7. Other spaces such as reading area, cafeteria, etc. shall have multi-level switching capabilities.
(Specific drawing sheet #/specification page #____.)
8. Has it been specified that fluorescent fixtures shall include electronic ballasts and be lamped with low energy consumption tubes such as T8? Alternate designs (i.e., spectrum "T5 day lighting with dimming ballasts & lighting controls) may be considered with a life-cycle cost analysis. See notes in Division 15001.
(Specific drawing sheet #/specification page #____.)
9. Has it been specified that light fixtures in stairways should be above the landings and not above the steps?
(Specific drawing sheet #/specification page #____.)
10. Has it been specified that emergency lighting shall be provided at all exits and in all stairways, hallways, mechanical rooms, elevators, etc. in accordance with the State Fire Marshal's requirements?
(Specific drawing sheet #/specification page #____.)
11. Has it been specified that security lighting and parking lot lighting shall be included in the building design?
(Specific drawing sheet #/specification page #____.)
12. Has it been specified that no lights are to be used that require scaffolding for re-lamping?
(Specific drawing sheet #/specification page #____.)
13. Has it been specified that when emergency lighting is required in an interior classroom, a bypass will be provided to permit darkening of the room when visual aids are being used?
(Specific drawing sheet #/specification page #____.)
14. Has it been specified that ex

Yes No N/A

- (Specific drawing sheet #/specification page #____.)
2. Has it been specified that the Contractor shall furnish all labor and equipment for the complete installation of a fire alarm system?
(Specific drawing sheet #/specification page #____.)
 3. Has it been specified that the fire alarm equipment shall be manufactured by Simplex, EST, Notifier, or approved equal?
(Specific drawing sheet #/specification page #____.)
 4. Has it been specified that the Contractor shall submit a list of all material items giving manufacturer's names and catalog numbers?
(Specific drawing sheet #/specification page #____.)
 5. Is maintenance service available within a reasonable distance of the University and shall stock the manufacturer's standard parts?
(Specific drawing sheet #/specification page #____.)
 6. Has it been specified that alarm notification appliances (audible and visible) are to comply with NFPA 72, the Florida Building Code and ADA for intensity and placement? The standard audible evacuation signal shall be the ANSI S3.41 three pulse temporal pattern. All strobe lights installed in a single space must be synchronized?
(Specific drawing sheet #/specification page #____.)
 7. Has it been specified that the fire alarm system shall be connected to FAU Police central monitoring system?
(Specific drawing sheet #/specification page #____.)
 8. Has it been specified that the Contractor shall fully instruct representatives of the University in operation and maintenance of the fire alarm system?
(Specific drawing sheet #/specification page #____.)
 9. Has it been specified that a 100% system and device functional test shall be performed and documented prior to the SFM final inspection?
(Specific drawing sheet #/specification page #____.)
 10. Has it been specified that the Contractor shall assemble and bind manufacturer's operating and maintenance literature for inclusion in the Maintenance Manual? Maintenance literature shall include wiring diagrams showing point-to-point identification. All externally operated equipment shall also be shown, such as fan shutdown equipment and automatic smoke dampers.
(Specific drawing sheet #/specification page #____.)
 11. Has it been specified that the Engineer of record will provide as-built drawings?
(Specific drawing sheet #/specification page #____.)
 12. Has it been specified that all addressable spot type and duct smoke detectors shall be the analog type and the alarm system shall automatically compensate for detector sensitivity changes due to ambient conditions and dust build-up within detectors? **Note:** this feature must be armed and sensitivities set prior to acceptance of the system.
(Specific drawing sheet #/specification page #____.)
 13. Has it been specified that Alarm Notification Appliance (NAC) circuits shall be NFPA 72 Style Y (Class B)? The load to each NAC shall not exceed 80% of rated module

- output.
(Specific drawing sheet #/specification page #____.)
14. Has it been specified that the system shall be addressable type, with a 24 vdc nominal operating voltage? All equipment supplied must be specifically listed for its intended use and shall be installed in accordance with any instructions included in its listing.
(Specific drawing sheet #/specification page #____.)
15. Has it been specified that the FACU and all other control equipment locations, including any transponders, sub-panels, and booster power supplies, shall be protected by a spot type smoke detector located within 15 feet of the equipment (measured horizontally)?
(Specific drawing sheet #/specification page #____.)
16. Is a fire alarm Input/Output Matrix shown on the plans?
(Specific drawing sheet #/specification page #____.)
17. Is all wiring in dedicated metal conduit?
(Specific drawing sheet #/specification page #____.)
18. Has it been specified that there shall be NO splices in the system other than at device terminal blocks, or on terminal blocks in cabinets? Wire nuts and crimp splices will NOT be permitted.
(Specific drawing sheet #/specification page #____.)
19. Has it been specified that Signaling Line Circuits (SLC's, also call addressable loops) shall be NFPA Style 6 (Class A) with NO "T" taps? Each circuit must have a minimum of 20% spare addresses for future use.
(Specific drawing sheet #/specification page #____.)
20. Has it been specified that isolation modules shall be provided at all of the locations listed below? **Note:** if ceiling height is 10 feet or less, isolator base type initiating devices are permitted to be used to satisfy any or all of the following:
1. In or immediately adjacent to the FACP, at each end of the addressable loop.
 2. After each 25 initiating devices and control points on the addressable loop, or a lesser number where recommended by the manufacturer.
 3. For loops with less than 25 devices and control points, install an isolator at the middle of the loop.
 4. Near the point, any addressable circuit extends outside the building, except for those attached to the building exterior walls and well sheltered by walkways.
 5. For loops covering more than one floor, install isolators at terminal cabinets on each floor (with additional isolator(s) on any floor with over 25 addresses).
- (Specific drawing sheet #/specification page #____.)
21. Has it been specified that in multistory buildings, all circuits leaving the riser on each floor, shall feed through a labeled terminal block in a hinged enclosure accessible from the floor? **Note:** If building layout requires the terminal cabinet to be above a ceiling, its location must be clearly and permanently identified with a placard readable from the floor level. Terminal block connections shall have pressure wire connectors of the self-lifting or box lug type.
(Specific drawing sheet #/specification page #____.)
22. Has it been specified that the following protection against voltage transients and surges shall be provided?
1. ON AC Input – a feed through (not shunt-type) branch circuit TVSS.

2. ON DC Circuits Extending Outside Building – adjacent to the FACU and also near the point of entry to outlying devices (or buildings), provide a “pi” type filter on each leg.

Yes No N/A

