

ELECTRICAL DIVISION 26 00 00

The UVU Standards are provided in CSI format for ease of locating requirements from UVU. These requirements are in addition to the State of Utah Division of Facilities and Construction Management (DFCM) Design Requirements. In the event of any discrepancy between the DFCM Design and UVU Standards requirements, the Architectural/Engineering Team shall use the UVU Standards over the DFCM Design Requirements.

Items below are not intended to specify all the requirements needed for the completion of a project. The Engineer of Record shall provide their expertise for full completion. Items below that UVU does currently give direction on, are left to the discretion of the Engineer of Record. (EOR)

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SECTION 26 00 00 ELECTRICAL

1. GENERAL

1.1. Campus Electrical System Description

1.1.1 Electricity is distributed throughout the UVU main campus via three 12,470 volt (phase to phase) 3 phase, 3 wire w/ground (delta) configured lateral circuits deriving from the customer owned substation located at 800 south and 800 west. It is then transformed into 3 phase, 4 wire w/ground, (wye) configured systems at 480/277 volts and/or 208/120 volts for utilization.

1.2. Workmanship

1.2.1 Electrical work performed for UVU must be executed in a professional and workmanlike manner. Careful consideration should be taken to minimize the disruption of campus operations while performing work.

1.2.2 Electrical Contractors hired to perform Electrical work at any UVU owned property are required to have at least one Journeyman Electrician, currently licensed by the State of Utah, on site at all times while work is being performed.

1.3. Deviation from Standards

1.3.1 Any deviation from these standards can be considered if written permission is obtained from all the following prior to any work performed:

(A) Assigned UVU Project Manager

(B) UVU Director of Campus Services

(i) 801.863.8131

(ii) campusservices@uvu.edu

(a) When emailing please put "Standards Deviation" in the subject line

(C) UVU Electrical Superintendent

(i) 801.863.8022

1.4. Materials and Equipment

1.4.1 All Electrical materials and equipment (panel boards, disconnects, circuit breakers, fuses, luminaires, devices, cover plates, etc.) must be NEW. Re-furnished or re-purposed materials and equipment of any kind will not be accepted. Utilization of existing, unused materials and equipment (empty conduits, circuit breakers, junction boxes, existing wiring, etc.) must be approved by a representative from the UVU Electrical department prior to any work performed.

1.5. Applicable Codes and Standards

1.5.1 The most recent code/standards adopted by the state of Utah shall be followed. The code/standards referenced here-in shall be followed.

(A) NFPA 70 – National Electrical Code

(B) NFPA 72 – National Fire Alarm and Signaling Code

(C) IBC – International Building Code

(D) International Fire Code

- (E) Internal Energy Conservation Code OR ASHRAE 90.1
- (F) NFPA 780 – Standard for Installing Lightning Protection Systems
- (G) Illumination Engineering Society: The Lighting Handbook
- (H) NFPA 110 – Standard for Emergency and Standby Power Systems
- (I) State of Utah High Performance Building Standard

1.6. Temporary power

- 1.6.1 UVU will allow contractors to utilize new, permanently installed transformers for temporary/construction power without billing for KWh used.
- 1.6.2 All other temporary/construction power shall be provided by the contractor. The use of temporary transformers connected to existing infrastructure is allowed if:
 - (A) Contractor provides a functioning KWh usage/metering device for all secondary transformer phases being utilized.
 - (B) Contractor agrees to compensate UVU for KWh used at a reasonable rate, subject to terms and conditions.

1.7. Interruption of Electrical Service

- 1.7.1 Unscheduled Interruption of ANY Electrical services to UVU owned properties is strictly prohibited. Interruption shall be permitted once arrangements are agreed upon by all parties involved/affected, according to requirements indicated.
- 1.7.2 Notify UVU Electrical Superintendent a minimum of 30 days prior to outages/interruptions affecting two or more buildings/properties/services, a minimum of 15 days prior to outages/interruptions affecting a single building/property/service, a minimum of 10 days prior to outages/interruptions involving a portion or portions of any building/property/service.
- 1.7.3 Do not proceed with the interruption of Electrical services without notifying UVU Assigned Project Manager and UVU Electrical Superintendent ON the proposed date of interruption.
- 1.7.4 To gain permission, please provide the following to the UVU Assigned Project Manager, UVU Director of Campus Services and UVU Electrical Superintendent: (contact information is outlined under Deviation of Standards)
 - (A) Date and time of proposed outage/interruption.
 - (B) Estimated duration of proposed outage/interruption.
 - (C) Buildings, properties, equipment, etc. affected by the proposed outage/interruption.
- 1.7.5 It is strongly recommended, whenever possible, that all outages/interruptions be scheduled on Sundays, Faculty/Student holidays and/or between the hours of 10:00 PM and 6:00 AM on all other days. Consideration will be given during regular operating hours for outages/interruptions affecting small or unoccupied areas with approval from the UVU Assigned Project Manager.

1.8. System Phasing, Voltage and Configurations

- 1.8.1 New buildings shall contain one or more of the following electrical systems:

- (A) 208/120 volt, 3 phase, 4 wire, wye configuration secondary.
- (B) 480/277 volt, 3 phase, 4 wire, wye configuration secondary.
- (C) 480/277 volt, 3 phase, 3 wire, delta configuration primary.

1.8.2 208/120 volt, 3 phase, 3 wire, ungrounded delta configuration secondary systems are not permitted unless otherwise indicated by the EOR.

SECTION 26 01 00 OPERATIONS AND MAINTENANCE OF ELECTRICAL SYSTEMS

1. GENERAL

1.1. None

2. PRODUCTS

2.1. Digital Copy O&M Manuals

2.1.1 Provide 3 digital copies of O&M manuals uploaded to 'flash drive-thumb drive type' external hard drive.

(A) Deliver all digital copies of O&M manuals to UVU Assigned Project Manager.

2.1.2 Each copy shall include some form of labeling that indicates:

(A) Project Name

(B) "Electrical O&M Manual"

(C) Date of Substantial Completion

3. EXECUTION

3.1. Clearances/Locations

3.1.1 All interior and exterior Electrical equipment and associated rooms shall be designed to ensure adequate clearances for servicing, maintenance, and removal/replacement. (panelboards, switchboards, transformers, generators, etc.)

3.1.2 All Electrical rooms shall contain Electrical equipment only. All other equipment/systems not associated with the function of Electrical rooms is prohibited.

3.1.3 All interior Electrical panelboards, transformers, and switchboards shall be located within designated Electrical rooms when practical.

3.2. Single Line Diagram

3.2.1 For newly constructed buildings and building-wide Electrical service modifications the contractor shall provide a laminated, 17" x 11" Single Line Diagram reflecting all new and/or existing Electrical distribution equipment associated with the project. Where practical, display new Single Line Diagram within Electrical room near the main switchboard/main distribution panel.

3.3. Redline Diagrams

- 3.3.1 A Redline Diagram documenting all major changes, upgrades, locations and relocations of significant Electrical systems must be kept and shall include the following:
 - (A) All underground routing of raceways 1-1/2" trade size or larger.
 - (B) All underground routing of four or more raceways, regardless of trade size, within a single trench/duct bank.
 - (C) All overhead routing of four or more raceways, 3/4" trade size or larger sharing a common support system. ("rack")
 - (D) All overhead routing of raceways 1-1/2" trade size or larger.
 - (E) Junction boxes, gutters, enclosures, etc. larger than 4-11/16" squared and containing more than 3 branch circuits.
- 3.3.2 Plan markings shall show general locations for underground conduits and junction boxes.
- 3.3.3 Plan markings shall show general locations for overhead conduit and junction boxes.
- 3.3.4 Exterior junction boxes containing line voltage conductors, larger than 24"L x 16"W shall be GPS located and noted as such on Redline Diagram.

SECTION 26 05 13 MEDIUM VOLTAGE CABLES

1. GENERAL

1.1. None

2. PRODUCTS

2.1. Cable

2.1.1 Cable Manufacturers: Defer to EOR.

2.1.2 All medium voltage conductors shall be MV-105 copper conductors, single conductor, EPR (Ethylene Propylene Rubber) insulated with black sun-light resistant polyvinyl chloride jacket rated for proper voltage as determined by EOR.

2.2. Shielded-Cable Terminations

2.2.1 Comply with the following classes of IEEE 48. Insulation class is equivalent to that of cable. Include a shield ground strap for shielded cable terminations. Verify with the EOR the exact type of terminations required.

- (A) 1. Class 1 Terminations: Modular type, furnished as a kit, with a stress-relief tube; multiple, molded-silicone rubber, insulator modules; a shield ground strap; and a compression-type connector.
- (B) 2. Class 1 Terminations: Heat-shrink type with heat-shrink inner stress control and outer non-tracking tubes; multiple, molded, non-tracking skirt modules; and a compression-type connector.
- (C) 3. Class 1 Terminations indoors: Kit with stress-relief tube, a non-tracking insulator tube, a shield ground strap, a compression-type connector and end seal.
- (D) 4. Class 2 Terminations indoors: Kit with a stress-relief tube, a non-tracking insulator tube, a shield ground strap, and a compression-type connector. Include silicone-rubber tape, cold-shrink-rubber sleeve.

3. EXECUTION

3.1. Medium voltage conductor splices shall only be made with approval from the EOR and the deviation of standards group identified in the general requirements. Splices, when allowed, shall be of the molded material type with conductor mating seal to provide a fully shielded and fully submersible splice. Splices shall not be made with 'taped splice kits.'

3.2. Medium voltage terminations and splices shall be performed by qualified, competent individuals with manufacturer's certification(s) for installation. Proof of current and proper certification may be requested by UVU prior to installation.

3.3. Phase color coding for medium voltage conductors shall be:

3.3.1 A phase – Red; B phase – Yellow; C phase – Blue.

- 3.4. High potential testing as determined by the EOR must be performed on all new medium voltage conductors, splices and terminations. Test results must be presented to the UVU Electrical Superintendent before energization will be considered.

SECTION 26 05 19 LOW/LINE VOLTAGE ELECTRICAL CONDUCTORS AND CABLES

1. GENERAL

- 1.1. The minimum amperage for general use branch circuits and lighting branch circuits is 20.

2. PRODUCTS

2.1. Conductors

- 2.1.1 Individual conductors shall be insulation type THHN/THWN unless extreme conditions exist. Refer to NEC and manufacturer's specifications for all other insulation types required.
- 2.1.2 Conductor Material: Copper. All individual branch circuit and feeder conductors shall be stranded copper except for the following:
 - (A) Bare copper equipment grounding conductors.
 - (B) Individual insulated conductors #14 AWG or smaller.
 - (C) Manufactured cabling systems (metal clad cable) factory equipped with solid copper conductors.
- 2.1.3 Conductor Material: Aluminum. Aluminum service and feeder conductors #1/0 AWG and larger will be considered in certain instances. Documented approval from the EOR and UVU Electrical Superintendent is required prior to installation of any aluminum conductors. Installation of aluminum conductors without approval will be subject to re-installation using copper.
- 2.1.4 Individual ungrounded conductor insulation shall be uniform in color throughout the circuit from source to point of utilization.
- 2.1.5 Individual grounded (neutral) conductor insulation shall have a trace color stripe corresponding to the ungrounded phase that is served.

2.2. Metal Clad Cable (MC cable)

2.3. Conductors

- 2.3.1 Ungrounded conductor insulation shall correspond with the system voltage being utilized.
 - (A) Re-identification of ungrounded conductor(s) by use of colored tape or paint is permitted if executed properly according to NEC. Manufactured systems with properly colored, integrated insulation is preferred.
 - (B) MC cable containing conductors larger than #10 AWG is not permitted.
 - (C) 4 conductor MC cable utilized for multiwire branch circuits is strictly prohibited.

2.4. Jacketing

- 2.4.1 Jacketing of metal clad cable shall be constructed from light-steel, steel, or aluminum.

2.5. NM Cable (Romex)

2.5.1 NM Cable (Romex) shall not be used unless specifically indicated by the EOR.

3. EXECUTION

3.1. Conductor Size

3.1.1 Minimum conductor size for general use branch circuits and lighting branch circuits shall be #12 AWG.

3.1.2 Conductors shall be sized to allow for no more than 5% voltage drop at 80% of circuit's overcurrent protection device amperage rating.

3.2. MC Cable Usage

3.2.1 MC Cable may be used for the following:

(A) Lighting fixture whips.

(B) Within interior metal framed, finished walls and hard ceilings.

3.2.2 MC Cable usage is prohibited for the following:

(A) Areas where cable may be subjected to physical damage.

(i) Mechanical rooms.

(ii) Electrical rooms.

(iii) Exposed ceiling areas.

(D) For use as 'home-run' circuits and/or directly penetrating enclosures of load centers, panelboards, switchboards, motor control centers, etc.

1.9. Multiwire (shared neutral) Branch Circuits

1.9.1 Multiwire branch circuits are prohibited. All ungrounded phase conductors must have a dedicated grounded (neutral) conductor.

(A) Exception: Multi phase equipment that does not require grounded (neutral) conductor for function.

SECTION 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1. GENERAL

1.1. Underground Distribution System Grounding. Provide grounding for the following:

- 1.1.1 Underground concrete encased duct banks.
- 1.1.2 Connections to Manhole Components
- 1.1.3 Pad-Mounted Transformers and Switches.

2. PRODUCTS

2.1. Grounding Conductors

- 2.1.1 Use only copper conductors.
- 2.1.2 Use insulated conductors for wire size #1/0 AWG and smaller.
- 2.1.3 Uninsulated copper is acceptable for sizes larger than #1/0.

2.2. Isolated Grounding Conductors

- 2.2.1 Isolated grounding conductors shall be insulated green with continuous yellow trace marking.
- 2.2.2 Isolated grounding systems shall only be used where substantial non-linear loads are anticipated.

3. EXECUTION

3.1. Metallic conduit shall not be used for equipment grounding. A separate equipment grounding conductor must be used.

3.2. Provide the following Grounding requirements:

- 3.2.1 Provide a building grounding means in each electrical room.
- 3.2.2 Building grounding means shall be located within sight of any main switch board/main distribution panel enclosure.

SECTION 26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

1. GENERAL

- 1.1. All raceways, boxes, luminaires, devices, conductors, etc. shall be supported by a listed device, independent from all other electrical, mechanical, ceiling, or any other support systems.

2. PRODUCTS

2.1. Multiple Raceways or Cables:

- 2.1.1 Trapeze-type support systems shall be fabricated with steel or aluminum.

3. EXECUTION

- 3.1. Trapeze-type support systems shall be constructed with additional room/capacity for future usage by UVU Electrical department.

SECTION 26 05 33 RACEWAYS AND ENCLOSURES FOR ELECTRICAL SYSTEMS

1. GENERAL

- 1.1. Provide steel (EMT, IMC, RMC, FMC, LFMC) raceways, fittings and box/enclosure systems for all interior wiring.
- 1.2. Aluminum FMC raceways are permitted in short lengths where movement, vibration, misalignment, expansion points and spaces where EMT bends are not practical.
- 1.3. Schedule 40 Poly Vinyl Chloride (PVC) raceways shall be used for below grade/underground installations. Factory bent IMC or RMC with corrosive resistant covering must be used where bends exceeding 30 degrees are necessary in below grade/underground installations.

2. PRODUCTS

- 2.1. Any products listed and labeled for intended use shall be accepted.

3. EXECUTION

3.1. Raceways

- 3.1.1 Minimum metallic and non-metallic raceways shall be $\frac{3}{4}$ " trade size.
- 3.1.2. All conduit terminations larger than $\frac{3}{4}$ " trade size shall be terminated using insulated throat connectors or connectors with insulating bushings installed.
- 3.1.3. LFMC shall be used for connection of equipment subject to vibration/movement such as motors, bailers, compactors, etc.
- 3.1.4. All exterior above ground raceways, fittings, boxes, enclosures, etc. must be listed for use in wet locations.

3.2. Junction box/enclosure covers.

- 3.2.3. Junction box/enclosure covers must be labeled with:
 - (A) Panel nomenclature where circuit(s) originate.
 - 3.2.3.1. Circuit/OCPD number(s) for circuit(s).
 - 3.2.3.2. Voltage of circuit(s).
 - 3.2.3.3. Known, specific equipment being served by circuit(s).

SECTION 26 05 43 UNDERGROUND RACEWAYS AND ENCLOSURES/BOXES

1. GENERAL

1.1. None

2. PRODUCTS

- 2.1. Poly Vinyl Chloride (PVC) Raceways shall be used for underground installations. High Density Polyethylene (HDPE) will be considered for certain installations but is discouraged and must be approved by the EOR.
- 2.2. All raceways containing voltage greater than 600 volts shall be encased in red dyed concrete.
- 2.3. All raceways containing voltage greater than 600 volts must be inspected by a UVU representative prior to concrete encasement.
- 2.4. All underground raceways shall be a minimum of $\frac{3}{4}$ " trade size.
- 2.5. In-ground junction/pull boxes shall be constructed of polymer/concrete and be equipped with corresponding steel or polymer/concrete cover. Plastic junction boxes will be considered where subject to physical damage is minimal.
- 2.6. Splices/terminations in underground installations must be listed for wet location/in ground use.

SECTION 26 05 48 VIBRATION AND SEISMIC CONTROL FOR ELECTRICAL SYSTEMS

1. GENERAL

1.1. Determined by the Engineer of Record.

2. PRODUCTS

2.1. None

3. EXECUTION

3.1. None

SECTION 26 05 53 HAZARD LABELING OF ELECTRICAL SYSTEMS

1. GENERAL

1.1. WARNING LABELS AND SIGNS

1.1.1 Comply with NFPA 70 and 29 CFR 1910.145.

2. PRODUCTS

1.1. Determined by the EOR.

3. EXECUTION

3.1. Provide floor markings to ensure clearances as required by the NEC.

3.2. Provide ARC Flash warning labels in accordance with NEC, NFPA and OSHA requirements.

SECTION 26 05 73 POWER SYSTEM STUDIES

1. GENERAL

1.1. The following studies shall be performed and documented by the contractor:

- 1.1.1 Short-Circuit
- 1.1.2 Coordination Studies
- 1.1.3 Arc-Flash Hazard Analysis
- 1.1.4 Harmonic-Analysis Study

2. PRODUCTS

2.1. None

3. EXECUTION

3.1. Final studies/results shall be provided to the EOR.

SECTION 26 09 13 ELECTRICAL POWER MONITORING

1. GENERAL

1.1. EOR shall determine all metering requirements. Electrical metering requirements are determined by project scope and size.

2. PRODUCTS

2.1. Electrical metering manufacturer: Schneider Electric Meters.

2.2. All Electrical meters and associated equipment shall be produced by a single manufacturer to ensure integration continuity with existing BMS.

2.3. Split core or removable leg Current Transducers (CT's) shall be used.

3. EXECUTION

3.1. All electrical meters shall be BACnet TCP/IP capable and report to the division 230900 system.

3.2. Meters shall comply with the most current edition of the State of Utah High Performance Building Standard.

3.3. All additional design requirements for power monitoring products, equipment, execution, etc. are further defined and shall comply with standards provided in division 23.

SECTION 26 09 23 NON-NETWORK CONNECTED LIGHTING CONTROLS

1. GENERAL

- 1.1. All lighting control circuits in areas not defined as “public spaces” (classrooms, labs, conference rooms, offices, break rooms, etc.) shall be controlled independently using line voltage, dual technology sensor switches whenever possible. Dimmable lighting control systems and low voltage lighting control systems should be avoided in these spaces.
- 1.2. Follow minimum code and energy management standards.

2. PRODUCTS

- 2.1. Manufacturers: Wattstopper, Lutron, Hubbell, Cooper-Greengate
- 2.2. Sensor switches shall be white with stainless steel or white cover plate. Deviation will require approval from EOR and UVU Assigned Project Manager.

3. EXECUTION

- 3.1. Install sensor switches as is using factory default settings. UVU Electrical department will determine if factory default settings will require adjustment after occupancy is established.
- 3.2. Cover plates must be labeled. Indicate panel nomenclature and circuit number serving all line voltage lighting control devices.

SECTION 26 09 43 NETWORK CONNECTED LIGHTING CONTROLS

1. GENERAL

- 1.1. All lighting control circuits in public corridors, gathering areas, study areas, common spaces, etc. and exterior lighting shall be controlled by a network connected lighting control panel and must be tied to the campus BMS system. Consideration for utilization/connection to existing network connected lighting control panels/devices will be given when practical.

2. PRODUCTS

- 2.1. Basis of design shall be Legrand-Wattstopper brand. Lighting control panels and all associated components/devices (relays, low voltage switches, room controllers, occupancy sensors, daylight harvesting sensors, etc.) of alternate brands will not be considered.

3. EXECUTION

- 3.1. Emergency/egress lighting shall be placed on a dedicated circuit and shall not be controlled by any network connected lighting control panel or device.
- 3.2. The 230900 contractor shall provide programming/integration of network connected lighting control systems.
- 3.3. A single, manual override device (switch) serving new network connected lighting control panels shall be provided. Device shall be located where it is accessible to UVU Electrical department, UVU custodial department and UVU Police/EMS departments for emergencies. The EOR will determine functionality of device and location.
- 3.4. Requirements for graphics shall be determined by UVU.

SECTION 26 11 00 SUBSTATIONS

1. GENERAL

1.1. Deferred to the Engineer of Record

2. PRODUCTS

2.1. None

3. EXECUTION

3.1. None

SECTION 26 12 00 MEDIUM VOLTAGE TRANSFORMERS

1. GENERAL

1.1. Deferred to the Engineer of Record

2. PRODUCTS

2.1. None

3. EXECUTION

3.1. None

SECTION 26 13 00 MEDIUM VOLTAGE SWITCHGEAR

1. GENERAL

1.1. Deferred to the Engineer of Record

2. PRODUCTS

2.1. Basis of Design shall be Eaton brand type MVS. Consideration of other manufacturers shall be given when practical.

3. EXECUTION

3.1. None

SECTION 26 22 00 LOW VOLTAGE TRANSFORMERS

1. GENERAL

1.1. Deferred to the Engineer of Record.

2. EXECUTION

2.1. Install listed, insulated bonding bushings for all transformer enclosure penetrations and properly connect to system equipment grounding conductor.

2.2. Install all free-standing interior and exterior Electrical equipment on 4" thick concrete 'housekeeping pad'. This shall include switchboards, switchgear, transfer switches, transformers, enclosures, etc. Construct concrete bases using manufacturer's recommendation for dimensions OR not less than 4 inches larger in all directions than the equipment's footprint. Maintain all clearance requirements provided by the NEC.

2.3. Follow equipment manufacturer's current written anchorage recommendations and factory provided templates for anchor-bolt and tie locations unless otherwise indicated.

3. PRODUCTS

3.1. All transformers shall be Energy Star NEMA TPI K rated. The K rating shall be determined by the manufacturer.

3.2. All transformers known to be serving areas subject to high non-linear loads shall require a Harmonic Mitigating Transformer.

3.3. Testing

3.3.1 Comply with NETA ATS 7.2.1.1, 7.2.1.2, 7.2.2 testing requirements.

(A) Perform additional visual and electrical testing as determined by the EOR.

SECTION 26 24 00 SWITCHBOARDS, PANELBOARDS AND LOAD CENTERS

1. GENERAL

- 1.1. Switchboards, panelboards and load centers must be equipped with bolt-on type bussing and overcurrent protection devices. (OCPD's) Equipment with snap in type bussing and overcurrent protection devices will not be accepted.

2. PRODUCTS

- 2.1. Eaton-Cutler Hammer or Siemens brand(s) shall be considered preferred products. GE/ABB, Square D/Schneider or other brand(s) will be considered as non-preferred/acceptable products when practical. Justification for use of non-preferred/acceptable products must be approved by the EOR, UVU Assigned Project Manager and UVU Electrical Superintendent.

3. EXECUTION

- 3.1. New switchboards, panelboards and load centers shall include a minimum of 25% spare OCPD spaces for future usage.
 - 3.1.1 All new switchboards, panelboards and load-centers shall include a minimum of three (3) spare/empty ¾" trade size EMT raceways connected to panel enclosure (can) and terminating in a readily accessible ceiling or suspended floor space for future usage.
- 3.2. TVSS shall be provided as determined by the EOR.
- 3.3. Factory constructed multiple pole OCPD's shall be used. Single pole OCPD's with factory constructed, listed handle ties will be considered but should be avoided.
- 3.4. All switchboards, panelboards and load centers (new and existing) shall have printed, new circuit identification schedules. New printed schedules shall reflect all existing circuit identification as is (handwritten or printed) and all new circuiting changes performed.
- 3.5. New switchboards, panelboards and load centers shall have a unique identifying nomenclature as noted by the EOR or UVU Electrical Superintendent.
- 3.6. Testing
 - 3.6.1 Comply with NETA ATS 7.1 for Switchboards and Main Distribution Panels.
 - 3.6.2 Comply with NETA ATS 7.6.1.1 or 7.6.1.2 .

SECTION 26 27 26 GENERAL USE WIRING DEVICES

1. GENERAL

1.1. None

2. PRODUCTS

2.1. Receptacles/Outlets

- 2.1.1 All general use (non-emergency) receptacles/outlets must be listed, spec grade, back wired and rated at 20 amps. Side wired only receptacles will not be accepted if submitted or installed.
- 2.1.2 General use receptacles shall be white with stainless steel cover plates unless otherwise noted by the EOR.
- 2.1.3 General use receptacles tied to emergency/generator circuits shall be red with stainless steel cover plates.

2.2. Lighting (toggle) Switches

- 2.2.1 All general use (non-emergency) lighting (toggle) switches must be listed, spec grade, back wired and rated at 20 amps. Side wired only switches will not be accepted if submitted or installed.
- 2.2.2 Switches shall be white with stainless cover unless otherwise noted by the EOR.

3. EXECUTION

3.1. Receptacle Orientation

- 3.1.1. Receptacles **MUST** be installed with grounding prong connection up (top) in vertical installations and neutral (grounded) prong connection up (top) in horizontal installations. Installing receptacles with the grounding prong connection down (bottom) will be subject to re-installation.

SECTION 26 29 23 VARIABLE FREQUENCY MOTOR CONTROLLERS

1. GENERAL

1.1. Variable Frequency Motor Controllers shall be provided by the mechanical contractor and installed by the electrical contractor as defined by the EOR.

1.2. Refer to division 23 for details.

2. PRODUCTS

2.1. None

3. EXECUTION

SECTION 26 32 13 ENGINE GENERATORS

1. GENERAL

1.1. Generators shall be provided on new buildings larger than 40,000 sqft.

2. PRODUCTS

2.1. Manufacturers: Cummins, Caterpillar, Kohler

2.2. Generators shall be equipped with BACNet device for monitoring using BMS.

3. EXECUTION

3.1. When generators are provided, size fuel usage (tank) for a minimum of 24 hours of operation at full load.

3.2. Testing

3.2.1 Comply with NFPA 110 Section 7.13 for acceptance testing.

SECTION 26 36 00 TRANSFER SWITCHES

1. GENERAL

1.1. None

2. PRODUCTS

2.1. Deferred to the Engineer of Record

2.2. ATS shall be equipped with BACnet device for monitoring using BMS.

3. EXECUTION

3.1. Testing

3.1.1 Comply with NFPA 110 Section 7.13 for acceptance testing.

SECTION 26 41 00 FACILITY LIGHTNING PROTECTION

1. GENERAL

1.1. Deferred to Engineer of Record.

2. PRODUCTS

2.1. None

3. EXECUTION

3.1. None

SECTION 26 51 00 INTERIOR LIGHTING

1. GENERAL

1.1. None

2. PRODUCTS

2.1. Interior Luminaires (fixtures)

- 2.1.1 Only LED (integrated and lamp equipped) lighting shall be used.
 - (A) Consideration of non-LED lighting requires written approval from all Deviation from Standards personnel listed in Section 26 00 00.
- 2.1.2 ALL components of ALL interior fixtures, (junction boxes, whips, driver enclosures, drivers, etc.) regardless of location, construction methods, materials used, etc. must be serviceable and readily accessible as defined by NEC.
- 2.1.3 Color temperature for all interior lighting shall be ~4,000K.
- 2.1.4 Lay-in type fixtures shall be edge-lit, flat panel type. Fixtures with "basket" type covers/diffusers will be rejected if submitted.
- 2.1.5 Surface mounted low profile linear (strip) fixtures are preferred for use in areas without lay-in grid type ceiling construction. Recessed fixtures of any type, in hard ceilings and walls, are strongly discouraged due to the lack of accessibility to serviceable components after installation.
- 2.1.6 Pendant type (hanging) fixtures shall not be installed where lay-in grid type ceilings are the method of construction.
- 2.1.7 Linear-type (complete) lighting fixtures and/or systems shall not have a cost that exceeds \$100/linear foot.
- 2.1.8 Decorative pendant type fixtures shall have standard, medium base Edison style lamp holders and shall be connected to nearest 208/120 volt panel whenever possible.

3. EXECUTION

3.1. Illuminance values shall comply with the IESNA Lighting Handbook.

- 3.1.1 The general use for classrooms and study rooms are for people between the age of 18-25.
- 3.1.2 The general use for offices and conference rooms are for people between the ages of 25-60.

SECTION 26 56 00 EXTERIOR LIGHTING

1. GENERAL

1.1. None

2. PRODUCTS

2.1. Exterior Luminaires (fixtures) and poles

2.1.1 Bollard Fixtures

- (A) Bollard type fixtures are strongly discouraged on campus in areas that require snow removal.
- (B) Approved bollard type fixtures will require exposed, finished concrete base 12" above grade with finished 2'x2'x4" concrete pad. (mow strip)

2.1.2 Wall mounted exterior fixtures

- (A) Basis of design for wall mounted exterior fixtures shall be LED, Cooper brand, XTOR type or equivalent.

2.1.3 Walkway and parking fixtures

- (A) Basis of design for walkway and parking fixtures shall be LED, Lithonia brand, DSX type or equivalent. Consideration for deviation will be given in architecturally sensitive areas.

2.1.4 Walkway Poles

- (A) 14' Square Straight Aluminum
- (B) 4"x4"
- (C) 0.125" Wall Thickness
- (D) Handhole and cover at base or hinged base
- (E) Color: Bronze
- (F) Steel poles will be considered when practical

2.1.5 Parking Poles

- (A) 25' Square Straight Aluminum
- (B) 5"x5"
- (C) 0.188" Wall Thickness
- (D) Handhole and cover at base
- (E) Color: Bronze
- (F) Steel poles will be considered when practical

3. EXECUTION

- 3.1. Pole base depths, bolt patterns, re-enforcement means, etc. to be determined by the EOR.