SECTION 16010
BASIC ELECTRICAL REQUIREMENTS

PART 1  GENERAL

1.01  SUMMARY

Colorado School of Mines Standards are not intended and shall not be used as guide specifications. While it is expected that this information will be of assistance to architect and engineer, in developing plans, specifications, and contract documents on particular projects, *no portion of this standard may be produced by photographic or other means in any specification intended to become a part of contract documents without explicit written prior approval of the Colorado School of Mines.*

A. Section Includes:

1. Basic requirements related to Division 16.

1.02  REFERENCE CODES AND STANDARDS

A. The electrical design and installations shall meet as a minimum of the most recent versions of the following:

1. Federal and State regulations.
2. OSHA
3. NFPA
4. NEMA
5. IEEE
6. ANSI

PART 2  PRODUCTS

2.01  MANUFACTURERS

A. Product Data:

1. Mines requires shop drawings/submittals on the following products to verify that standards are being satisfied.

   b. Medium voltage distribution equipment.
   c. Low voltage distribution equipment.
   d. Contactors.
   e. Wiring devices.
   f. Luminaires.
   g. Generator equipment.
   h. Battery power systems.
   i. Special systems equipment.
   j. Cabinets and enclosures.
   k. Modular wiring systems.
   l. Door-in-door panelboard covers.
   m. Supporting devices.
   n. UPS systems.

C. Permanent Power: Permanent power will not be turned on until all breaker settings are received and set, the correct CT’s and PT’s are installed, metering is installed correctly and wired correctly, grounding system is correctly installed, ground fault levels are properly set and all the above is verified by an independent testing agency, the design engineer and the University.
D. A new breaker coordination study of a building’s distribution system shall be completed whenever main distribution gear is modified. The Engineer of Record (EOR) shall give, in writing, all settings to the Contractor and Mines. The settings shall be verified at the time of the final inspection.

2.02 CONSULTANT SUBMITTAL REQUIREMENTS

The drawing information required from the Consulting Engineer shall be composed of:

A. Schematic Design Documents shall at a minimum contain:

1. Lighting and device layouts for “typical rooms”.
2. One line diagrams.
3. Luminaire schedule [partial for major luminare types].
4. Typical panelboard schedules.
5. Outline specification with all sections required.
6. Narrative of electrical design.

B. Design Development documents drawing submittal shall at a minimum contain:

1. All lighting and devices laid out but not circuited, or the circuitry beginning to be developed.
2. Low voltage one-line and preliminary fire alarm riser.
3. Luminaire schedule, typical panelboard schedules.
4. Specifications. [Full specifications with edit markings].
5. Fault study.
6. Medium voltage system one-line.

C. The ±90% document submittal shall be complete and contain:

1. All lighting and devices laid out and completely circuited.
2. Completed power one-line and fire alarm risers.
3. Completed medium voltage three line diagram.
4. Completed luminaire and panelboard schedules.
5. Completed specifications.
6. Completed fault study, load study, relay calibration study and breaker setting study for a fully rated, selectively coordinated system.

D. The 100% documents will be used only as a back check of all previous review comments. The drawings shall be composed of:

1. Lighting.
2. Power/Communications/Fire Alarm.
3. Specifications
4. One-lines.
5. Schedules, legends, details.

E. Review comments shall be in writing to the design consultant. Consultants shall respond to all comments in writing. Put in general Electrical section.

2.03 LOAD SHED CAPABILITIES:

Corridors, laboratory and classroom lighting to be on the DDC controls with local overrides

PART 3 EXECUTION

3.01 SPECIAL ELECTRICAL PROVISIONS
A. Bidding Requirements

1. The bidder shall give evidence of being able to be bonded to \( \frac{1}{2} \) times project value. A letter shall be provided by the bonding agency assuring capability of bonding this level and associated rates.

2. The successful firm shall be capable of starting work immediately upon receipt of contract award and have the resources to complete the total project in 30 (time should be project specific) days or less. (Allowance will be made for material delays caused by problems outside of contractor’s control, with proper documentation.)

C. General Requirements:

1. The successful firm shall provide a project supervisor of proven experience, and be willing to leave him (or her) on the project for the duration of the project, unless acceptable alternative arrangements are made with the owner.

2. The successful firm must have a business office which is staffed during normal working hours (8:00 - 5:00 Monday through Friday).

3. The project manager of the successful firm shall have paging or cell phone capability during working hours.

D. Craftsman Regulations

1. Contractors shall include no more than one indentured apprentice per journeyman electrician. Apprentices shall be under the direct supervision of a licensed electrician at all times.

2. Helpers may be assigned to the project as required to do laboring type tasks, but may not do any installation type electrical work.

3. High voltage cable splicers must be factoried trained

3.4. A NICET II Fire Alarm Systems Certification is required for anyone working on an existing fire alarm system.

E. Shop Drawing Submittals

1. Shop drawings shall be provided showing the following information. Equipment wiring diagrams indicating circuit arrangements, bussing, size, electrical ratings, equipment dimensions, weights, equipment arrangements, housing and proposed finishes, and NEMA rating. Equipment requiring this information:

   a. Medium voltage distribution equipment, cable and devices.
   b. Switchboards
   c. Panelboards including Door-in-Door Enclosure
   d. Standby Power Generation and ATS Systems
   e. Television Systems
   f. Electrical Systems Control
   g. Fire Detection/Alarm Systems and other special systems
   h. Circuit and Motor Disconnects
   i. Contactors
   j. Wiring Devices
   k. Luminaires
   l. Battery Powered Equipment including UPS Equipment
   m. Cabinets, Enclosures and Supporting Systems

F. Construction Requirements:

1. It shall be a requirement that the Contractor have available at the job site, current information, on the following at all times:
a. Construction Plans and Specifications
b. Addenda
c. Change Orders
d. Submittals
e. Inspection Reports
f. Test Results
g. Outage Information and requests
h. Electrical outages must be held to a minimum. The contractor shall submit a request for the outage to the owner detailing the reasons for the outage, areas affected, sequence of procedures to accomplish work, estimated maximum length of time, the date and time of day outage will occur. The Contractor shall obtain written authorization from the owner fourteen calendar days prior to all outages. Due to the critical implications of power outages, the owner may direct the contractor as to the time of day or night and date an outage may take place. The Contractor will be responsible for any temporary power required.
i. As-built Drawings (showing all changes)

3.02 MAINTENANCE

A. Maintenance Service:

1. As part of the service and instruction manuals for the project, the Contractor shall be required to submit schematic diagrams and point-to-point wiring diagrams for the following systems. Submittal shall be in the form of blacklines, furnish reproducible copy, and AutoCAD 2005 or later.
   a. Fire Detection/Alarm Systems
   b. Communication System
   c. Lighting/Dimming Control System
   d. Motor Control Systems
   e. Electrical Systems Control
   f. Medium voltage equipment

3.03 PROJECT CLOSEOUT

A. Operating and Acceptance Tests

1. The Contractor shall hire an independent testing agent to conduct operating and acceptance tests on new electrical system components, including main breakers, panels, switchgear, PD testing, etc.
2. The Testing agent shall prepare written reports of values of all test readings and procedures. Reports shall include all breaker settings and modifications to one line drawings.
3. The Testing agent shall furnish all equipment, instruments and personnel required to conduct tests.
4. Test will be defined in the individual section describing the equipment or system.

C. Cleaning and Painting

1. Clean all electrical equipment, such as switches, panelboards, luminaires, etc., of construction dirt, dust, paint smears, etc., and touch-up or repaint all scars, blemishes, rust spots, etc., to original or approved other state of finish.
2. Outside switchgear shall be painted Mines Autumn Brown.

D. Operation and Maintenance Manuals
1. Compile a complete list of product data and shop drawings, acceptance tests, warranties, certificates, sub-contractor and supplier information (i.e. name, address, and phone no.).

E. Guarantees and Warranties

1. Furnish to the Owner a formal warranty covering the electrical system installed under this contract, to be free from defective materials and workmanship for a minimum period of one year after date of acceptance of installation by Owner. During this period provide all labor and new materials required to repair or replace all defects to the satisfaction of the Owner at no cost to Owner. See specific standards for warrantee requirements greater than one year.

END OF SECTION