PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions and Division 1 are part of this section and the contract for this work and apply to this section as fully as if repeated herein. This section, 260500, applies to all Division 26 categories.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 SUMMARY

A. Related Requirements:
1. Section 018113 “Sustainable Design Requirements.”

1.3 PERMITS AND FEES

A. Obtain and pay for all necessary electrical permits and fees ~~including those associated with SCAQCD~~.

1.4 EXPLANATION OF DRAWINGS

A. These construction documents are intended to be diagrammatic and reflect the scope, quality, and character of the work to be performed; all miscellaneous materials and work required for a complete and operational system, though not specifically mentioned, shall be furnished and installed by the Contractor.

B. The Contractor shall confirm sizes, dimensions, weights and locations of all devices, light fixtures, and equipment prior to installation. Dimensioned architectural drawings shall take precedence over diagrammatic layouts shown on these contract documents.

C. The specifications and the drawings are an integral document and shall be considered complementary to each other. In the case of a conflict between the specifications and the drawings, the more constricting condition shall be enforced.

D. The Contractor shall be responsible for reporting any discrepancies, errors, or omissions noted prior to bid.

E. It is the intent of the drawings to indicate schematic routing and placement of devices, fixtures, equipment and conduit. Equipment or devices requiring a precise location shall be dimensioned on other trade documents (architectural, mechanical, etc.). Offsets, elbows, or extensions shall be furnished and installed by the Contractor as necessary to avoid structure, piping, and clearances and to provide a complete and workmanlike installation.

1.5 QUALITY ASSURANCE

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement, including all amendments, modifications and supplements, of the following codes and standards or other regulations which may apply:
1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. California Electrical Code (CEC)
5. California State Fire Marshal (CSFM)
6. Institute of Cable Engineers Association (ICEA)
7. Institute of Electrical and Electronic Engineers (IEEE)
8. National Electrical Contractors Association (NECA)
9. National Electrical Manufacturers Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. San Diego State University (SDSU) Requirements
13. Underwriters' Laboratories, Inc. (UL)
14. California Building Code (CBC)
15. Titles 8, 19 and 24 of the California Code of Regulations (CCR).
16. Southern California Air Quality Control District (SCAQCD)

C. All items shall be listed by Underwriter’s Laboratories and shall bear the U.L. label or be listed by a National Recognized Testing Lab (NRTL).

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer’s requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the Contractor.

1.6 SUBMITTALS

A. Shop drawings for materials, equipment, devices, fixtures, and systems shall be submitted by the Contractor for review within 30 days after award of the contract. In addition to the requirements for submittals stated herein, the Contractor shall be responsible for compliance with the requirements of Division 1.

B. The Contractor shall bear the responsibility for any materials installed which were not submitted for review or not installed in compliance with the review comments and the contract documents.

C. Verbal modification of submittal documents or changes to the requirements of the contract documents shall not be acceptable. All submittal material must be documented in a written format.

D. All submittal packages must be submitted at one time and in accordance with the specification section appropriate for the material. All packages must be identical and clearly labeled indicating the specification section, project name, submittal date, Contractor's name, Engineer's name, preparer's name and submission version (first submission, resubmittal #1, etc.).

E. Product catalog cut sheets and descriptive literature shall be cross-referenced to the specification section by paragraph.

F. All submittal packages shall be furnished electronically by the Contractor; in pdf format.

G. Materials which bear a certification or approval of a testing agency, performance criteria, society, agency, of other organization shall be submitted with all labels identified.

H. The submittal shall be complete and with catalog data and information properly marked to show, among other things, materials, capacity and performance data to meet the specified requirements.

I. Incomplete submittals will be rejected at the discretion of the reviewing Engineer.

J. Review of the submittal is only for general conformance with the contract documents. The Contractor is responsible for confirmation and coordination of dimensions, quantities, sizes, fabrication, installation methods, and for coordination of work of other trades with electrical work.

K. Detailed working drawings shall be prepared and submitted showing items which are to be fabricated including transformer mounting racks, unistrut mounting frames, equipment room layouts, pull boxes, splice boxes, gutters, etc.

L. Prepare dimensionally accurate floor plans of each electrical and signal room and/or closet, fire control room and the like, drawn to 1/4" scale minimum. Submit electronic copies for review with two prints for Architect's record. Indicate all equipment within the rooms to scale based on shop drawing data, include structural support for suspended equipment and description of seismic bracing and fastening. Indicate system and equipment grounding details as applicable. Review elevator machine room shop drawings and coordinate location of electrical gear to maintain clearances. Submit with shop drawings.

M. Where conduit runs, 2" trade size and larger, are run in exposed locations, prepare dimensionally accurate floor plans indicating routing, coordinated with work of other trades and the structure. Submit legible reproducible transparencies with two prints for review.

N. Minimum scale for submitted drawings shall be 1/8". Details shall be drawn to 1/4" scale. All drawings shall be 8.5"x11" or larger.

O. Submittal brochures shall be complete and descriptive of the type, make, manufacturer, application, quantity, performance, capacity, ratings, options, dimensions, clearances, weights, nameplate data, special installation requirements, mounting method, NEMA type, NEMA class, environmental restrictions, layout requirements or other information as may be necessary for review of the material.

P. Submittal brochures for switchgear shall include, as a minimum, the following: singleline diagrams; fault current ratings of buses and devices; device identification, ratings, layout and characteristics; dimensions; circuit identification; identification label type and method of affixing; mounting; conduit entry point and quantities; NEMA enclosure type; and additional data as required for a complete review.

Q. Submittal brochures for lighting systems shall include, as a minimum, the following: manufacturer; detailed drawing or photograph; dimensions; lamp data; ballast data; certified photometric data from a third-party testing agency; U.L. label listing; fixture number or identification from the drawings; finish color and material; mounting equipment; socket type and rating; environmental ratings (damp location, watertight, explosion-proof, etc.); voltage; input wattage; and additional information as necessary for a complete review.

R. The Contractor shall be responsible for all aspects of substitutions of material including any additional cost or delay incurred as a result of the substitution. The Contractor shall coordinate all substitutions with other trades, verify code compliance, verify clearances, photometric performance, appearance, suitability, constructability, and availability of the material prior to submitting the substitution for review. The Contractor shall bear the responsibility of any increased costs to other trades which are directly related to the substitution.

S. LEED Submittals: Credits EQc4.1 and EQc4.2. Refer to Section 018113 "Sustainable Design Requirements" for additional submittal requirements.

1.7 SUBSTITUTIONS

A. Refer to other Sections of these Specifications for substitution requirements.

1.8 MATERIAL HANDLING

A. The Contractor shall deliver all equipment and material to the site in the manufacturer's original packaging without seals broken.

B. The Contractor shall handle, store, protect, and unpack all equipment and materials in accordance with the manufacturer's recommendations.

C. The Contractor shall inspect the equipment and materials in a timely manner to ensure the completeness and appropriateness of the shipment.

D. The Contractor shall immediately replace damaged or defective equipment or materials with identical new equipment or material at no cost, inconvenience, or delay to the Owner.

1.9 EXISTING CONDITIONS

A. The Contractor shall verify all existing conditions prior to bid and include all costs associated with the existing conditions in bid.

B. The Contractor shall match the finish and appearance of all existing conditions where constructing new work adjacent to existing surfaces or equipment.

C. Coordinate with the Owner's Representative for all ongoing projects or the work of other trades which may affect the Contractor's work. Verify Owner schedule requirements for special or standard events which may impact the Contractor's work.

D. Coordinate work to be performed in occupied areas and comply with the Owner's requirements such that the Owner's work or ongoing activities are not disrupted by the Contractor. Verify the need for work to be performed during premium hours, evenings, weekends, or holidays prior to bid and include all costs in bid. Bring to the Owner's attention the need and locations for all disruptive work prior to commencement of work.

E. Unless specifically noted or otherwise indicated or directed, remove all existing electrical equipment in the areas to be demolished. Deliver all equipment removed, including lighting fixtures, to the Owner's representative.

F. Where areas of existing facilities are indicated to be demolished or remodeled, visit site to determine scope of work. Relocate electric and signal system equipment, and reroute or replace conduit and wiring as required to conform with new use of the area and maintain operation of adjacent areas.

1.10 UTILITY COMPANY REQUIREMENTS

A. The contractor shall contact the serving utility company for all utility system requirements prior to commencement of work. Utility work shall include electric power, telephone, data, fiber optic cable, cable television or other utilities as may require connections as a part of this contract. Coordinate and comply with all serving utility company requirements, designs, and schedules.

B. The utility information depicted on the contract documents is for bidding purposes only and shall not be used for construction purposes. All construction shall be performed according to engineered documents provided by the serving utility company. The Contractor shall obtain and coordinate with utility company requirements as a part of this contract and furnish and install all work as a part of this contract.

C. Verify all connection points, routing, and requirements with the serving utility company prior to commencement of work and coordinate final requirements with other trades.

D. The Contractor shall be responsible for all costs associated with failure to contact or coordinate with utility company requirements.

1.11 TEMPORARY CONSTRUCTION UTILITY REQUIREMENTS

A. Power, telephone or other temporary construction utility services required by the Contractor shall be the responsibility of the Contractor.

B. Arrangements for temporary construction utility services shall be made by the Contractor in coordination with the Owner's Representative and the serving utility company. For all connections into the University's system, all metering and equipment to provide temporary services shall be provided by the Contractor.

1.12 CONTINUITY OF SERVICE

A. The Contractor shall coordinate all shutdowns, outages, and service interruptions with the Owner's Representative. Electrical shutdowns shall be kept to the minimum number necessary to complete the work.

B. The Contractor shall coordinate all work done on overtime or premium time with Owner's Representative prior to commencement of work.

C. All work performed in or through occupied spaces, or other work disruptive to existing occupants shall be considered as performed during premium time or as overtime for the purposes of the bid; include all costs in bid.

D. The Contractor shall notify Owner's Representative of all shutdowns or disruptive work a minimum of 72 hours prior to commencement of work. The Contractor shall obtain written approval from the Owner’s Representative prior to commencement of work.

E. The Contractor shall provide all necessary temporary power, including temporary power generation, to accommodate shutdowns and minimize disruption of the Owner’s activities.

F. The Owner reserves the right to provide emergency repairs or temporary power to maintain service continuity at the Contractor's cost in the event Contractor fails to provide adequate service continuity.

1.13 RECORD DOCUMENTS

A. The Contractor shall prepare as-built documents depicting all revisions to branch circuits, conduit routing, equipment, panel schedules, lighting control schedules, or materials. Drawings shall be in AutoCAD dwg format and Adobe .pdf formats. Contractor shall provide (1) full-size hard copy print and (1) CD-ROM of all as-built drawings and files. Hand-drawn or “red-line” drawings shall not be accepted. Drawings shall be legible, reproducible, and properly identified such they may be used as a reference for maintenance or construction.

B. The Contractor shall provide a minimum of three copies of the operation and maintenance manuals to the Owner's Representative at the completion of the project. Each copy shall be bound in a three-ring binder and labeled indicating: the project name; system name; Contractor’s name, telephone number, and contact person; and Owner’s name. The Contractor shall provide the following minimum information within each manual:
   1. List of the Subcontractors performing work on the system including contact names, telephone numbers, and email addresses.
   2. Routine and emergency service contact names, telephone numbers, and email addresses for each system.
   3. Description of system operation.
   4. Single line diagrams and control wiring diagrams.
   5. Detailed product literature with technical information.
   6. Local factory representative contact name, telephone number, and email address.
   7. Sequence of starting, shutdown and operation.
   8. Installation instructions and safety requirements.
   9. Maintenance schedule, testing instructions and performance parameters.

10. Parts list including recommended spare parts.

1.14 GUARANTEE

A. All electrical work, materials and equipment provided under this contract shall be guaranteed for a period of one year from the date of acceptance of the work by the Owner. Any failures, problems, or deficiencies experienced during this period due to defective materials or faulty workmanship shall be immediately corrected by the Contractor without cost to the Owner. The Contractor shall be responsible for all damages to the Owner's facility, production, or work product due to deficiencies in the electrical system. Equipment guarantees in excess of one year shall not be superseded by this guarantee.

1.15 COMMISSIONING

A. Commissioning requires the participation of Division 26 work to ensure that all systems are operating in a manner consistent with the construction documents and the design intent. The general commissioning requirements and coordination are detailed in Division 1 and Division 26. This Division shall be familiar with all parts of Division 1 and Division 26 and the commissioning plan issued by the Commissioning Authority and shall execute all commissioning responsibilities assigned to them in the Contract Documents.

B. The electrical contractor and lighting controls contractor are responsible for assisting the commissioning agent throughout the entire commissioning process. The work is not complete until the commissioning agent and the University has signed off on the commissioned systems.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials shall be new, of prime quality, listed as suitable for the application, and bear factory-applied U.L. labels.

B. Materials shall be currently in production and shall be supported by spare parts, repair service, maintenance, and factory technical support.

C. Materials of one assembly (switchboards, substations, motor control centers, etc.) shall be of one manufacturer unless specifically stated otherwise in the contract documents.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. All work shall conform to National Electrical Contractors Association standards of installation and the requirements of the manufacturer, Division 1, Division 26, and the Owner's Representative.

B. The Contractor shall field-verify all dimensions and coordinate dimensions with equipment sizes and locations. Throughout the course of construction, verify that sufficient space will be available for the equipment to be installed.

C. The Contractor shall coordinate and install all penetrations, openings, slots, chases, or sleeves as necessary for the routing and installation of raceways, conductors, or equipment. The Contractor shall provide approved fire sealant to maintain fire ratings at all penetrations.

D. The Contractor shall coordinate the placement and sequence of installation of all mounting bolts, conduits, sleeves, etc. which are to be set in poured-in-place concrete slabs, concrete walls, and post-tension slabs per the structural drawings.

E. The Contractor shall verify and coordinate all equipment points of connection, voltages, wiring requirements, disconnecting means, fuse sizes, overcurrent protection, etc. with the equipment supplier. The Contractor shall immediately notify the Engineer of any discrepancies with the construction documents.

F. The Contractor shall install access panels in walls or ceilings in coordination with the Architect for all junction boxes or electrical equipment that require access.

G. All equipment shall be installed plumb, parallel, or orthogonal to structure and in a neat orderly fashion. All material shall be accessible for maintenance, inspection, servicing or replacement.

H. Verify final locations of devices, equipment, and fixtures during the rough-in phase with dimensioned architectural drawings, fabrication drawings, or other space planning requirements included in the contract documents.

I. The Contractor shall coordinate and arrange for the proper sequence of construction including scheduling of long-lead items, shutdowns, work of other trades, and Owner-scheduled events.

J. The Contractor shall provide adequate and qualified supervision for the work performed; no work shall be performed without the supervision of a representative of the Contractor.

K. The Contractor shall coordinate and cooperate with all other trades for a successful completion of the project.

L. All modifications to UL Listed equipment that voids the factory listing shall be re-listed in the field by UL at the cost to the Contractor.

3.2 SEISMIC BRACING

A. The Contractor shall seismically brace all equipment in accordance with requirements of the California Code of Regulations, Title 24, Seismic Design Category D and provide certification of seismic compliance upon request, including structural calculations as required.

3.3 WATERPROOFING

A. Wherever electrical Work pierces waterproofing or waterproofing membranes, install it in an approved watertight manner.

3.4 CUTTING AND PATCHING

A. The Contractor shall provide cutting and patching as required to install the electrical system in this contract.

B. Coordinate the schedule of all cutting such that the work may be performed in an expeditious manner with minimum inconvenience to the Owner.

C. Remove or cut structures or materials as necessary for demolition prior to the installation of new electrical work.

D. The Contractor shall protect all surfaces, structure, furnishings, and finishes not directly affected by cutting or patching.

E. Provide dust and moisture barriers as required during cutting and prior to patching openings.

F. All penetrations through roofs shall be performed per architectural requirements, including compliance with the roofing manufacturer’s requirements.

G. Patching shall be performed with materials which exactly match the adjacent surfaces in color, texture, character, and appearance.

H. All patches must maintain the fire ratings of the original surface and shall be sealed with a U.L. listed and Fire Marshal approved sealant.

3.5 REQUESTS FOR INFORMATION (RFIS)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified (refer to Division 1).
   1. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
   2. RFIs shall address single questions and related issues only.
   3. All RFIs shall be thoroughly reviewed and approved by the General Contractor and/or Construction Manager for accuracy and need for information required before submittal to Owner’s Design Representative.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Project name.
      a. Project number.
      b. Date.
      c. Name of Contractor.
      d. Name of Architect.
      e. RFI number, numbered sequentially and unique.
      f. RFI subject.
      g. Specification Section number and title and related paragraphs, as appropriate.
      h. Drawing number and detail references, as appropriate.
      i. Field dimensions and conditions, as appropriate.

j. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
k. Contractor's signature.
l. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

2. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. Engineer’s Action: Engineer will review each RFI, determine action required, and respond. Allow a minimum three business days for Engineer's response for each RFI, plus additional time for Architect and General Contractor to review and forward. RFIs received by Engineer after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:
   a. Incomplete RFIs or inaccurately prepared RFIs.
   b. RFIs submitted without indication of review and approval for submission by General Contractor.
   c. RFIs addressing multiple unrelated issues.
   d. Requests for approval of submittals.
   e. Requests for approval of substitutions.
   f. Requests for approval of Contractor's means and methods.
   g. Requests for information already indicated in the Contract Documents.
   h. Requests for adjustments in the Contract Time or the Contract Sum.
   i. Requests for interpretation of Engineer's actions on submittals.
2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt of additional information.

3.6 FIELD QUALITY CONTROL

A. Closing in of Work: Do not allow Electrical Work to be covered or enclosed until it has been observed by the Architect's Representative. Should unobserved Electrical Work be covered or enclosed, uncover it for observation and then make repairs as necessary to restore the Electrical Work and the Work of other affected installers to its original and proper condition, at no cost to the Owner.

3.7 COMMISSIONING

A. The Contractor shall initiate start-up of all electrical equipment including operation of all devices, switches, generators, transfer switches, overcurrent protection, disconnect switches, etc. to verify normal operation of all moving parts and electrical performance.

B. The Contractor shall test, adjust, aim, align, label, clean and complete all systems prior to acceptance by the Owner's Representative.

C. The Contractor shall demonstrate that all systems operate within the manufacturer's recommended performance characteristics, the electrical construction documents, system requirements, and Owner requirements.

D. The Contractor shall test each system per the manufacturer’s requirements and shall perform the following system tests:

1. Inspect cables for physical damage and proper connection.
2. Torque test cable connection and tighten in accordance with termination manufacturers recommendations.
3. Infrared scan all connections under loaded conditions and provided color printed images.
4. Insulation resistance test of each cable.
5. Inspect ground system connections.
6. Voltage drop tests on the main grounding electrode of system.
7. Determine the ground resistance between the main grounding system and all major electrical equipment frames, system neutral points.
8. Check rated voltage and phase balance at all equipment, motors and selected devices at full load conditions. Measure no load voltage conditions at each location.
9. Furnish all material, equipment, instruments and labor as required to complete testing.
10. Provide all test results properly bound in a three-ring binder.

3.8 TRAINING

A. Furnish at least one copy operating instructions from the manufacturer for all electrical equipment to the Owner's Representative. Instructions shall be clean, legible, and properly bound in a three-ring binder.

B. The Contractor shall provide training for the Owner’s staff as directed by the Owner's Representative for a minimum of one man-day (eight hours).

C. Provide classroom training by a qualified instructor for the operation, installation, and maintenance of designated equipment or systems including, but not limited to, generation systems, transfer switches, uninterruptible power supplies, energy management systems, lighting control systems, power distributions systems, and other systems which may require instruction. All instructional training shall be professionally recorded by the Contractor and a DVD of the recording shall be provided to the Owner.

3.9 CLEANING

A. Contractor shall clean all equipment, panelboard interiors, conduit interiors, fixtures, devices, etc. of all extraneous paint, drywall mud, overspray, dust, dirt, debris, trash, grease or markings. All cleaning shall be performed by the Contractor in accordance with the appropriate manufacturer’s recommendations.

B. Keep the Project Site free from accumulations of electrical rubbish and debris. Remove such accumulations from the Project Site.

END OF SECTION