SECTION 26 0100 - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to work specified in this section.

1.2 SCOPE OF PROJECT:

A. Provide a complete and operating electrical installation in accordance with these specifications and accompanying contract drawings. This includes all required labor, materials, apparatus and supervision.

B. Without limiting or restricting the volume of work and solely for the convenience of the Contractor, the work to be performed in general, comprises the following:

1. New Building Lighting and Lighting Controls.
2. New power circuits for pool equipment
3. Control wiring for Division 23 equipment where shown on Division 26 documents.

1.3 INTENT OF THIS SECTION:

A. This Section is intended as a supplement to each of the following Sections of Division 26, 27, 28 ELECTRICAL.

B. Consider each article of this Section as a part of each of the following Sections insofar as such requirements may be termed applicable.

1.4 TRUE INTENT:

A. The Drawings and Specifications are intended to provide a complete and perfectly operating system. Therefore, it is specifically agreed and understood by the Contractor that anything, be it labor, material or equipment, which is not described in the Specifications or specifically shown on the Drawings, but is necessary for the operation and completion of a perfectly operating system, according to the true intent of the Specifications and Drawings and as interpreted by the architect, shall be furnished by the Contractor as a part of his Contract, at no extra charge, as though it were specifically detailed and described.

1.5 DEFINITIONS:

A. General - Basic Contract definitions are included in the Conditions of the Contract.

B. Indicated - The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

C. Directed - Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Architect, requested by the Architect, and similar phrases.

D. Approved - The term approved, when used in conjunction with the Architect's action on the Contractor's submittals, applications and requests, is limited to the Architects duties and responsibilities as stated in the Conditions of the Contract.

E. Regulation - The term regulation includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. Furnish - The term furnish means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation and similar operations.

G. Install - The term install describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. Provide - The term provide means to furnish and install, complete and ready for the intended use.

I. Contractor - The Contractor or Electrical Contractor - The term means the Contractor responsible for all work under this section.

J. Installer - An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

   1. The term experienced, when used with the term installer, means having a minimum of five previous projects similar in size and scope to this project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.

2. Trades - Using terms such as carpentry is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
3. Assigning Specialists - Certain Section of the Specifications require that specific construction activities are performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no choice or option. However, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.
    a. This requirement is not to be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

K. Testing Agencies - A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere and to report on and, if required, to interpret results of those inspections or tests.

1.6 VISITS TO SITE:

A. Attention is directed to the necessity for all the Electrical Contractor to visit the site and examine all conditions affecting the proper execution of this Contract. Submission of proposals shall be considered evidence that Contractors have visited and examined the site.

B. Existing contours and topography as indicated, are believed to be reasonably correct, but are not guaranteed. Where conditions at project site do not agree exactly with conditions as indicated, Contractor shall assume all responsibility for said discrepancy.

C. No extra payment will be allowed the Electrical Contractor for extra work caused by failure to visit, examine and clarify.

1.7 GENERAL:

A. Throughout the Specifications, types of material are specified by manufacturer's name. Where more than one manufacturer is mentioned, catalog and specification data is given for a specific manufacturer. Equal material produced by other manufacturers listed is acceptable. Refer to SPECIAL REQUIREMENTS - Division 1 for substitution of materials.

1.8 RULES AND REGULATIONS

A. Perform in accordance with the rules and regulations of the National Electric Code (NEC), International Building Code (IBC) and other Codes and Standards cited in this specification and the requirements of the Utility Companies serving this project.

B. Certificates of Approval in triplicate, for rough and finished wiring from a Certified Inspection Service must be delivered to the Engineer before final payment can be authorized.

C. Perform all work in accordance with the rules and regulations of the Pennsylvania Department of Labor and Industry, Federal Department of Labor (Occupational Safety and Health Administration) and any other national, state, or local authority having jurisdiction.

D. Perform all Construction, design, fabrication, tests, rating, and installation in compliance with the regulations of all local, state or national agencies having jurisdiction over the project. Pay all costs involved in work necessary to comply with these regulations.

E. The Contractor assumes all responsibility and liability for any code violations, damage or injury which occurs as a result of deviation from or a change to the requirements of these plans and specifications which has not been approved in writing by the Engineer.

1.9 SUBMITTAL OF SHOP DRAWINGS FOR REVIEW:

A. Submit Shop Drawings in accordance with SUBMITTALS Division 1 and as indicated in subsequent Sections of this Division. Assume responsibility for quantities and correct mounting details. In addition, submit other shop drawings as may be requested by the Architect.

1. Metal Clad Cable
2. Building Wire
3. Conduit
4. Fittings
5. Wireways
6. Outlet Boxes
7. Switches
8. Receptacles
9. Electronic Circuit Monitors
10. Panelboards and Circuit Breakers
11. Safety Switches and Fuses
12. Interior and exterior Lighting
13. Lighting controls

1.10 DRAWINGS:

A. The Electrical drawings are indicative of the general arrangements and approximate sizes and relative locations of principal materials to be provided. Drawings are diagrammatic and are a graphic representation of contract requirements to best available standards at the scale required. Provide certain items such as pull boxes, offsets to clear interferences, and supports which are not specifically shown but which are obviously needed to make the system complete and operable.

B. Verify all grades, elevations, dimensions and clearances at the site.

C. Electrical riser and schematic diagrams generally indicate wiring to be used in various systems. Provide all work shown on diagrams whether or not it is duplicated on the plans.

D. All drawings and specifications pertaining to general construction, plumbing, HVAC, kitchen, electrical and other work shall be carefully examined. Where physical interferences with his work occur because of his failure to coordinate with other trades, this Contractor shall rearrange his work at his own expense.

1.11 ENVIRONMENTAL CONDITIONS:

A. Provide effective protection for all material and equipment against damage that may be caused by environmental conditions. Do no work when conditions or temperature in area or moisture on materials or substrates are not in accordance with material manufacturer's recommended conditions for installation.

1.12 PROTECTION:

A. Provide effective protection against damage for all materials and equipment during shipment, and storage at the Project site. Cover all stored equipment to exclude dust and moisture. Place stored conduit on dunnage with appropriate weather cover and caps on exposed ends.

B. After cabinets and boxes are installed, cover openings to prevent entrance of water and foreign materials. Close conduit openings with temporary metal or plastic caps, including those terminated in cabinets.

C. Protect all rough and finished floors and finished surfaces from damage which may be caused by construction materials and methods. Protect floors with tarpaulins, chip pans and oil-proof floor coverings. Protect finished surfaces from welding and cutting splatters with baffles and asbestos splatter blankets. Protect finished surfaces from paint droppings, adhesive and other marring agents with drop cloths. Protect other surfaces with appropriate protective measures.

1.13 PRODUCT:

A. Have materials delivered to site. Unload and store materials in allotted location, and protect from damage. Deliver materials to their point of installation.

B. Deliver materials to Project site in manufacturer's original unopened containers with manufacturer's name and product identification clearly marked thereon.

1.14 COMPLIANCE WITH GENERAL STANDARDS AND REGULATIONS:

A. Provide equipment that is in conformity with these specifications and applicable requirements of the following:

1.	AASHTO	American Assoc. of State Highway and Transportation Officials
2.	ACI	American Concrete Institute
3.	AISC	American Institute of Steel Construction
4.	AISI	American Iron and Steel Institute
5.	ANSI	American National Standards Institute
6.	ASTM	American Society for Testing and Materials
7.	AWS	American Welding Society
8.	CBM	Certified Ballast Manufacturers Assoc.
9.	CRSI	Concrete Reinforcing Steel Institute
10.	EIA	Electronic Industries Assoc.
11.	ETL	ETL Testing Laboratories Inc.
12.	FM	Factory Mutual Research Assoc.
13.	ICEA	Insulated Cable Engineers Association, Inc.
14.	IEC	International Electrotechnical Commission
15.	IEEE	Institute of Electrical and Electronic Engineers
16.	IESNA	Illuminating Engineering Society of North America
17.	IMSA	International Municipal Signal Association
18.	LPI	Lighting Protection Institute
19.	NEC	National Electric Code
20.	NECA	National Electrical Contractors Association
21.	NEMA	National Electrical Manufacturers Association
22.	NETA	International Electrical Testing Association
23.	NFPA	National Fire Protection Association
24.	UL	Underwriters Laboratories, Inc

1.15 COMPLIANCE WITH FEDERAL GOVERNMENT AGENCIES

A. Names and titles of federal government standard - or Specification-producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard - Specification-producing agencies of the federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up to the date of the Contract Documents.

1. ADA Americans with Disabilities Act
2. CFR Code of Federal Regulations
3. EPA Environmental Protection Agency
4. FAA Federal Aviation Administration (US Dept. of Transportation)
5. FCC Federal Communication Commission
6. FS Federal Specification (from GSA); Specifications Unit (WFISIS)
7. MIL Military Standardization Documents (US Department of Defense) Naval Publications and Forms Center
8. OSHA Occupational Safety and Health Administration (US Department of Labor)
9. REA Rural Electrification Administration (US Department of Agriculture)

1.16 GUARANTEE:

A. Each Contractor shall unconditionally guarantee in writing all materials, equipment, and workmanship for a period of one year from the date of substantial completion of the final phase of the project. The Contractor shall provide free service for all equipment involved in his Contract during this guarantee period.

B. The guarantee shall include restoration to its original condition of all adjacent work that must be disturbed in fulfilling this guarantee.

C. All such repairs and/or replacements shall be made without delay and at the convenience of the Owner.

PART 2 - PRODUCTS

2.1 Refer to Division 26 - ELECTRICAL

PART 3 - EXECUTION

3.1 LOCATION OF MATERIAL:

A. Locate all lighting fixtures, power apparatus, conduit, outlets and other materials to result in proper operation of the building and to avoid conflicts with the work of other trades. Obtain required location information sufficiently in advance of installation time to allow uninterrupted progress of the work. Check layouts of equipment with shop drawings of all trades to determine roughing-in requirements. Do not scale drawings for exact locations. Exercise proper judgment to secure a neat arrangement of conduit, piping, ductwork and other material; and to overcome local interferences to best advantage of the Project.

B. Where physical interferences cannot be resolved readily, consult with the Construction Manager and Architect and prepare dated, dimensioned drawings correcting the interferences. Obtain written approval of the Construction Manager and Architect for such changes and distribute the drawings to all interested parties as directed by the Construction Manager and Architect.

C. In modular panel ceilings, locate lights, detectors and similar equipment as shown on reflected ceiling plan. Arrange ceiling outlets symmetrically. Verify locations of all floor outlets with Architect before roughing-in.

D. Locate switches and other manually operated devices in a location easily accessible and convenient to operating personnel. If any such devices are mounted in a location deemed inaccessible or impractical, relocate devices at no increase in contract costs.

3.2 EARTHWORK:

A. Provide all excavation, backfill, shoring and similar work as required for the installation of the Work of this Division. Refer to the requirements of Excavation, Grading and Site Work, Section 33, and Earthwork, Division 2.

B. Protect roots of live trees encountered in excavation.

C. Where excavations at footings, foundations, and other structures are deeper than the angle of repose deemed adequate by Architect, backfill such excavations solidly with 3000 pound concrete.

D. Remove and dispose of excess excavated materials as directed by the Construction Manager or Architect.

3.3 FLASHING AND COUNTERFLASHING:

A. Provide metal flashing and counterflashing under Division 26 in accordance with SHEET METAL, Division 7, for all conduits penetrating the roof. Form counterflashing into a rainhood attached to conduit and passed down over top of flashing. Attach counterflashing to conduit with clamp, and waterproof with sealing compound.

B. Base flashing will be worked into roofing.

3.4 CHASES AND OPENINGS:

A. Openings, recesses and chases will be provided in the building construction as described in SUPPLEMENTAL GENERAL CONDITIONS. Make detailed dimensioned drawings under Division 26 where required by Architect.

3.5 CUTTING AND PATCHING:

A. Perform all cutting of existing building construction under Division 26 as required for installation of electrical work.

B. Perform cutting carefully so as not to damage the structure or leave unsightly surfaces that cannot be covered with plates, escutcheons, or other normal concealing construction. Patch unsightly conditions resulting from cutting as directed by the Construction Manager or Architect. Engage competent mechanics for patching.

3.6 CONCRETE:

A. Provide all concrete required for the work of Division 26 - ELECTRICAL, unless otherwise noted. Provide 3000 pound concrete in accordance with the provisions of Division- CONCRETE.

B. Provide concrete housing cleaning pads for all freestanding electrical equipment inside and site light bases outside building, unless otherwise noted. Include all required anchor bolts, fish plates, sleeves, inserts, conduit and miscellaneous hardware and have them installed in their proper location in all concrete foundations.

3.7 MOTOR STARTERS

A. Furnish all manual motor starters, and mount where shown on drawings.

B. Mount manual motor starters for roof fans in an accessible location inside the building to avoid affecting thermal devices by atmospheric conditions.

C. In general, magnetic motor starters will be delivered to the site with the equipment they control.

1. Starters furnished under Division 21, 22, and 23 will be delivered to the Electrical Contractor for installation and wiring. The Electrical Contractor shall mount the starters where shown on the Drawings, and provide power wiring to the starter, as well as power wiring from the starter to the motor. Control wiring will be provided under the HVAC Contract.
2. Equipment furnished under other Divisions and under other contracts generally will not be combination type. Provide disconnects as required by the NEC within site of the controller and motor.
3. Check running current of each motor and verify correct size of overload elements, and fuses in combination starters. Notify Architect in writing of all overload elements and fuses incorrectly sized, so that corrective action can be initiated.
4. Prepare a typewritten list of all motors in the project, and submit to Architect for delivery to the Owner. Include the following information for each motor:

a. Function and nomenclature, as identified by the marking actually used in the field.
b. Physical location in the building.
c. Rated horsepower, voltage and phase.
d. Rated full load current.
e. Proper size of thermal overload element.
f. Mount all motor starters, except those factory mounted on equipment.

3.8 COLOR CODING OF WIRING

A. Color code all wiring in accordance with the following table. In general, use factory colored insulation. Use colored vinyl tape for black insulation on cables No. 8 and larger. Apply pressure sensitive tape in half-lap serving for distance of 6" at cable terminations, in pull boxes, manholes, panels, and similar locations.

1.	Phase	208/120 Volts	480/277 Volts
2.	Phase "A"	Black	Brown
3.	Phase "B"	Blue	Orange
4.	Phase "C"	Red	Yellow
5.	Neutral	White	Gray
6.	Equipment ground	Green	Green

3.9 PHASING

A. Phase building load centers and panelboards "A", "B", "C" top to bottom and left to right. Identify the neutral, although it may be in different locations for different equipment.

B. Connect transformers in all systems so that:

1. "A" Phase is terminated at "H1" connection.
2. "B" Phase is terminated at "H2" connection.
3. "C" Phase is terminated at "H3" connection.
4. "X1" connection shall be the "A" Phase.
5. "X2" connection shall be the "B" Phase.
6. "X3" connection shall be the "C" Phase.

C. Ascertain from Power Company phase identifications at the point of connection and thereafter carry out and maintain this consistent system of color coding, phase identification and positioning.

D. Verify phase rotation after all terminations at equipment have been made, by producing a 1-2-3 rotation on a phase sequence meter when connected to "A", "B", and "C" phases. Make phase rotation compatible with existing distribution system.

3.10 GROUNDING RESISTANCE TEST:

A. Provide grounding system resistance test to verify resistance. Maximum resistance shall be 5 ohms.

B. Send final certified test reports and Certifications to Construction Manager for approval and transmittal to the Owner in accordance with SUBMITTALS, Division 1.

3.11 INSPECTION AND CERTIFICATION:

A. Obtain and deliver a final Certificate of Approval from the applicable NEC inspection authority having jurisdiction. Make delivery to Construction Manager for transmittal to the Owner upon completion of the work and before final payment in accordance with PROJECT CLOSE-OUT, Division 1. Pay all charges made by the inspection authority and include their cost in the bid.

3.12 INSTALLATION:

A. Install equipment in accordance with manufacturer's recommendations.

3.13 EQUIPMENT BY OWNER:

A. The Owner will furnish certain equipment, and deliver this equipment to the site as stated in EQUIPMENT FURNISHED BY OWNER, Division 11. Provide final electrical connections as required.

3.14 AS-BUILT DRAWINGS:

A. During construction, the Contractor shall maintain a record set of installation prints. He shall record on these prints, all deviations from the Contract Drawings in pipe sizing, location, and details. The record set of installation prints shall be updated at the end of each month and shall be delivered to the Construction Manager and the Architect.

B. At the completion of the work, the Contractor shall forward these prints to the Construction Manager and the Architect for incorporation into the final As-Built Drawings.

3.15 INSTRUCTION TO EMPLOYEES:

A. At the completion of the work, and before final acceptance of the building by the Owner, each Contractor, together with the representatives of the manufacturers of the equipment installed by the Contractor, shall instruct the designated employees of the Owner in the care, adjustment, maintenance and operation of equipment installed by him. The instruction shall be video recorded and a copy of the recording turned over to the Owner for future reference.

B. Three copies of factory maintenance schedules shall be furnished for each of equipment. Acceptance of materials and equipment is conditional upon receipts of maintenance manuals.

C. A representative of the manufacturer of each piece of equipment shall inspect his respective pieces of equipment, make final adjustments, and put them in a satisfactory working condition.

D. Instructions described shall be given for the following systems:

1. Lighting control systems.

END OF SECTION