PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section and all following Division 16, Electrical Specifications.

1.02 SCOPE:

A. Furnish all labor, materials, equipment and services necessary for and reasonably incidental to the complete installation of all electrical as shown on the drawings and as specified herein to result in a finished and operating facility.

B. Principal features of the installation are as follows:

1. Service entrance, branch panelboards, wiring devices, etc.
2. Lighting fixtures and lamps.
3. Wiring in connection with mechanical equipment.
4. Outside lighting and control.
5. Emergency lighting system.
6. Telephone system provisions.
7. Control systems.
8. Control wiring provisions.
9. Electric unit heaters.
10. Underground system installation.
11. Connection of equipment.
12. Demolition of existing electrical systems.

13. Fire alarm system.

14. Sound system.

15. Computer system provisions and relocation of existing computer equipment.

16. Security and CCTV systems.

1.03 CODES AND STANDARDS:

A. The entire electrical installation shall be made in strict accordance with the requirements of any and all City, County, State or Federal codes of Law having jurisdiction, the requirements and recommendations of the Board of Fire Underwriters, including all amendments and/or additions to the said codes, laws, requirements, and recommendations, the requirements and recommendations of the local utility, the Owner, and the Standard Building Code Congress International, Inc. Standard Codes.

B. Should any work shown on the drawings or herein specified be construed as being contrary to or not conforming to the previously mentioned codes, laws, etc., the same shall be brought to the attention of the Designer or Owner’s Representative to be reviewed, approved, and/or corrected prior to final bid date.

C. Should any work shown on the drawings or herein specified be more rigid as to requirements than the requirements of the various codes, the drawings and specifications shall be followed in executing the work.

D. The Contractor shall file with proper authorities all necessary drawings as required by various codes, laws, ordinances and/or other requirements.

E. Permits, inspections and fees: The Contractor shall obtain all permits and inspections required for the work, and shall pay all costs and fees thereof including the Power Company's contribution to construction costs.
1.04 RELATED PROJECT DOCUMENTS:

A. The complete set of project documents contain requirements that relate to the electrical construction work specified by the Division 16 electrical specifications and illustrated by the electrical design drawings. All project documents shall be referenced and conformed with for the required electrical installation work. Each Division 16 specification section or subsection relates to all other Division 16 sections or subsections. No specification section may be used as stand alone requirements.

1.05 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacture of electrical construction products of types required for this project, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with not less than 5 years of successful experience in installation of products similar to those required for this project.

C. UL Compliance: Comply with applicable portions of UL safety standards pertaining to electrical equipment and installation required for this project.

D. NEC Compliance: Comply with NEC and NESC as applicable to installation of equipment and installation required for this project.

E. Comply with all current work safety rules and regulations as well as the owners safety requirements and regulations.

PART 2 - GENERAL ELECTRICAL REQUIREMENTS

2.01 REQUIREMENTS:

A. Drawings indicate the general character, scope, and arrangements of the electrical installation. Approval of any change or departure from the drawings must be obtained from the Designer or Owner’s Representative.

B. Equal Products: Those items on the drawings or in these specifications designating particular product numbers limit their use only as to design, workmanship and quality, not manufacturer. Approval for alternate or substitute items shall be secured from the Owner’s Representative, and submittals for
approval must be accompanied by all necessary descriptions, catalog sheets, etc. Authority over such submittals shall rest with the Owner’s Representative.

C. Workmanship: All work shall be performed by skilled workmen in a manner reflecting the best modern construction practices. It shall present, upon completion, a neat, orderly, finished appearance. All evidence of debris associated with the work shall be removed from the premises. Conform to all OSHA workplace requirements.

D. Coordination with other trades to the fullest of ability in relation with others to result in a professional installation shall be complete, and more specifically, as follows:

1. The drawings and specifications are based on the best information available when prepared. Frequently minor changes occur with respect to the architectural plans, construction, and the requirements of equipment furnished by others. The electrical contractor shall recognize this in bidding, supervising, and in planning construction.

2. Before locating conduit runs, boxes, etc., the drawings shall be carefully checked to see that they are in accord with the electrical drawings. Required adjustments shall be made with the General Contractor's superintendent and with the Designer.

3. Before proceeding with the wiring for mechanical, owner furnished material and equipment trades, each item requiring electrical work shall be reviewed with those responsible for their installation. The electrical contractor shall become well acquainted with their characteristics, location and arrangement for mounting. Changes in wiring arrangements and other adjustments necessary or desirable shall be reviewed with the Owner’s Representative for authorization. This applies also to all equipment for which wiring is required, such as HVAC units, water heating, pumps, thermostats, motors, pushbuttons, limit switches, fire protection systems, shop equipment, cooking equipment etc., as they occur.

E. Allowances for Contingencies: No change in contract price will be allowed for alternate work which requires approximately the same work to adjust or relocate electrical components or devices as part of the construction coordination work. An adequate allowance shall be included in the bid price for such coordination contingencies and for the additional work required by these coordination adjustments.
F. Record Drawings: The job supervisor shall maintain a set of prints on the job to be used to illustrate and note job changes as they occur. This shall include the locations of concealed or underground lines sizes over 1", the type of lighting fixtures provided, and any other information necessary to record the job as actually installed. Upon completion of the prints, the electrical contractor shall furnish to the Designer at the contractor's expense, a set of reproducible drawings containing the above-mentioned field notes.

G. Coordinate the proposed locations of major raceway systems, equipment, and materials. Include the following:

1. Clearances for servicing equipment, including space for equipment disassembly required for periodic maintenance. Comply with code requirements for working space about electrical equipment.

2. Exterior wall and foundation penetrations.

3. Fire-rated wall and floor penetrations.

4. Equipment connections and support details.

5. Sizes and location of required concrete pads and bases.

6. Scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

7. Penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

8. Coordinate and integrate ceiling installations, air outlets and inlets, light fixtures, communications systems components, sprinklers, and other ceiling-mounted devices.

H. Materials shall be new and unused and shall bear the Underwriters' Seal where applicable.

I. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

J. Retain two sets of all equipment or device installation instructions and submit to the Owner’s Representative prior to project completion.
3.01 ROUGH-IN:

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected. Refer to individual equipment shop drawings prior to rough-in installation work.

B. Refer to equipment specifications in Divisions 2 through 16 and the complete project drawing set for rough-in requirements.

3.02 ELECTRICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate electrical systems, equipment, and materials installation with other building components.

B. Verify all dimensions by field measurements.

C. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.

D. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

E. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.

F. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.

G. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

H. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to
arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Owner’s Representative.

I. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

J. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

K. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.03 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with Division 1 Section "CUTTING AND PATCHING." In addition to the requirements specified in Division 1, the following requirements apply:

1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
   
a. Uncover Work to provide for installation of ill-timed Work.
   
b. Remove and replace defective Work.
   
c. Remove and replace Work not conforming to requirements of the Contract Documents.
   
d. Remove samples of installed Work as specified for testing.
   
e. Install equipment and materials in existing structures.
   
f. Upon written instructions from the Owner’s Representative, uncover and restore Work to provide for Owner’s Representative observation of concealed Work.

2. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to
removal of electrical items indicated to be removed and items made obsolete by the new Work.

3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

B. Patch existing finished and disturbed new finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required or the surface and building components being patched.

3.04 TEST AND GUARANTEES:

A. The Contractor shall perform, prior to final acceptance, an operations test to all electrical equipment. The entire installation shall be free from grounds and short circuits. Before the Owner operates the equipment for the first time, the Contractor shall furnish a person familiar with the equipment to instruct and assist the Owner’s personnel in the proper operation and maintenance of said equipment.

B. Warranty-Guarantee: The electrical contractor shall warrant that all work executed under this Division of the specifications will be free from defects in materials and workmanship for a period of one year from the date of final acceptance of the building. The above parties agree that they will, at their own expense, repair and replace all such defective work, and all other work damaged thereby, which becomes defective during the term of the warranty-guarantee.

3.05 PROTECTION OF MATERIALS:

A. All work, fixtures, and materials shall be protected at all times. Fixtures and equipment shall be tightly covered and protected against dirt, water, chemical, or mechanical injury. At final completion, all work shall be thoroughly cleaned and delivered in an unblemished condition.

B. The Contractor shall defer the installation of all electrical fixtures liable to damage until authorized by the Owner’s Representative. After fixtures are
permanently installed, they shall be completely protected against breaking, damage, or the depositing of any waste or materials therein or thereon until the system is accepted.

C. Touch up all damaged painted surfaces on equipment to match original paint.

3.06 SHOP DRAWINGS AND MAINTENANCE MANUALS:

A. Shop Drawings: Furnish quantity, in accordance with Division I requirements, shop drawings and wiring diagrams for the following:

1. Panelboards.
2. Fire Alarm System.
4. CCTV System.

B. Materials and Equipment Submittals: Furnish catalog sheets or cuts for all items above, and submit catalog data of the following:

1. Lighting fixtures.
2. Exit signs.
3. Emergency lighting fixtures.
4. Panelboards.
5. Wiring devices.
6. Control devices.
7. Disconnect switches.
8. Fire stop assemblies.

C. Furnish all equipment submittals in one package to Engineer for approval. All partial submittals will be rejected, or will be held unchecked until submittals are complete.
D. Maintenance Manuals: Upon completion of the work, deliver to the Designer for the Owner's use, two copies each of complete operation and maintenance instructions and data for the electrical equipment furnished under the electrical contract work. Data shall include catalog pages or data sheets for each piece of equipment, wiring diagrams showing the internal and external elements and their connections, manufacturer's maintenance manuals, bills of materials showing necessary data for ordering repair parts, and approved shop drawings. This information shall be furnished for the following systems and items.

1. Lighting fixtures.
2. Exit signs.
3. Fire alarm system.
4. Panelboards.
5. Emergency lighting system.
7. CCTV System.

3.07 WORK IN CONNECTION WITH EQUIPMENT FURNISHED BY OTHERS:

A. Mechanical: Furnish and install all necessary wiring for the supply and control of all mechanical work, including plumbing, heating, air conditioning, and ventilation. Furnish and install disconnect switches for motors where required by the codes. The contractor shall make provisions for variations in the mechanical equipment and make connections as required by the actual equipment furnished.

B. Motor Wiring:

1. Services to equipment shall be checked out against that required by the equipment prior to service connection. Should the equipment require service different to that provided, the contractor shall call that fact to the attention of the Designer prior to connection of the service. Check equipment to determine whether proper control and safety devices are provided to insure proper operation. Assist Owner in the initial operation of the equipment, and make any necessary adjustments to the service for proper operation.
2. Motor and Motor Controls: Where required, the manual motor starters shall be suitable for the application, Square D Co., Type F, K, M or T with proper overload protection, mounted in an appropriate box with a 120-volt pilot light. Disconnect switches shall be the heavy-duty type with "Dual Element" fuses, with an enclosure suitable for the application. Provide accessories necessary for the application.

3. Equipment shall be controlled by manual and automatic systems as required by the control documents, shown on the drawings and specified in this section of the specifications.

4. Air Conditioning and Heating Equipment: All air conditioning and heating equipment shall have fused disconnect switches or breakers installed at the unit. These switches or breakers shall be sized and be of the type as it appears on the label of the equipment.

5. Install and connect all package control equipment and control devices furnished under other divisions of these specifications including all interconnecting control wiring.

C. Work in Connection with Motors:

1. Rotation: All motors shall be checked for proper rotation just as soon as power is available. Should any motor rotate in the wrong direction, it shall be re-connected for proper operation.

2. Overload Heaters: Check all motor starters overload heater elements for the proper size to conform to the name plate rating of the motor. Should an improper size unit be installed, the attention of the Owner’s Representative and the starter supplier shall be called to that fact.

3. Connection: The raceway connection to the individual motors shall be by means of a short length of flexible conduit. All pump motors shall be connected with type "UA" liquid tight flexible conduit. Connectors used with liquid tight flexible conduit shall be of a type made for the purpose and that will establish a continuous ground. All motors and all controls therewith shall be connected up completely as required for proper operation of the system involved.

D. Fire Protection Equipment: Furnish and install all necessary wiring for the power supply, control, fire alarm connection, and code compliance requirements for
sprinkler, standpipe, or other fire protection systems. The fire protection work shall be in accordance with applicable sections of the NFPA codes.

E. Owner Furnished: Furnish power wiring and connections to all equipment furnished by others and shown on the plans.

3.08 TEMPORARY WIRING

A. The installation of the temporary wiring shall comply with the current codes and rulings of the local inspector. All breakers serving receptacle outlets shall have ground fault protection.

B. In renovation construction, maintain the existing lighting and power systems as required for temporary power or provide temporary wiring and lighting in accordance with (A.) above.

END OF SECTION 16050