SECTION 16010

GENERAL REQUIREMENTS - ELECTRICAL

PART 1 - GENERAL

1.01 PROVISIONS GOVERNING WORK UNDER THIS DIVISION

A. SEE Division 1.

1. This Section 16010 governs and is applicable to all Sections concerning Electrical.

1.02 SUBMITTALS

A. SUBMIT Shop Drawings per Part 2 of this Section.

B. SUBMIT project record Drawings upon completion of project.

1.03 WARRANTY

A. WARRANTY ALL MATERIALS AND WORK for a period of one year after acceptance of project by Owner.

1.04 DESCRIPTION

A. EXCEPT AS SPECIFICALLY INDICATED OTHERWISE, these specifications require finished work, tested out and made ready for normal operation.

B. COORDINATION WITH OTHERS: Work under this Division shall be fully coordinated with work, Drawings and Specifications for: general construction, electric operated doors, finish hardware devices, incinerators, site utilities, sprinklers, mechanical, telephone, alarms, and others as included in project.

1.05 REQUIREMENTS OF REGULATORY AGENCIES

A. CODES, INSPECTIONS AND STANDARDS:

1. INSTALLATION SHALL CONFORM WITH THE LATEST PUBLISHED AND CURRENT EDITION OF THE FOLLOWING:
   National Electrical Code (NEC) (NFPA 70)
   City and State Electrical Code and Regulations
   National Electrical Safety Code
   Americans with Disabilities Act (ADA)
   Life Safety Code (NFPA l0l) as well as with all Interim Amendments and all other applicable Regulations and Requirements of City, County, State and Federal Governments having jurisdiction over the conduct of this work or any part thereof.
2. INSTALLATION shall be done in accordance with the latest Rules and Regulations of the Occupational Safety and Health Act (OSHA).
3. INSTALLATION SHALL CONFORM WITH THE LATEST PUBLISHED STANDARDS OF:
   Institute of Electrical and Electronic Engineers (IEEE).
   Illuminating Engineering Society (IES).
   National Electrical Manufacturers Association (NEMA).
4. MAKE CORRECTIONS TO INSTALLATIONS, requested by official Electrical Inspectors representing City and State Inspection Departments, so long as such corrections are necessary for compliance with official and published requirements prior to date of the Contract.
5. REQUESTED CHANGES: See that Architect is advised and given a copy of work so requested by City, State, or Federal Inspectors, and that the work does not conflict with intended design.
6. SERVICE STANDARDS: Service entrance, metering arrangements, and motor loading, shall be in conformity with applicable Service Standards published by the serving Utility Company.
7. INTERIM AND FINAL INSPECTIONS: Call for and pay for inspections required by City's Inspection Department and other Governing Bodies. Keep record of such calls and submit to Architect, if requested.

1.06 QUALITY ASSURANCE

A. LABELS:

1. MATERIALS AND EQUIPMENT furnished under this Section shall either have a UL (Underwriters' Laboratories) label affixed, or shall be listed as being approved for the application being made, by UL, where such approvals are applicable.
2. FURNISH ETL (Electrical Testing Laboratories), CBM (Certified Ballast Manufacturers), RLM (Registered Luminaire Manufacturers) labels on items advertised as having such labels, when such items are specified, or upon items proposed as substitutions for such specified items.

B. MATERIALS AND WORKMANSHIP:

1. MATERIALS shall be those shown on Drawings and specified herein.
2. MATERIALS shall match and fit together in a complete and working installation.
3. UNSIGHTLY INSTALLATIONS shall be removed and replaced, or otherwise satisfactorily reworked until acceptable, when so ordered by Architect, even though having no circuitry or operating faults.

1.07 TESTS

A. MAKE TESTS necessary to insure against concealment of defective materials and workmanship, before inspection, and again if requested in the presence of the Architect, Engineer, or official Inspector.

1.08 INSTRUCTIONS AND OPERATIONAL DATA

A. PROVIDE at least one set of instructions and maintenance data for wiring items or equipment items. Furnish complete and reasonable instructions for the operation of switches, circuits, systems, and equipment.

1.09 SITE VISIT

A. Visit the site and become familiar with all aspects of the site and existing conditions before submitting Contract price.

B. No allowance will be made for lack of knowledge of existing conditions.

1.10 DEVIATIONS

A. No deviations from the Contract Documents shall be made without the full knowledge and written consent of the Architect.

B. If the existing conditions make it desirable to modify the Contract Documents in regard to any item, provide a written request to the Architect.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. REFER to the various Sections under Division 16.

2.02 STANDARDS FOR MATERIALS AND WORKMANSHIP

A. All materials shall be new and shall be stamped with the label of Underwriters Laboratories, Inc. (UL).

B. All materials shall meet the standards of the following associations and institutes where applicable.

1. National Fire Protection Association (NFPA)
2. American Society of Testing Materials (ASTM)
3. American National Standards Institute (ANSI)
4. National Electrical Manufacturer's Association (NEMA)
5. Institute of Electrical and Electronic Engineers (IEEE)

C. Manufacturer's names and catalog numbers specified herein are intended to describe the material and set the standard of quality. All bids shall be based on material specified.

2.03 SHOP DRAWING SUBMITTAL

A. The Engineer's review of shop drawings or submittals is a cursory review to check for general compliances of submittals with the design intent of the Contract Documents. The Engineer's review does not relieve the Contractor of his responsibility of complying with the contract documents. All coordination of the work in the strict compliance with the Contract Documents is the sole responsibility of the Contractor.

B. The following items shall be submitted for review:

1. Conduit and wire
2. Grounding system
3. Overcurrent devices
4. Lighting Fixtures
5. Service Entrance Equipment

C. All shop drawings and submittals shall be submitted in compliance with the requirements of the general and supplementary conditions. No more than six (6) copies of submittal data will be reviewed. Any additional copies will be returned unmarked. The responsibility of copying review comments on any additional copies will rest solely with the Contractor.

D. All submittals shall bear the name of the manufacturer to be used.

E. All shop drawings and submittals shall include a stamped indication signifying that the submittal has been reviewed for compliance with the Contract Documents by the Contractor. This stamped indication also represents the fact that the Contractor has checked his submittal for it's interaction with all other Divisions and certifies by his signature or initials that all coordination has taken place. The stamp shall include the date, name of the Contracting Firm, the signature of the contractor, certification and approval. This stamp will be on the submittal before the Engineer will review it.

F. The Engineer will review an individual submittal not more than twice. If the submittal is rejected again on the second review, the contractor will bare all responsibility for paying the Engineer's time for additional reviews. Such payment to the Engineer shall be withheld from the next monthly pay application.

PART 3 - EXECUTION

3.01 INSTALLATION

A. REFER to the various Sections under Division 16.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 CONTENTS

A. Supporting Devices for Electrical Components.

B. Concrete Equipment Bases.

C. Touchup Painting.

1.02 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories:
   1. Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. NFPA Compliance:
   1. Comply with NFPA 70.

C. Code Compliance:
   1. All work to be in accordance with latest requirements of the N.E.C. and all other applicable codes and regulations of authorities having jurisdiction over the work.

1.03 SUPPORTING DEVICES

A. Performance Criteria.
   1. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
   2. Metal Items for use Outdoors or in Damp Locations: Hot-dip galvanized steel.
   3. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
   4. Expansion Anchors: Carbon-steel wedge or sleeve type.
   5. Toggle Bolts: All-steel springhead type.

1.04 CONCRETE BASES

A. Performance Criteria.
   1. Concrete Forms and Reinforcement Materials: As specified in Special Provisions Section: “Cast-in-Place Concrete.”

PART 2 - PRODUCTS

2.01 TOUCHUP PAINT

A. Performance Criteria.
   1. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
   2. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

END OF SECTION

SECTION 16111

CONDUIT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. CONDUIT AND COUPLINGS.

B. NON-METALLIC DUCTS.

PART 2 - PRODUCTS

2.01 RIGID METAL CONDUIT (HEAVY WALL)

A. RIGID METAL CONDUIT shall be used in areas so indicated on Drawings and as listed below.

B. RIGID METAL CONDUIT shall be steel, hot-dip galvanized after threading.

C. RIGID METAL CONDUIT COUPLING'S CONNECTORS shall be threaded. Connections shall be made up tight.

D. RIGID METAL shall be used in wet locations.

2.02 DUCT-RIGID POLYVINYL CHLORIDE

A. PVC CONDUIT shall be used in all areas below grade. Unless noted otherwise, minimum size PVC conduit shall be 1" trade size.

B. FITTINGS for PVC conduit shall be suitable for the conduit and type of installation.

C. GROUNDING CONDUCTOR: Whenever PVC conduit is used; a separate grounding conductor shall be installed in entire length of conduit.

2.03 GENERAL

A. INTERCONNECTIONS BETWEEN DIFFERENT TYPES OF RACEWAYS shall in all cases be made with manufactured fittings approved by UL.

2.04 LOCKNUTS, BUSHINGS, CONNECTORS, AND COUPLINGS

A. "DOUBLE-LOCKNUT" system (2 locknuts) shall be used throughout, each being tightened wrench-tight as to effectively bond outlet box or cabinet to conduit.

B. BUSHINGS shall be malleable, except that plastic bushings may be used in lieu of phenolic-lined malleable bushings where "insulating bushings" are required per NEC.

C. INSULATED-THROAT TYPE GROUND BUSHINGS shall be malleable type and fully equal to T & B #3802 series.

D. CONNECTORS AND/OR COUPLINGS shall be proper for conduit they are used with. They shall be watertight when required.

E. FINISH on such fittings shall be cadmium or galvanized.

F. THREADS on fittings shall be die-cut unless approved otherwise.

PART 3 - EXECUTION

3.01 INSTALLATION

A. SIZE RACEWAYS in accordance with NEC Tables, except that size shall not be reduced from any sizes indicated on Drawings or called out herein.

B. DO NOT exceed number of bends allowed in conduit by the NEC and reduce such to that indicated or specified when so done.

C. JOINTS shall be wrench-tight or otherwise with minimum resistance to the flow of fault currents.

D. PROTECT CONDUITS from damage, entrance of water or foreign objects and jog as necessary to prevent weakening walls or construction.

E. REMOVE flattened or otherwise damaged conduits from site.

F. ALL BENDS shall be pre-manufactured.

G. TEST any conduit with hacksaw or with approved pipe cutting tool and ream ends before connecting.

H. RACEWAYS shall be securely fastened in place. Conduit shall be firmly fastened within 3 ft of each outlet, junction box, cabinet or fitting. Metallic conduit, rigid (heavy wall) shall be supported at least every 10 ft. Raceway fasteners shall be only those designed for the purpose.

I. FOR EXPOSED RUNS, attach surface-mounted conduit with clamps.

J. CLEAN out conduit before installation of conductor.

K. KEEP A RECORD of deviations from routes and locations shown on Drawings. Indicate all deviations on Project Record Drawings and submit drawings to Architect.

END OF SECTION

SECTION 16120

WIRES AND CABLES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. WIRES AND CABLES.

1.02 SUBMITTALS

A. SUBMIT product information.

1.03 WIRING METHODS

A. Use PVC conduit in earth.

PART 2 - PRODUCTS

2.01 WIRE AND CABLE MANUFACTURERS

A. Okonite
B. Southwire
C. Coleman
D. Or equal, approved by the Architect.

2.02 GENERAL

A. BRANCH CIRCUITS: Flame retardant, moisture resistant, thermoplastic, Type Letter THWN, 60 degrees C maximum operating temperature, rated 600v, unless noted otherwise on Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. PULLING FRICTION: Keep to a minimum using no more than the NEC allowed number of bends, as well as not to exceed maximum allowable pulling tensions derived from tables or formula provided by the several Wire Manufacturers.

B. USED APPROVED WIRE LUBRICANT of a type suitable for wire and/or raceway involved, such as Burndy "Silkon", "Albentonite", "Protectant 626", Ideal "Yellow-77", or Polywater "J".

C. FURNISH necessary reels, reel jacks and other pulling aids required to prevent damage to wires and cable.

D. DO NOT PULL WIRE until construction work in vicinity is complete enough to avoid damage to wires and cables in any manner.

E. IDENTIFY conductors with pressure sensitive tags as manufactured by Brady, when so indicated on Drawings.

F. WIRES AND CABLES REQUIRED shall be installed continuous without splice from source of supply to lighting outlet. In no case shall pull boxes be used for making splices; neither shall splices be installed in conduits.

G. PROVIDE copper grounding conductors and straps.

H. INSTALL wire and cable in conduit.

I. INSTALL wire in conduit runs after concrete and masonry work is complete and after moisture is swabbed from conduits.

J. SPLICE only in accessible junction or outlet boxes.

K. CONDUCTOR CONNECTIONS:

1. USE approved pressure type solderless connectors and lugs for all connections.
2. CONNECTORS shall be equal to Burndy, T & B, O-Z, or Penn Union, and shall be of a type compatible to conductors, location and load.
3. NEUTRAL CONNECTIONS AND TAPS shall be made individually, in order to prevent the possibility of an "open-neutral."
4. BRANCH CIRCUIT CONNECTIONS shall be made with UL approved solderless connectors equal to Buchanan, Scotch or T & B. Fixture connections shall be equal to those made by same Manufacturers. Any type used shall not depend solely upon a single insulating material to secure connection as well as to insulate it.
5. SOLDER JOINTS using Kester 50-50 solder and approved soldering paste equal to Nokorode, will be acceptable in lieu of mechanical pressure or solderless types for branch circuit and fixture connections.
6. BUS BAR CONNECTIONS shall be bolted with adequate nonferrous bolts, washers, and lockwashers, after first either silverplating the bars or applying suitable nonoxidizing agents equal to No-Oxide.
7. JOINTS AND TAPS shall be insulated with patented or molded plastic or insulators, or shall be taped suitably with Okonite or Scotch tapes. Tapes shall be compatible with conductor jackets, temperature, and other conditions.

L. ALL WIRE shall be color coded to indicate the various phases and neutral. Where color coding is impractical, approved 3/4 in. wide tape bands, corresponding to Color Code, NEC Section 210.5, and as specified below shall be provided.
1. COLOR CODING for the various systems shall be as follows:

For 120/240 Volt System
Phase A - Black
Phase B - Red
Neutral - White
Ground - Green

END OF SECTION

SECTION 16160

PANELBOARDS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. BRANCH CIRCUIT PANELBOARDS.

1.02 SUBMITTALS

A. SUBMIT Shop Drawings.

PART 2 - PRODUCTS

2.01 PANELBOARDS

A. ACCEPTABLE PRODUCTS:
   1. Square D, "Type NQ".
   2. General Electric, "Type AQ".
   3. Siemens, "Type P1".

2.02 GENERAL

A. VOLTAGE: 120/240V, 1-Phase, 3-Wire, S/N, service entrance rated, equipped with automatic circuit breakers.

B. PANELBOARDS shall be of the same make, and shall be keyed alike with a masterkey arrangement.

C. PANELBOARDS shall be of dead-front type. Cabinets shall be one-piece construction from galvanized code gauge steel. Cabinets shall have knockouts and minimum gutter space of 4 inches on all sides.

D. BRANCHES shall be automatic circuit breakers, thermo-magnetic type, with inverse time characteristics. Circuit breaker shall be quick make, quick break on manual and automatic operation. Circuit breaker shall have positive trip indication, as well as clear "OFF" and "ON" indication. Circuit breakers shall have a minimum interrupting capacity of 10,000 AMPS at 120V. Branch breakers shall be 1 or 2-pole types, having "common-trip" arrangement.

E. FACTORY ASSEMBLE panelboards with ampere rated units as indicated on Drawings. Provide spare units and blank spaces as indicated on Drawings. Main circuit breaker or lugs only as shown on Drawings. Branch connections shall be PLUG-IN.

F. NUMBERING OF BREAKERS: Large permanent individual number shall be affixed to each breaker in a uniform position. Numbering shall be such that starting at the top, odd numbers shall be used in sequence down left hand side, and even number shall be used in sequence down right hand side.

G. CONSTRUCTION: Fronts shall be galvanized code gauge steel, finished with rust-inhibiting primer and baked-enamel finish, Manufacturer's standard color. Doors shall have flush tumbler-type locks. A circuit directory frame and card with a clear plastic covering shall be provided inside of the door. Directory shall be typed to identify load fed by each circuit.

H. LOCKING CLIPS for "ON" position only, with "OFF" trip free travel, shall be furnished and installed in all circuits so indicated on Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. PROVIDE mounting brackets, bus bar drillings, and filler pieces for unused spaces.

B. PREPARE AND AFFIX typewritten directory with plastic cover to inside cover of panelboard indicating loads controlled by each circuit.

C. LABEL each panel with name and voltage on the outside with plastic engraved nameplates.

END OF SECTION

SECTION 16450

GROUNDING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. POWER SYSTEM GROUNDING.

1.02 TESTS

A. MEASURE ground grid resistance with earth test meter and install additional ground rods and conductors as required until resistance to ground complies with Code requirements.

PART 2 - PRODUCTS

2.01 POWER SYSTEM GROUNDING

A. PROVIDE APPROVED GROUNDING of secondary alternating current system per NEC.

B. GROUND AND BOND service entrance raceways, cabinets and equipment.

C. GROUNDING ELECTRODES shall be as required by NEC and as indicated on the Drawings.

D. GROUNDING/BONDING CONDUCTORS shall be sized as indicated but in no case less than minimum NEC requirements. They shall be of soft annealed copper and shall be stranded when larger than No. 10, unless noted otherwise. They may be bare except where dangerously close to live parts, but where insulated they shall have a green color jacket or finish. When metallic conduit is used as conductor, connections shall be made tight.

E. WHEN PLASTIC CONDUIT IS USED, an extra ground wire shall be provided on each run.

F. LUGS AND FITTINGS: Grounding shall be UL approved solderless.

END OF SECTION

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1ST STREET IMPROVEMENTS
SANTE FE TO WASHINGTON IN OLD TOWN
WICHITA, KANSAS
CITY OF WICHITA

REVISIONS:	MARK	DATE	DESCRIPTION

PROJ NO: 472-85285
SCALE: NONE
DATE: 7/5/17
DESIGNED BY: ST
DRAWN BY: ST
CHECKED BY: .

SHEET TITLE:
ELECTRICAL SPECIFICATIONS

SHEET NO.
75
SHEET 75 OF 90