SECTION 16010

GENERAL REQUIREMENTS – ELECTRICAL

PART 1 – GENERAL

1.01 PROVISIONS GOVERNING WORK UNDER THIS DIVISION

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

B. SUBSTITUTIONS: There shall be no substitutions without prior approval by the engineer.

1.02 SUBMITTALS

A. SUBMIT Shop Drawings within 15 days of notice to proceed. Shop drawings, product data and samples shall be dated and contain: Name of project, description or name of equipment, materials or items, identification of location at which the material or equipment is to be installed, specification section and the Contractor's approval stamp. Six copies of shop drawings shall be submitted.

B. The contractor shall during execution of the work, maintain a complete record of deviations, changes and actual installed positions (as–built drawings), accurately located by dimensions for items shown, including equipment, conduit, lighting fixtures and controls. Mark all changes on the prints. As built drawings shall be updated continuously and shall be submitted to the engineer for review.

1.03 WARRANTY

A. The contractor shall provide a written guarantee from himself and all his sub–contractors and suppliers in a form acceptable to the Owner for all materials and equipment furnished and work performed for one (1) year after substantial completion or Grand Opening.

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

   Life Safety Code (NFPA 101) 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) and the Americans with Disabilities Act (ADA).

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. 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 six sets 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 CONTROLS

A. The contractor shall provide all contactors, conduit and connections required.

PART 2 – PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. REFER to the various Sections under Division 16.

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 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Raceways.
2. Supporting devices for electrical components.
3. Electrical identification.
4. Concrete equipment bases.
5. Cutting and patching for electrical construction.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: 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. Comply with NFPA 70.

1.04 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow:

1. Set inserts and sleeves in poured–in–place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Where electrical identification devices are applied to field–finished surfaces, coordinate installation of identification devices with completion of finished surface.

PART 2 – PRODUCTS

2.01 SUPPORTING DEVICES

A. Material: Cold–formed steel, with corrosion–resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot–dip galvanized steel.

C. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

D. Expansion Anchors: Carbon–steel wedge or sleeve type.

2.02 ELECTRICAL IDENTIFICATION

A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.

B. Underground Warning Tape: Permanent, bright–colored, continuous–printed, vinyl tape with the following features:

1. Not less than 6 inches wide by 4 mils thick.
2. Compounded for permanent direct–burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend that indicates type of underground line.

C. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather–resistant, non–fading, preprinted, cellulose–acetate butyrate signs with 0.0396–inch, galvanized–steel backing, with colors, legend, and size appropriate to the application. 1/4–inch grommets in corners for mounting.

D. Fasteners for Nameplates and Signs: Self–tapping, stainless–steel screws or No. 10/32 stainless–steel machine screws with nuts and flat and lock washers.

2.03 CONCRETE BASES

A. Concrete Forms and Reinforcement Materials: As specified in Special Provision Section "Cast–in–Place Concrete."

B. Concrete: 3000–psi, 28–day compressive strength as specified in Special Provision Section "Cast–in–Place Concrete."

PART 3 – EXECUTION

3.01 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.02 RACEWAY AND CABLE INSTALLATION

A. Conceal raceways and cables unless otherwise indicated.

B. Use temporary raceway caps to prevent foreign matter from entering.

C. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

D. Use raceway and cable fittings compatible with raceways and cables and suitable for use and location.

E. Install pull wires in empty raceways. Use No. 14 AWG zinc–coated steel or monofilament plastic line with not less than 200–lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.

3.03 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot–dip galvanized materials or nonmetallic, U–channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click–type clamp system.

D. Selection of Supports: Comply with manufacturer's written instructions.

E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200–lb design load.

3.04 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U–bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

3.04 SUPPORT INSTALLATION (continued)

C. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

D. Simultaneously install vertical conductor supports with conductors.

E. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet–metal boxes directly from the structure.

F. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core–drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire–rated gypsum walls and of all other fire–rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

G. Securely fasten electrical items and their supports to the structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Existing Concrete: Expansion bolts.
2. Steel: Welded threaded studs or spring–tension clamps on steel.

   a. Field Welding: Comply with AWS D1.1.

3. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
4. Light Steel: Sheet–metal screws.
5. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof–test load.

3.05 IDENTIFICATION MATERIALS AND DEVICES

A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.

C. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color–coding may be used for voltage and phase identification.

D. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.

E. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic–laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal–backed butyrate signs for outdoor items.

3.06 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor–bolt and tie locations, unless otherwise indicated. Use 3000–psi, 28–day compressive–strength concrete and reinforcement as specified in Special Provision Section "Cast–in–Place Concrete."

3.07 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Raceways.
2. Wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Concrete bases.

3.08 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 16111

CONDUIT

PART 1 – GENERAL

1.01 WORK INCLUDED

A. CONDUIT AND COUPLINGS.

B. FLEXIBLE CONDUIT.

C. NONMETALLIC 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 INTERMEDIATE METAL CONDUIT (IMC)

A. INTERMEDIATE METAL CONDUIT shall be used in all areas rigid metal conduit is required and as allowed by the NEC.

B. INTERMEDIATE METAL CONDUIT shall be steel, galvanized.

C. INTERMEDIATE METAL CONDUIT connectors shall be threaded. Connections shall be made up tight.

D. IMC shall be used for all work in the open structures of the entrances and any installation above grade outside the building envelope.

2.03 DUCT–RIGID POLYVINYL CHLORIDE

A. PVC CONDUIT shall be used in all areas below grade, except as limited by NEC, state and local codes and regulations.

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.

2.04 FLEXIBLE CONDUIT

A. FLEXIBLE PLASTIC JACKETED TYPE with liquid tight connectors.

B. CONDUIT CONNECTIONS to motors, limit switches, solenoids, leveling devices, transformers, or as specifically indicated on Drawings shall be made with flexible conduit with vinyl jacket grounding type, same size as metallic conduit, equal to Sealtite as manufactured by American Brass Company.

C. ALL flexible conduit shall be UL listed.

2.05 GENERAL

A. OTHER SPECIAL RACEWAYS shall be used as indicated on Drawings.

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

2.06 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 & 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. The minimum size of any type of raceway shall be 1/2" trade size. "Homeruns" shall be 3/4" trade size minimum. Site lighting conduits shall be 1" trade size minimum.

B. DO NOT exceed sizes permitted by Architect in slabs and/or walls, using multiple runs where absolutely necessary.

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

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

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

F. REMOVE flattened or otherwise damaged conduits from site.

G. USE FURRED SPACES AND CHASES to an advantage in concealing conduits.

H. FIELD BENDS shall be made only where needed and then carefully to minimize wire pulling tensions and for best appearance in exposed runs.

I. TEST any conduit with lignum vitale ball (mandrel) of 85 percent of conduit diameter, wherever directed by Architect.

J. CUT CONDUIT with hacksaw or with approved pipe cutting tool and ream ends before connecting.

K. ROUTES OF ALL CONDUITS shall be parallel and/or perpendicular with walls, floors, and structural elements, except as indicated and/or approved otherwise.

L. RACEWAYS shall be securely fastened in place. Conduit shall be firmly fastened within 3 ft. of each outlet, junction box, cabinet or fitting. Rigid (heavy wall) conduit shall be supported at least every 10 ft. Rigid nonmetallic conduit shall be supported in strict accordance with Table 352.30 of the N.E.C. Raceway fasteners shall be only those designed for the purpose.

M. INSTALL conduit concealed in all areas excluding connections to surface cabinets.

N. FOR EXPOSED RUNS, attach surface–mounted conduit with clamps.

O. CLEAN out conduit before installation of conductor.

P. ALL empty conduits shall have a non–metallic pull cable installed for future use. Leave 4 ft of slack at both ends.

Q. 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

PRINTS ISSUED

DATE	PURPOSE	NO.
02.01.10	FINAL PLANS	

RIVER CORRIDOR
IMPROVEMNTS PHASE 1C:
WICHITA, KS

LawKingdon Architecture
Engineering · Planning · Interiors · Landscapes

LawKingdon Architecture
345 RIVERVIEW, WICHITA, KS 67203
Phone (316) 268-0230 Fax: (316) 268-0205

CONTACT: JEFFREY A. BEST, ASLA

PROJECT NUMBER:
08386

SHEET TITLE:
ELECTRICAL SPECIFICATIONS

SHEET NUMBER:
SE-3
OF SE-5 SHEETS