

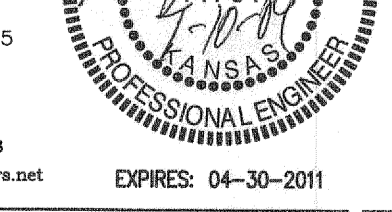
<p>7/9/2009 4:00:38 PM Mc:\2009\0907A.00 - EAO\DWG</p>	<p>DIVISION 16 ELECTRICAL</p> <p>SECTION 16010 GENERAL REQUIREMENTS</p> <p>PART 1 - GENERAL EXTENT OF WORK</p> <p>1.01 The General Conditions, General Requirements, and Special Conditions shall be and are hereby made a part of this section. The Electrical Contractor shall furnish all labor, materials, tools, transportation, equipment, services and facilities required for the complete, proper and substantial installation of all electrical work shown on the drawings and/or outlined in these specifications. The installation shall include all materials, appliances and apparatus not specifically mentioned herein or noted on the drawings, but which are necessary to make a complete working installation of all electrical systems.</p> <p>1.02 The Contractor shall consult and be guided by the General Conditions and all other divisions referred to herein and relative thereto in performing the work covered under this division of the specification.</p> <p>1.03 All of the electrical related work required for this project (unless specified otherwise) is a part of the electrical contract price and is not necessarily specified under this division of the specifications or shown on the drawings. Therefore, all divisions of the specifications and all drawings shall be consulted.</p> <p>1.04 The drawings showing the layout of the work indicate the approximate locations of outlets, apparatus and equipment. The drawings are schematic only and are not intended to show the exact routing of conductors, etc. The final determination as to the routing shall be governed by structural conditions and other obstructions. This shall not be construed to mean the design of the system may be changed. It merely refers to the exact run of a raceway between given points. The Contractor shall consult all contract drawings which may affect the location of any outlet, apparatus or equipment to avoid possible interference and permit full coordination of all work. The right to make any reasonable change in the location of apparatus, outlets and equipment up to the time of rough-in is reserved by the Architect without incurring any additional expense to the Owner.</p> <p>1.05 The approval by the Architect or his representative of any materials, drawings, etc., submitted by the Contractor will be considered as general only and to aid the Contractor in carrying out his work. Such approval does not constitute a warranty or release from the necessity of furnishing the materials and performing all the work as required by the drawings and the specifications.</p> <p>1.06 The work specified under this division of the specifications shall include the furnishing of all labor, materials, apparatus and tools necessary for the complete installation of all conduit and wiring devices for lighting, power and control systems, and such other work and equipment as are indicated on the drawings or as noted herein.</p> <p>1.07 The entire installation shall be made in a workman like manner, left completely connected, and ready to give proper and continuous service.</p> <p>1.08 All materials and work in connection with the foregoing items shall be as specified herein, or called for on the drawings.</p> <p>1.09 The complete installation shall be in accordance with the latest rules and regulations of the National Fire Protection Association and all other Boards and Departments having jurisdiction. Any items or requirements noted herein or shown on the drawings in excess of the requirements permitted under the code, shall take preference unless special permission is obtained from the Architect to the contrary.</p> <p>1.10 The light and power installation shall operate with the electrical energy obtained from outside sources. Such part of the system as may be regulated by rules of the local utility company and, in such method as construction, workmanship and materials are concerned, be in full accordance with the standard practice and rules and regulations of the local utility company.</p> <p>1.11 This Contractor shall coordinate his work under this division of the specifications with the work of other trades wherein it may be interrelated. His work shall be done in such an order that there will be no interference in installing, nor delay in completion, of any part or parts of each respective trade, thereby permitting all construction work to proceed in its natural sequence without unnecessary delay.</p> <p>1.12 Before submitting his bid, the Contractor shall familiarize himself with the rules of all governing bodies having jurisdiction and shall notify the Architect if submitting his bid, if in his opinion, any work or material specified is contrary to such rules. Otherwise, the Contractor shall be responsible for the application of all work and materials and, in case the use of any material specified is not permitted, a substitute shall be approved by the Architect and shall be provided at no increase in cost.</p> <p>1.13 Unless noted otherwise on the Drawings, or elsewhere in these Specifications, the singular words "Provide", "Furnish" or "Install" shall be construed to mean these Specifications shall mean to completely furnish, install, and connect each item, and if such is a part or component of a system the entire system shall be functional with all items and components provided.</p> <p>PART 2 - RULES AND REGULATIONS</p> <p>2.01 All work under this heading shall comply with the latest rules and regulations of the National Electrical Code Standard of the National Fire Protection Association and with all laws, regulations and ordinances of the utility company, City, County and State.</p> <p>2.02 Drawings and specifications indicate the minimum standards of construction. Should any work indicated be substandard of any ordinance, law, code, rule or regulation bearing on work shown on the drawings, the Contractor shall execute work accordingly, without increased cost to the Owner, but not until he has referred such variances to the Architect for his approval.</p> <p>2.03 This Contractor shall provide and install only the brands of materials and equipment specified herein, or equipment approved by the Architect-Engineer as equal. All material and equipment shall be listed and labeled by Underwriters Laboratories, Inc., indicating compliance with nationally recognized standards and/or tests.</p> <p>PART 3 - PERMITS, FEES AND INSPECTIONS</p> <p>3.01 Secure and pay for all necessary and usual permits, fees, inspections and certificates required for this work and deliver permits and certificates to the Architect for transmittal to the Owner before final acceptance of the project.</p> <p>PART 4 - SERVICES</p> <p>4.01 This Contractor shall pay for all expenses, deposits, reimbursements, etc., required by the local rules and codes for the service to be installed, complete and ready for use.</p>	<p>PART 9 - OPERATING INSTRUCTIONS</p> <p>9.01 The Contractor shall submit along with the shop drawings of the equipment, three (3) copies of operating instructions for all items. Instructions shall be prepared by the manufacturer of the equipment.</p> <p>9.02 After the operating instructions have been approved by the Engineer, the Contractor shall frame one (1) set under plastic and mount near the equipment described.</p> <p>9.03 The Contractor shall obtain all manufacturer's instruction manuals and provide one complete set of "as built" drawings and turn these over to the Architect upon completion of the project.</p> <p>9.04 The Contractor shall keep in a safe place all keys and special wrenches furnished with equipment under this contract and shall give same to the Architect at the completion of the project.</p> <p>9.05 The Contractor shall prepare (5) complete brochures covering all systems and equipment furnished and installed under this contract. Brochures shall be submitted to the Architect-Engineer for review prior to delivery to the Owner. The Engineer will retain (1) copy. The cost of these brochures shall be included in the contract cost. Brochures shall contain the following:</p> <p>A. Certified equipment drawings and/or catalog data clearly marked for equipment furnished as required for approval submitted under previously detailed section of these specifications.</p> <p>B. Complete operating and maintenance instructions for each item of equipment.</p> <p>C. Complete parts list for each equipment item.</p> <p>D. Any special emergency operating instructions and a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to the various parts of the system.</p> <p>E. Rear diagrams on hard systems.</p> <p>9.06 Brochures shall be bound in clear fiberoast covers or loose-leaf binders. If loose-leaf binding is used, each sheet shall be reinforced to prevent tearing from continued usage. Each brochure shall have the following information clearly printed on its front cover:</p> <p>A. Project name and address.</p> <p>B. Section of work covered: "Electrical Work".</p> <p>C. Name and address of Architect.</p> <p>D. Name and address of Engineer.</p> <p>E. Name and address of Contractor.</p> <p>F. Telephone number of Contractor, including night or emergency number.</p> <p>9.07 In addition to these written instructions, each respective Contractor shall fully and carefully instruct the Owner, or his representatives, as to the proper operation, care and maintenance of each system and its equipment.</p> <p>PART 10 - COORDINATION AND BUILDING CONDITIONS</p> <p>10.01 The Contractor shall visit the site and determine all existing local conditions affecting work in his contract. He shall examine architectural drawings and specifications to familiarize himself with the type of construction to be used for all work and how it will affect the installation of work in his contract.</p> <p>10.02 Failure to determine existing conditions or the nature of existing or new construction will not be considered as a basis for the granting of additional compensation.</p> <p>10.03 The drawings have been prepared to cover all electrical work under this contract. The Contractor is referred to all other contract drawings to guide him in the proper installation of his work.</p> <p>10.04 The Contractor shall fully familiarize himself with the floor drawings, elevations, details of construction, feeders, fixtures, conduit, wiring, services, etc., insofar as it may affect the installation of the work under this specification in order that all necessary materials and labor may be provided even though not specifically referred to on the drawings or called for in the specifications.</p> <p>10.05 As the drawings are generally diagrammatic, the final layout of the work shall be subject to the approval of the Architect but the Contractor shall be responsible without increase in contract price for the coordination of all work under various divisions of the specifications.</p> <p>10.06 This Contractor shall confer with other Contractors installing work which may affect his work and must arrange his conduit, etc., in proper relation to such work. Any damage resulting from his neglect to do so must be paid for by the Contractor.</p> <p>PART 11 - PERFORMANCE</p> <p>11.01 Provide as part of the work of this contract, in addition to the first year guarantee on equipment and materials, the following described routine maintenance and inspection. (The one year time period will not start until each and every item is complete in accordance with drawings and specifications and accepted by the Owner). Check of all emergency systems, control, fire alarm, transformers, etc., correct and adjust same. This service to be provided during the guarantee period.</p> <p>PART 12 - SYSTEM</p> <p>12.01 System: Distribution characteristics shall be as indicated on drawings.</p> <p>PART 13 - GROUNDING</p> <p>13.01 All conductors, motor frames, etc., that require grounding shall be grounded in accordance with the requirements of the National Electrical Code, local power company and local electrical codes. All ground connections to ground rods shall be with U.L. approved ground clamps. Provide additional ground rods as required to achieve a resistance of 25 ohms or less per N.E.C. 250-94; at the request of the Engineer provide a copy of the ground test results. Multiple ground rods (when required) shall not be less than 6 feet apart.</p> <p>PART 14 - ADJUSTING, ALIGNING AND TESTING</p> <p>14.01 All equipment shall be checked for proper adjustment and balance. All panelboards, distribution panels, switchboards, and transformers shall be balanced to provide a balanced load on each phase. A complete record of all such adjustments shall be made. Final readings shall be submitted to the Architect-Engineer for records. The Contractor shall provide all equipment, instruments, gauges, meters, etc., as required for the complete checking of these systems.</p> <p>14.02 Mechanisms of all electrical equipment shall be checked, adjusted, and tested for proper operation. Adjustable parts of all lighting fixtures and other electrical equipment shall be checked, adjusted, and tested as required to provide the intended performance.</p> <p>14.03 Completed wiring system shall be free from open or shorted circuits. After completion, this Contractor shall perform tests for insulation resistance in accordance with the requirements of the National Electrical Code.</p>	<p>14.04 The Contractor shall maintain service and equipment for the testing of electrical equipment and apparatus until all work is approved and accepted by the Owner. A first class voltmeter and ammeter shall be kept available at all times and this Contractor shall provide service for test readings when and as required. All test records shall be recorded on an approved form and submitted to the Architect.</p> <p>14.05 Before final acceptance is made, this Contractor shall, at his own expense, frame under plastic the sequence of operations of the sound system, controls, fire alarm, etc., for each and every item requiring instructions. These instructions shall be mounted as directed. He shall confer same with the Architect and/or his selected parties, and shall adjust all apparatus and place same in satisfactory operating condition as approved by the Architect.</p> <p>14.06 Final observation will be made upon written request from the Contractor after the project is complete. At the time of final observation, the Contractor shall be present or shall be represented by a person of authority. The Contractor shall demonstrate, as directed by the Architect-Engineer, that his work fully complies with the specifications and that all instruments or tools necessary for such demonstration and tests shall be provided by the Contractor.</p> <p>PART 15 - NOT USED</p> <p>PART 16 - GUARANTEE</p> <p>16.01 This Contractor, by the acceptance of this specification and the signing of his contract, acknowledges his acquaintance with the requirements and guarantees that every part used in constructing the system as herein described will be of the best of its respective kind that can be obtained, unless otherwise specified in most thorough and substantial manner by none but experienced workmen.</p> <p>16.02 He guarantees that all conduit as provided within and by this specification will be free from all obstructions of every description and will be free from holes or broken pipes and will be well bonded together. He guarantees that all wiring and equipment to be used in the construction of this project will be new and unused.</p> <p>16.03He further guarantees to hold himself responsible for any defects which may develop in any part of the entire system, including apparatus and appliances provided under this section of the specification, and to replace and make good without cost to the Owner any such faulty parts of construction which develop defects at any time within one year from date of final certification of completion and acceptance. Provide manufacturer's engineering and technical staff of site to analyze and rectify problems that develop during guarantee period immediately. If problems cannot be rectified immediately to the Page 16010- Owner's satisfaction, advise Architect in writing, describe efforts to rectify situation, and provide analysis of cause of problem. Architect will then suggest course of action. The Electrical Contractor shall replace material and equipment that requires excessive service during guarantee period as defined and as directed by the Architect. This guarantee does not include ordinary lamp failure.</p> <p>16.04 Use of systems provided under the Specification for temporary services and facilities shall not constitute Final Acceptance of the work nor beneficial use by the Owner, and shall not constitute guarantee period.</p> <p>PART 17 - SUPPLEMENTARY CONDITIONS</p> <p>17.01 Supplementary to all other terms of the contract, this work shall be performed subject to the following conditions.</p> <p>17.02 Materials and equipment installed on this project shall be first class in quality and shall be new and unused.</p> <p>17.03 Workmanship on this project shall be first class work performed by the experienced licensed mechanics of the proper trade.</p> <p>17.04 Work under this contract shall be adequately protected at all times. Temporary raceways shall be kept closed and all raceways shall be installed clean and free from dirt and grease.</p> <p>17.05 Storage, parking, signs, advertisement, fires and smoking shall conform to all applicable regulations and/or directions of the Architect.</p> <p>17.06 Measurements on job and shop layouts required for installation of work shall be the responsibility of the contractor and accepted by the Architect.</p> <p>17.07 Contractor shall furnish all hoists, scaffolds, staging, runways and equipment necessary for the completion of this work.</p> <p>17.08 Obtain and pay for all required electrical permits and licenses.</p> <p>17.09 Maintain lights and guards required for safety.</p> <p>17.10 Remove temporary service after use.</p> <p>PART 18 - CONTRACT CHANGES</p> <p>18.01 All changes or deviations from the contract, including those for extra or additional work, must be submitted in writing for the approval of the Architect/Engineer. No verbal orders will be recognized.</p> <p>PART 19 - RUBBISH/CLEANUP</p> <p>19.01 All rubbish resulting from the work herein specified shall be periodically removed by this Contractor.</p> <p>19.02 Clean all electrical equipment and materials of all foreign matter (both inside and outside). Clean all light fixtures using only methods and materials as recommended by the manufacturer.</p> <p>PART 20 - PROPOSALS</p> <p>20.01 The Contractor shall consult the General Conditions and the Proposal Form for proposals and subdivisions of the work required.</p> <p>PART 21 - EXTENT OF WORK</p> <p>21.01 The extent of the work under this heading of the contract shall be the furnishing of all plant, labor, materials, and equipment as required to complete work as shown on the drawings and as specified under this heading, and all plant, labor, materials and equipment not shown on the drawings or specified, but necessary for the complete installation complete in accordance with the intent of the contract, to provide first class, complete, and operative installation throughout.</p> <p>PART 22 - TAXES</p> <p>22.01 Contractor shall include all applicable local, state and federal taxes in this bid. Consult the Supplementary Conditions of these specifications relative to any and all tax exemptions permitted for this project.</p>	<p>PART 23 - "AS-BUILT DRAWINGS"</p> <p>23.01 E.C. shall prepare and submit to the Engineer, upon completion of the project, one complete set of reproducible "As Built" drawings for the electrical portion of the project.</p> <p>23.02 Drawings shall clearly indicate any and all approved deviations (i.e. addendum items, change order data, etc.) from the Project Bid Documents.</p> <p>23.03 These drawings will become the property of the Owner and will be for his future reference file, record document.</p> <p>DIVISION 16 ELECTRICAL SECTION 16020 BASIC MATERIALS AND METHODS</p> <p>PART 1 - CONDUIT</p> <p>1.01 Materials:</p> <p>A. All conduits and raceways shall be as listed below. No other wiring or raceway systems will be allowed.</p> <p>B. Rigid conduit (G.R.S.) and intermediate metal conduits (IMC) shall be standard size, hot dip galvanized steel conduit, minimum 1/2" trade size, as manufactured by Triangle PWC, Inc., Allied, or equal. Rigid conduit and IMC shall be provided with threaded fittings and couplings. In trade sizes 2-1/2" to 4", contractor may use Allied "KwikCouple" fittings in lieu of individual steel couplings. Where "Kwik-Couple" fittings are used exterior for vertical risers, install fitting with taper end up. A "green" ground wire, sized per NEC 250-95, shall be installed in all conduits containing power conductors.</p> <p>C. E.M.T. (thinwall conduit) shall be minimum 1/2" trade size, as manufactured by Triangle PWC, Inc., Allied, or equal. Provide EMT with Thomas and Betts, or equal, U.L. listed steel or die-cast type fittings. Intermediate type fittings shall not be used. Contractor may use Allied "Kwik-Tit" fittings in lieu of individual fittings. A "green" ground wire, sized per NEC 250-95, shall be installed in all conduits containing power conductors. E.M.T. conduit shall not be installed in earth or below grade.</p> <p>D. All conduit installed in wet locations, exposed exterior to the building, or subjected to physical abuse (i.e. industrial locations), shall be rigid steel conduit (G.R.S.) or intermediate metal conduit (I.M.C.). All conduit installed in earth or below grade shall be rigid steel conduit (G.R.S.), intermediate metal conduit (I.M.C.), or U.L. approved schedule 40 P.V.C. conduit.</p> <p>E. Thin wall conduit (E.M.T.) may be used where code permits except as outlined above.</p> <p>F. Short runs of galvanized or liquid tight steel flexible conduit may be used when approved by the Engineer. (Minimum 1/2" trade size.) A separate "green" ground conductor (sized per N.E.C.) shall be installed in all flexible conduits. Type AC "Armored Cable", Type MC "Metal-Clad Cable", or "BX" copper shall not be used in any manner unless supplied as part of a manufacturer's flexible wiring system for lighting and approved by the Engineer.</p> <p>G. U.L. approved schedule 40 P.V.C. conduit may only be used where conduits are to be run in earth or below grade. P.V.C. conduits shall not be used above grade inside or outside of the building, unless specifically noted otherwise on the drawings. Use G.R.S. pipe and risers, both horizontal and vertical. Use conduit adapters when converting from P.V.C. to steel conduit. Branch circuit and feeder P.V.C. conduit to be 3/4" min. Concrete encase all conduit installed below grade where so noted on the drawings. (U.L. approved schedule 40 P.V.C. with plastic spacers. All P.V.C. conduit shall be provided with a separate "green" ground conductor, sized per N.E.C.)</p> <p>1.02 Bushings and Locknuts:</p> <p>A. Where conduits enter boxes, they shall be rigidly clamped to the box by double locknuts and bushings. Conduit shall stop at the box squarely. Bushings and locknuts shall be made of malleable iron and shall have sharp clean-cut threads.</p> <p>1.03 Conduit Installation:</p> <p>A. Where conduit sizes are not specifically indicated, provide sizes in accordance with the requirements of the N.E.C.</p> <p>2.07 A "green" insulated ground conductor, sized per N.E.C. 250-95 and/or as shown on the drawings, shall be installed in each conduit containing power conductors.</p> <p>2.08 Where quantities of conductors in a raceway system are not specifically indicated, provide the number as required to maintain function, control and number of circuits as indicated.</p> <p>2.09 All conductors shall be identified at all termination points and in all pull and junction boxes by the following method of color coding:</p> <table border="1"> <tr> <td>208Y/120 Volt System</td> <td>240Y/120 Volt System</td> <td>480Y/277 Volt System</td> </tr> <tr> <td>Phase A Black</td> <td>Phase A Black</td> <td>Phase A Brown</td> </tr> <tr> <td>Phase B Red</td> <td>Phase B Red</td> <td>Phase B Orange</td> </tr> <tr> <td>Phase C Blue</td> <td>Phase C Blue</td> <td>Phase C Yellow</td> </tr> <tr> <td>Neutral White</td> <td>Neutral White</td> <td>Neutral Green</td> </tr> <tr> <td>Ground Green</td> <td>Ground Green</td> <td>Ground Green</td> </tr> </table> <p>(Note: identify "high leg" per N.E.C.)</p> <p>2.10 All conductors size #6 AWG and smaller shall have colored insulation. Where conductors with black insulation are used for the larger wire sizes (#4 AWG and larger), color coding shall be provided with two (2) open ends of No. 10 colored Scotch Vinyl electrical tape. Where any conductor is or can be supplied from an emergency system the Contractor shall mark each conductor with an additional two layers, one-half lapped, of Purple colored Scotch Vinyl electrical tape.</p> <p>2.11 Isolated ground conductors shall be green with one yellow stripe. All isolated ground circuits shall be provided with separate phase, neutral, and ground conductors (no shared neutrals or grounds).</p> <p>2.12 Provide a listing of the above described conductor color code identification scheme at all branch circuit panelboards per Article 210-4(d), National Electrical Code.</p>	208Y/120 Volt System	240Y/120 Volt System	480Y/277 Volt System	Phase A Black	Phase A Black	Phase A Brown	Phase B Red	Phase B Red	Phase B Orange	Phase C Blue	Phase C Blue	Phase C Yellow	Neutral White	Neutral White	Neutral Green	Ground Green	Ground Green	Ground Green	<p>2.13 Splices and taps for #6 and larger conductors shall be made with block type terminations (with insulating jacket) or with split bolt connectors, covered and completely insulated with a minimum of three half-lapped layers of Scotch No. 33+ (105 degree C) plastic electrical tape or by approved insulated fasteners. All splices and taps having irregular surfaces shall be properly padded with Scotchfill putty before application of insulating plastic tape. Scotchfill electrical pre-insulated splicing and tapping connectors or equal may be used up to #6 conductors.</p> <p>PART 3 - NOT USED</p> <p>PART 4 - NOT USED</p> <p>PART 5 - SUPPORTS AND HANGERS</p> <p>5.01 Provide supports and hangers as necessary and as required to insure a good and substantial installation. Support raceways, fixtures, cabinets, boxes, etc., on approved type of trapeze hangers and wall brackets, as manufactured by Unistrut, American Electric, B-I-Line, Globe, or approved equal. Provide steel hanger rods securely fastened to or through the building structure for all trapezes, etc. Do not support from mechanical piping or ductwork. Perforated plumber's straps or wire will not be permitted.</p> <p>6.01 Pull and junction boxes shall be code gauge galvanized steel boxes with hatted, hinged or screwed covers. Boxes shall be flush or surface mounted as shown or required for proper job conditions. Install in accessible locations.</p> <p>6.02 Conductors shall not be spliced within pull boxes.</p> <p>PART 7 - NOT USED</p> <p>PART 8 - NAMEPLATES AND IDENTIFICATION</p> <p>8.01 General: The following shall be equipped with nameplates:</p> <p>A. All distribution equipment (disconnect switches (fused or nonfused), switchboards, transformers, motor control centers, separately mounted circuit breakers, contactors, motor starters and relays, etc.).</p> <p>8.02 Inscription: Nameplates shall adequately describe the function or use of the particular equipment involved. Nameplates for panelboards and switchboards shall include the panel designation, voltage, phase and A.I.C. rating required (See Schedules). For example, "Panel - A, 120/208 V, 3-Phase, 4-wire, 10,000 A.I.C." The name used for a machine nameplate shall be the same as the one used on the machine's motor starter, disconnect and P.B. starter. Nameplates for fused switches and panels shall also indicate fuse type and size.</p> <p>8.03 Construction: Nameplates shall be laminated phenolic plastic, black front and black with white core. Nameplates for emergency system panelboards and transfer switches shall be front black with white core letters. Lettering shall be engraved through front layer to form 1/4" white characters (1/2" white letters for distribution panels and switchboards). Branch switch label shall be 1/4" letters. Nameplates shall be securely fastened to equipment to be identified, with double sided adhesive backed tape. Motor nameplates may be non-ferrous metal not less than 0.03" thick, die stamped. All nameplates and their installation are part of this work. All hand lettering or adhesive type type label markers will not be accepted.</p> <p>8.04 Special Electrical Systems (fire alarm, sound system, emergency systems, etc.) shall be so identified at junction and pull boxes, terminal cabinets and equipment racks with a permanent, waterproof means of identification. (Example - FIRE ALARM). Free hand lettering or adhesive type type label markers will not be accepted.</p> <p>8.05 Wall switches or other control devices controlling mechanical or special lighting control configurations shall have either engraved wall plates or shall be provided with engraved nameplates.</p> <p>DIVISION 16 ELECTRICAL SECTION 16030 SERVICE AND DISTRIBUTION</p> <p>PART 1 - MAIN SERVICE</p> <p>1.01 Primary: See the plans.</p> <p>1.02 Secondary: See the plans. Voltage will be, 277/480-volt, 3-phase, 4-wire, WYE, 120/208-volt, 3-phase, 4-wire, WYE, 240-volt, 3-phase, 3 wire Delta, or 120/240-volt, 1-phase, 3 wire.</p> <p>1.03 Consult power company for their requirements and for coordinating with their installation. Contractor shall provide any work thus required beyond that indicated by drawings and/or specifications and pay for costs incurred for the Utility Company to install both temporary and permanent service to the project. Verify costs with Utility Company prior to bidding. Contractor shall provide guard posts around electrical transformers and electrical pedestals per Utility Company standards.</p> <p>PART 2 - DISTRIBUTION EQUIPMENT</p> <p>2.01 Part 2 applies to all distribution equipment supplied on the Project.</p> <p>2.02 All electrical distribution equipment (switchboards, panelboards, disconnect switches, transformers, starters, etc.) shall be of one manufacturer, unless specifically noted on the drawings or specifications, or approved by the Engineer. Interfacing of distribution equipment by different manufacturers will not be permitted.</p> <p>2.03 If shown on the plans, provide surge arrester for lightning protection on main service entrance. Refer to drawings for voltage and phasing of service. Arrester shall be located within 100 feet of the main service entrance as indicated on the plans.</p> <p>2.04 Equipment layouts on the drawings are based upon one manufacturer. Verify all actual equipment sizes with equipment manufacturer prior to bidding.</p> <p>2.05 If layout changes are required due to other electrical manufacturers equipment size, they must be submitted to and approved by the Engineer prior to bidding. National Electric Code working clearances must be maintained at all times. In no case shall extra remuneration be allowed for layout changes that differ from those shown.</p> <p>2.06 Shop drawings shall be furnished for all distribution equipment indicating the following information:</p> <p>A. Switchboard voltage/current rating.</p> <p>B. Overall outline dimensions including weight, available conduit space.</p> <p>C. Switching and protective device ampere ratings.</p> <p>D. Bus ratings and material.</p> <p>E. One line diagram.</p> <p>F. Integrated short circuit rating.</p> <p>G. Coordination of any ground fault system settings shall be as per the manufacturers requirements.</p> <p>H. Adequate conduit space shall be provided to meet the requirements established on the drawings.</p> <p>2.07 All items of distribution equipment required to be floor mounted shall be mounted on a minimum 3 1/2" concrete base above floor. Concrete base to be by Electrical Contractor.</p> <p>2.08 All phase and neutral busing and all ground bars in panelboards and switchboards shall be copper only. All bus shall be AL/CU rated. All panelboards supplied by "K" factor transformers shall have 200% rated neutrals.</p> <p>2.09 Panel schedules are not shown on the drawings, however, copies of these schedules are available to the Contractor after bids are let, upon request to the Engineer.</p> <p>PART 3 - BRANCH CIRCUIT AND DISTRIBUTION PANELBOARDS</p> <p>3.01 General:</p> <p>A. All panels shall be provided with key locking door.</p> <p>B. Panels shall have hinged covers with concealed trim clamps, doors shall have laser cut trim with concealed hinges, and flush lock, master keyed. Hinged cover shall have a typewriter hinge down one side and door opening by a single latch. Where multi-section panelboards are indicated on the drawings, panel enclosures and covers shall be of the same size for each section.</p> <p>C. Key all doors alike and furnish two (2) keys for each lock. Doors over 48" high and double doors shall be provided with the same key for each door. Consult drawings for flush or surface mounting.</p> <p>D. After wiring, label each circuit and provide under each label a complete and legible wiring schedule including load description of all circuits in panel. Mark spare breakers and provisions for future breakers in pencil on schedule for future marking.</p> <p>E. Breakers shall have individual plastic cases sized as scheduled on the plans. Two and three pole breakers shall have common trip (single pole units with the bars are not acceptable). Main circuit breakers shall be vertically mounted. Back-feed main circuit breakers above 100 amps will not be acceptable. Where spaces exist in the panel summary, provide all necessary bussing, device support, and connections for future circuit breakers. Provide blank cover for all spaces.</p> <p>F. All panelboards shall have copper ground buses installed and grounded per the requirements of the N.E.C. All panelboards serving devices having isolated ground circuits shall be provided with an additional insulated copper ground bus for connection of isolated ground conductors. All neutral and ground bars shall have a minimum number of lugs equal to 65% of number of pole spaces in panel. In computer rated or high speed panelboards, all neutral, ground and isolated ground bars shall have a minimum number of lugs equal to 100% of number of pole spaces in panel.</p> <p>G. Where flush mounted panels occur on drawings Contractor shall stub into ceiling void for future use, (1) 1" empty conduit for every four spare 20A breakers or unused panel spaces. On multi-story buildings, Contractor shall stub into ceiling void above panel and into ceiling void of floor below for future use, (1) 1" empty conduit for every four spare 20A breakers or unused panel spaces. Conduits stubbed into ceiling void below panel shall be provided with conduit cap and labeled "To Panel Above".</p> <p>H. All panelboards supplied from an emergency source shall have breakers provided with handle lock-offs for each breaker. Breaker handles to be set in the "ON" position.</p> <p>I. All phase and neutral busing and all ground bars in branch circuit panelboards and circuit breaker distribution panelboards shall be copper only. All lugs shall be AL/CU rated. All panelboards supplied by "K" factor transformers shall have 200% rated neutrals.</p> <p>3.02 Branch Circuit Panelboards:</p> <p>A. Panelboards rated up to 240V (400A max.) shall have a short circuit current rating tested to U.L. Standards for a minimum rating of 10,000 A.I.C. unless noted otherwise. Breaker rating with-in panel shall be equal to or greater than minimum integrated equipment rating. Series ratings will not be accepted, unless specifically noted otherwise on the drawings. All breakers shall be of either the plug-in type or bolt-in type.</p> <p>B. Panelboards rated over 240V and up to 480V (400A max.) shall have a short circuit current rating tested to U.L. Standards for a minimum rating of 14,000 A.I.C. unless noted otherwise. Breaker rating with-in panel shall be equal to or greater than minimum integrated equipment rating. Series ratings will not be accepted, unless specifically noted otherwise on the drawings.</p> <p>C. Branch Circuit Breaker Panelboards:</p> <table border="1"> <tr> <td>Panel Rating</td> <td>Surge & Siemens G.E. Cutler-Hammer</td> </tr> <tr> <td>240V (400A max)</td> <td>N000 51/53 AL PRL1</td> </tr> <tr> <td>480V (400A max)</td> <td>NF 52/53 AE PRL2</td> </tr> </table> <p>D. Distribution panels located in finished rooms (other than mechanical, electrical rooms or janitor rooms) shall be provided with key locking doors.</p> <p>DIVISION 16 ELECTRICAL SECTION 16040 LIGHTING</p> <p>PART 1 - LIGHTING FIXTURES</p> <p>1.01 This work shall include all lighting fixtures and lamps as specified on the drawings and herein. Fixtures shall be completely free of defects, dents, rust or chipped surfaces. No cracked, broken, or chipped lenses will be acceptable. Fixtures that are cracked, broken, chipped, rusted, dented or otherwise damaged, shall be replaced without additional cost to the Owner. Fixtures shall be furnished complete including hickey, suspension nipples, and all other materials and equipment as required for hanging and supporting fixtures in accordance with U.L. ULB, and NEC requirements. This Contractor shall furnish and install lamps for all fixtures and shall wipe fixtures and lamps before and after installation. All recessed mounted fixtures shall be provided with the trim flush to the finish ceiling or wall surface, free of gaps or cracks.</p> <p>1.02 H.L.D. Fixture Ballasts shall be capable of starting and operating the specified lamps within the limits specified by the lamp manufacturer. The ballast shall limit lamp wattage variation to a maximum of +5 percent from nominal. At rated line voltage the ballast shall have a minimum power factor of 95% Ballast primary current during lamp starting must not exceed current during normal lamp operation. The ballast must reliably start and operate the lamp in ambient temperatures down to -20 degree F, where installed outdoors and down to +20 degree F, where installed indoors. The ballast shall be capable of withstanding continuous operation with the ballast secondary in a short-circuit condition without loss of ballast life. Ballasts shall be Jefferson, Sylvania, Universal, Magnetek, Advance, Wide-Life, Halophane or Westinghouse.</p> <p>1.03 Lamps shall be as follows. Once a manufacturer has been selected, all lamps on the project shall be by the same manufacturer.</p> <p>A. Incandescent lamps shall be instant frosted unless otherwise called for in the fixture specifications. (Rated at 130 volts). Incandescent lamps shall be manufactured by Philips, G.E., Sylvania, or equal approved by the Engineer. Refer to lighting fixture manufacturer for lamp type.</p> <p>E. High pressure sodium lamps shall be Lumalux/D (coated) as manufactured by G.E., Sylvania, Philips, or equal approved by the Engineer. Refer to lighting fixture manufacturer for lamp type.</p>	Panel Rating	Surge & Siemens G.E. Cutler-Hammer	240V (400A max)	N000 51/53 AL PRL1	480V (400A max)	NF 52/53 AE PRL2
208Y/120 Volt System	240Y/120 Volt System	480Y/277 Volt System																											
Phase A Black	Phase A Black	Phase A Brown																											
Phase B Red	Phase B Red	Phase B Orange																											
Phase C Blue	Phase C Blue	Phase C Yellow																											
Neutral White	Neutral White	Neutral Green																											
Ground Green	Ground Green	Ground Green																											
Panel Rating	Surge & Siemens G.E. Cutler-Hammer																												
240V (400A max)	N000 51/53 AL PRL1																												
480V (400A max)	NF 52/53 AE PRL2																												

Drawing Title: Intrust Bank Arena Parking Lots/Title and Note Page:dwg

Design: ICE
Drawn: ICE
Approved: ICE
Scale: As Shown

Project No: 0903E274
CITY OF WICHITA
INTRUST ARENA PARKING LOTS
CONCEPT 1 LIGHTING PLAN

Integrated Consulting Engineers, Inc.
2604 W 9th St - Ste. 100 - Wichita, KS 67203
316-264-3588 - 316-264-3948 - icengineers.net



EXPIRES: 04-30-2011
SHEET: B31 OF 31

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