

## SECTION 16000

### ELECTRICAL

#### PART 1 GENERAL

##### 1.01 General:

- A. Provisions of the bidding requirements and conditions of the contract, Division 1, and this section apply to all sections in the divisions.
- B. Furnish and install all labor, material and equipment required for installation of a complete safe, workable, electrical system as indicated by contract drawings and the electrical specifications. All work shall be in complete compliance with all local, state and national applicable codes, and as approved by Owner, including but not limited to N.E.C. (2005), OSHA and Washington Construction Code (State Department of Labor and Industries regulations).

##### 1.02 Scope of Work:

- A. Electrical contractor to install Owner provided standby generator and (2) associated 150 amp automatic transfer switches.
- B. 100 kw, 277/480 volt, 3 phase, 4 wire standby generator set, (2) automatic transfer switches and remote annunciator will be delivered to site. All other associated work to be by electrical contractor.
- C. Standby generator will be delivered to site and set on concrete pad by electrical contractor. Contractor to coordinate size of concrete pad, crane and associated equipment required for complete installation.
- D. Owner will delivery automatic transfer switches, remote annunciator and contractor shall install where indicated on drawings.
- E. Contractor shall be responsible for providing fuel for a complete fuel tank.
- F. Contractor will be responsible for coordination of start up and training. Start up and training will be provided by generator supplier.
- G. All conduit, wiring and installation associated with this project to be done by electrical contractor.

##### 1.03 Approved Equal Products:

- A. Items of equipment or materials referred to in these specifications and on the drawings are used for the purpose of establishing a quality and standard of materials. Equal material may be used only if submitted and approved as equal products by shop drawings, the contractor shall assume full responsibility and cost to provide a product of equal quality to that specified.

1.04 Drawings:

- A. Drawings are to be used as a guide for quantity, approximate location and electrical system design criteria. It shall be the contractor's responsibility to coordinate all electrical devices with all other trades, and over-all features to provide a symmetrical appearance. Should a conflict of quantity, coordination, location, etc., arise; the Electrical Contractor shall immediately contact the Owner for clarification. The Owner's decision shall be final and binding as though a part of the specifications. All extra cost involved with the electrical to comply with the specifications or intent of the drawings, will be absorbed by the Electrical Contractor unless a written change order (including dollar amounts), is signed by the Owner.
- B. The Electrical Contractor shall examine all drawings (structural, mechanical and over-all), and specifications for contradictions or discrepancies between drawings and existing conditions, specifications, etc. Any contradictions, discrepancies or design which the contractor does not believe meet all codes, or will not work as shown or intended, shall be reported in writing (72 hours prior to bid opening) to the Owner. If no discrepancies, etc., are reported, the contractor will be held responsible for a complete electrical installation as shown and specified without any additional cost to Owner.

1.05 Compliance:

- A. Contractor shall secure and pay for all necessary permits and inspections required to complete work shown and intended.

1.06 Workmanship:

- A. All work shall be performed by skilled, qualified workmen, with adequate experience in his trade to execute all work intended subject to approval of Owner.

1.07 Guarantee:

- A. All work and equipment to be free of defects for a period of (1) year from date of job completion. Job completion shall be determined as Owner's acceptance in writing or final payment by Owner. Any work or material determined as defective within the one-year guarantee period shall be replaced or repaired by the contractor at no cost to the Owner.

1.08 Shop Drawings:

- A. Contractor shall submit 5 copies of shop drawings to Owner for approval of equipment to be used. Shop drawing review and/or approval do not relieve the contractor from any responsibilities for providing proper materials as intended to complete a workable, safe project. No equipment subject to shop drawing approval shall be installed or purchased without approved shop drawings.

1.09 Revisions:

- A. There shall be no changes regarding the intent of these drawings or specifications or materials previously approved without the written approval of the Owner. Any changes believed to be necessary by the contractor shall be brought to the attention of the Owner for his approval.

1.10 Existing Conditions:

- A. Contractor shall visit site to verify existing conditions for complete coordination between drawings and existing field conditions prior to bidding. Should the contractor find a discrepancy between drawings and existing conditions, he shall notify the Owner (72) hours before bid date. If the contractor fails to notify the Owner before bid date, the contractor will be held responsible for all revisions as shown or as required by job conditions to provide a complete electrical installation as indicated.

1.11 Coordination:

- A. The Division 16 contractor is responsible to coordinate electrical work with other existing trades to allow the code compliant installation of electrical equipment, raceways, lighting, etc. with respect to other equipment including but not limited to ductwork, piping, HVAC equipment, and furniture.

1.12 Cutting And Patching:

- A. Any opening required for installation of electrical equipment, conduit, etc., shall be by the Electrical Contractor. All cutting and patching shall be subject to approval of Owner.

1.13 Equipment Connections:

- A. The Electrical Contractor shall make final electrical connections to all pieces of equipment supplied and installed by other contractors as indicated on drawings. Should any of the above equipment require a disconnecting device (per N.E.C.) it shall be this contractor's responsibility to coordinate, supply and install such devices and make final connection.

1.14 Identification:

- A. Provide proper identification for panel, switches, starters or any other piece of electrical device which would be used as a control device or disconnecting means for any equipment.

1.15 Grounding:

- A. All electrical devices, motors, etc., shall be grounded per N.E.C. Article 250.
- B. See drawings for additional or special grounding requirements.

1.16 Accessibility Of Electrical Components:

- A. Contractor shall be responsible for code compliance accessibility of all electrical devices per 2005 N.E.C. Section 110-16 and shall coordinate with other trades. Electrical power connections shall not be made to equipment not in compliance.

1.17 As Built-Drawings:

- A. Contractor shall keep record drawing of any and all electrical field changes required during construction. At the end of construction the contractor shall turn over to owner one complete set of drawings indicating field changes for record purposes.

**PART 2 PRODUCTS**

2.01 Labeling:

- A. All electrical equipment shall have Underwriters Laboratories, Inc., or other owner approved testing facility label wherever published standards exist. Compliance with UL standards is not acceptable. If the manufacturer cannot arrange for labeling of an assembled unit at the factory, the necessary inspection and acceptance by the testing facility shall be performed in the field at no additional cost to the owner, and be acceptable to the authority having jurisdiction.

**PART 3 EXECUTION**

3.01 Workmanship:

- A. Shall be of quality satisfactory to the owner. Remove and replace lesser quality work as directed at no additional cost to the owner. The owner shall be the judge of the required quality of workmanship.

3.02 Completion, Testing and Clean Up:

- A. Upon completion of all electrical work, the contractor shall have thoroughly clean equipment and premises of any tools, crates, boxes, wire, etc., related to the electrical work. Contractor shall perform all tests required to assure a complete safe operating system, including but not limited to tests required by other sections of this specification. After the above conditions have been complied with, the contractor shall inform the general contractor or owner for final inspection.
- B. During final inspection, the contractor shall have a representative present for removal and replacement of any box face plates, panel fronts, etc., requested by the engineer for inspection purposes. At time of request of final inspection, contractor shall provide certificate of inspection. If field observation by owner/engineer determines that electrical work is not substantially complete and ready for final inspection, any additional trips for final inspection will be at the expense of the contractor. A written report of conditions, required changes to meet contract documents, etc.,

will follow inspection and the contractor shall immediately make changes, corrections, etc., required to comply with the report. Final contract payment will not be made until this has been completed to owner's satisfaction.

## SECTION 16110

### ELECTRICAL RACEWAYS, WIRING AND DEVICES

#### PART 1 GENERAL

##### 1.01 Description of Work:

- A. This section covers the furnishing and installation of all raceways, wiring and devices used in the construction of this facility.

##### 1.02 Submittals:

- A. Project data and samples submitted in accordance with the General Division and shall include, but not limited to the following:
  - 1. Catalog data showing material information and conformance with specifications.
  - 2. Manufacturer's name and address.

#### PART 2 PRODUCTS

##### 2.01 Wiring:

- A. All conductors shall be #12 copper or larger, except control wiring may be #14 copper. #10 conductors or smaller must be solid, #8 conductors and larger shall be stranded copper of minimum size called for or as required by N.E.C.
- B. Conductor insulation shall be 600 volt THHW or THWN, 75 °C unless noted otherwise.
- C. All conductors shall be new, clean, soldered and insulated with PVC electrical tape or provided with U.L. approved pressure type connectors equal to 3M Company, Scotchlock or Ideal wing nut with PVC on nylon covers.
- D. All wire shall be copper conductors.

##### 2.02 Raceways:

- A. Conduit
  - 1. Galvanized rigid steel conduit or IMC shall be used in wet, corrosive or hazardous areas, main service feeders, and where exposed to physical damage.
  - 2. EMT conduit may be used for branch circuiting or for panelboard feeders where concealed in walls or ceiling.

3. Liquid tight flexible metallic conduit shall be used for connections to vibrating equipment or motors.
  4. For underground applications, Schedule 40 PVC (except as noted above) shall be used. All bends 45° or larger shall be made with rigid steel elbows. All PVC conduit installations shall include a separate ground wire.
- B. Conduit fittings used shall match the raceway system being used.
- C. Refer to drawings for additional conduit type requirement.

2.03 Devices:

- A. Approved manufacturers are:

1.	Receptacles	<u>Hubbell</u>	<u>Leviton</u>	<u>P&amp;S</u>
	a. GFI	GF5362I	6899I	2091-S

**PART 3 EXECUTION**

3.01 Wiring:

- A. All wiring shall be installed in a rigid raceway system, including control wiring low voltage, etc., unless specifically noted otherwise.
- B. All conductor joints shall be in accessible boxes. Additional junction boxes shall be installed as required to meet N.E.C. or as required to install conductors without physical damage. Any conductors determined damaged will be replaced by the contractor as recommended by owner or engineer.

3.02 Conduit Installation:

- A. Where conduits are run above accessible ceilings, route parallel or at right angles to ceiling system and structural members. Install as close to the underside of the roof as possible in order to avoid conflicting with removal of ceiling panels. Coordinate with the location of structural members, mechanical ductwork, plumbing, lighting fixtures and ceiling support system. Conduits shall not be supported from mechanical ducts or pipes.
- B. In all finished areas conduit system shall be concealed in walls, floors or above ceilings. In unfurnished areas conduit may be exposed, run straight, horizontal or plumb with proper support, unless shown otherwise.
- C. All conduit shall be independently supported with steel supports at ends, at boxes and all vertical or horizontal runs in compliance with N.E.C.

- D. Conduit hangers shall be provided for all conduit runs. Secure hangers to inserts embedded or drilled into concrete slabs. All anchors in concrete to be drilled and set.

3.03 Devices:

- A. Center all outlets with regard to building lines, furring and trim.