SECTION 16010
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 Scope:

a. This section supplements all sections of this division and shall apply to all phases of work hereinafter specified, shown on the drawings, or required to provide a complete installation of electrical systems for the Project. The work required under this division is not limited to the Electrical Drawings. Refer to Site, Architectural, Structural, and Mechanical Drawings which may designate Work to be accomplished. The intent of the Specifications is to provide a complete electrical system which include all documents which are part of the contract.

1. Work included: Furnish all labor, material, tools, equipment, facilities, transportation, skilled supervision necessary for, and incidental to, performing operations in connection with furnishing, delivery, and installation of the work in this section complete as shown or noted on the Drawings and specified herein.

b. Related Work Specified Elsewhere:

1. Refer to all sections in Division 0, Contract Requirements and Division 1, General Requirements.

c. Work Installed but Furnished by Others:

1. The electrical work includes the installation or connection of certain materials and equipment furnished by others. Verify installation details. Foundations for apparatus and equipment will be furnished by others unless otherwise noted or detailed.

1.2 General Requirements:

a. Guaranty See General Conditions:

1. Except as may be specified under other Sections in the specification, guarantee equipment furnished under the specifications for a period of one year, except for equipment required to have a longer guaranty period, from date of Substantial Completion against defective workmanship and material, and improper installation. Upon notification of failure, correct deficiency immediately and without cost to the Owner.

2. Standard warranty of manufacturer shall apply for replacement of parts after expiration of the above period. Manufacturer shall furnish replacement parts to the Owner or his service agency as approved. Furnish to the Owner, through the Architect, printed manufacturer's warranties complete with material included and expiration dates, upon completion of project. Conform to Section 01720.

b. Equipment Safety: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety.

c. Codes and Regulations:

1. Design, manufacture, testing and method of installation of all apparatus and materials furnished under the requirements of these specifications shall conform to the latest publications or standard rules of the following:

Institute of Electrical and Electronic Engineers – IEEE
National Electrical Manufacturers' Association – NEMA
Underwriters' Laboratories, Inc. – UL
National Fire Protection Association – NFPA
American Society for Testing and Materials –ASTM
American National Standards Institute – ANSI
California Electrical Code - CEC
California Fire Code
California Energy Code
California Code of Regulations, Title 8, Subchapter 5
California Building Code
State & Municipal Codes in Force in the Specific Project Area
Occupational Safety & Health Administration – OSHA
California State Fire Marshall – CSM

The term "Code" when used within the specifications, shall refer to the Publications, Standards, ordinances and codes, listed above. In the case where the codes have different levels of requirements the most stringent rules shall apply.

d. Requirements of Regulatory Agencies:

1. Codes, Permits, and Fees: Where the Contract Documents exceed minimum requirements, the Contract Documents take precedence. Where code conflicts occur, the most stringent shall apply unless variance is approved.

a. Comply with all requirements for permits, licenses, fees and Code. Permits, licenses, for the Work shall be obtained by the Contractor at his expense, unless otherwise specified.

b. Comply with the requirements of the applicable utility companies serving the Project. Make all arrangements with the utility companies for proper coordination of the Work.

e. Shop Drawings:

1. See Section 01340 for additional requirements.

2. Coordination Drawings: Prepare coordination drawings in accordance with the Provision in section 01340.

3. Time Schedules for Submission and Ordering: The Contractor shall prepare, review and coordinates his schedule of submissions carefully, determining the necessary lead time for preparing, submitting, checking, ordering and delivery of materials and equipment for timely arrival. The Contractor shall be responsible for conformance with the overall construction schedule.

4. Submittals will be checked for general compliance with specifications only. The Contractor shall be responsible for deviations from the drawings or specifications and for errors or omissions of any sort in submittals.

5. Submit a complete list of materials and equipment proposed for the job, including manufacturer's names and catalog numbers.

6. Shop drawings shall be submitted in completed groups of materials (i.e., lighting fixtures or switchgear). The Contractor shall add and sign the following paragraph on equipment and materials submitted for review. "It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into the project; is in compliance with the Contract Drawings and specifications and can be installed in the allocated spaces." Failure to add the above written statement for compliance will result in return of submittals to be reviewed.

   a. Bind catalog cuts, plate numbers, descriptive bulletins and drawings, 11" x 17" or smaller, in sets with covers neatly showing titles.
   b. The Contractors shall verify dimensions of equipment and be satisfied as to Code compliance for fit prior to submitting shop drawings for approval.
   c. Where current limiting devices are specified, submit technical data to substantiate adequate protection of equipment cascaded downstream. Submittals shall not be reviewed unless supporting calculations and data are submitted therewith.
   d. Include complete catalog information such as construction, ratings, and insulation systems, as applicable.
   e. For any material specified to meet UL or trade standards, furnish the manufacturers or vendors certification that the material furnished for the work does in fact equal or exceed such specifications.
   f. Reference listings to the specifications' Sections and Article to which each is applicable.
   g. Equipment Floor Plans: After approval of material is secured prepare a floor plan of each electrical and communication equipment room, drawn to scale at ½ inch equals 1 foot and submit for approval in the same manner as for shop drawings. The layout drawings shall be exact scale.
   h. Contractor shall prepare coordinated drawings when required.

f. Interpretations: Request for interpretations of drawings and specifications must be made by the Contractor through the Architect. Any such requests made by equipment manufacturers or suppliers will be referred to the Contractor.

g. Substitutions: Refer to section 01600.

h. Submit comprehensive material list, shop drawings and complete technical data for the following equipment and materials:

   1. General Requirements:
      a. Main service and distribution switchboards.
      b. Panelboards.
      c. Transformers.
      d. Building Wires and Cables.
      e. Conduits, Conduit fittings and Boxes.
      f. Wiring Devices.
      g. Disconnect Switches.
      h. Pull boxes and Handholes.
      i. Standard lighting fixtures, specially fabricated fixtures, ballasts and lamps, with samples and sample of standard finish available (where requested).
      j. Control devices, standard and special receptacles, switches, plug strips and finish device plates.

k. Cabinets for signal and telephone system and special terminal cabinets.
l. Lighting Control Panels.
m. Motor Controls.
n. Contactors.
o. Sports Lighting System.
p. Fire Alarm System.
q. Security System.
r. CATV System
s. CCTV System
t. Communication and Data Processing Equipment
u. Public Address / Paging System.

i. Utility Service:

1. Contractor shall verify the locations shown on the drawings and shall include extensions of lines to service locations which are acceptable to the utility companies. Costs levied by the serving utility must be borne by the Contractor.

2. Verify electrical, civil, architectural and structural, dimensional and other requirements with the serving utility companies.

3. Should any major modifications to the work indicated be necessary to comply with the utilities requirements, notify the Architect.

4. Within five days after award of Contract, notify serving utilities that the project is under construction and furnish them the dates on which various services will be required.

j. Record Drawings: Refer to Section 01700, Contract Closeout.

k. Work Responsibilities:

1. The drawings indicate diagrammatically the desired locations or arrangement of conduit runs, outlets, junction boxes and equipment and are to be followed. Execute the work so as to secure the best possible installation in the available space and to overcome local difficulties due to space limitations. The Contractor is responsible for the correct placing of his work. Where conflicts occur in plans and/or specifications, the most stringent application shall apply.

2. Locations shown on architectural plan or on wall elevations shall take precedence over electrical plan locations, but where a major conflict is evident, notify the Architect.

3. In the event changes in the indicated locations or arrangement are necessary due to developed conditions on the building construction or rearrangement of furnishings or equipment, such changes shall be made without extra cost.

4. Verify dimensions and the correct location of Owner-Furnished equipment before proceeding with the roughing-in of connections.

5. Lighting fixtures in mechanical spaces are shown in their approximate locations only. Do not install light outlets or fixtures until mechanical piping and ductwork are installed; then lights shall be installed in locations best suited for equipment arrangement as directed by the Architect.

6. All scaled and figured dimensions are approximate of typical equipment of the class indicated. Before proceeding with work carefully check and verify dimensions and sizes with the drawings to see that the equipment will fit into the spaces provided without violation of applicable Codes.

7. Should any changes to the work indicated on the drawings or described in the specifications be necessary in order to comply with the above requirements, notify the Architect.

8. Be responsible for coordination of coordinated drawings.

9. Replace or repair, without additional compensation any work which does not comply with these requirements.

I. Installation General: For special requirements, refer to specific equipment under these requirements:

1. Unless otherwise specified elsewhere in the specifications, do all excavating necessary for proper installation of the electrical work.

2. Locations of Openings: Locate chases, shafts and openings required for the installation of the electrical work during framing of the structure. Do any additional cutting and patching required. Cutting or drilling in any structural member is prohibited without approval of the Architect. Furnish access panels as required.

3. Location of Sleeves: Where conduits pass through concrete walls, suspended slabs or metal deck floors, install sleeves of adequate size to permit installation of conduit. Sleeves shall be installed prior to pouring of concrete and shall have ends flush with the wall or extend 2 inches above floor surfaces. Verify locations.

4. Type of Sleeves: Sleeves shall be steel pipe or galvanized sheet steel.

5. Finish Around Sleeves: Rough edges shall be finished smooth. Space between conduit and sleeves where conduit passes through exterior walls shall be sealed to permit movement of conduit, but prevent entrance of water. Space between conduit and sleeves where conduit passes through fire rated interior walls and slabs shall be sealed with approved materials to provide a fire barrier conforming to the requirements of the governing authorities having jurisdiction, using UL Approved Firestopping Systems.

6. Wherever conduit extends through roof, install flashings in accordance with drawings and details.

7. Be responsible for cutting and patching which may be required for the proper installation of the electrical work.

8. Protect work, materials and equipment cause whatever and provide adequate and proper storage facilities during the progress of the work. Storage outdoors shall be weather protected and shall include space heaters to prevent condensation. Provide for the safety and good condition of all work until final acceptance of the work. Replace all damage or defective work, materials and equipment before requesting final acceptance.

9. Conduit and Equipment to be Installed: Clean thoroughly to remove plaster, spattered paint, cement and dirt on both exterior and interior.

10. Conduit and Equipment to be Painted: Clean conduit exposed to view in completed structure by removing plaster and dirt. Remove grease, oil and similar material from conduit and equipment by wiping with clean rags and suitable solvents in preparation for paint.

11. Items with Factory Finish: Remove cement, plaster, grease and oil, and leave surfaces, including cracks and corners, clean and polished. Touch up scratched or bare spots to match finish.

12. Site Cleaning: Remove from site all packing cartons, scrap materials and other rubbish.

13. Electrical equipment and materials exposed to public and in finished areas shall be finish-painted after installation in accordance with the Painting Section. All exposed screw-type fasteners, exterior or interior in restrooms, shall be vandal-resistant spanner type; include tool.

m. Excavation, Cutting and Patching:

1. Excavating, trenching and backfilling required for the work of this Division in accordance with the applicable requirements of Division 2. Excavating and backfilling connected with electrical work, repaving cuts and providing and maintaining protective measures for the electrical work excavation required by the governing authorities having jurisdiction shall be performed as a part of the work of this division.

2. Verify openings indicated on the drawings. Additional cutting, patching and reinforcement of the construction of the building as required.

n. Tests:

1. Equipment and systems for which the National Electrical Testing Association (NETA) has an approved or recommended procedure, shall be tested in accordance with that procedure. Test values shall equal values recommended by NETA. Copies of test reports shall be submitted as required under shop drawing submittals.

2. Resistance to ground test shall be accomplished by a qualified independent testing firm to measure resistance to ground at grounding electrodes. Make test before slabs or affected areas are poured in order that corrective measures, if required, may be taken. Submit a report showing the results of these measurements. If the resistance exceed values specified elsewhere or NETA test procedure recommendations, perform corrective measures required to reduce resistance to acceptable values.

3. Prior to energizing any motor, measure the service voltage for phase balance and report if unbalance exceeds 1% from mean.

4. Measure the three-phase voltage at no load and at maximum load conditions and submit to the engineer a report showing the results of these measurements.

5. Upon completion of the work and adjustment of all equipment, conduct

an operating test. Conduct the test in the presence of an authorize representative of the Architect. Demonstrate system and equipment to operate in accordance with requirements of the Contract Documents and to be free from electrical and mechanical defects. Provide systems free from short circuits and grounds and show an insulation resistance between phase conductors and ground not less than the requirements of the governing electric code. Test circuits for proper neutral connection.

6. Complete test prior to final inspection of project, including corrective work based on the results of the tests.

7. Perform special tests on systems and equipment as specified herein using personnel qualified to perform such tests.

o. Protection: Protect finish parts of the materials and equipment against damage during the progress of the work and until final completion and acceptance. Cover materials and equipment in storage and during construction in such a manner that no finished surfaces will be damage or marred. Keep moving parts clean, dry and lubricated.

p. Cleaning Up:

1. Upon completion of the work and at various time during the progress of the work, remove from the building all surplus materials, rubbish and debris resulting from the work of this Division.

2. Thoroughly clean switchgear including busses, apparatus exposed conduit, metal work including the exterior and interior, and accessories for the work of this Division, of cement, plaster and other deleterious materials; remove grease and oil spots with cleaning solvent; carefully wipe surfaces and scrape cracks and corners clean.

3. Thoroughly polish chromium or plated work. Remove dirt stains from lighting fixtures.

4. Leave the entire installation in a clean condition.

q. Completion:

1. The work will not be reviewed for final acceptance until operating and maintenance data, manufacturer's literature, panel directories and nameplates specified herein have been approved and properly posted or installed and final cleaning of equipment and premises has been completed.

2. When the installation is complete and adjustments have been made, operate the system for a period of one week, during which time demonstrate that systems are completed and operating in conformance with the specifications.

r. Operating and Maintenance Data: Submit complete and at one time, prior to acceptance of the installation, 4 copies of manufacturer's instructions for operation and maintenance of electrical equipment, including replacement parts lists.

s. Inspection and Acceptance Procedures: The Architect will submit observation reports periodically during the construction phase detailing Contract deficiencies. The Contractor is responsible for making corrections immediately. Notice of

Completion of the project will not be made until all items have been corrected.

t. Substantial Completion of Electrical Systems:

1. Prior to Substantial Completion of operating electrical systems, the Contractor shall:

a. Provide material of the type and quality specified and as necessary for proper operation, tested and ready for use.

b. Deliver to the Architect, the Record Drawings.

c. Furnish the required Operating and Maintenance manuals of electrical equipment.

d. Clean-up of the project pertaining to this Division of the work.

e. After installation has been completed and adjustments made, operate the system for a period of one week, during which time, demonstrate to the Architect that systems are complete and operating in conformance with Contract Documents.

f. Conduct test required and as specified in this Division and submit test reports and corrective actions taken.

g. Submission of warranties and guaranties.

2. Substantial Completion of Work Shall be Contingent On:

a. Contractor replacing defective materials and workmanship.

b. Upon completion of work and adjustments made, Contractor shall conduct an operating test for each systems for approval at such time as Architect directs. Conduct test in presence of authorize representative of Architect and Demonstrate that Systems and equipment do operate in accordance with requirements of the Contract Documents and are free from electrical and mechanical defect.

c. Contractor shall provide the necessary training programs and instructions to the Owner's representative. Number of hours or days as required under separate Sections of these Specifications.

d. Submit copies of manufacturer's instructions and maintenance of electrical equipment including replacement parts lists. Each set shall include one set of shop drawings of equipment installed.

u. Submittals for Change Orders: When changes are made during the construction phase, deletions and additions shall be presented in a manner that will indicate the cost of each item of material and corresponding labor. Markup shall be then added in accordance with the requirements of the General Conditions as modified by the Supplementary Conditions.

1. Unit pricing shall apply in event of changes, additions and deletions to the base Contract, as follows:

a. Submit a unit cost, covering one hour of labor, including all applicable supervision, nonproductive labor, burdens, benefits,

insurances, taxes, direct and indirect job expenses including drawings, engineering temporary power, warehouse, tools, equipment, clean-up. Bonds, overhead and profit, charged for labor. Unit cost of labor shall be applicable for duration through completion of the project.

b. Material unit cost shall be based on the latest of "Electrical Trade Book," published by Trade Service Publications, Inc., Unit cost shall be taken from extreme right-hand column.

2. Labor unit quantities, for specific items as required by unit pricing and for equipment not covered by unit pricing shall be those listed in the third column from the National Electrical Contractor's Association, Inc., "NECA Manual of Labor Units."

3. For material not covered by the Unit Pricing, use the latest edition of "Electrical Trade Book", extreme right hand column. This materials cost shall remain for the duration of the contract and shall apply to all phases of construction.

v. The Contractor at a time convenient to the Owner shall provide instruction to the Owner's operating personnel in the proper operation and maintenance of the equipment and systems. The instructions shall have received factory training and shall be thoroughly familiar with the equipment installed. The operating personnel shall receive the number of days instruction as indicated in other sections.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION - 16010